



YAMAHA

2007

**XP500
XP500A**

SERVICE MANUAL

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EAS20040

**XP500/XP500A 2007
SERVICE MANUAL
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NOTICE

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.

This model has been designed and manufactured to perform within certain specifications in regard to performance and emissions. Proper service with the correct tools is necessary to ensure that the vehicle will operate as designed. If there is any question about a service procedure, it is imperative that you contact a Yamaha dealer for any service information changes that apply to this model. This policy is intended to provide the customer with the most satisfaction from his vehicle and to conform to federal environmental quality objectives.

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.

NOTE:

- This Service Manual contains information regarding periodic maintenance to the emission control system. Please read this material carefully.
- Designs and specifications are subject to change without notice.

IMPORTANT MANUAL INFORMATION

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



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



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

CAUTION:

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

NOTE:

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

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

1

CLUTCH

Disassembling the clutch

Order	Job/Parts to remove	Qty	Remarks
1	Circlip	1	
2	Spring stopper plate	1	
3	Clutch damper spring 2	1	
4	Pressure plate	1	
5	Clutch plate 2	2	
6	Clutch damper spring 1	6	
7	Friction plate	5	
8	Clutch plate 1	4	
9	Clutch spring	68pc	
10	Thrust plate	1	
11	Clutch boss nut	1	
12	Primary drive gear	1	
13	Bearing	1	
14	Circlip	1	
15	Bearing	1	
16	Clutch boss	1	
17	Collar	1	
18	Wedge	12	
19	Clutch housing	1	

For assembly, reverse the removal procedure.

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CLUTCH

REMOVING THE CLUTCH

1. Remove:

- Clutch assembly nut 1
- Clutch assembly 2

NOTE:

- Before removal, apply "a" and "b" alignment marks.
- While holding the clutch assembly with the rotor holding tool 3, loosen the clutch assembly nut.
- Align these marks during reassembly.

2. Remove:

- Spring stopper plate 1
- Clutch damper spring 2
- Pressure plate
- Clutch plate 2
- Friction plate
- Clutch plate 1
- Clutch damper spring 1
- Thrust plate
- Clutch springs

NOTE:

One to three holes "a" are drilled in the spring stopper plate to adjust the balance of the clutch assembly. Before removing the spring stopper plate, make alignment marks on both the plate and the clutch housing so that the plate can be reinstalled in its original position.

3. Remove:

- Clutch boss nut 1

NOTE:

While holding the clutch boss "2" with the clutch holding tool 3, loosen the clutch boss nut.

DISASSEMBLING THE CLUTCH

1. Remove:

- Circlip 1

NOTE:

Install the clutch spring compressor "2" onto the clutch assembly as shown. Then, compress the spring, and remove the circlip.

Universal clutch holder
90890-04086
YM-91042

Clutch spring compressor
90890-01482

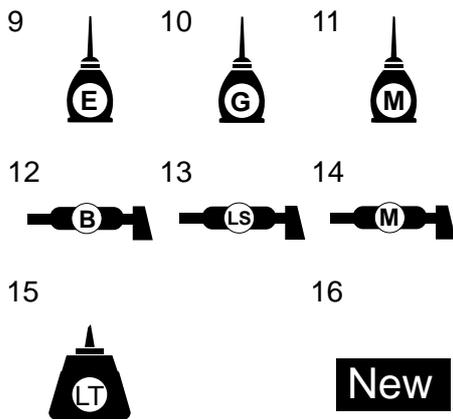
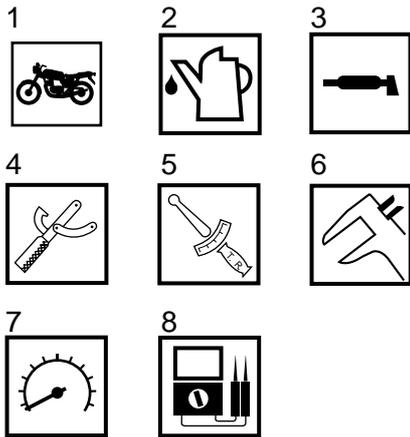
5-45

SYMBOLS

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

NOTE:

The following symbols are not relevant to every vehicle.



1. Serviceable with engine mounted
2. Filling fluid
3. Lubricant
4. Special tool
5. Tightening torque
6. Wear limit, clearance
7. Engine speed
8. Electrical data
9. Engine oil
10. Gear oil
11. Molybdenum-disulfide oil
12. Wheel-bearing grease
13. Lithium-soap-based grease
14. Molybdenum-disulfide grease
15. Apply locking agent (LOCTITE®)
16. Replace the part

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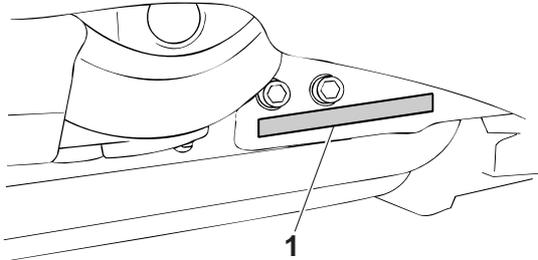
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IDENTIFICATION

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VEHICLE IDENTIFICATION NUMBER

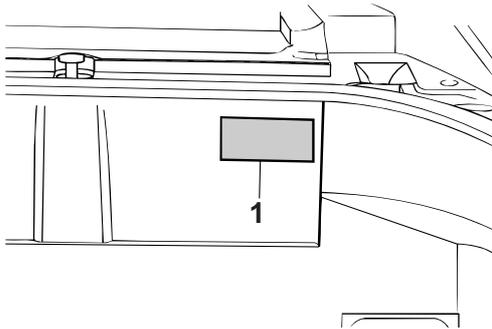
The vehicle identification number "1" is stamped into the right side of the frame.



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MODEL LABEL

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



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FEATURES

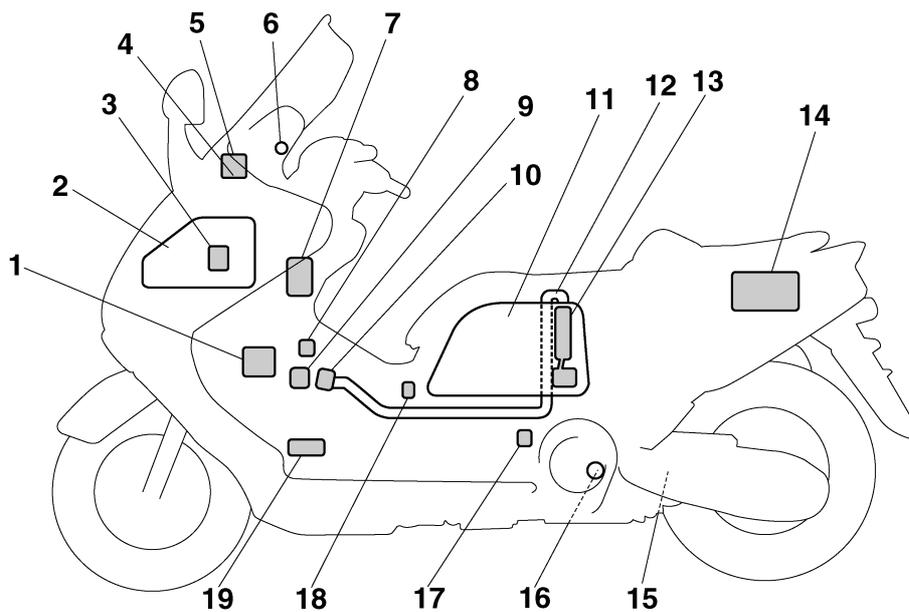
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OUTLINE OF FI SYSTEM

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. In a 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 chamber. Despite the same volume of intake air, the fuel volume requirement varies with the engine operating conditions, such as acceleration, deceleration, or operation 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 engines 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 a 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.

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



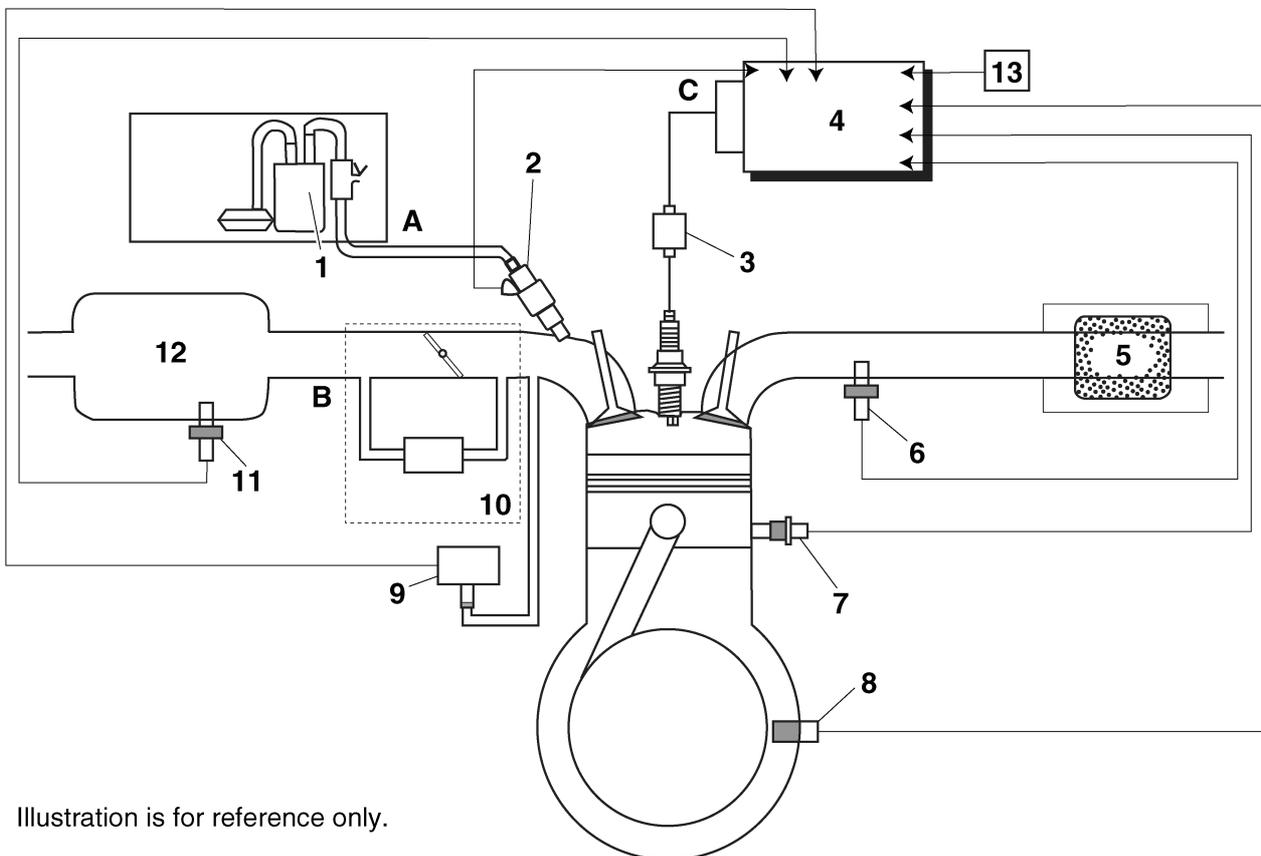
- | | |
|----------------------------------|--------------------------------|
| 1. Ignition coil | 18. Coolant temperature sensor |
| 2. Air filter case | 19. Spark plug |
| 3. Intake air temperature sensor | |
| 4. Fuel injection system relay | |
| 5. Lean angle sensor | |
| 6. Engine trouble warning light | |
| 7. ECU (engine) | |
| 8. Intake air pressure sensor | |
| 9. Throttle position sensor | |
| 10. Fuel injector | |
| 11. Fuel tank | |
| 12. Fuel delivery hose | |
| 13. Fuel pump | |
| 14. Battery | |
| 15. Catalyst | |
| 16. O ₂ sensor | |
| 17. Crankshaft position sensor | |

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FI SYSTEM

The fuel pump delivers fuel to the fuel injector via the fuel filter. The pressure regulator (in the fuel pump) maintains the fuel pressure that is applied to the fuel injector at 240–260 kPa (2.40–2.60 kg/cm², 34.1–37.0 psi) higher than the intake manifold pressure. Accordingly, when the energizing signal from the ECU (engine) 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 (engine). Signals that are input from the throttle position sensor, crankshaft position sensor, intake air pressure sensor, intake air temperature sensor, coolant temperature sensor, and O₂ sensor enable the ECU (engine) 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. Ignition coil
4. ECU (engine)
5. Catalyst
6. O₂ sensor
7. Coolant temperature sensor
8. Crankshaft position sensor
9. Intake air pressure sensor
10. Throttle body
11. Intake air temperature sensor
12. Air filter case
13. Throttle position sensor

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

EAS15B1004

OUTLINE OF ANTI-LOCK BRAKE SYSTEM (XP500A)

Yamaha ABS features

1. The Yamaha ABS (Anti-Lock Brake System) features a dual 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, which is the main component of the ABS, is centrally located on the vehicle to increase mass centralization.

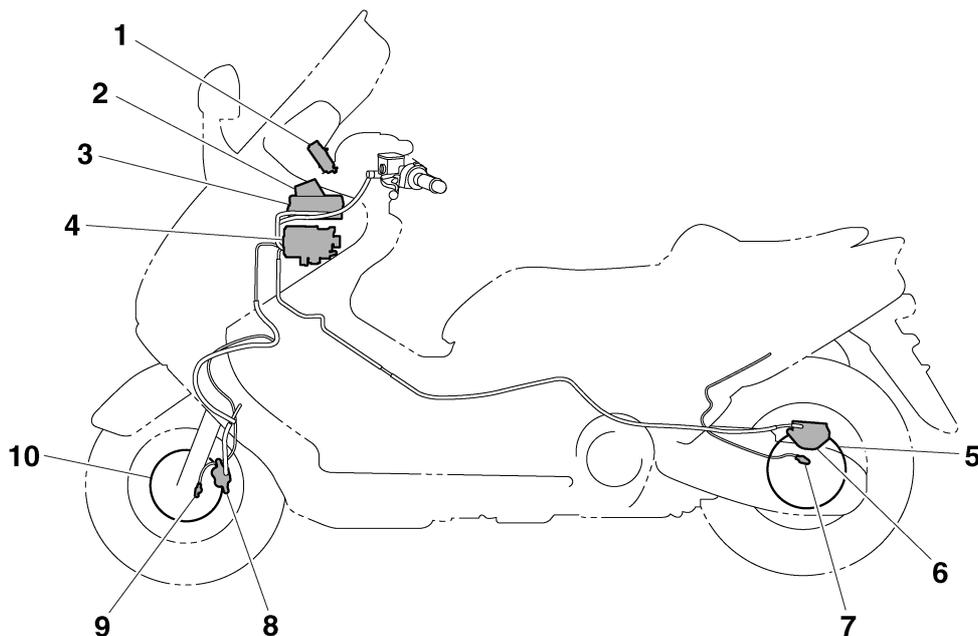
The operation of the Yamaha ABS brakes is the same as conventional vehicle, with a right hand brake lever for operating the front wheel brake and a left hand brake lever for operating the rear wheel brake. When wheel lockup is detected during emergency braking, hydraulic control is performed by the hydraulic system independently.

The ABS also includes a highly developed self-diagnostic function. The ABS detects any problem conditions 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.

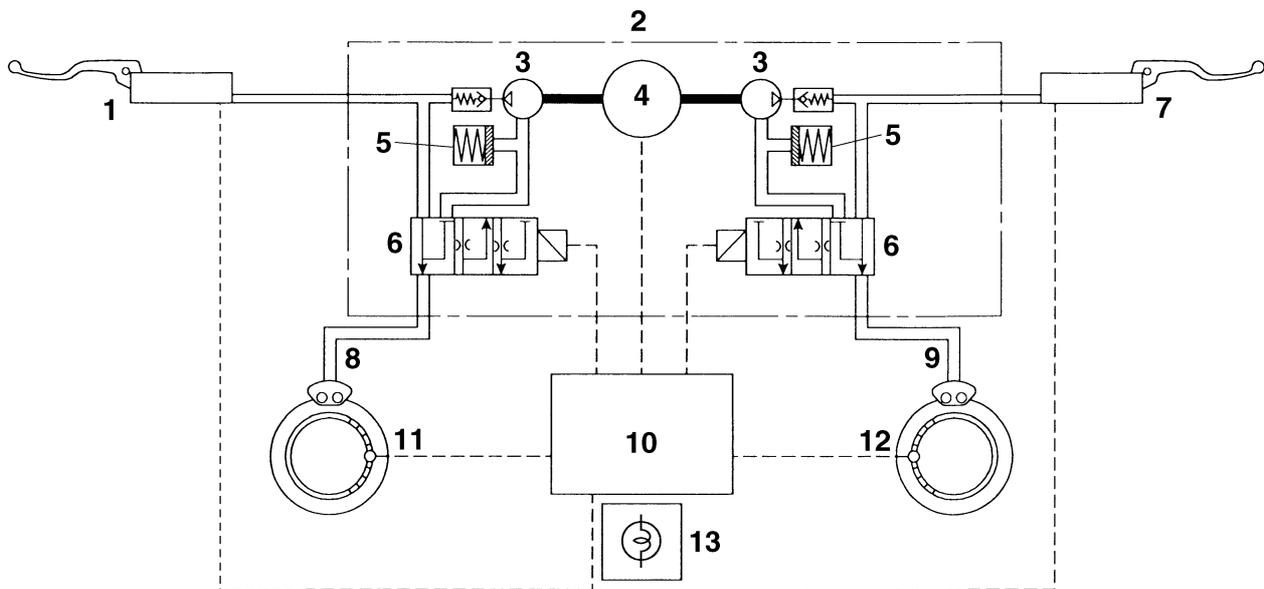
The ABS stores the malfunction codes in the memory of the ECU (ABS) for easy problem identification and troubleshooting.

ABS layout



1. ABS warning light
2. Fail-safe relay
3. Electronic control unit (ECU)
4. Hydraulic unit
5. Rear disc rotor
6. Rear brake caliper
7. Rear wheel sensor
8. Front brake caliper
9. Front wheel sensor
10. Front disc rotor

ABS block diagram



- | | |
|--------------------------------|------------------------|
| 1. Rear brake master cylinder | 8. Rear brake caliper |
| 2. Hydraulic unit | 9. Front brake caliper |
| 3. Hydraulic pump | 10. ECU (ABS) |
| 4. ABS motor | 11. Rear wheel sensor |
| 5. Buffer chamber | 12. Front wheel sensor |
| 6. Hydraulic control valve | 13. ABS warning light |
| 7. Front brake master cylinder | |

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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.

$\text{Slip ratio} = \frac{\text{Chassis speed} - \text{Wheel speed}}{\text{Chassis speed}} \times 100 (\%)$
--

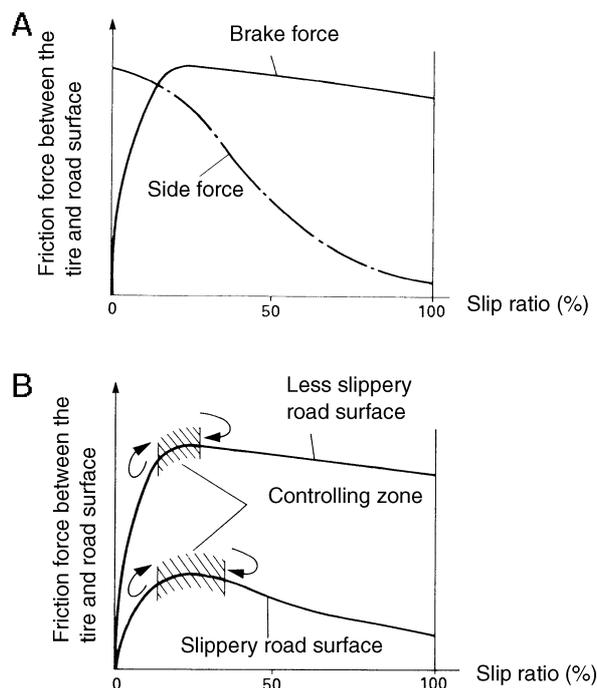
0%: There is no slip between the wheel and the road surface. The chassis speed is equal to the wheel speed.

100%: The wheel speed is "0", but the chassis is moving (i.e., wheel lock).

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Brake force and vehicle stability

When the brake pressure is increased, wheel speed is reduced. Slip 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. Therefore, 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 tire capabilities even on slippery road surfaces or less slippery road surfaces. See figure "B".



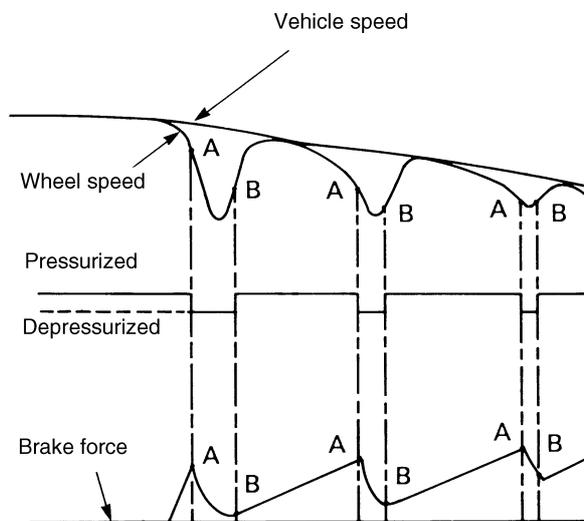
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Wheel slip and hydraulic control

The ECU (ABS) calculates the wheel speed of each wheel according to the rotation signal received from the front and rear wheel sensors. In addition, the ECU (ABS) 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 has a tendency to lock, the wheel speed is suddenly reduced. When the wheel slip and the wheel speed reduction rate exceed the preset values, the ECU (ABS) 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 figure), the ECU (ABS) reduces the brake fluid pressure in the brake caliper and increases the pressure of the brake fluid in the brake caliper when the tendency to lock has diminished (point B in the figure).



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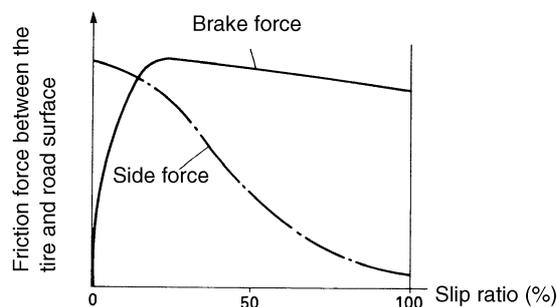
ABS operation and vehicle control

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.

NOTE:

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

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



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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 an 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 brake hydraulic pres-

sure. But, 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.

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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.

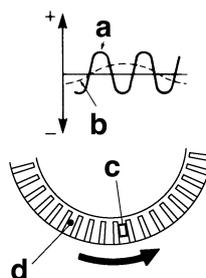
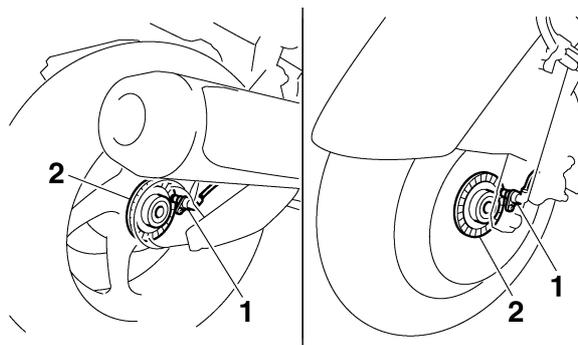
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ABS component functions

● Wheel sensors and sensor rotors

Wheel sensors “1” detect the wheel rotation speed and transmit the wheel rotation signal to the ECU (ABS).

Each wheel sensor is composed of a permanent magnet and a coil. The wheel sensors are installed in the sensor housing for each wheel. Sensor rotors “2” are installed inside the front and rear wheel hubs and rotate with the wheels. Each sensor rotor has 40 serrations that face the sensor housing. As the distance changes between the top and bottom of the serrations with the rotation of the wheels, inductive electromotive force is generated in the wheel sensors. Wheel rotation speed is detected based on the frequency of this alternating voltage.

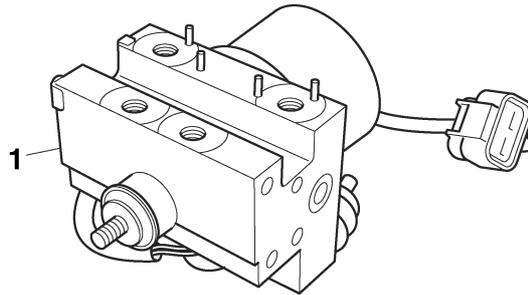


- a. At high speed
- b. At low speed

- c. Wheel sensor
- d. Sensor rotor

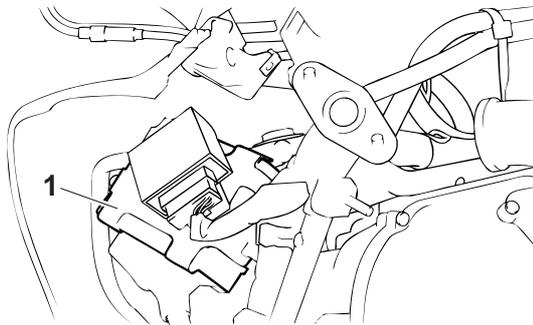
● Hydraulic unit

The hydraulic unit “1” is composed of a hydraulic control valve (solenoid valve, flow control valve), a buffer chamber, and a hydraulic pump for each brake and an ABS motor. The hydraulic unit adjusts the front and rear wheel brake fluid pressure to control the wheel rotation speed according to signals transmitted from the ECU (ABS).



- Electronic control unit (ECU)

The ECU (ABS) “1” controls the ABS and is located on the right side of the vehicle near the top of the front fork. To protect the ECU (ABS) from water damage, it is protected by a cover.



- ABS control operation

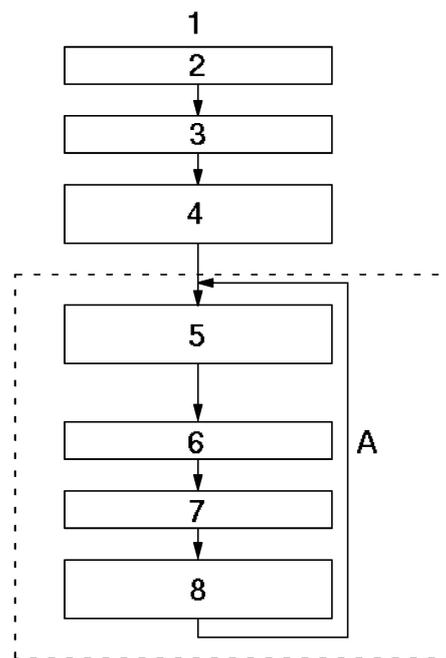
The ABS control operation performed in the ECU (ABS) is divided into the following two parts.

- Hydraulic control
- Self-diagnosis

These operations are performed once every 8/1,000 of a second. When a failure is detected in the ABS, a malfunction code is stored in the memory of the ECU (ABS) for easy problem identification and troubleshooting.

NOTE:

Some types of failures are not recorded in the memory of the ECU (ABS) (e.g., a drop in battery voltage).



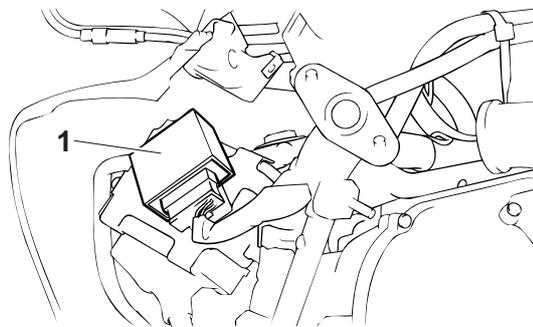
1. Software operation flow
2. Set the main switch to "ON".
3. Initialize
4. Self-diagnosis (when static)
5. Self-diagnosis (when riding)

6. Receive signals
7. Control operation
8. Depressurize/pressurize

A. 8/1,000 of a second

● Fail-safe relay

The fail-safe relay controls the power supply of the hydraulic unit and is located upper the ECU (ABS).



1. Fail-safe relay

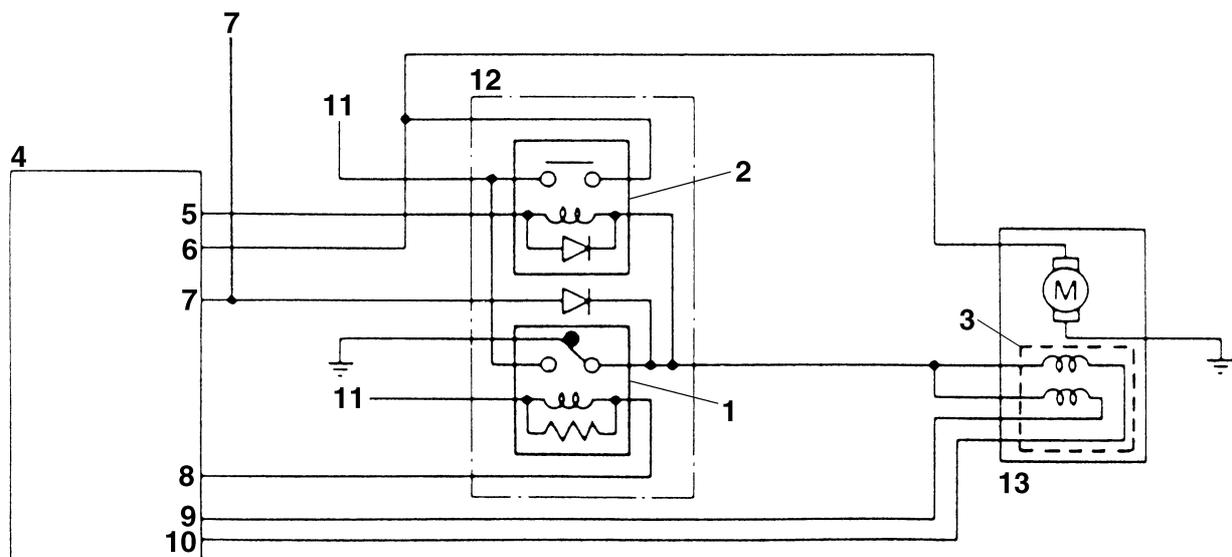
Composition and operation

The fail-safe relay is composed of the solenoid relay "1" and fail-safe relay "2". The solenoid relay is activated (continuous) by signals transmitted from the ECU (ABS). As a result, the solenoid valve "3" can be operated.

If a malfunction occurs in the circuit, the solenoid relay is deactivated and it becomes impossible for the solenoid valve to reduce the hydraulic pressure of the brake fluid and normal braking is resumed.

The fail-safe relay is also activated by signals transmitted from the ECU (ABS) and operates simultaneously when the ABS starts to reduce the hydraulic pressure of the brake fluid.

If the solenoid relay is turned off, the motor relay is also deactivated and the motor stops operating if there is a malfunction.



1. Solenoid relay
2. Fail-safe relay
3. Solenoid valve
4. ECU (ABS)
5. Pump motor relay coil
6. Pump motor monitor
7. ABS warning light
8. Fail-safe relay coil
9. Rear solenoid
10. Front solenoid
11. Power
12. Fail-safe relay
13. Hydraulic unit

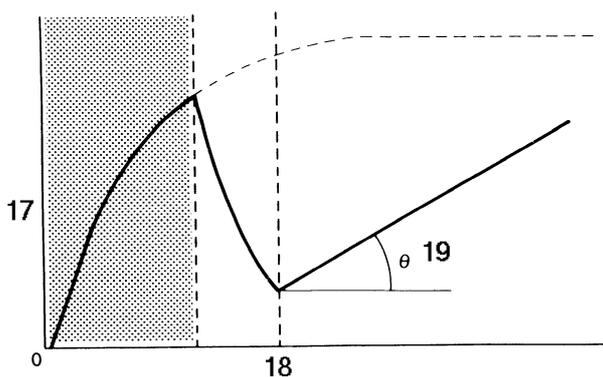
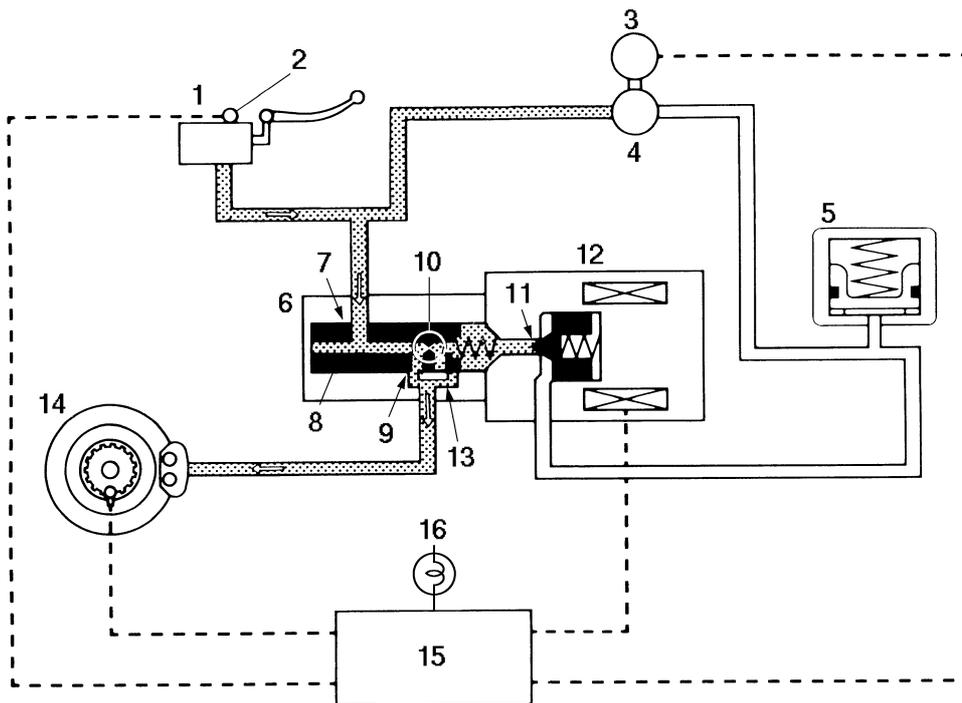
ABS operation

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

● Normal braking (ABS not activated)

When the ABS is not activated port D “11” of the solenoid valve is closed because a control signal has not been transmitted from the ECU (ABS) and port A “7” and port B “9” of the flow control valve are open. 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 via port A and port B.

At this time, the inlet and outlet check valves of the pump close the lines and brake fluid is not sent. As a result, 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 via port A and port B.



1. Brake master cylinder
2. Brake light switch
3. ABS motor
4. Pump
5. Buffer chamber
6. Flow control valve
7. Port A
8. Spool
9. Port B
10. Orifice

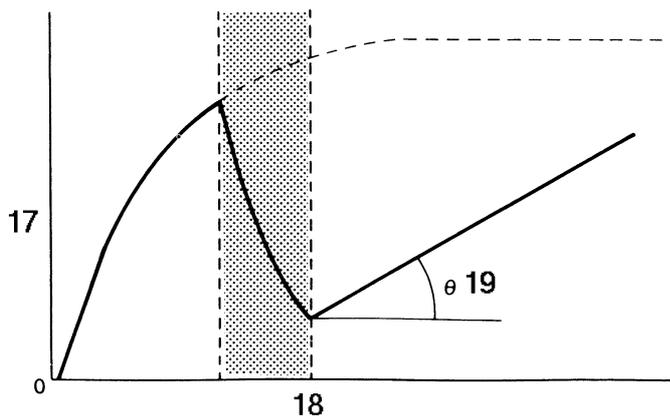
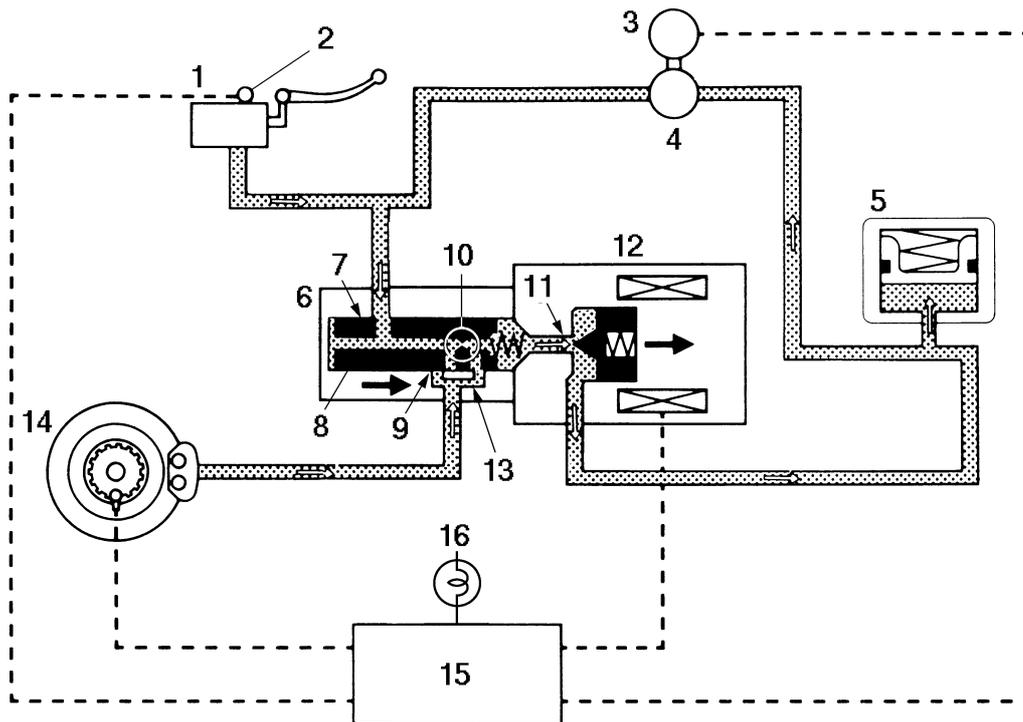
11. Port D
12. Solenoid valve
13. Port C
14. Brake caliper
15. ECU (ABS)
16. ABS warning light
17. Brake fluid pressure
18. Time
19. Repressurizing

● Emergency braking (ABS activated)

1. Depressurized state

When the front wheel is about to lockup, port D “11” of the solenoid valve is opened by the “depressurization” signal transmitted from the ECU (ABS). When this occurs, the spool of the flow control valve compresses the return spring to close port B “9”. Brake fluid that has entered through port A “7” is restricted by the orifice “10” and the brake fluid is sent to the brake caliper via port C “13” and port D “11”, and the buffer chamber. As a result, the hydraulic pressure in the brake caliper is reduced.

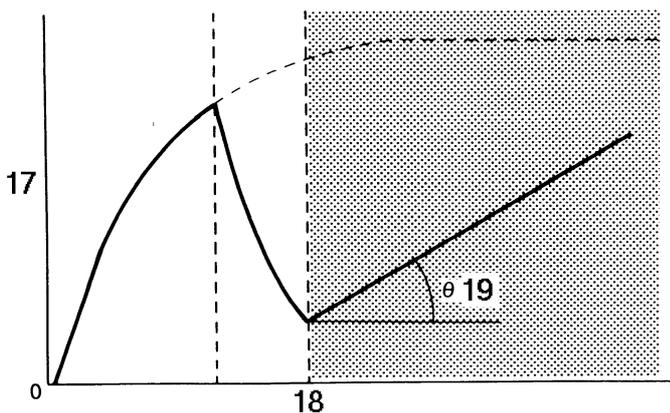
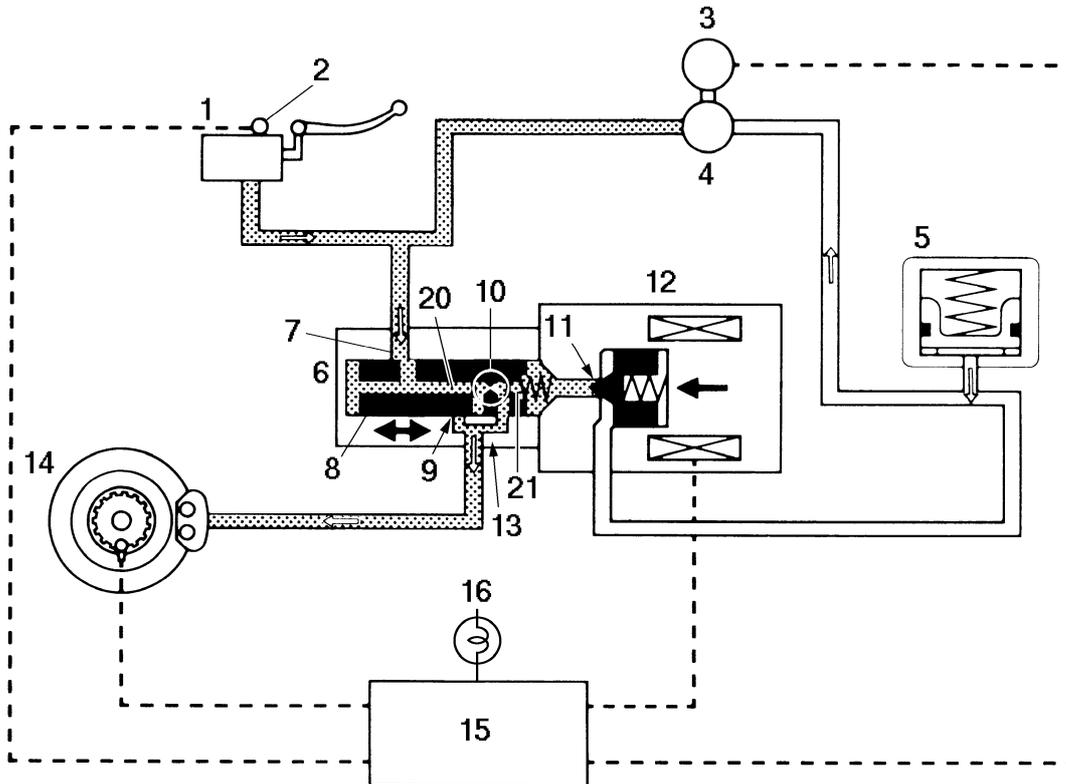
The brake fluid stored in the buffer chamber is pumped back to the brake master cylinder by the fluid pressure pump linked to the pump motor.



- | | |
|--------------------------|--------------------------|
| 1. Brake master cylinder | 10. Orifice |
| 2. Brake light switch | 11. Port D |
| 3. ABS motor | 12. Solenoid valve |
| 4. Pump | 13. Port C |
| 5. Buffer chamber | 14. Brake caliper |
| 6. Flow control valve | 15. ECU (ABS) |
| 7. Port A | 16. ABS warning light |
| 8. Spool | 17. Brake fluid pressure |
| 9. Port B | 18. Time |
| | 19. Repressurizing |

2. Pressurized state

Port D "11" is closed by the "pressurization" signal transmitted from the ECU (ABS). Before this occurs, the spool of the flow control valve has compressed the return spring to close port B "9". Brake fluid that has entered through port A "7" is further restricted by the orifice "10" and the brake fluid is sent to the brake calipers via port A "7" and port C "13". At this time, the brake is pressurized at a constant speed regardless of the brake fluid pressure level since restriction of port A "7" changes so that a constant pressure difference is maintained between chamber A "20" and chamber B "21" of the flow control valve.



1. Brake master cylinder
2. Brake light switch
3. ABS motor
4. Pump
5. Buffer chamber
6. Flow control valve
7. Port A
8. Spool
9. Port B
10. Orifice

11. Port D
12. Solenoid valve
13. Port C
14. Brake caliper
15. ECU (ABS)
16. ABS warning light
17. Brake fluid pressure
18. Time
19. Repressurizing
20. Chamber A
21. Chamber B

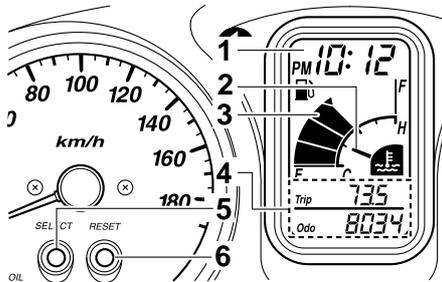
EAS15B1001

MULTI-FUNCTION DISPLAY

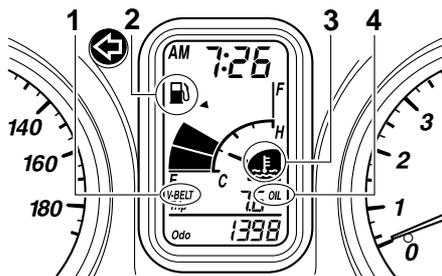
EWA12311

⚠ WARNING

Be sure to stop the vehicle before making any setting changes to the multi-function display.



1. Clock
2. Coolant temperature meter
3. Fuel meter
4. Odometer/tripmeters
5. "SELECT" button
6. "RESET" button



1. V-belt replacement indicator "V-BELT"
2. Fuel level warning indicator "⚠"
3. Coolant temperature warning indicator "⚠"
4. Oil change indicator "OIL"

The multi-function display is equipped with the following:

- a fuel meter
- a coolant temperature meter
- an odometer (which shows the total distance traveled), 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 bottom segment of the fuel meter and fuel level warning indicator started flashing), a self-diagnosis device (engine and ABS)
- a clock
- an oil change indicator
- a V-belt replacement indicator

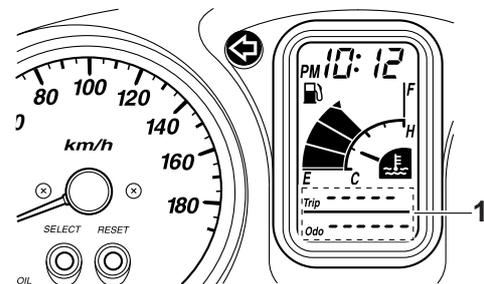
NOTE:

- Be sure to turn the key to "ON" before using the "SELECT" and "RESET" buttons.
- When the key is turned to "ON", all of the display segments of the multi-function display will appear one after the other and then disappear, in order to test the electrical circuit.

ECA15B1001

CAUTION:

If bars "1" appear where the odometer and tripmeters are normally displayed, the multi-function display is malfunctioning. Replace the entire multi-function display.



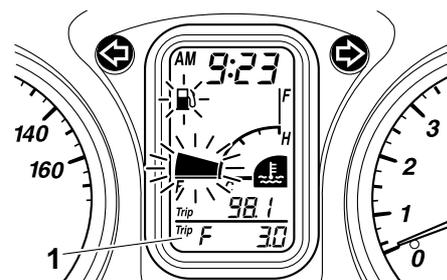
Odometer and tripmeter modes

Pushing the "SELECT" button switches the display between the odometer mode "ODO" and the tripmeter modes "TRIP" in the following order:

ODO → TRIP (top) → TRIP (bottom) → ODO

When approximately 2.8 L (0.74 US gal) (0.62 Imp.gal) of fuel remains in the fuel tank, the bottom segment of the fuel meter and fuel level warning indicator will start flashing, and the display will automatically change to the fuel reserve tripmeter mode "TRIP F" and start counting the distance traveled from that point. In that case, pushing the "SELECT" button switches the display between the various tripmeter and odometer modes in the following order:

TRIP F → TRIP (top) → TRIP (bottom) → ODO → TRIP F



1. Fuel reserve tripmeter

To reset a tripmeter, select it by pushing the "SELECT" button until "TRIP" or "TRIP F" begins flashing ("TRIP" or "TRIP F" will only flash for five seconds). While "TRIP" or "TRIP F" is flashing, push the "RESET" button for at least one second. If you do not reset the fuel reserve tripmeter manually, it will reset itself automatically and the display will return to the prior mode after refueling and traveling 5 km (3 mi).

NOTE:

The display cannot be changed back to "TRIP F" after pushing the "RESET" button.

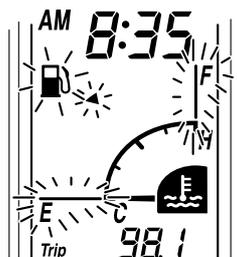
Fuel meter

With the key in the "ON" position, 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 fuel level reaches the bottom segment near "E", the fuel level warning indicator and the bottom segment will flash. Refuel as soon as possible.

ECA15B1002

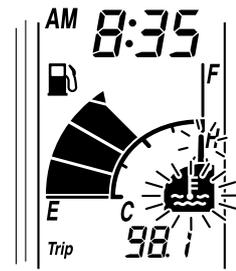
CAUTION:

If the fuel level is not displayed and the fuel level warning symbol, triangular mark, "E" line and "F" line flash in the fuel meter, the fuel level monitoring system is malfunctioning. Check the fuel sender and the electrical circuit.



Coolant temperature meter

With the key in the "ON" position, the coolant temperature meter indicates the temperature of the coolant. The coolant temperature varies with changes in the weather and engine load. If the top segment and coolant temperature warning indicator flash, stop the vehicle and let the engine cool.



ECA10020

CAUTION:

Do not operate the engine if it is overheated.

Oil change indicator "OIL"

This indicator flashes at the initial 1000 km (600 mi), then at 5000 km (3000 mi) and every 5000 km (3000 mi) thereafter to indicate that the engine oil should be changed.

After changing the engine oil, reset the oil change indicator. Refer to "CHANGING THE ENGINE OIL" on page 3-13.

If the engine oil is changed before the oil change indicator comes on (i.e. before the periodic oil change interval has been reached), the indicator must be reset after the oil change for the next periodic oil change to be indicated at the correct time. "CHANGING THE ENGINE OIL" on page 3-13

The electrical circuit of the indicator can be checked according to the following procedure.

1. Set the engine stop switch to "O" and turn the key to "ON".
2. Check that the indicator comes on for a few seconds and then goes off.
3. If the indicator does not come on, check the electrical circuit. Refer to "SIGNALING SYSTEM" on page 8-23.

NOTE:

The oil change indicator may flash when the engine is revved with the scooter on the centerstand, but this does not indicate a malfunction.

V-belt replacement indicator "V-BELT"

This indicator flashes every 20000 km (12000 mi) when the V-belt needs to be replaced.

The electrical circuit of the indicator can be checked according to the following procedure.

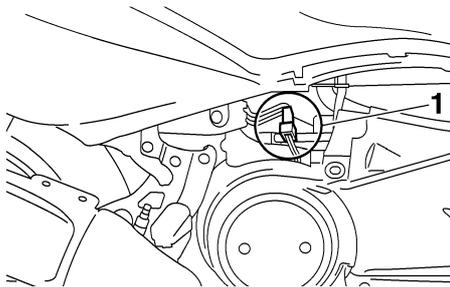
1. Turn the key to "ON" and make sure that the engine stop switch is set to "O".
2. If the indicator does not come on, check the electrical circuit. Refer to "SIGNALING SYSTEM" on page 8-23.

To reset the V-belt replacement indicator

1. Turn the key to "ON" and make sure that the

engine stop switch is set to "ON".

2. Disconnect the V-belt replacement reset coupler "1" for two to ten seconds.



3. And then, connect the V-belt replacement reset coupler, the V-belt replacement indicator will come on for 1.4 seconds. And the V-belt replacement indicator will go off.

NOTE:

If the V-belt is replaced before the V-belt replacement indicator comes on (i.e. before the V-belt replacement interval has been reached), the indicator must be reset after the V-belt replacement for the next periodic V-belt replacement to be indicated at the correct time.

Self-diagnosis device

This model is equipped with a self-diagnosis device for various electrical circuits.

If any of those circuits are defective, the multi-function display will indicate a two-digit error code.

If the multi-function display indicates such an error code, note the code number, and then check the vehicle. Refer to "FUEL INJECTION SYSTEM" on page 8-33, "IMMOBILIZER SYSTEM" on page 8-57, "ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)" on page 8-65.

ECA11790

CAUTION:

If the multi-function display indicates an error code, the vehicle should be checked as soon as possible in order to avoid engine damage.

Clock mode

To set the clock:

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

EAS20180

IMPORTANT INFORMATION

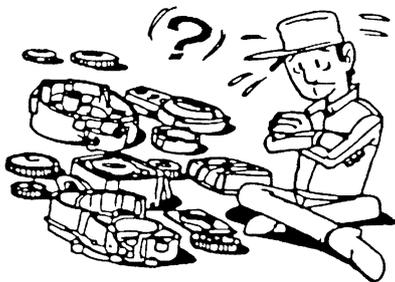
EAS20190

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 1-21.
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.

EAS20200

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.



EAS20210

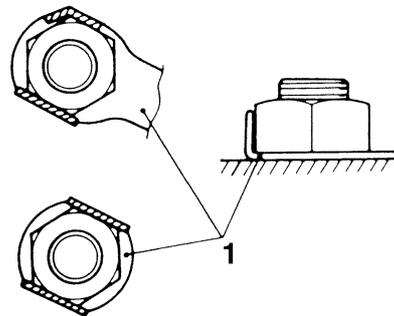
GASKETS, OIL SEALS AND O-RINGS

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.

EAS20220

LOCK WASHERS/PLATES AND COTTER PINS

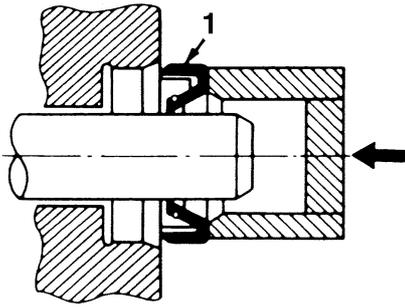
After removal, replace all lock washers/plates "1" and cotter pins. After the bolt or nut has been tightened to specification, bend the lock tabs along a flat of the bolt or nut.



EAS20230

BEARINGS AND OIL SEALS

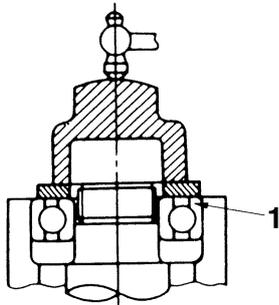
Install bearings and oil seals so that the manufacturer's marks or numbers are visible. When installing oil seals "1", lubricate the oil seal lips with a light coat of lithium-soap-based grease. Oil bearings liberally when installing, if appropriate.



ECA13300

CAUTION:

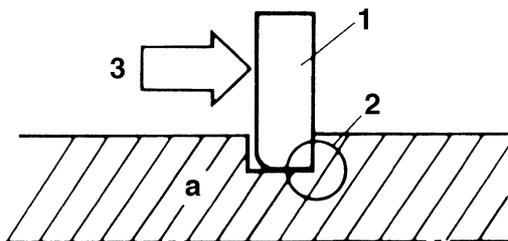
Do not spin the bearing with compressed air because this will damage the bearing surfaces.



EAS20240

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.



a. Shaft

CHECKING THE CONNECTIONS

EAS20250

CHECKING THE CONNECTIONS

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

1. Disconnect:

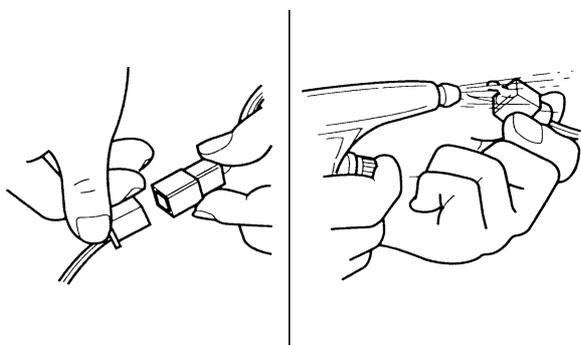
- Lead
- Coupler
- Connector

2. Check:

- Lead
- Coupler
- Connector

Moisture → Dry with an air blower.

Rust/stains → Connect and disconnect several times.

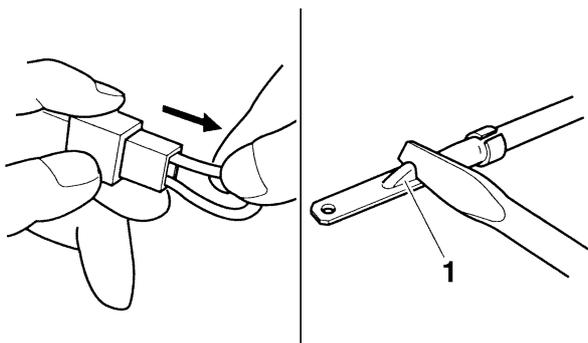


3. Check:

- All connections
- Loose connection → Connect properly.

NOTE:

If the pin "1" on the terminal is flattened, bend it up.



4. Connect:

- Lead
- Coupler
- Connector

NOTE:

Make sure all connections are tight.

5. Check:

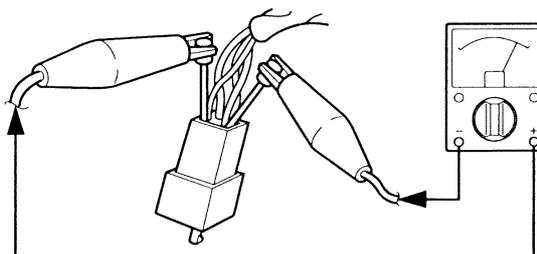
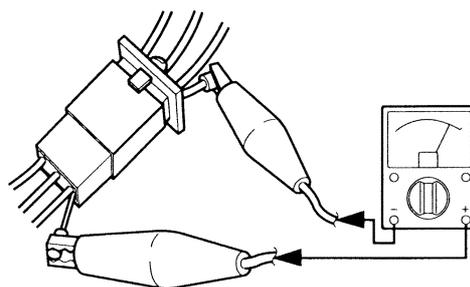
- Continuity
(with the pocket tester)



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

NOTE:

- If there is no continuity, clean the terminals.
- When checking the wire harness, perform steps (1) to (3).
- As a quick remedy, use a contact revitalizer available at most part stores.



SPECIAL TOOLS

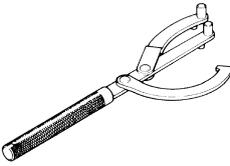
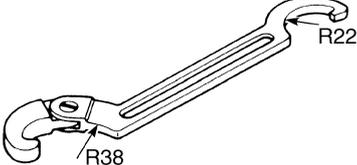
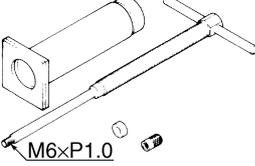
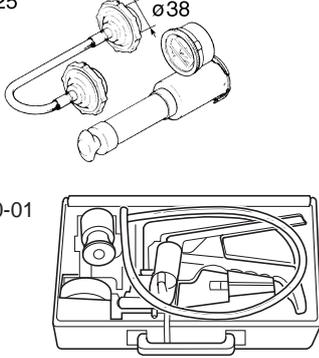
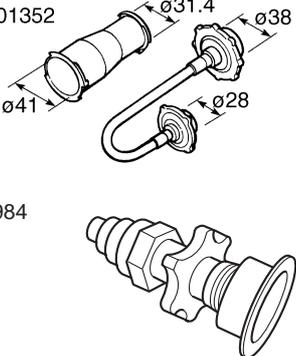
EAS20260

SPECIAL TOOLS

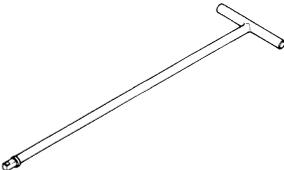
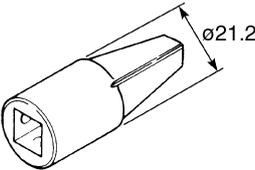
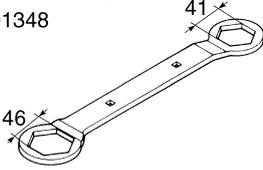
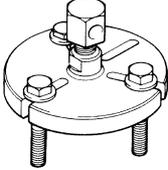
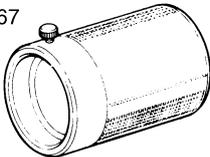
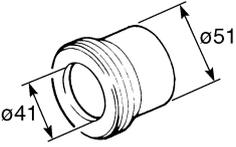
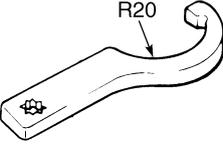
The following special tools are necessary for complete and accurate tune-up and assembly. Use only the appropriate special tools as this will help prevent damage caused by the use of inappropriate tools or improvised techniques. Special tools, part numbers or both may differ depending on the country.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

NOTE:

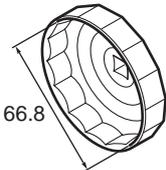
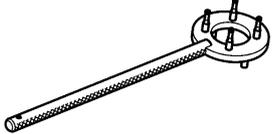
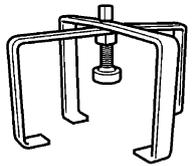
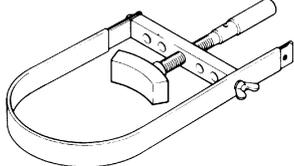
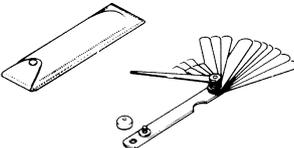
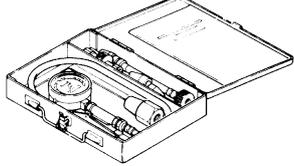
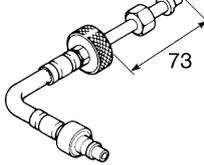
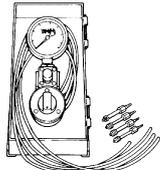
For U.S.A. and Canada, use part number starting with "YM-", "YU-", or "ACC-".
For others, use part number starting with "90890-".

Tool name/Tool No.	Illustration	Reference pages
Rotor holding tool 90890-01235 Universal magneto & rotor holder YU-01235		5-45, 5-48
Ring nut wrench 90890-01268 Spanner wrench YU-01268		4-66
Piston pin puller set 90890-01304 Piston pin puller YU-01304	90890-01304 	5-26
Radiator cap tester 90890-01325 Radiator pressure tester YU-24460-01	90890-01325 	6-3
Radiator cap tester adapter 90890-01352 Radiator pressure tester adapter YU-33984	90890-01352 	6-3

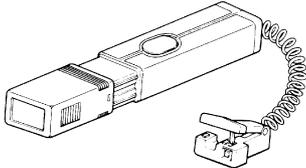
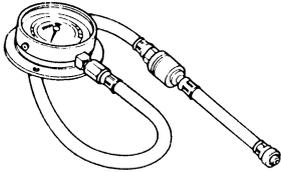
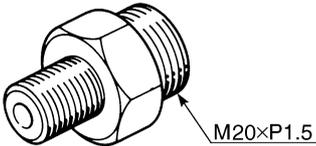
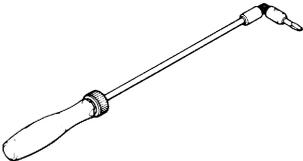
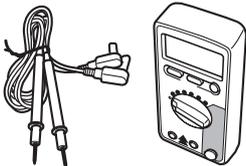
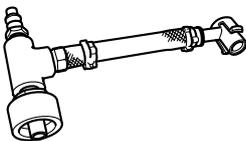
SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
T-handle 90890-01326 T-handle 3/8" drive 60 cm long YM-01326		4-59, 4-61
Damper rod holder 90890-01460		4-59, 4-61
Locknut wrench 90890-01348 YM-01348	90890-01348 	5-55, 5-57
Flywheel puller 90890-01362 Heavy duty puller YU-33270-B		5-32
Fork seal driver weight 90890-01367 Replacement hammer YM-A9409-7	90890-01367  YM-A9409-7/YM-A5142-4 	4-62
Fork seal driver attachment (ø41) 90890-01381 Replacement 41 mm YM-A5142-2		4-62
Steering nut wrench 90890-01403 Spanner wrench YU-33975		3-27

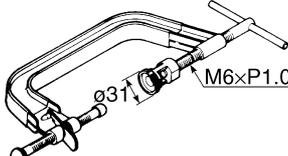
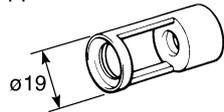
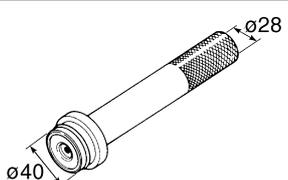
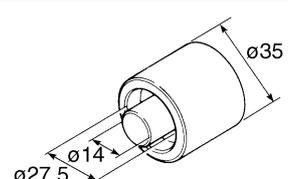
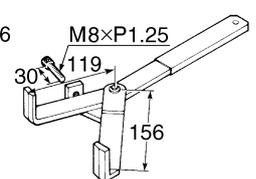
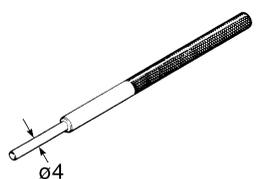
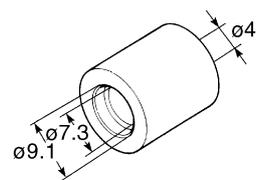
SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Oil filter wrench 90890-01469 Oil filter wrench YM-01469		3-13
Sheave holder 90890-01481		5-54
Clutch spring compressor 90890-01482		5-45
Sheave holder 90890-01701 Primary clutch holder YS-01880-A		5-32, 5-33
Thickness gauge 90890-03079 Narrow gauge set YM-34483		3-3
Compression gauge 90890-03081 Engine compression tester YU-33223		3-11
Extension 90890-04082		3-11
Vacuum gauge 90890-03094 Carburetor synchronizer YU-44456	90890-03094 	3-6

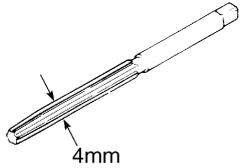
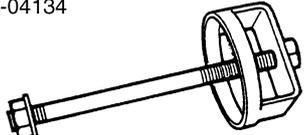
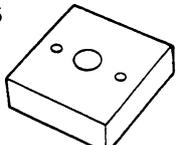
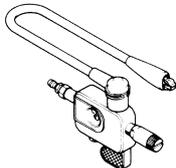
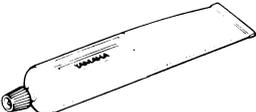
SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Pocket tester 90890-03112 Analog pocket tester YU-03112-C		1-20, 5-37, 8-103, 8-105, 8-106, 8-108, 8-110, 8-111, 8-112, 8-113, 8-114, 8-115, 8-116, 8-117, 8-118, 8-119, 8-120, 8-121
Timing light 90890-03141 Inductive clamp timing light YU-03141		3-10
Test coupler adapter 90890-03149		4-50, 4-51
Pressure gauge 90890-03153		3-15, 7-7
Oil pressure adapter B 90890-03124		3-15
Carburetor angle driver 90890-03158		3-6
Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927		5-37
Fuel pressure adapter 90890-03181		7-7

SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Valve spring compressor 90890-04019 YM-04019		5-18, 5-23
Valve spring compressor attachment 90890-04114 Valve spring compressor adapter 19.5 mm YM-04114	90890-04114 	5-18, 5-23
Middle driven shaft bearing driver 90890-04058 Bearing driver 40 mm YM-04058		6-10
Mechanical seal installer 90890-04078 Water pump seal installer YM-33221-A		6-10
Universal clutch holder 90890-04086 YM-91042	90890-04086 	5-45, 5-48
Valve lapper 90890-04101 Valve lapping tool YM-A8998		3-4
Valve guide remover (ø4) 90890-04111 Valve guide remover (4.0 mm) YM-04111		5-19
Valve guide installer (ø4) 90890-04112 Valve guide installer (4.0 mm) YM-04112		5-19

SPECIAL TOOLS

Tool name/Tool No.	Illustration	Reference pages
Valve guide reamer (ø4) 90890-04113 Valve guide reamer (4.0 mm) YM-04113		5-19
Sheave spring compressor 90890-04134 YM-04134	90890-04134 	5-55, 5-57
Sheave fixed block 90890-04135 Sheave fixed bracket YM-04135	90890-04135 	5-55, 5-57
Plane bearing installer 90890-04139		5-62
Ignition checker 90890-06754 Opama pet-4000 spark checker YM-34487		8-113
Digital tachometer 90890-06760 YU-39951-B		3-8
Yamaha bond No. 1215 (Three Bond No.1215®) 90890-85505		5-34, 5-68

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GENERAL SPECIFICATIONS

EAS20280

GENERAL SPECIFICATIONS

Model

Model	XP500 15B1 (EUR)
	XP500 15B4 (EUR)
	XP500A 15B2 (EUR)
	XP500A 15B5 (EUR)
	XP500W 15B3 (AUS)
	XP500W 15B6 (AUS)

Dimensions

Overall length	2235 mm (88.0 in)
Overall width	775 mm (30.5 in)
Overall height	1410 mm (55.5 in)
Seat height	795 mm (31.3 in)
Wheelbase	1575 mm (62.0 in)
Ground clearance	130 mm (5.12 in)
Minimum turning radius	2800 mm (110.2 in)

Weight

With oil and fuel	XP500 227.0 kg (500 lb)
	XP500A 232.0 kg (511 lb)
	XP500W 225.0 kg (496 lb)
Maximum load	XP500 188 kg (414 lb)
	XP500A 183 kg (403 lb)
	XP500W 190 kg (419 lb)

ENGINE SPECIFICATIONS

EAS20290

ENGINE SPECIFICATIONS

Engine

Engine type	Liquid cooled 4-stroke, DOHC
Displacement	499.0 cm ³
Cylinder arrangement	Forward-inclined parallel 2-cylinder
Bore × stroke	66.0 × 73.0 mm (2.60 × 2.87 in)
Compression ratio	11.00 :1
Standard compression pressure (at sea level)	1400 kPa/360 r/min (199.1 psi/360 r/min) (14.0 kgf/cm ² /360 r/min)
Starting system	Electric starter

Fuel

Recommended fuel	XP500 Regular unleaded gasoline only XP500A Regular unleaded gasoline only XP500W Unleaded gasoline only
Fuel tank capacity	14.0 L (3.70 US gal) (3.08 Imp.gal)

Engine oil

Lubrication system	Dry sump
Type	SAE10W30 or SAE10W40
Recommended engine oil grade	API service SG type or higher, JASO standard MA
Engine oil quantity	
Total amount	3.60 L (3.81 US qt) (3.17 Imp.qt)
Without oil filter cartridge replacement	2.80 L (2.96 US qt) (2.46 Imp.qt)
With oil filter cartridge replacement	2.90 L (3.07 US qt) (2.55 Imp.qt)
Oil pressure (hot)	150.0 kPa/1200 r/min (21.8 psi/1200 r/min) (1.50 kgf/cm ² /1200 r/min)

Chain drive oil

Type	SAE80 API GL-4 Hypoid gear oil
Quantity	0.70 L (0.74 US qt) (0.62 Imp.qt)
Oil filter type	Paper

Oil pump

Oil pump type	Trochoid
Inner-rotor-to-outer-rotor-tip clearance	0.040–0.120 mm (0.0016–0.0047 in)
Limit	0.20 mm (0.0079 in)
Outer-rotor-to-oil-pump-housing clearance	0.045–0.085 mm (0.0018–0.0033 in)
Limit	0.155 mm (0.0061 in)
Oil-pump-housing-to-inner-and-outer-rotor clearance	0.11–0.23 mm (0.0043–0.0091 in)
Limit	0.30 mm (0.0118 in)
Bypass valve opening pressure	80.0–120.0 kPa (11.6–17.4 psi) (0.80–1.20 kgf/cm ²)
Relief valve operating pressure	450.0–550.0 kPa (65.3–79.8 psi) (4.50–5.50 kgf/cm ²)
Pressure check location	MAIN GALLERY

Cooling system

Radiator capacity (including all routes)	1.50 L (1.59 US qt) (1.32 Imp.qt)
Coolant reservoir capacity (up to the maximum level mark)	0.35 L (0.37 US qt) (0.31 Imp.qt)
Radiator cap opening pressure	107.9–137.3 kPa (15.6–19.9 psi) (1.08–1.37 kgf/cm ²)

ENGINE SPECIFICATIONS

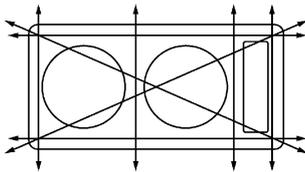
Thermostat	
Model/manufacturer	4JH/NIPPON THERMOSTAT
Valve opening temperature	69.0–73.0 °C (156.20–163.40 °F)
Valve full open temperature	85.0 °C (185.00 °F)
Valve lift (full open)	8.0 mm (0.31 in)
Radiator core	
Width	330.0 mm (12.99 in)
Height	138.0 mm (5.43 in)
Depth	24.0 mm (0.94 in)
Water pump	
Water pump type	Single suction centrifugal pump
Reduction ratio	23/19 (1.210)

Spark plug (s)

Manufacturer/model	NGK/CR7E
Spark plug gap	0.7–0.8 mm (0.028–0.031 in)

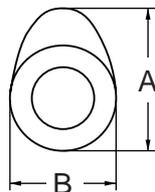
Cylinder head

Volume	14.97–15.57 cm ³ (0.91–0.95 cu.in)
Warpage limit	0.03 mm (0.0012 in)



Camshaft

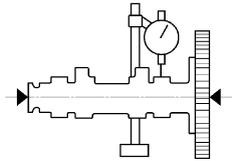
Drive system	Chain drive (left)
Camshaft cap inside diameter	23.000–23.021 mm (0.9055–0.9063 in)
Camshaft journal diameter	22.967–22.980 mm (0.9042–0.9047 in)
Camshaft-journal-to-camshaft-cap clearance	0.020–0.054 mm (0.0008–0.0021 in)
Camshaft lobe dimensions	
Intake A	33.252–33.352 mm (1.3091–1.3131 in)
Limit	33.152 mm (1.3052 in)
Intake B	24.956–25.056 mm (0.9825–0.9865 in)
Limit	24.856 mm (0.9786 in)
Exhaust A	33.252–33.352 mm (1.3091–1.3131 in)
Limit	33.152 mm (1.3052 in)
Exhaust B	24.956–25.056 mm (0.9825–0.9865 in)
Limit	24.856 mm (0.9786 in)



ENGINE SPECIFICATIONS

Camshaft runout limit

0.030 mm (0.0012 in)



Timing chain

Model/number of links

SCR-0409 SV/132

Tensioning system

Automatic

Valve, valve seat, valve guide

Valve clearance (cold)

Intake

0.15–0.20 mm (0.0059–0.0079 in)

Exhaust

0.25–0.30 mm (0.0098–0.0118 in)

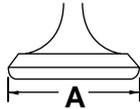
Valve dimensions

Valve head diameter A (intake)

24.90–25.10 mm (0.9803–0.9882 in)

Valve head diameter A (exhaust)

21.90–22.10 mm (0.8622–0.8701 in)

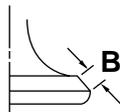


Valve face width B (intake)

1.140–1.980 mm (0.0449–0.0780 in)

Valve face width B (exhaust)

1.140–1.980 mm (0.0449–0.0780 in)



Valve seat width C (intake)

0.90–1.10 mm (0.0354–0.0433 in)

Limit

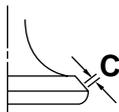
1.6 mm (0.06 in)

Valve seat width C (exhaust)

0.90–1.10 mm (0.0354–0.0433 in)

Limit

1.6 mm (0.06 in)

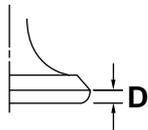


Valve margin thickness D (intake)

0.60–0.80 mm (0.0236–0.0315 in)

Valve margin thickness D (exhaust)

0.60–0.80 mm (0.0236–0.0315 in)



Valve stem diameter (intake)

