YAMAHA 2014

SERVICE MANUAL

MT07A

MT-07

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EAS20002

MT07A 2014
SERVICE MANUAL

First edition, October 2014

EAS20003
IMPORTANT

This manual was produced by the Yamaha Motor Company, Ltd. primarily for use by Yamaha dealers and their qualified mechanics. It is not possible to include all the knowledge of a mechanic in one manual. Therefore, anyone who uses this book to perform maintenance and repairs on Yamaha vehicles should have a basic understanding of mechanics and the techniques to repair these types of vehicles. Repair and maintenance work attempted by anyone without this knowledge is likely to render the vehicle unsafe and unfit for use.

Yamaha Motor Company, Ltd. is continually striving to improve all of its models. Modifications and significant changes in specifications or procedures will be forwarded to all authorized Yamaha dealers and will appear in future editions of this manual where applicable.

TIP

Designs and specifications are subject to change without notice.

EAS30001
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.**

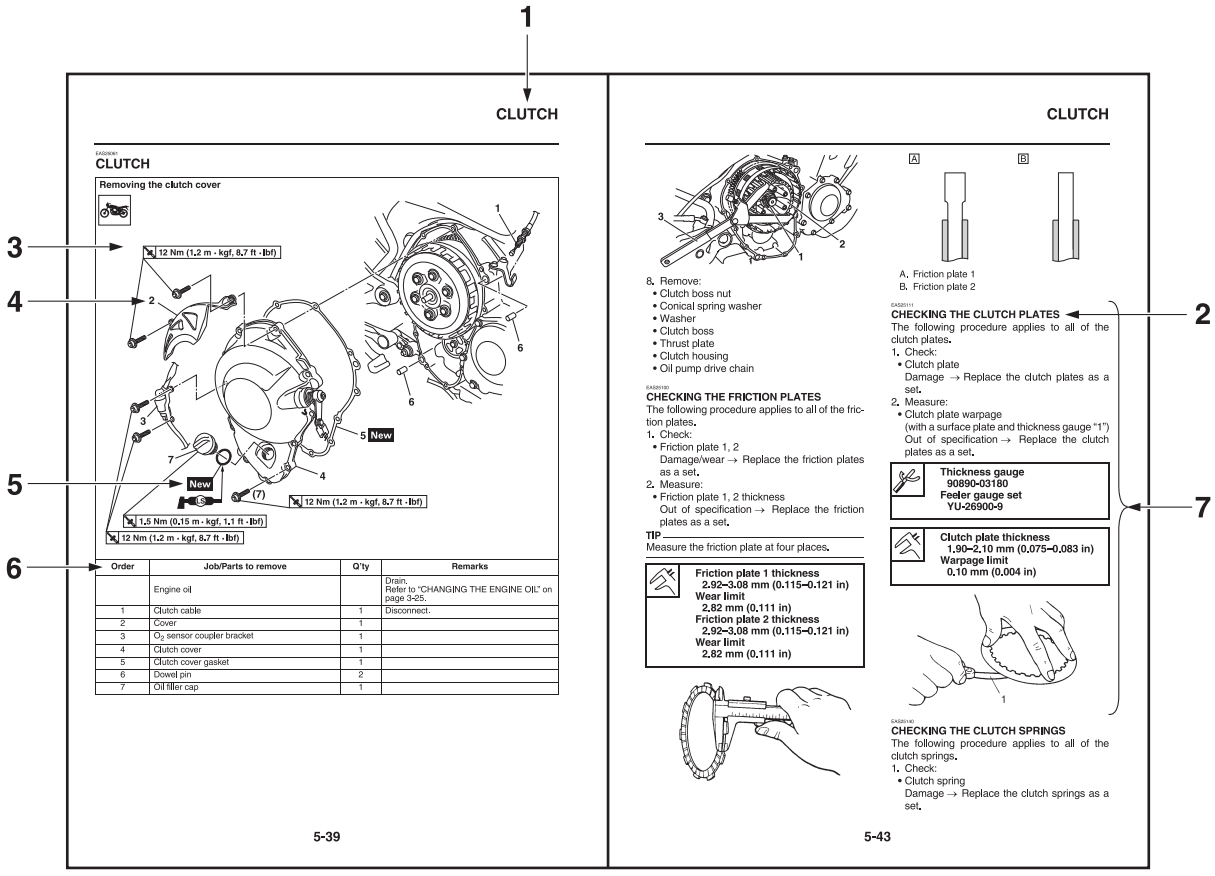
TIP	A TIP provides key information to make procedures easier or clearer.

EAS20004

HOW TO USE THIS MANUAL

This manual is intended as a handy, easy-to-read reference book for the mechanic. Comprehensive explanations of all installation, removal, disassembly, assembly, repair and check 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 disassembly step.
- Symbols "5" indicate parts to be lubricated or replaced.
  Refer to "SYMBOLS" on page 1-4.
- A job instruction chart "6" accompanies the exploded diagram, providing the order of jobs, names of parts, notes in jobs, etc. This step explains removal and disassembly procedure only. For installation and assembly procedure, reverse the steps.
- Jobs "7" requiring more information (such as special tools and technical data) are described sequentially.

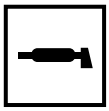


EAS20005
SYMBOLS

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

TIP

The following symbols are not relevant to every vehicle.

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

EAS10003

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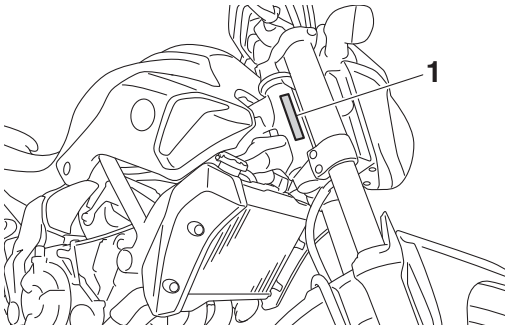
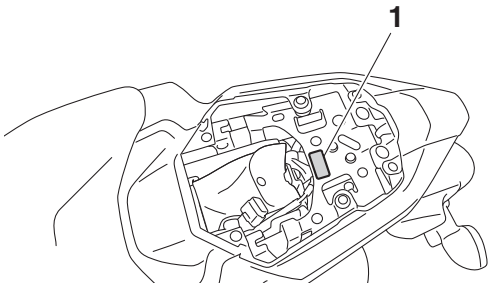
GENERAL INFORMATION

EAS20007
IDENTIFICATION

EAS30002
VEHICLE IDENTIFICATION NUMBER
The vehicle identification number “1” is stamped into the right side of the steering head pipe.



EAS30003
MODEL LABEL
The model label “1” is affixed to the frame under the passenger seat. This information will be needed to order spare parts.



EAS20008
FEATURES

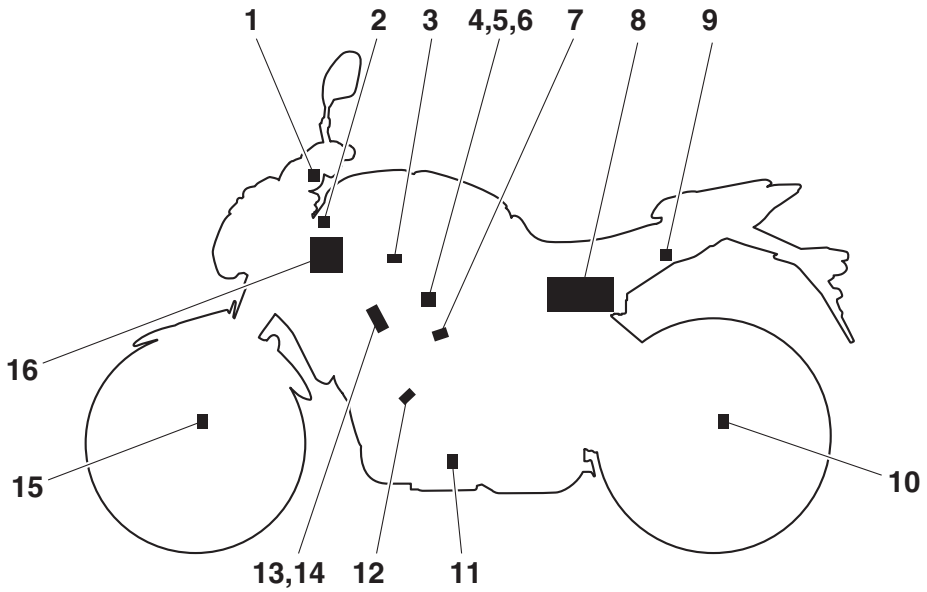
EAS30005
OUTLINE OF THE FI SYSTEM

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 that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet used in the respective carburetor.

Despite the same volume of intake air, the fuel volume requirement varies by the engine operating conditions, such as acceleration, deceleration, or operating under a heavy load. Carburetors that meter the fuel through the use of jets have been provided with various auxiliary devices, so that an optimum air-fuel ratio can be achieved to accommodate the constant changes in the operating conditions of the engine.

As the requirements for the engine to deliver more performance and cleaner exhaust gases increase, it becomes necessary to control the air-fuel ratio in a more precise and finely tuned manner. To accommodate this need, this model has adopted an electronically controlled fuel injection (FI) system, in place of the conventional carburetor system. This system can achieve an optimum air-fuel ratio required by the engine at all times by using a microprocessor that regulates the fuel injection volume according to the engine operating conditions detected by various sensors.

The adoption of the FI system has resulted in a highly precise fuel supply, improved engine response, better fuel economy, and reduced exhaust emissions.

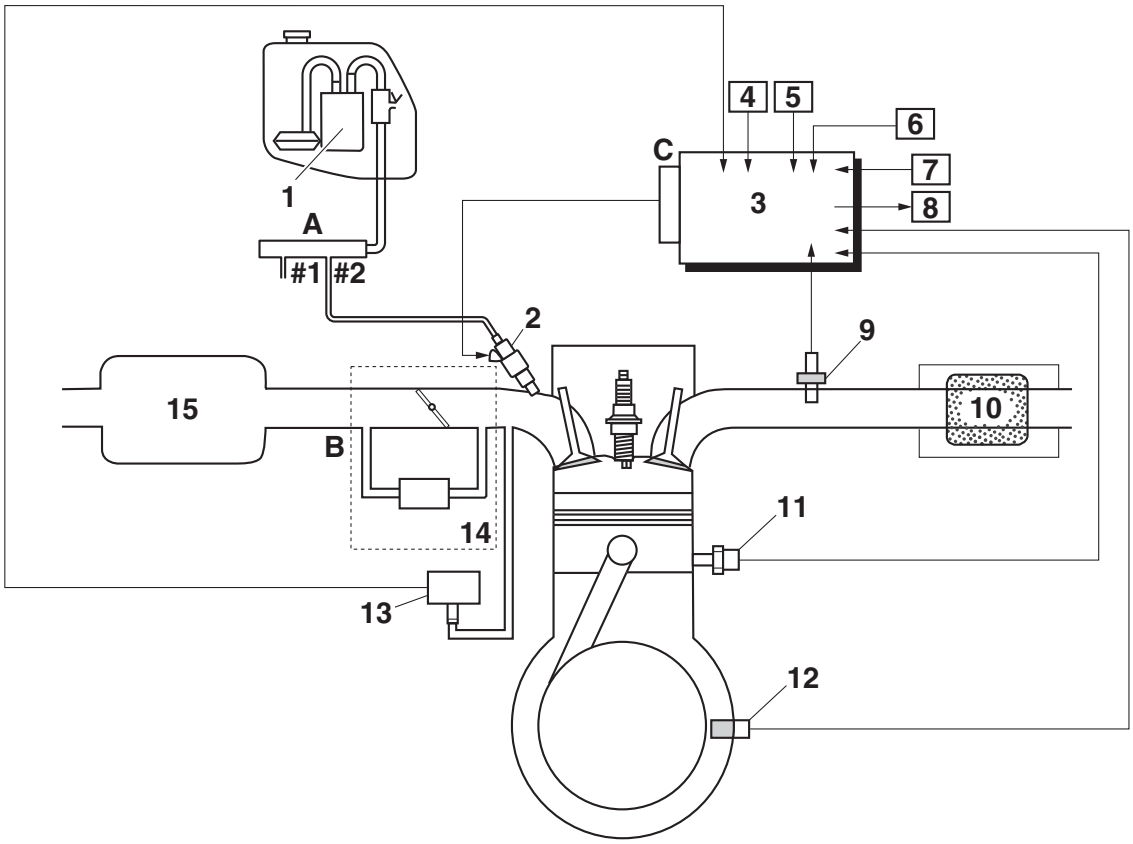


1. Engine trouble warning light
2. Intake air temperature sensor
3. Intake air pressure sensor
4. Fuel injectors
5. Throttle position sensor
6. ISC (idle speed control) valve
7. Coolant temperature sensor
8. Battery
9. Lean angle sensor
10. Rear wheel sensor
11. O_2 sensor
12. Crankshaft position sensor
13. Ignition coils
14. Spark plugs
15. Front wheel sensor
16. ECU (engine control unit)

EAS30617
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 a certain level. 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 that are input from the throttle position sensor, coolant temperature sensor, lean angle sensor, crankshaft position sensor, intake air pressure sensor, intake air temperature sensor, rear wheel sensor and O_2 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.



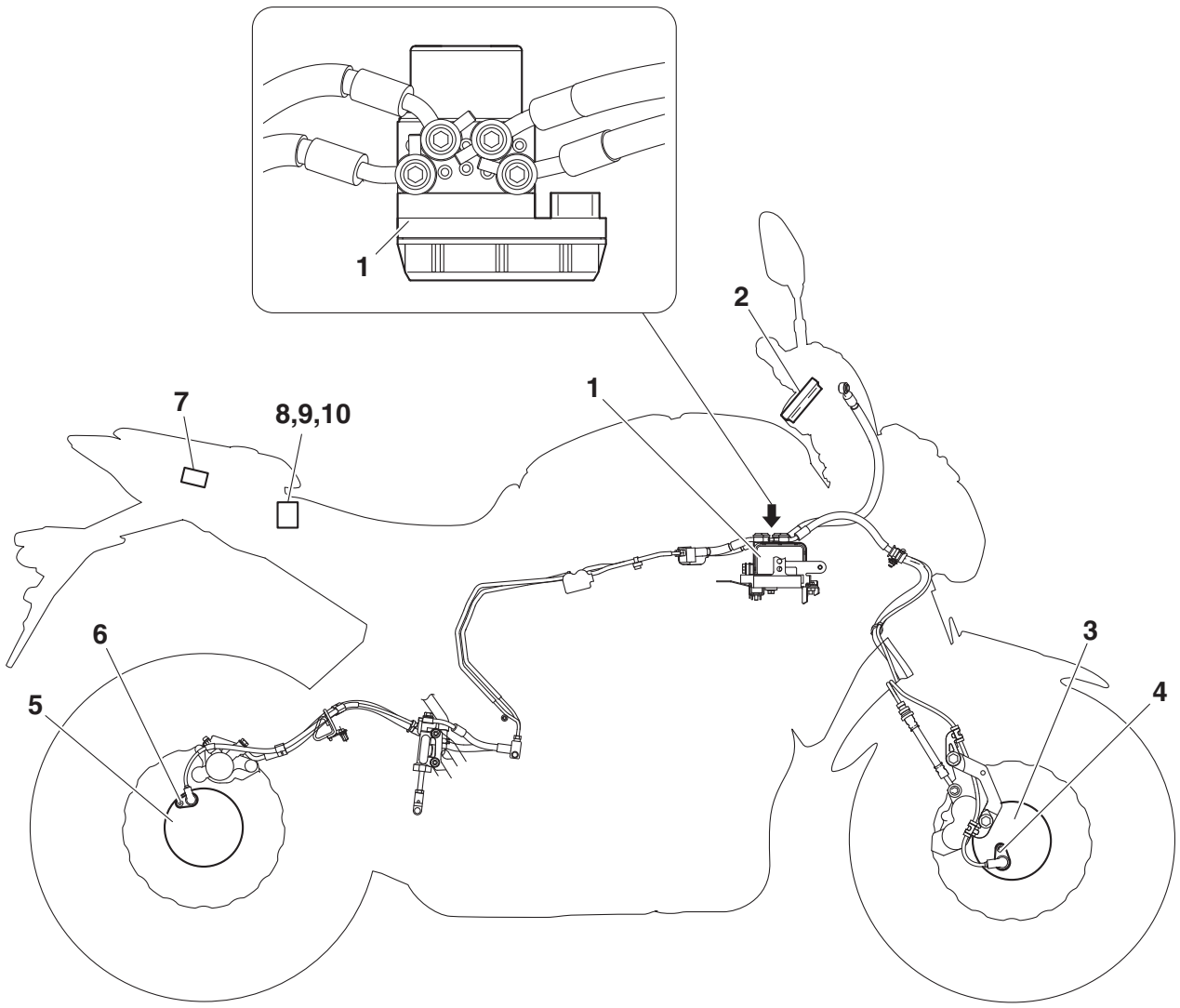
1. Fuel pump
2. Fuel injector
3. ECU (engine control unit)
4. Throttle position sensor
5. Intake air temperature sensor
6. Rear wheel sensor
7. Lean angle sensor
8. ISC (idle speed control) unit
9. O_2 sensor
10. Catalytic converter
11. Coolant temperature sensor
12. Crankshaft position sensor
13. Intake air pressure sensor
14. Throttle body
15. Air filter case

A. Fuel system
B. Air system
C. Control system

EAS30683
OUTLINE OF THE ABS

1. The Yamaha ABS (anti-lock brake system) features an electronic control system, which acts on the front and rear brakes independently.
2. The ABS features a compact and lightweight design to help maintain the basic maneuverability of the vehicle.
3. The hydraulic unit assembly, which is the main component of the ABS, is centrally located on the vehicle to increase mass centralization.

ABS layout



1. Hydraulic unit assembly
2. ABS warning light
3. Front wheel sensor rotor
4. Front wheel sensor
5. Rear wheel sensor rotor
6. Rear wheel sensor
7. Yamaha diagnostic tool coupler
8. ABS control unit fuse
9. ABS solenoid fuse
10. ABS motor fuse

ABS

The operation of the Yamaha ABS brakes is the same as conventional brakes on other vehicles, with a brake lever for operating the front brake and a brake pedal for operating the rear brake.
When wheel lock is detected during emergency braking, hydraulic control is performed by the hydraulic system on the front and rear brakes independently.

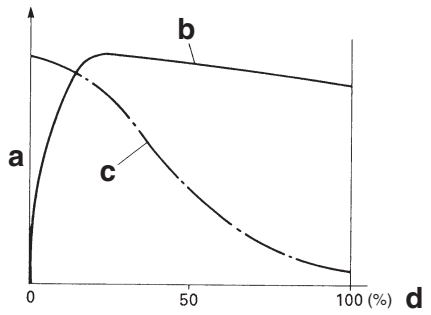
Useful terms

- Wheel speed:
  The rotation speed of the front and rear wheels.
- Chassis speed:
  The speed of the chassis.
  When the brakes are applied, wheel speed and chassis speed are reduced. However, the chassis travels forward by its inertia even though the wheel speed is reduced.
- Brake force:
  The force applied by braking to reduce the wheel speed.
- Wheel lock:
  A condition that occurs when the rotation of one or both of the wheels has stopped, but the vehicle continues to travel.
- Side force:
  The force on the tires which supports the vehicle when cornering.
- Slip ratio:
  When the brakes are applied, slipping occurs between the tires and the road surface. This causes a difference between the wheel speed and the chassis speed.
  Slip ratio is the value that shows the rate of wheel slippage and is defined by the following formula.
  Slip ratio = (Chassis speed – Wheel speed)/Chassis speed × 100 (%)
  0%: There is no slipping between the wheel and the road surface. The chassis speed is equal to the wheel speed.
  100%: The wheel speed is “0”, but the chassis is moving (i.e., wheel lock).

Brake force and vehicle stability

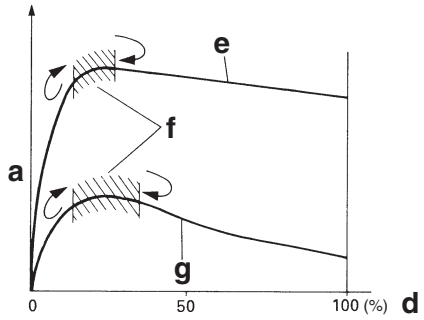
When the brake pressure is increased, wheel speed is reduced. Slipping occurs between the tire and the road surface and brake force is generated. The limit of this brake force is determined by the friction force between the tire and the road surface and is closely related to wheel slippage. Wheel slippage is represented by the slip ratio.
Side force is also closely related to wheel slippage. See figure “A”. If the brakes are applied while keeping the proper slip ratio, it is possible to obtain the maximum brake force without losing much side force. ABS allows full use of the tires’ capabilities even on slippery road surfaces or less slippery road surfaces. See figure “B”.

A



a. Friction force between the tire and road surface
b. Brake force
c. Side force
d. Slip ratio

B



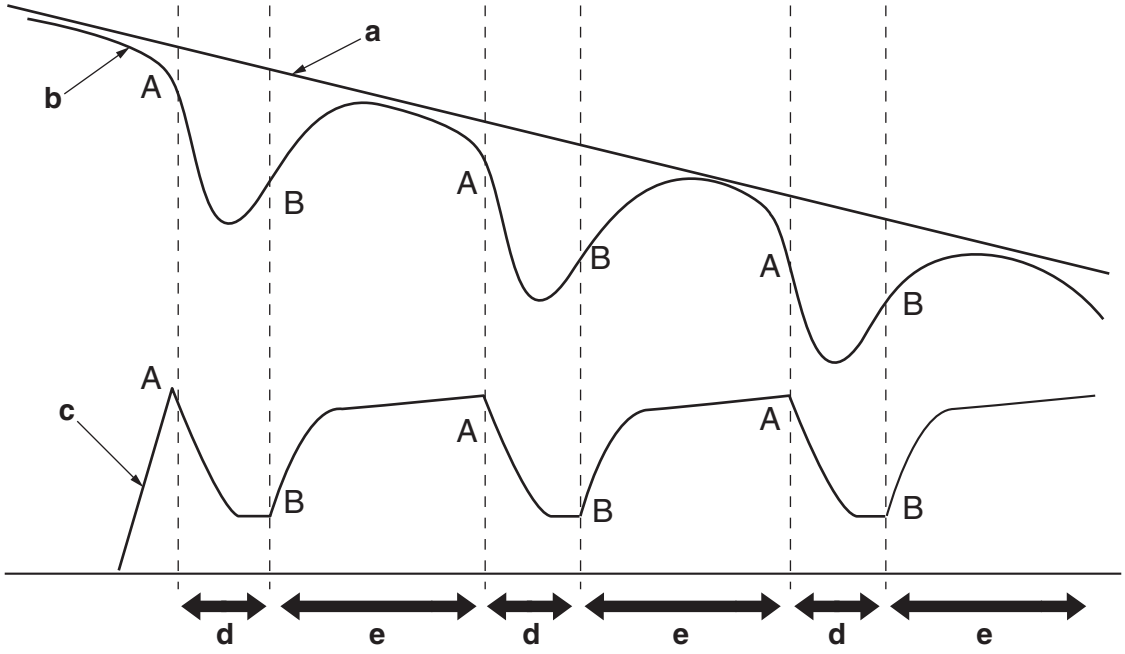
e. Less slippery road surface
f. Controlling zone
g. Slippery road surface

Wheel slip and hydraulic control

The ABS ECU calculates the wheel speed of each wheel according to the rotation signal received from the front and rear wheel sensors. In addition, the ABS ECU calculates the vehicle chassis speed and the rate of speed reduction based on the wheel speed values.

The difference between the chassis speed and the wheel speed calculated in the slip ratio formula is equal to the wheel slip. When the wheel speed is suddenly reduced, the wheel has a tendency to lock. When the wheel slip and the wheel speed reduction rate exceed the preset values, the ABS ECU determines that the wheel has a tendency to lock.

If the slip is large and the wheel has a tendency to lock (point "A" in the following figure), the ABS ECU reduces the hydraulic pressure in the brake caliper. Once the ABS ECU determines that the tendency of the wheel to lock has diminished after the hydraulic pressure is reduced, it increases the hydraulic pressure (point "B" in the following figure). The hydraulic pressure is initially increased quickly, and then it is increased gradually.



a. Chassis speed
b. Wheel speed
c. Brake force
d. Depressurizing phase
e. Pressurizing phase

ABS operation and vehicle control

If the ABS starts operating, there is a tendency of the wheel to lock, and the vehicle is approaching the limit of control. To make the rider aware of this condition, the ABS has been designed to generate a reaction-force pulsating action in the brake lever and brake pedal independently.

TIP

When the ABS is activated, a pulsating action may be felt at the brake lever or brake pedal, but this does not indicate a malfunction.

The higher the side force on a tire, the less traction there is available for braking. This is true whether the vehicle is equipped with ABS or not. Therefore, sudden braking while cornering is not recommended. Excessive side force, which ABS cannot prevent, could cause the tire to slip sideways.

EWA16510

⚠ WARNING

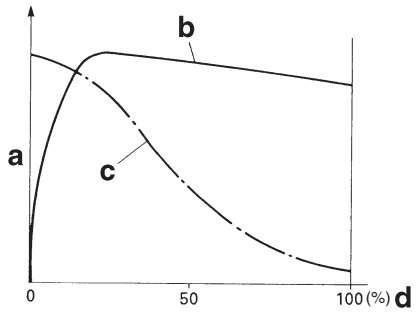
The braking of the vehicle, even in the worst case, is principally executed when the vehicle is advancing straight ahead. During a turn, sudden braking is liable to cause a loss of traction of the tires. Even in vehicles equipped with ABS, overturning of the vehicle cannot be prevented if it is braked suddenly.

The ABS functions to prevent the tendency of the wheel to lock by controlling the hydraulic pressure. However, if there is a tendency of the wheel to lock on a slippery road surface, due to engine braking, the ABS may not be able to prevent the wheel from locking.

EWA13870

⚠ WARNING

The ABS controls only the tendency of the wheel to lock caused by applying the brakes. The ABS cannot prevent wheel lock on slippery surfaces, such as ice, when it is caused by engine braking, even if the ABS is operating.

