YAMAHA

2023

# OWNER'S SERVICE MANUAL

# YZ250F

⚠ Read this manual carefully before operating this vehicle.

# *YZ250FP*

LIT-11626-36-26

BSB-2819U-10

**WARNING:** Operating, servicing and maintaining a passenger vehicle or off-road vehicle can expose you to chemicals including engine exhaust, carbon monoxide, phthalates, and lead, which are known to the State of California to cause cancer and birth defects or other reproductive harm. To minimize exposure, avoid breathing exhaust, do not idle the engine except as necessary, service your vehicle in a well-ventilated area and wear gloves or wash your hands frequently when servicing your vehicle. For more information go to www.P65Warnings.ca.gov/passenger-vehicle

⚠ **Read this manual carefully before operating this vehicle. This manual should stay with this vehicle if it is sold.**

FCC CAUTION
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment and meets the FCC radio frequency (RF) Exposure Guidelines. This equipment has very low levels of RF energy that is deemed to comply without maximum permissive exposure evaluation (MPE).

EAM20080

**YZ250FP**
**OWNER'S SERVICE MANUAL**
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**First edition, March 2022**
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**without the written permission of**
**Yamaha Motor Corporation, U.S.A.**
**is expressly prohibited.**
**P/N. LIT-11626-36-26**

EAM20180

# IMPORTANT

Congratulations on your purchase of a Yamaha YZ 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.

**TIP**

- Yamaha continually seeks advancements in product design and quality. Therefore, while this manual contains the most current product information available at the time of printing, there may be minor discrepancies between your machine and this manual. If you have any questions concerning this manual, please consult your Yamaha dealer.
- This manual is intended for those who have basic knowledge and skill concerning the servicing of Yamaha motorcycles (e.g., Yamaha dealers, service engineers, etc.). Those who have little knowledge and skill concerning servicing are requested not to undertake inspection, adjustment, disassembly, or reassembly only by reference to this manual. It may lead to servicing trouble and mechanical damage.

EWA20270

**⚠ 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 SAFETY ENJOY THE CAPABILITIES AND THE RELIABILITY OF THIS MACHINE.**

EAM30001

## IMPORTANT MANUAL INFORMATION

Particularly important information is distinguished in this manual by the following notations.

| | |
|---|---|
| ⚠ | **This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.** |

| | |
|---|---|
| **⚠ WARNING** | **A WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.** |

| | |
|---|---|
| ***NOTICE*** | **A NOTICE indicates special precautions that must be taken to avoid damage to the vehicle or other property.** |

| | |
|---|---|
| **TIP** | A TIP provides key information to make procedures easier or clearer. |

EAM20162

# YAMAHA MOTOR CORPORATION, U.S.A. YZ 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 motorcycles purchased from an authorized Yamaha motorcycle dealer in the continental United States will be free from defects in materiel and workmanship for the period of time stated herein, subject to certain stated limitations. YZ components included under this warranty are the engine, frame, swingarm, and monoshock. It is understood that the balance of the YZ 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 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 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 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 deale'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

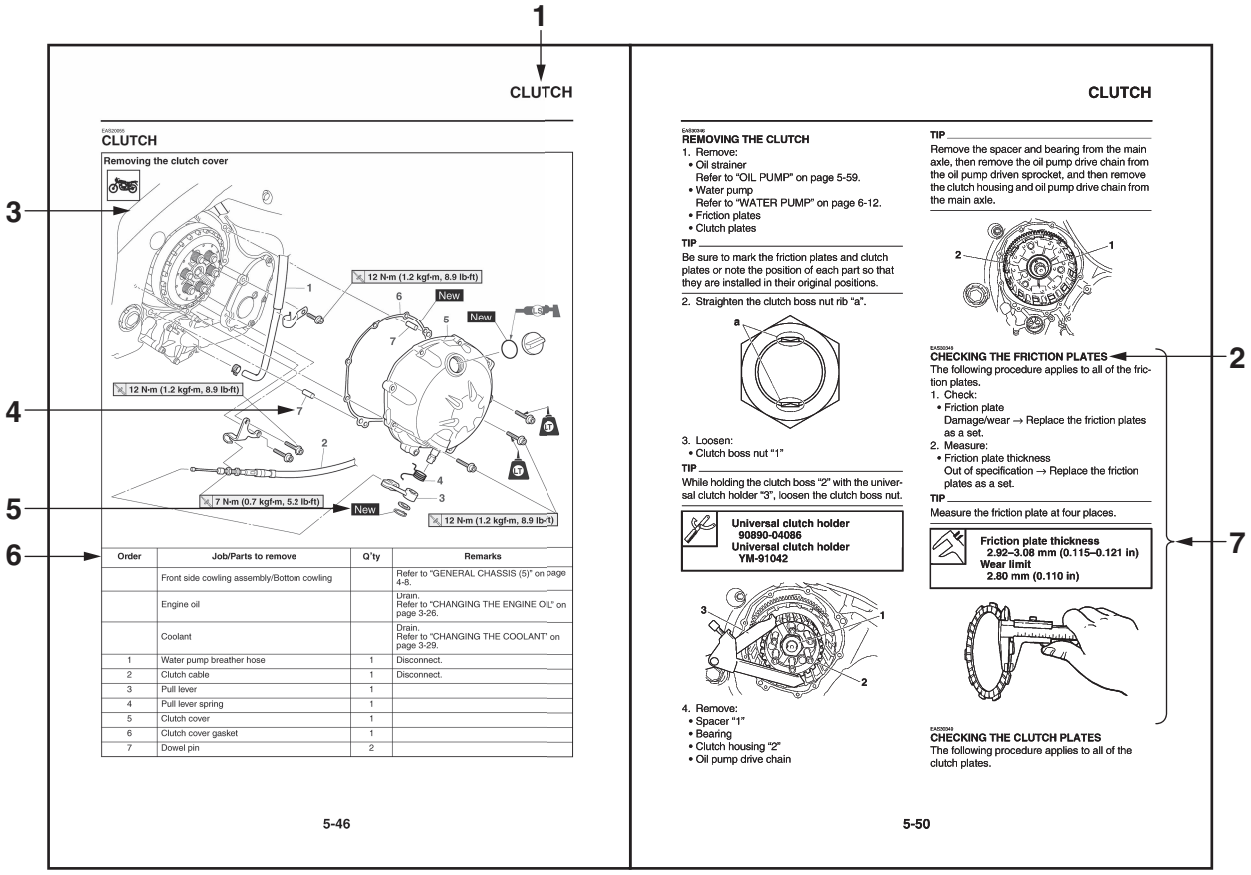
This will ensure that Yamaha Motor Corporation, U.S.A. has an up-to-date registration record in accordance with federal law.

EAM20082

# HOW TO USE THIS MANUAL

In this manual, descriptions of installation, removal, disassembly, assembly, check, and adjustment procedures are laid out with the individual steps in sequential order.

- The manual is divided into chapters and each chapter is divided into sections. The current section title "1" is shown at the top of each page.
- Sub-section titles "2" appear in smaller print than the section title.
- To help identify parts and clarify procedure steps, there are exploded diagrams "3" at the start of each removal and disassembly section.
- Numbers "4" are given in the order of the jobs in the exploded diagram. A number indicates a removal or a disassembly step.
- Symbols "5" indicate parts to be lubricated or replaced.
  Refer to "SYMBOLS".
- A job instruction chart "6" accompanies the exploded diagram, providing the order of jobs, the names of parts, the notes in jobs, etc. This step explains removal and disassembly procedure only. For installation and assembly procedure, reverse the steps.
- Jobs "7" requiring more information (such as special tools and technical data) are described sequentially.




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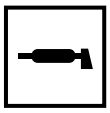
EAM20083

# SYMBOLS

The following symbols are used in this manual for easier understanding.

**TIP**

The following symbols are not relevant to every vehicle.

| SYMBOL | DEFINITION | SYMBOL | DEFINITION |
|---|---|---|---|
|  | Serviceable with engine mounted |  | Gear oil |
|  | Filling fluid |  | Molybdenum disulfide oil |
|  | Lubricant |  | Brake fluid |
|  | Special tool |  | Wheel bearing grease |
|  | Tightening torque |  | Lithium-soap-based grease |
|  | Wear limit, clearance |  | Molybdenum disulfide grease |
|  | Engine speed |  | Silicone grease |
|  | Electrical data |  | Apply locking agent (LOCTITE®). |
|  | Engine oil |  | Replace the part with a new one. |

EAM10003

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EAM20168

# SAFETY INFORMATION

Be sure to read this manual carefully and completely in order to operate the machine safely and correctly prior to riding the Yamaha machine, and take care to maintain it properly and operate it safely.

EAM30401

## FOR SAFETY, BE SURE TO OBEY THE FOLLOWING:

### Be a Responsible Owner

As the vehicle's owner, you are responsible for the safe and proper operation of your motorcycle.

Motorcycles are single-track vehicles.

Their safe use and operation are dependent upon the use of proper riding techniques as well as the expertise of the operator. Every operator should know the following requirements before riding this motorcycle.

He or she should:

1. Obtain thorough instructions from a competent source on all aspects of motorcycle operation.
2. Observe the warnings and maintenance requirements in this manual.
3. Obtain qualified training in safe and proper riding techniques.
4. Obtain professional technical service as indicated in this manual and/or when made necessary by mechanical conditions.
5. Never operate a motorcycle without proper training or instruction. Take a training course. Beginners should receive training from a certified instructor. Contact an authorized motorcycle dealer to find out about the training courses nearest you.

### Safe Riding

Perform the pre-operation checks each time you use the vehicle to make sure it is in safe operating condition. Failure to inspect or maintain the vehicle properly increases the possibility of an accident or equipment damage. Refer to "PRE-OPERATION INSPECTION AND MAINTENANCE" on page 3-5 for a list of pre-operation checks.

1. This motorcycle is designed for off-road use only, therefore, it is illegal to operate it on public streets, roads, or highways, even a dirt or gravel one. Off-road use on public lands may be illegal. Please check local regulations before riding.
2. This motorcycle is designed to carry the operator only. No passengers.
3. The failure of motorists to detect and recognize motorcycles in traffic is the predominating cause of automobile/motorcycle accidents. Many accidents have been caused by an automobile driver who did not see the motorcycle. Making yourself conspicuous appears to be very effective in reducing the chance of this type of accident.

   **Therefore:**

   - Wear a brightly colored jacket.
   - Use extra caution when you are approaching and passing through intersections, since intersections are the most likely places for motorcycle accidents to occur.
   - Ride where other motorists can see you. Avoid riding in another motorist's blind spot.
   - Never maintain a motorcycle without proper knowledge. Contact an authorized motorcycle dealer to inform you on basic motorcycle maintenance. Certain maintenance can only be carried out by certified staff.
4. Many accidents involve inexperienced operators.
   - Make sure that you are qualified and that you only lend your motorcycle to other qualified operators.
   - Know your skills and limits. Staying within your limits may help you to avoid an accident.
   - We recommend that you practice riding your motorcycle until you have become thoroughly familiar with the motorcycle and all of its controls.
5. Many accidents have been caused by error of the motorcycle operator. A typical error made by the operator is veering wide on a turn due to excessive speed or under cornering (insufficient lean angle for the speed). Never travel faster than warranted by conditions.
6. Ride cautiously in unfamiliar areas. You may encounter hidden obstacles that could cause an accident.
7. The posture of the operator is important for proper control. The operator should keep both hands on the handlebar and both feet on the operator footrests during operation to maintain control of the motorcycle.
8. Never ride under the influence of alcohol or other drugs.
9. Be sure the transmission is in neutral before starting the engine.

### Protective Apparel

The majority of fatalities from motorcycle acci-

dents are the result of head injuries. The use of a safety helmet is the single most critical factor in the prevention or reduction of head injuries.

1. Always wear an approved helmet.
2. Wear a face shield or goggles. Wind in your unprotected eyes could contribute to an impairment of vision that could delay seeing a hazard.
3. The use of a jacket, heavy boots, trousers, gloves, etc., is effective in preventing or reducing abrasions or lacerations.
4. Never wear loose-fitting clothes, otherwise they could catch on the control levers, footrests, or wheels and cause injury or an accident.
5. Always wear protective clothing that covers your legs, ankles, and feet. The engine or exhaust system become very hot during or after operation and can cause burns.

**Avoid Carbon Monoxide Poisoning**

All engine exhaust contains carbon monoxide, a deadly gas. Breathing carbon monoxide can cause headaches, dizziness, drowsiness, nausea, confusion, and eventually death.

Carbon Monoxide is a colorless, odorless, tasteless gas which may be present even if you do not see or smell any engine exhaust. Deadly levels of carbon monoxide can collect rapidly and you can quickly be overcome and unable to save yourself. Also, deadly levels of carbon monoxide can linger for hours or days in enclosed or poorly ventilated areas. If you experience any symptoms of carbon monoxide poisoning, leave the area immediately, get fresh air, and SEEK MEDICAL TREATMENT.

1. Do not run engine indoors. Even if you try to ventilate engine exhaust with fans or open windows and doors, carbon monoxide can rapidly reach dangerous levels.
2. Do not run engine in poorly ventilated or partially enclosed areas such as barns, garages, or carports.
3. Do not run engine outdoors where engine exhaust can be drawn into a building through openings such as windows and doors.

**Genuine Yamaha Accessories**

Choosing accessories for your vehicle is an important decision. Genuine Yamaha accessories, which are available only from a Yamaha dealer, have been designed, tested, and approved by Yamaha for use on your vehicle.

Many companies with no connection to Yamaha manufacture parts and accessories or offer other modifications for Yamaha vehicles. Yamaha is not in a position to test the products that these aftermarket companies produce. Therefore, Yamaha can neither endorse nor recommend the use of accessories not sold by Yamaha or modifications not specifically recommended by Yamaha, even if sold and installed by a Yamaha dealer.

**Aftermarket Parts, Accessories, and Modifications**

While you may find aftermarket products similar in design and quality to genuine Yamaha accessories, recognize that some aftermarket accessories or modifications are not suitable because of potential safety hazards to you or others. Installing aftermarket products or having other modifications performed to your vehicle that change any of the vehicle's design or operation characteristics can put you and others at greater risk of serious injury or death. You are responsible for injuries related to changes in the vehicle. Keep the following guidelines in mind, as well as those provided under "Loading" when mounting accessories.

1. Never install accessories that would impair the performance of your motorcycle. Carefully inspect the accessory before using it to make sure that it does not in any way reduce ground clearance or cornering clearance, limit suspension travel, steering travel or control operation.
   - Accessories fitted to the handlebar or the front fork area can create instability due to improper weight distribution. If accessories are added to the handlebar or front fork area, they must be as lightweight as possible and should be kept to a minimum.
   - Bulky or large accessories may seriously affect the stability of the motorcycle. Wind may attempt to lift the motorcycle, or the motorcycle may become unstable in cross winds.
   - Certain accessories can displace the operator from his or her normal riding position. This improper position limits the freedom of movement of the operator and may limit control ability, therefore, such accessories are not recommended.
2. Use caution when adding electrical accessories. If electrical accessories exceed the capacity of the motorcycle's electrical system, an electric failure could result, which could cause a dangerous loss of lights or engine power.

**Aftermarket Tires and Rims**

The tires and rims that came with your motorcycle were designed to match the performance capabilities and to provide the best combination of handling, braking, and comfort. Other tires, rims, sizes, and combinations may not be appropriate. Refer to "CHECKING THE TIRES" on page 3-32 for tire specifications and more information on replacing your tires.

**Transporting the Motorcycle**

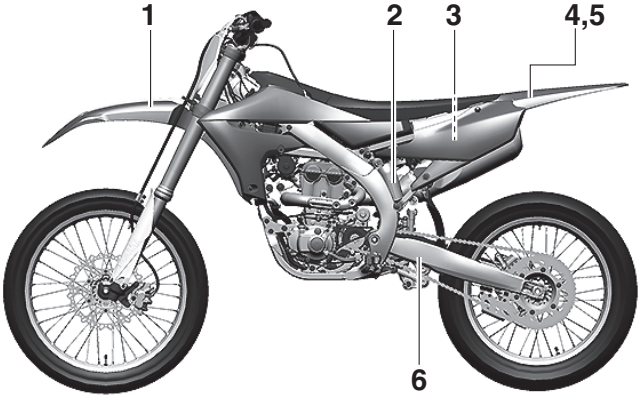
Be sure to observe following instructions before transporting the motorcycle in another vehicle.

1. Remove all loose items from the motorcycle.
2. Check that the fuel cock (if equipped) is in the "OFF" position and that there are no fuel leaks.
3. Point the front wheel straight ahead on the trailer or in the truck bed, and choke it in a rail to prevent movement.
4. Shift the transmission in gear (for models with a manual transmission).
5. Secure the motorcycle with tie-downs or suitable straps that are attached to solid parts of the motorcycle, such as the frame or upper front fork triple clamp (and not, for example, to rubber-mounted handlebars or turn signals, or parts that could break). Choose the location for the straps carefully so the straps will not rub against painted surfaces during transport.
6. The suspension should be compressed somewhat by the tie-downs, if possible, so that the motorcycle will not bounce excessively during transport.

EAM20085

# LOCATION OF IMPORTANT LABELS

Please read the following important labels carefully before operating this vehicle.




**1**

Premium unleaded gasoline only.

3FB-2415E-03

**2**

**⚠WARNING**

This unit contains high pressure nitrogen gas. Mishandling can cause explosion.
- Read owner's manual for instructions.
- Do not incinerate, puncture or open.

4AA-22259-80

**3**

**⚠WARNING**

To avoid sparking, burns, fire, and explosion:
- Read owner's manual before use.
- Charge battery only with specified charger.
- Use battery only for specified product – no other use.
- Do not place near fire or immerse in water.
- Do not use battery if it has been dropped, subject to impact, or visibly damaged.
- Do not disassemble or modify the battery, or short across its terminals.

RECYCLE RBRC Li-ion 1.800.822.8837

**4**

**⚠ WARNING**

- BEFORE YOU OPERATE THIS VEHICLE, READ THE OWNER'S MANUAL AND ALL LABELS.
- NEVER CARRY A PASSENGER. You increase your risk of losing control if you carry a passenger.
- NEVER OPERATE THIS VEHICLE ON PUBLIC ROADS. You can collide with another vehicle if you operate this vehicle on a public road.
- ALWAYS WEAR AN APPROVED MOTORCYCLE HELMET, eye protection, and protective clothing.
- EXPERIENCED RIDER ONLY.

5PA-2118K-01

**5**

For use only on a closed course in sanctioned competition.

This motorcycle does not meet EPA noise and emissions standards and is not for general off-road recreational riding.

17D-2812P-00

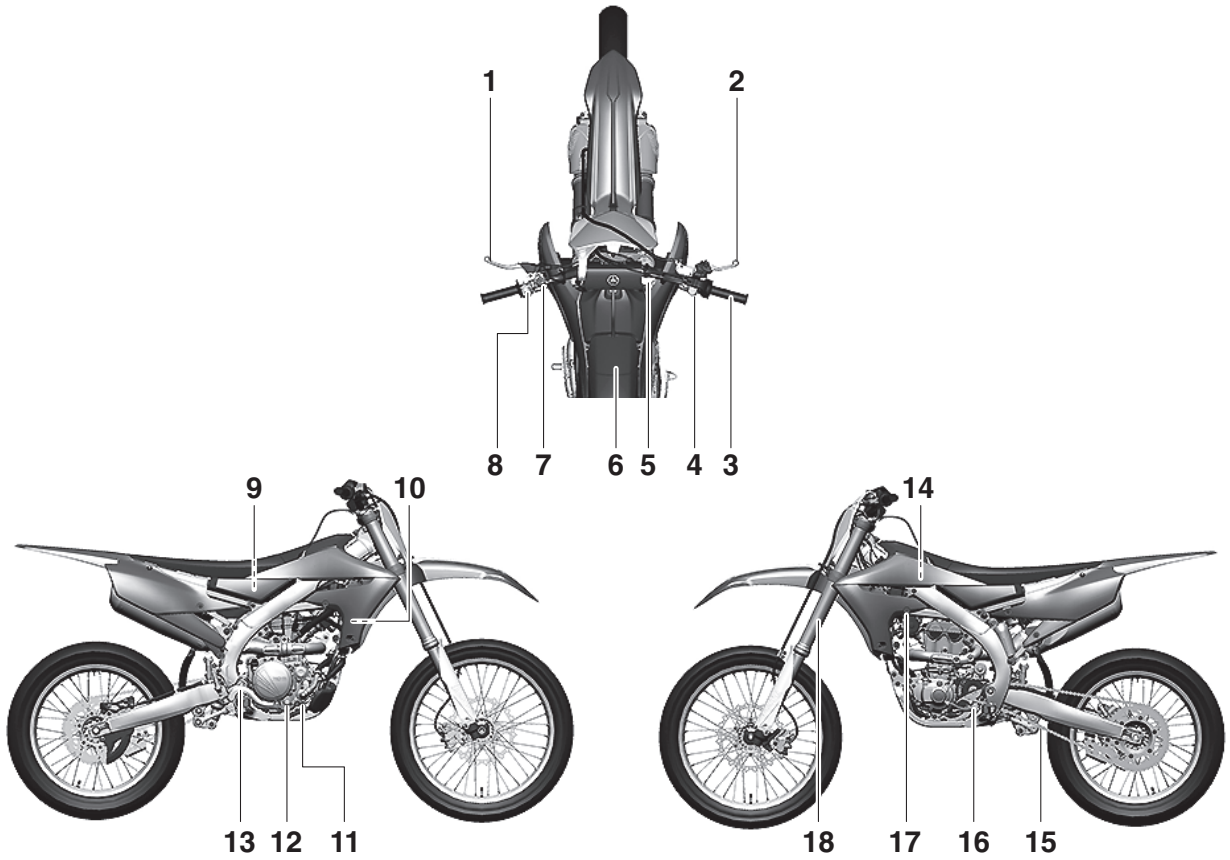
**6**

**TIRE INFORMATION**

Cold tire normal pressure should be set as follows.
FRONT : 100kPa, {1.00kgf/cm$^2$}, 15psi
REAR : 100kPa, {1.00kgf/cm$^2$}, 15psi

3RV-21668-A1

EAM20086
# DESCRIPTION




1. Clutch lever
2. Front brake lever
3. Throttle grip
4. Start switch
5. Radiator cap
6. Fuel tank cap
7. Mode switch
8. Engine stop switch
9. Fuel tank
10. Radiator
11. Coolant drain bolt
12. Oil level check window
13. Rear brake pedal
14. Air filter
15. Drive chain
16. Shift pedal
17. Starter knob
18. Front fork

**TIP**
Designs and specifications of the vehicle are subject to change without notice. Therefore, please note that the descriptions in this manual may be different from those for the vehicle you have purchased.

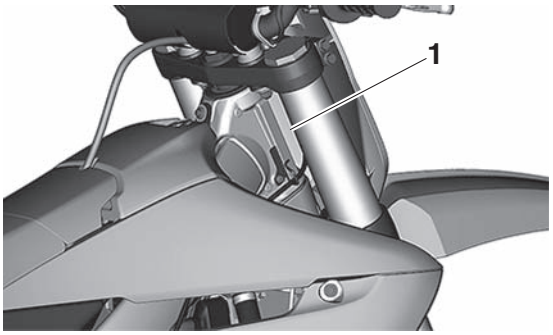
EAM20087
# IDENTIFICATION

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

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

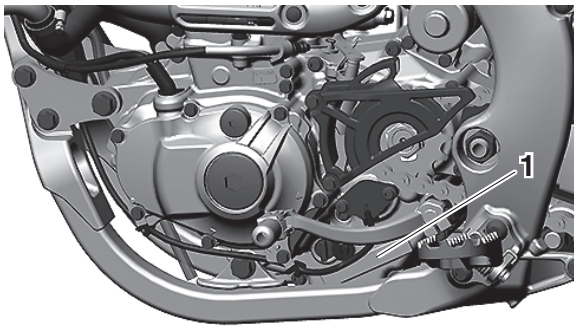
EAM30002
## VEHICLE IDENTIFICATION NUMBER

The vehicle identification number “1” is stamped into the right side of the frame.




EAM30003
## ENGINE SERIAL NUMBER

The engine serial number “1” is stamped into the lower left side of the engine.

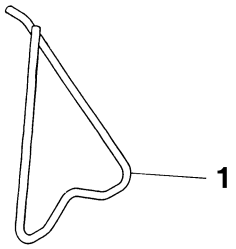


EAM20088
# INCLUDED PARTS

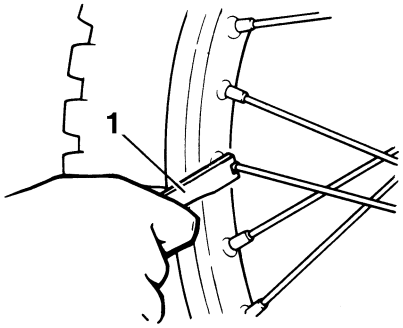
EAM30372
### SIDESTAND
This sidestand “1” is used to support only the machine when standing or transporting it.

EWA20260
**⚠ WARNING**

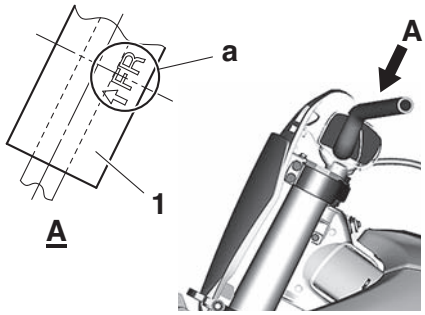
**• Never apply additional force to the sidestand.**
**• Remove this sidestand before starting out.**



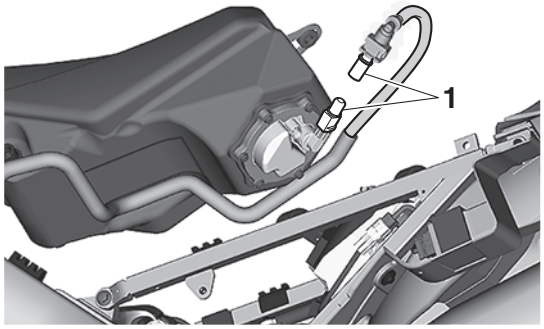

EAM30005
### NIPPLE WRENCH
The nipple wrench “1” is used to tighten the spoke.




EAM30006
### HANDLEBAR PROTECTOR
Install the handlebar protector “1” with the mark “a” facing forward.




EAM30007
### FUEL HOSE JOINT COVER
The fuel hose joint covers “1” are used to prevent mud, dust, and other foreign materials from entering the inside when the fuel hose is disconnected.




EAM30443
### POWER TUNER
By downloading the Power Tuner app to your smartphone and wirelessly connecting to the CCU wireless network, you can adjust various vehicle settings.

EWA20460
**⚠ WARNING**

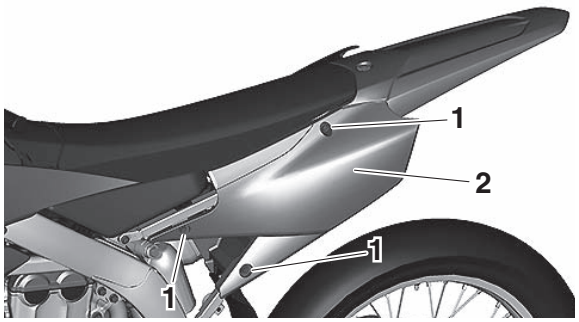
**• Do not operate the engine in a closed area. The exhaust gas is poisonous.**
**• Never let flames near the servicing area.**

ECA26050
***NOTICE***

**• This application is designed for adjusting the settings on a standard vehicle. In case the engine specifications (muffler, compression ratio, etc.) have been changed, the performance may not match to the actual settings.**
**• Do not run the engine with the smartphone carried with you. Otherwise, the smartphone could be damaged.**

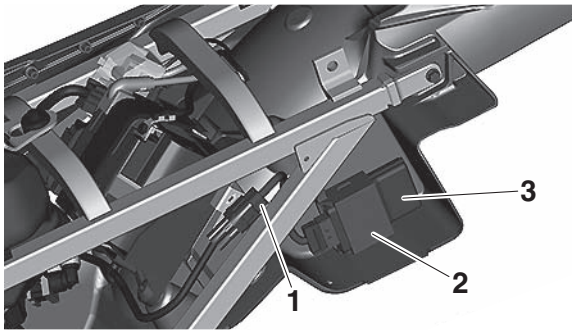
**TIP**
- Download the Power Tuner app from the Google© or Apple© store.
- For details about handling the smartphone, read the owner’s manual of the smartphone.

**Before connecting to the CCU wireless network (in case of initial use of the Power Tuner app)**
1. Remove the bolts and side cover (left).

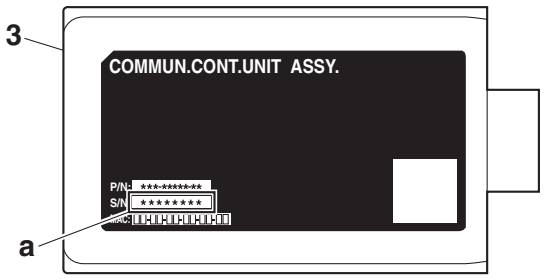



1. Bolt
2. Side cover (left)

2. Remove the CCU and record the CCU serial number.




1. CCU coupler
2. Holder
3. CCU (Communication Control Unit)




3. CCU (Communication Control Unit)

a. CCU serial number

3. Install the removed CCU and side cover (left).

**Connecting to the CCU wireless network**

ECA26060

***NOTICE***

**The CCU (Communication Control Unit) uses weak radio waves. The CCU may not work in the following situations.**

- **The CCU is placed in a location exposed to strong radio waves or other electromagnetic noise**
- **There are facilities nearby that are emitting strong radio waves (TV or radio towers, power plants, broadcasting stations, airports, etc.)**
- **You are carrying or using communication equipment such as radios or mobile phones in close proximity of the CCU**
- **The CCU is in contact with or covered by a metallic object**
- **Other vehicles equipped with a CCU are nearby**

**In such situations, move the CCU to another location and perform the operation again.**

1. Turn on the smartphone.
2. For two minutes after the start switch is pressed or while the engine is running (the CCU is activated), input the CCU serial number into your smartphone and establish a wireless connection.
3. Activate the Power Tuner app.

**TIP**

If the CCU wireless network cannot be detected, operate the start switch again.

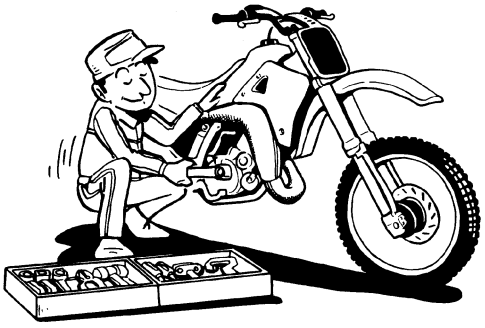
EAM20089
# IMPORTANT INFORMATION

EAM30009
## PREPARATION FOR REMOVAL AND DISASSEMBLY

1. Before the jobs, completely remove mud, dust, and the like in order to prevent the entry of them into the inside during the jobs.
   Refer to “CARE” on page 1-28.



2. Use proper special tools and equipment. Refer to “SPECIAL TOOLS” on page 1-15.



3. During disassembly, check and measure the required parts, and make a record of them so that you may refer to the record when installing them. Moreover, arrange gears, cylinders, pistons, and other parts for each section so as not to confuse or lose them.



4. During disassembly, clean each of the parts, and store them in trays for each section.
5. Flammable. Keep servicing areas away from any source of fire.
6. During servicing, take special care not to receive an injury or a burn on the engine, the exhaust pipe, the silencer, or the like.
7. If coolant is left adhered to the chassis, paint and plating will be damaged. Therefore, rinse it out with water in good time.

EWA18970
**⚠ WARNING**

**Coolant is potentially harmful and should be handled with special care.**
- **If it enters your eyes, wash it away with water enough and then get medical attention**
- **If it splashes on your skin or clothes, quickly wash it away with water and then with soapy water.**
- **If it is swallowed, immediately induce vomiting and get medical attention.**

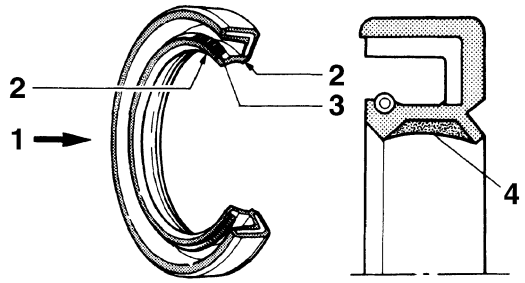
EAM30010
## REPLACEMENT PARTS

Make sure that the parts and grease or oil to be used for repair of the vehicle, including periodic replacement parts, are new YAMAHA genuine parts and recommended parts.
Do not use any used parts, because these may not be genuine though they have similar appearances or because the quality may be changed by aging.



EAM30011
## GASKETS, OIL SEALS AND O-RINGS

1. When overhauling the engine, replace all gaskets and O-rings. All gasket surfaces, oil seal lips, and O-rings must be cleaned so that there may be no dust on them.
2. During assembly, always apply proper oil to bearings and proper grease to oil seal lips before installation.

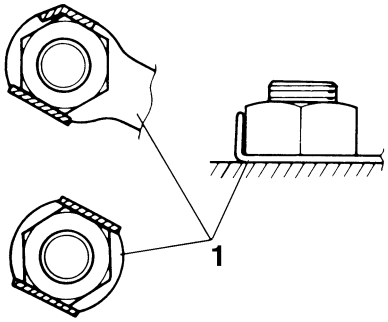



1. Oil
2. Lip
3. Spring
4. Grease

EAM30012

## LOCK WASHERS/PLATES AND COTTER PINS

After removal, replace lock washers/plates “1” and cotter pins with new ones. After the bolt or nut has been tightened to specification, firmly bend the lock tabs along a flat of the bolt or nut.




EAM30013

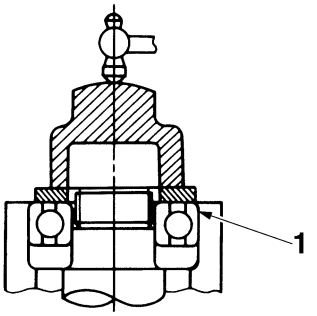
## BEARINGS AND OIL SEALS

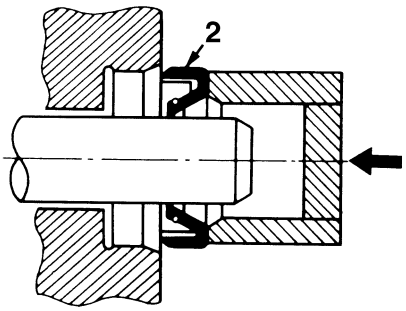
Install bearings “1” and oil seals “2” with their manufacturer’s marks or size symbols facing outward. During installation of an oil seal, make sure that its main lip faces the oil chamber (the target to be sealed). Before installation, always apply a light coat of grease to the oil seal lip.

ECA13300

***NOTICE***

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

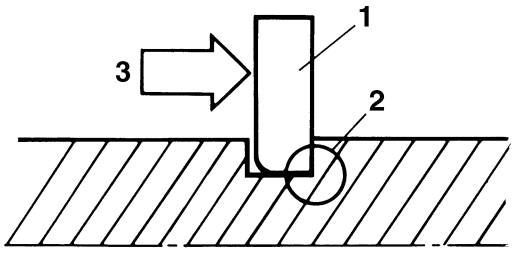



EAM30014

## CIRCLIPS

When assembling parts, always use new circlips. During installation of a circlip, make sure that the edge “2” of the circlip “1” is positioned opposite to the force “3” that the circlip receives. Install the circlip with its end aligned with the center of the spline, without opening the circlip more than necessary.

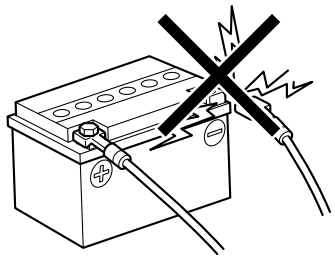


EAM20120
# BASIC SERVICE INFORMATION

EAM30181
## ELECTRICAL SYSTEM
### Electrical parts handling

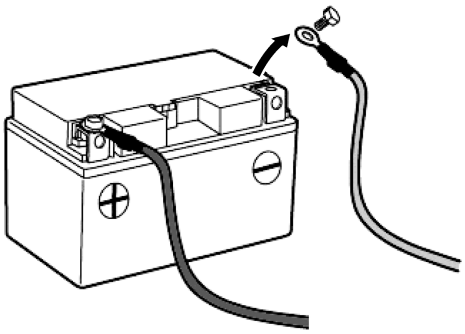
ECA16600
***NOTICE***

**Never disconnect a battery lead while the engine is running; otherwise, the electrical components could be damaged.**

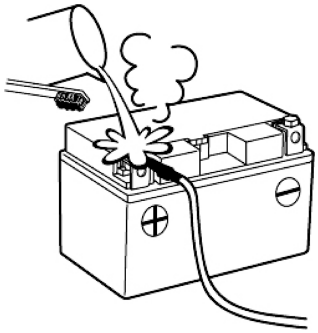


ECA16751
***NOTICE***

**When disconnecting the battery leads from the battery, be sure to disconnect the negative battery lead first, then the positive battery lead. If the positive battery lead is disconnected first and a tool or similar item contacts the vehicle, a spark could be generated, which is extremely dangerous.**

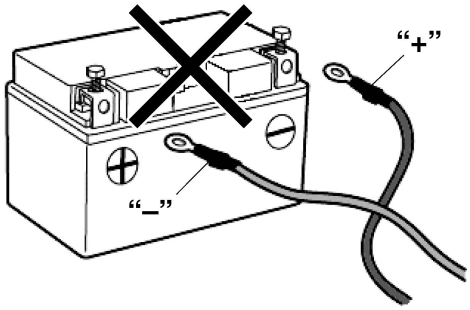


**TIP**
If a battery lead is difficult to disconnect due to rust on the battery terminal, remove the rust using hot water.



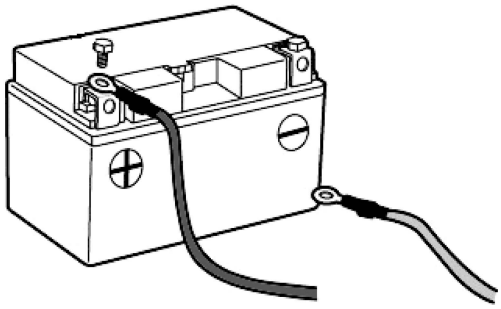
ECA16760
***NOTICE***

**Be sure to connect the battery leads to the correct battery terminals. Reversing the battery lead connections could damage the electrical components.**



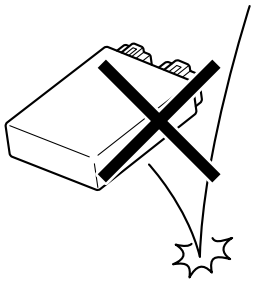

ECA16771
***NOTICE***

**When connecting the battery leads to the battery, be sure to connect the positive battery lead first, then the negative battery lead. If the negative battery lead is connected first and a tool or similar item contacts the vehicle while the positive battery lead is being connected, a spark could be generated, which is extremely dangerous.**



ECA16620
***NOTICE***

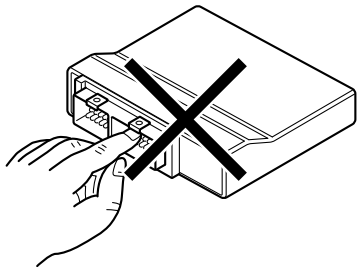
**Handle electrical components with special care, and do not subject them to strong shocks.**



ECA16630

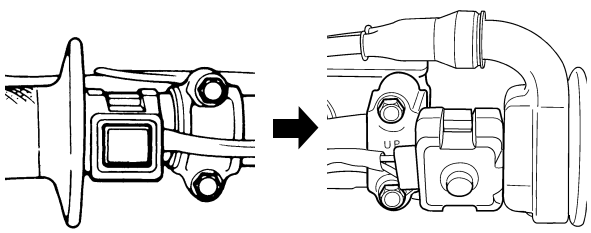
***NOTICE***

**Electrical components are very sensitive to and can be damaged by static electricity. Therefore, never touch the terminals and be sure to keep the contacts clean.**



**TIP**

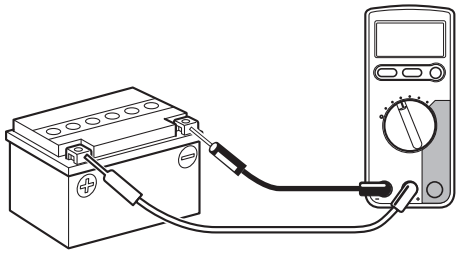
Push and hold the engine stop switch to turn off the multi-function display when resetting the ECU (Engine Control Unit). Disconnect the starter motor lead of the starter relay, and then push the starter switch. Be sure to wait for five seconds or longer before pushing the start switch after the multi-function display goes off.



### Checking the electrical system

**TIP**

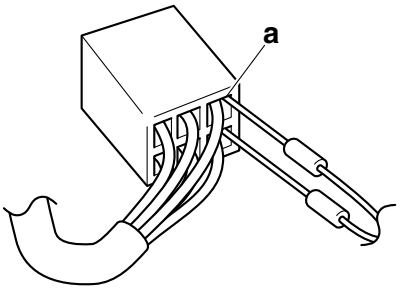
Before checking the electrical system, make sure that the battery voltage is at least 12 V.



ECA14371

***NOTICE***

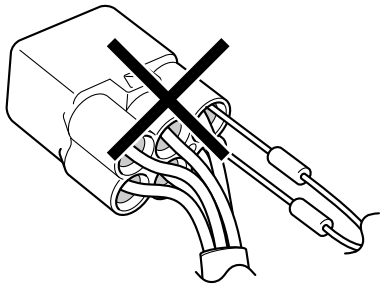
**Never insert the tester probes into the coupler terminal slots. Always insert the probes from the opposite end "a" of the coupler, taking care not to loosen or damage the leads.**




ECA16640

***NOTICE***

**For waterproof couplers, never insert the tester probes directly into the coupler. When performing any checks using a waterproof coupler, use the specified test harness or a suitable commercially available test harness.**



### Checking the connections

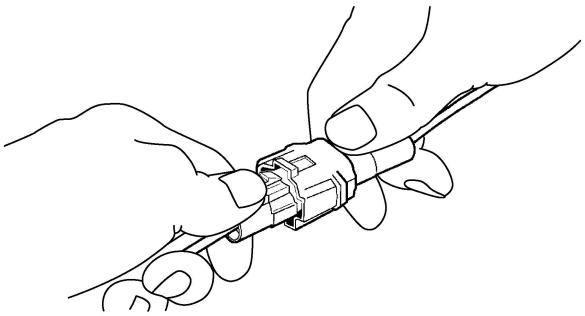
Check the leads, couplers, and connectors for stains, rust, moisture, etc.

1. Disconnect:
   - Lead
   - Coupler
   - Connector

ECA16780

***NOTICE***

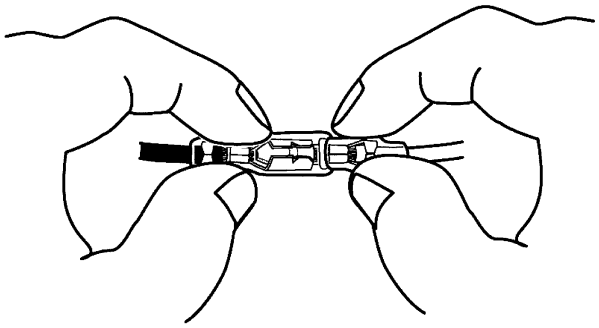
**• When disconnecting a coupler, release the coupler lock, hold both sections of the coupler securely, and then disconnect the coupler.**
**• There are many types of coupler locks; therefore, be sure to check the type of coupler lock before disconnecting the coupler.**



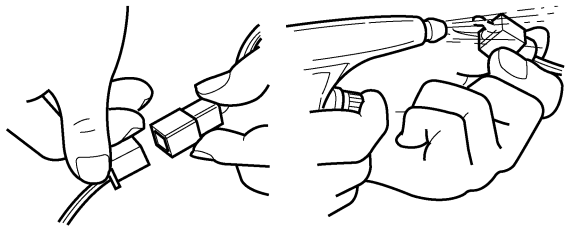
ECA16790

***NOTICE***

**When disconnecting a connector, do not pull the leads. Hold both sections of the connector securely, and then disconnect the connector.**



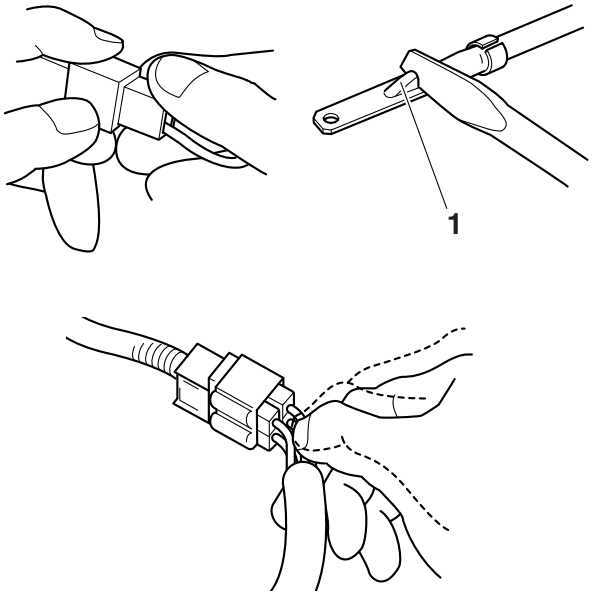
2. Check:
   • Lead
   • Coupler
   • Connector
   Moisture → Dry with compressed air.
   Rust/stains → Connect and disconnect several times.



3. Check:
   • All connections
   Loose connection → Connect properly.

**TIP**

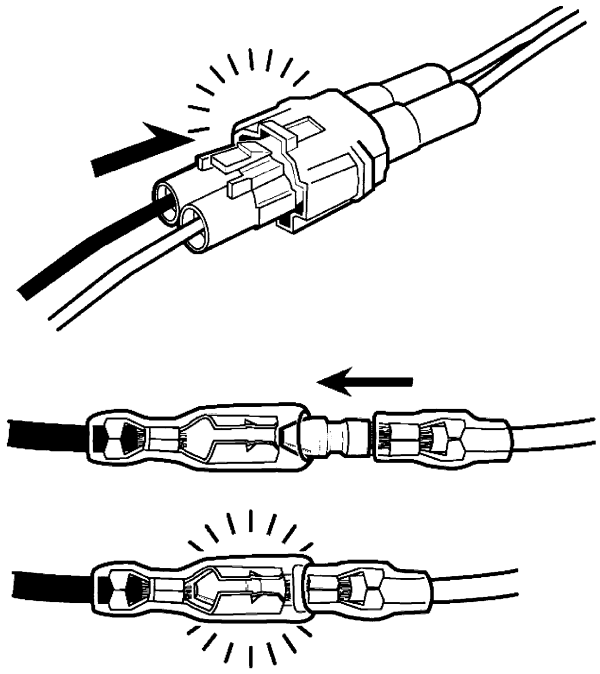
• If the pin "1" on the terminal is flattened, bend it up.
• After disassembling or assembling a coupler, pull on the leads to make sure that they are installed securely.

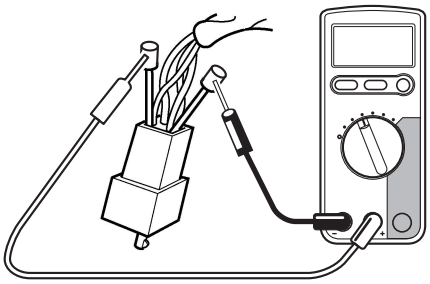



4. Connect:
   • Lead
   • Coupler
   • Connector

**TIP**

• When connecting a coupler or connector, make sure that both terminals are connected securely.
• Make sure all connections are tight.



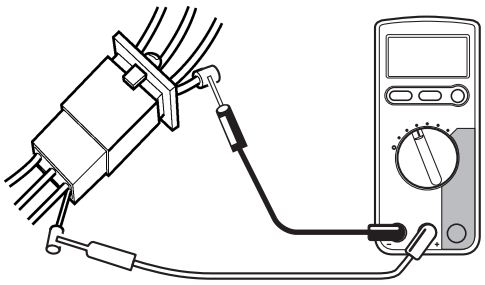


5. Check:
   • No continuity

| | |
|---|---|
| | **Digital circuit tester (CD732)**<br>**90890-03243**<br>**Model 88 Multimeter with tachometer**<br>**YU-A1927** |

**TIP**

- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (4).
- As a quick remedy, use a contact revitalizer available at most part stores.



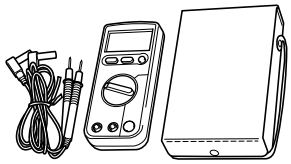
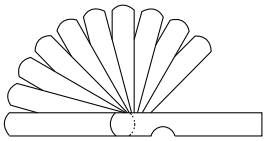
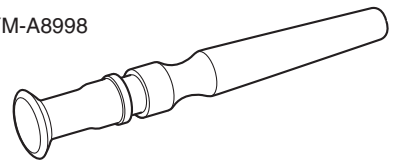
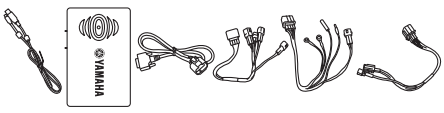
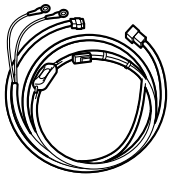
EAM20121

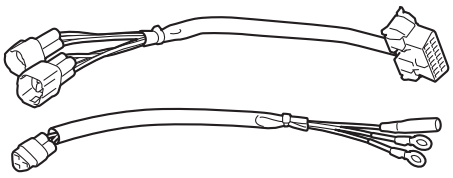
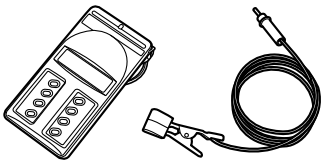
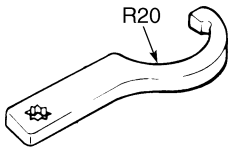
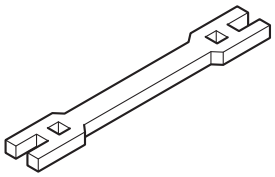
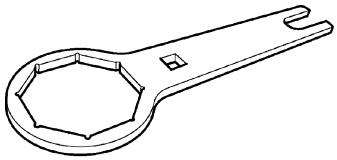
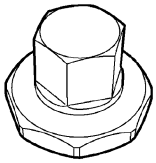
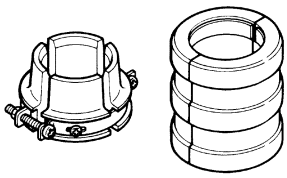
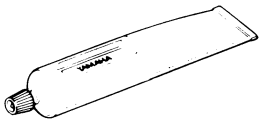
# SPECIAL TOOLS

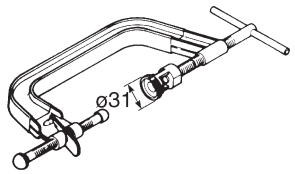
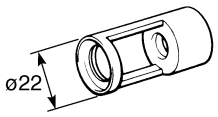
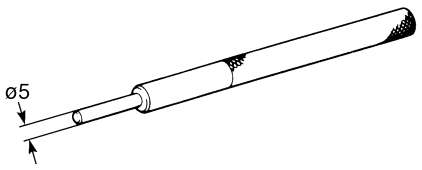
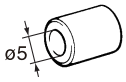
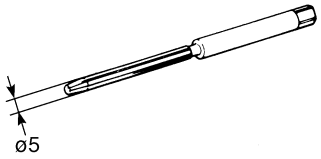
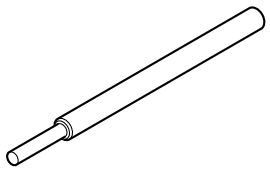
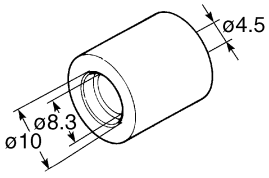
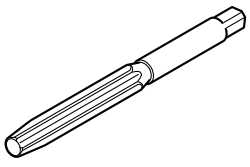
The following special tools are required for accurate and complete adjustment and assembly. Using the correct special tool will help prevent damage caused by the use of improper tools or improvised techniques. The shape and tool number used for the special tool differ by country, so two types are provided.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

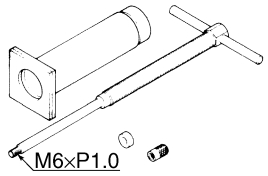
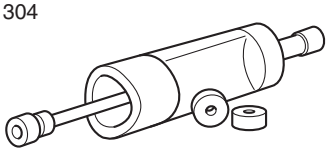
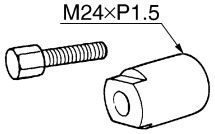
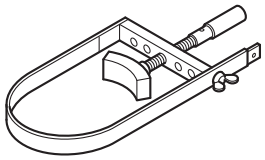
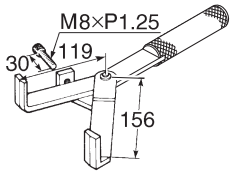
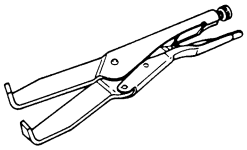
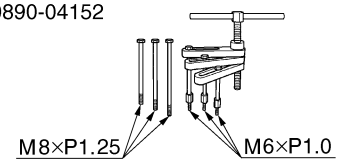
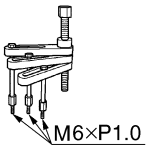
**TIP**

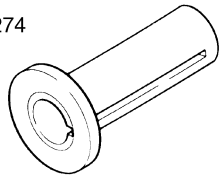
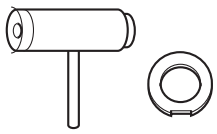
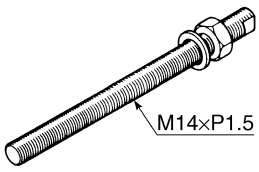
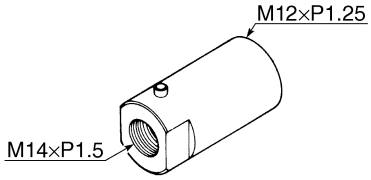
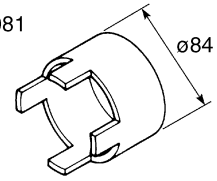
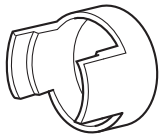
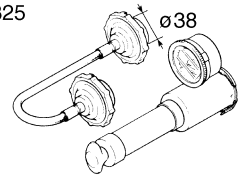
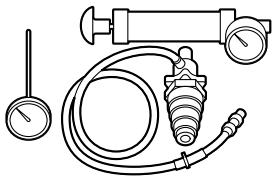
- For U.S.A. and Canada, use tool number starting with “YM-”, “YU-”, or “ACC-”.
- For others, use tool number starting with “90890-”.

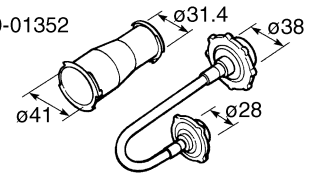
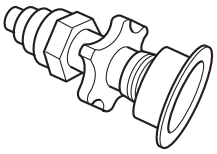
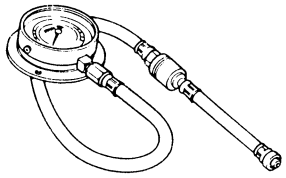
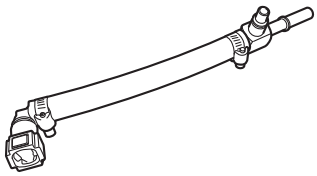
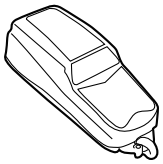
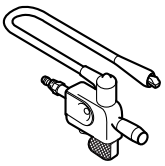
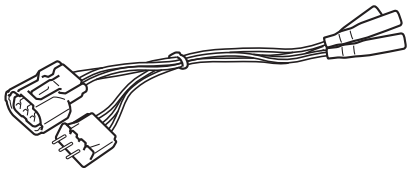
| Tool name/Tool No. | Illustration | Reference pages |
|---|---|---|
| Digital circuit tester (CD732)<br>90890-03243<br>Model 88 Multimeter with tachometer<br>YU-A1927 |  | 1-14, 5-45, 8-42, 8-43, 8-45, 8-45, 8-47, 8-47, 8-47, 8-47, 8-48, 8-49, 8-49, 8-50, 8-50, 8-51, 8-51 |
| Thickness gauge<br>90890-03268<br>Feeler gauge set<br>YU-26900-9 |  | 3-6, 5-50 |
| Valve lapper (ø14)<br>90890-04101<br>Valve lapper (ø14)<br>YM-A8998 | 90890-04101<br>  <br>YM-A8998<br>  | 3-7, 5-26 |
| Yamaha diagnostic tool USB (US)<br>90890-03269 |  | 3-11, 7-8, 8-15 |
| Yamaha diagnostic tool (A/I)<br>90890-03264 |  | 3-11, 7-8, 8-15 |
| FI diagnostic tool sub–lead<br>90890-03212<br>FI diagnostic tool sub–lead<br>YU-03212 |  | 3-11, 7-8, 8-15 |

| Tool name/Tool No. | Illustration | Reference pages |
|---|---|---|
| OBD/ GST Leadwire kit<br>90890-03249 |  | 3-11, 7-8, 8-15 |
| Digital tachometer<br>90890-06760<br>Digital tachometer<br>YU-39951-B |  | 3-11, 8-49 |
| Steering nut wrench<br>90890-01403<br>Exhaust flange nut wrench<br>YU-A9472 |  | 3-27, 4-55 |
| Spoke nipple wrench (6–7)<br>90890-01521<br>Spoke nipple wrench (6–7)<br>YM-01521 |  | 3-33 |
| Cap bolt ring wrench<br>90890-01501<br>Cap bolt ring wrench<br>YM-01501 |  | 4-43, 4-43, 4-44, 4-47, 4-50, 4-52 |
| Cap bolt wrench<br>90890-01500<br>Cap bolt wrench<br>YM-01500 |  | 4-44, 4-47 |
| Fork seal driver<br>90890-01502<br>Fork seal driver (48)<br>YM-A0948 |  | 4-48, 4-49 |
| Yamaha bond No. 1215<br>90890-85505<br>Three bond No. 1215® |  | 5-19, 5-38, 5-68 |

| Tool name/Tool No. | Illustration | Reference pages |
|---|---|---|
| Valve spring compressor<br>90890-04200<br>Valve spring compressor<br>YM-04019 |  | 5-26, 5-30 |
| Valve spring compressor attachment<br>90890-04108<br>Valve spring compressor adapter 22 mm<br>YM-04108 |  | 5-26, 5-30 |
| Valve guide remover (ø5)<br>90890-04097<br>Valve guide remover (5.0 mm)<br>YM-04097 |  | 5-28 |
| Valve guide installer (ø5)<br>90890-04098<br>Valve guide installer (5.0 mm)<br>YM-04098 |  | 5-28 |
| Valve guide reamer (ø5)<br>90890-04099<br>Valve guide reamer (5.0 mm)<br>YM-04099 |  | 5-28 |
| Valve guide remover (ø4.5)<br>90890-04116<br>Valve guide remover (4.5 mm)<br>YM-04116 |  | 5-28 |
| Valve guide installer (ø4.5)<br>90890-04117<br>Valve guide installer (4.5 mm)<br>YM-04117 |  | 5-28 |
| Valve guide reamer (ø4.5)<br>90890-04118<br>Valve guide reamer (4.5 mm)<br>YM-04118 |  | 5-28 |

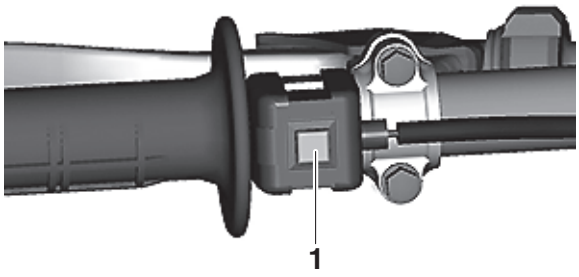
| Tool name/Tool No. | Illustration | Reference pages |
|---|---|---|
| Piston pin puller set<br>90890-01304<br>Piston pin puller<br>YU-01304 | 90890-01304<br>  <br><br>YU-01304<br>  | 5-33 |
| Rotor puller<br>90890-04151<br>Rotor puller<br>YM-04151 |  <br> | 5-38 |
| Sheave holder<br>90890-01903<br>Primary clutch holder<br>YS-01880-A |  | 5-41, 5-42 |
| Clutch holder<br>90890-04199<br>Universal clutch holder<br>YM-91042 |  <br><br>YM-91042<br>  | 5-50, 5-52 |
| Crankcase separating tool<br>90890-04152<br>Crankcase separating tool<br>YU-A9642 | 90890-04152<br>  <br><br>YU-A9642<br>  <br> | 5-70 |

| Tool name/Tool No. | Illustration | Reference pages |
|---|---|---|
| Crankshaft installer pot<br>90890-01274<br>Installing pot<br>YU-90058 | 90890-01274<br>  <br>YU-90058/YU-90059<br>  | 5-71 |
| Crankshaft installer bolt<br>90890-01275<br>Bolt<br>YU-90060 |  | 5-71 |
| Adapter (M12)<br>90890-01278<br>Adapter #3<br>YU-90063 |  | 5-71 |
| Spacer (crankshaft installer)<br>90890-04081<br>Pot spacer<br>YM-91044 | 90890-04081<br>  <br>YM-91044<br>  | 5-71 |
| Radiator cap tester<br>90890-01325<br>Mityvac cooling system tester kit<br>YU-24460-A | 90890-01325<br>  <br>YU-24460-A<br>  | 6-4, 6-4 |

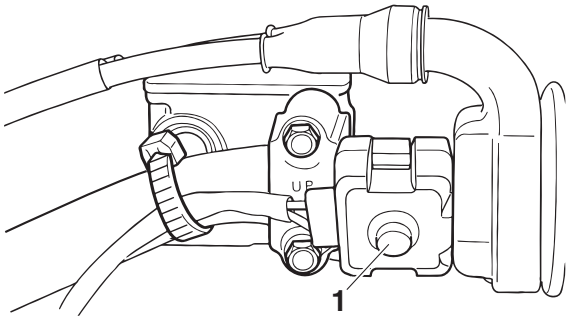
| Tool name/Tool No. | Illustration | Reference pages |
|---|---|---|
| Radiator cap tester adapter<br>90890-01352<br>Pressure tester adapter<br>YU-33984 | 90890-01352<br>  <br><br>YU-33984<br>  | 6-4, 6-4 |
| Pressure gauge<br>90890-03153<br>Pressure gauge<br>YU-03153 |  | 7-8 |
| Fuel pressure adapter<br>90890-03186<br>Fuel pressure adapter<br>YM-03186 |  | 7-8 |
| Lithium battery charger<br>90890-05376<br>Lithium battery charger<br>DBY-ACC51-70-02 |  | 8-44, 8-44 |
| Ignition checker<br>90890-06754<br>Oppama pet–4000 spark checker<br>YM-34487 |  | 8-46 |
| Test harness S– pressure sensor (3P)<br>90890-03207<br>Test harness S– pressure sensor (3P)<br>YU-03207 |  | 8-50 |

EAM20181
# INSTRUMENT AND CONTROL FUNCTIONS

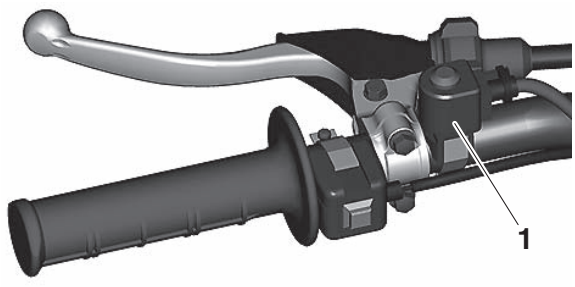
EAM30182
### ENGINE STOP SWITCH
The engine stop switch “1” is located on the left handlebar. Continue pushing the engine stop switch till the engine comes to a stop.




EAM30183
### START SWITCH
The start switch “1” is located on the right handlebar. Push this switch to crank the engine with the starter.

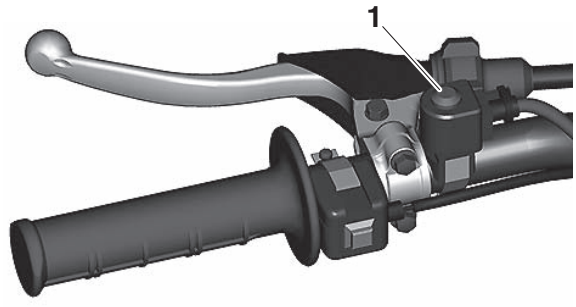



EAM30471
### MODE SWITCH
The mode switch “1” is located on the left handlebar.
Press the mode switch to change between map 1 and map 2.

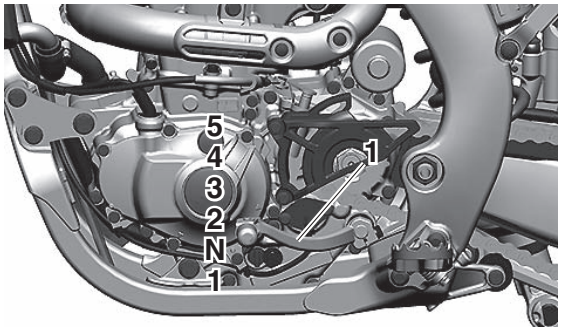



**To change the mode**
1. Shift to neutral.
2. Start the engine.
3. Press the mode switch.

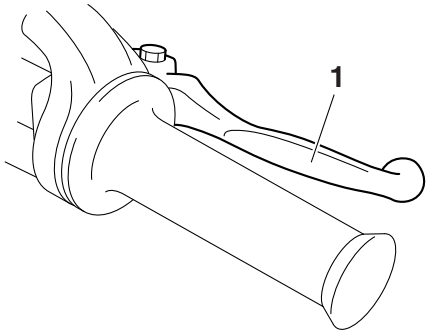
**TIP**
As shipped from the factory, maps 1 and 2 are the same. You must use the Power Tuner app to adjust the map settings.
When the mode switch “1” is illuminated, map 2 is selected.




EAM30185
### SHIFT PEDAL
The shift pedal “1” has adopted a method of 1 down & 4 ups (press-down & kick-ups).
Press it down for N (neutral) to 1st, and kick it up for 2nd to 5th.

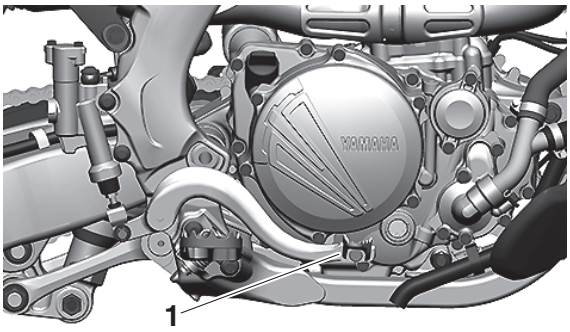



EAM30188
### FRONT BRAKE LEVER
The front brake lever “1” is located on the right handlebar. Pull it toward the handlebar to activate the front brake.




EAM30189
### REAR BRAKE PEDAL
The rear brake pedal “1” is in the right of the

chassis. Press down on the brake pedal to activate the rear brake.




EAM30444

### STARTER KNOB

Starting a cold engine requires a larger amount of intake air, which is supplied by the starter knob “1”.

Pushing the knob toward “a” turns ON the starter, resulting in a larger angle of throttle valve.

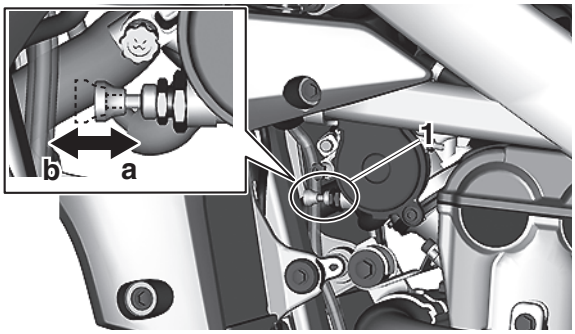
**TIP**

When operating the throttle grip in the closing direction, the starter knob “1” moves in the direction “b” as shown and returns to its original position.

EWA20470

**⚠ WARNING**

**While handling the starter knob, take care not to burn yourself on exhaust pipes.**




EAM30192

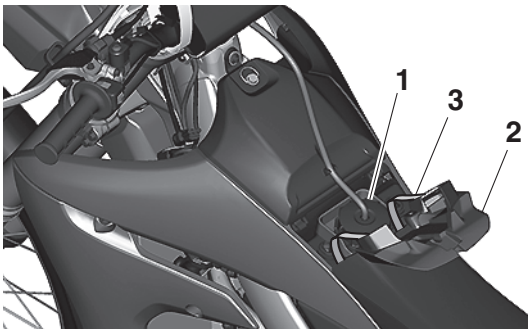
### FUEL TANK CAP

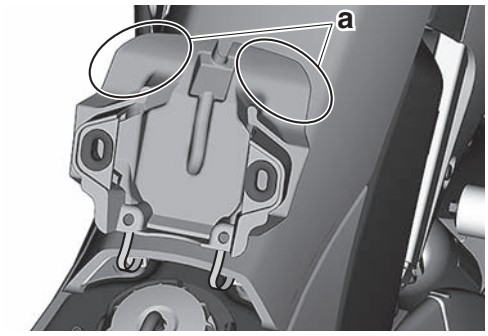
Fuel tank cap “1” is located under the fuel tank cap cover “2”.

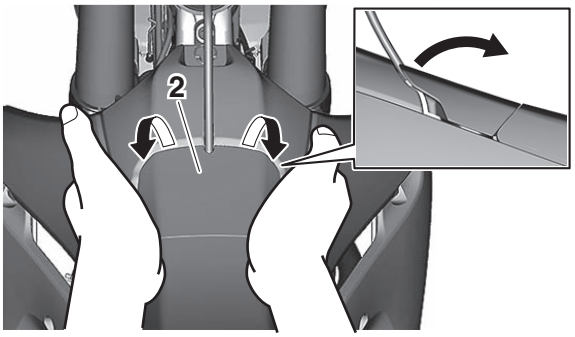
Remove the fuel tank cap cover to open the fuel tank cap.

**TIP**

- To remove the fuel tank cap cover, insert fingers under part “a”, and then use both hands to lift it up towards the rear of the vehicle.
- Install the fuel tank cap cover after placing the bands “3” all the way in under the seat.



EAM20123
# STARTING AND BREAK-IN

EAM30193
## FUEL
Always use the recommended fuel as stated below. Also, be sure to use new gasoline the day of a race.

**Recommended fuel**
**Unleaded gasoline (E10 acceptable)**
**Octane number (R+M)/2**
**91 or higher**
**Fuel tank capacity**
**6.2 L (1.6 US gal, 1.4 Imp.gal)**

ECA24180
***NOTICE***
**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.**

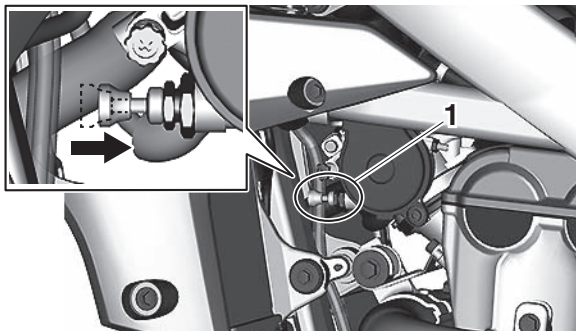
**TIP**
Your Yamaha engine has been designed to use unleaded gasoline with a pump octane number [(R+M)/2] of 91 or higher, or a research octane number of 95 or higher. If knocking (or pinging) occurs, use a gasoline of a different brand.

EWA19010
**⚠ 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.**

### Gasohol
There are two types of gasohol: gasohol containing ethanol and that containing methanol. Gasohol containing ethanol can be used if the ethanol content does not exceed 10 %. Gasohol containing methanol is not recommended by Yamaha because it can cause damage to the fuel system or vehicle performance problems.

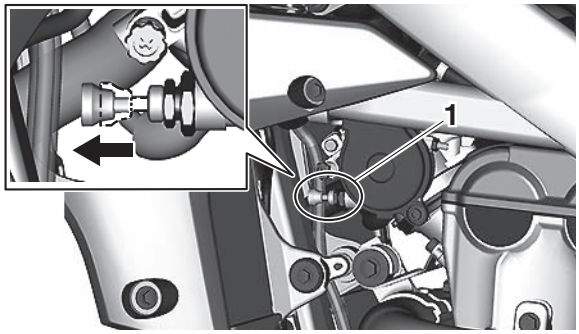
EAM30196
## STARTING A COLD ENGINE
1. Press the shift pedal to neutral.
2. Push the starter knob “1” completely.

**TIP**
- When the ambient temperature is 15 °C (59 °F) or below, use the starter knob.
- Do not operate the throttle grip when operating the starter knob.




3. Start the engine by pushing the start switch. If the engine fails to start when using the start switch, release it, 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.
4. When the engine starts running, warm this up one or two minutes at a steady speed (of 3000 to 5000 r/min), and then return the starter knob to its original position.

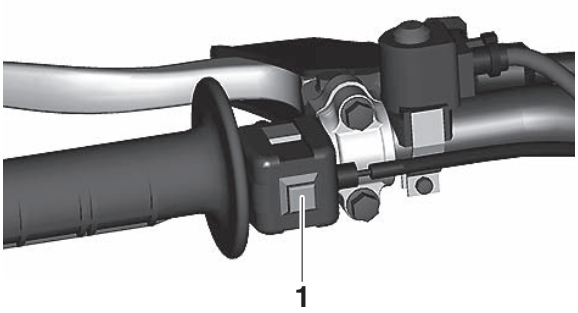
**TIP**
When operating the throttle grip in the closing direction, the starter knob “1” moves in the direction as shown and returns to its original position.




EWA19030
**⚠ WARNING**
**Since exhaust gas contains harmful ingredients, do not start or warm it up at an illventilated place or a closed narrow place.**

5. To stop the engine, push the engine stop switch “1”.

**TIP**
Continue pushing the engine stop switch till the engine comes to a full stop.




EAM30197

### STARTING A WARM ENGINE

Follow the same procedure as for starting a cold engine with the exception that the starter is not required when the engine is warm.

**TIP**

If the engine fail to start, fully open the throttle grip and push the start switch few seconds to clear the engine of the rich air-fuel mixture retained in it.

EAM30198

### BREAK-IN PROCEDURES

A break-in is important so that rotating portion, sliding surfaces, and mounted areas may fit one another, and that the rider may become accustomed to the machine.

ECA25811

***NOTICE***

**Before running, do maintenance on the air filter element.**

1. After warming up the engine, drive it for about 20 minutes at a throttle opening of 1/2 or less.

**TIP**

This model is equipped with an engine auto-stop system. The engine stops automatically if left idling for 7 minutes. If the engine stops, push the start switch to restart the engine.

2. Make a pit stop, and check mounted areas for looseness, oil leaks, or other problems.
3. Then, drive it for about 40 minutes at a throttle opening of 3/4 or less.
4. Make a pit stop again, and thoroughly check mounted areas for looseness, oil leaks, or other problems. Thorough checks and adjustments are required in particular for stretch of cables, free play of the brake, stretch of the drive chain, looseness of the spoke, and so on.

ECA25821

***NOTICE***

**After a break-in or after each race, always check the points shown in "TORQUE-CHECK POINTS" for tightening torques and retighten them.**
**Also when the following parts are replaced, a break-in is required.**

- **Cylinder and Crankshaft: A break-in is required for about an hour.**
- **Piston, Piston ring, Valve, Camshaft, and Gear: A break-in is required for about 30 minutes at a throttle opening of 1/2 or less.**

**Observe the condition of the engine carefully during a break-in.**
**For checkpoints for a break-in, see "MAINTENANCE AFTER BREAK-IN". If any problem is found, immediately stop the engine and make a checkup.**

EAM30468

### ENGINE STARTING PRECAUTION

Make sure the transmission is in neutral or be sure to pull the clutch lever before pressing the start switch.

EWA20540

**⚠ WARNING**

**If the clutch lever is not pulled and the start switch is pressed with the transmission in gear, the starter motor will cause the rear wheel to spin, which may cause injury.**

EAM20124
# MAINTENANCE AFTER BREAK-IN

After a break-in, perform careful maintenance to get ready for the next practice or race.
Refer to “PRE-OPERATION INSPECTION AND MAINTENANCE” on page 3-5.

EAM30199
## MAJOR MAINTENANCE

1. For the engine
   - Leaks around the engine
     Check for pressure leaks from the cylinder head or the cylinder, oil leaks from the crankcase or the case cover, leaks from the coolant system, and other leaks.
   - Check that the valve, the cylinder head, the cylinder, the piston, and the piston ring fit one another, and that contact between the valve and the cylinder head, and that between the cylinder and the piston are correct.
   - Engine oil change
     Drain the oil, and check for dirt and foreign materials such as metal chips. (If any foreign material is mixed, disassemble and check the crankcase.)
     Pour the specified amount of the recommended oil.
   - Generator
     Check for looseness in mounted areas of the generator rotor and the stator coil assembly.
     Check that the connector is not being disconnected.
   - Silencer
     Check the main body and stay for cracks. Check for leaks.
   - Mounting bolts and nuts
     Check for looseness in mounted areas of parts, as well as engine mounting bolts and engine brackets.
2. For the chassis
   - Check welds and mounted areas of the frame, the swingarm, the link, the bracket, and so on, for looseness and cracks.
   - Wheel(s)
     Check the wheel for runout. Check the spoke for looseness.
   - Brake(s)
     Check the brake disc mounting bolt for looseness.
     Check that the reservoir contains the specified amount of brake fluid. Check for leaks.
   - Cable
     Grease and adjust cables.
   - Drive chain
     Lubricate the drive chain and adjust its tension.
   - Fuel tank
     Clean the inside of the fuel tank. Check for leaks.
   - Suspension
     Check for oil leaks in the front fork or the rear shock absorber. Check that the mounted conditions are good.
   - Sprocket
     Check for looseness in the sprocket mounted on the rear wheel.
   - Mounting bolts and nuts
     Check mounted areas for looseness.

ECA25831
***NOTICE***

**After a break-in or before each race, always check the points shown in “TORQUE-CHECK POINTS” for tightening torques and retighten them.**

   - Greasing and oiling
     Always grease or oil the specified points.

EAM30195
## AIR FILTER MAINTENANCE

Apply the Yamaha foam air filter oil or other quality foam air filter oil to the element. (Excess oil in the element may adversely affect engine starting.) Refer to “CLEANING THE AIR FILTER ELEMENT” on page 3-15.

EAM20125

# TORQUE-CHECK POINTS

| | | | | |
|---|---|---|---|---|
| Frame construction | | Combined seat and fuel tank | | Fuel tank to frame |
| | | | | Frame to rear frame |
| | | | | Frame to engine protector |
| Engine mounting | | | | Frame to engine |
| | | | | Engine bracket to engine |
| | | | | Engine bracket to frame |
| Seat | | | | Seat to frame |
| Steering | | Steering stem to handlebar | | Steering stem to frame |
| | | | | Steering stem to upper bracket |
| | | | | Upper bracket to handlebar |
| Suspension | Front | Steering stem to front fork | | Front fork to upper bracket |
| | | | | Front fork to lower bracket |
| | Rear | Link | | Assembly of links |
| | | | | Link to frame |
| | | | | Link to rear shock absorber |
| | | | | Link to swingarm |
| | | Mounting of rear shock absorber | | Rear shock absorber and frame |
| | | Mounting of swingarm | | Tightening of pivot shaft |
| Wheel(s) | | Mounting of wheel | Front | Tightening of wheel axle |
| | | | | Tightening of axle holder |
| | | | | Tightening of spoke nipple |
| | | | Rear | Tightening of wheel axle |
| | | | | Wheel to rear wheel sprocket |
| | | | | Tightening of spoke nipple |
| Brake(s) | | | Front | Brake caliper to front fork |
| | | | | Brake disc to wheel |
| | | | | Tightening of union bolt |
| | | | | Brake master cylinder to handlebar |
| | | | | Tightening of bleed screw |
| | | | | Tightening of brake hose holder |
| | | | Rear | Brake pedal to frame |
| | | | | Brake disc to wheel |
| | | | | Tightening of union bolt |
| | | | | Brake master cylinder to frame |
| | | | | Tightening of bleed screw |
| | | | | Tightening of brake hose holder |
| Fuel system | | | | Fuel pump to fuel tank |

| | |
|---|---|
| Shift pedal | Shift pedal to shift shaft |
| Plastic cover | Tightening of front fender |
| | Tightening of fork leg protector |
| | Tightening of air scoop |
| | Left cover to rear frame |
| | Tightening of side cover |
| | Tightening of rear fender |
| | Tightening of mud flap |
| | Tightening of rear brake disc cover |
| | Tightening of rear brake caliper cover |

**TIP**
Concerning the tightening torque, refer to “TIGHTENING TORQUES” on page 2-9.

EAM20126

# MOTORCYCLE CARE AND STORAGE

EAM30200

## CARE

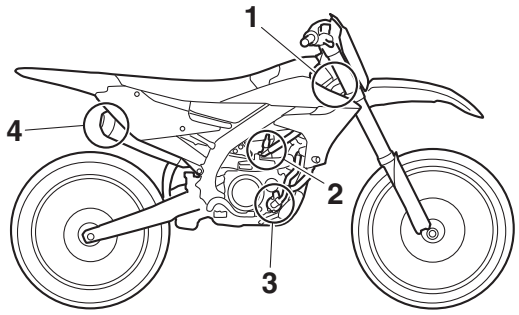
While the open design of a motorcycle reveals the attractiveness of the technology, it also makes it more vulnerable. Rust and corrosion can develop even if high-quality components are used. A rusty exhaust pipe may go unnoticed on a car, however, it detracts from the overall appearance of a motorcycle. Frequent and proper care does not only comply with the terms of the warranty, but it will also keep your motorcycle looking good, extend its life and optimize its performance.

### Before cleaning

**TIP**

Be sure to confirm that the vehicle is completely cooled.

1. Block or cover the following parts with suitable measures.
   - Air duct "1"
   - Drain hole on the cylinder head (right side) "2"
   - Hole under the water pump housing "3"
   - Muffler outlet "4"



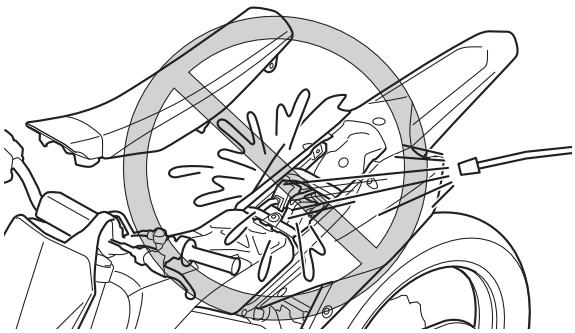

2. Make sure that all caps and covers as well as all electrical couplers and connectors, including the spark plug cap, are tightly installed.
3. Remove extremely stubborn dirt, like oil burnt onto the crankcase, with a degreasing agent and a brush, but never apply such products onto seals, gaskets, sprockets,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

### Cleaning

ECA26730

***NOTICE***

- **Avoid using strong acidic wheel cleaners, especially on spoked wheels. If such products are used on hard-to-remove dirt, do not leave the cleaner on the affected area any longer than instructed. Also, thoroughly rinse the area off with water, immediately dry it, and then apply a corrosion protection spray.**
- **Improper cleaning can damage plastic parts (such as cowlings, panels, windshields, headlight lenses, meter lenses, etc.) and the mufflers. Use only a soft, clean cloth or sponge with water to clean plastic. However, if the plastic parts cannot be thoroughly cleaned with water, diluted mild detergent with water may be used. Be sure to rinse off any detergent residue using plenty of water, as it is harmful to plastic parts.**
- **Do not use any harsh chemical products on plastic parts. Be sure to avoid using cloths or sponges which have been in contact with strong or abrasive cleaning products, solvent or thinner, fuel (gasoline), rust removers or inhibitors, brake fluid, antifreeze or electrolyte.**
- **For motorcycles equipped with a windshield: Do not use strong cleaners or hard sponges as they will cause dulling or scratching. Some cleaning compounds for plastic may leave scratches on the windshield. Test the product on a small hidden part of the windshield to make sure that it does not leave any marks. If the windshield is scratched, use a quality plastic polishing compound after washing.**
- **When cleaning using either a high-pressure cleaning machine or a water hose, do not direct the water jet toward the following areas:(Otherwise, it could cause either damage due to the water pressure or malfunction due to water entry.)**
  **Wheels or swing arm bearings**
  **Fork seals or brake seals**
  **Electrical parts, such as couplers, switches, battery, etc.**
  **Muffler or hoses**
  **Air cleaner intake port**
- **Do not clean using a water jet with the seat or cover removed.**



After normal use

Remove dirt with warm water, a mild detergent, and a soft, clean sponge, and then rinse thoroughly with clean water. Use a toothbrush or bottlebrush for hard-to-reach areas. Stubborn dirt and insects will come off more easily if the area is covered with a wet cloth for a few minutes before cleaning.

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

Since sea salt or salt sprayed on roads during winter are extremely corrosive in combination with water, carry out the following steps after each ride in the rain, near the sea or on salt-sprayed roads.

**TIP**

Salt sprayed on roads in the winter may remain well into spring.

1. Clean the motorcycle with cold water and a mild detergent, after the engine has cooled down.
   ***NOTICE:*** **Do not use warm water since it increases the corrosive action of the salt.**
2. Apply a corrosion protection spray on all metal, including chrome- and nickel-plated, surfaces to prevent corrosion.

**After cleaning**

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

EWA19050

**⚠ WARNING**

**Contaminants on the brakes or tires can cause loss of control.**

- **Make sure that there is no oil or wax on the brakes or tires.**
- **If necessary, clean the brake discs and brake linings with a regular brake disc cleaner or acetone, and wash the tires with warm water and a mild detergent. Before riding at higher speeds, test the motorcycle's braking performance and cornering behavior.**

ECA24240

***NOTICE***

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

**TIP**

- Consult a Yamaha dealer for advice on what products to use.
- Washing, rainy weather or humid climates can cause the headlight lens to fog. Turning the headlight on for a short period of time will help remove the moisture from the lens.

EAM30201

## STORAGE

### Short-term

Always store your motorcycle in a cool, dry place and, if necessary, protect it against dust with a porous cover. Be sure the engine and the exhaust system are cool before covering the motorcycle.

ECA24250

***NOTICE***

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

**stored.**

**Long-term**

Before storing your motorcycle for several months:

1. Follow all the instructions in the “CARE” on page 1-28.
2. Fill up the fuel tank and add fuel stabilizer (if available) to prevent the fuel tank from rusting and the fuel from deteriorating.
3. Perform the following steps to protect the cylinder, piston rings, etc. from corrosion.
   a. Remove the spark plug cap and spark plug.
   b. Pour a teaspoonful of engine oil into the spark plug bore.
   c. Install the spark plug cap onto the spark plug, and then place the spark plug on the cylinder head so that the electrodes are grounded. (This will limit sparking during the next step.)
   d. Turn the engine over several times with the starter. (This will coat the cylinder wall with oil.)
   e. Remove the spark plug cap from the spark plug, and then install the spark plug and the spark plug cap. **WARNING! To prevent damage or injury from sparking, make sure to ground the spark plug electrodes while turning the engine over.**
4. Lubricate all control cables and the pivoting points of all levers and pedals as well as of the sidestand/centerstand.
5. Check and, if necessary, correct the tire air pressure, and then lift the motorcycle so that both of its wheels are off the ground. Alternatively, turn the wheels a little every month in order to prevent the tires from becoming degraded in one spot.
6. Cover the muffler outlet with a plastic bag to prevent moisture from entering it.
7. Remove the battery and fully charge it. Store it in a cool, dry place and charge it once a month. Do not store the battery in an excessively cold or warm place [less than 0 °C (32 °F) or more than 65 °C (149 °F)]. For more information on storing the battery, “CHECKING AND CHARGING THE BATTERY” on page 8-43.

**TIP**

Make any necessary repairs before storing the motorcycle.

# SPECIFICATIONS

**GENERAL SPECIFICATIONS** ..... 2-1

**ENGINE SPECIFICATIONS** ..... 2-2

**CHASSIS SPECIFICATIONS** ..... 2-5

**ELECTRICAL SPECIFICATIONS** ..... 2-8

**TIGHTENING TORQUES** ..... 2-9
- GENERAL TIGHTENING TORQUE SPECIFICATIONS ..... 2-9
- ENGINE TIGHTENING TORQUES ..... 2-10
- CHASSIS TIGHTENING TORQUES ..... 2-13

**CABLE ROUTING DIAGRAM** ..... 2-17

EAM20127

# GENERAL SPECIFICATIONS

| | |
|---|---|
| **Model** | |
| Model | BSB1<br>BSB6 |
| **Dimensions** | |
| Overall length | 2175 mm (85.6 in) |
| Overall width | 825 mm (32.5 in) |
| Overall height | 1285 mm (50.6 in) |
| Seat height | 970 mm (38.2 in) |
| Wheelbase | 1475 mm (58.1 in) |
| Ground clearance | 335 mm (13.19 in) |
| **Weight** | |
| Curb weight | 106 kg (234 lb) |
| Riding capacity | 1 person |

EAM20128
# ENGINE SPECIFICATIONS

| | |
|---|---|
| **Engine** | |
| Combustion cycle | 4-stroke |
| Cooling system | Liquid cooled |
| Valve train | DOHC |
| Displacement | 250 cm³ |
| Number of cylinders | Single cylinder |
| Bore × stroke | 77.0 × 53.6 mm (3.03 × 2.11 in) |
| Compression ratio | 13.8 : 1 |
| Starting system | Electric starter |
| **Fuel** | |
| Recommended fuel | Unleaded gasoline (E10 acceptable) |
| Octane number (RON) | 95 |
| Fuel tank capacity | 6.2 L (1.6 US gal, 1.4 Imp.gal) |
| **Engine oil** | |
| Recommended brand | YAMALUBE |
| SAE viscosity grades | 10W-40, 10W-50, 15W-40, 20W-40 or 20W-50 |
| Recommended engine oil grade | API service SG type or higher, JASO standard MA |
| Lubrication system | Wet sump |
| Engine oil quantity | |
| Oil change | 0.73 L (0.77 US qt, 0.64 Imp.qt) |
| With oil filter removal | 0.75 L (0.79 US qt, 0.66 Imp.qt) |
| Quantity (disassembled) | 0.95 L (1.00 US qt, 0.84 Imp.qt) |
| **Oil filter** | |
| Oil filter type | Cartridge |
| **Cooling system** | |
| Coolant quantity | |
| Radiator (including all routes) | 0.93 L (0.98 US qt, 0.82 Imp.qt) |
| Radiator cap valve opening pressure | 107.9–137.3 kPa (1.08–1.37 kgf/cm², 15.6–19.9 psi) |
| **Spark plug(s)** | |
| Manufacturer/model | NGK/LMAR9E-J |
| Spark plug gap | 0.6–0.7 mm (0.024–0.028 in) |
| **Cylinder head** | |
| Warpage limit | 0.05 mm (0.0020 in) |
| **Camshaft** | |
| Camshaft cap inside diameter | 22.000–22.021 mm (0.8661–0.8670 in) |
| Camshaft journal diameter | 21.959–21.972 mm (0.8645–0.8650 in) |
| Camshaft-journal-to-camshaft-cap clearance | 0.028–0.062 mm (0.0011–0.0024 in) |
| Camshaft-journal-to-camshaft-cap clearance limit | 0.080 mm (0.0032 in) |
| Camshaft lobe dimensions | |
| Lobe height limit (Intake) | 32.130 mm (1.2650 in) |
| Lobe height limit (Exhaust) | 33.460 mm (1.3173 in) |
| **Valve, valve seat, valve guide** | |
| Valve clearance (cold) | |
| Intake | 0.12–0.19 mm (0.0047–0.0075 in) |

| | |
|---|---|
| Exhaust | 0.17–0.24 mm (0.0067–0.0094 in) |
| Valve dimensions | |
| Valve seat contact width limit (intake) | 1.6 mm (0.06 in) |
| Valve seat contact width limit (exhaust) | 1.6 mm (0.06 in) |
| Valve stem diameter limit (intake) | 4.945 mm (0.1947 in) |
| Valve stem diameter limit (exhaust) | 4.430 mm (0.1744 in) |
| Valve guide inside diameter (intake) | 5.000–5.012 mm (0.1969–0.1973 in) |
| Valve guide inside diameter (exhaust) | 4.500–4.512 mm (0.1772–0.1776 in) |
| Valve-stem-to-valve-guide clearance limit (intake) | 0.080 mm (0.0032 in) |
| Valve-stem-to-valve-guide clearance limit (exhaust) | 0.100 mm (0.0039 in) |
| Valve stem runout | 0.020 mm (0.0008 in) |
| **Valve spring** | |
| Free length limit (intake) | 34.94 mm (1.38 in) |
| Free length limit (exhaust) | 33.82 mm (1.33 in) |
| **Cylinder** | |
| Bore | 77.000–77.010 mm (3.0315–3.0319 in) |
| Wear limit | 77.060 mm (3.0339 in) |
| **Piston** | |
| Piston-to-cylinder clearance | 0.030–0.055 mm (0.0012–0.0022 in) |
| Diameter | 76.955–76.970 mm (3.0297–3.0303 in) |
| Measuring point (from piston skirt bottom) | 4.0 mm (0.16 in) |
| Piston pin bore inside diameter limit | 16.043 mm (0.6316 in) |
| Piston pin outside diameter limit | 15.971 mm (0.6288 in) |
| Piston-pin-to-piston-pin-bore clearance | 0.002–0.022 mm (0.0001–0.0009 in) |
| **Piston ring** | |
| Top ring | |
| End gap limit | 0.50 mm (0.0197 in) |
| Ring side clearance | 0.030–0.065 mm (0.0012–0.0026 in) |
| Side clearance limit | 0.115 mm (0.0045 in) |
| **Crankshaft** | |
| Crank assembly width | 55.93–56.00 mm (2.202–2.205 in) |
| Runout limit | 0.030 mm (0.0012 in) |
| **Clutch** | |
| Clutch type | Wet, multiple-disc |
| Clutch lever free play | 7.0–12.0 mm (0.28–0.47 in) |
| Friction plate thickness | 2.70–2.90 mm (0.106–0.114 in) |
| Wear limit | 2.60 mm (0.102 in) |
| Plate quantity | 8 pcs |
| Clutch plate thickness | 1.50–1.70 mm (0.059–0.067 in) |
| Plate quantity | 7 pcs |
| Warpage limit | 0.10 mm (0.004 in) |
| Clutch spring free length | 46.20 mm (1.82 in) |
| Clutch spring free length limit | 43.89 mm (1.73 in) |
| Push rod bending limit | 0.30 mm (0.012 in) |
| **Drivetrain** | |
| Primary reduction ratio | 3.353 (57/17) |
| Transmission type | Constant mesh 5-speed |

| | |
|---|---|
| Gear ratio | |
| 1st | 2.143 (30/14) |
| 2nd | 1.750 (28/16) |
| 3rd | 1.444 (26/18) |
| 4th | 1.222 (22/18) |
| 5th | 1.042 (25/24) |
| Main axle runout limit | 0.08 mm (0.0032 in) |
| Drive axle runout limit | 0.08 mm (0.0032 in) |
| Secondary reduction ratio | 3.846 (50/13) |
| Final drive | Chain |
| **Air filter** | |
| Air filter element | Wet element |
| Air filter oil grade | Yamaha foam air filter oil or other quality foam air filter oil |
| **Fuel pump** | |
| Pump type | Electrical |
| Maximum consumption amperage | 2.4 A |
| **Fuel injector** | |
| Resistance | 12.0 Ω |
| **Throttle body** | |
| ID mark | B7B1 |
| **Idling condition** | |
| Engine idling speed | 1900–2100 r/min |
| Coolant temperature | 70–80 °C (158–176 °F) |
| Fuel line pressure (at idle) | 300–390 kPa (3.0–3.9 kgf/cm², 43.5–56.6 psi) |
| Throttle grip free play | 3.0–6.0 mm (0.12–0.24 in) |

EAM20129
# CHASSIS SPECIFICATIONS

| | |
|---|---|
| **Chassis** | |
| Caster angle | 26.8 ° |
| Trail | 119 mm (4.7 in) |
| **Front wheel** | |
| Wheel type | Spoke wheel |
| Rim size | 21x1.6 |
| Radial wheel runout limit | 2.0 mm (0.08 in) |
| Lateral wheel runout limit | 2.0 mm (0.08 in) |
| Wheel axle bending limit | 0.50 mm (0.02 in) |
| **Rear wheel** | |
| Wheel type | Spoke wheel |
| Rim size | 19x2.15 |
| Radial wheel runout limit | 2.0 mm (0.08 in) |
| Lateral wheel runout limit | 2.0 mm (0.08 in) |
| Wheel axle bending limit | 0.50 mm (0.02 in) |
| **Front tire** | |
| Type | With tube |
| Size | 80/100-21 51M |
| Manufacturer/model | DUNLOP/MX33F |
| **Rear tire** | |
| Type | With tube |
| Size | 110/90-19 62M |
| Manufacturer/model | DUNLOP/MX33 |
| **Tire air pressure (measured on cold tires)** | |
| Front | 100 kPa (1.00 kgf/cm², 15 psi) |
| Rear | 100 kPa (1.00 kgf/cm², 15 psi) |
| **Front brake** | |
| Type | Hydraulic single disc brake |
| Brake disc thickness limit | 2.5 mm (0.10 in) |
| Brake disc runout limit (as measured on wheel) | 0.15 mm (0.0059 in) |
| Brake pad lining thickness limit | 1.0 mm (0.04 in) |
| Master cylinder inside diameter | 9.52 mm (0.37 in) |
| Caliper cylinder inside diameter (Left) | 25.40 mm, 25.40 mm (1.00 in, 1.00 in) |
| Specified brake fluid | DOT 4 |
| **Rear brake** | |
| Type | Hydraulic single disc brake |
| Brake disc thickness limit | 3.5 mm (0.14 in) |
| Brake disc runout limit (as measured on wheel) | 0.15 mm (0.0059 in) |
| Brake pad lining thickness limit | 1.0 mm (0.04 in) |
| Master cylinder inside diameter | 11.0 mm (0.43 in) |
| Caliper cylinder inside diameter | 25.40 mm (1.00 in) |
| Specified brake fluid | DOT 4 |
| **Front suspension** | |
| Type | Telescopic fork |
| Spring | Coil spring |

| | |
|---|---|
| Shock absorber | Hydraulic damper |
| Wheel travel | 310 mm (12.2 in) |
| Fork spring free length limit | 492.0 mm (19.37 in) |
| Inner tube bending limit | 0.2 mm (0.01 in) |
| Recommended oil | Yamaha Suspension Oil S1 |
| Quantity (left) | 501.0 cm³ (16.94 US oz, 17.67 Imp.oz) |
| Quantity (right) | 501.0 cm³ (16.94 US oz, 17.67 Imp.oz) |
| Rebound damping | |
| Adjusting system | Mechanical adjustable type |
| Unit for adjustment | Click |
| Adjustment value from the start position (Soft) | 20 |
| Adjustment value from the start position (STD) | 7 |
| Adjustment value from the start position (Hard) | 0 |
| Compression damping | |
| Adjusting system | Mechanical adjustable type |
| Unit for compression damping adjustment | Click |
| Adjustment value from the start position (Soft) | 20 |
| Adjustment value from the start position (STD) | 10 |
| Adjustment value from the start position (Hard) | 0 |

**Rear suspension**

| | |
|---|---|
| Type | Swingarm (link suspension) |
| Spring | Coil spring |
| Shock absorber | Gas-hydraulic damper |
| Wheel travel | 317 mm (12.5 in) |
| Spring preload | |
| Adjusting system | Mechanical adjustable type |
| Adjustment value (Soft) | 1.5 mm (0.06 in) |
| Adjustment value (STD) | 7.0 mm (0.28 in) |
| Adjustment value (Hard) | 18.0 mm (0.71 in) |
| Rebound damping | |
| Adjusting system | Mechanical adjustable type |
| Unit for adjustment | Click |
| Adjustment value from the start position (Soft) | 30 |
| Adjustment value from the start position (STD) | 10 |
| Adjustment value from the start position (Hard) | 0 |
| Compression damping | |
| Adjusting system | Mechanical adjustable type |
| Fast compression damping | |
| Unit for adjustment | Turn |
| Adjustment value from the start position (Soft) | 2 |
| Adjustment value from the start position (STD) | 7/8 |

| | |
|---|---|
| Adjustment value from the start position (Hard) | 0 |
| Slow compression damping | |
| Unit for adjustment | Click |
| Adjustment value from the start position (Soft) | 20 |
| Adjustment value from the start position (STD) | 8 |
| Adjustment value from the start position (Hard) | 0 |

| **Drive chain** | |
|---|---|
| Size | 520 |
| Chain type | Non-sealed type |
| Number of links | 114 |
| Drive chain slack (Maintenance Stand) | 50.0–60.0 mm (1.97–2.36 in) |
| 15-link length limit | 242.9 mm (9.56 in) |

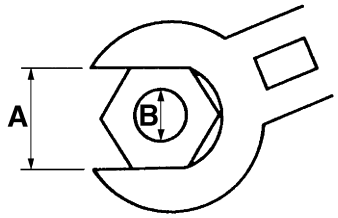
EAM20130
# ELECTRICAL SPECIFICATIONS

| | |
|---|---|
| **Voltage** | |
| System voltage | 12 V |
| **Ignition system** | |
| Ignition system | TCI |
| Ignition timing (B.T.D.C.) | 8.0–12.0 °/2000 r/min |
| **Engine control unit** | |
| Model | B7B6 |
| **Ignition coil** | |
| Primary coil resistance | 2.16–2.64 Ω |
| Secondary coil resistance | 8.64–12.96 kΩ |
| **Spark plug cap** | |
| Resistance | 7.50–12.50 kΩ |
| **Charging system** | |
| Charging system | AC magneto |
| Standard output | 14.0 V, 5.4 A at 5000 r/min |
| Stator coil resistance | 0.512–0.768 Ω |
| **Rectifier/regulator** | |
| Regulator type | Single-phase |
| Regulated voltage (DC) | 14.0–14.8 V |
| **Battery** | |
| Model | BR98 |
| Voltage, capacity | 12 V, 2.4 Ah (5 HR) |
| **Starter motor** | |
| Brush overall length | 7.0 mm (0.28 in) |
| Brush overall length limit | 3.5 mm (0.14 in) |
| Brush spring force | 3.92–5.88 N (400–600 gf, 14.11–21.17 oz) |
| Mica undercut (depth) | 1.50 mm (0.06 in) |
| **Fuel injection sensor** | |
| Crankshaft position sensor resistance | 228–342 Ω |
| Intake air temperature sensor resistance | 5400–6600 Ω at 0 °C (5400–6600 Ω at 32 °F) |
| Intake air temperature sensor resistance | 290–390 Ω at 80 °C (290–390 Ω at 176 °F) |
| Coolant temperature sensor resistance | 2513–2777 Ω at 20 °C (2513–2777 Ω at 68 °F) |
| Coolant temperature sensor resistance | 210–221 Ω at 100 °C (210–221 Ω at 212 °F) |
| **Fuse(s)** | |
| Main fuse | 15.0 A |
| Spare fuse | 15.0 A |

EAM20131
# TIGHTENING TORQUES

EAM30205
## GENERAL TIGHTENING TORQUE SPECIFICATIONS

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




A. Distance between flats
B. Outside thread diameter

| A (nut) | B (bolt) | General tightening torques | | |
|---|---|---|---|---|
| | | N·m | kgf·m | lb·ft |
| 10 mm | 6 mm | 6 | 0.6 | 4.4 |
| 12 mm | 8 mm | 15 | 1.5 | 11 |
| 14 mm | 10 mm | 30 | 3.0 | 22 |
| 17 mm | 12 mm | 55 | 5.5 | 41 |
| 19 mm | 14 mm | 85 | 8.5 | 63 |
| 22 mm | 16 mm | 130 | 13.0 | 96 |

EAM30203
## ENGINE TIGHTENING TORQUES

**TIP**

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

| Item | Thread size | Q'ty | Tightening torques | Remarks |
|---|---|---|---|---|
| Camshaft cap bolt | M6 | 8 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | E |
| Spark plug | M10 | 1 | 13 N·m (1.3 kgf·m, 9.6 lb·ft) | |
| Oil passage plug (cylinder head) | M6 | 1 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Cylinder head bolt | M9 | 4 | See TIP. | M |
| Cylinder head nut | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Cylinder head cover bolt | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Cylinder head stud bolt (exhaust pipe) | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | |
| Stud bolt (Cylinder head cover) | M6 | 1 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | LT |
| Cylinder bolt | M6 | 1 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Oil pressure check bolt | M6 | 1 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Balancer weight plate screw | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | LT |
| Balancer weight gear nut | M14 | 1 | 50 N·m (5.0 kgf·m, 37 lb·ft) | |
| Balancer nut | M10 | 1 | 38 N·m (3.8 kgf·m, 28 lb·ft) | E |
| Timing chain guide stopper plate (exhaust side) | M6 | 1 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | LT |
| Timing chain tensioner cap bolt | M6 | 1 | 6 N·m (0.6 kgf·m, 4.4 lb·ft) | |
| Timing chain tensioner bolt | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Coolant drain bolt | M6 | 1 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Radiator hose clamp screw | M6 | 8 | 1.5 N·m (0.15 kgf·m, 1.1 lb·ft) | |
| Radiator bolt | M6 | 4 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Radiator pipe joint bolt | M6 | 1 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Water pump housing cover bolt | M6 | 4 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Water pump impeller | M8 | 1 | 14 N·m (1.4 kgf·m, 10 lb·ft) | |
| Oil pump assembly bolt | M5 | 2 | 5 N·m (0.5 kgf·m, 3.7 lb·ft) | LT |
| Oil pump cover bolt | M4 | 1 | 6 N·m (0.6 kgf·m, 4.4 lb·ft) | LT |
| Oil strainer bolt | M6 | 1 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Throttle cable cover bolt | M5 | 1 | 3.5 N·m (0.35 kgf·m, 2.6 lb·ft) | |
| Throttle body joint bolt | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Throttle body joint clamp screw | M5 | 1 | 3.0 N·m (0.30 kgf·m, 2.2 lb·ft) | |
| Air filter case joint clamp screw | M5 | 1 | 3.0 N·m (0.30 kgf·m, 2.2 lb·ft) | |
| Air filter case bolt | M6 | 3 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | |
| Clutch cable locknut (clutch cable adjuster) | M6 | 1 | 4.3 N·m (0.43 kgf·m, 3.2 lb·ft) | |

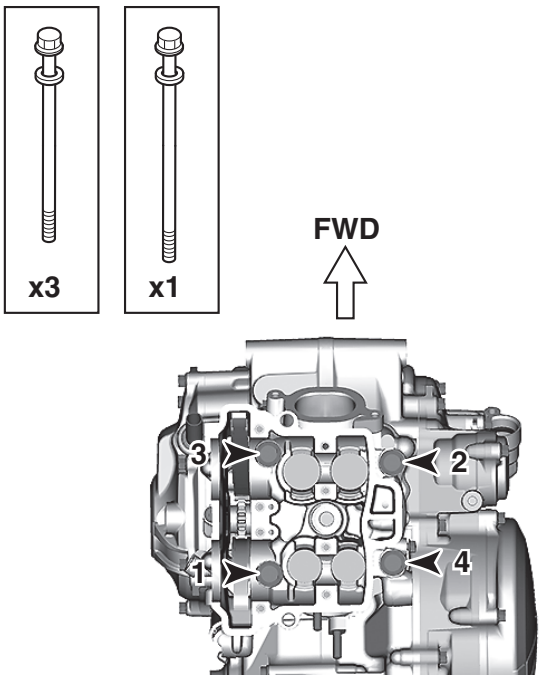
| Item | Thread size | Q'ty | Tightening torques | Remarks |
|---|---|---|---|---|
| Clutch cable locknut (engine side) | M8 | 1 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | |
| Exhaust pipe nut | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Exhaust pipe protector screw | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | T |
| Exhaust pipe bracket bolt | M8 | 1 | 20 N·m (2.0 kgf·m, 15 lb·ft) | |
| Silencer bolt (front) | M8 | 1 | 30 N·m (3.0 kgf·m, 22 lb·ft) | |
| Silencer bolt (rear) | M8 | 1 | 30 N·m (3.0 kgf·m, 22 lb·ft) | |
| Exhaust pipe clamp bolt | M8 | 2 | 12 N·m (1.2 kgf·m, 8.9 lb·ft) | |
| Silencer body bolt | M5 | 6 | 8 N·m (0.8 kgf·m, 5.9 lb·ft) | T |
| Oil nozzle bolt | M5 | 1 | 5 N·m (0.5 kgf·m, 3.7 lb·ft) | T |
| Engine oil drain bolt | M10 | 1 | 20 N·m (2.0 kgf·m, 15 lb·ft) | |
| Crankcase bolt | M6 | 13 | 12 N·m (1.2 kgf·m, 8.9 lb·ft) | |
| Clutch cable holder bolt | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | T |
| Crankshaft end accessing screw | M36 | 1 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | E |
| Timing mark accessing screw | M14 | 1 | 6 N·m (0.6 kgf·m, 4.4 lb·ft) | E |
| Drive sprocket cover bolt | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | |
| Crankcase bearing cover plate screw | M8 | 4 | 22 N·m (2.2 kgf·m, 16 lb·ft) | T |
| Bearing plate cover bolt (left side of the drive axle) | M6 | 2 | 12 N·m (1.2 kgf·m, 8.9 lb·ft) | T |
| Plate bolt | M6 | 4 | 12 N·m (1.2 kgf·m, 8.9 lb·ft) | T |
| Clutch cover bolt | M6 | 6 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Crankcase cover bolt (left) | M6 | 7 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Crankcase cover bolt (right) | M6 | 9 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Oil filter element cover bolt | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Starter clutch screw | M6 | 8 | 12 N·m (1.2 kgf·m, 8.9 lb·ft) | T |
| Primary drive gear nut | M16 | 1 | 105 N·m (10.5 kgf·m, 77 lb·ft) | T |
| Clutch spring bolt | M6 | 6 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Clutch boss nut | M20 | 1 | 95 N·m (9.5 kgf·m, 70 lb·ft) | Stake. E |
| Drive sprocket nut | M18 | 1 | 75 N·m (7.5 kgf·m, 55 lb·ft) | Use a lock washer. |
| Segment bolt | M8 | 1 | 30 N·m (3.0 kgf·m, 22 lb·ft) | |
| Shift guide bolt | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | T |
| Stopper lever bolt | M6 | 1 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | T |
| Shift pedal bolt | M6 | 1 | 12 N·m (1.2 kgf·m, 8.9 lb·ft) | △ |
| Generator rotor nut | M12 | 1 | 65 N·m (6.5 kgf·m, 48 lb·ft) | |
| Stator coil screw | M5 | 3 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | T |

| Item | Thread size | Q'ty | Tightening torques | Remarks |
|---|---|---|---|---|
| Crankshaft position sensor bolt | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Stator coil assembly lead holder bolt | M5 | 1 | 8 N·m (0.8 kgf·m, 5.9 lb·ft) | |
| Coolant temperature sensor | M10 | 1 | 14 N·m (1.4 kgf·m, 10 lb·ft) | |
| Gear position switch bolt | M5 | 2 | 3.5 N·m (0.35 kgf·m, 2.6 lb·ft) | |
| Rectifier/regulator bolt | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | |
| ECU bolt | M5 | 2 | 3.8 N·m (0.38 kgf·m, 2.8 lb·ft) | |
| Ignition coil bolt | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | |
| Starter motor bolt | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | |
| Nut (holder) | M6 | 1 | 8 N·m (0.8 kgf·m, 5.9 lb·ft) | |
| Throttle position sensor screw | M5 | 1 | 3.5 N·m (0.35 kgf·m, 2.6 lb·ft) | |
| Intake air pressure sensor screw | M6 | 1 | 3.5 N·m (0.35 kgf·m, 2.6 lb·ft) | |

**TIP**

**Cylinder head bolt**

Tighten all the cylinder head tightening bolts evenly in the tightening order to 30 N·m (3.0 kgf·m, 22 lb·ft). Remove the one bolt according to the tightening order. When doing so, do not remove the other bolts. Retighten the bolt to 15 N·m (1.5 kgf·m, 11 lb·ft), and then tighten it further to reach the specified angle (60°). Remove the remaining bolts one by one in the same manner and retighten them. Finally, tighten all the bolts to reach the specified angle (60°). Total tightening angle: 60° + 60° = 120° (The first and second time, be sure to apply molybdenum disulfide oil to the bolt threads and seats as well as to both sides of the lock washers.)