3.975–3.990 mm (0.1565–0.1571 in)

Limit

3.945 mm (0.1553 in)

Valve stem diameter (exhaust)

3.960–3.975 mm (0.1559–0.1565 in)

Limit

3.930 mm (0.1547 in)

Valve guide inside diameter (intake)

4.000–4.012 mm (0.1575–0.1580 in)

Limit

4.050 mm (0.1594 in)

Valve guide inside diameter (exhaust)

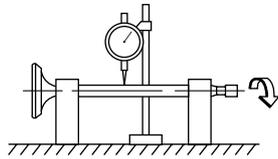
4.000–4.012 mm (0.1575–0.1580 in)

Limit

4.050 mm (0.1594 in)

ENGINE SPECIFICATIONS

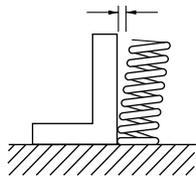
Valve-stem-to-valve-guide clearance (intake)	0.010–0.037 mm (0.0004–0.0015 in)
Limit	0.080 mm (0.0032 in)
Valve-stem-to-valve-guide clearance (exhaust)	0.025–0.052 mm (0.0010–0.0020 in)
Limit	0.100 mm (0.0039 in)
Valve stem runout	0.040 mm (0.0016 in)



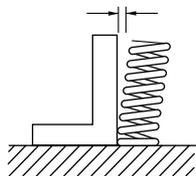
Cylinder head valve seat width (intake)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	1.6 mm (0.06 in)
Cylinder head valve seat width (exhaust)	0.90–1.10 mm (0.0354–0.0433 in)
Limit	1.6 mm (0.06 in)

Valve spring

Free length (intake)	35.59 mm (1.40 in)
Limit	33.81 mm (1.33 in)
Free length (exhaust)	35.59 mm (1.40 in)
Limit	33.81 mm (1.33 in)
Installed length (intake)	30.39 mm (1.20 in)
Installed length (exhaust)	30.39 mm (1.20 in)
Spring rate K1 (intake)	18.84 N/mm (107.60 lb/in) (1.92 kgf/mm)
Spring rate K2 (intake)	24.52 N/mm (140.01 lb/in) (2.50 kgf/mm)
Spring rate K1 (exhaust)	18.84 N/mm (107.60 lb/in) (1.92 kgf/mm)
Spring rate K2 (exhaust)	24.52 N/mm (140.01 lb/in) (2.50 kgf/mm)
Spring tilt (intake)	2.5 °/1.6 mm
Spring tilt (exhaust)	2.5 °/1.6 mm



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



Valve lifter

Valve lifter outside diameter (intake)	24.476–24.500 mm (0.9636–0.9646 in)
Limit	24.451 mm (0.9626 in)
Valve lifter outside diameter (exhaust)	24.476–24.500 mm (0.9636–0.9646 in)
Limit	24.451 mm (0.9626 in)

Cylinder

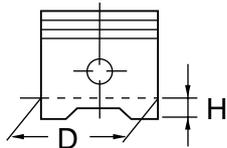
Bore	66.000–66.010 mm (2.5984–2.5988 in)
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ENGINE SPECIFICATIONS

Wear limit	66.100 mm (2.6024 in)
Taper limit	0.050 mm (0.0020 in)
Out of round limit	0.050 mm (0.0020 in)

Piston

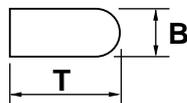
Piston-to-cylinder clearance	0.020–0.045 mm (0.0008–0.0018 in)
Limit	0.15 mm (0.0059 in)
Diameter D	65.965–65.980 mm (2.5970–2.5976 in)
Height H	9.0 mm (0.35 in)



Offset	0.50 mm (0.0197 in)
Offset direction	Intake side
Piston pin bore inside diameter	15.002–15.013 mm (0.5906–0.5911 in)
Limit	15.043 mm (0.5922 in)
Piston pin outside diameter	14.991–15.000 mm (0.5902–0.5906 in)
Limit	14.971 mm (0.5894 in)

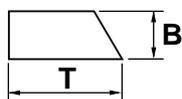
Piston ring

Top ring	
Ring type	Barrel
Dimensions (B × T)	0.80 × 2.45 mm (0.03 × 0.10 in)



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	0.100 mm (0.0039 in)

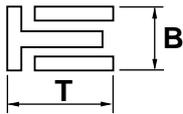
2nd ring	
Ring type	Plain
Dimensions (B × T)	0.80 × 2.50 mm (0.03 × 0.10 in)



End gap (installed)	0.40–0.50 mm (0.0157–0.0197 in)
Limit	0.75 mm (0.0295 in)
Ring side clearance	0.020–0.055 mm (0.0008–0.0022 in)
Limit	0.100 mm (0.0039 in)

Oil ring	
Dimensions (B × T)	1.50 × 2.00 mm (0.06 × 0.08 in)

ENGINE SPECIFICATIONS



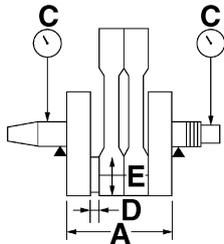
End gap (installed)	0.10–0.35 mm (0.0039–0.0138 in)
Ring side clearance	0.040–0.160 mm (0.0016–0.0063 in)

Connecting rod

Oil clearance (using plastigauge®)	0.026–0.050 mm (0.0010–0.0020 in)
Bearing color code	1.Blue 2.Black 3.Brown 4.Green
Small end inside diameter	15.005–15.018 mm (0.5907–0.5913 in)

Crankshaft

Width A	50.00–50.60 mm (1.969–1.992 in)
Width B	118.55–118.60 mm (4.67–4.67 in)
Runout limit C	0.030 mm (0.0012 in)
Big end side clearance D	0.160–0.262 mm (0.0063–0.0103 in)
Big end radial clearance E	0.026–0.050 mm (0.0010–0.0020 in)



Journal oil clearance (using plastigauge®)	0.040–0.082 mm (0.0016–0.0032 in)
Bearing color code	1.Blue 2.Black 3.Brown 4.Green
Balancer drive method	Piston

Clutch

Clutch type	Wet, multiple-disc automatic
Clutch release method	Automatic
Friction plate thickness	2.75–3.05 mm (0.108–0.120 in)
Wear limit	2.65 mm (0.1043 in)
Plate quantity	5 pcs
Clutch plate thickness	1.30–1.50 mm (0.051–0.059 in)
Plate quantity	4 pcs
Warpage limit	0.10 mm (0.0039 in)
Clutch plate thickness	1.80–2.00 mm (0.071–0.079 in)
Plate quantity	2 pcs
Warpage limit	0.20 mm (0.0079 in)
Clutch spring free length	25.90 mm (1.02 in)
Minimum length	25.40 mm (1.00 in)
Spring quantity	6 pcs
Clutch spring height “c”	4.70 mm (0.19 in)
Minimum height	4.40 mm (0.17 in)
Spring quantity	1 pcs
Clutch spring height “b”	3.30 mm (0.13 in)
Minimum height	2.9 mm (0.11 in)
Spring quantity	6 pcs

ENGINE SPECIFICATIONS

V-belt

V-belt width	32.0 mm (1.26 in)
Limit	30.5 mm (1.20 in)

Transmission

Transmission type	V-belt automatic
Primary reduction system	Spur gear/helical gear
Primary reduction ratio	52/32 × 36/22 (2.659)
Secondary reduction system	Chain drive
Secondary reduction ratio	41/25 × 40/29 (2.262)
Operation	Centrifugal automatic type

Air filter

Air filter element	Dry element
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Fuel pump

Pump type	Electrical
Model/manufacture	5VU/AISAN
Maximum consumption amperage	1.9 A
Output pressure	246.0–254.0 kPa (35.7–36.8 psi) (2.46–2.54 kgf/cm ²)

Fuel injector

Model/quantity	1100-87B60/1100-87B70
Manufacturer	AISAN

Throttle body

Type/quantity	ACW31/1
Manufacturer	MIKUNI
ID mark	5VU1 00

Idling condition

Engine idling speed	1100–1300 r/min
Intake vacuum	33.0 kPa (9.7 inHg) (248 mmHg)
Water temperature	85.0–100.0 °C (185.00–212.00 °F)
Oil temperature	70.0 °C (158.00 °F)
Throttle cable free play	3.0–5.0 mm (0.12–0.20 in)

CHASSIS SPECIFICATIONS

EAS20300

CHASSIS SPECIFICATIONS

Chassis

Frame type	Diamond
Caster angle	28.00 °
Trail	95.0 mm (3.74 in)

Front wheel

Wheel type	Cast wheel
Rim size	14M/C x MT3.50
Rim material	Aluminum
Wheel travel	120.0 mm (4.72 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)
Wheel axle bending limit	0.25 mm (0.01 in)

Rear wheel

Wheel type	Cast wheel
Rim size	15M/C x MT5.00
Rim material	Aluminum
Wheel travel	117.0 mm (4.61 in)
Radial wheel runout limit	1.0 mm (0.04 in)
Lateral wheel runout limit	0.5 mm (0.02 in)
Wheel axle bending limit	0.25 mm (0.01 in)

Front tire

Type	Tubeless
Size	120/70R14 M/C 55H
Manufacturer/model	DUNLOP/D252F
Manufacturer/model	BRIDGESTONE/TH01F
Wear limit (front)	1.6 mm (0.06 in)

Rear tire

Type	Tubeless
Size	160/60R15 M/C 67H
Manufacturer/model	DUNLOP/D252
Manufacturer/model	BRIDGESTONE/TH01R
Wear limit (rear)	1.6 mm (0.06 in)

Tire air pressure (measured on cold tires)

Loading condition	0–90 kg (0–198 lb)
Front	225 kPa (33 psi) (2.25 kgf/cm ²) (2.25 bar)
Rear	250 kPa (36 psi) (2.50 kgf/cm ²) (2.50 bar)
Loading condition	XP500 90–188 kg (198–414 lb)
	XP500A 90–183 kg (198–403 lb)
	XP500W 90–190 kg (198–419 lb)
Front	225 kPa (33 psi) (2.25 kgf/cm ²) (2.25 bar)
Rear	280 kPa (41 psi) (2.80 kgf/cm ²) (2.80 bar)

Front brake

Type	Dual disc brake
Operation	Right hand operation
Front disc brake	
Disc outside diameter × thickness	267.0 × 4.0 mm (10.51 × 0.16 in)
Brake disc thickness limit	3.5 mm (0.14 in)
Brake disc deflection limit	0.12 mm (0.0047 in)

CHASSIS SPECIFICATIONS

Brake pad lining thickness (inner)	6.2 mm (0.24 in)
Limit	0.8 mm (0.03 in)
Brake pad lining thickness (outer)	6.2 mm (0.24 in)
Limit	0.8 mm (0.03 in)
Master cylinder inside diameter	14.00 mm (0.55 in)
Caliper cylinder inside diameter	30.16 mm (1.19 in)
Caliper cylinder inside diameter	25.40 mm (1.00 in)
Recommended fluid	DOT 4

Rear brake

Type	Single disc brake
Operation	Left hand operation
Rear disc brake	
Disc outside diameter × thickness	267.0 × 5.0 mm (10.51 × 0.20 in)
Brake disc thickness limit	4.5 mm (0.18 in)
Brake disc deflection limit	0.15 mm (0.0059 in)
Brake pad lining thickness (inner)	8.3 mm (0.33 in)
Limit	0.8 mm (0.03 in)
Brake pad lining thickness (outer)	8.3 mm (0.33 in)
Limit	0.8 mm (0.03 in)
Master cylinder inside diameter	12.7 mm (0.50 in)
Caliper cylinder inside diameter	38.10 mm (1.50 in)
Recommended fluid	DOT 4

Steering

Steering bearing type	Angular bearing
Center to lock angle (left)	38.5 °
Center to lock angle (right)	38.5 °

Front suspension

Type	Telescopic fork
Spring/shock absorber type	Coil spring/oil damper
Front fork travel	120.0 mm (4.72 in)
Fork spring free length	405.0 mm (15.94 in)
Limit	400.0 mm (15.75 in)
Collar length	145.0 mm (5.71 in)
Installed length	400.0 mm (15.75 in)
Spring rate K1	15.60 N/mm (89.08 lb/in) (1.59 kgf/mm)
Spring rate K2	23.60 N/mm (134.76 lb/in) (2.41 kgf/mm)
Spring stroke K1	0.0–80.0 mm (0.00–3.15 in)
Spring stroke K2	80.0–120.0 mm (3.15–4.72 in)
Inner tube outer diameter	41.0 mm (1.61 in)
Inner tube bending limit	0.2 mm (0.01 in)
Optional spring available	No
Recommended oil	Fork oil 7.5W or equivalent
Quantity	512.0 cm ³ (17.31 US oz) (18.06 Imp.oz)
Level	109.0 mm (4.29 in)

Rear suspension

Type	Swingarm
Spring/shock absorber type	Coil spring/gas-oil damper
Rear shock absorber assembly travel	43.0 mm (1.69 in)
Spring free length	191.2 mm (7.53 in)
Installed length	180.0 mm (7.09 in)
Spring rate K1	225.60 N/mm (1288.18 lb/in) (23.00 kgf/mm)

CHASSIS SPECIFICATIONS

Spring rate K2	294.00 N/mm (1678.74 lb/in) (29.98 kgf/mm)
Spring stroke K1	0.0–28.8 mm (0.00–1.13 in)
Spring stroke K2	28.8–43.0 mm (1.13–1.69 in)
Optional spring available	No
Enclosed gas/air pressure (STD)	4900 kPa (696.9 psi) (49.0 kgf/cm ²)

Swingarm

Swingarm end free play limit (radial)	1.0 mm (0.04 in)
Swingarm end free play limit (axial)	1.0 mm (0.04 in)

ELECTRICAL SPECIFICATIONS

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ELECTRICAL SPECIFICATIONS

Voltage

System voltage 12 V

Ignition system

Ignition system Transistorized coil ignition (digital)
Advancer type Digital
Ignition timing (B.T.D.C.) 10.0 °/1200 r/min
Crankshaft position sensor resistance 189–231 Ω (Gy-B)

Engine control unit

Model/manufacturer XP500 TBDF48/DENSO
XP500A TBDF49/DENSO
XP500W TBDF07/DENSO

Ignition coil

Model/manufacturer JO313/DENSO
Minimum ignition spark gap 6.0 mm (0.24 in)
Primary coil resistance 1.87–2.53 Ω
Secondary coil resistance 12.00–18.00 kΩ

Spark plug cap

Material Resin
Resistance 10.0 kΩ

AC magneto

Model/manufacturer F4T383/MITSUBISHI
Standard output 14.0 V/350 W/5000 r/min
Stator coil resistance 0.216–0.264 Ω

Rectifier/regulator

Regulator type Semi conductor-short circuit
Model/manufacturer SH719AA/SHINDENGEN
Regulated voltage (DC) 14.1–14.9 V
Rectifier capacity (DC) 25.0 A
Withstand voltage 240.0 V

Battery

Model GT9B-4
Voltage, capacity 12 V, 8.0 Ah
Specific gravity 1.320
Manufacturer GYM
Ten hour rate amperage 0.80 A

Headlight

Bulb type Halogen bulb

Bulb voltage, wattage × quantity

Headlight 12 V, 60 W/55.0 W × 1
Headlight 12 V, 55.0 W × 1
Auxiliary light XP500 12 V, 5.0 W × 2
XP500A 12 V, 5.0 W × 2
XP500W 12 V, 5.0 W × 2 (AUS)
Tail/brake light 12 V, 5.0 W/21.0 W × 2
Front turn signal/position light 12 V, 21 W/5.0 W × 2
Rear turn signal light 12 V, 21.0 W × 2

ELECTRICAL SPECIFICATIONS

License plate light	12 V, 5.0 W × 1
Meter lighting	14 V, 2.0 W × 3

Indicator light	
Turn signal indicator light	14 V, 1.4 W × 2
High beam indicator light	14 V, 1.4 W × 1
Engine trouble warning light	14 V, 1.4 W × 1
ABS warning light	XP500A 14 V, 1.4 W × 1
Immobilizer system indicator light	LED

Electric starting system	
System type	Constant mesh

Starter motor	
Model/manufacture	SM-13/MITSUBA
Power output	0.70 kW
Armature coil resistance	0.0015–0.0025 Ω
Brush overall length	12.0 mm (0.47 in)
Limit	4.00 mm (0.16 in)
Brush spring force	7.65–10.01 N (27.54–36.03 oz) (780–1021 gf)
Commutator diameter	28.0 mm (1.10 in)
Limit	27.0 mm (1.06 in)
Mica undercut (depth)	0.70 mm (0.03 in)

Starter relay	
Model/manufacture	MS5F-561/JIDECO
Amperage	180.0 A
Coil resistance	4.18–4.62 Ω

Horn	
Horn type	Plane
Quantity	2 pcs
Model/manufacture	YF-12/NIKKO
Maximum amperage	3.0 A
Coil resistance	1.15–1.25 Ω
Performance	105–113 dB/2m

Turn signal/hazard relay	
Relay type	Full transistor
Model/manufacture	FE246BH/DENSO
Built-in, self-canceling device	No
Turn signal blinking frequency	75.0–95.0 cycles/min
Wattage	21 W × 2.0 +3.4 W

Fuel sender unit	
Model/manufacture	5VU/AISAN
Sender unit resistance (full)	19.0–21.0 Ω
Sender unit resistance (empty)	137.0–143.0 Ω

Fuses	
Main fuse	30.0 A
Headlight fuse	15.0 A
Signaling system fuse	XP500 20.0 A XP500A 15.0 A XP500W 20.0 A
Ignition fuse	10.0 A
Radiator fan fuse	15.0 A

ELECTRICAL SPECIFICATIONS

Parking lighting fuse	10.0 A
Fuel injection system fuse	10.0 A
ABS motor fuse	XP500A 30.0 A
ABS control unit fuse	XP500A 5.0 A
Backup fuse	10.0 A
Reserve fuse	30.0 A
Reserve fuse	XP500 20.0 A
	XP500A 15.0 A
	XP500W 20.0 A
Reserve fuse	XP500 15.0 A
	XP500A 10.0 A
	XP500W 15.0 A
Reserve fuse	XP500 10.0 A
	XP500A 5.0 A
	XP500W 10.0 A

TIGHTENING TORQUES

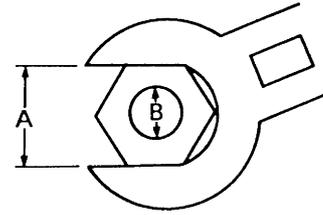
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TIGHTENING TORQUES

EAS20330

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•kg	ft•lb
10 mm	6 mm	6	0.6	4.3
12 mm	8 mm	15	1.5	11
14 mm	10 mm	30	3.0	22
17 mm	12 mm	55	5.5	40
19 mm	14 mm	85	8.5	61
22 mm	16 mm	130	13.0	94

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ENGINE TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Spark plug	M10	2	13 Nm (1.3 m•kg, 9.4 ft•lb)	
Cylinder head cover	M6	10	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Camshaft cap	M6	12	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Cylinder head and cylinder body	M9	4	35 Nm (3.5 m•kg, 25 ft•lb)	
Cylinder head and cylinder body	M9	2	46 Nm (4.6 m•kg, 33 ft•lb)	
Cylinder head and cylinder body	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Cylinder head (exhaust pipe)	M8	4	15 Nm (1.5 m•kg, 11 ft•lb)	
Cylinder body	M6	1	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Connecting rod cap	M7	4	See NOTE*1	
Connecting rod cap (balancer)	M9	2	60 Nm (6.0 m•kg, 43 ft•lb)	
Balancer piston cylinder	M10	4	58 Nm (5.8 m•kg, 42 ft•lb)	
A.C. magneto rotor	M18	1	See NOTE*2	
Timing chain tensioner	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Timing chain tensioner cap bolt	M6	1	7 Nm (0.7 m•kg, 5.1 ft•lb)	

TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Chain guide (intake side)	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Water pump housing cover	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Water pump assembly	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Coolant pipe	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Radiator filler neck	M6	1	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Radiator drain bolt	M12	1	1.6 Nm (0.16 m•kg, 1.2 ft•lb)	
Water pump inlet pipe	M6	1	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Water pump outlet pipe	M6	1	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Thermostat cover	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Oil pump assembly	M6	3	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Oil strainer assembly	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Oil cooler assembly	M20	1	63 Nm (6.3 m•kg, 45 ft•lb)	
Oil filter cartridge	M20	1	17 Nm (1.7 m•kg, 12 ft•lb)	
Oil delivery pipe	M6	1	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Intake manifold and cylinder head	M6	4	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Silencer assembly	M6	2	9 Nm (0.9 m•kg, 6.5 ft•lb)	
Air filter case assembly	M6	3	9 Nm (0.9 m•kg, 6.5 ft•lb)	
Exhaust pipe	M8	4	20 Nm (2.0 m•kg, 14 ft•lb)	
Muffler	M10	1	31 Nm (3.1 m•kg, 22 ft•lb)	
Muffler protector 1	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Muffler protector 2	M6	1	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Crankcase	M6	13	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Crankcase	M8	8	24 Nm (2.4 m•kg, 17 ft•lb)	
Engine oil drain bolt	M14	1	43 Nm (4.3 m•kg, 31 ft•lb)	
Main gallery bolt	M20	1	12 Nm (1.2 m•kg, 8.7 ft•lb)	
Oil tank	M6	7	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Stator coil base	M6	3	12 Nm (1.2 m•kg, 8.7 ft•lb)	
Timing plug	M16	1	8 Nm (0.8 m•kg, 5.8 ft•lb)	
A.C. magneto cover	M6	19	10 Nm (1.0 m•kg, 7.2 ft•lb)	
V-belt case	M6	4	10 Nm (1.0 m•kg, 7.2 ft•lb)	
V-belt case	M8	6	24 Nm (2.4 m•kg, 17 ft•lb)	
V-belt case cover 1	M6	3	7 Nm (0.7 m•kg, 5.1 ft•lb)	
V-belt case cover 2	M6	2	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Plate and right crankcase cover	M6	3	10 Nm (1.0 m•kg, 7.2 ft•lb)	

TIGHTENING TORQUES

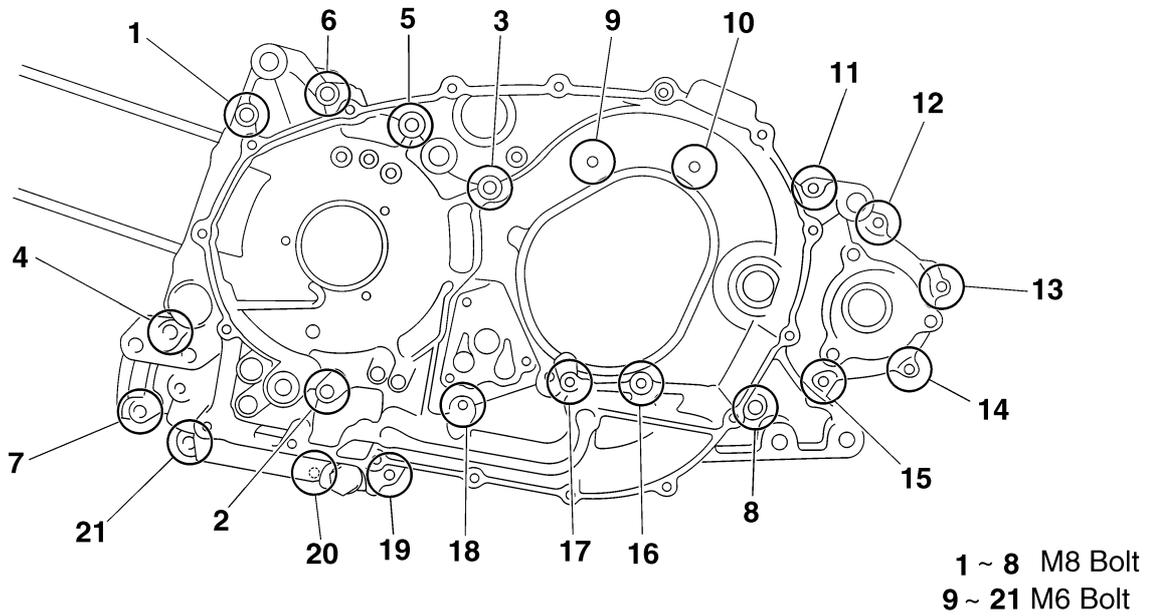
Item	Thread size	Q'ty	Tightening torque	Remarks
Right crankcase cover	M8	2	24 Nm (2.4 m•kg, 17 ft•lb)	
V-belt case air filter cover and V-belt case air filter element (right)	M6	3	7 Nm (0.7 m•kg, 5.1 ft•lb)	
V-belt case air filter element (left)	M6	2	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Generator cover protector	M6	1	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Generator cover protector cover	M6	2	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Starter clutch	M8	3	30 Nm (3.0 m•kg, 22 ft•lb)	
Clutch boss nut	M36	1	90 Nm (9.0 m•kg, 65 ft•lb)	
Clutch assembly	M16	1	65 Nm (6.5 m•kg, 47 ft•lb)	
Chain drive holder assembly	M8	3	30 Nm (3.0 m•kg, 22 ft•lb)	
Chain drive drain bolt	M12	1	20 Nm (2.0 m•kg, 14 ft•lb)	
Chain drive case (outer)	M6	18	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Chain drive case cover	M6	2	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Primary sheave assembly nut	M20	1	160 Nm (16.0 m•kg, 115 ft•lb)	BEL-RAY assembly lube®
Secondary sheave spring seat	M36	1	90 Nm (9.0 m•kg, 65 ft•lb)	
Secondary sheave assembly	M18	1	90 Nm (9.0 m•kg, 65 ft•lb)	Shell BT grease®
Primary bearing retainer	M6	1	11 Nm (1.1 m•kg, 8.0 ft•lb)	
Secondary shaft bearing retainer	M6	1	12 Nm (1.2 m•kg, 8.7 ft•lb)	
Stator coil assembly	M6	3	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Crankshaft position sensor	M5	2	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Starter motor	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Starter motor lead	M6	1	5 Nm (0.5 m•kg, 3.6 ft•lb)	
Thermostat cover	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Fuel injector assembly	M6	2	12 Nm (1.2 m•kg, 8.7 ft•lb)	
O ₂ sensor	M18	1	45 Nm (4.5 m•kg, 32 ft•lb)	
Coolant temperature sensor	M12	1	18 Nm (1.8 m•kg, 13 ft•lb)	
ECU (engine)	M6	2	3 Nm (0.3 m•kg, 2.2 ft•lb)	
Intake air pressure sensor	M6	2	10 Nm (1.0 m•kg, 7.2 ft•lb)	

NOTE:

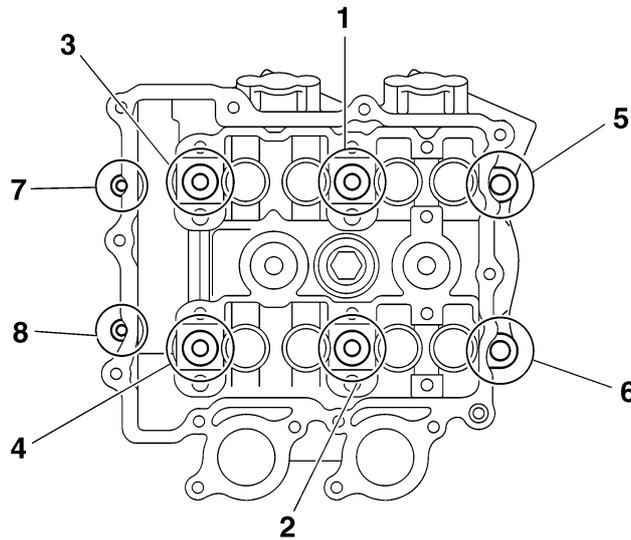
- *1:After tightening to 16 Nm (1.6 m•kg, 11 ft•lb), tighten another 90°.
- *2:After tightening to 60 Nm (6.0 m•kg, 43 ft•lb), tighten another 120°.

TIGHTENING TORQUES

Crankcase tightening sequence:



Cylinder head tightening sequence:



TIGHTENING TORQUES

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CHASSIS TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
Upper bracket pinch bolt	M8	2	30 Nm (3.0 m•kg, 22 ft•lb)	
Steering stem nut	M22	1	110 Nm (11.0 m•kg, 80 ft•lb)	
Lower ring nut	M25	1	20 Nm (2.0 m•kg, 14 ft•lb)	See NOTE.
Front fork cap bolt	M38	1	24 Nm (2.4 m•kg, 17 ft•lb)	
Lower bracket pinch bolt	M8	4	23 Nm (2.3 m•kg, 17 ft•lb)	
Front fender	M6	4	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Damper rod assembly bolt	M10	2	23 Nm (2.3 m•kg, 17 ft•lb)	
Upper handlebar holder	M8	4	23 Nm (2.3 m•kg, 17 ft•lb)	
Brake hose holder and upper bracket	M6	1	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Brake hose union bolt	M10	8	30 Nm (3.0 m•kg, 22 ft•lb)	
Brake master cylinder holder	M6	4	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Master cylinder reservoir cap	M4	8	1 Nm (0.1 m•kg, 0.7 ft•lb)	
Handlebar grip end	M16	2	26 Nm (2.6 m•kg, 19 ft•lb)	
Engine mounting front mounting nut (upper)	M12	1	87 Nm (8.7 m•kg, 63 ft•lb)	
Engine mounting front mounting bolt (lower)	M10	2	48 Nm (4.8 m•kg, 35 ft•lb)	
Engine mounting rear mounting nut	M12	1	87 Nm (8.7 m•kg, 63 ft•lb)	
Front wheel axle	M14	1	59 Nm (5.9 m•kg, 43 ft•lb)	
Front wheel axle pinch bolt	M8	1	23 Nm (2.3 m•kg, 17 ft•lb)	
Rear wheel axle nut	M14	1	100 Nm (10.0 m•kg, 72 ft•lb)	
Rear wheel axle pinch bolt	M8	1	17 Nm (1.7 m•kg, 12 ft•lb)	
Front brake caliper bracket	M10	2	40 Nm (4.0 m•kg, 29 ft•lb)	
Front brake caliper retaining bolt	M10	2	27 Nm (2.7 m•kg, 19 ft•lb)	
Front brake disc	M8	6	18 Nm (1.8 m•kg, 13 ft•lb)	
Rear brake caliper bracket	M10	2	40 Nm (4.0 m•kg, 29 ft•lb)	
Rear brake caliper retaining bolt	M10	2	27 Nm (2.7 m•kg, 19 ft•lb)	
Rear brake disc	M8	6	18 Nm (1.8 m•kg, 13 ft•lb)	
Rear wheel drive hub	M10	4	69 Nm (6.9 m•kg, 50 ft•lb)	
Rear brake lock lever cable holder	M8	1	22 Nm (2.2 m•kg, 16 ft•lb)	
Brake caliper bleed screw	M7	2	6 Nm (0.6 m•kg, 4.3 ft•lb)	
Rear wheel sensor (XP500A)	M8	1	30 Nm (3.0 m•kg, 22 ft•lb)	
Front wheel sensor (XP500A)	M8	1	30 Nm (3.0 m•kg, 22 ft•lb)	

TIGHTENING TORQUES

Item	Thread size	Q'ty	Tightening torque	Remarks
ECU (ABS) bracket (XP500A)	M6	2	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Hydraulic unit (XP500A)	M8	3	16 Nm (1.6 m•kg, 11 ft•lb)	
Brake lever	M6	1	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Swingarm and pivot shaft	M22	1	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Pivot shaft and lock nut	M22	1	100 Nm (10.0 m•kg, 72 ft•lb)	
Chain drive case and swingarm	M10	3	40 Nm (4.0 m•kg, 29 ft•lb)	
Rear shock absorber (front side)	M16	1	68 Nm (6.8 m•kg, 49 ft•lb)	
Rear shock absorber (rear side)	M12	1	53 Nm (5.3 m•kg, 38 ft•lb)	
Front cowling and frame	M6	4	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Inner fender and frame	M6	2	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Headlight unit and front cowling	M6	2	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Tail/brake light assembly and frame	M6	2	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Footrest board and frame	M6	4	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Upper side cover moulding and passenger footrest	M6	6	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Rear side cover and frame	M6	6	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Leg shield, footrest board and frame	M6	2	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Seat damper	M8	1	16 Nm (1.6 m•kg, 11 ft•lb)	
Fuel tank	M6	4	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Fuel pump	M5	6	4 Nm (0.4 m•kg, 2.9 ft•lb)	
Grab bar	M8	4	16 Nm (1.6 m•kg, 11 ft•lb)	
Seat lock	M6	4	7 Nm (0.7 m•kg, 5.1 ft•lb)	
Storage box	M6	6	10 Nm (1.0 m•kg, 7.2 ft•lb)	
Windshield	M5	6	0.4 Nm (0.04 m•kg, 0.3 ft•lb)	
Coolant reservoir	M6	1	4 Nm (0.4 m•kg, 2.9 ft•lb)	
Centerstand bracket	M10	2	55 Nm (5.5 m•kg, 40 ft•lb)	
Centerstand	M10	2	55 Nm (5.5 m•kg, 40 ft•lb)	
Sidestand (bolt and frame)	M10	1	9 Nm (0.9 m•kg, 6.5 ft•lb)	
Sidestand (bolt and nut)	M10	1	40 Nm (4.0 m•kg, 29 ft•lb)	
Passenger footrest	M8	4	23 Nm (2.3 m•kg, 17 ft•lb)	

NOTE:

- First, tighten the lower ring nut to approximately 52 Nm (5.2 m•kg, 37 ft•lb) with a torque wrench, then loosen the lower ring nut completely.
- Retighten the lower ring nut to 20 Nm (2.0 m•kg, 14 ft•lb) with a torque wrench.

LUBRICATION POINTS AND LUBRICANT TYPES

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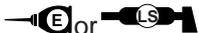
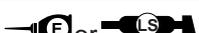
LUBRICATION POINTS AND LUBRICANT TYPES

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ENGINE

Lubrication point	Lubricant
Oil seal lips	
O-rings	
Bearing and bushes	
Crankshaft pins	
Piston surfaces	
Piston pins and connecting rod small end	
Balancer surface	
Connecting rod big end thrust surface	
Connecting rod bolts and nuts	
Crankshaft thrust surface	
Crankshaft journals	
Camshaft lobes	
Camshaft journals	
Camshaft cap	
Valve stems (intake and exhaust)	
Valve stem ends (intake and exhaust)	
Cylinder head nut	
Water pump impeller shaft	
Oil pump shaft	
Oil pump rotors (inner and outer)	
Oil pump O-ring	
Oil cooler union bolt	
O-ring (fuel injector assembly)	Silicone oil
Starter clutch idle gear inner surface	
Starter clutch	
Main axle thrust surface	

LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant
Main and drive axle serration	 or 
Drive axle spline	 or 
Chain drive case and taper bearing	
Bearing (chain drive case)	Chain drive oil
Primary sheave spacer	Shell BT grease 3®
Primary sheave nut	Shell BT grease 3®
Secondary sheave nut	BEL-RAY assembly lube®
Primary sheave	BEL-RAY assembly lube®
Secondary sheave	BEL-RAY assembly lube®
Swingarm pivot shaft bearing	
Crankcase mating surface	Yamaha bond No.1215
A.C. magneto lead	Yamaha bond No.1215
Cylinder head cover (gasket mating surface)	Yamaha bond No.1215
Cylinder head cover (guide stopper mating surface)	Yamaha bond No.1215
Right crankcase cover (air duct seal mating surface)	Yamaha bond No.1215

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CHASSIS

Lubrication point	Lubricant
Front wheel oil seal lip	
Steering bearings and oil seal lip	
Throttle grip inner surface and throttle cables	
Brake lever pivoting point and metal-to-metal moving parts (left and right)	
Parking brake lock lever cable and parking brake lock lever (cable connection area)	
Sidestand pivoting point, metal-to-metal moving parts	
Centerstand shaft pivoting point and metal-to-metal moving parts	
Oil seal lip (chain drive case)	
Rear wheel drive hub spline	
Rear wheel oil seal lip	
Passenger footrest pivoting point	

LUBRICATION POINTS AND LUBRICANT TYPES

Lubrication point	Lubricant
Rear shock absorber bearing and collar inner surface	
Swingarm, oil seal lip and collar inner surface	
Rear shock absorber bolt (front side)	

LUBRICATION POINTS AND LUBRICANT TYPES

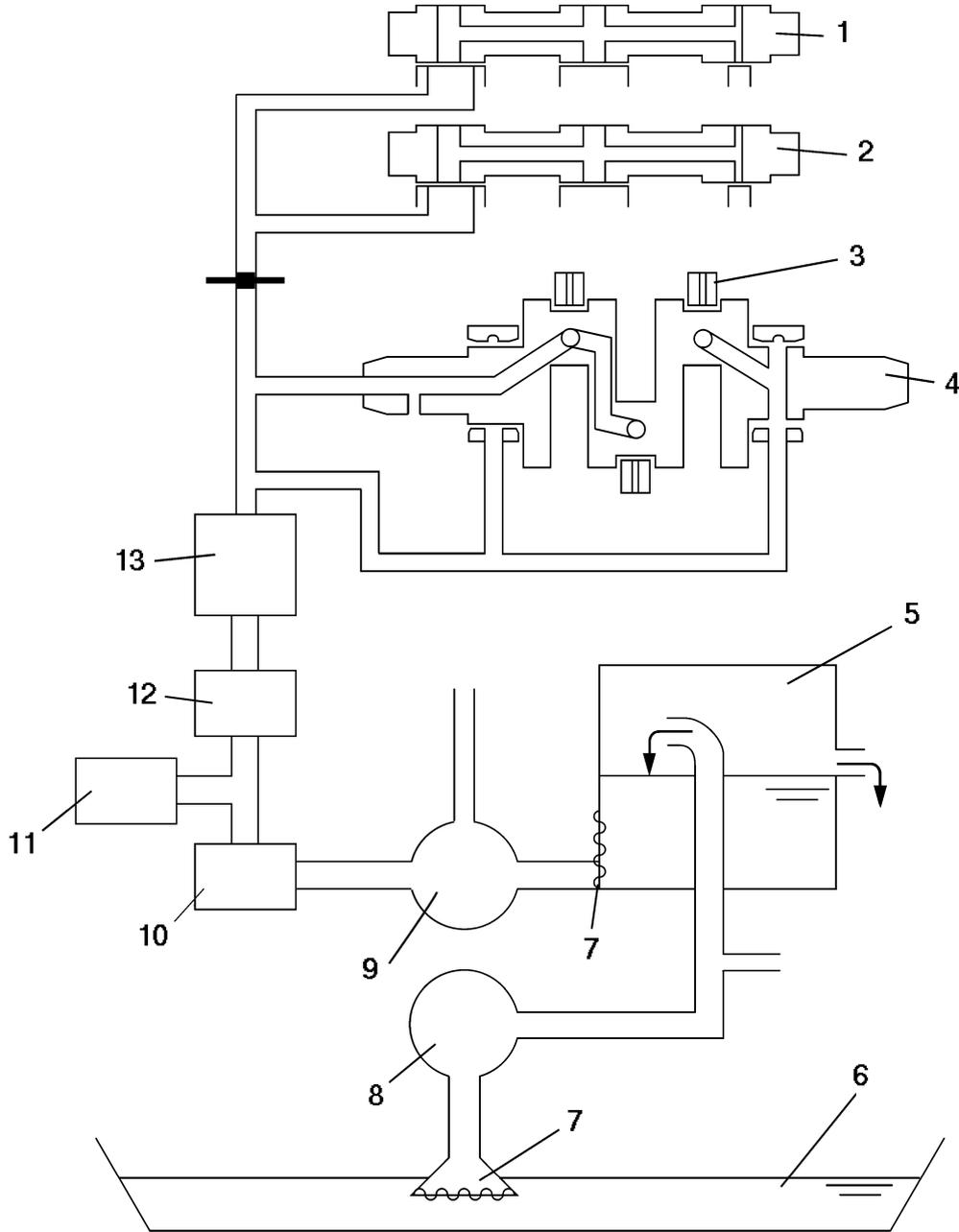
LUBRICATION SYSTEM CHART AND DIAGRAMS

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LUBRICATION SYSTEM CHART AND DIAGRAMS

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ENGINE OIL LUBRICATION CHART



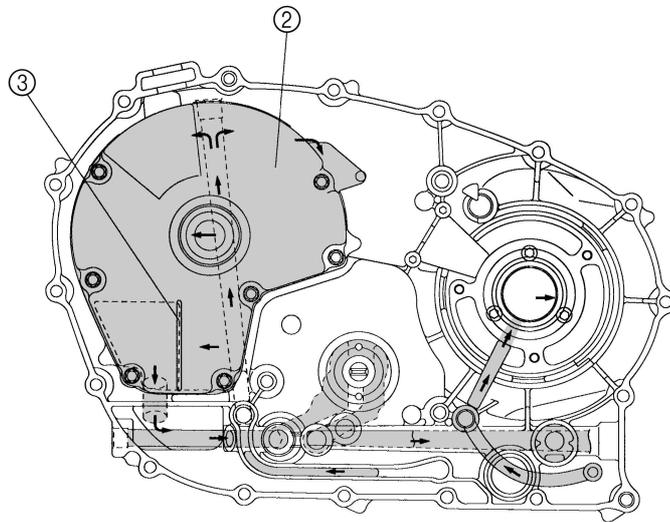
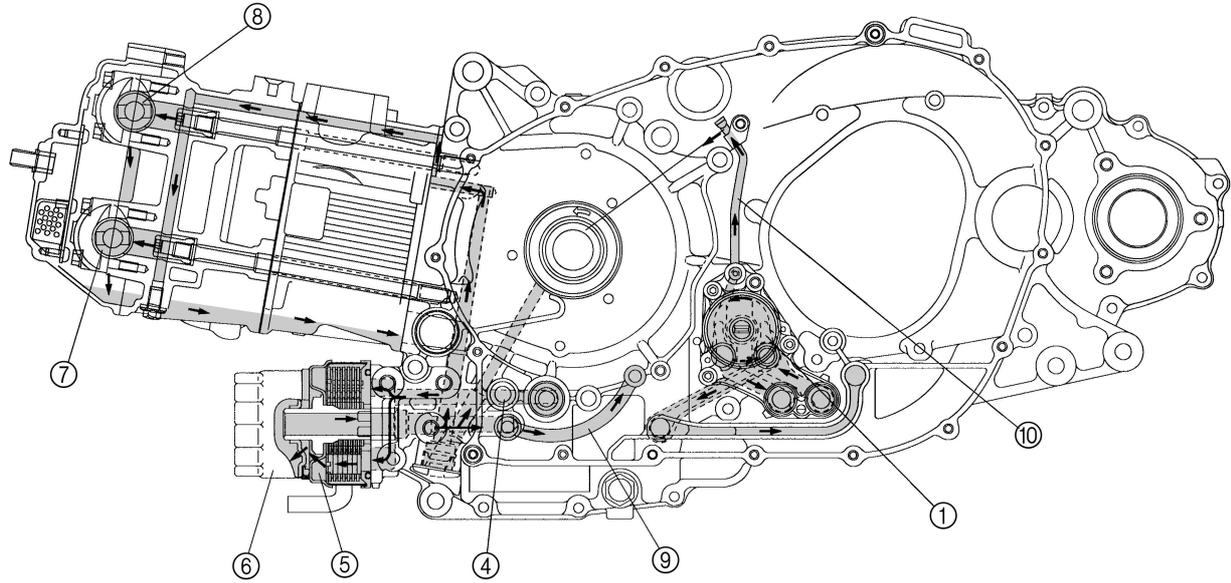
LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Exhaust camshaft
2. Intake camshaft
3. Piston cooler
4. Crankshaft
5. Oil tank
6. Oil pan
7. Strainer
8. Suction oil pump
9. Flush oil pump
10. Check valve
11. Relief valve
12. Oil cooler
13. Oil filter cartridge

LUBRICATION SYSTEM CHART AND DIAGRAMS

EAS20410

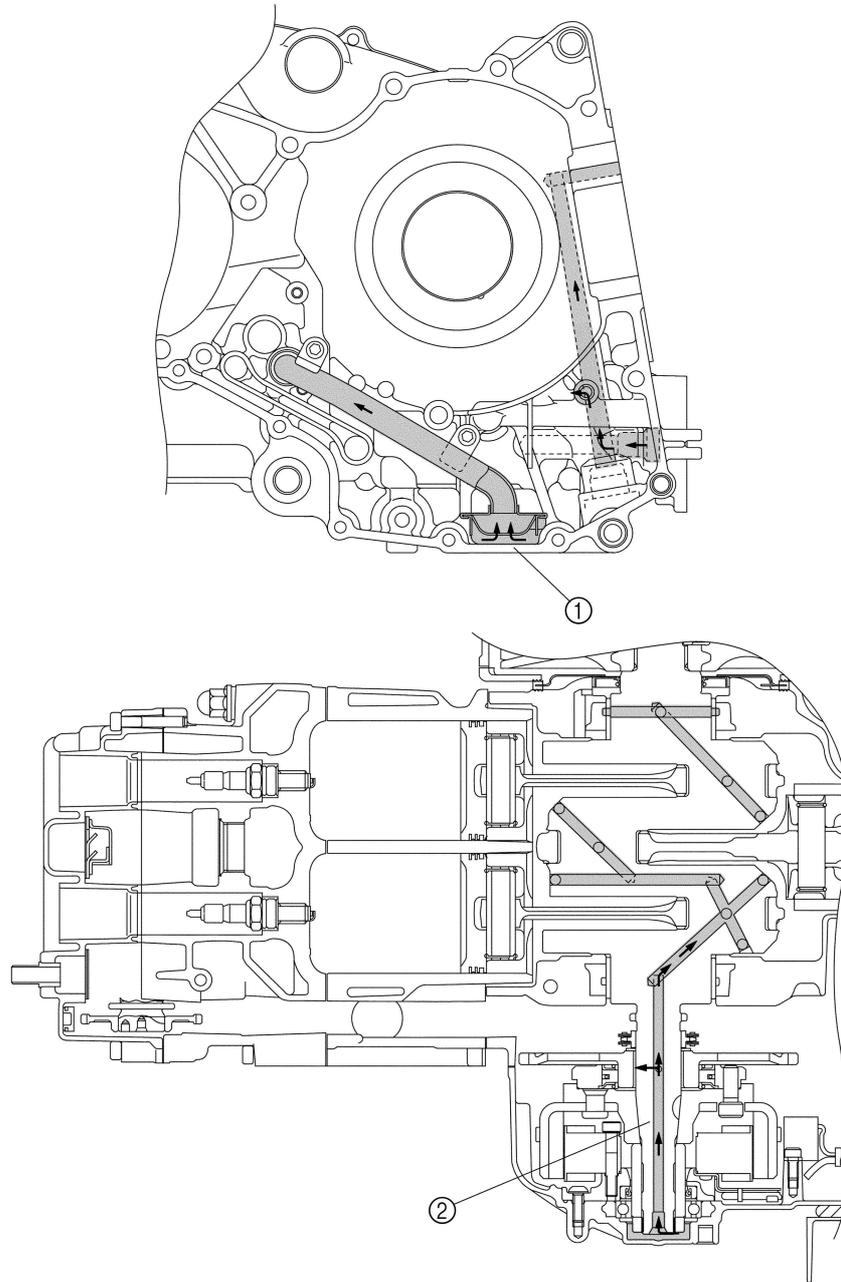
LUBRICATION DIAGRAMS



LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Oil pump
2. Oil tank
3. Oil strainer
4. Relief valve
5. Oil cooler
6. Oil filter cartridge
7. Exhaust camshaft
8. Intake camshaft
9. Oil pipe
10. Oil delivery pipe

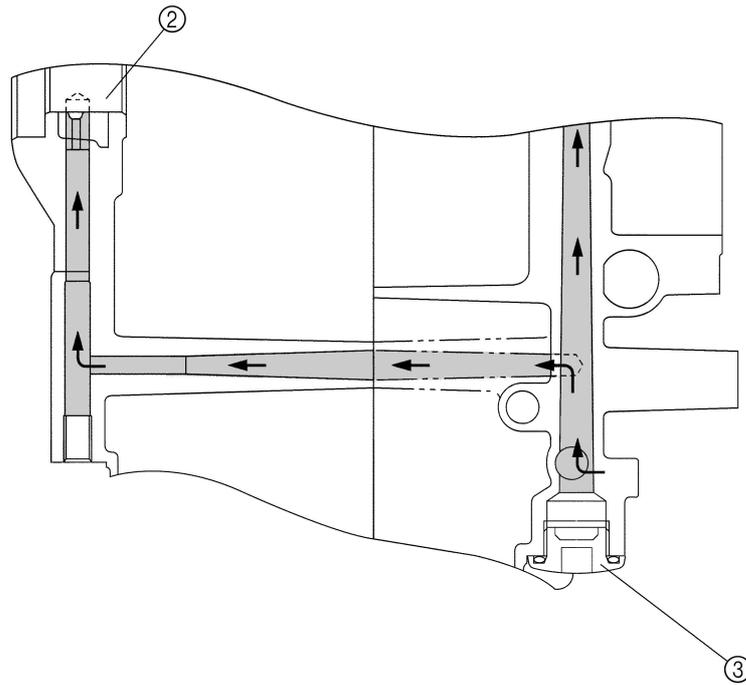
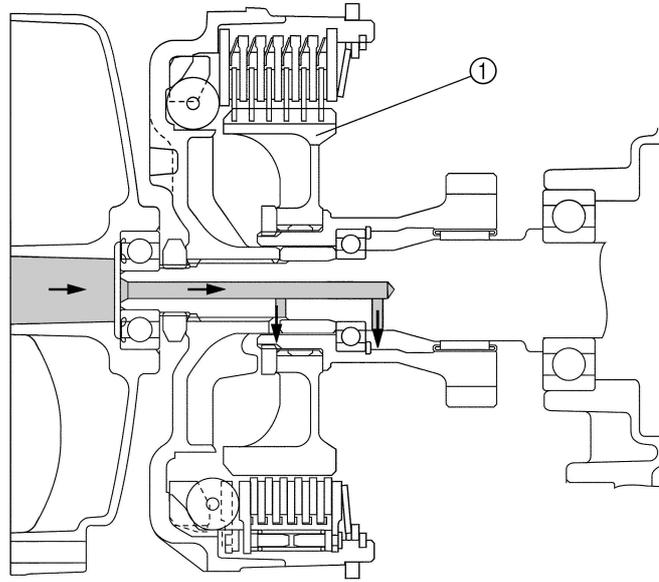
LUBRICATION SYSTEM CHART AND DIAGRAMS



LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Oil strainer
2. Crankshaft

LUBRICATION SYSTEM CHART AND DIAGRAMS



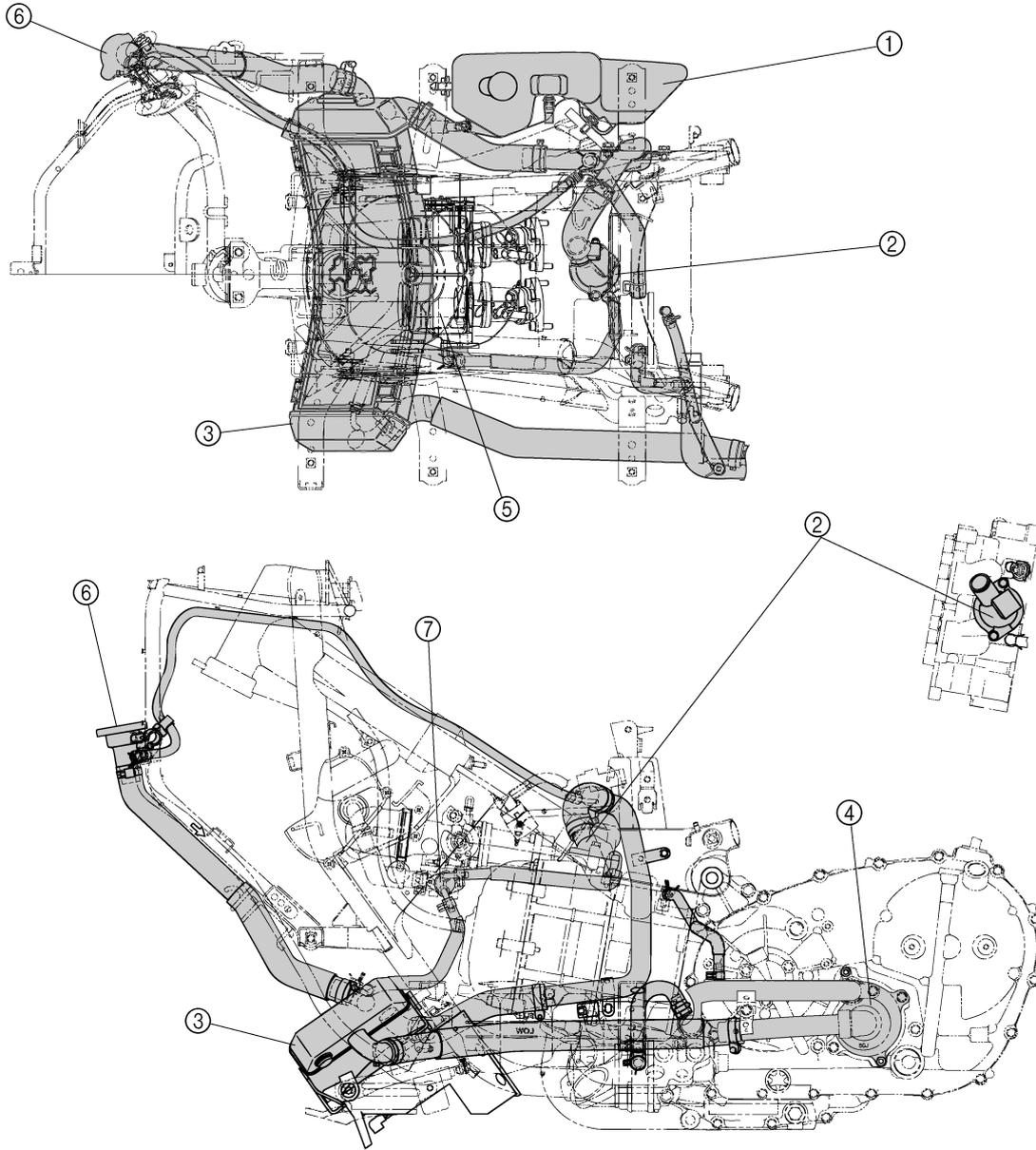
LUBRICATION SYSTEM CHART AND DIAGRAMS

1. Clutch
2. Right main journal bearing
3. Main gallery plug

COOLING SYSTEM DIAGRAMS

EAS20420

COOLING SYSTEM DIAGRAMS



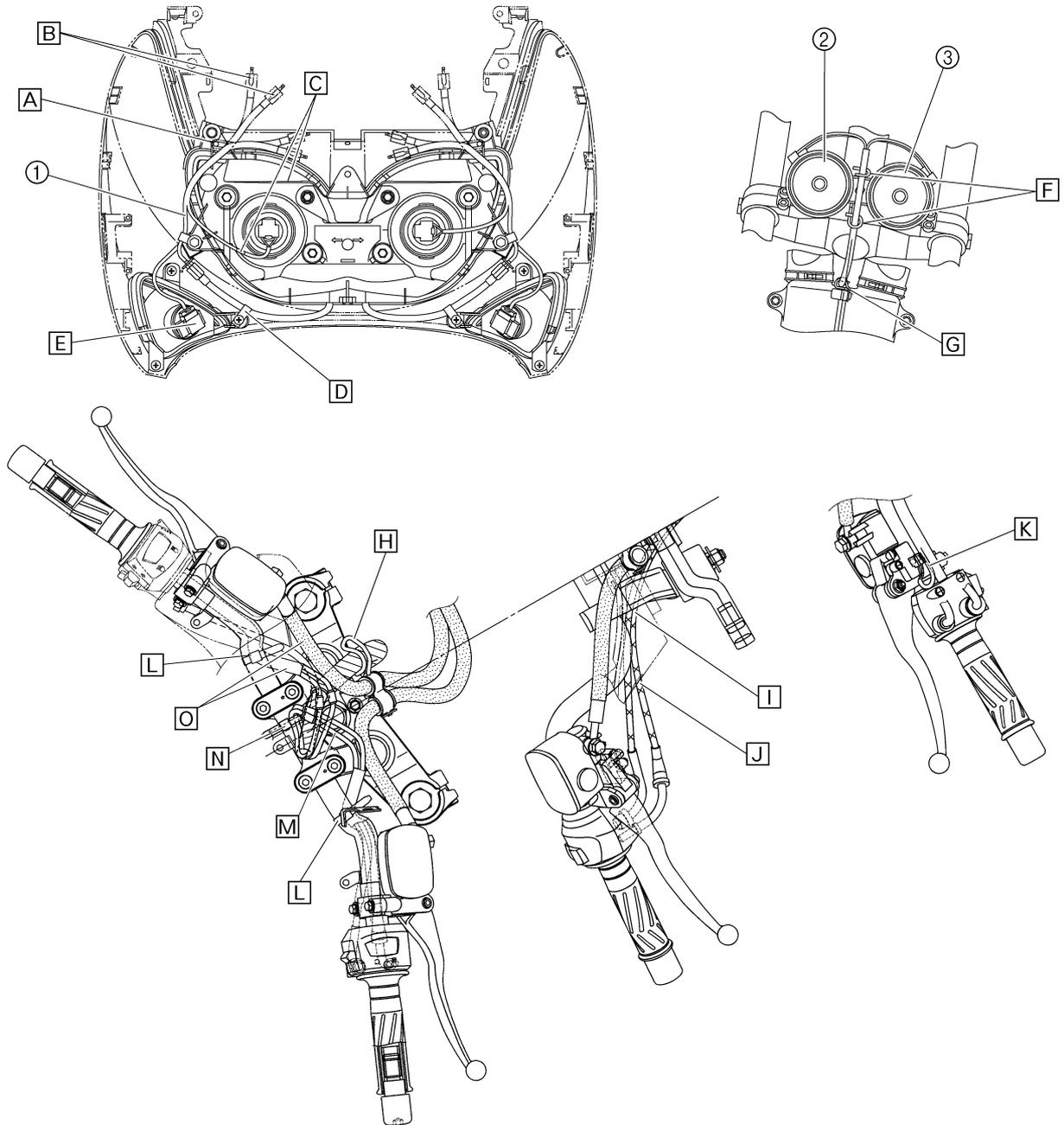
COOLING SYSTEM DIAGRAMS

1. Coolant reservoir
2. Thermostat
3. Radiator
4. Water pump
5. Radiator fan
6. Radiator cap
7. Fast idle plunger

EAS20430

CABLE ROUTING

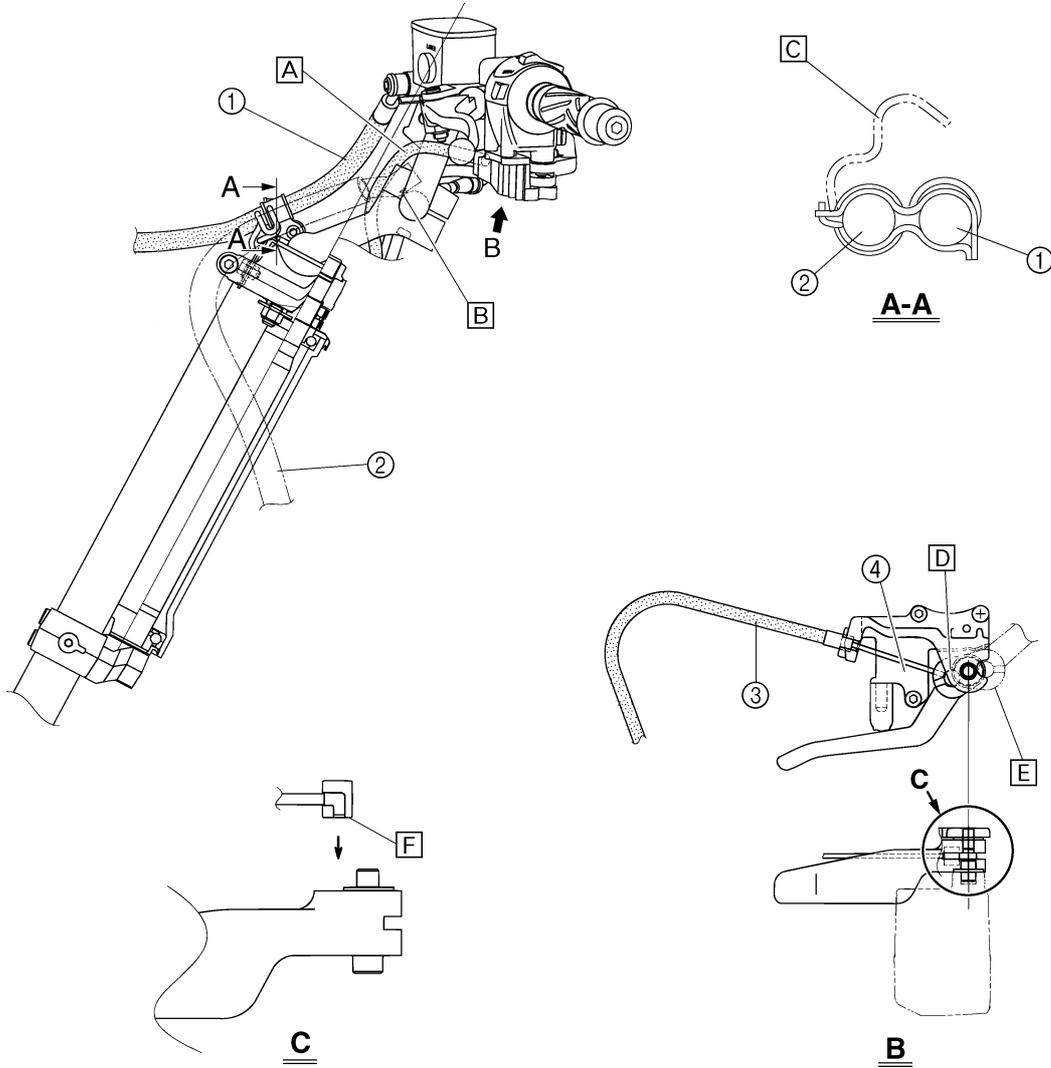
XP500/XP500A



1. Headlight sub-wire harness
 2. Horn
 3. Horn (H mark on the back of the horn)
-
- A. Securely fasten the wire strap to the front cowling hook to prevent it from being pulled out by the headlight assembly. (left and right)
 - B. Connect the headlight sub-wire harness to the wire harness on top of the stay (left and right). After making the connection, push the coupler between the front cowling and the air filter case.
 - C. Connect the taped headlight lead coupler to the headlights white marked side (left side: high beam side). (For GB the right side is the high beam side.)
 - D. Fasten the headlight sub-wire harness using a lead holder. (left and right)
 - E. Connect the turn signal light. (left and right)
 - F. Route the horn lead through the wire guide.
 - G. After passing the horn lead through the lead holder, crimp the lead holder.
 - H. Install a wire harness guide to hold down the wire harness.
 - I. Route the throttle cables between handle under cover and upper bracket.
 - J. Route the throttle cables through the hole of the lower handlebar cover.
 - K. Connect the brake light switch lead through the handlebar switch side.
 - L. Fasten the handlebar switch lead to the handlebar using a plastic band. The fastening location is the bend area on the bottom of the handlebar.
 - M. Route the left handlebar switch leads under the right handlebar switch leads.
 - N. Fasten the right handlebar switch leads to the handlebar with a plastic band.
 - O. Route the rear brake hose and left handlebar switch leads over the wire harness.

CABLE ROUTING

XP500/XP500A

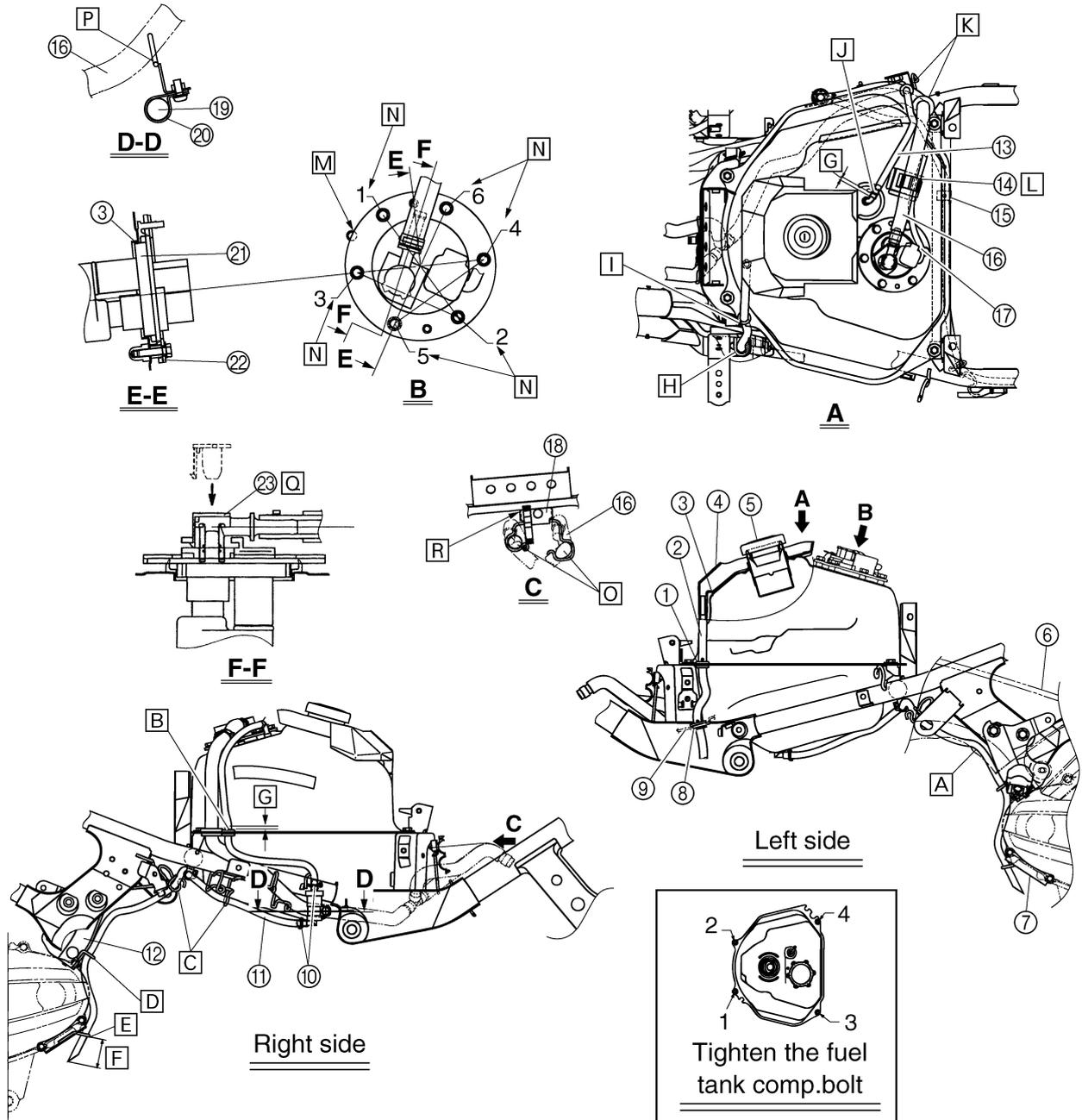


CABLE ROUTING

1. Rear brake hose
 2. Front brake hose
 3. Rear brake lock lever cable
 4. Left handlebar switch
-
- A. Route the rear brake lock lever cable in front of the handlebar, then down through the space between the handlebar and the upper bracket.
 - B. Fasten the wire harness by sliding the plastic holder on the wire harness onto the stud on the handlebar.
 - C. Fasten the grommets on the brake hoses with the holder.
 - D. Install the rear brake lock lever cable after lubricating the grease to the cable end.
 - E. Install the rear brake lock lever cable after turning the parking brake lever as illustration.
 - F. Install the cable end (Face the notch side to lever).

CABLE ROUTING

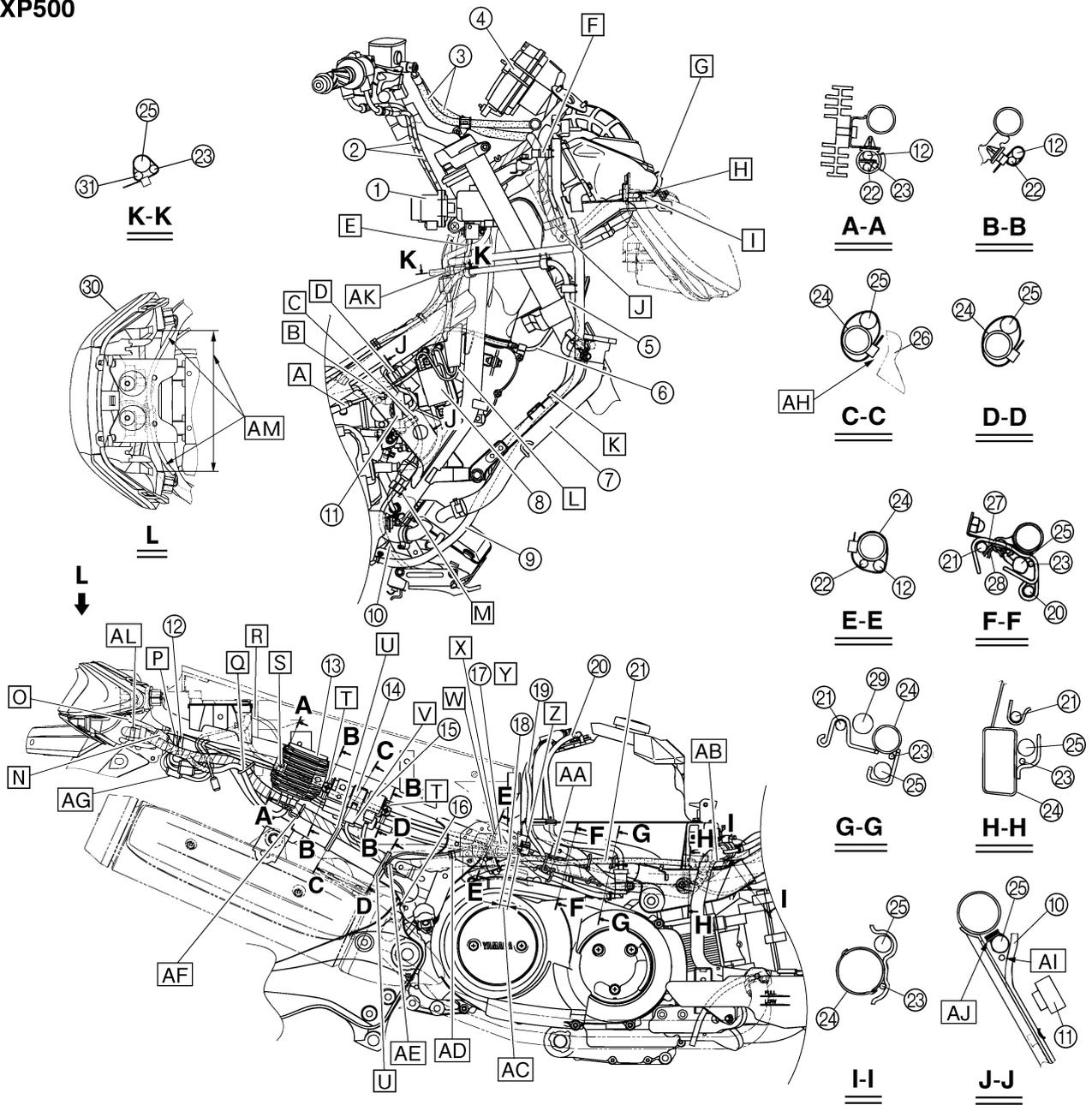
XP500/XP500A



1. Grommet
 2. Fuel over flow hose
 3. Fuel tank
 4. Fuel overflow tray
 5. Fuel tank cap
 6. Upper side cover moulding (left)
 7. Hose guide
 8. Grommet
 9. Footrest board
 10. Hose clamp
 11. Fuel tank breather hose
 12. Rear footrest assembly
 13. Fuel tank breather hose
 14. Hose holder
 15. Hose holder
 16. Fuel hose
 17. Fuel pump lead
 18. Hose guide
 19. Roll over valve assembly
 20. Holder
 21. Fuel pump
 22. Fuel pump bracket
 23. Fuel hose connector cover
-
- A. Do not protrude from the upper side cover moulding (left).
 - B. Fix the fuel tank breather hose with the white paint mark.
 - C. Pass the fuel tank breather hose to the hose guide of frame (both right and left).
 - D. Pass the fuel tank breather hose to the hose guide of rear footrest assembly.
 - E. Pass the fuel tank breather hose to the hose guide of frame.
 - F. 50 – 70 mm (1.97 – 2.76 in)
 - G. 2 – 5 mm (0.08 – 0.20 in)
 - H. Install the grommet to the footrest board securely.
 - I. Install the grommet to the fuel tank securely.
 - J. Make sure that the clip end faces to the front side.
 - K. Install the grommet to the fuel tank securely after installing the hoses.
 - L. Fasten the fuel hose and fuel pump lead with a hose holder, making sure that there are no twists in the hose or lead.
 - M. Align the projection on the fuel pump with the projection on the fuel tank when installing the fuel pump.
 - N. Tighten the fuel pump bolts in the proper tightening sequence as shown.
 - O. Pass the fuel hose to the hose guide.
 - P. Pass the fuel hose to the inside of the frame guide.
 - Q. After connecting the fuel hose connector to the fuel tank, install the fuel hose connector cover completely onto the connector. Install and remove the fuel hose connector and cover manually. Do not use tools.
 - R. Make sure that the pipe guide contact to the frame when install the pipe guide.