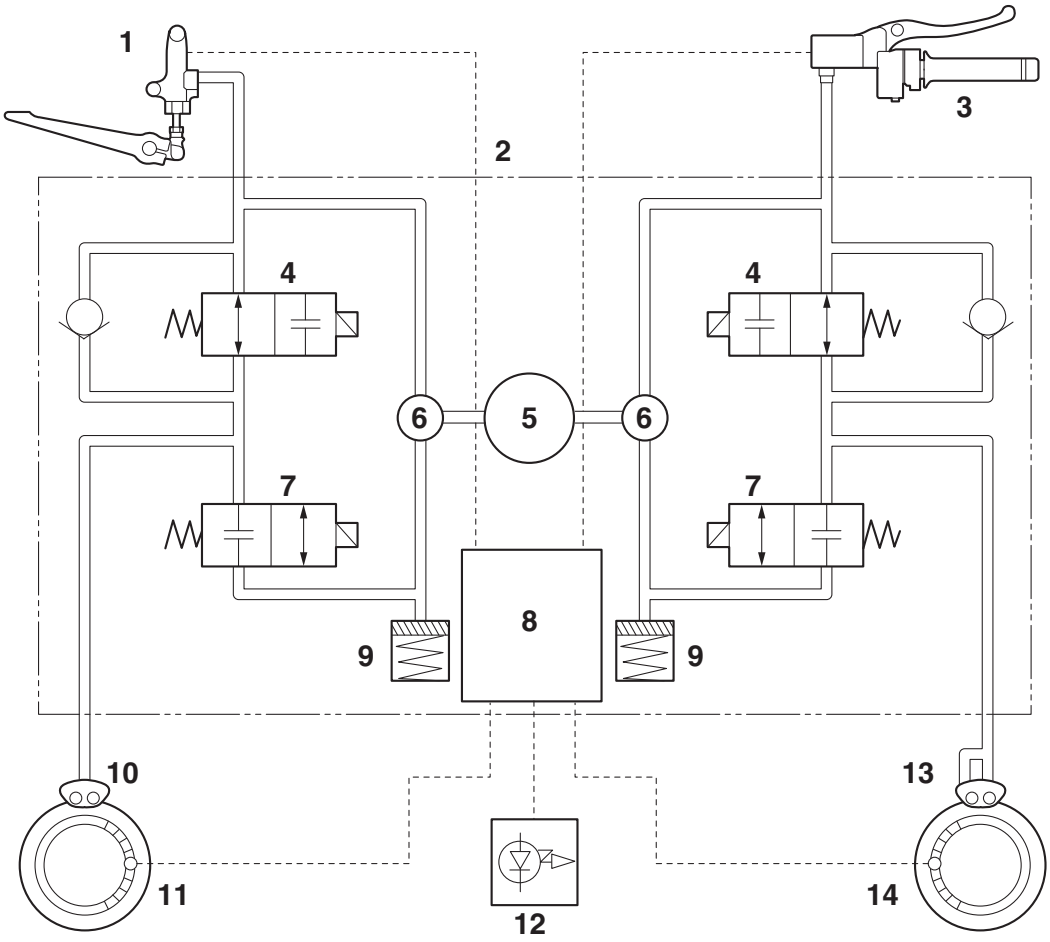


a. Friction force between the tire and road surface
b. Brake force
c. Side force
d. Slip ratio

Electronic ABS features

The Yamaha ABS (anti-lock brake system) has been developed with the most advanced electronic technology.
The ABS control is processed with good response under various vehicle travel conditions.
The ABS also includes a highly developed self-diagnosis function. The ABS detects any problem condition and allows normal braking even if the ABS is not operating properly.
When this occurs, the ABS warning light on the meter assembly comes on.
The ABS stores the fault codes in the memory of the ABS ECU for easy problem identification and troubleshooting.

ABS block diagram

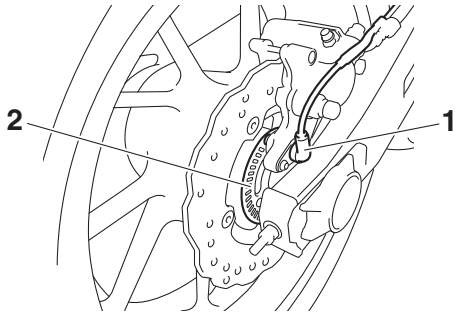


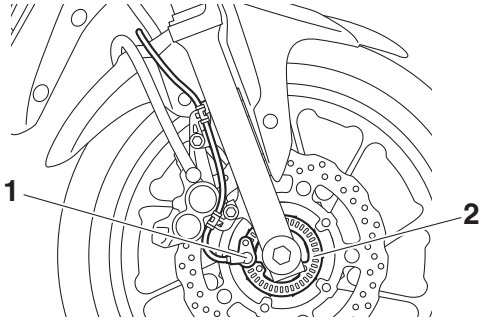
1. Rear brake master cylinder
2. Hydraulic unit assembly
3. Front brake master cylinder
4. Inlet solenoid valve
5. ABS motor
6. Hydraulic pump
7. Outlet solenoid valve
8. ABS ECU
9. Buffer chamber
10. Rear brake caliper
11. Rear wheel sensor
12. ABS warning light
13. Front brake caliper
14. Front wheel sensor

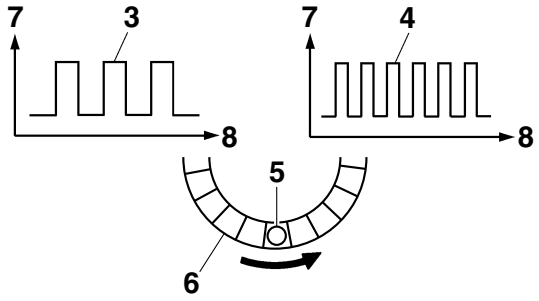
EAS30684
ABS COMPONENT FUNCTIONS

Wheel sensors and wheel sensor rotors

Wheel sensors “1” detect the wheel speed and transmit the rotation signal to the ABS ECU.
Each wheel sensor is composed of a permanent magnet and a hall IC. The sensor rotors “2” rotate with the wheels. The sensor rotors “2” have 40 slots and are installed close to the wheel sensors. As the sensor rotor rotates, the hall element in the hall IC installed in the wheel sensor generates pulses. The pulse frequency, which is proportional to the magnetic flux density, is converted into a wave in the hall IC so that it can be output.
The ABS ECU calculates the wheel rotation speed by detecting the pulse frequency.







3. At low speed
4. At high speed
5. Wheel sensor
6. Wheel sensor rotor
7. Voltage
8. Time

ABS warning light

The ABS warning light "1" comes on to warn the rider if a malfunction in the ABS occurs.
When the main switch is turned to "ON", the ABS warning light comes on to check the electrical circuit and the system function (ABS self-diagnosis), and goes off when the vehicle is operated (the function check is properly completed at a speed of about 6 to 10 km/h [3.8 to 6.3 mi/h]).

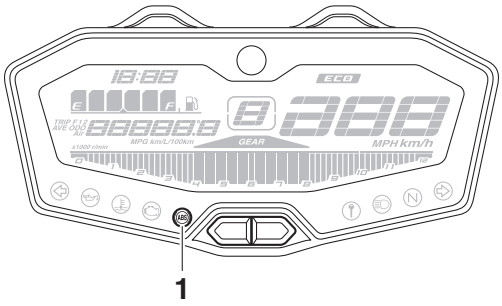
TIP

After all checks and servicing are completed, the ABS warning light will go off when the vehicle is ridden or pushed at a speed of 7 km/h (4 mi/h) or faster.

ECA20950

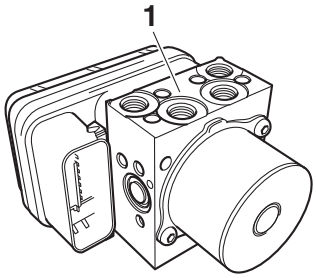
NOTICE

If the rear wheel is raced with the vehicle on a suitable stand, the ABS warning light may flash or come on. If this occurs, turn the main switch to "OFF", then back to "ON". The ABS operation is normal if the ABS warning light goes off after the vehicle starts off. If the fault codes are not deleted, the ABS warning light goes off after the vehicle is ridden at a speed of about 30 km/h (19 mi/h).



Hydraulic unit assembly

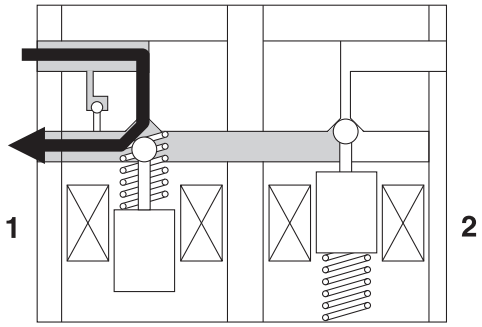
The hydraulic unit assembly "1" is composed of hydraulic control valves (each with a outlet solenoid valve and inlet solenoid valve), buffer chambers, hydraulic pumps, an ABS motor, and ABS ECU. The hydraulic unit adjusts the front and rear wheel brake fluid pressure to control the wheel speed according to signals transmitted from the ABS ECU.



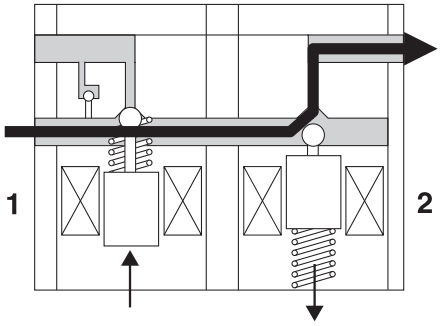
Hydraulic control valve

The hydraulic control valve is composed of a inlet solenoid valve and outlet solenoid valve.
The electromagnetic force generated in the inlet solenoid valve varies proportionally with the duty cycle control voltage that is supplied to it. Since this voltage is continuously variable, the solenoid valve moves smoothly and the hydraulic pressure is adjusted linearly.

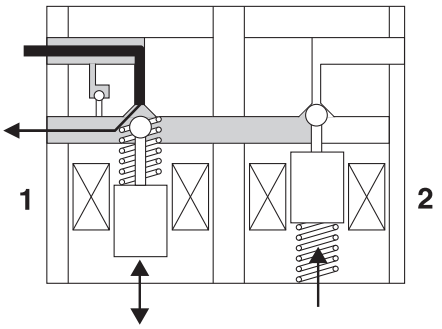
1. When the brakes are operated normally, the inlet solenoid valve "1" is open and the outlet solenoid valve "2" is closed. The brake line between the brake master cylinder and brake caliper is open.



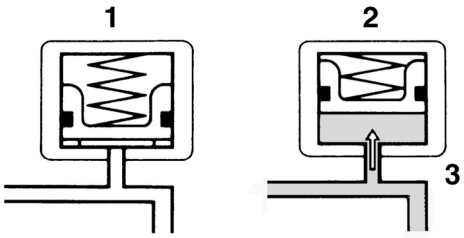
2. When the ABS is activated, the inlet solenoid valve "1" closes and the outlet solenoid valve "2" opens using the power supplied from the ABS ECU signals. This reduces the hydraulic pressure.



3. When the ABS ECU sends a signal to stop reducing the hydraulic pressure, the outlet solenoid valve "2" closes and the brake fluid is pressurized again. The inlet solenoid valve "1" controls the hydraulic pressure difference between the brake fluid in the upper brake lines (brake master cylinder side) and the brake fluid in the lower brake lines (brake caliper side).

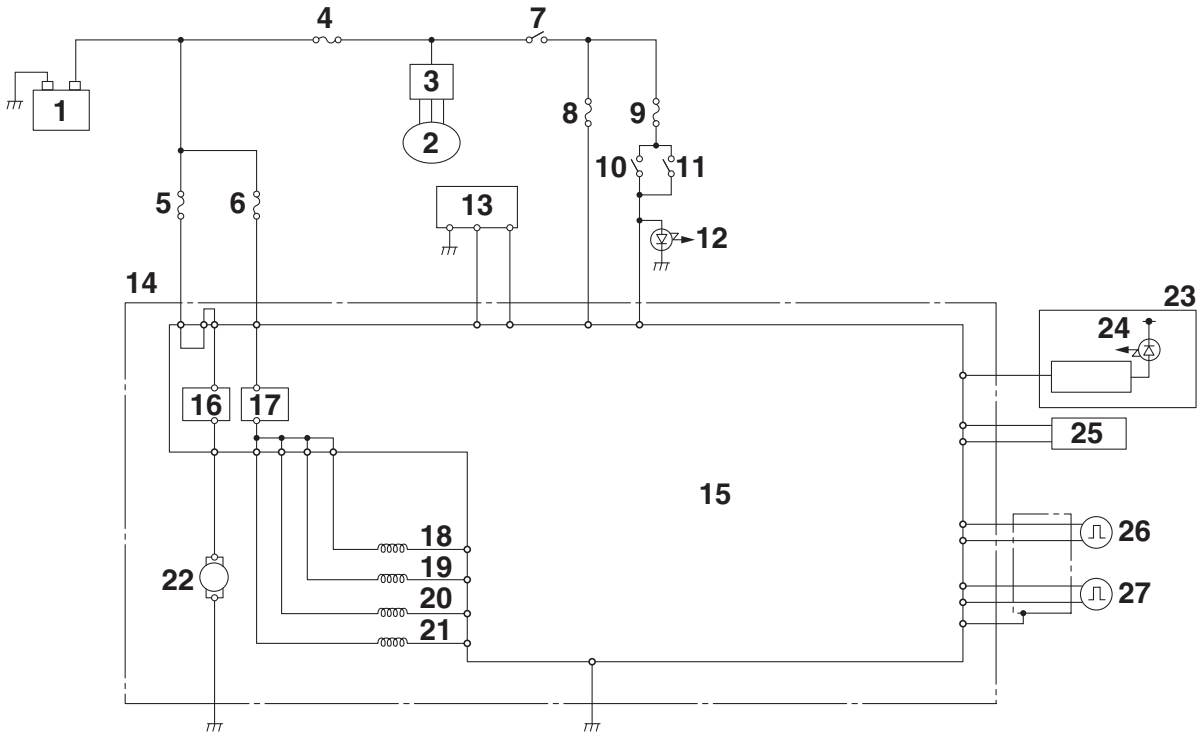


Buffer chamber
The buffer chamber accumulates the brake fluid that is depressurized while the ABS is operating.



1. Buffer chamber (pressurizing phase)
2. Buffer chamber (depressurizing phase)
3. Raised piston

ABS ECU
The ABS ECU is integrated with the hydraulic unit to achieve a compact and lightweight design.
As shown in the following block diagram, the ABS ECU receives wheel sensor signals from the front and rear wheels and also receives signals from other monitor circuits.



1. Battery
2. AC magneto
3. Rectifier/regulator
4. Main fuse
5. ABS motor fuse
6. ABS solenoid fuse
7. Main switch
8. ABS control unit fuse
9. Signaling system fuse
10. Rear brake light switch
11. Front brake light switch
12. Tail/brake light
13. Yamaha diagnostic tool coupler
14. Hydraulic unit assembly
15. ABS ECU
16. ABS motor relay
17. Solenoid relay
18. Front brake outlet solenoid
19. Front brake inlet solenoid
20. Rear brake outlet solenoid
21. Rear brake inlet solenoid
22. ABS motor
23. Meter assembly
24. ABS warning light
25. ECU (engine control unit)
26. Front wheel sensor
27. Rear wheel sensor

The necessary actions are confirmed using the monitor circuit and control signals are transmitted to the hydraulic unit assembly.

ABS control operation

The ABS control operation performed in the ABS ECU is divided into the following two parts.

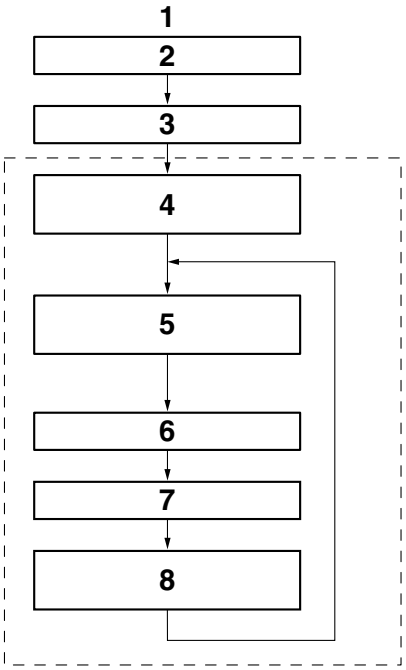
- Hydraulic control
- Self-diagnosis

When a malfunction is detected in the ABS, a fault code is stored in the memory of the ABS ECU for easy problem identification and troubleshooting.

TIP

- Some types of malfunctions are not recorded in the memory of the ABS ECU (e.g., a blown ABS control unit fuse).

• The ABS performs a self-diagnosis test for a few seconds each time the vehicle first starts off after the main switch was turned on. During this test, a “clicking” noise can be heard from under the seat, and if the brake lever or brake pedal is even slightly operated, a vibration can be felt at the lever and pedal, but these do not indicate a malfunction.



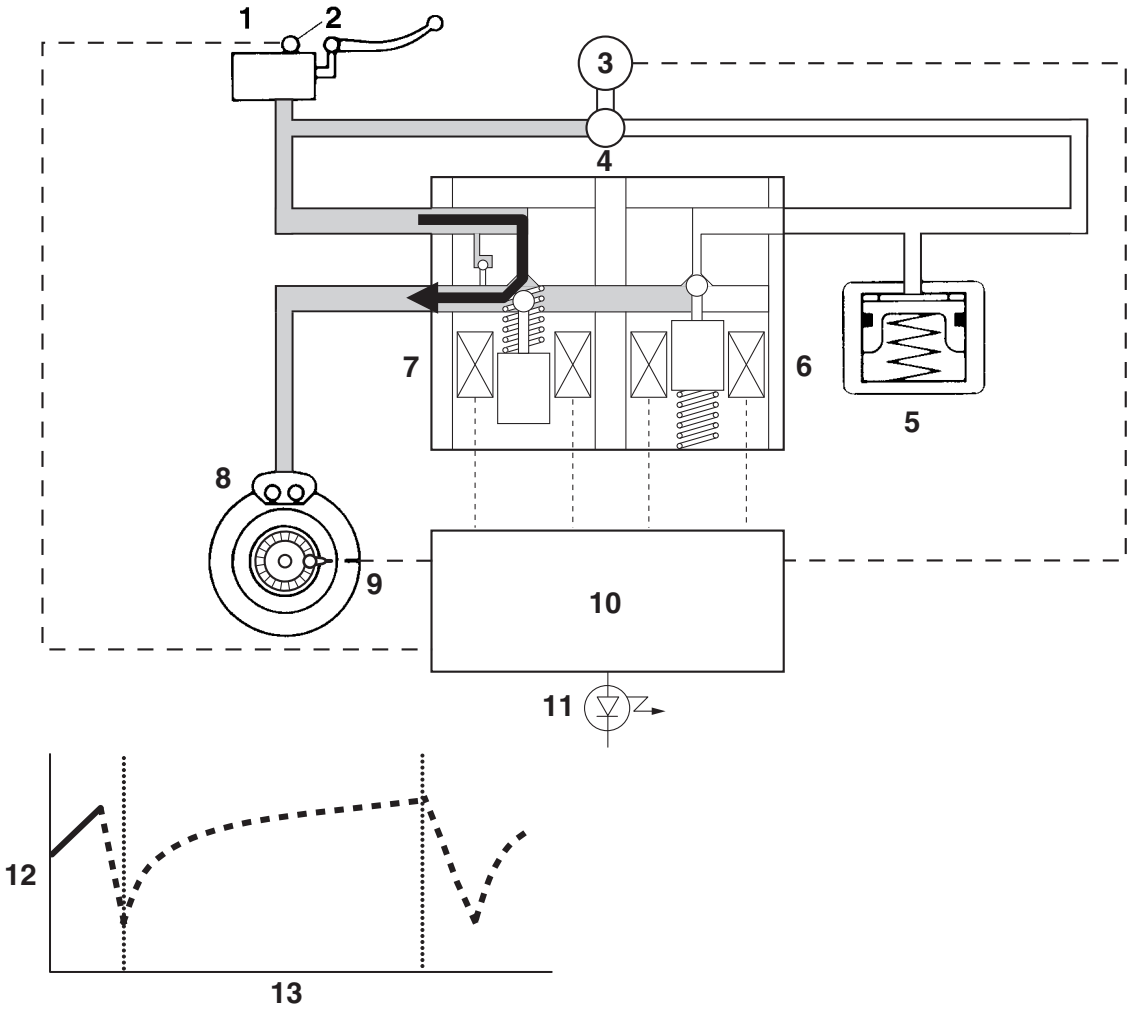
1. Software operation flow
2. Main switch “ON”
3. Initialize
4. Self-diagnosis (when static)
5. Self-diagnosis (when riding)
6. Receive signals
7. Control operation
8. Depressurize/pressurize

EAS30710
ABS OPERATION

The ABS hydraulic circuit consists of two systems: the front wheel, and rear wheel. The following describes the system for the front wheel only.

Normal braking (ABS not activated)

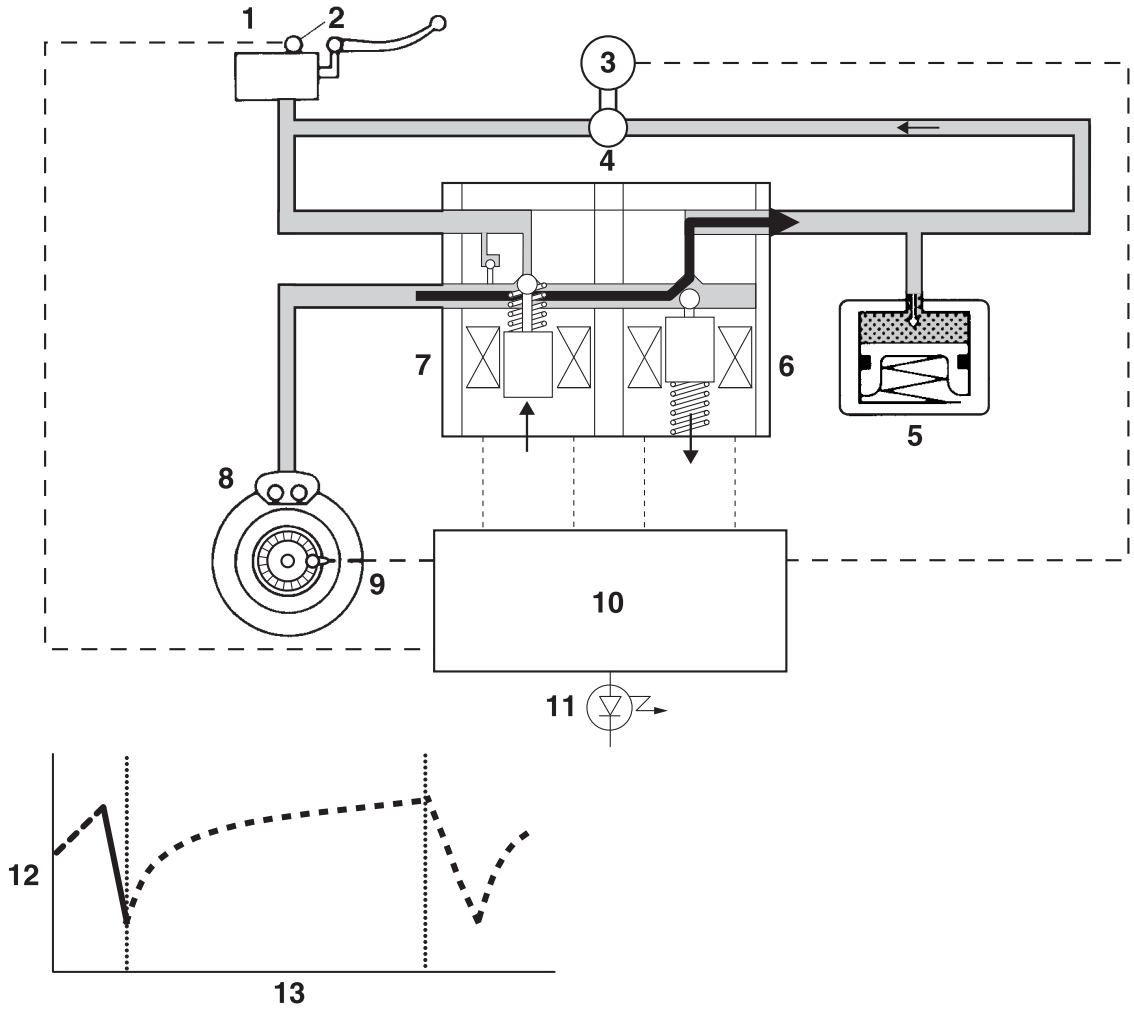
When the ABS is not activated, the inlet solenoid valve is open and the outlet solenoid valve is closed because a control signal has not been transmitted from the ABS ECU. Therefore, when the brake lever is squeezed, the hydraulic pressure in the brake master cylinder increases and the brake fluid is sent to the brake caliper.
At this time, the inlet and outlet check valves of the hydraulic pump are closed. As a result of eliminating the orifice, the brake master cylinder directly pressurizes the brake caliper during normal braking. When the brake lever is released, the brake fluid in the brake caliper returns to the brake master cylinder.



1. Brake master cylinder
2. Brake light switch
3. ABS motor
4. Hydraulic pump
5. Buffer chamber
6. Outlet solenoid valve
7. Inlet solenoid valve
8. Brake caliper
9. Wheel sensor
10. ABS ECU
11. ABS warning light
12. Brake fluid pressure
13. Time

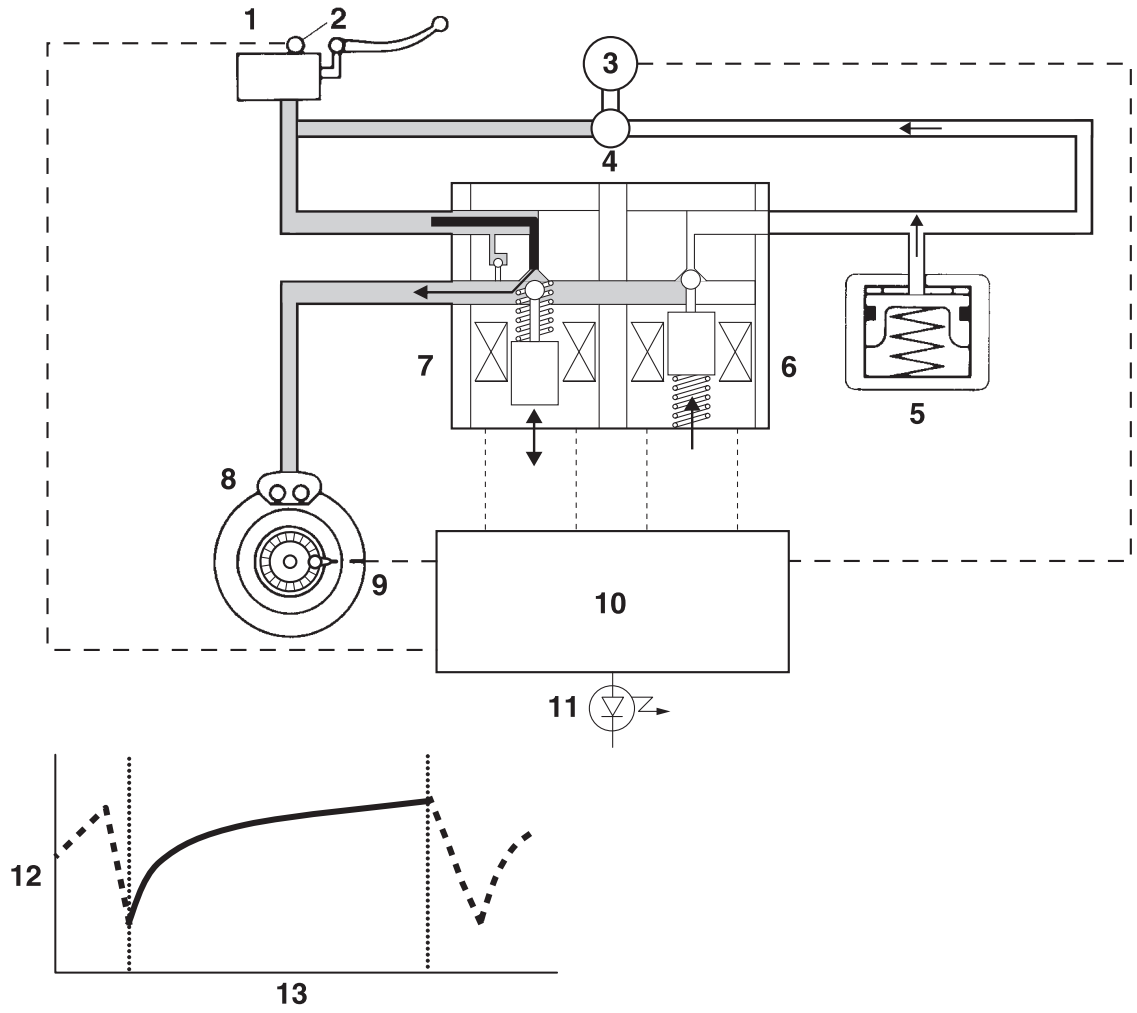
Emergency braking (ABS activated)

1. Depressurizing phase
   When the front wheel is about to lock, the outlet solenoid valve is opened by the “depressurization” signal transmitted from the ABS ECU. When this occurs, the inlet solenoid valve compresses the spring and closes the brake line from the brake master cylinder. Because the outlet solenoid valve is open, the brake fluid is sent to the buffer chamber. As a result, the hydraulic pressure in the brake caliper is reduced.
   The brake fluid stored in the buffer chamber is pumped back to the brake master cylinder by the hydraulic pump linked to the ABS motor.