EAM30204
## CHASSIS TIGHTENING TORQUES

**TIP**

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

| Item | Thread size | Q'ty | Tightening torques | Remarks |
|---|---|---|---|---|
| Upper bracket pinch bolt | M8 | 4 | 21 N·m (2.1 kgf·m, 15 lb·ft) | △ |
| Lower bracket pinch bolt | M8 | 4 | 21 N·m (2.1 kgf·m, 15 lb·ft) | △ |
| Steering stem nut | M24 | 1 | 145 N·m (14.5 kgf·m, 107 lb·ft) | △ |
| Upper handlebar holder bolt | M8 | 4 | 28 N·m (2.8 kgf·m, 21 lb·ft) | △ |
| Lower handlebar holder nut | M10 | 2 | 40 N·m (4.0 kgf·m, 30 lb·ft) | △ |
| Engine stop switch screw | M3 | 1 | 0.5 N·m (0.05 kgf·m, 0.37 lb·ft) | |
| Start switch | M3 | 1 | 0.5 N·m (0.05 kgf·m, 0.37 lb·ft) | |
| Mode switch | M3 | 1 | 1.3 N·m (0.13 kgf·m, 0.95 lb·ft) | |
| Lower ring nut | M28 | 1 | See TIP. | △ |
| Damper assembly (front fork) | M51 | 2 | 30 N·m (3.0 kgf·m, 22 lb·ft) | |
| Inner tube and adjuster | M22 | 2 | 55 N·m (5.5 kgf·m, 41 lb·ft) | LT |
| Base valve (front fork) | M42 | 2 | 28 N·m (2.8 kgf·m, 21 lb·ft) | |
| Adjuster (damper assembly) | M12 | 2 | 29 N·m (2.9 kgf·m, 21 lb·ft) | |
| Bleed screw (front fork) | M5 | 2 | 1.3 N·m (0.13 kgf·m, 0.95 lb·ft) | |
| Front fork protector bolt | M6 | 6 | 5 N·m (0.5 kgf·m, 3.7 lb·ft) | △ |
| Brake hose holder bolt | M6 | 2 | 9 N·m (0.9 kgf·m, 6.6 lb·ft) | △ |
| Throttle grip cap screw | M5 | 2 | 3.8 N·m (0.38 kgf·m, 2.8 lb·ft) | |
| Clutch lever holder bolt | M6 | 2 | 5 N·m (0.5 kgf·m, 3.7 lb·ft) | |
| Clutch lever nut | M6 | 1 | 4.0 N·m (0.40 kgf·m, 3.0 lb·ft) | |
| Clutch lever position locknut | M5 | 1 | 4.8 N·m (0.48 kgf·m, 3.5 lb·ft) | |
| Front brake master cylinder holder bolt | M6 | 2 | 9 N·m (0.9 kgf·m, 6.6 lb·ft) | △ |
| Front brake master cylinder reservoir cap screw | M4 | 2 | 1.5 N·m (0.15 kgf·m, 1.1 lb·ft) | |
| Front brake lever pivot bolt | M6 | 1 | 6 N·m (0.6 kgf·m, 4.4 lb·ft) | |
| Front brake lever pivot nut | M6 | 1 | 6 N·m (0.6 kgf·m, 4.4 lb·ft) | |
| Locknut (front brake lever position) | M6 | 1 | 5 N·m (0.5 kgf·m, 3.7 lb·ft) | |
| Front brake hose holder bolt | M6 | 1 | 9 N·m (0.9 kgf·m, 6.6 lb·ft) | △ |
| Front brake hose union bolt | M10 | 2 | 30 N·m (3.0 kgf·m, 22 lb·ft) | △ |
| Front brake caliper bolt | M8 | 2 | 28 N·m (2.8 kgf·m, 21 lb·ft) | △ |
| Front brake pad pin | M10 | 1 | 17 N·m (1.7 kgf·m, 13 lb·ft) | |
| Front brake pad pin plug | M10 | 1 | 2.5 N·m (0.25 kgf·m, 1.8 lb·ft) | |
| Front brake caliper bleed screw | M8 | 1 | 6 N·m (0.6 kgf·m, 4.4 lb·ft) | △ |
| Front wheel axle nut | M18 | 1 | 115 N·m (11.5 kgf·m, 85 lb·ft) | △ |

| Item | Thread size | Q'ty | Tightening torques | Remarks |
|---|---|---|---|---|
| Front wheel axle pinch bolt | M8 | 4 | 21 N·m (2.1 kgf·m, 15 lb·ft) | △ |
| Front brake disc bolt | M6 | 6 | 12 N·m (1.2 kgf·m, 8.9 lb·ft) | △/LT |
| Rear brake disc bolt | M6 | 6 | 12 N·m (1.2 kgf·m, 8.9 lb·ft) | △/LT |
| Footrest bracket bolt | M10 | 4 | 55 N·m (5.5 kgf·m, 41 lb·ft) | LT |
| Rear brake pedal bolt | M8 | 1 | 26 N·m (2.6 kgf·m, 19 lb·ft) | △ |
| Rear brake pedal adjusting locknut | M6 | 1 | 6 N·m (0.6 kgf·m, 4.4 lb·ft) | |
| Rear brake master cylinder bolt | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | △ |
| Rear brake master cylinder reservoir cap bolt | M4 | 2 | 1.5 N·m (0.15 kgf·m, 1.1 lb·ft) | |
| Rear brake hose union bolt | M10 | 2 | 30 N·m (3.0 kgf·m, 22 lb·ft) | △ |
| Rear brake caliper bleed screw | M8 | 1 | 6 N·m (0.6 kgf·m, 4.4 lb·ft) | △ |
| Rear brake pad pin | M10 | 1 | 17 N·m (1.7 kgf·m, 13 lb·ft) | |
| Rear brake pad pin plug | M10 | 1 | 2.5 N·m (0.25 kgf·m, 1.8 lb·ft) | |
| Rear wheel axle nut | M22 | 1 | 135 N·m (13.5 kgf·m, 100 lb·ft) | △ |
| Drive chain puller locknut | M8 | 2 | 21 N·m (2.1 kgf·m, 15 lb·ft) | |
| Rear wheel sprocket nut | M8 | 6 | 42 N·m (4.2 kgf·m, 31 lb·ft) | △ |
| Nipple (spoke) | — | 72 | 2.5 N·m (0.25 kgf·m, 1.8 lb·ft) | △ |
| Bolt (rear brake disc cover) | M6 | 2 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | △ |
| Rear brake caliper protector bolt | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | △ |
| Engine mounting bolt (upper side) | M10 | 2 | 45 N·m (4.5 kgf·m, 33 lb·ft) | △ |
| Engine mounting bolt (front side) | M10 | 1 | 55 N·m (5.5 kgf·m, 41 lb·ft) | △ |
| Engine mounting bolt (lower side) | M10 | 1 | 53 N·m (5.3 kgf·m, 39 lb·ft) | △ |
| Engine bracket bolt (upper side) | M8 | 4 | 34 N·m (3.4 kgf·m, 25 lb·ft) | △ |
| Engine bracket bolt (lower side) | M8 | 4 | 34 N·m (3.4 kgf·m, 25 lb·ft) | △ |
| Rear frame bolt | M8 | 4 | 38 N·m (3.8 kgf·m, 28 lb·ft) | △ |
| Engine guard bolt (right side) | M6 | 1 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | △ |
| Pivot shaft nut | M16 | 1 | 85 N·m (8.5 kgf·m, 63 lb·ft) | △ |
| Rear shock absorber assembly upper nut | M10 | 1 | 56 N·m (5.6 kgf·m, 41 lb·ft) | △ |
| Rear shock absorber assembly lower nut | M10 | 1 | 53 N·m (5.3 kgf·m, 39 lb·ft) | △ |
| Relay arm nut (swingarm side) | M14 | 1 | 70 N·m (7.0 kgf·m, 52 lb·ft) | △ |
| Connecting arm nut (relay arm side) | M14 | 1 | 80 N·m (8.0 kgf·m, 59 lb·ft) | △ |
| Connecting arm nut (frame side) | M14 | 1 | 80 N·m (8.0 kgf·m, 59 lb·ft) | △ |
| Brake hose holder screw | M5 | 4 | 3.5 N·m (0.35 kgf·m, 2.6 lb·ft) | △ |
| Drive chain tensioner bolt (upper side) | M8 | 1 | 16 N·m (1.6 kgf·m, 12 lb·ft) | |

| Item | Thread size | Q'ty | Tightening torques | Remarks |
|---|---|---|---|---|
| Drive chain tensioner bolt (lower side) | M8 | 1 | 16 N·m (1.6 kgf·m, 12 lb·ft) | |
| Bolt (drive chain support) | M6 | 1 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | |
| Drive chain support nut | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | |
| Drive chain guide bolt | M5 | 3 | 4.0 N·m (0.40 kgf·m, 3.0 lb·ft) | |
| Fuel tank bolt (front side) | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | △ |
| Fuel tank bolt (rear side) | M6 | 1 | 9 N·m (0.9 kgf·m, 6.6 lb·ft) | |
| Fuel tank bracket bolt (rear side) | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | |
| Fuel pump bolt | M5 | 6 | 4.0 N·m (0.40 kgf·m, 3.0 lb·ft) | △ |
| Screw (fuel inlet pipe) | M5 | 2 | 3.5 N·m (0.35 kgf·m, 2.6 lb·ft) | |
| Bolt (fuel tank cap cover) | M6 | 2 | 4.0 N·m (0.40 kgf·m, 3.0 lb·ft) | |
| Seat set bracket screw | M6 | 1 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | |
| Seat bolt | M8 | 2 | 22 N·m (2.2 kgf·m, 16 lb·ft) | △ |
| Side cover bolt (left) | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | △ |
| Side cover bolt (right) | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | △ |
| Air scoop bolt (frame) | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | △ |
| Air scoop bolt (fuel tank) | M6 | 2 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | △ |
| Air scoop bolt (radiator guard) | M6 | 4 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | △ |
| Front fender bolt | M6 | 4 | 10 N·m (1.0 kgf·m, 7.4 lb·ft) | △ |
| Rear fender bolt (front side) | M6 | 4 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | △ |
| Rear fender bolt (rear side) | M6 | 2 | 16 N·m (1.6 kgf·m, 12 lb·ft) | △ |
| Screw (mud flap) | — | 2 | 1.3 N·m (0.13 kgf·m, 0.95 lb·ft) | △ |
| Number plate bolt | M6 | 1 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | △ |
| Frame ground bolt (negative battery lead) | M6 | 1 | 7 N·m (0.7 kgf·m, 5.2 lb·ft) | |

**TIP**

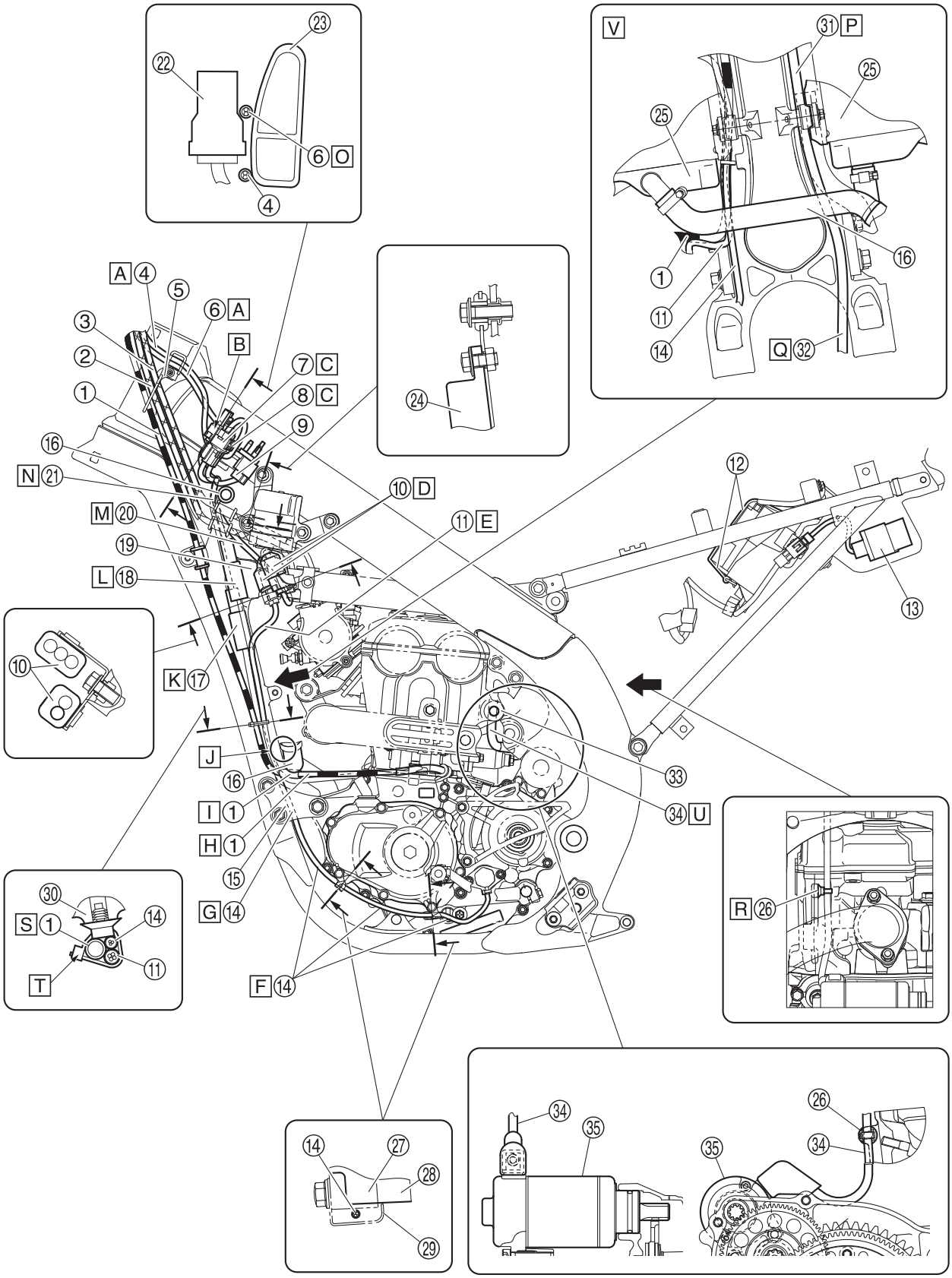
**Lower ring nut**

1. First, tighten the lower ring nut approximately 38 N·m (3.8 kgf·m, 28 lb·ft) by using the steering nut wrench, then loosen the lower ring nut one turn.
2. Retighten the lower ring nut 7 N·m (0.7 kgf·m, 5.2 lb·ft).

EAM20152

# CABLE ROUTING DIAGRAM

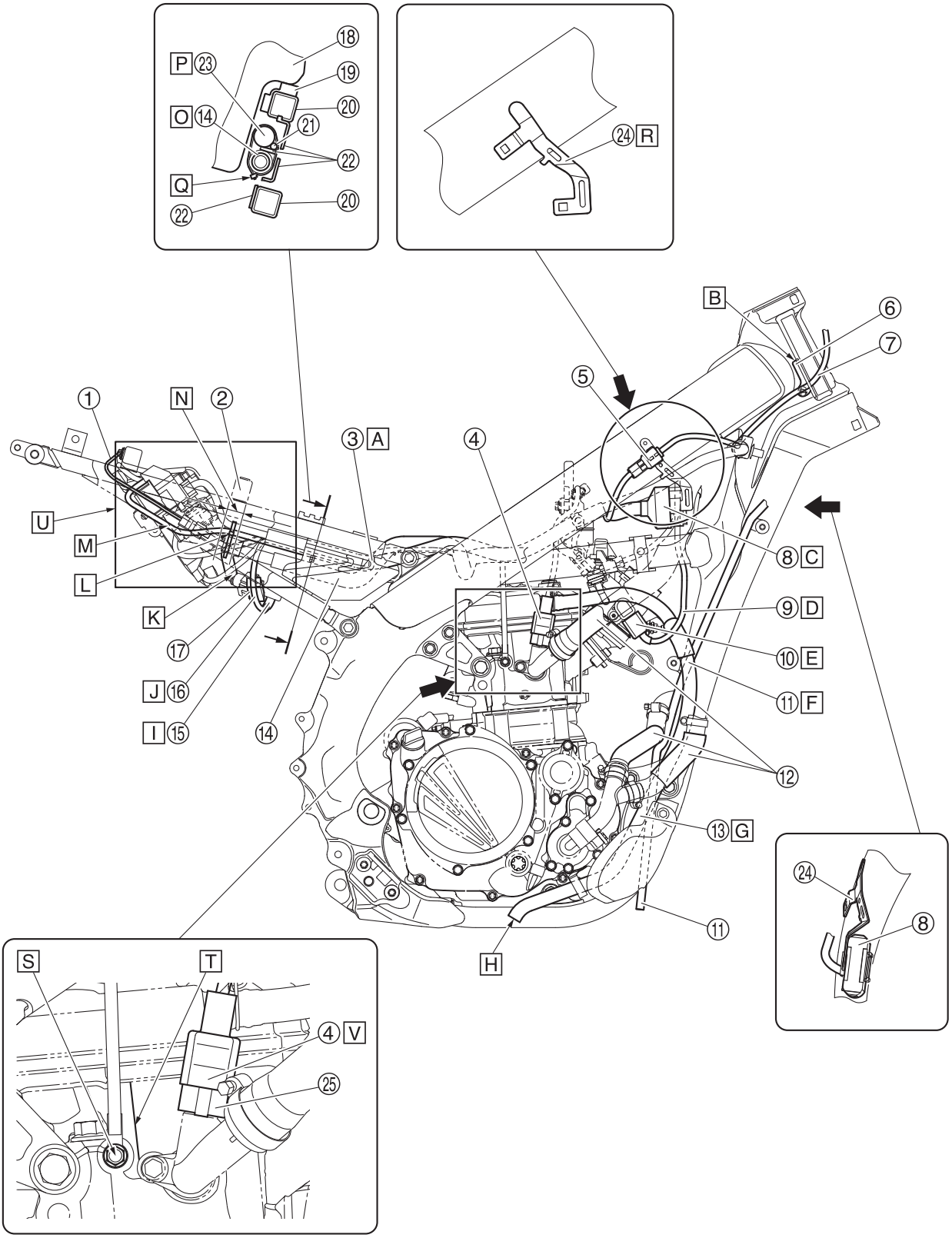
**Frame and engine (left side view)**



1. Clutch cable
2. Throttle cable (return)
3. Throttle cable (pull)
4. Mode switch lead
5. Cable holder
6. Engine stop switch lead
7. Mode switch coupler
8. Engine stop switch coupler
9. Intake air temperature sensor coupler
10. Rectifier/regulator coupler
11. Stator coil assembly lead
12. Battery band
13. CCU (Communication Control Unit)
14. Gear position switch lead
15. Lower engine bracket
16. Radiator hose
17. Gear position switch coupler
18. Stator coil assembly coupler
19. Tension arm
20. Rectifier/regulator lead
21. Wire harness
22. Yamaha diagnostic tool coupler
23. Tank rail
24. Rectifier/regulator
25. Radiator
26. Clamp
27. Crankcase cover
28. Crankcase
29. Clamp
30. Frame
31. Cylinder head breather hose
32. Radiator breather hose
33. Engine mounting bracket boss
34. Starter motor lead
35. Starter motor

A. Pass the engine stop switch lead and the mode switch lead between the frame and the cable holder. Route engine stop switch lead and the mode switch lead above of the vehicle. Pass the mode switch lead above the engine stop switch lead.
B. Insert the Yamaha diagnostic tool coupler into the connector, and fix it to the bracket.
C. Fasten the engine stop switch coupler to the bracket of the inside. Fasten the mode switch coupler to the bracket of the outside. Route the mode switch lead under the bracket.
D. Fasten the rectifier/regulator coupler to the bracket. Attach the coupler cover.
E. Pass the stator coil assembly lead through rear side of the vehicle. No pinch is allowed between the radiator and the tension arm.
F. Route the gear position switch lead along the crankcase without slack.
G. Pass the gear position switch lead to the inside of the lower engine bracket (the side of the vehicle).
H. Pass the clutch cable with no downward sag allowed.
I. Bring the protector of the clutch cable into contact with the radiator hose, and pass it to the outside of the gear position switch lead and the stator coil assembly lead (the outside of the vehicle).
J. No pinch is allowed the leads between the radiator and the tension arm.
K. After connecting the gear position switch coupler, attach the coupler cover.
L. After connecting the stator coil assembly coupler, attach the coupler cover.
M. Pass the rectifier/regulator lead (wire harness side) to the inside of the tension arm (the side of the vehicle).
N. Pass the main harness to the front of the radiator hose (the front of the vehicle), and to the inside of the throttle cable (the side of the vehicle).
O. Pass the engine stop switch lead and mode switch lead between the Yamaha diagnostic tool coupler and the tank rail.
P. Pass the cylinder head breather hose between the down tube and radiator, and front of the radiator under boss.
Q. Route the radiator breather hose between the down tubes.
R. Insert the clamp into the hole in the cylinder head. When doing so, the starter motor lead should not be twisted.
S. Clamp the clutch cable at the front of the lead (the front of the vehicle).
T. Insert the clamp into the hole in the frame. Cut off the excess end of the locking portion, and the locking portion should face toward the front of the vehicle.
U. Route the starter motor lead through the inside of the engine mounting bracket boss and along the front side of the vehicle behind the engine mounting bracket boss.
V. Diagram for routing the radiator hose, cylinder head breather hose, and radiator breather hose.

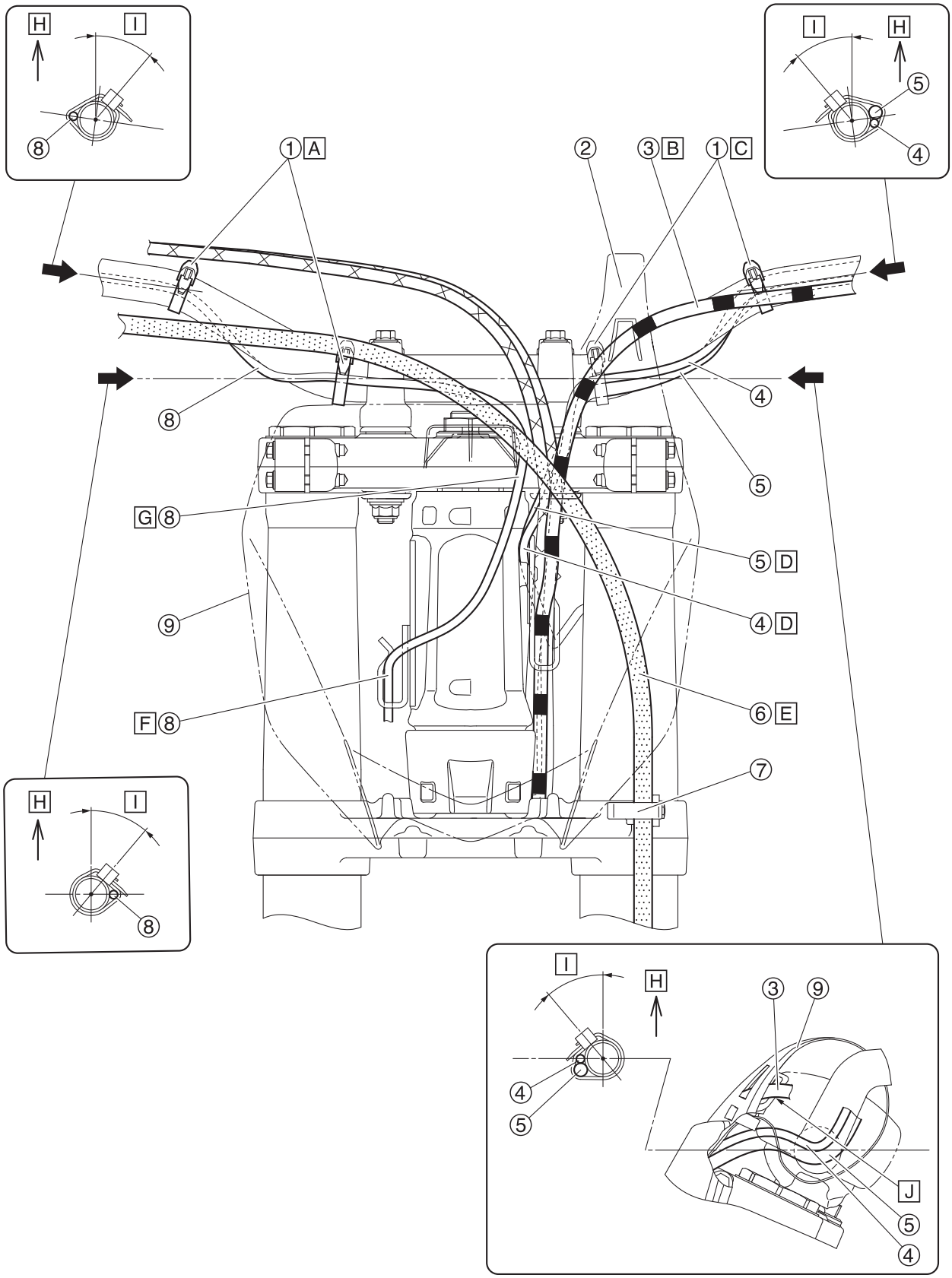
**Frame and engine (right side view)**



1. Negative battery lead
2. Cross tube
3. Starter motor lead
4. Coolant temperature sensor coupler
5. Start switch coupler
6. Cable guide
7. Start switch lead
8. Joint coupler
9. Throttle position sensor lead
10. Throttle position sensor coupler
11. Radiator breather hose
12. Radiator hose
13. Cylinder head breather hose
14. Fuel hose
15. Fuel pump coupler
16. Fuel pump lead
17. Diode
18. Fuel tank
19. Rubber damper
20. Rear frame
21. Starter motor lead
22. Side cover
23. Wire harness
24. Bracket
25. Holder

A. Adjust any slack between the rear shock absorber and the clamp of the side cover.
B. Make sure the cable guide has contact with the stamped location of the vehicle identification number, and install it.
C. Insert the joint coupler into the plate and secure it. After securing it, put the cover over the joint coupler. The inserted portion of the coupler should be hidden with the cover.
D. Pass the throttle position sensor lead through the outside of the cylinder head breather hose.
E. After connecting the throttle position sensor coupler, attach the cover.
F. The radiator breather hose should be routed in the following order and via each mentioned point.
The upper radiator boss at the rear of the vehicle →
The cylinder head breather hose at the rear of the vehicle →
The lower radiator boss at the front of the vehicle →
The radiator hose at the front of the vehicle →
For routing the remaining leads, refer to the diagram “V” under “Frame and engine (left side view)”.
G. Pass the cylinder head breather hose between the radiator hose and the engine bracket.
H. Install the cylinder head breather hose so that the outlet faces downward. Align the outlet with the lower side of the down tube.
I. After connecting the fuel pump coupler, attach the cover.
J. Pass the fuel pump lead through the outside of the fuel hose.
K. Pass the fuel hose through the front of the battery.
L. Fasten the starter relay lead and starter motor lead with the plastic locking tie within the range of the cross tube width. Make sure that the locking portion of the plastic locking tie faces to the lower side of the vehicle and put it inside the rear frame without cutting off the end.
M. Route the starter motor lead inside of the rear frame and along the rear fender.
N. 20 mm (0.7874 in)
O. Fasten the fuel hose at the pink dot position using the plastic locking tie.
P. Fasten the wire harness at the white tape position using the plastic locking tie.
Q. Position the lock part of the plastic locking tie to downward of the vehicle. Cut the end of the plastic locking tie.
R. Fasten the bracket to the tank rail (right) using the rivet.
S. When installing the engine ground lead terminal, it can face either way. Make sure that the terminal does not contact the cylinder head bolt and that it faces to the rear beyond the cylinder ridge line.
T. Cylinder head ridge line
U. The routing order of leads not indicated does not matter.
V. After the connection, attach the cover to the holder.

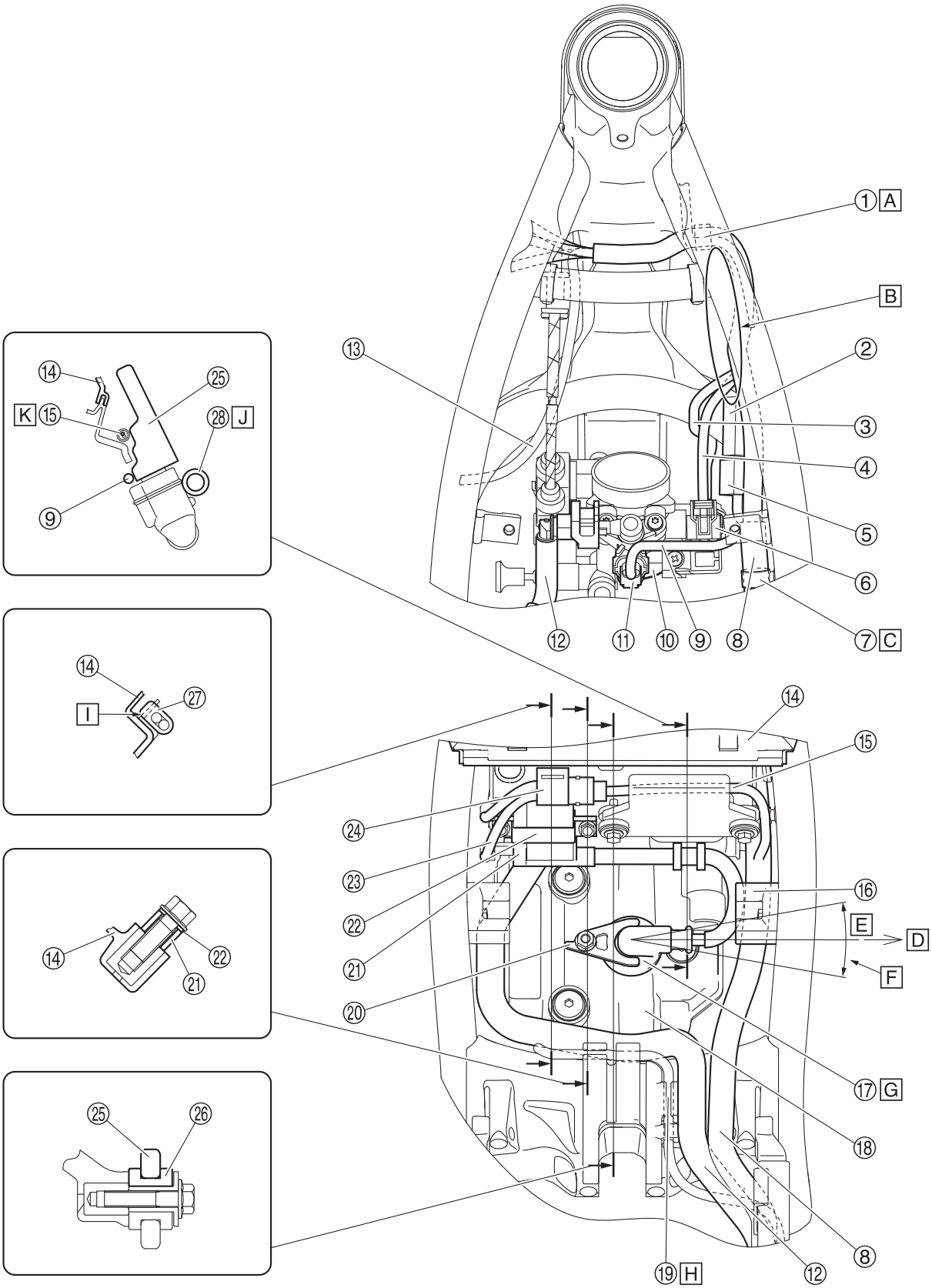
**Handlebar (front view)**



1. Plastic locking tie
2. Number plate band
3. Clutch cable
4. Engine stop switch lead
5. Mode switch lead
6. Front brake hose
7. Cable guide
8. Start switch lead
9. Number plate

A. Fasten the start switch lead to the handlebar using the plastic locking tie. Do not cut the end of the plastic locking tie.
B. Pass the clutch cable through the rear side of the number plate band.
C. Fasten the engine stop switch lead and mode switch lead to the handlebar using the plastic locking tie. Do not cut the end of the plastic locking tie.
D. Pass the engine stop switch lead and mode switch lead between the frame and the cable guide.
E. Pass the front brake hose through the front side of the number plate.
F. Pass the start switch lead between the frame and the cable guide.
G. Pass the start switch lead through the left side of the number plate mounting bracket.
H. Vertical direction of vehicle
I. 30–50°
J. Pass the clutch cable through the guide of the number plate.

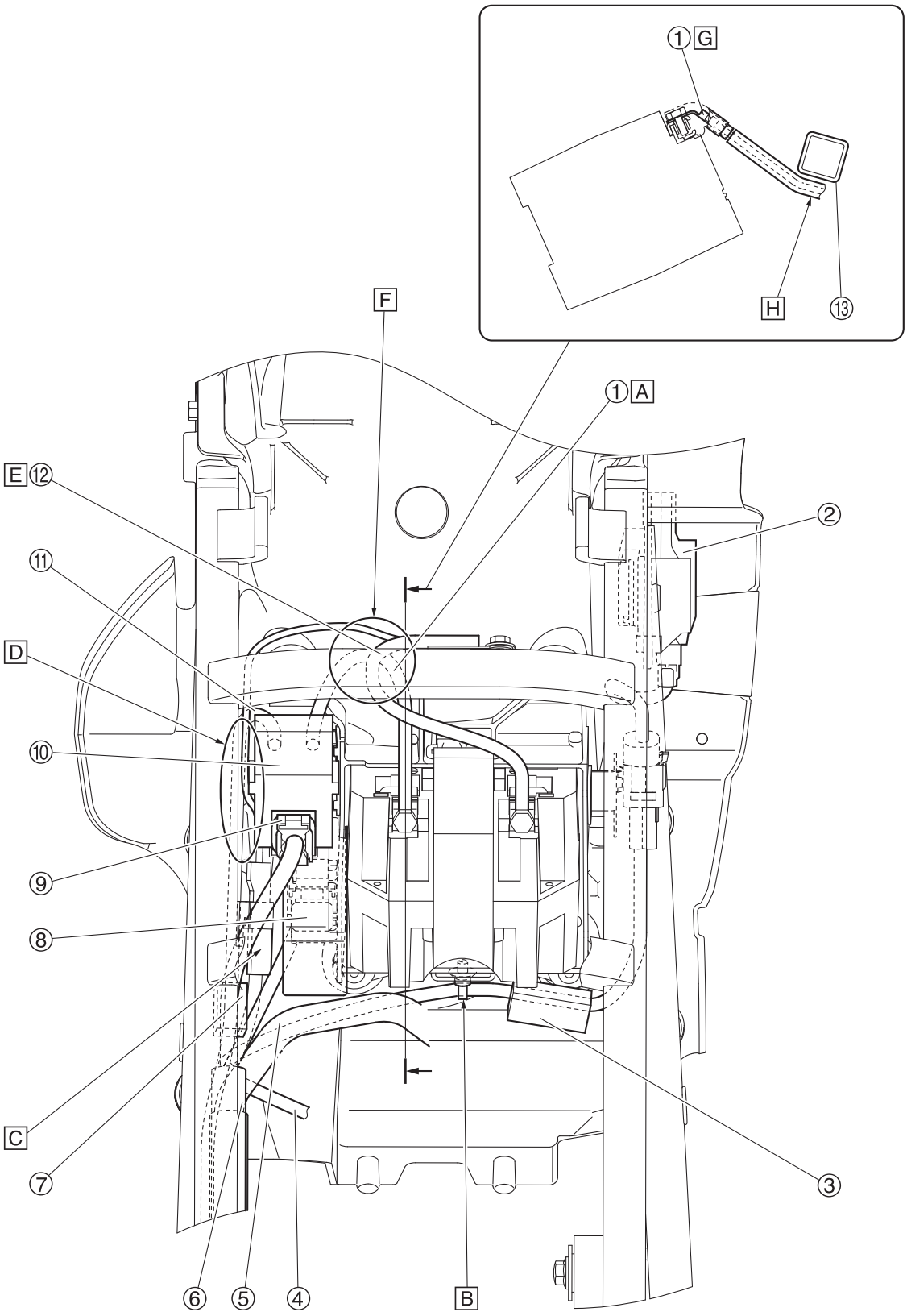
**Frame and engine (top view)**



1. Clamp
2. Diode
3. Throttle position sensor lead
4. Intake air pressure sensor lead
5. Joint coupler
6. Intake air pressure sensor coupler
7. Clamp (wire harness)
8. Wire harness
9. Fuel injector lead
10. Throttle body
11. Fuel injector coupler
12. Fuel hose
13. Rectifier/regulator lead
14. Air filter assembly
15. Wire harness
16. Fuel tank bracket
17. Plug cap
18. Cylinder head cover
19. Starter motor lead
20. Holder
21. Ignition coil
22. Side core
23. Sub-lead wire
24. Sub-lead wire coupler
25. ECU (Engine Control Unit)
26. Grommet
27. Clamp
28. High tension cord

A. Fasten the main harness and start switch lead by the clamp, and insert the clamp projection into the hole in the sheet metal of the radiator. The direction of the clamp lock portion does not matter. It is allowed to run the leads near the radiator cap on the inside.
B. No pinch is allowed the leads between the tank rail and the air filter joint.
C. Insert the projection of the main harness into the hole in the frame.
D. Right side of the vehicle.
E. ±10°
F. Install the plug cap so it faces to the right side of the vehicle.
G. Push the spark plug cap home, where there shall be no gap between it and the cylinder head cover.
H. Fasten the starter motor lead along the locating damper.
I. Insert the clamp into the rib so that it contacts the rib.
J. It does not matter if the high tension cord and grommet do not contact the ECU.
K. Pass the wire harness between the ECU and air filter assembly.

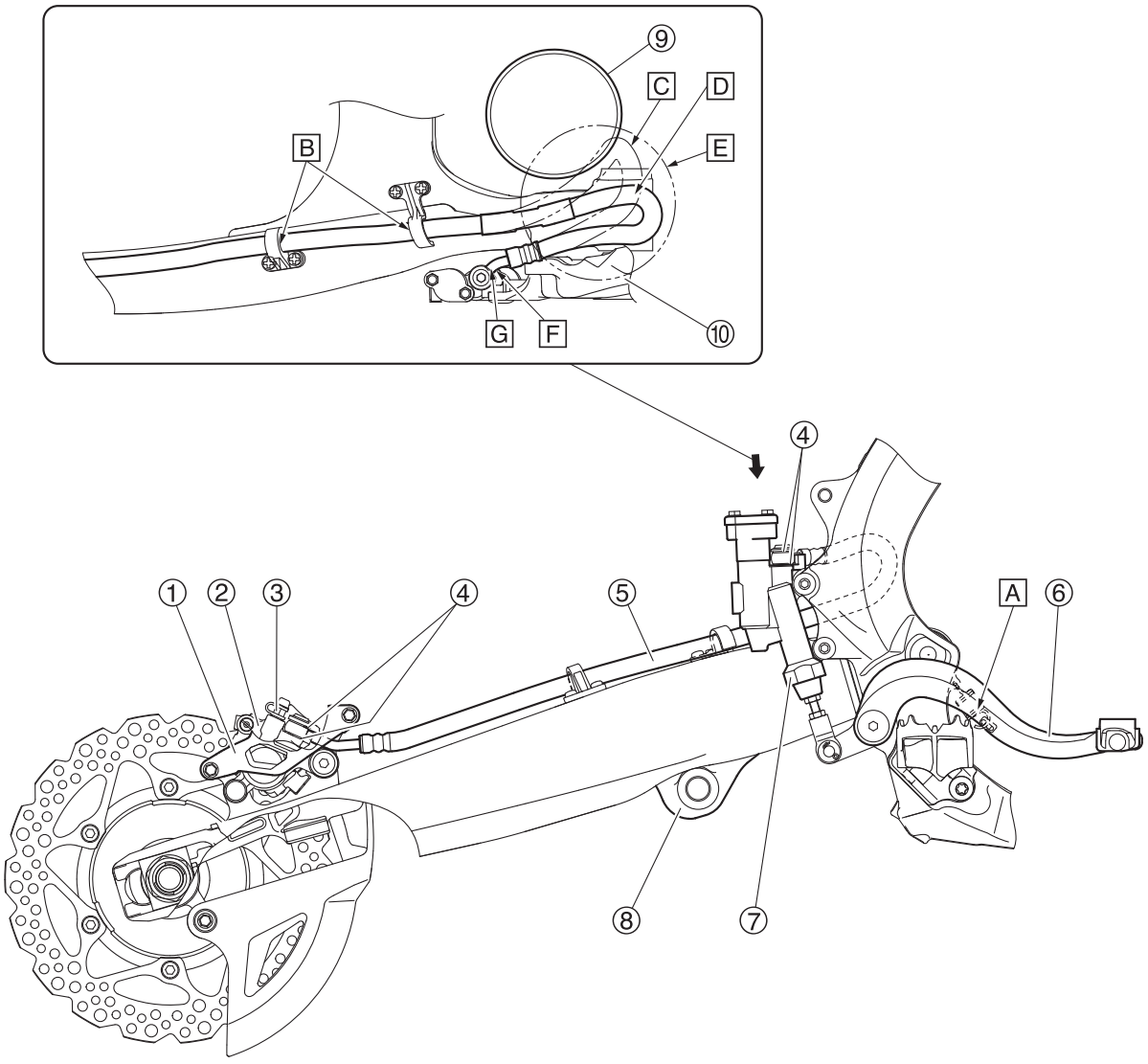
**Frame and battery (top view)**



1. Positive battery lead
2. CCU (Communication Control Unit)
3. Diode
4. Fuel pump lead
5. Fuel hose
6. Wire harness
7. Joint coupler
8. Main relay
9. Starter relay coupler
10. Starter relay
11. Starter motor lead
12. Negative battery lead
13. Cross member

A. Connect the positive battery lead and starter relay terminal.
B. Install the clamp (wire harness) to the hole of the battery bracket.
C. After connecting the negative battery coupler, position to the right side of the starter relay.
D. The position of the starter motor lead and negative battery lead does not matter.
E. Pass the negative battery lead through lower side of the cross member.
F. The position of the negative battery lead in relation to the battery side and coupler side and the corresponding position of the positive battery lead do not matter.
G. After connecting the positive battery lead in the direction shown in the illustration, put the cover over it.
H. Pass the positive battery lead through the lower side of the cross member.

**Rear brake (right side view)**



1. Protector
2. Rear brake caliper
3. Bleed screw
4. Gasket
5. Rear brake hose
6. Brake pedal
7. Rear brake master cylinder assembly
8. Swingarm
9. Spring
10. Frame

A. It does not matter whether the spring is installed upward or downward.
B. Pass the rear brake hose into the rear brake hose holders.
C. Route the rear brake hose so that it is not bent as shown by the double-dash line.
D. Route the rear brake hose and spring so that they do not interfere with each other.
E. Make sure that the rear brake hose is not excessively twisted.
F. Make sure that the metal part of the rear brake hose contacts the stopper of the rear brake master cylinder.
G. Install the rear brake hose so that the bended portion of the metal part of the rear brake hose faces as shown in the illustration.

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EAM20157
# MAINTENANCE INTERVALS

EAM30369
## MAINTENANCE INTERVALS

ECA25871
***NOTICE***

**• After a break-in or before each race, always check the points shown in "TORQUE-CHECK POINTS" for tightening torques and retighten them.**
**• Periodic inspection is essential in making full use of the machine performance. The life of parts varies significantly according to the environment in which the machine runs (e.g., rain, dirt, etc.). Therefore, earlier inspection is required by reference to the list below.**

**TIP**

Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

| No. | | Item | Routine | After break-in | Every race (about 2.5 hours) | Every third race (about 7.5 hours) | Every fifth race (about 12.5 hours) | As required |
|---|---|---|---|---|---|---|---|---|
| 1 | * | Valve | • Check the valve clearances. | √ | | √ | | |
| | | | • Check the valve seats and the valve faces for wear. | | | | √ | |
| | | | • Replace. | | | | | √ |
| 2 | * | Valve spring | • Check the free length. | | | | √ | |
| | | | • Replace. | | | | | √ |
| 3 | * | Valve lifter | • Check for scratches and wear. | | | | √ | |
| | | | • Replace. | | | | | √ |
| 4 | * | Camshaft | • Inspect the camshaft surface.<br>• Inspect the decompression system. | | | | √ | |
| | | | • Replace. | | | | | √ |
| 5 | * | Timing chain | • Check for damage and sticking. | | | | | √ |
| | | | • Replace the timing chain and timing chain tensioner as a set. | | | | √ | √ |
| 6 | * | Timing chain tensioner | • Replace the timing chain and timing chain tensioner as a set. | | | | √ | √ |
| 7 | * | Camshaft sprocket | • Check for wear on the teeth and for damage. | | | | √ | |
| | | | • Replace. | | | | | √ |
| 8 | * | Piston | • Inspect crack. | | | | | √ |
| | | | • Inspect carbon deposits and eliminate them. | | | | | √ |
| | | | • Replace the piston, piston pin, piston pin clip, and piston ring all as a set. | | | | √ | √ |
| 9 | * | Piston ring | • Check the end gap of the piston ring. | | | | | √ |
| | | | • Replace the piston, piston pin, piston pin clip, and piston ring all as a set. | | | | √ | √ |
| 10 | * | Piston pin | • Inspect. | | | | | √ |
| | | | • Replace the piston, piston pin, piston pin clip, and piston ring all as a set. | | | | √ | √ |

| No. | | Item | Routine | After break-in | Every race (about 2.5 hours) | Every third race (about 7.5 hours) | Every fifth race (about 12.5 hours) | As required |
|---|---|---|---|---|---|---|---|---|
| 11 | * | Cylinder head | • Check the coolant passages for corrosion.<br>• Inspect carbon deposits and eliminate them.<br>• Check for warpage, and replace the gasket. | | | | √ | |
| 12 | * | Cylinder | • Inspect score marks. | | | | √ | |
| | | | • Inspect wear. | | | | | √ |
| 13 | | Engine oil | • Check the engine oil amount. | | √ | | | √ |
| | | | • Replace. | √ | | √ | | |
| 14 | | Oil filter element | • Replace. | √ | | | √ | |
| 15 | * | Oil strainer | • Clean. | | | | √ | |
| 16 | * | Clutch | • Inspect housing, friction plate, clutch plate and spring. | √ | √ | | | |
| | | | • Replace. | | | | | √ |
| 17 | * | Transmission | • Inspect. | | | | | √ |
| | | | • Replace bearings. | | | | | √ |
| 18 | * | Shift fork, shift cam, guide bar | • Inspect wear. | | | | | √ |
| 19 | * | Nut (generator rotor) | • Check for tightening torques. | √ | | | √ | |
| 20 | * | Exhaust pipe, silencer, protector | • Check for exhaust leaks, and tightening torques. | √ | √ | | | |
| | | | • Clean. | | | | √ | |
| | | | • Replace fiver.<br>(When the exhaust sound becomes louder or when a performance drop is felt.) | | | √ | | √ |
| 21 | * | Crankshaft | • Inspect and clean. | | | | √ | √ |
| 22 | * | Throttle body | • Inspect. | | | | | √ |
| 23 | | Air filter | • Clean and lubricate. | √ | √ | | | |
| | | | • Replace. | | | | | √ |
| 24 | | Spark plug | • Check the electrodes and the terminals for wear. | √ | | √ | | |
| | | | • Replace. | | | | | √ |
| 25 | * | Cooling system | • Check coolant level and leakage. | √ | √ | | | |
| | | | • Check radiator cap operation. | | | | | √ |
| | | | • Check radiator cap attached. | √ | √ | | | |
| | | | • Change the coolant. | Every two years | | | | √ |
| | | | • Inspect hoses. | | √ | | | |
| 26 | * | Engine guard | • Replace. | | | | | √ |
| 27 | * | Frame | • Clean and inspect. | √ | √ | | | |
| 28 | * | Fuel tank, fuel pump | • Inspect. | √ | | √ | | |
| 29 | * | Fuel hose | • Inspect. | | | | | √ |
| | | | • Replace. | Every four years | | | | √ |

| No. | | Item | Routine | After break-in | Every race (about 2.5 hours) | Every third race (about 7.5 hours) | Every fifth race (about 12.5 hours) | As required |
|---|---|---|---|---|---|---|---|---|
| 30 | * | Front fork leg(s) | • Clean. | √ | √ | | | |
| | | | • Inspect and adjust. | √ | √ | | | |
| | | | • Replace oil. | √ | | | √ | |
| | | | • Replace oil seal. | | | | | √ |
| | | | • Clean and grease oil seals and dust seals. | √ | √ | | | √ |
| 31 | | Protector guide | • Replace. | | | | | √ |
| 32 | * | Rear shock absorber | • Inspect and adjust. | √ | √ | | | |
| | | | • Grease pillow balls and bearings. (After rain ride) | | | √ | | √ |
| | | | • Check for tightening torques. | √ | √ | | | |
| 33 | * | Brake(s) | • Adjust lever position and pedal position. | √ | √ | | | |
| | | | • Lubricate pivot point. | √ | √ | | | |
| | | | • Check brake disc surface. | √ | √ | | | |
| | | | • Check fluid level and leakage. | √ | √ | | | |
| | | | • Retighten brake disc bolts, caliper bolts, master cylinder bolts and union bolts. (Check for tightening torques.) | √ | √ | | | |
| | | | • Replace pads. | | | | | √ |
| | | | • Replace brake fluid. | Every one year | | | | √ |
| 34 | * | Swingarm | • Inspect, lube and retighten. | √ | √ | | | |
| 35 | * | Relay arm, connecting rod | • Inspect, lube and retighten. | √ | √ | | | |
| 36 | * | Steering head | • Inspect free play and retighten. (Check for tightening torques.) | √ | √ | | | |
| | | | • Clean and lube. (After rain ride) | | | | √ | |
| | | | • Replace bearings. | | | | | √ |
| 37 | * | Tire, wheels | • Inspect air pressure, wheel run-out, tire wear and spoke looseness. | √ | √ | | | |
| | | | • Retighten sprocket bolt. | √ | √ | | | |
| | | | • Check the bearing. | | | √ | | |
| | | | • Replace bearings. | | | | | √ |
| | | | • Lubricate. | | | √ | | |
| 38 | * | Drive chain | • Clean, lubricate, slack, alignment. | √ | √ | | | |
| | | | • Replace. | | | | | √ |
| 39 | * | Drive chain guide | • Inspect wear. | | √ | | | |
| 40 | * | Drive chain guide and drive chain support | • Replace. | | | | | √ |
| 41 | | Cables | • Routing (Connection) | √ | √ | | | |
| | | | • Check and grease. | √ | √ | | | |
| | | | • Check throttle cables on the throttle body for dirt and wear. | √ | √ | | | |
| 42 | | Levers | • Adjust clutch lever free play. | | | | | √ |

| No. | | Item | Routine | After break-in | Every race (about 2.5 hours) | Every third race (about 7.5 hours) | Every fifth race (about 12.5 hours) | As required |
|---|---|---|---|---|---|---|---|---|
| 43 | | Brake pedal, footrest | • Lubricate. | √ | √ | | | |
| 44 | * | Outside nuts and bolts | • Retighten. | √ | √ | | | |
| 45 | * | Battery | • Check terminal for looseness and corrosion. | | | | | √ |

EAM20134
# 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.

EAM30209
## GENERAL INSPECTION AND MAINTENANCE

| Item | Inspect | Page |
|---|---|---|
| Coolant | Check that coolant is filled up to the radiator cap. Check the cooling system for leakage. | 3-20, 3-21, 3-21, 6-4, 6-4 |
| Fuel | Check that a fresh gasoline is filled in the fuel tank. Check the fuel line for leakage. | 1-23 |
| Engine oil | Check that the oil level is correct. Check the crankcase and oil line for leakage. | 3-13, 3-13 |
| Gear shifter and clutch | Check that gears can be shifted correctly in order and that the clutch operates smoothly. | 3-15, 3-15 |
| Throttle grip/Housing | Check that the throttle grip operation and free play are correctly adjusted. Lubricate the throttle grip and housing, if necessary. | 3-11, 3-33 |
| Brakes | Check the play of front brake and effect of front and rear brake. | 3-23, 3-23, 3-23, 3-24, 3-24, 3-24, 3-24, 3-25 |
| Drive chain | Check drive chain slack and alignment. Check that the drive chain is lubricated properly. | 3-26, 4-68, 4-68, 4-69, 4-69, 4-69 |
| Wheels | Check for excessive wear and tire pressure. Check for loose spokes and have no excessive play. | 3-32, 3-33, 3-33, 3-33 |
| Steering | Check that the handlebar can be turned smoothly and have no excessive play. | 3-27 |
| Front forks and rear shock absorber | Check that they operate smoothly and there is no oil leakage. | 3-28, 3-28, 3-30, 3-30, 3-32 |
| Cables (wires) | Check that the clutch and throttle cables move smoothly. Check that they are not caught when the handlebars are turned or when the front forks travel up and down. | — |
| Exhaust pipe | Check that the exhaust pipe is tightly mounted and has no cracks. | 3-18 |
| Rear wheel sprocket | Check that the rear wheel sprocket tightening bolt is not loose. | 4-10, 4-10, 4-10, 4-10, 4-11, 4-11 |
| Lubrication | Check for smooth operation. Lubricate if necessary. | 3-33, 3-34, 3-34, 3-34 |
| Bolts and nuts | Check the chassis and engine for loose bolts and nuts. | 1-26 |
| Lead connectors | Check that the stator coil assembly, ECU and ignition coil are connected tightly. | 1-11 |
| 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? | 10-1, 10-1, 10-1, 10-2, 10-2, 10-3, 10-3, 10-4, 10-4, 10-6, 10-7 |

**TIP**
Perform usual maintenance enough so that, in the race course, a confirmation of that and simple setting adjustments may only be left, in order to get enough time to use effectively.

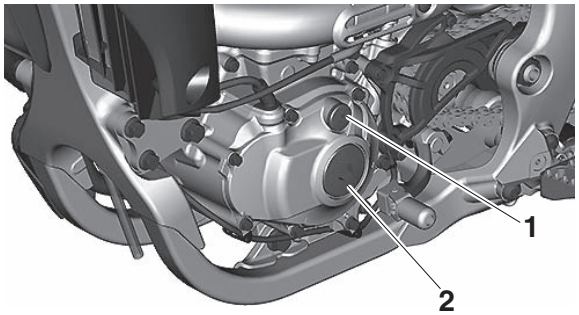
EAM20135
# ENGINE

EAM30226
## ADJUSTING THE VALVE CLEARANCE

**TIP**

- This section is intended for those who have basic knowledge and skill concerning the servicing of Yamaha motorcycles (e.g., Yamaha dealers, service engineers, etc.). Those who have little knowledge and skill concerning servicing are requested not to undertake inspection, adjustment, disassembly, or reassembly only by reference to this manual. It may lead to servicing trouble and mechanical damage.
- Make sure that the valve clearance is checked or adjusted while the engine is cold (at room temperature).
- While the valve clearance is checked or adjusted, make sure that the piston is positioned in the top dead center (TDC).

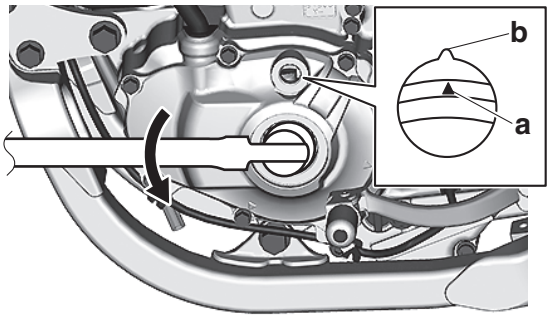
1. Remove:
   - Seat
   - Side cover (left/right)
   - Air scoop (left/right)
   Refer to "GENERAL CHASSIS" on page 4-1.
   - Fuel tank
   Refer to "FUEL TANK" on page 7-1.
   - ECU (Engine Control Unit)
2. Remove:
   - Spark plug
   - Cylinder head cover
   Refer to "CAMSHAFT" on page 5-13.
3. Remove:
   - Timing mark accessing screw "1"
   - Crankshaft end accessing screw "2"
   - O-ring




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

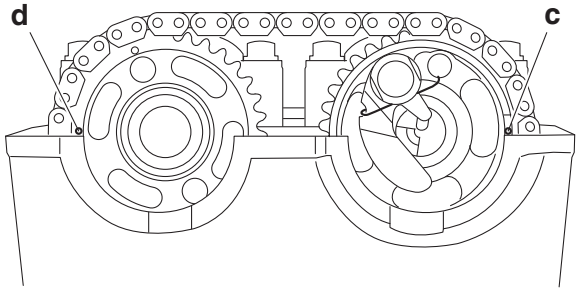
**Valve clearance (cold)**
**Intake**
**0.12–0.19 mm (0.0047–0.0075 in)**
**Exhaust**
**0.17–0.24 mm (0.0067–0.0094 in)**

a. Turn the crankshaft counterclockwise with a wrench.
b. Align the top dead center (TDC) mark "a" on the generator rotor with the alignment mark "b" on the crankcase cover.




**TIP**

Check that the alignment mark "c" on the camshaft sprocket and the alignment mark "d" on the intake camshaft sprocket are aligned with the edge of the cylinder head.

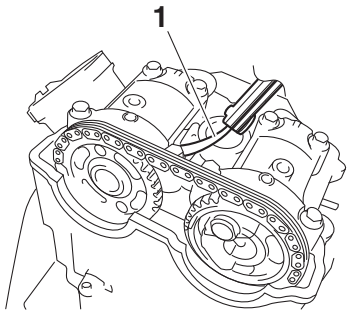



c. Measure the valve clearance using a thickness gauge "1".

**Thickness gauge**
**90890-03268**
**Feeler gauge set**
**YU-26900-9**

**TIP**

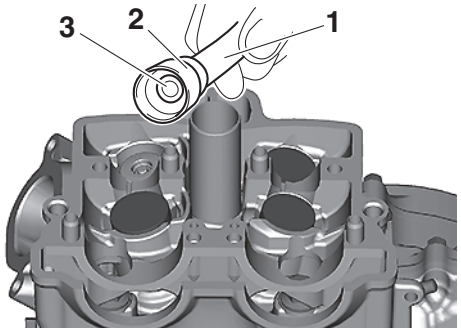
Record the measured reading if the clearance is incorrect.

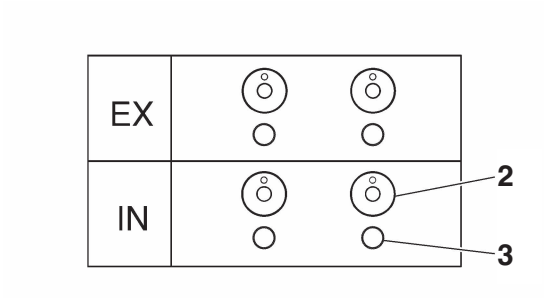



5. Adjust:
   • Valve clearance
   a. Remove the camshaft (intake and exhaust).
      Refer to "CAMSHAFT" on page 5-13.
   b. Remove the valve lifter "2" and the adjusting pad "3" with a valve lapper "1".

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

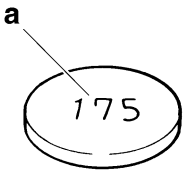
**Valve lapper (ø14)**
**90890-04101**
**Valve lapper (ø14)**
**YM-A8998**




   c. Check the number on the originally installed adjusting pad.

**TIP**
- The adjusting pad number "a" is indicated on the top of the adjusting pad.
- For the number on the originally installed adjusting pad, convert the last digit of adjusting pad number as per the below table.




   d. Select an adjusting pad with a proper valve clearance from the adjusting pad selection table.

**TIP**
- There are 25 types of adjusting pads, ranging from 1.20 mm (0.0472 in) to 2.40 mm (0.0945 in), in increments of 0.05 mm (0.0020 in).
- The field where the number on the originally installed adjusting pad and the measured valve clearance intersect shows the adjusting pad number to replace.

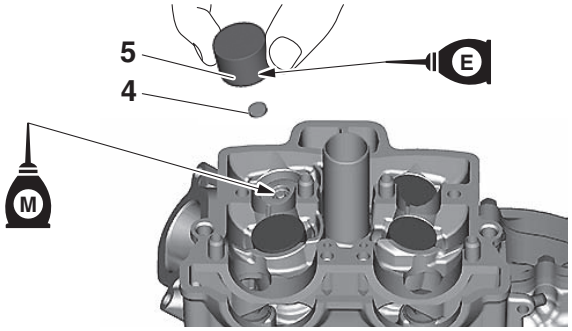
| Last digit of pad number | Rounded value |
|---|---|
| 0, 1 or 2 | 0 |
| 4, 5 or 6 | 5 |
| 8 or 9 | 10 |

   Example:
   Pad number = 148
   Rounded value = 150
   e. Install the new adjusting pads "4" and the valve lifters "5".

ECA24310
***NOTICE***
**Do not twist adjusting pads and valve lifters forcibly during installation.**

**TIP**
- Apply the engine oil on the valve lifters.
- Apply molybdenum disulfide oil to the valve stem ends.
- Check that the valve lifters turn smoothly when rotated with your finger.
- Make sure that valve lifters and adjusting pads are installed in place.

• Make sure that adjusting pads are installed with their numbers facing upward.




f. Install the camshafts (exhaust and intake). Refer to “CAMSHAFT” on page 5-13.
g. Measure the valve clearance again.
h. If the valve clearance is out of specification, repeat adjusting the valve clearance until it is within specification.

EAM30383

## VALVE CLEARANCE SHIM CHART

INTAKE

| A | B | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 |
| 0.00 – 0.01 | | | | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 |
| 0.02 – 0.06 | | | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 |
| 0.07 – 0.11 | | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 |
| 0.12 – 0.19 | C | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.20 – 0.24 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | |
| 0.25 – 0.29 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | |
| 0.30 – 0.34 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | |
| 0.35 – 0.39 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | |
| 0.40 – 0.44 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | |
| 0.45 – 0.49 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | |
| 0.50 – 0.54 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | |
| 0.55 – 0.59 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | |
| 0.60 – 0.64 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | |
| 0.65 – 0.69 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | |
| 0.70 – 0.74 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | |
| 0.75 – 0.79 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | |
| 0.80 – 0.84 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | |
| 0.85 – 0.89 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | |
| 0.90 – 0.94 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | |
| 0.95 – 0.99 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | |
| 1.00 – 1.04 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | |
| 1.05 – 1.09 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | | |
| 1.10 – 1.14 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | | | |
| 1.15 – 1.19 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | | | | |
| 1.20 – 1.24 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | | | | | |
| 1.25 – 1.29 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | | | | | | |
| 1.30 – 1.34 | 235 | 240 | | | | | | | | | | | | | | | | | | | | | | | |
| 1.35 – 1.39 | 240 | | | | | | | | | | | | | | | | | | | | | | | | |

A. Measured clearance
B. Installed pad number
C. Standard clearance

Example:
Valve clearance (cold) 0.12–0.19 mm (0.0047–0.0075 in)
Installed is 175.
Measured clearance 0.27 mm (0.0106 in)
Replace 175 pad with 185 pad.
Pad No. 175 = 1.75 mm (0.0689 in)
Pad No. 185 = 1.85 mm (0.0728 in)

EXHAUST

| A | B | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 |
| 0.00 – 0.01 | | | | | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 |
| 0.02 – 0.06 | | | | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 |
| 0.07 – 0.11 | | | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 |
| 0.12 – 0.16 | | 120 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 |
| 0.17 – 0.24 | C | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.25 – 0.29 | 125 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | |
| 0.30 – 0.34 | 130 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | |
| 0.35 – 0.39 | 135 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | |
| 0.40 – 0.44 | 140 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | |
| 0.45 – 0.49 | 145 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | |
| 0.50 – 0.54 | 150 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | |
| 0.55 – 0.59 | 155 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | |
| 0.60 – 0.64 | 160 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | |
| 0.65 – 0.69 | 165 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | |
| 0.70 – 0.74 | 170 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | |
| 0.75 – 0.79 | 175 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | |
| 0.80 – 0.84 | 180 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | |
| 0.85 – 0.89 | 185 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | |
| 0.90 – 0.94 | 190 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | |
| 0.95 – 0.99 | 195 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | |
| 1.00 – 1.04 | 200 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | |
| 1.05 – 1.09 | 205 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | |
| 1.10 – 1.14 | 210 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | | |
| 1.15 – 1.19 | 215 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | | | |
| 1.20 – 1.24 | 220 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | | | | |
| 1.25 – 1.29 | 225 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | | | | | |
| 1.30 – 1.34 | 230 | 235 | 240 | | | | | | | | | | | | | | | | | | | | | | |
| 1.35 – 1.39 | 235 | 240 | | | | | | | | | | | | | | | | | | | | | | | |
| 1.40 – 1.44 | 240 | | | | | | | | | | | | | | | | | | | | | | | | |

A. Measured clearance
B. Installed pad number
C. Standard clearance

Example:
Valve clearance (cold) 0.17–0.24 mm (0.0067–0.0094 in)
Installed is 175.
Measured clearance 0.32 mm (0.0126 in)
Replace 175 pad with 185 pad.
Pad No. 175 = 1.75 mm (0.0689 in)
Pad No. 185 = 1.85 mm (0.0728 in)

EAM30412
## CHECKING THE ENGINE IDLING SPEED

**TIP**
- Because the air pressure is lower at high altitudes, the air-fuel mixture will become richer. If the idling speed is low, turn the idle screw clockwise to increase the speed before the adjustment.
- Before adjusting the engine idling speed, make sure that the air filter element is not clogged, the engine compression is proper, and the throttle grip free play is proper.
- Adjust the engine idling speed with the starter knob pulled in completely.

1. Start the engine, and warm this up until the oil has reached the specified temperature.
2. Measure the coolant temperature using the Yamaha diagnostic tool.

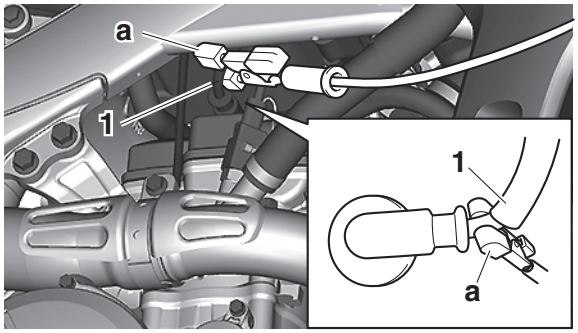
**Yamaha diagnostic tool USB (US)**
**90890-03269**
**Yamaha diagnostic tool (A/I)**
**90890-03264**
**FI diagnostic tool sub–lead**
**90890-03212**
**FI diagnostic tool sub–lead**
**YU-03212**
**OBD/ GST Leadwire kit**
**90890-03249**

**Coolant temperature**
**70–80 °C (158–176 °F)**

3. Install:
   - Digital tachometer

**Digital tachometer**
**90890-06760**
**Digital tachometer**
**YU-39951-B**

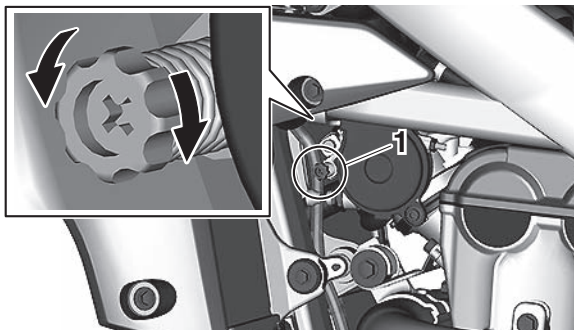
**TIP**
Get the high tension cord “1” of the ignition coil pinched in the detector “a” of the digital tachometer.




4. Measure:
   - Engine idling speed
     Out of specification → Regulate.

**Engine idling speed**
**1900–2100 r/min**

5. Adjust:
   - Engine idling speed
     a. Turn the idle screw “1” to make an adjustment.

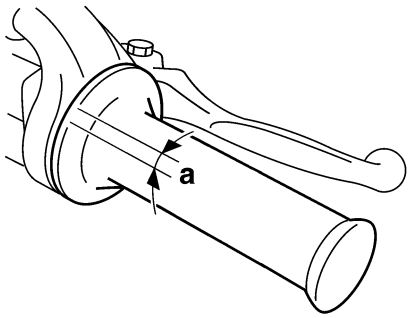



EAM30475
## CHECKING THE THROTTLE GRIP

**TIP**
Prior to adjusting throttle grip free play, the engine idling speed should be adjusted.

1. Check:
   - Throttle grip free play “a”
     Out of specification → Regulate.

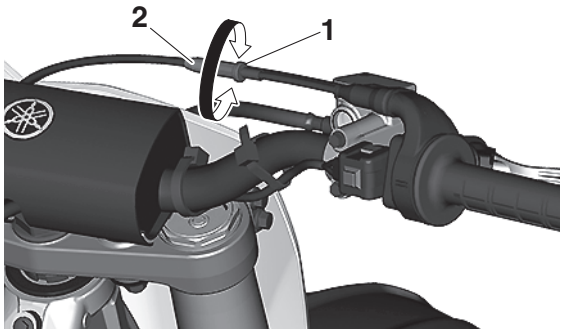
**Throttle grip free play**
**3.0–6.0 mm (0.12–0.24 in)**



2. Adjust:
   • Throttle grip free play
     a. Loosen the locknut “1”.
     b. Turn the adjuster “2” until the specified throttle grip free play is obtained.
     c. Tighten the locknut.

EWA18470
**⚠ WARNING**

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




EAM30254
## CHECKING THE SPARK PLUG

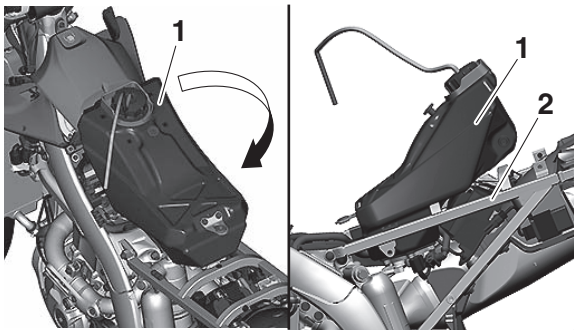
1. Remove:
   • Seat
   • Air scoop (left/right)
   Refer to “GENERAL CHASSIS” on page 4-1.
   • Fuel tank “1”
   Refer to “FUEL TANK” on page 7-1.

ECA24400
***NOTICE***

**Do not use too much force to pull the hose.**

**TIP**

Remove the fuel tank, turn this 180° clockwise, and put it in the frame “2” as shown.




2. Remove:
   • Holder
   • Spark plug cap
   • Spark plug
   Refer to “CAMSHAFT” on page 5-13.

ECA24410
***NOTICE***

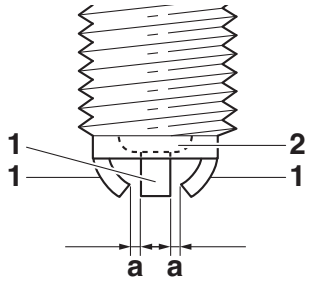
**In order not to allow the dirt accumulated around the spark plug to drop from the spark plug hole into the cylinder, clean it before removing the spark plug.**

3. Check:
   • Spark plug type
   Wrong type → Replace.

| | |
|---|---|
| | **Manufacturer/model**<br>**NGK/LMAR9E-J** |

4. Check:
   • Electrode “1”
   Damage/wear → Replace the spark plug.
   • Insulator “2”
   Abnormal color → Replace the spark plug.
   Normal color is medium-to-light tan.
5. Clean:
   • Spark plug
   (with a spark plug cleaner or a wire brush)
6. Measure:
   • Spark plug gap “a”
   Out of specification → Adjust the spark plug gap.

| | |
|---|---|
| | **Spark plug gap**<br>**0.6–0.7 mm (0.024–0.028 in)** |




7. Install:
   • Spark plug

| | |
|---|---|
| | **Spark plug**<br>**13 N·m (1.3 kgf·m, 9.6 lb·ft)** |

**TIP**

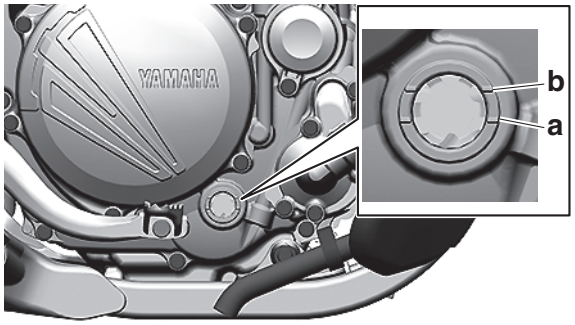
Before installing the spark plug, clean the spark plug and gasket surface.

8. Install:
   • Spark plug cap
   • Holder
   • Fuel tank
   • Air scoop (left/right)

- Seat
- Side cover (left/right)
  Refer to “GENERAL CHASSIS” on page 4-1.

EAM30224
## CHECKING THE ENGINE OIL LEVEL

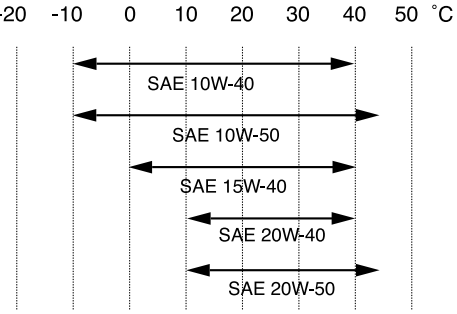
1. Stand the vehicle upright on a level surface.
2. Start the engine, warm this up for 2–3 minutes, and then stop the engine and wait about 1 minute.
3. Check:
   - Oil level
     The engine oil level should be between the minimum level mark “a” and maximum level mark “b”.
     Below the minimum level mark → Add the recommended engine oil to the proper level.




ECA24290
***NOTICE***

- **Since engine oil also lubricates the clutch, the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives.**
- **Do not allow foreign material to enter the crankcase.**

**Recommended brand**
**YAMALUBE**
**SAE viscosity grades**
**10W-40, 10W-50, 15W-40, 20W-40 or 20W-50**
**Recommended engine oil grade**
**API service SG type or higher, JASO standard MA**



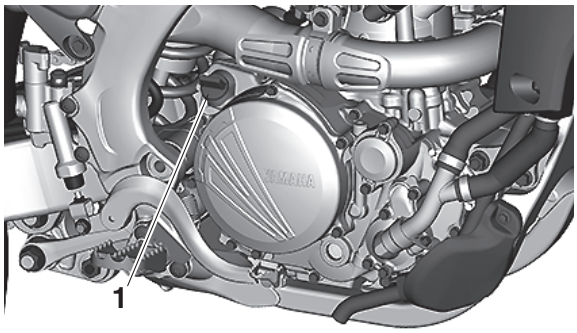

EAM30225
## CHANGING THE ENGINE OIL

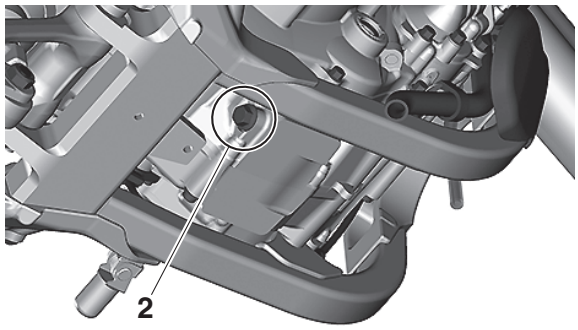
Stand the vehicle upright on a level surface.

1. Start the engine, warm this up for several minutes, and then stop the engine and wait about 5 minutes.

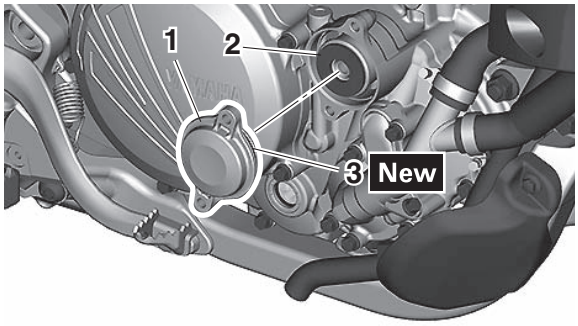
**TIP**
This model is equipped with an engine auto-stop system. The engine stops automatically if left idling for 7 minutes. If the engine stops, push the start switch to restart the engine.

2. Place an oil pan under the drain bolt.
3. Remove:
   - Oil filler cap “1”
   - Drain bolt (with gasket) “2”



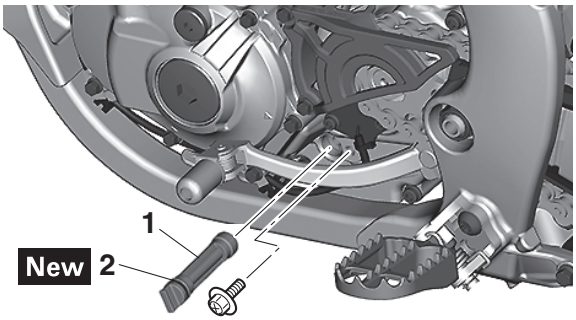

4. If the oil filter element is also to be replaced, perform the following procedure.
   a. Remove the oil filter element cover “1” and oil filter element “2”.
   b. Replace the new O-ring “3”.




c. Install the new oil filter element and the oil filter element cover.

| | |
|---|---|
| | **Oil filter element cover bolt**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

5. To check the oil strainer, perform the following procedure.
   a. Remove the oil strainer "1".
   b. Check the oil strainer.
      Damage → Replace.
      Clogging due to dirt → Wash with kerosene.
   c. Replace the new O-ring "2".




d. Install the oil strainer.

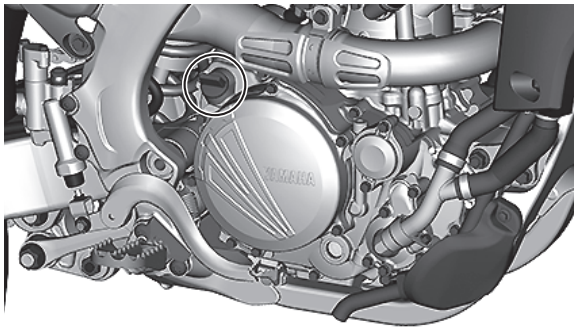
| | |
|---|---|
| | **Oil strainer bolt**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

6. Install:
   • Gasket New
   • Drain bolt

| | |
|---|---|
| | **Drain bolt**<br>**20 N·m (2.0 kgf·m, 15 lb·ft)** |

7. Pour the specified amount of engine oil into the oil filler cap hole.

| | |
|---|---|
| | **Engine oil quantity**<br>**Oil change**<br>**0.73 L (0.77 US qt, 0.64 Imp.qt)**<br>**With oil filter removal**<br>**0.75 L (0.79 US qt, 0.66 Imp.qt)**<br>**Quantity (disassembled)**<br>**0.95 L (1.00 US qt, 0.84 Imp.qt)** |

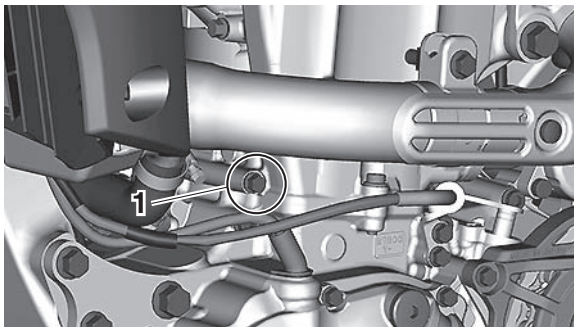


8. Install:
   • Oil filler cap
9. Check:
   • Oil level
   Refer to "CHECKING THE ENGINE OIL LEVEL" on page 3-13.
10. Check:
   • Engine oil pressure
   a. Slightly loosen the oil pressure check bolt "1".

EWA19120

**⚠ WARNING**

**When the engine is started with the check bolt removed, oil will spout; therefore, always loosen it before the checkup.**




b. Start the engine and keep it idling until oil starts to seep from the oil pressure check bolt.

EWA19130

**⚠ WARNING**

**Always keep the engine idling speed during the checkup without increasing the engine speed.**

ECA25840

***NOTICE***

**If no engine oil seeps out after one minute, immediately turn the engine off so it will not seize.**

c. If no engine oil seeps out, check the engine oil for leaks, and the engine oil passage and the oil pump for damage.
d. Check the oil pressure again.
e. Tighten the oil pressure check bolt.

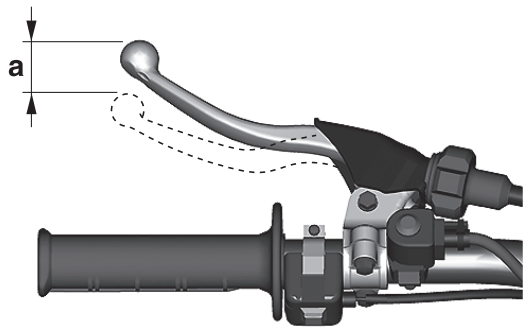
| | |
|---|---|
| | **Oil pressure check bolt**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

EAM30216

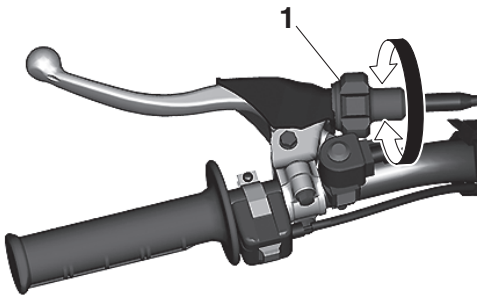
## ADJUSTING THE CLUTCH LEVER FREE PLAY

1. Check:
   • Clutch lever free play "a"
   Out of specification → Regulate.

| | |
|---|---|
| | **Clutch lever free play**<br>**7.0–12.0 mm (0.28–0.47 in)** |




2. Adjust:
   • Clutch lever free play
   **Handlebar side**
   a. Turn the adjuster "1" until the specified clutch lever free play is obtained.




**TIP**

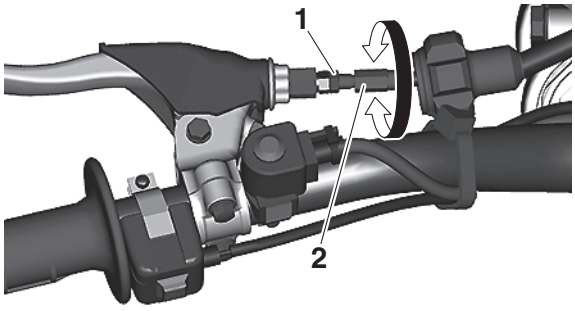
If the clutch lever free play cannot be obtained on the handlebar side, use the adjuster on the clutch cable side.

**Clutch cable side**

a. Slide the clutch cable cover.
b. Loosen the locknut "1".
c. Turn the adjuster "2" until the specified clutch lever free play is obtained.
d. Tighten the locknut "1".

| | |
|---|---|
| | **Clutch cable locknut**<br>**4.3 N·m (0.43 kgf·m, 3.2 lb·ft)** |

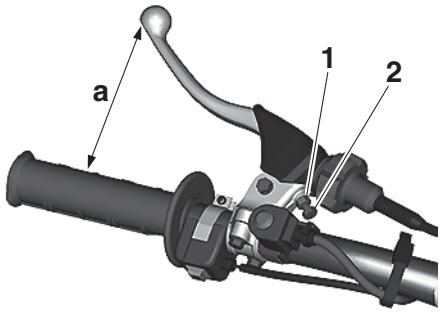
e. Return the clutch cable cover to its original position.




EAM30370

## ADJUSTING THE CLUTCH LEVER POSITION

1. Adjust:
   • Clutch lever position "a"
   Loosen the locknut "1" and use the adjuster "2" to adjust the clutch lever position "a" as desired.




2. Tighten:
   • Locknut

| | |
|---|---|
| | **Locknut (clutch lever position)**<br>**4.8 N·m (0.48 kgf·m, 3.5 lb·ft)** |

EAM30219

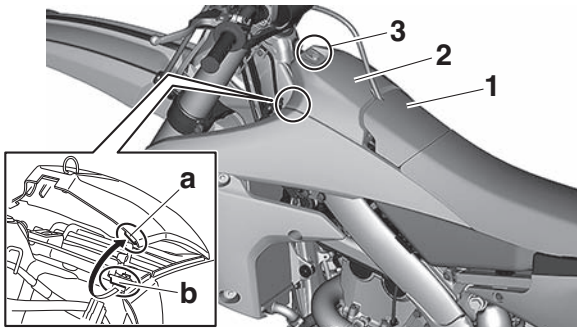
## CLEANING THE AIR FILTER ELEMENT

1. Remove:
   • Fuel tank cap cover "1"
   Refer to "FUEL TANK CAP" on page 1-22.
   • Air filter case cover "2"

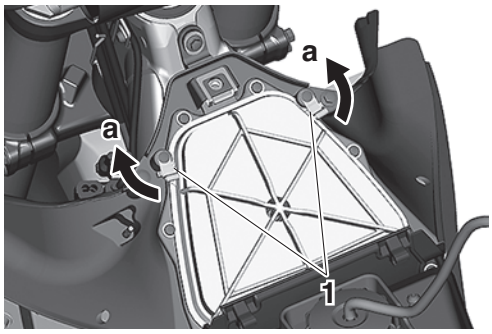
**TIP**

• Loosen the quick fastener screw "3" and remove the air filter case cover.

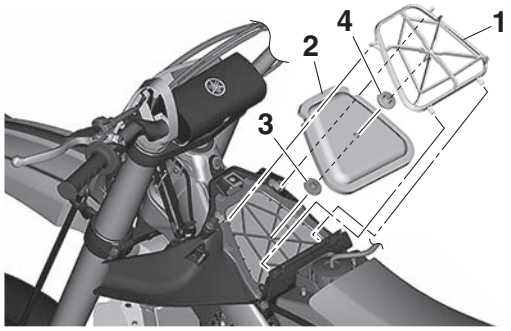
• Remove the two ribs “a” located on the left and right sides of the projections “b” on the air scoop, and slide the air filter case cover toward the front of the vehicle to remove it.




2. Turn the plates “1” in direction “a”.




3. Remove:
   • Air filter guide “1”
   • Air filter element “2” (from the air filter guide)
   • Guide “3” (from the air filter element)
   • Seal “4” (from the air filter element)




4. Wash:
   • Air filter element
     a. After washing the element with air filter cleaner or kerosene, squeeze and dry it completely.

EWA19110

**⚠ WARNING**

**Do not use gasoline or organic (acid/alkaline) volatile oil for washing.**

ECA24280

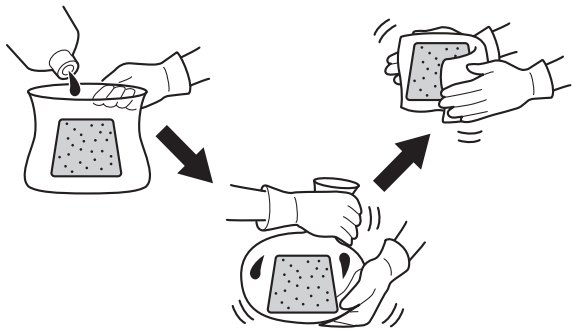
***NOTICE***

**Do not twist the element when squeezing the element.**

5. Check:
   • Air filter element
   Damage → Replace.
6. Apply:
   • Yamaha foam air filter oil or other quality foam air filter oil
     a. Put the air filter element into a plastic bag and drip the filter oil into the bag.
     b. With the element inside the bag, rub it thoroughly so that the element is evenly permeated with the oil.
     c. Wrap the element in a clean cloth, rub the element gently, and wipe off any excess oil.

**TIP**

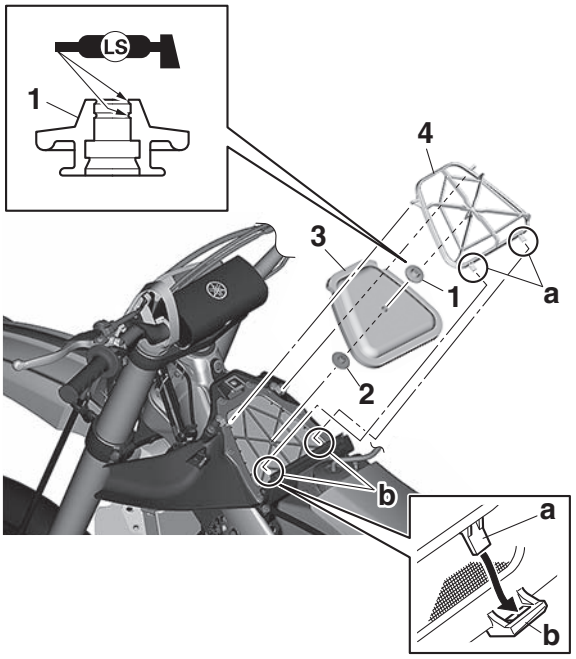
• The element should be permeated with oil so that it is wet but not dripping.
• When replacing the element, permeate the element in oil by using the same procedure as when cleaning.



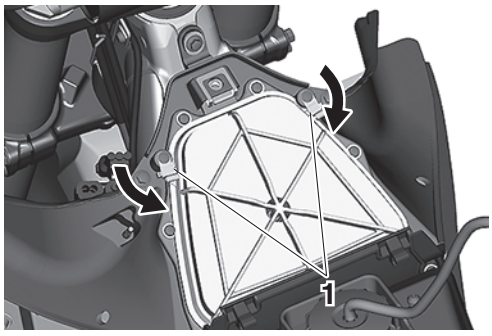
7. Install:
   • Seal “1” (to the air filter element)
   • Guide “2” (to the air filter element)
   • Air filter element “3” (to the air filter guide)
   • Air filter guide “4”

**TIP**

• Apply lithium-soap-based grease on the entire seal lips when installing the air filter guide.
• Make sure that the two projections “a” at the rear side of the vehicle on the air filter guide are securely fitted into the two slots “b” in the air filter case.
• Check that the air filter element is turned up between the air filter guide and air filter case and that there is no gap.
  Gap → Reinstall.



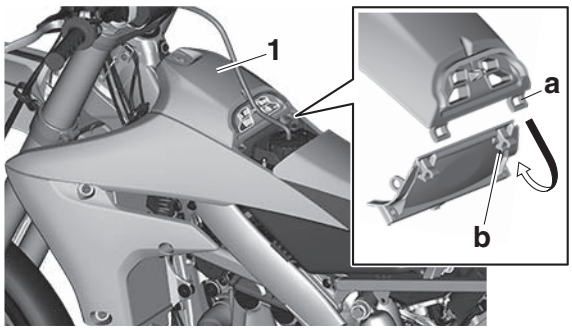

8. Turn the plates “1” to the original position.

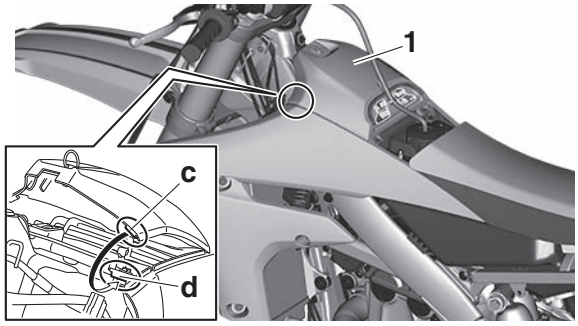



9. Install:
   - Air filter case cover “1”
   - Fuel tank breather hose (to the air filter case cover)

**TIP**

- Make sure that the two slots “a” at the rear side of the vehicle in the air filter case cover are securely fitted into the two edges “b” on the air filter case.
- Be sure to carefully align the two ribs “c” located on the left and right sides of the air filter case cover with the projections “d” on the air scoop, and then install the air filter case cover.



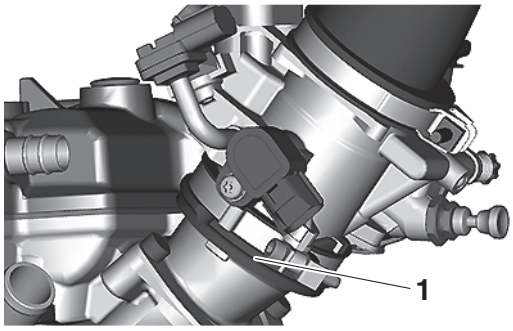




10. Install:
    - Fuel tank cap cover

EAM30335

## CHECKING THE THROTTLE BODY JOINT

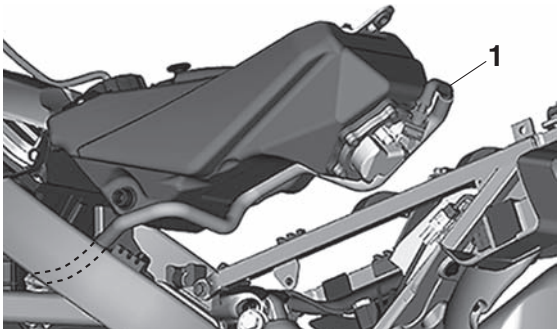
1. Check:
   - Throttle body joint “1”
     Crack/damage → Replace.




EAM30222

## CHECKING THE FUEL LINE

1. Remove:
   - Seat
   - Side cover (left/right)
   - Air scoop (left/right)
     Refer to “GENERAL CHASSIS” on page 4-1.
   - Fuel tank
     Refer to “FUEL TANK” on page 7-1.
2. Check:
   - Fuel hose “1”
     Crack/damage → Replace.
     Loose connection → Connect properly.



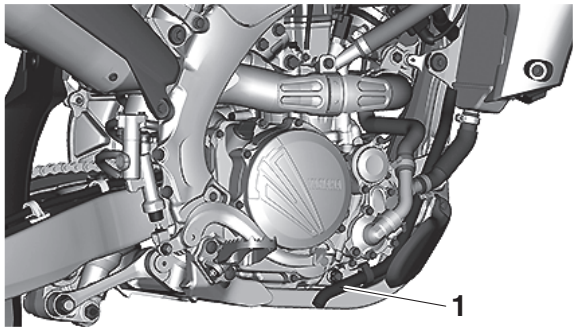

3. Install:
   - Fuel tank
     Refer to "FUEL TANK" on page 7-1.
   - Air scoop (left/right)
   - Seat
   - Side cover (left/right)
     Refer to "GENERAL CHASSIS" on page 4-1.

EAM30476
### CHECKING THE CYLINDER HEAD BREATHER HOSE

1. Check:
   - Breather hose "1"
     Crack/damage → Replace.
     Loose connection → Connect properly.

ECA14920
***NOTICE***

**Make sure the cylinder head breather hose is routed correctly.**




EAM30221
### CHECKING THE EXHAUST SYSTEM

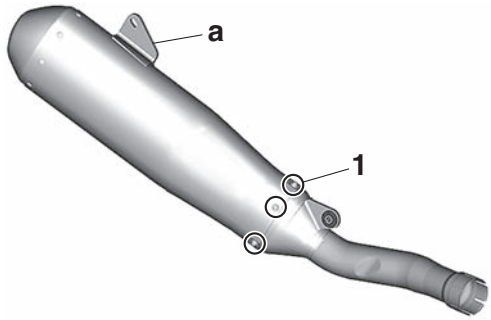
1. Remove:
   - Exhaust pipe 1
   - Exhaust pipe 2
     Refer to "ENGINE REMOVAL" on page 5-6.
2. Remove:
   - Exhaust pipe protector
3. Check:
   - Exhaust pipe 1
   - Exhaust pipe 2
   - Silencer
     Crack/damage → Replace.
4. Check:
   - Silencer fiber
     Damage → Replace.
5. Replace:
   - Silencer fiber
     a. Remove the bolts "1" and silencer body "2".

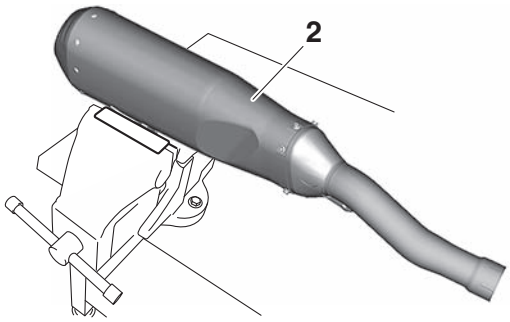
ECA25800
***NOTICE***

**Do not hit the silencer stay "a" as it may do damage to the silencer.**

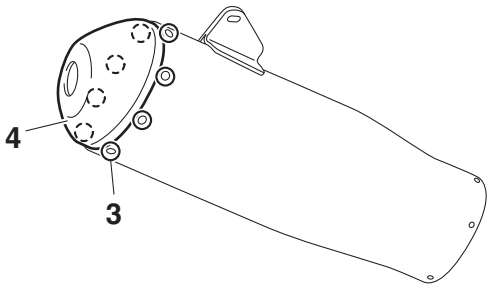
**TIP**

Remove the inner pipe while holding the silencer in place with a vise etc.

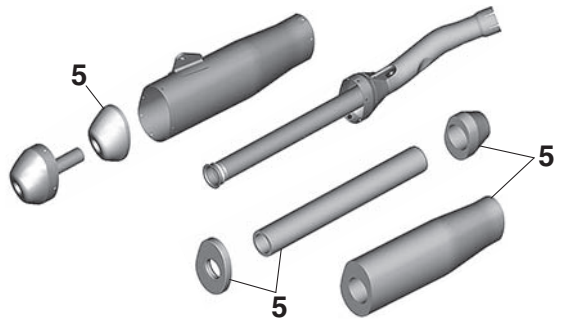


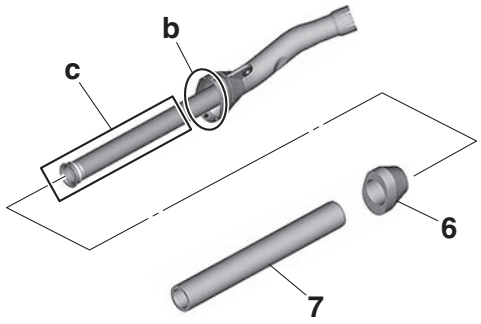

b. Remove the rivets "3" and silencer cap "4".




c. Replace the fiber inserts "5".



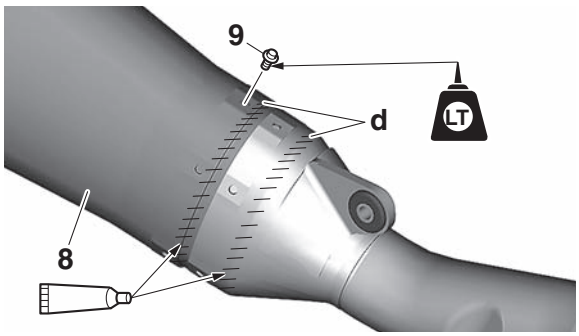

d. Install the fiber insert “6” to the part “b”.
e. Twist the fiber insert “7” onto the inner pipe “c”.




f. Install the silencer body “8” and bolts “9”.

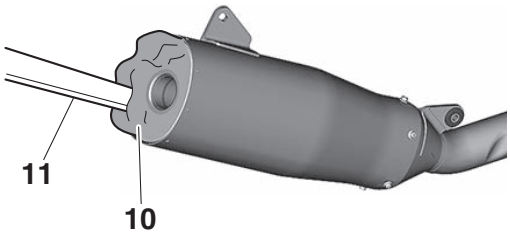
**Silencer body bolt**
**8 N·m (0.8 kgf·m, 5.9 lb·ft)**
**LOCTITE®**

**TIP**
Apply heat-resistant sealant to the areas “d” shown, making sure that there are no gaps in the beads of sealant.



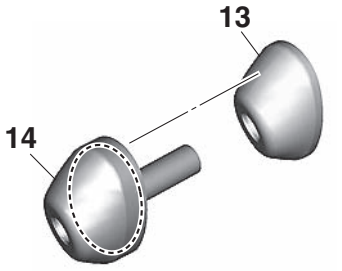

g. Install the fiber “10”.

**TIP**
Stuff the fiber into the silencer body by using a flat board “11”.



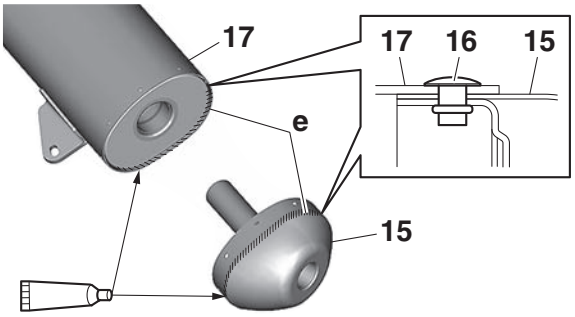

h. Install the fiber insert “12” to the inner pipe.
i. Install the fiber insert “13” to the inside of the silencer cap “14”.



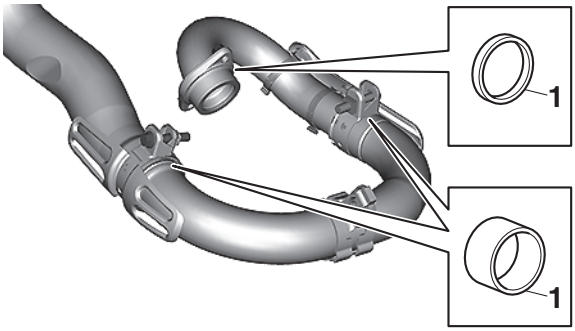




j. Install the silencer cap “15” and rivet “16”.

**TIP**
- Apply heat-resistant sealant to the areas “e” shown, making sure that there are no gaps in the beads of sealant.
- Take care not to allow the fiber out of place when installing the silencer body “17”.

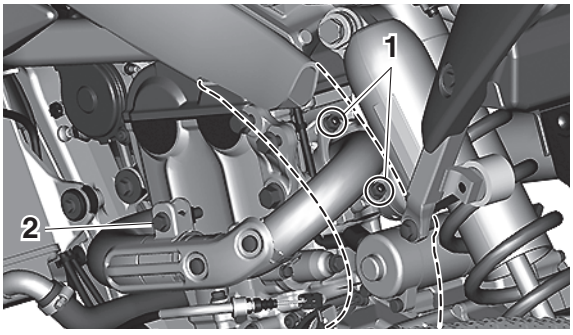


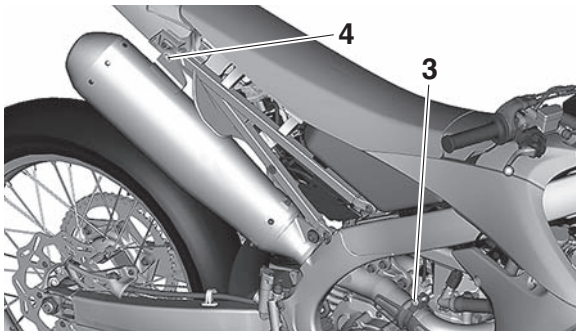
6. Check:
   • Gasket “1”
   Damage → Replace.




7. Check:
   • Tightening torques

**Exhaust pipe nut “1”**
**10 N·m (1.0 kgf·m, 7.4 lb·ft)**
**Exhaust pipe clamp bolt “2”**
**12 N·m (1.2 kgf·m, 8.9 lb·ft)**
**Exhaust pipe clamp bolt “3”**
**12 N·m (1.2 kgf·m, 8.9 lb·ft)**
**Silencer bolt (rear) “4”**
**30 N·m (3.0 kgf·m, 22 lb·ft)**




8. Install:
   • Exhaust pipe protector

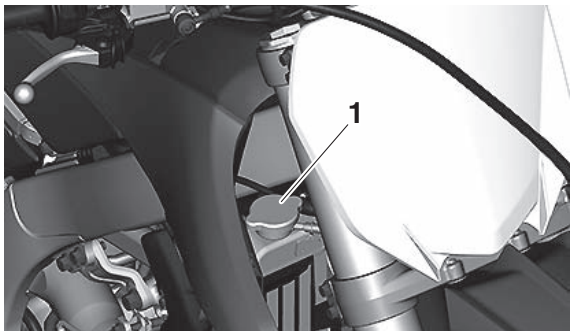
**Exhaust pipe protector screw**
**10 N·m (1.0 kgf·m, 7.4 lb·ft)**
**LOCTITE®**

EAM30210
## CHECKING THE COOLANT LEVEL

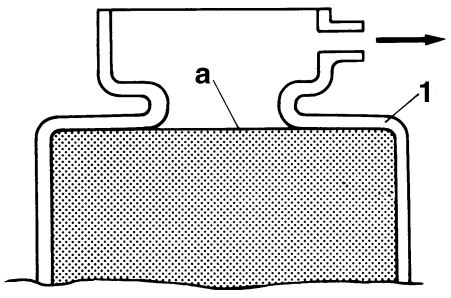
EWA13030
**⚠ WARNING**

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

1. Stand the vehicle upright on a level surface.
2. Remove:
   • Radiator cap “1”




3. Check:
   • Coolant level
   Maximum level “a” or below → Add coolant up to the maximum level.




1. Radiator

ECA24260
***NOTICE***

- **Adding water instead of coolant lowers the antifreeze content. If, therefore, water is used instead of coolant, check, and if necessary, adjust the antifreeze concentration.**
- **Use only distilled water. However, if dis-**

**tilled water is not available, soft water may be used.**

4. Start the engine, warm this up for several minutes, and then stop it.
5. Check:
   • Coolant level

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

EAM30211
## CHECKING THE COOLING SYSTEM

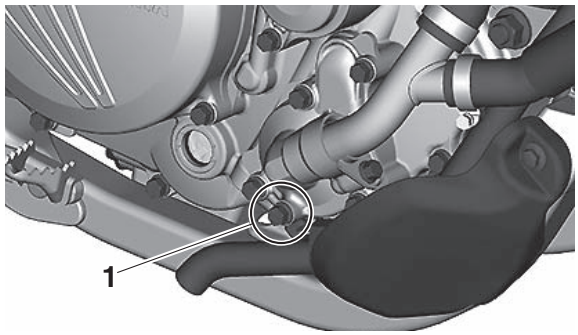
1. Remove:
   • Seat
   • Side cover (left/right)
   • Air scoop (left/right)
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
   • Radiator
   • Radiator hose
   Crack/damage → Replace.
   Refer to "RADIATOR" on page 6-2.
3. Install:
   • Air scoop (left/right)
   • Seat
   • Side cover (left/right)
   Refer to "GENERAL CHASSIS" on page 4-1.

EAM30212
## CHANGING THE COOLANT

EWA13030
**WARNING**

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

1. Place a container under the engine.
2. Remove:
   • Coolant drain bolt "1"




3. Remove:
   • Radiator cap
   Slowly loosen the radiator cap to drain coolant.

**TIP**
When the radiator cap is loosened, coolant will gush out transversely; therefore, bring the container near to the outlet.

4. Thoroughly flush the cooling system with clean tap water.
5. Install:
   • Copper washer New
   • Coolant drain bolt

**Coolant drain bolt**
**10 N·m (1.0 kgf·m, 7.4 lb·ft)**

6. Pour coolant.

**Recommended coolant**
**High quality ethylene glycol anti-freeze containing anti-corrosion for aluminum engine**
**Radiator (including all routes)**
**0.93 L (0.98 US qt, 0.82 Imp.qt)**
**Coolant mixing ratio**
**1:1 (Coolant:Water)**

EWA13040
**WARNING**

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

ECA13481
***NOTICE***

- **Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant, check, and if necessary, correct the antifreeze concentra-**

**tion of the coolant.**
- **Use only distilled water. However, if distilled water is not available, soft water may be used.**
- **If coolant comes into contact with painted surfaces, immediately wash them with water.**
- **Do not mix different types of antifreeze.**

7. Install:
   - Radiator cap
8. Start the engine, warm this up for several minutes, stop it, and then wait for it to cool down.
9. Check:
   - Coolant level
     Refer to “CHECKING THE COOLANT LEVEL” on page 3-20.

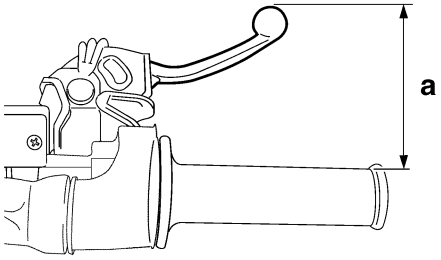
EAM20136
# CHASSIS

EAM30479
## ADJUSTING THE FRONT DISC BRAKE

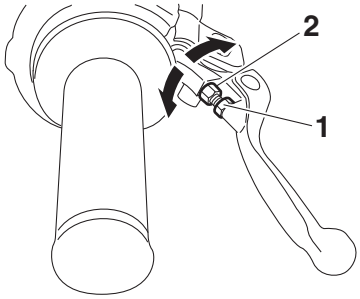
**TIP**
There should be no free play at the brake lever end.

1. Check:
   • Brake lever position “a”

**Brake lever position**
**100 mm (3.94 in)**
**Extent of adjustment**
**86–105 mm (3.39–4.13 in)**




2. Remove:
   • Brake lever cover
3. Adjust:
   • Brake lever position
   a. Loosen the locknut “1”.
   b. Turn the adjusting bolt “2” until the specified brake lever position is obtained.




   c. Tighten the locknut.

**Locknut**
**5 N·m (0.5 kgf·m, 3.7 lb·ft)**

EWA13050
**⚠ WARNING**

**A soft or spongy feeling in the brake lever can indicate the presence of air in the brake system. Before the vehicle is operated, the air must be removed by bleeding the brake system. Air in the brake system will considerably reduce braking performance.**

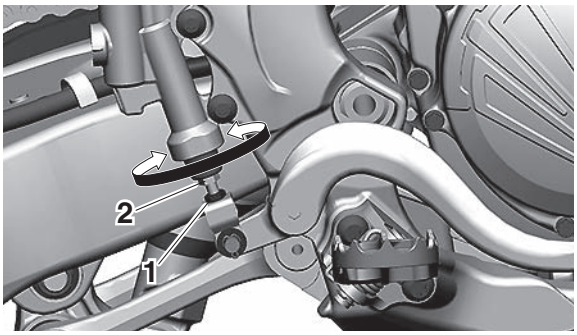
ECA13490
***NOTICE***

**After adjusting the brake lever position, make sure there is no brake drag.**

4. Install:
   • Brake lever cover

EAM30480
## ADJUSTING THE REAR DISC BRAKE

1. Adjust:
   • Brake pedal position
   a. Loosen the locknut “1”.
   b. Turn the adjusting bolt “2” until the brake pedal is in the correct position.




   c. Tighten the locknut.

**Locknut**
**6 N·m (0.6 kgf·m, 4.4 lb·ft)**

EWA19150
**⚠ WARNING**

**A soft or spongy feeling in the brake pedal can indicate the presence of air in the brake system. Before running, bleed the brake system. Air in the brake system will cause braking performance to be reduced.**

ECA13510
***NOTICE***

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

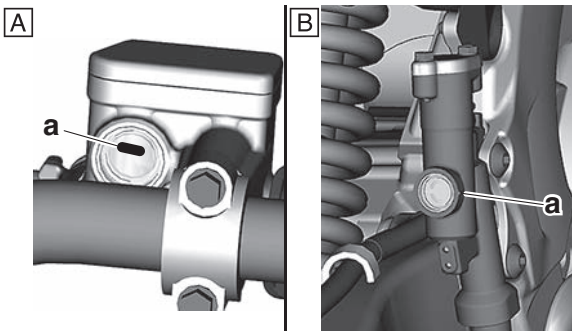
EAM30234
## CHECKING THE BRAKE FLUID LEVEL

1. Stand the vehicle upright on a level surface.

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

2. Check:
   • Brake fluid level
   The minimum level mark “a” or below → Add.

**Specified brake fluid**
**DOT 4**




A. Front brake
B. Rear brake

EWA13090

**WARNING**

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

ECA13540

***NOTICE***

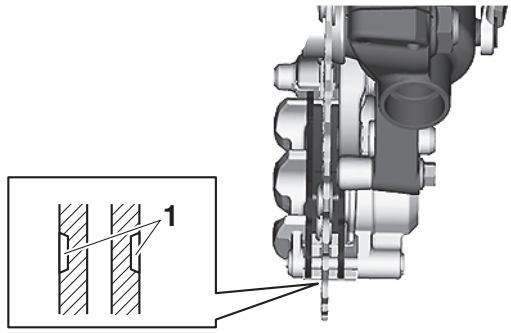
**Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**

EAM30231

### CHECKING THE FRONT BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
   - Front brake pad
     Wear indicator grooves "1" almost touch the brake disc → Replace the brake pads as a set.
     Refer to "FRONT BRAKE" on page 4-13.

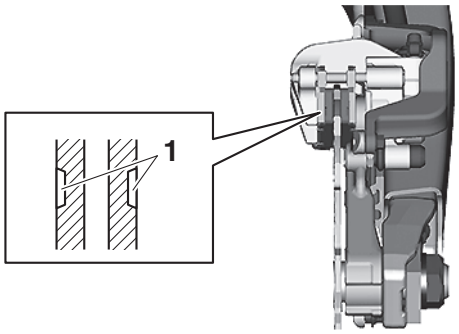



EAM30232

### CHECKING THE REAR BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
   - Rear brake pad
     Wear indicator grooves "1" almost disappeared → Replace the brake pads as a set.
     Refer to "REAR BRAKE" on page 4-24.




EAM30478

### CHECKING THE FRONT BRAKE HOSE

1. Check:
   - Brake hose
     Cracks/damage/wear → Replace.
2. Check:
   - Brake hose clamp
     Loose connection → Tighten the clamp bolt.
3. Stand the vehicle upright and apply the front brake several times.
4. Check:
   - Brake hose
     Brake fluid leaks → Replace the damaged brake hose.
     Refer to "FRONT BRAKE" on page 4-13.

EAM30498

### CHECKING THE REAR BRAKE HOSE

1. Check:
   - Brake hose
     Cracks/damage/wear → Replace.
2. Check:
   - Brake hose holder

Loose connection → Tighten the holder bolt.
3. Hold the vehicle upright and apply the rear brake several times.
4. Check:
   • Brake hose
   Brake fluid leakage → Replace the damaged hose.
   Refer to "REAR BRAKE" on page 4-24.

EAM30499
### CHECKING THE BRAKE OPERATION
1. Check:
   • Brake operation
   Brake not working properly → Check the brake system.
   Refer to "FRONT BRAKE" on page 4-13 and "REAR BRAKE" on page 4-24.

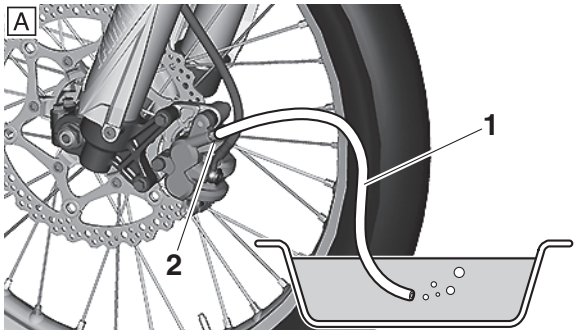
**TIP**
Drive on the dry road, operate the front and rear brakes separately and check to see if the brakes are operating properly.

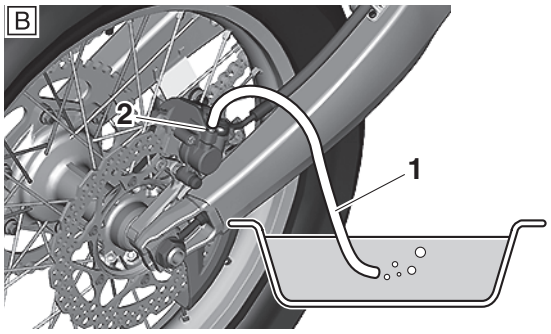
EAM30477
### BLEEDING THE HYDRAULIC BRAKE SYSTEM
EWA19140
**⚠ WARNING**
**Bleed the brake system whenever:**
- **The system is disassembled.**
- **A brake hose is loosened, disconnected, or replaced.**
- **The brake fluid level is very low.**
- **Brake operation is faulty.**

1. Remove:
   • Brake master cylinder cap
   • Reservoir diaphragm
   • Reservoir float (front brake)
   • Protector (rear brake)

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

2. Bleed the brake system.
   a. Fill the reservoir to the proper level with the recommended brake fluid.
   b. Install the reservoir diaphragm.
   c. Connect the plastic hose "1" to the bleed screw "2" securely, and place a container under the end of the plastic hose.




A. Front
B. Rear

   d. Slowly apply the brake several times.
   e. Fully pull the brake lever or fully press down the brake pedal and hold it in position.
   f. Loosen the bleed screw.

**TIP**
Loosening the bleed screw will release the pressure in the brake caliper and cause the brake lever to contact the throttle grip or the brake pedal to fully extend.

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

**TIP**
During the procedure, keep adding brake fluid to the reservoir.

ECA24320
***NOTICE***
- **Wipe off any brake fluid on the brake discs, tires, wheels, etc.**
- **Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid**

**immediately.**

i. Tighten the bleed screw.

| | |
|---|---|
| | **Bleed screw**<br>**6 N·m (0.6 kgf·m, 4.4 lb·ft)** |

j. Pour brake fluid to the reservoir up to the specified level.
Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-23.

EWA13110

**⚠ WARNING**

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

EAM30481

## DRIVE CHAIN SLACK

ECA13550

***NOTICE***

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

### Checking the drive chain slack

1. Use a maintenance stand to raise the rear wheel off the ground.

EWA13120

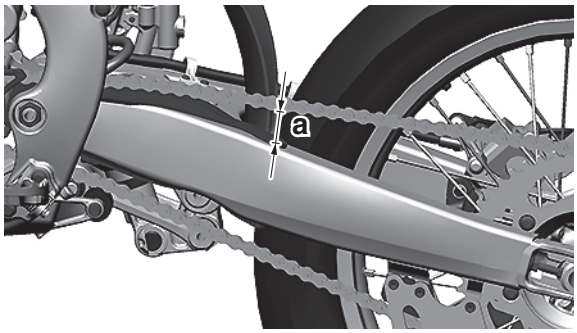
**⚠ WARNING**

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

2. Shift the transmission into the neutral position.
3. Pull the drive chain up above the drive chain guide installation bolt with a force of about 50 N (5.0 kgf, 37 lbf).
4. Check:
   - Drive chain slack "a"
     Out of specification → Regulate.

**TIP**

Measure drive chain slack between the drive chain guide and the bottom of the chain as shown.




| | |
|---|---|
| | **Drive chain slack (Maintenance Stand)**<br>**50.0–60.0 mm (1.97–2.36 in)** |

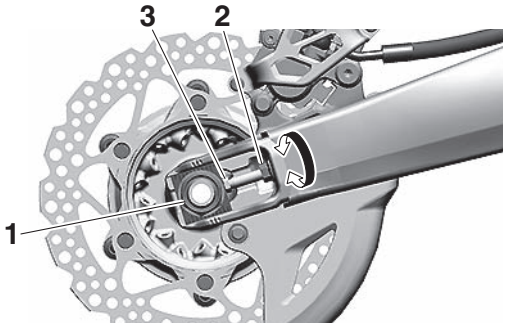
### Adjusting the drive chain slack

EWA13120

**⚠ WARNING**

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

1. Adjust:
   - Drive chain slack
     a. Loosen the wheel axle nut "1".
     b. Loosen both locknuts "2".
     c. Turn the adjusting bolt "3" until the specified drive chain slack is obtained.




**TIP**

- To maintain the proper wheel alignment, adjust both sides evenly.
- Push the rear wheel forward to make sure that there is no clearance between the swingarm end plates and the ends of the swingarm.

d. Tighten the wheel axle nut.

| | |
|---|---|
| | **Wheel axle nut**<br>**135 N·m (13.5 kgf·m, 100 lb·ft)** |

e. Tighten the drive chain puller locknut.

| | |
|---|---|
| | **Drive chain puller locknut**<br>**21 N·m (2.1 kgf·m, 15 lb·ft)** |

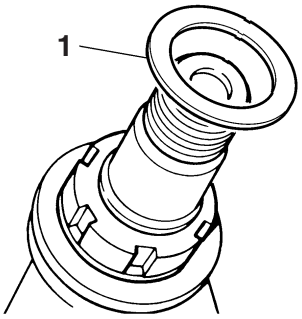
EAM30247
## CHECKING AND ADJUSTING THE STEERING HEAD

1. Use a maintenance stand to raise the front wheel off the ground.

EWA13120
**⚠ WARNING**

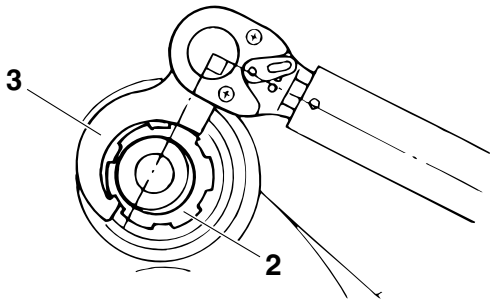
**Securely support the vehicle so that there is no danger of it falling over.**

2. Check:
   - Steering head
     Grasp the bottom of the front fork legs and gently rock the front fork.
     Blinding/looseness → Adjust the steering head.
3. Remove:
   - Handlebar
     Refer to "HANDLEBAR" on page 4-35.
   - Upper bracket
     Refer to "STEERING HEAD" on page 4-54.
4. Adjust:
   - Steering head
     a. Remove the washer "1".

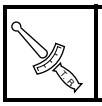



     b. After loosening the ring nut "2" with a steering nut wrench "3", tighten it to the specified torque.

**TIP**
- Set the torque wrench at a right angle to the steering nut wrench.
- Move the steering to the left and right a couple of times to check that it moves smoothly.



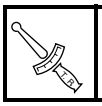

| | |
|---|---|
|  | **Steering nut wrench 90890-01403**<br>**Exhaust flange nut wrench YU-A9472** |

| | |
|---|---|
|  | **Ring nut (initial tightening torque) 38 N·m (3.8 kgf·m, 28 lb·ft)** |

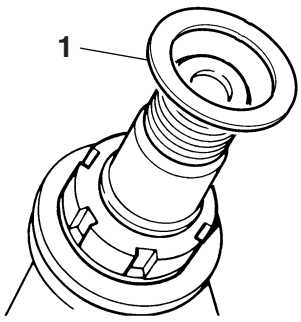
     c. Turn the front fork to the right and left a few times, and make sure that the steering rotates smoothly. If it does not turn smoothly, remove the lower bracket and check the upper and lower bearings.
     Refer to "STEERING HEAD" on page 4-54.
     d. Loosen the ring nut fully turn and then tighten it to specification with a steering nut wrench.

EWA13140
**⚠ WARNING**

**Do not overtighten the lower ring nut.**

| | |
|---|---|
|  | **Ring nut (final tightening torque) 7 N·m (0.7 kgf·m, 5.2 lb·ft)** |

     e. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.
     Refer to "STEERING HEAD" on page 4-54.
     f. Install the washer "1".




5. Install:
   - Upper bracket
     Refer to "STEERING HEAD" on page 4-54.
   - Handlebar
     Refer to "HANDLEBAR" on page 4-35.

EAM30502
## LUBRICATING THE STEERING HEAD

1. Lubricate:
   - Upper bearing

- Lower bearing
- Bearing race

| | |
|---|---|
| | **Recommended lubricant**<br>**Lithium-soap-based grease** |

EAM30338
### CHECKING THE FRONT FORK LEGS

1. Stand the vehicle upright on a level surface.

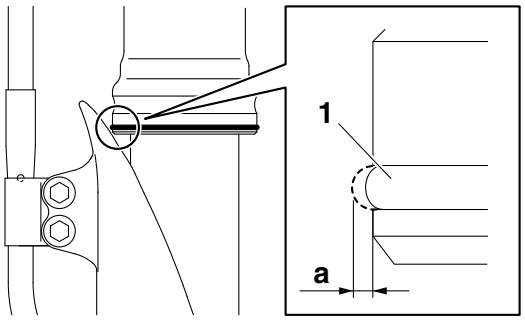
EWA13120
**WARNING**

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

2. Check:
   - Inner tube
     Damage/scratches → Replace.
   - Front fork leg
     Oil leaks between inner tube and outer tube → Replace the oil seal.
3. Hold the vehicle upright and apply the front brake.
4. Check:
   - Front fork operation
     Push down hard on the handlebar several times and check if the front fork rebounds smoothly.
     Unsmooth operation → Correct or replace.
     Refer to "FRONT FORK" on page 4-41.
5. Check:
   - Protector guide "1"
     Out of specification → Replace.

**TIP**

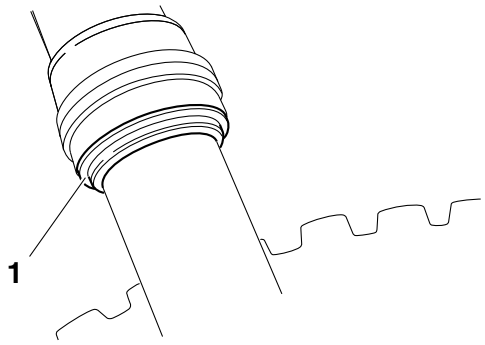
The protector guide reaches the limit of its use when it is worn down to the same height "a" as of the outer tube circumference.




