



# OWNER'S SERVICE MANUAL

## *WR450FR*

LIT-11626-16-43

5TJ-28199-10

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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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EC010000

**WR450FR**  
**OWNER'S SERVICE MANUAL**  
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**1st Edition, October 2002**  
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**Printed in Japan**  
**P/N. LIT-11626-16-43**

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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As improvements are made on this model, some data in this manual may become outdated.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**

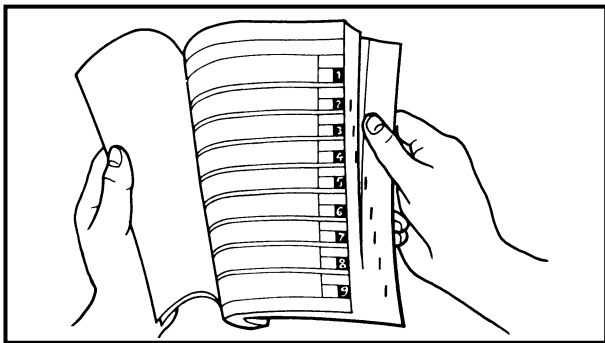
Failure to follow WARNING instructions could result in severe injury or death to the machine operator, a bystander, or a person inspecting or repairing the machine.

### **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.

**CLUTCH REMOVAL**  
Drain the engine oil.  
Refer to "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.  
Refer to "ENGINE REMOVAL" section. Disconnect at engine side.

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

Extent of removal	Order	Part name	Qty	Remarks
④	<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. Disconnect at engine side.
		Clutch cable		
	⑤	1	Clutch cover	1
		2	Gasket	1
		3	Dowel pin	2
		4	Clutch spring	6
		5	Pressure plate	1
		6	Push rod 1	1
		7	Circlip	1
	8	Plain washer	1	
	9	Bearing	1	
	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.






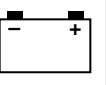




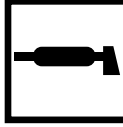








**Primary driven gear**

- 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)

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**

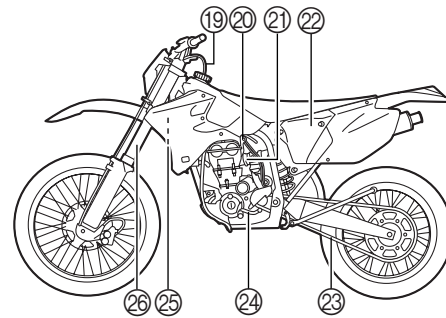
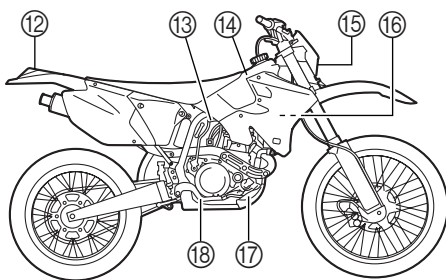
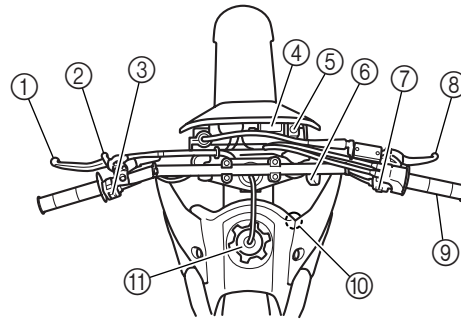
EC110000

**DESCRIPTION**

- ① Clutch lever
- ② Hot starter lever
- ③ "ENGINE STOP" button
- ④ Trip meter
- ⑤ Main switch
- ⑥ Lights switch
- ⑦ Start switch
- ⑧ Front brake lever
- ⑨ Throttle grip
- ⑩ Radiator cap
- ⑪ Fuel tank cap
- ⑫ Taillight
- ⑬ Kickstarter
- ⑭ Fuel tank
- ⑮ Headlight
- ⑯ Radiator
- ⑰ Coolant drain bolt
- ⑱ Rear brake pedal
- ⑲ Valve joint
- ⑳ Fuel cock
- ㉑ Cold starter knob
- ㉒ Air cleaner
- ㉓ Drive chain
- ㉔ Shift pedal
- ㉕ Oil dipstick
- ㉖ 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.

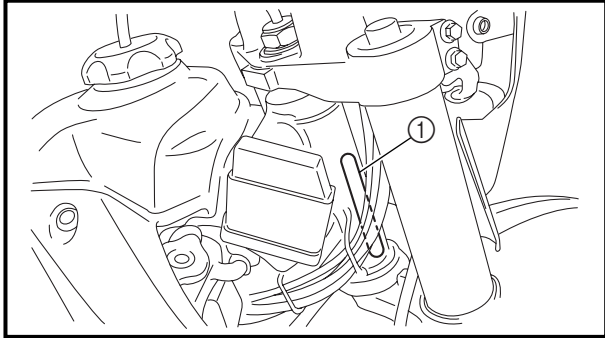
**1**

EC120001

## MACHINE IDENTIFICATION

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

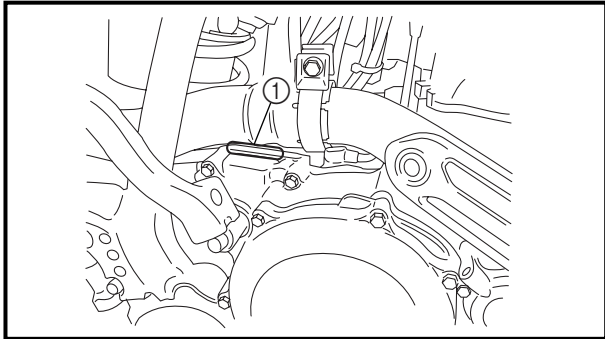
1. When ordering parts, you can give the number to your Yamaha dealer for positive identification of the model you own.
2. If your machine is stolen, the authorities will need the number to search for and identify your machine.



EC121001

## VEHICLE IDENTIFICATION NUMBER

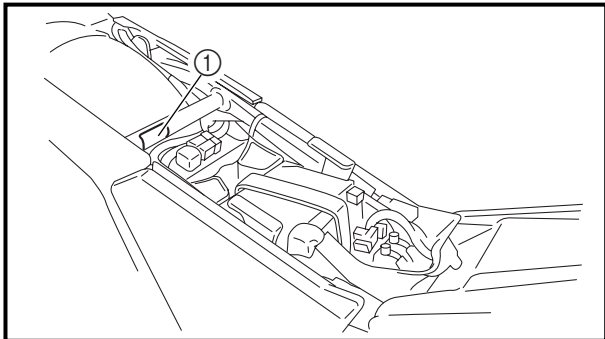
The vehicle identification number ① is stamped on the right of the steering head pipe.



EC123001

## ENGINE SERIAL NUMBER

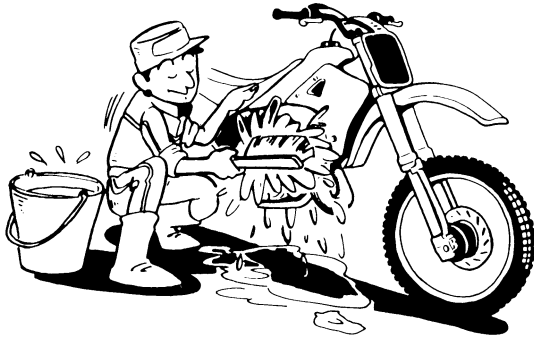
The engine serial number ① is stamped into the elevated part of the right-side of the engine.



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**

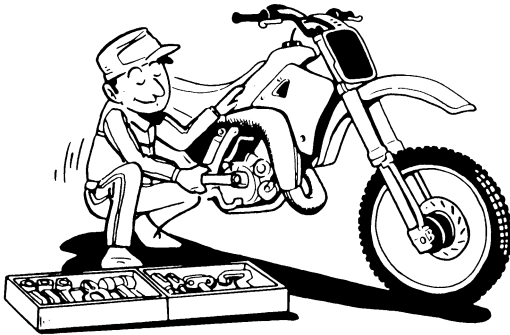
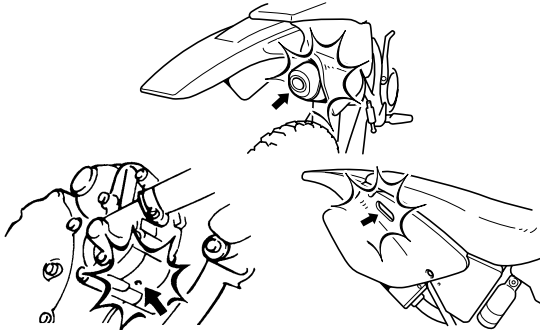
EC131010

**PREPARATION FOR REMOVAL AND DISASSEMBLY**

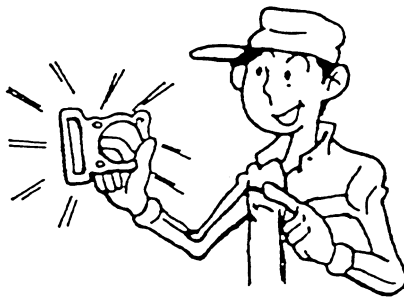
1. Remove all dirt, mud, dust, and foreign material before removal and disassembly.

When washing the machine with high pressured water, cover the parts as follows.

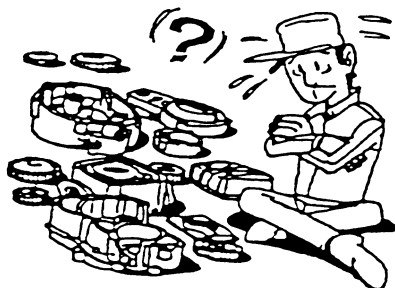
- Silencer exhaust port
- Side cover air intake port
- Water pump housing hole at the bottom
- Drain hole on the cylinder head (right side)
- All electrical components



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

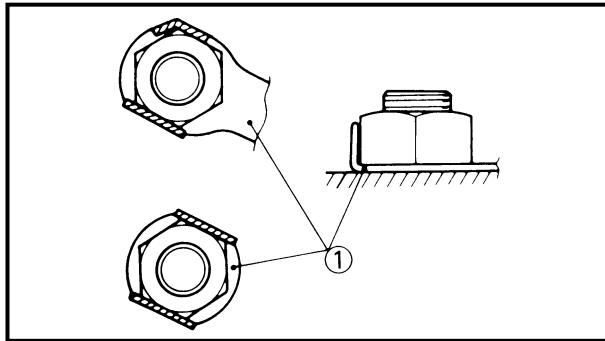
**ALL REPLACEMENT PARTS**

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**

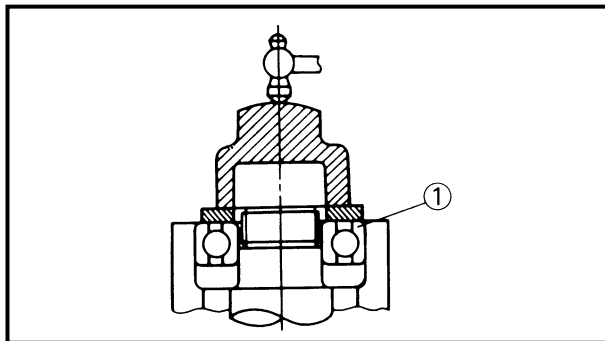
1. All gaskets, oil seals, and O-rings should be replaced when an engine is overhauled. All gasket surfaces, oil seal lips, and O-rings must be cleaned.
2. Properly oil all mating parts and bearings during reassembly. Apply grease to the oil seal lips.



EC134000

**LOCK WASHERS/PLATES AND COTTER PINS**

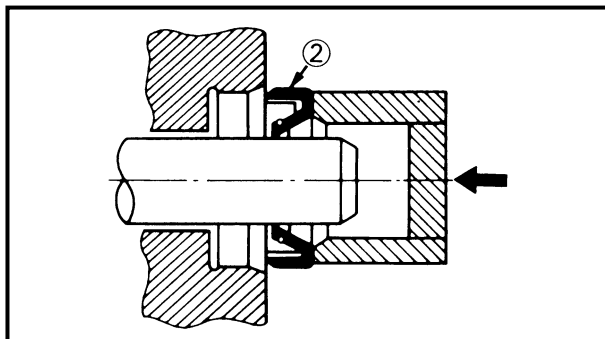
1. All lock washers/plates ① and cotter pins must be replaced when they are removed. Lock tab(s) should be bent along the bolt or nut flat(s) after the bolt or nut has been properly tightened.



EC135001

**BEARINGS AND OIL SEALS**

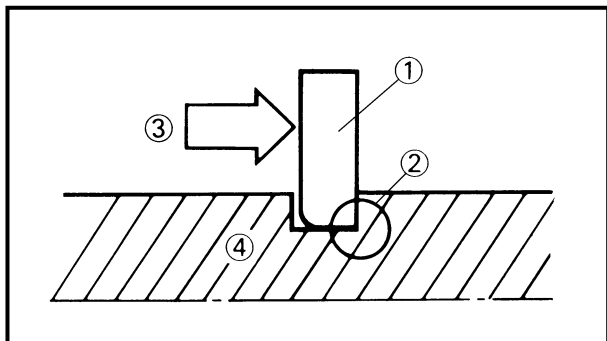
1. Install the bearing(s) ① and oil seal(s) ② with their manufacturer's marks or numbers facing outward. (In other words, the stamped letters must be on the side exposed to view.) When installing oil seal(s), apply a light coating of light-weight lithium base grease to the seal lip(s). Oil the bearings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



**CAUTION:**

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



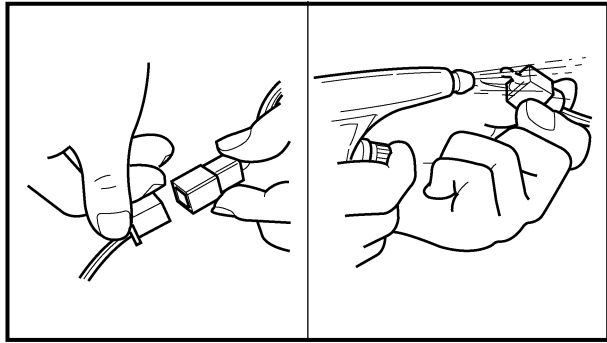


EC136000

**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

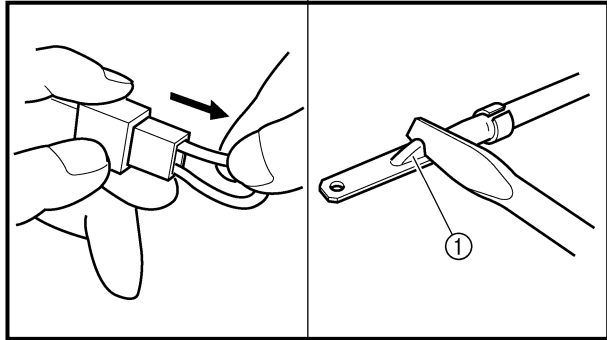


EC1C0001

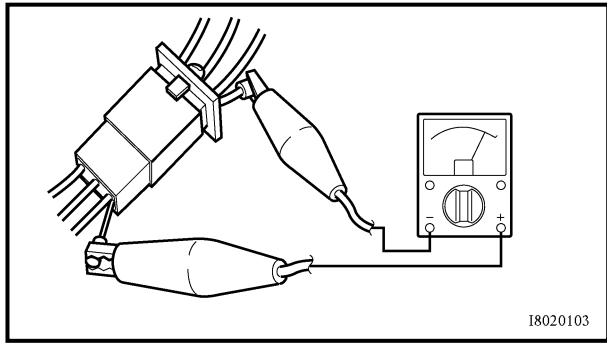
## CHECKING OF CONNECTION

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

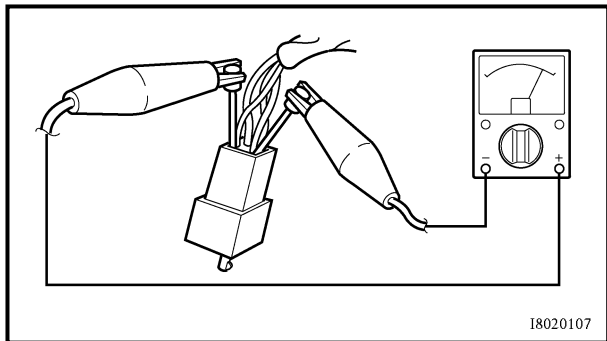
**NOTE:** \_\_\_\_\_

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 wireharness.
- For a field remedy, use a contact revitalizer available on the market.
- Use the tester on the connector as shown.



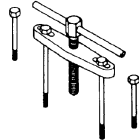
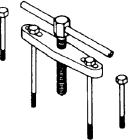
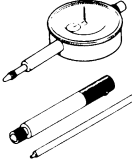
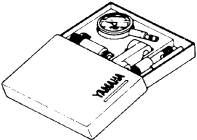
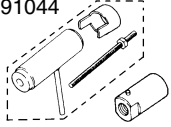

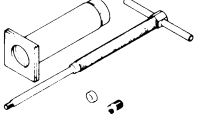
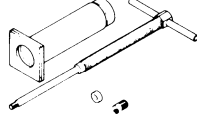
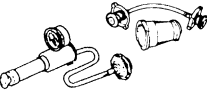
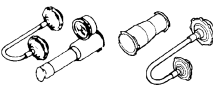
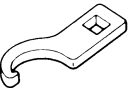
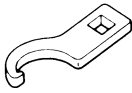
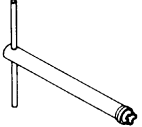
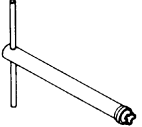
EC140001

**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.

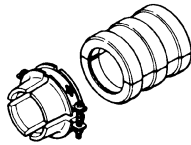
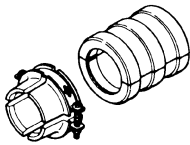


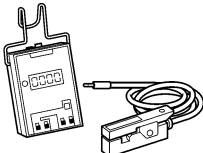
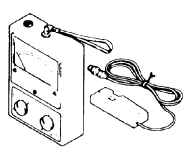
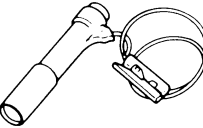
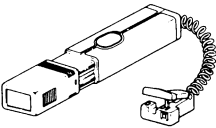
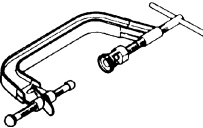
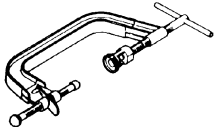
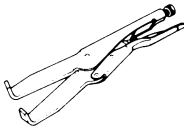
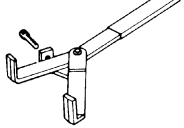


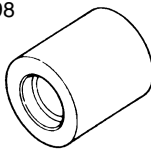
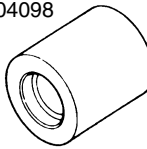
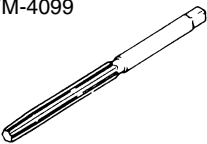
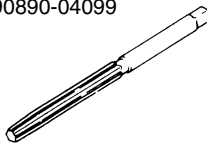
**NOTE:**

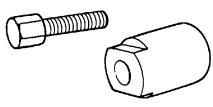
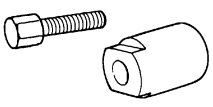
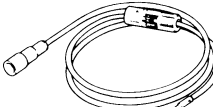
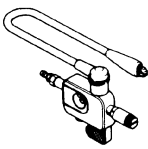
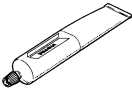
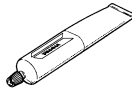
- For U.S.A. and Canada, use part number starting with “YM-”, “YU-” or “ACC-”.
- For others, use part number starting with “90890-”.

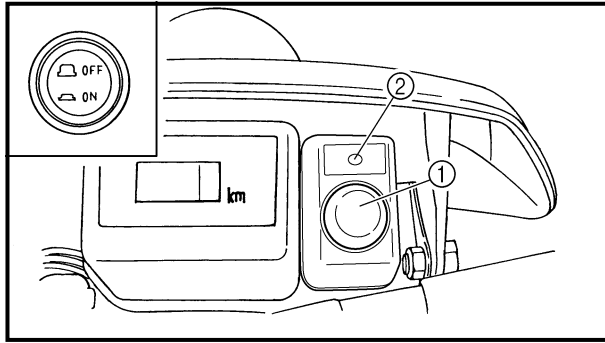
Part number	Tool name/How to use	Illustration	
YU-1135-A, 90890-01135	Crankcase separating tool  These tool is used to remove the crankshaft from either case.	YU-1135-A 	90890-01135 
YU-3097, 90890-01252 YU-1256	Dial gauge and stand Stand  These tools are used to check each part for runout or bend.	YU-3097 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  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 Adapter  These tools are used for checking the cooling system.	YU-24460-01 YU-33984 	90890-01325 90890-01352 
YU-33975, 90890-01403	Ring 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  
YU-3112-C, 90890-03112	Yamaha pocket tester  Use this tool to inspect the coil resistance, output voltage and amperage.	YU-3112-C  	90890-03112  
YU-8036-B 90890-03113	Inductive tachometer Engine tachometer  This tool is needed for observing engine rpm.	YU-8036-B  	90890-03113  
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-4116, 90890-04116 YM-4097, 90890-04097	Valve guide remover Intake 4.5 mm (0.18 in) Exhaust 5.0 mm (0.20 in)  This tool is needed to remove and install the valve guide.	YM-4116 YM-4097  	90890-04116 90890-04097  
YM-4117, 90890-04117 YM-4098, 90890-04098	Valve guide installer Intake Exhaust  This tool is needed to install the valve guide.	YM-4117 YM-4098  	90890-04117 90890-04098  
YM-4118, 90890-04118 YM-4099, 90890-04099	Valve guide reamer Intake 4.5 mm (0.18 in) Exhaust 5.0 mm (0.20 in)  This tool is needed to rebores the new valve guide.	YM-4118 YM-4099  	90890-04118 90890-04099  

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



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.

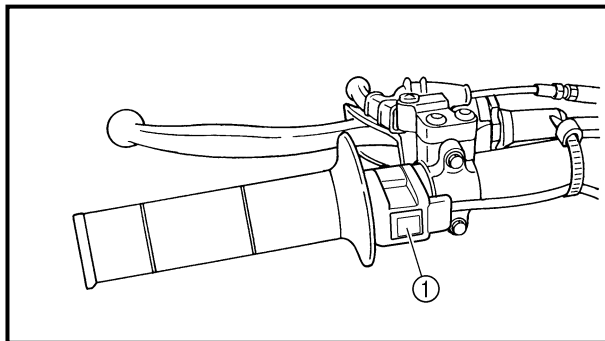
### Main switch indicator light

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:

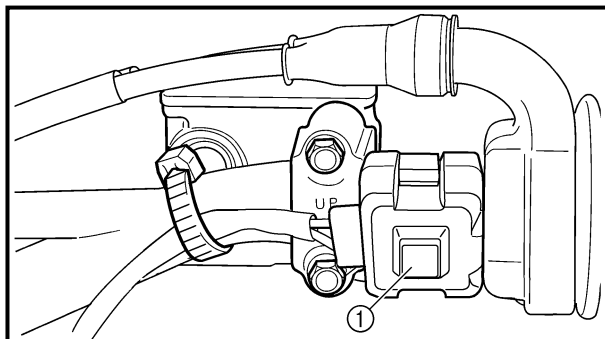
If the indicator light will not light up with the main switch “ON”, it shows a lack of the battery voltage. Recharge the battery. If the engine is kick started, turn off the light switch.



EC151000

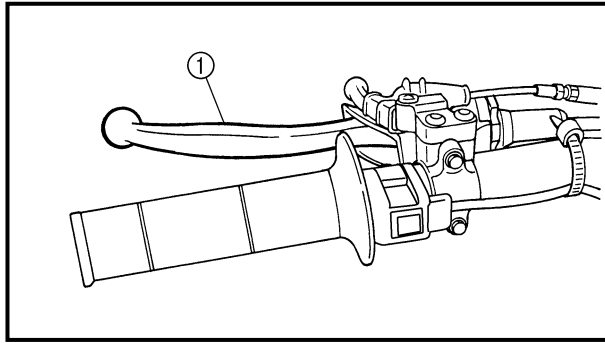
### “ENGINE STOP” BUTTON

The “ENGINE STOP” button ① is located on the left handlebar. Continue pushing the “ENGINE STOP” button till the engine comes to a stop.



### START SWITCH

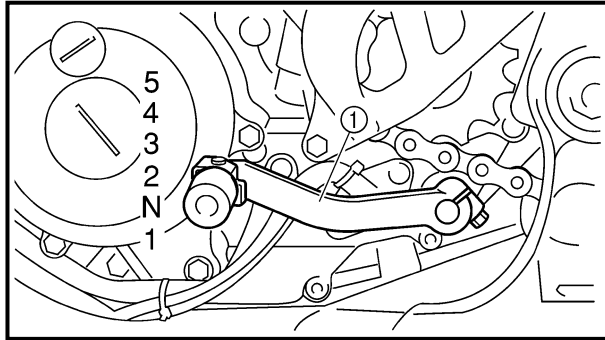
The start switch ① is located on the right handlebar. Push this switch to crank the engine with the starter.



EC152000

## CLUTCH LEVER

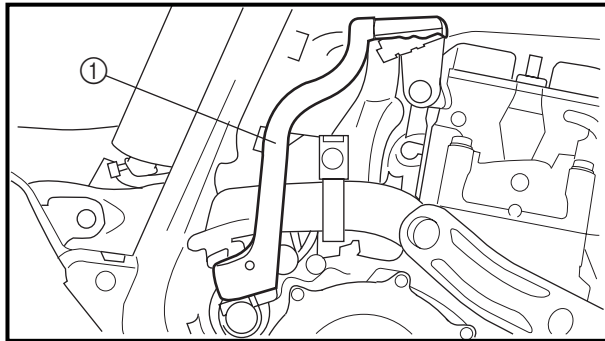
The clutch lever ① is located on the left handlebar; it disengages or engages the clutch. Pull the clutch lever to the handlebar to disengage the clutch, and release the lever to engage the clutch. The lever should be pulled rapidly and released slowly for smooth starts.



EC153000

## SHIFT PEDAL

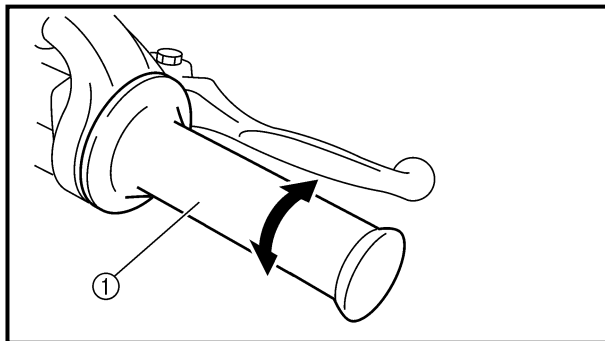
The gear ratios of the constant-mesh 5 speed transmission are ideally spaced. The gears can be shifted by using the shift pedal ① on the left side of the engine.



EC154000

## KICKSTARTER

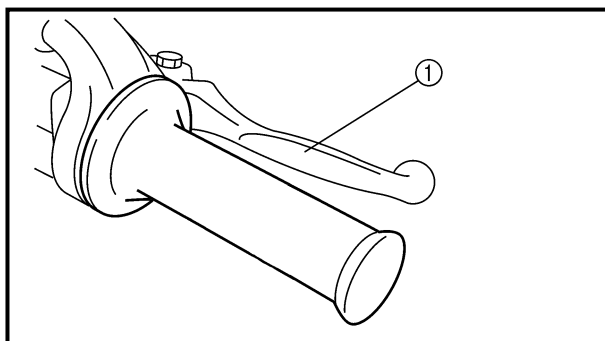
Rotate the kickstarter ① away from the engine. Push the starter down lightly with your foot until the gears engage, then kick smoothly and forcefully to start the engine. This model has a primary kickstarter so the engine can be started in any gear if the clutch is disengaged. In normal practices, however,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



EC155001

## THROTTLE GRIP

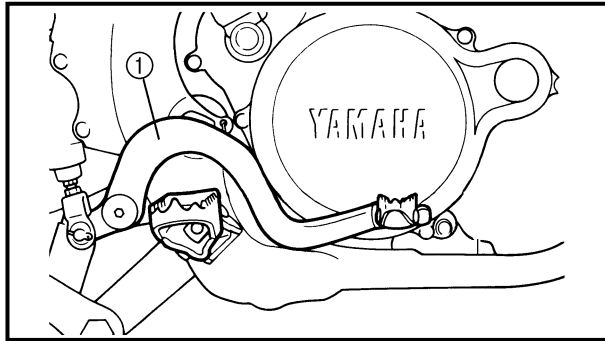
The throttle grip ① is located on the right handlebar; it accelerates or decelerates the engine. For acceleration, turn the grip toward you; for deceleration, turn it away from you.



EC156000

## FRONT BRAKE LEVER

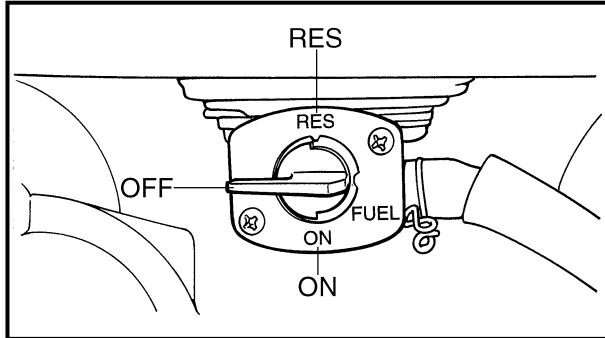
The front brake lever ① is located on the right handlebar. Pull it toward the handlebar to activate the front brake.



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.



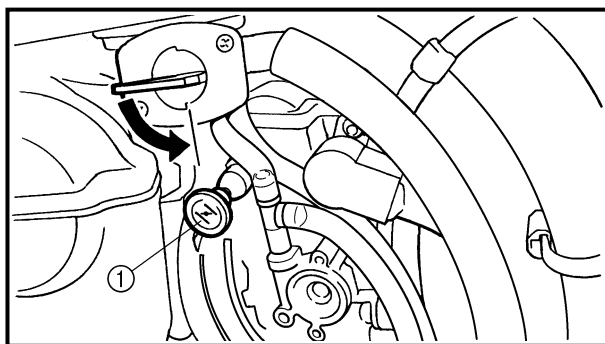
## FUEL COCK

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.

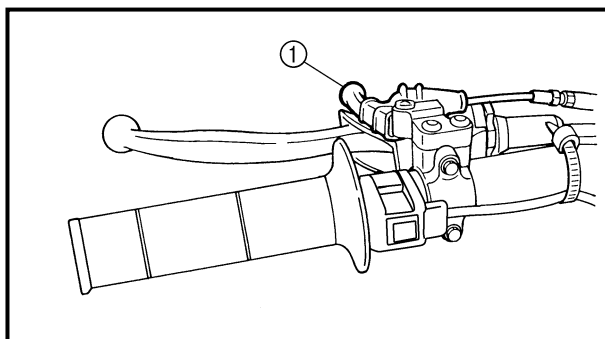
**ON:** With the lever in this position fuel flows to the carburetor. Normal riding is done with the lever in this position.

**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.

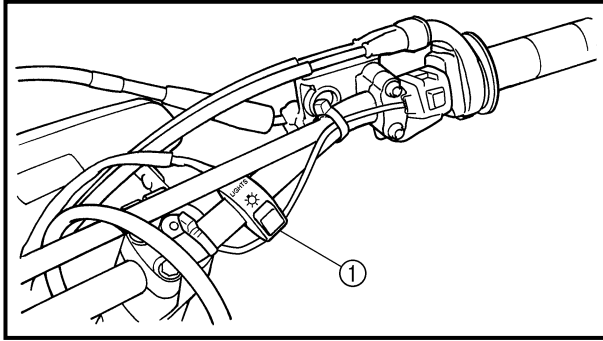


## HOT STARTER LEVER

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

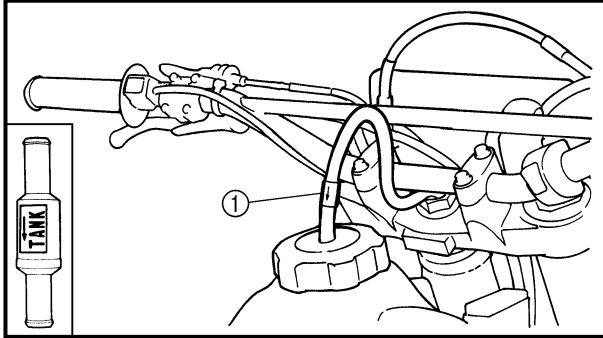
Use the hot starter lever when starting the engine again immediately after it was stopped (the engine is still warm). Pulling the hot starter lever injects secondary air to thin the air-fuel mixture temporarily, allowing the engine to be started more easily.





## LIGHTS SWITCH

The lights switch ① is located on the handlebar.



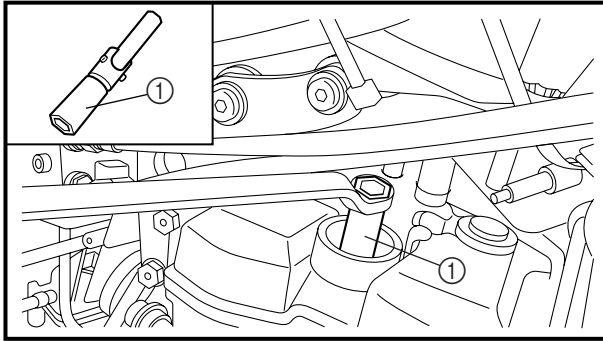
EC15F000

## VALVE JOINT

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

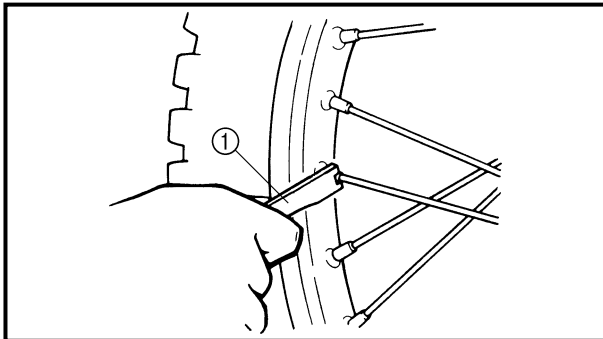
### **CAUTION:**

**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**

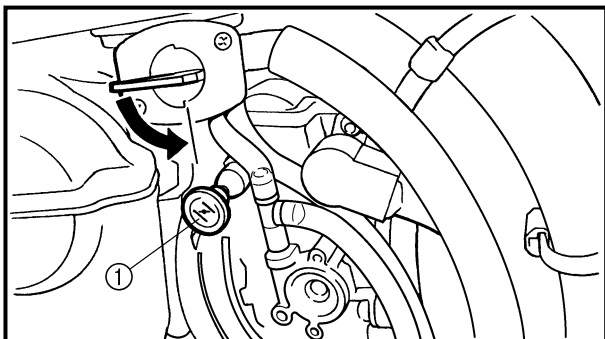
According to “AIR FILTER CLEANING” section in the CHAPTER 3, apply the foam-air-filter oil or its equivalent to the element. (Excess oil in the element may adversely affect engine starting.)

### **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 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.

**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.

---

**⚠ 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. Otherwise, the kickstarter 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:** \_\_\_\_\_

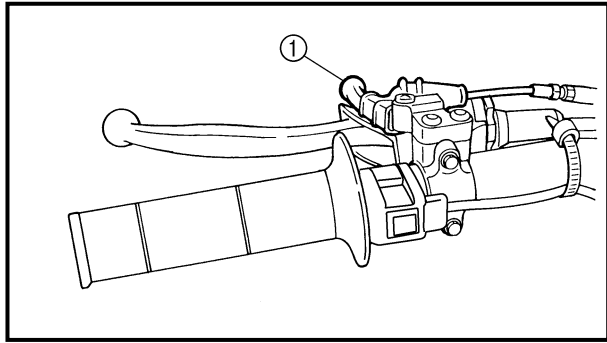
Since this model is equipped with an accelerator pump, if the engine is raced (the throttle opened and closed), the air/fuel mixture will be too rich and the engine may stall. Also unlike a two-stroke engine, this model can idle.

---

**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 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 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” button. 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:**

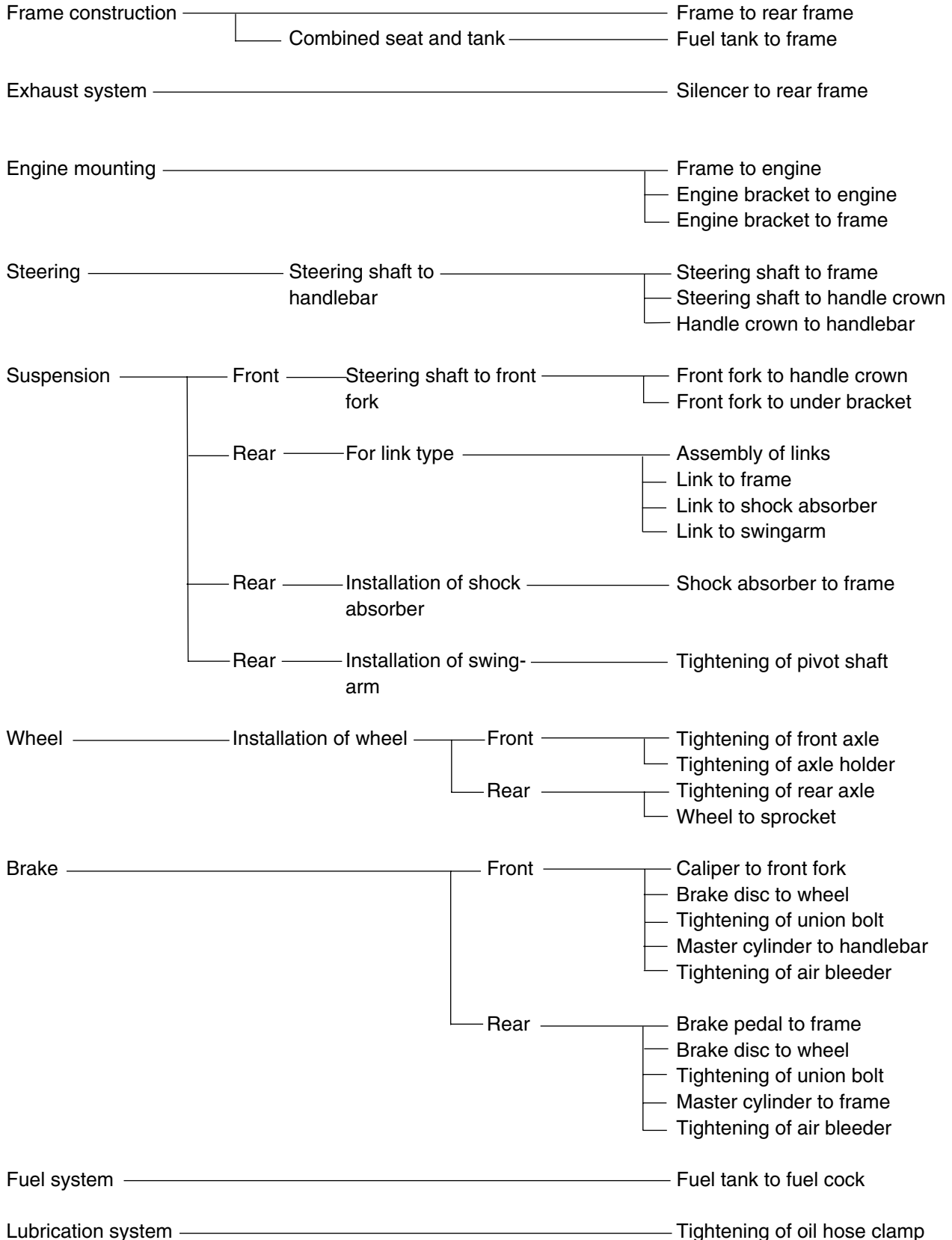
**About one hour of break-in operation is necessary.**

**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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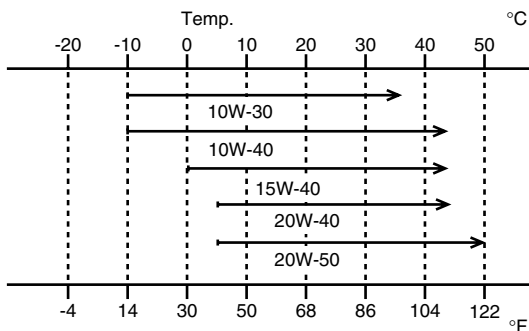
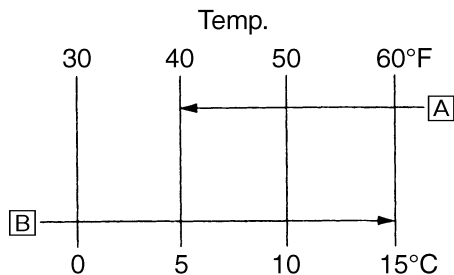
EC200000

**SPECIFICATIONS**

EC211000

**GENERAL SPECIFICATIONS**

Model name:	WR450FR (USA) WR450F (EUROPE) WR450F(R) (CDN, AUS, NZ, ZA)
Model code number:	5TJ1 (USA) 5TJ2 (EUROPE) 5TJ4 (CDN, AUS, NZ, ZA)
Dimensions:	
Overall length	2,171 mm (85.5 in)
Overall width	827 mm (32.6 in)
Overall height	1,303 mm (51.3 in)
Seat height	998 mm (39.3 in)
Wheelbase	1,485 mm (58.5 in)
Minimum ground clearance	371 mm (14.6 in)
Basic weight:	
With oil and full fuel tank	122 kg (269 lb)
Engine:	
Engine type	Liquid cooled 4-stroke, DOHC
Cylinder arrangement	Single cylinder, forward inclined
Displacement	449 cm <sup>3</sup> (15.8 Imp oz, 15.2 US oz)
Bore × stroke	95.0 × 63.4 mm (3.74 × 2.50 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





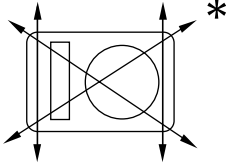
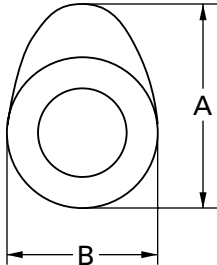
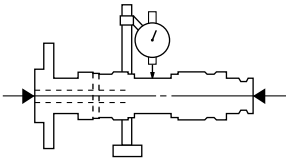
Oil capacity:	
Engine oil	
Periodic oil change	1.0 L (0.88 Imp qt, 1.06 US qt)
With oil filter replacement	1.1 L (0.97 Imp qt, 1.16 US qt)
Total amount	1.2 L (1.06 Imp qt, 1.27 US qt)
Coolant capacity (including all routes):	1.6 L (1.41 Imp qt, 1.69 US qt)
Air filter:	Wet type element
Fuel:	
Type	Premium unleaded gasoline only with a research octane number of 95 or higher. (Except for ZA) Premium gasoline (For ZA)
Tank capacity	10 L (2.2 Imp gal, 2.64 US gal)
Reserve	1.2 L (0.26 Imp gal, 0.32 US gal)
Carburetor:	
Type	FCR MX39
Manufacturer	KEIHIN
Spark plug:	
Type/manufacturer	CR8E/NGK (resistance type)
Gap	0.7 ~ 0.8 mm (0.028 ~ 0.031 in)
Clutch type:	Wet, multiple-disc
Transmission:	
Primary reduction system	Gear
Primary reduction ratio	62/22 (2.818)
Secondary reduction system	Chain drive
Secondary reduction ratio	50/14 (3.571)
Transmission type	Constant mesh, 5-speed
Operation	Left foot operation
Gear ratio: 1st	29/12 (2.416)
2nd	26/15 (1.733)
3rd	21/16 (1.312)
4th	21/20 (1.050)
5th	21/25 (0.840)
Chassis:	
Frame type	Semi double cradle
Caster angle	27.2°
Trail	118 mm (4.65 in)
Tire:	
Type	With tube
Size (front)	80/100-21 51M (USA, CDN, ZA) 90/90-21 54R (EUROPE, AUS, NZ)
Size (rear)	110/100-18 64M (USA, CDN, ZA) 130/90-18 69R (EUROPE, AUS, NZ)
Tire pressure (front and rear)	100 kPa (1.0 kgf/cm <sup>2</sup> , 15 psi)



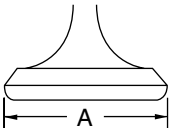
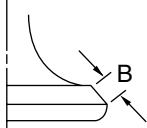
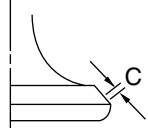
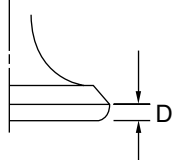
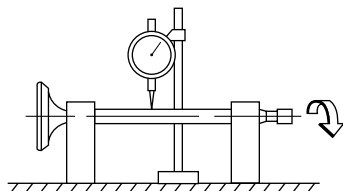
<b>Brake:</b> Front brake type Operation Rear brake type Operation	Single disc brake Right hand operation Single disc brake Right foot operation
<b>Suspension:</b> Front suspension Rear suspension	Telescopic fork Swingarm (link type monocross suspension)
<b>Shock absorber:</b> Front shock absorber Rear 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 YTZ7S 12 V/6 AH 1.310
<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



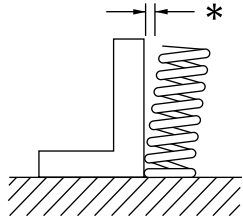
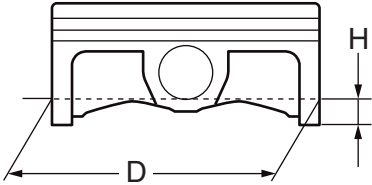
**MAINTENANCE SPECIFICATIONS  
ENGINE**

Item	Standard	Limit
Cylinder head: Warp limit 	----	0.05 mm (0.002 in)
Cylinder: Bore size Out of round limit	95.00 ~ 95.01 mm (3.7402 ~ 3.7406 in) ----	---- 0.05 mm (0.002 in)
Camshaft: Drive method Camshaft cap inside diameter Camshaft journal diameter Shaft-to-cap clearance Cam dimensions  Intake "A" "B" Exhaust "A" "B" 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) ---- 31.200 ~ 31.300 mm (1.2283 ~ 1.2323 in) 22.550 ~ 22.650 mm (0.8878 ~ 0.8917 in) 30.950 ~ 31.050 mm (1.2185 ~ 1.2224 in) 22.494 ~ 22.594 mm (0.8856 ~ 0.8895 in) ----	---- ---- ---- 0.08 mm (0.003 in) 31.100 mm (1.2244 in) 22.450 mm (0.8839 in) 30.850 mm (1.2146 in) 22.394 mm (0.8817 in) 0.03 mm (0.0012 in)



Item	Standard	Limit	
Cam chain:			
Cam chain type/No. of links	98XRH2010-118M/118	----	
Cam chain adjustment method	Automatic	----	
Valve, valve seat, valve guide:			
Valve clearance (cold)			
IN	0.10 ~ 0.15 mm (0.0039 ~ 0.0059 in)	----	
EX	0.20 ~ 0.25 mm (0.0079 ~ 0.0098 in)	----	
Valve dimensions:			
			
Head Diameter	Face Width	Seat Width	Margin Thickness
"A" head diameter	IN	26.9 ~ 27.1 mm (1.0591 ~ 1.0669 in)	----
	EX	27.9 ~ 28.1 mm (1.0984 ~ 1.1063 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	1 mm (0.0394 in)	0.85 mm (0.033 in)
	EX	1 mm (0.0394 in)	0.85 mm (0.033 in)
Stem outside diameter	IN	4.475 ~ 4.490 mm (0.1762 ~ 0.1768 in)	4.445 mm (0.1750 in)
	EX	4.965 ~ 4.980 mm (0.1955 ~ 0.1961 in)	4.935 mm (0.1943 in)
Guide inside diameter	IN	4.500 ~ 4.512 mm (0.1772 ~ 0.1776 in)	4.550 mm (0.1791 in)
	EX	5.000 ~ 5.012 mm (0.1969 ~ 0.1973 in)	5.050 mm (0.1988 in)
Stem-to-guide clearance	IN	0.010 ~ 0.037 mm (0.0004 ~ 0.0015 in)	0.08 mm (0.003 in)
	EX	0.020 ~ 0.047 mm (0.0008 ~ 0.0019 in)	0.10 mm (0.004 in)
Stem runout limit		----	0.01 mm (0.0004 in)
			



Item	Standard	Limit
<b>Valve spring:</b>		
Free length	IN 37.03 mm (1.46 in)	35.17 mm (1.38 in)
	EX 37.68 mm (1.48 in)	35.79 mm (1.41 in)
Set length (valve closed)	IN 27.87 mm (1.10 in)	----
	EX 27.38 mm (1.08 in)	----
Compressed force (installed)	IN 111.3 ~ 127.9 N at 27.87 mm (11.3 ~ 13.0 kg at 27.87 mm, 24.91 ~ 28.66 lb at 1.10 in)	----
	EX 127.4 ~ 146.4 N at 27.38 mm (13.0 ~ 14.9 kg at 27.38 mm, 28.66 ~ 32.85 lb at 1.08 in)	----
Tilt limit *	IN ----	2.5°/1.61 mm (2.5°/0.063 in)
	EX ----	2.5°/1.65 mm (2.5°/0.065 in)
		
Direction of winding (top view)	IN Clockwise	----
	EX Clockwise	----
<b>Piston:</b>		
Piston to cylinder clearance	0.040 ~ 0.065 mm (0.0016 ~ 0.0026 in)	0.1 mm (0.004 in)
Piston size "D"	94.945 ~ 94.960 mm (3.738 ~ 3.739 in)	----
		
Measuring point "H"	8 mm (0.315 in)	----
Piston off-set	1 mm (0.0394 in)	----
Piston pin bore inside diameter	18.004 ~ 18.015 mm (0.7088 ~ 0.7093 in)	18.045 mm (0.7104 in)
Piston pin outside diameter	17.991 ~ 18.000 mm (0.7083 ~ 0.7087 in)	17.971 mm (0.7075 in)



Item	Standard	Limit
<p>Piston rings:</p> <p>Top ring:</p> <div data-bbox="581 296 756 384" style="text-align: center;"> </div> <p>Type                      Dimensions (B × T)                      End gap (installed)                      Side clearance (installed)</p> <p>2nd ring:</p> <div data-bbox="581 674 756 762" style="text-align: center;"> </div> <p>Type                      Dimensions (B × T)                      End gap (installed)                      Side clearance</p> <p>Oil ring:</p> <div data-bbox="561 1056 737 1157" style="text-align: center;"> </div> <p>Dimensions (B × T)                      End gap (installed)</p>	<p>Barrel</p> <p>1.2 × 3.5 mm (0.05 × 0.14 in)</p> <p>0.20 ~ 0.30 mm (0.008 ~ 0.012 in)</p> <p>0.030 ~ 0.065 mm (0.0012 ~ 0.0026 in)</p> <p>Taper</p> <p>1.00 × 3.35 mm (0.04 × 0.13 in)</p> <p>0.35 ~ 0.50 mm (0.014 ~ 0.020 in)</p> <p>0.020 ~ 0.055 mm (0.0008 ~ 0.0022 in)</p> <p>2.0 × 2.9 mm (0.08 × 0.11 in)</p> <p>0.2 ~ 0.5 mm (0.01 ~ 0.02 in)</p>	<p>----</p> <p>----</p> <p>0.55 mm (0.022 in)</p> <p>0.12 mm (0.005 in)</p> <p>----</p> <p>----</p> <p>0.85 mm (0.033 in)</p> <p>0.12 mm (0.005 in)</p> <p>----</p> <p>----</p>
<p>Crankshaft:</p> <p>Crank width "A"</p> <p>Runout limit "C"</p> <p>Big end side clearance "D"</p> <p>Small end free play "F"</p> <div data-bbox="586 1304 786 1539" style="text-align: center;"> </div>	<p>61.95 ~ 62.00 mm (2.439 ~ 2.441 in)</p> <p>0.03 mm (0.0012 in)</p> <p>0.15 ~ 0.45 mm (0.0059 ~ 0.0177 in)</p> <p>0.4 ~ 1.0 mm (0.02 ~ 0.04 in)</p>	<p>----</p> <p>0.05 mm (0.002 in)</p> <p>0.50 mm (0.02 in)</p> <p>2.0 mm (0.08 in)</p>
<p>Balancer:</p> <p>Balancer drive method</p>	<p>Gear</p>	<p>----</p>
<p>Air filter oil grade:</p>	<p>Foam-air-filter oil or equivalent oil</p>	<p>----</p>





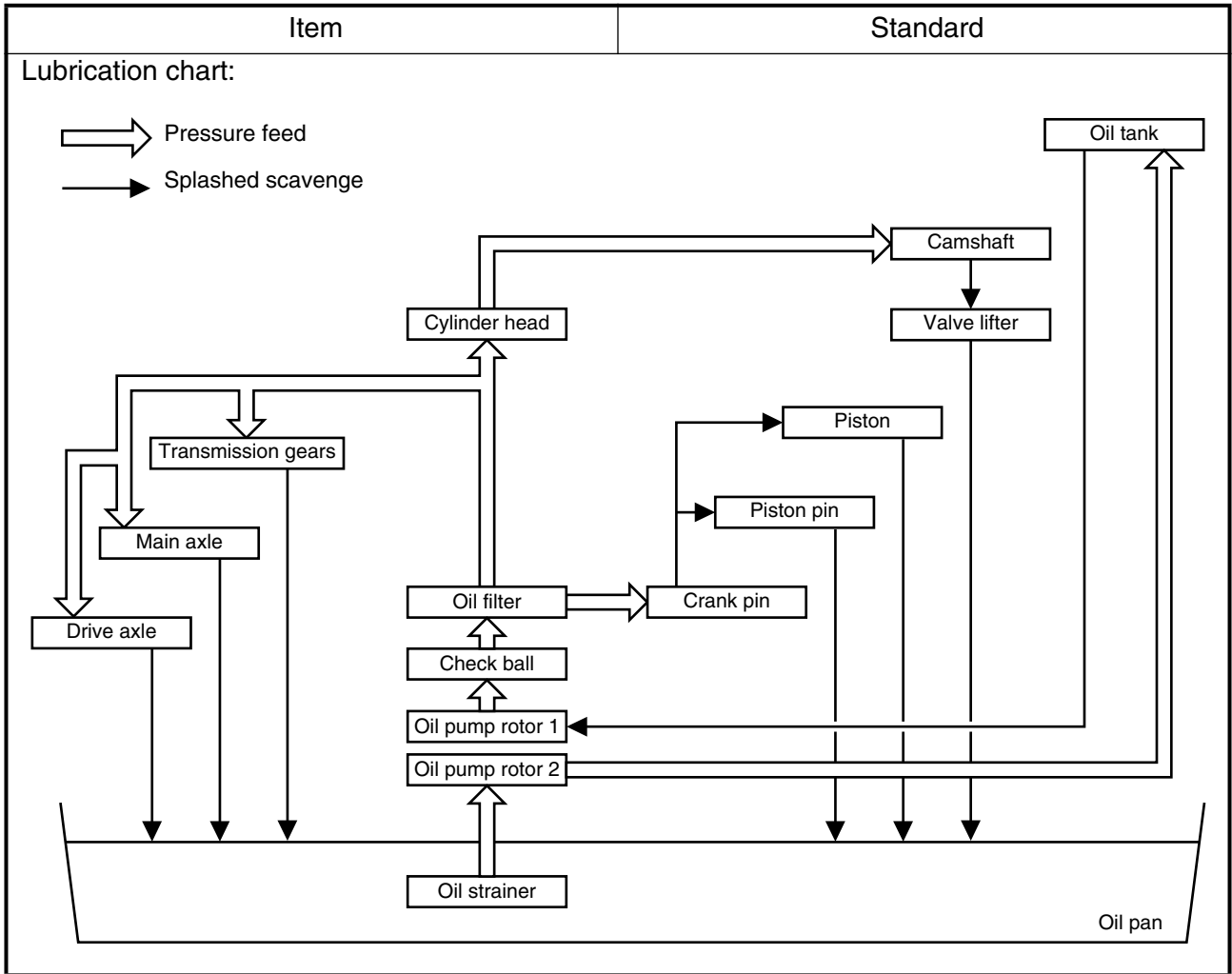
Item	Standard		Limit
<b>Clutch:</b>			
Friction plate thickness	2.92 ~ 3.08 mm (0.115 ~ 0.121 in)		2.8 mm (0.110 in)
Quantity	9		----
Clutch plate thickness	1.1 ~ 1.3 mm (0.043 ~ 0.051 in)		----
Quantity	8		----
Warp limit	----		0.1 mm (0.004 in)
Clutch spring free length	48.4 mm (1.91 in)		47.4 mm (1.87 in)
Quantity	6		----
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	Ratchet type		----
<b>Carburetor:</b>			
	USA	EUROPE, CDN, AUS, NZ, ZA	
I. D. mark	5TJ1 00	5TJ2 10	----
Main jet (M.J)	#150	#160	----
Main air jet (M.A.J)	ø2.0	←	----
Jet needle - clip position (J.N)	OBDUT-4	OBDUQ-4	----
Cutaway (C.A)	1.5	←	----
Pilot jet (P.J)	#45	#48	----
Pilot air jet (P.A.J)	#70	#80	----
Pilot outlet (P.O)	ø0.9	←	----
Pilot screw (example) (P.S)	1-3/4	1-1/2	----
Bypass (B.P)	ø1.0	←	----
Valve seat size (V.S)	ø3.8	←	----
Starter jet (G.S)	#65	←	----
Leak jet (Acc.P)	#70	#50	----
Float height (F.H)	8 mm (0.31 in)	←	----
Engine idle speed	1,700 ~ 1,900 r/min	←	----
Intake vacuum	33.3 ~ 38.7 kPa (250 ~ 290 mmHg, 9.84 ~ 11.42 inHg)	←	----
Hot starter lever free play	3 ~ 6 mm (0.12 ~ 0.24 in)	←	----

# MAINTENANCE SPECIFICATIONS

**SPEC**



Item	Standard	Limit
<p><b>Lubrication system:</b></p> <p>Oil filter type</p> <p>Oil pump type</p> <p>Tip clearance "A"</p> <p>Tip clearance "B"</p> <p>Side clearance</p> <p>Bypass valve setting pressure</p>	<div style="text-align: center;"> </div> <p>Paper type</p> <p>Trochoid type</p> <p>0.12 mm or less (0.0047 in or less)</p> <p>0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in)</p> <p>0.03 ~ 0.10 mm (0.0012 ~ 0.0039 in)</p> <p>40 ~ 80 kPa (0.4 ~ 0.8 kg/cm<sup>2</sup>, 5.69 ~ 11.38 psi)</p>	<p>----</p> <p>----</p> <p>0.20 mm (0.008 in)</p> <p>0.24 mm (0.009 in)</p> <p>0.17 mm (0.007 in)</p> <p>----</p>
<p><b>Cooling:</b></p> <p>Radiator core size</p> <p style="padding-left: 20px;">Width</p> <p style="padding-left: 20px;">Height</p> <p style="padding-left: 20px;">Thickness</p> <p>Radiator cap opening pressure</p> <p>Radiator capacity (total)</p> <p>Water pump</p> <p style="padding-left: 20px;">Type</p>	<p>127.8 mm (5.0 in)</p> <p>260 mm (10.2 in)</p> <p>32 mm (1.26 in)</p> <p>110 kPa (1.1 kg/cm<sup>2</sup>, 15.6 psi)</p> <p>0.78 L (0.69 Imp qt, 0.82 US qt)</p> <p>Single-suction centrifugal pump</p>	<p>----</p> <p>----</p> <p>----</p> <p>----</p> <p>----</p> <p>----</p>





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	37	3.7	27
Cylinder head (stud bolt)	M6 × 1.0	2	7	0.7	5.1
	M8 × 1.25	1	15	1.5	11
(bolt)	M10 × 1.25	4	Refer to NOTE.*1		
(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
Timing chain tensioner	M6 × 1.0	2	10	1.0	7.2
Tensioner cap bolt	M6 × 1.0	1	7	0.7	5.1
Timing chain guide (rear)	M6 × 1.0	2	10	1.0	7.2
Exhaust pipe (nut)	M8 × 1.25	1	13	1.3	9.4
(bolt)	M8 × 1.25	1	24	2.4	17
△ Silencer	M8 × 1.25	2	35	3.5	25
Silencer clamp	M8 × 1.25	1	20	2.0	14
Exhaust pipe protector	M6 × 1.0	3	10	1.0	7.2
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
Carburetor joint clamp (cylinder head side)	M5 × 0.8	1	3	0.3	2.2
Carburetor joint clamp (carburetor side)	M4 × 0.7	1	3	0.3	2.2
Air filter case	M6 × 1.0	2	8	0.8	5.8
Air filter joint clamp	M6 × 1.0	1	3	0.3	2.2
Air filter joint and air filter case	M5 × 0.8	1	4	0.4	2.9
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
Radiator panel (upper)	M6 × 1.0	2	10	1.0	7.2
Radiator	M6 × 1.0	6	10	1.0	7.2
Radiator hose clamp	M6 × 1.0	8	2	0.2	1.4
Radiator pipe 1, 2	M10 × 1.0	2	10	1.0	7.2
Impeller	M8 × 1.25	1	14	1.4	10
Water pump housing cover	M6 × 1.0	3	10	1.0	7.2
Coolant drain bolt	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
Engine oil drain bolt (oil filter)	M6 × 1.0	1	10	1.0	7.2
Oil filter cover	M6 × 1.0	2	10	1.0	7.2
Oil delivery pipe 1	M10 × 1.25	1	20	2.0	14
	M8 × 1.25	2	18	1.8	13
Oil delivery pipe 2	M6 × 1.0	1	10	1.0	7.2
Oil hose	M6 × 1.0	2	10	1.0	7.2

# MAINTENANCE SPECIFICATIONS

**SPEC**



Part to be tightened	Thread size	Q'ty	Tightening torque		
			Nm	m·kg	ft·lb
Oil check bolt	M6 × 1.0	1	10	1.0	7.2
△ Oil hose clamp	–	2	2	0.2	1.4
Clutch cover	M6 × 1.0	7	10	1.0	7.2
Crankcase cover (right)	M6 × 1.0	10	10	1.0	7.2
Crankcase cover (left)	M6 × 1.0	9	10	1.0	7.2
Idle gear cover (starter motor)	M6 × 1.0	2	10	1.0	7.2
Crankcase	M6 × 1.0	12	12	1.2	8.7
Clutch cable holder	M6 × 1.0	1	10	1.0	7.2
Oil drain bolt (crankcase rear)	M10 × 1.25	1	20	2.0	14
(crankcase left)	M6 × 1.0	1	10	1.0	7.2
Oil drain bolt (frame)	M8 × 1.25	1	23	2.3	17
Oil strainer (frame)	M18 × 1.5	1	90	9.0	65
Crankcase bearing stopper	M6 × 1.0	15	10	1.0	7.2
Drive axle oil seal stopper	M6 × 1.0	2	10	1.0	7.2
Ratchet wheel guide	M6 × 1.0	2	12	1.2	8.7
Stopper plate	M6 × 1.0	2	12	1.2	8.7
Kickstarter	M8 × 1.25	1	33	3.3	24
Screw (kickstarter)	M6 × 1.0	1	7	0.7	5.1
Starter clutch	M6 × 1.0	6	16	1.6	11
Primary drive gear	M20 × 1.0	1	75	7.5	54
Clutch boss	M20 × 1.0	1	75	7.5	54
Push lever	M6 × 1.0	1	10	1.0	7.2
Clutch spring	M6 × 1.0	6	8	0.8	5.8
Balancer driven gear	M14 × 1.0	1	50	5.0	36
Balancer weight plate	M6 × 1.0	3	10	1.0	7.2
Drive sprocket	M20 × 1.0	1	75	7.5	54
Drive sprocket cover	M6 × 1.0	2	8	0.8	5.8
Shift pedal	M6 × 1.0	1	12	1.2	8.7
Shift guide	M6 × 1.0	2	10	1.0	7.2
Stopper lever	M6 × 1.0	1	10	1.0	7.2
Segment	M8 × 1.25	1	30	3.0	22

**NOTE:**

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

**NOTE:**

\*1: Tighten the cylinder head bolts to 30 Nm (3.0 m · kg, 22 ft · lb) in the proper tightening sequence, remove and retighten the cylinder head bolts to 20 Nm (2.0 m · kg, 14 ft · lb) in the proper tightening sequence, and then tighten the cylinder head bolts further to reach the specified angle 180° in the proper tightening sequence.



EC212201

**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 = 4.51 N/mm (0.46 kg/mm, 25.8 lb/in)	K = 4.12 N/mm (0.42 kg/mm, 23.5 lb/in)	K = 4.31 N/mm (0.44 kg/mm, 24.6 lb/in)	
Optional spring/spacer	Yes	←	←	
Oil capacity	573 cm <sup>3</sup> (20.2 Imp oz, 19.4 US oz)	←	←	
Oil level	130 mm (5.12 in)	←	←	
<Min.~Max.> (From top of outer tube with inner tube and damper rod fully com- pressed without spring.)	80 ~ 150 mm (3.15 ~ 5.91 in)	←	←	
Oil grade	Suspension oil "01"	←	←	
Inner tube outer diameter	46 mm (1.81 in)	←	←	
Front fork top end	Zero mm (Zero in)	←	←	
Rear suspension:	USA, CDN	EUROPE	AUS, NZ, ZA	
Shock absorber travel	132 mm (5.20 in)	←	←	
Spring free length	260 mm (10.24 in)	←	←	
Fitting length	246 mm (9.69 in)	246.5 mm (9.70 in)	←	
<Min.~Max.>	240.5 ~ 258.5 mm (9.47 ~ 10.18 in)	←	←	
Spring rate, STD	K = 51.0 N/mm (5.20 kg/mm, 291.2 lb/in)	K = 48.0 N/mm (4.90 kg/mm, 274.4 lb/in)	K = 52.0 N/mm (5.30 kg/mm, 296.8 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
<b>Wheel:</b> Front wheel type Rear wheel type Front rim size/material Rear rim size/material Rim runout limit: Radial Lateral	Spoke wheel Spoke wheel 21 × 1.60/Aluminum 18 × 2.15/Aluminum ---- ----	---- ---- ---- ---- 2.0 mm (0.08 in) 2.0 mm (0.08 in)
<b>Drive chain:</b> 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)
<b>Front disc brake:</b> 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) ---- ---- ----
<b>Rear disc brake:</b> 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) ---- ---- ----
<b>Brake lever and brake pedal:</b> 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
△	Handle crown and outer tube	M8 × 1.25	4	23	2.3	17
△	Under bracket and outer tube	M8 × 1.25	4	20	2.0	14
△	Handle crown and steering shaft	M24 × 1.0	1	145	14.5	105
△	Handlebar holder (upper)	M8 × 1.25	4	28	2.8	20
△	Steering ring nut	M28 × 1.0	1	Refer to NOTE.		
	Front fork and cap bolt	M48 × 1.0	2	30	3.0	22
	Front fork and base valve	M30 × 1.0	2	55	5.5	40
	Cap bolt and damper rod (front fork)	M12 × 1.25	2	29	2.9	21
	Bleed screw (front fork) and cap bolt	M5 × 0.8	2	1	0.1	0.7
	Front fork and 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 hose cover	M8 × 1.25	1	16	1.6	11
	Front fork and hose cover	M6 × 1.0	1	7	0.7	5.1
	Throttle cable cap	M5 × 0.8	2	4	0.4	2.9
	Clutch lever holder mounting	M5 × 0.8	2	4	0.4	2.9
	Hot starter lever holder mounting	M5 × 0.8	2	4	0.4	2.9
	Hot starter lever mounting	M5 × 0.8	1	2	0.2	1.4
	Lights switch	M4 × 0.7	2	2	0.2	1.4
△	Front brake master cylinder and bracket	M6 × 1.0	2	9	0.9	6.5
	Front brake master cylinder cap	M4 × 0.7	2	2	0.2	1.4
	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
	Hose guide (front brake hose)	M5 × 0.8	2	4	0.4	2.9
△	Front brake hose union bolt (master cylinder)	M10 × 1.25	1	30	3.0	22
△	Front brake hose union bolt (caliper)	M10 × 1.25	1	30	3.0	22
△	Front brake caliper and front fork	M8 × 1.25	2	23	2.3	17
△	Brake caliper (front and rear) and pad pin plug	M10 × 1.0	2	3	0.3	2.2
△	Brake caliper (front and rear) and pad pin	M10 × 1.0	2	18	1.8	13
△	Brake caliper (front and rear) and bleed screw	M8 × 1.25	2	6	0.6	4.3
△	Front wheel axle and nut	M16 × 1.5	1	105	10.5	75
△	Front wheel axle holder	M8 × 1.25	4	23	2.3	17
△	Front brake disc and wheel hub	M6 × 1.0	6	12	1.2	8.7
△	Rear brake disc and wheel hub	M6 × 1.0	6	14	1.4	10
△	Brake pedal mounting	M8 × 1.25	1	26	2.6	19
△	Rear brake master cylinder and frame	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 (caliper)	M10 × 1.25	1	30	3.0	22
△	Rear brake hose union bolt (master cylinder)	M10 × 1.25	1	30	3.0	22

**NOTE:**

1. First, tighten the ring nut approximately 38 Nm (3.8 m • kg, 27 ft • lb) by using the ring nut wrench, then loosen the ring nut one turn.
2. Retighten the ring 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
△	Rear wheel axle and nut	M20 × 1.5	1	125	12.5	90
△	Driven sprocket and wheel hub	M8 × 1.25	6	50	5.0	36
△	Nipple (spoke)	–	72	3	0.3	2.2
	Disc cover and rear brake caliper	M6 × 1.0	2	7	0.7	5.1
	Protector and rear brake caliper	M6 × 1.0	2	7	0.7	5.1
	Chain puller adjust bolt and locknut	M8 × 1.25	2	16	1.6	11
	Engine mounting:					
△	Engine upper bracket and frame	M10 × 1.25	2	55	5.5	40
△	Engine lower bracket and frame	M8 × 1.25	4	34	3.4	24
△	Engine and frame (front)	M10 × 1.25	1	69	6.9	50
△	Engine and frame (upper)	M10 × 1.25	1	55	5.5	40
△	Engine and frame (lower)	M10 × 1.25	1	69	6.9	50
	Engine guard (left and right)	M8 × 1.25	2	23	2.3	17
	Engine skid plate mounting	M6 × 1.0	6	10	1.0	7.2
	Regulator bracket mounting	M6 × 1.0	2	7	0.7	5.1
	Regulator mounting	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 and frame (upper)	M8 × 1.25	1	32	3.2	23
△	Rear frame and 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
	Drive chain tensioner mounting (upper)	M8 × 1.25	1	19	1.9	13
	Drive chain tensioner mounting (lower)	M8 × 1.25	1	20	2.0	14
	Chain support and swingarm	M6 × 1.0	3	7	0.7	5.1
△	Seal guard and swingarm	M5 × 0.8	4	6	0.6	4.3
△	Fuel tank mounting	M6 × 1.0	2	10	1.0	7.2
△	Fuel tank and fuel cock	M6 × 1.0	2	7	0.7	5.1
	Fuel tank and seat set bracket	M6 × 1.0	1	7	0.7	5.1
	Fuel tank and hooking screw (fitting band)	M6 × 1.0	1	7	0.7	5.1
	Fuel tank and fuel tank bracket	M6 × 1.0	4	7	0.7	5.1
	Seat mounting	M8 × 1.25	2	23	2.3	17
	Side cover mounting	M6 × 1.0	2	7	0.7	5.1
	Air scoop and fuel tank	M6 × 1.0	6	4	0.4	2.9
	Air scoop and radiator panel (lower)	M6 × 1.0	2	4	0.4	2.9
	Front fender mounting	M6 × 1.0	4	7	0.7	5.1
	Rear fender mounting (front)	M6 × 1.0	2	7	0.7	5.1
	Rear fender mounting (rear)	M6 × 1.0	2	10	1.0	7.2
	Trip meter mounting	M6 × 1.0	2	7	0.7	5.1

# MAINTENANCE SPECIFICATIONS

**SPEC**



Part to be tightened	Thread size	Q'ty	Tightening torque		
			Nm	m·kg	ft·lb
Meter cable holder and protector	M5 × 0.8	2	4	0.4	2.9
Headlight stay (lower) and under bracket	M8 × 1.25	2	7	0.7	5.1
Headlight body and headlight unit	M6 × 1.0	2	7	0.7	5.1
Headlight mounting (left and right)	M6 × 1.0	2	10	1.0	7.2
Headlight mounting (lower)	M6 × 1.0	1	7	0.7	5.1
Taillight mounting	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 tank mounting	M6 × 1.0	2	7	0.7	5.1
Sidestand bracket mounting	M10 × 1.25	2	66	6.6	48
Sidestand mounting	M10 × 1.25	1	64	6.4	46

**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	----
C.D.I.: Pickup coil resistance (color)	248 ~ 372 Ω at 20 °C (68 °F) (White – Red)	----
CDI unit-model/manufacture	5TJ-00/YAMAHA (For USA) 5TJ-10/YAMAHA (Except for USA)	---- ----
Ignition coil: Model/manufacture	5TA-00/DENSO	----
Minimum spark gap	6 mm (0.24 in)	----
Primary winding resistance	0.08 ~ 0.10 Ω at 20 °C (68 °F)	----
Secondary winding resistance	4.6 ~ 6.8 kΩ at 20 °C (68 °F)	----
Charging system: System type	AC magneto	----
Model/manufacture	5TJ-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/manufacture	5TJ00/YAMAHA	----
Operation voltage	12 V	----
Output	0.48 kW	----
Armature coil resistance	0.0117 ~ 0.0143 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)	----



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

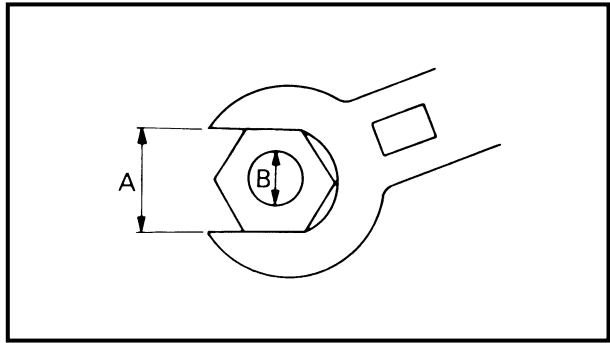
**NOTE:**

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

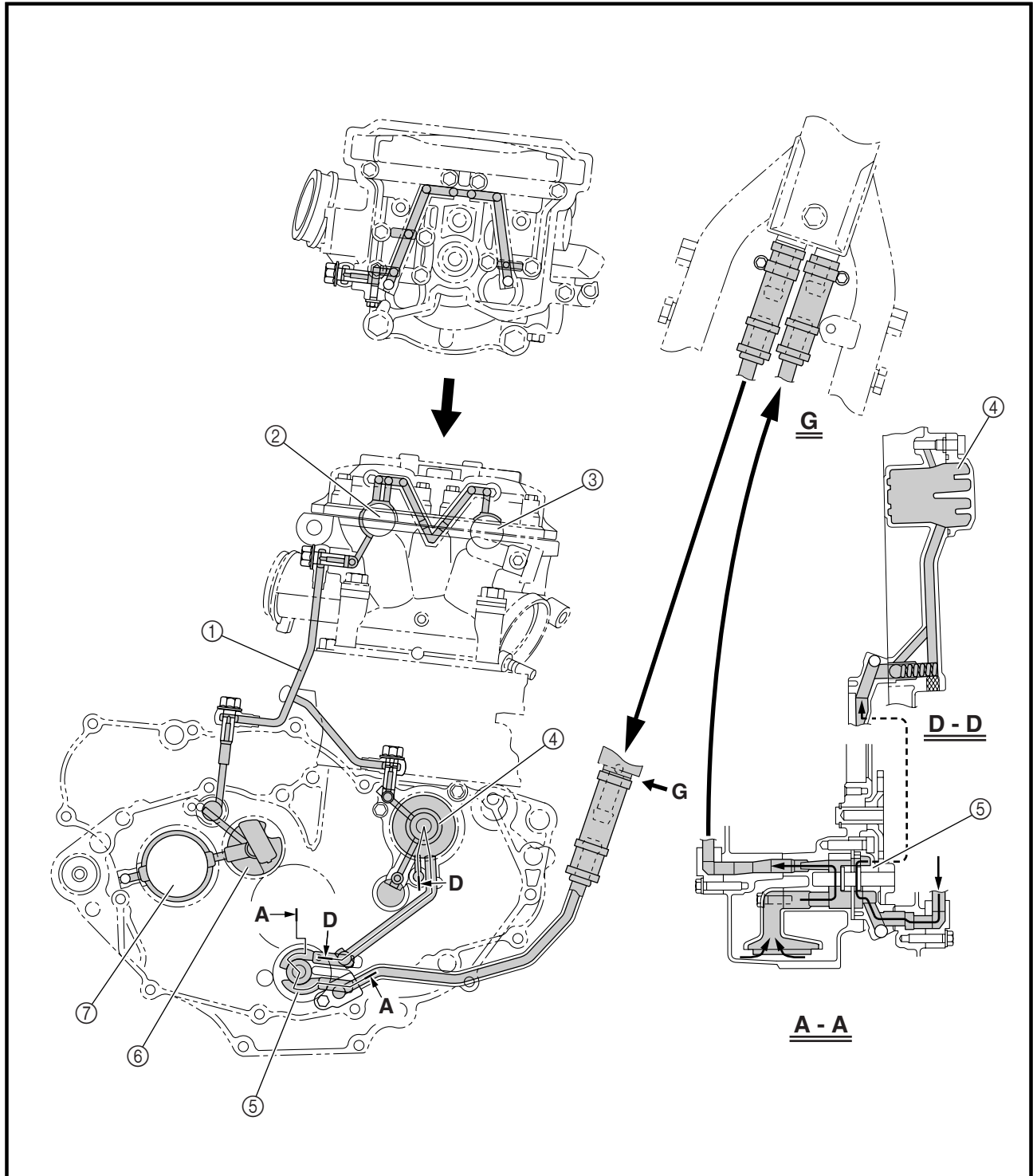
## DEFINITION OF UNITS

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



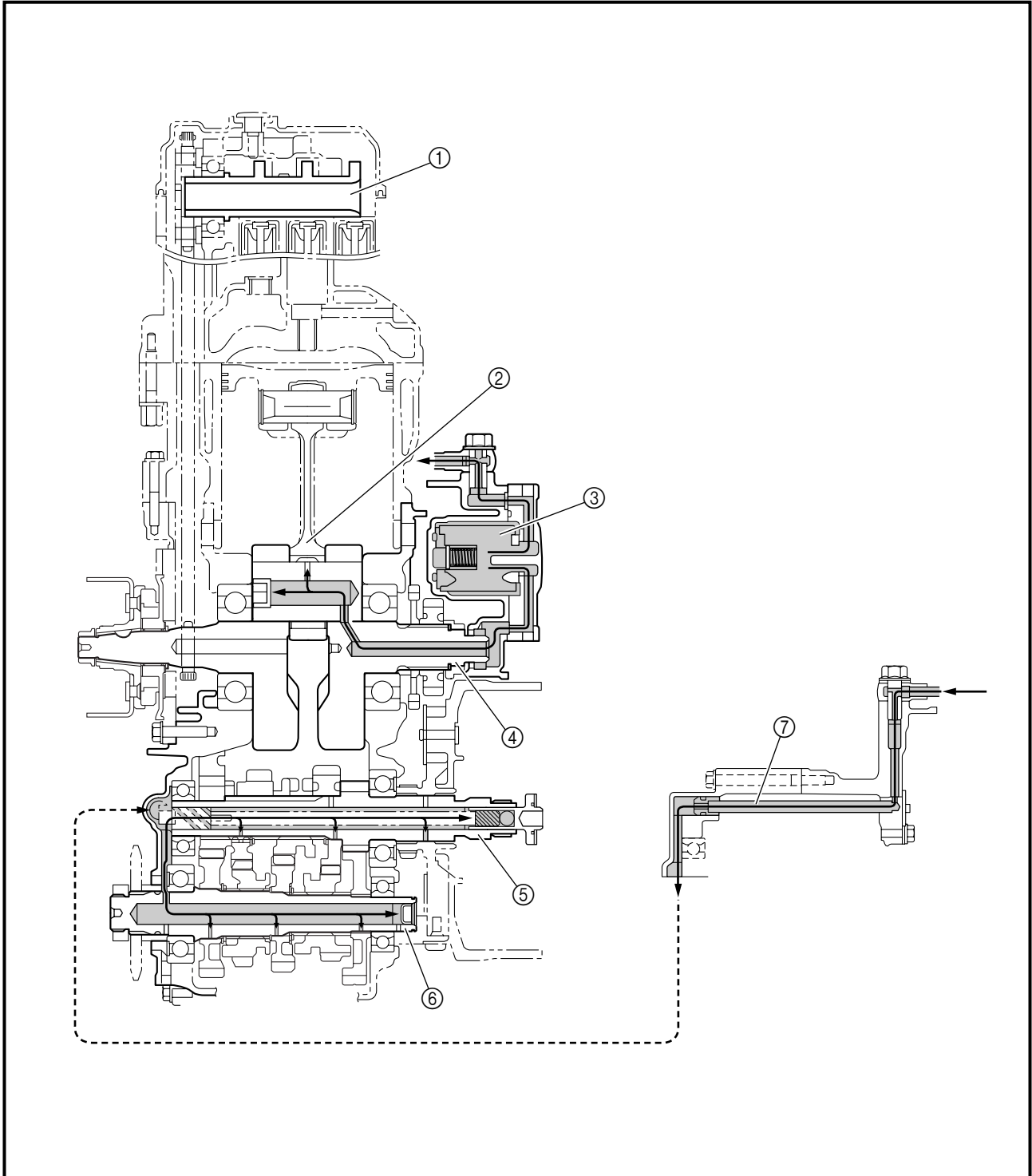
**LUBRICATION DIAGRAMS**

- ① Oil delivery pipe
- ② Intake camshaft
- ③ Exhaust camshaft
- ④ Oil cleaner element
- ⑤ Oil pump
- ⑥ Main axle
- ⑦ Drive axle





- ① Camshaft
- ② Connecting rod
- ③ Oil cleaner element
- ④ Crankshaft
- ⑤ Main axle
- ⑥ Drive axle
- ⑦ Oil delivery pipe





EC240000

## CABLE ROUTING DIAGRAM

- ① Fuel tank breather hose
- ② Clamp
- ③ Diode
- ④ Wire harness
- ⑤ Hot starter cable
- ⑥ Negative battery lead
- ⑦ Starter motor lead
- ⑧ TPS (throttle position sensor) lead
- ⑨ Neutral switch lead
- ⑩ Oil hose
- ⑪ Hose holder
- ⑫ Radiator hose 4
- ⑬ Cylinder head breather hose
- ⑭ AC magneto lead
- ⑮ Radiator hose 1
- ⑯ Oil tank breather hose

- ⑰ Lights switch lead
- ⑱ Brake hose
- ⑲ Hose guide
- ⑳ Carburetor breather hose
- ㉑ Overflow hose
- ㉒ Coolant reservoir tank breather hose

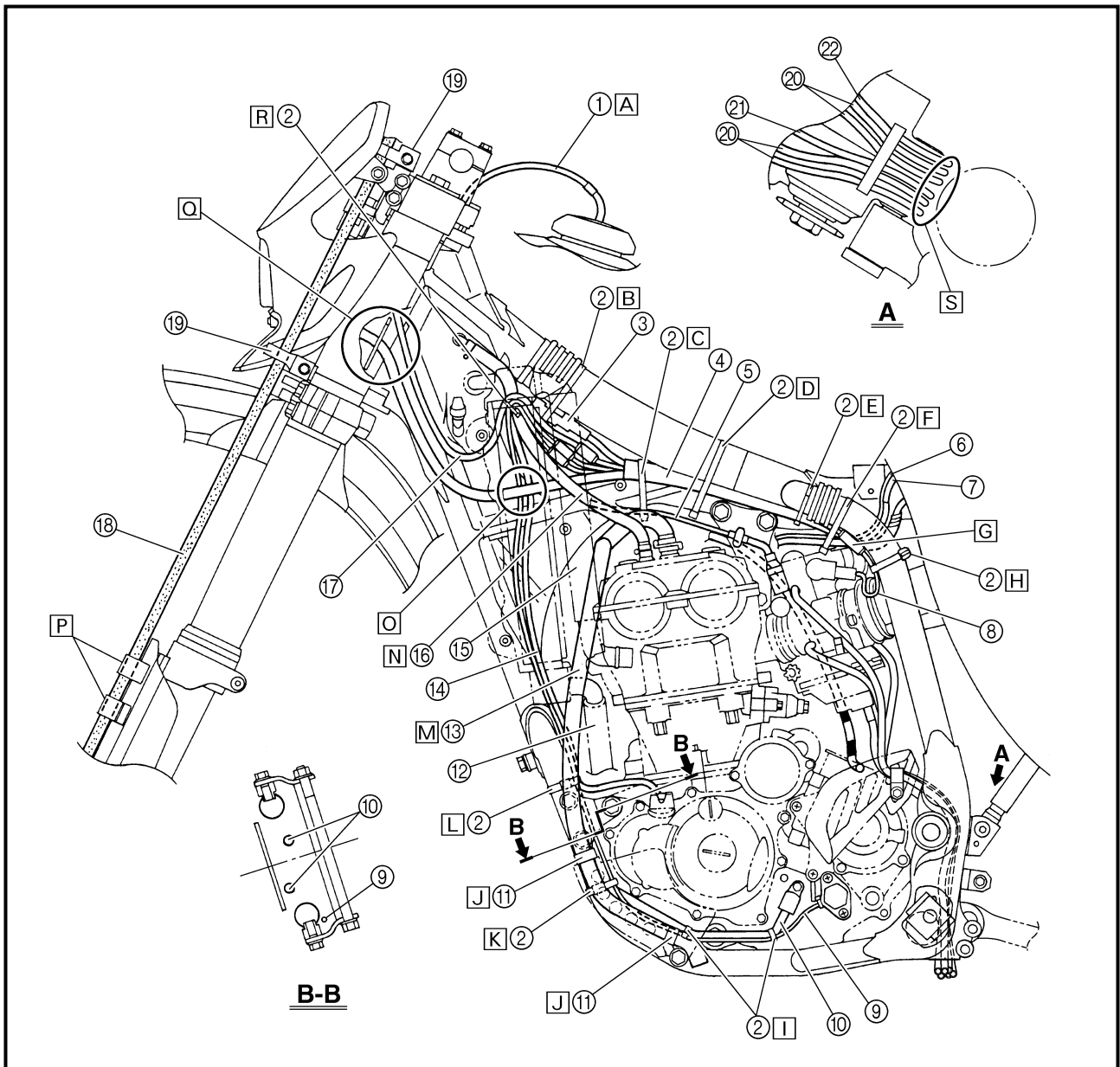
**A** Insert the fuel tank breather hose into the hole in the steering shaft cap.

**B** Fasten the diode of the wire harness and rectifier/regulator lead (at its protecting tube) to the frame at the white tape for the diode with a plastic locking tie and cut off the tie end.

**C** Fasten the wire harness, rectifier/regulator lead, coolant reservoir hose and hot starter cable to the frame with a plastic locking tie and cut off the tie end.

**D** Fasten the wire harness, rectifier/regulator lead and coolant reservoir hose to the frame with a plastic locking tie and cut off the tie end.

**E** Fasten the wire harness to the frame at its white tape with a plastic locking tie and cut off the tie end.





# CABLE ROUTING DIAGRAM

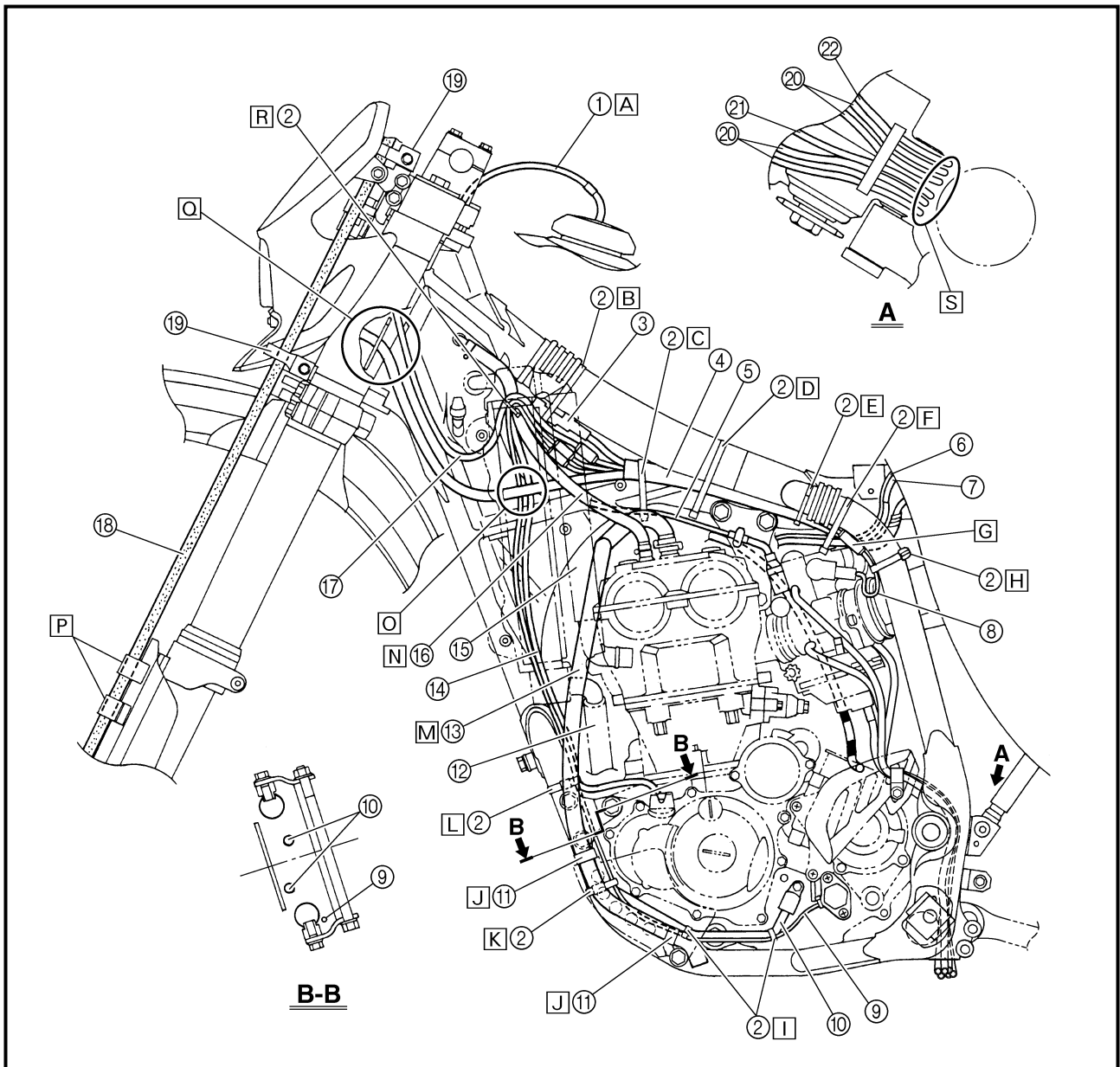
**SPEC**



- [F] Fasten the wire harness, TPS lead (in the wire harness), starter motor lead and negative battery lead to the frame with a plastic locking tie and cut off the tie end.
- [G] Make sure that the TPS coupler does not go out the chassis.
- [H] Fasten the TPS lead to the frame with a plastic band.
- [I] Fasten the neutral switch lead and oil hose together with the plastic locking ties and cut off the tie ends.
- [J] Pass the cylinder head breather hose through the hose holder.

- [K] Fasten the neutral switch lead to the frame with a plastic band ends outward.
- [L] Fasten the neutral switch lead and AC magneto lead to the frame with a plastic band.
- [M] Pass the cylinder head breather hose on the outside of the radiator hose 1 and on the inside of the radiator pipe (radiator hose 4).
- [N] Pass the oil tank breather hose on the outside of the AC magneto lead, neutral switch lead, lights switch lead, wire harness and cylinder head breather hose.

- [O] Pass the wire harness on the outside of the neutral switch lead and AC magneto lead.
- [P] Fit the brake hose into the guides on the protector.
- [Q] Pass the wire harness through the cable guide.
- [R] Fasten the AC magneto lead, neutral switch lead and lights switch lead to the cable guide at their protecting tube with a plastic locking tie and cut off the tie end.
- [S] Pass the carburetor breather hoses, overflow hose and coolant reservoir tank breather hose so that the hoses do not contact the rear shock absorber.

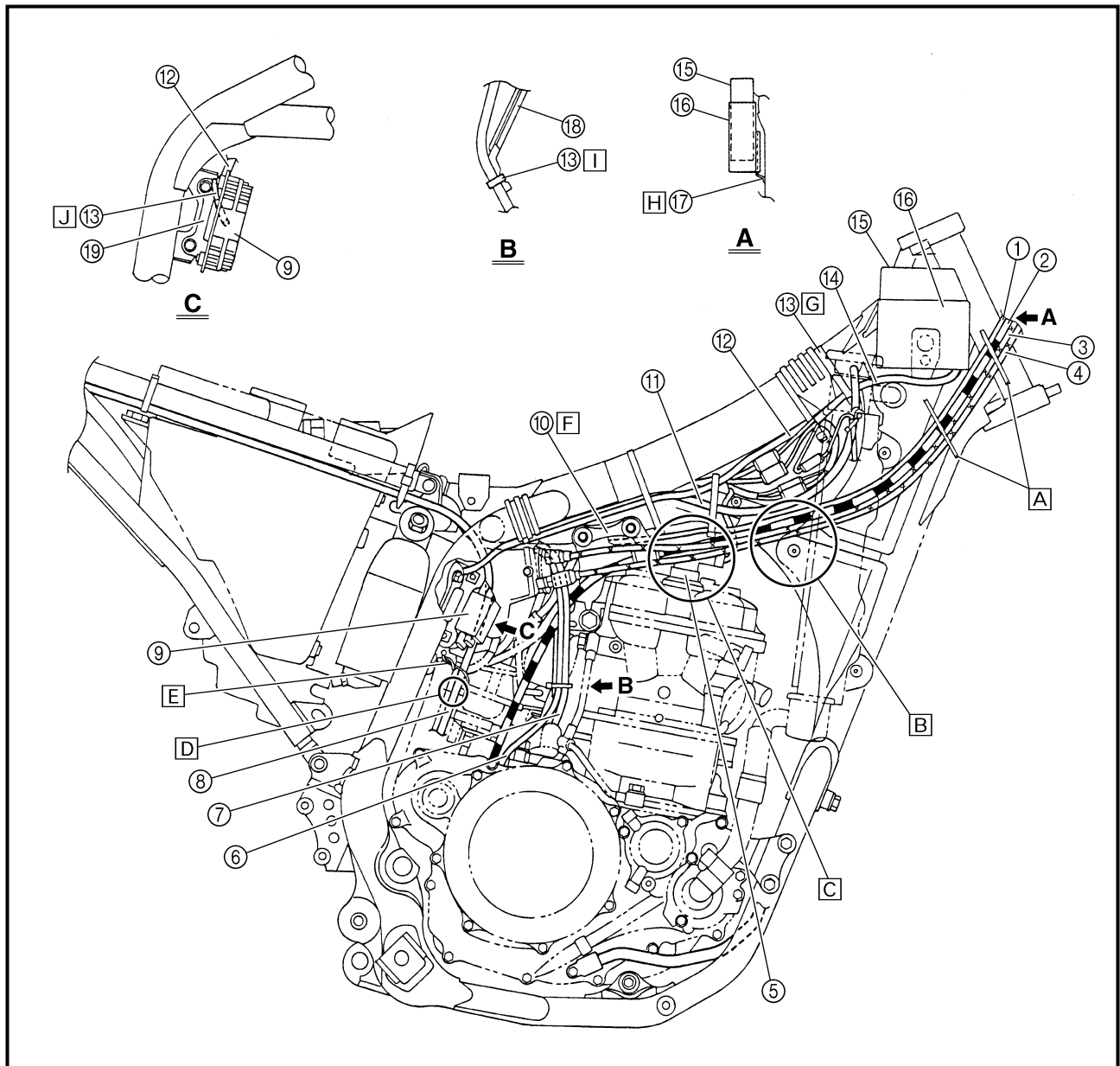




- ① Hot starter cable
- ② Clutch cable
- ③ Throttle cable (return)
- ④ Throttle cable (pull)
- ⑤ Ignition coil
- ⑥ Negative battery lead
- ⑦ Starter motor lead
- ⑧ Coolant reservoir tank breather hose
- ⑨ Rectifier/regulator
- ⑩ Cable holder
- ⑪ Coolant reservoir hose
- ⑫ Rectifier/regulator lead
- ⑬ Clamp
- ⑭ CDI unit lead
- ⑮ CDI unit
- ⑯ CDI unit band
- ⑰ CDI unit stay (frame)
- ⑱ Cable bracket

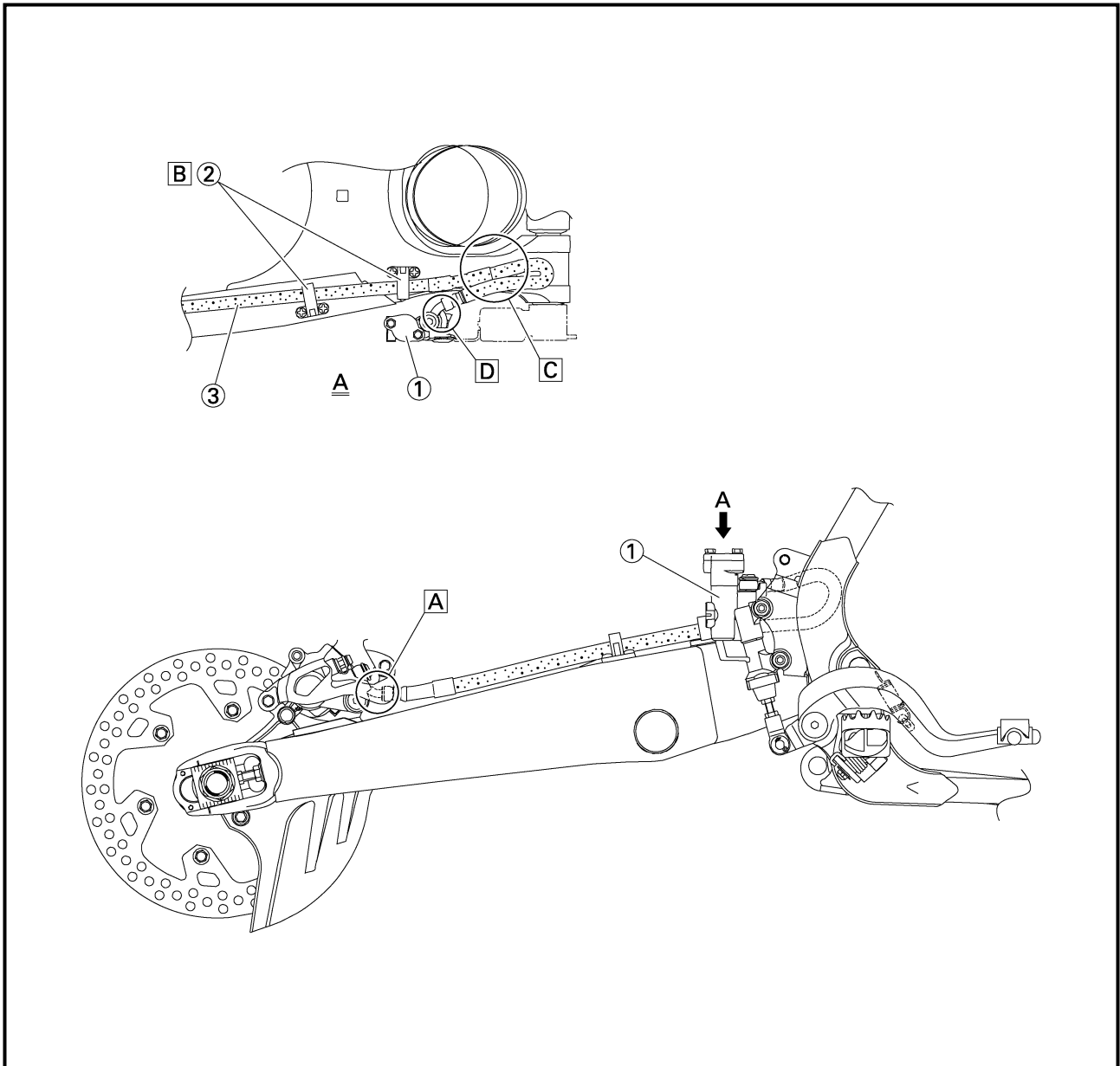
- Ⓐ Pass the throttle cables, clutch cable and hot starter cable through the cable guides.
- Ⓑ Pass the throttle cables, clutch cable and hot starter cable between the radiator and frame, then over the middle radiator mounting boss.
- Ⓒ Pass the throttle cables and clutch cable on the outside of the ignition coil.
- Ⓓ Pass the carburetor breather hose (throttle cable cover) through the hose holder.
- Ⓔ Fasten the coolant reservoir tank breather hose and carburetor breather hoses together with a plastic locking tie.

- Ⓕ Fasten the grommet of the clutch cable with the cable holder.
- Ⓖ Fasten the CDI unit lead to the frame with a plastic locking tie ends at the lower of the frame and cut off the tie end.
- Ⓗ Insert the CDI unit band over the CDI unit stay (frame) as far as possible.
- Ⓘ Fasten the starter motor lead and negative battery lead to the cable bracket in its slot with a plastic locking tie and cut off the tie end.
- Ⓝ Fasten the rectifier/regulator lead to the rectifier/regulator bracket with a plastic locking tie and cut off the tie end.



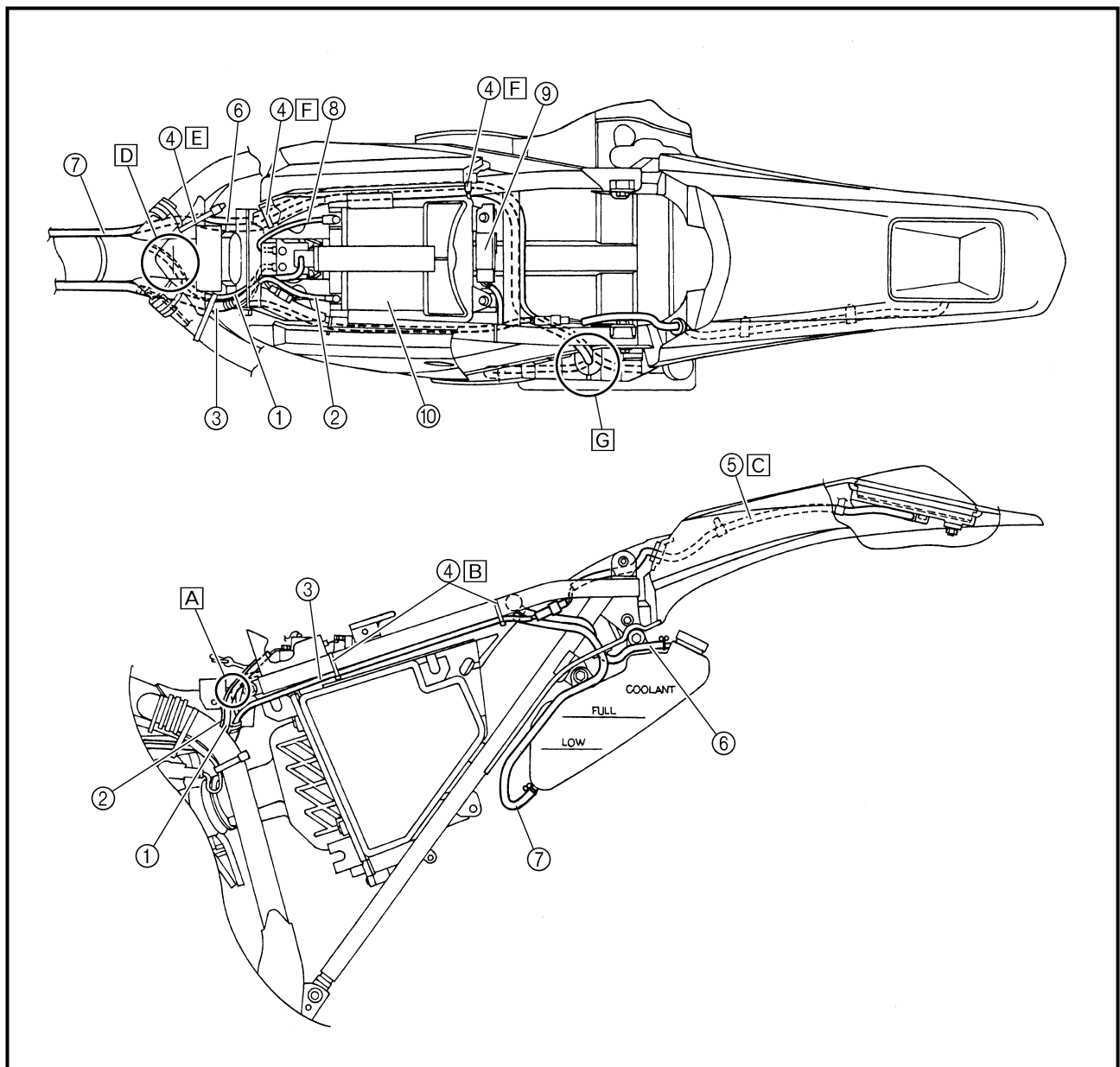


- ① Master cylinder
  - ② Brake hose holder
  - ③ Brake hose
- A Install the brake hose so that its pipe portion directs as shown and lightly touches the projection on the caliper.
  - B Pass the brake hose into the brake hose holders.
  - C If the brake hose contacts the spring (rear shock absorber), correct its twist.
  - D Install the brake hose so that its pipe portion directs as shown and lightly touches the projection on the master cylinder.





- ① Starter motor lead
  - ② Negative battery lead
  - ③ Wire harness
  - ④ Clamp
  - ⑤ Taillight lead
  - ⑥ Coolant reservoir tank 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 to the frame with a plastic locking tie and cut off the tie end.
  - C Do not allow the taillight lead to slacken.
  - D Pass the starter motor lead and negative battery lead over the carburetor.
  - E Fasten the coolant reservoir tank breather hose, coolant reservoir hose and rectifier/regulator lead to the frame with a plastic band.
  - F Fasten the coolant reservoir tank breather hose and coolant reservoir hose to the frame with a plastic band.
  - G Pass the coolant reservoir hose on the outside of the coolant reservoir tank breather hose.



# CABLE ROUTING DIAGRAM

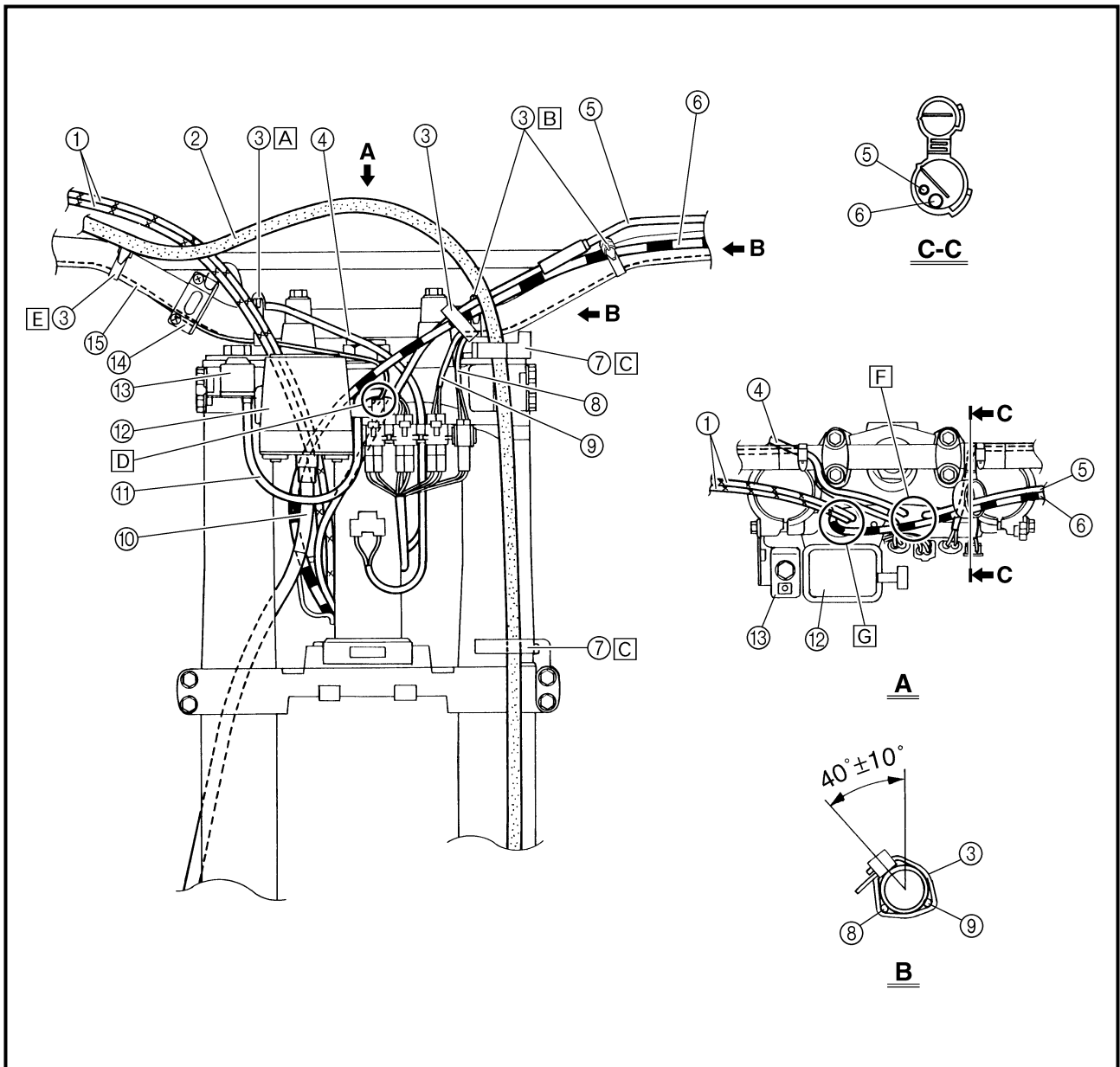
**SPEC**



- ① Throttle cable
- ② Brake hose
- ③ Clamp
- ④ Lights switch lead
- ⑤ Hot starter cable
- ⑥ Clutch cable
- ⑦ Hose guide
- ⑧ Clutch switch lead
- ⑨ "ENGINE STOP" button lead
- ⑩ Trip meter cable
- ⑪ Main switch lead
- ⑫ Trip meter
- ⑬ Main switch
- ⑭ Lights switch
- ⑮ Start switch lead

- A Fasten the start switch lead and lights switch lead to the handlebar with a plastic band.
- B Fasten the "ENGINE STOP" button lead and clutch switch lead to the handlebar with the plastic bands.
- C Pass the brake hose through the hose guide.
- D Pass the start switch lead in front of the main switch lead.
- E Fasten the start switch lead to the handlebar with a plastic band.
- F Pass the hot starter cable and lights switch lead between the handle crown and coupler bracket.

- G Pass the throttle cables and clutch cable between the handle crown 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	●			●		
VALVES Check the valve clearances Inspect Replace	●		●	●	●	The engine must be cold. Check the valve seats and valve stems for wear.
VALVE SPRINGS Inspect Replace				●	●	Check the free length and the tilt.
VALVE LIFTERS Inspect Replace				●	●	Check for scratches and wear.
CAMSHAFTS Inspect Replace				●	●	Inspect the camshaft surface. Inspect the decompression system
CAMSHAFT SPROCKETS Inspect Replace				●	●	Check for wear on the teeth and for damage.
PISTON Inspect Clean Replace				●	● ● ●	Inspect crack Inspect carbon deposits and eliminate them.
PISTON RING Inspect Replace				● ●	●	Check ring end gap
PISTON PIN Inspect Replace				●	●	
CYLINDER HEAD Inspect and clean				●		Inspect carbon deposits and eliminate them. Change gasket
CYLINDER Inspect and clean Replace				●	●	Inspect score marks Inspect wear
CLUTCH Inspect and adjust Replace	●	●			●	Inspect housing, friction plate, clutch plate and spring
TRANSMISSION Inspect Replace bearing					● ●	

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

3

# 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
CHAIN GUARD AND ROLLERS Inspect	●	●				
SWINGARM Inspect, lube and retighten	●	●				Molybdenum disulfide grease
RELAY ARM, CONNECTING ROD Inspect, lube and retighten	●	●				Molybdenum disulfide 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	● ●	● ●				Yamaha cable lube or SAE 10W-30 motor oil
HOT STARTER, CLUTCH LEVER Inspect free play					●	
BATTERY Check terminal for looseness and corrosion					●	

\* marked: For USA



EC320000

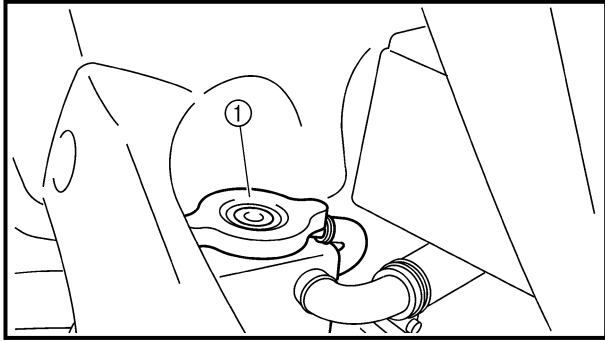
## PRE-OPERATION INSPECTION AND MAINTENANCE

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

Before using this machine, check the following points.

### GENERAL INSPECTION AND MAINTENANCE

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



EC350000

## ENGINE

### COOLANT LEVEL INSPECTION

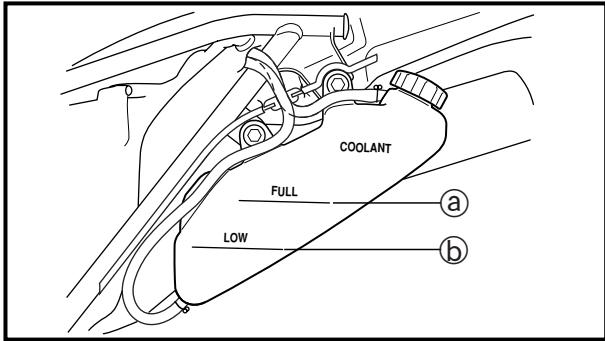
#### **⚠ WARNING**

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

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

#### **CAUTION:**

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



1. Place the machine on a level place, and hold it in an upright position.
2. Inspect:
  - Coolant level  
Coolant level should be between the maximum 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.