1. Brake master cylinder
2. Brake light switch
3. ABS motor
4. Hydraulic pump
5. Buffer chamber
6. Outlet solenoid valve
7. Inlet solenoid valve
8. Brake caliper
9. Wheel sensor
10. ABS ECU
11. ABS warning light
12. Brake fluid pressure
13. Time

2. Pressurizing phase
   The outlet solenoid valve is closed by the “pressurization” signal transmitted from the ABS ECU. At this time, the ABS ECU controls the opening of the inlet solenoid valve. As the inlet solenoid valve opens, the brake line from the brake master cylinder opens, allowing the brake fluid to be sent to the brake caliper.



1. Brake master cylinder
2. Brake light switch
3. ABS motor
4. Hydraulic pump
5. Buffer chamber
6. Outlet solenoid valve
7. Inlet solenoid valve
8. Brake caliper
9. Wheel sensor
10. ABS ECU
11. ABS warning light
12. Brake fluid pressure
13. Time

EAS30712
ABS WARNING LIGHT AND OPERATION

ABS warning light
- If the ABS warning light comes on while riding, stop the vehicle, and then turn the main switch to “OFF”, then back to “ON”. The ABS operation is normal if the ABS warning light comes on, then goes off.
- If the rear wheel is raced with the vehicle on a suitable stand, the ABS warning light may flash or come on. If this occurs, turn the main switch to “OFF”, then back to “ON”. The ABS operation is normal if the ABS warning light comes on, then goes off.
- The ABS operation is normal if the ABS warning light flashes.
- Even if the ABS warning light remains on and does not go off, or if it comes on after riding, conventional braking performance of the vehicle is maintained.

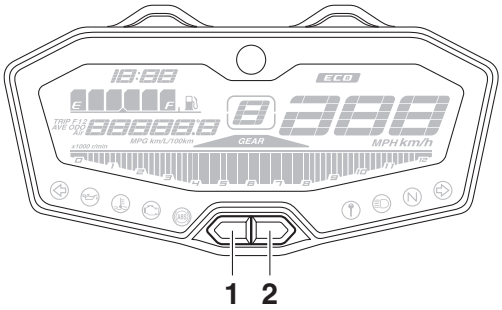
ABS function

EWA16520

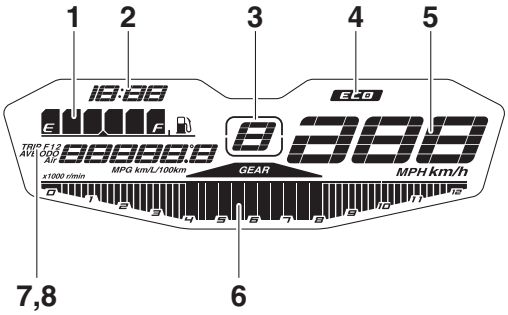
WARNING

• When hydraulic control is performed by the ABS, the brake system alerts the rider that the wheels have a tendency to lock by generating a reaction-force pulsating action in the brake lever or brake pedal. When the ABS is activated, the grip between the road surface and tires is close to the limit. The ABS cannot prevent wheel lock* on slippery surfaces, such as ice, when it is caused by engine braking, even if the ABS is activated.
Use extreme care when operating the vehicle under these conditions.
• The ABS is not designed to shorten the braking distance or improve the cornering performance.
• Depending on the road conditions, the braking distance may be longer compared to that of vehicles not equipped with ABS. Therefore, ride at a safe speed and keep a safe distance between yourself and other vehicles.
• The braking of the vehicle, even in the worst case, is principally executed when the vehicle is advancing straight ahead. During a turn, sudden braking is liable to cause a loss of traction of the tires. Even vehicles equipped with ABS cannot be prevented from falling over if braked suddenly.
• The ABS does not work when the main switch is turned to "OFF". The conventional braking function can be used.
*** Wheel lock: A condition that occurs when the rotation of one or both of the wheels has stopped, but the vehicle continues to travel.**

EAS30982
MULTI-FUNCTION METER UNIT



1. Set button (left)
2. Set button (right)



1. Fuel meter
2. Clock
3. Transmission gear display
4. Eco indicator “ECO”
5. Speedometer
6. Tachometer
7. Multi-function display
8. Self-diagnosis device

EWA12423
⚠ WARNING

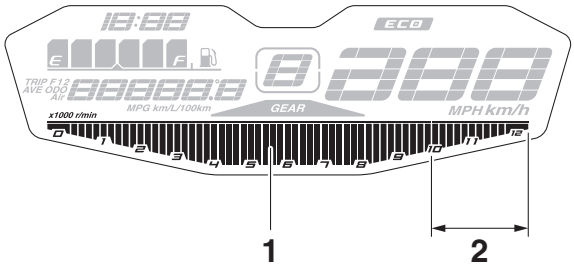
Be sure to stop the vehicle before making any setting changes to the multi-function meter unit. Changing settings while riding can distract the operator and increase the risk of an accident.

The multi-function meter unit is equipped with the following:
- a speedometer
- a tachometer
- a clock
- a fuel meter
- an eco indicator
- a transmission gear display
- a multi-function display
- a self-diagnosis device
- a brightness control mode

TIP
- Be sure to turn the key to “ON” before using the left and right set buttons except for setting the brightness control mode.
- For the U.K. only: To switch the speedometer and multi-function display between kilometers and miles, set the multi-function display to the odometer mode or a tripmeter mode, and then press the left set button for at least three seconds.

Speedometer
The speedometer shows the vehicle’s traveling speed.

Tachometer



1. Tachometer
2. Tachometer red zone

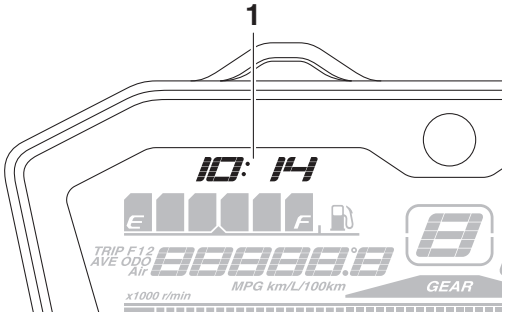
The tachometer allows the rider to monitor the engine speed and keep it within the ideal power range.

ECA19660
NOTICE

Do not operate the engine in the tachometer red zone.

	Red zone **10000 r/min and above**

Clock



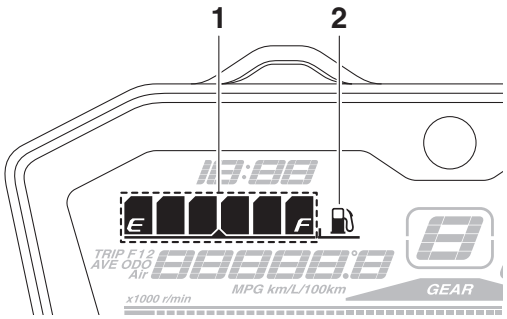
1. Clock

The clock displays when the key is turned to "ON". In addition, the clock can be displayed for 10 seconds by pushing the left set button when the main switch is in the "OFF", "LOCK" or "P≤" position.

[To set the clock]

1. Turn the key to "ON".
2. Push the left set button and right set button together for at least two seconds.
3. When the hour digits start flashing, push the right set button to set the hours.
4. Push the left set button, and the minute digits will start flashing.
5. Push the right set button to set the minutes.
6. Push the left set button and then release it to start the clock.

Fuel meter



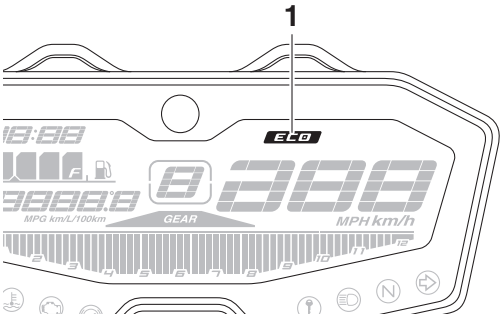
1. Fuel meter
2. Fuel level warning indicator "⛽"

The fuel meter indicates the amount of fuel in the fuel tank. The display segments of the fuel meter disappear towards "E" (Empty) as the fuel level decreases. When the last segment and fuel level warning indicator "⛽" start flashing, refuel as soon as possible.

TIP

This fuel meter is equipped with a self-diagnosis system. If a problem is detected in the electrical circuit, the following cycle is repeated until the malfunction is corrected: fuel level segments and fuel level warning indicator "⛽" flash eight times, then go off for approximately 3 seconds. If this occurs, check the electrical circuit. Refer to "SIGNALING SYSTEM" on page 8-21.

Eco indicator



1. Eco indicator "ECO"

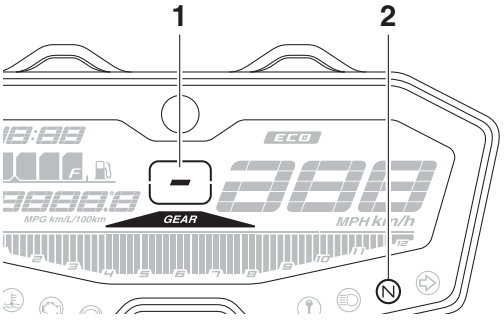
This indicator comes on when the vehicle is being operated in an environmentally friendly, fuel-efficient manner. The indicator goes off when the vehicle is stopped.

TIP

Consider the following tips to reduce fuel consumption:

- Avoid high engine speeds during acceleration.
- Travel at a constant speed.
- Select the transmission gear that is appropriate for the vehicle speed.

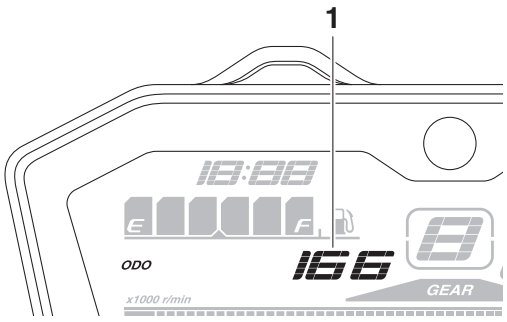
Transmission gear display



1. Transmission gear display
2. Neutral indicator light "**N**"

This display shows the selected gear. The neutral position is indicated by "–" and by the neutral indicator light.

Multi-function display



1. Multi-function display

The multi-function display is equipped with the following:
- an odometer
- two tripmeters (which show the distance traveled since they were last set to zero)
- a fuel reserve tripmeter (which shows the distance traveled since the left segment of the fuel meter started flashing)
- a coolant temperature display
- an ambient temperature display
- an instantaneous fuel consumption display
- an average fuel consumption display

Push the left set button to switch the display between the odometer mode “ODO”, tripmeter mode “TRIP 1” and “TRIP 2”, instantaneous fuel consumption mode “km/L” or “L/100 km”, average fuel consumption mode “AVE_ _._ km/L” or “AVE_ _._ L/100 km”, coolant temperature mode “_ _ °C”, and ambient temperature mode “Air_ _ °C” in the following order:
ODO → TRIP 1 → TRIP 2 → km/L or L/100 km → AVE_ _._ km/L or AVE_ _._ L/100 km → _ _ °C → Air_ _ °C → ODO

For the UK only:
Push the left set button to switch the display between the odometer mode “ODO”, tripmeter mode “TRIP 1” and “TRIP 2”, instantaneous fuel consumption mode “km/L”, “L/100 km” or “MPG”, average fuel consumption mode “AVE_ _._ km/L”, “AVE_ _._ L/100 km” or “AVE_ _._ MPG”, coolant temperature mode “_ _ °C”, and ambient temperature mode “Air_ _ °C” in the following order:
ODO → TRIP 1 → TRIP 2 → km/L, L/100 km or MPG → AVE_ _._ km/L, AVE_ _._ L/100 km or AVE_ _._ MPG → _ _ °C → Air_ _ °C → ODO

TIP

Push the right set button to switch the display in the reverse order.

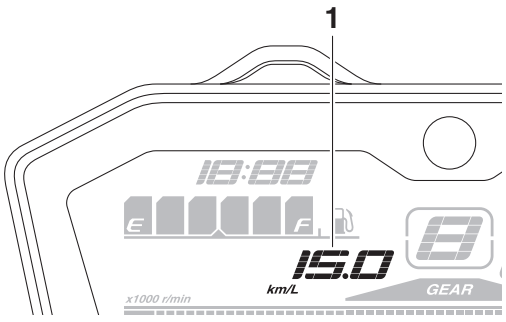
If the fuel level warning indicator “⛽” and left segment of the fuel meter start flashing, the display automatically changes to the fuel reserve tripmeter mode “TRIP F” and starts counting the distance traveled from that point. In that case, push the left set button to switch the display between the various tripmeter, odometer, instantaneous fuel consumption and average fuel consumption modes in the following order:

TRIP F → km/L or L/100 km → AVE_ _._ km/L or AVE_ _._ L/100 km → _ _ °C → Air_ _ °C → ODO → TRIP 1 → TRIP 2 → TRIP F

For the UK only:
TRIP F → km/L, L/100 km or MPG → AVE_ _._ km/L, AVE_ _._ L/100 km or AVE_ _._ MPG → _ _ °C → Air_ _ °C → ODO → TRIP 1 → TRIP 2 → TRIP F

To reset a tripmeter, select it by pushing the left set button, and then push the right set button for at least one second.
If you do not reset the fuel reserve tripmeter manually, it resets itself automatically and the display returns to the prior mode after refueling and traveling 5 km (3 mi).

Instantaneous fuel consumption display



1. Instantaneous fuel consumption display

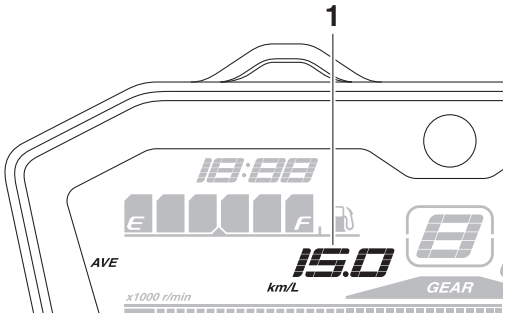
The instantaneous fuel consumption display can be set to either “km/L”, “L/100 km” or “MPG” (for the UK only).
- “km/L”: The distance that can be traveled on 1.0 L of fuel under the current riding conditions is shown.
- “L/100 km”: The amount of fuel necessary to travel 100 km under the current riding conditions is shown.
- “MPG” (for the UK only): The distance that can be traveled on 1.0 Imp.gal of fuel under the current riding conditions is shown.

To switch between the instantaneous fuel consumption displays, push the left set button for one second when one of the displays is shown.

TIP

If traveling at speeds under 20 km/h (12 mi/h), "_ _._" is displayed.

Average fuel consumption mode



1. Average fuel consumption display

The average fuel consumption display can be set to either "AVE_ _._ km/L", "AVE_ _._ L/100 km" or "AVE_ _._ MPG" (for the UK only).
This display shows the average fuel consumption since it was last reset.

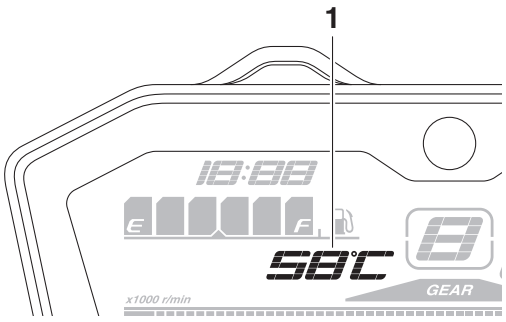
- "AVE_ _._ km/L": The average distance that can be traveled on 1.0 L of fuel is shown.
- "AVE_ _._ L/100 km": The average amount of fuel necessary to travel 100 km is shown.
- "AVE_ _._ MPG" (for the UK only): The average distance that can be traveled on 1.0 Imp.gal of fuel is shown.

To switch between the average fuel consumption displays, push the left set button for one second when one of the displays is shown.
To reset the average fuel consumption display, select it by pushing the left set, and then push the right set button for at least one second.

TIP

After resetting an average fuel consumption display, "_ _._" is shown for that display until the vehicle has traveled 1 km (0.6 mi).

Coolant temperature display



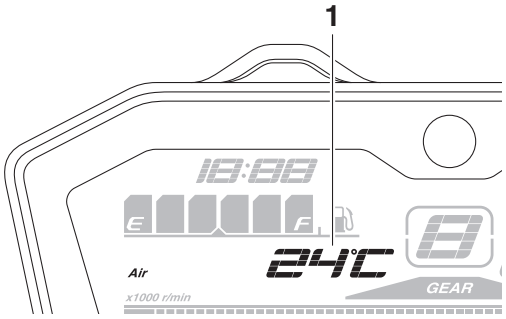
1. Coolant temperature display

This display shows the coolant temperature from 40 °C to 116 °C in 1 °C increments.
If the message "HI" flashes, stop the vehicle, then stop the engine, and let the engine cool.

TIP

- When the coolant temperature is below 40 °C, "LO" will be displayed.
- The coolant temperature varies with changes in the weather and engine load.

Air intake temperature display



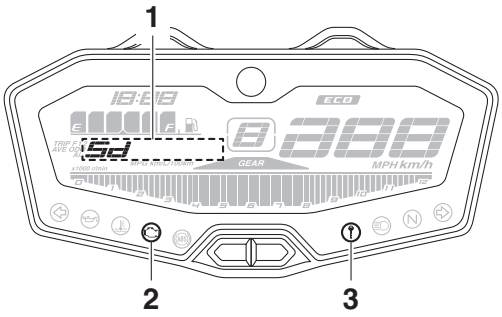
1. Air intake temperature display

This display shows the air intake temperature from –9 °C to 99 °C in 1 °C increments. The temperature displayed may vary from the air intake temperature.

TIP

- When the air intake temperature is below –9 °C, "LO" will be displayed.
- The accuracy of the temperature reading may be affected when riding slowly [approximately under 20 km/h (12.5 mi/h)] or when stopped at traffic signals, railroad crossings, etc.

Self-diagnosis device



1. Error code display
2. Engine trouble warning light " "
3. Immobilizer system indicator light " "

This model is equipped with a self-diagnosis device for various electrical circuits.
If a problem is detected in any of those circuits, the engine trouble warning light will come on and the display will indicate a fault code.
If the display indicates any fault codes, note the code number, and then check the fuel injection system. (Refer to "FUEL INJECTION SYSTEM" on page 8-33.)
The self-diagnosis device also detects problems in the immobilizer system circuits.
If a problem is detected in the immobilizer system circuits, the immobilizer system indicator light will flash and the display will indicate a fault code.

TIP

If the display indicates fault code 52, this could be caused by transponder interference. If this fault code appears, try the following.

1. Use the code re-registering key to start the engine.

TIP

Make sure there are no other immobilizer keys close to the main switch, and do not keep more than one immobilizer key on the same key ring! Immobilizer system keys may cause signal interference, which may prevent the engine from starting.

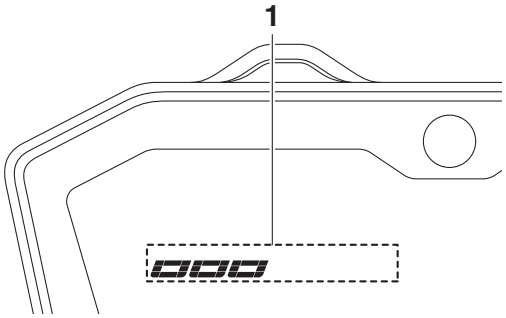
2. If the engine starts, turn it off and try starting the engine with the standard keys.
3. If one or both of the standard keys do not start the engine, take the vehicle, the code re-registering key and both standard keys. If the display indicates any fault codes, note the code number, and then check the vehicle.

ECA20360

NOTICE

If the display indicates a fault code, the vehicle should be checked as soon as possible in order to avoid engine damage.

Brightness control mode



1. Brightness level display

This function allows you to adjust the brightness of the multi-function meter unit panel to suit the outside lighting conditions.

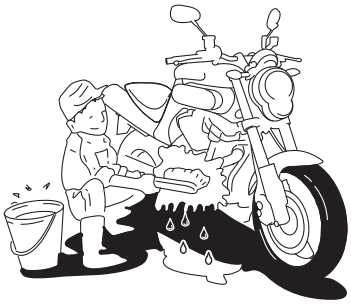
[To adjust the brightness]

1. Turn the key to "OFF".
2. Push and hold the left set button.
3. Turn the key to "ON" and continue pushing the left set button until the display switches to the brightness control mode.
4. Push the right set button to set the brightness level.
5. Push the left set button to confirm the selected brightness level and exit the brightness control mode.

EAS20009
IMPORTANT INFORMATION

EAS30006
PREPARATION FOR REMOVAL AND DISASSEMBLY

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



2. Use only the proper tools and cleaning equipment.
   Refer to “SPECIAL TOOLS” on page 1-30.
3. When disassembling, always keep mated parts together. This includes gears, cylinders, pistons and other parts that have been “mated” through normal wear. Mated parts must always be reused or replaced as an assembly.

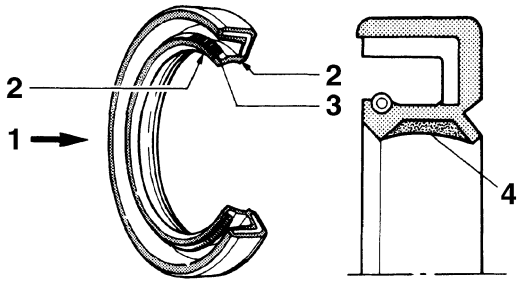
4. During disassembly, clean all of the parts and place them in trays in the order of disassembly. This will speed up assembly and allow for the correct installation of all parts.
5. Keep all parts away from any source of fire.

EAS30007
REPLACEMENT PARTS

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

EAS30008
GASKETS, OIL SEALS AND O-RINGS

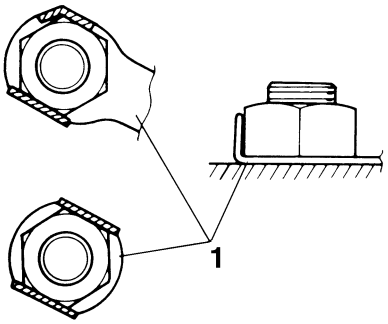
1. When overhauling the engine, replace all gaskets, seals and O-rings. All gasket surfaces, oil seal lips and O-rings must be cleaned.
2. During reassembly, properly oil all mating parts and bearings and lubricate the oil seal lips with grease.



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

EAS30009
LOCK WASHERS/PLATES AND COTTER PINS

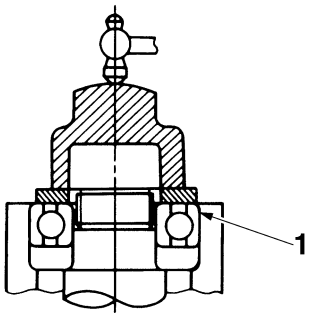
After removal, replace all lock washers/plates “1” and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.

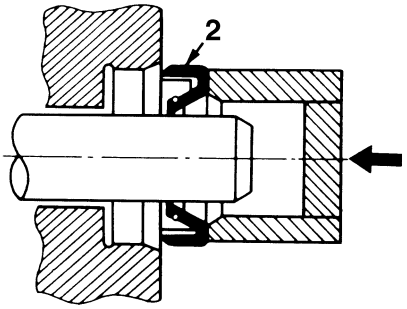


EAS30010
BEARINGS AND OIL SEALS
Install bearings “1” and oil seals “2” so that the manufacturer marks or numbers are visible. When installing oil seals, lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.

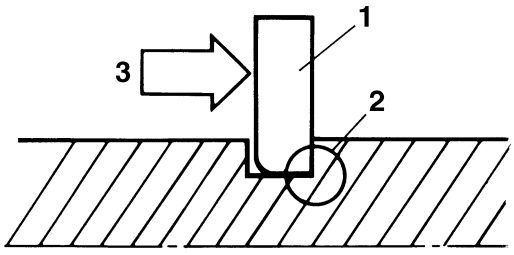
ECA13300
NOTICE

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





EAS30011
CIRCLIPS
Before reassembly, check all circlips carefully and replace damaged or distorted circlips. Always replace piston pin clips after one use. When installing a circlip “1”, make sure the sharp-edged corner “2” is positioned opposite the thrust “3” that the circlip receives.



EAS30012
RUBBER PARTS
Check rubber parts for deterioration during inspection. Some of the rubber parts are sensitive to gasoline, flammable oil, grease, etc. Do not allow any items other than the specified one to contact the parts.

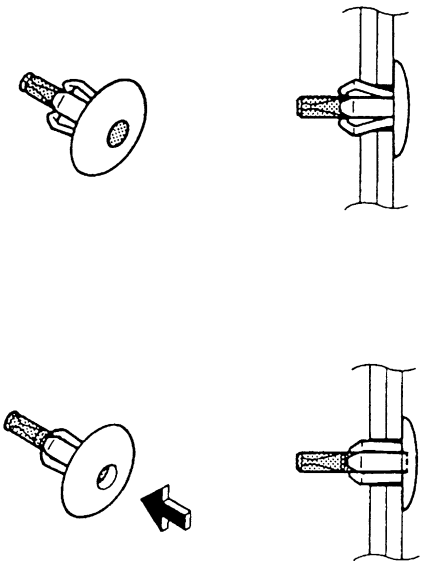
EAS20010
BASIC SERVICE INFORMATION

EAS30013
QUICK FASTENERS

Rivet type
1. Remove:
   • Quick fastener

TIP

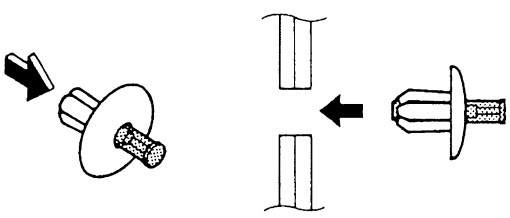
To remove the quick fastener, push its pin with a screwdriver, then pull the fastener out.

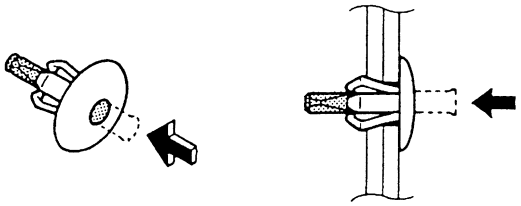


2. Install:
   • Quick fastener

TIP

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

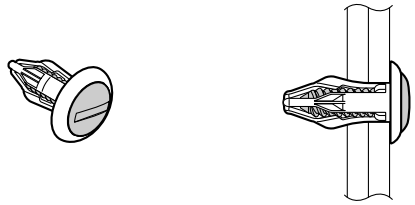


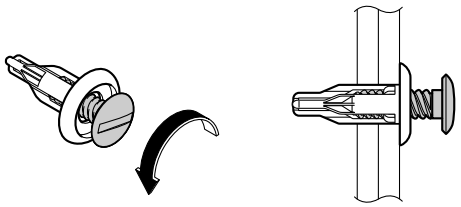


Screw type
1. Remove:
   • Quick fastener

TIP

To remove the quick fastener, loosen the screw with a screwdriver, then pull the fastener out.