6. Remove:
   - Protector
   - Dust seal "1"

ECA24330
***NOTICE***

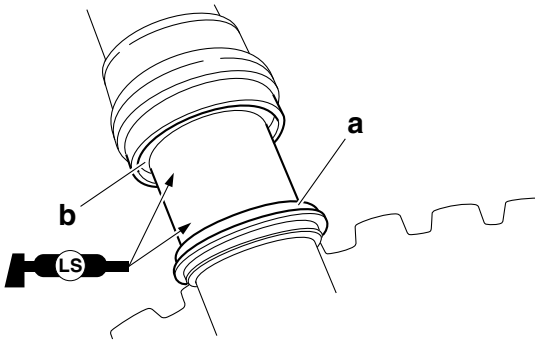
**Be careful not to damage the dust seal and the inner tube by a driver.**




7. Clean:
   - Dust seal "a"
   - Oil seal "b"

**TIP**

- Clean the dust seal and oil seal after every run.
- Apply lithium-soap-based grease on the inner tube.




EAM30239
### ADJUSTING THE FRONT FORK LEGS

EWA19180
**WARNING**

- **Always adjust the left and right front forks evenly. If this is not done, the vehicle may have poor stability.**
- **Securely support the vehicle so that there is no danger of it falling over.**

**Rebound damping**

ECA24340
***NOTICE***

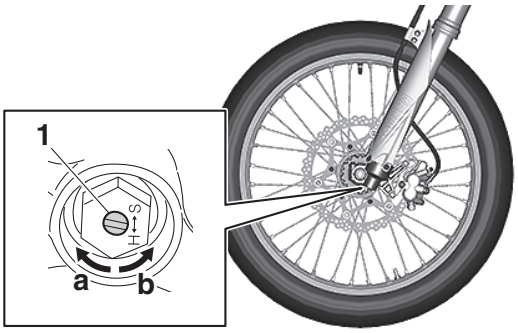
**Do not turn the adjuster forcibly beyond its adjusting range.**

1. Adjust:
   - Rebound damping
     a. Turn the adjuster "1" in the direction of "a" or "b" to make an adjustment.

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

**Rebound damping**
**Minimum (soft)**
**20 click(s) in direction “b”***
**Standard**
**7 click(s) in direction “b”***
**Maximum (hard)**
**0 click(s) in direction “b”***
***With the adjusting screw fully turned in direction “a”**

**TIP**
Although the total number of clicks of a damping force adjusting mechanism may not exactly match the above specifications due to small differences in production, the actual number of clicks always represents the entire adjusting range. To obtain a precise adjustment, it would be advisable to check the number of clicks of each damping force adjusting mechanism and to modify the specifications as necessary.



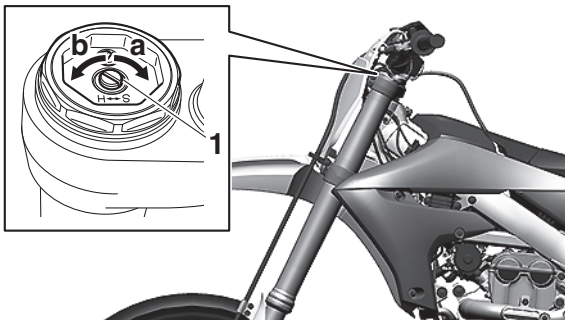

**Compression damping**
ECA24350
***NOTICE***
**Do not turn the adjuster forcibly beyond its adjusting range.**

1. Adjust:
   - Compression damping
     a. Turn the adjuster “1” in the direction of “a” or “b” to make an adjustment.

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

**Compression damping**
**Minimum (soft)**
**20 click(s) in direction “b”***
**Standard**
**10 click(s) in direction “b”***
**Maximum (hard)**
**0 click(s) in direction “b”***
***With the adjusting screw fully turned in direction “a”**

**TIP**
Although the total number of clicks of a damping force adjusting mechanism may not exactly match the above specifications due to small differences in production, the actual number of clicks always represents the entire adjusting range. To obtain a precise adjustment, it would be advisable to check the number of clicks of each damping force adjusting mechanism and to modify the specifications as necessary.




**Air bleeding from front fork**

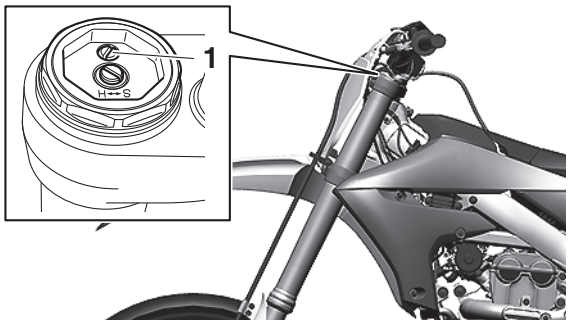
**TIP**
If the front fork initial movement feels stiff during a run, relieve the front fork internal pressure.

1. Use a maintenance stand to raise the front wheel off the ground.

EWA13120
**WARNING**
**Securely support the vehicle so that there is no danger of it falling over.**

2. Remove the bleed screw “1” and release the internal pressure from the front fork.
3. Tighten:
   - Bleed screw

**Bleed screw**
**1.3 N·m (0.13 kgf·m, 0.95 lb·ft)**




EAM30482
## CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle upright on a level surface.

EWA13120
**⚠ WARNING**

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

2. Check:
   - Rear shock absorber assembly
     Gas leaks/oil leaks → Replace the rear shock absorber assembly.
     Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-58.
3. Check:
   - Rear shock absorber assembly smooth action
   - Rear suspension link smooth action
     Sit astride the seat and shake your body up and down several times to check whether the rear shock absorber assembly operates smoothly.
     Unsmooth operation → Correct or replace.
     Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-58.

EAM30242
## ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

Use a maintenance stand to raise the rear wheel off the ground.

EWA13120
**⚠ WARNING**

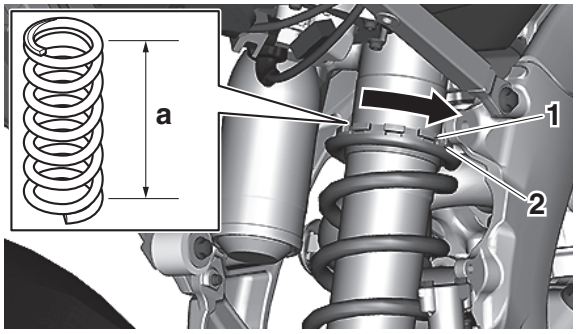
**Securely support the vehicle so that there is no danger of it falling over.**

### Spring preload

ECA24360
***NOTICE***

**Do not turn the adjuster forcibly beyond its adjusting range.**

1. Adjust:
   - Spring preload
     a. Loosen the locknut "1".
     b. Loosen the adjuster "2" until there is some clearance between the spring and the adjuster.
     c. Measure the spring free length "a".

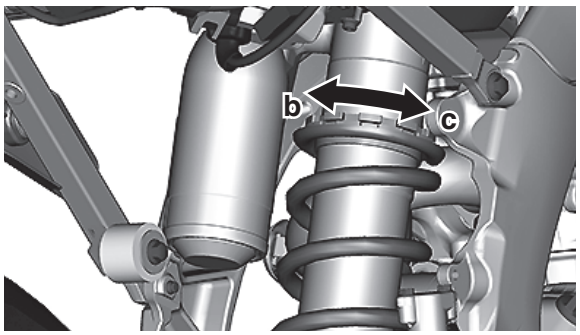



     d. Turn the adjuster in the direction of "b" or "c" to make an adjustment.

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

**Spring preload adjusting positions**
**Minimum**
**Position in which the spring is turned in 1.5 mm (0.06 in) from its free length.**
**Standard**
**Position in which the spring is turned in 7.0 mm (0.28 in) from its free length.**
**Maximum**
**Position in which the spring is turned in 18.0 mm (0.71 in) from its free length.**

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




e. Tighten the locknut.

**Rebound damping**

ECA24370

***NOTICE***

**Do not turn the adjuster forcibly beyond its adjusting range.**

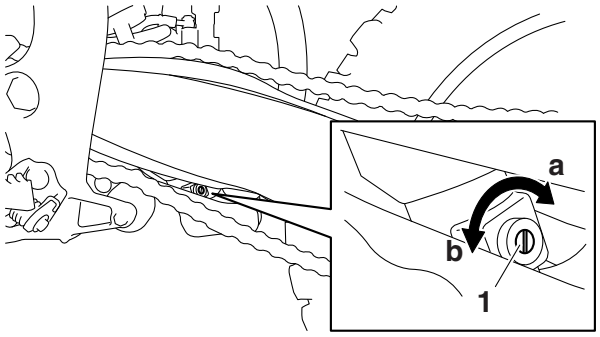
1. Adjust:
   - Rebound damping
     a. Turn the adjuster "1" in the direction of "a" or "b" to make an adjustment.

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

**Rebound damping**
**Minimum (soft)**
**30 click(s) in direction "b"***
**Standard**
**10 click(s) in direction "b"***
**Maximum (hard)**
**0 click(s) in direction "b"***
***With the adjusting screw fully turned in direction "a"**

**TIP**

Although the total number of clicks of a damping force adjusting mechanism may not exactly match the above specifications due to small differences in production, the actual number of clicks always represents the entire adjusting range. To obtain a precise adjustment, it would be advisable to check the number of clicks of each damping force adjusting mechanism and to modify the specifications as necessary.




**Compression damping (for fast compression damping)**

ECA24370

***NOTICE***

**Do not turn the adjuster forcibly beyond its adjusting range.**

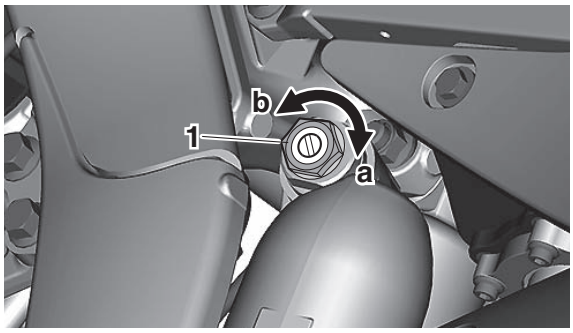
1. Adjust:
   - Compression damping (for fast compression damping)
     a. Turn the adjuster "1" in the direction of "a" or "b" to make an adjustment.

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

**Fast compression damping**
**Minimum (soft)**
**2 turn(s) in direction "b"***
**Standard**
**7/8 turn(s) in direction "b"***
**Maximum (hard)**
**0 turn(s) in direction "b"***
***With the adjusting screw fully turned in direction "a"**

**TIP**

To obtain a precise adjustment, it is advisable to check the actual total number of turns of the damping force adjusting mechanism. This adjustment range may not exactly match the specifications listed due to small differences in production.




**Compression damping (for slow compression damping)**

ECA24390

***NOTICE***

**Do not turn the adjuster forcibly beyond its adjusting range.**

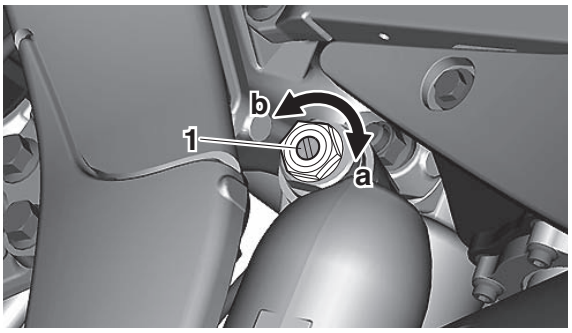
1. Adjust:
   - Compression damping (for slow compression damping)
     a. Turn the adjuster "1" in the direction of "a" or "b" to make an adjustment.

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

**Slow compression damping**
**Minimum (soft)**
**20 click(s) in direction "b"***
**Standard**
**8 click(s) in direction "b"***
**Maximum (hard)**
**0 click(s) in direction "b"***
***With the adjusting screw fully turned in direction "a"**

**TIP**

Although the total number of clicks of a damping force adjusting mechanism may not exactly match the above specifications due to small differences in production, the actual number of clicks always represents the entire adjusting range. To obtain a precise adjustment, it would be advisable to check the number of clicks of each damping force adjusting mechanism and to modify the specifications as necessary.




EAM30240

## CHECKING THE SWINGARM OPERATION

1. Check:
   - Swingarm smooth action
   - Swingarm free play
     Refer to "SWINGARM" on page 4-64.

EAM30500

## LUBRICATING THE SWINGARM PIVOT

1. Lubricate:
   - Oil seal
   - Collar

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

Refer to "INSTALLING THE SWINGARM" on page 4-65.

EAM30501

## CHECKING THE CONNECTING ARM AND RELAY ARM

Refer to "CHECKING THE CONNECTING ARM AND RELAY ARM" on page 4-62.

EAM30243

## CHECKING THE TIRES

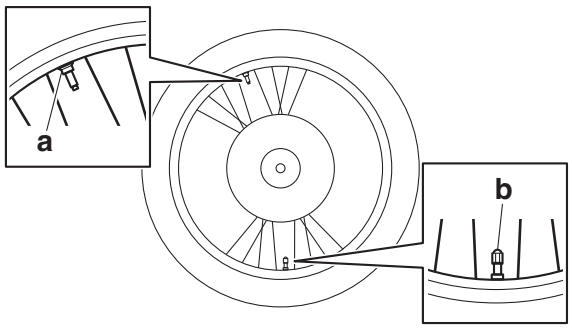
1. Measure:
   - Tire pressure
     Out of specification → Regulate.

**Tire air pressure (measured on cold tires)**
**Front**
**100 kPa (1.00 kgf/cm², 15 psi)**
**Rear**
**100 kPa (1.00 kgf/cm², 15 psi)**

**TIP**

- Check the tire while it is cold.
- Because if the bead stopper tightening nut is loose when the tire pressure is low, the tire could slip off the rim, thus be sure to check and tighten the bead stopper tightening nut "a".
- If the tire valve stem "b" is found tilted, the tire is considered to be slipping off its position. Cor-

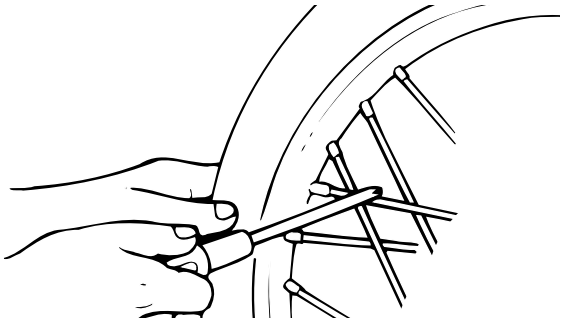
rect the tire position.




a. Bead stopper tightening nut
b. Tire valve stem

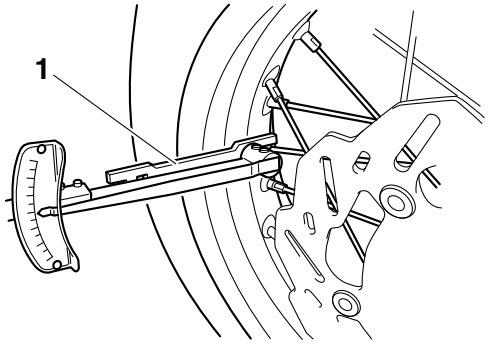
EAM30244
## CHECKING AND TIGHTENING THE SPOKES

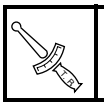
1. Check:
   • Spoke
   Bend/damage → Replace.
   Loose → Tighten.
   Tap the spokes with a screwdriver.



**TIP**
A tight spoke will emit a clear, ringing tone; a loose spoke will sound flat.

2. Tighten:
   • Spoke
   (with a spoke nipple wrench "1")




| | |
|---|---|
|  | **Spoke nipple wrench (6–7)**<br>**90890-01521**<br>**Spoke nipple wrench (6–7)**<br>**YM-01521** |
|  | **Spoke**<br>**2.5 N·m (0.25 kgf·m, 1.8 lb·ft)** |

**TIP**
- Do not give a half turn (180°) or more for one tightening.
- Make sure that tightening after a break-in is done until the initial looseness in nipples disappears.
- Make sure that tightening is done in stages, not at a time.

EAM30245
## CHECKING THE WHEELS

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

EWA13260
**⚠ WARNING**
**Never attempt to make any repairs to the wheel.**

EAM30246
## CHECKING THE WHEEL BEARINGS

1. Check:
   • Wheel bearing
   Refer to "CHECKING THE FRONT WHEEL" on page 4-6 and "CHECKING THE REAR WHEEL" on page 4-10.

EAM30253
## CHECKING THE CHASSIS FASTENERS

Make sure that all nuts, bolts, and screws are properly tightened.
Refer to "CHASSIS TIGHTENING TORQUES" on page 2-13.

EAM30248
## CHECKING AND LUBRICATING THE CABLES

The following procedure applies to all of the inner and outer cables.

EWA13270
**⚠ WARNING**
**Damaged outer cable may cause the cable to corrode and interfere with its movement. Replace damaged outer cable and inner cables as soon as possible.**

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

| | |
|---|---|
| | **Recommended lubricant**<br>**Engine oil or a suitable cable lubricant** |

**TIP**

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

EAM30483

### LUBRICATING THE BRAKE LEVER

1. Lubricate the pivoting points and metal-to-metal moving parts of the following parts.
   • Brake lever

| | |
|---|---|
| | **Recommended lubricant**<br>**Silicone grease** |

EAM30503

### LUBRICATING THE CLUTCH LEVER

1. Lubricate the pivoting points and metal-to-metal moving parts of the following parts.
   • Clutch lever

| | |
|---|---|
| | **Recommended lubricant**<br>**Lithium-soap-based grease** |

EAM30250

### LUBRICATING THE PEDAL

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

| | |
|---|---|
| | **Recommended lubricant**<br>**Lithium-soap-based grease** |

EAM20137
# ELECTRICAL SYSTEM

EAM30256
## CHECKING AND CHARGING THE BATTERY
Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-43.

EAM30505
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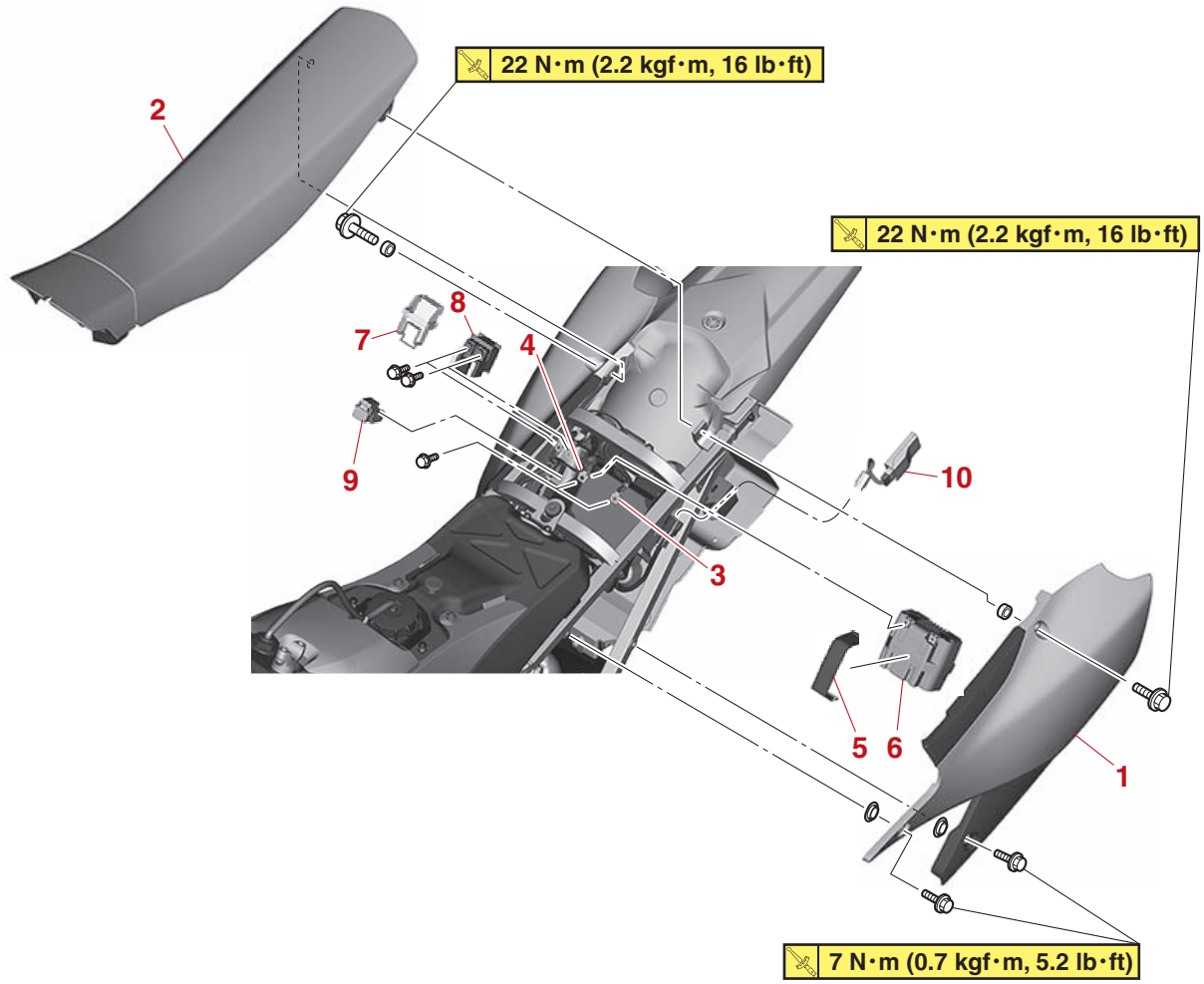
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EAM20094

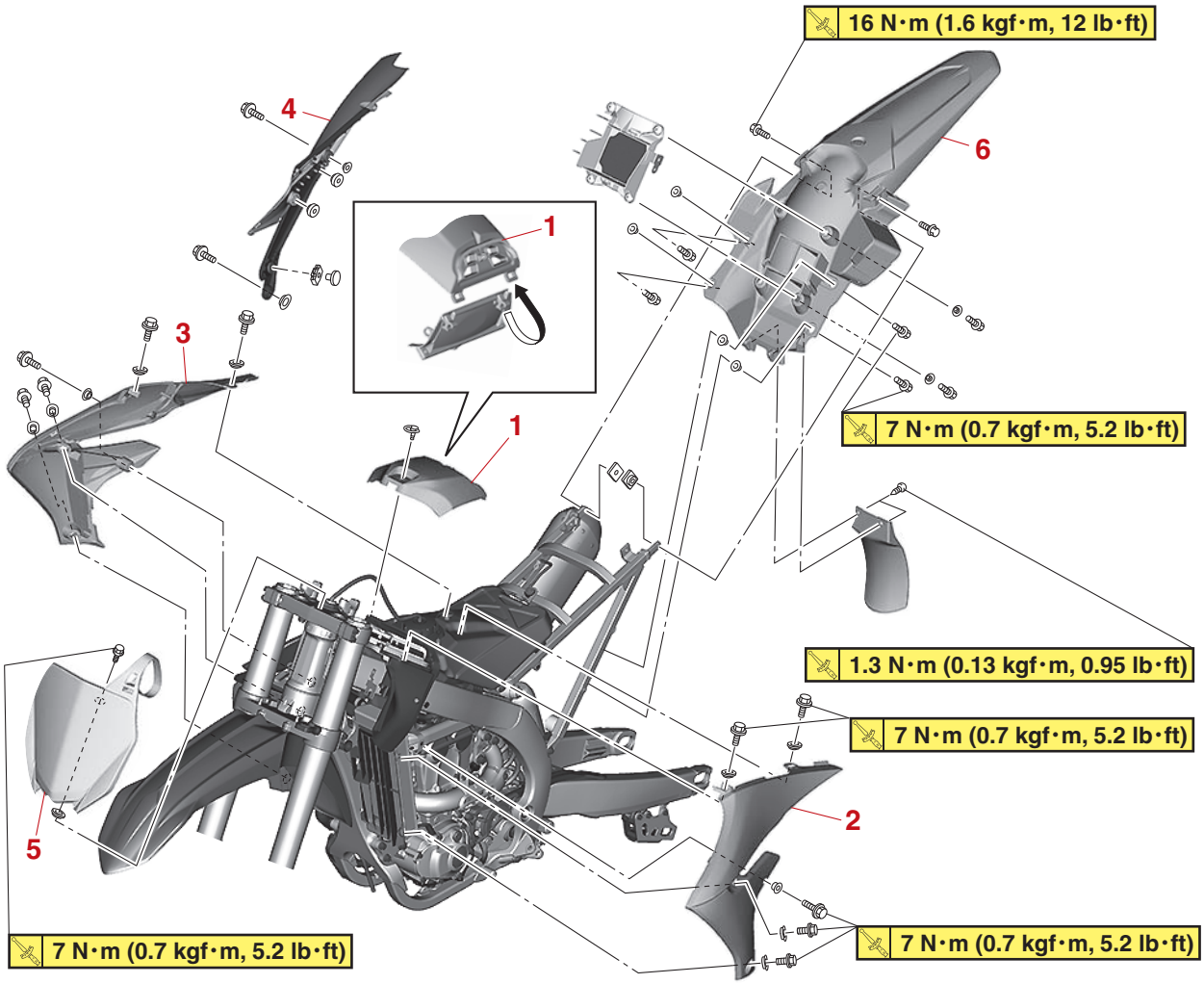
# GENERAL CHASSIS

## Removing the seat and battery




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 1 | Side cover (left) | 1 | |
| 2 | Seat | 1 | |
| 3 | Negative battery lead | 1 | Disconnect. |
| 4 | Positive battery lead | 1 | Disconnect. |
| 5 | Battery band | 1 | |
| 6 | Battery | 1 | |
| 7 | Cover | 1 | |
| 8 | Starter relay | 1 | |
| 9 | Main relay | 1 | |
| 10 | CCU (Communication Control Unit) | 1 | |

**Removing the side cover**



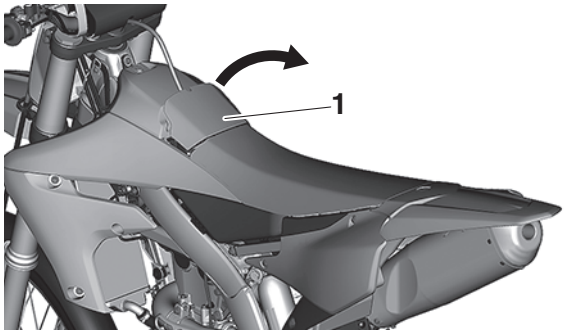

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 1 | Air filter case cover | 1 | Refer to "CLEANING THE AIR FILTER ELEMENT" on page 3-15. |
| 2 | Air scoop (left) | 1 | |
| 3 | Air scoop (right) | 1 | |
| 4 | Side cover (right) | 1 | |
| 5 | Number plate | 1 | |
| 6 | Rear fender | 1 | |

EAM30016
## REMOVING THE SEAT

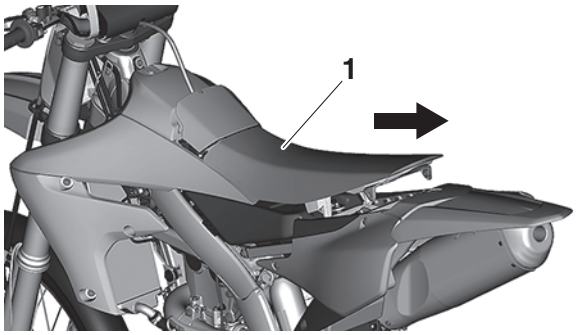
**TIP**

The fuel tank cap cover and the seat are coupled with each other with a plastic band.
When removing the seat, always remove the fuel tank cap cover beforehand.

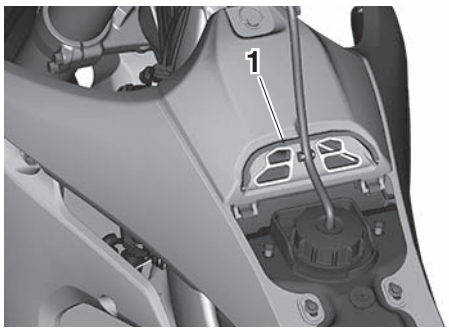
1. Remove:
   • Fuel tank cap cover “1”
   Refer to “FUEL TANK CAP” on page 1-22.




2. Remove:
   • Seat “1”



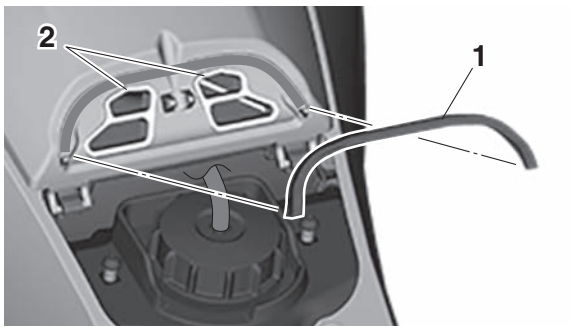

3. Check:
   • Seat “1”
   Damage/wear/detachment → Replace.




4. Replace:
   • Seat “1”

**TIP**

- Install the new seal in the original position.
- Make sure that the new seal does not cover the ducts “2”.

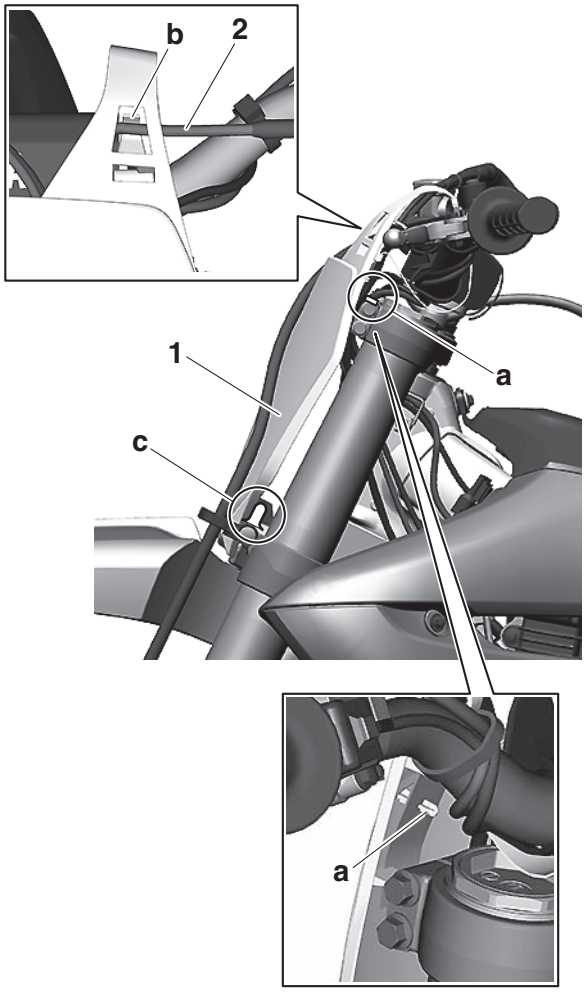



EAM30371
## REMOVING THE NUMBER PLATE

1. Remove:
   • Bolt (number plate)
   • Number plate “1”

**TIP**

- The projection “a” is inserted into the band of the number plate. Pull the band off the projection before removal.
- Remove the clutch cable “2” from the cable guide “b” on the number plate.
- The projection “c” on the lower bracket is inserted into the number plate. Remove the number plate by pulling it off the projection.
- When installing the number plate, insert the projection on the number plate into the hole in the upper side of the band.



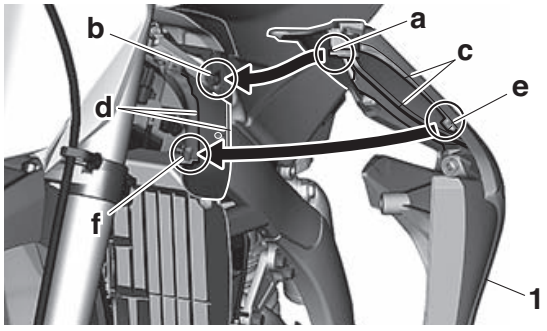

EAM30458

## INSTALLING THE AIR SCOOP

1. Install:
   - Air scoop (left “1”/right)

**TIP**

After inserting the projection “a” on the air scoop (left/right) into the hole “b” in the air filter case, inserting the grooves “c” into the ribs “d” of the air filter case, and inserting the projection “e” into the slot “f” in the air filter case, install the air scoop and secure it with the bolts.



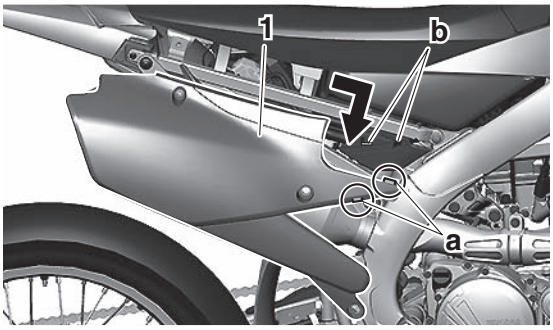

EAM30459

## REMOVING THE SIDE COVER

1. Remove:
   - Side cover (right) “1”

**TIP**

Remove the side cover (right) from the vehicle by removing the bolts and sliding it as shown.




a. Projection
b. Slot

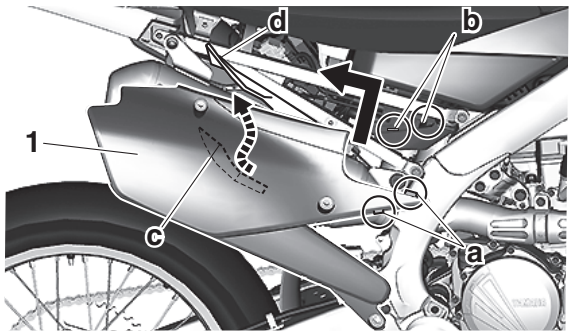
EAM30460

## INSTALLING THE SIDE COVER

1. Install:
   - Side cover (right) “1”

**TIP**

- Install the side cover (right) by sliding it as shown and secure it with the bolts to fit it to the vehicle.
- Install the side cover (right) so that the rib is located under the rib of the rear fender.

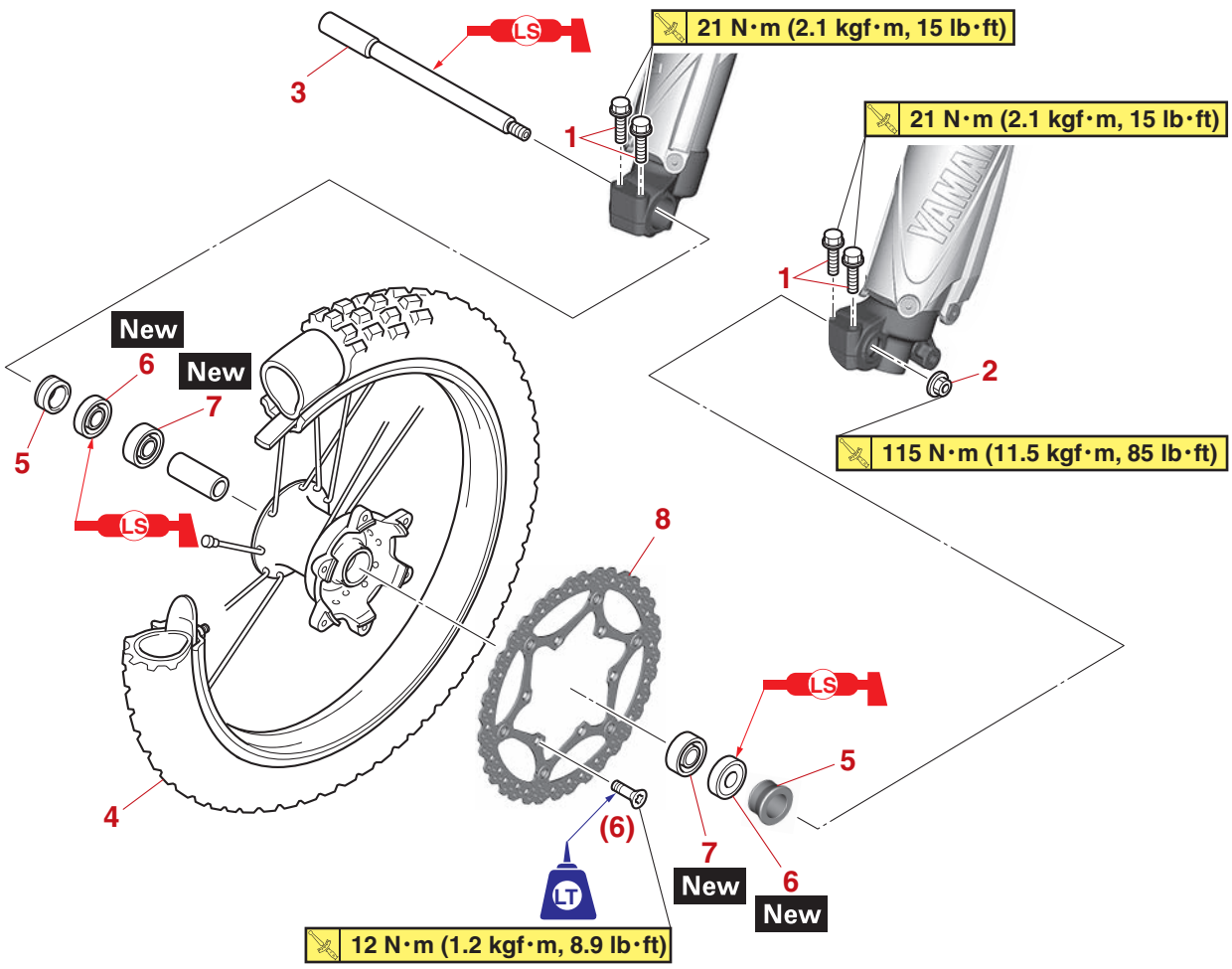



a. Projection
b. Slot
c. Rib (side cover)
d. Rib (rear fender)

EAM20095

# FRONT WHEEL

**Removing the front wheel**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | | | Use a maintenance stand to raise the front wheel off the ground. |
| 1 | Front wheel axle pinch bolt | 4 | Loosen. |
| 2 | Front wheel axle nut | 1 | |
| 3 | Front wheel axle | 1 | |
| 4 | Front wheel | 1 | |
| 5 | Collar | 2 | |
| 6 | Oil seal | 2 | |
| 7 | Bearing | 2 | |
| 8 | Brake disc | 1 | |

EAM30017
## REMOVING THE FRONT WHEEL

1. Use a maintenance stand to raise the front wheel off the ground.

EWA13120
**⚠ WARNING**

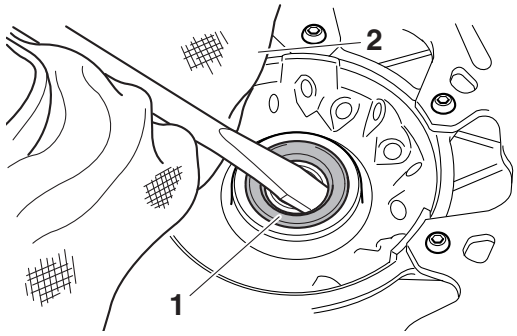
**Securely support the vehicle so that there is no danger of it falling over.**

2. Remove:
   • Front wheel

EAM30019
## DISASSEMBLING THE FRONT WHEEL

1. Remove:
   • Oil seal
   • Bearing
   a. Clean the outside of the front wheel hub.
   b. Remove the oil seals “1” with a flat-head screwdriver.

**TIP**
To prevent damaging the wheel, place a rag “2” between the screwdriver and the wheel surface.




   c. Remove the bearings with a bearing puller.

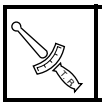
EAM30018
## CHECKING THE FRONT WHEEL

1. Check:
   • Front wheel axle
   Roll the front wheel axle on a flat surface.
   Bends → Replace.

EWA13460
**⚠ WARNING**

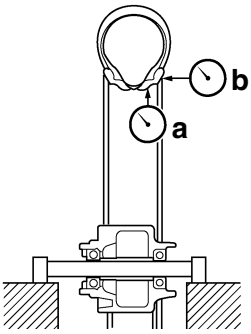
**Do not attempt to straighten a bent wheel axle.**

2. Check:
   • Tire
   • Front wheel
   Damage/wear → Replace.
   Refer to “CHECKING THE TIRES” on page 3-32 and “CHECKING THE WHEELS” on page 3-33.
3. Check:
   • Spoke
   Refer to “CHECKING AND TIGHTENING THE SPOKES” on page 3-33.
4. Tighten:
   • Spoke
   Refer to “CHECKING AND TIGHTENING THE SPOKES” on page 3-33.

| | |
|---|---|
|  | **Spoke**<br>**2.5 N·m (0.25 kgf·m, 1.8 lb·ft)** |

**TIP**
After tightening the spokes, measure the wheel runout.

5. Measure:
   • Radial wheel runout “a”
   • Lateral wheel runout “b”
   Out of specification → Repair/replace.




| | |
|---|---|
|  | **Radial wheel runout limit**<br>**2.0 mm (0.08 in)**<br>**Lateral wheel runout limit**<br>**2.0 mm (0.08 in)** |

6. Check:
   • Collar
   Damage/wear → Replace.
7. Check:
   • Bearing
   Front wheel turns roughly or is loose → Replace the wheel bearings.
   • Oil seal
   Damage/wear → Replace.

EAM30020
## ASSEMBLING THE FRONT WHEEL

1. Install:
   • Bearing (left side) “1” New
   • Spacer “2”
   • Bearing (right side) “3” New
   • Oil seal “4” New

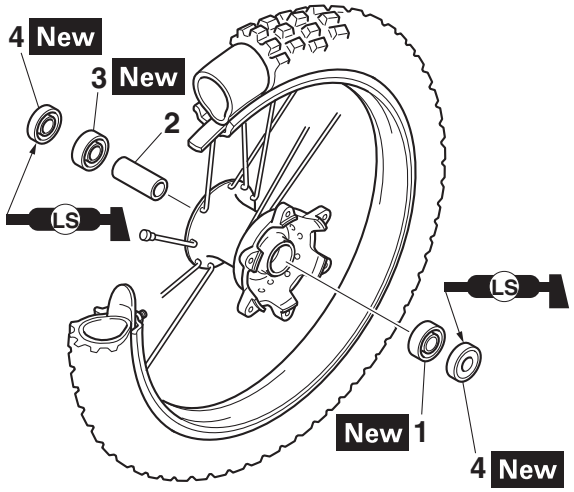
**TIP**
• Apply the lithium-soap-based grease to the bearing and the oil seal lip when installing.

- Left side of bearing shall be installed first.
- Install the oil seal with its manufacture's marks or numbers facing outward.

ECA24420

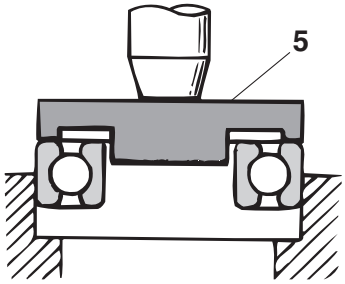
***NOTICE***

**Install the bearing by pressing its outer race parallel.**




**TIP**

Use a socket "5" that matches the diameter of the bearing outer race and that of the oil seal.




2. Install:
   - Brake disc
   - Brake disc bolt

**Brake disc bolt**
**12 N·m (1.2 kgf·m, 8.9 lb·ft)**
**LOCTITE®**

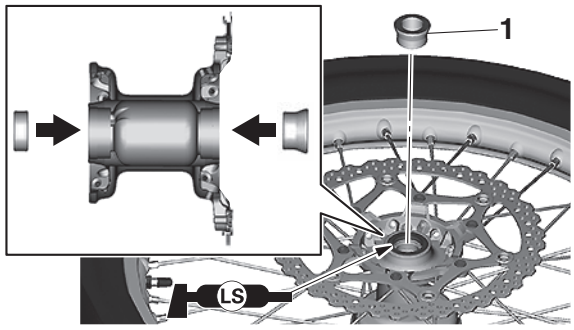
**TIP**

Tighten the bolts in stages and in a crisscross pattern.

3. Install:
   - Collar "1"

**TIP**

Apply the lithium-soap-based grease on the oil seal lip.



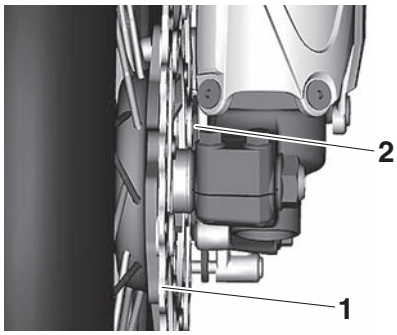

EAM30021

**INSTALLING THE FRONT WHEEL**

1. Install:
   - Front wheel

**TIP**

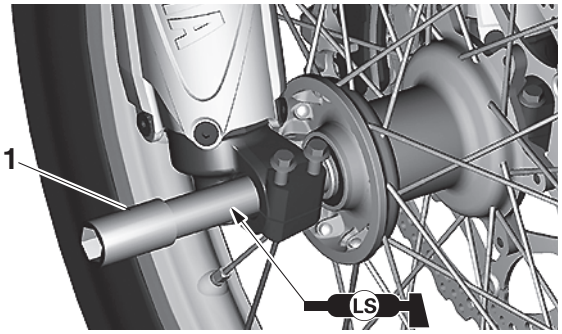
Install the brake disc "1" between the brake pads "2" correctly.




2. Install:
   - Front wheel axle "1"

**TIP**

Apply the lithium-soap-based grease to the front wheel axle.



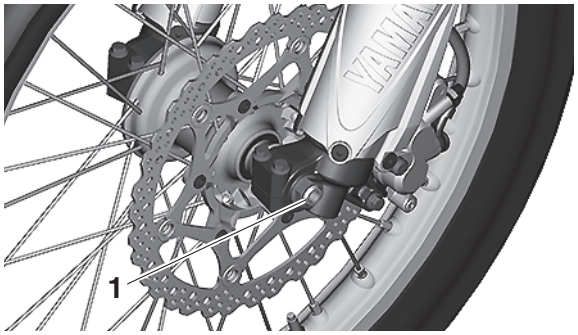

3. Tighten:
   - Front wheel axle nut "1"

| | |
|---|---|
| | **Front wheel axle nut**<br>**115 N·m (11.5 kgf·m, 85 lb·ft)** |

ECA24430

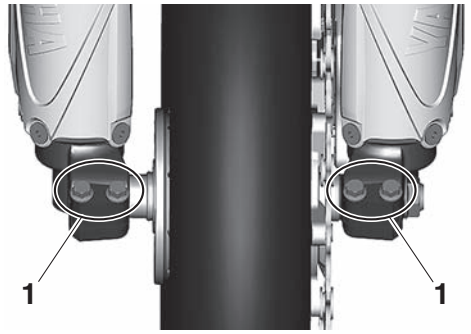
***NOTICE***

**Before tightening the front wheel axle nut, push down hard on the handlebar(s) several times and check if the front fork rebounds smoothly.**




4. Tighten:
   • Front wheel axle pinch bolt “1”

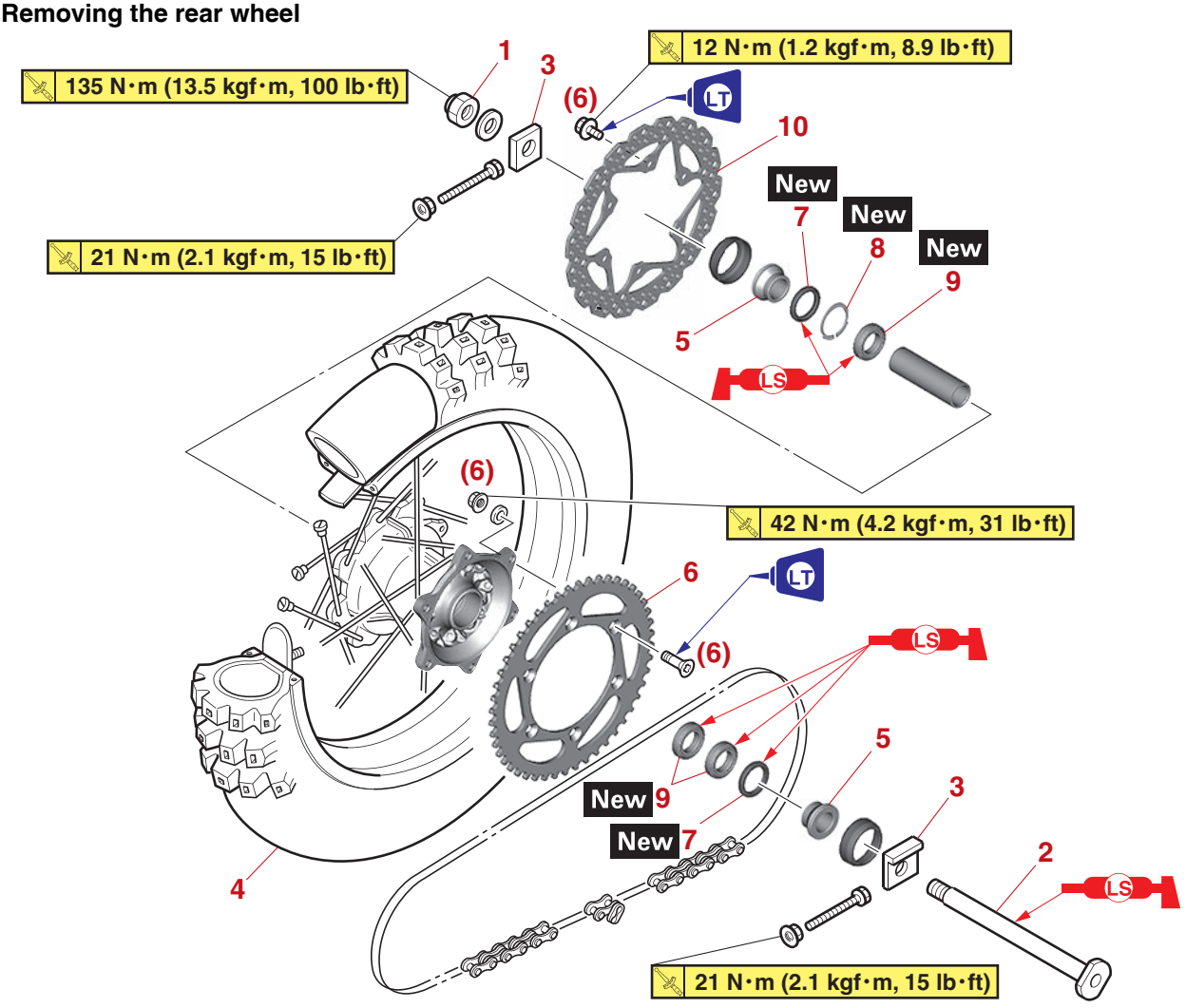
| | |
|---|---|
| | **Front wheel axle pinch bolt**<br>**21 N·m (2.1 kgf·m, 15 lb·ft)** |



EAM20096

# REAR WHEEL

**Removing the rear wheel**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | | | Use a maintenance stand to raise the rear wheel off the ground. |
| 1 | Rear wheel axle nut | 1 | |
| 2 | Rear wheel axle | 1 | |
| 3 | Drive chain puller | 2 | |
| 4 | Rear wheel | 1 | |
| 5 | Collar | 2 | |
| 6 | Rear wheel sprocket | 1 | |
| 7 | Oil seal | 2 | |
| 8 | Circlip | 1 | |
| 9 | Bearing | 3 | |
| 10 | Brake disc | 1 | |

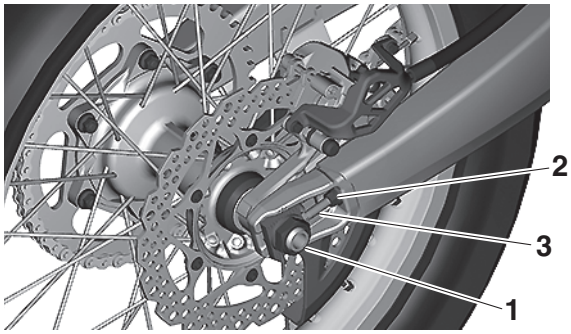
EAM30022
## REMOVING THE REAR WHEEL

1. Use a maintenance stand to raise the rear wheel off the ground.

EWA13120
**⚠ WARNING**

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

2. Remove:
   • Rear wheel axle nut "1"
3. Loosen:
   • Locknut "2"
4. Tighten:
   • Adjusting bolt "3"




5. Remove:
   • Rear wheel axle
   • Rear wheel

**TIP**
- Push the rear wheel forward and remove the drive chain from the rear wheel sprocket.
- Do not depress the brake pedal with the rear wheel removed.

EAM30024
## DISASSEMBLING THE REAR WHEEL

1. Remove:
   • Oil seal
   • Bearing
   Refer to "DISASSEMBLING THE FRONT WHEEL" on page 4-6.

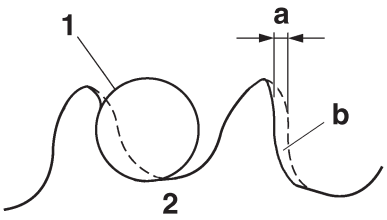
EAM30023
## CHECKING THE REAR WHEEL

1. Check:
   • Rear wheel axle
   • Rear wheel
   • Bearing
   • Oil seal
   Refer to "CHECKING THE FRONT WHEEL" on page 4-6.
2. Check:
   • Tire
   • Rear wheel
   Damage/wear → Replace.
   Refer to "CHECKING THE TIRES" on page 3-32 and "CHECKING THE WHEELS" on page 3-33.
3. Check:
   • Spoke
   Refer to "CHECKING AND TIGHTENING THE SPOKES" on page 3-33.
4. Measure:
   • Radial wheel runout
   • Lateral wheel runout
   Refer to "CHECKING THE FRONT WHEEL" on page 4-6.

**Radial wheel runout limit**
**2.0 mm (0.08 in)**
**Lateral wheel runout limit**
**2.0 mm (0.08 in)**

EAM30025
## CHECKING AND REPLACING THE REAR WHEEL SPROCKET

1. Check:
   • Rear wheel sprocket
   More than 1/4 tooth wear "a" → Replace the rear wheel sprocket and the drive sprocket as a set.
   Bent tooth → Replace the rear wheel sprocket and the drive sprocket as a set.




b. Correct

1. Drive chain roller
2. Rear wheel sprocket

2. Replace:
   • Rear wheel sprocket
   a. Remove the self-locking nuts and the rear wheel sprocket.
   b. Clean the rear wheel drive hub with a clean cloth, especially the surfaces that contact the sprocket.
   c. Install the new rear wheel sprocket.

**Rear wheel sprocket self-locking nut**
**42 N·m (4.2 kgf·m, 31 lb·ft)**

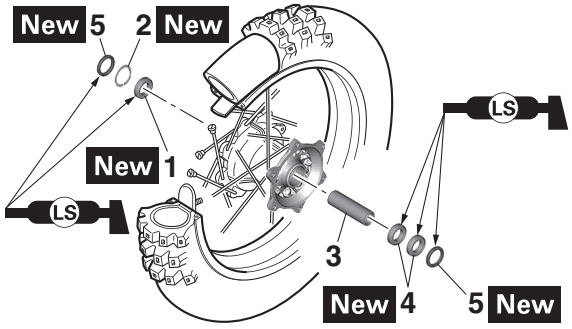
**TIP**
Tighten the self-locking nuts in stages and in a crisscross pattern.

EAM30026
## ASSEMBLING THE REAR WHEEL

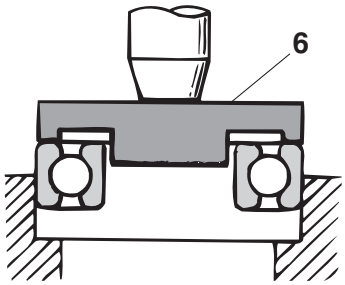
1. Install:
   - Bearing (right side) "1" New
   - Circlip "2" New
   - Spacer "3"
   - Bearing (left side) "4" New
   - Oil seal "5" New

**TIP**
- Apply the lithium-soap-based grease to the bearing and the oil seal lip when installing.
- Install the bearing with seal facing outward.
- Right side of bearing shall be installed first.
- Install the oil seal with its manufacture's marks or numbers facing outward.

ECA24440
***NOTICE***
**Install the bearing by pressing its outer race parallel.**




**TIP**
Use a socket "6" that matches the diameter of the bearing outer race and that of the oil seal.



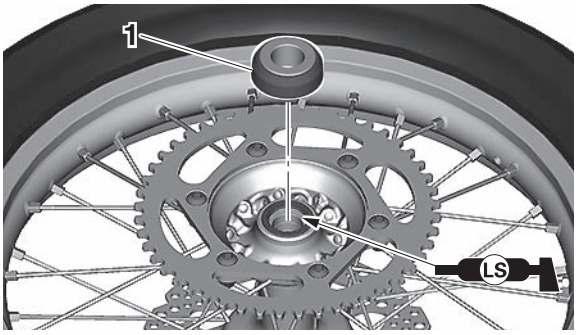

2. Install:
   - Brake disc
   - Brake disc bolt

**Brake disc bolt**
**12 N·m (1.2 kgf·m, 8.9 lb·ft)**
**LOCTITE®**

**TIP**
Tighten the bolts in stages and in a crisscross pattern.

3. Install:
   - Collar "1"

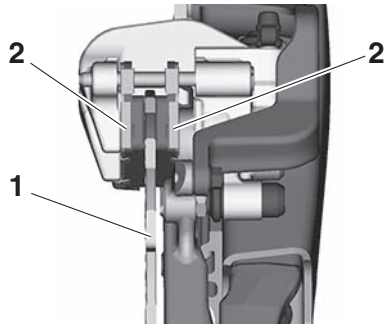
**TIP**
Apply the lithium-soap-based grease on the oil seal lip.




EAM30027
## INSTALLING THE REAR WHEEL

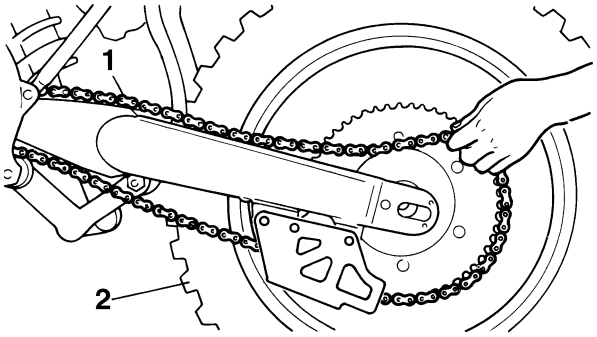
1. Install:
   - Rear wheel

**TIP**
Install the brake disc "1" between the brake pads "2" correctly.



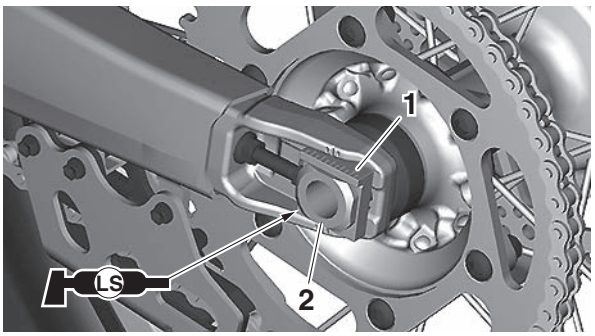

2. Install:
   - Drive chain "1"

**TIP**
Push the rear wheel "2" forward and install the drive chain.



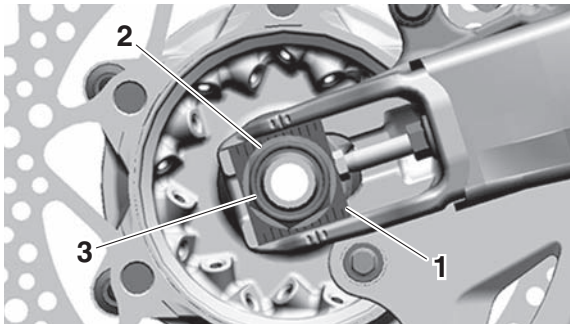

3. Install:
   • Drive chain puller (left) “1”
   • Rear wheel axle “2”

**TIP**
• Install the drive chain puller (left), and insert the rear wheel axle from the left side.
• Apply the lithium-soap-based grease to the rear wheel axle.




4. Install:
   • Drive chain puller (right) “1”
   • Washer “2”
   • Rear wheel axle nut “3”

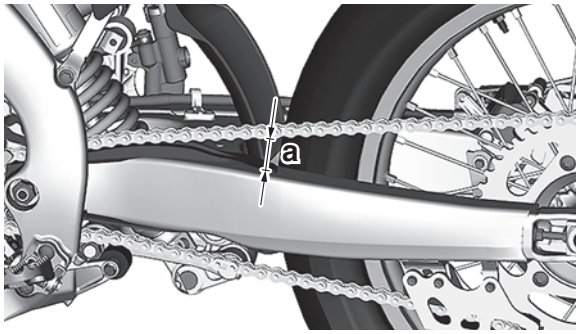
**TIP**
Temporarily tighten the rear wheel axle nut at this point.




5. Adjust:
   • Drive chain slack “a”

| | |
|---|---|
| | **Drive chain slack (Maintenance Stand)**<br>**50.0–60.0 mm (1.97–2.36 in)** |

Refer to “DRIVE CHAIN SLACK” on page 3-26.

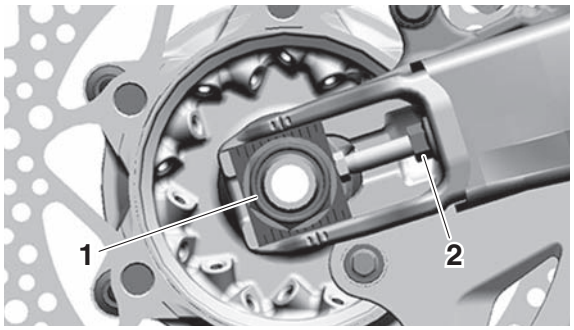



6. Tighten:
   • Rear wheel axle nut “1”

| | |
|---|---|
| | **Wheel axle nut**<br>**135 N·m (13.5 kgf·m, 100 lb·ft)** |

   • Locknut “2”

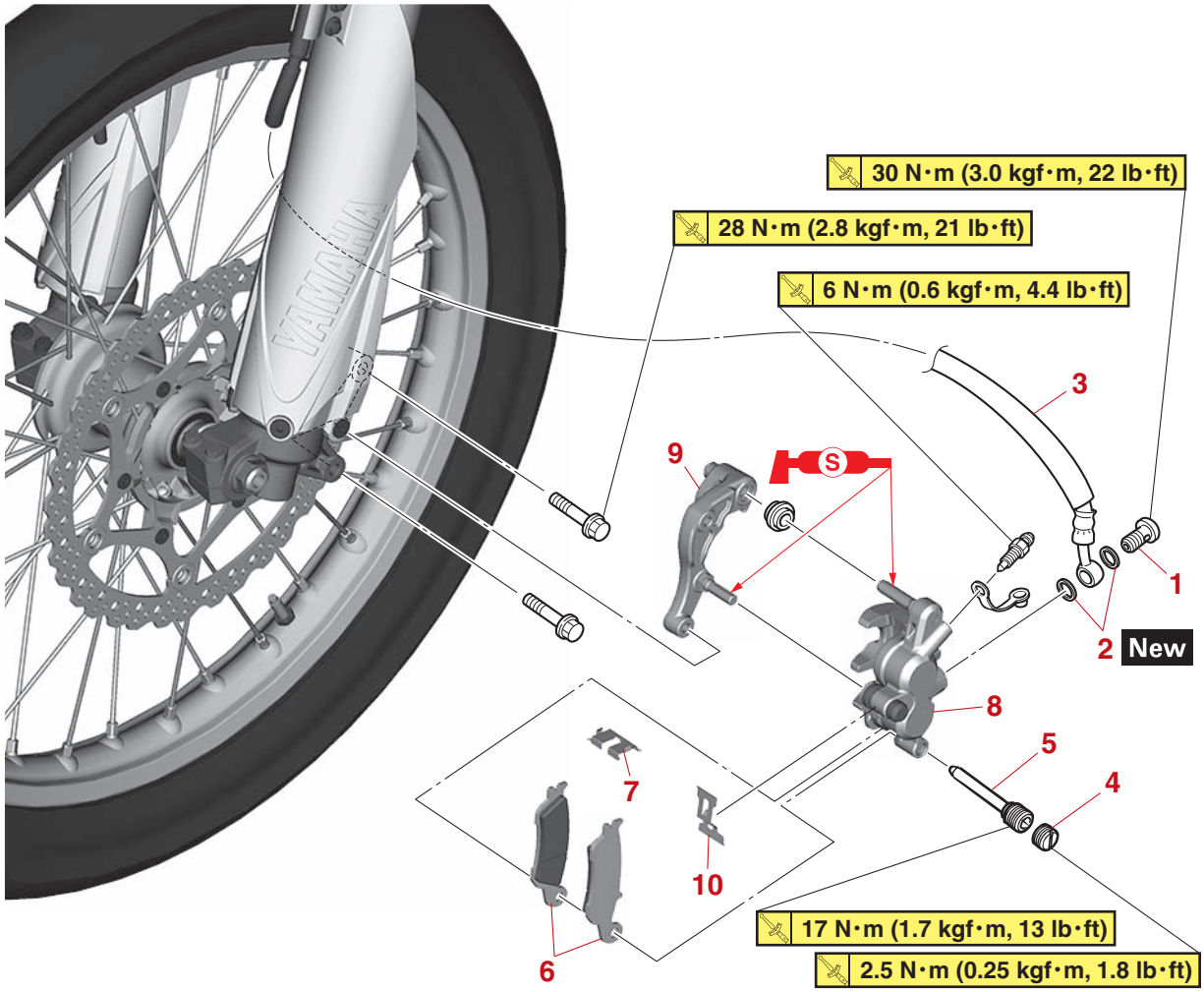
| | |
|---|---|
| | **Locknut**<br>**21 N·m (2.1 kgf·m, 15 lb·ft)** |



EAM20097

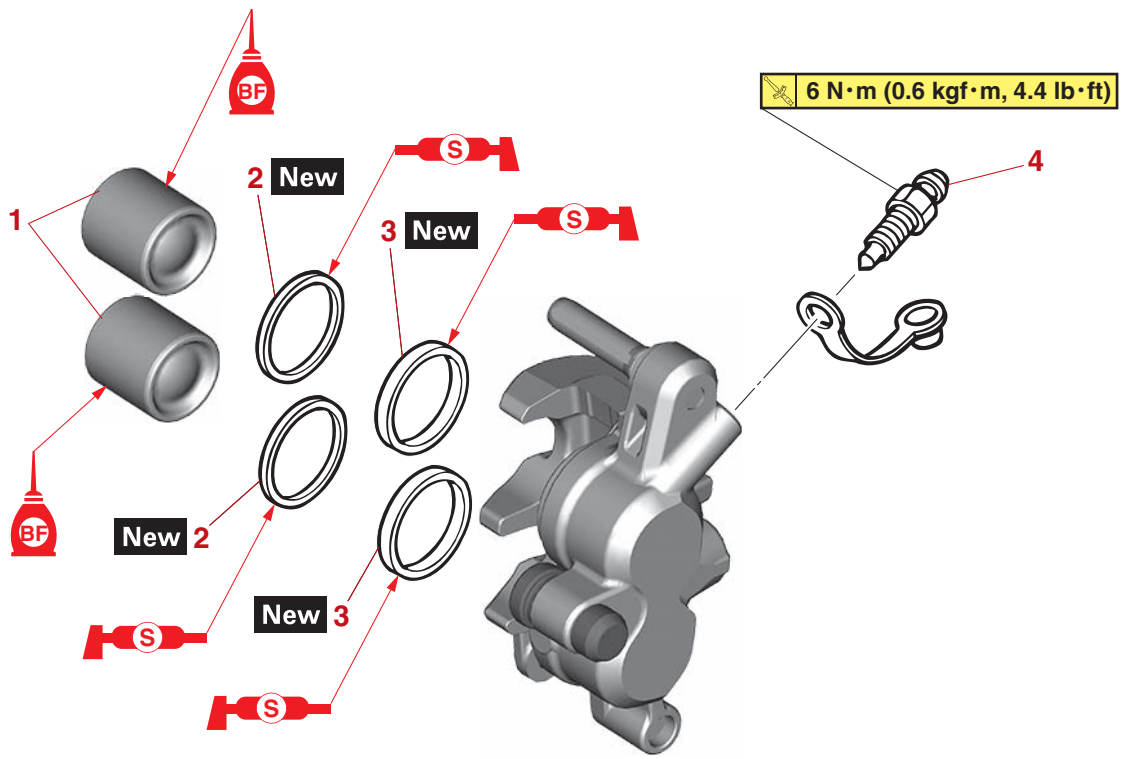
# FRONT BRAKE

## Removing the front brake caliper



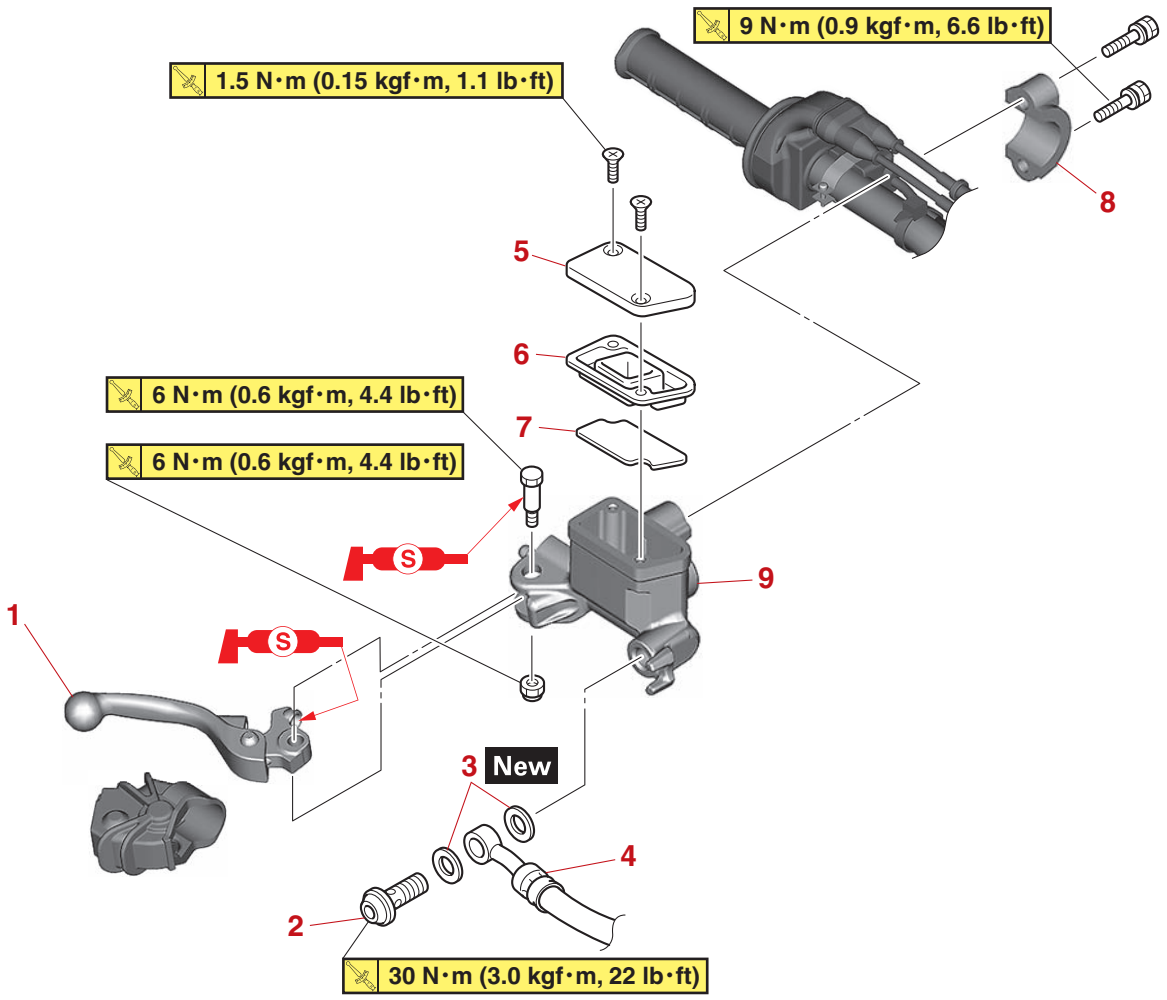

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Brake fluid | | Drain.<br>Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25. |
| 1 | Union bolt | 1 | |
| 2 | Copper washer | 2 | |
| 3 | Front brake hose | 1 | |
| 4 | Brake pad pin plug | 1 | |
| 5 | Brake pad pin | 1 | |
| 6 | Brake pad | 2 | |
| 7 | Brake pad spring | 1 | |
| 8 | Front brake caliper assembly | 1 | |
| 9 | Front brake caliper bracket | 1 | |
| 10 | Brake pad spring | 1 | |

**Disassembling the front brake caliper**



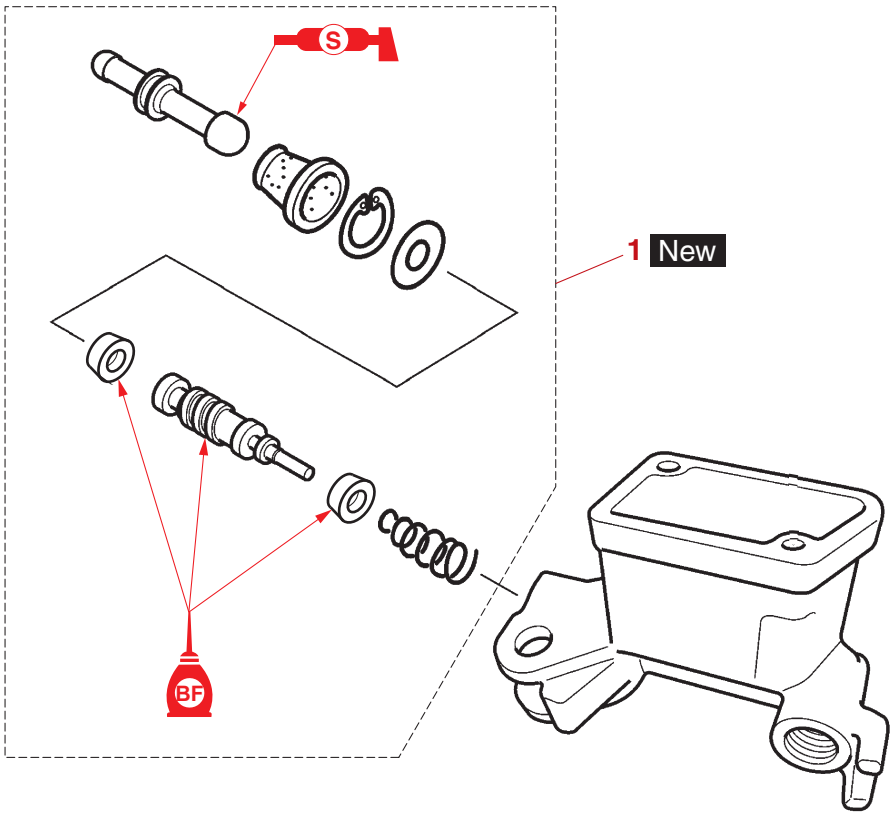

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 1 | Brake caliper piston | 2 | |
| 2 | Brake caliper piston dust seal | 2 | |
| 3 | Brake caliper piston seal | 2 | |
| 4 | Bleed screw | 1 | |

**Removing the front brake master cylinder**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Brake fluid | | Drain.<br>Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25. |
| 1 | Brake lever | 1 | |
| 2 | Union bolt | 1 | |
| 3 | Copper washer | 2 | |
| 4 | Front brake hose | 1 | |
| 5 | Brake master cylinder reservoir cap | 1 | |
| 6 | Brake master cylinder reservoir diaphragm | 1 | |
| 7 | Front brake master cylinder float | 1 | |
| 8 | Front brake master cylinder holder | 1 | |
| 9 | Front brake master cylinder | 1 | |

**Disassembling the front brake master cylinder**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 1 | Brake master cylinder kit | 1 | |

EAM30028
## INTRODUCTION
EWA19210
**⚠ WARNING**

**If you need to disassemble the disc brake components, observe the following precautions.**
- **Never disassemble the brake components unless absolutely necessary.**
- **If there is any problem with connections on the hydraulic brake system, perform the following jobs. Disassemble the brake system, drain the brake fluid, and clean it. After that, add a suitable amount of brake fluid. Then, bleed it after reassembly.**
- **Use only brake fluid for washing brake components.**
- **Use new brake fluid for cleaning the brake components.**
- **Immediately wipe off the spilled brake fluid to avoid damage to painted surfaces or plastic parts.**
- **Handle brake fluid with special care not to let it enter your eyes so that you may not lost your eyesight.**
- **FIRST AID FOR BRAKE FLUID ENTERING THE EYES:**
- **Flush with water for 15 minutes and get immediate medical attention.**

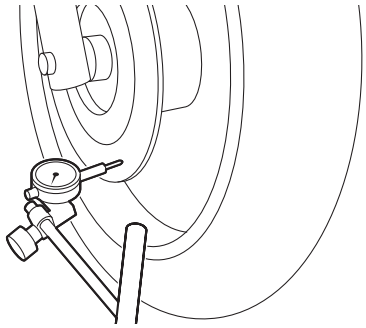
EAM30029
## CHECKING THE FRONT BRAKE DISC
1. Check:
   - Front brake disc
     Damage/galling → Replace.
2. Measure:
   - Brake disc thickness
     Measure the brake disc thickness at a few different locations.
     Out of specification → Replace.

**Brake disc thickness limit**
**2.5 mm (0.10 in)**

3. Measure:
   - Brake disc runout
     Out of specification → Replace the brake disc.

**Brake disc runout limit (as measured on wheel)**
**0.15 mm (0.0059 in)**

   a. Place the vehicle on a maintenance stand so that the front wheel is elevated.
   b. Remove the brake caliper.
   c. Hold the dial gauge at a right angle against the brake disc surface.
   d. Measure the runout 1.5 mm (0.06 in) above the brake disc edge.

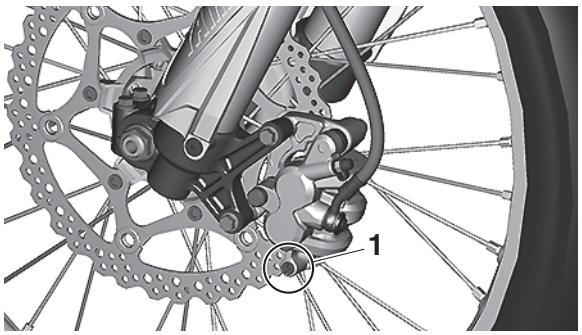


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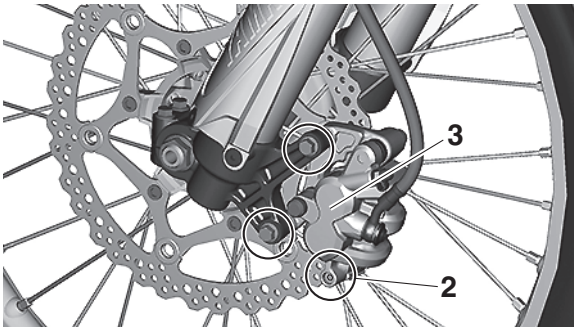
4. Replace:
   - Brake disc
     Refer to "ASSEMBLING THE FRONT WHEEL" on page 4-6.

EAM30519
## REPLACING THE FRONT BRAKE PADS
**TIP**
When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

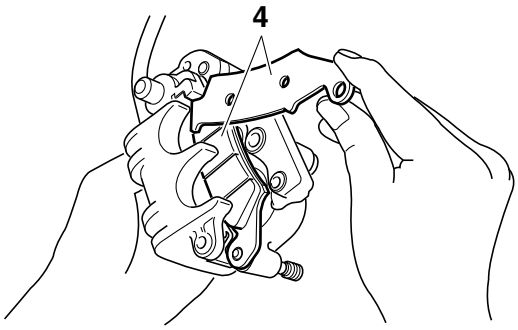
1. Remove:
   - Brake pad
     a. Remove the pad pin plug "1".




     b. Loosen the pad pin "2".
     c. Remove the brake caliper "3" from the front fork.

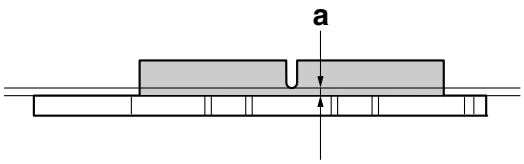


d. Remove the pad pin and brake pads “4”.

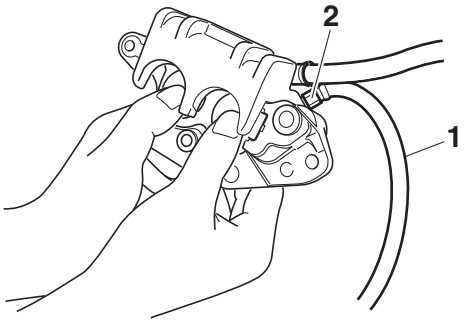



2. Measure:
   • Brake pad wear limit “a”
   Out of specification → Replace the brake pads as a set.

| | |
|---|---|
| | **Brake pad lining thickness limit**<br>**1.0 mm (0.04 in)** |




3. Install:
   • Brake pad
   a. Connect the plastic hose “1” to the bleed screw “2” and place a container under the end of the plastic hose.




   b. Loosen the bleed screw and push the brake caliper piston in.

EWA19160

**⚠ WARNING**

**Do not reuse the drained brake fluid.**

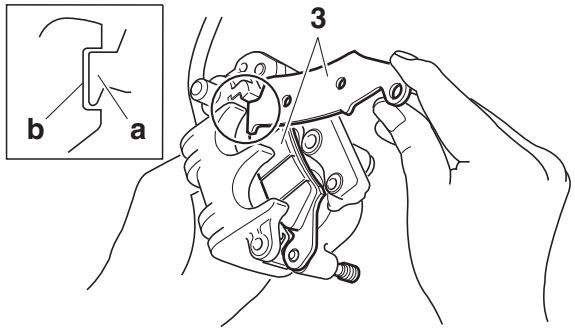
   c. Tighten the bleed screw.

| | |
|---|---|
| | **Bleed screw**<br>**6 N·m (0.6 kgf·m, 4.4 lb·ft)** |

   d. Install the brake pads “3” and the pad pin.

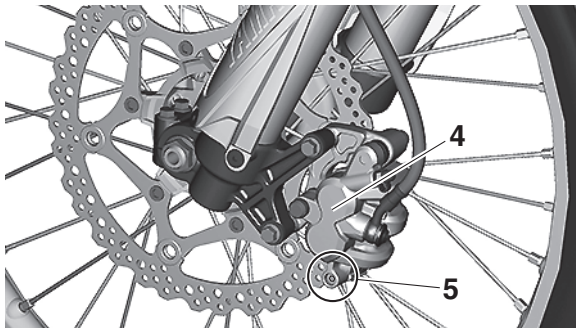
**TIP**

- Install the brake pads with their projections “a” into the brake caliper recesses “b”.
- Temporarily tighten the pad pin at this point.



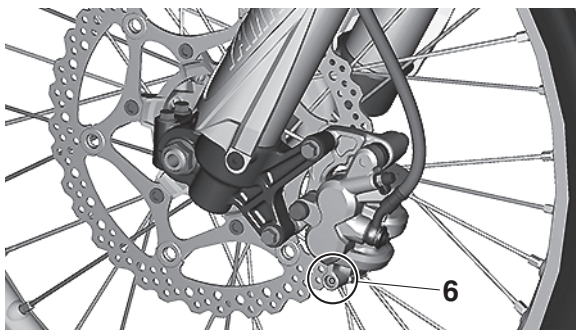

   e. Install the brake caliper “4” and tighten the pad pin “5”.

| | |
|---|---|
| | **Bolt (brake caliper)**<br>**28 N·m (2.8 kgf·m, 21 lb·ft)**<br>**Pad pin**<br>**17 N·m (1.7 kgf·m, 13 lb·ft)** |




   f. Install the pad pin plug “6”.

| | |
|---|---|
| | **Pad pin plug**<br>**2.5 N·m (0.25 kgf·m, 1.8 lb·ft)** |



4. Check:
   • Brake fluid level
   Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-23.
5. Check:
   • Brake lever operation
   A softy or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.

EAM30030
## REMOVING THE FRONT BRAKE CALIPER

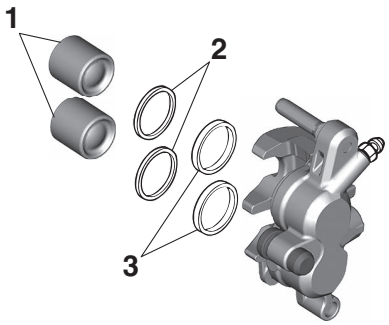
**TIP**
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.

1. Remove:
   • Union bolt
   • Copper washer
   • Brake hose

**TIP**
Put the end of the brake hose into a container and pump out the brake fluid.

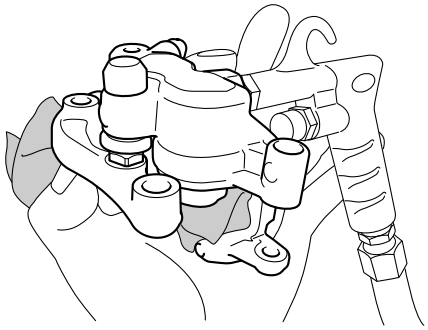
EAM30031
## DISASSEMBLING THE FRONT BRAKE CALIPER

1. Remove:
   • Brake caliper piston "1"
   • Brake caliper piston dust seal "2"
   • Brake caliper piston seal "3"




   a. Blow compressed air into the brake hose joint opening to force out the piston from the brake caliper.

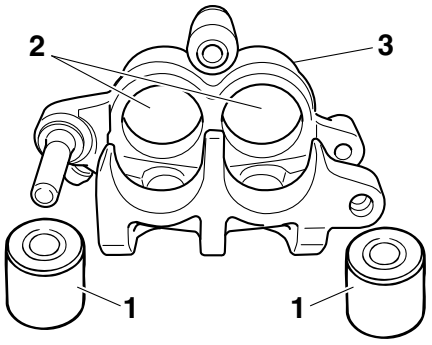
EWA13550
**⚠ WARNING**
- **Cover the brake caliper piston with a rag. Be careful not to get injured when the piston is expelled from the brake caliper.**
- **Never try to pry out the brake caliper piston.**



   b. Remove the brake caliper piston dust seal and the brake caliper piston seal.

EAM30032
## CHECKING THE FRONT BRAKE CALIPER

1. Check:
   • Brake caliper piston "1"
   Rust/scratches/wear → Replace the brake caliper piston.
   • Brake caliper cylinder "2"
   Scratches/wear → Replace the brake caliper assembly.
   • Brake caliper body "3"
   Cracks/damage → Replace the brake caliper assembly.
   • Brake fluid delivery passages (brake caliper body)
   Obstruction → Blow out with compressed air.




EWA19220
**⚠ WARNING**
**When the brake caliper is disassembled, replace the brake caliper piston seal and the brake caliper piston dust seal with new ones.**

2. Check:
   • Brake caliper bracket
   Crack/damage → Replace.

EAM30033
## ASSEMBLING THE FRONT BRAKE CALIPER

EWA19230
**⚠ WARNING**
- **Before installation, clean and lubricate the internal parts. Use new brake fluid for**

**cleaning and lubricating.**
- **Never use solvents on internal brake components as they will cause the piston seals to swell and distort.**
- **When the brake caliper is disassembled, replace the brake caliper piston seal and the brake caliper piston dust seal with new ones.**

| | |
|---|---|
| | **Specified brake fluid**<br>**DOT 4** |

EAM30035
### INSTALLING THE FRONT BRAKE CALIPER

1. Install:
   - Front brake caliper bracket
   - Front brake caliper (temporarily)
   - Copper washer New
   - Brake hose
   - Union bolt

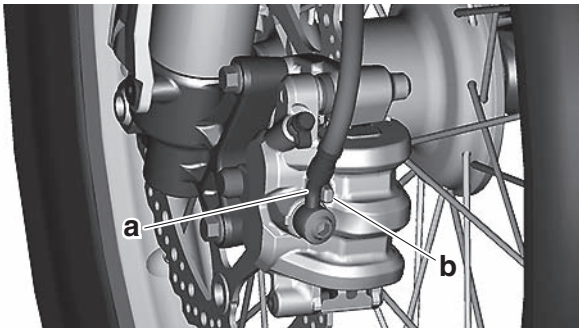
| | |
|---|---|
| | **Front brake caliper bolt**<br>**28 N·m (2.8 kgf·m, 21 lb·ft)**<br>**Brake hose union bolt**<br>**30 N·m (3.0 kgf·m, 22 lb·ft)** |

EWA13531
**WARNING**

**Proper brake hose routing is essential to insure safe vehicle operation.**

ECA24460
***NOTICE***

**Make sure that the pipe portion "a" of the brake hose touches the projection "b" on the brake caliper.**




2. Install:
   - Front brake caliper
   - Brake pad spring
   - Brake pad
   - Brake pad pin
   - Brake hose holder

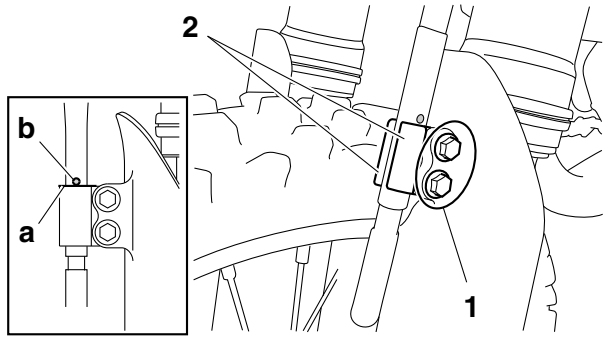
| | |
|---|---|
| | **Brake pad pin**<br>**17 N·m (1.7 kgf·m, 13 lb·ft)** |

   Refer to "CHECKING THE FRONT BRAKE PADS" on page 3-24.
3. Tighten:
   - Brake hose holder bolt "1"

| | |
|---|---|
| | **Brake hose holder bolt**<br>**9 N·m (0.9 kgf·m, 6.6 lb·ft)** |

**TIP**

Make sure that the brake hose holder "2" is installed with its upper end "a" aligned with the paint "b" on the brake hose.




4. Pour brake fluid to the brake master cylinder reservoir up to the specified level.

| | |
|---|---|
| | **Specified brake fluid**<br>**DOT 4** |

EWA13090
**WARNING**

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

ECA13540
***NOTICE***

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

5. Bleed:
   - Brake system

Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.

6. Check:
   • Brake fluid level
   The minimum level mark or below → Add.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-23.
7. Check:
   • Brake lever operation
   A softy or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.

EAM30036

## REMOVING THE FRONT BRAKE MASTER CYLINDER

**TIP**

Before removing the front brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:
   • Union bolt
   • Copper washer
   • Brake hose

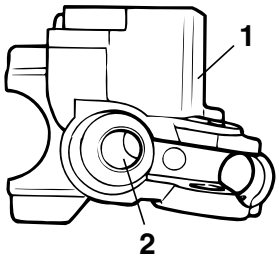
**TIP**

To drain any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

EAM30037

## CHECKING THE FRONT BRAKE MASTER CYLINDER

1. Check:
   • Brake master cylinder "1"
   Damage/scratches/wear → Replace the brake master cylinder assembly.
   • Brake fluid delivery passages "2"
   (brake master cylinder body)
   Obstruction → Blow out with compressed air.




2. Check:
   • Brake master cylinder reservoir cap
   Damage/scratches/wear → Replace.
3. Check:
   • Brake hose
   Cracks/damage/wear → Replace.

EAM30038

## ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

EWA13520

**⚠ WARNING**

**• Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
**• Never use solvents on internal brake components.**

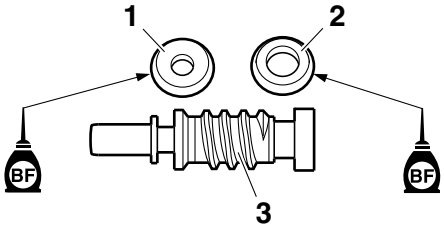
| | |
|---|---|
| | **Specified brake fluid**<br>**DOT 4** |

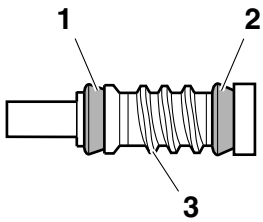
1. Wash the brake master cylinder with brake fluid.
2. Install:
   • Primary cylinder cup "1"
   • Secondary cylinder cup "2"
   (to the brake master cylinder piston "3")

EWA20240

**⚠ WARNING**

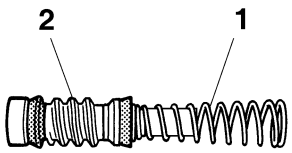
**Apply brake fluid to the cylinder cups and install them as shown. Wrong orientation in installation causes poor braking performance.**



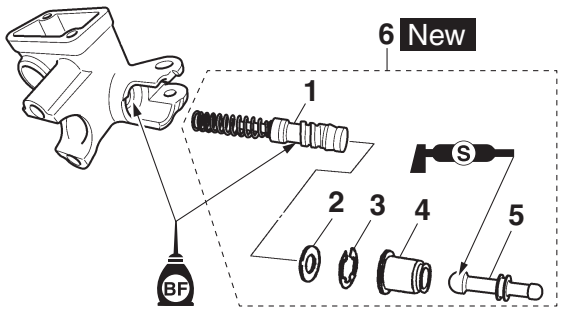

3. Install:
   • Spring "1"
   (to the brake master cylinder piston "2")

**TIP**
Install the spring with a smaller inside diameter to the brake master cylinder piston.




4. Install:
   - Brake master cylinder piston assembly "1"
   - Washer "2"
   - Circlip "3"
   - Dust boot "4"
   - Push rod "5"

**TIP**
- Always install new brake master cylinder kit "6".
- Before installation, apply brake fluid to the components of the brake master cylinder piston assembly.
- Before installation, apply silicone grease to the push rod end.
- Before installation, apply brake fluid to the inside of the brake master cylinder.

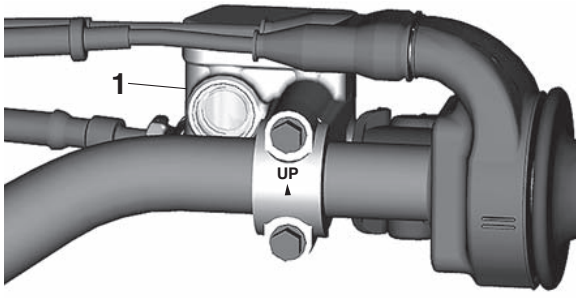



EAM30039
## INSTALLING THE FRONT BRAKE MASTER CYLINDER

1. Install:
   - Brake master cylinder "1"

| | |
|---|---|
| | **Brake master cylinder holder bolt**<br>**9 N·m (0.9 kgf·m, 6.6 lb·ft)** |

**TIP**
- Install the front brake master cylinder holder with the "UP" mark facing up.
- First, tighten the upper bolt, then the lower bolt.



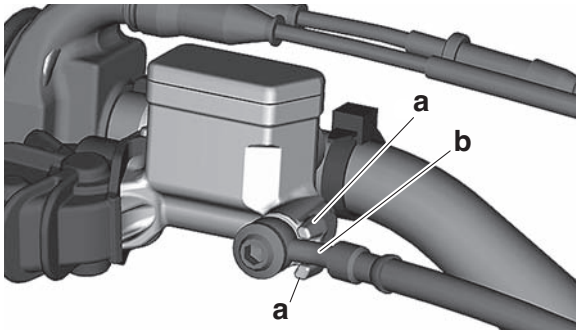

2. Install:
   - Copper washer New
   - Brake hose
   - Union bolt

| | |
|---|---|
| | **Brake hose union bolt**<br>**30 N·m (3.0 kgf·m, 22 lb·ft)** |

EWA13531
**WARNING**
**Proper brake hose routing is essential to insure safe vehicle operation.**

ECA24470
***NOTICE***
**During installation, bring the brake hose into contact with the brake master cylinder projection "a" and make its bent portion "b" face downward.**

**TIP**
Turn the handlebar toward right and left to make sure that the brake hose does not touch other parts (e.g., wire harness, cables, leads). Adjust if necessary.




3. Pour brake fluid to the brake master cylinder reservoir up to the specified level.

| | |
|---|---|
| | **Specified brake fluid**<br>**DOT 4** |

EWA13090

**WARNING**

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

ECA13540

***NOTICE***

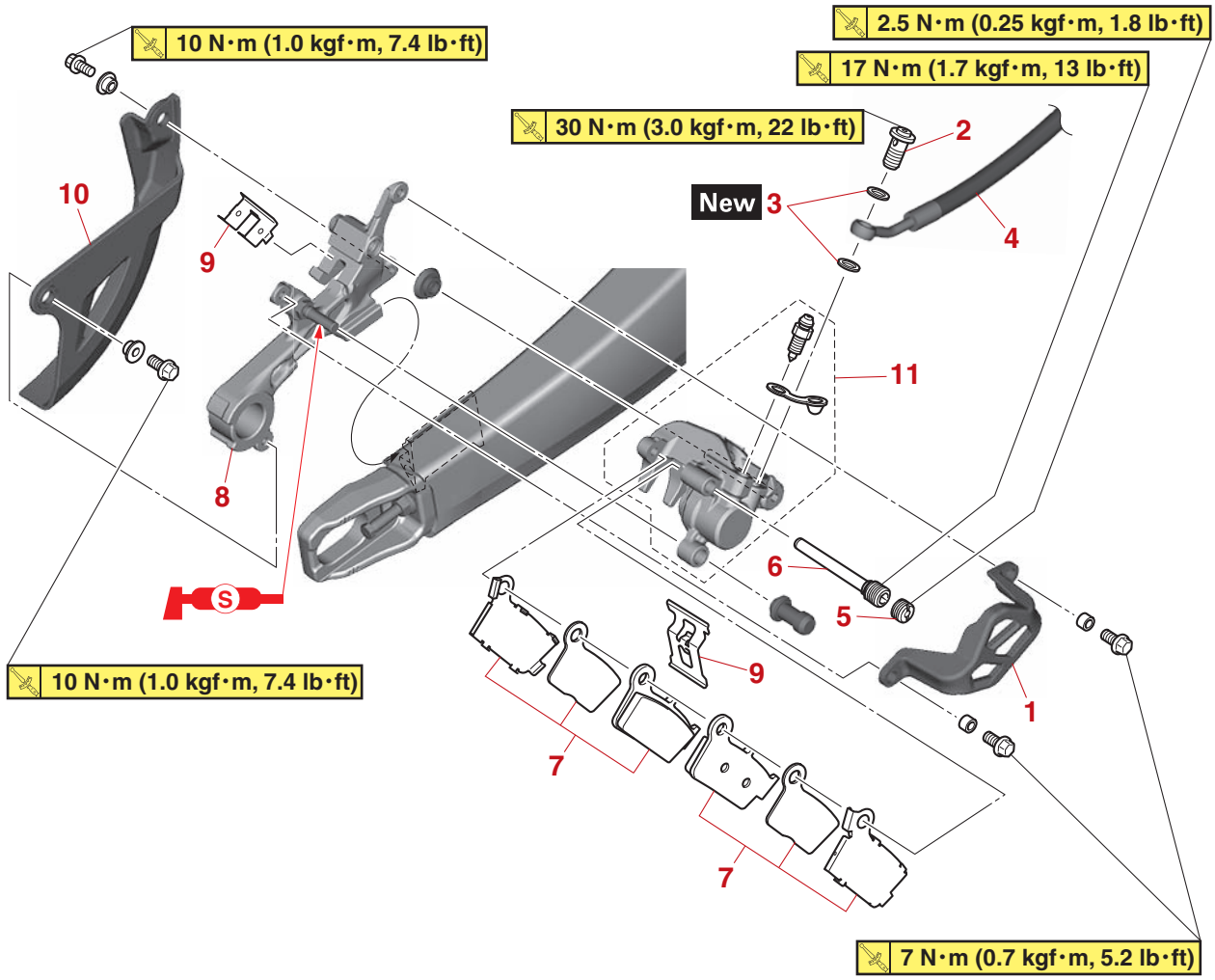
**Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**

4. Bleed:
   - Brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.
5. Check:
   - Brake fluid level
     The minimum level mark or below → Add.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-23.
6. Check:
   - Brake lever operation
     A softy or spongy feeling → Bleed the brake system.
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.

EAM20098

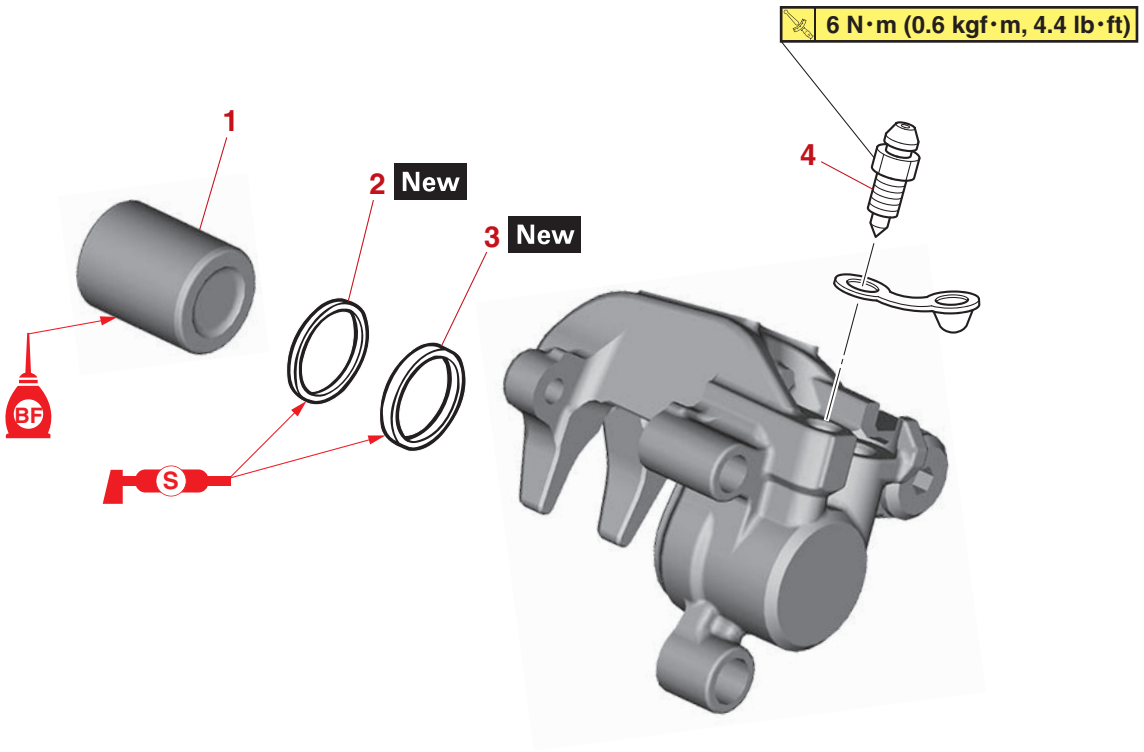
# REAR BRAKE

**Removing the rear brake caliper**



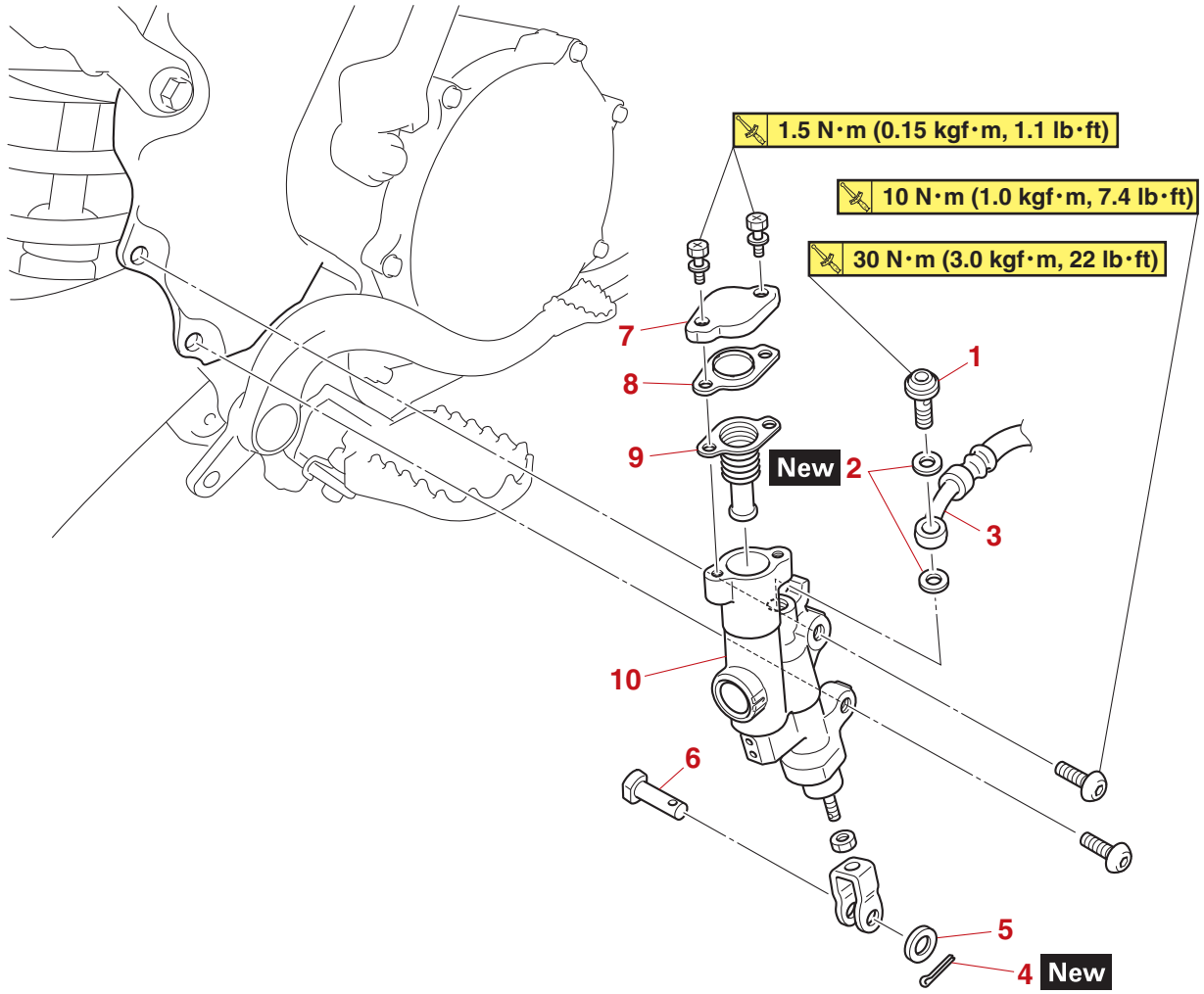

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Brake fluid | | Drain.<br>Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25. |
| 1 | Protector | 1 | |
| 2 | Union bolt | 1 | |
| 3 | Copper washer | 2 | |
| 4 | Rear brake hose | 1 | |
| 5 | Brake pad pin plug | 1 | |
| 6 | Brake pad pin | 1 | |
| 7 | Rear brake pad assembly | 2 | |
| 8 | Rear brake caliper bracket | 1 | |
| 9 | Brake pad spring | 2 | |
| 10 | Rear brake disc cover | 1 | |
| 11 | Rear brake caliper assembly | 1 | |

**Disassembling the rear brake caliper**



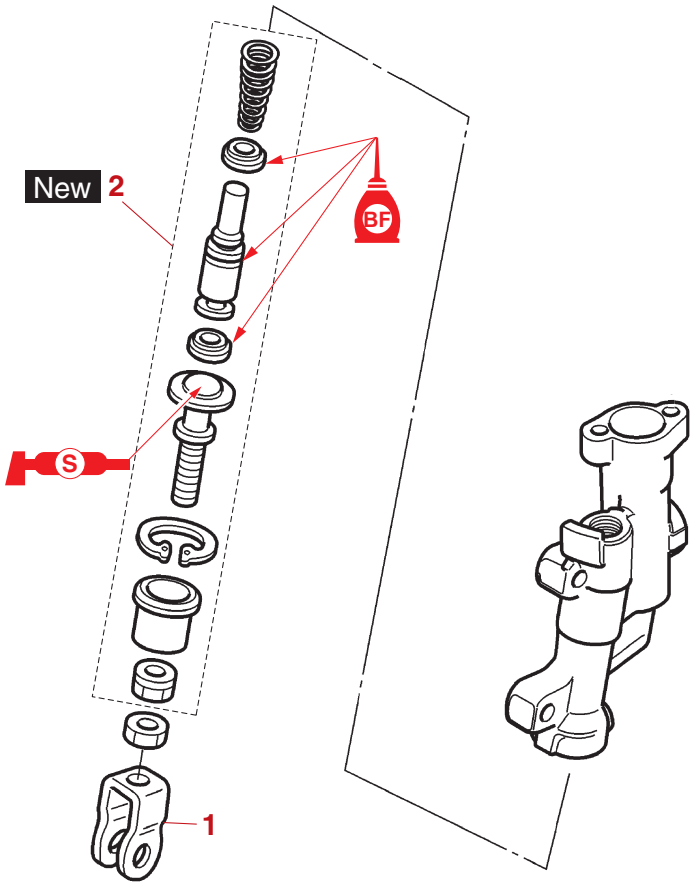

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 1 | Brake caliper piston | 1 | |
| 2 | Brake caliper piston dust seal | 1 | |
| 3 | Brake caliper piston seal | 1 | |
| 4 | Bleed screw | 1 | |

**Removing the rear brake master cylinder**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Brake fluid | | Drain.<br>Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25. |
| 1 | Union bolt | 1 | |
| 2 | Copper washer | 2 | |
| 3 | Brake hose | 1 | |
| 4 | Split pin | 1 | |
| 5 | Washer | 1 | |
| 6 | Pin | 1 | |
| 7 | Brake master cylinder reservoir cap | 1 | |
| 8 | Brake master cylinder reservoir diaphragm plate | 1 | |
| 9 | Brake master cylinder reservoir diaphragm | 1 | |
| 10 | Rear brake master cylinder | 1 | |

**Disassembling the rear brake master cylinder**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 1 | Brake master cylinder joint | 1 | |
| 2 | Brake master cylinder kit | 1 | |

EAM30040
## INTRODUCTION
EWA19260
**WARNING**

**If you need to disassemble the disc brake components, observe the following precautions.**
- **Never disassemble the brake components unless absolutely necessary.**
- **If there is any problem with connections on the hydraulic brake system, perform the following jobs. Disassemble the brake system, drain the brake fluid, and clean it. After that, add a suitable amount of brake fluid. Then, bleed it after reassembly.**
- **Use only brake fluid for washing internal brake components.**
- **Use new brake fluid for cleaning the brake components.**
- **Immediately wipe off the spilled brake fluid to avoid damage to painted surfaces or plastic parts.**
- **Handle brake fluid with special care not to let it enter your eyes so that you may not lost your eyesight.**
- **FIRST AID FOR BRAKE FLUID ENTERING THE EYES:**
- **Flush with water for 15 minutes and get immediate medical attention.**

EAM30041
## CHECKING THE REAR BRAKE DISC
1. Check:
   - Brake disc
     Damage/galling → Replace.
2. Measure:
   - Brake disc thickness
     Measure the brake disc thickness at a few different locations.
     Out of specification → Replace.
     Refer to "CHECKING THE FRONT BRAKE DISC" on page 4-17.

**Brake disc thickness limit**
**3.5 mm (0.14 in)**

3. Measure:
   - Brake disc runout
     Out of specification → Replace the brake disc.
     Refer to "CHECKING THE FRONT BRAKE DISC" on page 4-17.

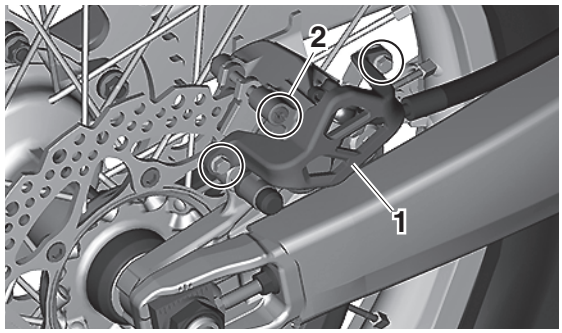
**Brake disc runout limit (as measured on wheel)**
**0.15 mm (0.0059 in)**

4. Replace:
   - Brake disc
     Refer to "ASSEMBLING THE REAR WHEEL" on page 4-11.

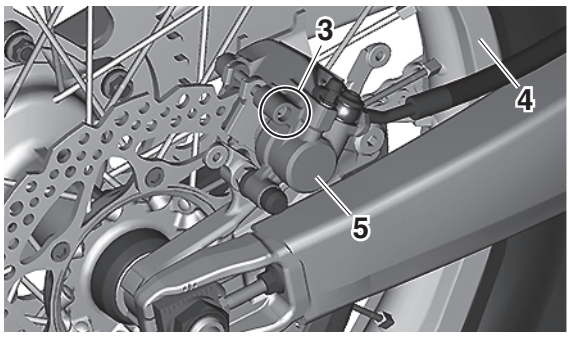
EAM30523
## REPLACING THE REAR BRAKE PADS
**TIP**

When replacing the brake pads, it is not necessary to disconnect the brake hose or disassemble the brake caliper.

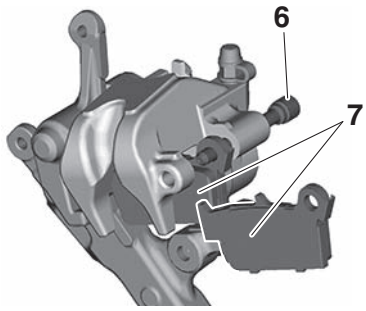
1. Remove:
   - Brake pad
     a. Remove the protector "1" and the pad pin plug "2".




     b. Loosen the pad pin "3".
     c. Remove the rear wheel "4" and the brake caliper "5".
        Refer to "REAR WHEEL" on page 4-9.

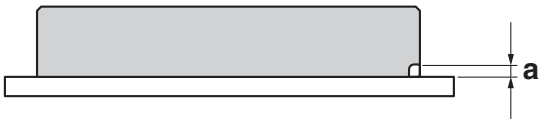



     d. Remove the pad pin "6" and the brake pads "7".

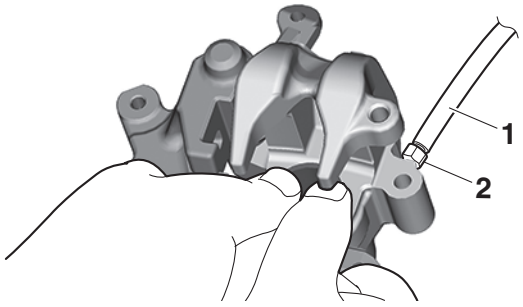



2. Measure:
   • Brake pad wear limit “a”
   Out of specification → Replace the brake pads as a set.

| | |
|---|---|
| | **Brake pad lining thickness limit**<br>**1.0 mm (0.04 in)** |




3. Install:
   • Brake pad
   a. Connect the plastic hose “1” to the bleed screw “2” and place a container under the end of the plastic hose.




   b. Loosen the bleed screw and push the brake caliper piston in.

EWA19170

**⚠ WARNING**

**Do not reuse the drained brake fluid.**

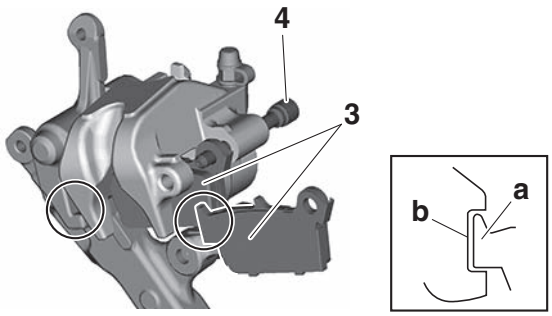
   c. Tighten the bleed screw.

| | |
|---|---|
| | **Bleed screw**<br>**6 N·m (0.6 kgf·m, 4.4 lb·ft)** |

   d. Install the brake pads “3” and the pad pin “4”.

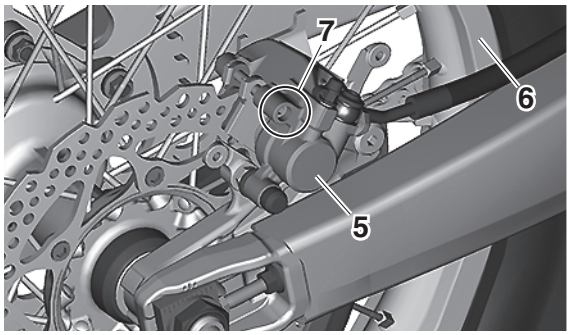
**TIP**

• Install the brake pads with their projections “a” into the brake caliper recesses “b”.
• Temporarily tighten the pad pin at this point.



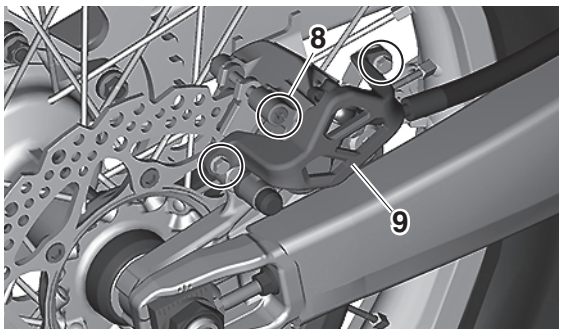

   e. Install the brake caliper “5” and the rear wheel “6”.
   Refer to “REAR WHEEL” on page 4-9.
   f. Tighten the pad pin “7”.

| | |
|---|---|
| | **Pad pin**<br>**17 N·m (1.7 kgf·m, 13 lb·ft)** |




   g. Install the pad pin plug “8” and the protector “9”.

| | |
|---|---|
| | **Pad pin plug**<br>**2.5 N·m (0.25 kgf·m, 1.8 lb·ft)**<br>**Bolt (protector)**<br>**7 N·m (0.7 kgf·m, 5.2 lb·ft)** |




4. Check:
   • Brake fluid level
   Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-23.
5. Check:
   • Brake pedal operation
   A softy or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.

EAM30042
## REMOVING THE REAR BRAKE CALIPER

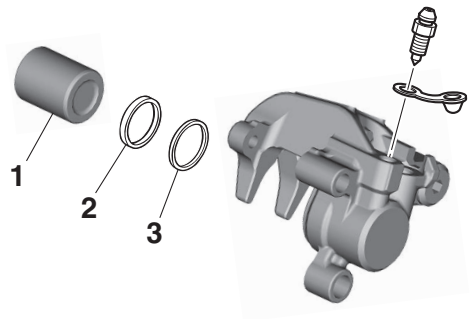
**TIP**
Before disassembling the brake caliper, drain the brake fluid from the entire brake system.