CABLE ROUTING

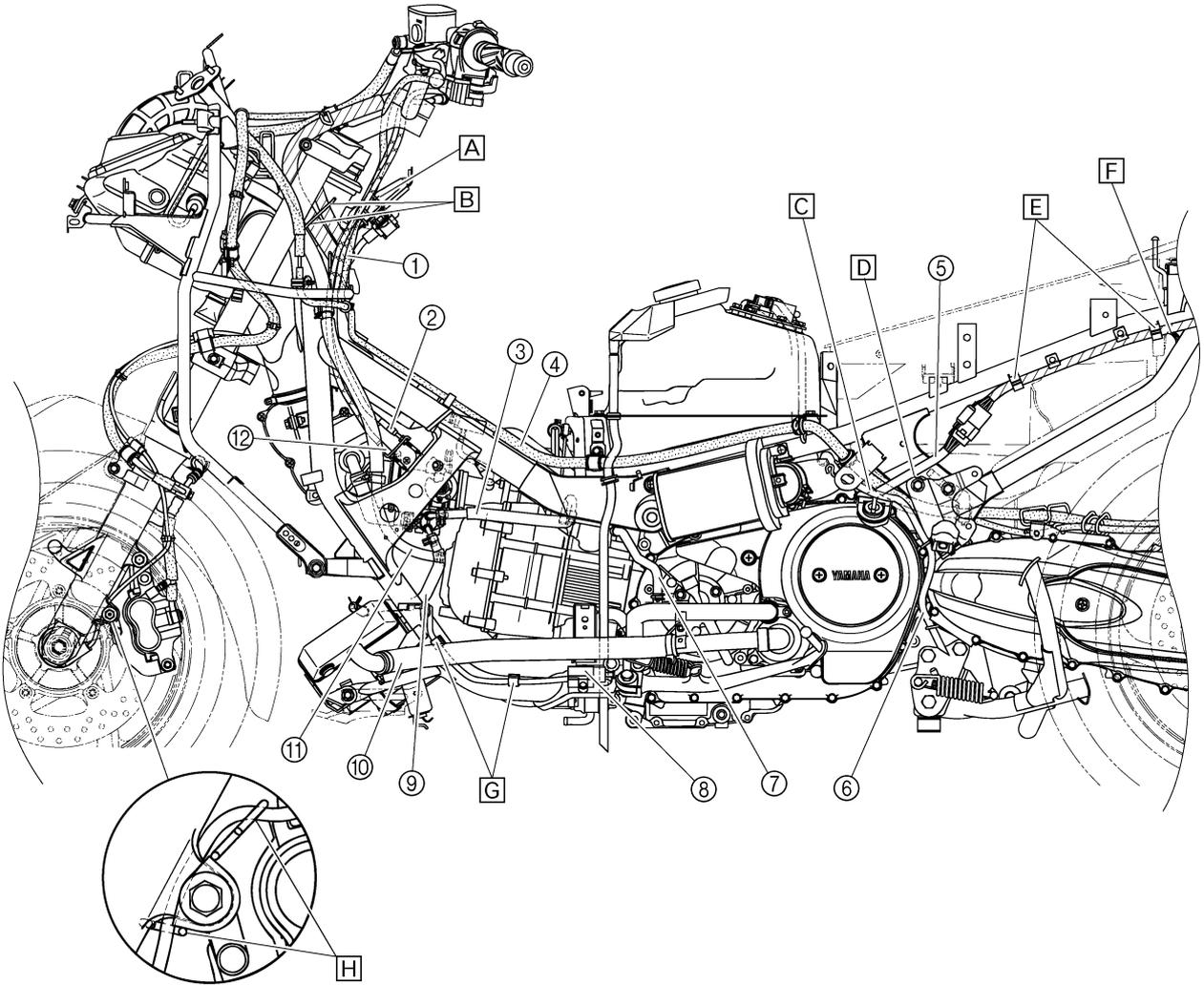
XP500



CABLE ROUTING

1. Main switch/immobilizer unit
 2. Throttle cable
 3. Brake hose
 4. Meter assembly
 5. Cooling system air bleed hose
 6. Horn lead
 7. Radiator filler hose
 8. Ignition coil
 9. Coolant reservoir hose
 10. Radiator fan motor lead
 11. Throttle position sensor coupler
 12. Starter motor lead
 13. Rectifier/regulator
 14. Starting circuit cut-off relay 1
 15. Turn signal/hazard relay
 16. O₂ sensor
 17. V-belt replacement indicator reset coupler
 18. O₂ sensor coupler
 19. Fuel pump lead
 20. Fuel tank breather hose
 21. Rear brake lock lever cable
 22. Negative battery lead
 23. Seat lock cable (left)
 24. Frame
 25. Wire harness
 26. Storage box
 27. V-belt replacement indicator reset coupler lead
 28. O₂ sensor lead
 29. Fuel hose
 30. Tail/brake light assembly
 31. Main switch lead
- A. After adjusting the adjustment nut, attach the front and rear parts of the boot tightly. Apply the silicone grease to the inside of the boot and surface of the adjusting nut possible, when installing the boot.
- B. Pass the seat lock cable between wire harness and frame.
- C. Use the plastic holder on the back of the frame to hold the radiator fan motor lead.
- D. Connect the wire harness (wire taped area) to the T stud of frame.
- E. Pass the main switch lead between stay 1 and seat lock cable.
- F. After connecting the wire harness and meter assembly lead, use a plastic holder to connect them to stay 1.
- G. After connecting the left headlight sub-wire harness and wire harness (by matching the coupler colors), fold back the lead facing to the right and insert it into the air filter case rib.
- H. Connect the wire harness to the headlight sub wire harness (cowling side).
- I. Fasten the headlight and turn signal sub-wire harness to the stay 1 with a plastic holder.
- J. Fasten the ECU (engine) lead to the stay 1 with a plastic holder. When fastening them using a plastic holder, make sure not to cross the branch leads.
- K. Fasten the coolant reservoir hose to the stay 1 with a plastic holder.
- L. Route the ignition coil lead through the inside of the ignition coil bracket.
- M. Fasten the radiator fan motor lead and side-stand switch lead to the frame with a plastic holder.
- N. Insert the tail/brake light coupler between the wire harness and the seat lock cable (left).
- O. To the tail/brake light.
- P. To the starter relay.
- Q. Route the wire harness and rectifier/regulator lead through the frame wire holder. Place the rectifier/regulator lead under the wire harness.
- R. Make sure that the seat lock cable do not lean over the storage box.
- S. Fasten the starter motor lead, negative battery lead and seat lock cable (left) to the frame with a plastic holder.
- T. Fasten the starter motor lead and negative battery lead to the frame with a plastic holder.
- U. Fasten the wire harness to the frame with the plastic band. The buckle of the plastic band should be facing towards the storage box.
- V. Insert the seat lock cable and the cylinder mounting rubber into the frame stay.
- W. Fasten the starter motor lead and negative battery lead to the frame with a plastic band. Position the band clasp on the bottom of the frame and face the band end to the outside.
- X. Install the clamshell cover around the V-belt replacement indicator reset coupler and O₂ sensor coupler.
- Y. Make sure that the V-belt replacement indicator reset coupler does not project out of the clamshell cover.
- Z. Fasten the O₂ sensor lead and V-belt replacement indicator reset coupler lead to the frame with a plastic holder.
- AA. Pass the wire harness and seat lock cable in the frame holder.
- AB. Pass the rear brake lock lever cable under the coolant pipe.
- AC. 40 – 50 mm (1.57 – 1.97 in)
- AD. Fasten the O₂ sensor lead to the frame with a plastic band.
- AE. Pass the O₂ sensor lead to the lead guide.
- AF. Pass the wire harness to the frame wire harness holder.
- AG. After making the connections, push the couplers into the space inside the frame above the mudguard.
- AH. Install the band fastened part between frame and storage box.
- AI. Route the seat lock cable through the frame bracket side and under the wire harness.
- AJ. T stud for position setting
- AK. Fasten the wire harness, main switch lead and seat lock cable with a clamp to under the cowling stay (Fasten the seat lock cables metal pipe section).
- AL. Route the taillight lead onto the seat lock cable, wire harness and positive battery lead.
- AM. Install the turn signal light lead, make sure does not hide the turn signal light lead under the tail light assembly as shown area.

XP500

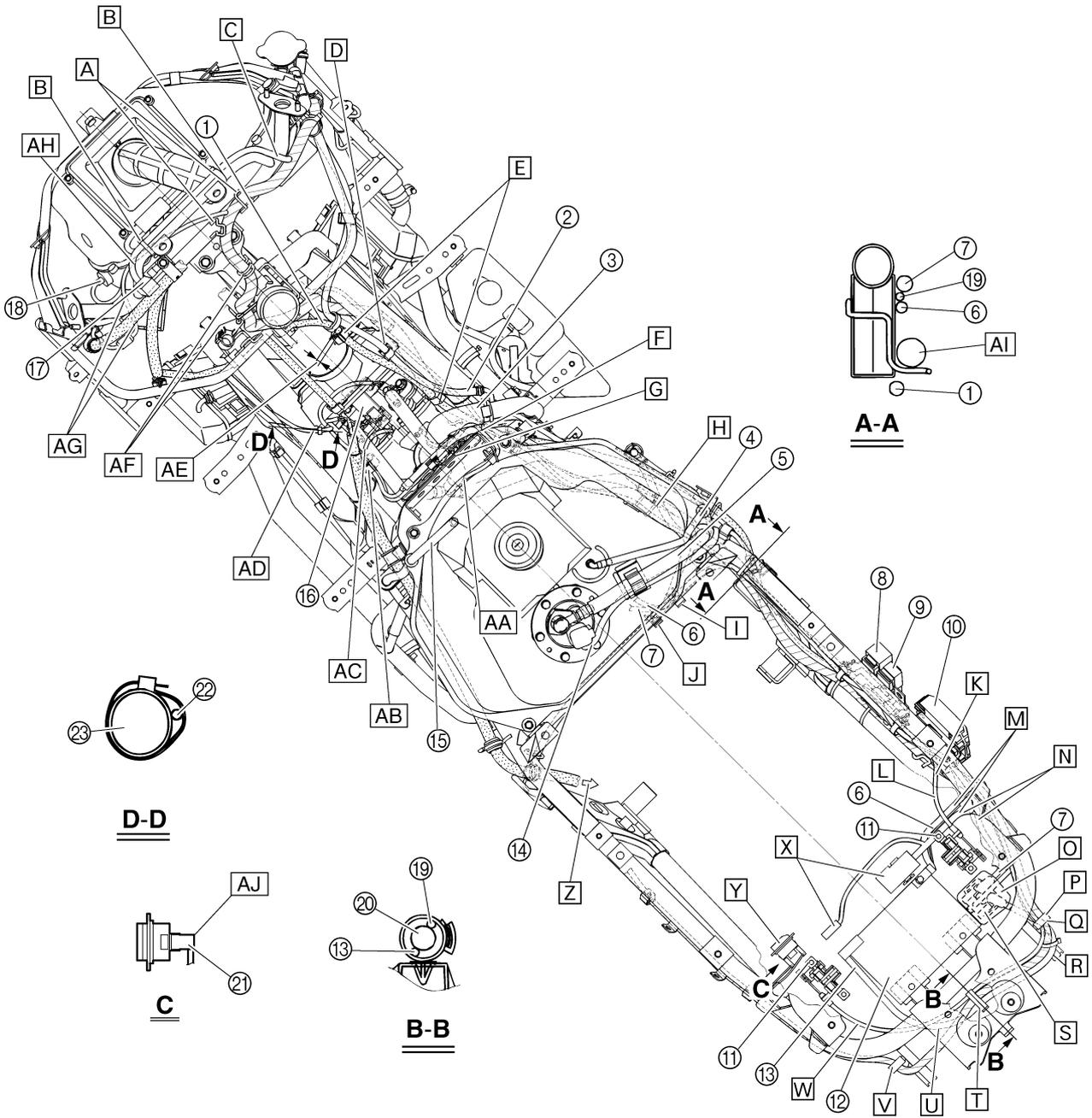


CABLE ROUTING

1. Rear brake lock lever cable
 2. Throttle cable (decelerator cable, double lock-nut)
 3. Fast idle inlet hose
 4. Rear brake hose
 5. A.C. magneto lead
 6. Fuel tank breather hose
 7. Coolant hose
 8. Sidestand switch
 9. Fast idle outlet hose
 10. Radiator outlet hose
 11. Crankcase breather hose
 12. Throttle cable (accelerator cable, single lock-nut)
-
- A. Pass the rear brake lock lever cable to the cable guide.
 - B. Route the wire harness through the frame guide. At this time, place the protector (for the handle cover inner side) on the bottom side.
 - C. Pass the fuel tank breather hose by the outside of the wire harness.
 - D. Pass the wire harness by the outside of the rear footrest mounting boss. (When installing the rear footrest, do not catch or pinch the A.C. magneto lead in the bracket.)
 - E. Fasten the wire harness to the frame with a plastic holder.
 - F. Pass the storage box light switch lead by the front of the frame back stay pipe.
 - G. Fasten the sidestand switch lead to the frame with a plastic holder.
 - H. Pass the speed sensor lead to the lead holder (2locations).

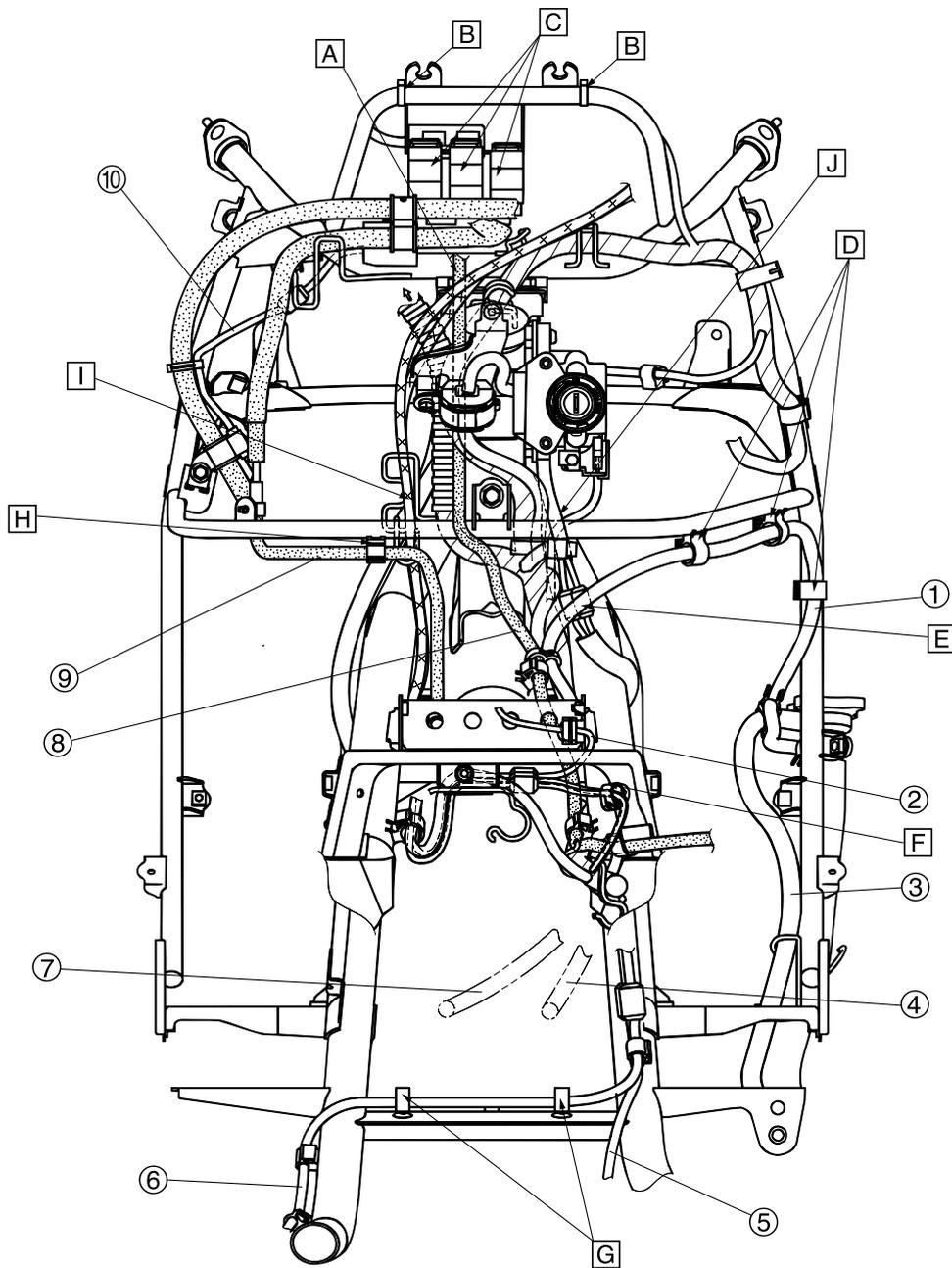
CABLE ROUTING

XP500



1. Rear brake lock lever cable
 2. Coolant system air bleed hose
 3. Thermostat outlet hose
 4. Fuel tank breather hose
 5. Fuel hose
 6. Negative battery lead
 7. Starter motor lead
 8. Turn signal/hazard relay
 9. Starting circuit cut-off relay
 10. Rectifier/regulator
 11. Seat lock
 12. Battery
 13. Positive battery lead
 14. Fuel pump lead
 15. Fuel overflow hose
 16. Intake air pressure sensor
 17. Meter assembly coupler
 18. Intake air temperature sensor
 19. Seat lock cable
 20. Wire harness
 21. Storage box light connector
 22. Fuel injector lead #2
 23. Frame
- A. Route the wire harness against the stay 1 wire guide.
 - B. Fasten the lean angle cut-off switch lead to the stay 1 with a plastic band. Face the band end to the downward.
 - C. Route the lean angle cut-off switch lead through the back of the mirror stay (cross pipe).
 - D. Fasten the cooling system air bleed hose to the frame with a plastic holder.
 - E. Fasten the rear brake lock lever cable to the frame with a plastic holder.
 - F. Be sure not to pinch the storage box light switch lead when installing the fuel tank.
 - G. Connect the fuel injector leads and intake air pressure sensor lead, storage box light switch lead to the pipe guide with a plastic holder. Connect the couplers in right side of the holder.
 - H. Pass the wire harness and seat lock cable through the guide.
 - I. Fasten the negative battery lead and the starter motor lead to the frame with a plastic holder.
 - J. Fasten the fuel tank breather hose to the frame with a plastic holder.
 - K. Pass the seat lock cable (black) between the negative battery lead, starter motor lead and the frame.
 - L. Connect the seat lock cable (black) to the right seat lock.
 - M. Route the negative battery lead and the fuse box lead from the storage box opening to the bottom of the cross pipe.
 - N. Route the fuse box lead above the starter motor lead.
 - O. Place the rubber cover over the starter relay, starter relay coupler, positive battery lead terminal, and starter motor lead terminal.
 - P. Align the plastic clamp with the white tape on the wire harness and fasten to the frame.
 - Q. Fasten the wire harness and seat lock cable to the frame with a plastic holder.
 - R. Pass the wire harness, lead and cable the outside of the frame bracket.
 - S. Install the starter relay to the mad guard.
 - T. Fasten the wire harness, positive battery lead and seat lock cable to the mad guard with a plastic holder.
 - U. Route the positive battery lead through the under the seat lock cable.
 - V. Fasten the wire harness to the frame with a plastic holder.
 - W. Connect the seat lock cable (gray) to the left seat lock.
 - X. Install the fuse box assembly to the storage box.
 - Y. Install the storage box light switch to the storage box.
 - Z. To the rear brake caliper
 - AA. To the storage box light switch on the seat hinge.
 - AB. Fasten the fuel injector lead (#1/#2), intake air pressure sensor lead to the frame with a plastic holder.
 - AC. Route the intake air pressure sensor lead over the fuel hose.
 - AD. Bundle the fuel injector lead (#2) to the frame with a plastic band softly (the band possible to turn), face the end of the plastic band to the inside of the frame.
 - AE. 10 – 15 mm (0.39 – 0.59 in)
 - AF. Route the wire harness through the wire guide.
 - AG. Pass the speed sensor lead under the stay 1 and cross pipe, and then over the brake hose guide.
 - AH. Place the speed sensor lead between the ribs of the air filter case.
 - AI. Pass the wire harness over the wire guide.
 - AJ. Connect the storage box light lead connectors to the storage box light with the leads routed downward.

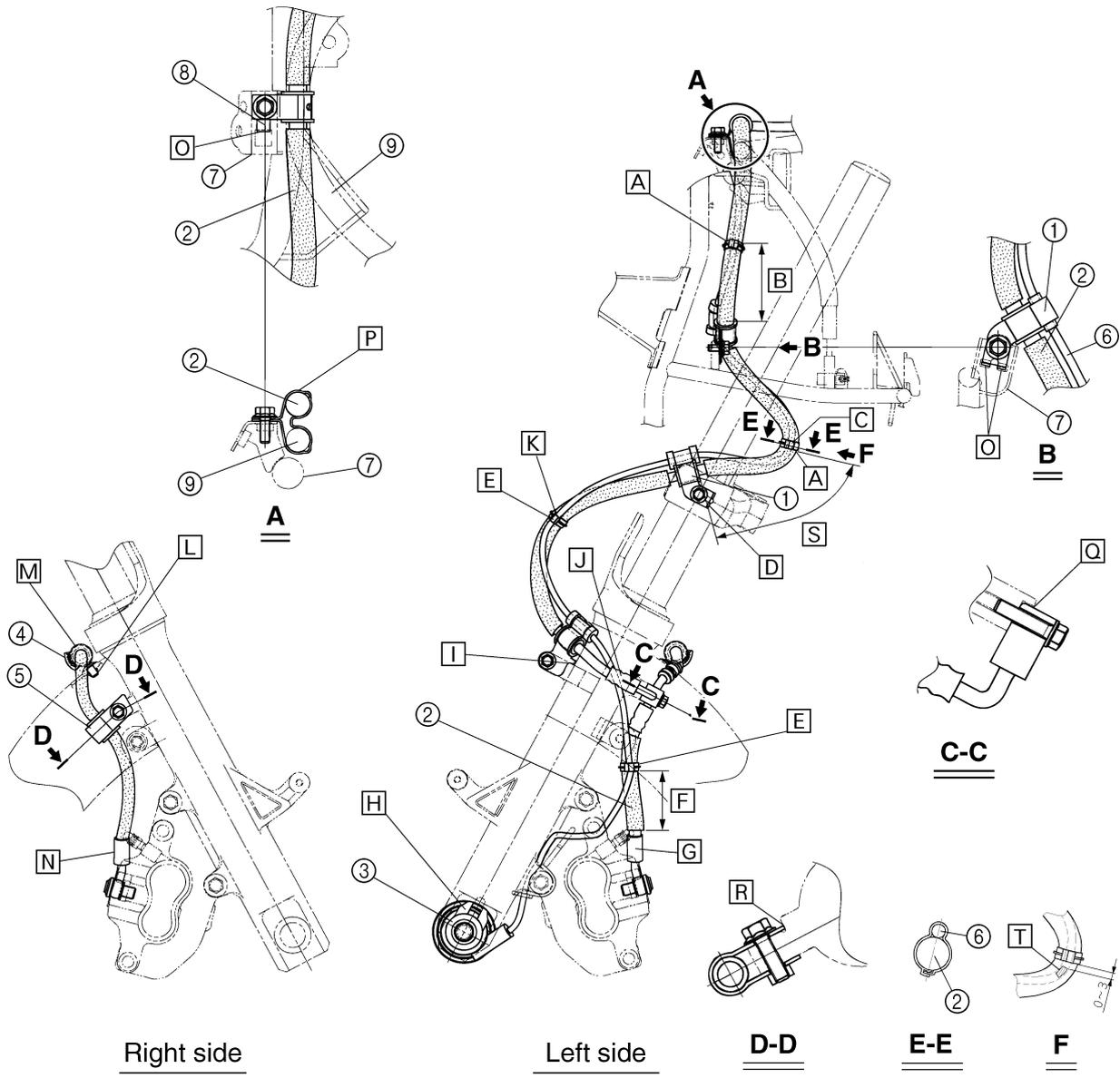
XP500



1. Cooling system air bleed hose
 2. Storage box light switch lead
 3. Coolant reservoir hose
 4. Spark plug lead #2
 5. Radiator fan motor lead
 6. Sidestand switch lead
 7. Spark plug lead #1
 8. Rear brake lock lever cable
 9. Rear brake hose
 10. Speed sensor lead
-
- A. Pass the rear brake lock lever cable on the front side of throttle cable.
 - B. Position of clamp.
 - C. Position the relay straighten.
 - D. Fasten the cooling system air bleed hose to the stay 1 with a plastic holder.
 - E. The main switch lead couplers should not protrude to the outside of the frame.
 - F. Fasten the fuel injector leads with the plastic holder.
 - G. Fasten the sidestand switch lead to the frame with a plastic holder.
 - H. Fasten the rear brake hose to the stay 1 with a plastic holder.
 - I. Route the throttle cable through the cable holder.
 - J. Route only the main switch lead onto the cowl-ing stay pipe.

CABLE ROUTING

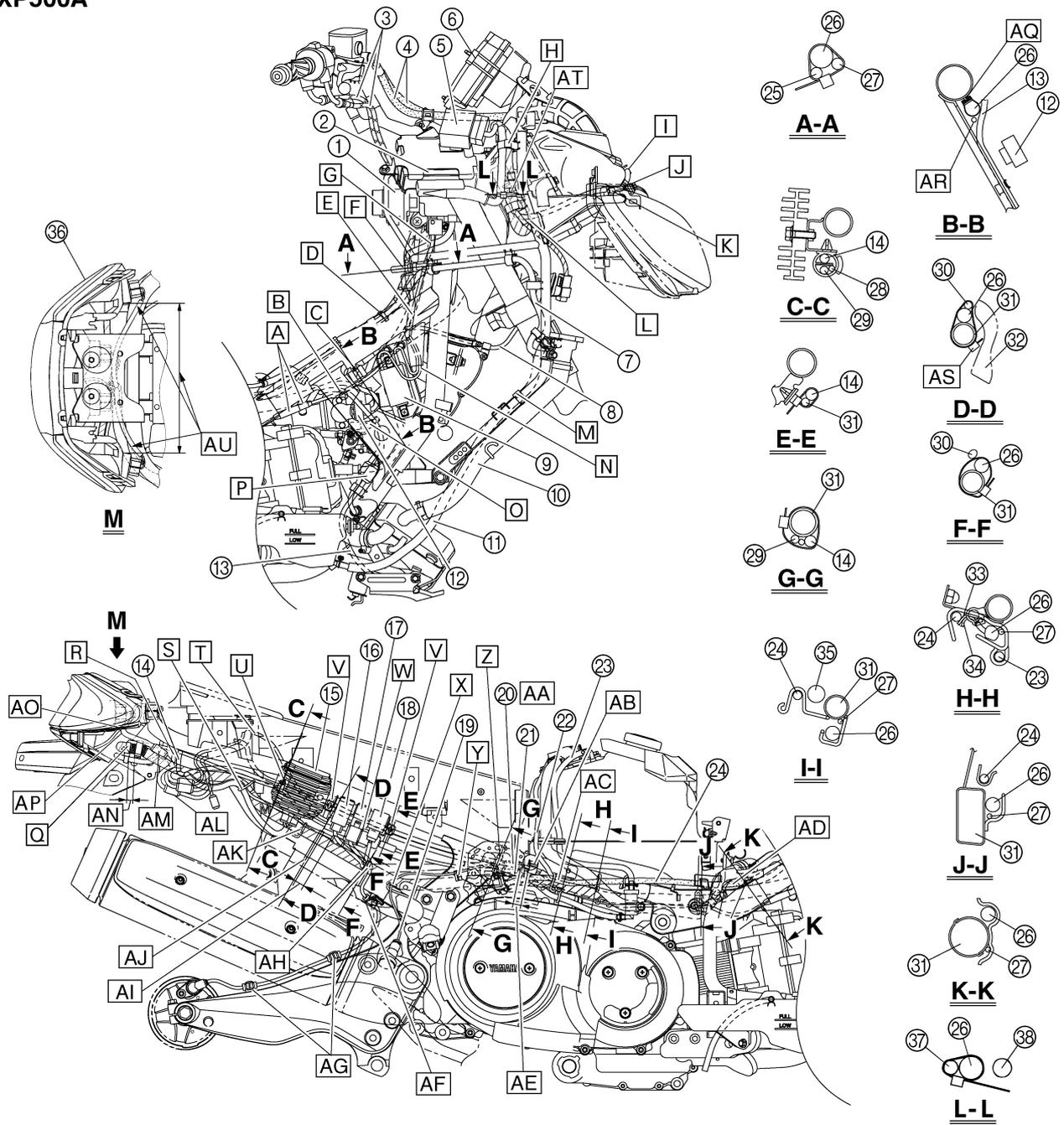
XP500



1. Brake hose holder 1
 2. Front brake hose
 3. Speed sensor
 4. Plastic holder
 5. Brake hose holder 2
 6. Speed sensor lead
 7. Stay 1
 8. Brake hose holder 3
 9. Rear brake hose 1
-
- A. Fasten the speed sensor lead along the inside of the brake hose.
 - B. 50 – 60 mm (1.97 – 2.36 in)
 - C. Turn the handlebar completely to the right, and then fasten the brake hose and speed sensor lead together with the plastic holder.
 - D. Install the stopper to lower bracket projection.
 - E. Fasten the speed sensor lead along the outside of the brake hose.
 - F. 30 – 40 mm (1.18 – 1.57 in)
 - G. Make sure that brake pipe touches the projection.
 - H. Make sure that the slot in the speed sensor fits stopper on the outer tube.
 - I. Make sure that the stopper touches the outer tube stay.
 - J. Pass the speed sensor lead between the brake hose and front fork.
 - K. Fasten the speed sensor lead to the center of brake hose holder.
 - L. Install the hose holder to the innermost securely.
 - M. Engage the hose holder rib more than 3 notch. Face the hose holder projection to the back.
 - N. Make sure that the white paint on the brake hose faces to back (right side only).
 - O. Install the stopper to the stay 1.
 - P. Fasten the front brake hose and rear brake hose with a hose holder.
 - Q. Make sure that the brake hose joint touches the projection of the outer tube.
 - R. Make sure that the brake hose holder touches the projection of the outer tube.
 - S. 107 mm (4.21 in)
 - T. Clamp the speed sensor lead with a plastic holder at the marking center.

CABLE ROUTING

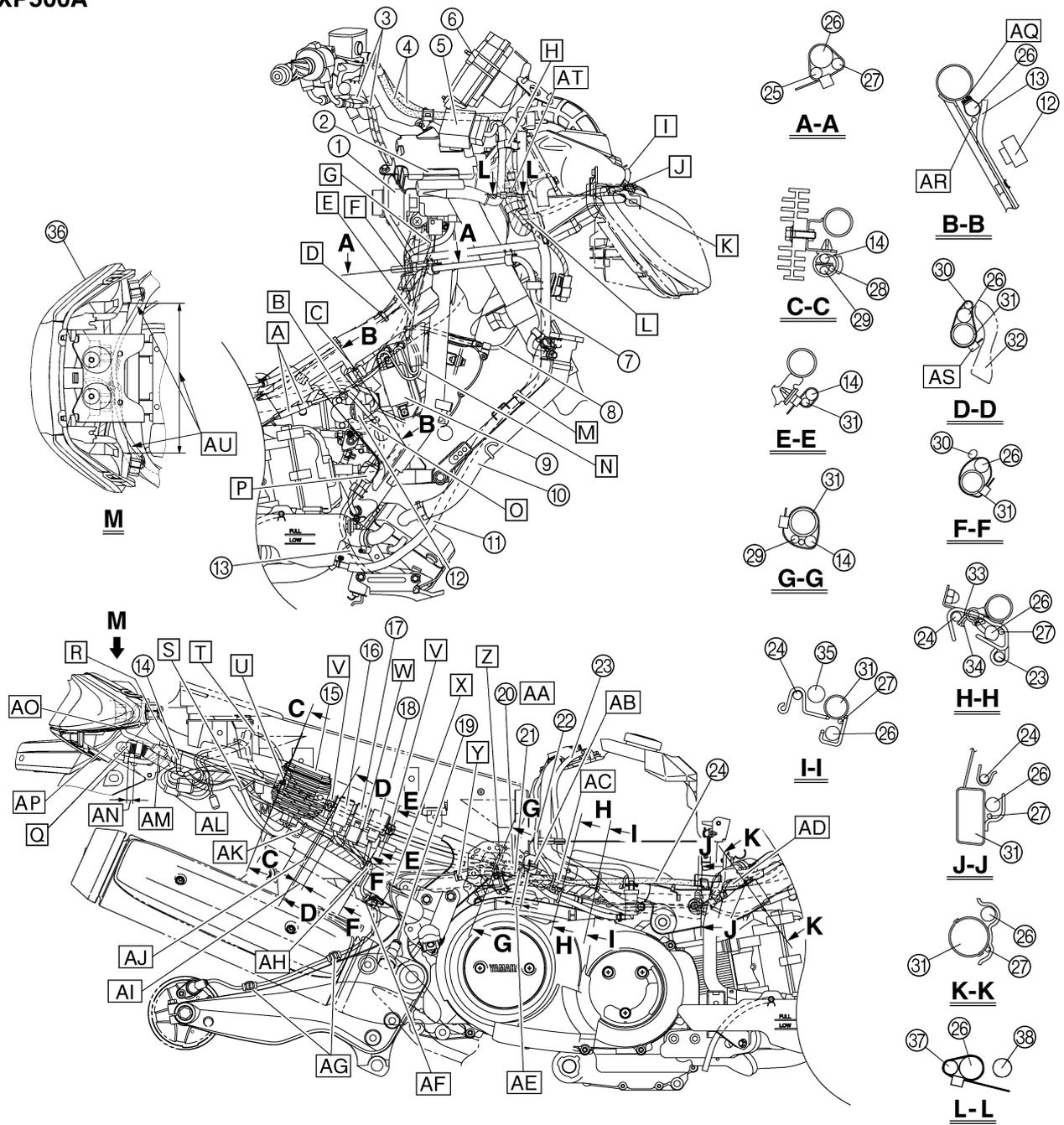
XP500A



1. Main switch/immobilizer unit
 2. ECU (ABS)
 3. Throttle cable
 4. Brake hose
 5. Fail-safe relay
 6. Meter assembly
 7. Coolant system air bleed hose
 8. Horn lead
 9. Ignition coil
 10. Radiator filler hose
 11. Coolant reservoir hose
 12. Throttle position sensor coupler
 13. Radiator fan motor lead
 14. Starter motor lead
 15. Rectifier/regulator
 16. Starting circuit cut-off relay 2
 17. Starting circuit cut-off relay 1
 18. Turn signal/hazard relay
 19. O₂ sensor
 20. V-belt replacement indicator reset coupler
 21. O₂ sensor coupler
 22. Fuel pump lead
 23. Fuel tank breather hose
 24. Rear brake lock lever cable
 25. Main switch lead
 26. Wire harness
 27. Seat lock cable
 28. Seat lock cable (left)
 29. Negative battery lead
 30. Rear wheel sensor lead
 31. Frame
 32. Storage box
 33. V-belt replacement indicator reset coupler lead
 34. O₂ sensor lead
 35. Fuel hose
 36. Tail/brake light assembly
 37. ECU lead
 38. Stay
- A. After adjusting the adjustment nut, attach the front and rear parts of the boot tightly. Apply the silicone grease to the inside of the boot and surface of the adjusting nut possible when installing the boot.
 - B. Pass the seat lock cable between wire harness and frame.
 - C. Connect the wire harness (wire taped area) to the T stud of frame.
 - D. Fasten the cooling system air bleed hose and rear brake lock lever cable together with the plastic clip. The open ends of the clip should face downward.
 - E. Fasten the wire harness, main switch lead and seat lock cable with a clamp to under the cowling stay (Fasten the seat lock cables metal pipe section).
 - F. Fasten the wire harness, main switch lead, and seat lock cable with the plastic band under the stay 1. Be sure to fasten the seat lock cable on the metal section of the outer cable.
 - G. Pass the main switch lead between stay 1 and seat lock cable.
 - H. Fasten the wire harness and ECU (engine) lead to the stay 1 with a holder.
 - I. After connecting the left headlight sub-wire harness and wire harness (by matching the coupler colors), fold back the lead facing to the right and insert it into the air filter case rib.
 - J. Connect the wire harness to the headlight sub wire harness (cowling side).
 - K. Fasten the headlight and turn signal sub-wire harness to the stay 1 with a plastic holder.
 - L. Fasten the ECU (engine) lead, ABS test coupler lead and headlight sub-wire harness to the stay 1 with a plastic holder. When fastening them using a plastic holder, make sure not to cross the branch leads.
 - M. Fasten the coolant reservoir hose to the stay 1 with a plastic holder.
 - N. Route the ignition coil lead through the inside of the ignition coil bracket.
 - O. Route the ignition coil lead through the inside of the ignition coil bracket.
 - P. Use the plastic holder on the back of the frame to hold the radiator fan motor lead.
 - Q. Fasten the radiator fan motor lead and side-stand switch lead to the frame with a plastic holder.
 - R. Fasten the wire harness and positive battery leads with a plastic band. Face the end of the plastic band upward.
 - S. To the starter relay
 - T. Pass the wire harness, rectifier/regulator lead, and rear wheel sensor lead through the guide, making sure that the rectifier/regulator lead is routed below the wire harness and rear wheel sensor lead.
 - U. Make sure that the seat lock cable do not lean over the storage box.
 - V. Fasten the starter motor lead, negative battery lead and seat lock cable (left) to the frame with a plastic holder.
 - W. Fasten the starter motor lead and negative battery lead to the frame with a plastic holder.
 - X. Insert the seat lock cable and the cylinder mounting rubber into the frame stay.
 - Y. Pass the O₂ sensor lead to the lead guide.
 - Z. Fasten the O₂ sensor lead to the frame with a plastic band.
 - AA. Fasten the starter motor lead and negative battery lead to the frame with a plastic band. Position the band clasp on the bottom of the frame and face the band end to the outside.
 - AB. Make sure that the V-belt replacement indicator reset coupler does not project out of the clamshell cover.
 - AC. Fasten the O₂ sensor lead and V-belt replacement indicator reset coupler lead to the frame with a plastic holder.
 - AD. Pass the wire harness and seat lock cable in the frame holder.
 - AE. Pass the rear brake lock lever cable under the coolant pipe.
 - AF. 40 – 50 mm (1.57 – 1.97 in)
 - AG. Fasten the wire harness to the frame with the plastic band. The buckle of the plastic band should be facing towards the storage box.

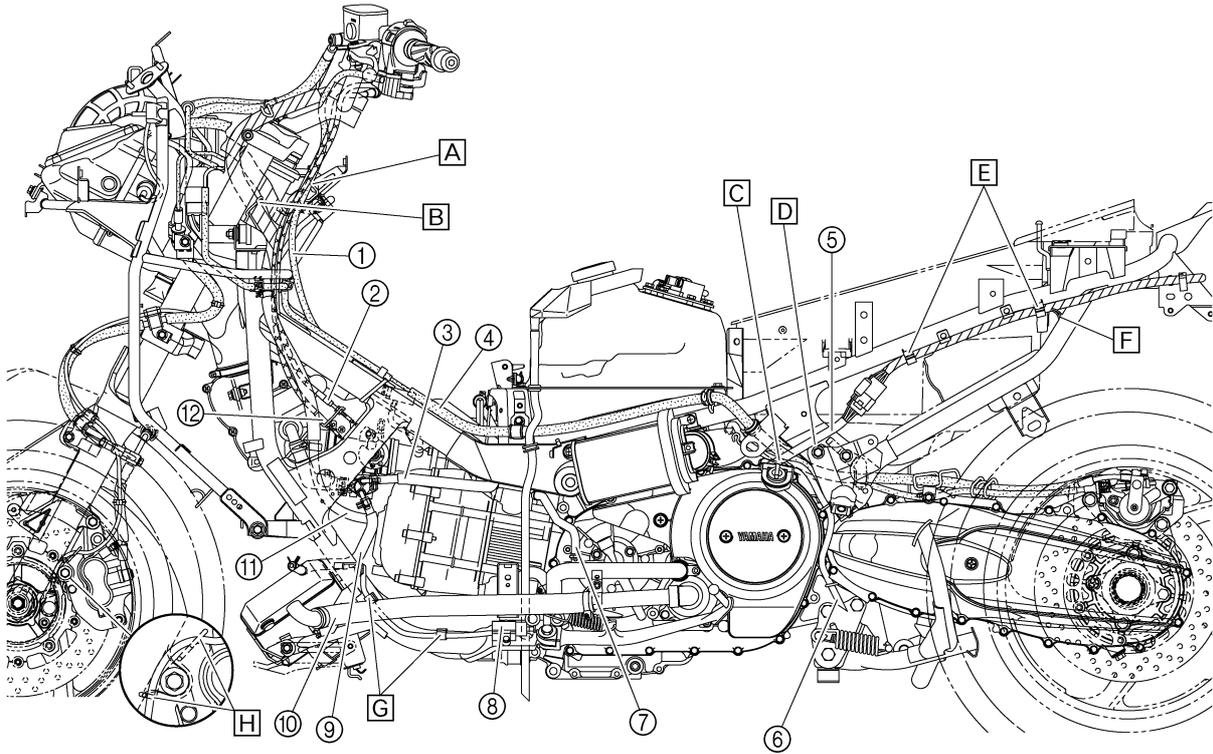
CABLE ROUTING

XP500A



- AH. Fasten the rear wheel sensor lead to the swingarm with the plastics holders. The open end of each holder should be facing downward.
- AI. Route the rear wheel sensor lead behind the relay leads.
- AJ. 10 – 20 mm (0.39 – 0.79 in)
- AK. Fasten the rear wheel sensor lead and wire harness to the frame with the plastic band.
- AL. Pass the wire harness and rear wheel sensor lead to the frame wire harness holder.
- AM. After making the connections, push the couplers into the space inside the frame above the mudguard.
- AN. 20 – 30 mm (0.79 – 1.18 in)
- AO. To the tail/brake light
- AP. Route the tail/brake light switch lead under the seat lock cable, wire harness, and positive battery leads and then towards the inside of the vehicle.
- AQ. T stud for position setting
- AR. Route the seat lock cable through the frame bracket side and under the wire harness.
- AS. Install the band fastened part between frame and storage box.
- AT. Fasten the wire harness and ECU lead with a plastic band. Position the band clasp under the joint connector and face the end of the plastic band forward.
- AU. Install the turn signal light lead, make sure does not hide the turn signal light lead under the taillight assembly as shown.

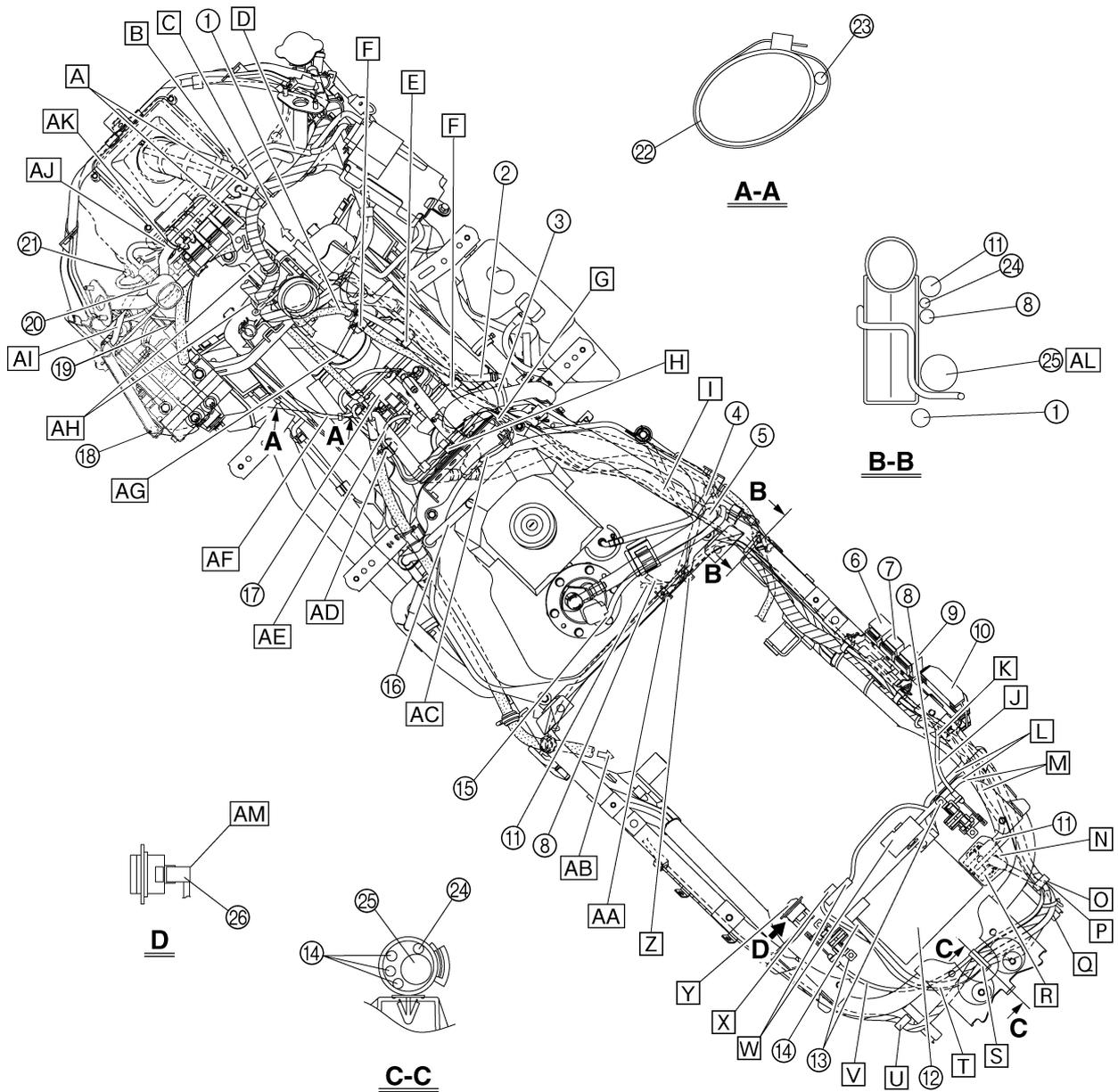
XP500A



1. Rear brake lock lever cable
 2. Throttle cable (decelerator cable, double lock-nut)
 3. Fast idle inlet hose
 4. Rear brake hose
 5. A.C. magneto lead
 6. Fuel tank breather hose
 7. Coolant hose
 8. Sidestand switch
 9. Fast idle outlet hose
 10. Radiator outlet hose
 11. Crankcase breather hose
 12. Throttle cable (accelerator cable, single lock-nut)
- A. Pass the rear brake lock lever cable to the cable guide.
 - B. Route the wire harness through the frame guide.
 - C. Pass the fuel tank breather hose by the outside of the wire harness.
 - D. Pass the wire harness by the outside of the rear footrest mounting boss. (When installing the rear footrest, do not catch or pinch the A.C. magneto lead in the bracket.)
 - E. Fasten the wire harness to the frame with a plastic holder.
 - F. Pass the storage box light switch lead by the front of the frame back stay pipe.
 - G. Fasten the sidestand switch lead to the frame with a plastic holder.
 - H. Pass the front wheel sensor lead to the lead holder (2 locations).

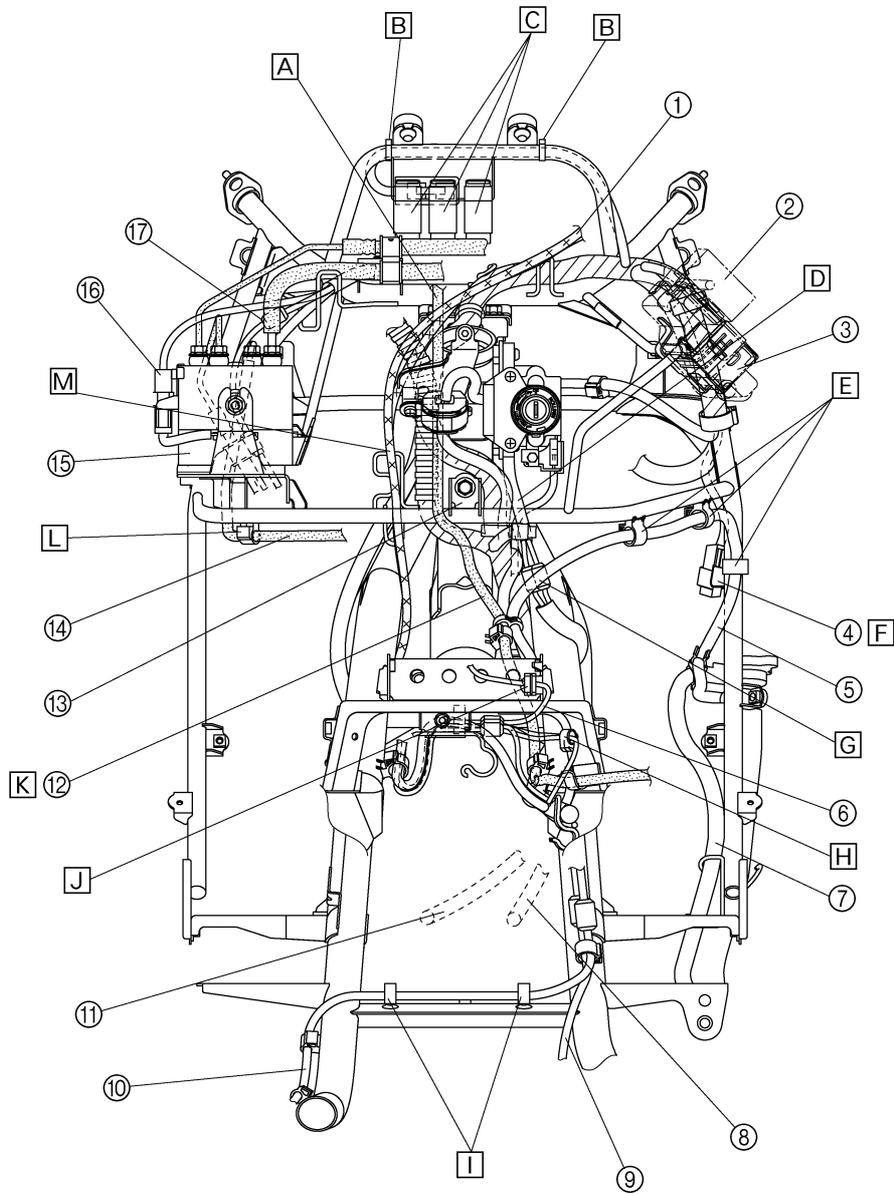
CABLE ROUTING

XP500A



1. Rear brake lock lever cable
 2. Cooling system air bleed hose
 3. Thermostat outlet hose
 4. Fuel tank breather hose
 5. Fuel hose
 6. Turn signal/hazard relay
 7. Starting circuit cut-off relay 1
 8. Negative battery lead
 9. Starting circuit cut-off relay 2
 10. Rectifier/regulator
 11. Starter motor lead
 12. Battery
 13. Seat lock
 14. Positive battery lead
 15. Fuel pump lead
 16. Fuel overflow hose
 17. Intake air pressure sensor
 18. Hydraulic unit solenoid coupler
 19. ABS motor coupler
 20. Meter assembly coupler
 21. Intake air temperature sensor
 22. Frame
 23. Fuel injector lead #2
 24. Seat lock cable
 25. Wire harness
 26. Storage box light connector
- A. Route the wire harness against the stay 1 wire guide.
- B. Fasten the lean angle cut-off switch lead to the stay 1 with a plastic band. Face the band end to the downward.
- C. To the main switch
- D. Route the lean angle cut-off switch lead through the back of the mirror stay (cross pipe).
- E. Fasten the cooling system air bleed hose to the frame with a plastic holder.
- F. Fasten the rear brake lock lever cable to the frame with a plastic holder.
- G. Be sure not to pinch the storage box light switch lead when installing the fuel tank.
- H. Connect the fuel injector leads and intake air pressure sensor lead, storage box light switch lead to the pipe guide with a plastic holder. Connect the couplers in right side of the holder.
- I. Pass the wire harness and seat lock cable through the guide.
- J. Connect the seat lock cable (black) to the right seat lock.
- K. Pass the seat lock cable (black) between the negative battery lead, starter motor lead and the frame.
- L. Route the negative battery lead and the fuse box lead from the storage box opening to the bottom of the cross pipe.
- M. Route the fuse box lead above the starter motor lead.
- N. Place the rubber cover over the starter relay, starter relay coupler, positive battery lead terminal, and starter motor lead terminal.
- O. Align the plastic clamp with the white tape on the wire harness and fasten to the frame.
- P. Fasten the wire harness and seat lock cable to the frame with a plastic holder.
- Q. Pass the wire harness, lead and cable the outside of the frame bracket.
- R. Install the starter relay to the mad guard.
- S. Fasten the wire harness, positive battery lead and seat lock cable to the mad guard with a plastic holder.
- T. Route the positive battery lead through the under the seat lock cable.
- U. Fasten the wire harness to the frame with a plastic holder.
- V. Connect the seat lock cable (gray) to the left seat lock.
- W. Install the fuse box assembly to the storage box.
- X. Connect the ABS motor fuse box to the fuse box 2.
- Y. Install the storage box light switch to the storage box.
- Z. Fasten the negative battery lead and the starter motor lead to the frame with a plastic holder.
- AA. Fasten the fuel tank breather hose to the frame with a plastic holder.
- AB. To the rear brake caliper
- AC. To the storage box light switch on the seat hinge.
- AD. Fasten the fuel injector lead (#1/#2), intake air pressure sensor lead to the frame with a plastic holder.
- AE. Pass the intake air pressure sensor lead over the fuel hose.
- AF. Bundle the fuel injector lead (#1) to the frame with a plastic band softly (the band possible to turn), face the end of the plastic band to the inside of the frame.
- AG. 10 – 15 mm (0.39 – 0.59 in)
- AH. Route the wire harness through the wire guide.
- AI. Pass the front wheel sensor lead under the stay 1 and cross pipe.
- AJ. Place the front wheel sensor lead between the ribs of the air filter case.
- AK. Fasten the protective tube around the lean angle cut-off switch lead to the stay 1 with a plastic band. Face the end of the plastic band downward.
- AL. Pass the wire harness over the wire guide.
- AM. Connect the storage box light lead connectors to the storage box light with the leads routed downward.

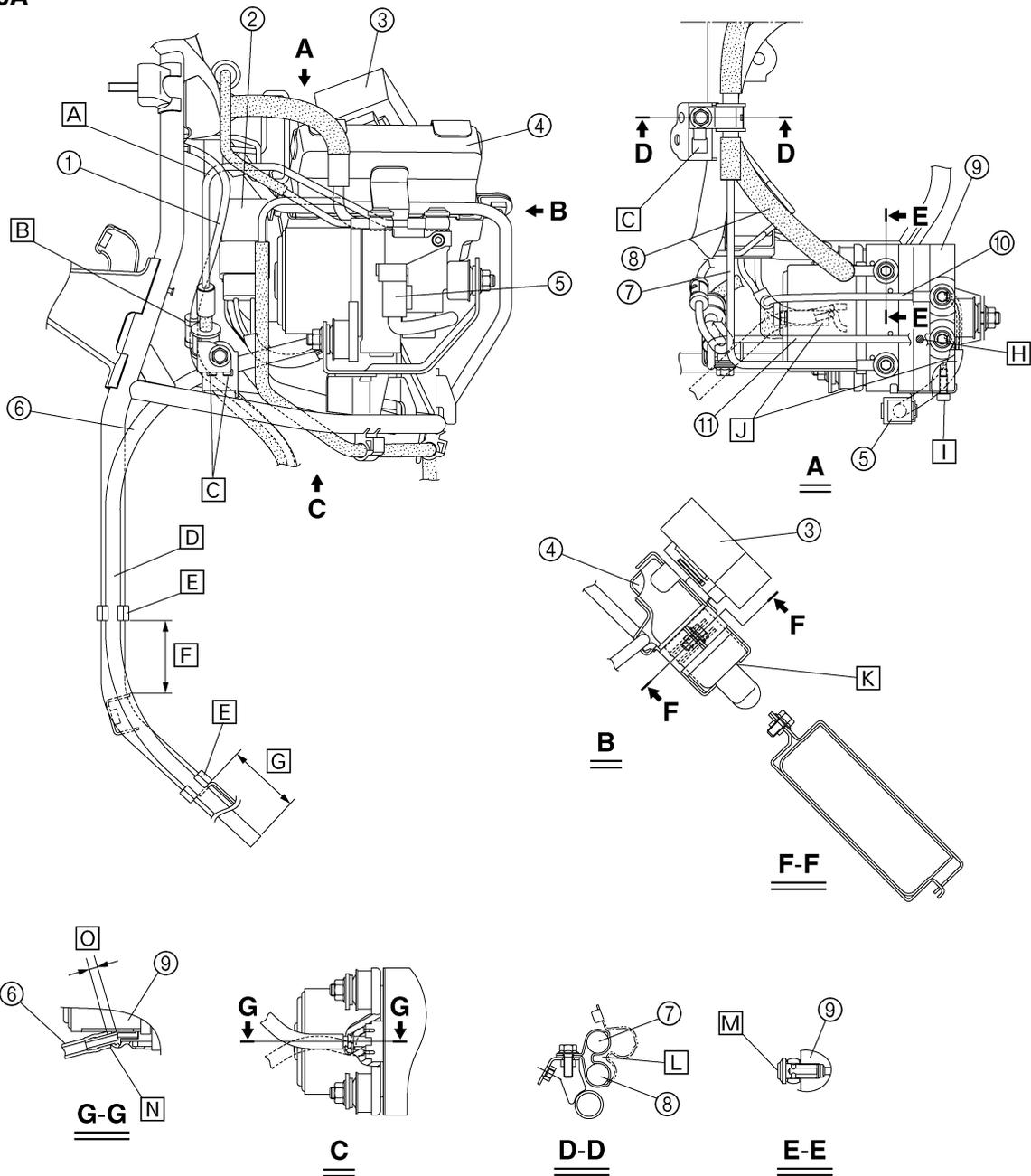
XP500A



1. Throttle cable
 2. Fail-safe relay
 3. ECU (ABS)
 4. ABS test coupler
 5. Cooling system air bleed hose
 6. Storage box light switch lead
 7. Coolant reservoir hose
 8. Spark plug lead #2
 9. Radiator fan motor lead
 10. Sidestand switch lead
 11. Spark plug lead #1
 12. Rear brake lock lever cable
 13. Stay 1
 14. Rear brake hose
 15. Hydraulic unit
 16. Hydraulic unit solenoid coupler
 17. Front wheel sensor coupler
-
- A. Pass the rear brake lock lever cable on the front side of throttle cable.
 - B. Position of clamp.
 - C. Position the relay straighten.
 - D. Route the main switch lead over the tube of the stay 1.
 - E. Fasten the cooling system air bleed hose to the stay 1 with a plastic holder.
 - F. After checking the ABS, install the ABS test coupler into the stay 1.
 - G. The main switch lead couplers should not protrude to the outside of the frame.
 - H. Fasten the fuel injection leads with a plastic holder.
 - I. Fasten the sidestand switch lead to the frame with a plastic holder.
 - J. Fasten the storage box light switch lead to the frame with a plastic clamp. Face the clamp clasp to the up side.
 - K. Route the rear brake lock lever cable to the left of the bracket welded to the stay 1.
 - L. Fasten the rear brake hose to the stay 1 with a plastic holder.
 - M. Route the throttle cable through the cable holder.

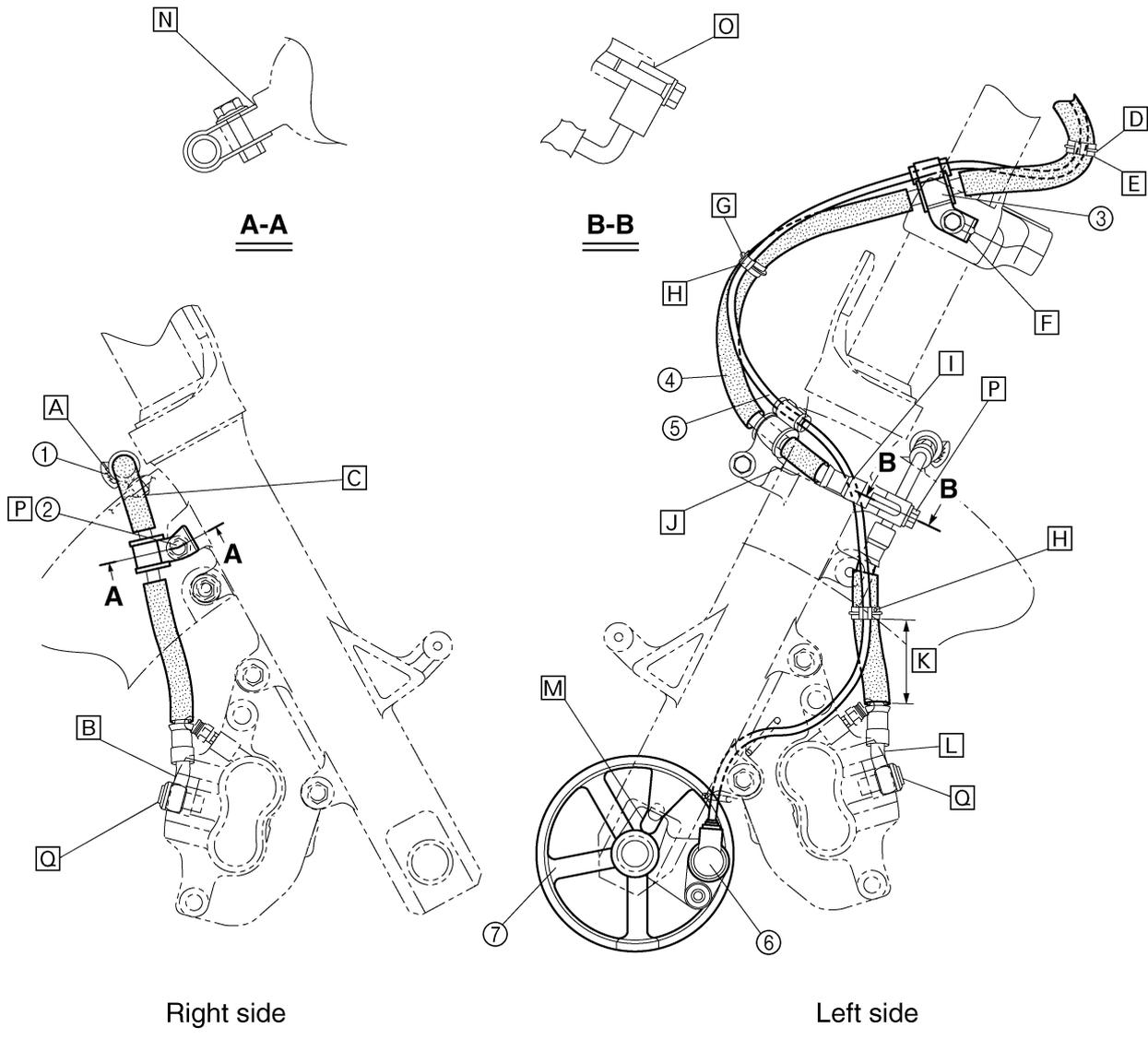
CABLE ROUTING

XP500A



1. Front wheel sensor
 2. ABS motor coupler
 3. Fail-safe relay
 4. ECU (ABS)
 5. Hydraulic unit solenoid coupler
 6. Hydraulic unit overflow hose
 7. Brake hose (front brake master cylinder to hydraulic unit)
 8. Brake hose (rear brake master cylinder to hydraulic unit)
 9. Hydraulic unit
 10. Brake hose (hydraulic unit to rear brake caliper)
 11. Brake hose (hydraulic unit to front brake caliper)
-
- A. Route the front wheel sensor lead in front of the brake hose (hydraulic unit to front brake calipers) as shown in the illustration.
 - B. Fasten the grommets on the front wheel sensor lead and brake hose (hydraulic unit to front brake calipers) with the holder.
 - C. Install the holder with its projections inserted into the slots in the stay 1.
 - D. Route the hydraulic unit overflow hose to the outside of the stay 1.
 - E. Fasten the hydraulic unit overflow hose with the lower hose holder first, and then fasten it with the upper hose holder. Make sure that the lower hose holder is contacting the top of the bracket welded to the stay 1 and the end of the hose extends 70 – 100 mm (2.76 – 3.94 in) past the holder.
 - F. 40 – 60 mm (1.57 – 2.36 in)
 - G. 70 – 100 mm (2.76 – 3.94 in)
 - H. Install the brake hose (hydraulic unit to front brake caliper) onto the hydraulic unit. The brake hose and its union bolt hole are identified by white paint marks.
 - I. Install the hydraulic unit solenoid coupler bracket onto the hydraulic unit, making sure that the projections on the bracket are aligned with the edges of the hydraulic unit.
 - J. Route the hydraulic unit solenoid lead and ABS motor lead under the hydraulic unit when installing the unit, making sure not to pinch the leads between the hydraulic unit and hydraulic unit bracket.
 - K. Install the ECU (ABS) lead coupler boot all the way onto the ECU (ABS), making sure that the section of the boot that covers the ECU (ABS) is not pinched between the ends of the upper and lower ECU (ABS) brackets.
 - L. Fasten the grommets on the brake hose (front brake master cylinder to hydraulic unit) and the brake hose (rear brake master cylinder to hydraulic unit) with the brake hose holder.
 - M. When tightening the union bolt, make sure that the brake hose contacts the left side of the stopper on the hydraulic unit.
 - N. Install the hydraulic unit overflow hose onto the hydraulic unit, making sure that the hose contacts the unit.
 - O. 5 – 7 mm (0.20 – 0.28 in)

XP500A



1. Plastic holder
 2. Brake hose holder 2
 3. Brake hose holder 1
 4. Front brake hose
 5. Front wheel sensor lead
 6. Front wheel sensor
 7. Front housing
-
- A. Engage the hose holder rib more than 3 notch. Face the hose holder projection to the back.
 - B. Make sure that the white paint on the brake hose faces to back (right side only).
 - C. Install the hose holder to the innermost securely.
 - D. Turn the handlebar completely to the right, and then fasten the brake hose and front wheel sensor lead together with the plastic holder.
 - E. Fasten the front wheel sensor lead along the inside of the brake hose.
 - F. Install the stopper to lower bracket projection.
 - G. Fasten the front wheel sensor lead to the center of brake hose holder.
 - H. Fasten the front wheel sensor lead along the outside of the brake hose.
 - I. Pass the front wheel sensor lead between the brake hose and front fork.
 - J. Make sure that the stopper touches the outer tube stay.
 - K. 30 – 40 mm (1.18 – 1.57 in)
 - L. Make sure that brake pipe touches the projection.
 - M. Make sure that the slot in the sensor housing fits stopper on the outer tube.
 - N. Make sure that the brake hose holder touches the projection of the outer tube.
 - O. Make sure that the brake hose joint touches the projection of the outer tube.
 - P. Install the brake hose to the brake caliper, and then tighten the brake hose holder.
 - Q. Tighten the union bolt before install the brake hose to the outer tube.

PERIODIC CHECKS AND ADJUSTMENTS

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PERIODIC MAINTENANCE

EAS20450

PERIODIC MAINTENANCE

EAS20460

INTRODUCTION

This chapter includes all information necessary to perform recommended checks and adjustments. If followed, these preventive maintenance procedures will ensure more reliable vehicle operation, a longer service life and reduce the need for costly overhaul work. This information applies to vehicles already in service as well as to new vehicles that are being prepared for sale. All service technicians should be familiar with this entire chapter.

EAS17705

GENERAL MAINTENANCE AND LUBRICATION CHART

NOTE:

- The annual checks must be performed every year, except if a kilometer-based maintenance is performed instead.
- From 50000 km, repeat the maintenance intervals starting from 10000 km.
- Items marked with an asterisk should be performed by a Yamaha dealer as they require special tools, data and technical skills.

NO.	ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING (× 1000 km)					ANNUAL CHECK
			1	10	20	30	40	
1	* Fuel line	<ul style="list-style-type: none"> ● Check fuel hoses for cracks or damage. 		√	√	√	√	√
2	Spark plugs	<ul style="list-style-type: none"> ● Check condition. ● Clean and regap. 		√		√		
		<ul style="list-style-type: none"> ● Replace. 			√		√	
3	* Valves	<ul style="list-style-type: none"> ● Check valve clearance. ● Adjust. 	Every 40000 km					
4	Air filter element	<ul style="list-style-type: none"> ● Clean. 		√		√		
		<ul style="list-style-type: none"> ● Replace. 			√		√	
5	* V-belt case air filter elements	<ul style="list-style-type: none"> ● Clean. 		√		√		
		<ul style="list-style-type: none"> ● Replace. 			√		√	
6	* Front brake	<ul style="list-style-type: none"> ● Check operation, fluid level and vehicle for fluid leakage. 	√	√	√	√	√	√
		<ul style="list-style-type: none"> ● Replace brake pads. 	Whenever worn to the limit					
7	* Rear brake	<ul style="list-style-type: none"> ● Check operation, fluid level and vehicle for fluid leakage. 	√	√	√	√	√	√
		<ul style="list-style-type: none"> ● Replace brake pads. 	Whenever worn to the limit					
8	Rear brake lock	<ul style="list-style-type: none"> ● Check operation. ● Adjust. 	√	√	√	√	√	√
9	* Brake hoses	<ul style="list-style-type: none"> ● Check for cracks or damage. 		√	√	√	√	√
		<ul style="list-style-type: none"> ● Replace. 	Every 4 years					
10	* Wheels	<ul style="list-style-type: none"> ● Check runout and for damage. 		√	√	√	√	
11	* Tires	<ul style="list-style-type: none"> ● Check tread depth and for damage. ● Replace if necessary. ● Check air pressure. ● Correct if necessary. 		√	√	√	√	√
12	* Wheel bearings	<ul style="list-style-type: none"> ● Check bearing for looseness or damage. 		√	√	√	√	

PERIODIC MAINTENANCE

NO.	ITEM	CHECK OR MAINTENANCE JOB	ODOMETER READING (× 1000 km)					ANNUAL CHECK
			1	10	20	30	40	
13	* Steering bearings	● Check bearing play and steering for roughness.	√	√	√	√	√	
		● Lubricate with lithium-soap-based grease.	Every 20000 km					
14	* Chassis fasteners	● Make sure that all nuts, bolts and screws are properly tightened.		√	√	√	√	√
15	Sidestand, centerstand	● Check operation. ● Lubricate.		√	√	√	√	√
16	* Sidestand switch	● Check operation.	√	√	√	√	√	√
17	* Front fork	● Check operation and for oil leakage.		√	√	√	√	
18	* Shock absorber assembly	● Check operation and shock absorber for oil leakage.		√	√	√	√	
19	* Fuel injection	● Adjust engine idling speed and synchronization.	√	√	√	√	√	√
20	Engine oil	● Change.	√	When the oil change indicator flashes (every 5000 km)				
		● Check oil level and vehicle for oil leakage.	Every 5000 km					√
21	Engine oil filter cartridge	● Replace.	√		√		√	
22	* Cooling system	● Check coolant level and vehicle for coolant leakage.		√	√	√	√	√
		● Change.	Every 3 years					
23	Chain drive oil	● Check vehicle for oil leakage. ● Change.		√	√	√	√	
24	* V-belt	● Replace.	When the V-belt replacement indicator flashes (every 20000 km)					
25	* Front and rear brake switches	● Check operation.	√	√	√	√	√	√
26	Moving parts and cables	● Lubricate.		√	√	√	√	√
27	* Throttle grip housing and cable	● Check operation and free play. ● Adjust the throttle cable free play if necessary. ● Lubricate the throttle grip housing and cable.		√	√	√	√	√
28	* Lights, signals and switches	● Check operation. ● Adjust headlight beam.	√	√	√	√	√	√

EAS34490

NOTE:

- The air filter needs more frequent service if you are riding in unusually wet or dusty areas.
- Hydraulic brake service
 - Regularly check and, if necessary, correct the brake fluid level.
 - Every two years replace the internal components of the brake master cylinders and calipers, and change the brake fluid.
 - Replace the brake hoses every four years and if cracked or damaged.

EAS20470

ENGINE

EAS20490

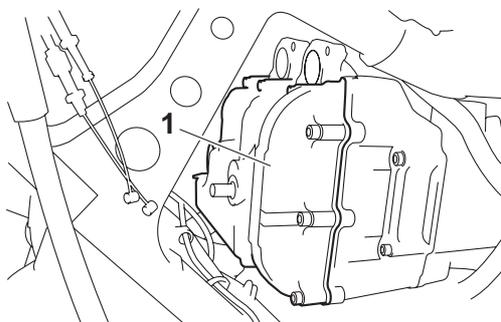
ADJUSTING THE VALVE CLEARANCE

The following procedure applies to all of the valves.

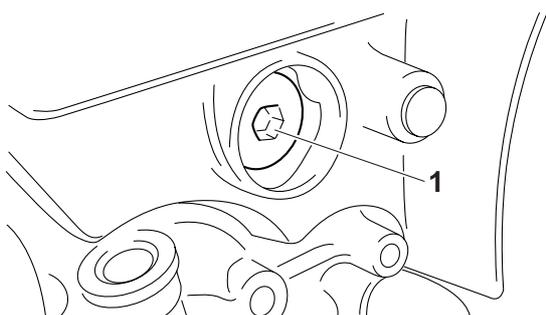
NOTE:

- Valve clearance adjustment should be made on a cold engine, at room temperature.
- When the valve clearance is to be measured or adjusted, the piston must be at top dead center (TDC) on the compression stroke.

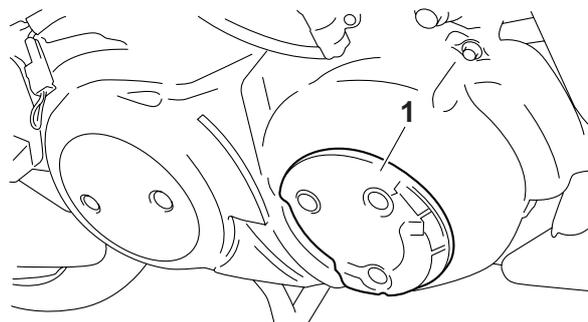
1. Remove:
 - Front cowlings
Refer to "GENERAL CHASSIS" on page 4-1.
 - Footrest boards
 - Leg shield
 - Inner fender
Refer to "GENERAL CHASSIS" on page 4-1.
2. Remove:
 - Radiator
Refer to "RADIATOR" on page 6-1.
3. Remove:
 - Spark plug
 - Cylinder head cover "1"
 - Cylinder head cover gasket



4. Remove:
 - Throttle body
 - Intake manifold
Refer to "THROTTLE BODIES" on page 7-4.
5. Remove:
 - Timing plug "1"



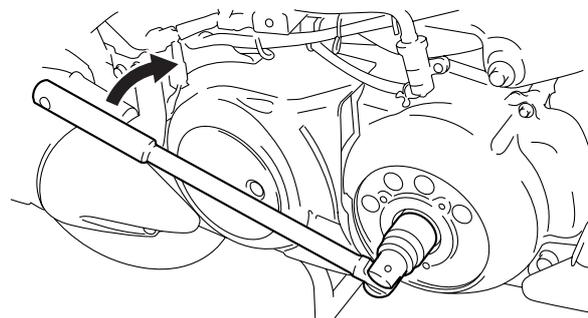
6. Remove:
 - V-belt case cover "1"



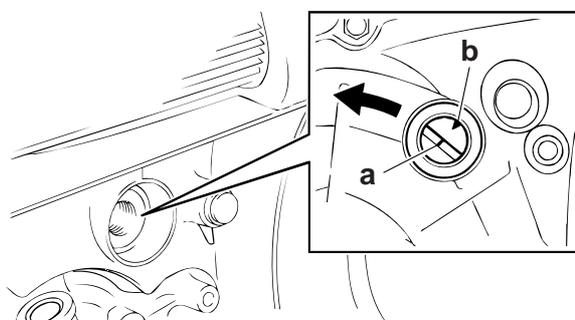
7. Measure:
 - Valve clearance
Out of specification → Adjust.

	Valve clearance (cold)
	Intake 0.15–0.20 mm (0.0059–0.0079 in)
	Exhaust 0.25–0.30 mm (0.0098–0.0118 in)

- a. Turn the crankshaft counterclockwise.