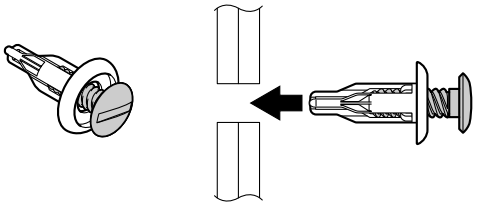


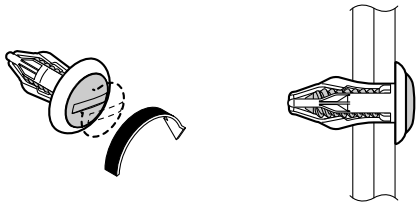


2. Install:
   • Quick fastener

TIP

To install the quick fastener, insert the fastener into the part to be secured and tighten the screw.



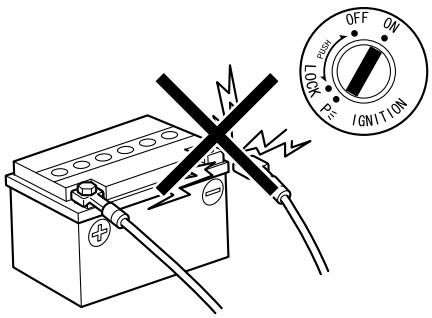


EAS30014
ELECTRICAL SYSTEM

Electrical parts handling

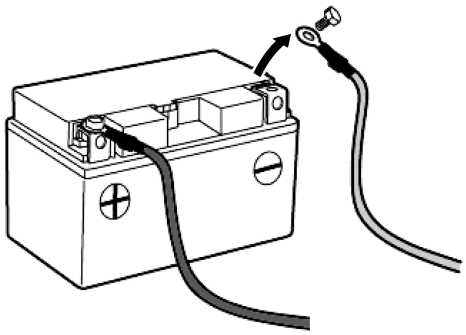
ECA16600
NOTICE

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



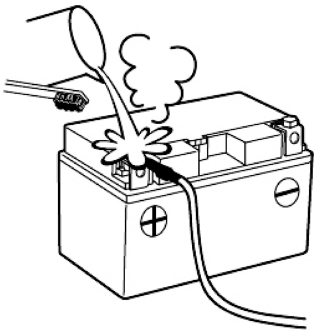
ECA16751
NOTICE

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



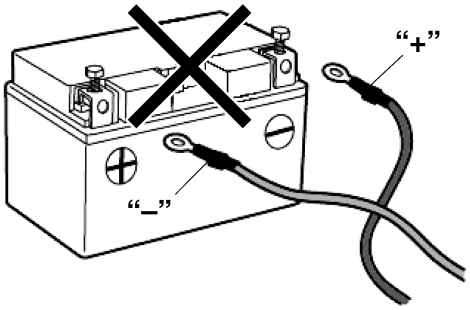
TIP

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



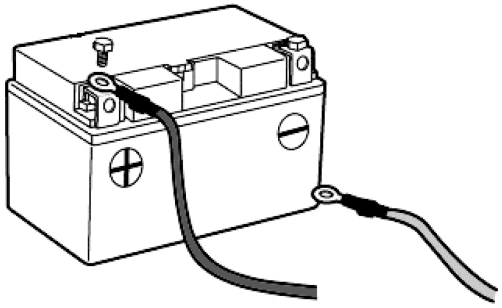
ECA16760
NOTICE

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



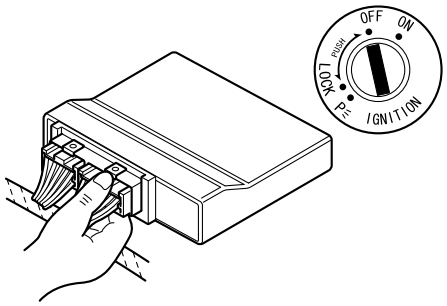
ECA16771
NOTICE

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



ECA16610
NOTICE

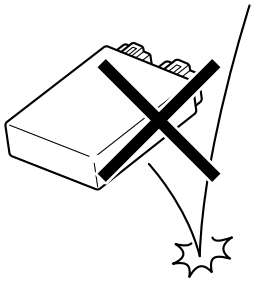
Turn the main switch to "OFF" before disconnecting or connecting an electrical component.



ECA16620

NOTICE

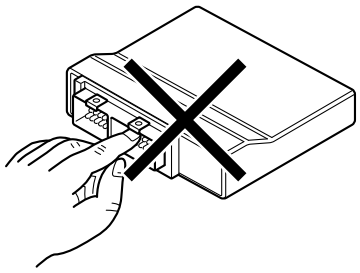
Handle electrical components with special care, and do not subject them to strong shocks.



ECA16630

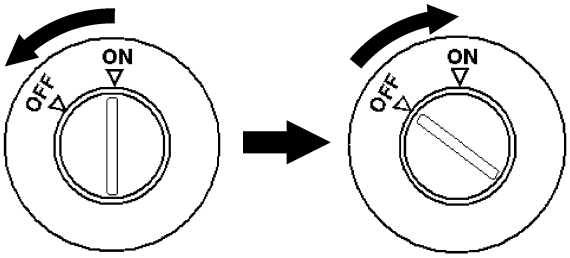
NOTICE

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



TIP

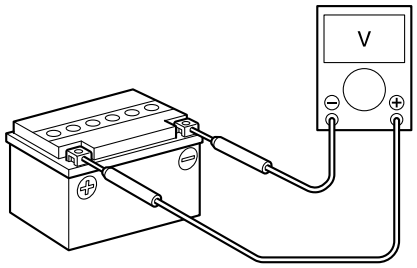
When resetting the ECU by turning the main switch to "OFF", be sure to wait approximately 5 seconds before turning the main switch back to "ON".



Checking the electrical system

TIP

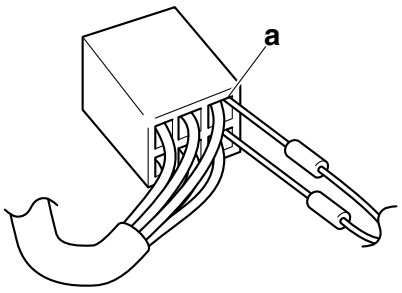
Before checking the electrical system, make sure that the battery voltage is at least 12 V.



ECA14371

NOTICE

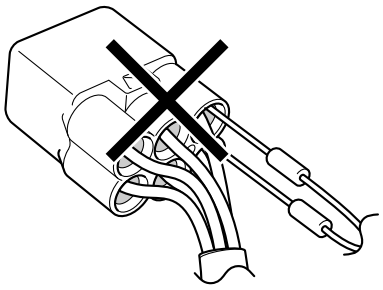
Never insert the tester probes into the coupler terminal slots. Always insert the probes from the opposite end "a" of the coupler, taking care not to loosen or damage the leads.



ECA16640

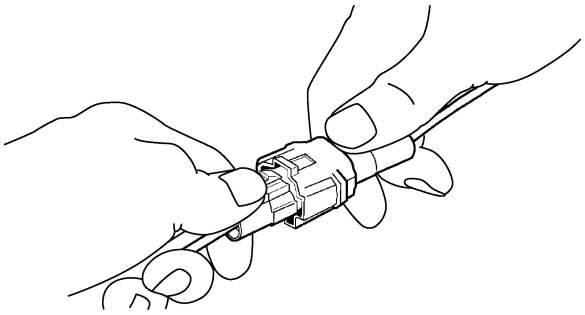
NOTICE

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

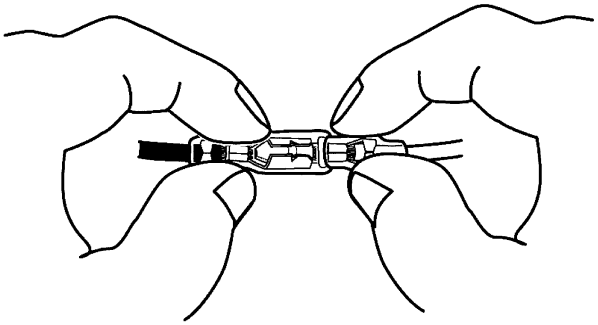


Checking the connections
Check the leads, couplers, and connectors for stains, rust, moisture, etc.
1. Disconnect:
   • Lead
   • Coupler
   • Connector

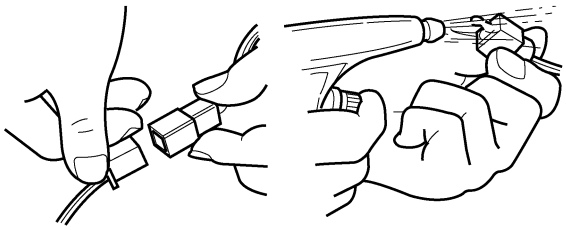
ECA16780
NOTICE
• When disconnecting a coupler, release the coupler lock, hold both sections of the coupler securely, and then disconnect the coupler.
• There are many types of coupler locks; therefore, be sure to check the type of coupler lock before disconnecting the coupler.



ECA16790
NOTICE
When disconnecting a connector, do not pull the leads. Hold both sections of the connector securely, and then disconnect the connector.

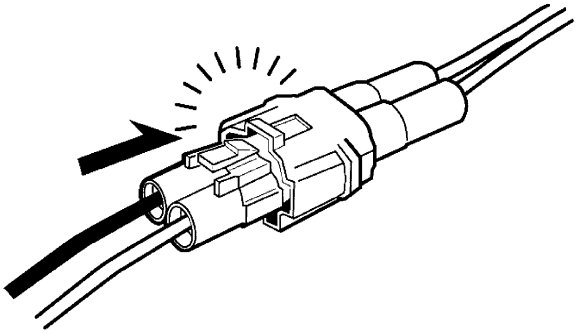


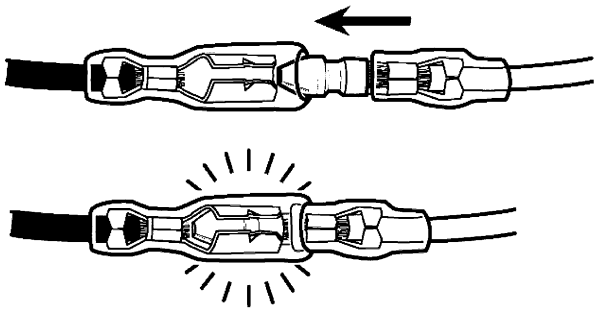
2. Check:
   • Lead
   • Coupler
   • Connector
   Moisture → Dry with an air blower.
   Rust/stains → Connect and disconnect several times.



3. Connect:
   • Lead
   • Coupler
   • Connector

TIP
• When connecting a coupler or connector, push both sections of the coupler or connector together until they are connected securely.
• Make sure all connections are tight.



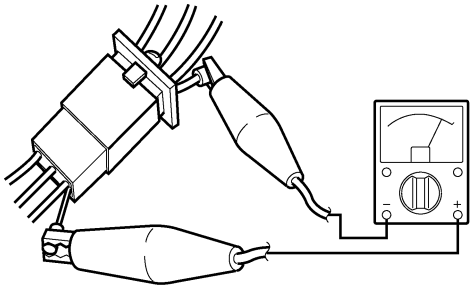


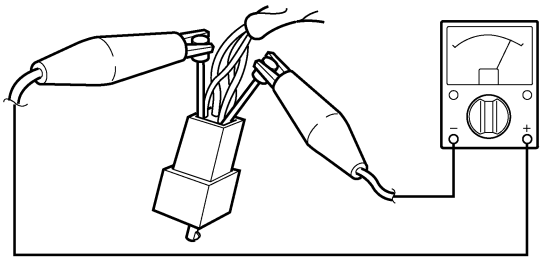
4. Check:
   • Continuity
   (with the pocket tester)

	Pocket tester **90890-03132**

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.





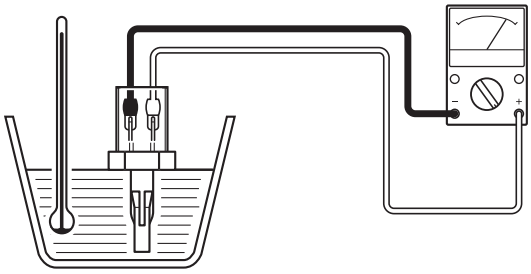
5. Check:
   • Resistance

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

TIP

The resistance values shown were obtained at the standard measuring temperature of 20 °C (68 °F). If the measuring temperature is not 20 °C (68 °F), the specified measuring conditions will be shown.

	Intake air temperature sensor resistance **5.40–6.60 kΩ at 0 °C (32 °F)** **290–390 Ω at 80 °C (176 °F)**

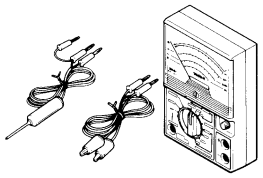
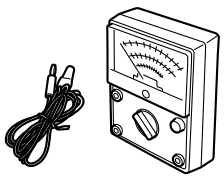
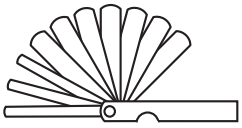
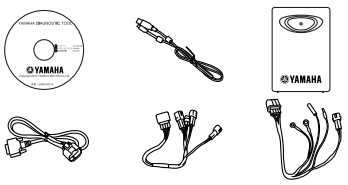


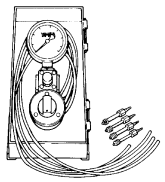
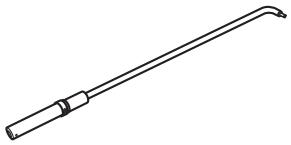
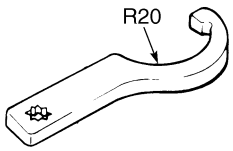
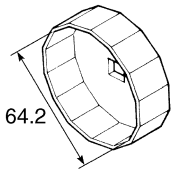
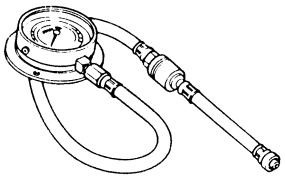
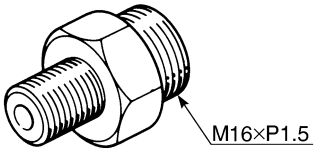
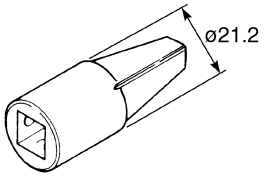
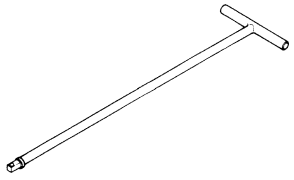
EAS20012
SPECIAL TOOLS

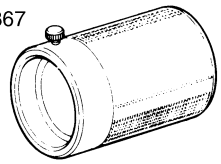
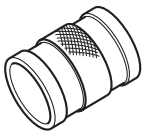
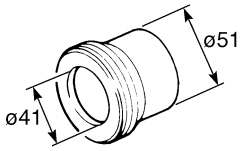
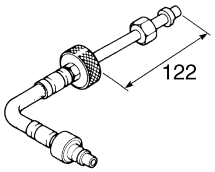
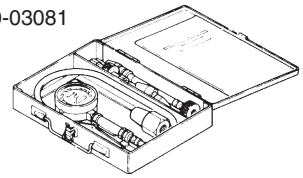
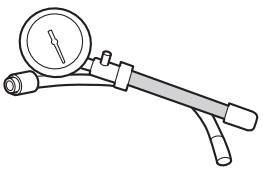
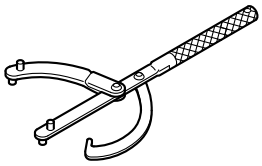
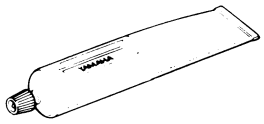
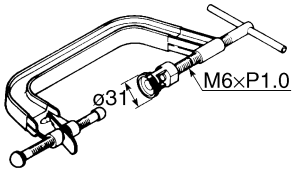
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

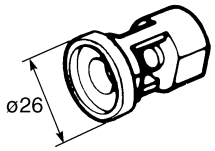
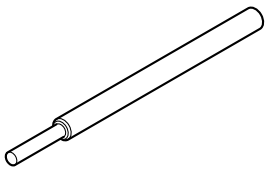
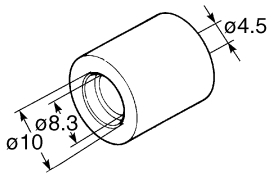
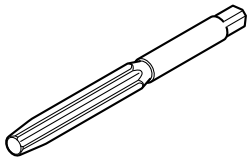
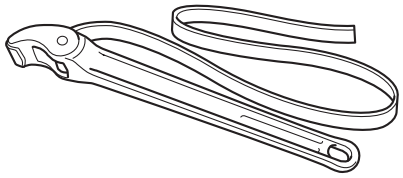
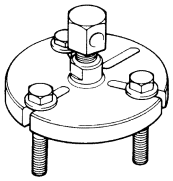
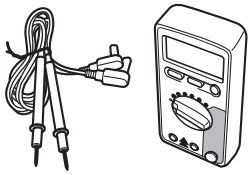
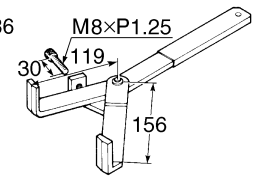
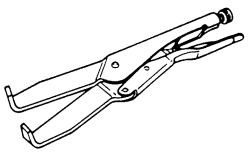
TIP

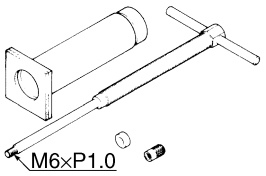
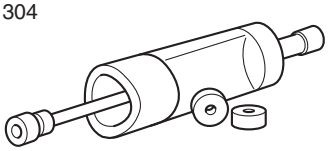
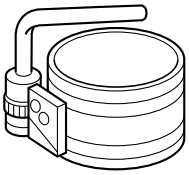
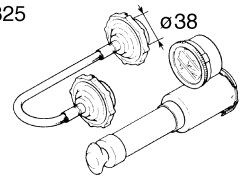
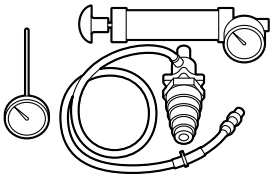
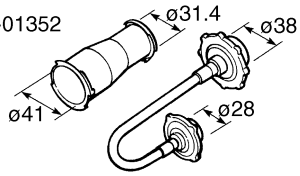
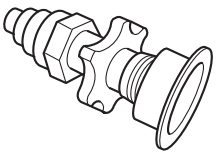
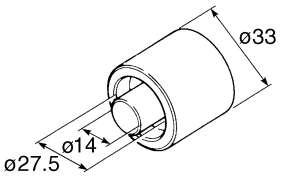
- For U.S.A. and Canada, use part number starting with “YM-”, “YU-”, or “ACC-”.
- For others, use part number starting with “90890-”.

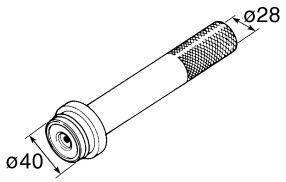
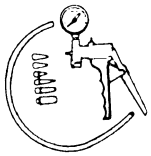
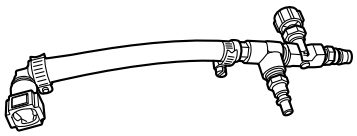
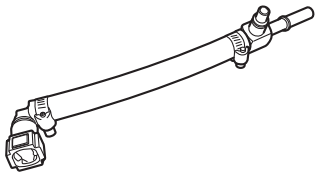
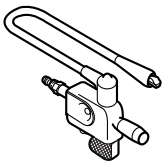
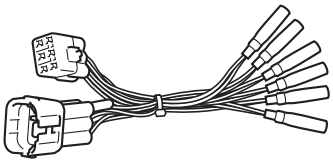
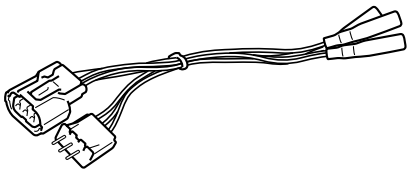
Tool name/Tool No.	Illustration	Reference pages
Pocket tester 90890-03132		1-29
Pocket tester 90890-03112 Analog pocket tester YU-03112-C		1-29, 8-125, 8-126, 8-127, 8-127, 8-131, 8-132, 8-133, 8-133, 8-134, 8-134, 8-135, 8-135, 8-137, 8-137, 8-138, 8-139, 8-140, 8-140, 8-141, 8-141
Thickness gauge 90890-03180 Feeler gauge set YU-26900-9		3-6, 4-25, 4-34, 5-55
Valve lapper 90890-04101 Valve lapping tool YM-A8998		3-7
Yamaha diagnostic tool 90890-03231		3-8, 4-67, 4-68, 5-2, 8-36, 8-95, 8-116

Tool name/Tool No.	Illustration	Reference pages
Vacuum gauge 90890-03094 Vacuummate YU-44456	90890-03094  YU-44456 	3-9
Carburetor angle driver 2 90890-03173		3-9
Steering nut wrench 90890-01403 Exhaust flange nut wrench YU-A9472		3-19, 4-89
Oil filter wrench 90890-01426 Oil filter wrench YU-38411		3-22
Pressure gauge 90890-03153 Pressure gauge YU-03153		3-23, 7-16, 7-17
Oil pressure adapter H 90890-03139		3-23
Damper rod holder 90890-01460		4-81, 4-83
T-handle 90890-01326 T-handle 3/8" drive 60 cm long YM-01326		4-81, 4-83

Tool name/Tool No.	Illustration	Reference pages
Fork seal driver weight 90890-01367 Replacement hammer YM-A9409-7	90890-01367  YM-A9409-7/YM-A5142-4 	4-83, 4-83, 4-84
Fork seal driver attachment (ø41) 90890-01381 Replacement 41 mm YM-A5142-2		4-83, 4-83
Extension 90890-04136		5-1
Compression gauge 90890-03081 Engine compression tester YU-33223	90890-03081  YU-33223 	5-1
Rotor holding tool 90890-01235 Universal magneto and rotor holder YU-01235		5-17, 5-21
Yamaha bond No. 1215 90890-85505 (Three bond No.1215®)		5-24, 5-44, 5-71, 5-73
Valve spring compressor 90890-04019 Valve spring compressor YM-04019		5-32, 5-37

Tool name/Tool No.	Illustration	Reference pages
Valve spring compressor attachment 90890-01243 Valve spring compressor adapter (26 mm) YM-01253-1		5-32, 5-37
Valve guide remover (ø4.5) 90890-04116 Valve guide remover (4.5 mm) YM-04116		5-34
Valve guide installer (ø4.5) 90890-04117 Valve guide installer (4.5 mm) YM-04117		5-34
Valve guide reamer (ø4.5) 90890-04118 Valve guide reamer (4.5 mm) YM-04118		5-34
Rotor holding tool 90890-04166 YM-04166		5-42, 5-42, 5-43, 5-43
Flywheel puller 90890-01362 Heavy duty puller YU-33270-B		5-42
Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927		5-48, 8-136, 8-139
Universal clutch holder 90890-04086 Universal clutch holder YM-91042	90890-04086  YM-91042 	5-54, 5-57

Tool name/Tool No.	Illustration	Reference pages
Piston pin puller set 90890-01304 Piston pin puller YU-01304	90890-01304  YU-01304 	5-77
Piston ring compressor 90890-05158 Piston ring compressor YM-08037		5-84
Radiator cap tester 90890-01325 Mityvac cooling system tester kit YU-24460-A	90890-01325  YU-24460-A 	6-3
Radiator cap tester adapter 90890-01352 Pressure tester adapter YU-33984	90890-01352  YU-33984 	6-3
Mechanical seal installer 90890-04132 Water pump seal installer YM-33221-A		6-12

Tool name/Tool No.	Illustration	Reference pages
Middle driven shaft bearing driver 90890-04058 Middle drive bearing installer 40 & 50 mm YM-04058		6-12
Vacuum/pressure pump gauge set 90890-06756 Mityvac brake bleeding tool YS-42423		7-8
Fuel injector pressure adapter 90890-03210 Fuel injector pressure adapter YU-03210		7-16
Fuel pressure adapter 90890-03176 Fuel pressure adapter YM-03176		7-17
Ignition checker 90890-06754 Oppama pet–4000 spark checker YM-34487		8-134
Test harness– lean angle sensor (6P) 90890-03209 Test harness– lean angle sensor (6P) YU-03209		8-135
Test harness S– pressure sensor (3P) 90890-03207 Test harness S– pressure sensor (3P) YU-03207		8-139

SPECIFICATIONS

EAS20013
GENERAL SPECIFICATIONS

Model	
Model	1XB1 (BEL)(CHE)(CZE)(DNK)(FIN)(GBR)(GRC)(HUN)(IRL)(NLD)(NOR)(POL)(PRT)(SVK)(SVN)(SWE)(TUR)(ZAF) 1XB2 (BEL)(CHE)(CZE)(DNK)(FIN)(GBR)(GRC)(HUN)(IRL)(NLD)(NOR)(POL)(PRT)(SVK)(SVN)(SWE)(TUR)(ZAF) 1XB5 (BEL)(CHE)(CZE)(DNK)(FIN)(GBR)(GRC)(HUN)(IRL)(NLD)(NOR)(POL)(PRT)(SVK)(SVN)(SWE)(TUR)(ZAF) 1XB6 (BEL)(CHE)(CZE)(DNK)(FIN)(GBR)(GRC)(HUN)(IRL)(NLD)(NOR)(POL)(PRT)(SVK)(SVN)(SWE)(TUR)(ZAF) 1XB7 (BEL)(CHE)(CZE)(DNK)(FIN)(GBR)(GRC)(HUN)(IRL)(NLD)(NOR)(POL)(PRT)(SVK)(SVN)(SWE)(TUR)(ZAF) 1XB8 (BEL)(CHE)(CZE)(DNK)(FIN)(GBR)(GRC)(HUN)(IRL)(NLD)(NOR)(POL)(PRT)(SVK)(SVN)(SWE)(TUR)(ZAF)
Dimensions	
Overall length	2085 mm (82.1 in)
Overall width	745 mm (29.3 in)
Overall height	1090 mm (42.9 in)
Seat height	805 mm (31.7 in)
Wheelbase	1400 mm (55.1 in)
Ground clearance	140 mm (5.51 in)
Minimum turning radius	2694 mm (106.1 in)
Weight	
Curb weight	182 kg (401 lb)
Maximum load	173 kg (381 lb)

EAS20014
ENGINE SPECIFICATIONS

Engine	
Engine type	Liquid cooled 4-stroke, DOHC
Displacement	689 cm³
Cylinder arrangement	Inline 2-cylinder
Bore × stroke	80.0 × 68.6 mm (3.15 × 2.70 in)
Compression ratio	11.5 : 1
Standard compression pressure (at sea level)	#1 880 kPa/355 r/min (8.8 kgf/cm²/355 r/min, 125.2 psi/355 r/min) #2 790 kPa/355 r/min (7.9 kgf/cm²/355 r/min, 112 psi/355 r/min)
Minimum–maximum	#1 770–990 kPa/355 r/min (7.7–9.9 kgf/cm²/355 r/min, 109.5–140.8 psi/355 r/min) #2 690–880 kPa/355 r/min (6.9–8.8 kgf/cm²/355 r/min, 98.1–125.1 psi/355 r/min)
Starting system	Electric starter
Fuel	
Recommended fuel	Premium unleaded gasoline (Gasohol (E10) acceptable)
Fuel tank capacity	14 L (3.70 US gal, 3.08 Imp.gal)
Fuel reserve amount	2.7 L (0.71 US gal, 0.59 Imp.gal)
Engine oil	
Lubrication system	Wet sump
Recommended brand	YAMALUBE
Type	SAE 10W-30, 10W-40, 10W-50, 15W-40, 20W-40 or 20W-50
Recommended engine oil grade	API service SG type or higher, JASO standard MA
Engine oil quantity	
Quantity (disassembled)	3.00 L (3.17 US qt, 2.64 Imp.qt)
Without oil filter cartridge replacement	2.30 L (2.43 US qt, 2.02 Imp.qt)
With oil filter cartridge replacement	2.60 L (2.75 US qt, 2.29 Imp.qt)
Oil pressure	280.0 kPa/5000 r/min@100 °C (40.6 psi/5000 r/min@212 °F)
Oil filter	
Oil filter type	Cartridge
Oil pump	
Oil pump type	Trochoid
Inner-rotor-to-outer-rotor-tip clearance	Less than 0.120 mm (0.0047 in)
Limit	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance	0.09–0.15 mm (0.0035–0.0059 in)
Limit	0.22 mm (0.0087 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance	0.03–0.08 mm (0.0012–0.0032 in)
Bypass valve opening pressure	80.0–120.0 kPa (0.80–1.20 kgf/cm², 11.6–17.4 psi)