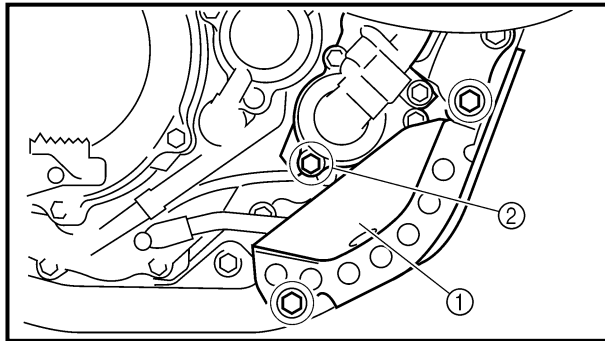
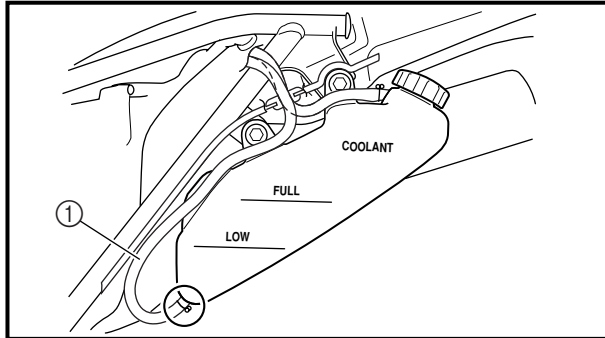
### COOLANT REPLACEMENT

#### **⚠ 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.

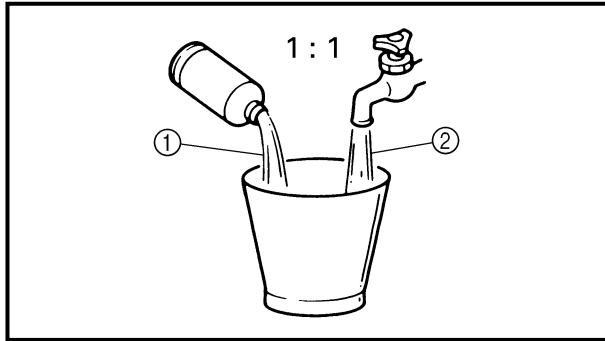


1. Place a container under the engine.
2. Remove:
  - Seat  
Refer to “SEAT, FUEL TANK AND SIDE COVERS” section in the CHAPTER 4.
3. Disconnect:
  - Coolant reservoir hose ①  
Drain the coolant completely.
4. Connect:
  - Coolant reservoir hose
5. Remove:
  - Engine guard ①
  - Coolant drain bolt ②
6. 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>
---	---------------------------------------



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



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

**CAUTION:**

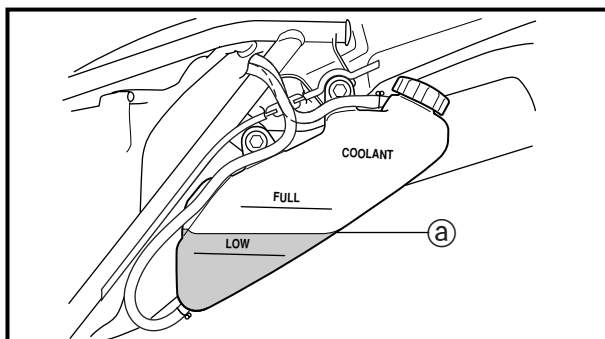
- Do not mix more than one type of ethylene glycol antifreeze containing corrosion inhibitors for aluminum engine.
- Do not use water containing impurities or oil.

**Handling notes of coolant:**

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

**⚠ WARNING**

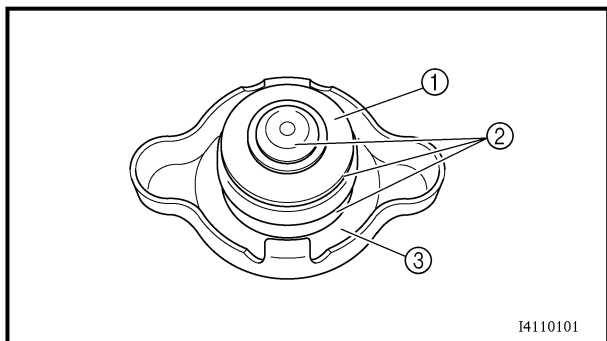
- When coolant splashes to your eye. Thoroughly wash your eye with water and see your doctor.
- When coolant splashes to your clothes. Quickly wash it away with water and then with soap.
- When coolant is swallowed. Quickly make him vomit and take him to a doctor.



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

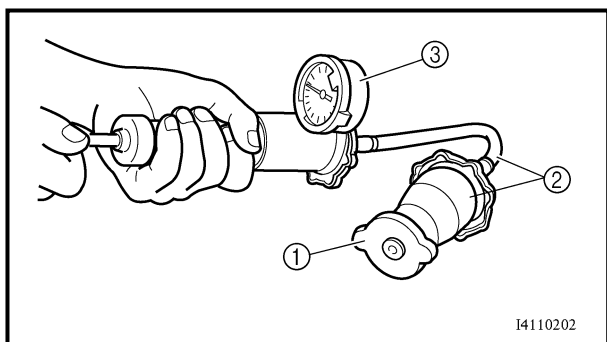
12. Install:
  - Coolant reservoir cap
13. Start the engine and let it warm up for several minutes.
14. Turn off the engine and inspect the coolant level.  
Refer to “COOLANT LEVEL INSPECTION” section.

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




EC355000  
**RADIATOR CAP INSPECTION**

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




EC356001  
**RADIATOR CAP OPENING PRESSURE INSPECTION**

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

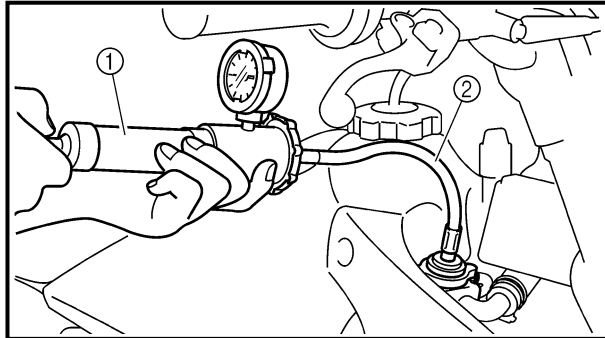
	<b>Radiator cap tester:</b> <b>YU-24460-01/90890-01325</b> <b>Adapter:</b> <b>YU-33984/90890-01352</b>
---	---

**NOTE:** \_\_\_\_\_  
Apply water on the radiator cap seal.

- ③ Radiator cap
2. Apply the specified pressure.

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

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



EC357002

## COOLING SYSTEM INSPECTION

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



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

3. Apply the specified pressure.

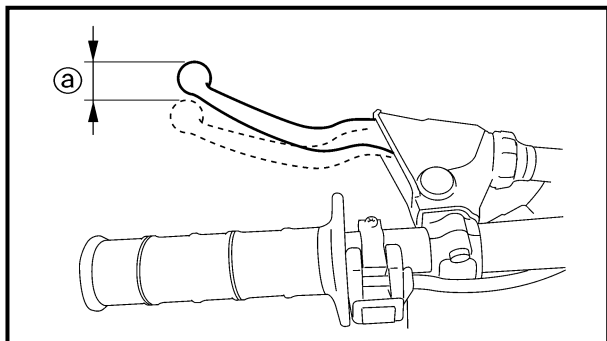


**Standard pressure:**  
180 kPa (1.8 kg/cm<sup>2</sup>, 25.6 psi)

### 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
  - Radiator hose joint  
Coolant leakage → Repair or replace.
  - Radiator hose  
Swelling → Replace.



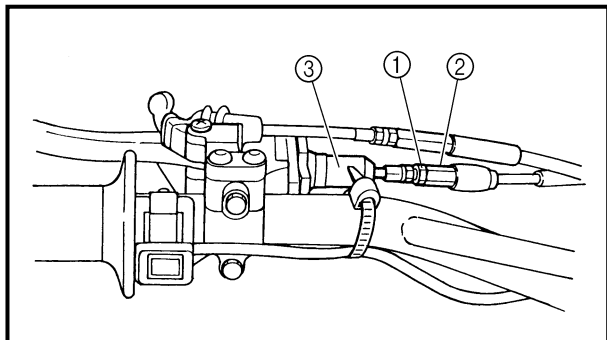
EC359020

## CLUTCH ADJUSTMENT

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



**Clutch lever free play ①:**  
8 ~ 13 mm (0.31 ~ 0.51 in)



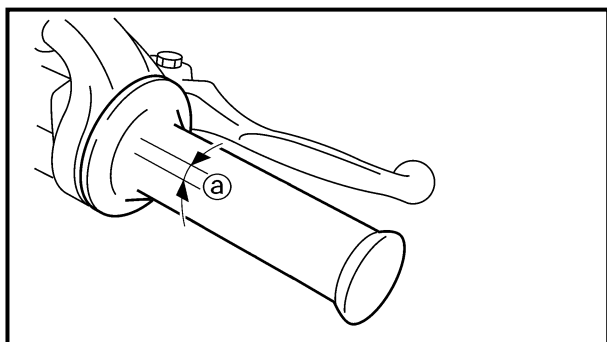
2. Adjust:
  - Clutch lever free play

### Clutch lever free play adjustment steps:

- Loosen the locknut ①.
- Turn the adjuster ② until free play ① is within the specified limits.
- Tighten the locknut.

### NOTE:

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



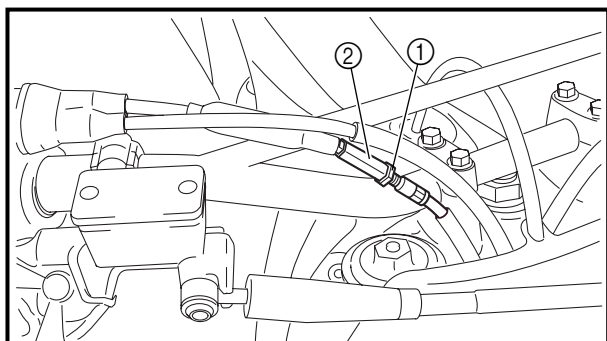
EC35A001

## THROTTLE CABLE ADJUSTMENT

1. Check:
  - Throttle grip free play ①
 Out 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:

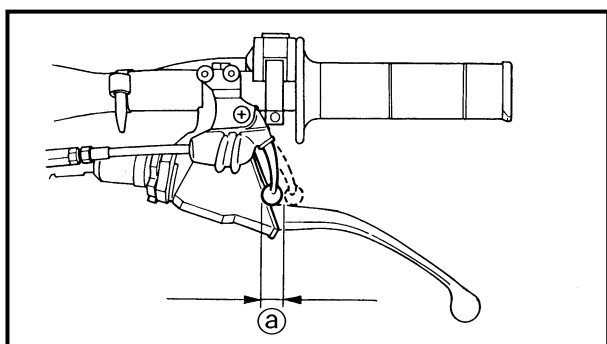
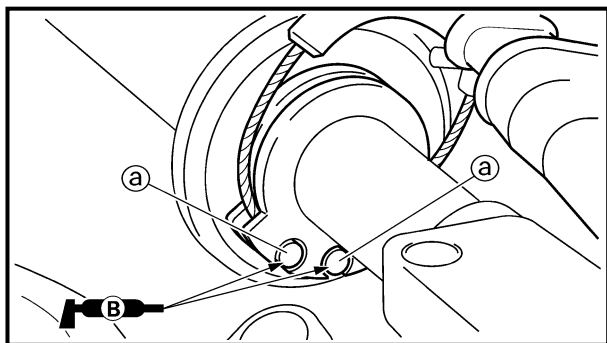
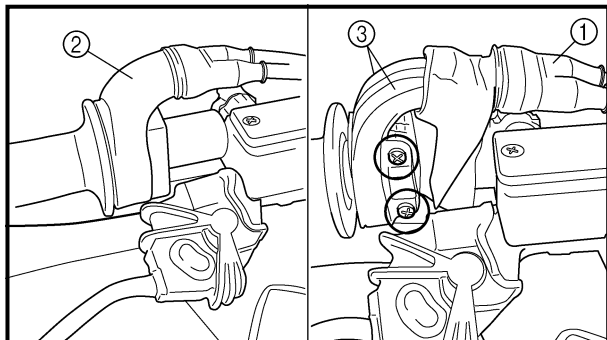
- Slide the adjuster cover.
- Loosen the locknut ①.
- Turn the adjuster ② until the specified free play is obtained.
- Tighten the locknut.



**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

1. Remove:
  - Cover (throttle cable cap) ①
  - Cover (grip cap) ②
  - Throttle cable cap ③
2. Apply:
  - Lithium soap base grease  
On the throttle cable end (a).
3. Install:
  - Throttle cable cap
  - Screw (throttle cable cap)

**4 Nm (0.4 m · kg, 2.9 ft · lb)**

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

## HOT STARTER LEVER ADJUSTMENT

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



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

2. Adjust:
  - Hot starter lever free play

### Hot starter lever free play adjustment steps:

- Loosen the locknut ①.
- Turn the adjuster ② until free play (a) is within the specified limits.
- Tighten the locknut.

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



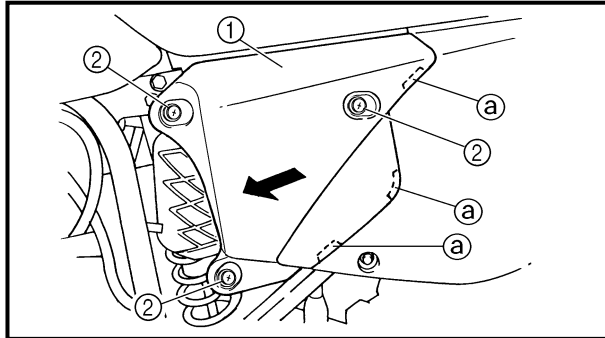
## AIR FILTER CLEANING

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

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

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

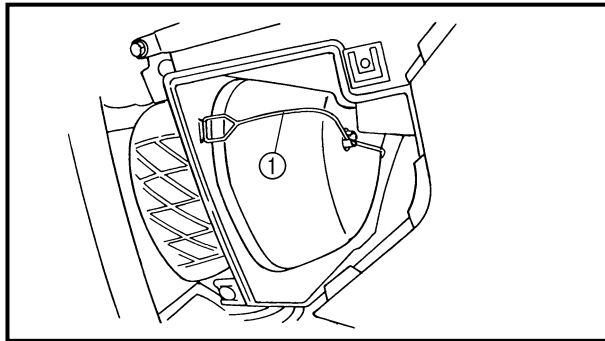
**Never run the engine without the air filter element in place; this would allow dirt and dust to enter the engine and cause rapid wear and possible engine damage.**



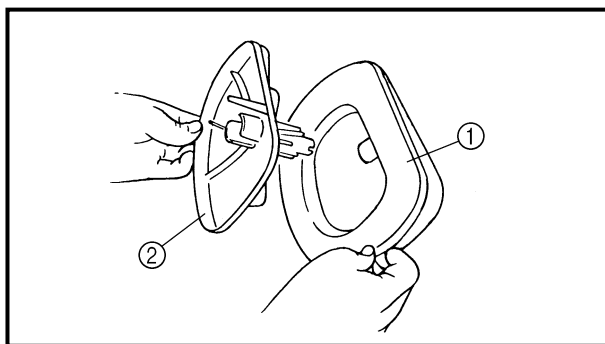
1. Remove:
  - Air filter case cover ①

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

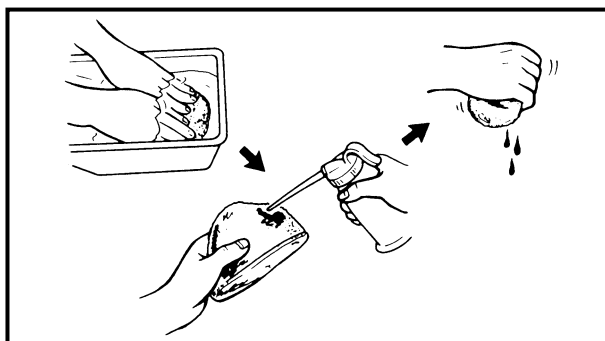
Loosen the quick screw ② and draw the air filter case cover to remove it because its claws ① are inserted in the side cover as shown.



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:

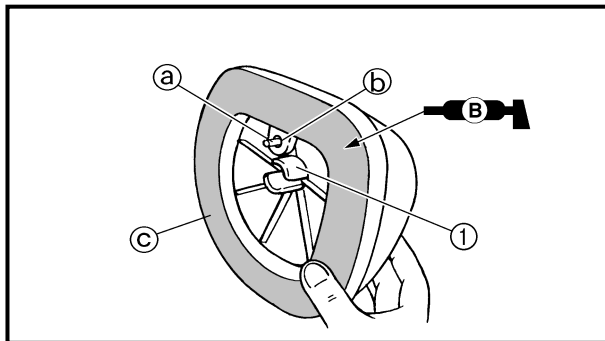
- Air filter element  
Damage → Replace.

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.)

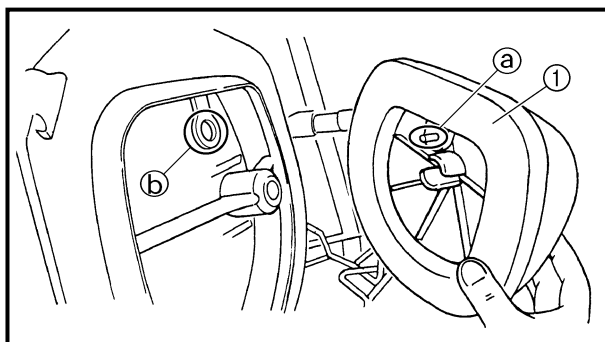


7. Install:

- 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.

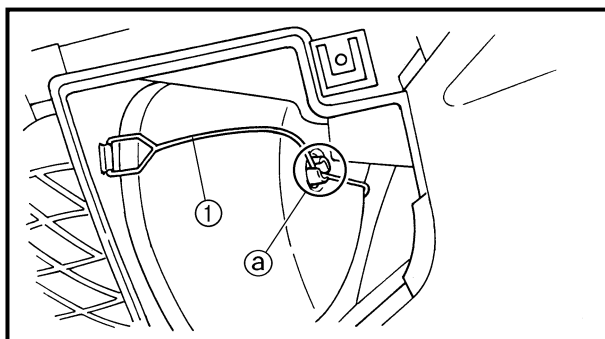


8. Install:

- 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. Stand the motorcycle on a level surface.

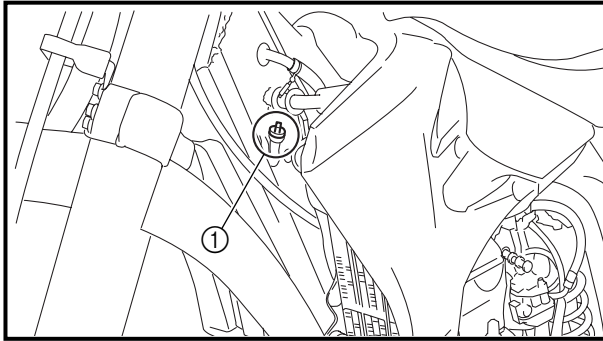
### NOTE:

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

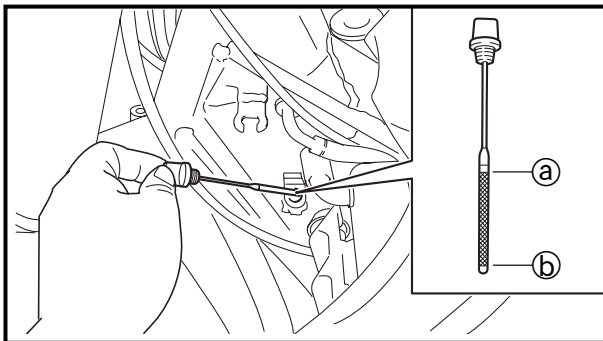
### ⚠ WARNING

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

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



3. Remove:
  - Oil tank cap ①

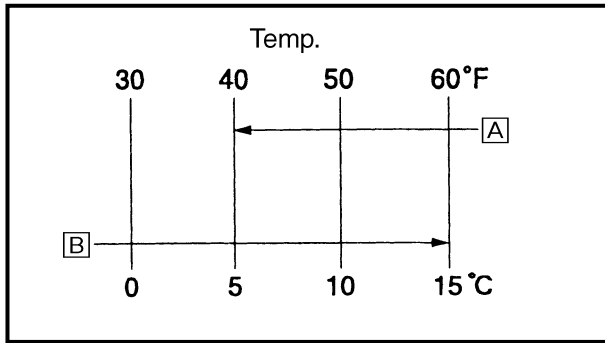


4. Inspect:
  - Oil level  
Oil level should be between maximum ① and minimum ② marks.  
Oil level low → Add oil to proper level.

### NOTE:

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

# ENGINE OIL LEVEL INSPECTION



(For USA and CDN)

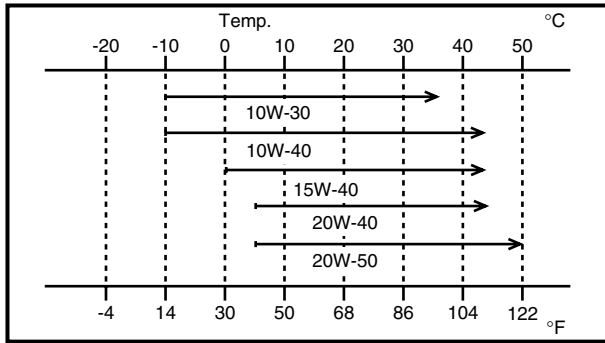


**Recommended oil:**  
 At 5 °C (40 °F) or higher **A**  
 Yamalube 4 (20W-40) or SAE 20W-40 type SG motor oil (Non-Friction modified)  
 At 15 °C (60 °F) or lower **B**  
 Yamalube 4 (10W-30) or SAE 10W-30 type SG motor oil (Non-Friction modified) and/or  
 Yamalube 4-R (15W-50) (Non-Friction modified)

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

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

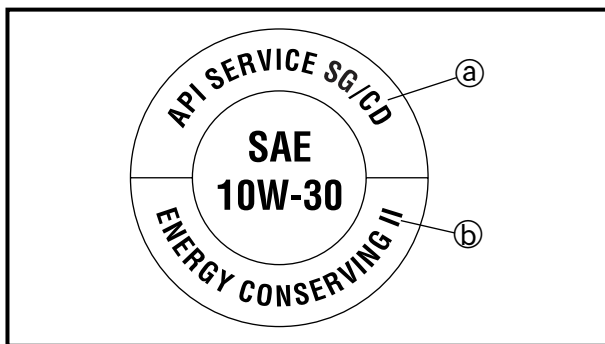
(Except for USA and CDN)



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

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

- Do not add any chemical additives or use oils with a grade of CD **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.

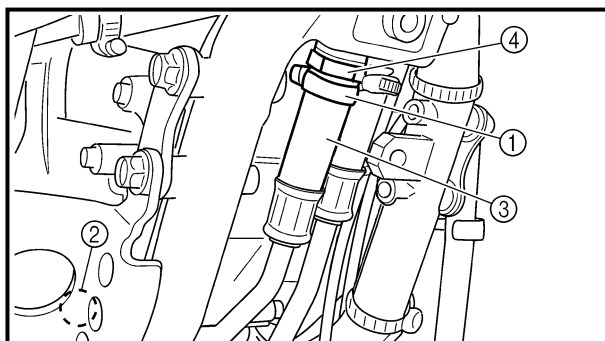
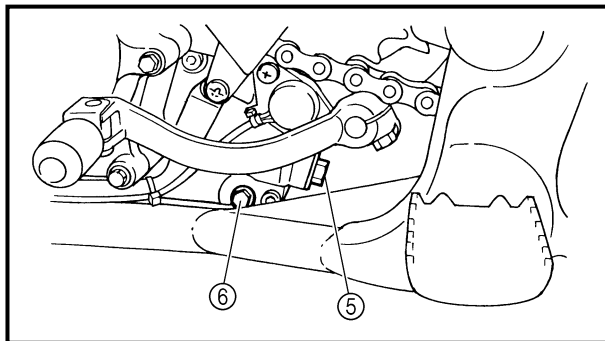
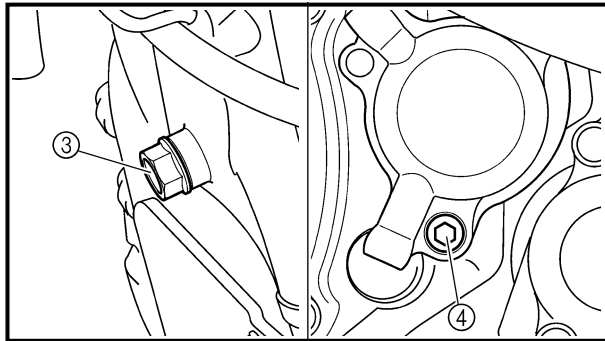
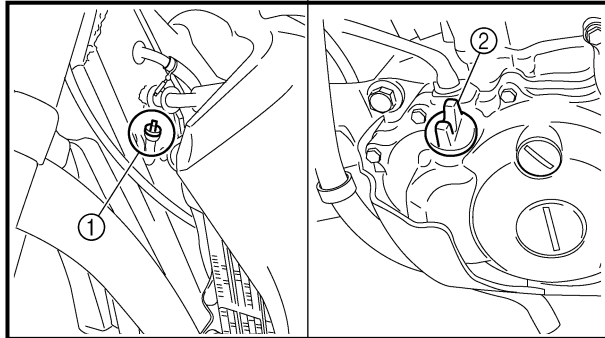


5. Start the engine and let it warm up for several minutes.

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

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

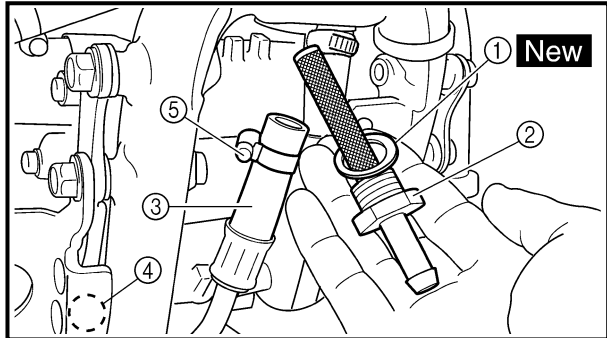
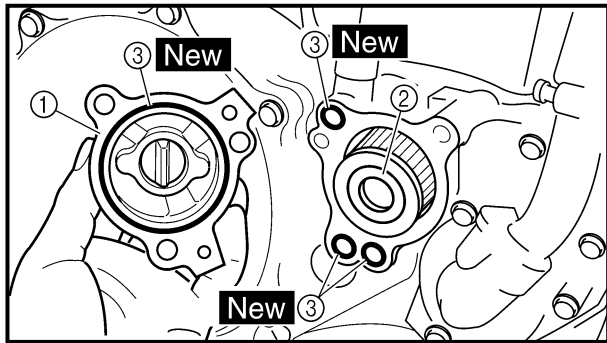
6. Idle the engine more than 10 seconds while keeping the motorcycle upright. Then stop the engine and add the oil to the maximum level.
7. Install:
  - Oil tank cap



## ENGINE OIL REPLACEMENT

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

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



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

### Replacement steps:


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




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

7. Install:


- Plain washer ① **New**
- Oil strainer (frame) ②

 90 Nm (9.0 m • kg, 65 ft • lb)

- Engine oil hose ③
- Bolt (engine oil hose) ④

 10 Nm (1.0 m • kg, 7.2 ft • lb)


- Engine oil hose clamp ⑤

 2 Nm (0.2 m • kg, 1.4 ft • lb)


- Engine skid plate

8. Install:


- Gaskets **New**
- Oil filter drain bolt

 10 Nm (1.0 m • kg, 7.2 ft • lb)


- Drain bolt (crankcase rear)

 20 Nm (2.0 m • kg, 14 ft • lb)

- Drain bolt (crankcase left)

 10 Nm (1.0 m • kg, 7.2 ft • lb)

- Drain bolt (frame)

 23 Nm (2.3 m • kg, 17 ft • lb)

9. Fill:

- Crankcase



### Oil quantity:

#### Total amount:

1.2 L (1.06 Imp qt, 1.27 US qt)

#### Periodic oil change:

1.0 L (0.88 Imp qt, 1.06 US qt)

#### With oil filter replacement:

1.1 L (0.97 Imp qt, 1.16 US qt)

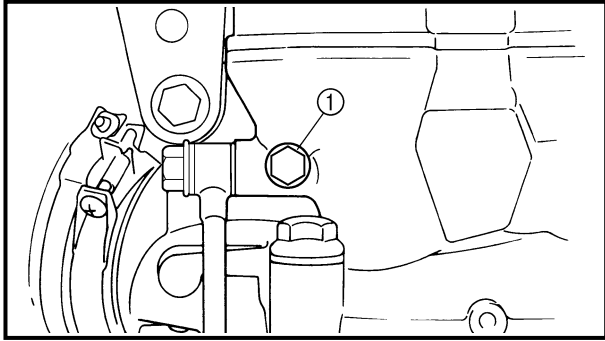
10. Install:

- Oil filler plug

11. Inspect:

- Engine (for oil leaks)
- Oil level

Refer to “ENGINE OIL LEVEL INSPECTION”.



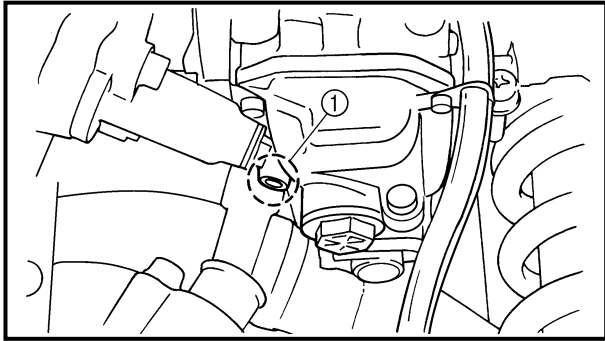
12. Check:
- Oil pressure

**Checking steps:**

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



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



## PILOT SCREW ADJUSTMENT

1. Adjust:
- Pilot screw ①

**Adjusting steps:**

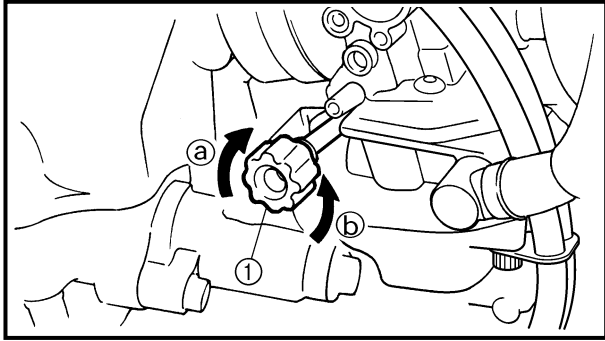
**NOTE:** \_\_\_\_\_  
To optimize the fuel flow at a smaller throttle opening, each machine's pilot screw has been individually set at the factory. Before adjusting the pilot screw, turn it in fully and count the number of turns. Record this number as the factory-set number of turns out.

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



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

\* Except for USA



EC35M021

## IDLE SPEED ADJUSTMENT

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

### Adjustment steps:

- Adjust the pilot screw.  
Refer to “PILOT SCREW ADJUSTMENT” section.
- Turn the throttle stop screw ① until the engine runs at the lowest possible speed.

**To increase idle speed →**

**Turn the throttle stop screw ① in ②.**

**To decrease idle speed →**

**Turn the throttle stop screw ① out ③.**



**Engine idling speed:**

**1,700 ~ 1,900 r/min**

## VALVE CLEARANCE ADJUSTMENT

### NOTE:

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

1. Remove:

- Seat
- Fuel tank

Refer to “SEAT, FUEL TANK AND SIDE COVERS” section in the CHAPTER 4.

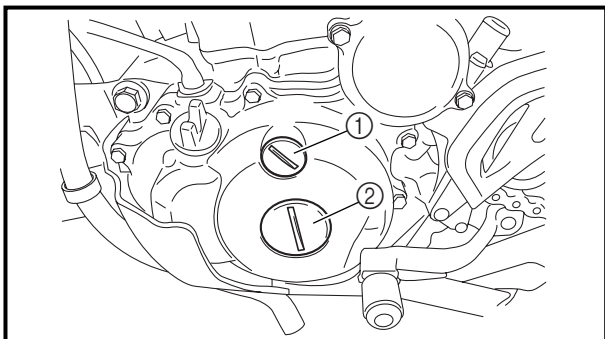
2. Remove:

- Carburetor
- Spark plug cap
- Engine stay (upper)
- Cylinder head cover

Refer to “CAMSHAFTS” section in the CHAPTER 4.

3. Remove:

- Timing plug ①
- Straight plug ②
- O-ring





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



**Valve clearance (cold):**

**Intake valve:**

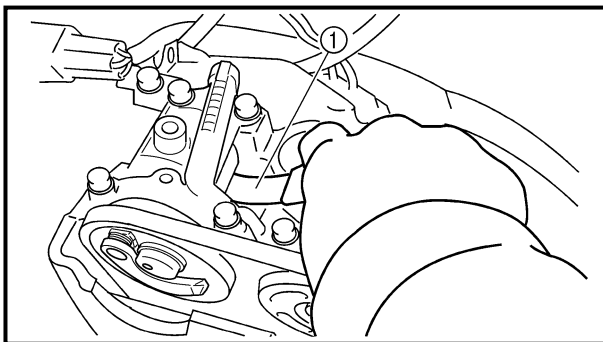
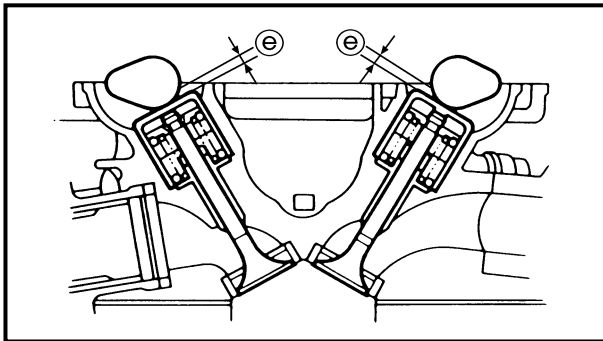
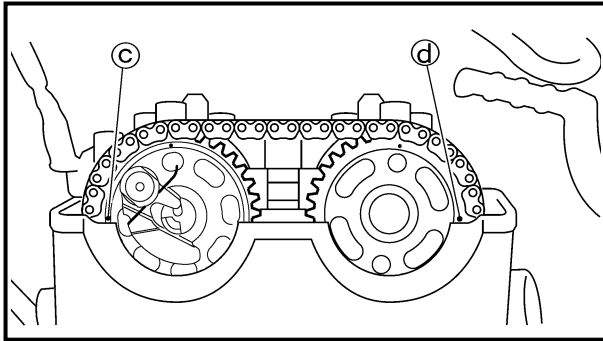
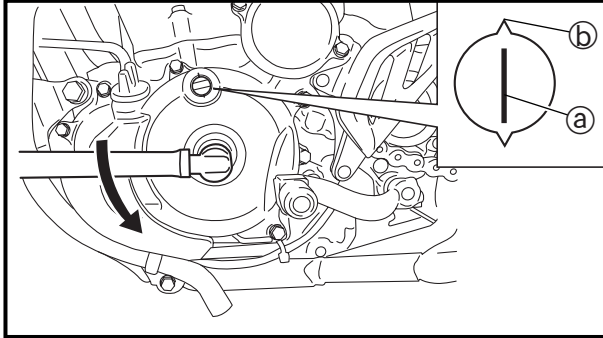
0.10 ~ 0.15 mm

(0.0039 ~ 0.0059 in)

**Exhaust valve:**

0.20 ~ 0.25 mm

(0.0079 ~ 0.0098 in)



**Checking steps:**

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

**NOTE:**

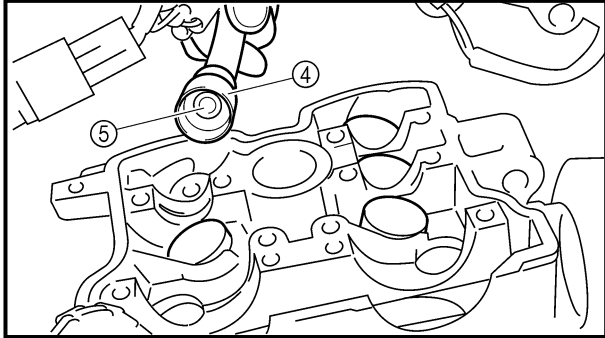
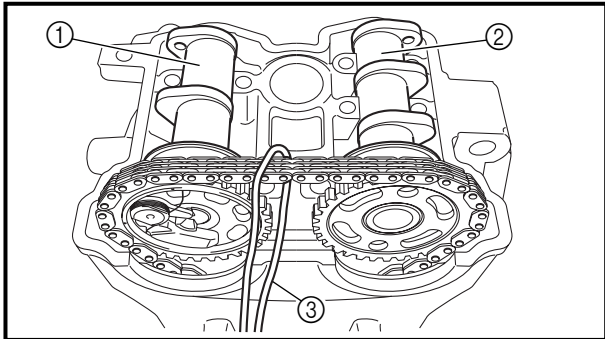
In order to be sure that the piston is at Top Dead Center, the punch mark ③ on the exhaust camshaft and the punch mark ④ on the intake camshaft must align with the cylinder head surface, as shown in the illustration.

- Measure the valve clearance ⑤ using a feeler gauge ①.

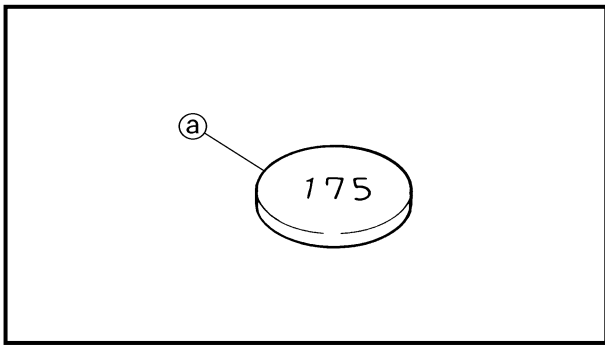
**NOTE:**

Record the measured reading if the clearance is incorrect.

# VALVE CLEARANCE ADJUSTMENT



EX			
IN			



5. Adjust:
- Valve clearance

**Adjustment steps:**

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

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

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

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

- Remove the valve lifters ④ and the pads ⑤.

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

- Select the proper pad using the pad selecting table.

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

**NOTE:** \_\_\_\_\_  
The thickness ① 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:**

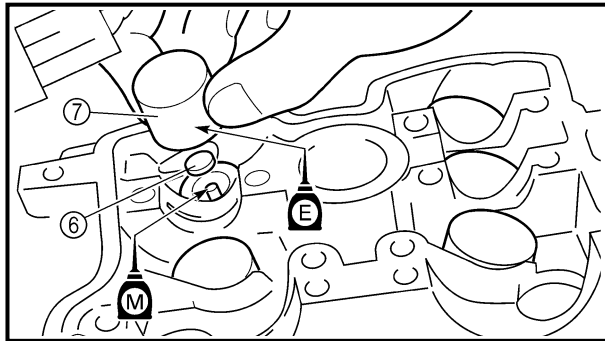
Use the new pad number only as a guide when verifying the valve clearance adjustment.

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

**NOTE:**

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

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



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

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

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

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

6. Install:
- All removed parts

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

# VALVE CLEARANCE 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

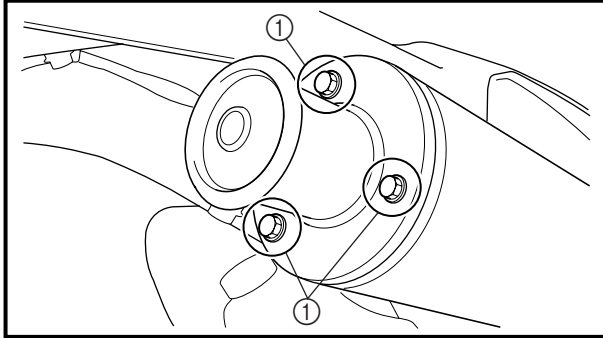
MEASURED CLEARANCE	INSTALLED PAD NUMBER																								
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240
0.00 ~ 0.04					120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220
0.05 ~ 0.09				120	125	130	135	140	145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

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

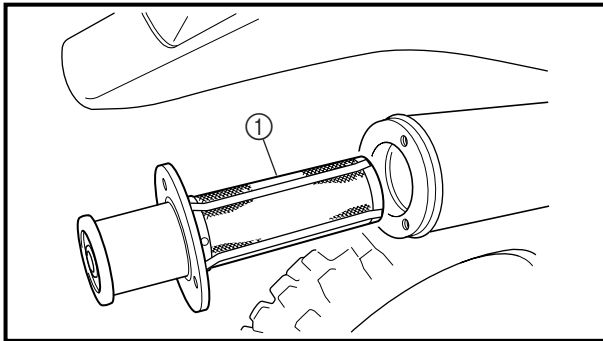
## SPARK ARRESTER CLEANING (For USA)

**⚠ WARNING**

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




1. Remove:
  - Bolt (spark arrester) ①



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

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

4. Install:
  - Spark arrester
  - Insert the spark arrester into the muffler and align the bolt holes.
  - Bolt (spark arrester)

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**

EC360000

## CHASSIS

EC361012

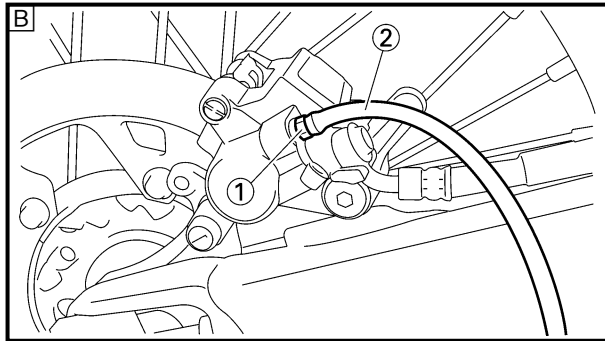
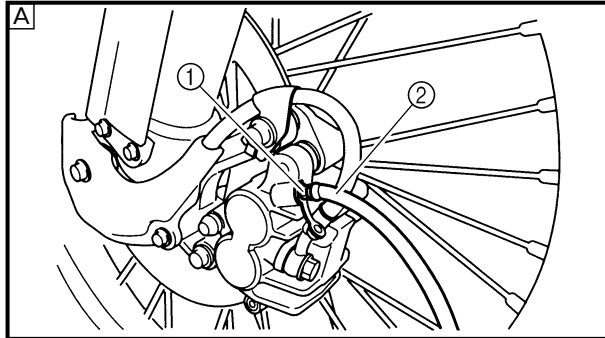
### BRAKE SYSTEM AIR BLEEDING

#### **⚠ 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:
  - Master cylinder cap
  - Diaphragm
  - 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)**

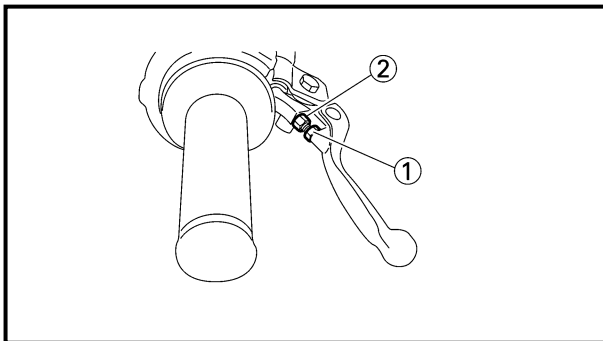
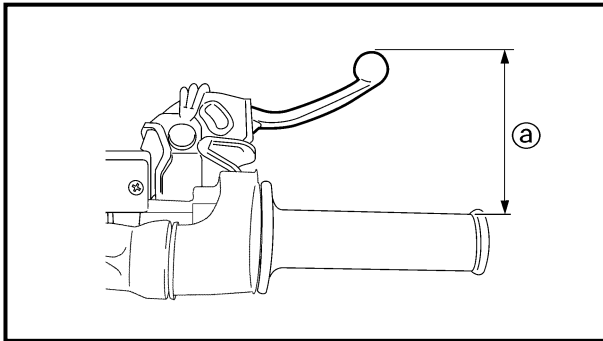
- i. Repeat steps (e) to (h) until of the air bubbles have been removed from the system.

**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)
  - Diaphragm
  - 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:
  - 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.

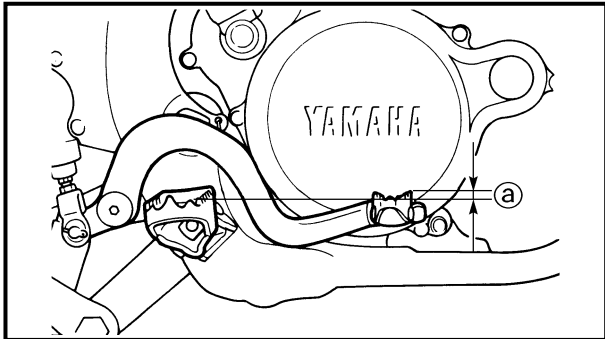
	<b>Locknut:</b> <b>5 Nm (0.5 m • kg, 3.6 ft • lb)</b>
---	--

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

4. Install:
  - Lever cover



# REAR BRAKE ADJUSTMENT/ FRONT BRAKE PAD INSPECTION AND REPLACEMENT

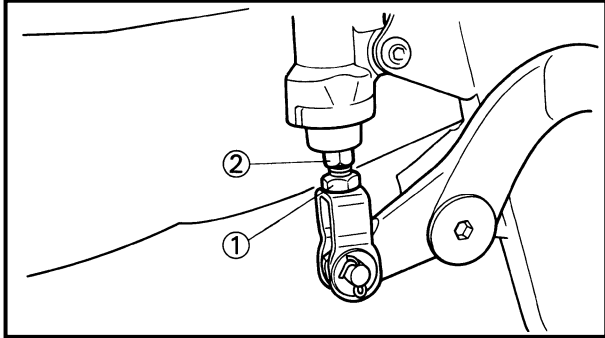


EC364002

## REAR BRAKE ADJUSTMENT

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

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



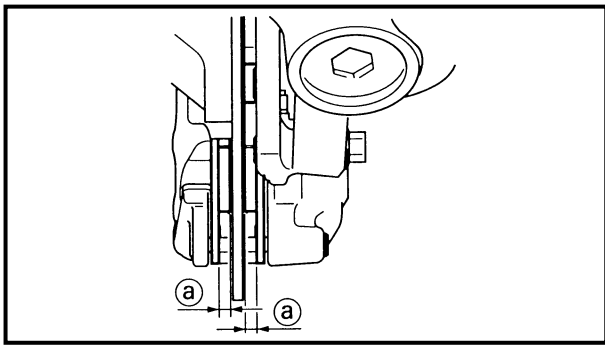
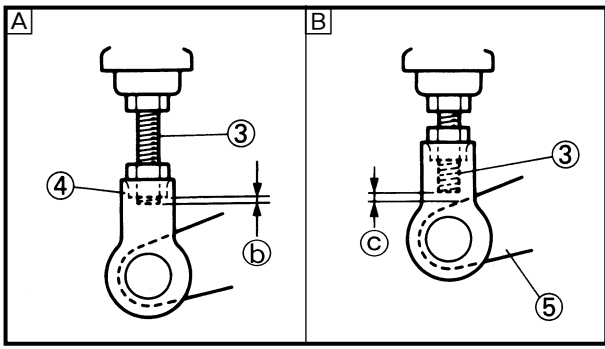
2. Adjust:
  - Brake pedal height

### 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 ④ should protrude out of the threaded portion ④ but not be less than 2 mm (0.08 in) ⑤ away from the brake pedal ⑤).
- After the pedal height adjustment, make sure that the rear brake does not drag.



EC365080

## FRONT BRAKE PAD INSPECTION AND REPLACEMENT

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

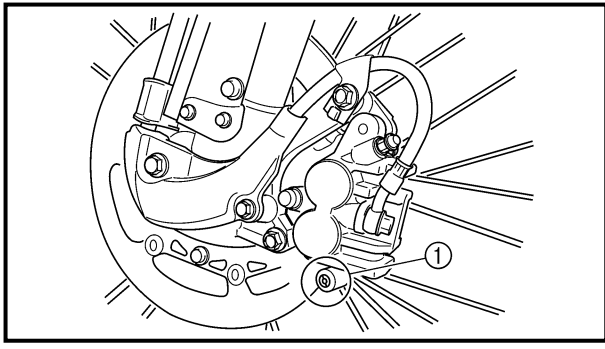
**Brake pad thickness ①:**

Standard	<Limit>
4.4 mm (0.17 in)	1.0 mm (0.04 in)

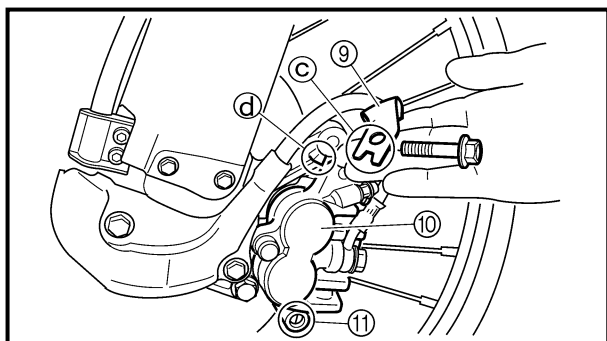
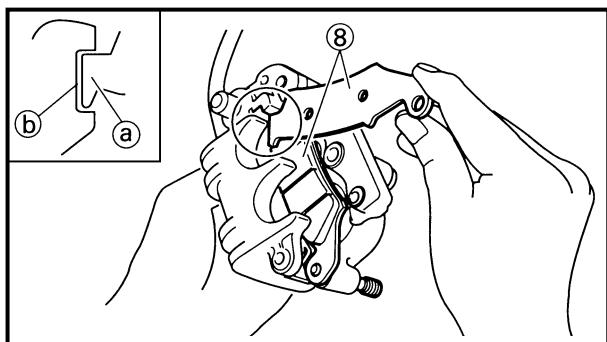
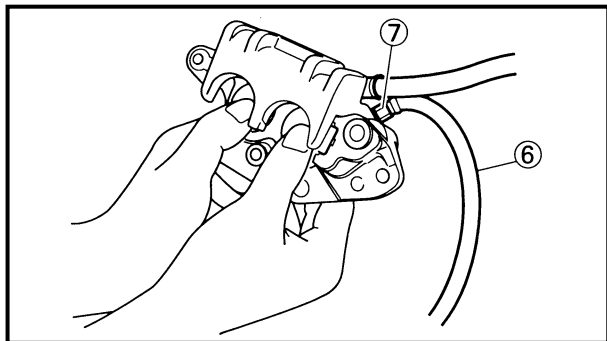
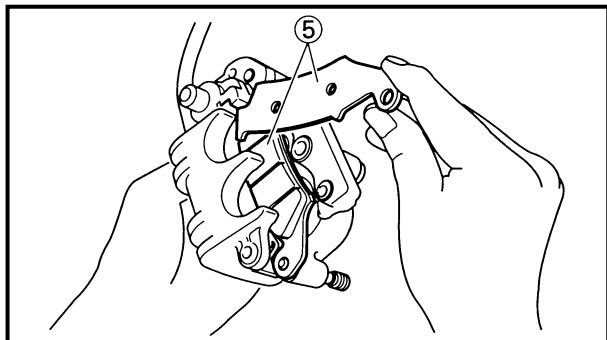
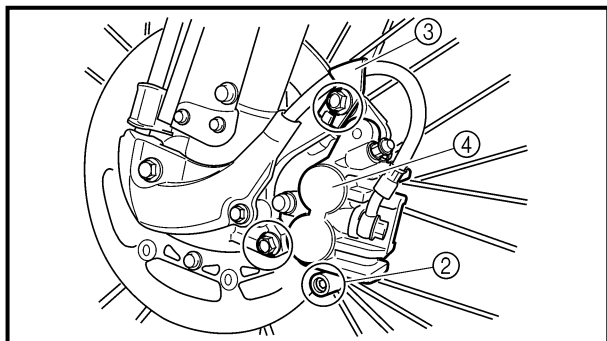
2. Replace:
  - Brake pad

### Brake pad replacement steps:

- Remove the pad pin plug ①.



# FRONT BRAKE PAD INSPECTION AND REPLACEMENT



- Loosen the pad pin ②.
- Remove the brake hose holder ③ and 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 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 caliper recesses ②.
- Temporarily tighten the pad pin at this point.

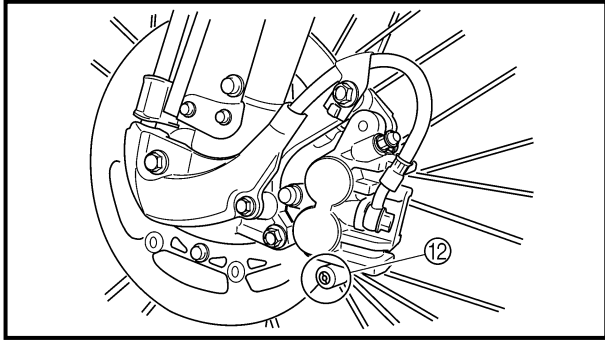
- Install the brake hose holder ⑨ and caliper ⑩ and tighten the pad pin ⑪.

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

Fit the brake hose holder cut ③ over the projection ④ on the front fork and clamp the brake hose.



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

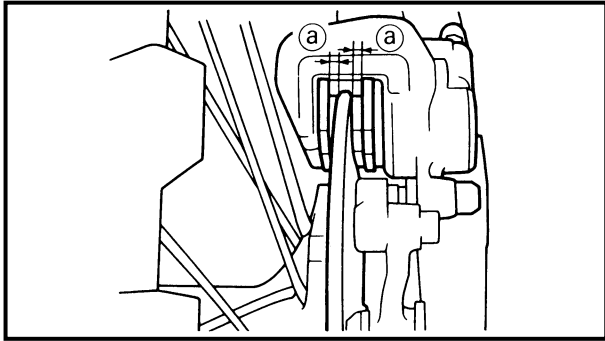


- Install the pad pin plug ⑫.



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

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



EC366060

## REAR BRAKE PAD INSPECTION AND REPLACEMENT

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



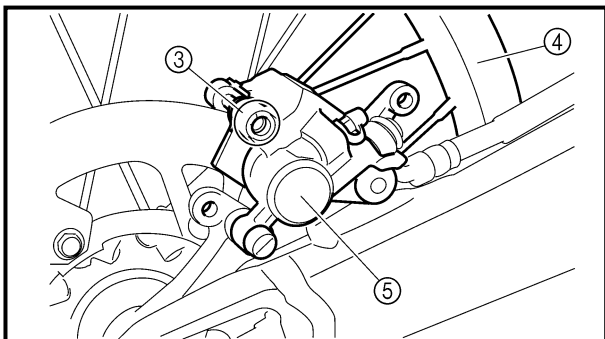
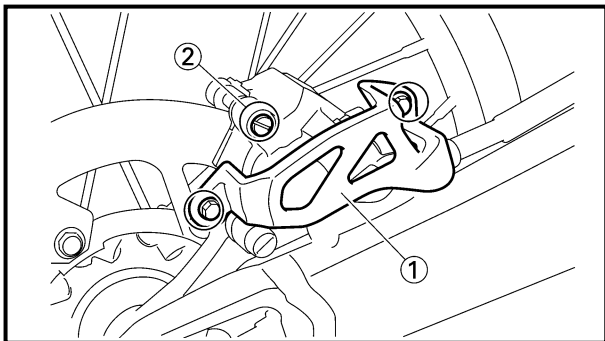
**Brake pad thickness ①:**

Standard	<Limit>
6.4 mm (0.25 in)	1.0 mm (0.04 in)

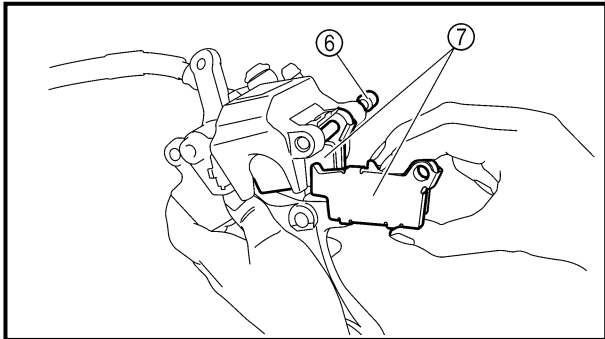
- Replace:
  - Brake pad

### Brake pad replacement steps:

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

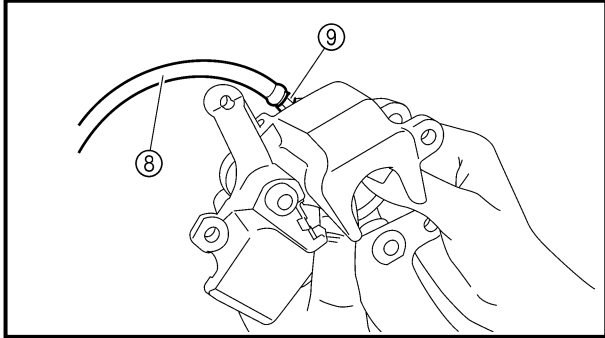


# REAR BRAKE PAD INSPECTION AND REPLACEMENT



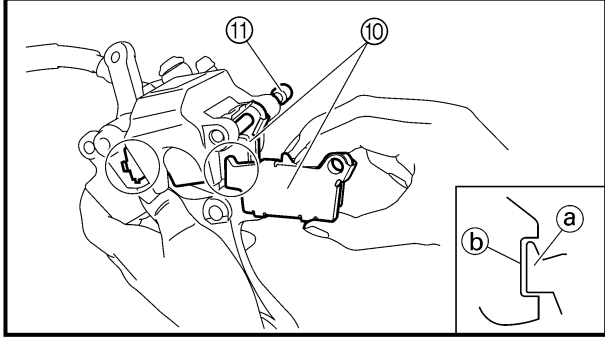
- Remove the pad pin (6) and brake pads (7).
- Connect the transparent hose (8) to the bleed screw (9) and place the suitable container under its end.
- Loosen the bleed screw and push the caliper piston in.

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



- Tighten the bleed screw.


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

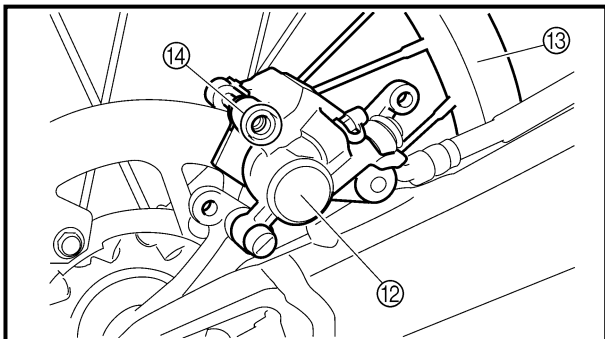


- Install the brake pad (10) and pad pin (11).


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

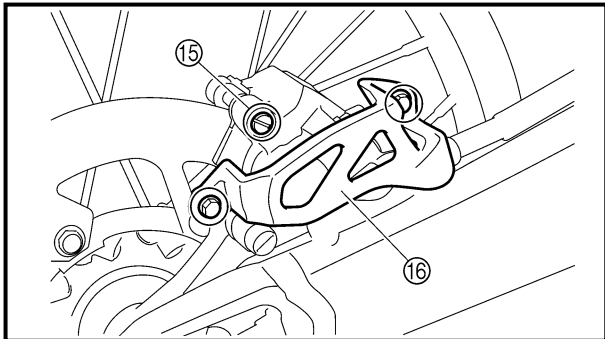
- Install the caliper (12) and rear wheel (13). Refer to “FRONT WHEEL AND REAR WHEEL” section in the CHAPTER 5.
- Tighten the pad pin (14).

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

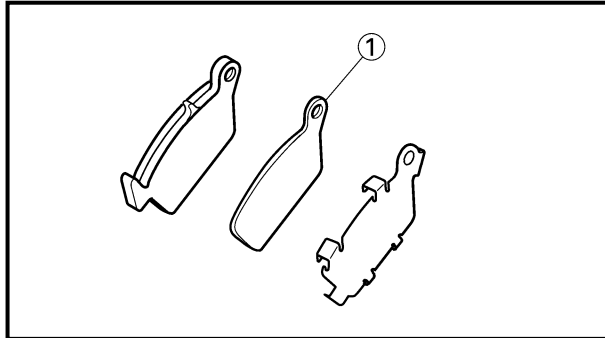


- Install the pad pin plug (15) and protector (16).

 **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)**



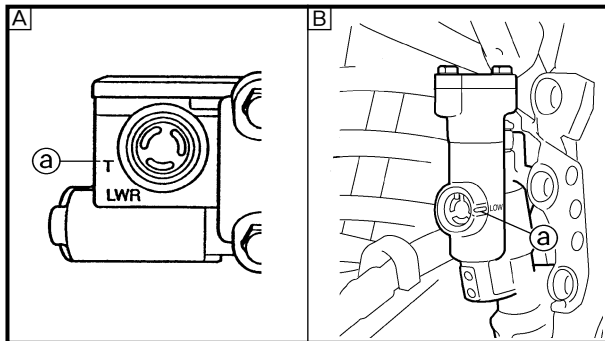
3. Inspect:
  - Brake fluid level  
Refer to “BRAKE FLUID LEVEL INSPECTION” section.
4. Check:
  - Brake pedal operation  
A softy or spongy feeling → Bleed brake system.  
Refer to “BRAKE SYSTEM AIR BLEEDING” section.



EC36b000

## 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.



EC367001

## BRAKE FLUID LEVEL INSPECTION

1. Place the 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

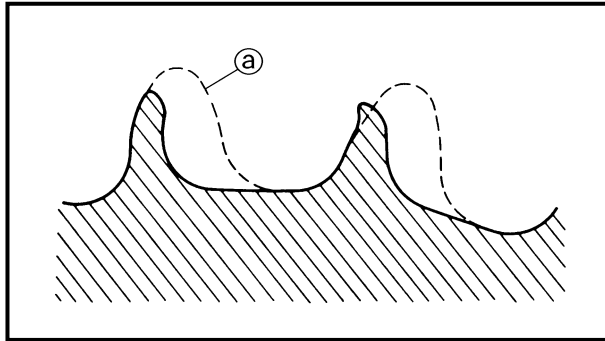
Ⓑ Rear



**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.



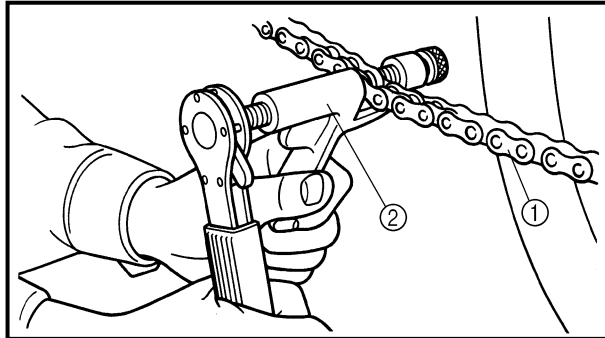
EC368000

## SPROCKETS INSPECTION

1. Inspect:
  - Sprocket teeth **a**
 Excessive wear → Replace.

### NOTE:

Replace the drive, driven sprockets and drive chain as a set.

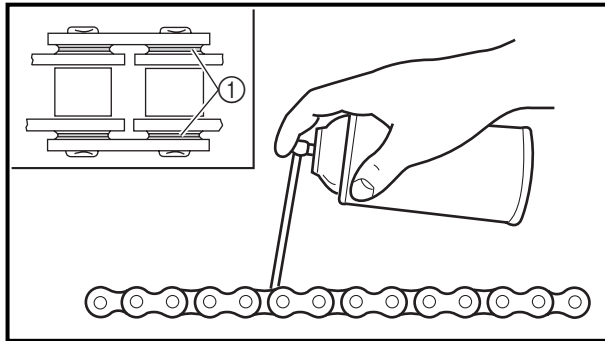


## DRIVE CHAIN INSPECTION

1. Remove:
  - Drive chain **1**

### NOTE:

Remove the drive chain using a chain cutter **2**.

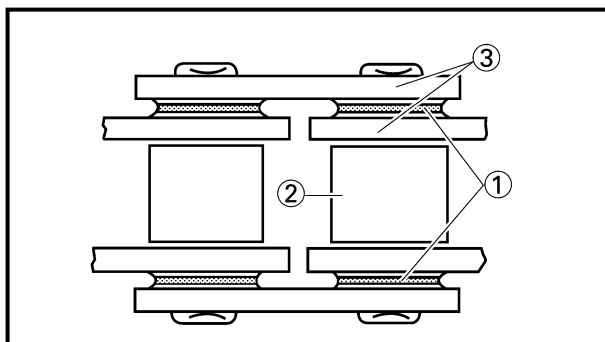


2. Clean:

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

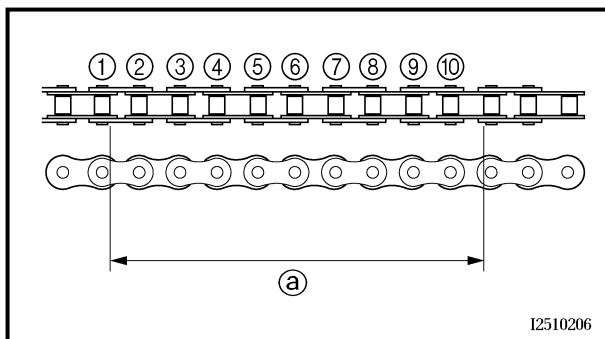
### CAUTION:

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.



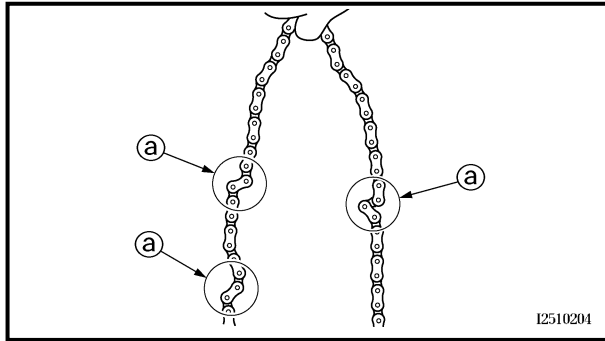
4. Measure:

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



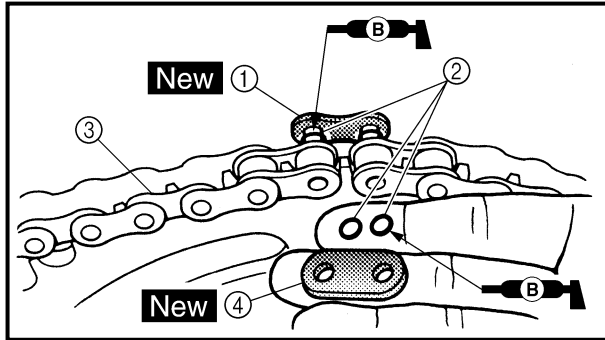
**Drive chain length (10 links):**  
**<Limit>: 150.1 mm (5.91 in)**

I2510206



5. Check:

- Drive chain stiffness ①
- Clean and oil the chain and hold as illustrated.  
Stiff → Replace the drive chain.



6. Install:

- Joint ① **New**
- O-ring ②
- Drive chain ③

**NOTE:**

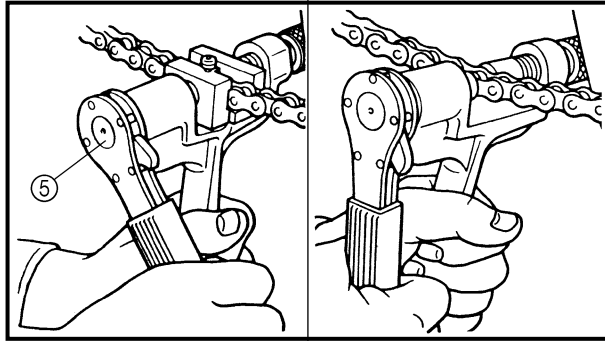
When installing the drive chain, apply the lithium soap base grease on the joint and O-rings.

7. Install:

- Link plate ④ **New**

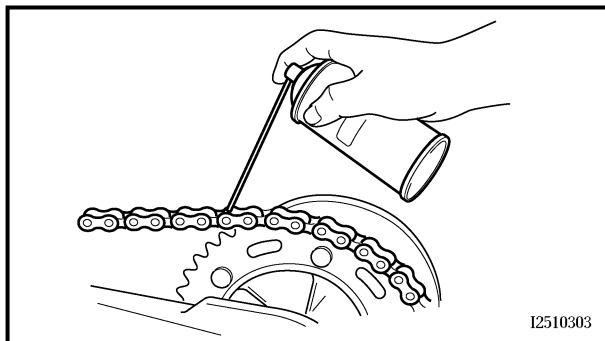
**NOTE:**


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

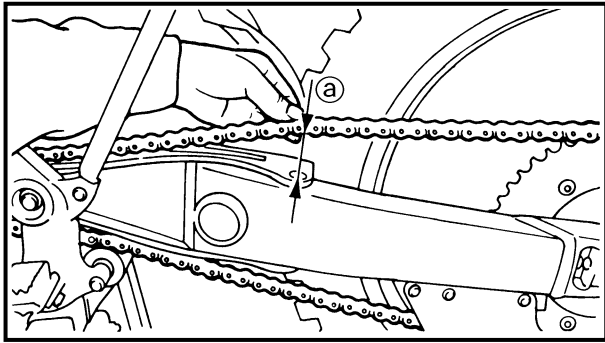


8. Lubricate:

- 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

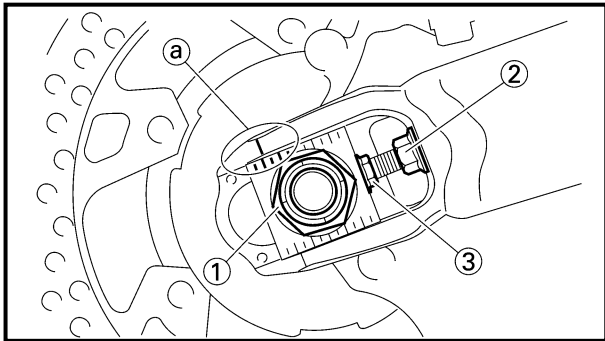
1. Elevate the rear wheel by placing the suitable stand under the engine.
2. Check:
  - Drive chain slack ①
  - Above the seal guard installation bolt.
  - Out of specification → Adjust.



**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 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 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 ① on each side of the chain puller alignment.)

### NOTE:

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

### CAUTION:

Too small 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.

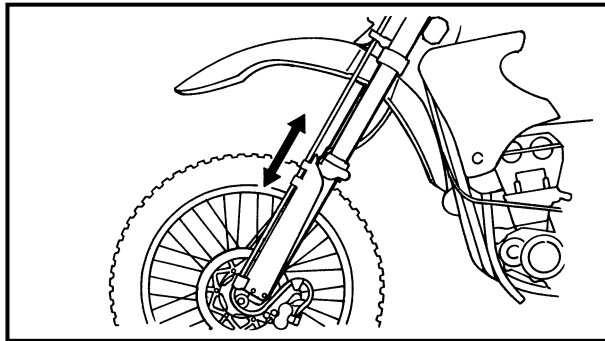


**Axle nut:**  
125 Nm (12.5 m • kg, 90 ft • lb)

- Tighten the locknuts.



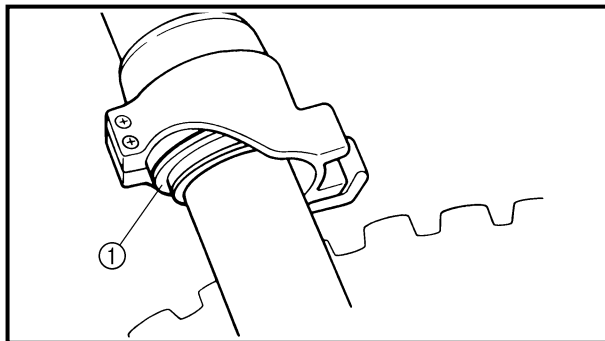
**Locknut:**  
16 Nm (1.6 m • kg, 11 ft • lb)



EC36C000

## 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.

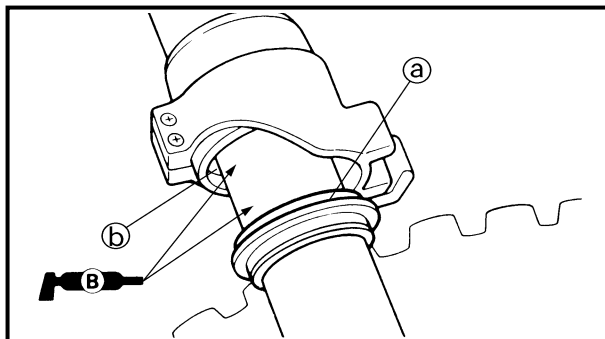


EC36D001

## FRONT FORK OIL SEAL AND DUST SEAL CLEANING

1. Remove:
  - Protector
  - Dust seal ①

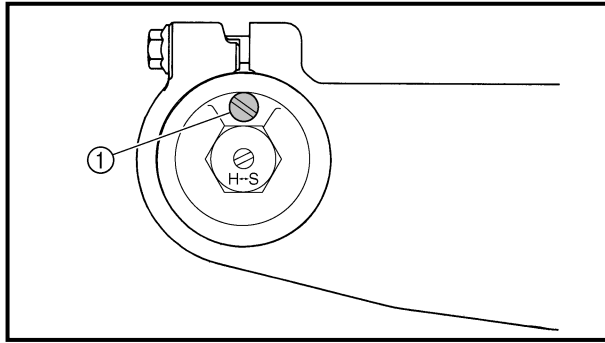
**NOTE:** \_\_\_\_\_  
Use a thin screw driver, and be careful not to damage the inner fork tube and dust seal.



2. Clean:
  - Dust seal ①
  - Oil seal ②

**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**



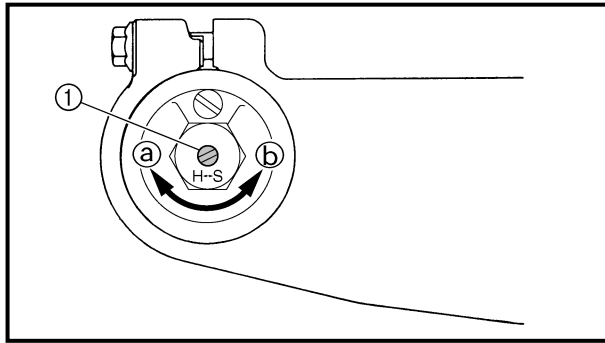
**FRONT FORK INTERNAL PRESSURE RELIEVING**

**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.

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



**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.

	<b>Standard position:</b>
	<b>10 clicks out</b>
	<b>* 8 clicks out</b>

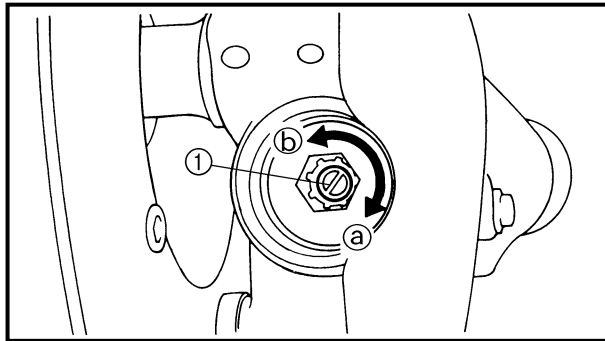
\* For EUROPE, AUS, NZ and ZA

**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.



EC36J001

## FRONT FORK COMPRESSION DAMPING FORCE ADJUSTMENT

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

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



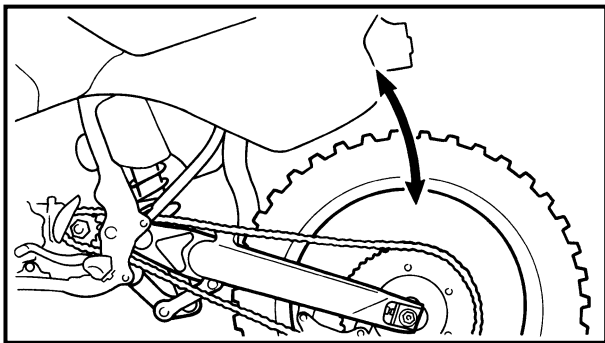
**CAUTION:**

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

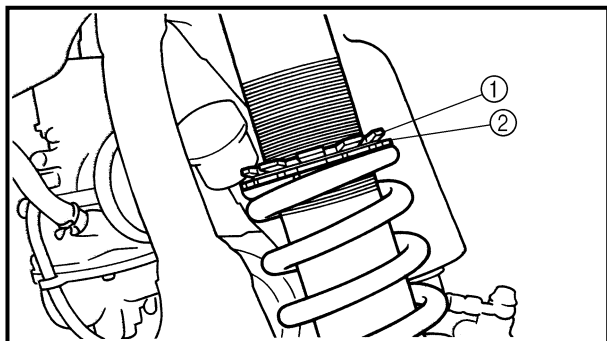


EC36K000

## 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.)



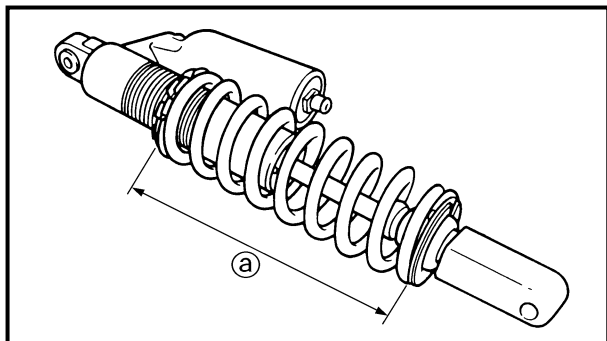
**Spring length (installed) ③:**

Standard length	Extent of adjustment
246 mm (9.69 in)	240.5 ~ 258.5 mm
* 246.5 mm (9.70 in)	(9.47 ~ 10.18 in)

\* For EUROPE, AUS, NZ and ZA

### 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)

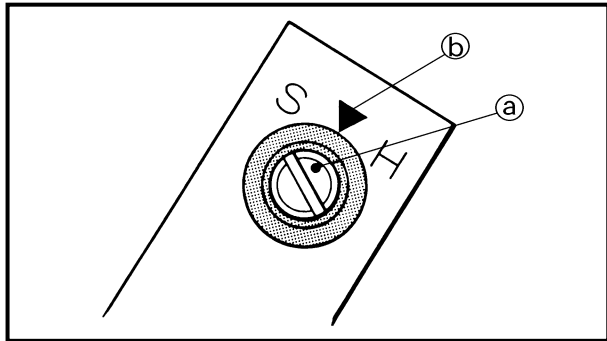
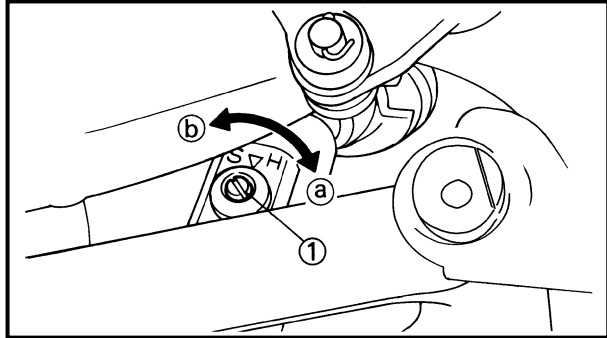
- Rear frame (lower)

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 9 clicks out  
\*About 10 clicks out

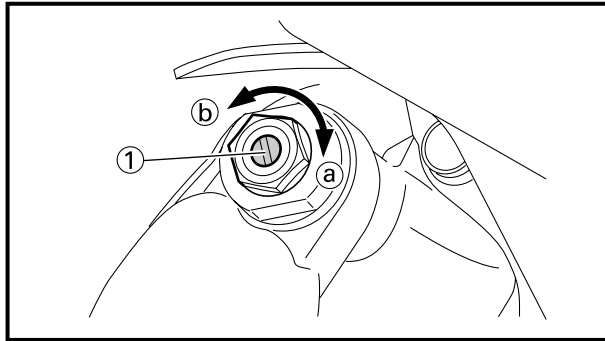
\* For EUROPE, AUS, NZ and ZA

**CAUTION:**

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

# REAR SHOCK ABSORBER LOW COMPRESSION DAMPING FORCE ADJUSTMENT

**INSP  
ADJ**



EC36c000

## REAR SHOCK ABSORBER LOW COMPRESSION DAMPING FORCE ADJUSTMENT

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

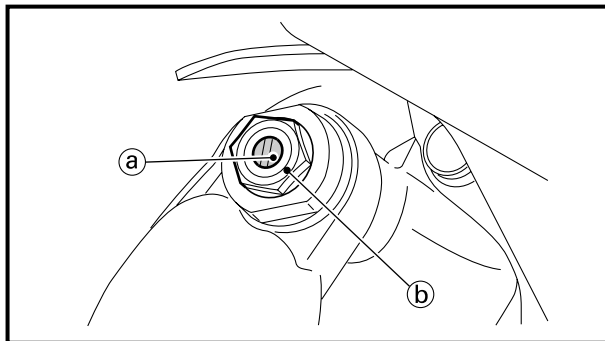
**Stiffer (a) → Increase the low compression damping force. (Turn the adjuster ① in.)**

**Softer (b) → Decrease the low 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. (Which align the punch mark (a) on the adjuster with the punch mark (b) on the high compression damping adjuster.)



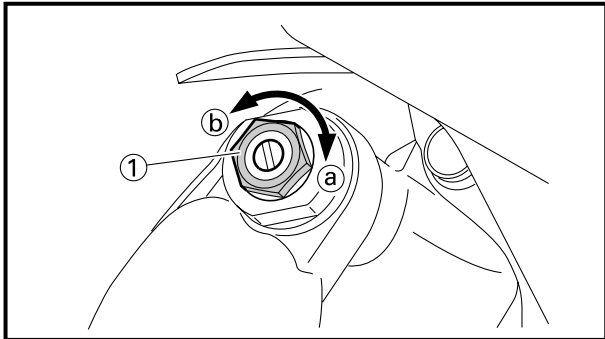
**Standard position:  
About 6 clicks out  
\*About 13 clicks out**

\* 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.**

# REAR SHOCK ABSORBER HIGH COMPRESSION DAMPING FORCE ADJUSTMENT



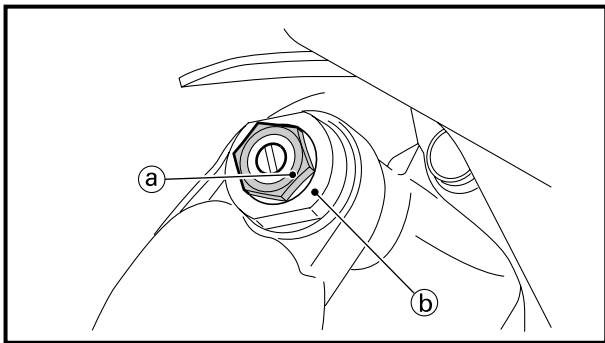
EC36d000

## REAR SHOCK ABSORBER HIGH COMPRESSION DAMPING FORCE ADJUSTMENT

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

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



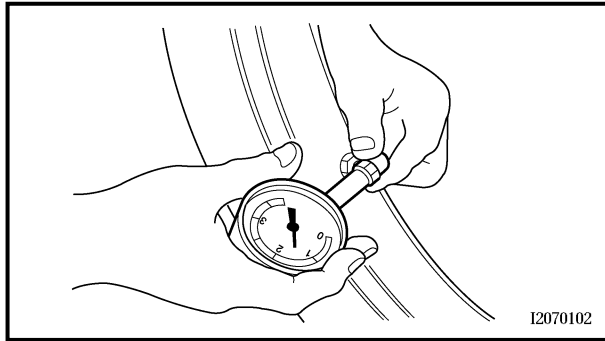
- STANDARD POSITION:**  
This is the position which is back by the specific number of turns from the fully turned-in position. (Which align the punch mark (a) on the adjuster with the punch mark (b) on the adjuster body.)

**Standard position:**  
**About 1-1/8 turns out**  
**\*About 1-1/3 turns 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.**





EC36Q000

## TIRE PRESSURE CHECK

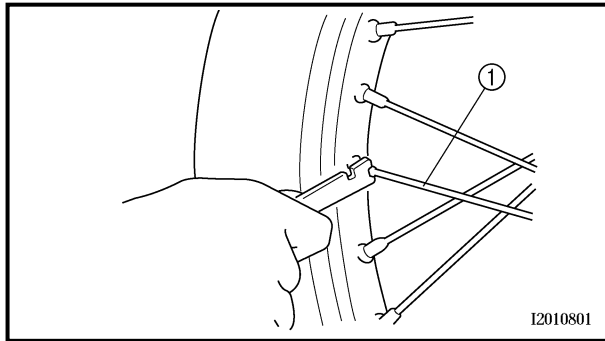
1. Measure:
  - Tire pressureOut of specification → Adjust.



**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.



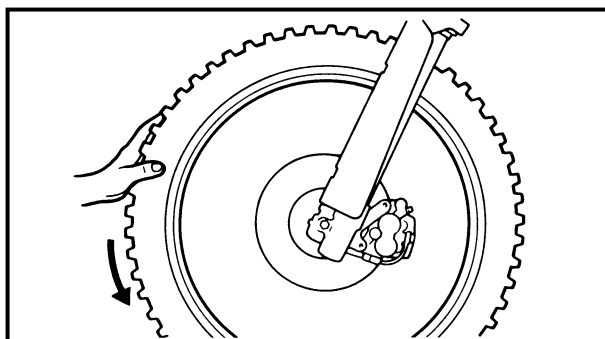
EC36S002

## 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:

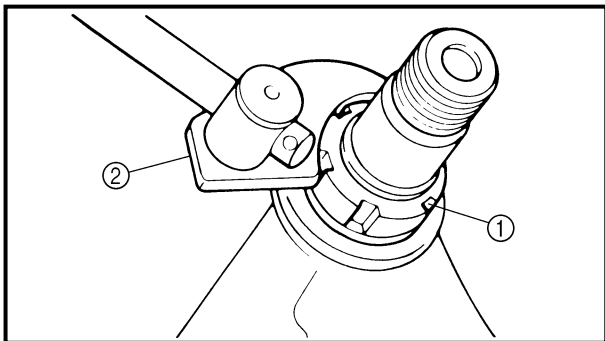
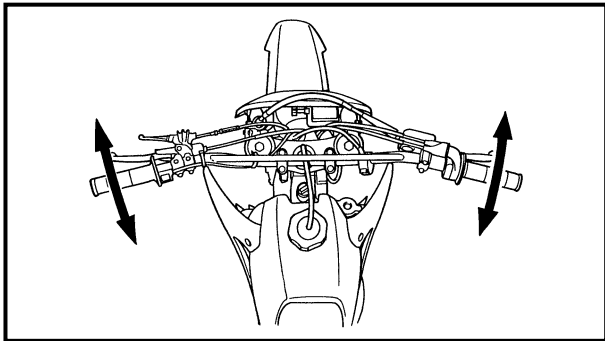
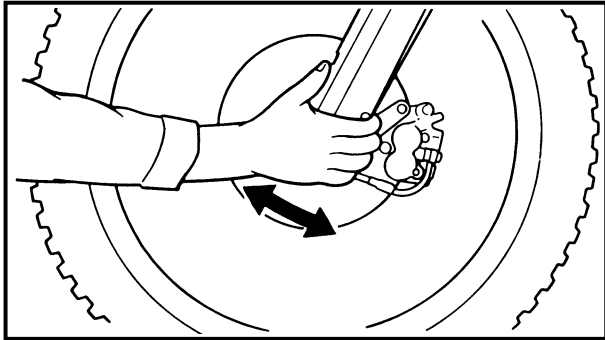
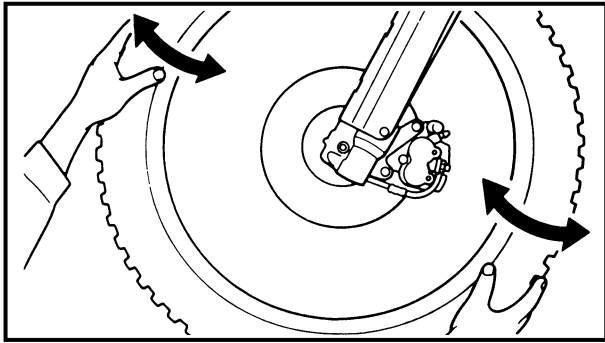
Be sure to retighten these spokes before and after break-in. After a practice or a race check spokes for looseness.



EC36T000

## WHEEL INSPECTION

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



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

## STEERING HEAD INSPECTION AND ADJUSTMENT

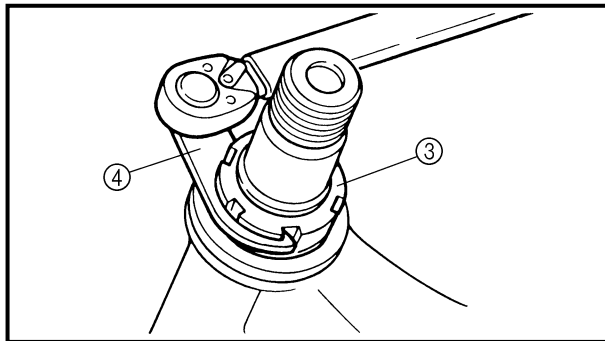
1. Elevate the front wheel by placing a suitable stand under the engine.
2. Check:
  - Steering shaft  
Grasp the bottom of the forks and gently rock the fork assembly back and forth.  
Free play → Adjust steering head.
3. Check:
  - Steering smooth action  
Turn the handlebar lock to lock.  
Unsmooth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

### Steering ring nut adjustment steps:

- Remove the headlight.
- Remove the handlebar and handle crown.
- Loosen the ring nut ① using the ring nut wrench ②.



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



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

**NOTE:** \_\_\_\_\_  
Set the torque wrench to the ring nut wrench so that they form a right angle.



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



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

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

**⚠ WARNING** \_\_\_\_\_

**Avoid over-tightening.**



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

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

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

- The handlebar 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 shaft cap.

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

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



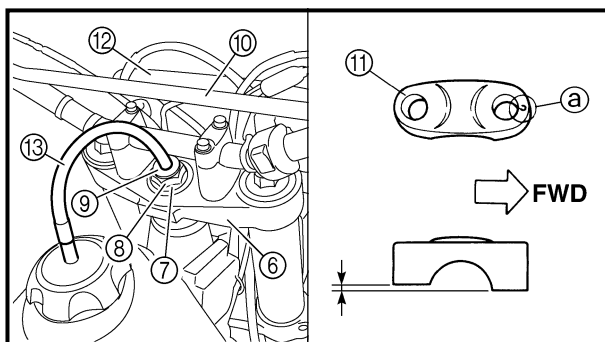
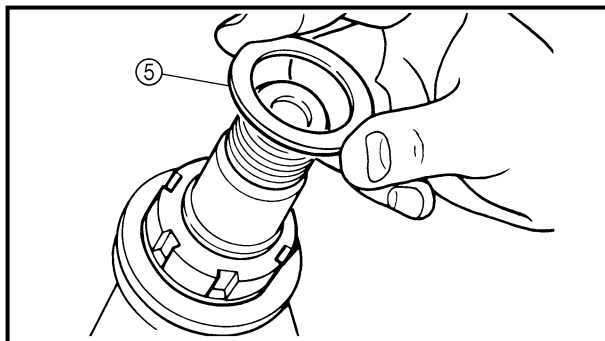
**Steering shaft nut:**  
**145 Nm (14.5 m • kg, 105 ft • lb)**

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

**Pinch bolt (handle crown):**  
**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**

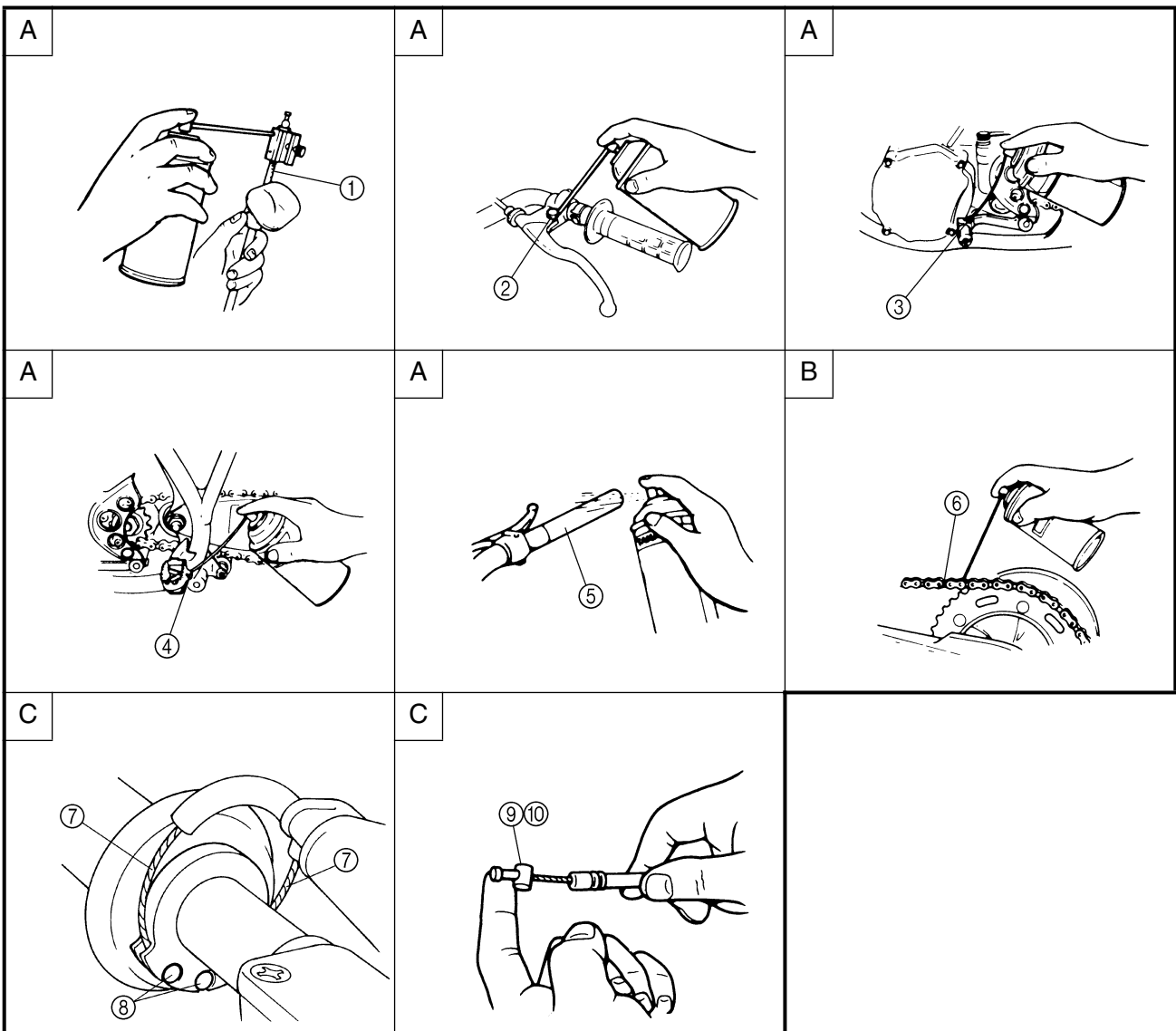
To ensure smooth operation of all components, lubricate your machine during setup, after break-in, and after every race.

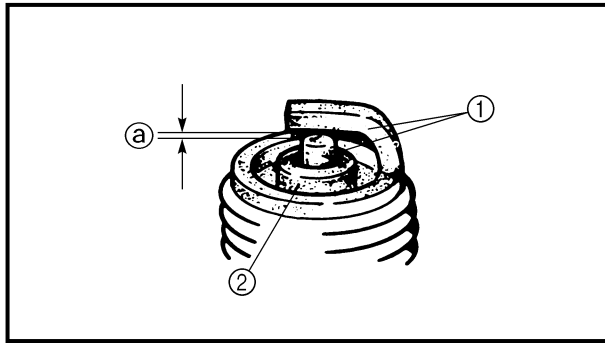
- ① All control cable
- ② Clutch lever pivot
- ③ Shift pedal pivot
- ④ Footrest pivot
- ⑤ Throttle-to-handlebar contact
- ⑥ Drive chain
- ⑦ Tube guide cable winding portion
- ⑧ Throttle cable end
- ⑨ Clutch cable end
- ⑩ Hot starter cable end

- 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:

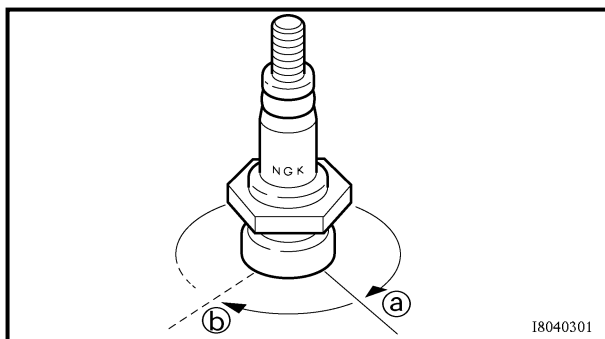
When the engine runs for many hours at low speeds, the spark plug insulator will become sooty, even if the engine and carburetor are in good operating condition.

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.



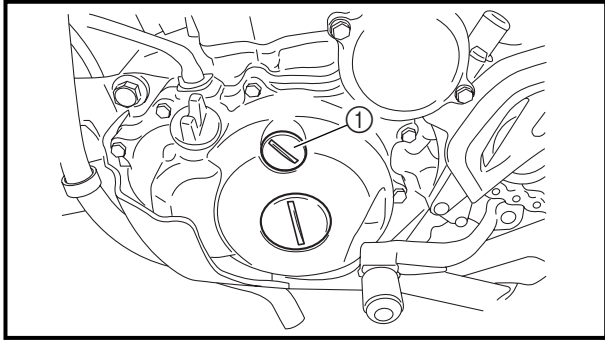
I8040301

5. Tighten:
  - Spark plug

 **13 Nm (1.3 m · kg, 9.4 ft · lb)**

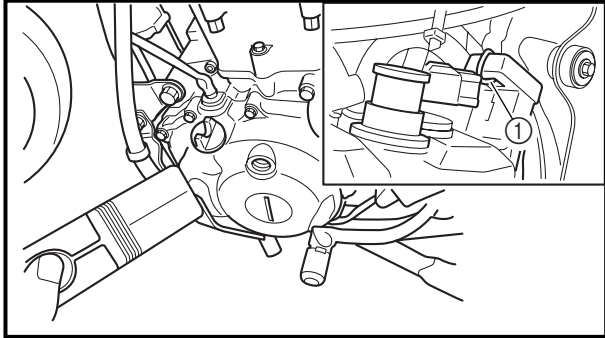
#### NOTE:

- Before installing a spark plug, clean the gasket surface and plug surface.
- Finger-tighten ③ the spark plug before torquing to specification ④.



## IGNITION TIMING CHECK

1. Remove:
  - Timing plug ①

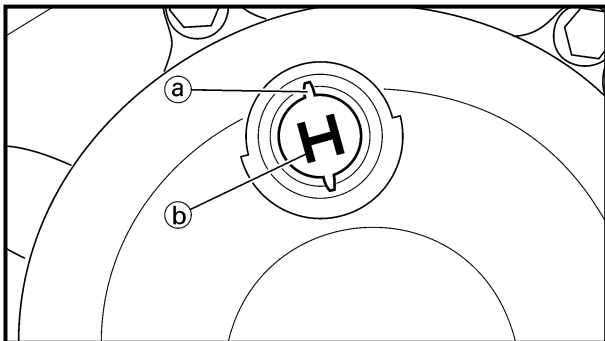


2. Attach:
  - Timing light
  - Inductive tachometer
 To the ignition coil lead (orange lead ①).



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

3. Check:
  - Ignition timing



### Checking steps:

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

4. Install:
  - Timing plug

## BATTERY INSPECTION AND CHARGING

### **⚠ WARNING**

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

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

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

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

### **INTERNAL**

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

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### **CAUTION:**

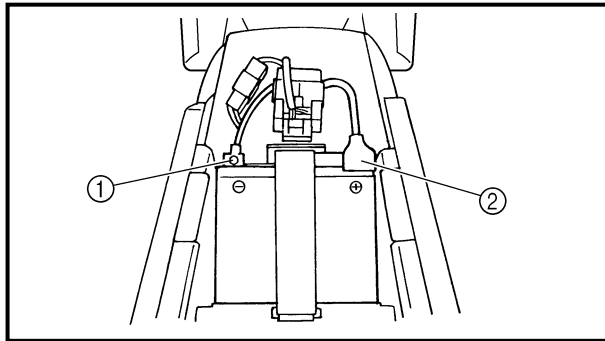
Charging time, charging amperage and charging voltage for an MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take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

---

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

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

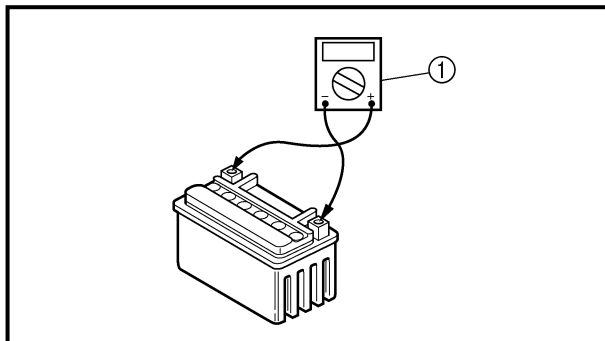
1. Remove:
  - Seat



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

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

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



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

**Measurement steps:**

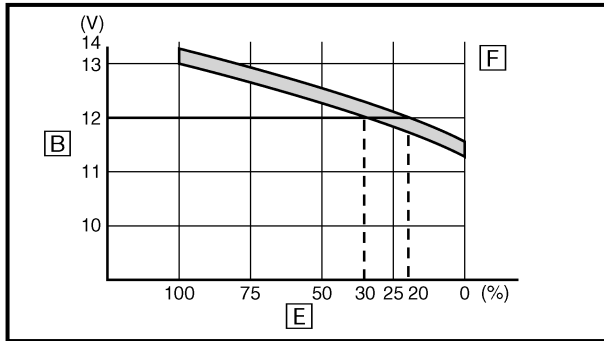
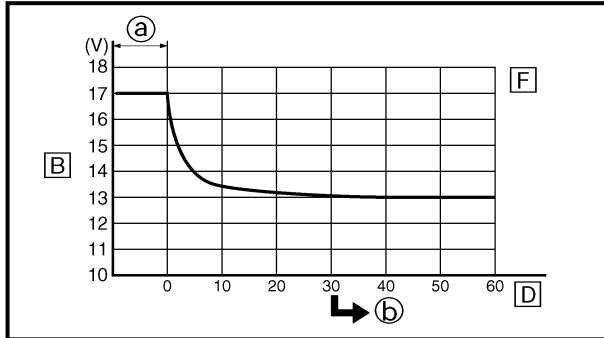
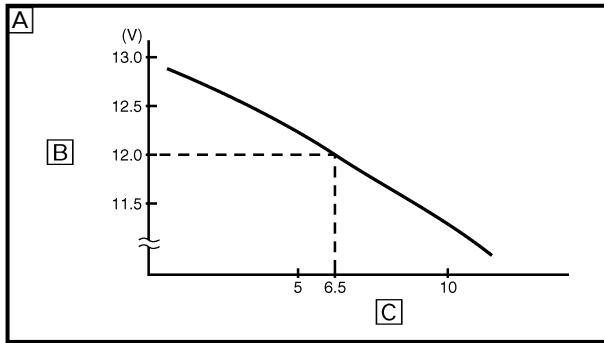
- Connect a pocket tester ① to the battery terminals.

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

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

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





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

### Example

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

**A** Relationship between the open-circuit voltage and the charging time at 20 °C (68 °F) (These values vary with the temperature, the condition of the battery plates, and the electrolyte level.)

**B** Open-circuit voltage

**C** Charging time (hours)

**D** Time (minutes)

**E** Charging condition of the battery

**F** Ambient temperature 20 °C (68 °F)

**a** Charging

**b** Check the open-circuit voltage.

5. Charge:

- Battery

(refer to the appropriate charging method illustration)

### ⚠ WARNING

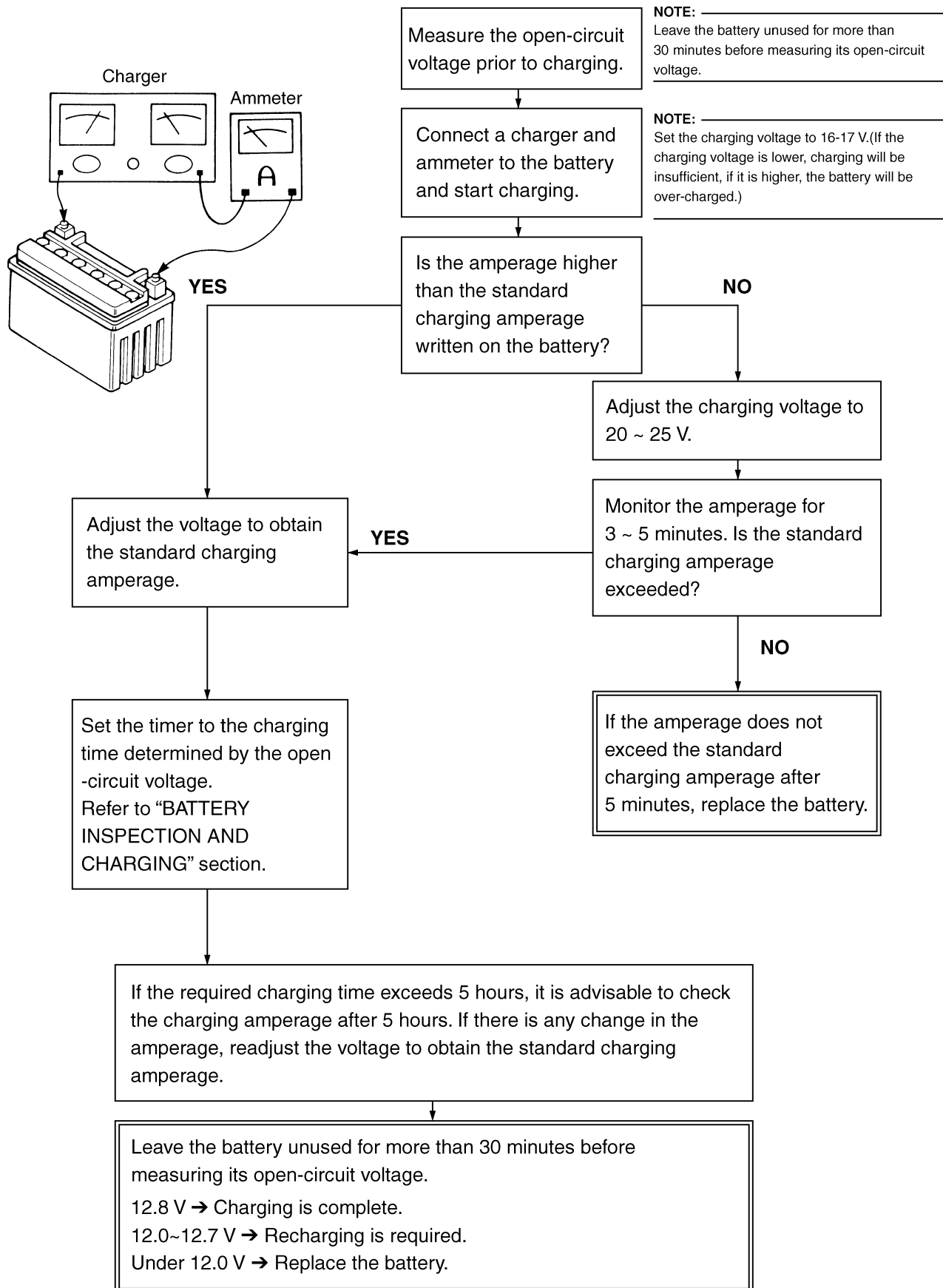
**Do not quick charge a battery.**

### ⚠ CAUTION:

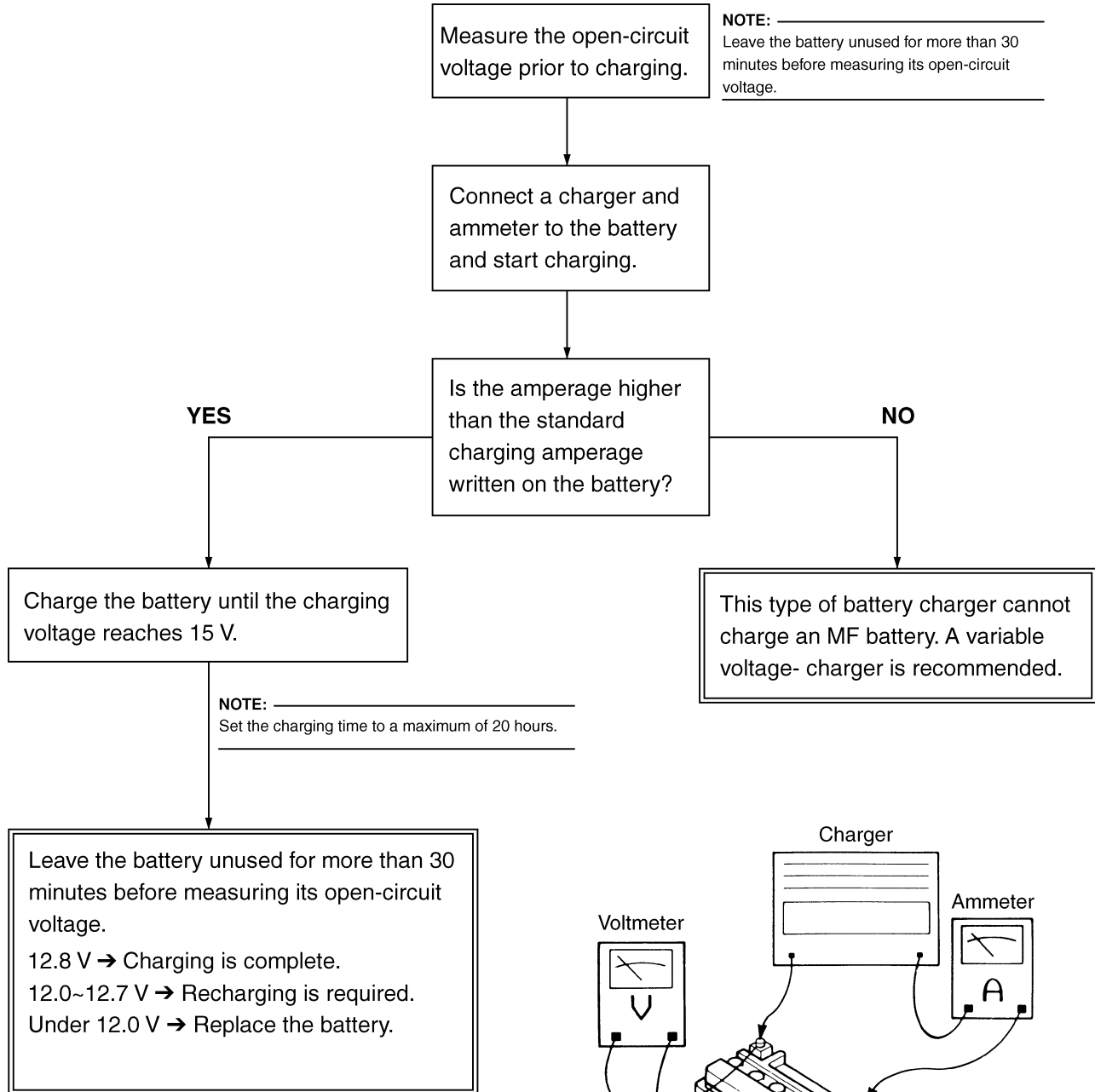
- Never remove the MF battery sealing caps.
- Do not use a high-rate battery charger since it forces a high-amperage current into the battery quickly and can cause battery overheating and battery plate damage.
- If it is impossible to regulate the charging current on the battery charger, be careful not 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.
-

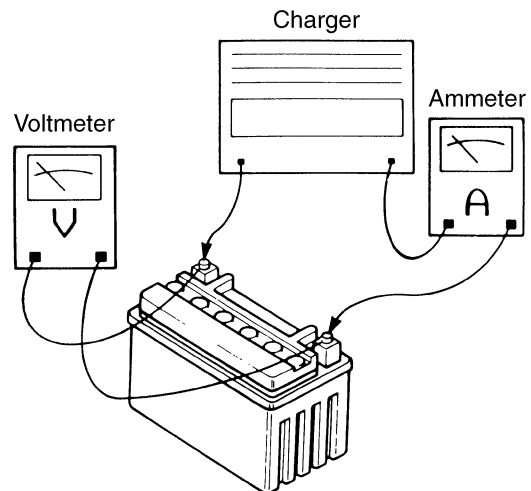
## Charging method using a variable voltage charger

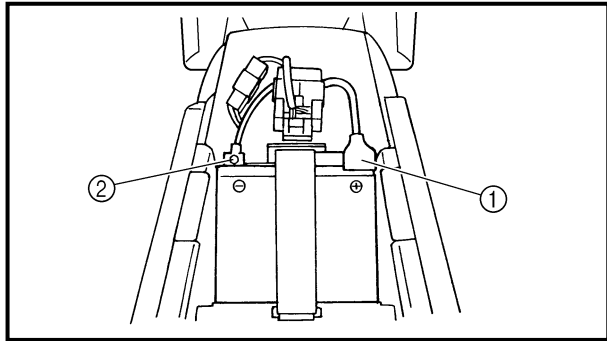


## Charging method using a constant voltage charger



**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.**

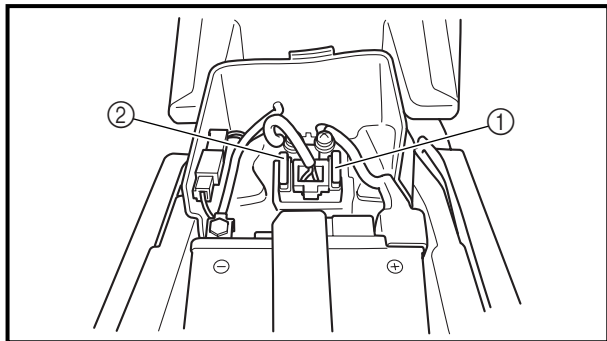
8. Check:
  - Battery terminals  
Dirt → Clean with a wire brush.  
Loose connection → Connect properly.
9. Lubricate:
  - Battery terminal

	<b>Recommended lubricant</b> Lithium soap base grease
---	--

10. Install:
  - Seat

EAS00181  
**FUSE INSPECTION**

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



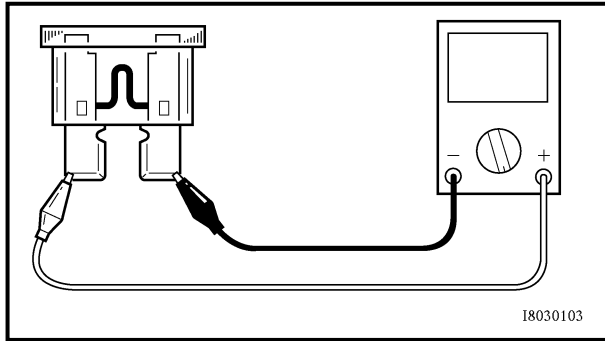
1. Remove:
  - Seat
  - Fuse cover
2. Check:
  - Continuity

<b>Checking steps:</b>	
<ul style="list-style-type: none"> <li>● Remove the fuse ①.</li> <li>● Connect the pocket tester to the fuse and check the continuity.</li> </ul>	
<b>NOTE:</b> _____	
Set the pocket tester selector to “Ω × 1”.	

