



2015

⚠ Read this manual carefully before operating this vehicle.

⚠ Il convient de lire attentivement ce manuel avant la première utilisation du véhicule.

⚠ Bitte lesen Sie diese Bedienungsanleitung sorgfältig durch, bevor Sie das Fahrzeug in Betrieb nehmen.

OWNER'S SERVICE MANUAL

**MANUEL D'ATELIER DU
PROPRIETAIRE**

**FAHRER- UND
WARTUNGSHANDBUCH**

YZ450F
YZ450FF

1SL-28199-81

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

 **Il convient de lire attentivement ce manuel avant la première utilisation du véhicule. Le manuel doit être remis avec le véhicule en cas de vente de ce dernier.**

 **Bitte lesen Sie diese Bedienungsanleitung sorgfältig durch, bevor Sie das Fahrzeug in Betrieb nehmen. Diese Bedienungsanleitung muss, wenn das Fahrzeug verkauft wird, beim Fahrzeug verbleiben.**



YAMAHA

2015

⚠ Read this manual carefully before operating this vehicle.

OWNER'S SERVICE MANUAL

YZ450F
YZ450FF

1SL-28199-81-E0

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**YZ450F
YZ450FF
OWNER'S SERVICE MANUAL
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INTRODUCTION

Congratulations on your purchase of a Yamaha YZ series. This model is the culmination of Yamaha's vast experience in the production of pacesetter 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.

WARNING

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

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.

SAFETY INFORMATION

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

- **THIS MACHINE IS TO BE OPERATED BY AN EXPERIENCED RIDER ONLY.**

Do not attempt to operate this machine at maximum power until you are totally familiar with its characteristics.

- **THIS MACHINE IS DESIGNED TO BE RIDDEN BY THE OPERATOR ONLY.**

Do not carry passengers on this machine.

- **ALWAYS WEAR PROTECTIVE APPAREL.**

When operating this machine, always wear an approved helmet with goggles or a face shield. Also wear heavy boots, gloves, and protective clothing. Always wear proper fitting clothing that will not be caught in any of the moving parts or controls of the machine.

- **ALWAYS MAINTAIN YOUR MACHINE IN PROPER WORKING ORDER.**

For safety and reliability, the machine must be properly maintained. Always perform the pre-operation checks indicated in this manual.

Correcting a mechanical problem before you ride may prevent an accident.

- **GASOLINE IS HIGHLY FLAMMABLE.**

Always turn off the engine while refueling. Take care to not spill any gasoline on the engine or exhaust system. Never refuel in the vicinity of an open flame, or while smoking.

- **GASOLINE CAN CAUSE INJURY.**

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

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

Never start the engine or let it run for any length of time in an enclosed area. Exhaust fumes are poisonous. These fumes contain carbon monoxide, which by itself is odorless and colorless. Carbon monoxide is a dangerous gas which can cause unconsciousness or can be lethal.

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

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

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

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

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

For safety, drain the gasoline from the fuel tank before transporting the vehicle.

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.
- Jobs “7” requiring more information (such as special tools and technical data) are described sequentially.

5

1

CLUTCH

CLUTCH

Removing the clutch

10 Nm (1.0 m.kgf, 7.2 ft.lbf)

10 Nm (1.0 m.kgf, 7.2 ft.lbf)

75 Nm (7.5 m.kgf, 54 ft.lbf)

6

Order	Part name	Q'ty	Remarks
	Engine oil		Drain. Refer to "ENGINE REMOVAL" on page 5-2.
	Brake pedal		Disconnect.
1	Clutch cable	1	
2	Clutch cover	1	
3	O-ring	1	
4	Clutch spring	6	
5	Pressure plate	1	
6	Push rod 1	1	
7	Circlip	1	
8	Washers	1	
9	Bearing	1	
10	Ball	1	
11	Push rod 2	1	
12	Friction plate 1	5	
13	Clutch plate	7	
14	Friction plate 2	3	Identification color (purple)

5-38

CLUTCH

REMOVING THE CLUTCH

1. Remove:

- Clutch boss nut "1"
- Conical washer "2"
- Clutch boss "3"

While holding the clutch boss with the clutch holder "4," loosen the clutch boss nut.

Clutch holder
90890-04088
YM-91042

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.

Measure it at four points on the friction plate.

Friction plate thickness
2.92-3.08 mm (0.115-0.121 in)
Wear limit
2.80 mm (0.110 in)

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 "1")

Out of specification → Replace the clutch plates as a set.

Warpage limit
0.10 mm (0.0039 in)

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
48.00 mm (1.89 in)
Limit
49.00 mm (1.93 in)

7

5-41

SYMBOLS

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

TIP

The following symbols are not relevant to every vehicle.





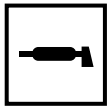









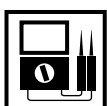



SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Serviceable with engine mounted		Gear oil
	Filling fluid		Molybdenum disulfide oil
	Lubricant		Brake fluid
	Special tool		Wheel bearing grease
	Tightening torque		Lithium-soap-based grease
	Wear limit, clearance		Molybdenum disulfide grease
	Engine speed		Silicone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

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GENERAL INFORMATION

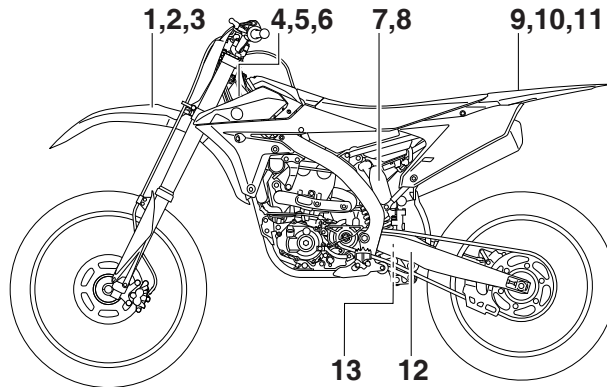
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LOCATION OF IMPORTANT LABELS

LOCATION OF IMPORTANT LABELS

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




CAN

1

Premium unleaded gasoline only.
3FB-2415E-02

5

 This spark ignition system meets all requirements of the Canadian Interference Causing Equipment Regulations.
Ce système d'allumage par étincelle de véhicule respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.
3JK-82377-10

2

Essence super sans plomb seulement.
3FB-2415E-12

7

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

▲AVERTISSEMENT
Cette unité contient de l'azote à haute pression. Une mauvaise manipulation peut entraîner d'explosion.
• Voir le manuel d'utilisateur pour les instructions.
• Ne pas brûler ni perforez ni ouvrir.
4AA-22259-70

3

THIS VEHICLE IS A COMPETITION MOTORCYCLE AND IS FOR USE EXCLUSIVELY IN CLOSED COURSE COMPETITION AND IS NOT INTENDED FOR USE ON PUBLIC HIGHWAYS.
CE VÉHICULE EST UNE MOTORCYCLETTE DE COMPÉTITION DONT L'USAGE EST RÉSERVÉ AUX COMPÉTITIONS EN CIRCUITS FERMÉS ET NON DESTINÉ AUX VOIES PUBLIQUES.
4SR-2416E-00

4

MFD. BY YAMAHA MOTOR CO., LTD. MM / YY MADE IN JAPAN
COMPETITION MOTORCYCLE

FABRIQUÉ PAR YAMAHA MOTOR CO., LTD. MM / YY FABRIQUÉ AU JAPON
MOTORCYCLETTE DE COMPÉTITION

4SR-21186-01

LOCATION OF IMPORTANT LABELS

9

⚠ 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-00

12

TIRE INFORMATION

Cold tire normal pressure should be set as follows:
 FRONT: 100kPa, {1.00kgf/cm²}, 15psi
 REAR : 100kPa, {1.00kgf/cm²}, 15psi

3RV-21668-A0

10

⚠ AVERTISSEMENT

- LIRE LE MANUEL DU PROPRIETAIRE AINSI QUE TOUTES LES ETIQUETTES AVANT D'UTILISER CE VEHICULE.
- NE JAMAIS TRANSPORTER DE PASSAGER. La conduite avec passager augmente les risques de perte de contrôle.
- NE JAMAIS ROULER SUR DES CHEMINS PUBLICS. Vous pourriez entrer en collision avec un autre véhicule.
- TOUJOURS PORTER UN CASQUE DE MOTOCYCLISTE APPROUVE, des lunettes et des vêtements de protection.
- EXCLUSIVEMENT POUR L'USAGE D'UN CONDUCTEUR EXPERIMENTE.

5PA-2118K-10

13

INFORMATION SUR LES PNEUS

La pression des pneus à froid doit normalement être réglée comme suit.
 AVANT : 100kPa, {1.00kgf/cm²}, 15psi
 ARRIERE : 100kPa, {1.00kgf/cm²}, 15psi

3RV-21668-B0

EUR

6





CE

YAMAHA MOTOR CO., LTD.
 SHIZUOKA JAPAN

YAMAHA 4GB-2155A-00

11

⚠

100 kPa 100 kPa
 1.00 kgf/cm² 1.00 kgf/cm²
 15 psi 15 psi

5PG-2816R-00

8



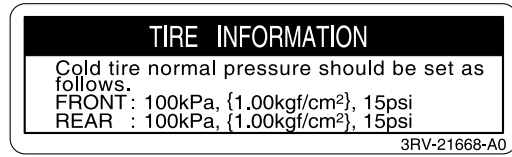
LOCATION OF IMPORTANT LABELS

AUS, NZL, ZAF

8



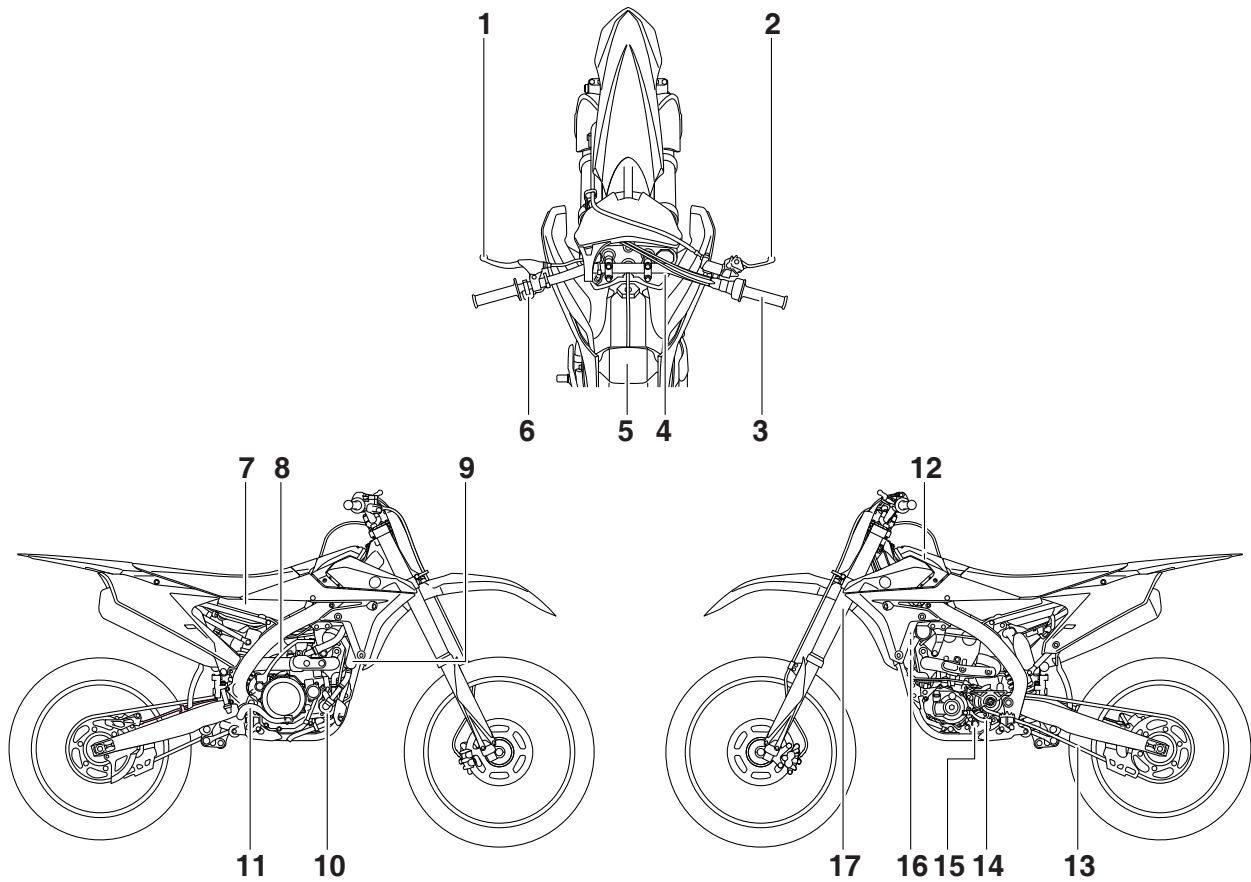
12



9



DESCRIPTION



1. Clutch lever
2. Front brake lever
3. Throttle grip
4. Radiator cap
5. Fuel tank cap
6. Engine stop switch
7. Fuel tank
8. Kickstarter lever
9. Radiator

10. Coolant drain bolt
11. Rear brake pedal
12. Air filter
13. Drive chain
14. Shift pedal
15. Oil level check window
16. Starter knob/idle screw
17. 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.

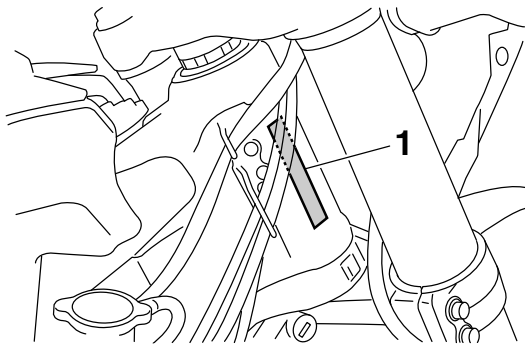
IDENTIFICATION

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.

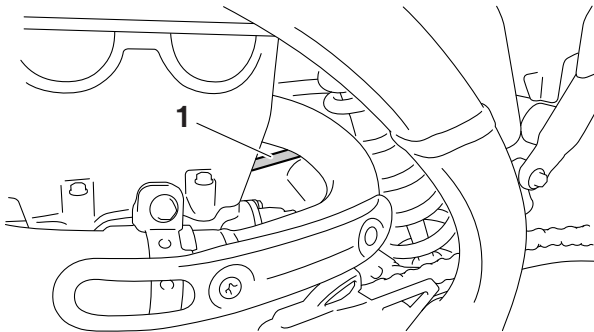
VEHICLE IDENTIFICATION NUMBER

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



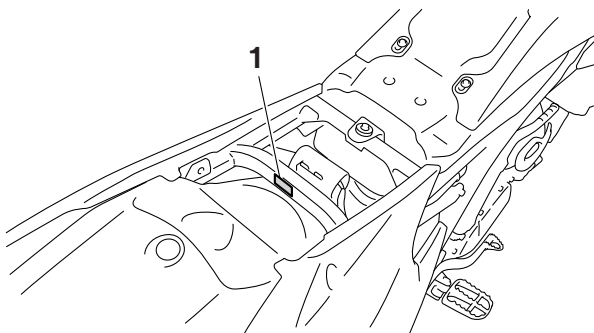
ENGINE SERIAL NUMBER

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



MODEL LABEL

The model label "1" is affixed to the rear frame. This information will be needed to order spare parts.

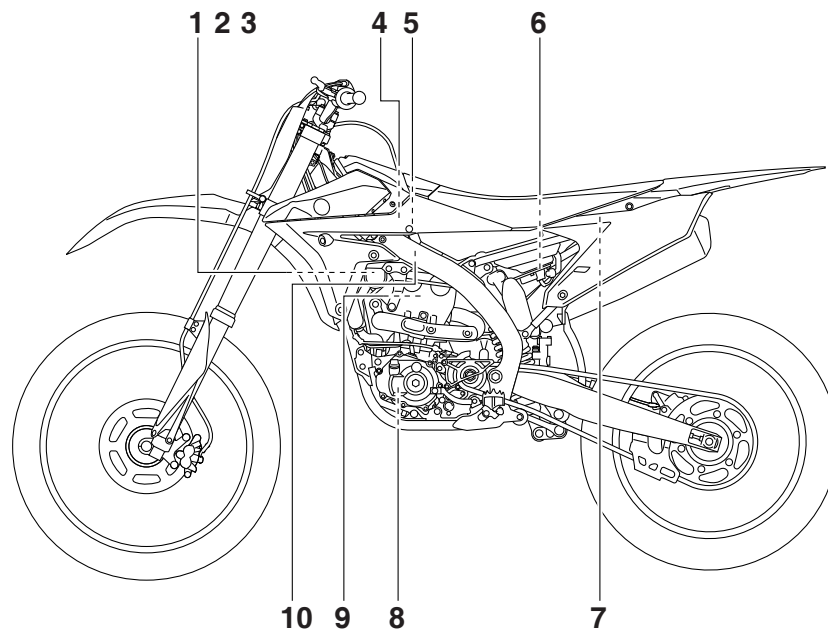


FEATURES

OUTLINE OF THE FI SYSTEM

The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature. In the conventional carburetor system, the air-fuel ratio of the mixture to be supplied to the combustion chamber is determined by the amount of intake air and fuel that is measured on the basis of the jets to be used in the carburetor.

Despite the same amount of intake air, the fuel amount requirement varies with the engine operating conditions (acceleration, deceleration, and operation under a heavy load). The carburetor that measures fuel through the use of jets are provided with various auxiliary devices, so that the optimum air fuel ratio can be obtained to accommodate frequent changes in the operating conditions of the engine. This model has adopted an electronically controlled fuel injection (FI) system, in place of the conventional carburetor system. This system can obtain the optimum air-fuel ratio required by the engine at all times by using a microprocessor that regulates the fuel injection amount according to the engine operating conditions detected by various sensors.

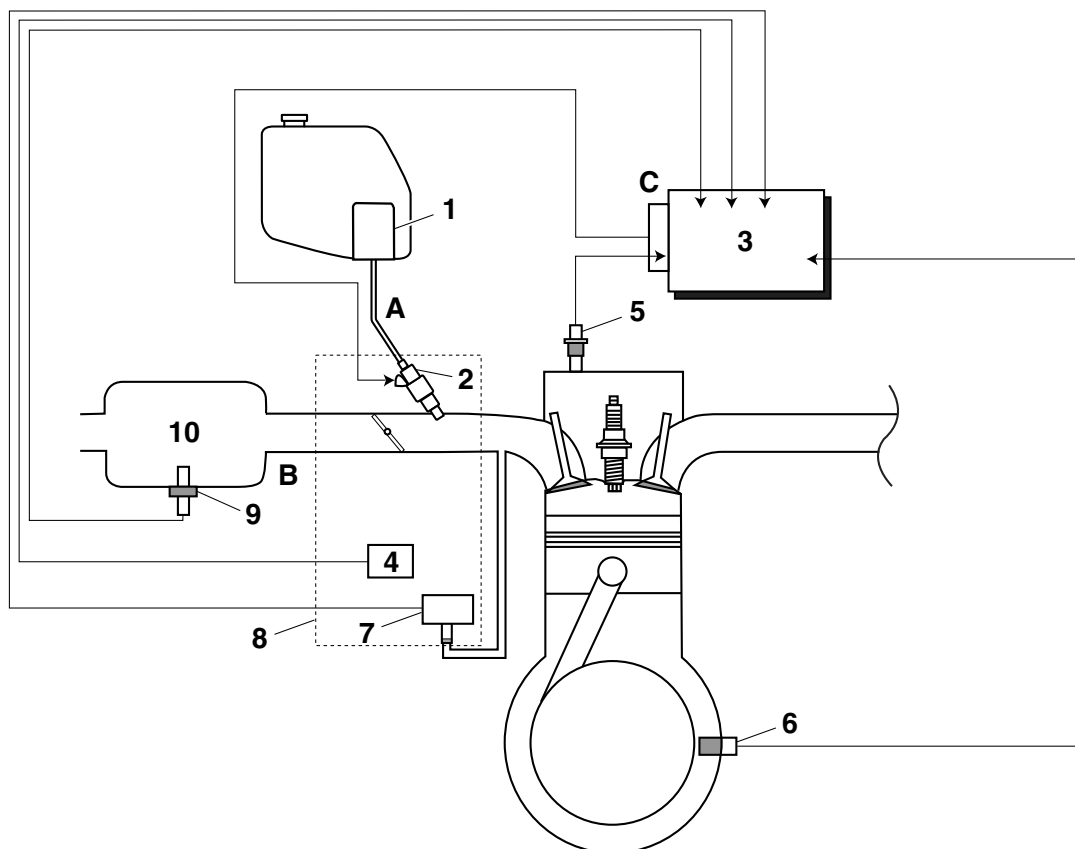


1. Fuel injector
2. Throttle position sensor
3. Intake air pressure sensor
4. Intake air temperature sensor
5. ECU
6. Fuel pump
7. Condenser
8. Crankshaft position sensor
9. Coolant temperature sensor
10. Ignition coil

FI SYSTEM

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator maintains the fuel pressure that is applied to the fuel injector at only 324 kPa (3.24 kgf/cm², 47.0 psi). Accordingly, when the energizing signal from the ECU energizes the fuel injector, the fuel passage opens, causing the fuel to be injected into the intake manifold only during the time the passage remains open. Therefore, the longer the length of time the fuel injector is energized (injection duration), the greater the volume of fuel that is supplied. Conversely, the shorter the length of time the fuel injector is energized (injection duration), the lesser the volume of fuel that is supplied.

The injection duration and the injection timing are controlled by the ECU. Signals input from the throttle position sensor, the coolant temperature sensor, the crankshaft position sensor, the intake air pressure sensor, and the intake air temperature sensor enable the ECU to determine the injection duration. The injection timing is determined through the signals from the crankshaft position sensor. As a result, the volume of fuel that is required by the engine can be supplied at all times in accordance with the driving conditions.



1. Fuel pump
2. Fuel injector
3. ECU
4. Throttle position sensor
5. Coolant temperature sensor
6. Crankshaft position sensor
7. Intake air pressure sensor
8. Throttle body
9. Intake air temperature sensor
10. Air filter case

- A. Fuel system
- B. Intake system
- C. Control system

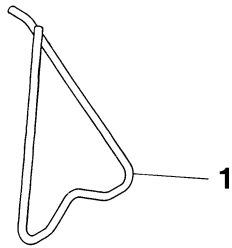
INCLUDED PARTS

SIDESTAND

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

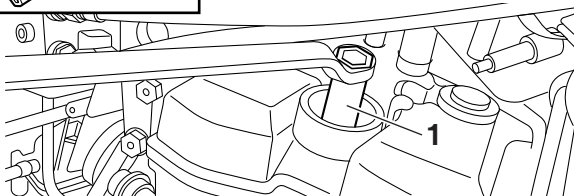
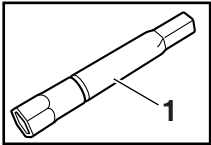
⚠ WARNING

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



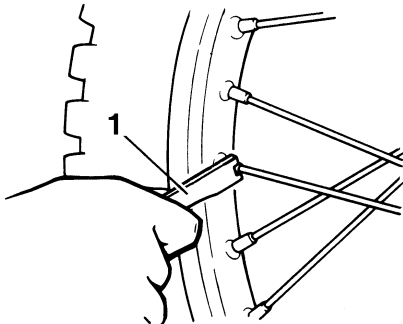
SPARK PLUG WRENCH

The spark plug wrench "1" is used to remove or install the spark plug.



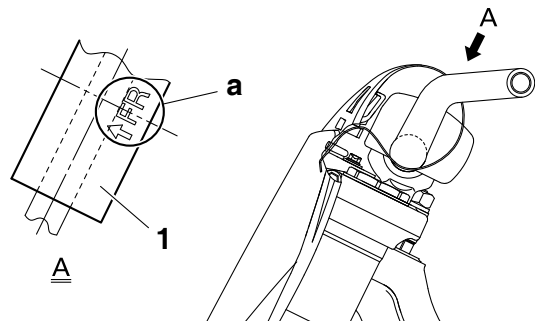
NIPPLE WRENCH

The nipple wrench "1" is used to tighten the spoke.



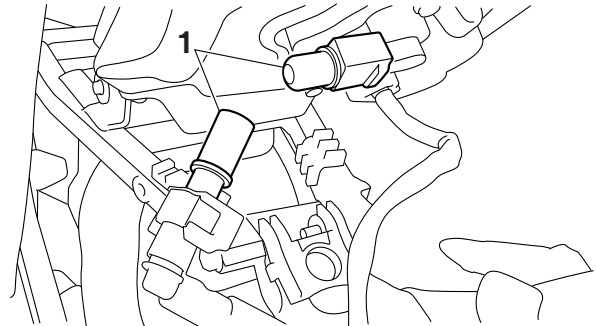
HANDLEBAR PROTECTOR

Install the handlebar protector "1" with the mark "a" facing forward.



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.



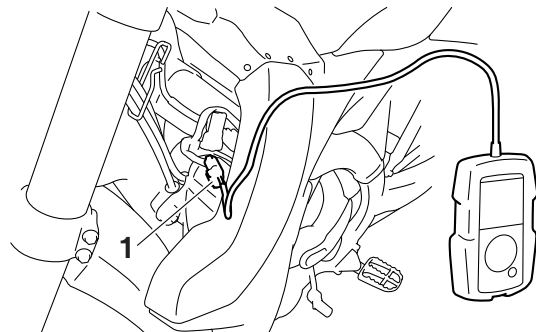
COUPLER FOR CONNECTING OPTIONAL PART

The coupler "1" is used for connecting the optional Power Tuner and so on.

NOTICE

When no optional parts, etc. are connected, connect the connection terminal to the original coupler.

Before disconnecting the coupler, thoroughly wipe off any mud or water stuck to it.



INCLUDED PARTS

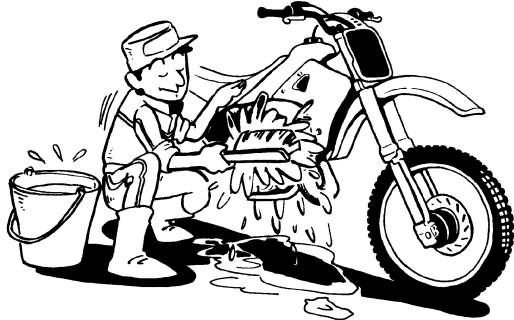
Part name	Part number
GYTR Power Tuner (For USA)	33D-H59C0-V0-00
YZ Power Tuner (Except for USA)	33D-859C0-10

The Power Tuner is an optional part.

IMPORTANT INFORMATION

PREPARATION FOR REMOVAL AND DIS-ASSEMBLY

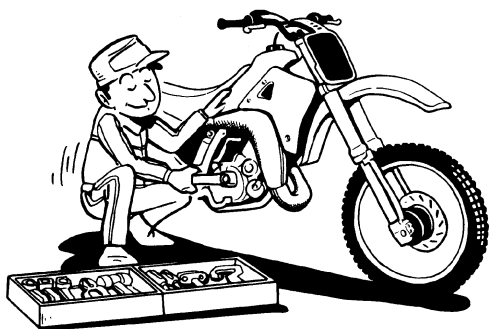
1. Before the jobs, completely remove mud, dust, and the like in order to prevent the entry of them into the inside during the jobs.



- Before cleaning with high-pressure water of washers, cover the following parts.
Air duct
Silencer exhaust port
Drain hole on the cylinder head (right side)
Hole under the water pump housing



2. Use proper special tools and equipment. See "SPECIAL TOOLS".



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.

⚠ WARNING

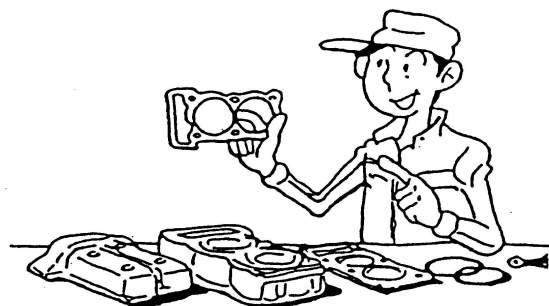
Coolant is potentially harmful and should be handled with special care.

- 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.

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.

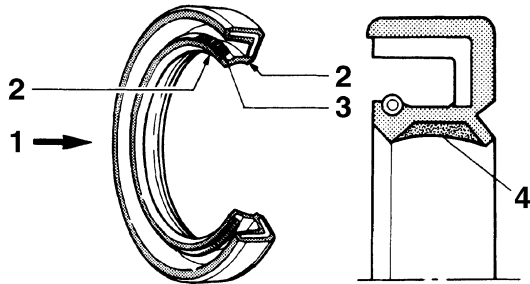
Do not use any used parts, because these may not be genuine though they have similar appearances or because the quality may be changed by aging.



IMPORTANT INFORMATION

GASKETS, OIL SEALS AND O-RINGS

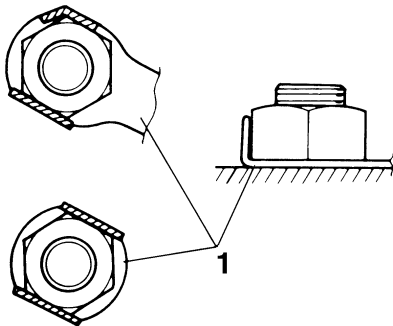
1. When overhauling the engine, replace all gaskets and O-rings. All gasket surfaces, oil seal lips, and O-rings must be cleaned so that there may be no dust on them.
2. During assembly, always apply proper oil to bearings and proper grease to oil seal lips before installation.



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

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.

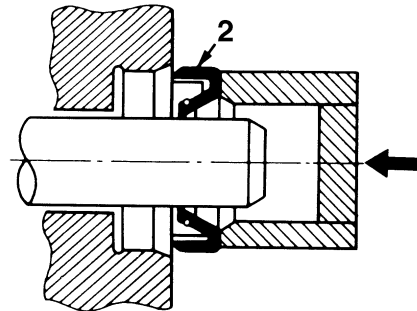
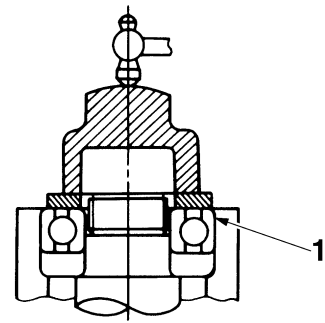


BEARINGS AND OIL SEALS

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.

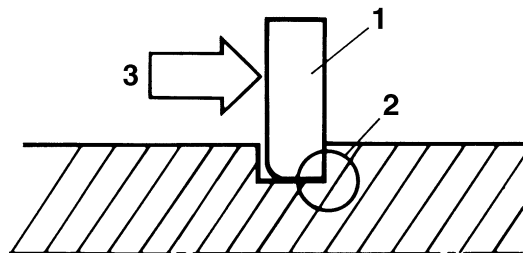
NOTICE

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



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.



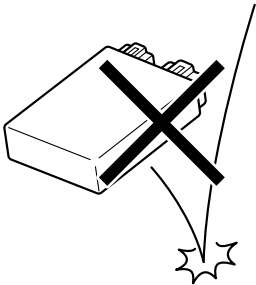
BASIC SERVICE INFORMATION

ELECTRICAL SYSTEM

Electrical parts handling

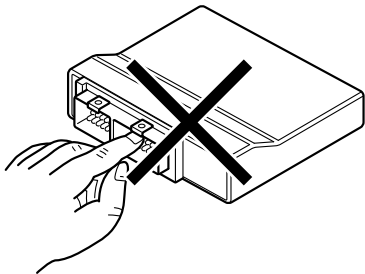
NOTICE

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



NOTICE

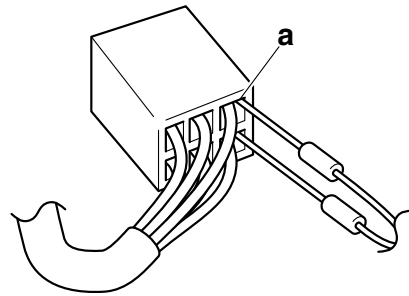
Electrical components are very sensitive to and can be damaged by static electricity. Therefore, never touch the terminals and be sure to keep the contacts clean.



Checking the electrical system

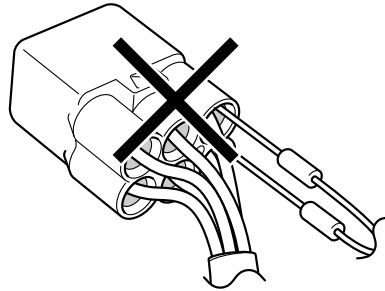
NOTICE

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.



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

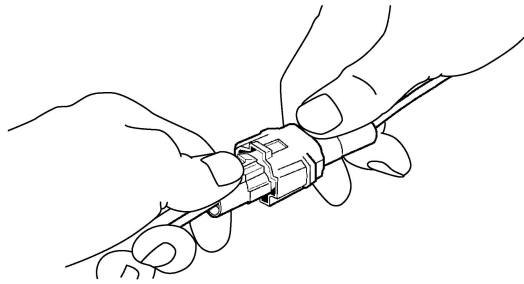
1. Disconnect:

- Lead
- Coupler
- Connector

NOTICE

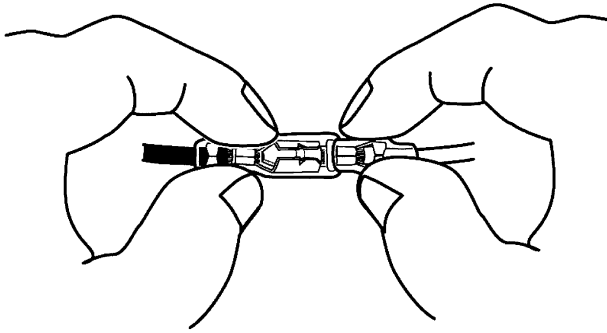
- When disconnecting a coupler, release the coupler lock, hold both sections of the coupler, and then disconnect the coupler.
- There are many types of coupler locks; therefore, be sure to check the type of coupler lock before disconnecting the coupler.

BASIC SERVICE INFORMATION



NOTICE

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

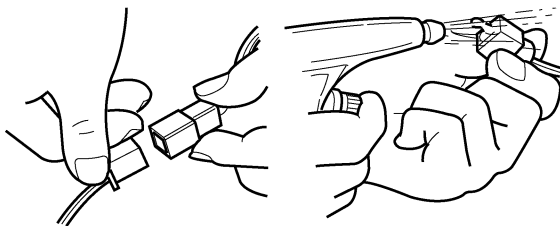


2. Check:

- Lead
- Coupler
- Connector

Moisture → Dry with compressed air.

Rust/stains → Connect and disconnect several times.

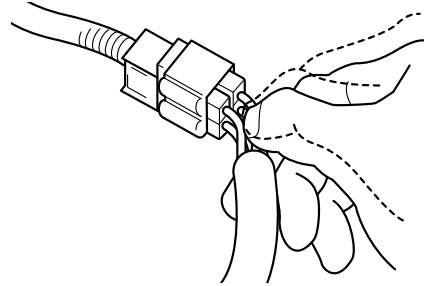
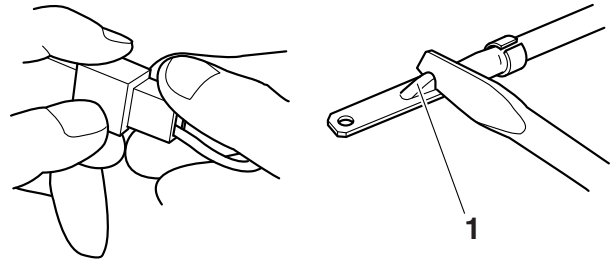


3. Check:

- 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.

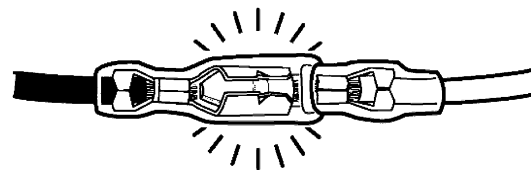
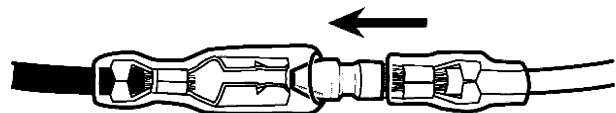
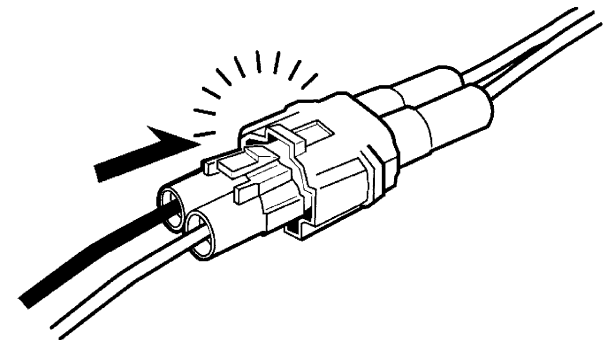


4. Connect:

- Lead
- Coupler
- Connector


TIP

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



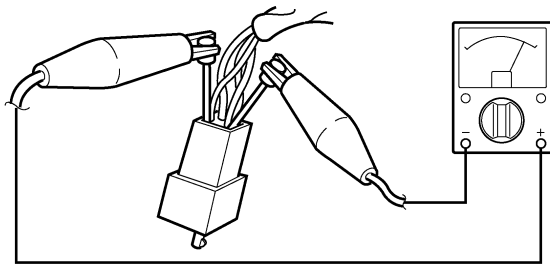
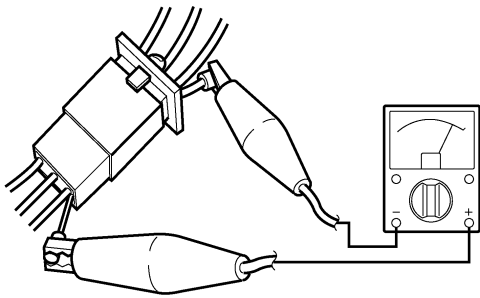
5. Check:

- No continuity

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


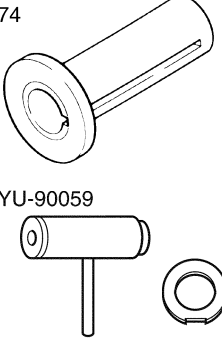
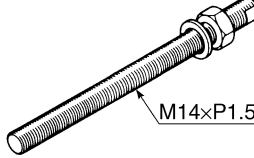
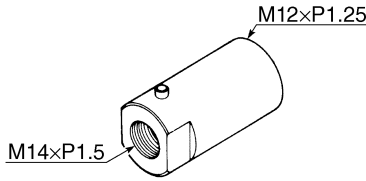
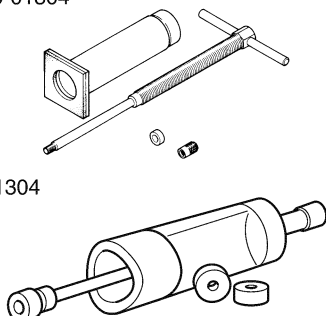


SPECIAL TOOLS

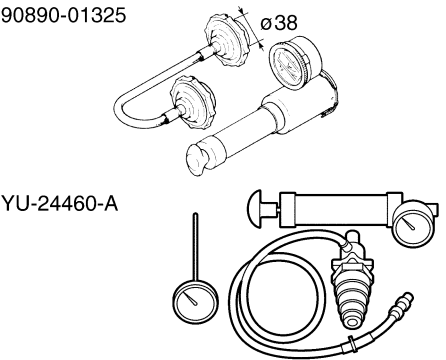
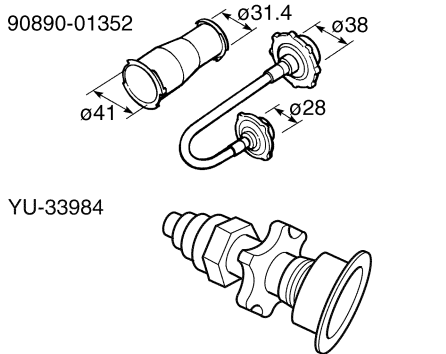
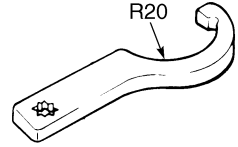

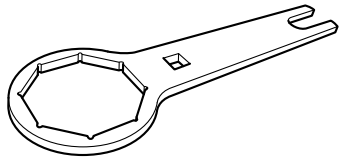
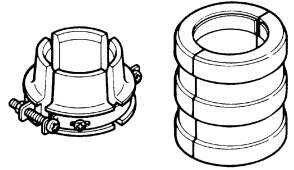
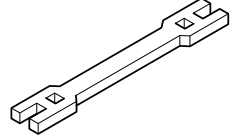
The following special tools are required for accurate and complete adjustment and assembly. Using the correct special tool will help prevent damage caused by the use of improper tools or improvised techniques. The shape and tool number used for the special tool differ by country, so two types are provided.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

TIP

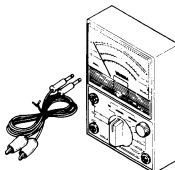
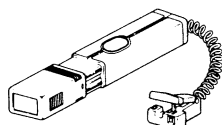
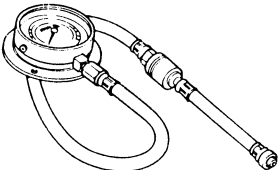
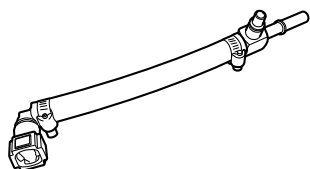
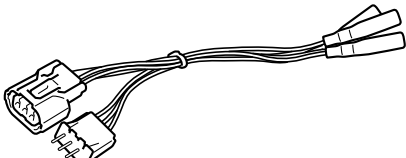
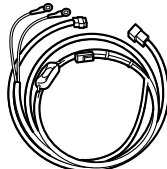
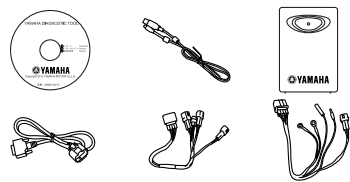
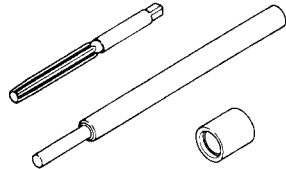
- For U.S.A. and Canada, use tool number starting with “YM-”, “YU-”, or “ACC-”.
- For others, use tool number starting with “90890-”.

Tool name/Part number	How to use	Illustration
Dial gauge & stand set 90890-01252 Dial gauge set YU-03097-B	This tool is used to check parts for runout or bend.	
Crankshaft installer pot 90890-01274 Installing pot YU-90058	This tool is used to install the crankshaft.	90890-01274  YU-90058/YU-90059
Crankshaft installer bolt 90890-01275 Bolts YU-90060	This tool is used to install the crankshaft.	 M14xP1.5
Adapter (M12) 90890-01278 Adapter #3 YU-90063	This tool is used to install the crankshaft.	 M12xP1.25 M14xP1.5
Piston pin puller set 90890-01304 Piston pin puller YU-01304	This tool is used to remove the piston pin.	90890-01304  YU-01304

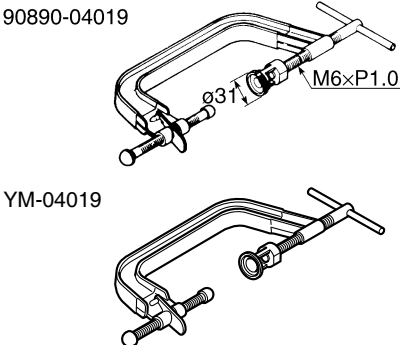
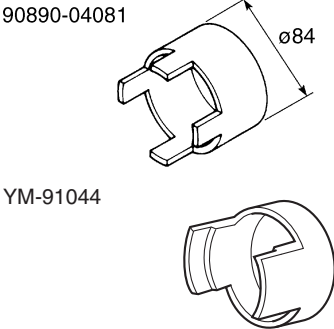
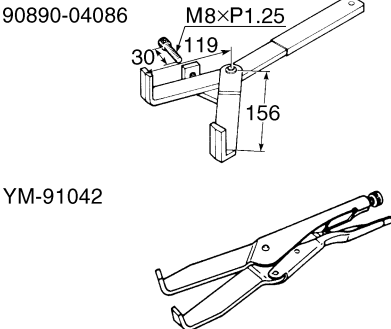

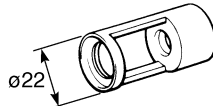
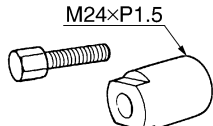
SPECIAL TOOLS

Tool name/Part number	How to use	Illustration
Radiator cap tester 90890-01325 Mityvac cooling system tester kit YU-24460-A	This tool is used to check the radiator and the radiator cap.	
Radiator cap tester adapter 90890-01352 Pressure tester adapter YU-33984	This tool is used to check the radiator and the radiator cap.	
Steering nut wrench 90890-01403 Exhaust flange nut wrench YU-A9472	This tool is used to remove or tighten the steering nut.	
Cap bolt wrench 90890-01500 YM-01500	This tool is used to remove or tighten the base valve.	
Cap bolt ring wrench 90890-01501 YM-01501	This tool is used to loosen or tighten the damper assembly.	
Fork seal driver 90890-01502 YM-A0948	This tool is used to install the oil seal of the front fork.	
Spoke nipple wrench (6-7) 90890-01521 YM-01521	This tool is used to tighten the spoke.	

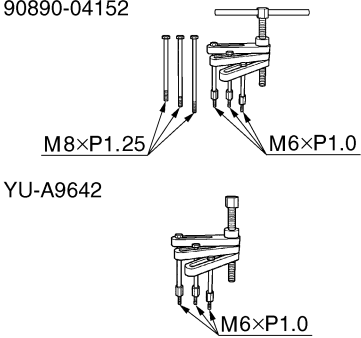
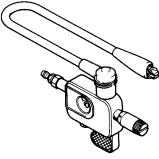

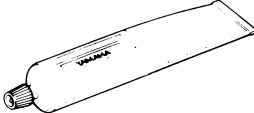
SPECIAL TOOLS

Tool name/Part number	How to use	Illustration
Pocket tester 90890-03112 Analog pocket tester YU-03112-C	This tool is used to measure the voltage, current, and resistance of electrical components.	
Timing light 90890-03141 YU-03141	This tool is used to measure the ignition timing.	
Pressure gauge 90890-03153 YU-03153	This tool is used to measure the fuel pressure.	
Fuel pressure adapter 90890-03186 YM-03186	This tool is used to mount the pressure gauge.	
Test harness S-pressure sensor (3P) 90890-03207 YU-03207	This tool is used to check the throttle position sensor input voltage.	
FI diagnostic tool sub-lead 90890-03212 YU-03212	This tool is used to connect the Yamaha diagnostic tool to a battery.	
Yamaha diagnostic tool 90890-03231 Yamaha diagnostic tool (US) 90890-03234	This tool is used to check error codes or carry out self-diagnosis.	
Valve guide remover & installer set (ø5.5) 90890-04016 Valve guide remover (5.5 mm) YM-01122 Valve guide installer (5.5 mm) YM-04015 Valve guide reamer (5.5 mm) YM-01196	This tool is used to replace the valve guide.	

SPECIAL TOOLS

Tool name/Part number	How to use	Illustration
Valve spring compressor 90890-04019 YM-04019	This tool is used to disconnect or connect the valve and the valve spring.	
Spacer (crankshaft installer) 90890-04081 Pot spacer YM-91044	This tool is used to install the crankshaft.	
Clutch holder 90890-04086 YM-91042	This tool is used to hold the clutch when removing or installing the clutch boss securing nut.	
Valve lapper 90890-04101 Valve lapping tool YM-A8998	This tool is used to remove the valve lifter or lap the valve.	
Valve spring compressor adapter 22 mm 90890-04108 YM-04108	This tool is used to disconnect or connect the valve and the valve spring.	
Rotor puller 90890-04151 YM-04151	This tool is used to remove the rotor.	

SPECIAL TOOLS

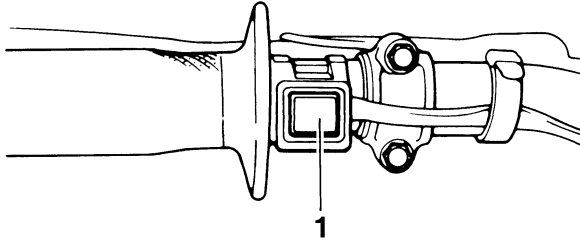
Tool name/Part number	How to use	Illustration
Crankcase separating tool 90890-04152 YU-A9642	This tool is used to remove the crankshaft.	 <p>90890-04152</p> <p>M8×P1.25 M6×P1.0</p> <p>YU-A9642</p> <p>M6×P1.0</p>
Ignition checker 90890-06754 Oppama pet-4000 spark checker YM-34487	This tool is used to check the spark performance of the ignition coil.	
Digital tachometer 90890-06760 YU-39951-B	This tool is used to measure the engine speed.	
Three bond No.1215® 90890-85505	This sealant (Bond) is used for crankcase mating surface, etc.	

CONTROL FUNCTIONS

CONTROL FUNCTIONS

ENGINE STOP SWITCH

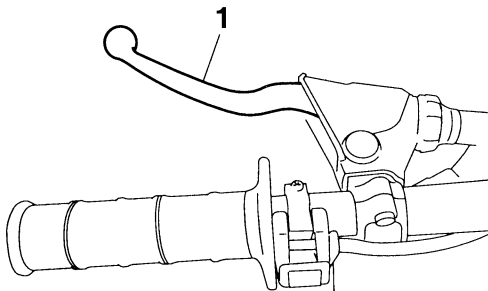
The engine stop switch "1" is located on the left handlebar. Continue pushing the engine stop switch till the engine comes to a stop.



CLUTCH LEVER

The clutch lever "1" is located on the left handlebar. The clutch lever disengages or engages the clutch.

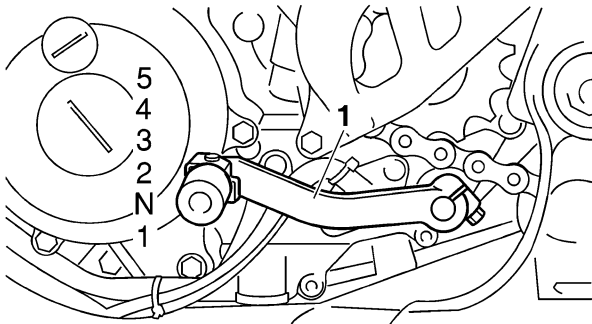
Pull the clutch lever toward the handlebar to disengage the clutch, and release the lever to engage the clutch.



SHIFT PEDAL

The shift pedal "1" has adopted a method of 1 down & 4 ups (press-down & kick-ups).

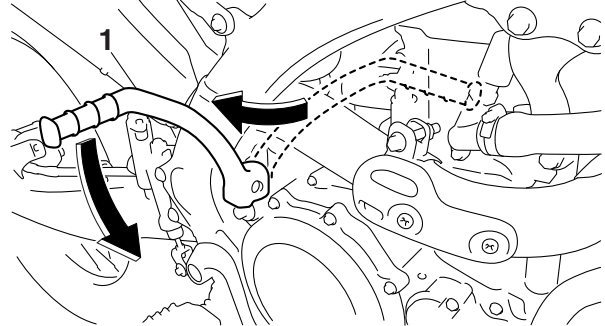
Press it down for N (neutral) to 1st, and kick it up for 2nd to 5th.



KICKSTARTER LEVER

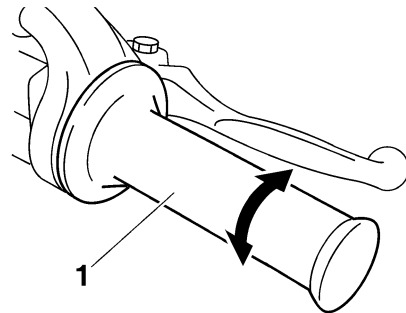
The kickstarter lever "1" is in the right of the chassis.

To start the engine, pull out and push down the kickstarter lever with your foot.



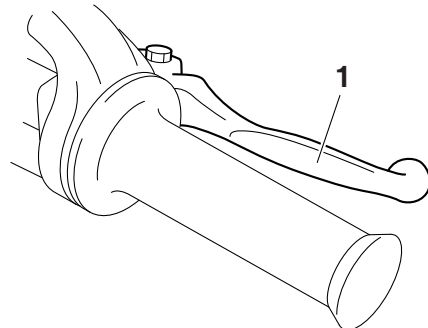
THROTTLE GRIP

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



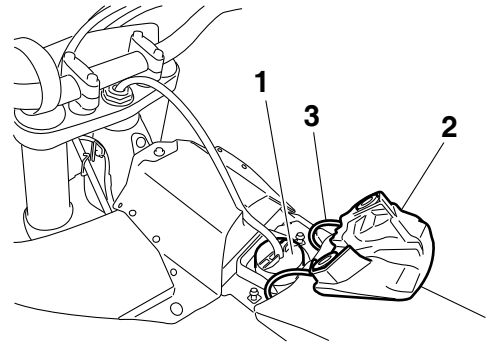
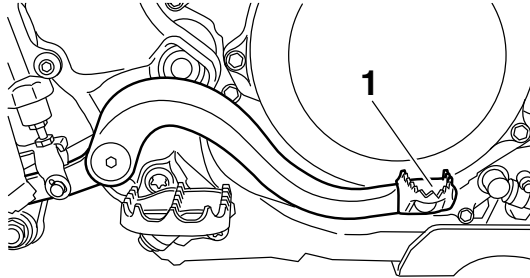
FRONT BRAKE LEVER

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

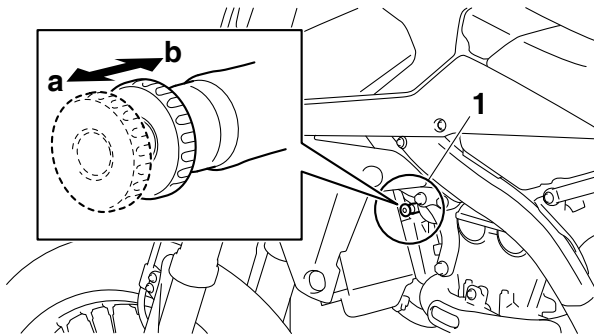


REAR BRAKE PEDAL

The rear brake pedal “1” is in the right of the chassis. Press down on the brake pedal to activate the rear brake.



STARTER KNOB/IDLE SCREW



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

Pulling the knob toward “a” turns ON the starter, resulting in a larger amount of intake air.

Pushing the knob toward “b” turns OFF the starter.

⚠ WARNING

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

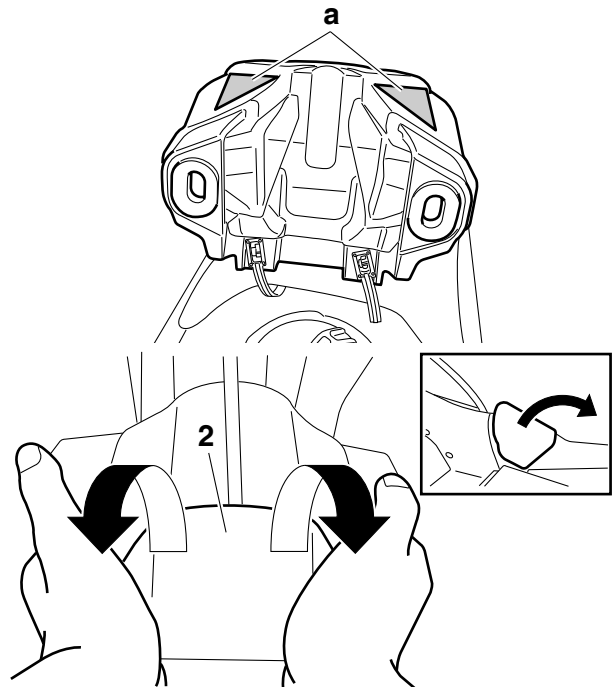
FUEL TANK CAP

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.



STARTING AND BREAK-IN

FUEL

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



Recommended fuel
Premium unleaded gasoline
Fuel tank capacity
7.5 L (1.98 US gal, 1.65 Imp.gal)

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 premium 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.

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 (For USA and Canada)

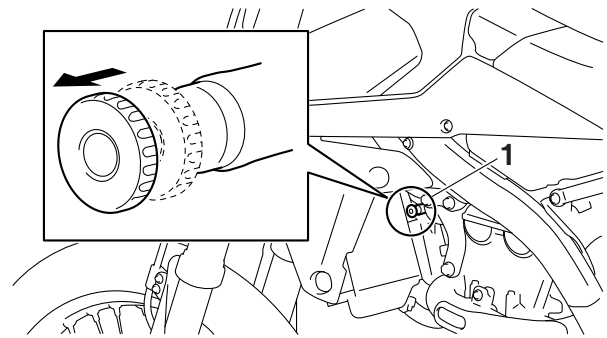
There are two types of gasohol: gasohol containing ethanol and that containing methanol. Gasohol containing ethanol can be used if the ethanol content does not exceed 10%. Gasohol containing methanol is not recommended by Yamaha because it can cause damage to the fuel system or vehicle performance problems.

STARTING A COLD ENGINE

1. Press the shift pedal to neutral.
2. Pull the starter knob/idle screw "1" to its full length.

TIP

When the ambient temperature is 15°C (59°F) or below, use the starter knob/idle screw.



3. Push down the kickstarter lever lightly until resistance is felt.
4. Fully close the throttle, and push down the kickstarter lever in a stroke.
5. Immediately release the kickstarter lever.

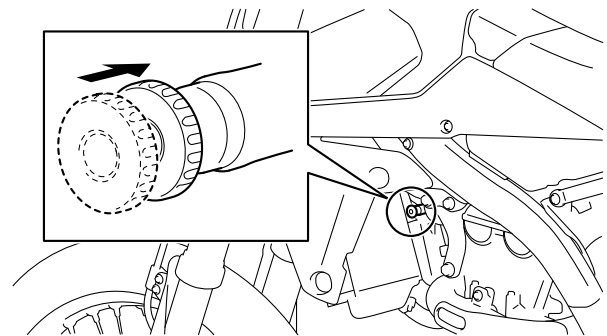
WARNING

Do not open the throttle at the moment when you kick the kickstarter lever, because this may kick back

TIP

If it fails to start, fully open the throttle grip and give 10 to 20 slow kicks to clear the engine of the rich air-fuel mixture retained in it.

6. 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/idle screw to its original position.



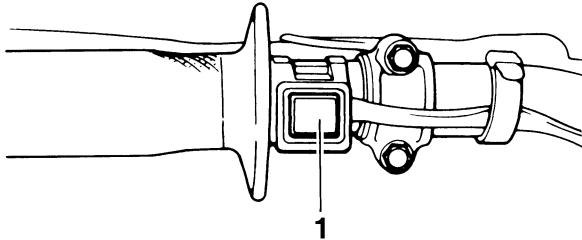
WARNING

Since exhaust gas contains harmful ingredients, do not start or warm it up at an ill-ventilated place or a closed narrow place.

7. 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.



STARTING A WARM ENGINE

When the engine is warm, give a kick with the throttle closed without using the starter knob/ idle screw.

TIP

If it fails to start, fully open the throttle grip and give 10 to 20 slow kicks to clear the engine of the rich air-fuel mixture retained in it.

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.

NOTICE

Before running, do maintenance on the air filter element.

Refer to "CLEANING THE AIR FILTER ELEMENT" on page 3-12.

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

NOTICE

After a break-in or after each race, always check the points shown in "TORQUE-CHECK POINTS" for tightening torques and retighten them. (Refer to "TORQUE-CHECK POINTS" on page 1-25.)

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.

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 3-7.

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.
- AC magneto
Check for looseness in mounted areas of the rotor and the stator.
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.

NOTICE

After a break-in or before each race, always check the points shown in “TORQUE-CHECK POINTS” for tightening torques and retighten them. (Refer to “TORQUE-CHECK POINTS” on page 1-25.)

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

TORQUE-CHECK POINTS

TORQUE-CHECK POINTS

Frame construction				Frame to rear frame	
				Frame to engine protector	
		Combined seat and fuel tank	Fuel tank to frame		
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	
Plastic cover				Tightening of number plate	

TORQUE-CHECK POINTS

	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 2-13.

CLEANING AND STORAGE

CLEANING

Frequent cleaning of your vehicle will enhance its appearance, maintain performance, and extend the life of parts.

1. Before cleaning, block the silencer outlet to prevent water from entering. A plastic bag secured with a rubber band may be used for this purpose.
2. If the engine is contaminated with oil, apply some degreaser to it with a brush. Do not apply degreaser to the drive chain, the sprockets, or the wheel axles.
3. Hose off dirt. Use only enough water pressure to do the job.

NOTICE

Do not use high-pressure washers or steam cleaners. Otherwise, these may cause a failure because of the entry of water.

4. After hosing off the dirt, wash all surfaces with a mild detergent and warm water. Use a toothbrush to clean hard-to-reach places.
5. Rinse the detergent with clean water, and dry the surfaces with a soft towel or a cloth.
6. Immediately after cleaning, remove any water from the drive chain with a paper towel, and lubricate it to prevent rust.
7. Clean the seat with a vinyl upholstery cleaner to keep the cover pliable and glossy.
8. Automotive wax may be applied to all painted or chromed surfaces. Avoid using such wax as contains abrasives, because it may scratch surfaces.
9. After completing the above, start the engine and allow it to warm up for several minutes.

STORAGE

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

1. Fill the fuel tank with gasoline.
2. Remove the spark plug, pour a spoonful of engine oil (SAE 10W-40) into the spark plug hole, and reinstall the plug. With the engine stop switch pushed in, by pushing down the kickstarter lever, crank the engine to coat the cylinder walls with oil.

3. Remove the drive chain, clean it thoroughly with solvent, and lubricate it. Reinstall the drive chain or store it in a plastic bag tied to the frame.
4. Lubricate all cables.
5. Lift up the frame of the vehicle to keep the wheels off the ground.
6. Tie a plastic bag over the muffler outlet to prevent moisture from entering.
7. If the vehicle is to be stored in a place that is humid or exposed to the sea breeze, apply a light coat of oil to metal surfaces. Do not apply oil to the seat or rubber parts.

TIP

Make any necessary repairs before the vehicle is stored.

CLEANING AND STORAGE

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GENERAL SPECIFICATIONS

GENERAL SPECIFICATIONS

Model

Model	1SL5 (USA) (CAN) 1SL6 (EUR) 1SL7 (JPN) 1SL8 (AUS) (NZL) (ZAF)
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Dimensions

Overall length	2175 mm (85.6 in) (USA) (CAN) 2180 mm (85.8 in) (EUR) (JPN) (AUS) (NZL) (ZAF)
Overall width	825 mm (32.5 in)
Overall height	1290 mm (50.8 in) (USA) (CAN) 1280 mm (50.4 in) (EUR) (JPN) (AUS) (NZL) (ZAF)
Seat height	975 mm (38.4 in) (USA) (CAN) 965 mm (38.0 in) (EUR) (JPN) (AUS) (NZL) (ZAF)
Wheelbase	1480 mm (58.3 in)
Ground clearance	335 mm (13.2 in) (USA) (CAN) (EUR) 330 mm (13.0 in) (JPN) (AUS) (NZL) (ZAF)

Weight

Curb weight	112 kg (247 lb)
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ENGINE SPECIFICATIONS

ENGINE SPECIFICATIONS

Engine

Engine type	Liquid cooled 4-stroke, DOHC
Displacement	450 cm ³
Cylinder arrangement	Single cylinder
Bore × stroke	97.0 × 60.8 mm (3.8 × 2.4 in)
Compression ratio	12.5:1
Starting system	Kickstarter

Fuel

Recommended fuel	Premium unleaded gasoline only
Fuel tank capacity	7.5 L (1.98 US gal, 1.65 Imp.gal)

Engine oil

Lubrication system	Wet sump
Recommended brand	YAMALUBE
Type	SAE 10W-30, SAE 10W-40, SAE 15W-40, SAE 20W-40 or SAE 20W-50
Recommended oil grade	API service SG type or higher, JASO standard MA
Engine oil quantity	
Quantity (disassembled)	0.95 L (1.00 US qt, 0.84 Imp.qt)
With oil filter element replacement	0.69 L (0.73 US qt, 0.61 Imp.qt)
Without oil filter element replacement	0.67 L (0.71 US qt, 0.59 Imp.qt)

Oil filter

Oil filter type	Paper
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Oil pump

Oil pump type	Trochoid
Inner-rotor-to-outer-rotor-tip clearance	Less than 0.150 mm (0.0059 in)
Limit	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance	0.13–0.18 mm (0.0051–0.0071 in)
Limit	0.24 mm (0.0094 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance	0.06–0.11 mm (0.0024–0.0043 in)
Limit	0.17 mm (0.0067 in)

Cooling system

Radiator capacity (including all routes)	1.04 L (1.10 US qt, 0.92 Imp.qt)
Radiator capacity	0.57 L (0.60 US qt, 0.50 mp.qt)
Radiator cap opening pressure	108–137 kPa (1.08–1.37 kg/cm ² , 15.7–19.9 psi)
Radiator core	
Width	112.6 mm (4.43 in)
Height	235.0 mm (9.25 in)
Depth	28.0 mm (1.10 in)
Water pump	
Water pump type	Single suction centrifugal pump

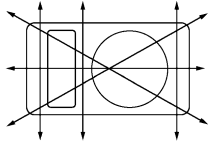
Spark plug

Manufacturer/model	NGK/CR8E
Spark plug gap	0.7–0.8 mm (0.028–0.031 in)

ENGINE SPECIFICATIONS

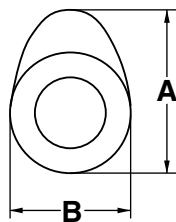
Cylinder head

Volume	25.98–26.78 cm ³ (1.59–1.63 cu.in)
Warpage limit	0.05 mm (0.0020 in)



Camshaft

Drive system	Chain drive (left)
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 lobe dimensions	
Intake A	37.730–37.830 mm (1.4854–1.4894 in)
Limit	37.630 mm (1.4815 in)
Intake B	27.950–28.050 mm (1.1004–1.1043 in)
Limit	27.850 mm (1.0965 in)
Exhaust A	33.540–33.640 mm (1.3205–1.3244 in)
Limit	33.440 mm (1.3165 in)
Exhaust B	24.769–24.869 mm (0.9752–0.9791 in)
Limit	24.669 mm (0.9712 in)



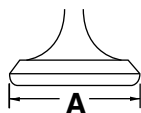
Camshaft runout limit	0.030 mm (0.0012 in)
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Timing chain

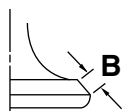
Tensioning system	Automatic
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Valve, valve seat, valve guide

Valve clearance (cold)	
Intake	0.13–0.20 mm (0.0051–0.0079 in)
Exhaust	0.20–0.25 mm (0.0079–0.0098 in)
Valve dimensions	
Valve head diameter A (intake)	36.90–37.10 mm (1.4528–1.4606 in)
Valve head diameter A (exhaust)	30.40–30.60 mm (1.1968–1.2047 in)

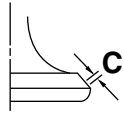


Valve face width B (intake)	1.697 mm (0.0668 in)
Valve face width B (exhaust)	1.768 mm (0.0696 in)

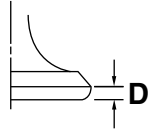


ENGINE SPECIFICATIONS

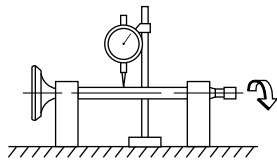
Valve seat width C (intake)	0.90–1.10 mm (0.0354–0.0433 in)
Valve seat width C (exhaust)	0.90–1.10 mm (0.0354–0.0433 in)



Valve margin thickness D (intake)	1.20 mm (0.0472 in)
Valve margin thickness D (exhaust)	0.85 mm (0.0335 in)

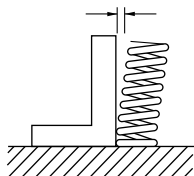


Valve stem diameter (intake)	5.475–5.490 mm (0.2156–0.2161 in)
Limit	5.445 mm (0.2144 in)
Valve stem diameter (exhaust)	5.465–5.480 mm (0.2152–0.2157 in)
Limit	5.435 mm (0.2140 in)
Valve guide inside diameter (intake)	5.500–5.512 mm (0.2165–0.2170 in)
Limit	5.550 mm (0.2185 in)
Valve guide inside diameter (exhaust)	5.500–5.512 mm (0.2165–0.2170 in)
Limit	5.550 mm (0.2185 in)
Valve-stem-to-valve-guide clearance (intake)	0.010–0.037 mm (0.0004–0.0015 in)
Limit	0.080 mm (0.0032 in)
Valve-stem-to-valve-guide clearance (exhaust)	0.020–0.047 mm (0.0008–0.0019 in)
Limit	0.100 mm (0.0039 in)
Valve stem runout	0.010 mm (0.0004 in)



Valve spring

Free length (intake)	40.76 mm (1.60 in)
Limit	39.76 mm (1.57 in)
Free length (exhaust)	37.01 mm (1.46 in)
Limit	36.01 mm (1.42 in)
Installed length (intake)	34.78 mm (1.37 in)
Installed length (exhaust)	30.83 mm (1.21 in)
Spring rate K1 (intake)	31.90 N/mm (3.25 kgf/mm, 182.15 lbf/in)
Spring rate K2 (intake)	41.37 N/mm (4.22 kgf/mm, 236.22 lbf/in)
Spring rate K1 (exhaust)	21.46 N/mm (2.19 kgf/mm, 122.54 lbf/in)
Spring rate K2 (exhaust)	27.84 N/mm (2.84 kgf/mm, 158.97 lbf/in)
Installed compression spring force (intake)	178.00–204.00 N (18.15–20.80 kgf, 40.01–45.86 lbf)
Installed compression spring force (exhaust)	124.00–142.00 N (12.64–14.48 kgf, 27.88–31.92 lbf)
Spring tilt (intake)	2.5 °/1.8 mm (2.5 °/0.07 in)
Spring tilt (exhaust)	2.5 °/1.6 mm (2.5 °/0.06 in)



ENGINE SPECIFICATIONS

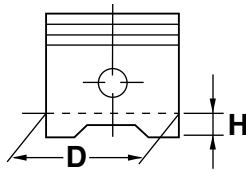
Winding direction (intake)	Clockwise
Winding direction (exhaust)	Clockwise

Cylinder

Bore	97.000–97.010 mm (3.8189–3.8193 in)
Taper limit	0.050 mm (0.0020 in)
Out of round limit	0.050 mm (0.0020 in)

Piston

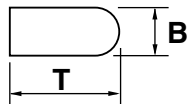
Piston-to-cylinder clearance Limit	0.030–0.055 mm (0.0012–0.0022 in) 0.15 mm (0.006 in)
Diameter D	96.955–96.970 mm (3.8171–3.8177 in)
Height H	9.0 mm (0.35 in)



Offset	0.00 mm (0.0000 in)
Piston pin bore inside diameter Limit	18.004–18.015 mm (0.7088–0.7093 in) 18.045 mm (0.7104 in)
Piston pin outside diameter Limit	17.991–18.000 mm (0.7083–0.7087 in) 17.971 mm (0.7075 in)

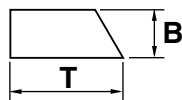
Piston ring

Top ring	
Ring type	Barrel
Dimensions (B × T)	1.00 × 3.30 mm (0.04 × 0.13 in)



End gap (installed) Limit	0.20–0.30 mm (0.0079–0.0118 in) 0.55 mm (0.0217 in)
Ring side clearance Limit	0.015–0.065 mm (0.0006–0.0026 in) 0.120 mm (0.0047 in)

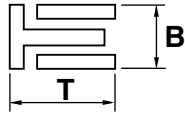
2nd ring	
Ring type	Taper
Dimensions (B × T)	1.00 × 3.10 mm (0.04 × 0.12 in)



End gap (installed) Limit	0.35–0.50 mm (0.0138–0.0197 in) 0.85 mm (0.0335 in)
Ring side clearance Limit	0.020–0.060 mm (0.0008–0.0024 in) 0.120 mm (0.0047 in)

ENGINE SPECIFICATIONS

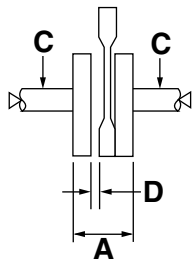
Oil ring	
Dimensions (B × T)	1.50 × 2.55 mm (0.06 × 0.10 in)



End gap (installed)	0.20–0.50 mm (0.0079–0.0197 in)
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Crankshaft

Width A	61.95–62.00 mm (2.439–2.441 in)
Runout limit C	0.030 mm (0.0012 in)
Big end side clearance D	0.150–0.450 mm (0.0059–0.0177 in)



Balancer

Balancer drive method	Gear
-----------------------	------

Clutch

Clutch type	Wet, multiple-disc
Clutch release method	Inner push, cam push
Clutch lever free play	7.0–12.0 mm (0.28–0.47 in)
Friction plate thickness	2.92–3.08 mm (0.115–0.121 in)
Wear limit	2.85 mm (0.112 in)
Plate quantity	8 pcs
Clutch plate thickness	1.10–1.30 mm (0.043–0.051 in)
Plate quantity	7 pcs
Warping limit	0.10 mm (0.0039 in)
Clutch spring free length	48.00 mm (1.89 in)
Minimum length	47.00 mm (1.85 in)
Spring quantity	6 pcs
Push rod bending limit	0.10 mm (0.0039 in)

Transmission

Transmission type	Constant mesh 5-speed
Primary reduction system	Spur gear
Primary reduction ratio	2.609 (60/23)
Final drive	Chain
Secondary reduction ratio	3.692 (48/13) (USA) (CAN) (AUS) (NZL) (ZAF) 3.769 (49/13) (EUR) (JPN)
Operation	Left foot operation
Gear ratio	
1st	1.929 (27/14)
2nd	1.533 (23/15)
3rd	1.300 (26/20)
4th	1.091 (24/22)
5th	0.952 (20/21)

ENGINE SPECIFICATIONS

Shifting mechanism	
Shift mechanism type	Shift drum and guide bar
Shift fork guide bar bending limit	0.050 mm (0.0020 in)
Shift fork thickness	4.85 mm (0.1909 in)
Decompression device	
Device type	Auto decomp
Air filter	
Air filter element	Wet element
Air filter oil grade	Foam air-filter oil
Fuel pump	
Pump type	Electrical
Fuel injector	
Model/quantity	1010/1
Resistance	12 Ω
Throttle body	
Type/quantity	30RA-JX1A/1
ID mark	1SL5 10
Fuel pressure	324.0 kPa (3.24 kgf/cm ² , 47.0 psi)
Throttle position sensor	
Resistance	6.30 k Ω
Output voltage (at idle)	0.48–0.52 V
Fuel injection sensor	
Crankshaft position sensor resistance	248–372 Ω
Intake air pressure sensor output voltage	3.57–3.71 V at 101.3 kPa
Intake air temperature sensor resistance	290–390 Ω at 80 °C (176 °F)
Coolant temperature sensor resistance	2.51–2.78 k Ω at 20°C (68°F) 210–221 Ω at 100°C (212°F)
Idling condition	
Engine idling speed	1900–2100 r/min
CO%	6.8–9.2 %
Intake vacuum	30.5–37.8 kPa (229–284 mmHg, 9.0–11.2 inHg)
Water temperature	70–80 °C (158–176 °F)
Oil temperature	55–65 °C (131–149 °F)
Throttle grip free play	3.0–5.0 mm (0.12–0.20 in)

CHASSIS SPECIFICATIONS

CHASSIS SPECIFICATIONS

Chassis

Frame type	Semi double cradle
Caster angle	27.08 ° (USA) (CAN) 27.50 ° (EUR) 27.67 ° (JPN) 27.58 ° (AUS) (NZL) (ZAF)
Trail	120 mm (4.7 in) (USA) (CAN) 122 mm (4.8 in) (EUR) 124 mm (4.9 in) (JPN) (AUS) (NZL) (ZAF)

Front wheel

Wheel type	Spoke wheel
Rim size	21 × 1.60
Rim material	Aluminum
Wheel travel	310 mm (12.2 in)
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	19 × 2.15
Rim material	Aluminum
Wheel travel	315 mm (12.4 in)
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/MX52F (USA) (CAN) PIRELLI/MID SOFT 32 (EUR) BRIDGESTONE/M601 (JPN) DUNLOP/MX52F (AUS) (NZL) (ZAF)

Rear tire

Type	With tube
Size	120/80-19 63M (USA) (CAN) 110/90-19 62M (EUR) (JPN) 120/80-19 63M (AUS) (NZL) (ZAF)
Manufacturer/model	DUNLOP/MX52 (USA) (CAN) PIRELLI/MID SOFT 32 (EUR) BRIDGESTONE/M602 (JPN) DUNLOP/MX52 (AUS) (NZL) (ZAF)

Tire air pressure (measured on cold tires)

Front	100 kPa (1.00 kgf/cm ² , 15 psi)
Rear	100 kPa (1.00 kgf/cm ² , 15 psi)

Front brake

Type	Single disc brake
Operation	Right hand operation
Front disc brake	
Disc outside diameter × thickness	250 × 3.0 mm (9.8 × 0.12 in)

CHASSIS SPECIFICATIONS

Brake disk thickness limit	2.5 mm (0.10 in)
Brake pad lining thickness (inner)	4.4 mm (0.17 in)
Limit	1.0 mm (0.04 in)
Brake pad lining thickness (outer)	4.4 mm (0.17 in)
Limit	1.0 mm (0.04 in)
Master cylinder inside diameter	9.52 mm (0.37 in)
Caliper cylinder inside diameter	22.65 mm × 2 (0.89 in × 2)
Recommended brake fluid	DOT 4

Rear brake

Type	Single disc brake
Operation	Right foot operation
Rear disc brake	
Disc outside diameter × thickness	245 × 4.0 mm (9.6 × 0.16 in)
Brake disc thickness limit	3.5 mm (0.14 in)
Brake disc deflection limit	0.15 mm (0.0059 in)
Brake pad lining thickness (inner)	6.4 mm (0.25 in)
Limit	1.0 mm (0.04 in)
Brake pad lining thickness (outer)	6.4 mm (0.25 in)
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 (1.00 in × 1)
Recommended fluid	DOT 4

Steering

Steering bearing type	Taper roller bearing
Center to lock angle (left)	43.0 °
Center to lock angle (right)	43.0 °

Front suspension

Type	Telescopic fork
Spring/shock absorber type	Coil spring/oil damper
Front fork travel	310.0 mm (12.20 in)
Fork spring free length	497.0 mm (19.57 in)
Limit	492.0 mm (19.37 in)
Installed length	497.0 mm (19.57 in)
Spring rate K1	5.00 N/mm (0.51 kgf/mm, 28.55 lbf/in) (USA) (CAN) 4.70 N/mm (0.48 kgf/mm, 26.84 lbf/in) (EUR) (JPN) (AUS) (NZL) (ZAF)
Spring stroke K1	0.0–310.0 mm (0.00–12.20 in)
Inner tube outer diameter	48 mm (1.9 in)
Inner tube bending limit	0.2 mm (0.01 in)
Optional spring available	Yes
Recommended oil	Suspension oil S1
Standard oil amount	511.0 cm ³ (17.28 US.oz, 18.02 Imp.oz) (USA) (CAN) 551.0 cm ³ (18.63 US.oz, 19.43 Imp.oz) (EUR) (JPN) (AUS) (NZL) (ZAF)

Rebound damping adjusting positions

* Position in which the adjuster is turned in finger tight

Minimum	20 click (s) out*
Standard	10 click (s) out* (USA) (CAN) 8 click (s) out* (EUR) (JPN) (AUS) (NZL) (ZAF)
Maximum (hard)	Fully turned in

CHASSIS SPECIFICATIONS

Compression damping adjusting positions

* Position in which the adjuster is turned in finger tight

Minimum	20 click (s) out*
Standard	8 click (s) out*
Maximum (hard)	Fully turned in

Rear suspension

Type	Swingarm (link suspension)
Spring/shock absorber type	Coil spring/gas-oil damper
Rear shock absorber assembly travel	132.0 mm (5.20 in)
Spring free length	275.0 mm (10.83 in)
Spring rate K1	58.00 N/mm (5.91 kgf/mm, 331.18 lbf/in) (USA) (CAN) 56.00 N/mm (5.71 kgf/mm, 319.76 lbf/in) (EUR) (JPN) (AUS) (NZL) (ZAF)
Spring stroke K1	0.0–150.0 mm (0.00–5.91 in)
Optional spring available	Yes
Enclosed gas/air pressure (STD)	980 kPa (9.8 kgf/cm ² , 139.4 psi)
Spring installed length	
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 10 mm (0.39 in) from its free length.
Maximum	Position in which the spring is turned in 18 mm (0.71 in) from its free length.

Rebound damping adjusting positions

* Position in which the adjuster is turned in finger tight

Minimum	30 click (s) out*
Standard	14 click (s) out* (USA) (CAN) 12 click (s) out* (EUR) (JPN) (AUS) (NZL) (ZAF)
Maximum	Fully turned in

Compression damping adjusting positions (for fast compression damping)

* Position in which the adjuster is turned in finger tight

Minimum	2 turn (s) out*
Standard	1-1/2 turn (s) out* (USA) (CAN) 1-1/8 turn (s) out* (EUR) (JPN) (AUS) (NZL) (ZAF)
Maximum	Fully turned in

Compression damping adjusting positions (for slow compression damping)

* Position in which the adjuster is turned in finger tight

Minimum	20 click (s) out*
Standard	12 click (s) out* (USA) (CAN) 10 click (s) out* (EUR) (JPN) (AUS) (NZL) (ZAF)
Maximum	Fully turned in

Swingarm

Swingarm end free play limit (radial)	1.0 mm (0.04 in)
Swingarm end free play limit (axial)	0.2–0.9 mm (0.01–0.04 in)

CHASSIS SPECIFICATIONS

Drive chain

Type/manufacturer	520DMA2-SDH/DAIDO
Number of links	114
Drive chain slack	50–60 mm (1.97–2.36 in)
15-link length limit	242.9 mm (9.56 in)

ELECTRICAL SPECIFICATIONS

ELECTRICAL SPECIFICATIONS

Voltage

System voltage 12 V

Ignition system

Ignition system TCI
Advancer type Digital
Ignition timing (B.T.D.C.) 10.0 ° at 2000 r/min

Engine control unit

Model/manufactururer 1SL4/YAMAHA (USA) (CAN)
1SL5/YAMAHA (EUR) (JPN) (AUS) (NZL)
(ZAF)

Ignition coil

Minimum ignition spark gap 6.0 mm (0.24 in)
Primary coil resistance 2.16–2.64 Ω
Secondary coil resistance 8.64–12.96 k Ω

AC magneto

Standard output 14.0 V, 95 W at 5000 r/min
Stator coil resistance 0.624–0.936 Ω

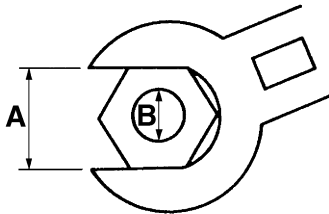
Rectifier/regulator

Regulator type Semi conductor-short circuit
No load regulated voltage 14.1–14.9 V
Rectifier capacity (DC) 23.0 A

TIGHTENING TORQUES

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 criss-cross 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		
		Nm	m·kgf	ft·lbf
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	61
22 mm	16 mm	130	13.0	94

TIGHTENING TORQUES






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 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Cylinder head blind plug	M12	1	28 Nm (2.8 m·kgf, 20 ft·lbf)	
Spark plug	M10	1	13 Nm (1.3 m·kgf, 9.4 ft·lbf)	
Cylinder head stud bolt (exhaust pipe)	M6	3	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Cylinder head bolts	M9	4	See TIP.* ¹	
Cylinder head bolts	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Cylinder head cover bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil passage plug (cylinder head)	M8	1	15 Nm (1.5 m·kgf, 11 ft·lbf)	
Cylinder bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil pressure check bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Balancer weight plate screw	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Balancer driven gear nut	M14	1	50 Nm (5.0 m·kgf, 36 ft·lbf)	Use a lock washer.
Balancer nut	M10	1	45 Nm (4.5 m·kgf, 33 ft·lbf)	Use a lock washer.
Timing chain guide stopper plate (exhaust side)	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Timing chain tensioner cap bolt	M6	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Timing chain tensioner bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Coolant drain bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Radiator hose clamp screw	M6	8	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Radiator bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Radiator pipe bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Radiator pipe joint bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Water pump housing cover bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil pump bolt	M5	2	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Oil pump cover screw	M4	1	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Oil strainer bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil passage cover bolt (left crank-case)	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Throttle cable cover bolt	M5	1	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
Throttle body joint bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Throttle body joint clamp bolt	M5	1	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	

TIGHTENING TORQUES

ITEM	Thread size	Q'ty	TIGHTENING TORQUES	Remarks
Air filter joint clamp bolt	M4	1	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
Air filter case bolt	M6	3	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Air filter bolt	M6	1	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Air filter guide holder screw	M5	8	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
Air filter case cap screw	M5	1	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
Starter knob/Idle screw	M12	1	2.1 Nm (0.21 m·kgf, 1.5 ft·lbf)	
Throttle cable nut (pull)	M10	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Throttle cable nut (return)	M10	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Clutch cable adjuster and locknut	M6	1	4.3 Nm (0.43 m·kgf, 3.1 ft·lbf)	
Clutch cable locknut (engine side)	M8	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Exhaust pipe nut	M6	3	See TIP.**2	
Exhaust pipe protector screw	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Exhaust pipe bracket bolt	M8	1	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Frame and silencer bolt (front)	M8	1	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Frame and silencer bolt (rear)	M8	1	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Exhaust pipe clamp bolt	M8	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Silencer body bolt	M5	6	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Oil nozzle bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Engine oil drain bolt	M10	1	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Crankcase bolt	M6	12	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Clutch cable holder bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Crankshaft end accessing screw	M36	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Timing mark accessing screw	M14	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Drive chain sprocket cover bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Crankcase bearing cover plate screw	M6	8	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Crankcase bearing cover plate screw (crankshaft)	M8	4	18 Nm (1.8 m·kgf, 13 ft·lbf)	Crimp.
Clutch cover bolt	M6	7	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil level check window bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Left crankcase cover bolt	M6	7	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Right crankcase cover bolt	M6	11	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil filter element cover bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil level check window bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Kick shaft ratchet wheel guide bolt	M6	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Kick starter lever bolt	M8	1	33 Nm (3.3 m·kgf, 24 ft·lbf)	
Kick starter lever boss screw	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	

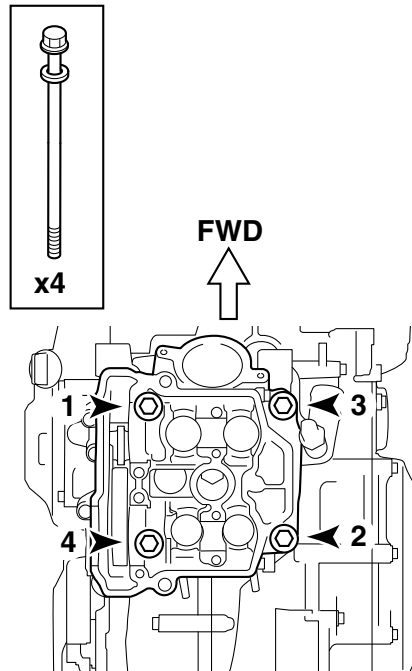
TIGHTENING TORQUES

ITEM	Thread size	Q'ty	TIGHTENING TORQUES	Remarks
Primary drive gear nut	M20	1	100 Nm (10 m·kgf, 72 ft·lbf)	
Clutch spring bolt	M6	6	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Clutch boss nut	M20	1	75 Nm (7.5 m·kgf, 54 ft·lbf)	
Drive sprocket nut	M20	1	75 Nm (7.5 m·kgf, 54 ft·lbf)	Use a lock washer.
Drive axle oil seal stopper bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Segment	M8	1	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Shift guide bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Stopper lever bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
△ Shift pedal bolt	M6	1	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Rotor nut	M12	1	65 Nm (6.5 m·kgf, 47 ft·lbf)	
Stator screw	M5	3	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Crankshaft position sensor bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
AC magneto lead holder bolt	M5	1	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Coolant temperature sensor	M10	1	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Neutral switch bolt	M5	2	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
Intake air temperature sensor screw	M5	1	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Rectifier/regulator bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
ECU bolt	M5	2	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Ignition coil bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Throttle position sensor screw	M5	2	3.4 Nm (0.34 m·kgf, 2.5 ft·lbf)	
Intake air pressure sensor screw	M6	1	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	

TIGHTENING TORQUES

TIP

*1: First, tighten the cylinder head bolts to 30 Nm (3.0 m·kgf, 22 ft·lbf) in the proper tightening sequence and remove them. Retighten the cylinder head bolts to 20 Nm (2.0 m·kgf, 14 ft·lbf) in the proper tightening sequence, and then tighten the cylinder head bolts further to reach the specified angle 150° in the proper tightening sequence.



TIP


*2: First temporarily tighten nuts to 7 Nm (0.7 m·kgf, 5.1 ft·lbf). Then retighten them to 10 Nm (1.0 m·kgf, 7.2 ft·lbf).