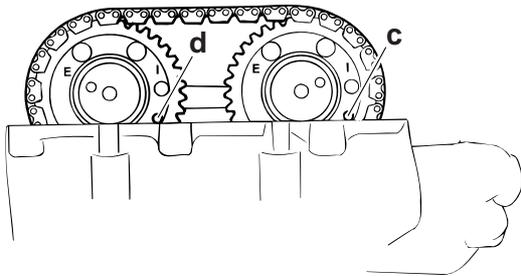
- b. When piston #1 is at TDC on the compression stroke, align the TDC mark "a" on the generator rotor with the mark "b" on the crankcase.



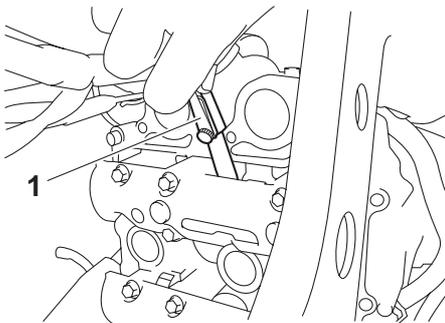
NOTE:

- TDC on the compression stroke can be found when the camshaft lobes are turned away from each other.

- In order to be sure that the piston is at TDC, the alignment mark “c” on the intake camshaft sprocket and the alignment mark “d” on the exhaust camshaft sprocket must align with the cylinder head mating surface as shown in the illustration.



- c. Measure the valve clearance with a thickness gauge “1”.



NOTE:

- If the valve clearance is incorrect, record the measured reading.
- Measure the valve clearance in the following sequence.

Valve clearance measuring sequence
Cylinder #1 → #2 → #4 → #3

- d. Turn the crankshaft 360° counterclockwise and check the valve clearance of piston #2.

Cylinder #2	180°
Cylinder #4	360°
Cylinder #3	540°

8. Remove:

- Intake camshaft

- Exhaust camshaft

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CAUTION:

Before removing the camshafts from the cylinder head, tilt up the engine at least 25°.

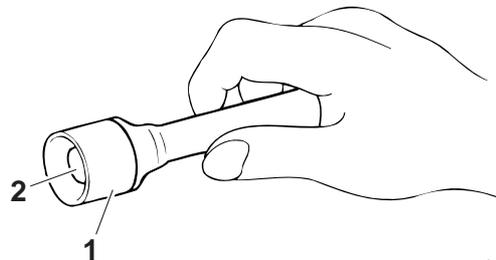
NOTE:

- Refer to “CAMSHAFTS” on page 5-6.
- When removing the timing chain and camshafts, fasten the timing chain with a wire to retrieve it if it falls into the crankcase.

9. Adjust:

- Valve clearance

- a. Remove the valve lifter “1” and the valve pad “2” with a valve lapper “3”.



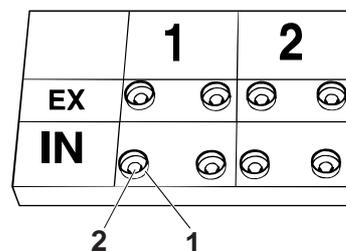
11171102



Valve lapper
90890-04101
Valve lapping tool
YM-A8998

NOTE:

- Cover the timing chain opening with a rag to prevent the valve pad from falling into the crankcase.
- Make a note of the position of each valve lifter “1” and valve pad “2” so that they can be installed in the correct place.



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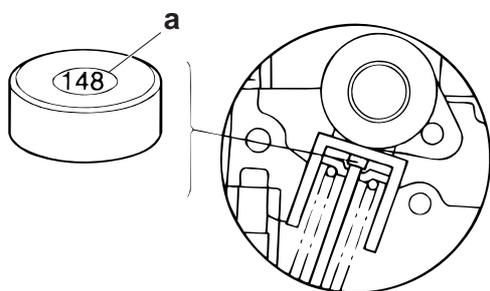
- b. Select the proper valve pad from the following table.

Valve pad range	Nos. 120–240
-----------------	--------------

Valve pad thickness	1.20–2.40 mm (0.0472–0.0945 in)
Available valve pads	25 thicknesses in 0.05 mm (0.002 in) increments

NOTE:

- The thickness “a” of each valve pad is marked in hundredths of millimeters on the side that touches the valve lifter.
- Since valve pads of various sizes are originally installed, the valve pad number must be rounded in order to reach the closest equivalent to the original.



c. Round off the original valve pad number according to the following table.

Last digit	Rounded value
0 or “2”	0
5	5
8	10

EXAMPLE:

Original valve pad number = 148 (thickness = 1.48 mm (0.058 in))

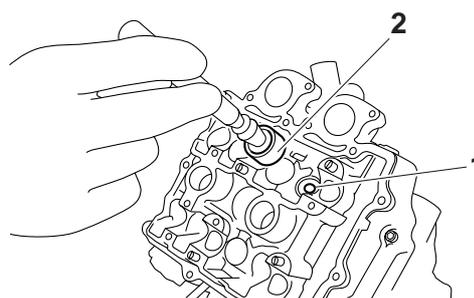
Rounded value = 150

d. Locate the rounded number of the original valve pad and the measured valve clearance in the valve pad selection table. The point where the column and row intersect is the new valve pad number.

NOTE:

The new valve pad number is only an approximation. The valve clearance must be measured again and the above steps should be repeated if the measurement is still incorrect.

e. Install the new valve pad “1” and the valve lifter “2”.



NOTE:

- Lubricate the valve pad with molybdenum disulfide grease.
- Lubricate the valve lifter with molybdenum disulfide oil.
- The valve lifter must turn smoothly when rotated by hand.
- Install the valve lifter and the valve pad in the correct place.

f. Install the exhaust and intake camshafts, timing chain and camshaft caps.

	Camshaft cap bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)
--	--

NOTE:

- Refer to “CAMSHAFTS” on page 5-6.
- Lubricate the camshaft bearings, camshaft lobes and camshaft journals.
- First, install the exhaust camshaft.
- Align the camshaft marks with the camshaft cap marks.
- Turn the crankshaft counterclockwise several full turns to seat the parts.

g. Measure the valve clearance again.
h. If the valve clearance is still out of specification, repeat all of the valve clearance adjustment steps until the specified clearance is obtained.



10. Install:
● All removed parts

NOTE:

For installation, reverse the removal procedure. Note the following points.

EAS20570

SYNCHRONIZING THE THROTTLE BODIES

NOTE:

Prior to synchronizing the throttle bodies, the valve clearance and the engine idling speed

should be properly adjusted and the ignition timing should be checked.

- Stand the vehicle on a level surface.

NOTE:

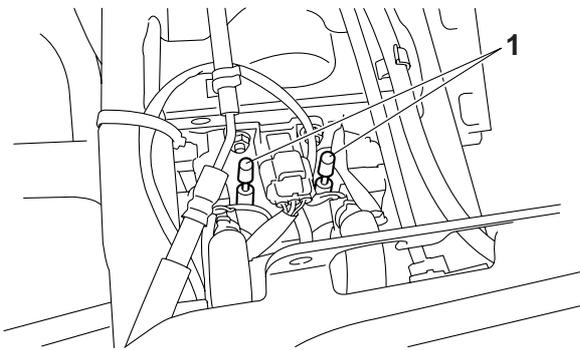
Place the vehicle on a suitable stand.

- Remove:

- Seat
Refer to "GENERAL CHASSIS" on page 4-1.
- Center cover
- Side cover (left and right)
Refer to "GENERAL CHASSIS" on page 4-1.

- Remove:

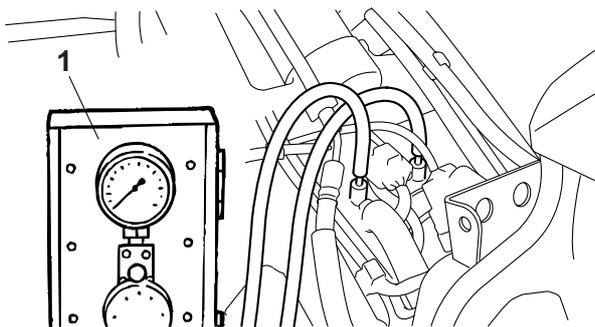
- Synchronizing pipe caps "1"



- Install:

- Vacuum gauge "1"
(onto the synchronizing hose)
- Digital tachometer

	<p>Vacuum gauge 90890-03094</p> <p>Carburetor synchronizer YU-44456</p>
---	---



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

- Check:

- Engine idling speed
Out of specification → Adjust.
Refer to "ADJUSTING THE ENGINE IDLING SPEED" on page 3-8.

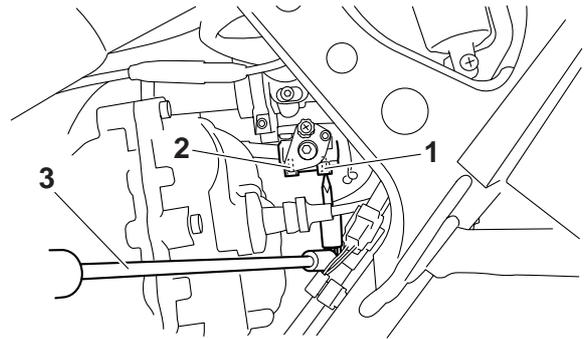


Engine idling speed
1100–1300 r/min

- Adjust:

- Throttle body synchronization

- Turn the throttle body #1 air screw "1", and #2 air screw "2". Using the carburetor angle driver "3".



NOTE:

- After each step, rev the engine two or three times, each time for less than a second, and check the synchronization again.
- If the air screw is removed, turn the screw 3/4 turn in and be sure to synchronize the throttle body.

ECA14900

CAUTION:

Do not use the throttle valve adjusting screws to adjust the throttle body synchronization.



Carburetor angle driver
90890-03158

Vacuum gauge
90890-03094

Carburetor synchronizer
YU-44456



Intake vacuum
33.0 kPa (9.7 inHg) (248 mmHg)

NOTE:

The difference in vacuum pressure between two throttle bodies should not exceed 1.33 kPa (10 mm Hg).

- Measure:

- Engine idling speed

Out of specification → Adjust.

Make sure that the vacuum pressure is within specification.

9. Stop the engine and remove the measuring equipment.
10. Adjust:
 - Throttle cable free play
Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-8.

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

11. Remove:
 - Vacuum gauge
12. Install:
 - Side cover (left and right)
 - Center cover
Refer to “GENERAL CHASSIS” on page 4-1.
 - Seat
Refer to “GENERAL CHASSIS” on page 4-1.

EAS20600

ADJUSTING THE EXHAUST GAS VOLUME

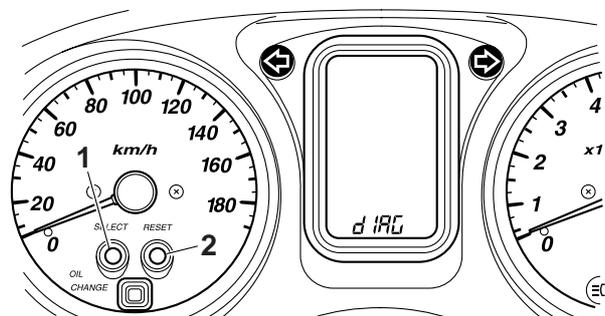
NOTE:

Be sure to set the CO density level to standard, and then adjust the exhaust gas volume.

1. Turn the main switch to “OFF” and set the engine stop switch to “ON”.
2. Simultaneously press and hold the “SELECT” “1” and “RESET” “2” buttons, turn the main switch to “ON”, and continue to press the buttons for 8 seconds or more.

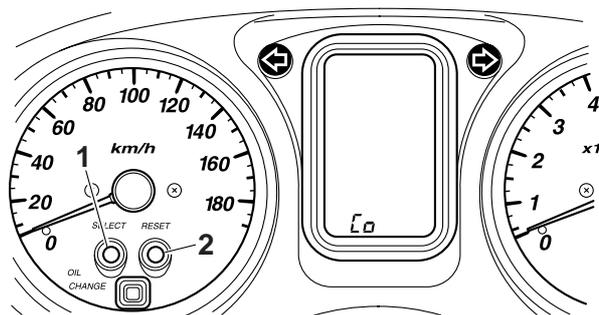
NOTE:

- All displays on the meter disappear except the clock and tripmeter displays.
- “diag” appears on the clock LCD.



3. Press the “SELECT” button to select the CO adjustment mode “CO” or the diagnostic mode “diag”.
4. After selecting “CO”, simultaneously press the “SELECT” “1” and “RESET” “2” buttons for 2 seconds or more to execute the selec-

tion.

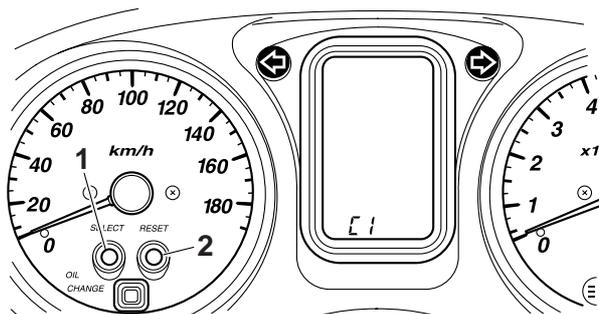


5. Press the “SELECT” “1” and “RESET” “2” buttons to select a cylinder.

NOTE:

The selected cylinder number appears on the clock LCD.

- To decrease the selected cylinder number, press the “RESET” button.
- To increase the selected cylinder number, press the “SELECT” button.



6. After selecting the cylinder, simultaneously press the “SELECT” and “RESET” buttons for 2 seconds or more to execute the selection.
7. Change the CO adjustment volume by pressing the “SELECT” “1” and “RESET” “2” buttons.

NOTE:

The CO adjustment volume appears on the tripmeter LCD.

- To decrease the CO adjustment volume, press the “RESET” button.
- To increase the CO adjustment volume, press the “SELECT” button.

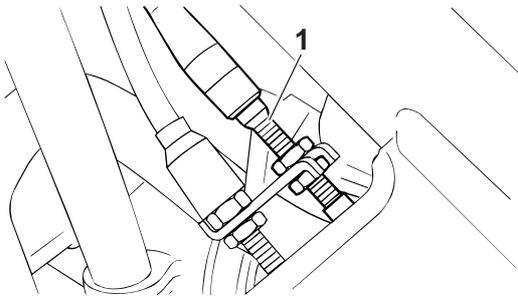
Refer to "GENERAL CHASSIS" on page 4-1.

3. Adjust:

- Throttle cable free play

NOTE:

When the throttle is opened, the accelerator cable "1" is pulled.



Throttle body side

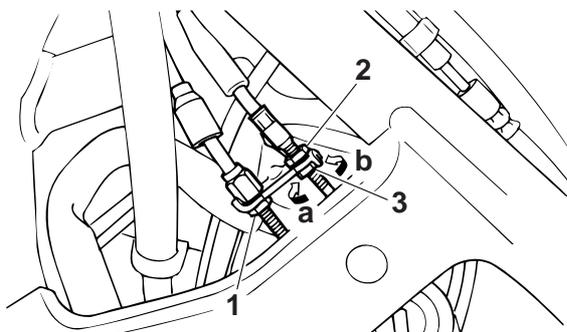
- Loosen the locknut "1" on the decelerator cable.
- Loosen the locknut "2" on the accelerator cable.
- Turn the adjusting nut "3" in direction "a" or "b" until the specified throttle cable free play is obtained.

Direction "a"
Throttle cable free play is increased.
Direction "b"
Throttle cable free play is decreased.

- Tighten the locknuts "1", "3".

NOTE:

If the specified throttle cable free play cannot be obtained on the throttle body side of the cable, use the adjusting nut on the handlebar side.



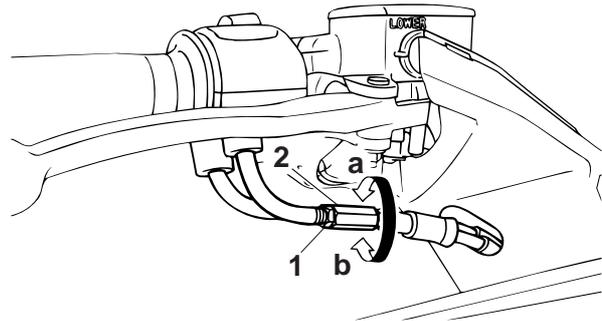
Handlebar side

- Loosen the locknut "1".

- Turn the adjusting nut "2" in direction "a" or "b" until the specified throttle cable free play is obtained.

Direction "a"
Throttle cable free play is increased.
Direction "b"
Throttle cable free play is decreased.

- Tighten the locknut "1".



- Slide the rubber cover to its original position.

EWA15B1010

WARNING

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

4. Install:

- Left side cover
- Center cover

Refer to "GENERAL CHASSIS" on page 4-1.

EAS20680

CHECKING THE SPARK PLUGS

The following procedure applies to all of the spark plugs.

1. Remove:

- Center cover
- Side cover (left and right)
- inner fender

Refer to "GENERAL CHASSIS" on page 4-1.

2. Disconnect:

- Spark plug cap

3. Remove:

- Spark plug

ECA13320

CAUTION:

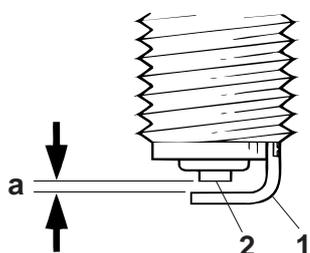
Before removing the spark plugs, blow away any dirt accumulated in the spark plug wells with compressed air to prevent it from falling

into the cylinders.

4. Check:
- Spark plug type
Incorrect → Change.



5. Check:
- Electrode "1"
Damage/wear → Replace the spark plug.
 - Insulator "2"
Abnormal color → Replace the spark plug.
Normal color is medium-to-light tan.



1R040201

6. Clean:
- Spark plug
(with a spark plug cleaner or wire brush)
7. Measure:
- Spark plug gap "a"
(with a wire thickness gauge)
Out of specification → Regap.



8. Install:
- Spark plug



NOTE: _____
Before installing the spark plug, clean the spark plug and gasket surface.

9. Connect:
- Spark plug
10. Install:
- Inner fender
 - Side cover (left and right)
 - Center cover
Refer to "GENERAL CHASSIS" on page 4-1.

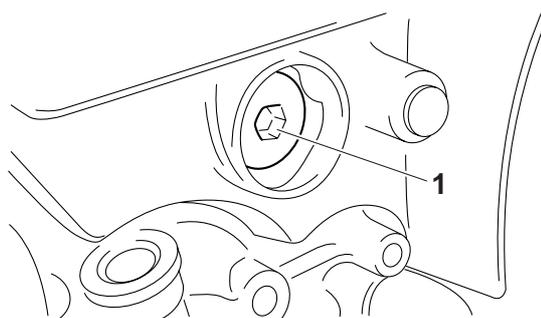
EAS20700

CHECKING THE IGNITION TIMING

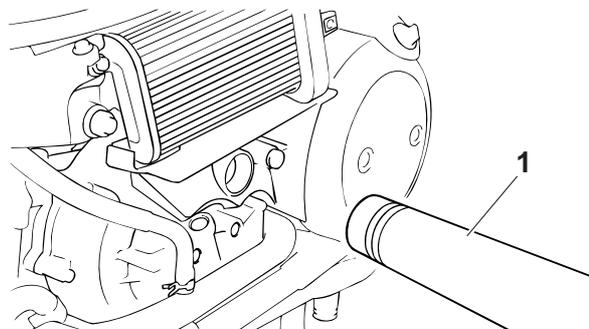
NOTE:

Prior to checking the ignition timing, check the wiring connections of the entire ignition system. Make sure all connections are tight and free of corrosion.

1. Remove:
- Center cover
 - Side cover (left and right)
 - Left footrest board
Refer to "GENERAL CHASSIS" on page 4-1.
2. Connect:
- Timing light "1"
 - Digital tachometer



3. Install:
- Timing light "1"
(onto the spark plug lead of cylinder #1)



4. Check:
- Ignition timing

- b. With the throttle wide open, crank the engine until the reading on the compression gauge stabilizes.

EWA12940

WARNING

To prevent sparking, ground all spark plug leads before cranking the engine.

NOTE:

The difference in compression pressure between cylinders should not exceed 100 kPa (1 kg/cm², 14 psi).

- c. If the compression pressure is above the maximum specification, check the cylinder head, valve surfaces and piston crown for carbon deposits.
Carbon deposits → Eliminate.
- d. If the compression pressure is below the minimum specification, pour a teaspoonful of engine oil into the spark plug bore and measure again.
Refer to the following table.

Compression pressure (with oil applied into the cylinder)	
Reading	Diagnosis
Higher than without oil	Piston ring(s) wear or damage → Repair.
Same as without oil	Piston, valves, cylinder head gasket or piston possibly defective → Repair.

8. Install:
 - Spark plug

	Spark plug 13 Nm (1.3 m•kg, 9.4 ft•lb)
---	--

9. Connect:
 - Spark plug cap
10. Install:
 - Inner fender
 - Footrest board (left and right)

Refer to “GENERAL CHASSIS” on page 4-1.

EAS20730

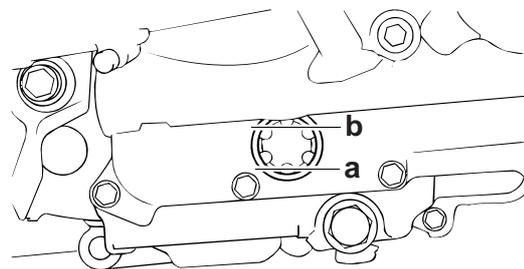
CHECKING THE ENGINE OIL LEVEL

1. Stand the vehicle on a level surface.

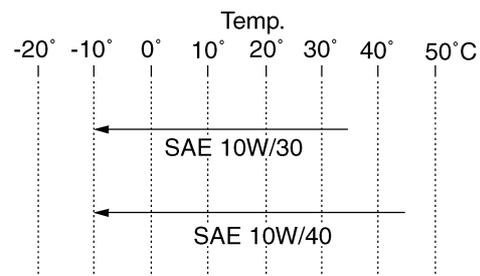
NOTE:

- Place the vehicle on a suitable stand.
- Make sure the vehicle is upright.

2. Start the engine, warm it up for several minutes, and then turn it off.
3. Wait two minutes until the oil settles, and then check the oil level through the check window located at the bottom-left side of the crankcase.
4. Check:
 - Engine oil level
The engine oil level should be between the minimum level mark “a” and maximum level mark “b”.
Below the minimum level mark → Add the recommended engine oil to the proper level.



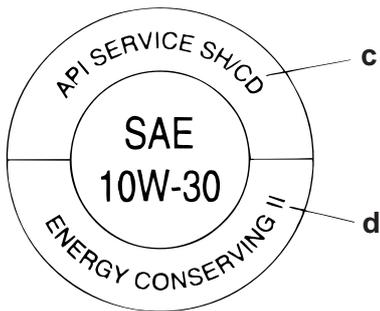
	<p>Type SAE10W30 or SAE10W40 Recommended engine oil grade API service SG type or higher, JASO standard MA</p>
---	---



ECA15B1035

CAUTION:

- Engine oil also lubricates the clutch and the wrong oil types or additives could cause clutch slippage. Therefore, do not add any chemical additives or use engine oils with a grade of CD “c” or higher and do not use oils labeled “ENERGY CONSERVING II” “b”.
- Do not allow foreign materials to enter the crankcase.



11750704

NOTE:

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

5. Start the engine, warm it up for several minutes, and then turn it off.
6. Check the engine oil level again.

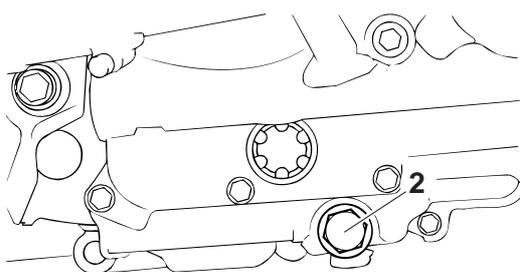
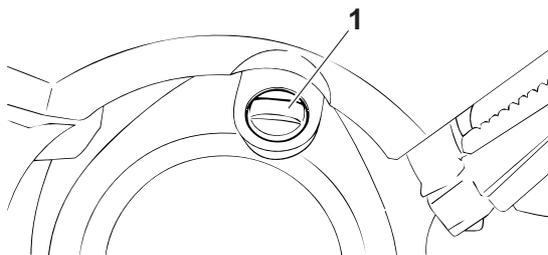
NOTE:

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

EAS20790

CHANGING THE ENGINE OIL

1. Start the engine, warm it up for several minutes, and then turn it off.
2. Place a container under the engine oil drain bolt.
3. Remove:
 - Engine oil filler cap "1"
 - Engine oil drain bolt "2" (along with the gasket)

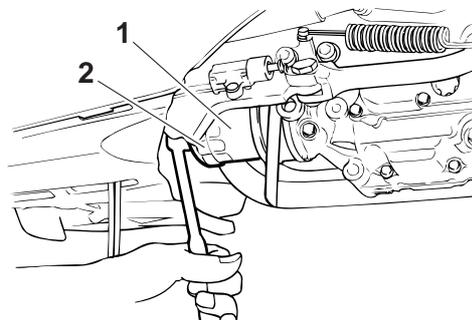


4. Drain:
 - Engine oil (completely from the crankcase)
5. If the oil filter cartridge is also to be replaced, perform the following procedure.



- a. Remove the oil filter cartridge "1" with an oil filter wrench "2".

	Oil filter wrench
	90890-01426
	YU-38411
	Oil filter wrench
	90890-01469
	YM-01469

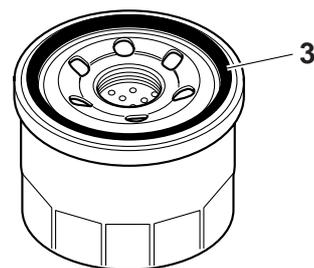


- b. Lubricate the O-ring "3" of the new oil filter cartridge with a thin coat of engine oil.

ECA13390

CAUTION:

Make sure the O-ring "3" is positioned correctly in the groove of the oil filter cartridge.



- c. Tighten the new oil filter cartridge to specification with an oil filter wrench.

	Oil filter cartridge
	17 Nm (1.7 m•kg, 12 ft•lb)



6. Check:
 - Engine oil drain bolt gasket
Damage → Replace.
7. Install:
 - Engine oil drain bolt
(along with the gasket)

	Engine oil drain bolt 43 Nm (4.3 m•kg, 31 ft•lb)
---	---

8. Fill:
 - Crankcase
(with the specified amount of the recommended engine oil)

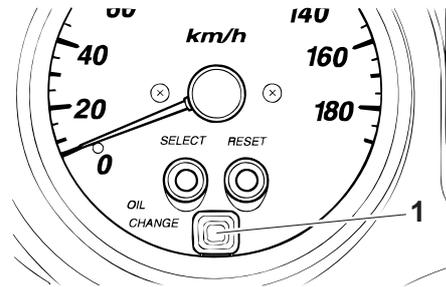
	Engine oil quantity Total amount 3.60 L (3.81 US qt) (3.17 Imp.qt) Without oil filter cartridge replacement 2.80 L (2.96 US qt) (2.46 Imp.qt) With oil filter cartridge replacement 2.90 L (3.07 US qt) (2.55 Imp.qt)
---	--

9. Install:
 - Engine oil filler cap
10. Start the engine, warm it up for several minutes, and then turn it off.
11. Check:
 - Engine
(for engine oil leaks)
12. Check:
 - Engine oil level
Refer to “CHECKING THE ENGINE OIL LEVEL” on page 3-12.
13. Reset:
 - Engine oil change indicator light

- a. Turn the key to “ON”.
- b. Hold the “OIL CHANGE” button “1” pushed for two to eight seconds.
- c. Release the “OIL CHANGE” button “1”, and the oil change indicator light will go off.

NOTE:
If the engine oil is changed before the oil change indicator light comes on (i.e. before the periodic oil change interval has been reached), the indicator light must be reset after the oil change for the next periodic oil change to be indicated at the correct time. To reset the oil change indicator light before the periodic oil change interval has been reached, follow the above procedure, but note that the indicator light will come on for 1.4 seconds after releasing the “OIL CHANGE”

button, otherwise repeat the procedure.



EAS20820

MEASURING THE ENGINE OIL PRESSURE

1. Check:
 - Engine oil level
Below the minimum level mark → Add the recommended engine oil to the proper level.
2. Remove:
 - Left lower side cover mole
Refer to “GENERAL CHASSIS” on page 4-1.
3. Start the engine, warm it up for several minutes, and then turn it off.

ECA13410

CAUTION:

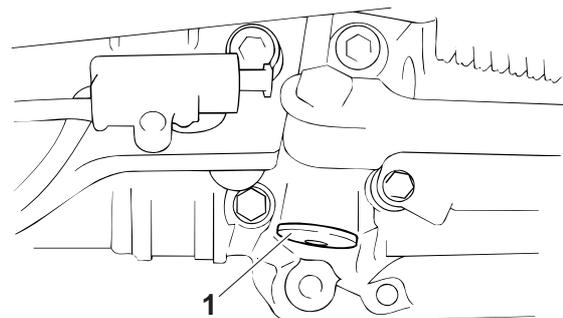
When the engine is cold, the engine oil will have a higher viscosity, causing the engine oil pressure to increase. Therefore, be sure to measure the engine oil pressure after warming up the engine.

4. Remove:
 - Main gallery bolt “1”
 - O-ring

EWA12980

WARNING

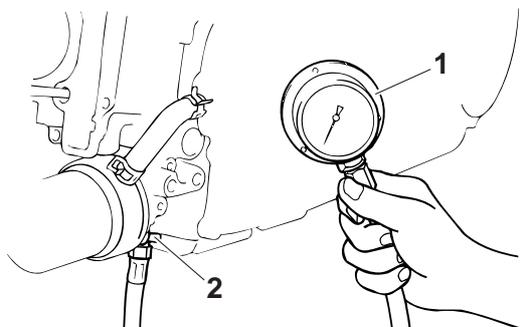
The engine, muffler and engine oil are extremely hot.



5. Install:
 - Oil pressure gauge “1”

- Adapter "2"

	<p>Pressure gauge 90890-03153</p> <p>Oil pressure adapter B 90890-03124</p>
---	---



6. Measure:

- Engine oil pressure
(at the following conditions)

	<p>Oil pressure (hot) 150.0 kPa/1200 r/min (21.8 psi/ 1200 r/min) (1.50 kgf/cm²/1200 r/ min)</p> <p>Oil temperature 70.0 °C (158.00 °F)</p>
--	--

Out of specification → Adjust.

Engine oil pressure	Possible causes
Below specification	<ul style="list-style-type: none"> • Faulty oil pump • Clogged oil filter • Leaking oil passage • Broken or damaged oil seal
Above specification	<ul style="list-style-type: none"> • Leaking oil passage • Faulty oil filter • Oil viscosity too high

7. Install:

- Main gallery bolt
- O-ring **New**

	<p>Main gallery bolt 12 Nm (1.2 m•kg, 8.7 ft•lb)</p>
---	---

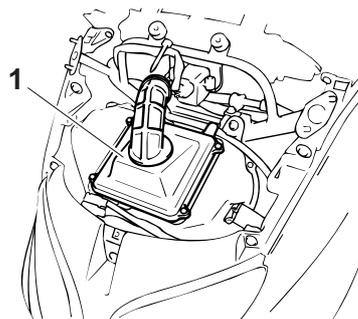
8. Install:

- Left lower side cover mole
Refer to "GENERAL CHASSIS" on page 4-1.

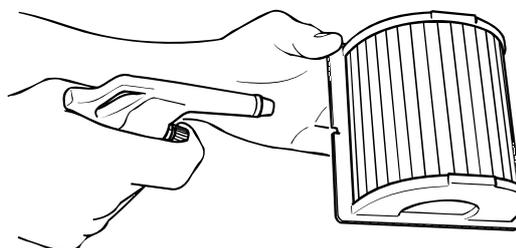
EAS20920

CLEANING THE AIR FILTER ELEMENT

1. Remove:
 - Front cowling upper cover
 - Windshield
 - Front cowling inner panel
Refer to "GENERAL CHASSIS" on page 4-1.
2. Remove:
 - Air filter case cover "1"
 - Air filter element



3. Clean:
 - Air filter element
Apply compressed air to the outer surface of the air filter element.



4. Check:
 - Air filter element
Damage → Replace.
5. Install:
 - Air filter element
 - Air filter case cover
(along with the gasket)

ECA1B706

CAUTION:

Never operate the engine without the air filter element installed. Unfiltered air will cause rapid wear of engine parts and may damage the engine. Operating the engine without the air filter element will also affect carburetor synchronization, leading to poor engine performance and possible overheating.

NOTE:

- Make sure the air filter element is properly in-

stalled in the air filter case.

- Make sure the air filter is installed with its mesh side facing towards the rear of the vehicle.

6. Install:

- Front cowling inner panel
- Windshield
- Front cowling upper cover

Refer to "GENERAL CHASSIS" on page 4-1.

EAS20980

CLEANING THE V-BELT CASE AIR FILTER ELEMENT

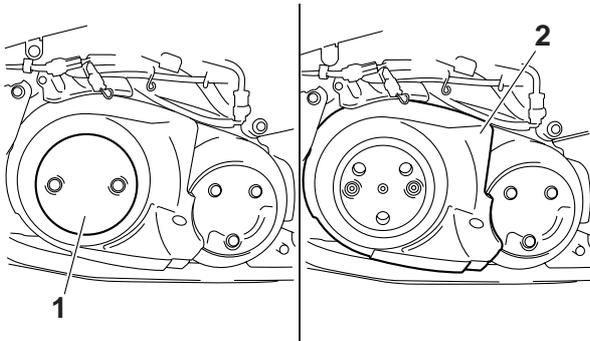
1. Remove:

- Left upper side cover mole
- Left footrest board

Refer to "GENERAL CHASSIS" on page 4-1.

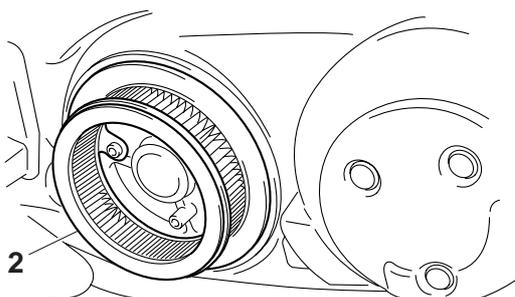
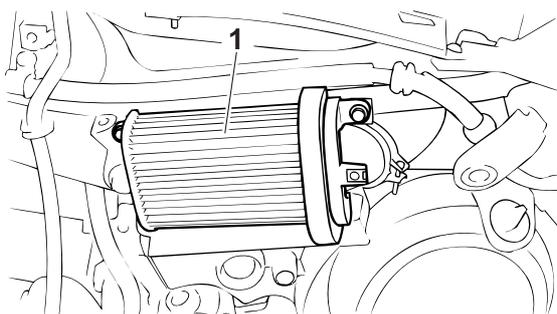
2. Remove:

- V-belt case cover 2 "1"
- V-belt case air filter cover "2"



3. Remove:

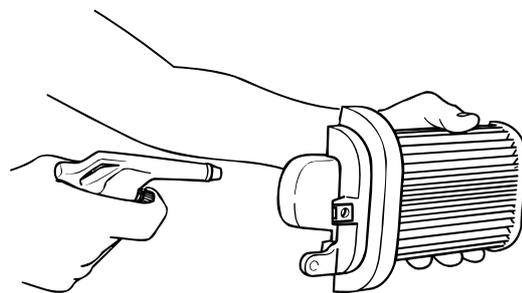
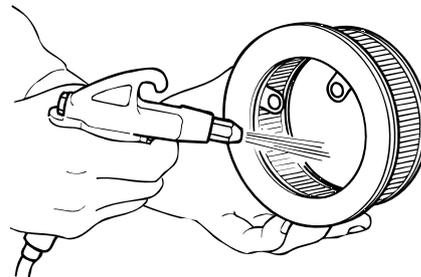
- V-belt case air filter element (left) "1"
- V-belt case air filter element (right) "2"



4. Clean:

- V-belt case air filter element

Blow the compressed air to the outer surface of the V-belt case air filter element.



5. Check:

- V-belt case air filter element

Damage → Replace.

ECA13440

CAUTION:

Since the V-belt case air filter element is a dry type, do not let grease or water contact it.

6. Install:

- V-belt case air filter element
- V-belt case air filter cover seal
- V-belt case air filter cover
- V-belt case air filter cover screw



**V-belt case air filter cover screw
7 Nm (0.7 m•kg, 5.1 ft•lb)**

7. Install:

- Left footrest board
- Left upper side cover mole

Refer to "GENERAL CHASSIS" on page 4-1.

EAS21010

CHECKING THE THROTTLE BODY JOINTS AND INTAKE MANIFOLDS

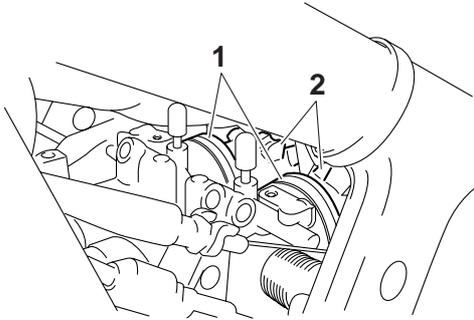
The following procedure applies to all of the throttle body joints and intake manifolds.

1. Remove:

- Leg shield

Refer to "GENERAL CHASSIS" on page 4-1.

2. Check:
 - Throttle body joints “1”
Cracks/damage → Replace.
 - Intake manifolds “2”
Cracks/damage → Replace.
 Refer to “THROTTLE BODIES” on page 7-4.



3. Install:
 - Leg shield
Refer to “GENERAL CHASSIS” on page 4-1.

EAS21030

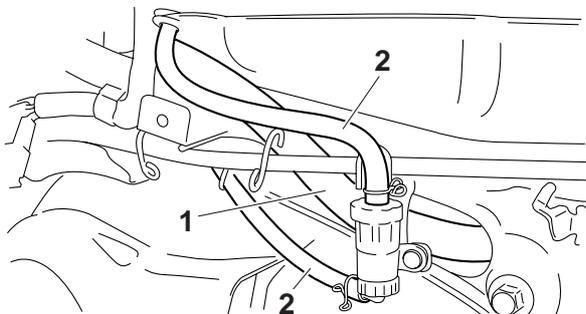
CHECKING THE FUEL HOSES AND FUEL TANK BREATHER HOSE

The following procedure applies to all of the fuel, vacuum and breather hoses.

1. Remove:
 - Right footrest board
 - Right upper side cover mole
Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
 - Fuel hose “1”
 - Fuel tank breather hose “2”
Cracks/damage → Replace.

ECA14940

CAUTION: _____
Make sure the fuel tank breather hose is routed correctly.



3. Install:
 - Right upper side cover mole
 - Right footrest board
Refer to “GENERAL CHASSIS” on page 4-1.

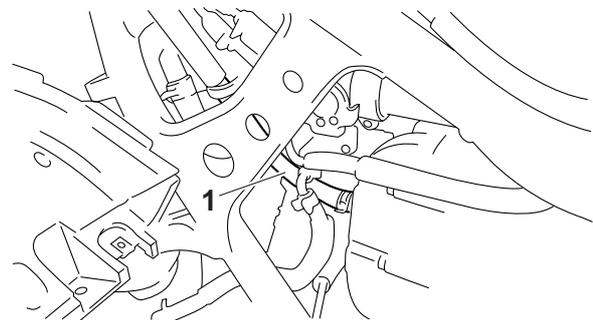
EAS21070

CHECKING THE CYLINDER HEAD BREATHER HOSE

1. Remove:
 - Leg shield
Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
 - Cylinder head breather hose “1”
Cracks/damage → Replace.
 - Loose connection → Connect properly.

ECA15B1036

CAUTION: _____
Make sure the cylinder head breather hose is routed correctly.



3. Install:
 - Leg shield
Refer to “GENERAL CHASSIS” on page 4-1.

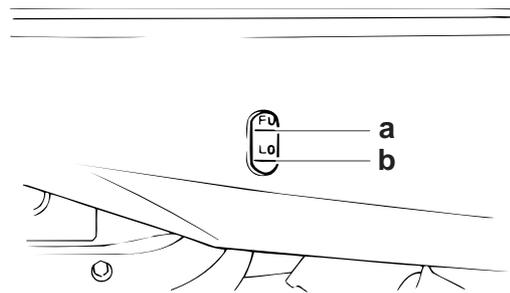
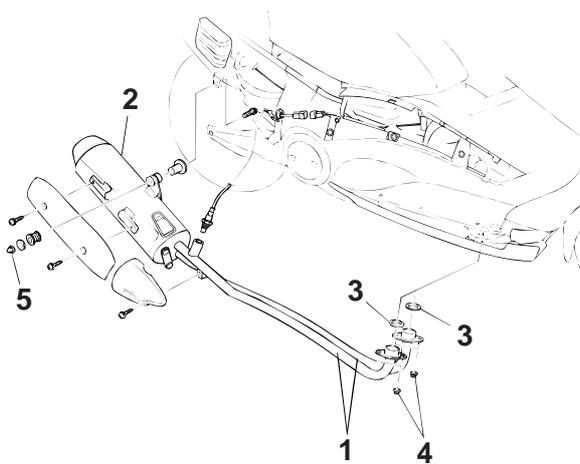
EAS21080

CHECKING THE EXHAUST SYSTEM

The following procedure applies to all of the exhaust pipes and gaskets.

1. Remove:
 - Right rear side cover
Refer to “GENERAL CHASSIS” on page 4-1.
 - Inner fender
Refer to “GENERAL CHASSIS” on page 4-1.
2. Check:
 - Exhaust pipe “1”
 - Muffler “2”
Cracks/damage → Replace.
 - Gasket “3”
Exhaust gas leaks → Replace.
3. Check:
 - Tightening torque

	Exhaust pipe nut “4”
	20 Nm (2.0 m•kg, 14 ft•lb)
	Muffler nut “5”
	31 Nm (3.1 m•kg, 22 ft•lb)



4. Install:

- Inner fender
Refer to "GENERAL CHASSIS" on page 4-1.
- Right rear side cover
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21110

CHECKING THE COOLANT LEVEL

1. Stand the vehicle on a level surface.

NOTE:

- Place the vehicle on a suitable stand.
- Make sure the vehicle is upright.

2. Check:

- Coolant level

The coolant level should be between the maximum level mark "a" and minimum level mark "b".

Below the minimum level mark → Add the recommended coolant to the proper level.

ECA13470

CAUTION:

- Adding water instead of coolant lowers the antifreeze content of the coolant. If water is used instead of coolant check, and if necessary, correct the antifreeze concentration of the coolant.
- Use only distilled water. However, if distilled water is not available, soft water may be used.

3. Start the engine, warm it up for several minutes, and then turn it off.

4. Check:

- Coolant level

NOTE:

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

EAS21120

CHECKING THE COOLING SYSTEM

1. Remove:

- Footrest board (left and right)
- Leg shield
- Inner fender

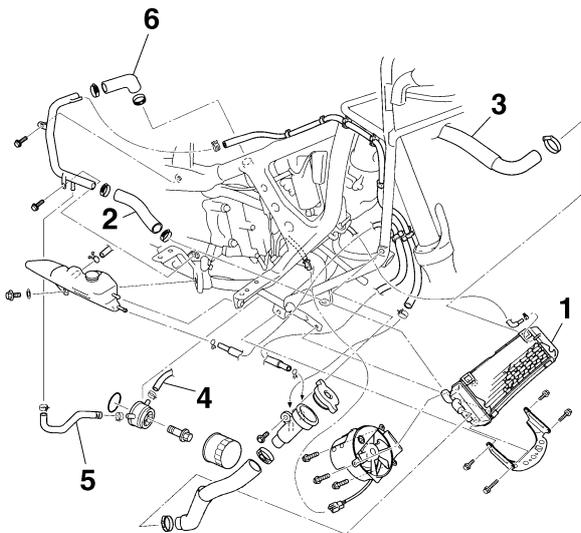
Refer to "GENERAL CHASSIS" on page 4-1.

2. Check:

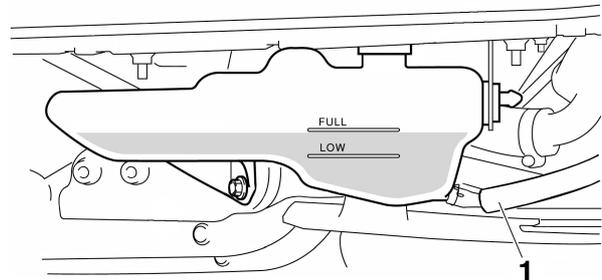
- Radiator "1"
- Radiator inlet hose "2"
- Radiator outlet hose "3"
- Oil cooler inlet hose "4"
- Oil cooler outlet hose "5"
- Water jacket outlet joint "6"
- Water jacket inlet joint "7"
- Water pump inlet pipe "8"
- Water pump outlet pipe "9"

Cracks/damage → Replace.

Refer to "RADIATOR" on page 6-1, "THERMOSTAT" on page 6-5 and "WATER PUMP" on page 6-7.



- Lower side cover mole (left and right)
 - Inner fender
- Refer to "GENERAL CHASSIS" on page 4-1.
2. Disconnect:
 - Coolant reservoir hose "1"



3. Drain:
 - Coolant
(from the coolant reservoir)
4. Remove:
 - Radiator cap "1"

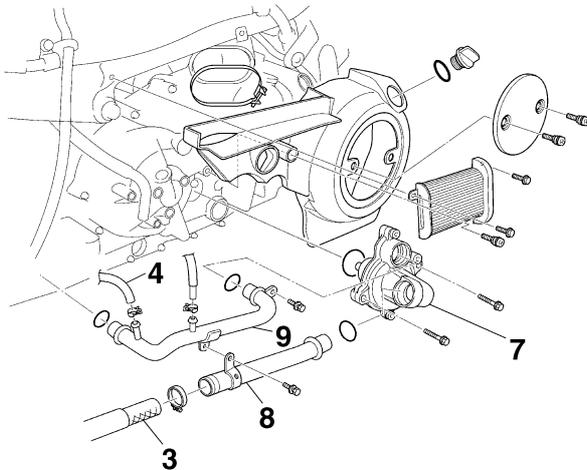
EWA13030

⚠ WARNING

A hot radiator is under pressure. Therefore, do not remove the radiator cap when the engine is hot. Scalding hot fluid and steam may be blown out, which could cause serious injury. When the engine has cooled, open the radiator cap as follows:

Place a thick rag or a towel over the radiator cap and slowly turn the radiator cap counterclockwise toward the detent to allow any residual pressure to escape. When the hissing sound has stopped, press down on the radiator cap and turn it counterclockwise to remove.

The following procedure applies to all of the coolant drain bolts and copper washers.



3. Install:
 - Inner fender
 - Leg shield
 - Footrest board (left and right)

Refer to "GENERAL CHASSIS" on page 4-1.

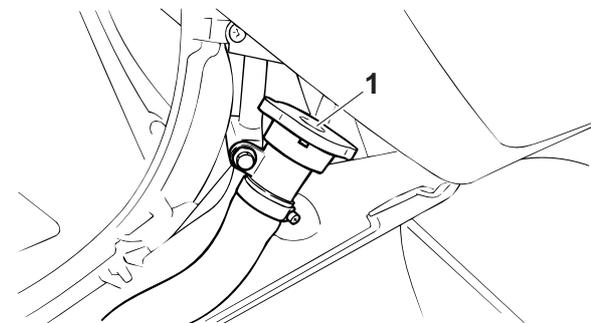
EAS21130

CHANGING THE COOLANT

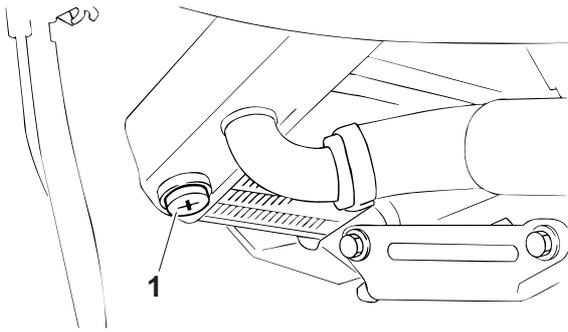
1. Remove:
 - Left footrest board mat
 - Front side cover mole (left and right)

Refer to "GENERAL CHASSIS" on page 4-1.

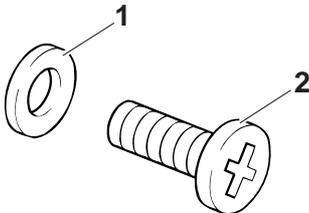
 - Coolant reservoir cap access panel



5. Remove:
 - Coolant drain bolt (engine) "1"
(along with the copper washer)



6. Drain:
 - Coolant (from the engine and radiator)
7. Check:
 - Rubber washer "1"
 - Drain bolt "2"



8. Install:
 - Coolant drain bolt (water pump)



Coolant drain bolt (water pump)
1.6 Nm (0.16 m•kg, 1.2 ft•lb)

9. Connect:
 - Coolant reservoir hose
10. Fill:
 - Cooling system (with the specified amount of the recommended coolant)



Recommended antifreeze
High-quality ethylene glycol anti-freeze containing corrosion inhibitors for aluminum engines
Mixing ratio
1:1 (antifreeze:water)

- Radiator capacity (including all routes)
 1.50 L (1.59 US qt) (1.32 Imp.qt)
- Coolant reservoir capacity (up to the maximum level mark)
 0.35 L (0.37 US qt) (0.31 Imp.qt)

Handling notes for coolant

Coolant is potentially harmful and should be

handled with special care.

EWA13040

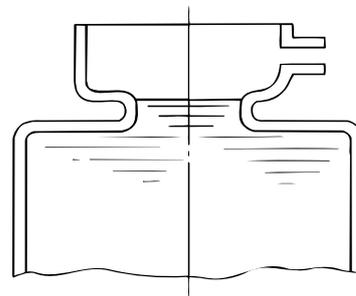
WARNING

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

ECA13480

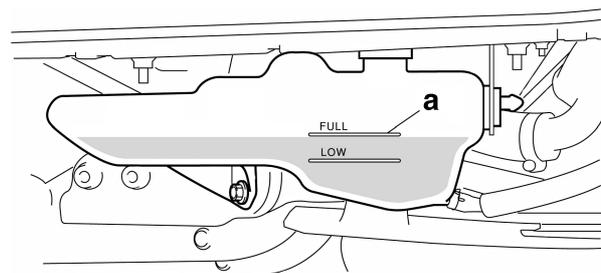
CAUTION:

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



14110501

11. Install:
 - Radiator cap
12. Fill:
 - Coolant reservoir (with the recommended coolant to the maximum level mark "a")



13. Install:

- Coolant reservoir cap

14. Start the engine, warm it up for several minutes, and then stop it.

15. Check:

- Coolant level
Refer to "CHECKING THE COOLANT LEVEL" on page 3-18.

NOTE:

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

16. Install:

- Inner fender
- Lower side cover mole (left and right)
- Coolant reservoir cap access panel
Refer to "GENERAL CHASSIS" on page 4-1.
- Front side cover mole (left and right)
- Left footrest board mat
Refer to "GENERAL CHASSIS" on page 4-1.

EAS21140

CHASSIS

EAS21240

CHECKING THE BRAKE FLUID LEVEL

1. Stand the vehicle on a level surface.

NOTE: _____

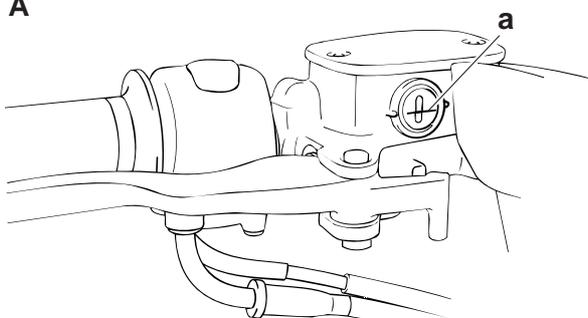
- Place the vehicle on a suitable stand.
- Make sure the vehicle is upright.

2. Check:

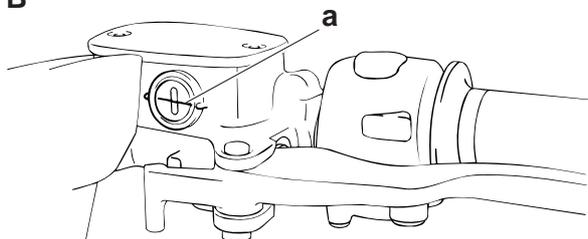
- Brake fluid level
Below the minimum level mark "a" → Add the recommended brake fluid to the proper level.



A



B



A. Front brake

B. Rear brake

EWA13090

WARNING _____

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

the brake fluid and could cause vapor lock.

ECA13540

CAUTION: _____

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

NOTE: _____

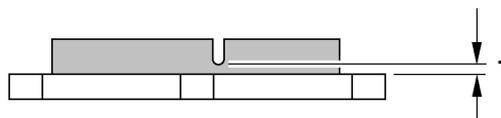
In order to ensure a correct reading of the brake fluid level, make sure the top of the brake fluid reservoir is horizontal.

EAS21250

CHECKING THE FRONT BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
 - Front brake pad
Wear indicator groove almost disappeared "1" → Replace the brake pads as a set.
Refer to "FRONT BRAKE" on page 4-21.



EAS21260

CHECKING THE REAR BRAKE PADS

The following procedure applies to all of the brake pads.

1. Operate the brake.
2. Check:
 - Rear brake pad
Wear indicators "1" almost touch the brake disc → Replace the brake pads as a set.
Refer to "REAR BRAKE" on page 4-34.



EAS21280

CHECKING THE FRONT BRAKE HOSES

The following procedure applies to all of the brake hoses and brake hose clamps.

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

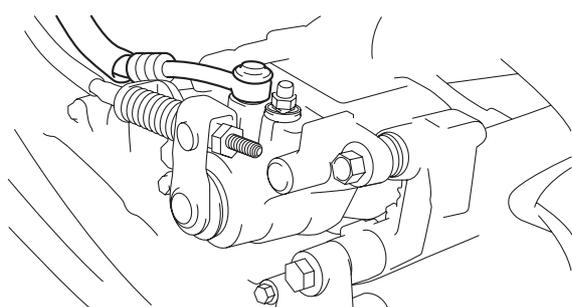


2. Check:
 - Brake hose clamp
Loose → Tighten the clamp bolt.
3. Hold the vehicle upright and apply the brake several times.
4. Check:
 - Brake hose
Brake fluid leakage → Replace the damaged hose.
Refer to "FRONT BRAKE" on page 4-21.

EAS21290

CHECKING THE REAR BRAKE HOSE

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



2. Check:
 - Brake hose clamp
Loose Connection → Tighten the clamp bolt.
3. Hold the vehicle upright and apply the front brake several times.
4. Check:
 - Brake hose
Brake fluid leakage → Replace the damaged hose.
Refer to "REAR BRAKE" on page 4-34.

EAS21320

ADJUSTING THE REAR BRAKE LOCK LEVER CABLE

EWA15B2001

WARNING

Do not apply the rear brake lock lever when riding.

NOTE:

- Place the vehicle on a suitable stand.
- Before adjusting the rear brake lock lever, check the rear brake fluid level.

1. Measure:
 - Rear brake lock lever cable length "a"
Out of specification → Adjust.



**Rear brake lock lever cable length
45–47 mm (1.77–1.85 in)**

2. Adjust:
 - Rear brake lock lever cable length

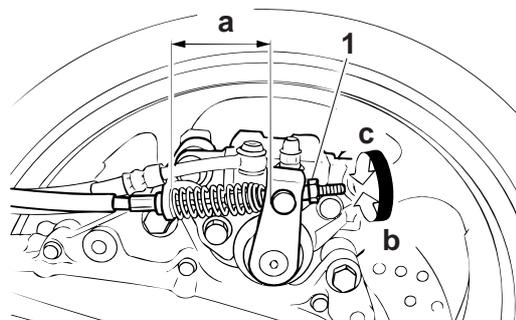
- a. Turn the adjusting nut "1" in direction "b" or "c" until the rear brake lock lever cable length "a" is 42–44 mm (1.65–1.73 in) when the rear brake lock lever is released.
- b. Slowly apply the rear brake several times.
- c. Set the rear brake lock lever and wait more than "5" minutes.
- d. Release the rear brake lock lever.
- e. Turn the adjusting nut "1" in direction "b" or "c" until the rear brake lock lever cable length "a" is 45–47 mm (1.77–1.85 in).

Direction "b"

Rear brake lock lever cable length is increased.

Direction "c"

Rear brake lock lever cable length is decreased.



der.

1st: Front brake caliper

2nd: Rear brake caliper

EWA15B1006

WARNING

Bleed the ABS whenever:

- the system is disassembled.
- a brake hose is loosened, disconnected or replaced.
- the brake fluid level is very low.
- brake operation is faulty.

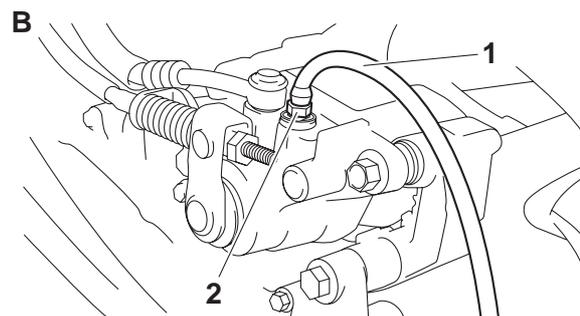
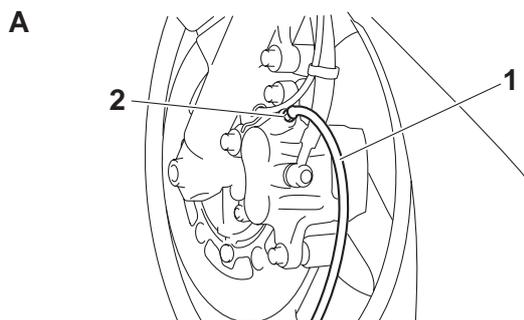
NOTE:

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

1. Bleed:

- ABS

- a. Fill the brake master cylinder reservoir to the proper level with the recommended brake fluid.
- b. Install the brake master cylinder reservoir diaphragm.
- c. Connect a clear plastic hose "1" tightly to the bleed screw "2".



A. Front
B. Rear

- d. Place the other end of the hose into a container.
- e. Slowly apply the brake several times.
- f. Fully squeeze the brake lever and do not release it.
- g. Loosen the bleed screw.

NOTE:

Loosening the bleed screw will release the pressure and cause the brake levers to contact the handlebar.

- h. Tighten the bleed screw, and then release the brake lever.
- i. Repeat steps (e) to (h) until all of the air bubbles have disappeared from the brake fluid in the plastic hose.
- j. Check the operation of the hydraulic unit. Refer to "HYDRAULIC UNIT OPERATION TEST" on page 4-49.

ECA15B1017

CAUTION:

Make sure that the main switch is set to "OFF" before checking the operation of the hydraulic unit.

- k. After operating the ABS, repeat steps (e) to (i), and then fill the primary circuit with 60 cm³ (2.11 Imp oz, 2.03 US oz) of the recommended brake fluid.
- l. Tighten the bleed screw to the specified torque.

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

- m. Fill the brake fluid reservoir to the proper level with the recommended brake fluid. Refer to "CHECKING THE BRAKE FLUID LEVEL".

EWA15B1007

WARNING

After bleeding the ABS, check the brake op-

eration.



EAS21480

CHECKING THE CHAIN DRIVE OIL LEVEL

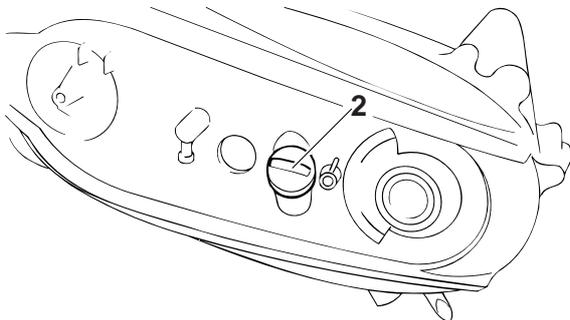
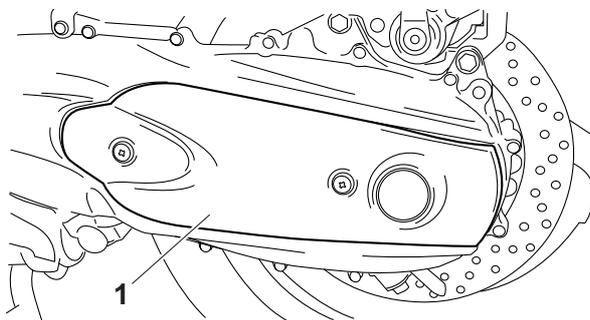
1. Stand the vehicle on a level surface.

NOTE:

- Place the vehicle on a suitable stand.
- Make sure that the vehicle is up right.

2. Remove:

- Chain drive case cover "1"
- Chain drive oil filler cap "2"



3. Check:

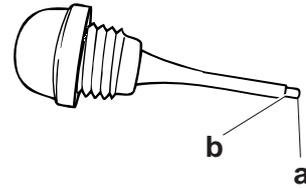
- Chain drive oil level

Wipe the dipstick clean, insert it into the oil filler hole (without screw it in), and then remove it to check the oil level.

The chain drive oil level should be between the minimum level mark "a" and maximum level mark "b".

Below the minimum level mark → Add the recommended transfer oil to the proper level.

	Type SAE80 API GL-4 Hypoid gear oil
---	--



4. Install:

- Chain drive oil filler cap
- Chain drive case cover

EAS21490

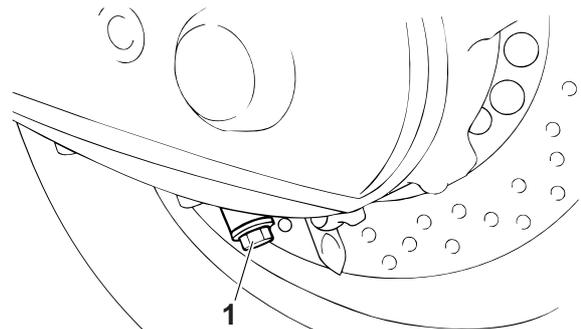
CHANGING THE CHAIN DRIVE OIL

1. Place a container under the chain drive.

2. Remove:

- Chain drive oil drain bolt "1"
- Chain drive oil filler cap

Completely drain the chain drive of its oil.



3. Check:

- Drain bolt gasket
Damage → Replace.

4. Install:

- Chain drive oil drain bolt

	Chain drive oil drain bolt 20 Nm (2.0 m•kg, 14 ft•lb)
---	--

5. Fill:

- Chain drive oil
(with the specified amount of the recommended chain drive oil)

	Quantity 0.70 L (0.74 US qt) (0.62 Imp.qt)
---	---

6. Check:

- Chain drive oil level
Refer to "CHECKING THE CHAIN DRIVE OIL LEVEL" on page 3-26.

EAS21500

CHECKING AND ADJUSTING THE STEERING HEAD

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

NOTE:

Place the vehicle on a suitable stand so that the front wheel is elevated.

2. Check:

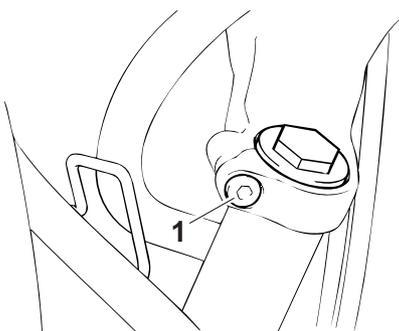
- Steering head
Grasp the bottom of the front fork legs and gently rock the front fork.
Binding/looseness → Adjust the steering head.

3. Remove:

- Handlebar
Refer to "HANDLEBAR" on page 4-53.

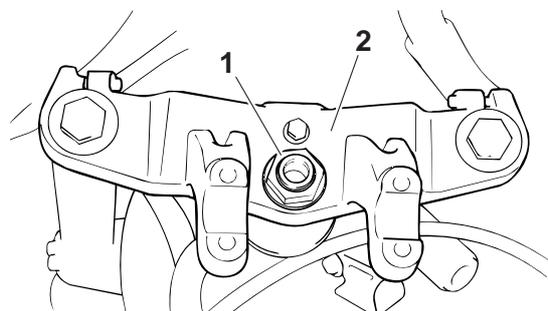
4. Loosen:

- Upper bracket pinch bolts "1"



5. Remove:

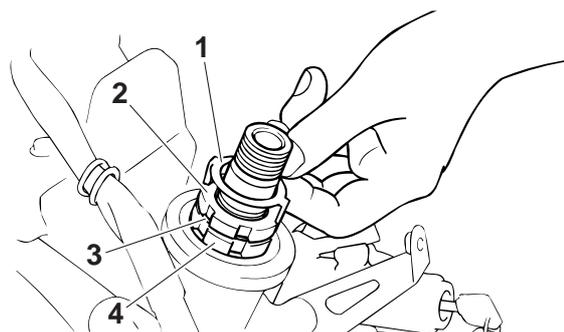
- Steering stem nut "1"
- Upper bracket "2"



6. Adjust:

- Steering head

a. Remove the lock washer "1", the upper ring nut "2", and the rubber washer "3".



b. Loosen the lower ring nut "4" and then tighten it to specification with a steering nut wrench "5".

NOTE:

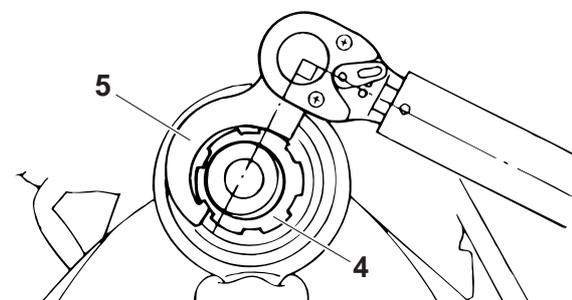
Set the torque wrench at a right angle to the steering nut wrench.



Steering nut wrench
90890-01403
Spanner wrench
YU-33975



Lower ring nut (initial tightening torque)
20 Nm (2.0 m•kg, 14 ft•lb)



c. Loosen the lower ring nut "4" completely, then tighten it to specification.

EWA13140

WARNING

Do not overtighten the lower ring nut.



Lower ring nut (final tightening torque)
20 Nm (2.0 m•kg, 14 ft•lb)

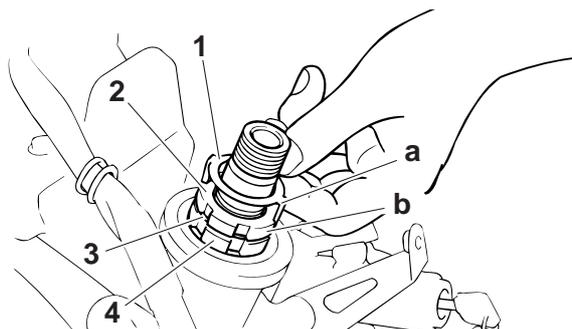
d. Check the steering head for looseness or binding by turning the front fork all the way in both directions. If any binding is felt, remove the lower bracket and check the upper and lower bearings.

Refer to "STEERING HEAD" on page 4-64.

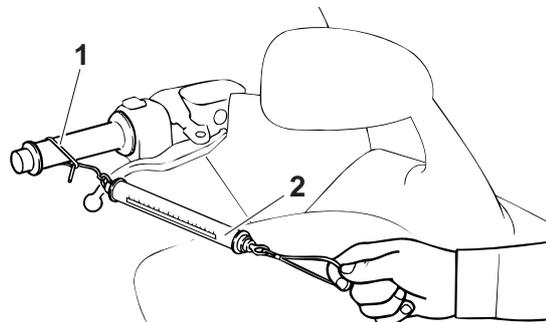
- e. Install the rubber washer "3".
- f. Install the upper ring nut "2".
- g. Finger tighten the upper ring nut "2", then align the slots of both ring nuts. If necessary, hold the lower ring nut and tighten the upper ring nut until their slots are aligned "1".
- h. Install the lock washer.

NOTE:

Make sure the lock washer tabs "a" sit correctly in the ring nut slots "b".



- b. Install a plastic locking tie "1" loosely around the end of the handlebar as shown.
- c. Hook a spring gauge "2" onto the plastic locking tie.



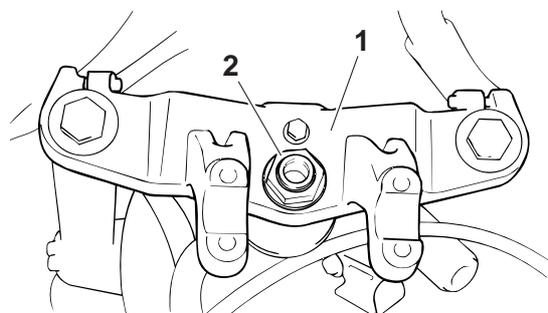
- d. Hold the spring gauge at a 45° angle from the handlebar, pull the spring gauge, and then record the measurement when the handlebar starts to run.



Steering head tension
1.96–4.90 N (200–500 gf)
(7.06–17.65 oz)

7. Install:

- Upper bracket "1"
- Steering stem nut "2"



8. Tighten:

- Upper bracket pinch bolt
- Steering stem nut



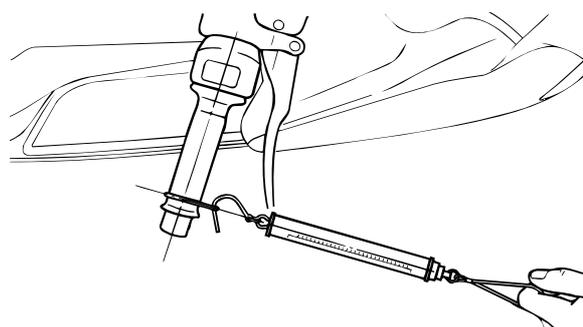
Upper bracket pinch bolt
30 Nm (3.0 m•kg, 22 ft•lb)
Steering stem nut
110 Nm (11.0 m•kg, 80 ft•lb)

9. Measure:

- Steering head tension

NOTE:

Make sure all of the cables and wires are properly routed.



- e. Repeat the above procedure on the opposite handlebar.
- f. If the steering head tension is out of specification (both handlebars should be within specification), remove the upper bracket and loosen or tighten the upper ring nut.
- g. Reinstall the upper bracket and measure the steering head tension again as described above.
- h. Repeat the above procedure until the steering head tension is within specification.
- i. Grasp the bottom of the front fork legs and gently rock the front fork. Binding/looseness → Adjust the steering head.

- a. Point the front wheel straight ahead.

EAS21530

CHECKING THE FRONT FORK

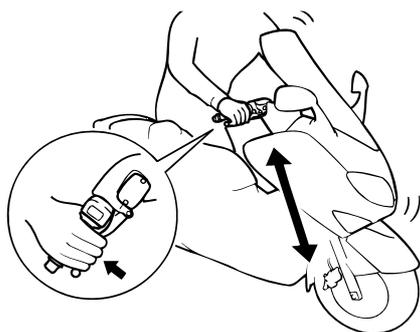
1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

2. Check:
 - Inner tube
Damage/scratches → Replace.
 - Oil seal
Oil leakage → Replace.
3. Hold the vehicle upright and apply the front brake.
4. Check:
 - Front fork operation
Push down hard on the handlebar several times and check if the front fork rebounds smoothly.
Rough movement → Repair.
Refer to "FRONT FORK" on page 4-57.

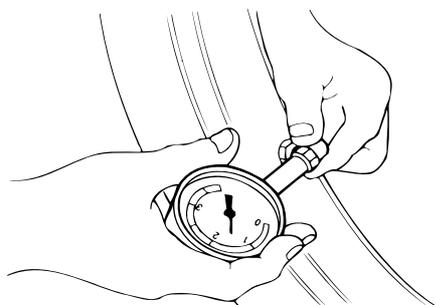


EAS21650

CHECKING THE TIRES

The following procedure applies to both of the tires.

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



I2070102

EWA13180

WARNING

- The tire pressure should only be checked and regulated when the tire temperature

equals the ambient air temperature.

- The tire pressure and the suspension must be adjusted according to the total weight (including cargo, rider, passenger and accessories) and the anticipated riding speed.
- Operation of an overloaded vehicle could cause tire damage, an accident or an injury.
NEVER OVERLOAD THE VEHICLE.



Tire air pressure (measured on cold tires)

Loading condition

0–90 kg (0–198 lb)

Front

225 kPa (33 psi) (2.25 kgf/cm²)
(2.25 bar)

Rear

250 kPa (36 psi) (2.50 kgf/cm²)
(2.50 bar)

Loading condition

XP500 90–188 kg (198–414 lb)

XP500A 90–183 kg (198–403 lb)

XP500W 90–190 kg (198–419 lb)

Front

225 kPa (33 psi) (2.25 kgf/cm²)
(2.25 bar)

Rear

280 kPa (41 psi) (2.80 kgf/cm²)
(2.80 bar)

Maximum load

XP500 188 kg (414 lb)

XP500A 183 kg (403 lb)

XP500W 190 kg (419 lb)

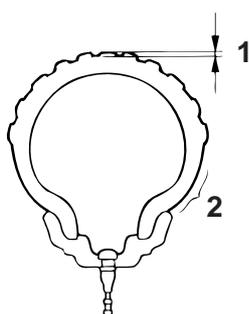
*Total weight of rider, passenger, cargo and accessories

EWA13190

WARNING

It is dangerous to ride with a worn-out tire. When the tire tread reaches the wear limit, replace the tire immediately.

2. Check:
 - Tire surfaces
Damage/wear → Replace the tire.



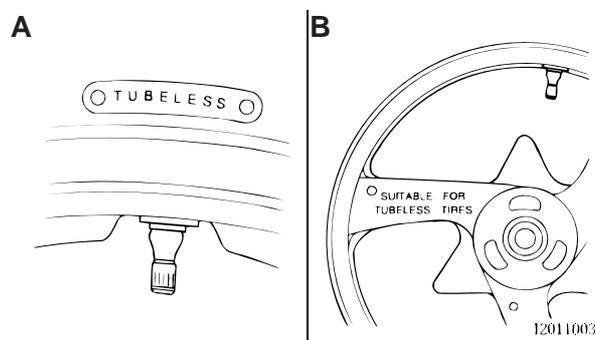
1. Tire tread depth
2. Side wall

	Wear limit (front)
	1.6 mm (0.06 in)
	Wear limit (rear)
	1.6 mm (0.06 in)

EWA14080

WARNING

- Do not use a tubeless tire on a wheel designed only for tube tires to avoid tire failure and personal injury from sudden deflation.
- When using a tube tire, be sure to install the correct tube.
- Always replace a new tube tire and a new tube as a set.
- To avoid pinching the tube, make sure the wheel rim band and tube are centered in the wheel groove.
- Patching a punctured tube is not recommended. If it is absolutely necessary to do so, use great care and replace the tube as soon as possible with a good quality replacement.



- A. Tire
- B. Wheel

Tube wheel	Tube tire only
Tubeless wheel	Tube or tubeless tire

EWA14090

WARNING

After extensive tests, the tires listed below have been approved by Yamaha Motor Co., Ltd. for this model. The front and rear tires should always be by the same manufacturer and of the same design. No guarantee concerning handling characteristics can be given if a tire combination other than one approved by Yamaha is used on this vehicle.