	<b>Pocket tester</b> YU-3112-C/90890-03112
---	---

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

② Reserve fuse



3. Replace:
  - Blown fuse

### Replacement steps:

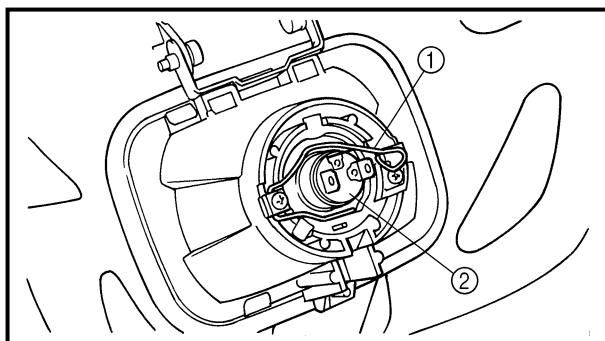
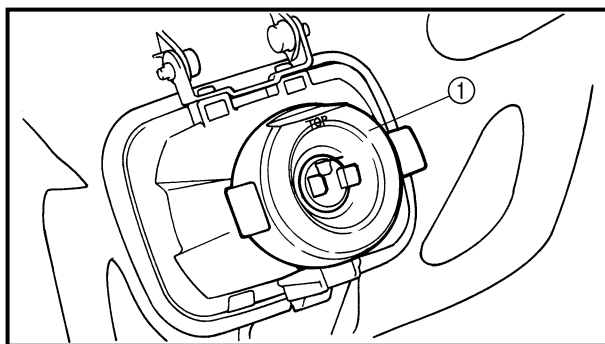
- Set the main switch to “OFF”.
- Install a new fuse of the correct amperage.
- Set on the switches to verify if the electrical circuit is operational.
- If the fuse immediately blows again, check the electrical circuit.

Items	Amperage rating	Q'ty
Main fuse	10 A	1

### **⚠ WARNING**

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

4. Install:
  - Fuse cover
  - Seat



## REPLACING THE HEADLIGHT BULBS

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

### **⚠ WARNING**


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

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

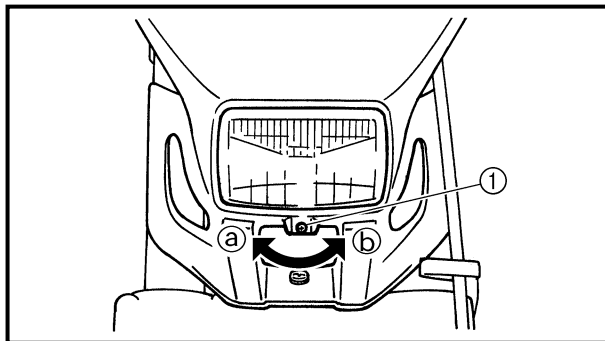
**CAUTION:**

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)

<b>Adjusting steps:</b>	
● Turn the adjusting screw ① in direction ② or ③.	
Direction ②	Headlight beam is raised.
Direction ③	Headlight beam is lowered.

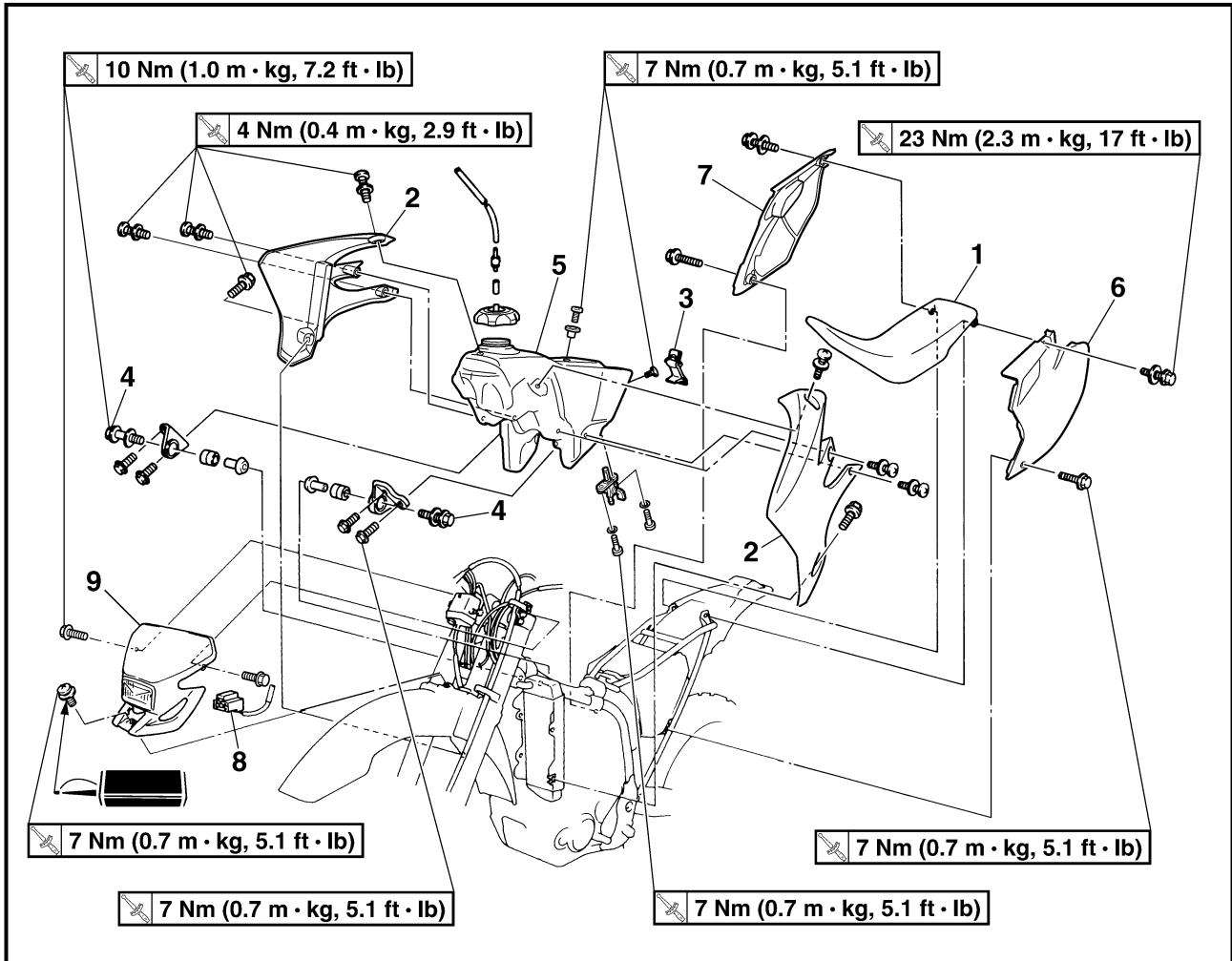
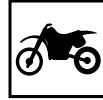


EC400000

## ENGINE

EC4R0000

## SEAT, FUEL TANK AND SIDE COVERS

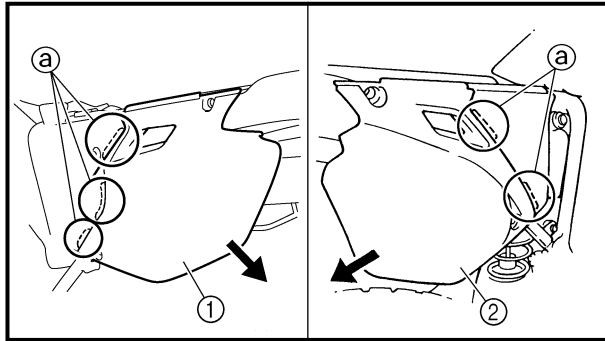


Extent of removal:

- 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	Refer to "REMOVAL POINTS".
	2	Air scoop (left and right)	2	
	3	Fitting band	1	
	4	Bolt (fuel tank)	2	
	5	Fuel tank	1	
	6	Side cover (left)	1	
	7	Side cover (right)	1	
	8	Headlight coupler	1	
	9	Headlight	1	



**REMOVAL POINTS****Side cover**

1. Remove:
  - Bolt (side cover)
  - Side cover (left) ①
  - Side cover (right) ②

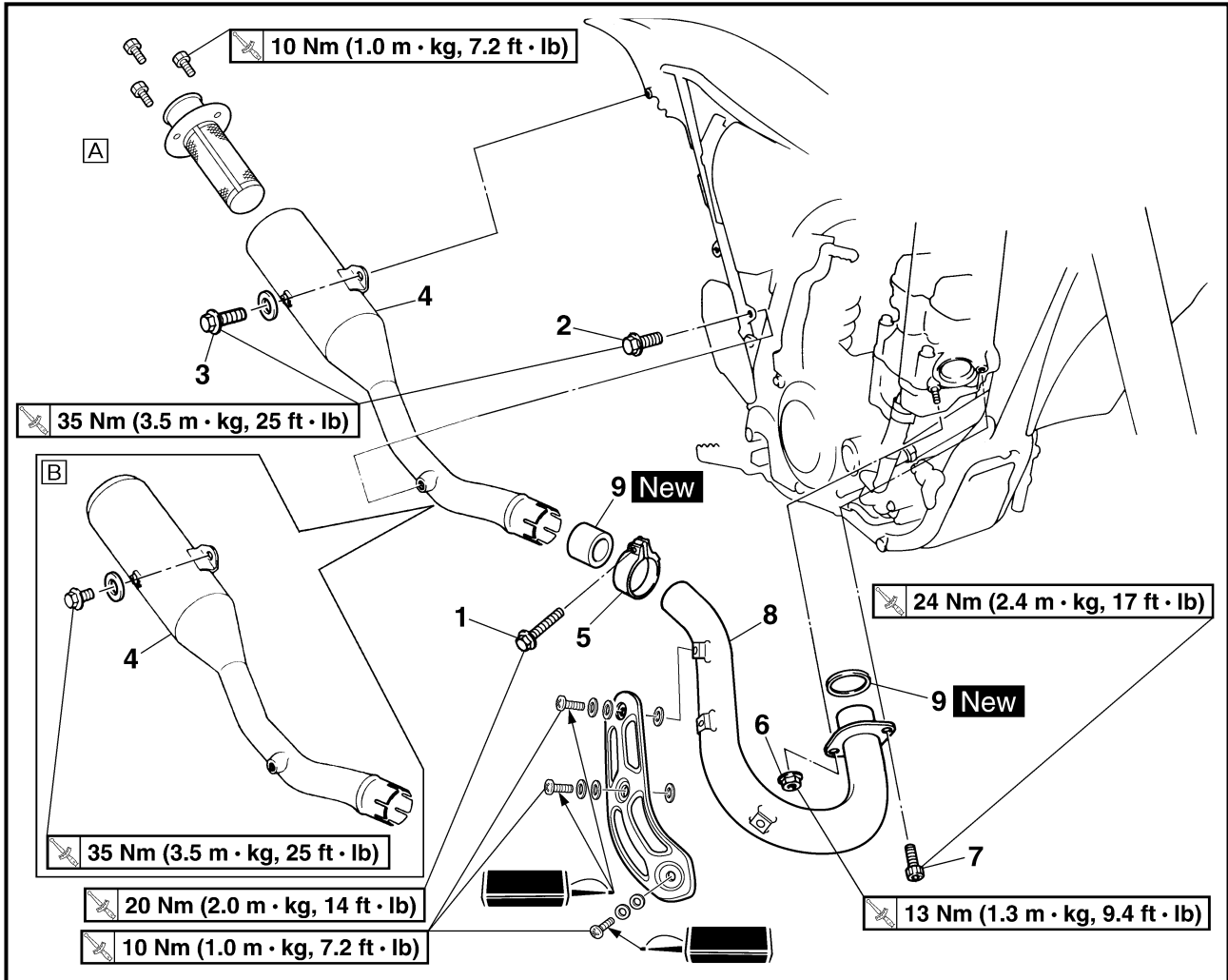
**NOTE:**

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** For USA

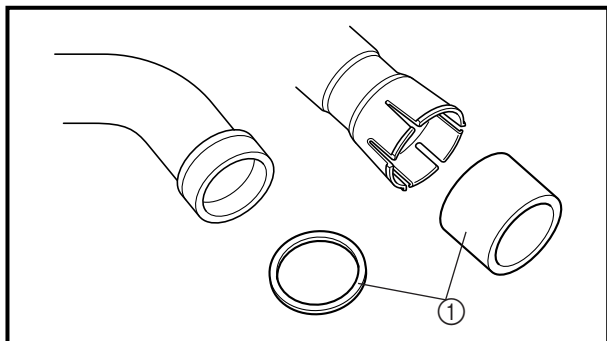
**B** Except for USA

Extent of removal:

① Silencer removal

② Exhaust pipe removal

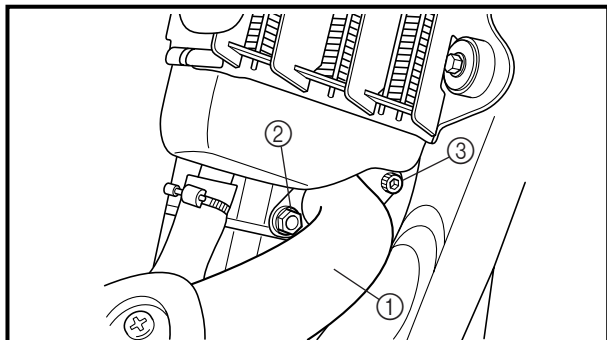
Extent of removal	Order	Part name	Q'ty	Remarks
<b>EXHAUST PIPE AND SILENCER REMOVAL</b>				
Preparation for removal		Side cover (right)		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
<div style="display: flex; align-items: center; justify-content: center;"> <div style="margin-right: 20px;"> <p>①</p> </div> <div style="margin-right: 20px;"> <p>②</p> </div> </div>	1	Bolt (clamp)	1	Only loosening.
	2	Bolt [silencer (front)]	1	
	3	Bolt [silencer (rear)]	1	
	4	Silencer	1	
	5	Clamp	1	
	6	Nut (exhaust pipe)	1	
	7	Bolt (exhaust pipe)	1	
	8	Exhaust pipe	1	
	9	Gasket	2	



### INSPECTION

#### Exhaust pipe and silencer

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



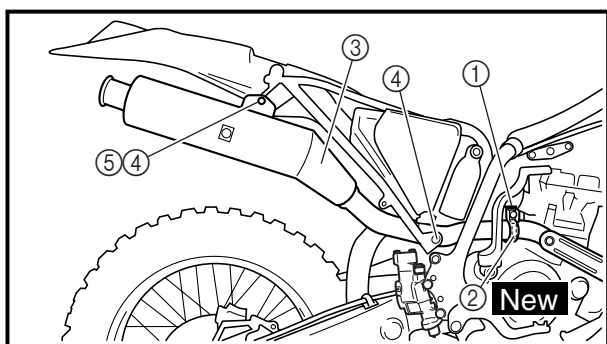
### ASSEMBLY AND INSTALLATION

#### Exhaust pipe and silencer

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

#### NOTE:

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

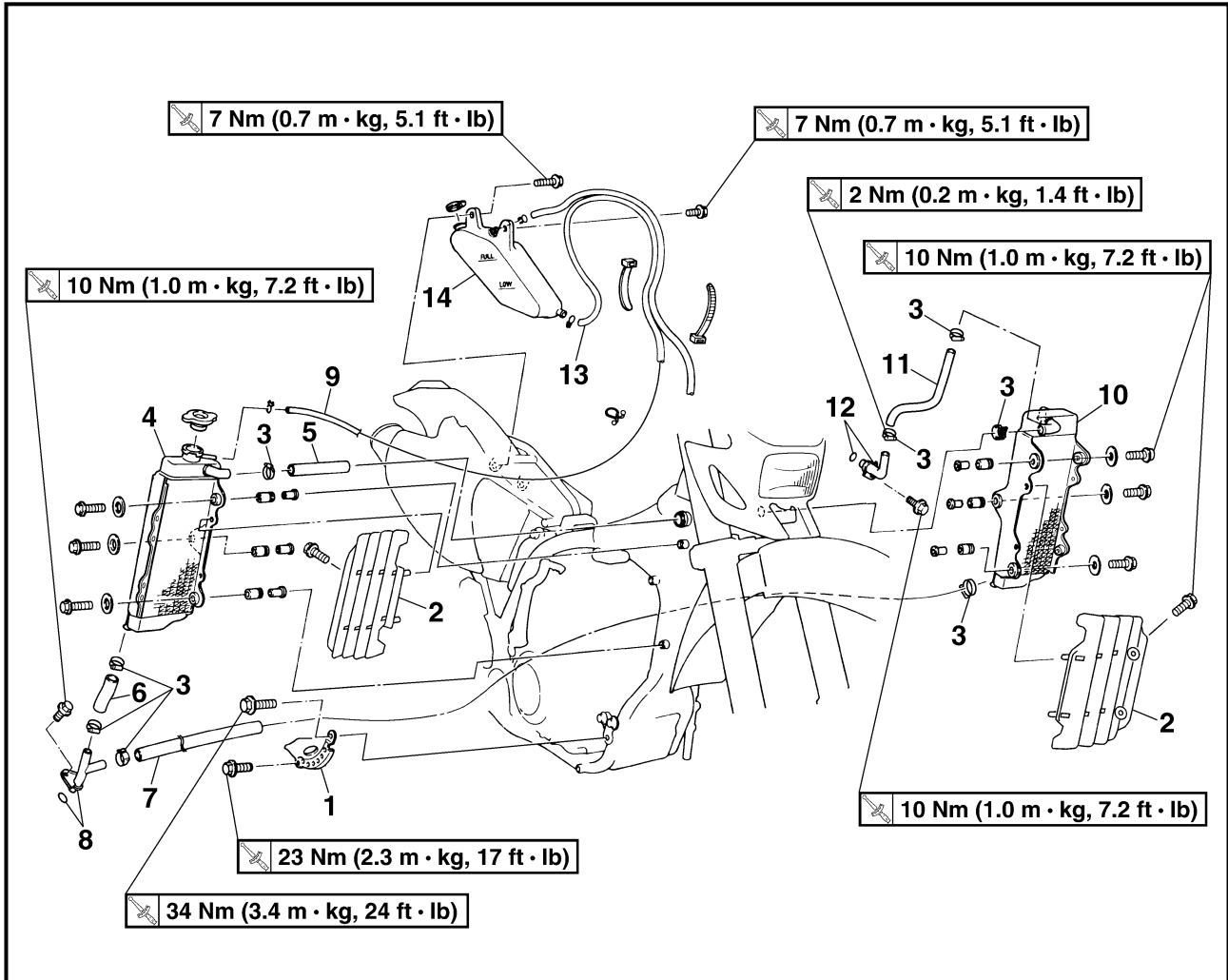


2. Install:
  - Clamp ①
    - 20 Nm (2.0 m · kg, 14 ft · lb)
  - Gasket ② **New**
  - Silencer ③
  - Washer ④
  - Bolt (silencer) ⑤
    - 35 Nm (3.5 m · kg, 25 ft · lb)



EC450001

## RADIATOR



Extent of removal:

① Radiator removal

② Coolant reservoir removal

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



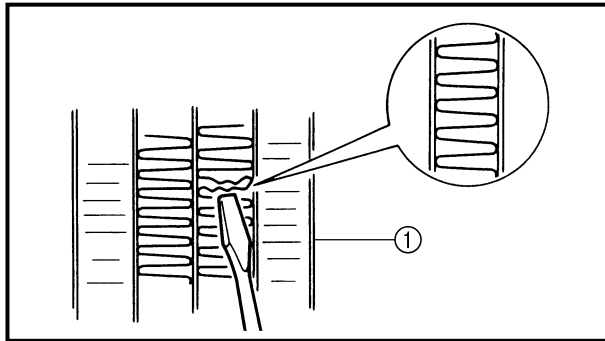
EC456000

**HANDLING NOTE****⚠ WARNING**

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

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

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



EC454000

**INSPECTION**

EC444100

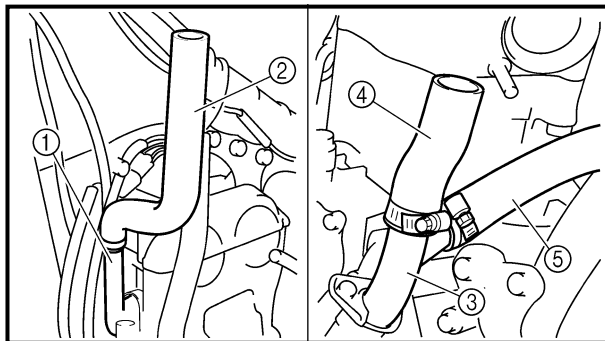
**Radiator**

## 1. Inspect:

- Radiator core ①

Obstruction → Blow out with compressed air through rear of the radiator.

Bent fin → Repair/replace.



EC455000

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

## 1. Install:

- Pipe 1 ①

10 Nm (1.0 m · kg, 7.2 ft · lb)

- Hose 1 ②

2 Nm (0.2 m · kg, 1.4 ft · lb)

- Pipe 2 ③

10 Nm (1.0 m · kg, 7.2 ft · lb)

- Hose 3 ④

2 Nm (0.2 m · kg, 1.4 ft · lb)

- Hose 4 ⑤

2 Nm (0.2 m · kg, 1.4 ft · lb)

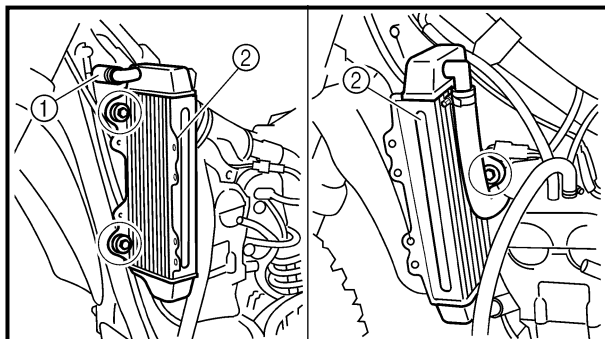
## 2. Install:

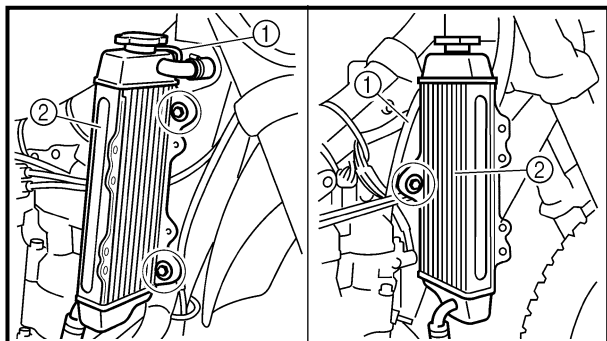
- Hose 2 ①

2 Nm (0.2 m · kg, 1.4 ft · lb)

- Radiator (left) ②


10 Nm (1.0 m · kg, 7.2 ft · lb)



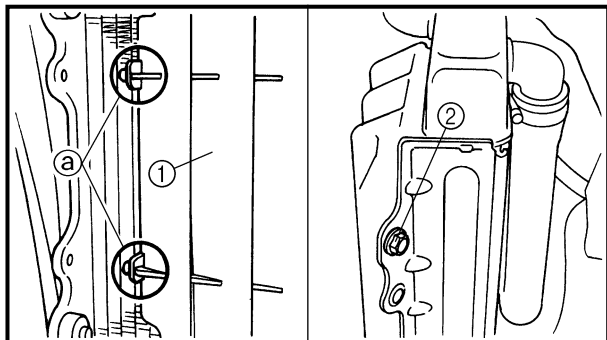


3. Install:

- Radiator breather hose ①
- Radiator (right) ②


 **10 Nm (1.0 m · kg, 7.2 ft · lb)**

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



4. Install:

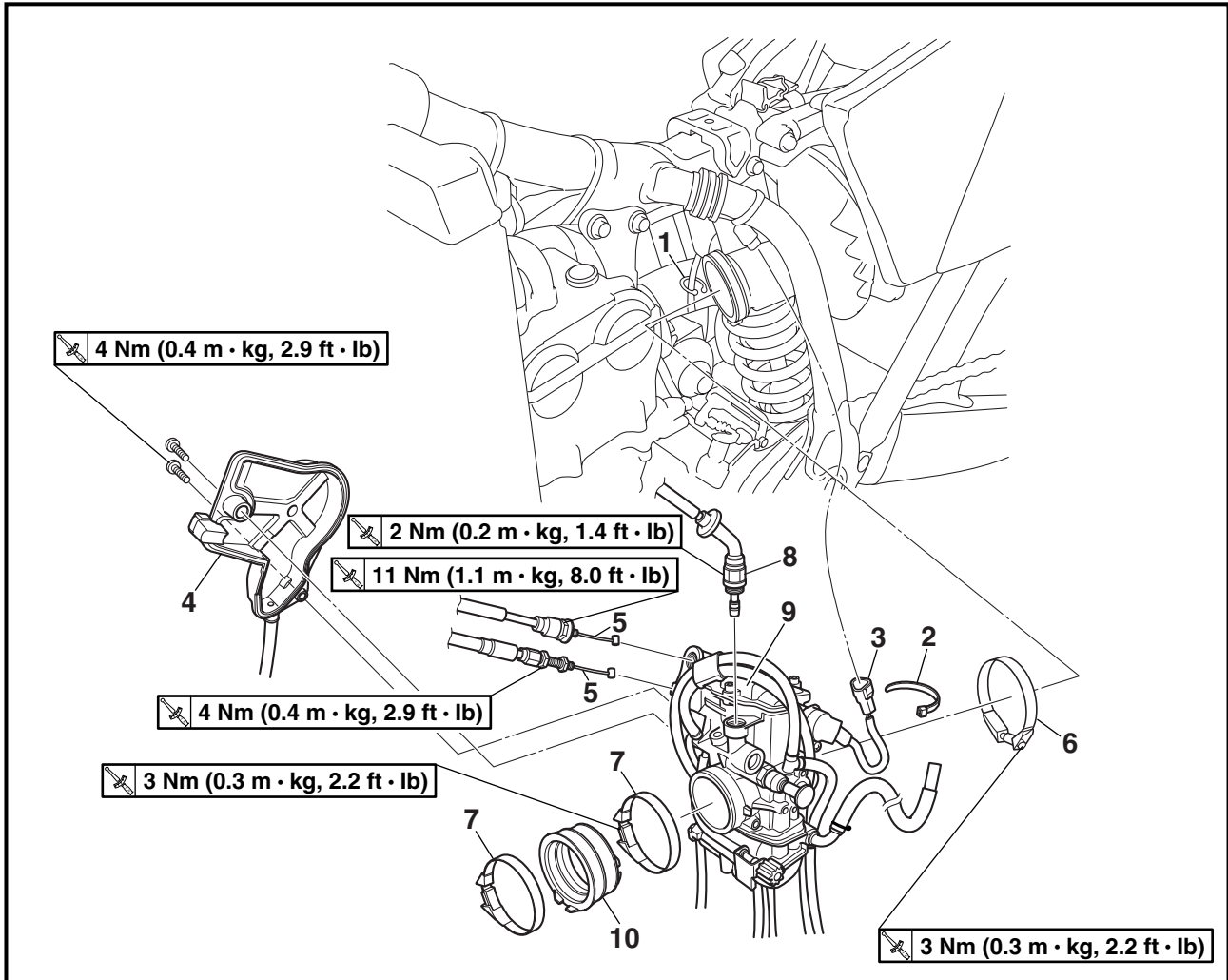
- Panel ①
- Bolt (radiator panel upper) ②

 **10 Nm (1.0 m · kg, 7.2 ft · lb)**

**NOTE:** \_\_\_\_\_  
 Fit the hook (a) on the inner side first into the radiator.  
 \_\_\_\_\_



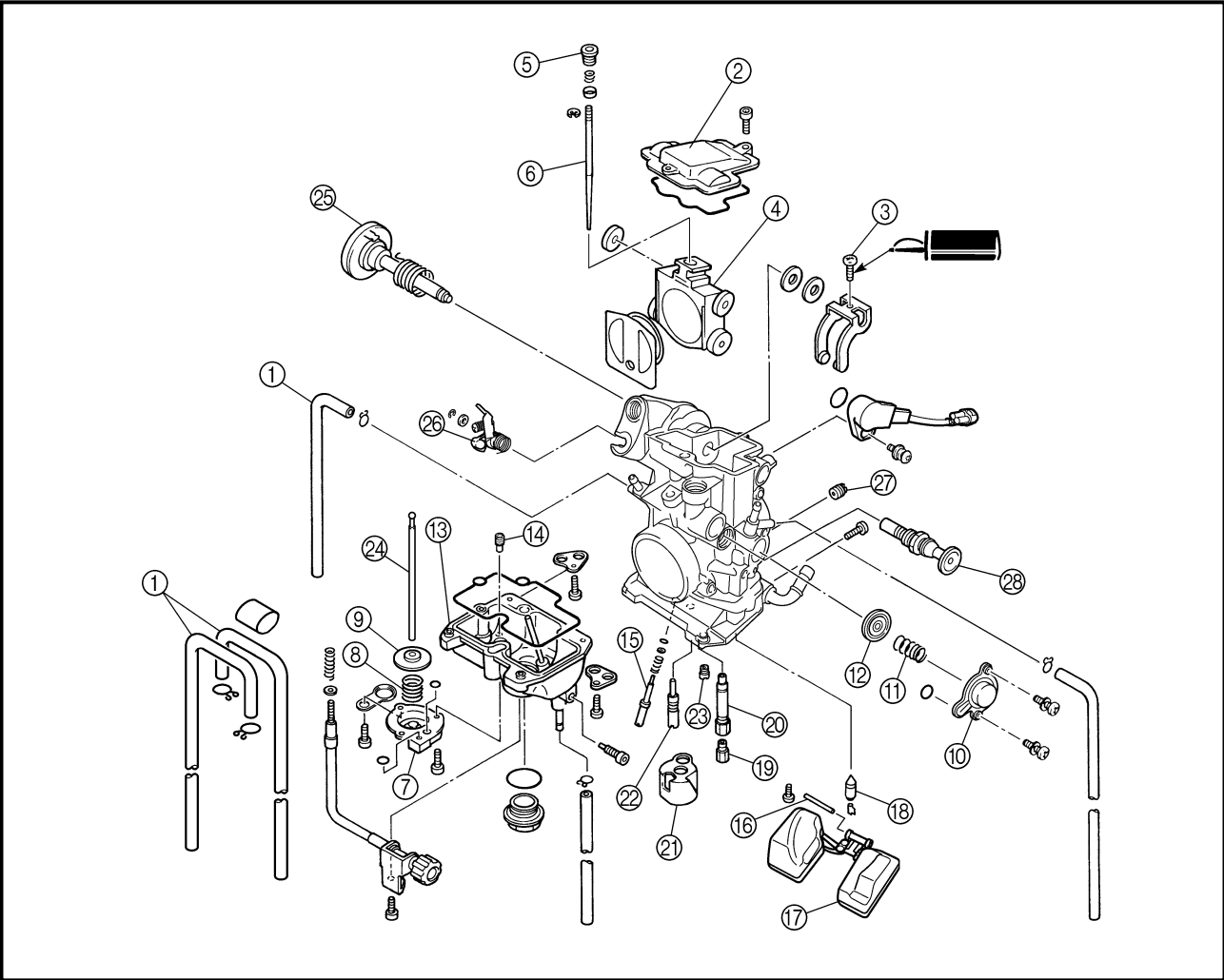
CARBURETOR




Extent of removal: ① Carburetor removal

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

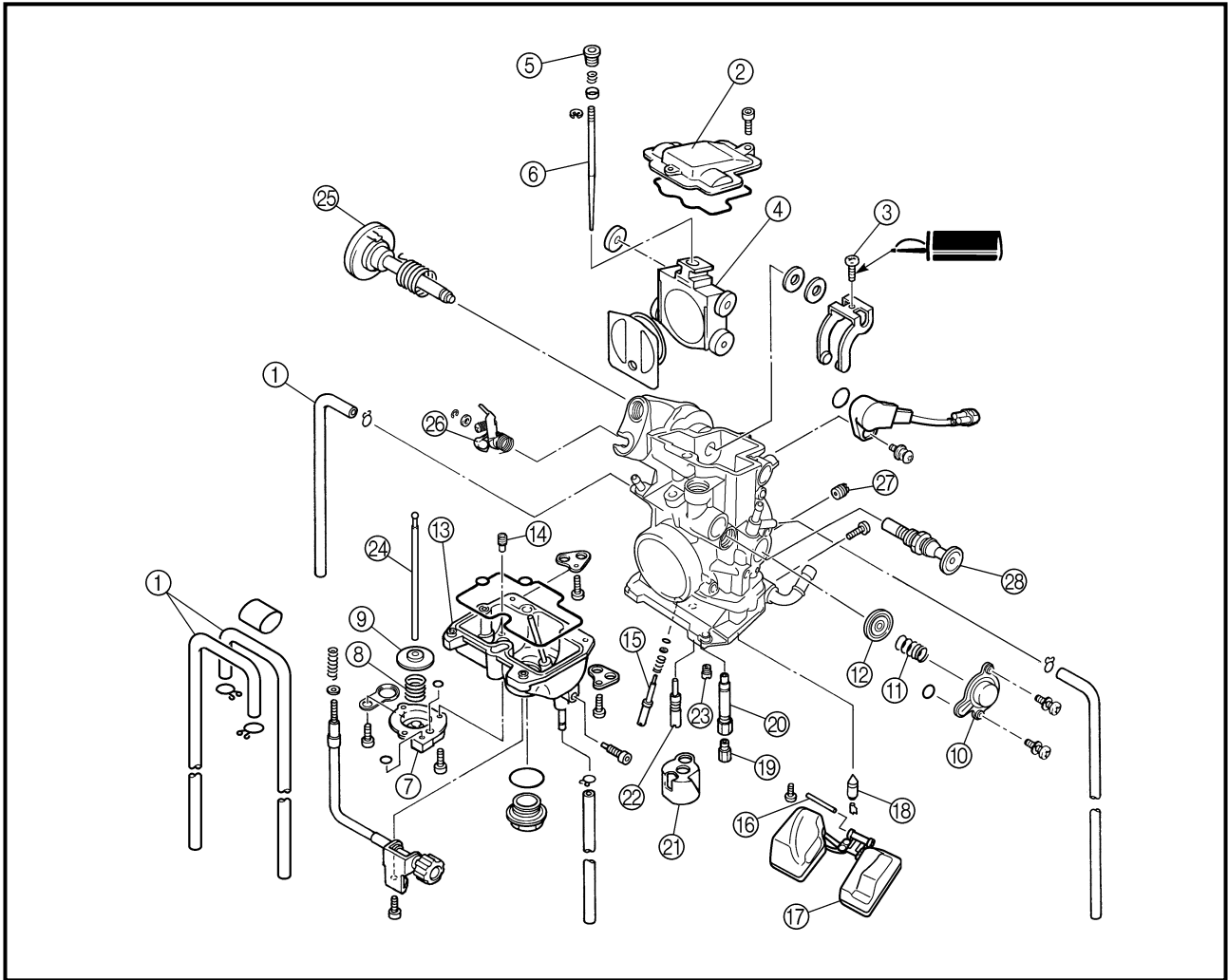
CARBURETOR DISASSEMBLY



Extent of removal: ① Carburetor disassembly

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





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

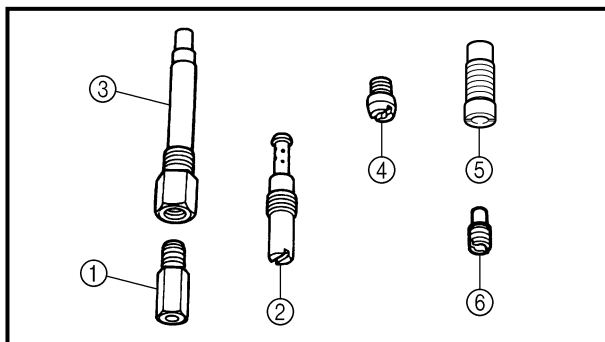
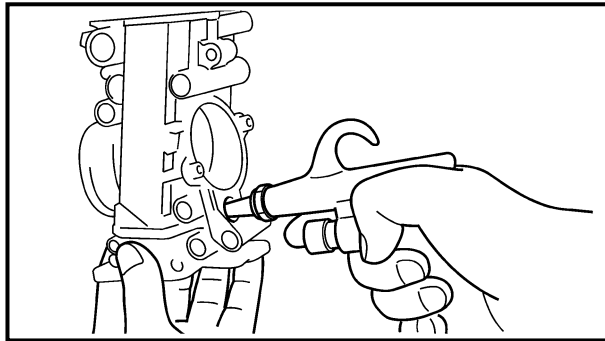
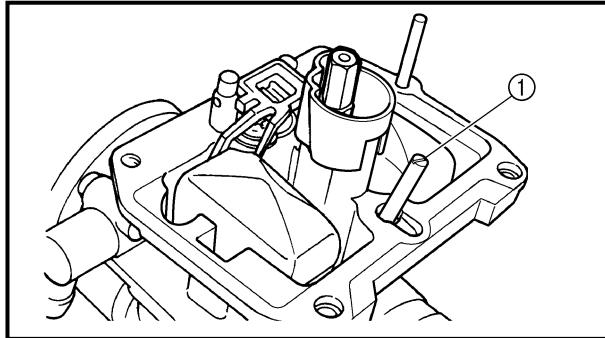
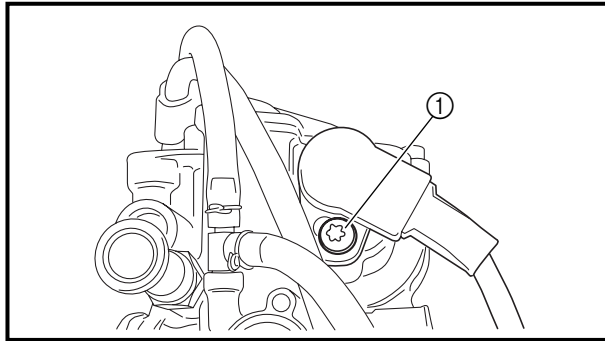


EC466020

## HANDLING NOTE

### CAUTION:

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



## REMOVAL POINTS

### Pilot screw

1. Remove:
  - Pilot screw ①

### NOTE:

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

## INSPECTION

### Carburetor

1. Inspect:
  - Carburetor body  
Contamination → Clean.

### NOTE:

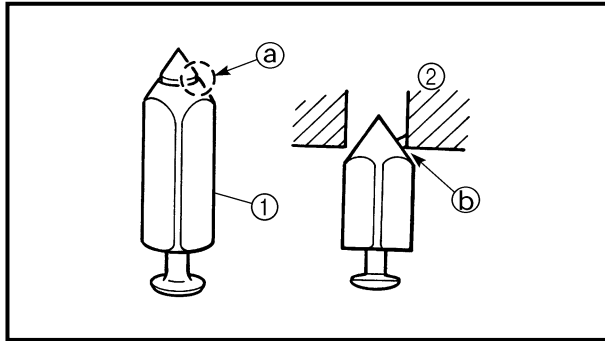
- Use a petroleum based solvent for cleaning. Blow out all passages and jets with compressed air.
- Never use a wire.

2. Inspect:

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

### NOTE:

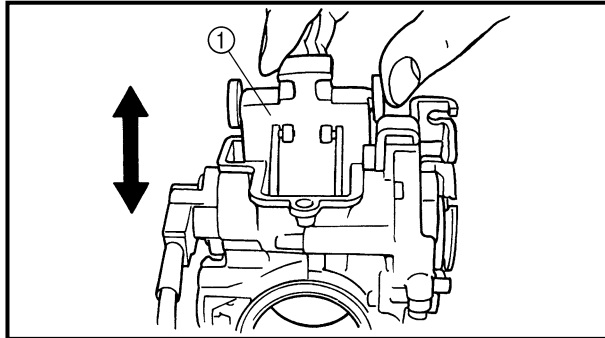
- Use a petroleum based solvent for cleaning. Blow out all passages and jets with compressed air.
- Never use a wire.



**Needle valve**

1. Inspect:

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

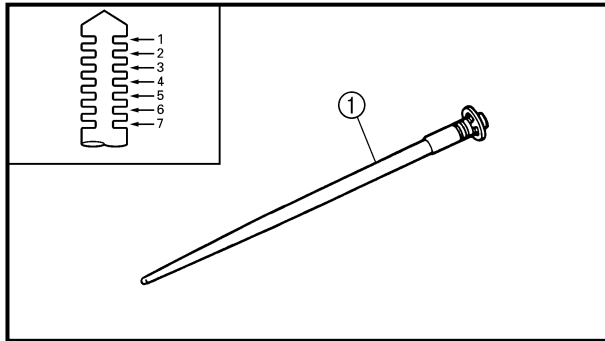


EC464300

**Throttle valve**

1. Check:

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



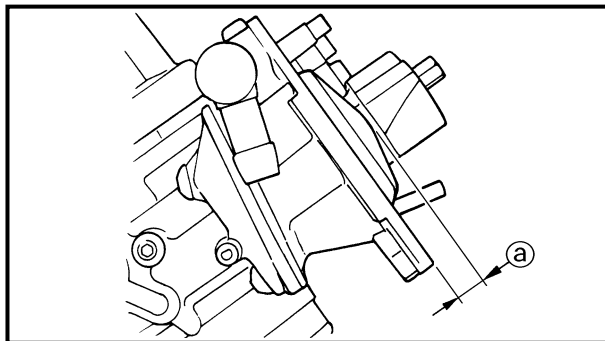
EC464400

**Jet needle**

1. Inspect:

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

	<b>Standard clip position: No.4 Groove</b>
--	--



EC464511

**Float height**

1. Measure:

- Float height (a)
- Out of specification → Adjust.

	<b>Float height: 8.0 mm (0.31 in)</b>
--	---

**Measurement and adjustment steps:**

- Hold the carburetor in an upside down position.

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

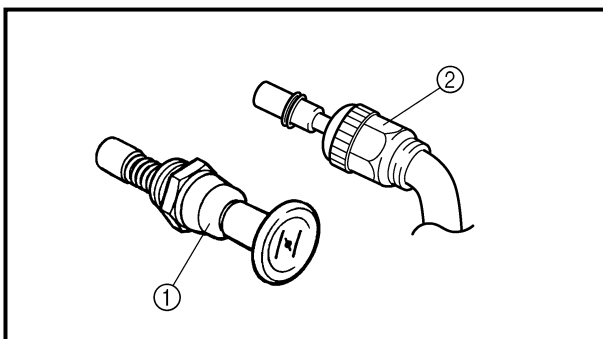
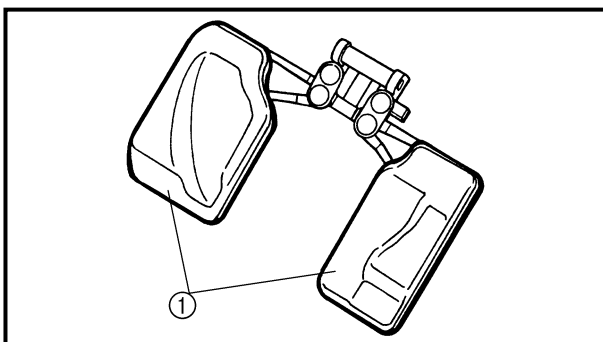
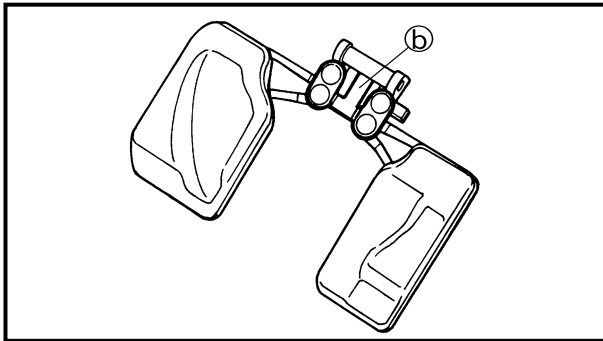
- Slowly tilt the carburetor in the opposite direction, then take the measurement when the needle valve aligns with the float arm.
- If the carburetor is level, the weight of the float will push in the needle valve, resulting in an incorrect measurement.

- 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 ⑥ on the float.
- Recheck the float height.



EC464600

**Float**

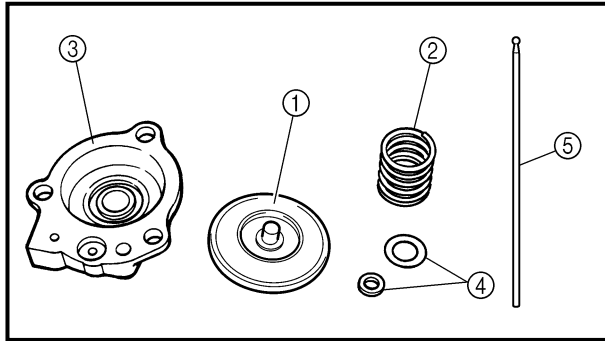
## 1. Inspect:

- Float ①  
Damage → Replace.

**Starter plunger**

## 1. Inspect:

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

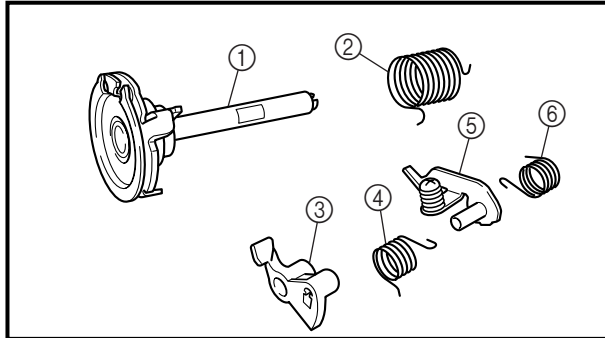


**Accelerator pump**

1. Inspect:

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

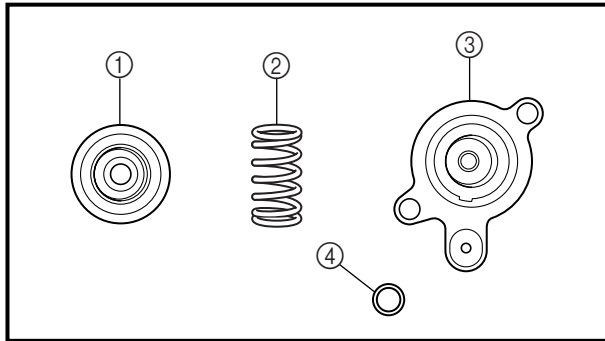
Tears (diaphragm)/damage → Replace.  
Dirt → Clean.



2. Inspect:

- Throttle shaft ①
- Spring ②
- Lever 1 ③
- Spring 1 ④
- Lever 2 ⑤
- Spring 2 ⑥

Dirt → Clean.

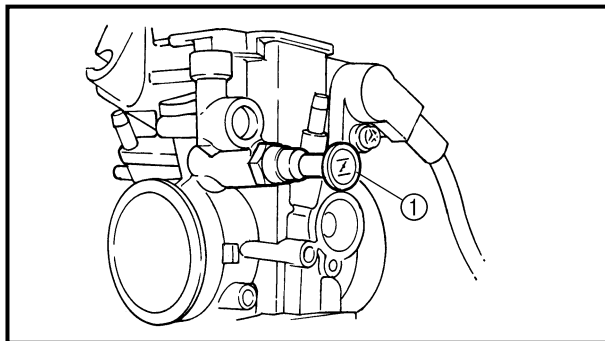


**Air cut valve**

1. Inspect:

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

Tears (diaphragm)/damage → Replace.

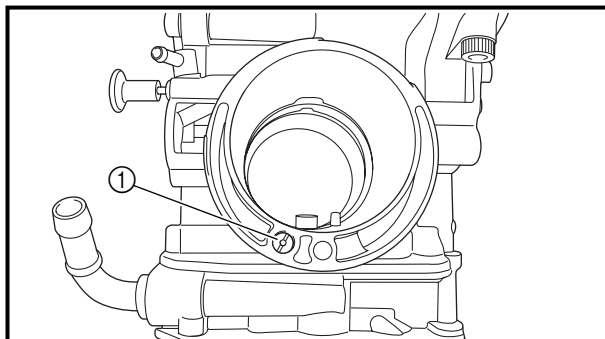


**ASSEMBLY AND INSTALLATION**

**Carburetor**

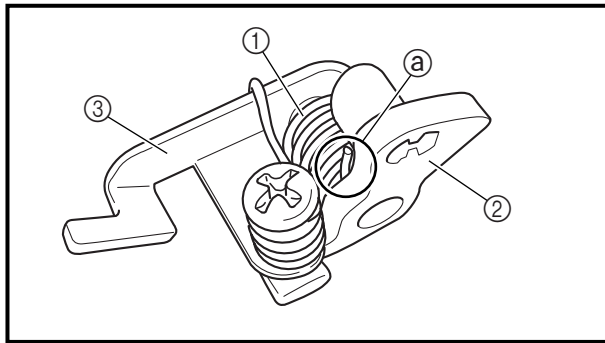
1. Install:

- Cold starter plunger ①



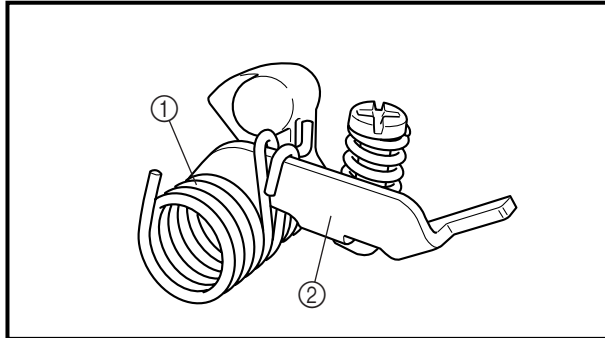
2. Install:

- Pilot air jet ①

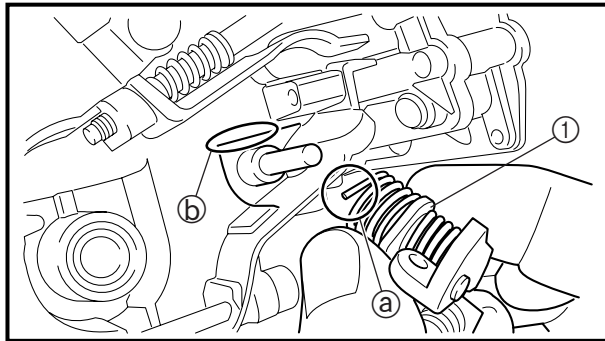


3. Install:
- Spring 1 ①
  - Lever 1 ②
  - To lever 2 ③.

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

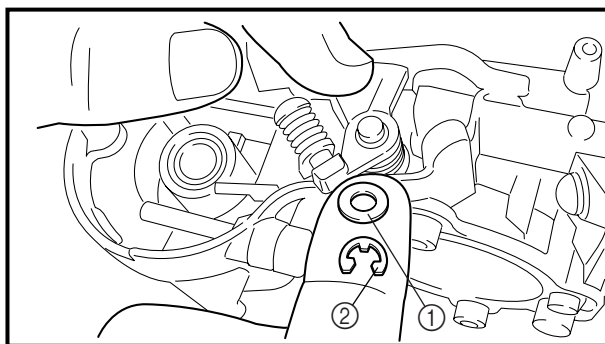


4. Install:
- Spring 2 ①
  - To lever 2 ②.

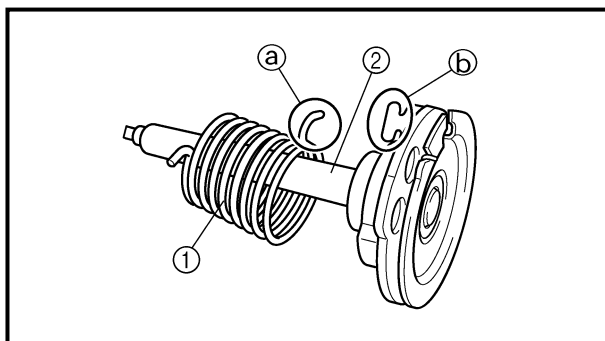


5. Install:
- Push rod link lever assembly ①

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

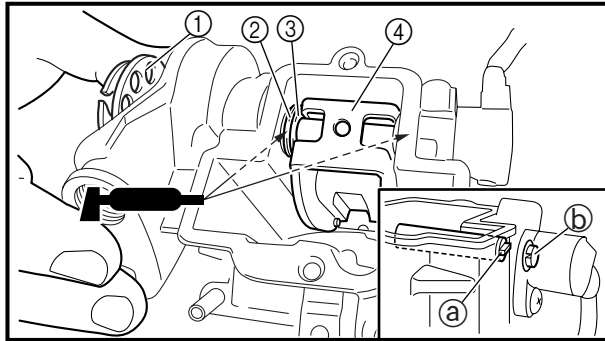


6. Install:
- Plain washer ①
  - Circlip ②



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.

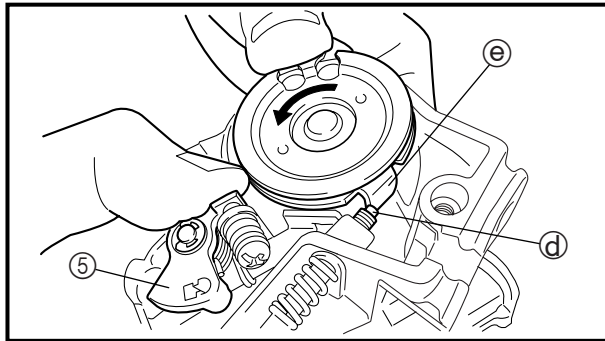
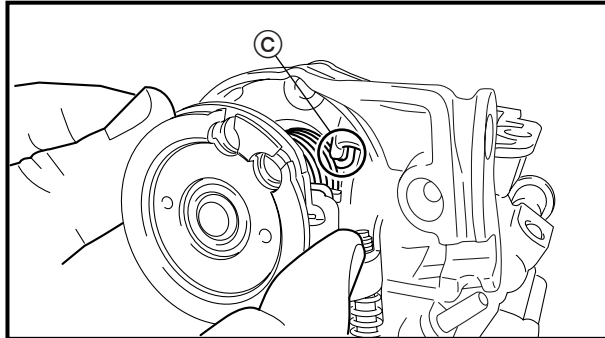


### 8. Install:

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

### NOTE:

- Apply the fluorochemical grease on the bearings.
- Fit the projection ① on the throttle shaft assembly into the slot ② in the TPS (throttle position sensor).
- Make sure the stopper ③ of the spring fits into the recess in the carburetor.
- Turn the throttle shaft assembly left while holding down the lever 1 ④ and fit the throttle stop screw tip ⑤ to the stopper ⑥ of the throttle shaft assembly pulley.

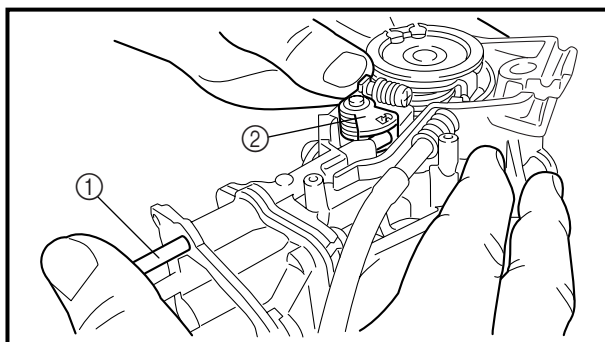


### 9. Install:

- Push rod ①

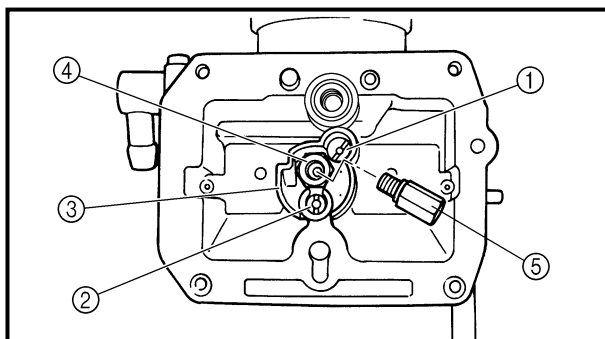
### NOTE:

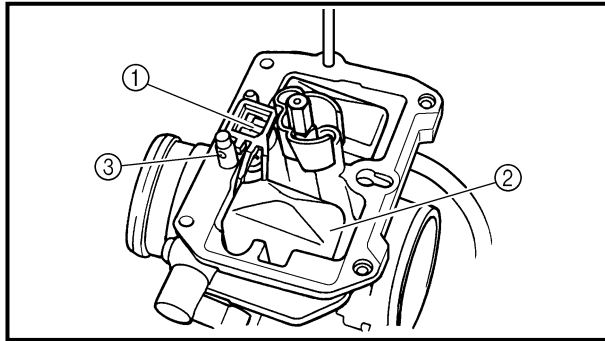
While holding down the lever 1 ②, insert the push rod farthest into the carburetor.



### 10. Install:

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



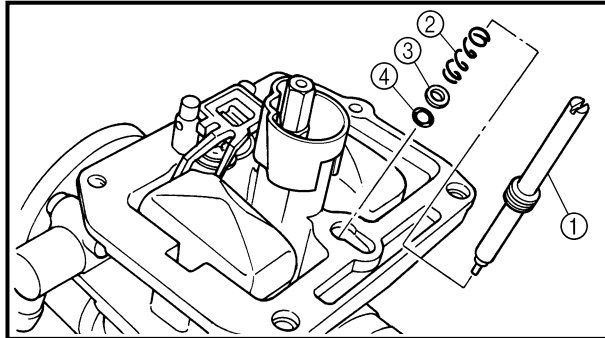


11. Install:

- Needle valve ①
- Float ②
- Float pin ③

**NOTE:**

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



12. Install:

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

**Note the following installation points:**

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

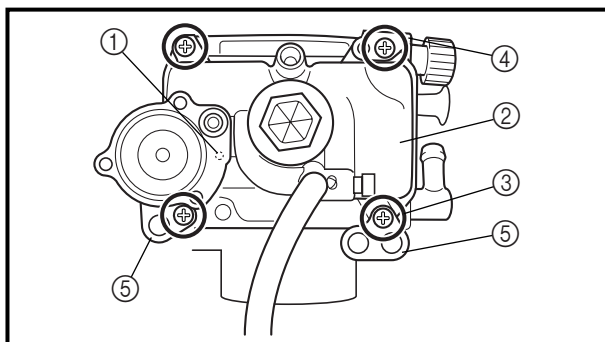


**Pilot screw:**

**1-3/4 turns out (example)**

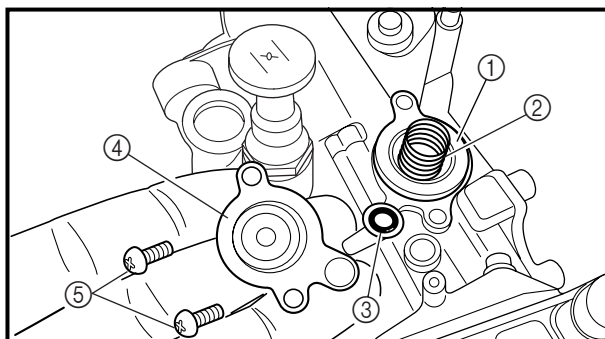
**\*1-1/2 turns out (example)**

\* Except for USA



13. Install:

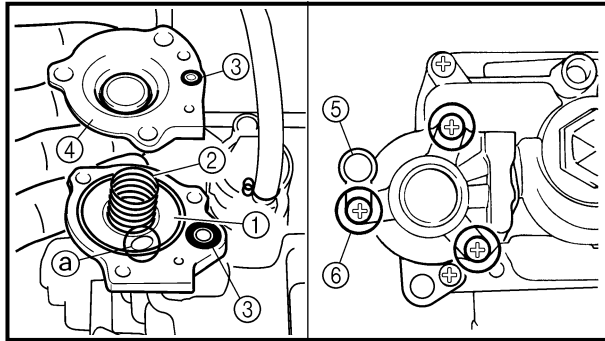
- O-ring ①
- Leak jet ②
- Float chamber ③
- Screw (float chamber) ④
- Cable holder (throttle stop screw cable) ⑤
- Hose holder (carburetor breather hose) ⑥



14. Install:

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



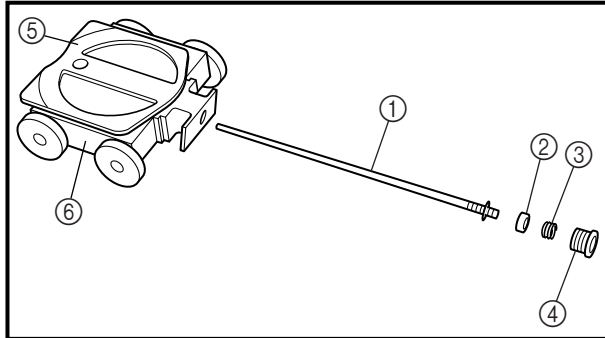


15. Install:

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

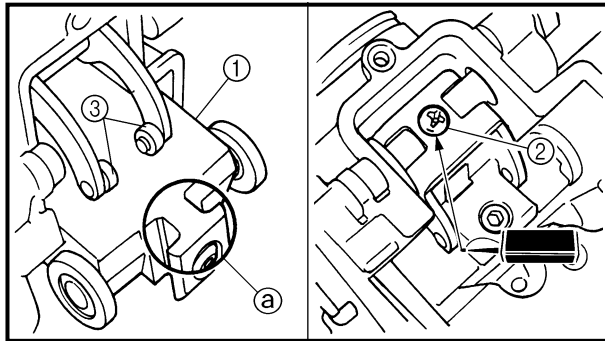
**NOTE:**

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



16. Install:

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

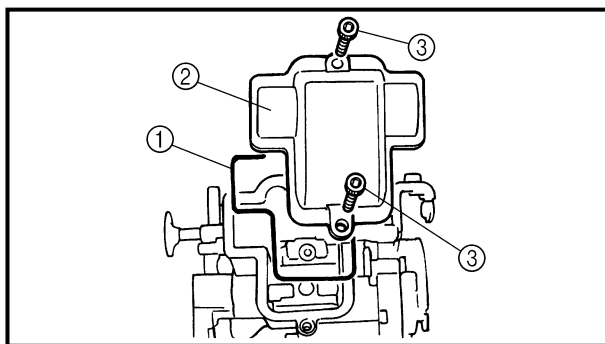


17. Install:

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

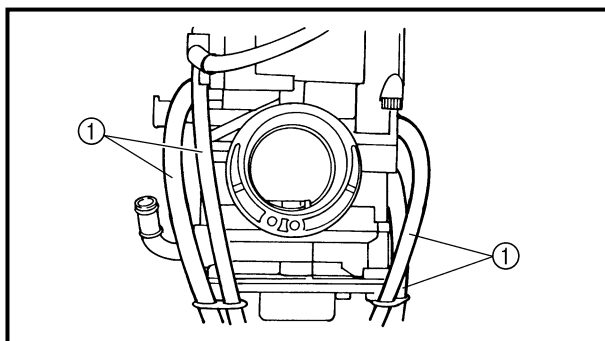
**NOTE:**

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



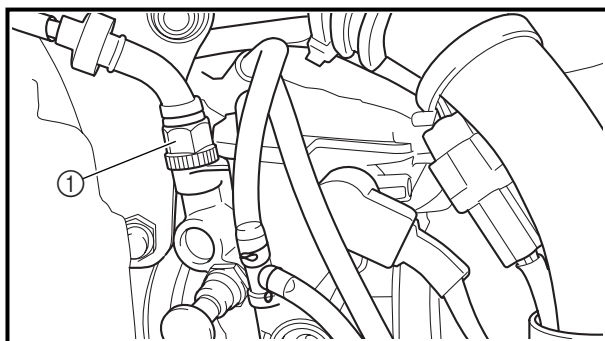
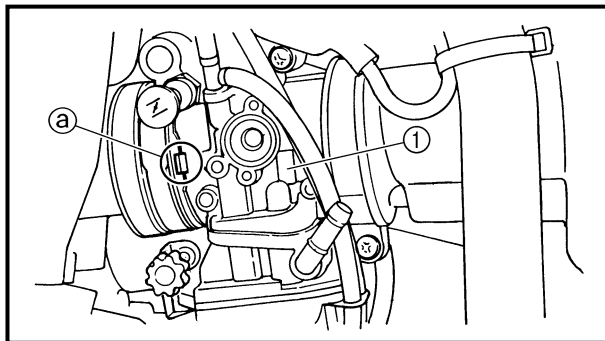
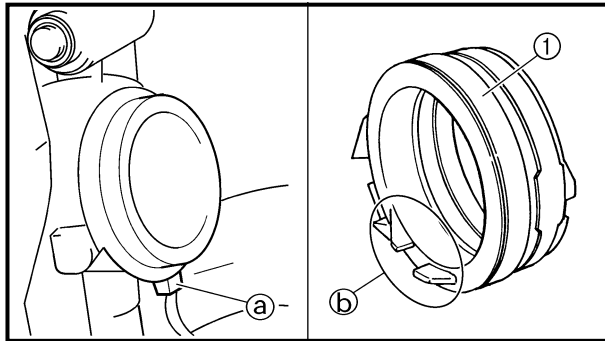
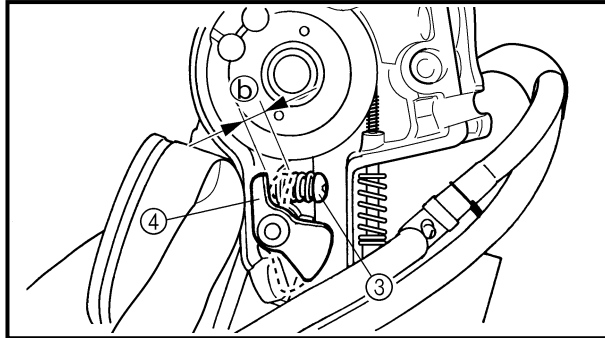
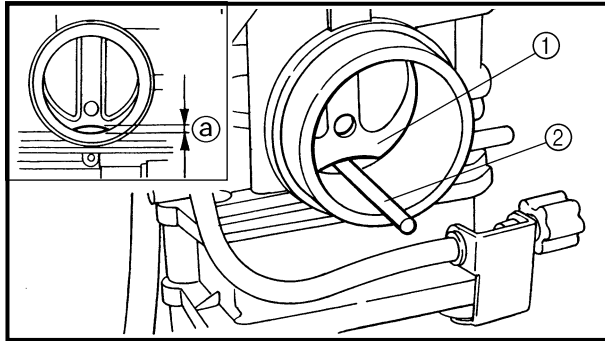
18. Install:

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



19. Install:

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



**Accelerator pump timing adjustment**

**Adjustment steps:**

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



**Throttle valve height:**  
**3.1 mm (0.122 in)**

- Fully turn in the accelerator pump adjusting screw (3).
- Check that the link lever (4) has free play (b) 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 (a) on the cylinder head between the carburetor joint slots (b).

2. Install:

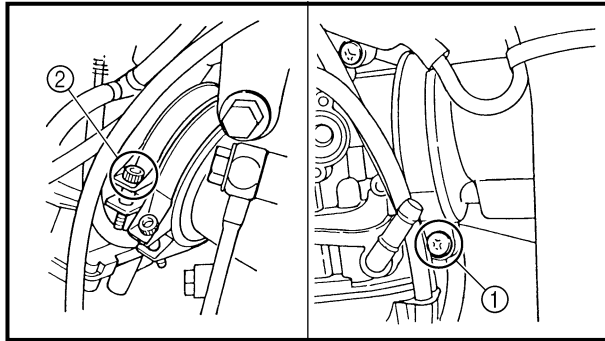
- Carburetor (1)

**NOTE:** \_\_\_\_\_  
 Install the projection (a) between the carburetor joint slots.

3. Install:

- Hot starter plunger (1)

**2 Nm (0.2 m · kg, 1.4 ft · lb)**



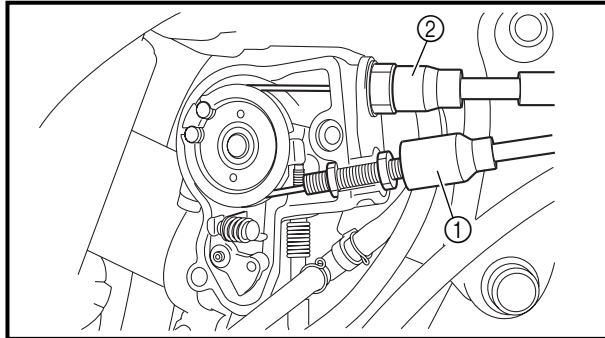
4. Tighten:

- Screw (air cleaner joint) ①

**3 Nm (0.3 m · kg, 2.2 ft · lb)**

- Screw (carburetor joint) ②

**3 Nm (0.3 m · kg, 2.2 ft · lb)**



5. Install:

- Throttle cable (pull) ①

**4 Nm (0.4 m · kg, 2.9 ft · lb)**

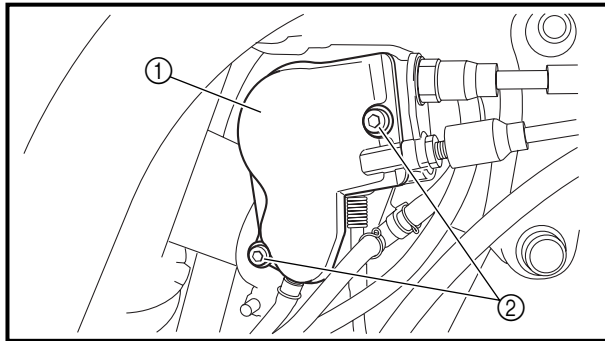
- Throttle cable (return) ②

**11 Nm (1.1 m · kg, 8.0 ft · lb)**

6. Adjust:

- Throttle grip free play

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

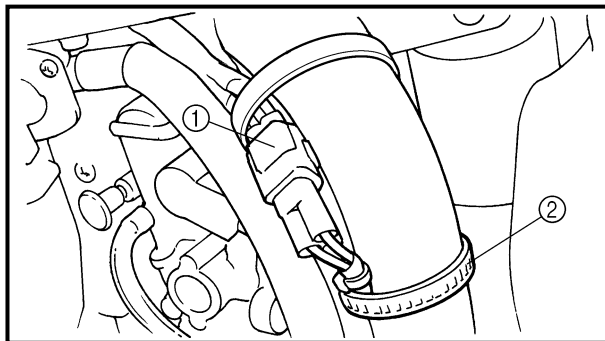


7. Install:

- Throttle cable cover ①

- Screw (throttle cable cover) ②

**4 Nm (0.4 m · kg, 2.9 ft · lb)**



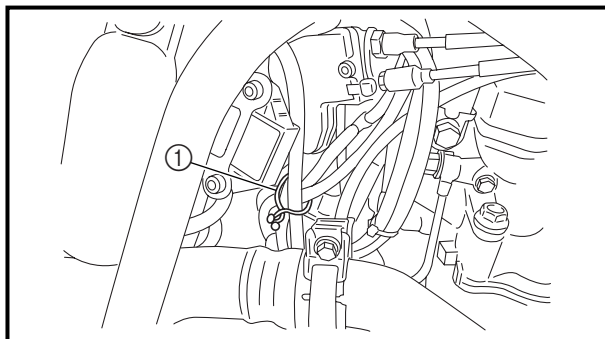
8. Install:

- TPS (throttle position sensor) coupler

①

- Clamp ②

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



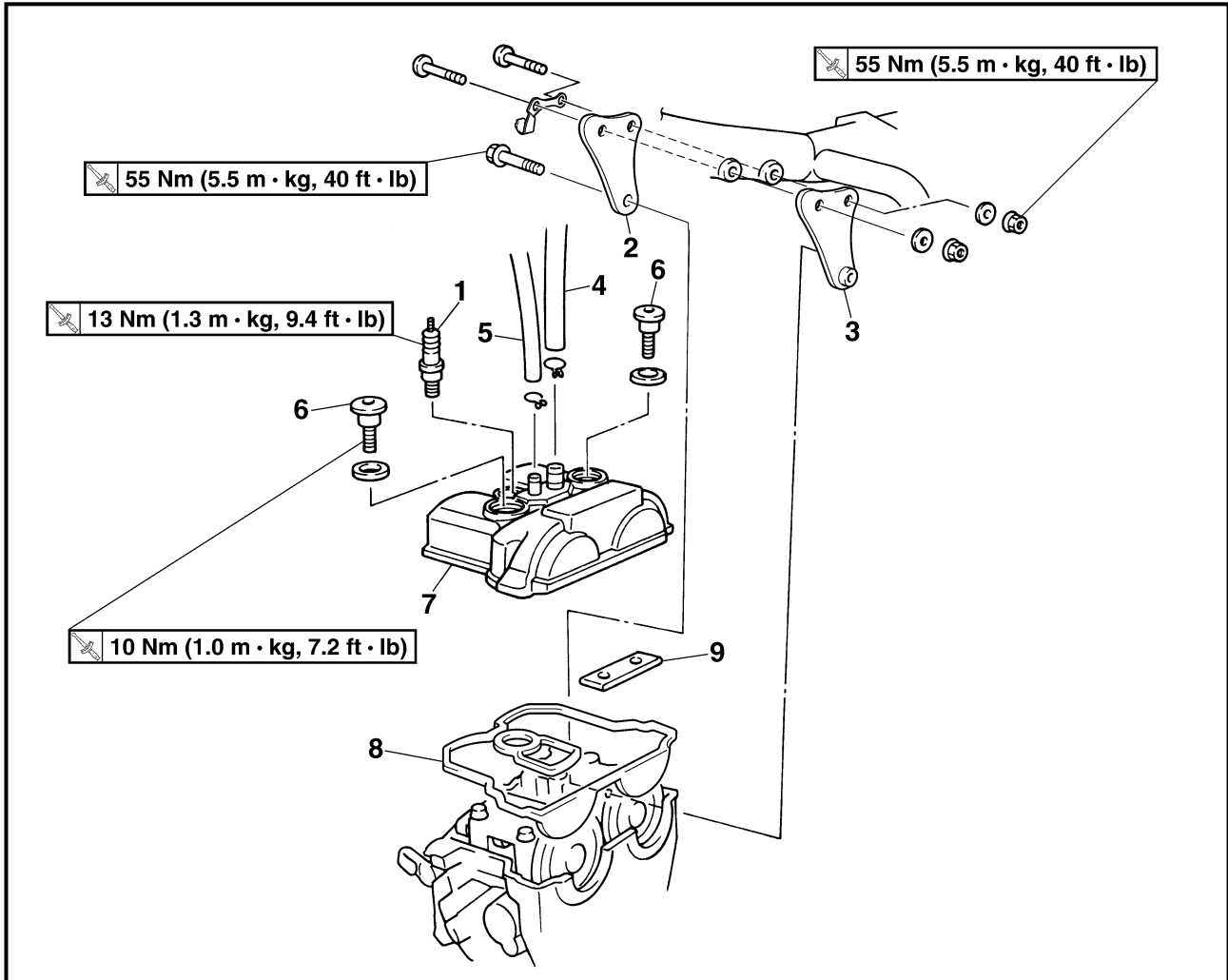
9. Install:

- Clamp ①

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



**CAMSHAFTS**  
CYLINDER HEAD COVER

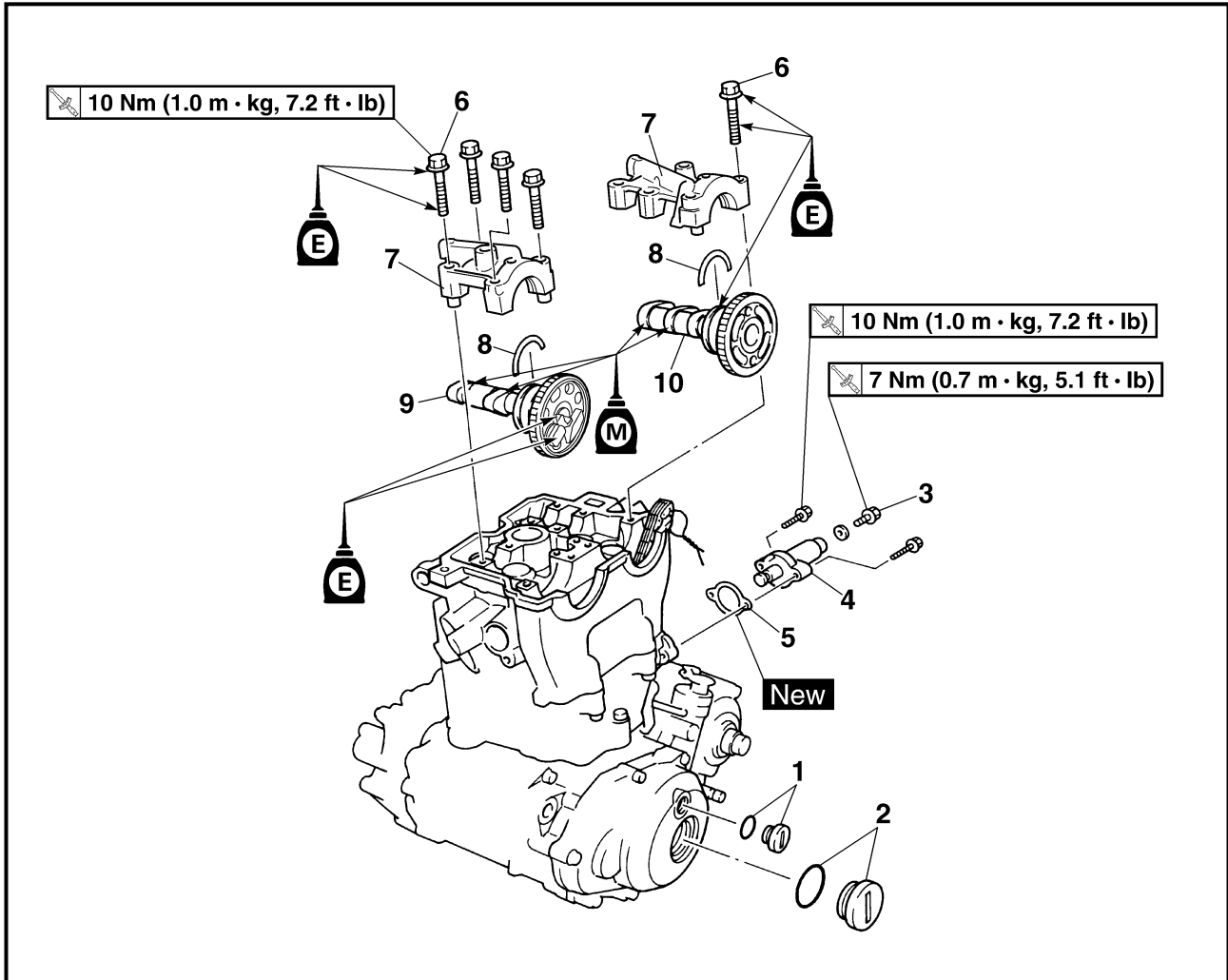


Extent of removal: ① Cylinder head cover removal

Extent of removal	Order	Part name	Q'ty	Remarks
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.
<div style="text-align: center;">             ↑              ①              ↓         </div>	1	Spark plug	1	
	2	Engine upper bracket (right)	1	
	3	Engine upper bracket (left)	1	
	4	Cylinder head breather hose	1	
	5	Oil tank breather hose	1	
	6	Bolt (cylinder head cover)	2	
	7	Cylinder head cover	1	
	8	Gasket	1	
	9	Timing chain guide (upper)	1	

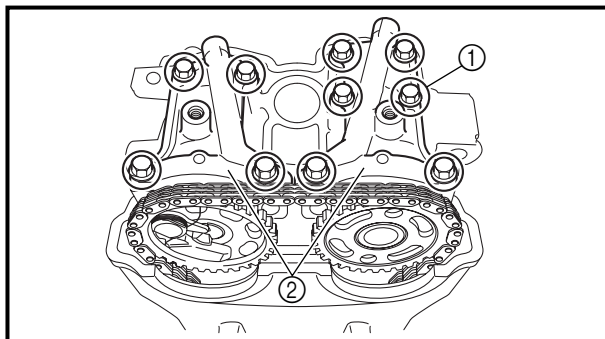
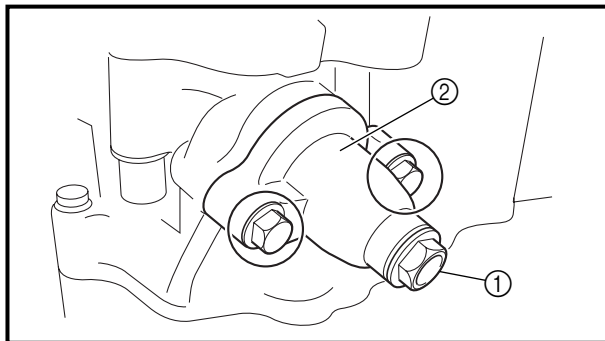
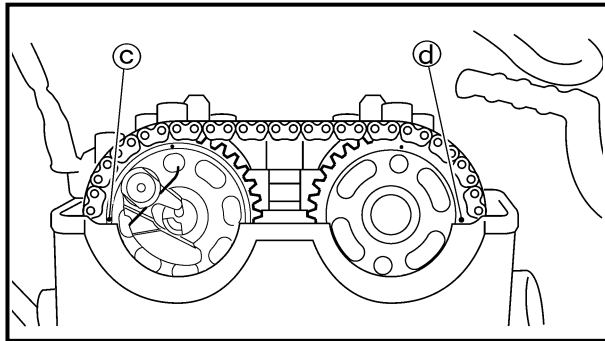
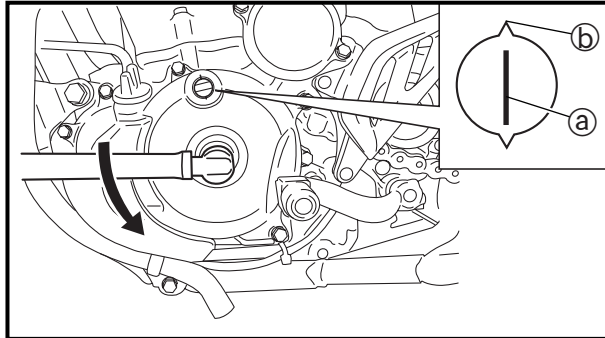
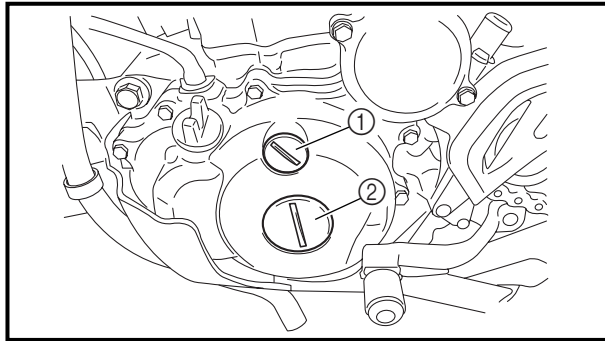


CAMSHAFTS



Extent of removal: ① Camshaft removal

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

**REMOVAL POINTS****Camshaft**

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

**Checking steps:**

- Turn the crankshaft counterclockwise with a wrench.
- Align the "I" mark ① on the rotor with the stationary pointer ② on the crankcase cover. When the "I" mark is aligned with the stationary pointer, the piston is at the Top Dead Center (T.D.C.).

**NOTE:**

- In order to be sure that the piston is at Top Dead Center, the punch mark 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.
- If there is no clearance, rotate the crankshaft counterclockwise one turn.

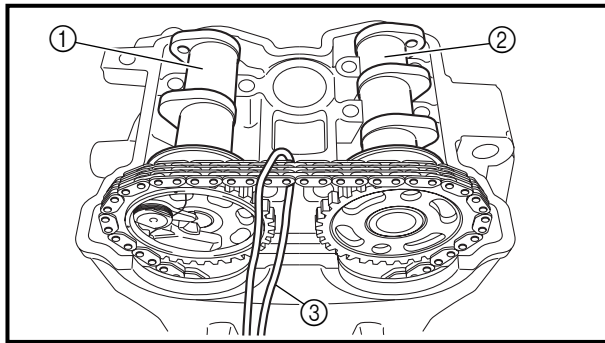
3. Loosen:
  - Tensioner cap bolt ①
4. Remove:
  - Timing chain tensioner ②
5. Remove:
  - Bolt (camshaft cap) ①
  - Camshaft caps ②

**NOTE:**

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

**CAUTION:**

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

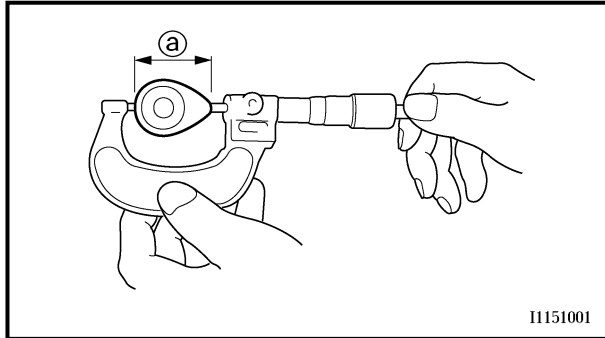


6. Remove:

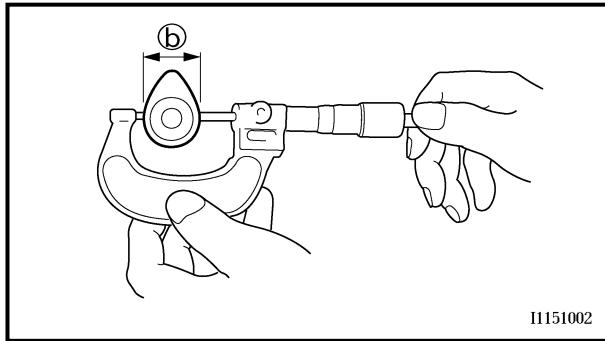
- Clips
- Exhaust camshaft ①
- Intake camshaft ②

**NOTE:**

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



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**INSPECTION**

**Camshaft**

1. Inspect:

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

2. Measure:

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



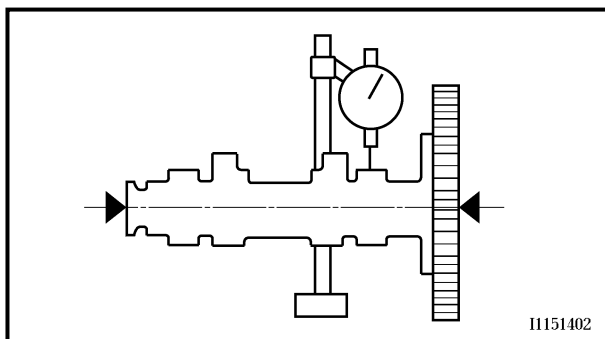
**Cam lobes length:**

**Intake:**

- ① 31.200 ~ 31.300 mm  
(1.2283 ~ 1.2323 in)  
<Limit>: 31.100 mm  
(1.2244 in)
- ② 22.550 ~ 22.650 mm  
(0.8878 ~ 0.8917 in)  
<Limit>: 22.450 mm  
(0.8839 in)

**Exhaust:**

- ① 30.950 ~ 31.050 mm  
(1.2185 ~ 1.2224 in)  
<Limit>: 30.850 mm  
(1.2146 in)
- ② 22.494 ~ 22.594 mm  
(0.8856 ~ 0.8895 in)  
<Limit>: 22.394 mm  
(0.8817 in)



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3. Measure:

- Runout (camshaft)  
Out of specification → Replace.



**Runout (camshaft):**

**Less than 0.03 mm (0.0012 in)**

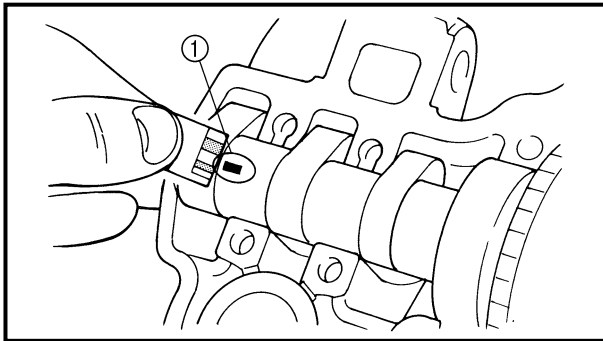
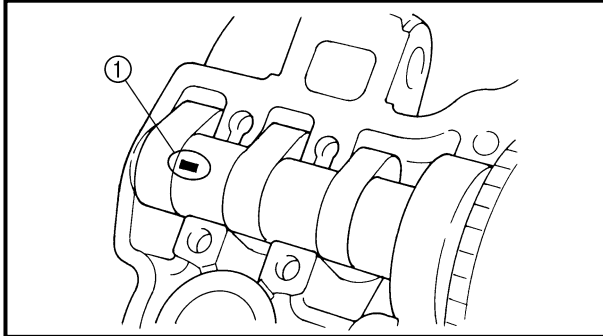


## 4. Measure:

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



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

**Measurement steps:**

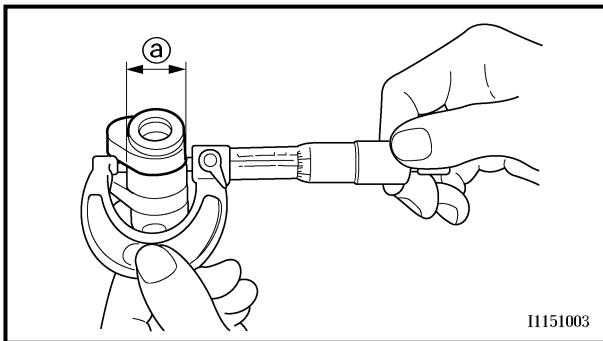
- Install the camshaft onto the cylinder head.
- Position a strip of Plastigauge® ① onto the camshaft.
- Install the circlip, dowel pins and camshaft caps.



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

**NOTE:**

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



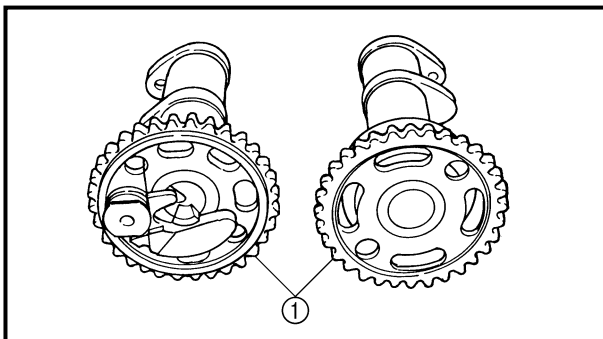
11151003

## 5. Measure:

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



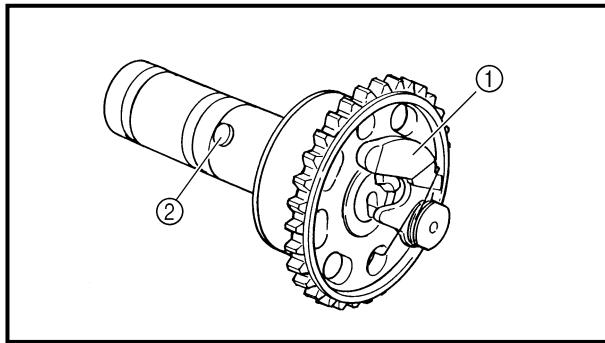
**Camshaft journal diameter:**  
21.967 ~ 21.980 mm  
(0.8648 ~ 0.8654 in)

**Camshaft sprocket**

## 1. Inspect:

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



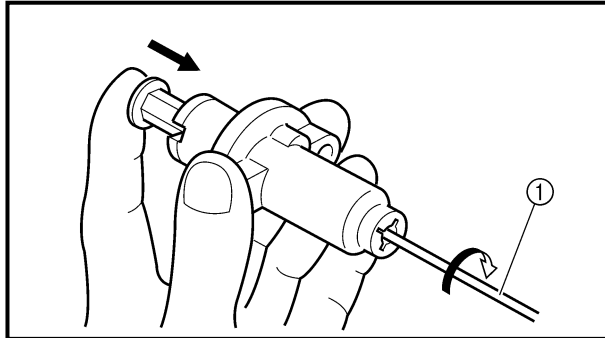


### Decompression system

1. Check:
  - Decompression system

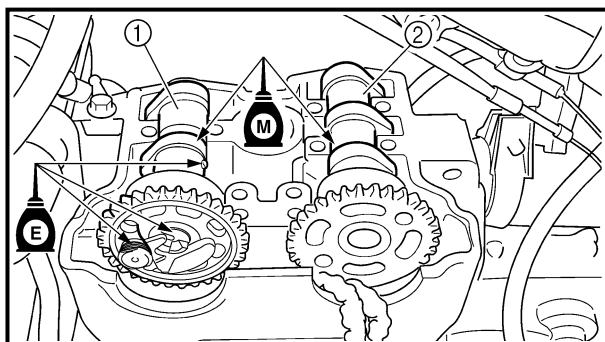
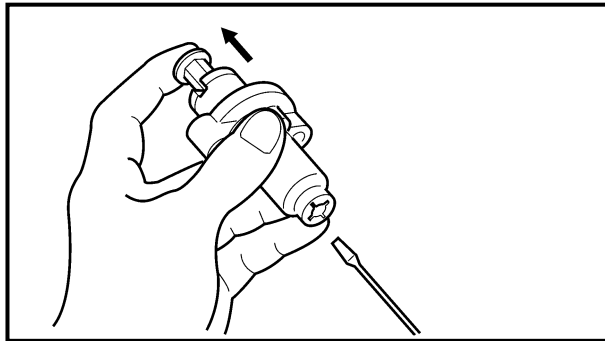
#### Checking steps:

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



### Timing chain tensioner

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



### ASSEMBLY AND INSTALLATION

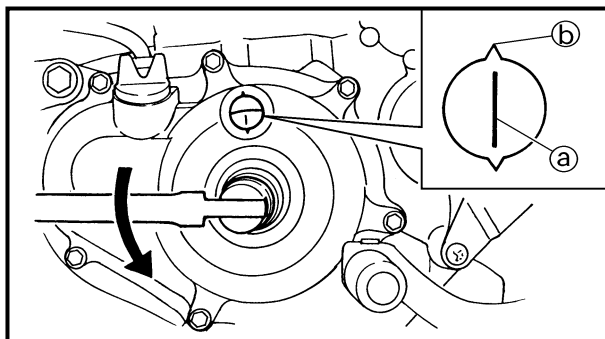
1. Install:
  - Exhaust camshaft ①
  - Intake camshaft ②

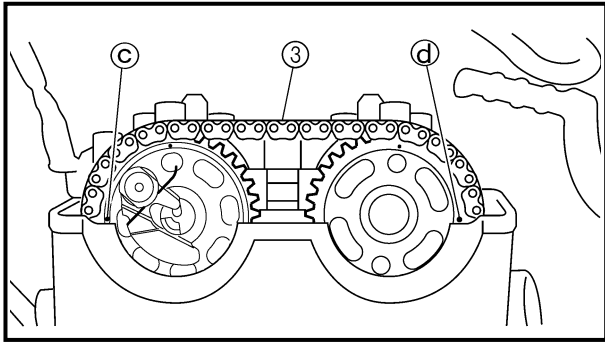
#### Installation steps:

- Turn the crankshaft counterclockwise until the "I" mark ① on the rotor is aligned with the stationary pointer ② on the crankcase cover.

#### NOTE:

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





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

**NOTE:**

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

**CAUTION:**

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

- Install the clips and camshaft caps (4).



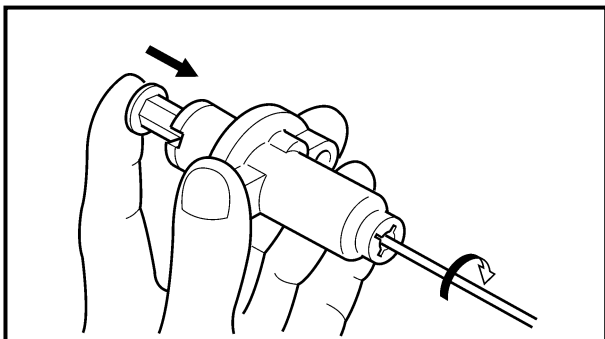
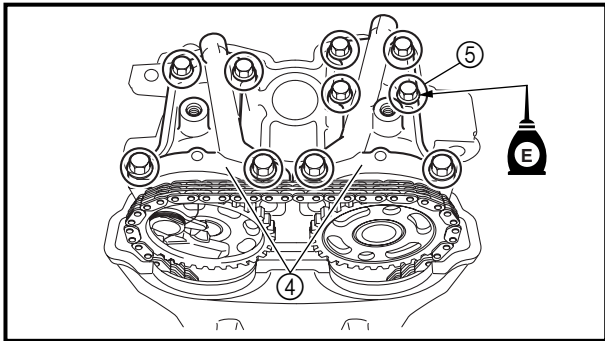
**Bolt (camshaft cap):**  
10 Nm (1.0 m • kg, 7.2 ft • lb)

**NOTE:**

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

**CAUTION:**

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

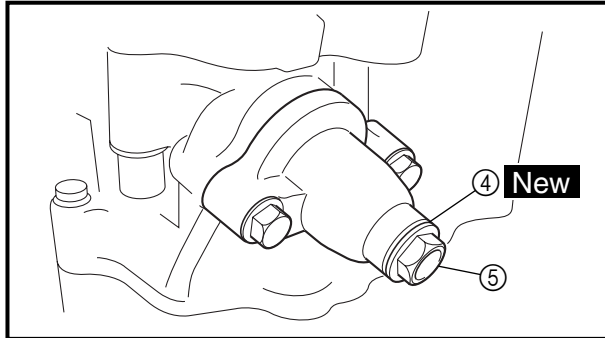
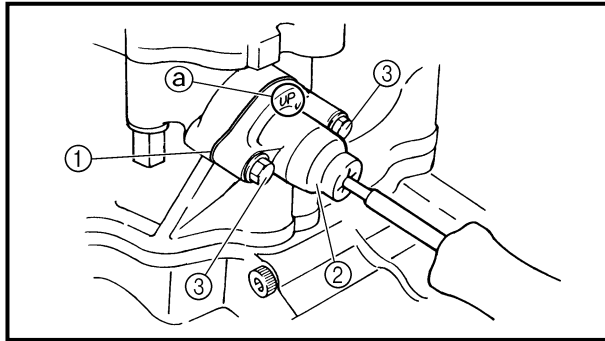


## 2. Install:

- Timing chain tensioner

**Installation steps:**

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



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



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

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

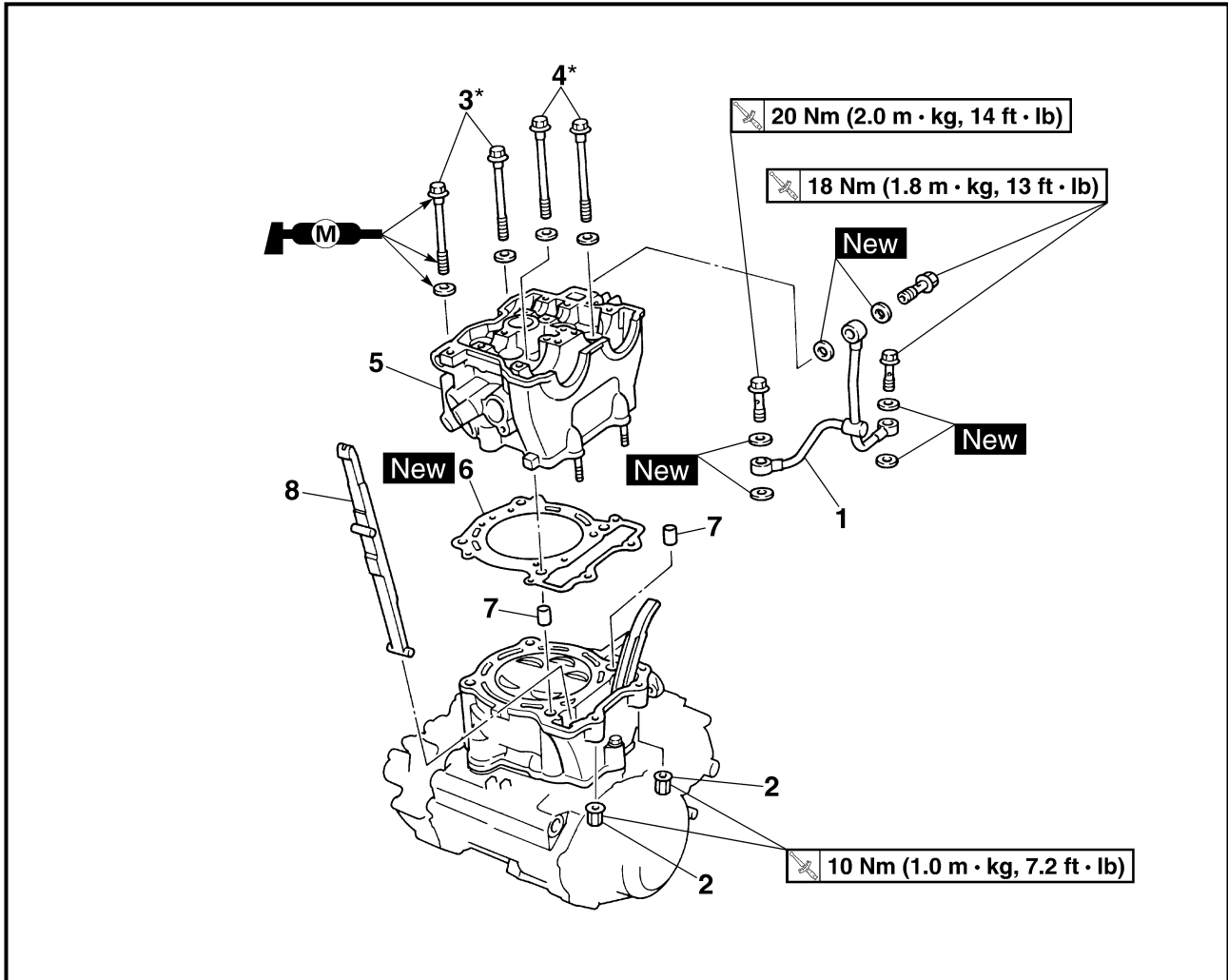


**Tensioner cap bolt:**  
7 Nm (0.7 m • kg, 5.1 ft • lb)

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



CYLINDER HEAD  
CYLINDER HEAD

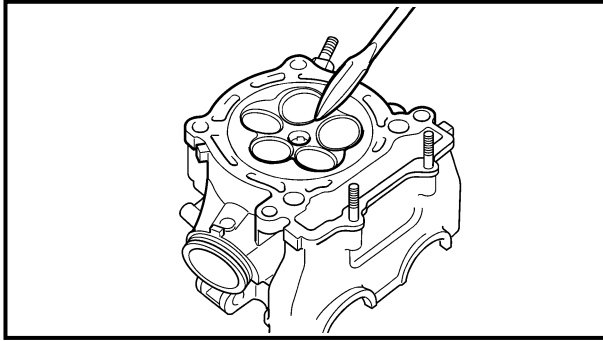


Extent of removal: ① Cylinder head removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<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		Refer to "RADIATOR" section.
		Carburetor		Refer to "CARBURETOR" section.
		Camshaft		Refer to "CAMSHAFTS" section.
①	1	Oil delivery pipe	1	Refer to NOTE.
	2	Nut	2	
	3*	Bolt (L = 150 mm)	2	
	4*	Bolt (L = 160 mm)	2	
	5	Cylinder head	1	
	6	Gasket	1	
	7	Dowel pin	2	
	8	Timing chain guide (front)	1	

**NOTE:**

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

**INSPECTION****Cylinder head**

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

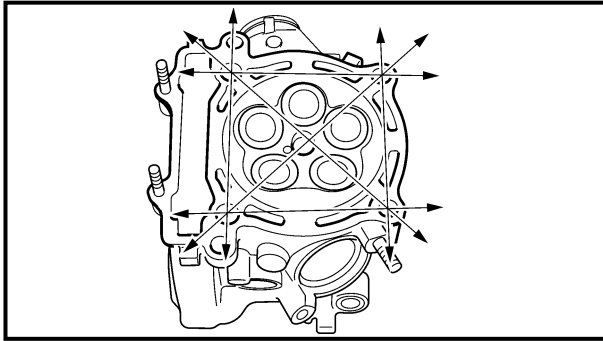
**NOTE:** \_\_\_\_\_

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

- Spark plug threads
- Valve seats

2. Inspect:

- Cylinder head
- Scratches/damage → Replace.



3. Measure:

- Cylinder head warpage
- Out of specification → Resurface.



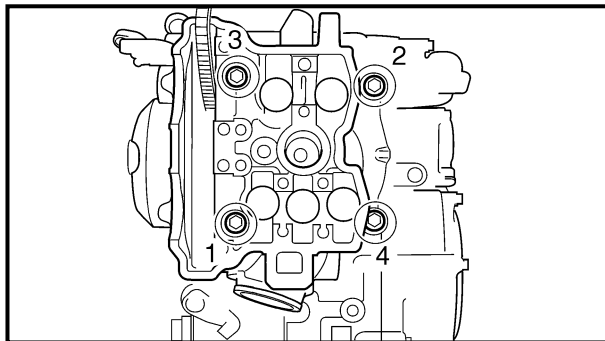
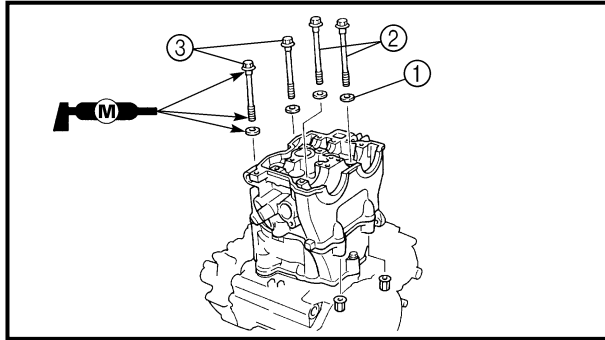
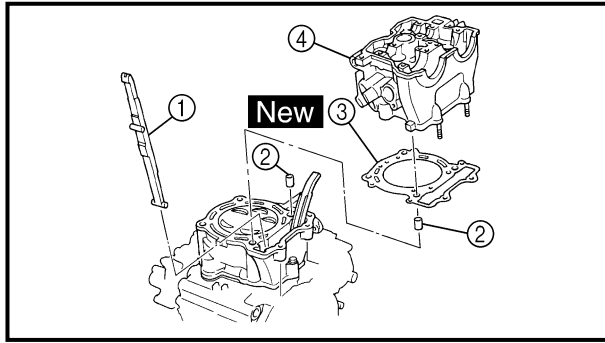
**Cylinder head warpage:**  
Less than 0.05 mm (0.002 in)

**Warpage measurement and 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**

1. Install:

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

**NOTE:**

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

2. Install:

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

**Installation steps:**

**CAUTION:**

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

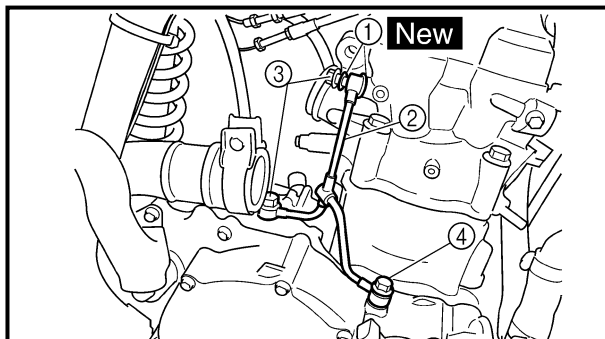
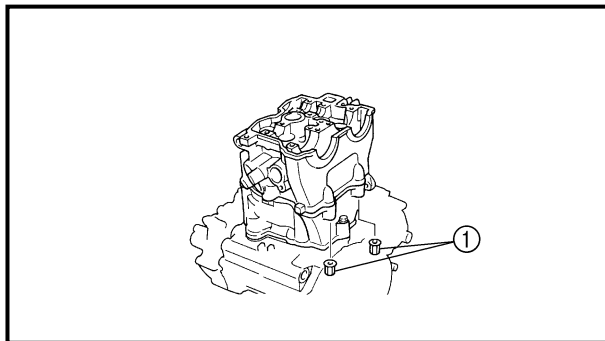
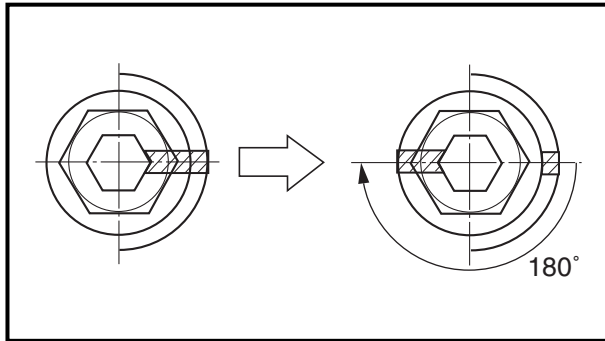
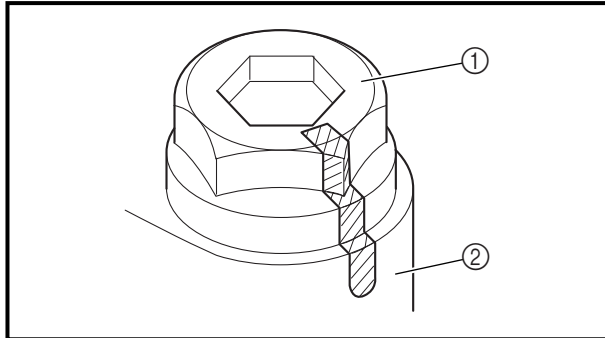
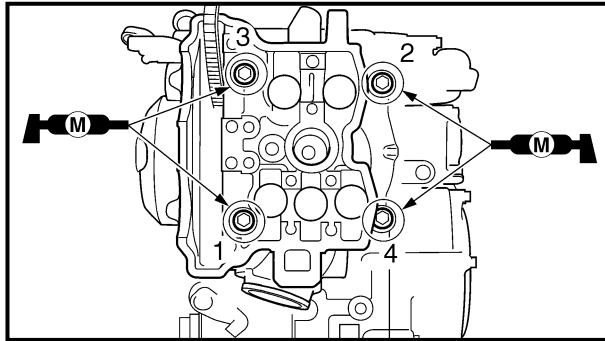
- Wash the threads and contact surfaces of the bolts, the contact surfaces of the plain washers, the contact surface of the cylinder head, and the threads of the crankcase.
- Apply the molybdenum disulfide grease on the threads and contact surfaces of the bolts and on both contact surfaces of the plain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



**Bolts (cylinder head):**

**1st:**

**30 Nm (3.0 m • kg, 22 ft • lb)**



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

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



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

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

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



**Bolts (cylinder head):**  
**Final:**  
**Specified angle 180°**

3. Install:

- Nut (cylinder head) ①

**10 Nm (1.0 m • kg, 7.2 ft • lb)**

4. Install:

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

**18 Nm (1.8 m • kg, 13 ft • lb)**

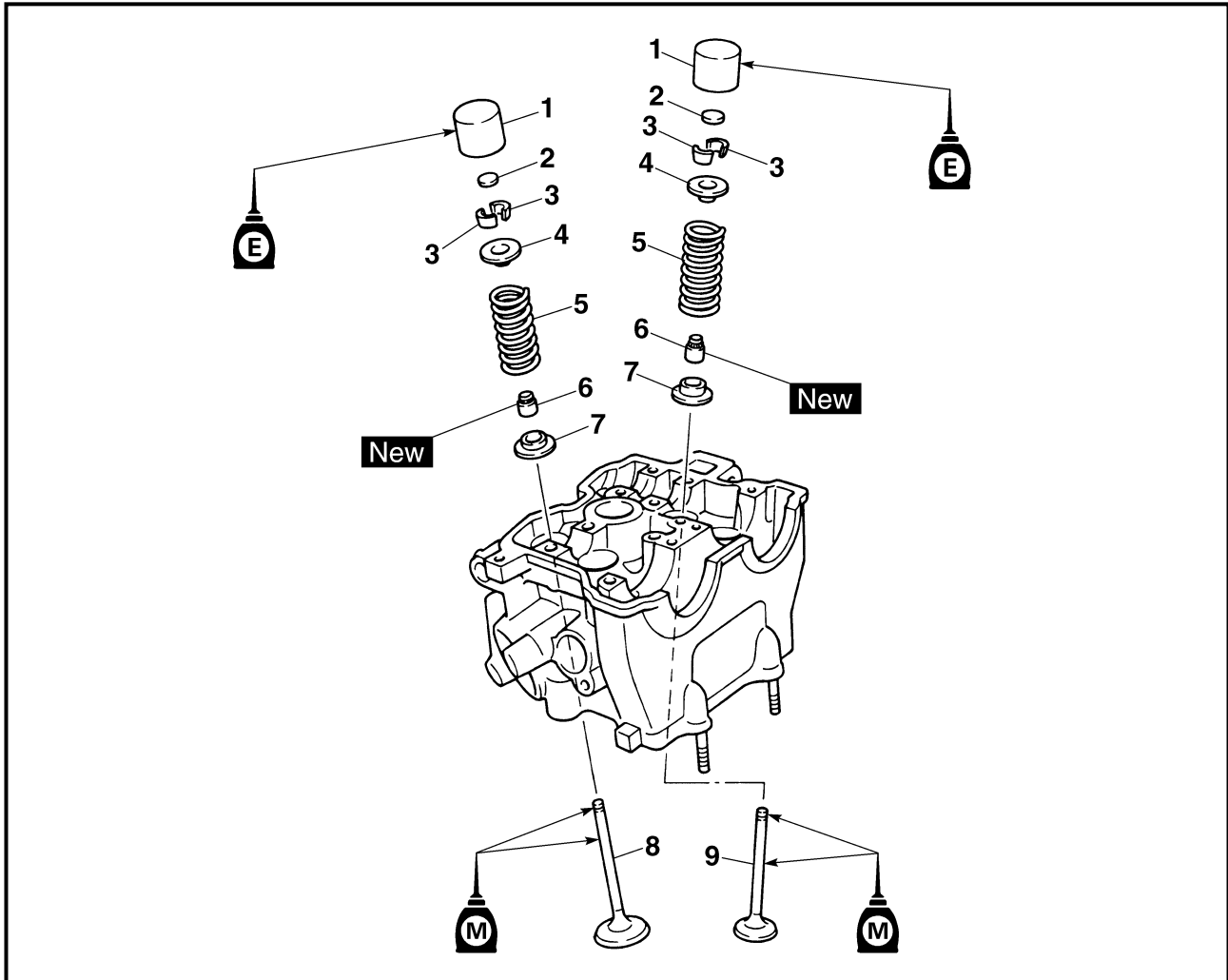
- Union bolt (M10) ④

**20 Nm (2.0 m • kg, 14 ft • lb)**



## VALVES AND VALVE SPRINGS

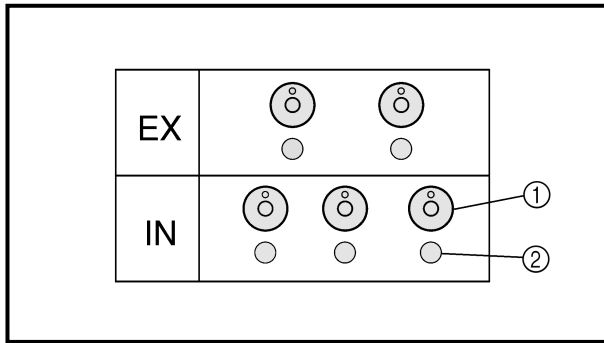
### VALVES AND VALVE SPRINGS



Extent of removal: ① Valve removal

Extent of removal	Order	Part name	Q'ty	Remarks
		<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 retainer	5	
	5	Valve spring	5	
	6	Stem seal	5	
	7	Valve spring seat	5	
	8	Exhaust valve	2	
	9	Intake valve	3	



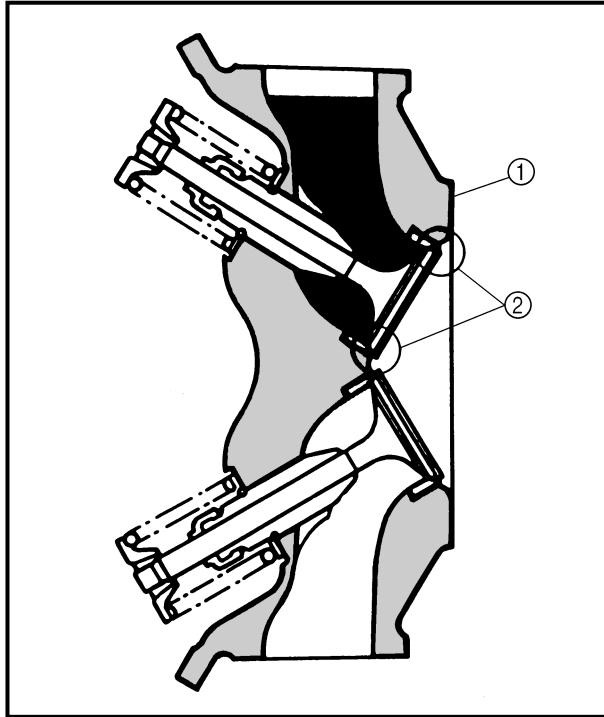


### REMOVAL POINTS

1. Remove:
  - Valve lifters ①
  - Pads ②

### NOTE:

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

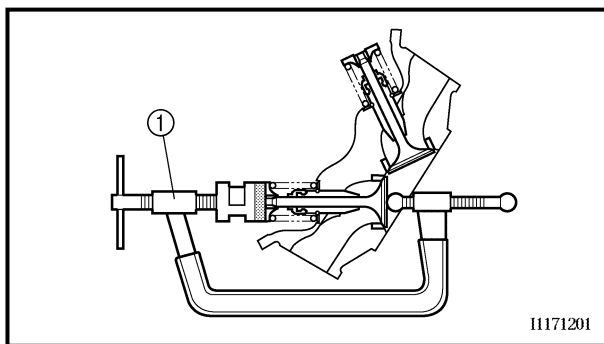


2. Check:
  - Valve sealing

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

### Checking steps:

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



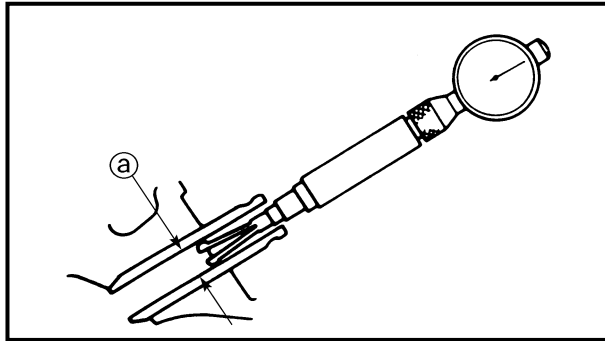
3. Remove:
  - Valve cotters

### NOTE:

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



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



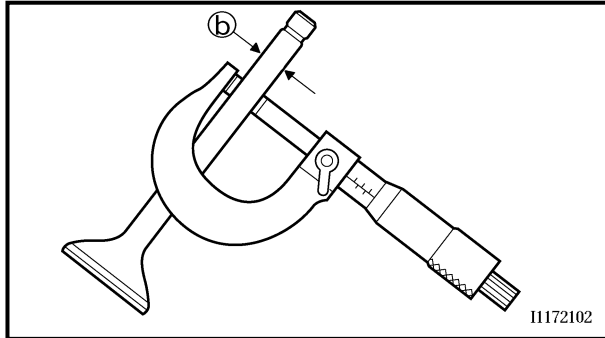
### INSPECTION

#### Valve

1. Measure:
  - Stem-to-guide clearance

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

Out of specification → Replace the valve guide.