TIGHTENING TORQUES




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
△	Outer tube and upper bracket bolt	M8	4	21 Nm (2.1 m·kgf, 15 ft·lbf)	
△	Outer tube and lower bracket bolt	M8	4	21 Nm (2.1 m·kgf, 15 ft·lbf)	
△	Upper bracket and steering stem nut	M24	1	145 Nm (14.5 m·kgf, 105 ft·lbf)	
△	Upper handlebar holder bolt	M8	4	28 Nm (2.8 m·kgf, 20 ft·lbf)	
△	Lower handlebar holder nut	M10	2	40 Nm (4.0 m·kgf, 29 ft·lbf)	
	Engine stop switch screw	M3	1	0.5 Nm (0.05 m·kgf, 0.36 ft·lbf)	
△	Lower ring nut	M28	1	See TIP.	
	Outer tube and damper assembly	M51	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
	Inner tube and adjuster	M22	2	55 Nm (5.5 m·kgf, 40 ft·lbf)	
	Damper assembly and base valve	M42	2	28 Nm (2.8 m·kgf, 20 ft·lbf)	
	Damper assembly adjuster	M12	2	29 Nm (2.9 m·kgf, 21 ft·lbf)	
	Bleed screw (front fork) and base valve	M5	2	1.3 Nm (0.13 m·kgf, 0.94 ft·lbf)	
△	Front fork protector bolt	M6	6	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
△	Front fork protector and brake hose holder bolt	M6	2	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
	Throttle grip cap screw	M5	2	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
	Clutch lever holder bolt	M6	2	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
	Clutch lever nut	M6	1	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
	Clutch lever position locknut	M5	1	4.8 Nm (0.48 m·kgf, 3.5 ft·lbf)	
△	Front brake master cylinder holder bolt	M6	2	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
	Front brake master cylinder reservoir cap screw	M4	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
	Front brake lever pivot bolt	M6	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
	Front brake lever pivot nut	M6	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
	Front brake lever position locknut	M6	1	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
△	Front brake hose holder and lower bracket bolt	M6	1	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
△	Front brake hose union bolt	M10	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
△	Front brake caliper bolt	M8	2	28 Nm (2.8 m·kgf, 20 ft·lbf)	
	Front brake pad pin	M10	1	17 Nm (1.7 m·kgf, 12 ft·lbf)	
	Front brake pad pin plug	M10	1	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
△	Front brake caliper bleed screw	M8	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
△	Front wheel axle nut	M18	1	115 Nm (11.5 m·kgf, 83 ft·lbf)	
△	Front wheel axle pinch bolt	M8	4	21 Nm (2.1 m·kgf, 15 ft·lbf)	

TIGHTENING TORQUES

	ITEM	Thread size	Q'ty	TIGHTENING TORQUES	Remarks
△	Front brake disc bolt	M6	6	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
△	Rear brake disc bolt	M6	6	14 Nm (1.4 m·kgf, 10 ft·lbf)	
	Footrest bracket bolt	M10	4	55 Nm (5.5 m·kgf, 40 ft·lbf)	
△	Rear brake pedal bolt	M8	1	26 Nm (2.6 m·kgf, 19 ft·lbf)	
	Rear brake pedal position locknut	M6	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
△	Rear brake master cylinder bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
	Rear brake master cylinder reservoir cap bolt	M4	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
△	Rear brake hose union bolt	M10	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
△	Rear brake caliper bleed screw	M8	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
	Rear brake pad pin	M10	1	17 Nm (1.7 m·kgf, 12 ft·lbf)	
	Rear brake pad pin plug	M10	1	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
△	Rear wheel axle nut	M22	1	135 Nm (13.5 m·kgf, 98 ft·lbf)	
	Drive chain puller adjust bolt and locknut	M8	2	21 Nm (2.1 m·kgf, 15 ft·lbf)	
△	Rear wheel sprocket nut	M8	6	42 Nm (4.2 m·kgf, 30 ft·lbf)	
△	Nipple (spoke)	—	72	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
△	Rear brake disc cover bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
△	Rear brake caliper protector bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
△	Engine mounting bolt (upper side)	M10	2	45 Nm (4.5 m·kgf, 33 ft·lbf)	
△	Engine mounting bolt (front side)	M10	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
△	Engine mounting bolt (lower side)	M10	1	53 Nm (5.3 m·kgf, 38 ft·lbf)	
△	Engine bracket bolt (upper side)	M8	4	34 Nm (3.4 m·kgf, 25 ft·lbf)	
△	Engine bracket bolt (front side)	M8	4	34 Nm (3.4 m·kgf, 25 ft·lbf)	
△	Rear frame and frame bolt	M8	4	32 Nm (3.2 m·kgf, 23 ft·lbf)	
△	Engine guard bolt (right side)	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
△	Pivot shaft and nut	M16	1	85 Nm (8.5 m·kgf, 61 ft·lbf)	
△	Rear shock absorber assembly upper bolt	M10	1	56 Nm (5.6 m·kgf, 41 ft·lbf)	
△	Rear shock absorber assembly lower bolt	M10	1	53 Nm (5.3 m·kgf, 38 ft·lbf)	
	Rear shock absorber locknut	M60	1	30 Nm (3.0 m·kgf, 22 ft·lbf)	
△	Relay arm bolt (swingarm side)	M14	1	70 Nm (7.0 m·kgf, 51 ft·lbf)	
△	Connecting arm bolt (relay arm side)	M14	1	80 Nm (8.0 m·kgf, 58 ft·lbf)	
△	Connecting arm bolt (frame side)	M14	1	80 Nm (8.0 m·kgf, 58 ft·lbf)	
△	Swingarm and brake hose holder screw	M5	4	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
	Drive chain tensioner bolt (upper side)	M8	1	16 Nm (1.6 m·kgf, 12 ft·lbf)	

TIGHTENING TORQUES

ITEM	Thread size	Q'ty	TIGHTENING TORQUES	Remarks
Drive chain tensioner bolt (lower side)	M8	1	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Drive chain support bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Drive chain support nut	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Drive chain guide bolt	M5	3	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
△ Rear frame and left cover bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
△ Fuel tank bolt (front side)	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Fuel tank bolt (rear side)	M6	1	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
Fuel tank bracket bolt (front side)	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Fuel tank bracket bolt (rear side)	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
△ Fuel pump bolt	M5	6	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Fuel inlet pipe screw	M5	2	3.4 Nm (0.34 m·kgf, 2.5 ft·lbf)	
Fuel tank cap cover bolt	M6	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Seat set bracket and fuel tank screw	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
△ Seat bolt	M8	2	22 Nm (2.2 m·kgf, 16 ft·lbf)	
△ Left side cover bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
△ Right side cover bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
△ Frame and air scoop bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
△ Fuel tank and air scoop bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
△ Radiator guard and air scoop bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
△ Front fender bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
△ Rear fender bolt (front side)	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
△ Rear fender bolt (rear side)	M6	2	16 Nm (1.6 m·kgf, 12 ft·lbf)	
△ Mud flap screw	—	2	1.3 Nm (0.13 m·kgf, 0.94 ft·lbf)	
△ Number plate bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	





































TIP

1. First, tighten the lower ring nut approximately 38 Nm (3.8 m·kgf, 27 ft·lbf) by using the steering nut wrench, then loosen the lower ring nut one turn.
2. Retighten the lower ring nut 7 Nm (0.7 m·kgf, 5.1 ft·lbf).

LUBRICATION POINTS AND LUBRICANT TYPES

LUBRICATION POINTS AND LUBRICANT TYPES

ENGINE







































Lubrication point	Lubricant types
Oil seal lips	
Bearing	
O-ring	
Cylinder head bolt threads, seats, washers	
Valve stems	
Valve stem ends	
Valve lifter outer surface	
Camshaft lobe and journal	
Valve lifter top surface	
Crankshaft journal	
Crankshaft big end thrust surfaces	
Piston outer surface	
Piston pin outer surface	
Decompression system moving parts	
Water pump impeller shaft	
Oil pump rotors (inner and outer)	
Oil passage gasket	
Oil pump shaft	
Kick gear and ratchet wheel	
Kick shaft	
Kick idle gear inner surface	
Ratchet wheel and ratchet wheel guide contacting portion	
Primary drive gear nut threads and contacting surface	
Clutch boss nut threads and contacting surface	
Primary driven gear inner surface and end surface	
Clutch push rod washer	
Clutch push rod 1 outer surface	
Clutch push rod 1 thrust surface	
Clutch push rod 2 outer surface	
Push lever shaft outer surface	
Transmission gear inner surface (wheel and pinion) and collar	
Transmission gears (shift fork groove)	
Shift cam grooves	
Shift fork and shift fork guide outer surface	
Shift shaft	
Shift lever assembly moving parts	

LUBRICATION POINTS AND LUBRICANT TYPES






Lubrication point	Lubricant types
Cylinder head cover gasket	Three Bond No.1215®
Crankcase mating surface	Three Bond No.1215®
Stator assembly lead grommet	Three Bond No.1215®

LUBRICATION POINTS AND LUBRICANT TYPES

CHASSIS

Lubrication point	Lubricant types
Upper bearings (steering head)	
Upper bearings and bearing race cover (steering head)	
Lower bearings and oil seal lip (steering head)	
Steering stem threads and nut contacting surface	
Pivot shaft bearing	
Swingarm pivot portion (collar side surface and thrust bearing)	
Swingarm pivot portion (collar outer surface)	
Swingarm pivot portion (oil seal lip)	
Pivot shaft outer surface	
Relay arm bearing and oil seal lip	
Relay arm thrust washer surface (both sides)	
Relay arm collar outer surface and bolt outer surface	
Relay arm bolt threads (swingarm side)	
Connecting arm bearing and oil seal lip	
Connecting arm collar outer surface and bolt outer surface	
Rear shock absorber assembly collar outer surface and dust seal lip (upper side)	
Rear shock absorber assembly bearing and dust seal lip (lower side)	
Brake pedal pivot portion (O-ring and bolt outer surface)	
Front wheel oil seal lip	
Front wheel axle outer surface	
Rear wheel oil seal lip	
Rear wheel axle outer surface	
Push rod contacting portion (front brake master cylinder)	
Front brake lever bolt outer surface	
Clutch lever sliding surface and bolt outer surface	
Clutch lever position adjuster end	
Clutch lever adjuster rubber lip	
Clutch cable end (clutch lever side)	
Tube guide (throttle grip) inner surface and throttle cable end	
Front brake caliper piston	
Front brake caliper piston seal	
Front brake caliper dust seal	
Front brake caliper piston outer surface	
Front brake caliper pin bolt and boot	
Front brake master cylinder push rod end	
Front brake master cylinder kit	
Rear brake caliper piston	
Rear brake caliper piston seal	

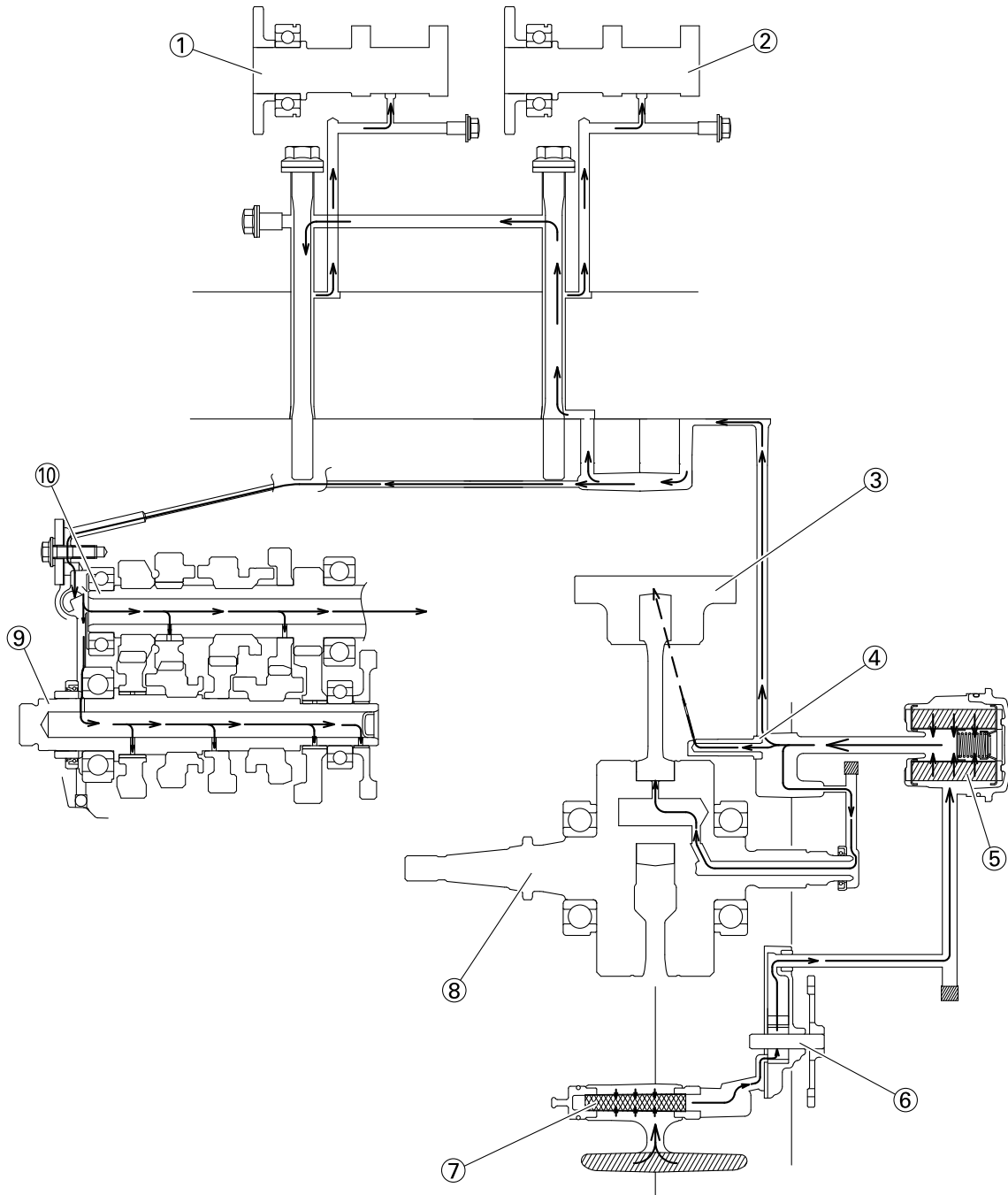
LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant types
Rear brake caliper dust seal	
Rear brake caliper piston outer surface	
Rear brake caliper pin bolt and boot	
Rear brake master cylinder push rod end	
Rear brake master cylinder kit	

LUBRICATION SYSTEM CHART AND DIAGRAMS

LUBRICATION SYSTEM CHART AND DIAGRAMS

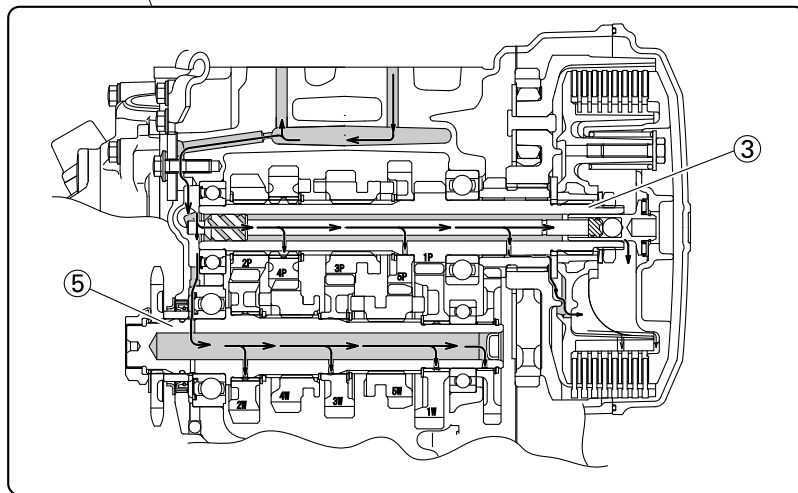
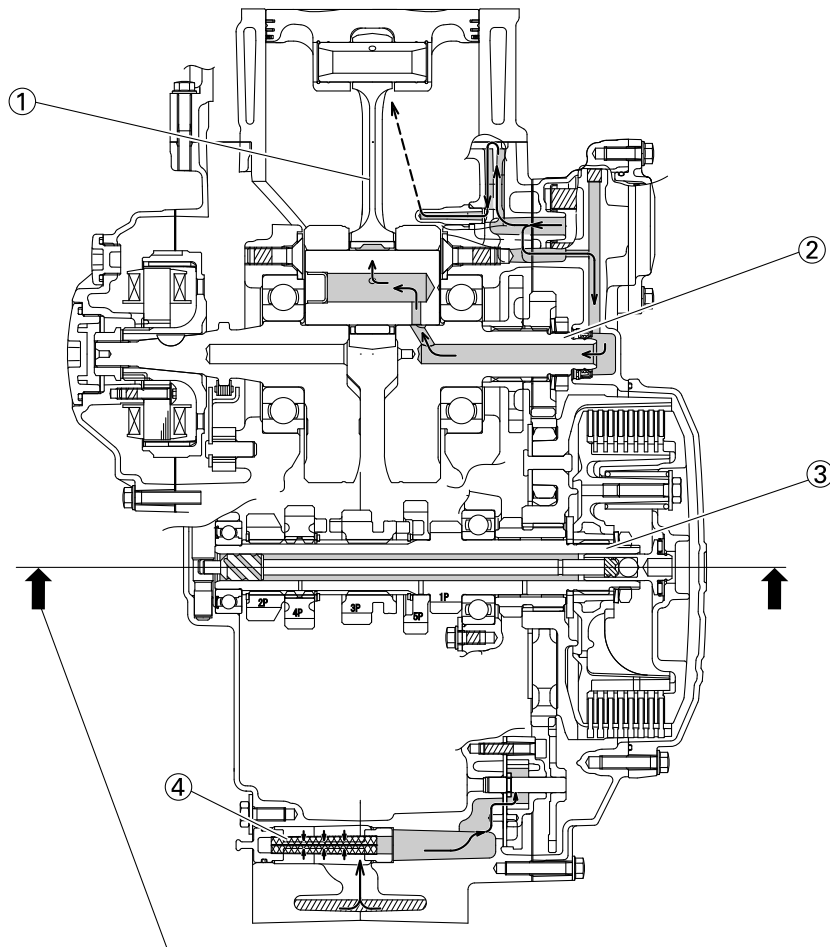
LUBRICATION DIAGRAMS



LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Intake camshaft
2. Exhaust camshaft
3. Piston
4. Oil nozzle
5. Oil filter element
6. Oil pump
7. Oil strainer
8. Crankshaft
9. Drive axle
10. Main axle

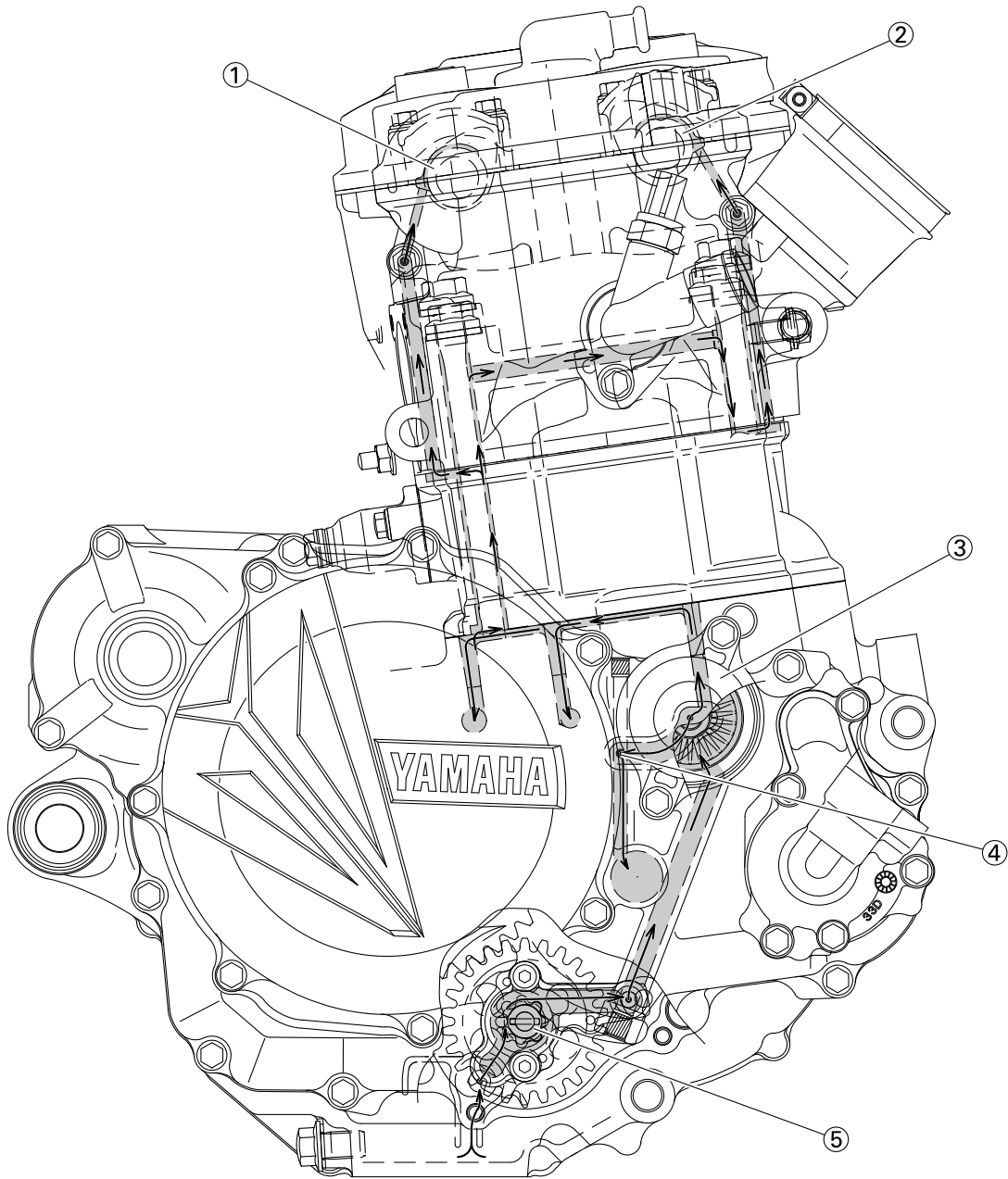
LUBRICATION SYSTEM CHART AND DIAGRAMS



LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Connecting rod
2. Crankshaft
3. Main axle
4. Oil strainer
5. Drive axle

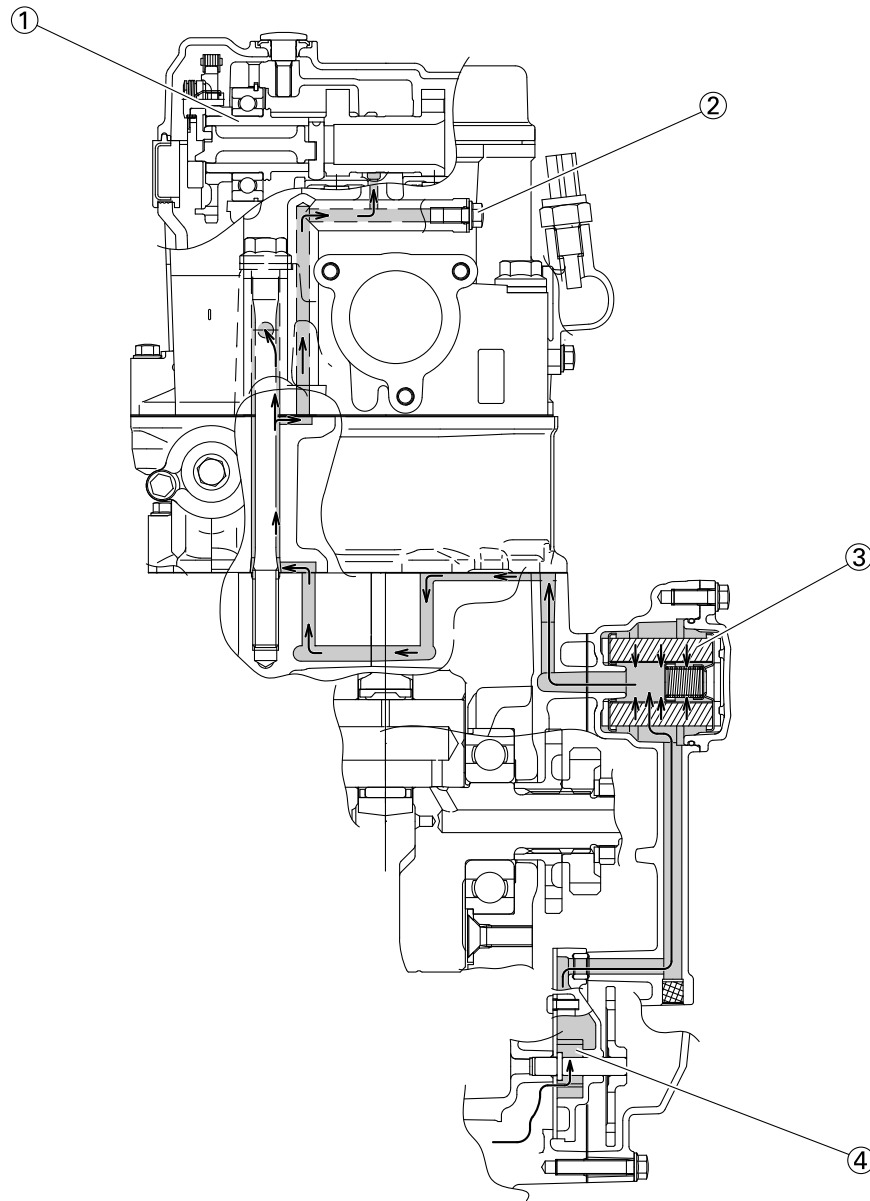
LUBRICATION SYSTEM CHART AND DIAGRAMS



LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Exhaust camshaft
2. Intake camshaft
3. Oil filter element
4. Relief valve
5. Oil pump

LUBRICATION SYSTEM CHART AND DIAGRAMS

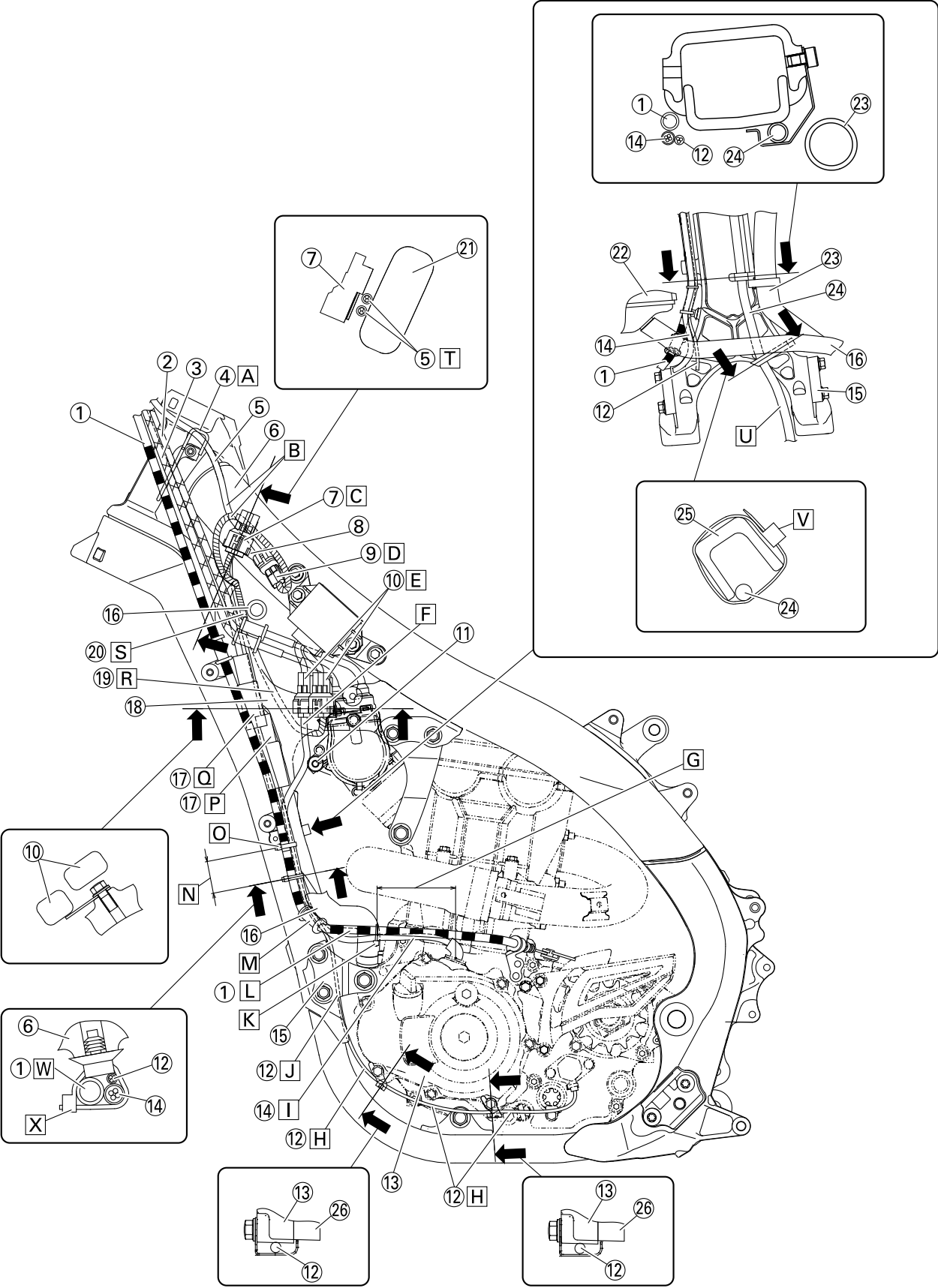


LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Camshaft
2. Oil pressure check bolt
3. Oil filter element
4. Oil pump

CABLE ROUTING DIAGRAM

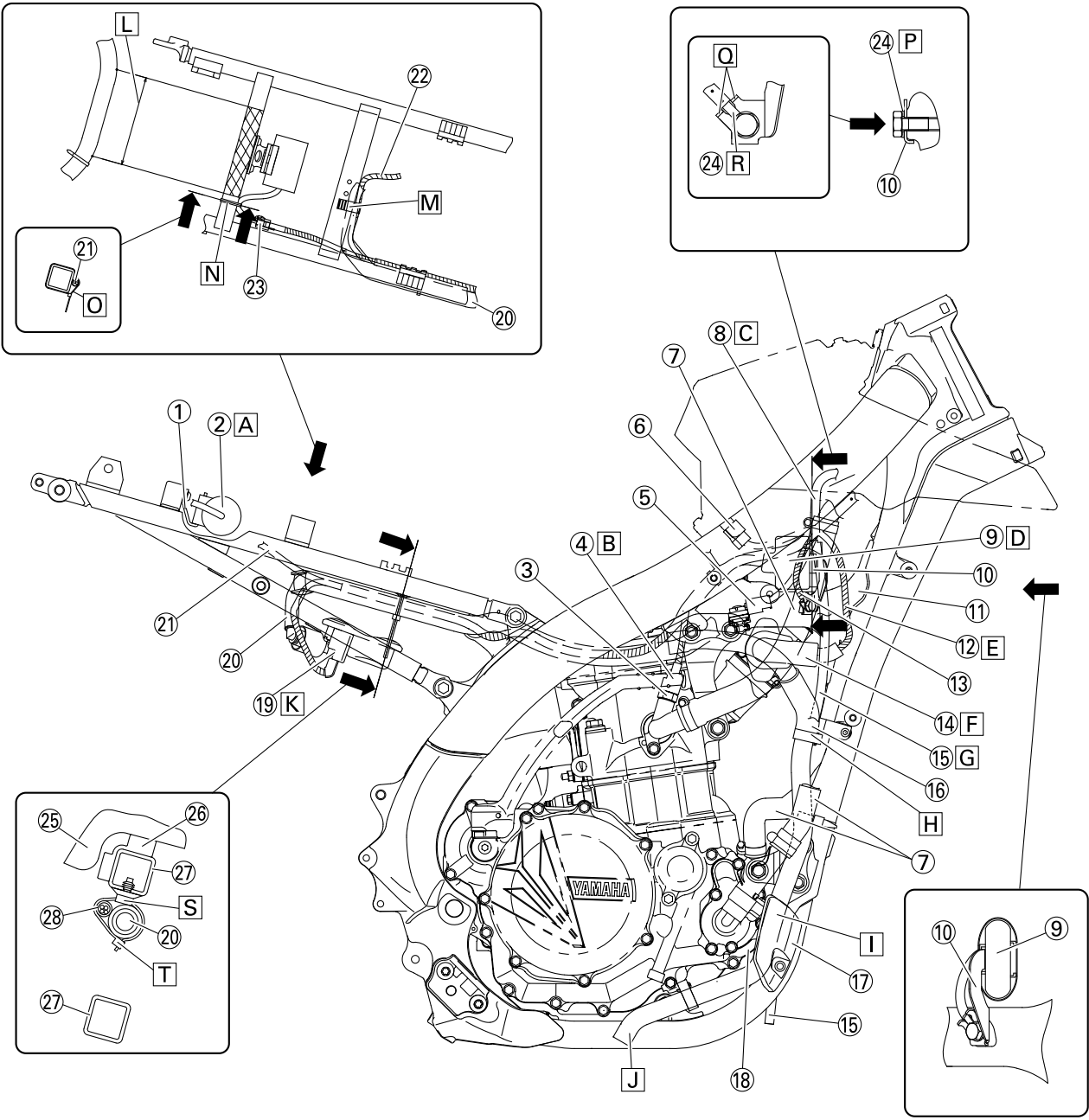
CABLE ROUTING DIAGRAM



CABLE ROUTING DIAGRAM

1. Clutch cable
 2. Throttle cable (pull)
 3. Throttle cable (return)
 4. Cable holder
 5. Engine stop switch lead
 6. Frame
 7. Coupler for connecting optional part
 8. Bracket
 9. Engine stop switch coupler
 10. Rectifier/regulator coupler
 11. Starter knob/idle screw
 12. Neutral switch lead
 13. Crankcase cover
 14. AC magneto lead
 15. Front engine bracket
 16. Radiator hose
 17. Coupler cover
 18. Tension arm
 19. Rectifier/regulator lead
 20. Main harness
 21. Tank rail
 22. Radiator
 23. Cylinder head breather hose
 24. Radiator breather hose
 25. Down tube
 26. Crankcase
- A. Pass the engine stop switch lead between the frame and the cable holder.
 - B. Pass the engine stop switch lead between the coupler for connecting optional part and the frame, where the main harness should face the outside of the vehicle.
 - C. Insert the coupler for connecting optional part into the connector, and fix it to the bracket.
 - D. Insert and fix the engine stop switch coupler to the bracket.
 - E. Insert and fix the rectifier/regulator coupler to the bracket.
 - F. Pass the AC magneto lead to the front of the vehicle beyond the starter knob/idle screw and to the rear of the vehicle beyond the radiator. No pinch is allowed between the radiator and the tension arm.
 - G. 70 mm (2.76 in)
 - H. Bring the neutral switch lead into line with the crankcase cover with no sag allowed.
 - I. Bring the AC magneto lead into line with the clutch cable with no sag allowed.
 - J. Pass the neutral switch lead to the inside of the front engine bracket (the side of the vehicle).
 - K. Clamp the clutch cable and the AC magneto lead by the plastic locking tie. Regardless of the orientation of the lock on the plastic locking tie, cut the end.
 - L. Pass the clutch cable with no downward sag allowed.
 - M. Bring the grommet of the clutch cable into contact with the radiator hose, and pass it to the outside of the neutral switch lead and the AC magneto lead (the outside of the vehicle).
 - N. 40 mm (1.57 in)
 - O. Clamp the clutch cable, the AC magneto lead, and the neutral switch lead by the plastic locking tie. Make sure that they are clamped at the positioning tape in the clutch cable. Make the lock on the plastic locking tie face the front of the vehicle, and cut the end.
 - P. After connecting the neutral switch coupler, attach the coupler cover.
 - Q. After connecting the AC magneto coupler, attach the coupler cover.
 - R. Pass the rectifier/regulator lead to the inside of the tension arm (the side of the vehicle).
 - S. Pass the main harness to the front of the radiator hose (the front of the vehicle), and to the inside of the clutch cable (the side of the vehicle).
 - T. Pass the engine stop switch lead between the coupler for connecting optional part and the tank rail, with the lead on the main harness side facing the top of the vehicle.
 - U. Pass the radiator breather hose between the down tubes.
 - V. Clamp the radiator breather hose, above the engine bracket (front). Clamp the lock on the plastic tie with it located outside the vehicle, and face the end toward the front of the vehicle.
 - W. Clamp the clutch cable at the front of the lead (the front of the vehicle).
 - X. Make the lock on the plastic locking tie face the front of the vehicle, and insert the projection into the hole in the frame. Cut the end of the plastic locking tie.

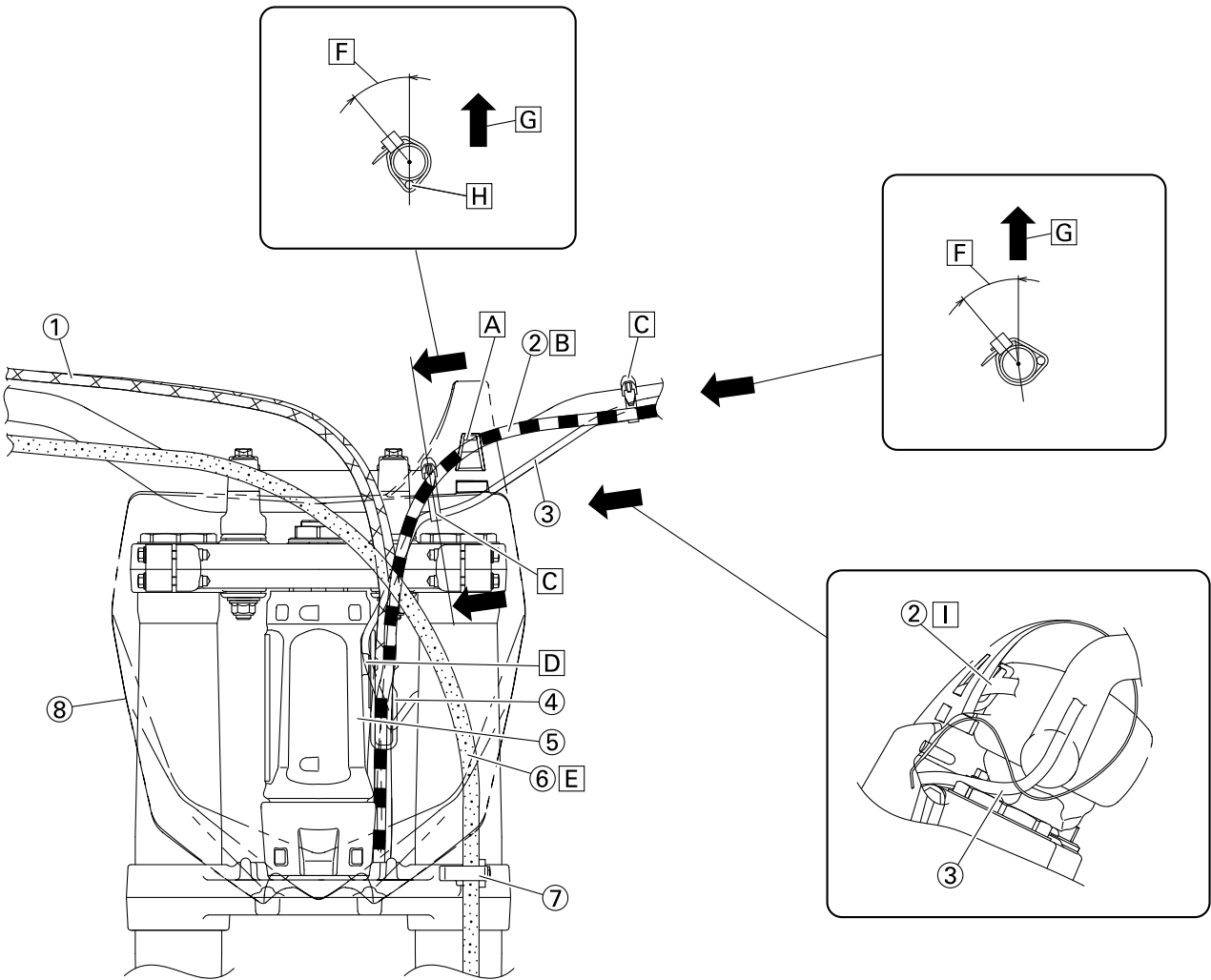
CABLE ROUTING DIAGRAM



CABLE ROUTING DIAGRAM

1. Bracket
 2. Condenser
 3. Coolant temperature sensor
 4. Coupler cover
 5. Intake air temperature sensor coupler
 6. Intake air temperature sensor coupler
 7. Radiator hoses
 8. Radiator breather hose
 9. Joint coupler
 10. Plate
 11. Tension arm
 12. Throttle position sensor lead
 13. Ground lead
 14. Throttle position sensor coupler
 15. Radiator breather hose
 16. Cylinder head breather hose
 17. Engine guard
 18. Crankcase
 19. Fuel pump coupler
 20. Fuel hose
 21. Condenser lead
 22. Fuel pump lead
 23. Condenser coupler
 24. Ground lead terminal
 25. Fuel tank
 26. Damper
 27. Rear frame
 28. Main harness
- A. Insert the condenser into the bracket as far as it will go.
 - B. Attach the coupler cover to the coolant temperature sensor coupler.
 - C. Pass the radiator breather hose to the inside of the radiator hose (the side of the vehicle).
 - D. Insert and fix the joint coupler to the plate. After fixing it, attach the cover.
 - E. Pass the throttle position sensor lead to the outside of the tension arm (the outside of the vehicle).
 - F. After connecting the throttle position sensor coupler, attach the cover.
 - G. Pass the radiator breather hose to the outside of the tension arm and the throttle position sensor lead (the outside of the vehicle), and to the inside of the radiator hose (the side of the vehicle).
 - H. Pass the protector of the cylinder head breather hose until it touches the holder.
 - I. Pass the cylinder head breather hose between the engine guard and the crankcase.
 - J. Install the end of the cylinder head breather hose with it facing downward.
 - K. After connecting the fuel pump coupler, attach the coupler cover.
 - L. 55 mm (2.17 in) (seat load receiver)
 - M. Clamp the fuel hose and the fuel pump lead by the holder. Make sure that the painted part on the fuel hose is clamped, and face the lock on the clamp toward the rear top of the vehicle.
 - N. Do not install the plastic locking tie to the seat load receiver.
 - O. Make the lock on the plastic locking tie face the front of the vehicle, and make the end face the bottom of the vehicle. Do not cut the end.
 - P. Install the ground lead terminal between the plate and the bolt.
 - Q. Detent
 - R. Fix the ground lead terminal to the detent in the plate. For the ground lead terminal, either side will do.
 - S. Insert the projection on the plastic locking tie into the hole in the rear frame.
 - T. Clamp the painted part on the fuel hose by the plastic clamp. Make the lock on the plastic clamp face the bottom of the vehicle, and cut the end.

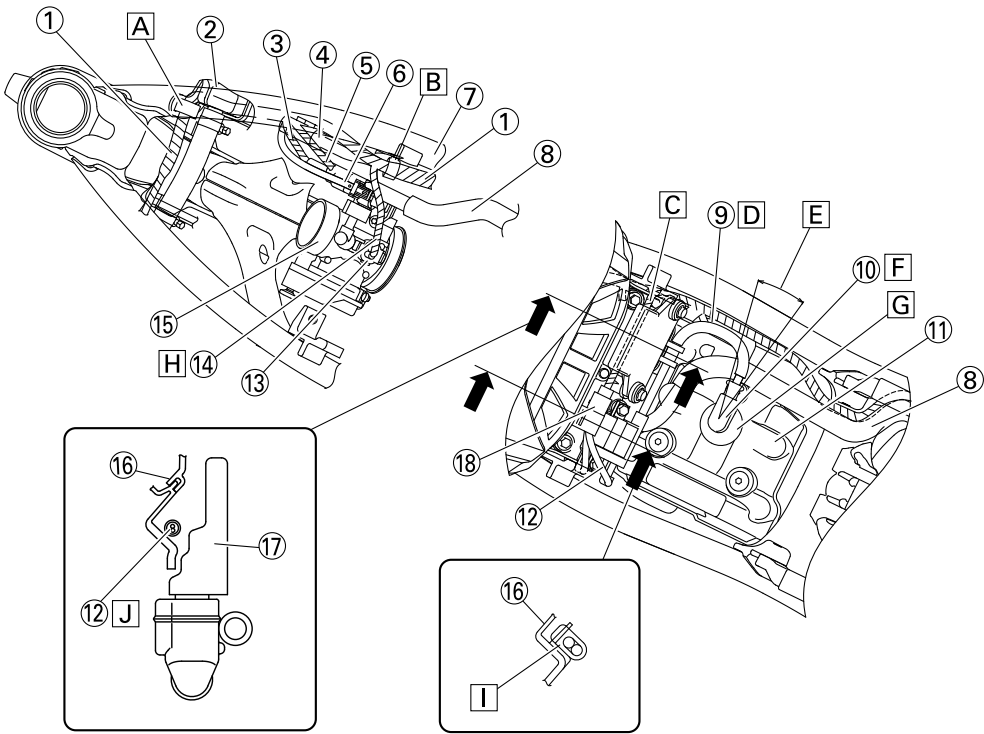
CABLE ROUTING DIAGRAM



CABLE ROUTING DIAGRAM

1. Throttle cable
 2. Clutch cable
 3. Engine stop switch lead
 4. Cable guide
 5. Head pipe
 6. Front brake hose
 7. Brake hose guide
 8. Number plate
-
- A. Number plate band
 - B. Pass the clutch cable to the rear of the number plate band.
 - C. Clamp the engine stop switch lead to the handlebar by the plastic band. Do not cut the end of the plastic band.
 - D. Pass the engine stop switch lead between the head pipe and the cable guide.
 - E. Pass the front brake hose to the front of the number plate.
 - F. $40^{\circ} \pm 10^{\circ}$
 - G. Vertical direction
 - H. Pass the engine stop switch lead under the handlebar.
 - I. Pass the clutch cable to the guide in the number plate.

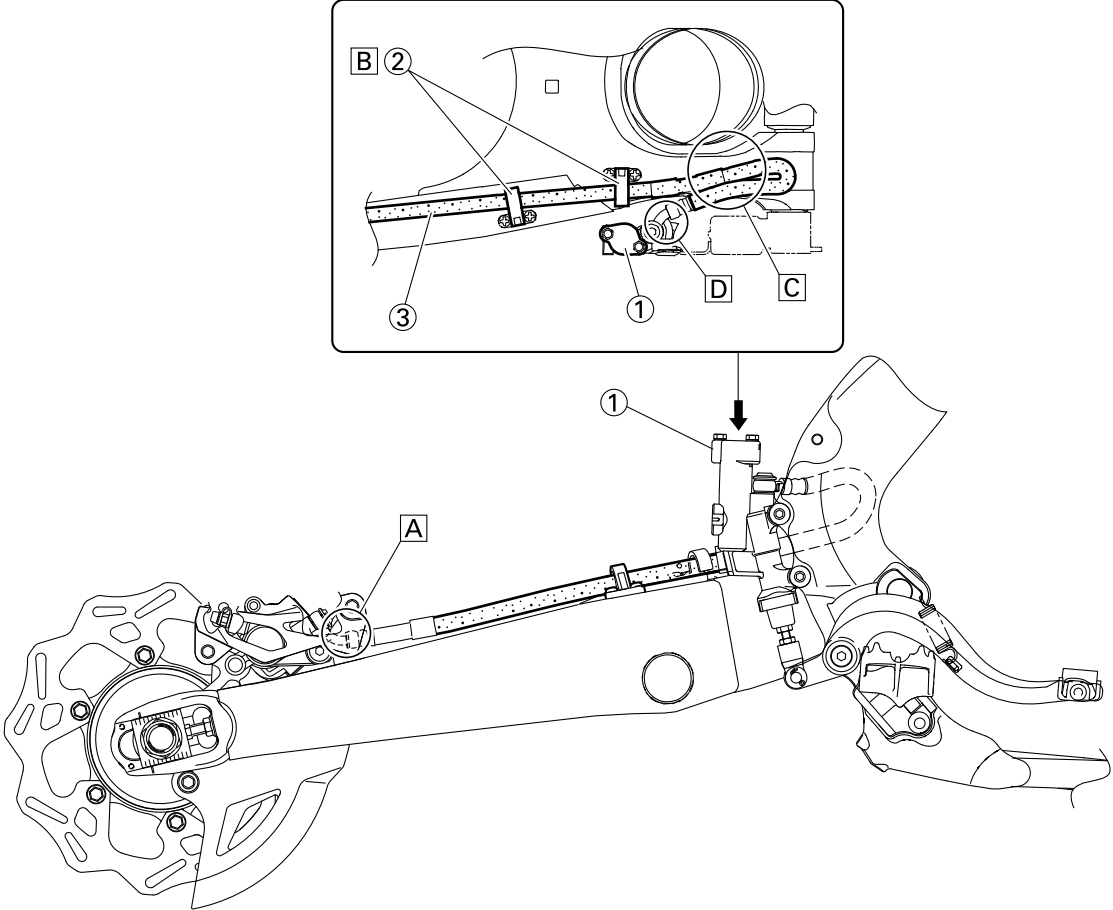
CABLE ROUTING DIAGRAM



CABLE ROUTING DIAGRAM

1. Main harness
 2. Radiator
 3. Throttle position sensor lead
 4. Joint coupler
 5. Intake air temperature sensor lead
 6. Intake air pressure sensor lead
 7. Frame
 8. Fuel hose
 9. High tension cord
 10. Spark plug cap
 11. Cylinder head cover
 12. Sub-wire harness
 13. Injector coupler
 14. Injector lead
 15. Throttle body
 16. Air filter case
 17. ECU
 18. Sub-wire harness coupler
- A. Fix the main harness by the plastic clamp, and insert the projection of the plastic clamp into the hole in the sheet metal of the radiator.
 - B. Insert the projection of the main harness into the hole in the frame.
 - C. To the sub-wire harness
 - D. Pass the high tension cord above the fuel hose.
 - E. $\pm 10^\circ$
 - F. Install the spark plug cap with this facing the right of the vehicle.
 - G. Push the spark plug cap home, where there shall be no gap between it and the cylinder head cover.
 - H. Pass the injector lead to the top of the vehicle beyond the fuel hose.
 - I. Insert the coupler of the sub-wire harness into the rib of the air filter case.
 - J. Pass the sub-wire harness between the ECU and the air filter case.

CABLE ROUTING DIAGRAM



CABLE ROUTING DIAGRAM

1. Brake master cylinder
 2. Brake hose holder
 3. Brake hoses
-
- A. While installing the brake hose, direct a bend in its pipe portion as shown, and bring it into contact with the projection on the brake caliper.
 - B. Pass the brake hose into the brake hose holders.
 - C. If the brake hose interferes with the rear shock absorber, correct its twist.
 - D. While installing the brake hose, direct a bend in its pipe portion as shown, and bring it into contact with the projection on the brake master cylinder.

CABLE ROUTING DIAGRAM

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MAINTENANCE INTERVALS

MAINTENANCE INTERVALS

MAINTENANCE INTERVALS

NOTICE

- After a break-in or before each race, always check the points shown in “TORQUE-CHECK POINTS” for tightening torques and retighten them. (“TORQUE-CHECK POINTS” on page 1-25.)
- 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.

ITEM	After break-in	Every race (about 2.5 hours)	Every third (about 7.5 hours)	Every fifth (about 12.5 hours)	As required	Remarks
VALVE Check the valve clearances Inspect Replace	●		●	●	●	The engine must be cold. Check the valve seats and the valve faces for wear.
VALVE SPRING Inspect Replace				●	●	Check the free length and the tilt.
VALVE LIFTER Inspect Replace				●	●	Check for scratches and wear.
CAMSHAFT Inspect Replace				●	●	Inspect the camshaft surface. Inspect the decompression system.
CAMSHAFT SPROCKET Inspect Replace				●	●	Check for wear on the teeth and for damage.
PISTON Inspect Clean Replace				●	● ● ●	Inspect crack. Inspect carbon deposits and eliminate them. Replace the piston, piston pin, piston pin clip, and piston ring all as a set.

MAINTENANCE INTERVALS

ITEM	After break- in	Every race (about 2.5 hours)	Every third (about 7.5 hours)	Every fifth (about 12.5 hours)	As re- quired	Remarks
PISTON RING Inspect Replace					● ●	Check the end gap of the piston ring. Replace the piston, piston pin, piston pin clip, and piston ring all as a set.
PISTON PIN Inspect Replace					● ●	Replace the piston, piston pin, piston pin clip, and piston ring all as a set.
CYLINDER HEAD Inspect and clean					●	Check the coolant passages for corrosion. Inspect carbon deposits and eliminate them. Check for warpage, and replace the gasket.
CYLINDER Inspect and clean Replace					● ●	Inspect score marks. Inspect wear.
ENGINE OIL Inspect Replace		●			●	Check the engine oil amount.
OIL FILTER ELEMENT Replace	●				●	
OIL STRAINER Clean					●	
CLUTCH Inspect and adjust Replace	●	●			●	Inspect housing, friction plate, clutch plate and spring.
TRANSMISSION Inspect Replace bearings					● ●	
SHIFT FORK, SHIFT CAM, GUIDE BAR Inspect					●	Inspect wear.

MAINTENANCE INTERVALS

ITEM	After break- in	Every race (about 2.5 hours)	Every third (about 7.5 hours)	Every fifth (about 12.5 hours)	As re- quired	Remarks
NUT (ROTOR) Retighten	●			●		Check for tightening torques.
EXHAUST PIPE, SI- LENCER, PROTEC- TOR Inspect and re- tighten Clean Replace filter	●	●		●	●*	Check for exhaust leaks, and tightening torques. * When the exhaust sound be- comes louder or when a per- formance drop is felt.
CRANKSHAFT Inspect and clean				●	●	
THROTTLE BODY Inspect					●	
AIR FILTER Clean and lubri- cate Replace	●	●			●	Use foam air-filter oil or equiv- alent oil.
SPARK PLUG Inspect and clean Replace	●		●		●	Check the electrodes and the terminals for wear.
COOLING SYSTEM Check coolant lev- el and leakage Check radiator cap operation Check radiator cap attached Change the cool- ant Inspect hoses	●	●			●	Use the radiator cap tester for a checkup. Every two years
ENGINE GUARD Replace					●	Breakage
FRAME Clean and inspect	●	●				

MAINTENANCE INTERVALS

ITEM	After break-in	Every race (about 2.5 hours)	Every third (about 7.5 hours)	Every fifth (about 12.5 hours)	As required	Remarks
FUEL TANK, FUEL PUMP Inspect	●		●			
FUEL HOSE Inspect Replace					● ●	Every four years
FRONT FORK LEG (S) Clean Inspect and adjust Replace oil Replace oil seal Clean and grease oil seals and dust seals	● ● ● ● ●	● ● ● ●		●	● ●	Dust seal Lithium soap base grease
PROTECTOR GUIDE Replace					●	
REAR SHOCK ABSORBER Inspect and adjust Lubricate Retighten	● ●	● ●		●	(After rain ride)●	Grease pillow balls and bearings. Check for tightening torques.
BRAKE(S) Adjust lever position and pedal height Lubricate pivot point Check brake disc surface Check fluid level and leakage Retighten brake disc bolts, caliper bolts, master cylinder bolts and union bolts Replace pads	● ● ● ● ●	● ● ● ●			●	Check for tightening torques.

MAINTENANCE INTERVALS

ITEM	After break-in	Every race (about 2.5 hours)	Every third (about 7.5 hours)	Every fifth (about 12.5 hours)	As required	Remarks
Replace brake fluid					●	Every one year
SWINGARM Inspect, lube and retighten	●	●				Molybdenum disulfide grease
RELAY ARM, CONNECTING ROD Inspect, lube and retighten	●	●				Molybdenum disulfide grease
STEERING HEAD Inspect free play and retighten Clean and lube Replace bearings	●	●		●	●	Check for tightening torques. After rain ride
TIRE, WHEELS Inspect air pressure, wheel run-out, tire wear and spoke looseness Retighten sprocket bolt Check the bearing Replace bearings Lubricate	●	●		●	●	Lithium soap base grease
DRIVE CHAIN Clean, lubricate, slack, alignment Replace	●	●			●	Use chain oil.
DRIVE CHAIN GUIDE Inspect		●				Inspect wear.
DRIVE CHAIN GUIDE AND DRIVE CHAIN SUPPORT Replace					●	
CABLES Routing (Connection) Check and grease Check and clean throttle cable	●	●				Check throttle cables on the throttle body for dirt and wear.

MAINTENANCE INTERVALS

ITEM	After break- in	Every race (about 2.5 hours)	Every third (about 7.5 hours)	Every fifth (about 12.5 hours)	As re- quired	Remarks
LEVERS Adjust clutch lever free play					●	
KICKSTARTER LE- VER, BRAKE PED- AL, FOOTREST Lubricate	●	●				
OUTSIDE NUTS AND BOLTS Retighten	●	●				Refer to "TORQUE-CHECK POINTS" on page 1-25.

PRE-OPERATION INSPECTION AND MAINTENANCE

PRE-OPERATION INSPECTION AND MAINTENANCE

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

Before using this machine, check the following points.

GENERAL INSPECTION AND MAINTENANCE

ITEM	inspect	Page
Coolant	Check that coolant is filled up to the radiator cap. Check the cooling system for leakage.	3-8 – 10
Fuel	Check that a fresh gasoline is filled in the fuel tank. Check the fuel line for leakage.	1-22
Engine oil	Check that the oil level is correct. Check the crankcase and oil line for leakage.	3-14 – 16
Gear shifter and clutch	Check that gears can be shifted correctly in order and that the clutch operates smoothly.	3-10 – 11
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 – 12
Brakes	Check the play of front brake and effect of front and rear brake.	3-21 – 27
Drive chain	Check drive chain slack and alignment. Check that the drive chain is lubricated properly.	3-27 4-64 – 65
Wheels	Check for excessive wear and tire pressure. Check for loose spokes and have no excessive play.	3-32 – 33
Steering	Check that the handlebar can be turned smoothly and have no excessive play.	3-33 – 34
Front forks and rear shock absorber	Check that they operate smoothly and there is no oil leakage.	3-28 – 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.	3-13 – 14
Rear wheel sprocket	Check that the rear wheel sprocket tightening bolt is not loose.	4-8 – 9
Lubrication	Check for smooth operation. Lubricate if necessary.	3-12 , 3-34
Bolts and nuts	Check the chassis and engine for loose bolts and nuts.	1-25 – 26
Lead connectors	Check that the AC magneto, ECU and ignition coil are connected tightly.	1-12 – 14
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 – 8

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.

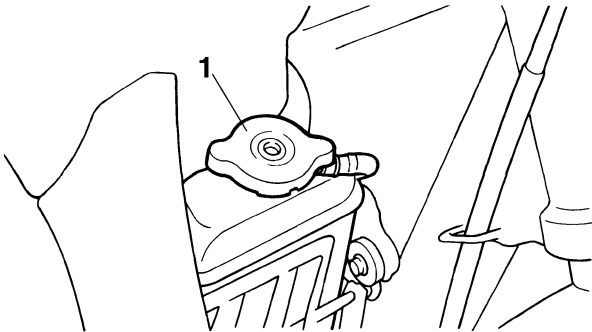
ENGINE

CHECKING THE COOLANT LEVEL

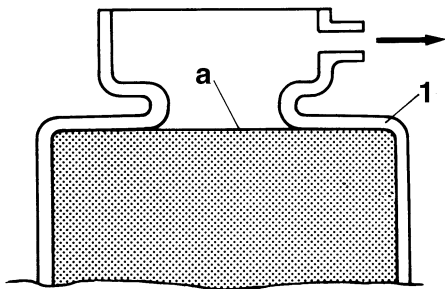
⚠ WARNING

If coolant seems hot, do not remove the radiator cap.

- Stand the vehicle upright on a level surface.
- Remove:
 - Radiator cap "1"



- Check:
 - Coolant level
Maximum level "a" or below → Add coolant up to the maximum level.



1. Radiator

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 distilled water is not available, soft water may be used.

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

TIP

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

CHECKING THE COOLING SYSTEM

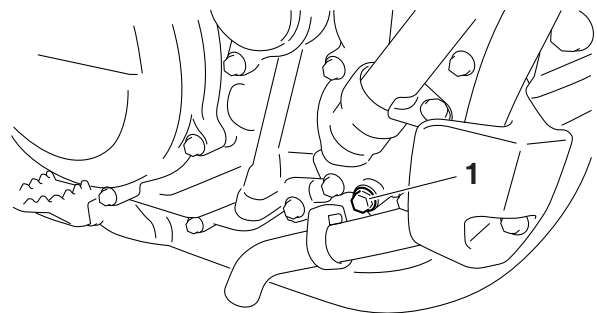
- Remove:
 - Seat
 - Side cover (left/right)
 - Air scoop (left/right)
Refer to "GENERAL CHASSIS" on page 4-1.
 - Air filter case cover
Refer to "THROTTLE BODY" on page 7-5.
- Check:
 - RADIATOR
 - Radiator hoses
Crack/damage → Replace.
Refer to "RADIATOR" on page 6-1.
- Install:
 - Air filter case cover
Refer to "THROTTLE BODY" on page 7-5.
 - Air scoop (left/right)
 - Seat
 - Side cover (left/right)
Refer to "GENERAL CHASSIS" on page 4-1.

CHANGING THE COOLANT

⚠ WARNING

If coolant seems hot, do not remove the radiator cap.

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



- 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.


- Thoroughly flush the cooling system with clean tap water.

5. Install:

- Copper washers **New**
- Coolant drain bolt

	Coolant drain bolt 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
---	---

6. Pour coolant.

	Recommended coolant High quality ethylene glycol anti-freeze containing anti-corrosion for aluminum engine Radiator capacity (including all routes) 1.04 L (1.10 US qt, 0.92 Imp.qt) Coolant mixing ratio 1:1 (Coolant:Water)
---	--

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.

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

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:

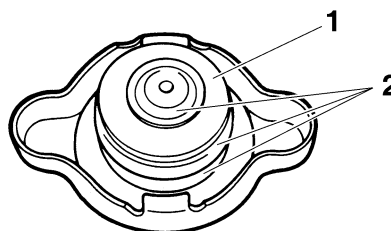
- Coolant level
Refer to "CHECKING THE COOLANT LEVEL" on page 3-8.

CHECKING THE RADIATOR CAP

1. Check:

- Seal (radiator cap) "1"

- Valve and valve seat "2"
Crack/damage → Replace.
Exist fur deposits → Clean or replace.



CHECKING THE RADIATOR CAP OPENING PRESSURE

1. Check:


- Radiator cap 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.

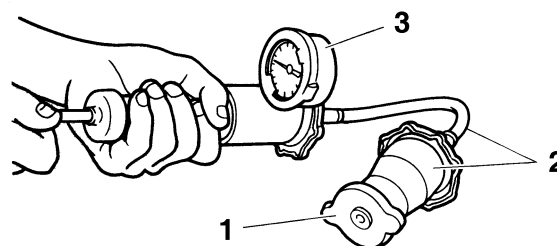
TIP

Before attaching the cap to the tester, apply water to its sealing surface.

	Radiator cap opening pressure 108–137 kPa (1.08–1.37 kg/cm², 15.7–19.9 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
---	--

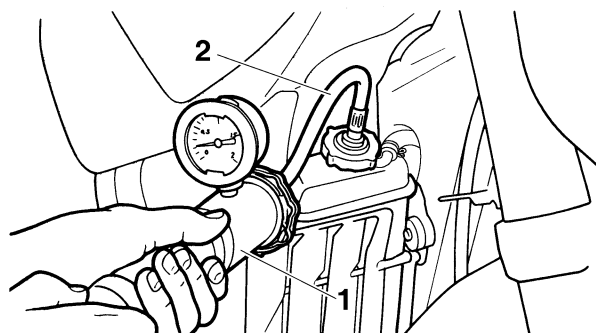


CHECKING THE COOLANT CIRCULATORY SYSTEM FOR LEAKS

1. Check:
 - Coolant level
2. Install:
 - Radiator cap tester "1"
 - 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



3. Activate the tester to apply the test pressure.



Test pressure value
196 kPa (1.96 kg/cm², 27.9 psi)

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 2 to 3 minutes of warm-up.
- Make sure that coolant is filled up to the upper level beforehand.

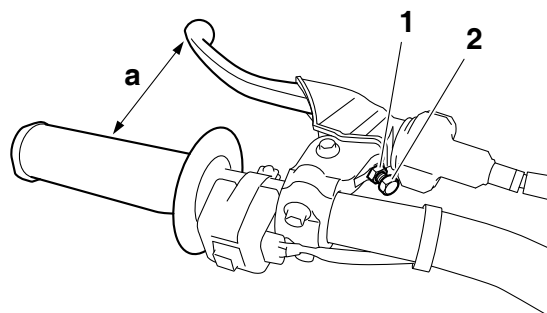
4. Check:
 - Pressure value
No stay for 5 to 10 seconds at the test pressure value → Correct.
 - Radiator
Coolant leaks → Correct or replace.
 - Radiator hose connections
Coolant leaks → Correct or replace.
 - Radiator hoses
Bulges → Replace

⚠ WARNING

When the radiator cap tester is removed, coolant will spout; therefore, cover it with a cloth beforehand.

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



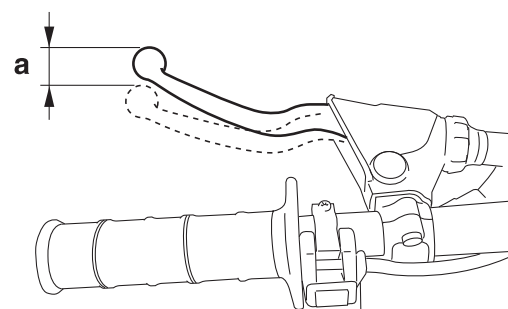
Locknut
4.8 Nm (0.48 m·kgf, 3.5 ft·lbf)

ADJUSTING THE CLUTCH LEVER FREE PLAY

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



Clutch lever free play
7.0–12.0 mm (0.28–0.47 in)

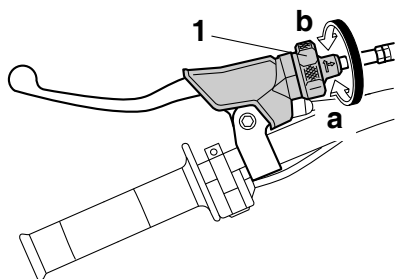


2. Adjust:
 - Clutch lever free play

Handlebar side

- a. Turn the adjuster "1" in direction "a" or "b" until the specified clutch lever free play is obtained.

Direction "a"
Clutch lever free play is increased.
Direction "b"
Clutch lever free play is decreased.



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" in direction "a" or "b" until the specified clutch lever free play is obtained.

Direction "a"

Clutch lever free play is increased.

Direction "b"

Clutch lever free play is decreased.

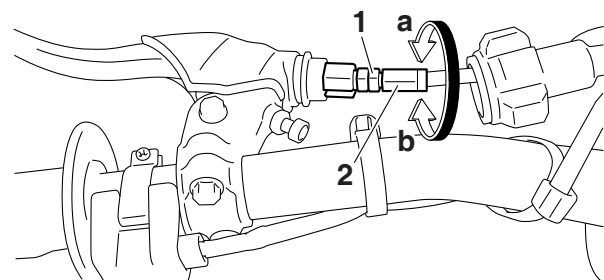
- d. Tighten the locknut "1".



Locknut

4.3 Nm (0.43 m·kgf, 3.1 ft·lbf)

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



ADJUSTING THE THROTTLE GRIP FREE PLAY

TIP

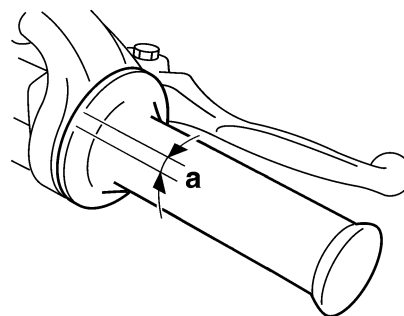
Prior to adjusting throttle grip free play, the engine idling speed should be adjusted.

1. Check:

- Throttle grip free play "a"
Out of specification → Regulate.



Throttle grip free play
3.0–5.0 mm (0.12–0.20 in)



2. Adjust:

- Throttle grip free play



- a. Loosen the locknut "1".
- b. Turn the adjuster "2" until the specified free play is obtained.

Direction "a"

Throttle grip free play is increased.

Direction "b"

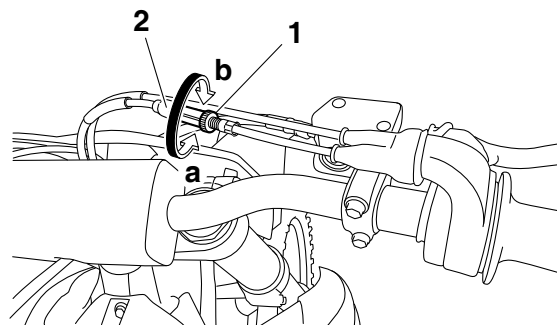
Throttle grip free play is decreased.

- c. Tighten the locknut.



WARNING

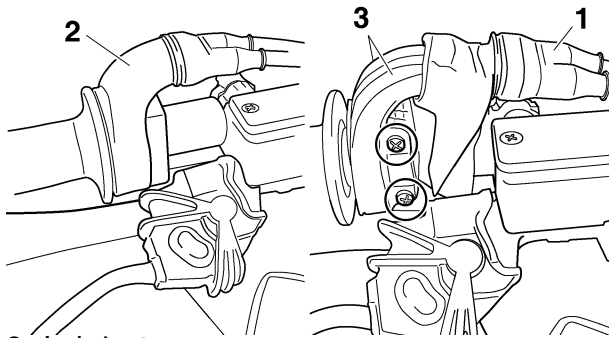
After adjusting the throttle grip free play, turn the handlebar to the right and to the left to ensure that this does not cause the engine idling speed to change.



LUBRICATING THE THROTTLE CABLE

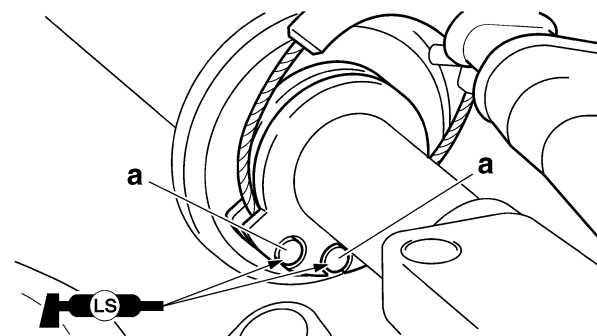
1. Remove:

- Cover (throttle cable cap) "1"
- Cover (grip cap) "2"
- Throttle grip cap "3"



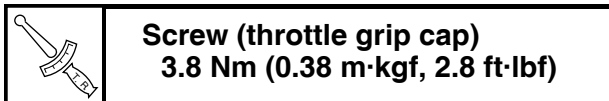
2. Lubricate:

- Throttle cable end "a"



3. Install:

- Throttle grip cap
- Screw (throttle grip cap)



4. Install:

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



WARNING
Check that the throttle grip moves smoothly. If this does not move smoothly, correct the installed positions.

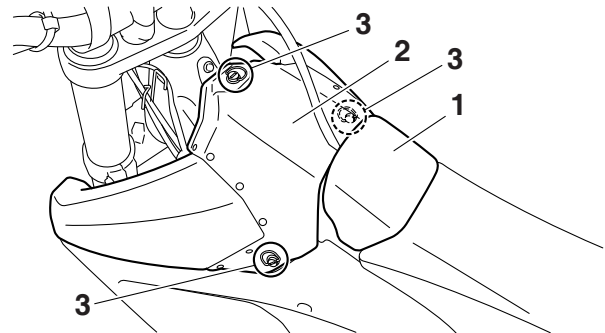
CLEANING THE AIR FILTER ELEMENT

1. Remove:

- Fuel tank cap cover "1"
Refer to "FUEL TANK CAP" on page 1-21.
- Air filter case cover "2"

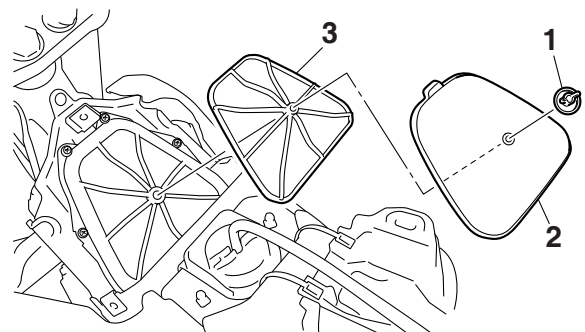
TIP

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



2. Remove:

- Air filter mounting bolt "1"
- Air filter element "2"
- Air filter guide "3" (from the air filter element)



3. Wash:

- Air filter element



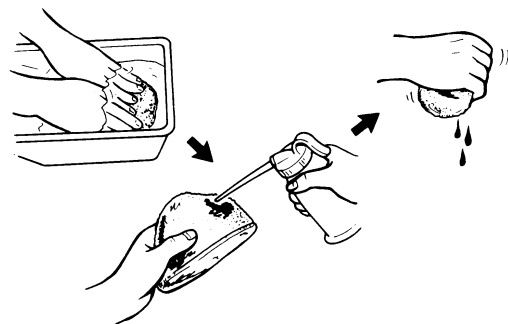
WARNING
Do not use gasoline or organic (acid/alkaline) volatile oil for washing.

TIP

After washing the element with air filter cleaner or kerosene, squeeze and dry it completely.



NOTICE
Do not twist the element when squeezing the element.

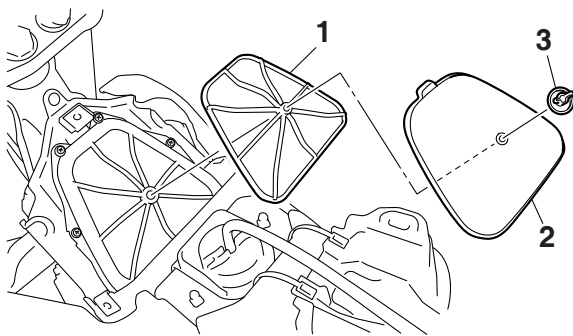
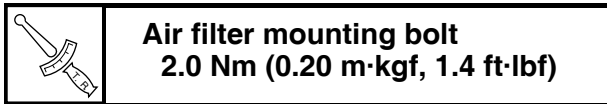


4. Check:
 - Air filter element
Damage → Replace.
5. Foam-air-filter oil or equivalent oil to the element



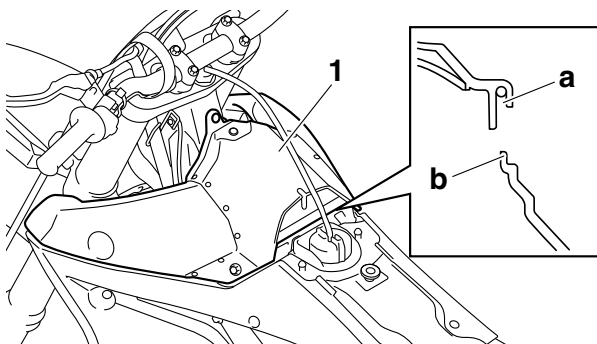
TIP _____
Squeeze out the excess oil. Element should be wet but not dripping.

6. Install:
 - Air filter guide “1” (to the air filter element)
 - Air filter element “2”
 - Air filter mounting bolt “3”



7. Install:
 - Air filter case cover “1”

TIP _____
Align the air filter case cover groove “a” with the air filter case edge “b”.



8. Install:
 - Fuel tank cap cover

CHECKING THE THROTTLE BODY JOINT

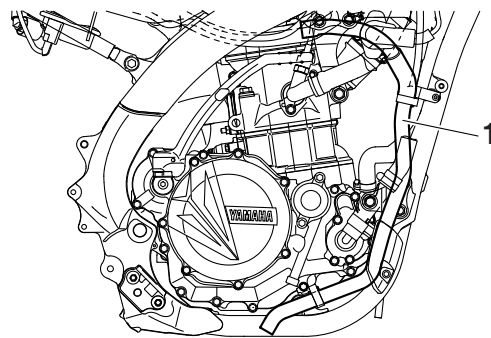
1. Check:
 - Throttle body joint
Refer to “CHECKING THE THROTTLE BODY JOINT” on page 7-8.

CHECKING THE BREATHER HOSES

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

NOTICE

Make sure the cylinder head breather hose is routed correctly.

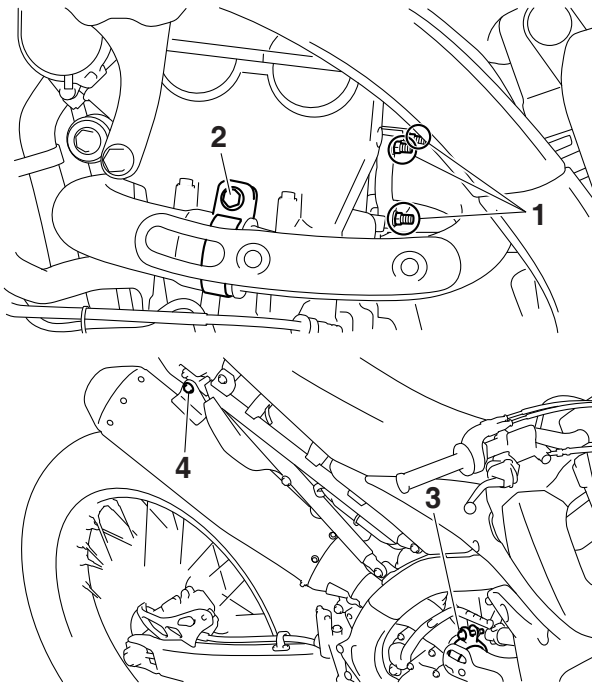


CHECKING THE EXHAUST SYSTEM

1. Remove:
 - Exhaust pipe protector
2. Check:
 - Exhaust pipe 1
 - Exhaust pipe 2
 - Silencer
Crack/damage → Replace.
Refer to “ENGINE REMOVAL” on page 5-1.
 - Exhaust gas
Leaks → Replace the gasket.
Refer to “ENGINE REMOVAL” on page 5-1.
3. Check:
 - Tightening torques



Exhaust pipe bolt 1 and nut “1” 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
Exhaust pipe 1 and exhaust pipe 2 bolt “2” 12 Nm (1.2 m·kgf, 8.7 ft·lbf)
Exhaust pipe 2 and silencer bolt “3” 12 Nm (1.2 m·kgf, 8.7 ft·lbf)
Silencer and silencer bracket bolt “4” 30 Nm (3.0 m·kgf, 22 ft·lbf)



4. Install:

- Exhaust pipe protector



Exhaust pipe protector screw
10 Nm (1.0 m·kgf, 7.2 ft·lbf)
LOCTITE®

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

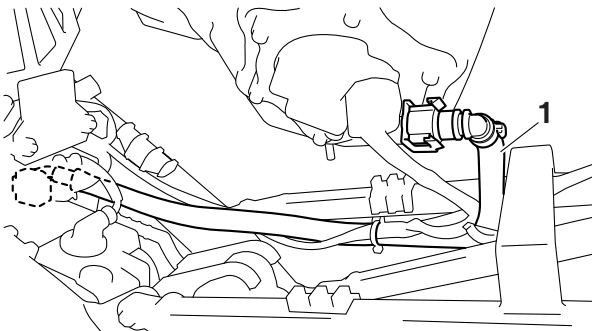
Refer to “FUEL TANK” on page 7-1.

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.

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.

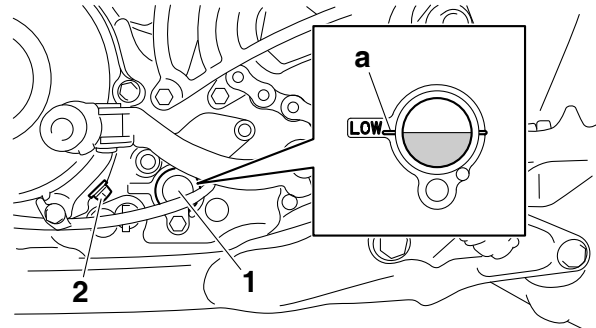
3. Check:

- Oil level

Make sure that the engine oil level is above the minimum level mark “a” shown for the oil level check window “1”, and that the engine oil does not come out by removing the oil check bolt “2”.

The minimum level mark “a” or below → Add the engine oil until its level exceeds the minimum level mark “a”.

Engine oil coming out of the oil check bolt → Drain it until its last drop is out.



NOTICE

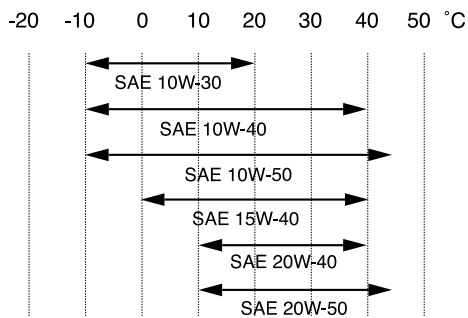
- Since engine oil also lubricates the clutch, the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives.
- Do not allow foreign material to enter the crankcase.



Recommended brand
YAMALUBE

Recommended engine oil type
SAE10W-30, SAE10W-40,
SAE10W-50, SAE15W-40,
SAE20W-40 or SAE20W-50

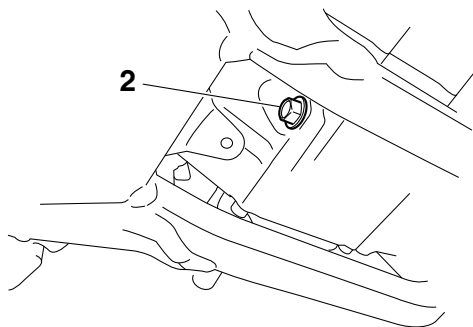
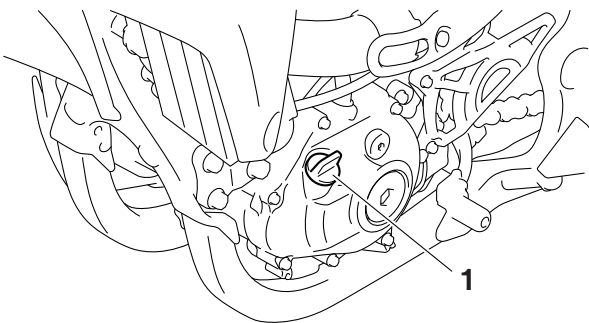
Recommended engine oil grade
API service SG type or higher,
JASO standard MA



CHANGING THE ENGINE OIL

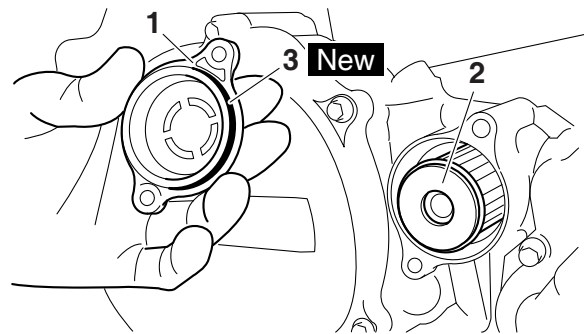
Stand the vehicle upright on a level surface.

1. Start the engine, warm this up for several minutes, and then stop the engine and wait about 5 minutes.
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 O-rings “3”.



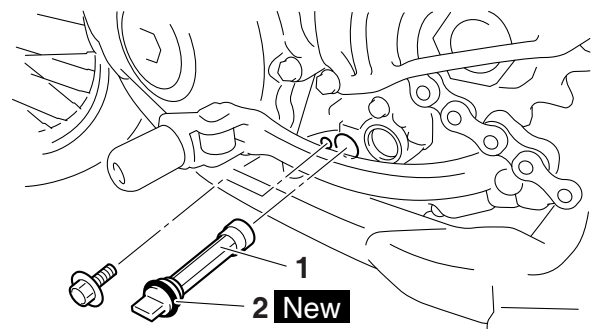
- c. Install the new oil filter element and the oil filter element cover.



Oil filter element cover bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

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 O-rings “2”.



- d. Install the oil strainer.



Oil strainer bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

6. Install:
 - Gaskets **New**
 - Drain bolt

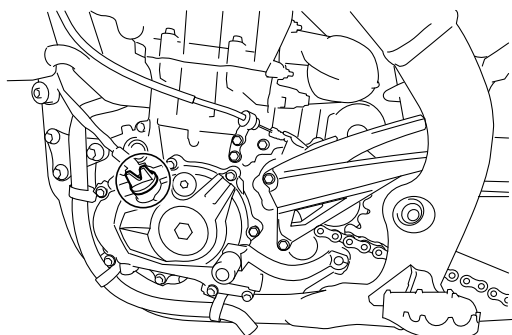


Drain bolt
20 Nm (2.0 m·kgf, 14 ft·lbf)

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



Engine oil quantity
With oil filter element replacement
0.69 L (0.73 US qt, 0.61 Imp.qt)
Quantity (disassembled)
0.95 L (1.00 US qt, 0.84 Imp.qt)

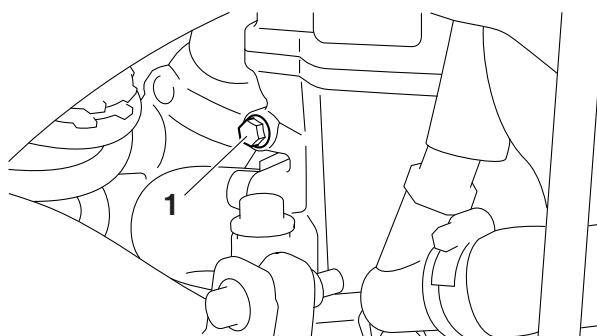


8. Install:
 - Oil filler cap
9. Check:
 - Oil level
 Refer to “CHECKING THE ENGINE OIL LEVEL” on page 3-14.
10. Check:
 - Engine oil pressure

- a. Slightly loosen the oil pressure check bolt “1”.

⚠ WARNING

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



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

⚠ WARNING

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

NOTICE

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

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



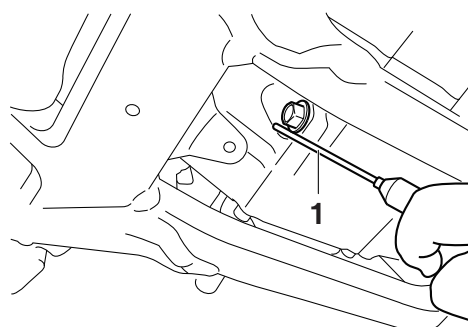
Oil pressure check bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

ADJUSTING 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 starter knob/idle screw a few clicks counterclockwise 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/idle screw pushed in completely.

1. Start the engine, and warm this up until the oil has reached the specified temperature.
2. Attach the pocket tester with temperature probe “1” to the oil drain bolt.

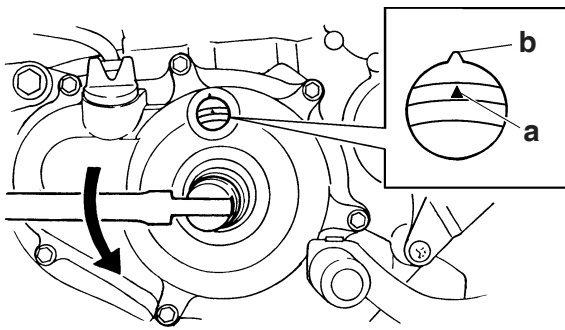


Oil temperature
55–65 °C (131–149 °F)

3. Install:
 - Digital tachometer

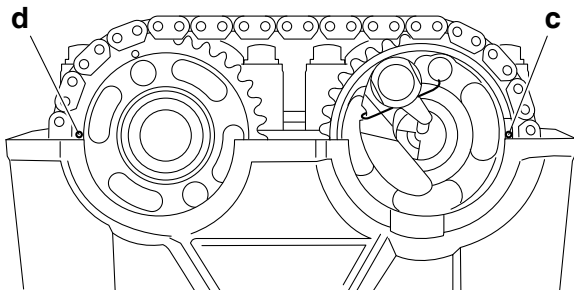


Digital tachometer
90890-06760
YU-39951-B



TIP

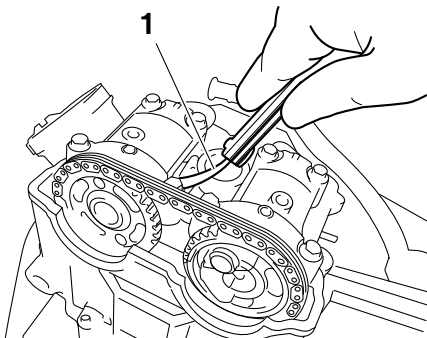
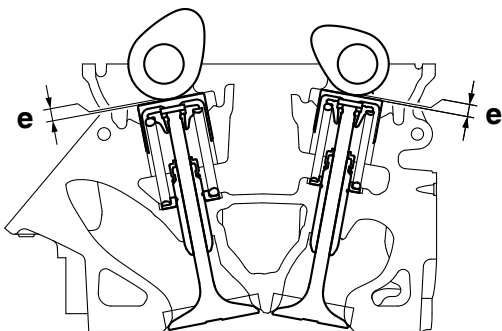
Check that the alignment mark “c” on the camshaft sprocket and the alignment mark “d” on the intake camshaft sprocket are aligned with the edge of the cylinder head.



c. Measure the valve clearance “e” using a thickness gauge “1”.

TIP

Record the measured reading if the clearance is incorrect.



5. Adjust:

- Valve clearance



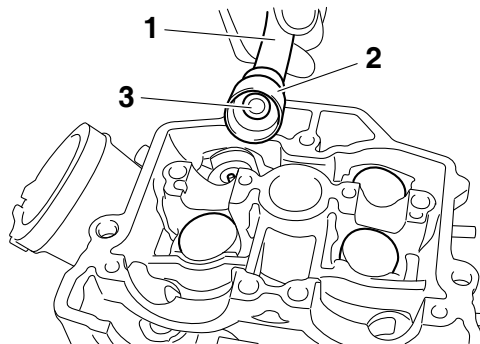
- Remove the camshaft (intake and exhaust). Refer to “CAMSHAFT” on page 5-11.
- Remove the valve lifter “2” and the adjusting pad “3” with a valve lapper “1”.

TIP

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



Valve lapper
90890-04101
Valve lapping tool
YM-A8998

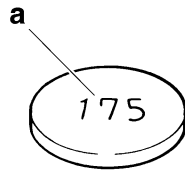


EX			
IN			2
			3

- 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 valve
0, 1 or 2	0
4, 5 or 6	5
8 or 9	10

Example:
 Pad number = 148
 Rounded value = 150

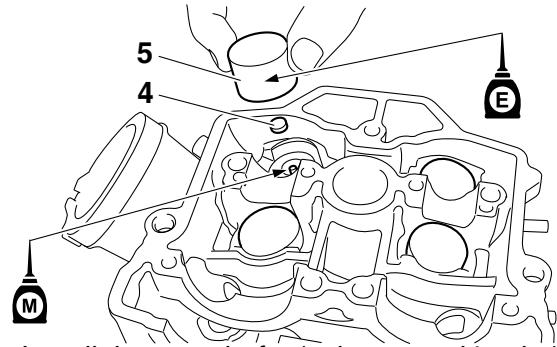
e. Install the new adjusting pads “4” and the valve lifters “5”.