	Front tire
	Size
	120/70R14 M/C 55H
	Manufacturer/model
	DUNLOP/D252F
	Manufacturer/model
	BRIDGESTONE/TH01F

	Rear tire
	Size
	160/60R15 M/C 67H
	Manufacturer/model
	DUNLOP/D252
	Manufacturer/model
	BRIDGESTONE/TH01R

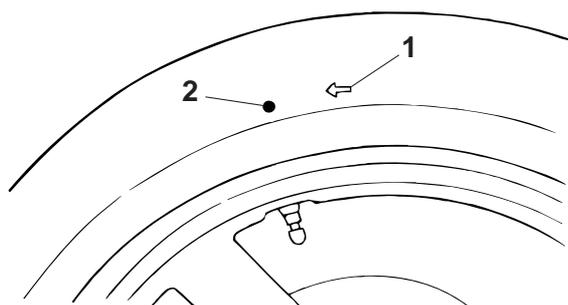
EWA13210

WARNING

New tires have a relatively low grip on the road surface until they have been slightly worn. Therefore, approximately 100 km should be traveled at normal speed before any high-speed riding is done.

NOTE:

- For tires with a direction of rotation mark "1":
- Install the tire with the mark pointing in the direction of wheel rotation.
 - Align the mark "2" with the valve installation point.



EAS21670

CHECKING THE WHEELS

The following procedure applies to both of the wheels.

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

EWA13260



WARNING

Never attempt to make any repairs to the wheel.

NOTE:

After a tire or wheel has been changed or replaced, always balance the wheel.

EAS21690

CHECKING AND LUBRICATING THE CABLES

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

EWA13270



WARNING

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

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



Recommended lubricant
Engine oil or a suitable cable lubricant

NOTE:

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

EAS21700

LUBRICATING THE LEVERS

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



Recommended lubricant
Lithium-soap-based grease

EAS21720

LUBRICATING THE SIDESTAND

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



Recommended lubricant
Lithium-soap-based grease

EAS21730

LUBRICATING THE CENTERSTAND

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



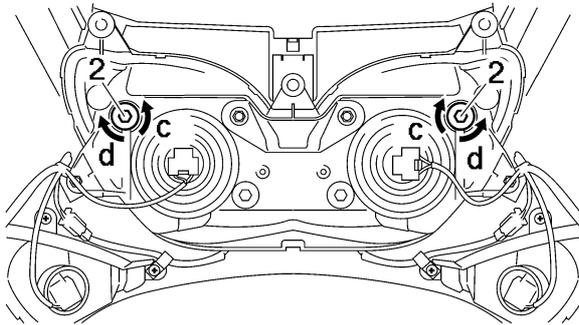
Recommended lubricant
Lithium-soap-based grease

Left headlight

Direction “c”
Headlight beam moves to the right.
Direction “d”
Headlight beam moves to the left.

Right headlight

Direction “c”
Headlight beam moves to the left.
Direction “d”
Headlight beam moves to the right.



CHASSIS

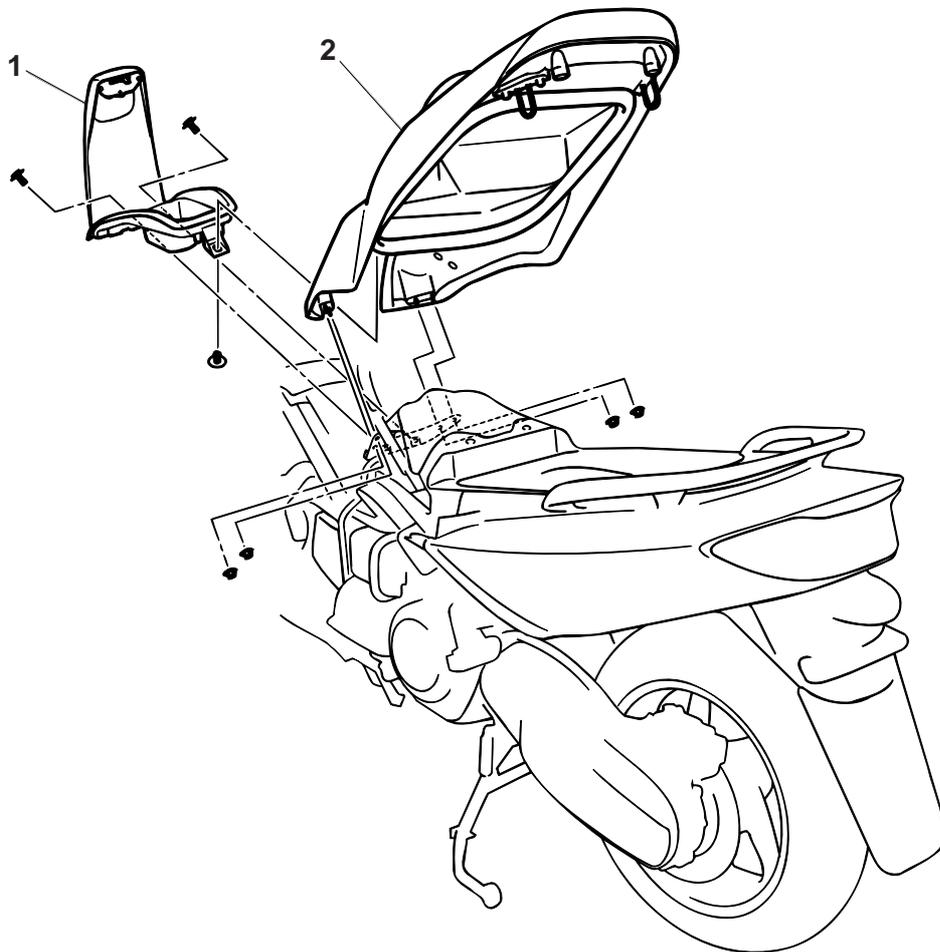
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EAS21830

GENERAL CHASSIS

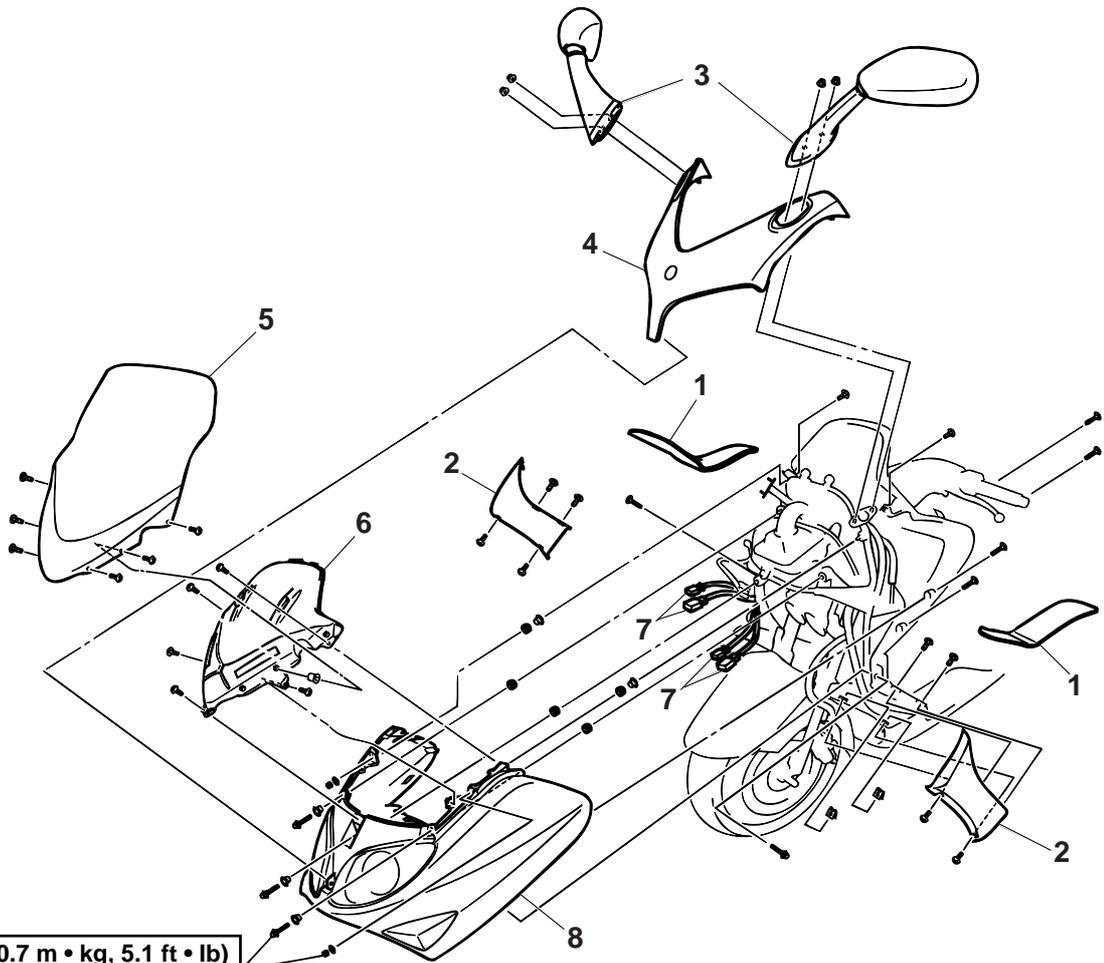
Seat



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank cap		
1	Fuel lid	1	
2	Seat	1	
			For installation, reverse the removal procedure.

GENERAL CHASSIS

Front cowling

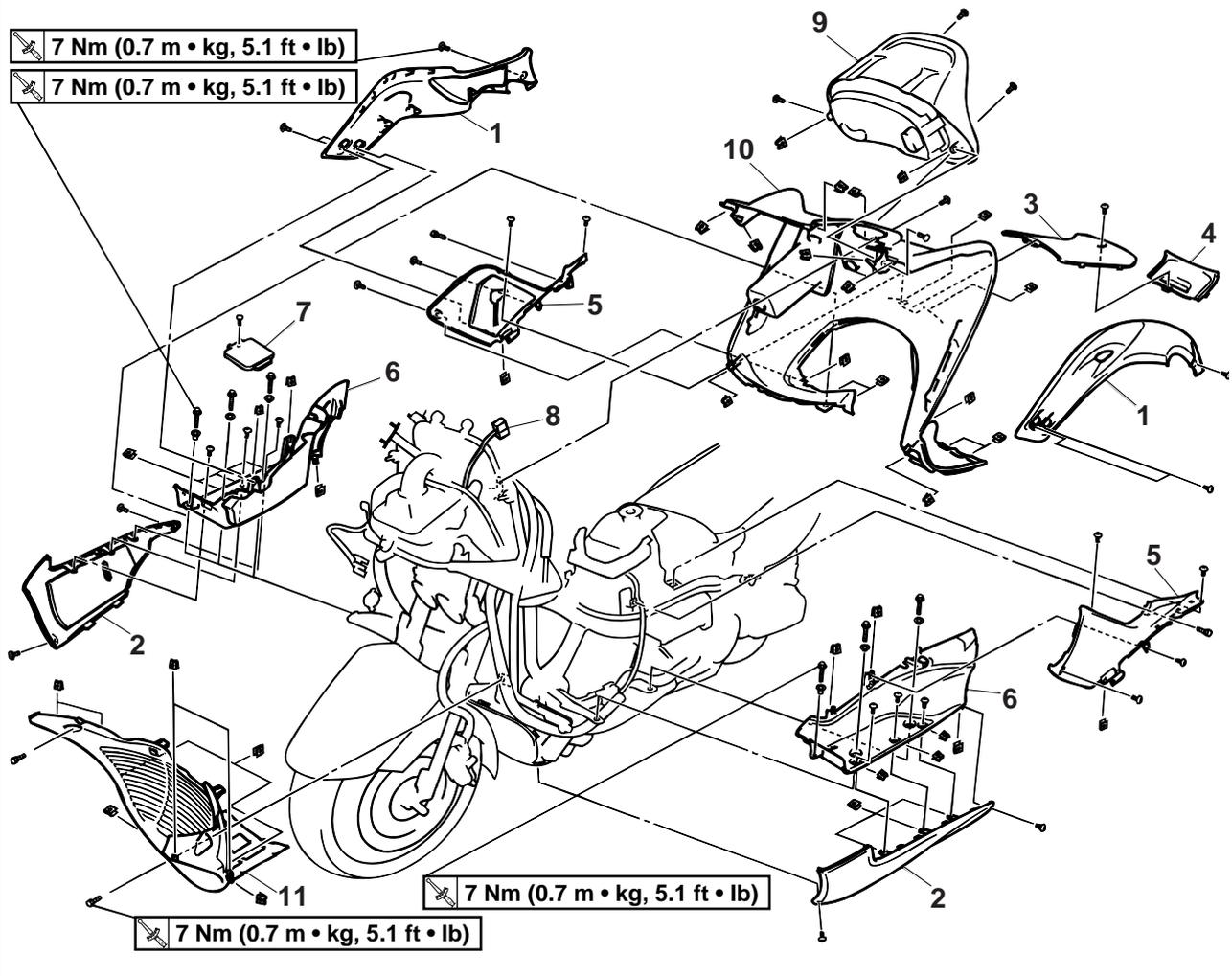


 7 Nm (0.7 m • kg, 5.1 ft • lb)

Order	Job/Parts to remove	Q'ty	Remarks
1	Footrest board mat (left and right)	2	
2	Front side cover moulding (left and right)	2	
3	Rear view mirror (left and right)	2	
4	Front cowling upper cover	1	
5	Windshield	1	
6	Front cowling inner panel	1	
7	Headlight sub-wire harness coupler	4	Disconnect.
8	Front cowling	1	
			For installation, reverse the removal procedure.

GENERAL CHASSIS

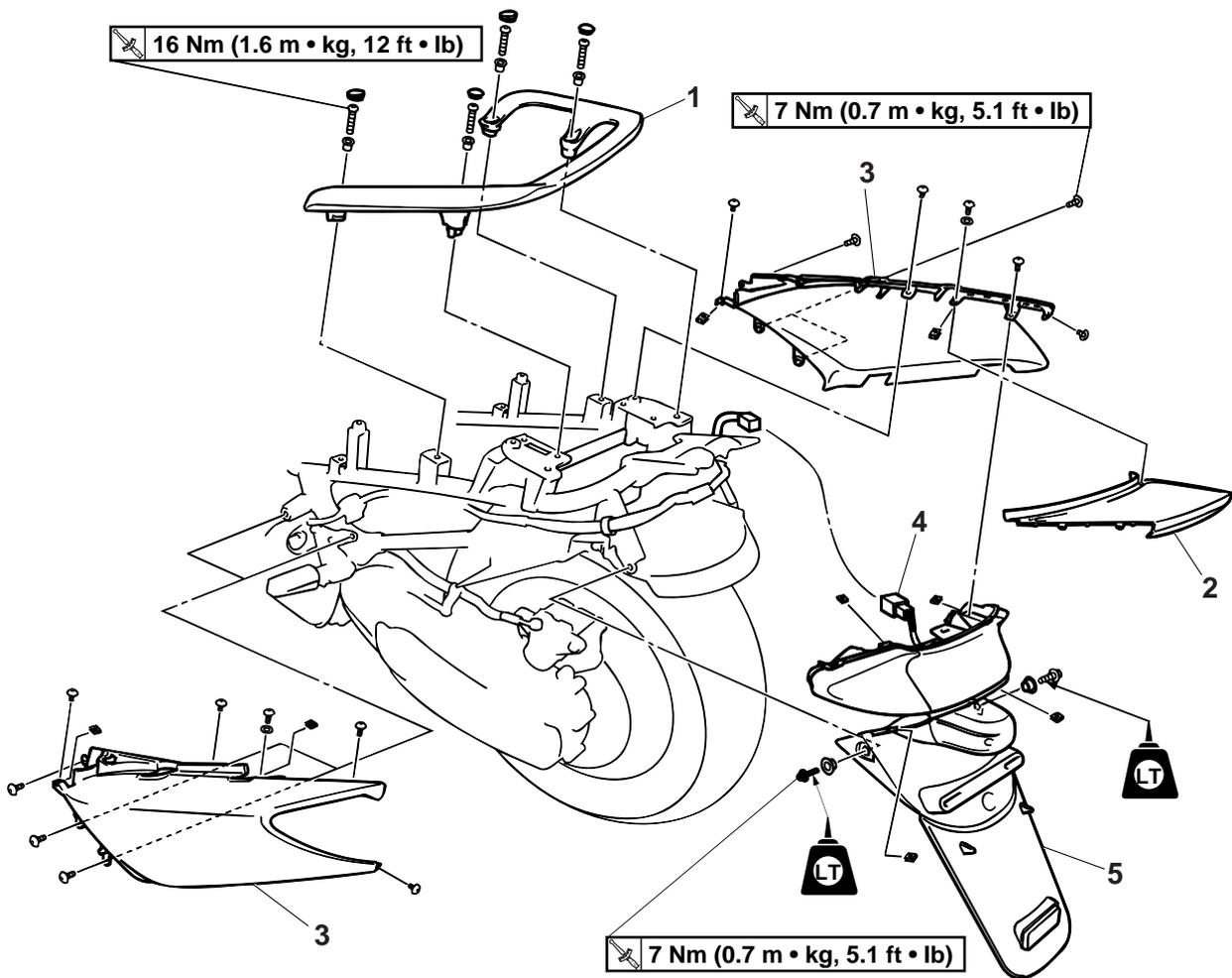
Side cover mouldings and leg shield



Order	Job/Parts to remove	Q'ty	Remarks
1	Upper side cover mole (left and right)	2	
2	Lower side cover mole (left and right)	2	
3	Center cover	1	
4	Hinge cover	1	
5	Side cover (left and right)	2	
6	Footrest board (left and right)	2	
7	Coolant reservoir cap access panel	1	
8	Meter assembly coupler	1	Disconnect.
9	Meter assembly	1	
10	Leg shield	1	
11	Inner fender	1	
			For installation, reverse the removal procedure.

GENERAL CHASSIS

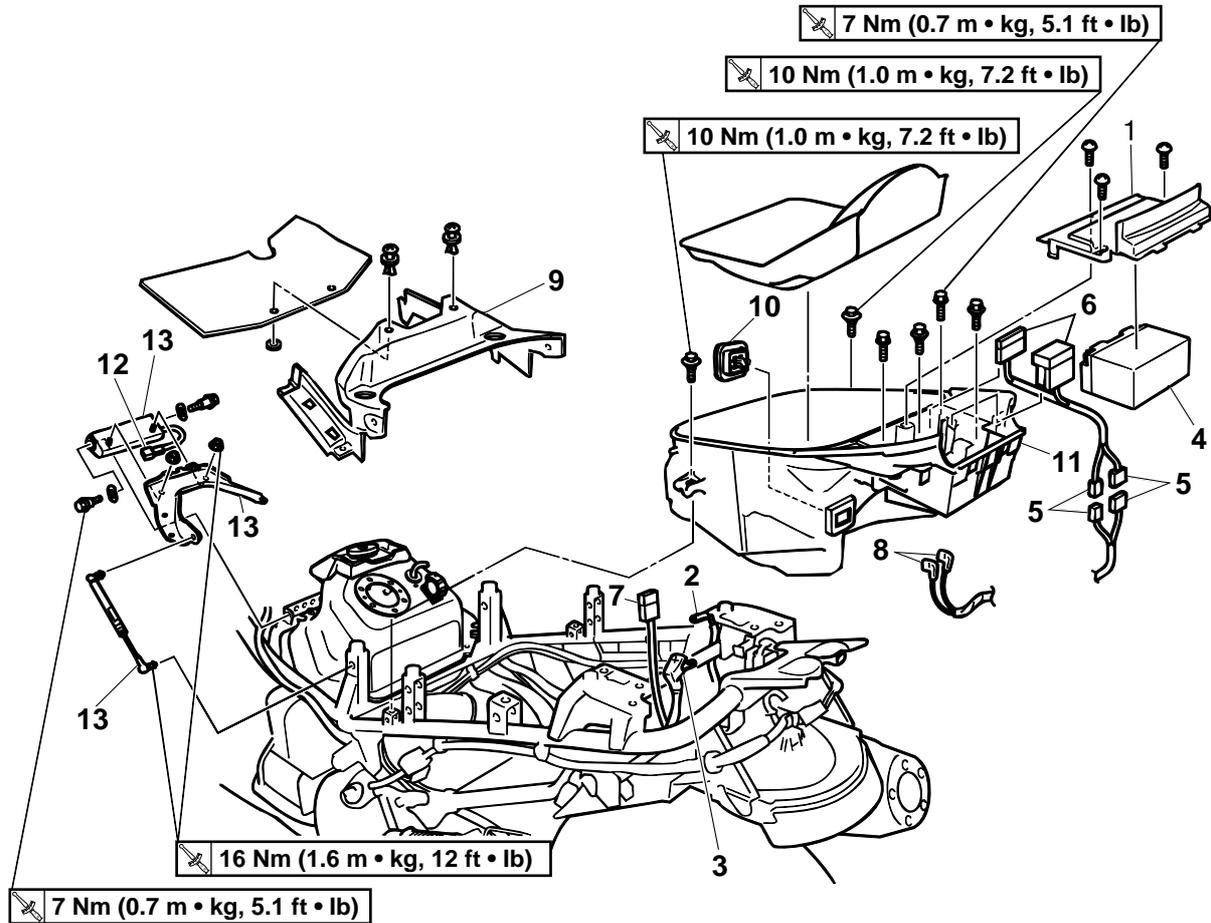
Rear covers and tail/brake light assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Seat		Open.
	Upper side cover mole (left/right)		
1	Grab bar	1	
2	Rear cover	1	
3	Rear side cover (left/right)	1/1	
4	Tail/brake light assembly coupler	1	Disconnect.
5	Tail/brake light assembly	1	
			For installation, reverse the removal procedure.

GENERAL CHASSIS

Storage box

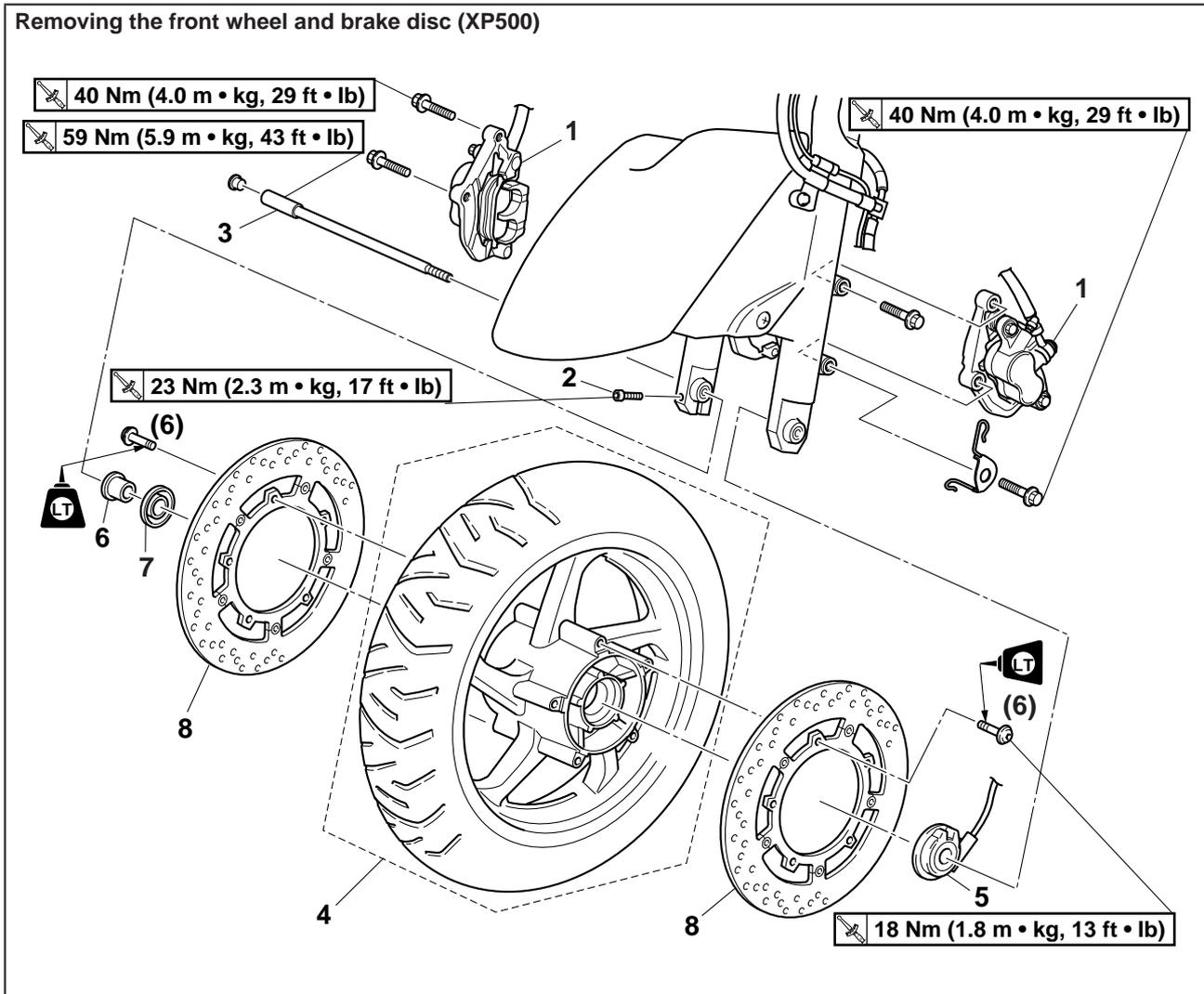


Order	Job/Parts to remove	Q'ty	Remarks
1	Battery cover	1	
2	Negative battery lead	1	Disconnect.
3	Positive battery lead	1	Disconnect.
4	Battery	1	
5	Fuse box assembly coupler	2	Disconnect.
6	Fuse box assembly	1	
7	ABS motor fuse box	1	(XP500A)
8	Storage box light connector	2	Disconnect.
9	Fuel tank cover	1	
10	Storage box light	1	
11	Storage box	1	
12	Storage box light switch coupler	1	Disconnect.
13	Hinge/damper	2/1	
			For installation, reverse the removal procedure.

EAS21880

FRONT WHEEL

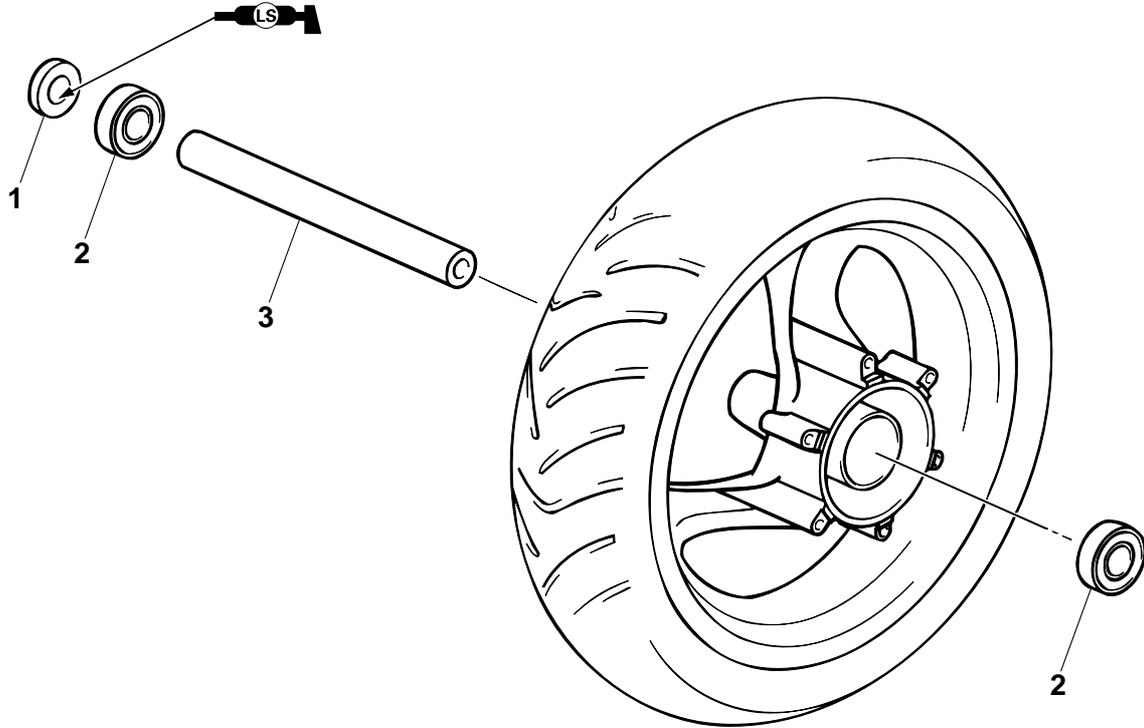
Removing the front wheel and brake disc (XP500)



Order	Job/Parts to remove	Q'ty	Remarks
			NOTE: _____ Place the vehicle on a suitable stand so that the front wheel is elevated.
	Front cowling upper cover		Refer to "GENERAL CHASSIS" on page 4-1.
1	Front brake caliper (left and right)	2	
2	Front wheel axle pinch bolt	1	Loosen.
3	Front wheel axle	1	
4	Front wheel	1	
5	Speed sensor	1	
6	Collar	1	
7	Dust cover	1	
8	Brake disc	2	
			For installation, reverse the removal procedure.

FRONT WHEEL

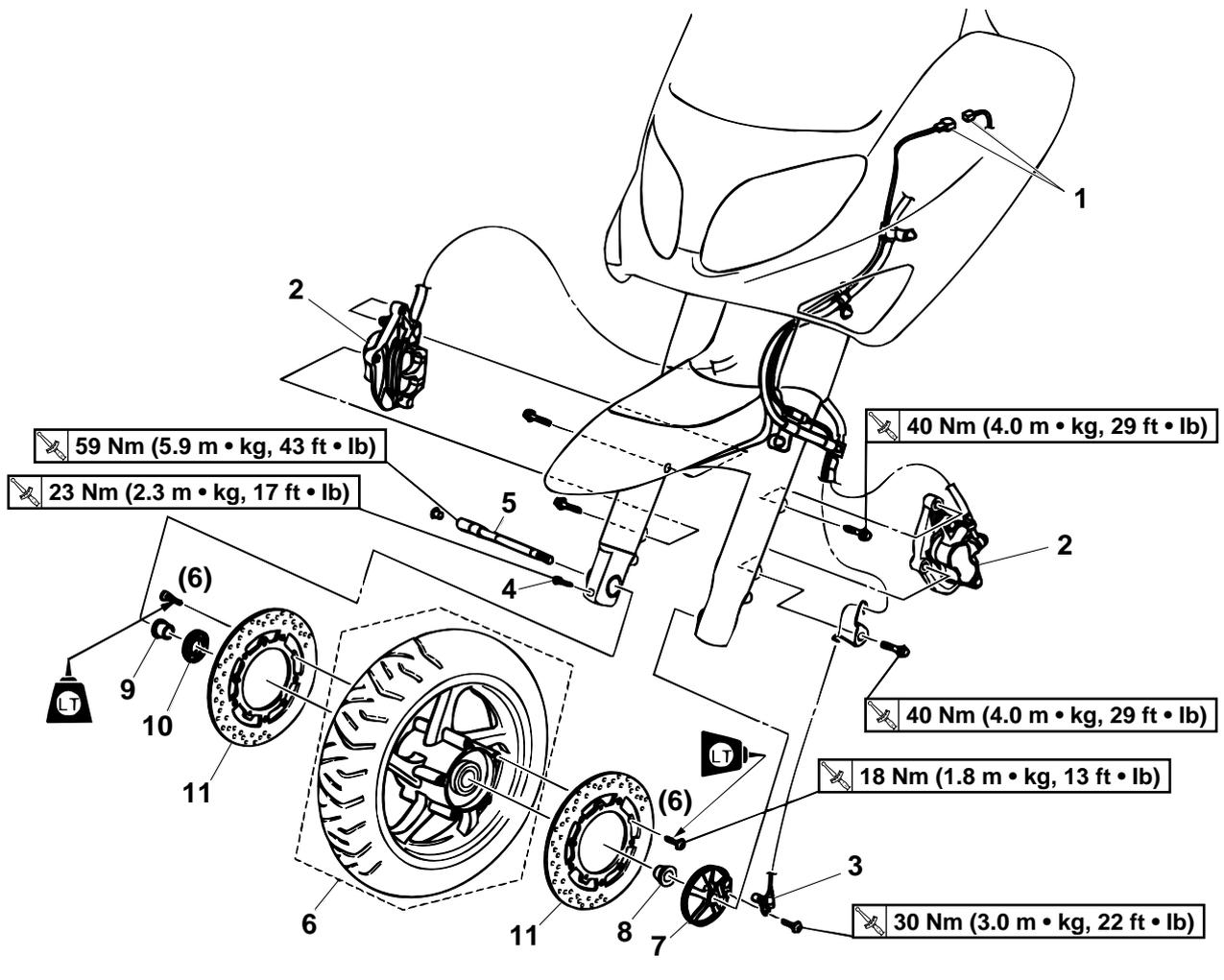
Disassembling the front wheel (XP500)



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil seal	1	
2	Bearing	2	
3	Collar	1	
			For installation, reverse the removal procedure.

FRONT WHEEL

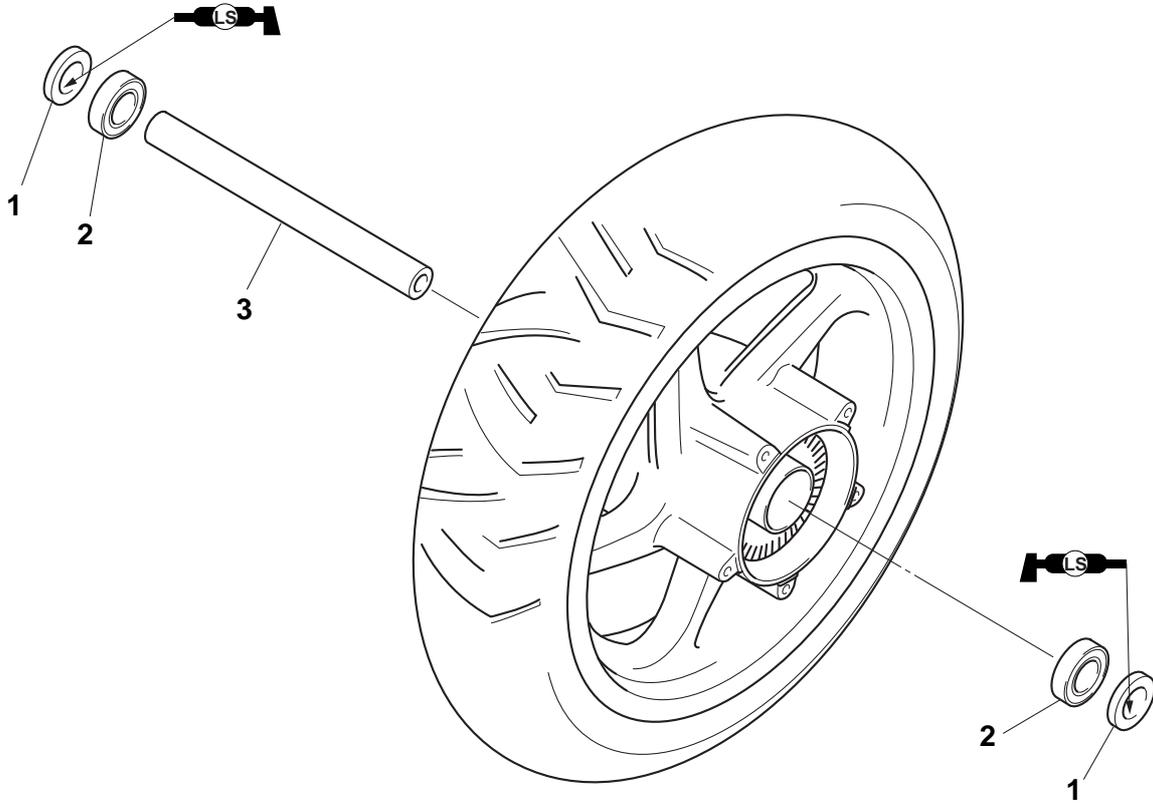
Removing the front wheel and brake disc (XP500A)



Order	Job/Parts to remove	Q'ty	Remarks
			NOTE: _____ Place the vehicle on a suitable stand so that the front wheel is elevated. _____
1	Front wheel sensor coupler	1	Disconnect.
2	Front brake caliper (left and right)	2	
3	Front wheel sensor	1	
4	Front wheel axle pinch bolt	1	Loosen.
5	Front wheel axle	1	
6	Front wheel	1	
7	Sensor housing	1	
8	Collar (left)	1	
9	Collar (right)	1	
10	Dust cover	1	
11	Brake disc	2	
			For installation, reverse the removal procedure.

FRONT WHEEL

Disassembling the front wheel (XP500A)



Order	Job/Parts to remove	Q'ty	Remarks
1	Oil seal	2	
2	Bearing	2	
3	Collar	1	
			For installation, reverse the removal procedure.

EAS21900

REMOVING THE FRONT WHEEL (XP500)

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

NOTE:

Place the vehicle on a suitable stand so that the front wheel is elevated.

2. Remove:

- Front brake calipers

NOTE:

Do not squeeze the brake lever when removing the brake caliper.

3. Elevate:

- Front wheel

NOTE:

Place the vehicle on a suitable stand so that the front wheel is elevated.

EAS21900b

Removing the front wheel (XP500A)

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

NOTE:

Place the vehicle on a suitable stand so that the front wheel is elevated.

2. Remove:

- Front wheel sensor
- Front brake calipers

ECA15B1041

CAUTION:

- Be sure not to contact the sensor electrode to any metal part when removing the front wheel sensor from the sensor housing.
- Do not operate the brake lever and brake pedal when removing the brake calipers.

3. Elevate:

- Front wheel

NOTE:

Place the vehicle on a suitable stand so that the front wheel is elevated.

EAS21920

CHECKING THE FRONT WHEEL

1. Check:

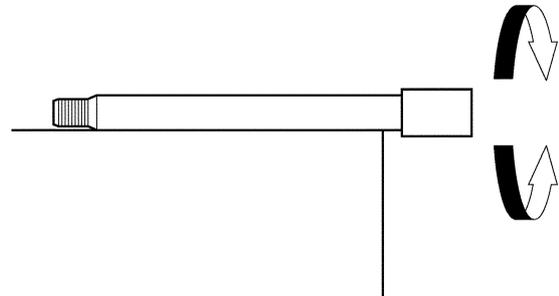
- Wheel axle
Roll the wheel axle on a flat surface.

Bends → Replace.

EWA13460

WARNING

Do not attempt to straighten a bent wheel axle.



2. Check:

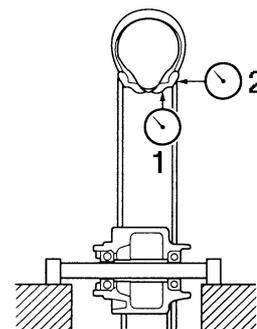
- Tire
- Front wheel
Damage/wear → Replace.
Refer to “CHECKING THE TIRES” on page 3-29 and “CHECKING THE WHEELS” on page 3-31.

3. Measure:

- Radial wheel runout “1”
- Lateral wheel runout “2”
Over the specified limits → Replace.



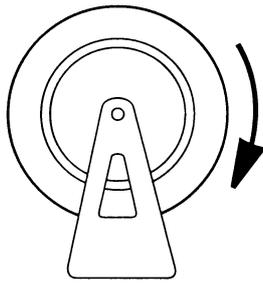
Radial wheel runout limit
1.0 mm (0.04 in)
Lateral wheel runout limit
0.5 mm (0.02 in)



I2010401

4. Check:

- Wheel bearings
Front wheel turns roughly or is loose → Replace the wheel bearings.
- Oil seals
Damage/wear → Replace.



I2010101

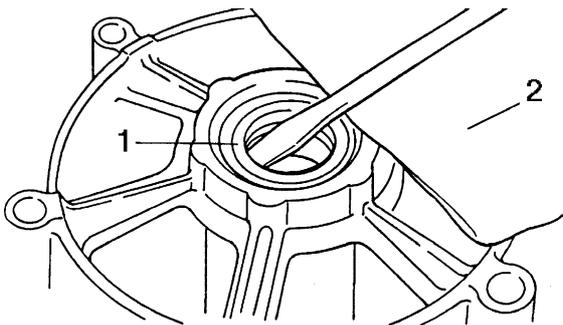
5. Replace:

- Wheel bearings **New**
- Oil seals **New**

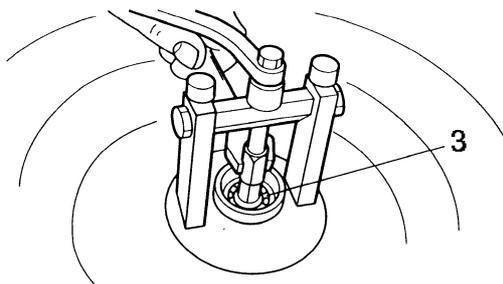
- Clean the outside of the front wheel hub.
- Remove the oil seals "1" with a flat-head screwdriver.

NOTE:

To prevent damaging the wheel, place a rag "2" between the screwdriver and the wheel surface.



- Remove the wheel bearings "3" with a general bearing puller.



I2010201

- Install the new wheel bearings and oil seals in the reverse order of disassembly.

ECA14130

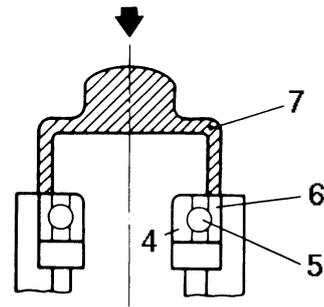
CAUTION:

Do not contact the wheel bearing inner race "4" or balls "5". Contact should be made only with the outer race "6".

NOTE:

Use a socket "7" that matches the diameter of

the wheel bearing outer race and oil seal.



EAS22010

MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR (XP500A)

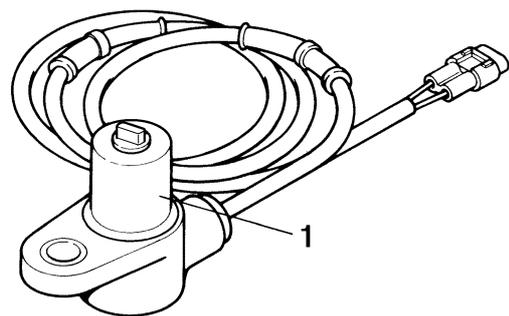
ECA14450

CAUTION:

- Handle the ABS components with care since they have been accurately adjusted. Keep them away from dirt and do not subject them to shocks.
- The ABS wheel sensor cannot be disassembled. Do not attempt to disassemble it. If faulty, replace with a new one.

Checking the front wheel sensor and sensor rotor

- Check:
 - Front wheel sensor "1"
Cracks/bends/distortion → Replace.
Iron powder/dust → Clean.



- Measure:
 - Front wheel sensor resistance
Connect the pocket tester ($\Omega \times 1k$) to the terminals of the front wheel sensor coupler.

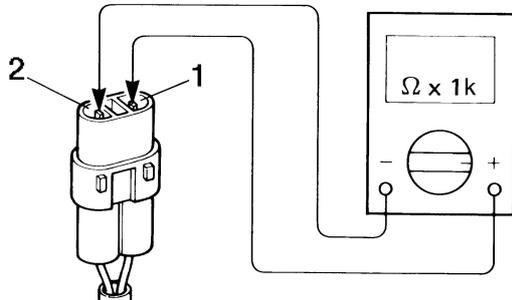
Tester positive probe → Terminal "1"
Tester negative probe → Terminal "2"

FRONT WHEEL



Regulated resistance
1.2–1.6 k Ω at 20°C (68°F)

Out of specification → Replace.

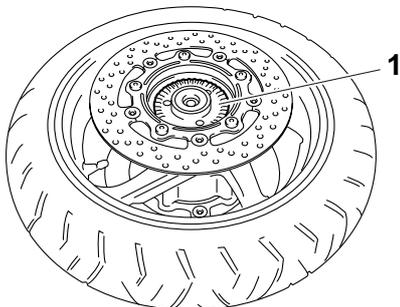


3. Check:

- Front wheel sensor rotor “1”
Cracks/damage → Replace the front wheel assembly.

NOTE:

The wheel sensor rotor of the vehicle is inserted under pressure by a special process and cannot be replaced as a single unit. To replace the sensor rotor, replace the wheel assembly.



EAS21970

ADJUSTING THE FRONT WHEEL STATIC BALANCE

NOTE:

- After replacing the tire, wheel or both, the front wheel static balance should be adjusted.
- Adjust the front wheel static balance with the brake disc installed.

1. Remove:

- Balancing weight(s)

2. Find:

- Front wheel’s heavy spot

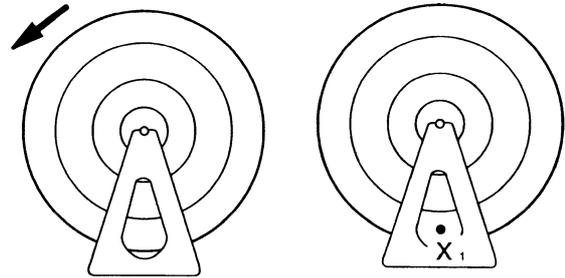
NOTE:

Place the front wheel on a suitable balancing stand.



a. Spin the front wheel.

b. When the front wheel stops, put an “X₁” mark at the bottom of the wheel.

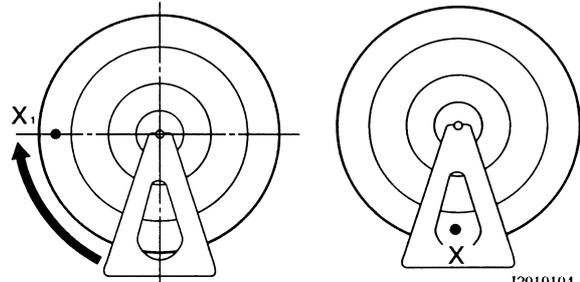


I2010102

c. Turn the front wheel 90° so that the “X₁” mark is positioned as shown.

d. Release the front wheel.

e. When the wheel stops, put an “X₂” mark at the bottom of the wheel.



I2010104

f. Repeat steps (d) through (f) several times until all the marks come to rest at the same spot.

g. The spot where all the marks come to rest is the front wheel’s heavy spot “X”.



3. Adjust:

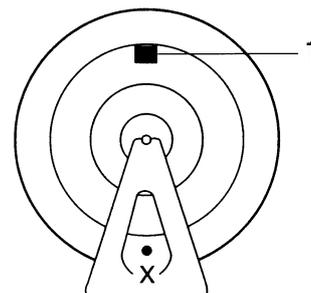
- Front wheel static balance



a. Install a balancing weight “1” onto the rim exactly opposite the heavy spot “X”.

NOTE:

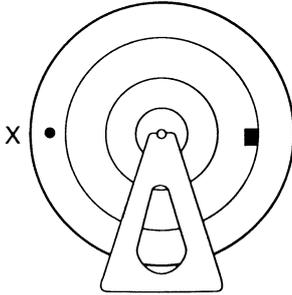
Start with the lightest weight.



I2010103

FRONT WHEEL

- b. Turn the front wheel 90° so that the heavy spot is positioned as shown.



12010105

- c. If the heavy spot does not stay in that position, install a heavier weight.
 d. Repeat steps (b) and (c) until the front wheel is balanced.

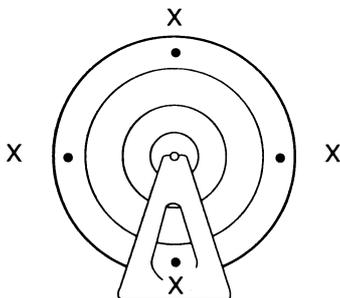


4. Check:

- Front wheel static balance



- a. Turn the front wheel and make sure it stays at each position shown.



12010106

- b. If the front wheel does not remain stationary at all of the positions, rebalance it.



EAS21990

INSTALLING THE FRONT WHEEL (XP500)

1. Lubricate:

- Wheel axle
- Wheel bearings
- Oil seal lips
- Speedometer drive gear
- Speedometer driven gear

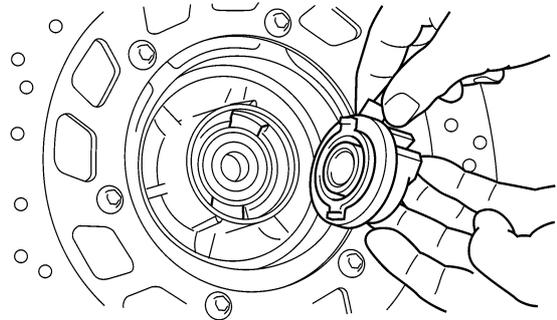
	Recommended lubricant Lithium-soap-based grease
--	---

2. Install:

- Speed sensor (to front wheel)

NOTE:

Make sure the speed sensor and the wheel hub are installed with the two projections meshed into the two slots respectively.

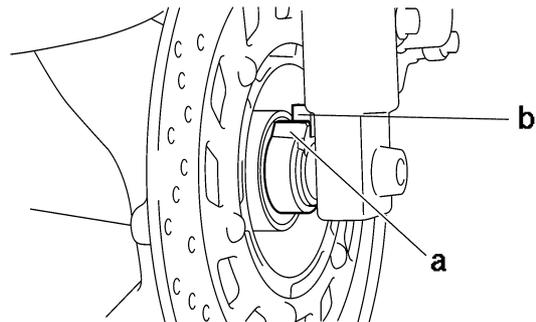


3. Install:

- Front wheel

NOTE:

Make sure the slot "a" in the speedometer gear unit fits over the stopper "b" on the outer tube.



4. Tighten:

- Wheel axle "1"
Use the damper rod holder "2"
- Wheel axle pinch bolt "3"
- Brake caliper bolts

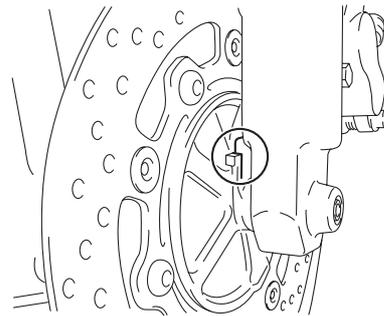
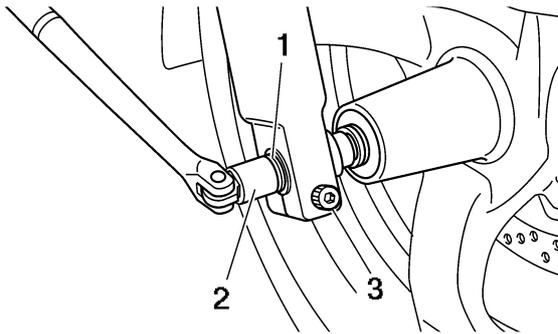
	Wheel axle 59 Nm (5.9 m•kg, 43 ft•lb) Wheel axle pinch bolt 23 Nm (2.3 m•kg, 17 ft•lb)
--	---

ECA14140

CAUTION:

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

FRONT WHEEL



5. Install:
- Front brake calipers

EWA15B1009

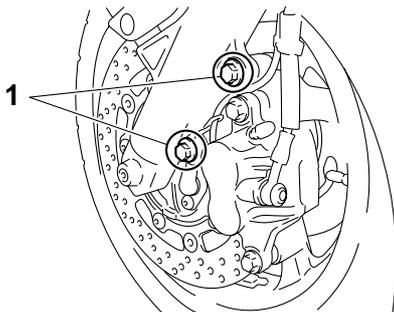
WARNING

Make sure the brake cable is routed properly.

6. Install:
- Front brake caliper bracket bolt "1"



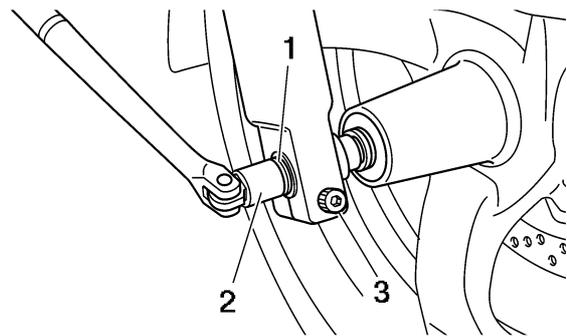
Front brake caliper bracket bolt
40 Nm (4.0 m•kg, 29 ft•lb)



3. Tighten:
- Front wheel axle "1"
 - Use the damper rod holder "2"
 - Front wheel axle pinch bolt "3"



Front wheel axle
59 Nm (5.9 m•kg, 43 ft•lb)
Front wheel axle pinch bolt
23 Nm (2.3 m•kg, 17 ft•lb)



EAS21990b

Installing the front wheel (XP500A)

1. Lubricate:
- Oil seal lips



Recommended lubricant
Lithium-soap-based grease

2. Install:
- Front wheel
 - Front wheel axle
 - Front wheel axle pinch bolt

NOTE:
Align the slot in the sensor housing with the projection of the front fork before assembly.

ECA14470

CAUTION:

Make sure there are no foreign materials in the wheel hub. Foreign materials cause damage to the inner sensor rotor and wheel sensor.

ECA15B1018

CAUTION:

Before tightening the wheel axle pinch bolt, push down hand on the handlebar several times and check if the front fork rebounds smoothly.

4. Install:
- Front wheel sensor "1"



Front wheel sensor bolt
30 Nm (3.0 m•kg, 22 ft•lb)

- Front wheel sensor lead holder
- Brake caliper "2"



Front brake caliper bolt
40 Nm (4.0 m•kg, 29 ft•lb)

- Brake hose holder



NOTE:

When installing the front wheel sensor, check the wheel sensor lead for twists and the sensor electrode for foreign materials.

ECA14480

CAUTION:

To route the front wheel sensor lead, refer to “CABLE ROUTING” on page 2-35.

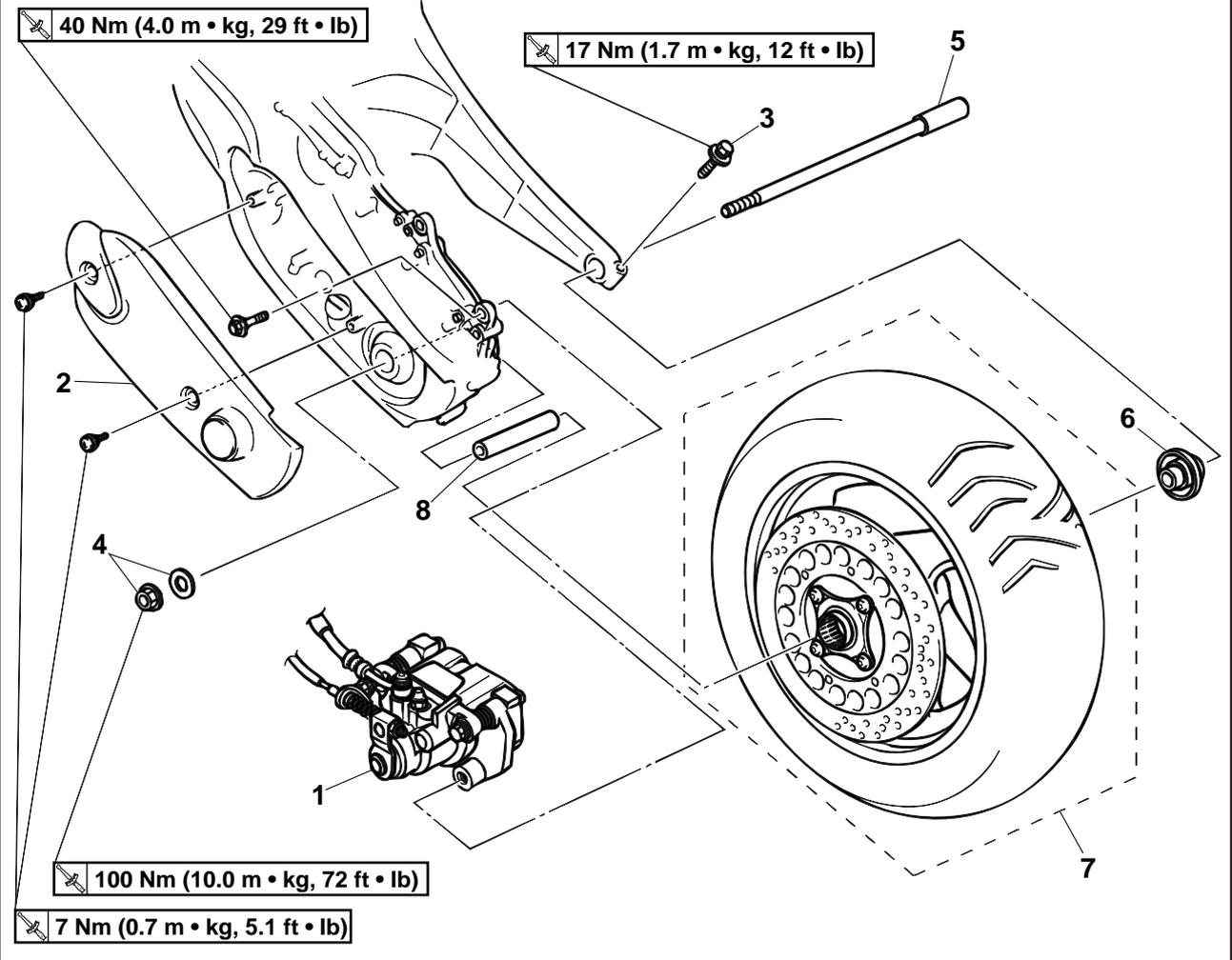
5. Check:
 - Front wheel sensor installation
Check if the wheel sensor housing is installed properly.
6. Check:
 - Front wheel sensor installation
Check if the wheel sensor housing is installed properly.
Refer to “[D-1] MAINTENANCE OF THE ECU (ABS)” on page 8-72.

REAR WHEEL

EAS22030

REAR WHEEL

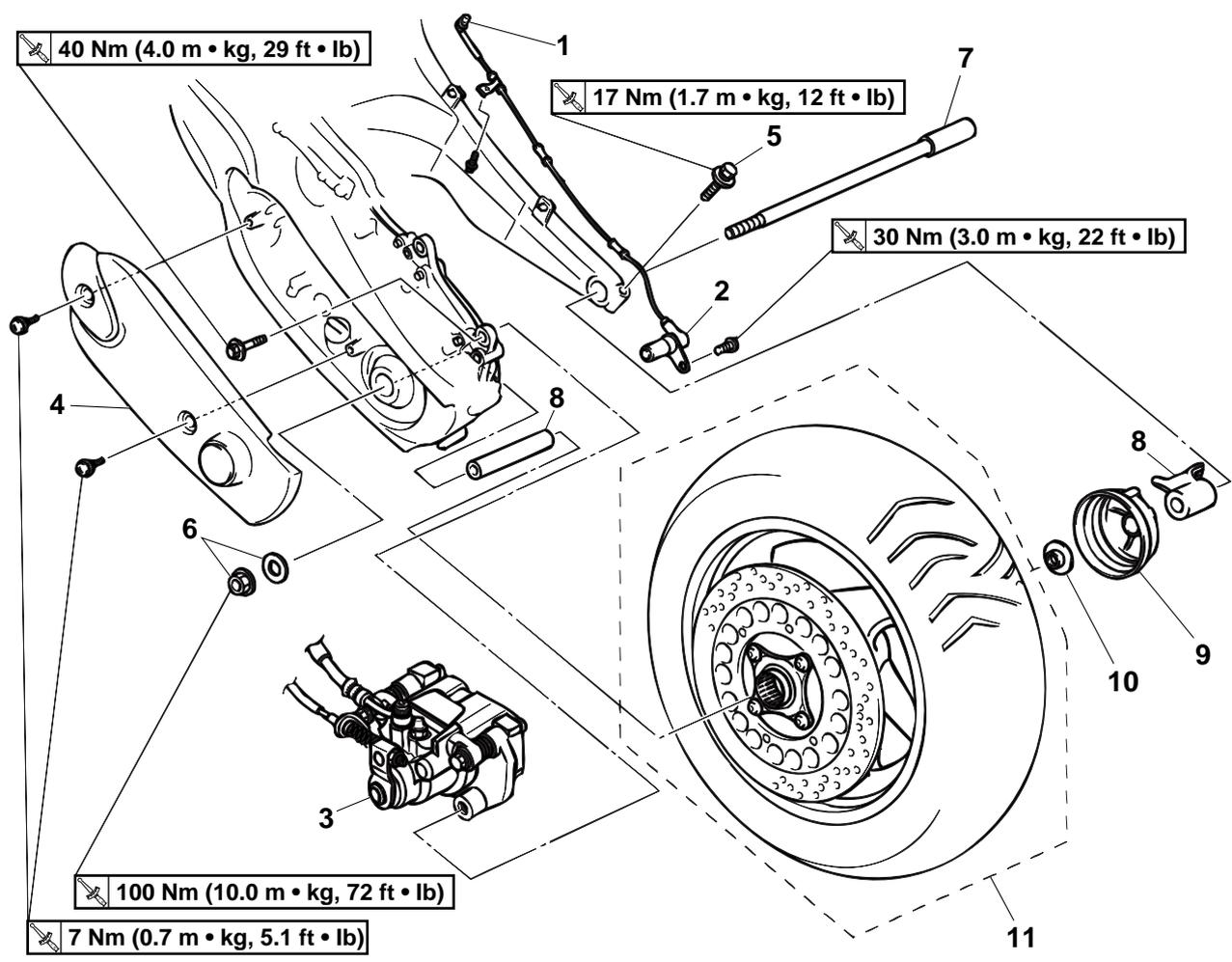
Removing the rear wheel (XP500)



Order	Job/Parts to remove	Q'ty	Remarks
			NOTE: _____ Place the vehicle on a suitable stand so that the rear wheel is elevated. _____
1	Rear brake caliper	1	
2	Chain drive case cover	1	
3	Rear wheel axle pinch bolt	1	Loosen.
4	Rear wheel axle nut/washer	1/1	
5	Rear wheel axle	1	
6	Collar	1	
7	Rear wheel	1	
8	Spacer	1	
			For installation, reverse the removal procedure.

REAR WHEEL

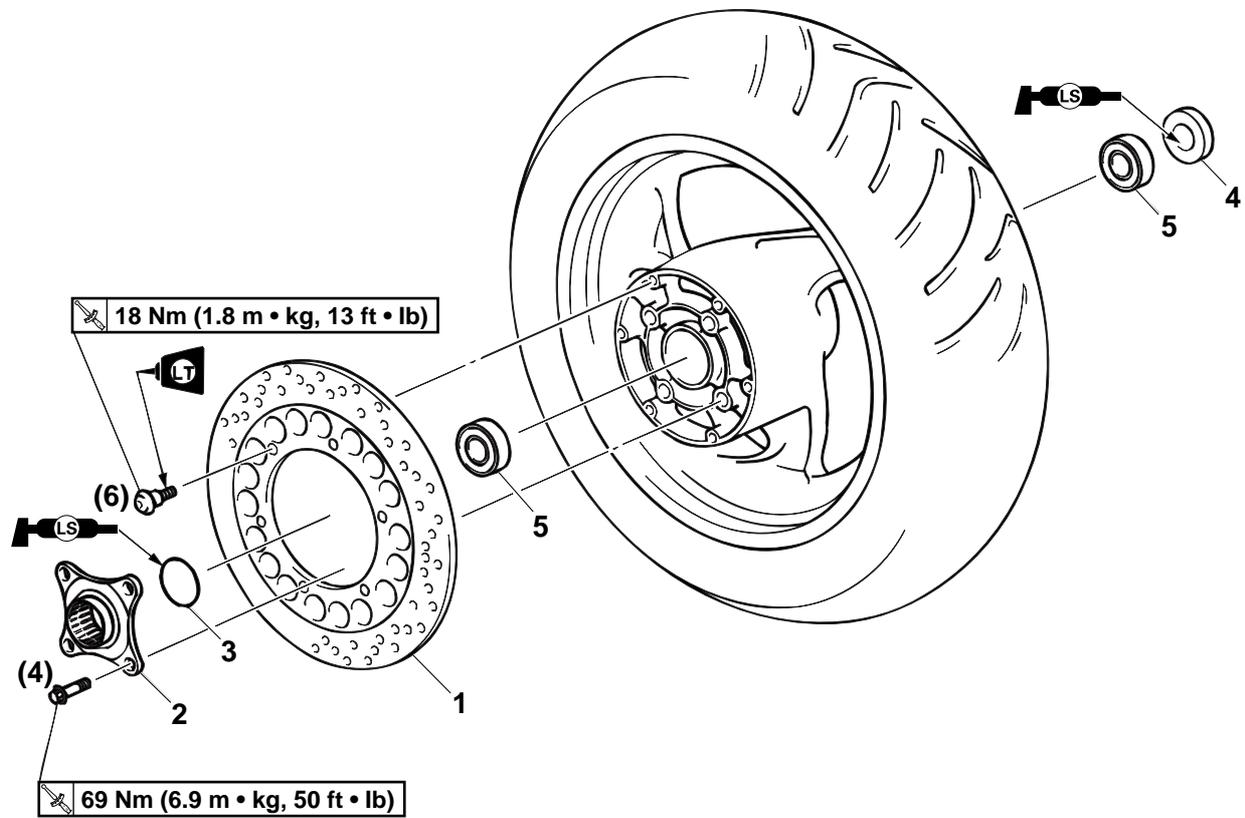
Removing the rear wheel (XP500A)



Order	Job/Parts to remove	Q'ty	Remarks
			NOTE: _____ Place the vehicle on a suitable stand so that the rear wheel is elevated.
	Tail/brake light assembly		Refer to "GENERAL CHASSIS" on page 4-1.
1	Rear wheel sensor coupler	1	Disconnect.
2	Rear wheel sensor	1	
3	Brake caliper	1	
4	Chain drive case cover	1	
5	Rear wheel axle pinch bolt	1	Loosen.
6	Rear wheel axle nut/washer	1/1	
7	Rear wheel axle	1	
8	Collar	1	
9	Sensor housing	1	
10	Collar	1	
11	Rear wheel	1	
			For installation, reverse the removal procedure.

REAR WHEEL

Disassembling the rear wheel



Order	Job/Parts to remove	Q'ty	Remarks
1	Brake disc	1	
2	Rear wheel drive hub	1	
3	O-ring	1	
4	Oil seal	1	
5	Bearing	2	
			For installation, reverse the removal procedure.

EAS28760

REMOVING THE REAR WHEEL (XP500)

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

NOTE:

Place the vehicle on a suitable stand so that the rear wheel is elevated.

2. Remove:

- Brake caliper

NOTE:

Do not depress the brake lever when removing the brake caliper.

EAS28760b

Removing the rear wheel (XP500A)

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

NOTE:

Place the vehicle on a suitable stand so that the rear wheel is elevated.

2. Remove:

- Rear wheel sensor
- Rear brake caliper

ECA15B1042

CAUTION:

- Be sure not to contact the sensor electrode to any metal part when removing the wheel sensor from the sensor housing.
- Do not operate the brake lever and brake pedal when removing the brake caliper.

EAS22090

CHECKING THE REAR WHEEL

1. Check:

- Wheel axle
- Rear wheel
- Wheel bearings
- Oil seals

Refer to "CHECKING THE FRONT WHEEL" on page 4-10.

2. Check:

- Tire
- Rear wheel

Damage/wear → Replace.

Refer to "CHECKING THE TIRES" on page 3-29 and "CHECKING THE WHEELS" on page 3-31.

3. Measure:

- Radial wheel runout
- Lateral wheel runout

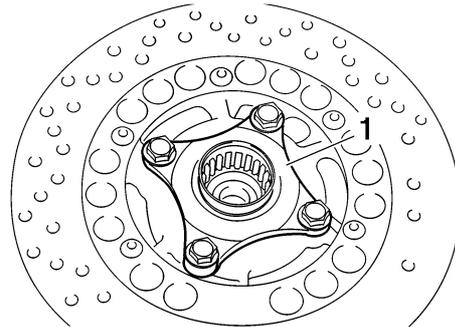
Refer to "CHECKING THE FRONT WHEEL" on page 4-10.

EAS15B4567

CHECKING THE REAR WHEEL DRIVE HUB

1. Check:

- Rear wheel drive hub "1"
Cracks/damage → Replace.



EAS22200

MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR

ECA15B1037

CAUTION:

- Be sure not to contact the sensor electrode to any metal part when removing the front wheel sensor from the sensor housing.
- Do not operate the brake lever when removing the brake caliper.

Checking the rear wheel sensor and sensor rotor

Refer to "Checking the front wheel sensor and sensor rotor".

EAS22150

ADJUSTING THE REAR WHEEL STATIC BALANCE

NOTE:

- After replacing the tire, wheel or both, the rear wheel static balance should be adjusted.
- Adjust the rear wheel static balance with the brake disc and rear wheel drive hub installed.

1. Adjust:

- Rear wheel static balance

Refer to "ADJUSTING THE FRONT WHEEL STATIC BALANCE" on page 4-12.

EAS22200b

INSTALLING THE REAR WHEEL (XP500A)

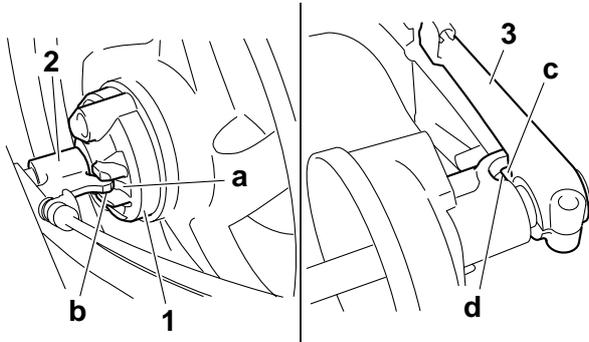
1. Install:

- Rear wheel

REAR WHEEL

NOTE:

- Align the slot “a” of the sensor housing “1” with the projection “b” of the collar “2”, and then assemble them.
- After installation, check that the projection “c” of the collar is inserted into the slot “d” of the sensor housing.



ECA14470

CAUTION:

Make sure there are no foreign materials in the wheel hub. Foreign materials cause damage to the inner sensor rotor and wheel sensor.

2. Install:

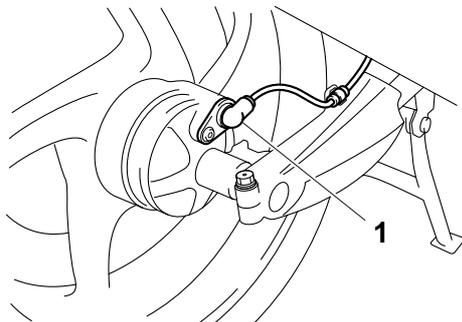
- Rear wheel sensor “1”



Rear wheel sensor bolt
30 Nm (3.0 m•kg, 22 ft•lb)

NOTE:

When installing the rear wheel sensor, check the rear wheel sensor lead for twists and the sensor electrode for foreign materials.



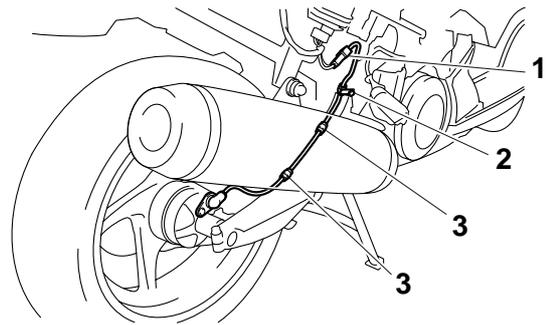
ECA14500

CAUTION:

To route the rear wheel sensor lead, refer to “CABLE ROUTING” on page 2-35.

3. Connect:

- Rear wheel sensor coupler “1”
- Rear wheel sensor lead holder “2”
- Clamp “3”



ECA14500

CAUTION:

To route the rear wheel sensor lead, refer to “CABLE ROUTING” on page 2-35.

4. Check:

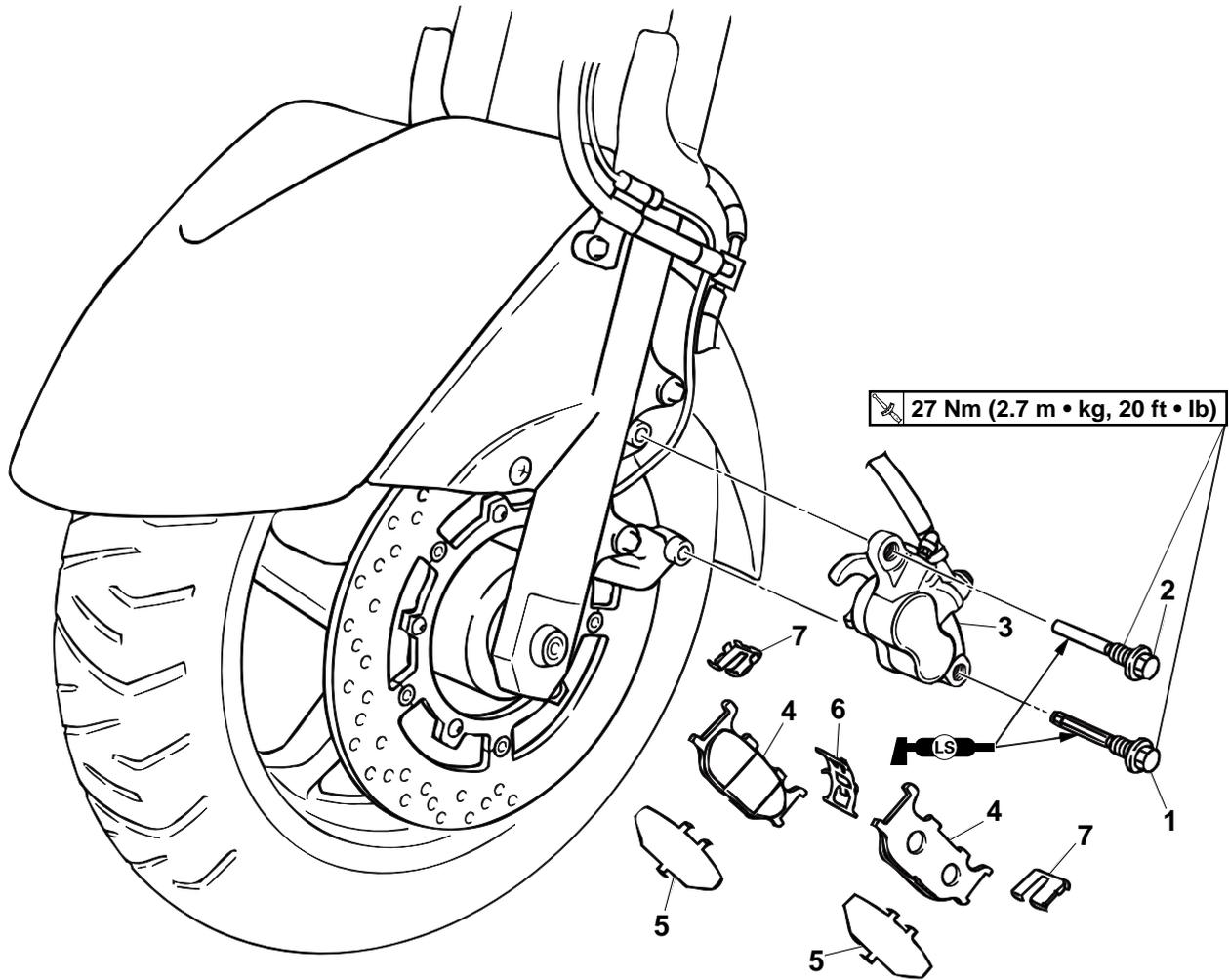
- Rear wheel sensor installation
Check if the wheel sensor housing is installed properly.