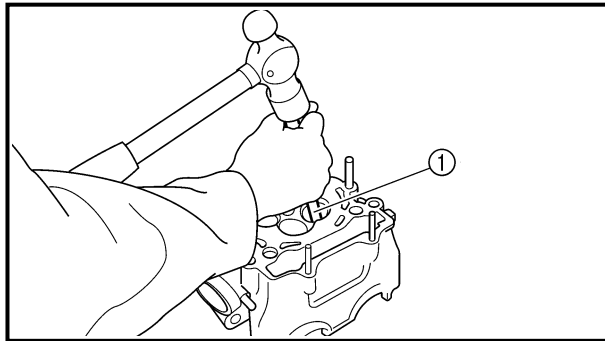
#### Clearance (stem to guide):

##### Intake:

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

##### Exhaust:

**0.020 ~ 0.047 mm**  
**(0.0008 ~ 0.0019 in)**  
**<Limit>: 0.10 mm (0.004 in)**



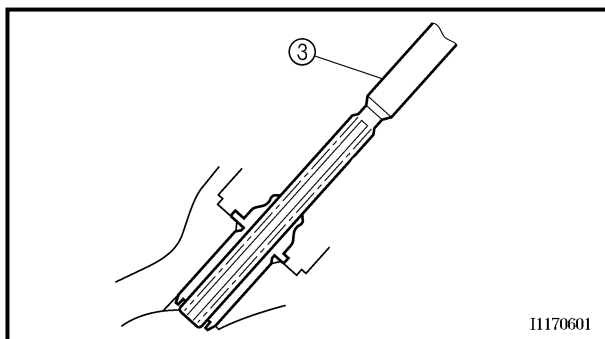
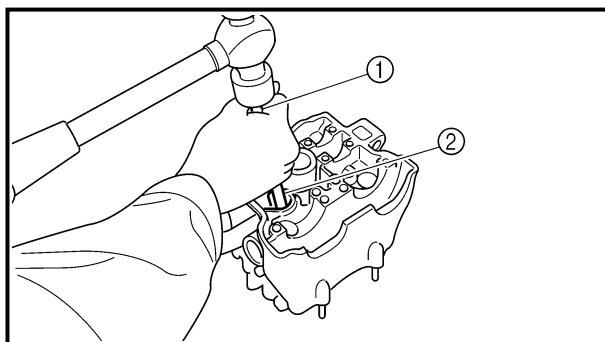
2. Replace:
  - Valve guide

#### Replacement steps:

##### NOTE:

To ease guide removal, installation and to maintain correct fit heat the cylinder head in an 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.

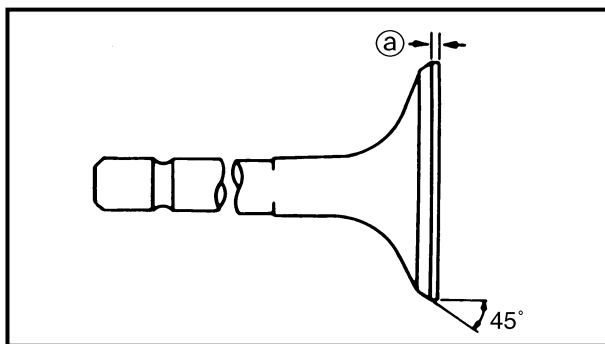




**Valve guide remover:**  
 Intake: 4.5 mm (0.18 in)  
 YM-4116/90890-04116  
 Exhaust: 5.0 mm (0.20 in)  
 YM-4097/90890-04097  
**Valve guide installer:**  
 Intake:  
 YM-4117/90890-04117  
 Exhaust:  
 YM-4098/90890-04098  
**Valve guide reamer:**  
 Intake: 4.5 mm (0.18 in)  
 YM-4118/90890-04118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

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

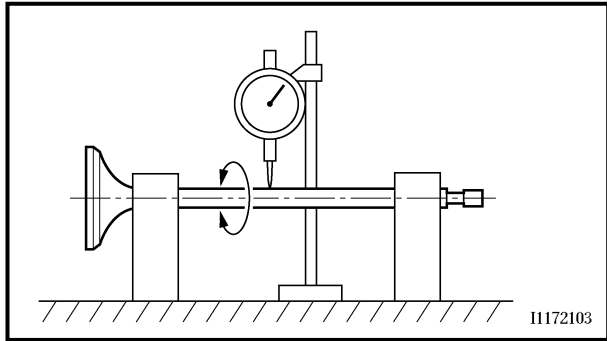
3. Inspect:
- Valve face  
 Pitting/wear → Grind the face.
  - Valve stem end  
 Mushroom shape or diameter larger than the body of the stem → Replace.



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



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



5. Measure:

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



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

**NOTE:**

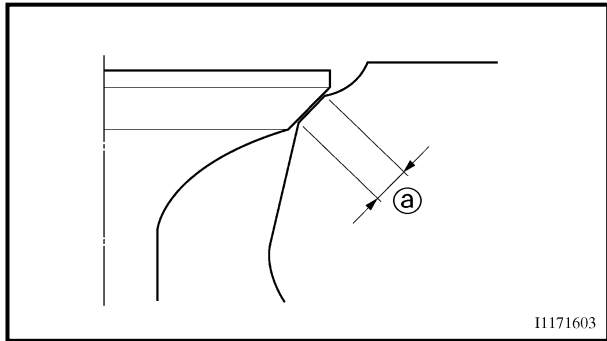
- When installing a new valve always replace the guide.
- If the valve is removed or replaced always replace the oil seal.

6. Eliminate:

- Carbon deposits  
(from the valve face and valve seat)

7. Inspect:

- Valve seats  
Pitting/wear → Reface the valve seat.

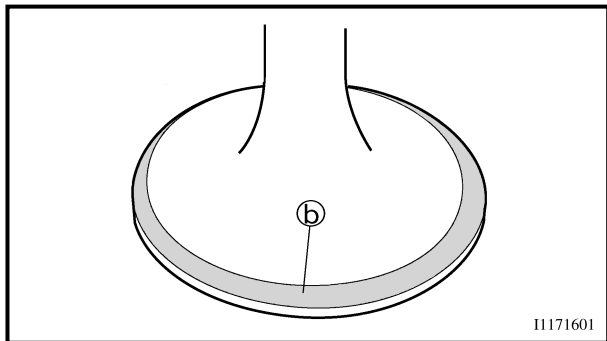


8. Measure:

- Valve seat width (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:**

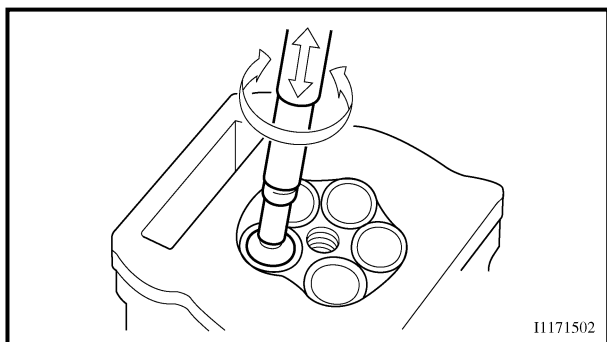
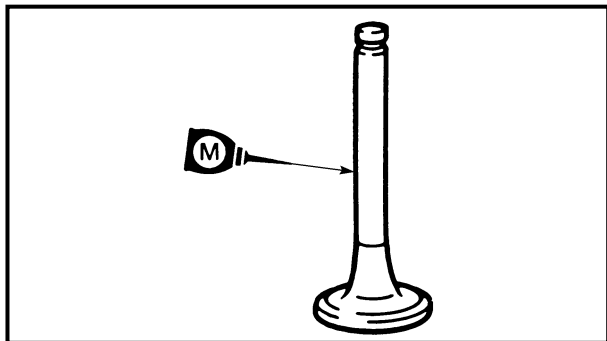
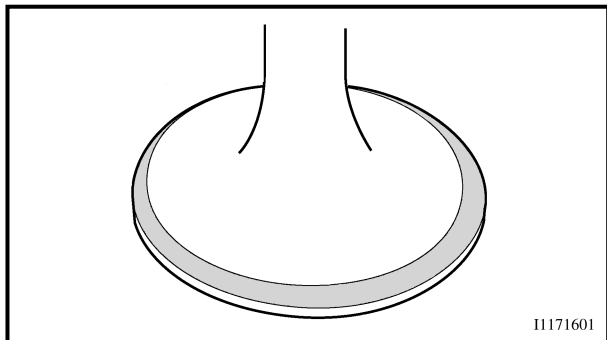
- Apply Mechanic's blueing dye (Dykem) (b) to the valve face.
- Install the valve into the cylinder head.
- Press the valve through the valve guide and onto the valve seat to make a clear pattern.
- Measure the valve seat width. Where the valve seat and valve face made contact, blueing will have been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

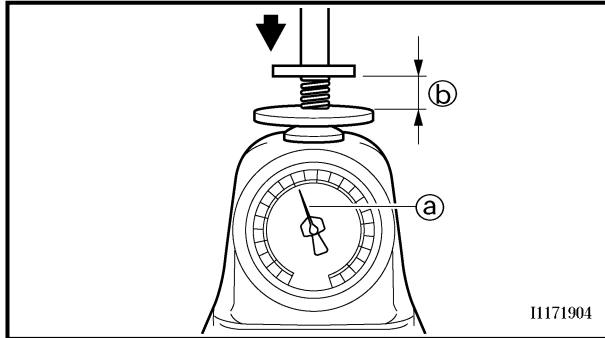
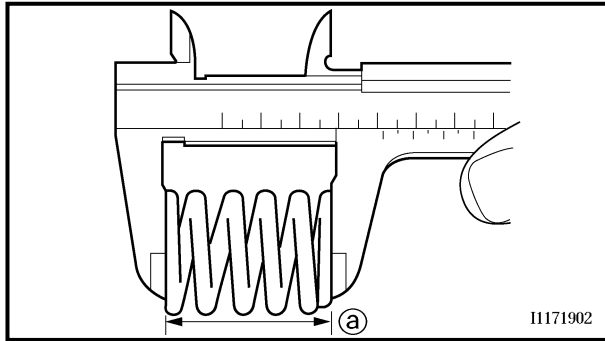
For best lapping results, lightly tap the valve seat while rotating the valve back and forth between your hands.

- 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 <sup>Ⓐ</sup>  
Out of specification → Replace.



### Free length (valve spring):

#### Intake:

37.03 mm (1.46 in)

<Limit>: 35.17 mm (1.38 in)

#### Exhaust:

37.68 mm (1.48 in)

<Limit>: 35.79 mm (1.41 in)

2. Measure:
  - Compressed spring force <sup>Ⓐ</sup>  
Out of specification → Replace.

<sup>Ⓑ</sup> Installed length



### Compressed spring force:

#### Intake:

111.3 ~ 127.9 N at 27.87 mm

(11.3 ~ 13.0 kg at 27.87 mm,

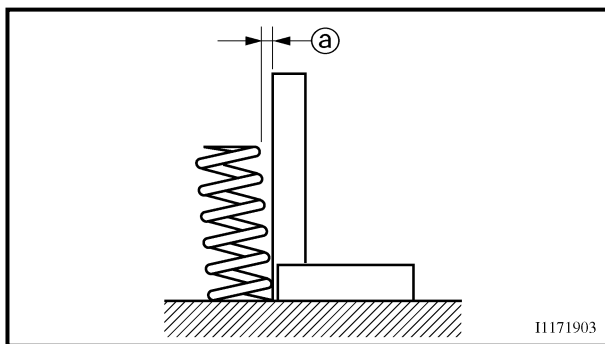
24.91 ~ 28.66 lb at 1.10 in)

#### Exhaust:

127.4 ~ 146.4 N at 27.38 mm

(13.0 ~ 14.9 kg at 27.38 mm,

28.66 ~ 32.85 lb at 1.08 in)



3. Measure:
  - Spring tilt <sup>Ⓐ</sup>  
Out of specification → Replace.



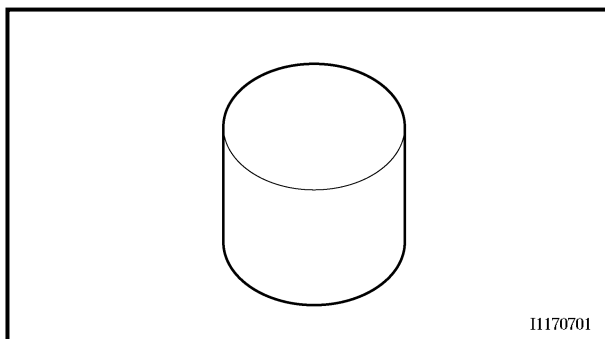
### Spring tilt limit:

#### Intake:

2.5°/1.61 mm (0.063 in)

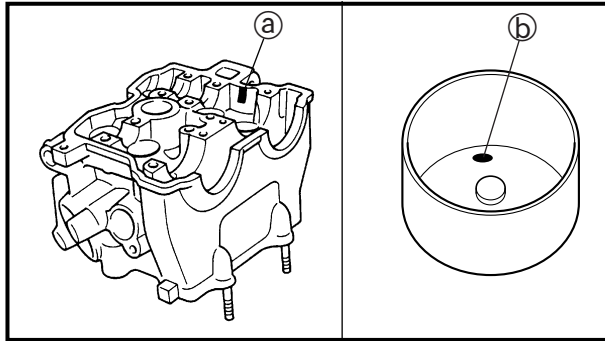
#### Exhaust:

2.5°/1.65 mm (0.065 in)



## Valve lifter

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



## Combination of cylinder head and valve lifter

### 1. Combination:

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

Combination	
Cylinder head mark Ⓐ (color)	Valve lifter mark Ⓑ (color)
Blue	Blue
Yellow	Yellow
Purple	Black

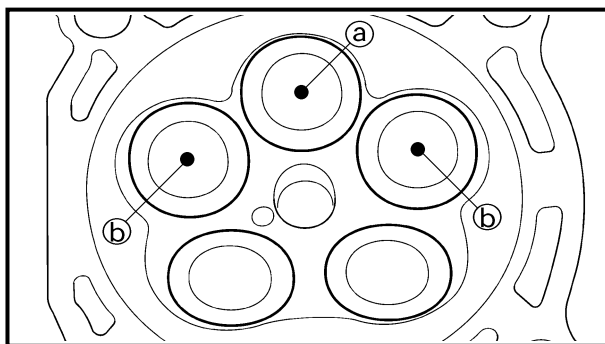
### NOTE:

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

## ASSEMBLY AND INSTALLATION

### 1. Apply:

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



### 2. Install:

- Valves ①
- Valve spring seats ②
- Valve stem seals ③ **New**
- Valve springs ④
- Valve spring retainers ⑤

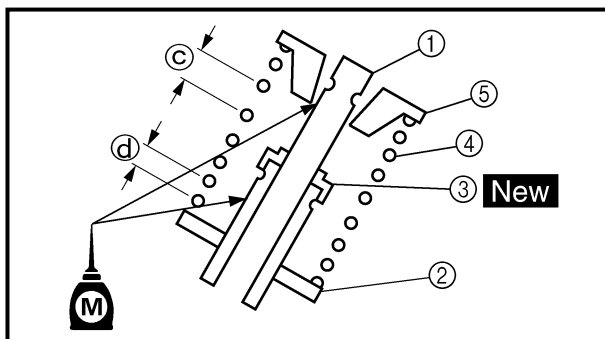
### NOTE:

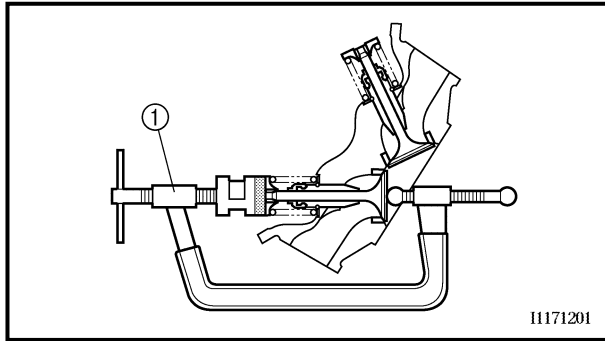
- Make sure that each valve is installed in its original place, also referring to the painted color as follows.

Intake (middle) Ⓐ: blue  
Intake (right/left) Ⓑ: gray  
Exhaust: not paint

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

Ⓓ Smaller pitch



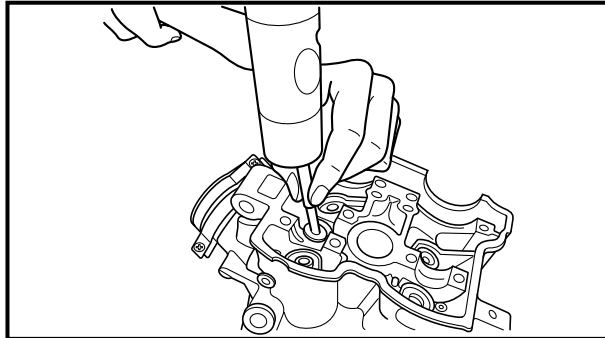


3. Install:
- Valve cotters

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

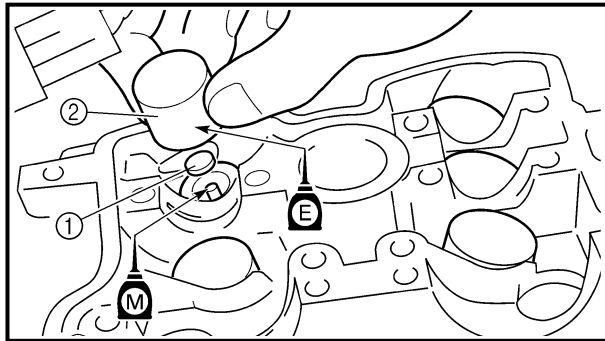


**Valve spring compressor:**  
**YM-4019/90890-04019**



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

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



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

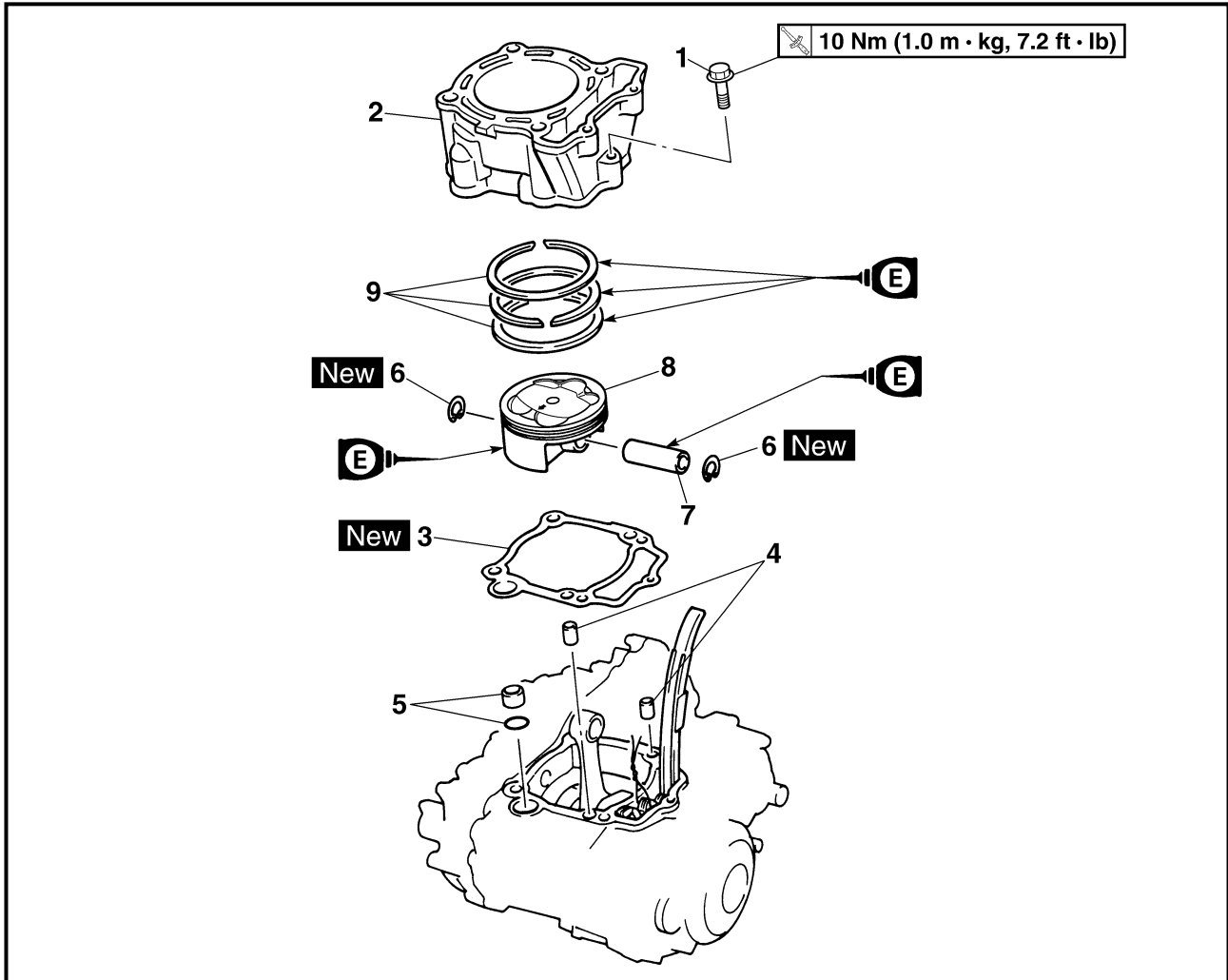
**NOTE:** \_\_\_\_\_

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





CYLINDER AND PISTON  
CYLINDER AND PISTON

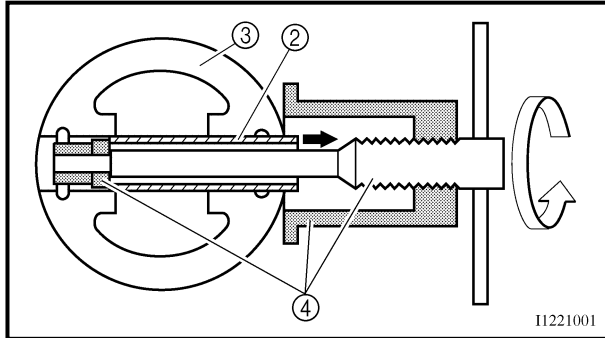
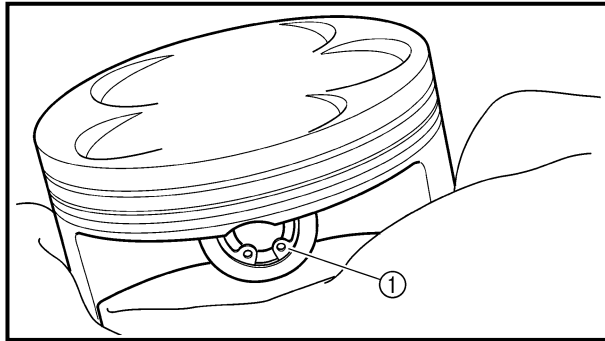


Extent of removal:

① Cylinder removal

② Piston removal

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



### REMOVAL POINTS

#### Piston

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

#### NOTE:

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



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

#### CAUTION:

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

#### Piston ring

1. Remove:
  - Piston rings

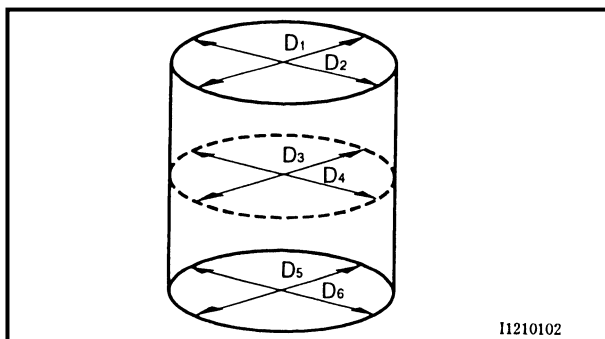
#### NOTE:

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

### INSPECTION

#### Cylinder and piston

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



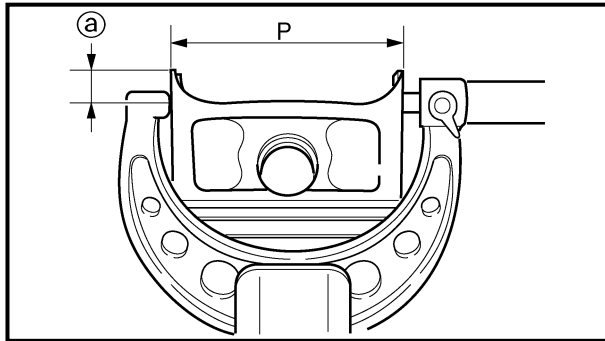
#### Measurement steps:

##### 1st step:

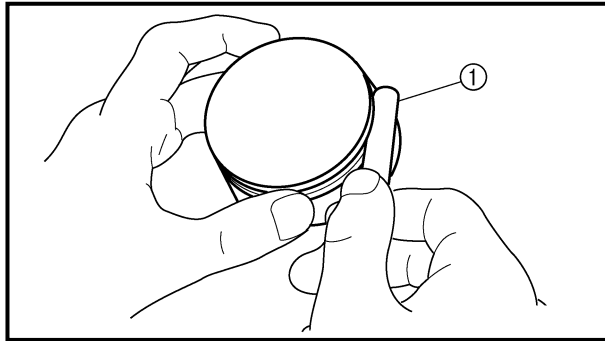
- Measure the cylinder bore "C" with a cylinder bore gauge.

#### NOTE:

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



Cylinder bore "C"	95.00 ~ 95.01 mm (3.7402 ~ 3.7406 in)
Taper limit "T"	0.05 mm (0.002 in)
Out of round "R"	0.05 mm (0.002 in)
<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 (0.315 in) from the piston bottom edge</li> </ul>	
	<b>Piston size "P"</b>
<b>Standard</b>	<b>94.945 ~ 94.960 mm (3.738 ~ 3.739 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>
Top ring	0.030 ~ 0.065 mm (0.0012 ~ 0.0026 in)	0.12 mm (0.005 in)
2nd ring	0.020 ~ 0.055 mm (0.0008 ~ 0.0022 in)	0.12 mm (0.005 in)

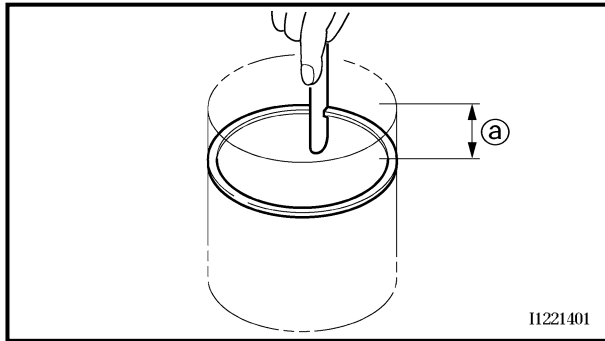
### 2. Position:

- Piston ring  
(in cylinder)

### NOTE:

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

① 10 mm (0.39 in)



### 3. Measure:

- Ring end gap

Out of specification → Replace.

### NOTE:

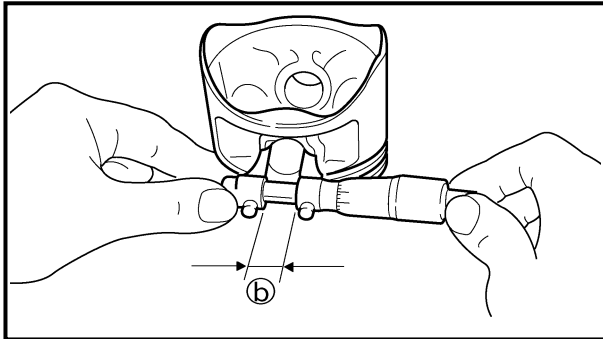
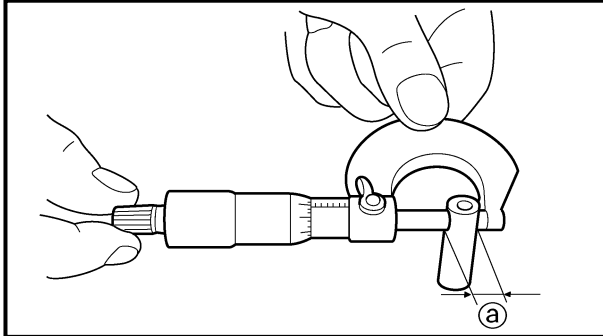
You cannot measure the end gap on the expander spacer of the oil control ring. If the oil control ring rails show excessive gap, replace all three rings.

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



## Piston pin

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



### Measurement steps:

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



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

- Measure the inside diameter (piston) ②.



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

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

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

- If out of specification, replace the piston.



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

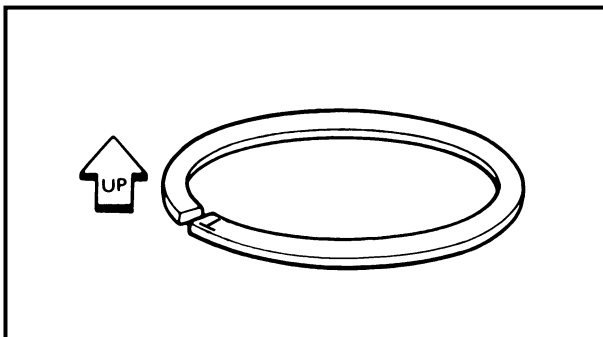
## ASSEMBLY AND INSTALLATION

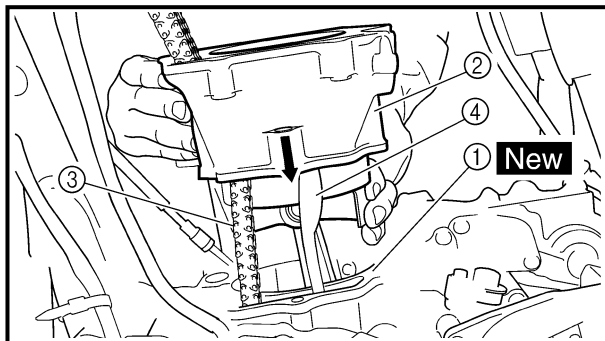
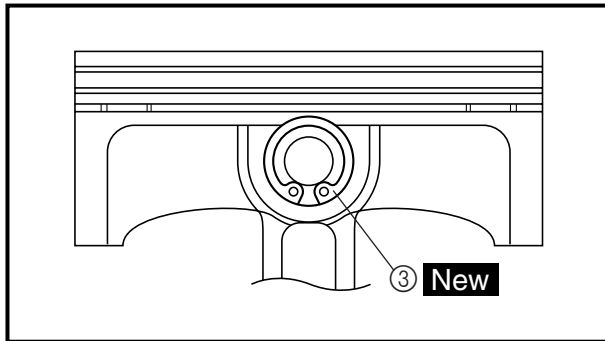
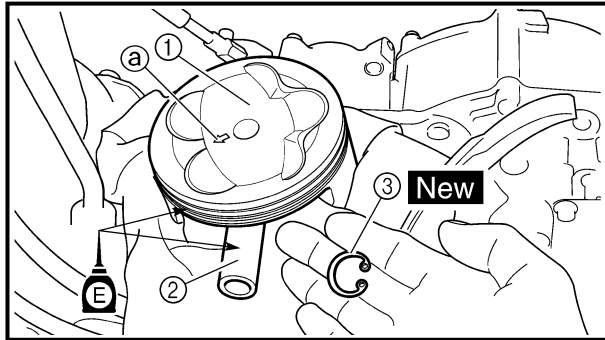
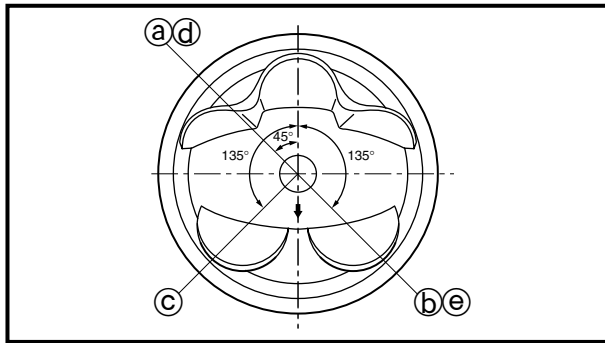
### Piston

1. Install:
  - Piston rings  
Onto the piston.

### NOTE:

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





## 2. Position:

- Top ring
- 2nd ring
- Oil ring

Offset the piston ring end gaps as shown.

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

## 3. Install:

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

## NOTE:

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

## 4. Lubricate:

- Piston
- Piston rings
- Cylinder

## NOTE:

Apply a liberal coating of engine oil.

## Cylinder

### 1. Install:

- Dowel pins
- O-ring
- Gasket ① **New**
- Cylinder ②

## NOTE:

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

## CAUTION:

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

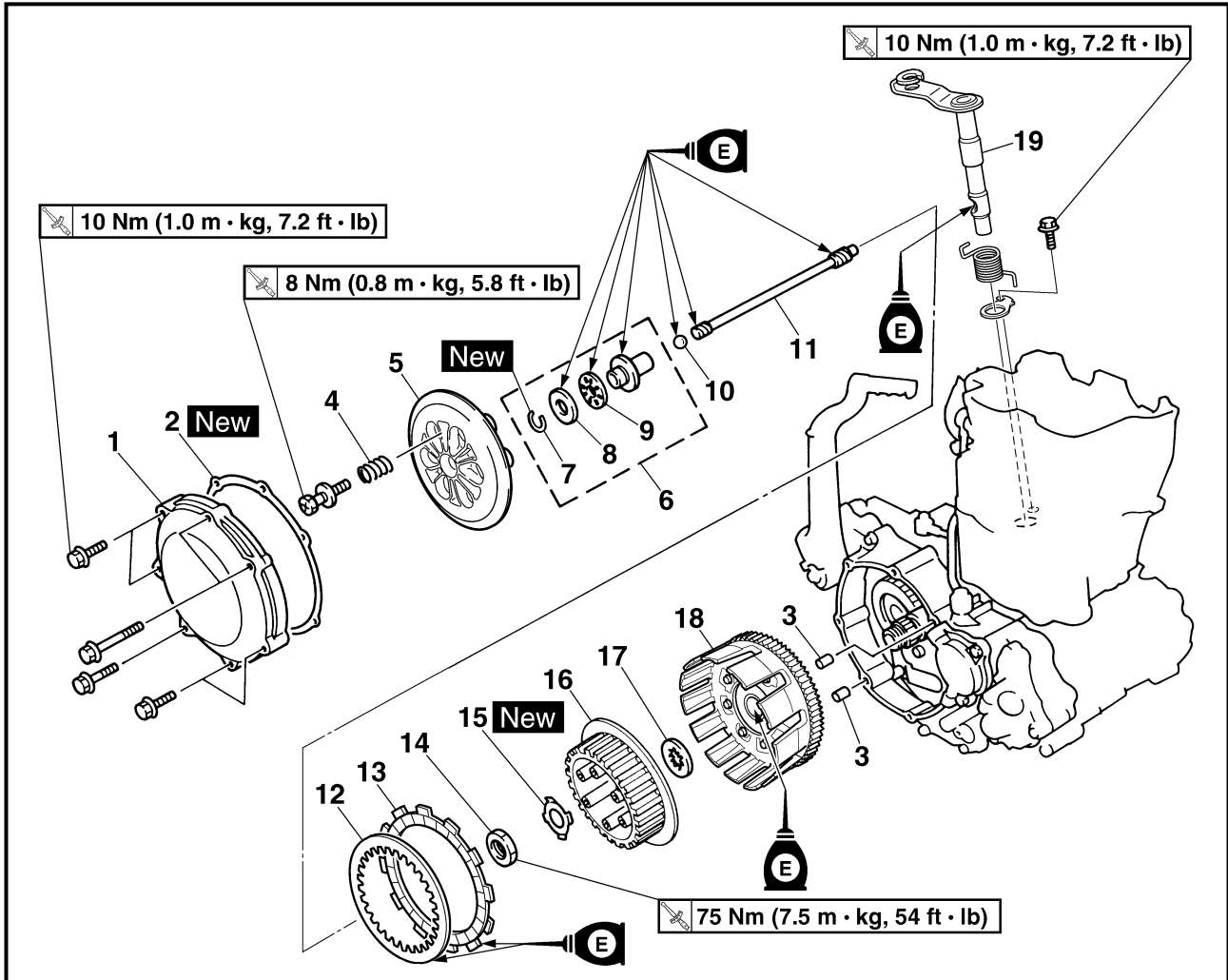
### 2. Install:

- Bolt (cylinder)

10 Nm (1.0 m · kg, 7.2 ft · lb)



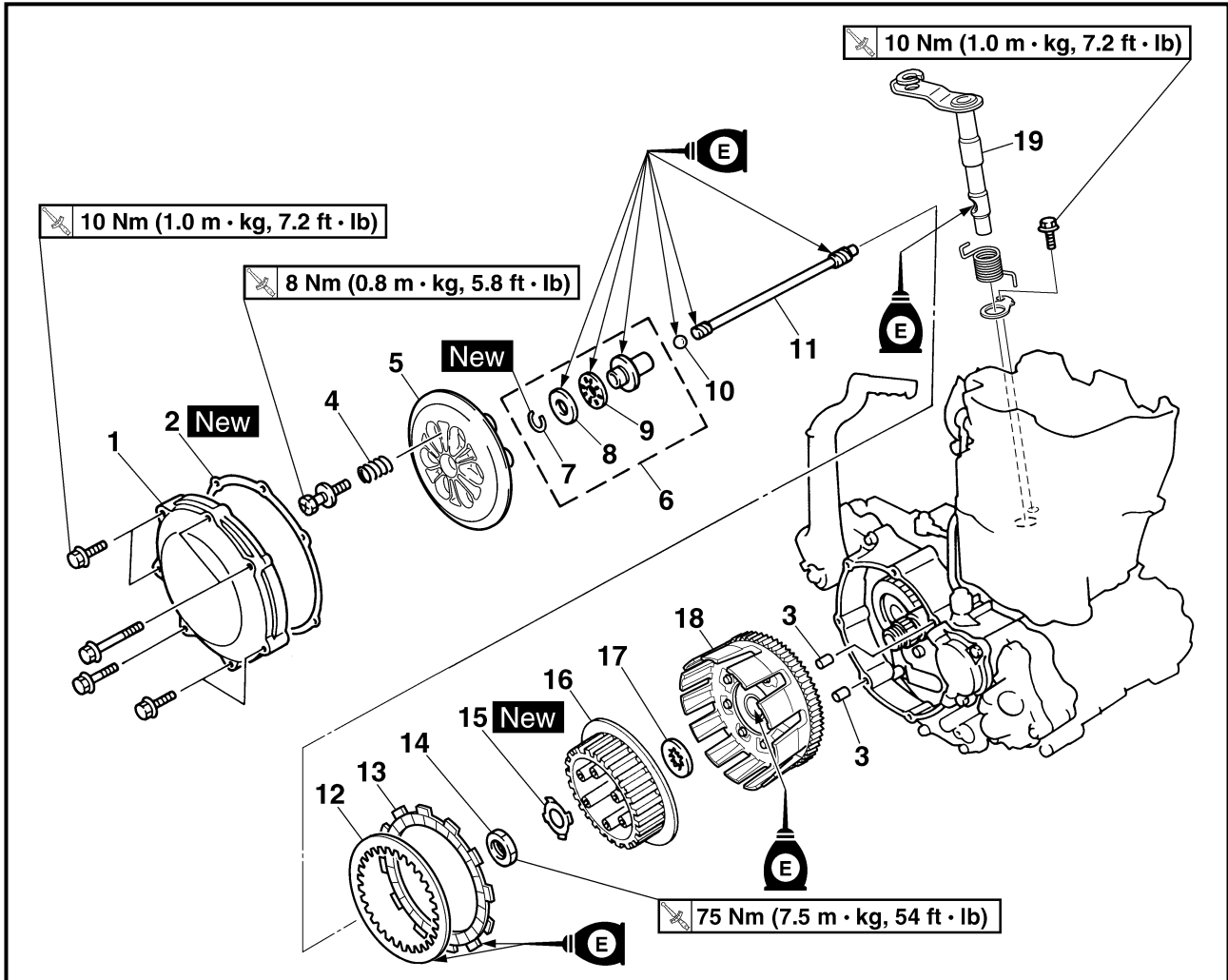
CLUTCH  
CLUTCH



Extent of removal:

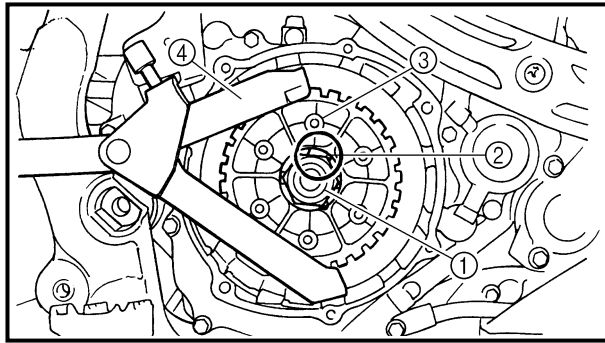
- ① Push rod and push lever removal
- ② Push pod 1 disassembly
- ③ Friction plate and clutch plate removal
- ④ Clutch housing removal

Extent of removal	Order	Part name	Q'ty	Remarks
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 ↓	1	Clutch cover	1	
② ↓	2	Gasket	1	
③ ↓	3	Dowel pin	2	
④ ↓	4	Clutch spring	6	
	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	



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





EC493000

**REMOVAL POINTS**

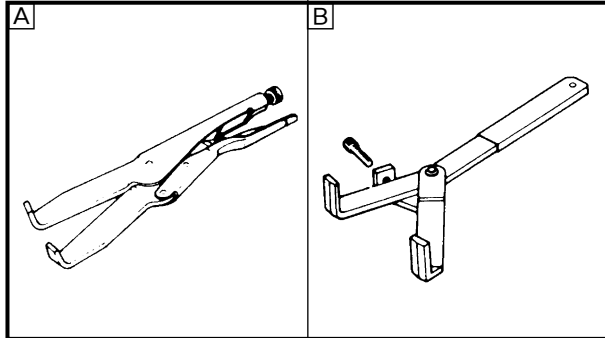
EC483211

**Clutch boss**

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

**NOTE:**

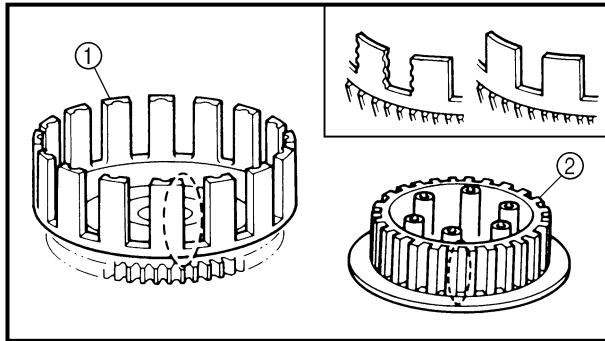
Straighten the lock washer tab and use the clutch holding tool ④ to hold the clutch boss.



	<p><b>Clutch holding tool:</b> YM-91042/90890-04086</p>
--	---

Ⓐ For USA and CDN

Ⓑ Except for USA and CDN



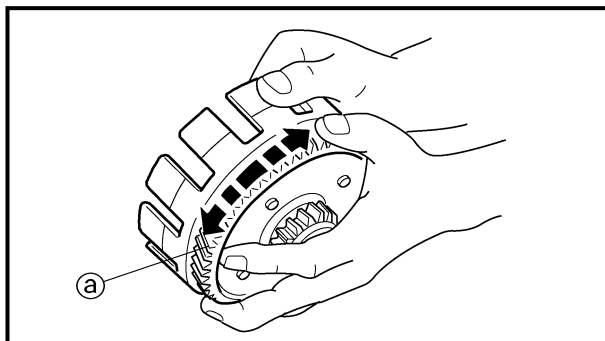
EC494000

**INSPECTION**

EC484100

**Clutch housing and boss**

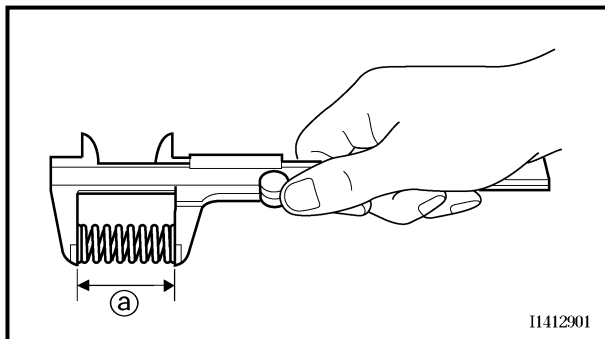
1. Inspect:
  - Clutch housing ①  
Cracks/wear/damage → Replace.
  - Clutch boss ②  
Scoring/wear/damage → Replace.



EC484201

**Primary driven gear**

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



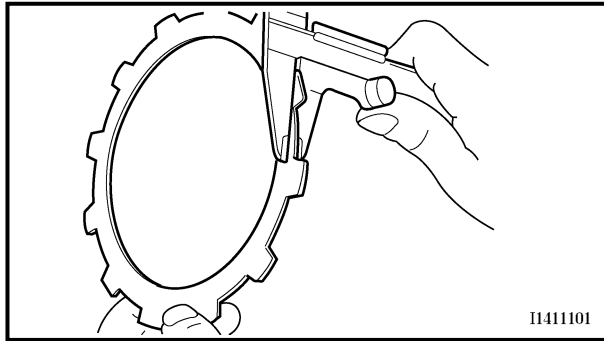
EC484400

**Clutch spring**

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

	<b>Clutch spring free length:</b>	
	<b>Standard</b>	<b>&lt;Limit&gt;</b>
	<b>48.4 mm (1.91 in)</b>	<b>47.4 mm (1.87 in)</b>

11412901



EC484500

**Friction plate**

## 1. Measure:

- Friction plate thickness

Out of specification → Replace friction plate as a set.

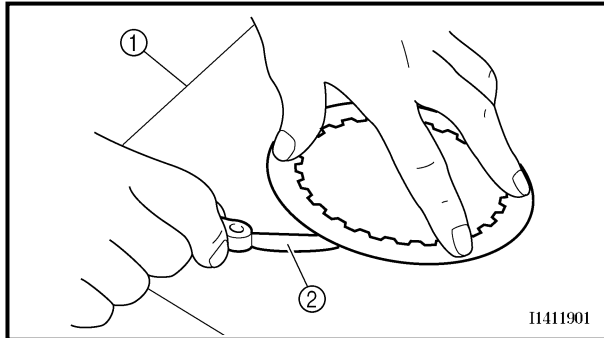
Measure at all four points.

**Friction plate thickness:**

**2.92 ~ 3.08 mm**

**(0.115 ~ 0.121 in)**

**<Limit>: 2.8 mm (0.110 in)**



EC484600

**Clutch plate**

## 1. Measure:

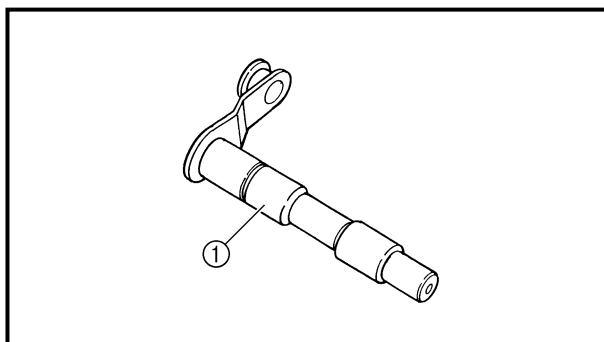
- Clutch plate warpage

Out of specification → Replace clutch plate as a set.

Use a surface plate ① and thickness gauge ②.

**Warp limit:**

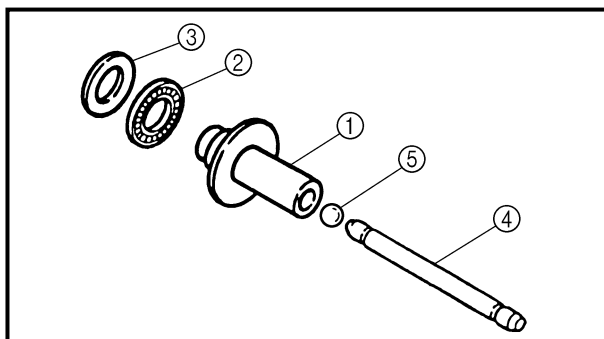
**0.1 mm (0.004 in)**

**Push lever**

## 1. Inspect:

- Push lever ①

Wear/damage → Replace.



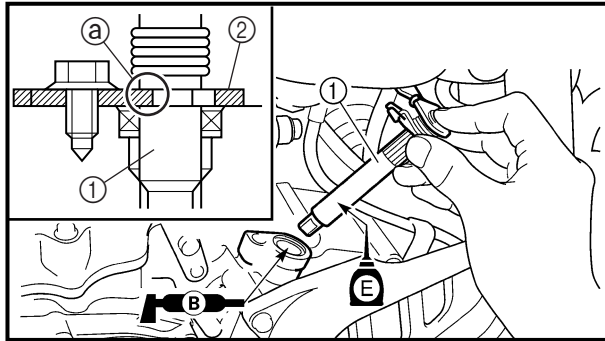
EC484810

**Push rod**

## 1. Inspect:

- Push rod 1 ①
- Bearing ②
- Plain washer ③
- Push rod 2 ④
- Ball ⑤

Wear/damage/bend → Replace.




EC4A5000

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

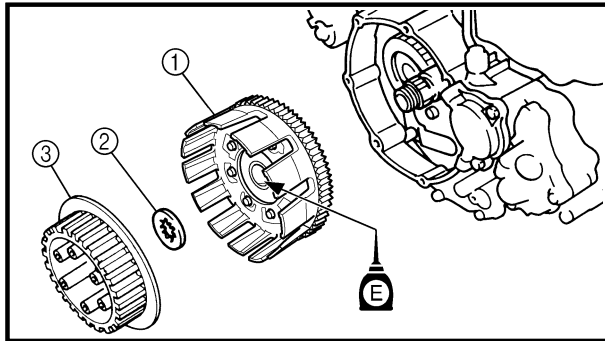
## 1. Install:

- Push lever ①
- Bolt (push lever)

	<b>10 Nm (1.0 m · kg, 7.2 ft · lb)</b>
---	--

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

- Apply the lithium soap base grease on the oil seal lip.
- Apply the engine oil on the push lever.
- Fit the seat plate ② in the groove ③ of the push lever and tighten the bolt (seat plate).

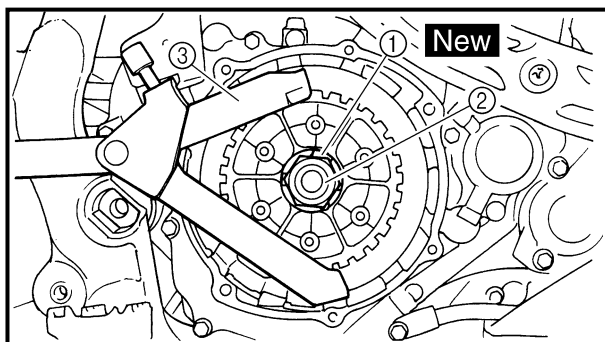
**Clutch**

## 1. Install:

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


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

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



## 2. Install:

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

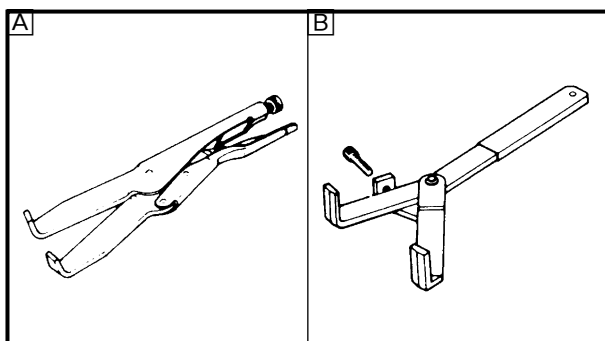
	<b>75 Nm (7.5 m · kg, 54 ft · lb)</b>
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**NOTE:** \_\_\_\_\_

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

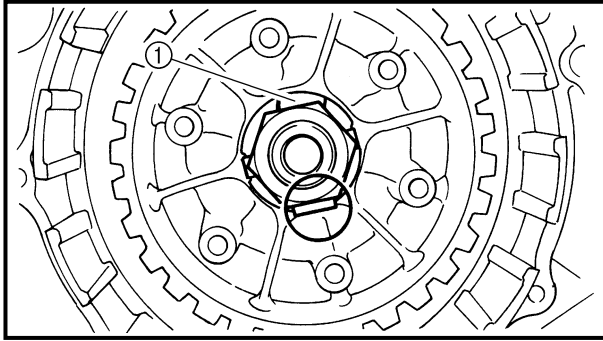


**Clutch holding tool:**  
**YM-91042/90890-04086**

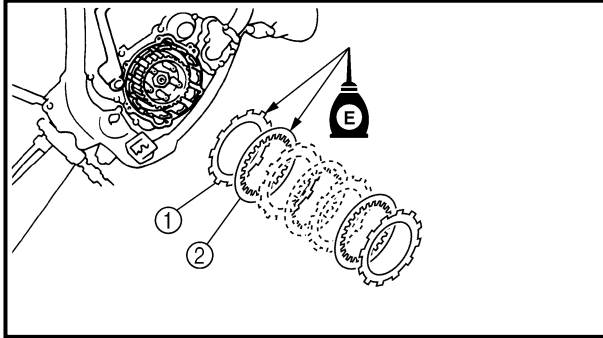


**A** For USA and CDN

**B** Except for USA and CDN



3. Bend the lock washer ① tab.

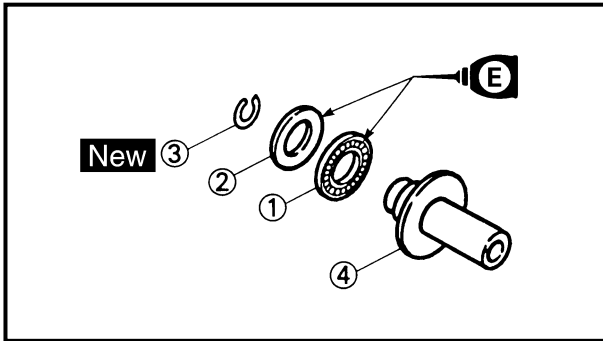


4. Install:

- Friction plate ①
- Clutch plate ②

**NOTE:**

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



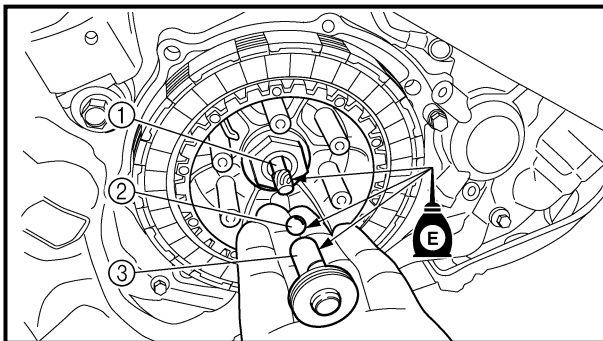
5. Install:

- Bearing ①
- Plain washer ②
- Circlip ③ **New**

To push rod 1 ④.

**NOTE:**

Apply the engine oil on the bearing and plain washer.

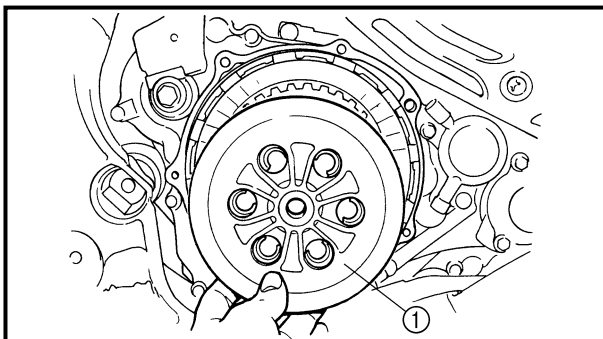


6. Install:

- Push rod 2 ①
- Ball ②
- Push rod 1 ③

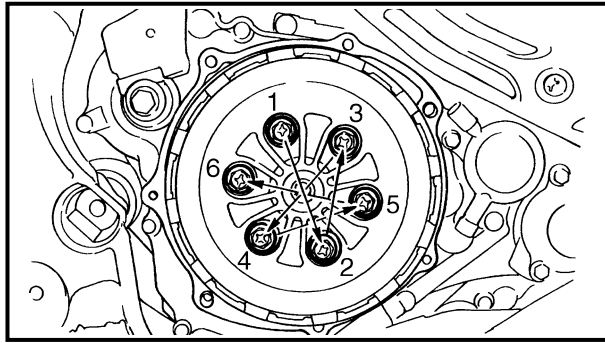
**NOTE:**

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



7. Install:

- Pressure plate ①



8. Install:

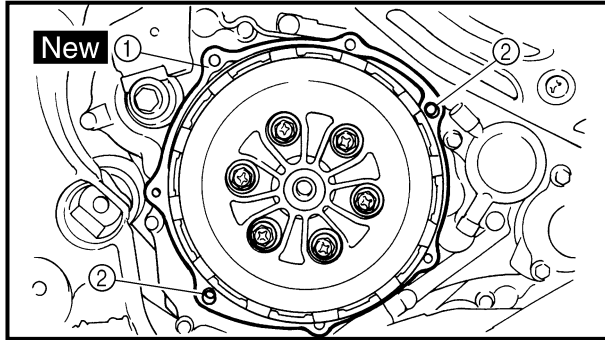
- Clutch spring
- Bolt (clutch spring)

8 Nm (0.8 m · kg, 5.8 ft · lb)

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

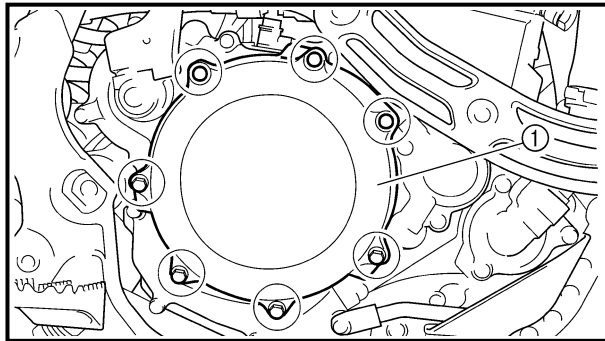
Tighten the bolts in stage, using a crisscross pattern.

---



9. Install:

- Gasket (clutch cover) ① **New**
- Dowel pin ②



10. Install:

- Clutch cover ①
- Bolt (clutch cover)

10 Nm (1.0 m · kg, 7.2 ft · lb)

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

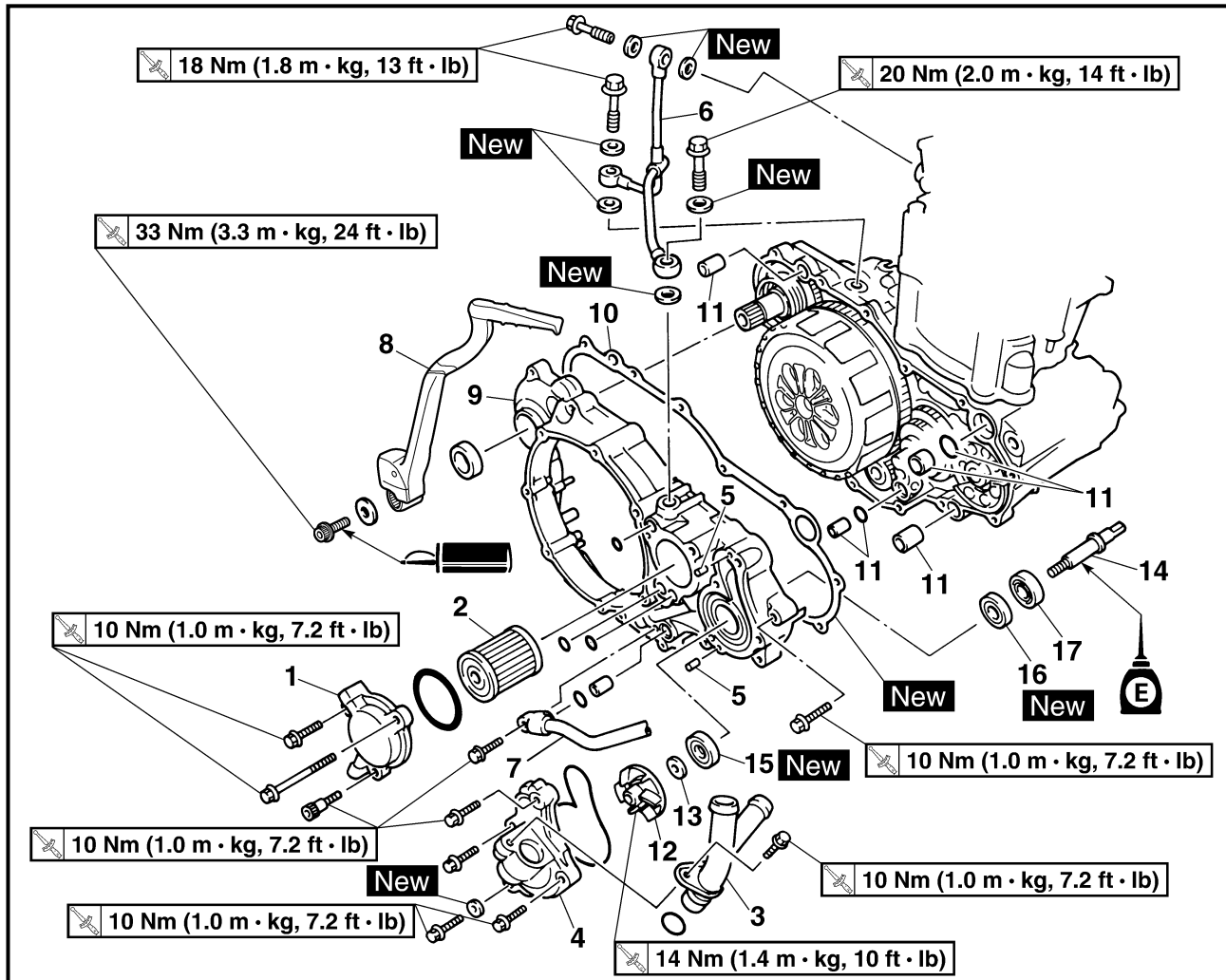
Tighten the bolts in stage, using a crisscross pattern.

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# OIL FILTER, WATER PUMP AND CRANKCASE COVER (RIGHT)



## OIL FILTER, WATER PUMP AND CRANKCASE COVER (RIGHT)

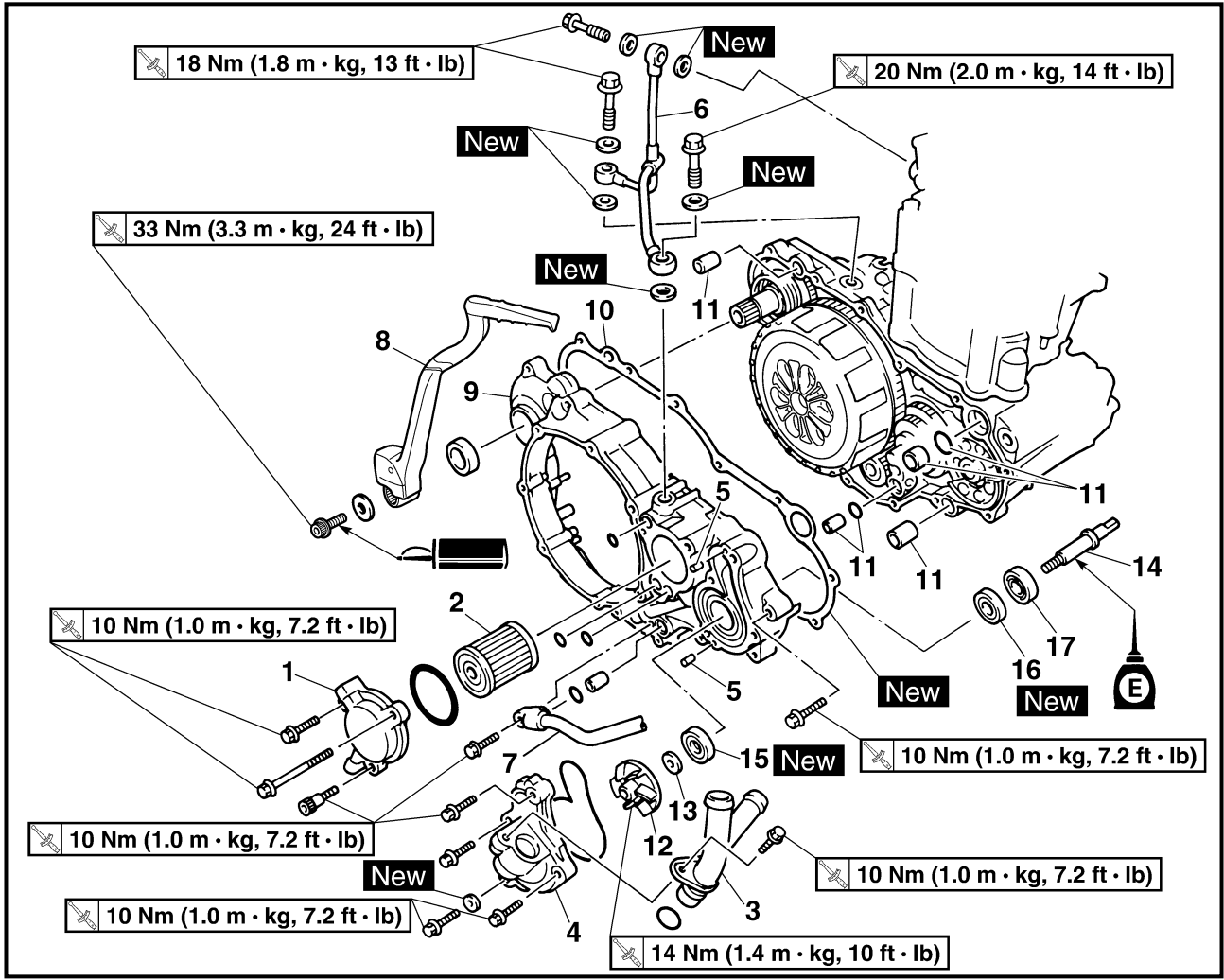


Extent of removal:

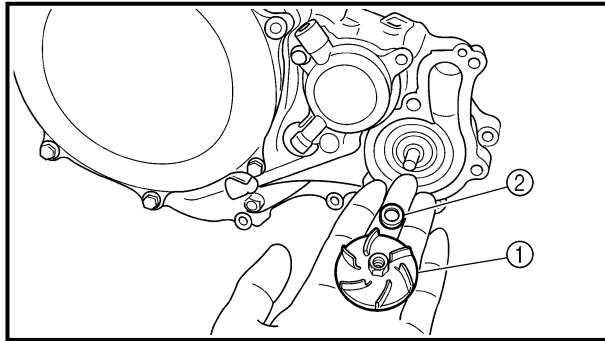
- ① Oil filter removal
- ② Water pump removal
- ③ Crankcase cover (right) removal

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

# OIL FILTER, WATER PUMP AND CRANKCASE COVER (RIGHT)



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



## REMOVAL POINTS

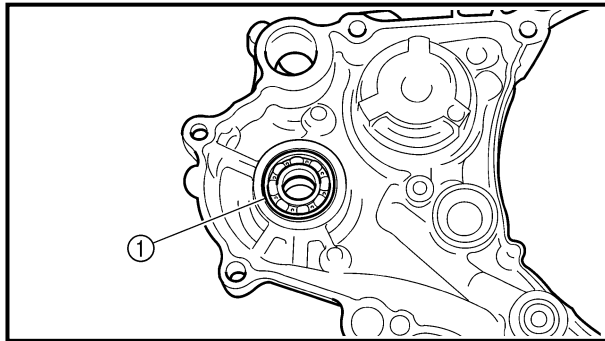
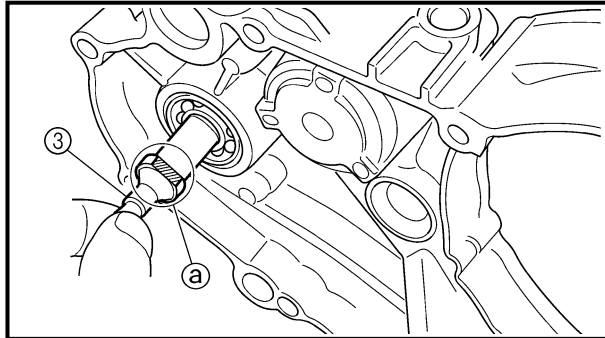
EC4G3110

### Impeller shaft

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

### NOTE:

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



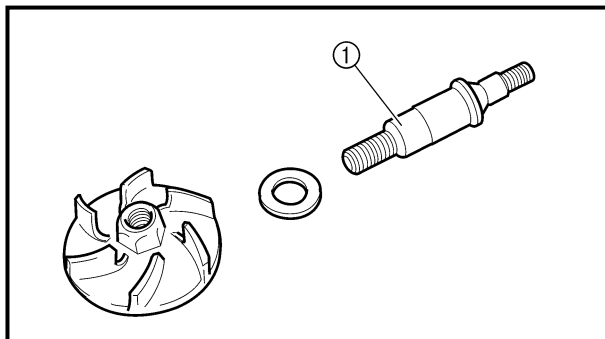
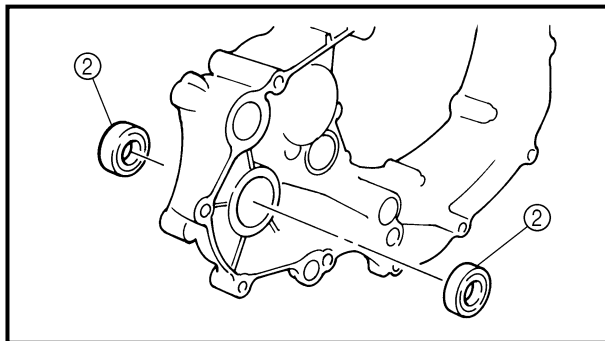
EC4G3210

### 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.

- Remove:
  - Bearing ①
  - Oil seal ②



## INSPECTION

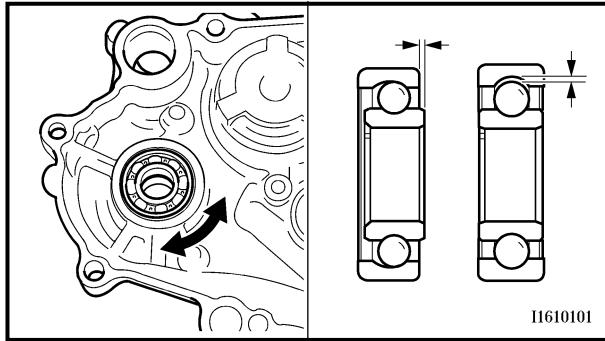
EC444200

### Impeller shaft

- Inspect:
  - Impeller shaft ①

Bend/wear/damage → Replace.  
Fur deposits → Clean.





EC4H4600

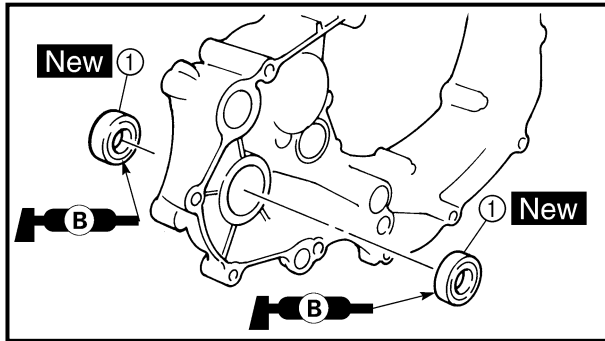
### Bearing

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

EC444400

### Oil seal

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



## ASSEMBLY AND INSTALLATION

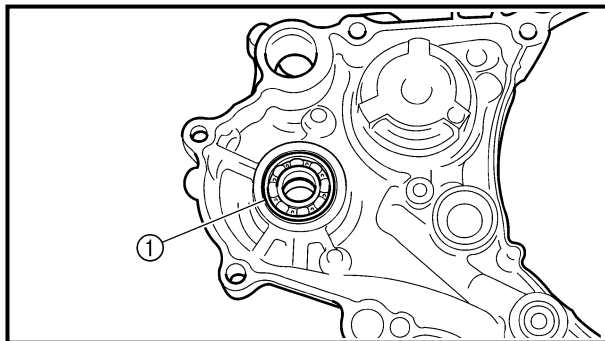
EC4G5110

### Oil seal

1. Install:
  - Oil seal ① **New**

#### NOTE:

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

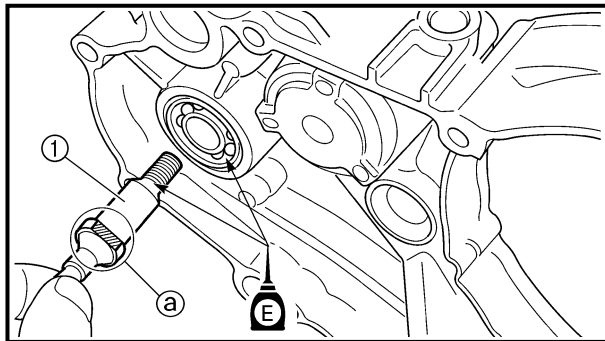


### Bearing

1. Install:
  - Bearing ①

#### NOTE:

Install the bearing by pressing its outer race parallel.



EC4G5220

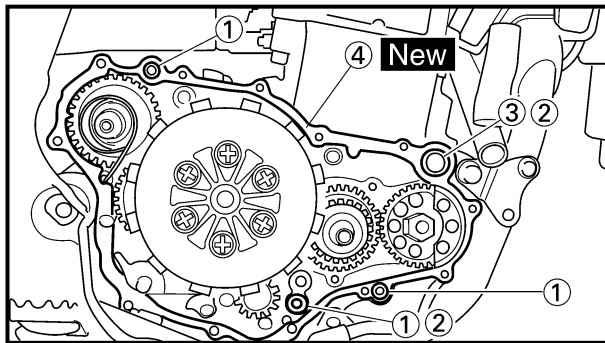
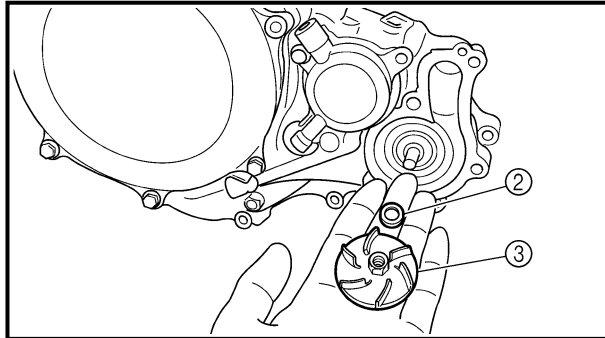
## Impeller shaft

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

14 Nm (1.4 m · kg, 10 ft · lb)

### NOTE:

- Take care so that the oil seal lip is not damaged or the spring does not slip off its position.
- When installing the impeller shaft, apply the engine oil on the oil seal lip, bearing and impeller shaft. And install the shaft while turning it.
- Hold the impeller shaft on its width across the flats ② with spanners, etc. and install the impeller.



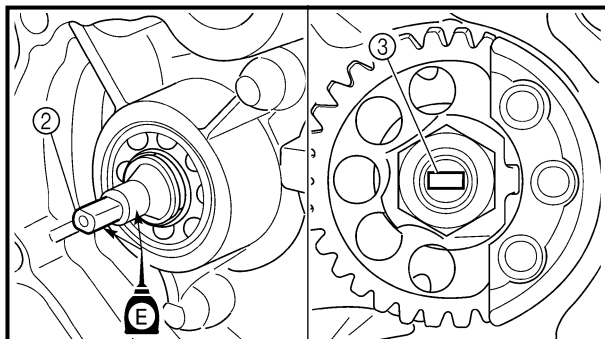
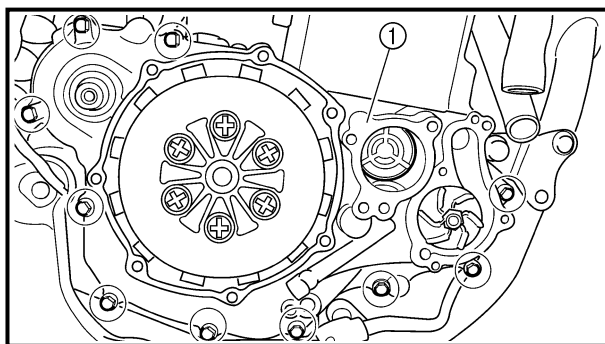
## Crankcase cover (right)

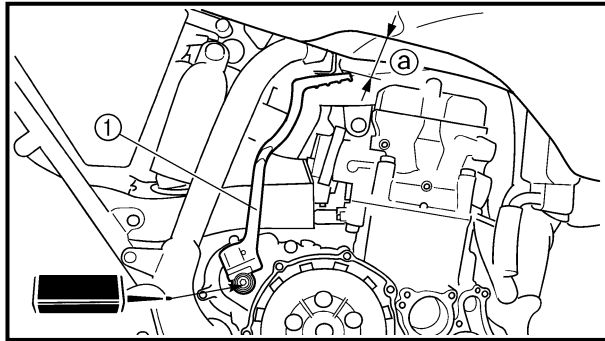
1. Install:
  - Dowel pin ①
  - O-ring ②
  - Collar ③
  - Gasket ④ **New**

2. Install:
  - Crankcase cover (right) ①
  - Bolt 10 Nm (1.0 m · kg, 7.2 ft · lb)

### NOTE:

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





### Kick crank

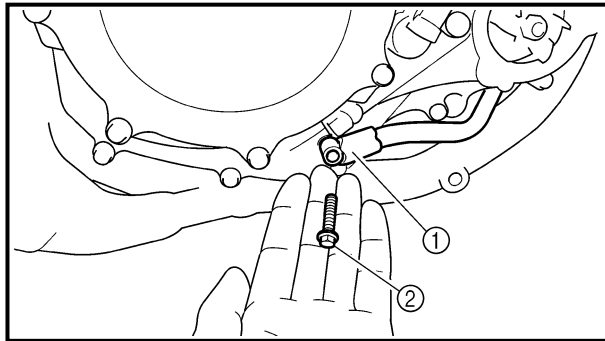
#### 1. Install:

- Kickstarter ①
- Plain washer
- Bolt (kickstarter)

**33 Nm (3.3 m · kg, 24 ft · lb)**

#### NOTE:

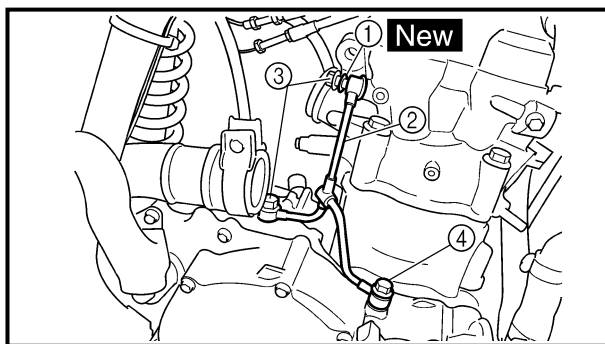
Install the kickstarter so that the distance ② between the kickstarter and the fuel tank is 12 mm (0.47 in) or more.



#### 2. Install:

- Oil hose ①
- Bolt (oil hose) ②

**10 Nm (1.0 m · kg, 7.2 ft · lb)**



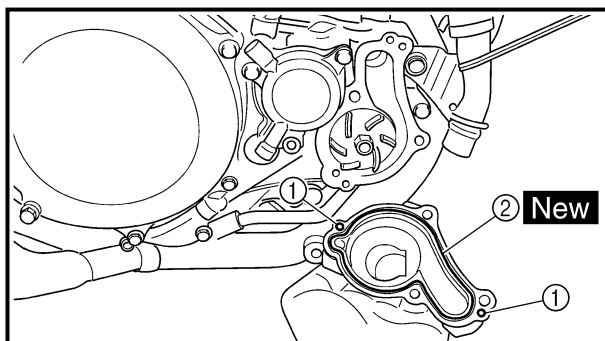
#### 3. Install:

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

**18 Nm (1.8 m · kg, 13 ft · lb)**

- Union bolt (M10) ④

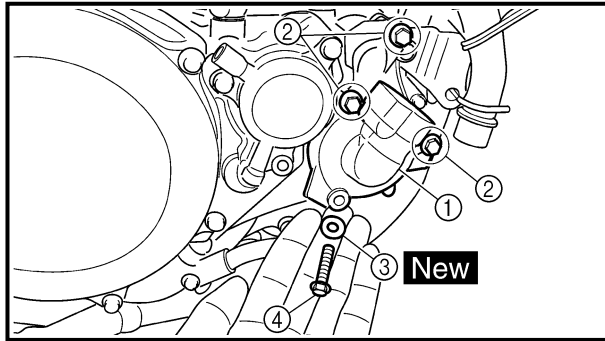
**20 Nm (2.0 m · kg, 14 ft · lb)**



### Water pump housing

#### 1. Install:

- Dowel pin ①
- O-ring ② **New**



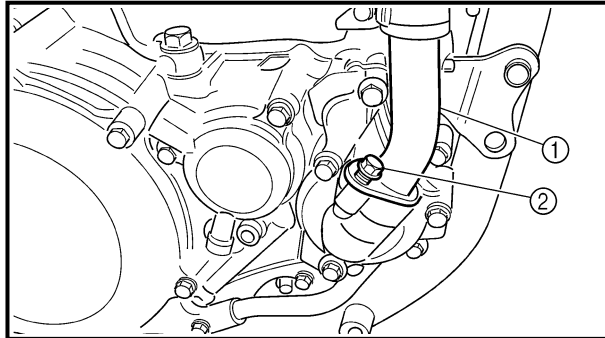
## 2. Install:

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

10 Nm (1.0 m · kg, 7.2 ft · lb)

- Plain washer ③ **New**
- Coolant drain bolt ④

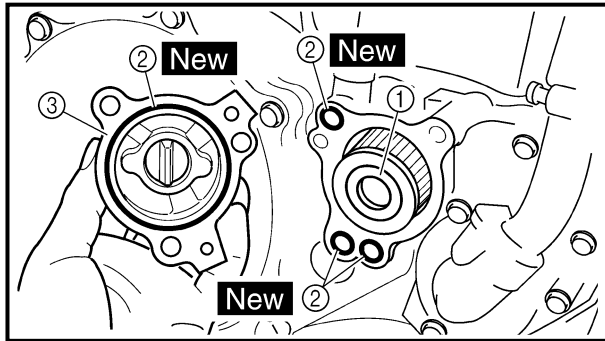
10 Nm (1.0 m · kg, 7.2 ft · lb)



## 3. Install:

- O-ring
- Coolant pipe ①
- Bolt (coolant pipe) ②

10 Nm (1.0 m · kg, 7.2 ft · lb)



## Oil filter

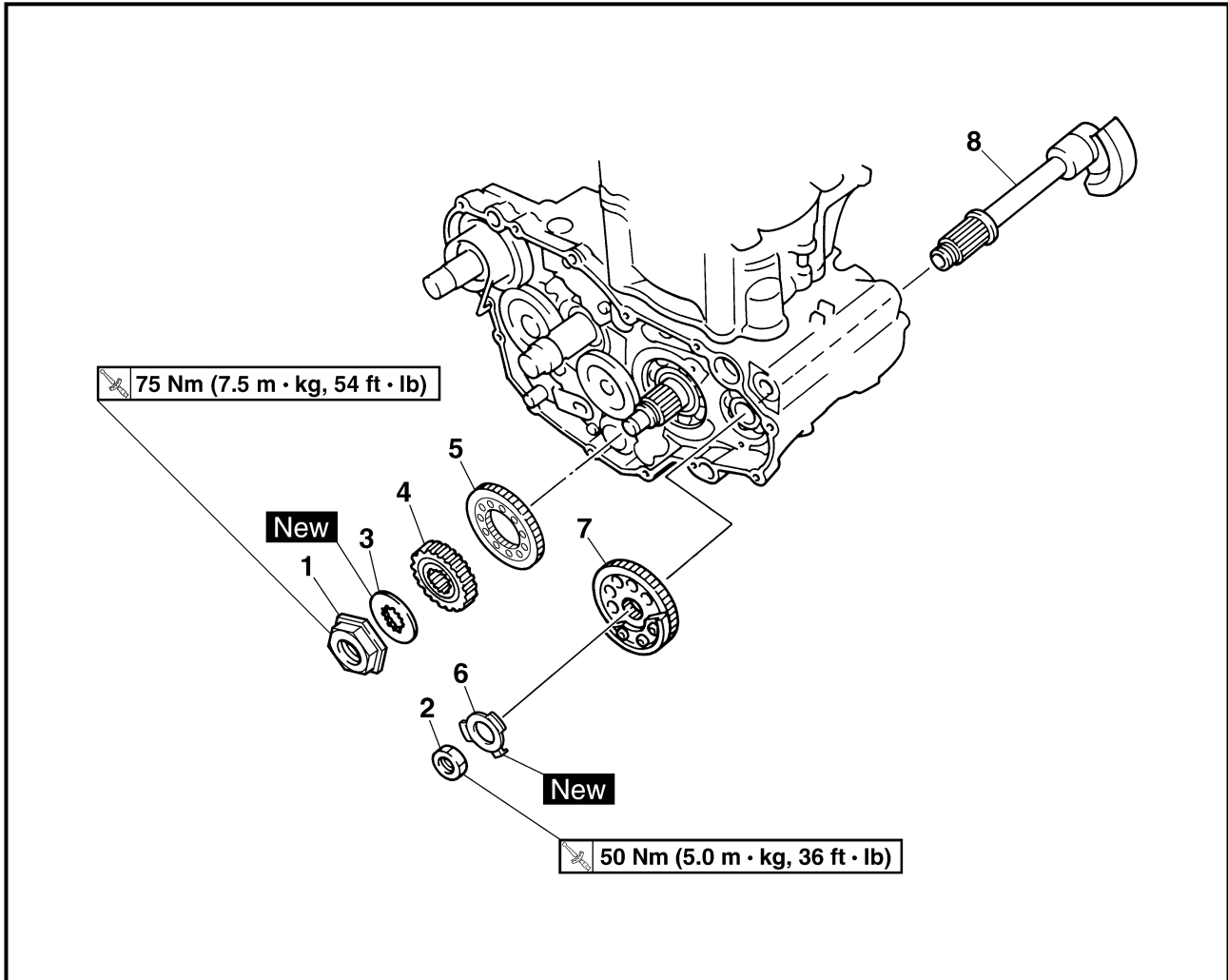
### 1. Install:

- Oil filter ①
- O-ring ② **New**
- Oil filter cover ③
- Bolt (oil filter cover)

10 Nm (1.0 m · kg, 7.2 ft · lb)

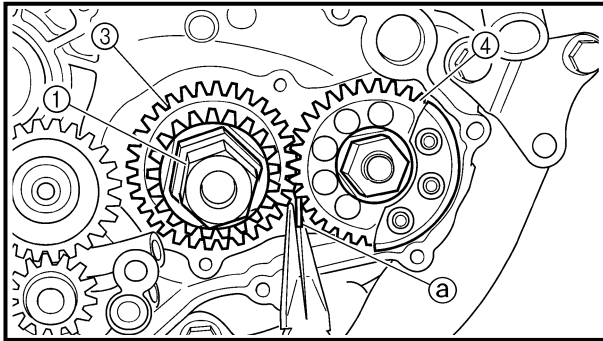


BALANCER  
BALANCER



Extent of removal:                      ① Balancer drive gear                      ② Balancer

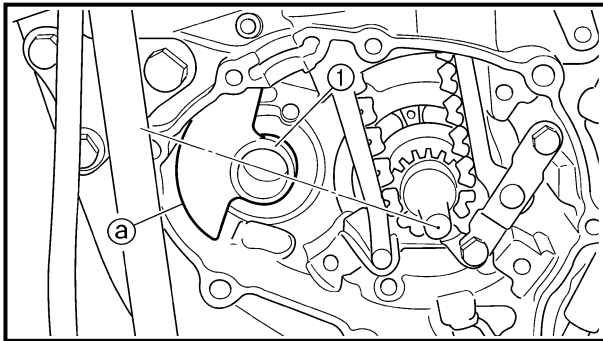
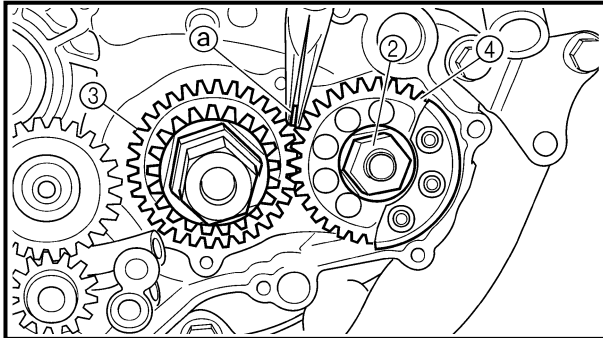
Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>BALANCER REMOVAL</b>		
		Clutch housing		Refer to "CLUTCH" section.
		Crankcase cover (right)		Refer to "OIL FILTER, WATER PUMP AND CRANKCASE COVER (RIGHT)" section.
		Stator		Refer to "AC MAGNETO AND STARTER CLUTCH" section.
<div style="display: flex; flex-direction: column; align-items: center;"> <div style="display: flex; align-items: center; margin-bottom: 20px;"> <div style="text-align: center; margin-right: 10px;"> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">①</span> ↑ ↓                 </div> <div style="text-align: center; margin-right: 10px;"> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">②</span> ↑ ↓                 </div> </div> <div style="text-align: center; margin-bottom: 20px;"> <span style="border: 1px solid black; border-radius: 50%; padding: 2px;">②</span> ↑ ↓             </div> </div>	1	Nut (primary drive gear)	1	Refer to "REMOVAL POINTS".
	2	Nut (balancer)	1	
	3	Lock washer	1	
	4	Primary drive gear	1	
	5	Balancer drive gear	1	
	6	Lock washer	1	
	7	Balancer driven gear	1	
	8	Balancer	1	

**REMOVAL POINTS****Balancer drive gear and balancer driven gear**

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

**NOTE:**

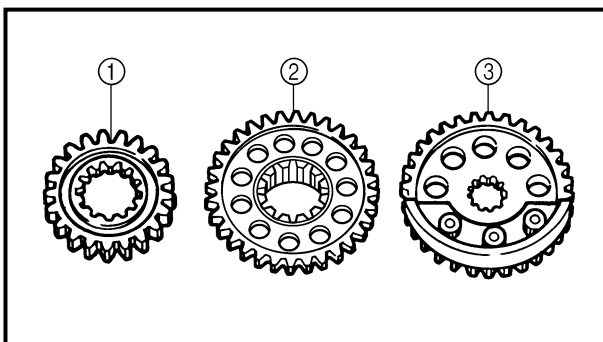
Place an aluminum plate ③ between the teeth of the balancer drive gear ③ and driven gear ④.

**Balancer**

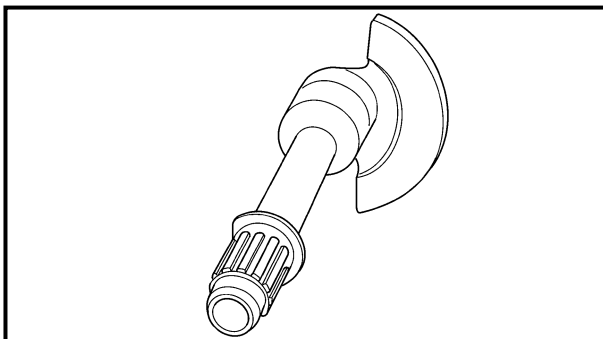
1. Remove:
  - Balancer ①

**NOTE:**

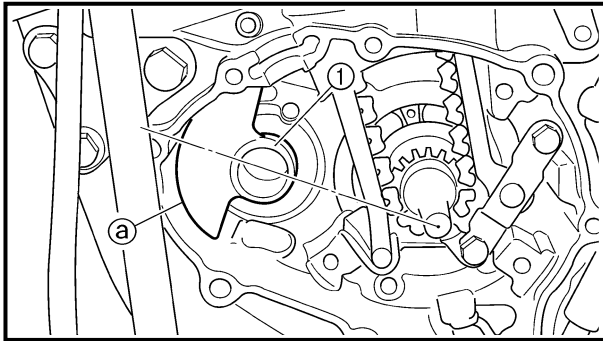
When removing the balancer shaft, align the center of the balancer shaft weight ③ along the line connecting the centers of the crankshaft and balancer shaft.

**INSPECTION****Primary drive gear, balancer drive gear and balancer driven gear**

1. Inspect:
  - Primary drive gear ①
  - Balancer drive gear ②
  - Balancer driven gear ③
 Wear/damage → Replace.

**Balancer**

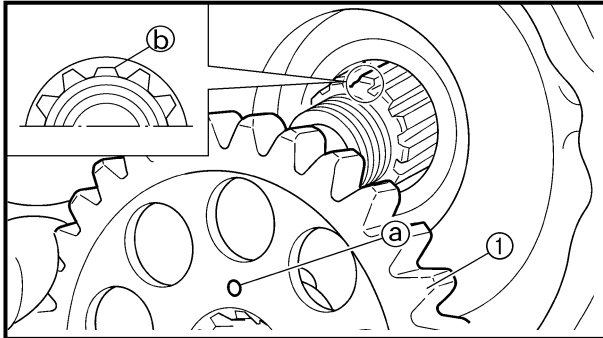
1. Inspect:
  - Balancer
 Cracks/damage → Replace.

**ASSEMBLY AND INSTALLATION****Balancer, balancer drive gear and balancer driven gear**

1. Install:
  - Balancer ①

**NOTE:**

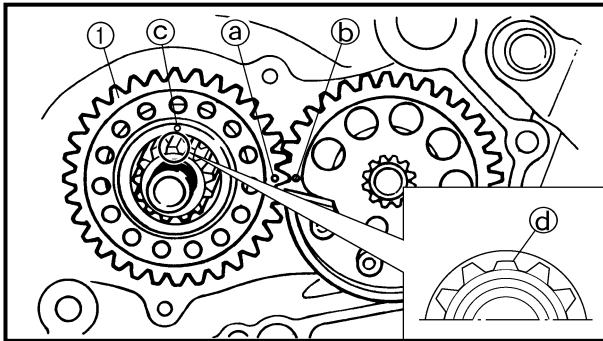
When installing the balancer shaft, align the center of the balancer shaft weight (a) along the line connecting the centers of the crankshaft and balancer shaft.



2. Install:
  - Balancer driven gear ①

**NOTE:**

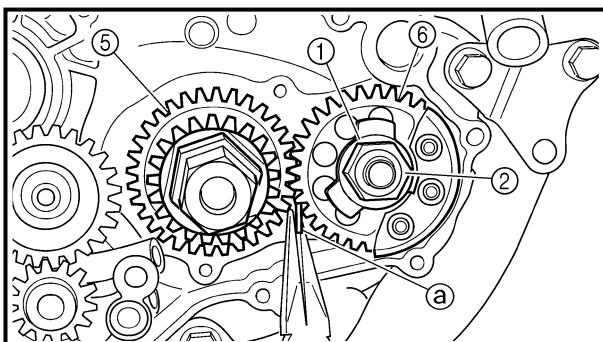
Install the balancer driven gear onto the balancer while aligning the punch mark (a) on the balancer driven gear with the lower spline (b) on the balancer end.



3. Install:
  - Balancer drive gear ①

**NOTE:**

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



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

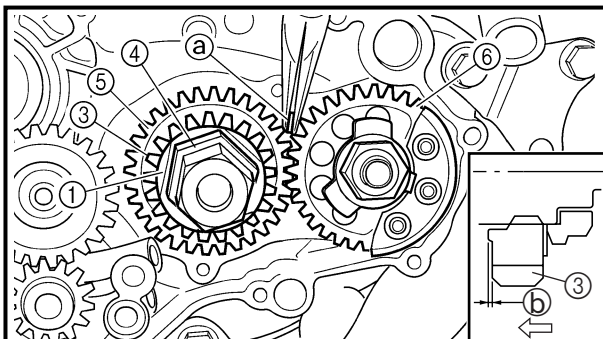
50 Nm (5.0 m · kg, 36 ft · lb)

- Primary drive gear ③
- Nut (primary drive gear) ④

75 Nm (7.5 m · kg, 54 ft · lb)

**NOTE:**

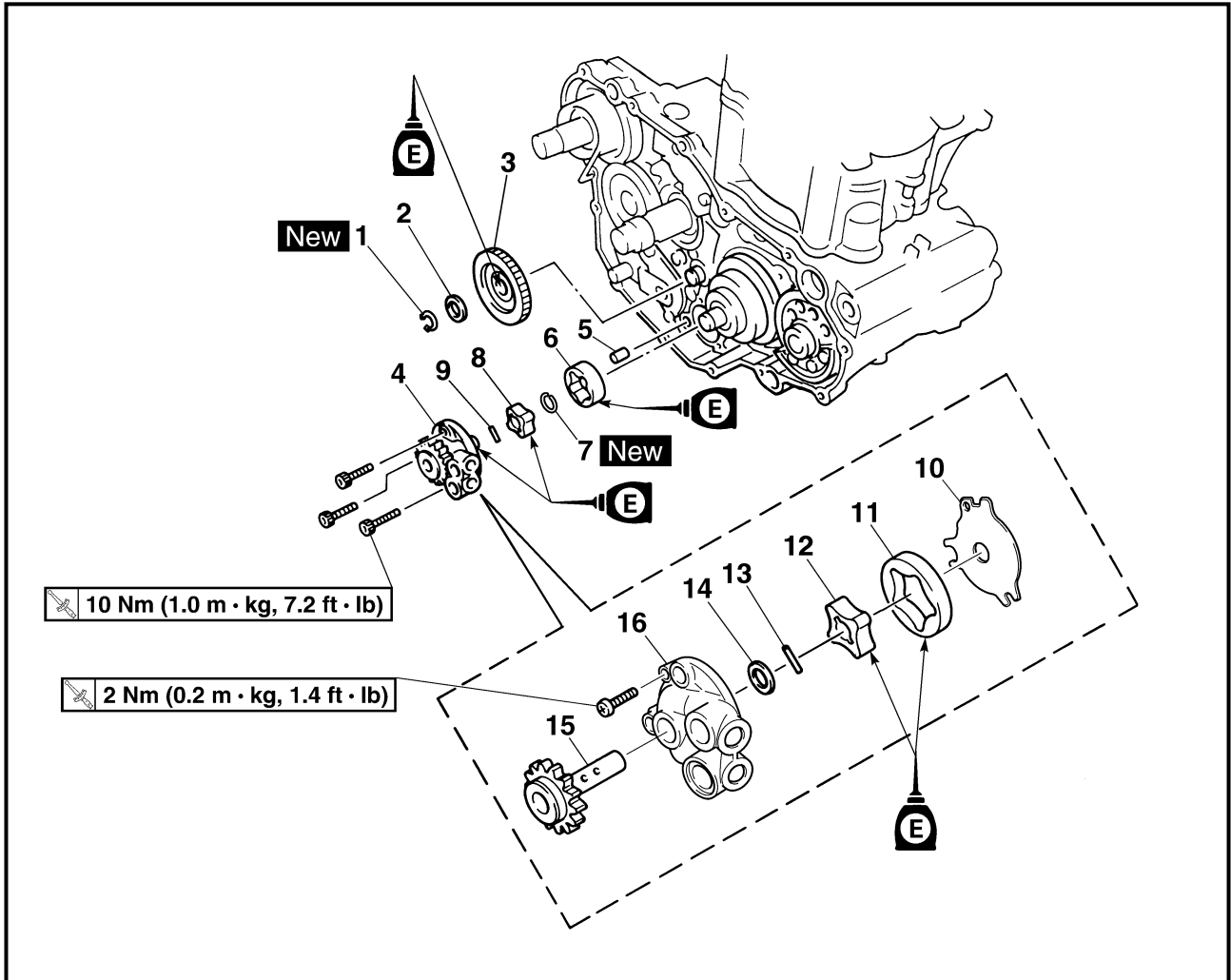
- Install the primary drive gear with its stepped side (b) facing the engine.
- Place an aluminum plate (a) between the teeth of the balancer drive gear (5) and driven gear (6).



5. Bend the lock washer tab.



OIL PUMP  
OIL PUMP



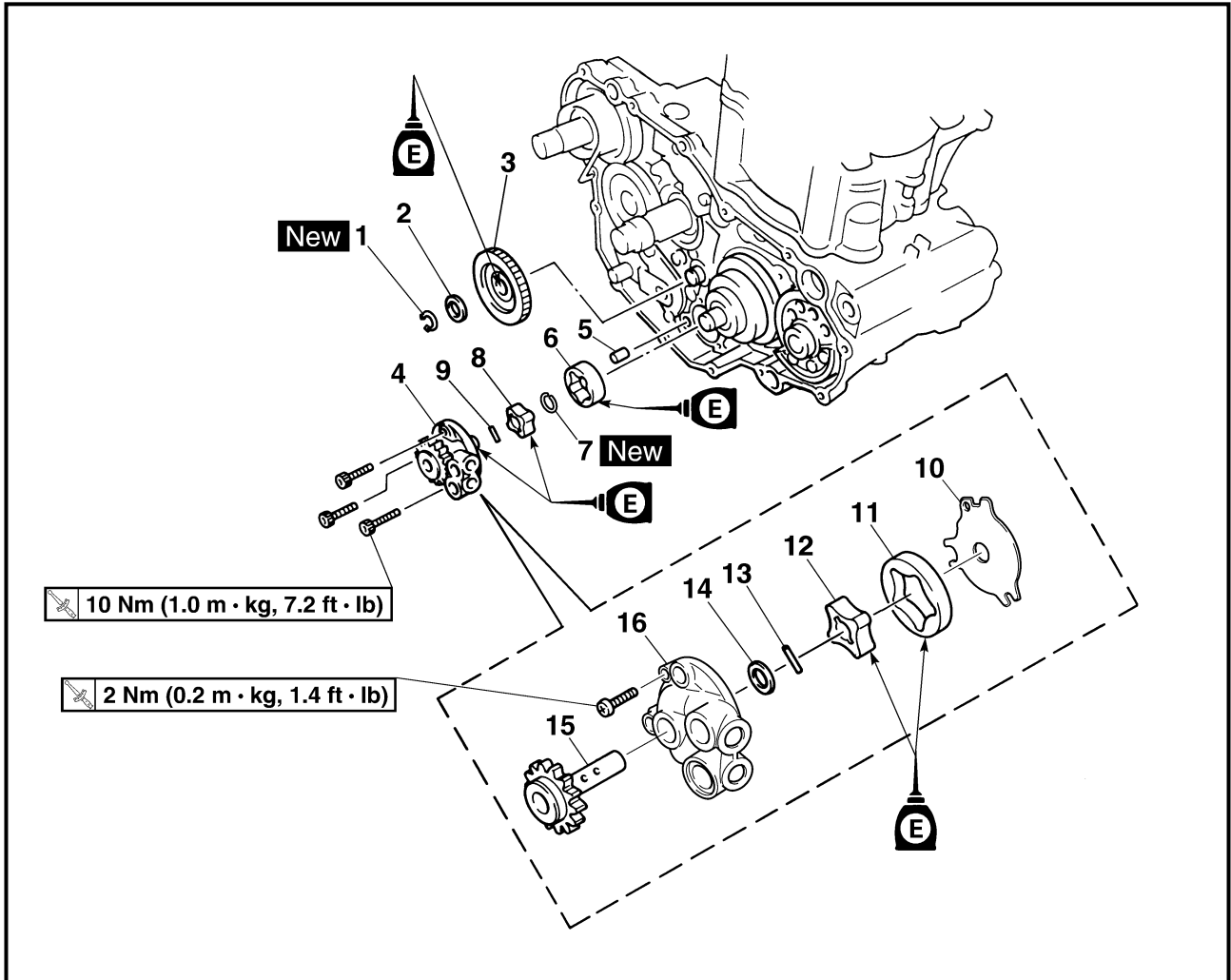
Extent of removal:

① Oil pump removal

② Oil pump disassembly

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





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



## INSPECTION

## Oil pump

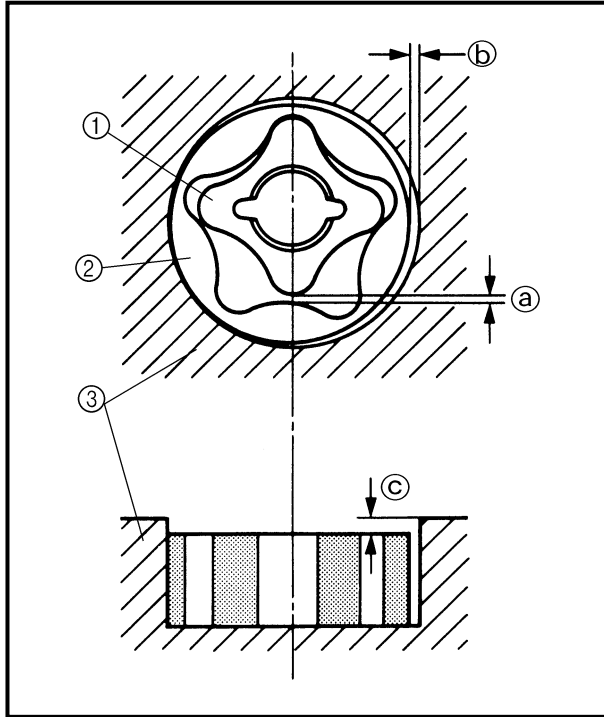
## 1. Inspect:

- Oil pump drive gear
- Oil pump driven gear
- Rotor housing
- Oil pump cover

Cracks/wear/damage → Replace.

## 2. Measure:

- Tip clearance ①  
Between the inner rotor ① and the outer rotor ②.
  - Tip clearance ②  
Between the outer rotor ② and the rotor housing ③.
- Out of specification → Replace the oil pump.



## Tip clearance ①:

**0.12 mm or less**  
(0.0047 in or less)

<Limit>: 0.20 mm (0.008 in)

## Tip clearance ②:

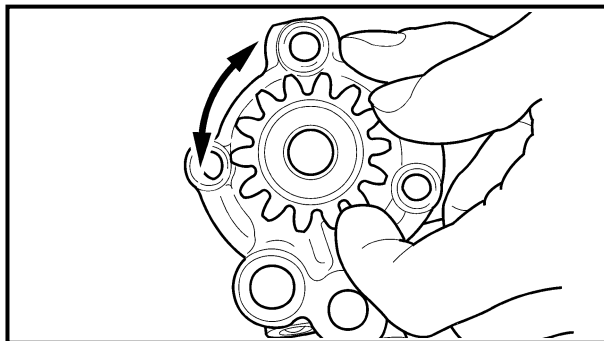
**0.09 ~ 0.17 mm (0.0035 ~ 0.0067 in)**

<Limit>: 0.24 mm (0.009 in)

## Side clearance ③:

**0.03 ~ 0.10 mm (0.0012 ~ 0.0039 in)**

<Limit>: 0.17 mm (0.007 in)



## 3. Check:

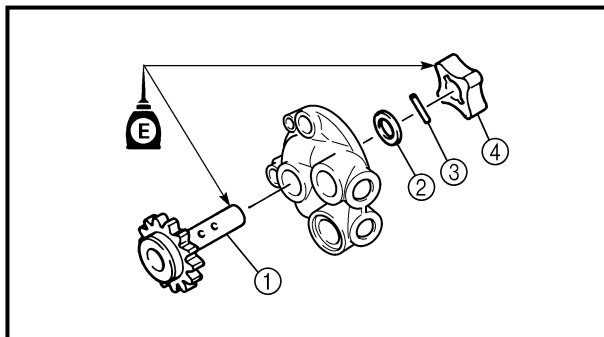
- Unsmooth → Repeat steps #1 and #2 or replace the defective parts.

## ASSEMBLY AND INSTALLATION

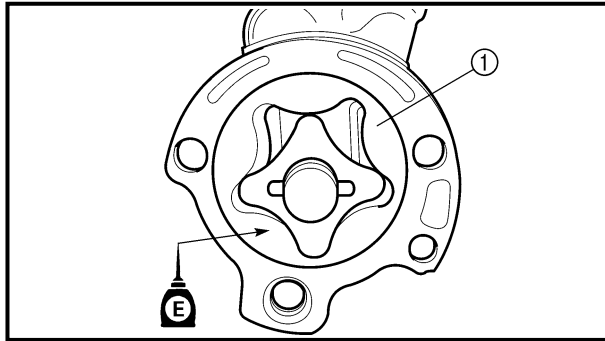
## Oil pump

## 1. Install:

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

**NOTE:**

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

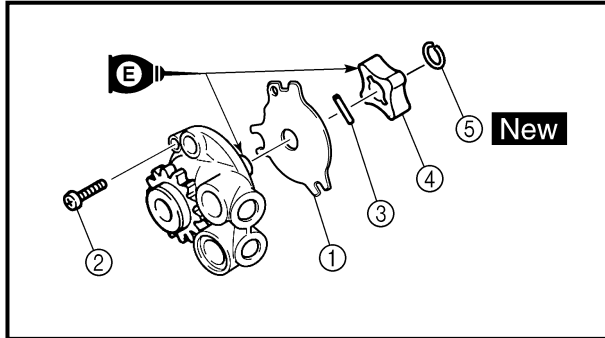


2. Install:

- Outer rotor 1 (1)

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

Apply the engine oil on the outer rotor 1.



3. Install:

- Oil pump cover (1)
- Screw (oil pump cover) (2)

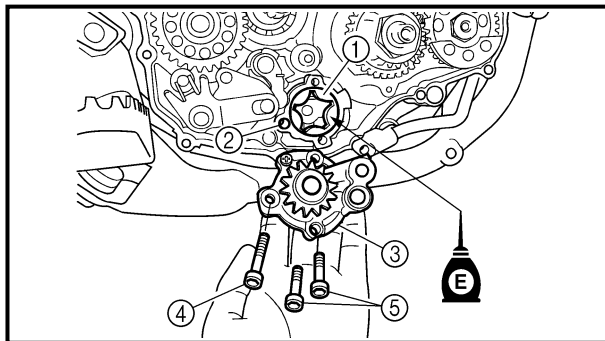
2 Nm (0.2 m · kg, 1.4 ft · lb)

- Pin (3)
- Inner rotor 2 (4)
- Circlip (5) **New**

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

• Apply the engine oil on the oil pump drive shaft end and inner rotor 2.

• Fit the pin into the groove in the inner rotor 2.



4. Install:

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

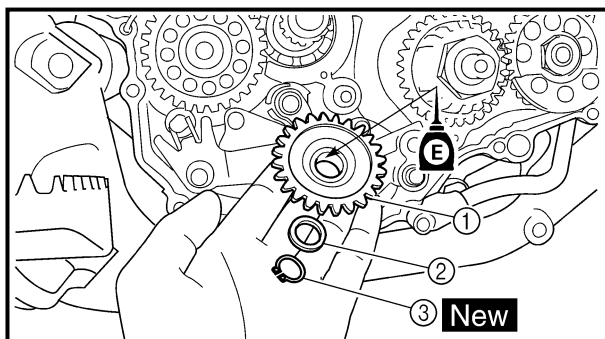
10 Nm (1.0 m · kg, 7.2 ft · lb)

- Bolt (oil pump assembly) [L = 25 mm (0.98 in)] (5)

10 Nm (1.0 m · kg, 7.2 ft · lb)

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

Apply the engine oil on the outer rotor 2.