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 5-11.
- 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.



INTAKE

MEASURED CLEARANCE	INSTALLED PAD NUMBER																									
	120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240	
0.00 ~ 0.02				120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	
0.03 ~ 0.07			120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	
0.08 ~ 0.12		120	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	
0.13 ~ 0.20	STANDARD CLEARANCE																									
0.21 ~ 0.25	125	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240		
0.26 ~ 0.30	130	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240			
0.31 ~ 0.35	135	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240				
0.36 ~ 0.40	140	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240					
0.41 ~ 0.45	145	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240						
0.46 ~ 0.50	150	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240							
0.51 ~ 0.55	155	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240								
0.56 ~ 0.60	160	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240									
0.61 ~ 0.65	165	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240										
0.66 ~ 0.70	170	175	180	185	190	195	200	205	210	215	220	225	230	235	240											
0.71 ~ 0.75	175	180	185	190	195	200	205	210	215	220	225	230	235	240												
0.76 ~ 0.80	180	185	190	195	200	205	210	215	220	225	230	235	240													
0.81 ~ 0.85	185	190	195	200	205	210	215	220	225	230	235	240														
0.86 ~ 0.90	190	195	200	205	210	215	220	225	230	235	240															
0.91 ~ 0.95	195	200	205	210	215	220	225	230	235	240																
0.96 ~ 1.00	200	205	210	215	220	225	230	235	240																	
1.01 ~ 1.05	205	210	215	220	225	230	235	240																		
1.06 ~ 1.10	210	215	220	225	230	235	240																			
1.11 ~ 1.15	215	220	225	230	235	240																				
1.16 ~ 1.20	220	225	230	235	240																					
1.21 ~ 1.25	225	230	235	240																						
1.26 ~ 1.30	230	235	240																							
1.31 ~ 1.35	235	240																								
1.36 ~ 1.40	240																									

VALVE CLEARANCE (cold):
0.13 ~ 0.20 mm
Example: Installed is 175
Measured clearance is 0.27 mm
Replace 175 pad with 185 pad
Pad number: (example)
Pad No. 175 = 1.75 mm
Pad No. 185 = 1.85 mm

EXHAUST

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

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

CHASSIS

BLEEDING THE BRAKE SYSTEM

⚠ 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)

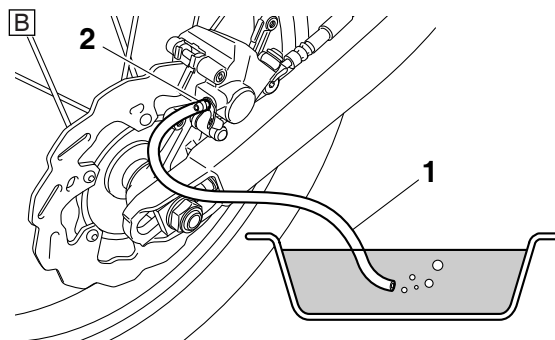
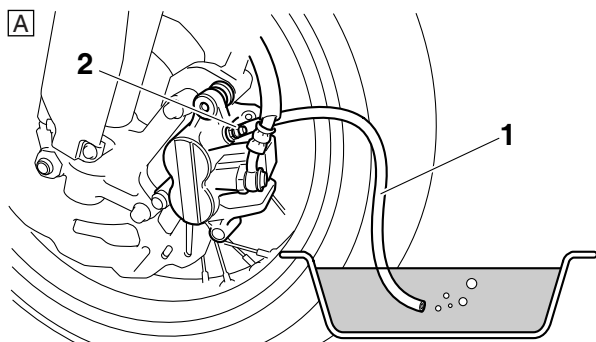
TIP

- 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.

NOTICE

Brake fluid may erode painted surfaces or plastic parts. Always clean up spilled fluid immediately.

- i. Tighten the bleed screw.



Bleed screw
6 Nm (0.6 m·kgf, 4.3 ft·lbf)

- j. Pour brake fluid to the reservoir up to the specified level. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-26.


⚠ WARNING

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



ADJUSTING THE REAR BRAKE

- Check:
 - Brake pedal position “a”
(distance from the top of the rider footrest to the top of the brake pedal)
Out of specification → Regulate.

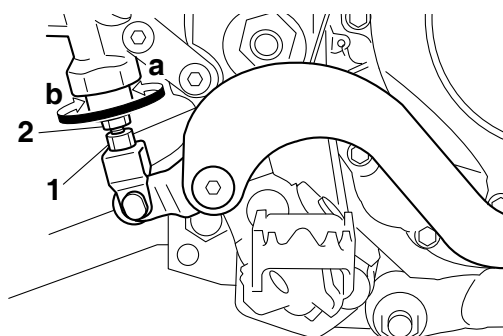
	Brake pedal position 0.0 mm (0.00 in)
---	--




- Adjust:
 - Brake pedal position

- Loosen the locknut “1”.
- Turn the adjusting bolt “2” in direction “a” or “b” until the specified brake pedal position is obtained.

Direction “a” Brake pedal is raised. Direction “b” Brake pedal is lowered.



- Tighten the locknut.

	Locknut 6 Nm (0.6 m·kgf, 4.3 ft·lbf)
---	---

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.

NOTICE

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




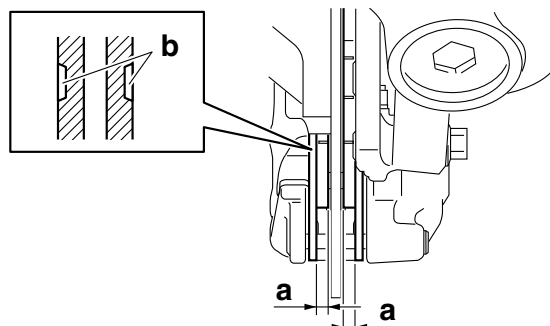
CHECKING THE FRONT BRAKE PADS

- Measure:
 - Brake pad thickness “a”
Out of specification → Replace as a set.

TIP

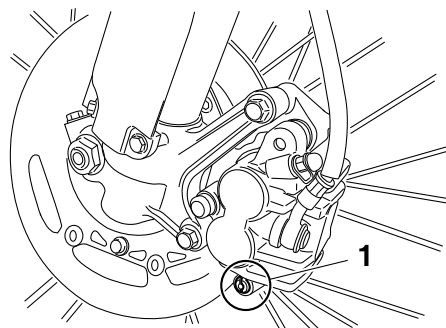
The pads worn up to the indicator “b” grooves mean that the brake pad thickness limit is reached.

	Brake pad lining thickness (inner) 4.4 mm (0.17 in) Limit 1.0 mm (0.04 in) Brake pad lining thickness (outer) 4.4 mm (0.17 in) Limit 1.0 mm (0.04 in)
---	--



- Replace:
 - Brake pads

- Remove the pad pin plug “1”.




CHECKING THE REAR BRAKE PADS

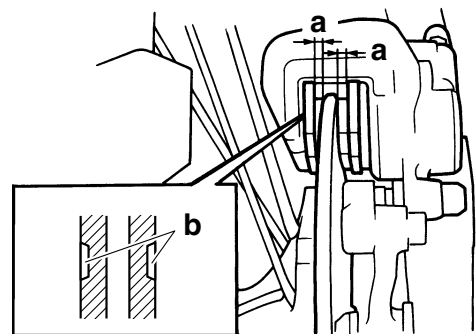
1. Measure:

- Brake pad thickness “a”
Out of specification → Replace as a set.

TIP

The pads worn up to the indicator “b” grooves mean that the brake pad thickness limit is reached.

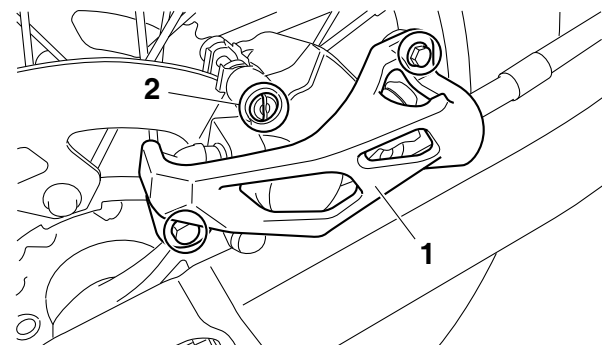
	Brake pad lining thickness (inner)
	6.4 mm (0.25 in) Limit
	Brake pad lining thickness (outer)
	6.4 mm (0.25 in) Limit
	1.0 mm (0.04 in)



2. Replace:

- Brake pads

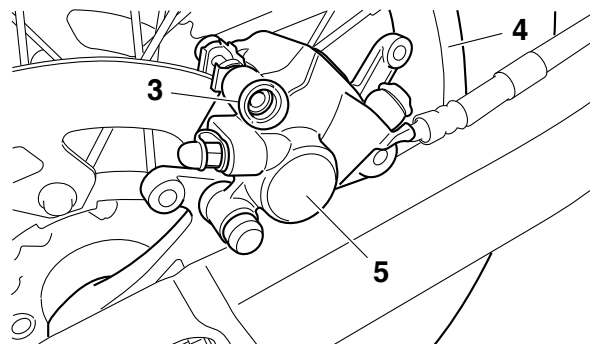
a. Remove the protector “1” and the pad pin plug “2”.



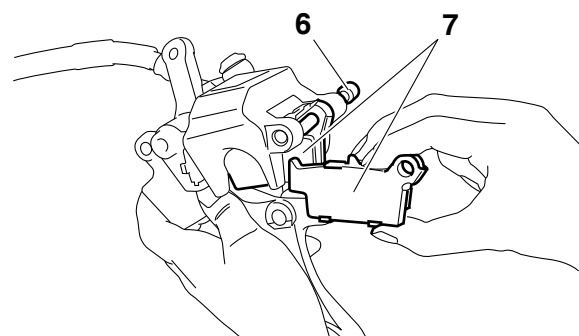
b. Loosen the pad pin “3”.

c. Remove the rear wheel “4” and the brake caliper “5”.

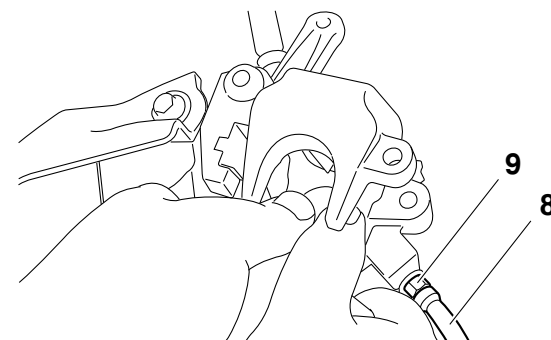
Refer to “REAR WHEEL” on page 4-7.



d. Remove the pad pin “6” and the brake pads “7”.



e. Connect the plastic hose “8” to the bleed screw “9” and place a container under the end of the plastic hose.



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

⚠ WARNING

Do not reuse the drained brake fluid.

g. Tighten the bleed screw.



Bleed screw
6 Nm (0.6 m·kgf, 4.3 ft·lbf)

h. Install the brake pad “10” and the pad pin “11”.

TIP

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

⚠ 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.

NOTICE

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

ADJUSTING THE DRIVE CHAIN SLACK

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.

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

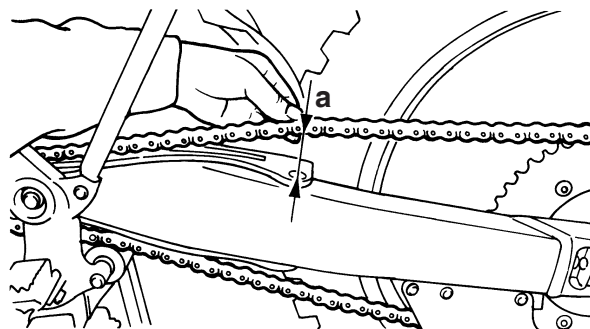
⚠ WARNING

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, 36 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.

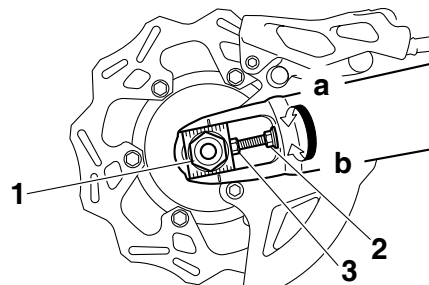


Drive chain slack
50–60 mm (1.97–2.36 in)

5. Adjust:
 - Drive chain slack

- a. Loosen the wheel axle nut “1”.
- b. Loosen both locknuts “2”.
- c. Turn the adjusting bolt “3” in direction “a” or “b” until the specified drive chain slack is obtained.

Direction “a”
The drive chain slack decreases.
Direction “b”
The drive chain slack increases.



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 locknut.

Locknut
21 Nm (2.1 m·kgf, 15 ft·lbf)

- e. Tighten the wheel axle nut.

Wheel axle nut
135 Nm (13.5 m·kgf, 98 ft·lbf)



CHECKING THE FRONT FORK LEGS

1. Stand the vehicle upright on a level surface.

WARNING

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

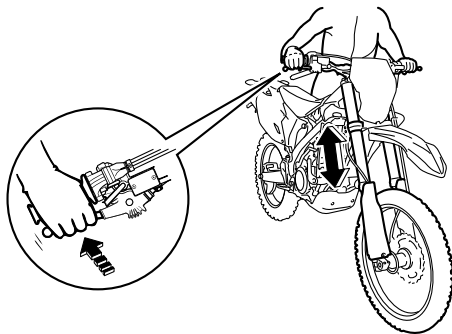
2. Check:

- Inner tube
Damage/scratches → Replace.
- Front fork leg (s)
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 4-37.



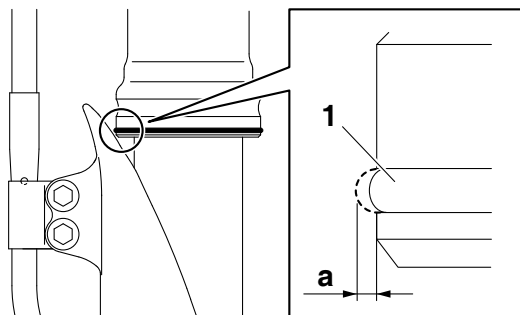
CHECKING THE FRONT FORK PROTECTOR GUIDE

1. 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.



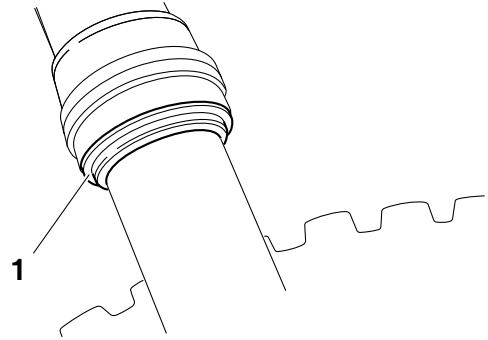
CLEANING THE FRONT FORK OIL SEAL AND DUST SEAL

1. Remove:

- Protector
- Dust seal "1"

NOTICE

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

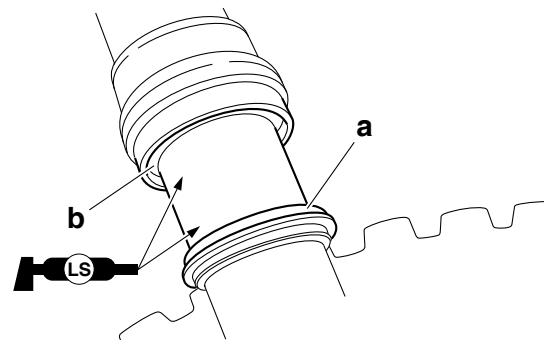


2. Clean:

- 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.



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 suitable stand to raise the front wheel off the ground.

WARNING

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

2. Remove the air bleed screw "1" and release the internal pressure from the front fork.

CHECKING THE SWINGARM OPERATION

1. Check:
 - Swingarm smooth action
 - Swingarm free play
 Refer to "SWINGARM" on page 4-60.

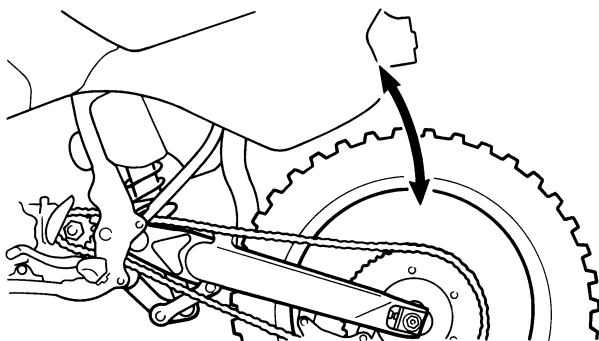
CHECKING THE REAR SUSPENSION

1. Stand the vehicle upright on a level surface.

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 4-53.
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 4-53.



ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY

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

WARNING

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

Spring preload

NOTICE

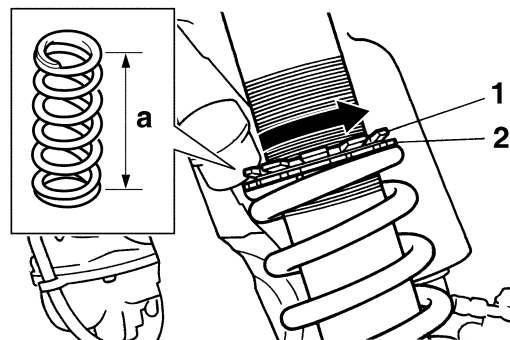
Do not turn the adjuster forcibly beyond its adjusting range.

1. Remove:
 - Rear frame
Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-53.

2. 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 installed length "d"

Minimum

Position in which the spring is turned in 1.5 mm (0.06 in) from its free length.

STD

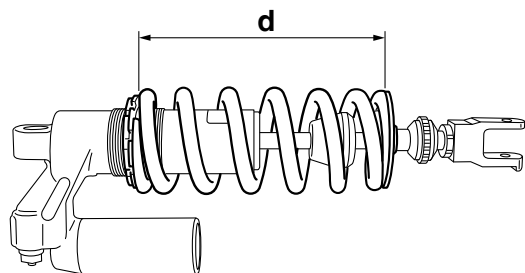
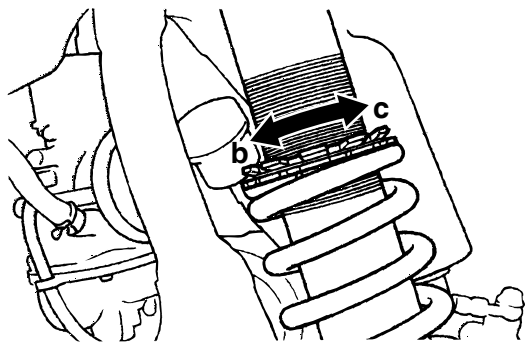
Position in which the spring is turned in 10 mm (0.39 in) from its free length.

Maximum


Position in which the spring is turned in 18 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.

	<p>Locknut 30 Nm (3.0 m-kgf, 22 ft-lbf)</p>
--	--



3. Install:

- Rear frame
Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-53.

Rebound damping force

NOTICE

Do not turn the adjuster forcibly beyond its adjusting range.

1. Adjust:

- Rebound damping force



a. Turn the adjuster "1" in the direction of "a" or "b" to make an adjustment.

<p>Direction "a" Rebound damping force is increased (suspension is harder).</p>
<p>Direction "b" Rebound damping force is decreased (suspension is softer).</p>



Rebound damping force

Maximum

Turn it in finger-tight.

STD

Turn it out by 14 clicks.*

(USA)(CAN)

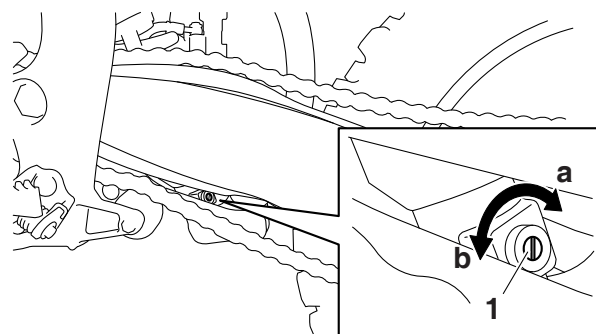
Turn it out by 12 clicks.*

(EUR)(JPN)(AUS)(NZL)(ZAF)

Minimum

Turn it out by 30 clicks.*

* With the adjuster fully turned



High compression damping

NOTICE

Do not turn the adjuster forcibly beyond its adjusting range.

1. Adjust:

- High compression damping



a. Turn the adjuster "1" in the direction of "a" or "b" to make an adjustment.

Direction "a"

High compression damping force is increased (suspension is harder).

Direction "b"

High compression damping force is decreased (suspension is softer).



High compression damping

Maximum

Turn it in finger-tight.

STD

Turn it out by 1 1/2 turns.*

(USA)(CAN)

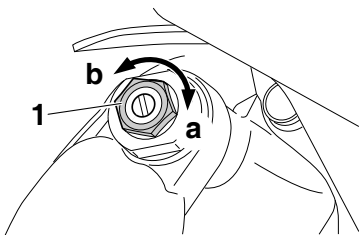
Turn it out by 1 1/8 turns.*

(EUR)(JPN)(AUS)(NZL)(ZAF)

Minimum

Turn it out by two turns.*

* With the adjuster fully turned



Low compression damping

NOTICE

Do not turn the adjuster forcibly beyond its adjusting range.

1. Adjust:

- Low compression damping



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

Direction "a"

Low compression damping force is increased (suspension is harder).

Direction "b"

Low compression damping force is decreased (suspension is softer).



Low compression damping

Maximum

Turn it in finger-tight.

STD

Turn it out by 12 clicks.*

(USA)(CAN)

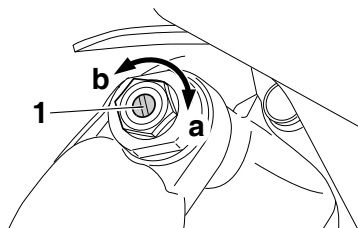
Turn it out by 10 clicks.*

(EUR)(JPN)(AUS)(NZL)(ZAF)

Minimum

Turn it out by 20 clicks.*

* With the adjuster fully turned in



CHECKING THE TIRES

1. Measure:

- Tire pressure

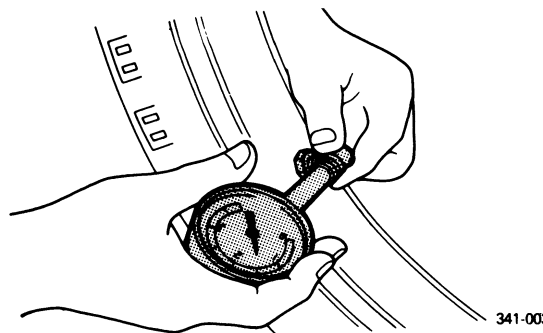
Out of specification → Regulate.



Tire pressure
100 kPa (1.0 kgf/cm², 15 psi)

TIP

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

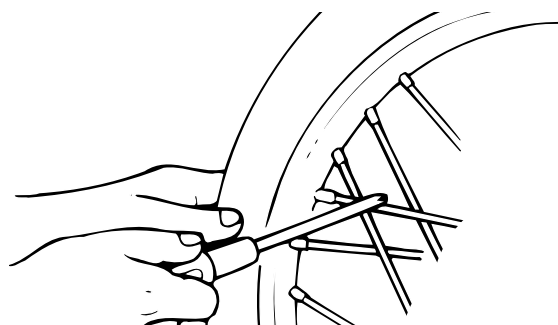


341-003

CHECKING AND TIGHTENING THE SPOKES

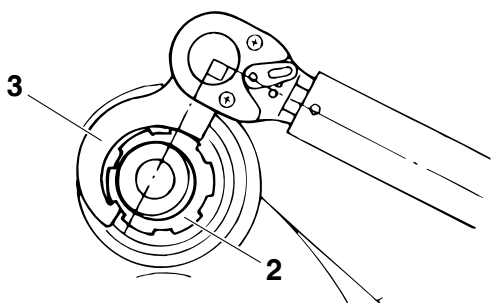
1. Check:

- Spokes
Bend/damage → Replace.
Loose → Tighten.




TIP

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




	Steering nut wrench 90890-01403 Exhaust flange nut wrench YU-A9472
---	---

	Ring nut (initial tightening torque) 38 Nm (3.8 m·kgf, 27 ft·lbf)
---	--

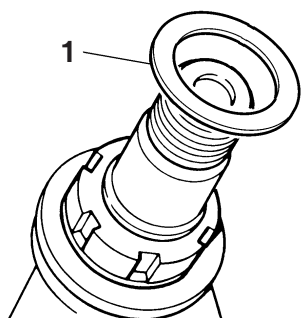
- c. Turn the front fork to the right and left a few times, and make sure that the steering rotates smoothly. If it does not turn smoothly, remove the lower bracket and check the upper and lower bearings. Refer to "STEERING HEAD" on page 4-49.
- d. Loosen the ring nut fully turn and then tighten it to specification with a steering nut wrench.

⚠ WARNING

Do not overtighten the lower ring nut.

	Ring nut (final tightening torque) 7 Nm (0.7 m·kgf, 5.1 ft·lbf)
---	--

- 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 4-49.
- f. Install the washer "1".



5. Install:
 - Upper bracket
Refer to "STEERING HEAD" on page 4-49.
 - Handlebar
Refer to "HANDLEBAR" on page 4-31.

LUBRICATING THE LEVERS

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

	Recommended lubricant Silicone grease
---	--

- Clutch lever

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

LUBRICATING THE PEDAL

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

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



ELECTRICAL SYSTEM

CHECKING THE SPARK PLUG

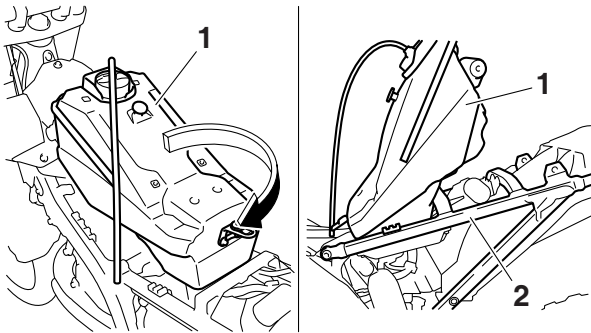
- Remove:
 - Seat
 - Air scoop (left/right)
Refer to "GENERAL CHASSIS" on page 4-1.
 - Fuel tank "1"
Refer to "FUEL TANK" on page 7-1.

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.



- Remove:
 - Spark plug cap
 - Spark plug
Refer to "CAMSHAFT" on page 5-11.

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.

- Check:
 - Spark plug type
Wrong type → Replace.



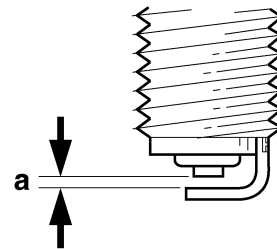
Manufacturer/model
NGK/CR8E

- Check:
 - Electrode
Damage/wear → Replace the spark plug.
 - Insulator
Abnormal color → Replace the spark plug.
Normal color is medium-to-light tan.

- Clean:
 - Spark plug
(with a spark plug cleaner or a wire brush)
- Measure:
 - Spark plug gap "a"
Out of specification → Adjust the spark plug gap.



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



- Install:
 - Spark plug



Spark plug
13 Nm (1.3 m·kgf, 9.4 ft·lbf)

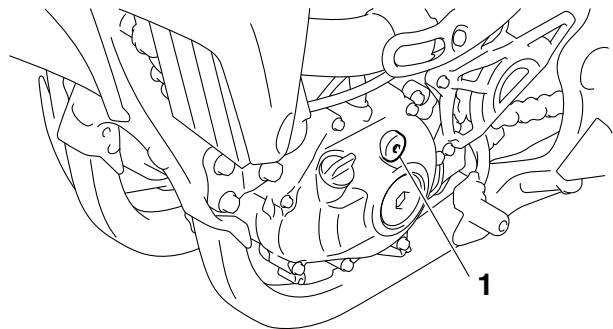
TIP

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

- Install:
 - Spark plug cap
 - Fuel tank
 - Air scoop (left/right)
 - Seat
 - Side cover (left/right)
Refer to "GENERAL CHASSIS" on page 4-1.

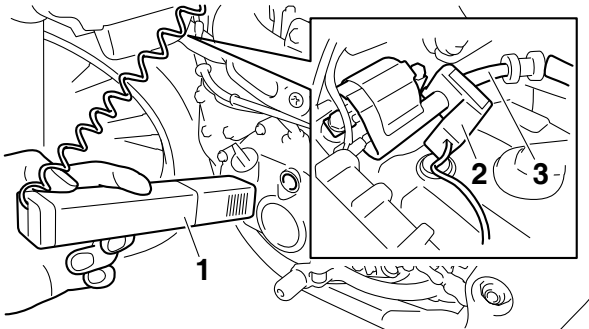
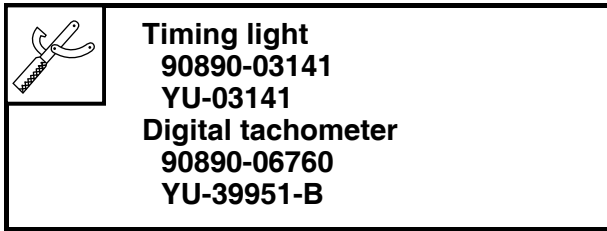
CHECKING THE IGNITION TIMING

- Remove:
 - Timing mark accessing screw "1"



2. Attach:

- Timing light "1"
 - Digital tachometer "2"
- To the high tension code "3".

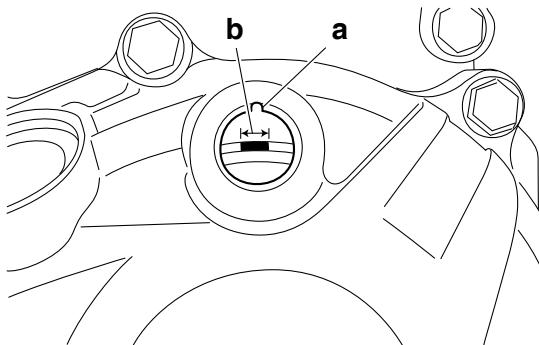


3. Adjust:

- Engine idling speed
- Refer to "ADJUSTING THE ENGINE IDLING SPEED" on page 3-16.

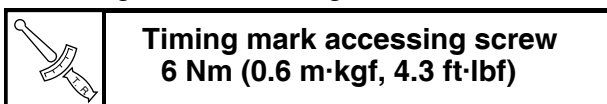
4. Check:

- Ignition timing
- Check whether the alignment mark "a" on the left crankcase cover is within the firing range "b" on the rotor.
- Incorrect firing range → Check rotor and Crankshaft position sensor.



5. Install:

- Timing mark accessing screw



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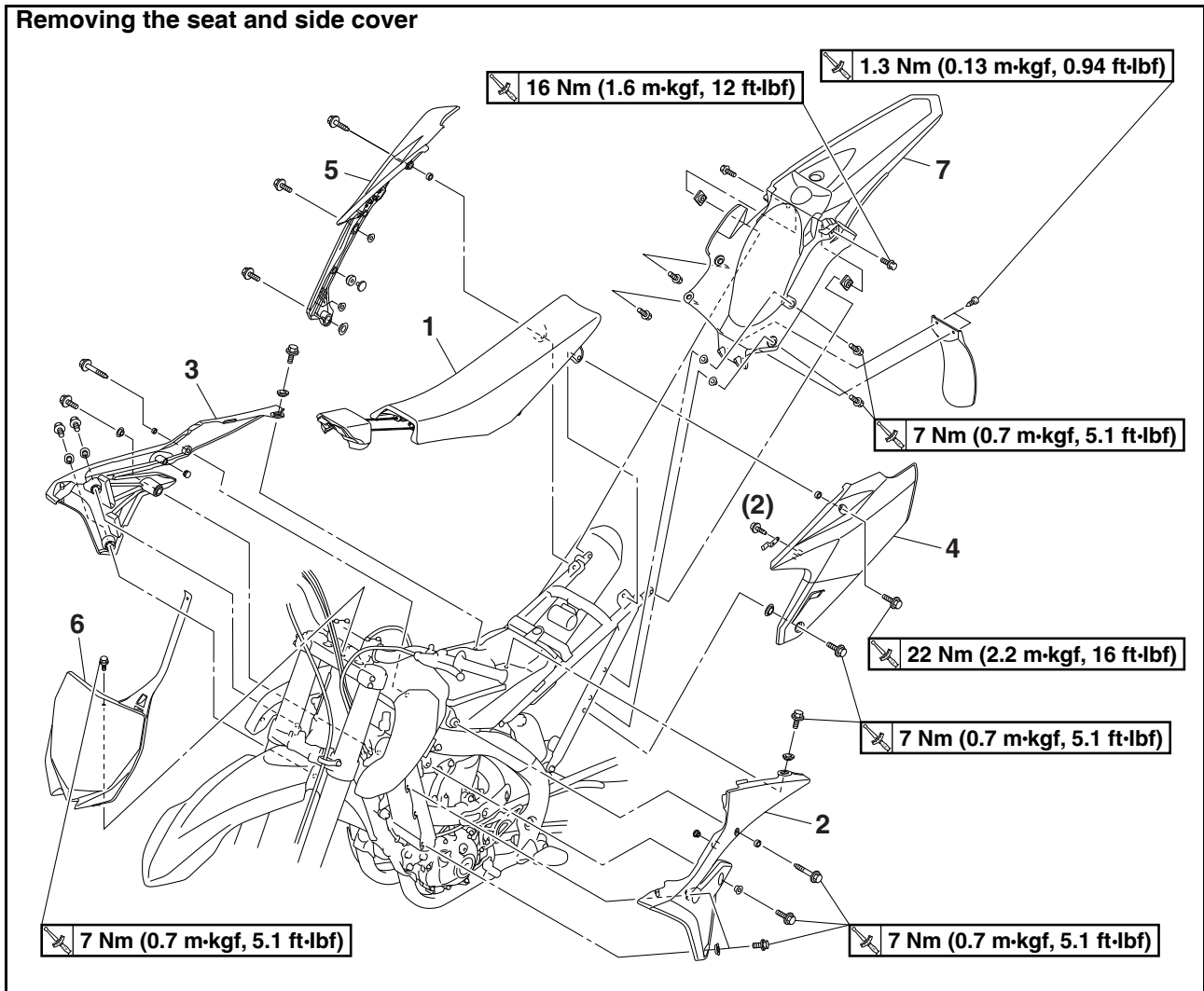
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GENERAL CHASSIS

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.

GENERAL CHASSIS



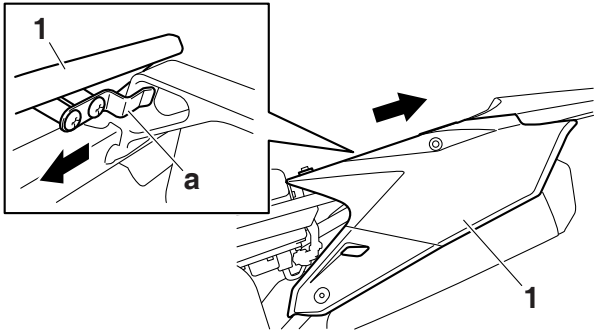
Order	Part name	Q'ty	Remarks
1	Seat	1	
2	Air scoop (left)	1	
3	Air scoop (right)	1	
4	Side cover (left)	1	
5	Side cover (right)	1	
6	Number plate	1	
7	Rear fender	1	
			For installation, reverse the removal procedure.

REMOVING THE LEFT SIDE COVER

1. Remove:
 - Bolt (side cover)
 - Side cover "1"

TIP

Draw the left side cover "1" backward to remove it because its projection "a" is inserted in the rear frame.

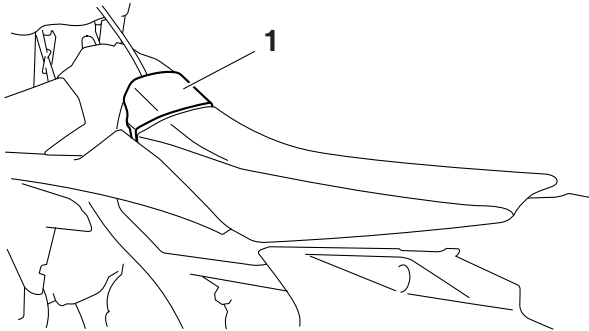


REMOVING THE SEAT

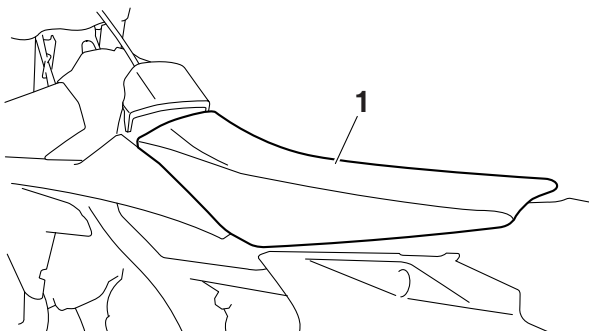
TIP

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 1-21.



2. Remove:
 - Seat "1"

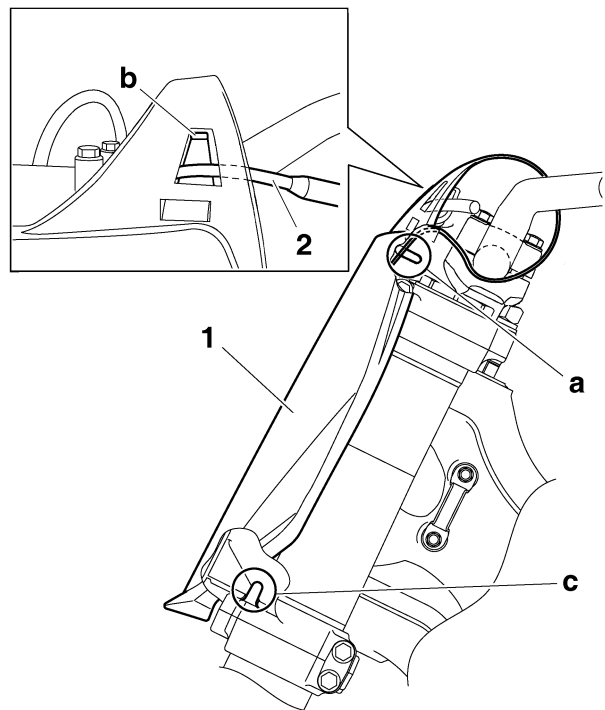


REMOVING THE NUMBER PLATE

1. Remove:
 - Bolt (number plate)
 - Number plate "1"

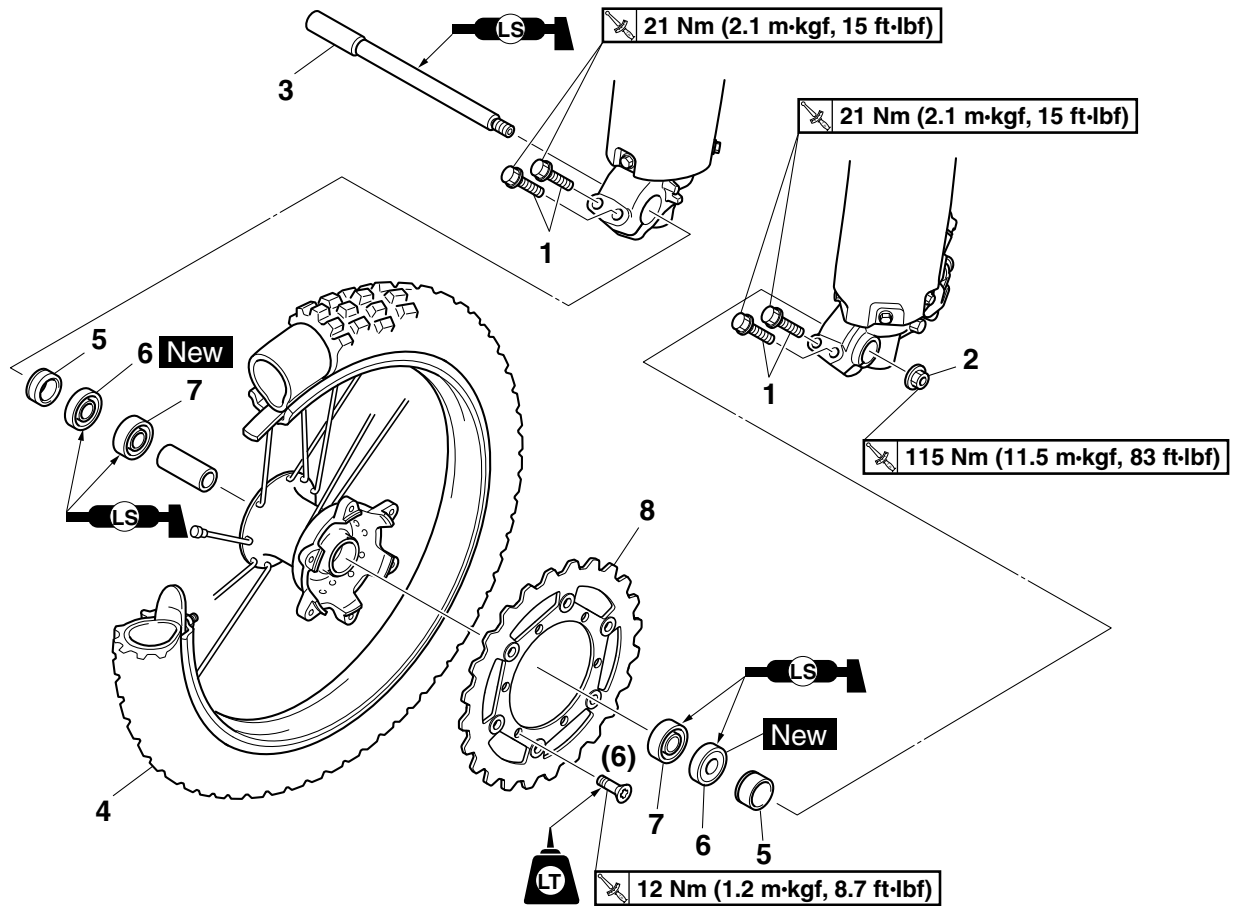
TIP

- 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.



FRONT WHEEL

Removing the front wheel



Order	Part name	Q'ty	Remarks
			Use a suitable 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	Collars	2	
6	Oil seals	2	
7	Bearing	2	
8	Brake disc	1	
			For installation, reverse the removal procedure.

REMOVING THE FRONT WHEEL

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

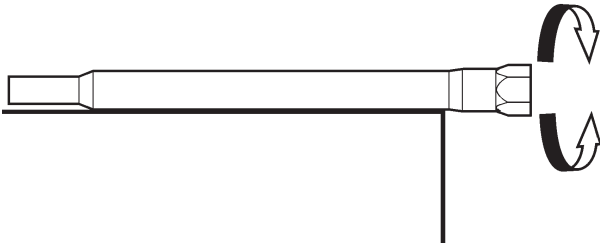
⚠ WARNING

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

2. Remove:
 - Front wheel

CHECKING THE FRONT WHEEL

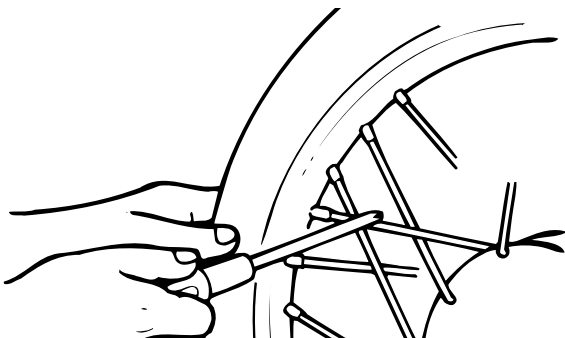
1. Check:
 - Front wheel axle
Roll the front wheel axle on a flat surface.
Bends → Replace.



⚠ WARNING

Do not attempt to straighten a bent wheel axle.

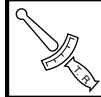
2. Check:
 - Tire (s)
 - Front wheel
Damage/wear → Replace.
Refer to “CHECKING THE TIRES” on page 3-32 and “CHECKING THE WHEELS” on page 3-33.
3. Check:
 - Spokes
Bend/damage → Replace.
Loose → Tighten.
Tap the spokes with a screwdriver.



TIP

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

4. Tighten:
 - Spokes
Refer to “CHECKING AND TIGHTENING THE SPOKES” on page 3-32.

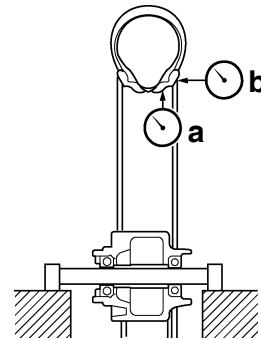


Spokes
2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)

TIP

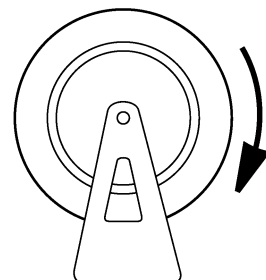
After tightening the spokes, measure the wheel runout.

5. Measure:
 - Wheel radial runout “a”
 - Wheel lateral runout “b”
Out of specification → Repair/replace.

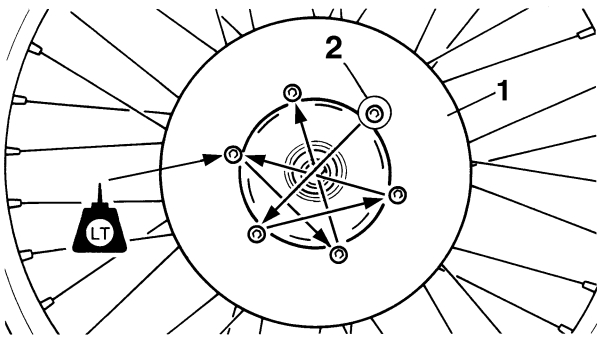


Radial wheel runout limit
2.0 mm (0.08 in)
Lateral wheel runout limit
2.0 mm (0.08 in)

6. Check:
 - Collars
Damage/wear → Replace.
7. Check:
 - Bearing
Front wheel turns roughly or is loose → Replace the wheel bearings.
 - Oil seals
Damage/wear → Replace.



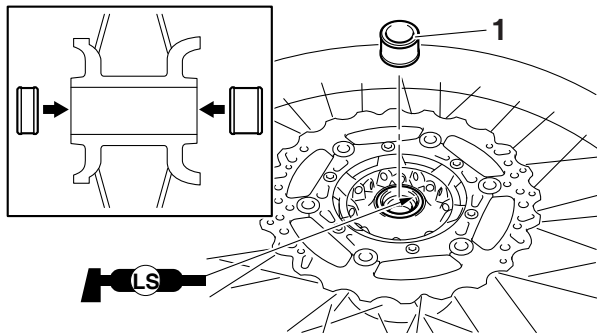
FRONT WHEEL



3. Install:
 • Collar "1"

TIP

Apply the lithium soap base grease on the oil seal lip.

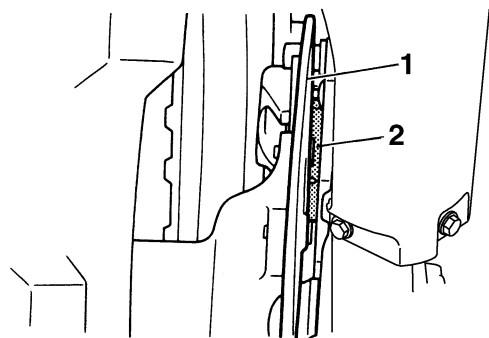


INSTALLING THE FRONT WHEEL

1. Install:
 • Front wheel

TIP

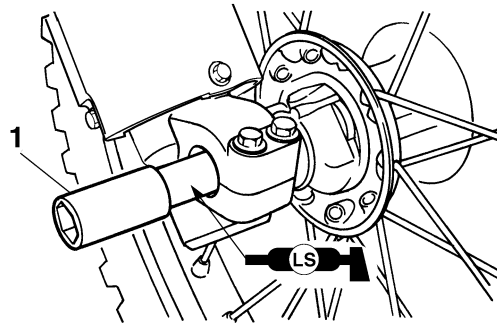
Install the brake disc "1" between the brake pads "2" correctly.




2. Install:
 • Front wheel axle "1"

TIP

Apply the lithium soap base grease to the front wheel axle.

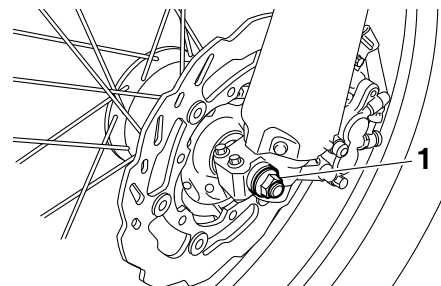


3. Tighten:
 • Front wheel axle nut "1"


	Front wheel axle nut 115 Nm (11.5 m·kgf, 83 ft·lbf)
---	---

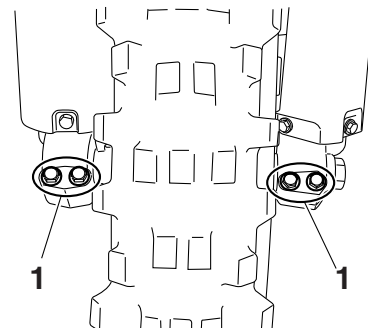
NOTICE

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



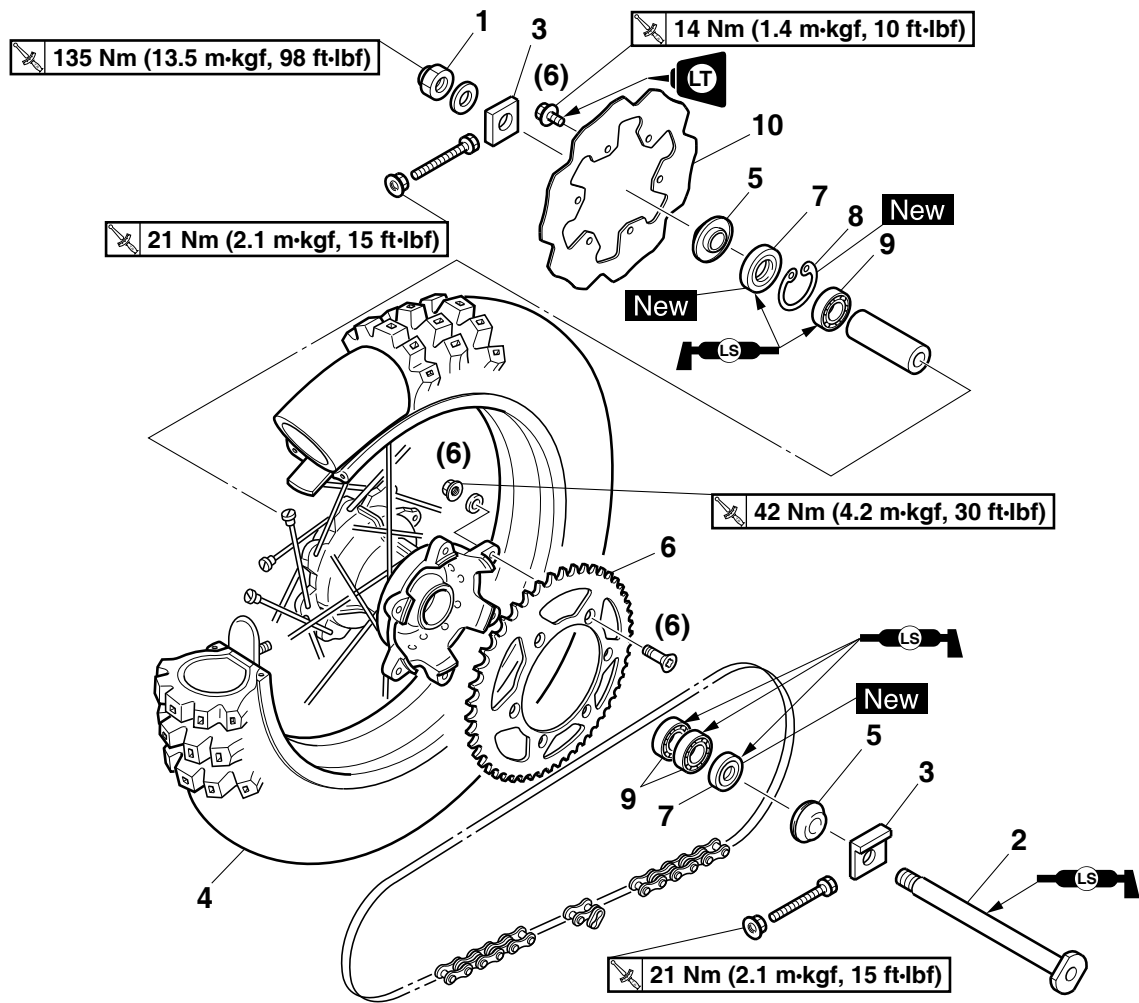
4. Tighten:
 • Front wheel axle pinch bolt "1"

	Front wheel axle pinch bolt 21 Nm (2.1 m·kgf, 15 ft·lbf)
---	--



REAR WHEEL

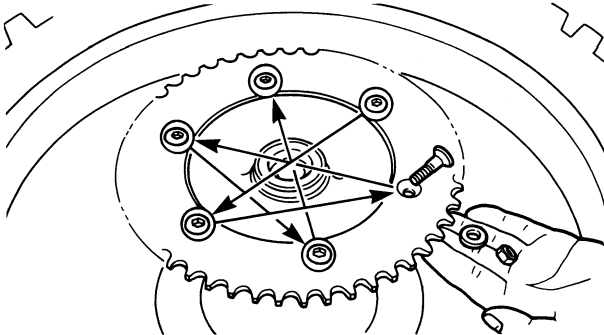
Removing the rear wheel



Order	Part name	Q'ty	Remarks
			Use a suitable stand to raise the rear wheel off the ground.
1	Nut (rear wheel axle)	1	
2	Rear wheel axle	1	
3	Drive chain puller	2	
4	Rear wheel	1	
5	Collars	2	
6	Rear wheel sprocket	1	
7	Oil seals	2	
8	Circlip	1	
9	Bearing	3	
10	Brake disc	1	
			For installation, reverse the removal procedure.

TIP

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



ASSEMBLING THE REAR WHEEL

1. Install:

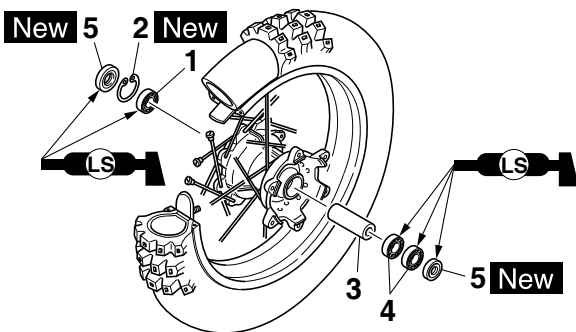
- Bearing (right side) "1"
- Circlip "2" **New**
- Spacer "3"
- Bearing (left side) "4"
- Oil seals "5" **New**

TIP

- Apply the lithium soap base 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.

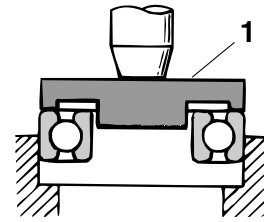
NOTICE

Install the bearing by pressing its outer race parallel.



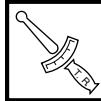
TIP

Use a socket "1" that matches the diameter of the bearing outer race and that of the oil seal.



2. Install:

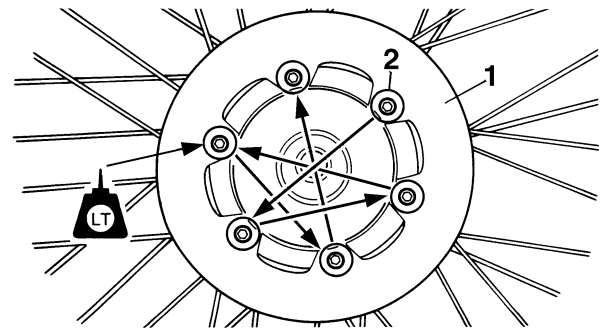
- Brake disc "1"
- Brake disc bolt "2"



Brake disc bolt
14 Nm (1.4 m·kgf, 10 ft·lbf)
LOCTITE®

TIP

Tighten the bolts in stages and in a crisscross pattern.

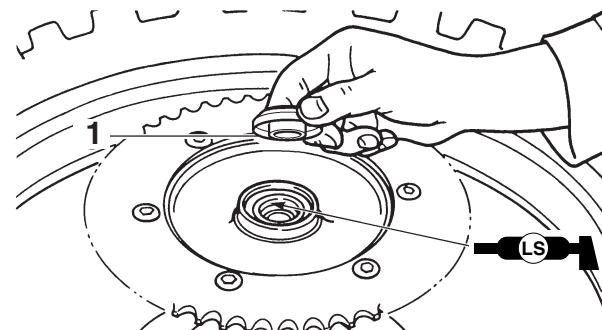


3. Install:

- Collar "1"

TIP

Apply the lithium soap base grease on the oil seal lip.



INSTALLING THE REAR WHEEL

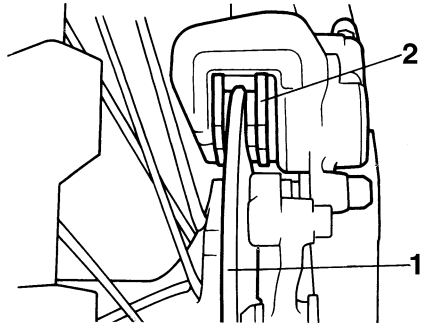
1. Install:

- Rear wheel

REAR WHEEL

TIP

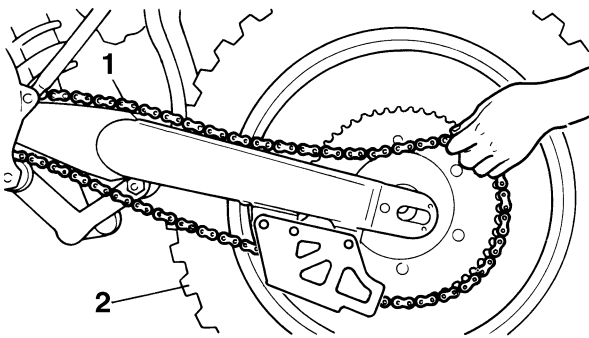
Install the brake disc "1" between the brake pads "2" correctly.



2. Install:
- Drive chain "1"

TIP

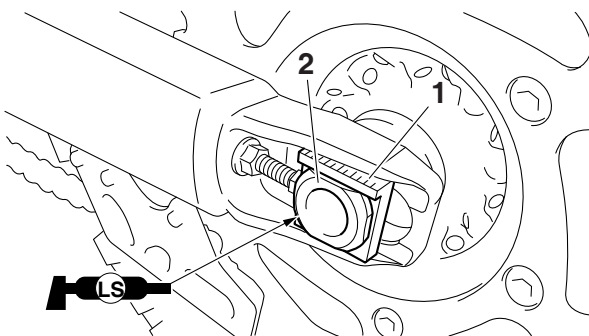
Push the rear wheel "2" forward and install the drive chain.



3. Install:
- Left drive chain puller "1"
 - Rear wheel axle "2"

TIP

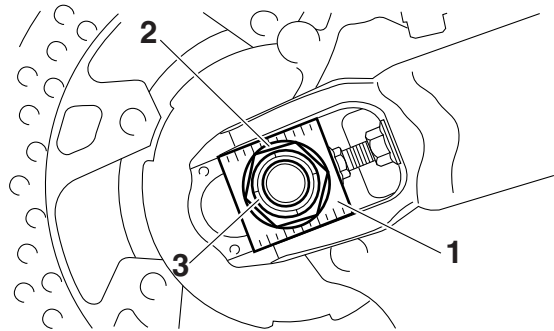
- Install the left drive chain puller, and insert the rear wheel axle from the left side.
- Apply the lithium soap base grease to the rear wheel axle.



4. Install:
- Right drive chain puller "1"
 - Washer "2"
 - Rear wheel axle nut "3"

TIP

Temporarily tighten the nut (rear wheel axle) at this point.

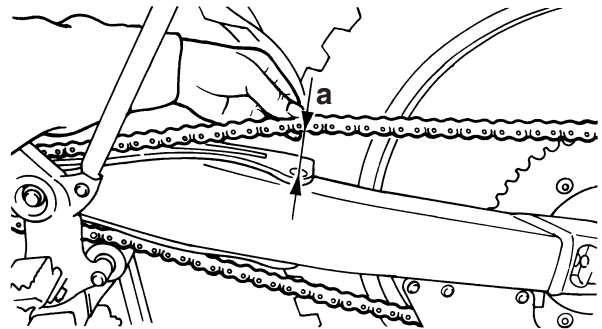


5. Adjust:
- Drive chain slack "a"



Drive chain slack
50–60 mm (1.97–2.36 in)

Refer to "ADJUSTING THE DRIVE CHAIN SLACK" on page 3-27.



6. Tighten:
- Rear wheel axle nut "1"

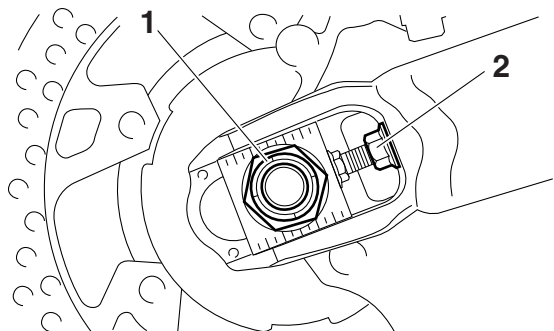


Wheel axle nut
135 Nm (13.5 m·kgf, 98 ft·lbf)

- Locknut "2"



Locknut
21 Nm (2.1 m·kgf, 15 ft·lbf)



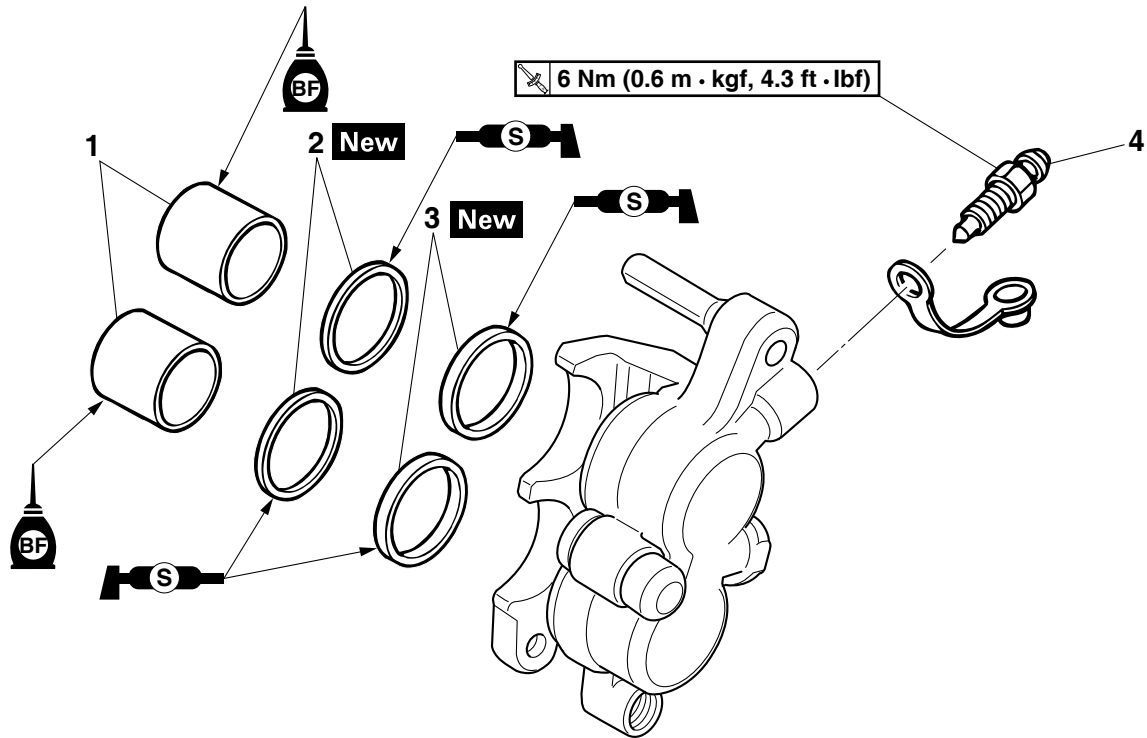
FRONT BRAKE

Removing the front brake caliper

Order	Part name	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE BRAKE SYSTEM" on page 3-21.
1	Union bolt	1	
2	Copper washers	2	
3	Front brake hose	1	
4	Brake pad pin plug	1	
5	Brake pad pin	1	
6	Brake pads	2	
7	Brake pad spring	1	
8	Front brake caliper assembly	1	
9	Front brake caliper bracket	1	
			For installation, reverse the removal procedure.

FRONT BRAKE

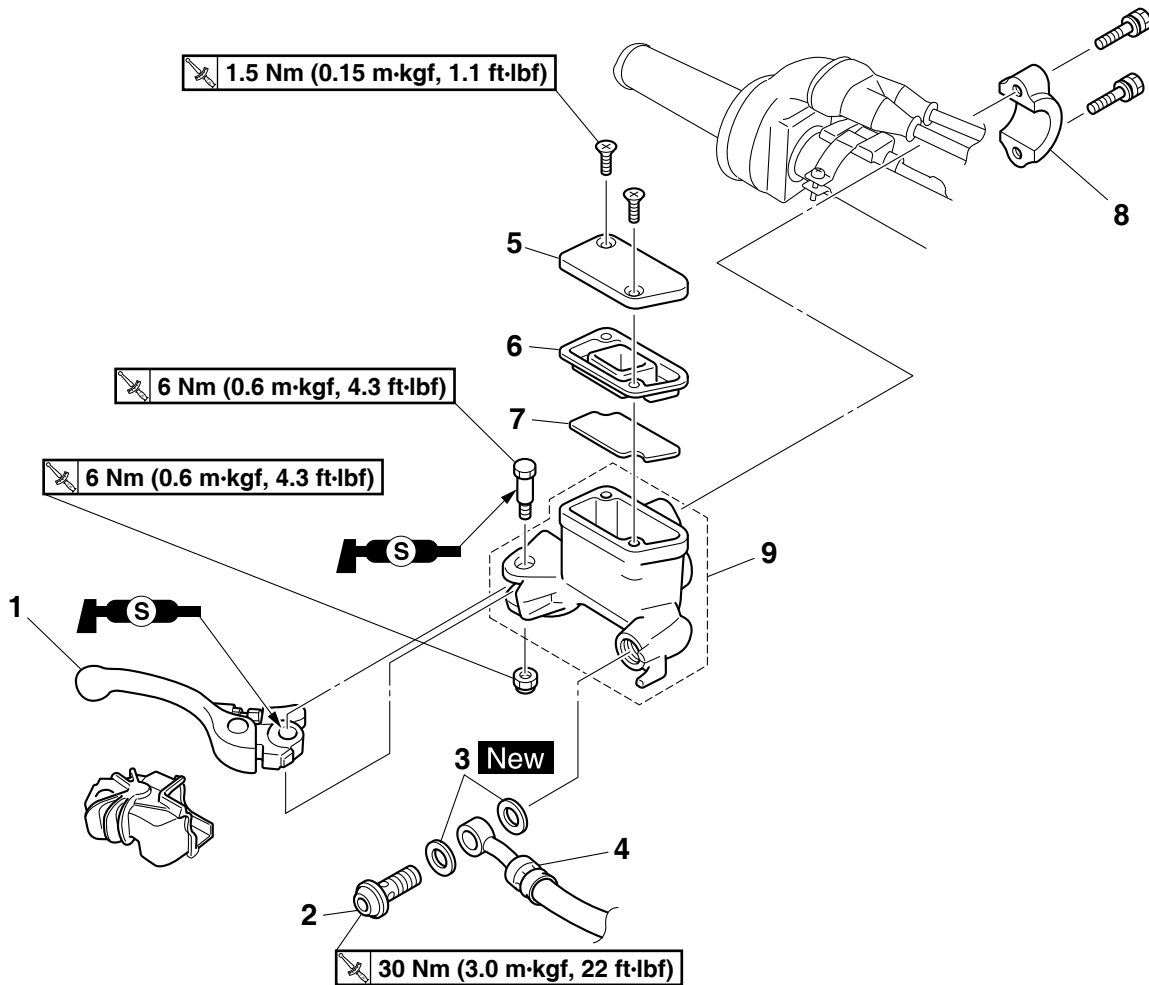
Disassembling the front brake caliper



Order	Part name	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	
			For assembly, reverse the disassemble procedure.

FRONT BRAKE

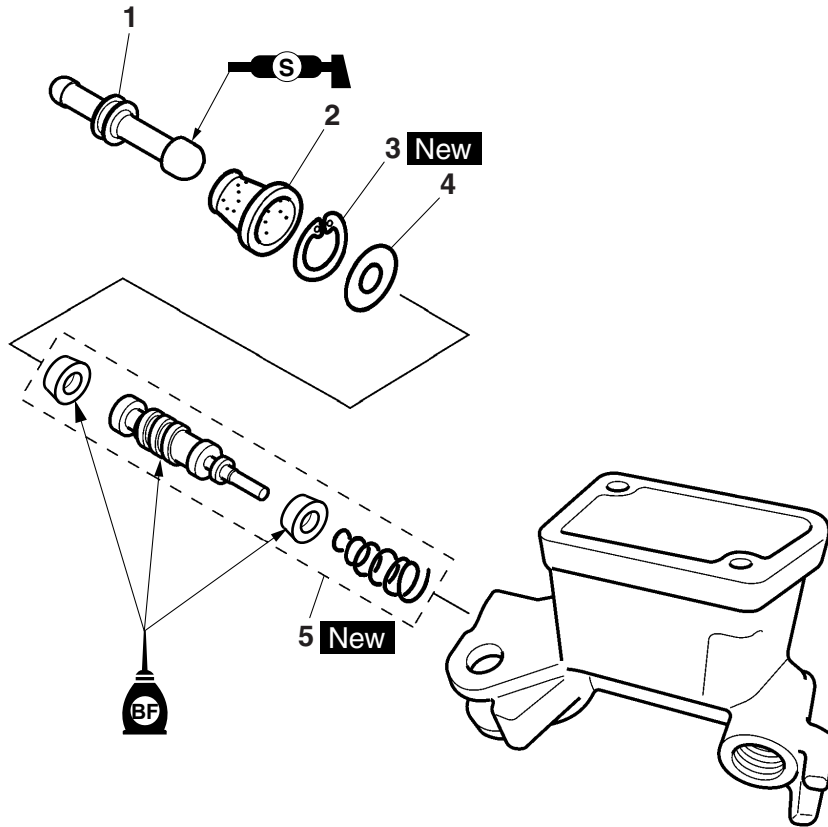
Removing the front brake master cylinder



Order	Part name	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE BRAKE SYSTEM" on page 3-21.
1	Brake lever	1	
2	Union bolt	1	
3	Copper washers	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	
			For installation, reverse the removal procedure.

FRONT BRAKE

Disassembling the front brake master cylinder



Order	Part name	Q'ty	Remarks
1	Push rod	1	
2	Dust boot	1	
3	Circlip	1	
4	Washer	1	
5	Brake master cylinder kit	1	
			For assembly, reverse the disassemble procedure.

INTRODUCTION

WARNING

If you need to disassemble the disc brake components, observe the following precautions.

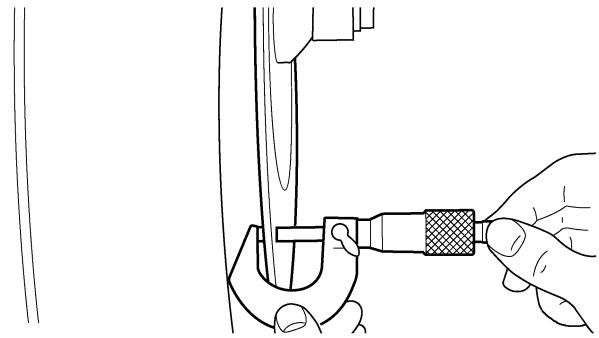
- Never disassemble the brake components unless absolutely necessary.
- If there is any problem with connections on the hydraulic brake system, perform the following jobs.


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 lose your eyesight.
- **FIRST AID FOR BRAKE FLUID ENTERING THE EYES:**
- Flush with water for 15 minutes and get immediate medical attention.

CHECKING THE FRONT BRAKE DISC

1. Remove:
 - Front wheel
Refer to "FRONT WHEEL" on page 4-3.
2. Check:
 - Front brake disc
Damage/galling → Replace.
3. Measure:
 - Brake disc thickness
Measure the brake disc thickness at a few different locations.
Out of specification → Replace.



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

4. Install:
 - Front wheel
Refer to "FRONT WHEEL" on page 4-3.

REMOVING THE FRONT BRAKE CALIPER

TIP

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

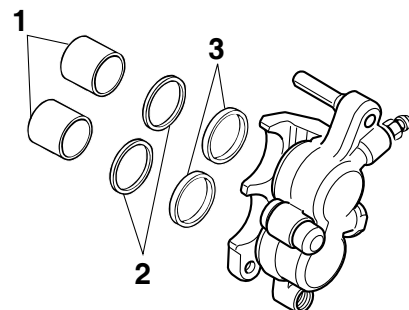
1. Remove:
 - Union bolt
 - Copper washers
 - Brake hose

TIP

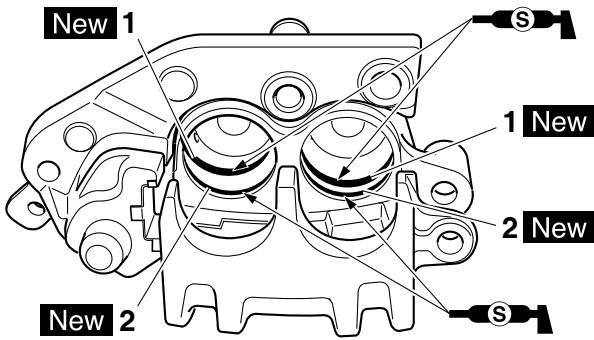
Put the end of the brake hose into a container and pump out the brake fluid.

DISASSEMBLING THE FRONT BRAKE CALIPER

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



FRONT BRAKE



3. Install:

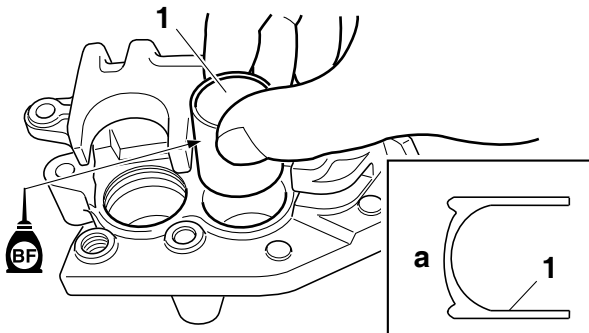
- Brake caliper piston "1"

TIP

Apply the brake fluid on the piston outer surface.

NOTICE

- Install the piston with its side "a" facing the brake caliper.
- Never force to insert.



INSTALLING THE FRONT BRAKE CALIPER

1. Install:

- Front brake caliper bracket
- Front brake caliper (temporarily)
- Copper washers **New**
- Brake hose
- Union bolt

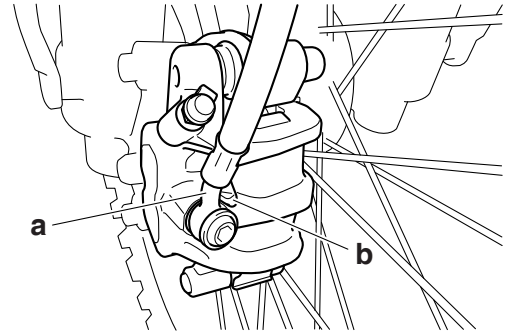
	Front brake caliper bracket
	28 Nm (2.8 m·kgf, 20 ft·lbf)
	Brake hose union bolt
	30 Nm (3.0 m·kgf, 22 ft·lbf)

⚠ WARNING

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

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
	17 Nm (1.7 m·kgf, 12 ft·lbf)

Refer to "CHECKING THE FRONT BRAKE PADS" on page 3-23.

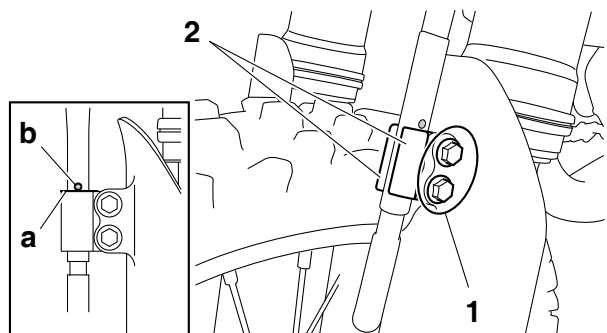
3. Tighten:

- Brake hose holder mounting bolt "1"

	Brake hose holder mounting bolt
	9 Nm (0.9 m·kgf, 6.5 ft·lbf)

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.

	Recommended brake fluid
	DOT 4

⚠ WARNING

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

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 BRAKE SYSTEM” on page 3-21.
6. Check:
 - Brake fluid level
The minimum level mark or below → Add.
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-26.
7. Check:
 - Brake lever free play
Refer to “ADJUSTING THE FRONT BRAKE” on page 3-22.
 - Brake lever operation
A softy or spongy feeling → Bleed the brake system.
Refer to “BLEEDING THE BRAKE SYSTEM” on page 3-21.

REMOVING THE FRONT BRAKE MASTER CYLINDER

TIP

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

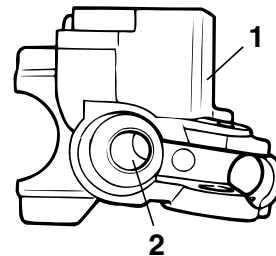
1. Remove:
 - Union bolt
 - Copper washers
 - Brake hoses

TIP

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

CHECKING THE FRONT 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:
 - Brake master cylinder kit
Damage/scratches/wear → Replace.
3. Check:
 - Brake master cylinder reservoir cap
4. Check:
 - Brake hoses
Cracks/damage/wear → Replace.

ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

⚠ WARNING

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



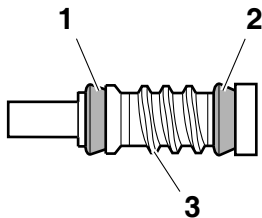
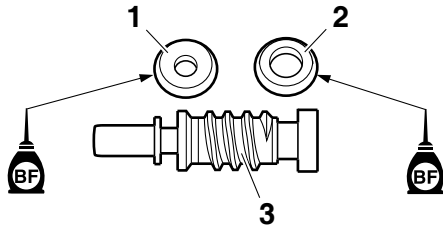
**Recommended brake fluid
DOT 4**

1. Wash the brake master cylinder and the brake master cylinder kit with brake fluid.
2. Install:
 - Primary cylinder cup “1”
 - Secondary cylinder cup “2”
Install to the brake master cylinder piston “3”.

FRONT BRAKE

⚠ WARNING

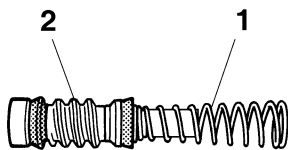
Apply brake fluid to the cylinder cups and install them as shown. Wrong orientation in installation causes poor braking performance.



3. Install:
- Spring "1"
Install to the brake master cylinder piston "2".

TIP

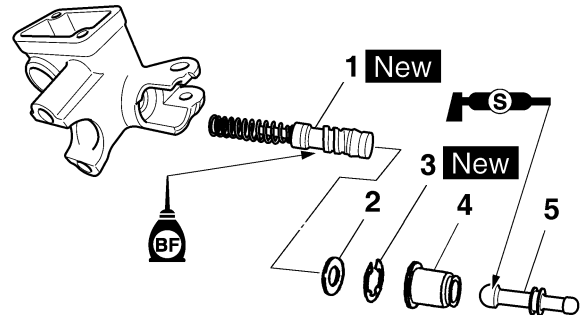
Install the spring with a smaller inside diameter to the brake master cylinder piston.



4. Install:
- Brake master cylinder kit "1" **New**
 - Washer "2"
 - Circlip "3" **New**
 - Dust boot "4"
 - Push rod "5"

TIP

- Before installation, apply brake fluid to the brake master cylinder kit.
- Before installation, apply silicone grease to the push rod end.
- Use circlip pliers to install the circlip.



INSTALLING THE FRONT BRAKE MASTER CYLINDER

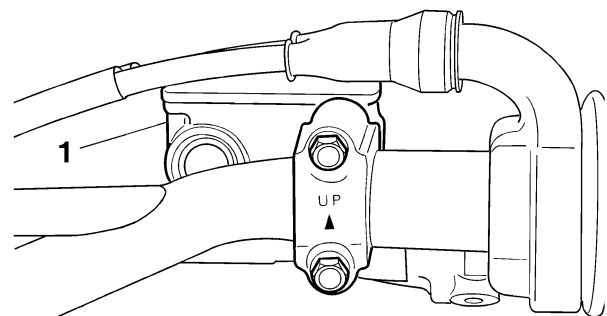
1. Install:
- Brake master cylinder "1"



**Brake master cylinder holder bolt
9 Nm (0.9 m·kgf, 6.5 ft·lbf)**

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 washers **New**
 - Brake hose
 - Union bolt



**Brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)**

⚠ WARNING

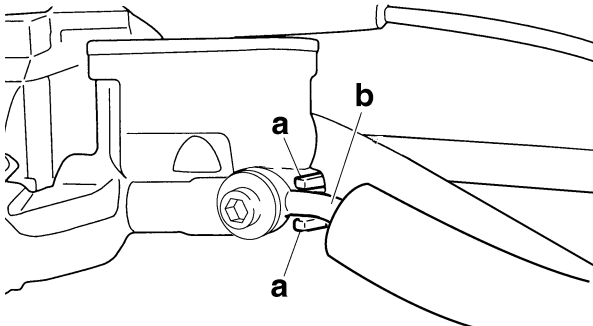
Proper brake hose routing is essential to insure safe vehicle operation.

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.



**Recommended brake fluid
DOT 4**

⚠ WARNING

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

NOTICE

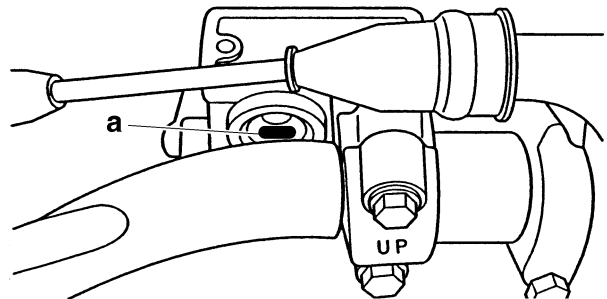
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

4. Bleed:

- Brake system
Refer to “BLEEDING THE BRAKE SYSTEM” on page 3-21.

5. Check:

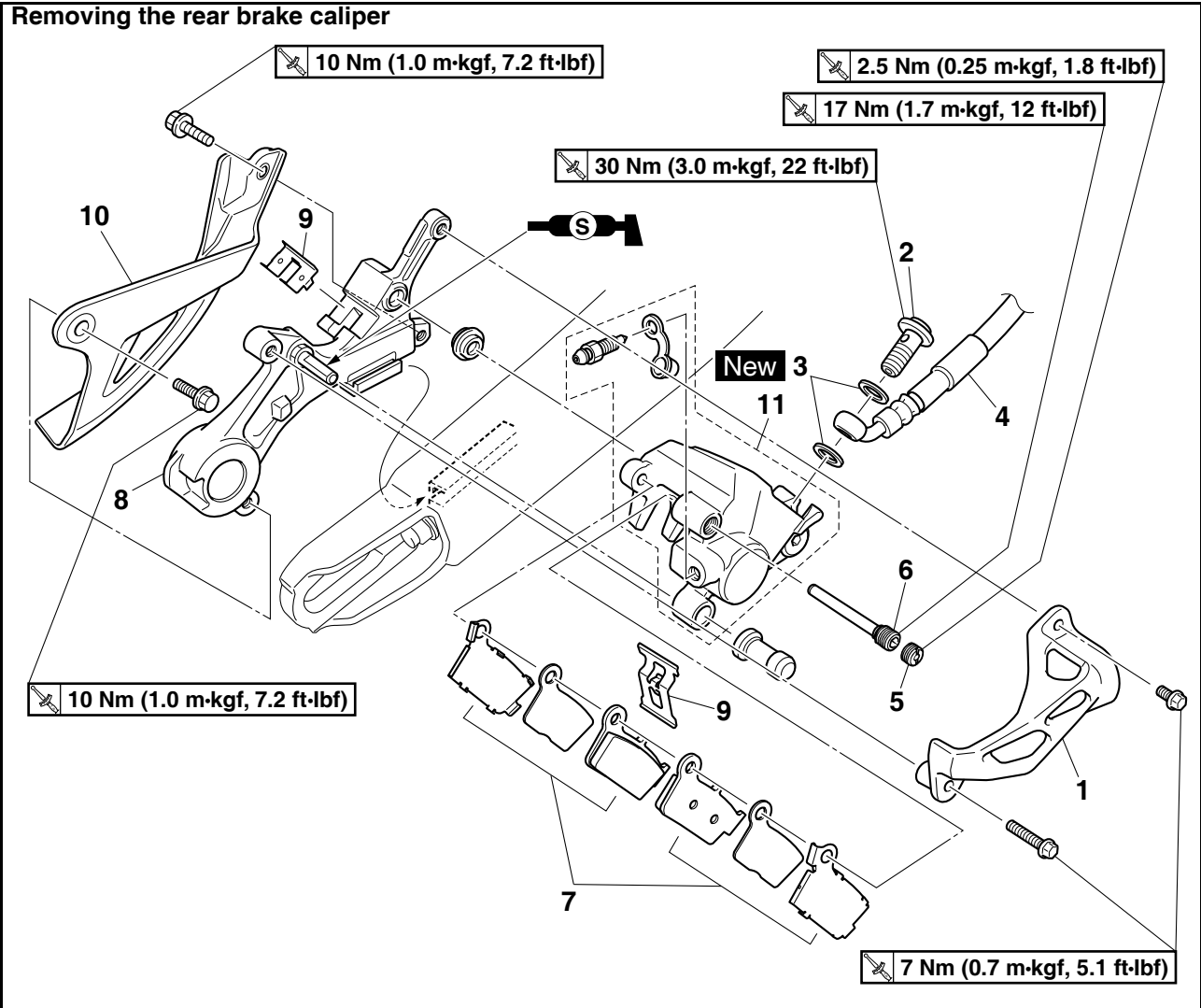
- Brake fluid level
The minimum level mark “a” or below → Add.
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-26.



6. Check:

- Brake lever free play
Refer to “ADJUSTING THE FRONT BRAKE” on page 3-22.
- Brake lever operation
A softy or spongy feeling → Bleed the brake system.
Refer to “BLEEDING THE BRAKE SYSTEM” on page 3-21.

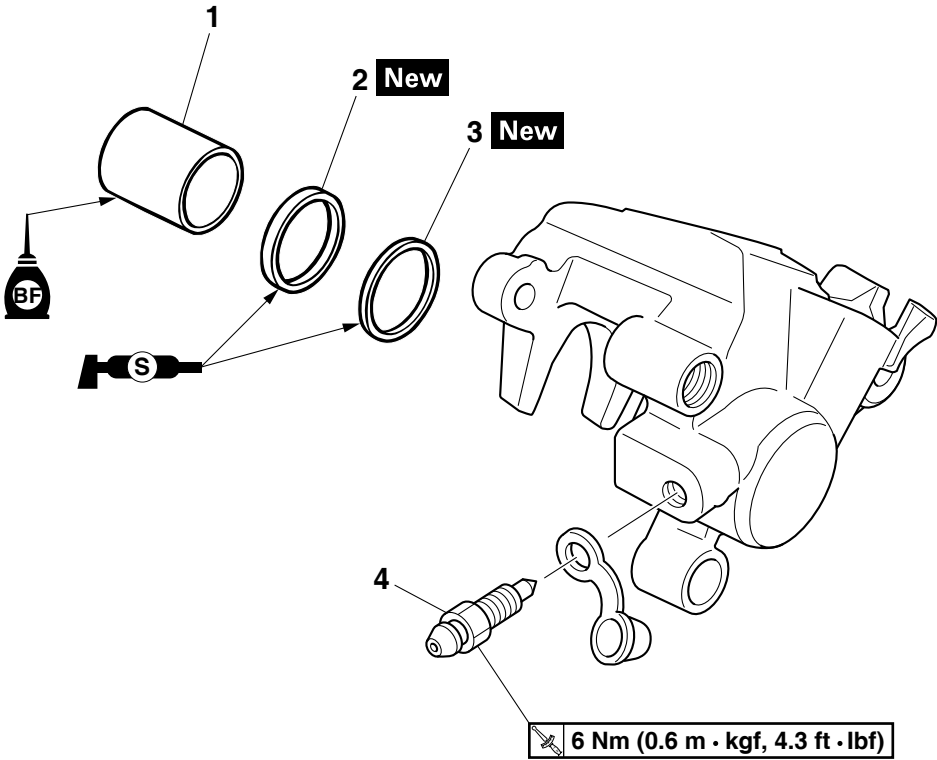
REAR BRAKE



Order	Part name	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE BRAKE SYSTEM" on page 3-21.
1	Protector	1	
2	Union bolt	1	
3	Copper washers	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 springs	2	
10	Rear brake disc cover	1	
11	Rear brake caliper assembly	1	
			For installation, reverse the removal procedure.