1. Remove:
   • Union bolt
   • Copper washer
   • Brake hose

**TIP**
Put the end of the brake hose into a container and pump out the brake fluid.

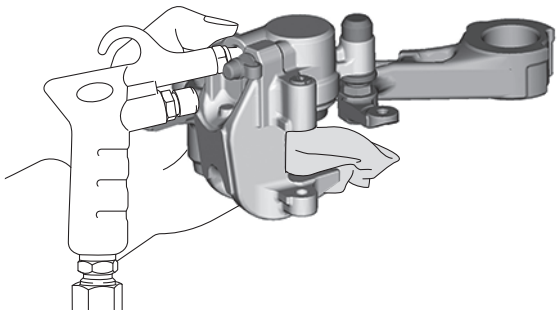
EAM30043
## DISASSEMBLING THE REAR BRAKE CALIPER

1. Remove:
   • Brake caliper piston "1"
   • Brake caliper piston dust seal "2"
   • Brake caliper piston seal "3"




a. Blow compressed air into the brake hose joint opening to force out the piston from the brake caliper.

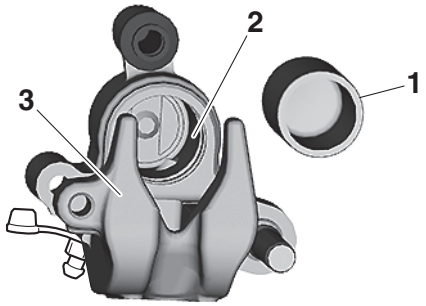
EWA13550
**WARNING**
- **Cover the brake caliper piston with a rag. Be careful not to get injured when the piston is expelled from the brake caliper.**
- **Never try to pry out the brake caliper piston.**



b. Remove the brake caliper piston dust seal and the brake caliper piston seal.

EAM30044
## CHECKING THE REAR BRAKE CALIPER

1. Check:
   • Brake caliper piston "1"
   Rust/scratches/wear → Replace the brake caliper piston.
   • Brake caliper cylinder "2"
   Scratches/wear → Replace the brake caliper assembly.
   • Brake caliper body "3"
   Cracks/damage → Replace the brake caliper assembly.
   • Brake fluid delivery passages (brake caliper body)
   Obstruction → Blow out with compressed air.




EWA19270
**WARNING**
**When the brake caliper is disassembled, replace the brake caliper piston seal and the brake caliper piston dust seal with new ones.**

2. Check:
   • Brake caliper bracket
   Crack/damage → Replace.

EAM30045
## ASSEMBLING THE REAR BRAKE CALIPER

EWA19280
**WARNING**

**• Before installation, clean and lubricate the internal parts. Use new brake fluid for cleaning and lubricating.**
**• Never use solvents on internal brake components as they will cause the piston seals to swell and distort.**
**• When the brake caliper is disassembled, replace the brake caliper piston seal and the brake caliper piston dust seal with new ones.**

**Specified brake fluid**
**DOT 4**

EAM30047
## INSTALLING THE REAR BRAKE CALIPER

1. Install:
   • Rear brake caliper
   • Rear brake caliper bracket
2. Install:
   • Rear wheel
   Refer to "REAR WHEEL" on page 4-9.
   • Copper washer New
   • Brake hose
   • Union bolt

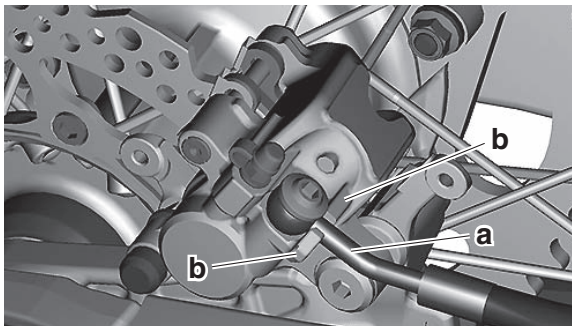
**Brake hose union bolt**
**30 N·m (3.0 kgf·m, 22 lb·ft)**

EWA13531
**WARNING**

**Proper brake hose routing is essential to insure safe vehicle operation.**

ECA24490
***NOTICE***

**Make sure that a bend in its pipe portion "a" is directed as shown and the brake hose touches the projection "b" on the brake caliper.**




3. Install:
   • Brake pad spring
   • Brake pad
   • Brake pad pin
   • Brake pad pin plug

**Brake pad pin**
**17 N·m (1.7 kgf·m, 13 lb·ft)**
**Brake pad pin plug**
**2.5 N·m (0.25 kgf·m, 1.8 lb·ft)**

Refer to "CHECKING THE REAR BRAKE PADS" on page 3-24.
4. Pour brake fluid to the brake fluid reservoir up to the specified level.

**Specified brake fluid**
**DOT 4**

EWA13090
**WARNING**

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

ECA13540
***NOTICE***

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

5. Bleed:
   • Brake system
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.

6. Check:
   • Brake fluid level
   The minimum level mark or below → Add.
   Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-23.
7. Check:
   • Brake pedal operation
   A softy or spongy feeling → Bleed the brake system.
   Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.

EAM30048
## REMOVING THE REAR BRAKE MASTER CYLINDER

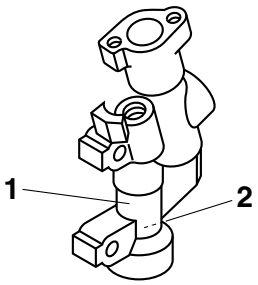
**TIP**
Before removing the rear brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:
   • Union bolt
   • Copper washer
   • Brake hose

**TIP**
To drain any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.

EAM30049
## CHECKING THE REAR BRAKE MASTER CYLINDER

1. Check:
   • Brake master cylinder "1"
   Damage/scratches/wear → Replace.
   • Brake fluid delivery passages "2"
   (brake master cylinder body)
   Obstruction → Blow out with compressed air.




2. Check:
   • Master cylinder reservoir cap
   Crack/damage → Replace.
   • Brake master cylinder reservoir diaphragm holder
   • Brake master cylinder reservoir diaphragm
   Crack/damage → Replace.
3. Check:
   • Brake hose
   Cracks/damage/wear → Replace.

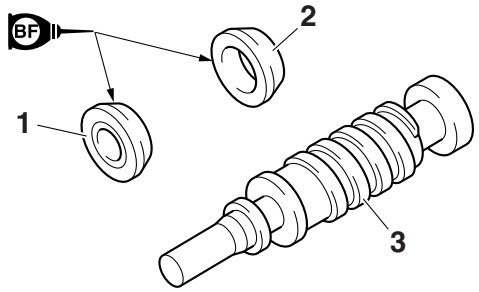
EAM30050
## ASSEMBLING THE REAR BRAKE MASTER CYLINDER

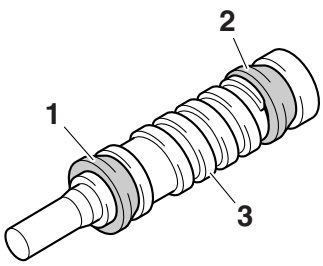
EWA13520
**⚠ WARNING**
- **Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.**
- **Never use solvents on internal brake components.**

**Specified brake fluid**
**DOT 4**

1. Wash the brake master cylinder with brake fluid.
2. Install:
   • Primary cylinder cup "1"
   • Secondary cylinder cup "2"
   (to the brake master cylinder piston "3")

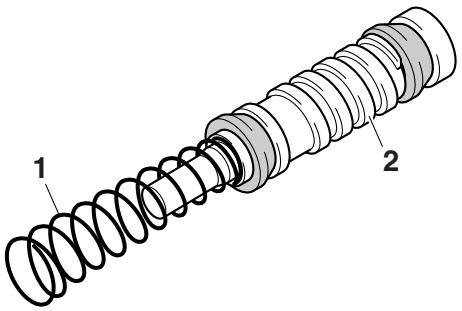
EWA19300
**⚠ WARNING**
**Apply brake fluid to the cylinder cups and install them as shown. Wrong orientation in installation causes poor braking performance.**



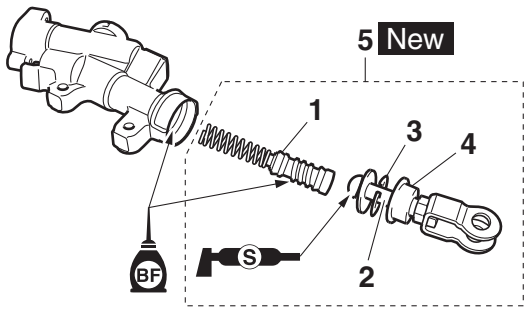

3. Install:
   • Spring "1"
   (to the brake master cylinder piston "2")

**TIP**
Install the spring with a smaller inside diameter to the brake master cylinder piston.




4. Install:
   - Brake master cylinder piston assembly "1"
   - Push rod "2"
   - Circlip "3"
   - Dust boot "4"

**TIP**
- Always install new brake master cylinder kit "5".
- Before installation, apply brake fluid to the brake master cylinder piston assembly.
- Before installation, apply silicone grease to the push rod end.
- Before installation, apply brake fluid to the inside of the brake master cylinder.



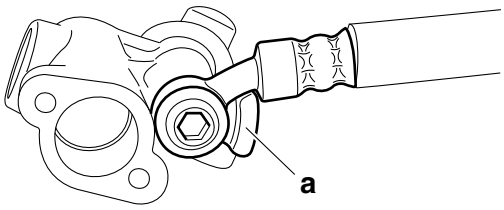

EAM30051
**INSTALLING THE REAR BRAKE MASTER CYLINDER**

1. Install:
   - Copper washer New
   - Brake hose
   - Union bolt

| | |
|---|---|
| | **Brake hose union bolt 30 N·m (3.0 kgf·m, 22 lb·ft)** |

EWA13531
**WARNING**
**Proper brake hose routing is essential to insure safe vehicle operation.**

ECA24500
***NOTICE***
**Make sure that the pipe portion of the brake hose touches the projection "a" on the brake caliper.**




2. Pour brake fluid to the brake fluid reservoir up to the specified level.

| | |
|---|---|
| | **Specified brake fluid DOT 4** |

EWA13090
**WARNING**
- **Use only the designated brake fluid. Other brake fluids may cause the rubber seals to deteriorate, causing leakage and poor brake performance.**
- **Refill with the same type of brake fluid that is already in the system. Mixing brake fluids may result in a harmful chemical reaction, leading to poor brake performance.**
- **When refilling, be careful that water does not enter the brake fluid reservoir. Water will significantly lower the boiling point of the brake fluid and could cause vapor lock.**

ECA24510
***NOTICE***
**Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.**

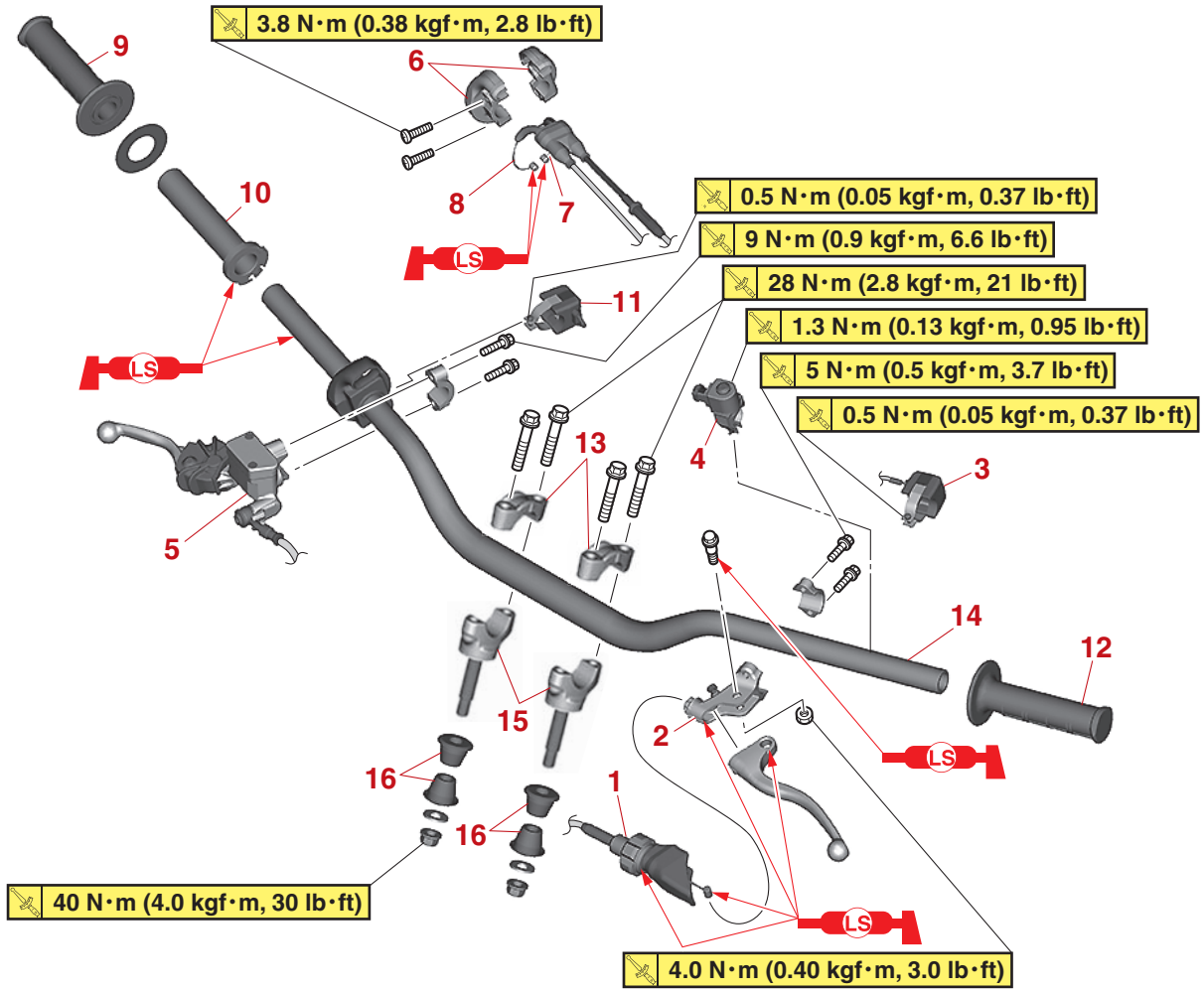
3. Bleed:
   - Brake system
     Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM" on page 3-25.
4. Check:
   - Brake fluid level
     The minimum level mark or below → Add.
     Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-23.
5. Check:
   - Brake pedal operation
     A softy or spongy feeling → Bleed the brake

system.
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM” on page 3-25.

EAM20099

# HANDLEBAR

**Removing the handlebar**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Number plate | | Refer to "GENERAL CHASSIS" on page 4-1. |
| 1 | Clutch cable | 1 | Disconnect. |
| 2 | Clutch lever holder | 1 | |
| 3 | Engine stop switch | 1 | |
| 4 | Mode switch | 1 | |
| 5 | Brake master cylinder | 1 | |
| 6 | Throttle cable cap | 1 | |
| 7 | Throttle cable (pull) | 1 | Disconnect. |
| 8 | Throttle cable (return) | 1 | Disconnect. |
| 9 | Right grip | 1 | |
| 10 | Tube guide | 1 | |
| 11 | Start switch | 1 | |
| 12 | Left grip | 1 | |
| 13 | Upper handlebar holder | 2 | |
| 14 | Handlebar | 1 | |
| 15 | Lower handlebar holder | 2 | |
| 16 | Damper | 4 | |

EAM30052
## REMOVING THE HANDLEBAR

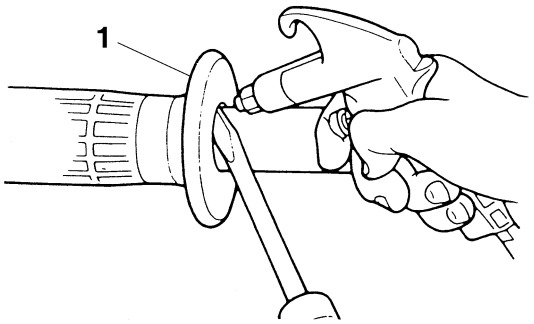
1. Stand the vehicle upright on a level surface.

EWA13120
**⚠ WARNING**

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

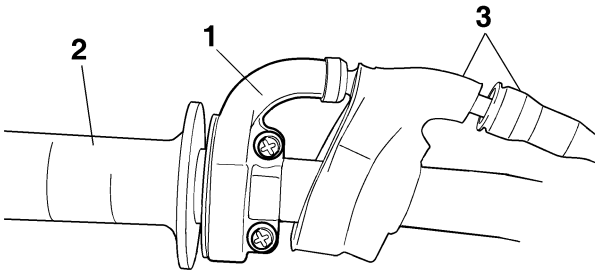
2. Remove:
   • Grip “1”

**TIP**
Blow in compressed air between the handlebar or tube guide and the grip. Then remove the grip which has become loose.




3. Remove:
   • Throttle cable housing “1”
   • Throttle grip “2”

**TIP**
While removing the throttle cable housing, pull back the rubber cover “3”.




EAM30053
## CHECKING THE HANDLEBAR

1. Check:
   • Handlebar
   Bends/cracks/damage → Replace.

EWA13690
**⚠ WARNING**

**Do not attempt to straighten a bent handlebar as this may dangerously weaken it.**

EAM30054
## INSTALLING THE HANDLEBAR

1. Stand the vehicle upright on a level surface.

EWA13120
**⚠ WARNING**

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

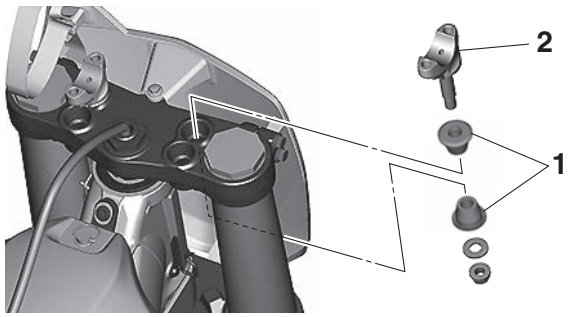
2. Install:
   • Damper “1”
   • Lower handlebar holder “2” (temporarily)
   • Handlebar “3”
   • Upper handlebar holder “4”

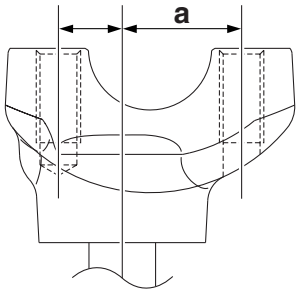
| | |
|---|---|
|  | **Upper handlebar holder bolt 28 N·m (2.8 kgf·m, 21 lb·ft)** |

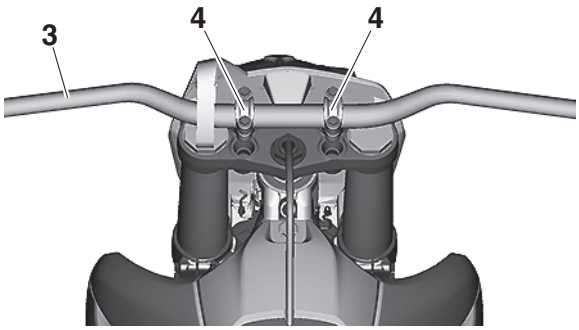
**TIP**
- Install the lower handlebar holders with the side having the longer distance “a” from the mounting bolt center facing towards the rear side of the vehicle.
- Installing the lower handlebar holders in the reverse direction allow the front-to-rear offset amount of the handlebar position to be changed.
- The upper handlebar holders should be installed with the punch marks “b” facing forward.
- When installing the handlebar, make sure that right and left marks “c” are in place identically on both sides.
- Install the handlebar so that the projection “d” of the upper handlebar holders is positioned at the mark on the handlebar as shown.

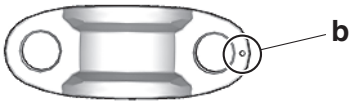
ECA14250
***NOTICE***

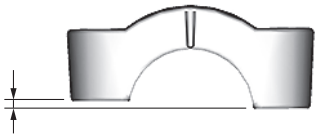
- **First, tighten the bolts on the front side of the handlebar holder, and then on the rear side.**
- **Turn the handlebar all the way to the left and right. If there is any contact with the fuel tank, adjust the handlebar position.**

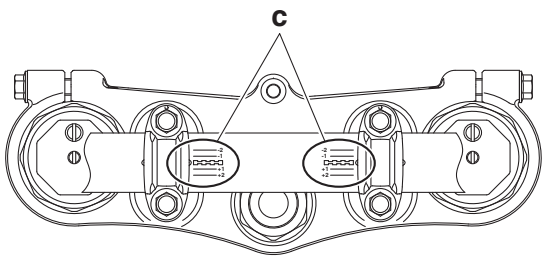


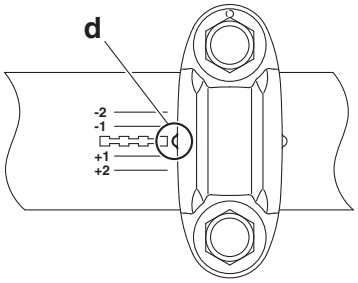





3. Tighten:
   - Lower handlebar holder nut

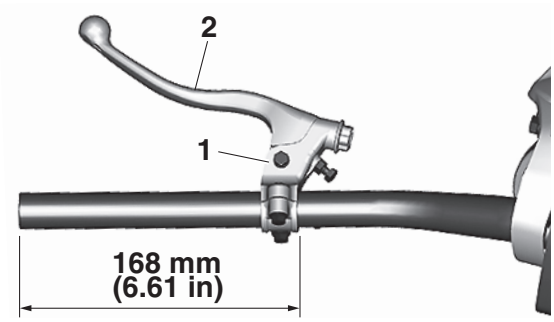
| | |
|---|---|
| | **Lower handlebar holder nut**<br>**40 N·m (4.0 kgf·m, 30 lb·ft)** |

4. Install:
   - Clutch lever holder “1”
   - Clutch lever “2”

| | |
|---|---|
| | **Clutch lever holder bolt**<br>**5 N·m (0.5 kgf·m, 3.7 lb·ft)**<br>**Clutch lever nut**<br>**4.0 N·m (0.40 kgf·m, 3.0 lb·ft)** |

**TIP**

The clutch lever holder “1” should be installed according to the dimensions shown.

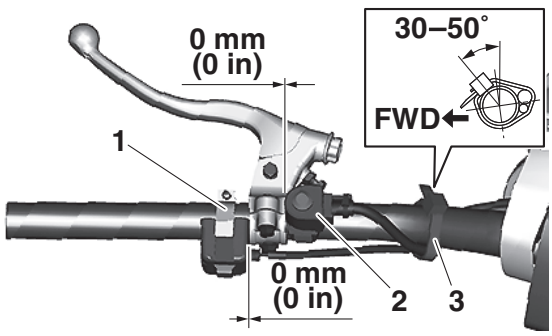



5. Install:
   - Engine stop switch “1”
   - Mode switch “2”
   - Clamp “3”

| | |
|---|---|
| | **Engine stop switch screw**<br>**0.5 N·m (0.05 kgf·m, 0.37 lb·ft)**<br>**Screw (mode switch)**<br>**1.3 N·m (0.13 kgf·m, 0.95 lb·ft)** |

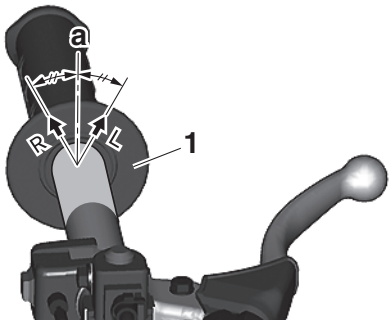
**TIP**

- The engine stop switch “1” and the mode switch “2” should be installed according to the dimensions shown.
- Pass the engine stop switch lead through the middle of the clutch lever holder.



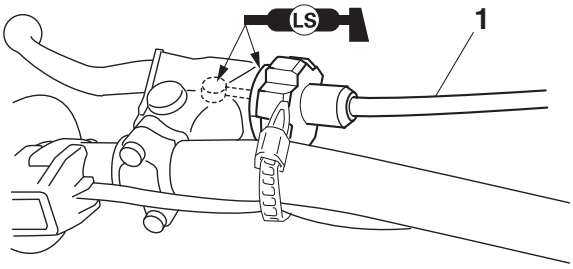
6. Install:
   • Handlebar grip “1”
     a. Slightly coat the handlebar left end with a rubber adhesive.
     b. Install the handlebar grip on the handlebar by pressing the grip from the left side.
     c. Wipe off any excess adhesive with a clean cloth.

**TIP**
Install the handlebar grip to the handlebar so that the line “a” between the two arrow marks faces straight upward.




7. Install:
   • Clutch cable “1”

**TIP**
Before installation, apply the lithium-soap-based grease to the clutch cable end.

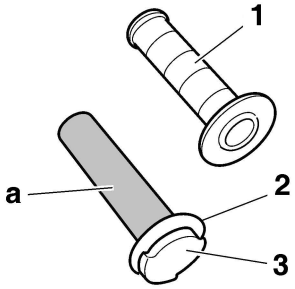


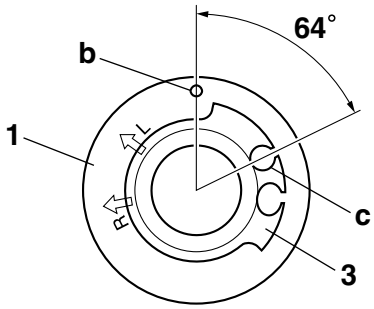

8. Adjust:
   • Clutch lever free play
   Refer to “ADJUSTING THE CLUTCH LEVER FREE PLAY” on page 3-15.

| | |
|---|---|
| | **Clutch lever free play**<br>**7.0–12.0 mm (0.28–0.47 in)** |

9. Install:
   • Right grip “1”
   • Collar “2”
   Apply adhesive to the tube guide “3”.

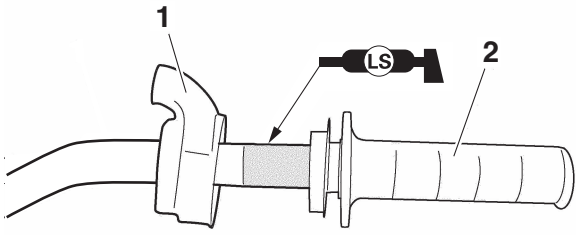
**TIP**
• Before applying the adhesive, wipe off grease or oil on the tube guide surface “a” with a lacquer thinner.
• Install the grip to the tube guide so that the grip match mark “b” and tube guide slot “c” form the angle as shown.



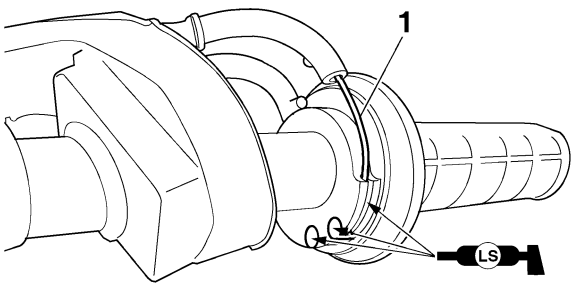

10. Install:
    • Rubber cover “1”
    • Throttle grip “2”

**TIP**
Apply the lithium-soap-based grease on the throttle grip sliding surface.




11. Install:
    • Throttle cable “1”

**TIP**
Slightly coat the end of throttle cable and inside of throttle grip with lithium-soap-based grease. Then, mount the throttle grip onto the handlebar.



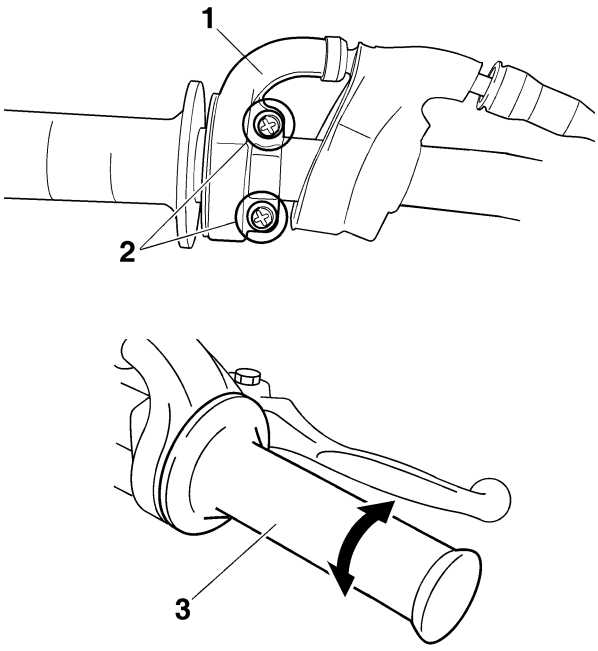

12.Install:
- Throttle cable housing “1”
- Screw (throttle cable housing) “2”

| | |
|---|---|
| | **Screw (throttle cable housing)**<br>**3.8 N·m (0.38 kgf·m, 2.8 lb·ft)** |

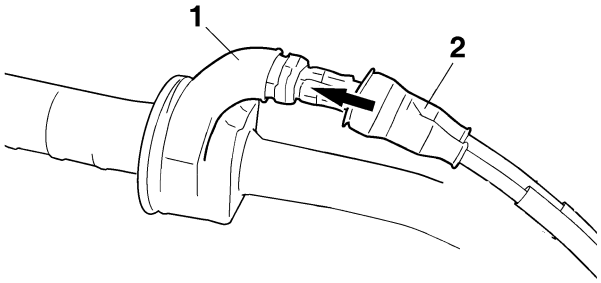
EWA19310

**⚠ WARNING**

**After tightening the throttle cable housing screws, check that the throttle grip “3” moves smoothly. If it does not, retighten the screws for adjustment.**



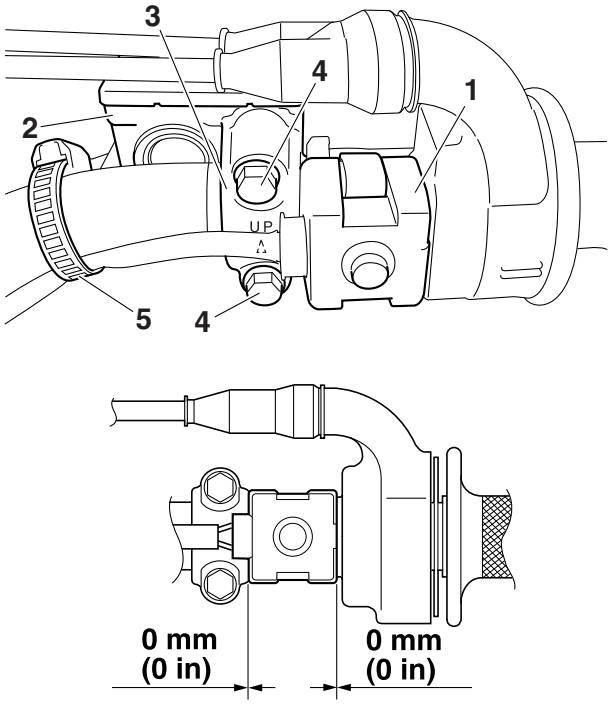

13.Install:
- Rubber cover “1”
- Cover (throttle cable housing) “2”




14.Install:
- Start switch “1”
- Front brake master cylinder assembly “2”
- Front brake master cylinder holder “3”
- Front brake master cylinder holder bolt “4”
- Clamp “5”

| | |
|---|---|
| | **Front brake master cylinder holder bolt**<br>**9 N·m (0.9 kgf·m, 6.6 lb·ft)** |

**TIP**
- Install the brake master cylinder holder with the “UP” mark facing up.
- Install in order for the top of the front brake master cylinder assembly to be level.
- First, tighten the upper bolt, then the lower bolt.




15.Adjust:
- Throttle grip free play
  Refer to “CHECKING THE THROTTLE GRIP” on page 3-11.

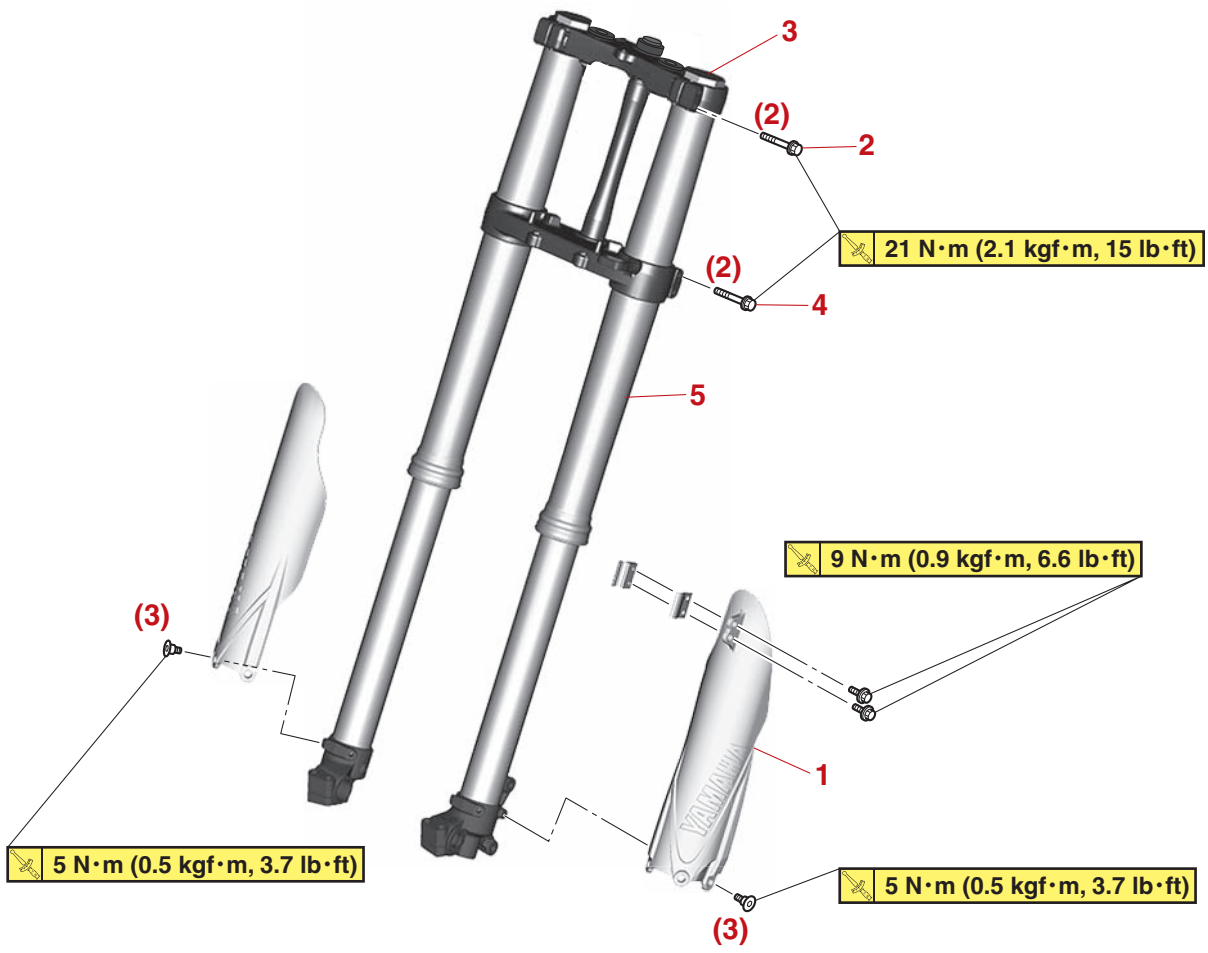


**Throttle grip free play**
**3.0–6.0 mm (0.12–0.24 in)**

EAM20100

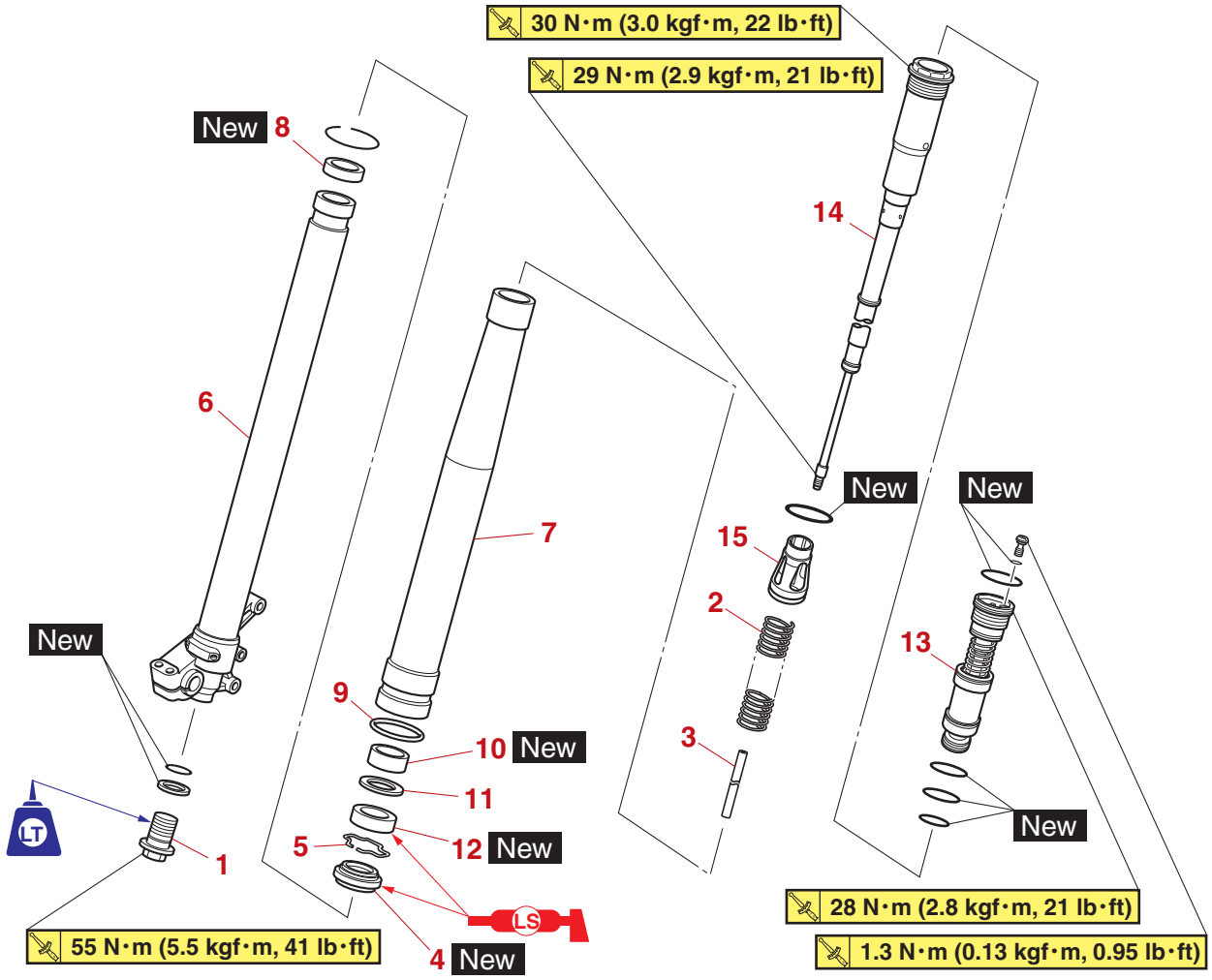
# FRONT FORK

**Removing the front fork legs**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | | | Use a maintenance stand to raise the front wheel off the ground. |
| | Front wheel | | Refer to "FRONT WHEEL" on page 4-5. |
| | Front brake caliper | | Refer to "FRONT BRAKE" on page 4-13. |
| | Number plate | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Lower handlebar holder | | Refer to "HANDLEBAR" on page 4-35 (with the handlebar holder). |
| 1 | Protector | 1 | |
| 2 | Upper bracket pinch bolt | 2 | Loosen. |
| 3 | Damper assembly | 1 | Loosen. |
| 4 | Lower bracket pinch bolt | 2 | Loosen. |
| 5 | Front fork leg | 1 | |

**Disassembling the front fork leg**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 1 | Adjuster | 1 | |
| 2 | Fork spring | 1 | |
| 3 | Damper adjusting rod | 1 | |
| 4 | Dust seal | 1 | |
| 5 | Stopper ring | 1 | |
| 6 | Inner tube | 1 | |
| 7 | Outer tube | 1 | |
| 8 | Piston metal | 1 | |
| 9 | Protector guide | 1 | |
| 10 | Slide metal | 1 | |
| 11 | Washer | 1 | |
| 12 | Oil seal | 1 | |
| 13 | Base valve | 1 | |
| 14 | Damper assembly | 1 | |
| 15 | Upper spring seat | 1 | |

EAM30055
## REMOVING THE FRONT FORK LEGS

1. Use a maintenance stand to raise the front wheel off the ground.

EWA13120
**⚠ WARNING**

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

**TIP**
Record the adjusting screw setting position before loosening the adjuster and the base valve.

2. Remove:
   • Lower handlebar holder (with the handlebar)
3. Loosen:
   • Upper bracket pinch bolt
   • Damper assembly
   • Lower bracket pinch bolt

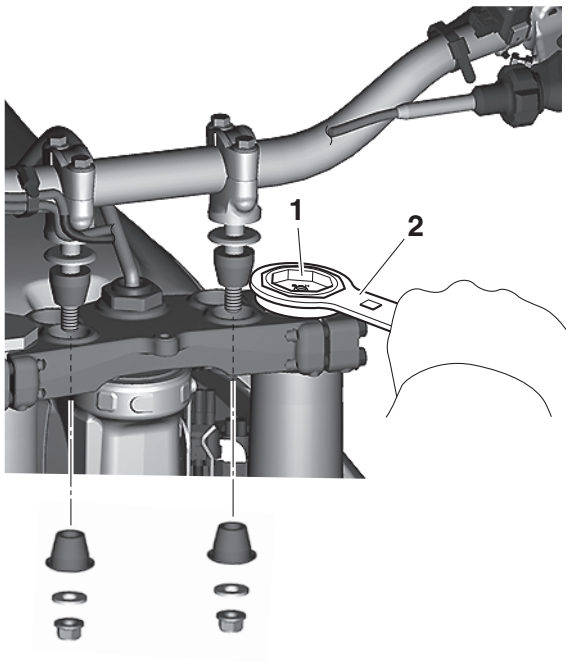
EWA20350
**⚠ WARNING**

**Before loosening the upper and lower bracket pinch bolts, support the front fork leg.**

**TIP**
- Before removing the front fork leg from the vehicle, loosen the damper assembly "1" with the cap bolt ring wrench "2".
- It is allowed to remove the lower handlebar holder with the handlebar installed as shown. When doing so, make sure that the handlebar is secured so that it does not move.



**Cap bolt ring wrench**
**90890-01501**
**Cap bolt ring wrench**
**YM-01501**




4. Remove:
   • Front fork leg

EAM30056
## DISASSEMBLING THE FRONT FORK LEGS

1. Drain:
   • Fork oil
2. Remove:
   • Adjuster "1"
   (from the inner tube)

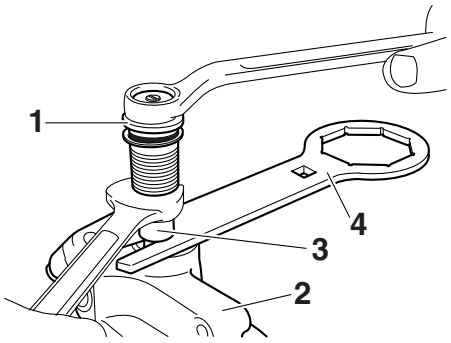
**TIP**
- While compressing the inner tube "2", set the cap bolt ring wrench "4" between the inner tube and locknut "3".
- Hold the locknut and remove the adjuster.

ECA24520
***NOTICE***

**Do not remove the locknut as the damper rod may go into the damper assembly and not be taken out.**



**Cap bolt ring wrench**
**90890-01501**
**Cap bolt ring wrench**
**YM-01501**

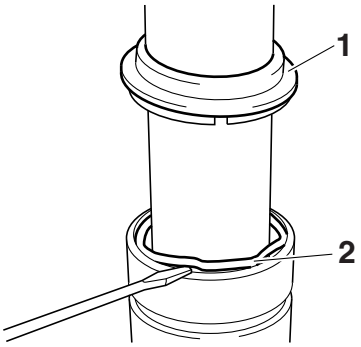



3. Remove:
   - Dust seal “1”
   - Stopper ring “2”
     (with a flat-head screwdriver)

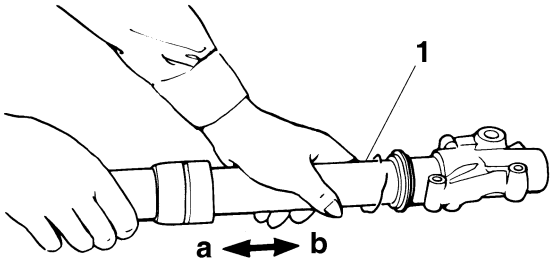
ECA14180

***NOTICE***

**Do not scratch the inner tube.**




4. Remove:
   - Inner tube “1”
     a. Push in slowly “a” the inner tube just before it bottoms out and then pull it back quickly “b”.
     b. Repeat this step until the inner tube can be pulled out from the outer tube.

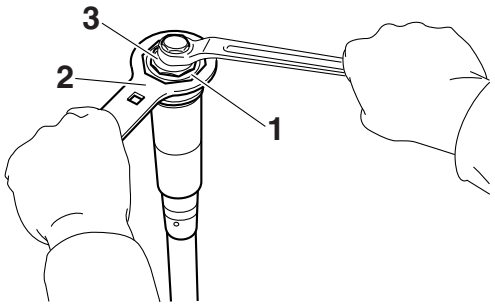



5. Remove:
   - Base valve “1”
     (from the damper assembly)

**TIP**

Hold the damper assembly with the cap bolt ring wrench “2” and use the cap bolt wrench “3” to remove the base valve.

**Cap bolt wrench**
**90890-01500**
**Cap bolt wrench**
**YM-01500**
**Cap bolt ring wrench**
**90890-01501**
**Cap bolt ring wrench**
**YM-01501**




EAM30057

## CHECKING THE FRONT FORK LEGS

1. Check:
   - Inner tube surface
     Scratches → Repair or replace.
     Use #1000 grit wet sandpaper.
     Damaged oil lock piece → Replace.
   - Inner tube bends
     Out of specification → Replace.
     Use the dial gauge.

**Inner tube bending limit**
**0.2 mm (0.01 in)**

**TIP**

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

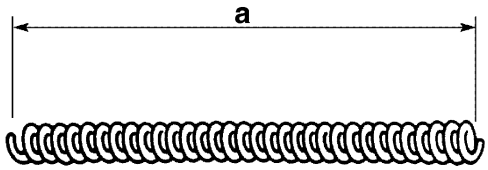
EWA13650

***WARNING***

**Do not attempt to straighten a bent inner tube as this may dangerously weaken it.**

2. Check:
   - Outer tube
     Scratches/wear/damage → Replace.
3. Measure:
   - Fork spring free length “a”
     Out of specification → Replace.

**Fork spring free length limit**
**492.0 mm (19.37 in)**

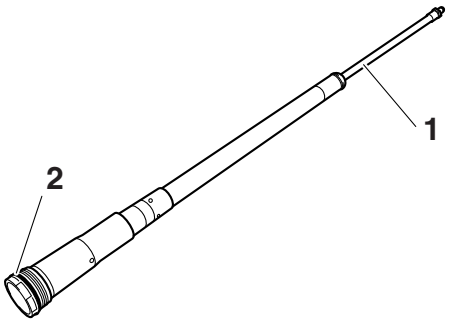



4. Check:
   • Damper assembly “1”
     Bend/damage → Replace.
   • O-ring “2”
     Wear/damage → Replace.

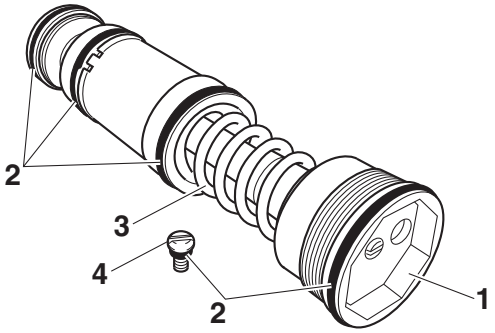
ECA14200

***NOTICE***

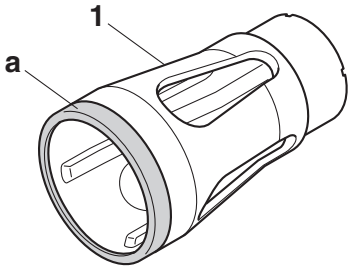
- **The front fork leg has a built-in damper adjusting rod and a very sophisticated internal construction, which are particularly sensitive to foreign material.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**



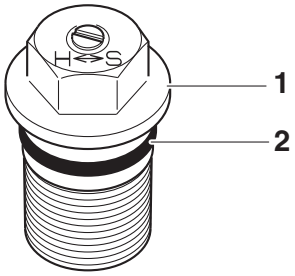

5. Check:
   • Base valve “1”
     Wear/damage → Replace.
     Contamination → Clean.
   • O-ring “2”
     Wear/damage → Replace.
   • Base valve bushing
     Wear/damage → Replace.
   • Fork spring “3”
     Damage/fatigue → Replace the base valve.
   • Bleed screw “4”
     Wear/damage → Replace.




6. Check:
   • Upper spring seat “1”
     (contacting surface “a”)
     Wear/damage → Replace.




7. Check:
   • Adjuster “1”
   • O-ring “2”
     Wear/damage → Replace.




EAM30058

## ASSEMBLING THE FRONT FORK LEGS

EWA13660

**⚠ WARNING**

- **Make sure the oil levels in both front fork legs are equal.**
- **Uneven oil levels can result in poor handling and a loss of stability.**

**TIP**

- When assembling the front fork leg, be sure to replace the following parts:
  - Inner tube bushing
  - Slide metal

- Oil seal
- Copper washer

• Before assembling the front fork leg, make sure that all of the components are clean.

1. Stretch the damper assembly fully.
2. Fill:
   • Damper assembly

**Recommended oil**
**Yamaha Suspension Oil S1**
**Standard oil amount**
**216 cm³ (7.30 US oz, 7.62 Imp.oz)**

ECA24530

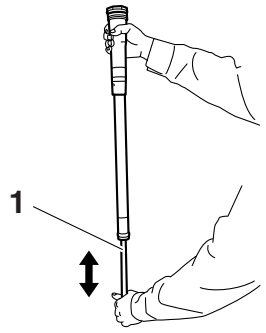
***NOTICE***

**• Be sure to use the recommended oil. Other oils may have an adverse effect on front fork performance.**
**• When disassembling and assembling the front fork leg, take care not to allow any foreign material to enter the front fork.**

3. After filling, pump the damper assembly "1" slowly up and down (about 200 mm (7.9 in) stroke) several times to bleed the damper assembly of air.

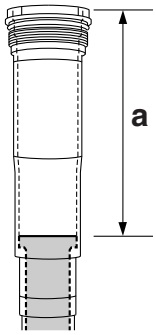
**TIP**

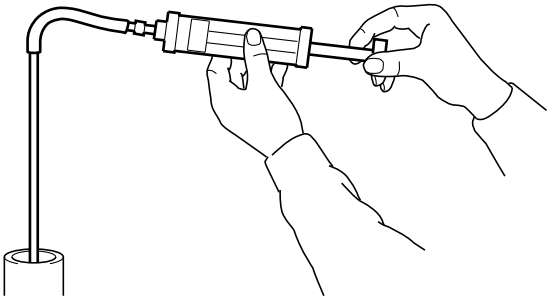
Avoid excessive full stroke. A stroke of 200 mm (7.9 in) or more will cause air to enter. In this case, repeat the steps (1) to (3).




4. Measure:
   • Oil level (left and right) "a"
   Out of specification → Regulate.

**Standard oil level**
**145–148 mm (5.71–5.83 in)**
**From top of fully stretched damper assembly.**

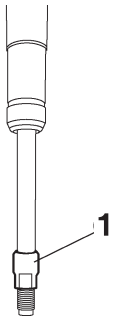


5. Tighten:
   • Locknut "1"

**TIP**

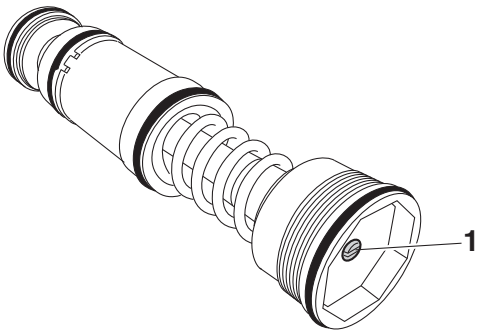
Fully finger tighten the locknut onto the damper assembly.




6. Loosen:
   • Compression damping force adjuster "1"

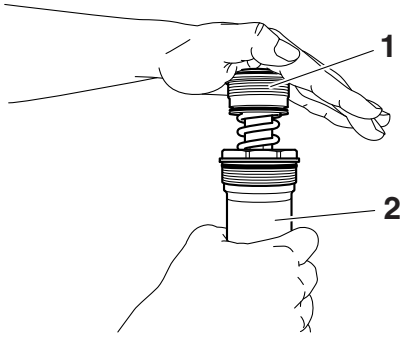
**TIP**

• Before loosening the damping force adjuster, record the setting position.
• Unless the damping force adjuster is fully loosened, correct damping characteristic cannot be obtained after installation.




7. Install:
   • Base valve “1”
   (to the damper assembly “2”)

**TIP**
First bring the damper rod pressure to a maximum. Then install the base valve while releasing the damper rod pressure.

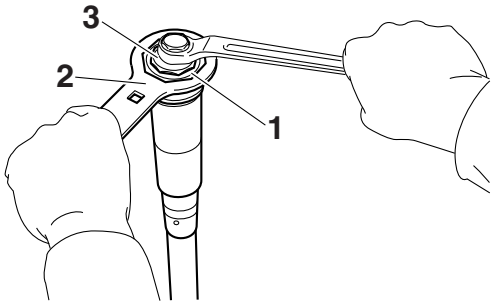



8. Check:
   • Damper assembly
   Not fully stretched → Repeat the steps (1) to (7).
9. Tighten:
   • Base valve “1”

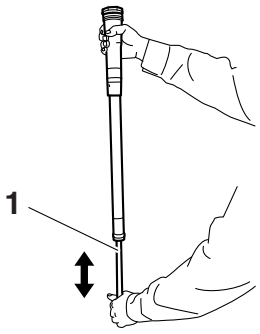
| | |
|---|---|
| | **Base valve**<br>**28 N·m (2.8 kgf·m, 21 lb·ft)** |

**TIP**
Hold the damper assembly with the cap bolt ring wrench “2” and use the cap bolt wrench “3” to tighten the base valve.

| | |
|---|---|
| | **Cap bolt wrench**<br>**90890-01500**<br>**Cap bolt wrench**<br>**YM-01500**<br>**Cap bolt ring wrench**<br>**90890-01501**<br>**Cap bolt ring wrench**<br>**YM-01501** |

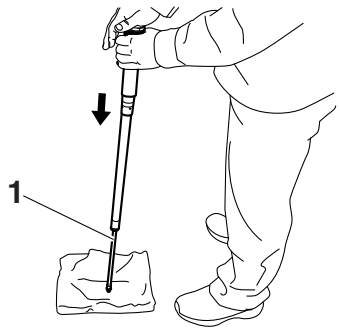



10. After filling, pump the damper assembly “1” slowly up and down more than 10 times to distribute the fork oil.



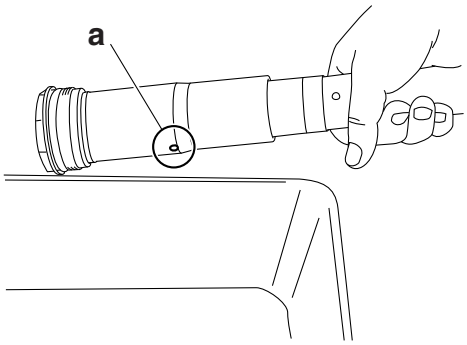

11. While protecting the damper assembly “1” with a cloth and compressing fully, allow excessive oil to overflow on the base valve side.

ECA24540
***NOTICE***
**Take care not to damage the damper assembly.**

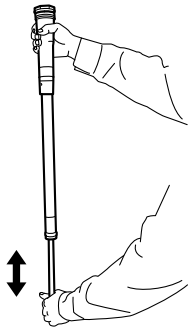



12. Allow the overflowing oil to escape at the hole “a” in the damper assembly.

**TIP**
The overflow measures about 10 cm³ (0.34 US oz, 0.35 Imp.oz).




13.Check:
- Damper assembly smooth movement
  Tightness/binding/rough spots → Repeat the steps (1) to (12).



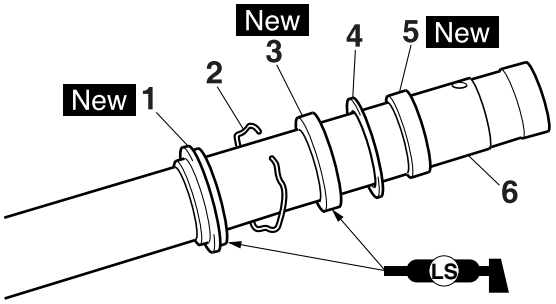
14.Install:
- Dust seal “1” New
- Stopper ring “2”
- Oil seal “3” New
- Washer “4”
- Slide metal “5” New
  (to the inner tube “6”)

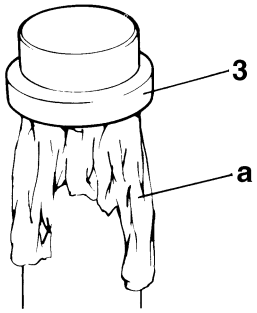
ECA24550

***NOTICE***

**Make sure that the numbered side of the oil seal faces bottom side.**

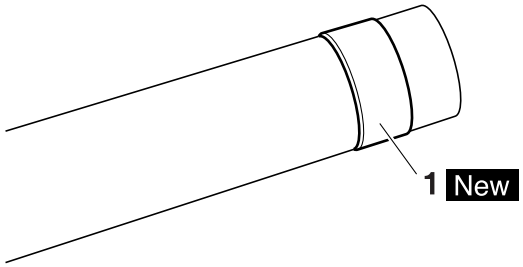
**TIP**
- Apply the lithium-soap-based grease on the dust seal lip and oil seal lip.
- Apply the fork oil on the inner tube.
- When installing the oil seal, use vinyl seat “a” with fork oil applied to protect the oil seal lip.



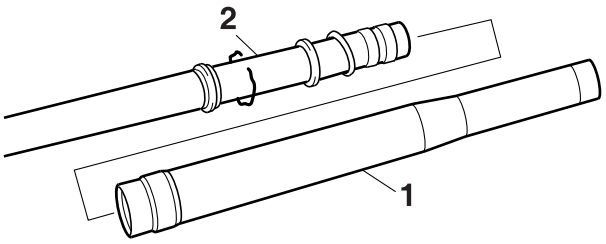




15.Install:
- Piston metal “1” New

**TIP**
Install the piston metal onto the slot on inner tube.




16.Install:
- Outer tube “1”
  (to the inner tube “2”)

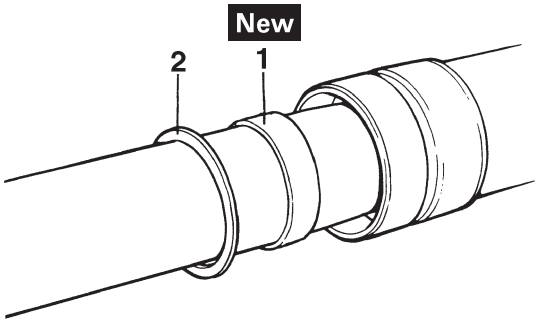


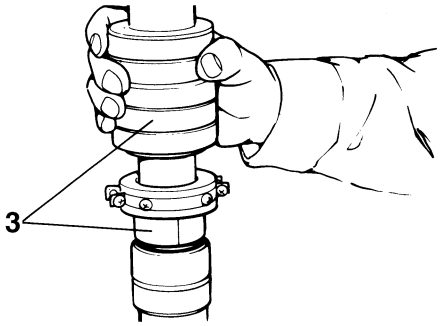

17.Install:
- Slide metal “1” New
- Washer “2”
  (to the outer tube)

**TIP**
Press the slide metal into the outer tube with fork seal driver “3”.



**Fork seal driver**
**90890-01502**
**Fork seal driver (48)**
**YM-A0948**

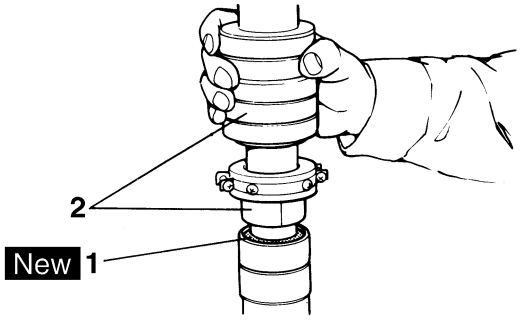



18.Install:
- Oil seal “1” New

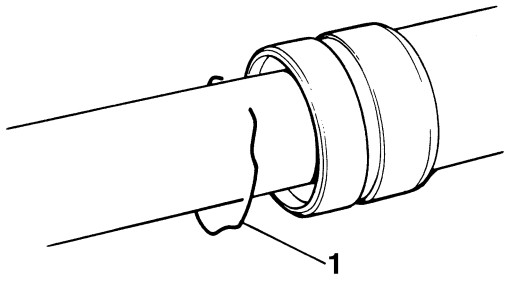
**TIP**
Using a fork seal driver “2”, press the oil seal in until the stopper ring groove fully appears.

**Fork seal driver**
**90890-01502**
**Fork seal driver (48)**
**YM-A0948**



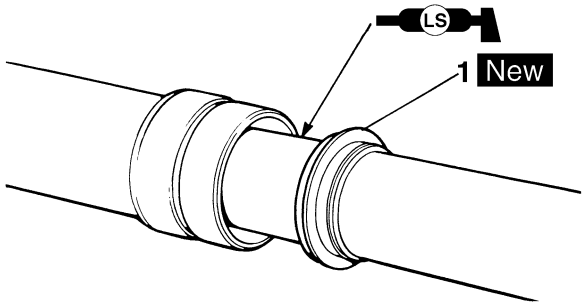

19.Install:
- Stopper ring “1”

**TIP**
Fit the stopper ring correctly in the groove in the outer tube.

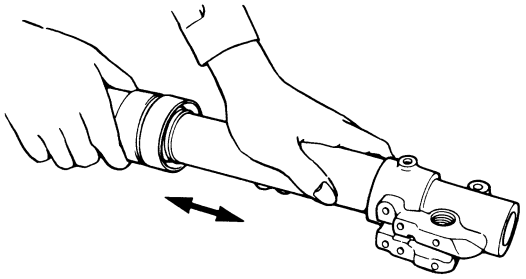



20.Install:
- Dust seal “1” New

**TIP**
Apply lithium-soap-based grease on the inner tube.

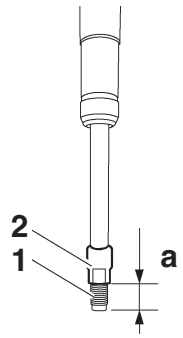



21.Check:
- Inner tube smooth movement
  Tightness/binding/rough spots → Repeat the steps (14) to (20).



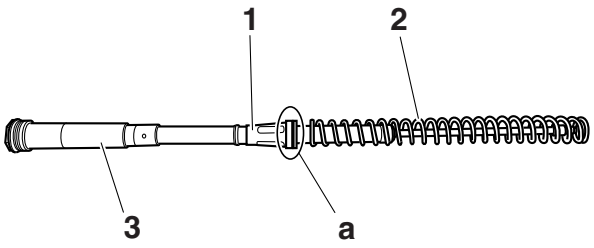
22.Measure:
- Distance “a”
  Out of specification → Turn the locknut to specification.

**Distance “a”**
**16 mm (0.63 in) or more**
**Between the damper assembly “1” bottom and locknut “2” bottom.**



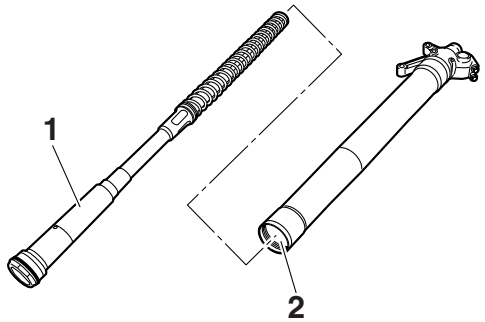

23.Install:
- Upper spring seat "1"
- Fork spring "2"
  (to the damper assembly "3")

**TIP**
Install the upper spring seat with its larger dia. end "a" facing the fork spring.



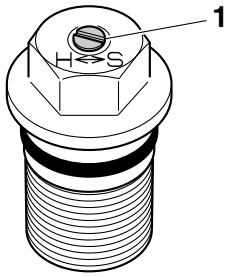

24.Install:
- Damper assembly "1"
  (to the inner tube "2")

ECA24560
***NOTICE***
**Allow the damper assembly to slide slowly down the inner tube until it contacts the bottom of the inner tube. Be careful not to damage the inner tube.**




25.Loosen:
- Rebound damping force adjuster "1"

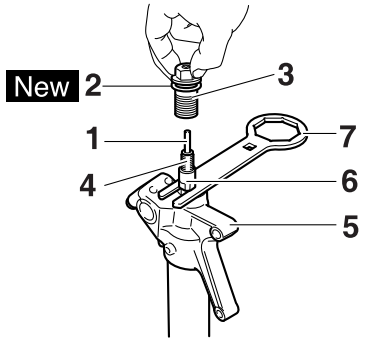
**TIP**
- Before loosening the damping force adjuster, record the setting position.
- Unless the damping force adjuster is fully loosened, correct damping characteristic cannot be obtained after installation.




26.Install:
- Damper adjusting rod "1"
- Copper washer "2" New
- Adjuster "3"
  (to the damper assembly "4")

**TIP**
- While compressing the inner tube "5", set the cap bolt ring wrench "7" between the inner tube and locknut "6".
- Fully finger tighten the adjuster onto the damper assembly.

**Cap bolt ring wrench**
**90890-01501**
**Cap bolt ring wrench**
**YM-01501**

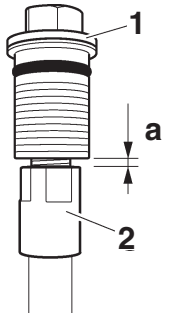



27.Measure:
- Gap "a" between the adjuster "1" and the locknut "2"
  Out of specification → Retighten and readjust the locknut.

**Gap "a" between the adjuster and the locknut**
**0.5–1.0 mm (0.02–0.04 in)**

**TIP**
If it is installed with a gap out of specification,

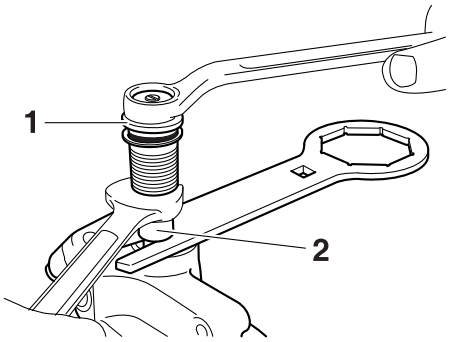
correct damping force cannot be obtained.




28.Tighten:
- Adjuster (damper assembly) “1”

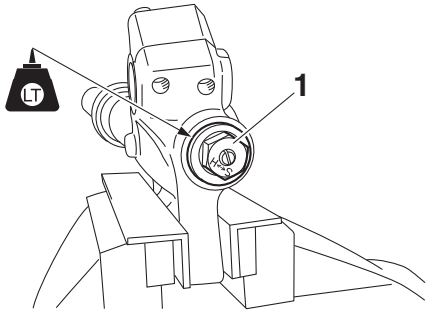
| | |
|---|---|
| | **Adjuster (damper assembly)**<br>**29 N·m (2.9 kgf·m, 21 lb·ft)** |

**TIP**
Hold the locknut “2” and tighten the adjuster.




29.Install:
- Adjuster “1”
  (to the inner tube)

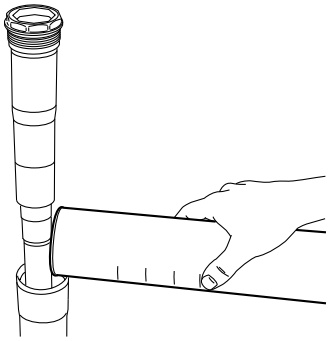
| | |
|---|---|
| | **Adjuster**<br>**55 N·m (5.5 kgf·m, 41 lb·ft)**<br>**LOCTITE®** |




30.Fill:
- Front fork leg

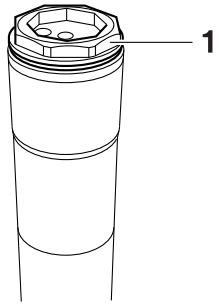
| | |
|---|---|
| | **Recommended oil**<br>**Yamaha Suspension Oil S1**<br>**Standard oil amount**<br>**295 cm³ (9.97 US oz, 10.4 Imp.oz)**<br>**Extent of adjustment**<br>**260–365 cm³ (8.79–12.34 US oz, 9.17–12.87 Imp.oz)** |

ECA24570
***NOTICE***
- **Be sure to use the recommended oil. Other oils may have an adverse effect on front fork performance.**
- **When disassembling and assembling the front fork leg, do not allow any foreign material to enter the front fork.**

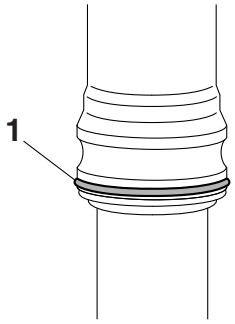


31.Install:
- Damper assembly “1”
  (to the outer tube)

**TIP**
Temporarily tighten the damper assembly.



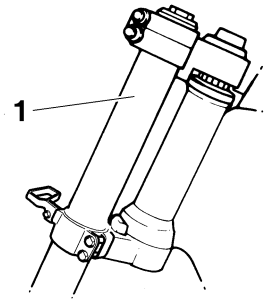

32.Install:
- Protector guide “1”




EAM30059
**INSTALLING THE FRONT FORK LEGS**

1. Install:
   • Front fork "1"

**TIP**
- Temporarily tighten the lower bracket pinch bolts.
- Do not tighten the upper bracket pinch bolts yet.

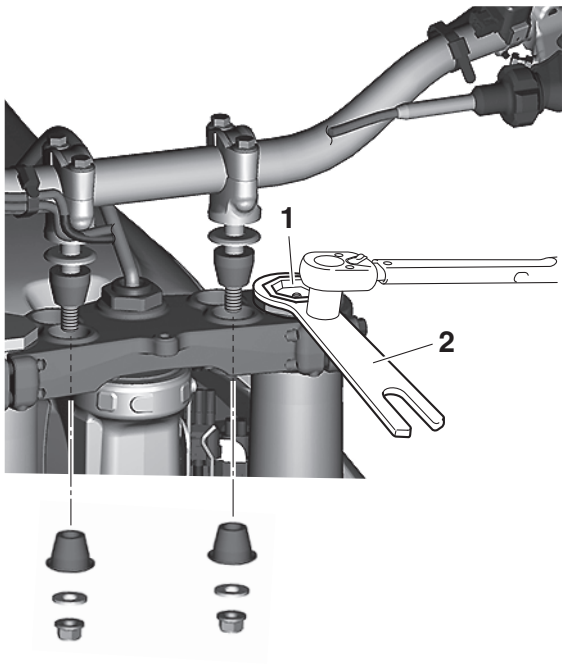



2. Tighten:
   • Damper assembly "1"

| | |
|---|---|
| | **Damper assembly**<br>**30 N·m (3.0 kgf·m, 22 lb·ft)** |

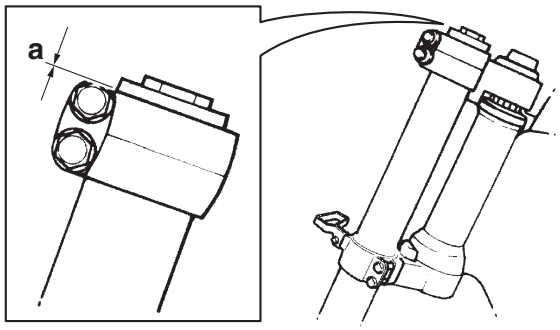
**TIP**
Use the cap bolt ring wrench "2" to tighten the damper assembly.

| | |
|---|---|
| | **Cap bolt ring wrench**<br>**90890-01501**<br>**Cap bolt ring wrench**<br>**YM-01501** |




3. Adjust:
   • Front fork top end "a"

| | |
|---|---|
| | **Front fork top end (standard) "a"**<br>**7 mm (0.28 in)** |




4. Install:
   • Lower handlebar holder (with the handlebar)

| | |
|---|---|
| | **Lower handlebar holder nut**<br>**40 N·m (4.0 kgf·m, 30 lb·ft)** |

5. Tighten:
   • Upper bracket pinch bolt "1"

| | |
|---|---|
| | **Upper bracket pinch bolt**<br>**21 N·m (2.1 kgf·m, 15 lb·ft)** |

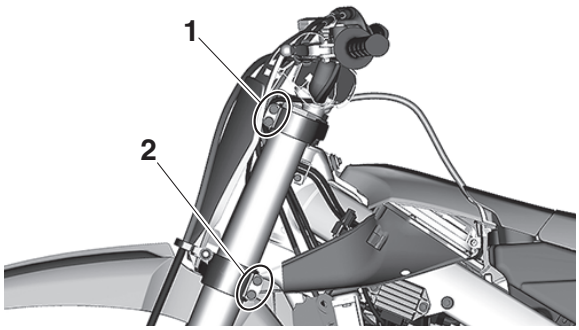
   • Lower bracket pinch bolt "2"

| | |
|---|---|
| | **Lower bracket pinch bolt**<br>**21 N·m (2.1 kgf·m, 15 lb·ft)** |

EWA19320

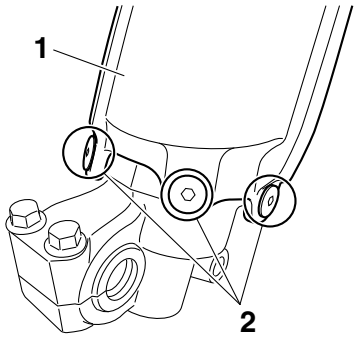
**⚠ WARNING**

**Tighten the lower bracket to specified torque. If torqued too much, it may cause the front fork to malfunction.**




6. Install:
   • Protector “1”
   • Bolt (protector) “2”

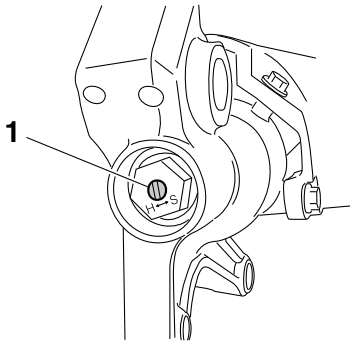
| | |
|---|---|
| | **Bolt (protector)**<br>**5 N·m (0.5 kgf·m, 3.7 lb·ft)** |




7. Adjust:
   • Rebound damping force

**TIP**

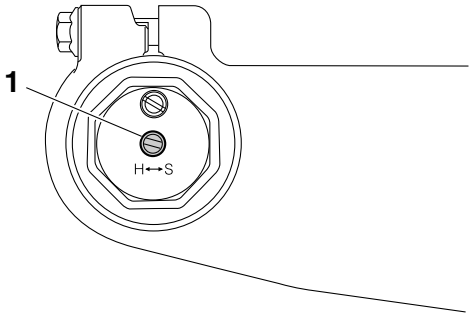
Turn in the damping adjuster “1” finger-tight and then turn out to the originally set position.




8. Adjust:
   • Compression damping force

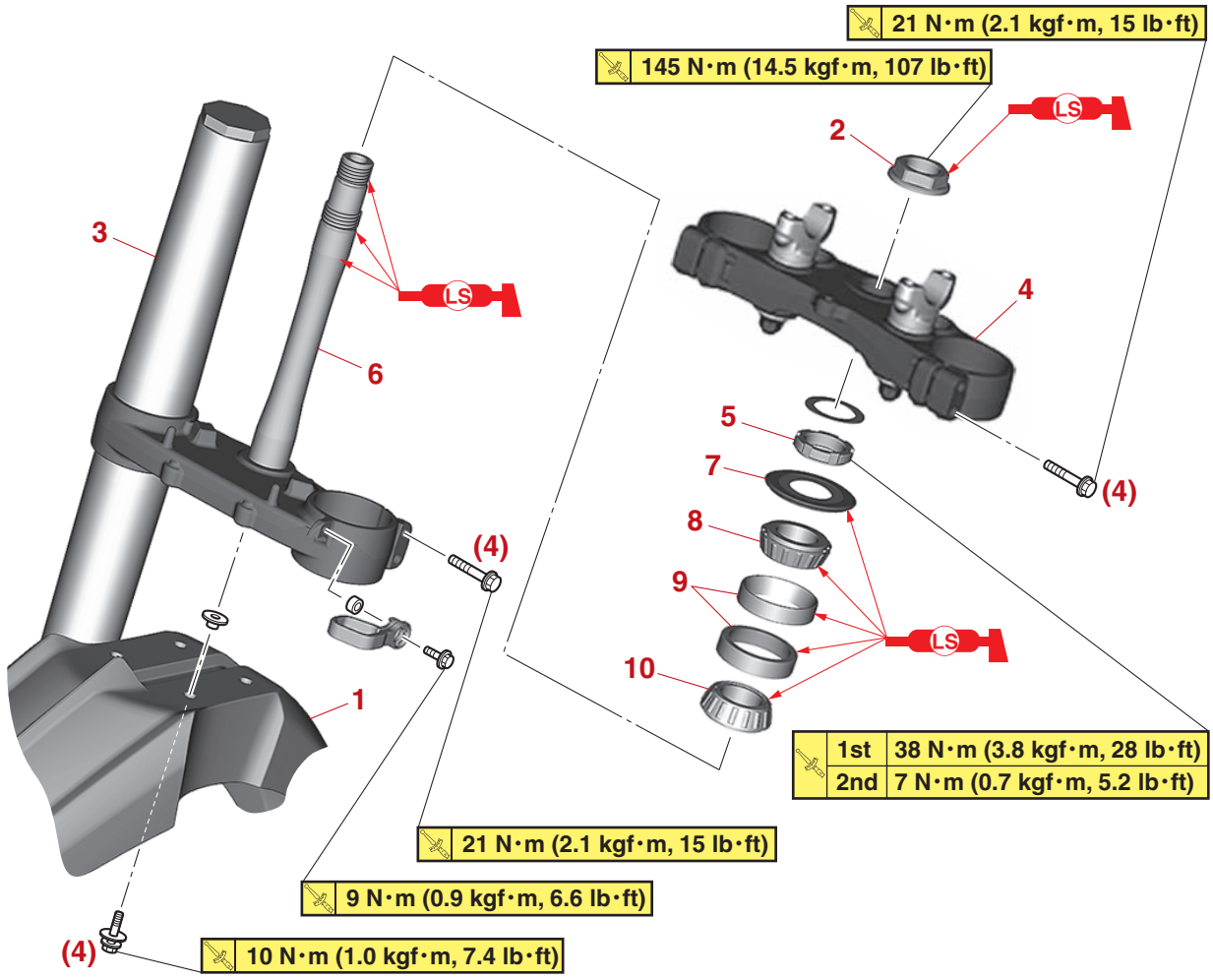
**TIP**

Turn in the damping adjuster “1” finger-tight and then turn out to the originally set position.



EAM20101
# STEERING HEAD

**Removing the lower bracket**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | | | Refer to "CHECKING AND ADJUSTING THE STEERING HEAD" on page 3-27. |
| | | | Use a maintenance stand to raise the front wheel off the ground. |
| | Number plate | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Handlebar | | Refer to "HANDLEBAR" on page 4-35. |
| 1 | Front fender | 1 | |
| 2 | Steering stem nut | 1 | |
| 3 | Front fork leg | 2 | Refer to "FRONT FORK" on page 4-41. |
| 4 | Upper bracket | 1 | |
| 5 | Steering ring nut | 1 | |
| 6 | Lower bracket | 1 | |
| 7 | Bearing race cover | 1 | |
| 8 | Upper bearing | 1 | |
| 9 | Bearing race | 2 | |
| 10 | Lower bearing | 1 | |

EAM30060
### REMOVING THE LOWER BRACKET
1. Use a maintenance stand to raise the front wheel off the ground.

EWA13120
**⚠ WARNING**

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

2. Remove:
   • Ring nut “1”

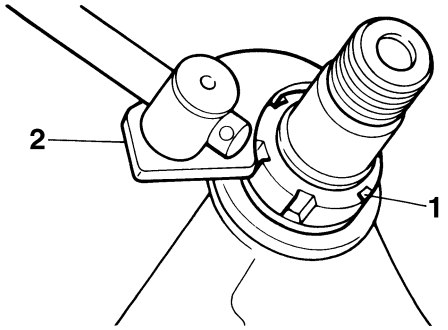
**TIP**
Remove the ring nut with the steering nut wrench “2”.



**Steering nut wrench**
**90890-01403**
**Exhaust flange nut wrench**
**YU-A9472**

EWA13730
**⚠ WARNING**

**Securely support the lower bracket so that there is no danger of it falling.**

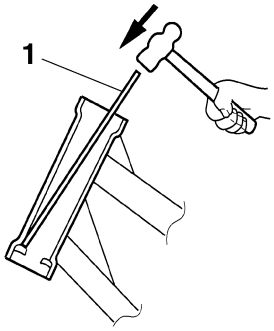


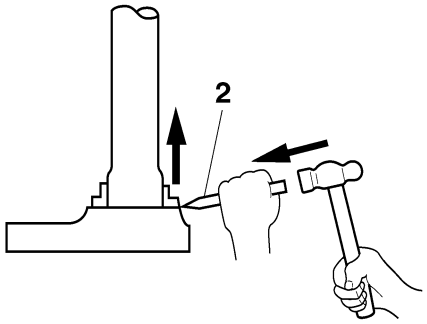

EAM30061
### CHECKING THE STEERING HEAD
1. Wash with kerosene:
   • Bearing
   • Bearing race
2. Check:
   • Bearing
   • Bearing race
   Damage/pitting → Replace.
3. Replace:
   • Bearing
   • Bearing race
   a. Remove the bearing race from the steering head pipe with a long rod “1” and a hammer.
   b. Remove the bearing race from the lower bracket with a chisel “2” and a hammer.
   c. Install a new bearing race.

ECA14270
**NOTICE**

**If the bearing race is not installed properly, the steering head pipe could be damaged.**

**TIP**
Always replace the bearing and the bearing race as a set.

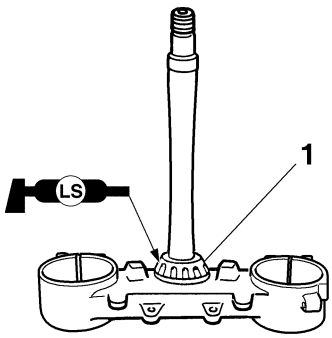



4. Check:
   • Upper bracket
   • Lower bracket
   (along with the steering stem)
   Bends/cracks/damage → Replace.

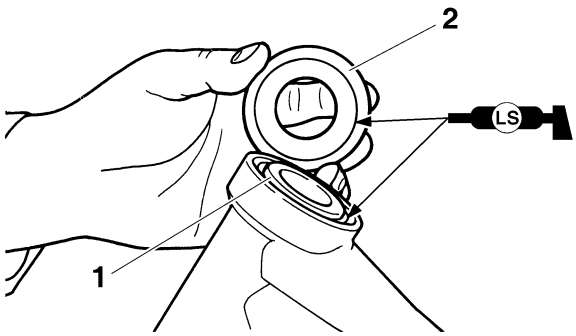
EAM30062
### INSTALLING THE STEERING HEAD
1. Install:
   • Lower bearing “1”

**TIP**
Apply the lithium-soap-based grease on the dust seal lip and bearing inner circumference.



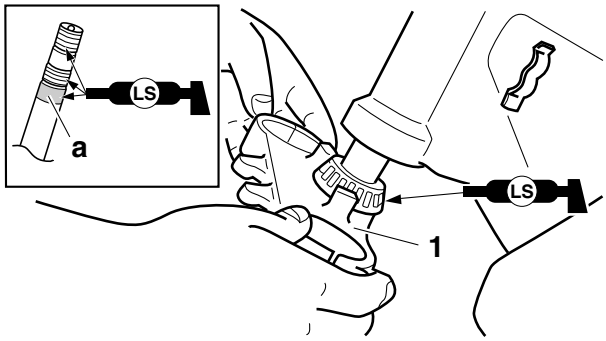
2. Install:
   • Bearing race
   • Upper bearing “1”
   • Bearing race cover “2”

**TIP**
Apply the lithium-soap-based grease on the bearing and bearing race cover lip.




3. Install:
   • Lower bracket “1”

**TIP**
Apply the lithium-soap-based grease on the bearing, the portion “a” and thread of the steering stem.

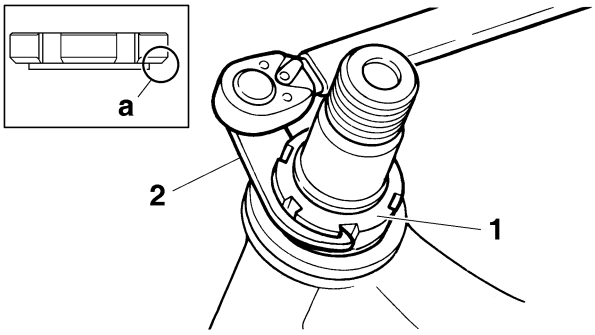



4. Install:
   • Steering ring nut “1”

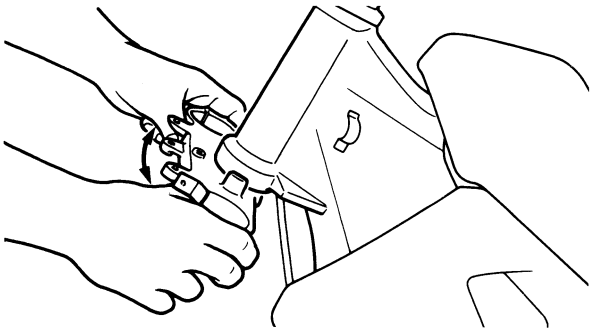
| | |
|---|---|
| | **Steering ring nut**<br>**7 N·m (0.7 kgf·m, 5.2 lb·ft)** |

**TIP**
Install the steering ring nut with its stepped side “a” facing downward.

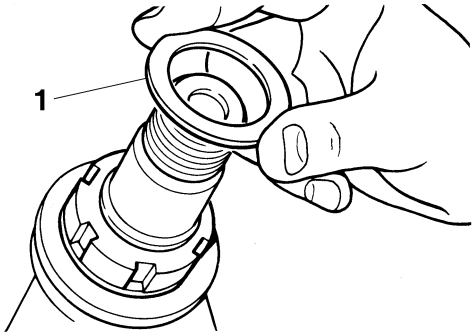
Tighten the steering ring nut with a steering nut wrench “2”.
Refer to “CHECKING AND ADJUSTING THE STEERING HEAD” on page 3-27.




5. Check the steering stem by turning this lock to lock. If there is any binding, remove the steering stem and check the steering bearing.

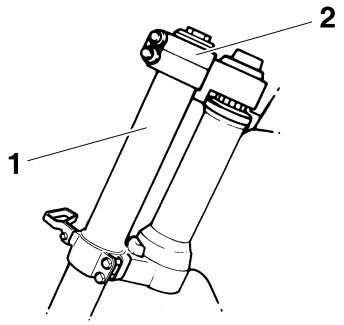


6. Install:
   • Washer “1”




7. Install:
   • Front fork “1”
   • Upper bracket “2”

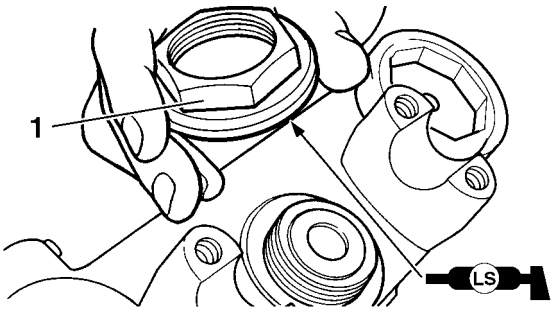
**TIP**
- Temporarily tighten the lower bracket pinch bolts.
- Do not tighten the upper bracket pinch bolts yet.




8. Install:
   • Steering stem nut “1”

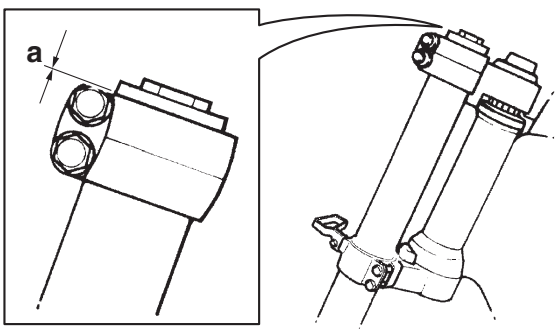
| | |
|---|---|
| | **Steering stem nut**<br>**145 N·m (14.5 kgf·m, 107 lb·ft)** |

**TIP**
Apply the lithium-soap-based grease to the contact surface of the steering stem nut when installing.




9. After tightening the nut, check the steering for smooth movement. If not, adjust the steering by loosening the steering ring nut little by little.
10. Adjust:
   • Front fork top end “a”

| | |
|---|---|
| | **Front fork top end (standard) “a”**<br>**7 mm (0.28 in)** |



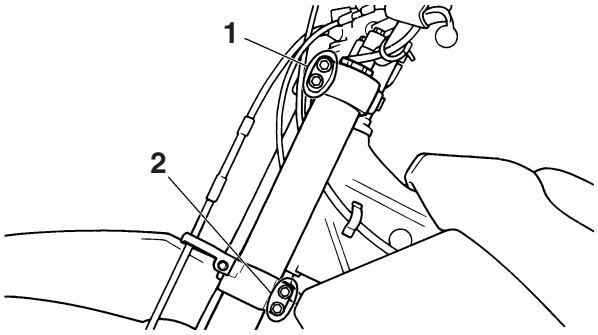

11. Tighten:
   • Upper bracket pinch bolt “1”

| | |
|---|---|
| | **Upper bracket pinch bolt**<br>**21 N·m (2.1 kgf·m, 15 lb·ft)** |

   • Lower bracket pinch bolt “2”

| | |
|---|---|
| | **Lower bracket pinch bolt**<br>**21 N·m (2.1 kgf·m, 15 lb·ft)** |

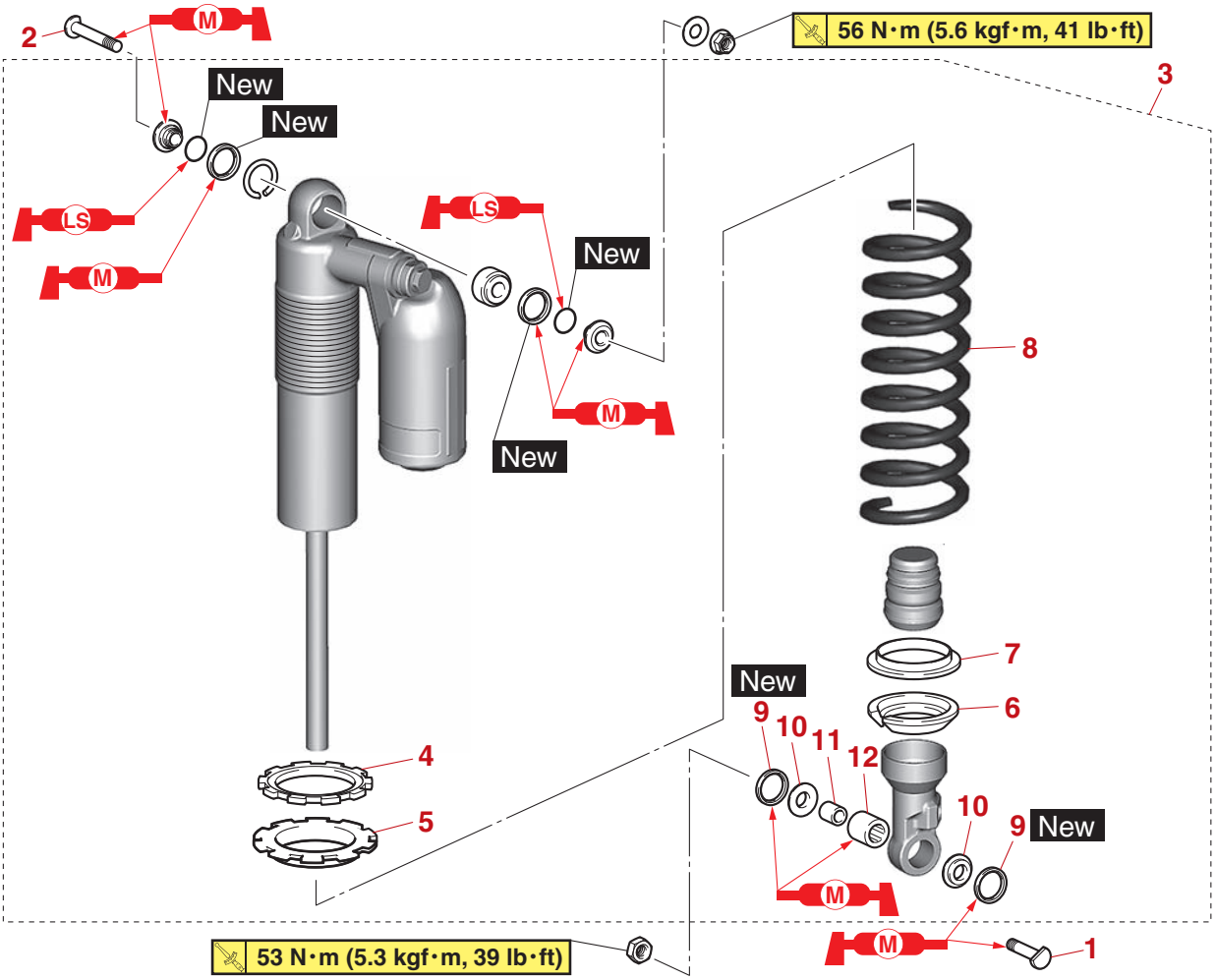
EWA19330
**⚠ WARNING**
**Tighten the lower bracket to specified torque. If torqued too much, it may cause the front fork to malfunction.**



EAM20102

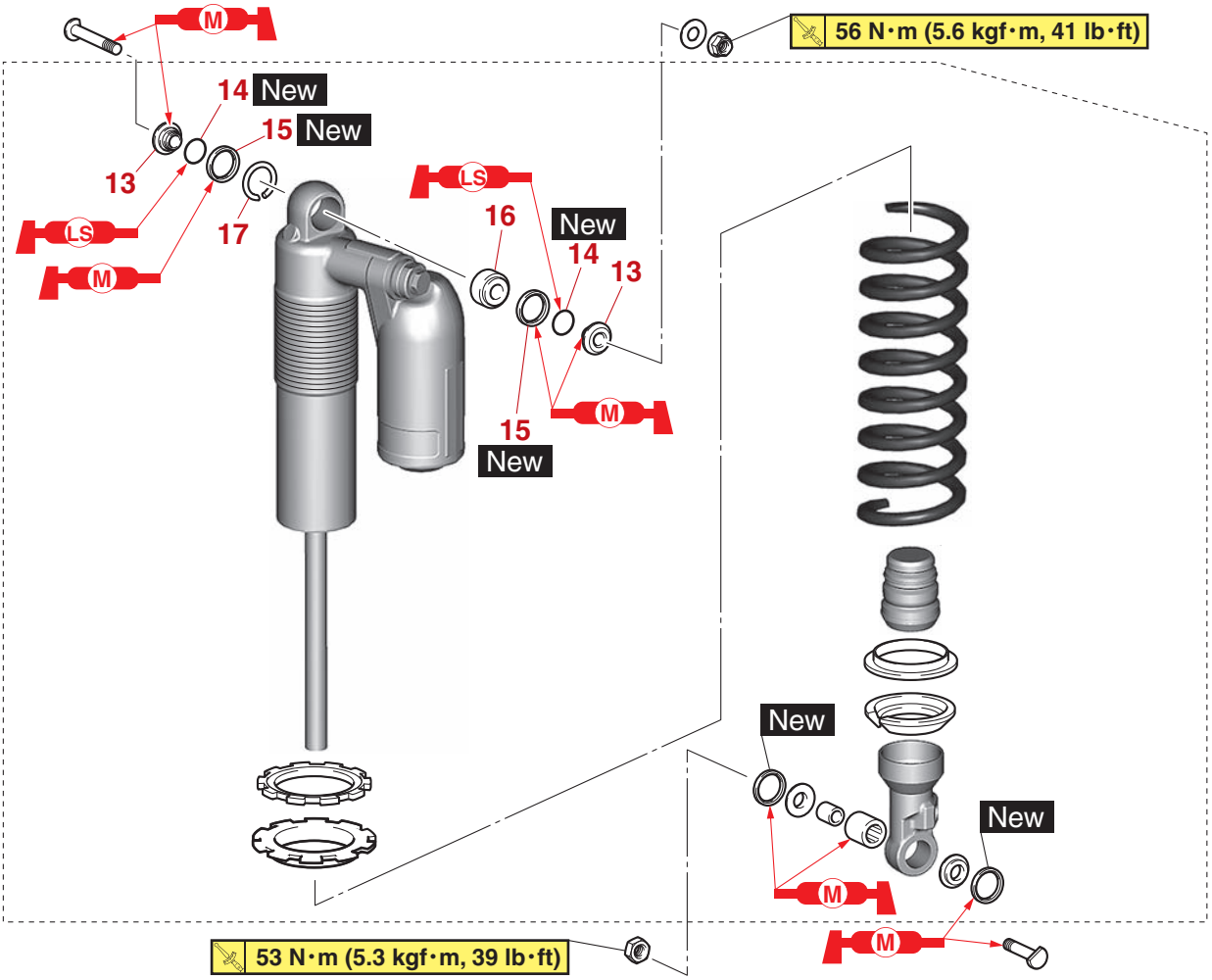
# REAR SHOCK ABSORBER ASSEMBLY

**Removing the rear shock absorber assembly**



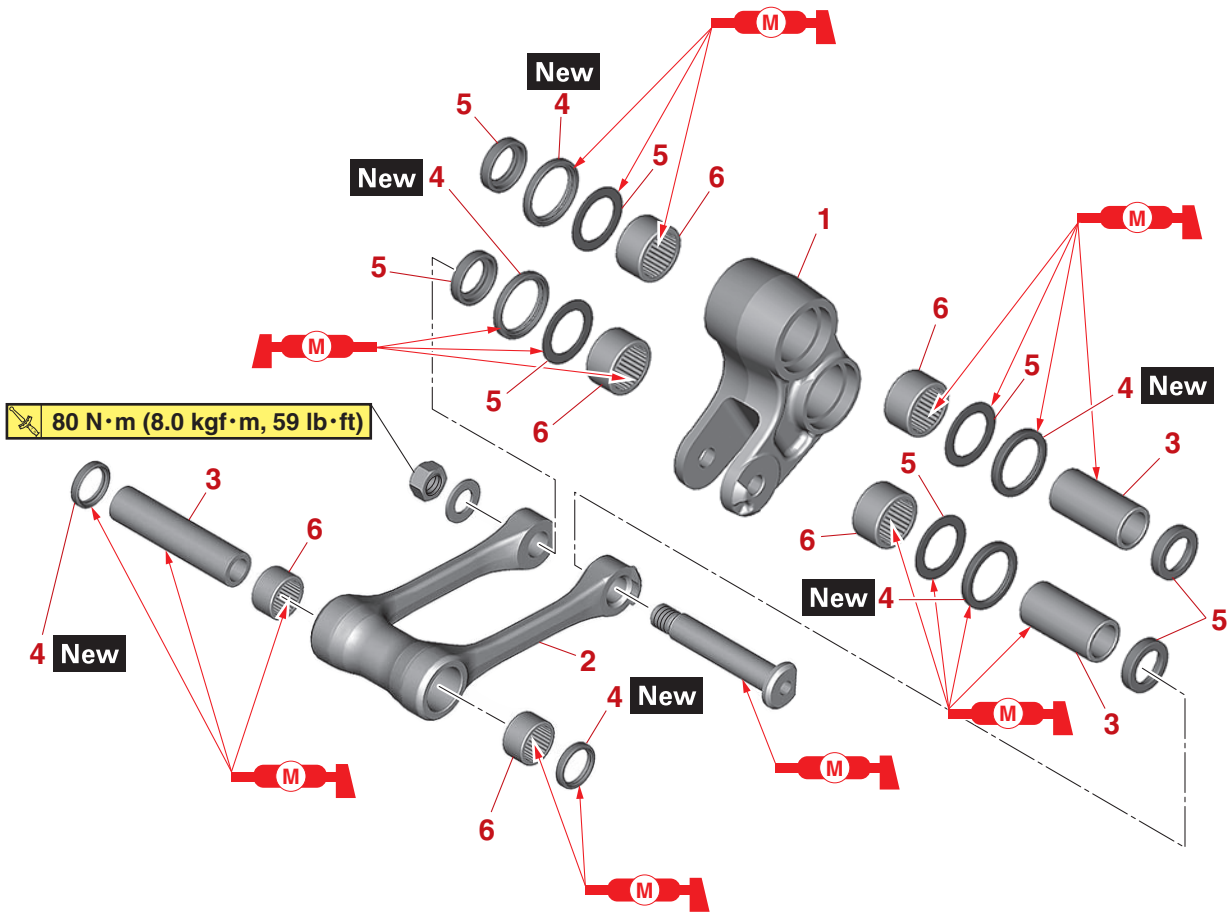

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Seat | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Side cover (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Air scoop (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| 1 | Rear shock absorber assembly lower bolt | 1 | |
| 2 | Rear shock absorber assembly upper bolt | 1 | |
| 3 | Rear shock absorber assembly | 1 | |
| 4 | Locknut | 1 | |
| 5 | Adjusting nut | 1 | |
| 6 | Lower spring guide | 1 | |
| 7 | Upper spring guide | 1 | |
| 8 | Spring | 1 | |
| 9 | Dust seal | 2 | |
| 10 | Collar | 2 | |
| 11 | Bushing | 1 | |
| 12 | Bearing | 1 | |

**Removing the rear shock absorber assembly**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 13 | Collar | 2 | |
| 14 | O-ring | 2 | |
| 15 | Dust seal | 2 | |
| 16 | Bushing | 1 | |
| 17 | Stopper ring | 1 | |

**Disassembling the relay arm**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 1 | Relay arm | 1 | |
| 2 | Connecting arm | 1 | |
| 3 | Collar | 3 | |
| 4 | Oil seal | 6 | |
| 5 | Washer | 8 | |
| 6 | Bearing | 6 | |

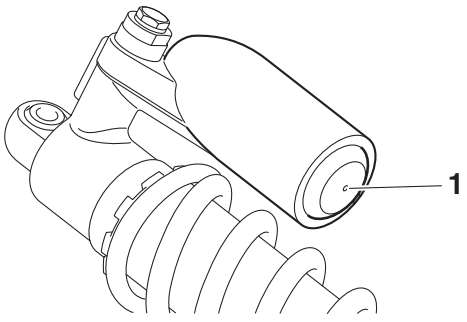
EAM30063
## HANDLING THE REAR SHOCK ABSORBER
EWA13740
**⚠ WARNING**

**This rear shock absorber contains highly compressed nitrogen gas. Before handling the rear shock absorber, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear shock absorber.**
- **Do not tamper or attempt to open the rear shock absorber.**
- **Do not subject the rear shock absorber to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.**
- **Do not deform or damage the rear shock absorber in any way. Rear shock absorber damage will result in poor damping performance.**

**TIP**

A break-in is required up to about 50 km of running.

EAM30064
## DISPOSING OF A REAR SHOCK ABSORBER
Before disposing the rear shock absorber, be sure to extract the nitrogen gas from valve "1".
EWA19340
**⚠ WARNING**
- **Wear protective glasses to prevent your eyes from damage due to possible gas or metal chips scattered.**
- **To dispose of a damaged or a worn-out rear shock absorber, take the unit to your Yamaha dealer for this disposal procedure.**




EAM30065
## REMOVING THE REAR SHOCK ABSORBER ASSEMBLY
1. Use a maintenance stand to raise the rear wheel off the ground.

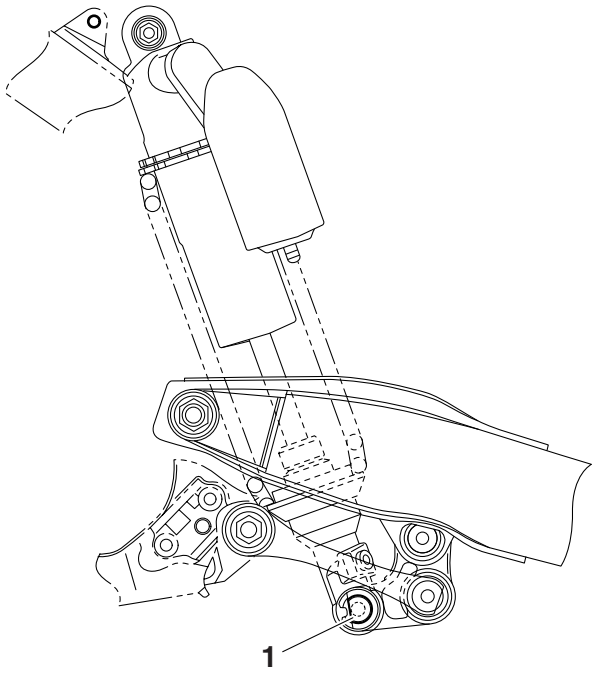
EWA13120
**⚠ WARNING**

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

2. Remove:
   - Rear shock absorber assembly lower bolt "1"

**TIP**

While removing the rear shock absorber assembly lower bolt, hold the swingarm so that it does not drop down.




3. Remove:
   - Rear shock absorber assembly upper bolt
   - Rear shock absorber assembly

EAM30067
## CHECKING THE REAR SHOCK ABSORBER ASSEMBLY
1. Check:
   - Rear shock absorber rod
     Bends/damage → Replace the rear shock absorber assembly.
   - Rear shock absorber
     Gas leaks/oil leaks → Replace the rear shock absorber assembly.
   - Spring
     Damage/wear → Replace.
   - Spring guide
     Damage/wear → Replace.
   - Bearing
     Damage/wear → Replace.
   - Bolt
     Bends/damage/wear → Replace.

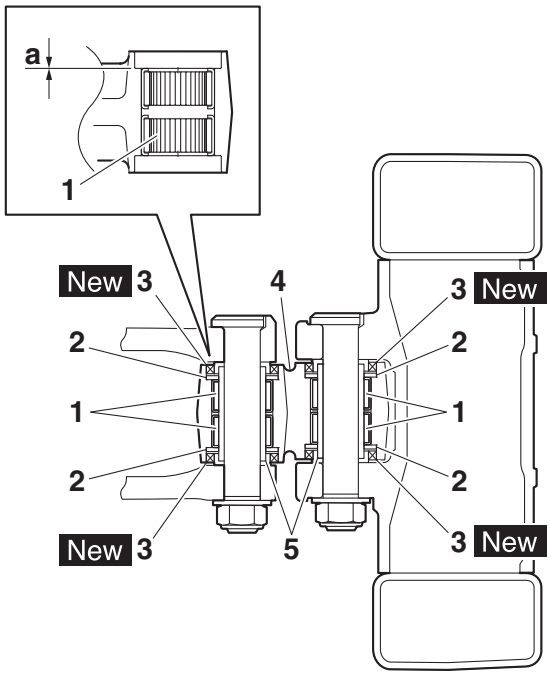
EAM30068
### CHECKING THE CONNECTING ARM AND RELAY ARM
1. Check:
   • Connecting arm
   • Relay arm
   Damage/wear → Replace.
2. Check:
   • Bearing
   • Collar
   Damage/pitting/scratches → Replace the bearings and collars as a set.
3. Check:
   • Oil seal
   Damage/pitting → Replace.

EAM30069
### INSTALLING THE RELAY ARM
1. Lubricate:
   • Oil seal
   • Bearing
   • Washer
   • Collar

| | |
|---|---|
| | **Recommended lubricant**<br>**Molybdenum disulfide grease** |

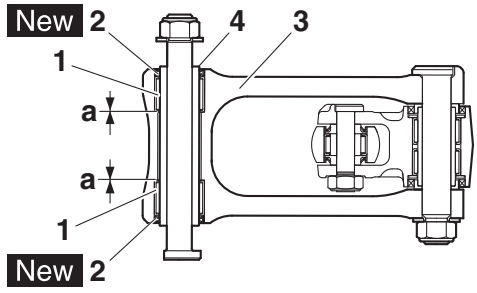
2. Install:
   • Bearing “1”
   • Washer “2”
   • Oil seal “3” New
   (into the relay arm “4”)
   • Collar “5”

| | |
|---|---|
| | **Installed depth “a”**<br>**0 mm (0 in)** |




3. Install:
   • Bearing “1”
   • Oil seal “2” New
   (into the connecting arm “3”)
   • Collar “4”

| | |
|---|---|
| | **Installed depth “a”**<br>**0 mm (0 in)** |




EAM30070
### INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY
1. Lubricate:
   • Bearing (lower side)
   • Dust seal

| | |
|---|---|
| | **Recommended lubricant**<br>**Molybdenum disulfide grease** |

ECA24580
***NOTICE***
**Do not apply the grease to the bearing outer race because it will wear the rear shock absorber surface on which the bearing is press**

**fitted.**

2. Lubricate:
   • O-ring

| | |
|---|---|
| | **Recommended lubricant**<br>**Lithium-soap-based grease** |

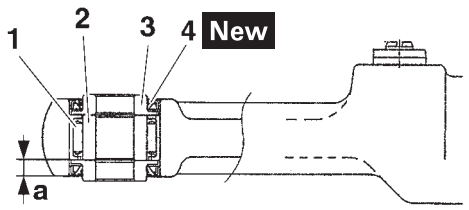
3. Install:
   • Bushing
   • Stopper ring
   (into the rear shock absorber assembly (upper side))

**TIP**
- Install the bushing parallel until the stopper ring groove appears by pressing its outer race.
- After installing the stopper ring, push back the bushing until it contacts the stopper ring.

4. Install:
   • Bearing "1"
   • Bushing "2"
   • Collar "3"
   • Dust seal "4" New
   (into the rear shock absorber assembly (lower side))

**TIP**
Install the dust seals with their lips facing inward.

| | |
|---|---|
| | **Installed depth "a"**<br>**4.25 mm (0.17 in)** |




5. Lubricate:
   • Connecting arm and frame bolt
   • Relay arm and connecting arm bolt
   • Relay arm and swingarm bolt
   (circumference and threaded portion)
   • Rear shock absorber assembly upper bolt
   • Rear shock absorber assembly lower bolt

| | |
|---|---|
| | **Recommended lubricant**<br>**Molybdenum disulfide grease** |

6. Install:
   • Rear shock absorber assembly

**TIP**
- When installing the rear shock absorber assembly, lift up the swingarm.
- Install the rear shock absorber assembly upper bolt, and connecting arm bolt (frame side) from the right.
- Install the rear shock absorber assembly lower bolts, connecting arm bolt (relay arm side), and relay arm bolt (swingarm side) from the left.

7. Tighten:
   • Rear shock absorber assembly upper nut

| | |
|---|---|
| | **Rear shock absorber assembly upper nut**<br>**56 N·m (5.6 kgf·m, 41 lb·ft)** |

   • Connecting arm nut (frame side)

| | |
|---|---|
| | **Connecting arm nut (frame side)**<br>**80 N·m (8.0 kgf·m, 59 lb·ft)** |

   • Connecting arm nut (relay arm side)

| | |
|---|---|
| | **Connecting arm nut (relay arm side)**<br>**80 N·m (8.0 kgf·m, 59 lb·ft)** |

   • Relay arm nut (swingarm side)

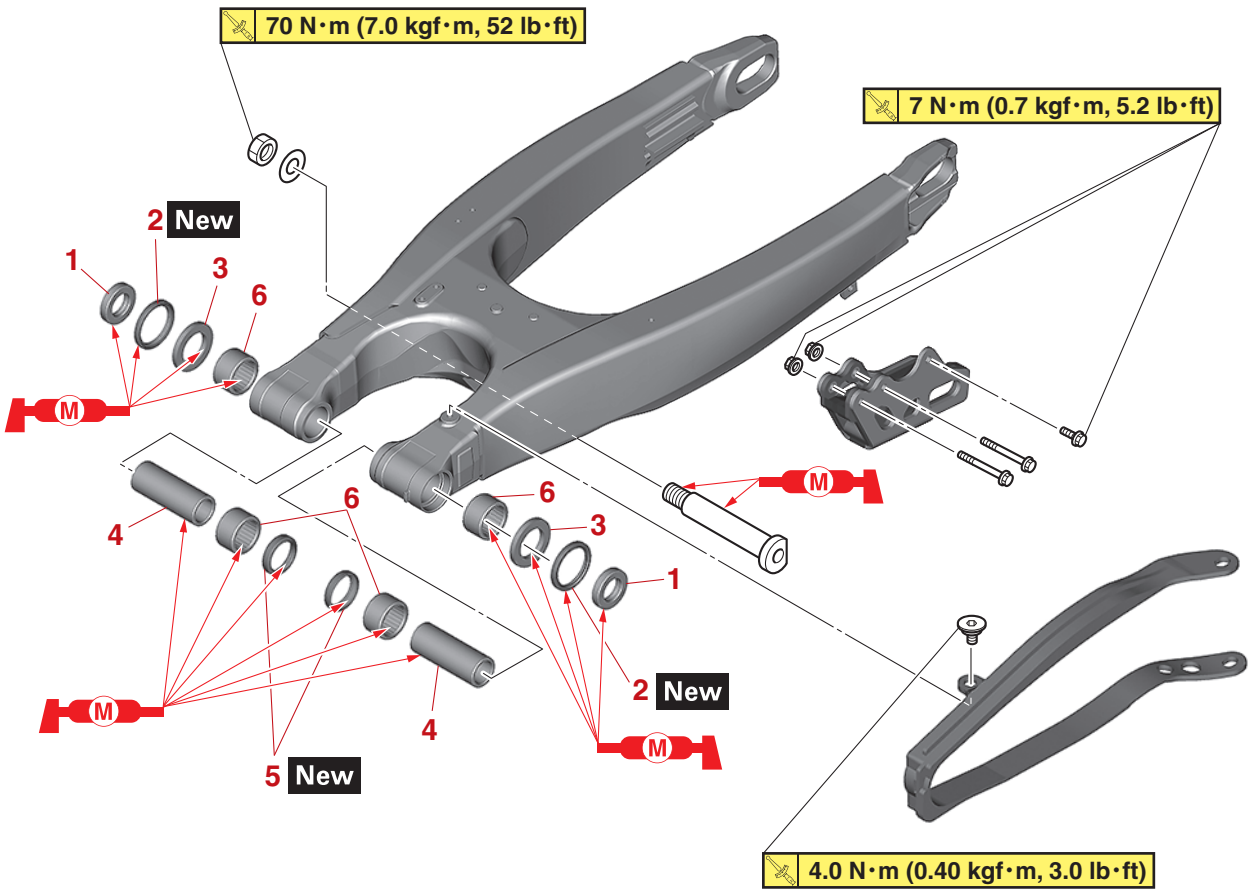
| | |
|---|---|
| | **Relay arm nut (swingarm side)**<br>**70 N·m (7.0 kgf·m, 52 lb·ft)** |

   • Rear shock absorber assembly lower nut

| | |
|---|---|
| | **Rear shock absorber assembly lower nut**<br>**53 N·m (5.3 kgf·m, 39 lb·ft)** |

EAM20103
# SWINGARM

## Removing the swingarm




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | | | Use a maintenance stand to raise the rear wheel off the ground. |
| | Brake hose holder | | Refer to "REAR BRAKE" on page 4-24. |
| | Rear brake caliper | | Refer to "REAR BRAKE" on page 4-24. |
| | Bolt (brake pedal) | | Refer to "ENGINE REMOVAL" on page 5-6. |
| | Drive chain | | Refer to "CHAIN DRIVE" on page 4-67. |
| 1 | Collar | 2 | |
| 2 | Oil seal | 2 | |
| 3 | Thrust bearing | 2 | |
| 4 | Bushing | 2 | |
| 5 | Oil seal | 2 | |
| 6 | Bearing | 4 | |

EAM30071
## REMOVING THE SWINGARM

1. Use a maintenance stand to raise the rear wheel off the ground.

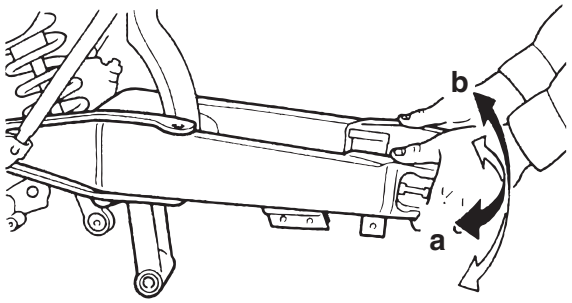
EWA13120
**⚠ WARNING**

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

2. Measure:
   - Swingarm side play
   - Swingarm vertical movement
   a. Measure the tightening torque of the pivot shaft nut.

| | |
|---|---|
| | **Pivot shaft nut**<br>**85 N·m (8.5 kgf·m, 63 lb·ft)** |

   b. Check the swingarm side play "a" by moving the swingarm from side to side. If the swingarm has side-to-side play, check the bushings, the bearings, and the collars.
   c. Check the swingarm vertical movement "b" by moving the swingarm up and down. If swingarm vertical movement is not smooth or if there is binding, check the bushings, the bearings, and the collars.




EAM30073
## CHECKING THE SWINGARM

1. Check:
   - Swingarm
   Bends/cracks/damage → Replace.
2. Check:
   - Pivot shaft
   Roll the pivot shaft on a flat surface.
   Bends → Replace.

EWA13770
**⚠ WARNING**

**Do not attempt to straighten a bent pivot shaft.**

3. Wash with kerosene:
   - Pivot shaft
   - Bushing
   - Collar
   - Bearing
4. Check:
   - Oil seal
   Damage → Replace.
   - Bearing
   - Bushing
   Free play exists/unsmooth revolution/rust → Replace bearing and bushing as a set.

EAM30074
## INSTALLING THE SWINGARM

1. Lubricate:
   - Bearing
   - Thrust bearing
   - Collar
   - Bushing
   - Oil seal
   - Pivot shaft

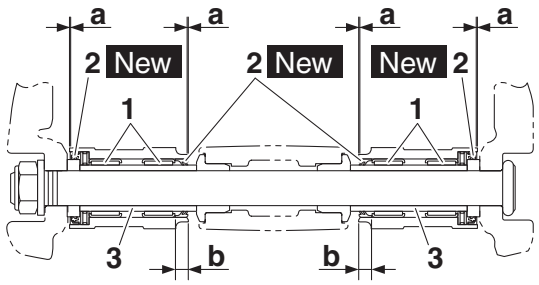
| | |
|---|---|
| | **Recommended lubricant**<br>**Molybdenum disulfide grease** |

2. Install:
   - Bearing "1"
   - Oil seal "2" New
   (to the swingarm)
   - Collar "3"

| | |
|---|---|
| | **Installed depth "a"**<br>**0–0.5 mm (0–0.02 in)**<br>**Installed depth "b"**<br>**6.5 mm (0.26 in)** |

**TIP**

First install the outer and then the inner bearings to a specified depth from inside.