5. Install:

- Oil pump drive gear (1)
- Plate washer (2)
- Circlip (3) **New**

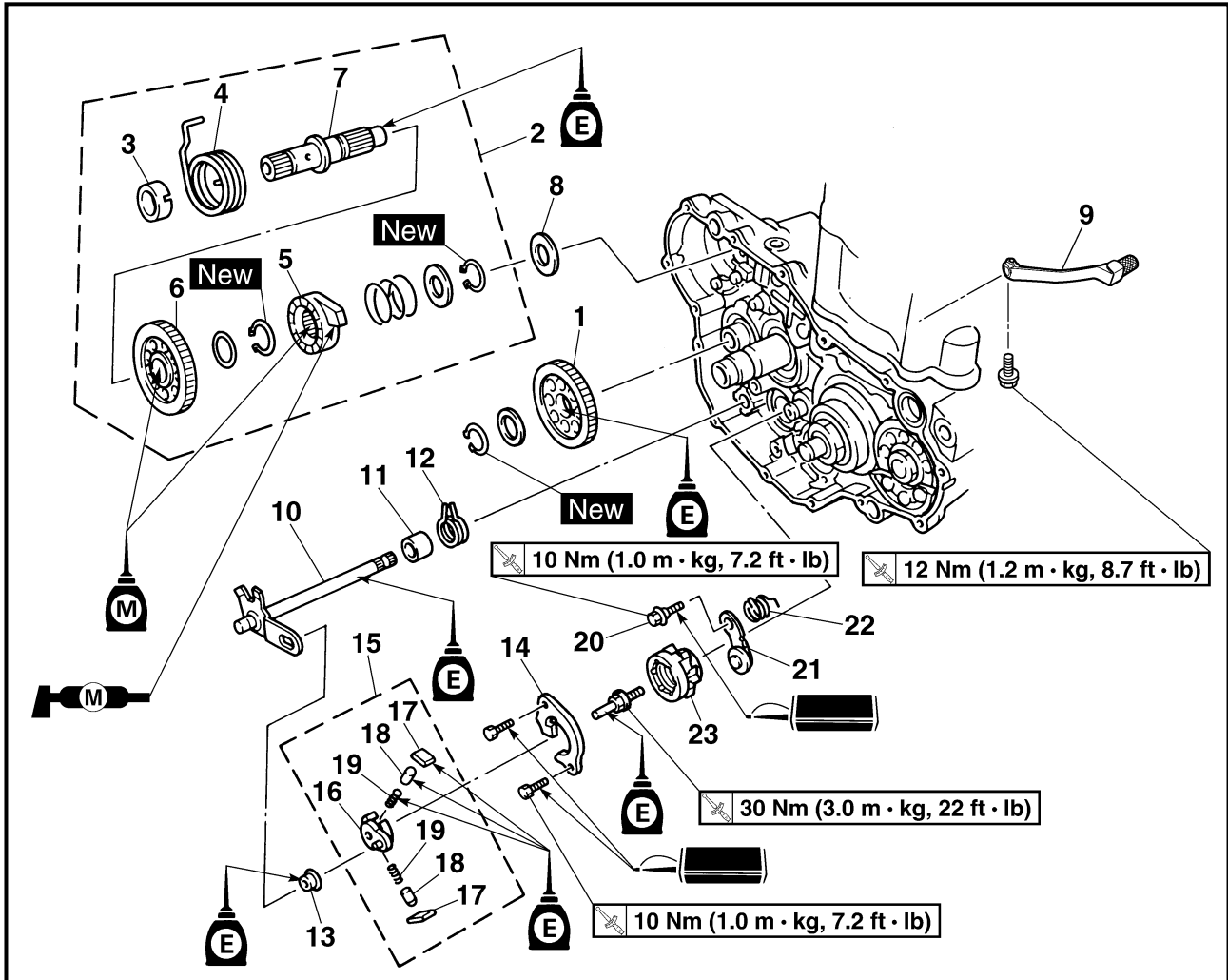
**NOTE:** \_\_\_\_\_

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



## KICK AXLE AND SHIFT SHAFT

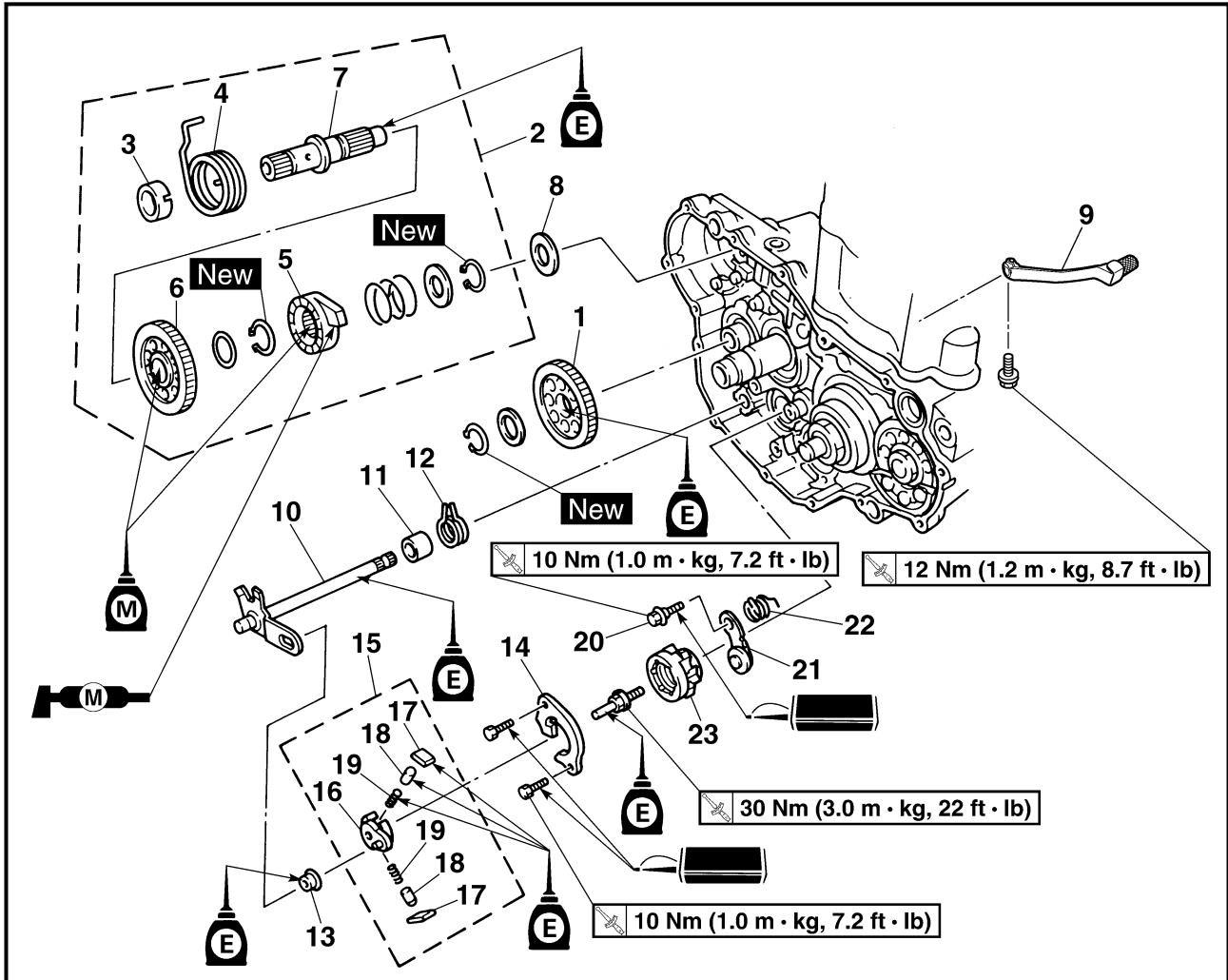
### KICK AXLE AND SHIFT SHAFT



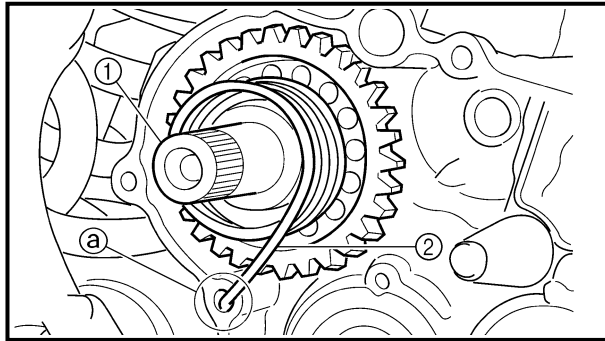
Extent of removal:

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

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



Extent of removal	Order	Part name	Q'ty	Remarks
↑ ④ ↓	13	Roller	1	Refer to "REMOVAL POINTS".
	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	



## REMOVAL POINTS

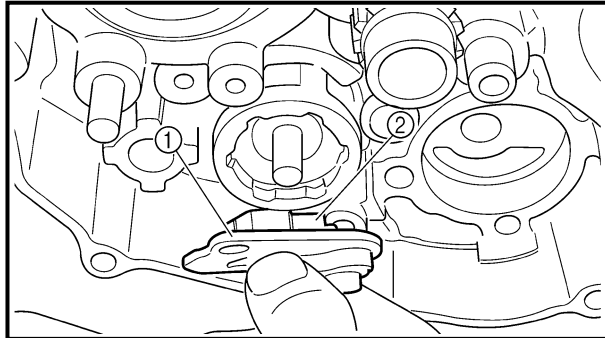
EC4B3101

### Kick axle assembly

- Remove:
  - Kick axle assembly ①

### NOTE:

Unhook the torsion spring ② from the hole ① in the crankcase.



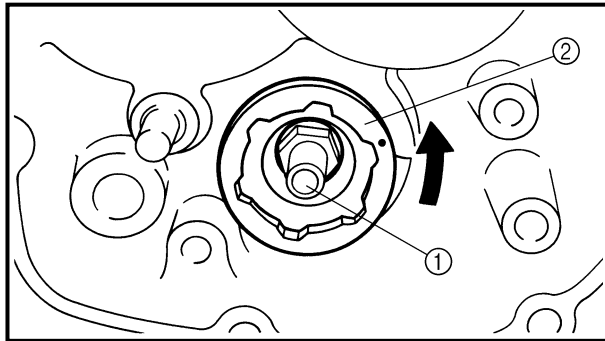
EC4C3101

### 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.



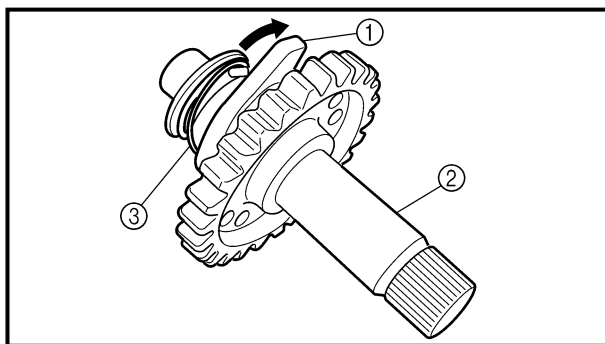
EC4N3100

### Segment

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

### NOTE:

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

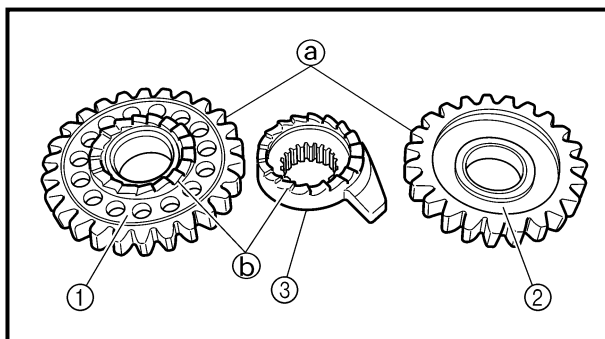


## INSPECTION

EC4C4200

### Kick axle and ratchet wheel

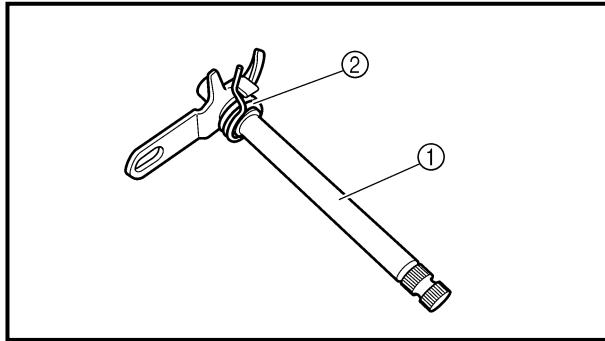
- Check:
  - Ratchet wheel ① smooth movement  
Unsmooth movement → Replace.
  - Kick axle ②  
Wear/damage → Replace.
  - Spring ③  
Broken → Replace.



EC4C4300

### Kick gear, kick idle gear and ratchet wheel

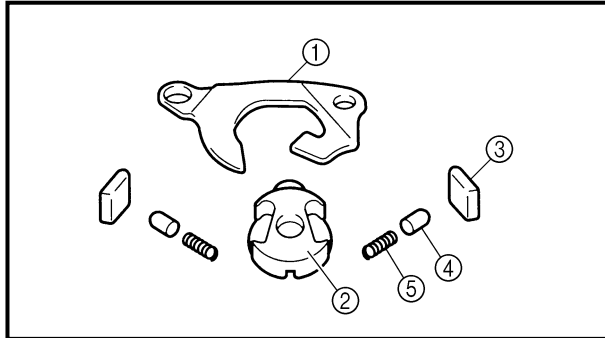
- Inspect:
  - Kick gear ①
  - Kick idle gear ②
  - Ratchet wheel ③
  - Gear teeth ①
  - Ratchet teeth ②
 Wear/damage → Replace.



EC4B4400

### Shift shaft

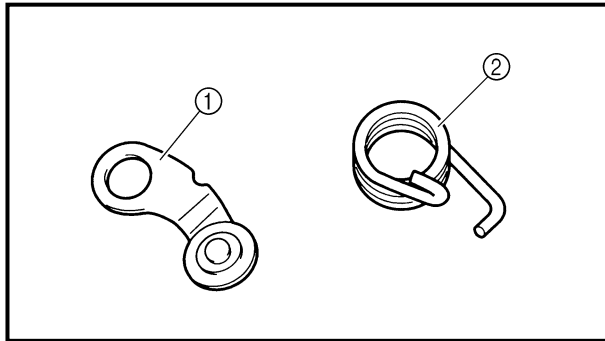
- Inspect:
  - Shift shaft ①  
Bend/damage → Replace.
  - Spring ②  
Broken → Replace.



EC4C4100

### Shift guide and shift lever assembly

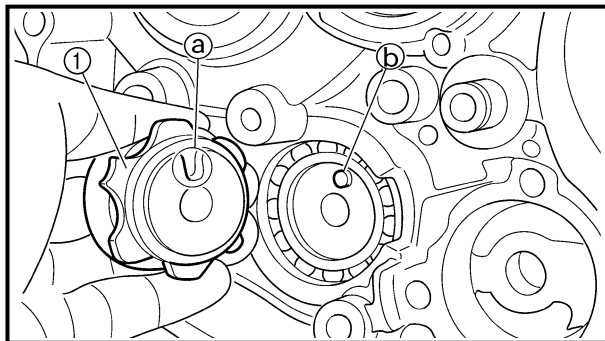
- Inspect:
  - Shift guide ①
  - Shift lever ②
  - Pawl ③
  - Pawl pin ④
  - Spring ⑤  
Wear/damage → Replace.



EC4B4500

### Stopper lever

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



EC4C5000

## ASSEMBLY AND INSTALLATION

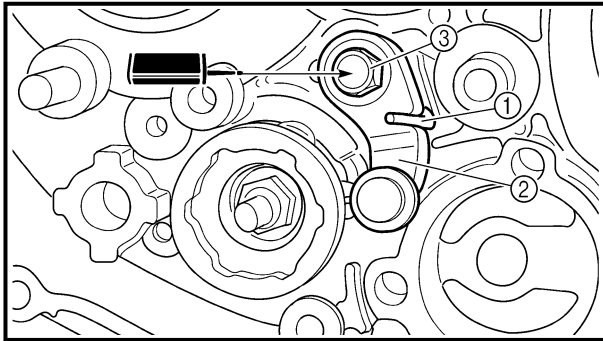
### Segment

- 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

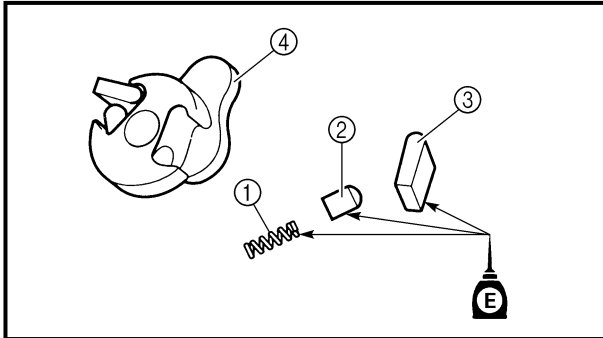
1. Install:

- 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.



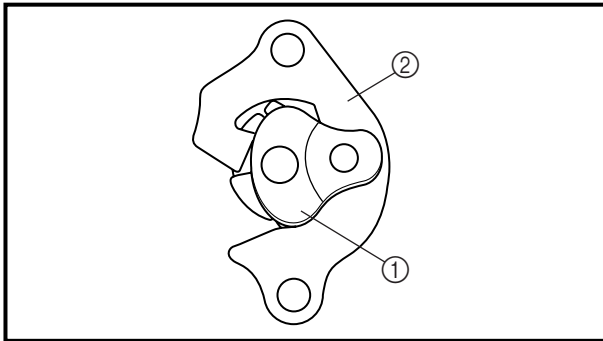
### Shift guide and shift lever assembly

1. Install:

- Spring ①
  - Pawl pin ②
  - Pawl ③
- To shift lever ④.

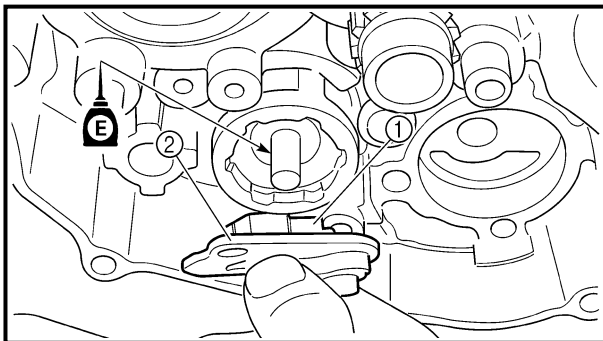
### NOTE:

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



2. Install:

- Shift lever assembly ①
- To shift guide ②.

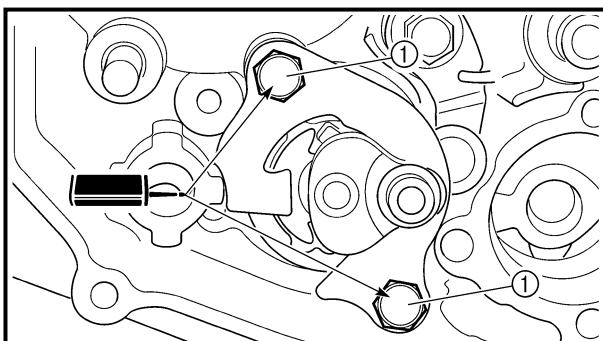


3. Install:

- Shift lever assembly ①
- Shift guide ②

### NOTE:

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

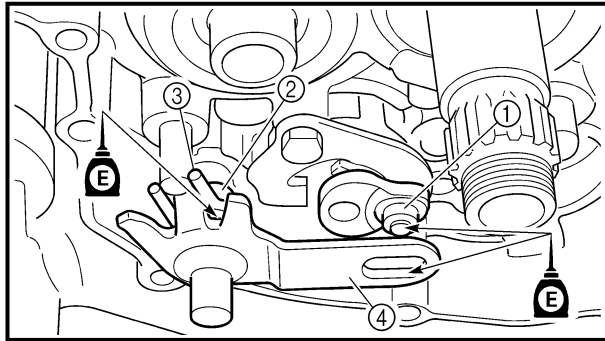


4. Install:

- Bolt (shift guide) ①

**10 Nm (1.0 m · kg, 7.2 ft · lb)**





EC4C5301

### Shift shaft

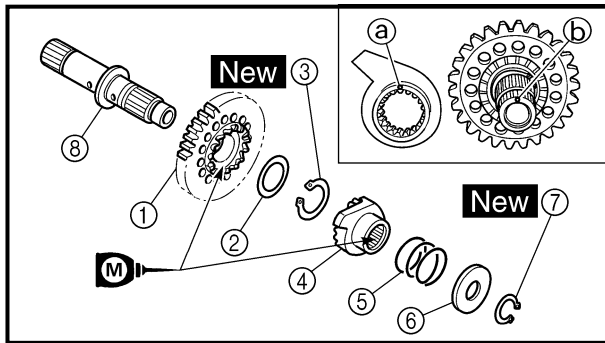
1. Install:
  - Roller ①
  - Collar ②
  - Torsion spring ③
  - Shift shaft ④

### NOTE:

Apply the engine oil on the roller and shift shaft.

2. Install:
  - Shift pedal

Refer to “AC MAGNETO AND STARTER CLUTCH” section.



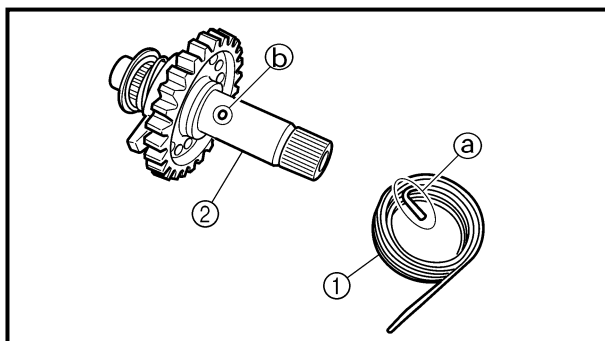
### Kick axle assembly

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

To kick axle ⑧.

### NOTE:

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

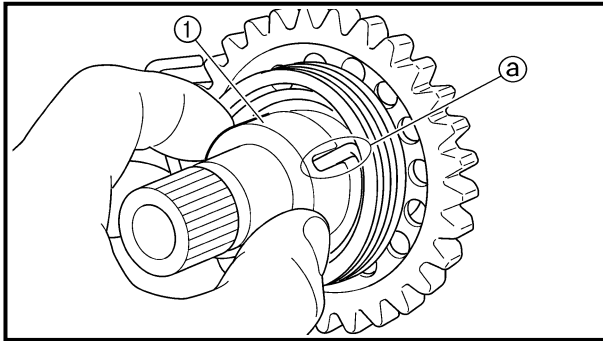


2. Install:
  - Torsion spring ①

To kick axle ②.

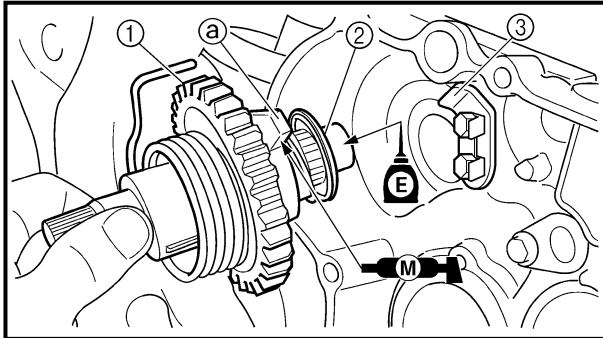
### NOTE:

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



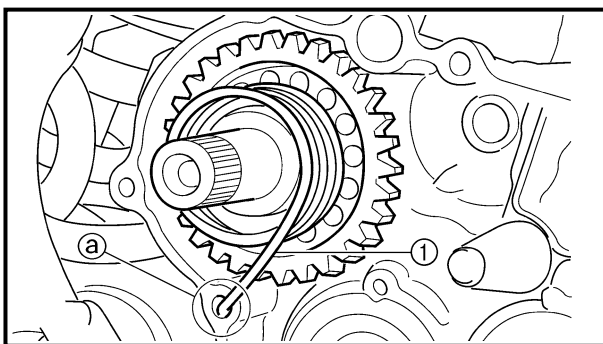
3. Install:
  - Spring guide ①

**NOTE:** \_\_\_\_\_  
 Slide the spring guide into the kick axle, make sure the groove ② in the spring guide fits on the stopper of the torsion spring.



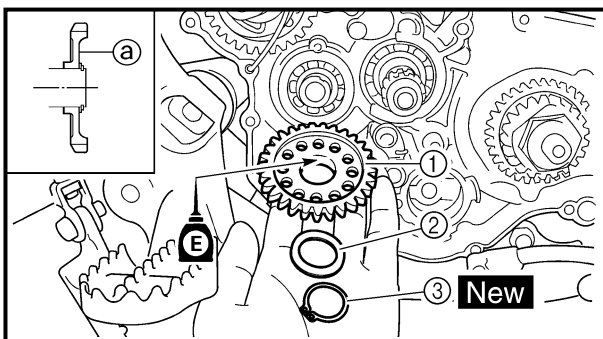
4. Install:
  - Kick axle assembly ①
  - Plain washer ②

**NOTE:** \_\_\_\_\_  
 • Apply the molybdenum disulfide grease on the contacting surfaces of the kick axle stopper ② and stopper plate ③.  
 • Apply the engine oil on the kick axle.  
 • Slide the kick axle assembly into the crankcase and make sure the kick axle stopper fits into the stopper plate.



5. Hook:
  - Torsion spring ①

**NOTE:** \_\_\_\_\_  
 Turn the torsion spring clockwise and hook into the proper hole ② in the crankcase.



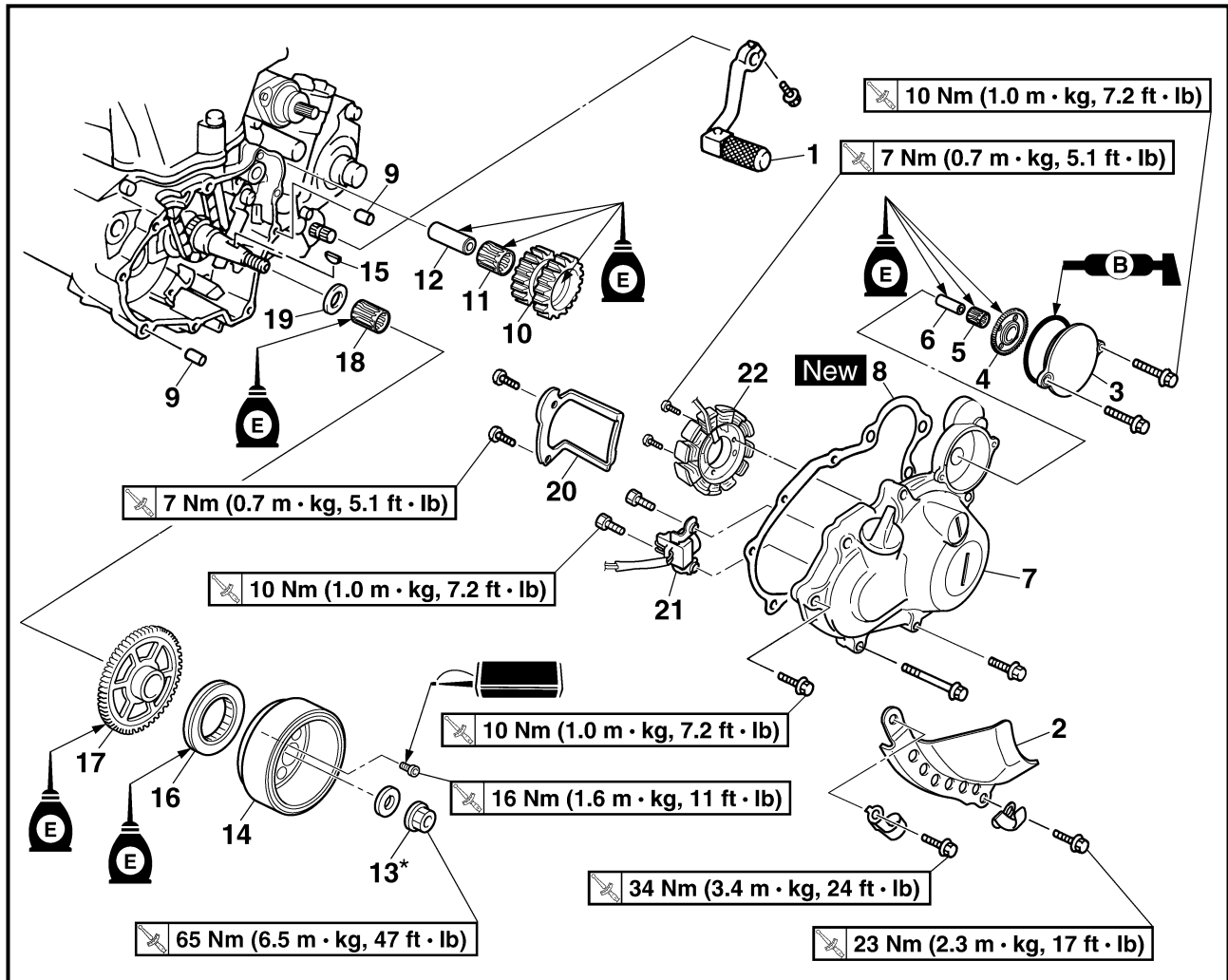
### Kick idle gear

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

**NOTE:** \_\_\_\_\_  
 • Install the kick idle gear with its depressed side ② toward you.  
 • Apply the engine oil on the kick idle gear inner circumference.



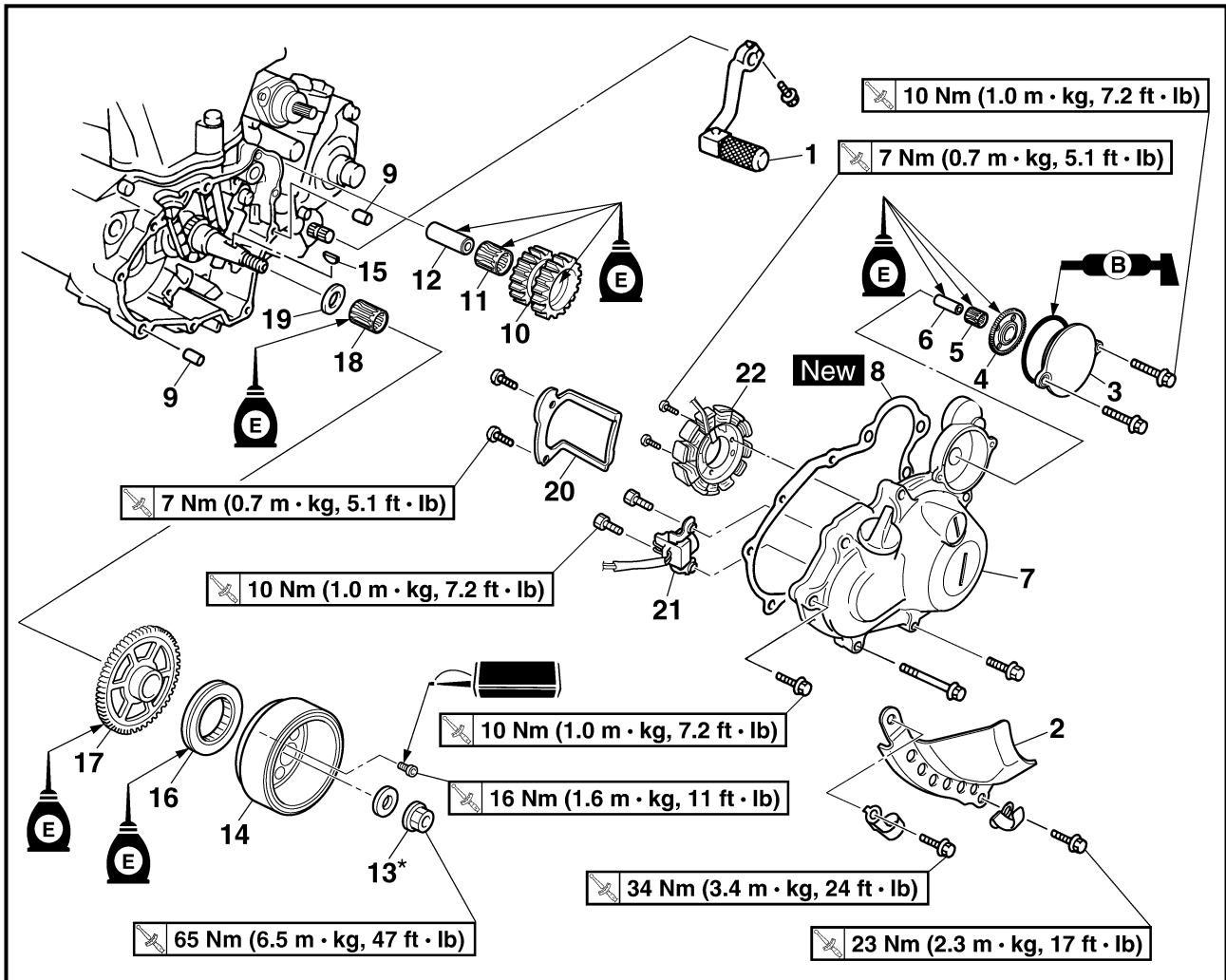
## AC MAGNETO AND STARTER CLUTCH



Extent of removal:

- ① Starter clutch/wheel gear removal
- ② Rotor removal
- ③ Pickup coil/stator removal

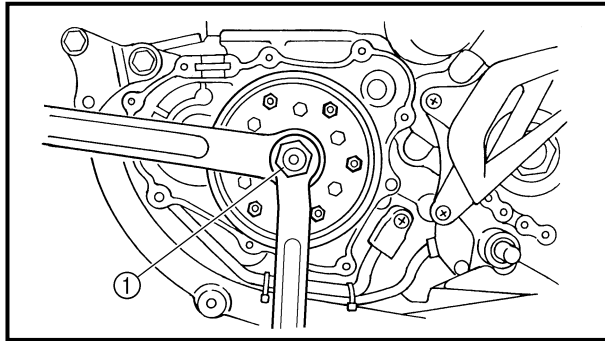
Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>AC MAGNETO AND STATOR REMOVAL</b>		
		Drain the engine oil.		Refer to "ENGINE OIL REPLACEMENT" section in the CHAPTER 3.
		Seat and fuel tank		Refer to "SEAT, FUEL TANK AND SIDE COVERS" section.
		Bolt [radiator (left)] Disconnect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



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

**NOTE:**

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

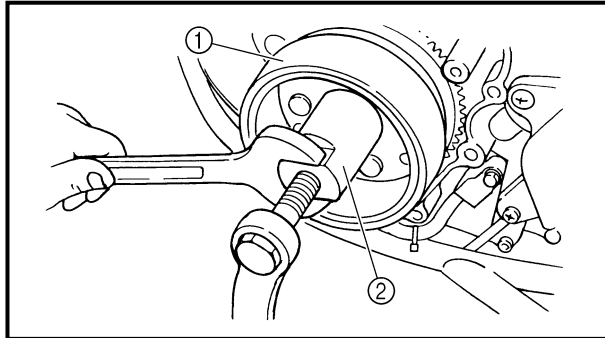


EC4L3000

### REMOVAL POINTS

#### Rotor

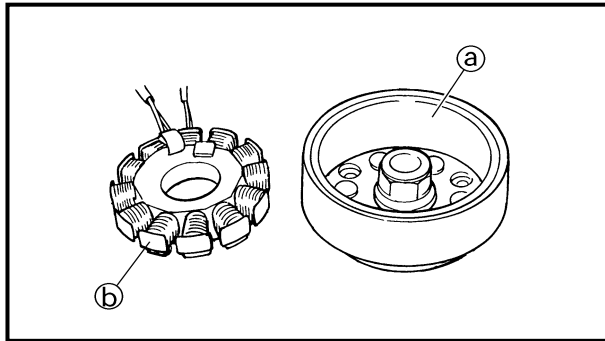
1. Remove:
  - Nut (rotor) ①
  - Plain washer



2. Remove:
  - Rotor ①
 Use the rotor puller ②.



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

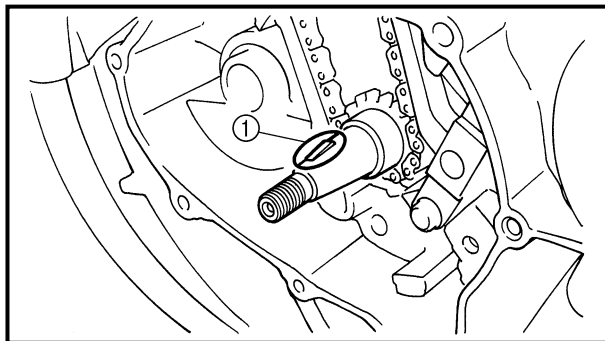


EC4L4000

### INSPECTION

#### AC magneto

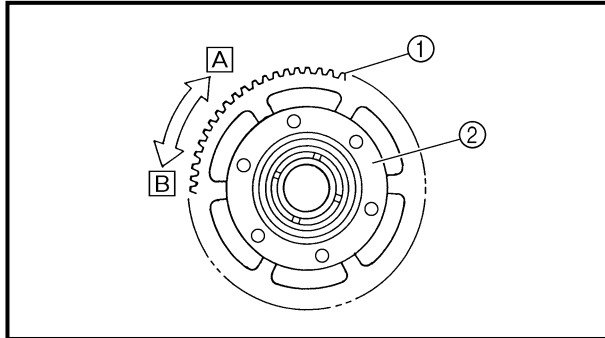
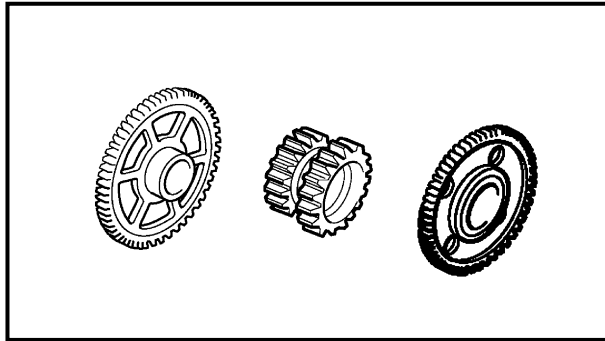
1. Inspect:
  - Rotor inner surface ①
  - Stator outer surface ②
 Damage → Inspect the crankshaft runout and crankshaft bearing.  
 If necessary, replace AC magneto and/or stator.



EC4L4200

### Woodruff key

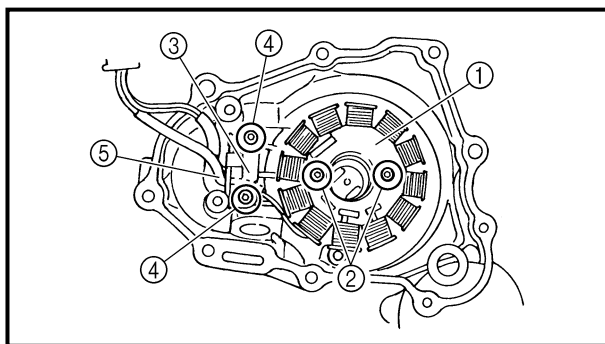
1. Inspect:
  - Woodruff key ①
 Damage → Replace.



### Starter clutch

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

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



EC4L5000

### ASSEMBLY AND INSTALLATION

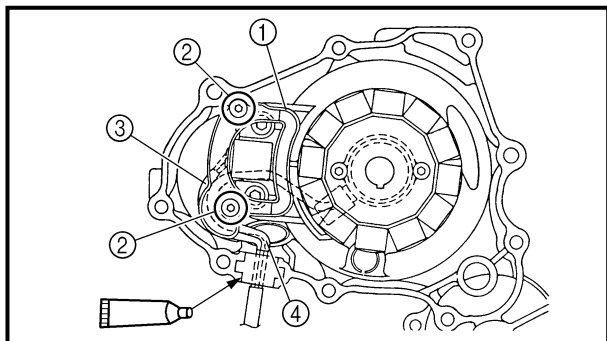
#### AC magneto and starter clutch

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

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

10 Nm (1.0 m · kg, 7.2 ft · lb)

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



2. Install:
- Holder ①
  - Bolt ②

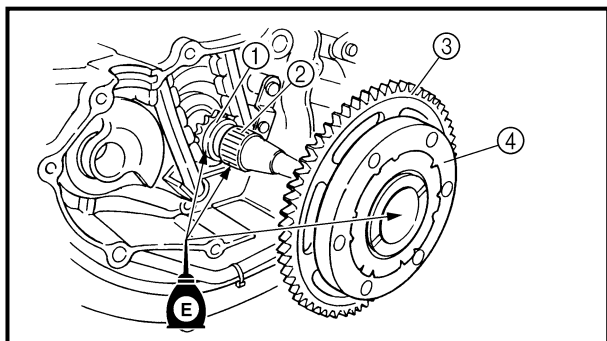
7 Nm (0.7 m · kg, 5.1 ft · lb)

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

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



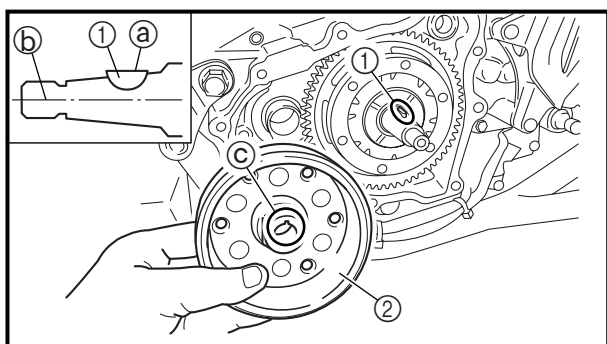
**Quick gasket®:**  
**ACC-QUICK-GS-KT**  
**YAMAHA Bond No. 1215:**  
**90890-85505**



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

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

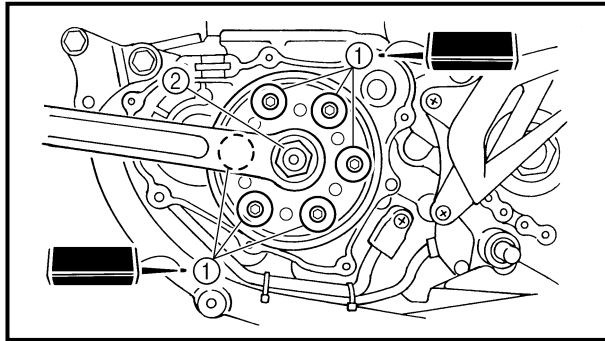
Apply the engine oil on the plain washer, bearing and starter clutch drive gear inner circumference.



4. Install:
- Woodruff key ①
  - Rotor ②

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

- Clean the tapered portions of the crankshaft and rotor.
- When installing the woodruff key, make sure that its flat surface 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.



5. Install:

- Bolt (starter clutch) ①

16 Nm (1.6 m · kg, 11 ft · lb)

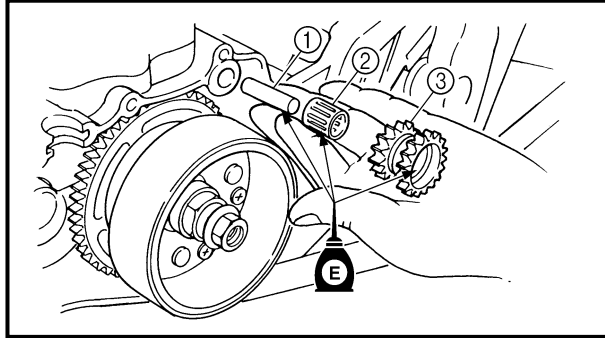
- Plain washer (rotor)

- Nut (rotor) ②

65 Nm (6.5 m · kg, 47 ft · lb)

**NOTE:**

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



6. Install:

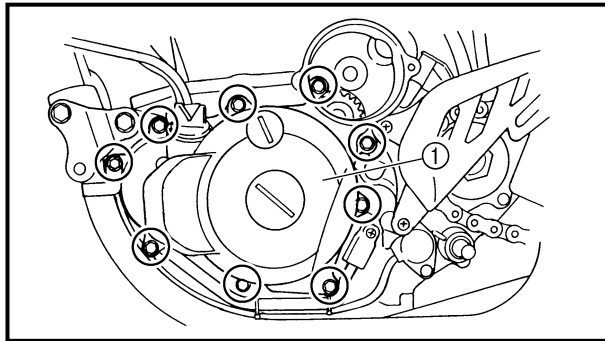
- Shaft ①

- Bearing ②

- Idle gear 2 ③

**NOTE:**

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



7. Install:

- Dowel pin

- Gasket [crankcase cover (left)] **New**

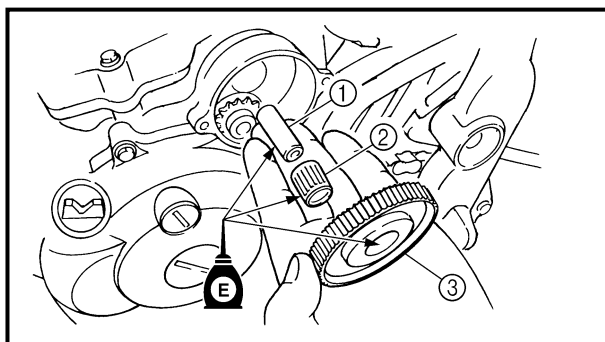
- Crankcase cover (left) ①

- Bolt [crankcase cover (left)]

10 Nm (1.0 m · kg, 7.2 ft · lb)

**NOTE:**

Tighten the bolts in stage, using a crisscross pattern.



8. Install:

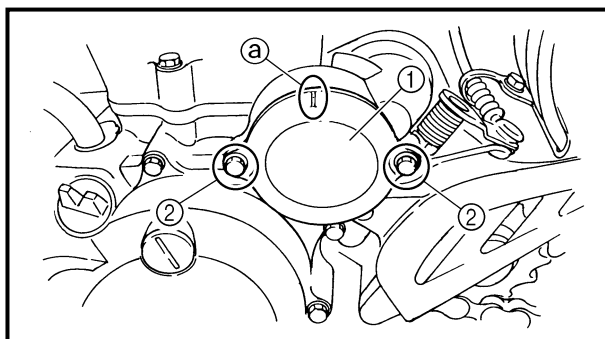
- Shaft ①

- Bearing ②

- Idle gear 1 ③

**NOTE:**

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



9. Install:

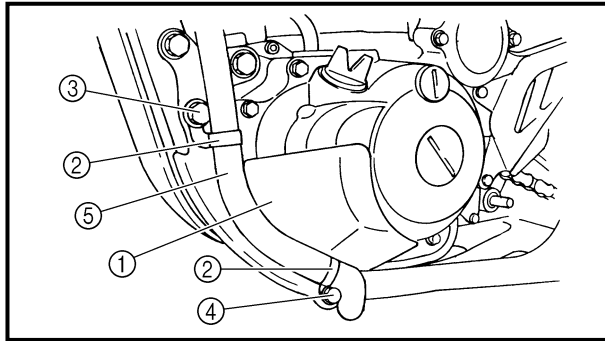
- Cover (idle gear 1) ①

- Bolt ② 10 Nm (1.0 m · kg, 7.2 ft · lb)

**NOTE:**

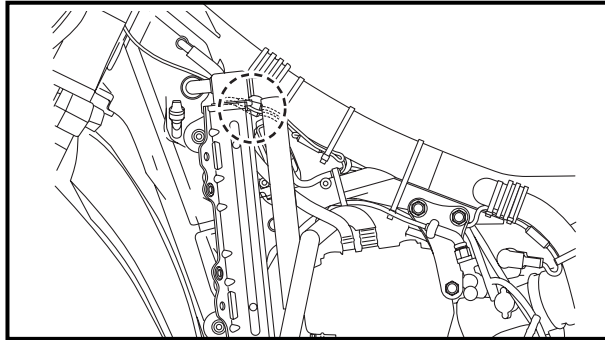
Install the cover (idle gear 1) with its mark (a) facing upward.





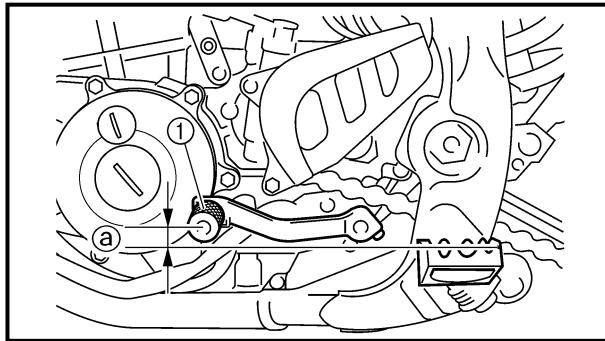
### 10. Install:

- Engine guard ①
- Clamp ②
- Bolt [engine guard (front)] ③  
🔩 34 Nm (3.4 m · kg, 24 ft · lb)
- Bolt [engine guard (rear)] ④  
🔩 23 Nm (2.3 m · kg, 17 ft · lb)
- Cylinder head breather hose ⑤



### 11. Connect:

- AC magneto lead  
 Refer to “CABLE ROUTING DIAGRAM” section in the CHAPTER 2.



### 12. Install:

- Shift pedal ①
- Bolt (shift pedal)  
🔩 12 Nm (1.2 m · kg, 8.7 ft · lb)

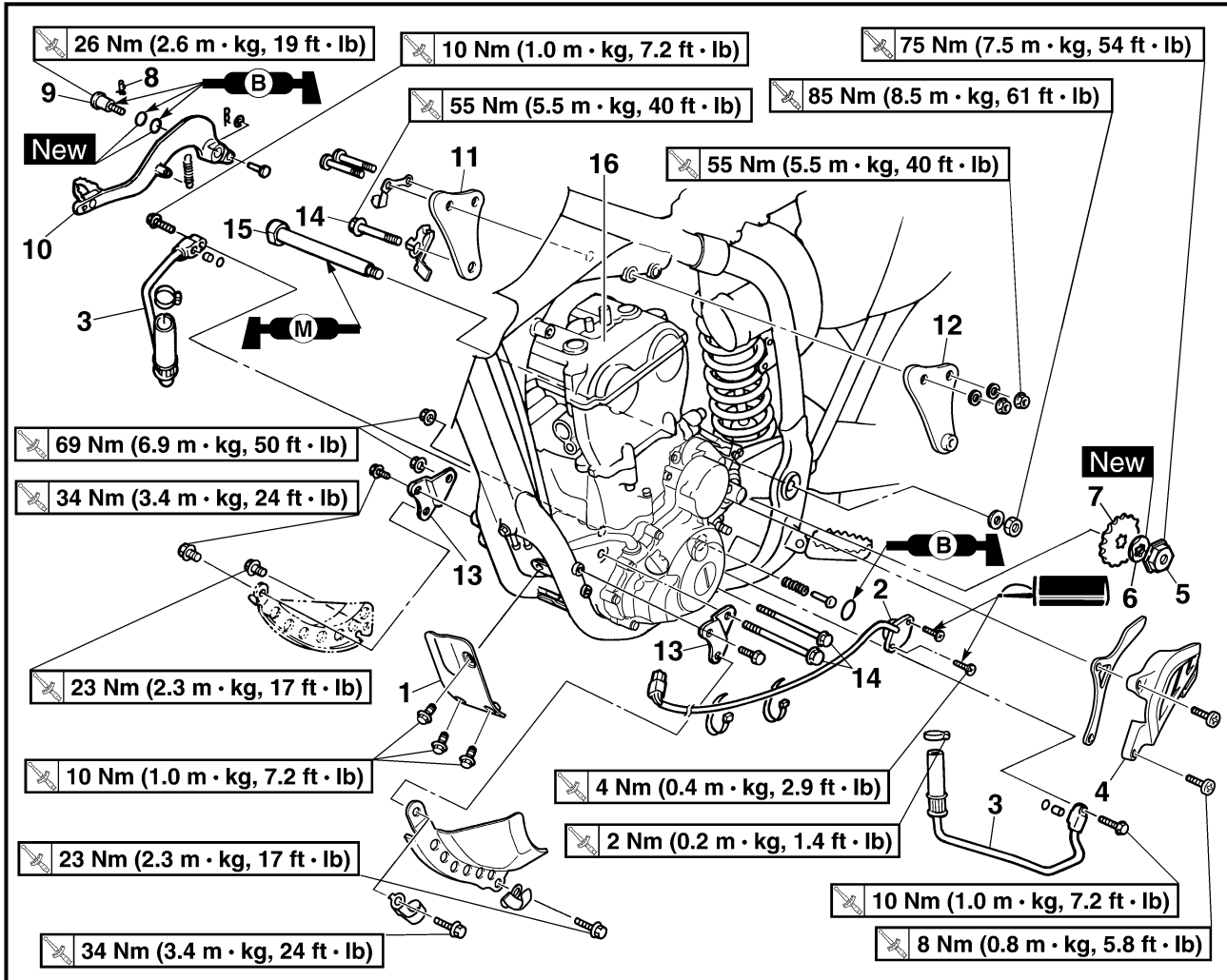
### NOTE:

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

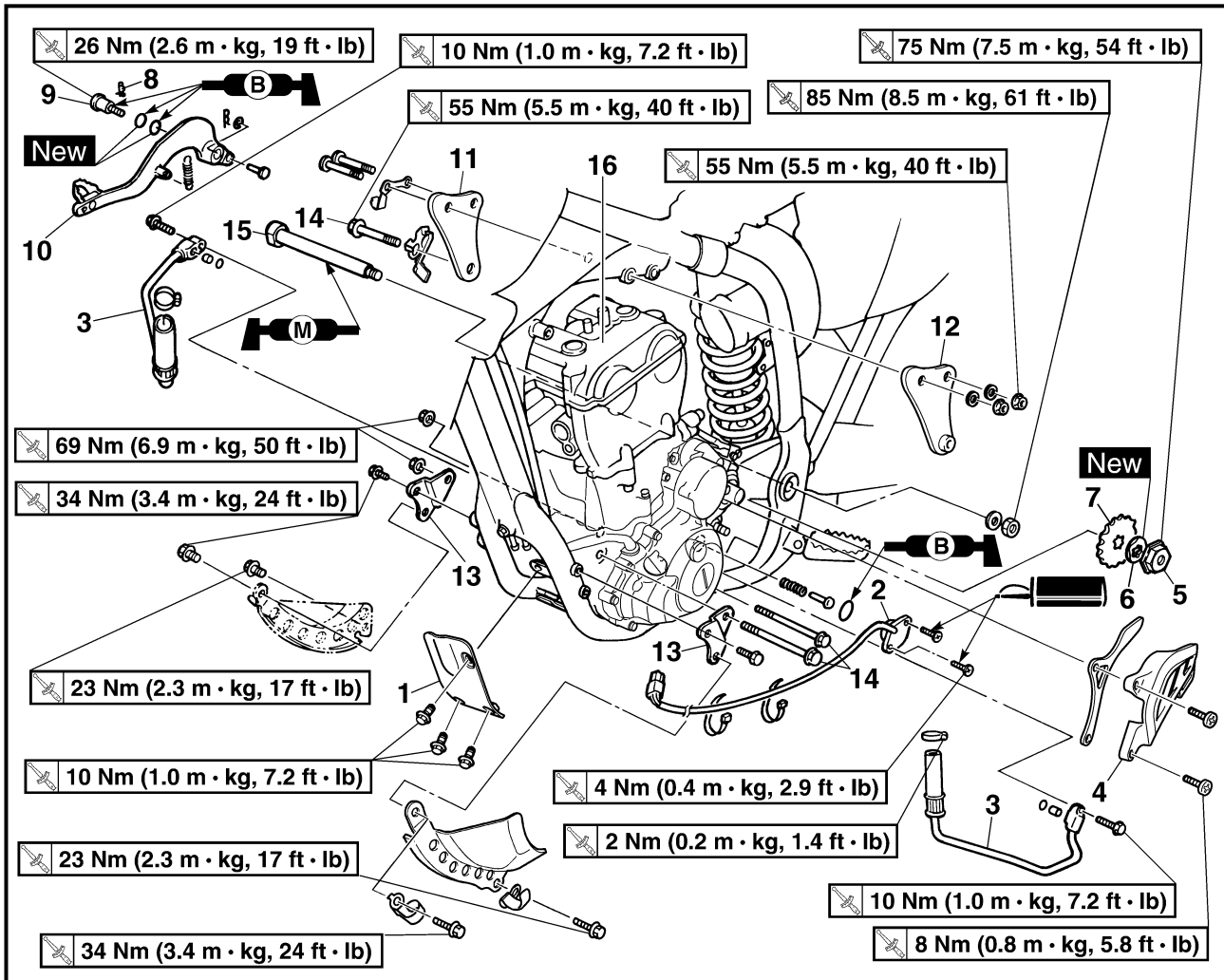


EC4M0000

## ENGINE REMOVAL

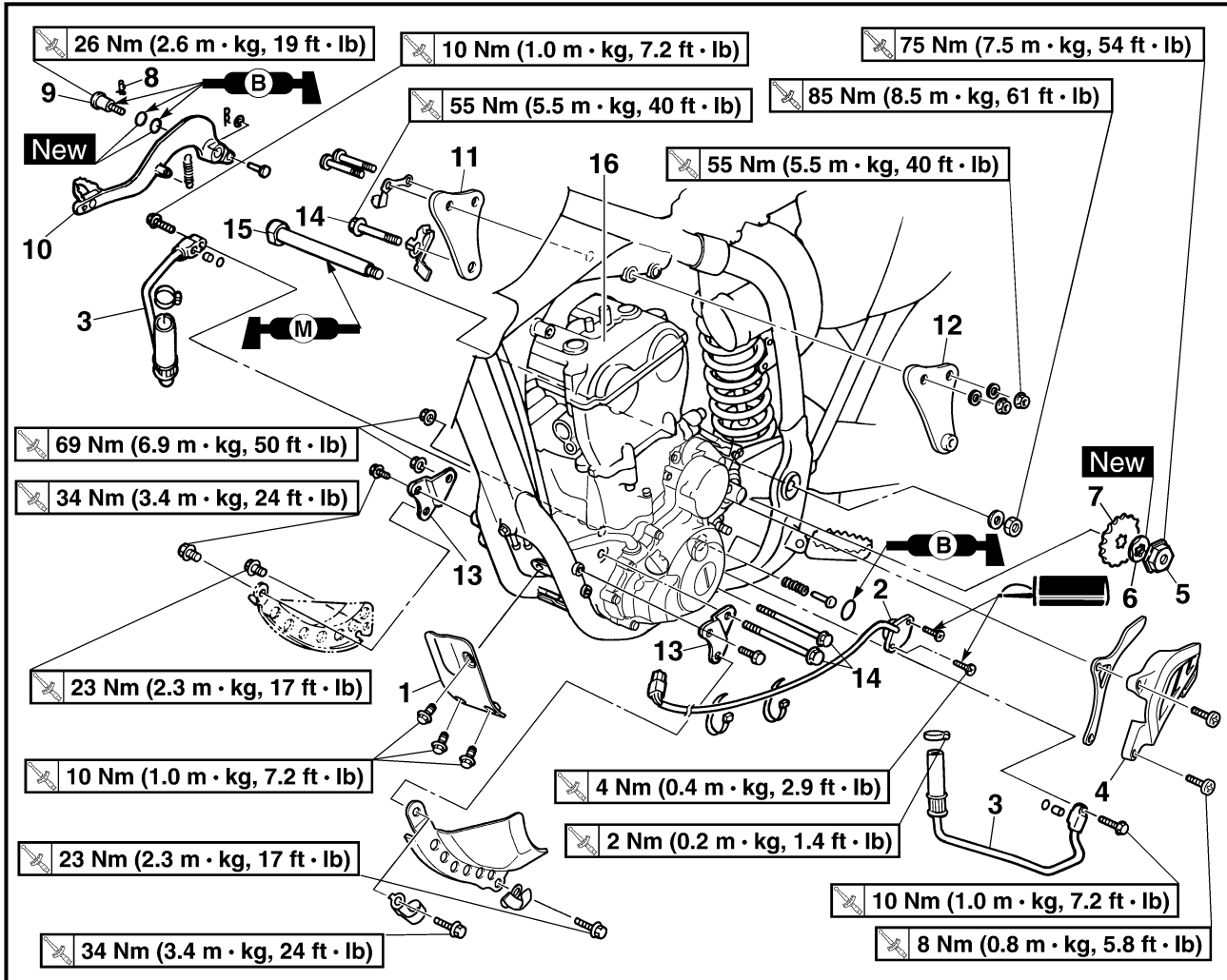


Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>ENGINE REMOVAL</b> Hold the machine by placing the suitable stand under the frame.  Drain the engine oil  Seat and fuel tank  Carburetor Exhaust pipe and silencer  Clutch cable and guide Radiator Shift pedal  Cylinder head breather hose and oil tank breather hose Ignition coil Disconnect the AC magneto lead.		<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.

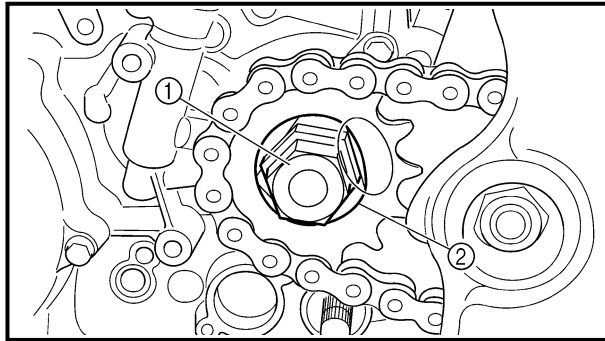


Extent of removal: ① Engine removal

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



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



EC4M3000

**REMOVAL POINTS**

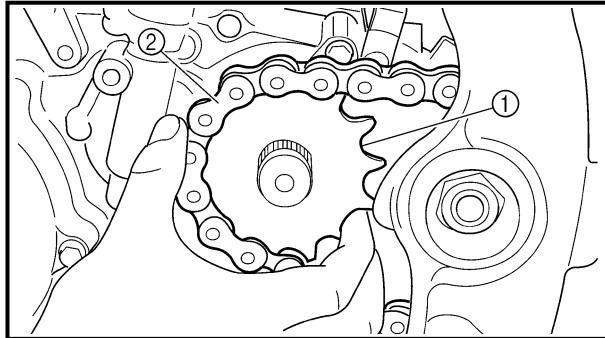
EC4F3100

**Drive sprocket**

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

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

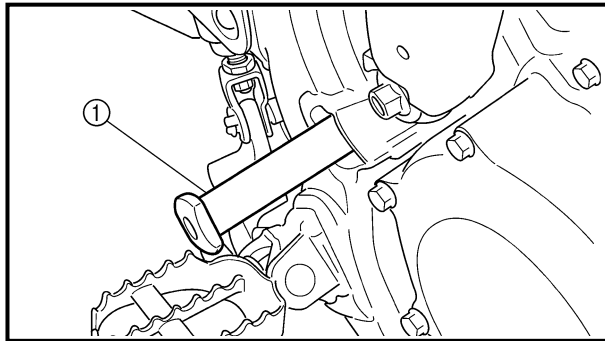
- Straighten the lock washer tab.
- Loosen the nut while applying the rear brake.



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

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

Remove the drive sprocket together with the drive chain.



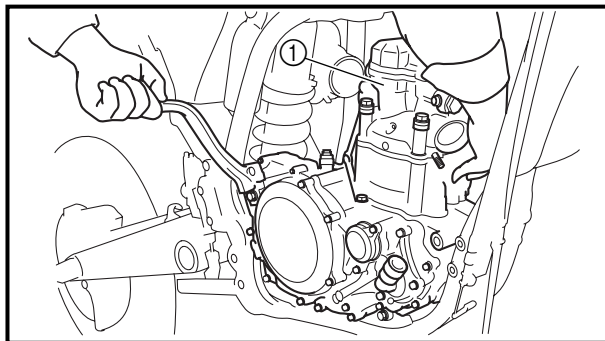
EC4M3301

**Engine removal**

1. Remove:
  - Pivot shaft ①

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

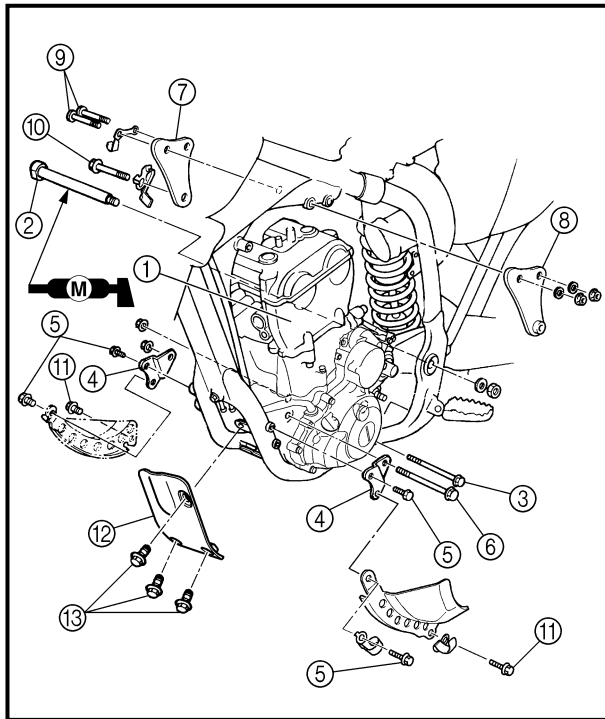
If the pivot shaft is pulled all the way out, the swingarm will come loose. If possible, insert a shaft of similar diameter into the other side of the swingarm to support it.



2. Remove:
  - Engine ①
 From right side.

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

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



EC4M5000

**ASSEMBLY AND INSTALLATION****Engine installation**

## 1. Install:

- Engine ①  
Install the engine from right side.

- Pivot shaft ②

85 Nm (8.5 m · kg, 61 ft · lb)

- Engine mounting bolt (lower) ③

69 Nm (6.9 m · kg, 50 ft · lb)

- Engine lower bracket ④

- Bolt (engine bracket) ⑤

34 Nm (3.4 m · kg, 24 ft · lb)

- Engine mounting bolt (front) ⑥

69 Nm (6.9 m · kg, 50 ft · lb)

- Engine upper bracket (right) ⑦

- Engine upper bracket (left) ⑧

- Bolt (engine bracket) ⑨

55 Nm (5.5 m · kg, 40 ft · lb)

- Engine mounting bolt (upper) ⑩

55 Nm (5.5 m · kg, 40 ft · lb)

- Bolt (engine guard) ⑪

23 Nm (2.3 m · kg, 17 ft · lb)

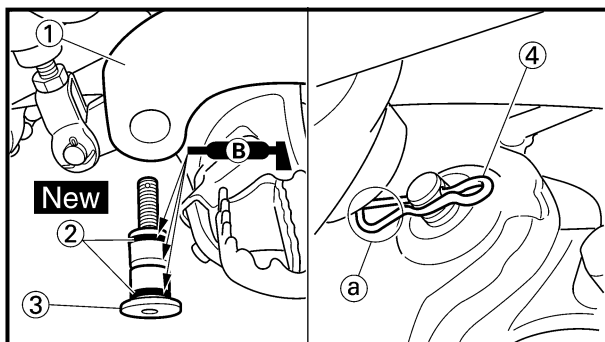
- Engine skid plate (front) ⑫

- Bolt (engine skid plate) ⑬

10 Nm (1.0 m · kg, 7.2 ft · lb)

**NOTE:**

Apply the molybdenum disulfide grease on the pivot shaft.



EC4M5211

**Brake pedal**

## 1. Install:

- Spring

- Brake pedal ①

- O-ring ② **New**

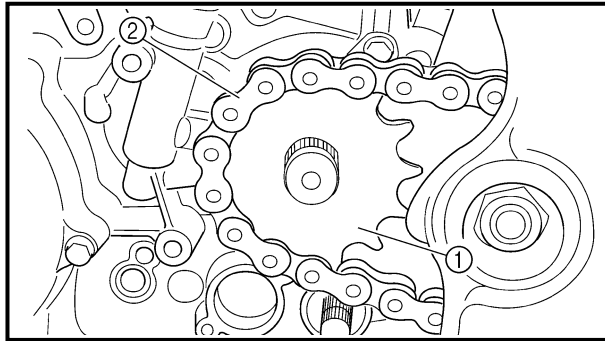
- Bolt (brake pedal) ③

26 Nm (2.6 m · kg, 19 ft · lb)

- Clip ④

**NOTE:**

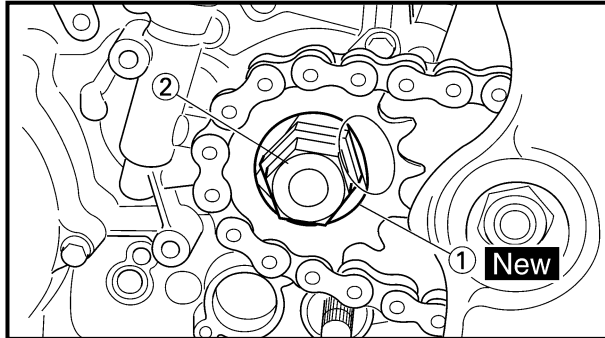
- Apply the lithium soap base grease on the bolt, O-rings and brake pedal bracket.
- Install the clip with its stopper portion ④ facing inward.



## Drive sprocket

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

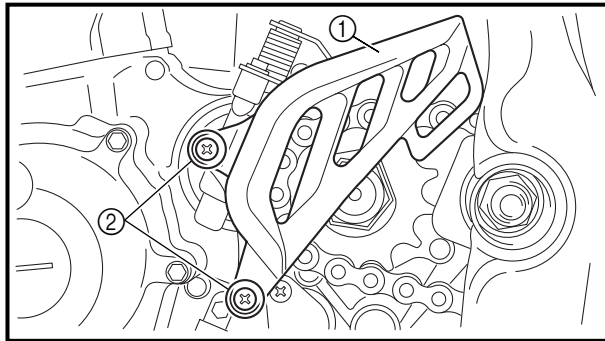
**NOTE:** \_\_\_\_\_  
Install the drive sprocket together with the drive chain.



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

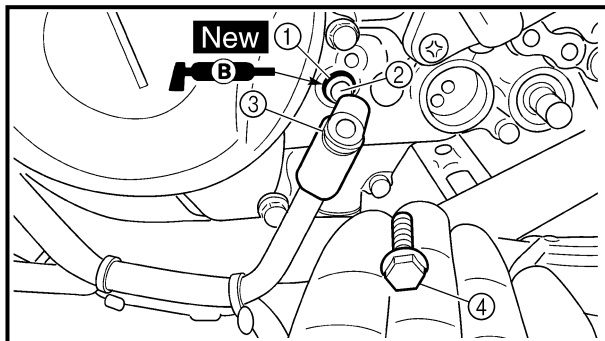
**75 Nm (7.5 m · kg, 54 ft · lb)**

**NOTE:** \_\_\_\_\_  
Tighten the nut while applying the rear brake.



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

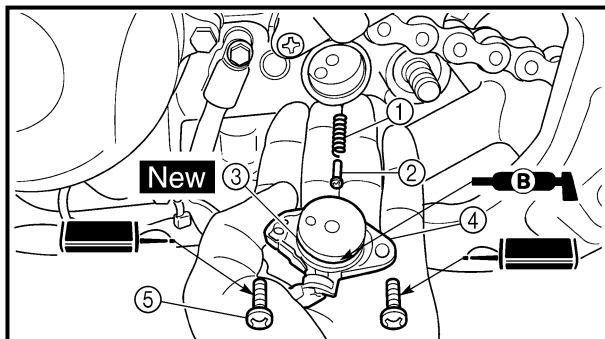
**8 Nm (0.8 m · kg, 5.8 ft · lb)**



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

**10 Nm (1.0 m · kg, 7.2 ft · lb)**

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



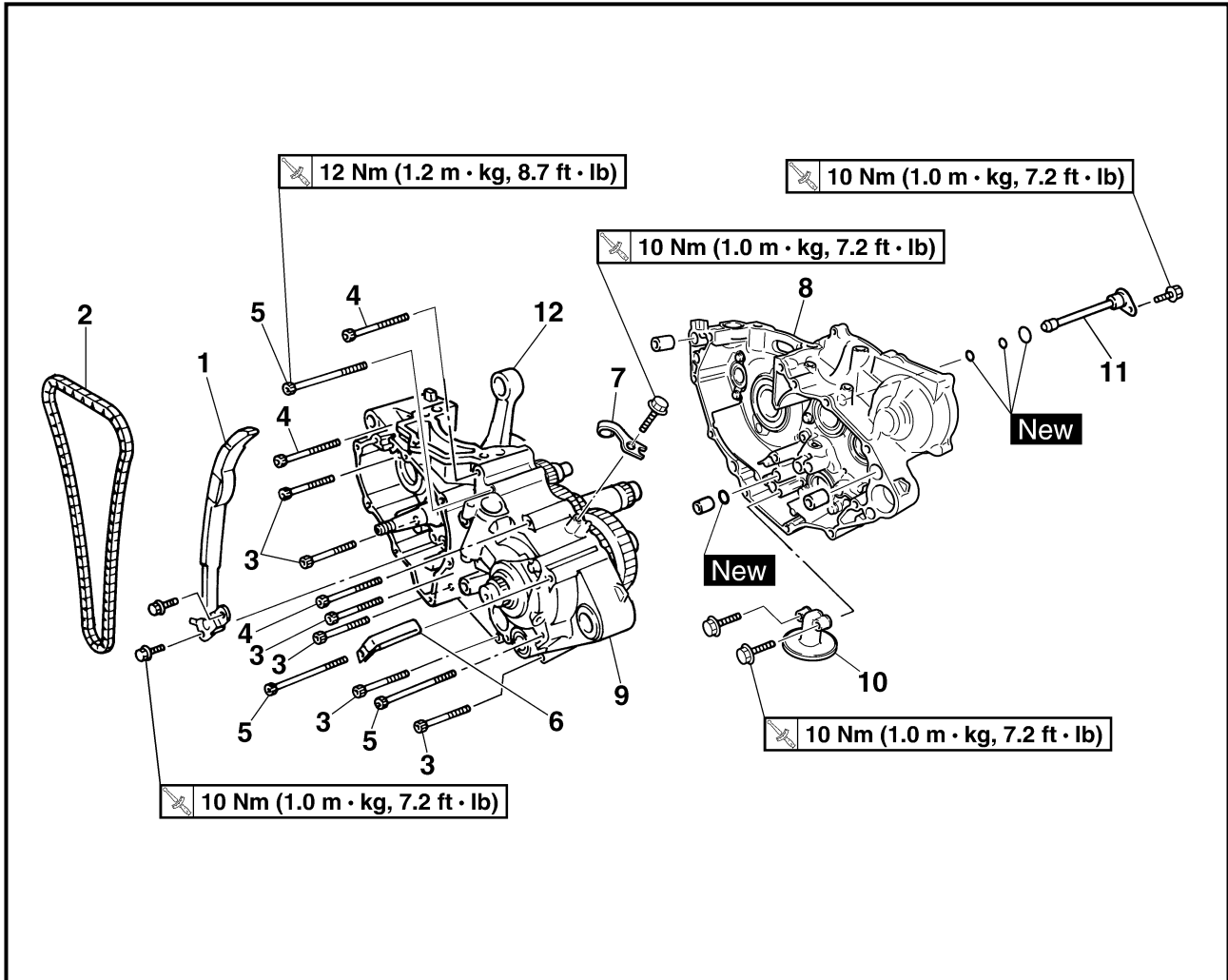
6. Install:
  - Spring ①
  - Pin ②
  - O-ring ③ **New**
  - Neutral switch ④
  - Screw (neutral switch) ⑤

**4 Nm (0.4 m · kg, 2.9 ft · lb)**

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



### CRANKCASE AND CRANKSHAFT CRANKCASE AND CRANKSHAFT



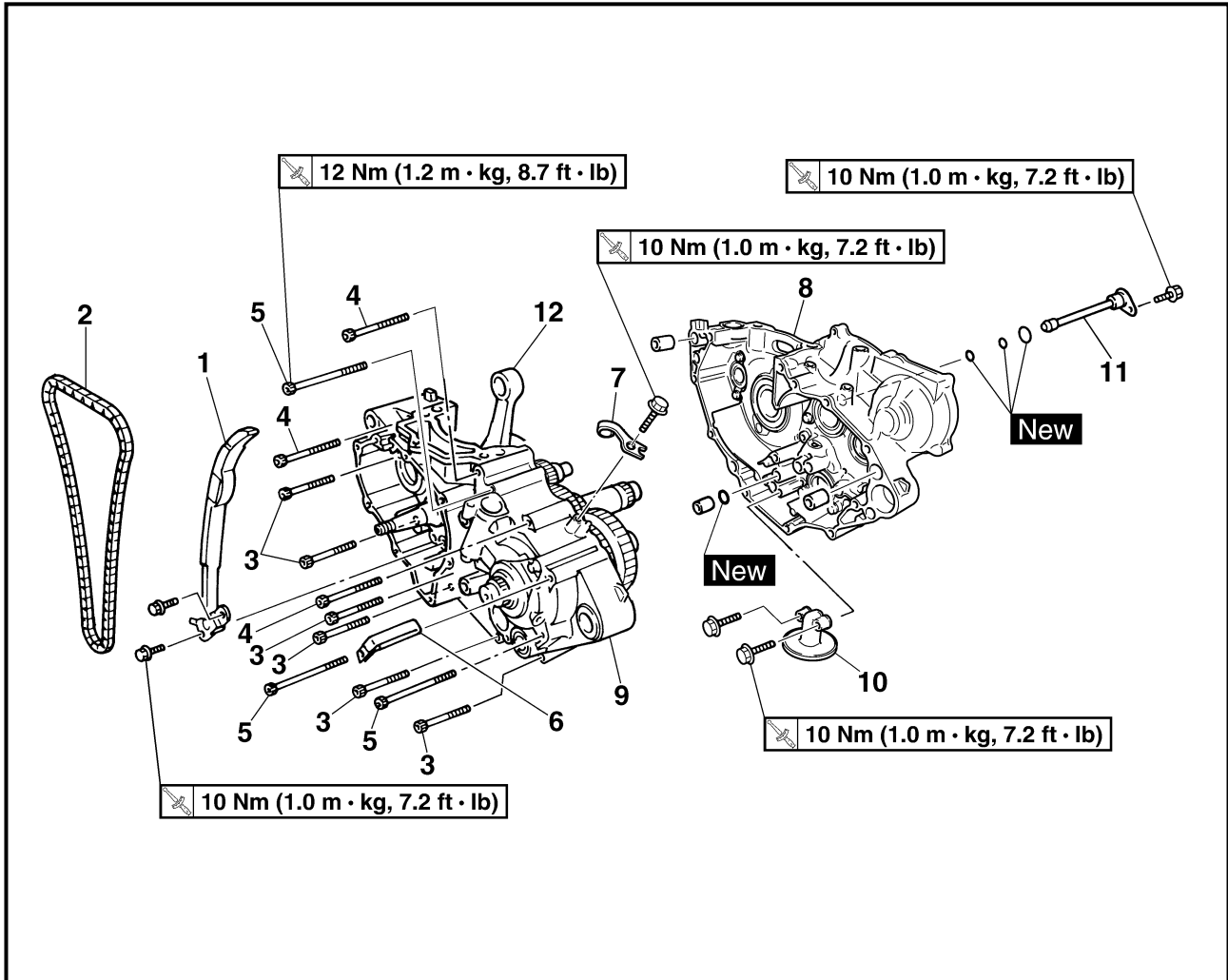
Extent of removal:

① Crankcase separation

② Crankshaft removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal	<b>CRANKCASE SEPARATION</b>			
		Engine		Refer to "ENGINE REMOVAL" section.
		Piston		Refer to "CYLINDER AND PISTON" section.
		Balancer		Refer to "BALANCER" section.
		Kick axle assembly		Refer to "KICK AXLE AND SHIFT SHAFT" section.
		Stator		Refer to "AC MAGNETO AND STARTER CLUTCH" section.
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;">             ↑ ① ↓           </div> <div style="text-align: center;">             ↑ ② ↓           </div> </div>	1	Timing chain guide (rear)	1	Refer to "REMOVAL POINTS".
	2	Timing chain	1	
	3	Bolt (50 mm)	6	
	4	Bolt (60 mm)	3	
	5	Bolt (75 mm)	3	
	6	Hose guide	1	
	7	Clutch cable holder	1	
	8	Crankcase (right)	1	
	9	Crankcase (left)	1	

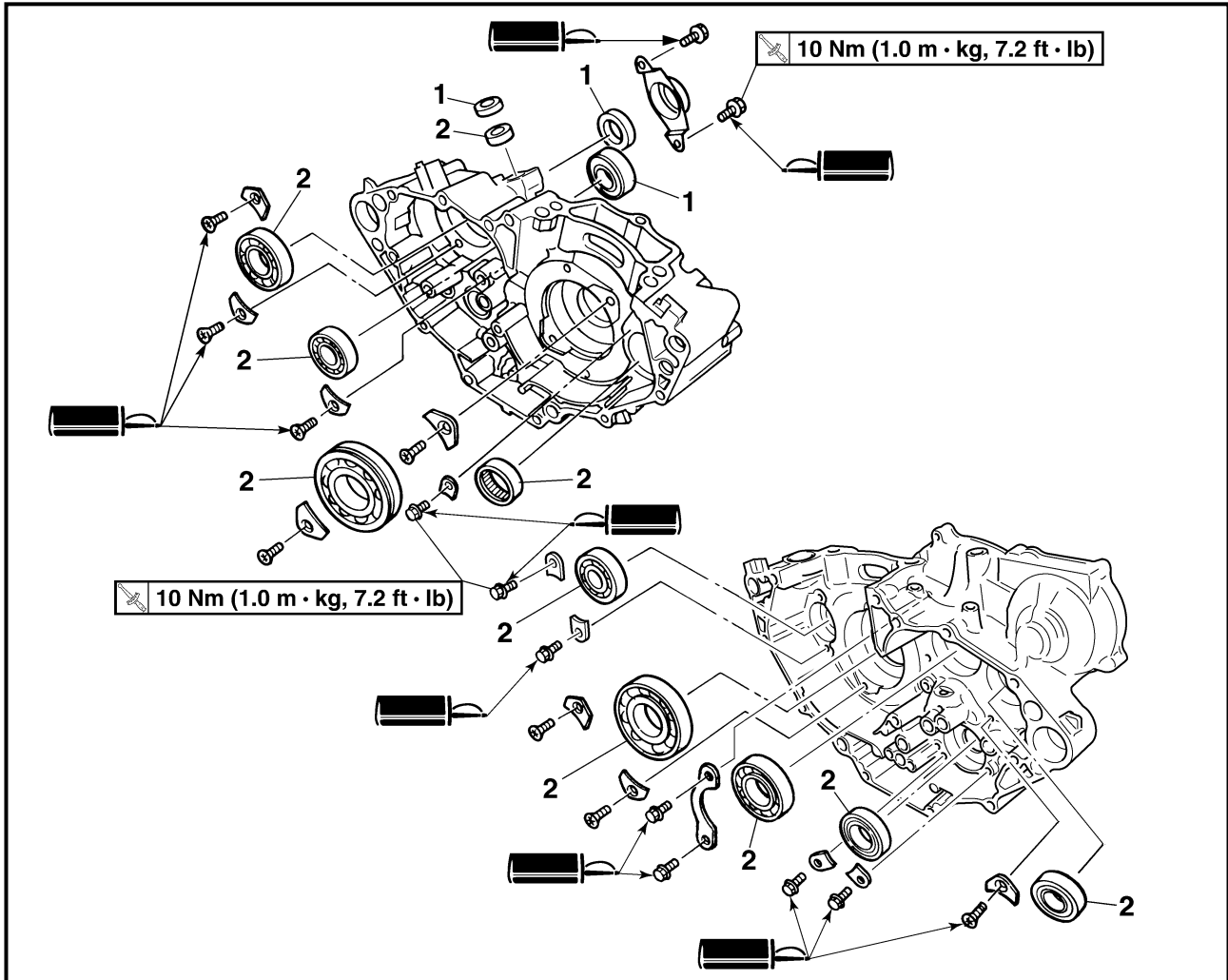




Extent of removal	Order	Part name	Q'ty	Remarks
↑ ② ↓	10	Oil strainer	1	
	11	Oil delivery pipe 2	1	
	12	Crankshaft	1	Use special tool. Refer to "REMOVAL POINTS".

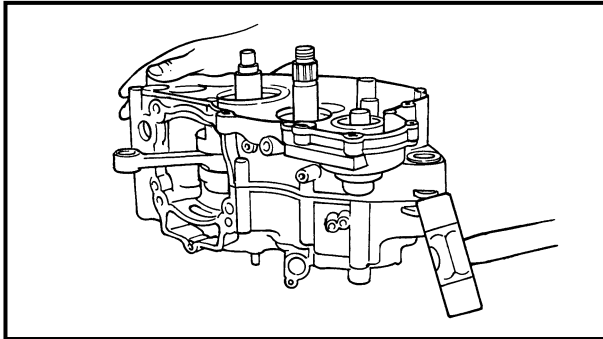
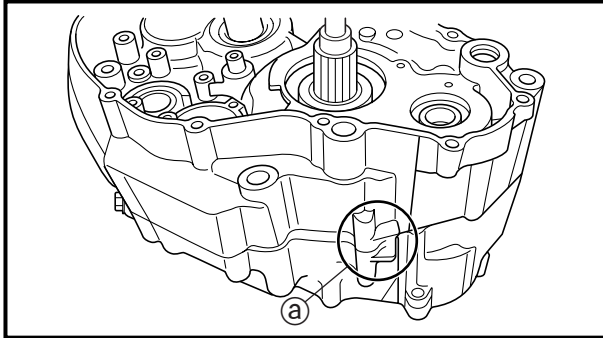
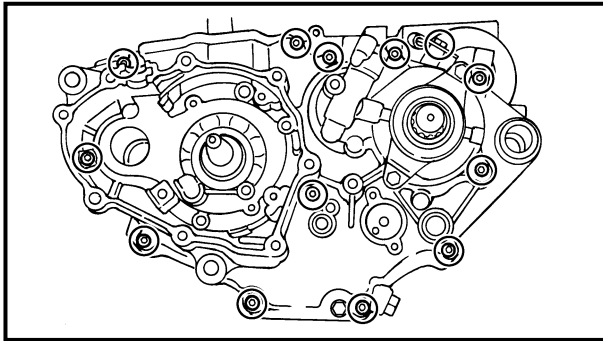


### CRANKCASE BEARING



Extent of removal: ① Crankcase bearing removal

Extent of removal	Order	Part name	Q'ty	Remarks
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	3	Refer to "REMOVAL POINTS".
	2	Bearing	10	



### REMOVAL POINTS

#### Crankcase

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

#### Separation steps:

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

#### NOTE:

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

- Remove the crankcase (right).

#### NOTE:

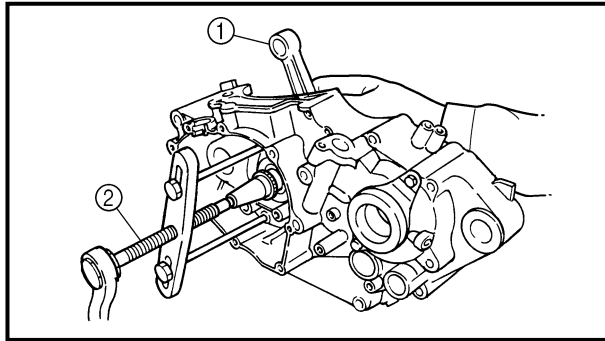
Place the crankcase with its left side downward and split it by inserting a screwdriver tip into the splitting slit (a) in the crankcase.

- Lift the crankcase (right) horizontally while lightly patting the case splitting slit and engine mounting boss using a soft hammer, and leave the crankshaft and transmission with the crankcase (left).

#### CAUTION:

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

- Remove the dowel pins and O-ring.



### Crankshaft

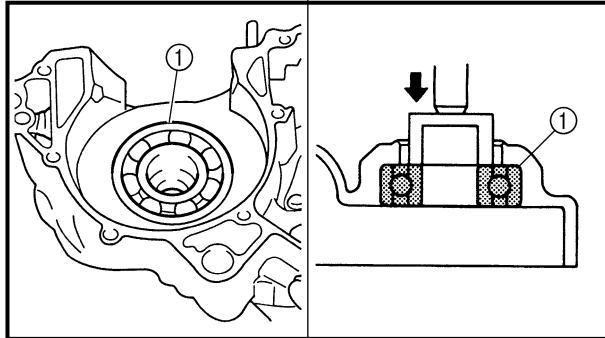
- Remove:
  - Crankshaft ①
 Use the crankcase separating tool ②.



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

### CAUTION:

Do not use a hammer to drive out the crankshaft.

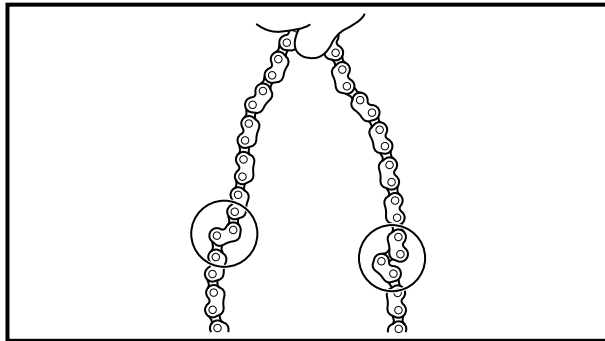


### Crankshaft bearing

- Remove:
  - Bearing ①

### NOTE:

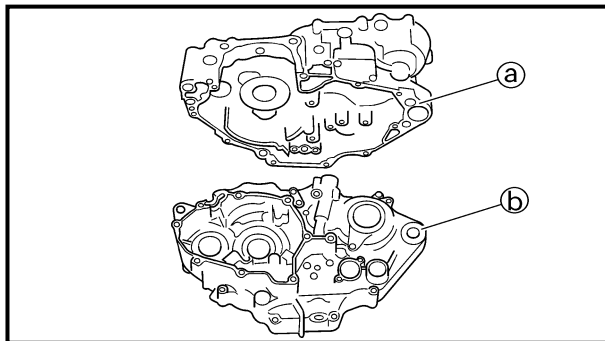
- Remove the bearing from the crankcase by pressing its inner race.
- Do not use the removed bearing.



### INSPECTION

#### Timing chain and timing chain guide

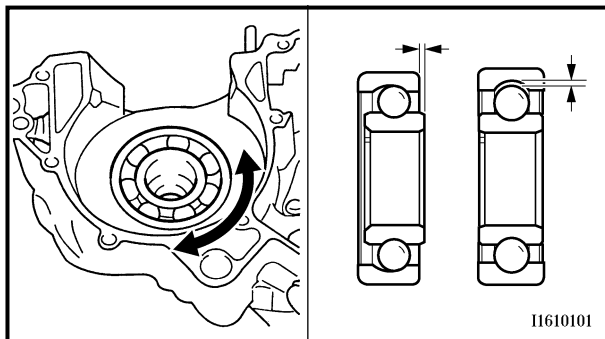
- Inspect:
  - Timing chain  
Cracks/stiff → Replace the timing chain and camshaft sprocket as a set.
- Inspect:
  - Timing chain guide  
Wear/damage → Replace.



EC4N4101

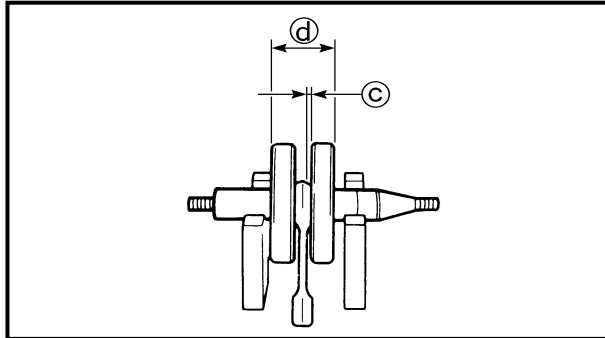
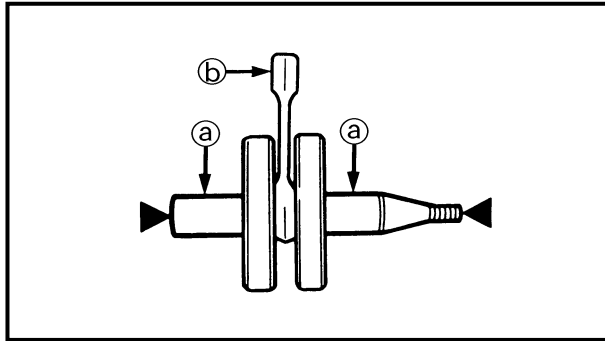
### Crankcase

- Inspect:
  - Contacting surface ①  
Scratches → Replace.
  - Engine mounting boss ②, crankcase  
Cracks/damage → Replace.



11610101

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



EC4N4201

### Crankshaft

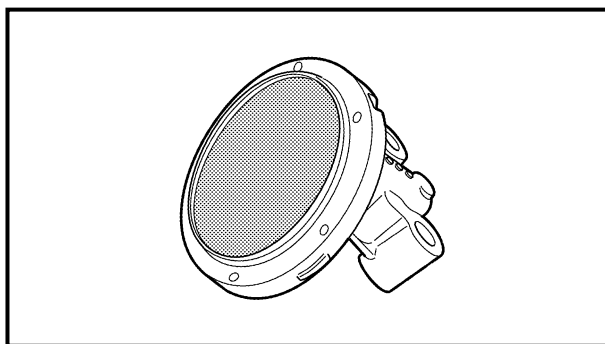
1. Measure:

- 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

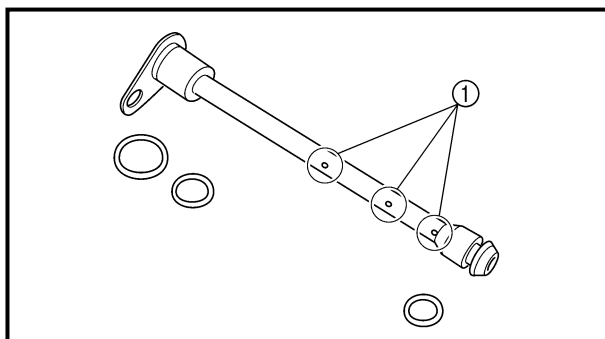
	Standard	<Limit>
<b>Runout limit:</b>	<b>0.03 mm</b> (0.0012 in)	<b>0.05 mm</b> (0.002 in)
<b>Small end free play:</b>	<b>0.4 ~ 1.0 mm</b> (0.016 ~ 0.039 in)	<b>2.0 mm</b> (0.08 in)
<b>Side clearance:</b>	<b>0.15 ~ 0.45 mm</b> (0.0059 ~ 0.0177 in)	<b>0.50 mm</b> (0.02 in)
<b>Crack width:</b>	<b>61.95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



### Oil strainer

1. Inspect:

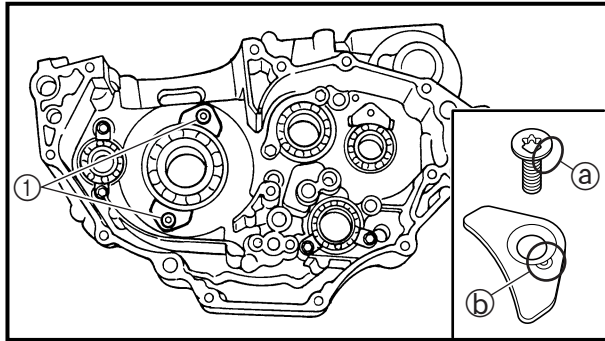
- Oil strainer
- Damage → Replace.



### Oil delivery pipe

1. Inspect:

- Oil delivery pipe
- Cracks/damage → Replace.
- Oil delivery pipe holes ①
- Clogged → Blow out with compressed air.



EC4N5000

## ASSEMBLY AND INSTALLATION

### Crankshaft bearing

1. Install:

- Bearing **New**
- Bearing stopper
- Bolt (bearing stopper)
 

	10 Nm (1.0 m · kg, 7.2 ft · lb)
--	---------------------------------
- Screw (bearing stopper)
 

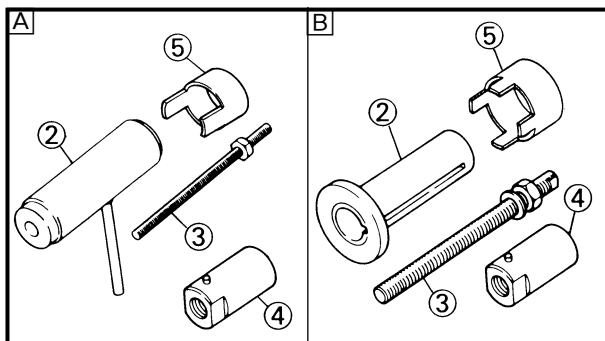
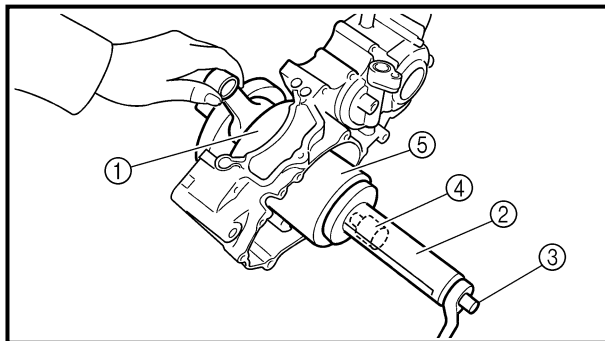
	10 Nm (1.0 m · kg, 7.2 ft · lb)
--	---------------------------------
- Screw [bearing stopper (crankshaft)] ①
 

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

To crankcase (left and right).

### NOTE:

- Install the bearing by pressing its outer race parallel.
- To prevent the screw [bearing stopper (crankshaft)] from becoming loose, crush the screw head periphery ② into the concave ③ using a punch etc. In so doing, take care not to damage the screwdriver receiving hole in the screw head.



### Crankshaft

1. Install:

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



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

**A** For USA and CDN

**B** Except for USA and CDN

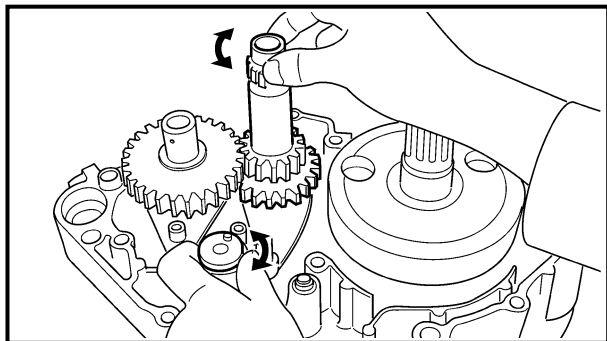


**NOTE:**

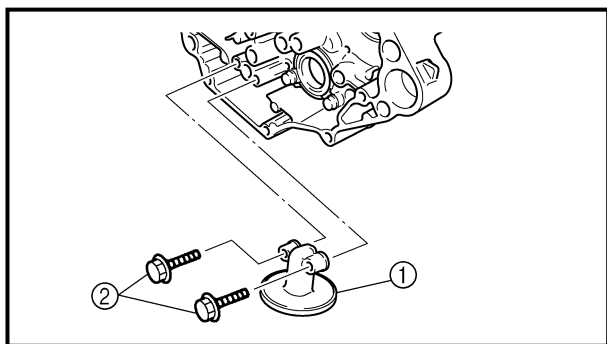
- Hold the connecting rod at top dead center with one hand while turning the nut of the installing tool with the other. Operate the installing tool until the crankshaft bottoms against the bearing.
- Before installing the crankshaft, clean the contacting surface of crankcase.

**CAUTION:**

**Do not use a hammer to drive in the crankshaft.**



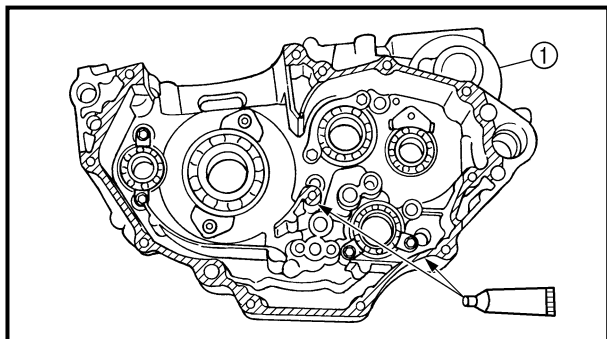
2. Check:
  - Shifter operation
  - Transmission operation
 Unsmooth operation → Repair.



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

**10 Nm (1.0 m · kg, 7.2 ft · lb)**

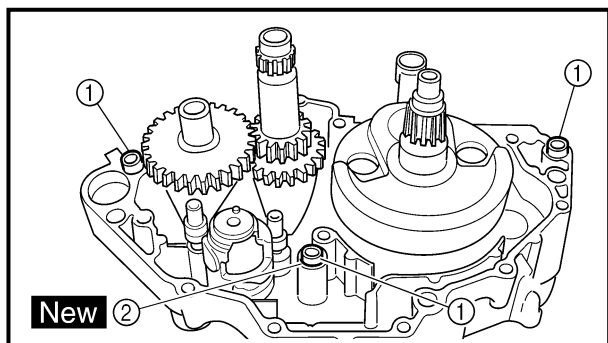
4. Apply:
  - Sealant
 On the crankcase (right) ①.



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

**NOTE:**

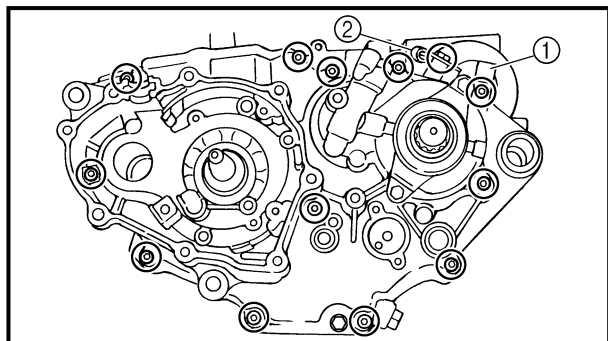
Clean the contacting surface of crankcase (left and right) before applying the sealant.



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

**NOTE:**

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



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

**NOTE:**

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

7. Install:
  - Oil delivery pipe
  - O-ring **New**
  - Bolt (oil delivery pipe)  
**10 Nm (1.0 m · kg, 7.2 ft · lb)**

8. Install:
  - Timing chain
  - Timing chain guide (rear)
  - Bolt (timing chain guide)  
**10 Nm (1.0 m · kg, 7.2 ft · lb)**

9. Remove:
  - Sealant  
Forced out on the cylinder mating surface.

10. Apply:
  - Engine oil  
To the crank pin, bearing and oil delivery hole.

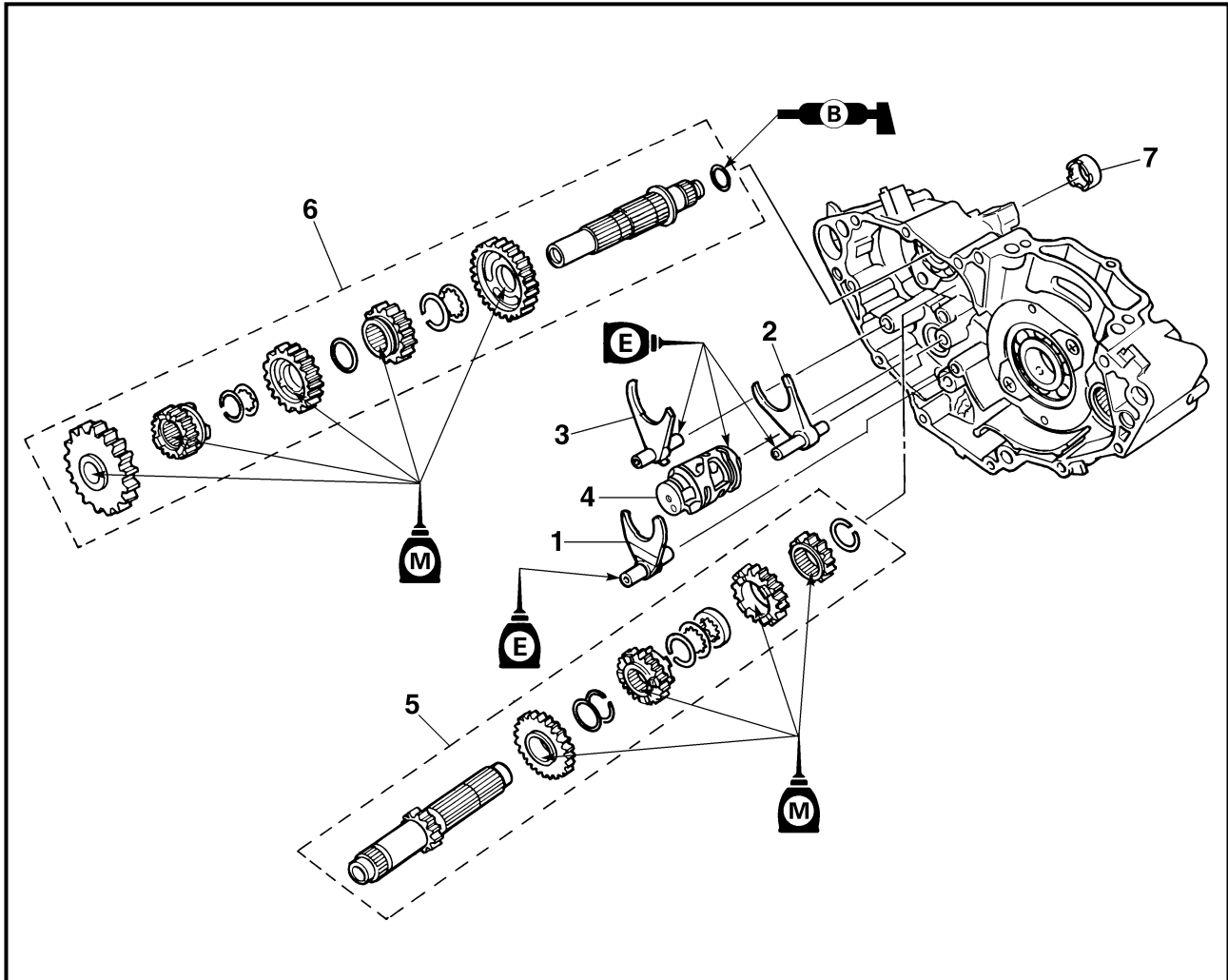
11. Check:
  - Crankshaft and transmission operation.  
Unsmooth operation → Repair.





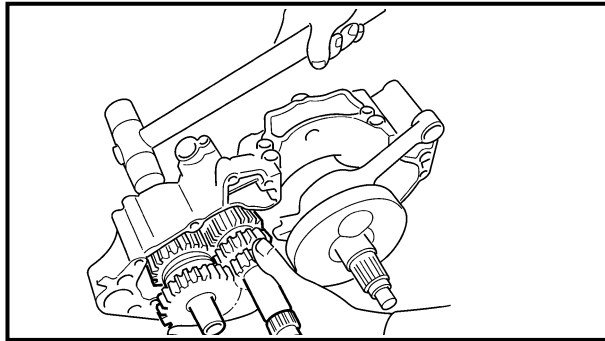
TRANSMISSION, SHIFT CAM AND SHIFT FORK

TRANSMISSION, SHIFT CAM AND SHIFT FORK



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

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<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.
	1	Shift fork 1	1	Refer to "REMOVAL POINTS".
	2	Shift fork 2	1	
	3	Shift fork 3	1	
	4	Shift cam	1	
	5	Main axle	1	
	6	Drive axle	1	
	7	Collar	1	



EC4H3000

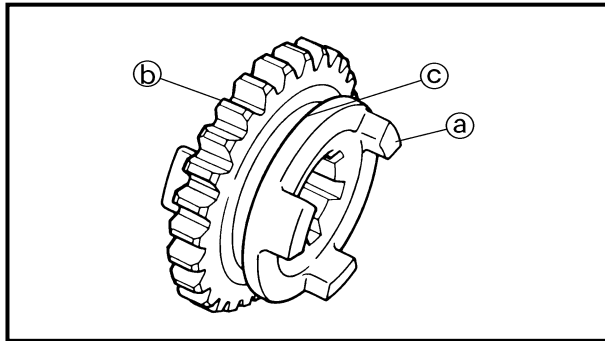
## REMOVAL POINTS

### Shift fork, shaft cam and transmission

1. Remove:
  - Shift forks
  - Shift cam
  - Main axle
  - Drive axle

### NOTE:

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



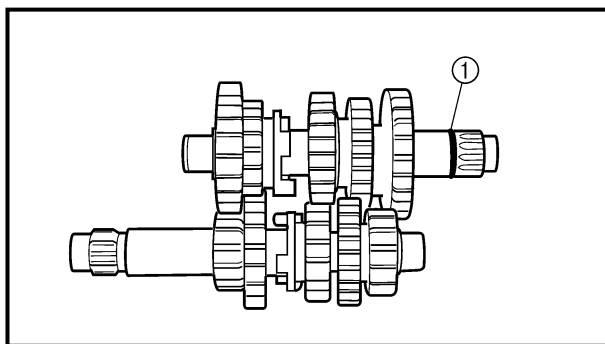
EC4H4000

## INSPECTION

EC4H4200

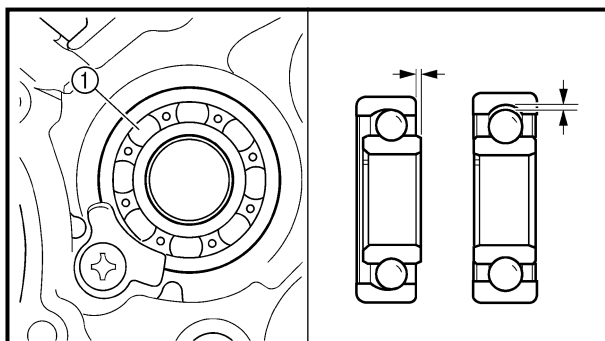
### Gears

1. Inspect:
  - Matching dog ①
  - Gear teeth ②
  - Shift fork groove ③
 Wear/damage → Replace.



2. Inspect:
  - O-ring ①
 Damage → Replace.

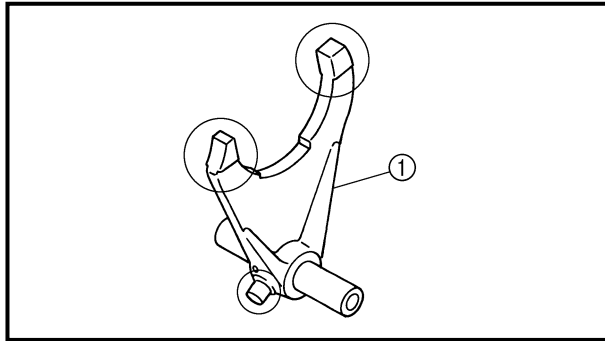
3. Check:
  - Gears movement
 Unsmooth movement → Repair or replace.



EC4H4600

### Bearing

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

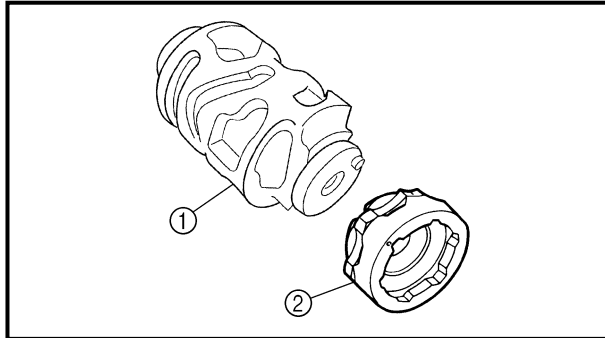


EC4H4801

### Shift fork, shift cam and segment

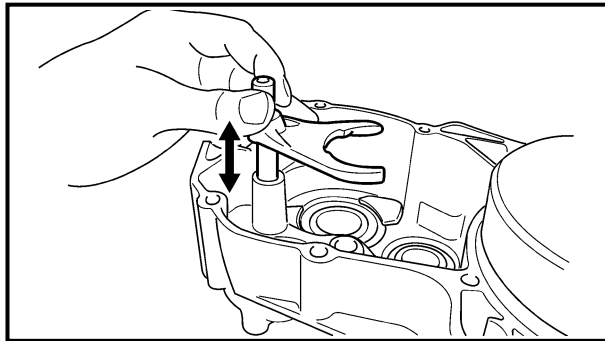
1. Inspect:

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



2. Inspect:

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

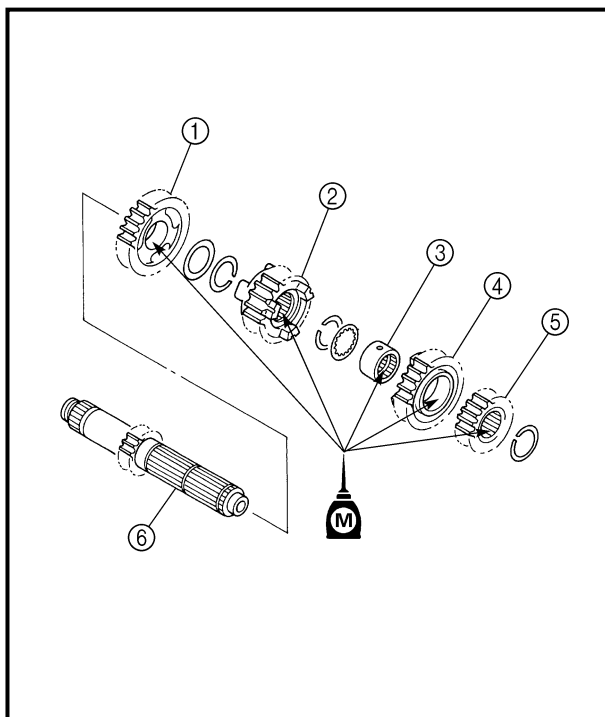


3. Check:

- Shift fork movement  
Unsmooth operation → Replace shift fork.

**NOTE:**

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



### ASSEMBLY AND INSTALLATION

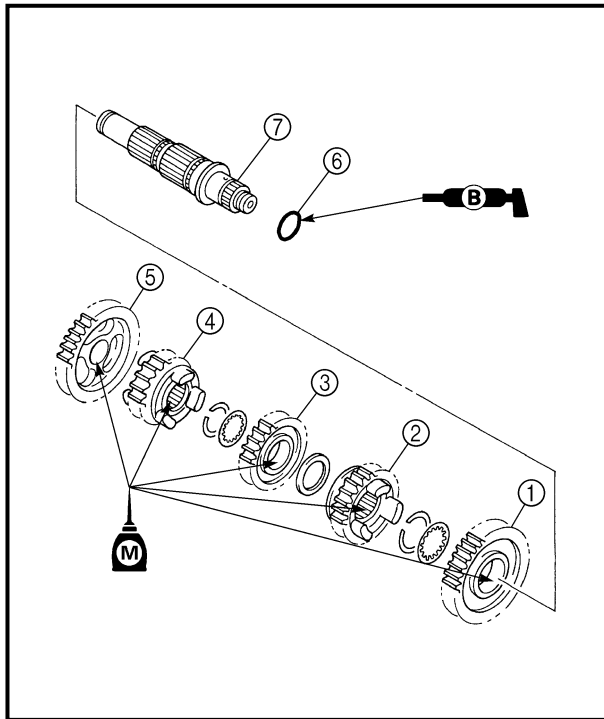
#### Transmission

1. Install:

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

**NOTE:**

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



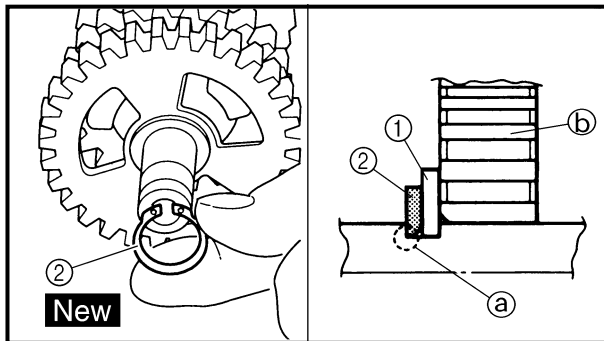
### 2. Install:

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

To drive axle ⑦.

### NOTE:

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

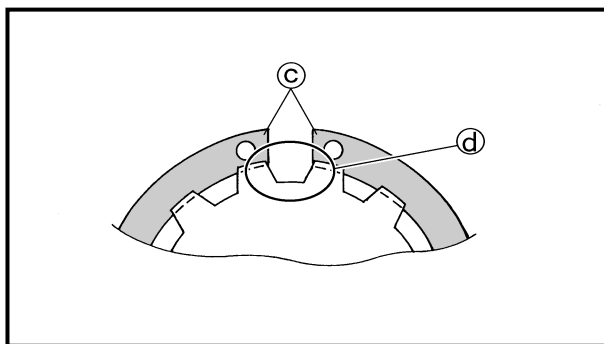


### 3. Install:

- Plain washer ①
- Circlip ② **New**

### NOTE:

- Be sure the circlip sharp-edged corner ③ is positioned opposite side to the plain washer and gear ④.
- Be sure the circlip end ⑤ is positioned at axle spline groove ⑥.