REAR BRAKE

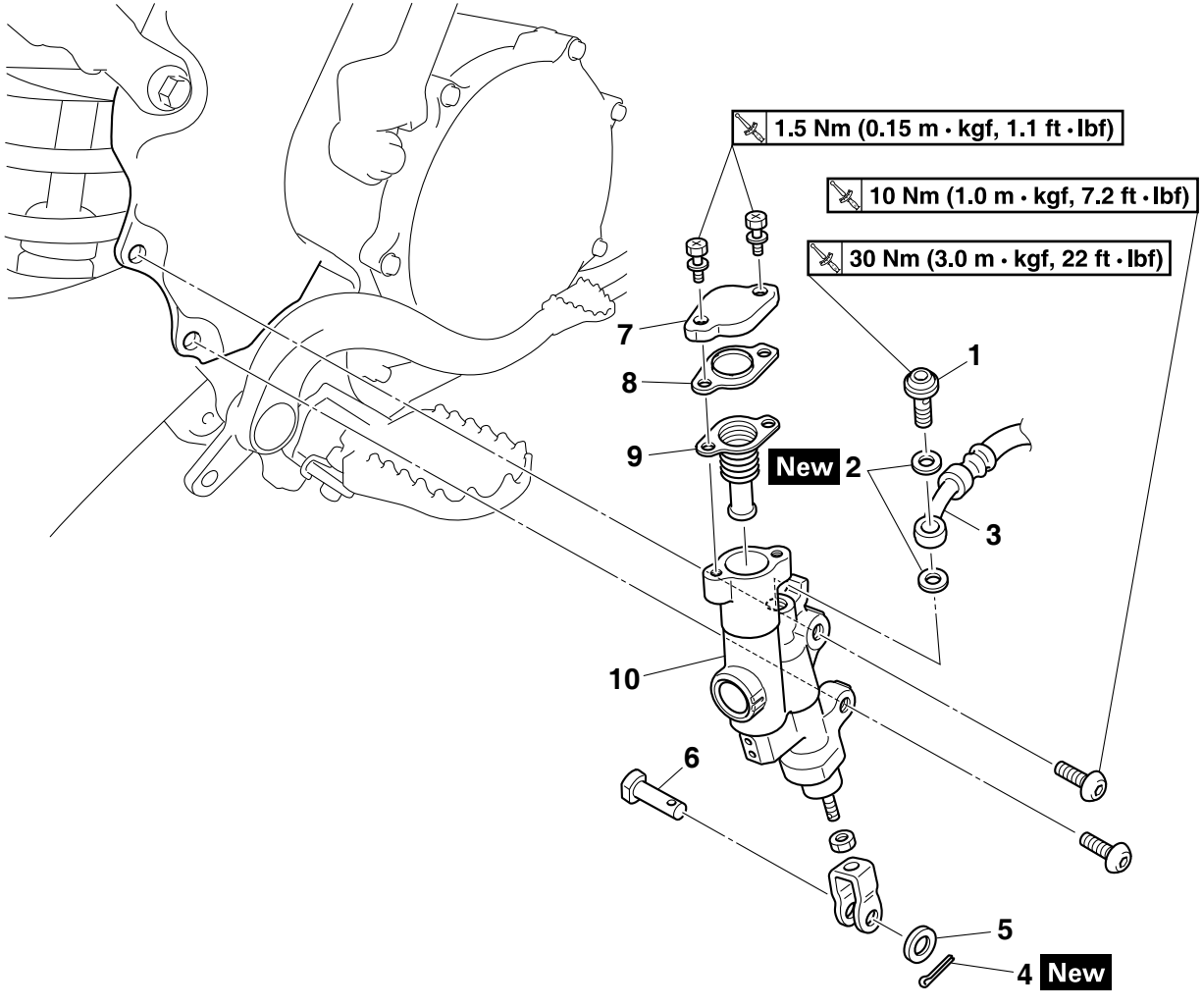
Disassembling the rear brake caliper



Order	Part name	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	
			For assembly, reverse the disassemble procedure.

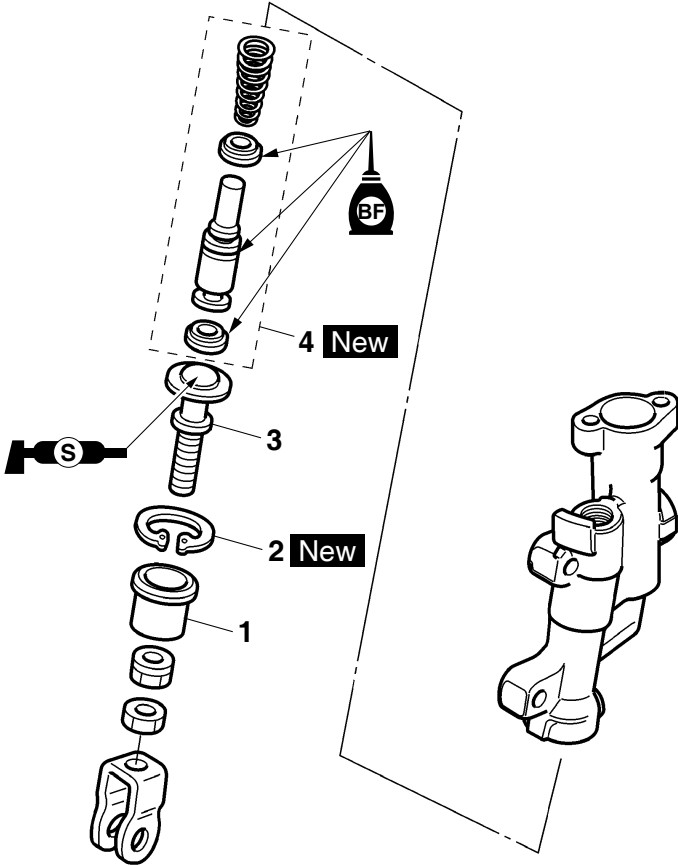
REAR BRAKE

Removing the rear brake master cylinder



Order	Part name	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE BRAKE SYSTEM" on page 3-21.
1	Union bolt	1	
2	Copper washers	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	
			For installation, reverse the removal procedure.

Disassembling the rear brake master cylinder



Order	Part name	Q'ty	Remarks
1	Dust boot	1	
2	Circlip	1	
3	Push rod	1	
4	Brake master cylinder kit	1	
			For assembly, reverse the disassemble procedure.

INTRODUCTION


WARNING

If you need to disassemble the disc brake components, observe the following precautions.

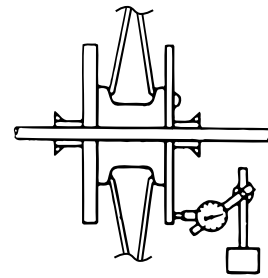
- Never disassemble the brake components unless absolutely necessary.
- If there is any problem with connections on the hydraulic brake system, perform the following jobs.
Disassemble the brake system, drain the brake fluid, and clean it. After that, add a suitable amount of brake fluid. Then, bleed 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 lose your eyesight.
- **FIRST AID FOR BRAKE FLUID ENTERING THE EYES:**
- Flush with water for 15 minutes and get immediate medical attention.


CHECKING THE REAR BRAKE DISC

1. Remove:
 - Rear wheel
Refer to "REAR WHEEL" on page 4-7.
2. Check:
 - Brake disc
Damage/galling → Replace.
3. 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 4-15.

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

4. Measure:
 - Brake disc deflection
Out of specification → Correct the brake disc deflection or replace the brake disc.



	Brake disc deflection limit 0.15 mm (0.0059 in)
---	---

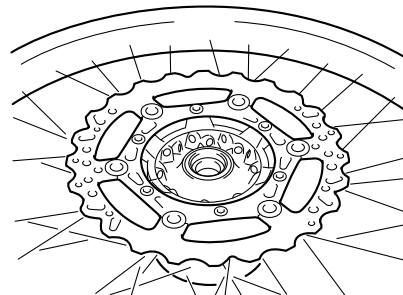
5. Adjust:
 - Brake disc deflection




- a. Remove the brake disc.
- b. Turn the mounted position of the brake disc by one bolt hole.
- c. Install the brake disc.

TIP

Tighten the brake disc bolts in stages and in a crisscross pattern.



	Brake disc bolt 14 Nm (1.4 m·kgf, 10 ft·lbf) LOCTITE®
---	--

- d. Measure the brake disc deflection.
- e. If out of specification, repeat the adjustment steps until the brake disc deflection is within specification.
- f. If the brake disc deflection cannot be brought within specification, replace the brake disc.



6. Install:
 - Rear wheel
Refer to "REAR WHEEL" on page 4-7.

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 washers
- Brake hose

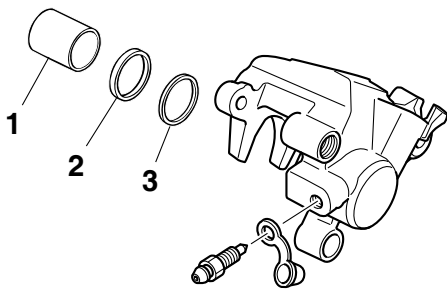
TIP

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

DISASSEMBLING THE REAR BRAKE CALIPER

1. Remove:

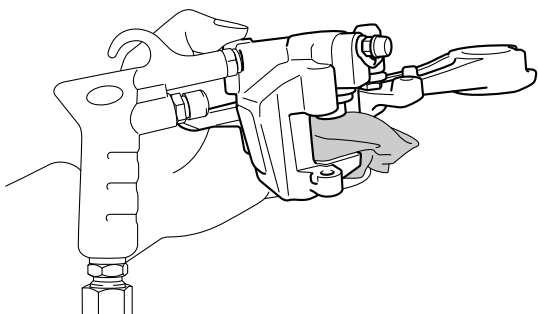
- Brake caliper piston "1"
- Brake caliper piston dust seal "2"
- Brake caliper piston seal "3"



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

⚠ 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.



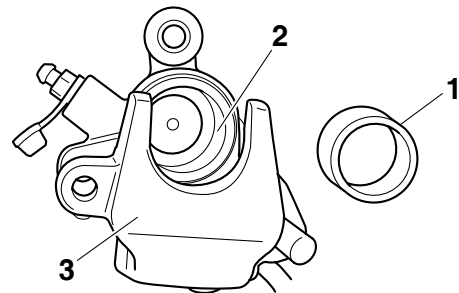
- b. Remove the brake caliper piston dust seal and the brake caliper piston seal.



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.



⚠ 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.

ASSEMBLING THE REAR BRAKE CALIPER

⚠ 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.



Recommended brake fluid
DOT 4

REAR BRAKE

INSTALLING THE BRAKE CALIPER PISTON

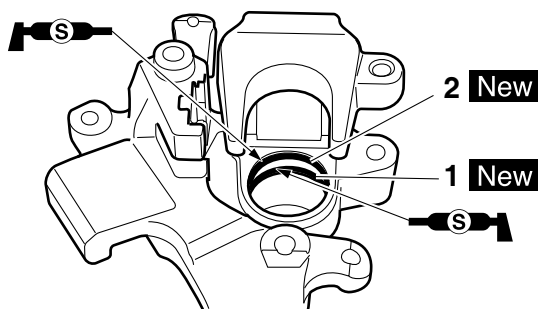
- Clean:
 - Brake caliper
 - Brake caliper piston seal
 - Brake caliper piston dust seal
 - Brake caliper pistonUse brake fluid for cleaning.
- Install:
 - Brake caliper piston seals "1" **New**
 - Brake caliper piston dust seal "2" **New**

WARNING

Always use new brake caliper piston seal and brake caliper piston dust seal.

TIP

- Apply the silicone grease on the brake caliper piston seal and brake caliper piston dust seal.
- Fit the brake caliper piston seals and brake caliper piston dust seals onto the slot on brake caliper correctly.



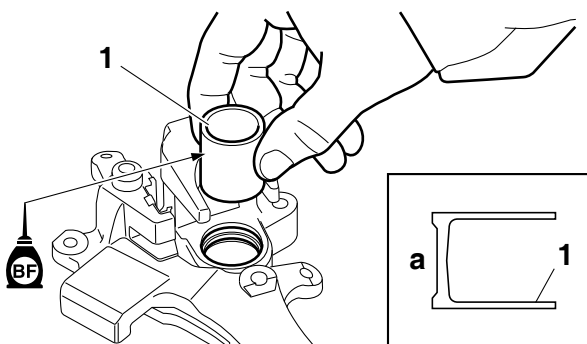
- Install:
 - Brake caliper piston "1"

TIP

Apply the brake fluid on the piston outer surface.

NOTICE

- Install the piston with its side "a" facing the brake caliper.
- Never force to insert.



INSTALLING THE REAR BRAKE CALIPER

- Install:
 - Rear brake caliper
 - Rear brake caliper bracket
- Install:
 - Rear wheelRefer to "REAR WHEEL" on page 4-7.
 - Copper washers **New**
 - Brake hose
 - Union bolt



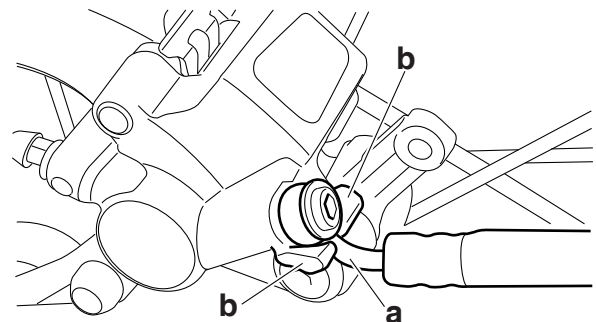
Brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)

WARNING

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

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.



- Install:
 - Brake pad springs
 - Brake pads
 - Brake pad pin
 - Brake pad pin plug



Brake pad pin
17 Nm (1.7 m·kgf, 12 ft·lbf)
Brake pad pin plug
2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)

Refer to "CHECKING THE REAR BRAKE PADS" on page 3-25.

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



Recommended brake fluid
DOT 4

⚠ WARNING

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

NOTICE

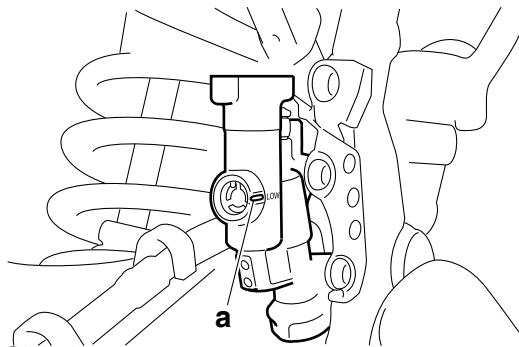
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

5. Bleed:

- Brake system
Refer to “BLEEDING THE BRAKE SYSTEM” on page 3-21.

6. Check:

- Brake fluid level
The minimum level mark “a” or below → Add.
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-26.



7. Check:

- Brake pedal operation
A softy or spongy feeling → Bleed the brake system.
Refer to “BLEEDING THE BRAKE SYSTEM” on page 3-21.

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 washers
- Brake hose

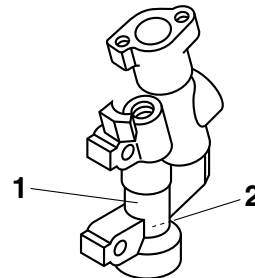
TIP

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

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:

- Brake master cylinder kit
Damage/wear → Replace.

3. Check:

- Master cylinder reservoir cap
Crack/damage → Replace.
- Brake master cylinder reservoir diaphragm holder
- Brake master cylinder reservoir diaphragm
Crack/damage → Replace.

4. Check:

- Brake hoses
Cracks/damage/wear → Replace.

ASSEMBLING THE REAR BRAKE MASTER CYLINDER

⚠ WARNING

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

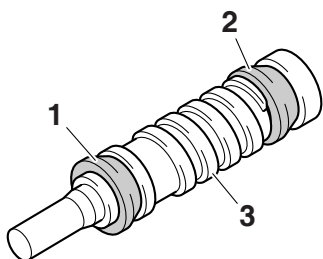
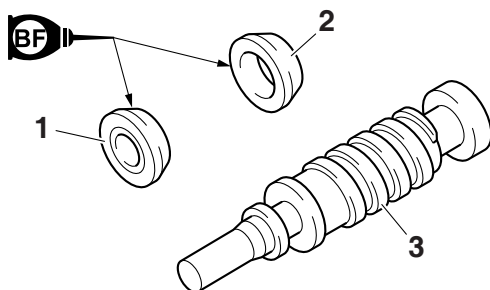


**Recommended brake fluid
DOT 4**

1. Wash the brake master cylinder and the brake master cylinder kit with brake fluid.
2. Install:
 - Primary cylinder cup "1"
 - Secondary cylinder cup "2"
 Install to the brake master cylinder piston "3".

⚠ WARNING

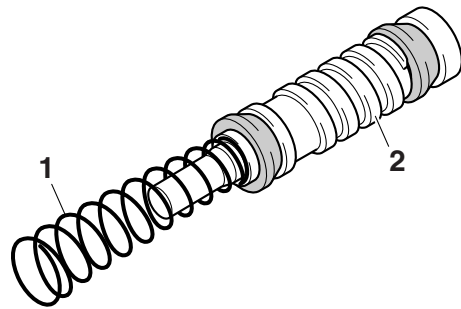
Apply brake fluid to the cylinder cups and install them as shown. Wrong orientation in installation causes poor braking performance.



3. Install:
 - Spring "1"
 Install to the brake master cylinder piston "2".

TIP

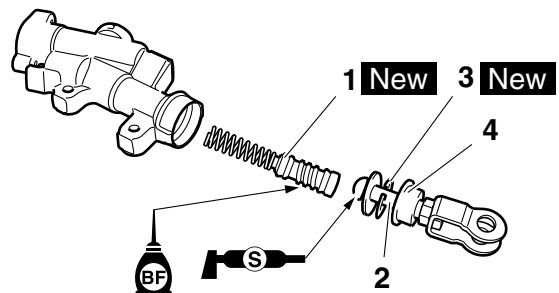
Install the spring with a smaller inside diameter to the brake master cylinder piston.



4. Install:
 - Master cylinder kit "1" **New**
 - Push rod "2"
 - Circlip "3" **New**
 - Dust boot "4"

TIP

- Before installation, apply brake fluid to the brake master cylinder kit.
- Before installation, apply silicone grease to the push rod end.
- Use circlip pliers to install the circlip.



INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:
 - Copper washers **New**
 - Brake hose
 - Union bolt



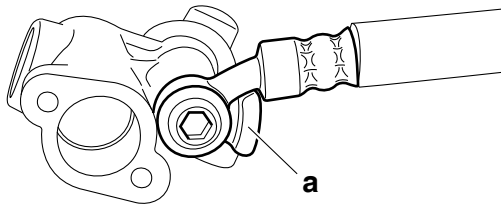
**Brake hose union bolt
30 Nm (3.0 m·kgf, 22 ft·lbf)**

⚠ WARNING

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

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.



**Recommended brake fluid
DOT 4**

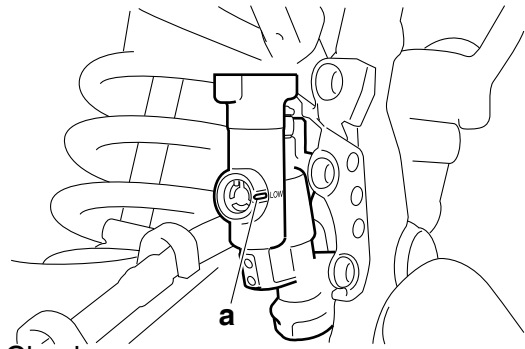
⚠ WARNING

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

NOTICE

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

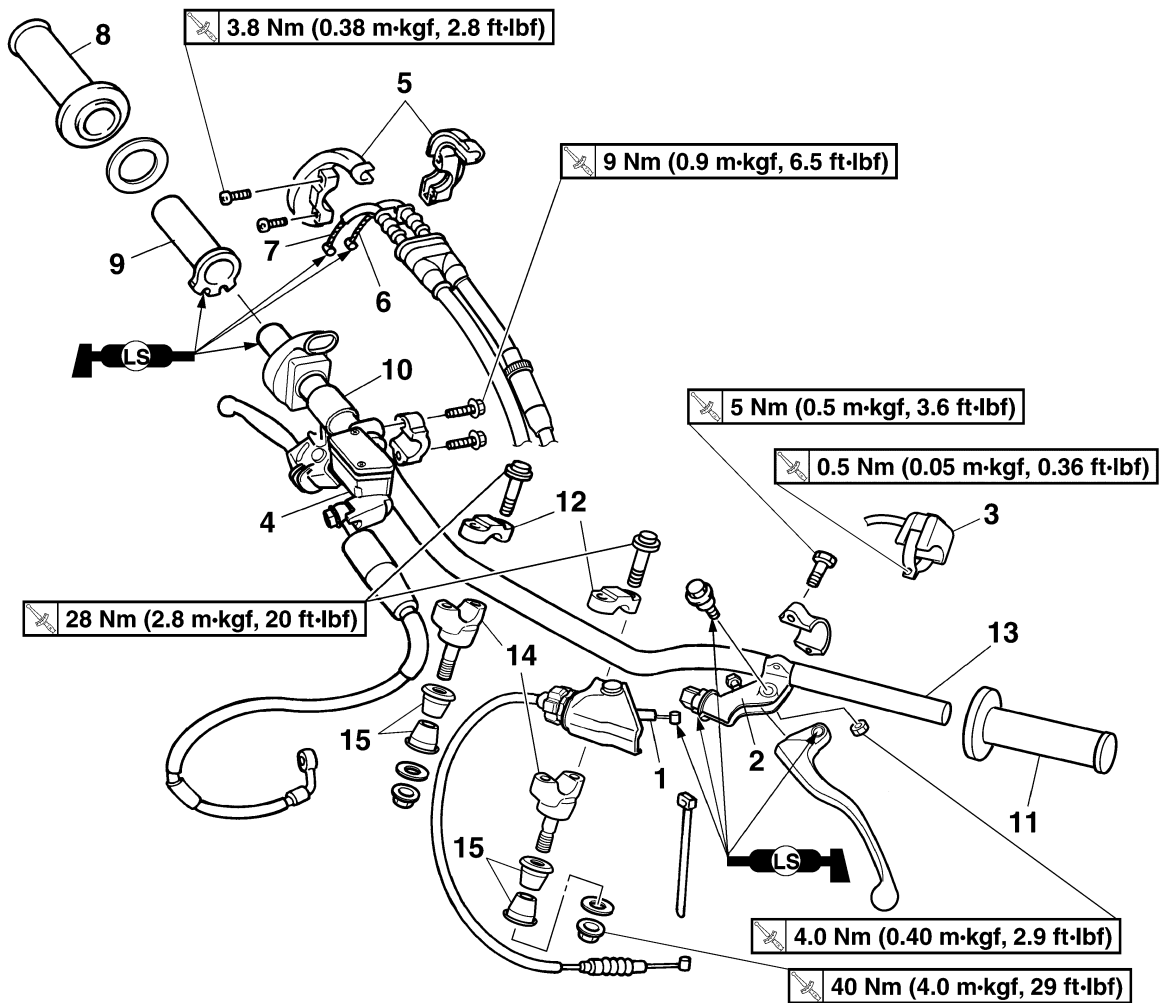
3. Bleed:
 - Brake system
Refer to “BLEEDING THE BRAKE SYSTEM” on page 3-21.
4. Check:
 - Brake fluid level
The minimum level mark “a” or below → Add.
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-26.



5. Check:
 - Brake pedal operation
A softy or spongy feeling → Bleed the brake system.
Refer to “BLEEDING THE BRAKE SYSTEM” on page 3-21.

HANDLEBAR

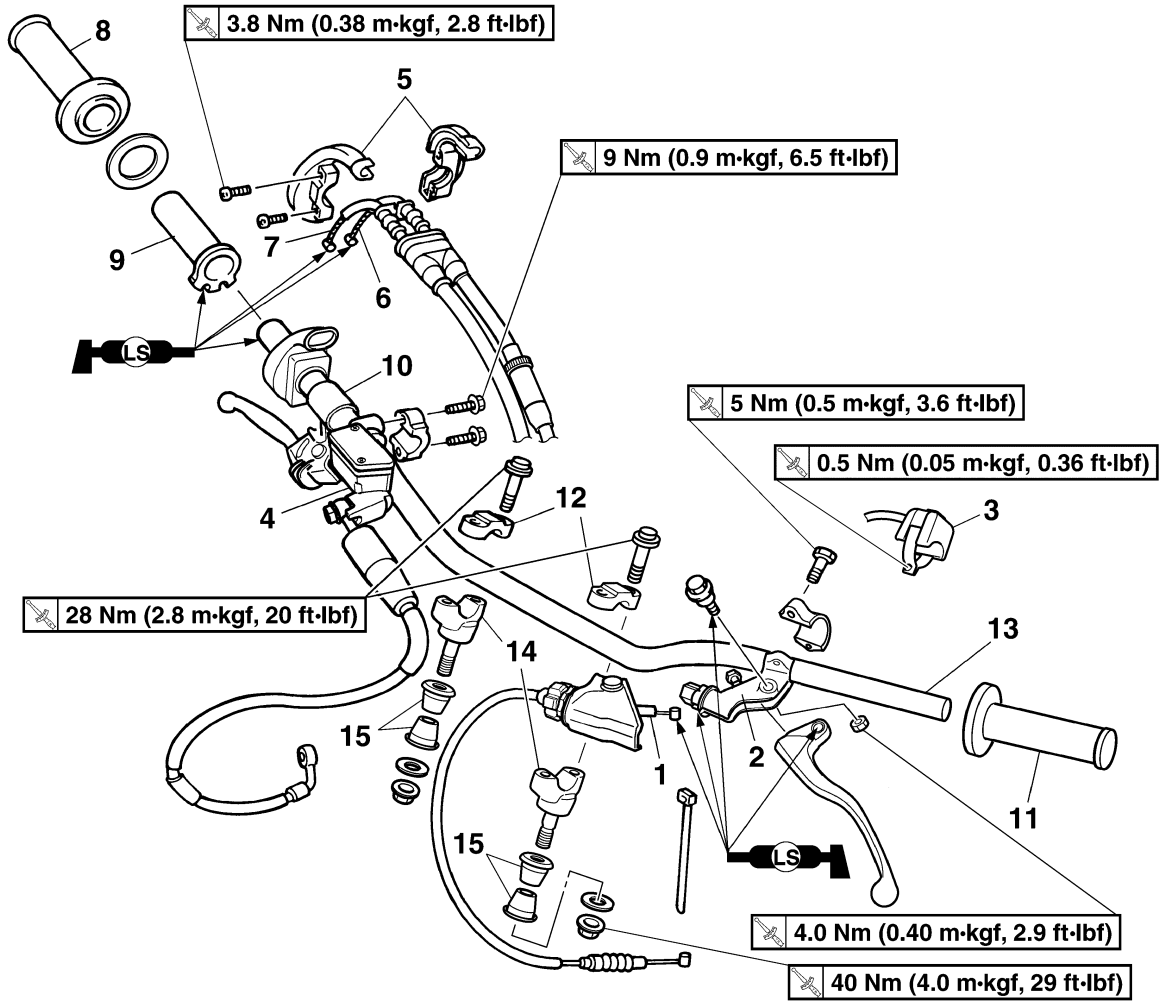
Removing the handlebar



Order	Part name	Q'ty	Remarks
	Number plate		Remove the band only.
1	Clutch cable	1	Disconnect.
2	Clutch lever holder	1	
3	Engine stop switch	1	
4	Brake master cylinder	1	
5	Throttle cable cap	1	
6	Throttle cable (pull)	1	Disconnect.
7	Throttle cable (return)	1	Disconnect.
8	Right grip	1	
9	Tube guide	1	
10	Collars	1	
11	Left grip	1	
12	Handlebar upper holder	2	
13	Handlebar	1	
14	Handlebar lower holder	2	
15	Damper	4	

HANDLEBAR

Removing the handlebar



Order	Part name	Q'ty	Remarks
			For installation, reverse the removal procedure.

REMOVING THE HANDLEBAR

1. Stand the vehicle upright on a level surface.

WARNING

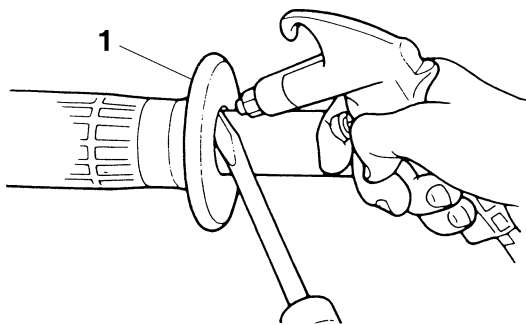
Securely support the vehicle so that there is no danger of it falling over.

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.



CHECKING THE HANDLEBAR

1. Check:

- Handlebar
Bends/cracks/damage → Replace.

WARNING

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

INSTALLING THE HANDLEBAR

1. Stand the vehicle upright on a level surface.

WARNING

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

2. Install:

- Damper "1"
- Lower handlebar holders "2" (temporarily)
- Handlebar "3"
- Upper handlebar holders "4"



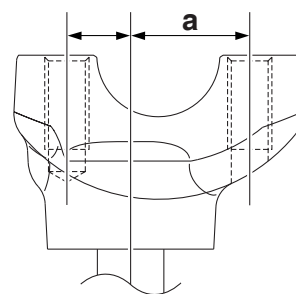
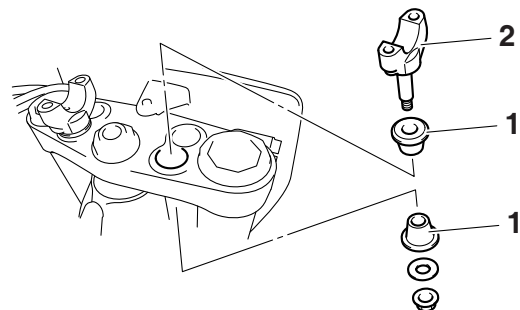
Upper handlebar holder bolt
28 Nm (2.8 m·kgf, 20 ft·lbf)

TIP

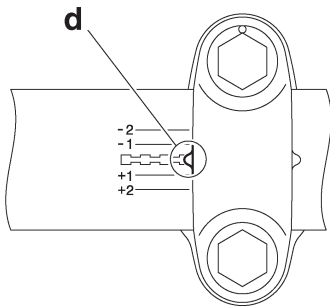
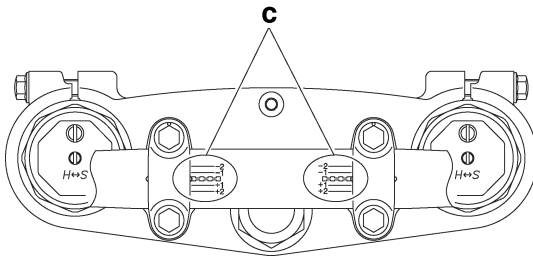
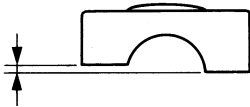
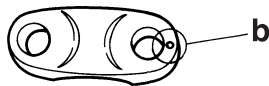
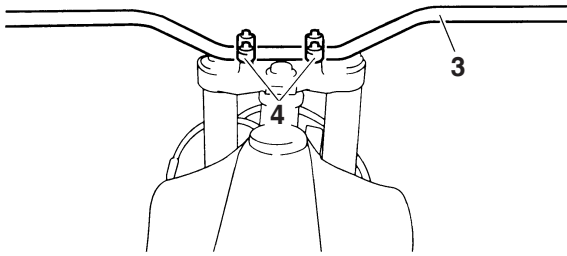
- Install the lower handlebar holders with them side having the greater distance "a" from the mounting bolt center facing forward.
- Installing the lower handlebar holders in the reverse direction allow the front-to-rear offset amount of the handlebar position to be changed.
- The upper handlebar holders 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.

NOTICE

- **First, tighten the bolts on the front side of the upper 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.**




HANDLEBAR



3. Tighten:

- Lower handlebar holder nut

	Lower handlebar holder nut 40 Nm (4.0 m·kgf, 29 ft·lbf)
---	---

4. Install:

- Handlebar grip “1”



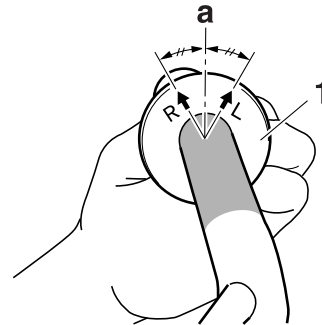
- Slightly coat the handlebar left end with a rubber adhesive.
- Install the handlebar grip on the handlebar by pressing the grip from the left side.
- Wipe off any excess adhesive with a clean cloth.

⚠ WARNING

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


TIP

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



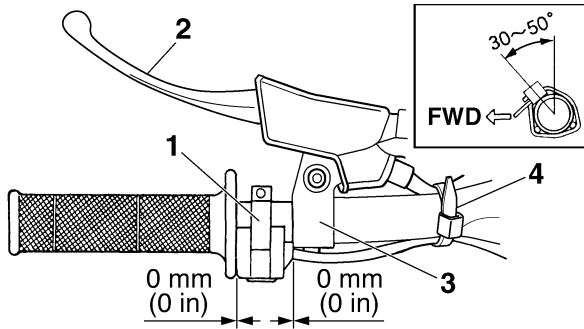
5. Install:

- Engine stop switch “1”
- Clutch lever “2”
- Clutch lever holder “3”
- Clamp “4”

	Engine stop switch screw 0.5 Nm (0.05 m·kgf, 0.36 ft·lbf)
	Clutch lever holder bolt 5 Nm (0.5 m·kgf, 3.6 ft·lbf)

TIP

- The engine stop switch, the clutch lever, and the clutch lever holder should be installed according to the dimensions shown.
- Pass the engine stop switch lead through the middle of the clutch lever holder.



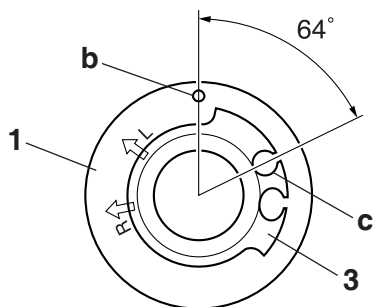
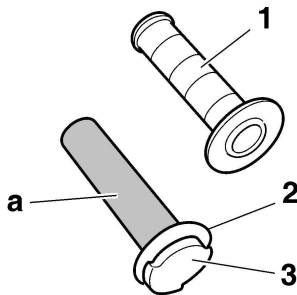
6. Install:

- 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.

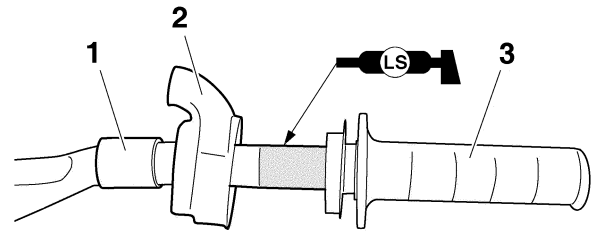


7. Install:

- Collar "1"
- Rubber cover "2"
- Throttle grip "3"

TIP

Apply the lithium soap base grease on the throttle grip sliding surface.

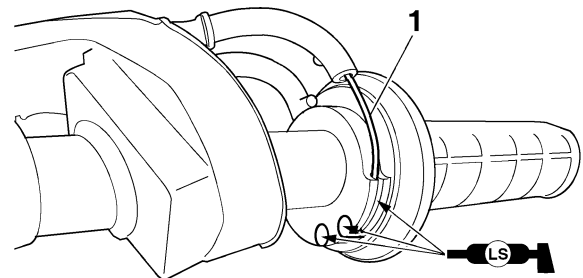


8. Install:

- Throttle cables "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.



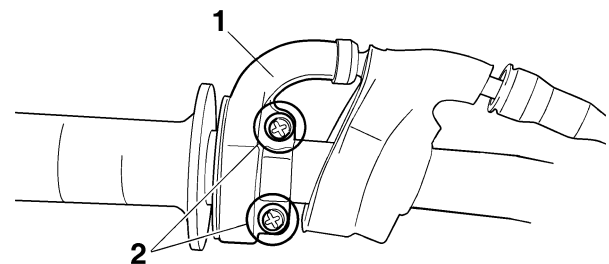
9. Install:

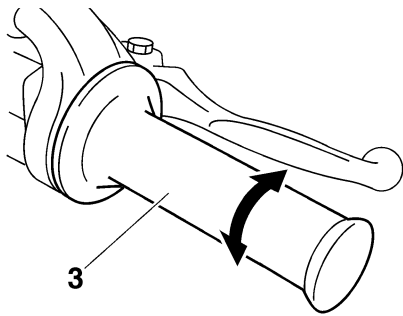
- Throttle cable housings "1"
- Screw (throttle cable housings) "2"

	Screw (throttle cable housings) 3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)
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WARNING

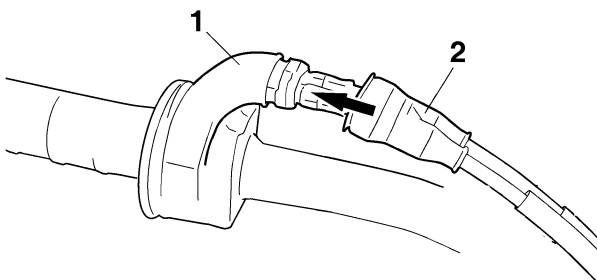
After tightening the throttle cable housing screws, check that the throttle grip "3" moves smoothly. If it does not, retighten the screws for adjustment.





10. Install:

- Rubber cover “1”
- Cover (throttle cable housings) “2”



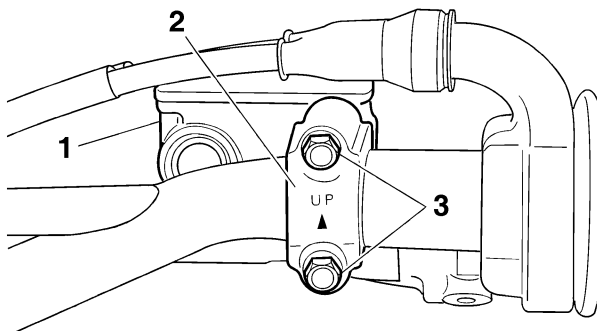
11. Install:

- Front brake master cylinder assembly “1”
- Front brake master cylinder holder “2”
- Bolt (brake master cylinder holder) “3”

	<p>Front brake master cylinder holder bolt 9 Nm (0.9 m·kgf, 6.5 ft·lbf)</p>
--	--

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.

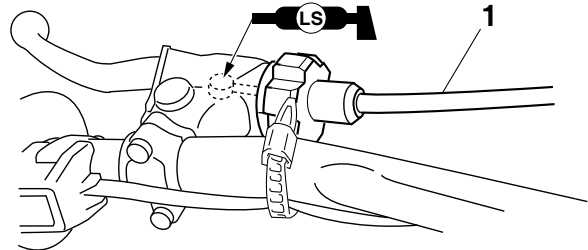


12. Install:

- Clutch cable “1”

TIP

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



13. Adjust:

- Clutch lever free play
Refer to “ADJUSTING THE CLUTCH LEVER FREE PLAY” on page 3-10.

	<p>Clutch lever free play 7.0–12.0 mm (0.28–0.47 in)</p>
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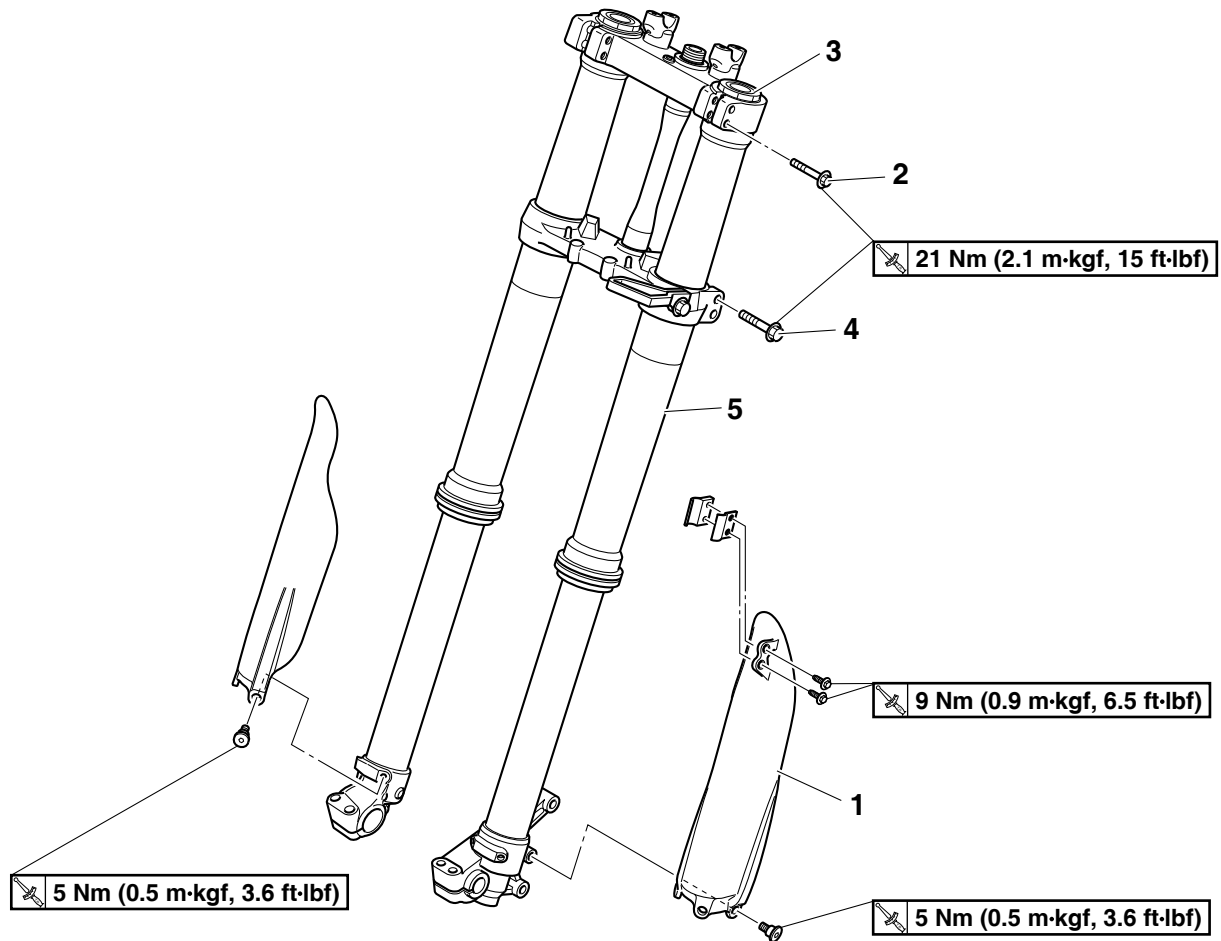
14. Adjust:

- Throttle grip free play
Refer to “ADJUSTING THE THROTTLE GRIP FREE PLAY” on page 3-11.

	<p>Throttle grip free play 3.0–5.0 mm (0.12–0.20 in)</p>
--	---

FRONT FORK

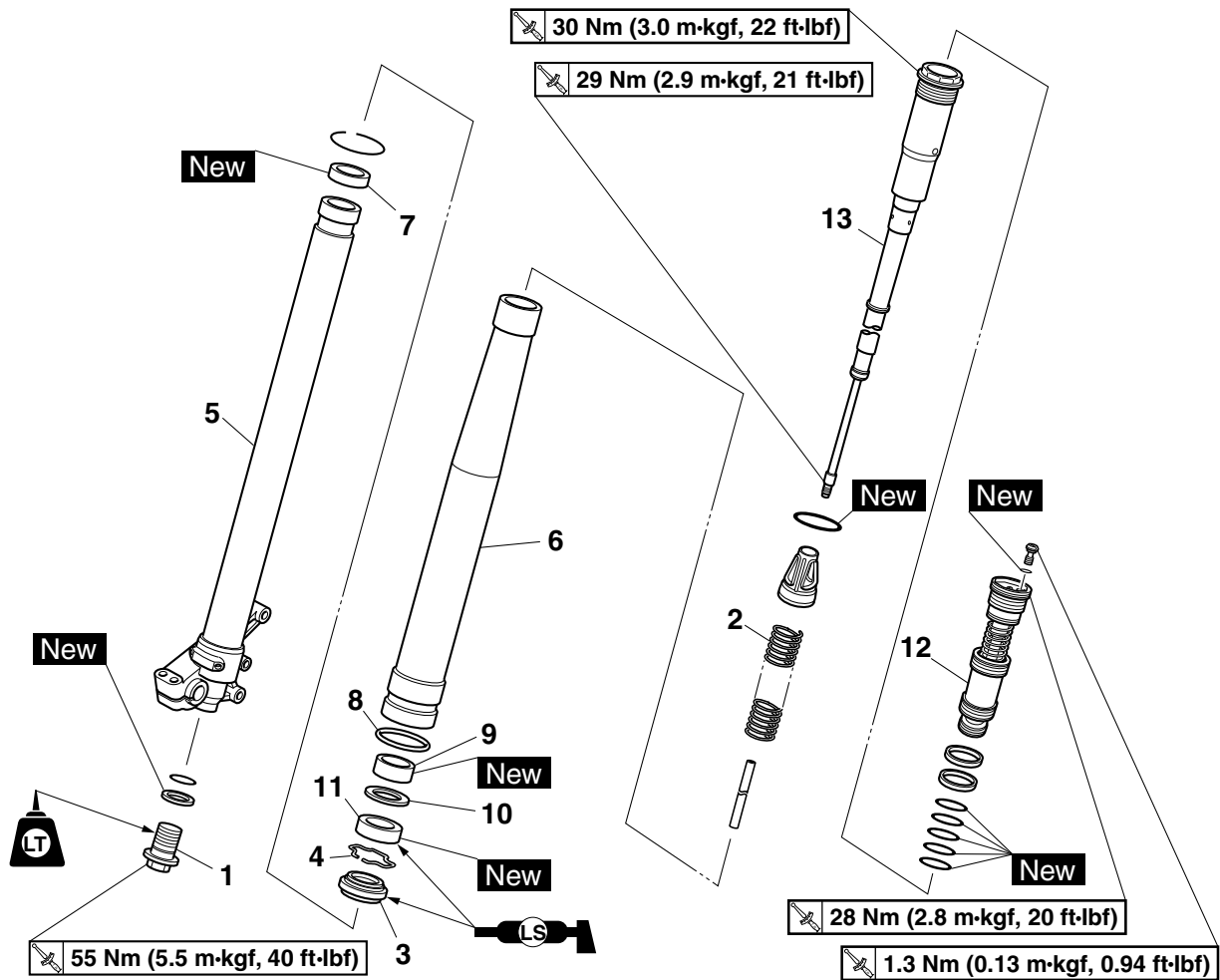
Removing the front fork legs



Order	Part name	Q'ty	Remarks
			Use a suitable stand to raise the front wheel off the ground.
	Front wheel		Refer to "FRONT WHEEL" on page 4-3.
	Front brake caliper		Refer to "FRONT BRAKE" on page 4-11.
	Number plate		Refer to "GENERAL CHASSIS" on page 4-1.
1	Protector	1	
2	Upper bracket pinch bolts	2	Loosen.
3	Damper assembly	1	Loosen.
4	Lower bracket pinch bolts	2	Loosen.
5	Front fork leg	1	
			For installation, reverse the removal procedure.

FRONT FORK

Disassembling the front fork leg



Order	Part name	Q'ty	Remarks
1	Adjuster	1	
2	Fork spring	1	
3	Dust seal	1	
4	Stopper ring	1	
5	Inner tube	1	
6	Outer tube	1	
7	Piston metal	1	
8	Protector guide	1	
9	Slide metal	1	
10	Washer	1	
11	Oil seals	1	
12	Base valve	1	
13	Damper assembly	1	
			For assembly, reverse the disassemble procedure.


FRONT FORK

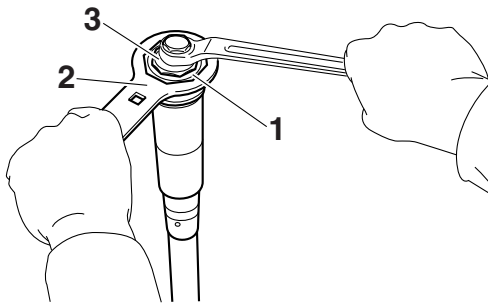
5. Remove:

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



CHECKING THE FRONT FORK LEGS

1. Check:

- Inner tube surface "a"
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 "1".

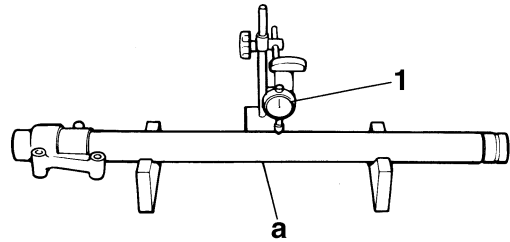
	Inner tube bending limit 0.2 mm (0.01 in)
---	---

TIP

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

WARNING

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




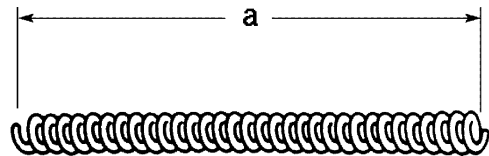
2. Check:

- Outer tube
Scratches/wear/damage → Replace.

3. Measure:

- Fork spring free length "a"
Out of specification → Replace.

	Fork spring free length 497.0 mm (19.57 in)
	Limit 492.0 mm (19.37 in)

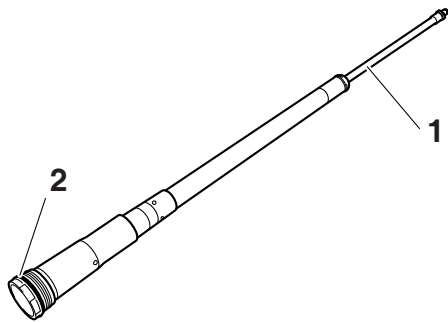


4. Check:

- Damper assembly "1"
Bend/damage → Replace.
- O-ring "2"
Wear/damage → Replace.

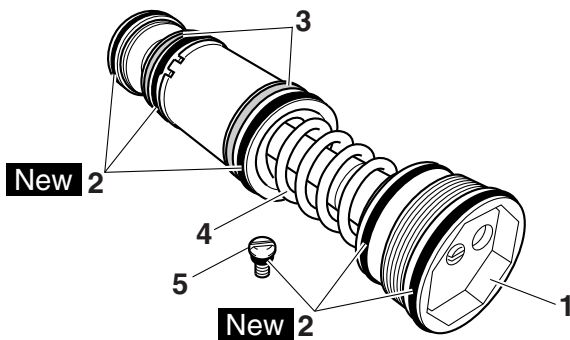
NOTICE

- 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.



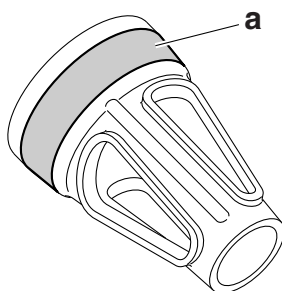
5. Check:

- Base valve “1”
Wear/damage → Replace.
Contamination → Clean.
- O-rings “2” **New**
Wear/damage → Replace.
- Base valve bushing “3”
Wear/damage → Replace.
- Spring “4”
Damage/fatigue → Replace the base valve.
- Air bleed screw “5”
Wear/damage → Replace.



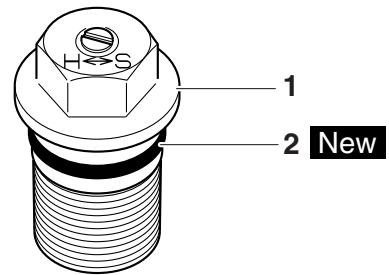
6. Check:

- Contacting surface “a”
Wear/damage → Replace.



7. Check:

- Adjuster “1”
- O-rings “2” **New**
Wear/damage → Replace.



ASSEMBLING THE FRONT FORK LEGS

⚠ 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
 - Outer tube bushing
 - Oil seals
 - Copper washers
- 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
Suspension oil S1
Standard oil amount
 204 cm³ (6.90 US oz, 7.20 Imp.oz)

NOTICE

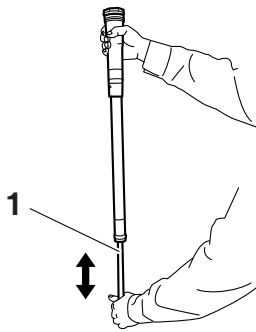
- Be sure to use the recommended oil. Other oils may have an adverse effect on front fork performance.
- When disassembling and assembling the front fork leg, take care not to allow any foreign material to enter the front fork.

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

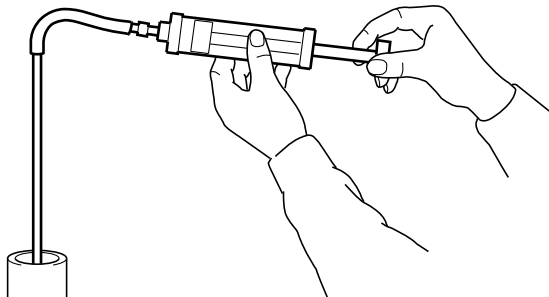
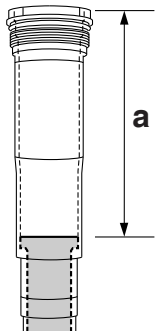
Avoid excessive full stroke. A stroke of 200 mm (7.9 in) or more will cause air to enter. In this case, repeat the steps 1 to 3.

FRONT FORK



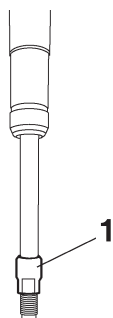
4. Measure:
- Oil level (left and right) "a"
 - Out of specification → Regulate.

	<p>Standard oil level 145–148 mm (5.71–5.83 in) From top of fully stretched damper assembly.</p>
---	---



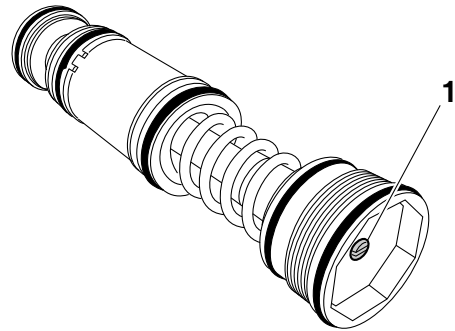
5. Tighten:
- Locknut "1"

TIP _____
 Fully finger tighten the locknut onto the damper assembly.



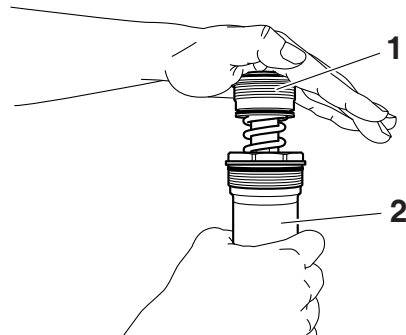
6. Loosen:
- Compression damping force adjuster "1"

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"

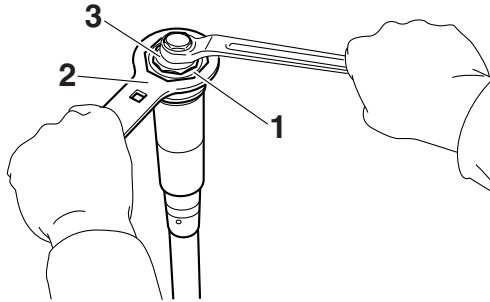
	<p>Base valve 28 Nm (2.8 m·kgf, 20 ft·lbf)</p>
---	---

TIP _____
 Hold the damper assembly with the cap bolt ring wrench "2" and use the cap bolt wrench "3" to tighten the base valve.

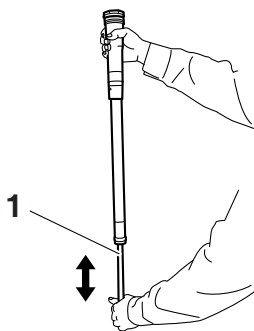


Cap bolt wrench
90890-01500
YM-01500

Cap bolt ring wrench
90890-01501
YM-01501



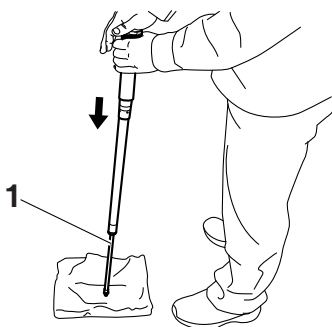
10. After filling, pump the damper assembly "1" slowly up and down more than 10 times to distribute the fork oil.



11. While protecting the damper assembly "1" with a cloth and compressing fully, allow excessive oil to overflow on the base valve side.

NOTICE

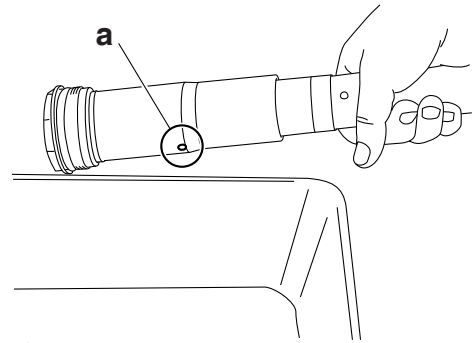
Take care not to damage the damper assembly.



12. Allow the overflowing oil to escape at the hole "a" in the damper assembly.

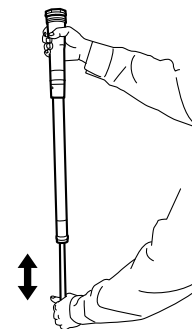
TIP

The overflow measures about 8 cm³ (0.27 US oz, 0.28 Imp oz).



13. Check:

- Damper assembly smooth movement
- Tightness/binding/rough spots → Repeat the steps 1 to 12.



14. Install:

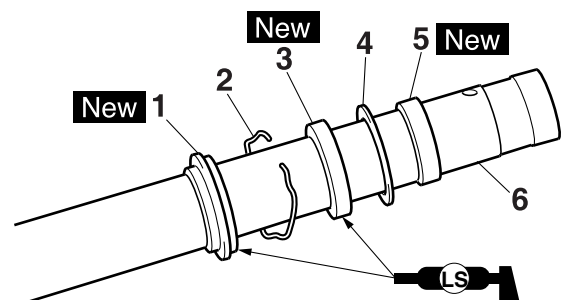
- Dust seal "1" **New**
- Oil seal clip "2"
- Oil seals "3" **New**
- Washer "4"
- Outer tube bushing "5" **New**
(to the inner tube "6")

NOTICE

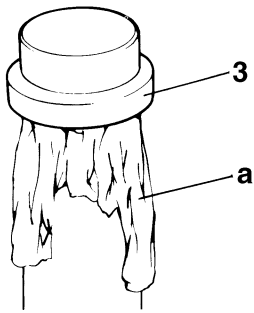
Make sure that the numbered side of the oil seal faces bottom side.

TIP

- Apply the lithium soap base 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.



FRONT FORK

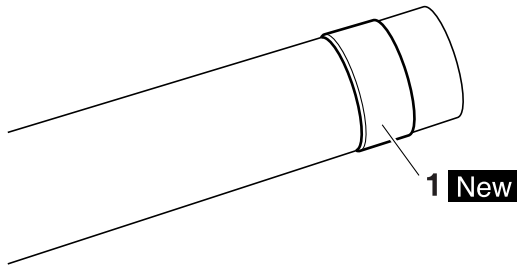


15. Install:

- Inner tube bushing "1" **New**

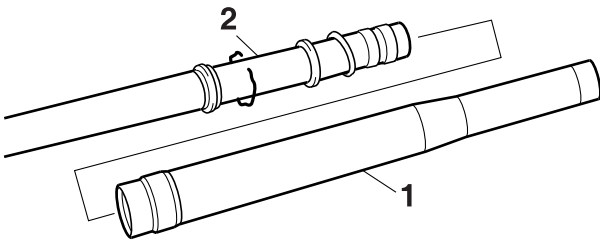
TIP _____

Install the inner tube bushing onto the slot on inner tube.



16. Install:

- Outer tube "1"
- (to the inner tube "2")



17. Install:

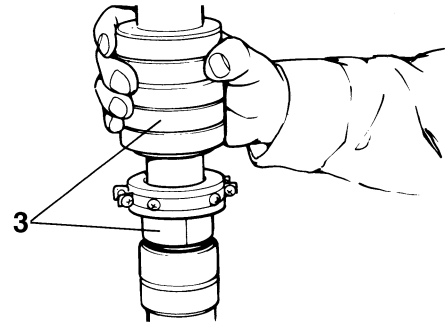
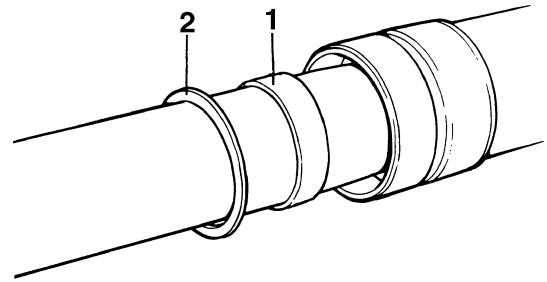
- Inner tube bushing "1"
- Washer "2"
- (to the outer tube)

TIP _____

Press the inner tube bushing into the outer tube with fork seal driver "3".



Fork seal driver
90890-01502
YM-A0948



18. Install:

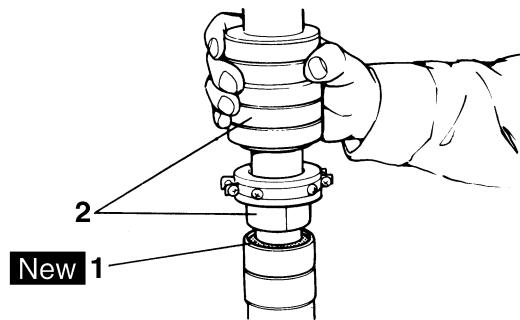
- Oil seals "1" **New**

TIP _____

Using a fork seal driver "2," press the oil seal in until the stopper ring groove fully appears.



Fork seal driver
90890-01502
YM-A0948



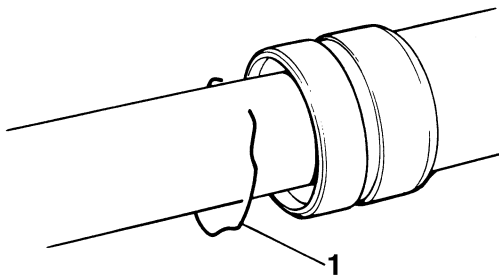
19. Install:

- Oil seal clip "1"

TIP _____

Fit the oil seal clip correctly in the groove in the outer tube.

FRONT FORK

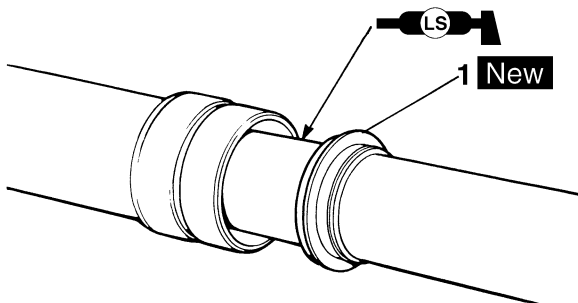


20. Install:

- Dust seal "1" **New**

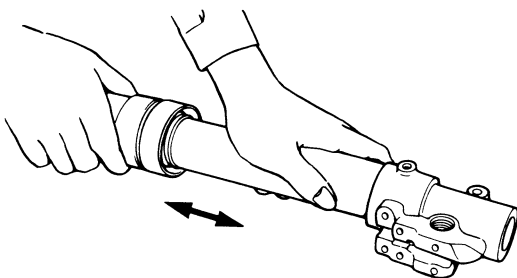
TIP

Apply lithium-soap-based grease on the inner tube.



21. Check:

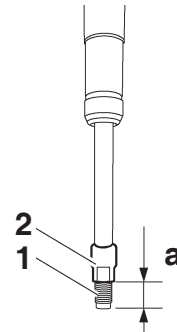
- Inner tube smooth movement
Tightness/binding/rough spots → Repeat the steps 14 to 20.



22. Measure:

- Distance "a"
Out of specification → Turn into the locknut.

	<p>Distance "a" 16 mm (0.63 in) or more Between the damper assembly "1" bottom and locknut "2" bot- tom.</p>
--	---

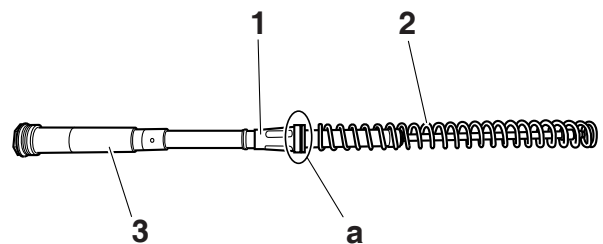


23. Install:

- Collar "1"
- Fork spring "2"
(to the damper assembly "3")

TIP

Install the collar with its larger dia. end "a" facing the fork spring.

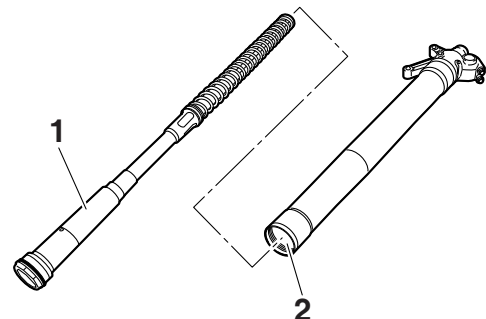


24. Install:

- Damper assembly "1"
(to the inner tube "2")

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.



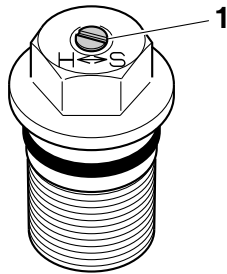
FRONT FORK

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:

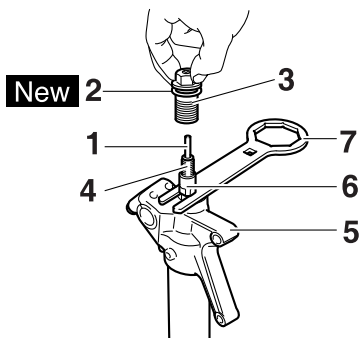
- Damper adjusting rod "1"
- Copper washer "2" **New**
- Adjuster "3"
- (to the damper assembly "4")

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
YM-01501



27. Measure:

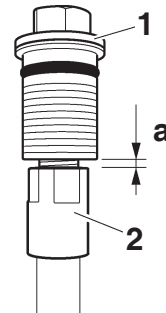
- Gap "a" between the adjuster "1" and the locknut "2"
- Out of specification → Retighten and readjust the locknut.



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:

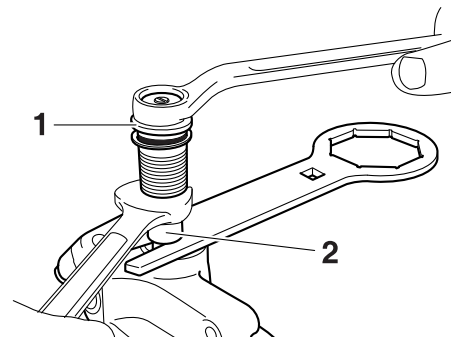
- Adjuster (locknut) "1"



Adjuster (locknut)
29 Nm (2.9 m·kgf, 21 ft·lbf)

TIP

Hold the locknut "2" and tighten the adjuster.

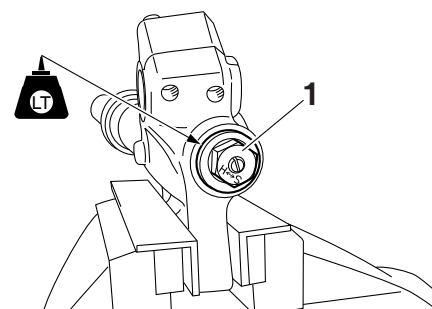


29. Install:

- Adjuster "1"
- (to the inner tube)



Adjuster
55 Nm (5.5 m·kgf, 40 ft·lbf)
LOCTITE®



FRONT FORK

30.Fill:

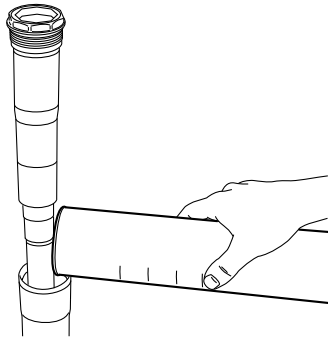
- Front fork leg



Recommended oil
Suspension oil S1
Standard oil amount
315 cm³ (10.65 US oz, 11.11 Imp oz) (USA) (CAN)
355 cm³ (12.00 US oz, 12.52 Imp oz) (EUR) (JPN) (AUS) (NZL) (ZAF)
Extent of adjustment
300–365 cm³ (10.14–12.34 US oz, 10.58–12.87 Imp oz)

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.

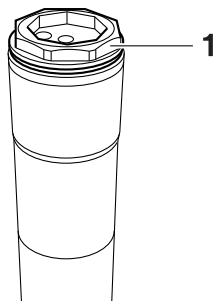


31.Install:

- Damper assembly “1”
(to the outer tube)

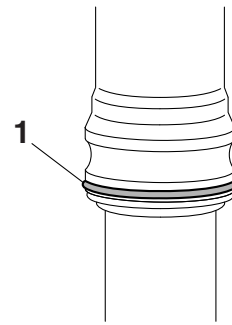
TIP

Temporarily tighten the damper assembly.



32.Install:

- Protector guide “1”



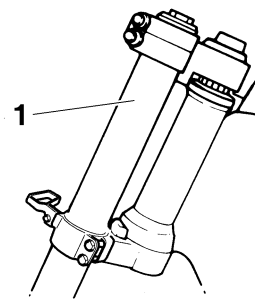
INSTALLING THE FRONT FORK LEGS

1. Install:

- Front fork “1”

TIP

- Temporarily tighten the pinch bolts (lower bracket).
- Do not tighten the pinch bolts (upper bracket) yet.



2. Tighten:

- Damper assembly “1”



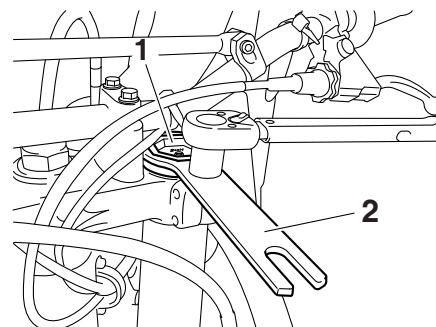
Damper assembly
30 Nm (3.0 m·kgf, 22 ft·lbf)

TIP

Use the cap bolt ring wrench “2” to tighten the damper assembly.



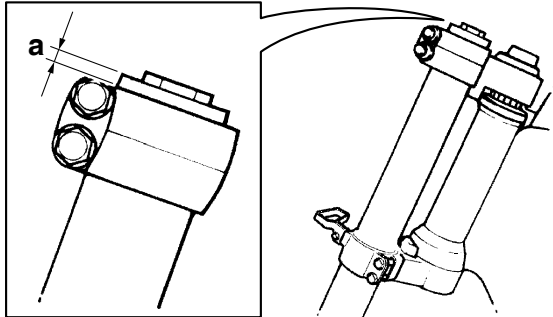
Cap bolt ring wrench
90890-01501
YM-01501



FRONT FORK

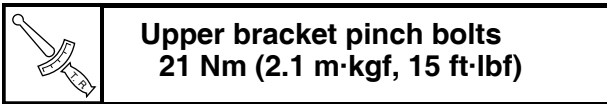
3. Adjust:

- Front fork top end “a”

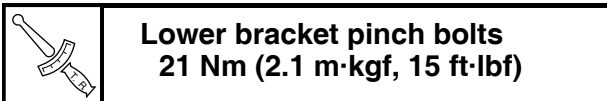


4. Tighten:

- Pinch bolt (upper bracket) “1”

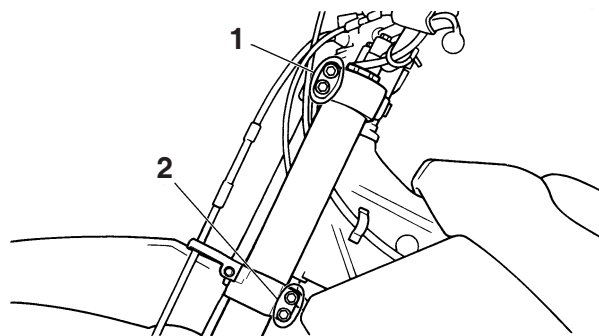


- Pinch bolt (lower bracket) “2”



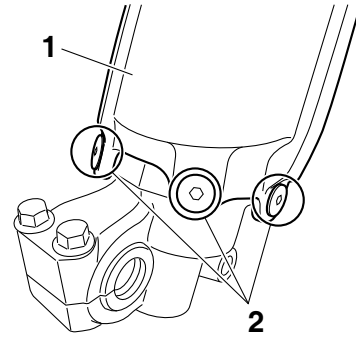
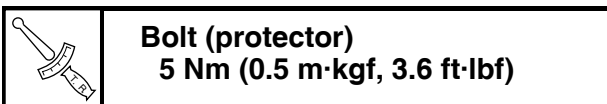
⚠ WARNING

Tighten the lower bracket to specified torque. If torqued too much, it may cause the front fork to malfunction.



5. Install:

- Protector “1”
- Bolt (protector) “2”

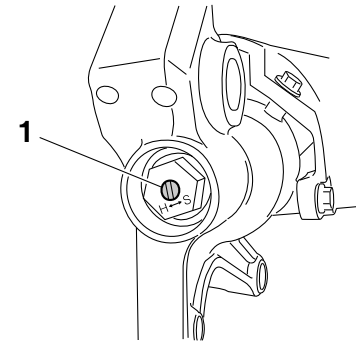


6. Adjust:

- Rebound damping force

TIP

Turn in the damping adjuster “1” finger-tight and then turn out to the originally set position.

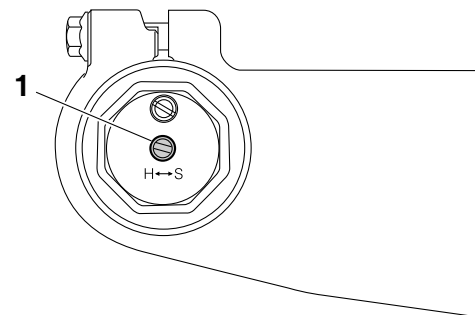


7. Adjust:

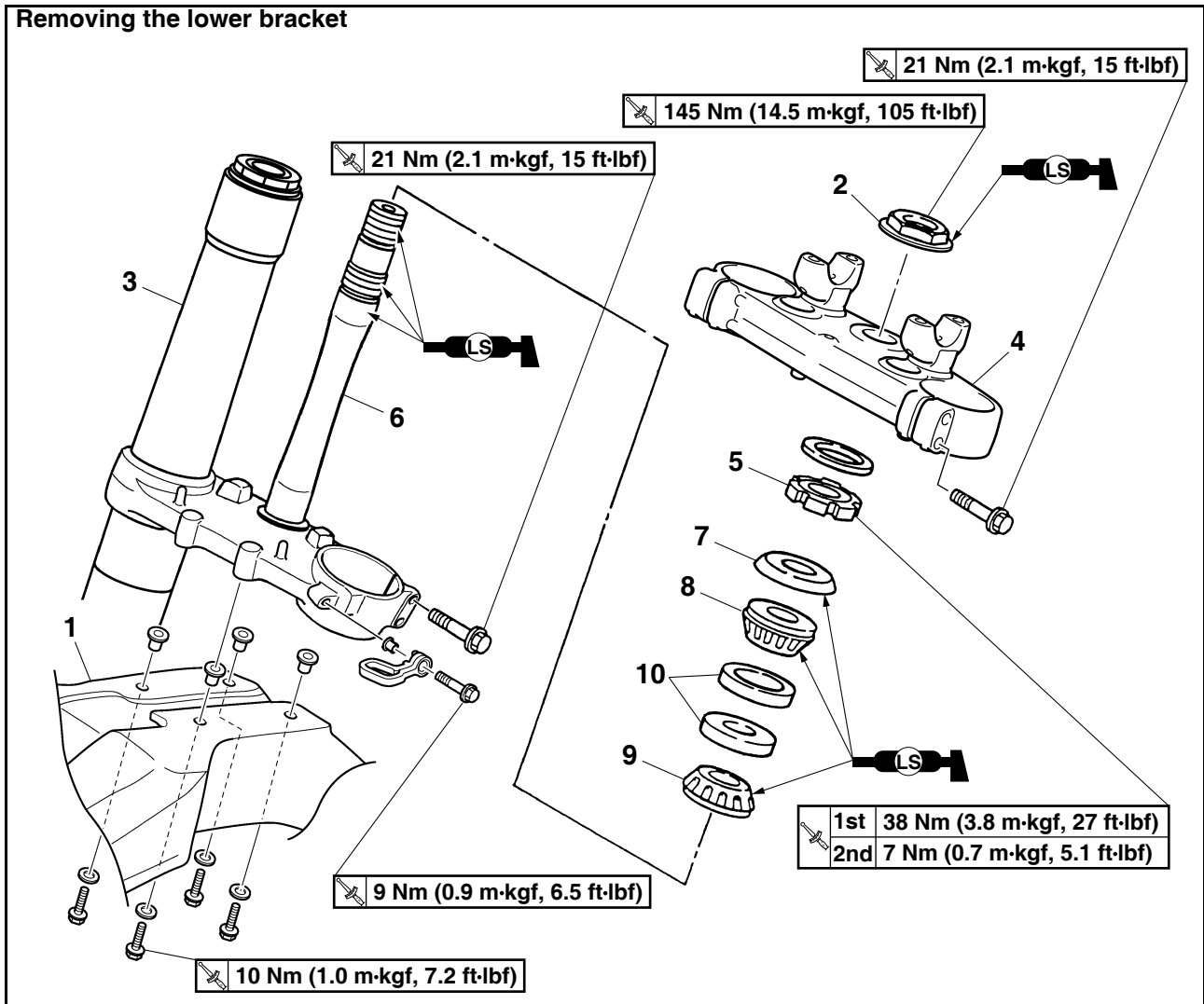
- Compression damping force

TIP

Turn in the damping adjuster “1” finger-tight and then turn out to the originally set position.



STEERING HEAD



Order	Part name	Q'ty	Remarks
			Use a suitable 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 4-31.
1	Front fender	1	
2	Steering stem nut	1	
3	Front fork leg (s)	2	Refer to "FRONT FORK" on page 4-37.
4	Upper bracket	1	
5	Steering ring nut	1	
6	Lower bracket	1	
7	Bearing race cover	1	
8	Upper bearing	1	
9	Bearing (lower side)	1	
10	Bearing races	2	
			For installation, reverse the removal procedure.

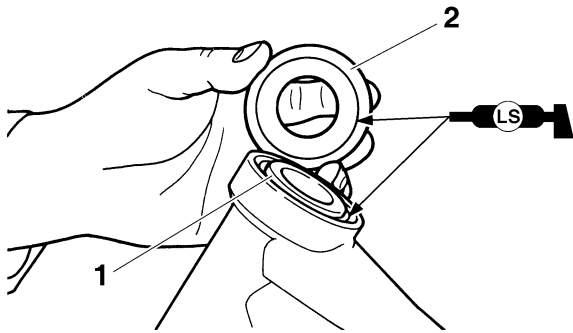
STEERING HEAD

2. Install:

- Bearing races
- Upper bearing "1"
- Bearing race cover "2"

TIP

Apply the lithium soap base grease on the bearing and bearing race cover lip.

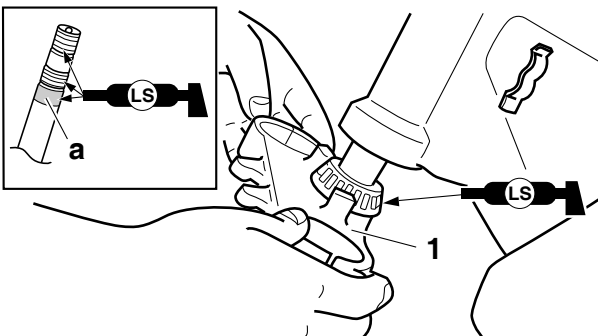


3. Install:

- Lower bracket "1"

TIP

Apply the lithium soap base grease on the bearing, the portion "a" and thread of the steering stem.



4. Install:

- Steering ring nut "1"



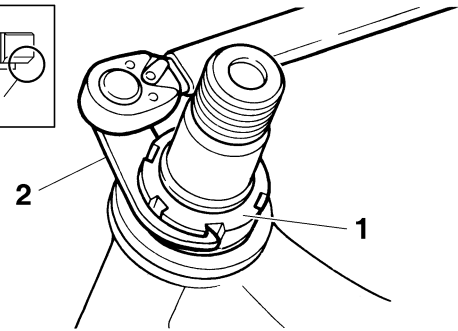
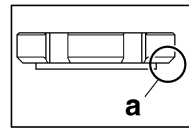
Steering ring nut
7 Nm (0.7 m·kgf, 5.1 ft·lbf)

TIP

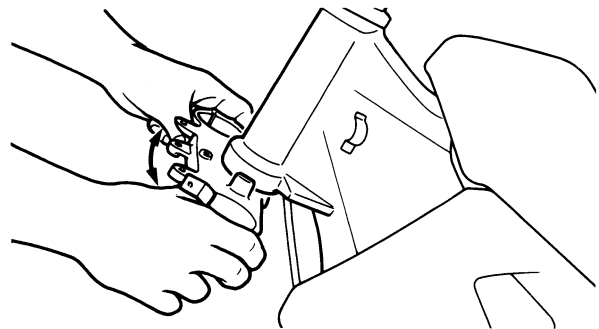
Install the steering nut with its stepped side "a" facing downward.

Tighten the steering ring nut with a steering nut wrench "2".

Refer to "CHECKING AND ADJUSTING THE STEERING HEAD" on page 3-33.

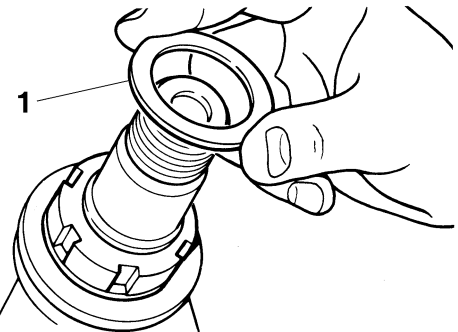


5. Check the steering stem by turning this lock to lock. If there is any binding, remove the steering stem and check the steering bearing.



6. Install:

- Washer "1"



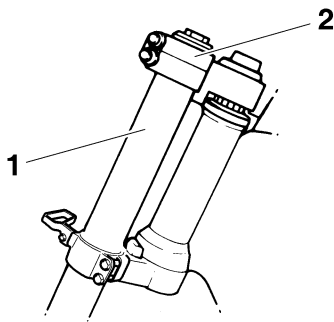
7. Install:

- Front fork "1"
- Upper bracket "2"

TIP


- Temporarily tighten the pinch bolts (lower bracket).
- Do not tighten the pinch bolts (upper bracket) yet.

STEERING HEAD



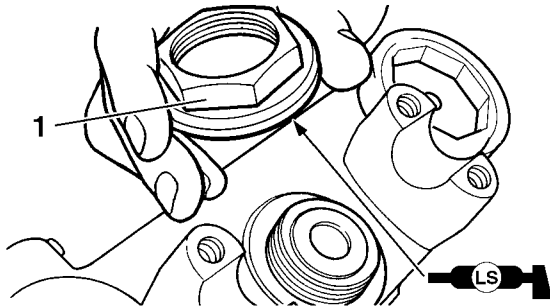
8. Install:

- Steering stem nut "1"

	Steering stem nut 145 Nm (14.5 m·kgf, 105 ft·lbf)
---	---

TIP

Apply the lithium soap base grease to the contact surface of the steering stem nut when installing.

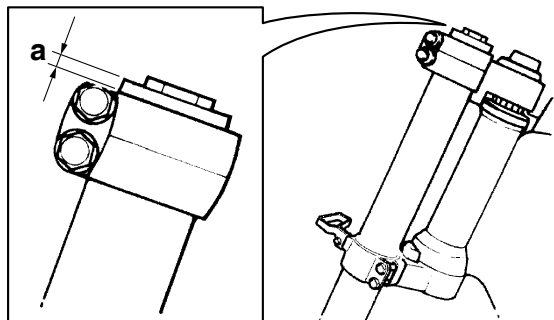


9. After tightening the nut, check the steering for smooth movement. If not, adjust the steering by loosening the steering ring nut little by little.

10. Adjust:


- Front fork top end "a"

	Front fork top end (standard) "a" 0 mm (0 in)
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11. Tighten:

- Pinch bolt (upper bracket) "1"

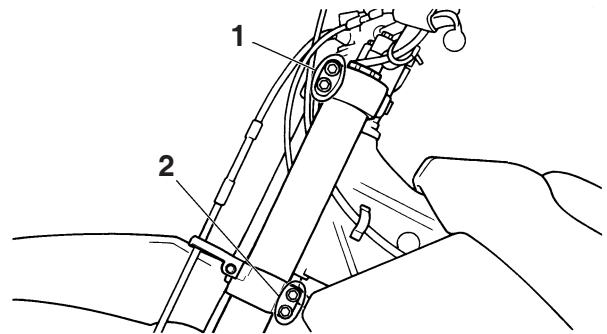
	Upper bracket pinch bolts 21 Nm (2.1 m·kgf, 15 ft·lbf)
---	--

- Pinch bolt (lower bracket) "2"

	Lower bracket pinch bolts 21 Nm (2.1 m·kgf, 15 ft·lbf)
---	--

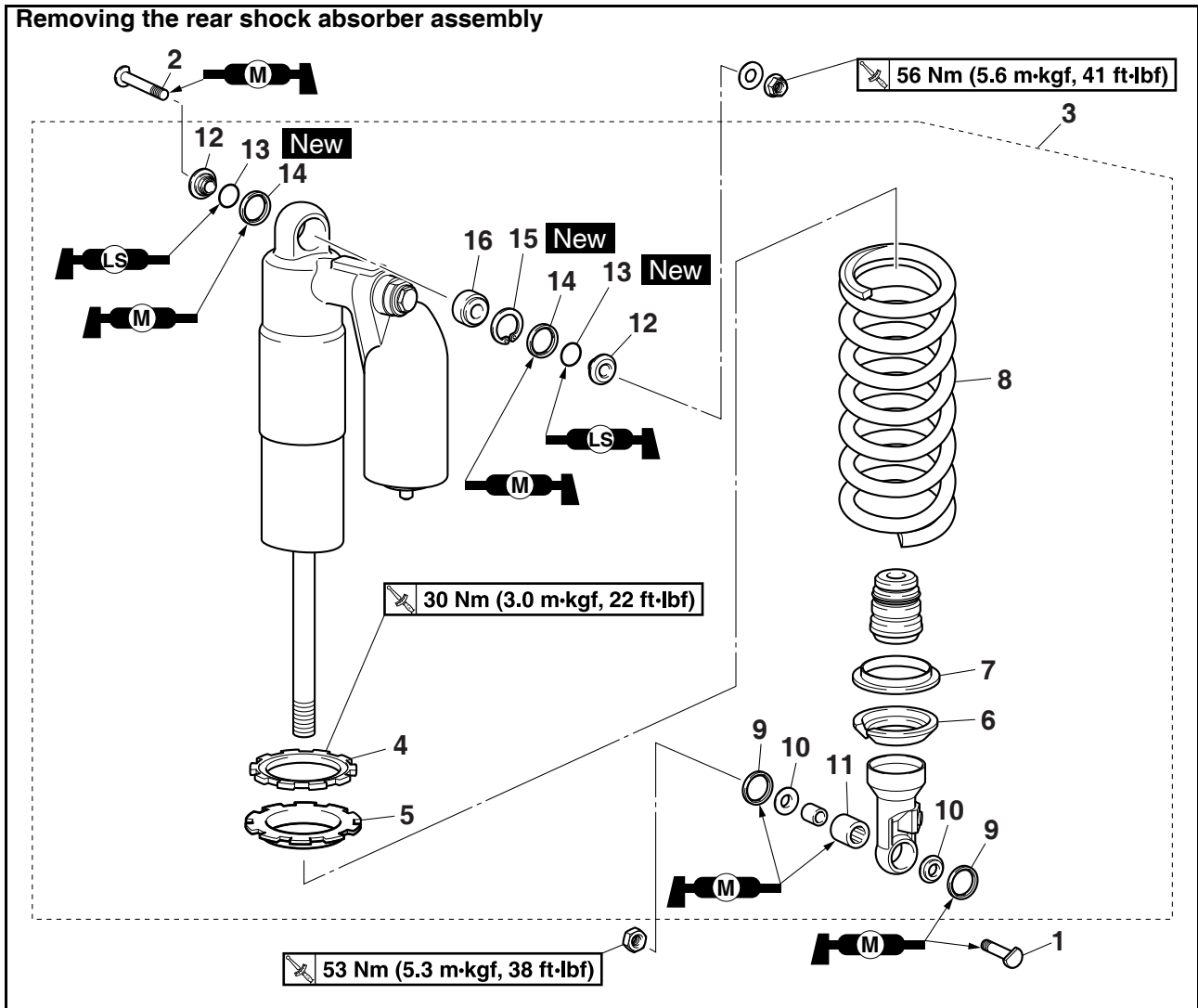
⚠ WARNING

Tighten the lower bracket to specified torque. If torqued too much, it may cause the front fork to malfunction.