FRONT BRAKE

EAS22210

FRONT BRAKE

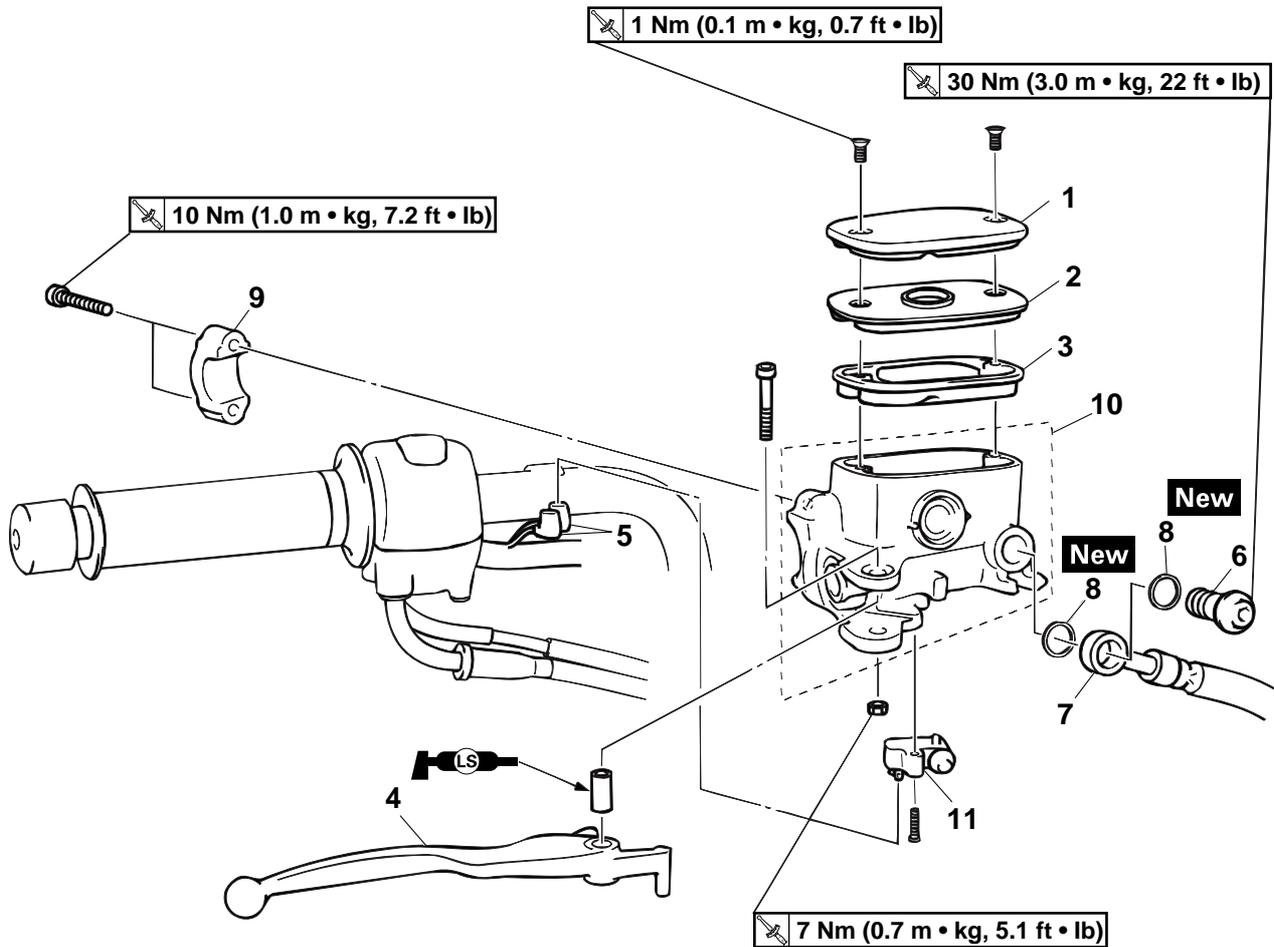
Removing the front brake pads



Order	Job/Parts to remove	Q'ty	Remarks
1	Front brake caliper retaining bolt (lower)	1	
2	Front brake caliper retaining bolt (upper)	1	
3	Brake caliper	1	
4	Brake pad	2	
5	Brake pad shim	2	
6	Brake pad spring	1	
7	Brake pad spring	2	
			For installation, reverse the removal procedure.

FRONT BRAKE

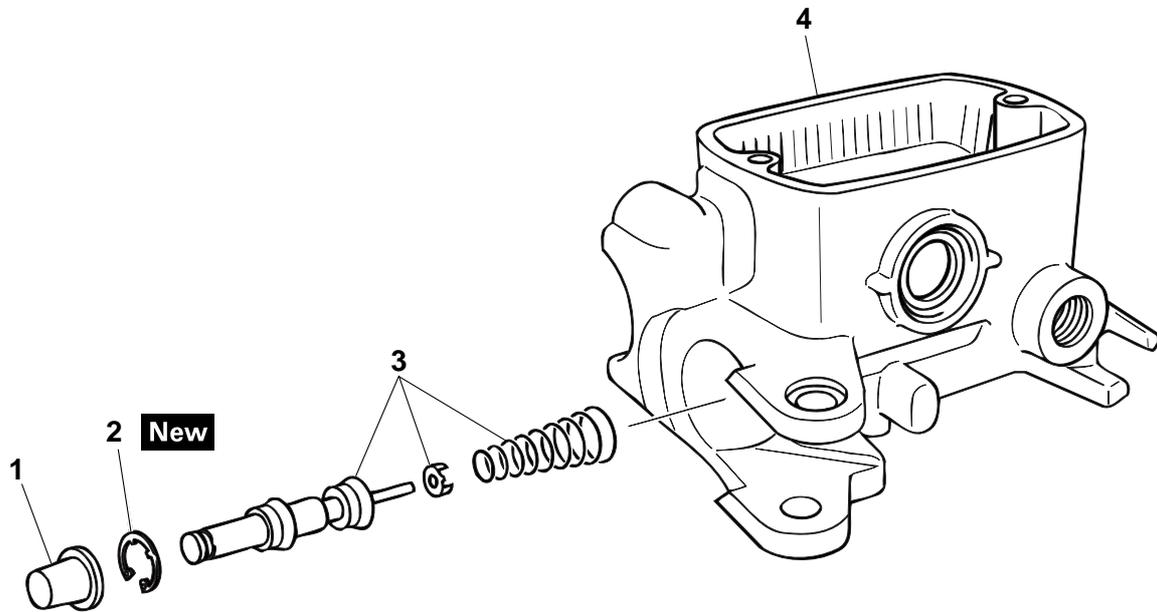
Removing the front brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
	Upper handlebar cover		Refer to "HANDLEBAR" on page 4-53
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)" on page 3-24.
1	Brake master cylinder reservoir cap	1	
2	Brake master cylinder reservoir diaphragm holder	1	
3	Brake master cylinder reservoir diaphragm	1	
4	Brake lever	1	
5	Front brake light switch connector	2	
6	Union bolt	1	
7	Brake hose	1	
8	Copper washer	2	
9	Brake master cylinder holder	1	
10	Brake master cylinder	1	
11	Front brake light switch	1	
			For installation, reverse the removal procedure.

FRONT BRAKE

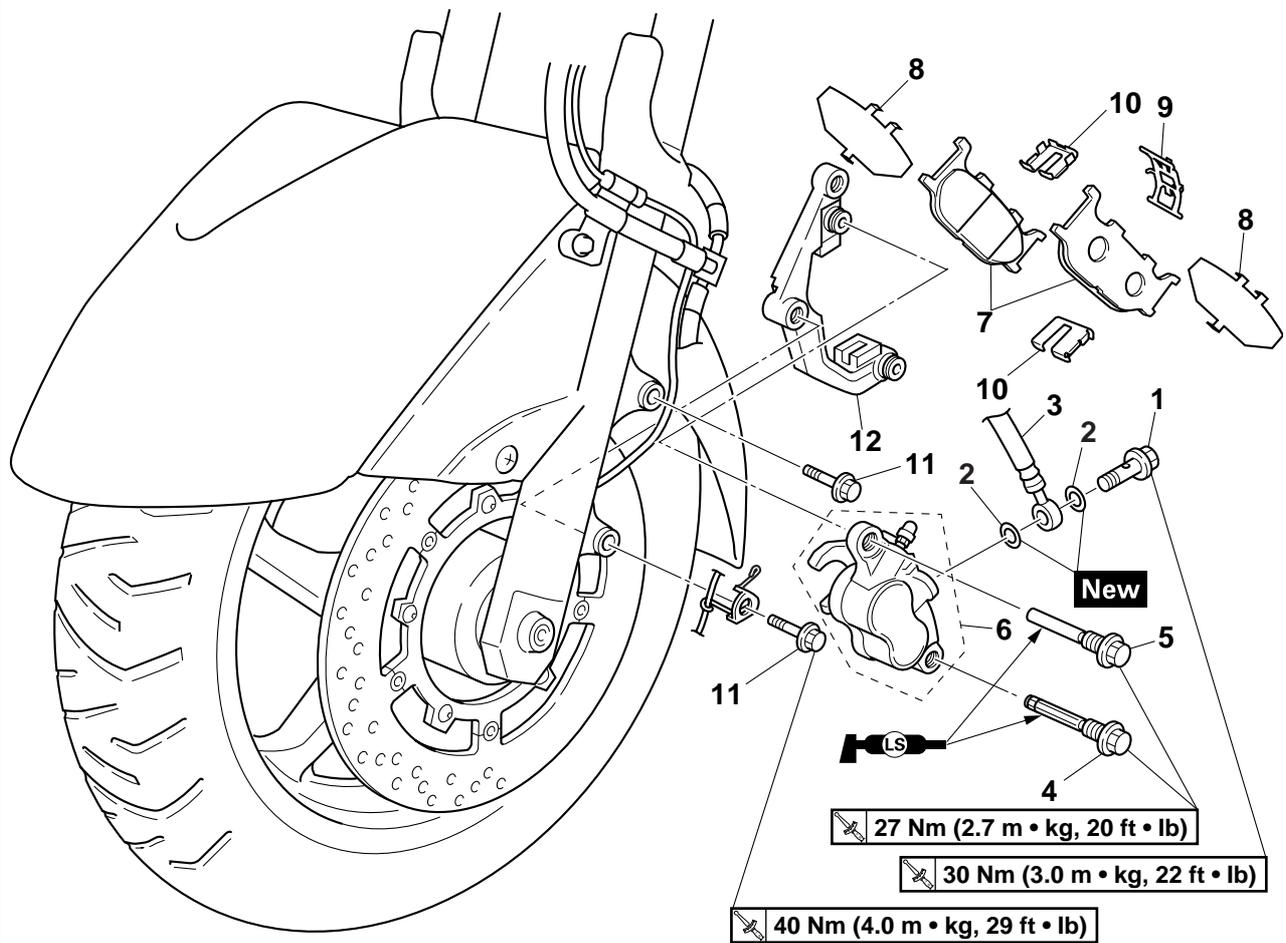
Disassembling the front brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
1	Dust boot	1	
2	Circlip	1	
3	Brake master cylinder kit	1	
4	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

FRONT BRAKE

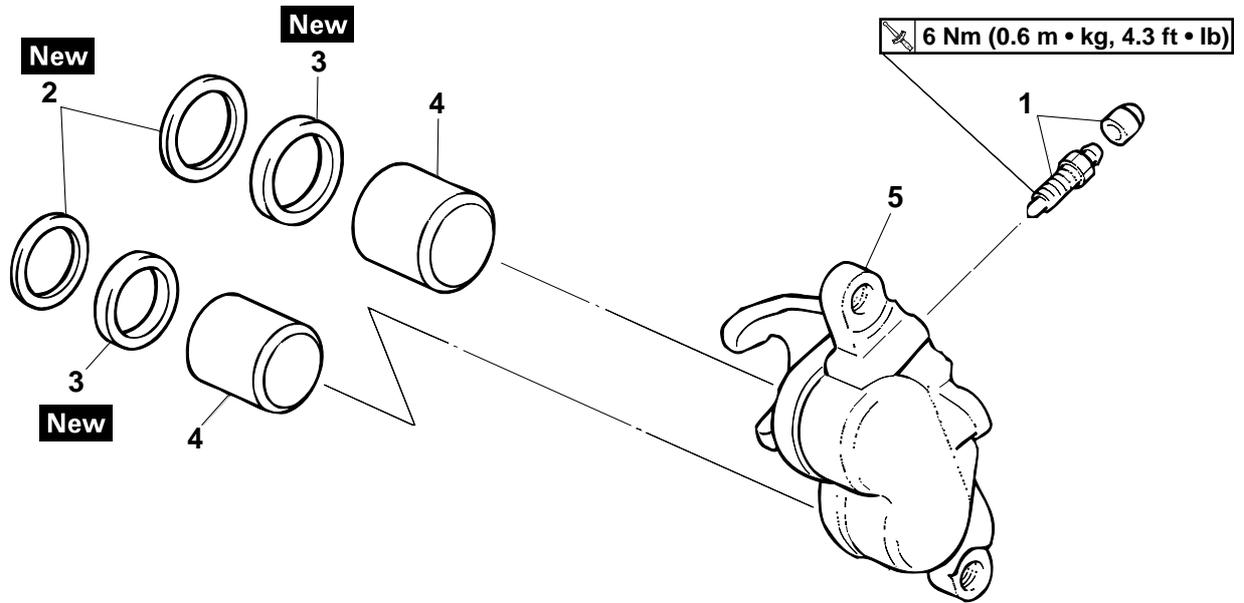
Removing the front brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)" on page 3-24.
1	Union bolt	1	
2	Copper washer	2	
3	Brake hose	1	
4	Front brake caliper retaining bolt (lower)	1	
5	Front brake caliper retaining bolt (upper)	1	
6	Brake caliper	1	
7	Brake pad	2	
8	Brake pad shim	2	
9	Brake pad spring	1	
10	Brake pad spring	2	
11	Front brake caliper bracket bolt 2	2	
12	Brake caliper bracket	1	
			For installation, reverse the removal procedure.

FRONT BRAKE

Disassembling the front brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
1	Bleed screw	1	
2	Dust seal	2	
3	Brake caliper piston seal	2	
4	Brake caliper piston	2	
5	Brake caliper body	1	
			For assembly, reverse the disassembly procedure.

EAS22220

INTRODUCTION

EWA14100

WARNING

Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:

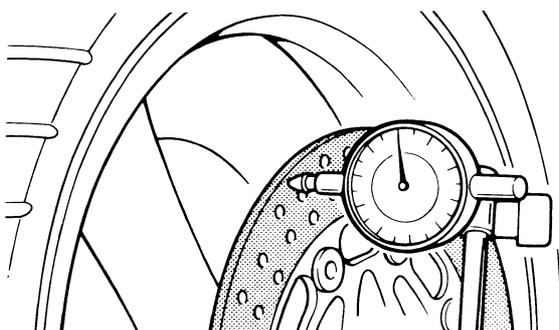
- Never disassemble brake components unless absolutely necessary.
- If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.
- Never use solvents on internal brake components.
- Use only clean or new brake fluid for cleaning brake components.
- Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.
- **FIRST AID FOR BRAKE FLUID ENTERING THE EYES:**
- Flush with water for 15 minutes and get immediate medical attention.

EAS22240

CHECKING THE FRONT BRAKE DISCS

The following procedure applies to both brake discs.

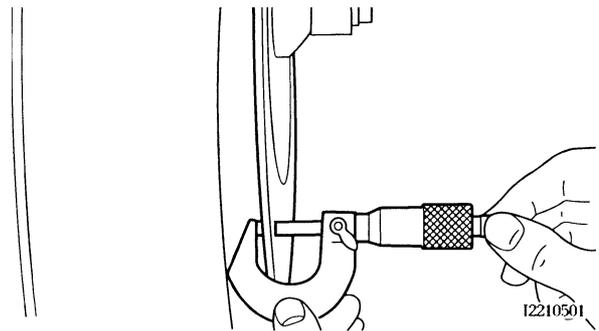
1. Remove:
 - Front wheel
Refer to "FRONT WHEEL" on page 4-6.
2. Check:
 - Brake disc
Damage/galling → Replace.
3. Measure:
 - Brake disc deflection
Out of specification → Correct the brake disc deflection or replace the brake disc.



Brake disc deflection limit
0.12 mm (0.0047 in)

- a. Place the vehicle on a suitable stand so that the front wheel is elevated.
- b. Before measuring the front brake disc deflection, turn the handlebar to the left or right to ensure that the front wheel is stationary.
- c. Remove the brake caliper.
- d. Hold the dial gauge at a right angle against the brake disc surface.
- e. Measure the deflection 1.5 mm (0.06 in) below the edge of the brake disc.

4. Measure:
 - Brake disc thickness
Measure the brake disc thickness at a few different locations.
Out of specification → Replace.



Brake disc thickness limit
3.5 mm (0.14 in)

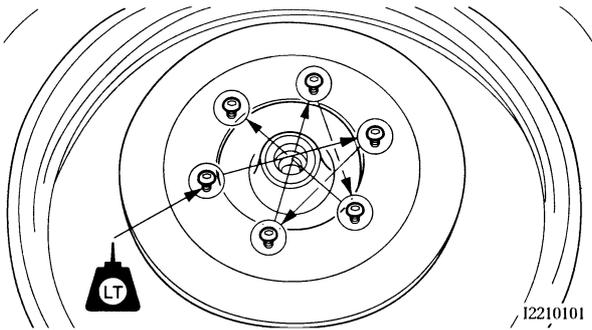
5. Adjust:
 - Brake disc deflection
 - a. Remove the brake disc.
 - b. Rotate the brake disc by one bolt hole.
 - c. Install the brake disc.

NOTE:

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



Brake disc bolt
18 Nm (1.8 m•kg, 13 ft•lb)
LOCTITE®



12210101

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



6. Install:
 - Front wheel
 Refer to "FRONT WHEEL" on page 4-6.

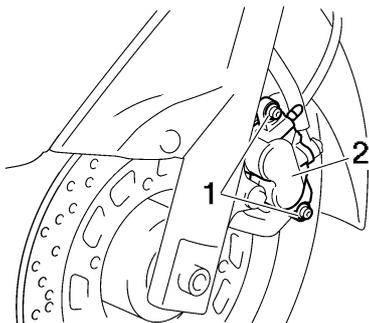
EAS22260

REPLACING THE FRONT BRAKE PADS

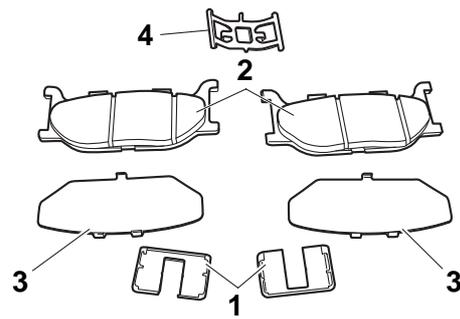
NOTE:

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

1. Remove:
 - Front brake caliper retaining bolts "1"
 - Brake caliper "2"

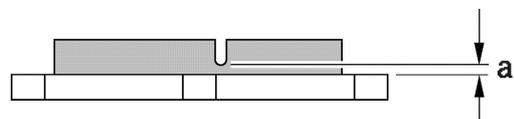


2. Remove:
 - Brake pad springs "1"
 - Brake pads "2"
 - Brake pad shims "3"
 - Brake pad spring "4"



3. Measure:
 - Brake pad wear limit "a"
 Out of specification → Replace the brake pads as a set.

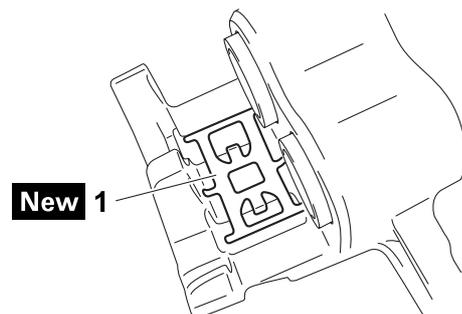
	Brake pad lining thickness (inner)
	6.2 mm (0.24 in)
	Limit
	0.8 mm (0.03 in)
	Brake pad lining thickness (outer)
	6.2 mm (0.24 in)
	Limit
	0.8 mm (0.03 in)



4. Install:
 - Brake pad spring "1"
 - Brake pad springs "2"
 - Brake pad shims "3"
 - Brake pads "4"

NOTE:

Always install new brake pads and a new brake pad spring as a set.



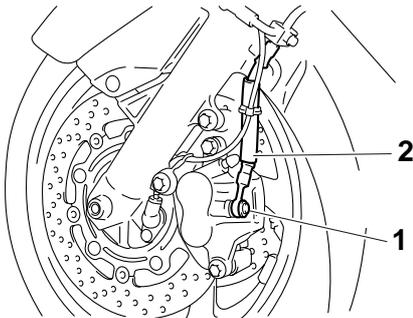
brake calipers.

NOTE:

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

1. Remove:

- Union bolt "1"
- Copper washers "2"
- Brake hose



NOTE:

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

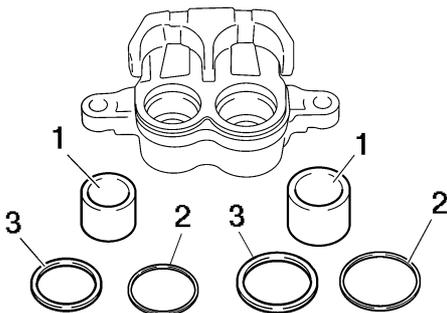
EAS22350

DISASSEMBLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

1. Remove:

- Brake caliper pistons "1"
- Dust seals "2"
- Brake caliper piston seals "3"



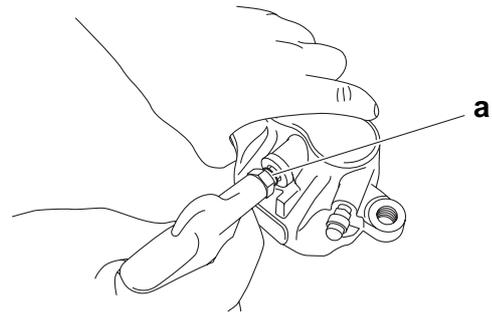
a. Blow compressed air into the brake hose joint opening "a" to force out the piston from the brake caliper.

EWA13580

WARNING

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

ton.



b. Remove the brake caliper piston seals.

EAS22390

CHECKING THE FRONT BRAKE CALIPERS

Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seals	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

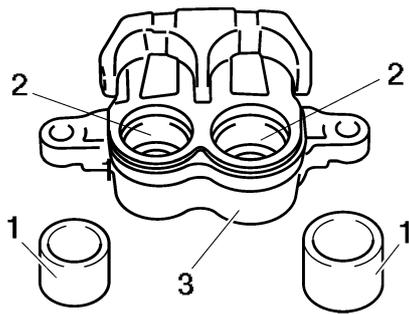
1. Check:

- Brake caliper pistons "1"
Rust/scratches/wear → Replace the brake caliper pistons.
- Brake caliper cylinders "2"
Scratches/wear → Replace the brake caliper assembly.
- Brake caliper body "3"
Cracks/damage → Replace the brake caliper assembly.
- Brake fluid delivery passages (brake caliper body)
Obstruction → Blow out with compressed air.

EWA13600

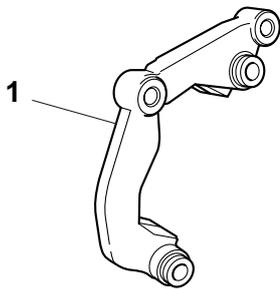
WARNING

Whenever a brake caliper is disassembled, replace the piston seals.



2. Check:

- Brake caliper brackets "1"
Cracks/damage → Replace.



EAS22410

ASSEMBLING THE FRONT BRAKE CALIPERS

EWA13620

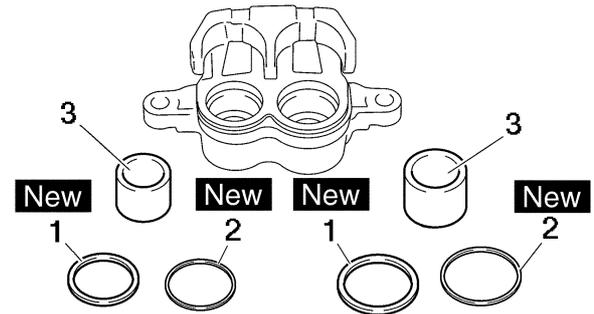
⚠ WARNING

- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components as they will cause the piston seals to swell and distort.
- Whenever a brake caliper is disassembled, replace the brake caliper piston seals.

	Recommended fluid DOT 4
---	------------------------------------

1. Install:

- Brake caliper piston seal "1" **New**
- Dust seal "2" **New**
- Brake caliper piston "3"



2. Install:

- Brake caliper bracket

	Brake caliper bracket bolt 40 Nm (4.0 m•kg, 29 ft•lb)
---	--

EAS22440

INSTALLING THE FRONT BRAKE CALIPERS

The following procedure applies to both of the brake calipers.

1. Install:

- Brake caliper "1"
- (temporarily)
- Copper washers **New**
- Brake hose "2"
- Union bolt "3"

	Brake hose union bolt 30 Nm (3.0 m•kg, 22 ft•lb)
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EWA13530

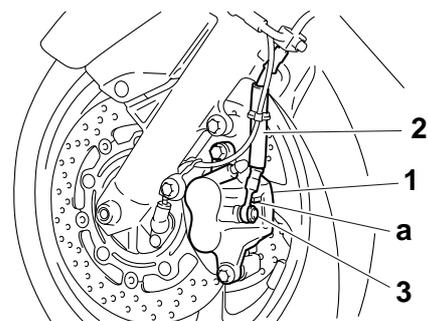
⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-35.

ECA14170

CAUTION:

When installing the brake hose onto the brake caliper "1", make sure the brake pipe "a" touches the projection "b" on the brake caliper.



2. Remove:

- Brake caliper

3. Install:

- Brake pads
- Brake pad springs
- Brake caliper retaining bolt
- Brake caliper
- Brake hose holder



Brake caliper retaining bolt
27 Nm (2.7 m•kg, 19 ft•lb)

Refer to “REPLACING THE FRONT BRAKE PADS” on page 4-27.

4. Fill:

- Brake master cylinder reservoir (with the specified amount of the recommended brake fluid)



Recommended fluid
DOT 4

EWA13090

WARNING

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

ECA13540

CAUTION:

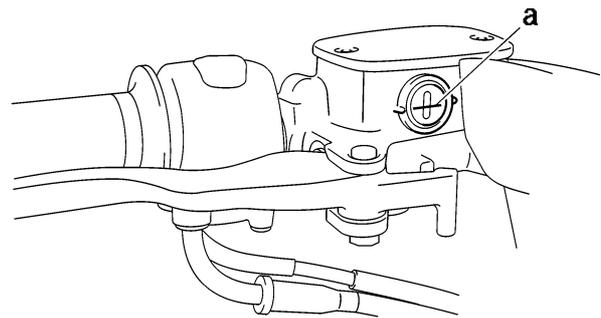
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

5. Bleed:

- Brake system
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)” on page 3-24.

6. Check:

- Brake fluid level
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-22.



7. Check:

- Brake lever operation
Soft or spongy feeling → Bleed the brake system.
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)” on page 3-24.

EAS22490

REMOVING THE FRONT BRAKE MASTER CYLINDER

NOTE:

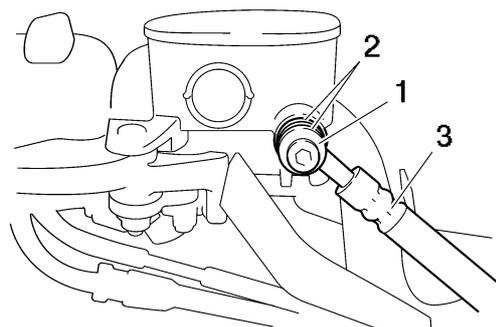
Before removing the front brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:

- Union bolt “1”
- Copper washers “2”
- Brake hoses “3”

NOTE:

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



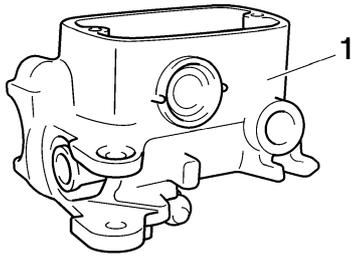
EAS22500

CHECKING THE FRONT BRAKE MASTER CYLINDER

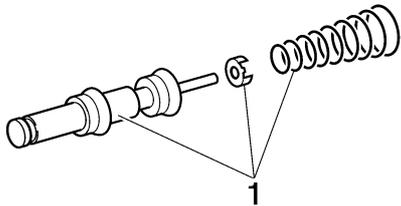
1. Check:

- Brake master cylinder “1”
Damage/scratches/wear → Replace.
- Brake fluid delivery passages (brake master cylinder body)
Obstruction → Blow out with compressed air.

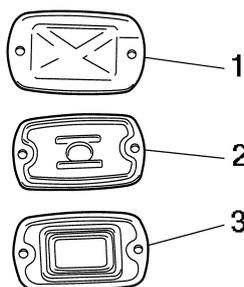
FRONT BRAKE



2. Check:
- Brake master cylinder kit "1"
Damage/scratches/wear → Replace.



3. Check:
- Brake master cylinder reservoir cap "1"
Cracks/damage → Replace.
 - Brake master cylinder reservoir diaphragm holder "2"
 - Brake master cylinder reservoir diaphragm "3"
Damage/wear → Replace.



4. Check:
- Brake hoses
Cracks/damage/wear → Replace.

EAS22520

ASSEMBLING THE FRONT BRAKE MASTER CYLINDER

EWA13520

⚠ WARNING

- Before installation, all internal brake components should be cleaned and lubricated

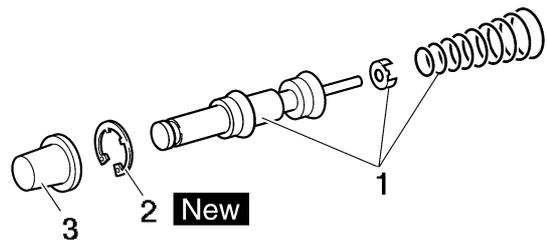
with clean or new brake fluid.

- Never use solvents on internal brake components.



Recommended fluid
DOT 4

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



EAS22530

INSTALLING THE FRONT BRAKE MASTER CYLINDER

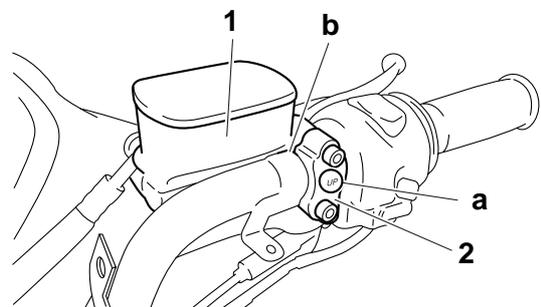
1. Install:
- Brake master cylinder "1"
 - Brake master cylinder holder "2"



Brake master cylinder holder bolt
10 Nm (1.0 m•kg, 7.2 ft•lb)

NOTE:

- Install the brake master cylinder holder with the "UP" mark facing up.
- Align the end of the brake master cylinder holder with the punch mark "a" on the handlebar.
- First, tighten the upper bolt, then the lower bolt.



2. Install:
- Copper washers "1" **New**
 - Brake hose "2"
 - Union bolt "3"



Brake hose union bolt
30 Nm (3.0 m•kg, 22 ft•lb)

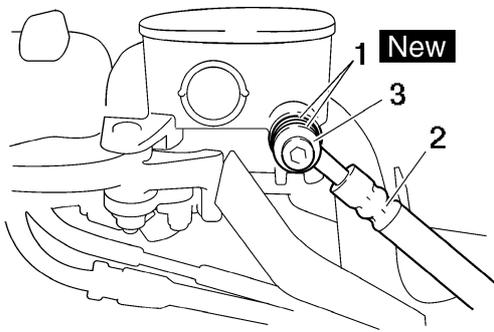
EWA13530

WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-35.

NOTE:

- While holding the brake hose, tighten the union bolt .
- Turn the handlebar to the left and right to make sure the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.



3. Fill:

- Brake master cylinder reservoir (with the specified amount of the recommended brake fluid)



Recommended fluid
DOT 4

EWA13540

WARNING

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

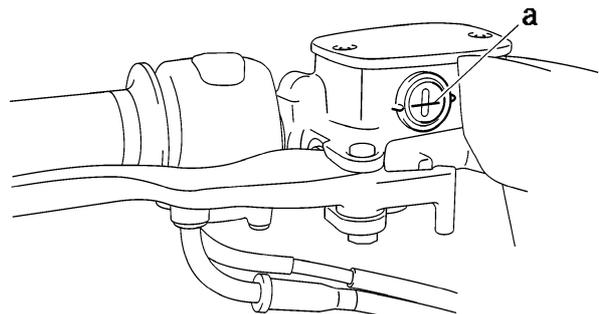
ECA13540

CAUTION:

Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up

any spilt brake fluid immediately.

4. Bleed:
 - Brake system
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)” on page 3-24.
5. Check:
 - Brake fluid level
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-22.



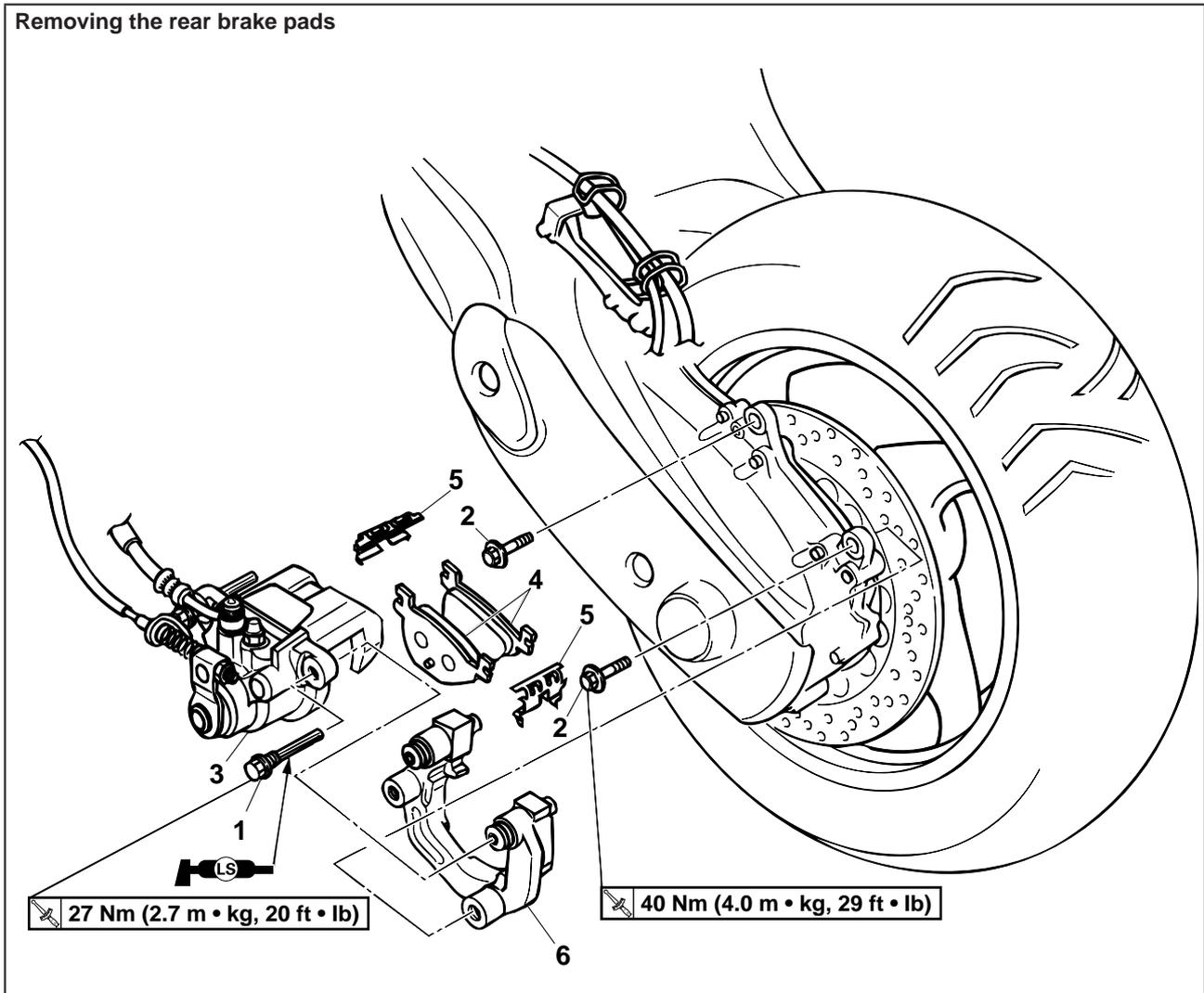
6. Check:

- Brake lever operation
Soft or spongy feeling → Bleed the brake system.
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)” on page 3-24.

EAS22550

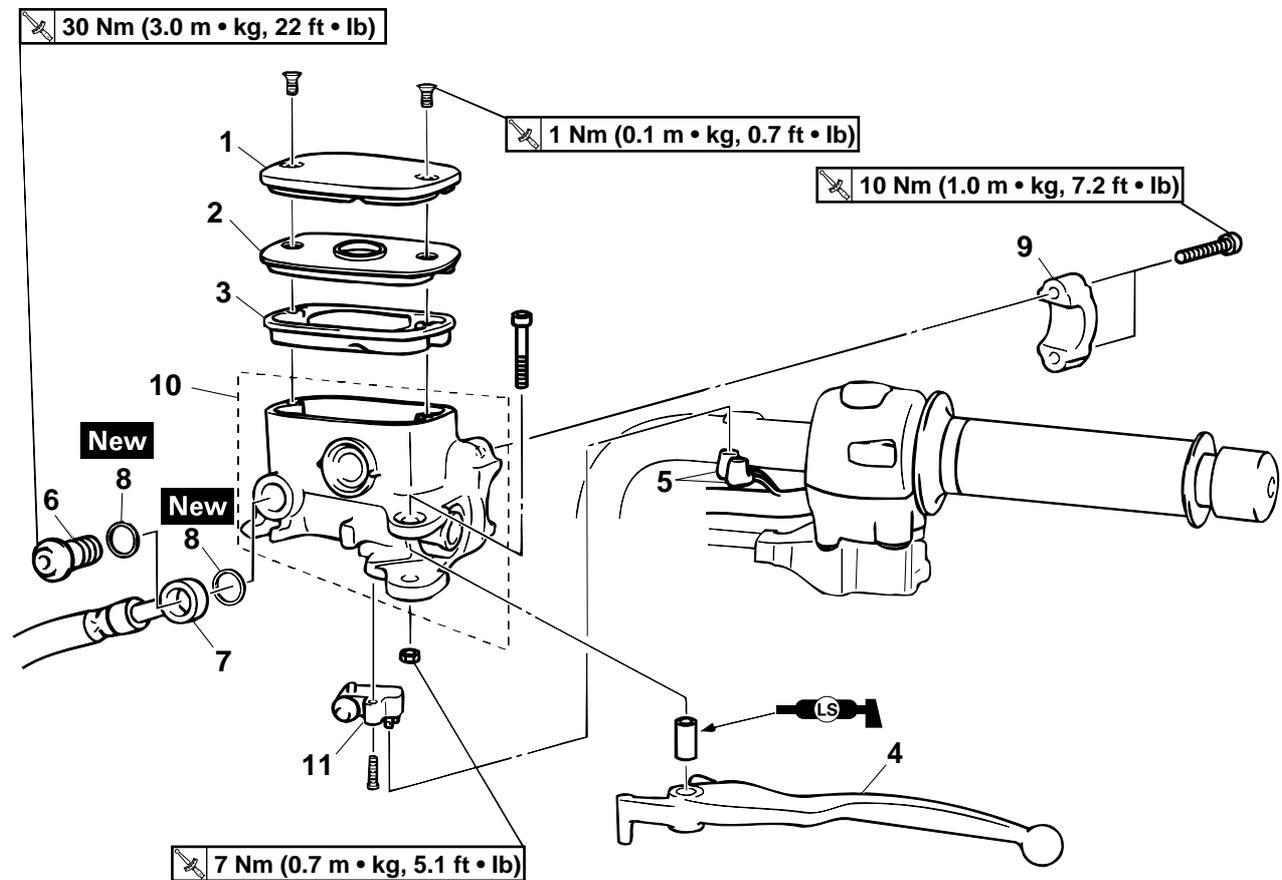
REAR BRAKE

Removing the rear brake pads



Order	Job/Parts to remove	Q'ty	Remarks
1	Rear brake caliper retaining bolt	1	
2	Rear brake caliper bracket bolt	2	
3	Brake caliper	1	
4	Brake pad	2	
5	Brake pad spring	2	
6	Brake caliper bracket	1	
			For installation, reverse the removal procedure.

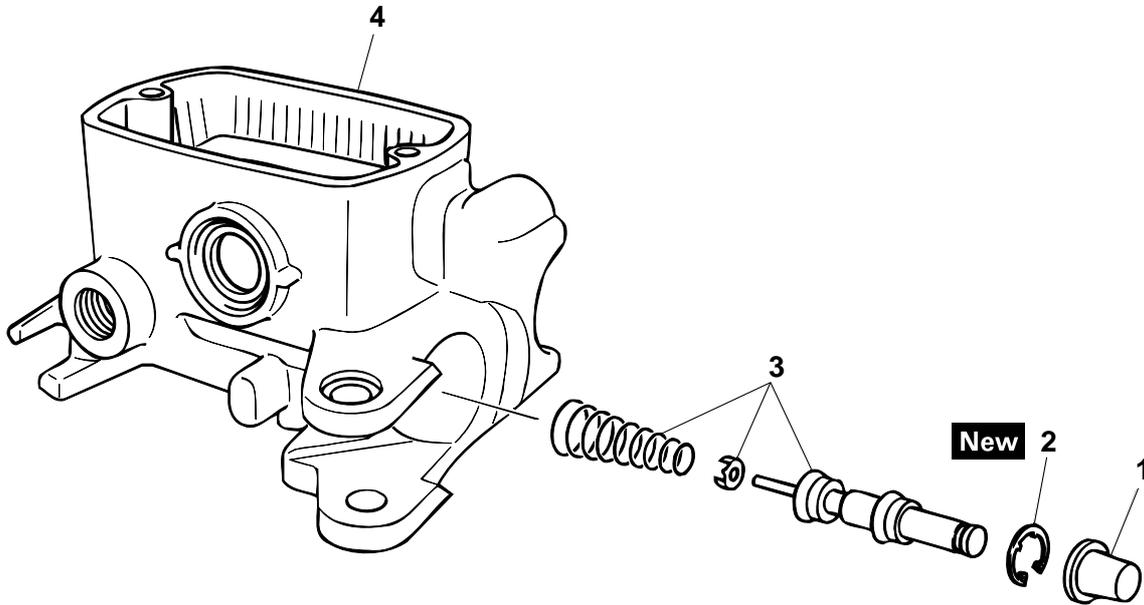
Removing the rear brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
	Upper handlebar cover		Refer to "HANDLEBAR" on page 4-53
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)" on page 3-24.
1	Brake master cylinder reservoir cap	1	
2	Brake master cylinder reservoir diaphragm holder	1	
3	Brake master cylinder reservoir diaphragm	1	
4	Brake lever	1	
5	Rear brake light switch connector	2	
6	Union bolt	1	
7	Brake hose	1	
8	Copper washer	2	
9	Brake master cylinder holder	1	
10	Brake master cylinder	1	
11	Rear brake light switch	1	
			For installation, reverse the removal procedure.

REAR BRAKE

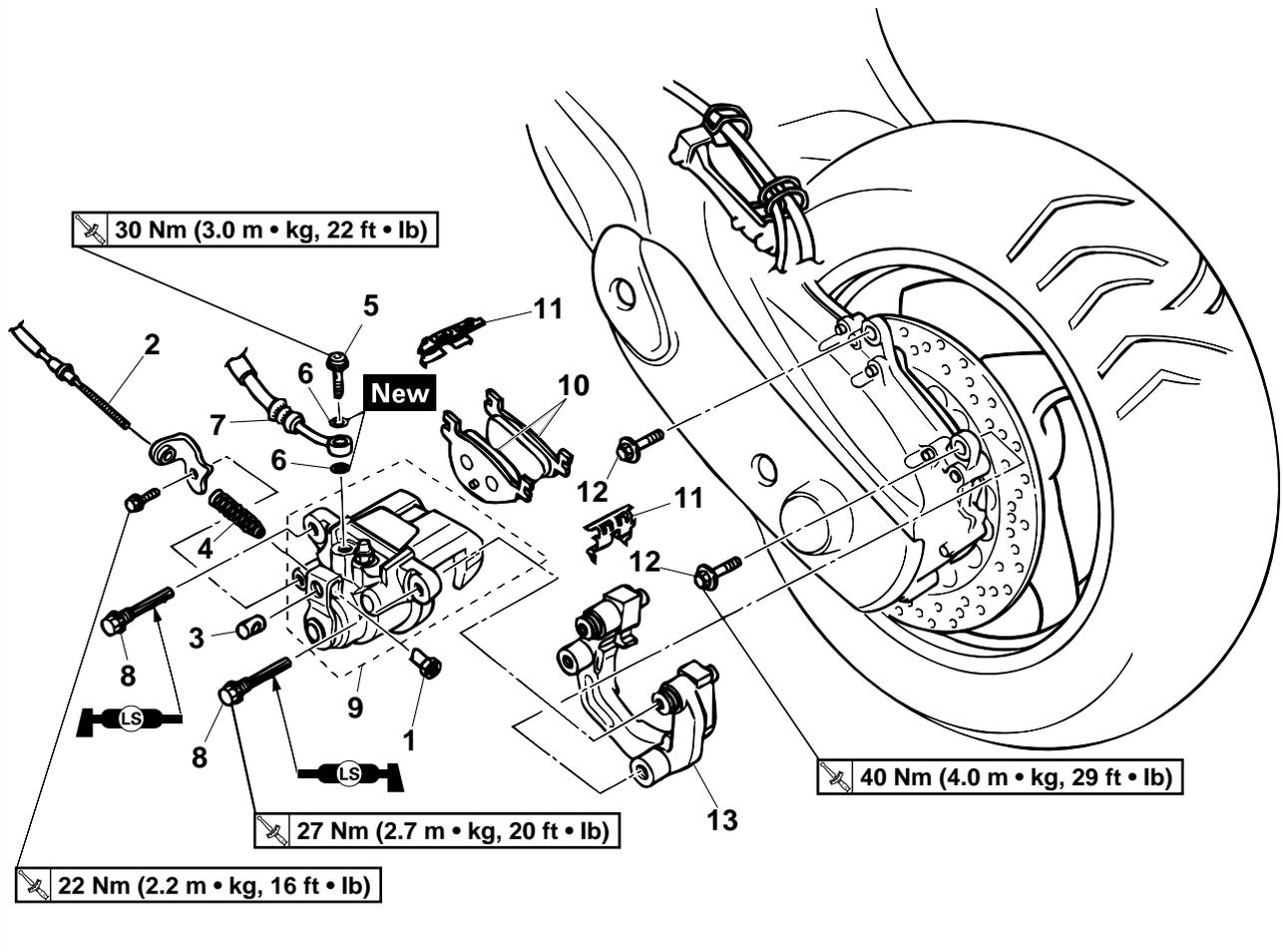
Disassembling the rear brake master cylinder



Order	Job/Parts to remove	Q'ty	Remarks
1	Dust boot	1	
2	Circlip	1	
3	Brake master cylinder kit	1	
4	Brake master cylinder body	1	
			For assembly, reverse the disassembly procedure.

REAR BRAKE

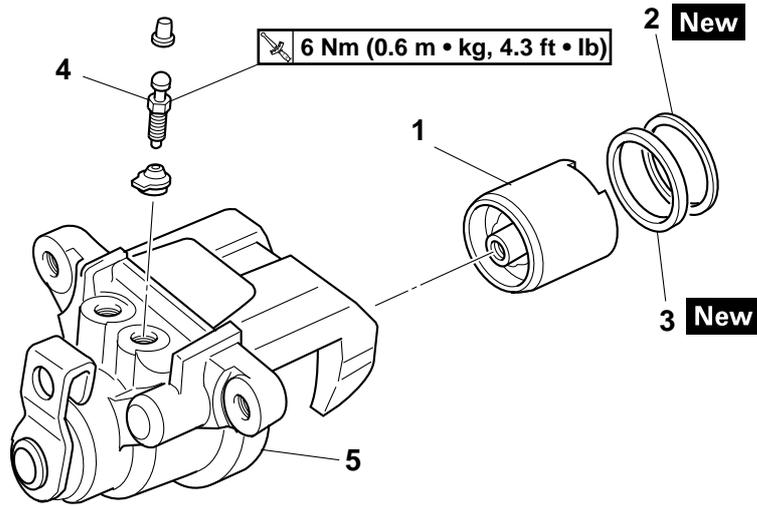
Removing the rear brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)" on page 3-24.
1	Nut	1	
2	Rear brake lock lever cable	1	
3	Pin	1	
4	Spring	1	
5	Union bolt	1	
6	Copper washer	2	
7	Brake hose	1	
8	Rear brake caliper retaining bolt	2	
9	Brake caliper	1	
10	Brake pad	2	
11	Brake pad spring	2	
12	Rear brake caliper bracket bolt	2	
13	Brake caliper bracket	1	
			For installation, reverse the removal procedure.

REAR BRAKE

Disassembling the rear brake calipers



Order	Job/Parts to remove	Q'ty	Remarks
1	Brake caliper piston	1	
2	Dust seal	1	
3	Piston seal	1	
4	Bleed screw	1	
5	Brake caliper body	1	
			For assembly, reverse the disassembly procedure.

EAS22560

INTRODUCTION

EWA14100

WARNING

Disc brake components rarely require disassembly. Therefore, always follow these preventive measures:

- Never disassemble brake components unless absolutely necessary.
- If any connection on the hydraulic brake system is disconnected, the entire brake system must be disassembled, drained, cleaned, properly filled, and bled after reassembly.
- Never use solvents on internal brake components.
- Use only clean or new brake fluid for cleaning brake components.
- Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.
- Avoid brake fluid coming into contact with the eyes as it can cause serious injury.
- **FIRST AID FOR BRAKE FLUID ENTERING THE EYES:**
- Flush with water for 15 minutes and get immediate medical attention.

EAS22570

CHECKING THE REAR BRAKE DISC

1. Remove:
 - Rear wheel
Refer to "REAR WHEEL" on page 4-16.
2. Check:
 - Brake disc
Damage/galling → Replace.
3. Measure:
 - Brake disc deflection
Out of specification → Correct the brake disc deflection or replace the brake disc.
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-26.



Brake disc deflection limit
0.15 mm (0.0059 in)

4. Measure:
 - Brake disc thickness
Measure the brake disc thickness at a few different locations.
Out of specification → Replace.
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-26.



Brake disc thickness limit
4.5 mm (0.18 in)

5. Adjust:
 - Brake disc deflection
Refer to "CHECKING THE FRONT BRAKE DISCS" on page 4-26.



Brake disc bolt
18 Nm (1.8 m•kg, 13 ft•lb)
LOCTITE®

6. Install:
 - Rear wheel
Refer to "REAR WHEEL" on page 4-16.

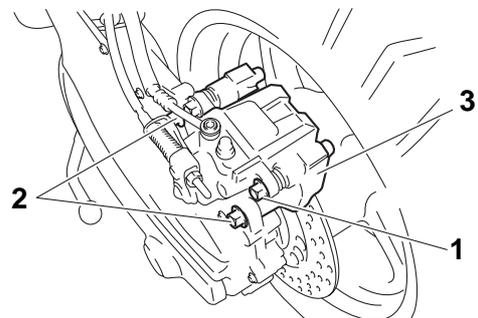
EAS22580

REPLACING THE REAR BRAKE PADS

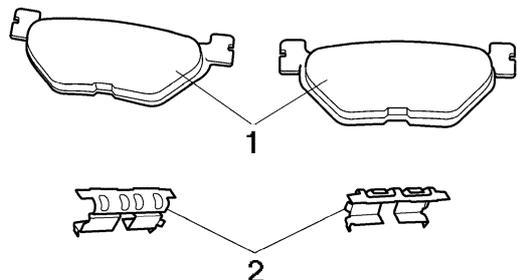
NOTE:

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

1. Remove:
 - Rear brake caliper retaining bolt (rear) "1"
 - Brake caliper bracket bolts "2"
 - Brake caliper "3"



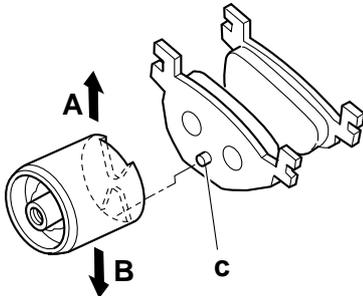
2. Remove:
 - Brake pads "1"
 - Brake pad springs "2"



3. Measure:
 - Brake pad wear limit "a"
Out of specification → Replace the brake

NOTE:

Align the projection “c” on the piston side of the brake pad with the lower recess in the brake caliper piston.



- A. Up
- B. Down



5. Lubricate:
 - Rear brake caliper retaining bolts

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

ECA15B1019

CAUTION:

- Do not allow grease to contact the brake pads.
- Remove any excess grease.

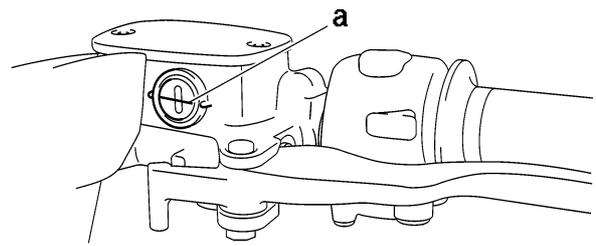
6. Install:
 - Rear brake caliper retaining bolt

	Rear brake caliper retaining bolt 27 Nm (2.7 m•kg, 20 ft•lb)
--	--

7. Install:
 - Rear brake caliper bracket bolts

	Rear brake caliper bracket bolts 40 Nm (4.0 m•kg, 29 ft•lb)
--	---

8. Check:
 - Brake fluid level
Below the minimum level mark “a” → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-22.



9. Check:
 - Brake pedal operation
Soft or spongy feeling → Bleed the brake system.
Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)” on page 3-24.

EAS22590

REMOVING THE REAR BRAKE CALIPER

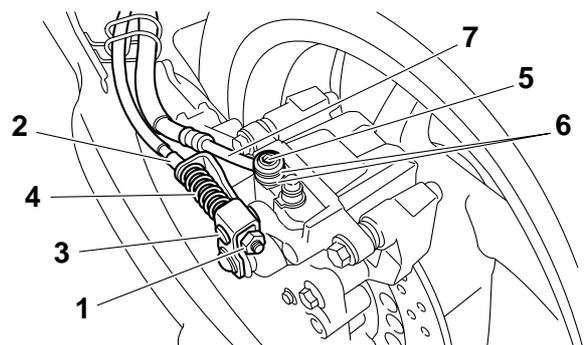
NOTE:

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

1. Remove:
 - Nut “1”
 - Rear brake lock lever cable “2”
 - Pin “3”
 - Spring “4”
 - Union bolt “5”
 - Copper washers “6”
 - Brake hose “7”

NOTE:

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

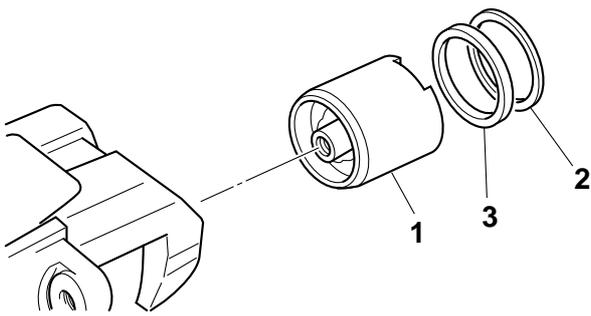


EAS22630

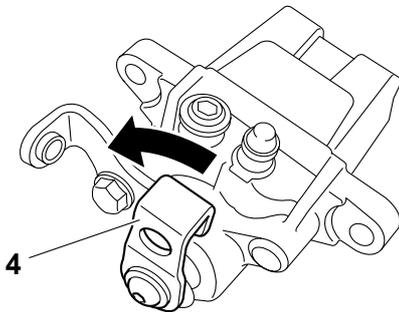
DISASSEMBLING THE REAR BRAKE CALIPER

1. Remove:
 - Brake caliper piston “1”
 - Dust seal “2”
 - Brake caliper piston seal “3”

REAR BRAKE



- a. Operate the rear brake lock lever "4" continuously in the direction shown by the arrow until the piston comes out.



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

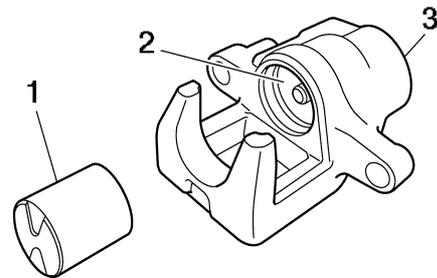
(brake caliper body)

Obstruction → Blow out with compressed air.

EWA13610

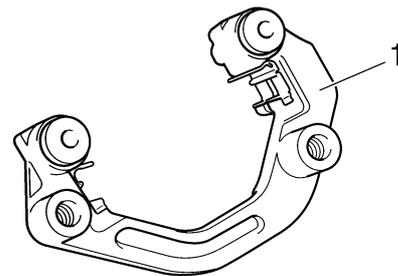
⚠ WARNING

Whenever a brake caliper is disassembled, replace the brake caliper piston seals.



2. Check:

- Brake caliper brackets "1"
- Cracks/damage → Replace.



EAS22640

CHECKING THE REAR BRAKE CALIPER

Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seals	Every two years
Brake hoses	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

1. Check:

- Brake caliper piston "1"
Rust/scratches/wear → Replace the brake caliper pistons.
- Brake caliper cylinder "2"
Scratches/wear → Replace the brake caliper assembly.
- Brake caliper body "3"
Cracks/damage → Replace the brake caliper assembly.
- Brake fluid delivery passages

EAS22660

ASSEMBLING THE REAR BRAKE CALIPER

EWA13620

⚠ WARNING

- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components as they will cause the piston seals to swell and distort.
- Whenever a brake caliper is disassembled, replace the brake caliper piston seals.



Recommended fluid
DOT 4

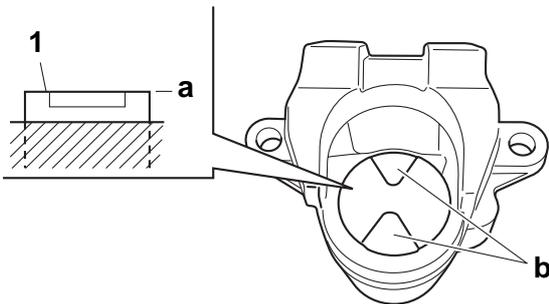
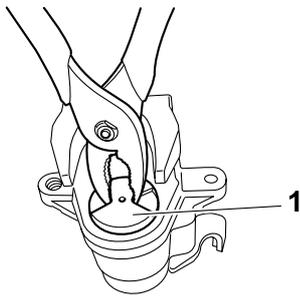
1. Install:

- Brake caliper piston "1"
Turn the brake caliper piston clockwise until section "a" of the brake caliper piston is level with the surface of the brake caliper body.

NOTE:

Align the recesses "b" in the brake caliper piston

with the brake caliper body as shown in the illustration.



EAS22670

INSTALLING THE REAR BRAKE CALIPER

1. Install:

- Brake caliper bracket
- Brake caliper "1" (temporarily)
- Copper washers **New**
- Brake hose "2"
- Union bolt "3"



Brake caliper bracket
40 Nm (4.0 m•kg, 29 ft•lb)
Brake hose union bolt
30 Nm (3.0 m•kg, 22 ft•lb)

EWA13530

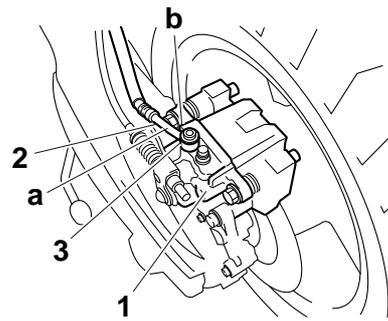
WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to "CABLE ROUTING" on page 2-35.

ECA14170

CAUTION:

When installing the brake hose onto the brake caliper "1", make sure the brake pipe "a" touches the projection "b" on the brake caliper.



2. Remove:

- Brake caliper

3. Install:

- Brake pads
- Brake pad springs
- Brake caliper retaining bolt
- Brake caliper
- Brake hose holder

Refer to "REPLACING THE REAR BRAKE PADS" on page 4-39.



Brake caliper retaining bolt
27 Nm (2.7 m•kg, 19 ft•lb)

4. Fill:

- Brake fluid reservoir (with the specified amount of the recommended brake fluid)



Recommended fluid
DOT 4

EWA13090

WARNING

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

ECA13540

CAUTION:

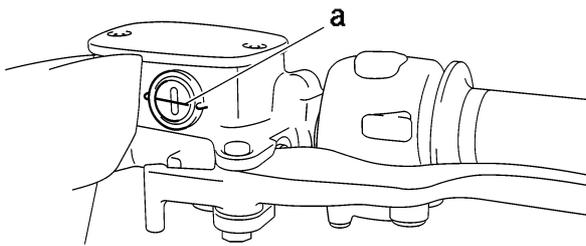
Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.

5. Bleed:

- Brake system
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)" on page 3-24.

6. Check:

- Brake fluid level
Below the minimum level mark "a" → Add the recommended brake fluid to the proper level. Refer to "CHECKING THE BRAKE FLUID LEVEL" on page 3-22.



7. Check:

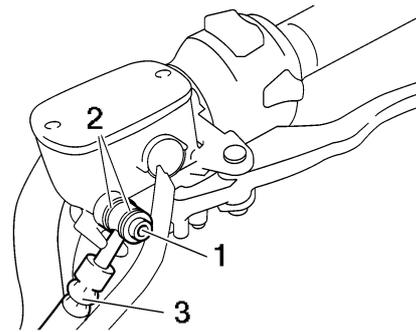
- Brake lever operation
Soft or spongy feeling → Bleed the brake system.
Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)" on page 3-24.

8. Install:

- Spring
- Pin
- Rear brake lock lever cable
- Nut

9. Check:

- Rear brake lock lever cable length
Refer to "ADJUSTING THE REAR BRAKE LOCK LEVER CABLE" on page 3-23.



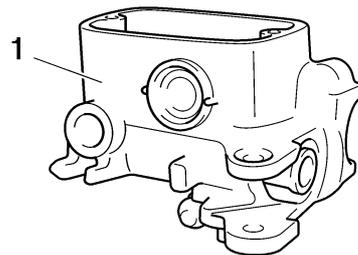
EAS22710

CHECKING THE REAR BRAKE MASTER CYLINDER

The following procedure applies to the both of the brake master cylinders.

1. Check:

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



2. Check:

- Brake master cylinder kit "1"
Damage/scratches/wear → Replace.

EAS22700

REMOVING THE REAR BRAKE MASTER CYLINDER

NOTE:

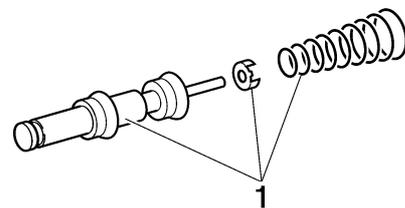
Before disassembling the rear brake master cylinder, drain the brake fluid from the entire brake system.

1. Remove:

- Union bolt "1"
- Copper washers "2"
- Brake hose "3"

NOTE:

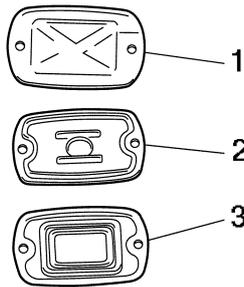
To collect any remaining brake fluid, place a container under the master cylinder and the end of the brake hose.



3. Check:

- Brake fluid reservoir "1"
Cracks/damage → Replace.
- Brake fluid reservoir diaphragm holder "2"
- Brake fluid reservoir diaphragm "3"
Cracks/damage → Replace.

REAR BRAKE



4. Check:

- Brake hoses
Cracks/damage/wear → Replace.

EAS22730

ASSEMBLING THE REAR BRAKE MASTER CYLINDER

EWA13520

⚠ WARNING

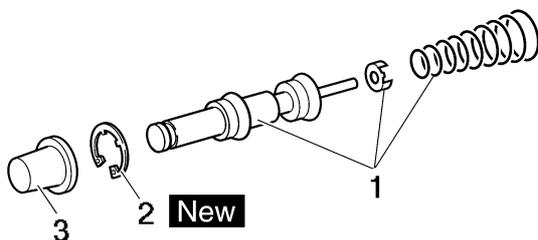
- Before installation, all internal brake components should be cleaned and lubricated with clean or new brake fluid.
- Never use solvents on internal brake components.

	Recommended fluid DOT 4
---	-----------------------------------

1. Install:

- Master cylinder kit “1”
- Circlip “2” **New**
- Dust boot “3”

	Cylinder cup installer 90890-01996
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EAS22750

INSTALLING THE REAR BRAKE MASTER CYLINDER

1. Install:

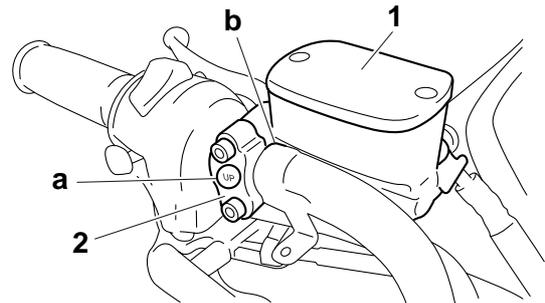
- Brake master cylinder “1”
- Brake master cylinder holder “2”



Holder bolts
10 Nm (1.0 m•kg, 7.2 ft•lb)

NOTE:

- Install the brake master cylinder holder with the “UP” mark facing up “a”.
- Align the brake master cylinder with the projection “b” on the handlebar.
- First, tighten the upper bolt, then the lower bolt.



2. Install:

- Copper washers “1” **New**
- Brake hoses “2”
- Union bolt “3”



Brake hose union bolt
30 Nm (3.0 m•kg, 22 ft•lb)

EWA13530

⚠ WARNING

Proper brake hose routing is essential to insure safe vehicle operation. Refer to “CABLE ROUTING” on page 2-35.

NOTE:

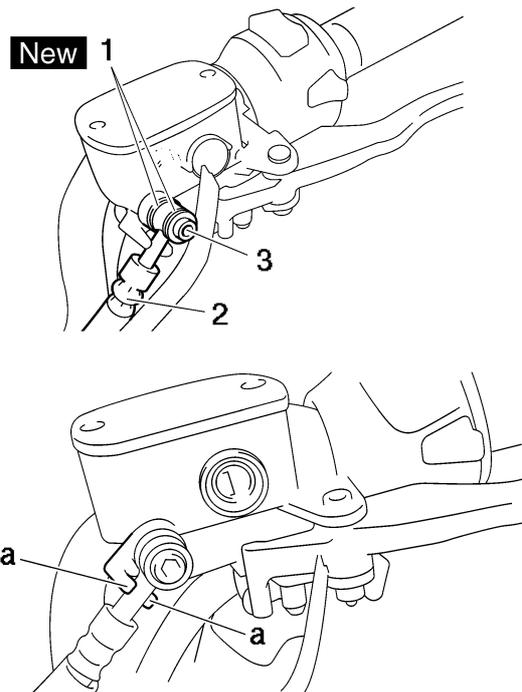
- While holding the brake hose, tighten the union bolt as shown.
- Turn the handlebar to the left and to the right to make sure that the brake hose does not touch other parts (e.g., wire harness, cables, leads). Correct if necessary.

ECA14160

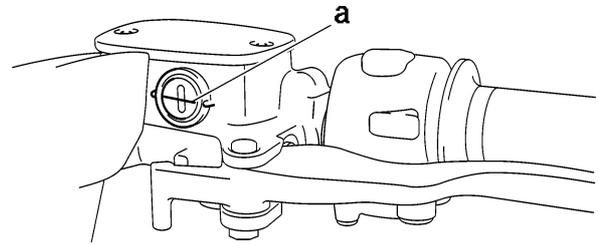
CAUTION:

When installing the brake hose onto the brake master cylinder, make sure the brake pipe touches the projection “a” as shown.

REAR BRAKE



Below the minimum level mark “a” → Add the recommended brake fluid to the proper level. Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-22.



6. Check:
 - Brake lever operationSoft or spongy feeling → Bleed the brake system. Refer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)” on page 3-24.

3. Fill:
 - Brake fluid reservoir (to the maximum level mark)



EWA13090

WARNING

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

ECA13540

CAUTION:

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

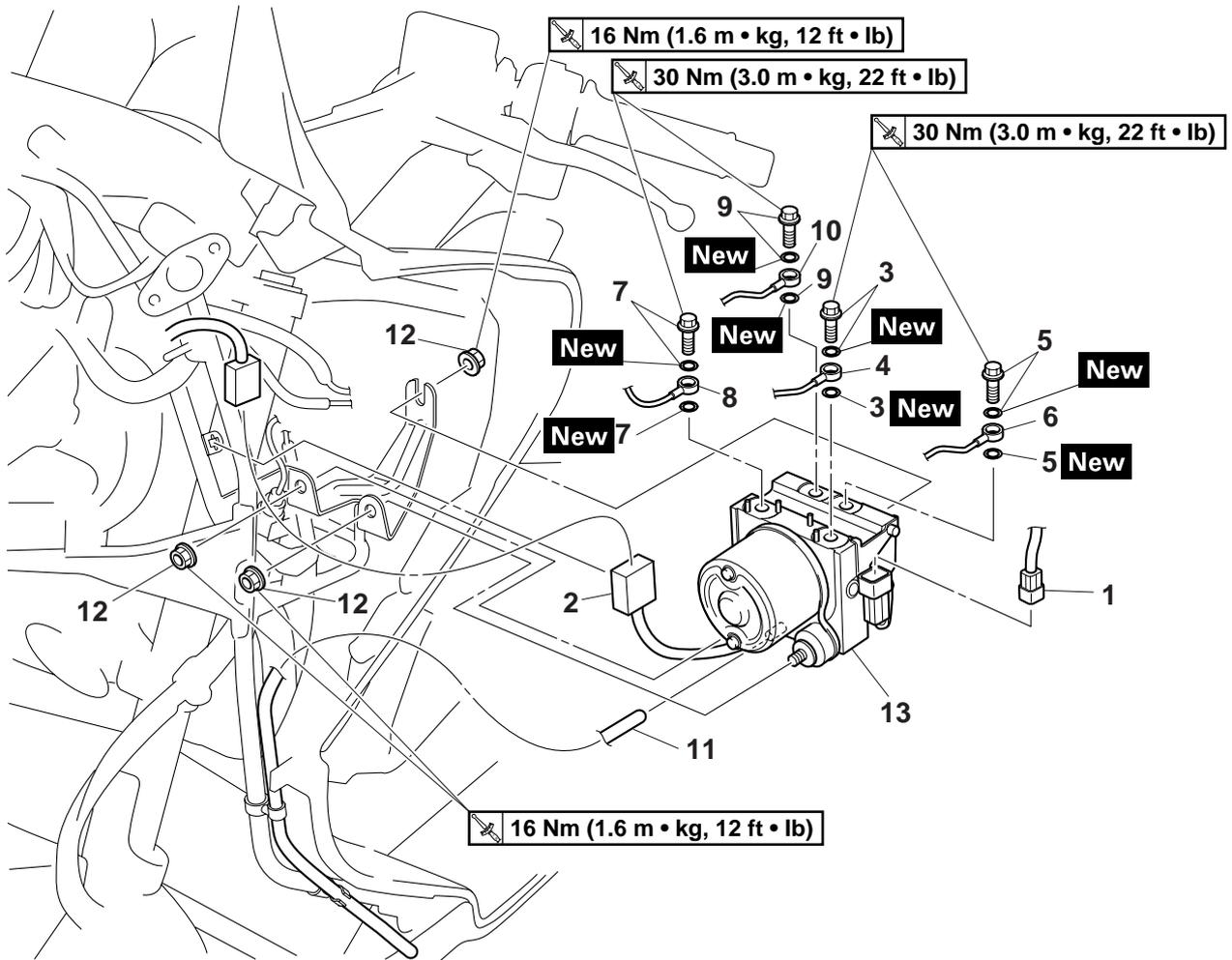
4. Bleed:
 - Brake systemRefer to “BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)” on page 3-24.
5. Check:
 - Brake fluid level

ABS (Anti-Lock Brake System)

EAS22760

ABS (Anti-Lock Brake System)

Removing the hydraulic unit



Order	Job/Parts to remove	Q'ty	Remarks
	Front cowling		Refer to "GENERAL CHASSIS" on page 4-1.
	Brake fluid		Drain. Refer to "BLEEDING THE HYDRAULIC BRAKE SYSTEM (XP500)" on page 3-24.
1	Hydraulic unit solenoid coupler (wire harness side)	1	
2	ABS motor coupler	1	
3	Union bolt/Copper washer	1/2	
4	Front brake hose	1	
5	Union bolt/Copper washer	1/2	
6	Front brake hose	1	
7	Union bolt/Copper washer	1/2	
8	Rear brake hose	1	
9	Union bolt/Copper washer	1/2	
10	Rear brake hose	1	
11	ABS motor breather hose	1	
12	Nut	3	
13	Hydraulic unit	1	
			For installation, reverse the removal procedure.

ABS (Anti-Lock Brake System)

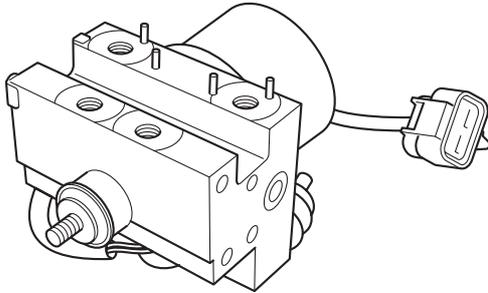
EAS22770

REMOVING THE HYDRAULIC UNIT

ECA15B1020

CAUTION:

Do not remove the hydraulic unit to check the resistance of the solenoid valves and the ABS motor for continuity.



EWA13930

WARNING

Refill with the same type of brake fluid that is already in the system. Mixing fluids may result in a harmful chemical reaction, leading to poor braking performance.