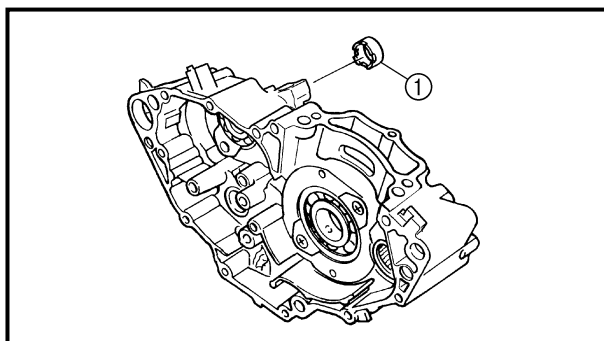


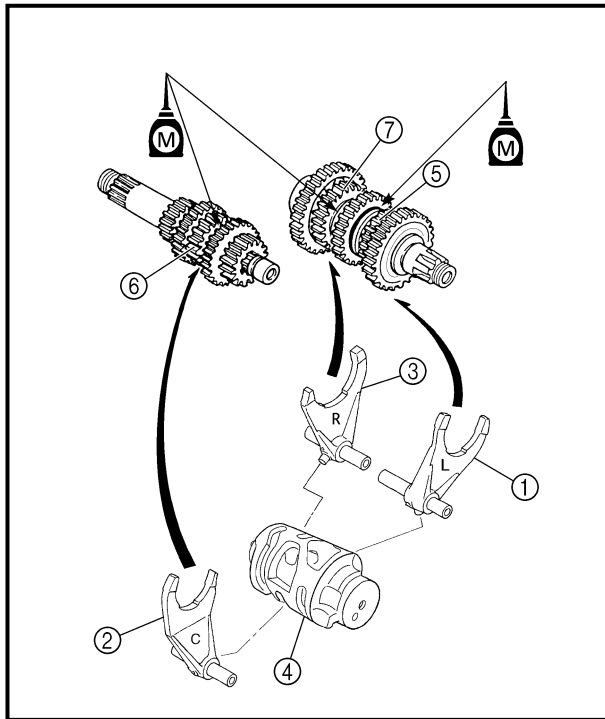
### 4. Install:

- Collar ①

### NOTE:

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





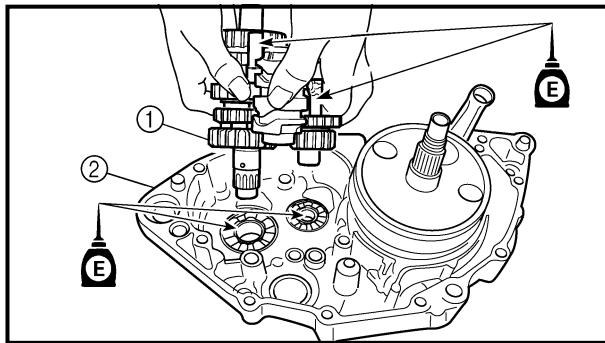
5. Install:

- Shift fork 1 (L) ①
- Shift fork 2 (C) ②
- Shift fork 3 (R) ③
- Shift cam ④

To main axle and drive axle.

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

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

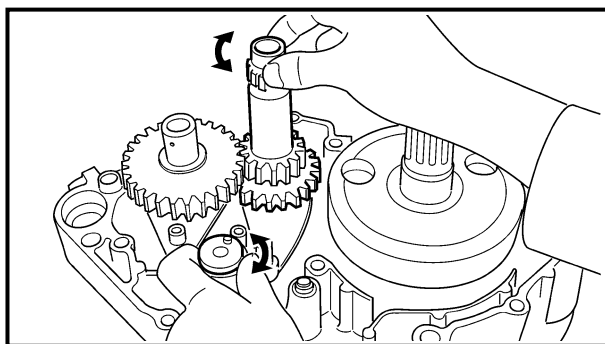


6. Install:

- Transmission assembly ①
- To crankcase (left) ②.

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

Apply the engine oil on the bearings and guide bars.



7. Check:

- Shifter operation
  - Transmission operation
- Unsmooth operation → Repair.

EC500000

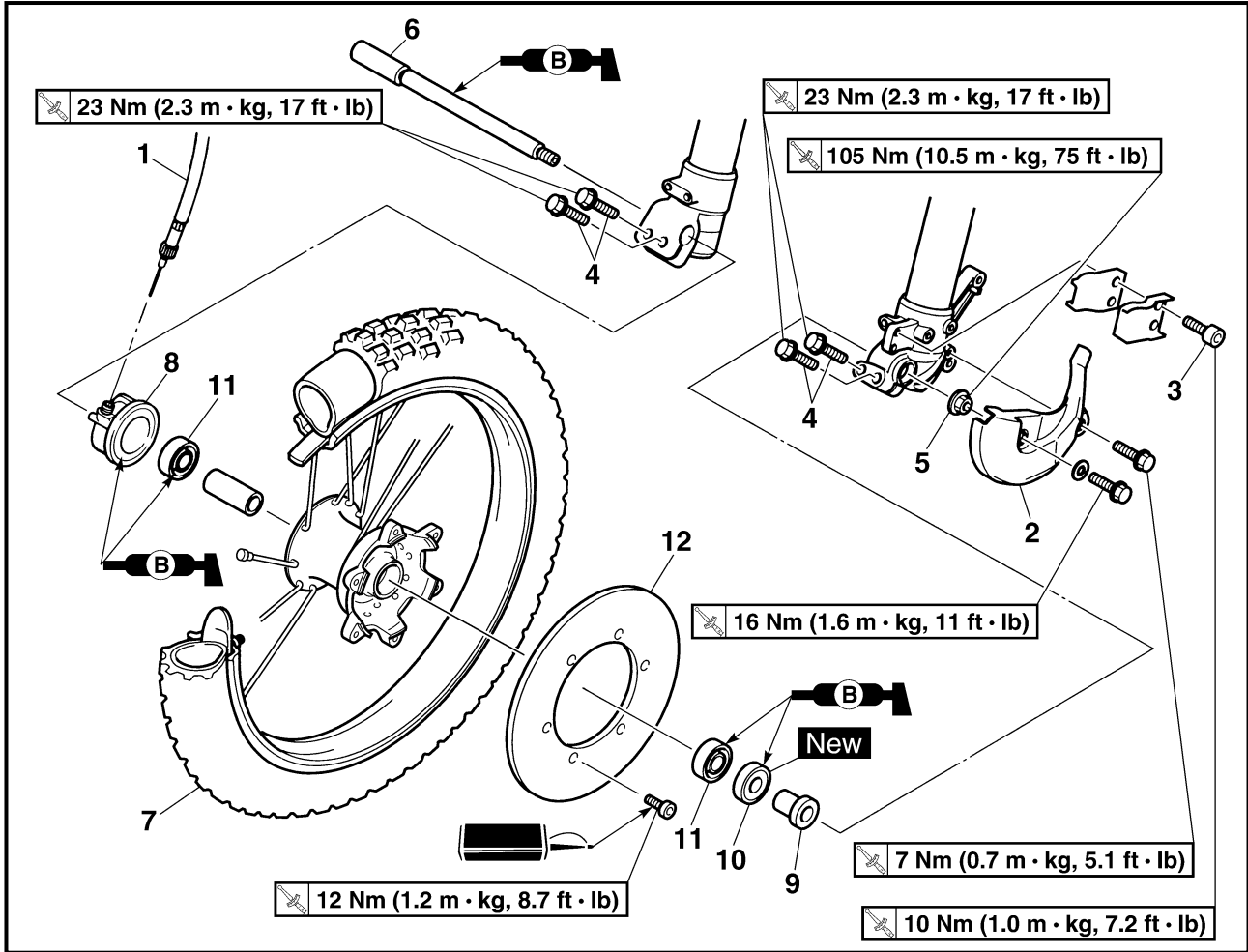
## CHASSIS

EC590000

### FRONT WHEEL AND REAR WHEEL

EC598000

#### FRONT WHEEL



Extent of removal:

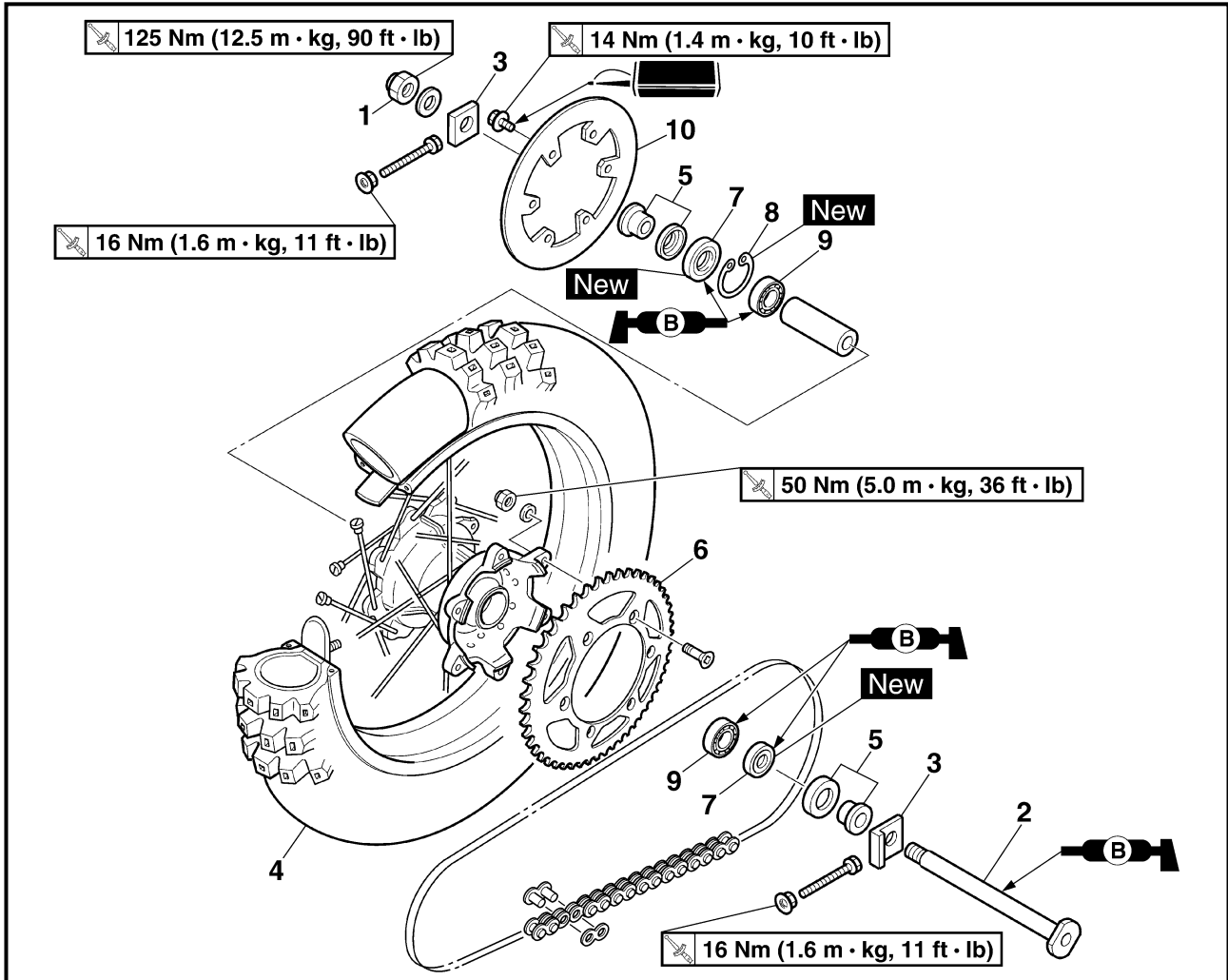
- ① Front wheel removal
- ② Wheel bearing removal
- ③ Brake disc removal

② Wheel bearing removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>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 2 Hose cover 3 Bolt (brake hose holder) 4 Bolt (axle holder) 5 Nut (front wheel axle) 6 Front wheel axle 7 Front wheel 8 Trip meter gear unit 9 Collar 10 Oil seal 11 Bearing 12 Brake disc	1 1 2 4 1 1 1 1 1 1 2 1	Only loosening. Only loosening. Refer to "REMOVAL POINTS".

EC598100

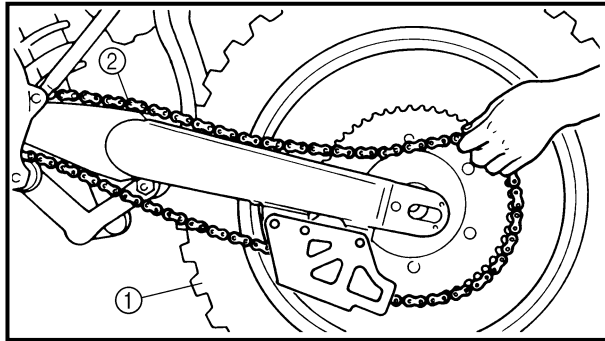
## REAR WHEEL



Extent of removal:

- ① Rear wheel removal
- ② Wheel bearing removal
- ③ Brake disc 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 2 3 4 5 6 7 8 9 10	Nut (rear wheel axle) Rear wheel axle Chain puller Rear wheel Collar Driven sprocket Oil seal Circlip Bearing Brake disc	1 1 2 1 2 1 2 1 2 1	Refer to "REMOVAL POINTS".  Refer to "REMOVAL POINTS".



EC593000

**REMOVAL POINTS**

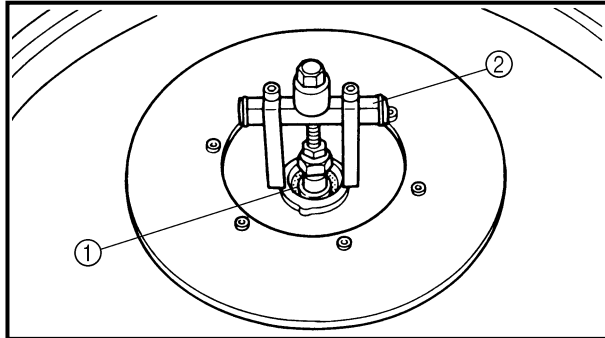
EC523101

**Rear wheel**

1. Remove:
  - Wheel ①

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

Push the wheel forward and remove the drive chain ②.



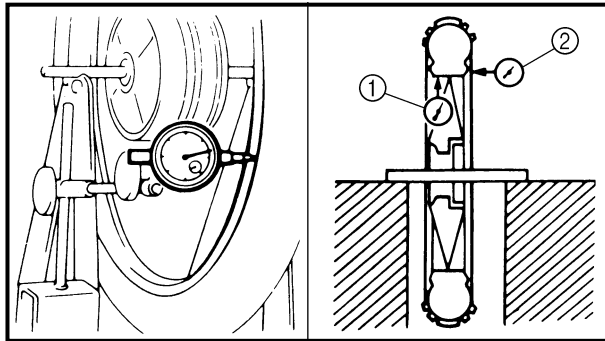
EC513201

**Wheel bearing (if necessary)**

1. Remove:
  - Bearing ①

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

Remove the bearing using a general bearing puller ②.



EC594000

**INSPECTION**

EC514100

**Wheel**

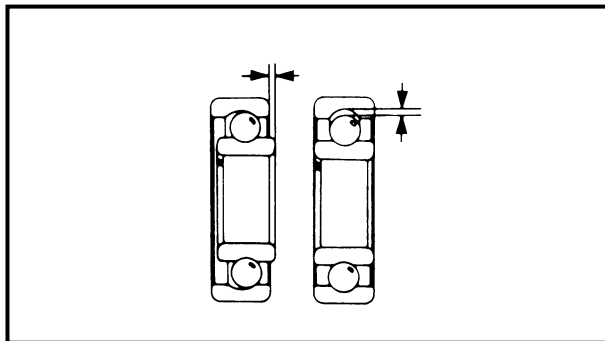
1. Measure:
  - Wheel runout
 Out of limit → Repair/replace.



**Wheel runout limit:**

**Radial ①: 2.0 mm (0.08 in)**

**Lateral ②: 2.0 mm (0.08 in)**

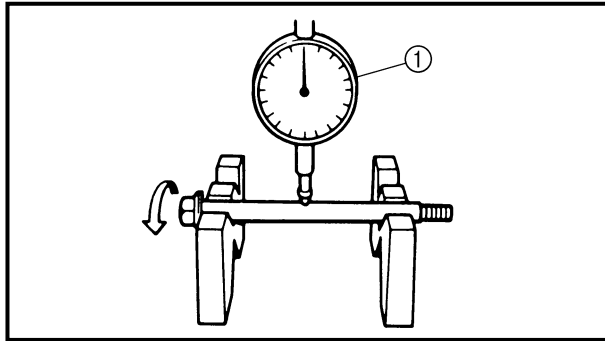


2. Inspect:
  - Bearing
 Rotate inner race with a finger.  
 Rough spot/seizure → Replace.

**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.



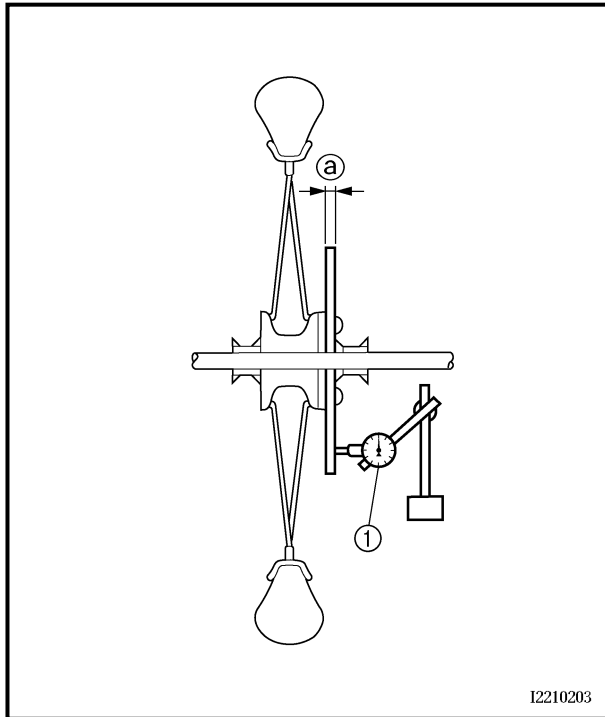
**Wheel axle bending limit:**  
**0.5 mm (0.020 in)**

### NOTE:

The bending value is shown by one half of the dial gauge reading.

### ⚠ WARNING

**Do not attempt to straighten a bent axle.**



12210203

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.



**Disc deflection limit:**

	Standard	<Limit>
Rear	—	0.15 mm (0.006 in)

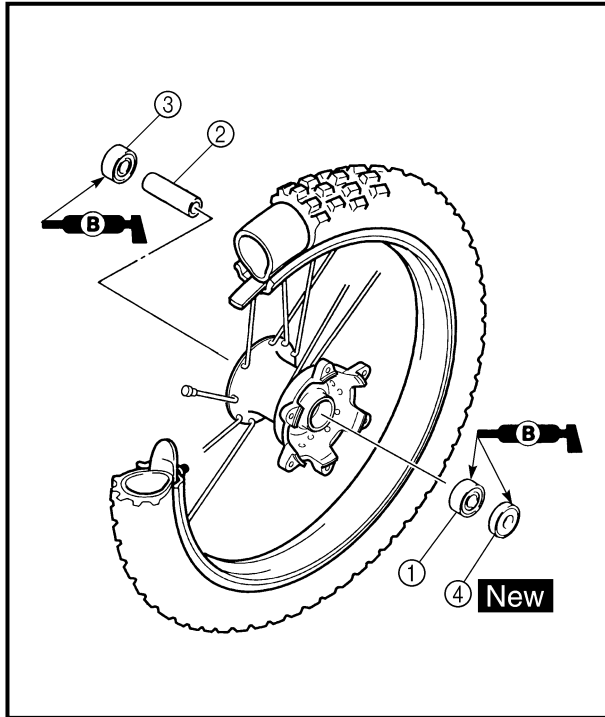
2. Measure:

- Brake disc thickness ②  
Out of limit → Replace.



**Disc wear limit:**

	Standard	<Limit>
Front	3.0 mm (0.12 in)	2.5 mm (0.10 in)
Rear	4.0 mm (0.16 in)	3.5 mm (0.14 in)



EC595000

## ASSEMBLY AND INSTALLATION

### Front wheel

1. Install:

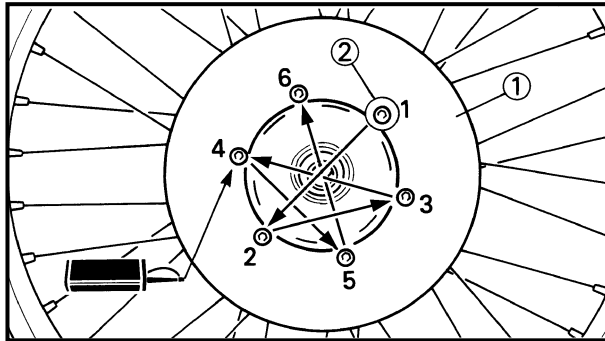
- Bearing (left) ①
- Spacer ②
- Bearing (right) ③
- Oil seal ④ **New**

#### 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.**



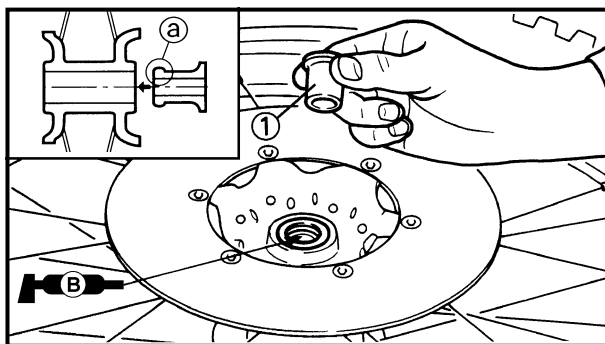
2. Install:

- 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.

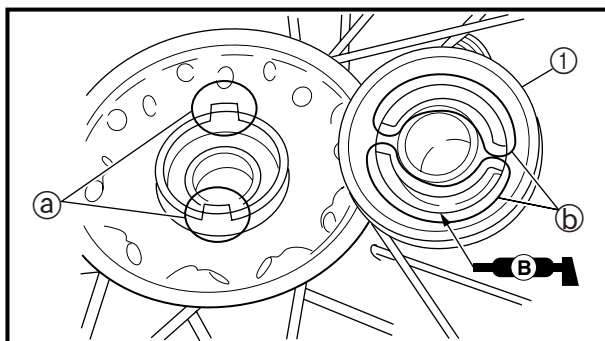


3. Install:

- Collar ①

#### NOTE:

- Apply the lithium soap base grease on the oil seal lip.
- Install the collar with their projection (a) facing the wheel.

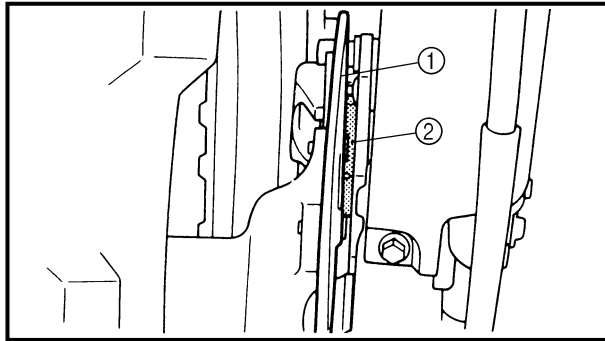


4. Install:

- Trip meter gear unit ①

#### NOTE:

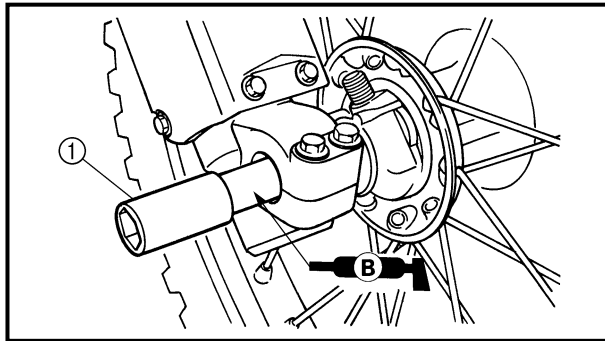
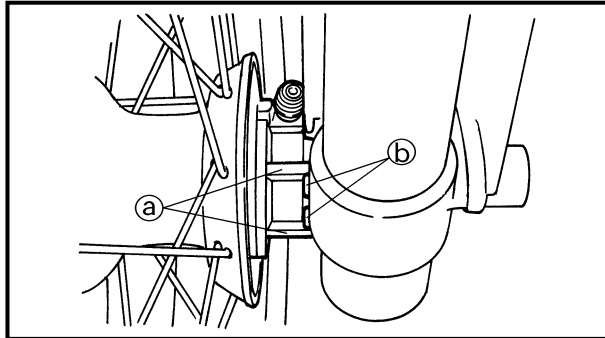
- Apply the lithium soap base grease on the oil seal lip of the trip meter gear unit.
- Make sure the two projections (a) in the wheel hub are meshed with the two slots (b) in the trip meter gear unit.



5. Install:
- Wheel

**NOTE:**

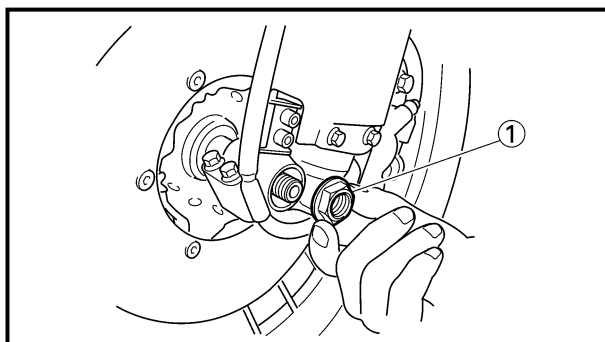
- Install the brake disc ① between the brake pads ② correctly.
- Make sure that the projections ③ in the trip meter gear unit fits over the stopper ④ on the front fork outer tube.



6. Install:
- Wheel axle ①

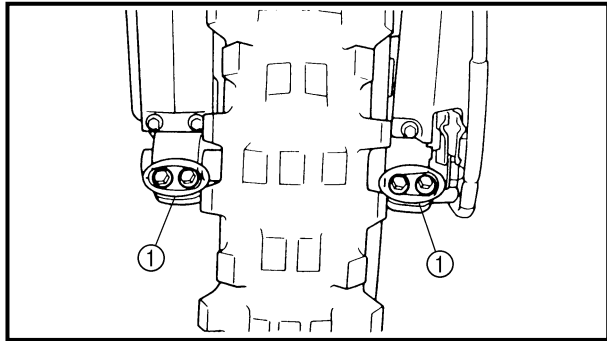
**NOTE:**

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)



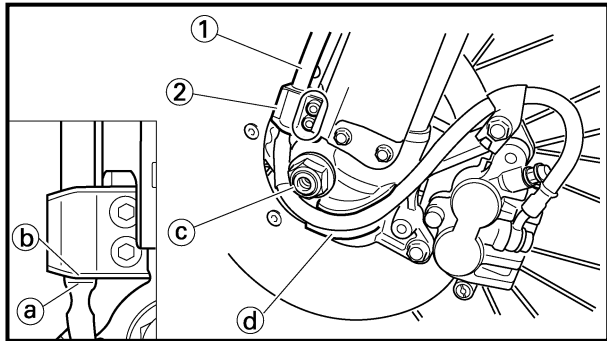
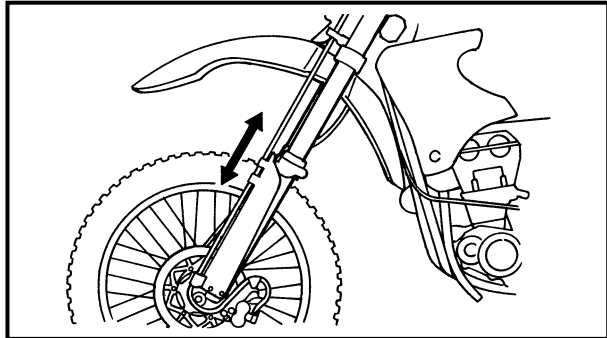
8. Tighten:

- 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:

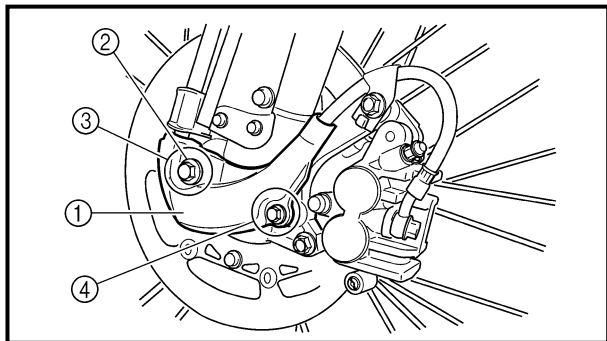
- Brake hose ①

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).



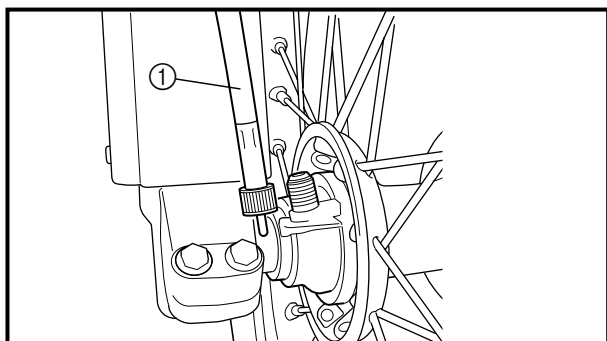
10. Install:

- Hose cover ①
- Plain washer ②
- Bolt [hose cover (M8)] ③

16 Nm (1.6 m · kg, 11 ft · lb)

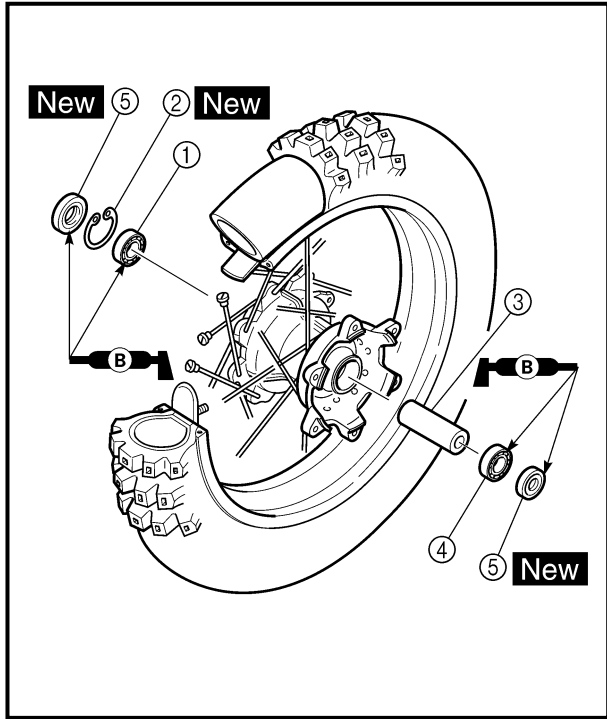
- Bolt [hose cover (M6)] ④

7 Nm (0.7 m · kg, 5.1 ft · lb)



11. Install:

- Trip meter cable ①



**Rear wheel**

1. Install:

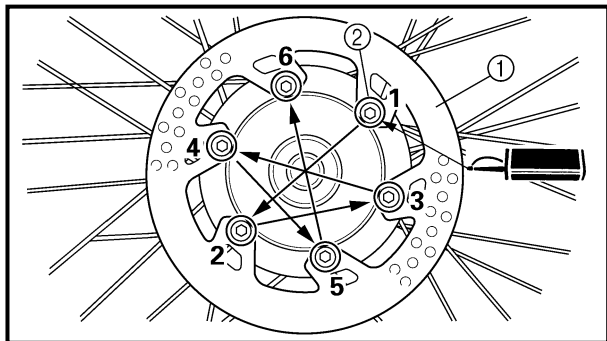
- Bearing (right) ①
- Circlip ② **New**
- Spacer ③
- Bearing (left) ④
- Oil seal ⑤ **New**

**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 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.**



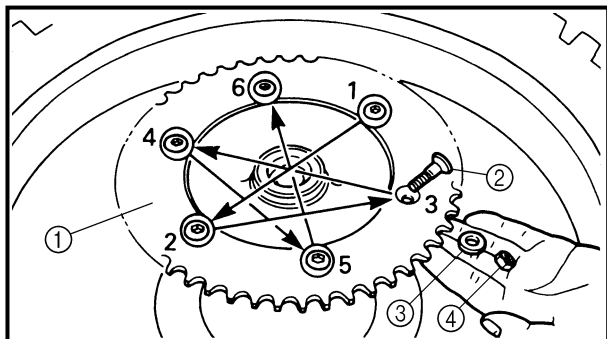
2. Install:

- Brake disc ①
- Bolt (brake disc) ②

 **14 Nm (1.4 m · kg, 10 ft · lb)**


**NOTE:**

Tighten the bolts in stage, using a crisscross pattern.



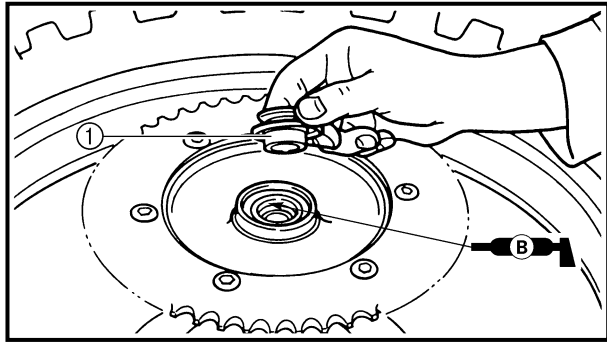
3. Install:

- Driven sprocket ①
- Bolt (driven sprocket) ②
- Plain washer (driven sprocket) ③
- Nut (driven sprocket) ④

 **50 Nm (5.0 m · kg, 36 ft · lb)**

**NOTE:**

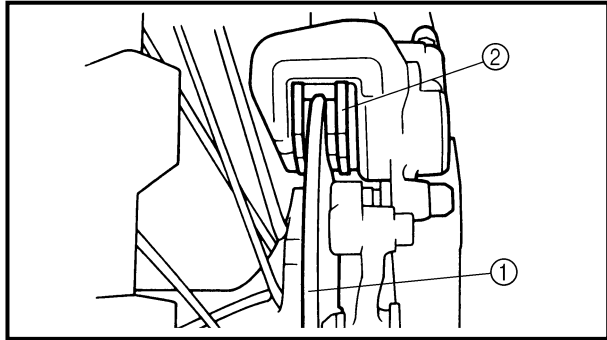
Tighten the nuts in stage, using a crisscross pattern.



4. Install:
- Collar ①

**NOTE:** \_\_\_\_\_  
Apply the lithium soap base grease on the oil seal lip.

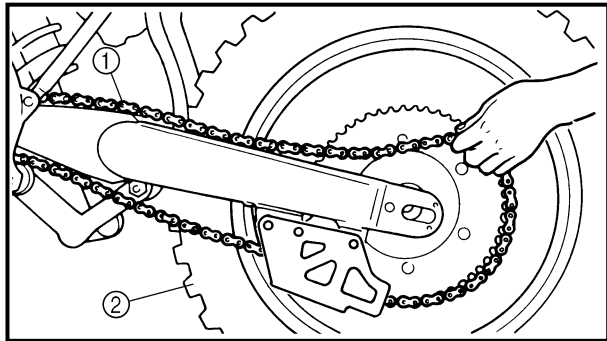
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5. Install:
- Wheel

**NOTE:** \_\_\_\_\_  
Install the brake disc ① between the brake pads ② correctly.

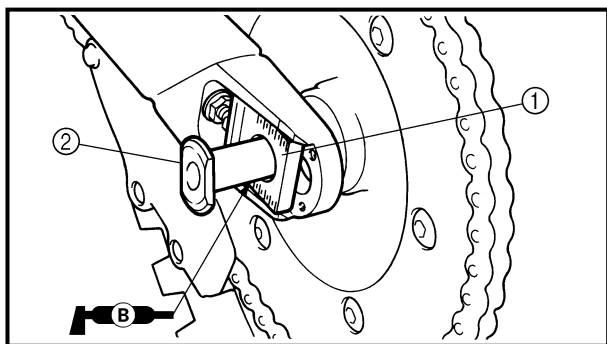
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6. Install:
- Drive chain ①

**NOTE:** \_\_\_\_\_  
Push the wheel ② forward and install the drive chain.

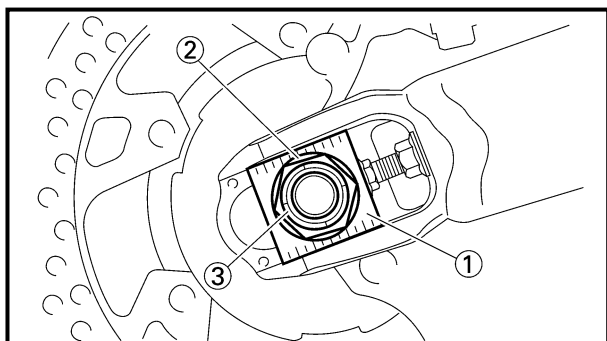
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7. Install:
- Chain puller (left) ①
  - Wheel axle ②

**NOTE:** \_\_\_\_\_  
• Install the chain puller (left), and insert the wheel axle from left side.  
• Apply the lithium soap base grease on the wheel axle.

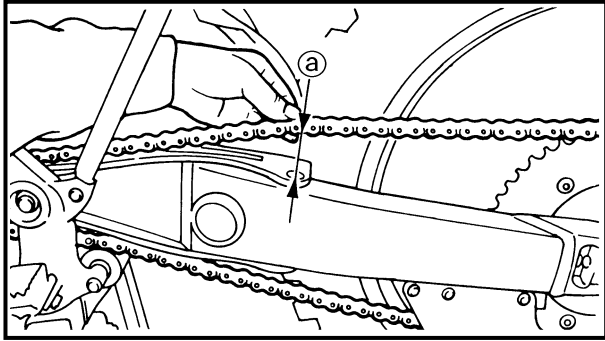
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8. Install:
- Chain puller (right) ①
  - Plain washer ②
  - Nut (wheel axle) ③

**NOTE:** \_\_\_\_\_  
Temporarily tighten the nut (wheel axle) at this point.

---



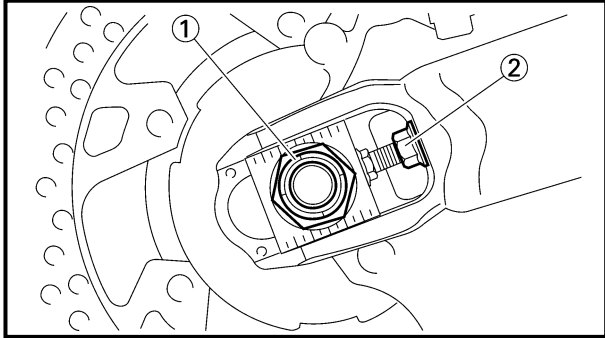
9. Adjust:

- 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

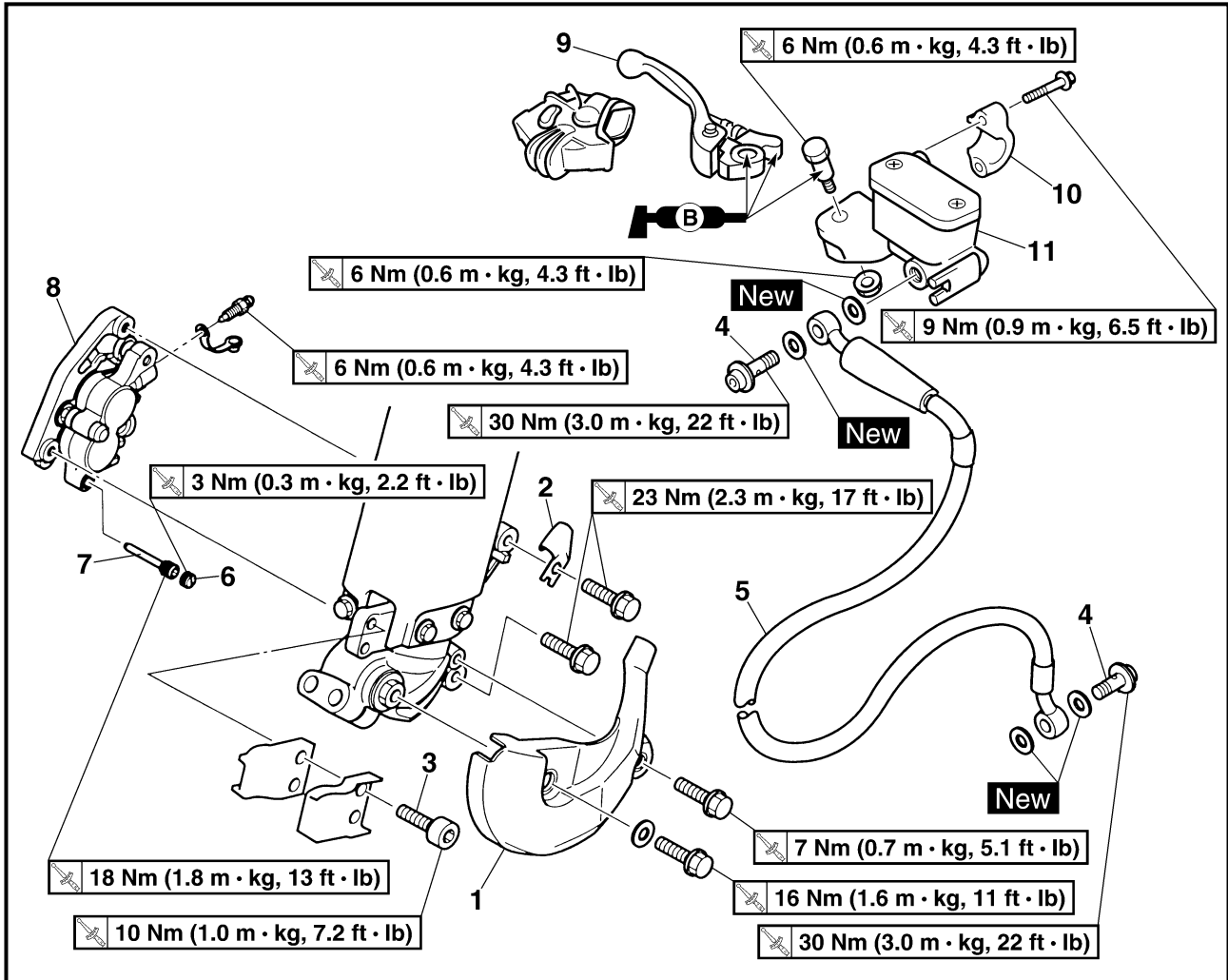
16 Nm (1.6 m · kg, 11 ft · lb)

EC5A0000

## FRONT BRAKE AND REAR BRAKE

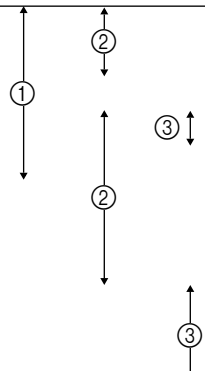
EC5A8000

### FRONT BRAKE



Extent of removal:

- ① Brake hose removal
- ② Caliper removal
- ③ Master cylinder removal

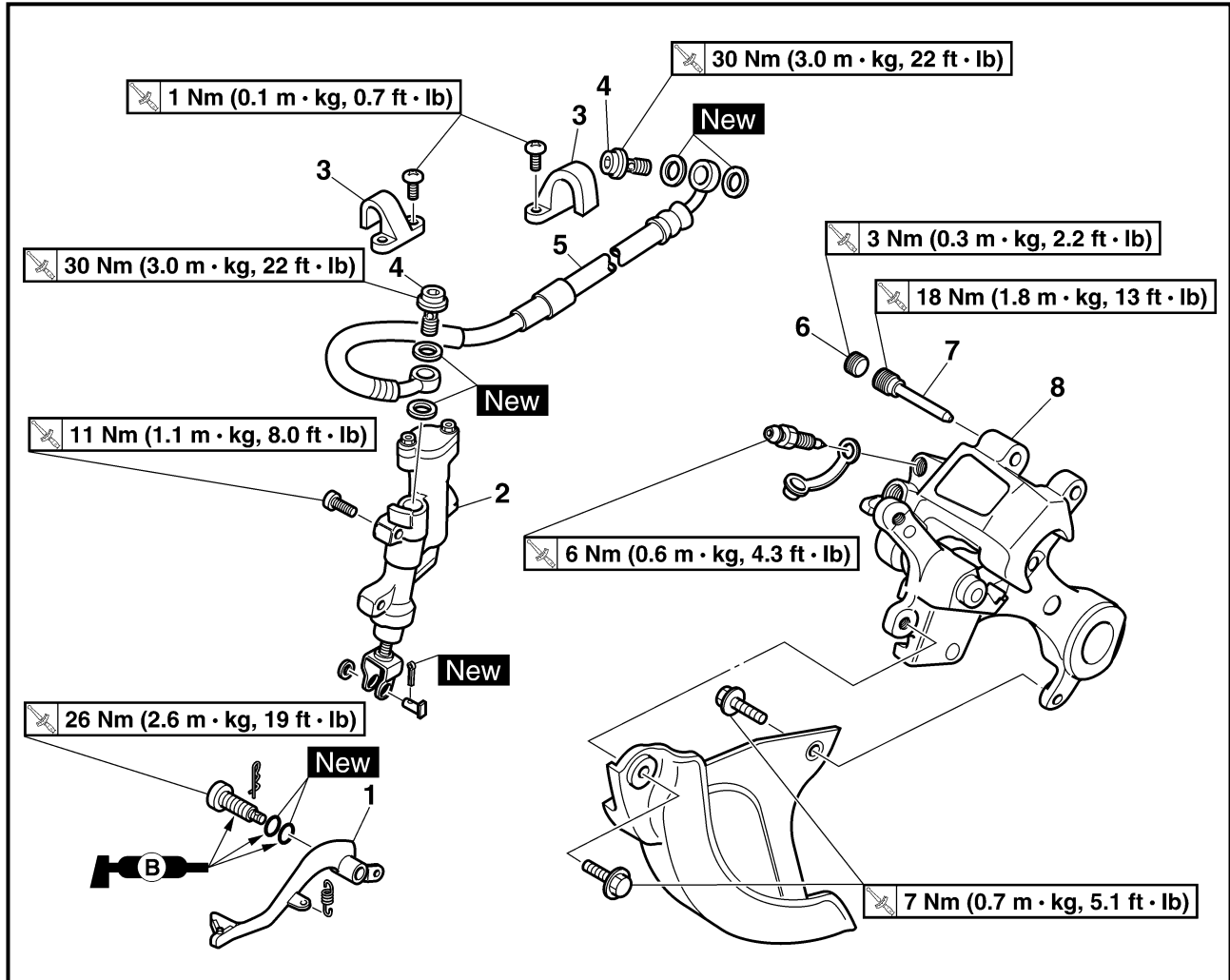
Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>FRONT BRAKE REMOVAL</b>		<b>⚠ WARNING</b> Support the machine securely so there is no danger of it falling over. <hr/> Refer to "REMOVAL POINTS".
		Hold the machine by placing the suitable stand under the engine. Drain the brake fluid.		
	1	Hose cover	1	Only loosening.  Remove when loosening the pad pin. Loosen when disassembling the 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	Caliper	1	
	9	Brake lever	1	
	10	Master cylinder bracket	1	
	11	Master cylinder	1	





EC5A8100

## REAR BRAKE



Extent of removal:

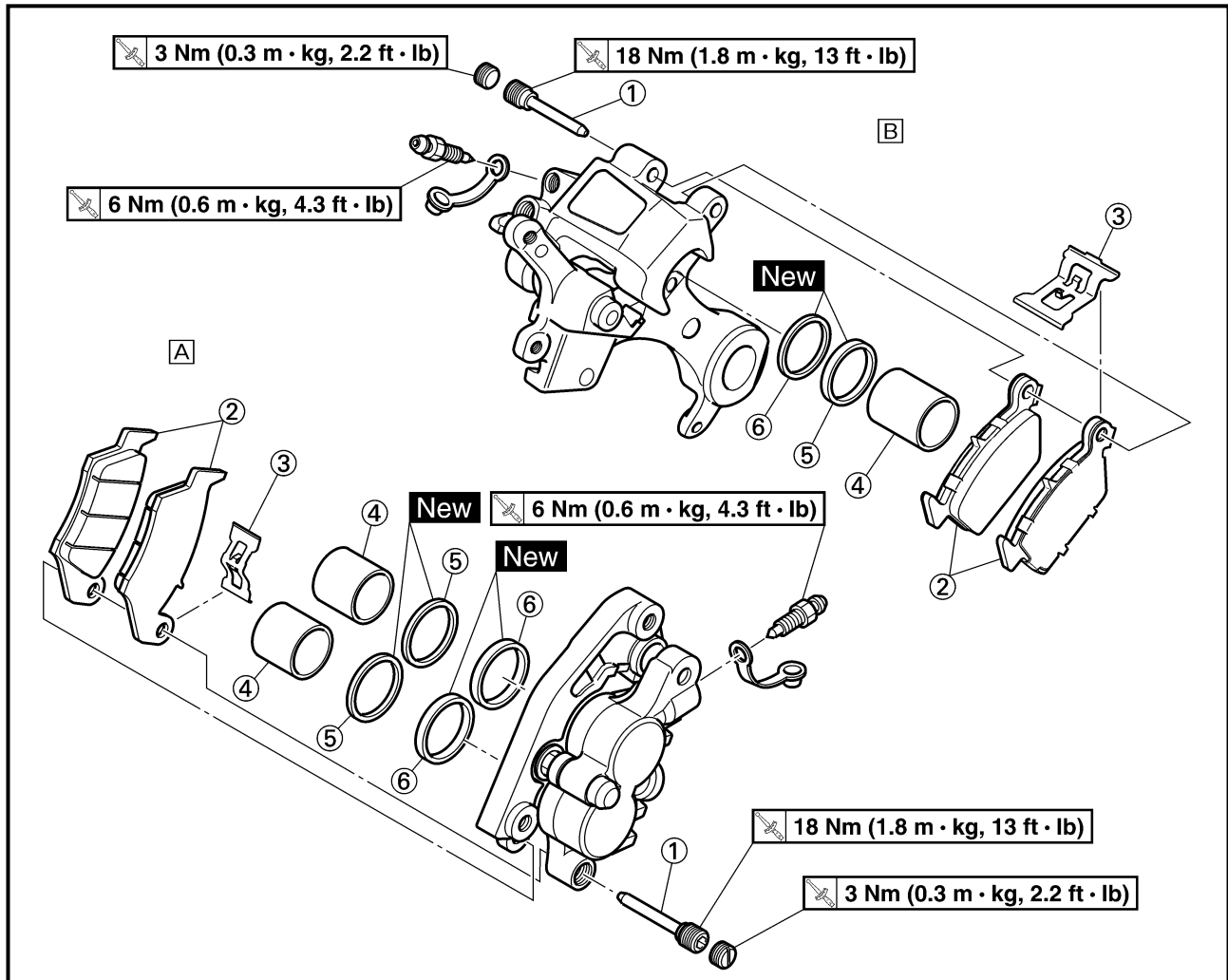
- ① Master cylinder removal
- ③ Caliper removal

- ② Brake hose 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	1	Brake pedal	1	
① ↓	2	Master cylinder	1	
① ↓      ② ↓	3	Brake hose holder	2	
① ↓      ② ↓      ③ ↓	4	Union bolt	2	
① ↓      ② ↓	5	Brake hose	1	
① ↓      ② ↓      ③ ↓	6	Pad pin plug	1	Remove when loosening the pad pin.
① ↓      ② ↓      ③ ↓	7	Pad pin	1	Loosen when disassembling the caliper.
① ↓      ② ↓      ③ ↓	8	Caliper	1	

EC5A8200

## CALIPER DISASSEMBLY



**A** Front

**B** Rear

Extent of removal:

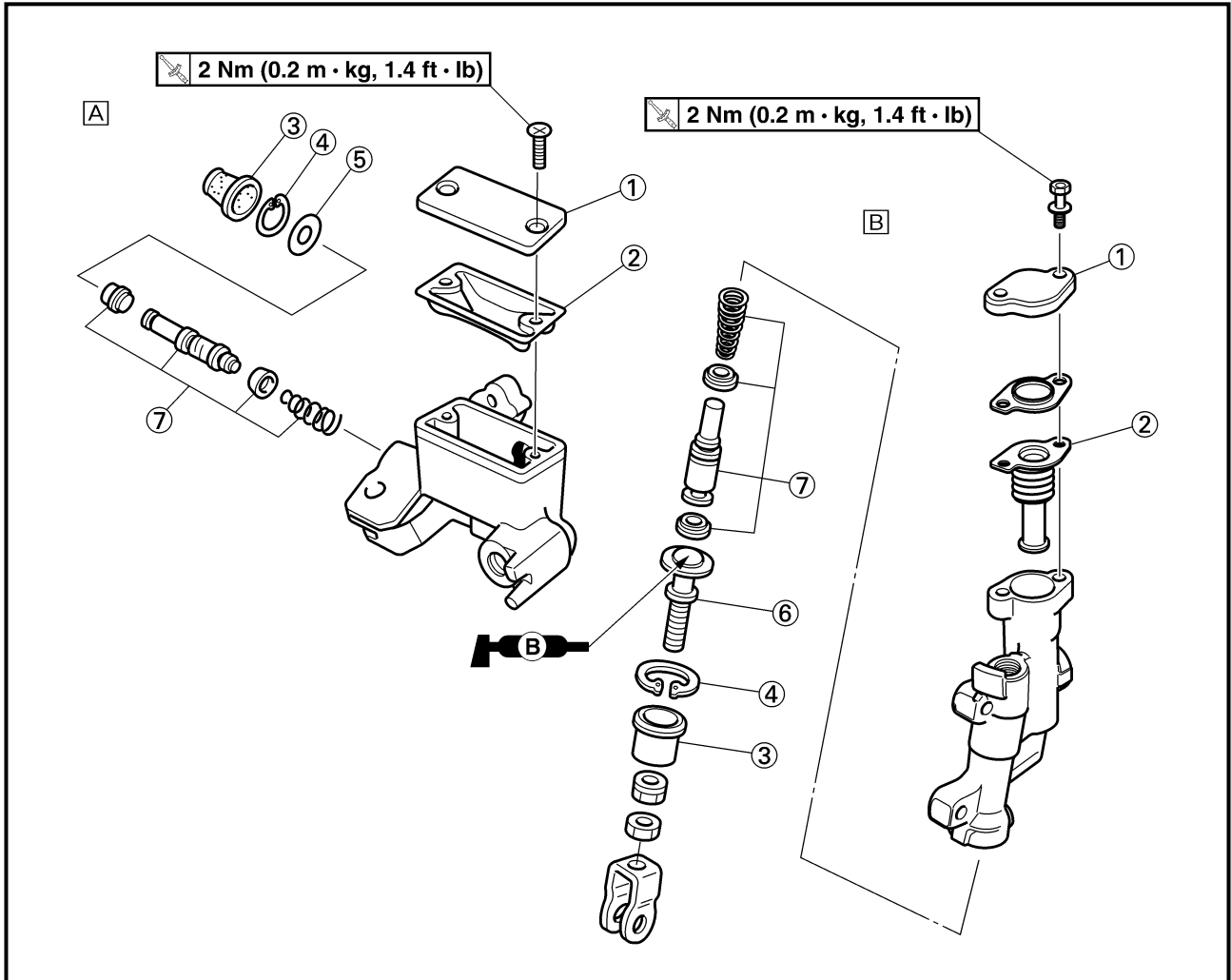
① Front caliper disassembly

② Rear 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>CALIPER DISASSEMBLY</b>				
	①	Pad pin	1	1	} Refer to "REMOVAL POINTS".
	②	Brake pad	2	2	
	③	Pad support	1	1	
	④	Caliper piston	2	1	
	⑤	Dust seal	2	1	
⑥	Piston seal	2	1		

EC5A8300

## MASTER CYLINDER DISASSEMBLY



**A** Front

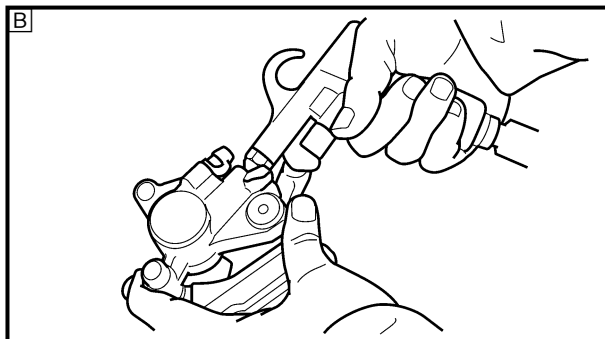
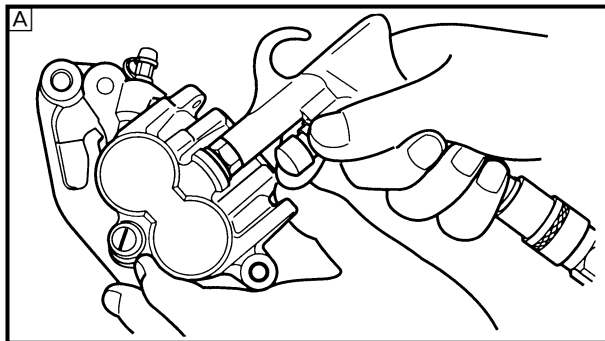
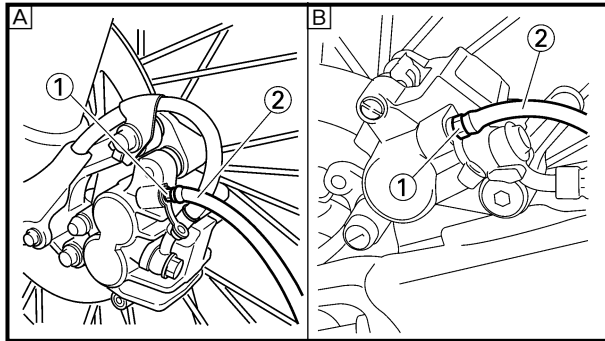
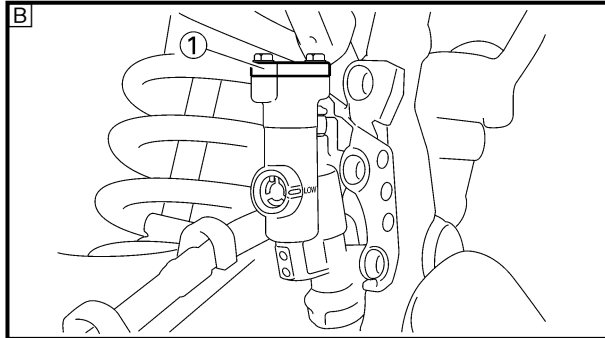
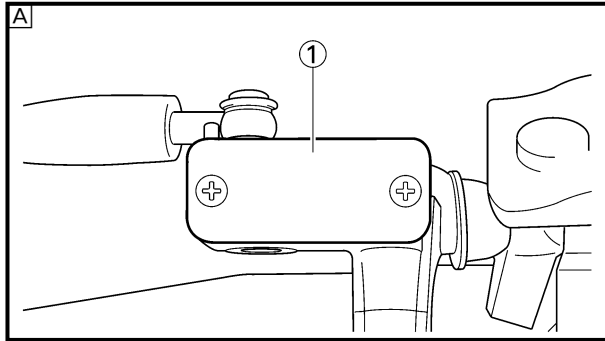
**B** Rear

Extent of removal:

① Front master cylinder disassembly

② Rear master cylinder disassembly

Extent of removal	Order	Part name	Q'ty	Remarks
<b>MASTER CYLINDER DISASSEMBLY</b>				
↑	①	Master cylinder cap	1	Use a long nose circlip pliers.
↑	②	Diaphragm	1	
↑	③	Master cylinder boot	1	
↑	④	Circlip	1	
↑	⑤	Plain washer	1	
↑	⑥	Push rod	1	
↑	⑦	Master cylinder kit	1	



EC5A3000

## REMOVAL POINTS

### Brake fluid

- Remove:
  - [Front]
    - Master cylinder cap ①
  - [Rear]
    - 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.

EC533301

## Caliper piston

- Remove:
  - Caliper piston  
Use compressed air and proceed carefully.

### ⚠ WARNING

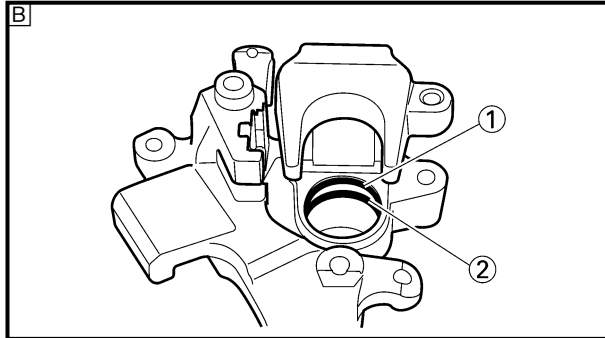
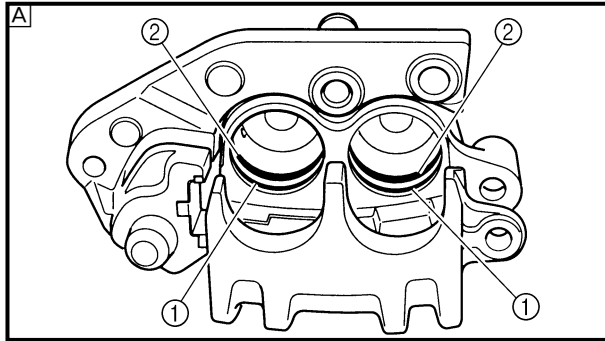
- Cover piston with rag and use extreme caution when expelling piston from cylinder.
- Never attempt to pry out piston.

### Caliper piston removal steps:

- Insert a piece of rag into the caliper to lock one caliper.
- Carefully force the piston out of the caliper cylinder with compressed air.

Ⓐ Front

Ⓑ Rear



EC533402

### Piston seal kit

- Remove:
  - Dust seal ①
  - Piston seal ②

### NOTE:

Remove the piston seals and dust seals by pushing them with a finger.

### CAUTION:

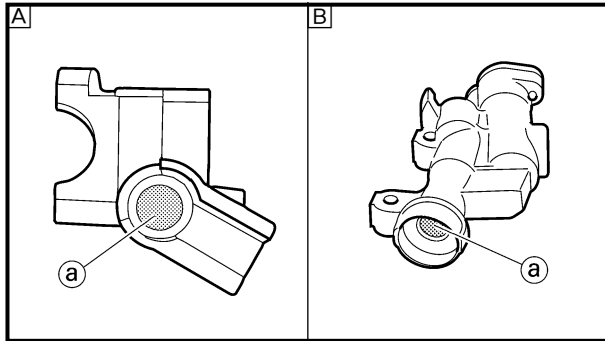
Never attempt to pry out piston seals and dust seals.

### ⚠ WARNING

Replace the piston seals and dust seals whenever a caliper is disassembled.

Ⓐ Front

Ⓑ Rear



EC5A4000

### INSPECTION

EC534112

### Master cylinder

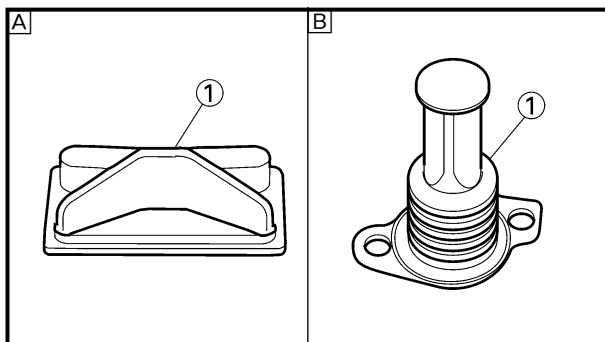
- Inspect:
  - Master cylinder inner surface ②  
Wear/scratches → Replace master cylinder assembly.  
Stains → Clean.

### ⚠ WARNING

Use only new brake fluid.

Ⓐ Front

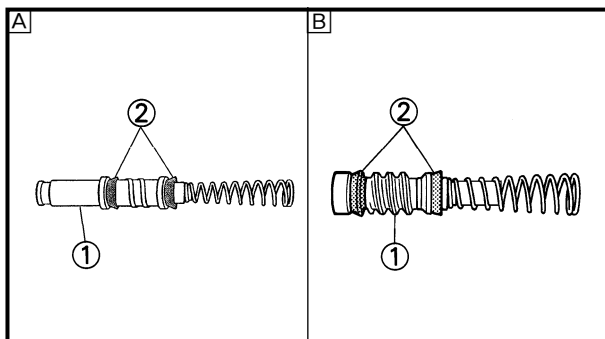
Ⓑ Rear



- Inspect:
  - Diaphragm ①  
Crack/damage → Replace.

Ⓐ Front

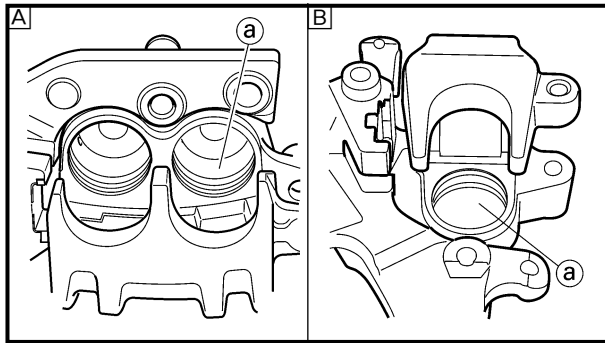
Ⓑ Rear



- Inspect:
  - Master cylinder piston ①
  - Master cylinder cup ②  
Wear/damage/score marks → Replace master cylinder kit.

Ⓐ Front

Ⓑ Rear



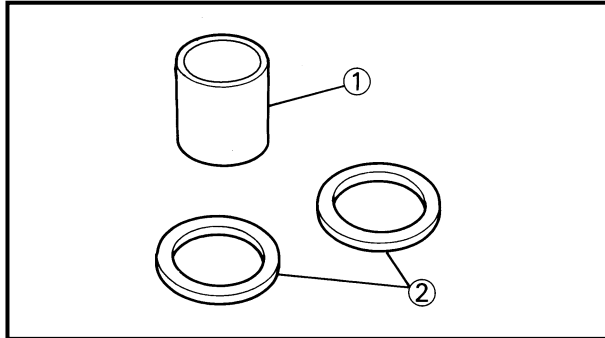
EC534214

## Caliper

1. Inspect:
  - Caliper cylinder inner surface ①
  - Wear/score marks → Replace caliper assembly.

**A** Front

**B** Rear

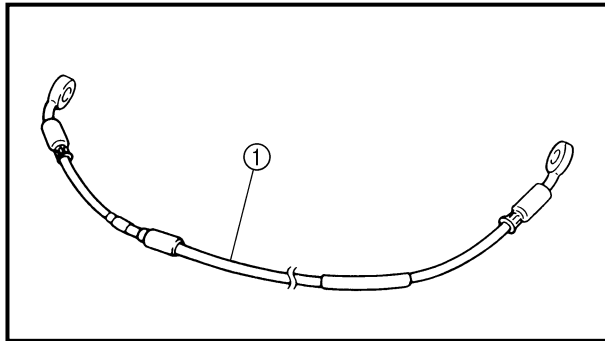


2. Inspect:

- Caliper piston ①
- Wear/score marks → Replace 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**

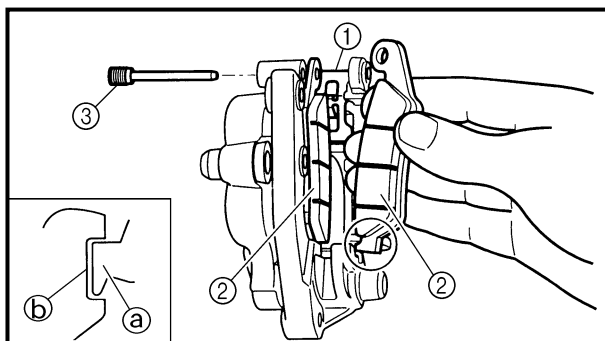
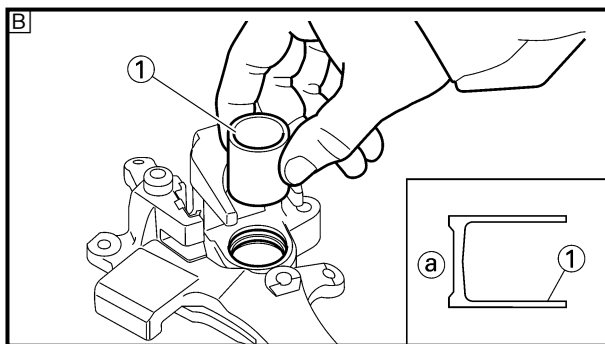
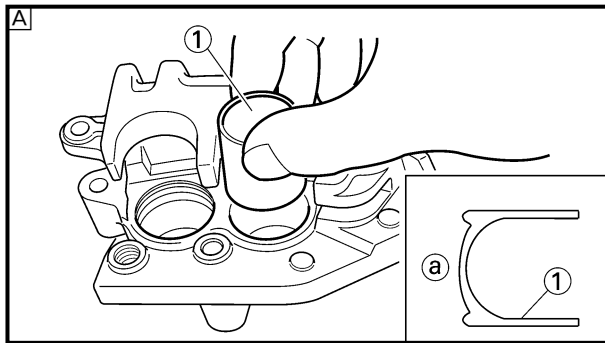
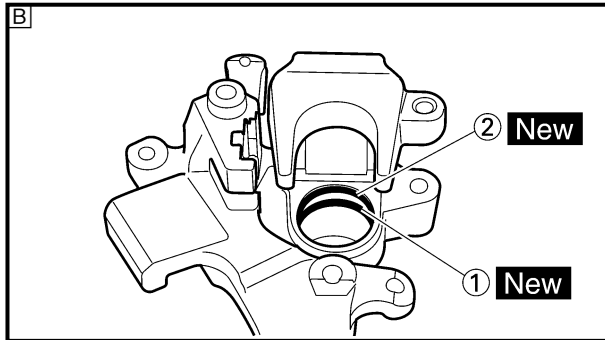
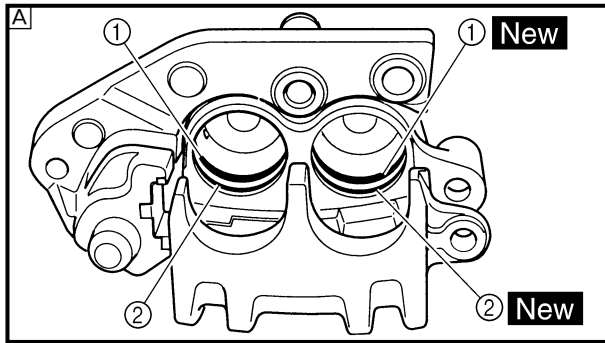
- All internal parts should be cleaned in new brake fluid only.
- Internal parts should be lubricated with brake fluid when installed.
- Replace the piston seals and dust seals whenever a caliper is disassembled.

EC5A5800

## Caliper piston

1. Clean:
  - Caliper
  - Piston seal
  - Dust seal
  - 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 caliper correctly.

- Ⓐ Front
- Ⓑ Rear

3. Install:
  - Caliper piston ①

**NOTE:**

Apply the brake fluid on the piston wall.

**CAUTION:**

- Install the piston with its shallow depressed side ① facing the caliper.
- Never force to insert.

- Ⓐ Front
- Ⓑ Rear

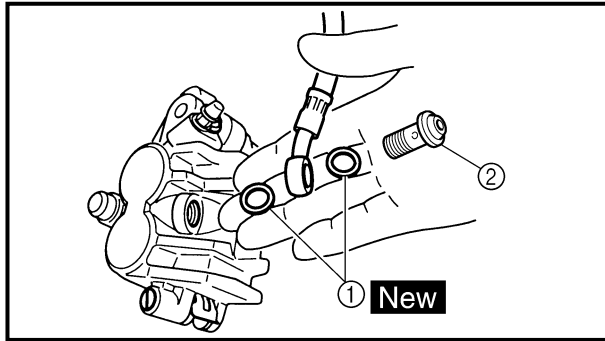
EC5A5700

### Front caliper

1. Install:
  - Pad support ①
  - Brake pad ②
  - Pad pin ③

**NOTE:**

- Install the brake pads with their projections ① into the caliper recesses ②.
- Temporarily tighten the pad pin at this point.



2. Install:

- Copper washer ① **New**
- Union bolt ②

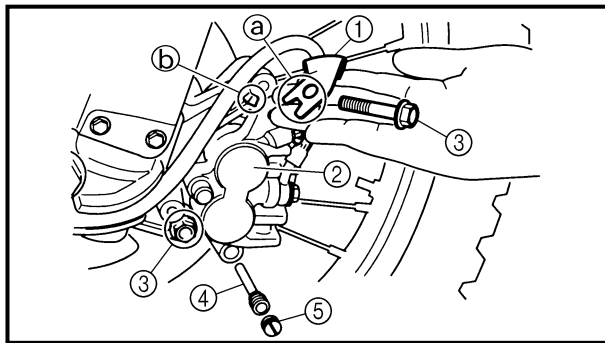
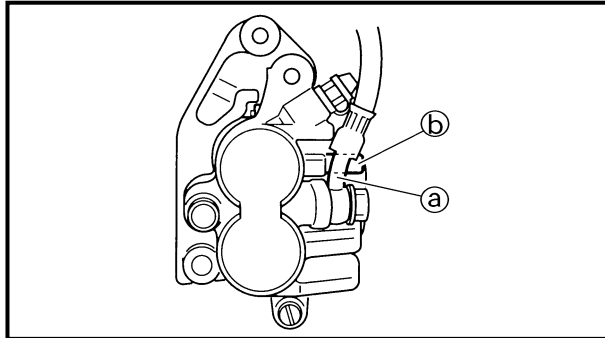
**30 Nm (3.0 m · kg, 22 ft · lb)**

### **⚠ 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 caliper.**



3. Install:

- Brake hose holder ①
- Caliper ②
- Bolt (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:

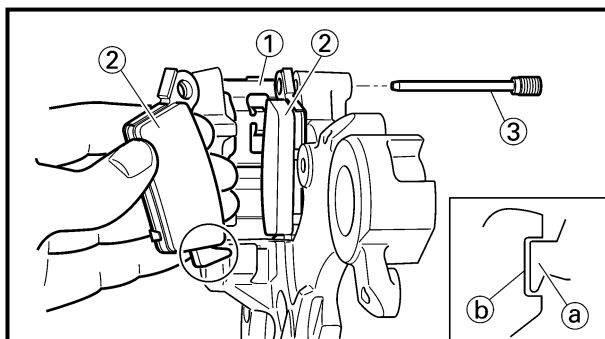
- Pad pin ④

**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)**



EC5A5100

### **Rear caliper**

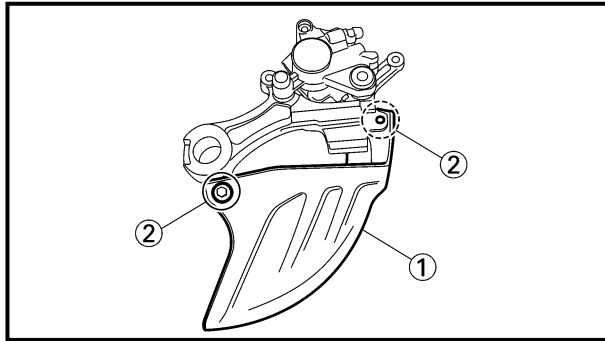
1. Install:

- Pad support ①
- Brake pad ②
- Pad pin ③

### **NOTE:**

- Install the brake pads with their projections ① into the caliper recesses ②.
- Temporarily tighten the pad pin at this point.

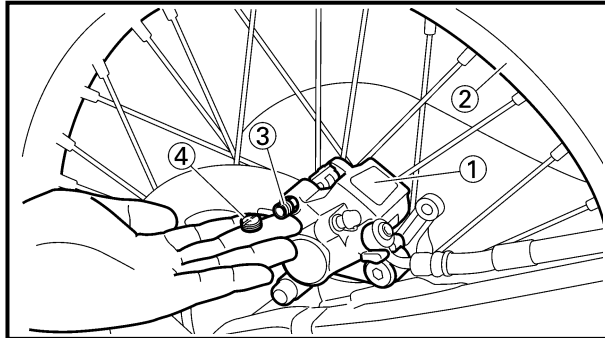




2. Install:

- Disc cover ①
- Bolt (disc cover) ②

7 Nm (0.7 m · kg, 5.1 ft · lb)



3. Install:

- 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)

## Master cylinder kit

1. Clean:

- Master cylinder
  - Master cylinder kit
- Clean them with brake fluid.

2. Install:

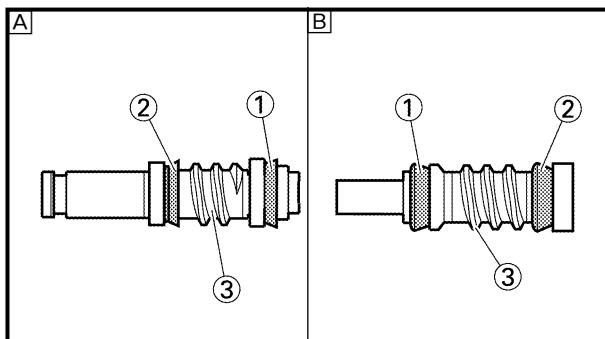
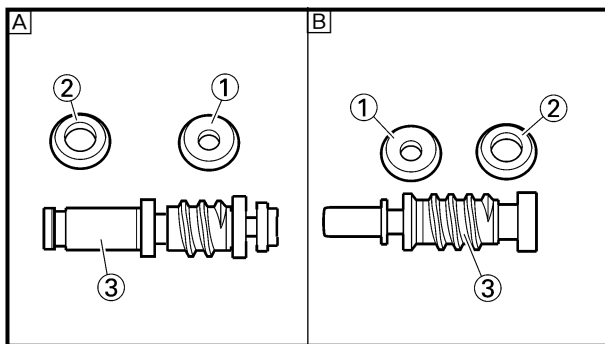
- Master cylinder cup (primary) ①
  - Master cylinder cup (secondary) ②
- To master cylinder piston ③.

### NOTE:

Apply the brake fluid on the master cylinder cup.

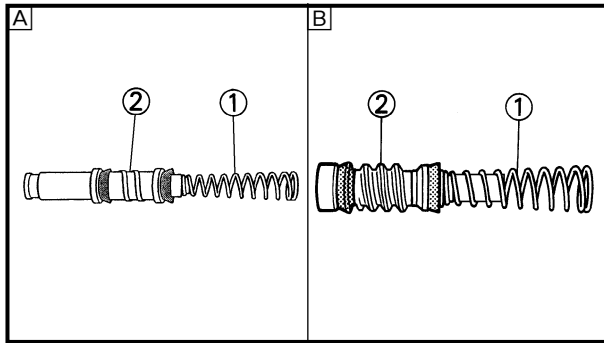
### ⚠ WARNING

After installing, cylinder cup should be installed as shown direction. Wrong installation cause improper brake performance.



**A** Front

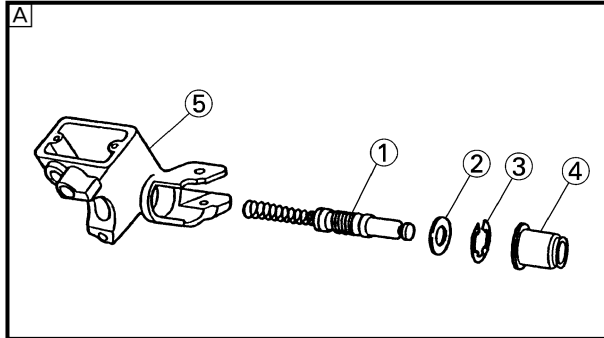
**B** Rear



3. Install:
  - Spring ①
  - To master cylinder piston ②.

**NOTE:** \_\_\_\_\_  
Install the spring at the smaller dia. side.

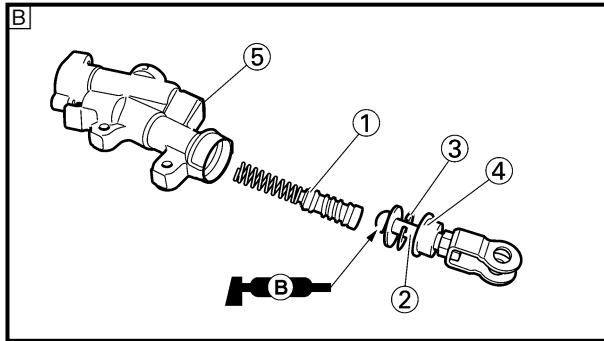
- Ⓐ Front
- Ⓑ Rear



4. Install:
  - [Front]
  - Master cylinder kit ①
  - Plain washer ②
  - Circlip ③
  - Master cylinder boot ④
  - To master cylinder ⑤.

[Rear]

- Master cylinder kit ①
- Push rod ②
- Circlip ③
- Master cylinder boot ④
- To master cylinder ⑤.



**NOTE:** \_\_\_\_\_  
• Apply the brake fluid on the 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.

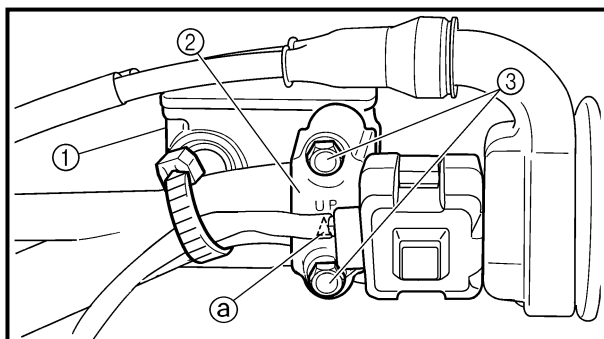
- Ⓐ Front
- Ⓑ Rear

EC5A5310

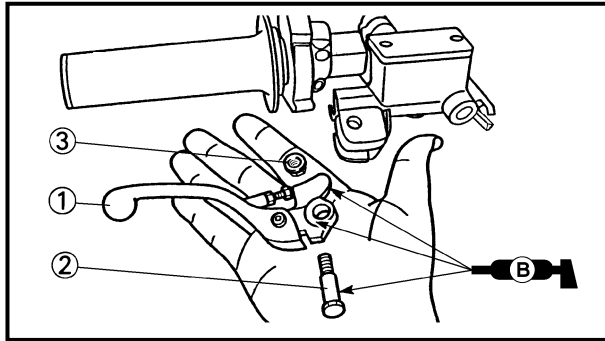
## Front master cylinder

1. Install:
  - Master cylinder ①
  - Master cylinder bracket ②
  - Bolt (master cylinder bracket) ③

**9 Nm (0.9 m · kg, 6.5 ft · lb)**



**NOTE:** \_\_\_\_\_  
• Install the bracket so that the arrow mark ① face upward.  
• First tighten the bolts on the upper side of the master cylinder bracket, and then tighten the bolts on the lower side.



2. Install:

- Brake lever ①
- Bolt (brake lever) ②

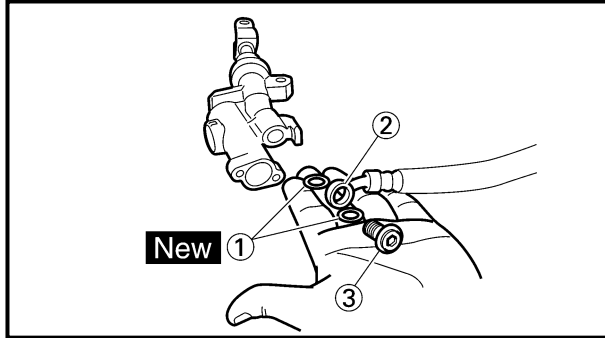
6 Nm (0.6 m · kg, 4.3 ft · lb)

- 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 master cylinder piston.



**Rear master cylinder**

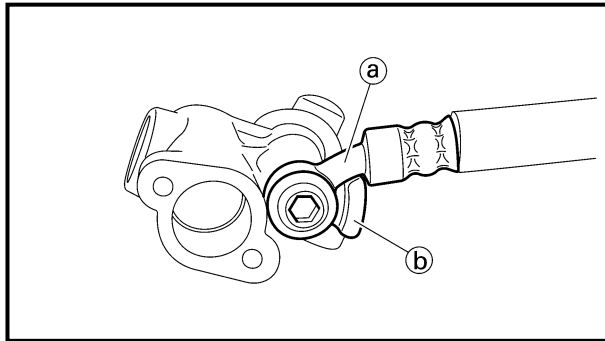
1. Install:

- Copper washer ① **New**
- Brake hose ②
- Union bolt ③

30 Nm (3.0 m · kg, 22 ft · lb)

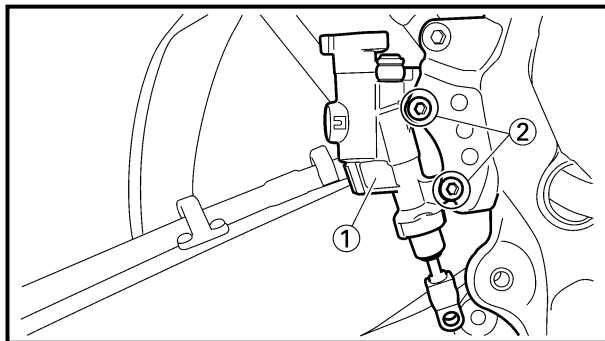
**⚠ WARNING**

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 master cylinder.



2. Install:

- Master cylinder ①
- Bolt (master cylinder) ②

11 Nm (1.1 m · kg, 8.0 ft · lb)

3. Install:

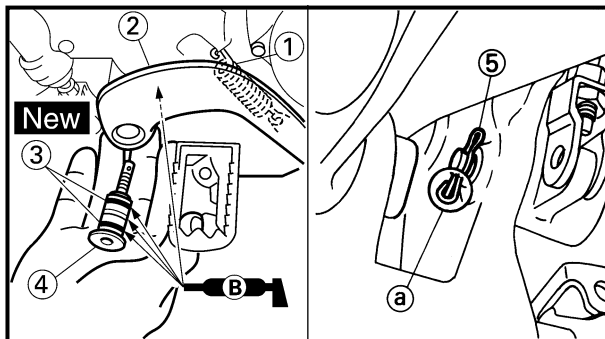
- Spring ①
- Brake pedal ②
- O-ring ③ **New**
- Bolt (brake pedal) ④

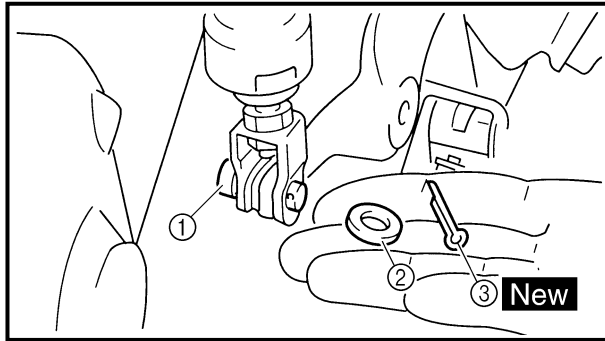
26 Nm (2.6 m · kg, 19 ft · lb)

- Clip ⑤

**NOTE:**

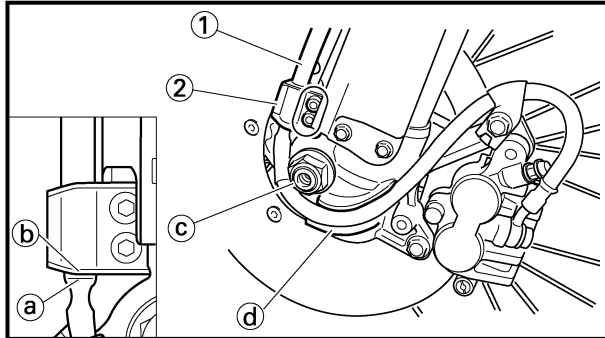
- Apply the lithium soap base grease on the bolt, O-ring and brake pedal bracket.
- Install the clip with its stopper portion ① facing inward.





4. Install:
  - Pin ①
  - Plain washer ②
  - Cotter pin ③ **New**

**NOTE:** \_\_\_\_\_  
 After installing, check the brake pedal height. Refer to “REAR BRAKE ADJUSTMENT” section in the CHAPTER 3.



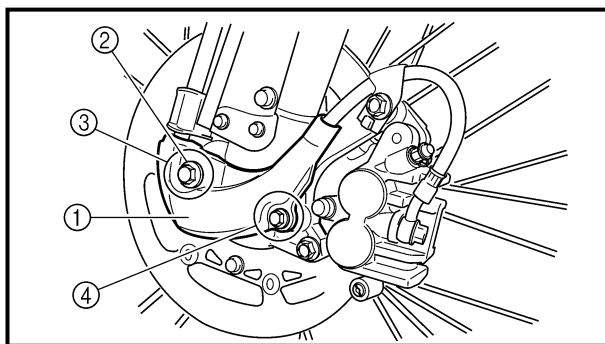
### Front brake hose

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).

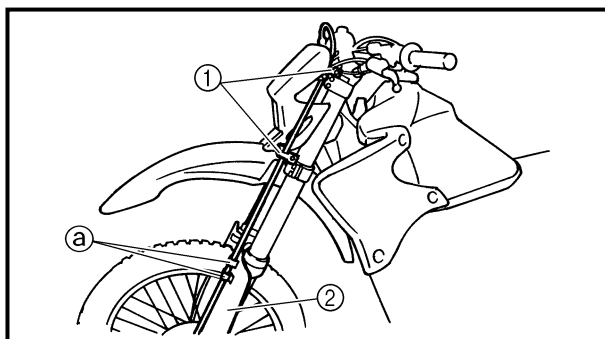


2. Install:
  - Hose cover ①
  - Plain washer ②
  - Bolt [hose cover (M8)] ③

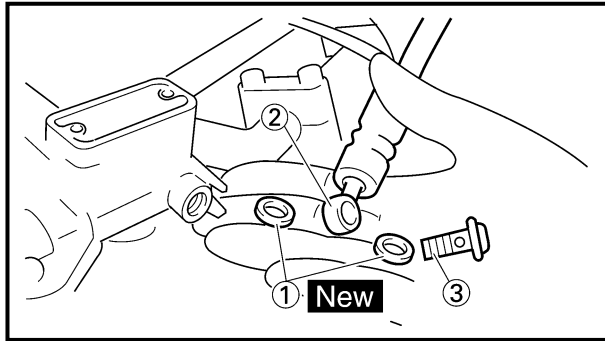
**16 Nm (1.6 m · kg, 11 ft · lb)**

  - Bolt [hose cover (M6)] ④

**7 Nm (0.7 m · kg, 5.1 ft · lb)**



3. Pass the brake hose through the hose guide ①, then through the guide ② on the protector ③.



4. Install:

- Copper washer ① **New**
- Brake hose ②
- Union bolt ③

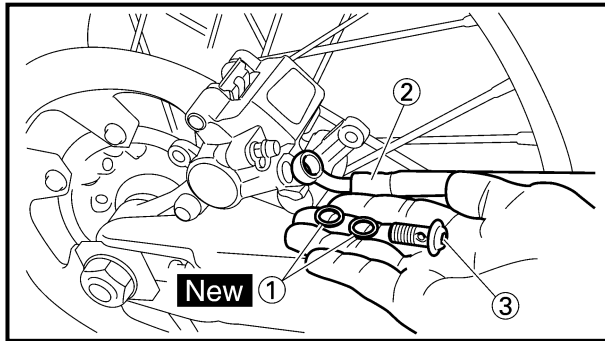
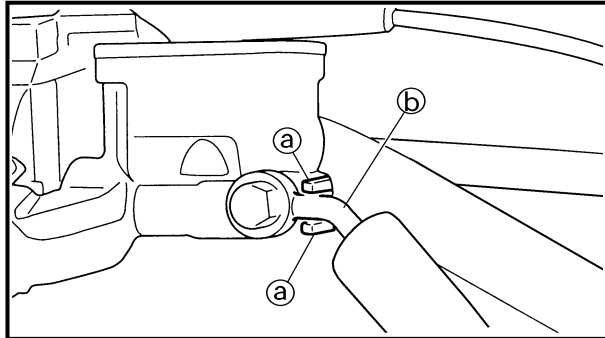
30 Nm (3.0 m · kg, 22 ft · lb)

**⚠ WARNING**

Always use new copper washers.

**CAUTION:**

Install the brake hose so that it contacts the 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

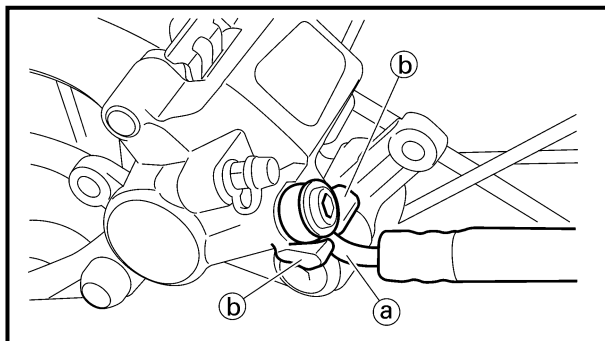
30 Nm (3.0 m · kg, 22 ft · lb)

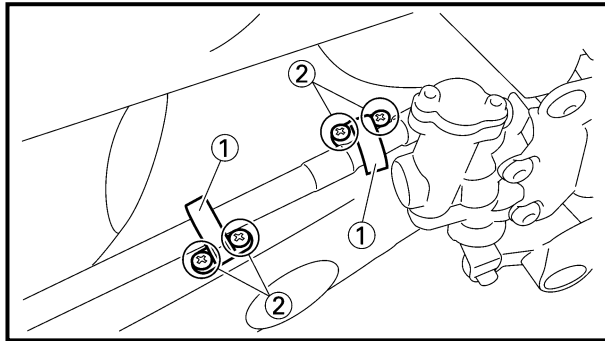
**⚠ WARNING**

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 caliper.





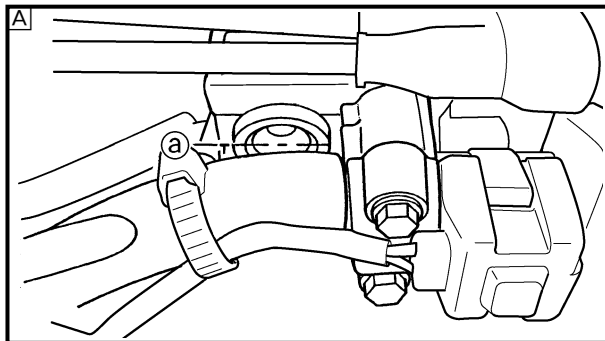
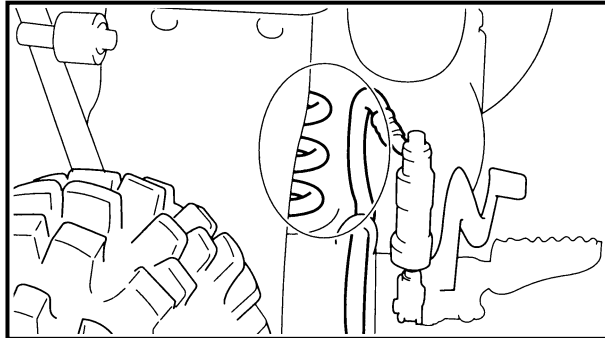
2. Install:

- 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.



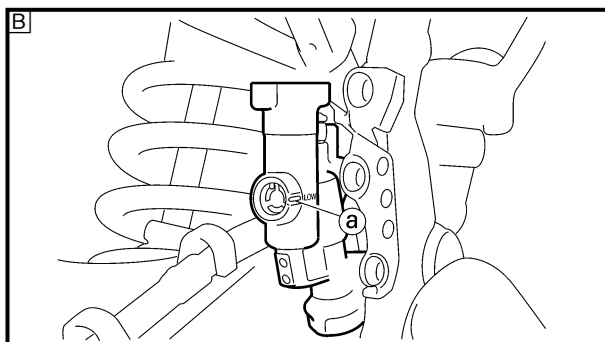
**Brake fluid**

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:**

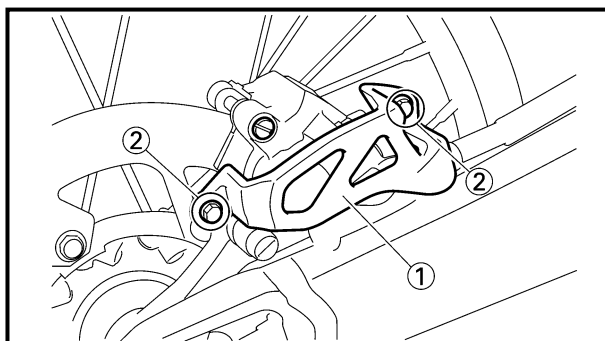
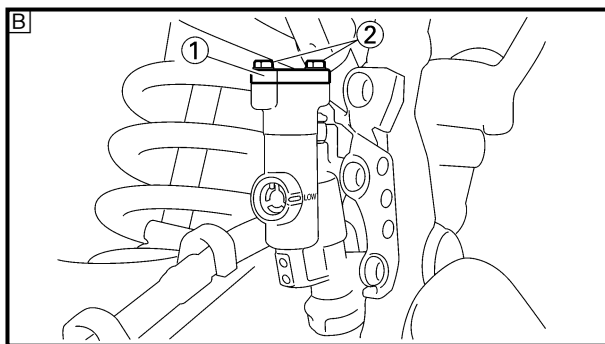
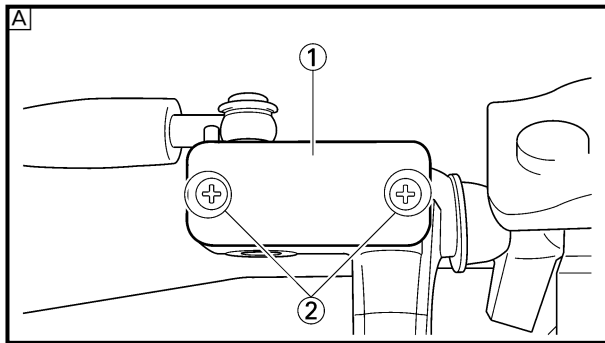
Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

- Ⓐ 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]
      - Diaphragm
      - Master cylinder cap ①
      - Screw (master cylinder cap) ②
- 2 Nm (0.2 m · kg, 1.4 ft · lb)**
- [Rear]
    - Diaphragm
    - Master cylinder cap ①
    - Bolt (master cylinder cap) ②
- 2 Nm (0.2 m · kg, 1.4 ft · lb)**

**CAUTION:**

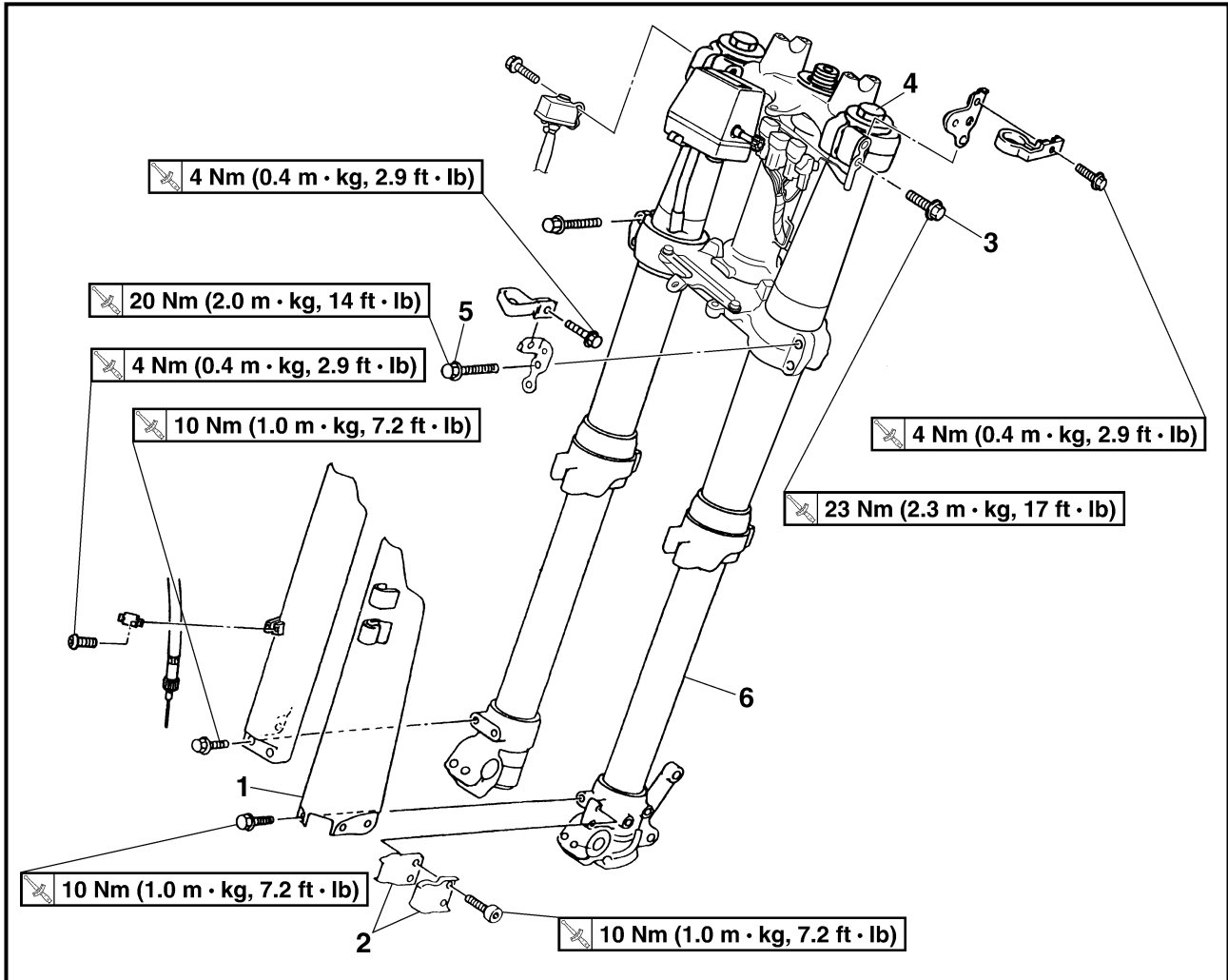
After installation, while pulling the lever in or pushing down on the pedal, check whether there is any brake fluid leaking where the union bolts are installed respectively at the master cylinder and caliper.

- Ⓐ Front
- Ⓑ Rear


5. Install: (rear brake only)
    - Protector ①
    - Bolt (protector) ②
- 7 Nm (0.7 m · kg, 5.1 ft · lb)**

EC550000

FRONT FORK



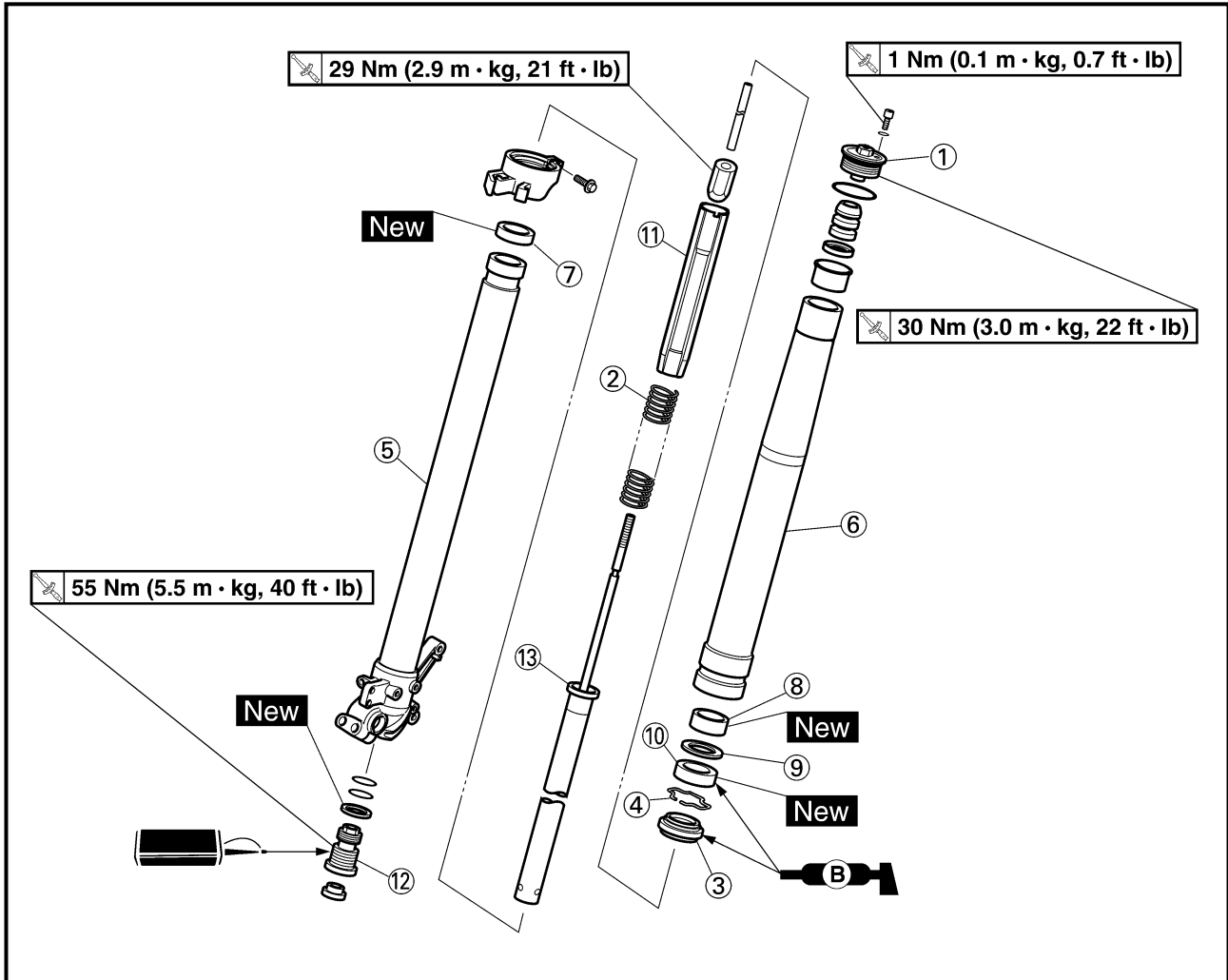
Extent of removal: ① Front fork removal

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 caliper		Refer to "FRONT BRAKE AND REAR BRAKE" section.
		Headlight		
		Handlebar		Refer to "HANDLEBAR" section.
	1	Protector	1	
	2	Brake hose holder	2	
	3	Pinch bolt (handle crown)	2	Only loosening.
	4	Cap bolt	1	Loosen when disassembling the front fork.
	5	Pinch bolt (under 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>					
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>↑</p> <p>①</p> <p>↓</p> </div> <div style="text-align: center;"> <p>↑</p> <p>②</p> <p>↓</p> </div> </div>	①	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	Plain 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.

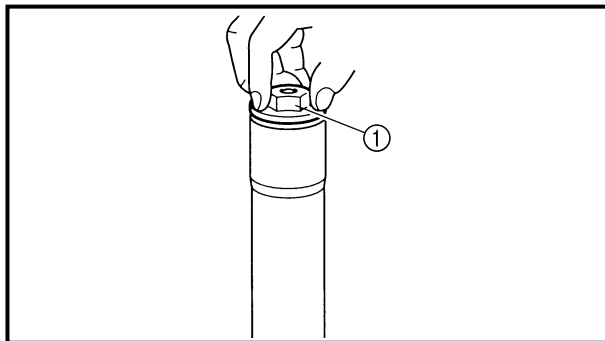
**CAUTION:**

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**

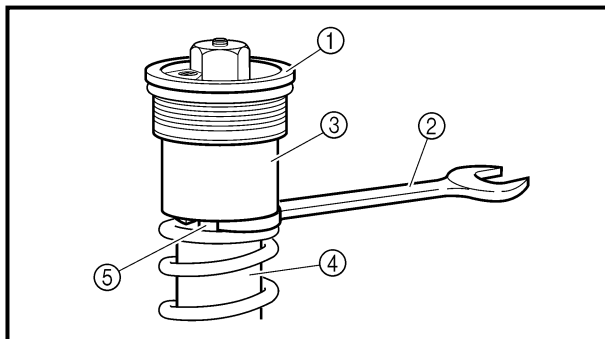
EC553150

**Cap bolt**

1. Remove:
  - Cap bolt ①  
From the outer tube.

**NOTE:**

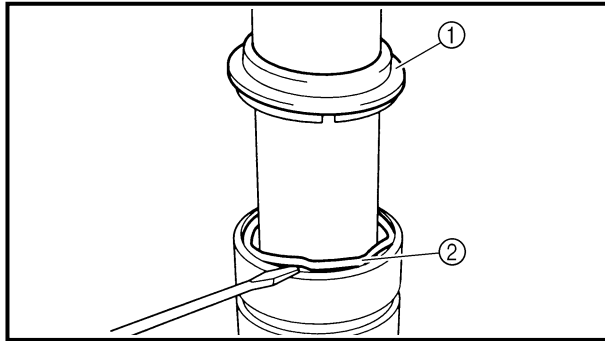
Before removing the front fork from the machine, loosen the cap bolt.



2. Remove:
  - 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 cap bolt.



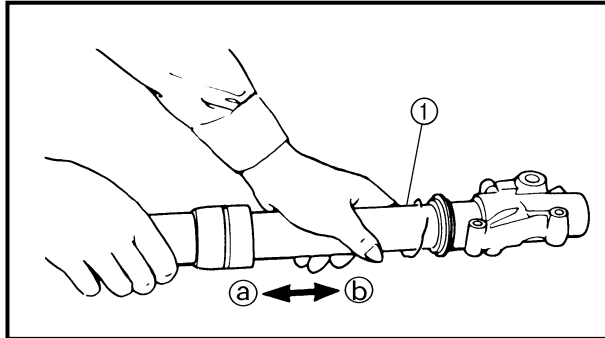
EC553201

**Inner tube**

- Remove:
  - Dust seal ①
  - Stopper ring ②
 Using slotted-head screwdriver.

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

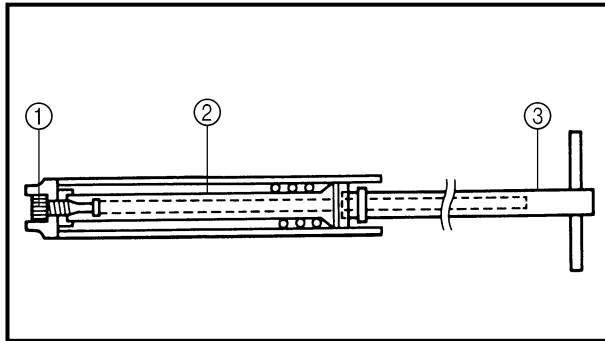
**Take care not to scratch the inner tube.**



- 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**

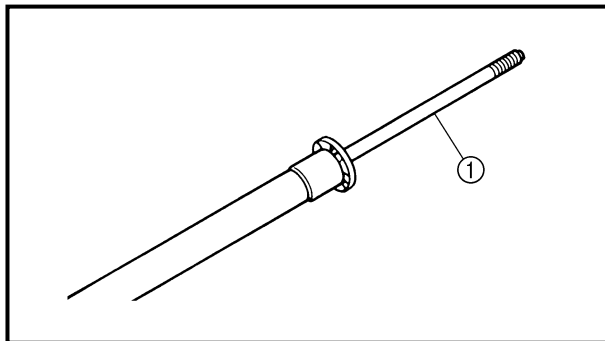
- Remove:
  - Base valve ①
  - Damper rod ②

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

Use a damper rod holder ③ to lock the damper rod.



**Damper rod holder:**  
YM-1423/90890-01423



EC554000

**INSPECTION**

EC554100

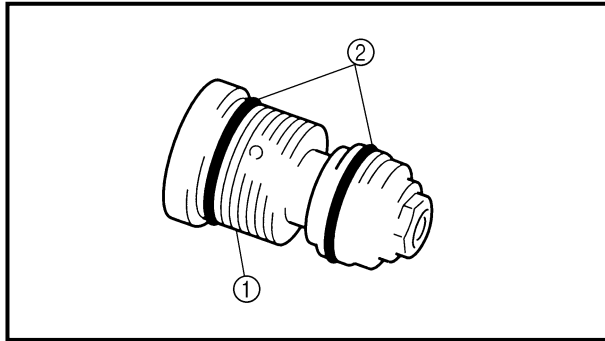
**Damper rod**

- 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.**

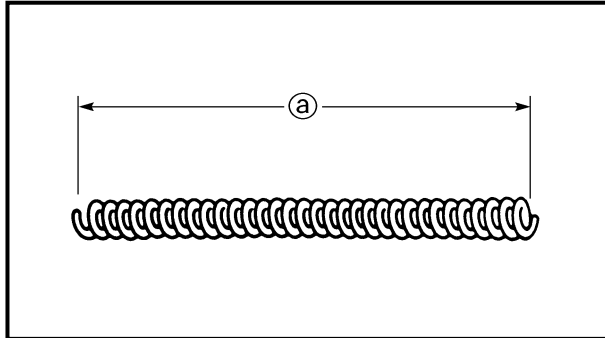
**Use enough care not to allow any foreign material to come in when the oil is replaced or when the front fork is disassembled and reassembled.**



EC554200

**Base valve**

1. Inspect:
  - Valve assembly ①  
Wear/damage → Replace.
  - O-ring ②  
Damage → Replace.

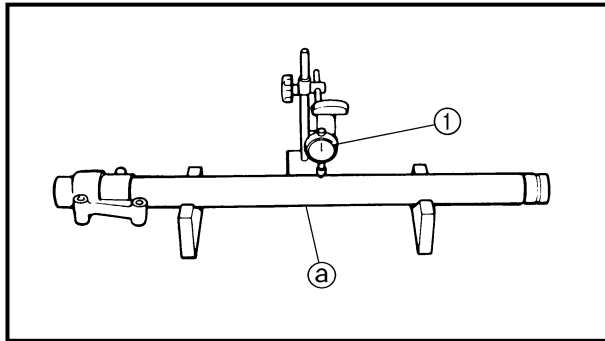


EC554400

**Fork spring**

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

<b>Fork spring free length:</b>	
<b>Standard</b>	<b>Limit</b>
<b>460 mm (18.1 in)</b>	<b>455 mm (17.9 in)</b>



EC554502

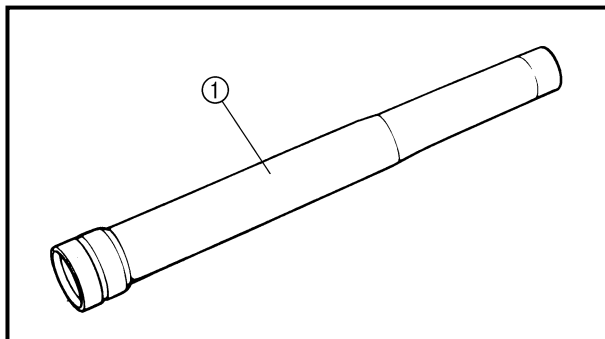
**Inner tube**

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.

<b>Inner tube bending limit:</b> <b>0.2 mm (0.008 in)</b>
--

**NOTE:** \_\_\_\_\_  
The bending value is shown by one half of the dial gauge reading.

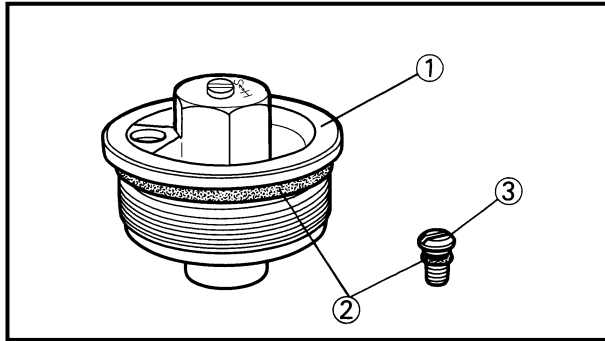
**⚠ WARNING** \_\_\_\_\_  
**Do not attempt to straighten a bent inner tube as this may dangerously weaken the tube.**



EC554600

**Outer tube**

1. Inspect:
  - Outer tube ①  
Score marks/wear/damage → Replace.



EC554700

**Cap bolt**

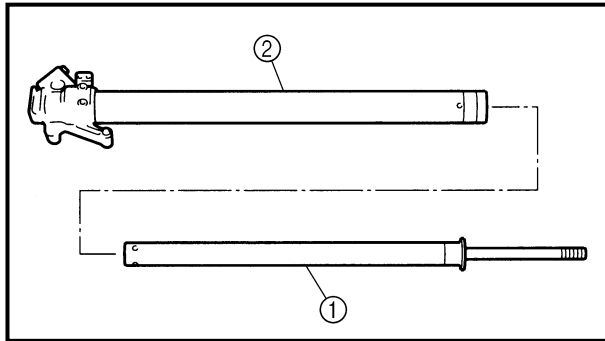
1. Inspect:
  - Cap bolt ①
  - O-ring ②
  - Air bleed screw ③
 Wear/damage → Replace.