REAR SHOCK ABSORBER ASSEMBLY

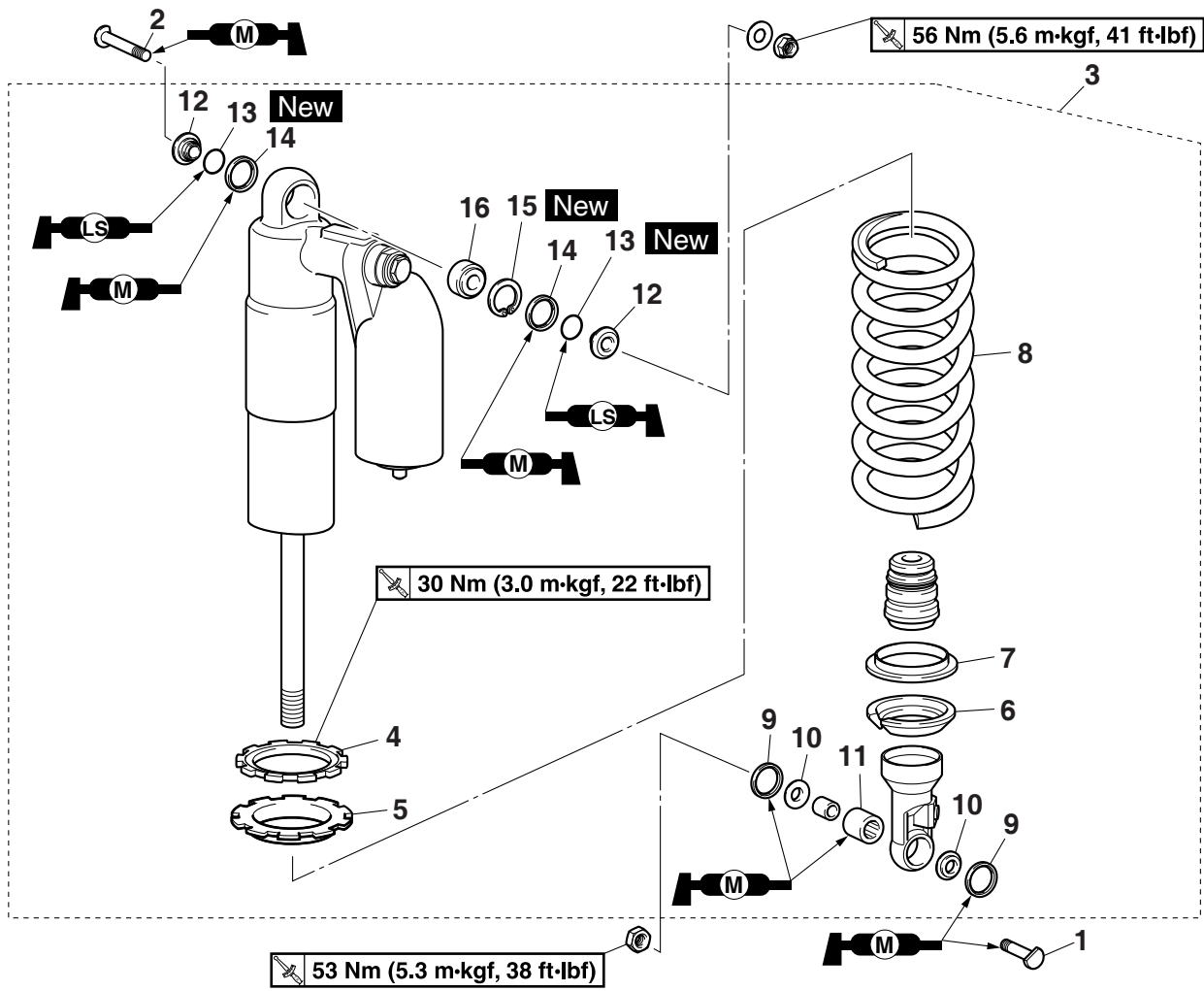
REAR SHOCK ABSORBER ASSEMBLY



Order	Part name	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	

REAR SHOCK ABSORBER ASSEMBLY

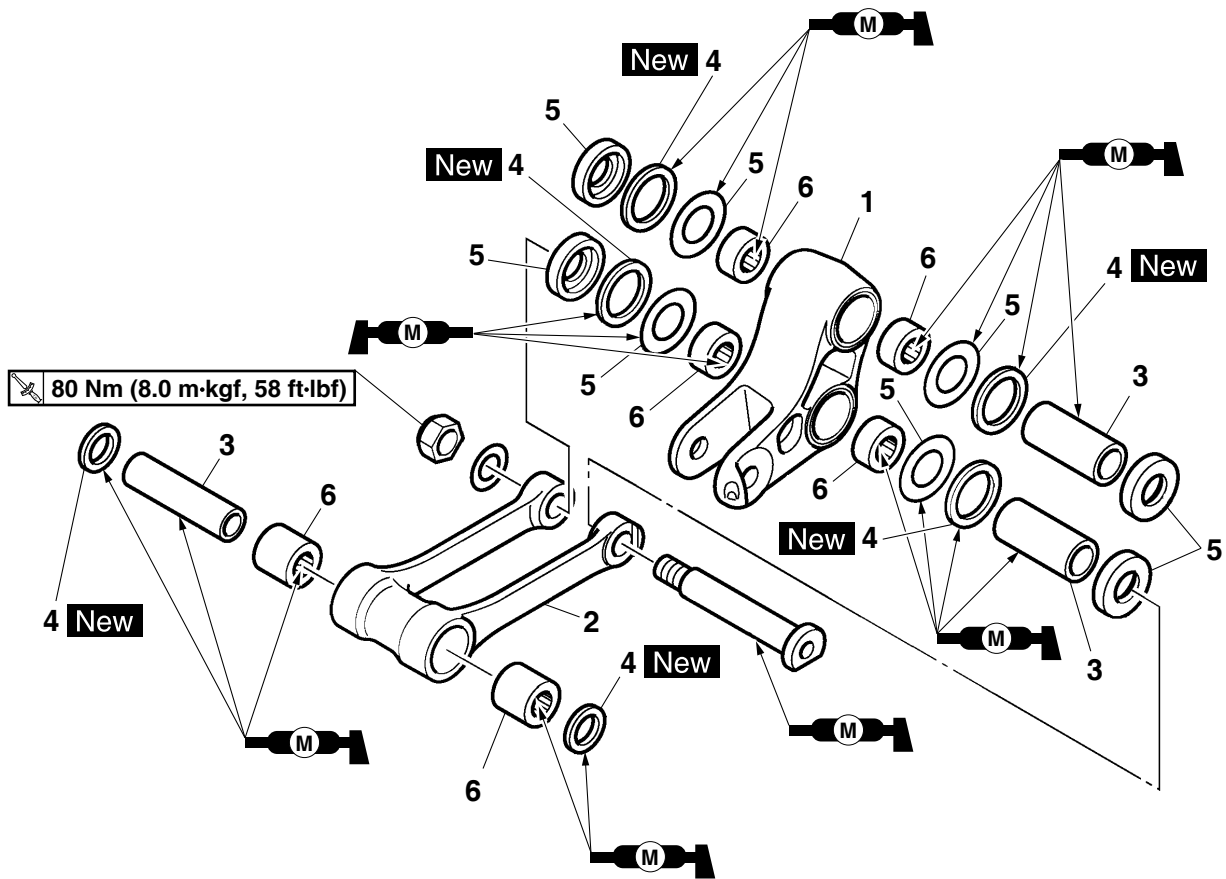
Removing the rear shock absorber assembly



Order	Part name	Q'ty	Remarks
8	Spring	1	
9	Dust seal	2	
10	Collars	2	
11	Bushing	1	
12	Collars	2	
13	O-ring	2	
14	Dust seal	2	
15	Stopper ring	1	
16	Bearing	1	
			For installation, reverse the removal procedure.

REAR SHOCK ABSORBER ASSEMBLY

Disassembling the relay arm



Order	Part name	Q'ty	Remarks
1	Relay arm	1	
2	Connecting arm	1	
3	Collars	3	
4	Oil seals	6	
5	Washers	8	
6	Bearing	6	
			For assembly, reverse the disassemble procedure.

REAR SHOCK ABSORBER ASSEMBLY

HANDLING THE REAR SHOCK ABSORBER

⚠ WARNING

This rear shock absorber contains highly compressed nitrogen gas. Before handling the rear shock absorber, read and make sure that 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

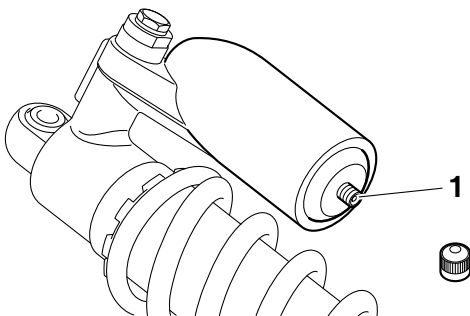
A break-in is required up to about 50 km of running.

DISPOSING OF A REAR SHOCK ABSORBER

Before disposing the rear shock absorber, be sure to extract the nitrogen gas from valve "1".

⚠ 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.



REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

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

⚠ WARNING

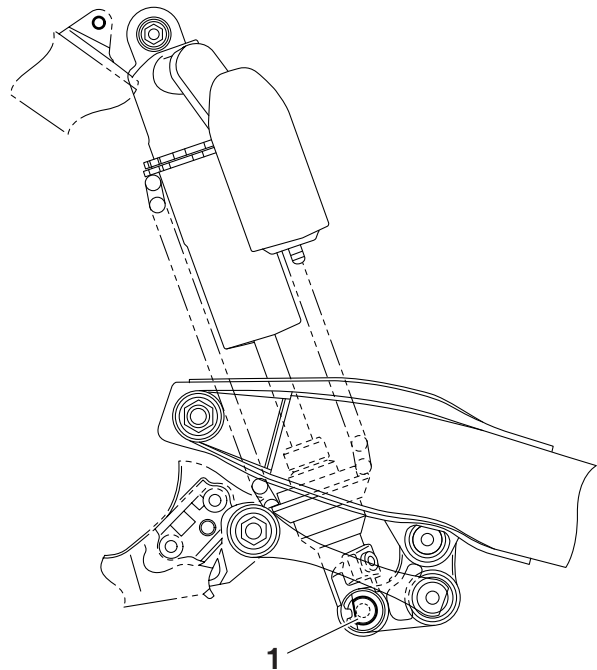
Securely support the vehicle so that there is no danger of it falling over.

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

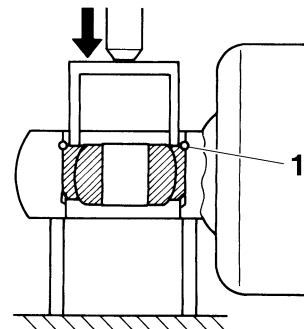
REMOVING THE BEARING

1. Remove:

- Stopper ring (upper bearing) "1"

TIP

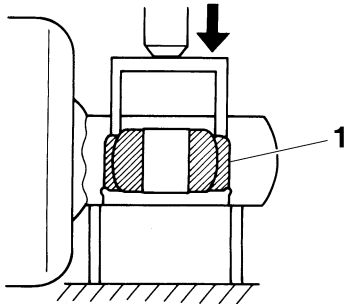
Press in the bearing while pressing its outer race and remove the stopper ring.



REAR SHOCK ABSORBER ASSEMBLY

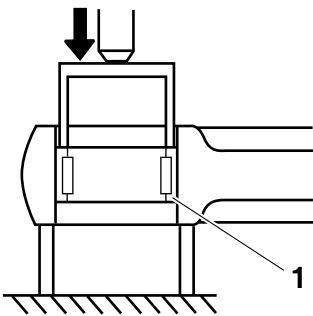
2. Remove:
- Upper bearing "1"

TIP _____
Remove the bearing by pressing its outer race.



3. Remove:
- Lower bearing "1"

TIP _____
Remove the bearing by pressing its outer race.



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.
 - Bolts
Bends/damage/wear → Replace.

CHECKING THE CONNECTING ARM AND RELAY ARM

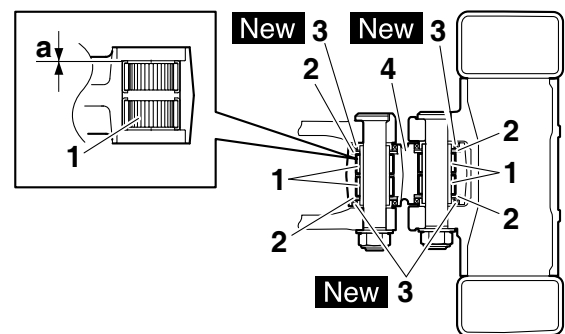
1. Check:
- Connecting arm
 - Relay arm
Damage/wear → Replace.
2. Check:
- Bearing
 - Spacers
Damage/pitting/scratches → Replace the bearings and spacers as a set.
3. Check:
- Oil seals
Damage/pitting → Replace.

INSTALLING THE RELAY ARM

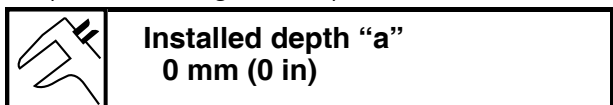
1. Lubricate:
- Oil seals
 - Bearing
 - Spacers
 - Washers
 - Collars



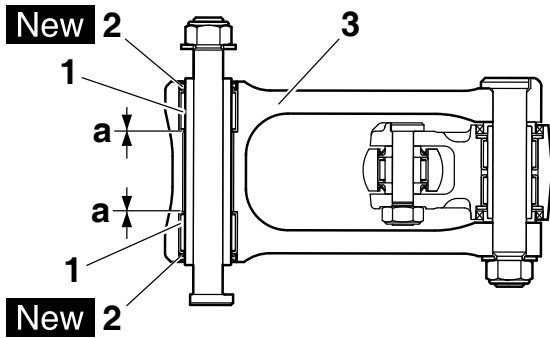
2. Install:
- Bearing "1"
 - Washer "2"
 - Oil seals "3" **New**
(to relay arm "4")



3. Install:
- Bearing "1"
 - Oil seals "2" **New**
(to connecting arm "3")

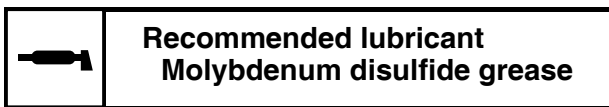


REAR SHOCK ABSORBER ASSEMBLY



INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

- Lubricate:
 - Bearing (lower side)
 - Dust seal
 - Collars
 - Bushing



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.

- Lubricate:
 - O-ring



- Install:
 - Bearing
 - Stopper ring **New**
(to rear shock absorber assembly (upper side))

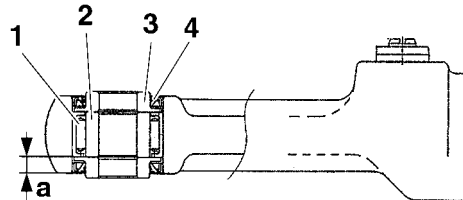
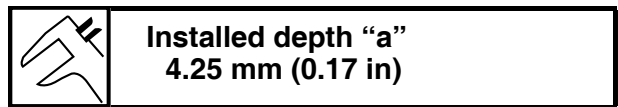
TIP

- Install the bearing parallel until the stopper ring groove appears by pressing its outer race.
- After installing the stopper ring, push back the bearing unit it contacts the stopper ring.

- Install:
 - Bearing "1"
 - Bushing "2"
 - Collar "3"
 - Dust seal "4"
(to rear shock absorber assembly (lower side))

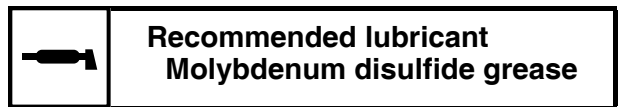
TIP

Install the dust seals with their lips facing inward.



- 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



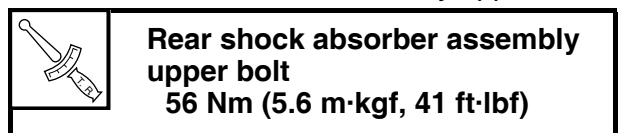
- Install:
 - Rear shock absorber assembly

TIP

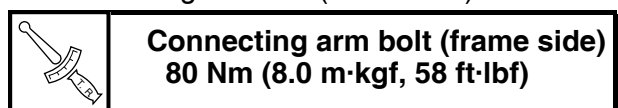
- When installing the rear shock absorber assembly, lift up the swingarm.
- Install the rear shock absorber assembly upper bolt, and connecting arm bolt (frame side) from the right.
- Install the rear shock absorber assembly lower bolts, connecting arm bolt (relay arm side), and relay arm bolt (swingarm side) from the left.

- Tighten:

- Rear shock absorber assembly upper bolt




- Connecting arm bolt (frame side)




REAR SHOCK ABSORBER ASSEMBLY


- Connecting arm bolt (relay arm side)

	Connecting arm bolt (relay arm side) 80 Nm (8.0 m·kgf, 58 ft·lbf)
---	--

- Relay arm bolt (swingarm side)

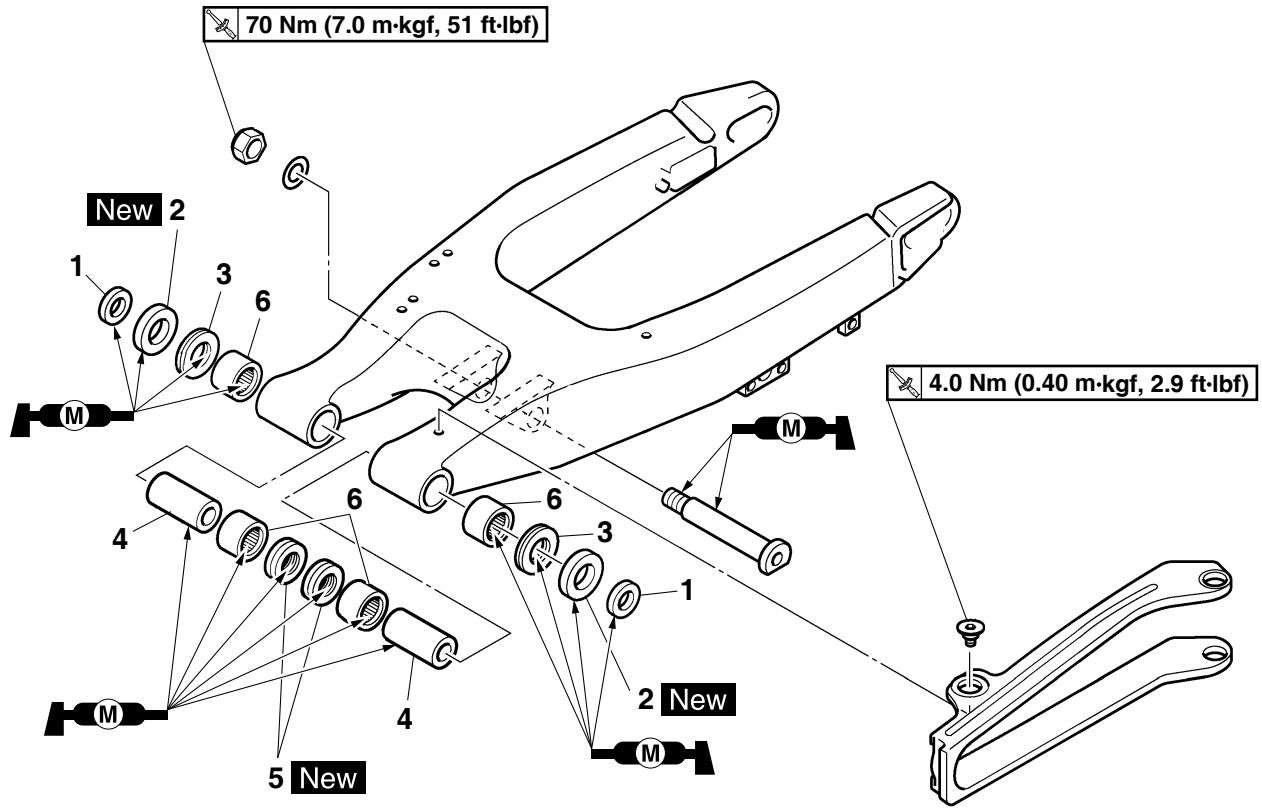
	Relay arm bolt (swingarm side) 70 Nm (7.0 m·kgf, 51 ft·lbf)
---	--

- Rear shock absorber assembly lower bolt

	Rear shock absorber assembly lower bolt 53 Nm (5.3 m·kgf, 38 ft·lbf)
---	---

SWINGARM

Removing the swingarm

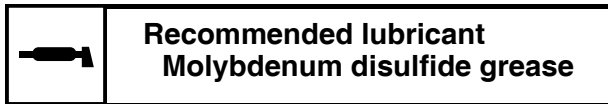


Order	Part name	Q'ty	Remarks
			Use a suitable stand to raise the front wheel off the ground.
	Brake hose holder		Refer to "REAR BRAKE" on page 4-21.
	Rear brake caliper		Refer to "REAR BRAKE" on page 4-21.
	Bolt (brake pedal)		
	Drive chain		
1	Collars	2	
2	Oil seals	2	
3	Thrust bearing	2	
4	Bushing	2	
5	Oil seals	2	
6	Bearing	4	
			For installation, reverse the removal procedure.

INSTALLING THE SWINGARM

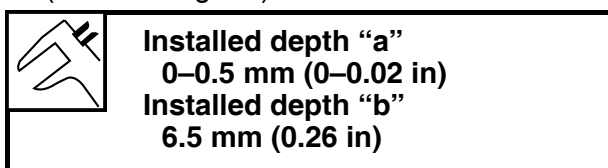
1. Lubricate:

- Bearing
- Collars
- Spacers
- Oil seal **New**
- Pivot shaft



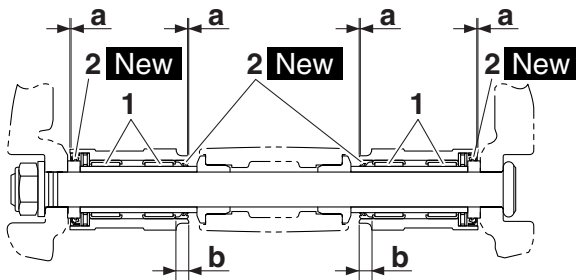
2. Install:

- Bearing "1"
- Oil seals "2" **New**
(to the swingarm)



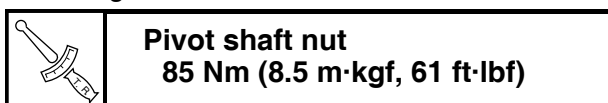
TIP

First install the outer and then the inner bearings to a specified depth from inside.



3. Install:

- Swingarm



TIP

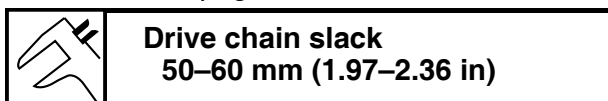
Install the pivot shaft from the right.

4. Install:

- Rear wheel
Refer to "REAR WHEEL" on page 4-7.

5. Adjust:

- Drive chain slack
Refer to "ADJUSTING THE DRIVE CHAIN SLACK" on page 3-27.



CHAIN DRIVE

Removing the drive chain

1

New

75 Nm (7.5 m·kgf, 54 ft·lbf)

7 Nm (0.7 m·kgf, 5.1 ft·lbf)

Job Order	Part name	Q'ty	Servicing Information
	Drive sprocket		Refer to "ENGINE REMOVAL" on page 5-1.
1	Drive chain	1	
			For installation, reverse the removal procedure.

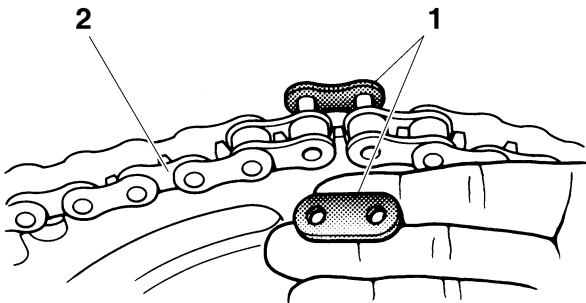
REMOVING THE DRIVE CHAIN

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

⚠ WARNING

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

2. Remove:
 - Joint clip
 - Drive chain joint "1"
 - Drive chain "2"



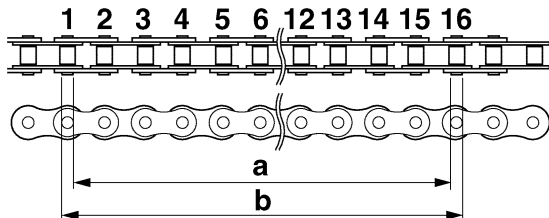
CHECKING THE DRIVE CHAIN

1. Measure:
 - 15-link section of the drive chain

Out of specification → Replace the drive chain.

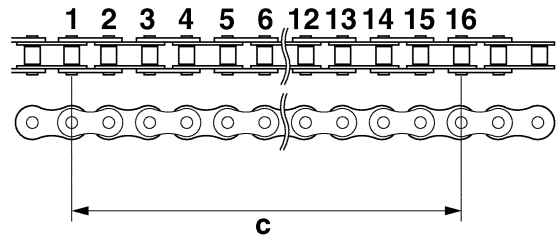
	15-link length limit 242.9 mm (9.56 in)
--	---

- 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" =
 $(\text{length "a" between pin inner sides} + \text{length "b" between pin outer sides}) / 2$

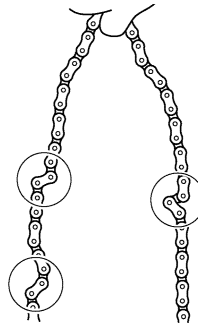


TIP

- 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:

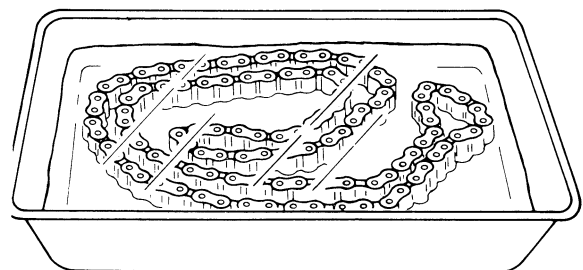
- Drive chain
- Stiffness → Clean, lubricate, or replace.



3. Clean:

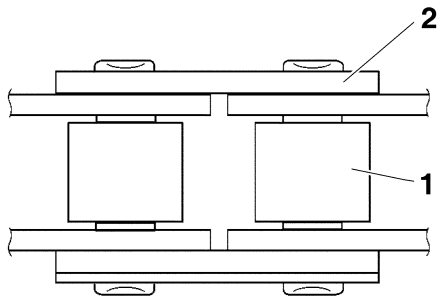
- Drive chain

- 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 rollers “1”
Damage/wear → Replace the drive chain.
- Drive chain side plates “2”
Damage/wear → Replace the drive chain.



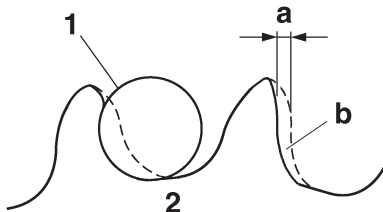
5. Lubricate:

- Drive chain

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

CHECKING THE REAR WHEEL SPROCKET

Refer to “CHECKING AND REPLACING THE REAR WHEEL SPROCKET” on page 4-8.

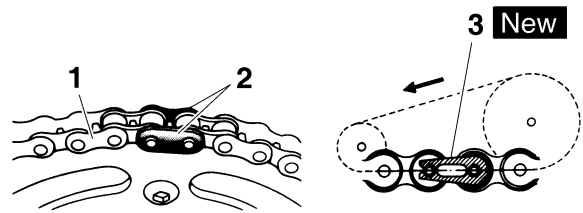
INSTALLING THE DRIVE CHAIN

1. Install:

- Drive chain “1”
- Drive chain joint “2”
- Joint clip “3” **New**

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 5-1.



Drive sprocket nut
75 Nm (7.5 m·kgf, 54 ft·lbf)

NOTICE

Never install a new drive chain onto worn drive sprockets; this will dramatically shorten the drive chain’s life.

4. Adjust:

- Drive chain slack

Refer to “ADJUSTING THE DRIVE CHAIN SLACK” on page 3-27.



Drive chain slack
50–60 mm (1.97–2.36 in)

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

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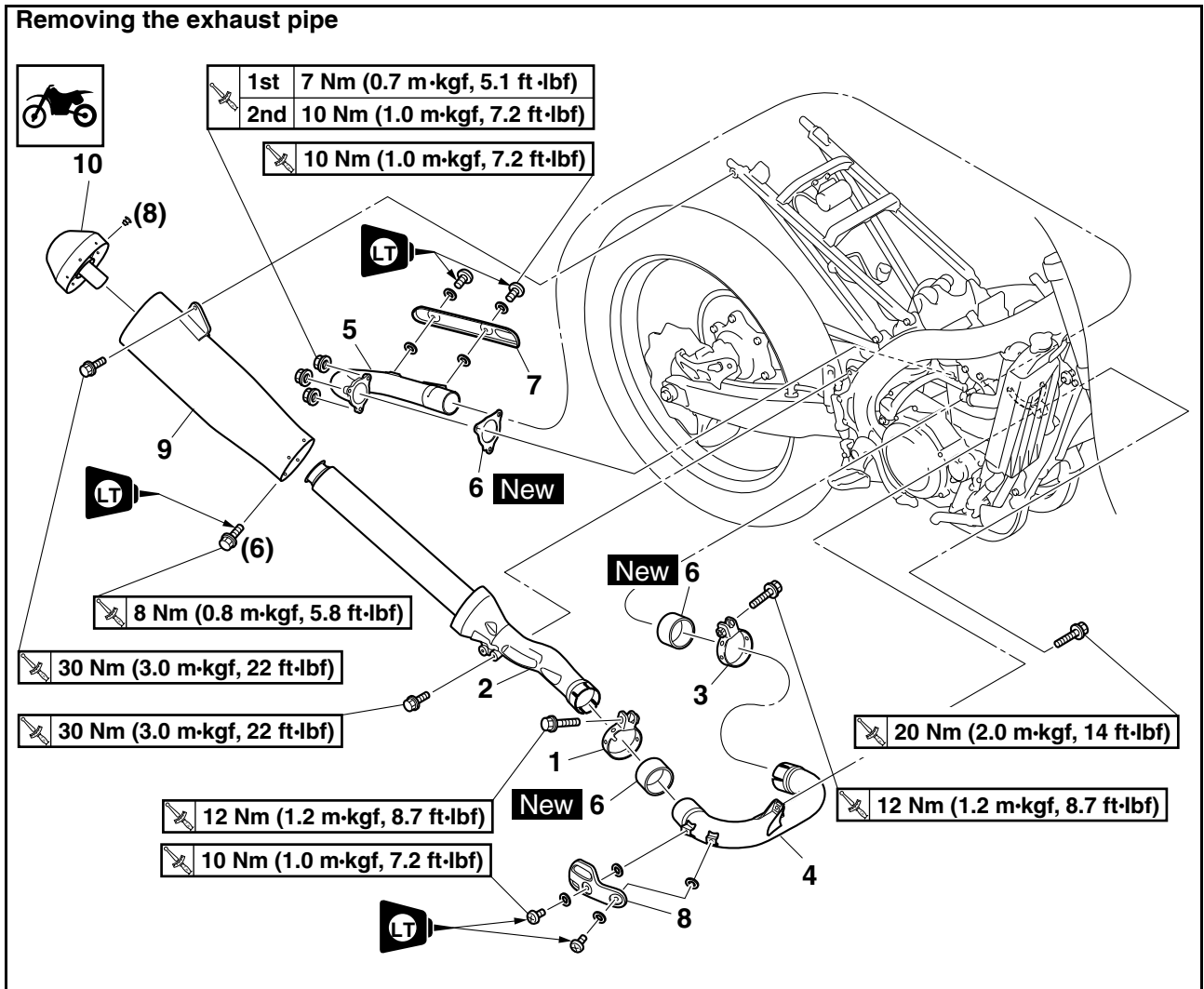
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ENGINE REMOVAL

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.

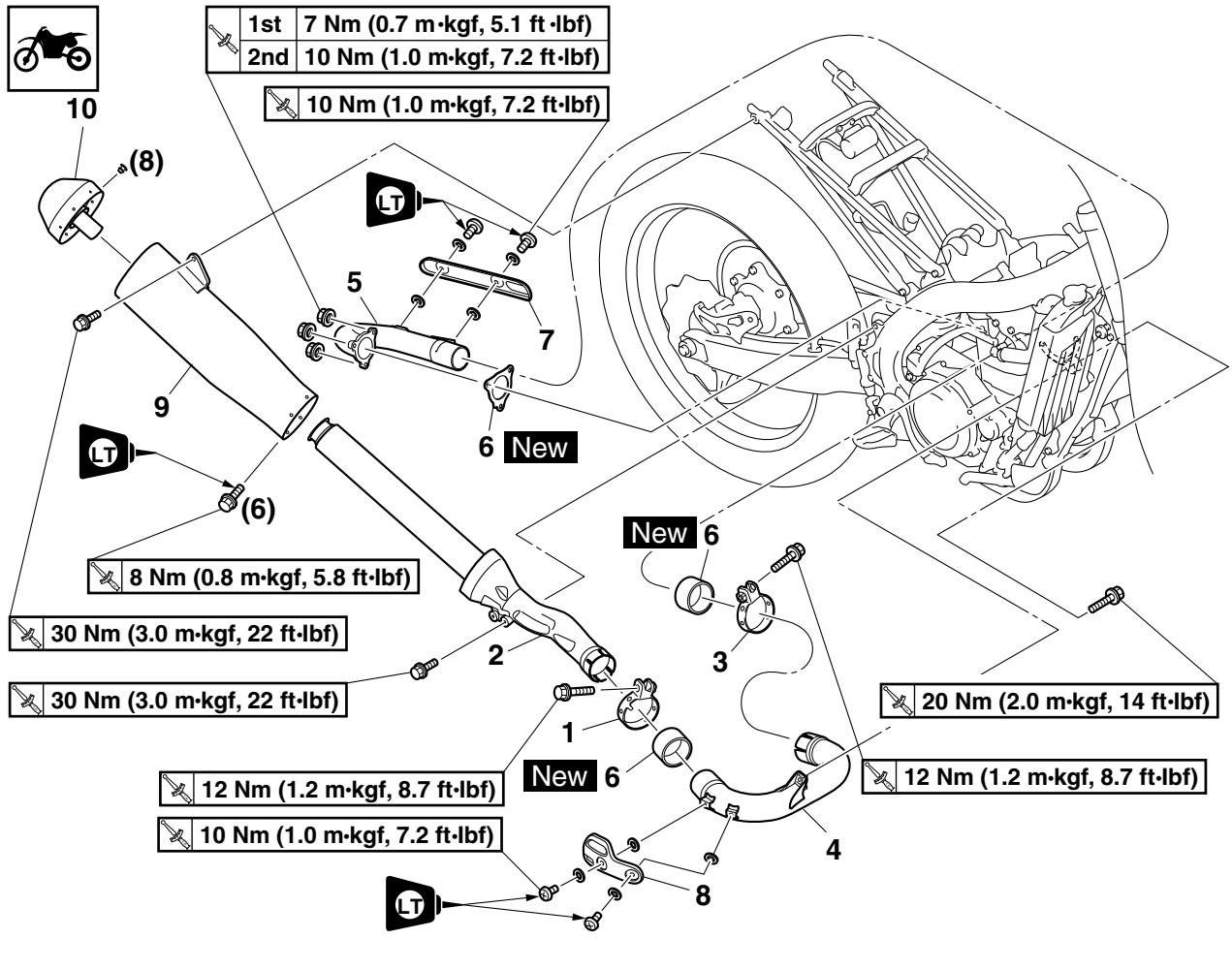
ENGINE REMOVAL



Order	Part name	Q'ty	Remarks
	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 4-53.
	Connecting arm bolt (frame side)		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-53.
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	Gaskets	3	

ENGINE REMOVAL

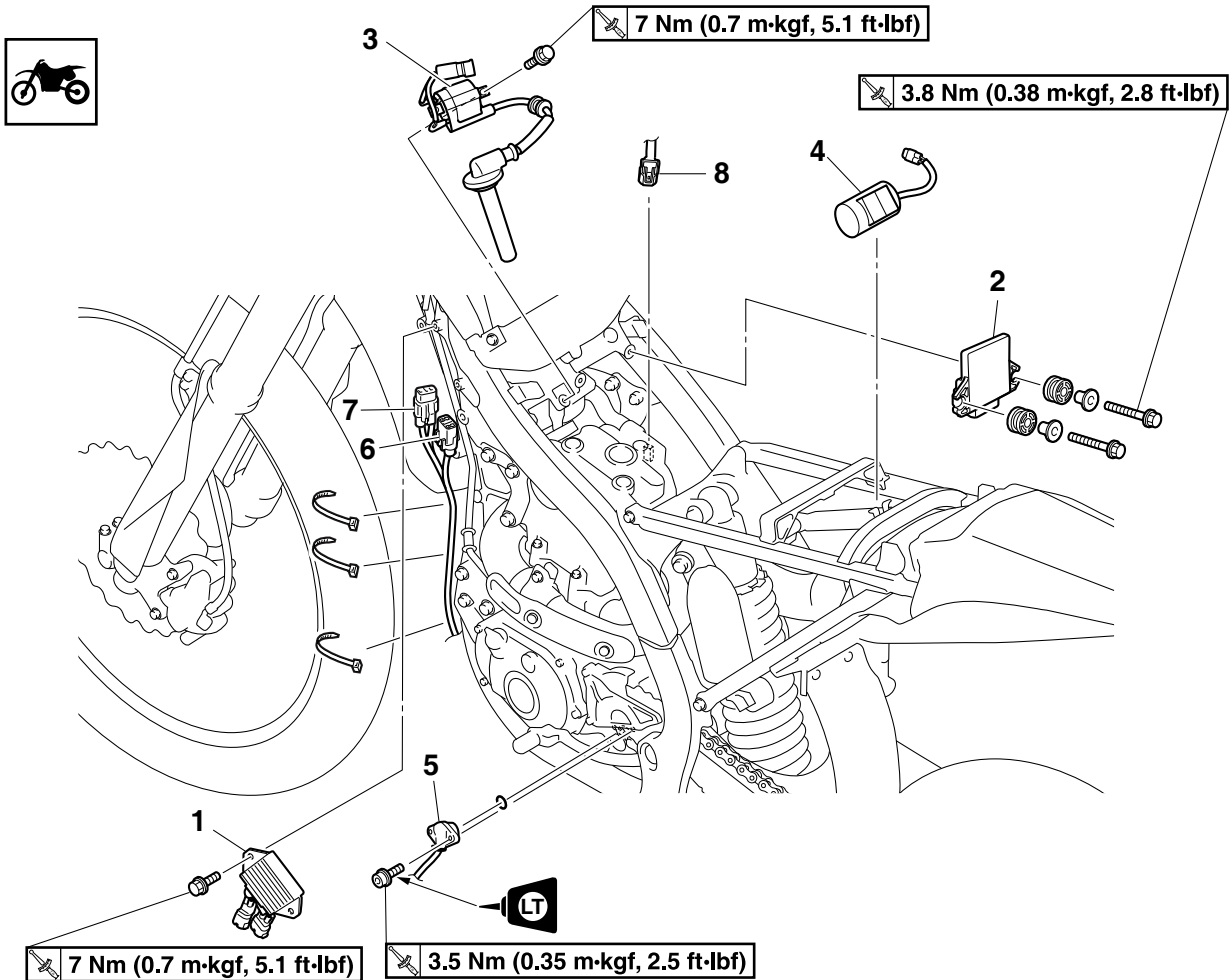
Removing the exhaust pipe



Order	Part name	Q'ty	Remarks
7	Exhaust pipe 1 protector	1	
8	Exhaust pipe 2 protector	1	
9	Silencer body	1	
10	Silencer cap	1	
			For installation, reverse the removal procedure.

ENGINE REMOVAL

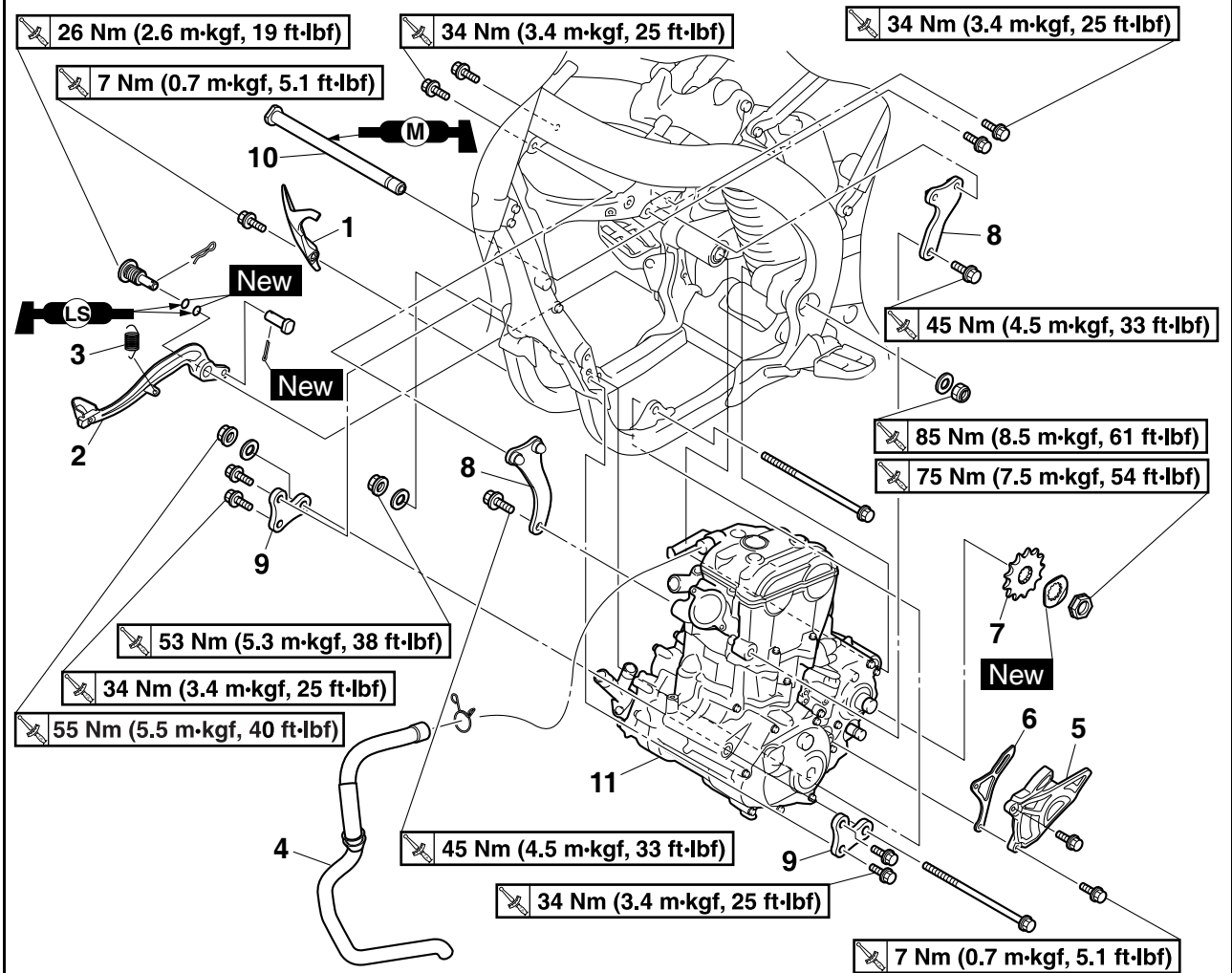
Removing the electronic parts



Order	Part name	Q'ty	Remarks
			Use a suitable 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		
1	Rectifier/regulator	1	
2	ECU	1	
3	Ignition coil	1	
4	Condenser	1	
5	Neutral switch	1	
6	AC magneto coupler	1	Disconnect.
7	Crankshaft position sensor coupler	1	Disconnect.
8	Coolant temperature sensor coupler	1	Disconnect.
			For installation, reverse the removal procedure.

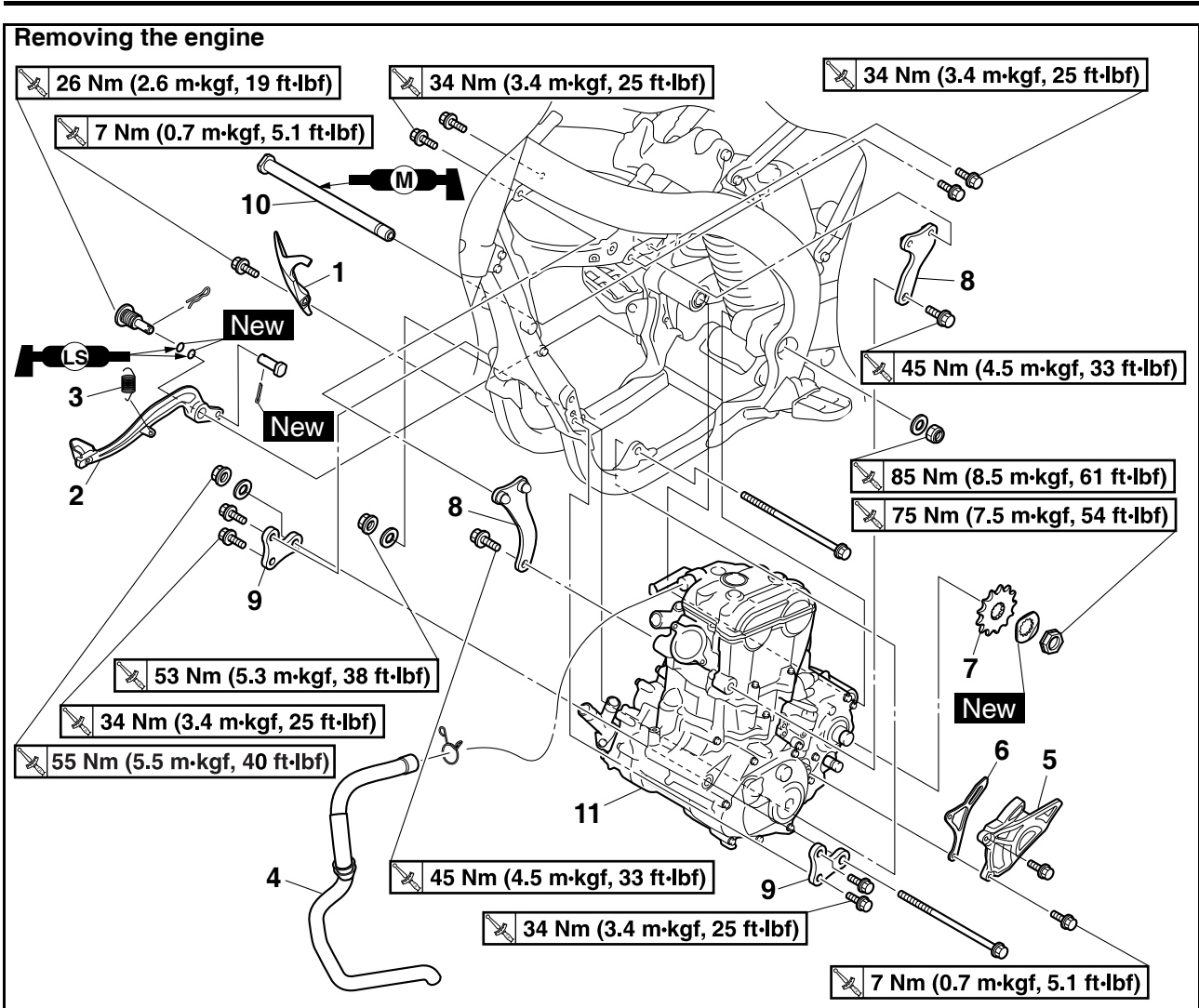
ENGINE REMOVAL

Removing the engine



Order	Part name	Q'ty	Remarks
			Use a suitable 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.
	Rear fender		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Exhaust pipe and silencer		Refer to "ENGINE REMOVAL" on page 5-1.
	Air filter case		Refer to "THROTTLE BODY" on page 7-5.
	Throttle body		Refer to "THROTTLE BODY" on page 7-5.
	Clutch cable		Refer to "CLUTCH" on page 5-37.
	Shift pedal		Refer to "SHIFT SHAFT" on page 5-49.
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	

ENGINE REMOVAL



Order	Part name	Q'ty	Remarks
7	Drive sprocket	1	
8	Upper engine bracket	2	
9	Lower engine bracket	2	
10	Pivot shaft	1	
11	Engine	1	
			For installation, reverse the removal procedure.

ENGINE REMOVAL

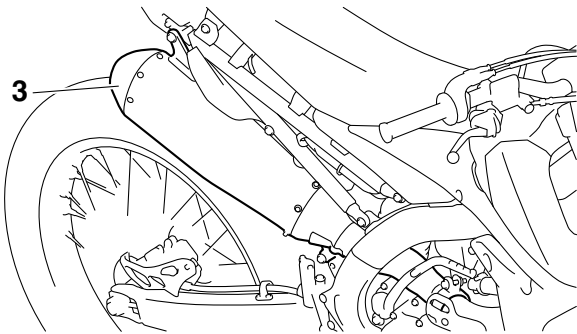
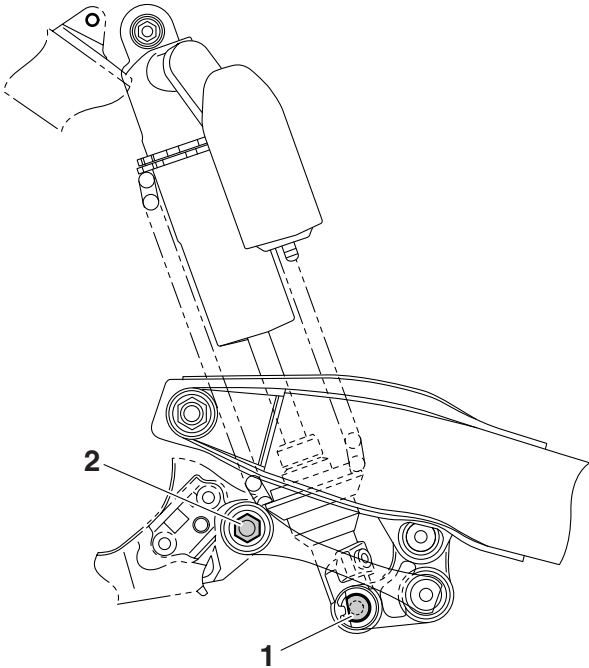
REMOVING THE SILENCER

1. Remove:

- Rear shock absorber assembly lower bolt "1"
- Connecting arm bolt (frame side) "2"
- Silencer "3"

TIP

Move the rear shock absorber to the left side of the chassis, and remove the silencer.



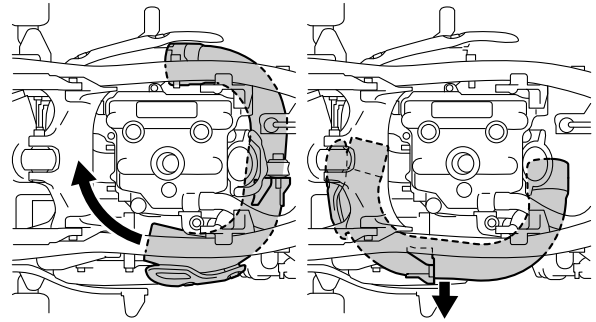
REMOVING THE EXHAUST PIPE 2

1. Remove:

- Exhaust pipe 2

TIP

Put the Exhaust pipe 2 into the state as shown by moving this, and then remove it.



REMOVING THE DRIVE SPROCKET

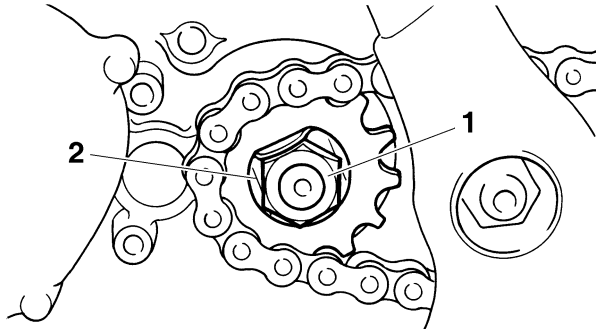
1. Straighten the lock washer tab.

2. Remove:

- Nut (drive sprocket) "1"
- Lock washer "2"

TIP

Loosen the nut while applying the rear brake.

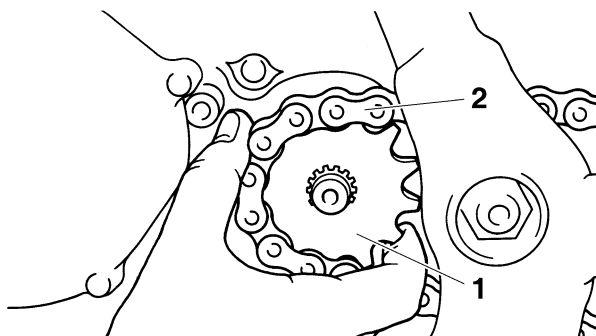


3. Remove:

- Drive sprocket "1"
- Drive chain "2"

TIP

Remove the drive sprocket together with the drive chain.



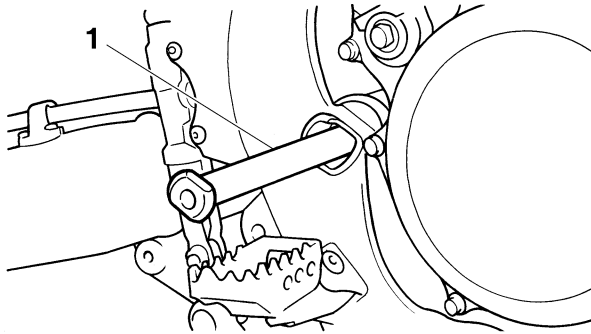
ENGINE REMOVAL

REMOVING THE ENGINE

1. Remove:
 - Pivot shaft "1"

TIP

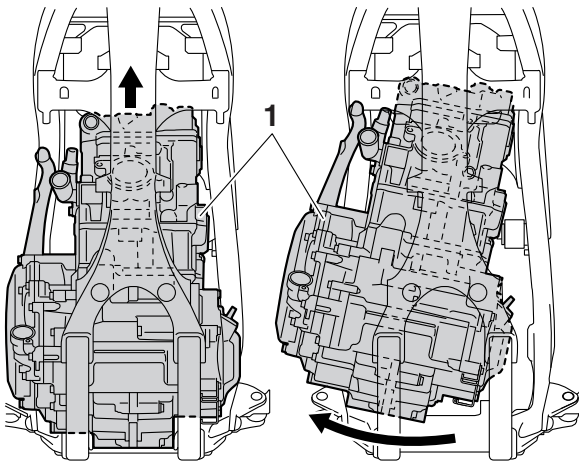
If the pivot shaft is pulled all the way out, the swingarm will come loose. If possible, insert a shaft of similar diameter into the other side of the swingarm to support it.



2. Remove:
 - Engine "1"From the right side.

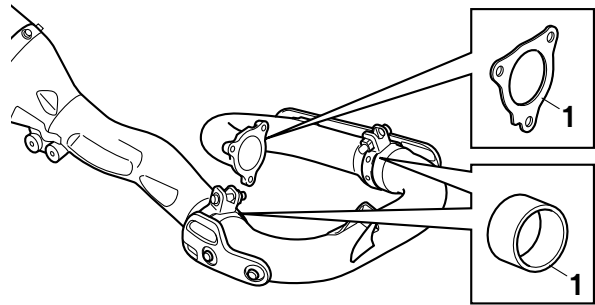
TIP

- 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.



CHECKING THE SILENCER AND EXHAUST PIPE

1. Check:
 - Gasket "1"Damage → Replace.



CHANGING THE SILENCER FIBER

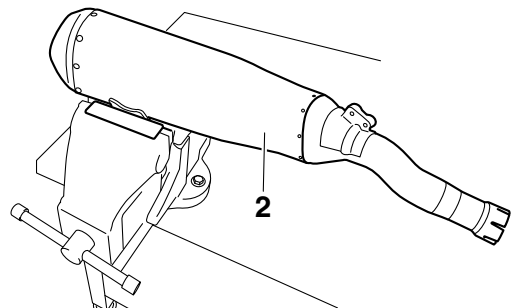
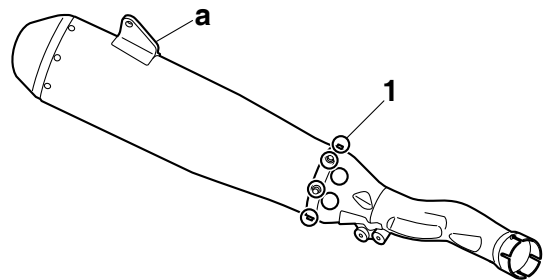
1. Remove:
 - Bolt "1"
 - Silencer body "2"

NOTICE

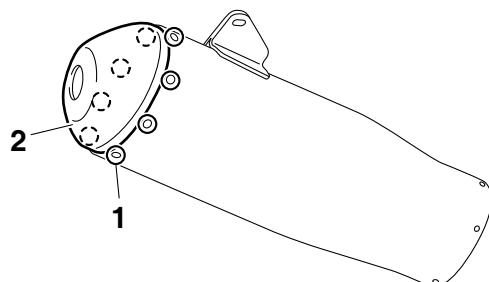
Do not hit the silencer stay "a" as it may do damage to the silencer.

TIP

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



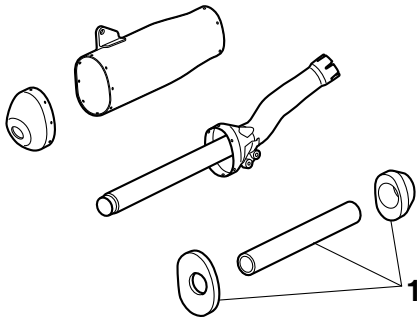
2. Remove:
 - Rivet "1"
 - Silencer cap "2"



ENGINE REMOVAL


3. Replace:

- Fiber "1"



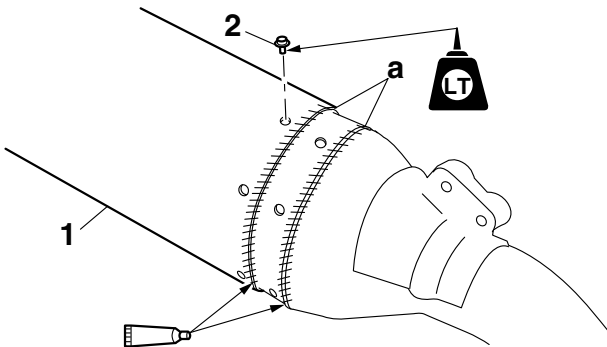
4. Install:

- Silencer body "1"
- Bolt "2"

	Silencer body bolt 8 Nm (0.8 m·kgf, 5.8 ft·lbf) LOCTITE®
---	---

TIP

Apply heat-resistant sealant to the areas "a" shown, making sure that there are no gaps in the beads of sealant.

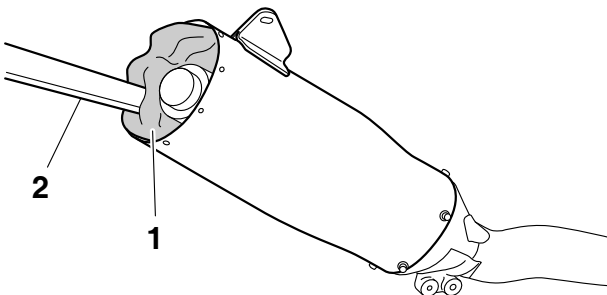


5. Replace:

- Fiber "1"

TIP

Stuff the fiber into the silencer body by using a flat board "2".

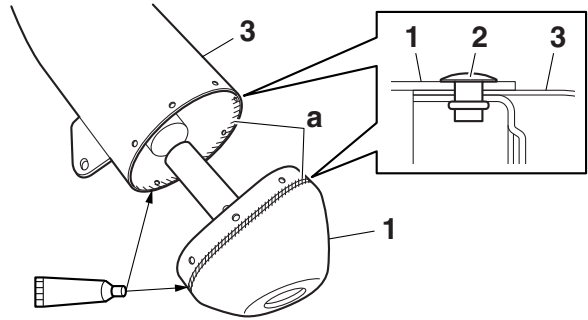


6. Install:

- Silencer cap "1"
- Rivet "2"

TIP


- Apply heat-resistant sealant to the areas "a" 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 "3".




INSTALLING THE ENGINE

1. Install:


- Engine "1"
- Install the engine from the right side.
- Pivot shaft "2"

	Pivot shaft 85 Nm (8.5 m·kgf, 61 ft·lbf)
--	---

- Engine mounting bolt (lower side) "3"

	Engine mounting bolt (lower side) 53 Nm (5.3 m·kgf, 38 ft·lbf)
---	---


- Front engine bracket "4"
- Engine bracket bolt (front side) "5"

	Engine bracket bolt (front side) 34 Nm (3.4 m·kgf, 25 ft·lbf)
---	--


- Engine mounting bolt (front side) "6"

	Engine mounting bolt (front side) 55 Nm (5.5 m·kgf, 40 ft·lbf)
---	---

- Upper engine bracket "7"
- Engine bracket bolt (upper side) "8"

	Engine bracket bolt (upper side) 34 Nm (3.4 m·kgf, 25 ft·lbf)
---	--

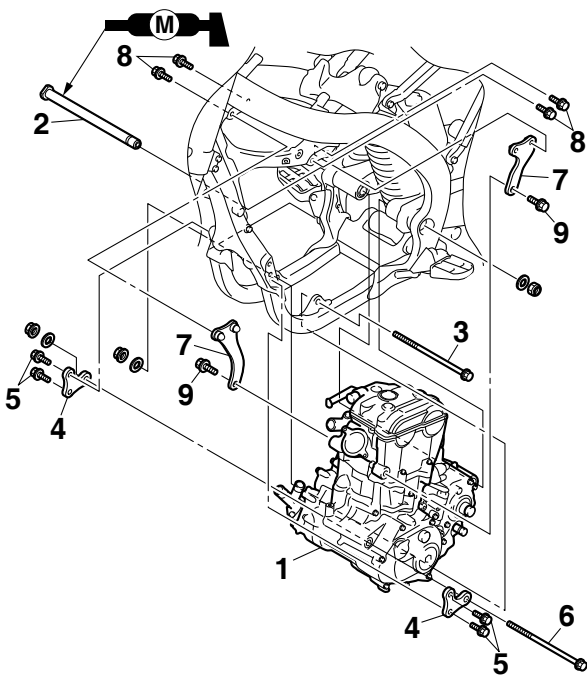
- Engine mounting bolt (upper side) "9"

	Engine mounting bolt (upper side) 45 Nm (4.5 m·kgf, 33 ft·lbf)
---	---

TIP

Apply molybdenum disulfide grease to the pivot shaft.

ENGINE REMOVAL



INSTALLING THE BRAKE PEDAL

1. Install:

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

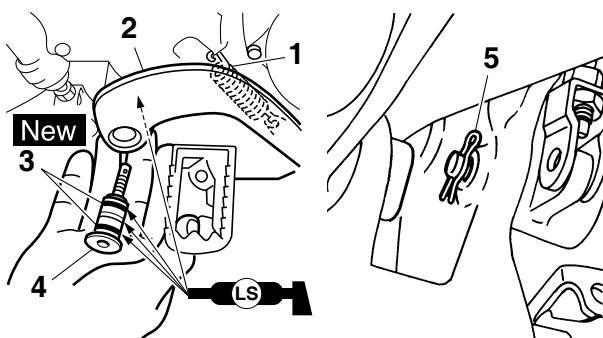


Bolt (brake pedal)
26 Nm (2.6 m·kgf, 19 ft·lbf)

- Clip "5"

TIP

Apply the lithium soap base grease on the bolt, O-rings and brake pedal bracket.



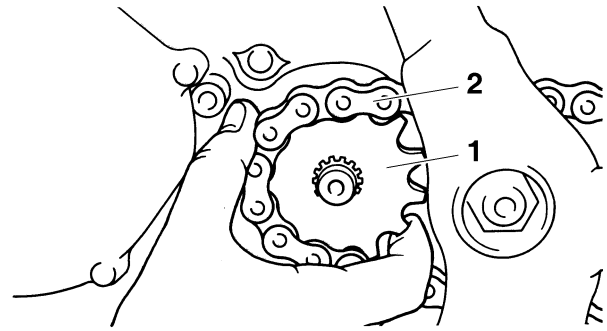
INSTALLING THE DRIVE SPROCKET

1. Install:

- Drive sprocket "1"
- Drive chain "2"

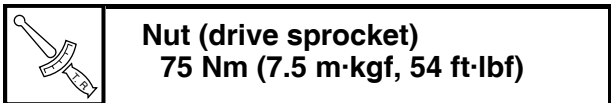
TIP

Install the drive sprocket together with the drive chain.



2. Install:

- Lock washer "1" **New**
- Nut (drive sprocket) "2"



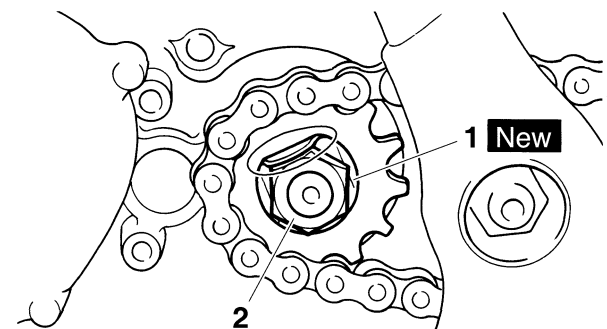
Nut (drive sprocket)
75 Nm (7.5 m·kgf, 54 ft·lbf)

TIP

Tighten the nut while applying the rear brake.

NOTICE

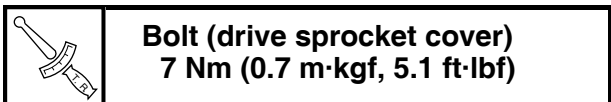
Make sure to tighten to specification; otherwise, it may damage the other part that is fastened together.



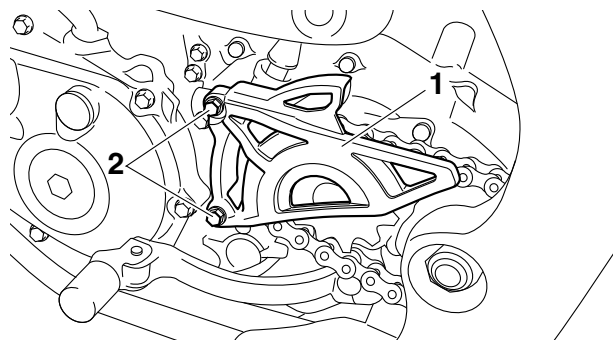
3. Bend the lock washer tab to lock the nut.

4. Install:

- Drive sprocket guide
- Drive sprocket cover "1"
- Bolt (drive sprocket cover) "2"



Bolt (drive sprocket cover)
7 Nm (0.7 m·kgf, 5.1 ft·lbf)




ENGINE REMOVAL

INSTALLING THE EXHAUST PIPE AND MUFFLER

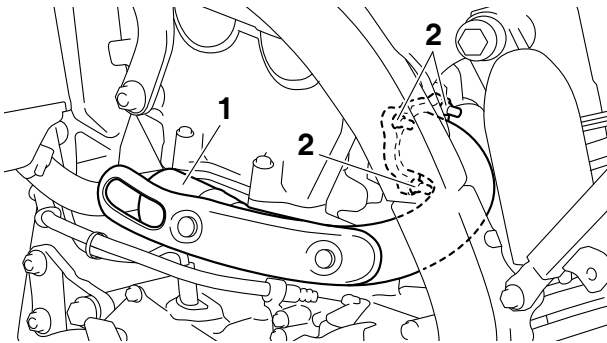
1. Install:

- Gasket **New**
- Exhaust pipe 1 "1"
- Nut (exhaust pipe 1) "2"

	Nut (exhaust pipe) 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
---	--

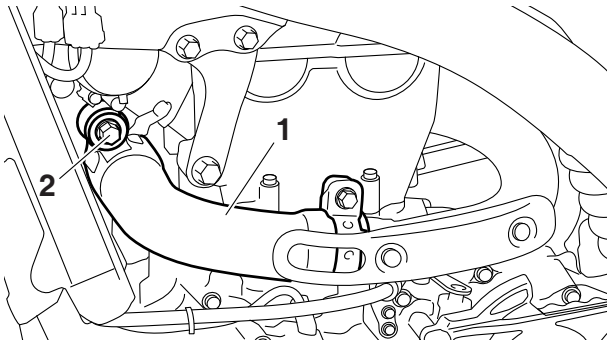
TIP

First temporarily tighten nuts to 7 Nm (0.7 m·kgf, 5.1 ft·lbf). Then retighten them to 10 Nm (1.0 m·kgf, 7.2 ft·lbf).



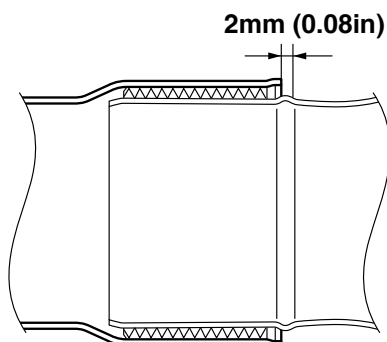
2. Install:

- Clamp
- Exhaust pipe 2 "1"
- Bolt (exhaust pipe 2) "2"




TIP

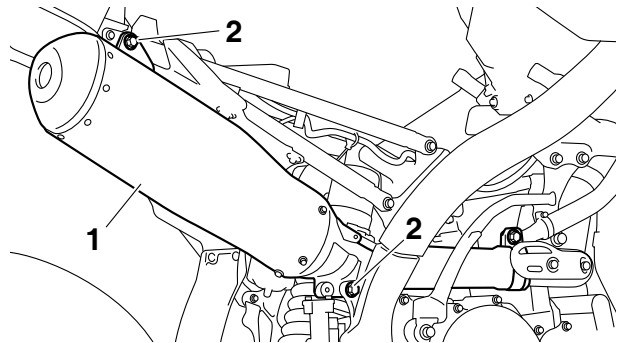
Install and temporarily tighten the exhaust pipe 2 with its end positioned as shown with respect to the exhaust pipe 1.



3. Install:

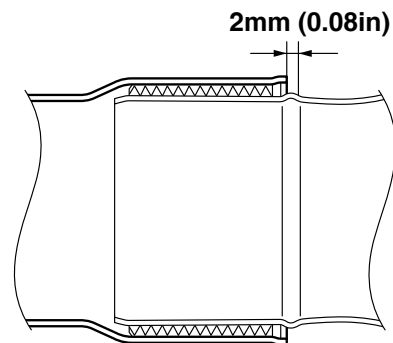
- Clamp
- Silencer "1"
- Bolt (silencer) "2"

	Bolt (silencer) 30 Nm (3.0 m·kgf, 22 ft·lbf)
---	--




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) 20 Nm (2.0 m·kgf, 14 ft·lbf)
---	--

- Clamp

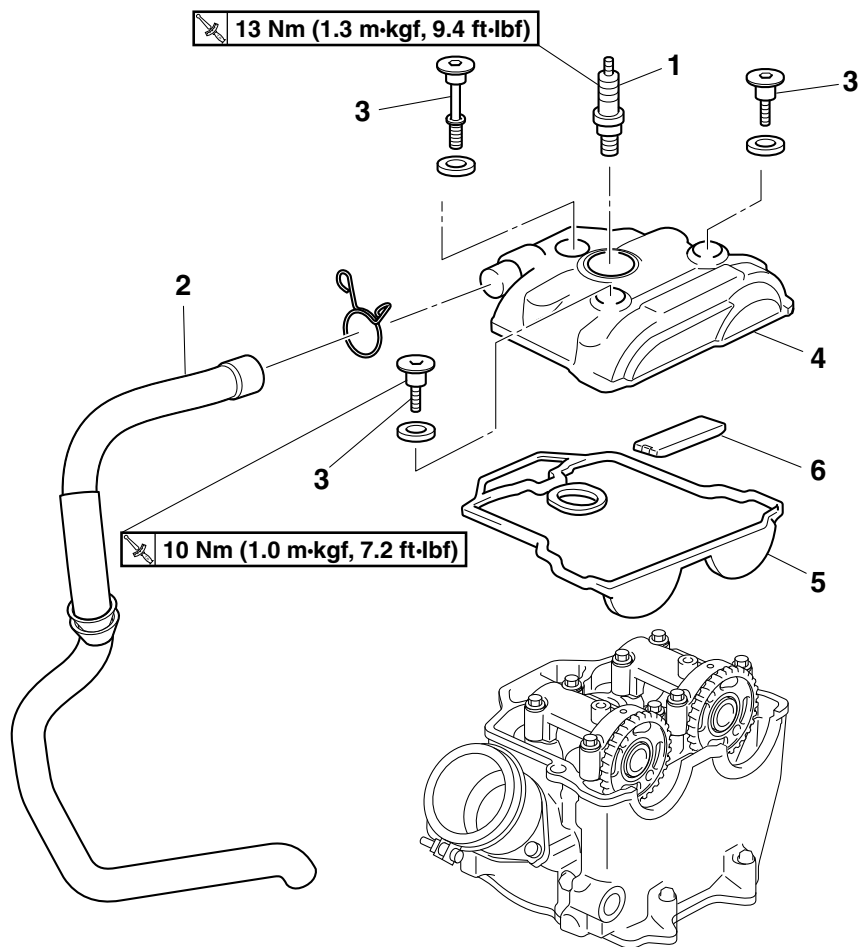
	Clamp 12 Nm (1.2 m·kgf, 8.7 ft·lbf)
---	---

TIP

Tighten while checking that their front and rear joints are inserted in position.

CAMSHAFT

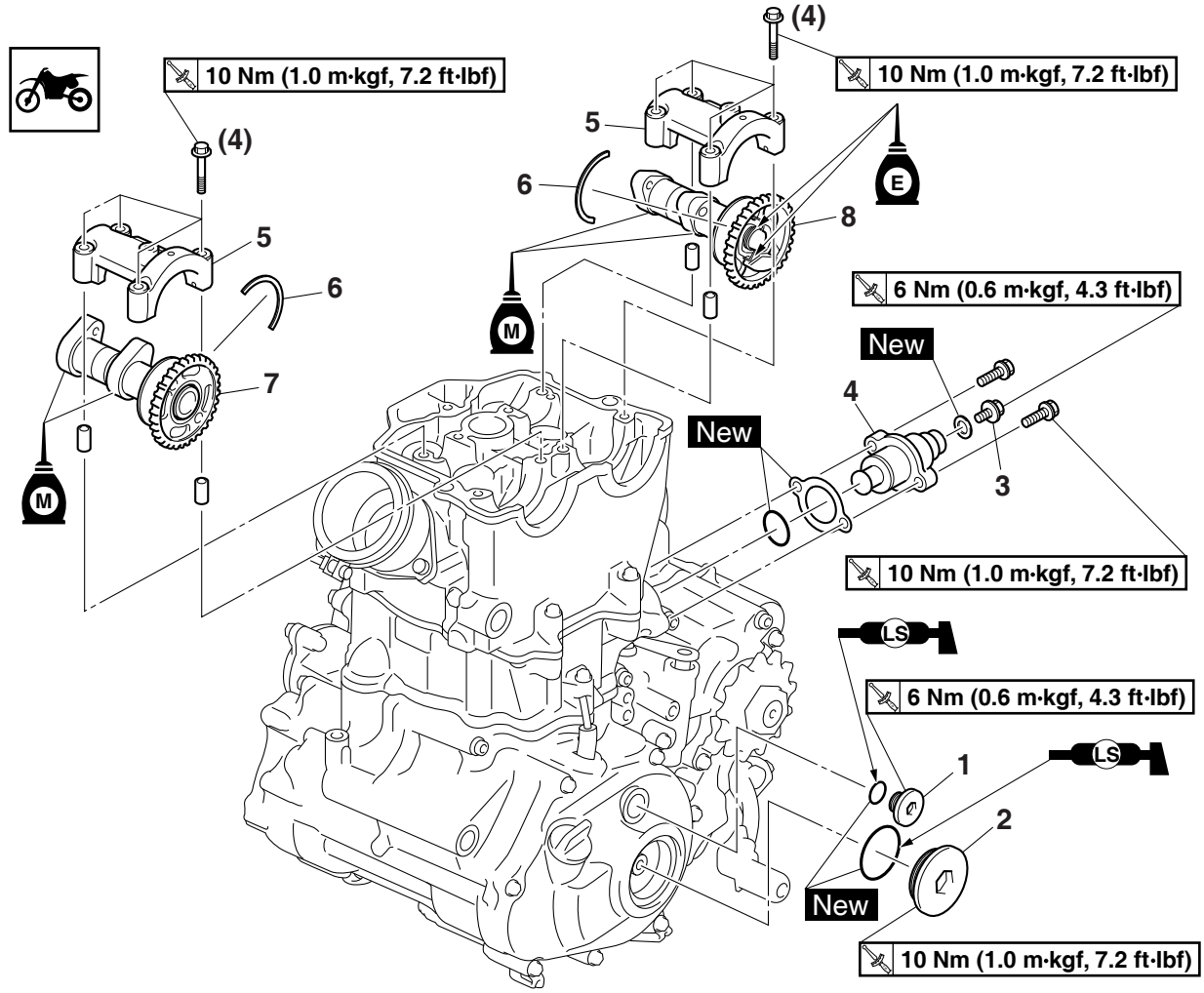
Removing the cylinder head cover



Order	Part name	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	Spark plug	1	
2	Cylinder head breather hose	1	
3	Bolt (cylinder head cover)	3	
4	Cylinder head cover	1	
5	Cylinder head cover gasket	1	
6	Timing chain guide (top side)	1	
			For installation, reverse the removal procedure.

CAMSHAFT

Removing the camshaft

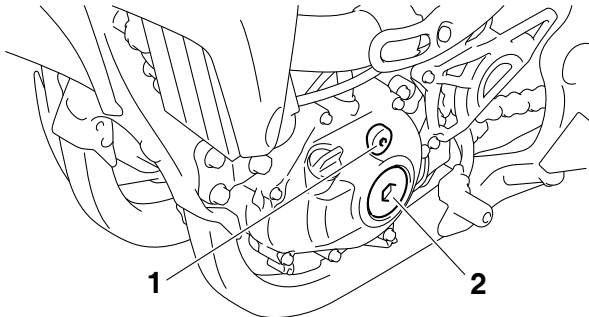


Order	Part name	Q'ty	Remarks
1	Timing mark accessing screw	1	
2	Crankshaft end accessing screw	1	
3	Timing chain tensioner cap bolt	1	
4	Timing chain tensioner	1	
5	Camshaft cap	2	
6	Clip	2	
7	Intake camshaft	1	
8	Exhaust camshaft	1	
			For installation, reverse the removal procedure.

REMOVING THE CAMSHAFT

1. Remove:

- Timing mark accessing screw "1"
- Crankshaft end accessing screw "2"



2. Align:

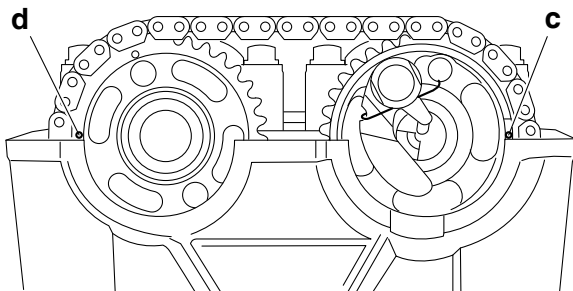
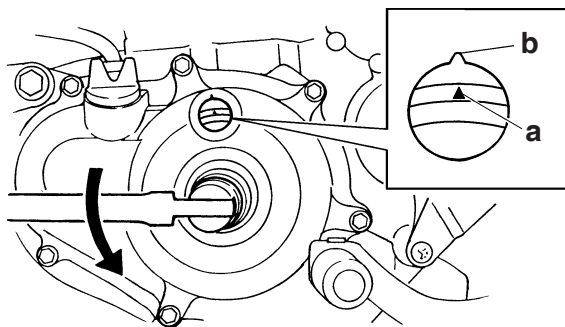
- Alignment mark



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

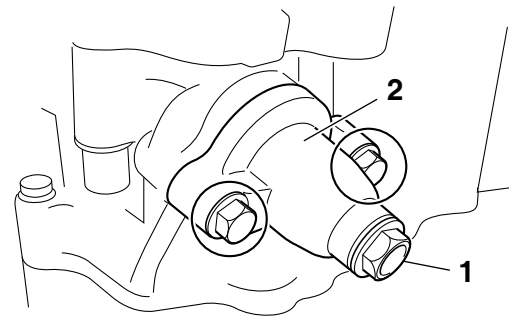
TIP

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"
- Gaskets



4. Remove:

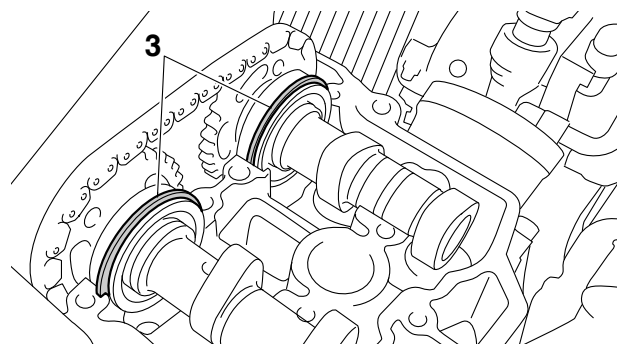
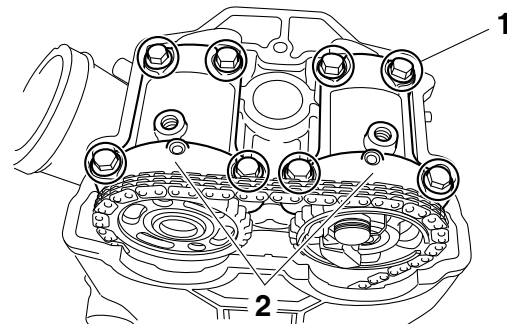
- Bolt (camshaft cap) "1"
- Camshaft cap "2"
- Clip "3"

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.

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

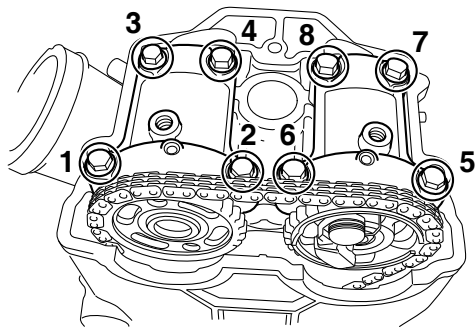
Attach a wire "3" to the timing chain to prevent it from falling into the crankcase.

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.
- Tighten the bolts to the specified torque in two or three steps in the proper tightening sequence as shown.

NOTICE

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

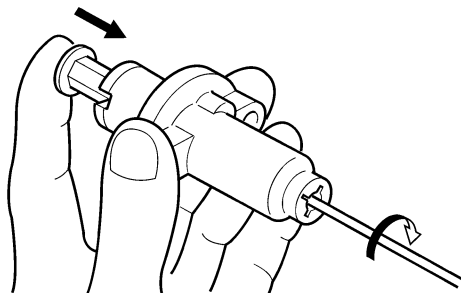


2. Install:


- Timing chain tensioner

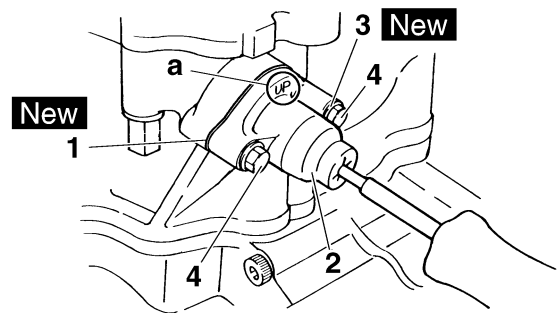


- a. While pressing the tensioner rod lightly with your fingers, use a thin screwdriver to wind the tensioner rod up fully clockwise.




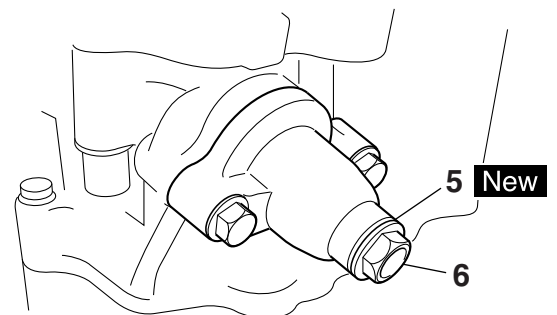
- b. With the tensioner rod fully wound and the chain tensioner UP mark "a" facing upward, install the gasket "1", the timing chain tensioner "2", and the gasket "3", and tighten the bolt "4".

	Bolt (timing chain tensioner) 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
---	---



- c. Release the screwdriver, check that the tensioner rod comes out smoothly, and tighten the gasket "5" and the cap bolt "6".

	Tensioner cap bolt 6 Nm (0.6 m·kgf, 4.3 ft·lbf)
---	---



3. Turn:


- Crankshaft
Counterclockwise several turns.

4. Check:

- Top dead center (TDC) mark on the rotor
Align with the crankcase alignment mark.
- Camshaft match marks
Align with the cylinder head surface.
Out of alignment → Adjust.


5. Install:

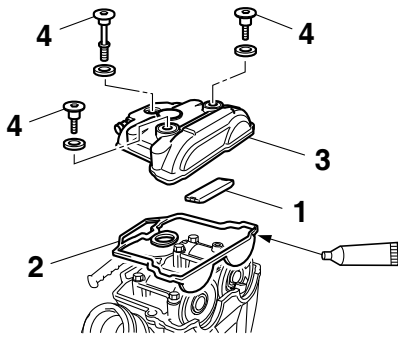
- Timing chain guide (top side) "1"
- Cylinder head cover gasket "2"
- Cylinder head cover "3"
- Bolt (cylinder head cover) "4"

	Bolt (cylinder head cover) 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
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TIP


Before installation, apply the sealant to the cylinder head cover gasket.

	Three Bond No.1215® 90890-85505
---	---



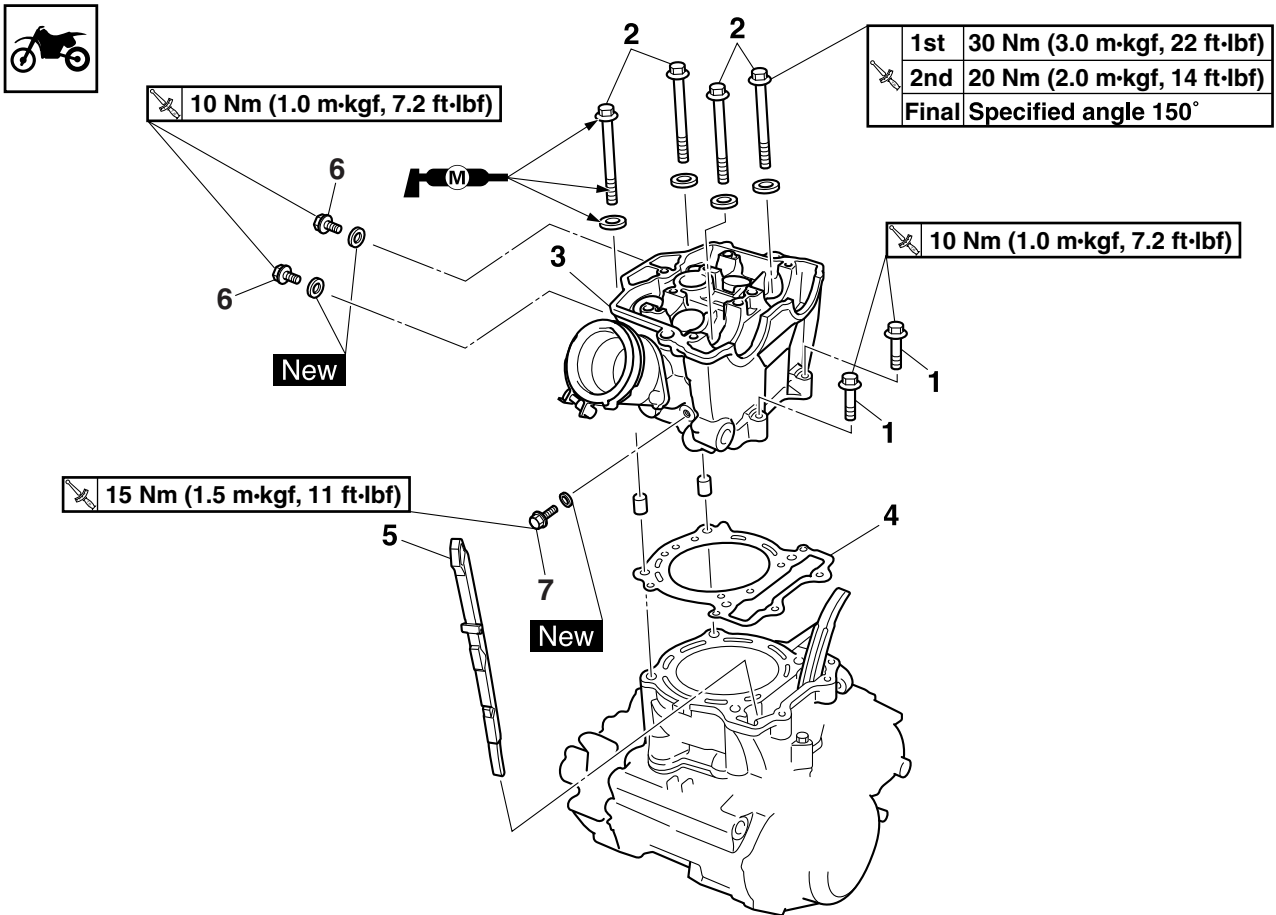
6. Install:

- Cylinder head breather hose
- Spark plug

	Spark plug 13 Nm (1.3m·kgf, 9.4 ft·lbf)
---	--

CYLINDER HEAD

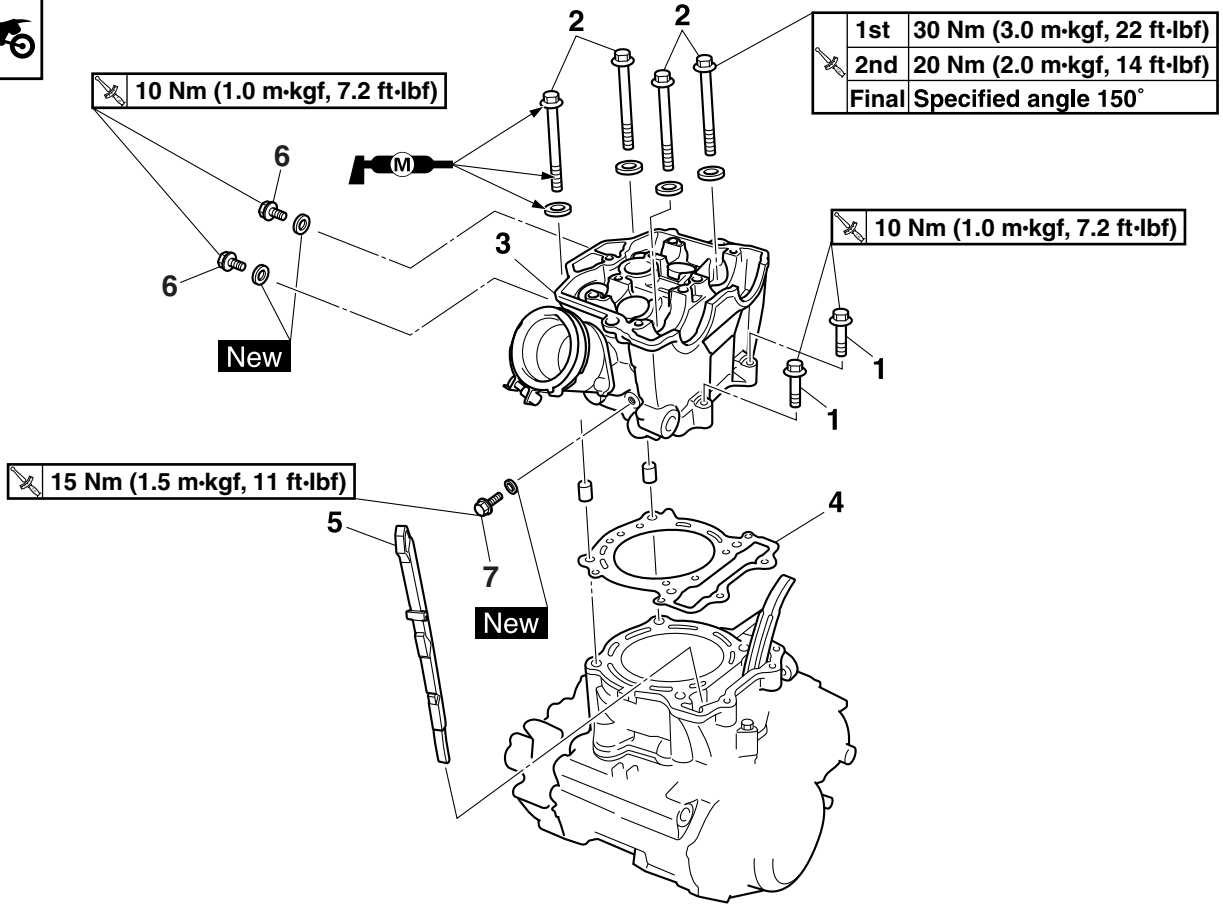
Removing the cylinder head



Order	Part name	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.
	Exhaust pipe and silencer		Refer to "ENGINE REMOVAL" on page 5-1.
	Radiator hose		Disconnect.
	Coolant temperature sensor coupler		Disconnect.
	Throttle body		Refer to "THROTTLE BODY" on page 7-5.
	Camshaft		Refer to "CAMSHAFT" on page 5-11.
	Upper engine bracket		Refer to "ENGINE REMOVAL" on page 5-1.
1	Bolt (cylinder head)	2	
2	Bolt (cylinder head)	4	
3	Cylinder head	1	
4	Cylinder head gasket	1	
5	Timing chain guide (intake side)	1	
6	Oil check bolt	2	

CYLINDER HEAD

Removing the cylinder head



Order	Part name	Q'ty	Remarks
7	Oil passage plug	1	
			For installation, reverse the removal procedure.