3. Install:
   - Swingarm

| | |
|---|---|
| | **Pivot shaft nut**<br>**85 N·m (8.5 kgf·m, 63 lb·ft)** |

**TIP**

Install the pivot shaft from the right.

4. Install:
   • Rear wheel
   Refer to “REAR WHEEL” on page 4-9.
5. Adjust:
   • Drive chain slack
   Refer to “DRIVE CHAIN SLACK” on page 3-26.

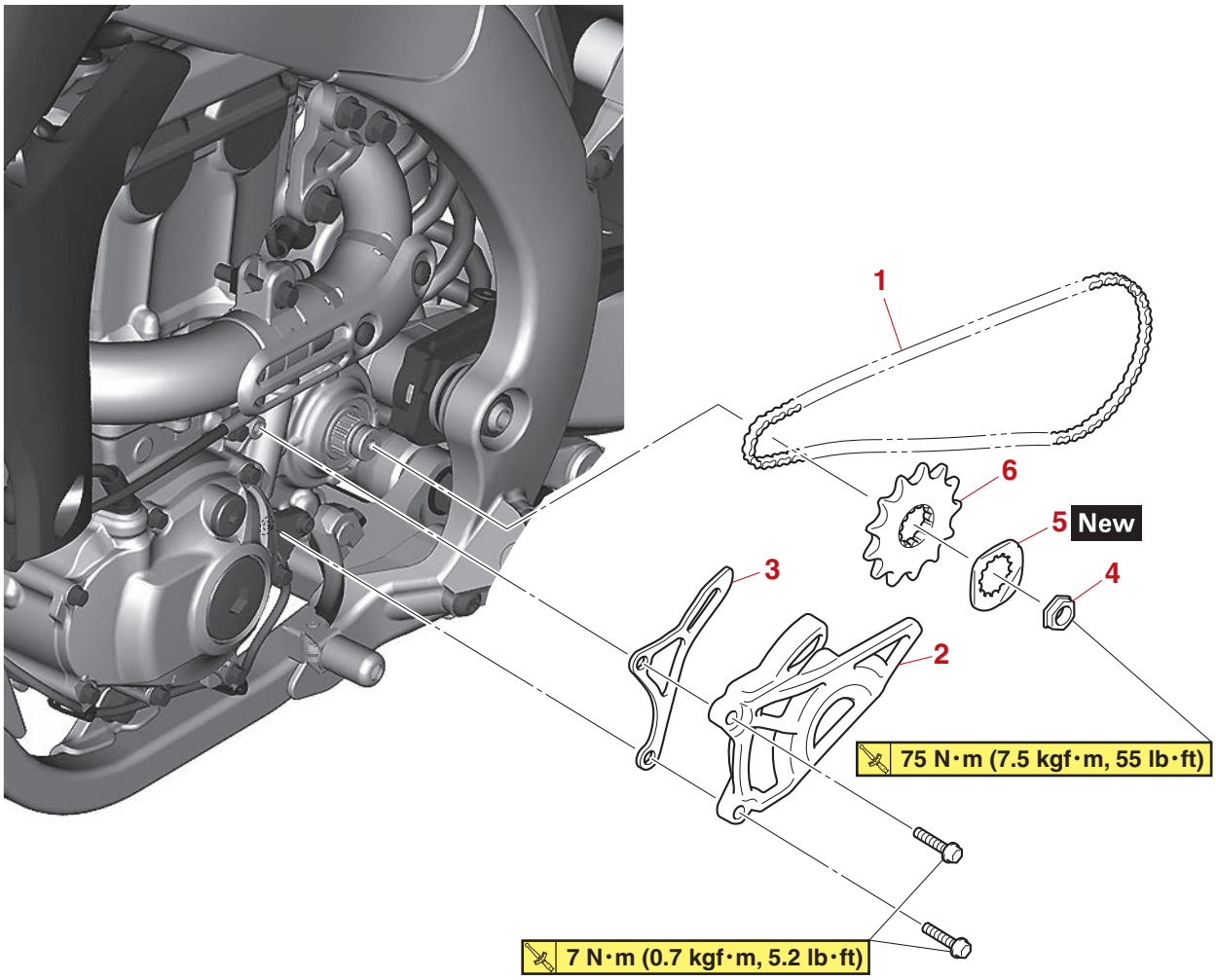


**Drive chain slack (Maintenance Stand)**
**50.0–60.0 mm (1.97–2.36 in)**

EAM20104

# CHAIN DRIVE

**Removing the drive chain**



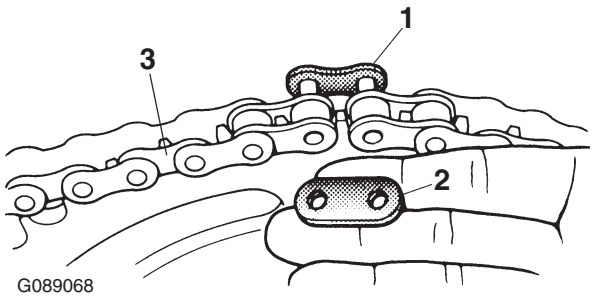

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Drive sprocket | | Refer to "ENGINE REMOVAL" on page 5-6. |
| 1 | Drive chain | 1 | |
| 2 | Drive sprocket cover | 1 | |
| 3 | Bracket | 1 | |
| 4 | Drive sprocket nut | 1 | |
| 5 | Lock washer | 1 | |
| 6 | Drive sprocket | 1 | |

EAM30075
## REMOVING THE DRIVE CHAIN
1. Stand the vehicle on a level surface.

EWA13120
**⚠ WARNING**

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

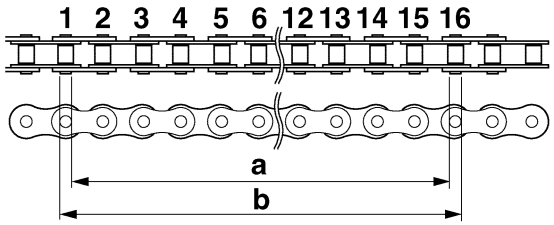
2. Remove:
   - Master link clip
   - Master link "1"
   - Master link plate "2"
   - Drive chain "3"



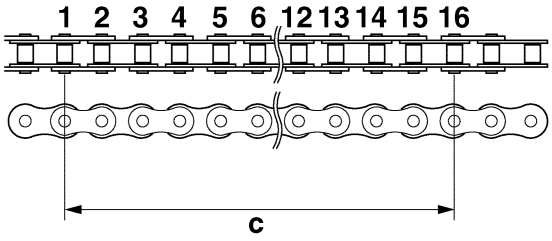

EAM30076
## CHECKING THE DRIVE CHAIN
1. Measure:
   - 15-link section of the drive chain
     Out of specification → Replace the drive chain.

| | |
|---|---|
| | **15-link length limit**<br>**242.9 mm (9.56 in)** |

   a. Measure the length "a" between the inner sides of the pins and the length "b" between the outer sides of the pins on a 15-link section of the drive chain as shown in the illustration.

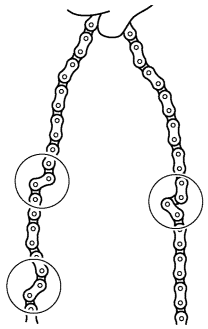



   b. Calculate the length "c" of the 15-link section of the drive chain using the following formula.
      Drive chain 15-link section length "c" = (length "a" between pin inner sides + length "b" between pin outer sides)/2

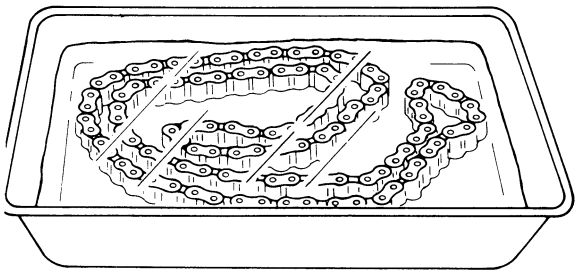



**TIP**
- When measuring a 15-link section of the drive chain, make sure that the drive chain is taut.
- Perform this procedure 2–3 times, at a different location each time.

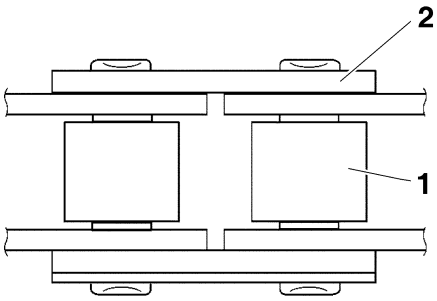
2. Check:
   - Drive chain
     Stiffness → Clean, lubricate, or replace.



3. Clean:
   - Drive chain
     a. Wipe the drive chain with a clean cloth.
     b. Put the drive chain in kerosene and remove any remaining dirt.
     c. Remove the drive chain from the kerosene and completely dry it.

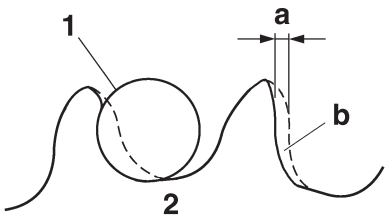


4. Check:
   - Drive chain roller "1"
     Damage/wear → Replace the drive chain.
   - Drive chain side plate "2"
     Damage/wear → Replace the drive chain.




5. Lubricate:
   • Drive chain

EAM30077
### CHECKING THE DRIVE SPROCKET
1. Check:
   • Drive sprocket
   More than 1/4 tooth wear “a” → Replace the drive sprocket and the rear wheel sprocket as a set.
   Bent tooth → Replace the drive sprocket and the rear wheel sprocket as a set.




b. Correct

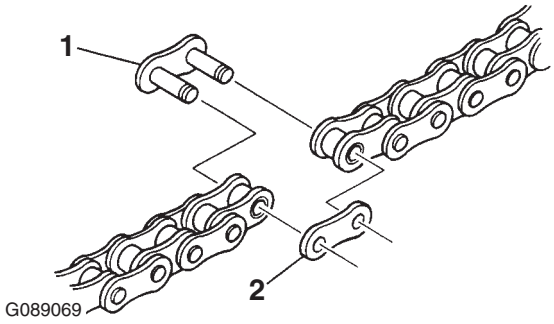
1. Drive chain roller
2. Drive sprocket

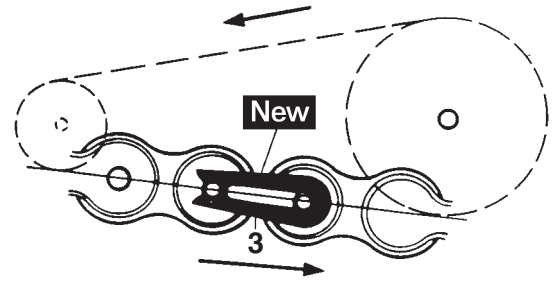
EAM30078
### CHECKING THE REAR WHEEL SPROCKET
Refer to “CHECKING AND REPLACING THE REAR WHEEL SPROCKET” on page 4-10.

EAM30079
### INSTALLING THE DRIVE CHAIN
1. Install:
   • Master link “1”
   • Master link plate “2”
   • Master link clip “3” New

EWA20250
**⚠ WARNING**

**When installing the joint clip, always keep the direction as shown in the figure.**




2. Lubricate:
   • Drive chain
3. Install:
   • Drive sprocket
   • Lock washer New
   • Drive sprocket nut
   Refer to “ENGINE REMOVAL” on page 5-6.

| | |
|---|---|
| | **Drive sprocket nut**<br>**75 N·m (7.5 kgf·m, 55 lb·ft)** |

ECA14300
***NOTICE***

**Never install a new drive chain onto worn drive chain sprockets; this will dramatically shorten the drive chain’s life.**

4. Adjust:
   • Drive chain slack
   Refer to “DRIVE CHAIN SLACK” on page 3-26.

| | |
|---|---|
| | **Drive chain slack (Maintenance Stand)**<br>**50.0–60.0 mm (1.97–2.36 in)** |

ECA24590
***NOTICE***

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

# ENGINE


**LUBRICATION SYSTEM CHART AND DIAGRAMS** .....5-1
ENGINE OIL LUBRICATION CHART.....5-1
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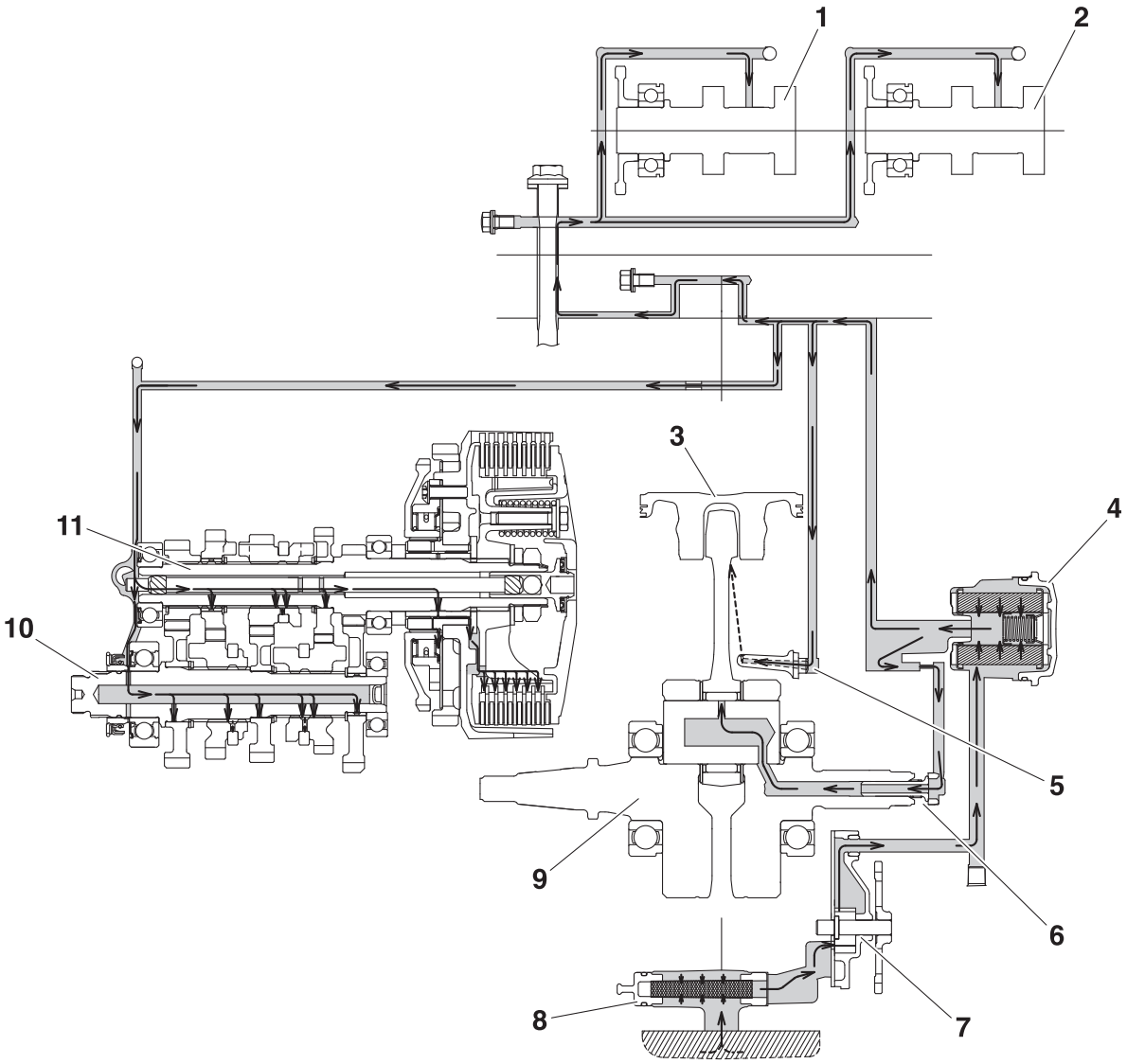
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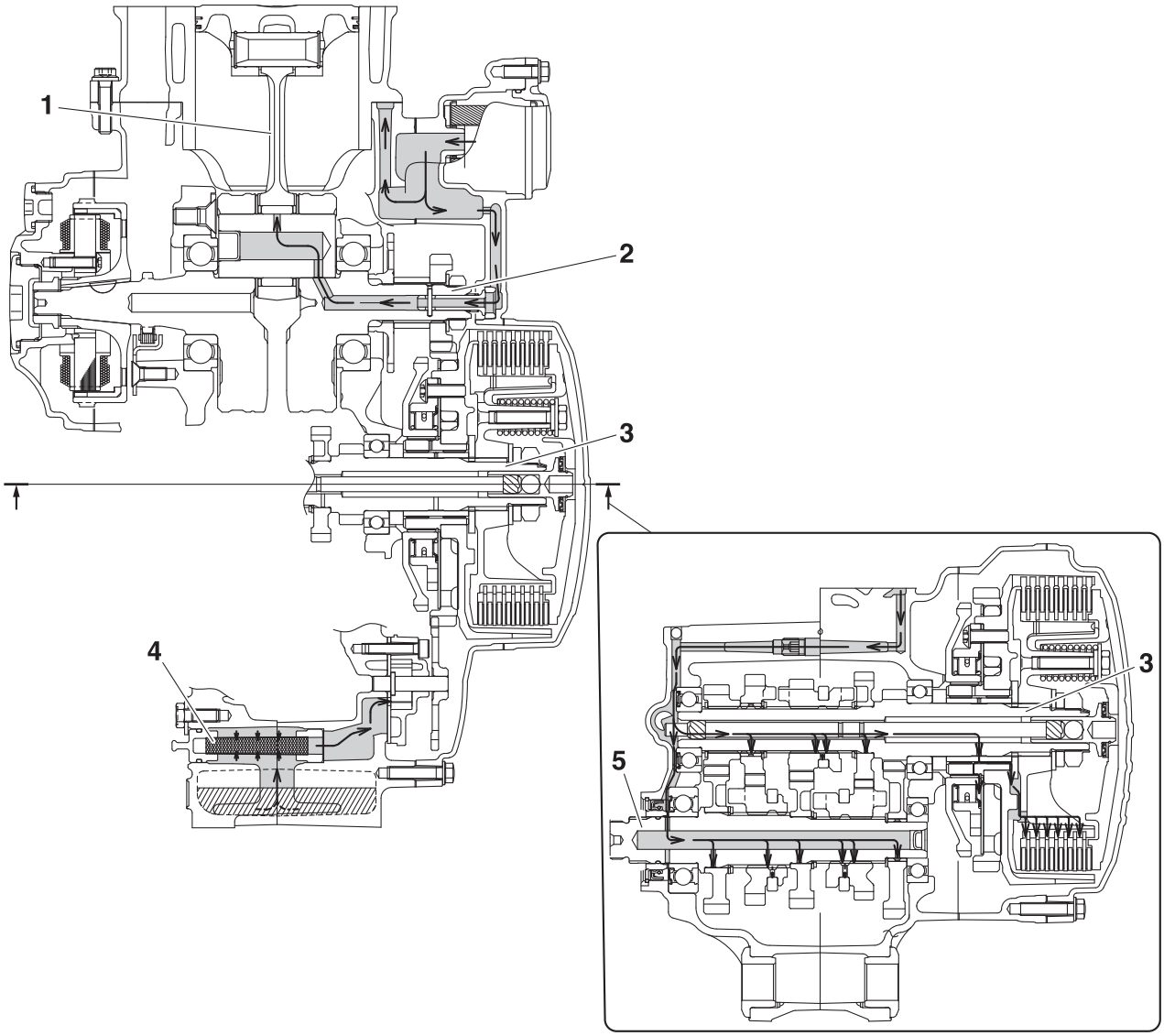
EAM20185
# LUBRICATION SYSTEM CHART AND DIAGRAMS

EAM30526
## ENGINE OIL LUBRICATION CHART

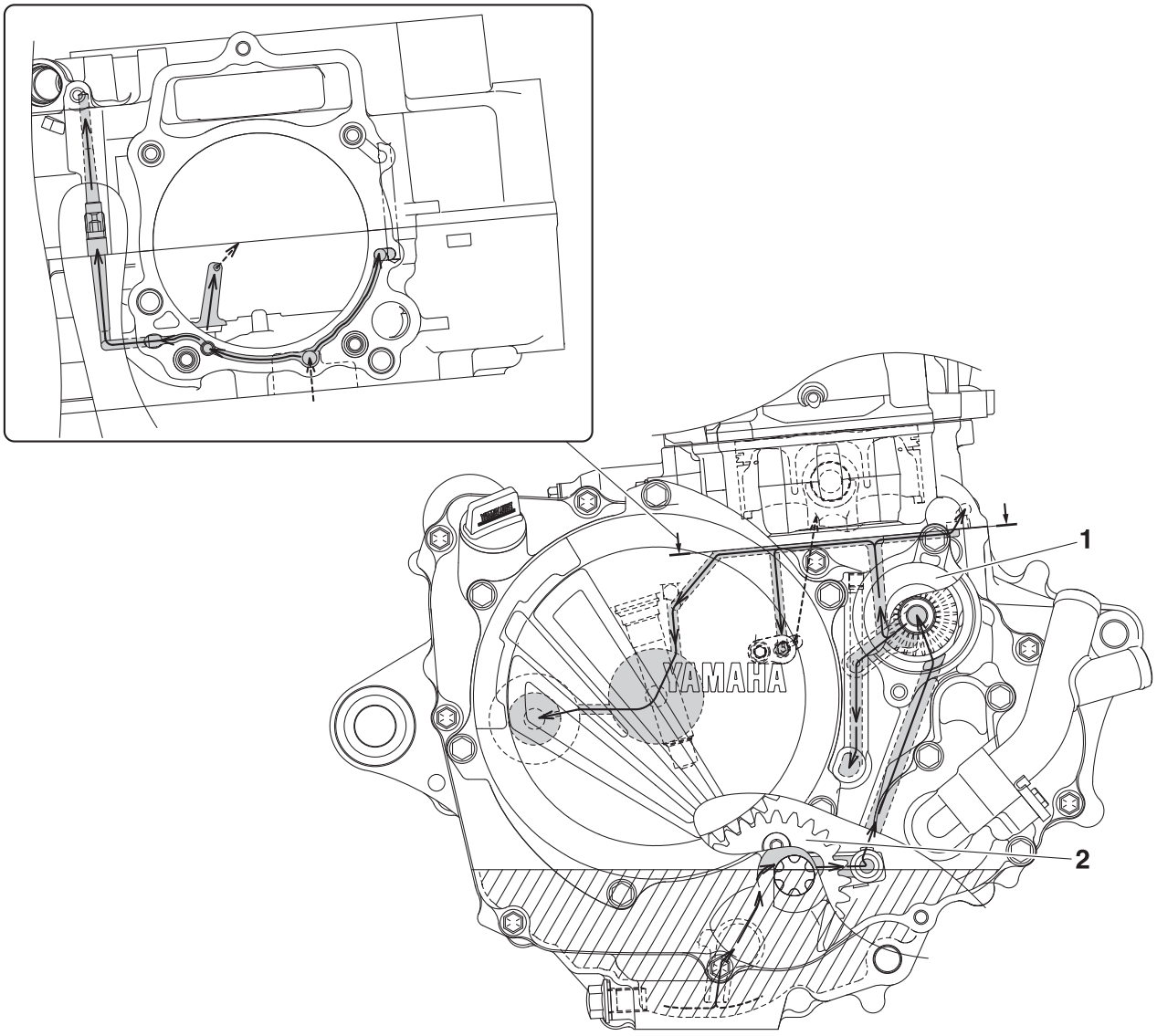



1. Intake camshaft
2. Exhaust camshaft
3. Piston
4. Oil filter element
5. Oil nozzle
6. Relief valve
7. Oil pump
8. Oil strainer
9. Crankshaft
10. Drive axle
11. Main axle

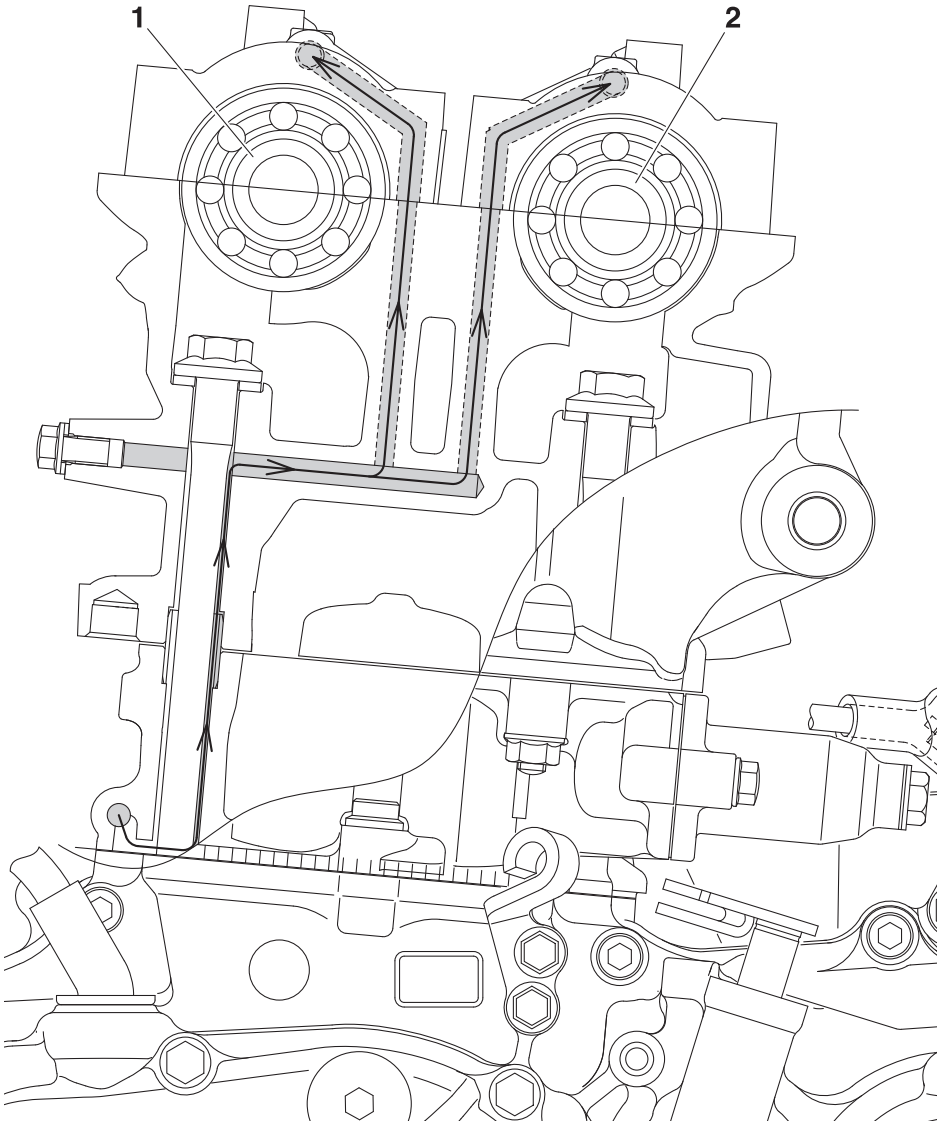
EAM30507
## LUBRICATION DIAGRAMS



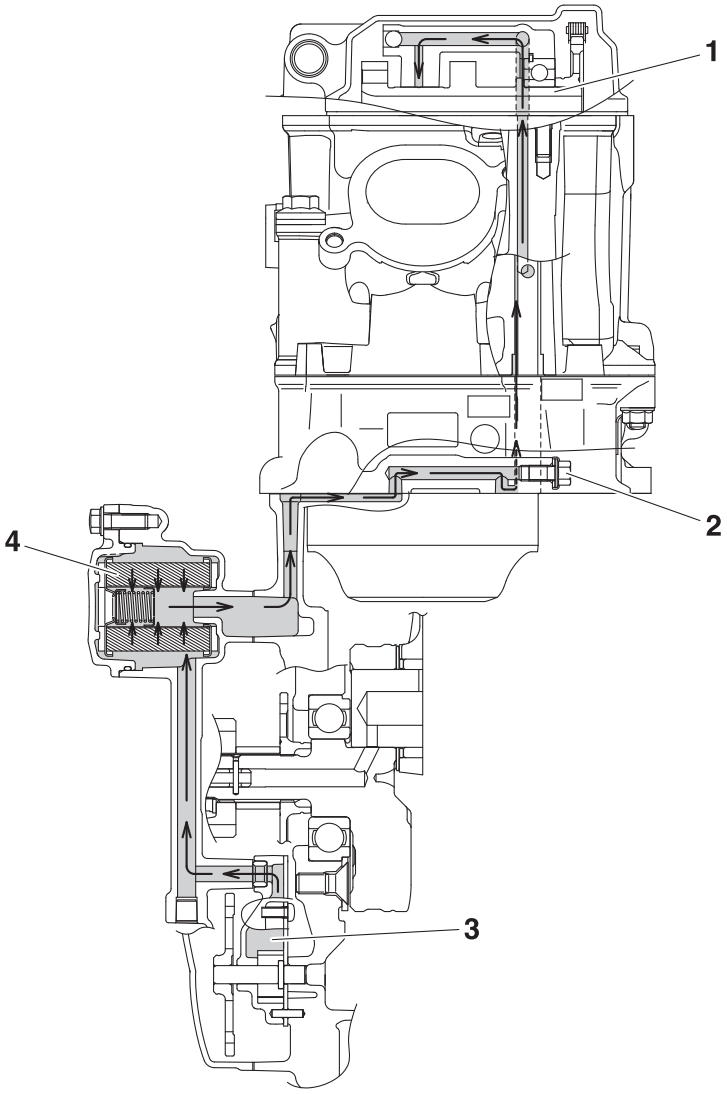

1. Connecting rod
2. Crankshaft
3. Main axle
4. Oil strainer
5. Drive axle




1. Oil filter element
2. Oil pump




1. Intake camshaft
2. Exhaust camshaft

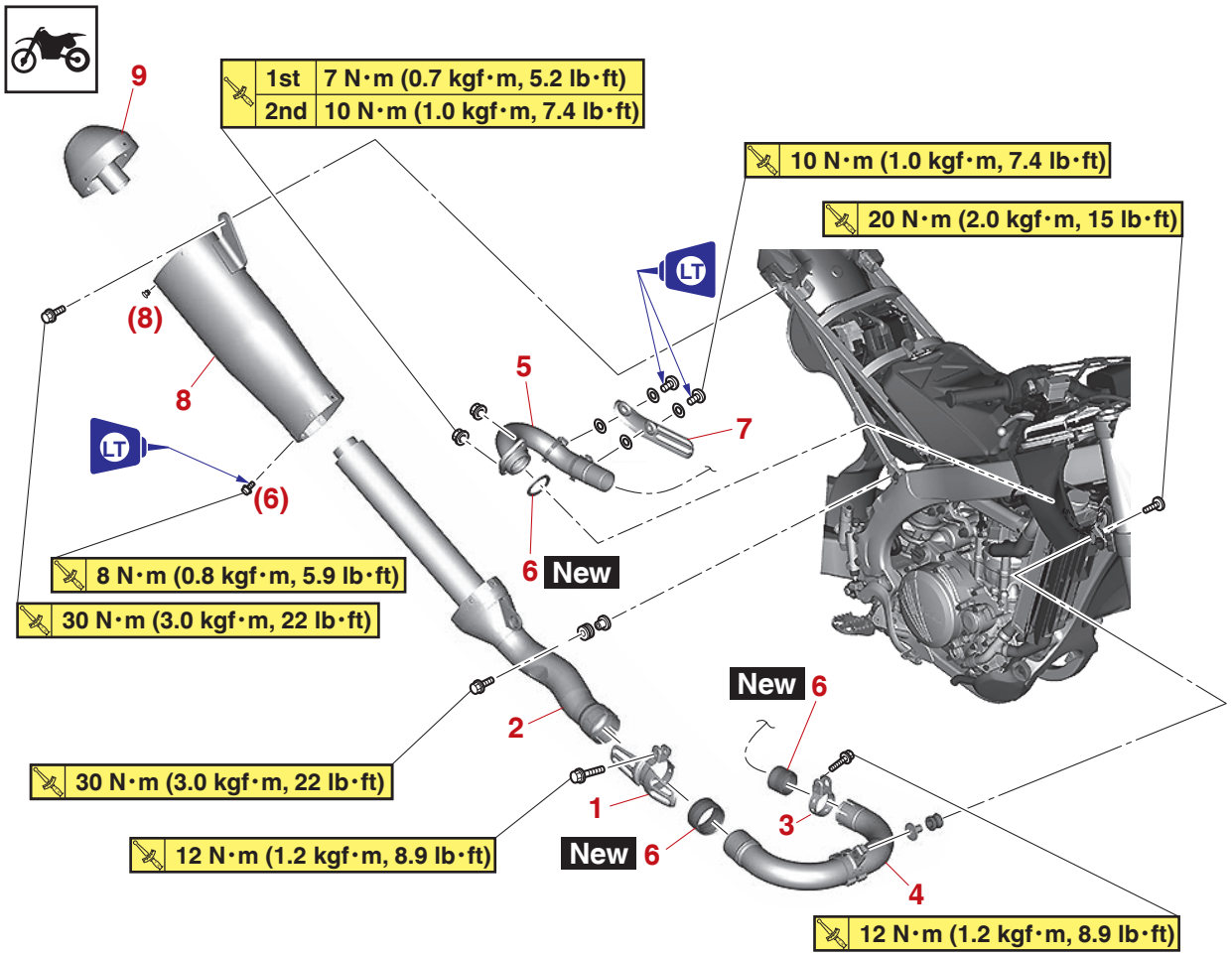



1. Camshaft
2. Oil pressure check bolt
3. Oil pump
4. Oil filter element

EAM20105

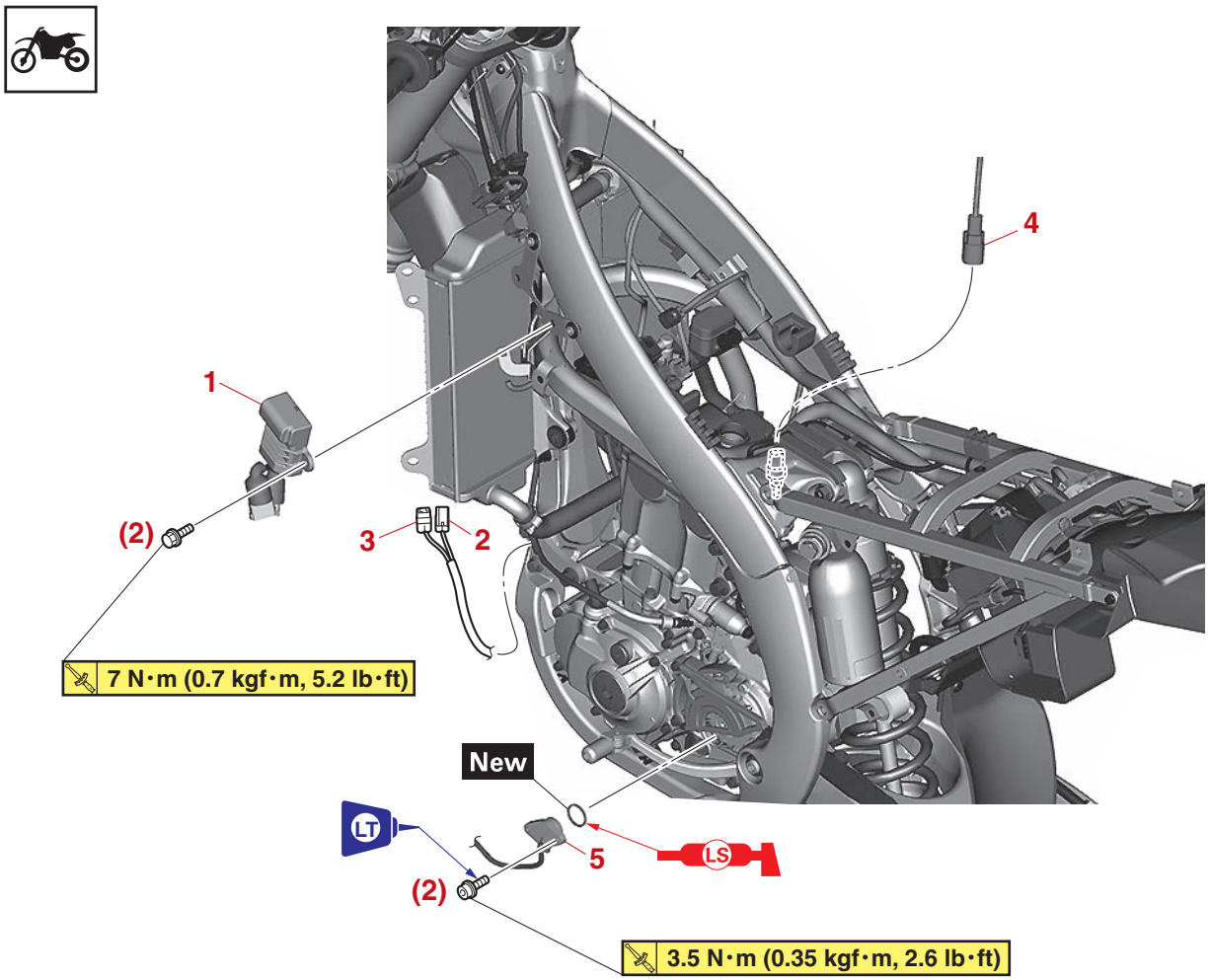
# ENGINE REMOVAL

**Removing the exhaust pipe**



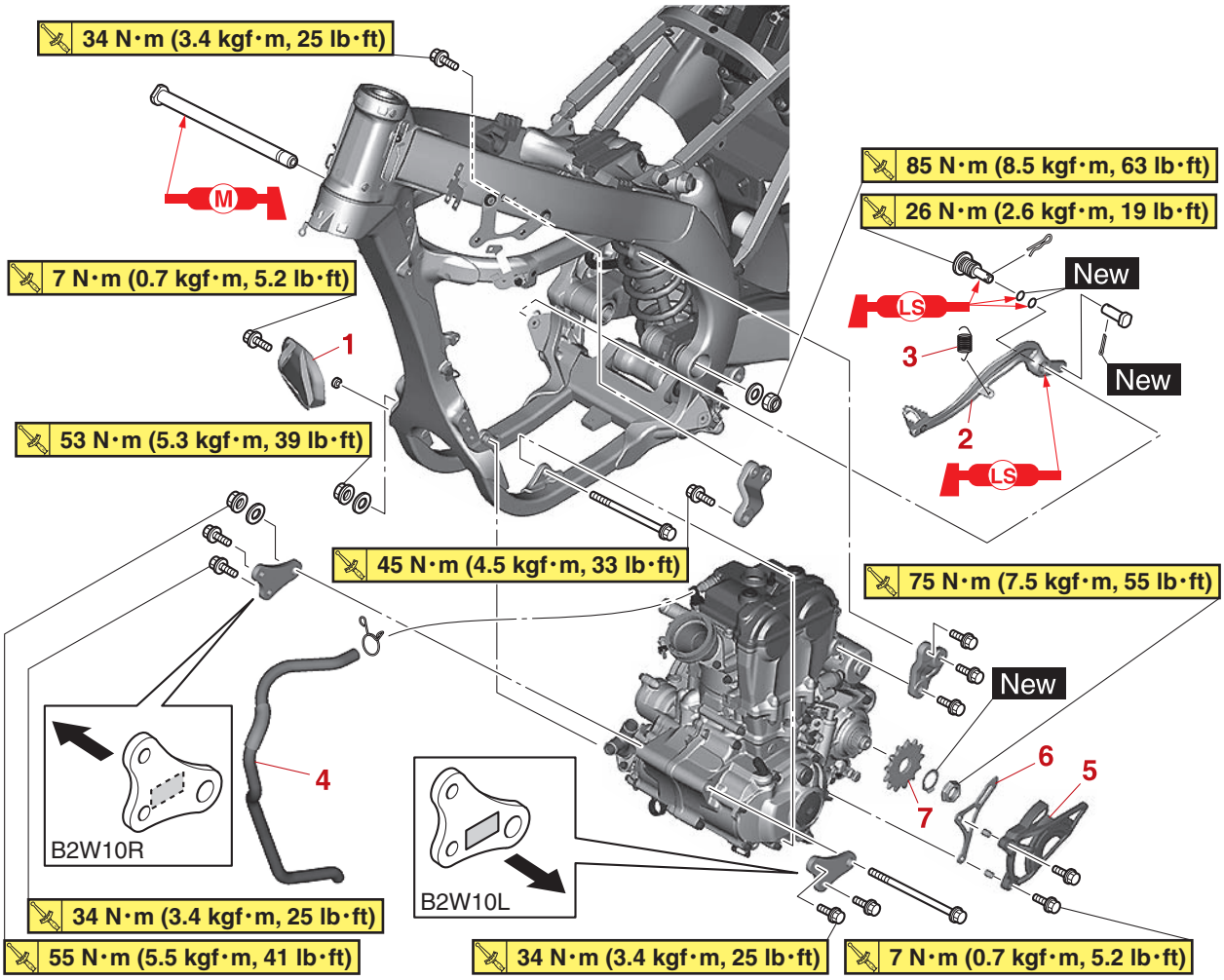

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | | | Refer to "INSTALLING THE EXHAUST PIPE AND MUFFLER" on page 5-11. |
| | Side cover (right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Rear shock absorber assembly lower bolt | | Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-58. |
| | Connecting arm bolt (frame side) | | Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-58. |
| 1 | Silencer clamp | 1 | Loosen. |
| 2 | Silencer | 1 | |
| 3 | Exhaust pipe 2 clamp | 1 | Loosen. |
| 4 | Exhaust pipe 2 | 1 | |
| 5 | Exhaust pipe 1 | 1 | |
| 6 | Gasket | 3 | |
| 7 | Exhaust pipe 1 protector | 1 | |
| 8 | Silencer body | 1 | |
| 9 | Silencer cap | 1 | |

**Removing the electronic parts**



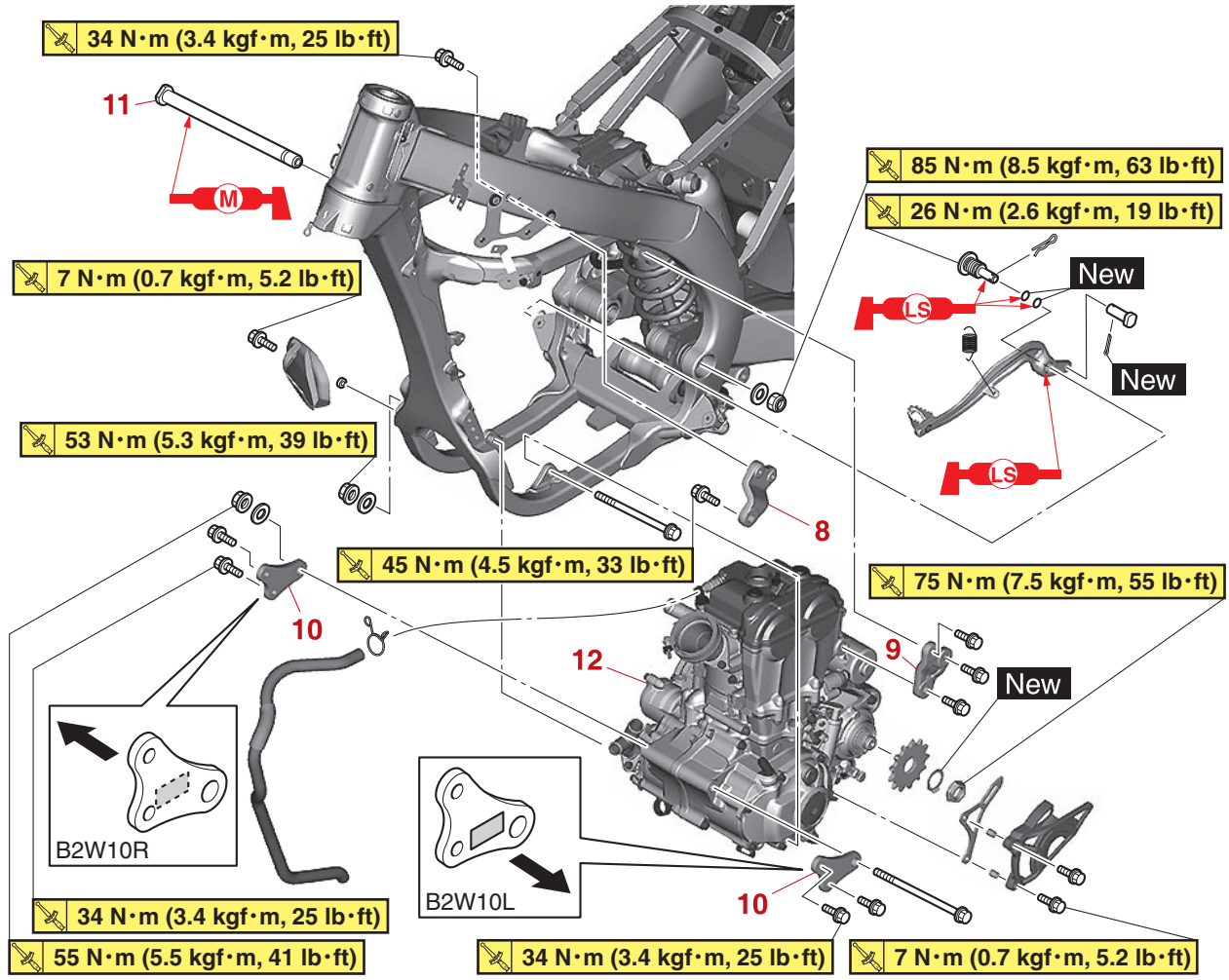

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | | | Use a maintenance stand to raise the front wheel off the ground. |
| | Seat | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Side cover (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Air scoop (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| | Air filter case cover | | Refer to "CLEANING THE AIR FILTER ELEMENT" on page 3-15. |
| | Intake air temperature sensor coupler | | Refer to "THROTTLE BODY" on page 7-4. |
| | ECU (Engine Control Unit) | | Refer to "THROTTLE BODY" on page 7-4. |
| | Ignition coil | | Refer to "THROTTLE BODY" on page 7-4. |
| 1 | Rectifier/regulator | 1 | |
| 2 | Stator coil assembly coupler | 1 | Disconnect. |
| 3 | Crankshaft position sensor coupler | 1 | Disconnect. |
| 4 | Coolant temperature sensor coupler | 1 | |
| 5 | Gear position switch | 1 | |

**Removing the engine**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | | | Use a maintenance stand to raise the front wheel off the ground. |
| | Seat | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Side cover (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Air scoop (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| | Exhaust pipe/Silencer | | Refer to "ENGINE REMOVAL" on page 5-6. |
| | Air filter case | | Refer to "THROTTLE BODY" on page 7-4. |
| | Throttle body | | Refer to "THROTTLE BODY" on page 7-4. |
| | Clutch cable | | Refer to "CLUTCH" on page 5-47. |
| | Shift pedal/Drive chain | | Refer to "SHIFT SHAFT" on page 5-55. Refer to "CHAIN DRIVE" on page 4-67. |
| 1 | Engine guard | 1 | |
| 2 | Brake pedal | 1 | |
| 3 | Spring | 1 | |
| 4 | Cylinder head breather hose | 1 | |
| 5 | Drive sprocket cover | 1 | |
| 6 | Drive chain guide | 1 | |
| 7 | Drive sprocket | 1 | |

**Removing the engine**

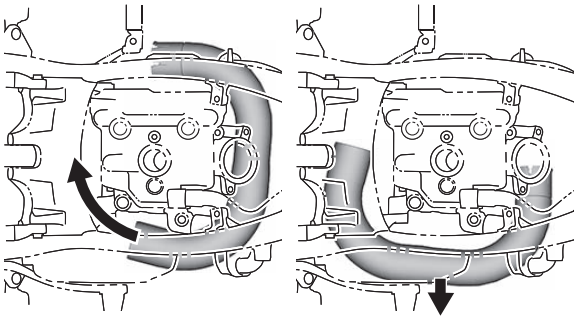



| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 8 | Upper engine bracket (right) | 1 | |
| 9 | Upper engine bracket (left) | 1 | |
| 10 | Lower engine bracket | 2 | |
| 11 | Pivot shaft | 1 | |
| 12 | Engine | 1 | |

EAM30161
## REMOVING THE ENGINE

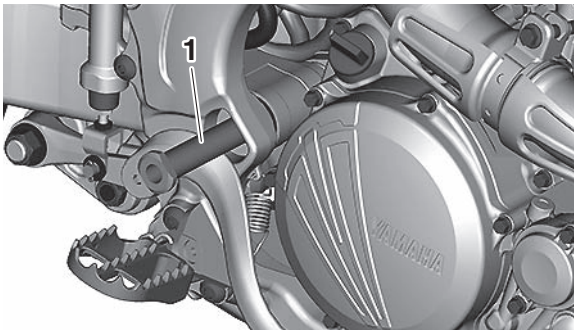
1. Remove:
   • Exhaust pipe 2

**TIP**
Put the exhaust pipe 2 into the state as shown by moving this, and then remove it.



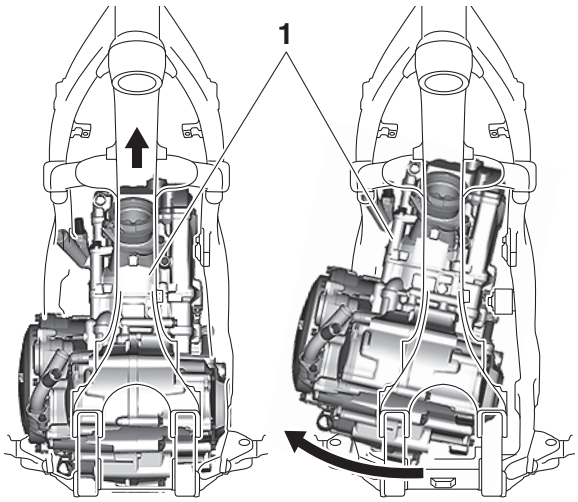
2. Remove:
   • Pivot shaft “1”

**TIP**
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.




3. Remove:
   • Engine “1”
   (from the right side)

**TIP**
- Make sure that the couplers, the hoses, and the cables are disconnected.
- Lift up the engine, and remove this from its lower part toward the right of the chassis.




EAM30164
## INSTALLING THE ENGINE

1. Install:
   • Engine “1”
   (from the right side)
   • Pivot shaft “2”

| | |
|---|---|
| | **Pivot shaft nut**<br>**85 N·m (8.5 kgf·m, 63 lb·ft)** |

   • Engine mounting bolt (lower side) “3”

| | |
|---|---|
| | **Engine mounting bolt (lower side)**<br>**53 N·m (5.3 kgf·m, 39 lb·ft)** |

   • Lower engine bracket “4”
   • Engine bracket bolt (front side) “5”

| | |
|---|---|
| | **Engine bracket bolt (front side)**<br>**34 N·m (3.4 kgf·m, 25 lb·ft)** |

   • Engine mounting bolt (front side) “6”

| | |
|---|---|
| | **Engine mounting bolt (front side)**<br>**55 N·m (5.5 kgf·m, 41 lb·ft)** |

   • Upper engine bracket “7”
   • Engine bracket bolt (upper side) “8”

| | |
|---|---|
| | **Engine bracket bolt (upper side)**<br>**34 N·m (3.4 kgf·m, 25 lb·ft)** |

   • Engine mounting bolt (upper side) “9”

| | |
|---|---|
| | **Engine mounting bolt (upper side)**<br>**45 N·m (4.5 kgf·m, 33 lb·ft)** |

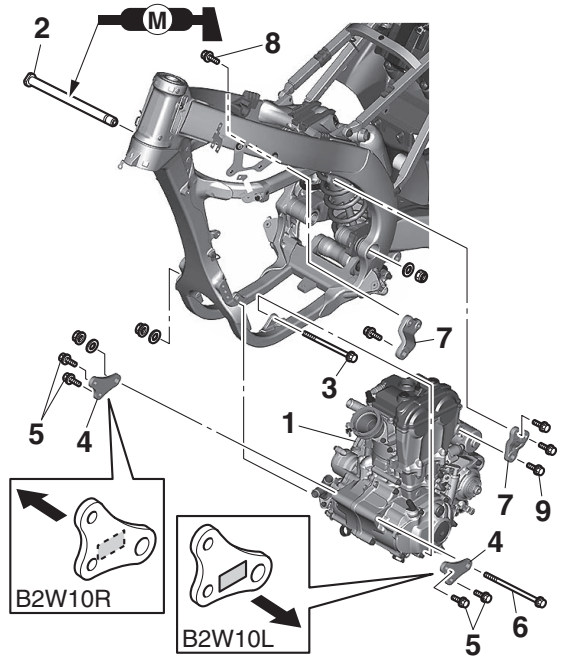
ECA27180

***NOTICE***

**Install the lower engine brackets with their stamps facing outward.**

**TIP**

Apply molybdenum disulfide grease to the pivot shaft.




EAM30167

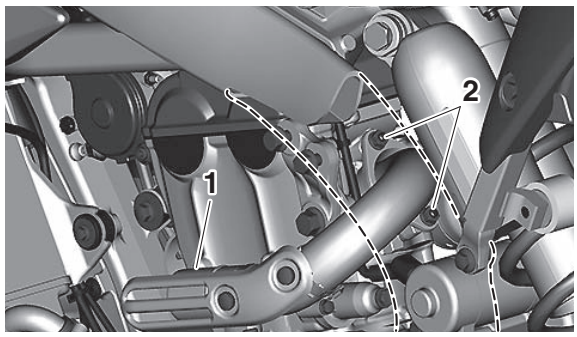
## INSTALLING THE EXHAUST PIPE AND MUFFLER

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

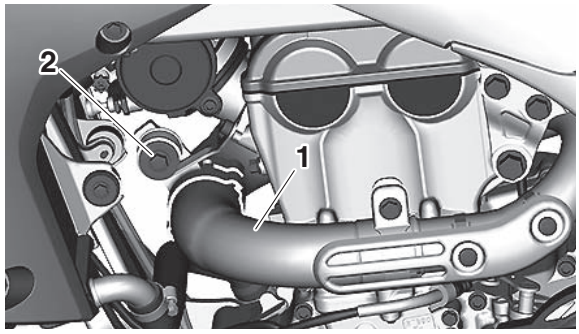
| | |
|---|---|
| | **Nut (exhaust pipe 1)**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

**TIP**

First temporarily tighten all nuts to 7 N·m (0.7 kgf·m, 5.2 lb·ft). Then retighten them to 10 N·m (1.0 kgf·m, 7.4 lb·ft).

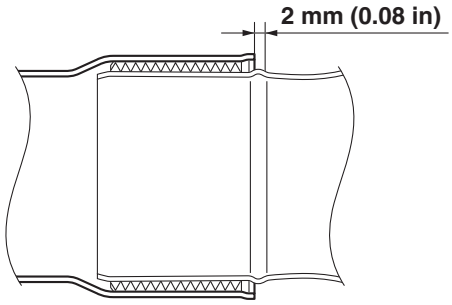



2. Install:
   - Clamp
   - Exhaust pipe 2 “1”
   - Bolt (exhaust pipe 2) “2”



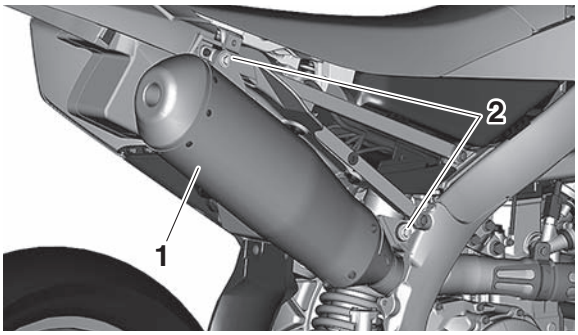

**TIP**

Install and temporarily tighten the exhaust pipe 2 and silencer with its end positioned as shown with respect to the exhaust pipe 1 and 2.



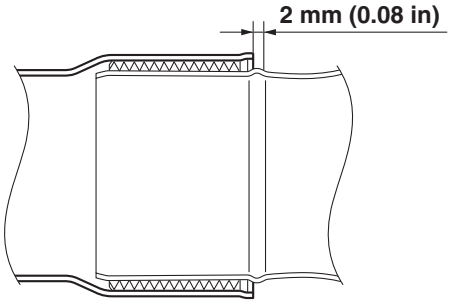

3. Install:
   - Clamp
   - Silencer “1”
   - Bolt (silencer) “2”

| | |
|---|---|
| | **Bolt (silencer)**<br>**30 N·m (3.0 kgf·m, 22 lb·ft)** |




**TIP**

Install and temporarily tighten the silencer so that its joint is positioned as shown with respect to the exhaust pipe 2.




4. Tighten:
   • Bolt (exhaust pipe 2)

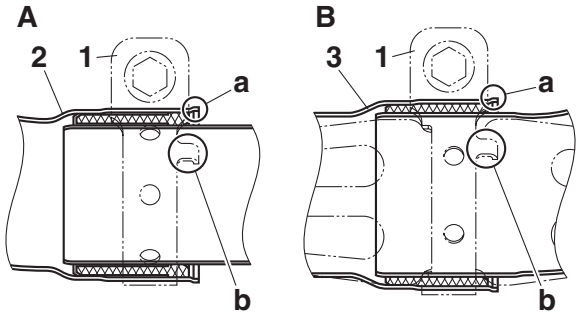
| | |
|---|---|
| | **Bolt (exhaust pipe 2)**<br>**20 N·m (2.0 kgf·m, 15 lb·ft)** |

   • Clamp "1"

| | |
|---|---|
| | **Clamp**<br>**12 N·m (1.2 kgf·m, 8.9 lb·ft)** |

**TIP**

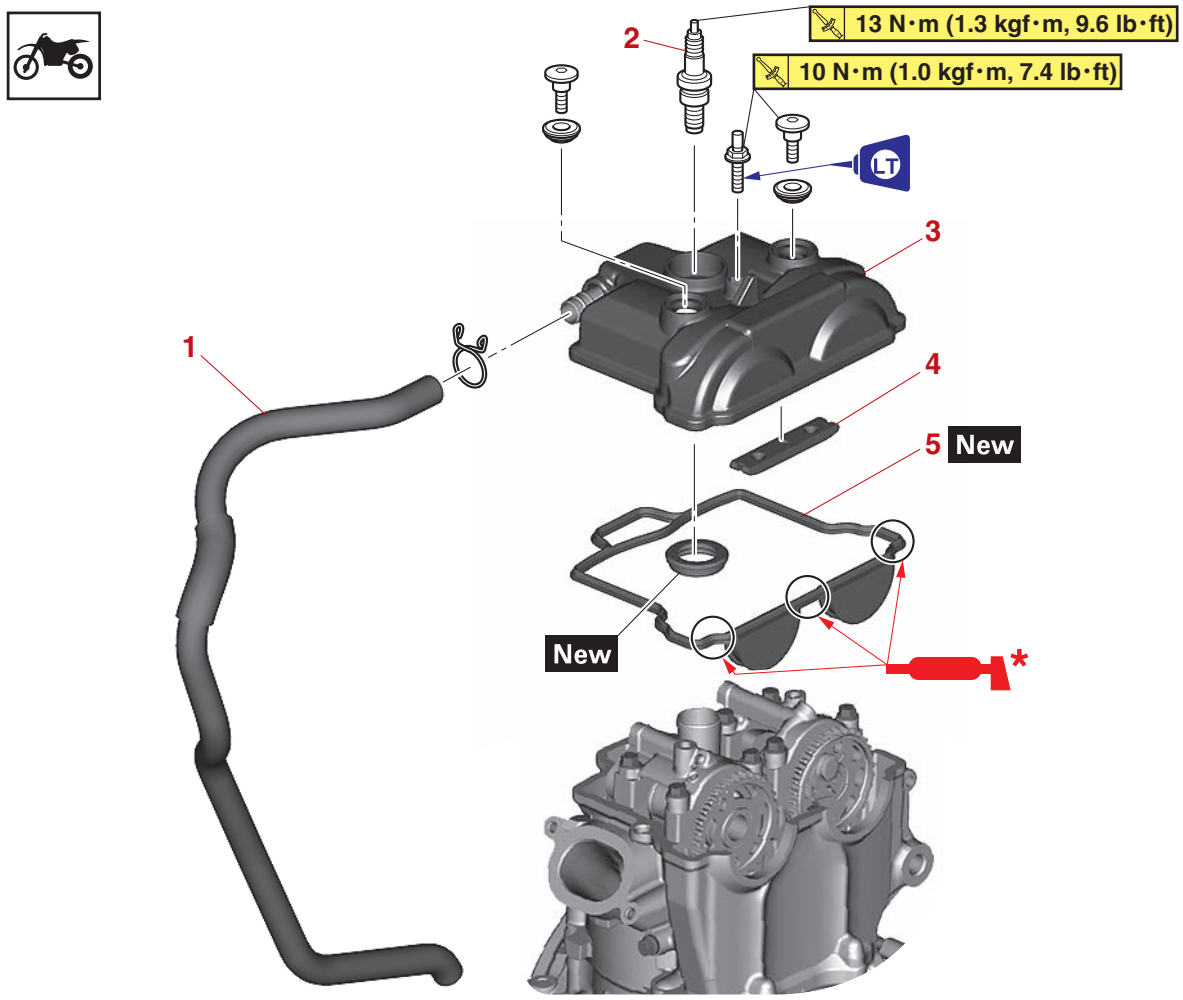
- Tighten while checking that their front and rear joints are inserted in position.
- Make sure that the exhaust pipe clamp "1" does not ride on the projection "a" on the exhaust pipe "2" or silencer "3". Be sure to insert the projection "b" into the slot in the exhaust pipe (or silencer).




A. Exhaust pipe 1 and exhaust pipe 2
B. Exhaust pipe 2 and silencer

EAM20106
# CAMSHAFT

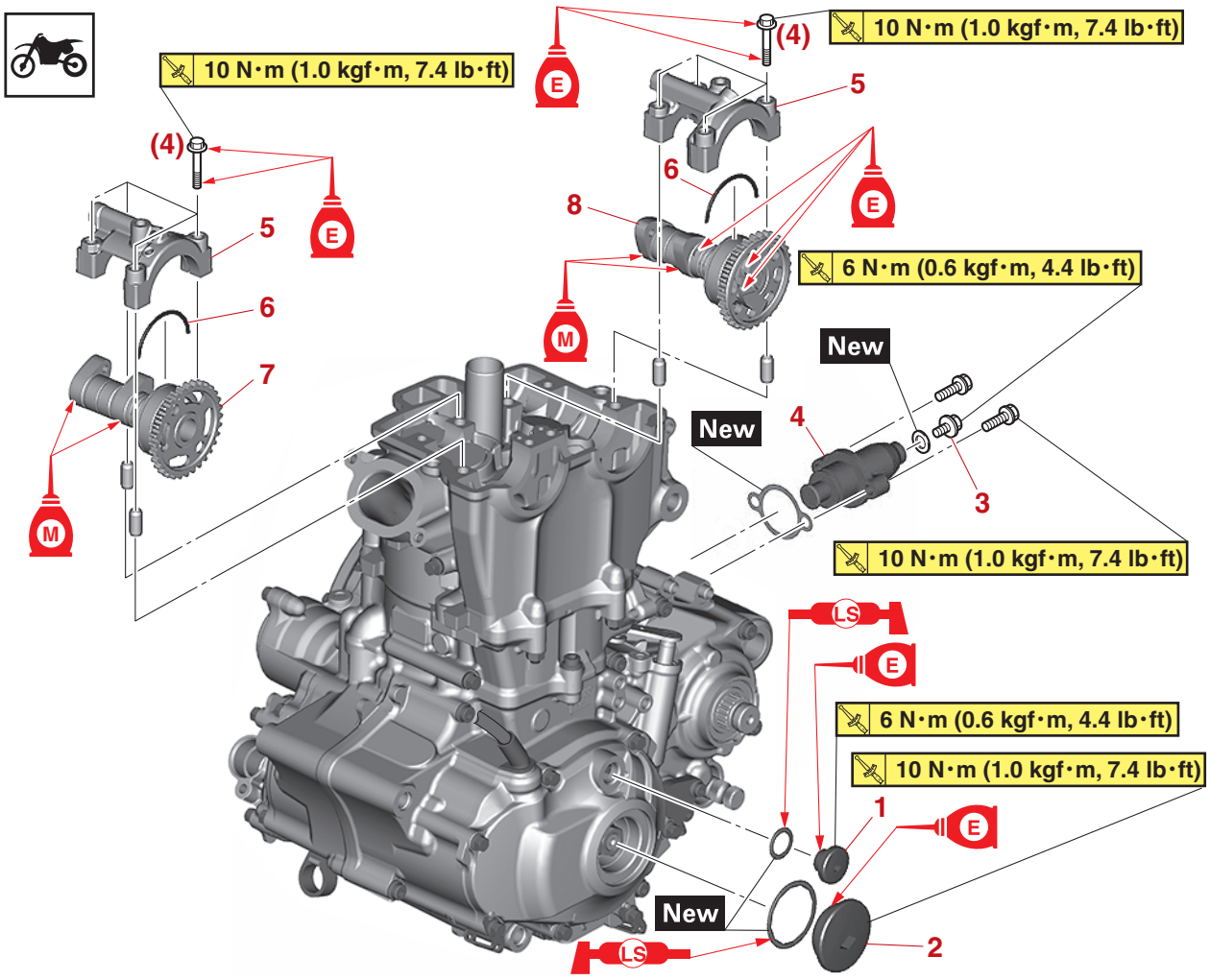
**Removing the cylinder head cover**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Seat | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Side cover (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Air scoop (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| | Ignition coil | | Refer to "ENGINE REMOVAL" on page 5-6. |
| 1 | Cylinder head breather hose | 1 | |
| 2 | Spark plug | 1 | |
| 3 | Cylinder head cover | 1 | |
| 4 | Timing chain guide (top side) | 1 | |
| 5 | Cylinder head cover gasket | 1 | |

*Yamaha bond No. 1215 (Three bond No.1215®)

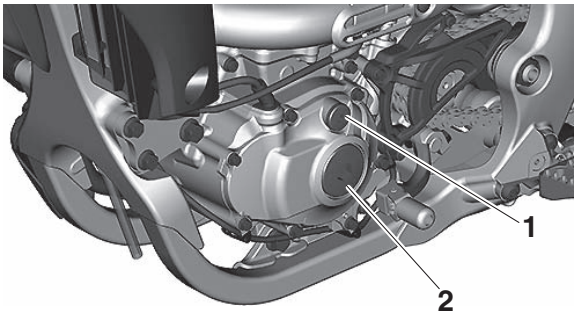
**Removing the camshaft**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 1 | Timing mark accessing screw | 1 | |
| 2 | Crankshaft end accessing screw | 1 | |
| 3 | Timing chain tensioner cap bolt | 1 | |
| 4 | Timing chain tensioner | 1 | |
| 5 | Camshaft cap | 2 | |
| 6 | Clip | 2 | |
| 7 | Intake camshaft | 1 | |
| 8 | Exhaust camshaft | 1 | |

EAM30080
## REMOVING THE CAMSHAFT

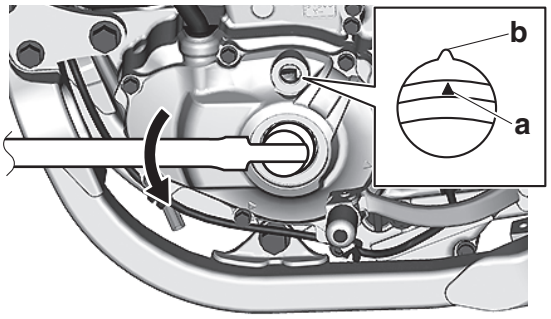
1. Remove:
   - Timing mark accessing screw “1”
   - Crankshaft end accessing screw “2”

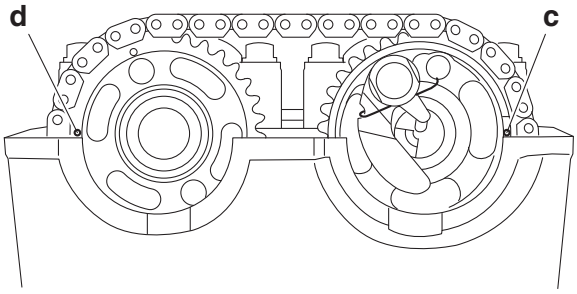



2. Align:
   - Alignment mark
     a. Turn the crankshaft counterclockwise with a wrench.
     b. Align the top dead center (TDC) mark “a” on the generator rotor with the alignment mark “b” on the crankcase cover.

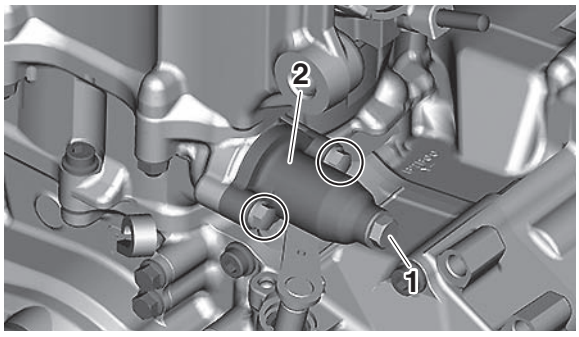
**TIP**

Align the alignment mark “c” on the exhaust camshaft sprocket and the alignment mark “d” on the intake camshaft sprocket with the edge of the cylinder head.




3. Remove:
   - Timing chain tensioner cap bolt “1”
   - Timing chain tensioner “2”
   - Gasket




4. Remove:
   - Bolt (camshaft cap) “1”
   - Camshaft cap “2”
   - Clip “3”

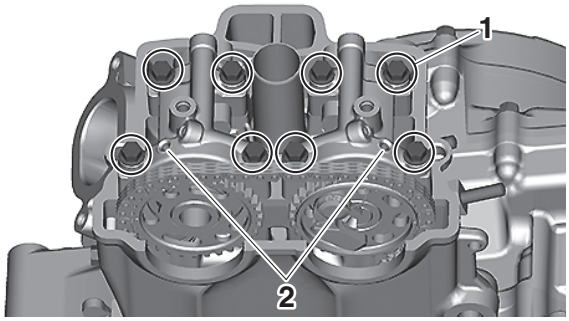
**TIP**

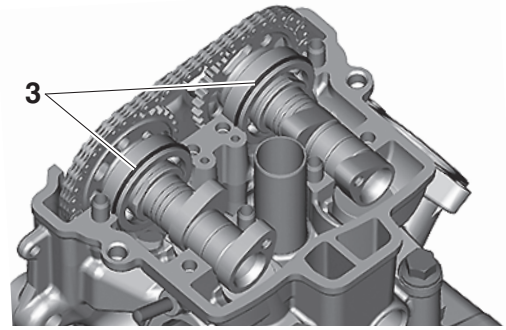
- Remove the bolts (camshaft cap) in a criss-cross pattern, working from the outside in.
- In order to prevent the clip from falling into the crankcase, remove the camshaft cap.

ECA24610

***NOTICE***

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

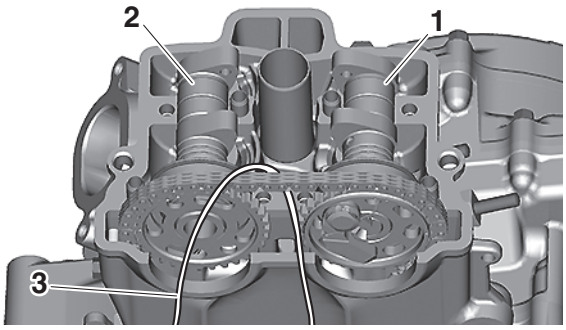



5. Remove:
   - Exhaust camshaft “1”
   - Intake camshaft “2”

**TIP**

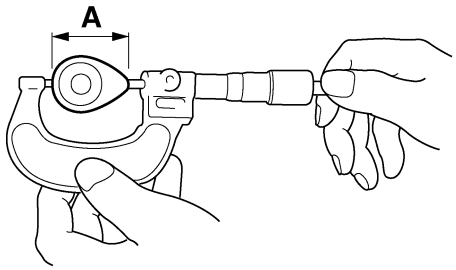
Attach a wire “3” to the timing chain to prevent it from falling into the crankcase.




EAM30081
## CHECKING THE CAMSHAFT

1. Check:
   • Camshaft lobe
   Blue discoloration/pitting/scratches → Replace the camshaft.
2. Measure:
   • Camshaft lobe dimensions “A”
   Out of specification → Replace the camshaft.

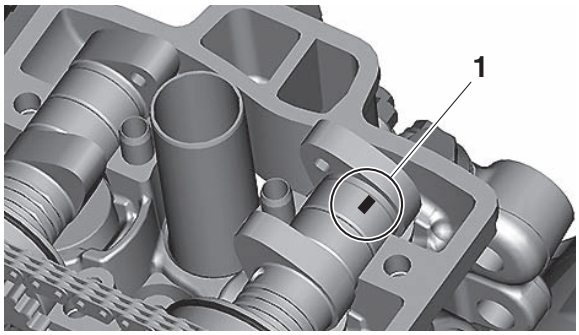
**Camshaft lobe dimensions**
**Lobe height limit (Intake)**
**32.130 mm (1.2650 in)**
**Lobe height limit (Exhaust)**
**33.460 mm (1.3173 in)**




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

**Camshaft-journal-to-camshaft-cap clearance**
**0.028–0.062 mm (0.0011–0.0024 in)**

   a. Install the camshaft into the cylinder head.
   b. Position a strip of Plastigauge® “1” onto the camshaft journal as shown.

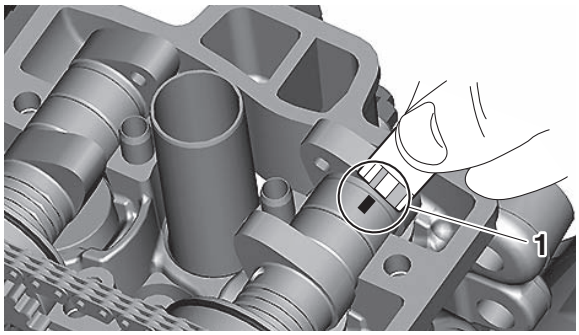



   c. Install the dowel pins and the camshaft caps.

**TIP**
- Tighten the camshaft cap bolts in a crisscross pattern from innermost to outer caps.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance.

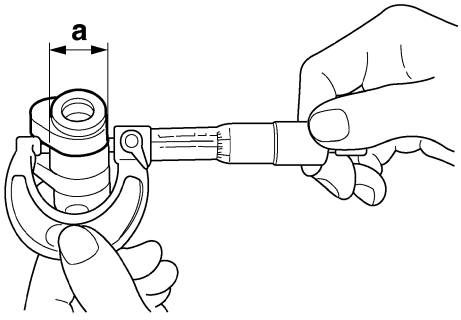
**Camshaft cap bolt**
**10 N·m (1.0 kgf·m, 7.4 lb·ft)**

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



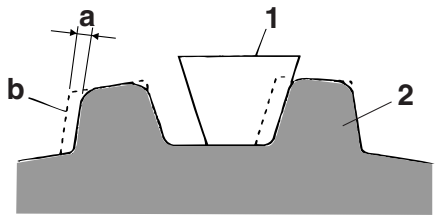

4. Measure:
   • Camshaft journal diameter “a”
   Out of specification → Replace the camshaft.
   Within specification → Replace the cylinder head and the camshaft caps as a set.

**Camshaft journal diameter**
**21.959–21.972 mm (0.8645–0.8650 in)**



EAM30082
## CHECKING THE TIMING CHAIN AND CAMSHAFT SPROCKET

1. Check:
   • Timing chain “1”
   Damage/stiffness → Replace the timing chain and camshaft as a set.
2. Check:
   • Camshaft sprocket
   More than 1/4 tooth wear “a” → Replace the camshaft and the timing chain as a set.

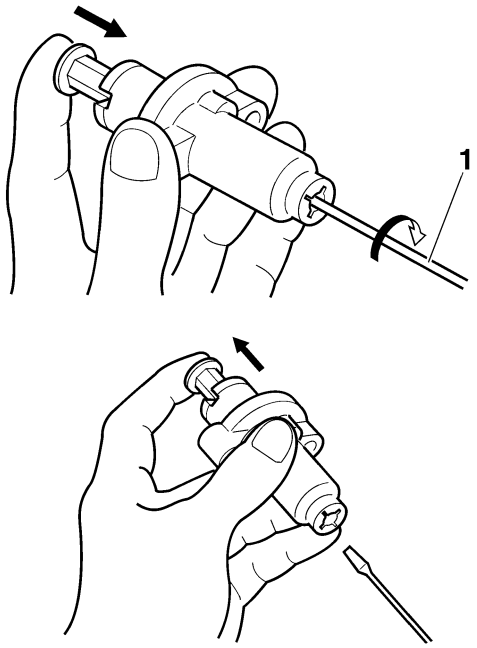



a. 1/4 tooth
b. Correct

1. Timing chain roller
2. Camshaft sprocket

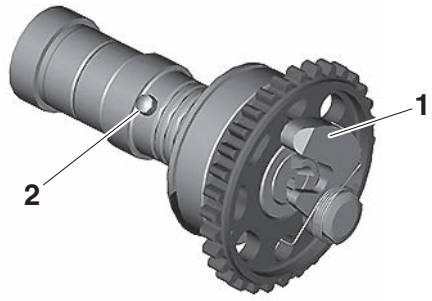
EAM30083
## CHECKING THE TIMING CHAIN TENSIONERS

1. Check:
   • Timing chain tensioner
   Crack/damage → Replace.
   a. While pressing the tensioner rod lightly with your fingers, use a thin screwdriver “1” to wind the tensioner rod up fully clockwise.
   b. When releasing the screwdriver by pressing lightly with your fingers, make sure that the tensioner rod will come out smoothly.
   c. If not, replace the tensioner assembly.



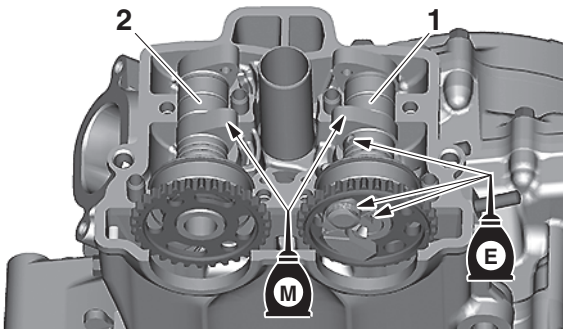

EAM30084
## CHECKING THE DECOMPRESSION SYSTEM

1. Check:
   • Decompression system
   a. Check that the decompressor cam “1” moves smoothly.
   b. Check that the decompressor lever pin “2” projects from the camshaft.




EAM30085
## INSTALLING THE CAMSHAFTS

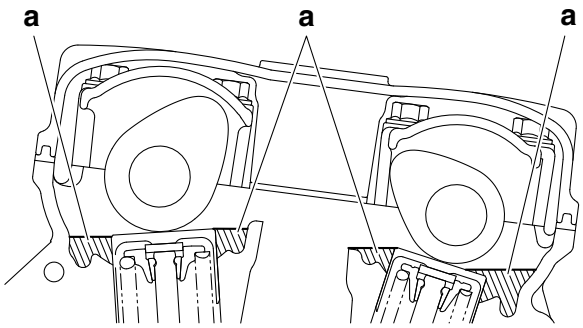
1. Install:
   • Exhaust camshaft “1”
   • Intake camshaft “2”



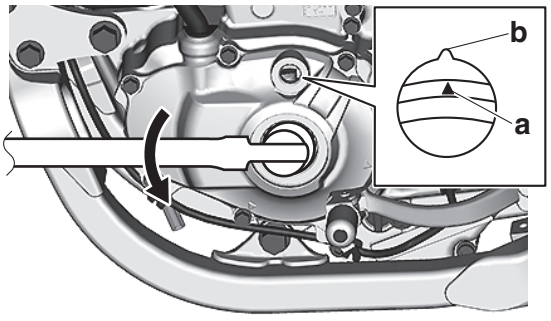

a. Turn the crankshaft counterclockwise with a wrench.

**TIP**

- Apply molybdenum disulfide oil to the camshafts.
- Apply the engine oil on the decompression system.
- Fill the cylinder head with engine oil up to the tops "a" of the valve lifters.



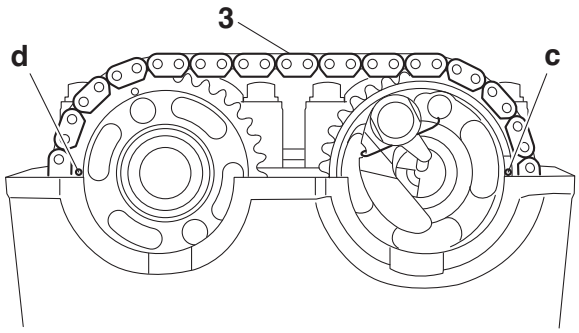

b. Align the top dead center (TDC) mark "a" on the generator rotor with the alignment mark "b" on the crankcase cover.




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

**TIP**

Make sure that the alignment mark "c" on the exhaust camshaft sprocket and the alignment mark "d" on the intake camshaft sprocket are aligned with the edge of the cylinder head.




ECA24620

***NOTICE***

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

d. Install the clips, the camshaft caps and the bolts (camshaft cap).

| | |
|---|---|
| | **Bolt (camshaft cap)**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

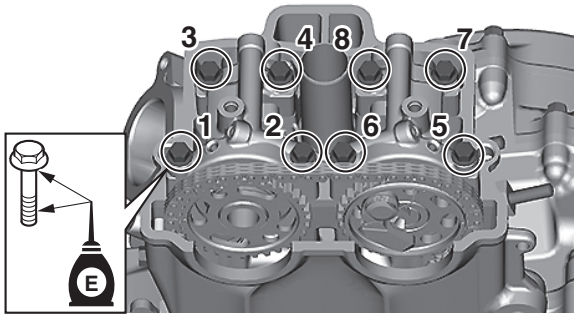
**TIP**

- Before installing the clips, cover the cylinder head with a clean cloth to prevent the clips from coming off into the cylinder head cavity.
- Apply the engine oil to the threads and contact surfaces.
- Tighten the bolts to the specified torque in two or three steps in the proper tightening sequence as shown.

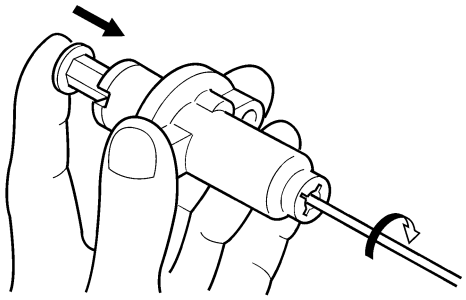
ECA24630

***NOTICE***

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

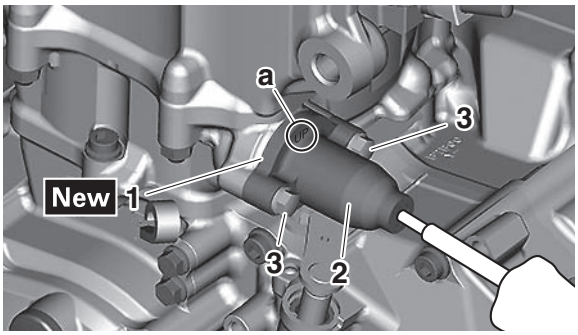



2. Install:
   - Timing chain tensioner
     a. While pressing the tensioner rod lightly with your fingers, use a thin screwdriver to wind the tensioner rod up fully clockwise.



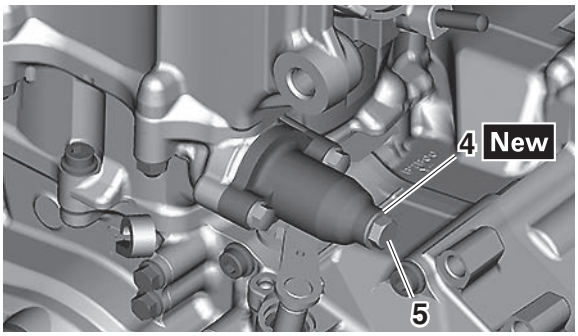
b. With the tensioner rod fully wound and the chain tensioner "UP" mark "a" facing upward, install the gasket "1", the timing chain tensioner "2" and tighten the bolts "3".

| | |
|---|---|
| | **Bolt (timing chain tensioner)**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |




c. Release the screwdriver, check that the tensioner rod comes out smoothly, and tighten the gasket "4" and the cap bolt "5".

| | |
|---|---|
| | **Timing chain tensioner cap bolt**<br>**6 N·m (0.6 kgf·m, 4.4 lb·ft)** |

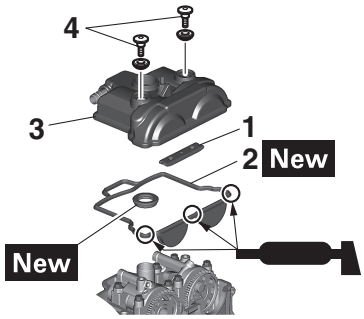



3. Turn:
   • Crankshaft
   Counterclockwise several turns.
4. Check:
   • Top dead center (TDC) mark on the generator rotor
   Align with the crankcase alignment mark.
   • Camshaft match marks
   Align with the cylinder head surface.
   Out of alignment → Adjust.
5. Install:
   • Timing chain guide (top side) "1"
   • Cylinder head cover gasket "2" New
   • Cylinder head cover "3"
   • Bolt (cylinder head cover) "4"

| | |
|---|---|
| | **Bolt (cylinder head cover)**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

**TIP**
Before installation, apply the sealant to the cylinder head cover gasket.

| | |
|---|---|
| | **Yamaha bond No. 1215**<br>**90890-85505**<br>**Three bond No. 1215®** |



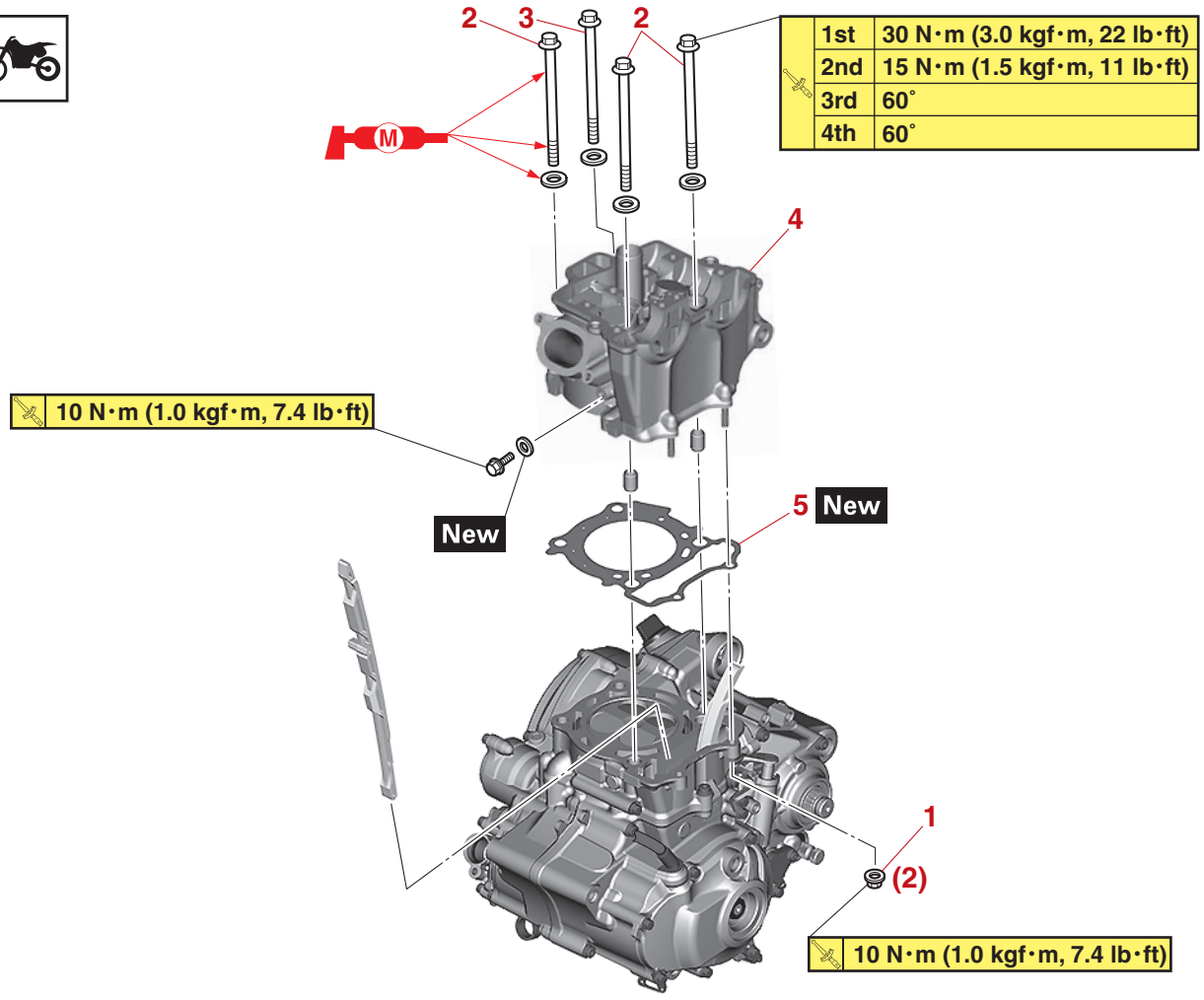

6. Install:
   • Cylinder head breather hose
   • Spark plug

| | |
|---|---|
| | **Spark plug**<br>**13 N·m (1.3 kgf·m, 9.6 lb·ft)** |

EAM20107

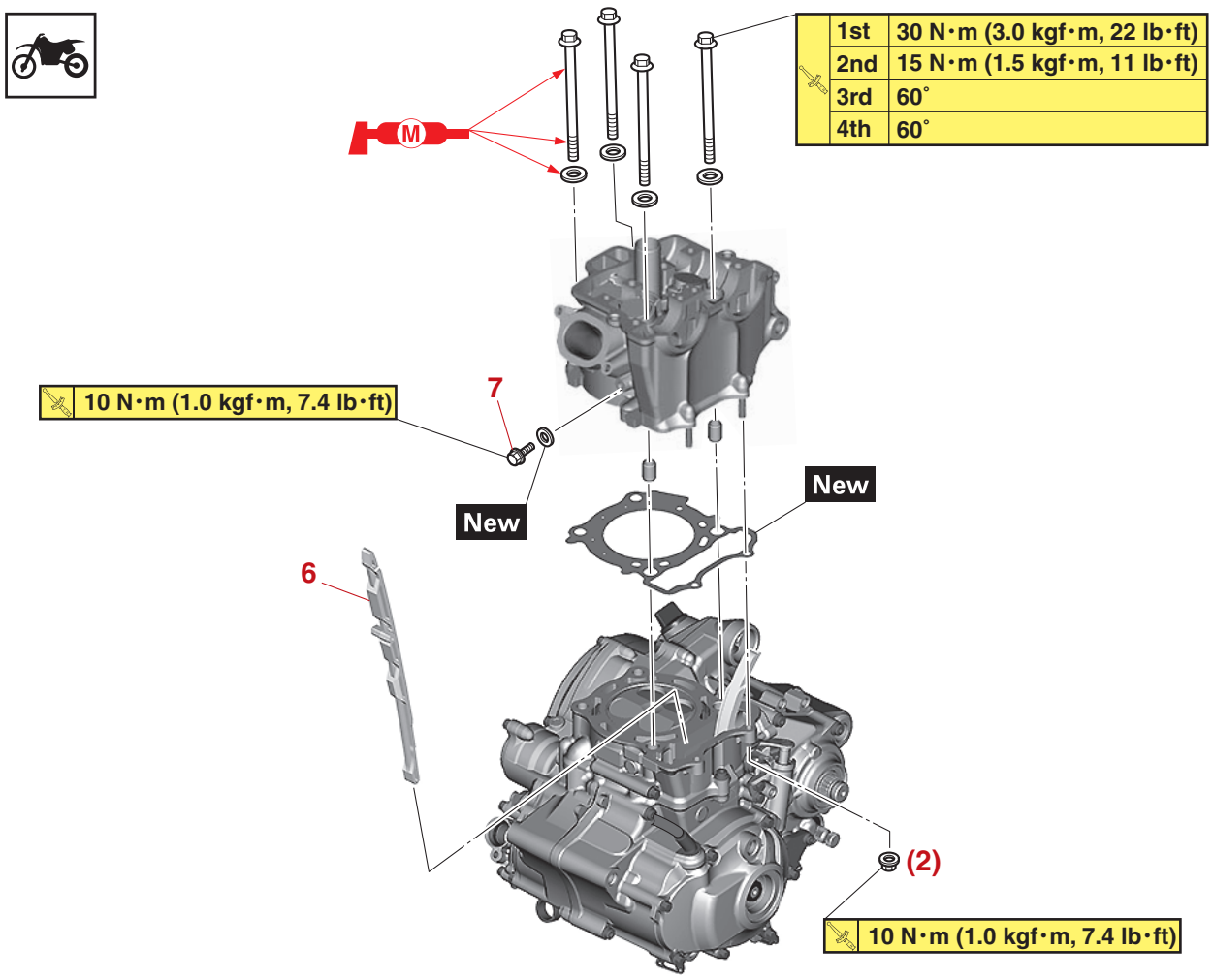
# CYLINDER HEAD

## Removing the cylinder head




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | | | Refer to "INSTALLING THE CYLINDER HEAD" on page 5-22. |
| | Seat | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Side cover (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Air scoop (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| | Exhaust pipe/Silencer | | Refer to "ENGINE REMOVAL" on page 5-6. |
| | Radiator hose | | Disconnect. |
| | Coolant temperature sensor coupler | | Disconnect. |
| | Throttle body | | Refer to "THROTTLE BODY" on page 7-4. |
| | Camshaft | | Refer to "CAMSHAFT" on page 5-13. |
| | Upper engine bracket | | Refer to "ENGINE REMOVAL" on page 5-6. |
| 1 | Nut (cylinder head) | 2 | |
| 2 | Bolt (cylinder head) | 3 | |
| 3 | Bolt (cylinder head) | 1 | |
| 4 | Cylinder head | 1 | |
| 5 | Cylinder head gasket | 1 | |

**Removing the cylinder head**

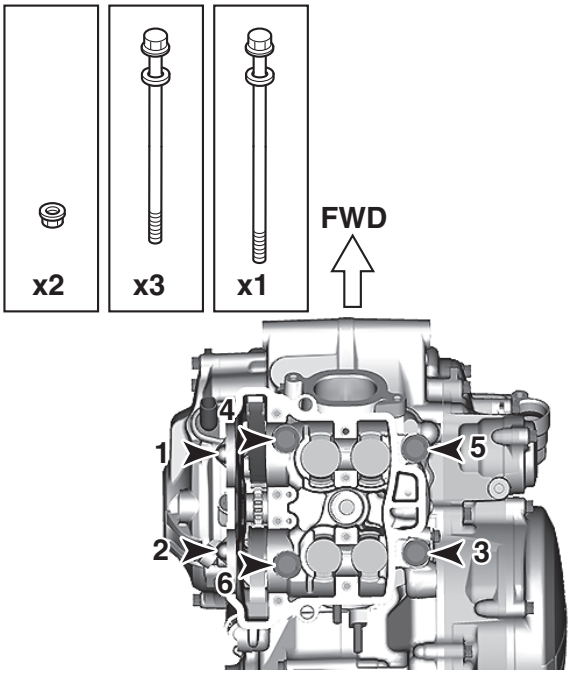



| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 6 | Timing chain guide (intake side) | 1 | |
| 7 | Oil passage plug | 1 | |

EAM30086
## REMOVING THE CYLINDER HEAD
1. Remove:
   • Cylinder head bolt and nut

**TIP**
- Loosen the bolts in the proper sequence as shown.
- Loosen each bolt 1/2 of a turn at a time. After fully loosening all the bolts, remove them.

   • M9 × 135 mm (5.31 in): [4], [5], [6]
   • M9 × 145 mm (5.71 in): [3]




EAM30087
## CHECKING THE TIMING CHAIN GUIDE (INTAKE SIDE)
1. Check:
   • Timing chain guide (intake side)
   Damage/wear → Replace.

EAM30088
## CHECKING THE CYLINDER HEAD
1. Eliminate:
   • Combustion chamber carbon deposits

**TIP**
Use a rounded scraper, not a sharp instrument, in order not to damage or scratch the spark plug bore threads.

2. Check:
   • Cylinder head
   Damage/scratches → Replace.

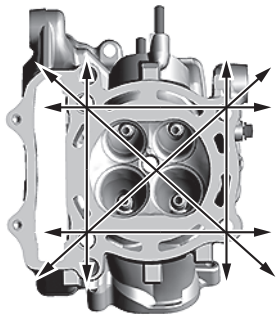
**TIP**
When replacing the cylinder head, replace also the valve.
Refer to "CHECKING THE VALVE SEATS" on page 5-28.

   • Cylinder head coolant passages
   Mineral deposits/rust → Eliminate.
3. Measure:
   • Cylinder head warpage
   Out of specification → Resurface the cylinder head.

| | |
|---|---|
| | **Warpage limit**<br>**0.05 mm (0.0020 in)** |

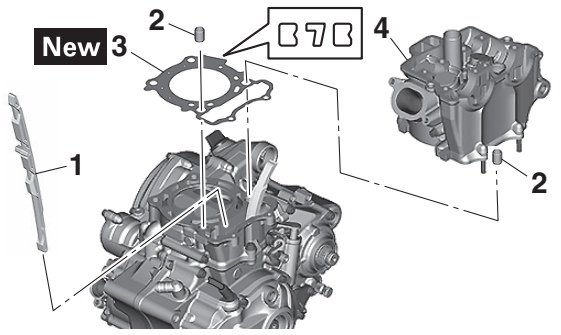
   a. Place a straightedge and a thickness gauge across the cylinder head.
   b. Measure the warpage.
   c. If the limit is exceeded, resurface the cylinder head as follows.
   d. Place a 400–600 grit wet sandpaper on a surface plate, and resurface the cylinder head using a figure-eight sanding pattern.

**TIP**
To ensure an even surface, turn the cylinder head several times.

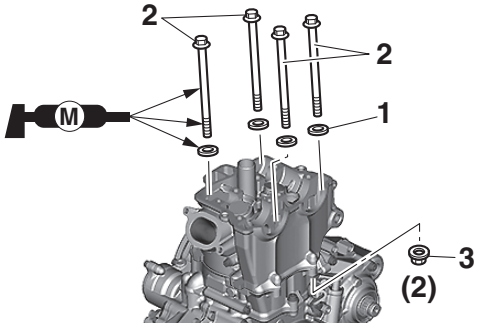


EAM30089
## INSTALLING THE CYLINDER HEAD
1. Install:
   • Timing chain guide (intake side) "1"
   • Dowel pin "2"
   • Cylinder head gasket "3" New
   • Cylinder head "4"

**TIP**
- While pulling up the timing chain, install the timing chain guide (intake side) and the cylinder head.
- Install the cylinder head gasket as shown in the illustration.




2. Install:
   - Washer “1”
   - Bolt “2”
   - Nut “3”

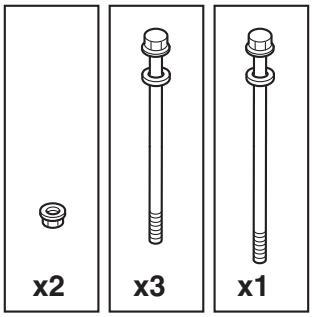


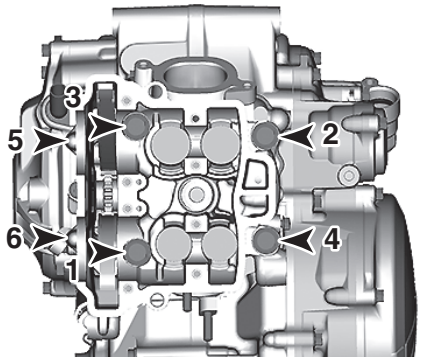

**TIP**

- Tighten the bolts using the following procedure.
- Repeat steps (e) to (j) for each bolt one at a time according to the tightening order of the bolts.

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

**Bolt [1]–[4]**
**1st**
**30 N·m (3.0 kgf·m, 22 lb·ft)**



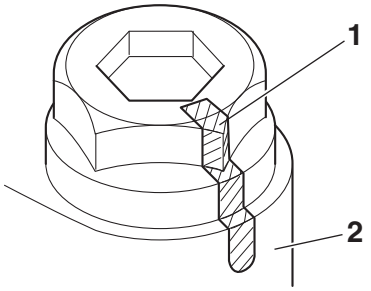

e. Remove the one bolt according to the tightening order of the bolts.
f. Again apply molybdenum disulfide grease to the threads and contact surfaces of the bolts and to both contact surfaces of the washers.
g. Retighten the bolts.

**TIP**

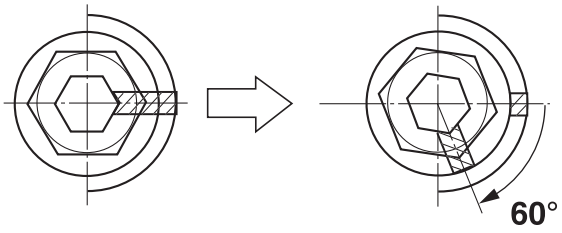
Do not remove the other bolts. Only remove the bolts one at a time according to the tightening order as shown and retighten them to the specified tightening torque.

**Bolt [1], [2], [3], [4]**
**2nd**
**15 N·m (1.5 kgf·m, 11 lb·ft)**

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

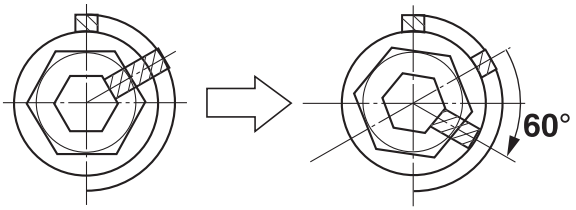



i. Tighten the bolts (cylinder head) further.




**Bolt [1], [2], [3], [4]**
**3rd**
**Specified angle**
**60°**

j. Put a mark on the corner of the bolt (cylinder head) and the cylinder head.
k. Finally, tighten all bolts (cylinder head) further according to the tightening order.




**TIP**
Tighten the bolts in two steps 60° to reach the specified angle in the proper tightening sequence. Total tightening angle: 60° + 60° = 120°

**Bolt [1], [2], [3], [4]**
**Final**
**Specified angle**
**60°**

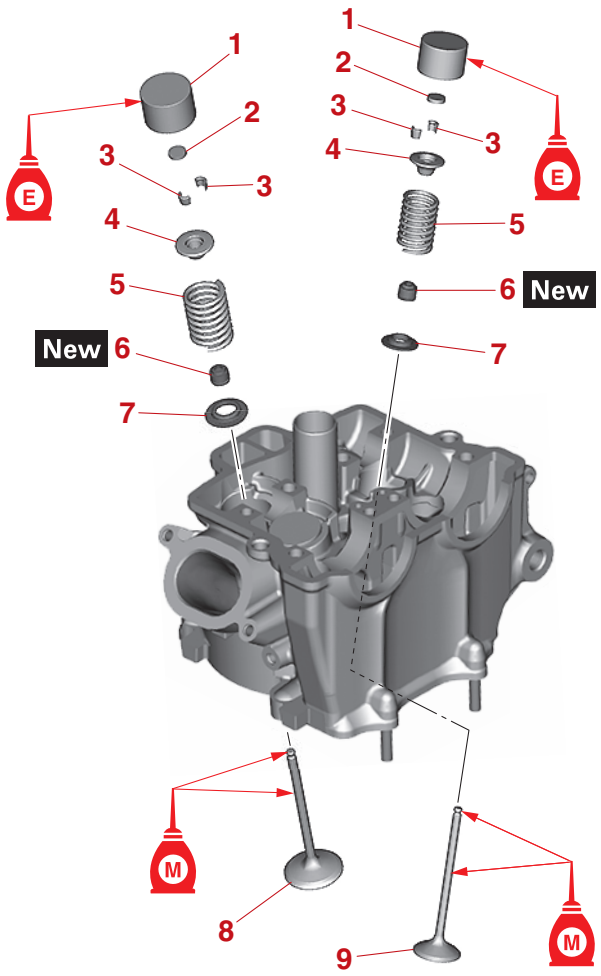
l. Tighten the nuts to the specified torque.

**Nut [5], [6]**
**10 N·m (1.0 kgf·m, 7.4 lb·ft)**

EAM20108

# VALVES AND VALVE SPRINGS

**Removing the valves and valve springs**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Cylinder head | | Drain.<br>Refer to "CYLINDER HEAD" on page 5-20. |
| 1 | Valve lifter | 4 | |
| 2 | Adjusting pad | 4 | |
| 3 | Valve cotter | 8 | |
| 4 | Valve spring retainer | 4 | |
| 5 | Valve spring | 4 | |
| 6 | Valve stem seal | 4 | |
| 7 | Valve spring seat | 4 | |
| 8 | Intake valve | 2 | |
| 9 | Exhaust valve | 2 | |

EAM30090
## REMOVING THE VALVES

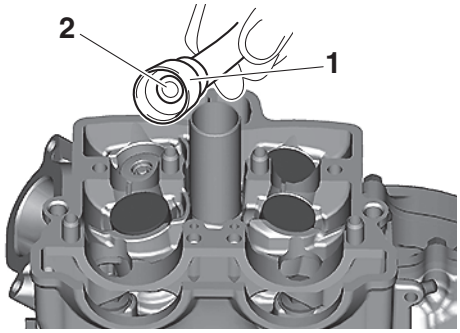
**TIP**
Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure that the valves are properly sealed.

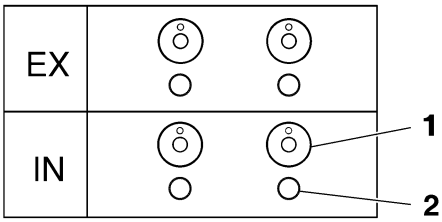
1. Remove:
   • Valve lifter “1”
   • Adjusting pad “2”

**TIP**
- Place a cloth in the timing chain space to prevent adjusting pads from falling into the crankcase.
- Make a note of the positions of valve lifters and adjusting pads so that they can be reinstalled in their original places.



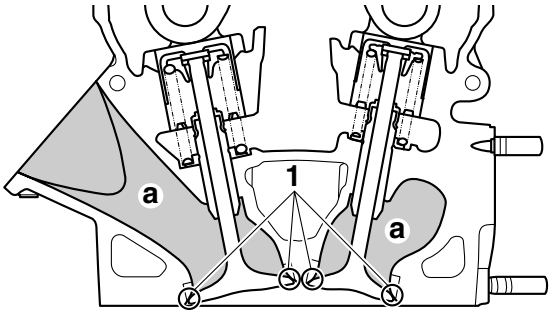
**Valve lapper (ø14)**
**90890-04101**
**Valve lapper (ø14)**
**YM-A8998**




2. Check:
   • Valve sealing
   Leakage at the valve seat → Check the valve face, the valve seat, and the valve seat contact width.
   Refer to “CHECKING THE VALVE SEATS” on page 5-28.
   a. Pour a clean solvent “a” into the intake and exhaust ports.
   b. Check that the valves are properly sealed.

**TIP**
Check that there are no kerosene leaks from the valve seat “1”.

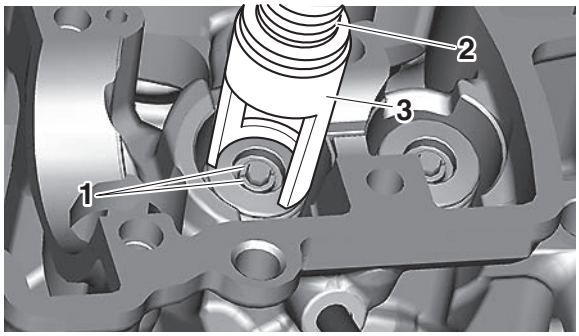



3. Remove:
   • Valve cotter “1”

**TIP**
Remove the valve cotters by compressing the valve spring with the valve spring compressor “2” and the valve spring compressor attachment “3”.

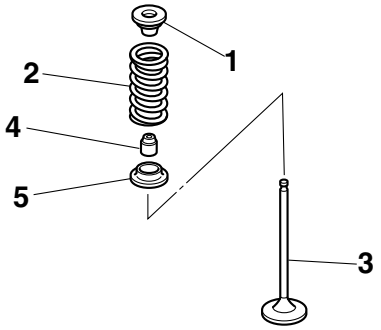


**Valve spring compressor**
**90890-04200**
**Valve spring compressor**
**YM-04019**
**Valve spring compressor attachment**
**90890-04108**
**Valve spring compressor adapter 22 mm**
**YM-04108**




4. Remove:
   • Valve spring retainer “1”
   • Valve spring “2”
   • Valve “3”
   • Valve stem seal “4”
   • Valve spring seat “5”

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



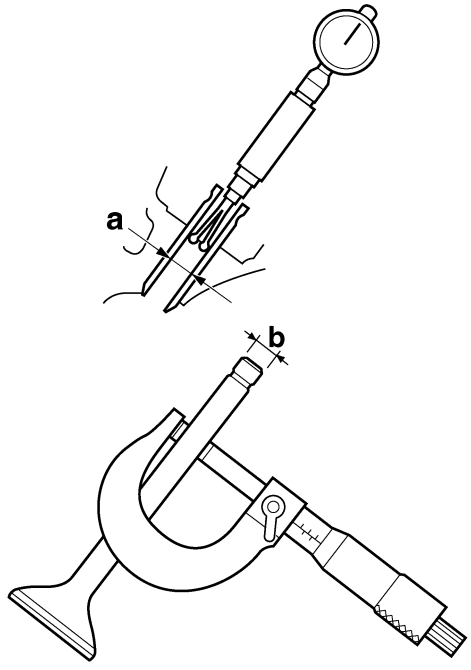

EAM30091

## CHECKING THE VALVES AND VALVE GUIDES

1. Measure:
   - Valve-stem-to-valve-guide clearance
     Out of specification → Replace the valve guide.

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

**Valve-stem-to-valve-guide clearance limit (intake)**
**0.080 mm (0.0032 in)**
**Valve-stem-to-valve-guide clearance limit (exhaust)**
**0.100 mm (0.0039 in)**

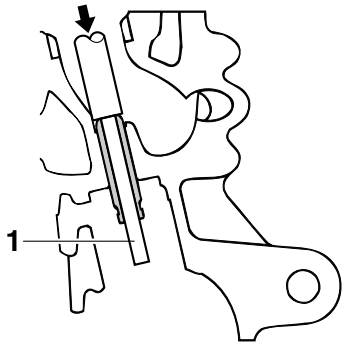



2. Replace:
   - Valve guide

**TIP**

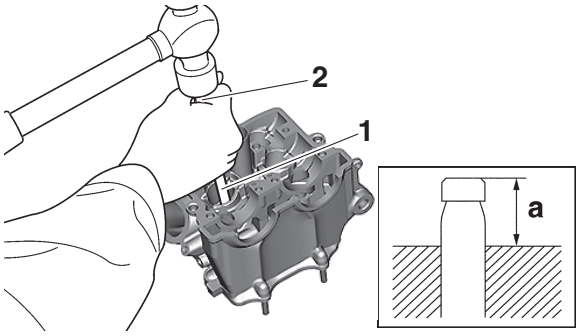
To ease valve guide removal and installation, and to maintain the correct fit, heat the cylinder head to 100 °C (212 °F) in an oven.

a. Remove the valve guide with the valve guide remover "1".

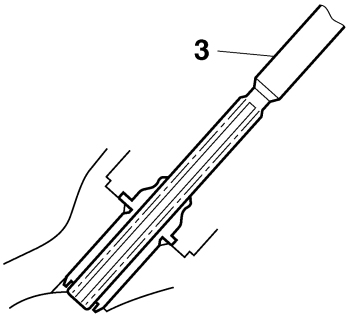



b. Install the new valve guide with the valve guide installer "1" and the valve guide remover "2".

**Valve guide installation height "a"**
**Intake**
**10.8–11.2 mm (0.43–0.44 in)**
**Exhaust**
**11.2–11.6 mm (0.44–0.46 in)**




c. After installing the valve guide, expand the hole in the valve guide with the valve guide reamer "3" to obtain the proper valve-stem-to-valve-guide clearance.




**TIP**

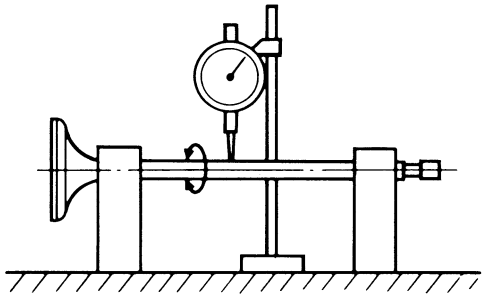
After replacing the valve guide, reface the valve seat.

**Intake**
**Valve guide remover (ø5)**
**90890-04097**
**Valve guide remover (5.0 mm)**
**YM-04097**
**Valve guide installer (ø5)**
**90890-04098**
**Valve guide installer (5.0 mm)**
**YM-04098**
**Valve guide reamer (ø5)**
**90890-04099**
**Valve guide reamer (5.0 mm)**
**YM-04099**
**Exhaust**
**Valve guide remover (ø4.5)**
**90890-04116**
**Valve guide remover (4.5 mm)**
**YM-04116**
**Valve guide installer (ø4.5)**
**90890-04117**
**Valve guide installer (4.5 mm)**
**YM-04117**
**Valve guide reamer (ø4.5)**
**90890-04118**
**Valve guide reamer (4.5 mm)**
**YM-04118**

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

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

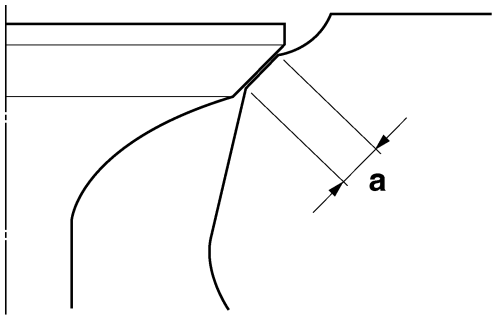
**Valve stem runout**
**0.020 mm (0.0008 in)**



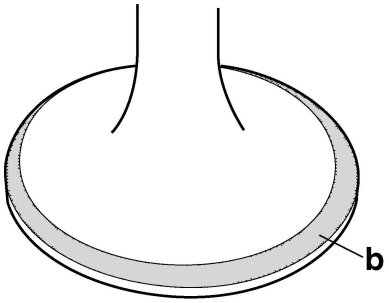
EAM30092
### CHECKING THE VALVE SEATS

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

**Valve seat contact width limit (intake)**
**1.6 mm (0.06 in)**
**Valve seat contact width limit (exhaust)**
**1.6 mm (0.06 in)**



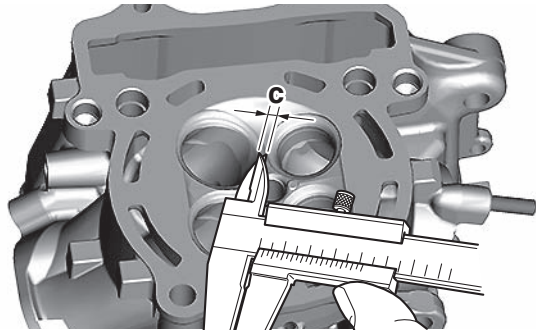

a. Apply blue layout fluid “b” onto the valve face.




b. Install the valve into the cylinder head.

c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
d. Measure the valve seat contact width “c”.

**TIP**
Where the valve seat and the valve face are in contact with each other, the blueing will have been removed.



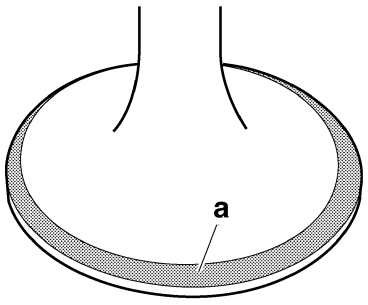

4. Lap:
   • Valve face
   • Valve seat

ECA24640
***NOTICE***
**This model uses titanium intake and exhaust valves.**
**Do not use the valves used for lapping the valve seat. Always replace the valves used for lapping with new ones.**

**TIP**
- When replacing the cylinder head, replace also the valves with new ones without them.
- When replacing the valves or the valve guides, use new valves to lap the valve seats, and then replace them with new valves.

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

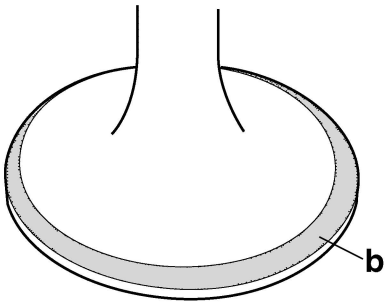
ECA13790
***NOTICE***
**Do not let the lapping compound enter the gap between the valve stem and the valve guide.**



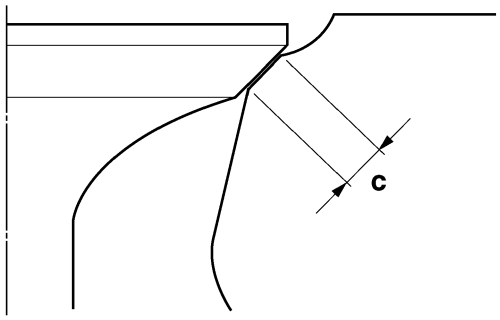

b. Apply molybdenum disulfide oil onto the valve stem.
c. Install the valve into the cylinder head.
d. Turn the valve until the valve face and the valve seat are evenly polished, then clean off all of the lapping compound.

**TIP**
While turning the valve lapper, tap and lap the valve seat.

e. Apply a fine lapping compound to the valve face, and repeat the above steps.
f. After every lapping step, be sure to clean off all of the lapping compound from the valve face and the valve seat.
g. Apply blue layout fluid “b” onto the valve face.

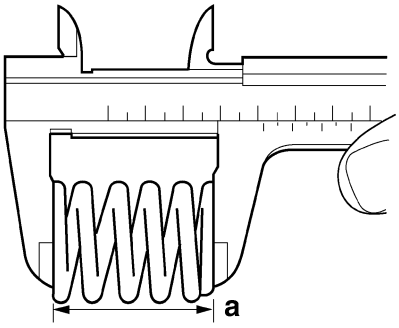



h. Install the valve into the cylinder head.
i. Press the valve through the valve guide and onto the valve seat to make a clear impression.
j. Measure the valve seat contact width “c” again. If the valve seat contact width is out of specification, reface and lap the valve seat.




EAM30093
## CHECKING THE VALVE SPRINGS
1. Measure:
   • Valve spring free length “a”
   Out of specification → Replace the valve spring.