EC555000

**ASSEMBLY AND INSTALLATION**

**Front fork assembly**

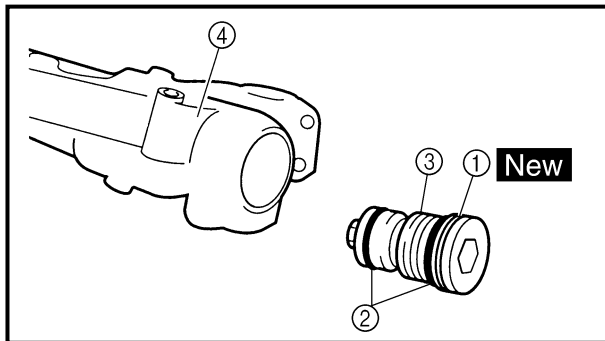
1. Wash the all parts in a clean solvent.



2. Install:
  - Damper rod ①
 To inner tube ②.

**CAUTION:**

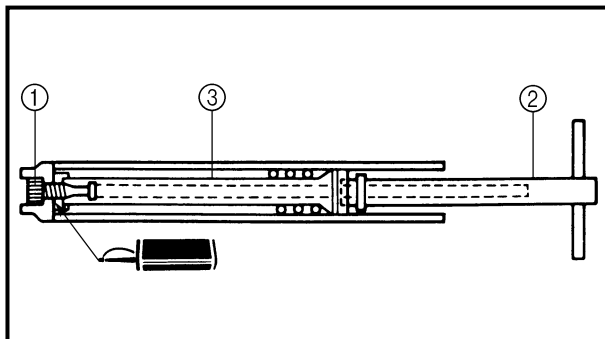
To install the damper rod into the inner tube, hold the inner tube aslant. If the inner tube is held vertically, the damper rod may fall into it, damaging the valve inside.



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)

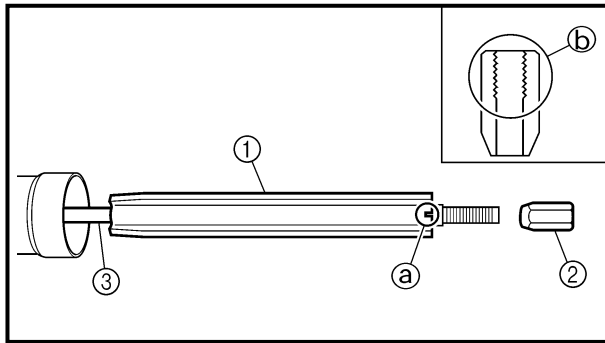


**NOTE:**

- Use a damper rod holder ② to lock the damper rod ③.
- Apply the LOCTITE® on the base valve thread.



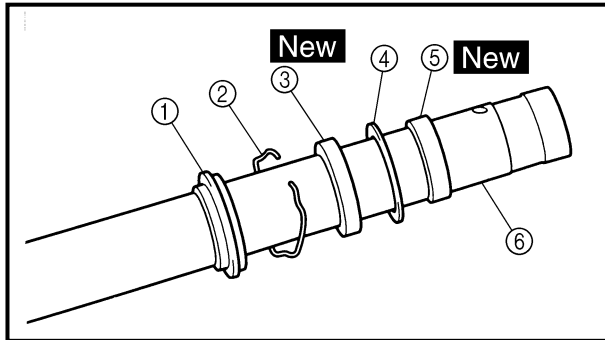
**Damper rod holder:**  
YM-1423/90890-01423



5. Install:
- Spring guide ①
  - Locknut ②
- To damper rod ③.

**NOTE:**

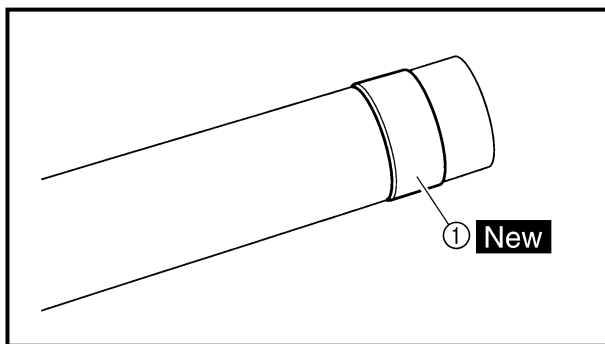
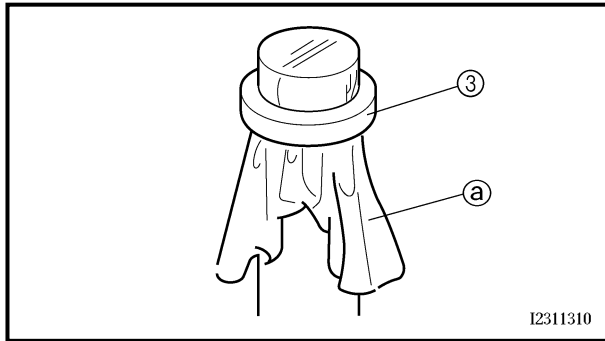
- Install the spring guide with its cut (a) facing upward.
- With its thread (b) facing upward, fully finger tighten the locknut onto the damper rod.



6. Install:
- Dust seal ①
  - Stopper ring ②
  - Oil seal ③ **New**
  - Plain washer ④
  - Slide metal ⑤ **New**
- To inner tube ⑥.

**NOTE:**

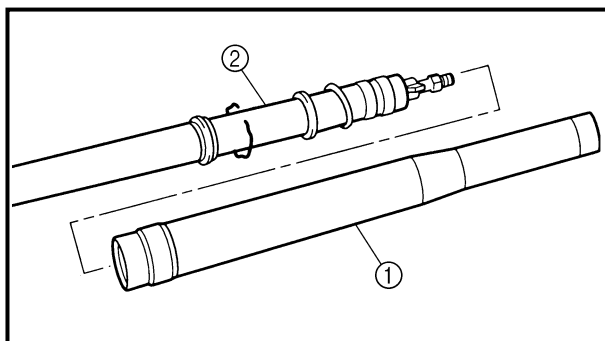
- Apply the fork oil on the inner tube.
- When installing the oil seal, use vinyl seat (a) with fork oil applied to protect the oil seal lip.
- Install the oil seal with its manufacturer's marks or number facing the axle holder side.



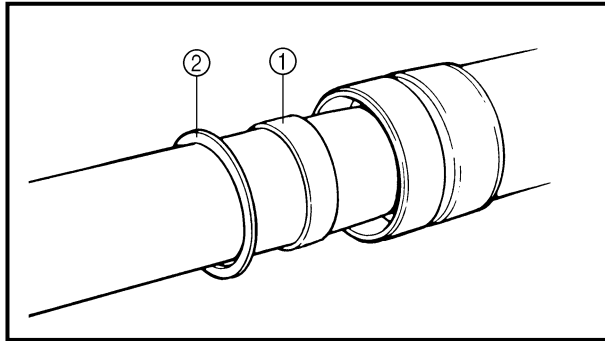
7. Install:
- Piston metal ① **New**

**NOTE:**

Install the piston metal onto the slot on inner tube.



8. Install:
- Outer tube ①
- To inner tube ②.

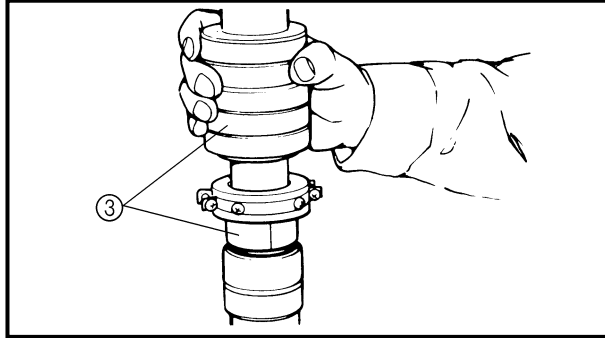


9. Install:
- Slide metal ①
  - Plain washer ②
- To outer tube slot.

**NOTE:** \_\_\_\_\_  
 Press the slide metal into the outer tube with fork seal driver ③.



**Fork seal driver:**  
 YM-01442/90890-01442

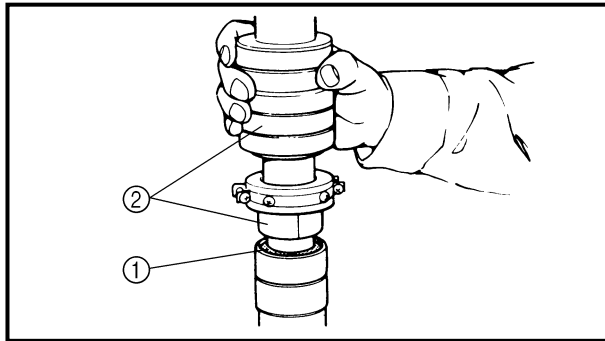


10. Install:
- Oil seal ①

**NOTE:** \_\_\_\_\_  
 Press the oil seal into the outer tube with fork seal driver ②.

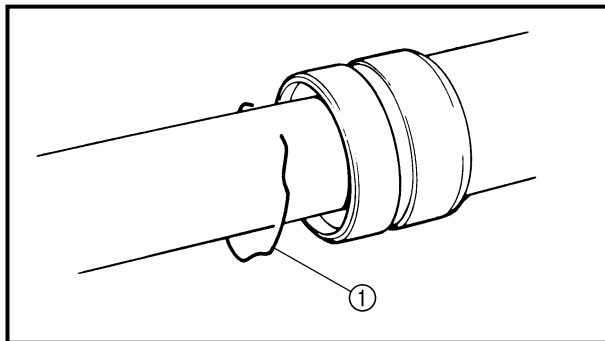


**Fork seal driver:**  
 YM-01442/90890-01442



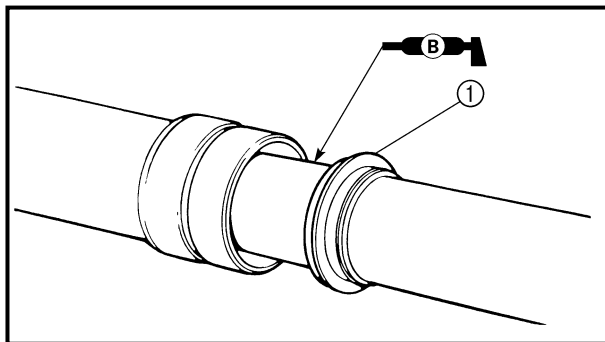
11. Install:
- Stopper ring ①

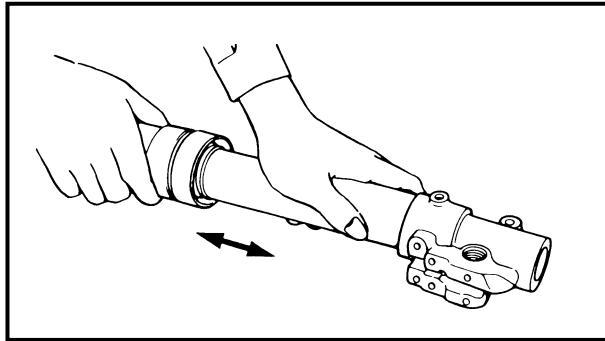
**NOTE:** \_\_\_\_\_  
 Fit the stopper ring correctly in the groove in the outer tube.



12. Install:
- Dust seal ①

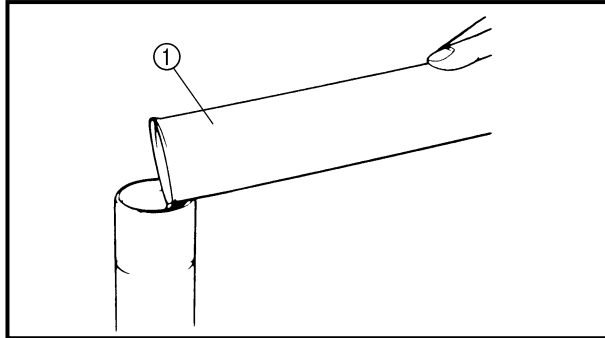
**NOTE:** \_\_\_\_\_  
 Apply the lithium soap base grease on the inner tube.





13. Check:

- Inner tube smooth movement
- Tightness/binding/rough spots →
- Repeat the steps 2 to 12.



14. Compress the front fork fully.

15. Fill:

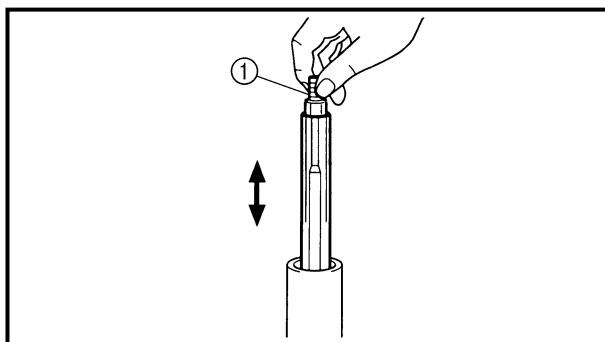
- Front fork oil
- Until outer tube top surface with recommended fork oil ①.



**Recommended oil:**  
Suspension oil "01"

**CAUTION:**

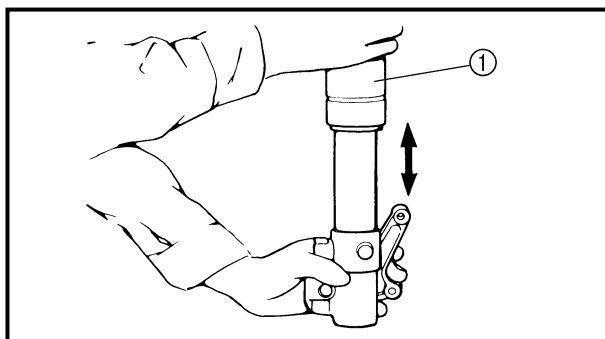
- Be sure to use recommended fork oil. If other oils are used, they may have an excessively adverse effect on the front fork performance.
- Never allow foreign materials to enter the front fork.



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.



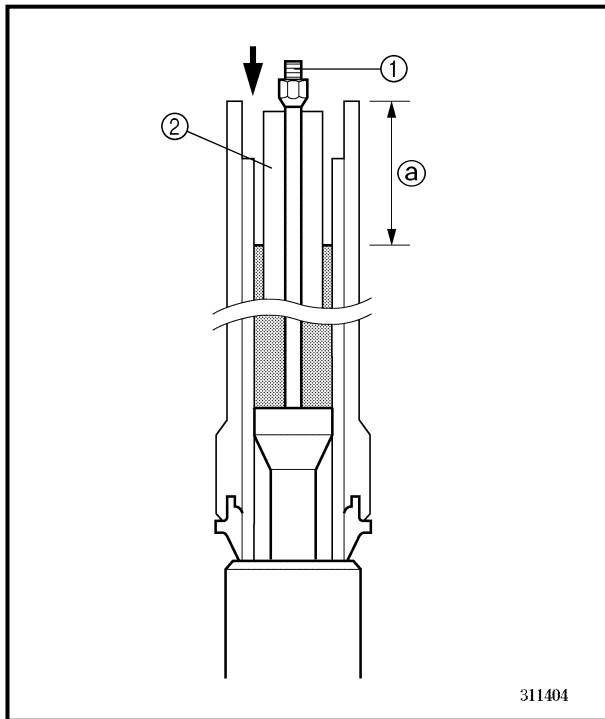


19. Wait ten minutes until the air bubbles have been removed from the front fork, and the oil has dispense evenly in system before setting recommended oil level.

**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.



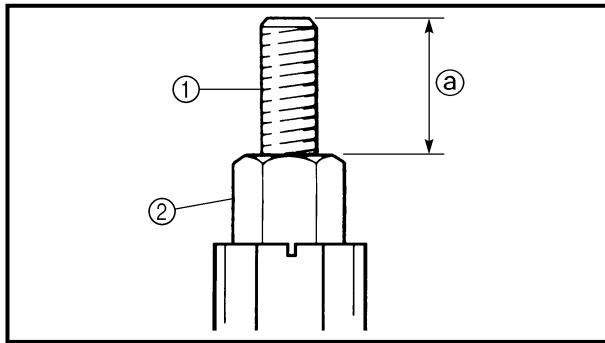
**Standard oil level:**  
130 mm (5.12 in)  
**Extent of adjustment:**  
80 ~ 150 mm (3.15 ~ 5.91 in)  
From top of outer tube with inner tube and damper rod (1) fully compressed without spring.

**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 ②

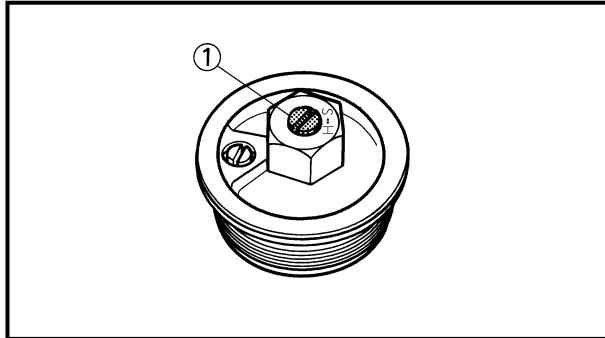
Out of specification → Turn into the locknut.



**Distance ②:**

**20 mm (0.79 in) or more**

**Between damper rod ① top and locknut ② top.**

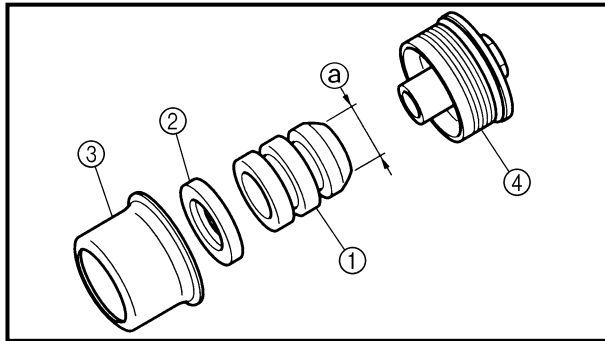


22. Loosen:

- 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).

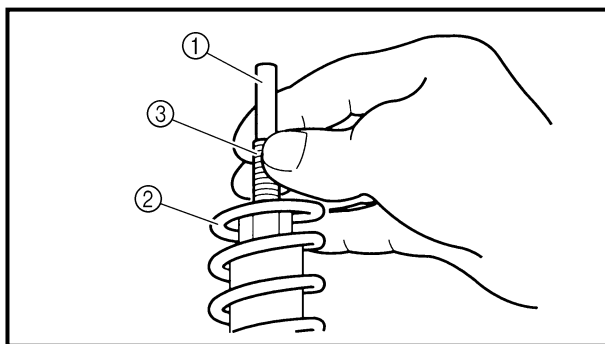


23. Install

- Cushion rubber ①
- Washer ②
- Spacer ③
- To cap bolt ④.

**NOTE:**

Install the cushion rubber with its smaller dia.end ② facing the cap bolt.

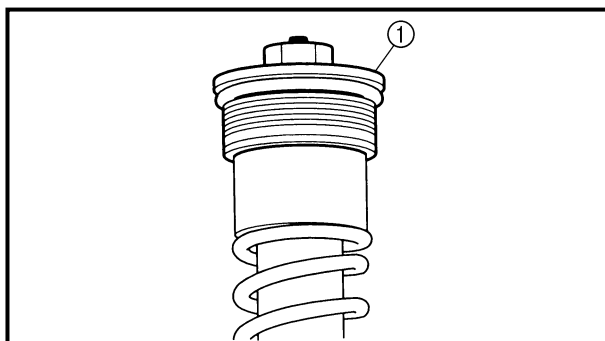


24. Install:

- Push rod ①
- Fork spring ②

**NOTE:**

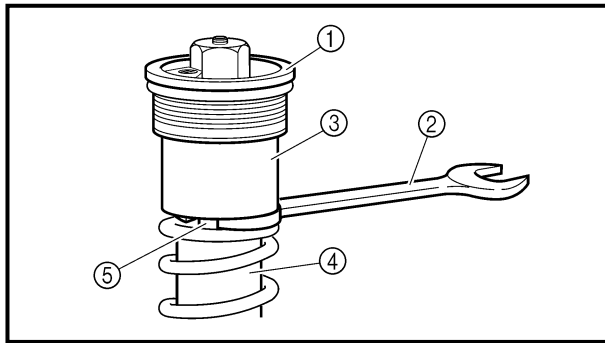
- Install the fork spring with the damper rod ③ pulled up.
- After installing the fork spring, hold the damper rod end so that it will not go down.



25. Install:

- Cap bolt ①

Fully tighten the cap bolt onto the damper rod by hand.



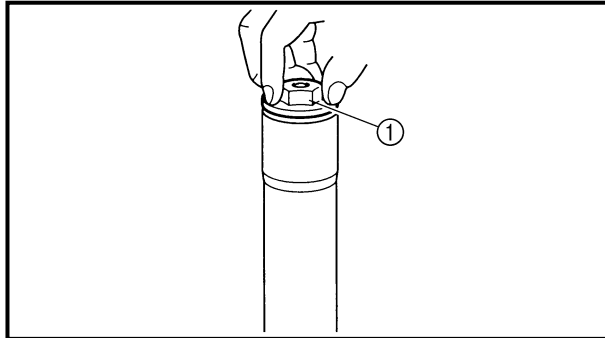
26. Tighten:

- 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 cap bolt with specified torque.

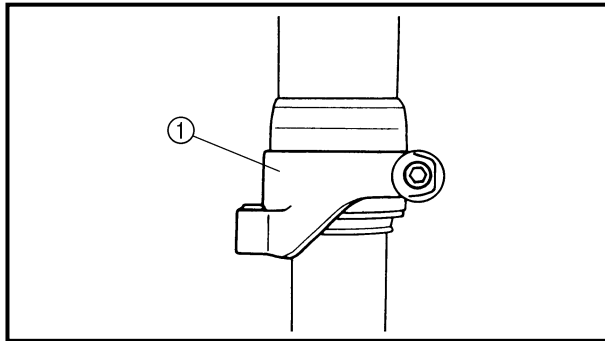


27. Install:

- Cap bolt ①  
To outer tube.

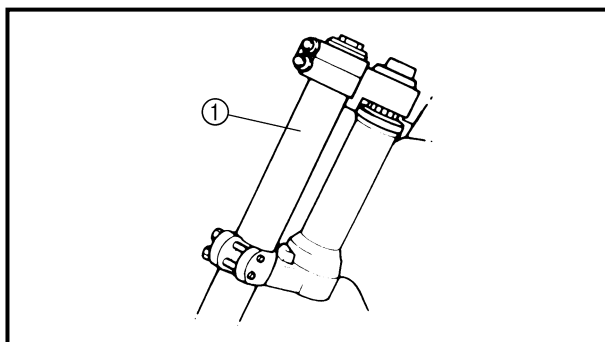
**NOTE:** \_\_\_\_\_

Temporarily tighten the cap bolt.



28. Install:

- Protector guide ①



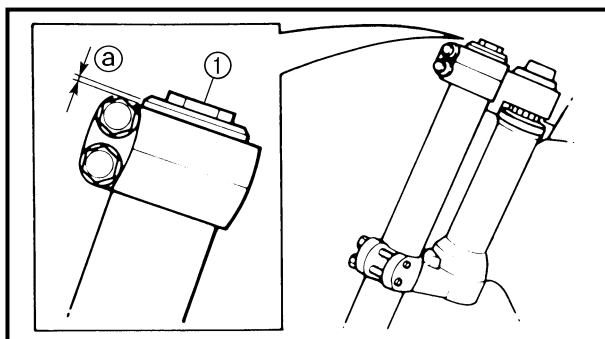
**Installation**

1. Install:

- Front fork ①

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

- Temporarily tighten the pinch bolts (under bracket).
- Do not tighten the pinch bolts (handle crown) yet.



2. Tighten:

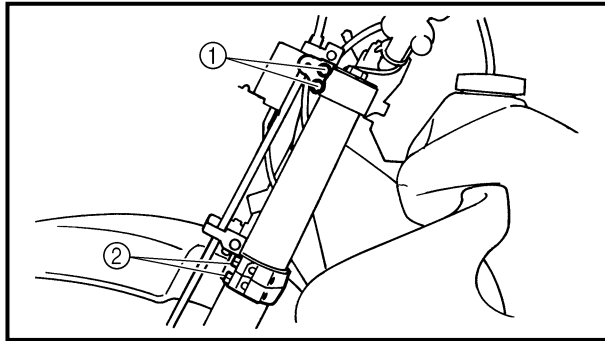
- Cap bolt ①

30 Nm (3.0 m · kg, 22 ft · lb)

3. Adjust:

- Front fork top end ②

**Front fork top end (standard) ②:**  
**Zero mm (Zero in)**



4. Tighten:

- Pinch bolt (handle crown) ①

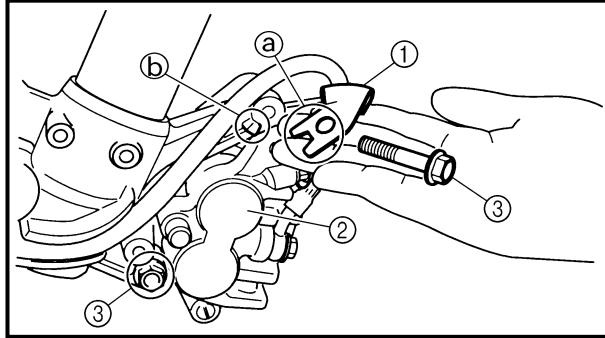
23 Nm (2.3 m · kg, 17 ft · lb)

- Pinch bolt (under bracket) ②

20 Nm (2.0 m · kg, 14 ft · lb)

**CAUTION:**

**Tighten the under bracket to specified torque. If torqued too much, it may cause the front fork to malfunction.**



5. Install:

- Brake hose holder ①

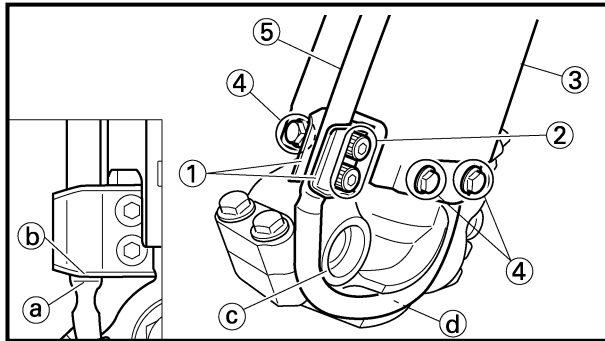
- Caliper ②

- Bolt (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)

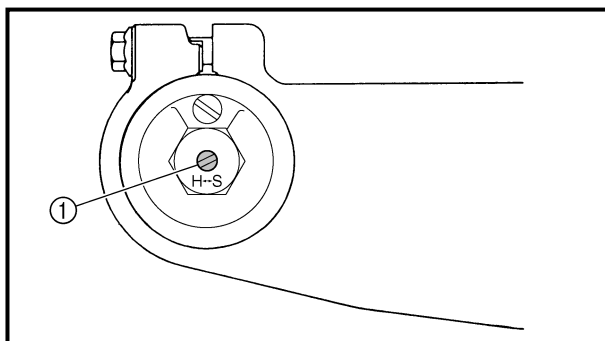
- Protector ③

- 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 ⑤ 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).



7. Adjust:

- Rebound damping force

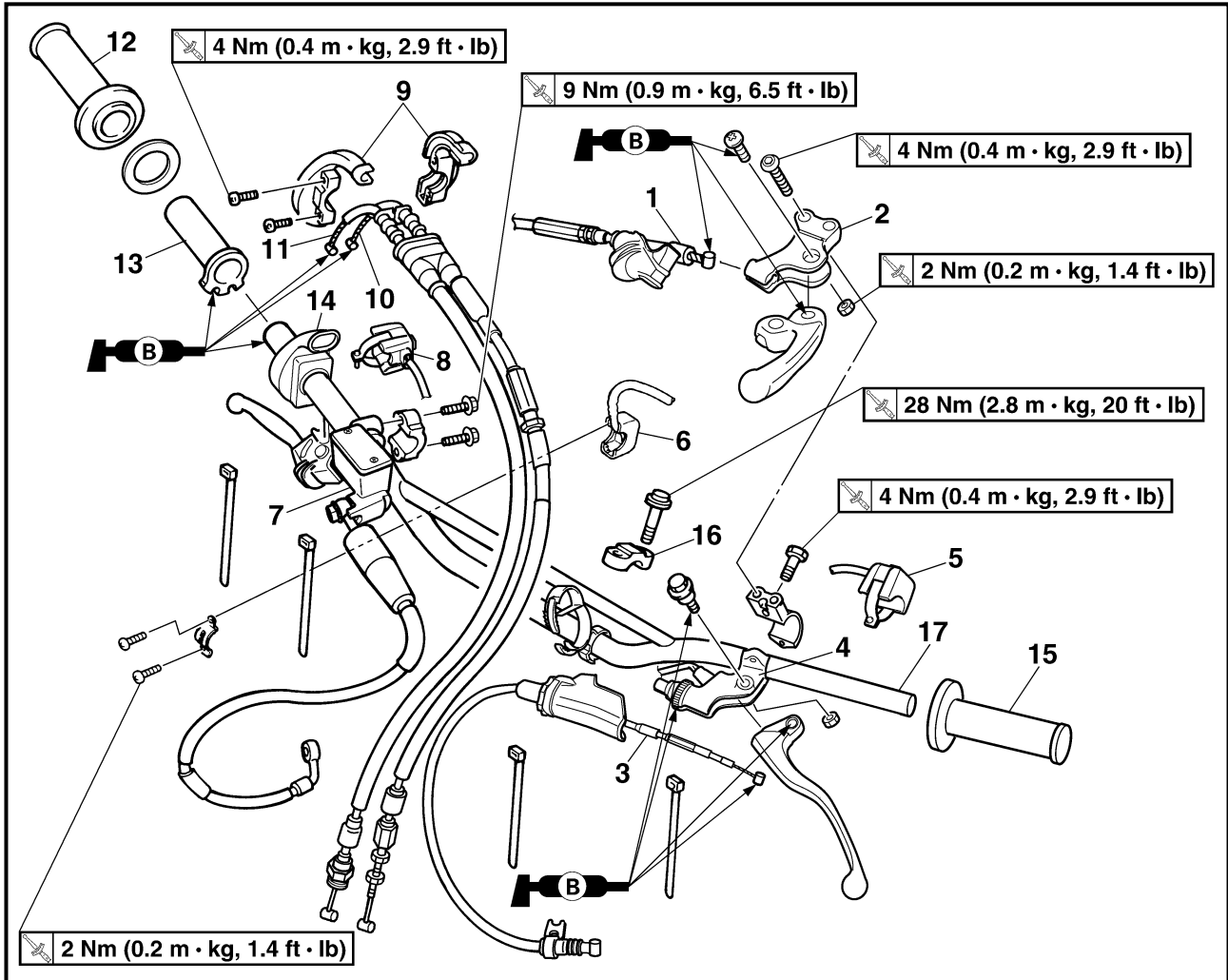
**NOTE:**

Turn in the damping adjuster ① finger-tight and then turn out to the originally set position.



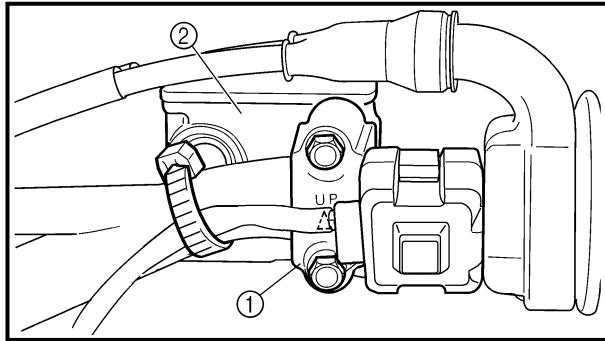
EC5B0000

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" button	1	Disconnect the "ENGINE STOP" button lead.
	6	Lights switch	1	
	7	Master cylinder	1	Refer to "REMOVAL POINTS".
	8	Start switch	1	Disconnect the start switch lead.
	9	Throttle cable cap	1	
	10	Throttle cable #2 (pushed)	1	Disconnect at the throttle side.
	11	Throttle cable #1 (pulled)	1	Disconnect at the throttle side.
	12	Grip (right)	1	Refer to "REMOVAL POINTS".
	13	Tube guide	1	
	14	Cover (grip cap)	1	
	15	Grip (left)	1	Refer to "REMOVAL POINTS".
	16	Handlebar holder (upper)	2	
	17	Handlebar	1	



EC5B3000

**REMOVAL POINTS**

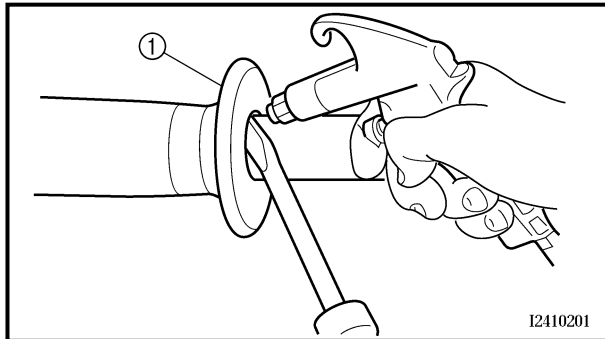
EC5B3100

**Master cylinder**

- Remove:
  - Master cylinder bracket ①
  - Master cylinder ②

**CAUTION:**

- Do not let the master cylinder hang on the brake hose.
- Keep the master cylinder cap side horizontal to prevent air from coming in.



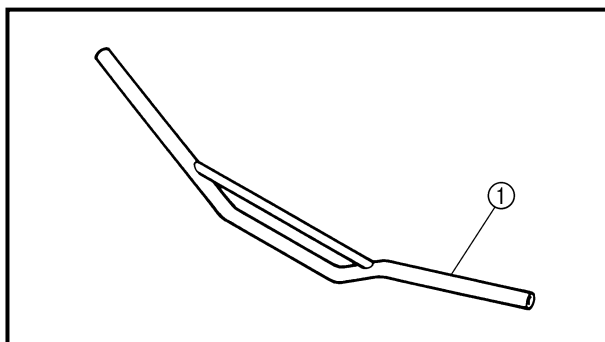
EC5B3200

**Grip**

- 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**

- 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

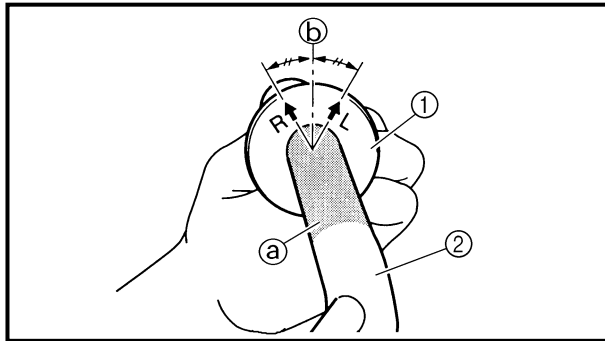
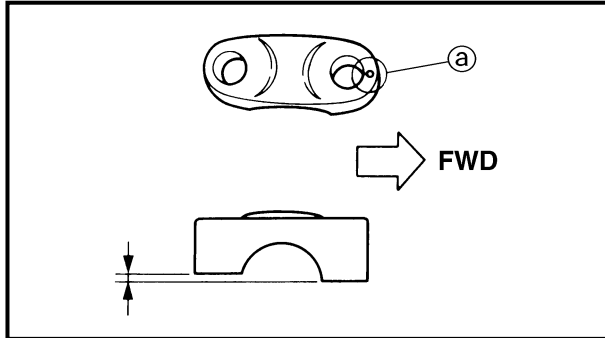
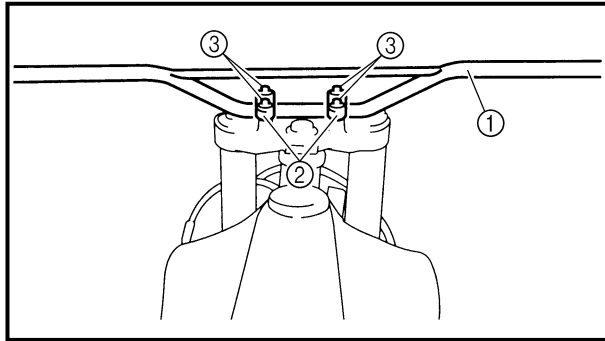
1. Install:

- Handlebar ①
- Handlebar holder ②
- Bolt (handlebar holder) ③

28 Nm (2.8 m · kg, 20 ft · lb)

**NOTE:**

- The handlebar holder should be installed with the punched mark **Ⓐ** forward.
- First tighten the bolts on the front side of the handlebar holder, and then tighten the bolts on the rear side.

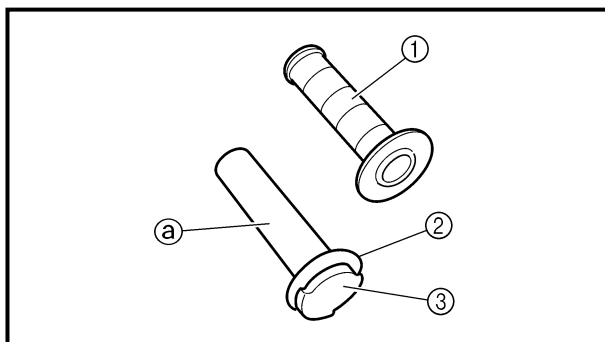


2. Install:

- Grip (left) 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 grip (left) to the handlebar so that the line **Ⓑ** between the two arrow marks faces straight upward.

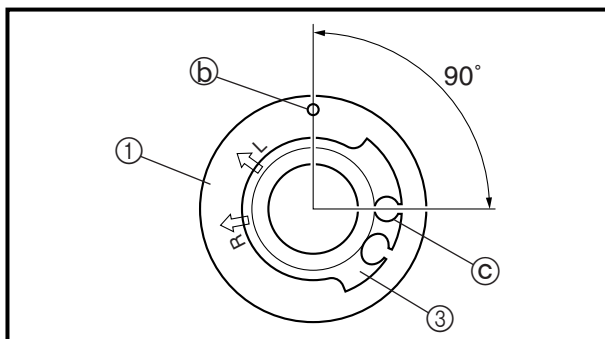


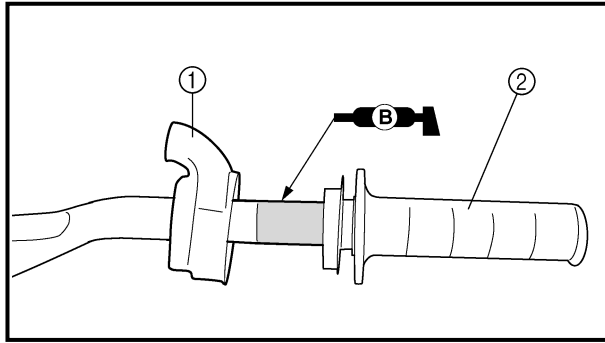
3. Install:

- Grip (right) 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.



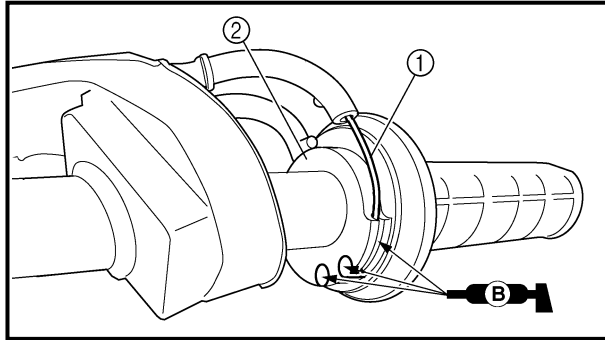


4. Install:

- Cover (grip cap) ①
- Throttle grip ②

**NOTE:**

Apply the lithium soap base grease on the throttle grip sliding surface.

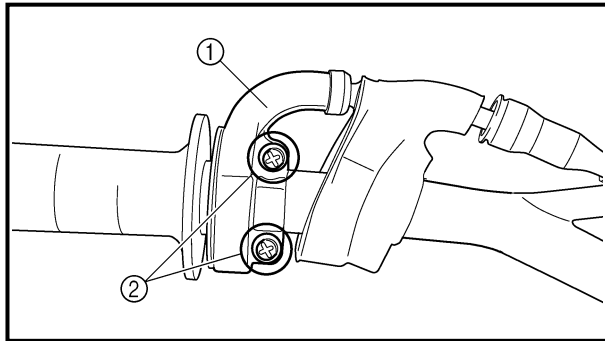


5. Install:

- Throttle cables ①
- To tube guide ②.

**NOTE:**

Apply the lithium soap base grease on the throttle cable end and tube guide cable winding portion.



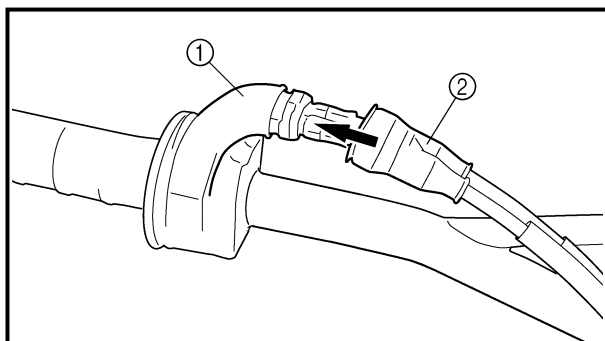
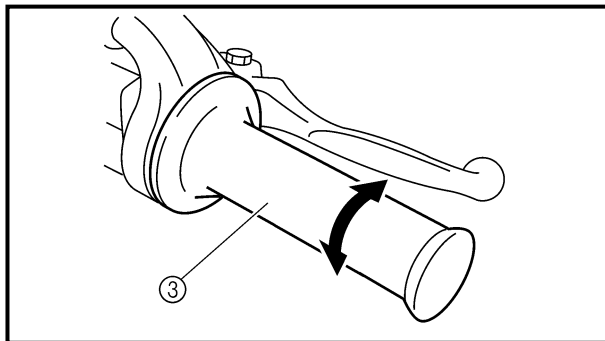
6. Install:

- Throttle cable cap ①
- Screw (throttle cable cap) ②

4 Nm (0.4 m · kg, 2.9 ft · lb)

**⚠ WARNING**

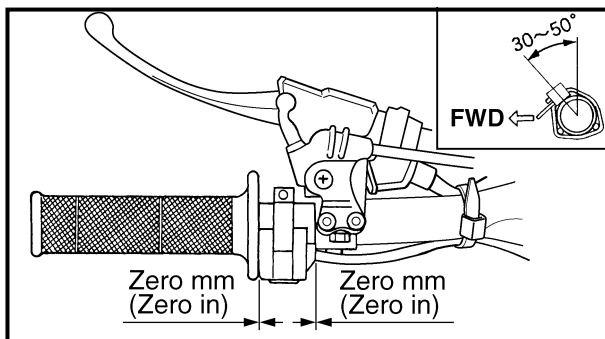
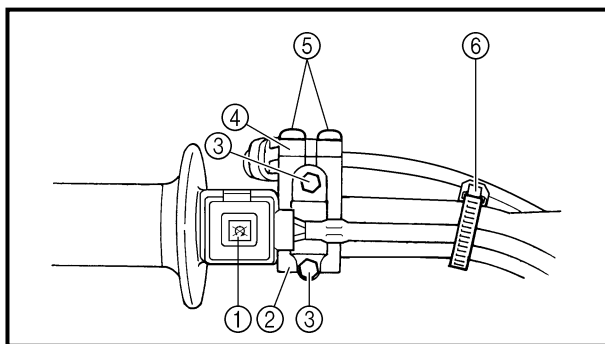
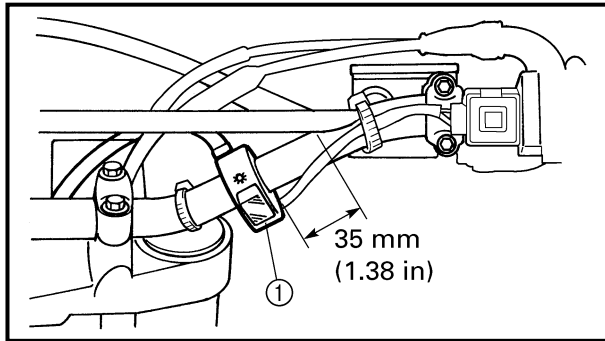
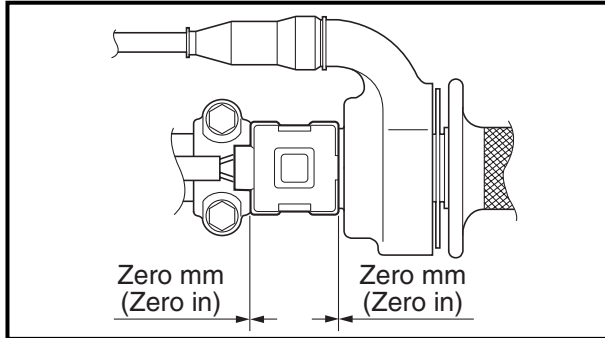
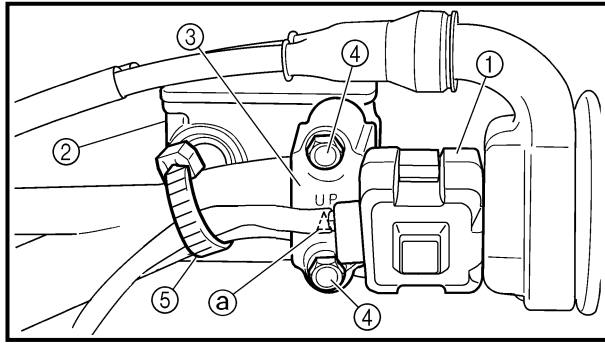
After tightening the screws, check that the throttle grip ③ moves smoothly. If it does not, retighten the bolts for adjustment.



7. Install:

- Cover (grip cap) ①
- Cover (throttle cable cap) ②





## 8. Install:

- Start switch ①
- Master cylinder ②
- Master cylinder bracket ③
- Bolt (master cylinder bracket) ④

9 Nm (0.9 m · kg, 6.5 ft · lb)

- Clamp ⑤

**NOTE:**

- The start switch and master cylinder bracket should be installed according to the dimensions shown.
- Install the bracket so that the arrow mark (a) faces upward.
- First tighten the bolt on the upper side of the master cylinder bracket, and then tighten the bolt on the lower side.

## 9. Install:

- Lights switch ①

2 Nm (0.2 m · kg, 1.4 ft · lb)

## 10. Install:

- “ENGINE STOP” button ①
- Clutch lever holder ②
- Bolt (clutch lever holder) ③

4 Nm (0.4 m · kg, 2.9 ft · lb)

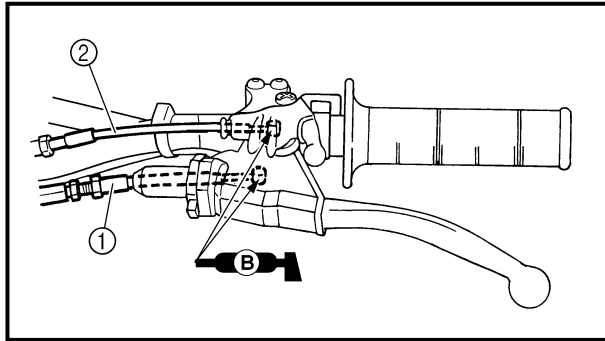
- Hot starter lever holder ④
- Bolt (hot starter lever holder) ⑤

4 Nm (0.4 m · kg, 2.9 ft · lb)

- Clamp ⑥

**NOTE:**

- The “ENGINE STOP” button, clutch lever holder and clamp should be installed according to the dimensions shown.
- Pass the “ENGINE STOP” button lead in the middle of the clutch lever holder.



11. Install:

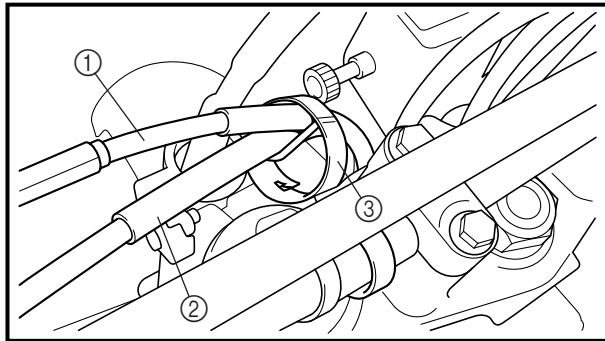
- Clutch cable ①
- Hot starter cable ②

**NOTE:**

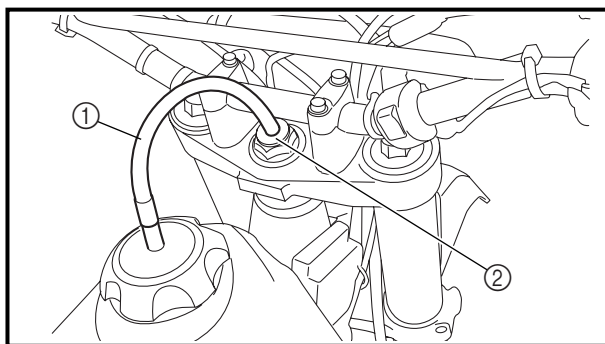
Apply the lithium soap base grease on the clutch cable end and hot starter cable end.

12. 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.



13. Fasten the hot starter cable ① and clutch cable ② with a clamp ③.

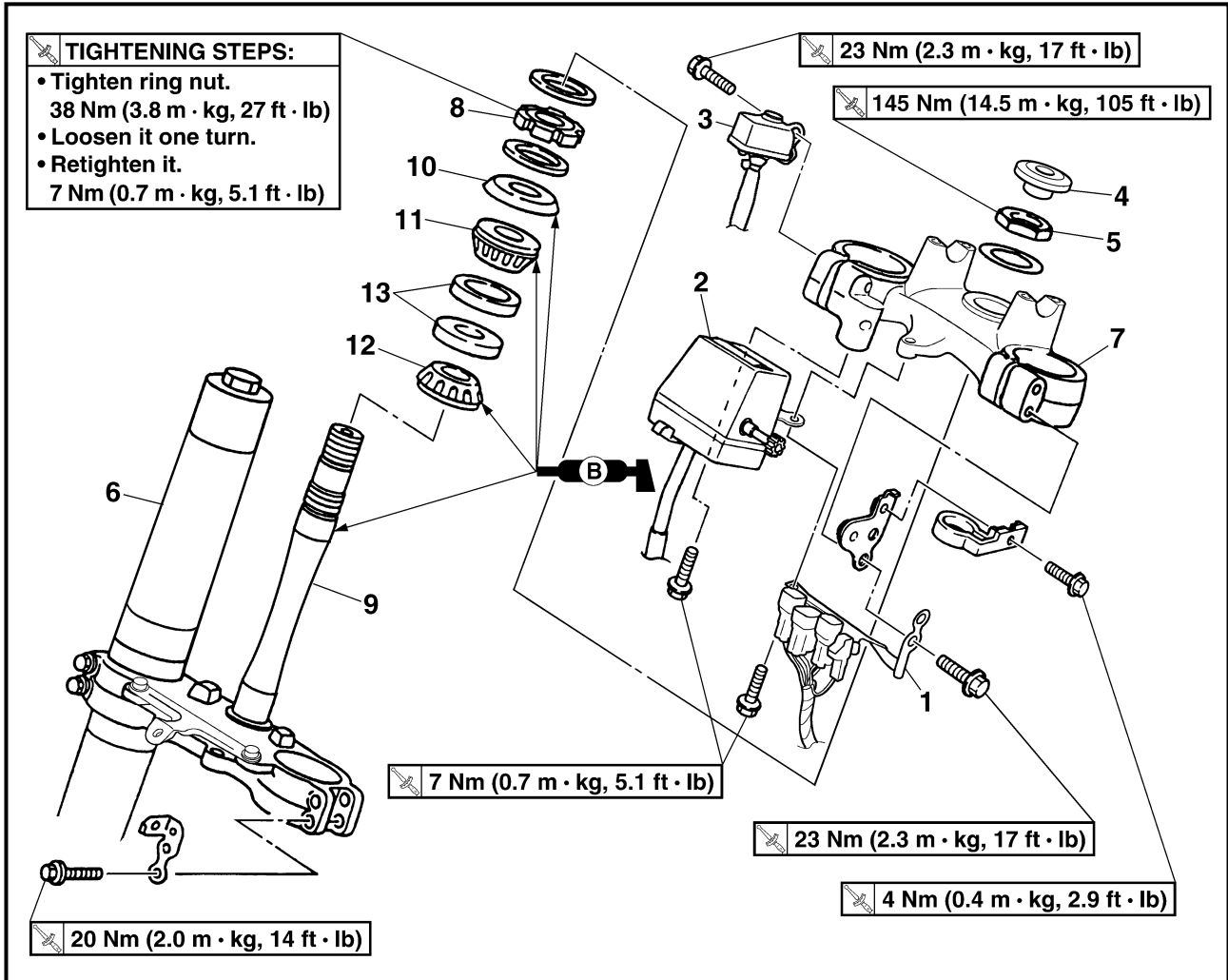


14. Insert the end of the fuel breather hose ① into the hole in the steering shaft cap ②.



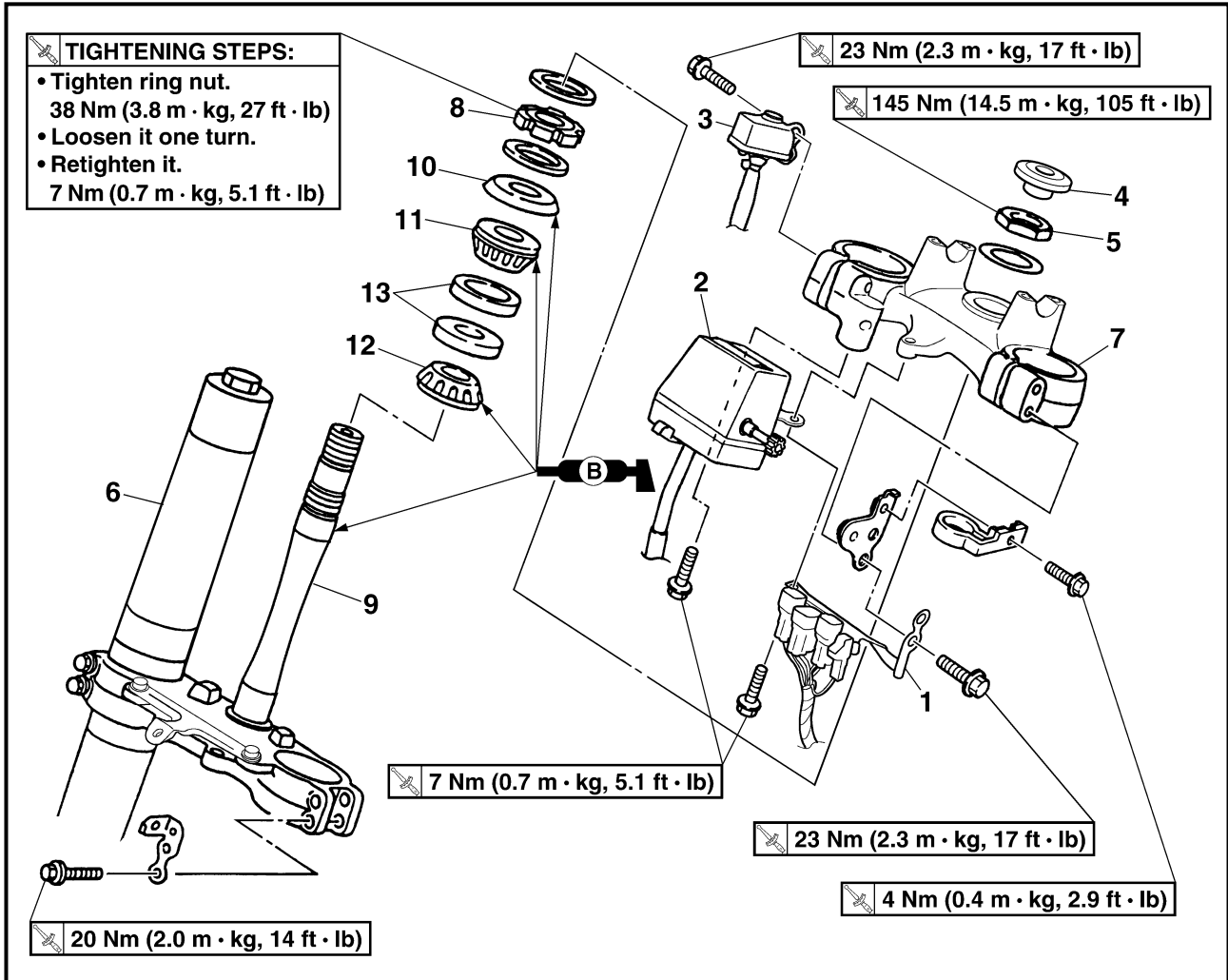
EC560000

STEERING

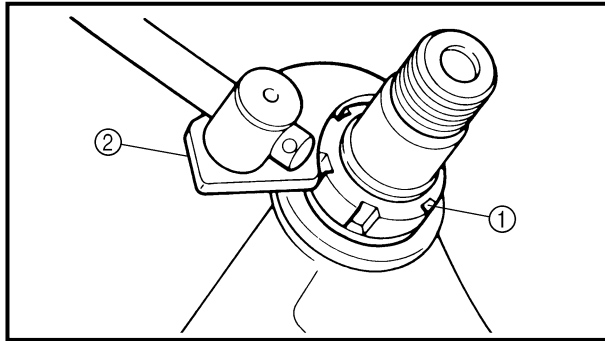


Extent of removal:                      ① Under bracket removal                      ② Bearing removal

Extent of removal	Order	Part name	Q'ty	Remarks	
Preparation for removal		<b>STEERING REMOVAL</b> Hold the machine by placing the suitable stand under the engine. Headlight Handlebar Hose guide Front fender		<b>⚠ WARNING</b> Support the machine securely so there is no danger of it falling over.  Refer to "HANDLEBAR" section.	
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>①</p> </div> <div style="text-align: center;"> <p>②</p> </div> </div>	1	Coupler bracket	1	Refer to "FRONT FORK" section.  Use special tool. Refer to "REMOVAL POINTS".	
	2	Trip meter	1		
	3	Main switch	1		Disconnect the main switch lead.
	4	Steering shaft cap	1		
	5	Steering shaft nut	1		
	6	Front fork	2		
	7	Handle crown	1		
	8	Ring nut	1		
	9	Under bracket	1		
	10	Ball race cover	1		



Extent of removal	Order	Part name	Q'ty	Remarks
	11	Bearing (upper)	1	Refer to "REMOVAL POINTS".
	12	Bearing (lower)	1	
	13	Ball race	2	



EC563000

**REMOVAL POINTS**

EC563202

**Ring nut**

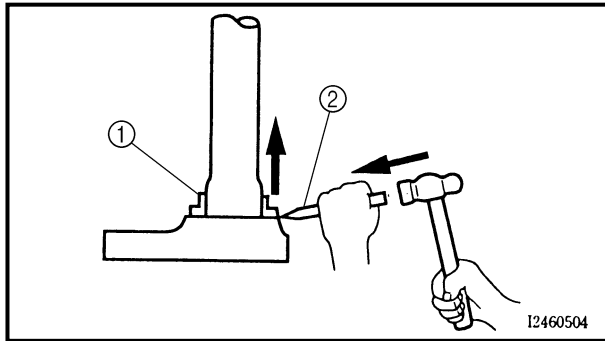
1. Remove:
  - Ring nut ①
 Use the ring nut wrench ②.



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

**⚠ WARNING**

**Support the steering shaft so that it may not fall down.**



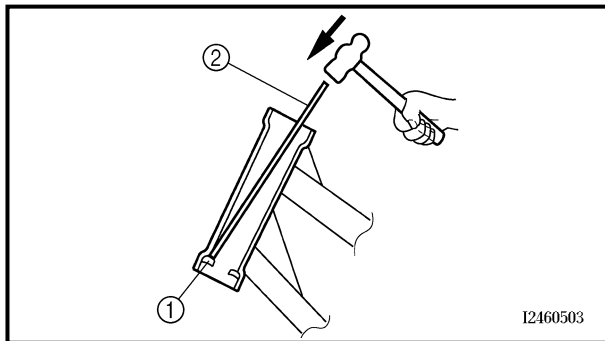
EC563300

**Bearing (lower)**

1. Remove:
  - Bearing (lower) ①
 Use the floor chisel ②.

**CAUTION:**

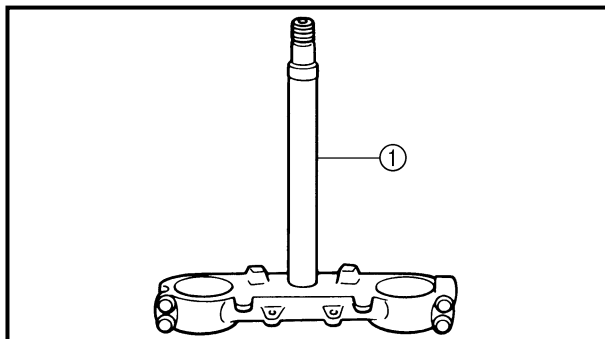
**Take care not to damage the steering shaft thread.**



EC563400

**Ball race**

1. Remove:
  - Ball race ①
 Remove the ball race using long rod ② and the hammer.



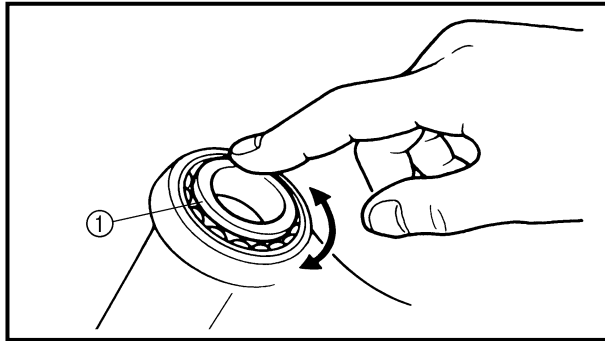
EC564000

**INSPECTION**

EC564200

**Steering shaft**

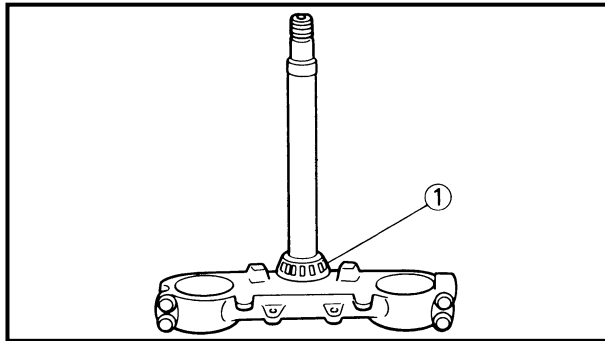
1. Inspect:
  - Steering shaft ①
 Bend/damage → Replace.



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.



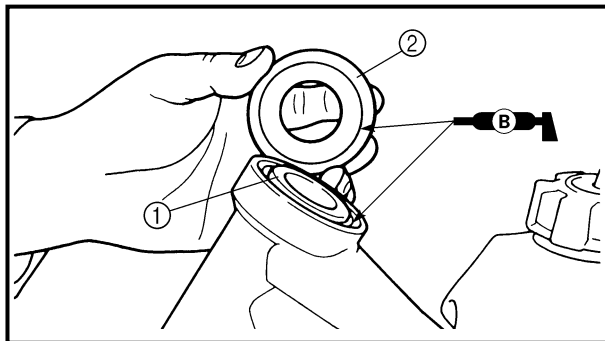
EC565000

**ASSEMBLY AND INSTALLATION**

**Under bracket**

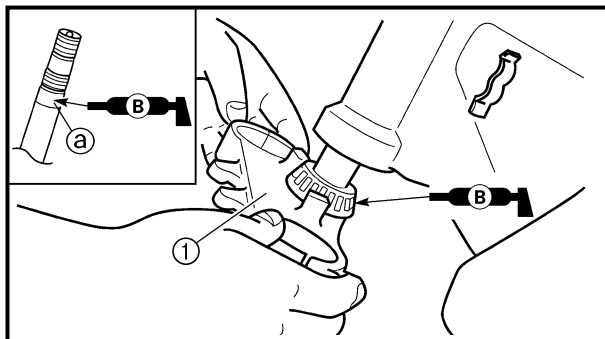
1. Install:
  - Bearing (lower) ①

**NOTE:** \_\_\_\_\_  
 Apply the lithium soap base grease on the dust seal lip and bearing inner circumference.



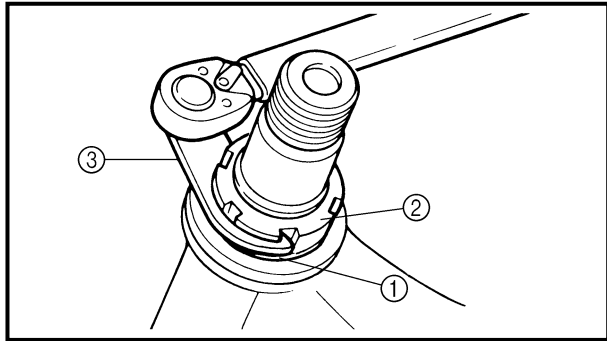
2. Install:
  - Ball race
  - Bearing (upper) ①
  - Ball race cover ②

**NOTE:** \_\_\_\_\_  
 Apply the lithium soap base grease on the bearing and ball race cover lip.



3. Install:
  - Under bracket ①

**NOTE:** \_\_\_\_\_  
 Apply the lithium soap base grease on the bearing and the portion ① of the steering shaft.

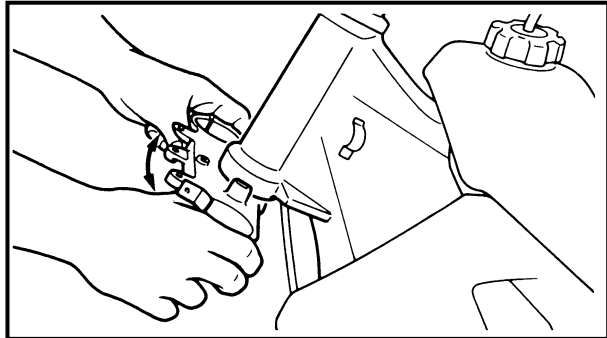


4. Install:
- Plain washer ①
  - Ring nut ②

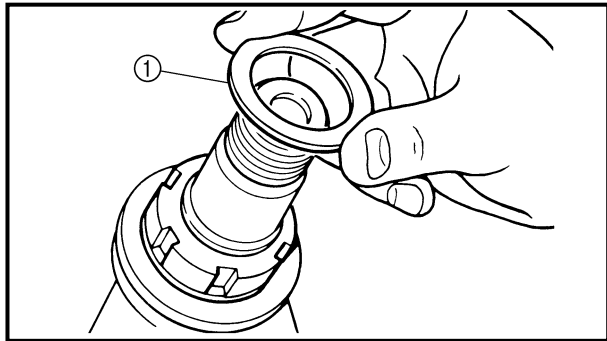
7 Nm (0.7 m · kg, 5.1 ft · lb)

Tighten the ring nut using the ring nut wrench ③.

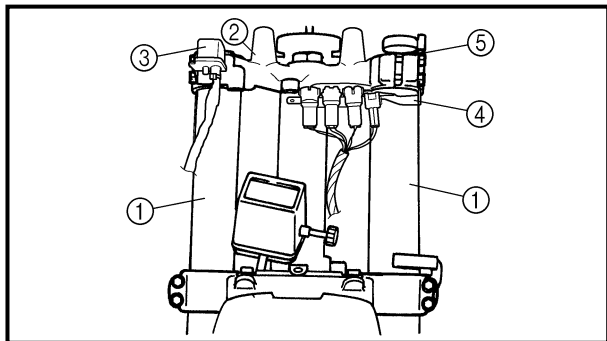
Refer to “STEERING HEAD INSPECTION AND ADJUSTMENT” section in the CHAPTER 3.



5. Check the steering shaft by turning it lock to lock. If there is any binding, remove the steering shaft assembly and inspect the steering bearings.



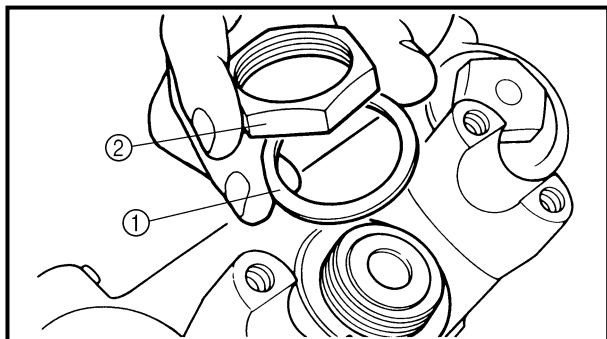
6. Install:
- Plain washer ①



7. Install:
- Front fork ①
  - Handle crown ②
  - Main switch ③
  - Coupler bracket ④
  - Hose guide bracket ⑤

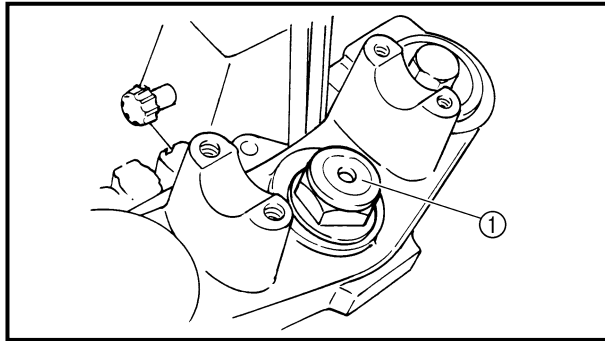
**NOTE:** \_\_\_\_\_

- Install the coupler bracket on the outside of the hose guide bracket.
- Temporarily tighten the pinch bolts (under bracket).
- Do not tighten the pinch bolts (handle crown) yet.

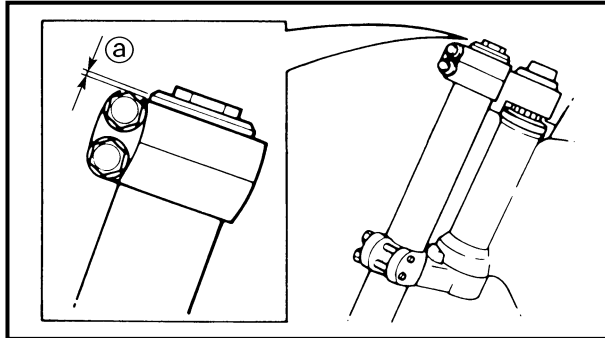


8. Install:
- Plain washer ①
  - Steering shaft nut ②

145 Nm (14.5 m · kg, 105 ft · lb)



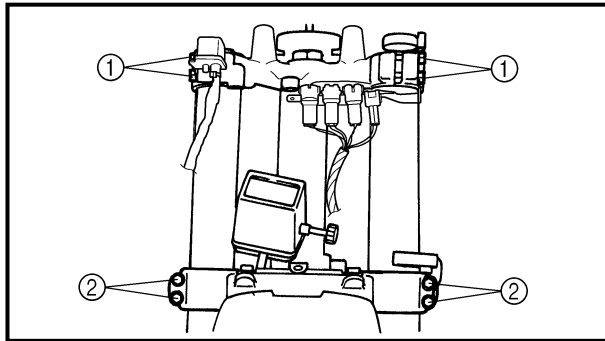
9. Install:
- Steering shaft cap ①





10. After tightening the nut, check the steering for smooth movement. If not, adjust the steering by loosening the ring nut little by little.

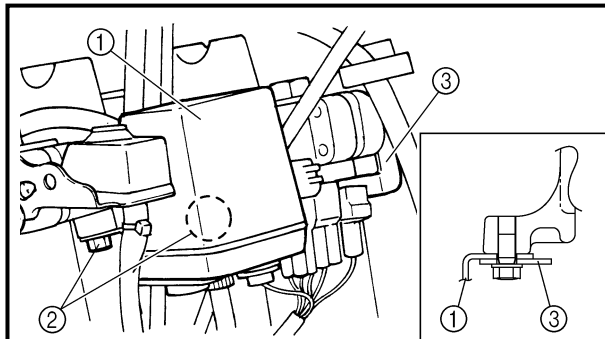
11. Adjust:
- Front fork top end ②


 **Front fork top end (standard) ②:**  
Zero mm (Zero in)



12. Tighten:
- Pinch bolt (handle crown) ①  
 **23 Nm (2.3 m · kg, 17 ft · lb)**
  - Pinch bolt (under bracket) ②  
 **20 Nm (2.0 m · kg, 14 ft · lb)**

**CAUTION:** \_\_\_\_\_  
**Tighten the under 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)**

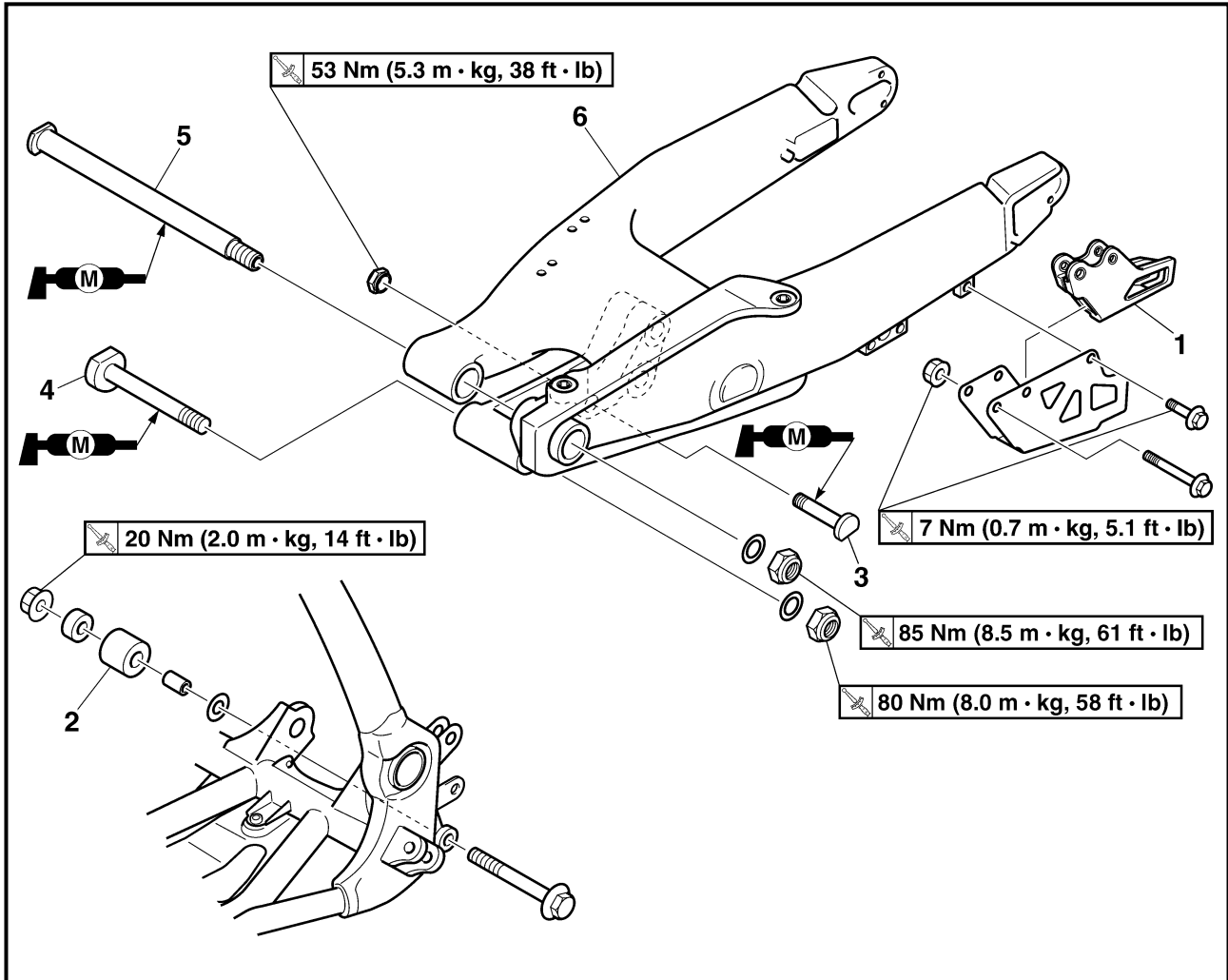
**NOTE:** \_\_\_\_\_  
Install the trip meter over the coupler bracket ③.





EC570000

**SWINGARM**



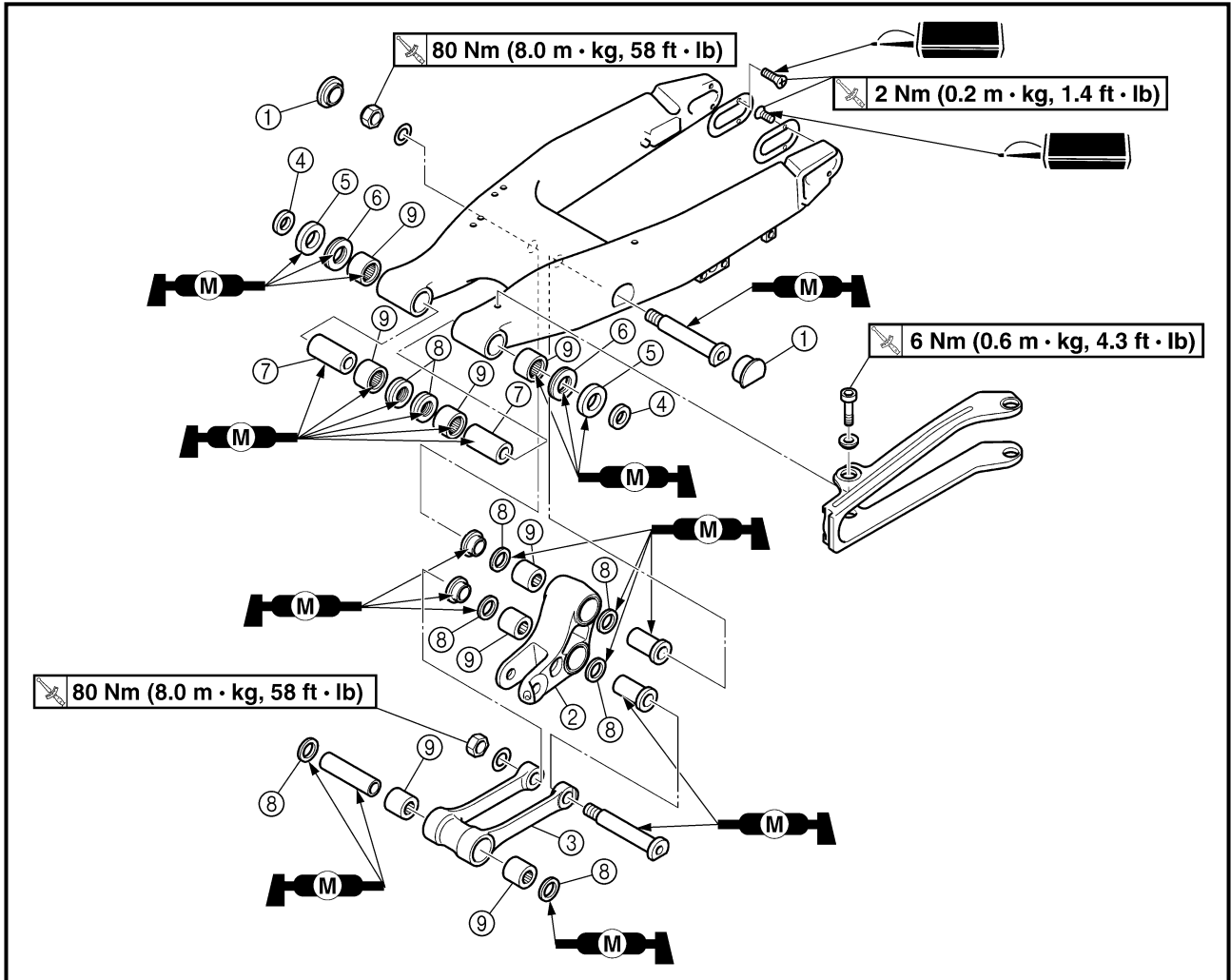
Extent of removal: ① Swingarm removal

Extent of removal	Order	Part name	Q'ty	Remarks
Preparation for removal		<b>SWINGARM REMOVAL</b>		<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.
		Brake hose holder		
		Rear caliper		
		Bolt (brake pedal)		
	1	Chain support	1	Hold the swingarm.
	2	Chain tensioner (lower)	1	
	3	Bolt (rear shock absorber-relay arm)	1	
	4	Bolt (connecting rod)	1	
	5	Pivot shaft	1	
	6	Swingarm	1	



EC578000

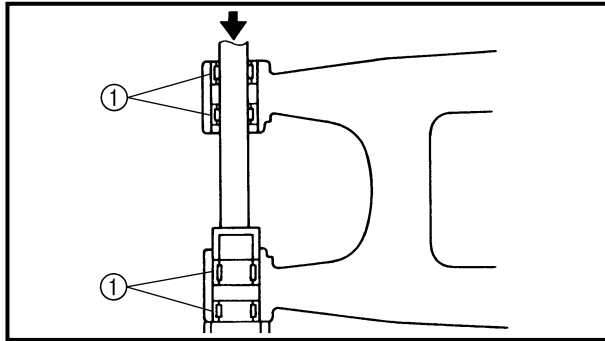
SWINGARM DISASSEMBLY



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>		
↑ ③ ↓	①	Cap	2	
↑ ② ↓	②	Relay arm	1	
↑ ③ ↓	③	Connecting rod	1	
↑ ④ ↓	④	Collar	2	
↑ ⑤ ↓	⑤	Oil seal	2	
↑ ⑥ ↓	⑥	Thrust bearing	2	
↑ ⑦ ↓	⑦	Bush	2	
↑ ⑧ ↓	⑧	Oil seal	8	
↑ ⑨ ↓	⑨	Bearing	8	Refer to "REMOVAL POINTS".



EC573000

**REMOVAL POINTS**

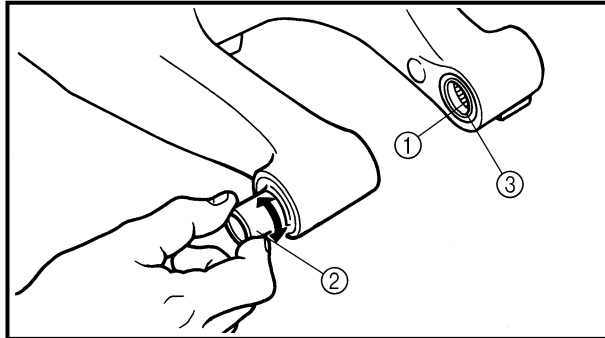
EC573200

**Bearing**

1. Remove:
  - Bearing ①

**NOTE:**

Install the bearing by pressing its outer race.



EC574010

**INSPECTION**

Wash the bearings, bushes, collars, and covers in a solvent.

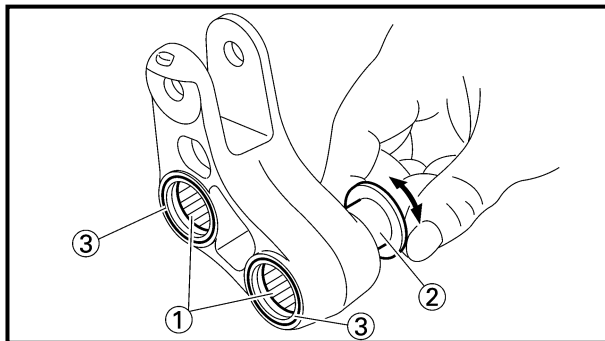
EC574111

**Swingarm**

1. Inspect:
  - Bearing ①
  - Bush ②

Free play exists/unsmooth revolution/rust → Replace bearing and bush 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

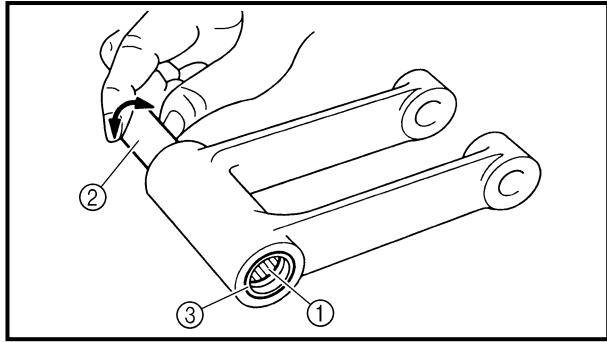
Loss of solid lubrication → Replace.

  - 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.



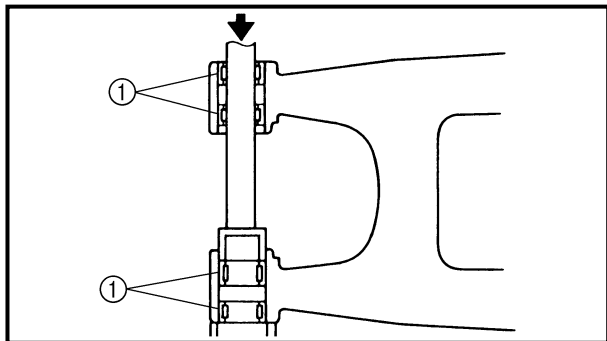
EC574310

**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**

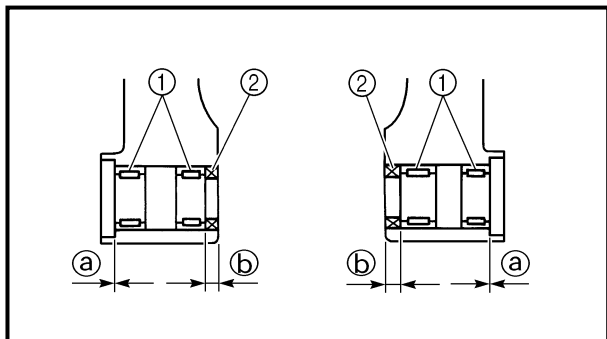
EC575201

**Bearing and oil seal**

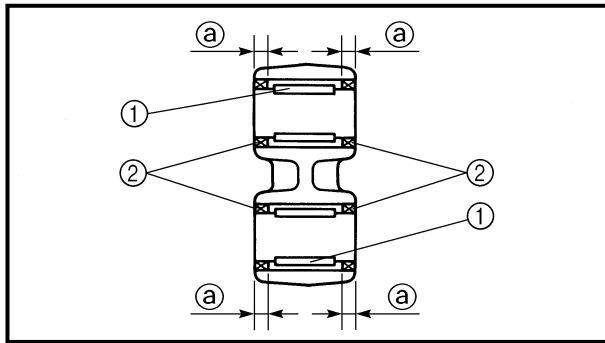
1. Install:
  - Bearing ①
  - Oil seal ②
  - To swingarm.

**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)



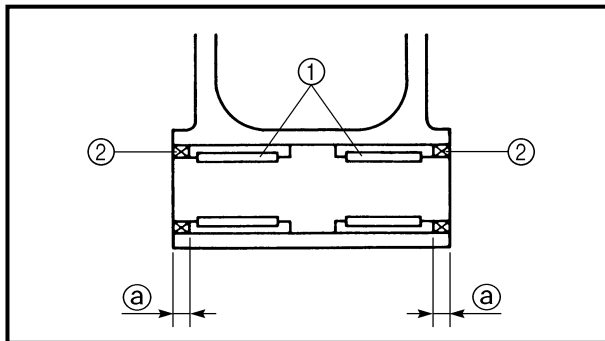
2. Install:
- Bearing ①
  - Oil seal ②
- To relay arm.

**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 ①:**  
5 mm (0.20 in)



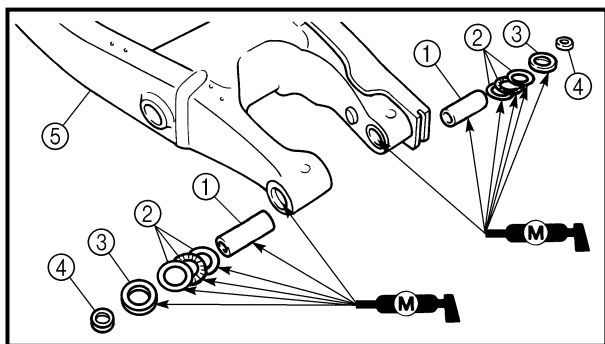
3. Install:
- Bearing ①
  - Oil seal ②
- To connecting rod.

**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 ①:**  
5 mm (0.20 in)

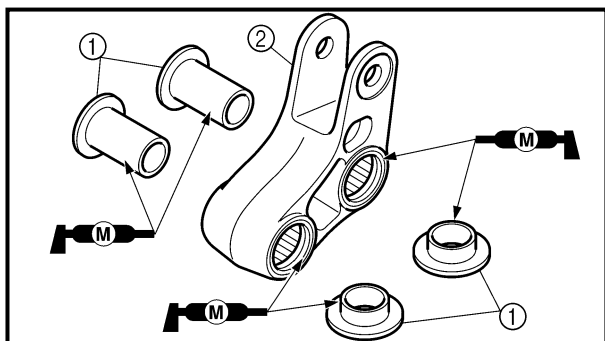


**Swingarm**

1. Install:
- Bush ①
  - Thrust bearing ②
  - Oil seal ③
  - Collar ④
- To swingarm ⑤.

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

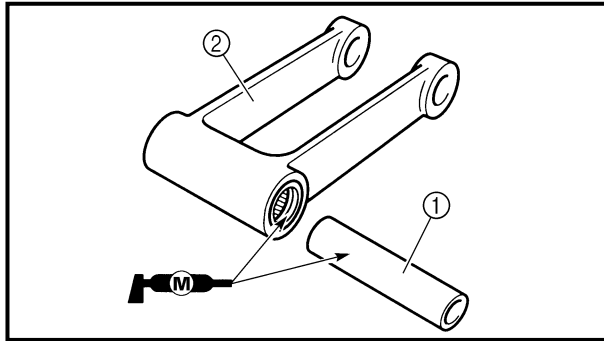
Apply the molybdenum disulfide grease on the bushes, thrust bearings and oil seal lips.



2. Install:
- Collar ①
- To relay arm ②.

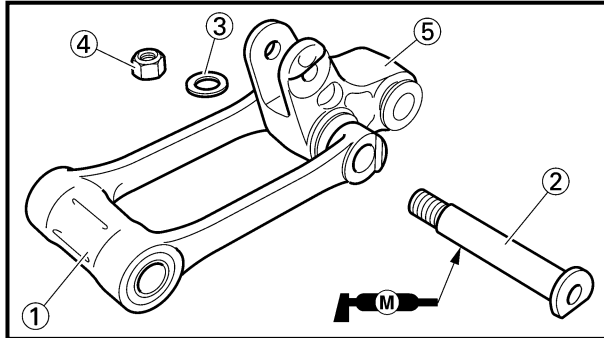
**NOTE:** \_\_\_\_\_

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.

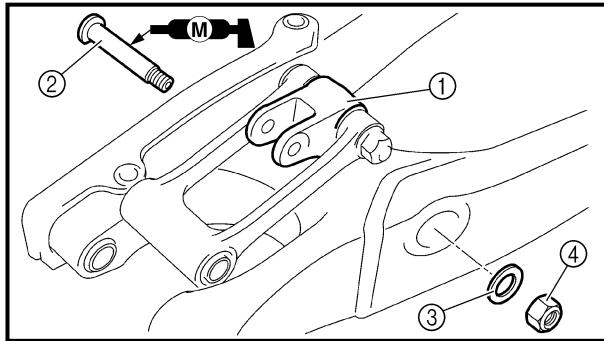


4. Install:
- Connecting rod ①
  - Bolt (connecting rod) ②
  - Plain washer ③
  - Nut (connecting rod) ④

**80 Nm (8.0 m · kg, 58 ft · lb)**

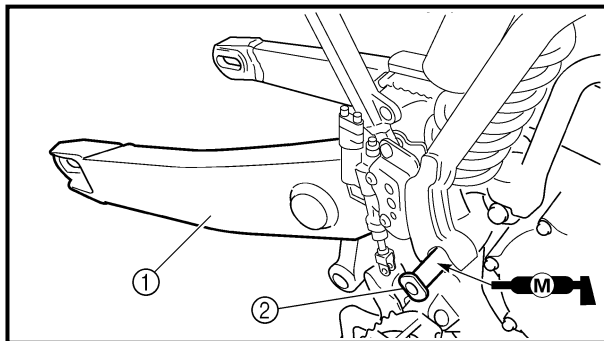
To relay arm ⑤.

**NOTE:** \_\_\_\_\_  
Apply the molybdenum disulfide grease on the bolt.



5. Install:
- Relay arm ①
  - Bolt (relay arm) ②
  - Plain washer ③
  - Nut (relay arm) ④
  - To swingarm.

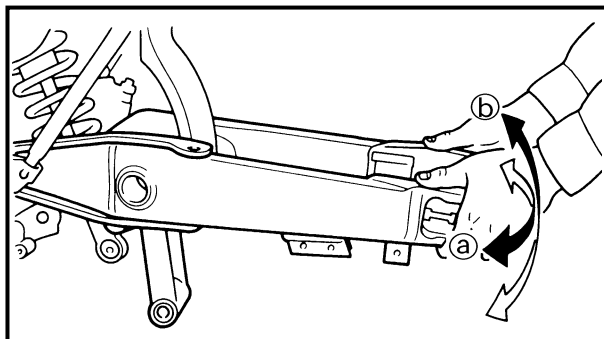
**NOTE:** \_\_\_\_\_  
• Apply the molybdenum disulfide grease on the bolt.  
• Do not tighten the nut yet.



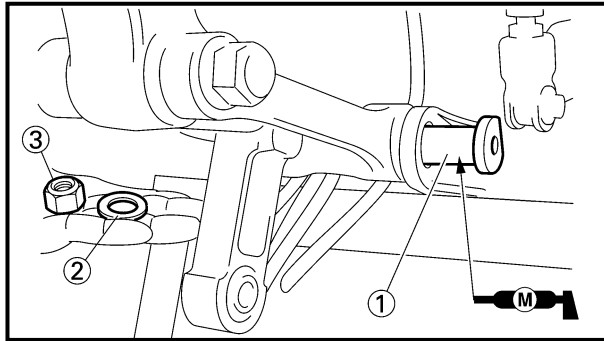
6. Install:
- Swingarm ①
  - Pivot shaft ②

**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.



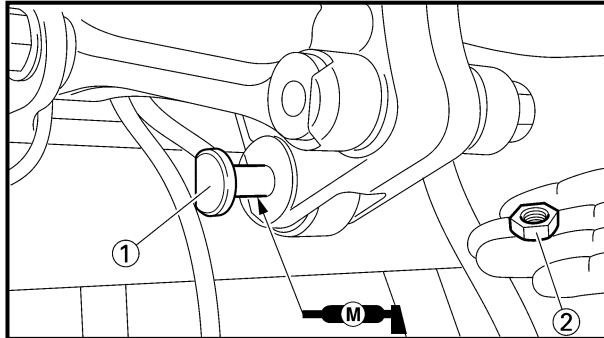
7. Check:
- Swingarm side play ①  
Free play exists → Replace thrust bearing.
  - Swingarm up and down movement ②  
Unsmooth movement/binding/rough spots → Grease or replace bearings, bushes and collars.



8. Install:
- Bolt (connecting rod) ①
  - Plain washer ②
  - Nut (connecting rod) ③

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

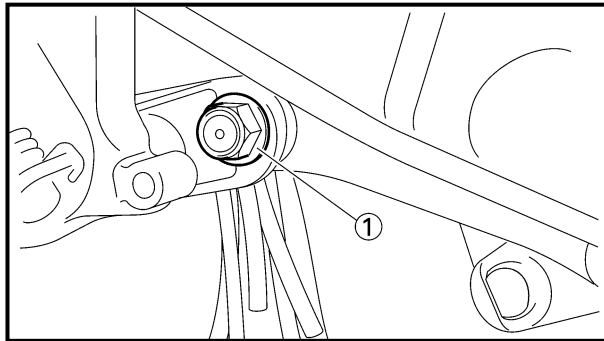
- Apply the molybdenum disulfide grease on the bolt.
- Do not tighten the nut yet.



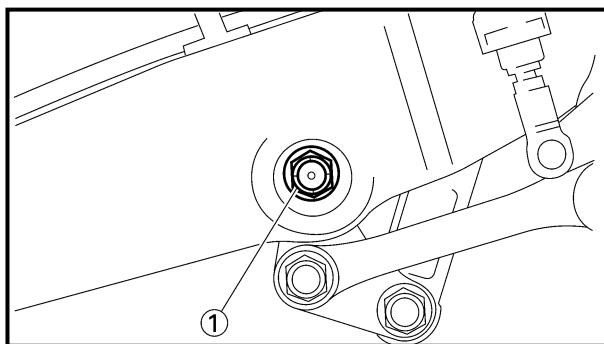
9. Install:
- Bolt (rear shock absorber-relay arm) ①
  - Nut (rear shock absorber-relay arm) ②
- 53 Nm (5.3 m · kg, 38 ft · lb)**

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

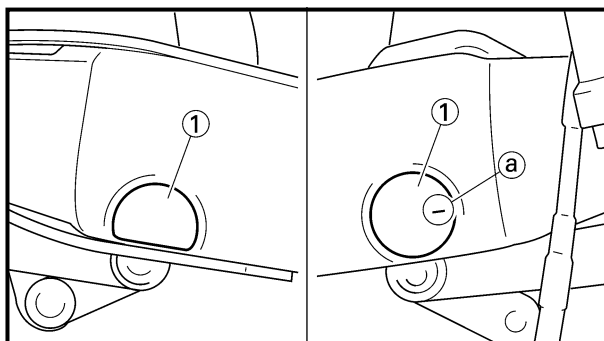
Apply the molybdenum disulfide grease on the bolt.



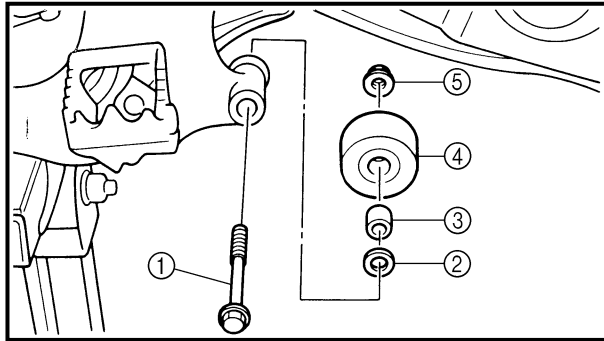
10. Tighten:
- Nut (connecting rod) ①
- 80 Nm (8.0 m · kg, 58 ft · lb)**



11. Tighten:
- Nut (relay arm) ①
- 80 Nm (8.0 m · kg, 58 ft · lb)**



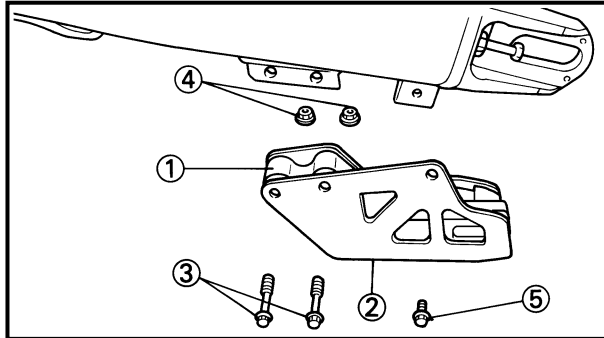
12. Install:
- Cap ①
- NOTE:** \_\_\_\_\_
- Install the cap (right) with its mark ② facing forward.



13. Install:

- Bolt [chain tensioner (lower)] ①
- Plain washer ②
- Collar ③
- Chain tensioner ④
- Nut [chain tensioner (lower)] ⑤

**20 Nm (2.0 m · kg, 14 ft · lb)**



14. Install:

- Chain support ①
- Support cover ②
- Bolt {chain support [  $\ell = 50 \text{ mm (1.97 in)}$  ]}
- ③
- Nut (chain support) ④

**7 Nm (0.7 m · kg, 5.1 ft · lb)**

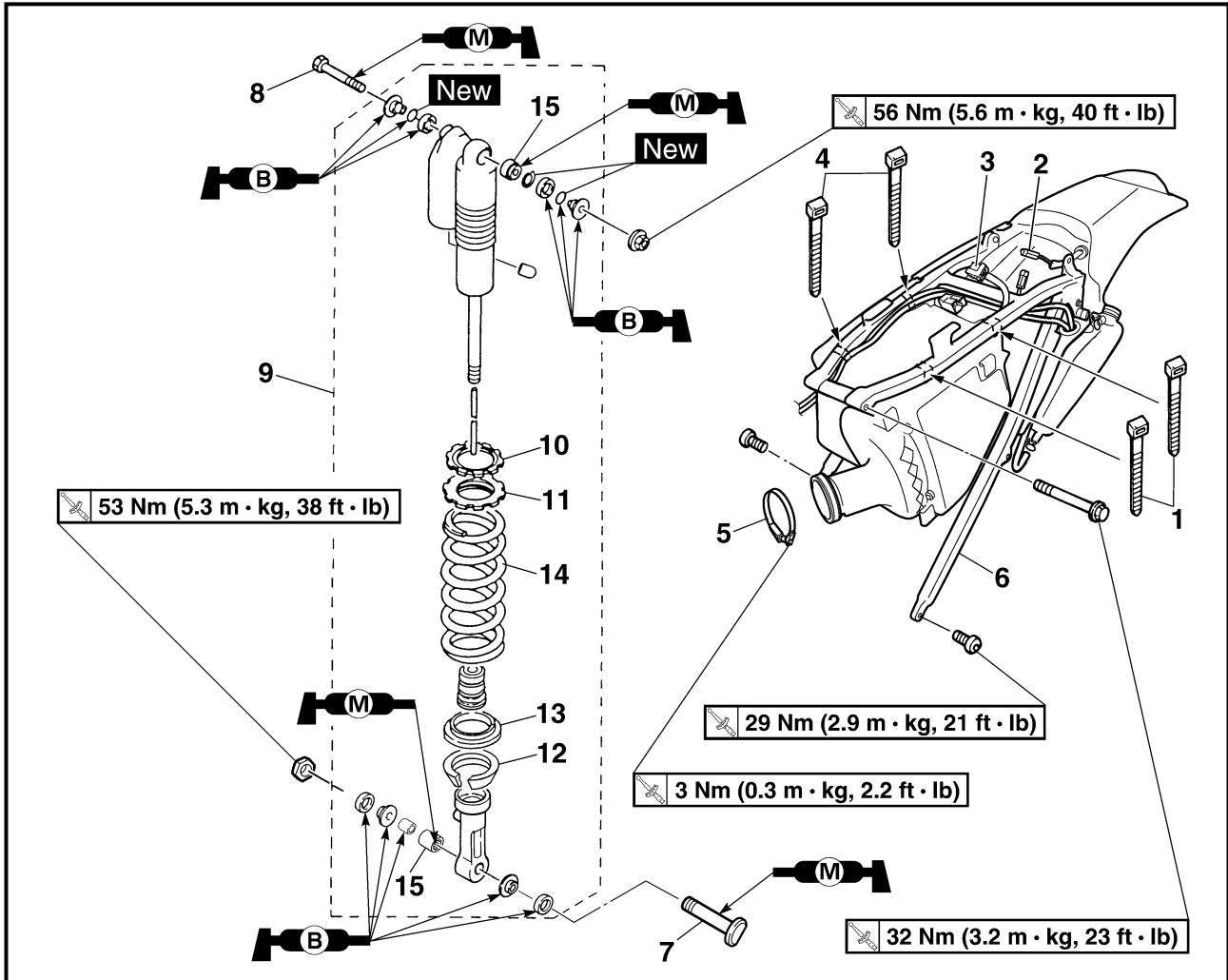
- Bolt {support cover [  $\ell = 10 \text{ mm (0.39 in)}$  ]}
- ⑤

**7 Nm (0.7 m · kg, 5.1 ft · lb)**



EC580000

## REAR SHOCK ABSORBER



Extent of removal:

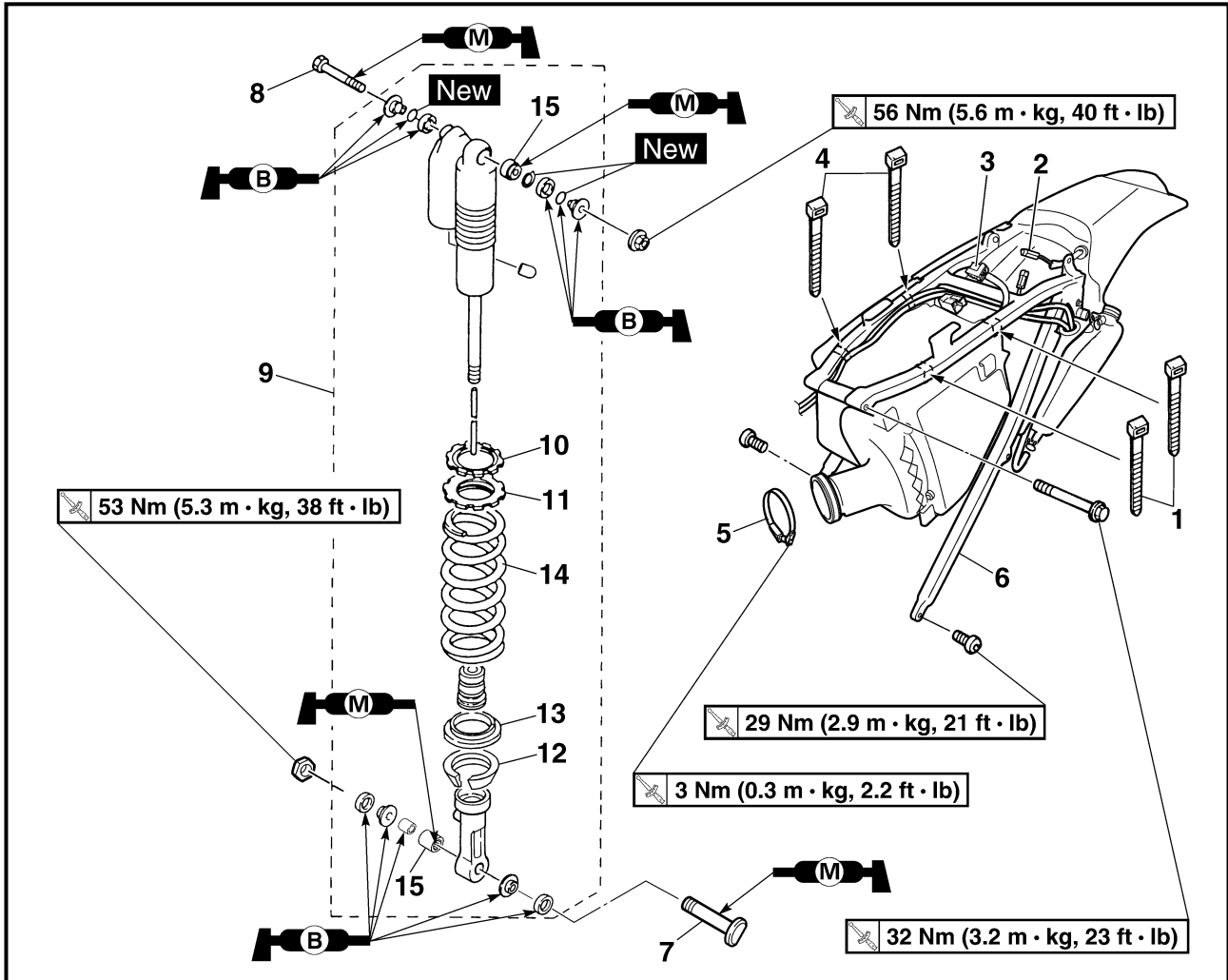
① Rear shock absorber removal

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 cover  Silencer  Drain the coolant.  Coolant reservoir tank breather hose Coolant reservoir hose  Battery		<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 tank side. Disconnect at the coolant reservoir tank side. Refer to "BATTERY INSPECTION AND CHARGING" section in the CHAPTER 3.

# REAR SHOCK ABSORBER

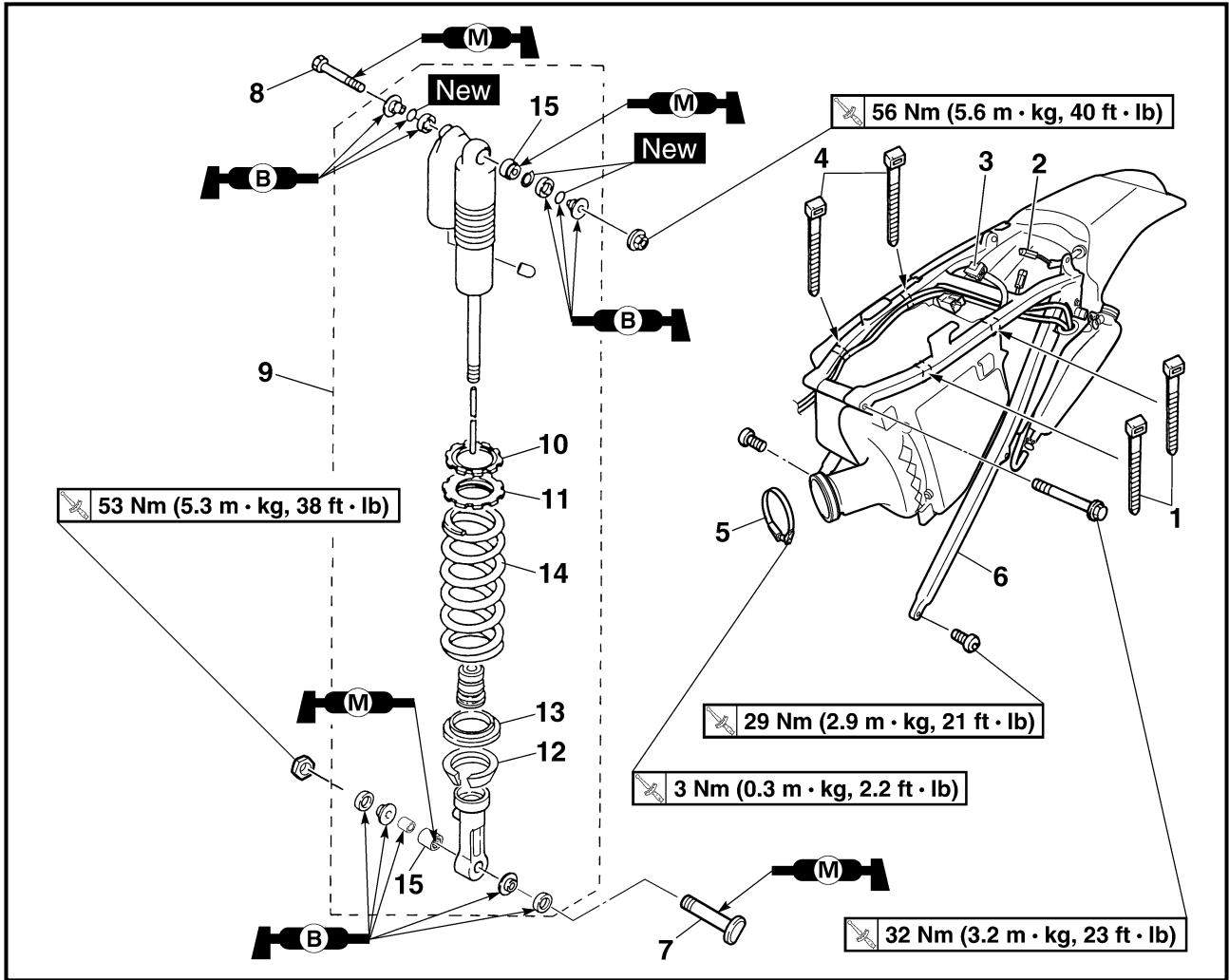
CHAS



Extent of removal	Order	Part name	Q'ty	Remarks
		Disconnect the starter relay coupler. Starter motor lead		Disconnect at the starter relay side.
①	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	Only loosening.
	12	Spring guide (lower)	1	
	13	Spring guide (upper)	1	

# REAR SHOCK ABSORBER

**CHAS**



Extent of removal	Order	Part name	Q'ty	Remarks
↑ ② ↓	14	Spring (rear shock absorber)	1	
	15	Bearing	2	Refer to "REMOVAL POINTS".



EC586000

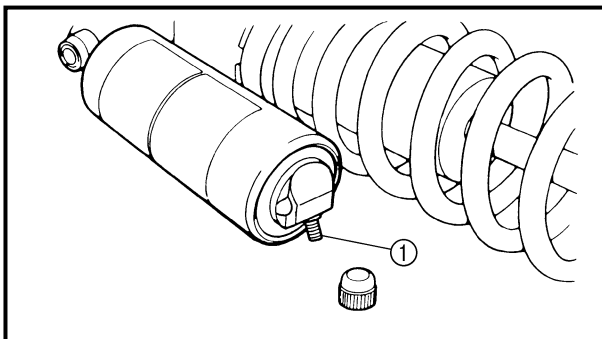
## HANDLING NOTE

### **⚠ WARNING**

This 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 shock absorber into an open flame or other high heat. The 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 shock absorber, follow the instructions on disposal.



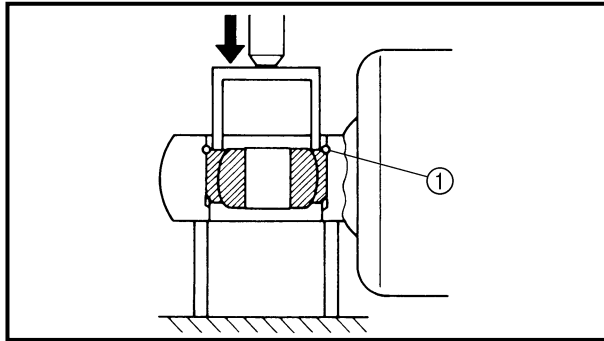
EC587000

## NOTES ON DISPOSAL (YAMAHA DEALERS ONLY)

Before disposing the 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 shock absorber, take the unit to your Yamaha dealer for this disposal procedure.