ECA14520

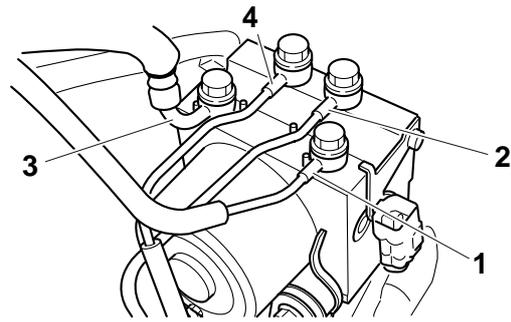
CAUTION:

- Handle the ABS components with care since they have been accurately adjusted. Keep them away from dirt and do not subject them to shocks.
- The ABS wheel sensor cannot be disassembled. Do not attempt to disassemble it. If faulty, replace with a new one.
- Do not turn the main switch to "ON" when removing the hydraulic unit.
- Do not clean with compressed air.
- Do not reuse the brake fluid.
- Brake fluid may damage painted surfaces and plastic parts. Therefore, always clean up any spilt brake fluid immediately.
- Do not allow any brake fluid to contact the couplers. Brake fluid may damage the couplers and cause bad contacts.
- If the union bolts for the hydraulic unit have been removed, be sure to tighten them to the specified torque and bleed the brake system.

1. Remove:

- Brake hose "1" (from the front brake master cylinder)
- Brake hose "2" (to the front brake caliper)
- Brake hose "3" (from the rear brake master cylinder)

- Brake hose "4" (to the rear brake caliper)



NOTE:

Do not operate the brake lever while removing the brake hoses.

ECA14530

CAUTION:

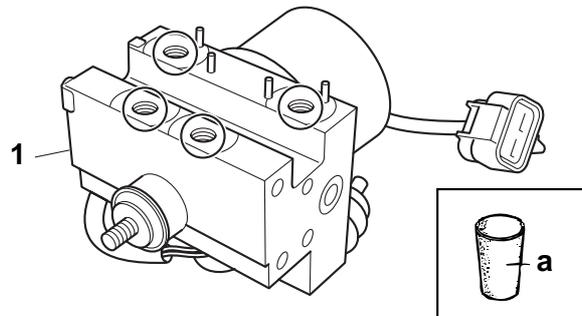
When removing the brake hoses, cover the area around the hydraulic unit to catch any spilt brake fluid. Do not allow the brake fluid to contact other parts.

2. Remove:

- Hydraulic unit "1"

NOTE:

To avoid brake fluid leakage and to prevent foreign materials from entering the hydraulic unit, insert a rubber plug "a" or a bolt (M10 × 1.25) into each union bolt hole.

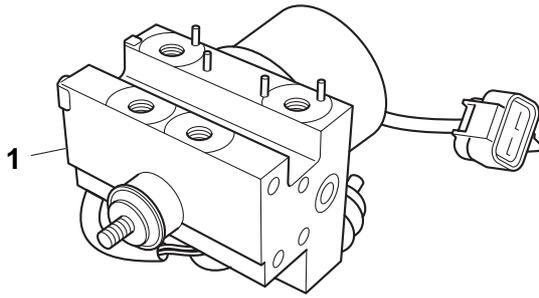


EAS22770b

CHECKING THE HYDRAULIC UNIT

1. Check:

- Hydraulic unit "1"
Cracks/damage → Replace the hydraulic unit.



EAS22770c

INSTALLING THE HYDRAULIC UNIT

Proceed in the reverse order of disassembly. Pay attention to the following items.

1. Install:
 - Hydraulic unit



Hydraulic unit bracket bolt
16 Nm (1.6 m•kg, 11 ft•lb)

NOTE:

- When tightening the hydraulic unit nuts, first temporarily tighten the front nuts, and then tighten the rear nut and the front nuts to specification in the order given.
- Do not allow any foreign materials to enter the hydraulic unit or the brake hoses when installing the hydraulic unit.

ECA15B1021

CAUTION:

Do not remove the rubber plugs or bolts (M10×1.25) installed in the union bolt holes before installing the hydraulic unit.

NOTE:

Do not allow any foreign materials to enter the hydraulic unit or the brake hoses when installing the hydraulic unit.

2. Remove:

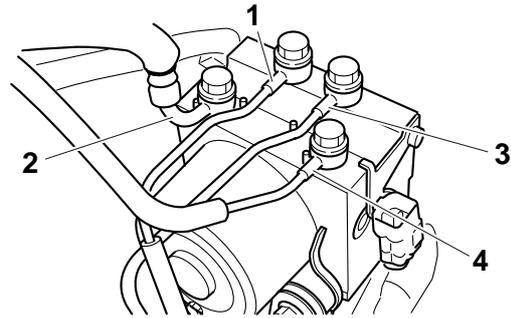
- Rubber plugs or bolts (M10 × 1.25)

3. Install:

- Copper washer **New**
- Brake hose “1” (to the rear brake caliper)
- Brake hose “2” (from the rear brake master cylinder)
- Brake hose “3” (to the front brake caliper)
- Brake hose “4” (from the front brake master cylinder)
- Union bolt



Brake hose union bolt
30 Nm (3.0 m•kg, 22 ft•lb)



EWA13940

WARNING

The brake hoses to the front and rear brake calipers can be distinguished by the rubber at the end of each hose. Be sure to connect each brake hose to the correct union bolt hole.

ECA14760

CAUTION:

To route the front and rear brake hoses, refer to “CABLE ROUTING” on page 2-35.

4. Fill:

- Brake master cylinder reservoir



Recommended brake fluid
DOT 4

5. Bleed the brake system.
6. Check the operation of the hydraulic unit according to the brake lever and the brake pedal response. (Refer to “HYDRAULIC UNIT OPERATION TEST” on page 4-49.)

ECA14770

CAUTION:

Always check the operation of the hydraulic unit according to the brake lever and the brake pedal response.

EAS22800

HYDRAULIC UNIT OPERATION TEST

The reaction-force pulsating action generated in the brake levers when the ABS is activated can be tested when the vehicle is stopped.

The hydraulic unit operation can be tested by the following two methods.

- Hydraulic unit operation test 1: this test generates the same reaction-force pulsating action that is generated in the brake levers when the ABS is activated.
- Hydraulic unit operation test 2: this test checks the function of the ABS after the system was disassembled, adjusted, or serviced.

ABS (Anti-Lock Brake System)

Hydraulic unit operation test 1

EWA15B1001



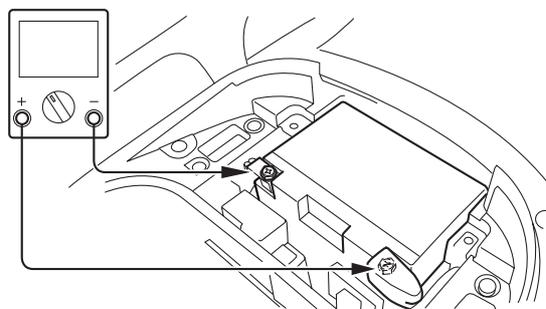
WARNING

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

1. Place the vehicle on the centerstand.
2. Set the main switch to "OFF".
3. Remove:
 - Battery cover
Refer to "FUEL TANK" in chapter "3".
4. Check:
 - Battery voltage
Lower than 12.8 V → Charge or replace the battery.



**Battery voltage
Higher than 12.8 V**



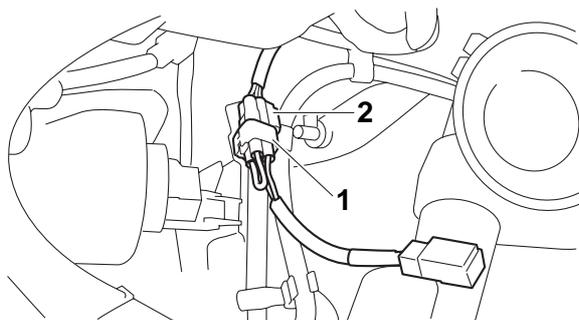
NOTE:

- If the battery voltage is lower than 12.8 V, charge the battery and perform hydraulic unit operation test 1.
- If the battery voltage is lower than 10 V, the ABS warning light comes on and the ABS does not operate.

5. Connect the test coupler adaptor "1" to the test coupler "2".



**Test coupler adaptor
90890-03149**



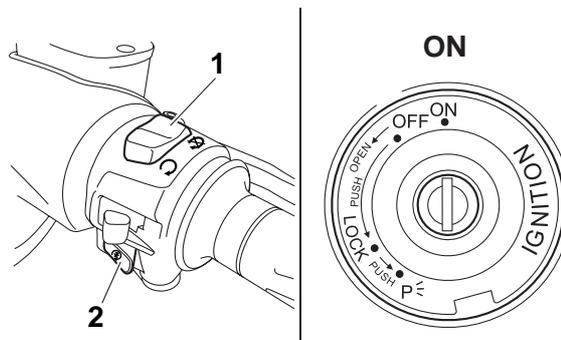
6. Set the engine stop switch "1" to "⊗".

7. Set the main switch to "ON".

NOTE:

After setting the main switch to "ON", wait (approximately 2 seconds) until the ABS warning light goes off.

8. Push the start switch "2" for at least 4 seconds.



ECA15B1008

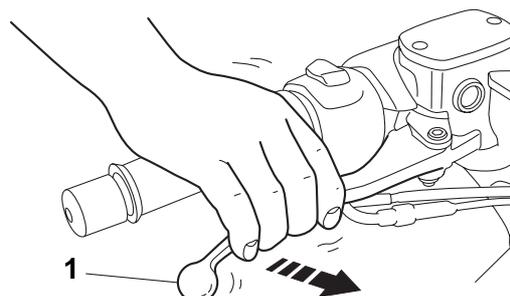
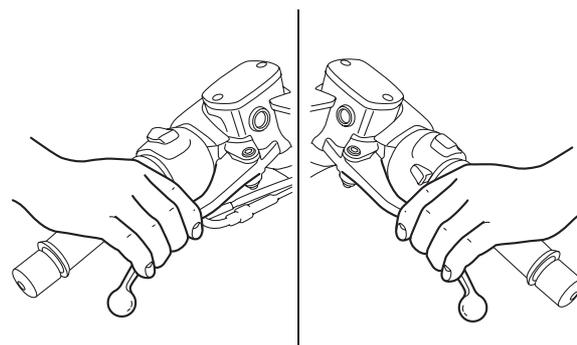
CAUTION:

Do not operate the brake levers.

9. After releasing the start switch, operate the brake levers simultaneously.

NOTE:

- A reaction-force pulsating action is generated in the front brake lever "1" 0.5 second after the rear brake lever and front brake lever are operated simultaneously and continues for approximately 1 second.
- Be sure to continue to operate the brake levers even after the pulsating action has stopped.

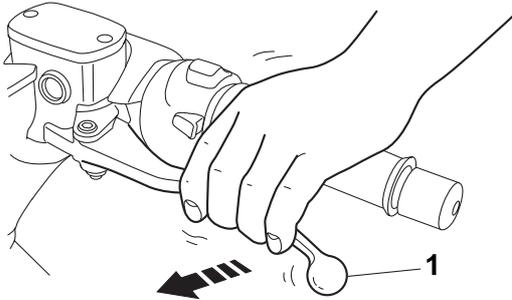


ABS (Anti-Lock Brake System)

10. After the pulsating action has stopped in the front brake lever, it is generated in the rear brake lever "1" 0.5 second after and continues for approximately 1 second.

NOTE:

Be sure to continue to operate the brake levers even after the pulsating action has stopped.



11. After the pulsating action has stopped in the rear brake lever, it is generated in the front brake lever 0.5 second after and continues for approximately 1 second.

ECA15B1009

CAUTION:

- Check that the pulsating action is felt in the front brake lever, rear brake lever, and again in the front brake lever, in this order.
- If the pulsating action is felt in the rear brake lever before it is felt in the front brake lever, check that the brake hoses are connected correctly to the hydraulic unit.
- If the pulsating action is hardly felt in either the brake levers, check that the brake hoses are connected correctly to the hydraulic unit.

12. Set the main switch to "OFF".

13. Remove the test coupler adaptor from the test coupler.

14. Set the main switch to "ON".

15. Set the engine stop switch to "⊗".

Hydraulic unit operation test 2

EWA15B1001

WARNING

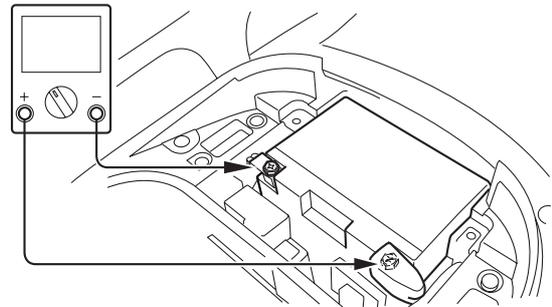
Securely support the vehicle so that there is no danger of it falling over.

1. Place the vehicle on the centerstand.
2. Set the main switch to "OFF".
3. Remove:
 - Front cowl
 - Battery
 Refer to "FUEL TANK" in chapter "3".
4. Check:

- Battery voltage
Lower than 12.8 V → Charge or replace the battery.



**Battery voltage
Higher than 12.8 V**



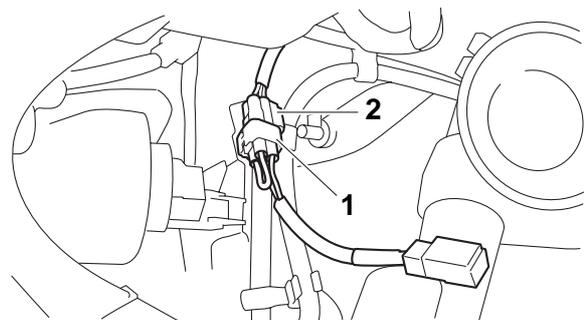
NOTE:

- If the battery voltage is lower than 12.8 V, charge the battery and perform hydraulic unit operation test 2.
- If the battery voltage is lower than 10 V, the ABS warning light comes on and the ABS does not operate.

5. Connect the test coupler adaptor "1" to the test coupler "2".



**Test coupler adaptor
90890-03149**



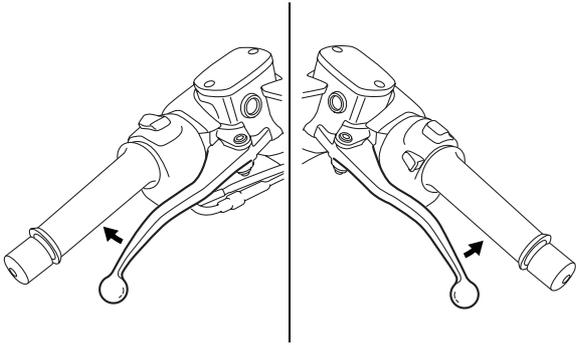
6. Set the main switch to "ON" while operating the brake levers simultaneously.

ECA15B1010

CAUTION:

When the main switch is set to "ON", be sure to operate both the brake levers simultaneously. If only the brake levers are operated, set the main switch to "OFF" and start the procedure again.

ABS (Anti-Lock Brake System)



unit.

- If the operation of the hydraulic unit is normal, delete all of the malfunction codes.

EAS22820

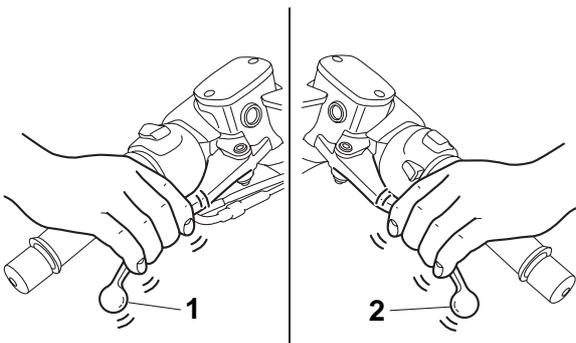
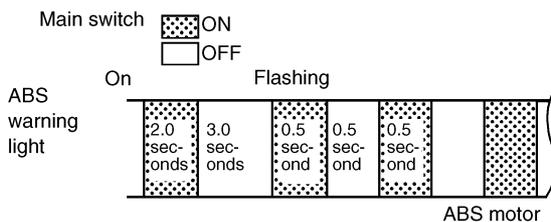
TRIAL RUN

After all checks and services are completed, always ensure the vehicle has no problems by performing the trial running at a speed of faster than 10 km/h.

7. Check:

- Hydraulic unit operation

When the main switch is set to "ON", the ABS warning light comes on for 2 seconds, goes off for 3 seconds, then starts flashing. When the ABS warning light starts flashing, the front brake lever "1" will return to its home position. The rear brake lever "2" will then return to its home position, then the front brake lever will return to its home position again.



ECA15B1011

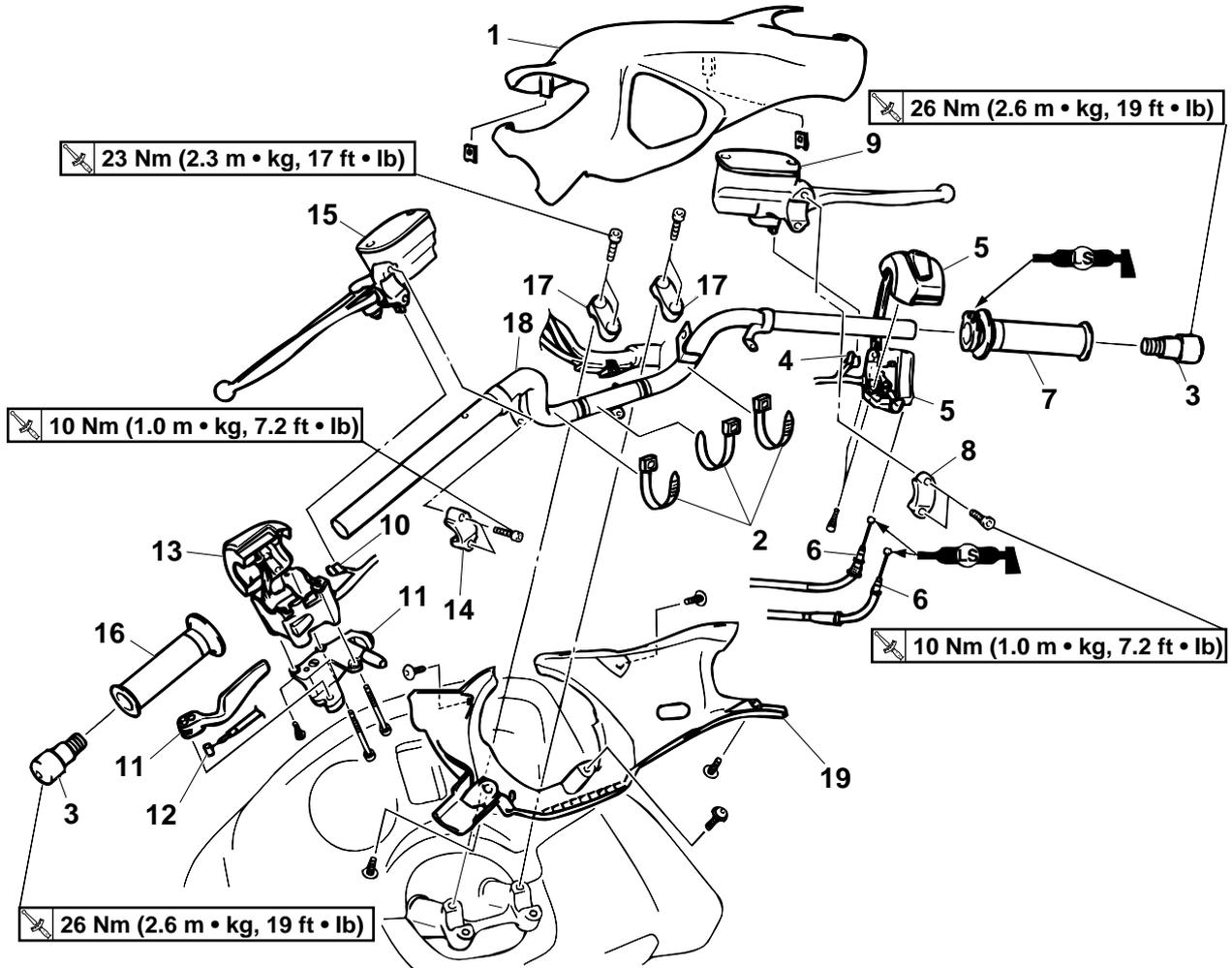
CAUTION:

- Check that the front brake lever returns to its home position before the rear brake lever returns to its home position.
- If the rear brake lever returns to its home position before the front brake lever does, check that the brake hoses are connected correctly to the hydraulic unit.
- If either the brake levers returns to its home position slowly, check that the brake hoses are connected correctly to the hydraulic

EAS22840

HANDLEBAR

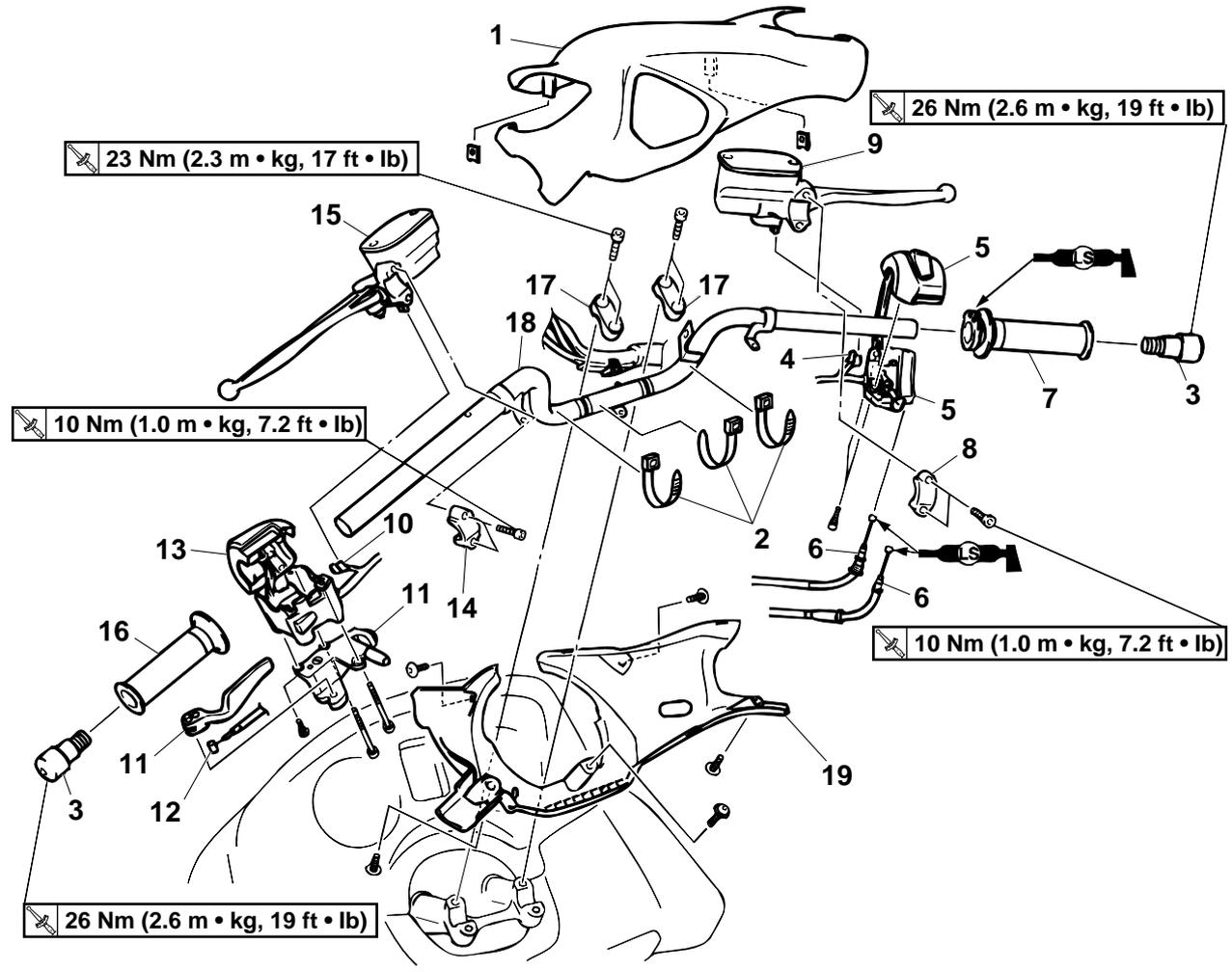
Removing the handlebar



Order	Job/Parts to remove	Q'ty	Remarks
1	Upper handle cover	1	
2	Band	3	
3	Grip end	2	
4	Front brake light switch connector	2	Disconnect.
5	Right handlebar switch	1	
6	Throttle cable	2	Disconnect.
7	Throttle grip	1	
8	Front brake master cylinder holder	1	
9	Front brake master cylinder	1	
10	Rear brake light switch connector	2	Disconnect.
11	Parking brake lever/Holder	1/1	
12	Rear brake lock lever cable	1	Disconnect.
13	Left handlebar switch	1	
14	Rear brake master cylinder holder	1	
15	Rear brake master cylinder	1	
16	Handlebar grip	1	
17	Upper handlebar holder	2	
18	Handlebar	2	
19	Lower handlebar cover	1	

HANDLEBAR

Removing the handlebar



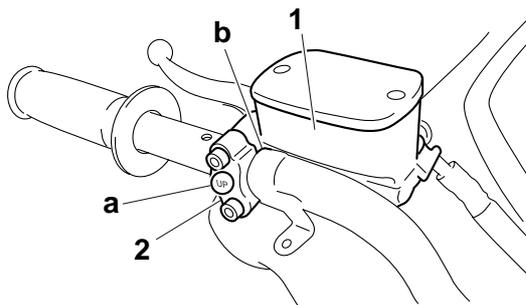
Order	Job/Parts to remove	Q'ty	Remarks
			For installation, reverse the removal procedure.



Rear brake master cylinder holder bolt
10 Nm (1.0 m•kg, 7.2 ft•lb)

NOTE:

- Install the rear brake master cylinder holder with the “UP” mark facing up “a”.
- Align the rear brake master cylinder with the projection “b” in the handlebar.
- First, tighten the upper bolt, then the lower bolt.



5. Connect:

- Rear brake lock lever cable

NOTE:

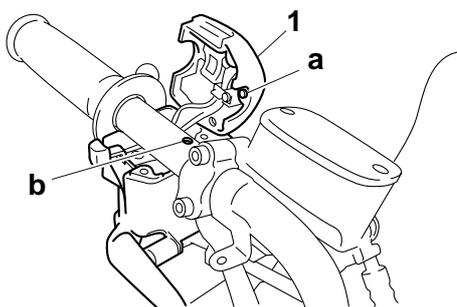
Lubricate the inside of the rear brake lock lever cable and parking brake lever with a thin coat of lithium-soap-based grease.

6. Install:

- Left handlebar switch “1”

NOTE:

Align the projection “a” of the left handlebar switch with the hole “b” on the handlebar.

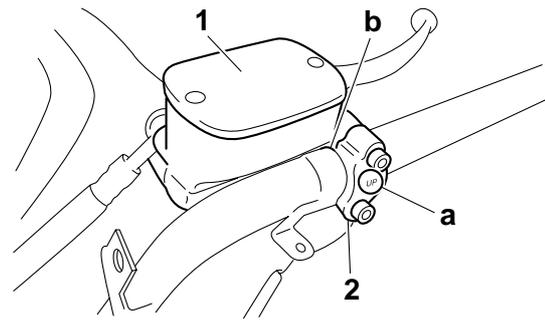


7. Install:

- Front brake master cylinder “1”
- Front brake master cylinder holder “2”

NOTE:

- Install the front brake master cylinder holder with the “UP” “a” mark facing up.
- Align the front brake master cylinder with the projection “b” in the handlebar.
- First, tighten the upper bolt, then the lower bolt.



8. Install:

- Throttle grip
- Throttle cables

NOTE:

Lubricate the inside of the throttle grip with a thin coat of lithium-soap-based grease and install it onto the handlebar.

9. Install:

- Right handlebar switch “1”

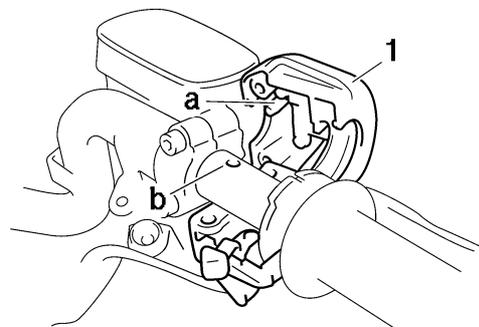
EWA13720

WARNING

Make sure the throttle grip operates smoothly.

NOTE:

Align the projection “a” of the right handlebar switch with the punch mark “b” on the handlebar.



10. Adjust:

- Throttle cable free play
Refer to “ADJUSTING THE THROTTLE CABLE FREE PLAY” on page 3-8.



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

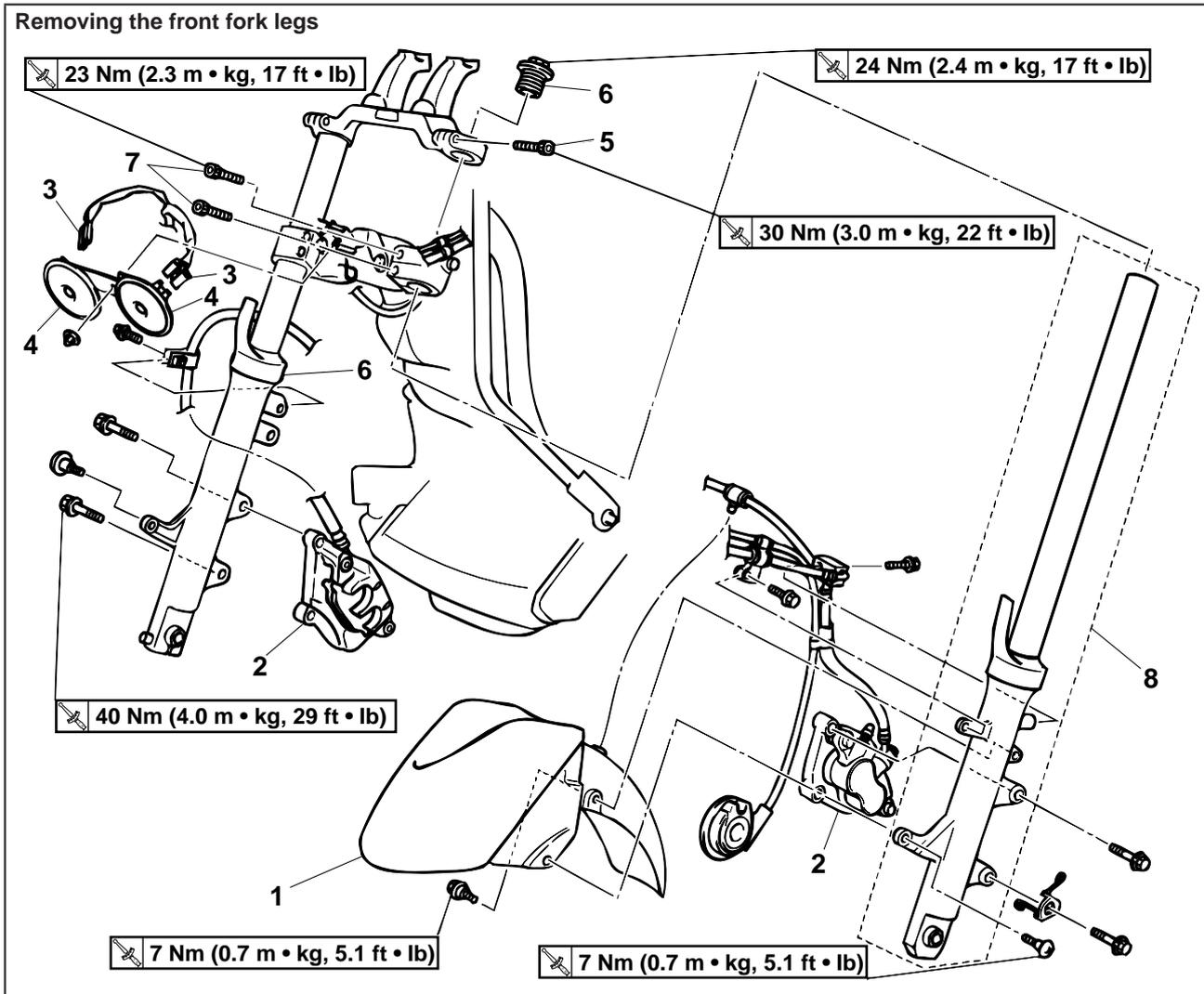
11. Adjust:

- Rear brake lock lever cable length
Refer to “ADJUSTING THE REAR BRAKE LOCK LEVER CABLE” on page 3-23.

EAS22950

FRONT FORK

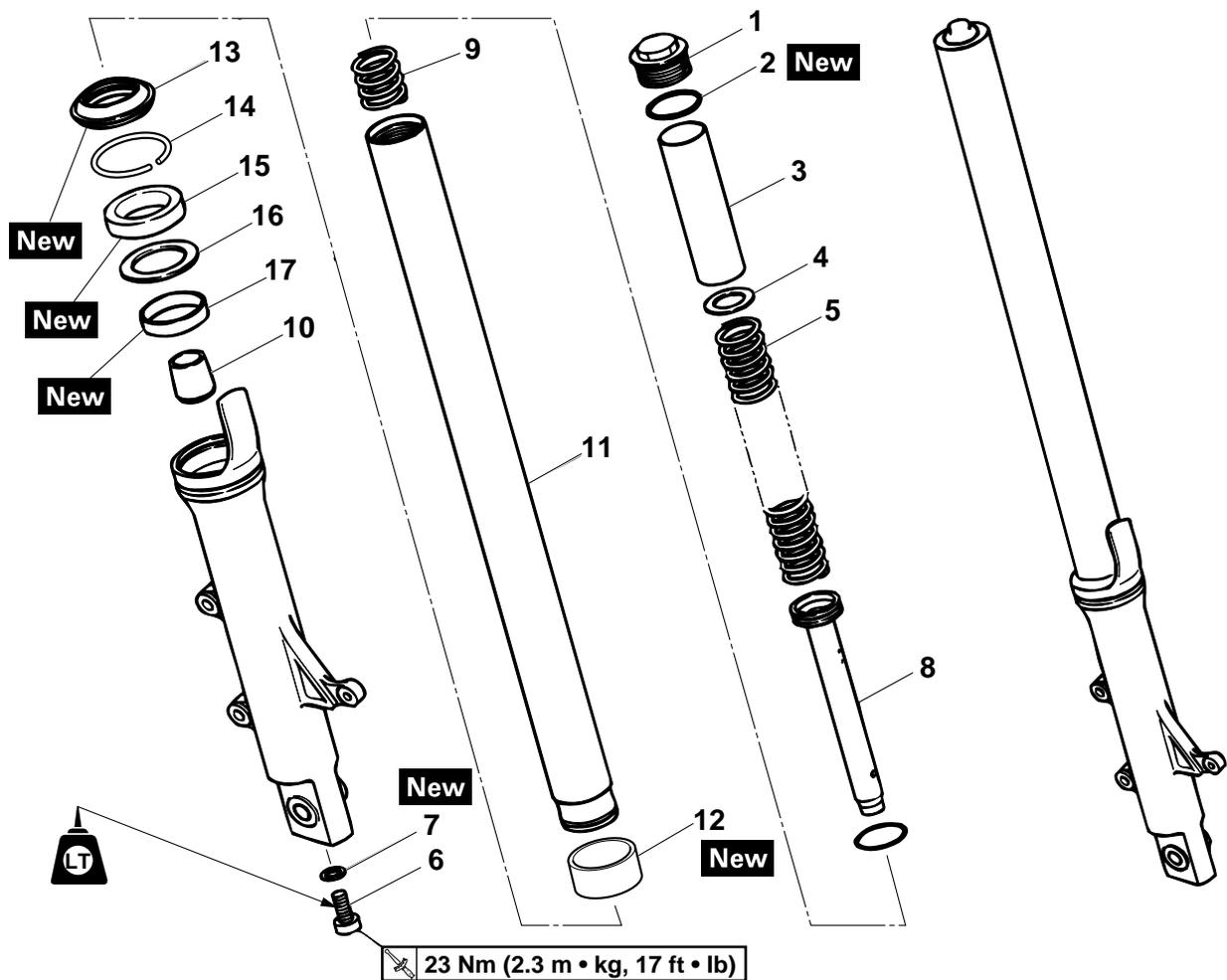
Removing the front fork legs



Order	Job/Parts to remove	Q'ty	Remarks
	Front cowling/leg shield		Refer to "GENERAL CHASSIS" on page 4-1.
	Handlebar cover (upper and lower)		Refer to "HANDLEBAR" on page 4-53.
	Front wheel		Refer to "FRONT WHEEL" on page 4-6.
	ECU (ABS)		For XP500A Refer to "ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)" on page 8-65.
1	Front fender	1	
2	Front brake caliper	2	
3	Horn coupler	2	Disconnect.
4	Horn	2	
5	Upper bracket pinch bolt	2	Loosen.
6	Cap bolt	1	Loosen.
7	Lower bracket pinch bolt	4	Loosen.
8	Front fork leg	2	
			For installation, reverse the removal procedure.

FRONT FORK

Disassembling the front fork legs



Order	Job/Parts to remove	Q'ty	Remarks
1	Cap bolt	1	
2	O-ring	1	
3	Spacer	1	
4	Fork spring seat	1	
5	Fork spring	1	
6	Damper rod assembly bolt	1	
7	Copper washer	1	
8	Damper rod assembly	1	
9	Rebound spring	1	
10	Oil flow stopper	1	
11	Inner tube	1	
12	Inner tube bushing	1	
13	Dust seal	1	
14	Oil seal clip	1	
15	Oil seal	1	
16	Washer	1	
17	Outer tube bushing	1	
			For assembly, reverse the disassembly procedure.

FRONT FORK

EAS22960

REMOVING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

NOTE:

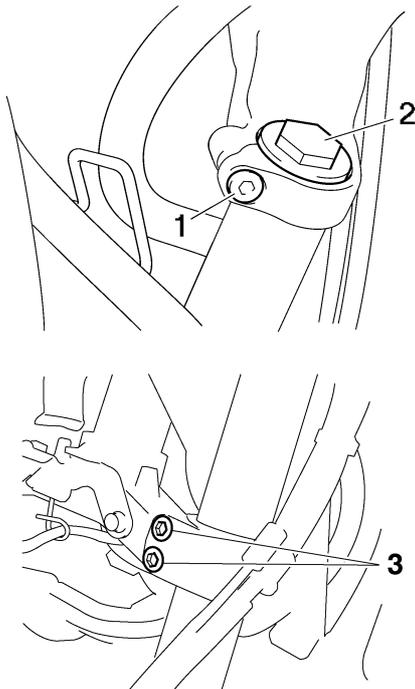
Place the vehicle on a suitable stand so that the front wheel is elevated.

2. Loosen:
 - Upper bracket pinch bolt "1"
 - Cap bolt "2"
 - Lower bracket pinch bolt "3"

EWA13640

WARNING

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



3. Remove:
 - Front fork leg

EAS22980

DISASSEMBLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Remove:
 - Dust seal "1"
 - Oil seal clip "2"

(with a flat-head screwdriver)

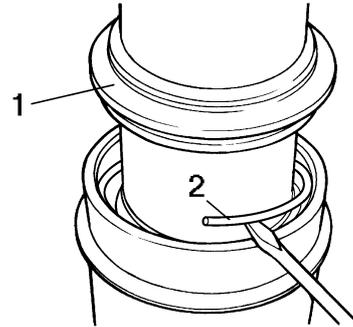
ECA14180

CAUTION:

Do not scratch the inner tube.

NOTE:

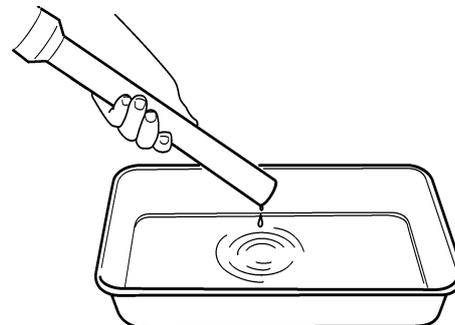
- Do not remove the fork leg protector from the outer tube.
- If the front fork leg protector must be removed, always install a new one.



2. Drain:
 - Fork oil

NOTE:

Stroke the outer tube several times while draining the fork oil.



I2311405

3. Remove:
 - Damper rod assembly bolt
 - Copper washer

NOTE:

While holding the damper rod assembly with the damper rod holder "1" and T-handle "2", loosen the damper rod assembly bolt.



Damper rod holder

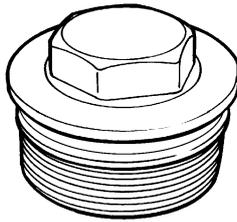
90890-01460

T-handle

90890-01326

T-handle 3/8" drive 60 cm long

YM-01326



EAS23020

ASSEMBLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

EWA13660

WARNING

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

NOTE:

- When assembling the front fork leg, be sure to replace the following parts:
 - Inner tube bushing
 - Outer tube bushing
 - Oil seal
 - Dust seal
- Before assembling the front fork leg, make sure all of the components are clean.

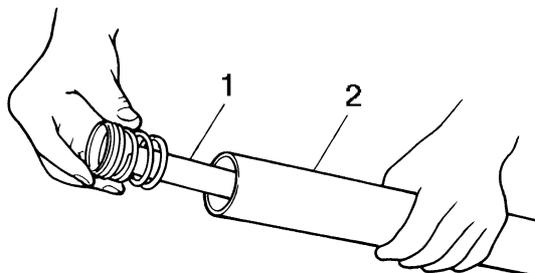
1. Install:

- Damper rod assembly "1"
- Rebound spring "2"

ECA14210

CAUTION:

Allow the damper rod assembly to slide slowly down the inner tube "2" until it protrudes from the bottom of the inner tube. Be careful not to damage the inner tube.



2. Install:

- Oil flow stopper "1"

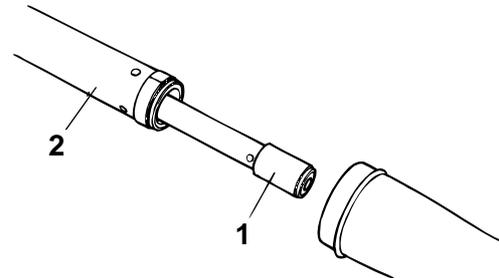
3. Lubricate:

- Inner tube's outer surface "2"



Recommended oil

Fork oil 7.5W or equivalent



4. Install:

- Outer tube (onto the inner tube)
- Copper washer **New**
- Damper rod assembly bolt

5. Tighten:

- Damper rod assembly bolt "1"



Damper rod assembly bolt

23 Nm (2.3 m•kg, 17 ft•lb)

LOCTITE®

NOTE:

- Apply the locking agent (LOCTITE) to the threads of the damper rod assembly bolt.
- While holding the damper rod assembly with the damper rod holder "2" and T-handle "3", tighten the damper rod assembly bolt.



Damper rod holder

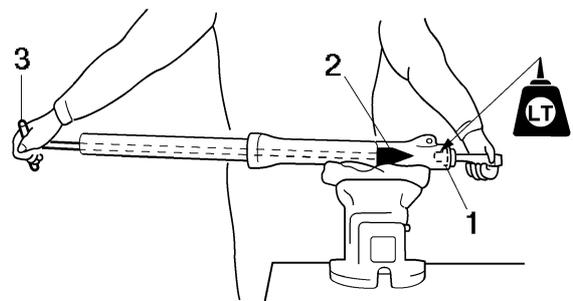
90890-01460

T-handle

90890-01326

T-handle 3/8" drive 60 cm long

YM-01326

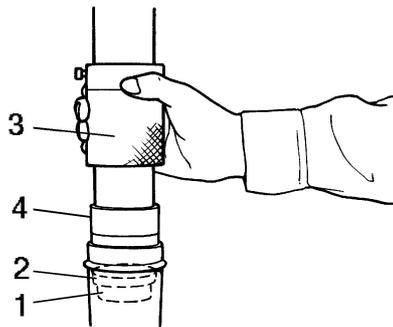


6. Install:

- Outer tube bushing "1" **New**
 - Washer "2"
- (with the fork seal driver "3" and adapter "4")



Frok seal driver weight
90890-01367
Replacement hammer
YM-A9409-7
Frok seal driver attachment (ø41)
90890-01381
Replacement 41 mm
YM-A5142-2



7. Install:
- Oil seal **New** "1"
(with the fork seal driver weight "2" and fork seal driver attachment "3")

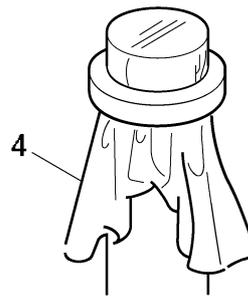
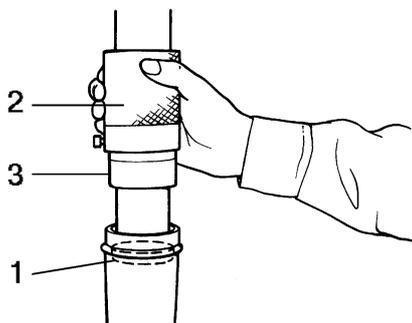
ECA14220

CAUTION:

Make sure the numbered side of the oil seal faces up.

NOTE:

- Before installing the oil seal, lubricate its lips with lithium soap base grease.
- Lubricate the outer surface of the inner tube with fork oil.
- Before installing the oil seal, cover the top of the front fork leg with a plastic bag "4" to protect the oil seal during installation.

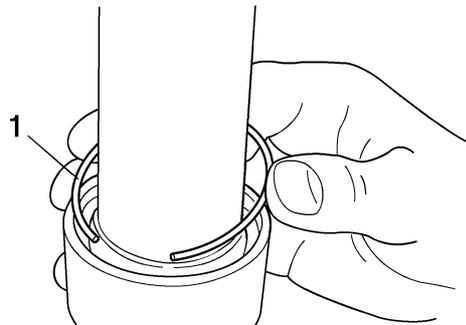


I2311310

8. Install:
- Oil seal clip "1"

NOTE:

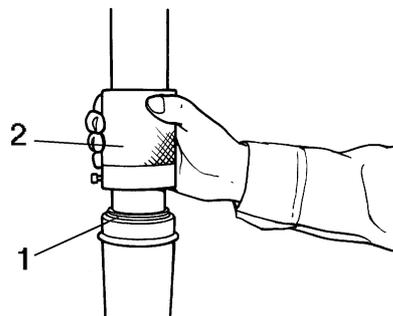
Adjust the oil seal clip so that it fits into the outer tube's groove.



9. Install:
- Dust seal "1" **New**
(with the fork seal driver weight "2")



Frok seal driver weight
90890-01367
Replacement hammer
YM-A9409-7



10. Fill:

- Front fork leg
(with the specified amount of the recommended fork oil "a")

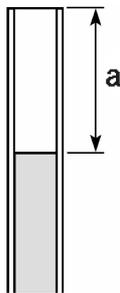
FRONT FORK

	Quantity 512.0 cm ³ (17.31 US oz) (18.06 Imp.oz) Recommended oil Fork oil 7.5W or equivalent
---	--

	Level 109.0 mm (4.29 in)
---	------------------------------------

NOTE:

- While filling the front fork leg, keep it upright.
- After filling, slowly pump the front fork leg up and down to distribute the fork oil.



12311403

11. Install:

- Spring
- Spring seat
- Spacer
- Cap bolt
- O-ring **New**

NOTE:

- Install the spring with the smaller pitch facing down.
- Before installing the cap bolt, lubricate its O-ring with grease.
- Temporarily tighten the cap bolt.

EAS23050

INSTALLING THE FRONT FORK LEGS

The following procedure applies to both of the front fork legs.

1. Install:

- Front fork leg
Temporarily tighten the upper and lower bracket pinch bolts.

NOTE:

Make sure the inner fork tube is flush with the top of the handlebar holder.

2. Tighten:

- Lower bracket pinch bolt "1"

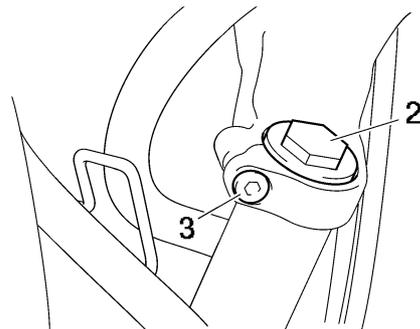
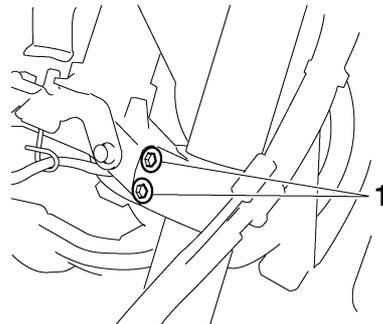
	Lower bracket pinch bolt 23 Nm (2.3 m•kg, 17 ft•lb)
---	---

- Cap bolt "2"

	Cap bolt 24 Nm (2.4 m•kg, 17 ft•lb)
---	---

- Upper bracket pinch bolt "3"

	Upper bracket pinch bolt 30 Nm (3.0 m•kg, 22 ft•lb)
---	---

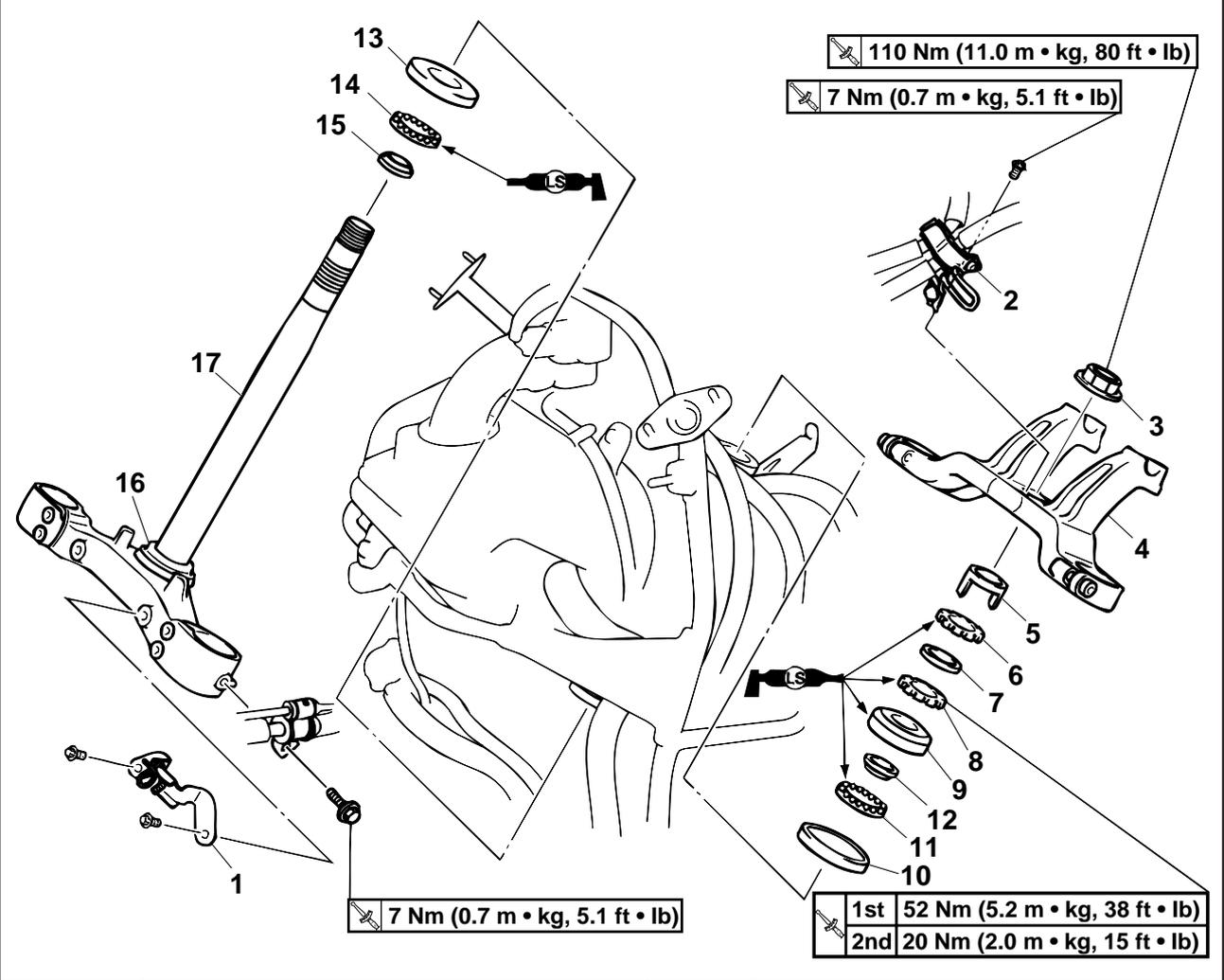


STEERING HEAD

EAS23090

STEERING HEAD

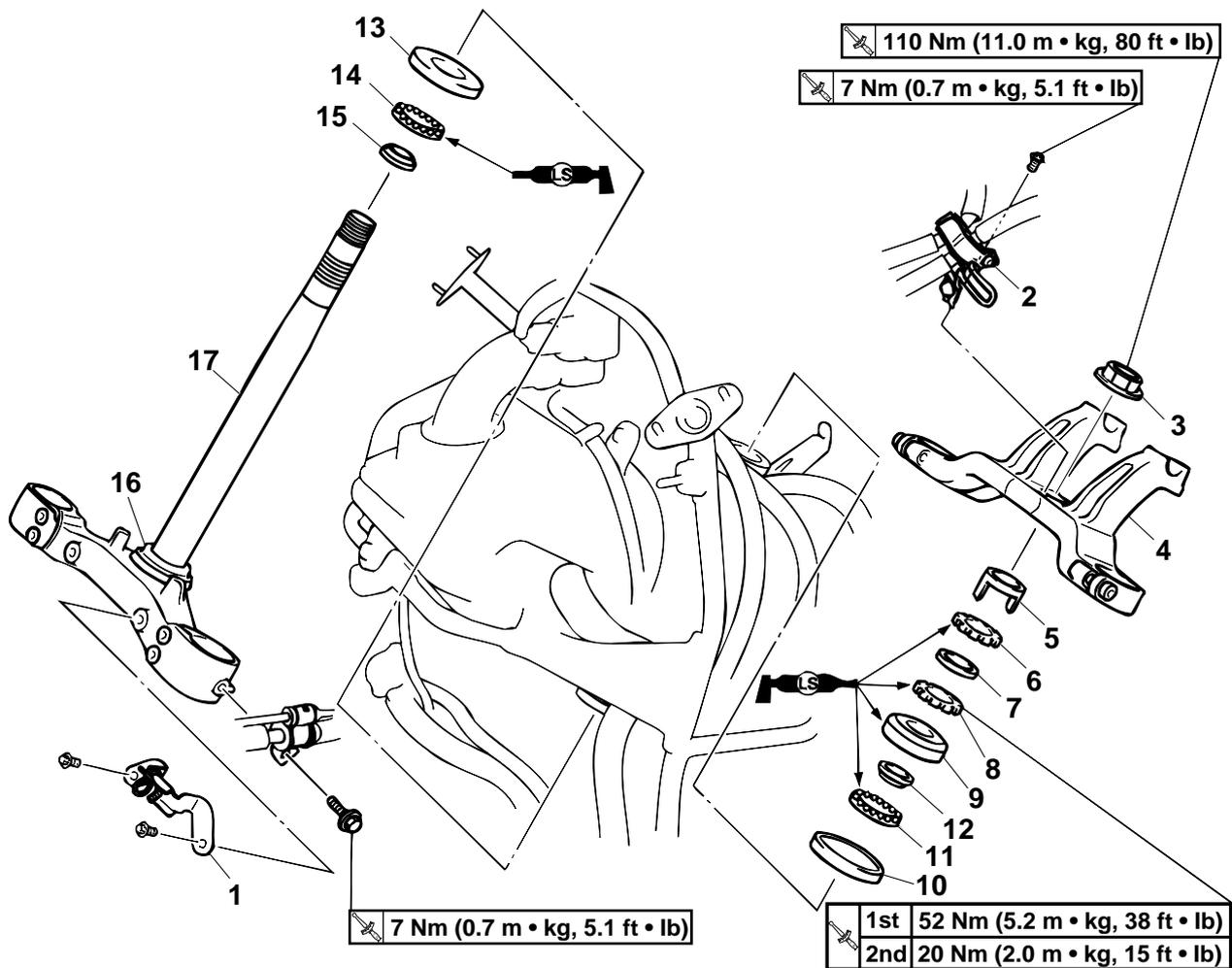
Removing the lower bracket



Order	Job/Parts to remove	Q'ty	Remarks
	Front cowling		Refer to "GENERAL CHASSIS" on page 4-1.
	Front wheel		Refer to "FRONT WHEEL" on page 4-6.
	Front fork legs		Refer to "FRONT FORK" on page 4-57.
	Handlebar		Refer to "HANDLEBAR" on page 4-53.
1	Horn bracket	1	
2	Brake hose holder	1	
3	Steering stem nut	1	
4	Upper bracket	1	
5	Lock washer	1	
6	Upper ring nut	1	
7	Rubber washer	1	
8	Lower ring nut	1	
9	Bearing cover	1	
10	Bearing outer race	1	
11	Upper bearing	1	
12	Bearing inner race	1	
13	Bearing outer race	1	
14	Lower bearing	1	

STEERING HEAD

Removing the lower bracket



Order	Job/Parts to remove	Q'ty	Remarks
15	Bearing inner race	1	
16	Rubber seal	1	
17	Lower bracket	1	
			For installation, reverse the removal procedure.

STEERING HEAD



4. Check:

- Upper bracket
- Lower bracket
(along with the steering stem)
Bends/cracks/damage → Replace.

EAS23140

INSTALLING THE STEERING HEAD

1. Lubricate:

- Upper bearing
- Lower bearing
- Bearing races

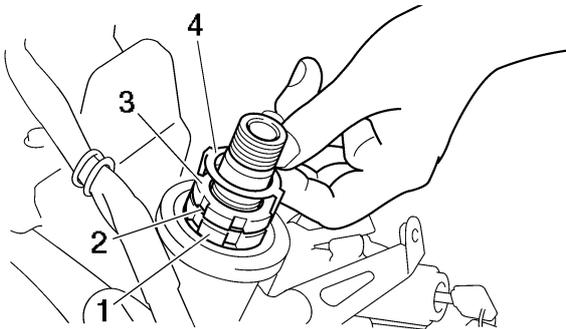


Recommended lubricant
Lithium-soap-based grease

2. Install:

- Lower ring nut "1"
- Rubber washer "2"
- Upper ring nut "3"
- Lock washer "4"

Refer to "CHECKING AND ADJUSTING THE STEERING HEAD" on page 3-27.

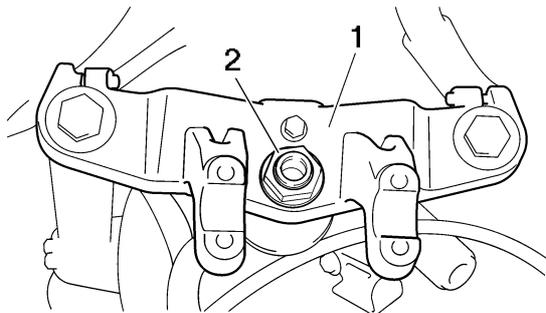


3. Install:

- Upper bracket "1"
- Steering stem nut "2"

NOTE:

Temporarily tighten the steering stem nut.



4. Install:

- Front fork legs

Refer to "FRONT FORK" on page 4-57.

NOTE:

Temporarily tighten the upper and lower bracket pinch bolts.

5. Tighten:

- Steering stem nut "2"



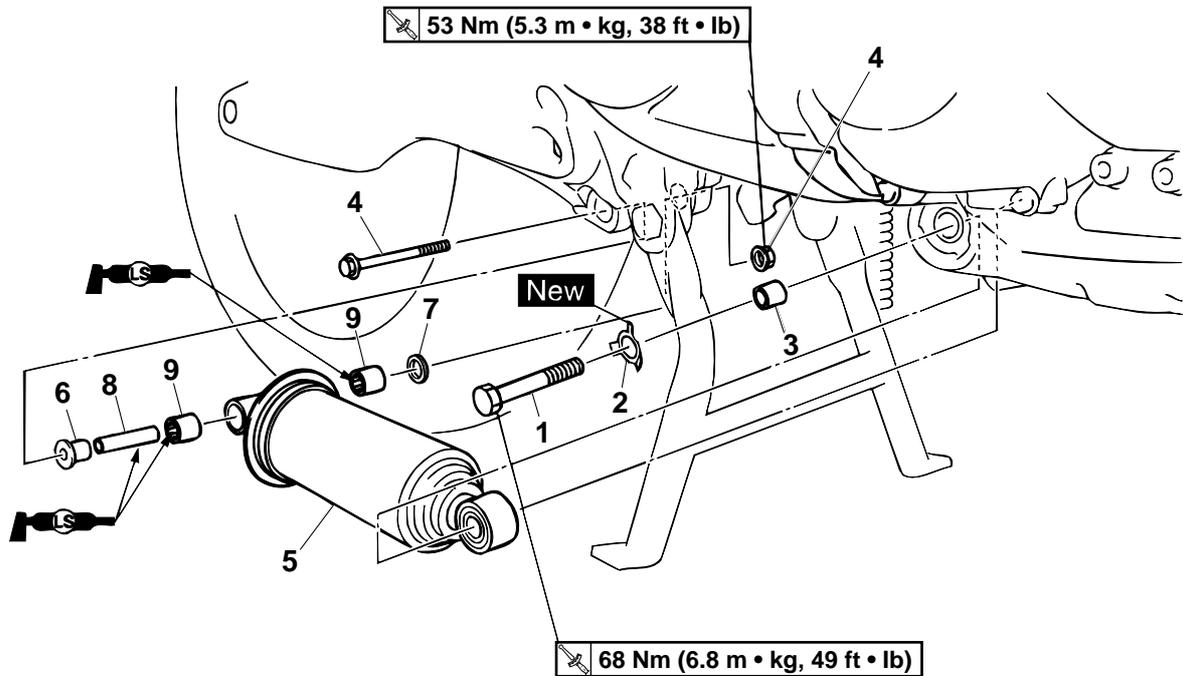
Steering stem nut
110 Nm (11.0 m•kg, 80 ft•lb)

REAR SHOCK ABSORBER ASSEMBLY

EAS23160

REAR SHOCK ABSORBER ASSEMBLY

Removing the rear shock absorber assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Muffler		Refer to "ENGINE REMOVAL" on page 5-1.
1	Bolt	1	
2	Lock washer	1	
3	Collar	1	
4	Bolt/Nut	1/1	
5	Rear shock absorber	1	
6	Collar	1	
7	Washer	1	
8	Spacer	1	
9	Bearing	2	
			For installation, reverse the removal procedure.

REAR SHOCK ABSORBER ASSEMBLY

EAS23180

HANDLING THE REAR SHOCK ABSORBER

EWA13740

WARNING

This rear shock absorber contains highly compressed nitrogen gas. Before handling the rear shock absorber, read and make sure you understand the following information. The manufacturer cannot be held responsible for property damage or personal injury that may result from improper handling of the rear shock absorber.

- Do not tamper or attempt to open the rear shock absorber.
- Do not subject the rear shock absorber to an open flame or any other source of high heat. High heat can cause an explosion due to excessive gas pressure.
- Do not deform or damage the rear shock absorber in any way. Rear shock absorber damage will result in poor damping performance.

EAS23190

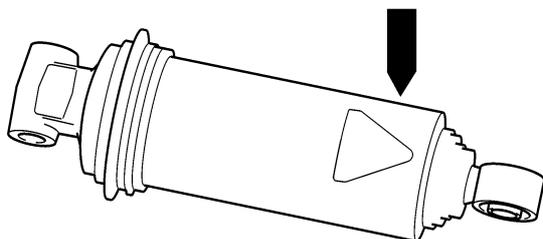
DISPOSING OF A REAR SHOCK ABSORBER

1. Gas pressure must be released before disposing of a rear shock absorber. To release the gas pressure, drill "a" 2–3-mm hole through the rear shock absorber at "a" point 15–20 mm from its end as shown.

EWA13760

WARNING

Wear eye protection to prevent eye damage from released gas or metal chips.



EAS23210

REMOVING THE REAR SHOCK ABSORBER ASSEMBLY

1. Stand the vehicle on a level surface.

EWA13120

WARNING

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

NOTE:

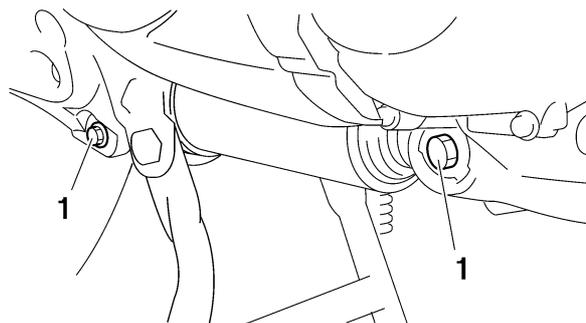
Place the vehicle on a suitable stand so that the rear wheel is elevated.

2. Remove:

- Rear shock absorber bolts "1"

NOTE:

When removing the rear shock absorber bolts "1", hold the swingarm so that it does not drop down.



3. Remove:

- Rear shock absorber assembly

EAS23240

CHECKING THE REAR SHOCK ABSORBER ASSEMBLY

1. Check:

- Rear shock absorber rod
Bends/damage → Replace the rear shock absorber assembly.
- Rear shock absorber
Gas leaks/oil leaks → Replace the rear shock absorber assembly.
- Spring
Damage/wear → Replace the rear shock absorber assembly.
- Bushings
Damage/wear → Replace.
- Dust seals
Damage/wear → Replace.
- Bolts
Bends/damage/wear → Replace.

EAS23300

INSTALLING THE REAR SHOCK ABSORBER ASSEMBLY

1. Lubricate:

- Spacers
- Bearings



Recommended lubricant
Lithium-soap-based grease

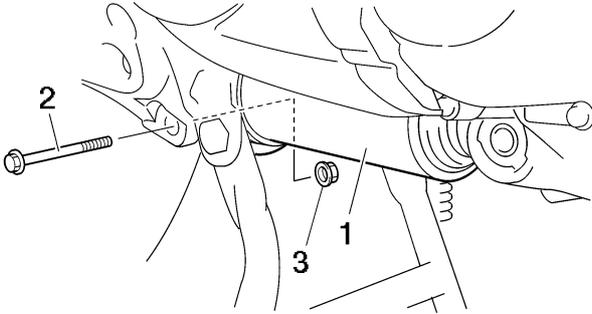
2. Install:

- Rear shock absorber assembly "1"

REAR SHOCK ABSORBER ASSEMBLY

3. Tighten:

- Bolt (rear side) "1"
- Nut "3"

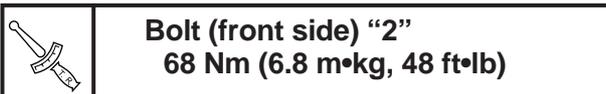


4. Install:

- Lock washer "1" **New**

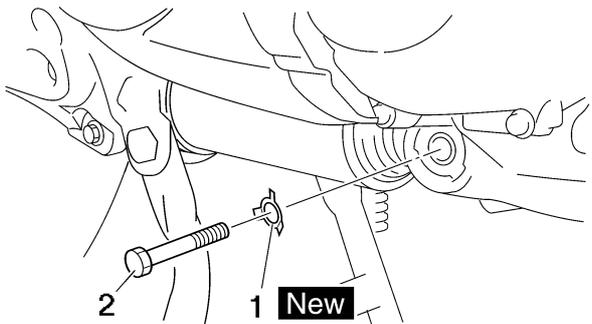
5. Tighten:

- Bolt (front side) "2"



NOTE:

- When installing the rear shock absorber assembly, lift up the swingarm.
- Bend the lock washer "2" tab along a flat side of the bolt "1".



ENGINE

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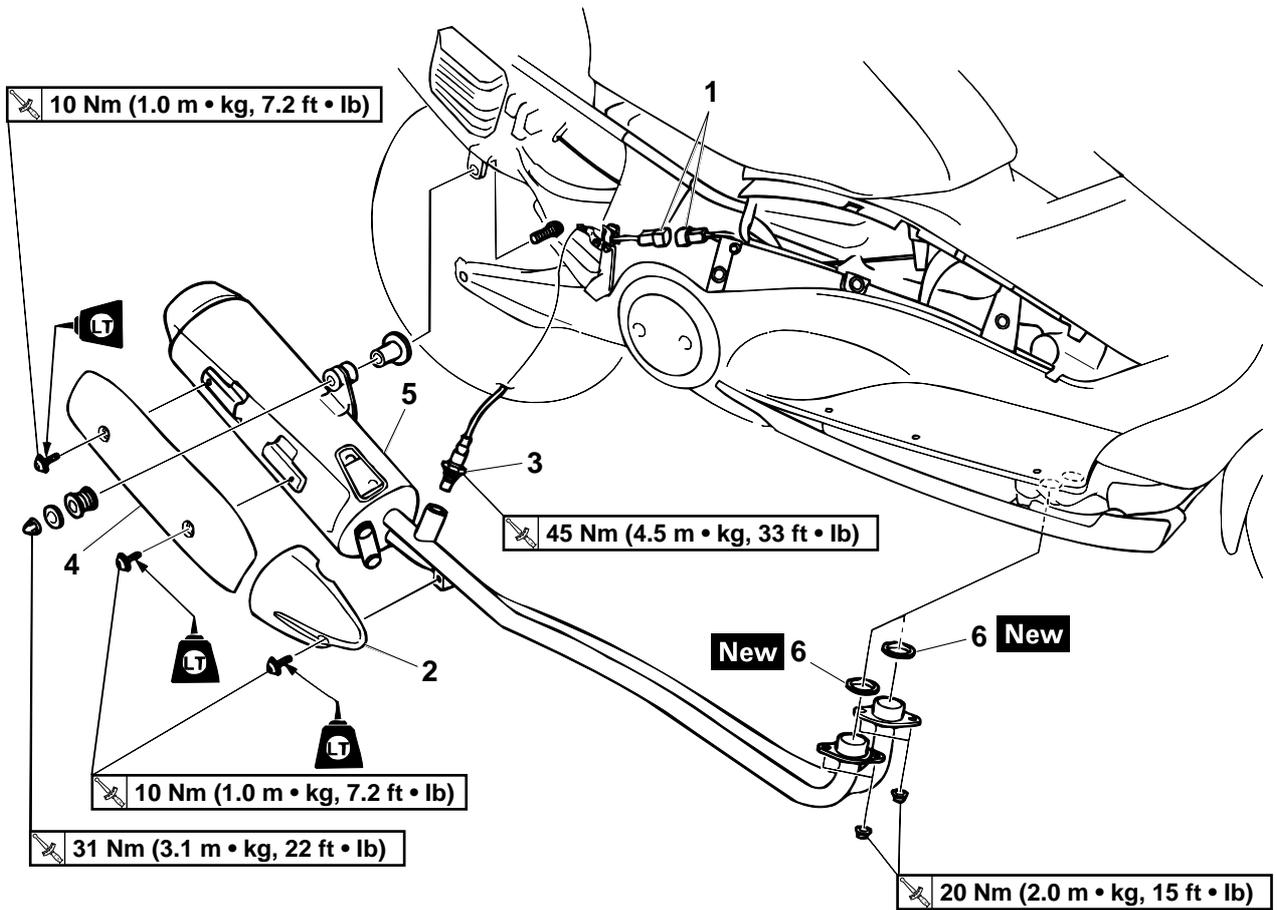
INSTALLING THE CHAIN DRIVE	5-75
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ENGINE REMOVAL

EAS23710

ENGINE REMOVAL

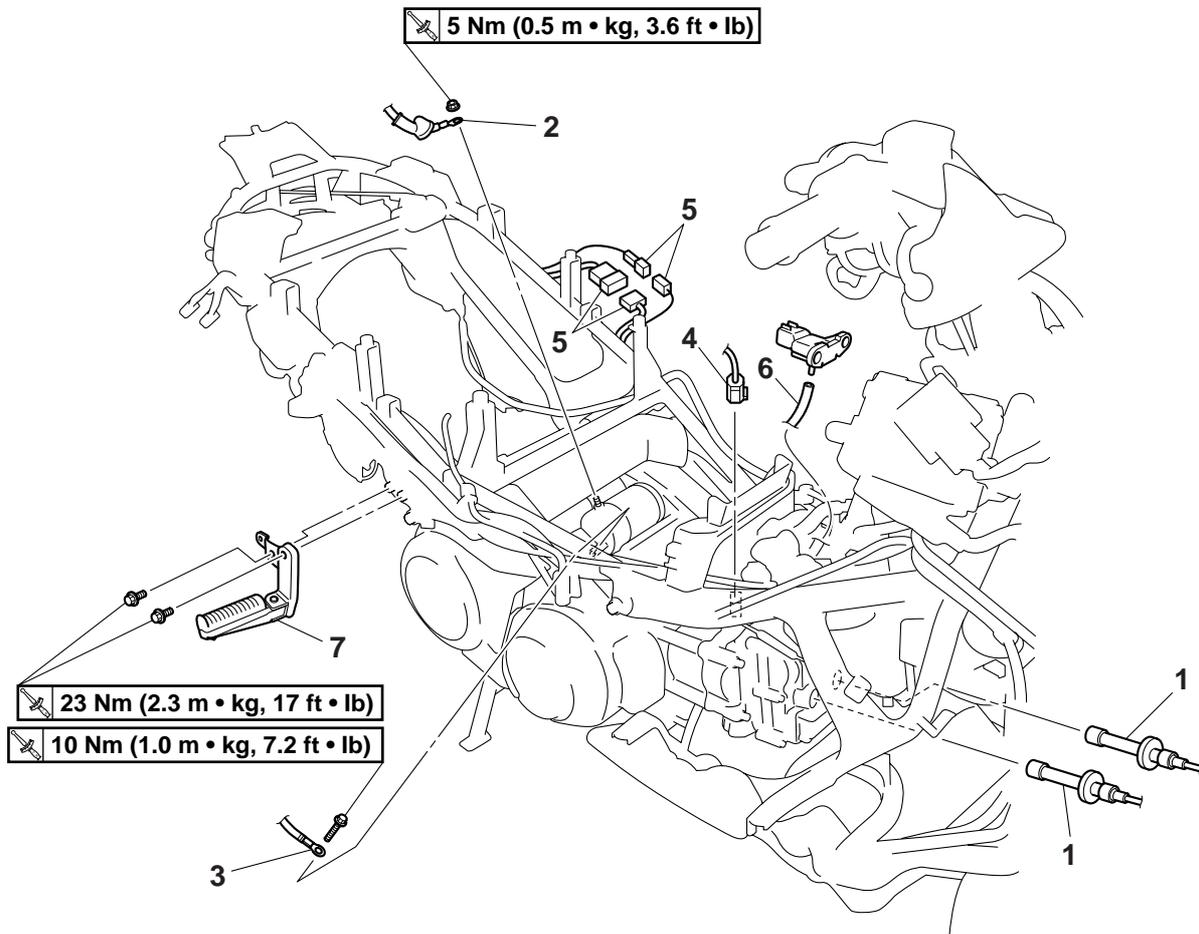
Removing the exhaust pipe



Order	Job/Parts to remove	Q'ty	Remarks
	Right rear side cover/inner fender		Refer to "GENERAL CHASSIS" on page 4-1.
1	O ₂ sensor coupler	1	
2	Protector 1	1	
3	O ₂ sensor	1	
4	Protector 2	1	
5	Muffler assembly	1	
6	Gasket	2	
			For installation, reverse the removal procedure.