Relief valve operating pressure	630.0–810.0 kPa (6.30–8.10 kgf/cm², 91.4–117.5 psi)
Cooling system	
Radiator capacity (including all routes)	1.60 L (1.69 US qt, 1.41 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)	0.25 L (0.26 US qt, 0.22 Imp.qt)
Radiator cap opening pressure	108.0–137.4 kPa (1.08–1.37 kgf/cm², 15.7–19.9 psi)
Thermostat	
Valve opening temperature	80.0–84.0 °C (176.00–183.20 °F)
Valve full open temperature	95.0 °C (203.00 °F)
Valve lift (full open)	8.0 mm (0.31 in)
Radiator core	
Width	322.6 mm (12.70 in)
Height	180.0 mm (7.09 in)
Depth	24.0 mm (0.94 in)
Water pump	
Water pump type	Single suction centrifugal pump
Reduction ratio	77/40 × 17/25 (1.309)
Spark plug(s)	
Manufacturer/model	NGK/LMAR8A-9
Spark plug gap	0.8–0.9 mm (0.031–0.035 in)
Cylinder head	
Combustion chamber volume	18.48–20.08 cm³ (1.13–1.23 cu.in)
Warpage limit	0.05 mm (0.0020 in)
Camshaft	
Drive system	Chain drive (right)
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	
Lobe height (Intake)	35.610–35.710 mm (1.4020–1.4059 in)
Limit	35.510 mm (1.3980 in)
Base circle diameter (Intake)	27.950–28.050 mm (1.1004–1.1043 in)
Limit	27.850 mm (1.0965 in)
Lobe height (Exhaust)	35.710–35.810 mm (1.4059–1.4098 in)
Limit	35.610 mm (1.4020 in)
Base circle diameter (Exhaust)	27.950–28.050 mm (1.1004–1.1043 in)
Limit	27.850 mm (1.0965 in)
Camshaft runout limit	0.030 mm (0.0012 in)
Timing chain	
Tensioning system	Automatic
Valve, valve seat, valve guide	
Valve clearance (cold)	
Intake	0.11–0.20 mm (0.0043–0.0079 in)
Exhaust	0.24–0.30 mm (0.0094–0.0118 in)

Valve dimensions	
Valve head diameter (intake)	31.40–31.60 mm (1.2362–1.2441 in)
Valve head diameter (exhaust)	26.40–26.60 mm (1.0394–1.0472 in)
Valve seat contact width (intake)	0.90–1.10 mm (0.0354–0.0433 in)
Valve seat contact width (exhaust)	0.90–1.10 mm (0.0354–0.0433 in)
Valve stem diameter (intake)	4.475–4.490 mm (0.1762–0.1768 in)
Limit	4.445 mm (0.1750 in)
Valve stem diameter (exhaust)	4.460–4.475 mm (0.1756–0.1762 in)
Limit	4.430 mm (0.1744 in)
Valve guide inside diameter (intake)	4.500–4.512 mm (0.1772–0.1776 in)
Limit	4.550 mm (0.1791 in)
Valve guide inside diameter (exhaust)	4.500–4.512 mm (0.1772–0.1776 in)
Limit	4.550 mm (0.1791 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)	0.025–0.052 mm (0.0010–0.0020 in)
Limit	0.100 mm (0.0039 in)
Valve stem runout	0.010 mm (0.0004 in)

Valve spring

Free length (intake)	40.30 mm (1.59 in)
Limit	38.29 mm (1.51 in)
Free length (exhaust)	41.39 mm (1.63 in)
Limit	39.32 mm (1.55 in)
Installed length (intake)	34.34 mm (1.35 in)
Installed length (exhaust)	35.84 mm (1.41 in)
Spring rate K1 (intake)	26.03 N/mm (2.65 kgf/mm, 148.63 lbf/in)
Spring rate K2 (intake)	42.21 N/mm (4.30 kgf/mm, 241.02 lbf/in)
Spring rate K1 (exhaust)	28.90 N/mm (2.95 kgf/mm, 165.02 lbf/in)
Spring rate K2 (exhaust)	44.19 N/mm (4.51 kgf/mm, 252.32 lbf/in)
Installed compression spring force (intake)	144.00–166.00 N (14.68–16.93 kgf, 32.37–37.32 lbf)
Installed compression spring force (exhaust)	149.00–171.00 N (15.19–17.44 kgf, 33.50–38.44 lbf)
Spring tilt (intake)	1.8 mm (0.07 in)
Spring tilt (exhaust)	1.8 mm (0.07 in)
Winding direction (intake)	Clockwise
Winding direction (exhaust)	Clockwise

Cylinder

Bore	80.000–80.010 mm (3.1496–3.1500 in)
Taper limit	0.050 mm (0.0020 in)
Out of round limit	0.050 mm (0.0020 in)

Piston

Piston-to-cylinder clearance	0.015–0.040 mm (0.0006–0.0016 in)
Diameter	79.970–79.985 mm (3.1484–3.1490 in)
Measuring point (from piston skirt bottom)	8.0 mm (0.31 in)
Offset	0.00 mm (0.0000 in)
Piston pin bore inside diameter	18.004–18.015 mm (0.7088–0.7093 in)
Limit	18.045 mm (0.7104 in)
Piston pin outside diameter	17.990–17.995 mm (0.7083–0.7085 in)
Limit	17.970 mm (0.7075 in)

Piston-pin-to-piston-pin-bore clearance	0.009–0.025 mm (0.0004–0.0010 in)
Limit	0.075 mm (0.0030 in)
Piston ring	
Top ring	
Ring type	Barrel
End gap (installed)	0.15–0.25 mm (0.0059–0.0098 in)
Limit	0.50 mm (0.0197 in)
Ring side clearance	0.030–0.065 mm (0.0012–0.0026 in)
Limit	0.115 mm (0.0045 in)
2nd ring	
Ring type	Taper
End gap (installed)	0.30–0.45 mm (0.0118–0.0177 in)
Limit	0.80 mm (0.0315 in)
Ring side clearance	0.020–0.055 mm (0.0008–0.0022 in)
Limit	0.115 mm (0.0045 in)
Oil ring	
End gap (installed)	0.10–0.35 mm (0.0039–0.0138 in)
Connecting rod	
Oil clearance	0.027–0.051 mm (0.0011–0.0020 in)
Bearing color code	1. Blue 2. Black 3. Brown 4. Green
Crankshaft	
Runout limit	0.030 mm (0.0012 in)
Big end side clearance	0.160–0.262 mm (0.0063–0.0103 in)
Journal oil clearance	0.018–0.042 mm (0.0007–0.0017 in)
Bearing color code	-1.Violet-Pink 0.White-Pink 1.Blue-Pink 2.Black-Pink 3.Brown-Pink
Balancer	
Balancer drive method	Gear
Balancer shaft runout limit	0.030 mm (0.0012 in)
Balancer shaft journal to balancer shaft bearing clearance	0.020–0.054 mm (0.0008–0.0021 in)
Clutch	
Clutch type	Wet, multiple-disc
Clutch release method	Outer pull, rack and pinion pull
Clutch lever free play	5.0–10.0 mm (0.20–0.39 in)
Friction plate 2 thickness	2.92–3.08 mm (0.115–0.121 in)
Wear limit	2.82 mm (0.111 in)
Plate quantity	5 pcs
Friction plate 1 thickness	2.90–3.10 mm (0.114–0.122 in)
Wear limit	2.80 mm (0.110 in)
Plate quantity	2 pcs
Clutch plate thickness	1.90–2.10 mm (0.075–0.083 in)
Plate quantity	6 pcs
Warpage limit	0.10 mm (0.004 in)
Clutch spring free length	50.00 mm (1.97 in)
Limit	47.50 mm (1.87 in)
Spring quantity	6 pcs

Transmission	
Transmission type	Constant mesh 6-speed
Primary reduction ratio	1.925 (77/40)
Final drive	Chain
Secondary reduction ratio	2.688 (43/16)
Operation	Left foot operation
Gear ratio	
1st	2.846 (37/13)
2nd	2.125 (34/16)
3rd	1.632 (31/19)
4th	1.300 (26/20)
5th	1.091 (24/22)
6th	0.964 (27/28)
Main axle runout limit	0.08 mm (0.0032 in)
Drive axle runout limit	0.08 mm (0.0032 in)
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	5.76–5.89 mm (0.2268–0.2319 in)
Air filter	
Air filter element	Oil-coated paper element
Fuel pump	
Pump type	Electrical
Maximum consumption amperage	3.3 A
Fuel injector	
Model/quantity	297500-2310/2
Throttle body	
Type/quantity	EHDW38-1
ID mark	1WS1 00 (1XB1, 1XB5, 1XB6) 1WS2 20 (1XB2, 1XB7, 1XB8)
Throttle position sensor	
Resistance	2.64–6.16 kΩ
Output voltage (at idle)	0.63–0.73 V
Fuel injection sensor	
Crankshaft position sensor resistance	228–342 Ω
Intake air pressure sensor output voltage	3.57–3.71 V@101.3 kPa
Intake air temperature sensor resistance	290–390 Ω@80 °C (290–390 Ω@176 °F)
Coolant temperature sensor resistance	2510–2780 Ω@20 °C (2510–2780 Ω@68 °F)
Idling condition	
Fuel line pressure at idling	300–390 kPa (3.0–3.9 kgf/cm², 43.5–56.6 psi) / Regulated pressure 324 kPa (3.2 kgf/cm², 47.0 psi)
Engine idling speed	1100–1300 r/min
CO%	0.0–2.0 %

Intake vacuum	29.8–32.4 kPa (224–243 mmHg, 8.8–9.6 inHg)
Water temperature	85.0–105.0 °C (185.00–221.00 °F)
Oil temperature	60.0–80.0 °C (140.00–176.00 °F)
Throttle grip free play	3.0–5.0 mm (0.12–0.20 in)

EAS20015
CHASSIS SPECIFICATIONS

Chassis	
Frame type	Diamond
Caster angle	24.80 °
Trail	90 mm (3.5 in)
Front wheel	
Wheel type	Cast wheel
Rim size	17M/C x MT3.50
Rim material	Aluminum
Wheel travel	130 mm (5.1 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)
Rear wheel	
Wheel type	Cast wheel
Rim size	17M/C x MT5.50
Rim material	Aluminum
Wheel travel	130 mm (5.1 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)
Front tire	
Type	Tubeless
Size	120/70 ZR17M/C (58W)
Manufacturer/model	MICHELIN/PILOT ROAD 3
Manufacturer/model	BRIDGESTONE/BT023F F
Wear limit (front)	1.6 mm (0.06 in)
Rear tire	
Type	Tubeless
Size	180/55 ZR17M/C (73W)
Manufacturer/model	MICHELIN/PILOT ROAD 3A
Manufacturer/model	BRIDGESTONE/BT023R M
Wear limit (rear)	1.6 mm (0.06 in)
Tire air pressure (measured on cold tires)	
Loading condition	0–173 kg (0–381 lb)
Front	225 kPa (2.25 kgf/cm², 33 psi)
Rear	250 kPa (2.50 kgf/cm², 36 psi)
High-speed riding	
Front	225 kPa (2.25 kgf/cm², 33 psi)
Rear	250 kPa (2.50 kgf/cm², 36 psi)
Front brake	
Type	Dual disc brake
Operation	Right hand operation
Front disc brake	
Disc outside diameter × thickness	282.0 × 4.5 mm (11.10 × 0.18 in)
Brake disc thickness limit	4.0 mm (0.16 in)
Brake disc runout limit (as measured on wheel)	0.10 mm (0.0039 in)

Brake pad lining thickness (inner)	4.5 mm (0.18 in)
Limit	0.5 mm (0.02 in)
Brake pad lining thickness (outer)	4.5 mm (0.18 in)
Limit	0.5 mm (0.02 in)
Master cylinder inside diameter	15.00 mm (0.59 in)
Caliper cylinder inside diameter	30.23 mm (1.19 in)
Caliper cylinder inside diameter	27.00 mm (1.06 in)
Specified brake fluid	DOT 4

Rear brake

Type	Single disc brake
Operation	Right foot operation
Rear disc brake	
Disc outside diameter × thickness	245.0 × 5.0 mm (9.65 × 0.20 in)
Brake disc thickness limit	4.5 mm (0.18 in)
Brake disc runout limit (as measured on wheel)	0.15 mm (0.0059 in)
Brake pad lining thickness (inner)	6.0 mm (0.24 in)
Limit	1.0 mm (0.04 in)
Brake pad lining thickness (outer)	6.0 mm (0.24 in)
Limit	1.0 mm (0.04 in)
Master cylinder inside diameter	12.7 mm (0.50 in)
Caliper cylinder inside diameter	38.18 mm (1.50 in)
Specified brake fluid	DOT 4

Steering

Steering bearing type	Angular bearing
Center to lock angle (left)	35.0 °
Center to lock angle (right)	35.0 °

Front suspension

Type	Telescopic fork
Spring/shock absorber type	Coil spring/oil damper
Front fork travel	130.0 mm (5.12 in)
Fork spring free length	345.4 mm (13.60 in)
Limit	331.6 mm (13.06 in)
Collar length	150.0 mm (5.91 in)
Fork spring installed length	338.4 mm (13.32 in)
Spring rate K1	8.50 N/mm (0.87 kgf/mm, 48.54 lbf/in)
Spring stroke K1	0.0–130.0 mm (0.00–5.12 in)
Inner tube outer diameter	41.0 mm (1.61 in)
Inner tube bending limit	0.2 mm (0.01 in)
Recommended oil	Fork oil 10W or equivalent
Quantity	403.0 cm^3 (13.63 US oz, 14.21 Imp.oz)
Level	162.0 mm (6.38 in)

Rear suspension

Type	Swingarm (link suspension)
Spring/shock absorber type	Coil spring/gas-oil damper
Rear shock absorber assembly travel	55.0 mm (2.17 in)
Spring free length	171.5 mm (6.75 in)
Spring installed length	158.5 mm (6.24 in)
Spring rate K1	107.80 N/mm (10.99 kgf/mm, 615.54 lbf/in)
Spring stroke K1	0.0–55.0 mm (0.00–2.17 in)

Enclosed gas/air pressure (STD)	980 kPa (9.8 kgf/cm², 139.4 psi)
Spring preload adjusting positions	
Minimum	1
Standard	3
Maximum	9

Drive chain

Type/manufacturer	525VAZ/DAIDO
Number of links	108
15-link length limit	239.3 mm (9.42 in)
Drive chain slack	51.0–56.0 mm (2.01–2.20 in)
Limit	58.0 mm (2.28 in)

EAS20016
ELECTRICAL SPECIFICATIONS

Voltage	
System voltage	12 V
Ignition system	
Ignition system	TCI
Ignition timing (B.T.D.C.)	10.0 °/1200 r/min
Engine control unit	
Model/manufacturer	TBDFH8/DENSO
Ignition coil	
Minimum ignition spark gap	6.0 mm (0.24 in)
Primary coil resistance	1.19–1.61 Ω
Secondary coil resistance	8.50–11.50 kΩ
Lean angle sensor output voltage	
Less than 65°	0.4–1.4 V
More than 65°	3.7–4.4 V
AC magneto	
Standard output	14.0 V, 29.3 A@5000 r/min
Stator coil resistance	0.128–0.192 Ω (W-W)
Rectifier/regulator	
Regulator type	Semi conductor-short circuit
Regulated voltage (DC)	14.1–14.9 V
Rectifier capacity	50.0 A
Battery	
Model	YTZ10S
Voltage, capacity	12 V, 8.6 Ah
Specific gravity	1.310
Manufacturer	GS YUASA
Ten hour rate charging current	0.86 A
Headlight	
Bulb type	Halogen bulb
Bulb voltage, wattage × quantity	
Headlight	12 V, 60.0 W/55.0 W × 1
Auxiliary light	12 V, 5.0 W × 1
Tail/brake light	LED
Front turn signal light	12 V, 10.0 W × 2
Rear turn signal light	12 V, 10.0 W × 2
License plate light	12 V, 5.0 W × 1
Meter lighting	LED
Indicator light	
Neutral indicator light	LED
Turn signal indicator light	LED

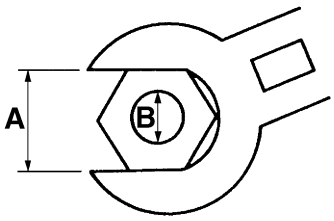
Oil pressure warning light	LED
High beam indicator light	LED
Coolant temperature warning light	LED
Engine trouble warning light	LED
ABS warning light	LED
Immobilizer system indicator light	LED
Electric starting system	
System type	Constant mesh
Starter motor	
Power output	0.50 kW
Armature coil resistance	0.0150–0.0250 Ω
Brush overall length	12.0 mm (0.47 in)
Limit	6.50 mm (0.26 in)
Brush spring force	6.03–6.52 N (615–665 gf, 21.71–23.47 oz)
Mica undercut (depth)	0.70 mm (0.03 in)
Starter relay	
Amperage	180.0 A
Coil resistance	4.18–4.62 Ω
Horn	
Horn type	Plane
Quantity	1
Maximum amperage	3.0 A
Turn signal/hazard relay	
Relay type	Full transistor
Built-in, self-canceling device	No
Fuel sender unit	
Sender unit resistance (full)	9.0–11.0 Ω
Sender unit resistance (empty)	213.0–219.0 Ω
Fuses	
Main fuse	30.0 A
Headlight fuse	15.0 A
Signaling system fuse	10.0 A
Ignition fuse	10.0 A
Radiator fan motor fuse	10.0 A
Parking lighting fuse	7.5 A
Fuel injection system fuse	10.0 A
ABS motor fuse	30.0 A
ABS control unit fuse	7.5 A
ABS solenoid fuse	20.0 A
Auxiliary fuse	2.0 A
Backup fuse	7.5 A
Spare fuse	30.0 A
Spare fuse	20.0 A
Spare fuse	15.0 A
Spare fuse	10.0 A
Spare fuse	7.5 A

Spare fuse	2.0 A

EAS20017
TIGHTENING TORQUES

EAS30015
GENERAL TIGHTENING TORQUE SPECIFICATIONS

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



A. Distance between flats
B. Outside thread diameter

A (nut)	B (bolt)	General tightening torques		
		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

EAS30016
ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Exhaust pipe nut	M8	4	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Cylinder head stud bolt (exhaust pipe)	M8	4	15 Nm (1.5 m·kgf, 11 ft·lbf)	
Muffler bracket bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Muffler bracket bolt	M8	2	20 Nm (2.0 m·kgf, 14 ft·lbf)	
Muffler cover bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
O_2 sensor	M12	1	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Starter motor terminal nut	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Engine ground lead bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
O_2 sensor coupler bracket bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Spark plug	M10	2	13 Nm (1.3 m·kgf, 9.4 ft·lbf)	
Exhaust camshaft sprocket bolt	M7	2	24 Nm (2.4 m·kgf, 17 ft·lbf)	
Intake camshaft sprocket bolt	M7	2	24 Nm (2.4 m·kgf, 17 ft·lbf)	
Exhaust camshaft cap bolt	M6	6	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	E
Intake camshaft cap bolt	M6	6	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	E
Timing chain tensioner bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Timing chain tensioner cap bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Timing mark accessing bolt	M8	1	15 Nm (1.5 m·kgf, 11 ft·lbf)	
Crankshaft end cover	M36	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Cylinder head cover bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Breather plate bolt	M5	6	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	LT
Cylinder head bolt	M10	6	See TIP.	E
Cylinder head bolt	M6	2	See TIP.	
Timing chain guide bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Timing chain bolt (right side of cylinder head)	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Starter clutch bolt	M8	3	32 Nm (3.2 m·kgf, 23 ft·lbf)	LT
Generator rotor bolt	M12	1	70 Nm (7.0 m·kgf, 51 ft·lbf)	E
Generator cover bolt	M6	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	LT
Generator cover bolt	M6	8	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Stator coil bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Crankshaft position sensor bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Coupler and hose bracket bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Starter motor bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Starter motor front cover bolt	M5	2	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Starter motor terminal and rear cover nut	M6	1	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Clutch boss nut	M20	1	95 Nm (9.5 m·kgf, 69 ft·lbf)	Stake. E
Clutch spring bolt	M6	6	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Clutch cover bolt	M6	10	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Clutch cable holder bolt	M6	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	LT
Oil pump drive chain guide bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Shift shaft spring stopper	M8	1	22 Nm (2.2 m·kgf, 16 ft·lbf)	LT
Oil pump cover screw	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Oil pump bolt	M6	4	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Holder bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Oil pan bolt	M6	11	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil strainer bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Crankcase bolt	M9	6	See TIP.	l=80 mm (3.15 in) E
Crankcase bolt	M8	6	See TIP.	l=70 mm (2.76 in) E
Crankcase bolt	M8	2	See TIP.	l=65 mm (2.56 in) E
Crankcase bolt	M6	2	See TIP.	l=65 mm (2.56 in) E
Crankcase bolt	M6	3	See TIP.	l=60 mm (2.36 in) E
Crankcase bolt	M6	8	See TIP.	l=40 mm (1.57 in) E
Oil pressure switch	PT1/8	1	15 Nm (1.5 m·kgf, 11 ft·lbf)	Three bond No.1215®
Oil pressure switch lead bolt	M4	1	1.8 Nm (0.18 m·kgf, 1.3 ft·lbf)	
Oil pressure switch lead holder bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Blind plate bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Gear position switch bolt	M5	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	LT
Cylinder plug bolt	M6	1	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Main gallery bolt	M16	1	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Connecting rod bolt	M8	4	See TIP.	M
Balancer driven gear bolt	M10	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	E
Balancer shaft cover bolt	M6	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	LT
Bearing retainer bolt	M6	3	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	LT

Item	Thread size	Q'ty	Tightening torque	Remarks
Shift drum retainer bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Radiator cap bolt	M3	1	1.0 Nm (0.10 m·kgf, 0.72 ft·lbf)	
Coolant reservoir bolt	M6	1	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Radiator side cover bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Radiator fan motor bolt	M6	3	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Radiator bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Horn nut	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Radiator inlet hose clamp screw	M5	1	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Water jacket joint inlet hose clamp screw	M5	1	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Water jacket joint bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Oil filter cartridge	M20	1	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Oil filter cartridge union bolt	M20	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Coolant temperature sensor	M10	1	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Thermostat cover bolt	M6	2	12 Nm (1.2 m·kgf, 8.7 ft·lbf)	
Water pump housing bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Water pump inlet/outlet pipe bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Coolant drain bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Intake air pressure sensor bolt	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Intake air temperature sensor bolt	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Air duct bracket screw	M5	4	1.6 Nm (0.16 m·kgf, 1.2 ft·lbf)	
Air filter element screw	M5	1	1.6 Nm (0.16 m·kgf, 1.2 ft·lbf)	
Throttle cable locknut (throttle body side)	M6	2	4.5 Nm (0.45 m·kgf, 3.3 ft·lbf)	
Throttle cable locknut (handlebar side)	M6	1	4.3 Nm (0.43 m·kgf, 3.1 ft·lbf)	
Throttle body joint clamp screw	M5	4	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Air filter case joint clamp screw	M5	2	3.0 Nm (0.30 m·kgf, 2.2 ft·lbf)	
Air filter case bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Fuel rail bolt	M5	2	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
Throttle position sensor screw	M5	2	3.5 Nm (0.35 m·kgf, 2.5 ft·lbf)	
ISC (idle speed control) valve plate screw	M6	1	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Intake solenoid bracket nut	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Surge tank nut	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Engine oil drain bolt	M14	1	43 Nm (4.3 m·kgf, 31 ft·lbf)	

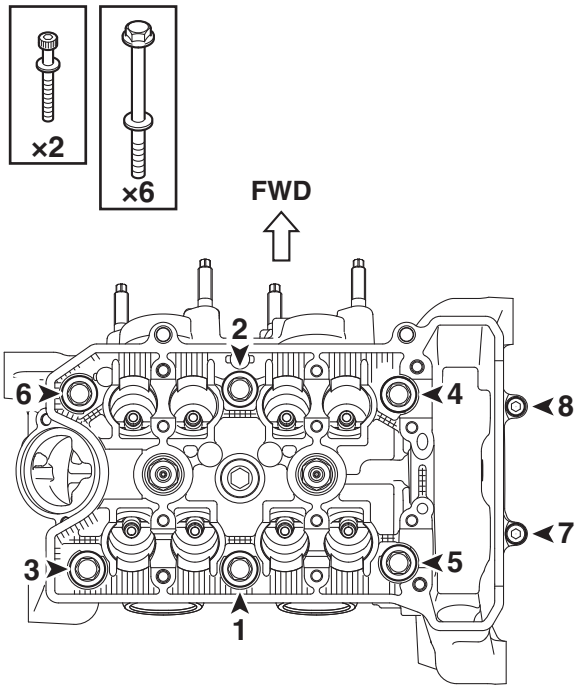
TIP

Cylinder head bolt

Tighten the cylinder head bolts "1"–"8" in the proper tightening sequence as follows:

1. Lubricate the cylinder head bolts "1"–"6" threads and mating surface with engine oil.
2. Tighten the cylinder head bolts "1"–"6" to 10 Nm (1.0 m·kgf, 7.2 ft·lbf).
3. Tighten the cylinder head bolts "1"–"6" to 40 Nm (4.0 m·kgf, 29 ft·lbf).

4. Loosen and retighten the cylinder head bolts “1”–“6” to 20 Nm (2.0 m·kgf, 14 ft·lbf) in the proper tightening sequence, and then tighten them further to reach the specified angle 90° in the proper tightening sequence.
5. Tighten the cylinder head bolts “7” and “8” to 10 Nm (1.0 m·kgf, 7.2 ft·lbf).

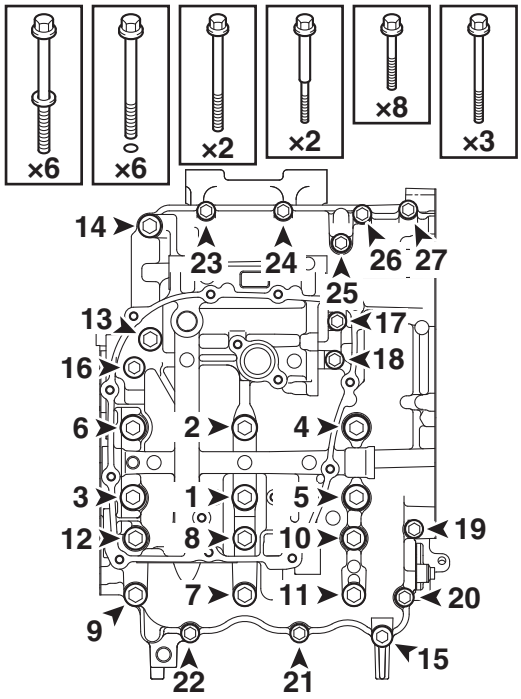


TIP

Crankcase bolt

Tighten the crankcase bolts “1”–“27” in the proper tightening sequence as follows: Tighten the bolts “1”–“16” in the order of the embossed numbers on the crankcase.