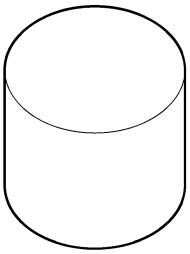
**Free length limit (intake)**
**34.94 mm (1.38 in)**
**Free length limit (exhaust)**
**33.82 mm (1.33 in)**




EAM30094

## CHECKING THE VALVE LIFTERS

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

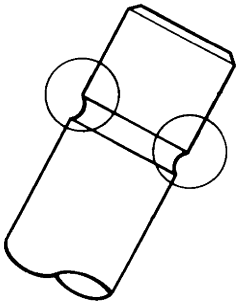


I1170701

EAM30095

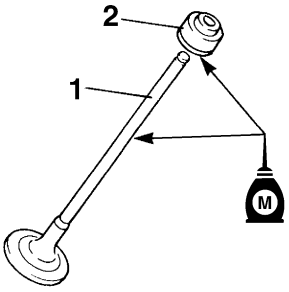
## INSTALLING THE VALVES

1. Clean:
   - Valve stem end



2. Lubricate:
   - Valve stem "1"
   - Valve stem seal "2"

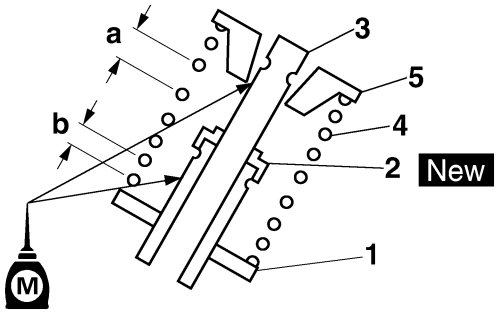
**Recommended lubricant**
**Molybdenum disulfide oil**




3. Install:
   - Spring seat "1"
   - Valve stem seal "2" New
   - Valve "3"
   - Valve spring "4"
   - Valve spring retainer "5"
     (to the cylinder head)

**TIP**

- Make sure each valve is installed in its original place.
- Install the valve springs with the larger pitch "a" facing up.



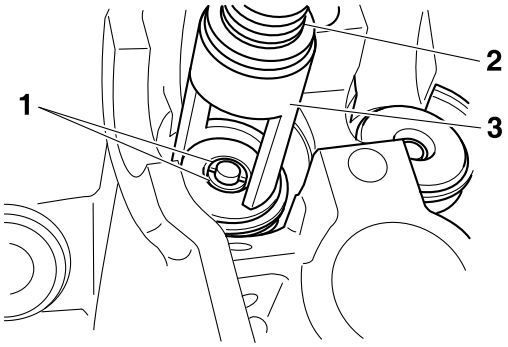

b. Smaller pitch

4. Install:
   - Valve cotter "1"

**TIP**

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

**Valve spring compressor**
**90890-04200**
**Valve spring compressor**
**YM-04019**
**Valve spring compressor attachment**
**90890-04108**
**Valve spring compressor adapter 22 mm**
**YM-04108**

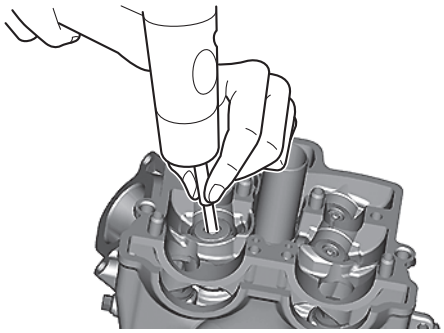



5. To fasten the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

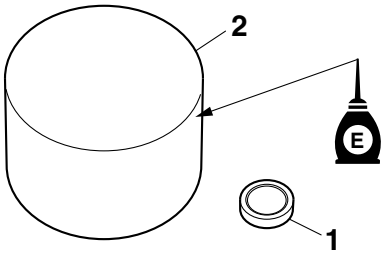
ECA13800

***NOTICE***

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



6. Lubricate:
   - Adjusting pad “1”
   - Valve lifter “2”




7. Install:
   - Adjusting pad
   - Valve lifter

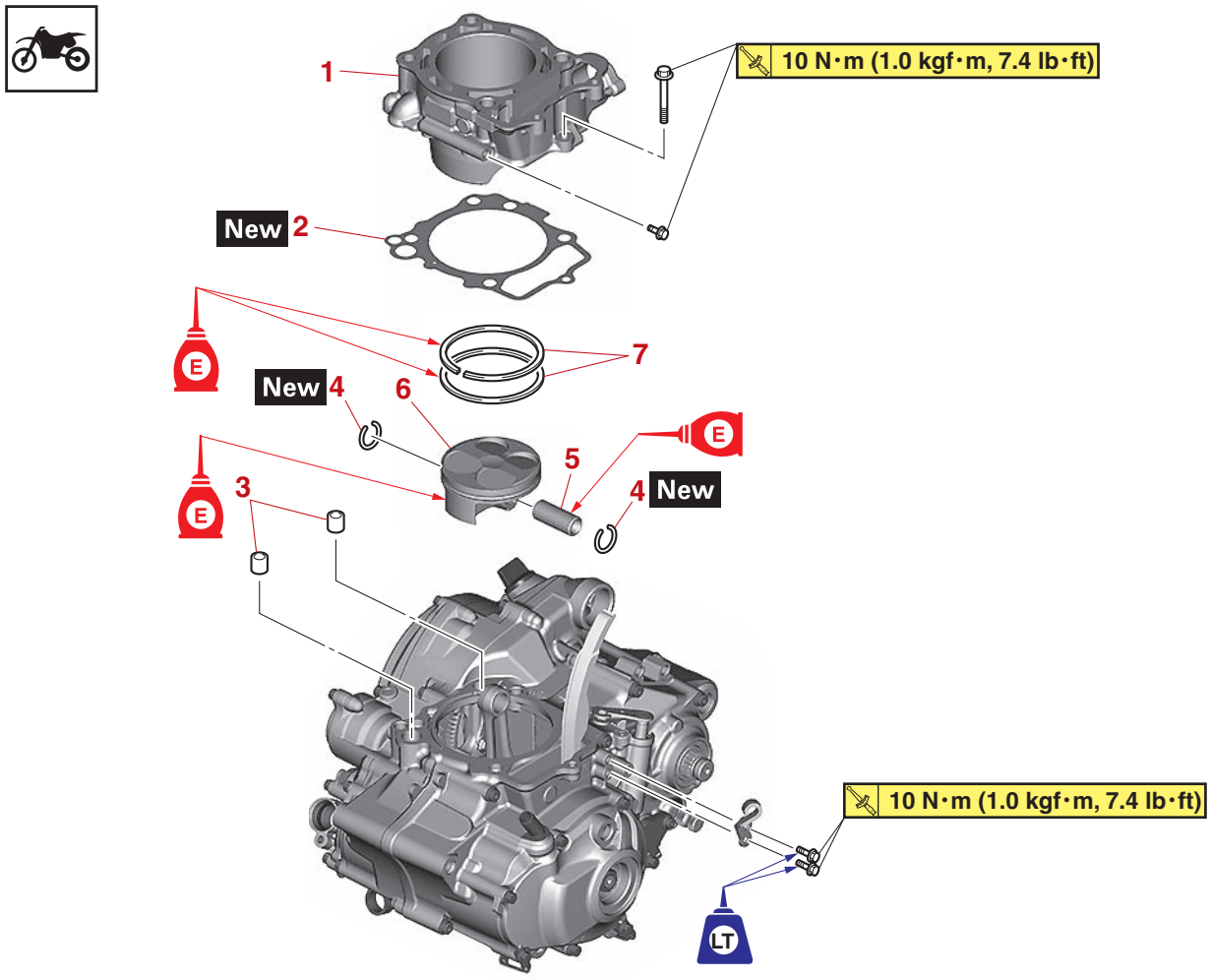
**TIP**

- Check that the valve lifter turns smoothly when rotated with your finger.
- Make sure that the valve lifter and the adjusting pad are reinstalled in their original positions.

EAM20109

# CYLINDER AND PISTON

**Removing the cylinder and piston**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Cylinder head | | Refer to "CYLINDER HEAD" on page 5-20. |
| 1 | Cylinder body | 1 | |
| 2 | Gasket | 1 | |
| 3 | Dowel pin | 2 | |
| 4 | Piston pin clip | 2 | |
| 5 | Piston pin | 1 | |
| 6 | Piston | 1 | |
| 7 | Piston ring set | 1 | |

EAM30096
## REMOVING THE PISTON

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

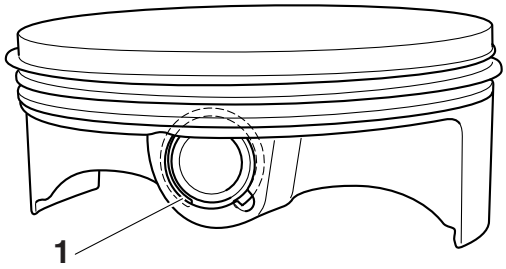
ECA13810
***NOTICE***

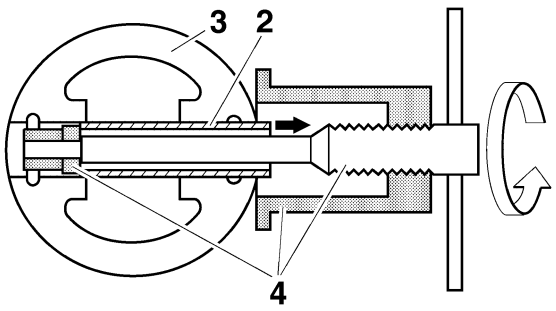
**Do not use a hammer to drive the piston pin out.**

**TIP**
- Before removing the piston pin clip, cover the crankcase opening with a cloth to prevent the piston pin clip from falling into the crankcase.
- Before removing the piston pin, deburr the piston pin clip’s groove and the piston pin’s bore area. If the piston pin groove is deburred and the piston pin is still difficult to remove, use the piston pin puller set “4”.



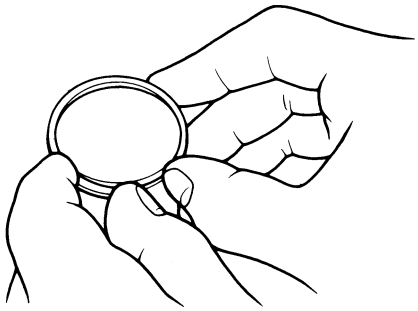
**Piston pin puller set**
**90890-01304**
**Piston pin puller**
**YU-01304**




2. Remove:
   - Top ring
   - Oil ring

**TIP**
When removing a piston ring, open the end gap with your fingers and lift the opposite end gap of the piston ring over the piston crown.



EAM30097
## CHECKING THE CYLINDER AND PISTON

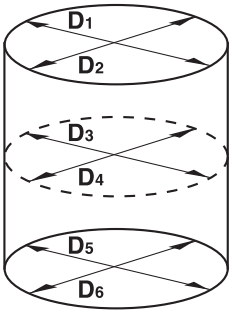
1. Check:
   - Piston wall (Sidewall)
   - Cylinder wall
     Vertical scratches → Replace the cylinder, and replace the piston and piston rings as a set.
2. Measure:
   - Piston-to-cylinder clearance
     a. Measure the cylinder bore “C” with the cylinder bore gauge.

**TIP**
Measure the cylinder bore “C” by taking side-to-side and front-to-back measurements of the cylinder.



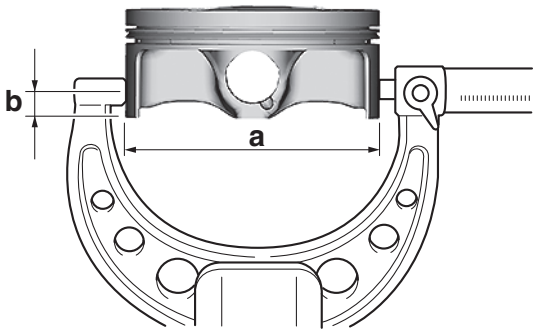
**Bore**
**77.000–77.010 mm (3.0315–3.0319 in)**
**Wear limit**
**77.060 mm (3.0339 in)**

“C” = maximum of $D_1$, $D_2$, $D_3$, $D_4$, $D_5$, $D_6$




   b. If out of specification, rebore or replace the cylinder, and replace the piston and the piston rings as a set.
   c. Measure the piston outside diameter “a” at the measuring point (from piston skirt bottom) “b” with the micrometer.

**Diameter**
**76.955–76.970 mm (3.0297–3.0303 in)**
**Measuring point (from piston skirt bottom)**
**4.0 mm (0.16 in)**




d. If out of specification, replace the cylinder, the piston, and the piston rings as a set.
e. Calculate the piston-to-cylinder clearance with the following formula.

Piston-to-cylinder clearance =
Cylinder bore "C" - Piston diameter

**Piston-to-cylinder clearance**
**0.030–0.055 mm (0.0012–0.0022 in)**

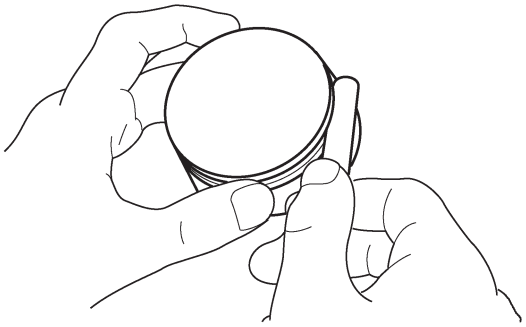
f. If out of specification, replace the cylinder, the piston, and the piston rings as a set.

EAM30098
## CHECKING THE PISTON RINGS

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

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

**Ring side clearance**
**0.030–0.065 mm (0.0012–0.0026 in)**
**Side clearance limit**
**0.115 mm (0.0045 in)**



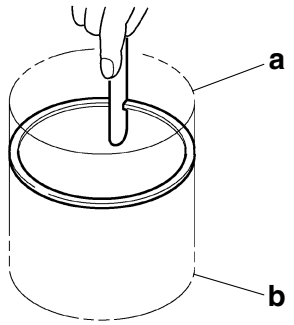
2. Install:
   • Piston ring
   (into the cylinder)

**TIP**
Use the piston crown to level the piston ring near bottom of cylinder "a", where cylinder wear is lowest.

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

**TIP**
The oil ring expander spacer's end gap cannot be measured. If the oil ring rail's gap is excessive, replace the oil ring as a set.

**Piston ring**
**Top ring**
**End gap limit**
**0.50 mm (0.0197 in)**

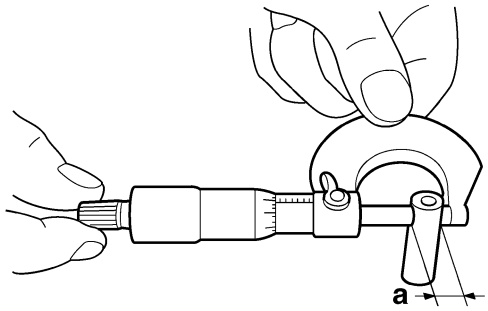



b. Upper of cylinder

EAM30099
## CHECKING THE PISTON PIN

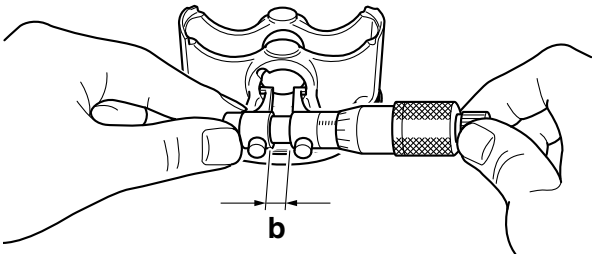
1. Check:
   • Piston pin
   Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.
2. Measure:
   • Piston pin outside diameter "a"
   Out of specification → Replace the piston pin.

**Piston pin outside diameter limit**
**15.971 mm (0.6288 in)**




3. Measure:
   • Piston pin bore inside diameter “b”
   Out of specification → Replace the piston.

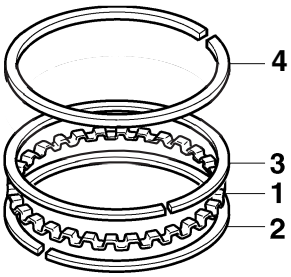
**Piston pin bore inside diameter limit**
**16.043 mm (0.6316 in)**

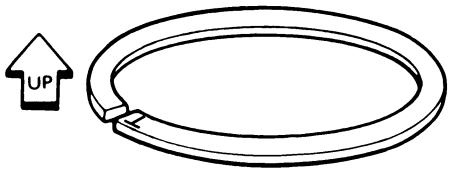



EAM30100
## INSTALLING THE PISTON AND CYLINDER

1. Install:
   • Oil ring expander “1”
   • Lower oil ring rail “2”
   • Upper oil ring rail “3”
   • Top ring “4”

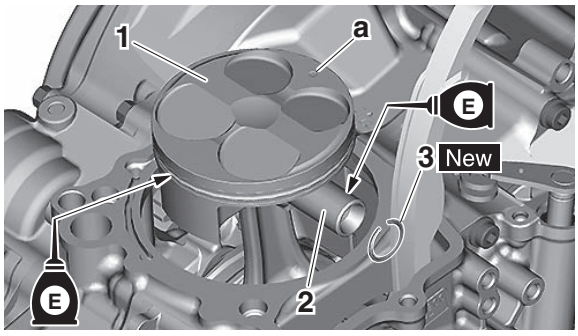
**TIP**
Be sure to install the piston ring so that the manufacturer’s marks or numbers face up.

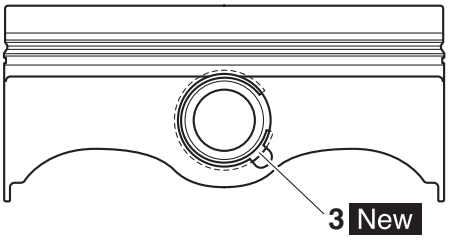


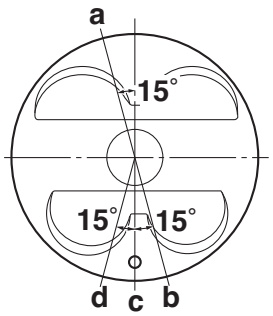

2. Install:
   • Piston “1”
   • Piston pin “2”
   • Piston pin clip “3” New

**TIP**
- Apply the engine oil to the piston pin.
- Install the piston with the mark “a” on it pointing to its exhaust (rear) side.
- Before installing the piston pin clip, cover the crankcase opening with a cloth to prevent the clip from falling into the crankcase.
- Make sure that the end of the piston pin clip is not positioned at the cutout in the piston.






3. Lubricate:
   • Piston
   • Piston ring
   • Cylinder
4. Offset:
   • Piston ring end gap




   a. Top ring
   b. Upper oil ring rail
   c. Oil ring expander
   d. Lower oil ring rail

5. Install:
   • Gasket New
   • Dowel pin
   • Cylinder

| | |
|---|---|
|  | **Cylinder bolt**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

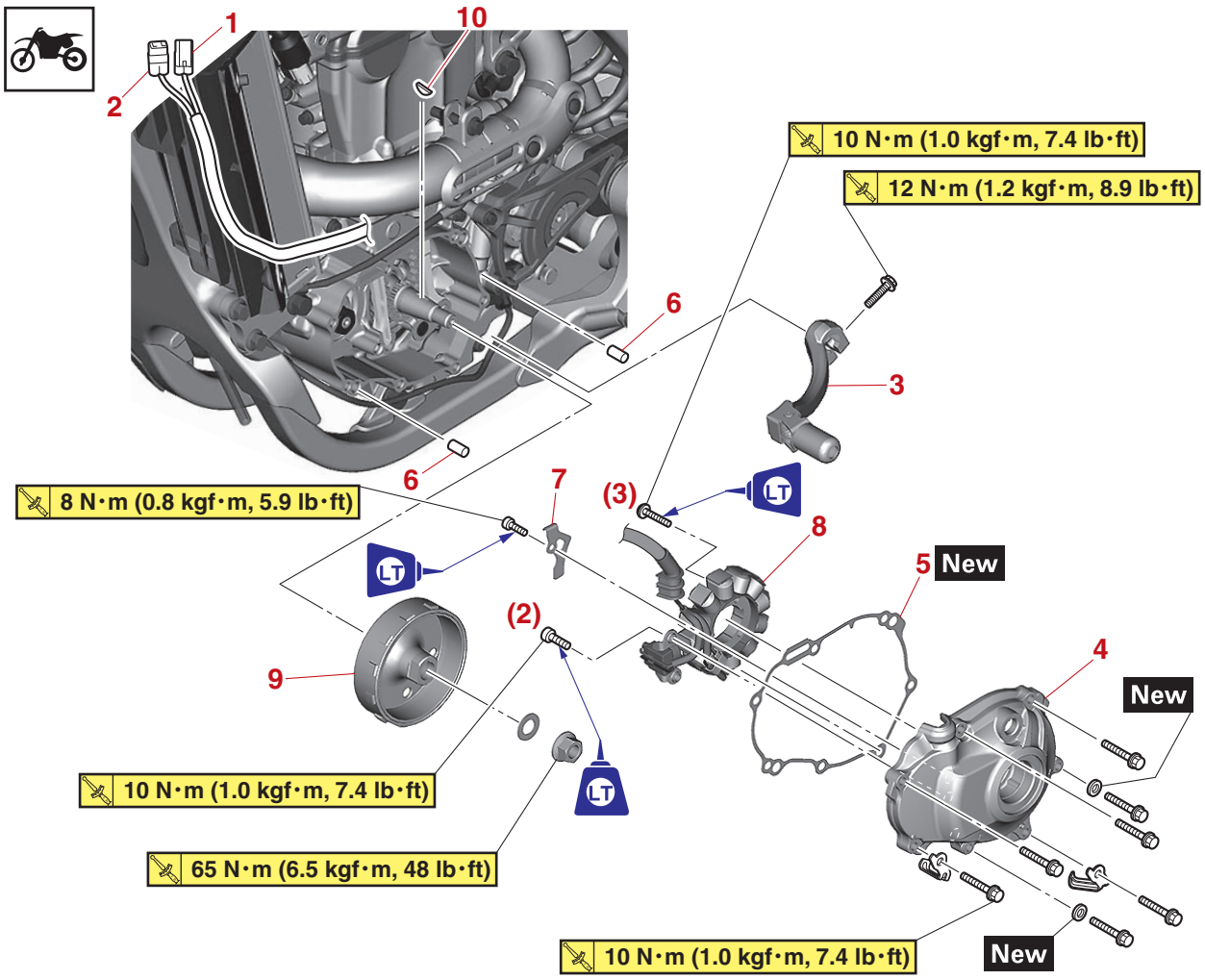
**TIP**

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

EAM20183

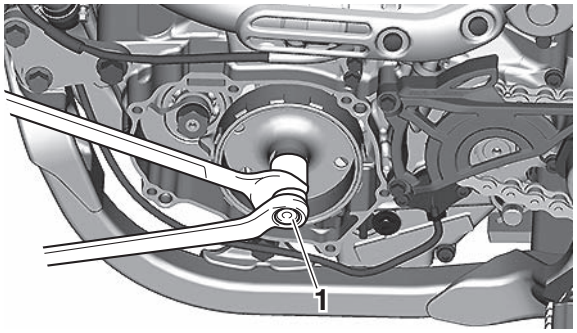
# GENERATOR

## Removing the stator coil assembly



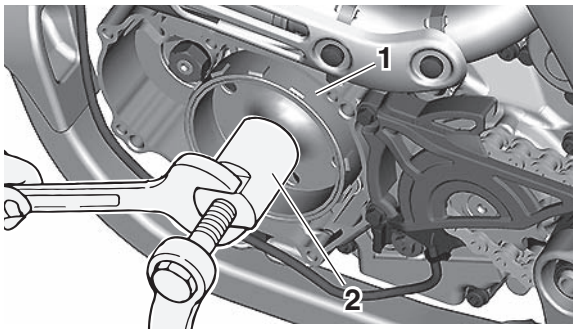

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Engine oil | | Drain.<br>Refer to "CHANGING THE ENGINE OIL" on page 3-13. |
| | Seat | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Air scoop (left) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| 1 | Stator coil assembly coupler | 1 | Disconnect. |
| 2 | Crankshaft position sensor coupler | 1 | Disconnect. |
| 3 | Shift pedal | 1 | |
| 4 | Crankcase cover (left) | 1 | |
| 5 | Gasket | 1 | |
| 6 | Dowel pin | 2 | |
| 7 | Holder | 1 | |
| 8 | Stator coil assembly | 1 | |
| 9 | Generator rotor | 1 | |
| 10 | Woodruff key | 1 | |

EAM30487
## REMOVING THE GENERATOR
1. Remove:
   • Nut (generator rotor) “1”
   • Washer

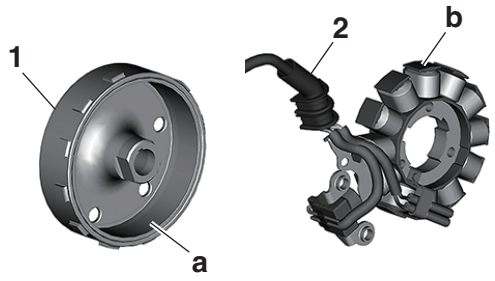



2. Remove:
   • Generator rotor “1”
   (with the rotor puller “2”)
   • Woodruff key

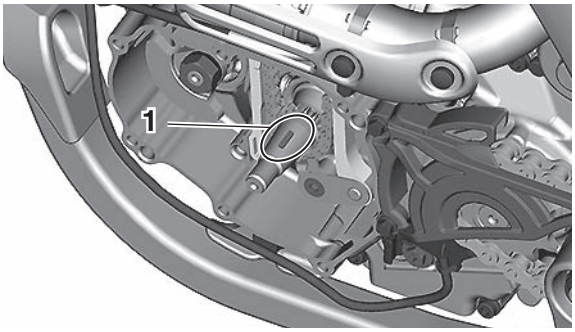
**Rotor puller**
**90890-04151**
**Rotor puller**
**YM-04151**




EAM30488
## CHECKING THE GENERATOR
1. Check:
   • Generator rotor “1” inner surface “a”
   • Stator coil assembly “2” outer surface “b”
   Damage → Inspect the crankshaft runout and crankshaft bearing.




EAM30377
## CHECKING THE WOODRUFF KEY
1. Check:
   • Woodruff key “1”
   Damage → Replace.




EAM30489
## INSTALLING THE GENERATOR
1. Install:
   • Stator coil assembly “1”
   • Screw (stator coil assembly) “2”

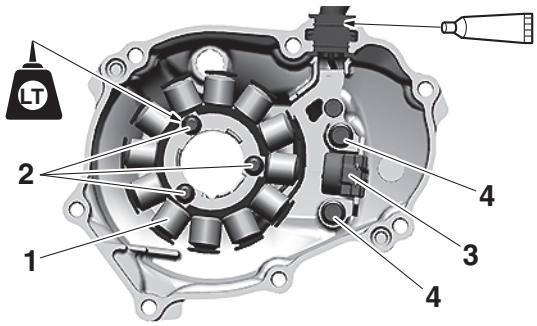
**Screw (stator coil assembly)**
**10 N·m (1.0 kgf·m, 7.4 lb·ft)**
**LOCTITE®**

   • Crankshaft position sensor “3”
   • Bolt (crankshaft position sensor) “4”
   • Holder
   • Bolt (holder)

**Bolt (crankshaft position sensor)**
**10 N·m (1.0 kgf·m, 7.4 lb·ft)**
**LOCTITE®**
**Bolt (holder)**
**8 N·m (0.8 kgf·m, 5.9 lb·ft)**
**LOCTITE®**

**TIP**
- Apply the sealant to the grommet of the stator coil assembly lead.
- Tighten the stator coil assembly screws using the T25 bit.
- Pass the stator coil assembly lead through the crankcase cover side.

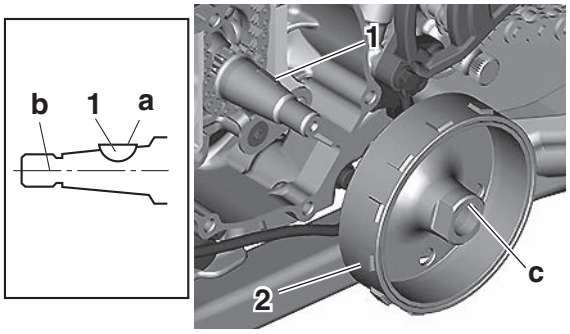
**Yamaha bond No. 1215**
**90890-85505**
**Three bond No. 1215®**




2. Install:
   - Woodruff key “1”
   - Generator rotor “2”

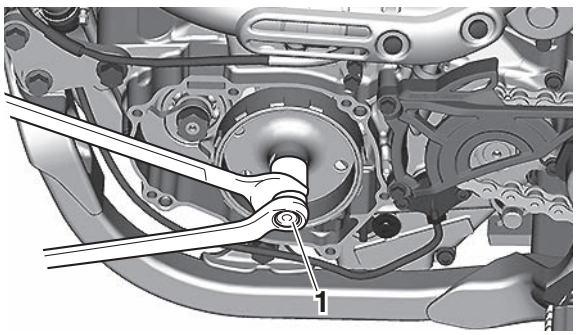
**TIP**

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




3. Install:
   - Washer
   - Nut (generator rotor) “1”

| | |
|---|---|
| | **Nut (generator rotor)**<br>**65 N·m (6.5 kgf·m, 48 lb·ft)** |

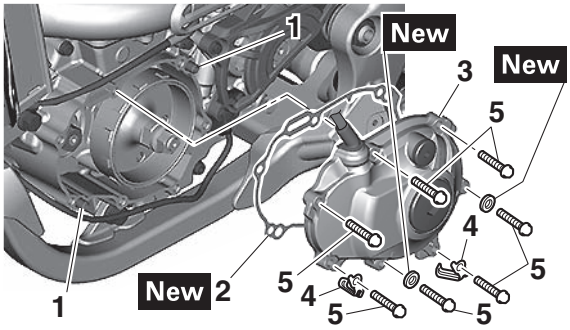



4. Install:
   - Dowel pin “1”
   - Gasket (left crankcase cover) “2” New
   - Crankcase cover (left) “3”
   - Lead holder “4”
   - Bolt (left crankcase cover) “5”

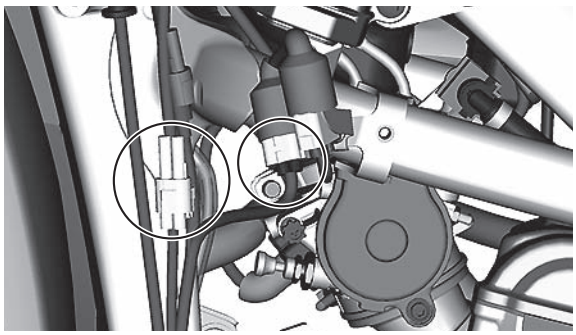
| | |
|---|---|
| | **Bolt (left crankcase cover)**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

**TIP**

Tighten the bolts in stages and in a crisscross pattern.



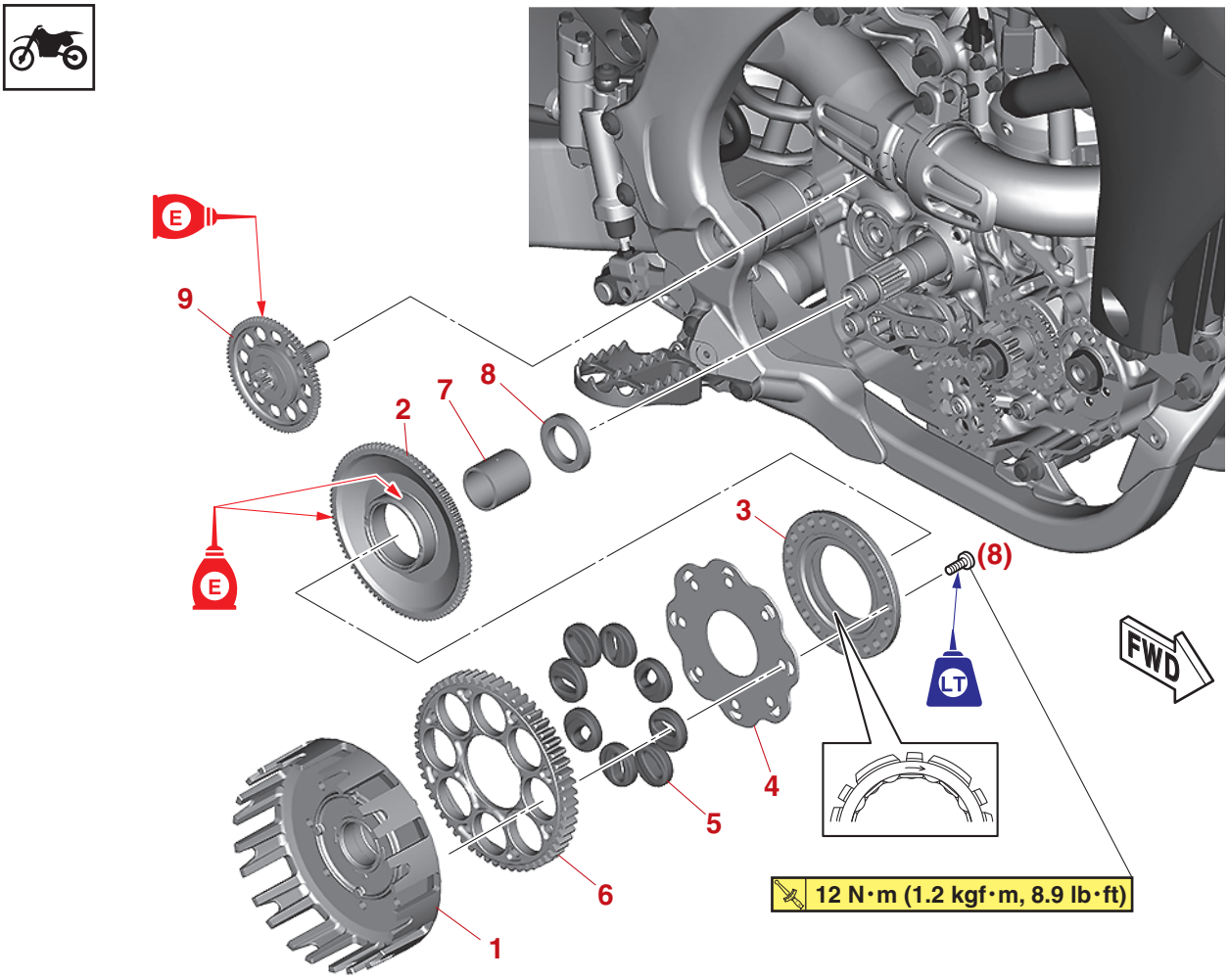

5. Connect:
   - Stator coil assembly lead
     Refer to “CABLE ROUTING DIAGRAM” on page 2-17.



EAM20175

# STARTER CLUTCH

## Removing the starter clutch




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Engine oil | | Refer to "CHANGING THE ENGINE OIL" on page 3-13. |
| | Clutch | | Refer to "CLUTCH" on page 5-47. |
| 1 | Clutch housing | 1 | |
| 2 | Starter clutch gear | 1 | |
| 3 | Starter clutch assembly | 1 | |
| 4 | Side plate | 1 | |
| 5 | Absorber | 8 | |
| 6 | Primary driven gear | 1 | |
| 7 | Spacer | 1 | |
| 8 | Collar | 1 | |
| 9 | Damper assembly | 1 | |

EAM30469
## REMOVING THE STARTER CLUTCH

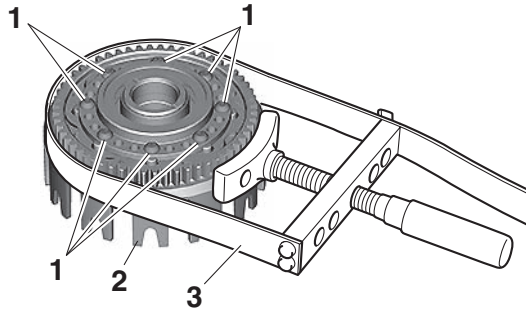
1. Remove:
   • Starter clutch screw “1”

**TIP**

While holding the side of the clutch housing “2” with the sheave holder “3” as shown, remove the starter clutch screws “1”.

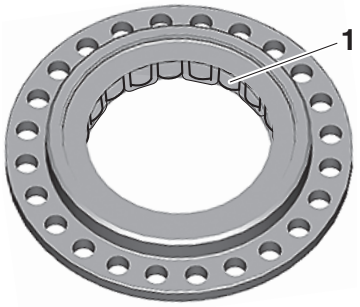


**Sheave holder**
**90890-01903**
**Primary clutch holder**
**YS-01880-A**

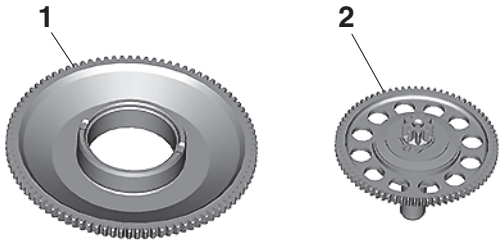



EAM30140
## CHECKING THE STARTER CLUTCH

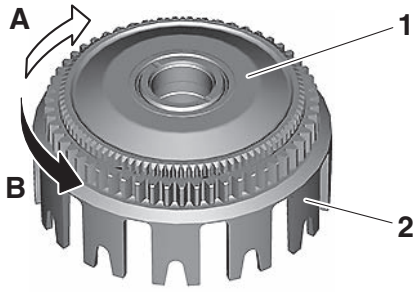
1. Check:
   • Starter clutch roller “1”
   Damage/wear → Replace.




2. Check:
   • Starter clutch gear “1”
   • Damper assembly “2”
   Burrs/chips/roughness/wear → Replace the defective part(s).




3. Check:
   • Starter clutch gear’s contacting surfaces
   Damage/pitting/wear → Replace the starter clutch gear.
4. Check:
   • Starter clutch operation
   a. Install the starter clutch gear “1” onto the primary driven gear “2” and hold the primary driven gear.
   b. When turning the starter clutch gear clockwise “A”, the starter clutch and the starter clutch gear should engage, otherwise the starter clutch is faulty and must be replaced.
   c. When turning the starter clutch gear counterclockwise “B”, it should turn freely, otherwise the starter clutch is faulty and must be replaced.

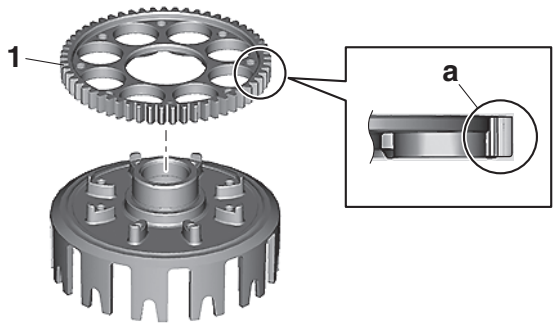



EAM30470
## INSTALLING THE STARTER CLUTCH

1. Install:
   • Primary driven gear “1”

**TIP**

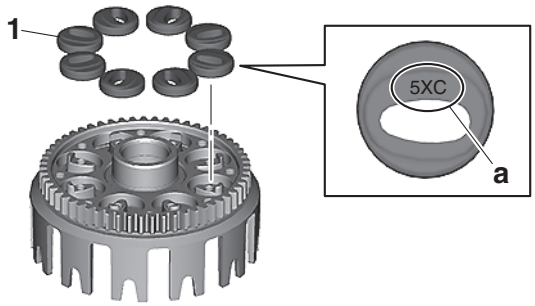
Install the primary driven gear “1” so that the portion “a” as shown faces to the starter clutch side.




2. Install:
   • Absorber “1”

**TIP**

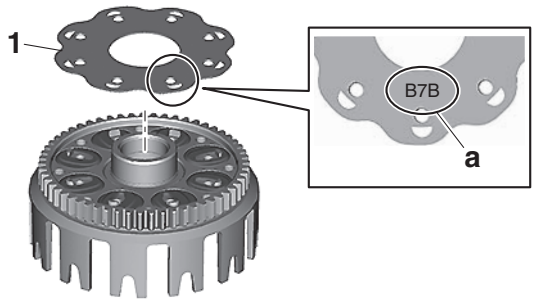
Install the absorber “1” so that the portion with the mark “5XC” “a” faces to the side plate side.




3. Install:
   • Side plate “1”

**TIP**

Install the side plate “1” so that the portion with the mark “B7B” “a” faces to the starter clutch side.



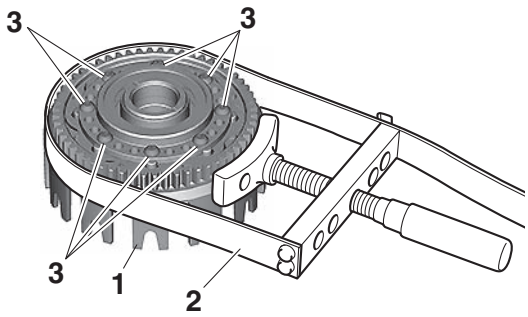

4. Install:
   • Starter clutch

| | |
|---|---|
| | **Starter clutch screw**<br>**12 N·m (1.2 kgf·m, 8.9 lb·ft)**<br>**LOCTITE®** |

**TIP**

• Install the starter clutch so that the side of the starter clutch assembly with the arrow mark is toward the primary driven gear.
• While holding the side of the clutch housing “1” with the sheave holder “2” as shown, tighten the starter clutch screws “3”.

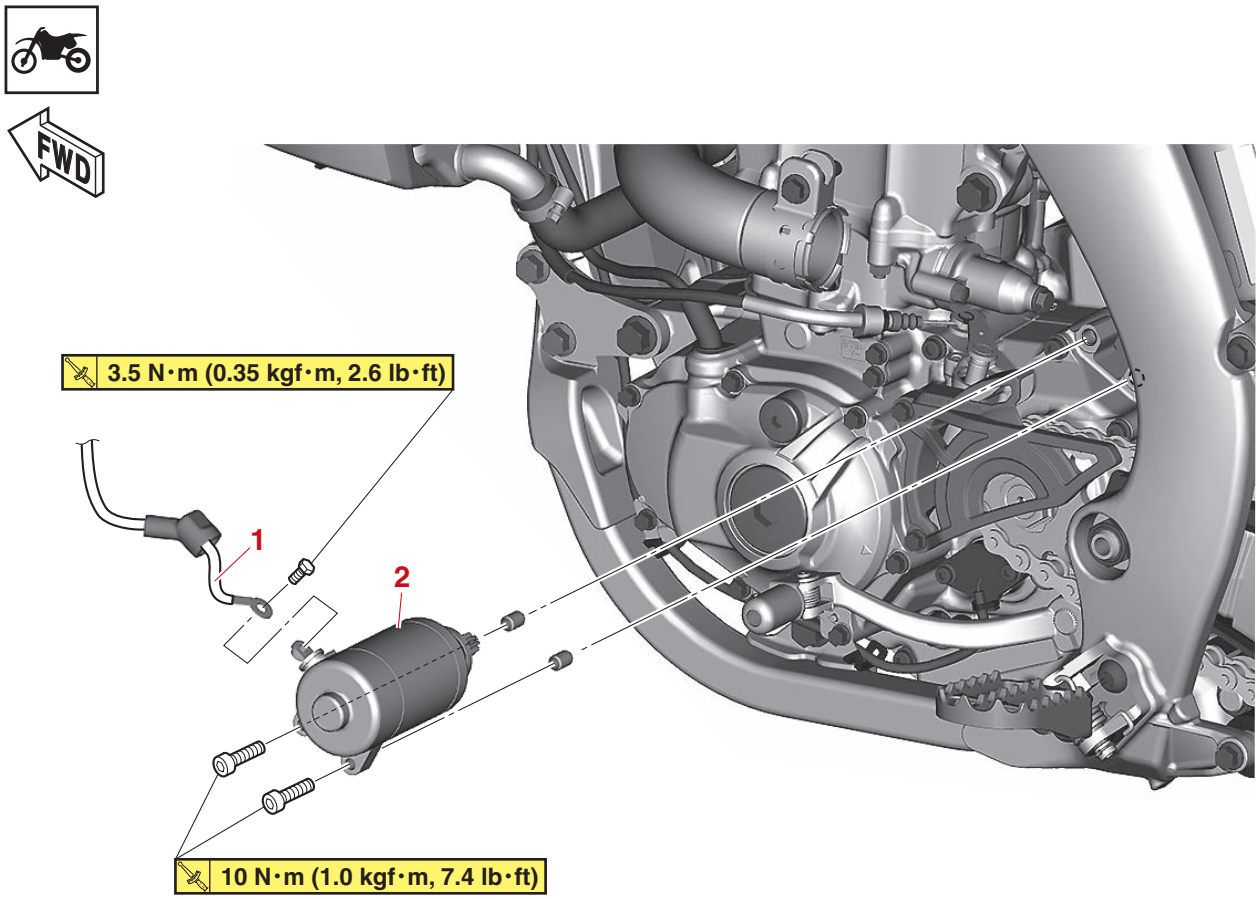
| | |
|---|---|
| | **Sheave holder**<br>**90890-01903**<br>**Primary clutch holder**<br>**YS-01880-A** |



EAM20110

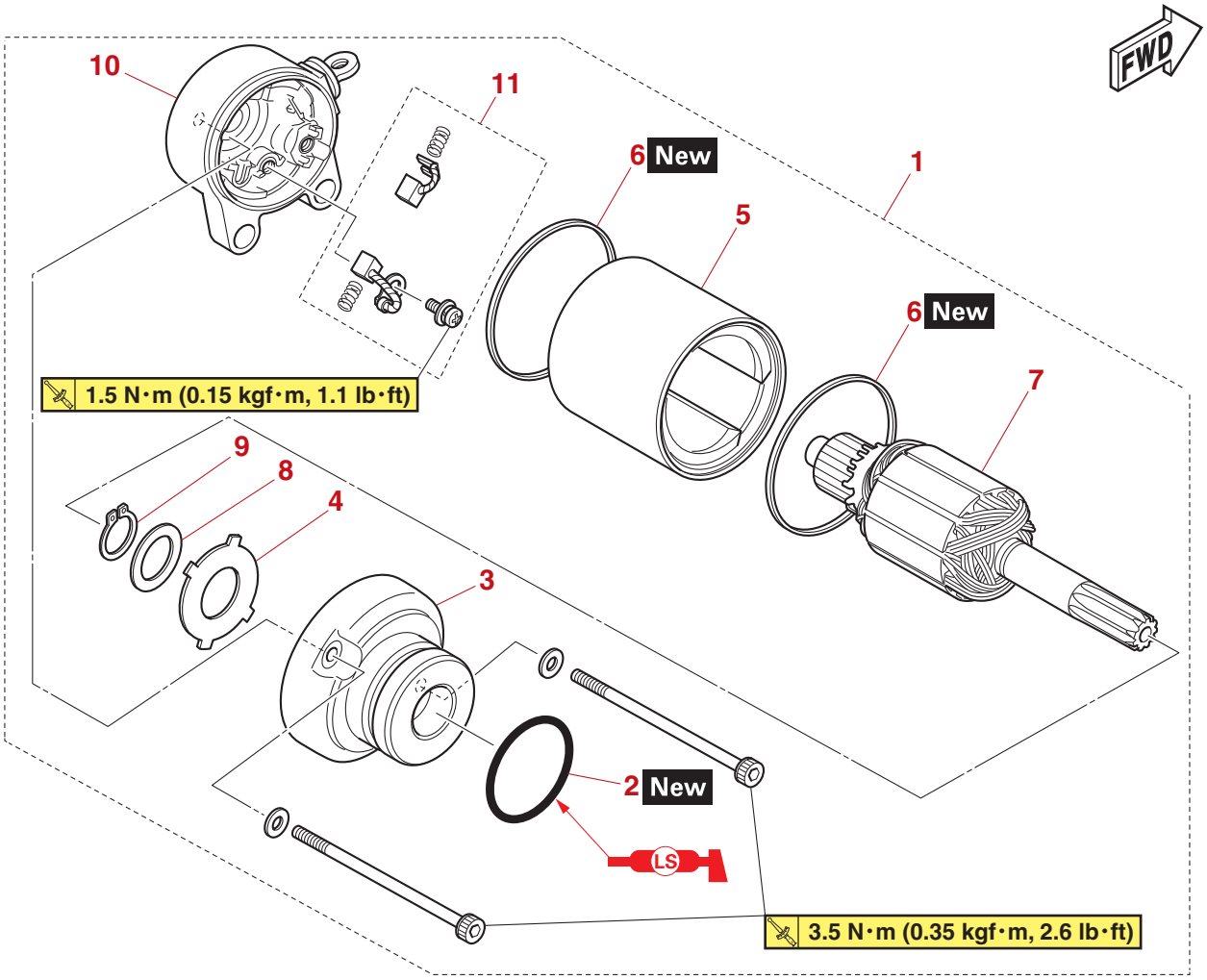
# ELECTRIC STARTER

**Removing the starter motor**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Exhaust pipe | | Refer to "ENGINE REMOVAL" on page 5-6. |
| 1 | Starter motor lead | 1 | |
| 2 | Starter motor | 1 | |

**Disassembling the starter motor**



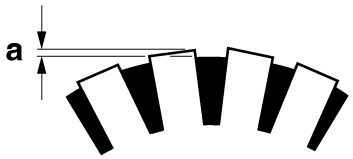

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 1 | Starter motor assembly | 1 | |
| 2 | O-ring | 1 | |
| 3 | Starter motor front cover | 1 | |
| 4 | Washer | 1 | Starter motor front cover |
| 5 | Starter motor yoke | 1 | |
| 6 | Gasket | 2 | |
| 7 | Armature assembly | 1 | |
| 8 | Washer | 1 | |
| 9 | Circlip | 1 | |
| 10 | Starter motor rear cover | 1 | |
| 11 | Brush set | 1 | |

EAM30106
## CHECKING THE STARTER MOTOR

1. Check:
   • Commutator
   Dirt → Clean with 600 grit sandpaper.
2. Measure:
   • Mica undercut “a”
   Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been grounded to fit the commutator.

**Mica undercut (depth)**
**1.50 mm (0.06 in)**

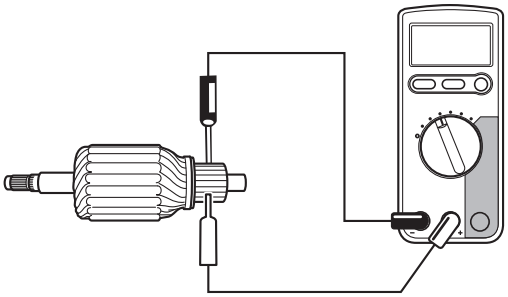
**TIP**
The mica of the commutator must be undercut to ensure proper operation of the commutator.




3. Check:
   • Armature assembly
   a. Connect the digital circuit tester to the armature coil and check the continuity.

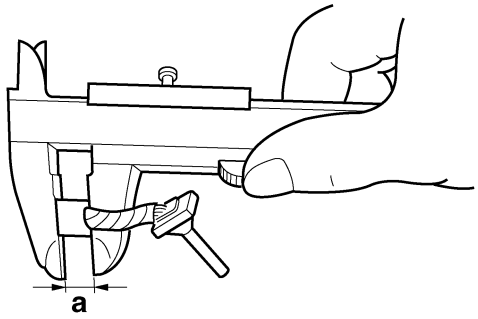
**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

   b. If there is no continuity, replace the starter motor.



4. Measure:
   • Brush length “a”
   Out of specification → Replace the brush set.

**Brush overall length limit**
**3.5 mm (0.14 in)**




5. Measure:
   • Brush spring force
   Out of specification → Replace the brush set.

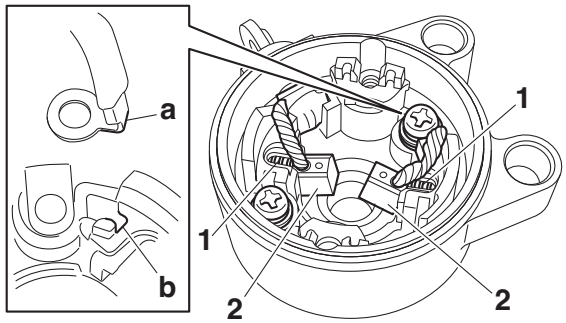
**Brush spring force**
**3.92–5.88 N (400–600 gf, 14.11–21.17 oz)**

6. Check:
   • Gear teeth
   Damage/wear → Replace the starter motor.
7. Check:
   • Oil seal
   Damage/wear → Replace the defective part(s).

EAM30107
## ASSEMBLING THE STARTER MOTOR

1. Install:
   • Brush spring “1”
   • Brush “2”

**TIP**
Align the corner of brush terminal “a” with groove “b” and fit them together.

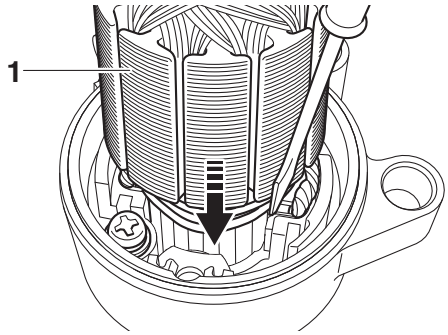



2. Install:
   • Armature assembly “1”
   Install while holding down the brush using a thin screw driver.

ECA24650

***NOTICE***

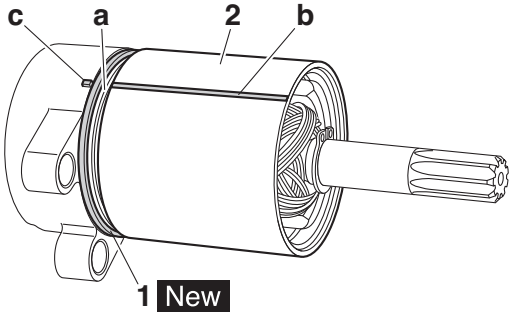
**Be careful not to damage the brush during installation.**




3. Install:
   - Gasket “1” New
   - Starter motor yoke “2”

**TIP**

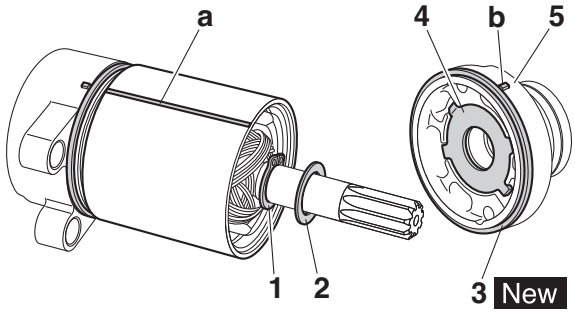
- Install the starter motor yoke with its groove “a” facing starter motor rear cover.
- Align the match mark “b” on the starter motor yoke with the match mark “c” on the starter motor rear cover.




4. Install:
   - Circlip “1”
   - Plain washer “2”
   - Gasket “3” New
   - Washer (starter motor front cover) “4”
   - Starter motor front cover “5”

**TIP**

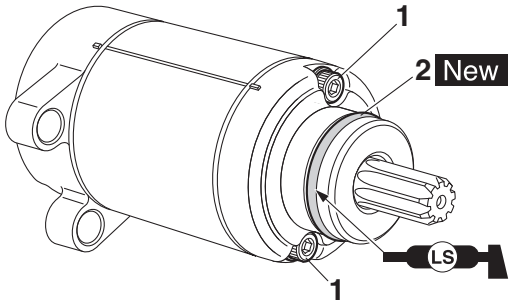
- For installation, align the projections on the washer with the slots in the front cover.
- Align the match mark “a” on the starter motor yoke with the match mark “b” on the starter motor front cover.



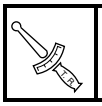

5. Install:
   - Bolt “1”
   - O-ring “2” New

**TIP**

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

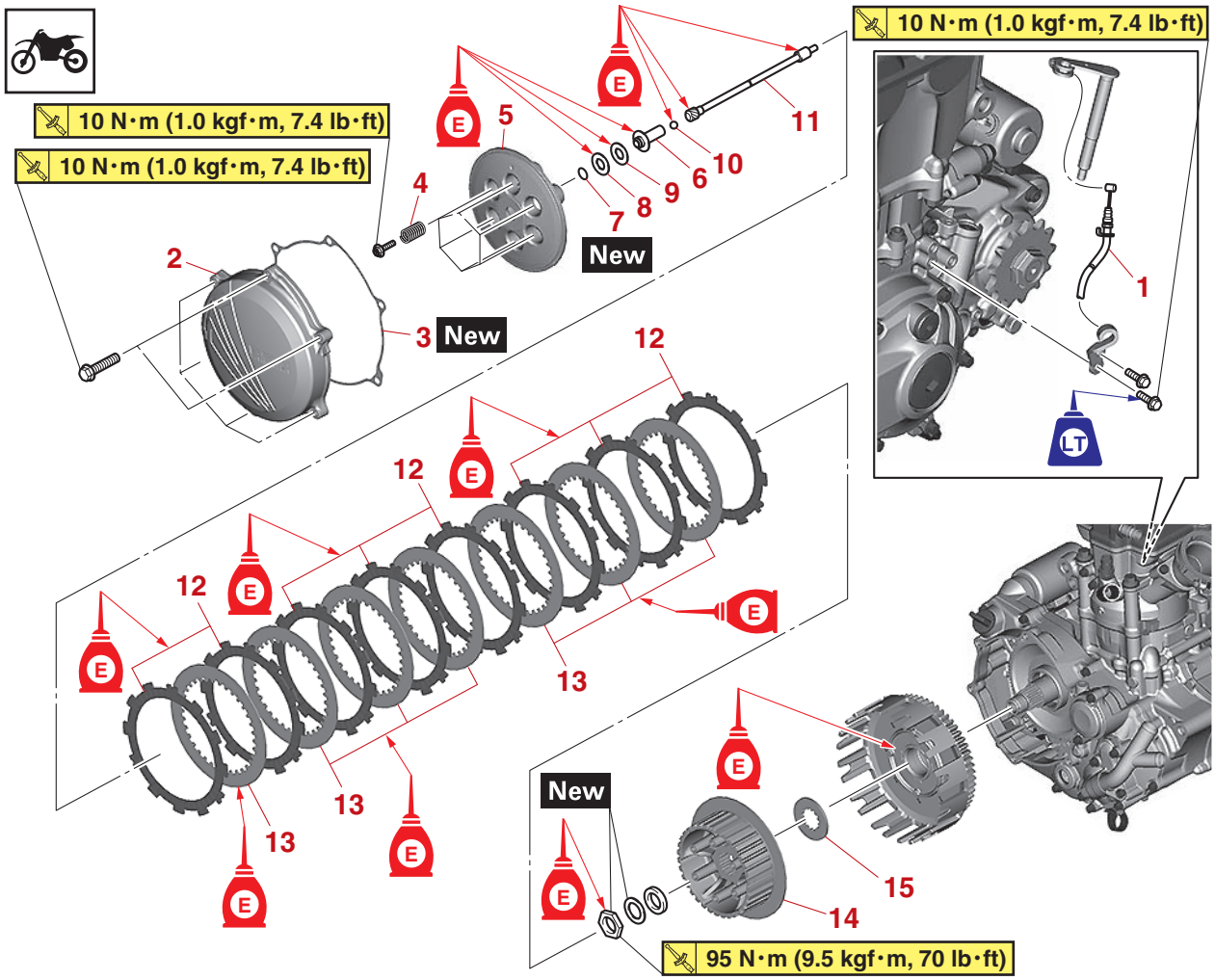



6. Install:
   - Starter motor
   - Starter motor bolt

| | |
|---|---|
|  | **Starter motor bolt**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

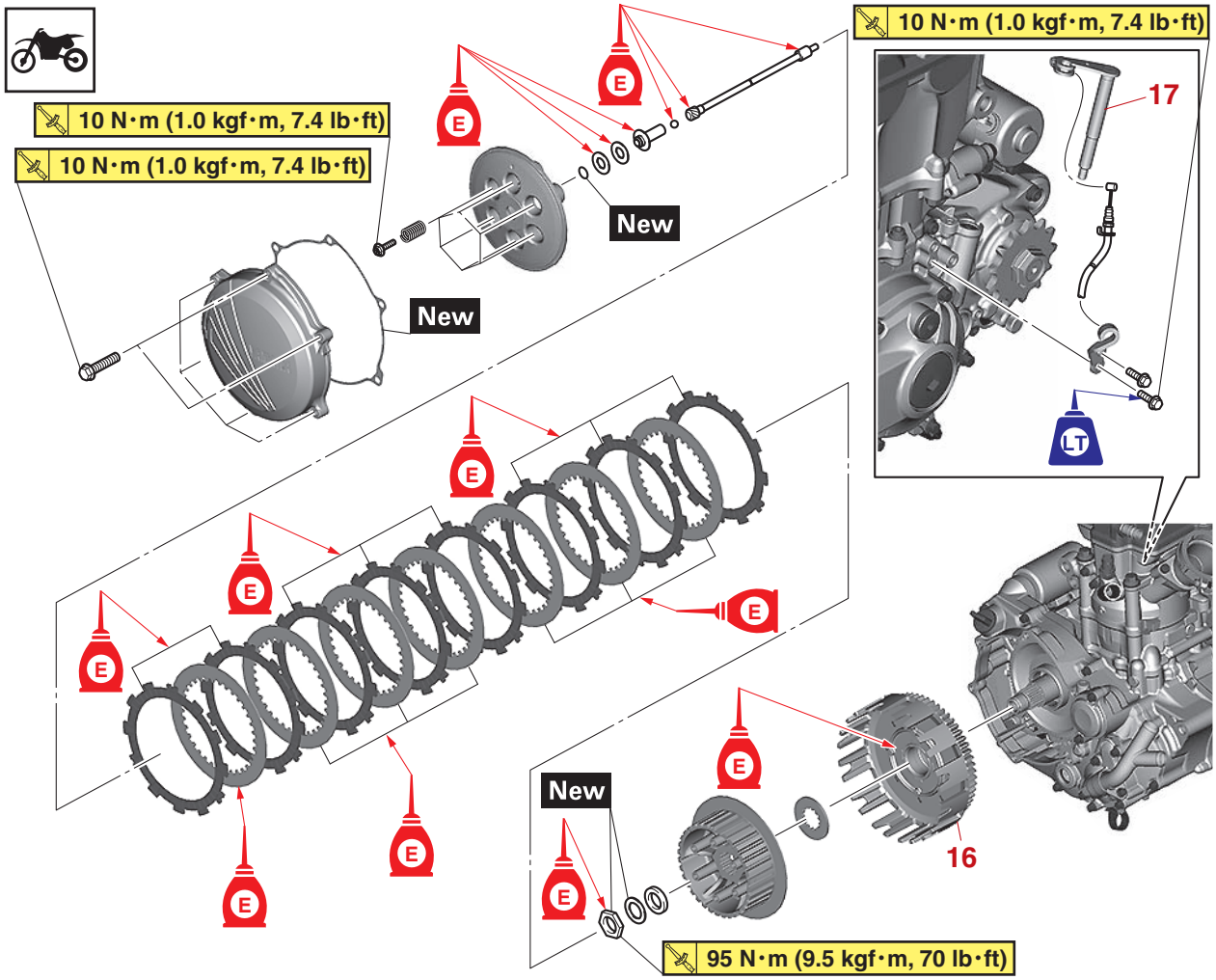
EAM20111
# CLUTCH

## Removing the clutch



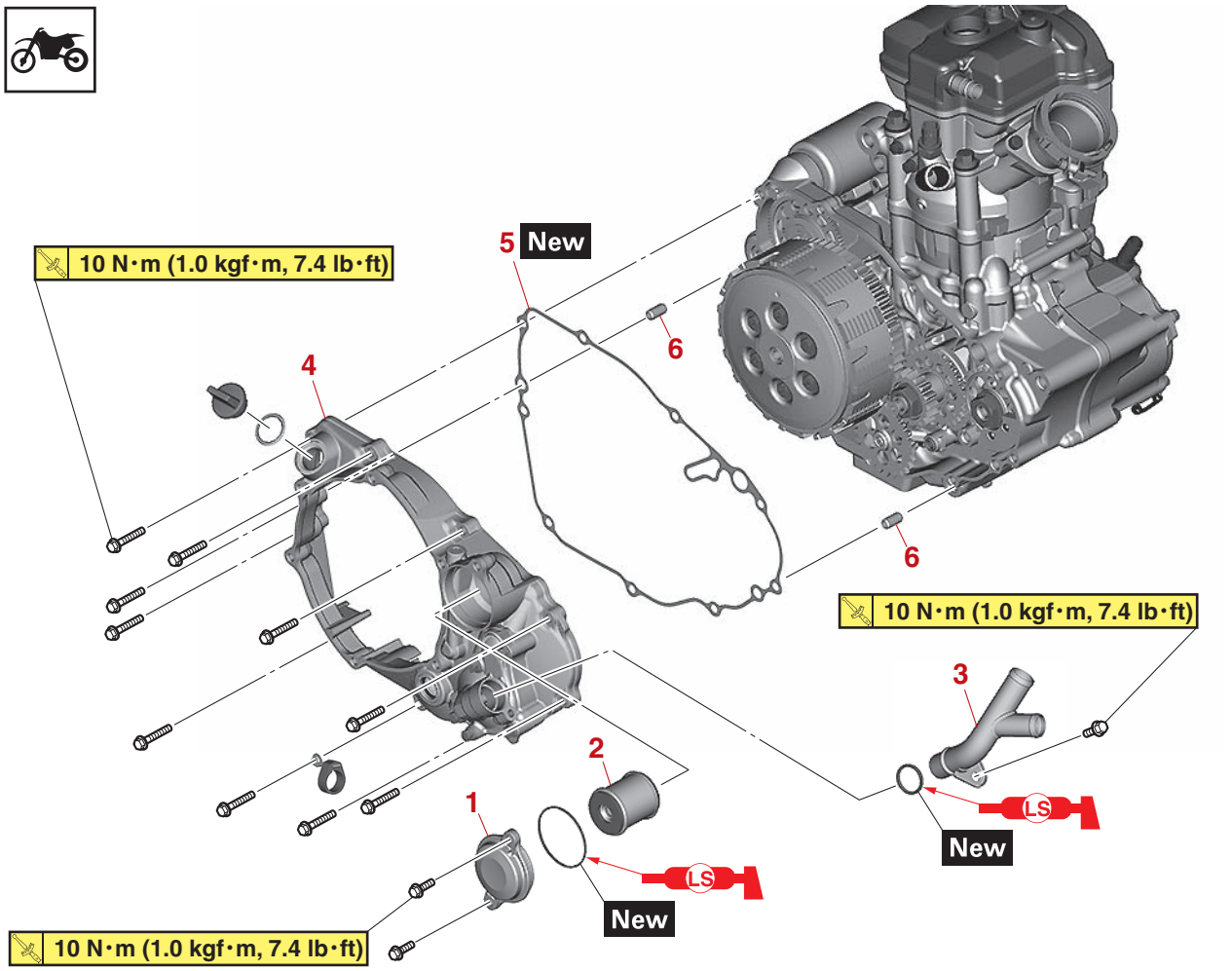

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Engine oil | | Drain.<br>Refer to "CHANGING THE ENGINE OIL" on page 3-13. |
| | Brake pedal | | Refer to "ENGINE REMOVAL" on page 5-6. |
| 1 | Clutch cable | 1 | Disconnect. |
| 2 | Clutch cover | 1 | |
| 3 | Gasket | 1 | |
| 4 | Clutch spring | 6 | |
| 5 | Pressure plate | 1 | |
| 6 | Push rod 1 | 1 | |
| 7 | Circlip | 1 | |
| 8 | Washer | 1 | |
| 9 | Bearing | 1 | |
| 10 | Ball | 1 | |
| 11 | Push rod 2 | 1 | |
| 12 | Friction plate | 8 | |
| 13 | Clutch plate | 7 | |
| 14 | Clutch boss | 1 | |
| 15 | Thrust washer | 1 | |

### Removing the clutch



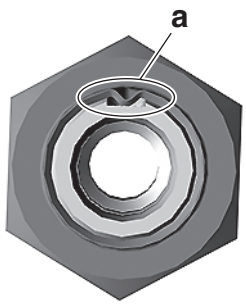

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 16 | Primary driven gear | 1 | |
| 17 | Push lever shaft | 1 | |

**Removing the right crankcase cover**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Right engine guard | | Refer to "ENGINE REMOVAL" on page 5-6. |
| | Engine oil | | Drain.<br>Refer to "CHANGING THE ENGINE OIL" on page 3-13. |
| | Coolant | | Drain.<br>Refer to "CHANGING THE COOLANT" on page 3-21. |
| | Brake pedal | | Refer to "ENGINE REMOVAL" on page 5-6. |
| | Clutch cover | | Refer to "CLUTCH" on page 5-47. |
| 1 | Oil filter element cover | 1 | |
| 2 | Oil filter element | 1 | |
| 3 | Radiator pipe 2 | 1 | |
| 4 | Right crankcase cover | 1 | |
| 5 | Gasket | 1 | |
| 6 | Dowel pin | 2 | |

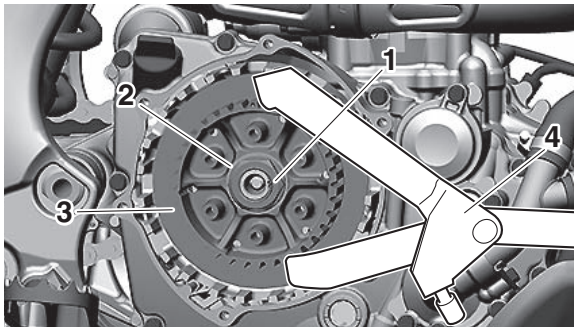
EAM30108
## REMOVING THE CLUTCH
1. Straighten the clutch boss nut rib “a”.




2. Remove:
   - Clutch boss nut “1”
   - Conical washer “2”
   - Clutch boss “3”

**TIP**
- While holding the clutch boss with the clutch holder “4”, loosen the clutch boss nut.
- Do not use an impact wrench for removing the clutch boss nut.

**Clutch holder**
**90890-04199**
**Universal clutch holder**
**YM-91042**




EAM30109
## CHECKING THE FRICTION PLATES
1. Check:
   - Friction plate
     Damage/wear → Replace the friction plates as a set.
2. Measure:
   - Friction plate thickness
     Out of specification → Replace the friction plates as a set.

**TIP**
Measure it at four points on the friction plate.

**Friction plate thickness**
**2.70–2.90 mm (0.106–0.114 in)**
**Wear limit**
**2.60 mm (0.102 in)**

EAM30110
## CHECKING THE CLUTCH PLATES
1. Check:
   - Clutch plate
     Damage → Replace the clutch plates as a set.
2. Measure:
   - Clutch plate warpage
     (with a surface plate and thickness gauge)
     Out of specification → Replace the clutch plates as a set.

**Thickness gauge**
**90890-03268**
**Feeler gauge set**
**YU-26900-9**

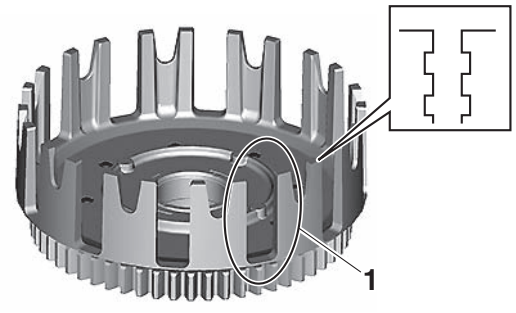
**Clutch plate thickness**
**1.50–1.70 mm (0.059–0.067 in)**
**Warpage limit**
**0.10 mm (0.004 in)**

EAM30111
## CHECKING THE CLUTCH SPRINGS
1. Check:
   - Clutch spring
     Damage → Replace the clutch springs as a set.
2. Measure:
   - Clutch spring free length
     Out of specification → Replace the clutch springs as a set.

**Clutch spring free length**
**46.20 mm (1.82 in)**
**Clutch spring free length limit**
**43.89 mm (1.73 in)**

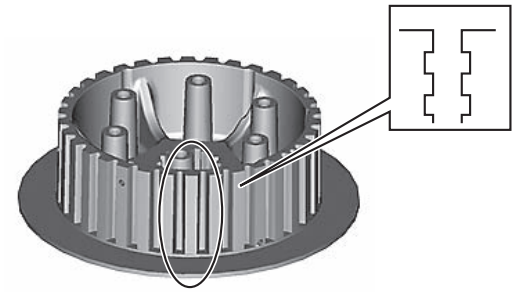
EAM30112
## CHECKING THE CLUTCH HOUSING
1. Check:
   - Clutch housing dogs “1”
     Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

**TIP**
Pitting on the clutch housing dogs will cause erratic clutch operation.



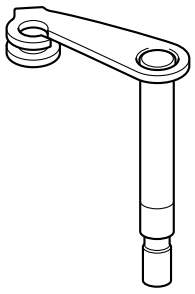

EAM30113
### CHECKING THE CLUTCH BOSS
1. Check:
   • Clutch boss splines
   Damage/pitting/wear → Replace the clutch boss.

**TIP**
Pitting on the clutch boss splines will cause erratic clutch operation.

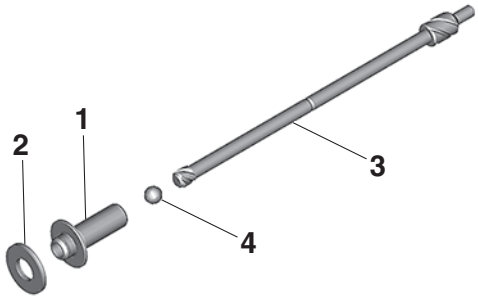


EAM30114
### CHECKING THE PRESSURE PLATE
1. Check:
   • Pressure plate
   Crack/damage → Replace.

EAM30115
### CHECKING THE PUSH LEVER SHAFT
1. Check:
   • Push lever shaft
   Wear/damage → Replace.



EAM30484
### CHECKING THE PUSH RODS
1. Check:
   • Push rod 1 “1”
   • Bearing/Washer “2”
   • Push rod 2 “3”
   • Ball “4”
   Cracks/damage/wear → Replace.



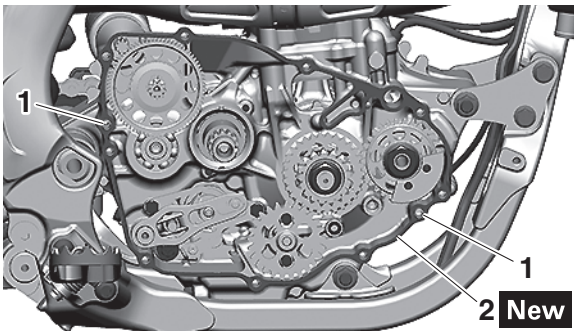

2. Measure:
   • Push rod 2 bending limit
   Out of specification → Replace.

| | |
|---|---|
| | **Push rod bending limit**<br>**0.30 mm (0.012 in)** |

EAM30117
### CHECKING THE PRIMARY DRIVE GEAR
1. Check:
   • Primary drive gear
   Damage/wear → Replace the primary drive and primary driven gears as a set.
   Excessive noise during operation → Replace the primary drive and primary driven gears as a set.
2. Check:
   • Primary-drive-gear-to-primary-driven-gear free play
   Free play exists → Replace the primary drive and primary driven gears as a set.

EAM30118
### CHECKING THE PRIMARY DRIVEN GEAR
1. Check:
   • Primary driven gear
   Damage/wear → Replace the primary drive and primary driven gears as a set.
   Excessive noise during operation → Replace the primary drive and primary driven gears as a set.

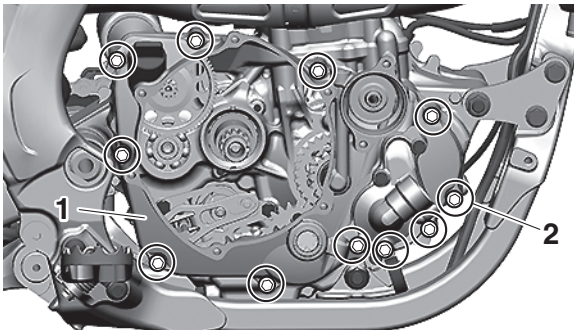
EAM30121
### INSTALLING THE CLUTCH
1. Install:
   • Dowel pin “1”
   • Gasket “2” New




2. Install:
   • Right crankcase cover “1”
   • Right crankcase cover bolt “2”

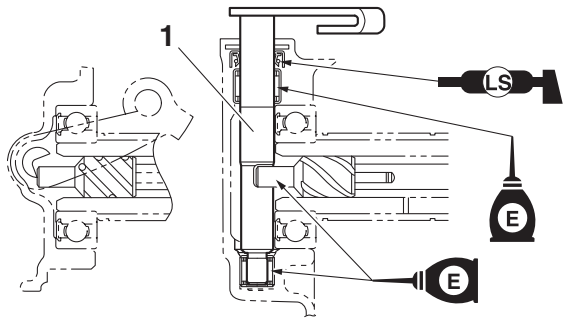
| | |
|---|---|
| | **Right crankcase cover bolt**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

**TIP**
Tighten the right crankcase cover bolts in stages and in a crisscross pattern.



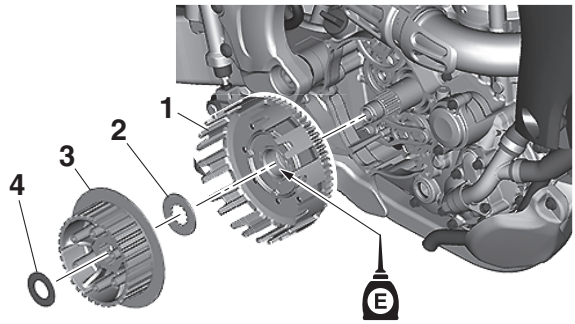

3. Install:
   • Push lever shaft “1”

**TIP**
- Apply the lithium-soap-based grease on the oil seal lip.
- Before installation, apply the engine oil to the bearings (upper side and lower side).




4. Install:
   • Primary driven gear “1”
   • Thrust washer “2”
   • Clutch boss “3”
   • Washer “4”

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



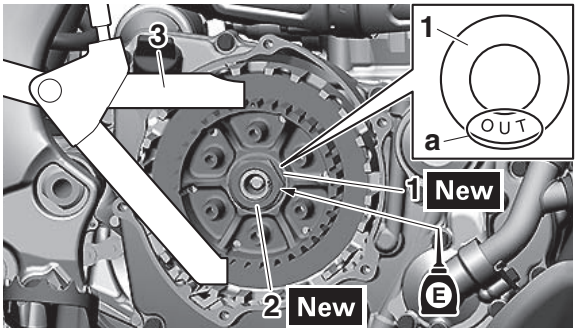

5. Install:
   • Conical washer “1” New
   • Clutch boss nut “2” New

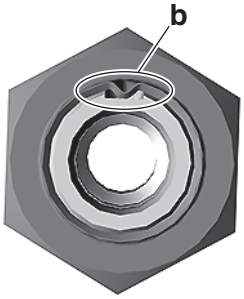
| | |
|---|---|
| | **Clutch boss nut**<br>**95 N·m (9.5 kgf·m, 70 lb·ft)** |

ECA24660
***NOTICE***
**Make sure to tighten to specification; otherwise, it may damage the other part that is fastened together.**

**TIP**
- Install the conical washer on the main axle with the “OUT” mark “a” facing away from the vehicle.
- Apply engine oil to the threads and contact surface of the clutch boss nut.
- Apply engine oil to the contact surfaces of the conical washer.
- Use the clutch holder “3” to hold the clutch boss.
- Do not use an impact wrench for installing the clutch boss nut.
- Stake the clutch boss nut at cutouts “b” in the main axle.

| | |
|---|---|
| | **Clutch holder**<br>**90890-04199**<br>**Universal clutch holder**<br>**YM-91042** |

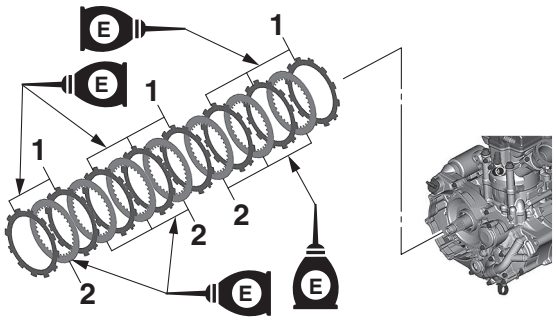


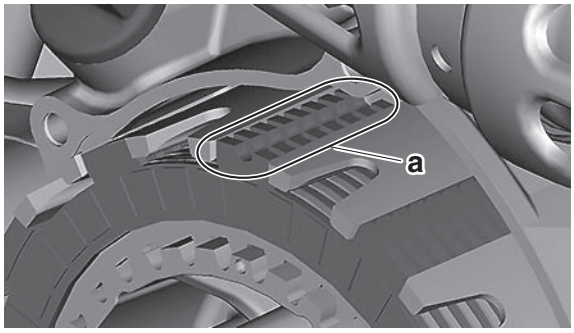




6. Install:
   - Friction plate “1”
   - Clutch plate “2”

**TIP**

- Install the clutch plates and friction plates alternately on the clutch boss, starting with a friction plate and ending with a friction plate.
- Align the friction plate with the groove “a” in the friction plate and install it to the primary driven gear.
- Apply the engine oil on the friction plates and clutch plates.

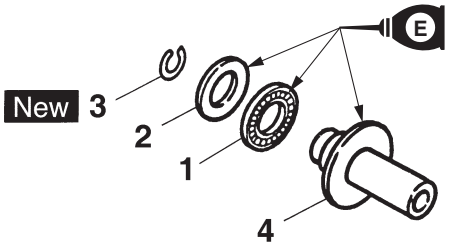



7. Install:
   - Bearing “1”
   - Washer “2”
   - Circlip “3” New
     (to the push rod 1 “4”)

**TIP**

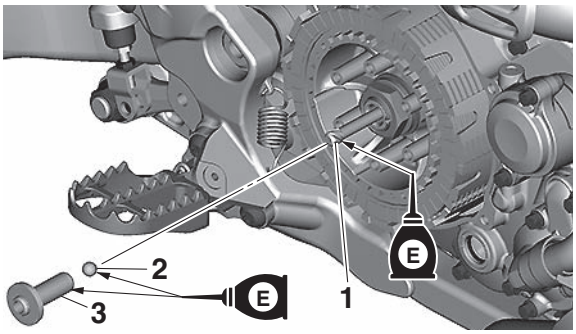
Apply the engine oil on the bearing, washer and push rod 1.




8. Install:
   - Push rod 2 “1”
   - Ball “2”
   - Push rod 1 “3”

**TIP**

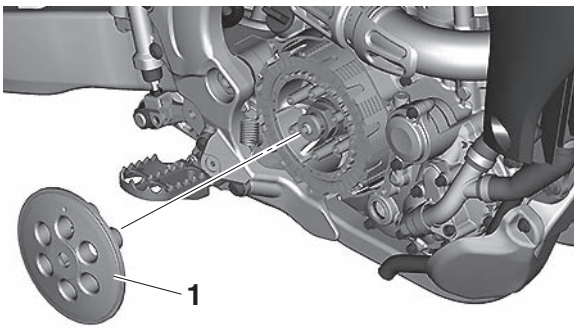
Apply the engine oil on the push rod 1, 2 and ball.

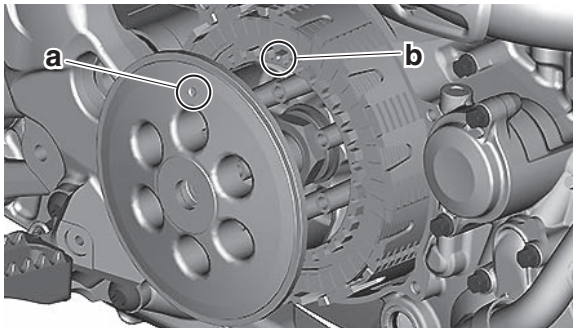



9. Install:
   - Pressure plate “1”

**TIP**

Making sure to align a “a” on the pressure plate with the punch mark “b” on the clutch housing.



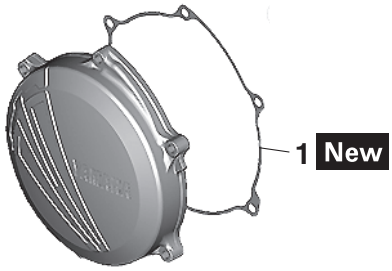




10.Install:
- Clutch spring
- Clutch spring bolt

| | |
|---|---|
| | **Clutch spring bolt**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

**TIP**
Tighten the bolts in stages and in a crisscross pattern.

11.Install:
- Gasket “1” New




12.Install:
- Clutch cover
- Clutch cover bolt

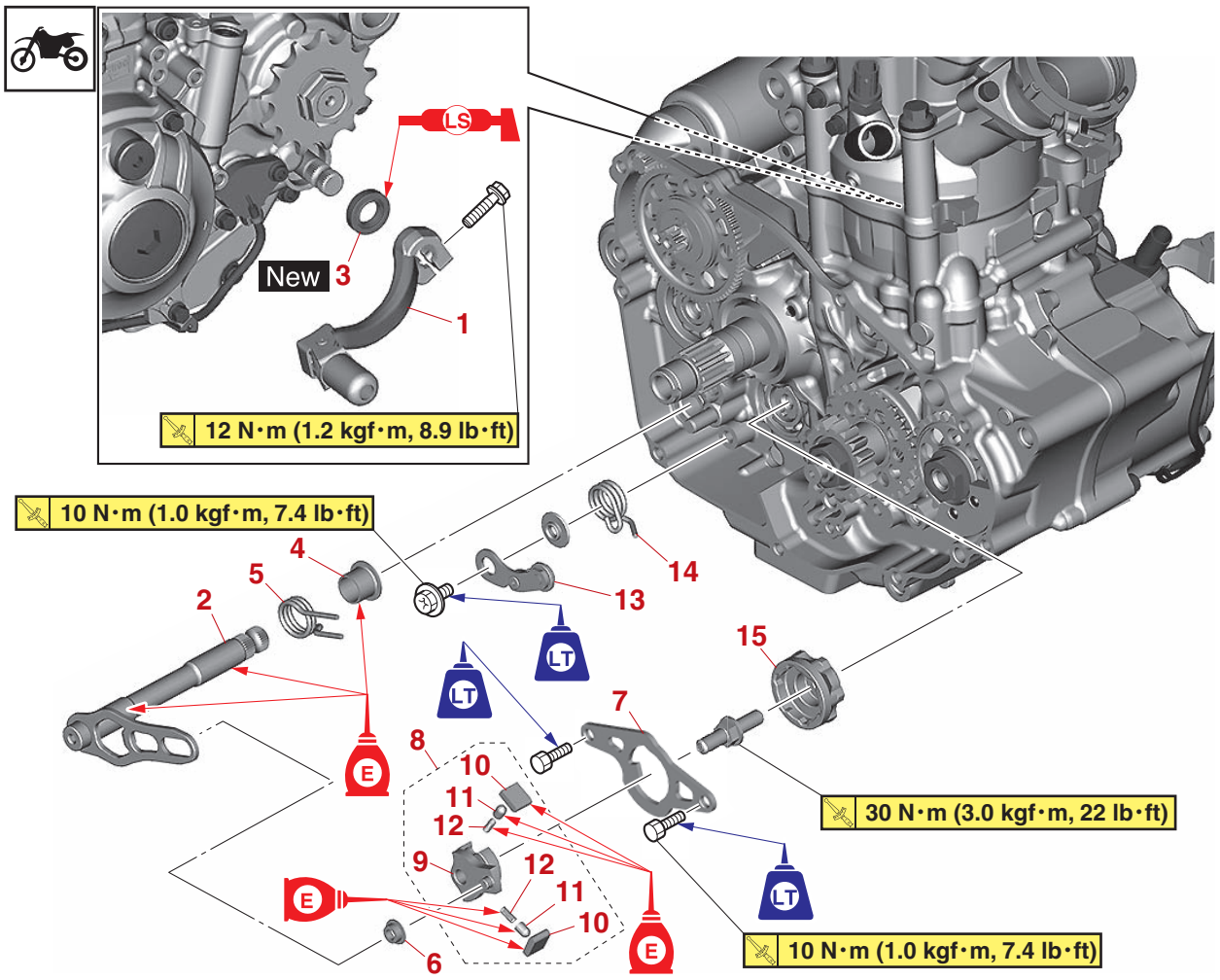
| | |
|---|---|
| | **Clutch cover bolt**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

**TIP**
Tighten the bolts in stages and in a crisscross pattern.

EAM20113

# SHIFT SHAFT

**Removing the shift shaft and stopper lever**

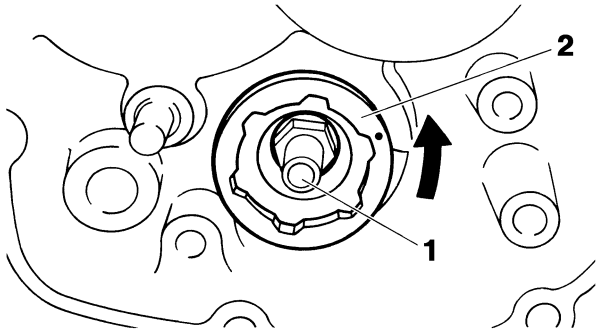



| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Primary driven gear | | Refer to "CLUTCH" on page 5-47. |
| 1 | Shift pedal | 1 | |
| 2 | Shift shaft | 1 | |
| 3 | Oil seal | 1 | |
| 4 | Collar | 1 | |
| 5 | Shift shaft spring | 1 | |
| 6 | Roller | 1 | |
| 7 | Shift guide | 1 | |
| 8 | Shift lever assembly | 1 | |
| 9 | Shift lever | 1 | |
| 10 | Pawl | 2 | |
| 11 | Pawl pin | 2 | |
| 12 | Spring | 2 | |
| 13 | Stopper lever | 1 | |
| 14 | Stopper lever spring | 1 | |
| 15 | Segment | 1 | |

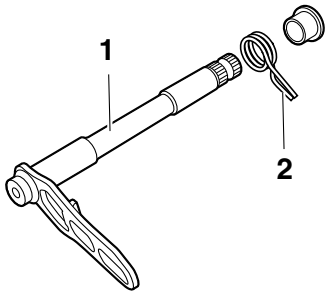
EAM30124
### REMOVING THE SEGMENT
1. Remove:
   • Segment bolt “1”
   • Segment “2”

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

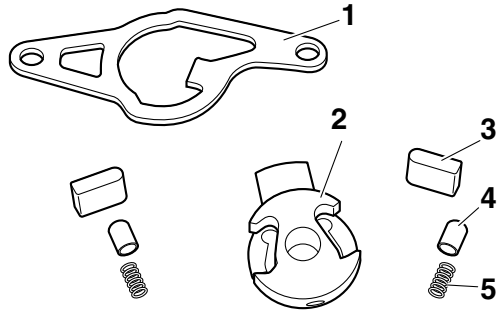
ECA24670
***NOTICE***
**If the segment gets an impact, the stopper lever may be damaged. Take care not to give an impact to it when removing the bolt.**



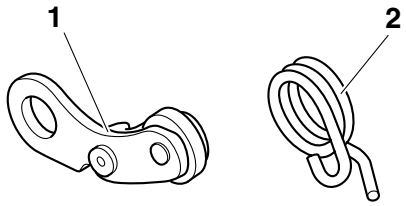

EAM30125
### CHECKING THE SHIFT SHAFT
1. Check:
   • Shift shaft “1”
   Bends/damage/wear → Replace.
   • Shift shaft spring “2”
   Damage/wear → Replace.




2. Check:
   • Shift guide “1”
   • Shift lever “2”
   • Pawl “3”
   • Pawl pin “4”
   • Spring “5”
   Wear/damage → Replace.

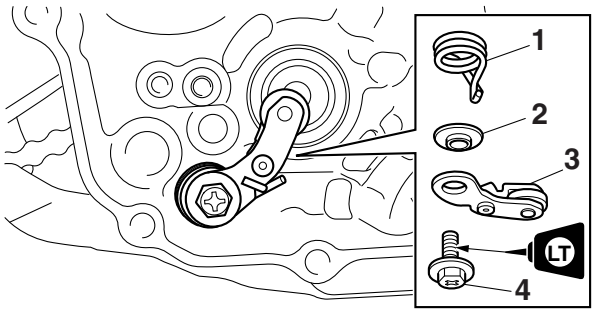



EAM30127
### CHECKING THE STOPPER LEVER
1. Check:
   • Stopper lever “1”
   Wear/damage → Replace.
   • Stopper lever spring “2”
   Broken → Replace.




EAM30131
### INSTALLING THE SHIFT SHAFT
1. Install:
   • Stopper lever spring “1”
   • Collar “2”
   • Stopper lever “3”
   • Bolt (stopper lever) “4”

**Bolt (stopper lever)**
**10 N·m (1.0 kgf·m, 7.4 lb·ft)**
**LOCTITE®**




2. Install:
   • Segment “1”
   • Segment bolt

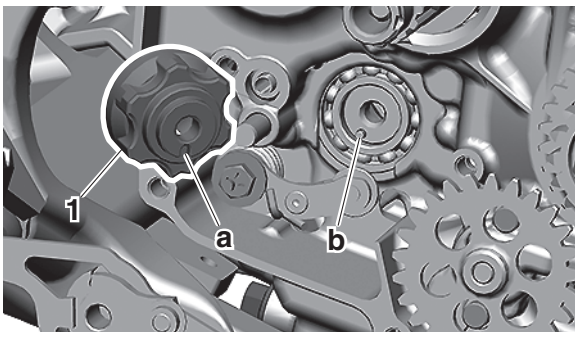
| | |
|---|---|
| | **Segment bolt**<br>**30 N·m (3.0 kgf·m, 22 lb·ft)** |

**TIP**
- Align the notch "a" on the segment with the pin "b" on the shift cam.
- With the stopper lever pushed down, install the segment.

ECA24680

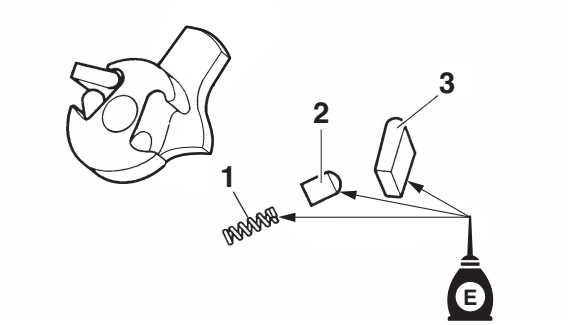
***NOTICE***

**If the segment gets an impact, the stopper lever may be damaged. Take care not to give an impact to it when tightening the bolt.**



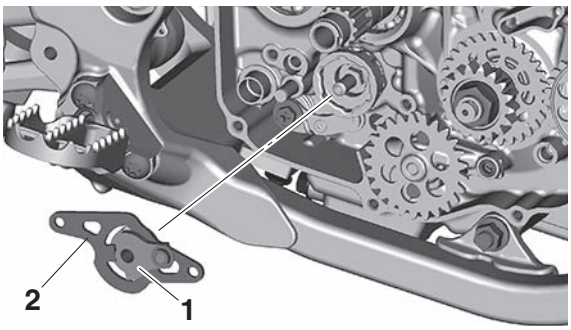

3. Install:
   - Spring "1"
   - Pawl pin "2"
   - Pawl "3"
     (to the shift lever)

**TIP**
Apply the engine oil on the spring, pawl pin and pawl.



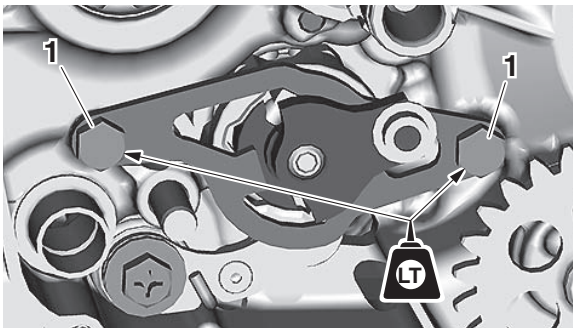

4. Install:
   - Shift lever assembly
     (to the shift guide)
5. Install:
   - Shift lever assembly "1"
   - Shift guide "2"

**TIP**
The shift lever assembly is installed at the same time as the shift guide.



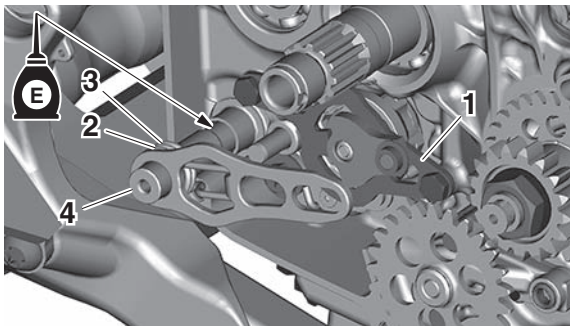

6. Tighten:
   - Shift guide bolt "1"

| | |
|---|---|
| | **Shift guide bolt**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)**<br>**LOCTITE®** |




7. Install:
   - Roller "1"
   - Shift shaft spring "2" (to the shift shaft)
   - Collar "3" (to the shift shaft)
   - Shift shaft "4"

**TIP**
Apply the engine oil on the shift shaft.

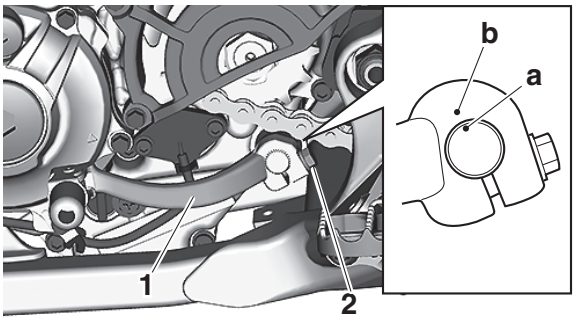



8. Install:
   - Oil seal New
9. Install:
   - Shift pedal "1"
   - Shift pedal bolt "2"

| | |
|---|---|
| | **Shift pedal bolt**<br>**12 N·m (1.2 kgf·m, 8.9 lb·ft)** |

**TIP**

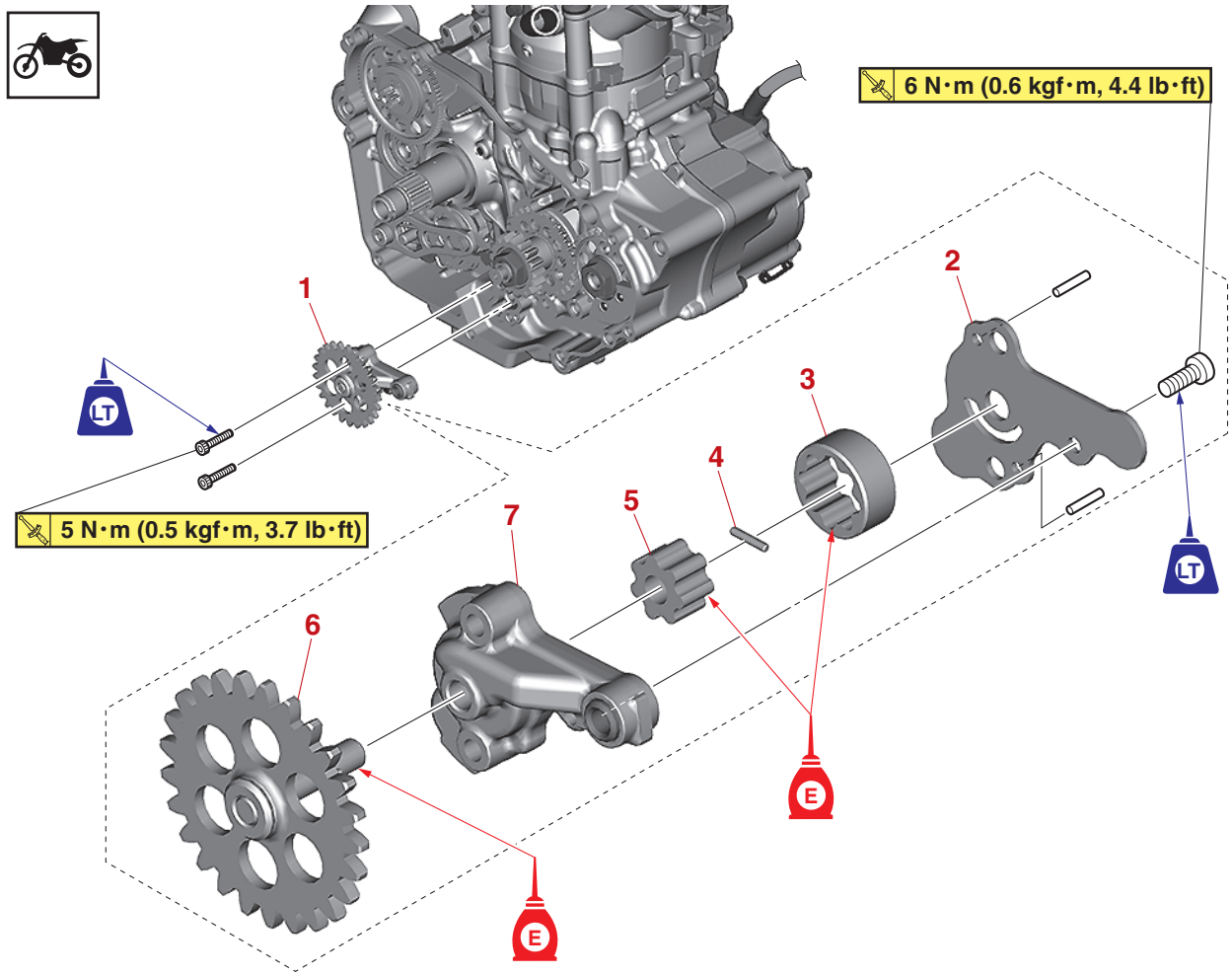
Align the punch mark “a” on the shift shaft with the punch mark “b” in the shift pedal.



EAM20182

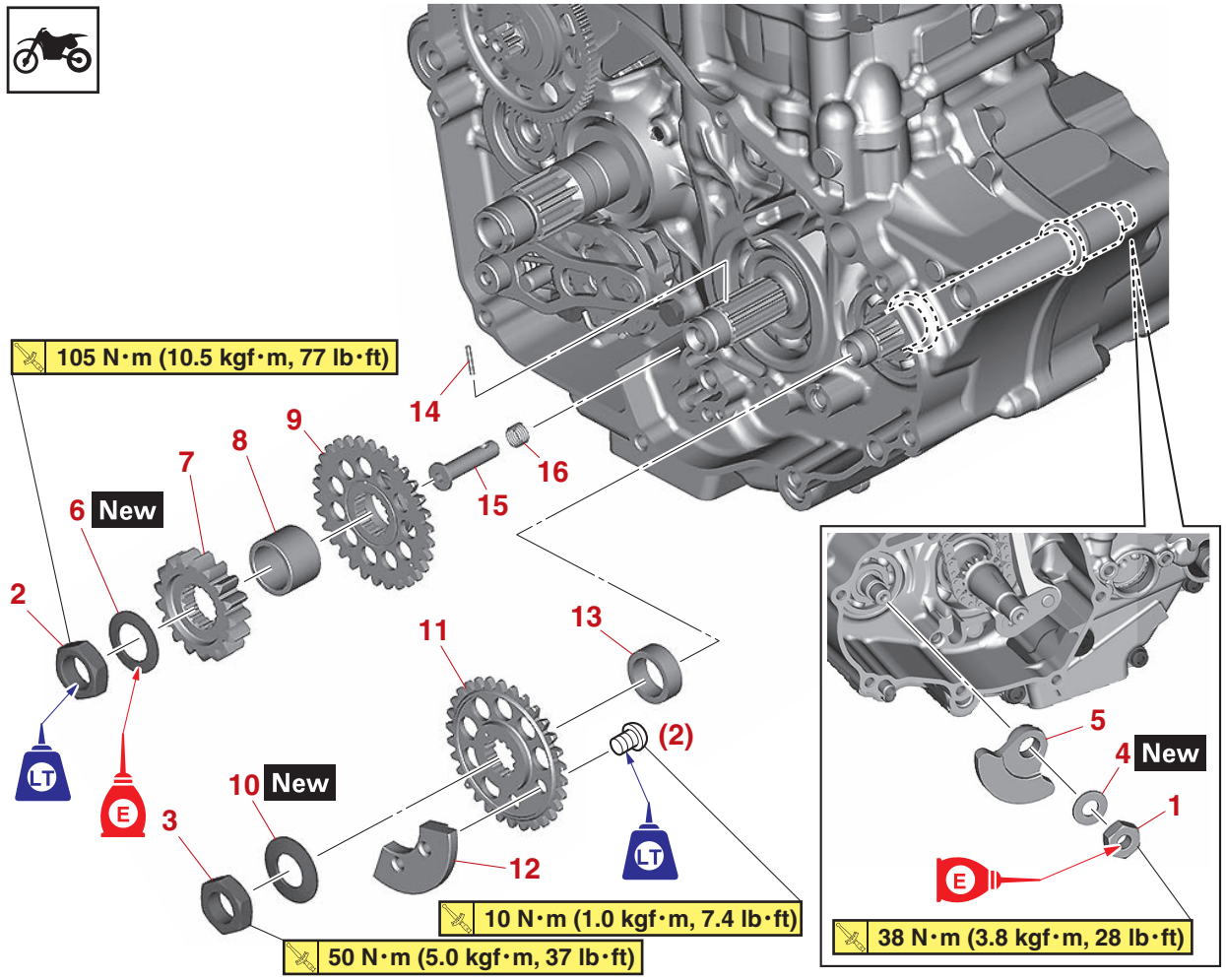
# OIL PUMP

**Removing the oil pump**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Primary driven gear | | Refer to "CLUTCH" on page 5-47. |
| | Right crankcase cover | | Refer to "CLUTCH" on page 5-47. |
| 1 | Oil pump assembly | 1 | |
| 2 | Oil pump cover | 1 | |
| 3 | Outer rotor | 1 | |
| 4 | Dowel pin | 1 | |
| 5 | Inner rotor | 1 | |
| 6 | Oil pump drive shaft | 1 | |
| 7 | Oil pump housing | 1 | |

**Removing the balancer**



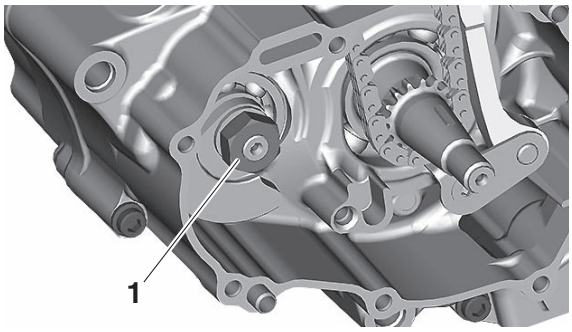

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Primary driven gear | | Refer to "CLUTCH" on page 5-47. |
| | Right crankcase cover | | Refer to "CLUTCH" on page 5-47. |
| | Stator coil assembly | | Refer to "GENERATOR" on page 5-37. |
| 1 | Nut (balancer) | 1 | |
| 2 | Nut (primary drive gear) | 1 | |
| 3 | Nut (balancer weight gear) | 1 | |
| 4 | Conical washer | 1 | |
| 5 | Balancer weight | 1 | |
| 6 | Conical washer | 1 | |
| 7 | Primary drive gear | 1 | |
| 8 | Collar | 1 | |
| 9 | Balancer drive gear | 1 | |
| 10 | Conical washer | 1 | |
| 11 | Balancer weight gear | 1 | |
| 12 | Balancer weight | 1 | |
| 13 | Collar | 1 | |
| 14 | Pin | 1 | |
| 15 | Relief valve | 1 | |
| 16 | Spring | 1 | |

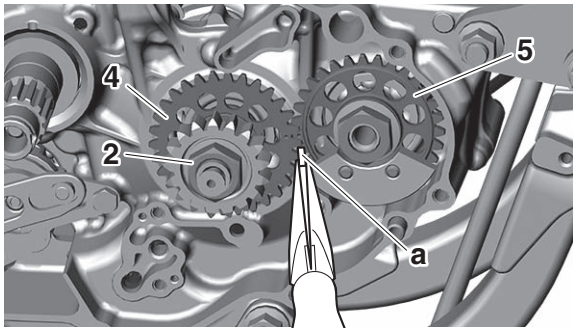
EAM30133
## REMOVING THE BALANCER

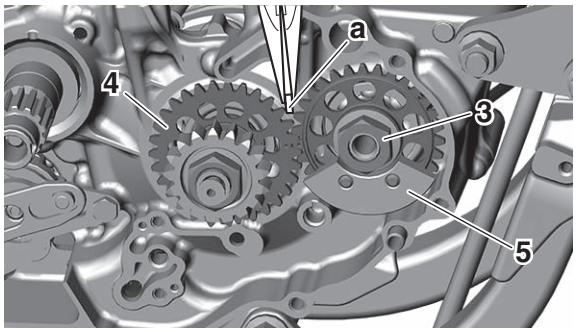
1. Remove:
   • Oil pump
2. Loosen:
   • Balancer nut “1”
   • Primary drive gear nut “2”
   • Balancer weight gear nut “3”

**TIP**

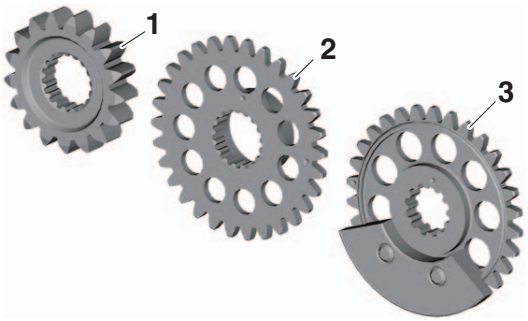
Place an aluminum plate “a” between the teeth of the balancer drive gear “4” and balancer weight gear “5”.




3. Check:
   • Primary drive gear “1”
   • Balancer drive gear “2”
   • Balancer weight gear “3”
   Wear/damage → Replace.




4. Check:
   • Balancer
   Crack/damage → Replace.



EAM30136
## CHECKING THE OIL PUMP

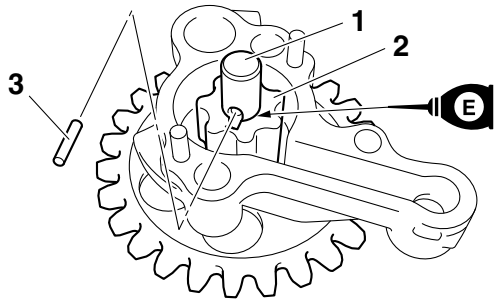
1. Check:
   • Oil pump cover
   • Oil pump drive shaft
   • Oil pump housing
   Cracks/damage/wear → Replace the oil pump assembly.
2. Check:
   • Oil pump operation
   Rough movement → Repeat step (1) or replace the oil pump assembly.

EAM30137
## ASSEMBLING THE OIL PUMP

1. Install:
   • Oil pump drive shaft “1”
   • Inner rotor “2”
   • Dowel pin “3”

**TIP**

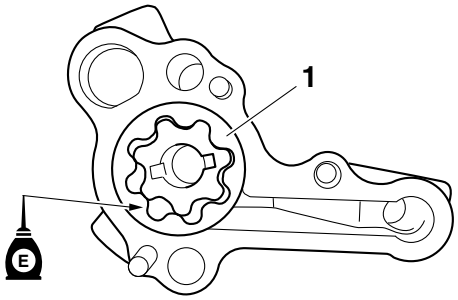
• Apply the engine oil on the oil pump drive shaft and inner rotor.
• Fit the dowel pin into the groove in the inner rotor.




2. Install:
   • Outer rotor “1”

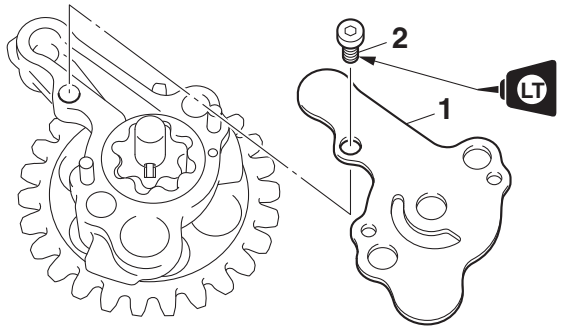
**TIP**

Apply the engine oil on the outer rotor.




3. Install:
   • Oil pump cover “1”
   • Oil pump cover bolt “2”

| | |
|---|---|
|  | **Oil pump cover bolt**<br>**6 N·m (0.6 kgf·m, 4.4 lb·ft)**<br>**LOCTITE®** |




EAM30486

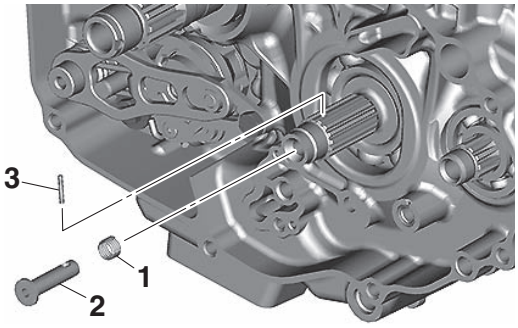
## INSTALLING THE OIL PUMP

1. Install:
   • Spring “1”
   • Relief valve “2”
   • Pin “3”

**TIP**

• Install the spring “1” and relief valve “2”, and pin “3”. After installing, make sure that the relief valve “2” does not come loose.

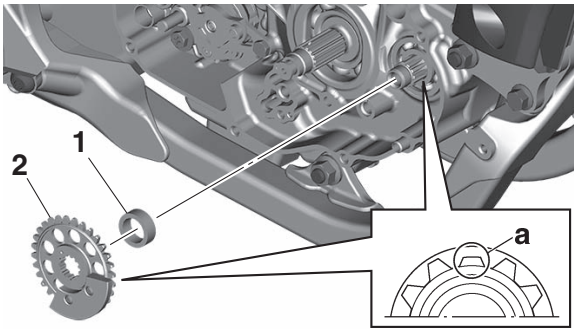
• Install the relief valve before installing the primary drive gear and collar.




2. Install:
   • Collar “1”
   • Balancer weight gear “2”

**TIP**

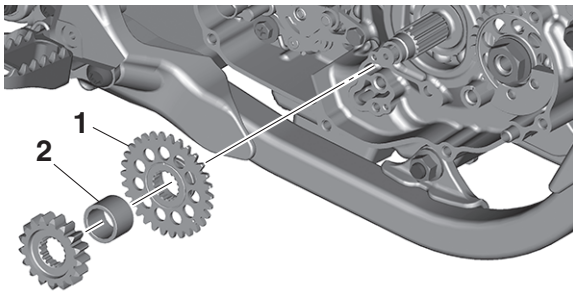
Install the balancer weight gear and balancer shaft with their lower splines “a” aligning with each other.

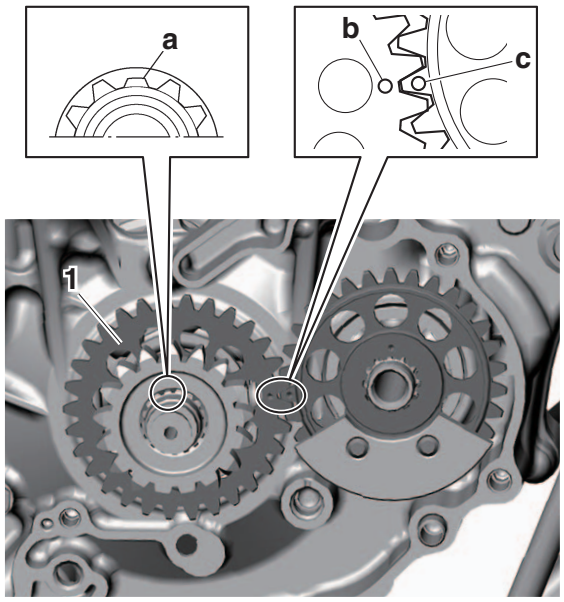



3. Install:
   • Balancer drive gear “1”
   • Collar “2”

**TIP**

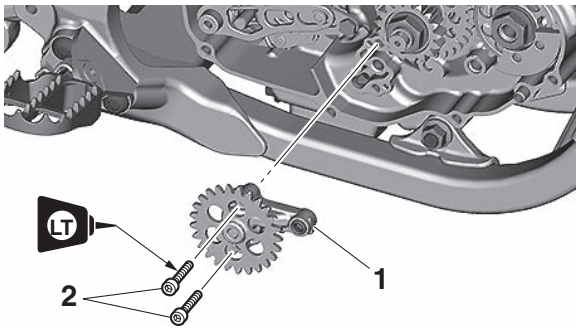
• Install the balancer drive gear and crankshaft with the lower splines “a” aligning with each other.
• Align the punched mark “b” on the balancer drive gear with the punched mark “c” on the balancer weight gear.






4. Install:
   - Oil pump assembly “1”
   - Oil pump assembly bolt “2”

| | |
|---|---|
| | **Oil pump assembly bolt**<br>**5 N·m (0.5 kgf·m, 3.7 lb·ft)**<br>**LOCTITE®** |




ECA13890

***NOTICE***

**After tightening the bolts, make sure the oil pump turns smoothly.**

5. Install:
   - Conical washer “1” New
   - Balancer weight gear nut “2”

| | |
|---|---|
| | **Balancer weight gear nut**<br>**50 N·m (5.0 kgf·m, 37 lb·ft)** |

   - Primary drive gear “3”
   - Conical washer “4” New
   - Primary drive gear nut “5”

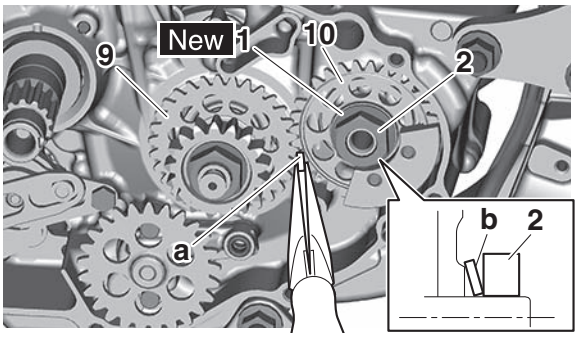
| | |
|---|---|
| | **Primary drive gear nut**<br>**105 N·m (10.5 kgf·m, 77 lb·ft)**<br>**LOCTITE®** |

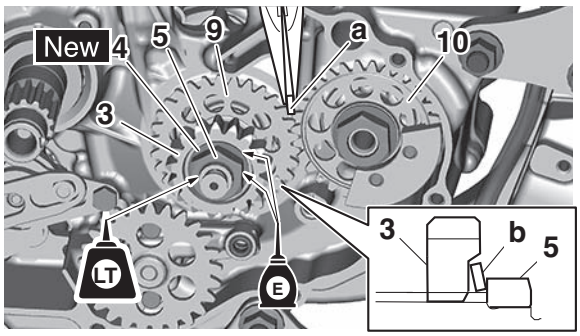
   - Balancer “6”
   - Conical washer “7” New
   - Balancer nut “8”

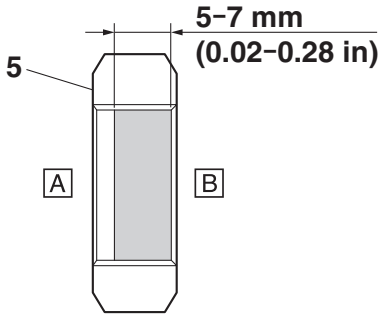
| | |
|---|---|
| | **Balancer nut**<br>**38 N·m (3.8 kgf·m, 28 lb·ft)** |

**TIP**

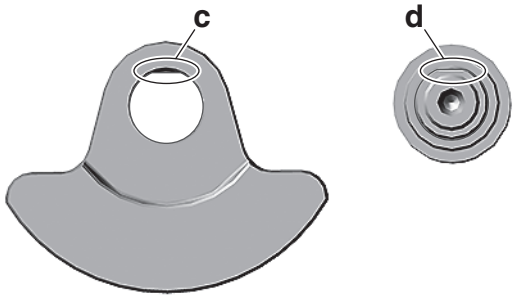
- Apply engine oil to the contact surfaces of the conical washer.
- Place an aluminum plate “a” between the teeth of the balancer drive gear “9” and balancer weight gear “10”.
- Install the conical washer with its convex surface “b” outward.
- Align the balancer flat portion “c” with the flat portion “d”.
- Apply LOCTITE® to the primary drive gear nut “5” within the area shown in the illustration.