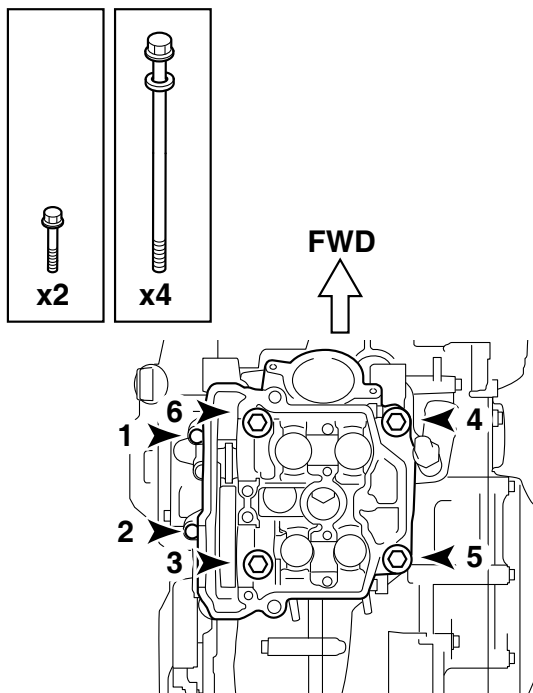
REMOVING THE CYLINDER HEAD

- Remove:
 - Cylinder head bolts

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.

- M6 × 35 mm (1.38 in): “1” – “2”
- M10 × 149 mm (5.87 in): “3” – “6”



CHECKING THE TIMING CHAIN GUIDE (INTAKE SIDE)

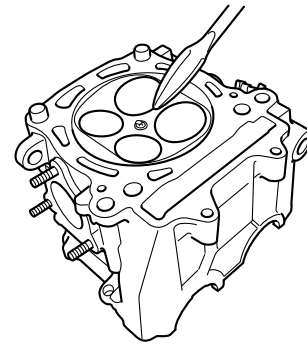
- Check:
 - Timing chain guide (intake side)
 Damage/wear → Replace.

CHECKING THE CYLINDER HEAD

- 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.



- Check:
 - Cylinder head
 Damage/scratches → Replace.

TIP

When replacing the cylinder head, replace also the valve.

“CHECKING THE VALVE SEATS” on page 5-27.

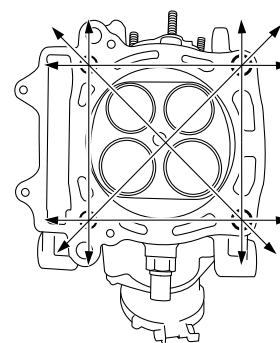
- Cylinder head coolant passages
 - Mineral deposits/rust → Eliminate.
- Measure:
 - Cylinder head warpage
 Out of specification → Resurface the cylinder head.

	Warpage limit 0.05 mm (0.0020 in)
--	---

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


TIP

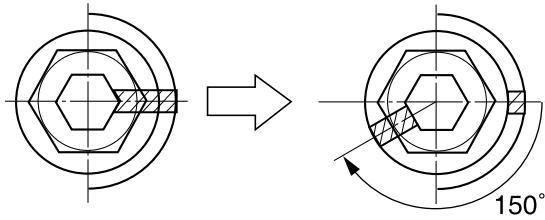
To ensure an even surface, turn the cylinder head several times.




- i. Retighten the cylinder head mounting bolts 150° in the proper tightening sequence.

TIP _____
Tighten the bolts in two steps (90° and 60°) to reach the specified angle in the proper tightening sequence.

	Bolts "1"–"4" Final Specified angle 150°
---	---



- j. Tighten the bolts to the specified torque.

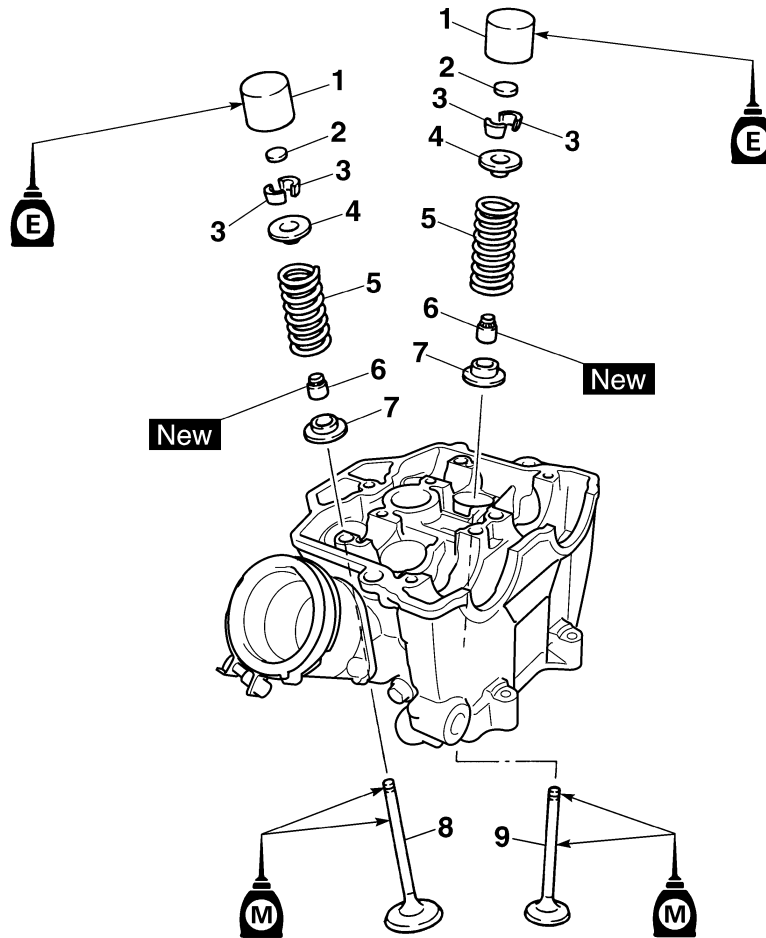
	Bolt "5", "6" 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
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VALVES AND VALVE SPRINGS

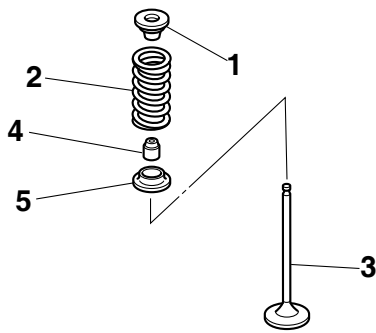
VALVES AND VALVE SPRINGS

Removing the valves and valve springs



Order	Part name	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-19.
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	
			For installation, reverse the removal procedure.

VALVES AND VALVE SPRINGS



CHECKING THE VALVES AND VALVE GUIDES

- 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"



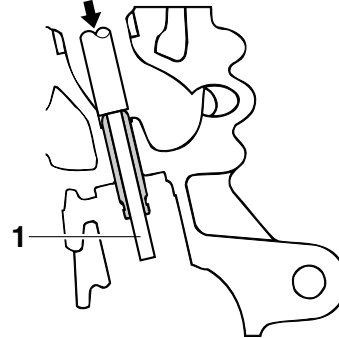
Valve-stem-to-valve-guide clearance (intake)
0.010–0.037 mm (0.0004–0.0015 in)
Limit
0.080 mm (0.0032 in)
Valve-stem-to-valve-guide clearance (exhaust)
0.020–0.047 mm (0.0008–0.0019 in)
Limit
0.100 mm (0.0039 in)

- 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.

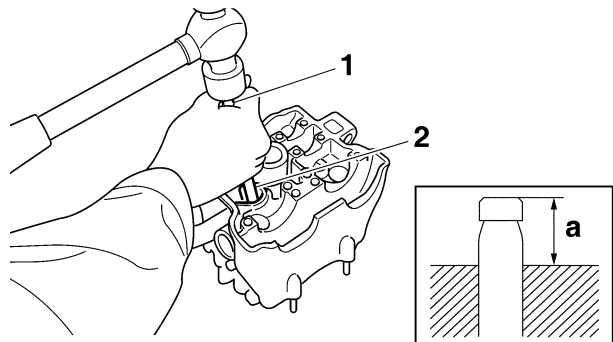
- Remove the valve guide with the valve guide remover "1".



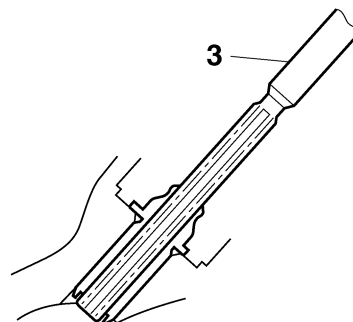
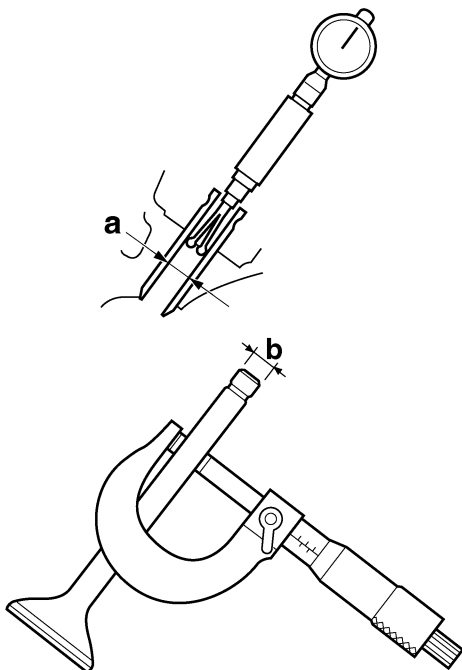
- Install the new valve guide with the valve guide installer "2" and the valve guide remover "1".



Valve guide installation height "a"
Intake
15.1–15.5 mm (0.59–0.61 in)
Exhaust
12.2–12.6 mm (0.48–0.50 in)



- 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.



VALVES AND VALVE SPRINGS

TIP

After replacing the valve guide, reface the valve seat.



Valve guide remover & installer set (ø5.5)
90890-04016
Valve guide remover (5.5 mm)
YM-01122
Valve guide installer (5.5 mm)
YM-04015
Valve guide reamer (5.5 mm)
YM-01196



3. Eliminate:

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

4. Check:

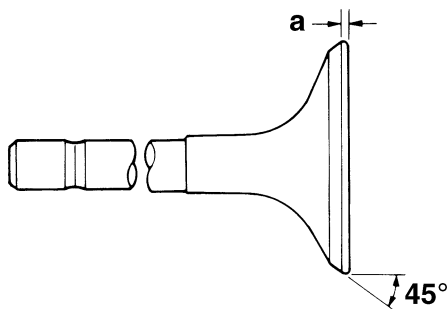
- Valve face
Pitting/wear → Grind the valve face.
- Valve stem end
Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.

5. Measure:

- Valve margin thickness D "a"
Out of specification → Replace the valve.



Valve margin thickness D (intake)
1.20 mm (0.0472 in)
Valve margin thickness D (exhaust)
0.85 mm (0.0335 in)



6. Measure:

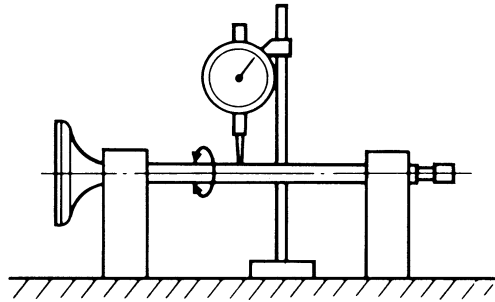
- Valve stem runout
Out of specification → Replace the valve.

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
0.010 mm (0.0004 in)



CHECKING THE VALVE SEATS

1. Eliminate:

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

2. Check:

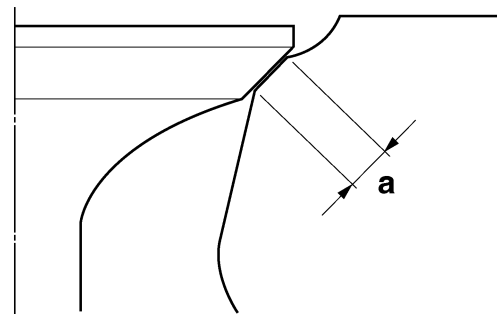
- Valve seat
Pitting/wear → Replace the cylinder head.

3. Measure:

- Valve seat width C "a"
Out of specification → Replace the cylinder head.

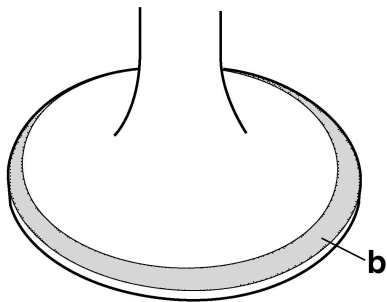


Valve seat width C (intake)
0.90–1.10 mm (0.0354–0.0433 in)
Valve seat width C (exhaust)
0.90–1.10 mm (0.0354–0.0433 in)



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

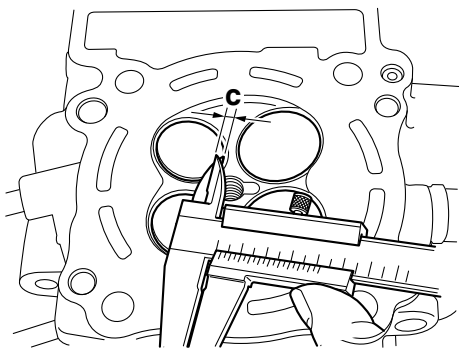
VALVES AND VALVE SPRINGS



- b. Install the valve into the cylinder head.
- c. Press the valve through the valve guide and onto the valve seat to make a clear impression.
- d. Measure the valve seat width "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

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.

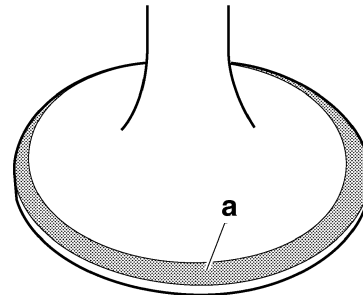
TIP

- 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.

NOTICE

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

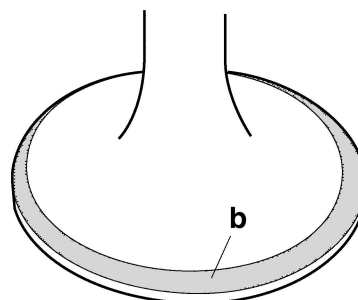


- b. Apply molybdenum disulfide oil onto the valve stem.
- c. Install the valve into the cylinder head.
- d. Turn the valve until the valve face and the valve seat are evenly polished, then clean off all of the lapping compound.

TIP

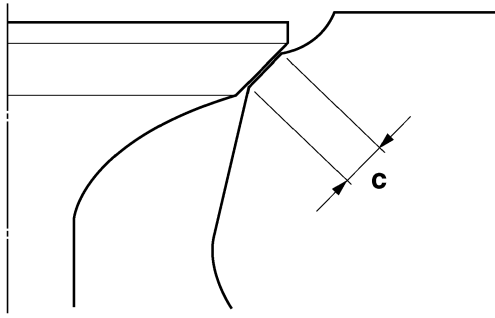
While turning the valve lapper, tap and lap the valve seat.

- 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 Mechanic's blueing dye (Dykem) "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 width "c" again. If the valve seat width is out of specification, reface and lap the valve seat.

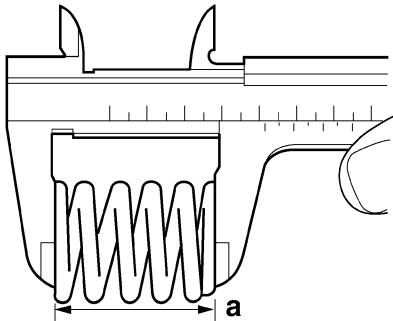
VALVES AND VALVE SPRINGS



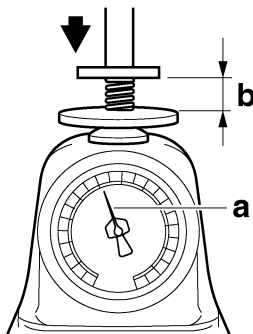
CHECKING THE VALVE SPRINGS

1. Measure:
 - Valve spring free length "a"
 - Out of specification → Replace the valve spring.

	Free length (intake)	40.76 mm (1.60 in)
	Limit	39.76 mm (1.57 in)
	Free length (exhaust)	37.01 mm (1.46 in)
	Limit	36.01 mm (1.42 in)



2. Measure:
 - Compressed valve spring force "a"
 - Out of specification → Replace the valve spring.



b. Installed length

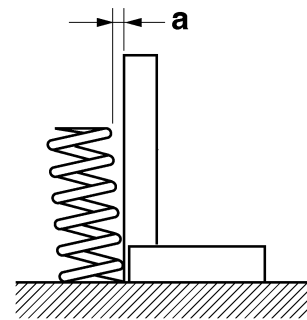


Installed compression spring force (intake)
178.00–204.00 N (18.15–20.80 kgf, 40.01–45.86 lbf)
Installed compression spring force (exhaust)
124.00–142.00 N (12.64–14.48 kgf, 27.88–31.92 lbf)
Installed length (intake)
34.78 mm (1.37 in)
Installed length (exhaust)
30.83 mm (1.21 in)

3. Measure:
 - Valve spring tilt "a"
 - Out of specification → Replace the valve spring.

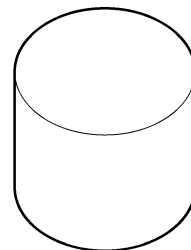


Spring tilt (intake)
2.5 °/1.8 mm (2.5 °/0.07 in)
Spring tilt (exhaust)
2.5 °/1.6 mm (2.5 °/0.06 in)



CHECKING THE VALVE LIFTERS

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

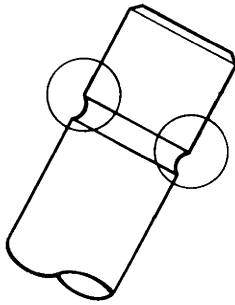


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VALVES AND VALVE SPRINGS

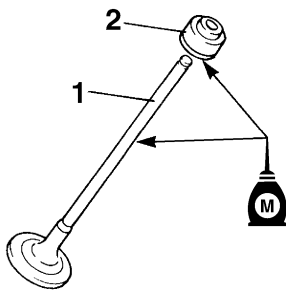
INSTALLING THE VALVES

- Clean:
 - Valve stem end



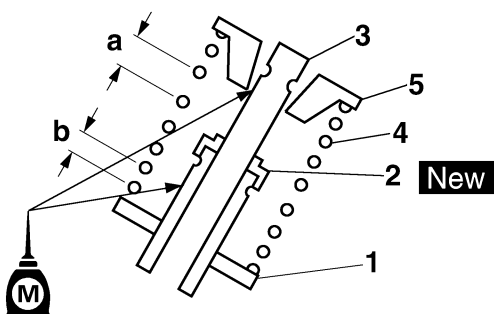
- Lubricate:
 - Valve stem "1"
 - Valve stem seal "2"

	Recommended lubricant Molybdenum disulfide oil
---	--



- 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.



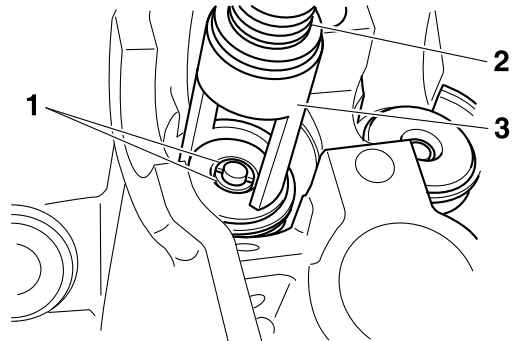
b. Smaller pitch

- 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 adapter "3".

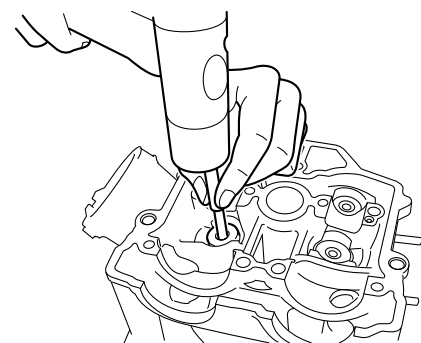
	Valve spring compressor 90890-04019 YM-04019 Valve spring compressor adapter 22 mm 90890-04108 YM-04108
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- To fasten the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

NOTICE _____

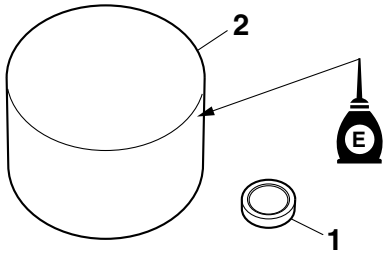
Hitting the valve tip with excessive force could damage the valve.



VALVES AND VALVE SPRINGS

6. Lubricate:

- Adjusting pad “1”
- Valve lifter “2”



7. Install:

- Adjusting pad
- Valve lifter

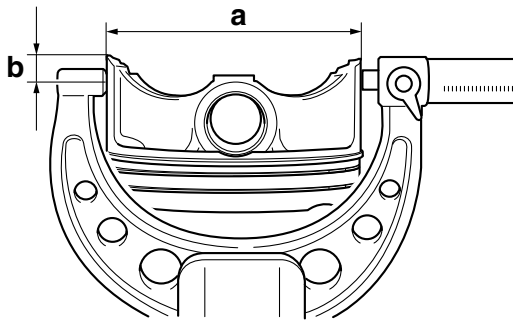
TIP

- 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.
-

CYLINDER AND PISTON

- 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 D “a” at the measurement position H “b” with the micrometer.

	Diameter D
	96.955–96.970 mm (3.8171–3.8177 in)
	Measurement position H
	9.0 mm (0.35 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.

$\text{Piston-to-cylinder clearance} = \text{Cylinder bore} - \text{Piston diameter}$

	Piston-to-cylinder clearance
	0.030–0.055 mm (0.0012–0.0022 in)
	Limit
	0.15 mm (0.006 in)

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



CHECKING THE PISTON RINGS

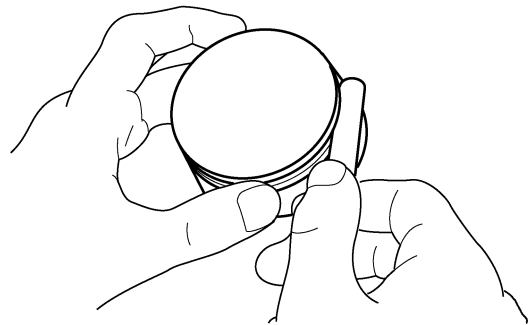
1. Measure:
- Piston ring side clearance
- Out of specification → Replace the piston and piston rings as a set.

TIP

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



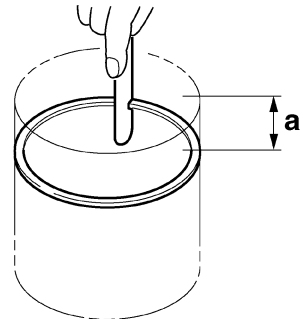
Ring side clearance
0.015–0.065 mm (0.0006–0.0026 in)
Limit
0.120 mm (0.0047 in)
2nd ring
0.020–0.060 mm (0.0008–0.0024 in)
Limit
0.120 mm (0.0047 in)



2. Install:
- Piston rings

TIP

Level the piston ring into the cylinder with the piston.




- a. 10 mm (0.39 in)

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


TIP

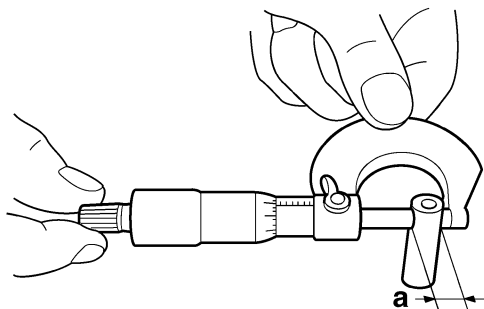
The oil ring expander’s end gap cannot be measured. If the oil ring rail’s gap is excessive, replace all three oil rings.

	Piston ring end gap
	Top ring
	End gap (installed)
	0.20–0.30 mm (0.0079–0.0118 in)
	Limit
	0.55 mm (0.0217 in)
End gap (installed)	
0.35–0.50 mm (0.0138–0.0197 in)	
Limit	
0.85 mm (0.0335 in)	
Oil ring	
End gap (installed)	
0.20–0.50 mm (0.0079–0.0197 in)	


CHECKING THE PISTON PIN

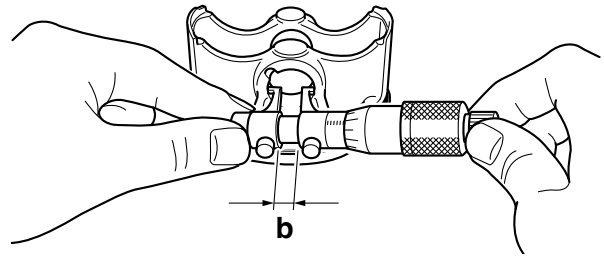
- Check:
 - Piston pin
Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.
- Measure:
 - Piston pin outside diameter “a”
Out of specification → Replace the piston pin.

	Piston pin outside diameter
	17.991–18.000 mm (0.7083–0.7087 in)
	Limit
17.971 mm (0.7075 in)	



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

	Piston pin bore inside diameter
	18.004–18.015 mm (0.7088–0.7093 in)
	Limit
18.045 mm (0.7104 in)	

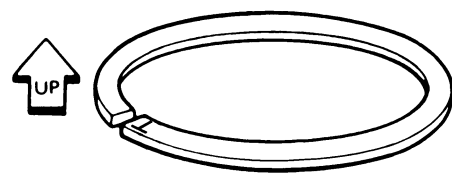
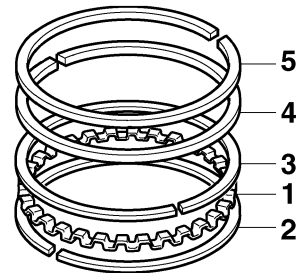


INSTALLING THE PISTON AND CYLINDER

- Install:
 - Oil ring expander “1”
 - Lower oil ring rail “2”
 - Upper oil ring rail “3”
 - 2nd ring “4”
 - Top ring “5”

TIP

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

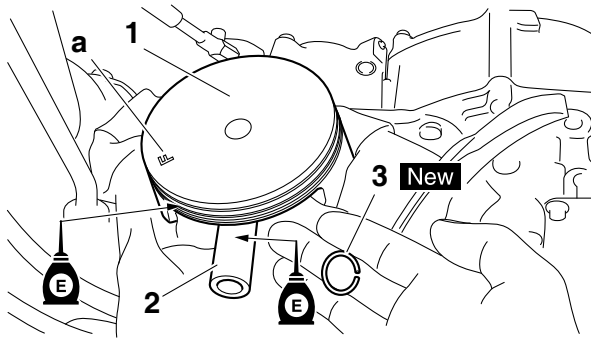


- Install:
 - Piston “1”
 - Piston pin “2”
 - Piston pin clip “3” **New**

TIP

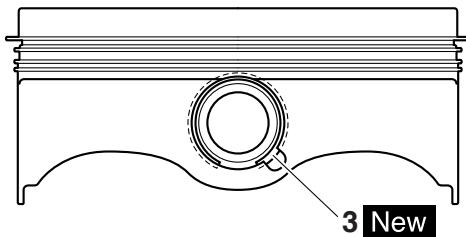
- Apply the engine oil to the piston pin.
- Install the piston with the F mark “a” on it pointing to its intake (front) side.
- Before installing the piston pin clip, cover the crankcase opening with a cloth to prevent the clip from falling into the crankcase.

CYLINDER AND PISTON



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.

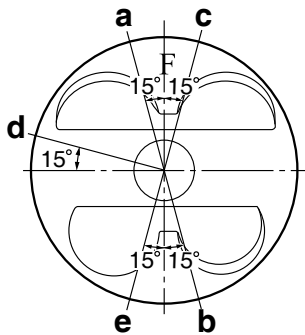


3. Lubricate:

- Piston
- Piston rings
- Cylinder

4. Offset:

- Piston ring end gap



- a. Top ring
- b. 2nd ring
- c. Upper oil ring rail
- d. Oil ring expander
- e. Lower oil ring rail

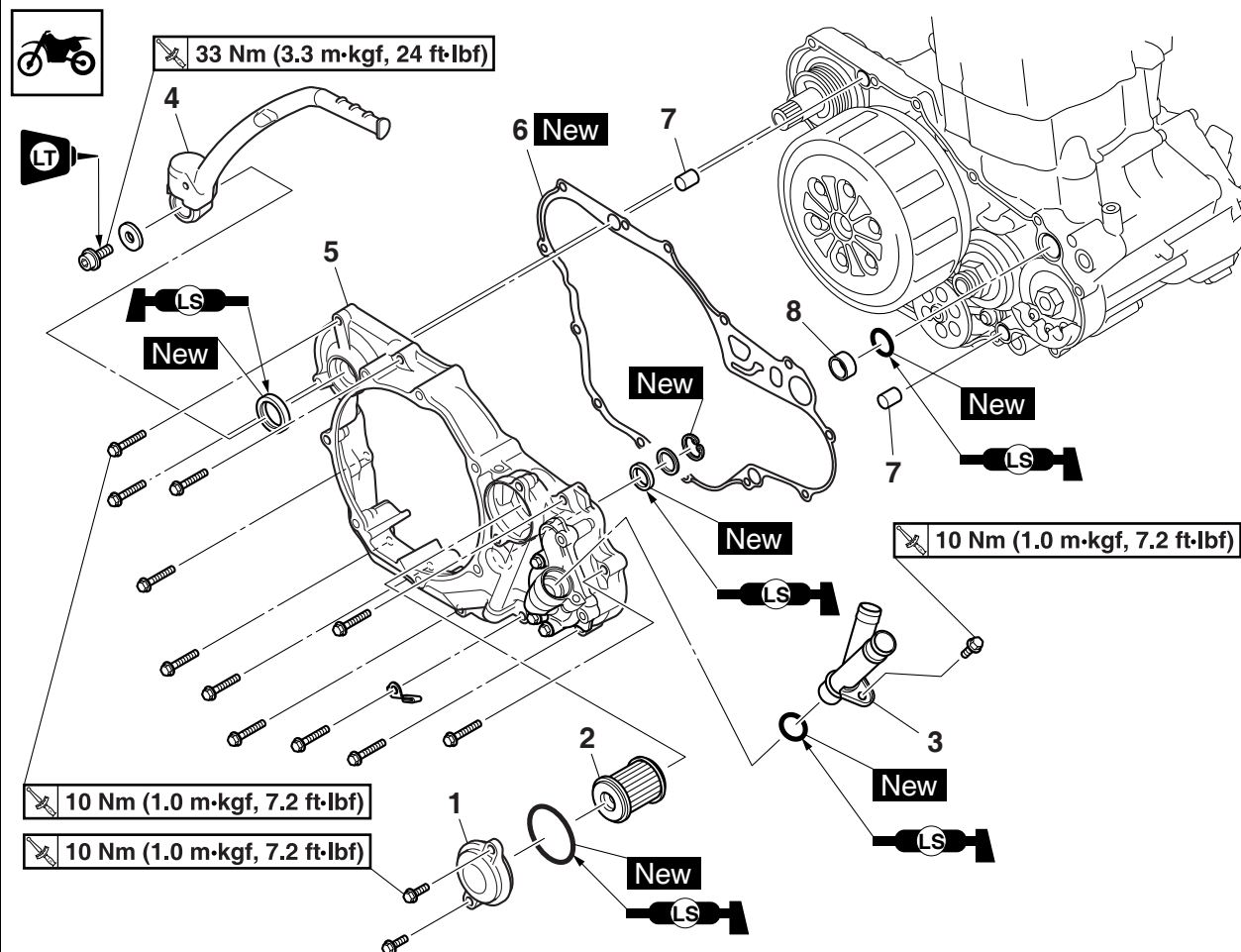
5. Install:

- Cylinder gasket **New**
- Dowel pin
- Cylinder



Cylinder bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

Removing the right crankcase cover



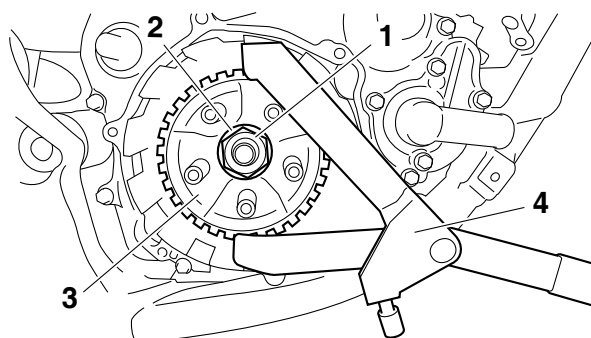
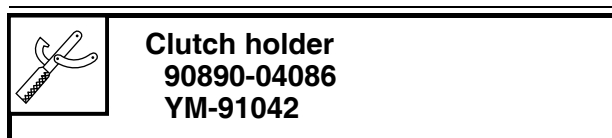
Order	Part name	Q'ty	Remarks
	Right engine guard		Refer to "ENGINE REMOVAL" on page 5-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-15.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-8.
	Brake pedal		Refer to "ENGINE REMOVAL" on page 5-1.
	Clutch cover		Refer to "CLUTCH" on page 5-37.
1	Oil filter element cover	1	
2	Oil filter element	1	
3	Radiator pipe 2	1	
4	Kickstarter lever	1	
5	Right crankcase cover	1	
6	Gaskets	1	
7	Dowel pin	2	
8	Collar	1	
			For installation, reverse the removal procedure.

REMOVING THE CLUTCH

1. 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.

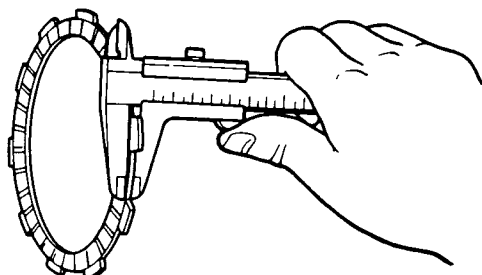
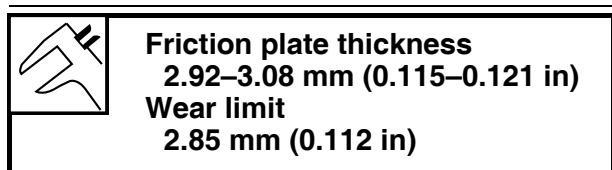


CHECKING THE FRICTION PLATES

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.

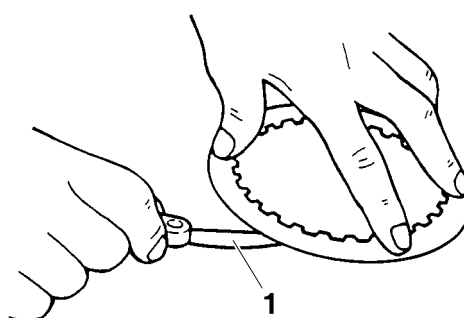
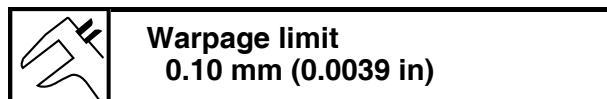
TIP

Measure it at four points on the friction plate.



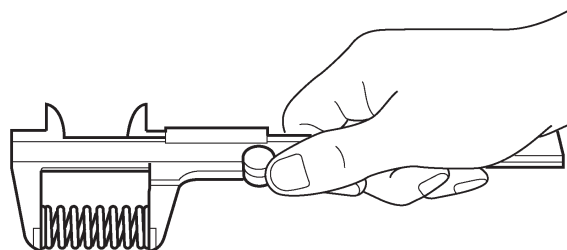
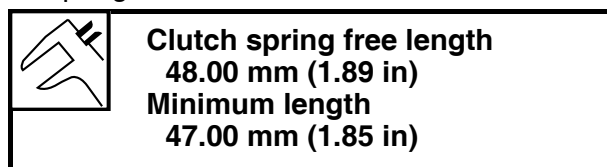
CHECKING THE CLUTCH PLATES

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



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.



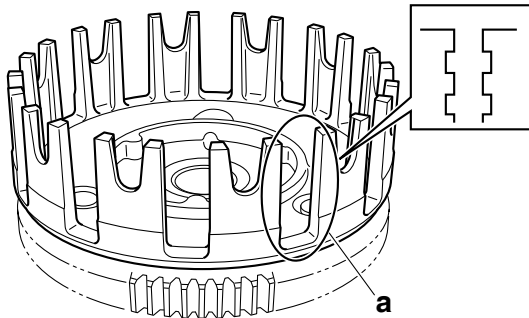
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CHECKING THE CLUTCH HOUSING

- Check:
 - Clutch housing dogs "a"
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.

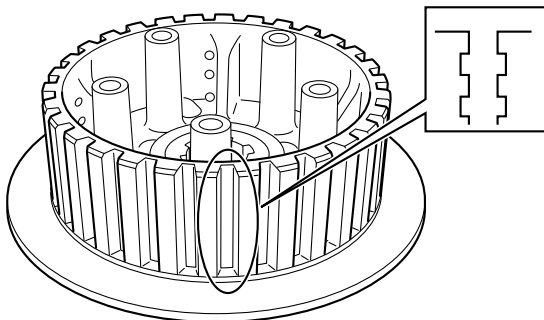


CHECKING THE CLUTCH BOSS

- Check:
 - Clutch boss splines
Damage/pitting/wear → Replace the clutch boss.

TIP

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

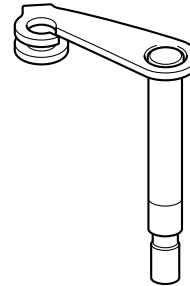


CHECKING THE PRESSURE PLATE

- Check:
 - Pressure plate
Crack/damage → Replace.

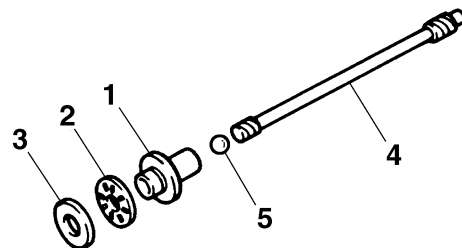
CHECKING THE PUSH LEVER SHAFT

- Check:
 - Push lever shaft
Wear/damage → Replace.



CHECKING THE CLUTCH PUSH RODS

- Check:
 - Push rod 1 "1"
 - Bearing "2"
 - Washer "3"
 - Push rod 2 "4"
 - Ball "5"
 - Cracks/damage/wear → Replace.



- Measure:
 - Push rod 2 bending limit
Out of specification → Replace.



Push rod bending limit
0.10 mm (0.0039 in)

CHECKING THE PRIMARY DRIVE GEAR

- 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.
- Check:
 - Primary-drive-gear-to-primary-driven-gear free play
Free play exists → Replace the primary drive and primary driven gears as a set.

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.

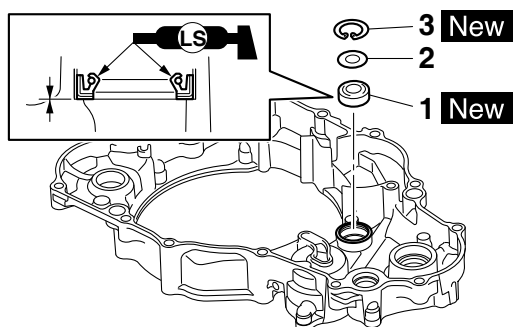
INSTALLING THE OIL SEAL

1. Install:

- Oil seal "1" **New**
- Washer "2"
- Circlip "3" **New**

TIP

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



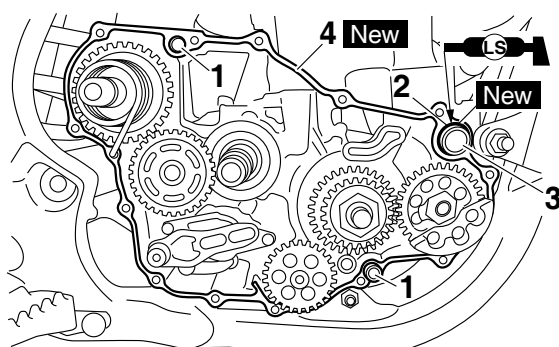
INSTALLING THE RIGHT CRANKCASE COVER

1. Install:

- Dowel pin "1"
- O-rings "2" **New**
- Collar "3"
- Gasket "4" **New**

TIP

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



2. Install:

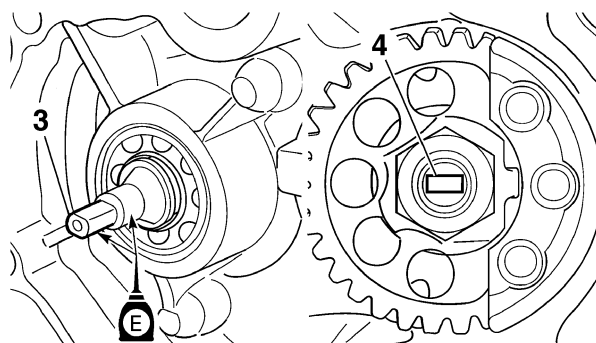
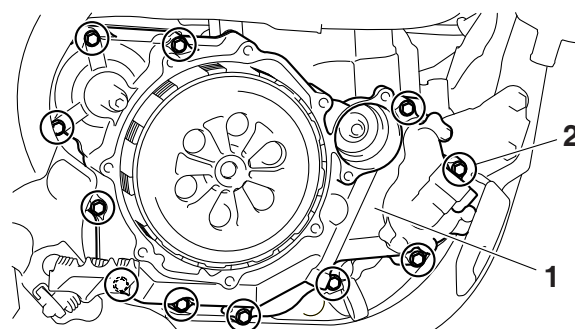
- Right crankcase cover "1"
- Right crankcase cover bolt "2"



Right crankcase cover bolt
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

TIP

- Apply the engine oil on the impeller shaft end.
- When installing the crankcase cover onto the crankcase, make sure that the impeller shaft end "3" aligns with the balancer end slot "4".
- Tighten the right crankcase cover bolts in stages and in a crisscross pattern.



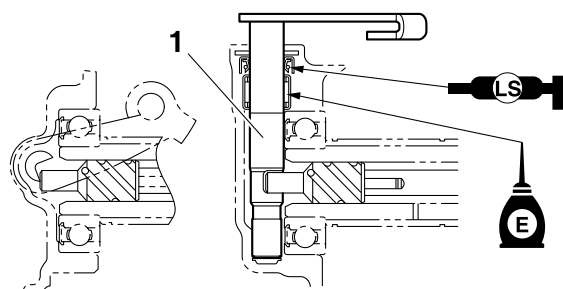
INSTALLING THE CLUTCH

1. Install:

- Push lever shaft "1"

TIP

- Apply the lithium soap base grease on the oil seal lip.
- Before installation, apply the engine oil to the push lever shaft sliding surface.

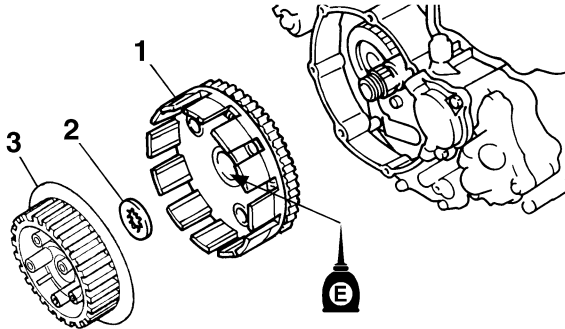


2. Install:

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

TIP

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



3. Install:

- Conical washer "1" **New**
- Clutch boss nut "2"



Clutch boss nut
75 Nm (7.5 m·kgf, 54 ft·lbf)

NOTICE

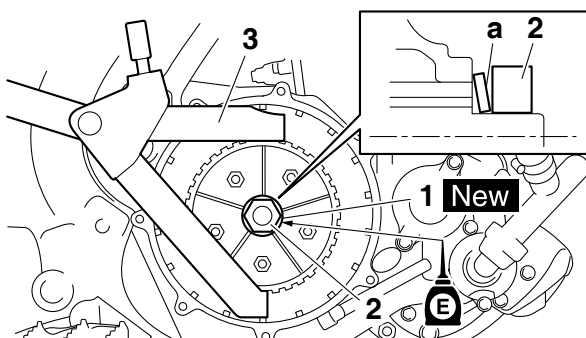
Make sure to tighten to specification; otherwise, it may damage the other part that is fastened together.

TIP

- Install the conical washer with its convex surface "a" outward.
- 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 holding tool "3" to hold the clutch boss.



Clutch holder
90890-04086
YM-91042

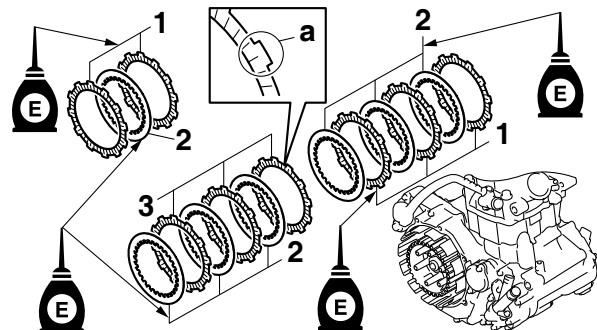


4. Install:

- Friction plate 1 "1"
- Clutch plate "2"
- Friction plate 2 "3"

TIP

- Install the clutch plates and friction plates alternately on the clutch boss, starting with a friction plate and ending with a friction plate.
- From the clutch boss side, install the friction plates in order: friction plate 1 × 3, friction plate 2 (identification color: purple) × 3, and friction plate 1 × 2.
- Apply the engine oil on the friction plates and clutch plates.



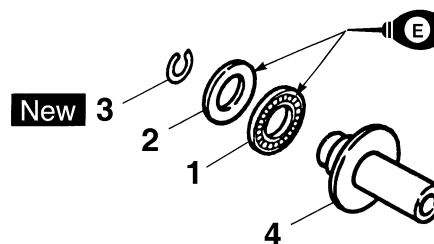
a. Identification color

5. Install:

- Bearing "1"
- Washer "2"
- Circlip "3" **New**
To push rod 1 "4".

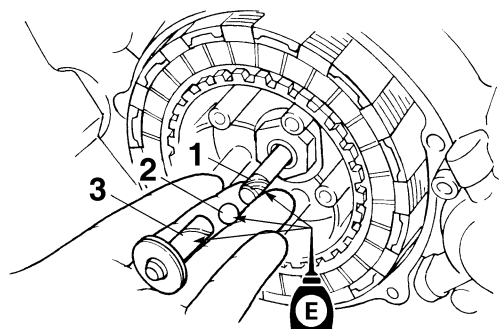
TIP

Apply the engine oil on the bearing and washer.

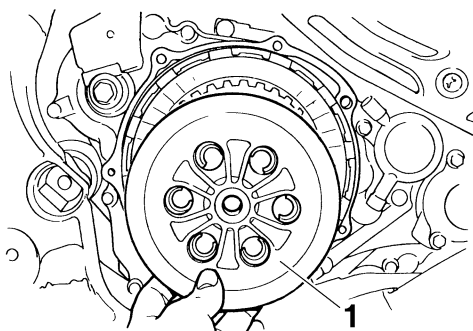


6. Install:
- Push rod 2 "1"
 - Ball "2"
 - Push rod 1 "3"


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



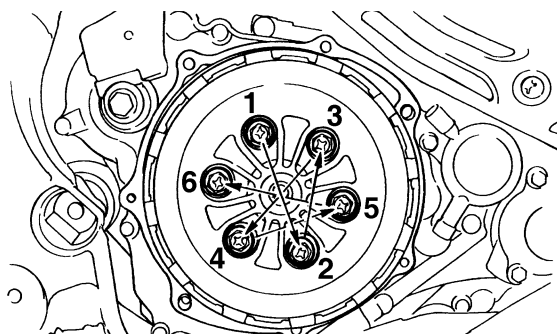
7. Install:
- Pressure plate "1"



8. Install:
- Clutch spring
 - Clutch spring bolt

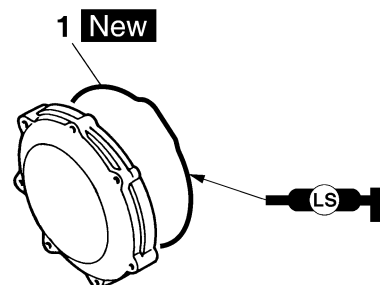
	Clutch spring bolt 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
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TIP _____
Tighten the bolts in stages and in a crisscross pattern.




9. Install:
- O-ring "1" **New**

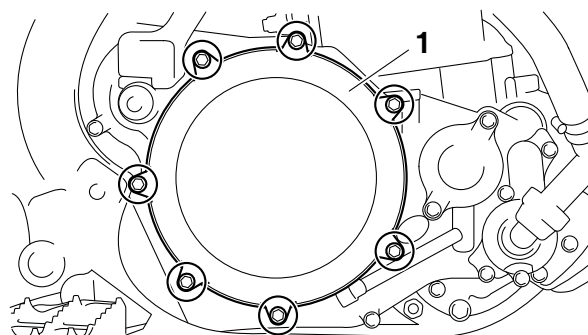
TIP _____
Apply the lithium-soap-based grease to the O-ring.



10. Install:
- Clutch cover "1"
 - Clutch cover bolt

	Clutch cover bolt 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
---	---

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



INSTALLING THE KICKSTARTER LEVER

1. Install:

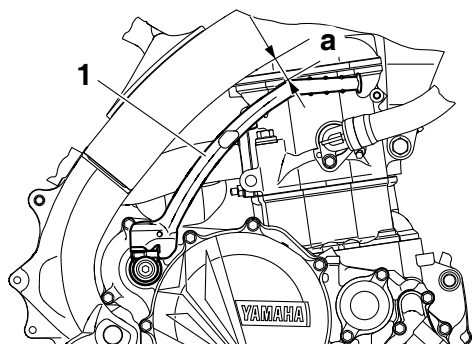
- Kickstarter lever “1”
- Washers
- Bolt (kickstarter lever)



Bolt (kickstarter lever)
33 Nm (3.3 m·kgf, 24 ft·lbf)

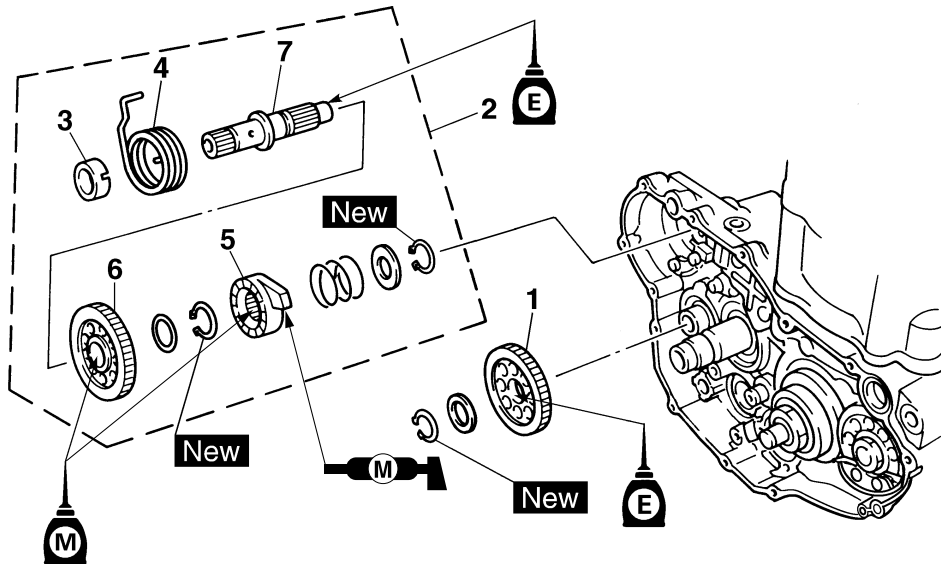
TIP

Install so that there is a clearance “a” of 5 mm (0.2 in) or more between the kickstarter lever and the frame and that the kickstarter lever does not contact the right crankcase cover when it is pulled.



KICKSTATER

Removing the kick shaft



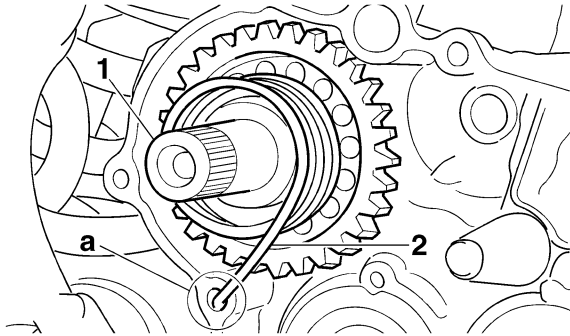
Order	Part name	Q'ty	Remarks
	Primary driven gear		Refer to "CLUTCH" on page 5-37.
1	Kick idle gear	1	
2	Kick shaft assembly	1	
3	Spring guide	1	
4	Torsion spring	1	
5	Ratchet wheel	1	
6	Kick gear	1	
7	Kick shaft	1	
			For installation, reverse the removal procedure.

REMOVING THE KICK SHAFT ASSEMBLY

- Remove:
 - Kick shaft assembly "1"

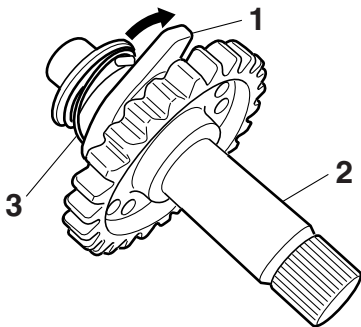
TIP

Unhook the torsion spring "2" from the hole "a" in the crankcase.



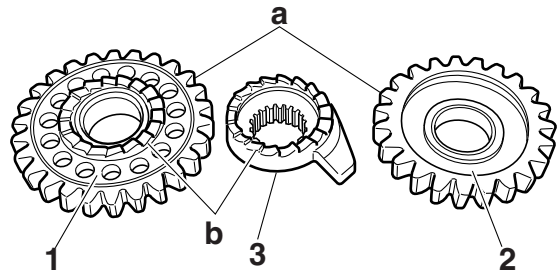
CHECKING THE KICK SHAFT AND RATCHET WHEEL

- Check:
 - Ratchet wheel "1" smooth movement
Unsmooth movement → Replace.
 - Kick shaft "2"
Wear/damage → Replace the kick shaft assembly.
 - Spring "3"
Broken → Replace.



CHECKING THE KICK GEAR, KICK IDLE GEAR AND RATCHET WHEEL

- Check:
 - Kick gear "1"
Wear/damage → Replace the kick shaft assembly.
 - Kick idle gear "2"
 - Ratchet wheel "3"
 - Gear teeth "a"
 - Ratchet teeth "b"
Wear/damage → Replace.

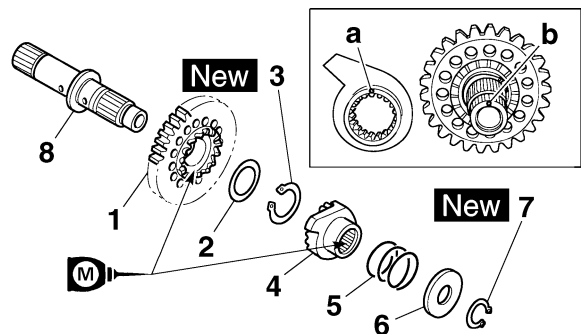


INSTALLING THE KICK SHAFT ASSEMBLY

- Install:
 - Kick gear "1"
 - Washer "2"
 - Circlip "3" **New**
 - Ratchet wheel "4"
 - Spring "5"
 - Washer "6"
 - Circlip "7" **New**
(to the kick shaft "8")

TIP

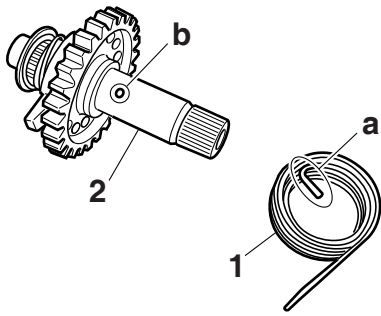
- Apply molybdenum disulfide oil to the inner circumferences of the kick gear and ratchet wheel.
- Align the punch mark "a" on the ratchet wheel with the punch mark "b" on the kick shaft.



- Install:
 - Torsion spring "1"
(to the kick shaft "2")

TIP

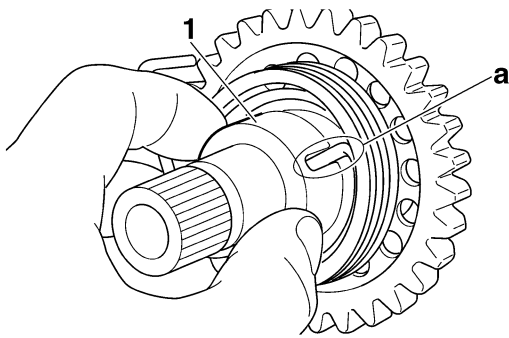
Make sure the stopper "a" of the torsion spring fits into the hole "b" on the kick shaft.



3. Install:
 • Spring guide "1"

TIP

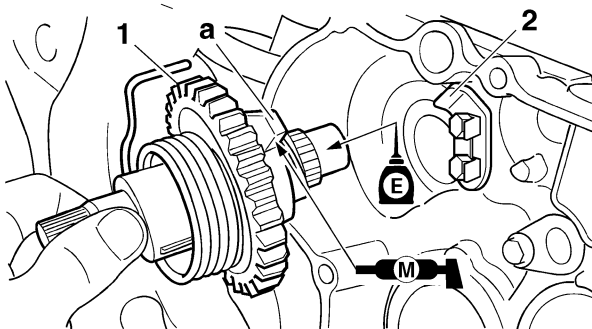
Slide the spring guide into the kick shaft, make sure the groove "a" in the spring guide fits on the stopper of the torsion spring.



4. Install:
 • Kick shaft assembly "1"

TIP

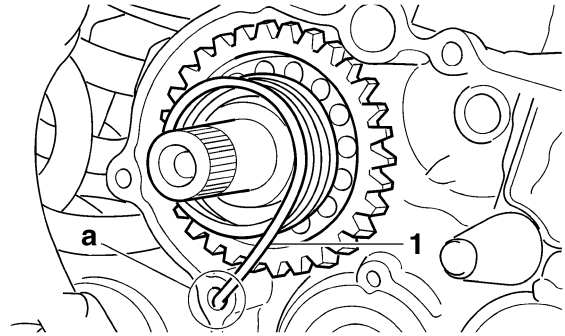
- Before installation, apply molybdenum disulfide grease to the contacting surfaces of the kick shaft ratchet wheel guide "2" and the kick shaft stopper "a".
- Apply the engine oil on the kick shaft.
- Slide the kick shaft assembly into the crankcase and make sure the kick shaft stopper "a" fits into the kick shaft ratchet wheel guide.



5. Install:
 • Torsion spring "1"

TIP

Turn the torsion spring clockwise and hook into the proper hole "a" in the crankcase.

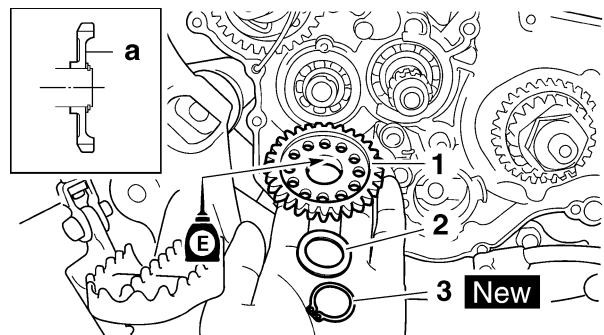


INSTALLING THE KICK IDLE GEAR

1. Install:
 • Kick idle gear "1"
 • Washer "2"
 • Circlip "3" **New**

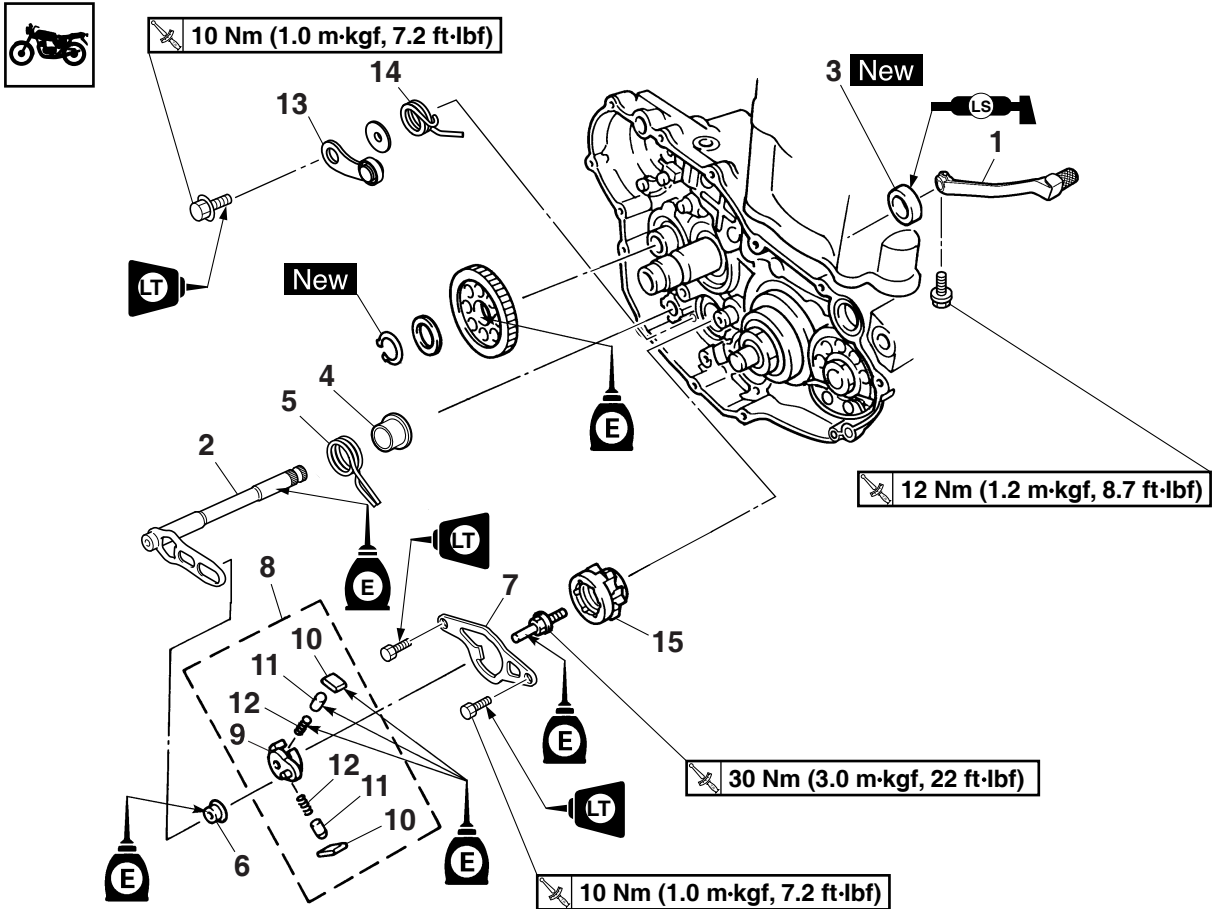
TIP

- Apply the engine oil on the kick idle gear inner circumference.
- Install the kick idle gear with its depressed side "a" toward you.



SHIFT SHAFT

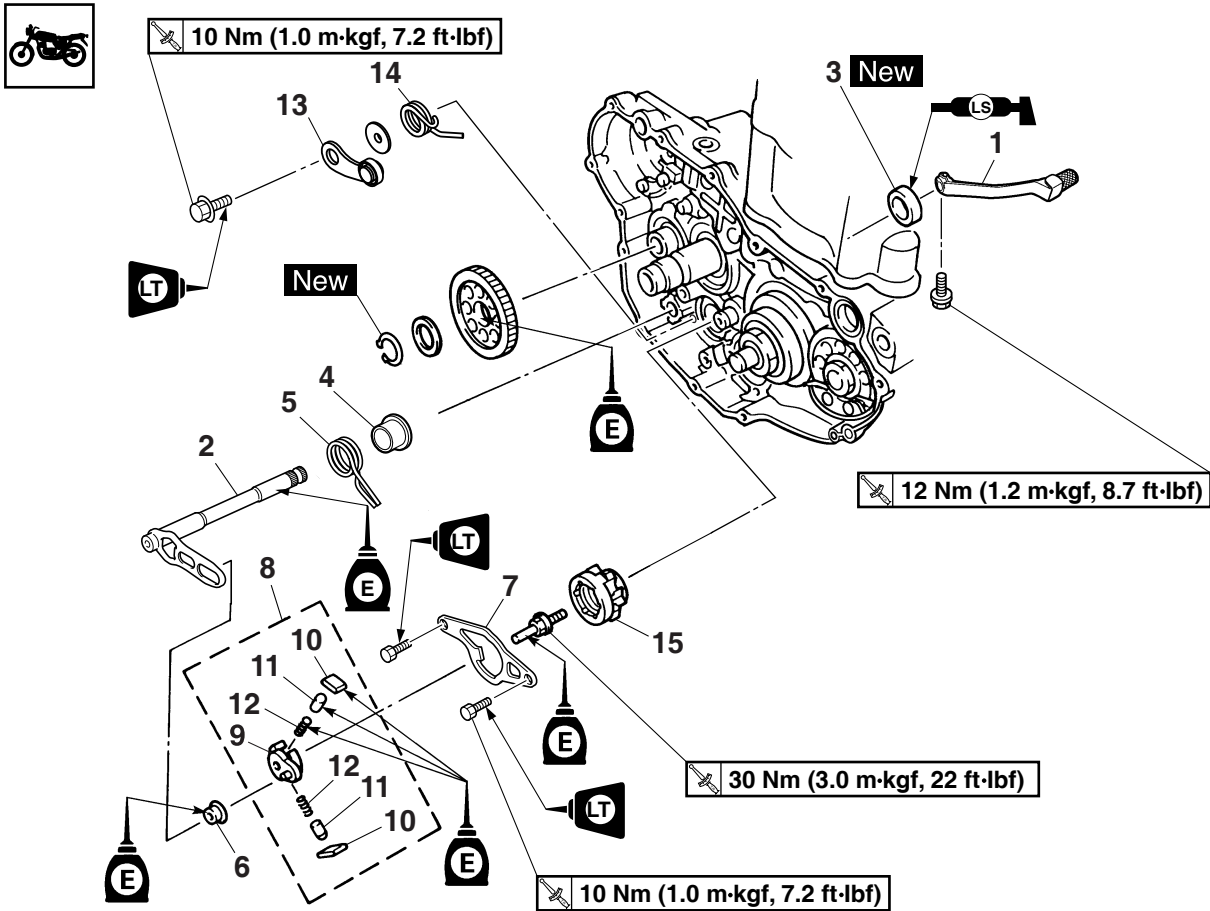
Removing the shift shaft and stopper lever



Order	Part name	Q'ty	Remarks
	Primary driven gear		Refer to "CLUTCH" on page 5-37.
1	Shift pedal	1	
2	Shift shaft	1	
3	Oil seals	1	
4	Collars	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	

SHIFT SHAFT

Removing the shift shaft and stopper lever



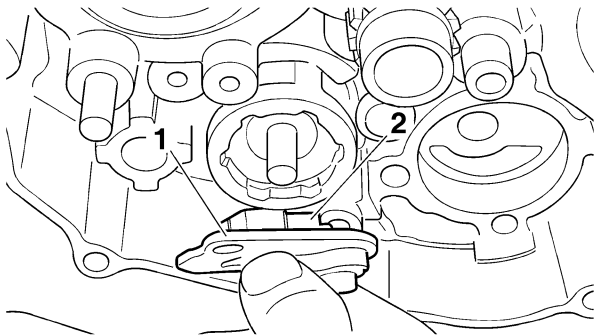
Order	Part name	Q'ty	Remarks
14	Stopper lever spring	1	
15	Segment	1	
			For installation, reverse the removal procedure.

REMOVING THE SHIFT GUIDE AND SHIFT LEVER ASSEMBLY

- Remove:
 - Bolt (shift guide)
 - Shift guide "1"
 - Shift lever assembly "2"

TIP

Make sure that the shift lever assembly is removed together with the shift guide.



REMOVING THE SEGMENT

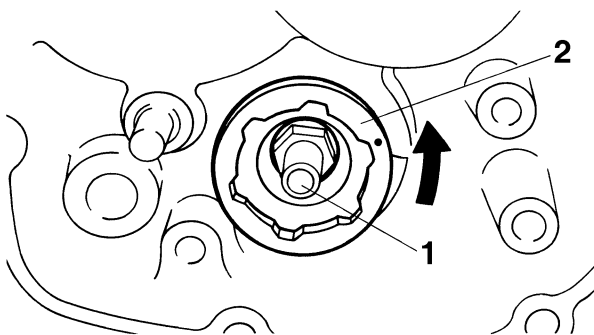
- Remove:
 - Bolt (segment) "1"
 - Segment "2"

TIP

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

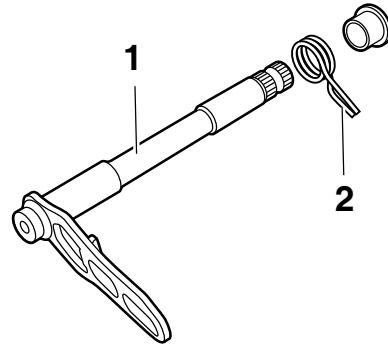
NOTICE

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.



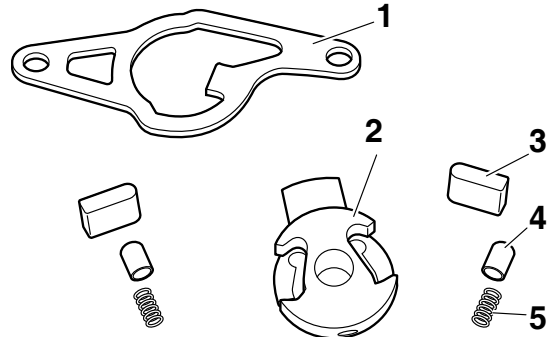
CHECKING THE SHIFT SHAFT

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



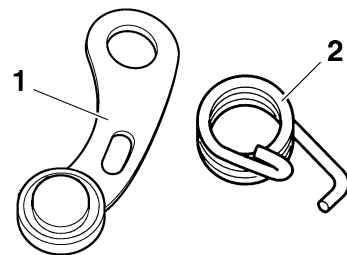
CHECKING THE SHIFT GUIDE AND SHIFT LEVER ASSEMBLY

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



CHECKING THE STOPPER LEVER

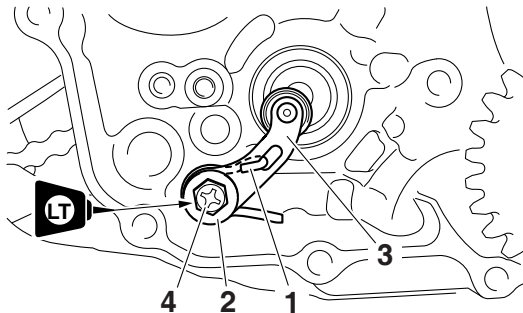
- Check:
 - Stopper lever "1"
Wear/damage → Replace.
 - Torsion spring "2"
Broken → Replace.



INSTALLING THE STOPPER LEVER

1. Install:

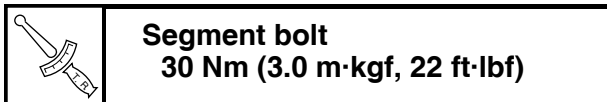
- Torsion spring "1"
- Collar "2"
- Stopper lever "3"
- Bolt (stopper lever) "4"



INSTALLING THE SEGMENT

1. Install:

- Segment "1"
- Segment bolt

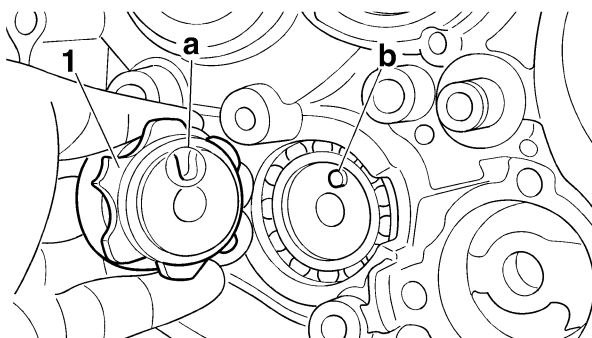


TIP

- Align the notch "a" on the segment with the pin "b" on the shift cam.
- With the stopper lever pushed down, install the segment.

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.



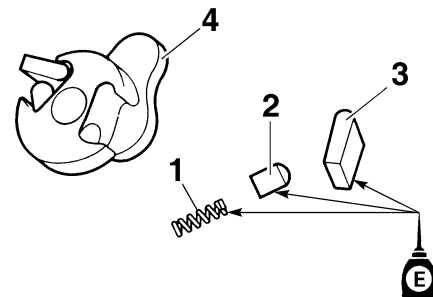
INSTALLING THE SHIFT GUIDE AND SHIFT LEVER ASSEMBLY

1. Install:

- Spring "1"
 - Pawl pin "2"
 - Pawl "3"
- (to the shift lever "4")

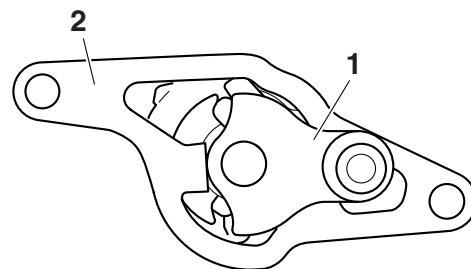
TIP

Apply the engine oil on the spring, pawl pin and pawl.



2. Install:

- Shift lever assembly "1"
- (to the shift guide "2")

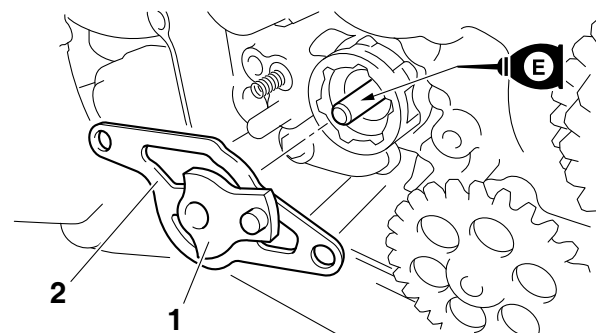


3. Install:

- Shift lever assembly "1"
- Shift guide "2"

TIP

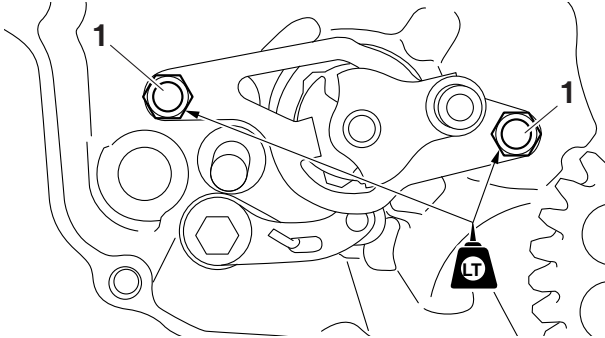
- The shift lever assembly is installed at the same time as the shift guide.
- Apply the engine oil on the segment bolt shaft.



SHIFT SHAFT

4. Tighten:

- Shift guide bolt "1"



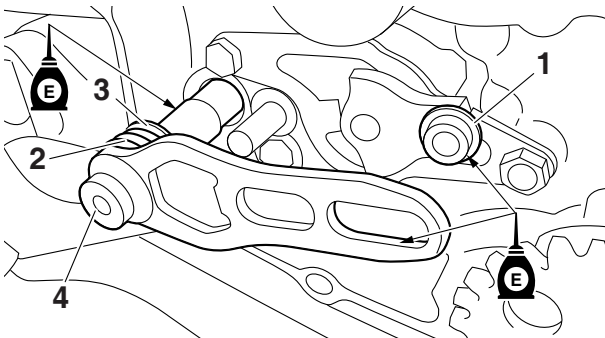
INSTALLING THE SHIFT SHAFT

1. Install:

- Roller "1"
- Shift shaft spring "2" (to shift shaft)
- Collar "3" (to shift shaft)
- Shift shaft "4"

TIP

Apply the engine oil on the roller and shift shaft.



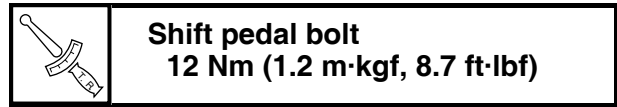
2. Install:

- Oil seal **New**

INSTALLING THE SHIFT PEDAL

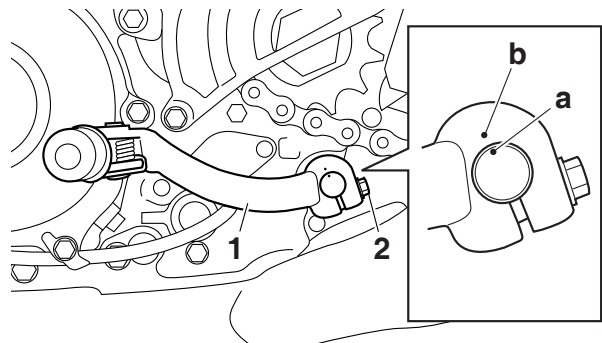
1. Install:

- Shift pedal "1"
- Shift pedal bolt "2"



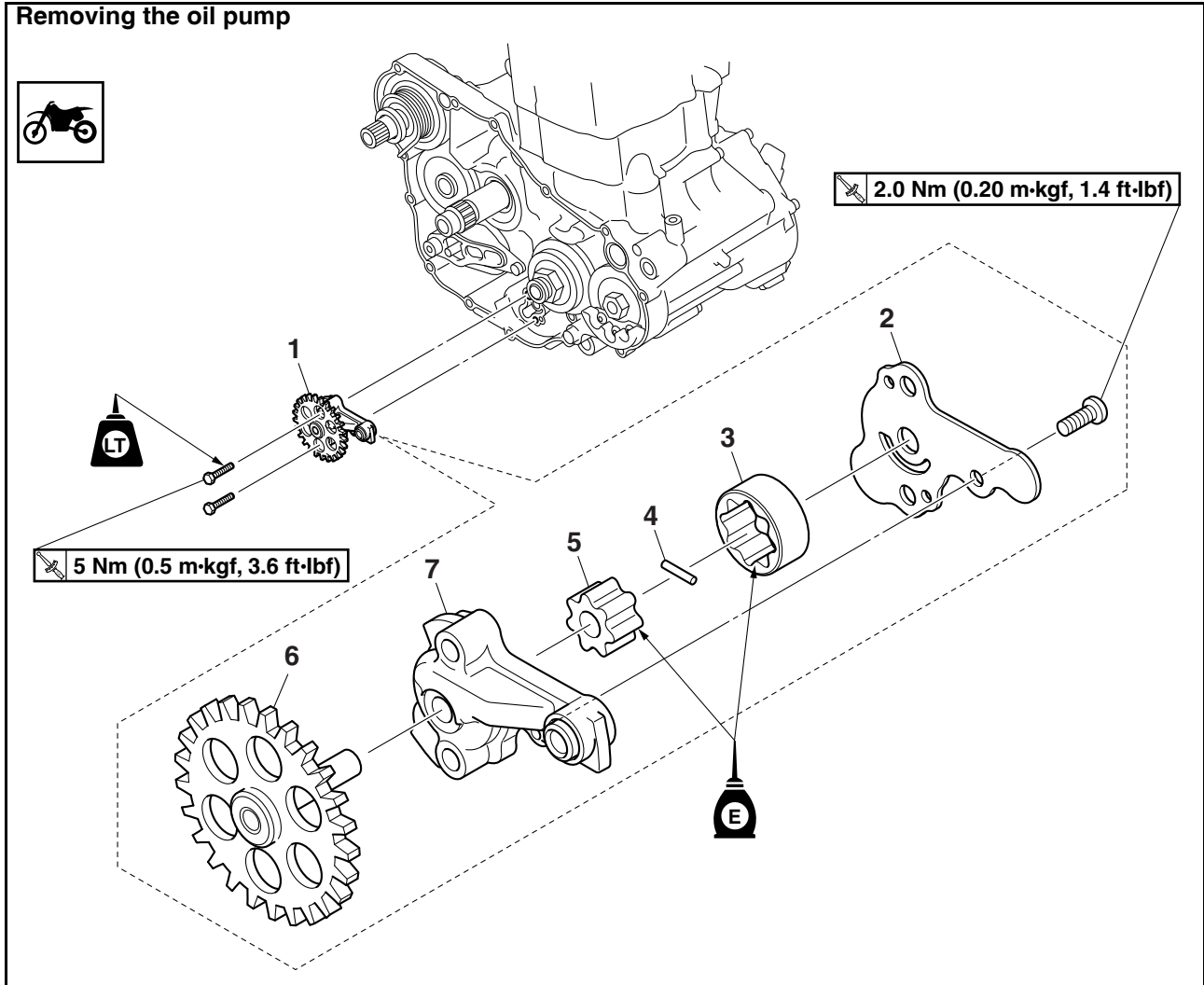
TIP

Align the punch mark "a" on the shift shaft with the punch mark "b" in the shift pedal.



OIL PUMP AND BALANCER GEAR

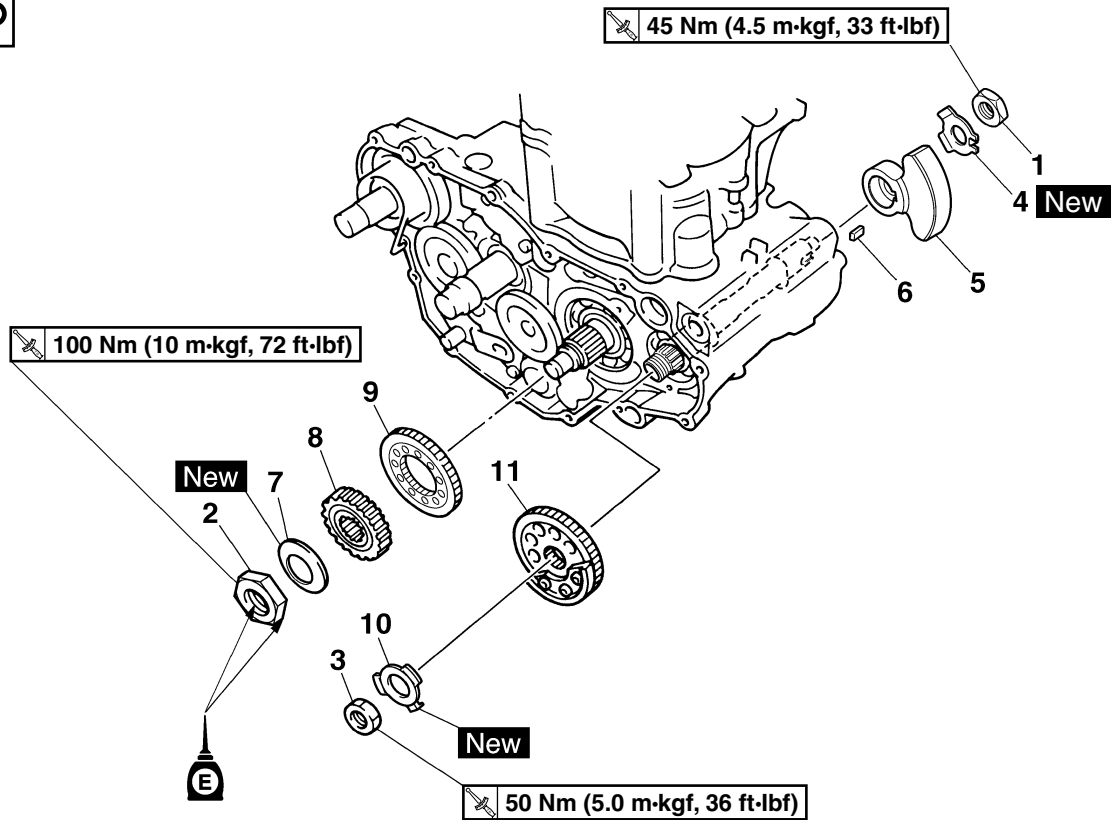
OIL PUMP AND BALANCER GEAR



Order	Part name	Q'ty	Remarks
	Primary driven gear		Refer to "CLUTCH" on page 5-37.
	Right crankcase cover		Refer to "CLUTCH" on page 5-37.
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	Rotor housing	1	
			For installation, reverse the removal procedure.

OIL PUMP AND BALANCER GEAR

Removing the balancer



Order	Part name	Q'ty	Remarks
	Primary driven gear		Refer to "CLUTCH" on page 5-37.
	Right crankcase cover		Refer to "CLUTCH" on page 5-37.
	Stator		Refer to "AC MAGNETO" on page 5-59.
1	Nut (balancer)	1	
2	Nut (primary drive gear)	1	
3	Nut (balancer shaft driven gear)	1	
4	Lock washer	1	
5	Balancer	1	
6	Straight key	1	
7	Conical washer	1	
8	Primary drive gear	1	
9	Balancer shaft drive gear	1	
10	Lock washer	1	
11	Balancer weight gear	1	
			For installation, reverse the removal procedure.

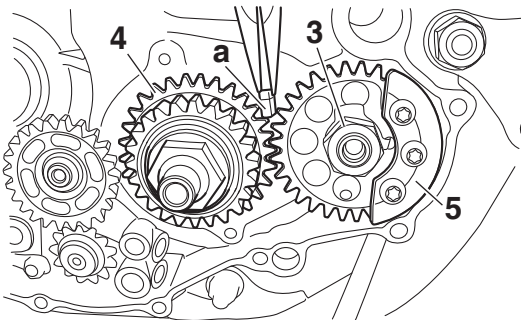
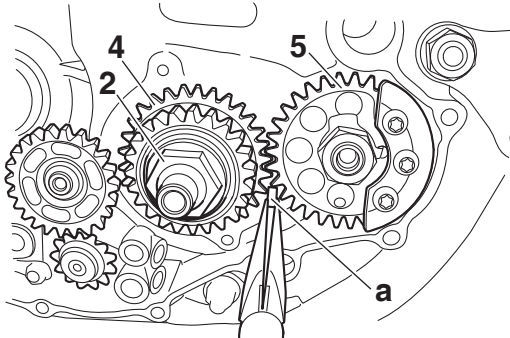
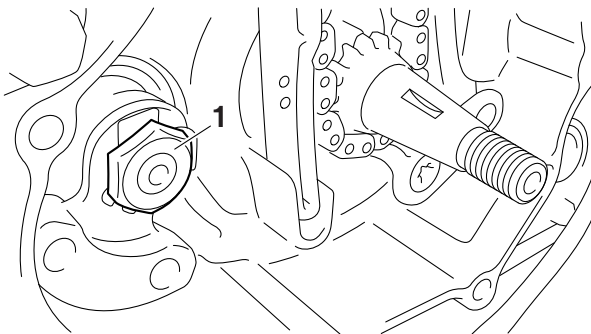
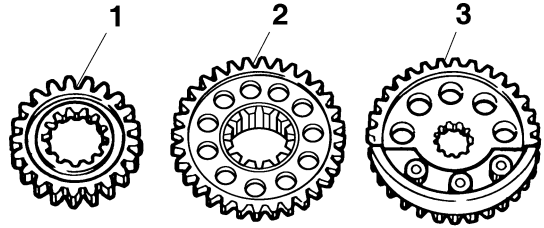
OIL PUMP AND BALANCER GEAR

REMOVING THE BALANCER

1. Straighten the lock washer tab.
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".

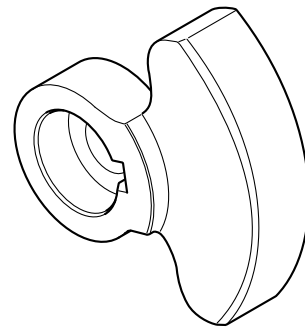


CHECKING THE PRIMARY DRIVE GEAR, BALANCER SHAFT DRIVE GEAR, AND BALANCER WEIGHT GEAR

1. Check:
 - Primary drive gear "1"
 - Balancer shaft drive gear "2"
 - Balancer weight gear "3"
 Wear/damage → Replace.

CHECKING THE BALANCER

1. Check:
 - Balancer
 Crack/damage → Replace.



CHECKING THE OIL PUMP

1. Check:
 - Oil pump drive gear
 - Oil pump driven gear
 - Oil pump housing
 - Oil pump housing cover
 Cracks/damage/wear → Replace the defective part(s).
2. Measure:
 - Inner-rotor-to-outer-rotor-tip clearance "a"
 - Outer-rotor-to-oil-pump-housing clearance "b"
 - Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance "c"
 Out of specification → Replace the oil pump.