EC583000

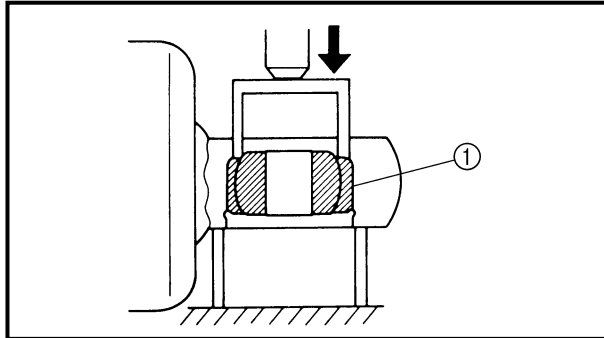
## REMOVAL POINTS

EC583320

### Bearing

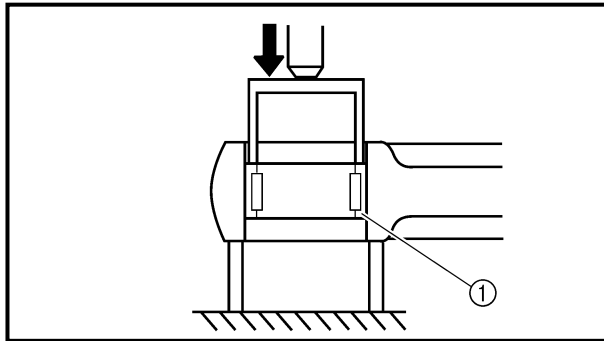
1. Remove:
  - Stopper ring (upper bearing) ①

**NOTE:** \_\_\_\_\_  
 Press in the bearing while pressing its outer race and remove the stopper ring.



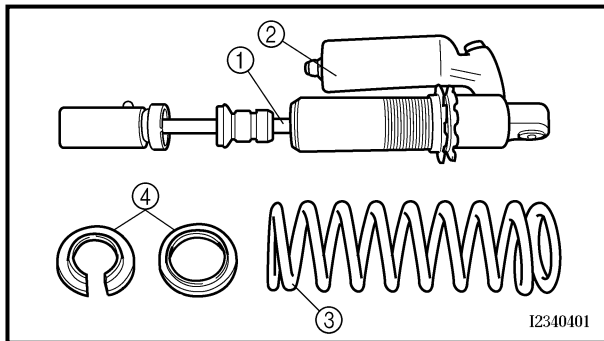
2. Remove:
  - Upper bearing ①

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



3. Remove:
  - Lower bearing ①

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

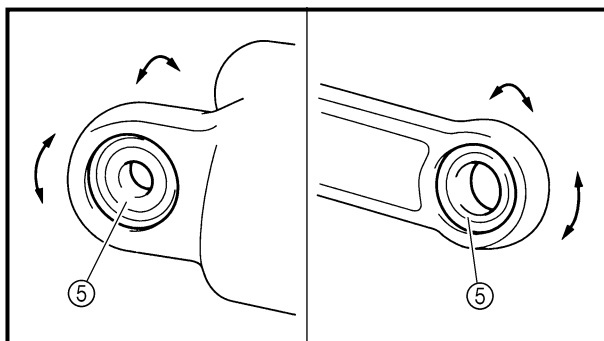


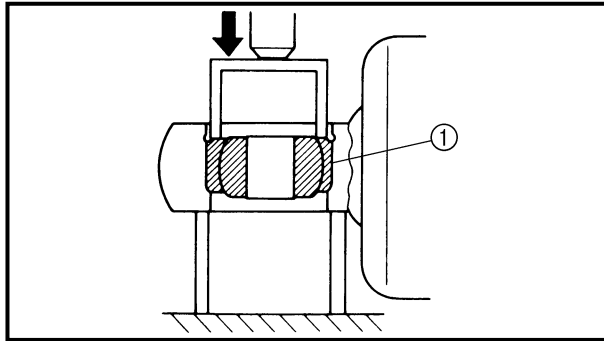
EC584000

## INSPECTION

### Rear shock absorber

1. Inspect:
  - Damper rod ①  
 Bends/damage → Replace absorber assembly.
  - Shock absorber ②  
 Oil leaks → Replace absorber assembly.  
 Gas leaks → Replace 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

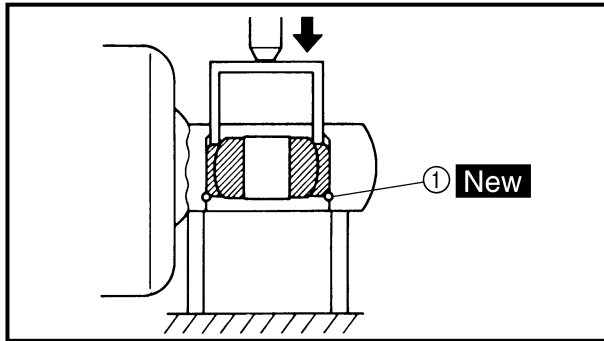
1. Install:
  - Upper bearing ①

#### NOTE:

Install the bearing parallel until the stopper ring groove appears by pressing its outer race.

#### CAUTION:

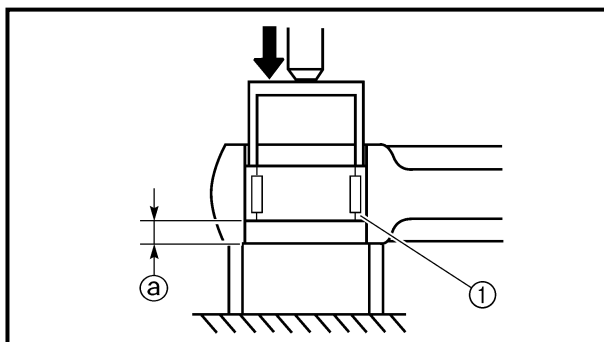
Do not apply the grease on the bearing outer race because it will wear the rear shock absorber surface on which the bearing is press fitted.



2. Install:
  - Stopper ring (upper bearing) ① **New**

#### NOTE:

After installing the stopper ring, push back the bearing until it contacts the stopper ring.

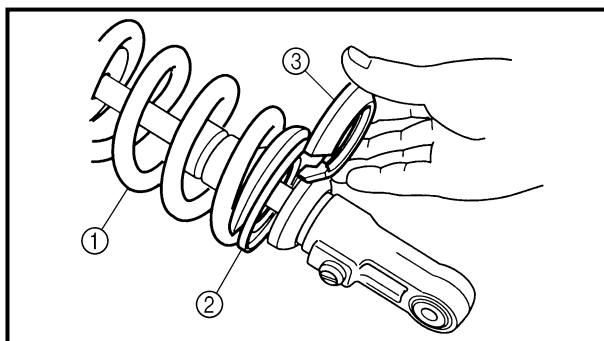


3. Install:
  - Lower bearing ①

#### NOTE:

Install the bearing by pressing it on the side having the manufacture's marks or numbers.

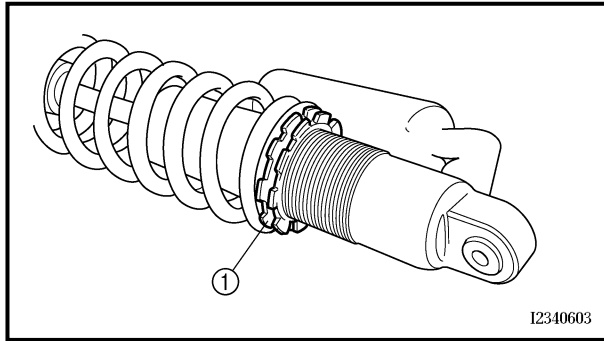
	<p><b>Installed depth of the bearing ①:</b> 4 mm (0.16 in)</p>
--	--



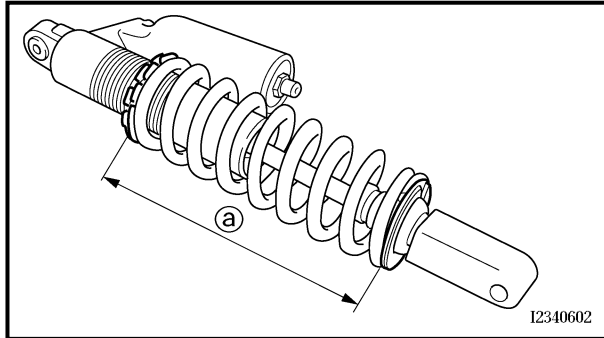
EC585111

### Spring (rear shock absorber)

1. Install:
  - Spring ①
  - Spring guide (upper) ②
  - Spring guide (lower) ③



2. Tighten:
  - Adjuster ①



3. Adjust:
  - Spring length (installed) ②

Spring length (installed) ②:	
Standard length	Extent of adjustment
246 mm (9.69 in) * 246.5 mm (9.70 in)	240.5 ~ 258.5 mm (9.47 ~ 10.18 in)

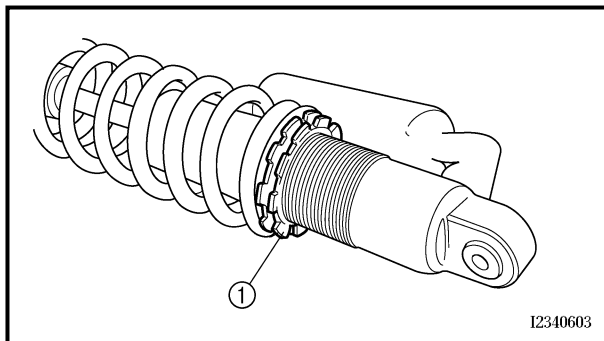
\* For EUROPE, AUS, NZ and ZA

**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.



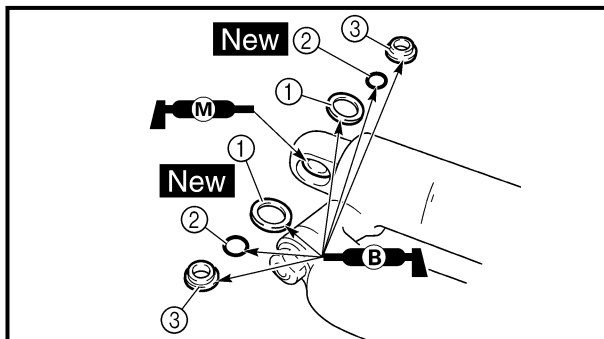
4. Tighten:
  - Locknut ①

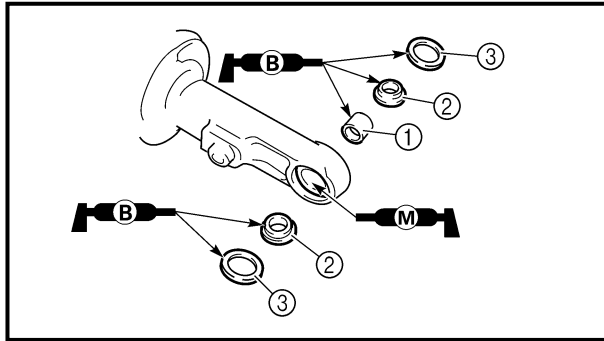
**Rear shock absorber**

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.

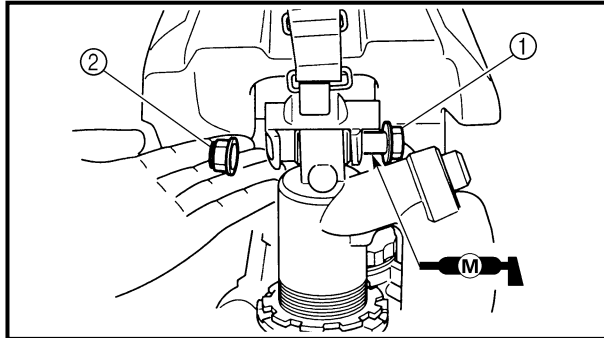




2. Install:
  - Bush ①
  - Collar ②
  - Dust seal ③

**NOTE:**

- Apply the molybdenum disulfide grease on the bearing.
- Apply the lithium soap base grease on the bush, collars and dust seals.
- Install the dust seals with their lips facing outward.



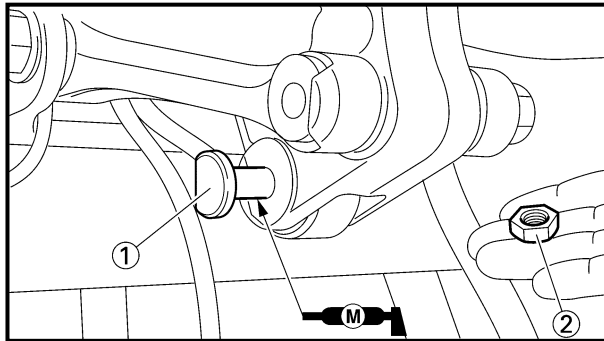
3. Install:
  - Rear shock absorber

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.

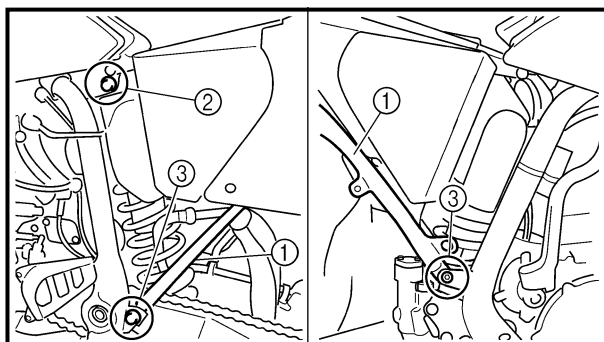


5. Install:
  - Bolt (rear shock absorber-relay arm) ①
  - Nut (rear shock absorber-relay arm) ②

**53 Nm (5.3 m · kg, 38 ft · lb)**

**NOTE:**

Apply the molybdenum disulfide grease on the bolt.

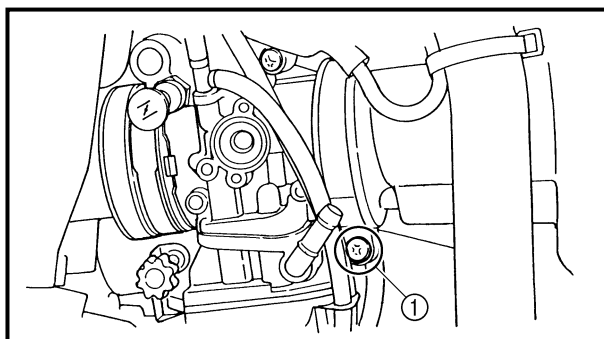


6. Install:
  - Rear frame ①
  - Bolt [rear frame (upper)] ②

**32 Nm (3.2 m · kg, 23 ft · lb)**

- Bolt [rear frame (lower)] ③

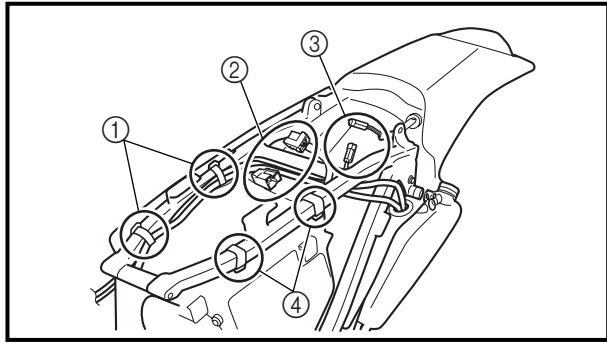
**29 Nm (2.9 m · kg, 21 ft · lb)**



7. Tighten:
  - Screw (air filter joint) ①

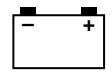
**3 Nm (0.3 m · kg, 2.2 ft · lb)**





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

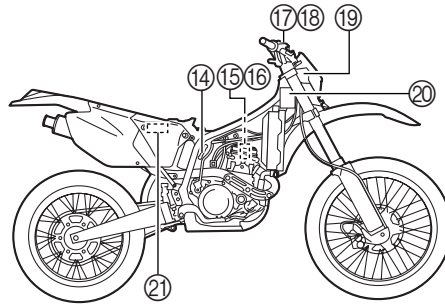
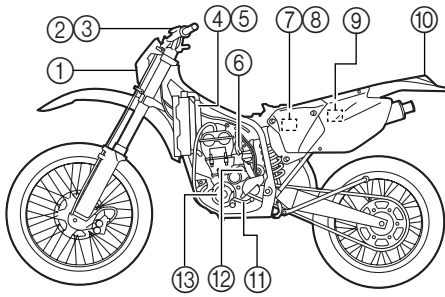
EC611000

### ELECTRICAL COMPONENTS

- |                                  |                       |
|----------------------------------|-----------------------|
| ① Headlight                      | ⑩ Taillight           |
| ② "ENGINE STOP" button           | ⑪ Neutral switch      |
| ③ Clutch switch                  | ⑫ Starter motor       |
| ④ Diode                          | ⑬ AC magneto          |
| ⑤ Starter relay diode            | ⑭ Rectifier/regulator |
| ⑥ TPS (throttle position sensor) | ⑮ Ignition coil       |
| ⑦ Starter relay                  | ⑯ Spark plug          |
| ⑧ Fuse                           | ⑰ Start switch        |
| ⑨ Starting circuit cut-off relay | ⑱ Lights switch       |
|                                  | ⑲ Main switch         |
|                                  | ⑳ CDI unit            |
|                                  | ㉑ Battery             |

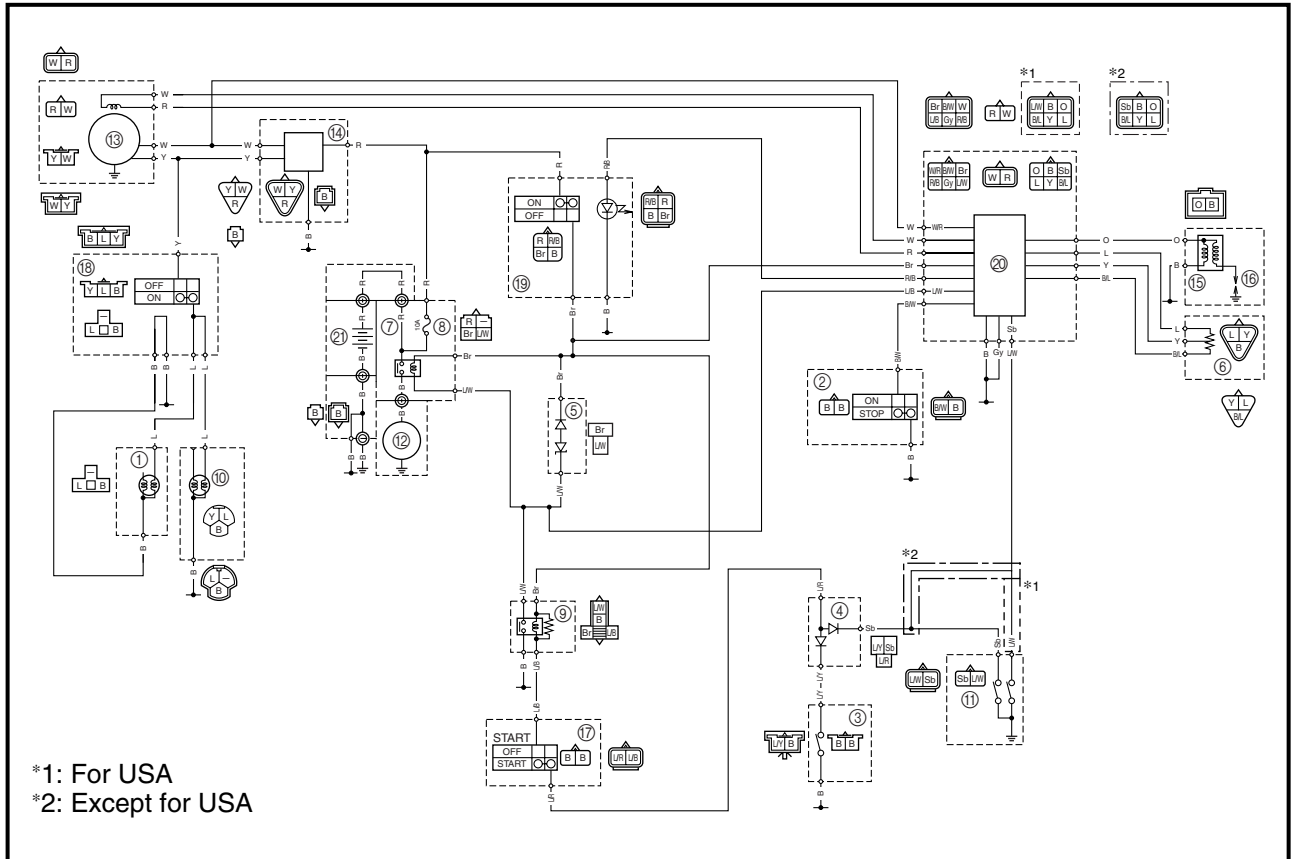
### COLOR CODE

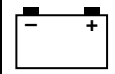
B.....	Black	B/W.....	Black/White
Br.....	Brown	L/B.....	Blue/Black
Gy.....	Gray	L/R.....	Blue/Red
L.....	Blue	L/Y.....	Blue/Yellow
O.....	Orange	L/W.....	Blue/White
R.....	Red	R/B.....	Red/Black
Sb.....	Sky blue		
W.....	White		
Y.....	Yellow		
B/L.....	Black/Blue		



EC612000

### WIRING DIAGRAM

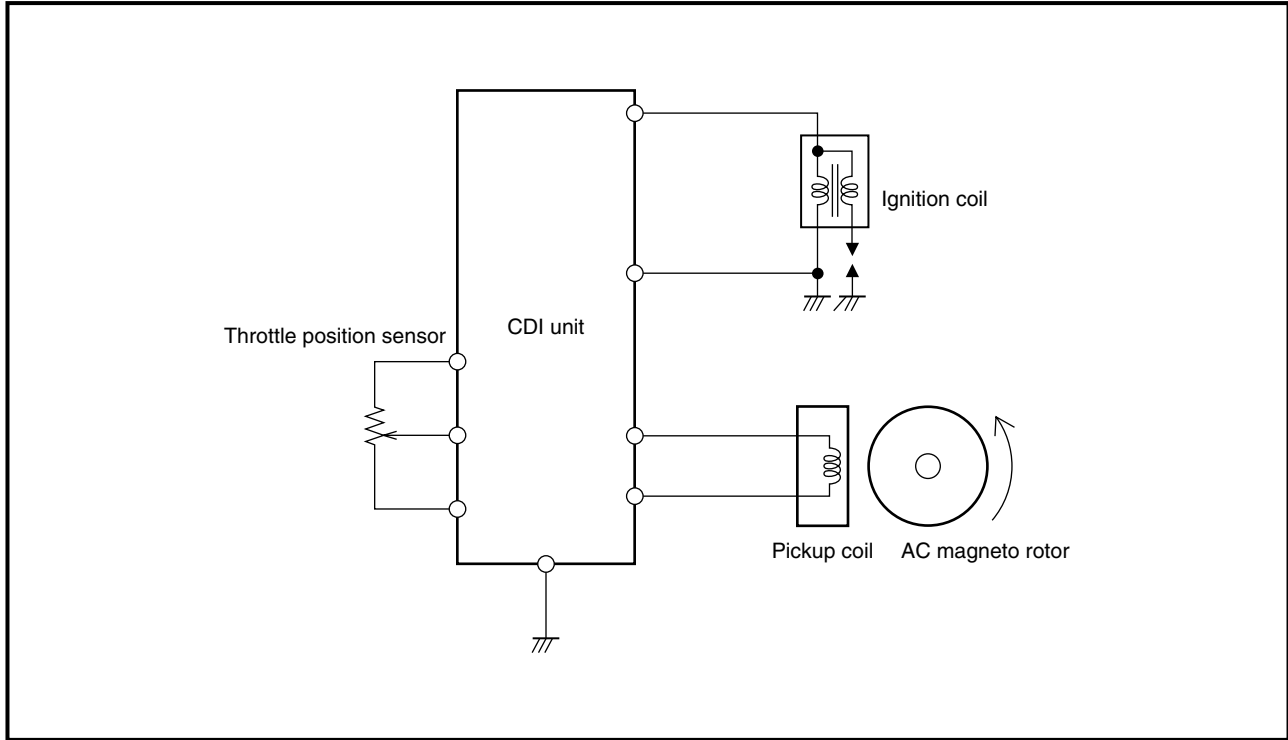




## MAP-CONTROLLED CDI UNIT

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

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

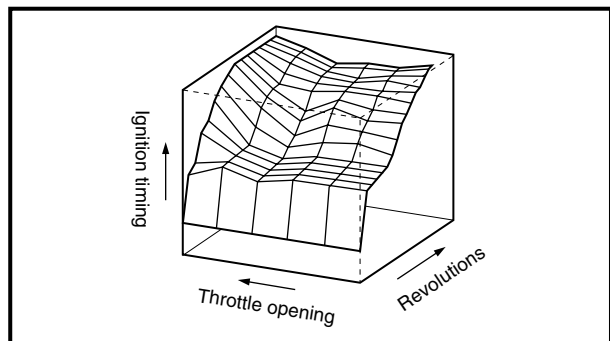


### Function of Component

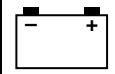
Component	Function
TPS (throttle position sensor)	Detects throttle valve opening and inputs it into the computer in the CDI unit as a throttle opening signal.
Pickup coil	Detects signal rotor revolutions and inputs them into the computer in the CDI unit as engine revolution signals.
CDI unit	The signals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

### Principal of 3-Dimensional Control

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



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

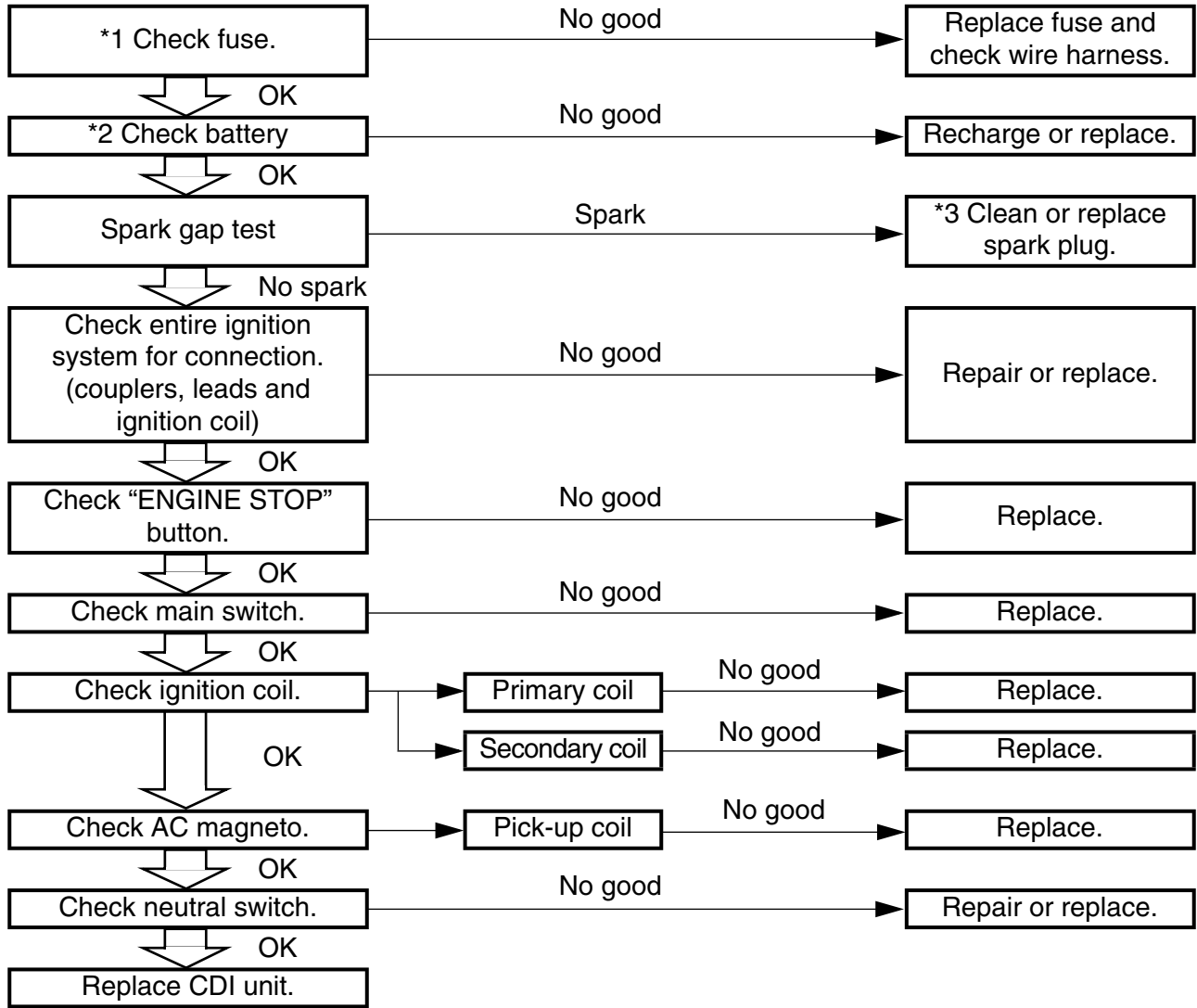


EC620000

**IGNITION SYSTEM**

**INSPECTION STEPS**

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



\*1 marked: Refer to “FUSE INSPECTION” section in the CHAPTER 3.

\*2 marked: Refer to “BATTERY INSPECTION AND CHARGING” section in the CHAPTER 3.

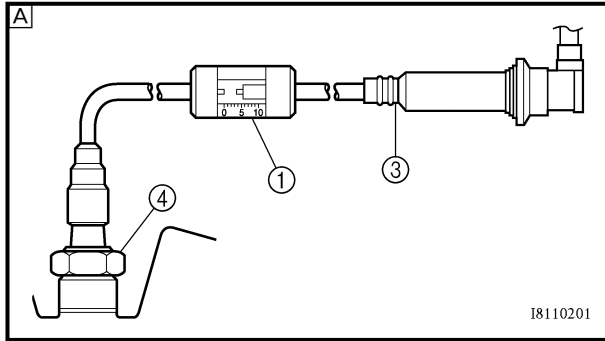
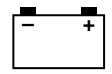
\*3 marked: Only when the ignition checker is used.

**NOTE:**

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

	<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>
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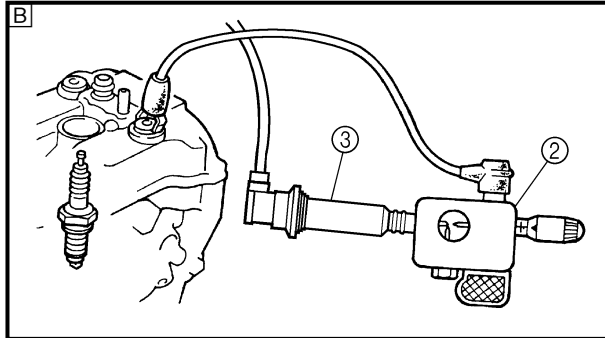


## SPARK GAP TEST

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

**A** For USA and CDN

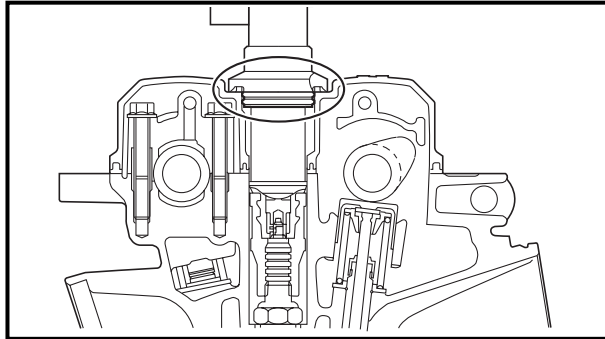
**B** Except for USA and CDN



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



**Minimum spark gap:**  
6.0 mm (0.24 in)



## COUPLERS, LEADS AND IGNITION COIL CONNECTION INSPECTION

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

EC625001

## “ENGINE STOP” BUTTON INSPECTION

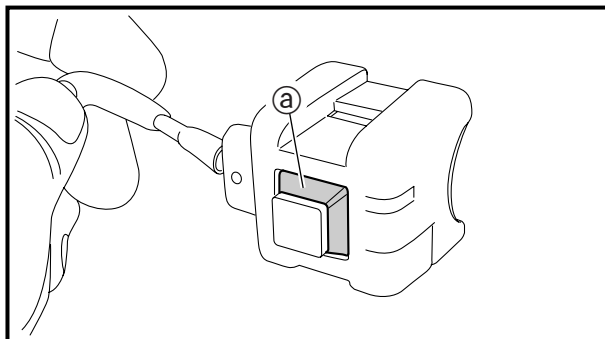
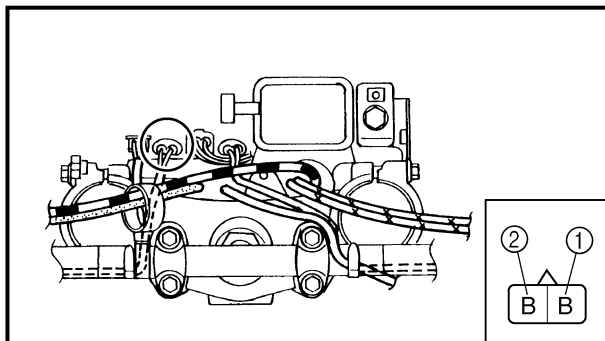
1. Inspect:
  - “ENGINE STOP” button conduct

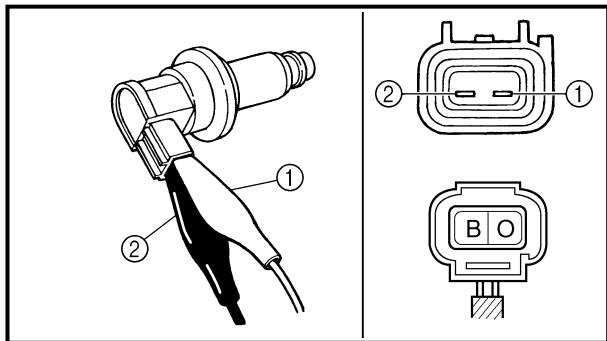
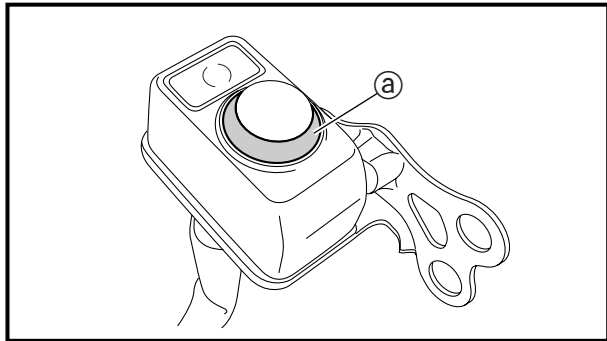
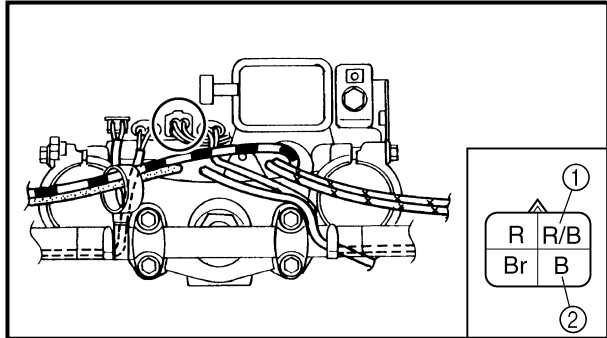
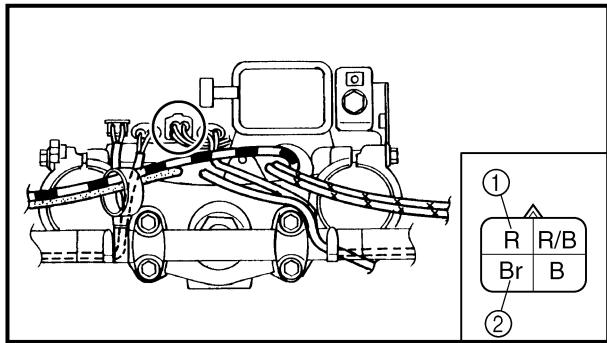
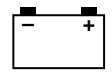
Tester (+) lead → Black lead (1)  
Tester (-) lead → Black lead (2)

		B ①	B ②	Tester selector position
	<b>PUSH IN</b>	○	○	
<b>FREE</b>				

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

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





## MAIN SWITCH INSPECTION

1. Inspect:
  - Main switch conduct

**Tester (+) lead** → Red lead ①  
**Tester (-) lead** → Brown lead ②

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

Continuous while the main switch is moved to “OFF” → Replace.

Not continuous while the main switch is moved to “ON” → Replace.

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

**Battery (+) lead** → Red/Black lead ①  
**Battery (-) lead** → Black lead ②

Indicator light does not come on → Replace.

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

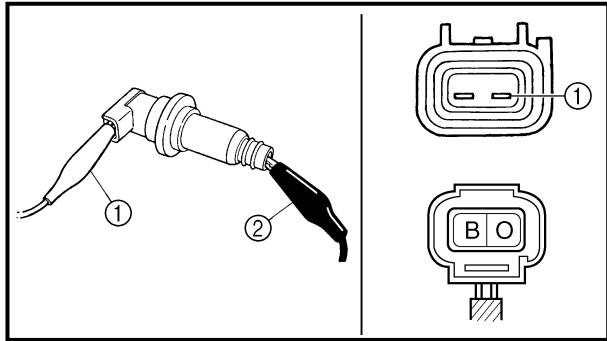
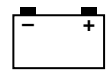
EC626002

## IGNITION COIL INSPECTION

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

**Tester (+) lead** → Orange lead ①  
**Tester (-) lead** → Black lead ②

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

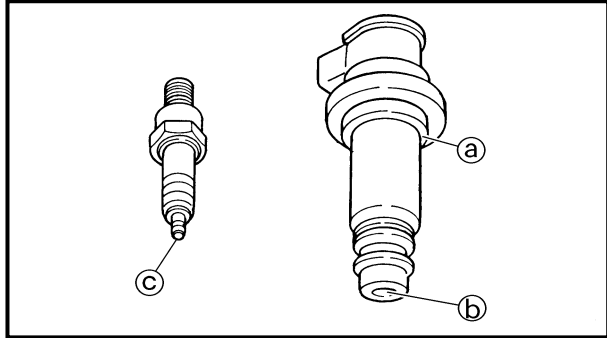


3. Inspect:

- Secondary coil resistance  
Out of specification → Replace.

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

	<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.

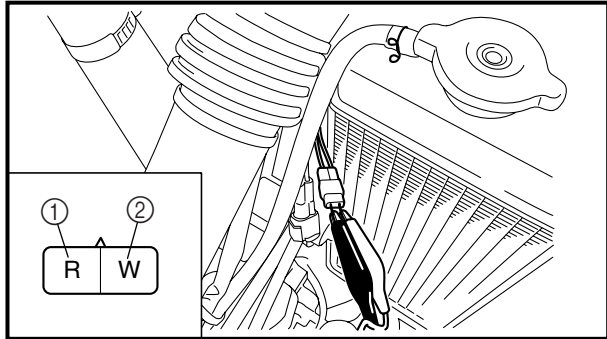
**AC MAGNETO INSPECTION**

1. Inspect:

- Pick-up coil resistance  
Out of specification → Replace.

**Tester (+) lead → Red lead ①**  
**Tester (-) lead → White lead ②**

	<b>Pick-up coil resistance</b>	<b>Tester selector position</b>
	<b>248 ~ 372 Ω at 20 °C (68 °F)</b>	<b>Ω × 100</b>

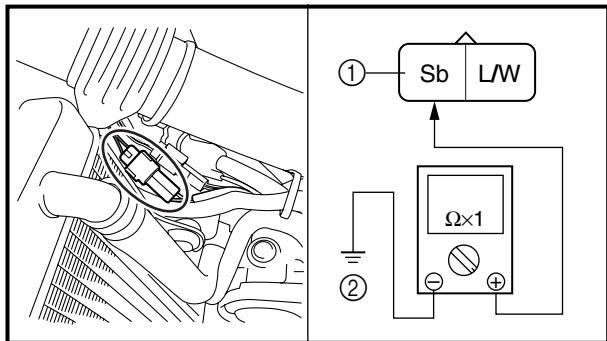


**NEUTRAL SWITCH INSPECTION**

1. Inspect:

- Neutral switch conduct

**Tester (+) lead → Sky blue lead ①**  
**Tester (-) lead → Ground ②**



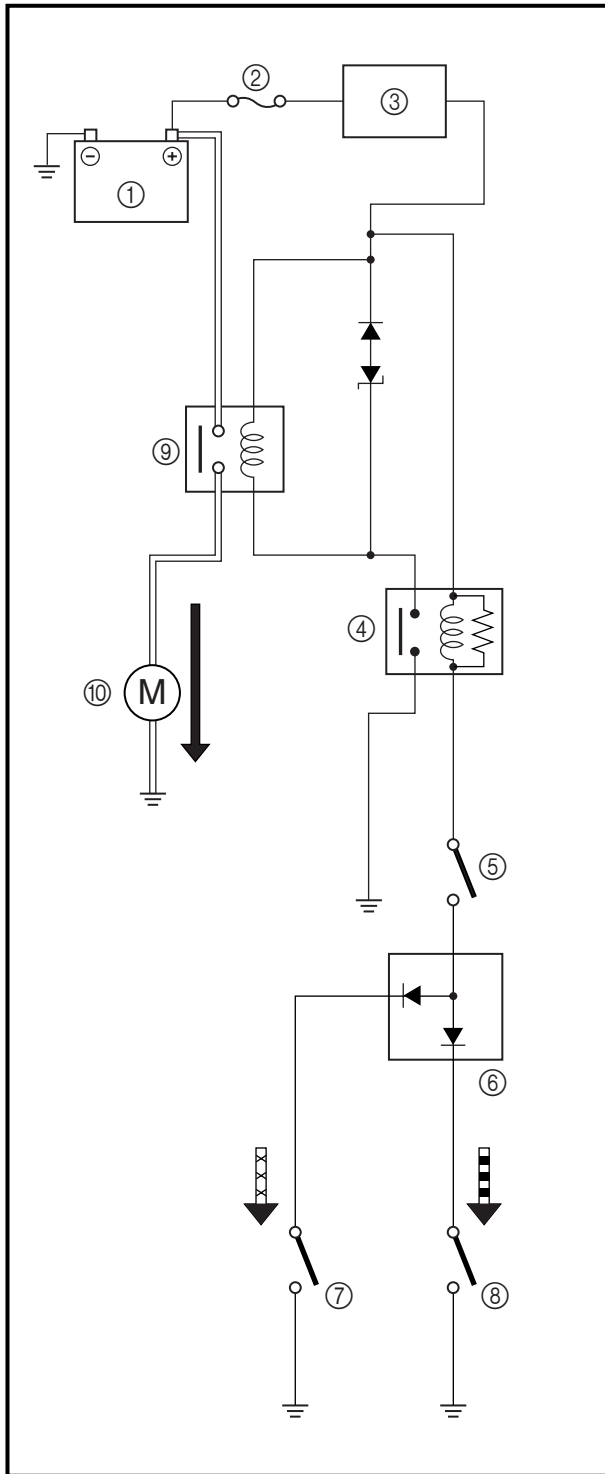
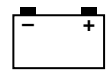
		<b>Sb ①</b>	<b>Ground</b>	<b>Tester selector position</b>
	<b>NEUTRAL</b>	○	○	<b>Ω × 1</b>
	<b>IN GEAR</b>			

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:

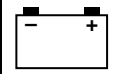
- The transmission is in neutral (the neutral switch is closed).
- The clutch lever is pulled to the handlebar (the clutch switch is closed).

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

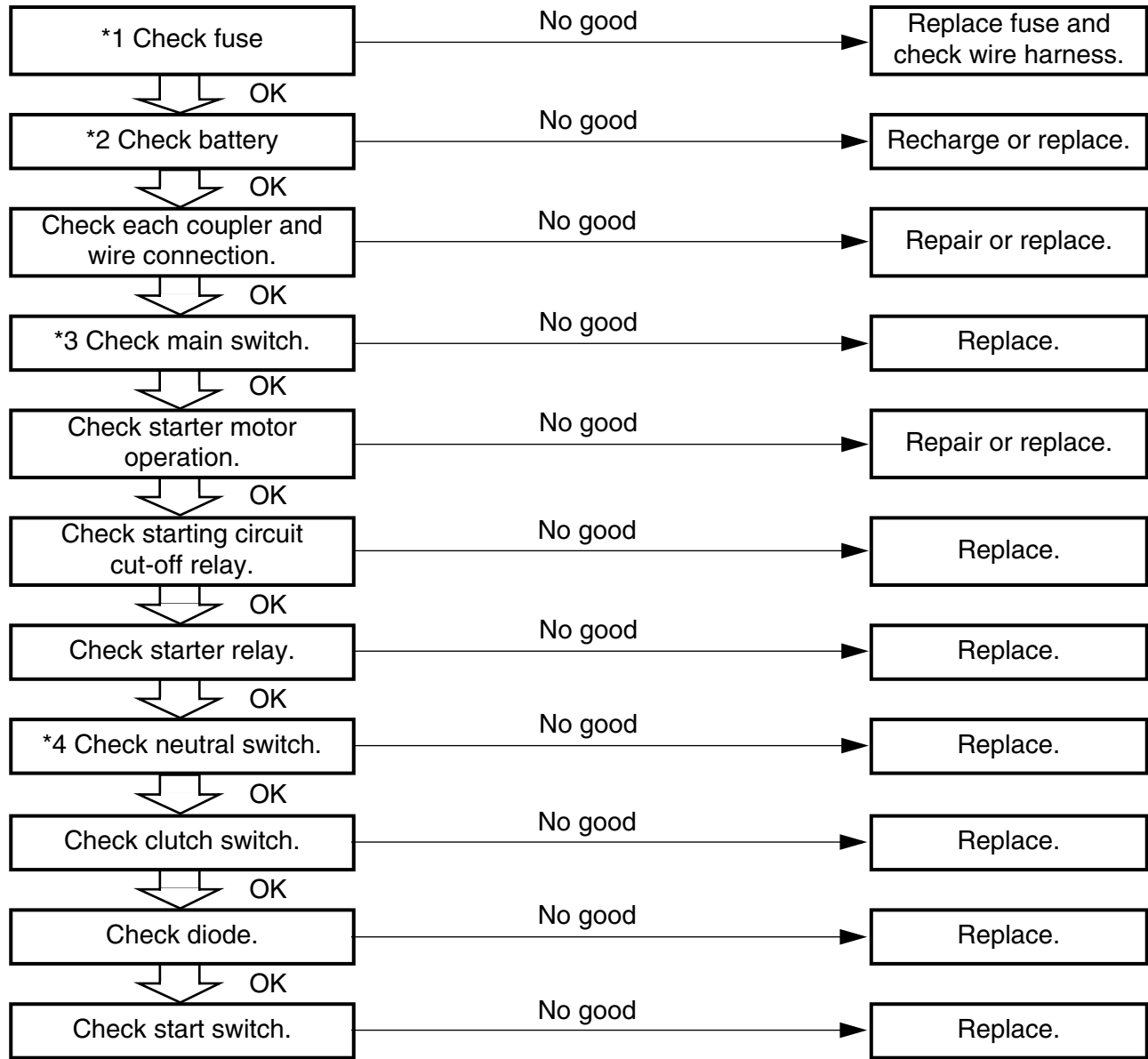
- ① Battery
- ② Main fuse
- ③ Main switch
- ④ Starting circuit cut-off relay
- ⑤ Start switch
- ⑥ Diode
- ⑦ Clutch switch
- ⑧ Neutral switch
- ⑨ Starter relay
- ⑩ Starter motor





## 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.

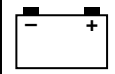
\*4 marked: Refer to "NEUTRAL SWITCH INSPECTION" section.

### 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.



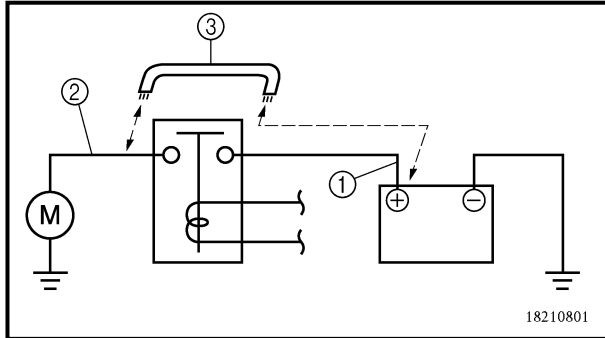
**Pocket tester:**  
YU-3112-C/90890-03112



EC624000

**COUPLERS AND LEADS CONNECTION INSPECTION**

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

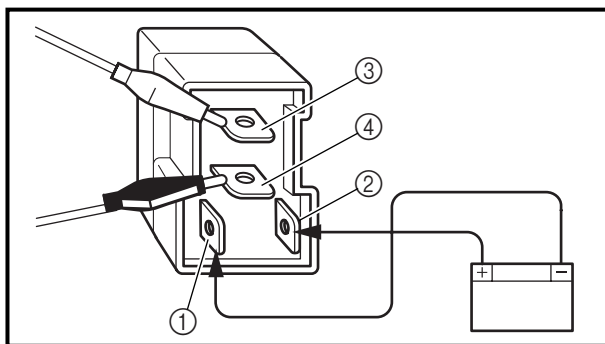


**STARTER MOTOR OPERATION**

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.




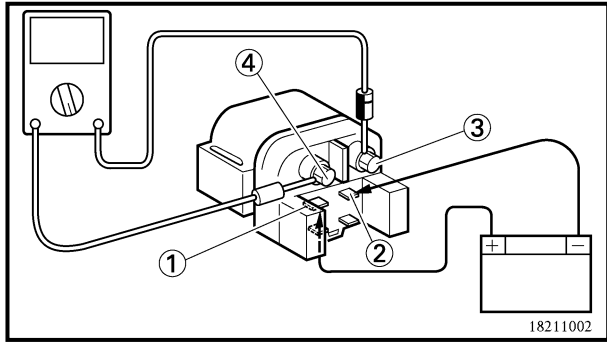
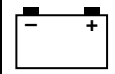
**STARTING CIRCUIT CUT-OFF RELAY INSPECTION**

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

**Battery (+) lead → Blue/Black lead ①**  
**Battery (-) lead → Brown lead ②**

**Tester (+) lead → Blue/White lead ③**  
**Tester (-) lead → Black lead ④**

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



## STARTER RELAY INSPECTION


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

**Battery (+) lead** → Starter relay terminal ①

**Battery (-) lead** → Starter relay terminal ②

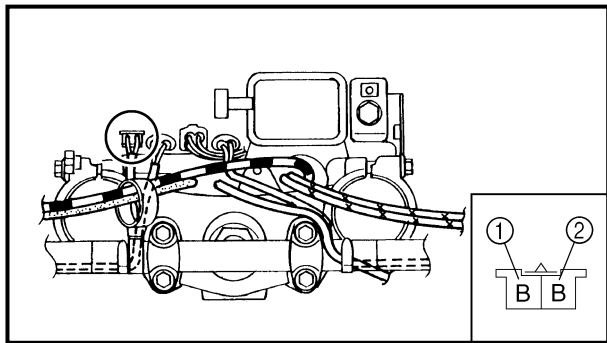
**Tester (+) lead** → Starter relay terminal ③

**Tester (-) lead** → Starter relay terminal ④

		Ter- minal ③	Ter- minal ④	Tester selec- tor 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

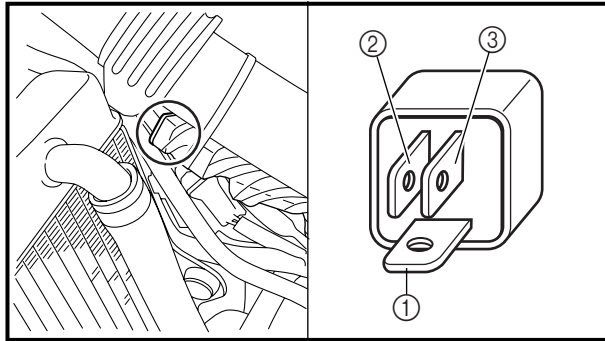
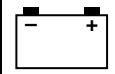
- Inspect:
  - Clutch switch continuity

**Tester (+) lead** → Black lead ①

**Tester (-) lead** → Black lead ②

		B ①	B ②	Tester selec- tor position
	<b>PULL</b>	○	○	$\Omega \times 1$
	<b>FREE</b>			

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

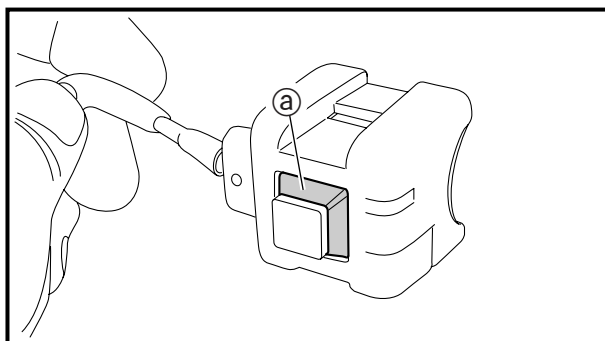
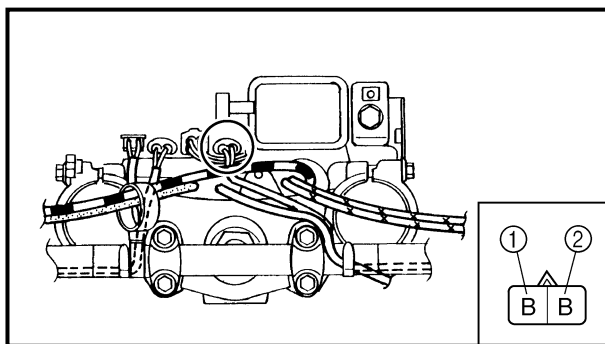


## DIODE INSPECTION

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

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

Incorrect continuity → Replace.



## START SWITCH INSPECTION

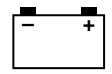
- Inspect:
  - Start switch continuity

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

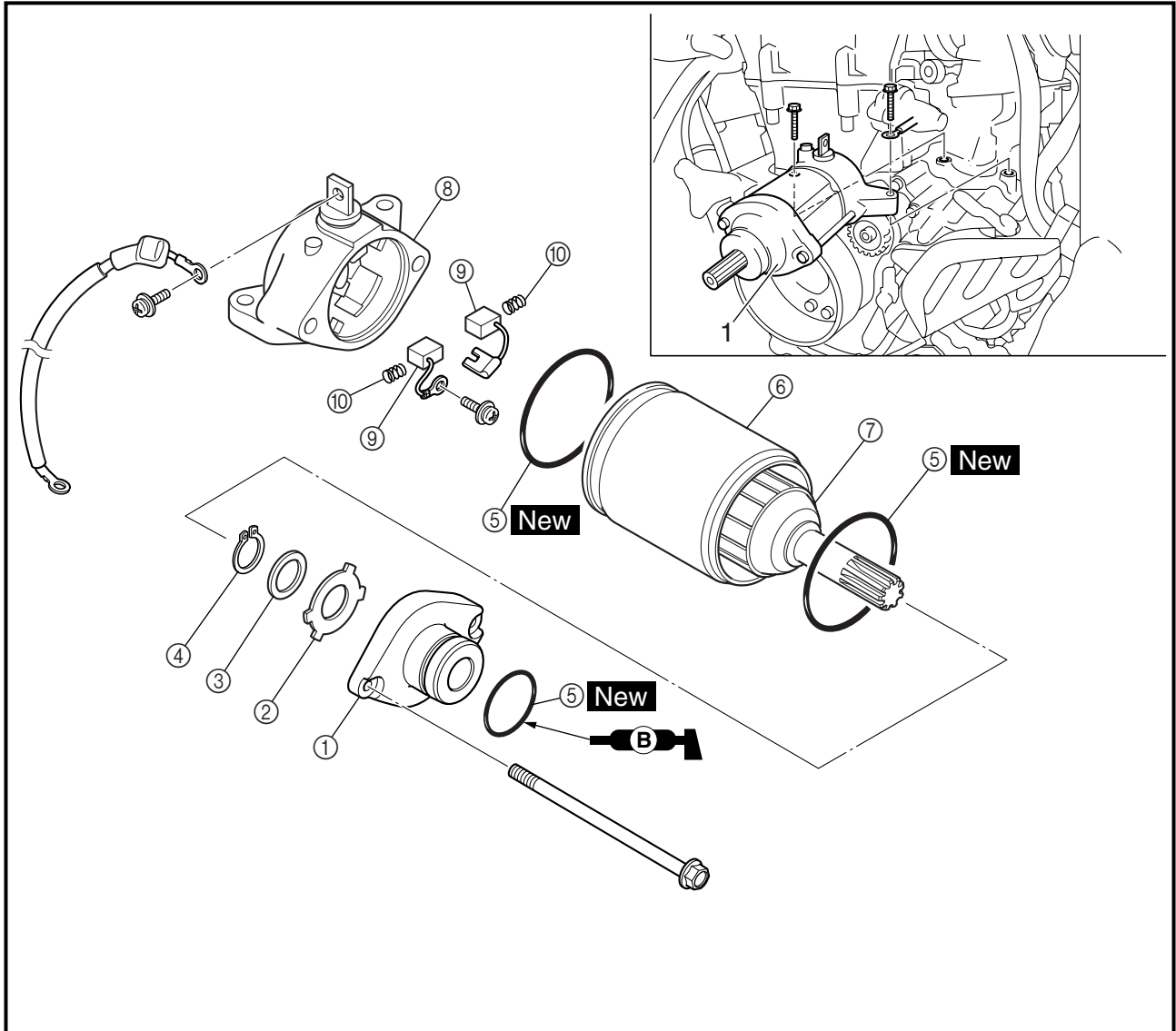
		B ①	B ②	Tester selector position
	PUSH IN	○	○	$\Omega \times 1$
FREE				

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

- Inspect:
  - Rubber part ①  
Tears/damage → Replace.

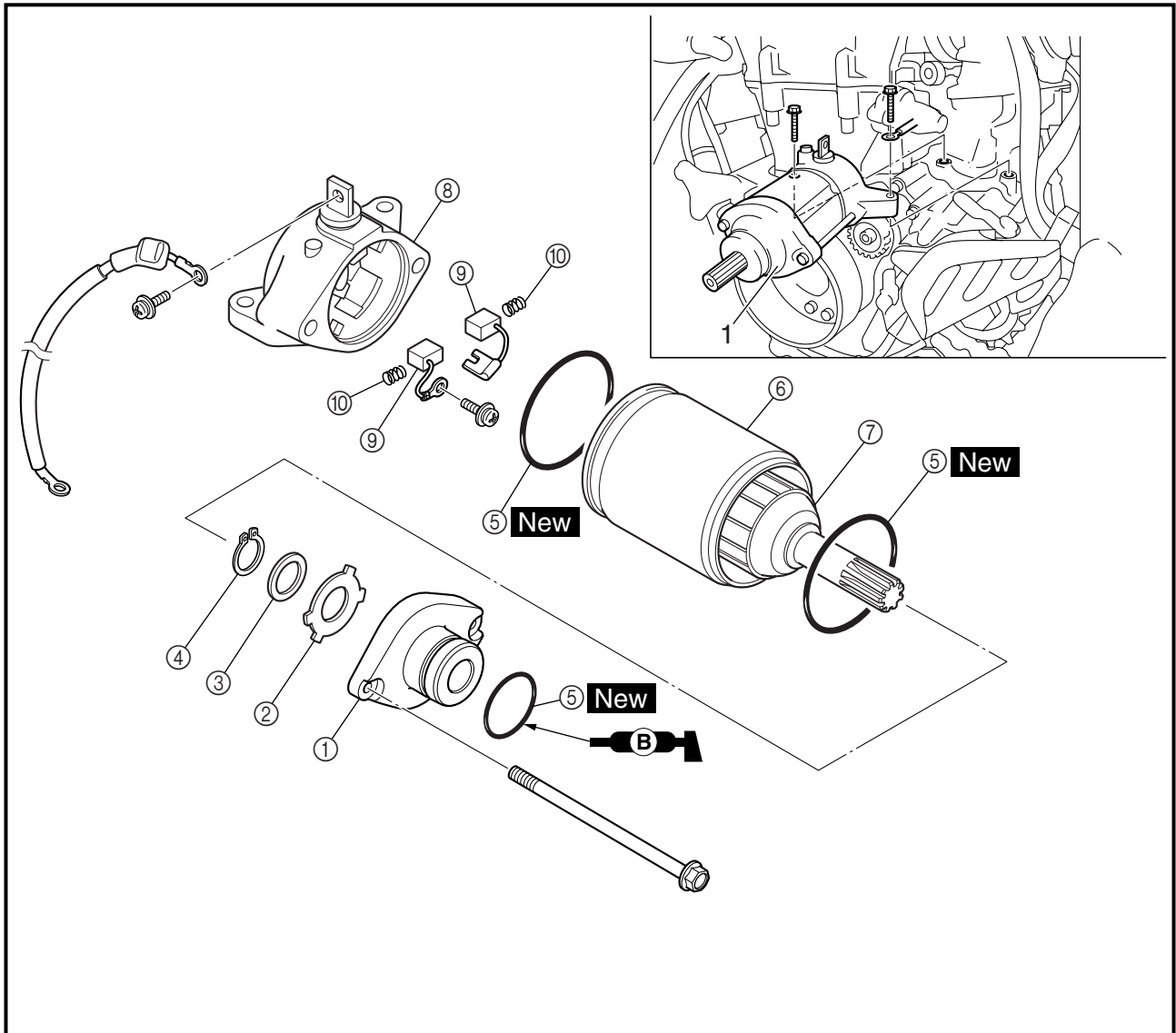
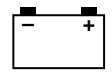


STARTER MOTOR

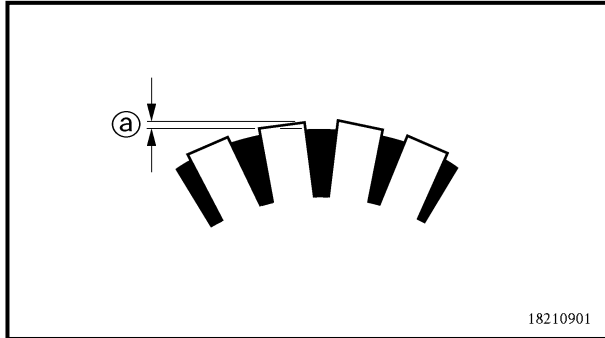
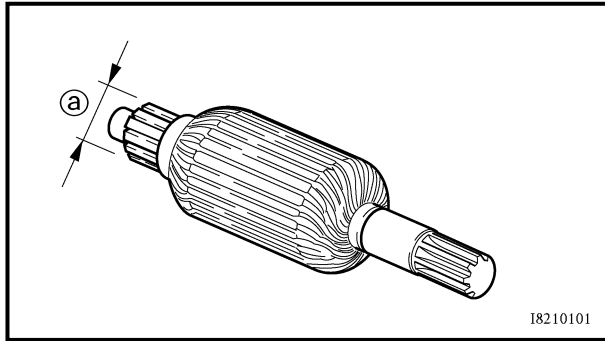
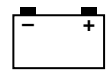


Extent of removal: ① Starter motor disassembly

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



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



**INSPECTION AND REPAIR**

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



**Min. commutator diameter**  
**16.6 mm (0.65 in)**

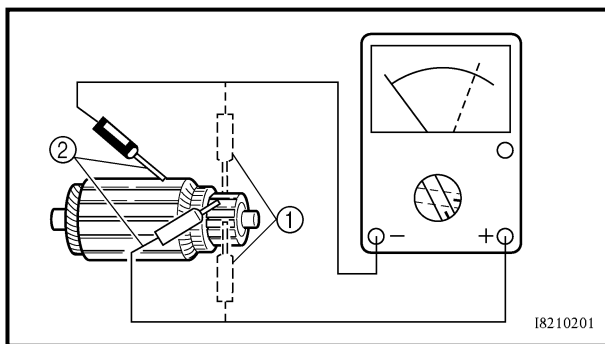
3. Measure:
  - Mica undercut Ⓐ
    - Out of specification → Scrape the mica to the proper measurement with a hacksaw blade which has been grounded to fit the commutator.



**Mica undercut**  
**1.5 mm (0.06 in)**

**NOTE:**

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



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



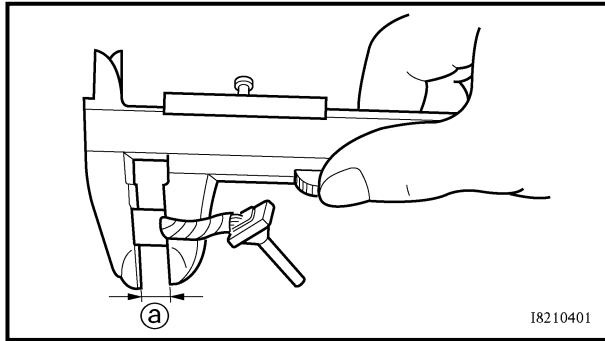
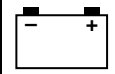
• Measure the armature assembly resistances with the pocket tester.



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

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

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

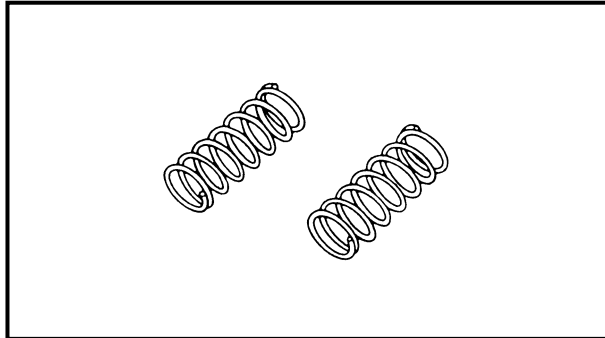


5. Measure:

- Brush length ③  
Out of specification → Replace the brushes as a set.



**Min. brush length**  
**3.5 mm (0.14 in)**

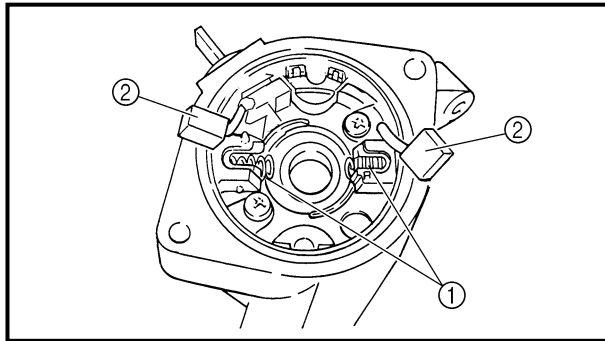


6. Measure:

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



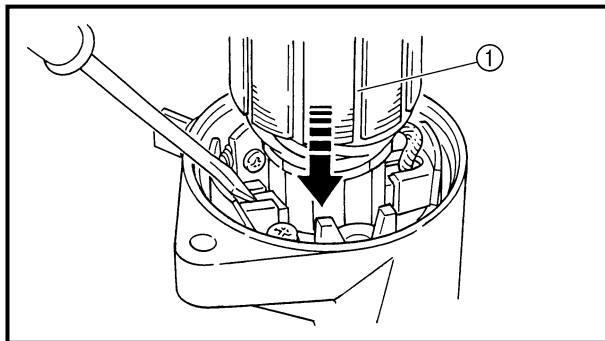
**Brush spring force**  
**3.92 ~ 5.88 N**  
**(400 ~ 600 gf, 14.1 ~ 21.2 oz)**



**ASSEMBLY**

1. Install:

- Brush spring ①
- Brush ②



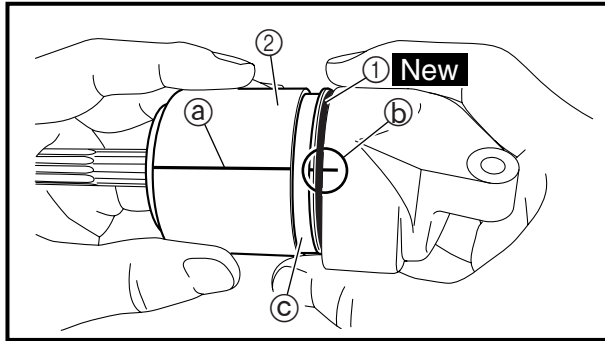
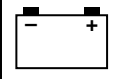
2. Install:

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

**CAUTION:**

**Be careful not to damage the brush during installation.**

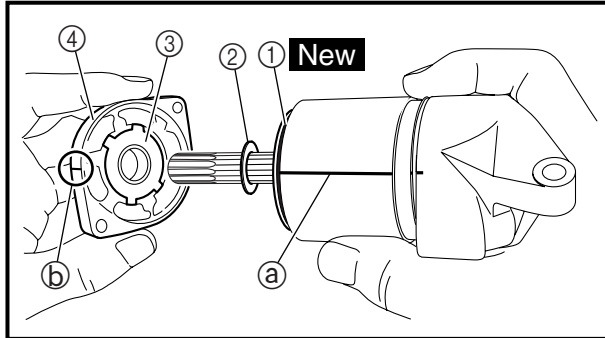




3. Install:
- O-ring ① **New**
  - Starter motor yoke ②

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

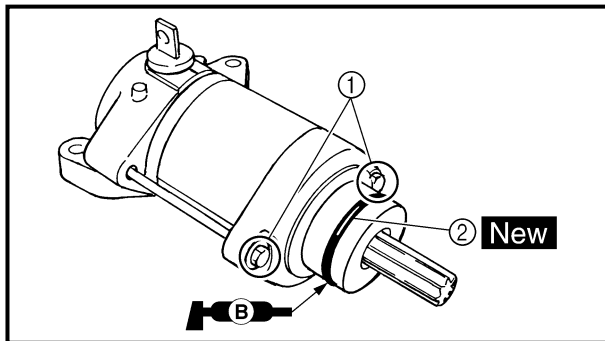
- Align the match mark (a) on the starter motor yoke with the match mark (b) on the starter motor rear cover.
- Install the starter motor yoke with its groove (c) facing rear cover.



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

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

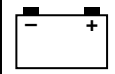
- For installation, align the projections on the washer with the slots in the front cover.
- Align the match mark (a) on the starter motor yoke with the match mark (b) on the starter motor front cover.



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

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

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



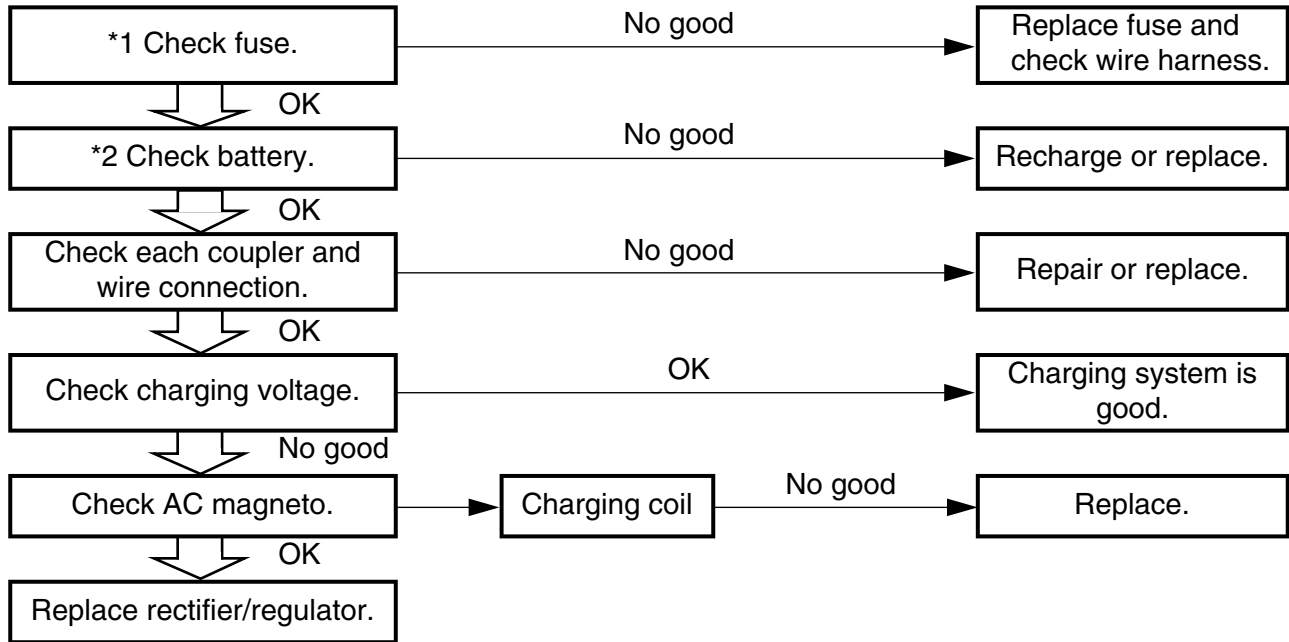
EC680000

**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.

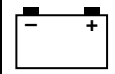
\*2 marked: Refer to “BATTERY INSPECTION AND CHARGING” section in the CHAPTER 3.

**NOTE:**

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

	<b>Pocket tester:</b> YU-3112-C/90890-03112
--	--

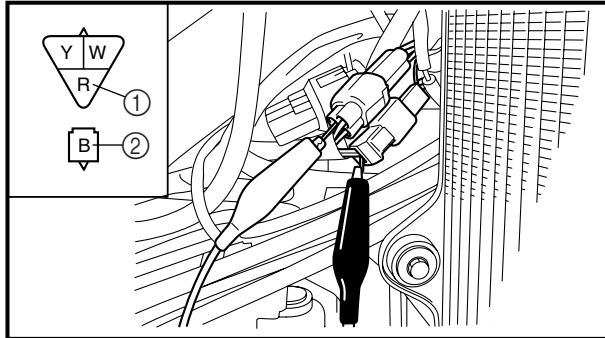
	<b>Inductive tachometer:</b> YU-8036-B <b>Engine tachometer:</b> 90890-03113
--	---



EC624000

## COUPLERS AND LEADS CONNECTION INSPECTION


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

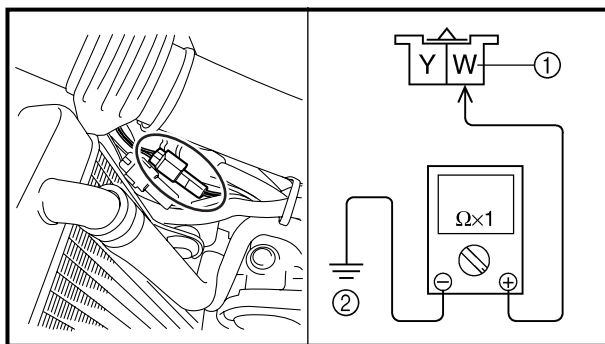


## CHARGING VOLTAGE INSPECTION

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


**Tester (+) lead → Red lead ①**  
**Tester (-) lead → Black lead ②**

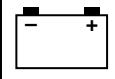
	Charging voltage	Tester selector position
	14.1 ~ 14.9 V at 5,000 r/min	DCV-20



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

**Tester (+) lead → White lead ①**  
**Tester (-) lead → Ground ②**

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

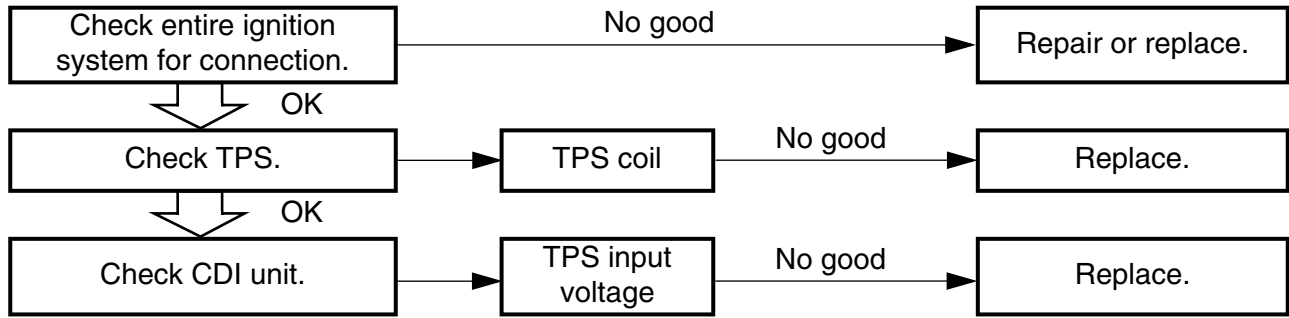


EC690000

**TPS (THROTTLE POSITION SENSOR) SYSTEM**

**INSPECTION STEPS**

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

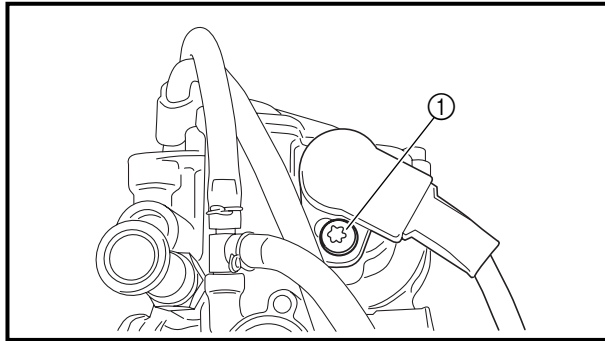
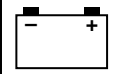


**NOTE:**

Use the following special tools in this inspection.

	<p><b>Pocket tester:</b> YU-3112-C/90890-03112</p>
--	--

	<p><b>Inductive tachometer:</b> YU-8036-B</p>
	<p><b>Engine tachometer:</b> 90890-03113</p>



### HANDLING NOTE

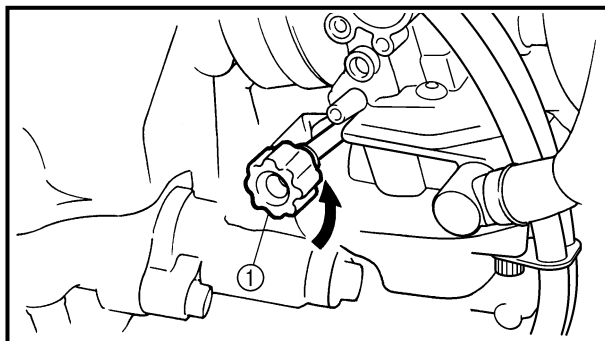
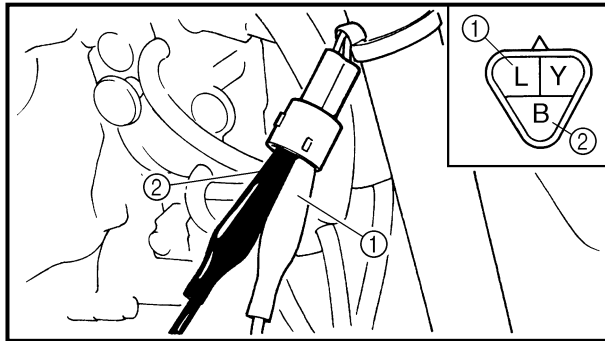
#### CAUTION:

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

EC624000

### COUPLERS AND LEADS CONNECTION INSPECTION


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



### TPS COIL INSPECTION

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

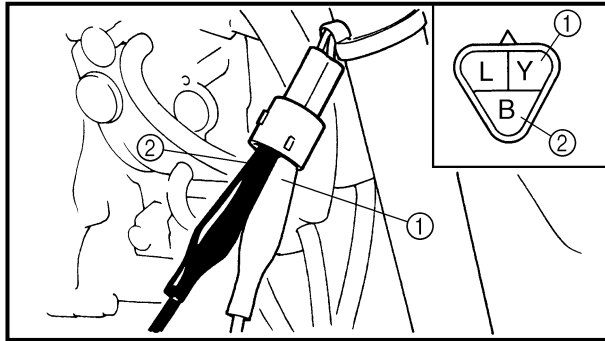
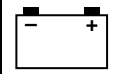
Tester (+) lead → Blue lead ①  
Tester (-) lead → Black lead ②

 Tester	TPS 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.

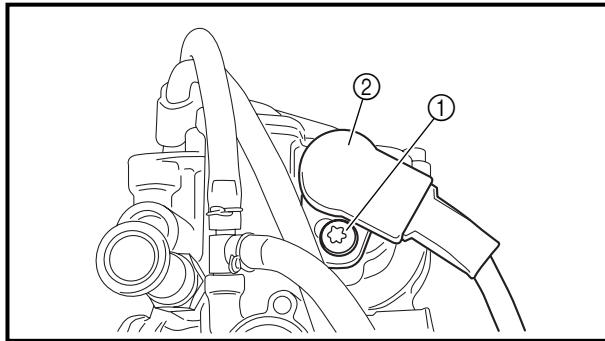


### 3. Inspect:

- TPS 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**

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



## TPS REPLACEMENT AND ADJUSTMENT

### 1. Remove:

- TPS coupler ①
- Screw (TPS) ①
- TPS ②

### NOTE:

Loosen the screws (TPS) using the T25 bit.

### 2. Replace:

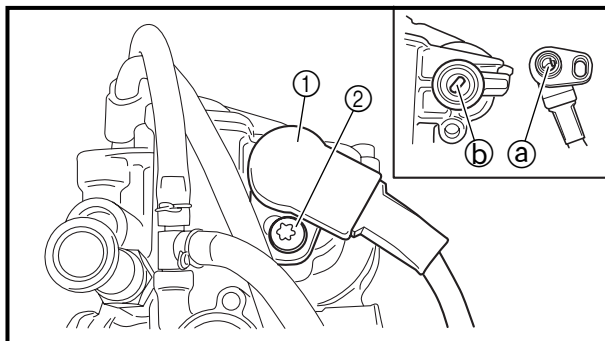
- TPS

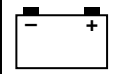
### 3. Install:

- TPS ①
- Screw (TPS) ②
- TPS coupler

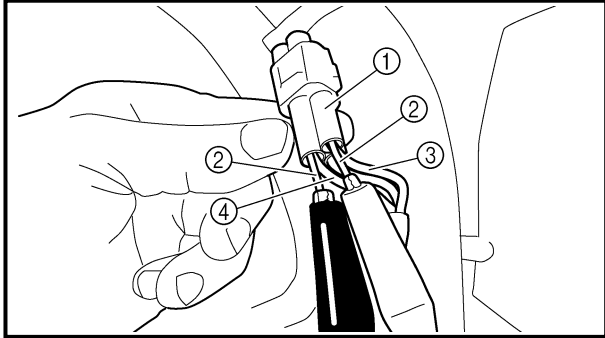
### NOTE:

- Align the slot ① in the TPS with the projection ② on the carburetor.
- Temporarily tighten the screws (TPS).





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



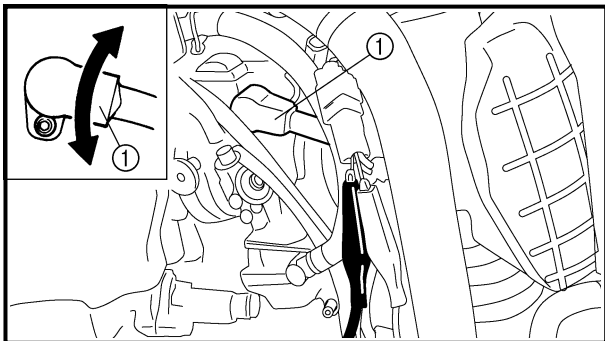
5. Insert the thin electric conductors ② (lead) into the TPS coupler ①, as shown, and connect the tester to them.

**Tester (+) lead** → **Yellow lead** ③  
**Tester (-) lead** → **Black lead** ④

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

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

6. Start the engine.




7. Adjust:
  - TPS output voltage

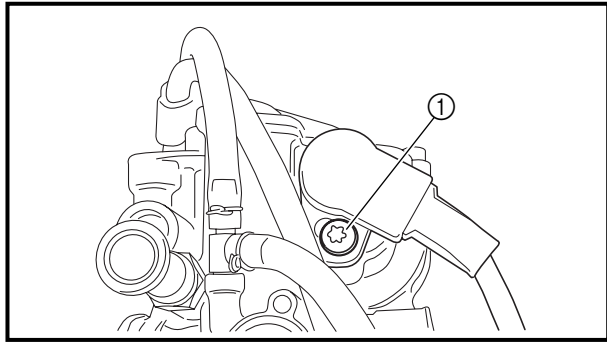
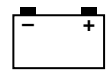
**Adjustment steps:**

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

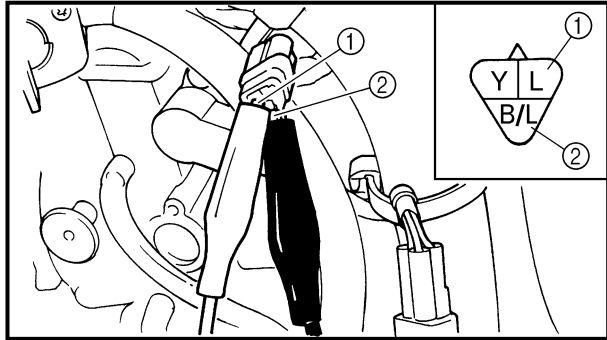
**NOTE:** \_\_\_\_\_

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

	TPS output voltage	Tester selector position
	0.58 ~ 0.78 V	DCV



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




EC694000

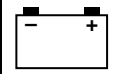
### TPS INPUT VOLTAGE INSPECTION

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

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

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

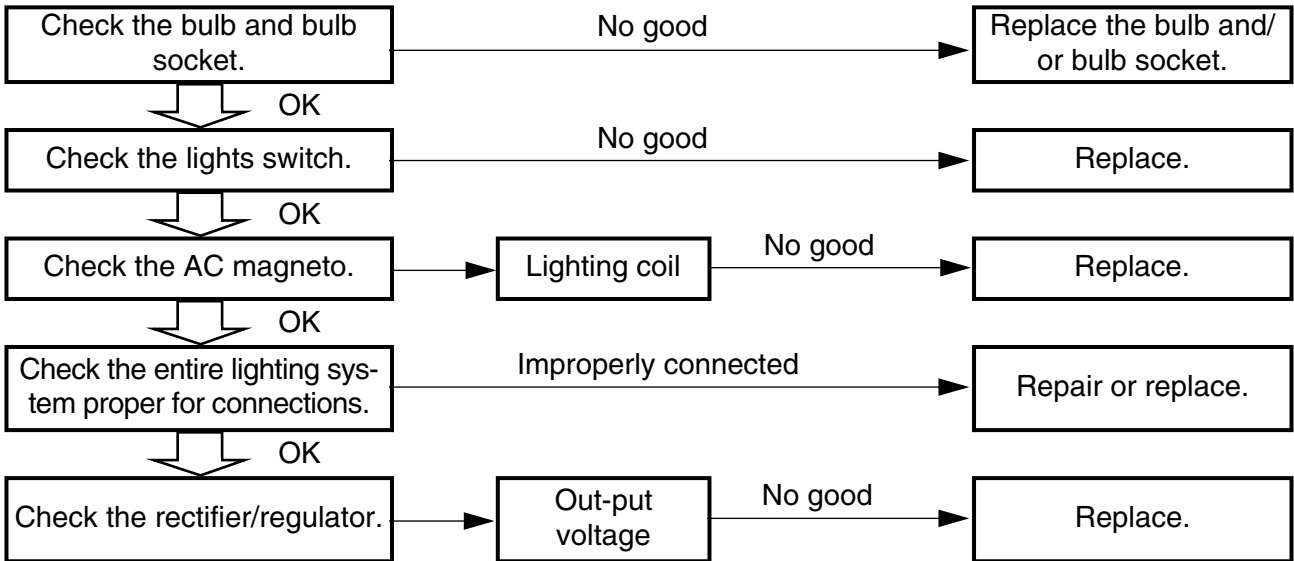




**LIGHTING SYSTEM**

**INSPECTION STEPS**

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



**NOTE:**

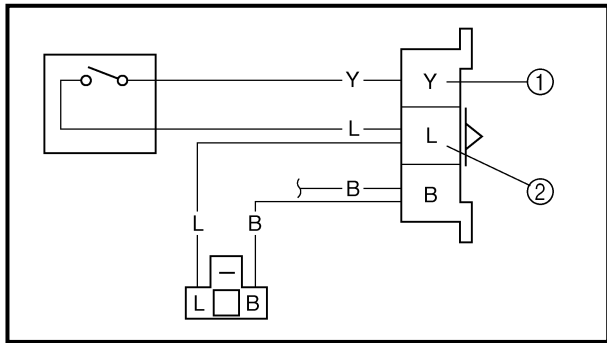
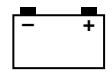
- Replace the bulb and/or bulb socket.
  - 1) Seat
  - 2) Fuel tank
- Use the following special tool.



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



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



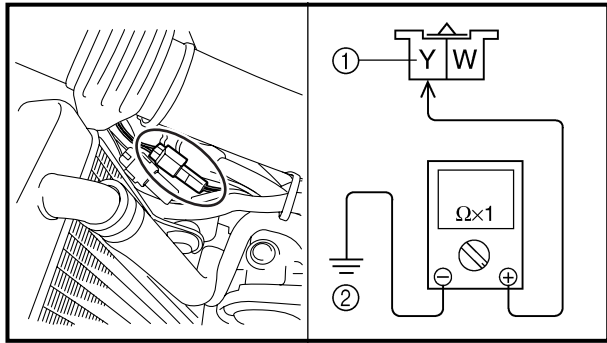
**LIGHTS SWITCH INSPECTION**

- Inspect:
  - Lights switch conduct

**Tester (+) lead → Yellow lead ①**  
**Tester (-) lead → Blue lead ②**

		Y ①	L ②	Tester selector position
	 OFF	○	○	$\Omega \times 1$

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



**AC MAGNETO INSPECTION**

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

**Tester (+) lead → Yellow lead ①**  
**Tester (-) lead → Ground ②**

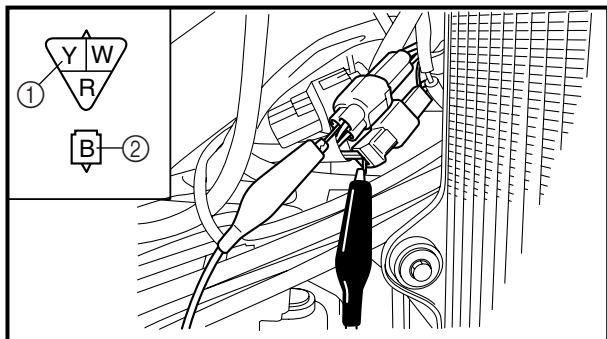
	Lighting coil resistance	Tester selector position
	0.224 ~ 0.336 $\Omega$ at 20 °C (68 °F)	$\Omega \times 1$

**RECTIFIER/REGULATOR INSPECTION**

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

**Tester (+) lead → Yellow lead ①**  
**Tester (-) lead → Black lead ②**

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





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.

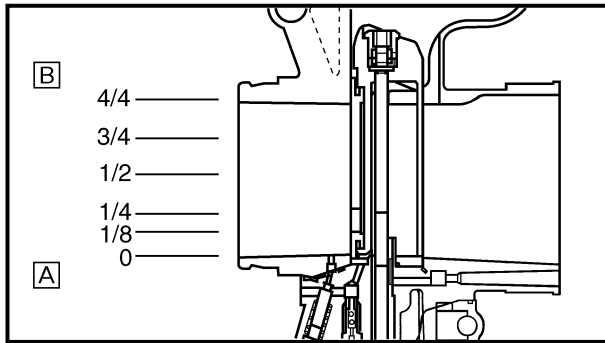
#### Atmospheric conditions and carburetor settings

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.

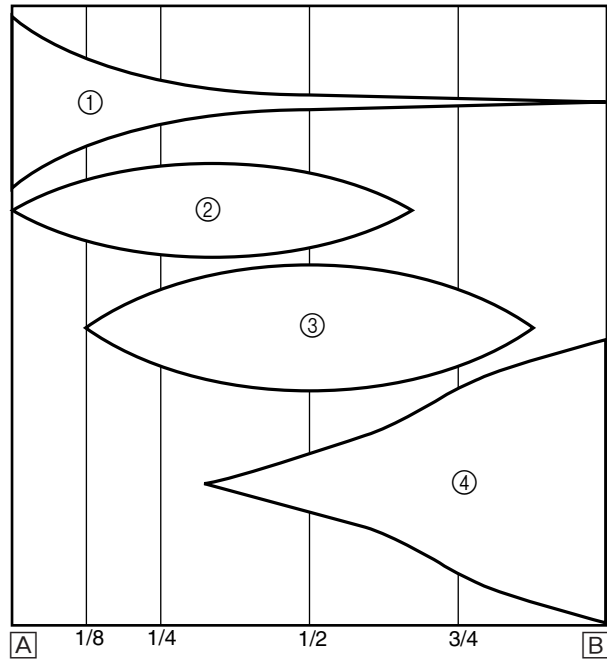
That is:

- 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.

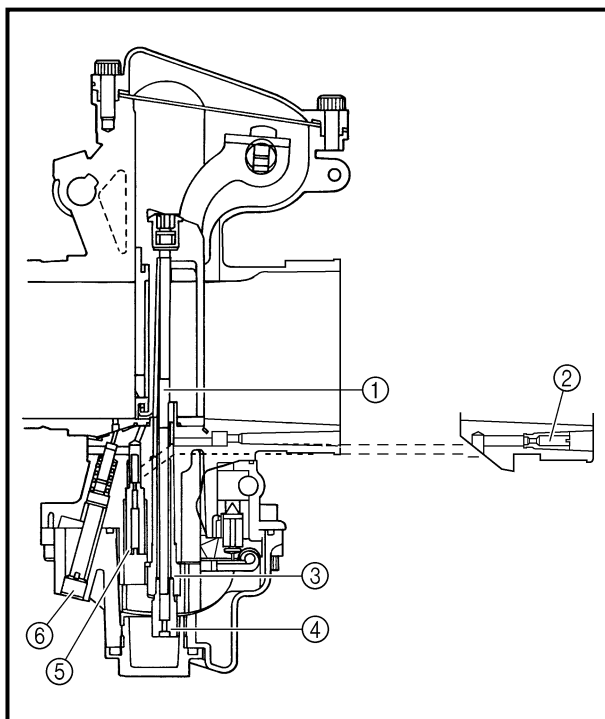


- A** Closed
- B** Fully open

**Effects of the setting parts on the throttle valve opening**



- ① Pilot screw/pilot jet
- ② Throttle valve cutaway
- ③ Jet needle
- ④ Main jet



**Main system**

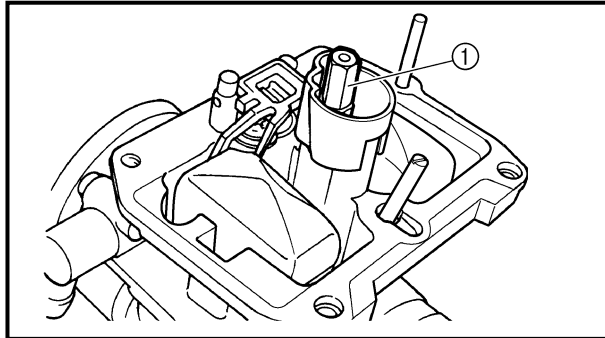
The FLATCR carburetor has a primary main jet. This type of main jet is perfect for racing motorcycles since it supplies an even flow of fuel, even at full load. Use the main jet and the jet needle to set the carburetor.

- ① Jet needle
- ② Pilot air jet
- ③ Needle jet
- ④ Main jet
- ⑤ Pilot jet
- ⑥ Pilot screw



**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.



**Main jet adjustment**

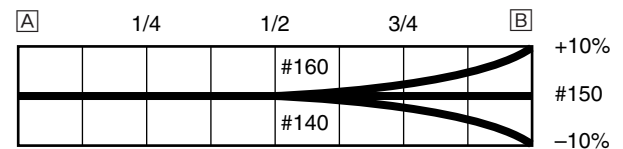
The richness of the air-fuel mixture at full throttle can be set by changing the main jet ①.

<b>Standard main jet</b>	<b>#150</b> <b>*#160</b>
--------------------------	-----------------------------

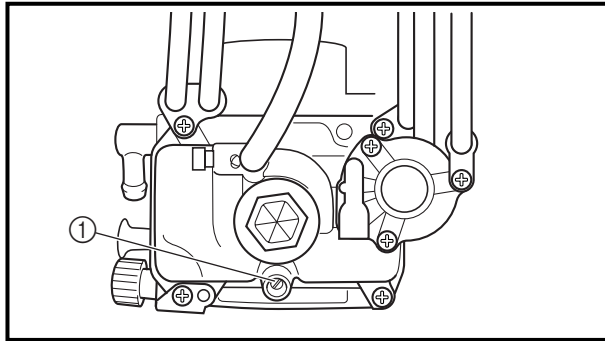
\* Except for USA

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)**



Ⓐ Idle      Ⓑ 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.

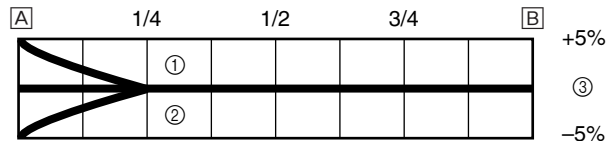
<b>Standard pilot screw position</b>	<b>1-3/4 *1-1/2 (example)</b>
--------------------------------------	---------------------------------------

\* Except for USA

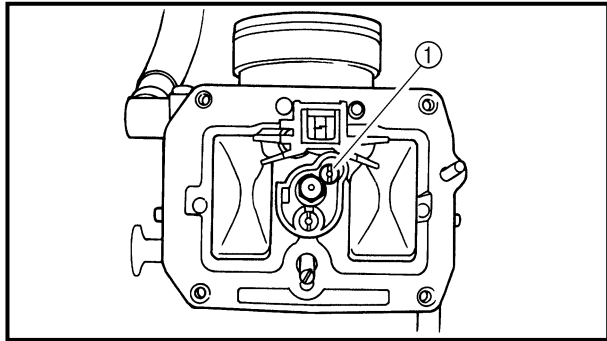
**NOTE:**

- If the 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 2-1/4 turns out
- ② 1-1/4 turns out
- ③ 1-3/4 turns out



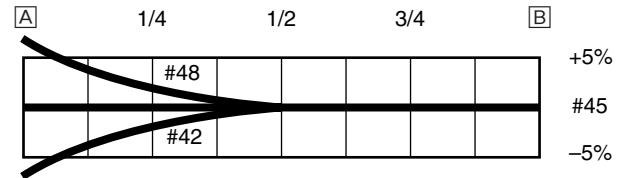
**Pilot jet adjustment**

The richness of the air-fuel mixture with the throttle open 1/4 or less can be set by adjusting the pilot jet ①.

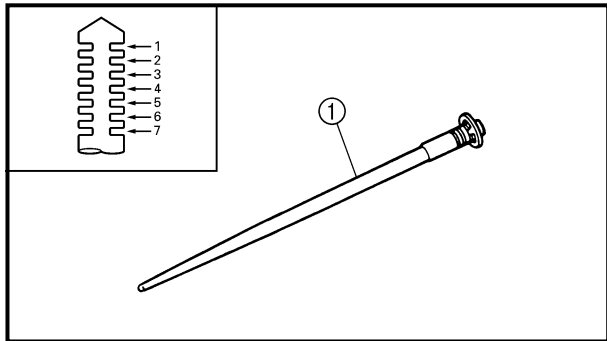
<b>Standard pilot jet</b>	<b>#45</b> <b>*#48</b>
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\* Except for USA

**Effects of adjusting the pilot jet (reference)**



[A] Idle      [B] Fully open



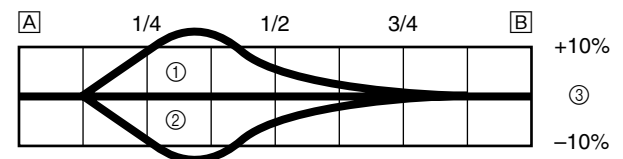
**Jet needle groove position adjustment**

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





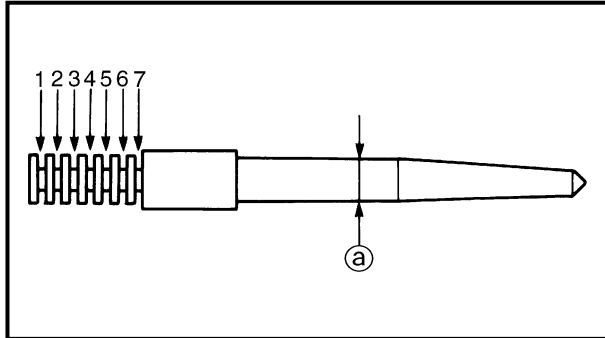
**Jet needle adjustment**

The jet needle is adjusted by changing it.

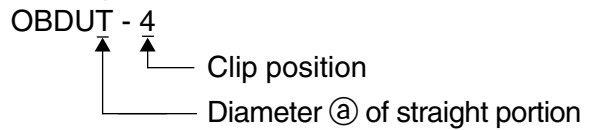
<b>Standard jet needle</b>	<b>OBDUT *OBDUQ</b>
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\* Except for USA

The tapered sections of all jet needles have the same starting positions, but the needles are available with different straight-portion diameters.



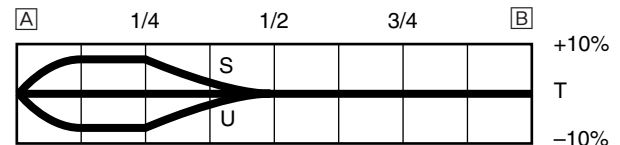
<Example>



**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

**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.



Carburetor setting parts

Part name	Size	Part number
Main jet	Rich	#170 4MX-14943-41
	▲	#168 4MX-14943-91
		#165 4MX-14943-40
		#162 4MX-14943-90
	*(STD)	#160 4MX-14943-39
		#158 4MX-14943-89
		#155 4MX-14943-38
		#152 4MX-14943-88
	(STD)	#150 4MX-14943-37
		#148 4MX-14943-87
		#145 4MX-14943-36
		#142 4MX-14943-86
	Lean	#140 4MX-14943-35
Pilot jet	Rich	#52 4MX-14948-08
	▲	#50 4MX-14948-07
	*(STD)	#48 4MX-14948-06
	(STD)	#45 4MX-14948-05
	▼	#42 4MX-14948-04
	Lean	#40 4MX-14948-03
	Jet needle	Rich
▲		#DUR 5TJ-14916-DR
		#DUS 5TJ-14916-DS
(STD)		#DUT 5TJ-14916-DT
▼		#DUU 5TJ-14916-DU
		#DUV 5TJ-14916-DV
Lean		#DUW 5TJ-14916-DW
Jet needle		Rich
	▲	#DUN 5TJ-14916-DN
		#DUP 5TJ-14916-DP
	*(STD)	#DUQ 5TJ-14916-D1
		#DUR 5TJ-14916-DR
		#DUS 5TJ-14916-DS
	Lean	#DUT 5TJ-14916-DT

\* 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 cleaner 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)	
Closed to 1/4 throttle Hard breathing Speed down	Use jet needle with a smaller diameter.	
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 cleaner 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**

EC71P002

**Selection of the secondary reduction ratio (Sprocket)**

Secondary reduction ratio =  $\frac{\text{Number of driven sprocket teeth}}{\text{Number of drive sprocket teeth}}$

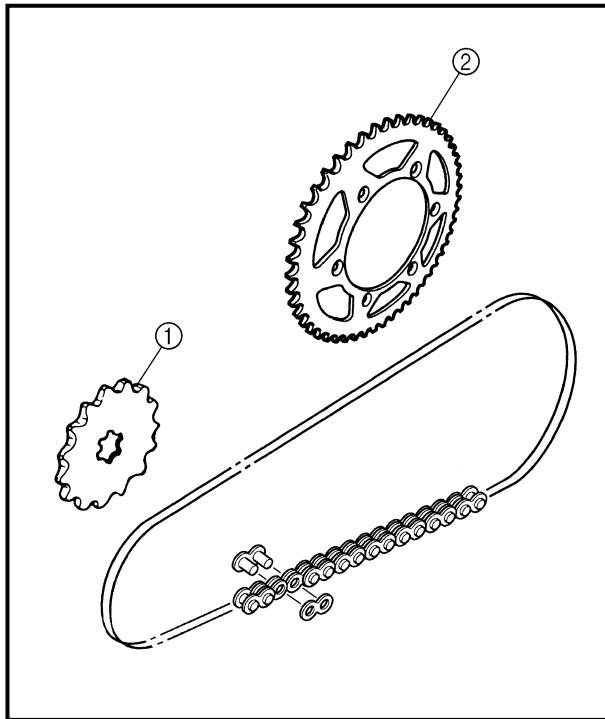
<b>Standard secondary reduction ratio</b>	<b>50/14 (3.571)</b>
---	----------------------

<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 driven sprockets setting parts**

Part name	Size	Part number
Drive sprocket ①		
(STD)	14T	5NG-17460-00
*(STD)	*14T	9383E-14215

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

Part name	Size	Part number
Driven sprocket ②		
	48T	5GS-25448-50
	*48T	5NY-25448-00
	*49T	5NY-25449-00
(STD)	50T	5GS-25450-50
*(STD)	*50T	5NY-25450-00
	*51T	5NY-25451-00
	52T	5GS-25452-50
	*52T	5NY-25452-00

\* 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.

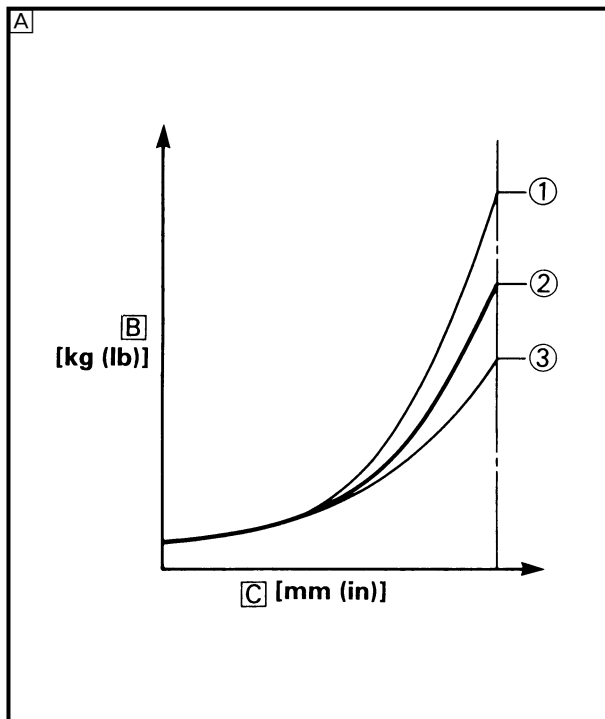
EC723001

### 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:**

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.

**A** Air spring characteristics in relation to oil level change

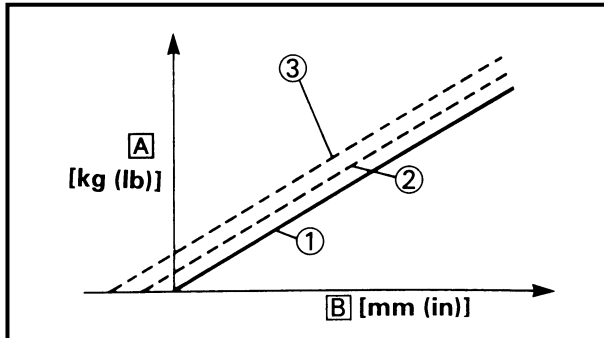
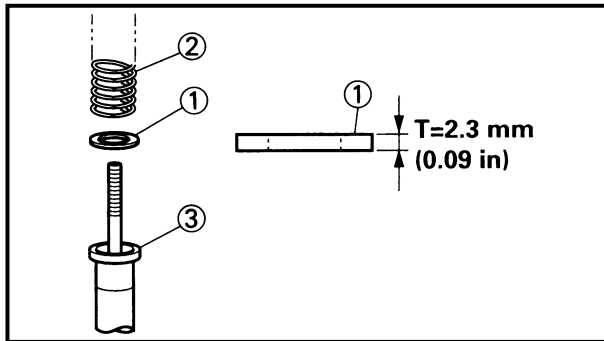
**B** Load

**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

Ⓐ Load

Ⓑ 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.

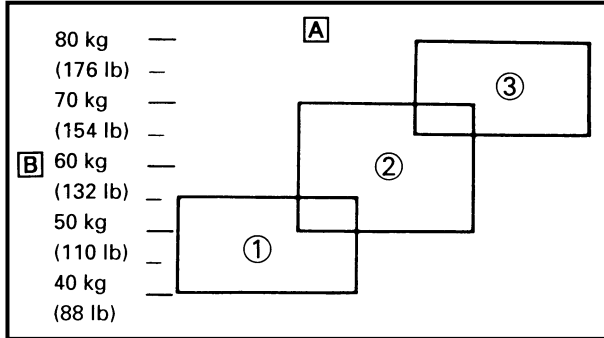


2. Use of stiff spring

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.

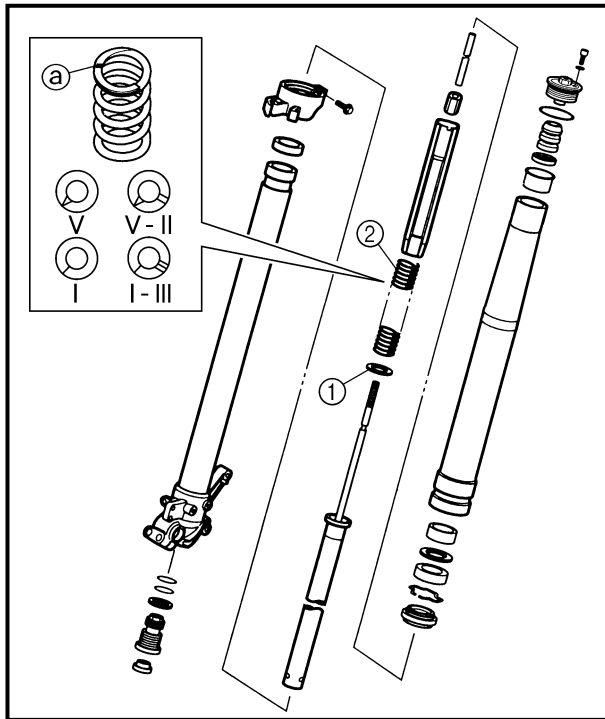
To set a stiff spring:

- 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	-
	0.430	4SS-23141-60	III
**STD	0.440	5NL-23141-00	-
	0.450	5BE-23141-L0	-
STD	0.460	5GR-23141-L0	-
STIFF	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-III

**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.



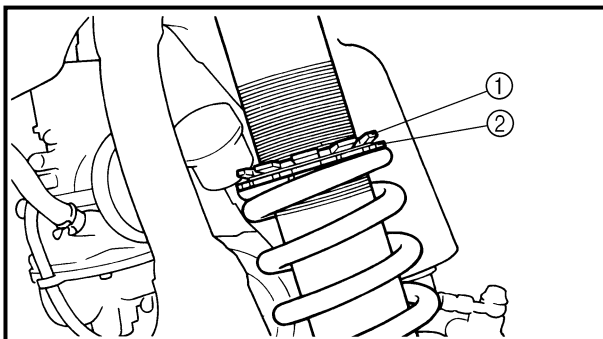
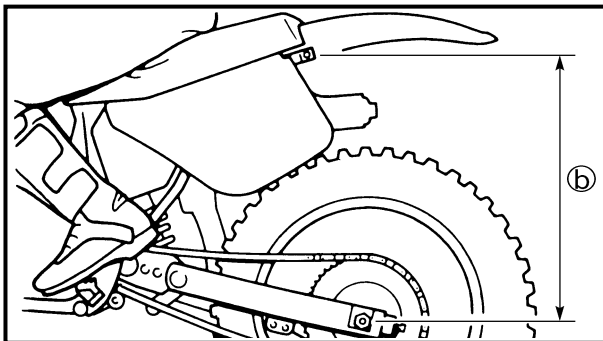
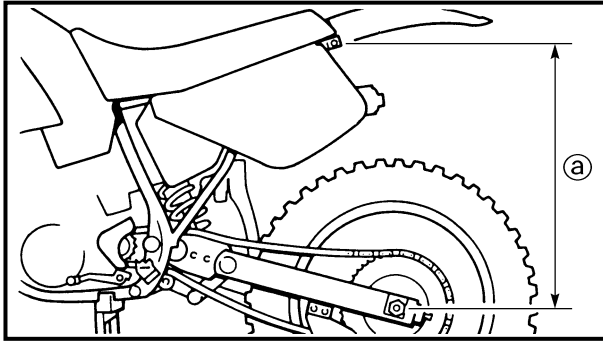
EC72B000

### 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:**

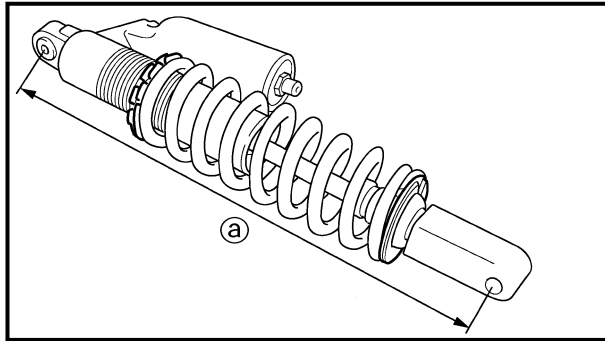
- If the machine is new and after it is broken in, the same set length of the spring may change because of the initial fatigue, etc. of the spring. Therefore, be sure to make re-evaluation.
- If the standard figure cannot be achieved by adjusting the spring adjuster and changing the spring set length, replace the spring with an optional one and make re-adjustment.

EC72G001

**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.

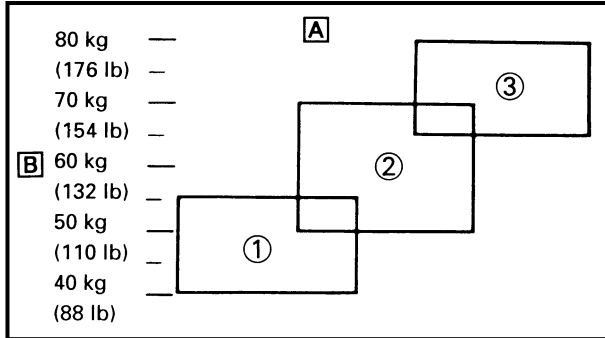


**CAUTION:**

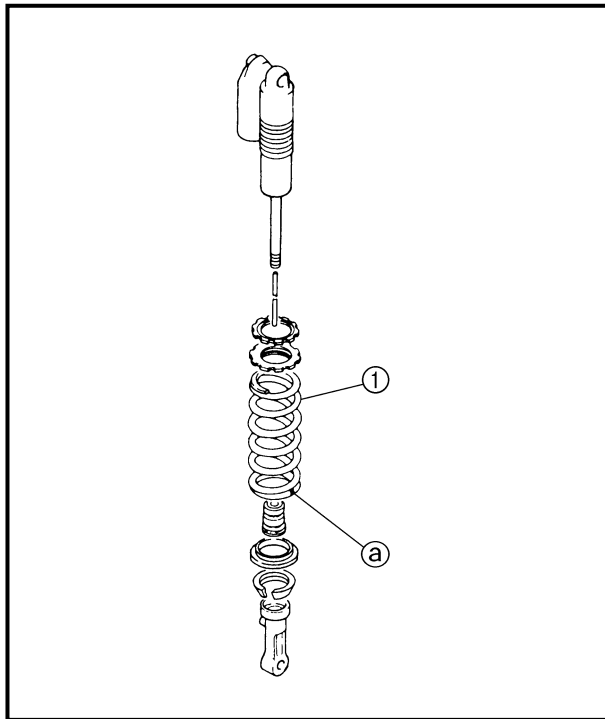
When using a rear cushion other than currently installed, use the one whose overall length ① does not exceed the standard as it may result in faulty performance. Never use one whose overall length is greater than standard.



**Length ① of standard shock:  
490.5 mm (19.31 in)**



- Ⓐ Coverage of spring by weight
- Ⓑ 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
	4.7	5UN-22212-20	Red/1	260
*STD	4.9	5UN-22212-30	Black/1	260
	5.1	5UN-22212-40	Blue/1	260
STD	5.2	5UN-22212-90	Purple/1	260
**STD	5.3	5UN-22212-50	Yellow/1	260
STIFF	5.5	5UN-22212-60	Pink/1	260
	5.7	5UN-22212-70	White/1	260

\* For EUROPE

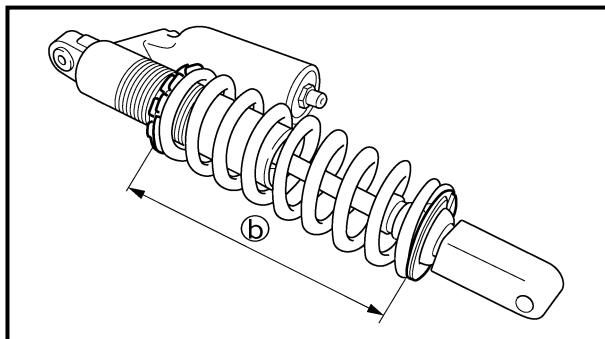
\*\* For AUS, NZ and ZA

[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 lever (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 95 ~ 100 mm (3.7 ~ 3.9 in) when one passenger is astride seat. Replace with soft spring.

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