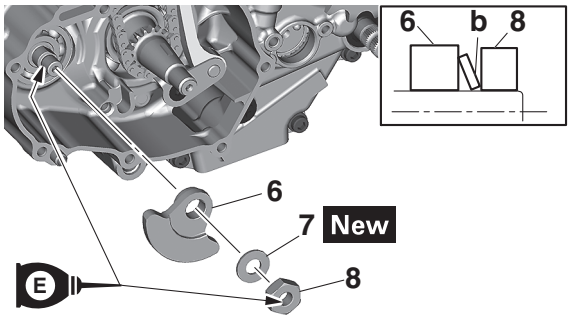





A. Primary drive gear side
B. Crankcase cover side

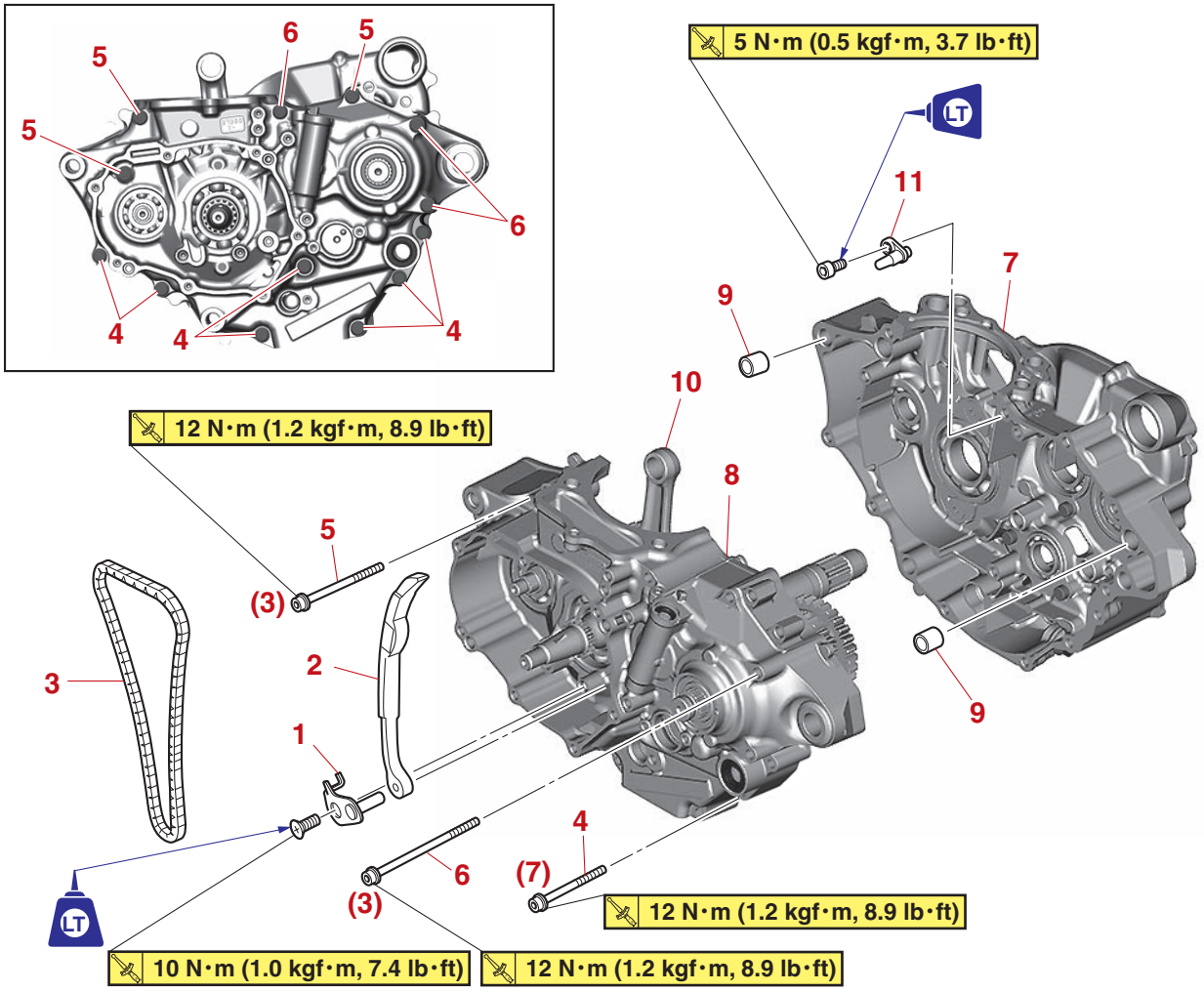


EAM20116

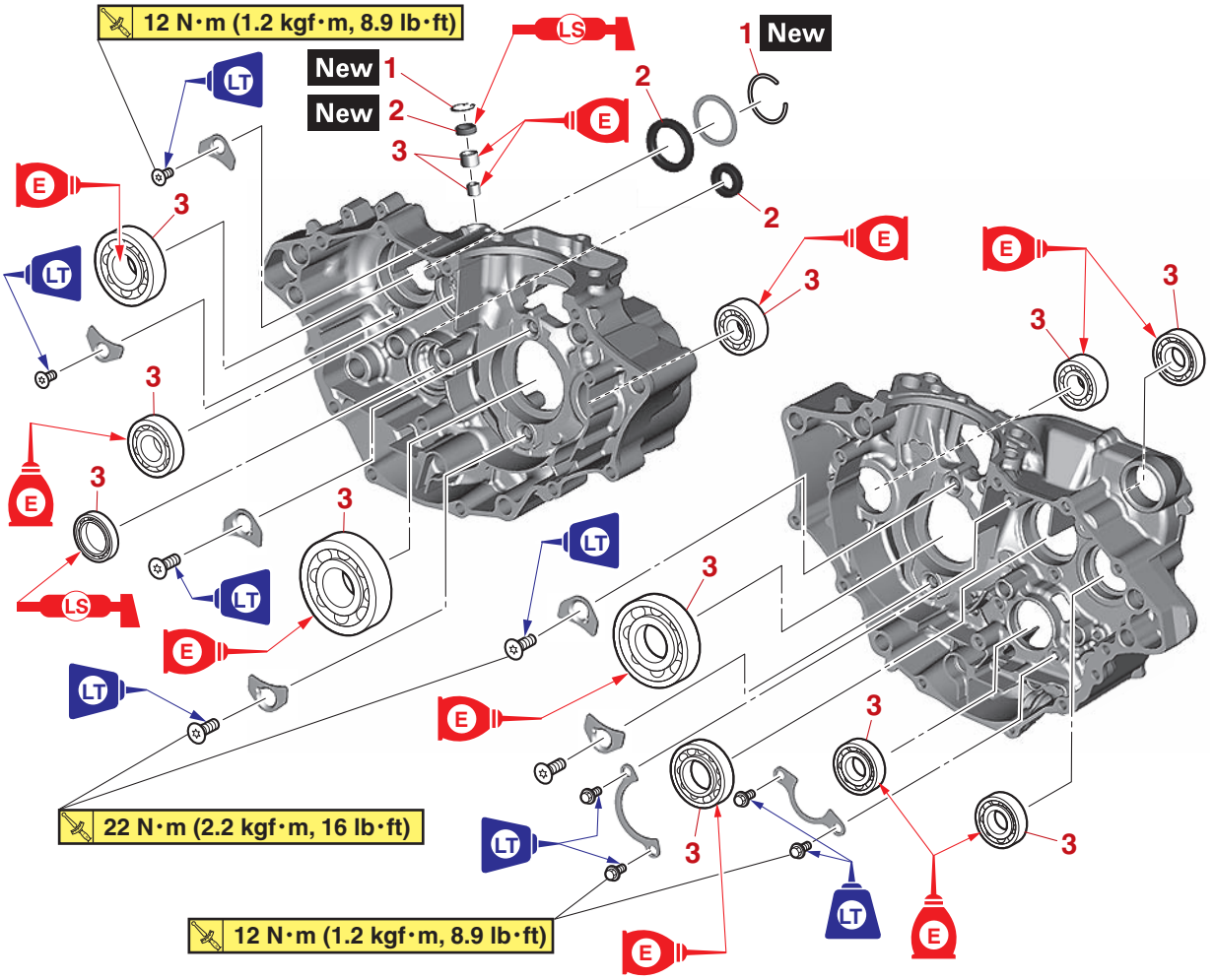
# CRANKCASE

## Separating the crankcase




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Engine | | Refer to "ENGINE REMOVAL" on page 5-6. |
| | Piston | | Refer to "CYLINDER AND PISTON" on page 5-32. |
| | Balancer | | Refer to "OIL PUMP" on page 5-59. |
| | Segment | | Refer to "SHIFT SHAFT" on page 5-55. |
| | Stator coil assembly | | Refer to "GENERATOR" on page 5-37. |
| 1 | Timing chain guide stopper plate | 1 | |
| 2 | Timing chain guide (exhaust side) | 1 | |
| 3 | Timing chain | 1 | |
| 4 | Bolt | 7 | [L = 45 mm (1.77 in)] |
| 5 | Bolt | 3 | [L = 60 mm (2.36 in)] |
| 6 | Bolt | 3 | [L = 75 mm (2.95 in)] |
| 7 | Right crankcase | 1 | |
| 8 | Left crankcase | 1 | |
| 9 | Dowel pin | 2 | |
| 10 | Crankshaft | 1 | |
| 11 | Oil nozzle | 1 | |

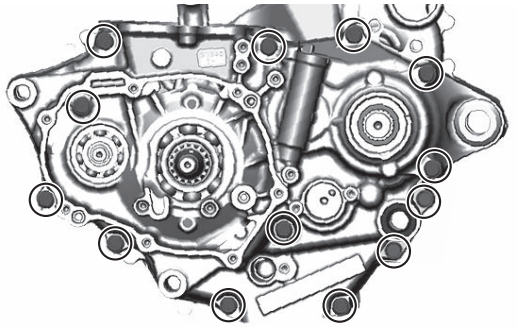
**Removing the bearing and oil seal**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Transmission | | Refer to "TRANSMISSION" on page 5-72. |
| | Shift cam/Shift fork | | Refer to "TRANSMISSION" on page 5-72. |
| 1 | Circlip | 2 | |
| 2 | Oil seal | 3 | |
| 3 | Bearing | 13 | |

EAM30147
## DISASSEMBLING THE CRANKCASE

1. Separate:
   - Right crankcase
   - Left crankcase
   a. Remove the crankcase bolts.



**TIP**

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

   b. Remove the right crankcase "1".

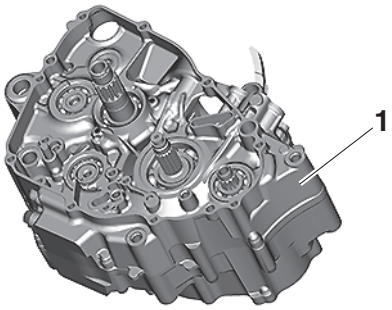
**TIP**

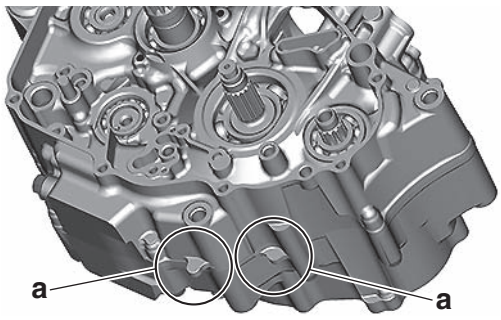
- Place the crankcase with its left side downward, split the crankcase splitting rib "a" while tap with a soft hammer.
- Lift the right crankcase horizontally while lightly patting the crankcase splitting rib and the engine mounting boss using a soft hammer, and leave the crankshaft and the transmission with the left crankcase.

ECA24690

***NOTICE***

**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 the cases do not separate, check for a remaining case bolt or fitting. Do not force.**

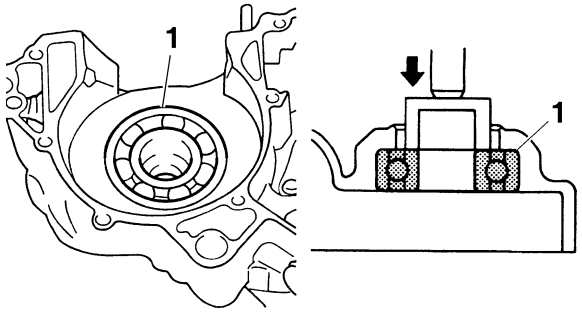



   c. Remove the dowel pins.
2. Remove:
   - Bearing "1"

**TIP**

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




EAM30490
## CHECKING THE TIMING CHAIN GUIDE (EXHAUST SIDE)

1. Check:
   - Timing chain
     Stiffness → Replace the camshaft sprocket, timing chain and crankshaft sprocket as a set.
2. Check:
   - Timing chain guide
     Damage/wear → Replace.

EAM30150
## CHECKING THE CRANKCASE

1. Wash:
   - Crankcase

**TIP**

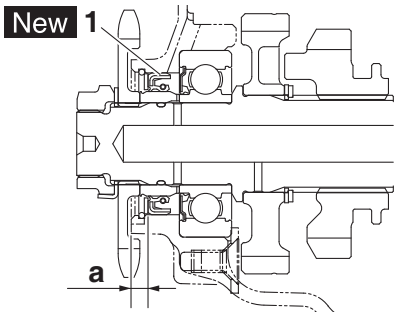
- Wash the crankcase in a mild solvent.
- Remove any remaining gasket from the crankcase mating surface.

2. Check:
   - Crankcase
     Crack/damage → Replace.
   - Oil delivery passages
     Obstruction → Blow out with compressed air.

EAM30152
## ASSEMBLING THE CRANKCASE

1. Install:
   • Oil seal “1” New
   (to the left crankcase)

| | |
|---|---|
| | **Installed depth “a”**<br>**4.5–5.0 mm (0.18–0.20 in)** |



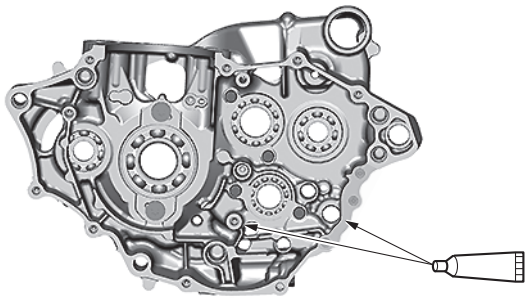

2. Install:
   • Bearing cover plate

| | |
|---|---|
| | **Bearing cover plate bolt**<br>**12 N·m (1.2 kgf·m, 8.9 lb·ft)**<br>**LOCTITE®**<br>**Bearing cover plate screw (crankshaft)**<br>**22 N·m (2.2 kgf·m, 16 lb·ft)**<br>**LOCTITE®** |

**TIP**
Install the bearing by pressing its outer race parallel.

3. Apply:
   • Sealant
   (to the crankcase mating surface)

| | |
|---|---|
| | **Yamaha bond No. 1215**<br>**90890-85505**<br>**Three bond No. 1215®** |



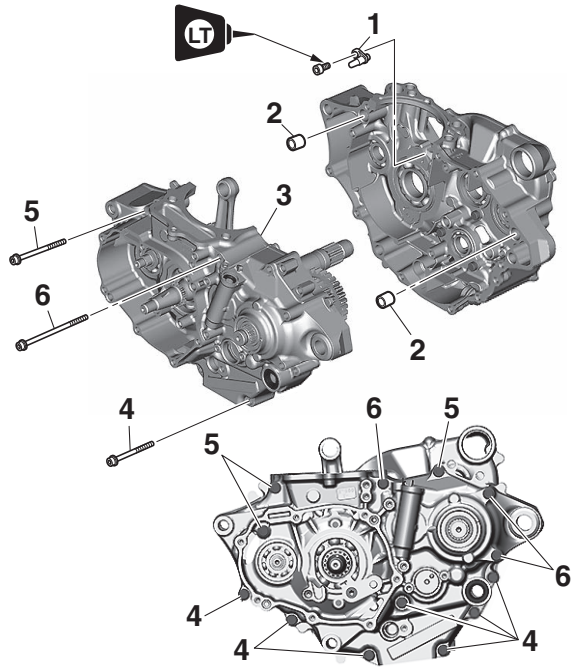
4. Install:
   • Oil nozzle “1”

| | |
|---|---|
| | **Oil nozzle bolt**<br>**5 N·m (0.5 kgf·m, 3.7 lb·ft)**<br>**LOCTITE®** |

   • Dowel pin “2”
   • Crankcase “3”
   (to the left crankcase)

| | |
|---|---|
| | **Crankcase bolt**<br>**12 N·m (1.2 kgf·m, 8.9 lb·ft)** |

**TIP**
- Fit the right crankcase onto the left crankcase. Tap lightly on the case with soft hammer.
- When installing the crankcase, the connecting rod should be positioned at top dead center (TDC).
- Tighten the bolts in a crisscross pattern in two stages, with 1/4 turn each.

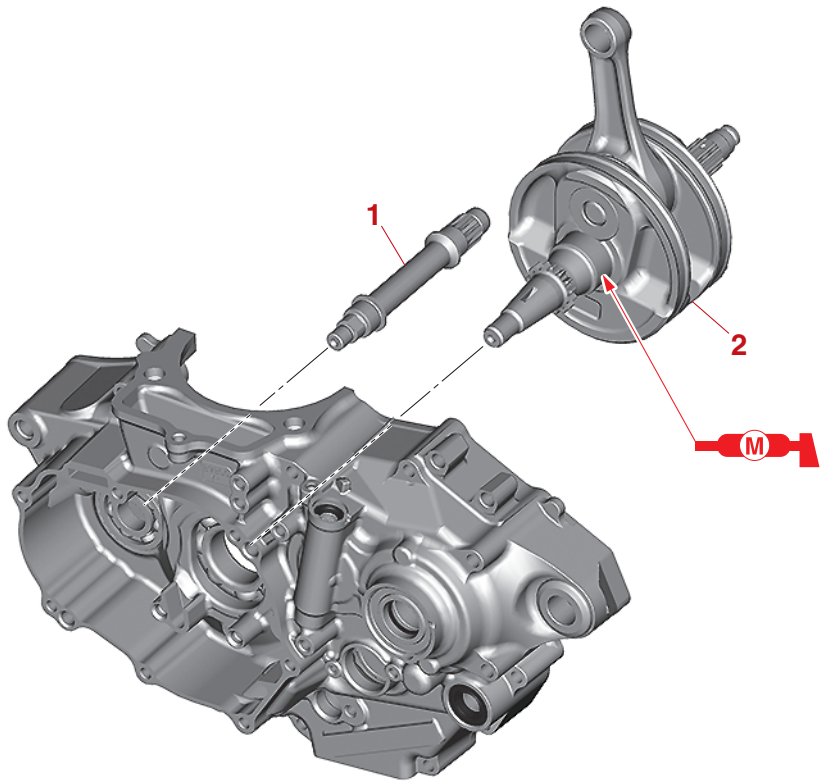



4. 45 mm (1.77 in)
5. 60 mm (2.36 in)
6. 75 mm (2.95 in)

EAM20184

# CRANKSHAFT AND BALANCER SHAFT

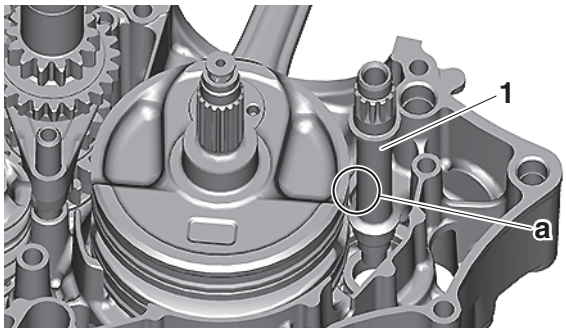
**Removing the crankshaft assembly and balancer shaft**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Crankcase | | Separate.<br>Refer to "CRANKCASE" on page 5-65. |
| | Transmission | | Refer to "TRANSMISSION" on page 5-72. |
| 1 | Balancer shaft | 1 | |
| 2 | Crankshaft assembly | 1 | |

EAM30491
### REMOVING THE CRANKSHAFT
1. Remove:
   • Balancer shaft “1”

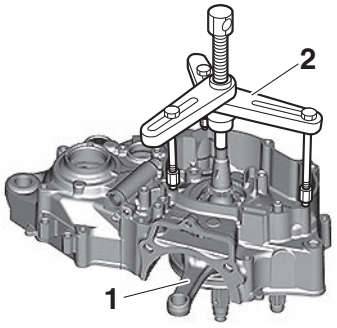
**TIP**
Remove the balancer shaft with its flat side “a” facing the crankshaft.

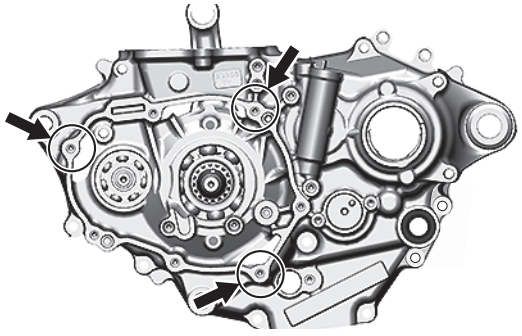



2. Remove:
   • Crankshaft assembly “1”

**TIP**
Remove the crankshaft assembly by using the crankcase separating tool “2”.

| | |
|---|---|
| | **Crankcase separating tool**<br>**90890-04152**<br>**Crankcase separating tool**<br>**YU-A9642** |

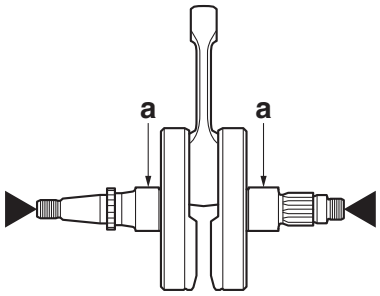


EAM30492
### CHECKING THE CRANKSHAFT
1. Measure:
   • Crankshaft runout “a”
     Out of specification → Replace the crankshaft.

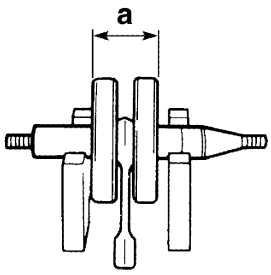
**TIP**
Turn the crankshaft slowly.

| | |
|---|---|
| | **Runout limit**<br>**0.030 mm (0.0012 in)** |

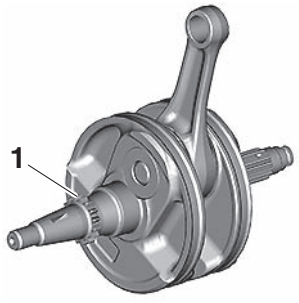



2. Measure:
   • Crank assembly width “a”
     Out of specification → Replace the crankshaft.

| | |
|---|---|
| | **Crank assembly width**<br>**55.93–56.00 mm (2.202–2.205 in)** |




3. Check:
   • Crankshaft sprocket “1”
     Damage → Replace the crankshaft.




4. Check:
   • Crankshaft journal oil passage
     Obstruction → Blow out with compressed air.

EAM30493

## INSTALLING THE CRANKSHAFT

1. Install:
   • Crankshaft assembly

**TIP**

Install the crankshaft assembly with the crankshaft installer pot "1", crankshaft installer bolt "2", adapter (M12) "3" and spacer "4".



**Crankshaft installer pot**
**90890-01274**
**Installing pot**
**YU-90058**
**Crankshaft installer bolt**
**90890-01275**
**Bolt**
**YU-90060**
**Adapter (M12)**
**90890-01278**
**Adapter #3**
**YU-90063**
**Spacer (crankshaft installer)**
**90890-04081**
**Pot spacer**
**YM-91044**

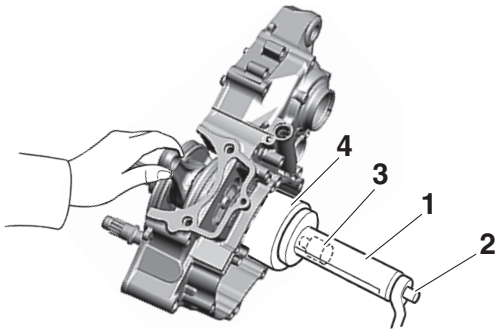
ECA26470

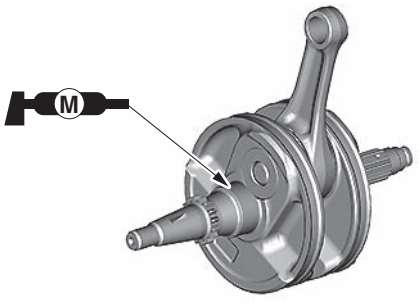
***NOTICE***

**In order to prevent the crankshaft seizure, apply molybdenum disulfide grease.**

**TIP**

Hold the connecting rod at top dead center (TDC) with one hand while turning the nut of the crankshaft installer bolt with the other. Turn the crankshaft installer bolt until the crankshaft assembly bottoms against the bearing.

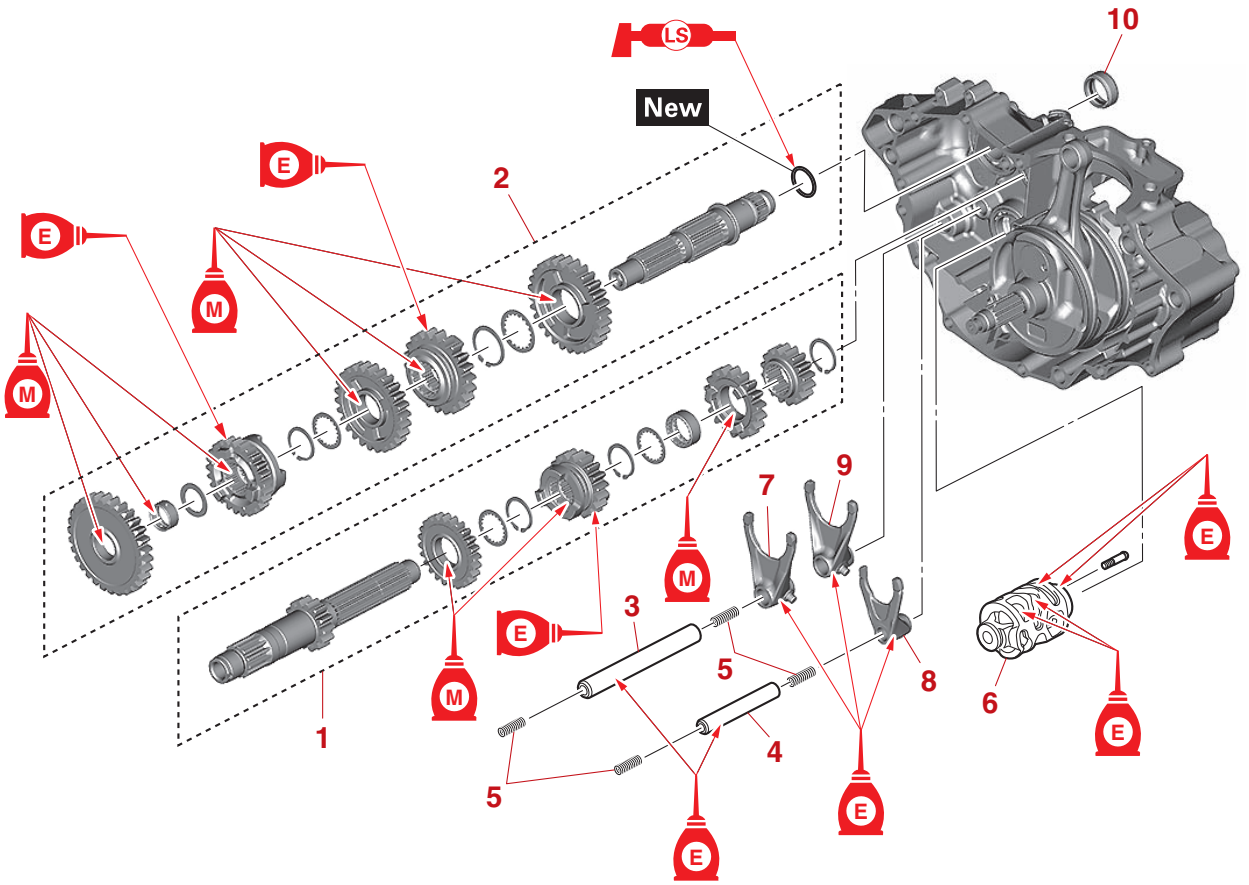


EAM20118

# TRANSMISSION

**Removing the transmission, shift drum assembly, and shift forks**



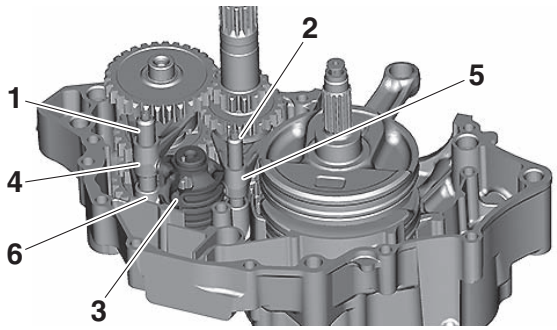

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Engine | | Refer to "ENGINE REMOVAL" on page 5-6. |
| | Crankcase | | Separate.<br>Refer to "CRANKCASE" on page 5-65. |
| 1 | Main axle | 1 | |
| 2 | Drive axle | 1 | |
| 3 | Long shift fork guide bar | 1 | |
| 4 | Short shift fork guide bar | 1 | |
| 5 | Spring | 4 | |
| 6 | Shift cam | 1 | |
| 7 | Shift fork 3 (R) | 1 | |
| 8 | Shift fork 2 (C) | 1 | |
| 9 | Shift fork 1 (L) | 1 | |
| 10 | Collar | 1 | |

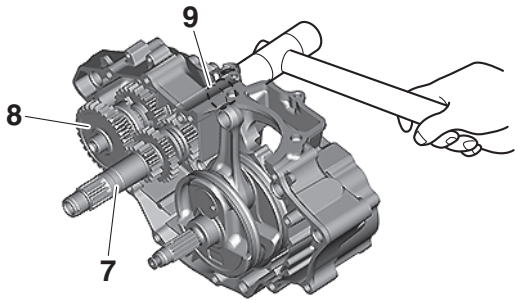
EAM30153
## REMOVING THE TRANSMISSION

1. Remove:
   - Long shift fork guide bar “1”
   - Short shift fork guide bar “2”
   - Shift cam “3”
   - Shift fork 3 “4”
   - Shift fork 2 “5”
   - Shift fork 1 “6”
   - Main axle “7”
   - Drive axle “8”
   - Collar “9”

**TIP**

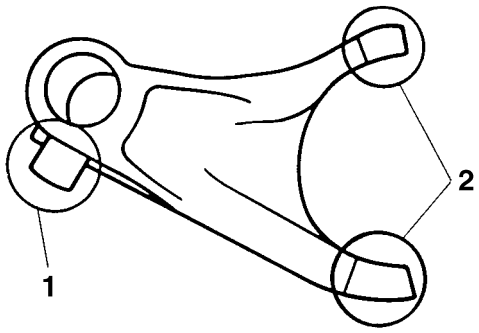
- Remove assembly with the collar “9” installed to the crankcase.
- Make a note of the position of each part. Pay particular attention to the location and direction of shift forks.
- Remove the main axle and the drive axle all together by tapping the drive axle lightly with a soft hammer.




EAM30154
## CHECKING THE SHIFT FORKS

1. Check:
   - Shift fork cam follower “1”
   - Shift fork pawl “2”
     Bends/damage/scoring/wear → Replace the shift fork.



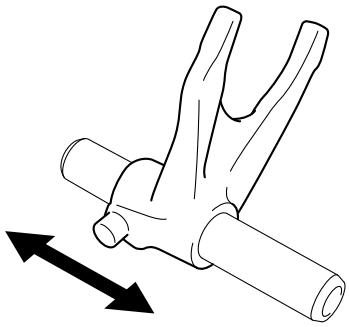

2. Check:
   - Shift fork guide bar
     Roll the shift fork guide bar on a flat surface.
     Bends → Replace.

EWA12840

**WARNING**

**Do not attempt to straighten a bent shift fork guide bar.**

3. Check:
   - Shift fork movement
     (along the shift fork guide bar)
     Rough movement → Replace the shift forks and shift fork guide bar as a set.



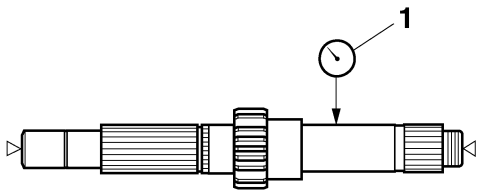
EAM30155
## CHECKING THE SHIFT DRUM ASSEMBLY

1. Check:
   - Shift drum groove
     Damage/scratches/wear → Replace the shift drum assembly.
   - Shift drum segment
     Damage/wear → Replace the shift drum assembly.

EAM30156
## CHECKING THE TRANSMISSION

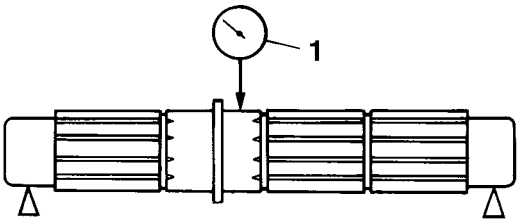
1. Measure:
   - Main axle runout
     (with a centering device and dial gauge “1”)
     Out of specification → Replace the main axle.

| | |
|---|---|
| | **Main axle runout limit**<br>**0.08 mm (0.0032 in)** |




2. Measure:
   • Drive axle runout
   (with a centering device and dial gauge "1")
   Out of specification → Replace the drive axle.

| | |
|---|---|
| | **Drive axle runout limit**<br>**0.08 mm (0.0032 in)** |




3. Check:
   • Transmission gear
   Blue discoloration/pitting/wear → Replace the defective gear(s).
   • Transmission gear dog
   Cracks/damage/rounded edges → Replace the defective gear(s).
4. Check:
   • Transmission gear movement
   Rough movement → Replace the defective gear(s).

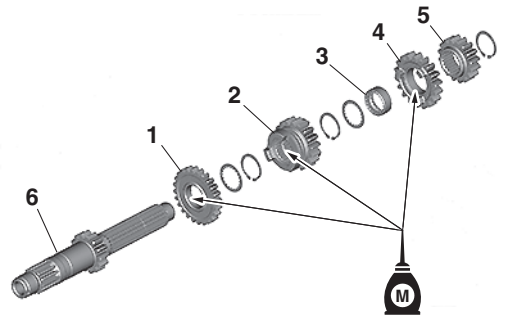
EAM30157

## INSTALLING THE TRANSMISSION

1. Install:
   • 5th pinion gear (24T) "1"
   • 3rd pinion gear (18T) "2"
   • Collar "3"
   • 4th pinion gear (18T) "4"
   • 2nd pinion gear (16T) "5"
   (to the main axle "6")

**TIP**

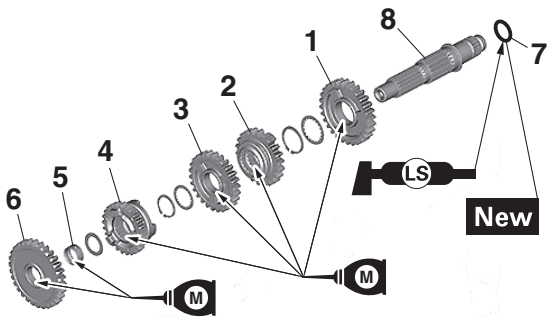
Before installation, apply molybdenum disulfide oil to the inner and end surface of the idler gear and to the inner surface of the sliding gear, then install.




2. Install:
   • 2nd wheel gear (28T) "1"
   • 4th wheel gear (22T) "2"
   • 3rd wheel gear (26T) "3"
   • 5th wheel gear (25T) "4"
   • Collar "5"
   • 1st wheel gear (30T) "6"
   • O-ring "7" New
   (to the drive axle "8")

**TIP**

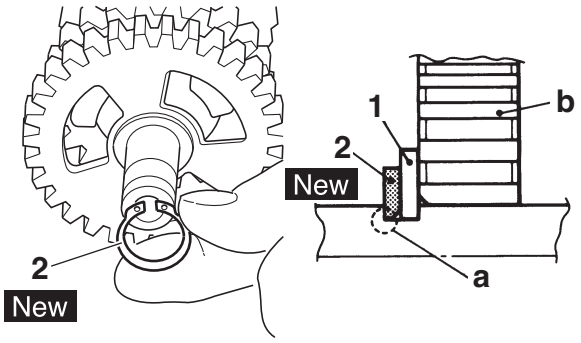
- Before installation, apply molybdenum disulfide oil to the inner and end surface of the idler gear and the collar and to the inner surface of the sliding gear, then install.
- Apply the lithium-soap-based grease on the O-ring.

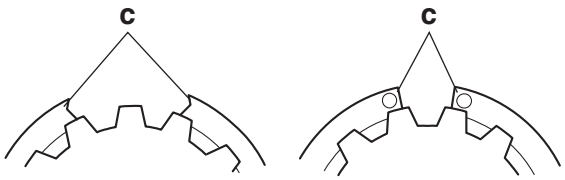



3. Install:
   • Washer "1"
   • Circlip "2" New

**TIP**

- Be sure the circlip sharp-edged corner "a" is positioned opposite side to the washer and gear "b".
- Install the circlip with its ends "c" settled evenly on the spline crests.

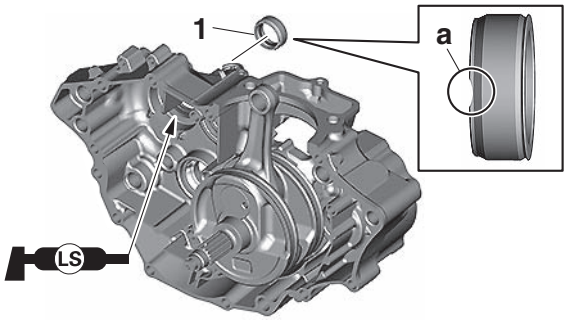



4. Install:
   • Collar “1”

**TIP**

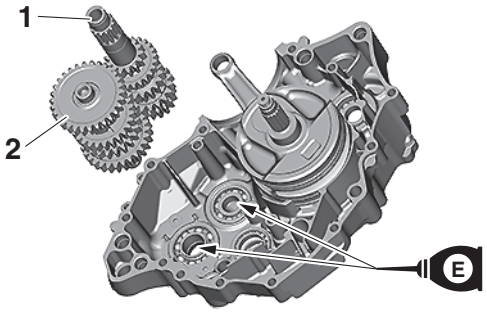
- Apply the lithium-soap-based grease on the oil seal lip.
- When installing the collar into the crankcase, pay careful attention to the crankcase oil seal lip.
- Install the collar “1” so that the slit “a” faces to the crankcase side.




5. Install:
   • Main axle “1”
   • Drive axle “2”

**TIP**

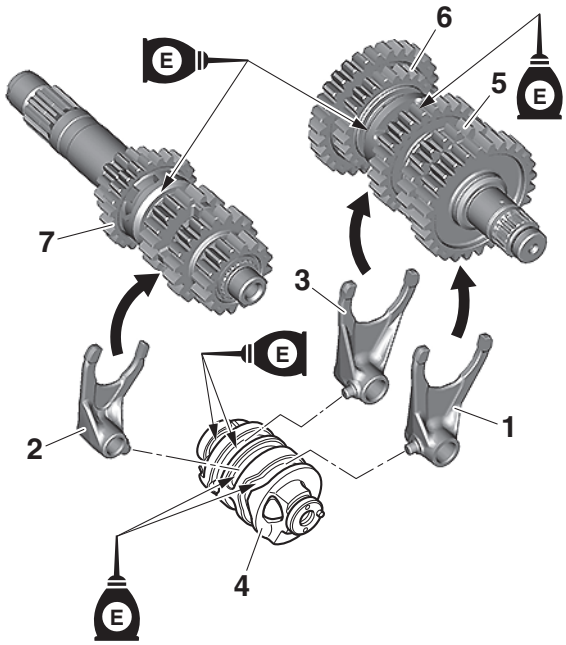
- Install to the left crankcase simultaneously.
- Apply engine oil to the main axle and the drive axle bearing.




6. Install:
   • Shift fork 1 (L) “1”
   • Shift fork 2 (C) “2”
   • Shift fork 3 (R) “3”
   • Shift cam “4”
   (to the main axle and the drive axle)

**TIP**

- Apply engine oil to the shift fork grooves.
- Apply engine oil to the shift cam groove and the bearing contact surface.
- Mesh the shift fork 1 (L) with the 4th wheel gear “5” and shift fork 3 (R) with the 5th wheel gear “6” on the drive axle.
- Mesh the shift fork 2 (C) with the 3rd pinion gear “7” on the main axle.

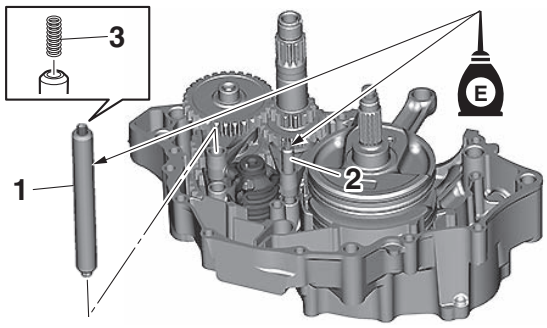



7. Install:
   • Long shift fork guide bar “1”
   • Short shift fork guide bar “2”
   • Spring “3”

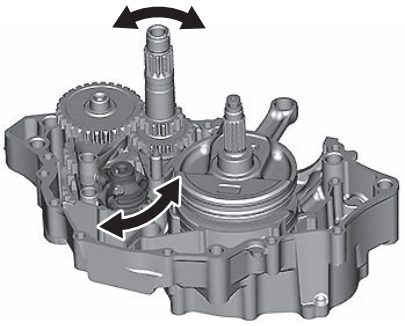
**TIP**

- Screw the spring into the shift fork guide bar lightly beforehand.

• Apply the engine oil on the shift fork guide bars.




8. Check:
   • Operation of shift cam and shift fork
   • Transmission operation
   Unsmooth operation → Repair.



# COOLING SYSTEM

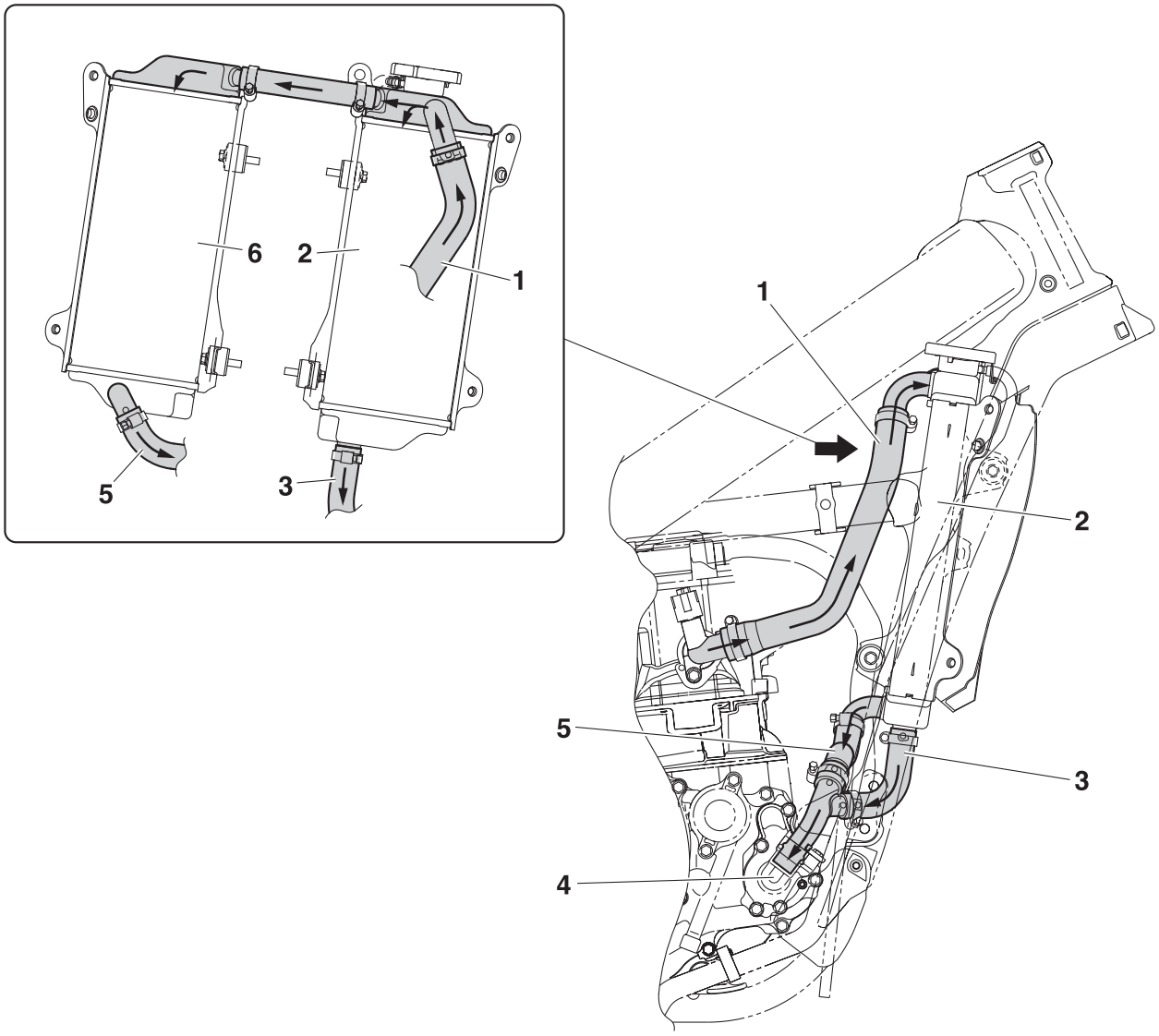
**COOLING SYSTEM DIAGRAMS** .....6-1

**RADIATOR**.....6-2
CHECKING THE RADIATOR .....6-4
INSTALLING THE RADIATOR .....6-4

**WATER PUMP** .....6-6
DISASSEMBLING THE WATER PUMP .....6-7
CHECKING THE WATER PUMP .....6-7
ASSEMBLING THE WATER PUMP .....6-7

EAM20186

# COOLING SYSTEM DIAGRAMS

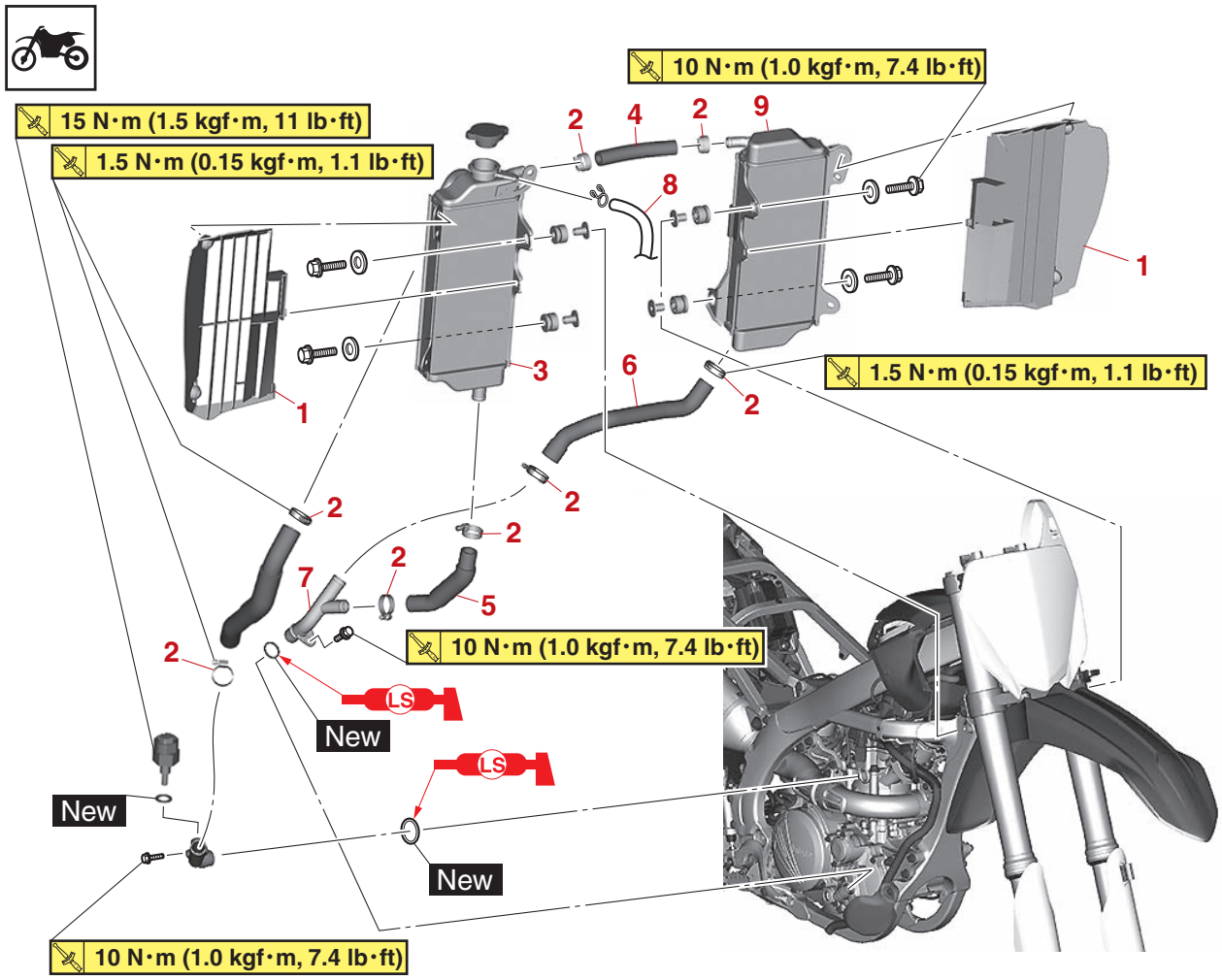



1. Radiator hose 1
2. Radiator (right)
3. Radiator hose 4
4. Water pump
5. Radiator hose 3
6. Radiator (left)

EAM20138

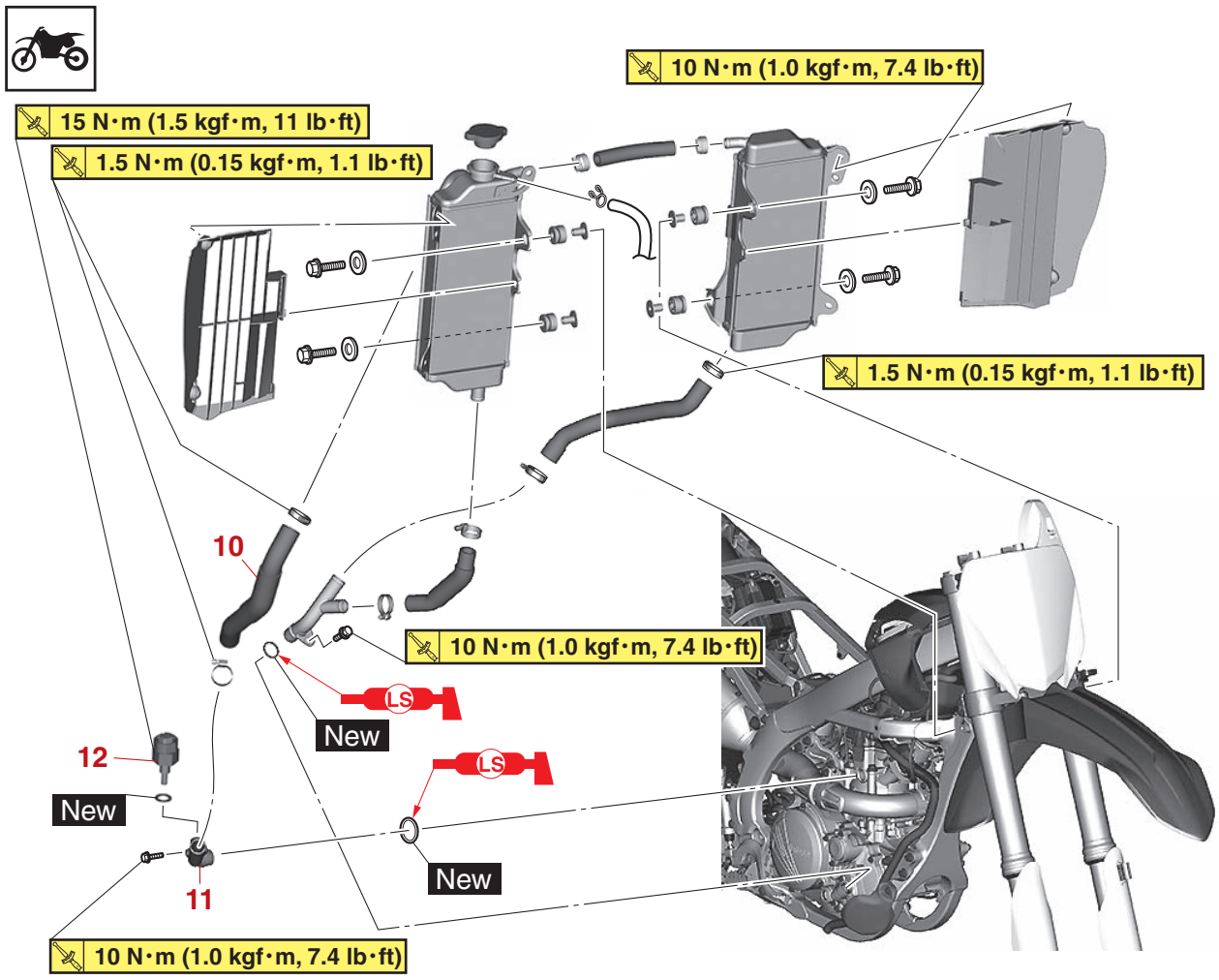
# RADIATOR

## Removing the radiator




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Coolant | | Drain.<br>Refer to "CHANGING THE COOLANT" on page 3-21. |
| | Seat | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Side cover (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Air scoop (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| | Air filter case | | Refer to "THROTTLE BODY" on page 7-4. |
| 1 | Radiator guard | 2 | |
| 2 | Radiator hose clamp | 8 | Loosen. |
| 3 | Radiator (right) | 1 | |
| 4 | Radiator hose 2 | 1 | |
| 5 | Radiator hose 4 | 1 | |
| 6 | Radiator hose 3 | 1 | |
| 7 | Radiator pipe 2 | 1 | |
| 8 | Radiator breather hose | 1 | |
| 9 | Radiator (left) | 1 | |

**Removing the radiator**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 10 | Radiator hose 1 | 1 | |
| 11 | Radiator pipe 1 | 1 | |
| 12 | Coolant temperature sensor | 1 | |

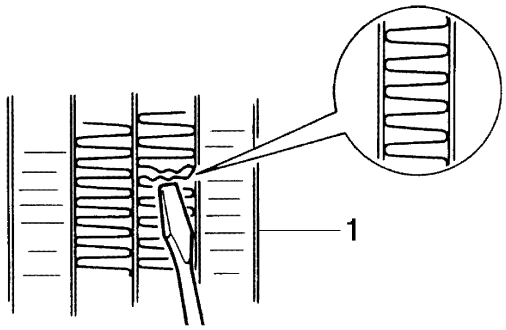
EAM30341
## CHECKING THE RADIATOR

EWA13030
**⚠ WARNING**

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

1. Check:
   - Radiator fin "1"
     Obstructions → Clean.
     Apply compressed air to the rear of the radiator.
     Damage → Repair or replace.

**TIP**
Correct any flattened fins with a thin, flat-head screwdriver.



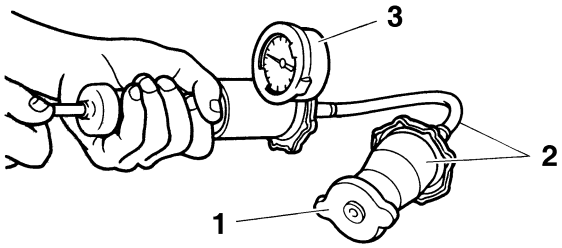

2. Check:
   - Radiator hose
   - Radiator pipe
     Crack/damage → Replace.
3. Check:
   - Radiator cap valve opening pressure
     a. Install the radiator cap tester adapter "2" and the radiator cap tester "3" to the radiator cap "1", and activate the tester to check whether it can stay for 5 to 10 seconds within standard pressure values.

**TIP**
Before attaching the cap to the tester, apply water to its sealing surface.

**Radiator cap valve opening pressure**
**107.9–137.3 kPa (1.08–1.37 kgf/cm², 15.6–19.9 psi)**

No stay → Replace.

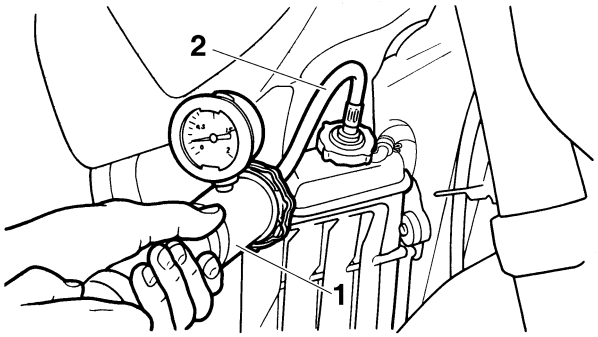
**Radiator cap tester**
**90890-01325**
**Mityvac cooling system tester kit**
**YU-24460-A**
**Radiator cap tester adapter**
**90890-01352**
**Pressure tester adapter**
**YU-33984**




EAM30506
## INSTALLING THE RADIATOR

1. Fill:
   - Cooling system
     (with the specified amount of the recommended coolant)
     Refer to "CHANGING THE COOLANT" on page 3-21.
2. Check:
   - Cooling system
     Leaks → Repair or replace any faulty part.
3. Install:
   - Radiator cap tester "1"
   - Radiator cap tester adapter "2"

**Radiator cap tester**
**90890-01325**
**Mityvac cooling system tester kit**
**YU-24460-A**
**Radiator cap tester adapter**
**90890-01352**
**Pressure tester adapter**
**YU-33984**




4. Activate the tester to apply the test pressure.

| | |
|---|---|
| | **Test pressure value**<br>**137.3 kPa (1.37 kgf/cm², 19.9 psi)** |

ECA24270

***NOTICE***

- **Do not apply such a high pressure as exceeds the test pressure.**
- **Make sure that a checkup after the cylinder head gasket is replaced is made after 3 minutes of warm-up.**
- **Make sure that coolant is filled up to the upper level beforehand.**

5. Check:
   - Pressure value
     No stay for 5 to 10 seconds at the test pressure value → Correct.
   - Radiator
   - Radiator hose connection
     Coolant leaks → Correct or replace.
   - Radiator hose
     Bulges → Replace.

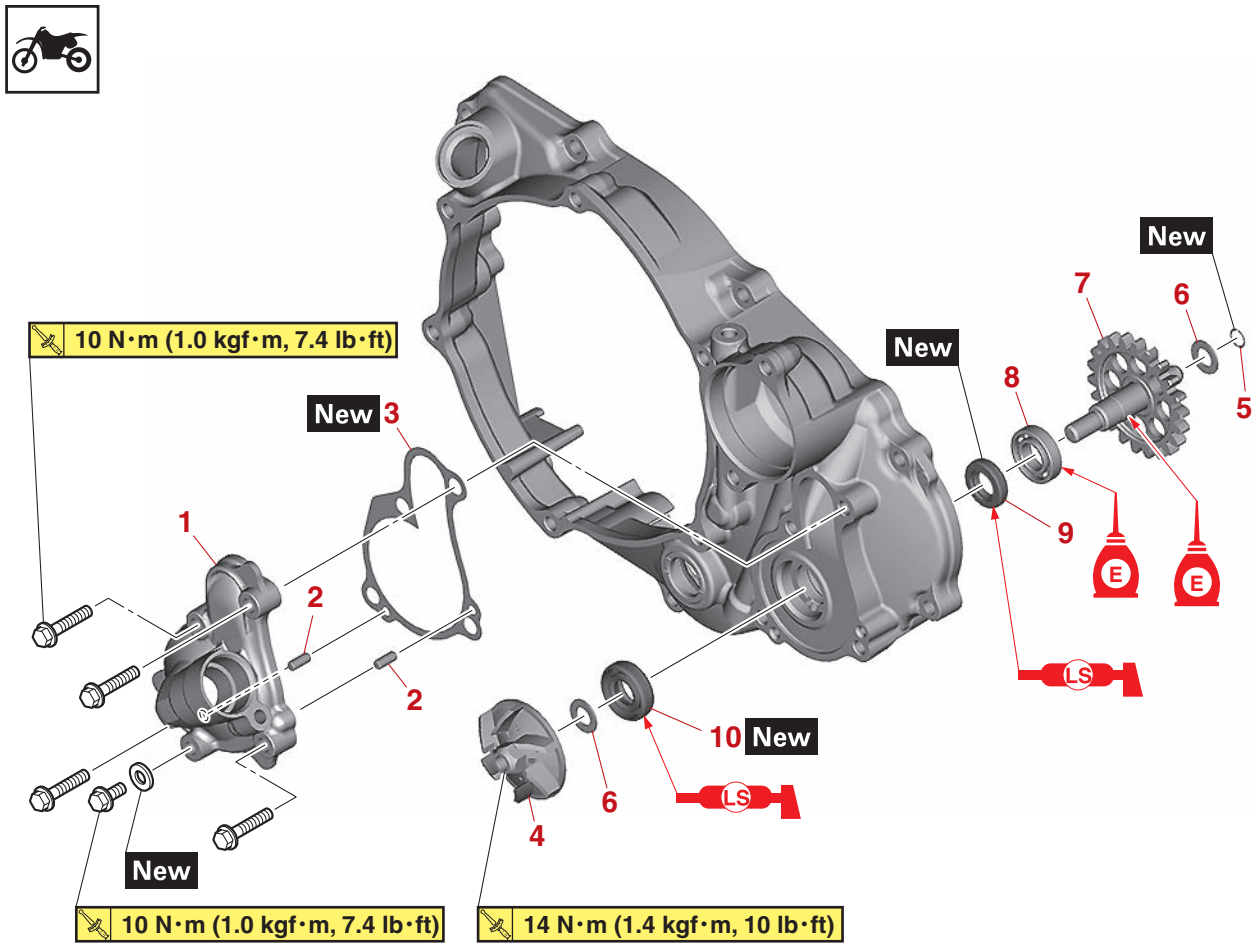
EWA19090

**⚠ WARNING**

**When the radiator cap tester is removed, coolant will spout; therefore, cover it with a cloth beforehand.**

EAM20139
# WATER PUMP

**Removing the water pump**

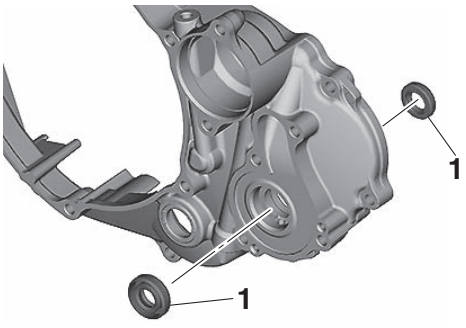



| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Coolant | | Drain.<br>Refer to "CHANGING THE COOLANT" on page 3-21. |
| | Engine oil | | Drain.<br>Refer to "CHANGING THE ENGINE OIL" on page 3-13. |
| | Right crankcase cover | | Refer to "CLUTCH" on page 5-47. |
| 1 | Water pump housing | 1 | |
| 2 | Dowel pin | 2 | |
| 3 | Gasket | 1 | |
| 4 | Impeller | 1 | |
| 5 | Circlip | 1 | |
| 6 | Washer | 2 | |
| 7 | Impeller shaft assembly | 1 | |
| 8 | Bearing | 1 | |
| 9 | Oil seal | 1 | |
| 10 | Oil seal | 1 | |

EAM30494
## DISASSEMBLING THE WATER PUMP

**TIP**
- Remove the oil seal when the coolant level changes frequently more than usual, coolant has discolored, or engine oil has become milky.
- Do not use the removed oil seal.

1. Remove:
   - Oil seal "1"

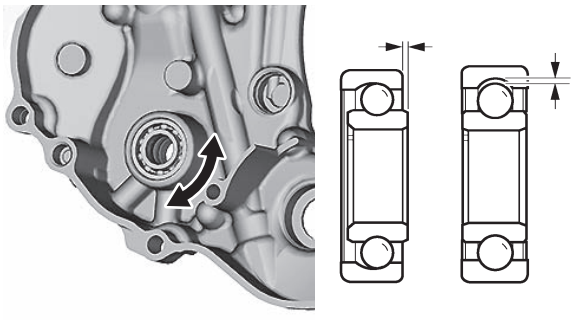



EAM30259
## CHECKING THE WATER PUMP

1. Check:
   - Water pump housing cover
   - Impeller shaft
   - Impeller

   Cracks/damage/wear → Replace.
2. Check:
   - Bearing

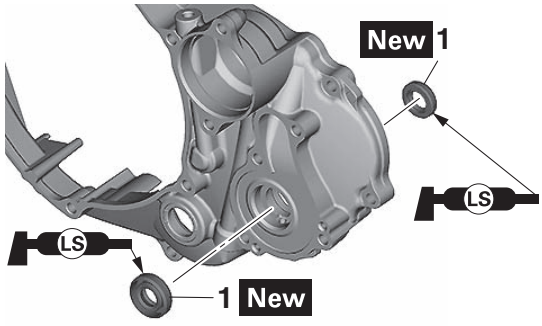
   Rotate the inner race with your finger.
   Rough spot/seizure → Replace.



EAM30262
## ASSEMBLING THE WATER PUMP

1. Install:
   - Oil seal "1" New

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




2. Install:
   - Bearing "1"

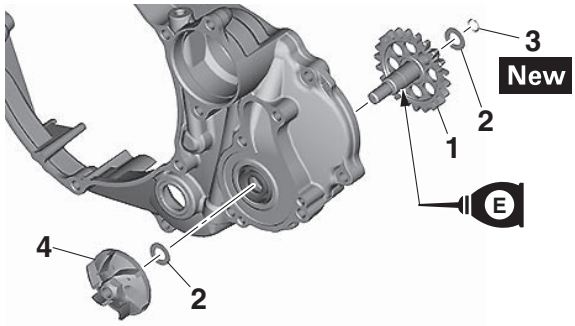
**TIP**
Install the bearing by pressing its outer race parallel.



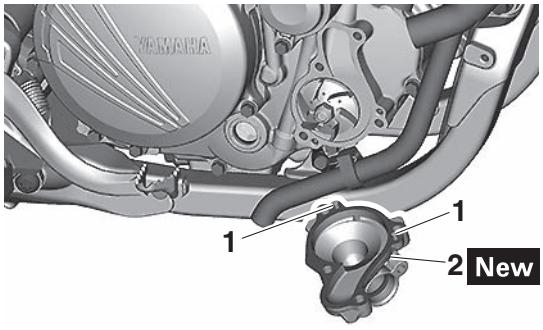

3. Install:
   - Impeller shaft assembly "1"
   - Washer "2"
   - Circlip "3" New
   - Impeller "4"

| | |
|---|---|
| | **Impeller**<br>**14 N·m (1.4 kgf·m, 10 lb·ft)** |

**TIP**
- 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 to the oil seal lip, the bearing, and the impeller shaft.



4. Install:
   • Dowel pin “1”
   • Gasket “2” New

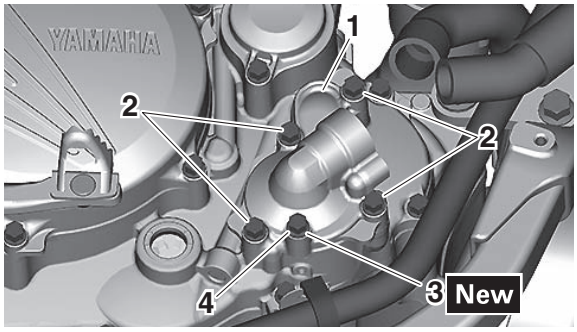



5. Install:
   • Water pump housing “1”
   • Water pump housing bolt “2”

| | |
|---|---|
| | **Water pump housing bolt**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |

   • Washer “3” New
   • Coolant drain bolt “4”

| | |
|---|---|
| | **Coolant drain bolt**<br>**10 N·m (1.0 kgf·m, 7.4 lb·ft)** |



# FUEL SYSTEM

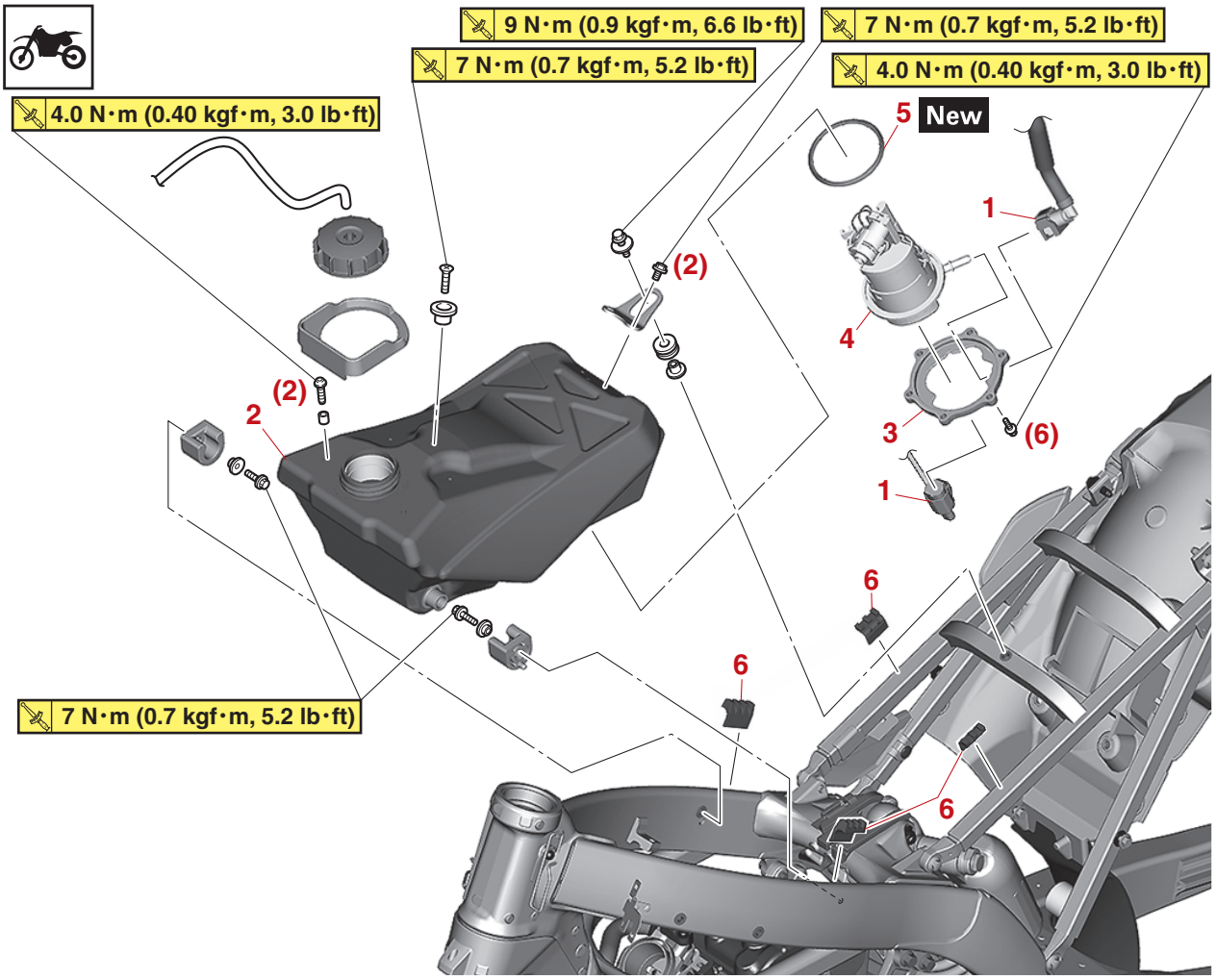
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EAM20140

# FUEL TANK

## Removing the fuel tank




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Seat | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Side cover (left/right) | | |
| | Air scoop (left/right) | | |
| 1 | Fuel pump coupler/Fuel hose | 1/1 | Disconnect. |
| 2 | Fuel tank | 1 | |
| 3 | Fuel pump bracket | 1 | |
| 4 | Fuel pump | 1 | |
| 5 | Fuel pump gasket | 1 | |
| 6 | Rubber damper | 4 | |

EAM30263
## REMOVING THE FUEL TANK
1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
   • Fuel hose coupler

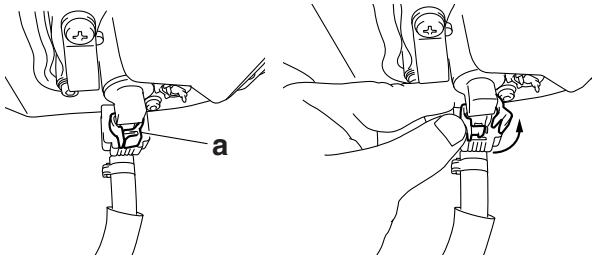
EWA19370
**⚠ WARNING**

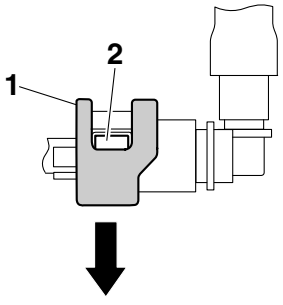
**Cover the fuel hose connection with a cloth when disconnecting it. This is because residual pressure in the fuel hose could cause fuel to spurt out when the hose is removed.**

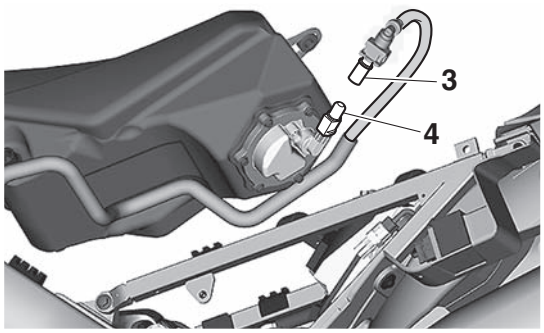
ECA24710
***NOTICE***

**Make sure that the fuel hose is disconnected by hand. Do not forcefully disconnect the hose with tools.**

**TIP**
- To disconnect the fuel hose from the fuel tank, remove the fuel hose connector holder "a", and then slide the fuel hose connector cover.
- To remove the fuel hose from the fuel rail, slide the fuel hose connector cover "1" on the end of the hose in the direction of the arrow shown, press the two buttons "2" on the sides of the connector, and then remove the hose.
- Before removing the hose, place a few cloths in the area under where it will be removed.
- To prevent sand, dust, and other foreign materials from entering the fuel pump, install the included fuel hose joint cover 1 "3" and the fuel hose joint cover 2 "4" onto the disconnected fuel hose and the fuel pump.




3. Remove:
   • Side cover (left/right)
   • Seat
   • Air scoop (left/right)
   • Fuel tank

**TIP**
Do not set the fuel tank down on the installation surface of the fuel pump. Be sure to lean the fuel tank against a wall or the like.

EAM30264
## REMOVING THE FUEL PUMP
1. Remove:
   • Fuel pump

ECA24720
***NOTICE***

**Do not drop the fuel pump or give it a strong shock.**

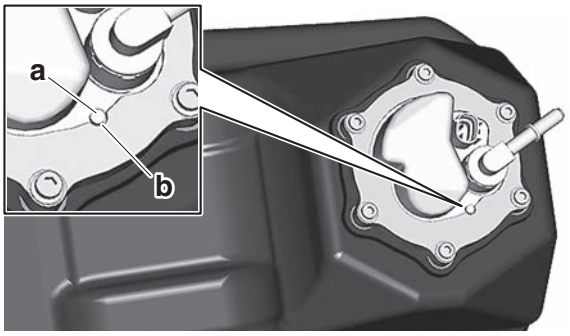
EAM30265
## CHECKING THE FUEL PUMP BODY
1. Check:
   • Fuel pump body
   Obstructions → Clean.
   Cracks/damage → Replace the fuel pump assembly.

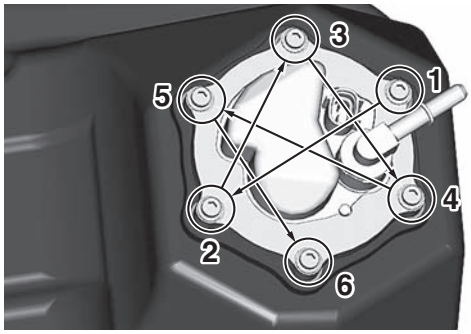
EAM30508
## CHECKING THE FUEL PUMP OPERATION
1. Check:
   • Fuel pump operation
   Refer to "CHECKING THE FUEL PRESSURE" on page 7-7.

EAM30266
## INSTALLING THE FUEL PUMP
1. Install:
   • Fuel pump gasket New
   • Fuel pump
   • Fuel pump bracket

| | |
|---|---|
| | **Fuel pump bolt**<br>**4.0 N·m (0.40 kgf·m, 3.0 lb·ft)** |

**TIP**
- Take care not to damage the installation surfaces of the fuel tank.
- Always use a new fuel pump gasket.
- Install the lip on the fuel pump gasket upward.
- Install the fuel pump as shown in the figure.
- Align the projection “a” on the fuel pump with the slot “b” in the fuel pump bracket.
- Tighten the fuel pump bolts in the proper tightening sequence as shown.

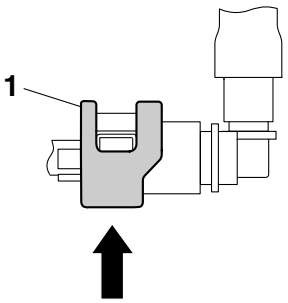


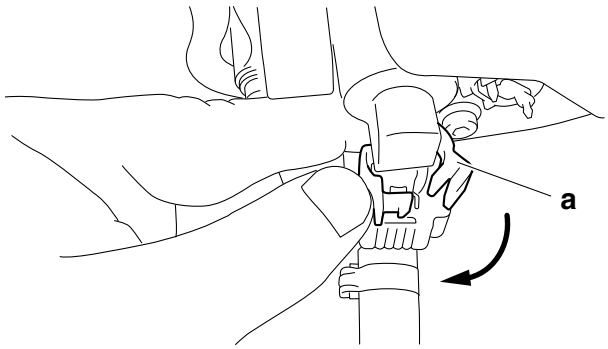




EAM30267
## INSTALLING THE FUEL TANK
1. Install:
   - Fuel tank
2. Connect:
   - Fuel hose

ECA24740
***NOTICE***
- **Connect the fuel hose securely, and check that the orientation of the installed fuel hose holder is correct.**
- **Take care not to kink or pinch the fuel hose.**

**TIP**
- Insert the fuel hose into the fuel pipe securely until you hear a “click”.
- Slide the fuel hose connector cover “1” at the hose end in the direction of the arrow.
- Install the fuel hose connector holder “a”.
- Check that the fuel hose and the fuel pump lead are routed through the guide on the cover.



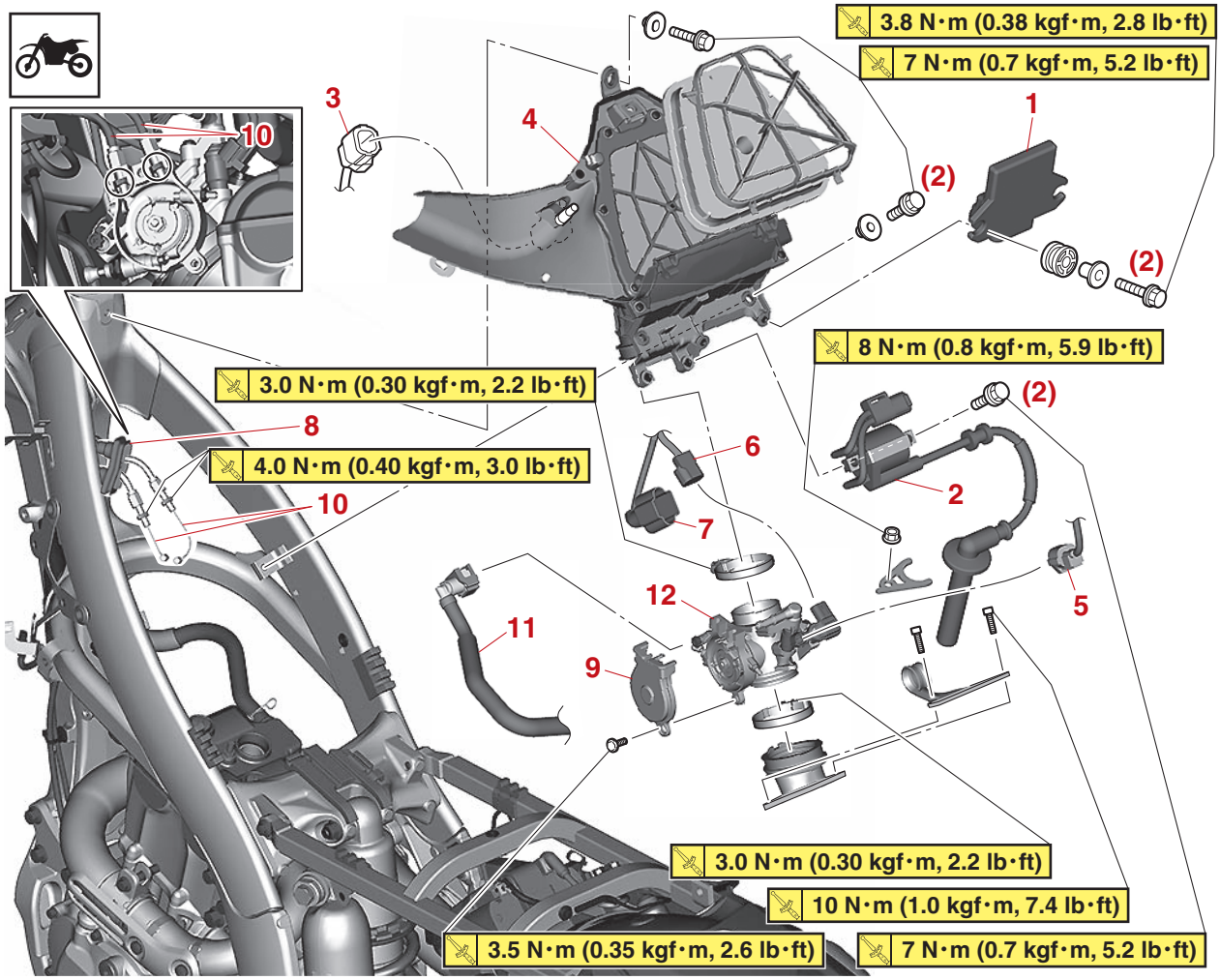




3. Connect:
   - Fuel pump coupler
4. Install:
   - Air scoop (left/right)
   - Seat
   - Side cover (left/right)
   Refer to “GENERAL CHASSIS” on page 4-1.

EAM20141

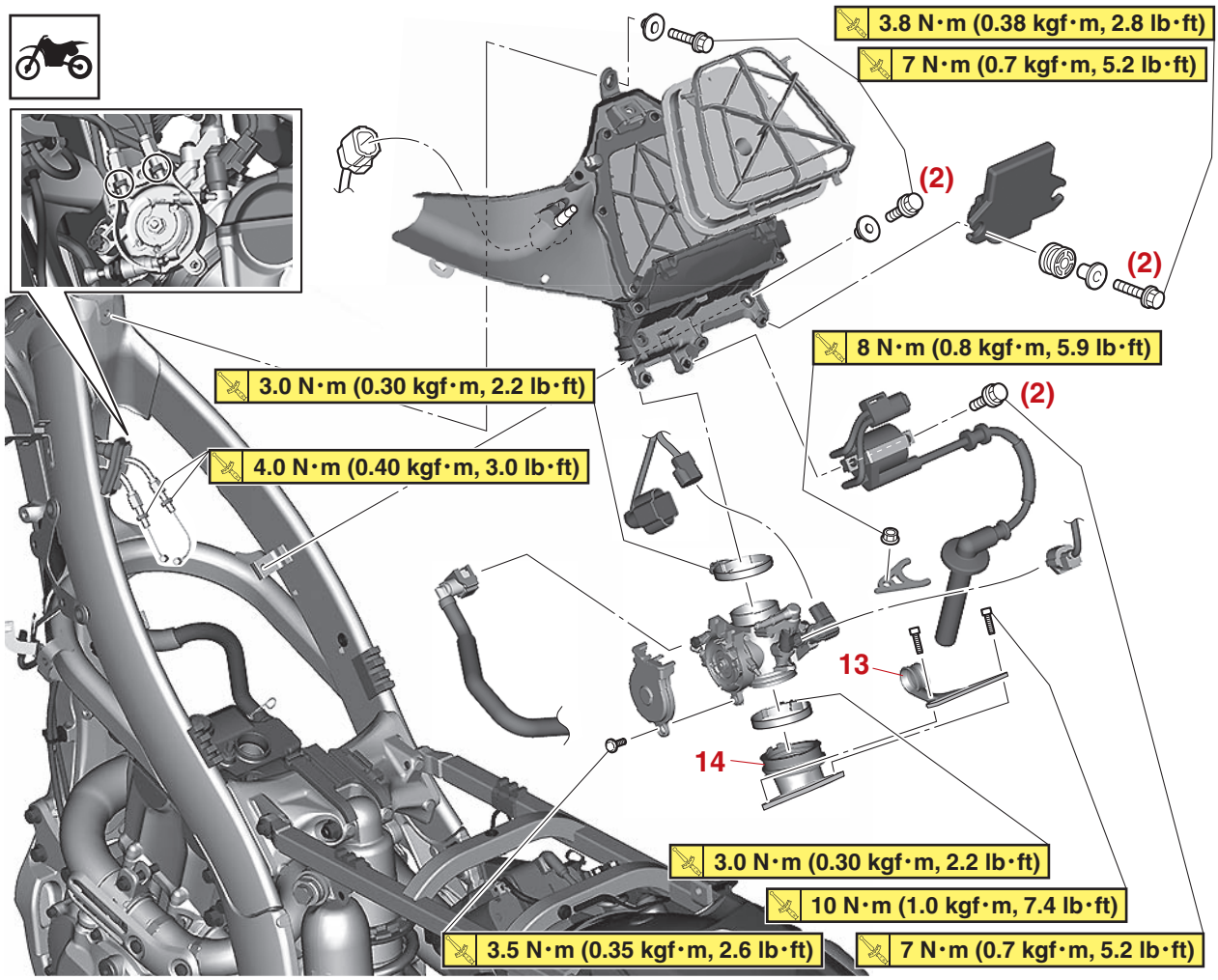
# THROTTLE BODY

**Removing the throttle body**



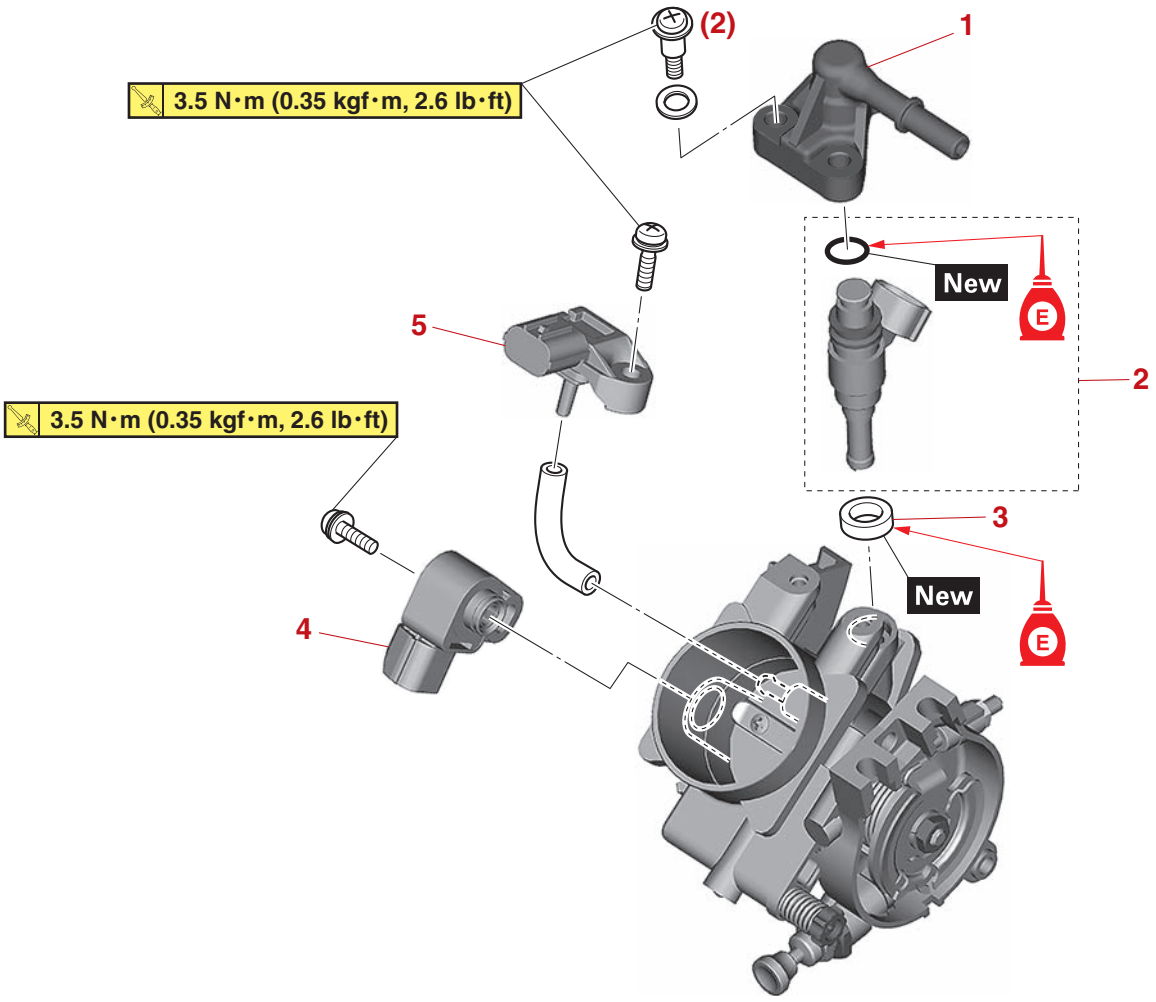

| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| | Seat/Air filter case cover | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Side cover (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Air scoop (left/right) | | Refer to "GENERAL CHASSIS" on page 4-1. |
| | Fuel tank | | Refer to "FUEL TANK" on page 7-1. |
| 1 | ECU (Engine Control Unit) | 1 | |
| 2 | Ignition coil | 1 | |
| 3 | Intake air temperature sensor coupler | 1 | Disconnect. |
| 4 | Air filter case | 1 | |
| 5 | Fuel injector coupler | 1 | Disconnect. |
| 6 | Intake air pressure sensor coupler | 1 | Disconnect. |
| 7 | Throttle position sensor coupler | 1 | Disconnect. |
| 8 | Cover | 1 | |
| 9 | Throttle cable cover | 1 | |
| 10 | Throttle cable | 2 | |
| 11 | Fuel hose | 1 | |
| 12 | Throttle body | 1 | |

**Removing the throttle body**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 13 | Exhaust pipe bracket | 1 | |
| 14 | Throttle body joint | 1 | |

**Removing the injector**




| Order | Job/Parts to remove | Q'ty | Remarks |
|---|---|---|---|
| 1 | Fuel inlet pipe | 1 | |
| 2 | Injector | 1 | |
| 3 | Gasket | 1 | |
| 4 | Throttle position sensor | 1 | |
| 5 | Intake air pressure sensor | 1 | |

EAM30271
## CHECKING THE INJECTOR

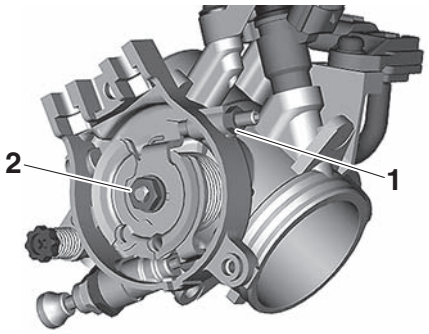
1. Check:
   • Injector
   Obstruction → Replace, and check the fuel pump and the fuel injection system.
   Refer to "FUEL INJECTION SYSTEM" on page 8-13.
   Deposits → Replace.
   Damage → Replace.
2. Check:
   • Injector resistance
   Refer to "CHECKING THE INJECTOR" on page 8-51.

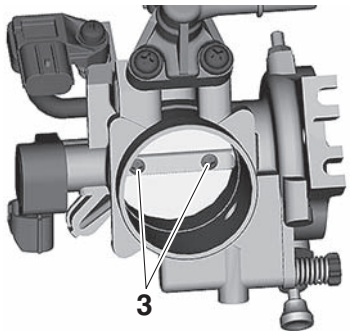
EAM30272
## CHECKING THE THROTTLE BODY

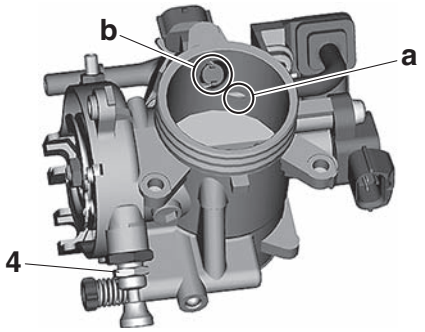
1. Check:
   • Throttle body
   Cracks/damage → Replace.
2. Check:
   • Fuel passages
   Obstructions → Clean.

ECA26070
***NOTICE***

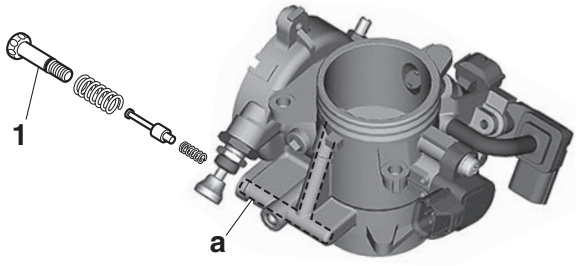
**• Before removing the throttle body, clean the area around the throttle body to prevent dirt and other foreign material from falling into the engine.**
**• If the throttle body is subject to strong shocks or dropped during cleaning, replace it.**
**• Do not use any caustic carburetor cleaning solution.**
**• Do not directly push the throttle valves to open them.**
**• Do not loosen the throttle valve stopper screw "1", throttle valve pulley nut "2", throttle valve screw "3" or starter knob nut "4". A loss of performance may occur.**
**• Do not use compressed air to clean the throttle body. Foreign materials may adhere to the intake air pressure sensor passage "a" and fuel injector "b" in the throttle body.**




3. Check:
   • Idle screw "1" passage "a"
   Obstruction → Blow out with compressed air.




EAM30268
## CHECKING THE FUEL PRESSURE

1. Check:
   • Fuel pressure
   a. Remove the side cover (left/right), the seat and the air scoop (left/right).
   Refer to "GENERAL CHASSIS" on page 4-1.

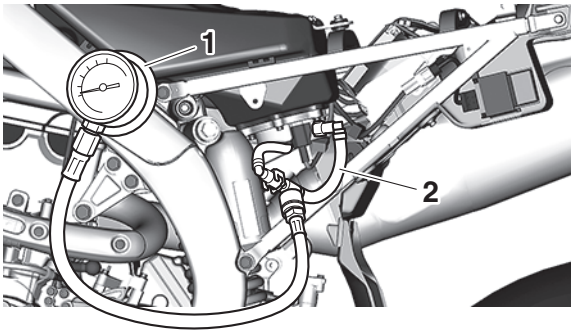
b. Remove the fuel tank bolt and lift the fuel tank.
c. Disconnect the fuel hose from the fuel pump.
Refer to "REMOVING THE FUEL TANK" on page 7-2.

EWA19380
**WARNING**
**Cover the fuel hose connection with a cloth when disconnecting it. This is because residual pressure in the fuel hose could cause fuel to spurt out when the hose is removed.**

ECA24750
***NOTICE***
**Make sure that the fuel hose is disconnected by hand. Do not forcibly disconnect the hose with tools.**

d. Connect the pressure gauge "1" and the fuel pressure adapter "2" to the fuel hose.

**Pressure gauge**
**90890-03153**
**Pressure gauge**
**YU-03153**
**Fuel pressure adapter**
**90890-03186**
**Fuel pressure adapter**
**YM-03186**




e. Start the engine.
f. Measure the fuel line pressure.
Out of specification → Replace the fuel pump.

**Fuel line pressure (at idle)**
**300–390 kPa (3.0–3.9 kgf/cm², 43.5–56.6 psi)**

EAM30273
## ADJUSTING THE THROTTLE POSITION SENSOR

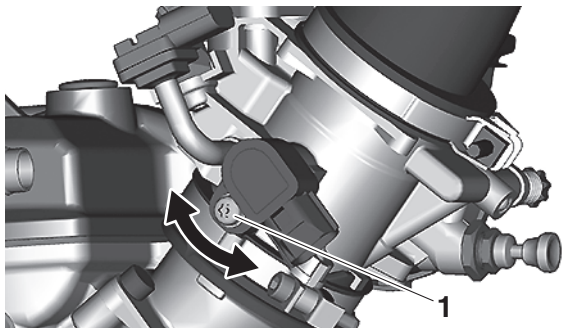
EWA15950
**WARNING**
**• Handle the throttle position sensor with special care.**
**• Never subject the throttle position sensor to strong shocks. If the throttle position sensor is dropped, replace it.**

1. Check:
   • Throttle position sensor
   Refer to "CHECKING THE THROTTLE POSITION SENSOR INPUT VOLTAGE" on page 8-50.
2. Adjust:
   • Throttle position sensor angle
   a. Connect the Yamaha diagnostic tool.
   Refer to "YAMAHA DIAGNOSTIC TOOL" on page 8-15.

**Yamaha diagnostic tool USB (US)**
**90890-03269**
**Yamaha diagnostic tool (A/I)**
**90890-03264**
**FI diagnostic tool sub–lead**
**90890-03212**
**FI diagnostic tool sub–lead**
**YU-03212**
**OBD/ GST Leadwire kit**
**90890-03249**

   b. Temporary tighten the throttle position sensor.
   c. Check that the throttle grip is fully closed.
   d. Connect the throttle position sensor to the wire harness.
   e. Set the Yamaha diagnostic tool to "diagnostic mode".
   f. Choose the diagnostic code No. "01".
   g. Adjust the throttle position sensor mounted angle until "11"–"14" appears on the Yamaha diagnostic tool.
   h. After adjusting the throttle position sensor mounted angle, tighten the throttle position sensor screw "1".

**Throttle position sensor screw**
**3.5 N·m (0.35 kgf·m, 2.6 lb·ft)**



# ELECTRICAL SYSTEM


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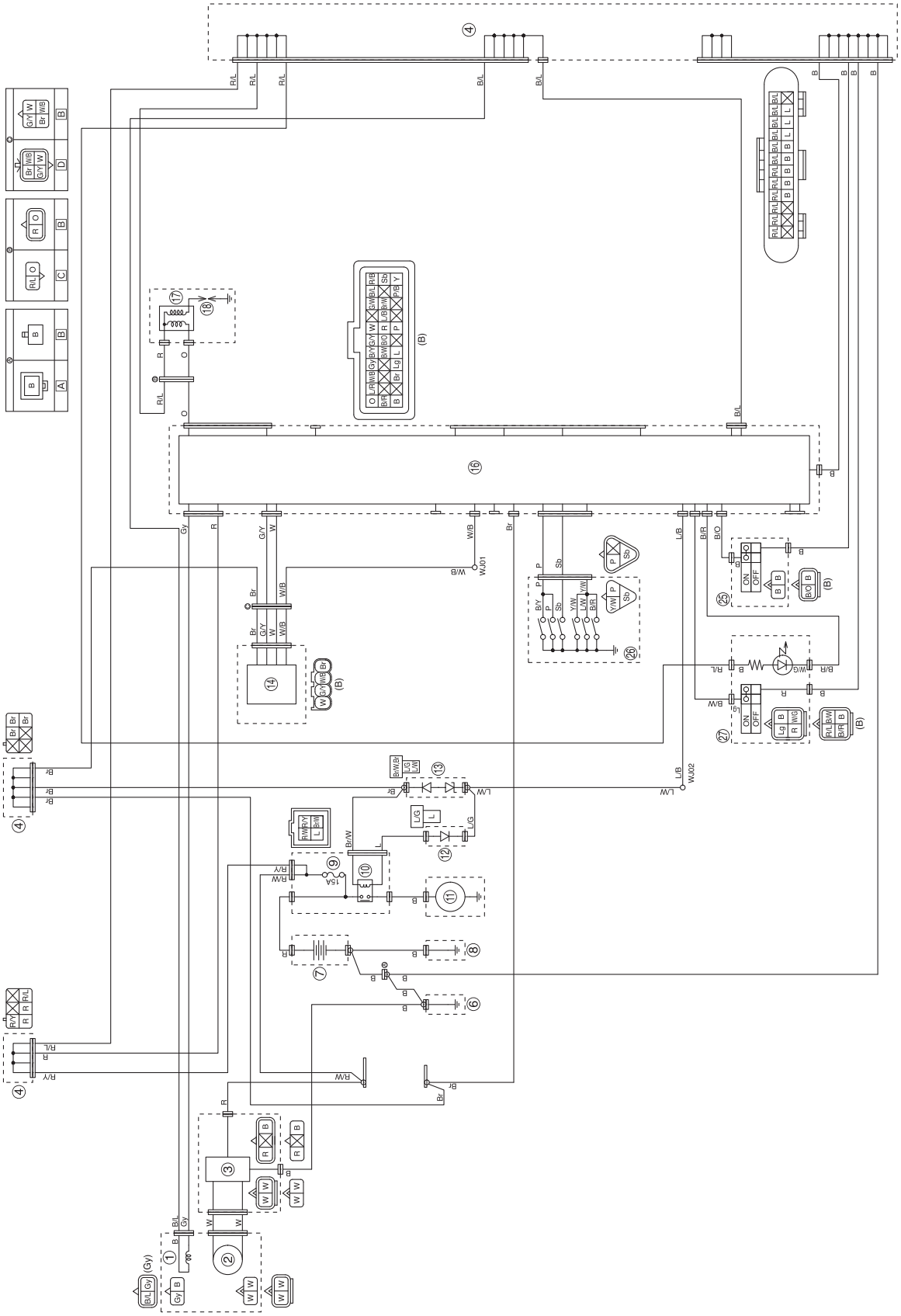
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EAM20142
# IGNITION SYSTEM

EAM30277
## CIRCUIT DIAGRAM



1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Joint connector
6. Engine ground
7. Battery
8. Frame ground
9. Fuse
10. Starter relay
11. Starter motor
12. Diode 1
13. Diode 2
14. CCU (Communication Control Unit)
16. ECU (Engine Control Unit)
17. Ignition coil
18. Spark plug
25. Engine stop switch
26. Gear position switch
27. Mode switch

A. Battery sub-lead
B. Wire harness
C. Ignition coil sub-lead
D. CCU sub-lead

EAM30278
## TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

**TIP**

Before troubleshooting, remove the following part(s):
1. Side cover (left/right)
2. Seat
3. Fuel tank
4. Air scoop (left/right)
5. Air filter case cover

| | | |
|---|---|---|
| 1. Check the ignition system wire harness connections. | NG→ | Reconnect. |
| OK↓ | | |
| 2. Check the fuse(s). Refer to “CHECKING THE FUSES” on page 8-43. | NG→ | Replace the fuse(s). |
| OK↓ | | |
| 3. Check the battery. Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-43. | NG→ | • Clean the battery terminals.<br>• Recharge or replace the battery. |
| OK↓ | | |
| 4. Check the spark plug. Refer to “CHECKING THE SPARK PLUG” on page 3-12. | NG→ | Correct or replace the spark plug. |
| OK↓ | | |
| 5. Check the ignition spark gap. Refer to “CHECKING THE IGNITION SPARK GAP” on page 8-46. | OK→ | The ignition system circuit is OK. |
| NG↓ | | |
| 6. Check the ignition coil. Refer to “CHECKING THE IGNITION COIL” on page 8-47. | NG→ | Replace the ignition coil. |
| OK↓ | | |
| 7. Check the engine stop switch. Refer to “CHECKING THE SWITCHES” on page 8-41. | NG→ | Replace the engine stop switch. |
| OK↓ | | |
| 8. Check the crankshaft position sensor. Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-47. | NG→ | Replace the crankshaft position sensor. |
| OK↓ | | |

| | | |
|---|---|---|
| 9. Check the stator coil assembly. Refer to "CHECKING THE STATOR COIL" on page 8-48. | NG→ | Replace the stator coil assembly. |
| OK↓ | | |
| 10. Check the ignition system wire harness. Refer to "CIRCUIT DIAGRAM" on page 8-1. | NG→ | Repair or replace the wire harness. |
| OK↓ | | |
| Replace the ECU. | | |

The mode switch to blink.

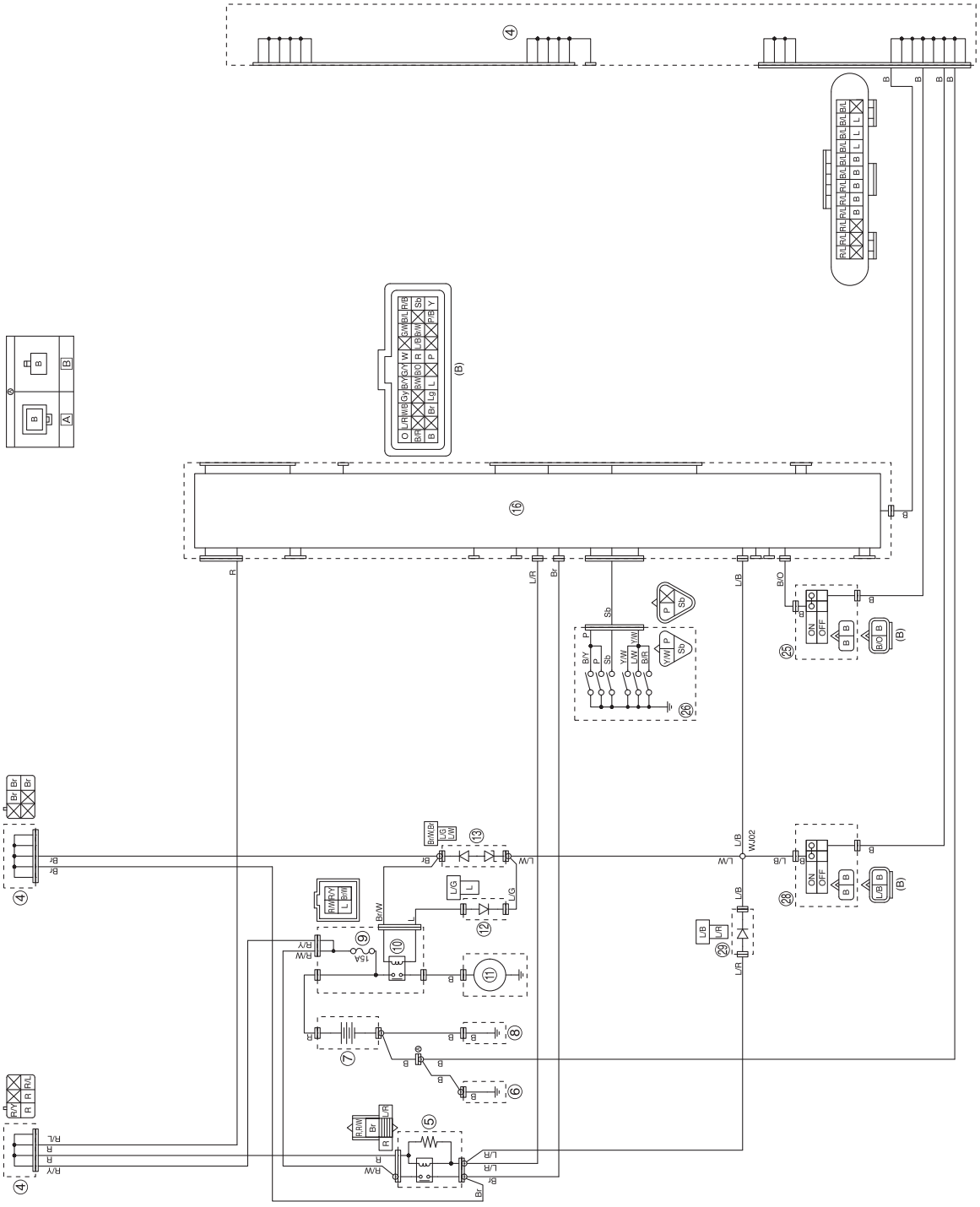
**TIP**

Before troubleshooting, remove the following part(s):
1. Seat
2. Air scoop (left)

| | | |
|---|---|---|
| 1. Check the mode switch coupler connections. | NG→ | Reconnect. |
| OK↓ | | |
| 2. Check the mode switch. Refer to "CHECKING THE SWITCHES" on page 8-41. | NG→ | Replace the mode switch. |
| OK↓ | | |
| 3. Check the ignition system wire harness. Refer to "CIRCUIT DIAGRAM" on page 8-1. | NG→ | Repair or replace the wire harness. |
| OK↓ | | |
| Replace the ECU. | | |

EAM20143
# ELECTRIC STARTING SYSTEM

EAM30279
## CIRCUIT DIAGRAM



4. Joint connector
5. Main relay
6. Engine ground
7. Battery
8. Frame ground
9. Fuse
10. Starter relay
11. Starter motor
12. Diode 1
13. Diode 2
16. ECU (Engine Control Unit)
25. Engine stop switch
26. Gear position switch
28. Start switch
29. Diode 3

A. Battery sub-lead
B. Wire harness

EAM30281
**TROUBLESHOOTING**
The starter motor fails to turn.

**TIP**
Before troubleshooting, remove the following part(s):
1. Seat
2. Side cover (left/right)
3. Air scoop (left/right)
4. Fuel tank
5. Air filter case cover

| | | |
|---|---|---|
| 1. Check the fuse.<br>Refer to "CHECKING THE FUSES" on page 8-43. | NG→ | Replace the fuse(s). |
| OK↓ | | |
| 2. Check the battery.<br>Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-43. | NG→ | • Clean the battery terminals.<br>• Recharge or replace the battery. |
| OK↓ | | |
| 3. Check the main relay.<br>Refer to "CHECKING THE RELAYS" on page 8-45. | NG→ | Replace the main relay. |
| OK↓ | | |
| 4. Check the starter motor operation.<br>Refer to "CHECKING THE STARTER MOTOR OPERATION" on page 8-48. | OK→ | Starter motor is OK. Perform the electric starting system troubleshooting, starting with step (5). |
| NG↓ | | |
| 5. Check the starter motor.<br>Refer to "CHECKING THE STARTER MOTOR" on page 5-45. | NG→ | Repair or replace the starter motor. |
| OK↓ | | |
| 6. Check the diodes.<br>(Diode 1, diode 2, diode 3)<br>Refer to "CHECKING THE RELAY UNIT (DIODE)" on page 8-45. | NG→ | Replace the diodes. |
| OK↓ | | |
| 7. Check the starter relay.<br>Refer to "CHECKING THE RELAYS" on page 8-45. | NG→ | Replace the starter relay. |
| OK↓ | | |
| 8. Check the engine stop switch.<br>Refer to "CHECKING THE SWITCHES" on page 8-41. | NG→ | Replace the engine stop switch. |
| OK↓ | | |

9. Check the start switch.
   Refer to "CHECKING THE SWITCHES" on page 8-41.

NG→ Replace the start switch.

OK↓

10. Check the entire starting system's wiring.
    Refer to "CIRCUIT DIAGRAM" on page 8-5.

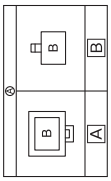
NG→ Properly connect or repair the starting system's wiring.

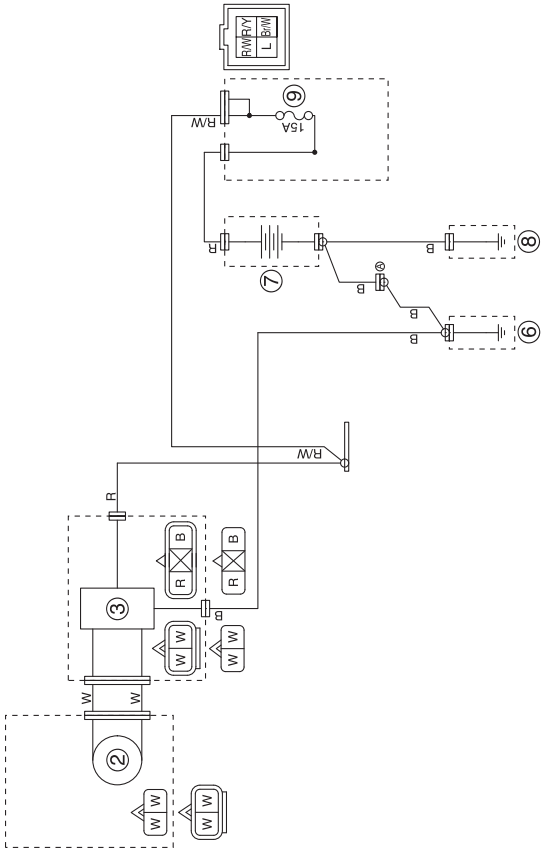
OK↓

Replace the ECU.

EAM20144
# CHARGING SYSTEM

EAM30282
## CIRCUIT DIAGRAM





2. AC magneto
3. Rectifier/regulator
6. Engine ground
7. Battery
8. Frame ground
9. Fuse

A. Battery sub-lead
B. Wire harness

EAM30283

**TROUBLESHOOTING**

The battery is not being charged.

**TIP**

Before troubleshooting, remove the following part(s):
1. Seat
2. Air scoop (left)

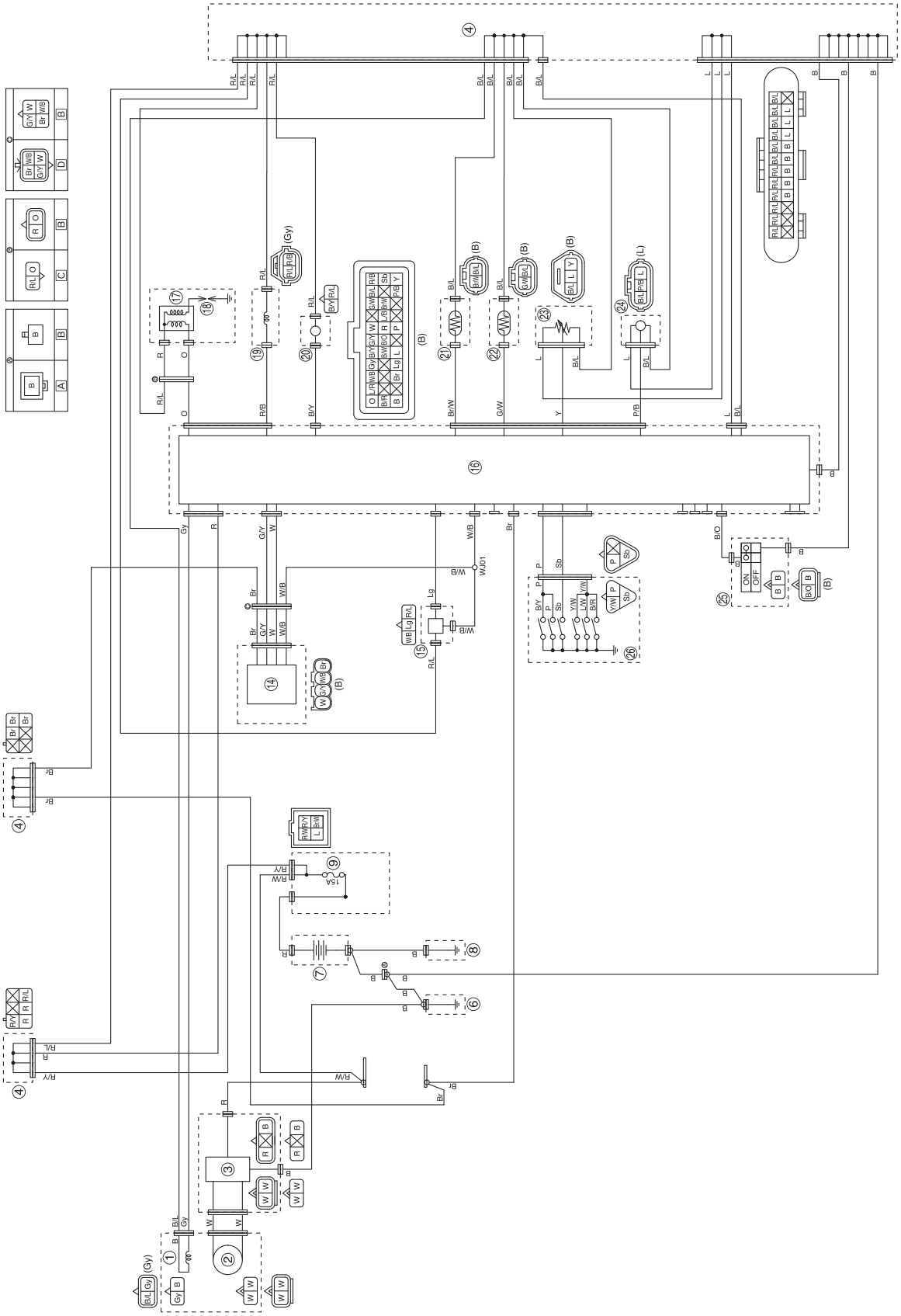
| | | |
|---|---|---|
| 1. Check the entire charging system's wiring. | NG→ | Reconnect. |
| OK↓ | | |
| 2. Check the fuse. Refer to "CHECKING THE FUSES" on page 8-43. | NG→ | Replace the fuse(s). |
| OK↓ | | |
| 3. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-43. | NG→ | • Clean the battery terminals.<br>• Recharge or replace the battery. |
| OK↓ | | |
| 4. Check the rectifier/regulator. Refer to "CHECKING THE RECTIFIER/REGULATOR" on page 8-48. | NG→ | Replace the rectifier/regulator. |
| OK↓ | | |
| 5. Check the stator coil assembly. Refer to "CHECKING THE STATOR COIL" on page 8-48. | NG→ | Replace the stator coil assembly. |
| OK↓ | | |
| 6. Check the charging system wire harness. Refer to "CIRCUIT DIAGRAM" on page 8-9. | NG→ | Repair or replace the wire harness. |
| OK↓ | | |
| This circuit is OK. | | |

EAM20145

# FUEL INJECTION SYSTEM

EAM30284

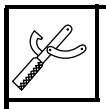
## CIRCUIT DIAGRAM



1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Joint connector
6. Engine ground
7. Battery
8. Frame ground
9. Fuse
14. CCU (Communication Control Unit)
15. Yamaha diagnostic tool coupler
16. ECU (Engine Control Unit)
17. Ignition coil
18. Spark plug
19. Fuel injector
20. Fuel pump
21. Intake air temperature sensor
22. Coolant temperature sensor
23. Throttle position sensor
24. Intake air pressure sensor
25. Engine stop switch
26. Gear position switch

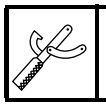
A. Battery sub-lead
B. Wire harness
C. Ignition coil sub-lead
D. CCU sub-lead

EAM30285
### YAMAHA DIAGNOSTIC TOOL
This model uses the Yamaha diagnostic tool to identify malfunctions.
For information about using the Yamaha diagnostic tool, refer to the operation manual that is included with the tool.