Inner-rotor-to-outer-rotor-tip clearance

Less than
0.150 mm (0.0059 in)

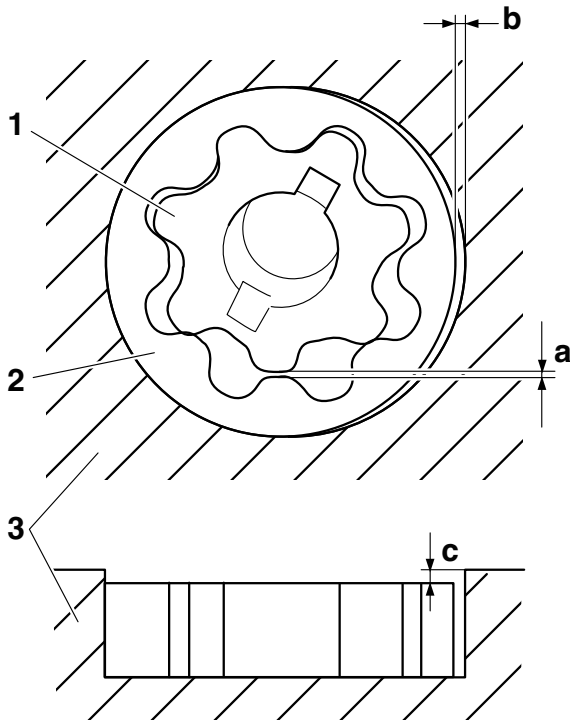
Outer-rotor-to-oil-pump-housing clearance

0.13–0.18 mm (0.0051–0.0071 in)

Oil-pump-housing-to-inner-and-outer-rotor clearance

0.06–0.11 mm (0.0024–0.0043 in)

OIL PUMP AND BALANCER GEAR



- 1. Inner rotor
- 2. Outer rotor
- 3. Oil pump housing

3. Check:

- Oil pump operation
- Rough movement → Repeat steps (1) and (2) or replace the defective part(s).

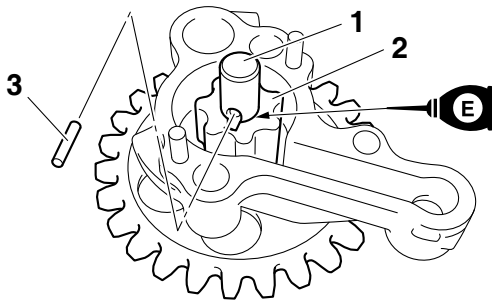
ASSEMBLING THE OIL PUMP

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.

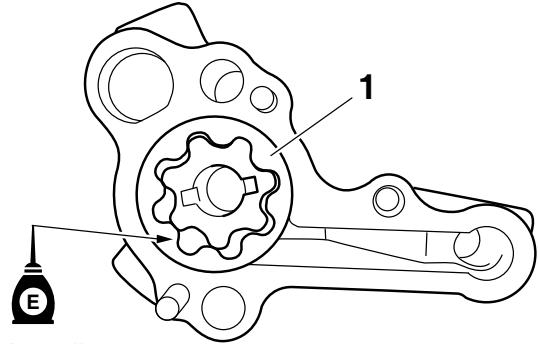


2. Install:

- Outer rotor "1"

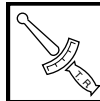
TIP

Apply the engine oil on the outer rotor.

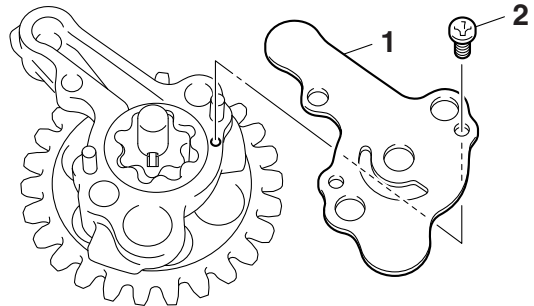


3. Install:

- Oil pump cover "1"
- Oil pump cover screw "2"



Oil pump cover screw
2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)



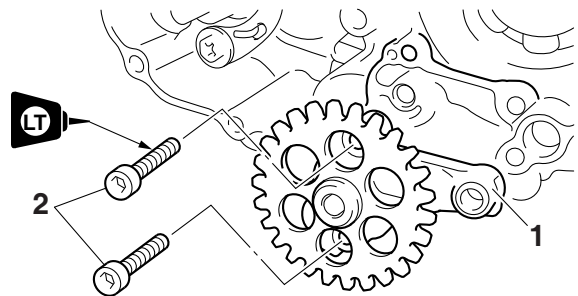
INSTALLING THE OIL PUMP AND BALANCER GEAR

1. Install:

- Oil pump assembly "1"
- Oil pump assembly bolt "2"



Oil pump assembly bolt
5 Nm (0.5 m·kgf, 3.6 ft·lbf)
LOCTITE®



OIL PUMP AND BALANCER GEAR

NOTICE

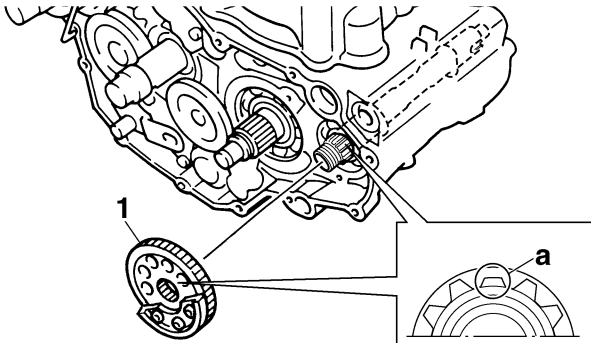
After tightening the bolts, make sure that the oil pump turns smoothly.

2. Install:

- Balancer weight gear "1"

TIP

Install the balancer weight gear and balancer shaft with their lower splines "a" aligning with each other.

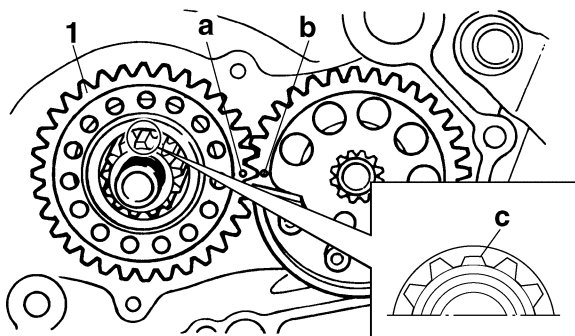


3. Install:

- Balancer drive gear "1"


TIP

- Align the punched mark "a" on the balancer drive gear with the punched mark "b" on the balancer weight gear.
- Install the balancer drive gear and crankshaft with the lower splines "c" aligning with each other.




4. Install:


- Lock washer "1" **New**
- Balancer weight gear nut "2"

	Balancer weight gear nut 50 Nm (5.0 m·kgf, 36 ft·lbf)
---	---

- Primary drive gear "3"
- Conical washer "4" **New**
- Primary drive gear nut "5"

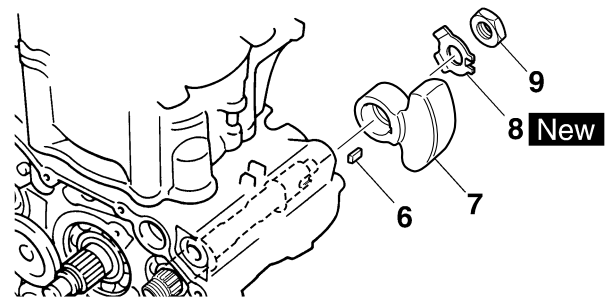
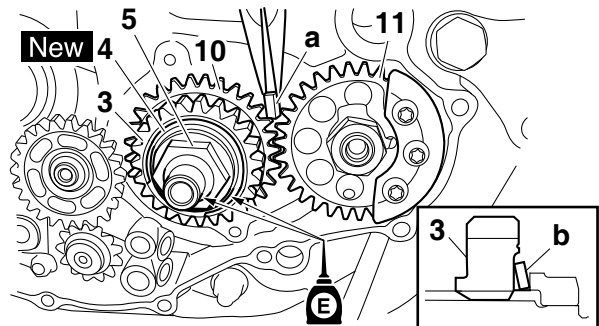
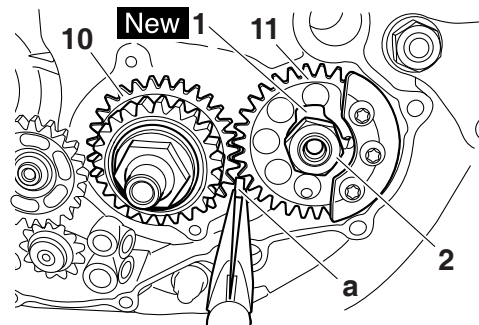
	Primary drive gear nut 100 Nm (10 m·kgf, 72 ft·lbf)
---	---

- Straight key "6"
- Balancer "7"
- Lock washer "8" **New**
- Balancer nut "9"

	Balancer nut 45 Nm (4.5 m·kgf, 33 ft·lbf)
---	---

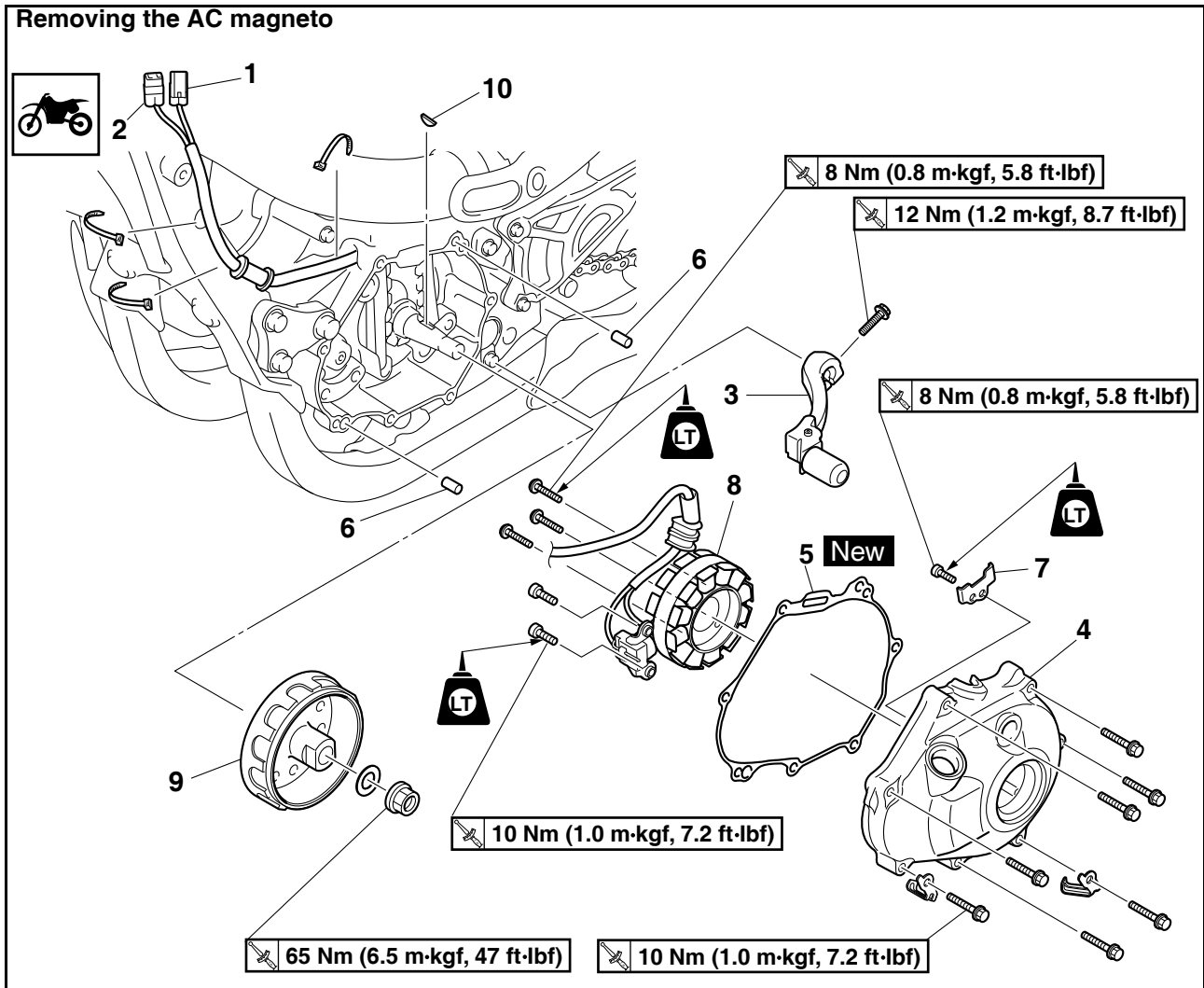
TIP

- Apply engine oil to the contact surface and threaded portion of the primary drive gear nut.
- Apply engine oil to the contact surfaces of the conical washer.
- Place an aluminum plate "a" between the teeth of the balancer drive gear "10" and balancer weight gear "11".
- Install the conical washer with its convex surface "b" outward.



5. Bend the lock washer tab.

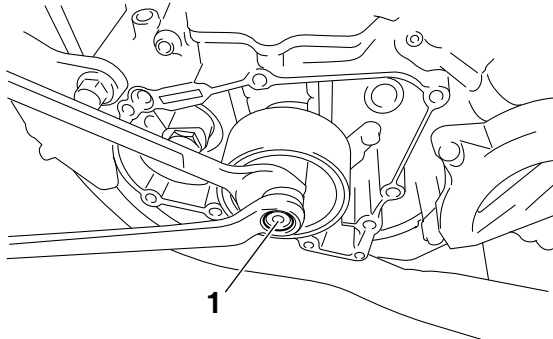
AC MAGNETO



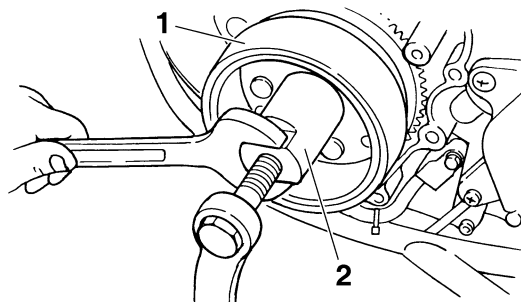
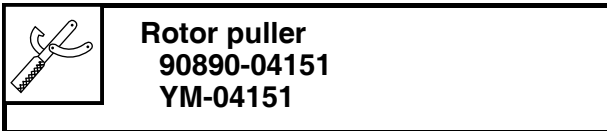
Order	Part name	Q'ty	Remarks
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-15.
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Air scoop (left)		Refer to "GENERAL CHASSIS" on page 4-1.
1	AC magneto coupler		Disconnect.
2	Crankshaft position sensor coupler	1	Disconnect.
3	Shift pedal	1	
4	Left crankcase cover	1	
5	Gaskets	1	
6	Dowel pin	2	
7	Holder	1	
8	Stator assembly	1	
9	Rotor	1	
10	Woodruff key	1	
			For installation, reverse the removal procedure.

REMOVING THE AC MAGNETO

1. Remove:
 - Nut (rotor) "1"
 - Washers

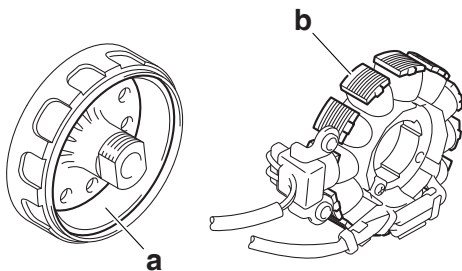


2. Remove:
 - Rotor "1"
 Use the rotor puller "2" to remove the rotor.
 - Woodruff key



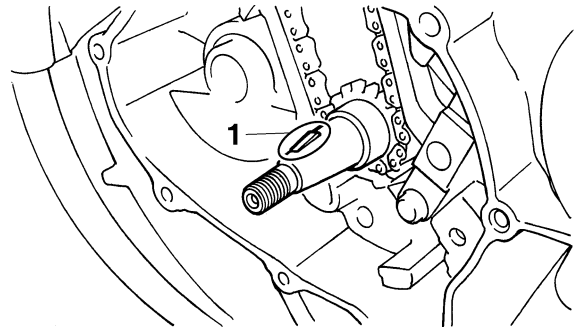
CHECKING THE AC MAGNETO

1. Check:
 - Rotor inner surface "a"
 - Stator outer surface "b"
 Damage → Inspect the crankshaft runout and crankshaft bearing.



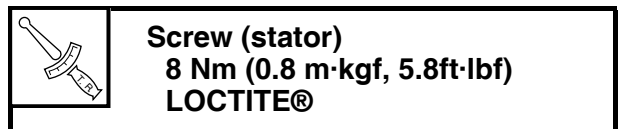
CHECKING THE WOODRUFF KEY

1. Check:
 - Woodruff key "1"
 Damage → Replace.

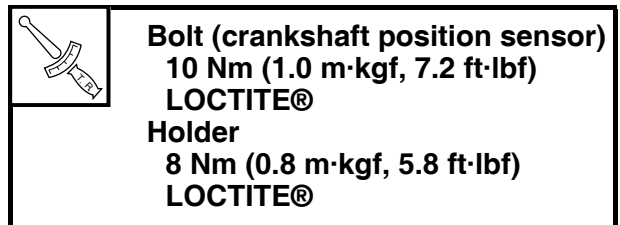


INSTALLING THE AC MAGNETO

1. Install:
 - Stator "1"
 - Screw (stator) "2"

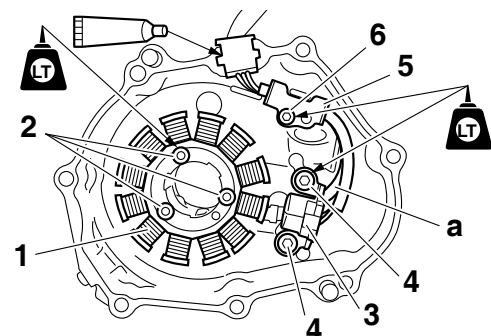
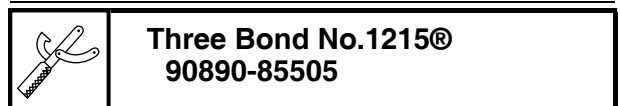


- Crankshaft position sensor "3"
- Bolt (crankshaft position sensor) "4"
- Holder "5"
- Bolt (holder) "6"



TIP

- Apply the sealant to the grommet of the AC magneto lead.
- Tighten the stator screws using the T25 bit.
- Pass the AC magneto lead "a" through the crankcase cover side.

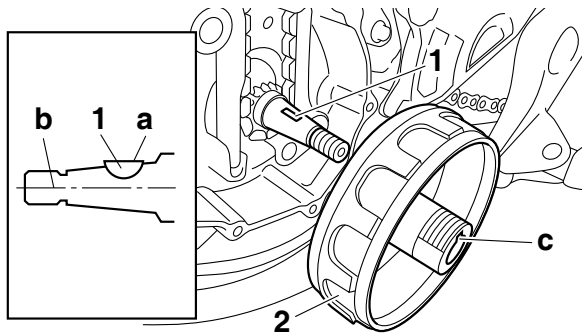


2. Install:

- Woodruff key "1"
- Rotor "2"


TIP

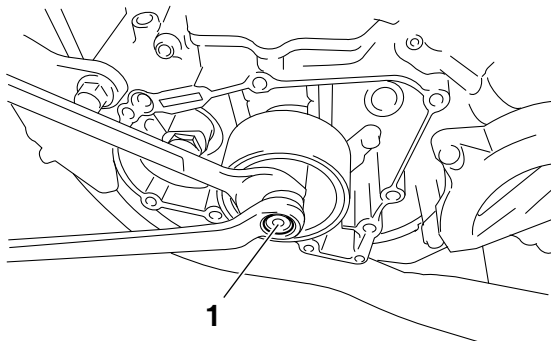
- Clean the contact surfaces of the tapered portions of the crankshaft and rotor.
- When installing the woodruff key, make sure that its flat surface "a" is in parallel with the crankshaft center line "b".
- When installing the rotor, align the keyway "c" of the rotor with the woodruff key.



3. Install:


- Washers
- Nut (rotor) "1"

	<p>Nut (rotor) 65 Nm (6.5 m-kgf, 47 ft-lbf)</p>
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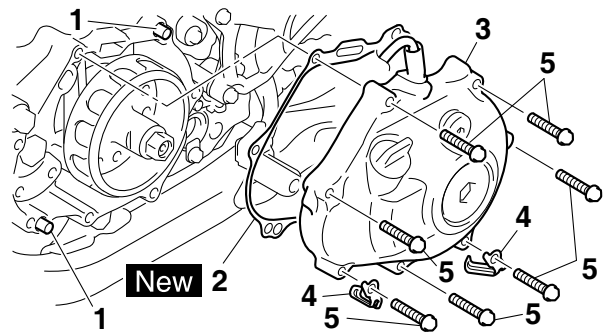
4. Install:

- Dowel pin "1"
- Gasket (left crankcase cover) "2" **New**
- Left crankcase cover "3"
- Lead holder "4"
- Bolt (left crankcase cover) "5"

	<p>Bolt (left crankcase cover) 10 Nm (1.0 m-kgf, 7.2 ft-lbf)</p>
---	---

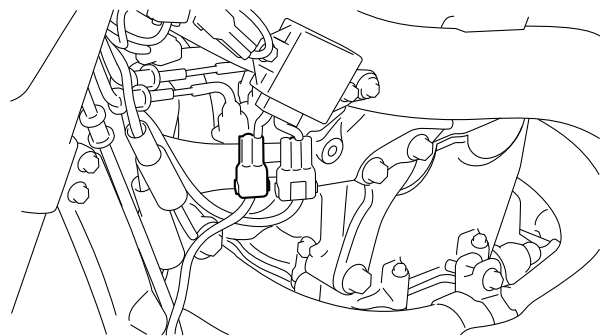
TIP

Tighten the bolts in stages and in a crisscross pattern.



5. Connect:

- AC magneto lead
- Refer to "CABLE ROUTING DIAGRAM" on page 2-33.



CRANKCASE

Separating the crankcase

12 Nm (1.2 m·kgf, 8.7 ft·lbf)

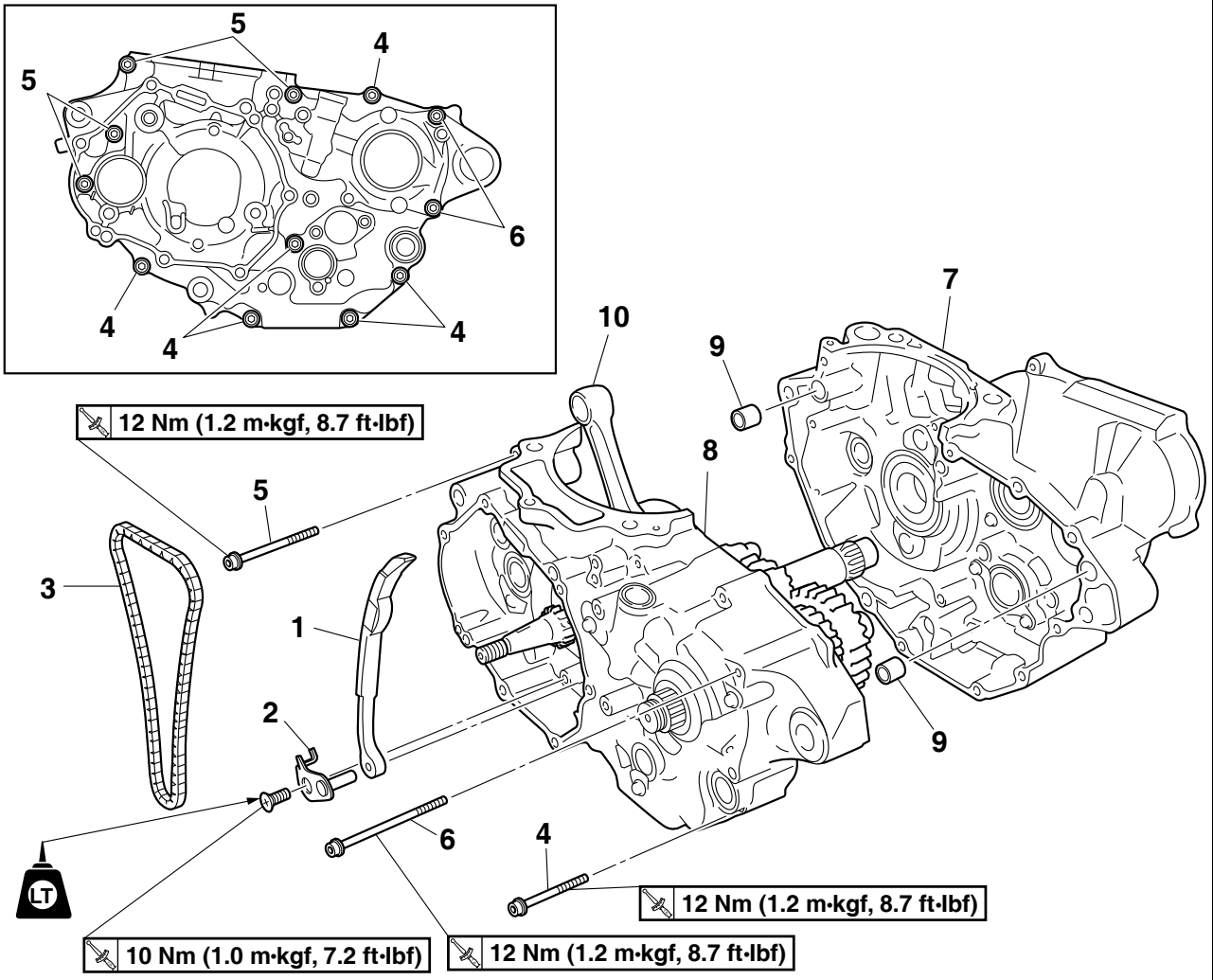
10 Nm (1.0 m·kgf, 7.2 ft·lbf)

12 Nm (1.2 m·kgf, 8.7 ft·lbf)

Order	Part name	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
	Piston		Refer to "CYLINDER AND PISTON" on page 5-32.
	Balancer		Refer to "OIL PUMP AND BALANCER GEAR" on page 5-54.
	Kick shaft assembly		Refer to "KICKSTATER" on page 5-46.
	Segment		Refer to "SHIFT SHAFT" on page 5-49.
	Stator		Refer to "AC MAGNETO" on page 5-59.
1	Timing chain guide (exhaust side)	1	
2	Timing chain guide stopper plate	1	
3	Timing chain	1	
4	Bolt [L = 45 mm (1.77 in)]	6	
5	Bolt [L = 65 mm (2.56 in)]	4	
6	Bolt [L = 75 mm (2.95 in)]	2	
7	Right crankcase	1	
8	Left crankcase	1	
9	Dowel pin	2	

CRANKCASE

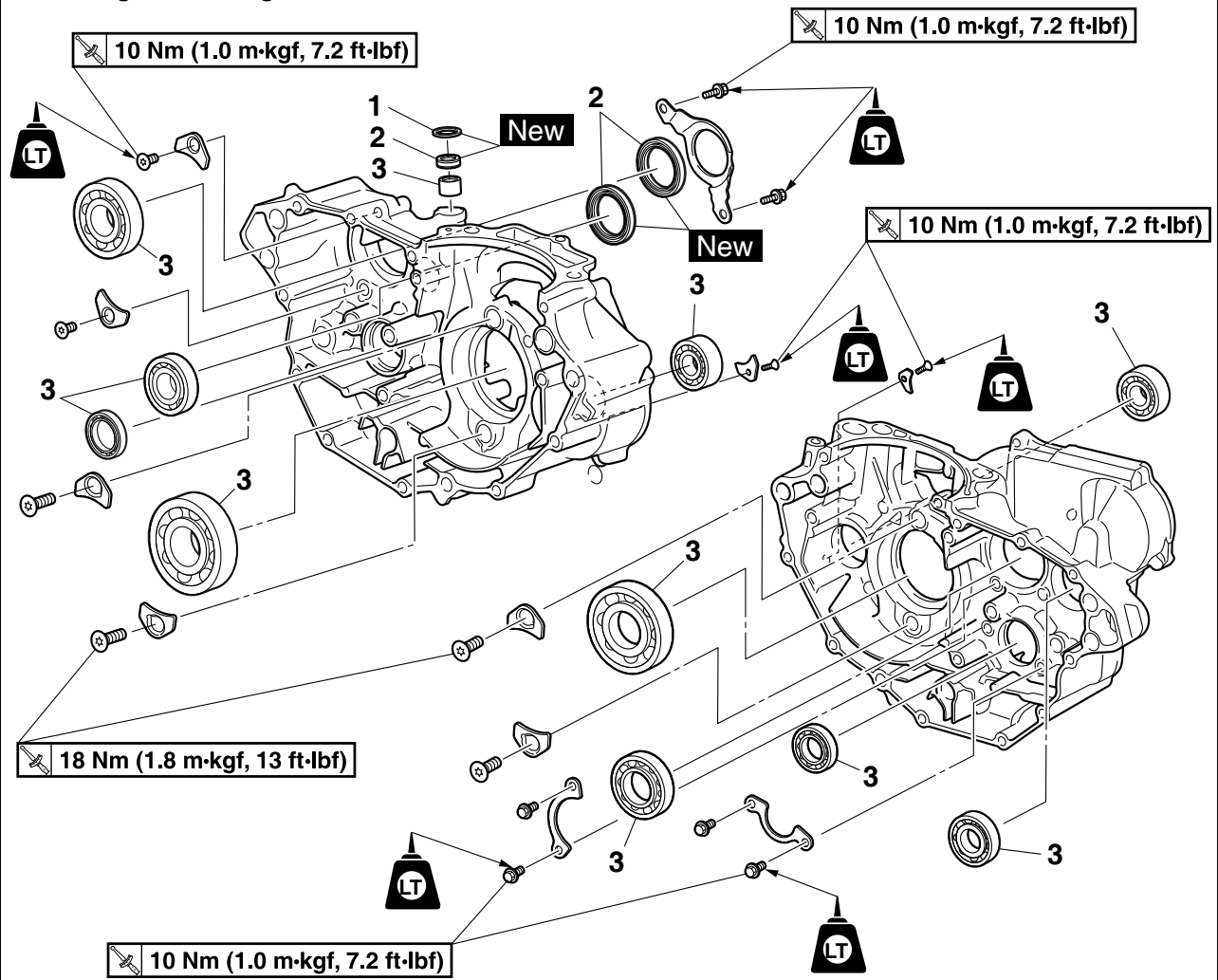
Separating the crankcase



Order	Part name	Q'ty	Remarks
10	Crankshaft	1	
			For assembly, reverse the disassemble procedure.

CRANKCASE

Removing the bearing and oil seal



Order	Part name	Q'ty	Remarks
	Transmission		Refer to "TRANSMISSION" on page 5-70.
	Shift cam and shift fork		Refer to "TRANSMISSION" on page 5-70.
1	Circlip	1	
2	Oil seals	3	
3	Bearing	11	
			For installation, reverse the removal procedure.

CRANKCASE

2. Check:

- Crankcase
Crack/damage → Replace.
- Oil delivery passages
Obstruction → Blow out with compressed air.

ASSEMBLING THE CRANKCASE

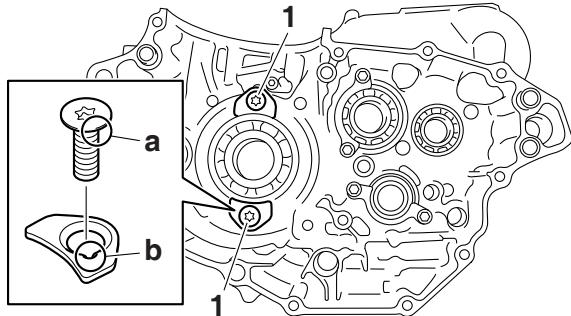
1. Install:

- Bearing cover plate

	Bearing cover plate 10 Nm (1.0 m·kgf, 7.2 ft·lbf) LOCTITE® Bearing cover plate (crankshaft) 18 Nm (1.8 m·kgf, 13 ft·lbf)
---	---


TIP

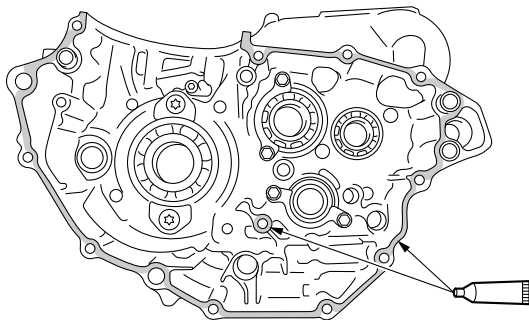
- Install the bearing by pressing its outer race parallel.
- To prevent the bearing cover plate screw (crankshaft) "1" from becoming loose, crimp the screw head periphery "a" into the concave "b" using a punch etc. In so doing, take care not to damage the screwdriver receiving hole in the screw.



2. Apply:


- Sealant
(to the crankcase mating surface)

	Three Bond No.1215® 90890-85505
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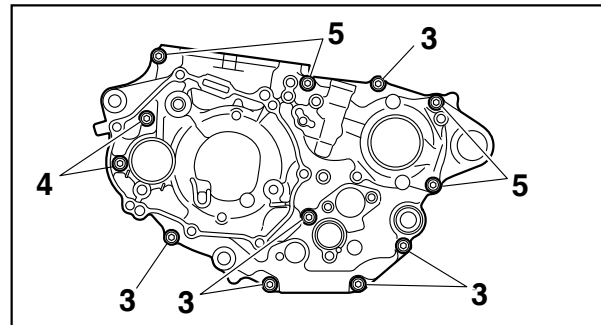
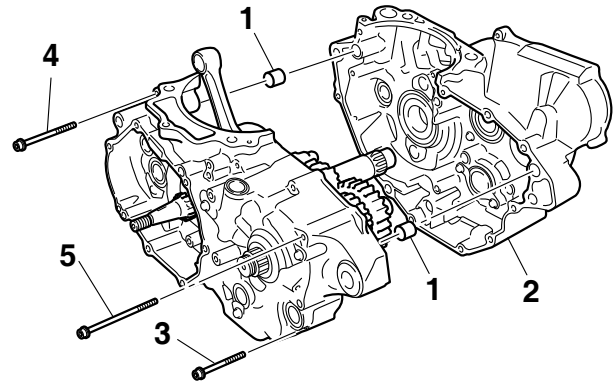
3. Install:

- Dowel pin "1"
- Crankcase "2"
(to the left crankcase)

	Crankcase bolt 12 Nm (1.2 m·kgf, 8.7 ft·lbf)
---	---

TIP

- Apply the lithium-soap-based grease on the O-ring.
- 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 (2) stages, with 1/4 turn each.

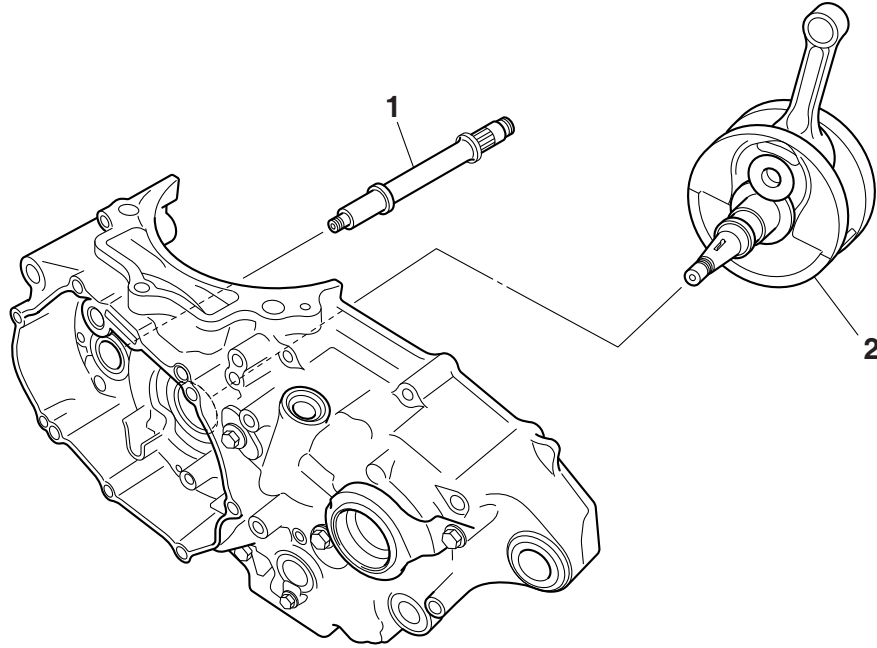


- 3. 45 mm (1.77 in)
- 4. 65 mm (2.56 in)
- 5. 75 mm (2.95 in)

CRANKSHAFT ASSEMBLY AND BALANCER SHAFT

CRANKSHAFT ASSEMBLY AND BALANCER SHAFT

Removing the crankshaft assembly and balancer shaft



Order	Part name	Q'ty	Remarks
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-62.
	Transmission		Refer to "TRANSMISSION" on page 5-70.
1	Balancer shaft	1	
2	Crankshaft assembly	1	
			For installation, reverse the removal procedure.

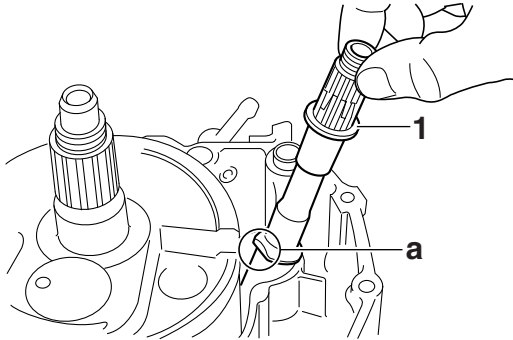
CRANKSHAFT ASSEMBLY AND BALANCER SHAFT

REMOVING THE BALANCER SHAFT

1. Remove:
 - Balancer shaft "1"

TIP

Remove the balancer shaft with its flat side "a" facing the crankshaft.



REMOVING THE CRANKSHAFT ASSEMBLY

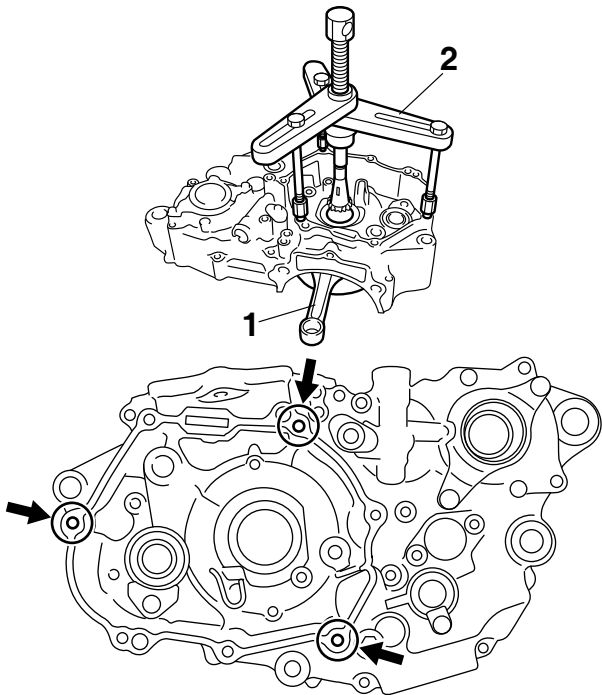
1. Remove:
 - Crankshaft assembly "1"

TIP

Remove the crankshaft assembly by using the crankcase separating tool "2".



Crankcase separating tool
90890-04152
YU-A9642



CHECKING THE CRANKSHAFT ASSEMBLY

1. Measure:
 - Crankshaft runout

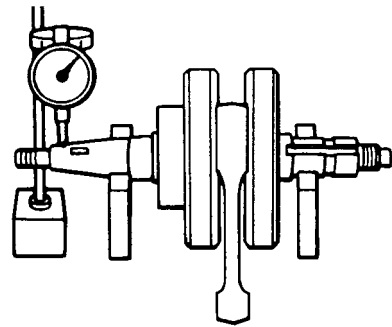
Out of specification → Replace the crankshaft, bearing or both.

TIP

Turn the crankshaft slowly.



Runout limit C
0.030 mm (0.0012 in)

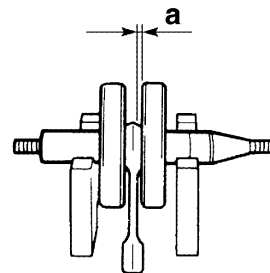


2. Measure:
 - Big end side clearance D "a"

Out of specification → Replace the big end bearing, crankshaft pin, or connecting rod.



Big end side clearance D
0.150–0.450 mm (0.0059–0.0177 in)



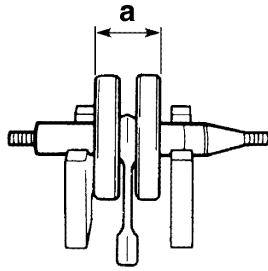
3. Measure:
 - Crankshaft width A "a"

Out of specification → Replace the crankshaft.



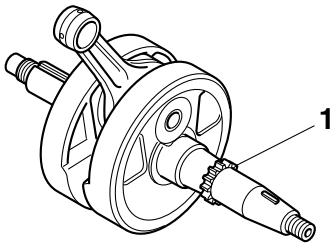
Width A
61.95–62.00 mm (2.439–2.441 in)

CRANKSHAFT ASSEMBLY AND BALANCER SHAFT



4. Check:

- Crankshaft sprocket "1"
Damage → Replace the crankshaft.



5. Check:

- Crankshaft journal oil passage
Obstruction → Blow out with compressed air.

INSTALLING THE CRANKSHAFT ASSEMBLY

1. Install:

- Crankshaft assembly

TIP

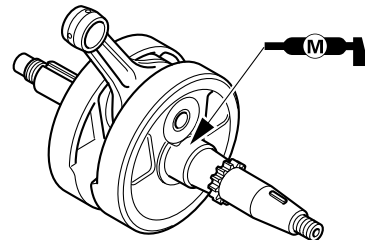
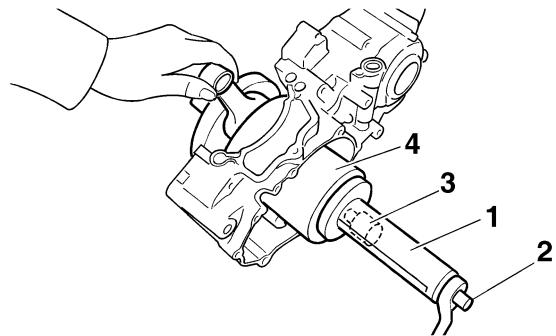
Install the crankshaft assembly with the crankshaft installer pot "1", crankshaft installer bolt "2", adapter (M12) "3" and spacer "4".

NOTICE

- To avoid scratching the crankshaft and to ease the installation procedure, lubricate the oil seal lips with lithium-soap-based grease.
- In order to prevent the crankshaft seizure, apply molybdenum disulfide grease.

TIP

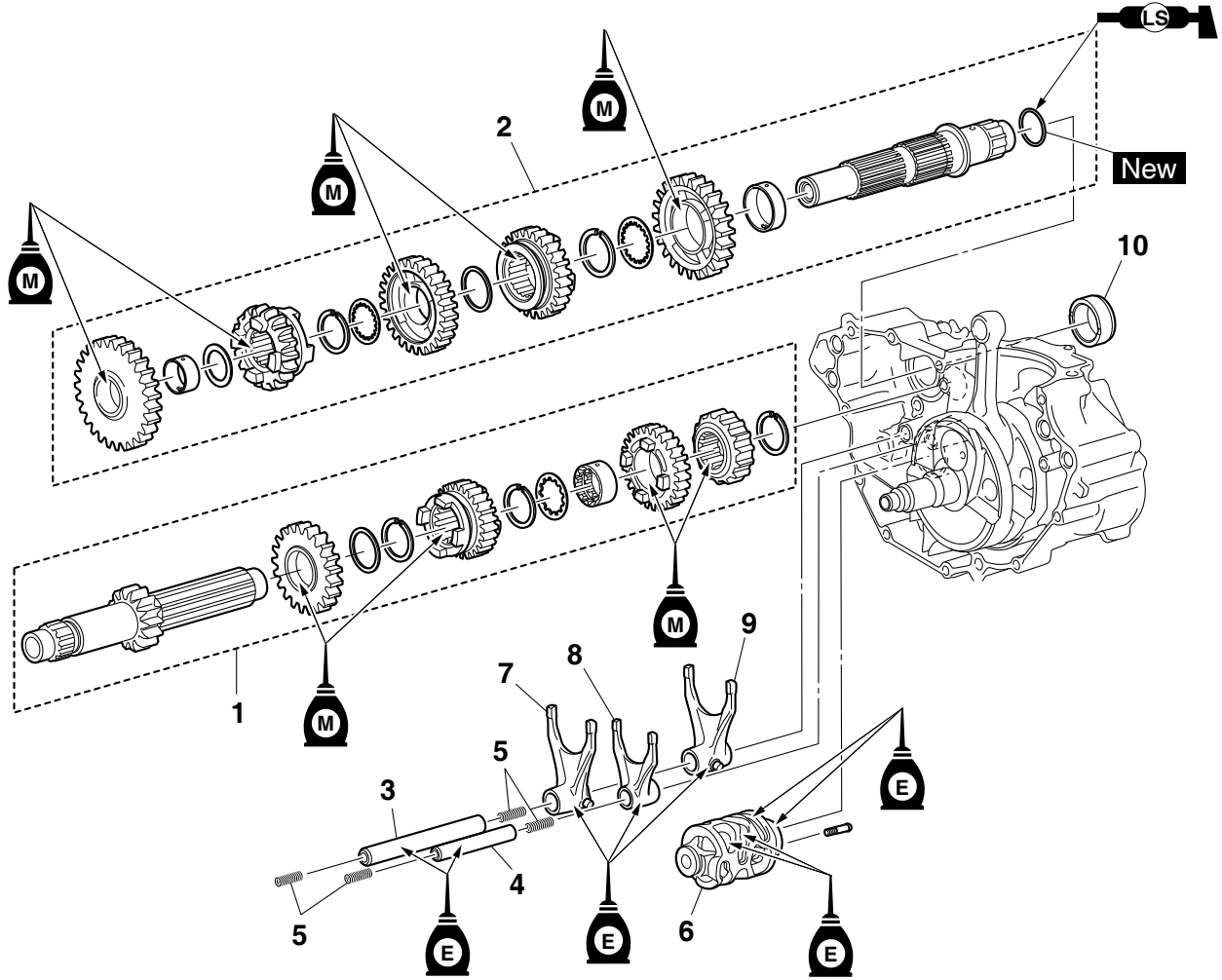
Hold the connecting rod at top dead center (TDC) with one hand while turning the nut of the crankshaft installer bolt with the other. Turn the crankshaft installer bolt until the crankshaft assembly bottoms against the bearing.



Crankshaft installer pot
90890-01274
Installing pot
YU-90058
Crankshaft installer bolt
90890-01275
Bolts
YU-90060
Adapter (M12)
90890-01278
Adapter #3
YU-90063
Spacer (crankshaft installer)
90890-04081
Pot spacer
YM-91044

TRANSMISSION

Removing the transmission, shift drum assembly, and shift forks



Order	Part name	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
	Crankcase		Separate. Refer to "CRANKCASE" on page 5-62.
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	Collars	1	
			For installation, reverse the removal procedure.

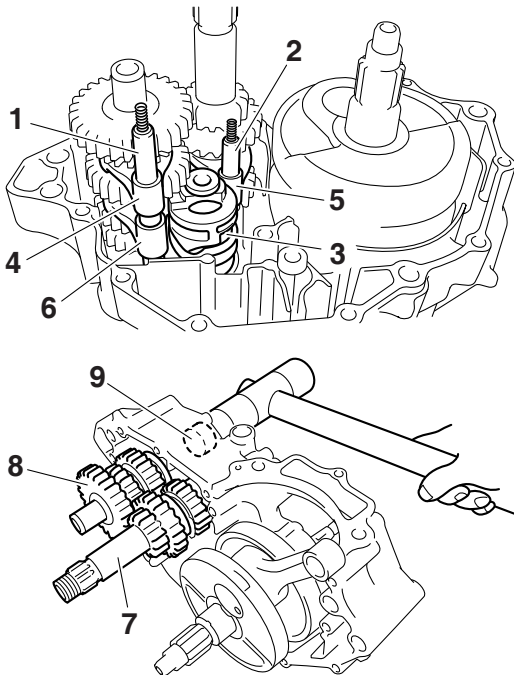
REMOVING THE TRANSMISSION

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

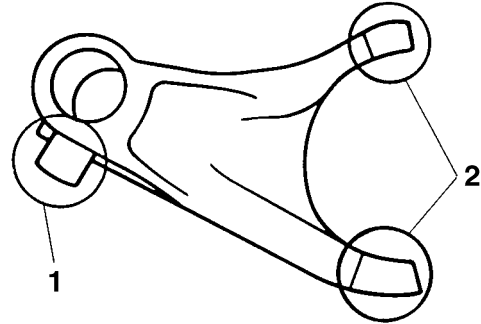
- Remove assembly with the collar "9" installed to the crankcase.
- Make a note of the position of each part. Pay particular attention to the location and direction of shift forks.
- Remove the main axle and the drive axle all together by tapping the drive axle lightly with a soft hammer.



CHECKING THE SHIFT FORKS

1. Check:

- Shift fork cam follower "1"
 - Shift fork pawl "2"
- Bends/damage/scoring/wear → Replace the shift fork.

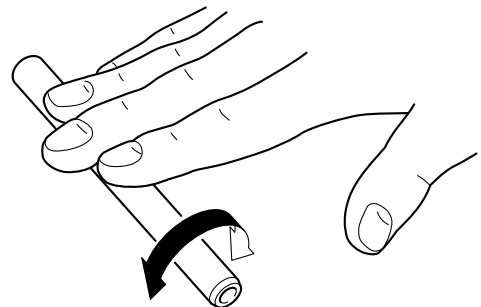


2. Check:

- Shift fork guide bar
- Roll the shift fork guide bar on a flat surface.
Bends → Replace.

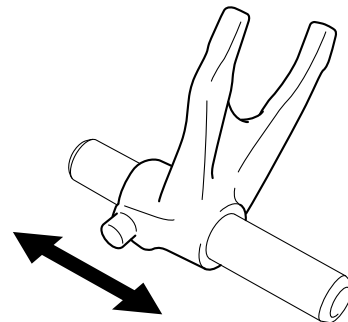
⚠ WARNING

Do not attempt to straighten a bent shift fork guide bar.



3. Check:

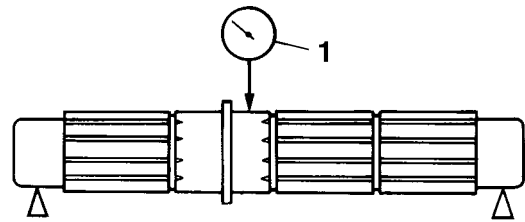
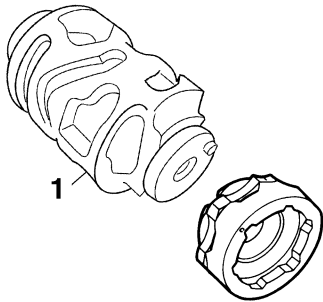
- Shift fork movement
(along the shift fork guide bar)
- Rough movement → Replace the shift forks and shift fork guide bar as a set.



CHECKING THE SHIFT DRUM ASSEMBLY

1. Check:

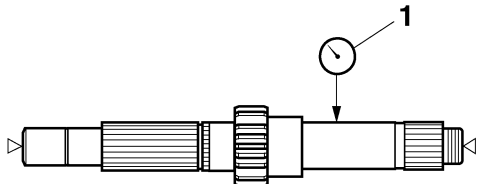
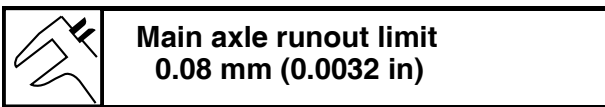
- Shift drum groove
Damage/scratches/wear → Replace the shift drum assembly.
- Shift drum segment "1"
Damage/wear → Replace the shift drum assembly.



CHECKING THE TRANSMISSION

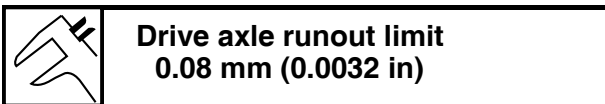
1. Measure:

- Main axle runout
(with a centering device and dial gauge "1")
Out of specification → Replace the main axle.



2. Measure:

- Drive axle runout
(with a centering device and dial gauge "1")
Out of specification → Replace the drive axle.



3. Check:

- Transmission gears
Blue discoloration/pitting/wear → Replace the defective gear (s).
- Transmission gear dogs
Cracks/damage/rounded edges → Replace the defective gear (s).

4. Check:

- Transmission gear movement
Rough movement → Replace the defective gear (s).

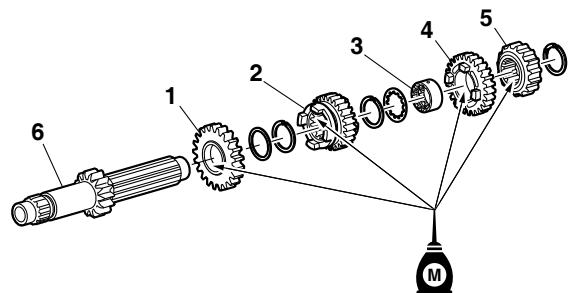
INSTALLING THE TRANSMISSION

1. Install:

- 5th pinion gear (21T) "1"
- 3rd pinion gear (20T) "2"
- Collar "3"
- 4th pinion gear (22T) "4"
- 2nd pinion gear (15T) "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.

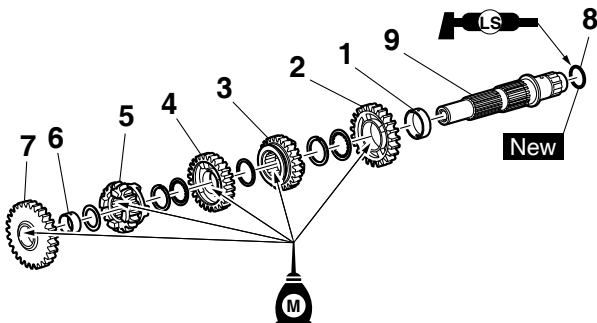


2. Install:

- Collar "1"
- 2nd wheel gear (23T) "2"
- 4th wheel gear (24T) "3"
- 3rd wheel gear (26T) "4"
- 5th wheel gear (20T) "5"
- Collar "6"
- 1st wheel gear (27T) "7"
- O-rings "8" **New**
(to the drive axle "9")

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

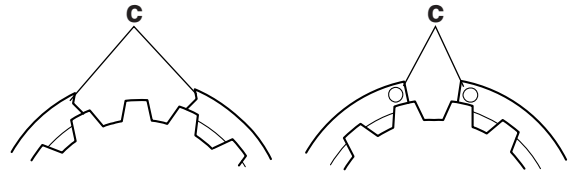
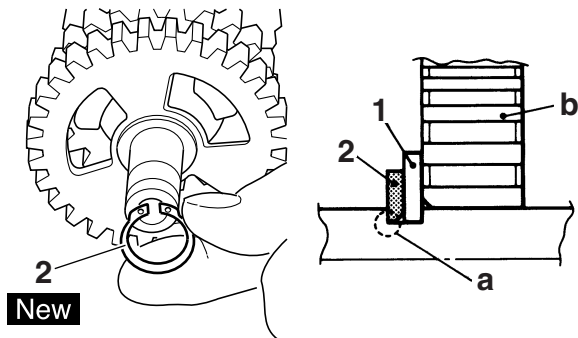


3. Install:

- 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.

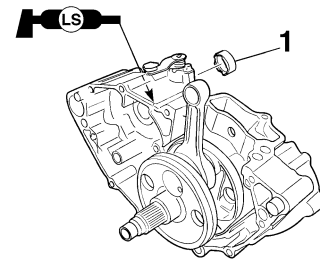


4. Install:

- Collar "1"

TIP

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

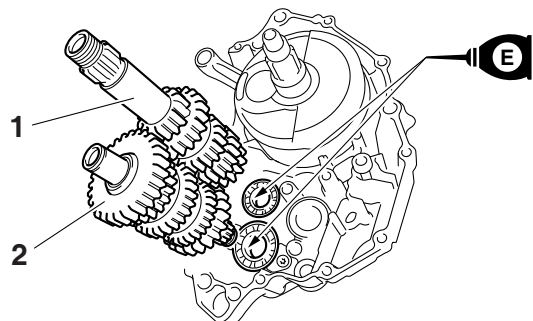


5. Install:

- 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.



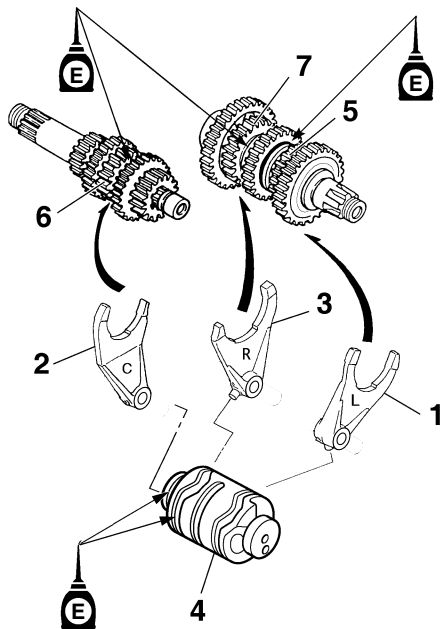
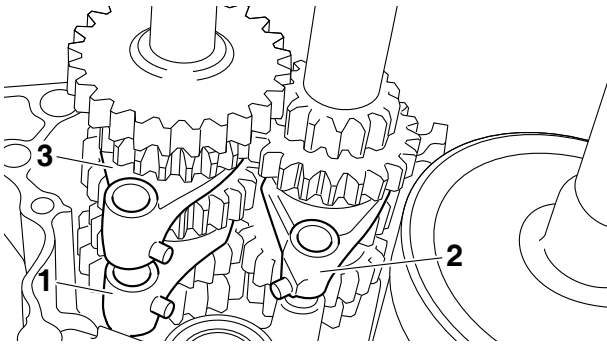
6. Install:

- 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 3 (R) with the 5th wheel gear "7" on the drive axle.
- Mesh the shift fork 2 (C) with the 3rd pinion gear "6" on the main axle.

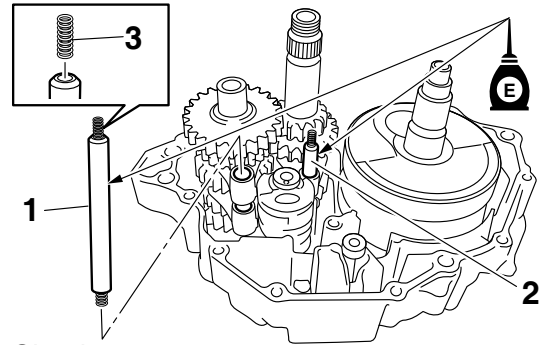


7. Install:

- Long shift fork guide bar "1"
- Short shift fork guide bar "2"
- Spring "3"

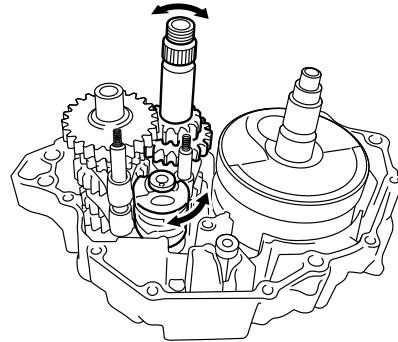
TIP

- 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.



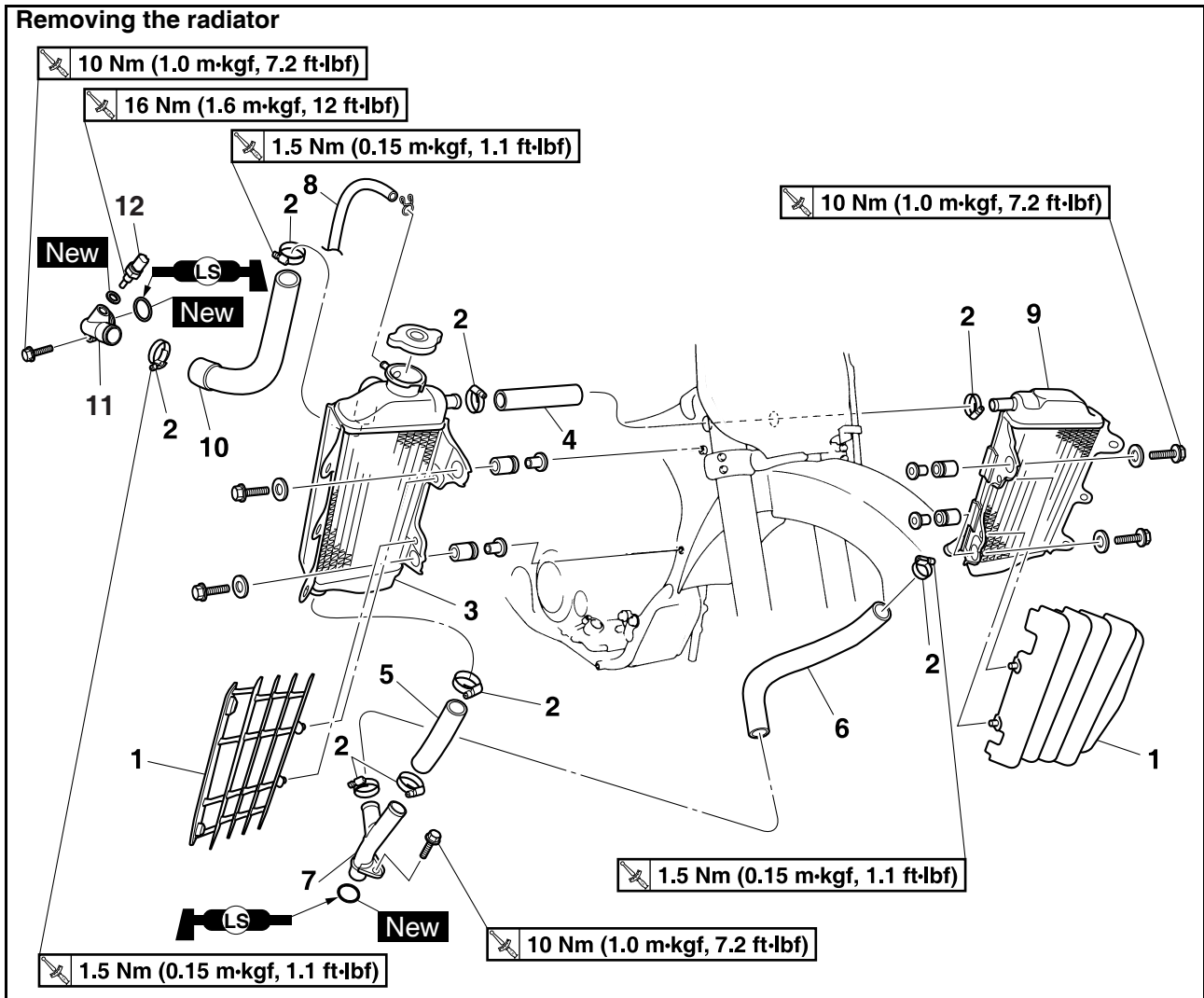
COOLING SYSTEM

RADIATOR	6-1
HANDLING NOTE	6-3
CHECKING THE RADIATOR.....	6-3
WATER PUMP	6-4
REMOVING THE OIL SEAL.....	6-5
CHECKING THE WATER PUMP	6-5
CHECKING THE BEARING	6-5
INSTALLING THE OIL SEAL	6-5
ASSEMBLING THE WATER PUMP.....	6-5

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.

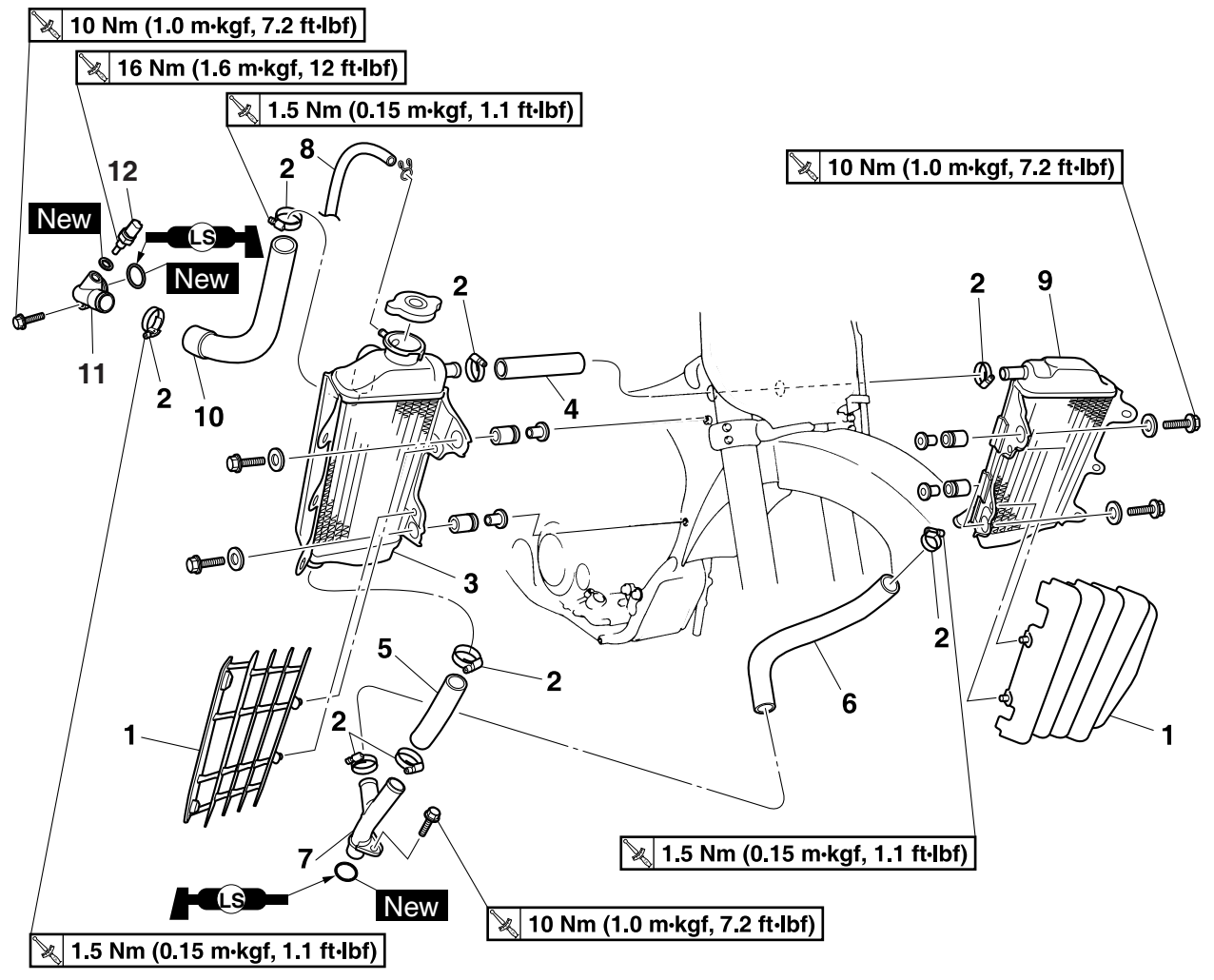
RADIATOR



Order	Part name	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-8.
	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 7-5.
1	Radiator guard	2	
2	Radiator hose clamp	8	Loosen.
3	Right radiator	1	

RADIATOR

Removing the radiator



Order	Part name	Q'ty	Remarks
4	Radiator hose 2	1	
5	Radiator hose 3	1	
6	Radiator hose 4	1	
7	Radiator pipe 2	1	
8	Radiator breather hose	1	
9	Left radiator	1	
10	Radiator hose 1	1	
11	Radiator pipe 1	1	
12	Coolant temperature sensor	1	
			For installation, reverse the removal procedure.

HANDLING NOTE

WARNING

If coolant seems hot, do not remove the radiator cap.

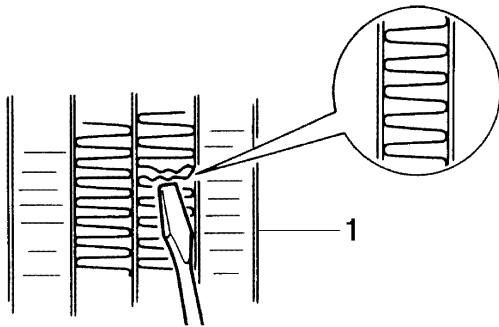
CHECKING THE RADIATOR

1. Check:

- Radiator fins “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.

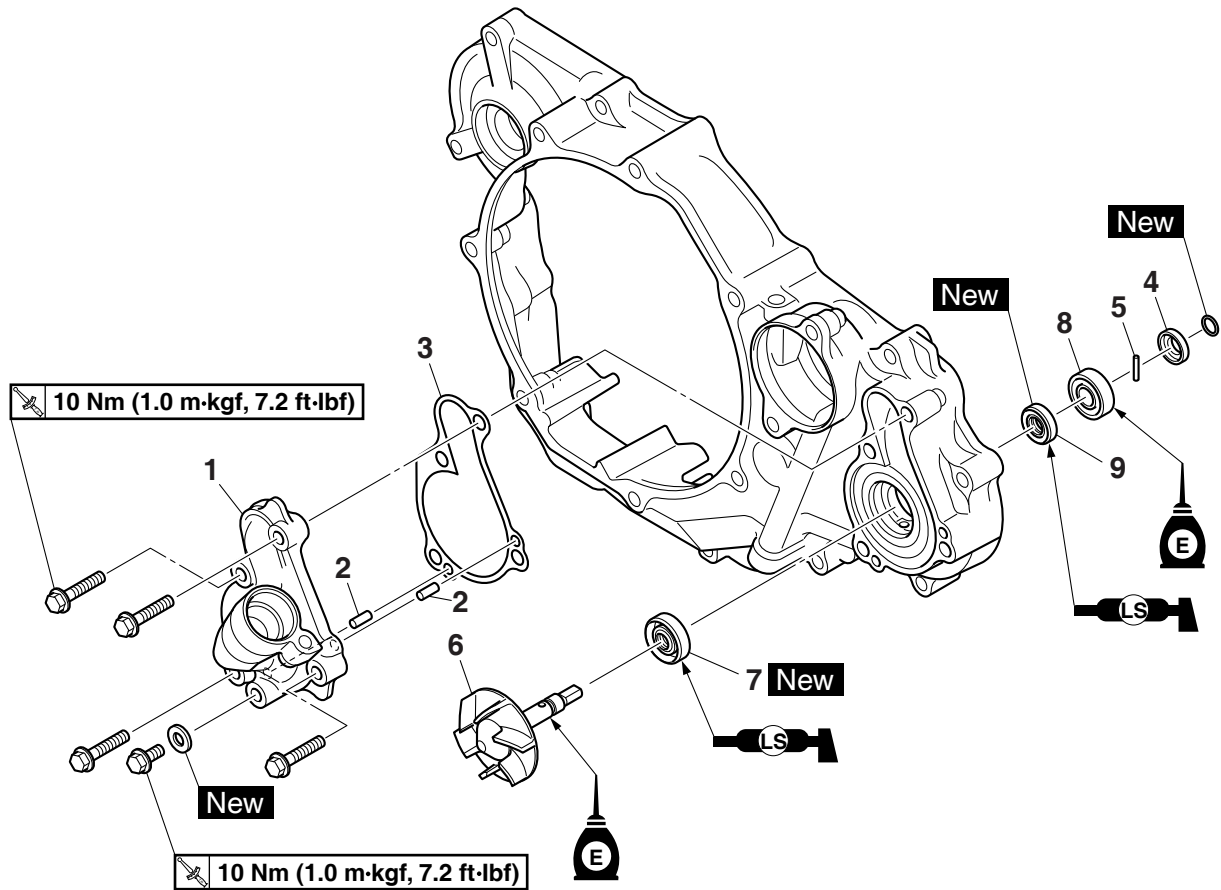


2. Check:

- Radiator hoses
- Radiator pipes
Crack/damage → Replace.

WATER PUMP

Removing the water pump



Order	Part name	Q'ty	Remarks
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-8.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-15.
	Right crankcase cover		Refer to "CLUTCH" on page 5-37.
1	Water pump housing	1	
2	Dowel pin	2	
3	Gasket	1	
4	Collar	1	
5	Pin	1	
6	Impeller shaft assembly	1	
7	Oil seal	1	
8	Bearing	1	
9	Oil seal	1	
			For installation, reverse the removal procedure.

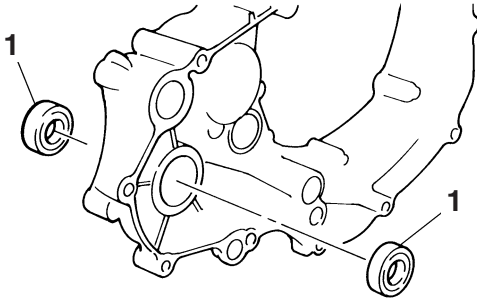
REMOVING THE OIL SEAL

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 seals "1"



CHECKING THE WATER PUMP

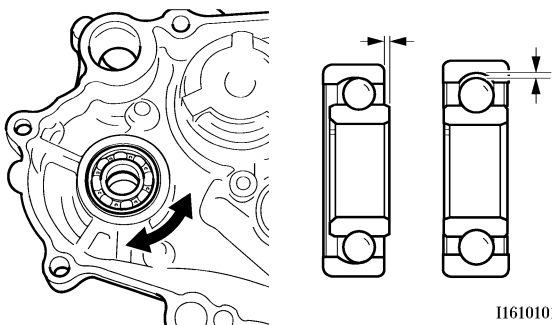
1. Check:

- Water pump housing cover
- Impeller shaft
- Cracks/damage/wear → Replace.

CHECKING THE BEARING

1. Check:

- Bearing
- Rotate the inner race with your finger.
- Rough spot/seizure → Replace.



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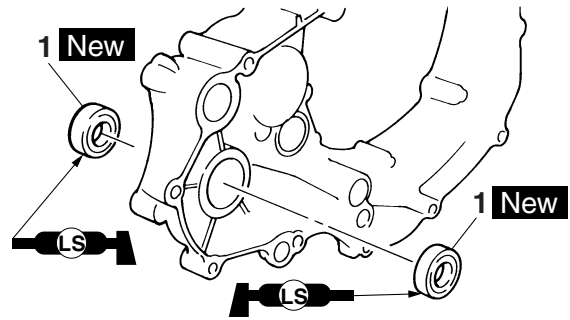
INSTALLING THE OIL SEAL

1. Install:

- Oil seals "1" **New**

TIP

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

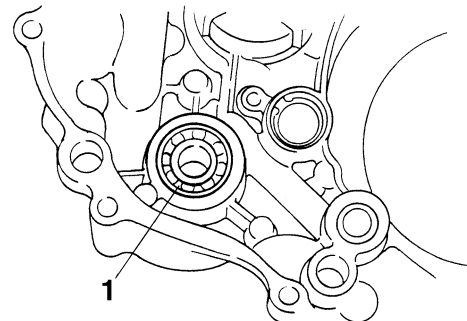


2. Install:

- Bearing "1"

TIP

Install the bearing by pressing its outer race parallel.



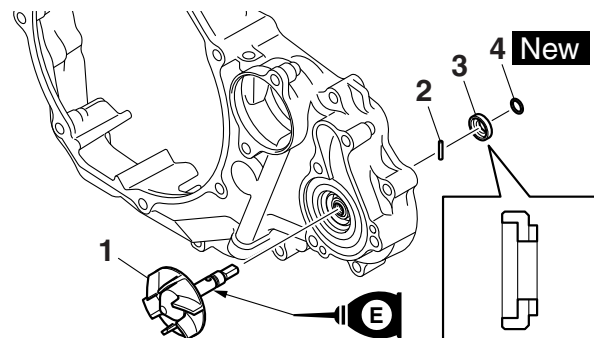
ASSEMBLING THE WATER PUMP

1. Install:

- Impeller shaft assembly "1"
- Pin "2"
- Collar "3"
- Circlip "4" **New**

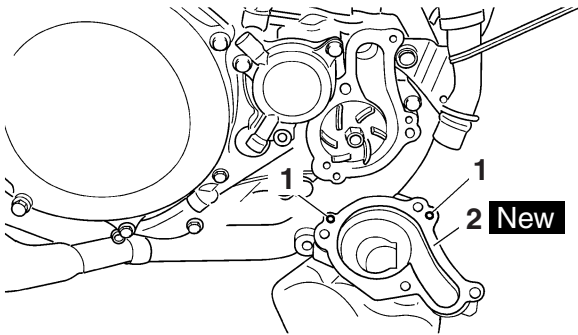
TIP

- 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.




2. Install:

- Dowel pin "1"
- Gasket "2" **New**




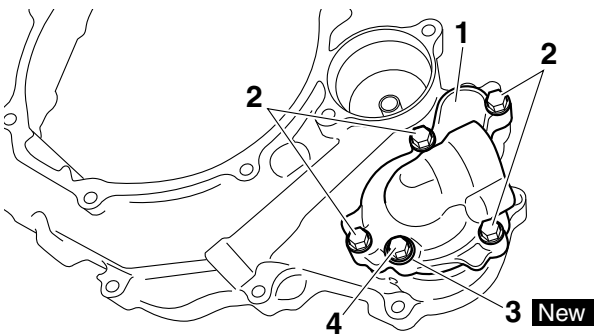
3. Install:

- Water pump housing "1"
- Water pump housing bolt "2"

	Water pump housing bolt 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
---	---

- Washer "3" **New**
- Coolant drain bolt "4"

	Coolant drain bolt 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
--	--



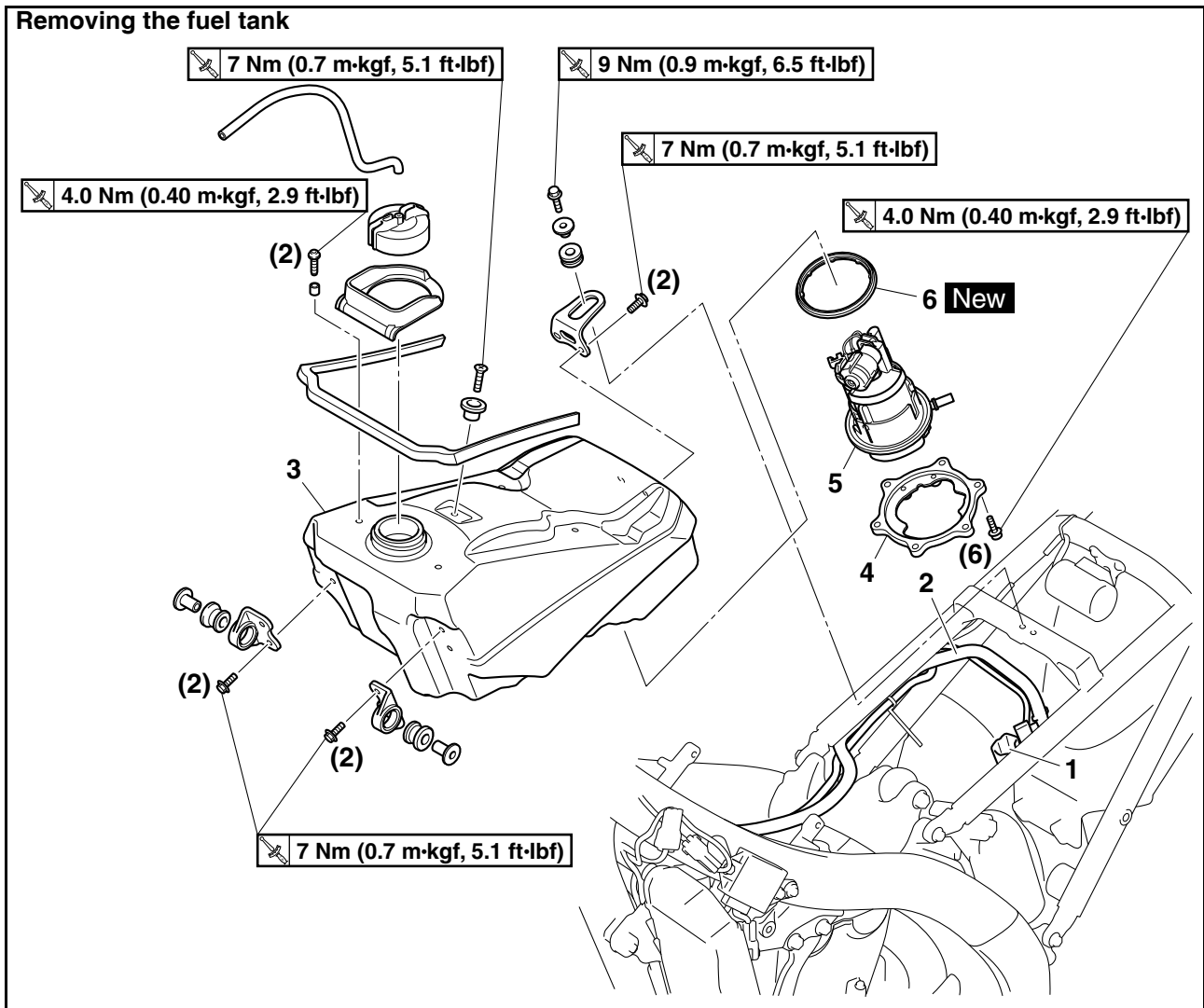
FUEL SYSTEM

FUEL TANK	7-1
REMOVING THE FUEL TANK	7-2
REMOVING THE FUEL PUMP	7-2
CHECKING THE FUEL PUMP BODY	7-2
INSTALLING THE FUEL PUMP	7-2
INSTALLING THE FUEL TANK.....	7-3
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TIP

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FUEL TANK



Order	Part name	Q'ty	Remarks
	Seat		Refer to "GENERAL CHASSIS" on page 4-1.
	Side cover (left/right)		
	Air scoop (left/right)		
1	Fuel pump coupler	1	Disconnect.
2	Fuel hose	1	Disconnect.
3	Fuel tank	1	
4	Fuel pump bracket	1	
5	Fuel pump	1	
6	Fuel pump gasket	1	
			For installation, reverse the removal procedure.

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

⚠ WARNING

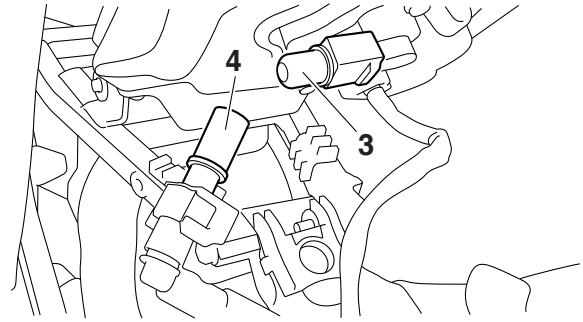
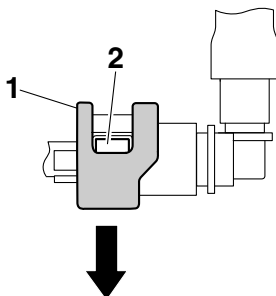
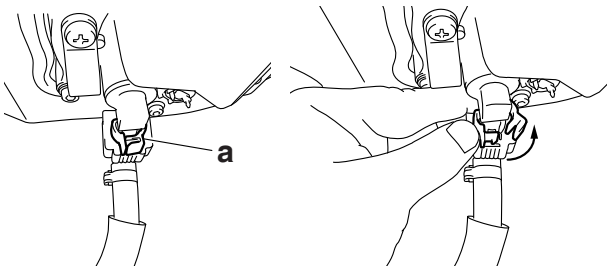
Cover the fuel hose connection with a cloth when disconnecting it. This is because residual pressure in the fuel hose could cause fuel to spurt out when the hose is removed.

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.

REMOVING THE FUEL PUMP

1. Remove:
 - Fuel pump

NOTICE

Do not drop the fuel pump or give it a strong shock.

CHECKING THE FUEL PUMP BODY

1. Check:
 - Fuel pump body
 - Obstructions → Clean.
 - Cracks/damage → Replace the fuel pump assembly.


INSTALLING THE FUEL PUMP

1. Install:
 - Fuel pump gasket **New**
 - Fuel pump
 - Fuel pump bracket



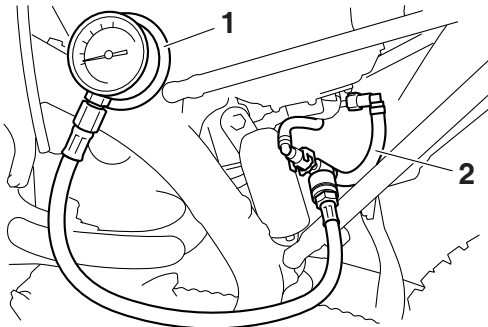
Fuel pump bolts
4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)

- d. Connect the pressure gauge “1” and the fuel pressure adapter “2” to the fuel hose.




Pressure gauge
90890-03153
YU-03153

Fuel pressure adapter
90890-03186
YM-03186



- e. Start the engine.
f. Measure the fuel pressure.
Out of specification → Replace the fuel pump.



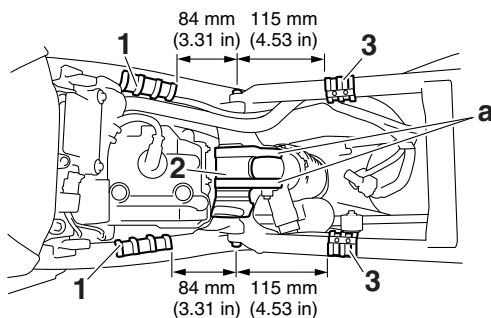
Fuel pressure
324.0 kPa (3.24 kgf/cm², 47.0 psi)

CHECKING THE DAMPER

1. Check:
- Damper 1 “1”
 - Damper 2 “2”
 - Damper 3 “3”
- Wear/damage → Replace.

TIP

- Affix dampers 1 and 3 with the arrow on each damper pointing outward.
- Affix the damper 2 with its projection “a” facing the rear of the vehicle.

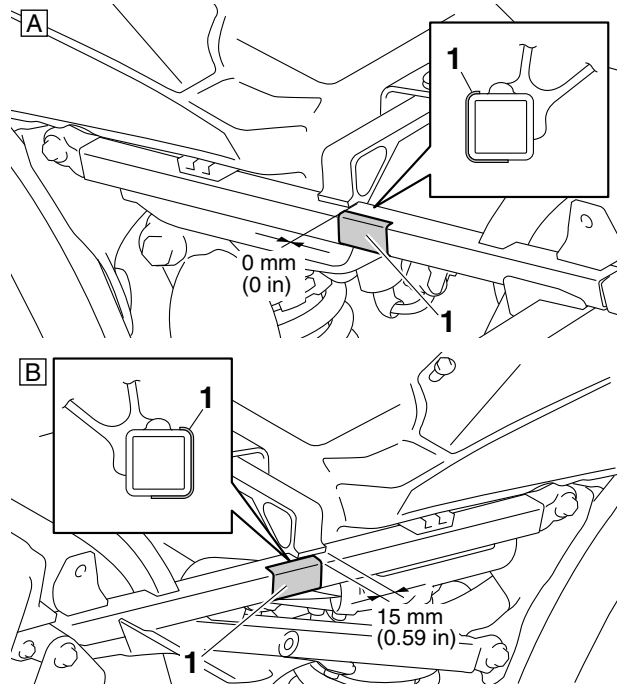


CHECKING AND REPLACING THE PROTECTOR

1. Check:
- Protector “1”
- Wear/damage → Replace.

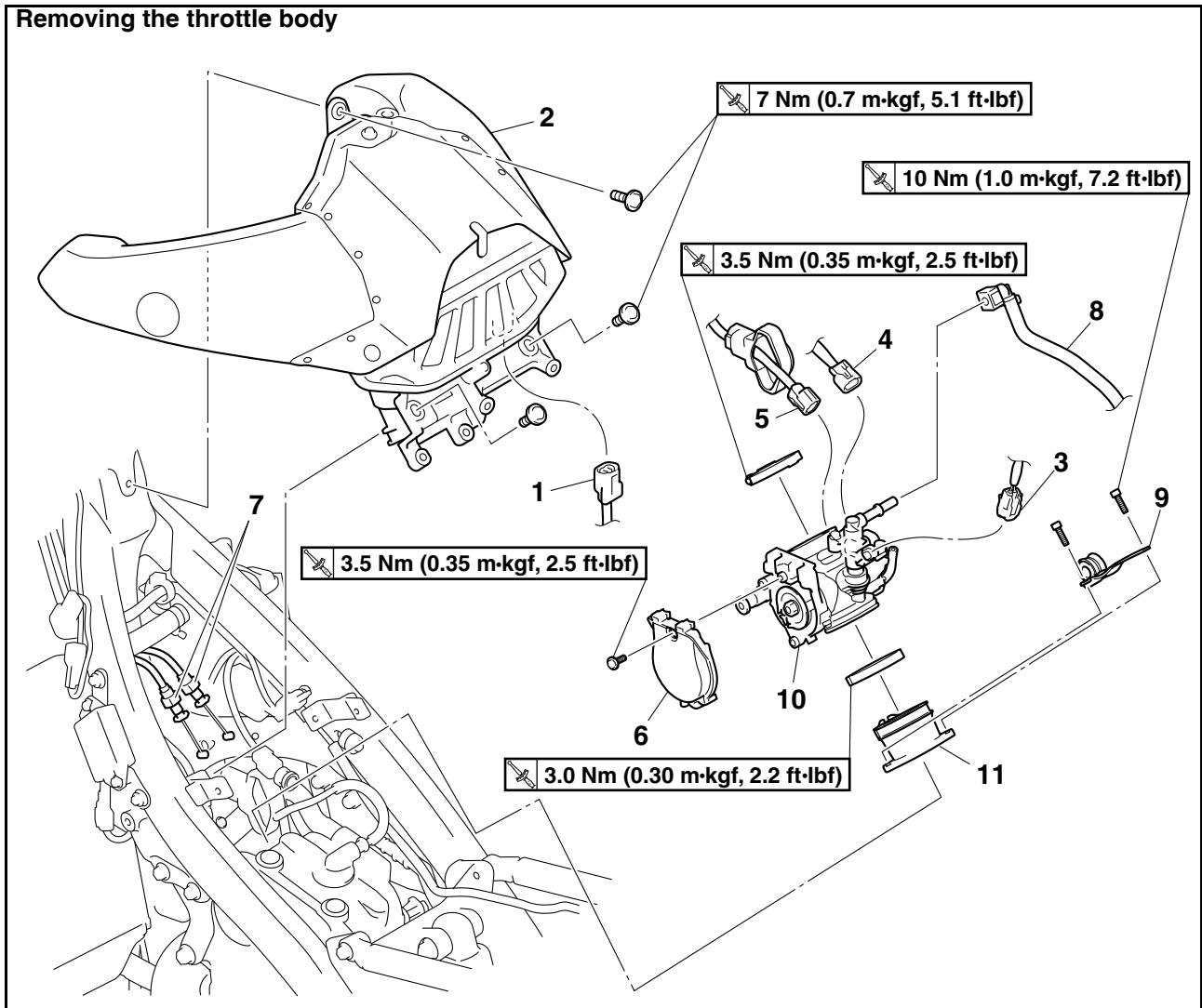
TIP

Affix the protector as shown.