1. Lubricate the crankcase bolts “1”–“27” threads, mating surfaces, washers, and O-rings with the engine oil.
2. Tighten the crankcase bolts “1”–“6” to 24 Nm (2.4 m·kgf, 17 ft·lbf).
3. Loosen and retighten the crankcase bolts “1”–“6” to 17 Nm (1.7 m·kgf, 12 ft·lbf) in the proper tightening sequence, and then tighten them further to reach the specified angle 60° in the proper tightening sequence.
4. Tighten the crankcase bolts “7”–“27”.
   “7”–“14”: 24 Nm (2.4 m·kgf, 17 ft·lbf)
   “15”–“16”: 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
   “17”–“27”: 10 Nm (1.0 m·kgf, 7.2 ft·lbf)
   Tighten the bolts “17”–“27” in any tightening sequence using a crisscross pattern.



TIP

Connecting rod bolt

Tighten the connecting rod bolts to 20 Nm (2.0 m·kgf, 14 ft·lbf), and then tighten them further to reach the specified angle 175–185°.

EAS30017
CHASSIS TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Engine mounting nut (rear upper side)	M10	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Engine mounting nut (rear lower side)	M10	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Engine mounting bolt (left front side)	M12	1	75 Nm (7.5 m·kgf, 54 ft·lbf)	
Engine mounting bolt (left upper side)	M10	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Engine mounting bolt (right front side)	M12	1	75 Nm (7.5 m·kgf, 54 ft·lbf)	
Engine mounting bolt (right upper side)	M10	1	55 Nm (5.5 m·kgf, 40 ft·lbf)	
Engine bracket bolt (right)	M8	2	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Engine bracket bolt (left)	M8	2	25 Nm (2.5 m·kgf, 18 ft·lbf)	
Clutch cable guide bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rider seat bracket bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Battery terminal bolt	M6	2	2.2 Nm (0.22 m·kgf, 1.6 ft·lbf)	
Rider seat bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Lean angle sensor bolt	M4	2	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Starter relay bolt	M6	2	3.6 Nm (0.36 m·kgf, 2.6 ft·lbf)	
Battery box bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear side cover bolt (M8 × 25 mm)	M8	2	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Rear side cover bolt (M6 × 12 mm)	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Tail/brake light bolt	M6	2	3.3 Nm (0.33 m·kgf, 2.4 ft·lbf)	
Mudguard assembly bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
License plate/turn signal light bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Center cover screw	M5	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Upper tail cover screw	M5	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Headlight assembly bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Headlight side cover bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Headlight center cover bolt	M6	4	0.8 Nm (0.08 m·kgf, 0.58 ft·lbf)	
Meter assembly screw	M4	3	1.3 Nm (0.13 m·kgf, 0.94 ft·lbf)	
Meter assembly bracket bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Fuel tank top cover bolt	M5	1	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Fuel tank cover bolt (M5 × 12 mm)	M5	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Fuel tank cover bolt (M5 × 16 mm)	M5	8	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Fuel tank center cover bolt	M5	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Air scoop bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Fuel tank front cover lower bolt	M6	2	4.0 Nm (0.40 m·kgf, 2.9 ft·lbf)	
Fuel tank front cover upper bolt	M5	2	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
Air scoop inner panel bolt	M5	6	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Electrical components tray 1 bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Rectifier/regulator bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Electrical components tray 2 nut	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Electrical components tray 2 bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Hydraulic unit assembly bolt	M6	3	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front brake hose guide bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front brake disc bolt	M6	10	18 Nm (1.8 m·kgf, 13 ft·lbf)	
Front wheel sensor rotor bolt	M5	3	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Front wheel sensor bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front wheel axle	M16	1	65 Nm (6.5 m·kgf, 47 ft·lbf)	
Front wheel axle pinch bolt	M8	1	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Drive chain puller locknut	M8	2	16 Nm (1.6 m·kgf, 12 ft·lbf)	
Rear wheel sprocket nut	M10	6	80 Nm (8.0 m·kgf, 58 ft·lbf)	
Rear brake disc bolt	M8	5	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Rear wheel sensor rotor bolt	M5	3	8 Nm (0.8 m·kgf, 5.8 ft·lbf)	
Rear wheel sensor bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Wheel axle nut	M18	1	105 Nm (10.5 m·kgf, 76 ft·lbf)	
Rear brake caliper retaining bolt	M12	1	27 Nm (2.7 m·kgf, 20 ft·lbf)	
Rear brake caliper bolt	M8	1	22 Nm (2.2 m·kgf, 16 ft·lbf)	
Brake master cylinder reservoir cap bolt	M4	2	1.5 Nm (0.15 m·kgf, 1.1 ft·lbf)	
Brake lever pivot bolt	M6	1	1.0 Nm (0.10 m·kgf, 0.72 ft·lbf)	
Brake lever pivot nut	M6	1	6 Nm (0.6 m·kgf, 4.3 ft·lbf)	
Front brake light switch screw	M4	1	1.2 Nm (0.12 m·kgf, 0.87 ft·lbf)	
Brake caliper bleed screw	M8	3	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Front brake caliper bolt	M10	2	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Front brake hose union bolt	M10	5	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Front brake master cylinder holder bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Brake pad retaining bolt	M10	1	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Screw plug	M10	1	2.5 Nm (0.25 m·kgf, 1.8 ft·lbf)	
Rear brake hose joint bracket bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake hose joint bolt	M6	3	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake hose union bolt	M10	4	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Brake fluid reservoir holder nut	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Footrest assembly bolt (right footrest)	M8	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Rear brake master cylinder bolt	M8	2	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Brake pedal bolt	M8	1	22 Nm (2.2 m·kgf, 16 ft·lbf)	
Rear brake hose/lead guide bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear brake hose/lead holder bolt	M6	1	5 Nm (0.5 m·kgf, 3.6 ft·lbf)	
Rear brake pedal adjusting locknut	M8	1	18 Nm (1.8 m·kgf, 13 ft·lbf)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Rearview mirror	M10	2	17 Nm (1.7 m·kgf, 12 ft·lbf)	
Handlebar switch screw (right)	M4	2	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Throttle cable housing bolt	M5	2	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Handlebar switch screw (left)	M4	2	2.0 Nm (0.20 m·kgf, 1.4 ft·lbf)	
Grip end	M16	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Upper handlebar holder bolt	M8	4	28 Nm (2.8 m·kgf, 20 ft·lbf)	
Lower handlebar holder nut	M10	2	32 Nm (3.2 m·kgf, 23 ft·lbf)	
Clutch lever pivot nut	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Clutch lever holder pinch bolt	M6	1	11 Nm (1.1 m·kgf, 8.0 ft·lbf)	
Clutch cable locknut	M8	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front fork damper rod bolt	M10	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Lower bracket pinch bolt	M8	4	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Upper bracket pinch bolt (left and right)	M8	2	26 Nm (2.6 m·kgf, 19 ft·lbf)	
Upper bracket pinch bolt (center)	M10	1	21 Nm (2.1 m·kgf, 15 ft·lbf)	
Front fork cap bolt	M38	2	23 Nm (2.3 m·kgf, 17 ft·lbf)	
Front fender bracket bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front fender bolt (upper side)	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front fender bolt (lower side)	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front brake hose/lead holder bolt	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front fender side cover bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Front brake hose holder bracket bolt	M5	1	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	
Front brake hose lower holder bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Cap nut	M25	1	See TIP.	
Drive chain guard bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Relay arm nut	M10	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Connecting arm nut (relay arm side)	M10	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Rear shock absorber assembly bolt (front side)	M10	1	44 Nm (4.4 m·kgf, 32 ft·lbf)	
Rear shock absorber assembly nut (rear side)	M10	1	40 Nm (4.0 m·kgf, 29 ft·lbf)	
Pivot shaft protector bolt	M6	4	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Pivot shaft protector bracket bolt	M6	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Sidestand bolt	M10	2	63 Nm (6.3 m·kgf, 46 ft·lbf)	
Footrest assembly bolt (left footrest)	M8	2	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Footrest plate bolt	M6	2	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Passenger footrest bolt	M8	4	28 Nm (2.8 m·kgf, 20 ft·lbf)	
Pivot shaft nut	M16	1	110 Nm (11 m·kgf, 80 ft·lbf)	
Footrest bracket bolt	M10	4	45 Nm (4.5 m·kgf, 33 ft·lbf)	
Sidestand pivot nut	M10	1	46 Nm (4.6 m·kgf, 33 ft·lbf)	
Sidestand switch nut	M5	2	3.8 Nm (0.38 m·kgf, 2.8 ft·lbf)	

Item	Thread size	Q'ty	Tightening torque	Remarks
Connecting arm nut (frame side)	M12	1	52 Nm (5.2 m·kgf, 38 ft·lbf)	
Drive sprocket cover bolt	M6	3	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	LT
Drive sprocket nut	M22	1	95 Nm (9.5 m·kgf, 69 ft·lbf)	Stake E
Shift rod locknut (shift arm side)	M6	1	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	
Shift rod locknut (shift pedal side)	M6	1	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	Left-hand threads
Shift arm pinch bolt	M6	1	14 Nm (1.4 m·kgf, 10 ft·lbf)	
Shift rod upper joint bolt	M6	1	9 Nm (0.9 m·kgf, 6.5 ft·lbf)	LT
Fuel pump bolt	M5	4	4.0 Nm (0.40 m·kgf, 2.9 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	2	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	
Rear fuel tank bracket bolt	M6	4	10 Nm (1.0 m·kgf, 7.2 ft·lbf)	
Front fuel tank bracket bolt	M8	1	30 Nm (3.0 m·kgf, 22 ft·lbf)	
Fuel tank overflow/breather hose clamp screw	M6	1	7 Nm (0.7 m·kgf, 5.1 ft·lbf)	

TIP

Cap nut

1. First, tighten the cap nut to approximately 52 Nm (5.2 m·kgf, 38 ft·lbf) with a torque wrench, then loosen the cap nut completely.
2. Retighten the cap nut to 18 Nm (1.8 m·kgf, 13 ft·lbf) with a torque wrench.

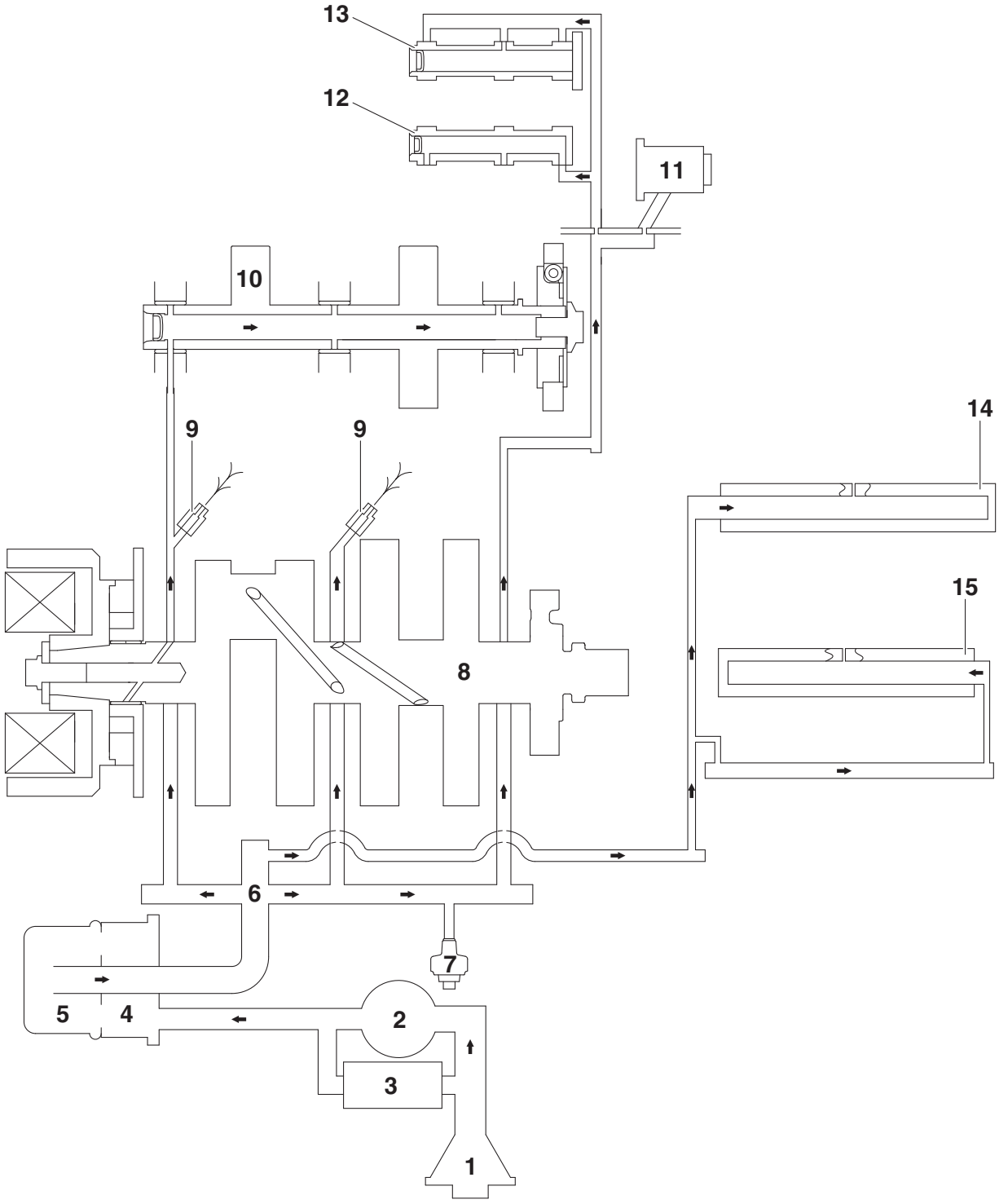
EAS20018
LUBRICATION POINTS AND LUBRICANT TYPES

EAS30018
ENGINE

Lubrication point	Lubricant
Oil seal lips	LS
O-rings	LS
Coolant hose insertion part	Water or S
Bearings	E
Camshaft lobes and journals (intake and exhaust)	M
Valve stem seal (installed on valve guide)	S
Valve lifter outer surface (intake and exhaust)	E
Valve stems and stem ends (intake and exhaust)	M
Decompression camshaft moving point	E
Crankshaft big ends	E
Piston surfaces	E
Piston pins	E
Connecting rod bolts	M
Crankshaft journals	E
Balancer shaft journals	E
Generator rotor bolt thread and washer	E
Balancer shaft buffer plate bolt	E
Oil pump rotors (inner and outer)	E
Oil pump shaft	E
Oil cooler union bolt	E
Starter clutch idle gear inner surface and end	E
Starter clutch outer assembly	E
Starter clutch gear	E
Primary driven gear end	E
Crankcase cover and clutch pull rod	LS
Clutch housing thrust washer	E
Clutch boss nut and conical washer	E
Transmission gears (wheel and pinion) and collar	M
Transmission gears inner surface (shift fork contact parts)	M
Drive sprocket nut	E
Shift drum assembly	E
Shift forks and shift fork guide bars	E
Shift shaft washer	E
Shift shaft moving surface	E

EAS20019
LUBRICATION SYSTEM CHART AND DIAGRAMS

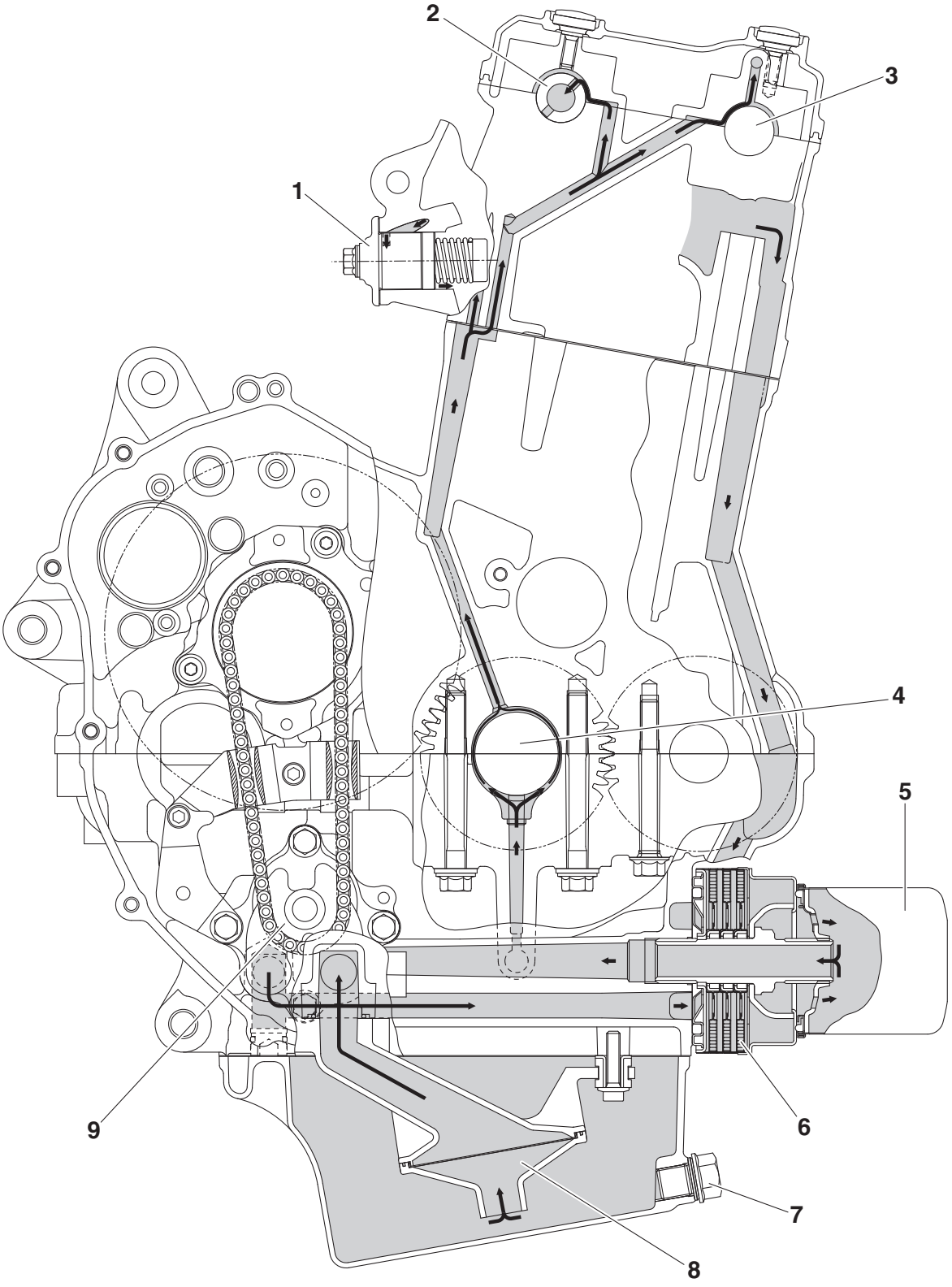
EAS30020
ENGINE OIL LUBRICATION CHART



1. Oil strainer
2. Oil pump
3. Relief valve
4. Oil cooler
5. Oil filter cartridge
6. Main gallery
7. Oil pressure switch
8. Crankshaft
9. Oil nozzle
10. Balancer shaft assembly
11. Timing chain tensioner
12. Intake camshaft
13. Exhaust camshaft
14. Main axle
15. Drive axle

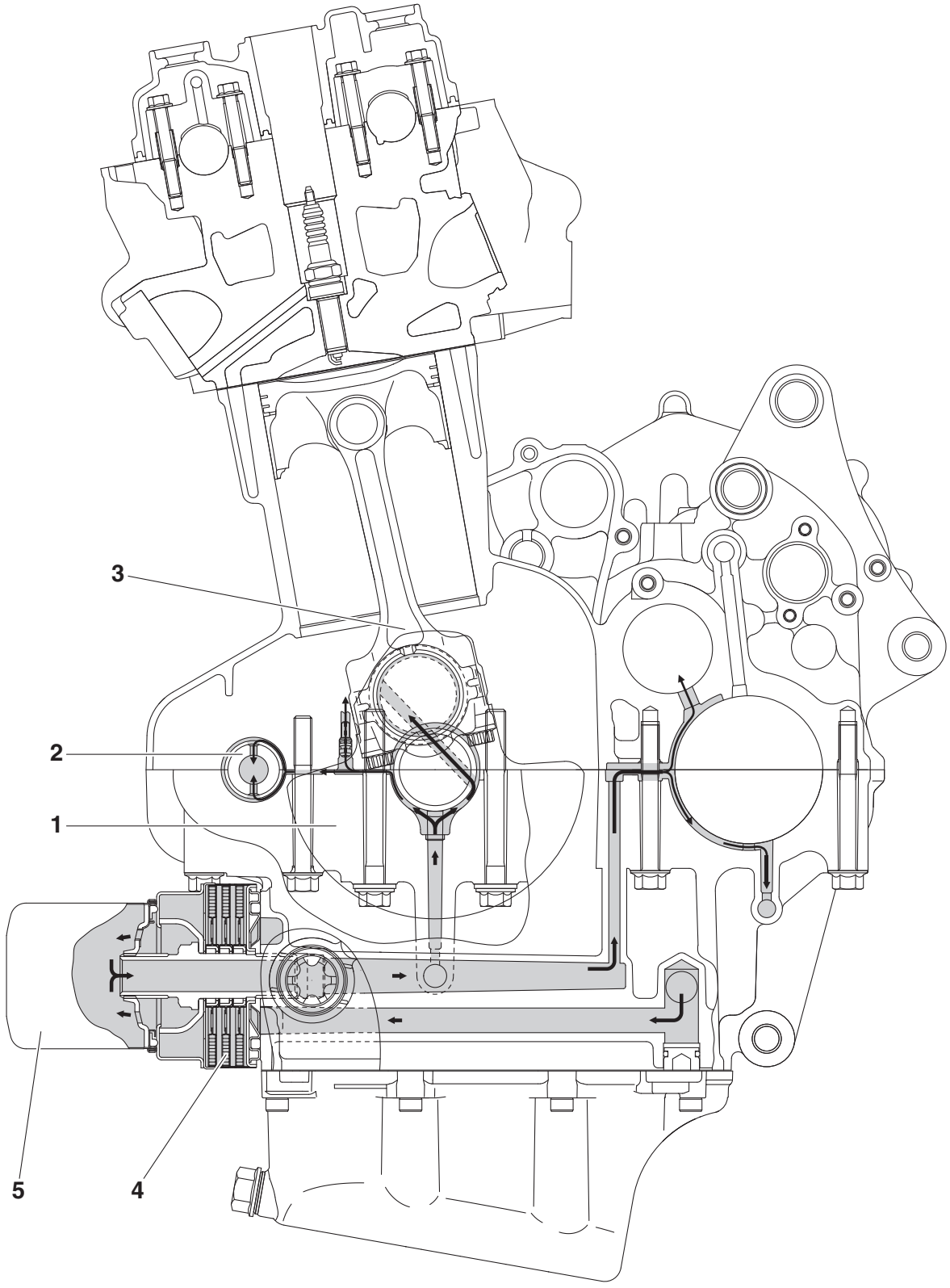
EAS30021
LUBRICATION DIAGRAMS

Crankcase, cylinder, and cylinder head (right side view)



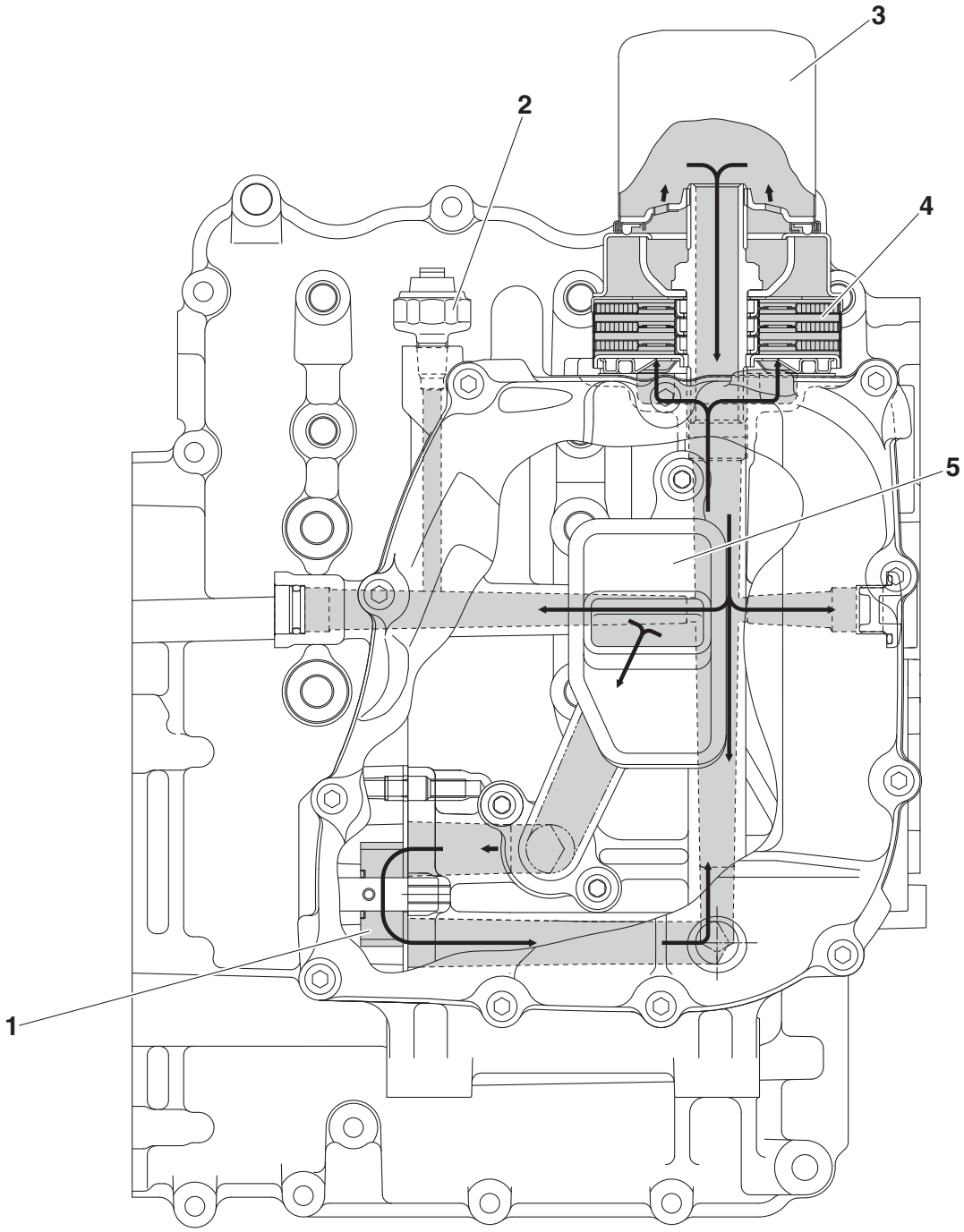
1. Timing chain tensioner
2. Intake camshaft
3. Exhaust camshaft
4. Crankshaft
5. Oil filter cartridge
6. Oil cooler
7. Oil drain bolt
8. Oil strainer
9. Oil pump

Crankcase and cylinder (left side view)