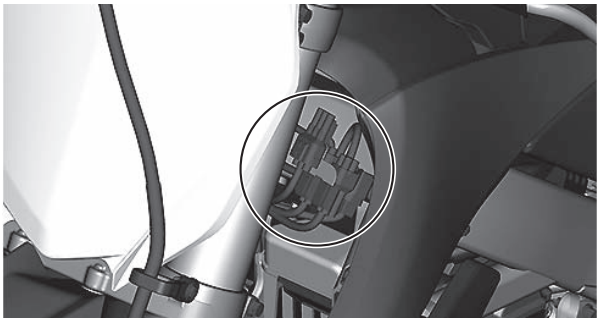
**Yamaha diagnostic tool USB (US)**
**90890-03269**
**Yamaha diagnostic tool (A/I)**
**90890-03264**

**TIP**
A generic scan tool can also be used to identify malfunctions.



**OBD/ GST Leadwire kit**
**90890-03249**

EAM30356
### CONNECTING THE YAMAHA DIAGNOSTIC TOOL
1. Remove the coupler for connecting setting tool.



2. Connect the FI diagnostic tool sub-lead.



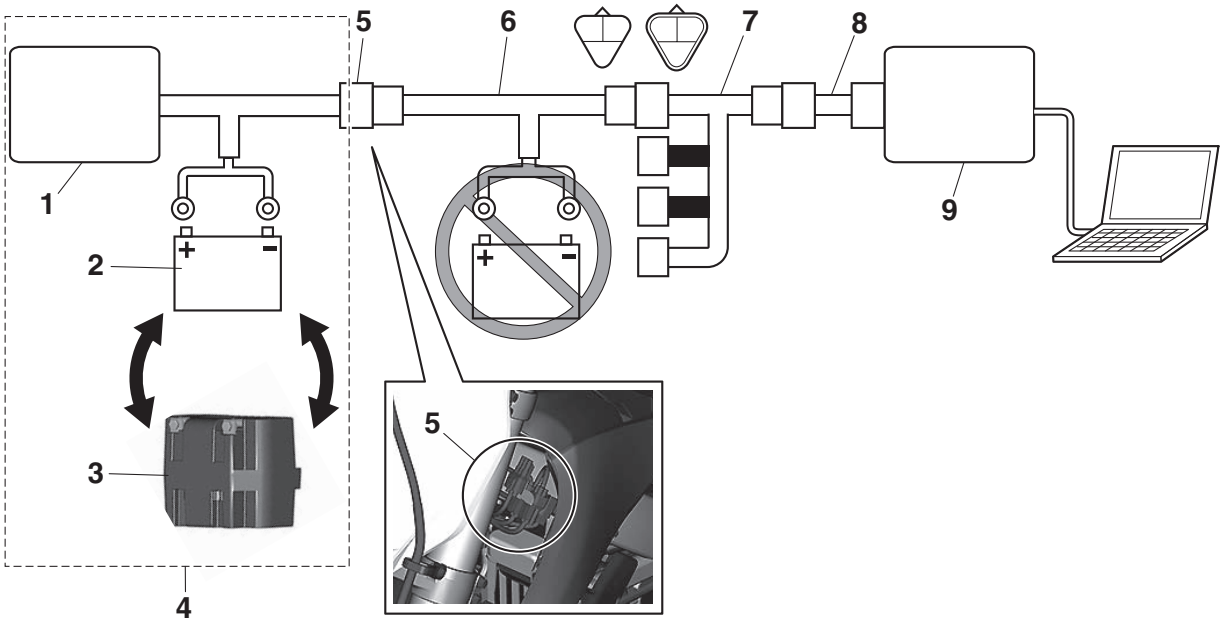
**FI diagnostic tool sub–lead**
**90890-03212**
**FI diagnostic tool sub–lead**
**YU-03212**

3. Connect the FI diagnostic tool sub-lead to the Yamaha diagnostic tool.

EWA20450
**⚠ WARNING**

**Never connect the sub-lead (special tool) to the battery. Otherwise, because of excessive current flow, the sub-lead can catch fire and the battery could be damaged.**

**TIP**
- Prepare the fully charged 12 V lead battery for yourself.
- Replace the vehicle battery with a lead battery (12 V).
- For information on how to connect and use the Yamaha diagnostic tool, refer to “YAMAHA DIAGNOSTIC TOOL OPERATION MANUAL”.




1. ECU (Engine Control Unit)
2. Lead battery (12 V)
3. Vehicle battery
4. Vehicle
5. Coupler for connecting optional part
6. FI diagnostic tool sub-lead
7. Sub-harness (included with the Yamaha diagnostic tool)
8. Vehicle communication cable (included with the Yamaha diagnostic tool)
9. Yamaha diagnostic tool

EAM30286
## TROUBLESHOOTING DETAILS (FAULT CODE)

This section describes the measures per fault code number displayed on the Yamaha diagnostic tool. Check and service the items or components that are the probable cause of the malfunction following the order given.
After the check and service of the malfunctioning part have been completed, delete the fault codes displayed on the Yamaha diagnostic tool according to the reinstatement method.
Fault code No.:
Fault code number displayed on the Yamaha diagnostic tool when the engine failed to work normally.
Diagnostic code No.:
Diagnostic code number to be used when the diagnostic mode is operated. Refer to "DIAGNOSTIC CODE: SENSOR OPERATION TABLE" on page 9-12.

### Parts connected to the ECU

The following parts are connected to the ECU.
When checking for a power short circuit, the couplers must be disconnected from all of the following parts beforehand.

- Crankshaft position sensor
- Fuel injector
- Ignition coil
- Throttle position sensor
- Intake air pressure sensor
- Coolant temperature sensor
- Intake air temperature sensor

### Fault code No. 12

| | |
|---|---|
| **Fault code No.** | **12** |
| **Item** | **Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.** |
| **Fail-safe system** | Unable to start engine |
| | Unable to drive vehicle |
| **Diagnostic code No.** | — |
| **Diagnostic tool display** | — |
| **Procedure** | — |

| Item | Probable cause of malfunction and check | Maintenance job | Confirmation of service completion |
|---|---|---|---|
| 1 | Connection of crankshaft position sensor coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 7 and finish the service.<br>Condition is "Detected" → Go to item 2. |
| 2 | Connection of wire harness ECU coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 7 and finish the service.<br>Condition is "Detected" → Go to item 3. |

| Fault code No. | | 12 | |
|---|---|---|---|
| **Item** | | **Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.** | |
| 3 | Wire harness continuity. | Open or short circuit → Replace the wire harness.<br>Between the crankshaft position sensor coupler and ECU coupler.<br>gray–gray<br>black/blue–black/blue | Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 4. |
| 4 | Mounted condition of crankshaft position sensor.<br>Check for looseness or pinching.<br>Check the gap (0.85 mm (0.0335 in)) between the crankshaft position sensor and the pickup rotor. | Improperly mounted sensor → Remount or replace the sensor.<br>Refer to “GENERATOR” on page 5-37. | Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 5. |
| 5 | Defective crankshaft position sensor. | Check the crankshaft position sensor.<br>Refer to “CHECKING THE CRANKSHAFT POSITION SENSOR” on page 8-47. | Crank the engine, and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 6. |
| 6 | Faulty ECU. | Replace the ECU. | Service is finished. |
| 7 | Delete the fault code. | Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 13**

**TIP**

- If fault code numbers 13 and 14 are both displayed, perform checkup and repair jobs for fault code number 13 first.
- Before troubleshooting, disconnect the starter motor lead from the starter relay.

| Fault code No. | | 13 | |
|---|---|---|---|
| **Item** | | **Intake air pressure sensor: open or short circuit detected.** | |
| **Fail-safe system** | | Able to start engine | |
| | | Able to drive vehicle | |
| **Diagnostic code No.** | | 03 | |
| **Diagnostic tool display** | | Displays the intake air pressure. | |
| **Procedure** | | The atmospheric pressure is displayed on the Yamaha diagnostic tool. | |
| **Item** | **Probable cause of malfunction and check** | **Maintenance job** | **Confirmation of service completion** |

| Fault code No. | | 13 | |
|---|---|---|---|
| Item | | Intake air pressure sensor: open or short circuit detected. | |
| 1 | Connection of intake air pressure sensor coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 2. |
| 2 | Connection of wire harness ECU coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 3. |
| 3 | Wire harness continuity. | Open or short circuit → Replace the wire harness.<br>Between intake air pressure sensor coupler and ECU coupler.<br>pink/black–pink/black<br>blue–blue<br>black/blue–black/blue | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 4. |
| 4 | Mounted condition of intake air pressure sensor.<br>Check for looseness or pinching.<br>Check the mounted position for correctness. | Improperly mounted sensor → Remount or replace the sensor. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 5. |
| 5 | Defective intake air pressure sensor. | Execute the diagnostic mode. (Code No. 03)<br>Atmospheric pressure at the current altitude and weather conditions is indicated.<br>0 m above sea level: About 101 kPa (about 3.63 V)<br>1000 m above sea level: About 90 kPa (about 3.30 V)<br>2000 m above sea level: About 80 kPa (about 3.00 V)<br>3000 m above sea level: About 70 kPa (about 2.70 V)<br>Abnormal display → Intake air pressure sensor is defective → Replace the intake air pressure sensor. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 6. |
| 6 | Faulty ECU. | Replace the ECU. | Service is finished. |
| 7 | Delete the fault code. | Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 14**

**TIP**

If fault code numbers 13 and 14 are both displayed, perform checkup and repair jobs for fault code number 13 first.

| | |
|---|---|
| **Fault code No.** | **14** |
| **Item** | **Intake air pressure sensor: hose system malfunction (clogged or detached hose).** |
| **Fail-safe system** | Able to start engine |
| | Able to drive vehicle |
| **Diagnostic code No.** | 03 |
| **Diagnostic tool display** | Displays the intake air pressure. |
| **Procedure** | The atmospheric pressure is displayed on the Yamaha diagnostic tool. |

| Item | Probable cause of malfunction and check | Maintenance job | Confirmation of service completion |
|---|---|---|---|
| 1 | The intake air pressure sensor hose is damaged, disconnected, clogged, twisted or bent. | Repair or replace the sensor hose. | Start the engine and let it idle for approximately 5 seconds (fully close the throttle valve).<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 3 and finish the service.<br>Condition is “Detected” → Go to item 2. |
| 2 | Defective intake air pressure sensor. | Execute the diagnostic mode. (Code No. 03)<br>Atmospheric pressure at the current altitude and weather conditions is indicated.<br>0 m above sea level: About 101 kPa (about 3.63 V)<br>1000 m above sea level: About 90 kPa (about 3.30 V)<br>2000 m above sea level: About 80 kPa (about 3.00 V)<br>3000 m above sea level: About 70 kPa (about 2.70 V)<br>Value does not change during cranking → Intake air pressure sensor replacement. | Service is finished. |
| 3 | Delete the fault code. | Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 15**

**TIP**

Before troubleshooting, disconnect the starter motor lead from the starter relay.

| | |
|---|---|
| **Fault code No.** | **15** |
| **Item** | **Throttle position sensor: open or short circuit detected.** |
| **Fail-safe system** | Able to start engine |
| | Able to drive vehicle |
| **Diagnostic code No.** | 01 |
| **Diagnostic tool display** | Displays the throttle angle.<br>• 11–14 (throttle in fully closed position)<br>• 86–92 (throttle in fully opened position) |
| **Procedure** | • Check with throttle fully closed.<br>• Check with throttle fully opened. |

| Item | Probable cause of malfunction and check | Maintenance job | Confirmation of service completion |
|---|---|---|---|
| 1 | Connection of throttle position sensor coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 2. |
| 2 | Connection of wire harness ECU coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 3. |
| 3 | Wire harness continuity. | Open or short circuit → Replace the wire harness.<br>Between throttle position sensor coupler and ECU coupler.<br>yellow–yellow<br>blue–blue<br>black/blue–black/blue | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 4. |
| 4 | Mounted condition of throttle position sensor.<br>Check for looseness or pinching.<br>Check the mounted position for correctness. | Improperly mounted sensor → Remount or replace the sensor.<br>Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-8. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 5. |

<table>
<tr><td colspan="2">Fault code No.</td><td colspan="3">15</td></tr>
<tr><td colspan="2">Item</td><td colspan="3">Throttle position sensor: open or short circuit detected.</td></tr>
<tr><td>5</td><td>Applied voltage of throttle position sensor lead.</td><td>Check the applied voltage. (black/blue–blue)<br>Location of disconnected lead: Output voltage<br>Disconnected ground lead: 5 V<br>Disconnected output lead: 0 V<br>Disconnected power supply lead: 0 V</td><td>Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 6.</td></tr>
<tr><td>6</td><td>Defective throttle position sensor.</td><td>Execute the diagnostic mode. (Code No. 01)<br>When the throttle is fully closed, 11–14 displays.<br>When the throttle is fully opened, 86–92 displays.<br>Incorrect display range → Replace the throttle position sensor.</td><td>Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 7.</td></tr>
<tr><td>7</td><td>Faulty ECU.</td><td>Replace the ECU.</td><td>Service is finished.</td></tr>
<tr><td>8</td><td>Delete the fault code.</td><td>Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code.</td><td></td></tr>
</table>

**Fault code No. 16**

**TIP**

- If fault code numbers 15 and 16 are both displayed, perform checkup and repair jobs for fault code number 15 first.
- Before troubleshooting, disconnect the starter motor lead from the starter relay.

<table>
<tr><td colspan="2">Fault code No.</td><td colspan="2">16</td></tr>
<tr><td colspan="2">Item</td><td colspan="2">Throttle position sensor: stuck throttle position sensor is detected.</td></tr>
<tr><td colspan="2" rowspan="2">Fail-safe system</td><td colspan="2">Able to start engine</td></tr>
<tr><td colspan="2">Able to drive vehicle</td></tr>
<tr><td colspan="2">Diagnostic code No.</td><td colspan="2">01</td></tr>
<tr><td colspan="2">Diagnostic tool display</td><td colspan="2">Displays the throttle angle.<br>• 11–14 (throttle in fully closed position)<br>• 86–92 (throttle in fully opened position)</td></tr>
<tr><td colspan="2">Procedure</td><td colspan="2">• Check with throttle fully closed.<br>• Check with throttle fully opened.</td></tr>
<tr><td>Item</td><td>Probable cause of malfunction and check</td><td>Maintenance job</td><td>Confirmation of service completion</td></tr>
</table>

| Fault code No. | | 16 | |
|---|---|---|---|
| **Item** | | **Throttle position sensor: stuck throttle position sensor is detected.** | |
| 1 | Mounted condition of throttle position sensor.<br>Check for looseness or pinching.<br>Check the mounted condition for correctness. | Improperly mounted sensor → Remount or replace the sensor. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-8. | Start switch to ON (main relay ON) and open and close the throttle several times.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 4 and finish the service.<br>Condition is “Detected” → Go to item 2. |
| 2 | Defective throttle position sensor. | Execute the diagnostic mode. (Code No. 01)<br>When the throttle is fully closed, 11–14 displays.<br>When the throttle is fully opened, 86–92 displays.<br>Incorrect display range → Replace the throttle position sensor. | Start switch to ON (main relay ON) and open and close the throttle several times.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 4 and finish the service.<br>Condition is “Detected” → Go to item 3. |
| 3 | Faulty ECU. | Replace the ECU. | Service is finished. |
| 4 | Delete the fault code. | Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 21**

**TIP**

- Make sure that the machine is completely cold before checking the coolant temperature sensor.
- Before troubleshooting, disconnect the starter motor lead from the starter relay.

| Fault code No. | | 21 | |
|---|---|---|---|
| **Item** | | **Coolant temperature sensor: open or short circuit detected.** | |
| **Fail-safe system** | | Able to start engine | |
| | | Able to drive vehicle | |
| **Diagnostic code No.** | | 06 | |
| **Diagnostic tool display** | | Displays the coolant temperature. | |
| **Procedure** | | Compare the actually measured coolant temperature with the Yamaha diagnostic tool display value. | |
| **Item** | **Probable cause of malfunction and check** | **Maintenance job** | **Confirmation of service completion** |
| 1 | Connection of coolant temperature sensor coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 2. |

| Fault code No. | | 21 | |
|---|---|---|---|
| Item | | Coolant temperature sensor: open or short circuit detected. | |
| 2 | Connection of wire harness ECU coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 3. |
| 3 | Wire harness continuity. | Open or short circuit → Replace the wire harness.<br>Between coolant temperature sensor coupler and ECU coupler.<br>green/white–green/white<br>black/blue–black/blue | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 4. |
| 4 | Mounted condition of coolant temperature sensor.<br>Check for looseness or pinching.<br>Check the mounted position for correctness. | Improperly mounted sensor → Remount or replace the sensor. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 5. |
| 5 | Defective coolant temperature sensor. | Execute the diagnostic mode. (Code No. 06)<br>When the machine is cold, displayed temperature is close to the ambient temperature.<br>Improper display → Replace the coolant temperature sensor.<br>Refer to “RADIATOR” on page 6-2. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 6. |
| 6 | Faulty ECU. | Replace the ECU. | Service is finished. |
| 7 | Delete the fault code. | Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 22**

**TIP**

- Make sure that the machine is completely cold before checking the intake air temperature sensor.
- Before troubleshooting, disconnect the starter motor lead from the starter relay.

| | |
|---|---|
| **Fault code No.** | **22** |
| **Item** | **Intake air temperature sensor: open or short circuit detected.** |
| **Fail-safe system** | Able to start engine |
| | Able to drive vehicle |
| **Diagnostic code No.** | 05 |
| **Diagnostic tool display** | Displays the intake air temperature. |
| **Procedure** | Compare the actually measured intake air temperature with the Yamaha diagnostic tool display value. |

| Item | Probable cause of malfunction and check | Maintenance job | Confirmation of service completion |
|---|---|---|---|
| 1 | Connection of intake air temperature sensor coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 2. |
| 2 | Connection of wire harness ECU coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 3. |
| 3 | Wire harness continuity. | Open or short circuit → Replace the wire harness.<br>Between intake air temperature sensor coupler and ECU coupler.<br>brown/white–brown/white<br>black/blue–black/blue | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 4. |
| 4 | Mounted condition of intake air temperature sensor.<br>Check for looseness or pinching.<br>Check the mounted position for correctness. | Improperly mounted sensor → Remount or replace the sensor. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 7 and finish the service.<br>Condition is “Detected” → Go to item 5. |

| Fault code No. | | 22 | |
|---|---|---|---|
| **Item** | | **Intake air temperature sensor: open or short circuit detected.** | |
| 5 | Defective intake air temperature sensor. | Execute the diagnostic mode. (Code No. 05)<br>When the machine is cold, displayed temperature is close to the ambient temperature.<br>Improper display → Replace the intake air temperature sensor. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 7 and finish the service.<br>Condition is "Detected" → Go to item 6. |
| 6 | Faulty ECU. | Replace the ECU. | Service is finished. |
| 7 | Delete the fault code. | Confirm that the fault code has a condition of "Recovered" using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 30**

**TIP**

Before troubleshooting, disconnect the starter motor lead from the starter relay.

| Fault code No. | | 30 | |
|---|---|---|---|
| **Item** | | **The vehicle has overturned.** | |
| **Fail-safe system** | | Unable to start engine | |
| | | Unable to drive vehicle | |
| **Diagnostic code No.** | | 08 | |
| **Diagnostic tool display** | | Displays the lean angle sensor output voltage.<br>• 0.4–1.4 (V) (upright)<br>• 3.7–4.4 (V) (overturned) | |
| **Procedure** | | Remove the ECU, and incline it 45° or more. | |
| **Item** | **Probable cause of malfunction and check** | **Maintenance job** | **Confirmation of service completion** |
| 1 | The vehicle has overturned. | Raise the vehicle upright. | Start switch to ON (main relay ON), wait 10 seconds, then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 4 and finish the service.<br>Condition is "Detected" → Go to item 2. |
| 2 | Mounted condition of ECU.<br>Check for looseness or pinching.<br>Check the mounted condition for correctness. | Improperly mounted ECU → Remount the ECU. | Start switch to ON (main relay ON), wait 10 seconds, then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 4 and finish the service.<br>Condition is "Detected" → Go to item 3. |

| Fault code No. | | 30 | |
|---|---|---|---|
| **Item** | | **The vehicle has overturned.** | |
| 3 | Faulty ECU. | Execute the diagnostic mode. (Code No. 08)<br>When the vehicle is upright: 0.4–1.4 (V)<br>When the vehicle is overturned: 3.7–4.4 (V)<br>Improper display → Replace the ECU. | Service is finished. |
| 4 | Delete the fault code. | Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 33**

| Fault code No. | | 33 | |
|---|---|---|---|
| **Item** | | **Ignition coil: open or short circuit detected in the primary lead of the ignition coil.** | |
| **Fail-safe system** | | Unable to start engine | |
| | | Unable to drive vehicle | |
| **Diagnostic code No.** | | 30 | |
| **Actuation** | | Actuates the ignition coil five times at one-second intervals.<br>“WARNING” on the Yamaha diagnostic tool blinks five times when the ignition coil is actuated. | |
| **Procedure** | | Check that a spark is generated five times.<br>• Connect an ignition checker. | |
| **Item** | **Probable cause of malfunction and check** | **Maintenance job** | **Confirmation of service completion** |
| 1 | Connection of ignition coil coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 2. |
| 2 | Connection of wire harness ECU coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 3. |

| Fault code No. | | 33 | |
|---|---|---|---|
| Item | | Ignition coil: open or short circuit detected in the primary lead of the ignition coil. | |
| 3 | Connection of sub wire harness coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the sub wire harness. | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 4. |
| 4 | Wire harness continuity. | Open or short circuit → Replace the wire harness.<br>Between ignition coil coupler and ECU coupler.<br>orange–orange<br>red–red/blue | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 5. |
| 5 | Mounted condition of ignition coil.<br>Check for looseness or pinching.<br>Check the mounted condition for correctness. | Improperly mounted sensor → Remount or replace the ignition coil. | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 6. |
| 6 | Defective ignition coil. (test the primary coils for continuity) | Check the primary resistance of the ignition coil.<br>Refer to “CHECKING THE IGNITION COIL” on page 8-47. | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 8 and finish the service.<br>Condition is “Detected” → Go to item 7. |
| 7 | Faulty ECU. | Execute the diagnostic mode. (Code No. 30)<br>No spark → Replace the ECU. | Service is finished. |
| 8 | Delete the fault code. | Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 39**

**TIP**

Disconnect the fuel pump coupler when this diagnostic tool is used.

| | |
|---|---|
| **Fault code No.** | **39** |
| **Item** | **Injector: open or short circuit detected.** |
| **Fail-safe system** | Unable to start engine |
| | Unable to drive vehicle |
| **Diagnostic code No.** | 36 |
| **Actuation** | Actuates injector five times at one-second intervals.<br>"WARNING" on the Yamaha diagnostic tool blinks five times when the injector is actuated. |
| **Procedure** | Check that injector is actuated five times by listening for the operating sound. |

| Item | Probable cause of malfunction and check | Maintenance job | Confirmation of service completion |
|---|---|---|---|
| 1 | Connection of injector coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 6 and finish the service.<br>Condition is "Detected" → Go to item 2. |
| 2 | Defective injector. | Check the injector.<br>Refer to "CHECKING THE INJECTOR" on page 8-51. | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 6 and finish the service.<br>Condition is "Detected" → Go to item 3. |
| 3 | Connection of wire harness ECU coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (for bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 6 and finish the service.<br>Condition is "Detected" → Go to item 4. |
| 4 | Wire harness continuity. | Open or short circuit → Replace the wire harness.<br>Between injector coupler and ECU coupler.<br>red/black–red/black<br>Between injector coupler and starter relay.<br>red/blue–red/blue<br>red–red<br>red/yellow–red/yellow | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 6 and finish the service.<br>Condition is "Detected" → Go to item 5. |
| 5 | Faulty ECU. | Replace the ECU. | Service is finished. |

| Fault code No. | | 39 | |
|---|---|---|---|
| Item | | Injector: open or short circuit detected. | |
| 6 | Delete the fault code. | Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 41**

| Fault code No. | | 41 | |
|---|---|---|---|
| Item | | ECU: built-in lean angle sensor malfunction. | |
| Fail-safe system | | Unable to start engine | |
| | | Able to drive vehicle | |
| Diagnostic code No. | | 08 | |
| Diagnostic tool display | | Displays the lean angle sensor output voltage.<br>• 0.4–1.4 (V) (upright)<br>• 3.7–4.4 (V) (overturned) | |
| Procedure | | Remove the ECU, and incline it 45° or more. | |
| **Item** | **Probable cause of malfunction and check** | **Maintenance job** | **Confirmation of service completion** |
| 1 | Faulty ECU. | Replace the ECU. | Service is finished. |

**Fault code No. 43**

| Fault code No. | | 43 | |
|---|---|---|---|
| Item | | Fuel system voltage: incorrect voltage supplied to the main relay and CCU. | |
| Fail-safe system | | Able to start engine | |
| | | Able to drive vehicle | |
| Diagnostic code No. | | 09 | |
| Diagnostic tool display | | Fuel system voltage<br>Approximately 12.0 (V) | |
| Procedure | | Disconnect the main relay, and push the start switch. | |
| **Item** | **Probable cause of malfunction and check** | **Maintenance job** | **Confirmation of service completion** |
| 1 | Connection of main relay coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Press the start switch and the engine stop switch alternately to switch the power supply (= main relay) from “ON → OFF → ON”.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 6 and finish the service.<br>Condition is “Detected” → Go to item 2. |

| Fault code No. | | 43 | |
|---|---|---|---|
| Item | | Fuel system voltage: incorrect voltage supplied to the main relay and CCU. | |
| 2 | Connection of wire harness ECU coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Press the start switch and the engine stop switch alternately to switch the power supply (= main relay) from "ON → OFF → ON".<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 6 and finish the service.<br>Condition is "Detected" → Go to item 3. |
| 3 | Wire harness continuity. | Open or short circuit → Replace the wire harness.<br>Between battery terminal and main relay.<br>red–red<br>red–red/white<br>Between main relay coupler and ECU coupler.<br>brown–brown<br>blue/red–blue/red | Press the start switch and the engine stop switch alternately to switch the power supply (= main relay) from "ON → OFF → ON".<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 6 and finish the service.<br>Condition is "Detected" → Go to item 4. |
| 4 | Defective main relay. | No operating sound → Replace the main relay.<br>Or execute the diagnostic mode. (Code No. 09)<br>Fuel system voltage is below 3 V → Replace the main relay. | Press the start switch and the engine stop switch alternately to switch the power supply (= main relay) from "ON → OFF → ON".<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is "Recovered" → Go to item 6 and finish the service.<br>Condition is "Detected" → Go to item 5. |
| 5 | Malfunction in ECU. | Replace the ECU. | Service is finished. |
| 6 | Delete the fault code. | Confirm that the fault code has a condition of "Recovered" using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 44**

**TIP**

Before troubleshooting, disconnect the starter motor lead from the starter relay.

| | |
|---|---|
| **Fault code No.** | **44** |
| **Item** | **EEPROM fault code number: an error is detected while reading or writing on EEPROM.** |
| **Fail-safe system** | Able/Unable to start engine |
| | Able/Unable to drive vehicle |
| **Diagnostic code No.** | 60 |
| **Diagnostic tool display** | Displays the location of the abnormal portion of the EEPROM data.<br>• 00: No fault<br>• 01: CO adjustment valve<br>• 07: Power Tuner injection correction setting 0–8, or Power Tuner ignition timing correction setting 0–8 |
| **Procedure** | — |

| Item | Probable cause of malfunction and check | Maintenance job | Confirmation of service completion |
|---|---|---|---|
| 1 | Identification of malfunctioning point. | Execute the diagnostic mode. (Code No. 60)<br>00: Go to item 4.<br>01: Go to item 2.<br>07: Go to item 3. | |
| 2 | “01” is indicated in diagnostic mode. (Code No. 60)<br>EEPROM data error for adjustment of CO concentration. | Change the CO concentration, and rewrite in EEPROM.<br>After this adjustment, push the engine stop switch, and then push the start switch. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 5 and finish the service.<br>Condition is “Detected” → Repeat item 1.<br>If the same number is indicated, go to item 4. |
| 3 | “07” is indicated in diagnostic mode. (Code No. 60)<br>EEPROM data error for setting tool adjustment values for fuel injection amount or ignition timing. | Erase the setting map in the diagnostic mode. (Code No. 65) | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 5 and finish the service.<br>Condition is “Detected” → Repeat item 1.<br>If the same number is indicated, go to item 4. |
| 4 | Faulty ECU. | Replace the ECU. | Service is finished. |
| 5 | Delete the fault code. | Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 46**

| | |
|---|---|
| **Fault code No.** | **46** |
| **Item** | **Vehicle system power supply: normal voltage is not supplied to the ECU.** |
| **Fail-safe system** | Able/Unable to start engine |
| | Able/Unable to drive vehicle |
| **Diagnostic code No.** | — |
| **Diagnostic tool display** | — |
| **Procedure** | — |

| Item | Probable cause of malfunction and check | Maintenance job | Confirmation of service completion |
|---|---|---|---|
| 1 | Connection of rectifier/regulator coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 6 and finish the service.<br>Condition is “Detected” → Go to item 2. |
| 2 | Connection of AC magneto coupler.<br>Check the locking condition of the coupler.<br>Disconnect the coupler, and check the pins (bent or broken terminals and locking condition of the pins). | Improperly connected → Connect the coupler securely, or repair/replace the wire harness. | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 6 and finish the service.<br>Condition is “Detected” → Go to item 3. |
| 3 | Wire harness continuity. | Open or short circuit → Replace the wire harness.<br>Between rectifier/regulator coupler and battery terminal.<br>red–red<br>black–black<br>Between rectifier/regulator coupler and AC magneto coupler.<br>white–white | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 6 and finish the service.<br>Condition is “Detected” → Go to item 4. |
| 4 | Defective AC magneto. | Check the AC magneto.<br>Refer to “CHECKING THE STATOR COIL” on page 8-48. | Start the engine and let it idle for approximately 5 seconds.<br>Check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool.<br>Condition is “Recovered” → Go to item 6 and finish the service.<br>Condition is “Detected” → Go to item 5. |
| 5 | Faulty ECU. | Replace the ECU. | Service is finished. |

| Fault code No. | | 46 | |
|---|---|---|---|
| Item | | Vehicle system power supply: normal voltage is not supplied to the ECU. | |
| 6 | Delete the fault code. | Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code. | |

**Fault code No. 50**

**TIP**

Before troubleshooting, disconnect the starter motor lead from the starter relay.

| Fault code No. | | 50 | |
|---|---|---|---|
| Item | | ECU: faulty ECU memory. | |
| Fail-safe system | | Unable to start engine | |
| | | Unable to drive vehicle | |
| Diagnostic code No. | | — | |
| Diagnostic tool display | | — | |
| Procedure | | — | |
| **Item** | **Probable cause of malfunction and check** | **Maintenance job** | **Confirmation of service completion** |
| 1 | Faulty ECU. | Replace the ECU. | Start switch to ON (main relay ON), and then check the condition of the fault code using the malfunction mode of the Yamaha diagnostic tool. Check that the fault code number is not displayed. |

**Fault code No. 70**

**TIP**

It is not a malfunction.

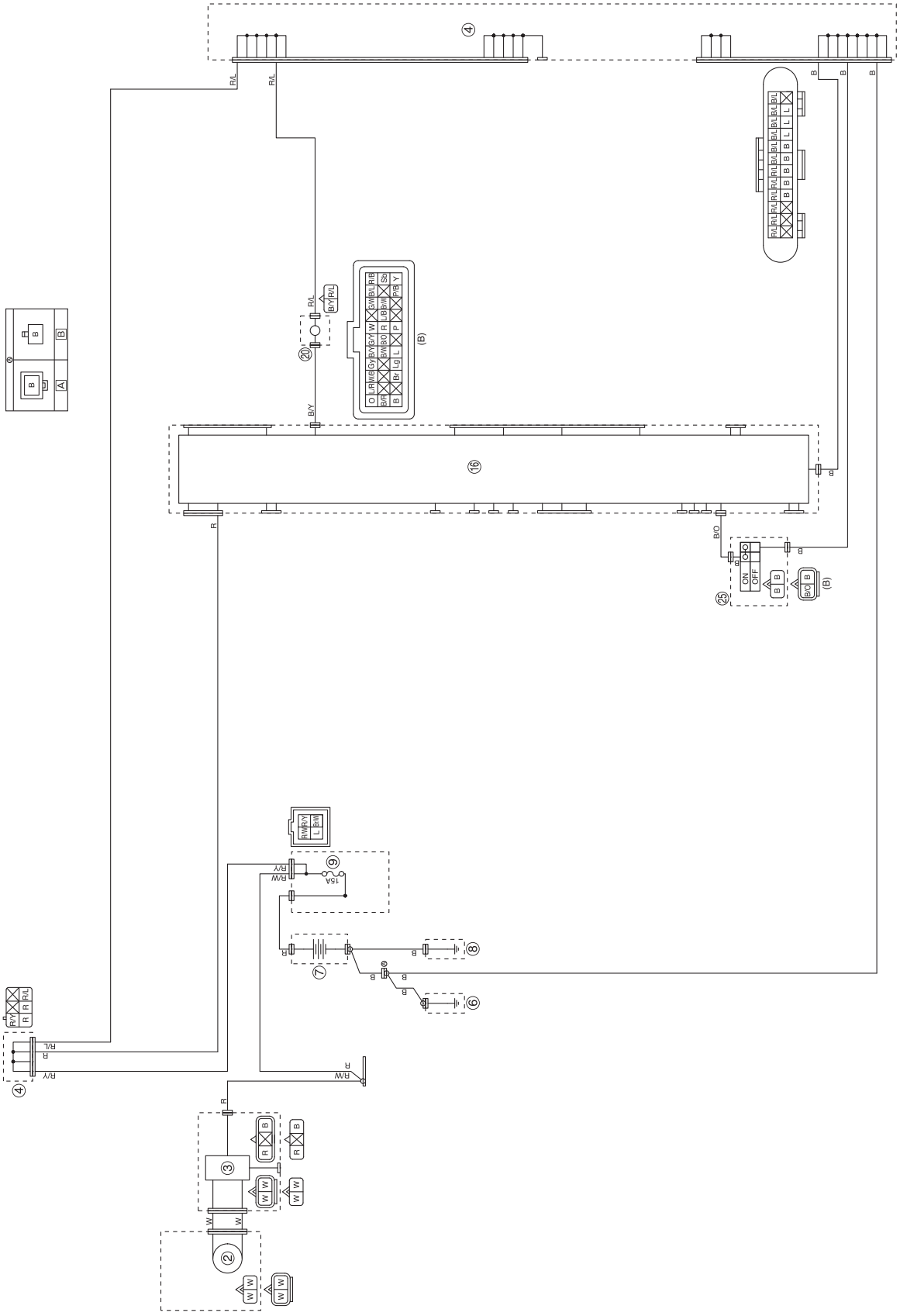
If the engine is forcibly stopped by leaving idle, the recovered state is recorded by malfunction mode.

| Fault code No. | | 70 | |
|---|---|---|---|
| Item | | Engine forcibly stops when the vehicle is left idling for a long period of time. | |
| Fail-safe system | | — | |
| | | Unable to drive vehicle | |
| Diagnostic code No. | | — | |
| Diagnostic tool display | | — | |
| Procedure | | — | |
| **Item** | **Probable cause of malfunction and check** | **Maintenance job** | **Confirmation of service completion** |

| Fault code No. | | 70 | |
|---|---|---|---|
| Item | | Engine forcibly stops when the vehicle is left idling for a long period of time. | |
| 1 | Delete the fault code. | Confirm that the fault code has a condition of “Recovered” using the Yamaha diagnostic tool, and then delete the fault code. | |

EAM20146
# FUEL PUMP SYSTEM

EAM30287
## CIRCUIT DIAGRAM



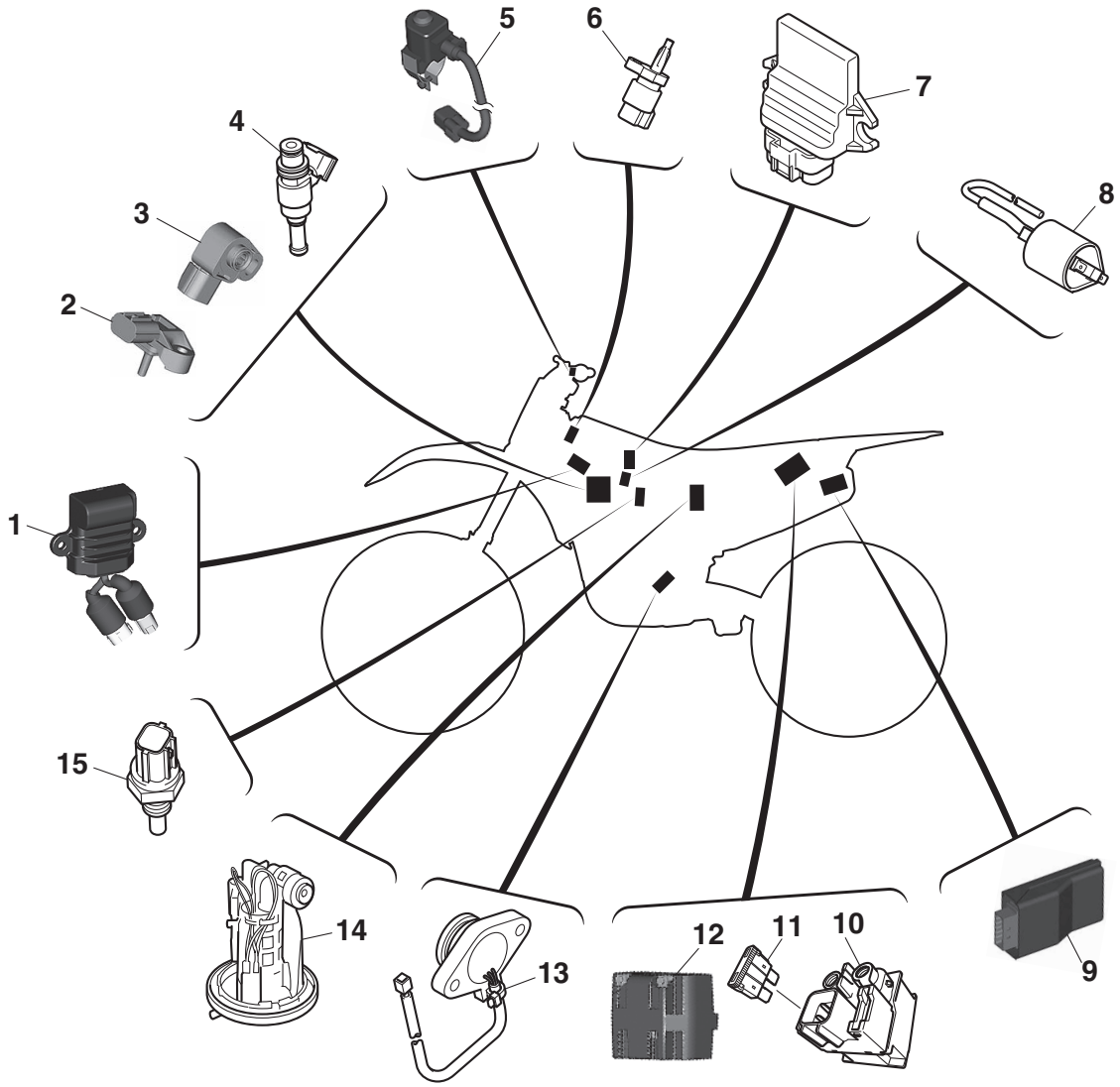
2. AC magneto
3. Rectifier/regulator
4. Joint connector
6. Engine ground
7. Battery
8. Frame ground
9. Fuse
16. ECU (Engine Control Unit)
20. Fuel pump
25. Engine stop switch

A. Battery sub-lead
B. Wire harness

EAM30288
**TROUBLESHOOTING**
The fuel pump fails to operate.
**TIP**
Before troubleshooting, remove the following part(s):
1. Seat
2. Side cover (left/right)
3. Air scoop (left/right)
4. Fuel tank
5. Air filter case cover

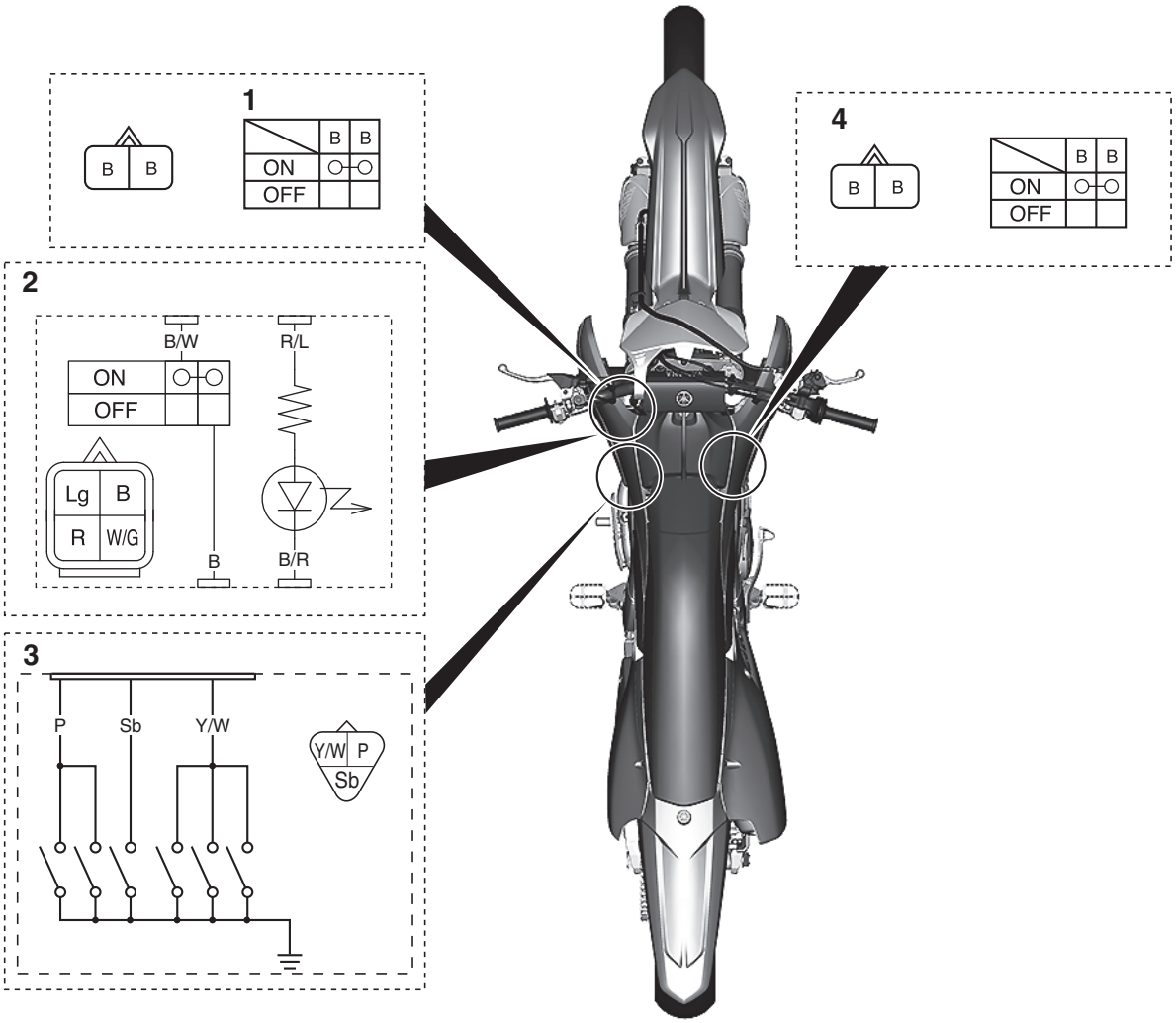
| | | |
|---|---|---|
| 1. Check the fuel pump system wire harness connections. | NG→ | Reconnect. |
| OK↓ | | |
| 2. Check the fuse. Refer to "CHECKING THE FUSES" on page 8-43. | NG→ | Replace the fuse(s). |
| OK↓ | | |
| 3. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-43. | NG→ | • Clean the battery terminals.<br>• Recharge or replace the battery. |
| OK↓ | | |
| 4. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-41. | NG→ | Replace the engine stop switch. |
| OK↓ | | |
| 5. Check fuel pressure. Refer to "CHECKING THE FUEL PRESSURE" on page 7-7. | NG→ | Replace the fuel pump. |
| OK↓ | | |
| 6. Check the fuel pump system wire harness connections. Refer to "CIRCUIT DIAGRAM" on page 8-37. | NG→ | Repair or replace the wire harness. |
| OK↓ | | |
| Replace the ECU. | | |

EAM20147
# ELECTRICAL COMPONENTS




1. Rectifier/regulator
2. Intake air pressure sensor
3. Throttle position sensor
4. Injector
5. Mode switch
6. Intake air temperature sensor
7. ECU (Engine Control Unit)
8. Ignition coil
9. CCU (Communication Control Unit)
10. Starter relay
11. Fuse
12. Battery
13. Gear position switch
14. Fuel pump
15. Coolant temperature sensor

EAM30289
## CHECKING THE SWITCHES




1. Engine stop switch
2. Mode switch
3. Gear position switch
4. Engine start switch

Check each switch for continuity with the digital circuit tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

ECA14371

***NOTICE***

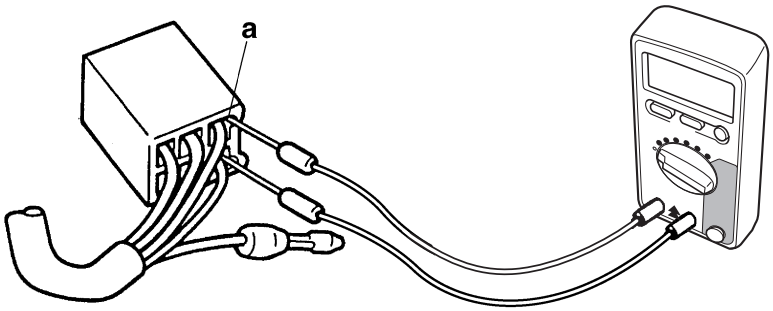
**Never insert the tester probes into the coupler terminal slots. Always insert the probes from the opposite end "a" of the coupler, taking care not to loosen or damage the leads.**



**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

**TIP**

When checking for continuity, switch back and forth between the switch positions a few times.

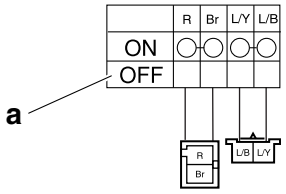



Terminal connections of the switch are shown in the terminal connection diagram below.
The switch positions "a" are shown in the far left column and the switch lead colors are shown in the top row in the switch illustration.

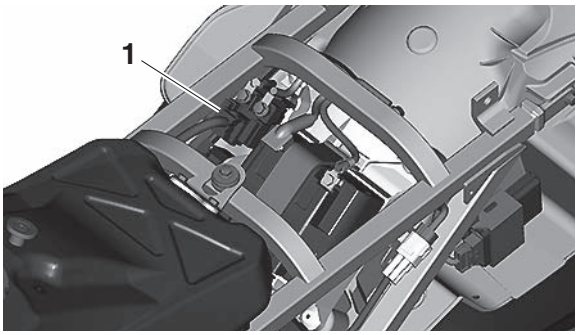
**TIP**

" ○——○ " indicates continuity between switch terminals (i.e., a closed circuit at each switch position).

**The example illustration below shows that:**
There is continuity between red and brown when the switch is "ON".



EAM30290
## CHECKING THE FUSES
The following procedure applies to all of the fuses.
1. Remove:
   • Seat
   Refer to "GENERAL CHASSIS" on page 4-1.
2. Check:
   • Fuse "1"




   a. Connect the digital circuit tester to the fuse and check the continuity.

**TIP**
Set the digital circuit tester selector to " Ω ".

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

   b. If the digital circuit tester indicates "O.L", replace the fuse.
3. Replace:
   • Fuse
   a. Install a new fuse of the correct amperage rating.
   b. Push the start switch to verify if the electrical circuit is operational.
   c. If the fuse immediately blows again, check the electrical circuit.

| Fuses | Amperage rating | Q'ty |
|---|---|---|
| Main | 15 A | 1 |
| Spare | 15 A | 1 |

EWA13310
**WARNING**
**Never use a fuse with an amperage rating other than that specified. Improvising or using a fuse with the wrong amperage rating may cause extensive damage to the electrical system, cause the lighting and ignition systems to malfunction and could possibly cause a fire.**

4. Install:
   • Seat
   Refer to "GENERAL CHASSIS" on page 4-1.

EAM30291
## CHECKING AND CHARGING THE BATTERY
EWA20430
**WARNING**
**To avoid sparking, burns, fire, and explosion:**
- **Charge battery only with specified charger.**
- **Use battery only for specified product – no other use.**
- **Do not place near fire or immerse in water.**
- **Do not use battery if it has been dropped, subject to impact, or visibly damaged.**
- **Do not disassemble or modify the battery, or short across its terminals.**

ECA26041
***NOTICE***
**To prevent damage to the battery and battery malfunction:**
- **Be sure to charge the battery using only the specified battery charger. Do not use a charger designed for lead-acid batteries. Otherwise, the battery could be damaged, such as from a long period of excessive current or voltage exceeding 16 V.**
- **Avoid excessive current discharge, such as pressing the starter switch for a long time. Wait for more than 10 seconds before attempting to start again. Charge the battery again as soon as possible. A long state of discharge below 10 V will damage the battery.**
- **Do not use the specified battery charger to charge a battery other than the lithium-ion battery. Otherwise, the battery or charger could be damaged.**
- **Be careful not to drop the battery or subject it to strong impacts.**
- **Avoid charging the battery at high temperatures of 65 °C (149 °F) or more or low temperatures under 0 °C (32 °F). A control feature preventing battery charging and discharging will temporarily intervene. The battery will discharge at 65 °C (149 °F) or more or low temperatures under -10 °C (14 °F).**
- **If the battery is charged between 0 °C (32 °F)and 10 °C (50 °F), battery charging may stop halfway without the battery becoming**

**fully charged even when the specified battery charger is used. If this occurs, disconnect the battery charger, and then resume charging again.**

**TIP**

This model uses a lithium-ion battery. When new, the battery is supplied in sleep mode to minimize current discharging until first-time use. In the sleep mode, a voltage as low as approximately 0.1 V can be measured if voltage measurement is performed. As such the battery cannot be used, but this is not a malfunction. By activating the battery as follows, the sleep mode will be canceled and the battery can be used normally.

**Charging (activation) steps**

1. Remove:
   - Side cover (left/right)
   - Seat

   Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
   - Battery lead

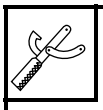
   (from the battery terminals)

ECA13700

***NOTICE***

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

3. Remove:
   - Battery
4. Connect the battery charger (special tool) to the battery.



**Lithium battery charger**
**90890-05376**
**Lithium battery charger**
**DBY-ACC51-70-02**

**TIP**

- For instructions on charging and handling the battery charger, refer to the battery charger's instruction manual.
- Once battery charging starts, the sleep mode is canceled.

5. Charge the battery until it is fully charged.
6. Install:
   - Battery
7. Connect:
   - Battery lead

   (to the battery terminals)

ECA26980

***NOTICE***

**First, connect the positive battery lead, and then the negative battery lead.**

8. Check:
   - Battery terminal

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



**Recommended lubricant**
**Dielectric grease**

10. Install:
    - Seat
    - Side cover (left/right)

    Refer to "GENERAL CHASSIS" on page 4-1.

**Checking the battery**

ECA26080

***NOTICE***

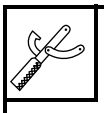
**The battery has a limited service life. If the battery cannot be charged or it is determined that the battery cannot be used after checking the battery, it should be replaced. When replacing the battery, be sure to use a Yamaha genuine lithium-ion battery.**

**TIP**

Do not check the battery at high temperature of 65 °C (149 °F) or more or low temperatures below 10 °C (50 °F). Otherwise, the control feature preventing battery charging and discharging will temporarily intervene.

1. Check:
   - Battery
     a. If the battery is hot, wait until the battery has cooled down to the ambient temperature.
     b. Measure the voltage between the battery terminals.

        13.25 V or more → The battery is normal. Checking is finished.
        Less than 13.25 V → Go to step (c).
     c. Connect the battery charger (special tool) to the battery and charge it.



**Lithium battery charger**
**90890-05376**
**Lithium battery charger**
**DBY-ACC51-70-02**

**TIP**

For instructions on charging and handling the battery charger, refer to the battery charger's instruction manual.

     d. If the battery is hot, wait until the battery

has cooled down to the ambient temperature.

e. Measure the voltage between the battery terminals.
   13.25 V or more → The battery is normal. Checking is finished.
   10 V or more and less than 13.25 V → Perform from step (c) again.
   Less than 10 V → Replace the battery.

**TIP**

Before replacing the battery, make sure that the battery temperature is proper (temperature not more than 65 °C (149 °F) or less than 0 °C (32 °F)). Otherwise, wait until the battery temperature is proper and perform the procedure from step (c) again.

EAM30292

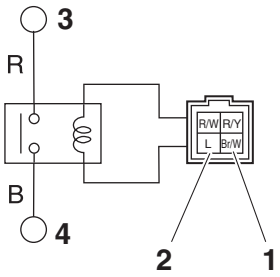
## CHECKING THE RELAYS

Check each switch for continuity with the digital circuit tester. If the continuity reading is incorrect, replace the relay.

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

1. Disconnect the relay from the wire harness.
2. Connect the digital circuit tester (Ω) and battery (12 V) to the relay terminal as shown.
   Check the relay operation.
   Out of specification → Replace.

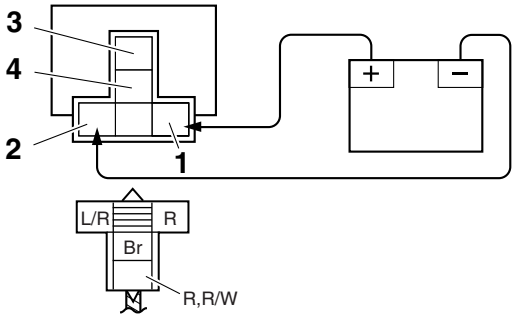
**Starter relay**




1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

**Result**
**Continuity**
**(between "3" to "4")**

**Main relay**




1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe

**Result**
**Continuity**
**(between "3" to "4")**

EAM30495

## CHECKING THE RELAY UNIT (DIODE)

1. Check:
   • Diode
   Out of specification → Replace.

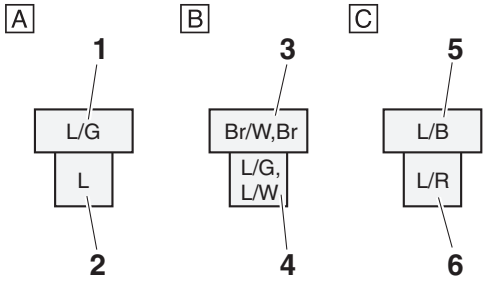
**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

**TIP**

The digital circuit tester and the multimeter with tachometer readings are shown in the following table.

**No continuity**
**Positive tester probe → Blue/Green "1"**
**Negative tester probe → Blue "2"**
**Continuity**
**Positive tester probe → Blue "2"**
**Negative tester probe → Blue/Green "1"**
**No continuity**
**Positive tester probe → Brown/White, Brown "3"**
**Negative tester probe → Blue/Green, Blue/White "4"**
**Continuity**
**Positive tester probe → Blue/Green, Blue/White "4"**
**Negative tester probe → Brown/White, Brown "3"**
**No continuity**
**Positive tester probe → Blue/Black "5"**
**Negative tester probe → Blue/Red "6"**
**Continuity**
**Positive tester probe → Blue/Red "6"**
**Negative tester probe → Blue/Black "5"**

a. Disconnect the diode from the wire harness.
b. Connect the digital circuit tester (Ω) to the diode coupler as shown.
c. Check the diode for continuity.
d. Check the diode for no continuity.




A. Diode 1
B. Diode 2
C. Diode 3

EAM30294
## CHECKING THE IGNITION SPARK GAP

1. Check:
• Ignition spark gap
Out of specification → Perform the ignition system troubleshooting, starting with step (5). Refer to "TROUBLESHOOTING" on page 8-3.

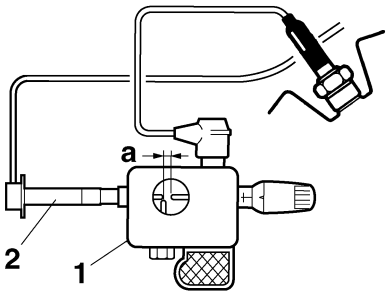
**Minimum ignition spark gap**
**6.0 mm (0.24 in)**

**TIP**
If the ignition spark gap is within specification, the ignition system circuit is operating normally.

a. Remove the spark plug cap from the spark plug.
b. Connect the ignition checker "1" as shown.

**Ignition checker**
**90890-06754**
**Oppama pet–4000 spark checker**
**YM-34487**

c. Crank the engine, and measure the ignition spark gap "a".




2. Spark plug cap

d. Crank the engine, and gradually increase the spark gap until a misfire occurs.

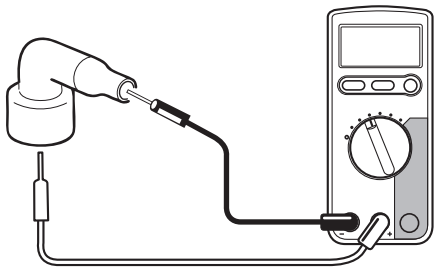
EAM30295
## CHECKING THE SPARK PLUG CAP

1. Remove:
• Spark plug cap
(from the spark plug lead)
2. Check:
• Spark plug cap resistance
Out of specification → Replace.

**Resistance**
**7.50–12.50 kΩ**

a. Connect the digital circuit tester (Ω) to the spark plug cap.

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**



b. Measure the spark plug cap resistance.

EAM30296
## CHECKING THE IGNITION COIL

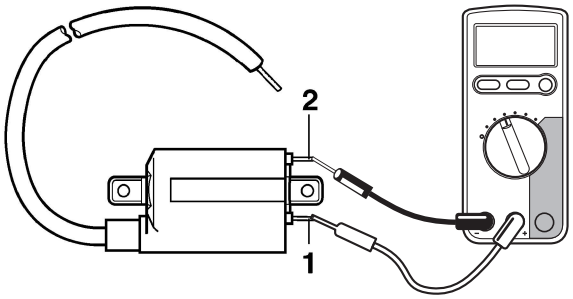
1. Disconnect:
   - Ignition coil terminal
     (from the sub wire harness)
   - Spark plug cap
     (from the ignition coil)
2. Check:
   - Primary coil resistance
     Out of specification → Replace.

**Primary coil resistance**
**2.16–2.64 Ω**

a. Connect the digital circuit tester (Ω) to the ignition coil.

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

- Positive tester probe →
  Ignition coil terminal 1 "1"
- Negative tester probe →
  Ignition coil terminal 2 "2"




b. Measure the primary coil resistance.

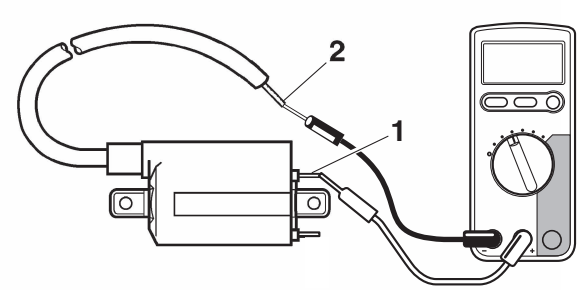
3. Check:
   - Secondary coil resistance
     Out of specification → Replace.

**Secondary coil resistance**
**8.64–12.96 kΩ**

a. Connect the digital circuit tester (Ω) to the ignition coil.

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

- Positive tester probe →
  Ignition coil terminal 1 "1"
- Negative tester probe →
  Spark plug lead "2"




b. Measure the secondary coil resistance.

EAM30297
## CHECKING THE CRANKSHAFT POSITION SENSOR

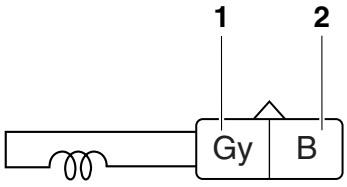
1. Disconnect:
   - Crankshaft position sensor coupler
     (from the wire harness)
2. Check:
   - Crankshaft position sensor resistance
     Out of specification → Replace.

**Crankshaft position sensor resistance**
**228–342 Ω**

a. Connect the digital circuit tester (Ω) to the crankshaft position sensor coupler.

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

| |
|---|
| • Positive tester probe → Gray “1”<br>• Negative tester probe → Black “2” |




b. Measure the crankshaft position sensor resistance.

EAM30298

## CHECKING THE LEAN ANGLE SENSOR

1. Check:
   • Mounted condition of ECU
   Improperly mounted → Remount.

**TIP**

- The lean angle sensor is built into the ECU.
- The lean angle sensor stops the engine in case of a turnover.
- To ensure that the lean angle sensor operates correctly, do not change the installed condition of the ECU.

EAM30299

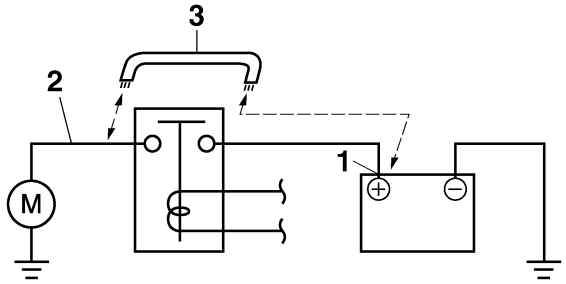
## CHECKING THE STARTER MOTOR OPERATION

1. Check:
   • Starter motor operation
   Does not operate → Perform the electric starting system troubleshooting, starting with step (4).
   Refer to “TROUBLESHOOTING” on page 8-7.
   a. Connect the positive battery terminal “1” and starter motor lead “2” with a jumper lead “3”.

EWA13810

**⚠ WARNING**

- **A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.**
- **This check is likely to produce sparks, therefore, make sure no flammable gas or fluid is in the vicinity.**

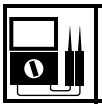



b. Check the starter motor operation.

EAM30300

## CHECKING THE STATOR COIL

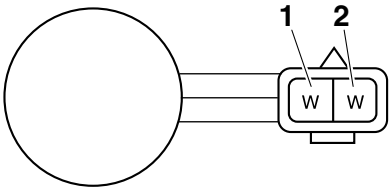
1. Disconnect:
   • Stator coil assembly coupler (from the wire harness)
2. Check:
   • Stator coil assembly resistance
   Out of specification → Replace.

| | |
|---|---|
|  | **Stator coil resistance**<br>**0.512–0.768 Ω** |

a. Connect the digital circuit tester (Ω) to the stator coil assembly coupler.

| | |
|---|---|
|  | **Digital circuit tester (CD732)**<br>**90890-03243**<br>**Model 88 Multimeter with tachometer**<br>**YU-A1927** |

| |
|---|
| • Positive tester probe → White “1”<br>• Negative tester probe → White “2” |




b. Measure the stator coil assembly resistance.

EAM30301

## CHECKING THE RECTIFIER/REGULATOR

1. Check:
   • Rectifier/regulator output voltage
   Out of specification → Replace.

**Regulated voltage (DC)**
**14.0–14.8 V**

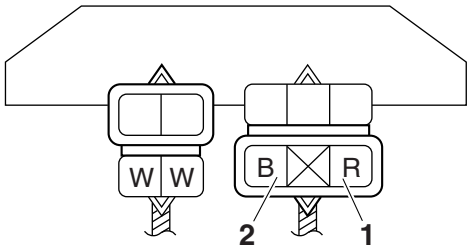
a. Set the digital tachometer to the ignition coil.

**Digital tachometer**
**90890-06760**
**Digital tachometer**
**YU-39951-B**

b. Connect the digital circuit tester (DCV) to the rectifier/regulator coupler.

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

- Positive tester probe → Red "1"
- Negative tester probe → Black "2"




c. Start the engine and let it run at about 5000 r/min.
d. Measure the output voltage.

EAM30303
## CHECKING THE COOLANT TEMPERATURE SENSOR

1. Remove:
   - Coolant temperature sensor

EWA14130
**⚠ WARNING**

- **Handle the coolant temperature sensor with special care.**
- **Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.**

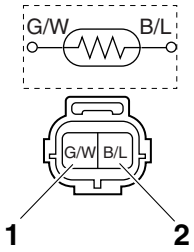
2. Check:
   - Coolant temperature sensor resistance
     Out of specification → Replace.

**Coolant temperature sensor resistance**
**2513–2777 Ω at 20 °C (2513–2777 Ω at 68 °F)**
**Coolant temperature sensor resistance**
**210–221 Ω at 100 °C (210–221 Ω at 212 °F)**

a. Connect the digital circuit tester (Ω) to the coolant temperature sensor.

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

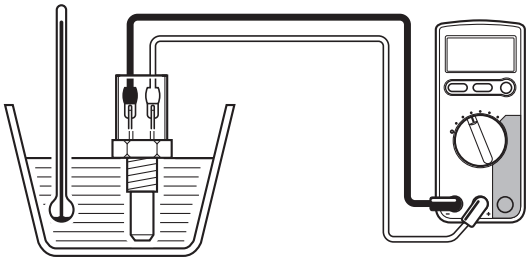
- Positive tester probe → Green/White "1"
- Negative tester probe → Black/Blue "2"




b. Immerse the coolant temperature sensor in a container filled with coolant.

**TIP**
Make sure the coolant temperature sensor terminals do not get wet.

c. Place a thermometer in the coolant.
d. Slowly heat the coolant, and then let it cool to the specified temperature indicated in the table.
e. Check the coolant temperature sensor for continuity at the temperatures indicated in the table.



EAM30305
**CHECKING THE THROTTLE POSITION SENSOR INPUT VOLTAGE**

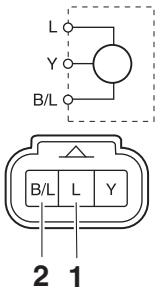
1. Check:
   - Throttle position sensor input voltage
     Out of specification → Replace the ECU.

**Throttle position sensor input voltage**
**4–6 V**

a. Connect the test harness S– pressure sensor (3P) to the throttle position sensor coupler and the wire harness.
b. Connect the digital circuit tester (DCV) to the test harness S– pressure sensor (3P).

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**
**Test harness S– pressure sensor (3P)**
**90890-03207**
**Test harness S– pressure sensor (3P)**
**YU-03207**

- Positive tester probe → Blue “1”
- Negative tester probe → Black/Blue “2”




c. Start the engine.
d. Measure the throttle position sensor input voltage.

EAM30307
**CHECKING THE INTAKE AIR TEMPERATURE SENSOR**

1. Remove:
   - Intake air temperature sensor (from the air filter case)

EWA14110
**WARNING**

- **Handle the intake air temperature sensor with special care.**
- **Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.**

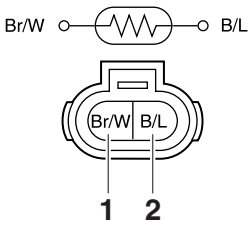
2. Check:
   - Intake air temperature sensor resistance
     Out of specification → Replace.

**Intake air temperature sensor resistance**
**5400–6600 Ω at 0 °C (5400–6600 Ω at 32 °F)**
**Intake air temperature sensor resistance**
**290–390 Ω at 80 °C (290–390 Ω at 176 °F)**

a. Connect the digital circuit tester (Ω) to the intake air temperature sensor terminal.

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

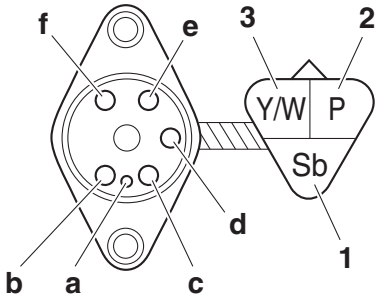
- Positive tester probe → Brown/White “1”
- Negative tester probe → Black/Blue “2”



EAM30467
### CHECKING THE GEAR POSITION SWITCH
1. Remove:
   • Gear position switch
2. Check:
   • Gear position switch
   Out of specification → Replace.

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

**Continuity**
**Positive tester probe →**
**Sky blue "1"**
**Negative tester probe →**
**Sensor terminal "a"**
**Continuity**
**Positive tester probe →**
**Pink "2"**
**Negative tester probe →**
**Sensor terminal "b"**
**Continuity**
**Positive tester probe →**
**Pink "2"**
**Negative tester probe →**
**Sensor terminal "c"**
**Continuity**
**Positive tester probe →**
**Yellow/White "3"**
**Negative tester probe →**
**Sensor terminal "d"**
**Continuity**
**Positive tester probe →**
**Yellow/White "3"**
**Negative tester probe →**
**Sensor terminal "e"**
**Continuity**
**Positive tester probe →**
**Yellow/White "3"**
**Negative tester probe →**
**Sensor terminal "f"**



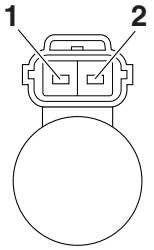

EAM30496
### CHECKING THE INJECTOR
1. Remove:
   • Fuel injector
   Refer to "THROTTLE BODY" on page 7-4.
2. Check:
   • Fuel injector resistance
   Out of specification → Replace.

**Resistance**
**12.0 Ω**

a. Disconnect the fuel injector coupler from the fuel injector.
b. Connect the digital circuit tester (Ω) to the fuel injector coupler.

**Digital circuit tester (CD732)**
**90890-03243**
**Model 88 Multimeter with tachometer**
**YU-A1927**

• Positive tester probe →
Injector terminal "1"
• Negative tester probe →
Injector terminal "2"




c. Measure the fuel injector resistance.

# TROUBLESHOOTING

**TROUBLESHOOTING** ..... 9-1
GENERAL INFORMATION ..... 9-1
TROUBLESHOOTING OF ENGINE (fault code not detected) ..... 9-1
TROUBLESHOOTING OF CLUTCH ..... 9-4
TROUBLESHOOTING OF TRANSMISSION ..... 9-6
TROUBLESHOOTING OF COOLING SYSTEM ..... 9-7
TROUBLESHOOTING OF BRAKE ..... 9-8
TROUBLESHOOTING OF SUSPENSION ..... 9-8
TROUBLESHOOTING OF STEERING/HANDLING ..... 9-10
TROUBLESHOOTING OF CHARGING SYSTEM ..... 9-11

**SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE** ..... 9-12
SELF-DIAGNOSTIC FUNCTION TABLE (FOR FUEL INJECTION SYSTEM) ..... 9-12
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EAM20148
# TROUBLESHOOTING

EAM30309
## GENERAL INFORMATION

**TIP**

Troubleshooting information provided here does not cover all the trouble symptoms, possible causes, and remedial actions. Some items may not apply depending on the model. Use this information as a guide and quick reference matrix when performing basic troubleshooting. Refer to the each chapter for detailed information on checking, adjustment, and replacement.

EAM30509
## TROUBLESHOOTING OF ENGINE (fault code not detected)

**TIP**

If a fault code is detected, refer to the “FUEL INJECTION SYSTEM” on page 8-13.

**Engine does not crank.**

| Symptom | Possible cause | Actions |
|---|---|---|
| Starter motor does not operate | Refer to “TROUBLESHOOTING” under “ELECTRIC STARTING SYSTEM” on page 8-5. | |
| Starter motor operates, but the engine does not crank. | Starter clutch malfunction | Replace the starter clutch. |
| | Improper oil grade (starter clutch slipping) | Change to recommended engine oil. |
| | Stuck piston or seized crankshaft | Disassemble and check the engine. Replace defective parts. |

**Engine will not start or is difficult to start, but it cranks.**

| Symptom | Possible cause | Actions |
|---|---|---|
| Spark plug does not produce a spark | Refer to “TROUBLESHOOTING” under “IGNITION SYSTEM” on page 8-1. | |
| Fuel not supplied | — | Measure the fuel pressure. |
| | Empty fuel tank | Fill the fuel tank with fuel. |
| | Clogged fuel tank cap breather hole | Clean the fuel tank cap. |
| | Clogged or damaged fuel hose | Clean, repair, or replace the fuel hose. |
| | Fuel leakage | Check the fuel passage. Repair or replace as necessary. |
| | Clogged fuel pump | Clean or replace the fuel pump. |
| | Cracks or damage in fuel pump | Replace the fuel pump. |
| | Fuel pump malfunction | Refer to “TROUBLESHOOTING” under “FUEL PUMP SYSTEM” on page 8-37. |
| | Failed or clogged fuel injector | Replace the fuel injector. |
| | ECU failure | Replace the ECU. |

| Symptom | Possible cause | Actions |
|---|---|---|
| — | Water or foreign material in fuel, degraded fuel | Change fuel. |
| | Loose spark plug | Tighten the spark plug to the specified torque. |
| | Loose cylinder head or cylinder | Tighten bolts or nuts on cylinder head and cylinder to the specified torque. |
| | Damaged cylinder head gasket | Replace the cylinder head gasket. |
| | Incorrect valve timing | Adjust the valve timing. |
| | Incorrect valve clearance | Adjust the valve clearance. |
| | Worn valve guide | Replace the valve guide. |
| | Bent, damaged, or stuck valve | Replace the valve. |
| | Poor contact between valve and valve seat | Reface the valve-to-valve-seat contact. |
| | Fatigued or broken valve spring | Replace the valve spring. |
| | Worn, damaged, or stuck piston ring | Replace the piston and piston rings as a set. |
| | Seized or damaged piston | Replace the piston and piston rings as a set. |
| | Worn or damaged cylinder bore | Replace the cylinder, piston, and piston rings as a set. |

**Incorrect idling speed or mid-to-high speed**

| Symptom | Possible cause | Actions |
|---|---|---|
| Spark plug does not produce a spark | Incorrect spark plug gap | Adjust the spark plug gap. |
| | Worn or damaged spark plug | Replace the spark plug. |
| | Defective spark plug cap | Replace the spark plug cap. |
| | Defective ignition coil | Replace the ignition coil. |
| | ECU failure | Replace the ECU. |
| Low fuel pressure | — | Measure the fuel pressure. |
| | Fuel leakage | Check the fuel passage. Repair or replace as necessary. |
| | Clogged fuel pump | Clean or replace the fuel pump. |
| | Cracks or damage in fuel pump | Replace the fuel pump. |
| | Fuel pump malfunction | Refer to “TROUBLESHOOTING” under “FUEL PUMP SYSTEM” on page 8-37. |
| Fuel not supplied | Failed or clogged fuel injector | Replace the fuel injector. |
| | ECU failure | Replace the ECU. |

| Symptom | Possible cause | Actions |
|---|---|---|
| — | Worn camshaft lobe | Replace the camshaft. |
| | Water or foreign material in fuel, degraded fuel | Change fuel. |
| | Contaminated throttle body or clogged internal passage | Clean the throttle body. |
| | Incorrectly adjusted throttle cable | Adjust the throttle grip free play. |
| | Incorrectly adjusted idling speed (idle screw) | Adjust the idle screw. |
| | Incorrect throttle position sensor angle | Adjust the throttle position sensor angle. |
| | Incorrect acceleration position sensor angle | Adjust the acceleration position sensor angle. |
| | Faulty ECU | Replace the ECU. |
| | Clogged vacuum hose | Clean the vacuum hose. |
| | Cracks and damage in vacuum hose | Replace the vacuum hose. |
| | Damaged throttle body joint | Replace the throttle body joint. |
| | Loose throttle body joint | Tighten the throttle body joint bolts to the specified torque. |
| | Clogged air filter element | Clean or replace the air filter element. |
| | Incorrect oil level (high) | Adjust the oil level to the specified level. |

**Excessive noise from engine**

| Symptom | Possible cause | Actions |
|---|---|---|
| Noise heard from around cylinder head | Incorrect valve clearance (too wide) | Adjust the valve clearance. |
| | Fatigued or broken valve spring | Replace the valve spring. |
| | Worn or damaged camshaft lobe | Replace the camshaft. |
| | Worn or damaged valve lifter | Replace the valve lifter and cylinder head as a set. |
| | Worn or damaged camshaft journal | Replace the camshaft. |
| | Worn or damaged cylinder head (camshaft journal) | Replace the cylinder head. |
| Noise heard from around timing chain | Worn or damaged timing chain | Replace the timing chain and camshaft sprocket as a set. |
| | Worn or damaged camshaft sprocket | Replace the timing chain and camshaft sprocket as a set. |
| | Worn or damaged timing chain guide | Replace the timing chain guide. |
| | Cracked, damaged, or faulty timing chain tensioner | Replace the timing chain tensioner. |

| Symptom | Possible cause | Actions |
|---|---|---|
| Noise heard from around piston | Worn or damaged piston ring | Replace the piston and piston rings as a set. |
| | Worn or damaged piston | Replace the piston and piston rings as a set. |
| | Worn piston (piston pin hole) | Replace the piston and piston pin as a set. |
| | Worn or damaged piston pin | Replace the piston pin. |
| | Worn or damaged cylinder bore | Replace the cylinder, piston, and piston rings as a set. |
| | Carbon buildup in piston head and combustion chamber | Clean the piston head and combustion chamber. |
| Noise heard from around crankshaft | Worn or damaged crankshaft journal or crank pin | Replace the crankshaft. |
| | Cracked, worn, or damaged balancer shaft | Replace the balancer drive gear and balancer shaft as a set. |
| | Worn or damaged balancer drive gear | Replace the balancer drive gear and balancer shaft as a set. |
| | Worn or damaged big end bearing | Replace the big end bearing. |
| | Worn or damaged crankshaft journal bearing | Replace the crankshaft journal bearing. |
| | Worn or damaged balancer shaft journal bearing | Replace the balancer shaft journal bearing. |

EAM30510

## TROUBLESHOOTING OF CLUTCH

### Manual clutch

| Symptom | Possible cause | Actions |
|---|---|---|
| Clutch slippage | Improperly assembled clutch | Reassemble the clutch. |
| | Improperly adjusted clutch cable | Adjust the clutch lever free play. |
| | Loose clutch spring | Tighten the clutch spring bolts to the specified torque. |
| | Fatigued clutch spring | Replace the clutch springs as a set. |
| | Warped pressure plate | Replace the pressure plate. |
| | Worn friction plate | Replace the friction plates as a set. |
| | Warped or worn clutch plate | Replace the clutch plates as a set. |
| | Incorrect oil level | Adjust the engine oil level to the specified level. |
| | Incorrect oil viscosity (low) | Change to recommended engine oil. |
| | Deteriorated oil | Change to recommended engine oil. |

| Symptom | Possible cause | Actions |
|---|---|---|
| Clutch drags | Faulty clutch spring | Replace the clutch springs as a set. |
| | Warped pressure plate | Replace the pressure plate. |
| | Swollen friction plate | Replace the friction plates as a set. |
| | Warped clutch plate | Replace the clutch plates as a set. |
| | Bent pull rod (outer pull type) | Replace the pull rod. |
| | Worn pull rod tooth (outer pull type) | Replace the pull rod and pull lever shaft as a set. |
| | Bent push rod (inner push type) | Replace the push rod. |
| | Damaged or worn clutch boss | Replace the clutch boss. |
| | Seized clutch housing bushing | Replace the clutch housing. |
| | Improperly installed pull lever | Align the match mark on the pull lever before installation. |
| | Incorrect oil level | Adjust the engine oil level to the specified level. |
| | Incorrect oil viscosity (high) | Change to recommended engine oil. |
| | Deteriorated oil | Change to recommended engine oil. |
| Clutch noise | Damaged or worn primary driven gear | Replace the primary drive gear or crankshaft, and the clutch housing as a set. |
| | Loose clutch boss nut | Tighten the clutch boss nut to the specified torque. |
| | Fatigued clutch damper | Replace the clutch housing. |
| | Worn clutch housing bearing | Replace the clutch housing bearing. |
| | Worn pressure plate bearing | Replace the pressure plate bearing. |

EAM30511
## TROUBLESHOOTING OF TRANSMISSION

| Symptom | Possible cause | Actions |
|---|---|---|
| Difficult or impossible to shift transmission gear | Clutch drags | Refer to “Clutch drags”. |
| | Improperly adjusted shift rod | Adjust the shift rod installation length. |
| | Bent shift shaft | Replace the shift shaft. |
| | Foreign object in a shift drum groove | Remove foreign object from shift drum groove. |
| | Damaged shift drum | Replace the shift drum. |
| | Seized shift fork | Replace the shift fork and shift fork guide bar as a set. |
| | Bent shift fork guide bar | Replace the shift fork guide bar. |
| | Foreign object between transmission gears | Remove foreign object from transmission gears. |
| | Seized transmission gear | Replace the seized gear and the axle as a set. |
| | Improperly assembled transmission | Reassemble the transmission axle assembly. |
| Jumps out of gear | Incorrect shift pedal position | Adjust the shift pedal position. |
| | Improperly returned stopper lever | Replace the stopper lever spring. |
| | Bent or worn shift fork | Replace the shift fork. |
| | Shift drum incorrect axial play | Replace the shift drum. |
| | Worn shift drum groove | Replace the shift drum. |
| | Worn transmission gear dog | Replace the transmission gear. |
| Transmission noise | Damaged or worn transmission gear | Replace the transmission gear. |
| | Worn main axle spline | Replace the main axle. |
| | Worn drive axle spline | Replace the drive axle. |
| | Worn bearing | Replace the bearing. |

EAM30512
## TROUBLESHOOTING OF COOLING SYSTEM

| Symptom | Possible cause | Actions |
|---|---|---|
| Overheating | Carbon buildup in piston head and combustion chamber | Clean the piston head and combustion chamber. |
| | Clogged engine cooling water passages | Check and clean the engine cooling water passages. |
| | Incorrect oil level | Adjust the oil level to the specified level. |
| | Incorrect oil viscosity | Change to recommended engine oil. |
| | Inferior oil quality | Change to recommended engine oil. |
| | Low coolant level | Add recommended coolant to the specified level. |
| | Damaged or leaking radiator | Replace the radiator. |
| | Faulty radiator cap | Replace the radiator cap. |
| | Clogged radiator fin | Clean the radiator fin. |
| | Bent or damaged radiator fin | Repair the radiator fin or replace the radiator. |
| | Damaged or faulty water pump | Replace the water pump. |
| | Damaged hoses or pipes | Replace the hose or pipe. |
| | Improperly connected hoses or pipes | Connect the hoses and pipes properly. |
| | Damaged throttle body joint | Replace the throttle body joint. |
| | Loose throttle body joint | Tighten the throttle body joint bolts to the specified torque. |
| | Clogged air filter element | Clean or replace the air filter element. |
| | Brake drags | Check the brake system and repair or replace faulty parts as necessary. |
| | Incorrect spark plug gap | Adjust to the specified spark plug gap. |
| | Incorrect spark plug heat range | Replace the spark plug with the one of the specified type. |
| | Faulty ECU | Replace the ECU. |
| Noise from water pump | Contact between the water pump housing cover and impeller | Disassemble the water pump and replace faulty parts. |
| | Worn water pump housing bearing | Replace the water pump housing bearing. |

EAM30513
## TROUBLESHOOTING OF BRAKE

| Symptom | Possible cause | Actions |
|---|---|---|
| Poor performance of disc brake | Worn brake pad | Replace the brake pads as a set. |
| | Worn or deflected brake disc | Replace the brake disc. |
| | Air in hydraulic brake system | Bleed the hydraulic brake system. |
| | Brake fluid leakage | Check the hydraulic brake system and repair or replace faulty parts as necessary. |
| | Incorrect brake fluid level (low) | Add brake fluid to the specified level. |
| | Stuck brake caliper piston | Replace the caliper piston seal. |
| | Stuck brake caliper and slide pin | Lubricate the caliper slide pin. |
| | Loose union bolt | Tighten the union bolt to the specified torque. |
| | Damaged brake hose and brake pipe | Replace the brake hose and brake pipe. |
| | Oil or grease on the brake disc or brake pad | Clean the brake disc or brake pad. |
| | Insufficient lubrication of brake lever or brake pedal pivot | Lubricate the brake lever or brake pedal pivot. |

EAM30514
## TROUBLESHOOTING OF SUSPENSION

| Symptom | Possible cause | Actions |
|---|---|---|
| Front fork is hard | Bent or damaged inner tube | Replace the inner tube. |
| | Bent or damaged outer tube | Replace the outer tube. |
| | Damaged or worn slide metal | Replace the slide metal. |
| | Bent or damaged damper rod | Replace the damper rod. |
| | Bent wheel axle | Replace the wheel axle. |
| | Incorrect oil viscosity (high) | Change to recommended fork oil. |
| | Incorrect oil level (high) | Adjust to the specified oil level. |
| | Improperly adjusted spring preload (hard) | Adjust the spring preload. |
| | Improperly adjusted rebound damping (hard) | Adjust the rebound damping. |
| | Improperly adjusted compression damping (hard) | Adjust the compression damping. |

| Symptom | Possible cause | Actions |
|---|---|---|
| Front fork is soft | Fatigued or broken fork spring | Replace the fork spring. |
| | Incorrect oil viscosity (low) | Change to recommended fork oil. |
| | Incorrect oil level (low) | Adjust to the specified oil level. |
| | Improperly adjusted spring preload (soft) | Adjust the spring preload. |
| | Improperly adjusted rebound damping (soft) | Adjust the rebound damping. |
| | Improperly adjusted compression damping (soft) | Adjust the compression damping. |
| Leaking oil from front fork | Bent, damaged, or corroded inner tube | Replace the inner tube. |
| | Cracked or damaged outer tube | Replace the outer tube. |
| | Improperly installed oil seal | Replace the oil seal. |
| | Damaged oil seal lip | Replace the oil seal. |
| | Incorrect oil level (high) | Adjust to the specified oil level. |
| | Loose damper rod assembly bolt | Tighten the damper rod assembly bolt to the specified torque. |
| | Damaged damper rod assembly bolt copper washer | Replace the damper rod assembly bolt copper washer. |
| | Cracked or damaged cap bolt O-ring | Replace the cap bolt O-ring. |
| Rear suspension is hard | Bent or damaged rear shock absorber rod | Replace the rear shock absorber. |
| | Bent swingarm pivot shaft | Replace the swingarm pivot shaft. |
| | Damaged or worn swingarm bearing or bushing | Replace the swingarm bearing or bushing. |
| | Damaged or worn relay arm bearing | Replace the relay arm bearing. |
| | Damaged or worn connecting arm bearing | Replace the connecting arm bearing. |
| | Improperly adjusted rear shock absorber spring preload (hard) | Adjust the spring preload. |
| | Improperly adjusted rear shock absorber rebound damping (hard) | Adjust the rebound damping. |
| | Improperly adjusted rear shock absorber compression damping (hard) | Adjust the compression damping. |

| Symptom | Possible cause | Actions |
|---|---|---|
| Rear suspension is soft | Oil leaking from rear shock absorber | Replace the rear shock absorber. |
| | Gas leaking from rear shock absorber | Replace the rear shock absorber. |
| | Fatigued or damaged rear shock absorber spring | Replace the rear shock absorber. |
| | Improperly adjusted rear shock absorber spring preload (soft) | Adjust the spring preload. |
| | Improperly adjusted rear shock absorber rebound damping (soft) | Adjust the rebound damping. |
| | Improperly adjusted rear shock absorber compression damping (soft) | Adjust the compression damping. |
| Oil leaking from rear shock absorber | Bent, damaged, or corroded rear shock absorber rod | Replace the rear shock absorber. |
| | Damaged oil seal lip | Replace the rear shock absorber. |

EAM30515
## TROUBLESHOOTING OF STEERING/HANDLING

| Symptom | Possible cause | Actions |
|---|---|---|
| Handlebar wobble | Loose lower ring nut | Tighten the lower ring nut to the specified torque. |
| | Worn bearing or bearing race | Replace the bearing and bearing race as a set. |
| | Warped front fork | Repair or replace the front fork. |
| | Bent front wheel axle | Replace the front wheel axle. |
| | Incorrect tire pressure | Adjust to the specified tire pressure. |
| | Worn, deformed, or incorrect tire | Replace the tire. |
| Heavy steering | Lower ring nut is tightened too tight. | Tighten the lower ring nut to the specified torque. |
| | Bent lower bracket | Replace the lower bracket. |
| | Broken bearing or bearing race | Replace the bearing and bearing race as a set. |
| | Incorrect tire pressure | Adjust to the specified tire pressure. |
| Front wheel vibration | Loose spoke | Tighten the spoke and adjust the runout. |
| | Damaged or worn wheel bearing | Replace the wheel bearing. |
| | Worn, deformed, or incorrect tire | Replace the tire. |
| | Loose wheel axle or wheel axle nut | Tighten the wheel axle or wheel axle nut to the specified torque. |
| | Loose wheel axle pinch bolt | Tighten the wheel axle pinch bolt to the specified torque. |
| | Incorrect front fork oil level | Adjust to the specified front fork oil level. |

| Symptom | Possible cause | Actions |
|---|---|---|
| Rear wheel vibration | Loose spoke | Tighten the spoke and adjust the runout. |
| | Damaged or worn wheel bearing | Replace the wheel bearing. |
| | Worn, deformed, or incorrect tire | Replace the tire. |
| | Loose wheel axle nut | Tighten the wheel axle nut to the specified torque. |
| | Loose swingarm pivot shaft | Tighten the swingarm pivot shaft to the specified torque. |
| | Bent or damaged swingarm | Replace the swingarm bearing. |
| | Damaged or worn swingarm bearing or bushing | Replace the swingarm bearing or bushing. |

EAM30516
## TROUBLESHOOTING OF CHARGING SYSTEM

| Symptom | Possible cause | Actions |
|---|---|---|
| Battery is not charged | Refer to “TROUBLESHOOTING” under “CHARGING SYSTEM” on page 8-9. | |

EAM20174
# SELF-DIAGNOSTIC FUNCTION AND DIAGNOSTIC CODE TABLE

EAM30497
## SELF-DIAGNOSTIC FUNCTION TABLE (FOR FUEL INJECTION SYSTEM)

| Fault code | Item | Page |
|---|---|---|
| 12 | Crankshaft position sensor: no normal signals are received from the crankshaft position sensor. | 8-17 |
| 13 | Intake air pressure sensor: open or short circuit detected. | 8-18 |
| 14 | Intake air pressure sensor: hose system malfunction (clogged or detached hose). | 8-20 |
| 15 | Throttle position sensor: open or short circuit detected. | 8-21 |
| 16 | Throttle position sensor: stuck throttle position sensor is detected. | 8-22 |
| 21 | Coolant temperature sensor: open or short circuit detected. | 8-23 |
| 22 | Intake air temperature sensor: open or short circuit detected. | 8-25 |
| 30 | The vehicle has overturned. | 8-26 |
| 33 | Ignition coil: open or short circuit detected in the primary lead of the ignition coil. | 8-27 |
| 39 | Injector: open or short circuit detected. | 8-29 |
| 41 | ECU: built-in lean angle sensor malfunction. | 8-30 |
| 43 | Fuel system voltage: incorrect voltage supplied to the main relay and CCU. | 8-30 |
| 44 | EEPROM fault code number: an error is detected while reading or writing on EEPROM. | 8-32 |
| 46 | Vehicle system power supply: normal voltage is not supplied to the ECU. | 8-33 |
| 50 | ECU: faulty ECU memory. | 8-34 |
| 70 | Engine forcibly stops when the vehicle is left idling for a long period of time. | 8-34 |

EAM30425
## DIAGNOSTIC CODE: SENSOR OPERATION TABLE

| Diagnostic code No. | Item | Display | Procedure |
|---|---|---|---|
| 01 | Throttle angle | Displays the throttle angle. | |
| | • Fully closed position | • 11–14 | • Check with throttle fully closed. |
| | • Fully opened position | • 86–92 | • Check with throttle fully opened. |
| 03 | Pressure of suction pipe | Displays the intake air pressure.<br>• Check the change of the intake pressure valve when the starter switch is pushed. | The atmospheric pressure is displayed on the Yamaha diagnostic tool. |
| 05 | Intake air temperature | Displays the intake air temperature. | Compare the actually measured intake air temperature with the Yamaha diagnostic tool display value. |

| Diagnostic code No. | Item | Display | Procedure |
|---|---|---|---|
| 06 | Coolant temperature | Displays the coolant temperature. | Compare the actually measured coolant temperature with the Yamaha diagnostic tool display value. |
| 08 | Lean angle sensor<br>• Upright<br>• Overturn | Displays the output voltage.<br>• 0.4–1.4 (V)<br>• 3.7–4.4 (V) | Remove the ECU, and incline it 45° or more. |
| 09 | Monitor voltage | Displays the voltage of the external battery connected to the Yamaha diagnostic tool.<br>• Approximately 12.0 (V) | — |
| 21 | Neutral switch<br>• Gear in neutral<br>• Gear not in neutral | <br>• ON<br>• OFF | Operate the shift pedal. |
| 25 | Gear position switch<br>• Gear in 1st or 2nd<br>• Gear in other than 1st or 2nd | <br>• ON<br>• OFF | Operate the shift pedal. |
| 60 | EEPROM fault code display<br>• No fault<br>• CO adjustment valve<br>• Power Tuner injection correction setting 0–8, or Power Tuner ignition timing correction setting 0–8 | <br>• 00<br>• 01<br>• 07 | — |
| 61 | Malfunction history (△) code display *1<br>• There is no history.<br>• There is some history. | <br>• 00<br>• Other: Displays the fault code of (△). | — |
| 62 | Malfunction history (△) code erasure *1<br>• There is no history.<br>• There is some history. | <br>• 00<br>• Other: Displays the total number of (×) and (△). | Replace all (△) with (○) by the operation start processing. |
| 64 | Setting history display<br>• There is no history.<br>• There is some history.<br>• History is unknown (History data is damaged). | Displays the presence or absence of the setting history by Power Tuner.<br>• 00<br>• 01<br>• 02 | — |

| Diagnostic code No. | Item | Display | Procedure |
|---|---|---|---|
| 65 | Setting map erasure<br><br>• There is no setting.<br>• There is some setting. | Displays the presence or absence of the setting history by Power Tuner.<br><br>• 00<br>• 01 | Erase all setting maps by the operation start processing. |
| 70 | Program version number | Displays a program version No. | — |

*1: Symbols used in the explanations of the malfunction history
○: Normal
×: There is currently a malfunction or abnormal condition.
△: A malfunction or abnormal condition occurred previously, but the affected system or component is currently operating normally.

EAM30426
**DIAGNOSTIC CODE: ACTUATOR OPERATION TABLE**

| Diagnostic code No. | Item | Actuation | Procedure |
|---|---|---|---|
| 30 | Ignition coil | Actuates the ignition coil five times at one-second intervals. "WARNING" on the Yamaha diagnostic tool blinks five times when the ignition coil is actuated. | Check that a spark is generated five times.<br>• Connect an ignition checker. |
| 36 | Injector | Actuates the injector five times at one-second intervals. "WARNING" on the Yamaha diagnostic tool blinks five times when the injector is actuated. | **TIP: Before performing this operation, be sure to disconnect the fuel pump coupler.**<br>Check that injector is actuated five times by listening for the operating sound. |

# TUNING

**CHASSIS** .....10-1
SELECTION OF THE SECONDARY REDUCTION RATIO (SPROCKET).....10-1
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EAM20119
# CHASSIS

EAM30168
## SELECTION OF THE SECONDARY REDUCTION RATIO (SPROCKET)

**Secondary reduction ratio = Number of rear wheel sprocket teeth/Number of drive sprocket teeth**

**Secondary reduction ratio**
**3.846 (50/13)**

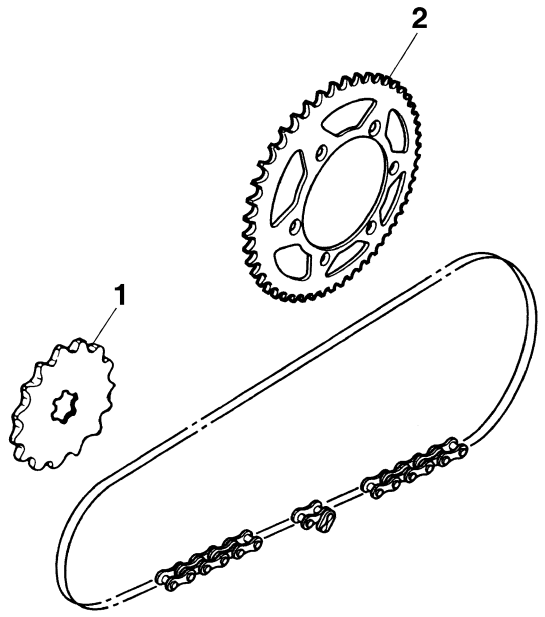
<Requirement for selection of secondary gear reduction ratio>
- It is generally said that the secondary gear ratio should be reduced for a longer straight portion of a speed course and should be increased for a course with many corners. Actually, however, as the speed depends on the ground condition 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.

**TIP**

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.

EAM30169
## DRIVE AND REAR WHEEL SPROCKETS SETTING PARTS

| Part name | | Type | Part number |
|---|---|---|---|
| Drive sprocket "1" | (STD) | 13T | 9383B-13218 |
| Rear wheel sprocket "2" | | 47T | 17D-25447-50 |
| | | 48T | 17D-25448-50 |
| | | 49T | B2W-25449-00 |
| | (STD) | 50T | B2W-25450-00 |
| | | 51T | B2W-25451-00 |
| | | 52T | 17D-25452-50 |




EAM30170
## TIRE PRESSURE

Tire pressure should be adjusted to suit the road surface condition of the circuit.

**Standard tire pressure**
**100 kPa (1.00 kgf/cm², 15 psi)**

- Under a rainy, a muddy, a sandy, or a slippery condition, the tire pressure should be lower for a larger area of contact with the road surface.

**Extent of adjustment**
**60–80 kPa (0.60–0.80 kgf/cm², 9–12 psi)**

- Under a stony or a hard road condition, the tire pressure should be higher to prevent a flat tire.

**Extent of adjustment**
**100–120 kPa (1.00–1.20 kgf/cm², 15–18 psi)**

EAM30171
## 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 amount.
2. Setting of spring preload
   • Change the spring.
3. Setting of damping force
   • Change the compression damping force.
   • Change the rebound damping force.
   The spring acts on the load and the damping force acts on the cushion travel speed.

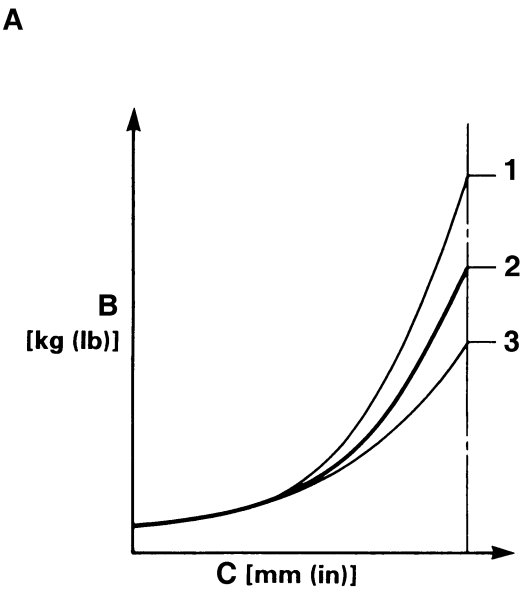
EAM30172
## CHANGE IN AMOUNT AND CHARACTERISTICS OF FORK OIL

Damping characteristic near the final stroke can be changed by changing the fork oil amount.

EWA19190
**⚠ WARNING**

**Adjust the oil amount in 5 cm³ (0.2 US oz, 0.2 Imp.oz) increments or decrements. Too small oil amount 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 large oil amount will cause the air spring characteristics to have a tendency to be stiffer with the consequent deteriorated performance and characteristics. Therefore, adjust the front fork within the specified range.**

**Recommended oil**
**Yamaha Suspension Oil S1**
**Standard oil amount**
**295 cm³ (9.97 US oz, 10.4 Imp.oz)**
**Extent of adjustment**
**260–365 cm³ (8.79–12.34 US oz, 9.17–12.87 Imp.oz)**




A. Air spring characteristics in relation to oil amount change
B. Load
C. Stroke

1. Max. oil amount
2. Standard oil amount
3. Min. oil amount

EAM30173
## SETTING OF SPRING AFTER REPLACEMENT

As the front fork setting can be easily affected by the rear suspension, take care so that the front and the rear are balanced (in position etc.) when setting the front fork.
1. Use of soft spring
   • Change the rebound damping force.
   Turn out one or two clicks.
   • Change the compression damping force.
   Turn in one or two clicks.

**TIP**
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.

2. Use of stiff spring
   • Change the rebound damping force.
   Turn in one or two clicks.
   • Change the compression damping force.
   Turn out one or two clicks.

**TIP**
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.

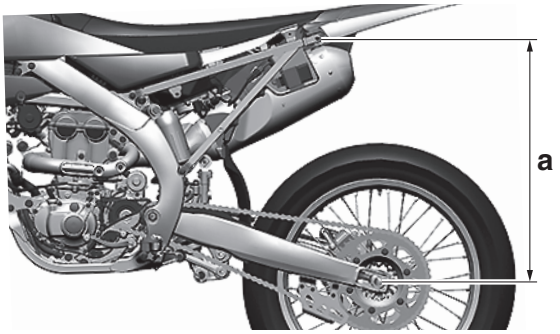
EAM30174
## FRONT FORK SETTING PARTS
• Front fork spring

| STD Spring rate N/mm | | 4.7 | |
|---|---|---|---|
| **Type** | **Spring rate N/mm** | **Part number** | **I.D. mark (slits)** |
| SOFT | 4.5 | BR9-23141-20 | I-II |
| ↑ | 4.6 | BR9-23141-30 | I-III |
| | 4.7 | BR9-23141-40 | I-IIII |
| | 4.8 | BR9-23141-50 | I-IIIII |
| | 4.9 | BR9-23141-60 | II-II |
| ↓ | 5.0 | BR9-23141-70 | II-III |
| STIFF | 5.1 | BR9-23141-80 | II-IIII |

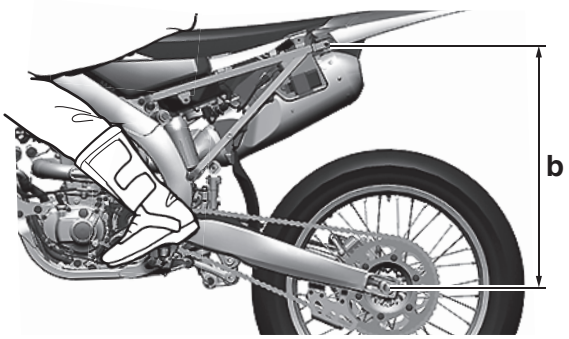
**TIP**
The I.D. mark (slits) is proved on the end of the spring.

EAM30175
## REAR SUSPENSION SETTING
The rear shock absorber 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 force.
   • Change the compression damping force.

EAM30176
## CHOOSING SET LENGTH
1. Place a stand or a block under the engine to put the rear wheel above the floor, and measure the length "a" between the rear wheel axle center and the rear fender holding bolt.



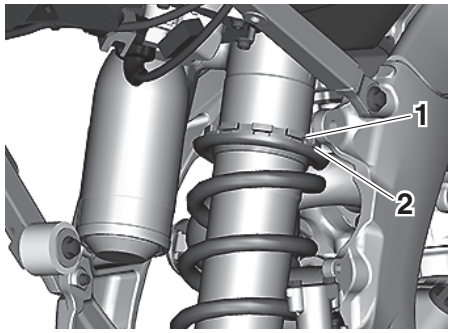

2. Remove the stand or block from the engine and, with a rider astride the seat, measure the sunken length "b" between the rear wheel axle center and the rear fender holding bolt.




3. Loosen the locknut "1" and make adjustment by turning the adjuster "2" to achieve the standard figure from the subtraction of the length "b" from the length "a".

**Standard figure**
**90–100 mm (3.5–3.9 in)**

**TIP**
• 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 reevaluation.
• If the standard figure cannot be achieved by adjusting the adjuster and changing the set length, replace the spring with an optional one and make readjustment.



EAM30177

## 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
   - Adjust to decrease rebound damping force to compensate for less spring load. Run with the rebound damping force adjuster one or two clicks turned out, and readjust it to suit your preference.
2. Use of stiff spring
   - Adjust to increase rebound damping force to compensate for greater spring load. Run with the rebound damping force adjuster one or two clicks turned in, and readjust it to suit your preference.

**TIP**

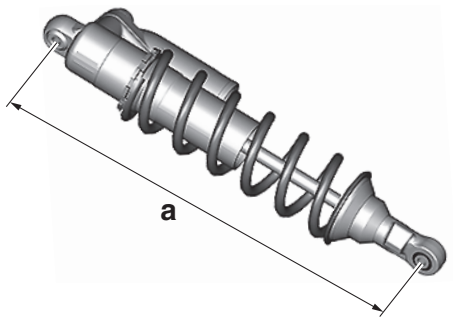
Adjusting the rebound damping force will be followed more or less by a change in the compression damping force. For correction, adjust to decrease compression damping force.

EWA19200

**⚠ WARNING**

**When using a rear shock absorber other than currently installed, use the one whose overall length "a" does not exceed the standard as it may result in faulty performance. Never use one whose overall length is greater than standard.**

**Length "a" of standard shock 460.5 mm (18.1 in)**




EAM30178

## REAR SHOCK ABSORBER SETTING PARTS

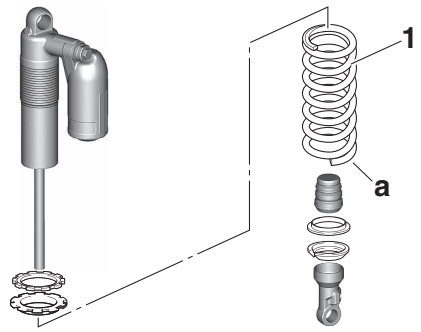
- Rear shock spring "1"

| STD Spring rate N/mm | | 56 | |
|---|---|---|---|
| **Type** | **Spring rate N/mm** | **Part number** | **I.D. mark** |
| SOFT | 52 | BR9-22212-00 (Blue) | Yellow |
| ↑ | 54 | BR9-22212-10 (Blue) | Pink |
| | 56 | BR9-22212-A0 (Silver) | White |
| | | BR9-22212-20* (Blue) | White |
| | 58 | BR9-22212-B0 (Silver) | Gold |
| ↓ | | BR9-22212-30* (Blue) | Silver |
| STIFF | 60 | BR9-22212-40 (Blue) | Brown |

* For BSB6

**TIP**

- The I.D. mark "a" is marked at the end of the spring.
- Spring specification varies according to the color of I.D. marks.




- Spring preload adjusting positions



**Spring preload adjusting positions**
**Minimum**
**Position in which the spring is turned in 1.5 mm (0.06 in) from its free length.**
**Standard**
**Position in which the spring is turned in 7.0 mm (0.28 in) from its free length.**
**Maximum**
**Position in which the spring is turned in 18.0 mm (0.71 in) from its free length.**

**TIP**
For the spring preload adjustment, refer to "ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY" on page 3-30.

EAM30179
## SUSPENSION SETTING (FRONT FORK)

**TIP**

- 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 force | Turn adjuster counterclockwise (about 2 clicks) to decrease damping. |
| | | | | | Oil amount | Decrease oil amount by about 5–10 cm³ (0.2–0.3 US oz, 0.2–0.4 Imp.oz). |
| | | | | | Spring | Replace with soft spring. |
| Unsmooth movement over entire range | √ | √ | √ | √ | Outer tube Inner tube | Check for any bends, dents, other noticeable scars, etc. If any, replace affected parts. |
| | | | | | Slide metal | Replace with a new one for extended use. |
| | | | | | Piston metal | Replace with a new one for extended use. |
| | | | | | Lower bracket tightening torque | Retighten to specified torque. |
| Poor initial movement | | | | √ | Rebound damping force | Turn adjuster counterclockwise (about 2 clicks) to decrease damping. |
| | | | | | Oil seals | Apply grease in oil seal wall. |
| Soft over entire range, bottoming out | √ | √ | | | Compression damping force | Turn adjuster clockwise (about 2 clicks) to increase damping. |
| | | | | | Oil amount | Increase oil amount by about 5–10 cm³ (0.2–0.3 US oz, 0.2–0.4 Imp.oz). |
| | | | | | Spring | Replace with stiff spring. |
| Stiff toward stroke end | √ | | | | Oil amount | Decrease oil amount by about 5 cm³ (0.2 US oz, 0.2 Imp.oz). |
| Soft toward stroke end, bottoming out | √ | | | | Oil amount | Increase oil amount by about 5 cm³ (0.2 US oz, 0.2 Imp.oz). |
| Stiff initial movement | √ | √ | √ | √ | Compression damping force | Turn adjuster counterclockwise (about 2 clicks) to decrease damping. |

| Symptom | Section | | | | Check | Adjust |
|---|---|---|---|---|---|---|
| | Jump | Large gap | Medium gap | Small gap | | |
| Low front, tending to lower front posture | | | √ | √ | Compression damping force | Turn adjuster clockwise (about 2 clicks) to increase damping. |
| | | | | | Rebound damping force | Turn adjuster counterclockwise (about 2 clicks) to decrease damping. |
| | | | | | Balance with rear end | Set sunken length for 95–100 mm (3.7–3.9 in) when one passenger is astride seat (lower rear posture). |
| | | | | | Oil amount | Increase oil amount by about 5 cm³ (0.2 US oz, 0.2 Imp.oz). |
| "Obtrusive" front, tending to upper front posture | | | √ | √ | Compression damping force | Turn adjuster counterclockwise (about 2 clicks) to decrease damping. |
| | | | | | Balance with rear end | Set sunken length for 90–95 mm (3.5–3.7 in) when one passenger is astride seat (upper rear posture). |
| | | | | | Spring | Replace with soft spring. |
| | | | | | Oil amount | Decrease oil amount by about 5–10 cm³ (0.2–0.3 US oz, 0.2–0.4 Imp.oz). |

EAM30180
## SUSPENSION SETTING (REAR SHOCK ABSORBER)

**TIP**

- 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 force | Turn adjuster counterclockwise (about 2 clicks) to decrease damping. |
| | | | | | Spring set length | Set sunken length for 90–100 mm (3.5–3.9 in) when one passenger is astride seat. |
| Spongy and unstable | | | √ | √ | Rebound damping force | Turn adjuster clockwise (about 2 clicks) to increase damping. |
| | | | | | Low compression damping | Turn adjuster clockwise (about 1 click) to increase damping. |
| | | | | | Spring | Replace with stiff spring. |

| Symptom | Section | | | | Check | Adjust |
|---|---|---|---|---|---|---|
| | Jump | Large gap | Medium gap | Small gap | | |
| Heavy and dragging | | | √ | √ | Rebound damping force | Turn adjuster counterclockwise (about 2 clicks) to decrease damping. |
| | | | | | Spring | Replace with soft spring. |
| Poor road gripping | | | | √ | Rebound damping force | Turn adjuster counterclockwise (about 2 clicks) to decrease damping. |
| | | | | | Low compression damping | Turn adjuster clockwise (about 1 click) to increase damping. |
| | | | | | High compression damping | Turn adjuster clockwise (about 1/6 turn) to increase damping. |
| | | | | | Spring set length | Set sunken length for 90–100 mm (3.5–3.9 in) when one passenger is astride seat. |
| | | | | | Spring | Replace with soft spring. |
| Bottoming out | √ | √ | | | High compression damping | Turn adjuster clockwise (about 1/6 turn) to increase damping. |
| | | | | | Spring set length | Set sunken length for 90–100 mm (3.5–3.9 in) when one passenger is astride seat. |
| | | | | | Spring | Replace with stiff spring. |
| Bouncing | √ | √ | | | Rebound damping force | Turn adjuster clockwise (about 2 clicks) to increase damping. |
| | | | | | Spring | Replace with soft spring. |
| Stiff travel | √ | √ | | | High compression damping | Turn adjuster counterclockwise (about 1/6 turn) to decrease damping. |
| | | | | | Spring set length | Set sunken length for 90–100 mm (3.5–3.9 in) when one passenger is astride seat. |
| | | | | | Spring | Replace with soft spring. |

EAM20149

# WIRING DIAGRAM

**YZ250FP 2023**

1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Joint connector
5. Main relay
6. Engine ground
7. Battery
8. Frame ground
9. Fuse
10. Starter relay
11. Starter motor
12. Diode 1
13. Diode 2
14. CCU (Communication Control Unit)
15. Yamaha diagnostic tool coupler
16. ECU (Engine Control Unit)
17. Ignition coil
18. Spark plug
19. Fuel injector
20. Fuel pump
21. Intake air temperature sensor
22. Coolant temperature sensor
23. Throttle position sensor
24. Intake air pressure sensor
25. Engine stop switch
26. Gear position switch
27. Mode switch
28. Start switch
29. Diode 3

A. Battery sub-lead
B. Wire harness
C. Ignition coil sub-lead
D. CCU sub-lead

EAM30323

## COLOR CODE

| | |
|---|---|
| B | Black |
| Br | Brown |
| Gy | Gray |
| L | Blue |
| Lg | Light green |
| O | Orange |
| P | Pink |
| R | Red |
| Sb | Sky blue |
| W | White |
| Y | Yellow |
| B/L | Black/Blue |
| B/O | Black/Orange |
| B/R | Black/Red |
| B/W | Black/White |
| B/Y | Black/Yellow |
| Br/W | Brown/White |
| G/W | Green/White |
| G/Y | Green/Yellow |
| L/B | Blue/Black |
| L/G | Blue/Green |
| L/R | Blue/Red |
| L/W | Blue/White |
| P/B | Pink/Black |
| R/B | Red/Black |
| R/L | Red/Blue |
| R/W | Red/White |
| R/Y | Red/Yellow |
| W/B | White/Black |
| W/G | White/Green |
| Y/W | Yellow/White |

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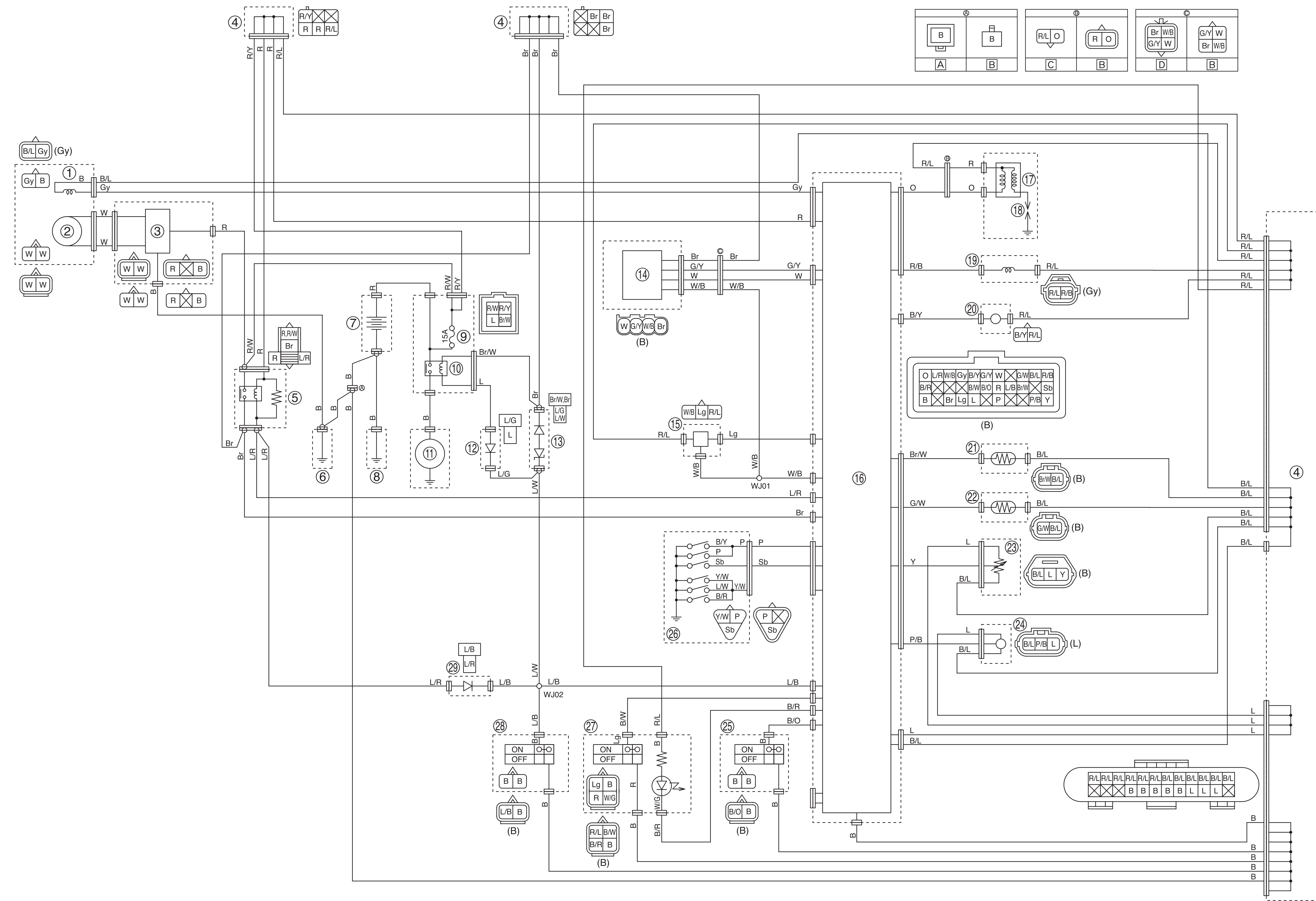
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# YZ250FP 2023
# WIRING DIAGRAM



**YZ250FP 2023**
**WIRING DIAGRAM**