- A. Left
B. Right

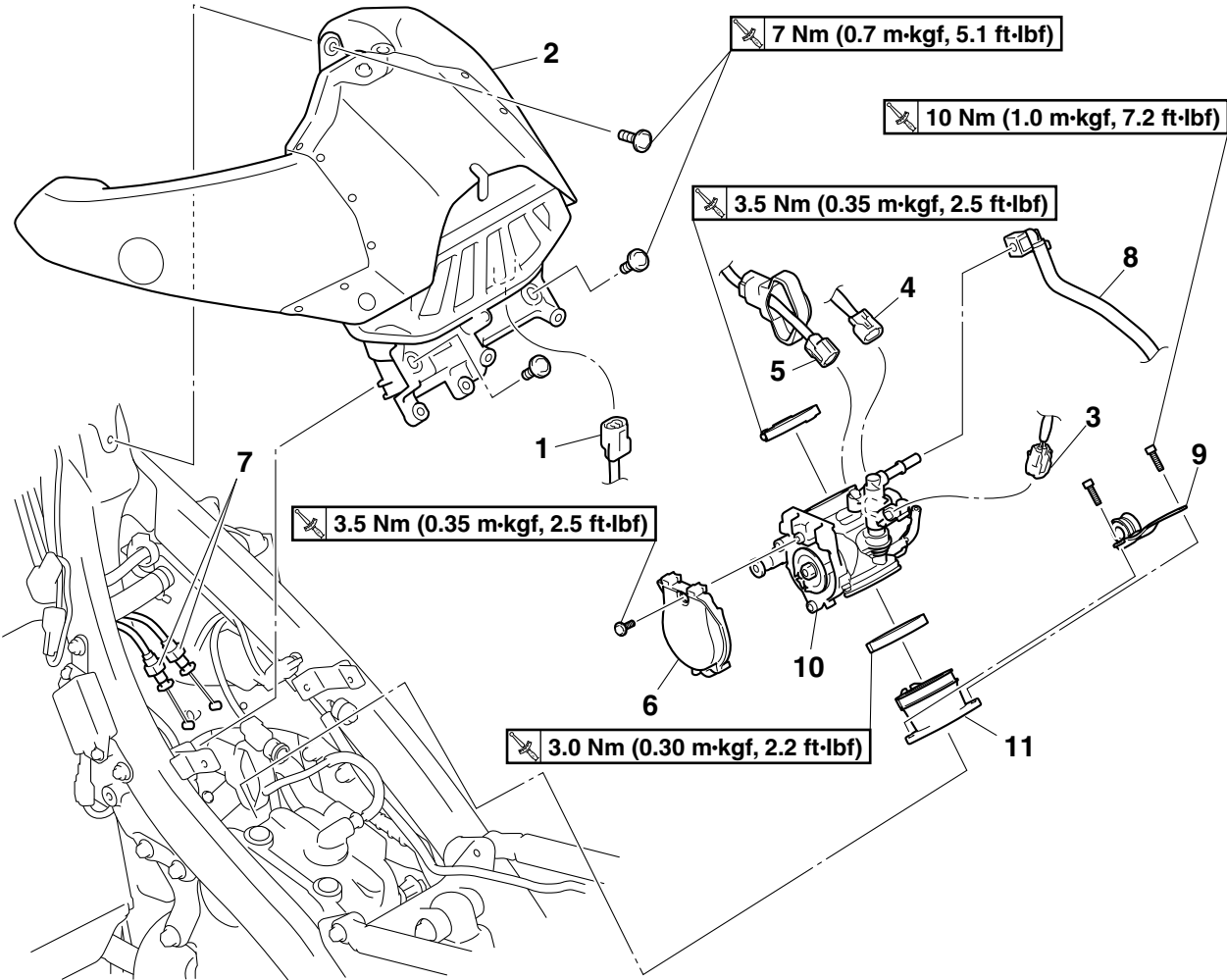
THROTTLE BODY



Order	Part name	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.
	ECU		Refer to "ENGINE REMOVAL" on page 5-1.
	Ignition coil		Refer to "ENGINE REMOVAL" on page 5-1.
1	Intake air temperature sensor coupler	1	Disconnect.
2	Air filter case	1	
3	Fuel injector coupler	1	Disconnect.
4	Intake air pressure sensor coupler	1	Disconnect.
5	Throttle position sensor coupler	1	Disconnect.
6	Throttle cable cover	1	
7	Throttle cable	2	
8	Fuel hose	1	
9	Exhaust pipe bracket	1	

THROTTLE BODY

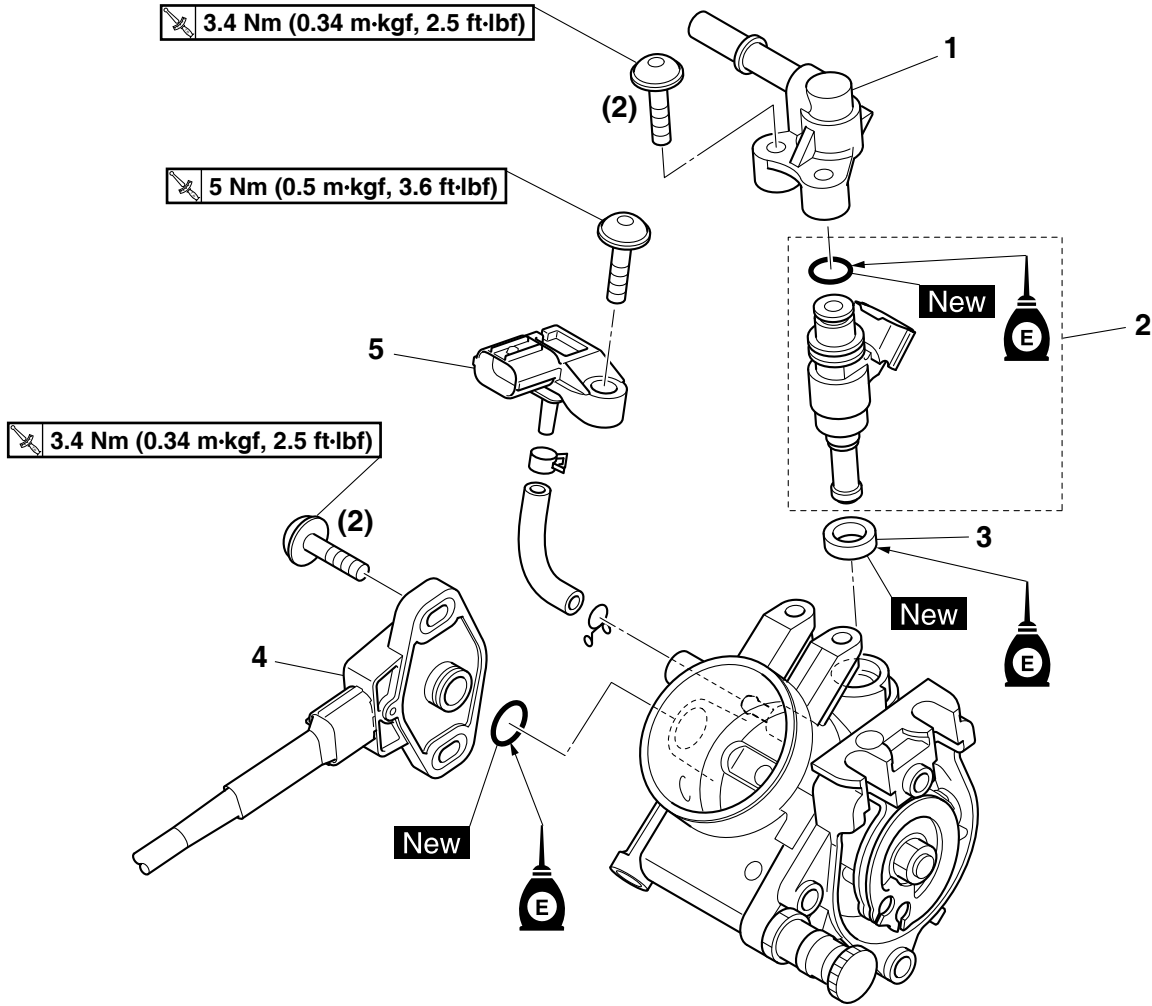
Removing the throttle body



Order	Part name	Q'ty	Remarks
10	Throttle body	1	
11	Throttle body joint	1	
			For installation, reverse the removal procedure.

THROTTLE BODY

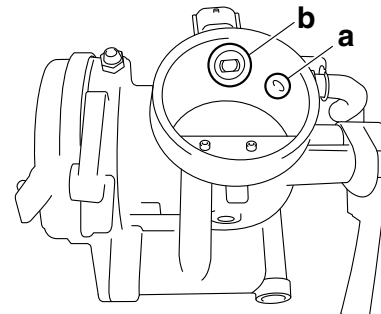
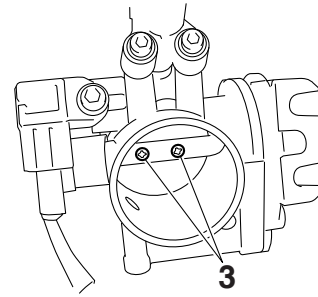
Removing the injector



Order	Part name	Q'ty	Remarks
1	Fuel inlet pipe	1	
2	Injector	1	
3	Gaskets	1	
4	Throttle position sensor	1	
5	Intake air pressure sensor	1	
			For installation, reverse the removal procedure.

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 8-10.
 - Deposits → Replace.
 - Damage → Replace.
2. Check:
 - Injector resistance
 - Refer to “CHECKING THE FUEL INJECTOR” on page 8-47.



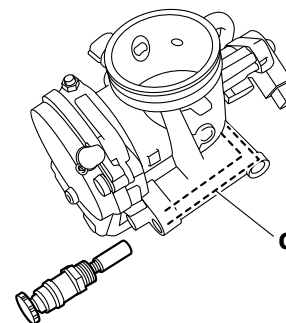
CHECKING THE THROTTLE BODY

1. Check:
 - Throttle body
 - Cracks/damage → Replace.
2. Check:
 - Fuel passages
 - Obstructions → Clean.

NOTICE

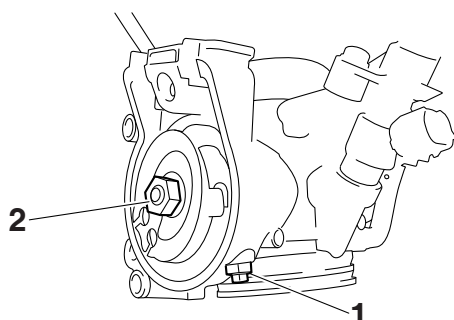
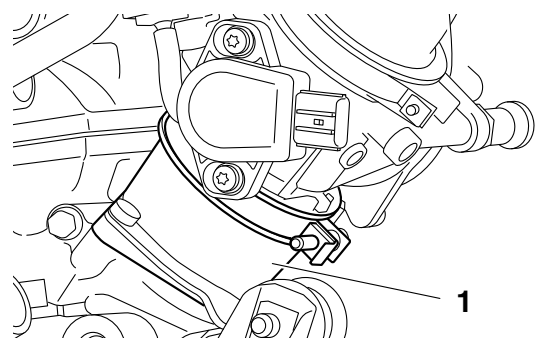
- Before removing the throttle body, clean the area around the throttle body to prevent dirt and other foreign material from falling into the engine.
- If the throttle body is subject to strong shocks or dropped during cleaning, replace it.
- Do not use any caustic carburetor cleaning solution.
- Do not directly push the throttle valves to open them.
- Do not loosen the throttle valve stopper screw “1”, throttle valve pulley nut “2”, or throttle valve screw “3”. 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:
 - Starter knob/idle screw passage “c”
 - Obstruction → Blow out with compressed air.



CHECKING THE THROTTLE BODY JOINT

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



ELECTRICAL SYSTEM

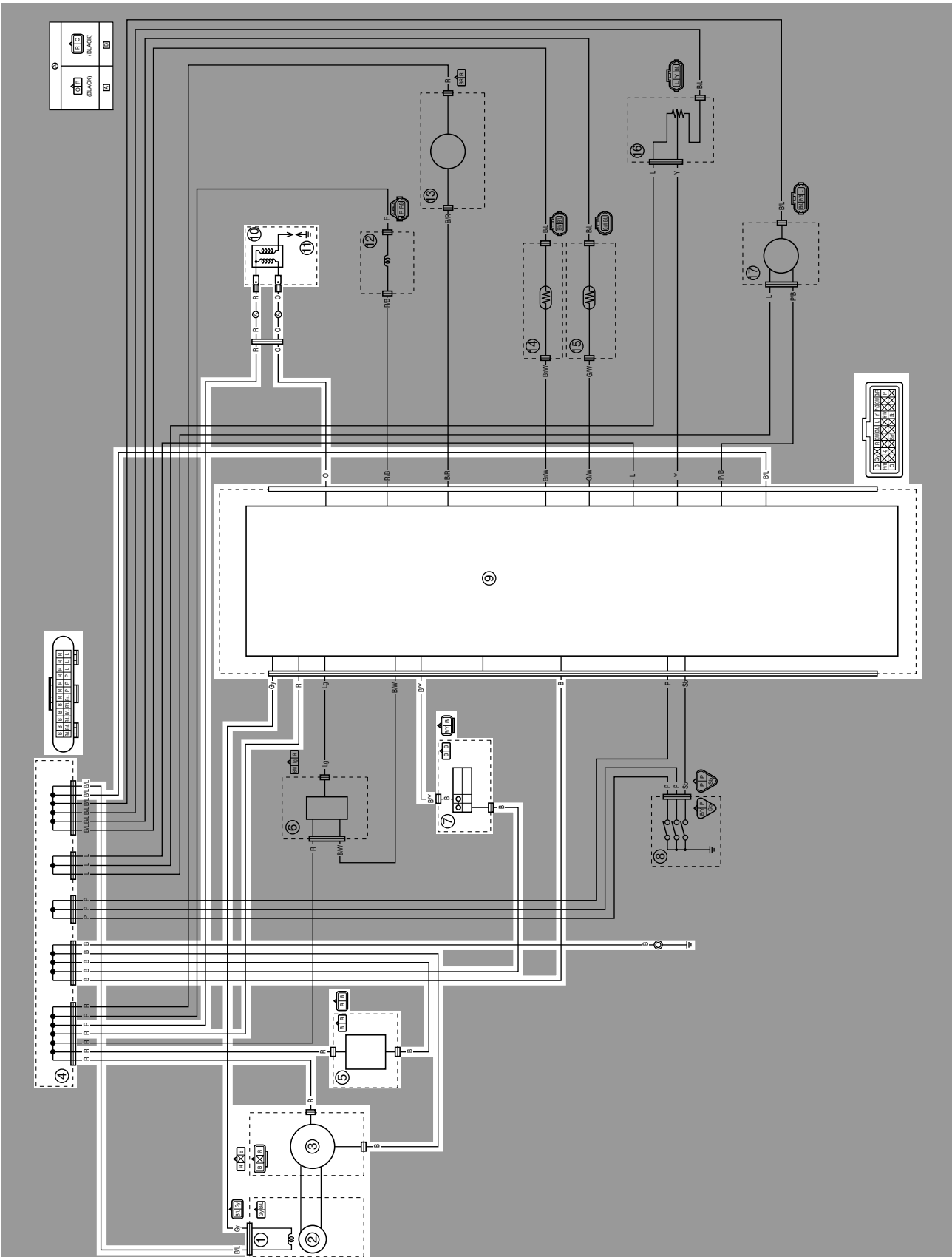
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CIRCUIT DIAGRAM	8-6
TROUBLESHOOTING	8-8
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CIRCUIT DIAGRAM	8-10
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TIP

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.

IGNITION SYSTEM

CIRCUIT DIAGRAM



IGNITION SYSTEM

1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Joint connector
5. Condenser
7. Engine stop switch
9. ECU
10. Ignition coil
11. Spark plug

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 spark plug. Refer to "CHECKING THE SPARK PLUG" on page 3-35.	NG →	Correct or replace the spark plug.
OK ↓		
3. Check the ignition spark gap. Refer to "CHECKING THE IGNITION SPARK GAP" on page 8-41.	OK →	The ignition system circuit is OK.
NG ↓		
4. Check the ignition coil. Refer to "CHECKING THE IGNITION COIL" on page 8-41.	NG →	Replace the ignition coil.
OK ↓		
5. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-38.	NG →	Replace the engine stop switch.
OK ↓		
6. Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-42.	NG →	Replace the crankshaft position sensor.
OK ↓		
7. Check the stator coil. Refer to "CHECKING THE STATOR COIL" on page 8-43.	NG →	Replace the stator coil.
OK ↓		

IGNITION SYSTEM

8. Check the ignition system wire harness.
Refer to "CIRCUIT DIAGRAM" on page 8-2.

OK ↓

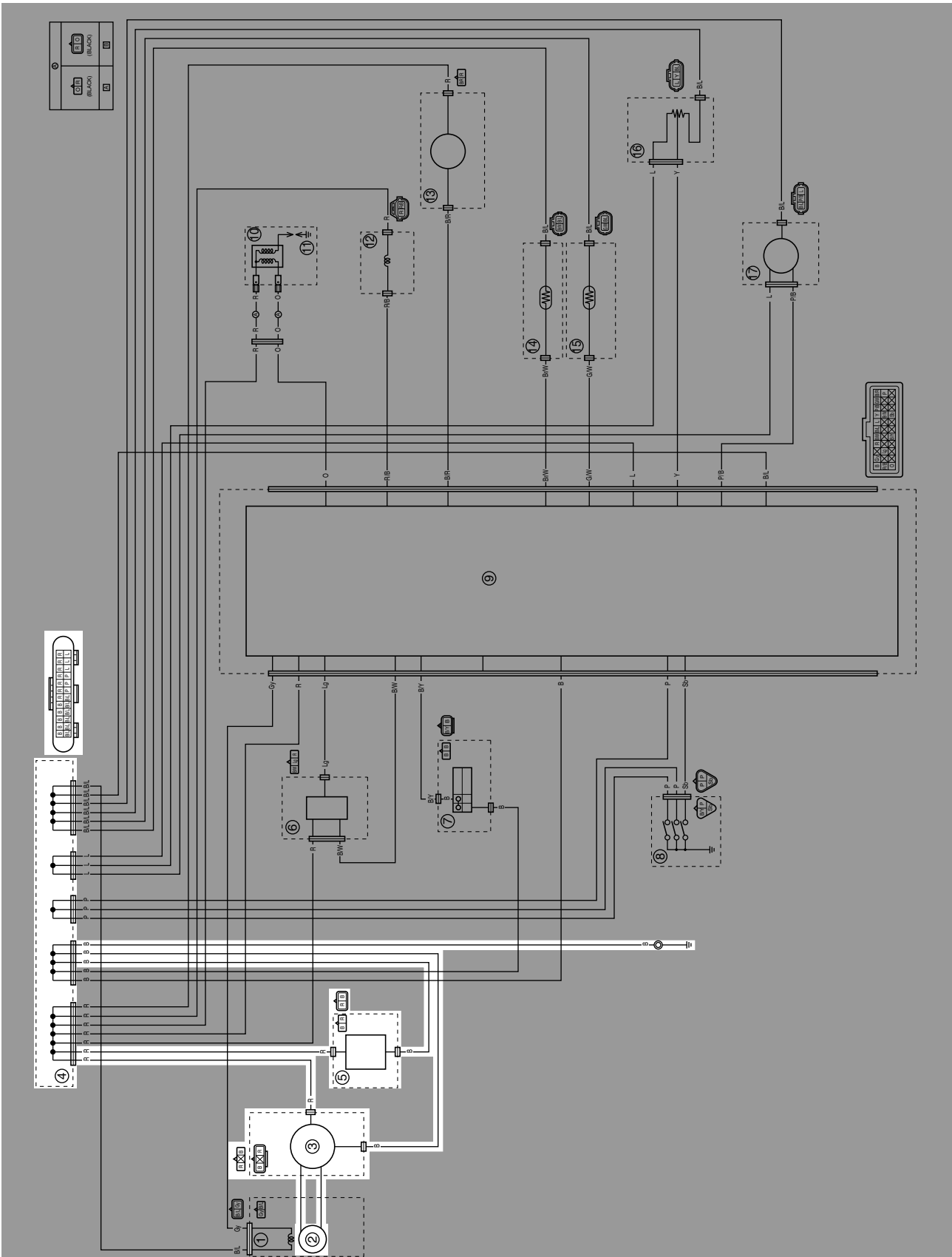
Replace the ECU.

NG →

Repair or replace the wire harness.

CHARGING SYSTEM

CIRCUIT DIAGRAM



CHARGING SYSTEM

2. AC magneto
3. Rectifier/regulator
4. Joint connector
5. Condenser

CHARGING SYSTEM

TROUBLESHOOTING

The condenser is not being charged.

TIP

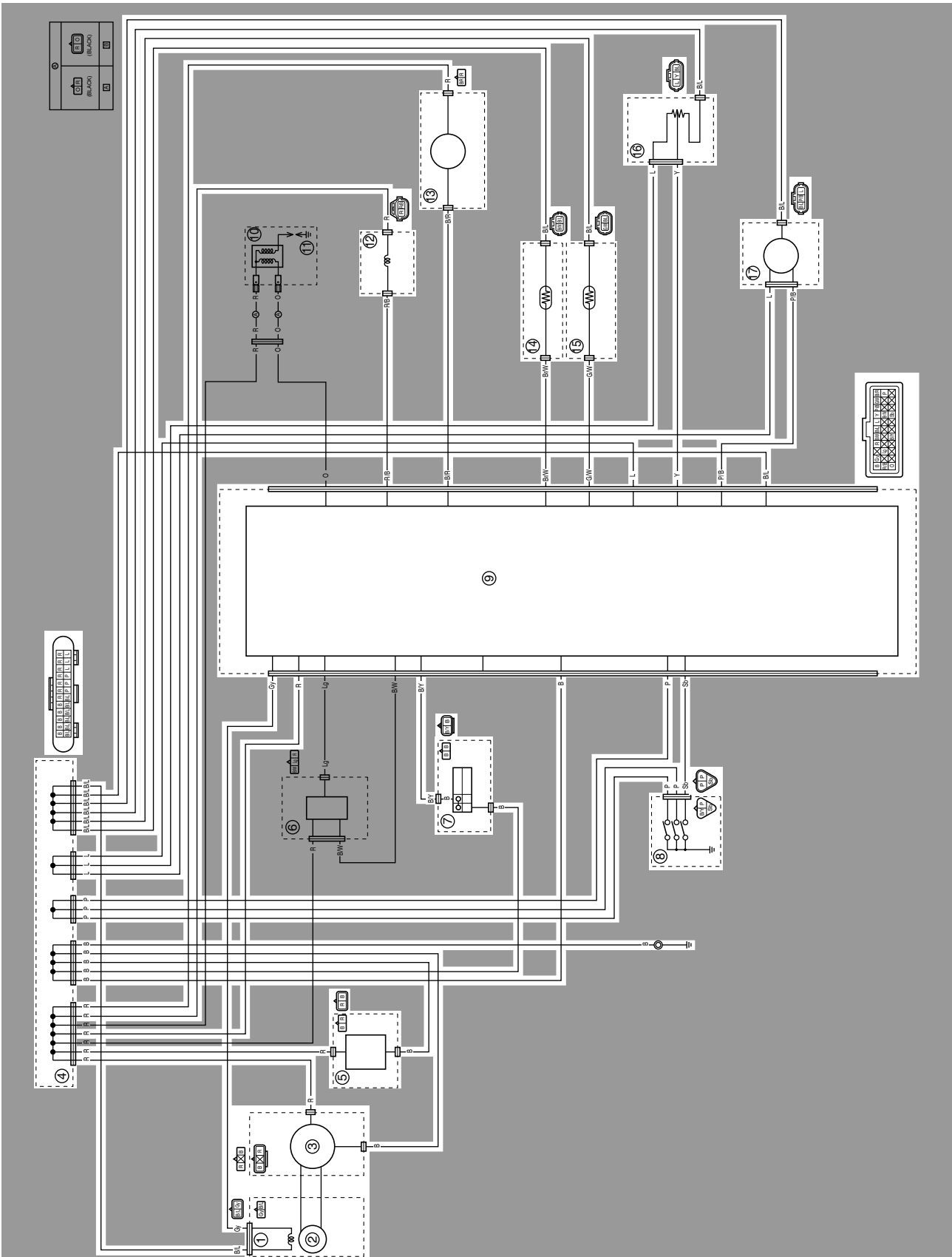
Before troubleshooting, remove the following part (s):

1. Seat
2. Air scoop (left)

1. Check the entire charging system's wiring.	NG →	Reconnect.
OK ↓		
2. Check the rectifier/regulator. Refer to "CHECKING THE RECTIFIER/REGULATOR" on page 8-43.	NG →	Replace the rectifier/regulator.
OK ↓		
3. Check the stator coil. Refer to "CHECKING THE STATOR COIL" on page 8-43.	NG →	Replace the stator coil.
OK ↓		
4. Check the charging system wire harness. Refer to "CIRCUIT DIAGRAM" on page 8-6.	NG →	Repair or replace the wire harness.
OK ↓		
Replace the condenser.		

FUEL INJECTION SYSTEM

CIRCUIT DIAGRAM



FUEL INJECTION SYSTEM

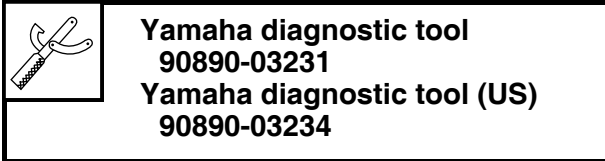
1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Joint connector
5. Condenser
7. Engine stop switch
8. Neutral switch
9. ECU
12. Fuel injector
13. Fuel pump
14. Intake air temperature sensor
15. Coolant temperature sensor
16. Throttle position sensor
17. Intake air pressure sensor

FUEL INJECTION SYSTEM

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.



FEATURES OF THE YAMAHA DIAGNOSTIC TOOL

A diagnosis can be made more quickly than traditional methods with the Yamaha diagnostic tool. Using this software, ECU and sensor data, as well as fault diagnosis, vehicle maintenance, and any necessary information can be recorded and displayed on your computer screen through a USB adapter connected to the computer interface with a communication cable connected to the vehicle's ECU.

Data obtained in various functions can be saved as vehicle history, and can be accumulated.

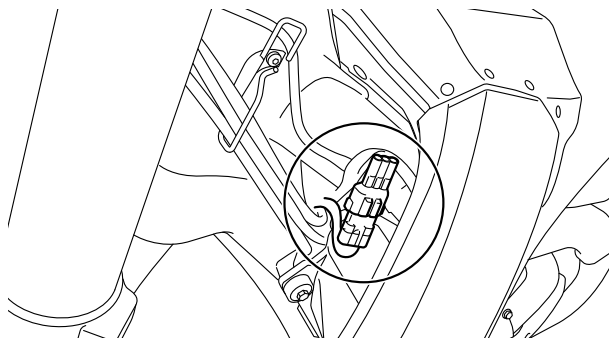
FUNCTIONS OF THE YAMAHA DIAGNOSTIC TOOL

Fault diagnosis mode	Fault codes recorded on the ECU are read, and the contents are displayed.
Function diagnostic mode	Check the operation of the output value of each sensor and actuator.
Inspection mode	Determine whether each sensor or actuator is functioning properly.
CO adjustment mode	Adjust the concentration of CO admissions during idling.
Monitoring mode	Displays a graph of sensor output values for actual operating conditions.
Logging mode	Records and saves the sensor output value in actual driving conditions.
View log	Displays the logging data.
ECU rewrite	If necessary, the ECU is rewritten using the ECU rewrite data provided by Yamaha. Ignition timing adjustment, etc. cannot be changed from the vehicle's original state.

However, the diagnostic tool cannot be used to freely change the basic vehicle functions, such as adjusting the ignition timing.

CONNECTING THE YAMAHA DIAGNOSTIC TOOL

1. Remove the coupler for connecting setting tool.



FUEL INJECTION SYSTEM

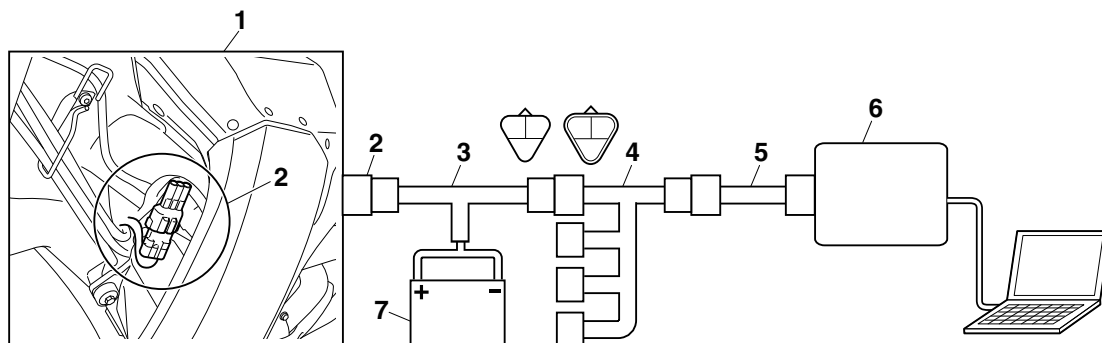
2. Connect the FI diagnostic tool sub-lead.



3. Connect the FI diagnostic tool sub-lead to the battery.

TIP

- Prepare the fully charged 12 V battery for yourself.
- For information on how to connect and use the Yamaha diagnostic tool, refer to “YAMAHA DIGNO-STIC TOOL OPERATION MANUAL”.



1. Vehicle
2. Coupler for connecting optional part
3. FI diagnostic tool sub-lead
4. Sub-harness (included with the Yamaha diagnostic tool)
5. Vehicle communication cable (included with the Yamaha diagnostic tool)
6. Yamaha diagnostic tool
7. Battery (12 V)

TROUBLESHOOTING DETAILS

This section describes the measures per fault code No. 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 in the troubleshooting chart.

After the check and service of the malfunctioning part have been completed, reset the Yamaha diagnostic tool display according to the “Reinstatement method”.

Fault code No.: To be displayed on the Yamaha diagnostic tool when the engine fails to work normally

Diagnostic code No.: To be used when the diagnostic mode is active

FUEL INJECTION SYSTEM

Fault code		12	
Symptom		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		—	
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of crankshaft position sensor coupler. Check the locking condition of the coupler. 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. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between the crankshaft position sensor coupler and ECU coupler. gray-gray black/blue-black/blue	Crank the engine. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
4	Mounted condition of crankshaft position sensor. Check for looseness or pinching. Check the gap between the crankshaft position sensor and the pickup rotor.	Improperly mounted sensor → Remount or replace the sensor. "AC MAGNETO" on page 5-59.	Crank the engine. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
5	Defective crankshaft position sensor.	Check the crankshaft position sensor. "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-42.	Crank the engine. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
6	Faulty ECU	Replace the ECU.	

FUEL INJECTION SYSTEM

TIP

If fault code Nos. 13 and 14 are both displayed, perform checkup and repair jobs for fault code No. 13 first.

Fault code	13		
Symptom	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.		
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of intake air pressure sensor coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Connection of sub wire harness coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
4	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between intake air pressure sensor coupler and ECU coupler. pink/black–pink/black blue–blue black/blue–black/blue	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
5	Mounted condition of intake air pressure sensor. Check for looseness or pinching. Check the mounted position for correctness.	Improperly mounted sensor → Remount or replace the sensor.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.

FUEL INJECTION SYSTEM

Fault code		13	
Symptom		Intake air pressure sensor: open or short circuit detected.	
6	Defective intake air pressure sensor.	Execute the diagnostic mode. (Code No.03) Atmospheric pressure at the current altitude and weather conditions is indicated. 0 m above sea level: About 101 kPa 1000 m above sea level: About 90 kPa 2000 m above sea level: About 80 kPa 3000 m above sea level: About 70 kPa	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
7	Faulty ECU	Replace the ECU.	

TIP

If fault code Nos. 13 and 14 are both displayed, perform checkup and repair jobs for fault code No. 13 first.

Fault code		14	
Symptom		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.	
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	The intake air pressure sensor hose is damaged, disconnected, clogged, twisted or bent.	Repair or replace the sensor hose.	After starting the engine, idle this and wait about 5 seconds. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.

FUEL INJECTION SYSTEM

Fault code		14	
Symptom		Intake air pressure sensor: hose system malfunction (clogged or detached hose)	
2	Defective intake air pressure sensor.	Execute the diagnostic mode. (Code No. 03) Atmospheric pressure at the current altitude and weather conditions is indicated. 0 m above sea level: About 101 kPa 1000 m above sea level: About 90 kPa 2000 m above sea level: About 80 kPa 3000 m above sea level: About 70 kPa	

Fault code		15	
Symptom		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. • 11–14 (throttle in fully closed position) • 109–116 (throttle in fully opened position)	
Procedure		Check with throttle valves fully closed. Check with throttle valves fully opened.	
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of throttle position sensor coupler. Check the locking condition of the coupler. 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.	Turn “ON” the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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.	Turn “ON” the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.

FUEL INJECTION SYSTEM

Fault code		15		
Symptom		Throttle position sensor: open or short circuit detected.		
3	Connection of sub wire harness coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.	
4	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between throttle position sensor coupler and ECU coupler. yellow–yellow blue–blue black/blue–black/blue	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.	
5	Mounted condition of throttle position sensor. Check for looseness or pinching. Check the mounted condition for correctness.	Improperly mounted sensor → Remount or replace the sensor. Refer to "ADJUSTING THE THROTTLE POSITION SENSOR" on page 7-9.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.	
6	Applied voltage of throttle position sensor lead.	Check the applied voltage. (black/blue–blue) Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 8-44.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.	
		Location of disconnected lead		Output voltage
		Disconnected ground lead		5 V
		Disconnected output lead		0 V
		Disconnected power supply lead		0 V
7	Defective throttle position sensor.	Execute the diagnostic mode. (Code No. 1) When the throttle is fully closed, 11–14 displays. When the throttle is fully opened, 109–116 displays. Incorrect display range → Replace the throttle position sensor.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.	
8	Faulty ECU	Replace the ECU.		

FUEL INJECTION SYSTEM

Fault code	16		
Symptom	Throttle position sensor: stuck throttle position sensor is detected.		
Fail-safe system	Able to start engine		
	Able to drive vehicle		
Diagnostic code No.	01		
Diagnostic tool display	Displays the throttle angle. • 11–14 (throttle in fully closed position) • 109–116 (throttle in fully opened position)		
Procedure	Check with throttle valves fully closed. Check with throttle valves fully opened.		
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Mounted condition of throttle position sensor. Check for looseness or pinching. Check the mounted condition for correctness.	Improperly mounted sensor → Remount or replace the sensor. Refer to “ADJUSTING THE THROTTLE POSITION SENSOR” on page 7-9.	Turn “ON” the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Defective throttle position sensor.	Execute the diagnostic mode. (Code No. d:01) When the throttle is fully closed, 11–14 displays. When the throttle is fully opened, 109–116 displays. Incorrect display range → Replace the throttle position sensor.	Turn “ON” the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Faulty ECU	Replace the ECU.	

FUEL INJECTION SYSTEM

TIP

Make sure that the machine is completely cold before checking the coolant temperature sensor.

Fault code	21		
Symptom	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.		
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of coolant temperature sensor coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between coolant temperature sensor coupler and ECU coupler. green/white–green/white black/blue–black/blue	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
4	Mounted condition of coolant temperature sensor. Check for looseness or pinching. Check the mounted condition for correctness.	Improperly mounted sensor → Remount or replace the sensor.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
5	Defective coolant temperature sensor.	Execute the diagnostic mode. (Code No. 06) When the machine is cold, displayed temperature is close to the ambient temperature. Improper display → Replace the coolant temperature sensor.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
6	Faulty ECU	Replace the ECU.	

FUEL INJECTION SYSTEM

TIP

Make sure that the machine is completely cold before checking the intake air temperature sensor.

Fault code	22		
Symptom	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.		
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of intake air temperature sensor coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between intake air temperature sensor coupler and ECU coupler. brown/white–brown/white black/blue–black/blue	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
4	Mounted condition of intake air temperature sensor. Check for looseness or pinching. Check the mounted condition for correctness.	Improperly mounted sensor → Remount or replace the sensor.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
5	Defective intake air temperature sensor.	Execute the diagnostic mode. (Code No. 05) When the machine is cold, displayed temperature is close to the ambient temperature. Improper display → Replace the intake air temperature sensor.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
6	Faulty ECU	Replace the ECU.	

FUEL INJECTION SYSTEM

Fault code	30		
Symptom	The vehicle has overturned.		
Fail-safe system	Able to start engine		
	Unable to drive vehicle		
Diagnostic code No.	08		
Diagnostic tool display	Displays the lean angle sensor output voltage. <ul style="list-style-type: none"> • 1.0 V (upright) • 4.0 V (overturned) 		
Procedure	Remove the ECU, and incline it 45 ° or more.		
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	The vehicle has overturned.	Raise the vehicle upright.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Mounted condition of ECU. Check for looseness or pinching. Check the mounted condition for correctness.	Improperly mounted ECU → Remount the ECU.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Faulty ECU	Execute the diagnostic mode. (Code No. 08) When the vehicle is upright: 1.0 V When the vehicle is overturned: 4.0 V Improper display → Replace the ECU.	

FUEL INJECTION SYSTEM

Fault code		33	
Symptom		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. “WARNING” on the Yamaha diagnostic tool blinks five times whenever the ignition coil is actuated.	
Procedure		Check that a spark is generated five times. • Connect an ignition checker.	
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of ignition coil coupler. Check the locking condition of the coupler. 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.	After starting the engine, idle this and wait about 5 seconds. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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.	After starting the engine, idle this and wait about 5 seconds. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between ignition coil coupler and ECU coupler. orange–orange	After starting the engine, idle this and wait about 5 seconds. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
4	Mounted condition of ignition coil. Check for looseness or pinching. Check the mounted condition for correctness.	Improperly mounted ignition coil → Remount or replace the ignition coil.	After starting the engine, idle this and wait about 5 seconds. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
5	Defective ignition coil (test the primary coils for continuity).	Check the primary resistance of the ignition coil. “CHECKING THE IGNITION COIL” on page 8-41.	After starting the engine, idle this and wait about 5 seconds. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.

FUEL INJECTION SYSTEM

Fault code		33	
Symptom		Ignition coil: open or short circuit detected in the primary lead of the ignition coil.	
6	Faulty ECU	Execute the diagnostic mode. (Code No. 30) No spark → Replace the ECU.	

TIP

Disconnect the fuel pump coupler when this diagnostic tool is used.

Fault code		39	
Symptom		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. “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.	
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of injector coupler. Check the locking condition of the coupler. 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.	After starting the engine, idle this and wait about 5 seconds. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Defective injector.	Check the injector. “CHECKING THE FUEL INJECTOR” on page 8-47.	After starting the engine, idle this and wait about 5 seconds. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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.	After starting the engine, idle this and wait about 5 seconds. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.

FUEL INJECTION SYSTEM

Fault code		39	
Symptom		Injector: open or short circuit detected.	
4	Connection of sub wire harness coupler. Check the locking condition of the coupler. 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.	After starting the engine, idle this and wait about 5 seconds. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
5	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between injector coupler and ECU coupler. red/black-red/black Between injector coupler and rectifier/regulator coupler red-red	After starting the engine, idle this and wait about 5 seconds. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
6	Faulty ECU	Replace the ECU.	

Fault code		41	
Symptom		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. • 1.0 V (upright) • 4.0 V (overturned)	
Procedure		Remove the ECU, and incline it 45° or more.	
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Faulty ECU	Replace the ECU.	

FUEL INJECTION SYSTEM

Fault code		44	
Symptom		EEPROM fault code No.: 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. <ul style="list-style-type: none"> • 00: No fault • 01: CO adjustment valve • 07: Power Tuner injection correction setting 0–8, or Power Tuner ignition timing correction setting 0–8 	
Procedure		—	
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Identification of malfunctioning point.	Execute the diagnostic mode. (Code No. 60) 00: Perform a checkup in order 4. 01: Perform a checkup in order 2. 07: Perform a checkup in order 3.	
2	“01” is indicated in Diagnostic mode (Code No. 60). EEPROM data error for adjustment of CO concentration.	Change the CO concentration, and rewrite in EEPROM. After this adjustment, turn OFF the switch on the FI diagnostic tool sub-lead, and turn it ON again. Memory not recovered → Replace the ECU.	Turn “ON” the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code number is displayed → Repeat the procedure in order 1. If the same number is indicated, perform the procedure in order 3.
3	“07” is indicated in Diagnostic mode (Code No. 60). 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)	Turn “ON” the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code number is displayed → Repeat the procedure in order 1. If the same number is indicated, perform the procedure in order 4.
4	Faulty ECU	Replace the ECU.	

FUEL INJECTION SYSTEM

Fault code		46	
Symptom		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		—	
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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.	After starting the engine, idle this, turn "OFF" the switch on the FI diagnostic tool sub-lead, and wait about 5 seconds or more. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Wire harness continuity.	Open or short circuit → Replace the wire harness. Between rectifier/regulator and ECU coupler red-red Between condenser and ECU coupler red-red	After starting the engine, idle this, turn "OFF" the switch on the FI diagnostic tool sub-lead, and wait about 5 seconds or more. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Faulty AC magneto	Check the AC magneto. "CHECKING THE AC MAGNETO" on page 5-60.	After starting the engine, idle this, turn "OFF" the switch on the FI diagnostic tool sub-lead, and wait about 5 seconds or more. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
4	Faulty ECU	Replace the ECU.	

FUEL INJECTION SYSTEM

Fault code	50		
Symptom	ECU: faulty ECU memory		
Fail-safe system	Unable to start engine		
	Unable to drive vehicle		
Diagnostic code No.	—		
Diagnostic tool display	—		
Procedure	—		
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Faulty ECU	Replace the ECU.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Check that the fault code number is not displayed.

Fault code	Waiting for connection		
Symptom	No communication signal is received from the ECU.		
Fail-safe system	Able to start engine (Unable when ECU is malfunctioning)		
	Able to drive vehicle (Unable when ECU is malfunctioning)		
Diagnostic code No.	—		
Diagnostic tool display	—		
Procedure	—		
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of Yamaha diagnostic tool coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. light green—light green	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.

FUEL INJECTION SYSTEM

Fault code		Waiting for connection	
Symptom		No communication signal is received from the ECU.	
4	Yamaha diagnostic tool malfunction	Replace the Yamaha diagnostic tool.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
5	Faulty ECU	Replace the ECU.	

Fault code	Er-2
Symptom	Signals from the ECU cannot be received within the specified period of time.
Fail-safe system	Able to start engine Able to drive vehicle
Diagnostic code No.	—
Diagnostic tool display	—
Procedure	—

Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of Yamaha diagnostic tool coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. light green—light green	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
4	Yamaha diagnostic tool malfunction	Replace the Yamaha diagnostic tool.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
5	Faulty ECU	Replace the ECU.	

FUEL INJECTION SYSTEM

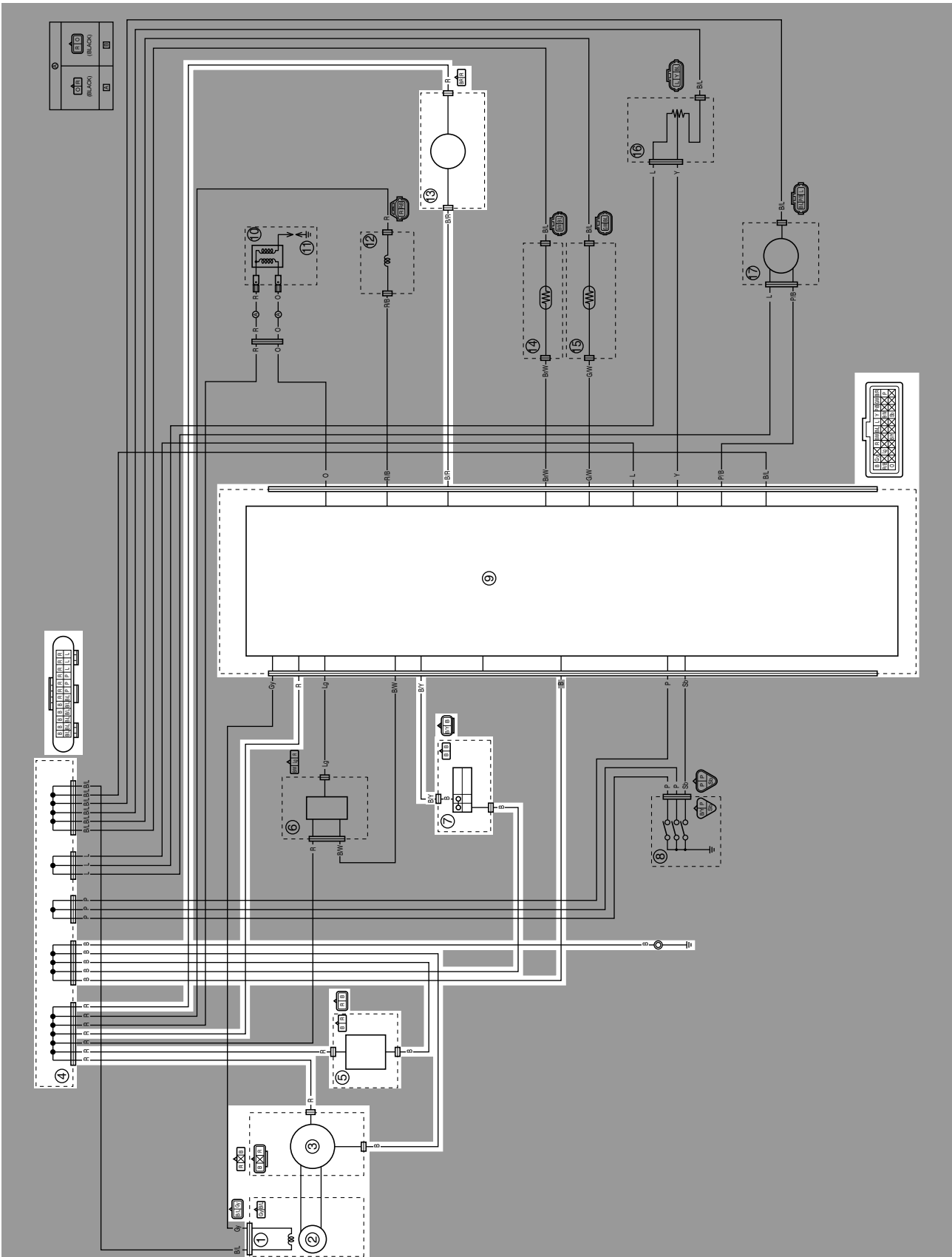
Fault code		Er-3	
Symptom		Data from the ECU cannot be received correctly.	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		—	
Diagnostic tool display		—	
Procedure		—	
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of Yamaha diagnostic tool coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. light green—light green	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
4	Yamaha diagnostic tool malfunction	Replace the Yamaha diagnostic tool.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
5	Faulty ECU	Replace the ECU.	

FUEL INJECTION SYSTEM

Fault code		Er-4	
Symptom		Registered data cannot be received from the Yamaha diagnostic tool.	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		—	
Diagnostic tool display		—	
Procedure		—	
Order	Probable cause of malfunction and check	Maintenance job	Reinstatement method
1	Connection of Yamaha diagnostic tool coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
2	Connection of wire harness ECU coupler. Check the locking condition of the coupler. 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.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
3	Wire harness continuity.	Open or short circuit → Replace the wire harness. light green—light green	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
4	Yamaha diagnostic tool malfunction	Replace the Yamaha diagnostic tool.	Turn "ON" the switch on the FI diagnostic tool sub-lead. Fault code No. is not displayed → Repair is finished. Fault code No. is displayed → Go to next order.
5	Faulty ECU	Replace the ECU.	

FUEL PUMP SYSTEM

CIRCUIT DIAGRAM



FUEL PUMP SYSTEM

2. AC magneto
3. Rectifier/regulator
4. Joint connector
5. Condenser
7. Engine stop switch
9. ECU
13. Fuel pump

FUEL PUMP SYSTEM

TROUBLESHOOTING

The fuel pump fails to operate.

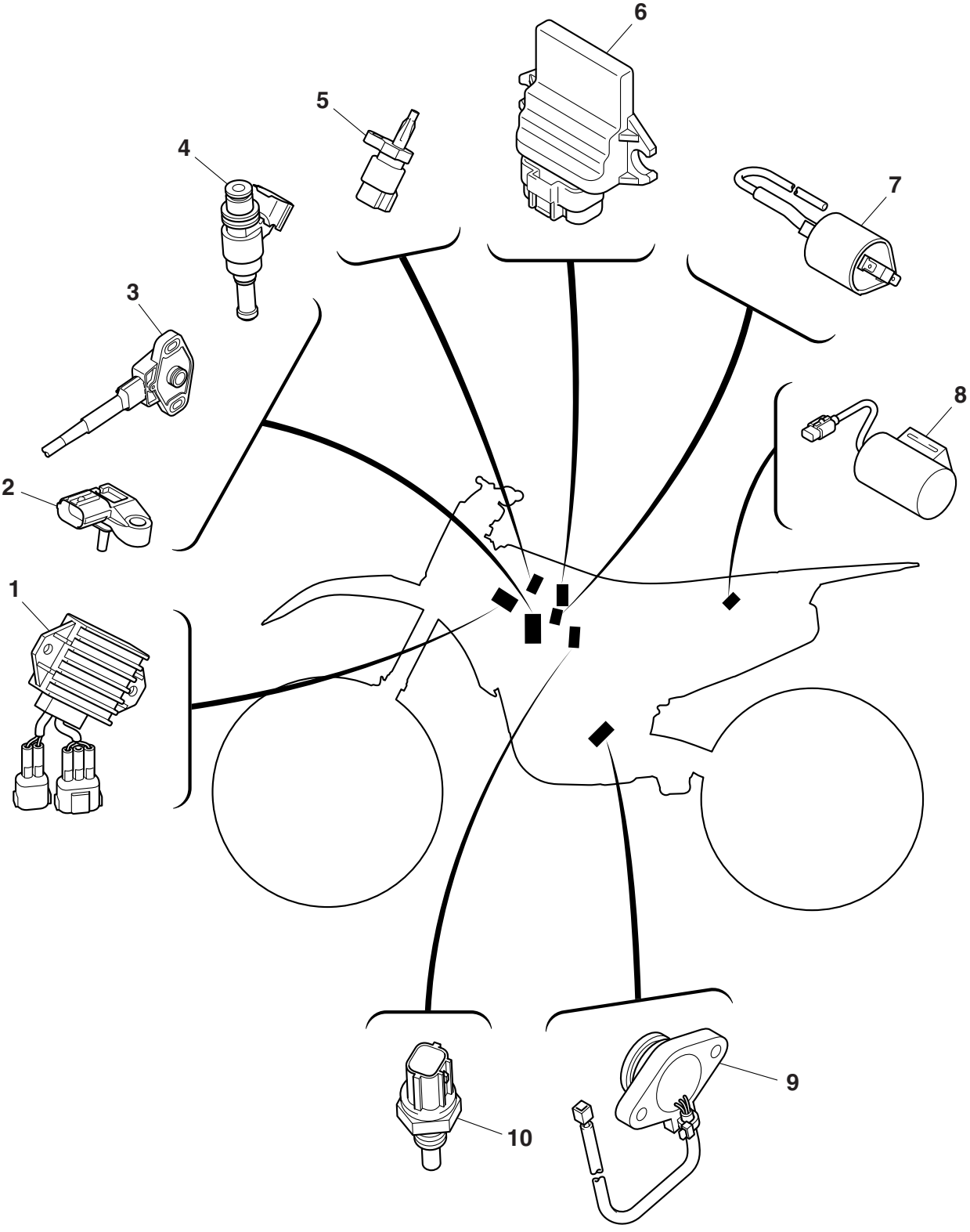
TIP

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 engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-38.	NG →	Replace the engine stop switch.
OK ↓		
3. Check fuel pressure. Refer to "CHECKING THE FUEL PRESSURE" on page 7-3.	NG →	Replace the fuel pump.
OK ↓		
4. Check the fuel pump system wire harness. Refer to "CIRCUIT DIAGRAM" on page 8-32.	NG →	Repair or replace the wire harness.
OK ↓		
Replace the ECU.		

ELECTRICAL COMPONENTS

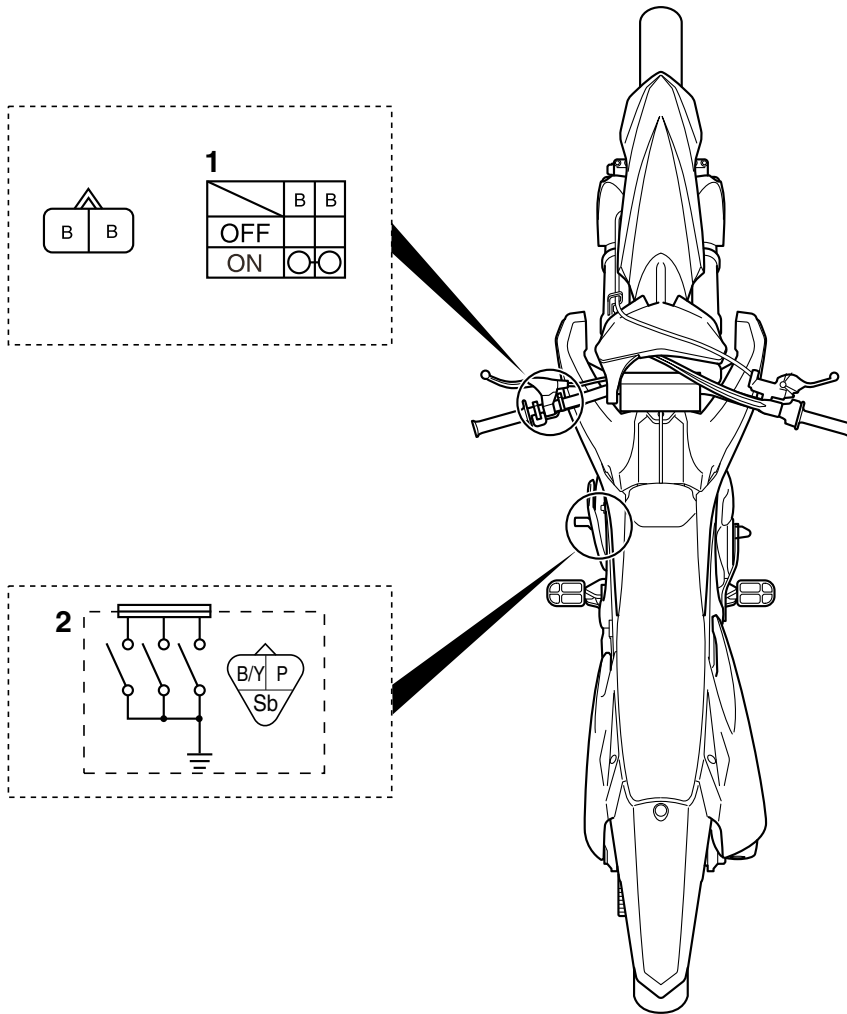


ELECTRICAL COMPONENTS

1. Rectifier/regulator
2. Intake air pressure sensor
3. Throttle position sensor
4. Injector
5. Intake air temperature sensor
6. ECU
7. Ignition coil
8. Condenser
9. Neutral switch
10. Coolant temperature sensor

ELECTRICAL COMPONENTS

CHECKING THE SWITCHES



ELECTRICAL COMPONENTS


1. Engine stop switch
2. Neutral switch

ELECTRICAL COMPONENTS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

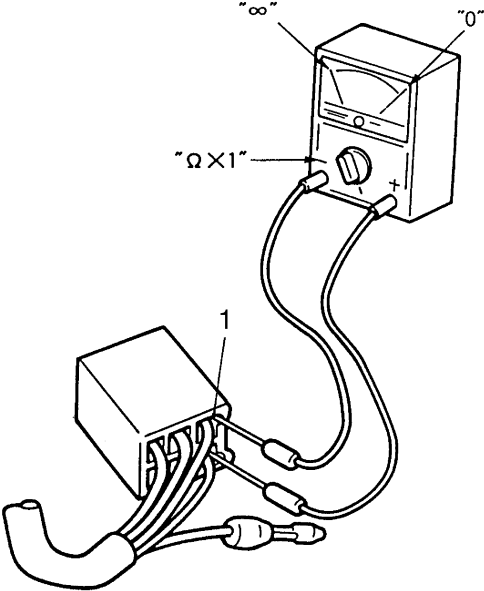
NOTICE

Never insert the tester probes into the coupler terminal slots "1". Always insert the probes from the opposite end of the coupler, taking care not to loosen or damage the leads.

	<p>Pocket tester 90890-03112 Analog pocket tester YU-03112-C</p>
---	---

TIP

- Before checking for continuity, set the pocket tester range to " $\Omega \times 1$ " to make a "0" adjustment.
- When checking for continuity, switch back and forth between the switch positions a few times.

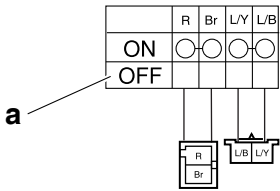


Terminal connections of the switch are shown in the terminal connection diagram below. The switch positions "a" are shown in the far left column and the switch lead colors are shown in the top row in the switch illustration.

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".



CHECKING THE IGNITION SPARK GAP


1. Check:
 - Ignition spark gap
Out of specification → Perform the ignition system troubleshooting.
Refer to “TROUBLESHOOTING” on page 8-4.

	Minimum ignition spark gap 6.0 mm (0.24 in)
---	--

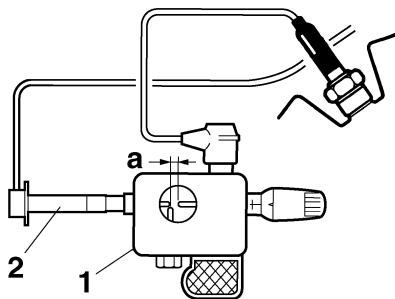
TIP

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”.

	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.

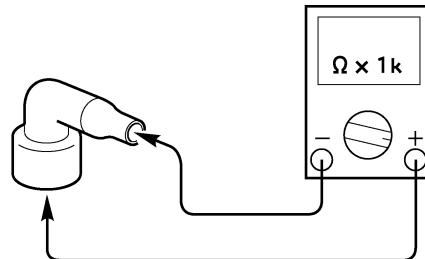
CHECKING THE SPARK PLUG CAP

1. Remove:
 - Spark plug cap
(from the spark plug lead)
2. Check:
 - Spark plug cap resistance
Out of specification → Replace.

	Spark plug cap resistance 10 kΩ
---	--

- a. Connect the pocket tester ($\Omega \times 1k$) to the spark plug cap.

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




- b. Measure the spark plug cap resistance.

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.

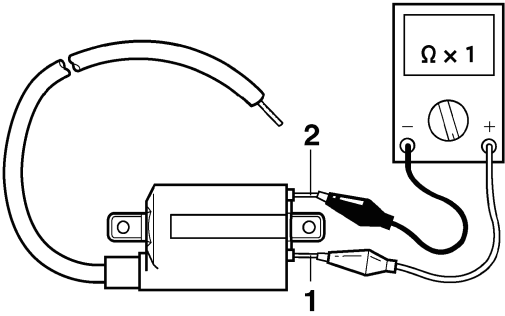
	Primary coil resistance 2.16–2.64 Ω
---	--

- a. Connect the pocket tester ($\Omega \times 1$) to the ignition coil.

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

- Positive tester probe → Ignition coil terminal 1 “1”
- Negative tester probe → Ignition coil terminal 2 “2”

ELECTRICAL COMPONENTS



b. Measure the primary coil resistance.



3. Check:

- Secondary coil resistance
Out of specification → Replace.

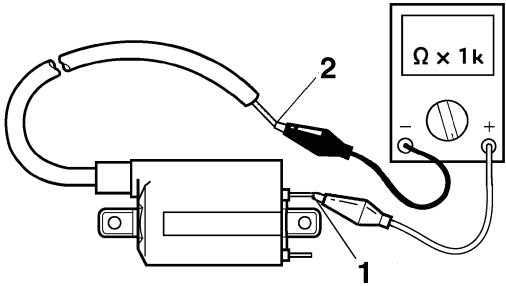
	Secondary coil resistance 8.64–12.96 kΩ
--	---



a. Connect the pocket tester ($\Omega \times 1k$) to the ignition coil.

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

- Positive tester probe → Ignition coil terminal 1 “1”
- Negative tester probe → Spark plug lead “2”



b. Measure the secondary coil resistance.



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.

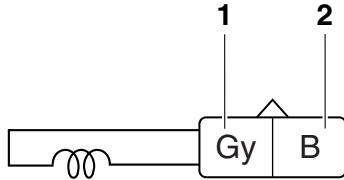
	Crankshaft position sensor resistance 228–342 Ω
--	---



a. Connect the pocket tester ($\Omega \times 100$) to the crankshaft position sensor coupler.

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

- Positive tester probe → Gray “1”
- Negative tester probe → Black “2”



b. Measure the crankshaft position sensor resistance.




CHECKING THE COOLANT TEMPERATURE SENSOR

- Remove:
 - Coolant temperature sensor


⚠ 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.

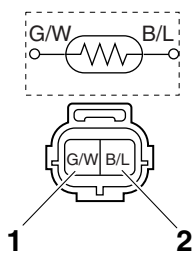
- Check:
 - Coolant temperature sensor resistance
Out of specification → Replace.

	Coolant temperature sensor resistance 2.51–2.78 kΩ at 20°C (68°F) 210–221 Ω at 100°C (212°F)
---	---

- Connect the pocket tester ($\Omega \times 1k/100$) to the coolant temperature sensor.

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

- Positive tester probe → Green/White “1”
- Negative tester probe → Black/Blue “2”

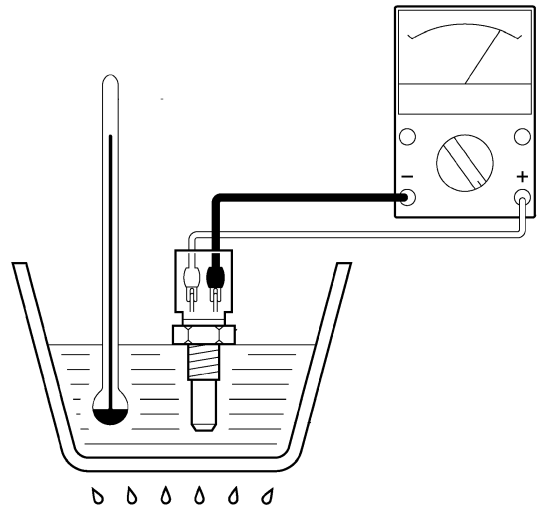


- Immerse the coolant temperature sensor in a container filled with coolant.

TIP

Make sure the coolant temperature sensor terminals do not get wet.

- Place a thermometer in the coolant.
- Slowly heat the coolant, and then let it cool to the specified temperature indicated in the table.
- Check the coolant temperature sensor for continuity at the temperatures indicated in the table.

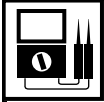


CHECKING THE THROTTLE POSITION SENSOR

- Remove:
 - Throttle position sensor
(from the throttle body)

⚠ WARNING

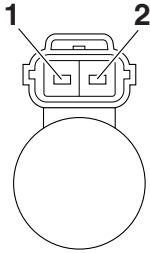
- Handle the throttle position sensor with special care.
- Never subject the throttle position sensor to strong shocks. If the throttle position sensor is dropped, replace it.



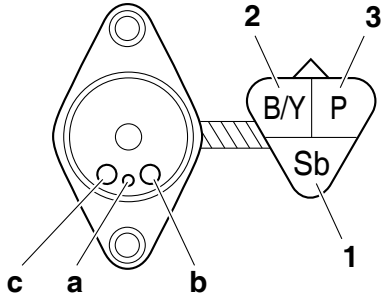
Continuity
 Positive tester probe →
 Sky blue "1"
 Negative tester probe →
 Sensor terminal "a"

Continuity
 Positive tester probe →
 Black/Yellow "2"
 Negative tester probe →
 Sensor terminal "b"

Continuity
 Positive tester probe →
 Pink "3"
 Negative tester probe →
 Sensor terminal "b"



c. Measure the fuel injector resistance.



CHECKING THE FUEL INJECTOR

1. Remove:
 - Fuel injector
 Refer to "THROTTLE BODY" on page 7-5.
2. Check:
 - Fuel injector resistance
 Out of specification → Replace.



Fuel injector resistance
 12.0 Ω

-
- a. Disconnect the fuel injector coupler from the fuel injector.
 - b. Connect the pocket tester (Ω × 10) to the fuel injector coupler.



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

- Positive tester probe →
 Injector terminal "1"
- Negative tester probe →
 Injector terminal "2"

TROUBLESHOOTING

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TROUBLESHOOTING

GENERAL INFORMATION

TIP

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

STARTING FAILURES

Engine

1. Cylinder and cylinder head
 - Loose spark plug
 - Loose cylinder head or cylinder
 - Damaged cylinder head gasket
 - Damaged cylinder gasket
 - Worn or damaged cylinder
 - Incorrect valve clearance
 - Improperly sealed valve
 - Incorrect valve-to-valve-seat contact
 - Incorrect valve timing
 - Faulty valve spring
 - Seized valve
2. Piston and piston ring(s)
 - Improperly installed piston ring
 - Damaged, worn or fatigued piston ring
 - Seized piston ring
 - Seized or damaged piston
3. Air filter
 - Improperly installed air filter
 - Clogged air filter element
4. Crankcase and crankshaft
 - Improperly assembled crankcase
 - Seized crankshaft

Fuel system

1. Fuel tank
 - Empty fuel tank
 - Clogged fuel tank breather hose
 - Deteriorated or contaminated fuel
 - Clogged or damaged fuel hose
2. Fuel pump
 - Faulty fuel pump
3. Throttle body
 - Deteriorated or contaminated fuel
 - Sucked-in air

Electrical system

1. Spark plug
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
 - Fouled spark plug
 - Worn or damaged electrode
 - Worn or damaged insulator
2. Ignition coil
 - Cracked or broken ignition coil body
 - Broken or shorted primary or secondary coils
3. Ignition system
 - Faulty ECU
 - Faulty crankshaft position sensor
 - Broken generator rotor woodruff key
4. Switches and wiring
 - Faulty ECU
 - Faulty engine stop switch
 - Broken or shorted wiring
 - Faulty neutral switch
 - Improperly grounded circuit
 - Loose connections

INCORRECT ENGINE IDLING SPEED

Engine

1. Cylinder and cylinder head
 - Incorrect valve clearance
 - Damaged valve train components
2. Air filter
 - Clogged air filter element

Fuel system

1. Throttle body
 - Damaged or loose throttle body joint
 - Improperly synchronized throttle bodies
 - Improper throttle cable free play
 - Flooded throttle body

Electrical system

1. Spark plug
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
 - Fouled spark plug
 - Worn or damaged electrode
 - Worn or damaged insulator
 - Faulty spark plug cap
2. Ignition coil
 - Broken or shorted primary or secondary coils
 - Cracked or broken ignition coil

3. Ignition system

- Faulty ECU
- Faulty crankshaft position sensor
- Broken generator rotor woodruff key

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to "STARTING FAILURES" on page 9-1.

Engine

1. Air filter
 - Clogged air filter element

Fuel system

1. Fuel pump
 - Faulty fuel pump
2. Throttle body
 - Defective throttle body
3. ECU
 - Faulty ECU

FAULTY GEAR SHIFTING

Shifting is difficult

Refer to "CLUTCH" on page 5-37.

SHIFT PEDAL DOES NOT MOVE

Shift shaft

- Bent shift shaft

Shift drum and shift forks

- Foreign object in a shift drum groove
- Seized shift fork
- Bent shift fork guide bar

Transmission

- Seized transmission gear
- Foreign object between transmission gears
- Improperly assembled transmission

JUMPS OUT OF GEAR

Shift shaft

- Incorrect shift pedal position
- Improperly returned stopper lever

Shift forks

- Worn shift fork

Shift drum

- Incorrect axial play
- Worn shift drum groove

Transmission

- Worn gear dog

FAULTY CLUTCH

Clutch slips

1. Clutch
 - Improperly assembled clutch
 - Loose or fatigued clutch spring
 - Worn friction plate
 - Worn clutch plate
2. Engine oil
 - Incorrect oil level
 - Incorrect oil viscosity (low)
 - Deteriorated oil

Clutch drags

1. Clutch
 - Unevenly tensioned clutch springs
 - Warped pressure plate
 - Bent clutch plate
 - Swollen friction plate
 - Bent clutch push rod
 - Damaged clutch boss
 - Burnt primary driven gear bushing
2. Engine oil
 - Incorrect oil level
 - Incorrect oil viscosity (high)
 - Deteriorated oil

OVERHEATING

Engine

1. Cylinder head and piston
 - Heavy carbon buildup
 - Clogged coolant passages
2. Engine oil
 - Incorrect oil level
 - Incorrect oil viscosity
 - Inferior oil quality

Cooling system

1. Coolant
 - Low coolant level
2. Radiator
 - Damaged or leaking radiator
 - Faulty radiator cap
 - Bent or damaged radiator fin
3. Water pump
 - Damaged or faulty water pump
 - Damaged hose
 - Improperly connected hose
 - Damaged pipe
 - Improperly connected pipe

Fuel system

1. Throttle body
 - Damaged or loose throttle body joint
2. Air filter
 - Clogged air filter element

Chassis

1. Brake(s)
 - Dragging brake

Electrical system

1. Spark plug
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
2. Ignition system
 - Faulty ECU
 - Faulty coolant temperature sensor

OVERCOOLING

Cooling system

- Faulty coolant temperature sensor

POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Defective master cylinder kit
- Faulty brake caliper kit
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

FAULTY FRONT FORK LEGS

Leaking oil

- Bent, damaged, or rusty inner tube
- Cracked or damaged outer tube
- Improperly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- Cracked or damaged cap bolt O-ring

Malfunction

- Bent or damaged inner tube
- Bent or damaged outer tube
- Broken fork spring
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

UNSTABLE HANDLING

1. Handlebar
 - Bent or improperly installed handlebar
2. Steering head components
 - Improperly installed upper bracket
 - Improperly installed lower bracket (improperly tightened ring nut)
 - Bent steering stem
 - Damaged ball bearing or bearing race
3. Front fork leg (s)
 - Uneven oil levels (both front fork legs)
 - Unevenly tensioned fork spring (both front fork legs)
 - Broken fork spring
 - Bent or damaged inner tube
 - Bent or damaged outer tube
4. Swingarm
 - Worn bearing or bushing
 - Bent or damaged swingarm
5. Rear shock absorber assembly (-ies)
 - Faulty rear shock absorber spring
 - Leaking oil or gas
6. Tire (s)
 - Uneven tire pressures (front and rear)
 - Incorrect tire pressure
 - Uneven tire wear
7. Wheel (s)
 - Incorrect wheel balance
 - Broken or loose spoke
 - Damaged wheel bearing
 - Bent or loose wheel axle
 - Excessive wheel runout
8. Frame
 - Bent frame
 - Damaged steering head pipe
 - Improperly installed bearing race

LIST OF SELF-DIAGNOSTIC AND FAIL-SAFE ACTIONS

LIST OF SELF-DIAGNOSTIC AND FAIL-SAFE ACTIONS

LIST OF DIAGNOSTIC CODES

Fault code	ITEM	Page
12	Crankshaft position sensor: no normal signals are received from the crankshaft position sensor.	8-14
13	Intake air pressure sensor: open or short circuit detected.	8-15
14	Intake air pressure sensor: hose system malfunction (clogged or detached hose)	8-16
15	Throttle position sensor: open or short circuit detected.	8-17
16	Throttle position sensor: stuck throttle position sensor is detected.	8-19
21	Coolant temperature sensor: open or short circuit detected.	8-20
22	Intake air temperature sensor: open or short circuit detected.	8-21
30	The vehicle has overturned.	8-22
33	Ignition coil: open or short circuit detected in the primary lead of the ignition coil.	8-23
39	Injector: open or short circuit detected.	8-24
41	ECU: built-in lean angle sensor malfunction	8-25
44	EEPROM fault code No.: an error is detected while reading or writing on EEPROM.	8-26
46	Vehicle system power supply: normal voltage is not supplied to the ECU.	8-27
50	ECU: faulty ECU memory	8-28

COMMUNICATION ERROR WITH YAMAHA DIAGNOSTIC TOOL

Fault code	ITEM	Page
Waiting for connection	No communication signal is received from the ECU.	8-28
Er-2	Signals from the ECU cannot be received within the specified period of time.	8-29
Er-3	Data from the ECU cannot be received correctly.	8-30
Er-4	Registered data cannot be received from the Yamaha diagnostic tool.	8-31

LIST OF SELF-DIAGNOSTIC AND FAIL-SAFE ACTIONS

SENSOR OPERATION TABLE

Diagnostic code No.	ITEM	Display	Procedure
01	Throttle angle • Fully closed position • Fully opened position	Displays the throttle angle. • 11–14 • 109–116	• Check with throttle fully closed. • Check with throttle fully opened.
03	Pressure of suction pipe	Displays the intake air pressure.	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.
06	Coolant temperature	Displays the coolant temperature.	Compare the actually measured coolant temperature with the Yamaha diagnostic tool display value.
08	Lean angle sensor • Upright • Overturn	Displays the output voltage. • 1.0 (V) • 4.0 (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. • Approximately 12.0 (V)	—
21	Neutral switch • Gear in neutral • Gear not in neutral	• ON • OFF	Operate the shift pedal.
25	Gear position switch • Gear in 1st or 2nd • Gear not in 1st or 2nd	• ON • OFF	Operate the shift pedal.
60	EEPROM fault code No. display • No fault • CO adjustment valve • Power Tuner injection correction setting 0–8, or • Power Tuner ignition timing correction setting 0–8	• 00 • 01 • 07	—
61	Malfunction history (△) code No. display *1 • There is no history. • There is some history.	• 00 • Other: Displays the fault code of (△).	—

LIST OF SELF-DIAGNOSTIC AND FAIL-SAFE ACTIONS

Diagnostic code No.	ITEM	Display	Procedure
62	Malfunction history (△) code No. erasure *1 <ul style="list-style-type: none"> • There is no history. • There is some history. 	<ul style="list-style-type: none"> • 00 • Other: Displays the total number of (×) and (△). 	Replace all (△) with (○) by the operation start processing.
64	Setting history display <ul style="list-style-type: none"> • There is no history. • There is some history. • History is unknown (History data is damaged). 	Displays the presence or absence of the setting history by Power Tuner. <ul style="list-style-type: none"> • 00 • 01 • 02 	—
65	Setting map erasure <ul style="list-style-type: none"> • There is no setting. • There is some setting. 	Displays the presence or absence of the setting history by Power Tuner. <ul style="list-style-type: none"> • 00 • 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.

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. <ul style="list-style-type: none"> • 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. Check that injector is actuated five times by listening for the operating sound.

LIST OF SELF-DIAGNOSTIC AND FAIL-SAFE ACTIONS

TUNING

CHASSIS	10-1
SELECTION OF THE SECONDARY REDUCTION	
RATIO (SPROCKET)	10-1
DRIVE AND REAR WHEEL SPROCKETS SETTING PARTS	10-1
TIRE PRESSURE.....	10-2
FRONT FORK SETTING.....	10-2
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CHASSIS

SELECTION OF THE SECONDARY REDUCTION RATIO (SPROCKET)

Secondary reduction ratio = Number of rear wheel sprocket teeth/Number of drive sprocket teeth

Secondary reduction ratio	3.692 (48/13) *3.769 (49/13)
---------------------------	---------------------------------

*For EUR and JPN

<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.

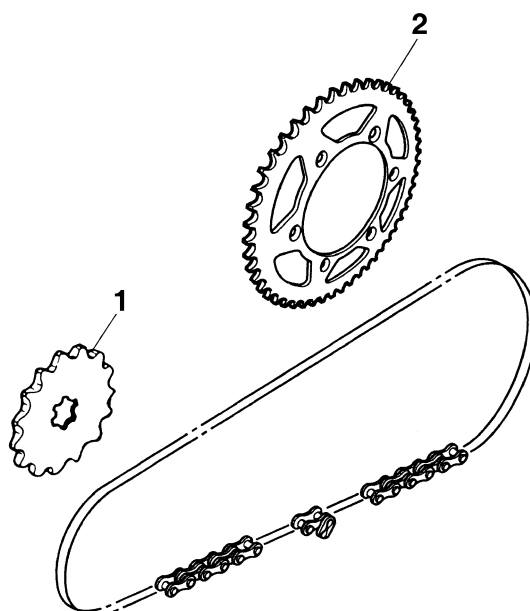
TIP

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.

DRIVE AND REAR WHEEL SPROCKETS SETTING PARTS

Part name	Type	Part number
Drive sprocket "1" (STD)	13T	9383E-13233
Rear wheel sprocket "2" (STD) *(STD)	47T	17D-25447-50
	48T	17D-25448-50
	49T	17D-25449-50
	50T	17D-25450-50
	51T	17D-25451-50
	52T	17D-25452-50

*For EUR and JPN



TIRE PRESSURE

Tire pressure should be adjusted to suit the road surface condition of the circuit.



Standard tire pressure
100 kPa (1.0 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 (0.6–0.8 kgf/cm², 9.0–12 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 (1.0–1.2 kgf/cm², 15–18 psi)

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.

CHANGE IN AMOUNT AND CHARACTERISTICS OF FORK OIL

Damping characteristic near the final stroke can be changed by changing the fork oil amount.

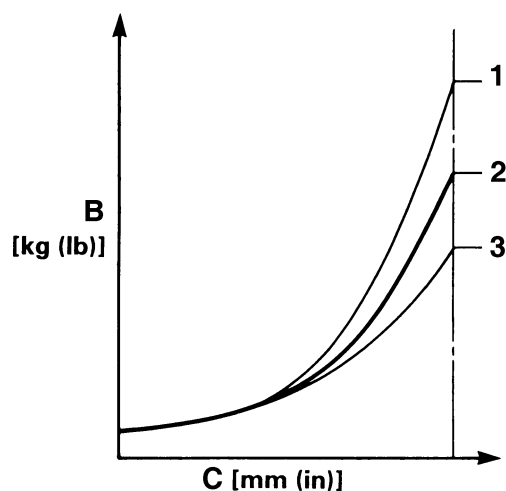
⚠ WARNING

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.



Standard oil amount
315 cm³ (10.65 US oz, 11.11 Imp.oz) (USA) (CAN)
355 cm³ (12.00 US oz, 12.52 Imp.oz) (EUR) (JPN) (AUS) (NZL) (ZAF)
Extent of adjustment
300–365 cm³ (10.14–12.34 US oz, 10.58–12.87 Imp.oz)

A



- 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

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.

FRONT FORK SETTING PARTS

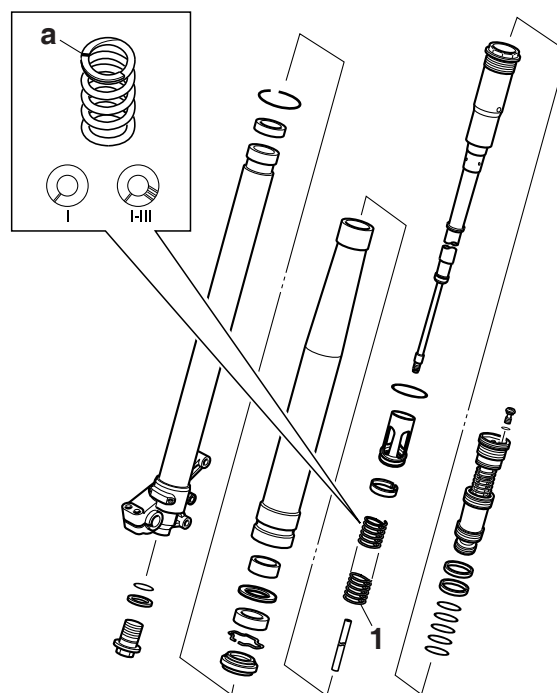
- Front fork spring "1"

Type	Spring rate N/mm	Part number	I.D. Mark (slits)
SOFT	4.5	1SL-23141-20	I-II
	4.6	1SL-23141-30	I-III
STD*	4.7	1SL-23141-10	—
		1SL-23141-40	I-IV
	4.8	1SL-23141-50	I-V
	4.9	1SL-23141-60	II-II
STD	5.0	1SL-23141-90	—
		1SL-23141-70	II-III
STIFF	5.1	1SL-23141-80	II-IV

*Except for USA and CAN

TIP

The I.D. mark (slits) "a" is proved on the end of the spring.



REAR SUSPENSION SETTING

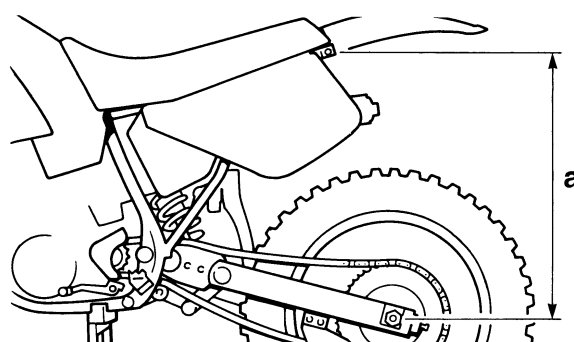
The rear shock absorber setting should be made depending on the rider's feeling of an actual run and the circuit conditions.

The rear suspension setting includes the following two factors:

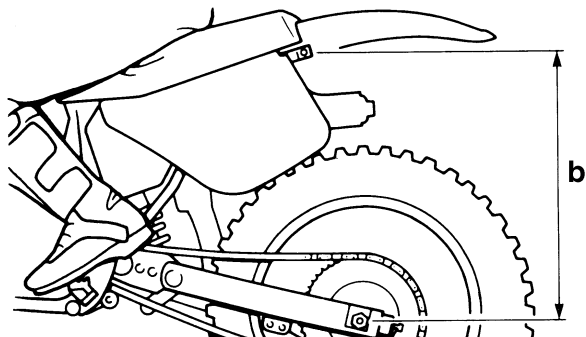
1. Setting of spring preload
 - Change the set length of the spring.
 - Change the spring.
2. Setting of damping force
 - Change the rebound damping force.
 - Change the compression damping force.

CHOOSING SET LENGTH

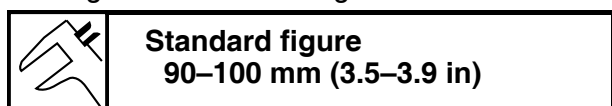
1. Place a stand or a block under the engine to put the rear wheel above the floor, and measure the length "a" between the rear wheel axle center and the rear fender holding bolt.



- 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.

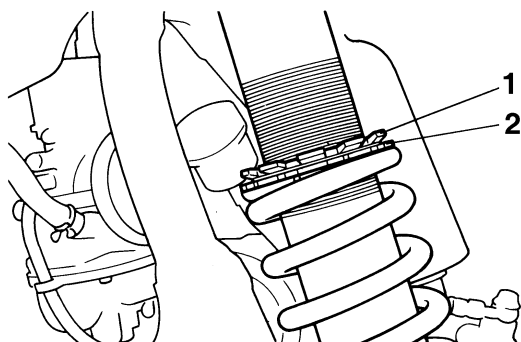


- Loosen the locknut "1" and make adjustment by turning the adjuster "2" to achieve the standard figure from the subtraction of the length "b" from the length "a".



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.



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.

- 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.
- 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

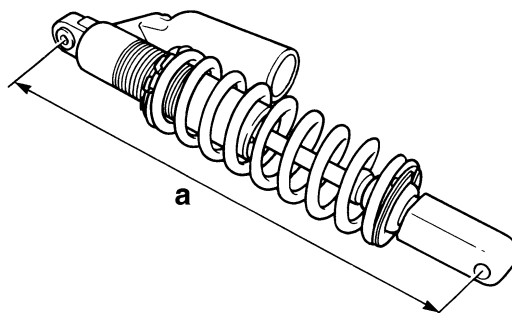
Adjusting the rebound damping force will be followed more or less by a change in the compression damping force. For correction, adjust to decrease compression damping force.

⚠ 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
458.5 mm (18.05 in)



REAR SHOCK ABSORBER SETTING PARTS

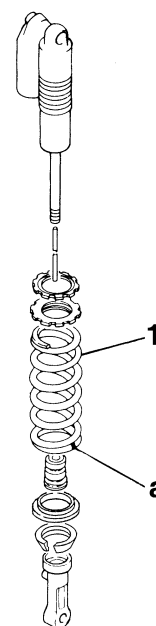
- Rear shock spring “1”

Type	Spring rate N/mm	Part number	I.D. Mark
SOFT	52	1SL-22212-40 (Blue)	Yellow
		1SL-22212-50 (Red)	
	54	1SL-22212-60 (Blue)	Pink
		1SL-22212-70 (Red)	
STD*	56	1SL-22212-20 (Blue)	White
		1SL-22212-30 (Red)	
STD	58	1SL-22212-00 (Blue)	Silver
		1SL-22212-10 (Red)	
STIFF	60	1SL-22212-80 (Blue)	Brown
		1SL-22212-90 (Red)	

*Except for USA and CAN

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.



- Extent of adjustment (spring preload)

Maximum	Minimum
Position in which the spring is turned in 18 mm (0.71 in) from its free length.	Position in which the spring is turned in 1.5 mm (0.06 in) from its free length.

TIP

For the spring preload adjustment, refer to “ADJUSTING THE REAR SHOCK ABSORBER ASSEMBLY” on page 3-30.

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 Oil amount Spring	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Decrease oil amount by about 5–10 cm ³ (0.2–0.3 US oz, 0.2–0.4 Imp.oz). Replace with soft spring.
Unsmooth movement over entire range	○	○	○	○	Outer tube Inner tube Slide metal Piston metal Lower bracket tightening torque	Check for any bends, dents, other noticeable scars, etc. If any, replace affected parts. Replace with a new one for extended use. Replace with a new one for extended use. Retighten to specified torque.
Poor initial movement				○	Rebound damping force Oil seals	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Apply grease in oil seal wall.
Soft over entire range, bottoming out	○	○			Compression damping force Oil amount Spring	Turn adjuster clockwise (about 2 clicks) to increase damping. Increase oil amount by about 5–10 cm ³ (0.2–0.3 US oz, 0.2–0.4 Imp.oz). Replace with stiff spring.
Stiff toward stroke end	○				Oil amount	Decrease oil amount by about 5 cm ³ (0.2 US oz, 0.2 Imp.oz).
Soft toward stroke end, bottoming out	○				Oil amount	Increase oil amount by about 5 cm ³ (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 Rebound damping force Balance with rear end Oil amount	Turn adjuster clockwise (about 2 clicks) to increase damping. Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Set sunken length for 95–100 mm (3.7–3.9 in) when one passenger is astride seat (lower rear posture). Increase oil amount by about 5 cm ³ (0.2 US oz, 0.2 Imp.oz).
“Obtrusive” front, tending to upper front posture			○	○	Compression damping force Balance with rear end Spring Oil amount	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Set sunken length for 90–95 mm (3.5–3.7 in) when one passenger is astride seat (upper rear posture). Replace with soft spring. Decrease oil amount by about 5–10 cm ³ (0.2–0.3 US oz, 0.2–0.4 Imp.oz).

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 Spring set length	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Set sunken length for 90–100 mm (3.5–3.9 in) when one passenger is astride seat.
Spongy and unstable			○	○	Rebound damping force Low compression damping Spring	Turn adjuster clockwise (about 2 clicks) to increase damping. Turn adjuster clockwise (about 1 click) to increase damping. Replace with stiff spring.

CHASSIS

Symptom	Section				Check	Adjust
	Jump	Large gap	Medium gap	Small gap		
Heavy and dragging			○	○	Rebound damping force Spring	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Replace with soft spring.
Poor road gripping				○	Rebound damping force Low compression damping High compression damping Spring set length Spring	Turn adjuster counterclockwise (about 2 clicks) to decrease damping. Turn adjuster clockwise (about 1 click) to increase damping. Turn adjuster clockwise (about 1/6 turn) to increase damping. Set sunken length for 90–100 mm (3.5–3.9 in) when one passenger is astride seat. Replace with soft spring.
Bottoming out	○	○			High compression damping Spring set length Spring	Turn adjuster clockwise (about 1/6 turn) to increase damping. Set sunken length for 90–100 mm (3.5–3.9 in) when one passenger is astride seat. Replace with stiff spring.
Bouncing	○	○			Rebound damping force Spring	Turn adjuster clockwise (about 2 clicks) to increase damping. Replace with soft spring.
Stiff travel	○	○			High compression damping Spring set length Spring	Turn adjuster counterclockwise (about 1/6 turn) to decrease damping. Set sunken length for 90–100 mm (3.5–3.9 in) when one passenger is astride seat. Replace with soft spring.

WIRING DIAGRAM

YZ450F/YZ450FF 2015

1. Crankshaft position sensor
2. AC magneto
3. Rectifier/regulator
4. Joint connector
5. Condenser
6. Coupler for connecting optional part
7. Engine stop switch
8. Neutral switch
9. ECU
10. Ignition coil
11. Spark plug
12. Injector
13. Fuel pump
14. Intake air temperature sensor
15. Coolant temperature sensor
16. Throttle position sensor
17. Intake air pressure sensor

COLOR CODE

B	Black
Gy	Gray
L	Blue
Lg	Light green
O	Orange
P	Pink
R	Red
Sb	Sky blue
Y	Yellow
B/L	Black/Blue
B/R	Black/Red
B/W	Black/White
B/Y	Black/Yellow
Br/W	Brown/White
G/W	Green/White
P/B	Pink/Black
R/B	Red/Black