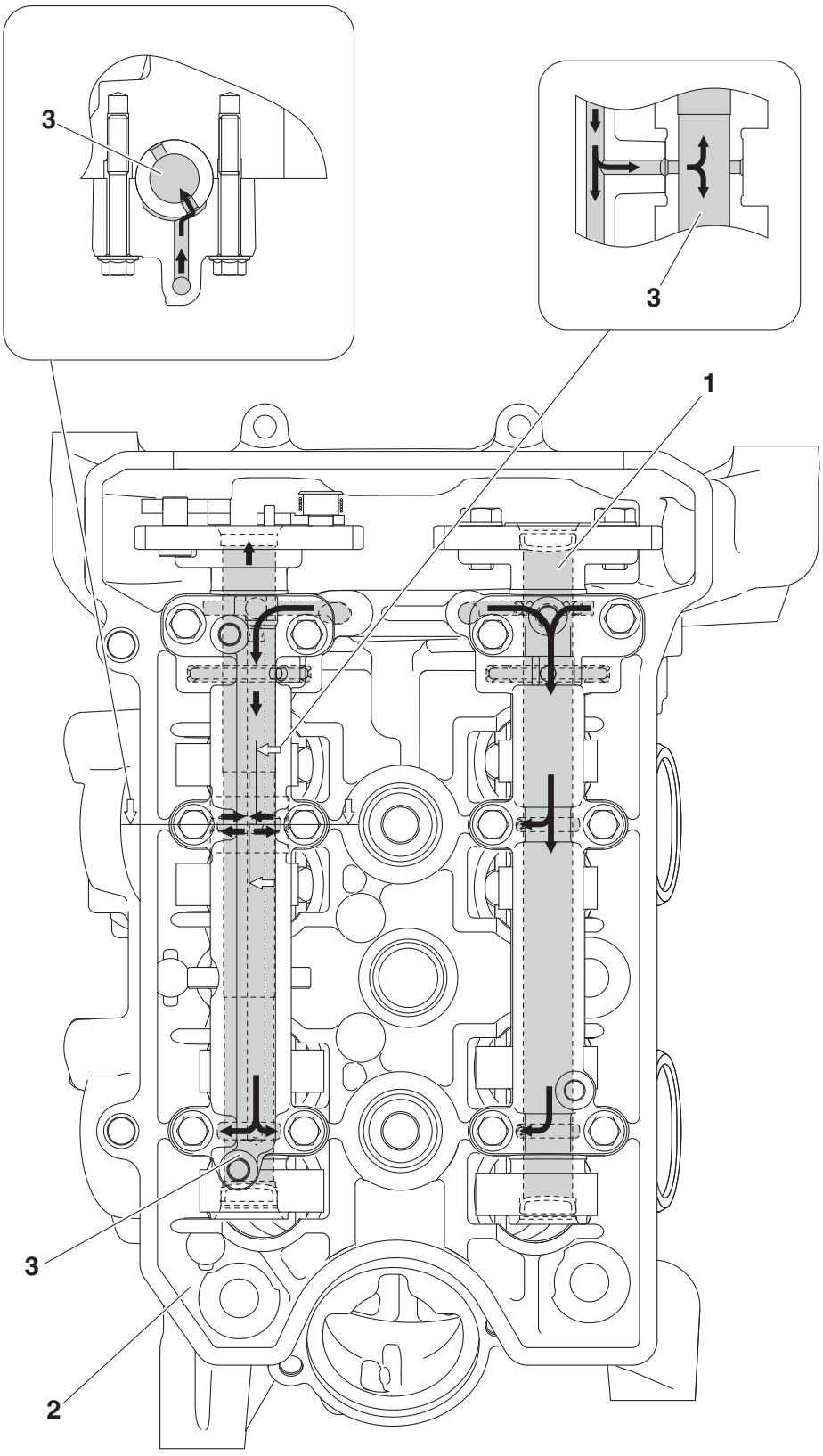
1. Crankshaft
2. Balancer shaft assembly
3. Connecting rod
4. Oil cooler
5. Oil filter cartridge

Oil pump (bottom view)



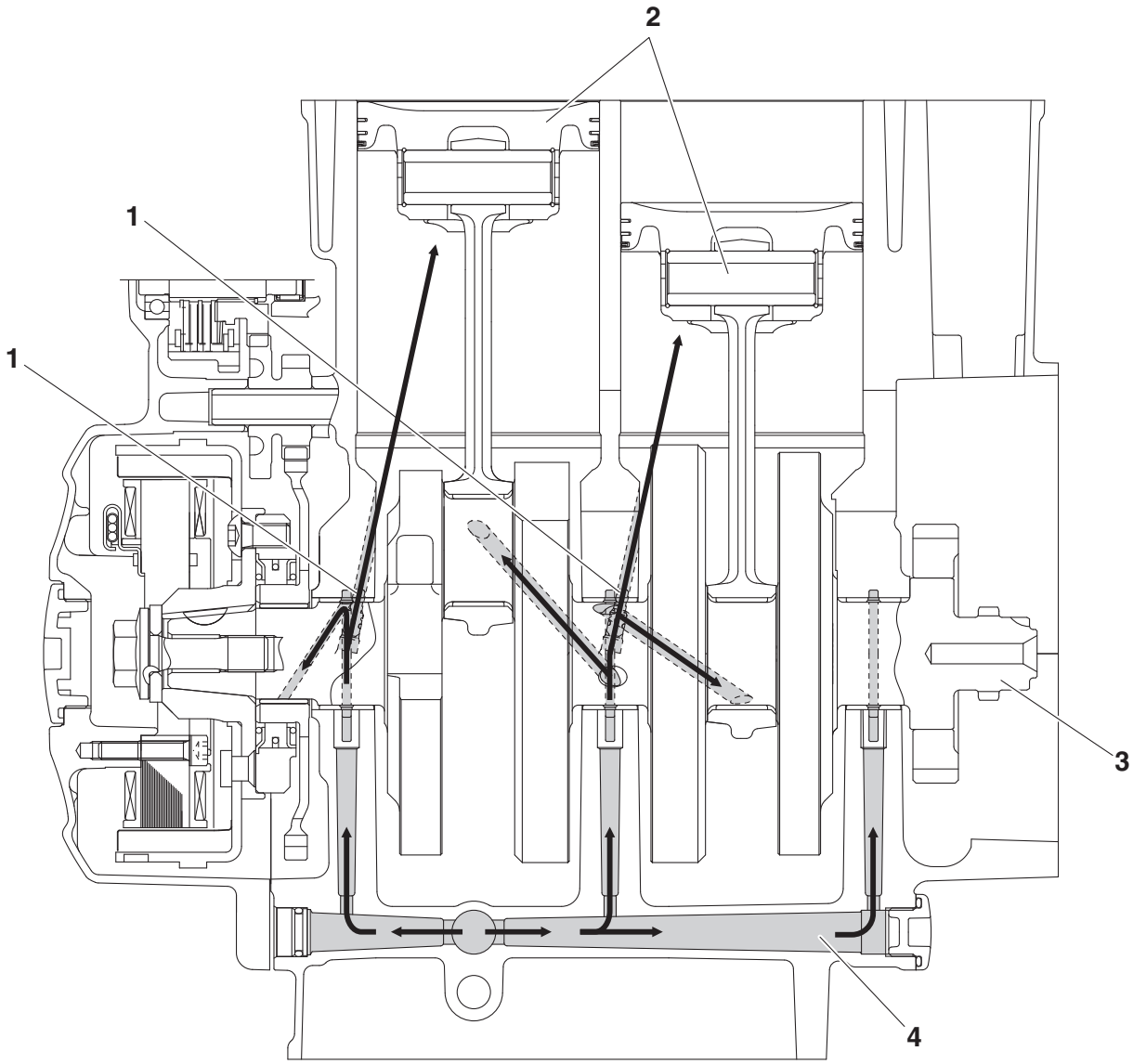
1. Oil pump
2. Oil pressure switch
3. Oil filter cartridge
4. Oil cooler
5. Oil strainer

Camshaft (top view)



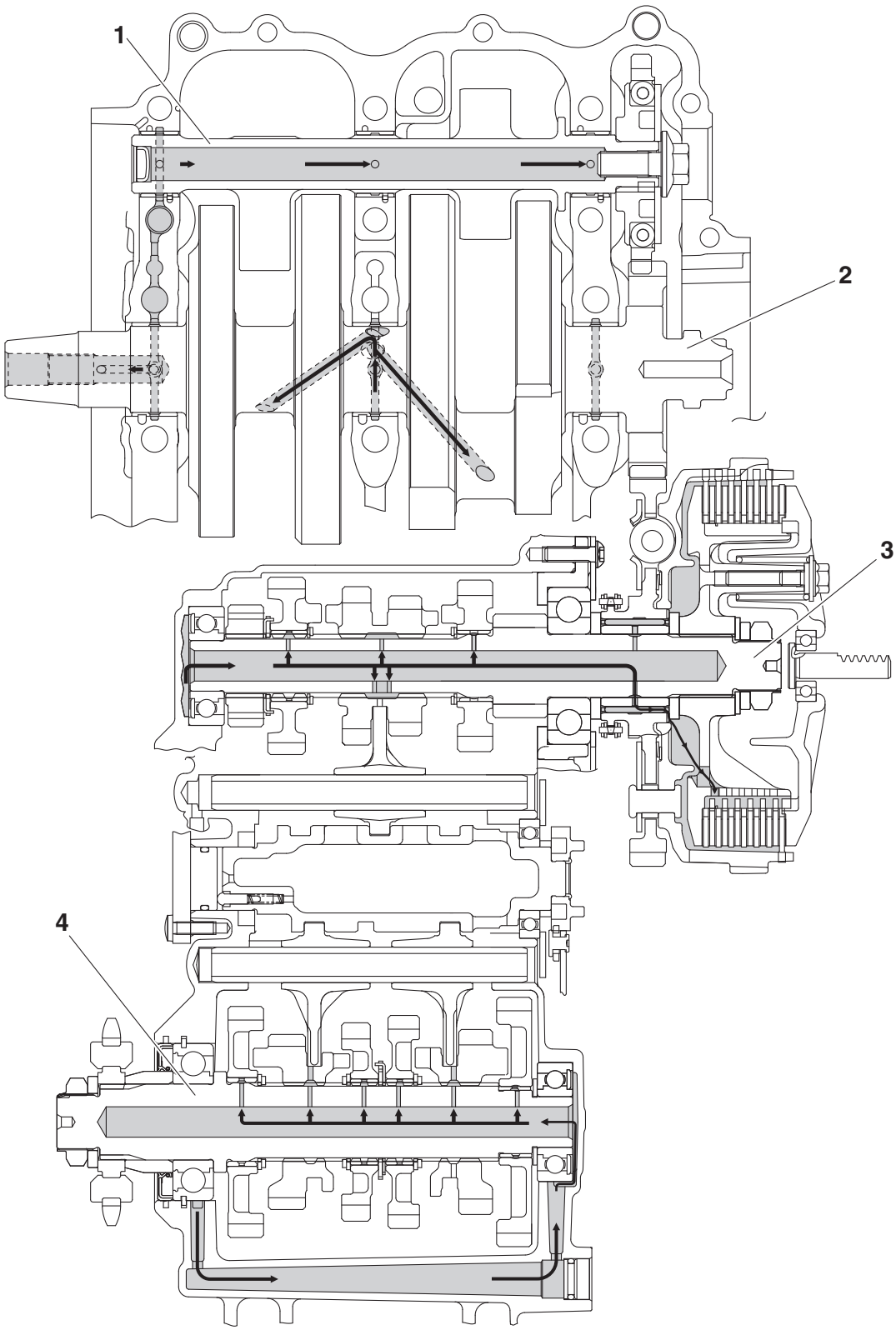
1. Intake camshaft
2. Cylinder head
3. Exhaust camshaft

Crankshaft (front view)



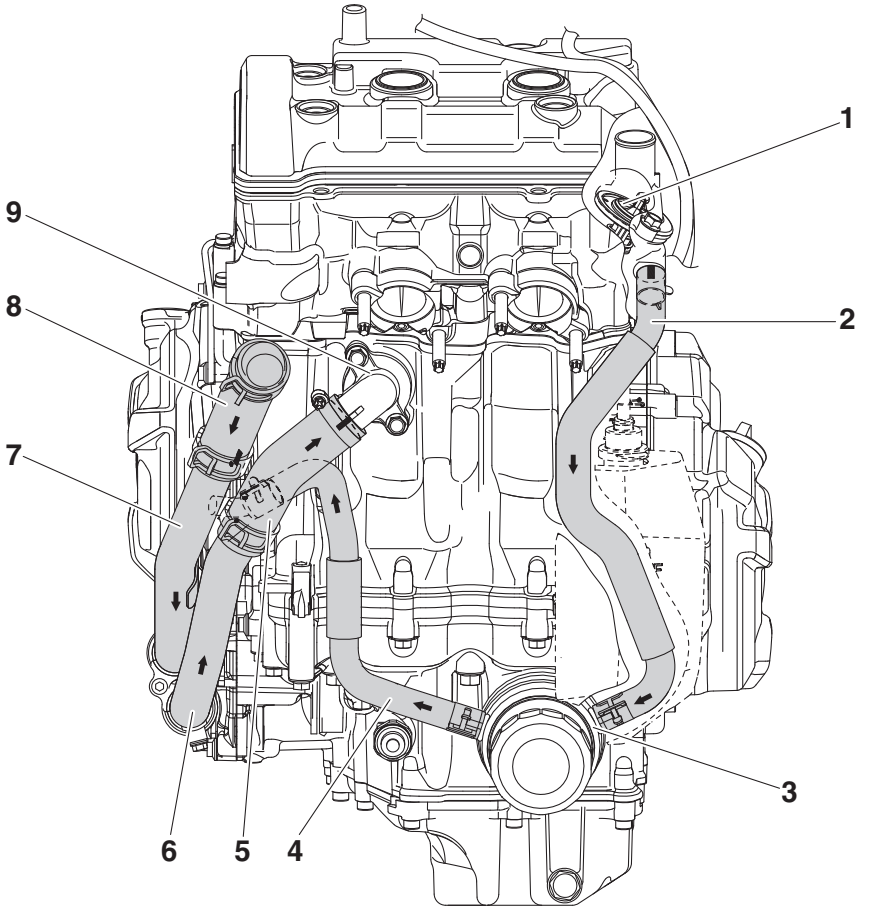
1. Oil nozzle
2. Piston
3. Crankshaft
4. Main gallery

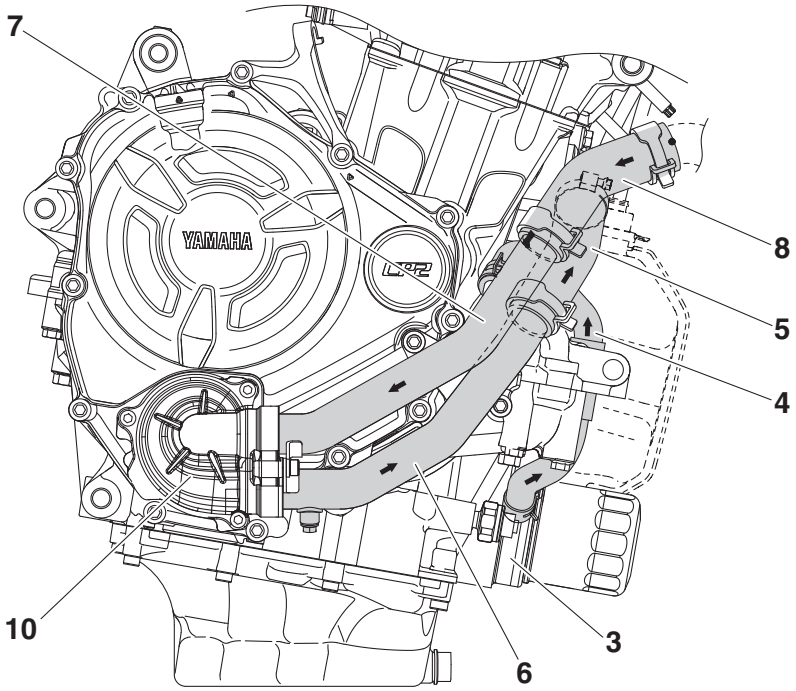
Crankshaft and transmission (top view)



1. Balancer shaft assembly
2. Crankshaft
3. Main axle
4. Drive axle

EAS20020
COOLING SYSTEM DIAGRAMS

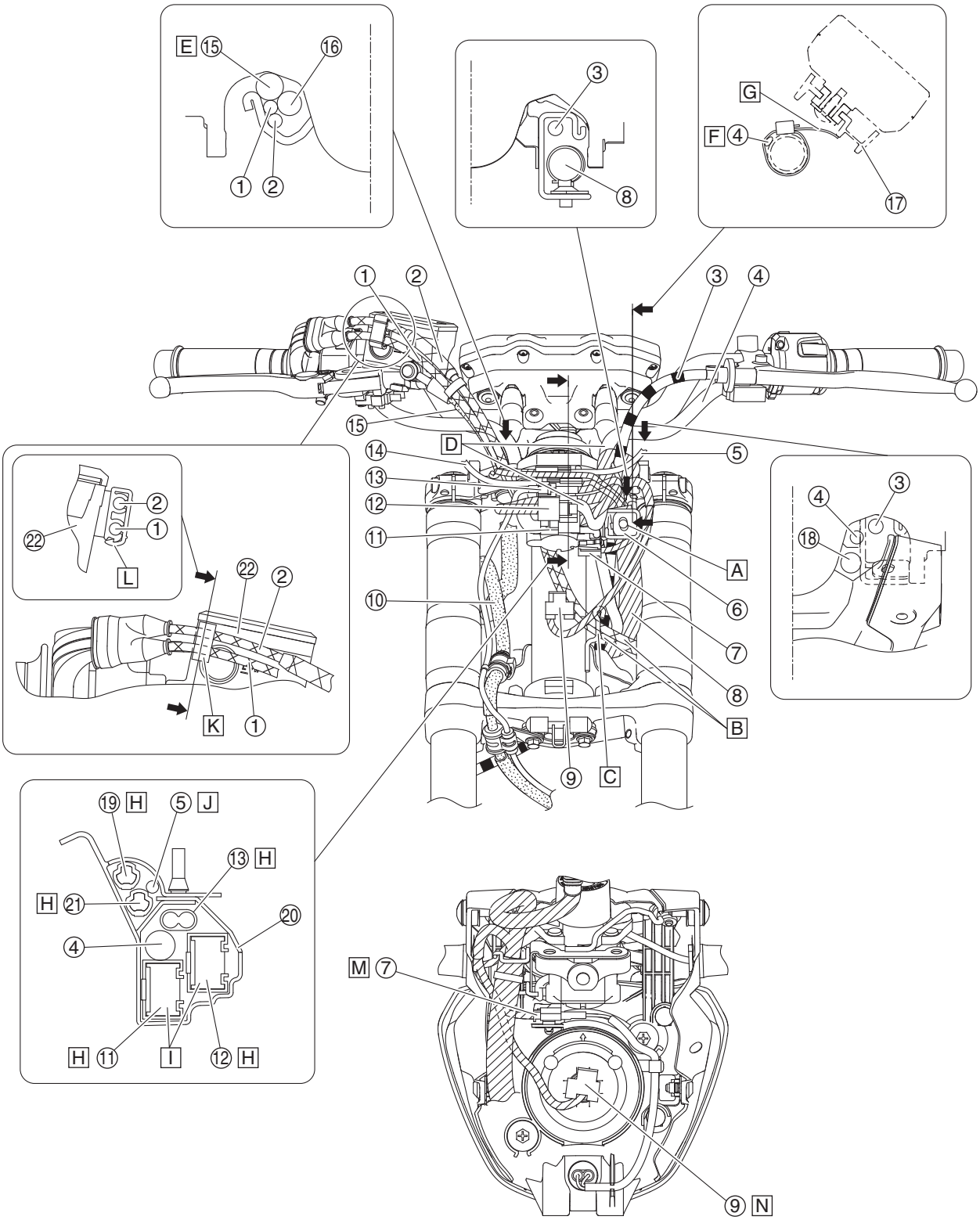




1. Thermostat
2. Oil cooler inlet hose
3. Oil cooler
4. Oil cooler outlet hose
5. Water jacket joint inlet hose
6. Water pump outlet pipe
7. Water pump inlet pipe
8. Radiator outlet hose
9. Water jacket joint
10. Water pump

EAS20021
CABLE ROUTING

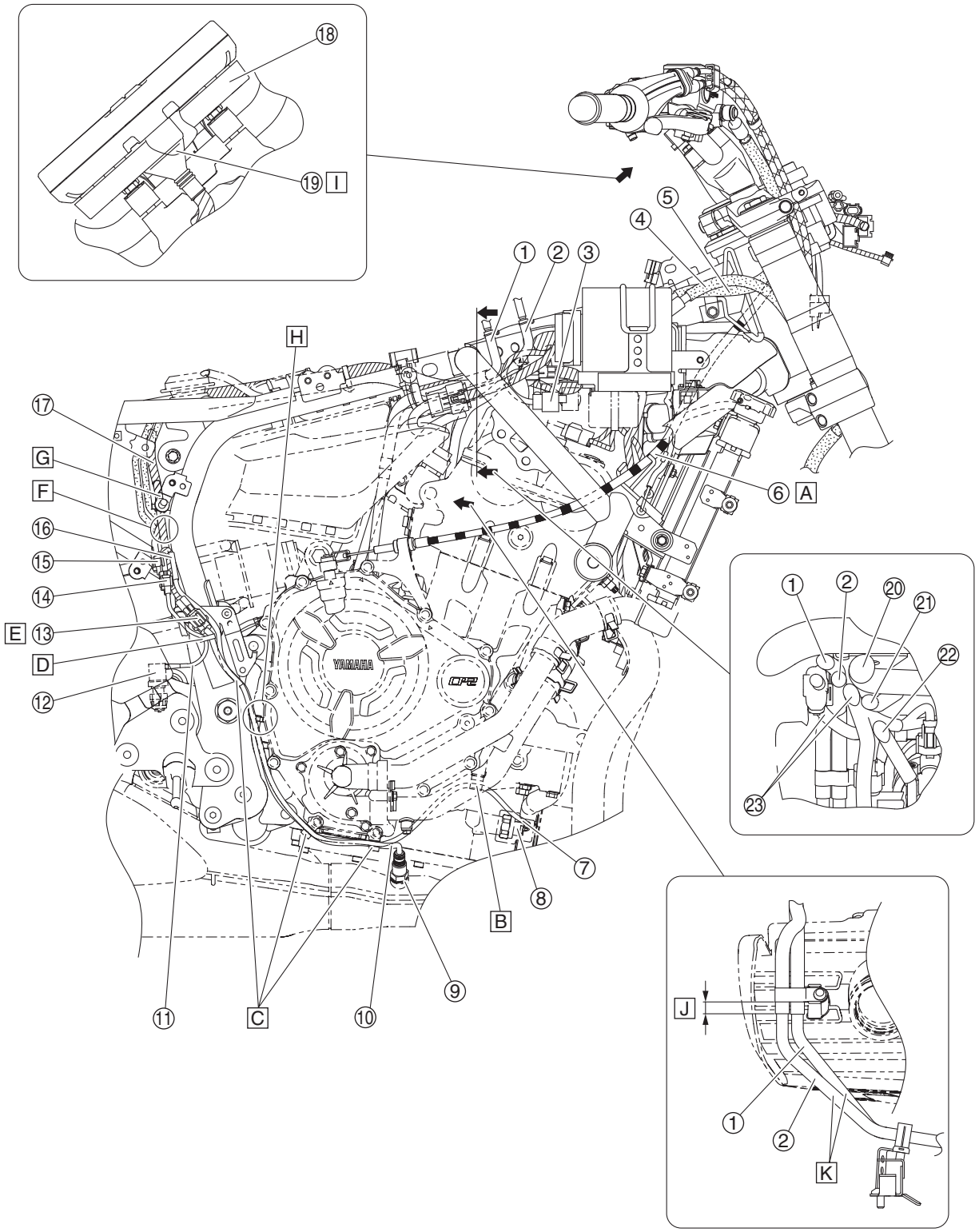
Handlebar (front view)



1. Throttle cable (decelerator cable)
2. Throttle cable (accelerator cable)
3. Clutch cable
4. Handlebar switch lead (left handlebar switch)
5. Front turn signal light lead (left turn signal light)
6. Guide
7. Auxiliary light coupler
8. Wire harness
9. Headlight coupler
10. Brake hose (hydraulic unit to left front brake caliper)
11. Handlebar switch coupler (right handlebar switch)
12. Handlebar switch coupler (left handlebar switch)
13. Front wheel sensor coupler
14. Front turn signal light lead (right turn signal light)
15. Brake hose (front brake master cylinder to hydraulic unit)
16. Handlebar switch lead (right handlebar switch)
17. Meter assembly bracket
18. Meter assembly lead
19. Front turn signal light coupler (left turn signal light)
20. Coupler cover
21. Front turn signal light coupler (right turn signal light)
22. Front brake master cylinder

A. Insert the projection on the wire harness holder completely into the hole in the guide.
B. Route the throttle cables through the guide.
C. Route the throttle cable (decelerator cable) over the throttle cable (accelerator cable)
D. Route the handlebar switch lead (left handlebar switch) to the rear of the wire harness.
E. Route the brake hose (front brake master cylinder to hydraulic unit) to the rear of the right handlebar switch lead and throttle cables.
F. Route the handlebar switch lead to the front of the handlebar.
G. Make sure that the end of the plastic band contacts the meter assembly bracket as shown in the illustration.
H. Connect the coupler, and then place the coupler in the coupler cover.
I. The couplers may be positioned in any order.
J. Route the front left turn signal light lead through the coupler cover, and then fold the lead back to the right of the cover.
K. Fasten the throttle cables with the holder at the location shown in the illustration.
L. Face the damper on the holder toward the front brake master cylinder and face the catch of the holder downward.
M. Connect the auxiliary light coupler.
N. Connect the headlight coupler.

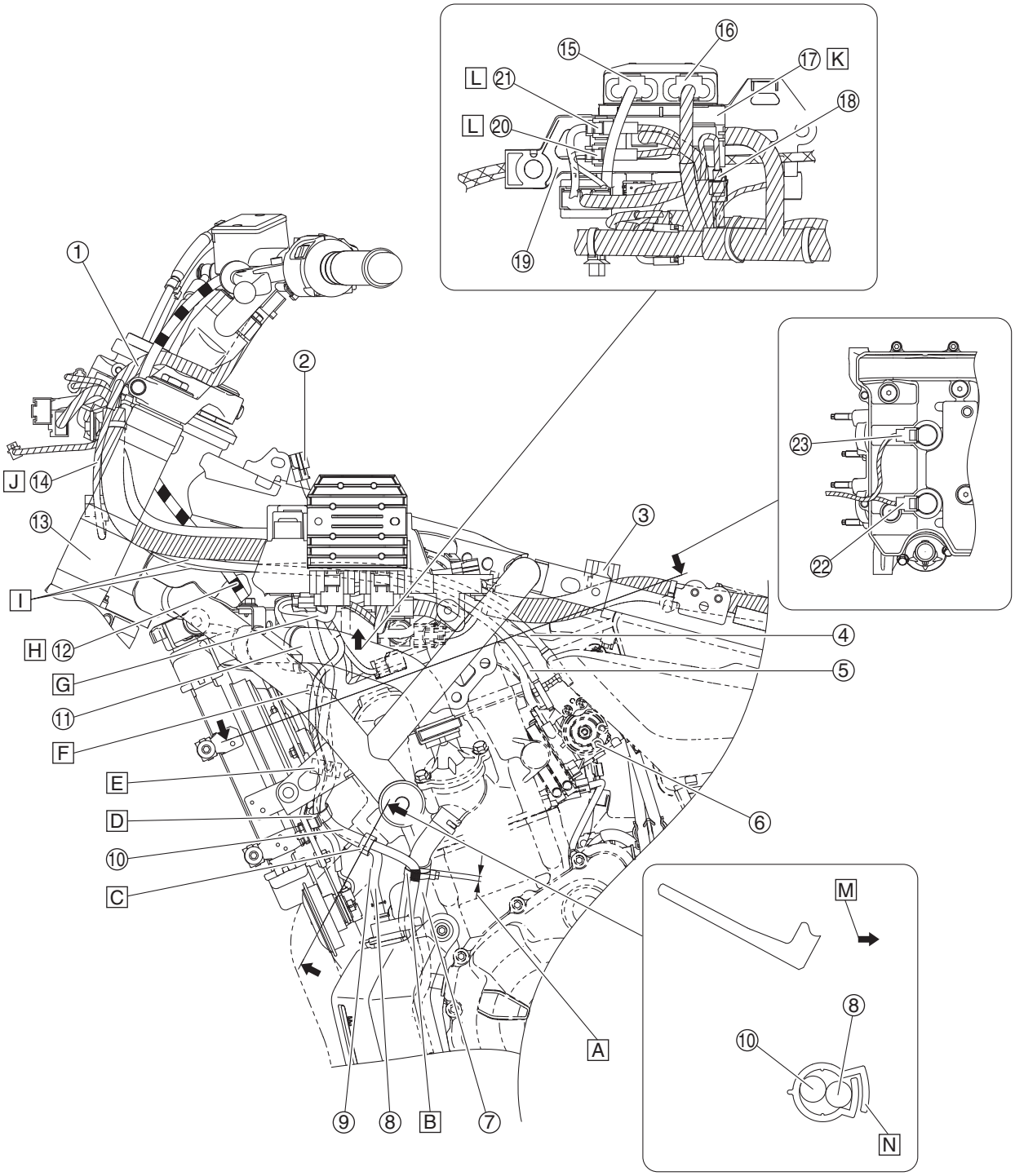
Clutch cable (right side view)



1. Fuel tank breather hose
2. Fuel tank overflow hose
3. Intake solenoid coupler
4. Brake hose (hydraulic unit to left front brake caliper)
5. Brake hose (front brake master cylinder to hydraulic unit)
6. Clutch cable
7. Oil pressure switch lead
8. Oil pressure switch
9. O_2 sensor
10. O_2 sensor lead
11. Rear brake light switch lead
12. Rear brake light switch
13. O_2 sensor coupler
14. Rear brake light switch coupler
15. Rear wheel sensor coupler
16. Oil pressure switch connector
17. Wire harness
18. Meter assembly cover
19. Coupler cover
20. Cylinder head breather hose
21. Intake solenoid vacuum hose (intake solenoid to air filter case valve)
22. Intake solenoid vacuum hose (throttle body to one-way valve)
23. Sub-wire harness

A. Route the clutch cable through the guide as shown in the illustration.
B. Route the oil pressure switch lead through the guide, and then secure the lead by bending the guide around the lead.
C. Route the oil pressure switch lead to the inside of the O_2 sensor lead, and then secure the leads by bending the guides around the leads.
D. Fasten the rear brake light switch lead and O_2 sensor lead with the holder.
E. Connect the O_2 sensor coupler, and then insert the projection on the coupler into the hole in the bracket.
F. Make sure that the wire harness is not pinched between the pivot shaft protector (right) and the frame.
G. Insert the projection on the wire harness holder into the hole in the frame from the inside of the frame.
H. Do not pinch the O_2 sensor lead between the pivot shaft protector and the engine.
I. After connecting the meter assembly coupler, install the coupler cover completely until it contacts the meter assembly.
J. Less than 10 mm (0.39 in). Fasten the hose protector of each hose with the holder.
K. Make sure that there is no slack in the fuel tank breather hose or fuel tank overflow hose.

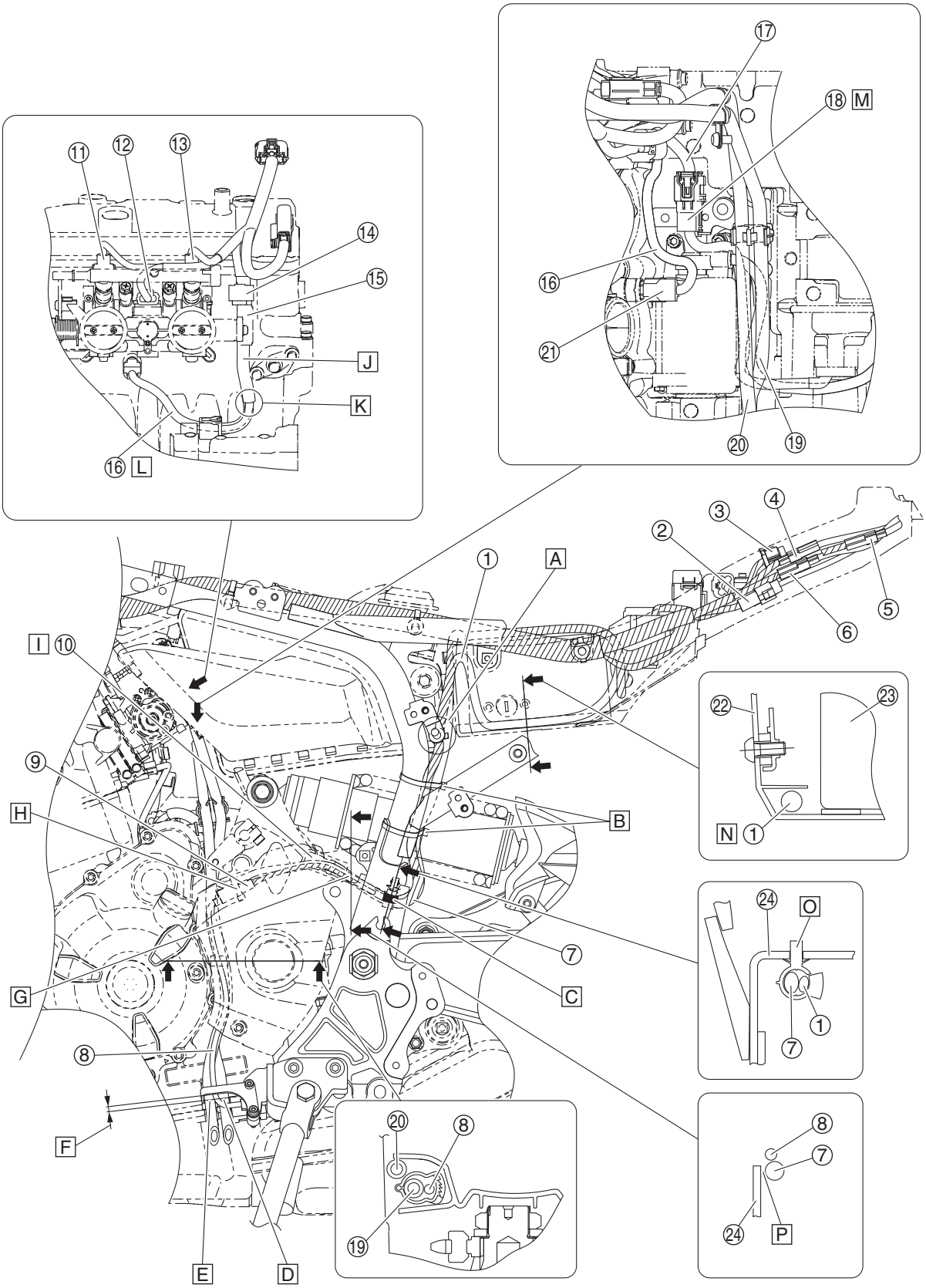
Rectifier/regulator (left side view)



1. Wire harness
2. Intake air temperature sensor coupler
3. Fuel pump coupler
4. Throttle cable (decelerator cable)
5. Throttle cable (accelerator cable)
6. Throttle body assembly
7. Oil cooler inlet hose
8. Coolant reservoir hose
9. Horn lead
10. AC magneto lead
11. Radiator inlet hose
12. Clutch cable
13. Steering head pipe
14. Headlight lead
15. AC magneto lead coupler
16. Rectifier/regulator coupler
17. Joint coupler
18. Auxiliary DC outlet coupler
19. Rectifier/regulator bracket
20. Crankshaft position sensor coupler
21. Radiator fan motor coupler
22. Ignition coil #1 coupler
23. Ignition coil #2 coupler

A. 5–10 mm (0.20–0.39 in)
B. Fasten the AC magneto lead to the oil cooler inlet hose with a plastic locking tie. Make sure to route the AC magneto lead to the outside of the oil cooler inlet hose. Align the plastic locking tie with the blue tape on the AC magneto lead. Face the buckle of the plastic locking tie rearward, and then cut off the excess end of the tie to 2 mm (0.08 in) or less.
C. Fasten the AC magneto lead, horn lead, and coolant reservoir hose with the holder at the location shown in the illustration. Make sure that there is no slack in the AC magneto lead.
D. Secure the holder by inserting the projection on the holder into the hole in the radiator fan motor bracket, and then fasten the AC magneto lead, horn lead, and coolant reservoir hose with the holder. Make sure that the coolant reservoir hose and leads do not cross between the oil cooler inlet hose and this holder.
E. Fasten the AC magneto lead, horn lead, and coolant reservoir hose with the holder.
F. Fasten the AC magneto lead, horn lead, and coolant reservoir hose with the holder at the location shown in the illustration. Make sure that there is no slack in the AC magneto lead, horn lead, and coolant reservoir hose.
G. Route the AC magneto lead to the inside of the radiator inlet hose, and then connect the AC magneto coupler to the rectifier/regulator.
H. Route the clutch cable through the hole in the cover.
I. Make sure that the throttle cables do not twist between the throttle body assembly and the steering head pipe.
J. Route the headlight lead to the rear of the guide.
K. Install the joint coupler completely onto the tab on the rectifier/regulator bracket.
L. Connect the coupler, and then insert the projection on the coupler into the hole in the rectifier/regulator bracket.
M. Inward
N. Face the catch of the holder inward.

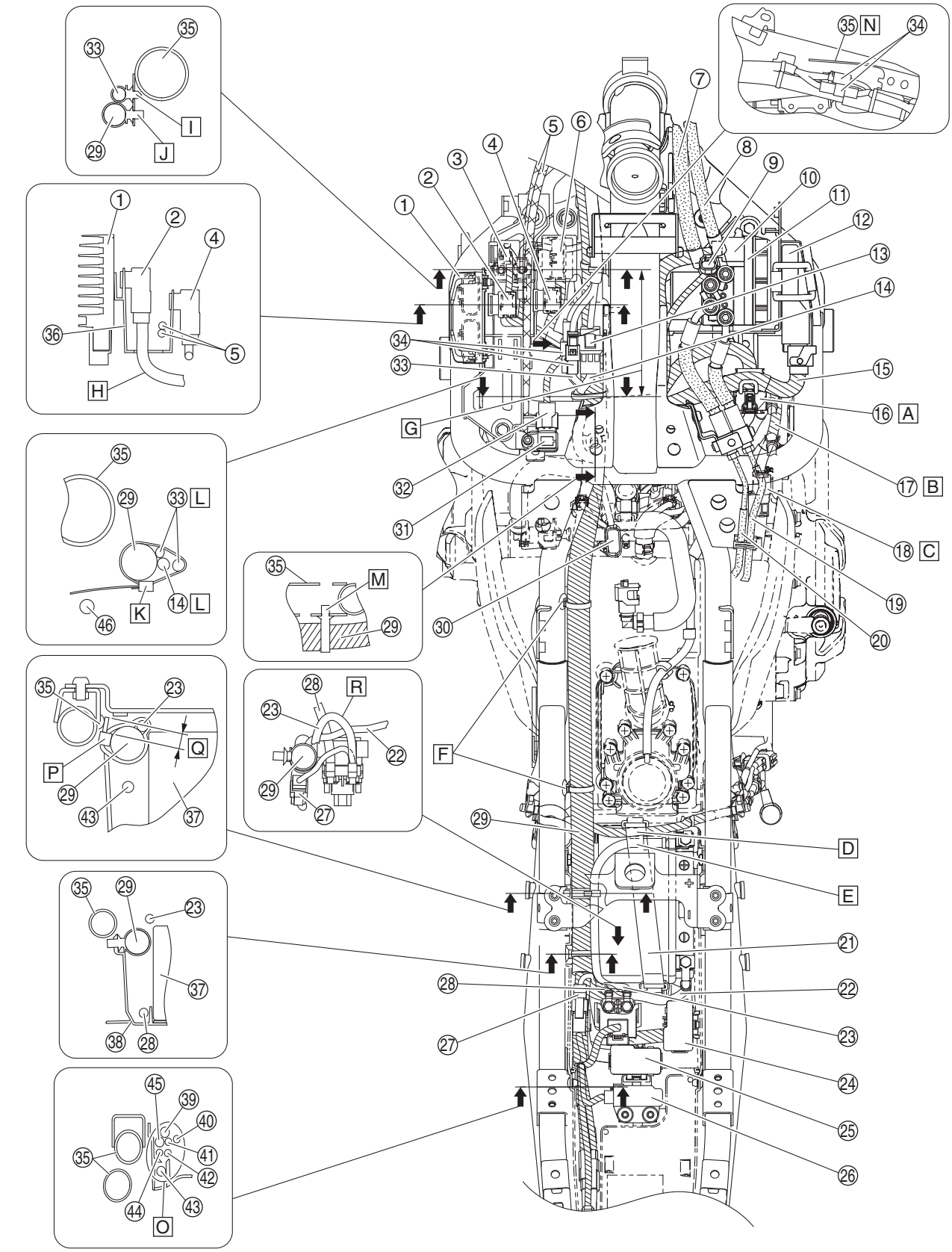
Engine (left side view)



1. Starter motor lead
2. Tail/brake light assembly coupler
3. Yamaha diagnostic tool coupler
4. License plate light coupler
5. Rear turn signal light coupler (left turn signal light)
6. Rear turn signal light coupler (right turn signal light)
7. Engine ground lead
8. Sidestand switch lead
9. Sidestand switch coupler
10. Terminal cover
11. Injector #1 coupler
12. ISC (idle speed control) unit coupler
13. Injector #2 coupler
14. Throttle position sensor coupler
15. Throttle position sensor
16. Coolant temperature sensor lead
17. Gear position switch lead
18. Gear position switch coupler
19. Fuel tank breather hose
20. Fuel tank overflow hose
21. Coolant temperature sensor coupler
22. Battery box
23. Battery
24. Frame

A. Insert the projection on the engine ground lead holder into the hole in the frame from the inside of the frame.
B. Fasten the engine ground lead and starter motor lead to the frame with plastic locking ties. Point the end of each plastic locking tie rearward, and then cut off the excess end of the tie to 2 mm (0.08 in) or less.
C. Fasten the starter motor lead and engine ground lead with the holder. Align the white tape on the starter motor lead with the holder.
D. Blue paint mark
E. White paint mark
F. 0–10 mm (0–0.39 in)
G. Make sure that there is no twist in the starter motor lead and sidestand switch lead.
H. Fasten the starter motor lead, gear position switch lead, and sidestand switch coupler with the plastic band. Face the buckle of the plastic band downward with the end pointing inward.
I. Cover the engine ground terminal with the terminal cover.
J. Route the coolant temperature sensor lead and gear position switch lead between the throttle position sensor and the cylinder head.
K. The gear position switch lead and coolant temperature sensor lead may be positioned and routed in any order.
L. Route the coolant temperature sensor lead to the front of the gear position sensor lead.
M. Insert the projection on the coupler into the hole in the bracket.
N. Fit the starter motor lead between the bottom of the battery box and the rib on the battery box.
O. Insert the projection on the holder into the hole in the frame from the bottom of the frame. The catch of the holder may be facing in any direction.
P. Do not pinch the sidestand switch lead between the engine ground lead and the frame.

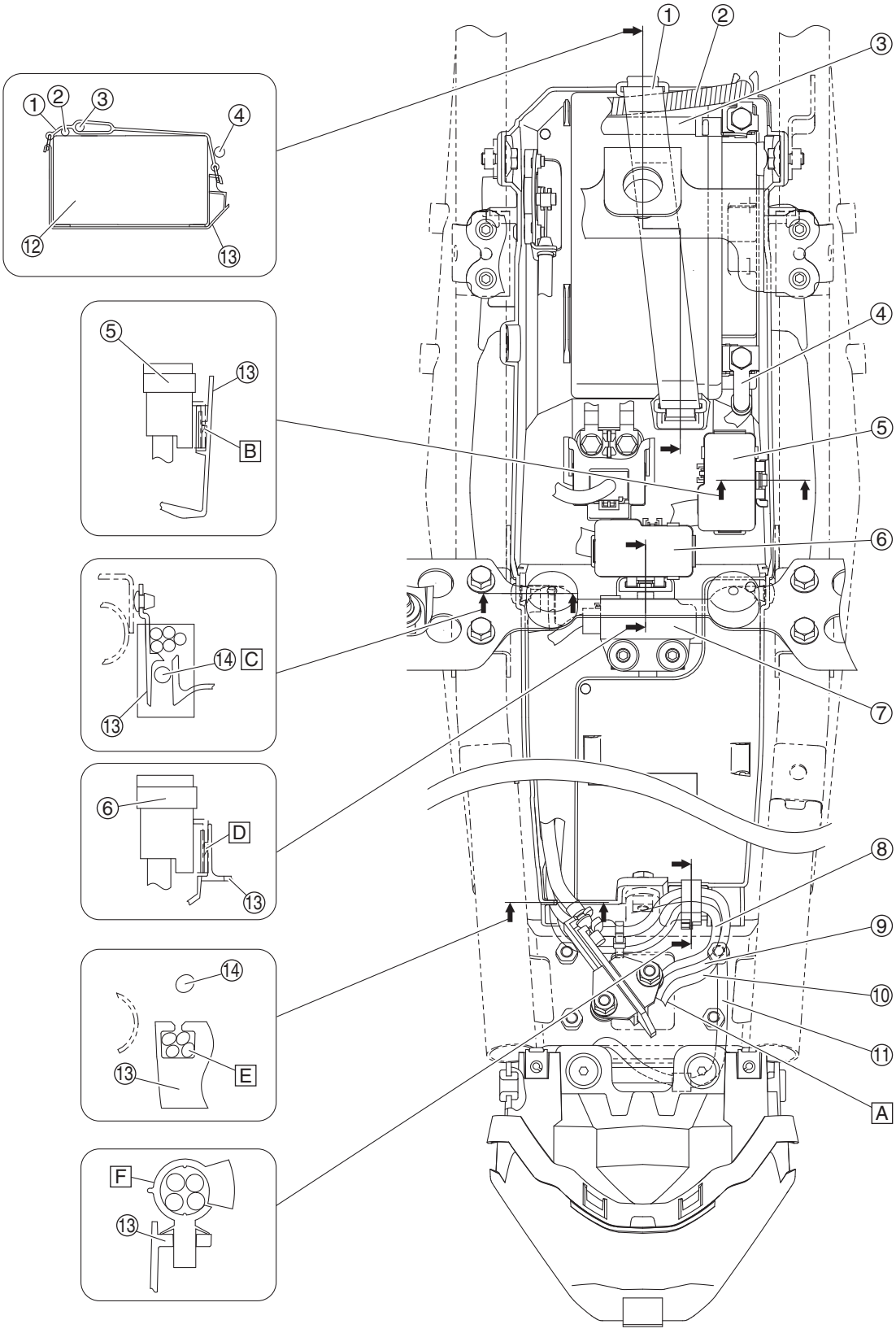
Frame (top view)



1. Rectifier/regulator
2. Headlight relay
3. Turn signal/hazard relay
4. Radiator fan motor relay
5. Throttle cable
6. Relay unit
7. Brake hose (front brake master cylinder to hydraulic unit)
8. Brake hose (hydraulic unit to left front brake caliper)
9. Intake air temperature sensor coupler
10. ABS ECU coupler
11. Hydraulic unit assembly
12. ECU (engine control unit)
13. Immobilizer unit coupler
14. Immobilizer unit lead
15. ECU lead
16. Sub-wire harness coupler (13 pins)
17. Sub-wire harness
18. Sub-wire harness coupler (7 pins)
19. Brake hose (hydraulic unit to rear brake caliper)
20. Brake hose (rear brake master cylinder to hydraulic unit)
21. Battery band
22. Negative battery lead
23. Positive battery lead
24. Fuse box 1
25. Fuse box 2
26. Lean angle sensor
27. Positive battery sub-wire harness coupler
28. Starter motor lead
29. Wire harness
30. Fuel pump coupler
31. Intake air pressure sensor
32. Intake air pressure sensor coupler
33. Main switch lead
34. Main switch coupler
35. Frame
36. Rectifier/regulator bracket
37. Battery
38. Battery box
39. Lean angle sensor lead
40. Yamaha diagnostic tool coupler lead
41. Rear left turn signal light lead
42. Rear right turn signal light lead
43. Seat lock cable
44. License plate light lead
45. Tail/brake light assembly lead
46. Surge tank hose

A. Insert the projection on the sub-wire harness coupler (13 pins) into the hole in the bracket.
B. Route the ECU lead and sub-wire harness through the guide.
C. Connect the sub-wire harness coupler (7 pins), and then insert the projection on the coupler into the hole in the bracket.
D. Fasten the wire harness with the battery band. Do not route the wire harness through the hole in the battery band.
E. Route the positive battery lead through the hole in the battery band.
F. Insert the projection on each wire harness holder into the hole in the frame.
G. After connecting the main switch coupler, place the slack in the main switch lead to the rear of the plastic band. Make sure that there is no slack in the lead in the area shown in the illustration.
H. Route the headlight relay lead and turn signal/hazard relay lead through the rear hole in the rectifier/regulator bracket.
I. Insert the projection on the main switch lead holder into the upper hole in the frame.
J. Insert the projection on the wire harness holder into the lower hole in the frame.
K. Face the buckle of the plastic band downward with the end pointing inward.
L. Route the immobilizer unit lead and main switch lead to the outside of the wire harness.
M. Insert the projection on the wire harness holder into the hole in the frame from the bottom of the frame.
N. Position the immobilizer unit coupler and main switch couplers under the frame.
O. The leads may be routed in any order.
P. Position the buckle of the plastic locking tie below the frame weld.
Q. Cut off the excess end of the plastic locking tie to 10 mm (0.39 in) or less.
R. Push the slack in the positive battery lead downward.

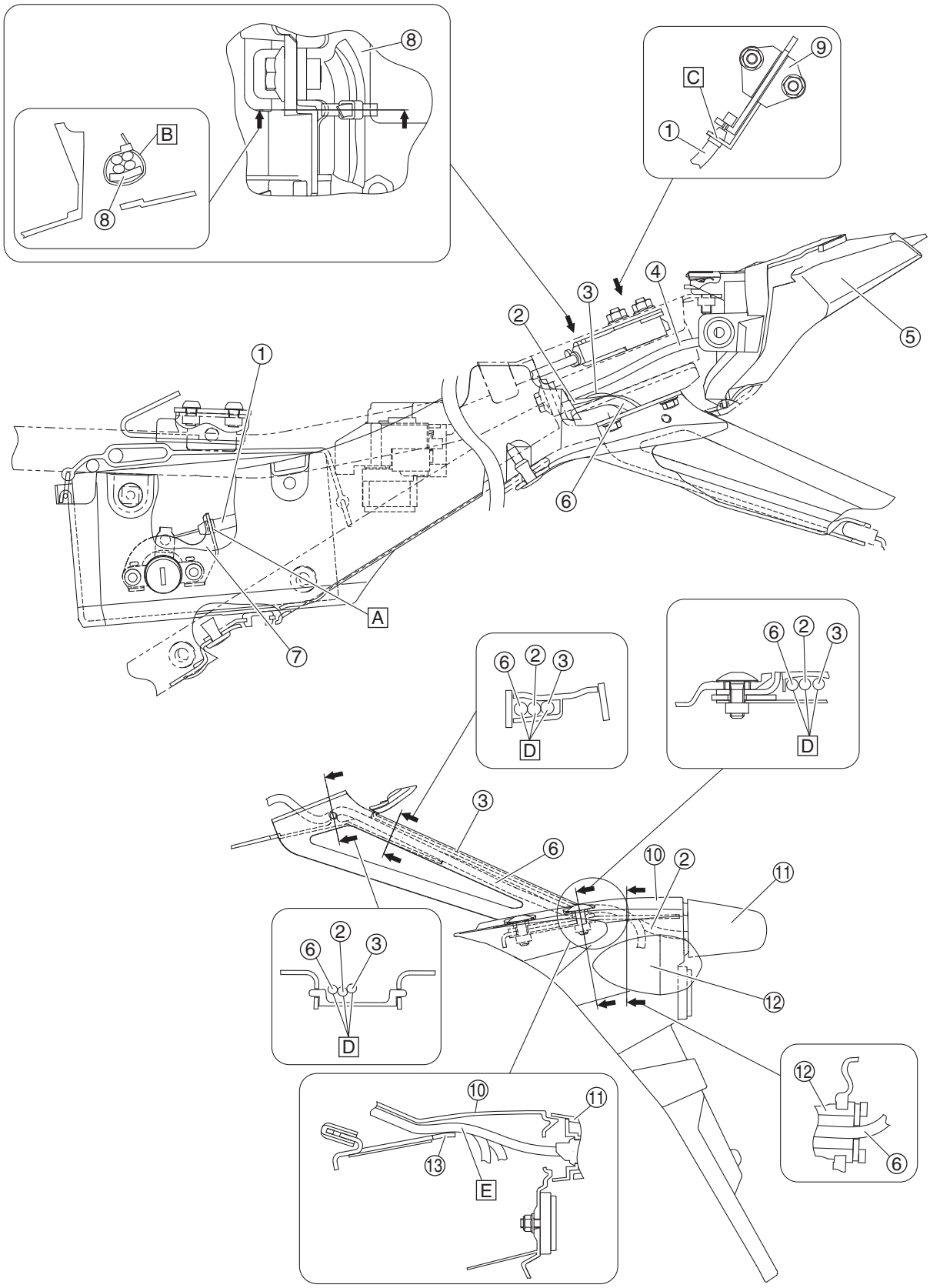
Rear fender (top view)



1. Battery band
2. Wire harness
3. Positive battery lead
4. Negative battery lead
5. Fuse box 1
6. Fuse box 2
7. Lean angle sensor
8. Rear turn signal light lead (left turn signal light)
9. Rear turn signal light lead (right turn signal light)
10. License plate light lead
11. Tail/brake light assembly lead
12. Battery
13. Battery box
14. Seat lock cable

A. Route the rear left turn signal light lead, rear right turn signal light lead, and license plate light lead through the hole in the frame.
B. Install fuse box 1 completely onto the tab on the battery box.
C. Route the seat lock cable through the guide on the battery box.
D. Install fuse box 2 completely onto the tab on the battery box.
E. Route the tail/brake light assembly lead, rear turn signal light leads, and license plate light lead through the hole in the battery box. The leads may be routed in any order.
F. Fasten the tail/brake light assembly lead, rear turn signal light leads, and license plate light lead with the holder. The leads may be fastened in any order.

Rear fender (left side view)



1. Seat lock cable
2. License plate light lead
3. Rear turn signal light lead (right turn signal light)
4. Tail/brake light assembly lead
5. Tail/brake light assembly
6. Rear turn signal light lead (left turn signal light)
7. Seat lock key cylinder bracket
8. Frame
9. Seat lock assembly
10. Mudguard
11. License plate light
12. Rear turn signal light (left)
13. Plate

A. Insert the seat lock cable completely into the hole in the seat lock key cylinder bracket.
B. Fasten the tail/brake light assembly lead, rear turn signal light leads, and license plate light lead with a plastic locking tie. The leads may be fastened in any order. Cut off the excess end of the plastic locking tie so that it does not contact the seat lock assembly.
C. Insert the seat lock cable completely into the hole in the seat lock assembly.
D. The leads may be routed in any order.
E. Route the rear turn signal light leads and license plate light lead between the mudguard and the plate.

Rear brake hose (right side view)