ENGINE REMOVAL

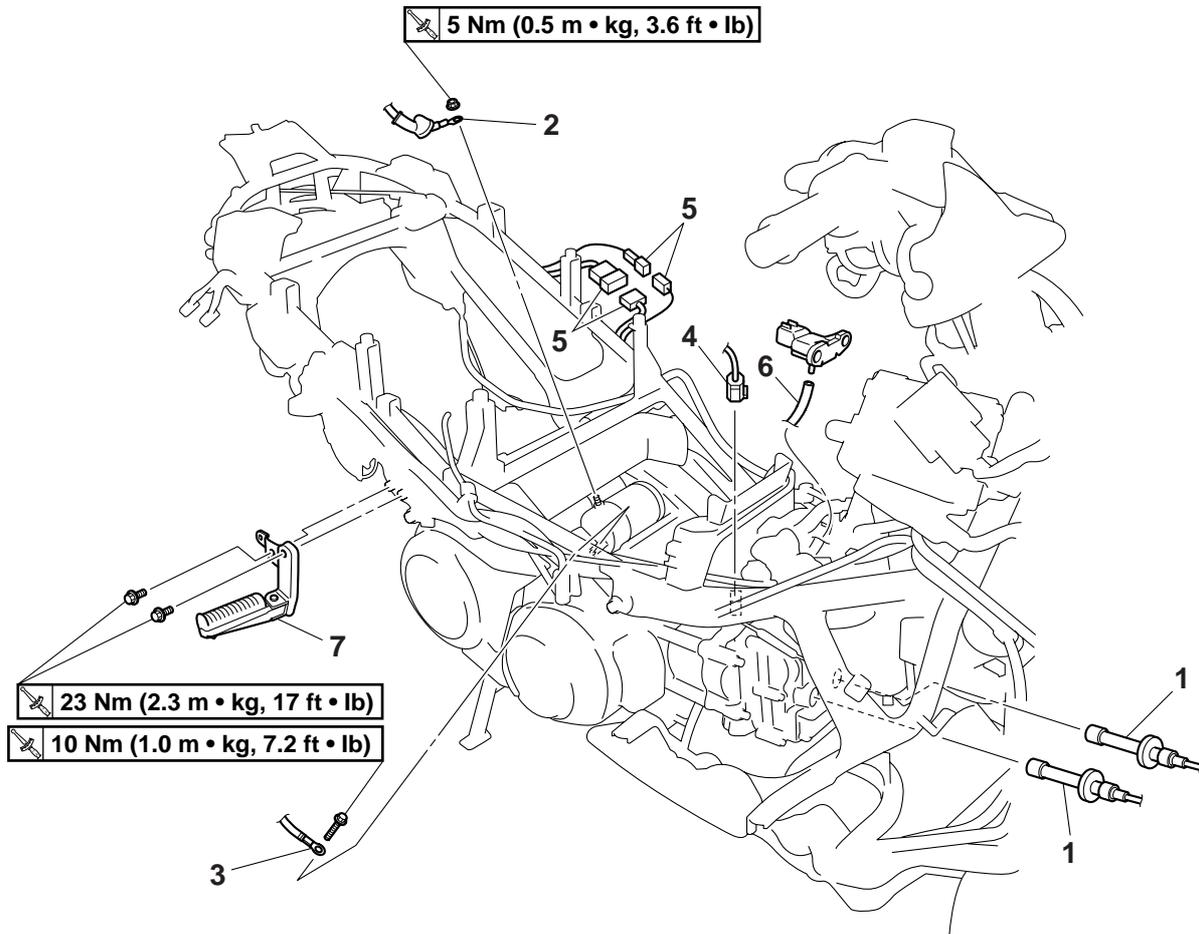
Disconnecting the leads and hoses



Order	Job/Parts to remove	Q'ty	Remarks
	Leg shield/footrest board		Refer to "GENERAL CHASSIS" on page 4-1.
	Storage box		Refer to "GENERAL CHASSIS" on page 4-1.
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-13.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
	Chain drive oil		Drain. Refer to "CHECKING THE CHAIN DRIVE OIL LEVEL" on page 3-26.
	Thermostat outlet hose/coolant pipe/oil filter cartridge		Refer to "RADIATOR" on page 6-1.
	V-belt case air filter element (left)/water pump inlet pipe/water pump outlet pipe		Refer to "WATER PUMP" on page 6-7.
	Throttle body/injector		Refer to "THROTTLE BODIES" on page 7-4.
	Rear shock absorber		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-68.
	Chain drive assembly		Refer to "CHAIN DRIVE TRANSMISSION" on page 5-72.
1	Spark plug cap	2	

ENGINE REMOVAL

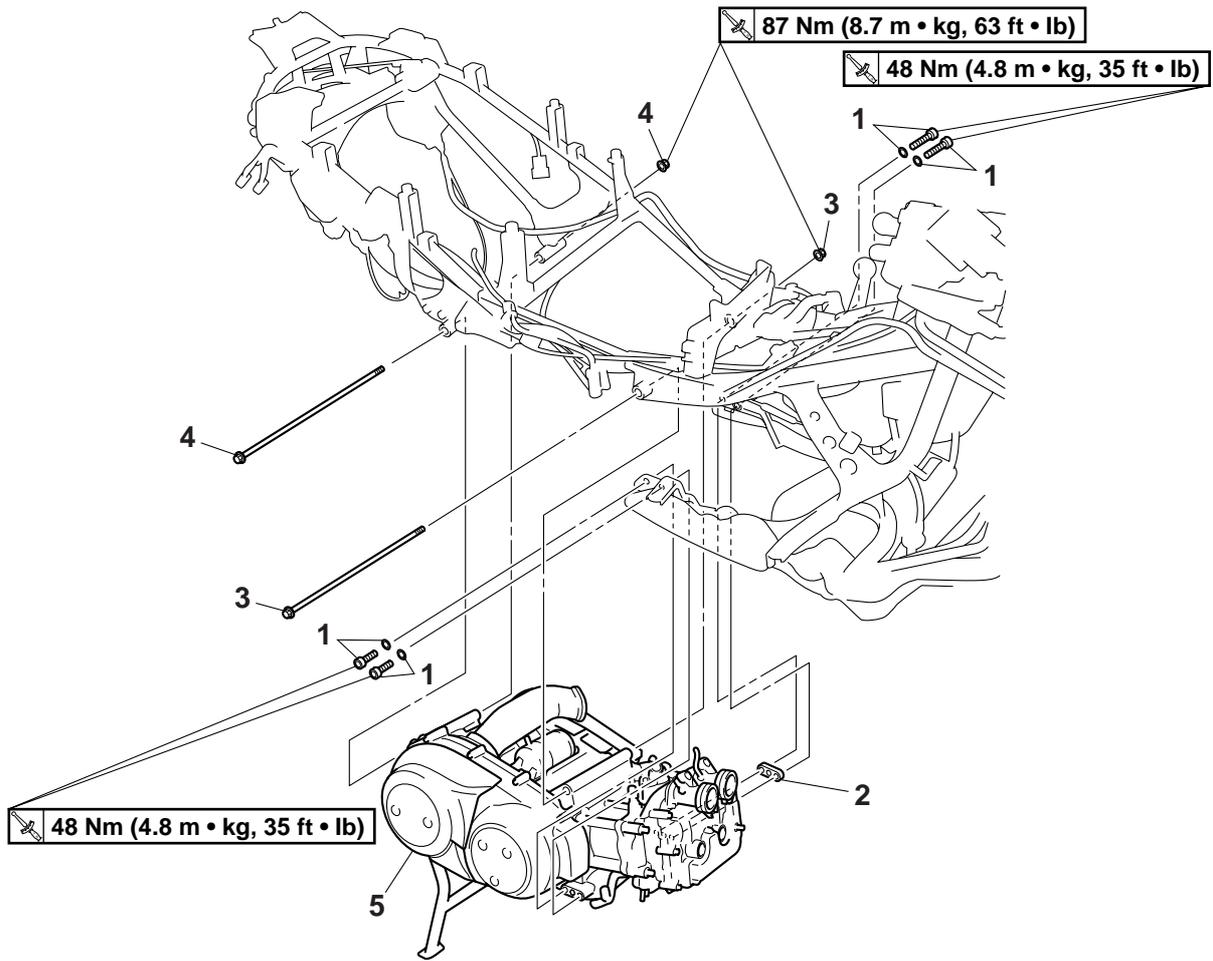
Disconnecting the leads and hoses



Order	Job/Parts to remove	Q'ty	Remarks
2	Starter motor lead	1	
3	Battery negative lead	1	
4	Coolant temperature sensor coupler	1	Disconnect.
5	A.C. magneto lead	2	Disconnect.
6	Intake air temperature sensor hose	1	Disconnect.
7	Right passenger footrest	1	
			For assembly, reverse the removal procedure.

ENGINE REMOVAL

Removing the engine



Order	Job/Parts to remove	Q'ty	Remarks
1	Front lower mounting bolt/Washer	4/4	
2	Spacer	1	
3	Front upper mounting bolt/Nut	1/1	
4	Rear mounting bolt/Nut	1/1	
5	Engine	1	
			For installation, reverse the removal procedure.

EAS23720

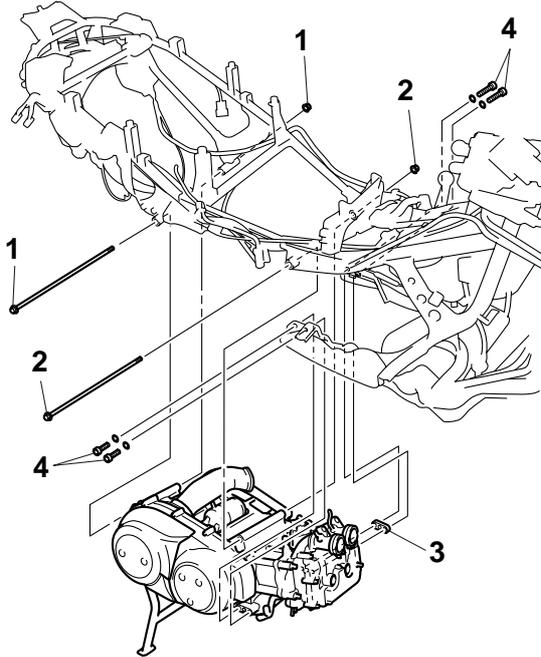
INSTALLING THE ENGINE

1. Install:

- Rear mounting bolt/nut "1"
- Front upper mounting bolt/nut "2"
- Washers.spacer "3"
- Front lower mounting bolts "4"

NOTE:

Do not fully tighten the bolts.



2. Tighten:

- Rear mounting nut "1"

	Rear mounting nut 87 Nm (8.7 m•kg, 63 ft•lb)
---	---

- Front upper mounting nut "2"

	Front upper mounting nut 87 Nm (8.7 m•kg, 63 ft•lb)
---	--

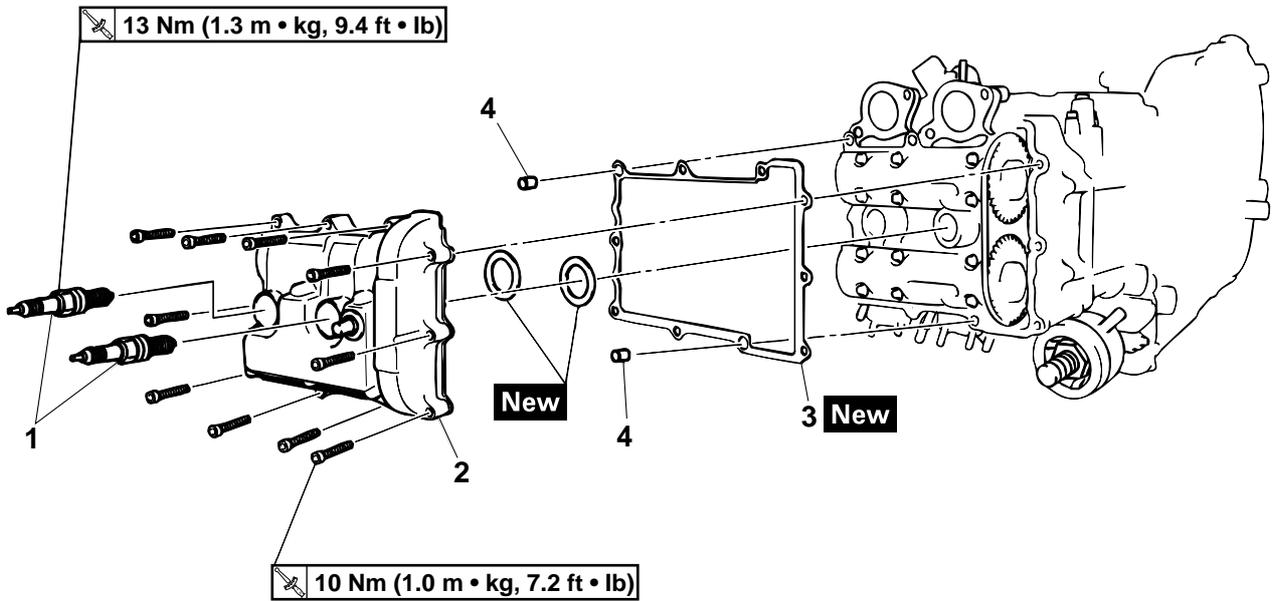
- Front lower mounting bolts

	Front lower mounting bolts 48 Nm (4.8 m•kg, 35 ft•lb)
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EAS23760

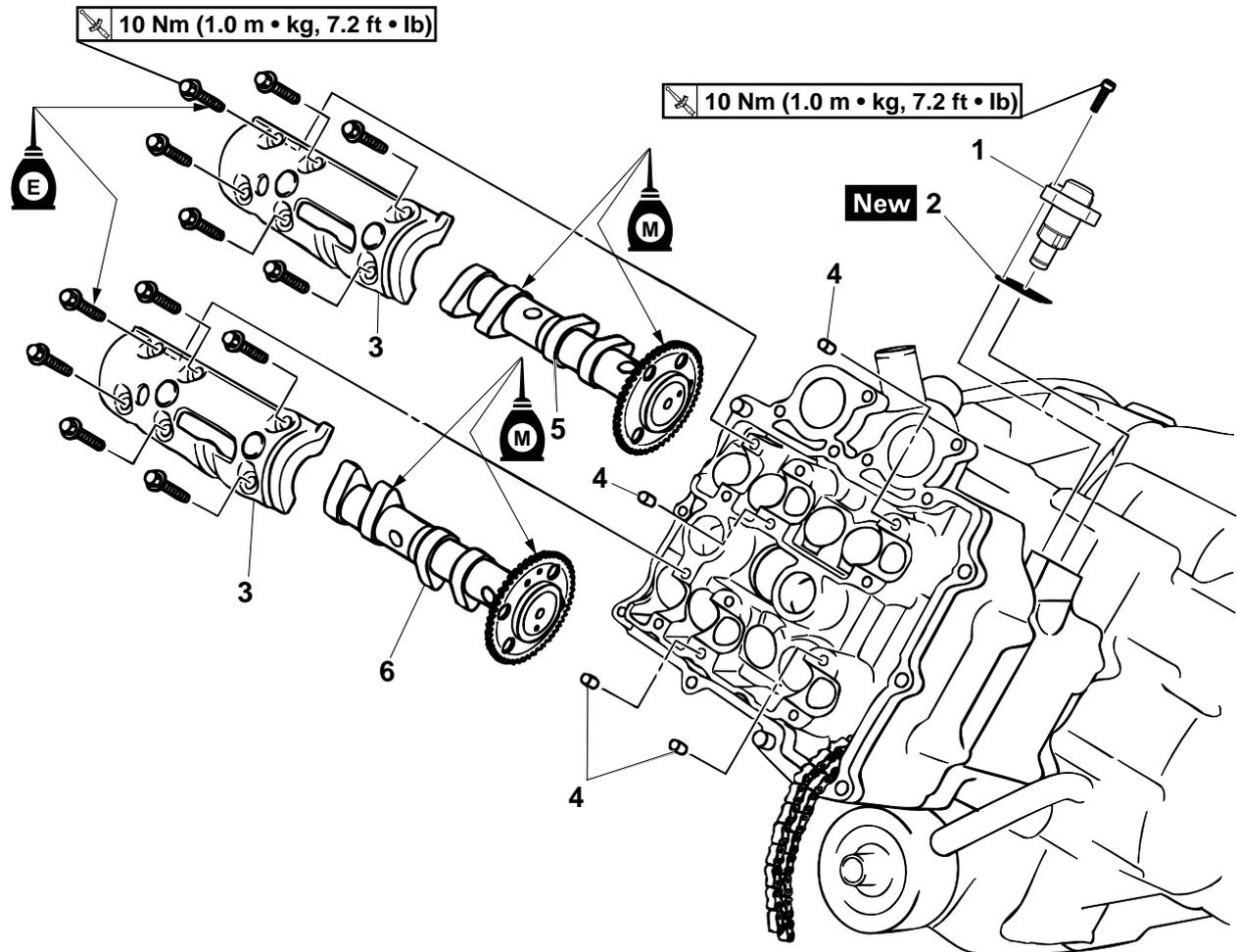
CAMSHAFTS

Removing the cylinder head cover



Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
	Intake manifold		Refer to "THROTTLE BODIES" on page 7-4.
1	Spark plug	2	
2	Cylinder head cover	1	
3	Cylinder head cover gasket	1	
4	Dowel pin	2	
			For installation, reverse the removal procedure.

Removing the camshafts

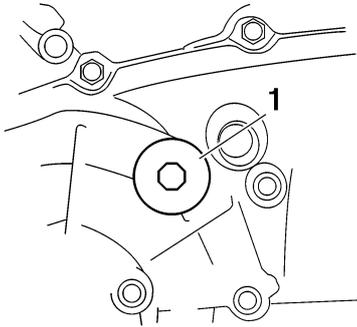


Order	Job/Parts to remove	Q'ty	Remarks
1	Timing chain tensioner	1	
2	Timing chain tensioner gasket	1	
3	Camshaft cap	2	
4	Dowel pin	4	NOTE: _____ During removal, the dowel pins may still be connected to the camshaft cap. _____
5	Intake camshaft	1	
6	Exhaust camshaft	1	
			For installation, reverse the removal procedure.

EAS23810

REMOVING THE CAMSHAFTS

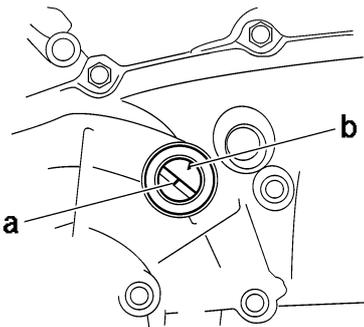
1. Remove:
 - Timing plug "1"



2. Align:
 - "I" mark "a" on the A.C. magneto rotor (with the stationary pointer "b" on the A.C. magneto cover)



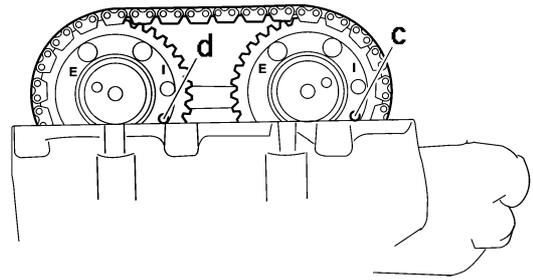
- a. Turn the crankshaft counterclockwise.



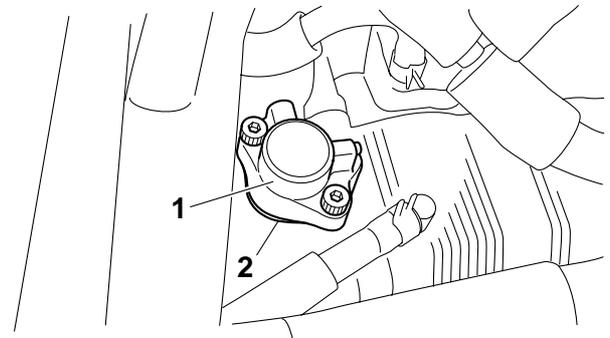
- b. When piston #1 is at TDC on the compression stroke, align the "I" mark "a" with the stationary pointer "b" on the A.C. magneto cover

NOTE:

- TDC on the compression stroke can be found when the camshaft lobes are turned away from each other.
- In order to be sure that the piston is at TDC, the alignment mark "c" on the intake camshaft sprocket and the alignment mark "d" on the exhaust camshaft sprocket must align with the cylinder head mating surface as shown in the illustration.



3. Remove:
 - Timing chain tensioner "1"
 - Timing chain tensioner gasket "2"



4. Remove:

ECA15B1022

CAUTION:

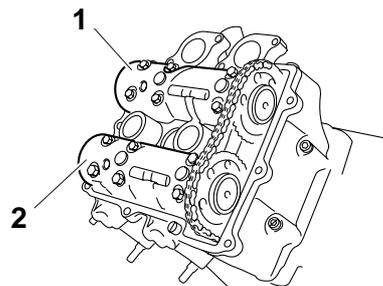
Before removing the camshafts from the cylinder head, tilt up the engine at least 25°.

- Intake camshaft cap "1"
- Exhaust camshaft cap "2"
- Dowel pins

ECA15B1023

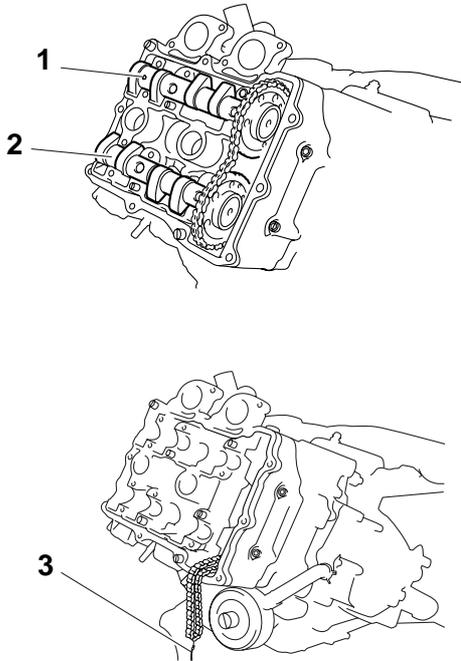
CAUTION:

To prevent damage to the cylinder head, camshafts or camshaft caps, loosen the camshaft cap bolts in stages and in a criss-cross pattern, working from the outside in.



5. Remove:
- Intake camshaft "1"
 - Exhaust camshaft "2"

NOTE:
To prevent the timing chain from falling into the crankcase, faster it with a wire "3".



6. Remove:
- Timing chain guide (exhaust side)

EAS23850

CHECKING THE CAMSHAFTS

1. Check:
 - Camshaft lobes
Blue discoloration/pitting/scratches → Replace the camshaft.
2. Measure:
 - Camshaft lobe dimensions "a" and "b"
Out of specification → Replace the camshaft.



Camshaft lobe dimension limit

Intake A

33.252–33.352 mm
(1.3091–1.3131 in)

Limit

33.152 mm (1.3052 in)

Intake B

24.956–25.056 mm
(0.9825–0.9865 in)

Limit

24.856 mm (0.9786 in)

Exhaust A

33.252–33.352 mm
(1.3091–1.3131 in)

Limit

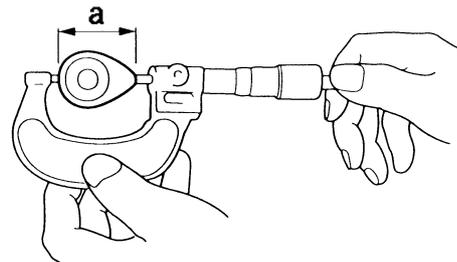
33.152 mm (1.3052 in)

Exhaust B

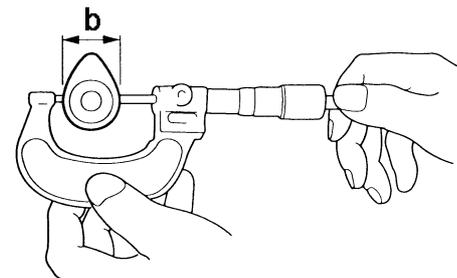
24.956–25.056 mm
(0.9825–0.9865 in)

Limit

24.856 mm (0.9786 in)



11151001

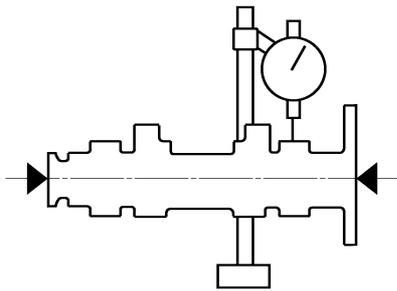


11151002

3. Measure:
 - Camshaft runout
Out of specification → Replace.



Camshaft runout limit
0.030 mm (0.0012 in)



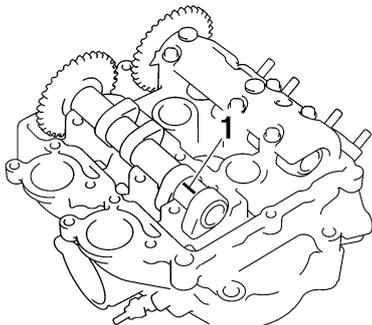
11151402

4. Measure:

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

	<p>Camshaft-journal-to-camshaft-cap clearance 0.020–0.054 mm (0.0008–0.0021 in)</p>
---	--

- Install the camshaft into the cylinder head (without the dowel pins and camshaft caps).
- Position “a” strip of Plastigauge® “1” onto the camshaft journal as shown.



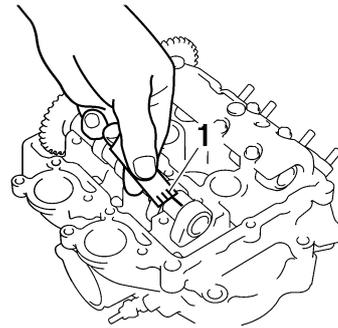
- Install the dowel pins and camshaft caps.

NOTE:

- Tighten the camshaft cap bolts in stages and in a crisscross pattern, working from the inner caps out.
- Do not turn the camshaft when measuring the camshaft journal-to-camshaft cap clearance with the Plastigauge®.

	<p>Camshaft cap bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)</p>
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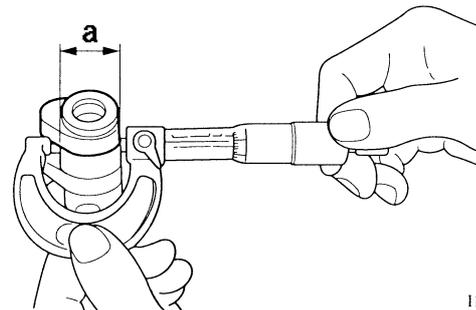
- Remove the camshaft caps and then measure the width of the Plastigauge® “1”.



- Measure:

- Camshaft journal diameter “a”
Out of specification → Replace the camshaft.
Within specification → Replace the cylinder head and the camshaft caps as a set.

	<p>Camshaft journal diameter 22.967–22.980 mm (0.9042–0.9047 in)</p>
---	---



11151003

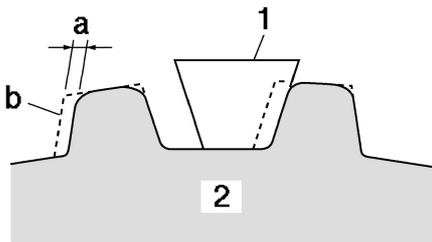
EAS23950

CHECKING THE TIMING CHAIN GUIDES

The following procedure applies to all of the camshaft sprockets and timing chain guides.

1. Check:

- Camshaft sprocket
More than 1/4 tooth wear “a” → Replace the camshaft sprockets and the timing chain as a set.

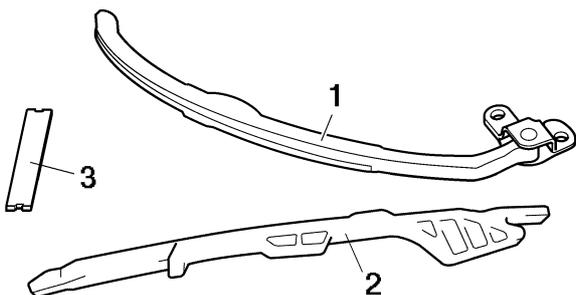


- a. 1/4 tooth
- b. Correct

- 1. Timing chain roller
- 2. Camshaft sprocket

2. Check:

- Timing chain guide (intake side) "1"
 - Timing chain guide (exhaust side) "2"
 - Timing chain guide (top side) "3"
- Damage/wear → Replace the defective part(s).



EAS23960

CHECKING THE TIMING CHAIN TENSIONER

The following procedure applies to the timing chain tensioner.

1. Check:

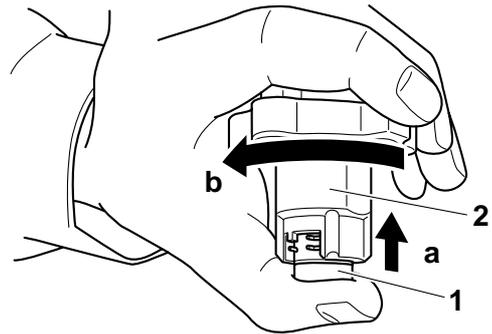
- Timing chain tensioner
- Cracks/damage → Replace.



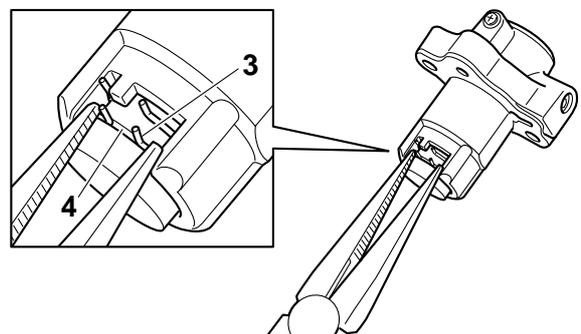
- a. Push the timing chain tensioner rod "1" into the timing chain tensioner housing by hand.

NOTE:

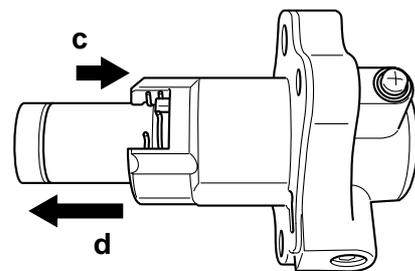
While pushing the timing chain tensioner rod "a", turn it clockwise "b" with the timing chain tensioner body "2" until it stops.



- b. Lock the timing chain tensioner rod "1" by setting the circlip "3" to groove "4" while pushing the timing chain tensioner rod.



- c. Push the timing chain tensioner rod "c".
- d. Make sure that the timing chain tensioner rod comes out "d" of the timing chain tensioner housing smoothly. If there is rough movement, replace the timing chain tensioner.

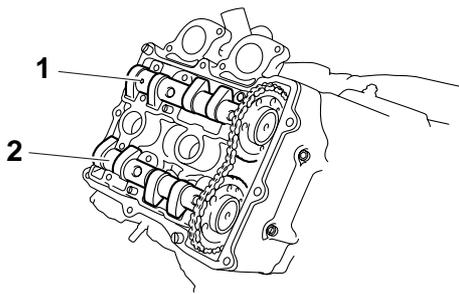


EAS24000

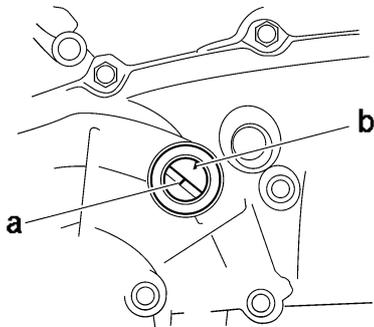
INSTALLING THE CAMSHAFTS

1. Install:

- Intake camshaft "1"
- Exhaust camshaft "2"



- a. Turn the crankshaft counterclockwise.
- b. When piston #1 is at TDC on the compression stroke, align the "I" mark "a" on the A.C. magneto rotor with the stationary pointer "b" on the A.C. magneto cover.



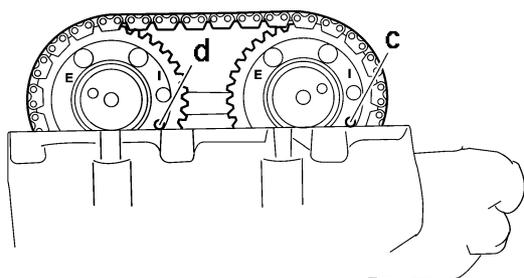
- c. Install the timing chain onto both camshaft sprockets, and then install the camshafts onto the cylinder head.

NOTE:
The camshafts should be installed onto the cylinder head so that the alignment mark "c" on the intake camshaft sprocket and the alignment mark "d" on the exhaust camshaft sprocket align with the cylinder head mating surface, as shown in the illustration.

ECA15B1024

CAUTION:

Do not turn the crankshaft when installing the camshafts to avoid damage or improper valve timing.



2. Install:
 - Dowel pins
 - Intake camshaft cap "1"
 - Exhaust camshaft cap "2"
 - Camshaft cap bolts



Camshaft cap bolts
10 Nm (1.0 m•kg, 7.2 ft•lb)

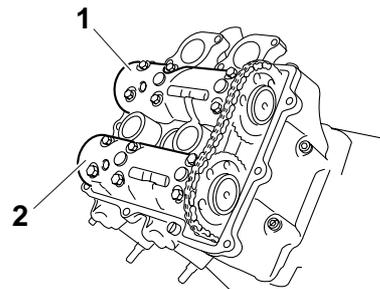
ECA15B1025

CAUTION:

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

NOTE:

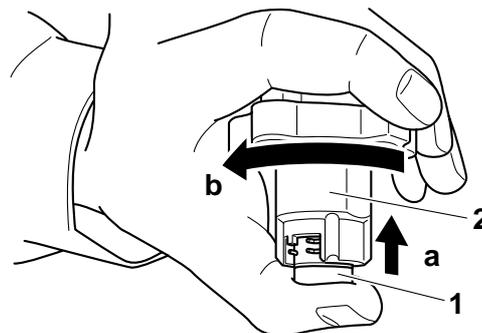
Lubricate the camshaft cap bolt threads with engine oil.



3. Install:
 - Timing chain tensioner gasket **New**
 - Timing chain tensioner

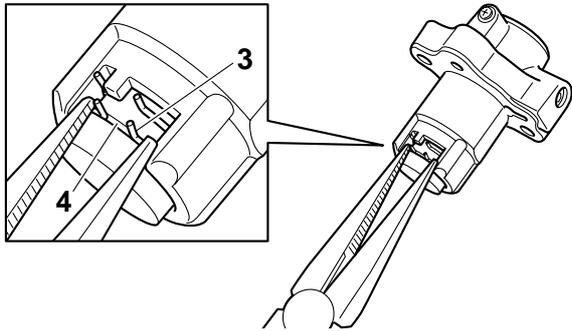
- a. Push the timing chain tensioner rod "1" into the timing chain tensioner housing by hand.

NOTE:
While pushing the timing chain tensioner rod "a", turn it clockwise "b" with the timing chain tensioner body "2" until it stops.



- b. Lock the timing chain tensioner rod "1" by set-

ting the circlip "3" into groove "4" while pushing the timing chain tensioner rod.



c. Install the timing chain tensioner to the cylinder block.



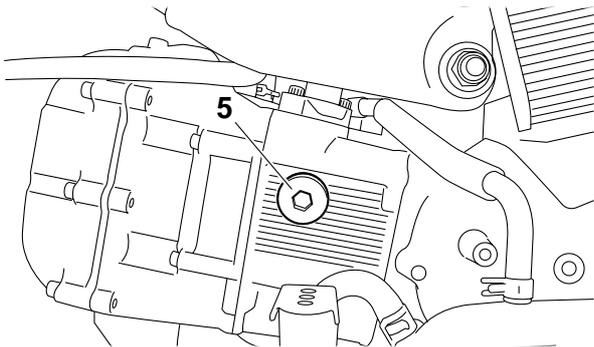
Timing chain tensioner bolts
10 Nm (1.0 m•kg, 7.2 ft•lb)

EWA15B1008

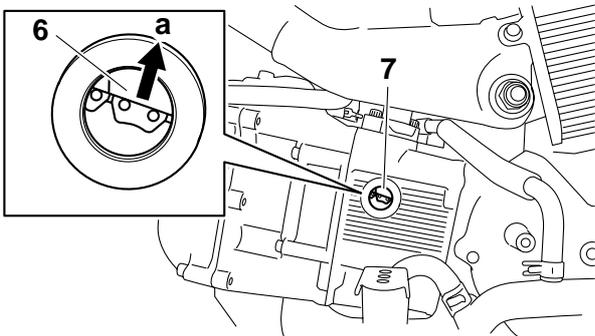
WARNING

Always use a new gasket.

d. Remove the cap "5".



e. Release the timing chain tensioner rod by pushing up the timing chain guide "6" from the hole "7".



ECA15B1034

CAUTION:

Do not push up the timing chain. Push up "a" the timing chain guide "6".

f. Install the cap.



4. Turn:

- Crankshaft (several turns counterclockwise)

5. Check:

- "I" mark "a"

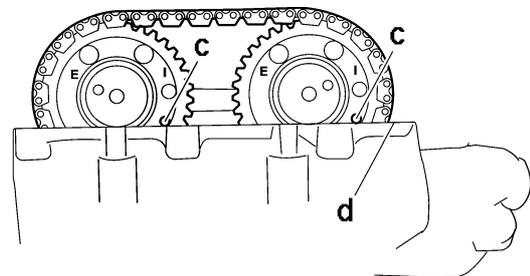
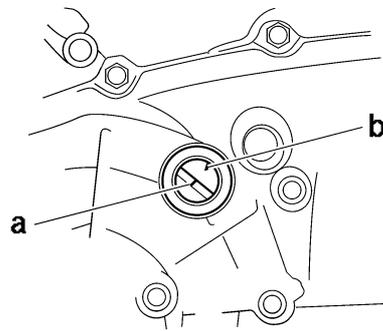
Make sure that the "I" mark is aligned with the stationary pointer "b".

- Camshaft sprocket alignment marks "c"

- Make sure that the camshaft sprocket alignment mark is aligned with the cylinder head mating surface "d".

Out of alignment → Reinstall.

Refer to the installation steps above.



6. Measure:

- Valve clearance

Out of specification → Adjust.

Refer to "ADJUSTING THE VALVE CLEARANCE" on page 3-3.

7. Install:

- Cylinder head cover gasket **New**
- Cylinder head cover



Cylinder head cover bolt
10 Nm (1.0 m•kg, 7.2 ft•lb)

NOTE:

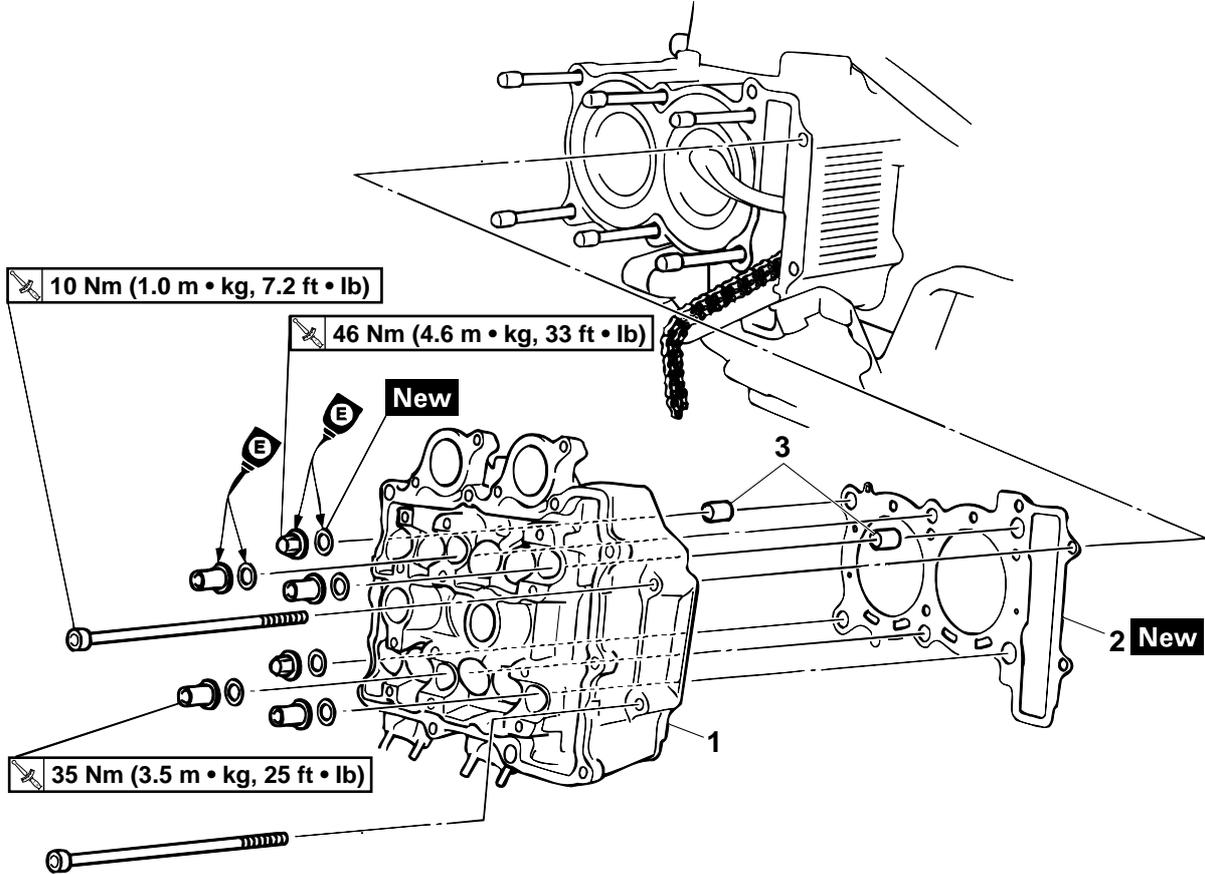
Tighten the cylinder head cover bolts in stages and in a crisscross pattern.

CYLINDER HEAD

EAS24100

CYLINDER HEAD

Removing the cylinder head



Order	Job/Parts to remove	Q'ty	Remarks
	Intake and exhaust camshafts		Refer to "CAMSHAFTS" on page 5-6.
1	Cylinder head	1	
2	Cylinder head gasket	1	
3	Dowel pin	2	
			For installation, reverse the removal procedure.

CYLINDER HEAD

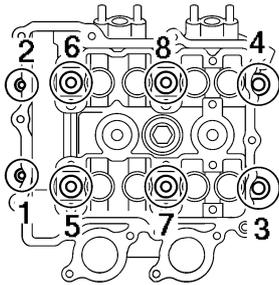
EAS15B420a

REMOVING THE CYLINDER HEAD

- Remove:
 - Cylinder head bolts
 - Cylinder head nuts

NOTE: _____

- Loosen the nuts and bolts in the proper sequence as shown.
- Loosen each nut 1/2 of a turn at a time. After all of the nuts are fully loosened, remove them.



EAS24160

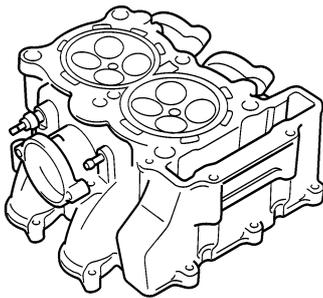
CHECKING THE CYLINDER HEAD

- Eliminate:
 - Combustion chamber carbon deposits (with a rounded scraper)

NOTE: _____

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

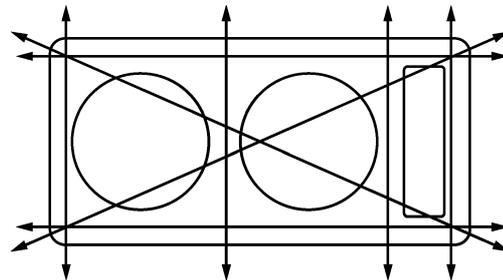
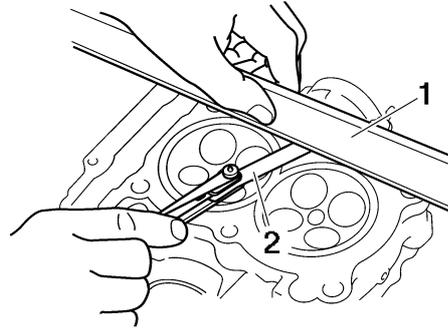
- Spark plug bore threads
- Valve seats



- Check:
 - Cylinder head
Damage/scratches → Replace.
 - Cylinder head water jacket
Mineral deposits/rust → Eliminate.
- Measure:
 - Cylinder head warpage
Out of specification → Resurface the cylinder head.

	Warpage limit 0.03 mm (0.0012 in)
--	--

- Place a straightedge "1" and a thickness gauge "2" across the cylinder head.



I1110303

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

NOTE: _____

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

EAS15B422a

INSTALLING THE CYLINDER HEAD

- Install:
 - Dowel pins
 - Cylinder head gasket **New**
- Install:
 - Cylinder head

NOTE: _____

Pass the timing chain through the timing chain cavity.

- Tighten:
 - Cylinder head nuts "1"

	Cylinder head nut 35 Nm (3.5 m•kg, 25 ft•lb)
--	---

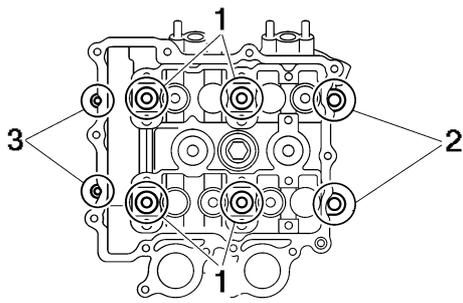
CYLINDER HEAD

- Cylinder head nuts "2"

	Cylinder head nut 46 Nm (4.6 m•kg, 33 ft•lb)
---	--

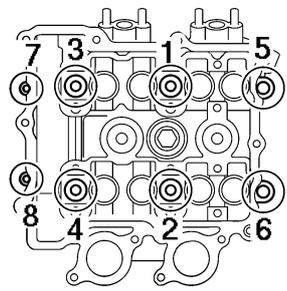
- Cylinder head bolts "3"

	Cylinder head bolts 10 Nm (1.0 m•kg, 7.2 ft•lb)
---	---



NOTE:

- Apply engine oil onto the threads of the cylinder head nuts.
- Tighten the cylinder head nuts and bolts in the proper tightening sequence as shown and torque them in two stages.

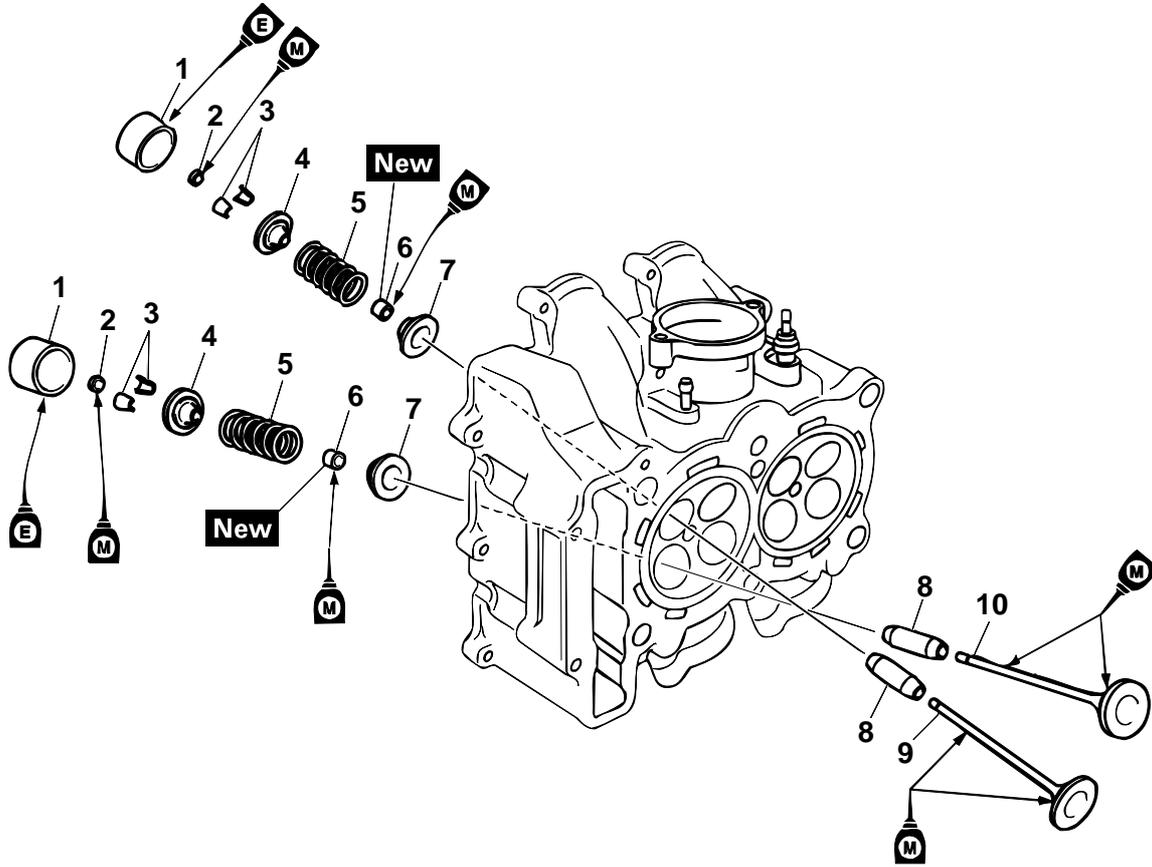


VALVES AND VALVE SPRINGS

EAS24270

VALVES AND VALVE SPRINGS

Removing the valves and valve springs



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-14.
1	Valve lifter	8	
2	Valve pad	8	
3	Valve cotter	16	
4	Valve retainer	8	
5	Valve spring	8	
6	Valve stem seal	8	
7	Valve spring seat	8	
8	Valve guide	8	
9	Intake valve	4	
10	Exhaust valve	4	
			For installation, reverse the removal procedure.

VALVES AND VALVE SPRINGS

EAS24280

REMOVING THE VALVES

The following procedure applies to all of the valves and related components.

NOTE:

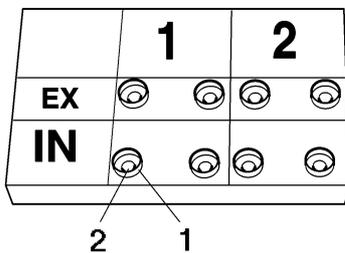
Before removing the internal parts of the cylinder head (e.g., valves, valve springs, valve seats), make sure the valves properly seal.

1. Remove:

- Valve lifter "1"
- Valve pad "2"

NOTE:

Make a note of the position of each valve lifter and valve pad so that they can be reinstalled in their original place.



I1172204

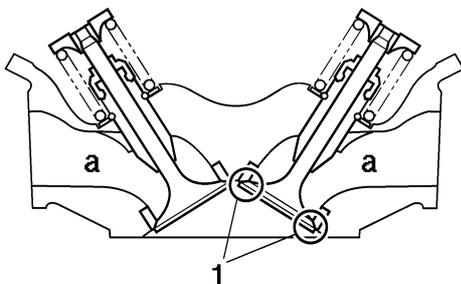
2. Check:

- Valve sealing
Leakage at the valve seat → Check the valve face, valve seat, and valve seat width. Refer to "CHECKING THE VALVE SEATS" on page 5-20.

- Pour a clean solvent "a" into the intake and exhaust ports.
- Check that the valves properly seal.

NOTE:

There should be no leakage at the valve seat "1".



I1171401

3. Remove:

- Valve cotters "1"

NOTE:

Remove the valve cotters by compressing the valve spring with the valve spring compressor "2" and the valve spring compressor attachment "3".



Valve spring compressor

90890-04019

YM-04019

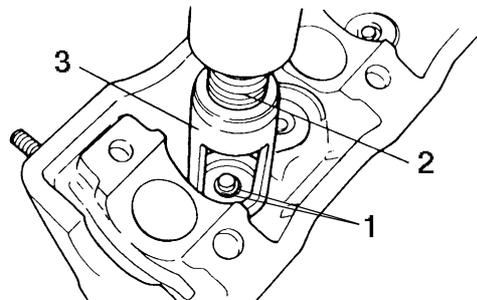
Valve spring compressor attachment

90890-04114

Valve spring compressor adapter

19.5 mm

YM-04114

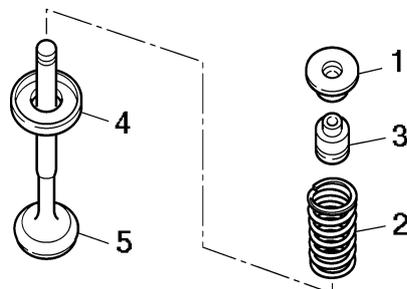


4. Remove:

- Upper spring seat "1"
- Valve spring "2"
- Valve stem seal "3"
- Lower spring seat "4"
- Valve "5"

NOTE:

Identify the position of each part very carefully so that it can be reinstalled in its original place.



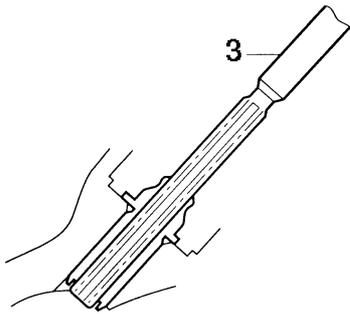
I1171203

EAS24290

CHECKING THE VALVES AND VALVE GUIDES

The following procedure applies to all of the valves and valve guides.

VALVES AND VALVE SPRINGS

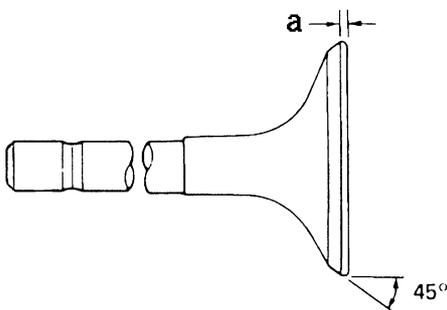


11170601



3. Eliminate:
 - Carbon deposits
(from the valve face and valve seat)
4. Check:
 - Valve face
Pitting/wear → Grind the valve face.
 - Valve stem end
Mushroom shape or diameter larger than the body of the valve stem → Replace the valve.
5. Measure:
 - Valve margin thickness “a”
Out of specification → Replace the valve.

Valve margin thickness
Valve margin thickness D (intake)
 0.60–0.80 mm (0.0236–0.0315 in)
Limit
 0.5 mm (0.0197 in)
Valve margin thickness D (exhaust)
 0.60–0.80 mm (0.0236–0.0315 in)
Limit
 0.5 mm (0.0197 in)



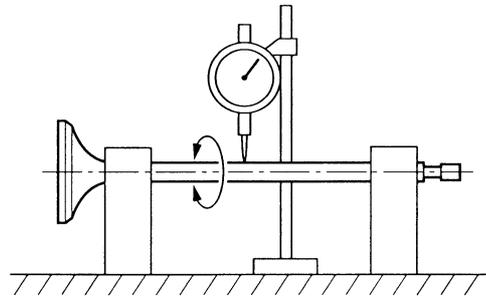
6. Measure:
 - Valve stem runout
Out of specification → Replace the valve.

- NOTE:**
- When installing a new valve, always replace the valve guide.
 - If the valve is removed or replaced, always re-

place the oil seal.



Valve stem runout
Valve stem runout
 0.040 mm (0.0016 in)



11172103

EAS24300

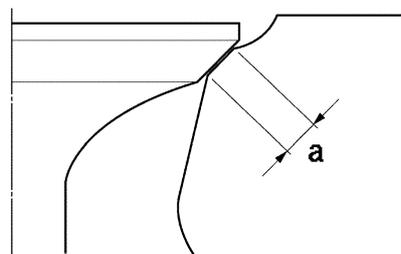
CHECKING THE VALVE SEATS

The following procedure applies to all of the valves and valve seats.

1. Eliminate:
 - Carbon deposits
(from the valve face and valve seat)
2. Check:
 - Valve seat
Pitting/wear → Replace the cylinder head.
3. Measure:
 - Valve seat width “a”
Out of specification → Replace the cylinder head.



Valve seat width
Valve seat width C (intake)
 0.90–1.10 mm (0.0354–0.0433 in)
Limit
 1.6 mm (0.06 in)
Valve seat width C (exhaust)
 0.90–1.10 mm (0.0354–0.0433 in)
Limit
 1.6 mm (0.06 in)



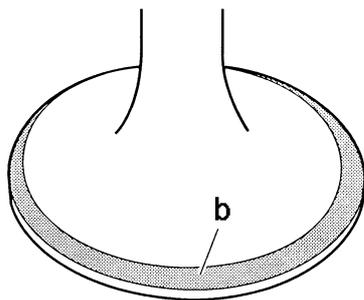
11171603



- a. Apply Mechanic's blueing dye (Dykem) “b”

VALVES AND VALVE SPRINGS

onto the valve face.



I1171601

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

NOTE:

Where the valve seat and valve face contacted one another, the blueing will have been removed.



4. Lap:

- Valve face
- Valve seat

NOTE:

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

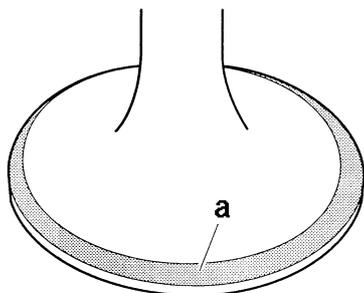


- a. Apply a coarse lapping compound "a" to the valve face.

ECA13790

CAUTION:

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

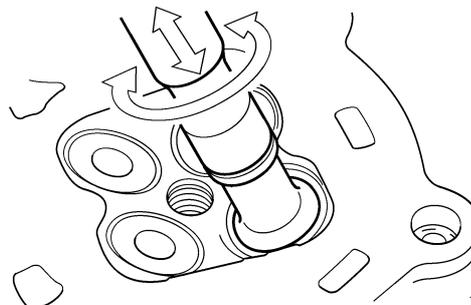


- b. Apply molybdenum disulfide oil onto the valve stem.
- c. Install the valve into the cylinder head.

- d. Turn the valve until the valve face and valve seat are evenly polished, then clean off all of the lapping compound.

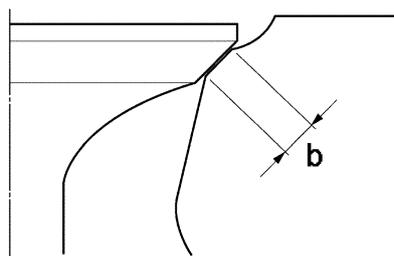
NOTE:

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



I1171503

- e. Apply a fine lapping compound to the valve face and repeat the above steps.
- f. After every lapping procedure, be sure to clean off all of the lapping compound from the valve face and valve seat.
- g. Apply Mechanic's blueing dye (Dykem) onto the valve face.
- h. Install the valve into the cylinder head.
- i. Press the valve through the valve guide and onto the valve seat to make a clear impression.
- j. Measure the valve seat width "b" again. If the valve seat width is out of specification, reface and lap the valve seat.



I1171603



EAS24310

CHECKING THE VALVE SPRINGS

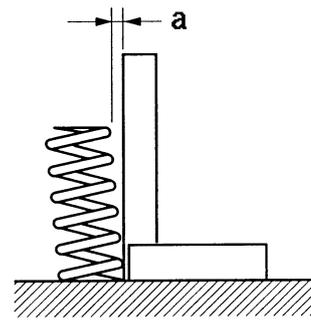
The following procedure applies to all of the valve springs.

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

VALVES AND VALVE SPRINGS



Valve spring free length
Free length (intake)
 35.59 mm (1.40 in)
Limit
 33.81 mm (1.33 in)
Free length (exhaust)
 35.59 mm (1.40 in)
Limit
 33.81 mm (1.33 in)

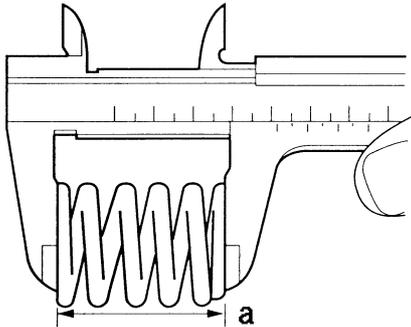


EAS24320

CHECKING THE VALVE LIFTERS

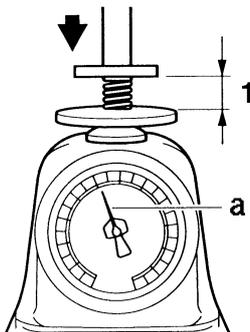
The following procedure applies to all of the valve lifters.

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

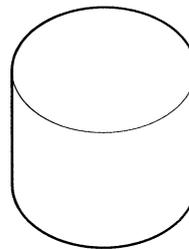


2. Measure:

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



1. Installed length



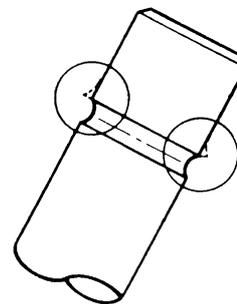
11170701

EAS24340

INSTALLING THE VALVES

The following procedure applies to all of the valves and related components.

1. Deburr:
 - Valve stem end
 - (with an oil stone)



2. Lubricate:
 - Valve stem "1"
 - Valve stem seal "2"
 - (with the recommended lubricant)



Intake
 91.2–104.9 N (9.3–10.7 kg,
 20.5–23.6 lb) at 30.4 mm (1.2 in)
Exhaust
 91.2–104.9 N (9.3–10.7 kg,
 20.5–23.6 lb) at 30.4 mm (1.2 in)

3. Measure:

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

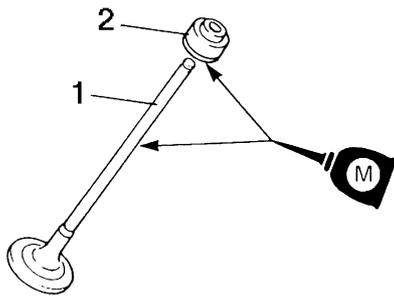


Spring tilt limit
Spring tilt (intake)
 2.5 °/1.6 mm
Spring tilt (exhaust)
 2.5 °/1.6 mm



Recommended lubricant
Molybdenum disulfide oil

VALVES AND VALVE SPRINGS



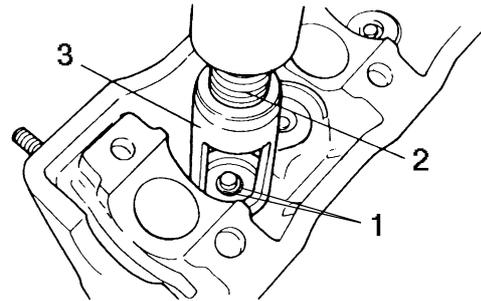
Valve spring compressor
90890-04019
YM-04019
Valve spring compressor attachment
90890-04114
Valve spring compressor adapter
19.5 mm
YM-04114

3. Install:

- Valve "1"
- Lower spring seat "2"
- Valve stem seal "3"
- Valve spring "4"
- Upper spring seat "5"
(into the cylinder head)

NOTE:

- Make sure each valve is installed in its original place.
- Install the valve springs with the larger pitch "a" facing up.

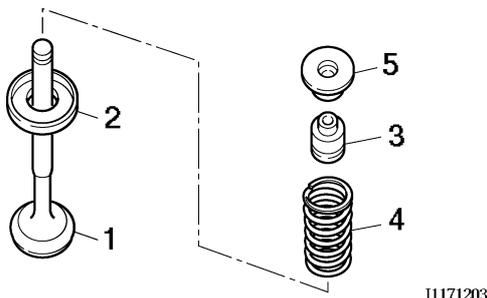


5. To secure the valve cotters onto the valve stem, lightly tap the valve tip with a soft-face hammer.

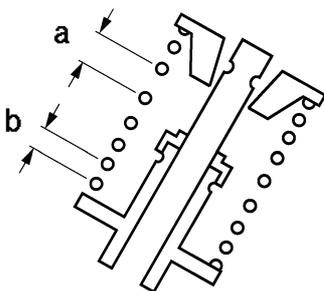
ECA13800

CAUTION:

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



11171203



11172001

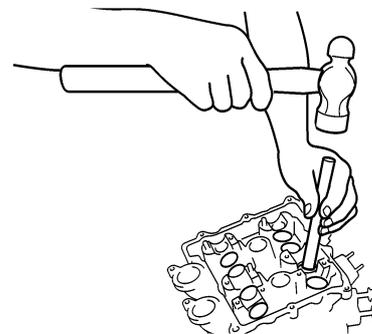
a. Smaller pitch

4. Install:

- Valve cotters "1"

NOTE:

Install the valve cotters by compressing the valve spring with the valve spring compressor "2" and the valve spring compressor attachment "3".



6. Lubricate:

- Valve pad
- Valve lifter
(with the recommended lubricant)



Recommended lubricant
Molybdenum disulfide oil

7. Install:

- Valve pad
- Valve lifter

ECA15B1026

CAUTION:

After making sure that the valve pads are fully inserted, install the valve lifter taking care

VALVES AND VALVE SPRINGS

so that the pads do not fall.

NOTE: _____

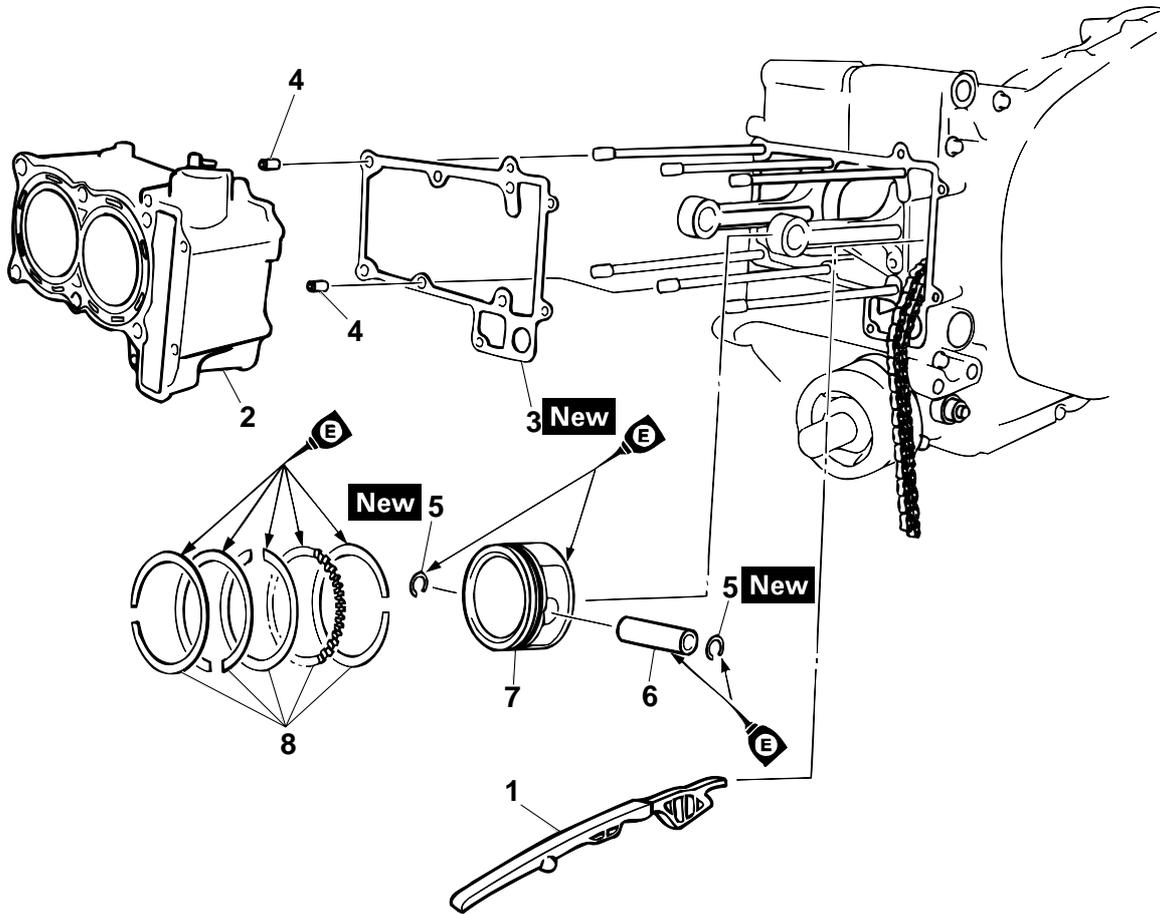
- The valve lifter must move smoothly when rotated with a finger.
 - Each valve lifter and valve pad must be reinstalled in its original position.
-

CYLINDER AND PISTONS

EAS24370

CYLINDER AND PISTONS

Removing the cylinder and pistons



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-14.
1	Timing chain guide (exhaust side)	1	
2	Cylinder	1	
3	Cylinder gasket	1	
4	Dowel pin	2	
5	Piston pin clip	4	
6	Piston pin	2	
7	Piston	2	
8	Piston ring set	2	
			For installation, reverse the removal procedure.

CYLINDER AND PISTONS

EAS24380

REMOVING THE PISTON

The following procedure applies to all of the pistons.

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

ECA13810

CAUTION:

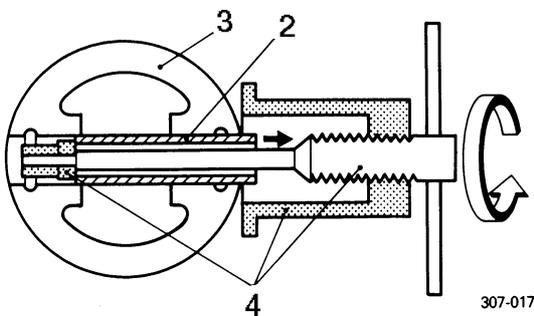
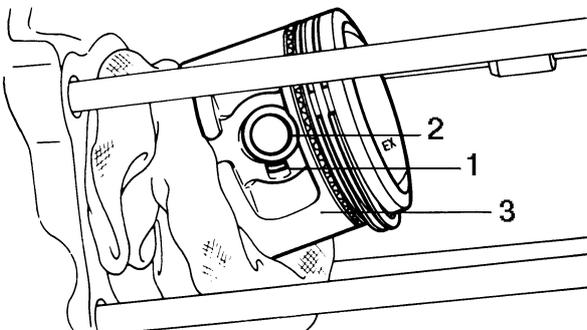
Do not use a hammer to drive the piston pin out.

NOTE:

- Before removing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.
- Before removing the piston pin, deburr the piston pin clip's groove and the piston's pin bore area. If both areas are deburred and the piston pin is still difficult to remove, remove it with the piston pin puller set "4".



**Piston pin puller set
90890-01304
Piston pin puller
YU-01304**

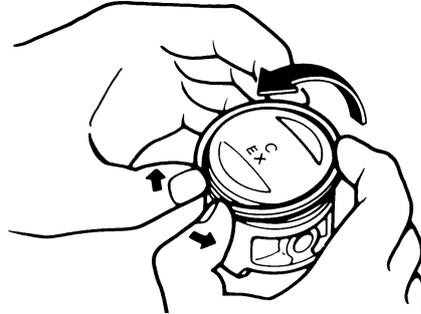


2. Remove:

- Top ring
- 2nd ring
- Oil ring

NOTE:

When removing a piston ring, open the end gap with your fingers and lift the other side of the ring over the piston crown.



EAS15B4256

CHECKING THE CYLINDERS AND PISTONS

The following procedure applies to all of the cylinders and pistons.

1. Check:
 - Piston wall
 - Cylinder wall

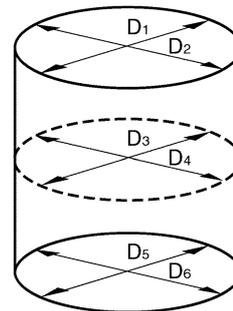
Vertical scratches → Rebore or replace the cylinder, and replace the piston and piston rings as a set.
2. Measure:

- Piston-to-cylinder clearance

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

NOTE:

Measure cylinder bore "C" by taking side-to-side and front-to-back measurements of the cylinder. Then, find the average of the measurements.



CYLINDER AND PISTONS



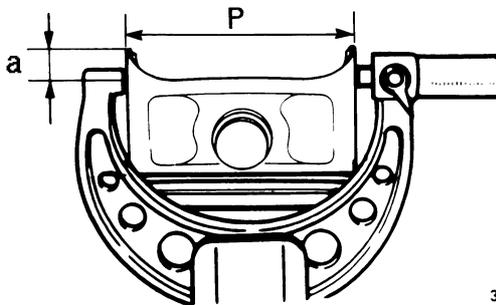
Bore "C"
Bore
 66.000–66.010 mm
 (2.5984–2.5988 in)
Taper limit "T"
Taper limit
 0.050 mm (0.0020 in)
Out of round "R"
Out of round limit
 0.050 mm (0.0020 in)

"C"= maximum of D1–D6
 "T"= (maximum of D1 or D2)—(maximum of D5 or D6)
 "R" = maximum of D1, D3 or D5 . minimum of D2, D4 or D6

- b. If out of specification, rebore or replace the cylinder, and replace the piston and piston rings as a set.
- c. Measure piston skirt diameter "P" with the micrometer.



Piston size "P"
 65.965–65.980 mm
 (2.5970–2.5976 in)



307-001

- a. 9.0 mm (0.35 in) from the bottom edge of the piston
- d. If out of specification, replace the piston and piston rings as a set.
- e. Calculate the piston-to-cylinder clearance with the following formula.

Piston-to-cylinder clearance =
 Cylinder bore "C"
 Piston skirt diameter "P"



Piston-to-cylinder clearance
 0.020 – 0.045 mm (0.0008 – 0.0018 in)
Limit: 0.15 mm (0.0059 in)

- f. If out of specification, rebore or replace the

cylinder, and replace the piston and piston rings as a set.



EAS24430

CHECKING THE PISTON RINGS

1. Measure:

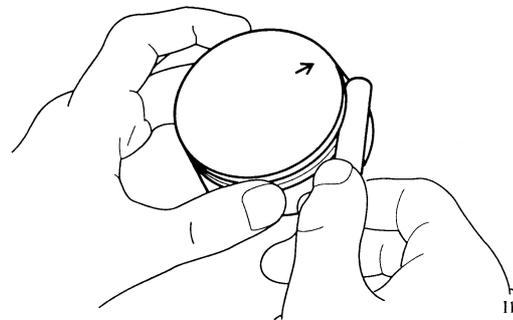
- Piston ring side clearance
 Out of specification → Replace the piston and piston rings as a set.

NOTE:

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



Piston ring side clearance
Ring side clearance
 0.030–0.065 mm (0.0012–0.0026 in)
Limit
 0.100 mm (0.0039 in)
Ring side clearance
 0.020–0.055 mm (0.0008–0.0022 in)
Limit
 0.100 mm (0.0039 in)



11221402

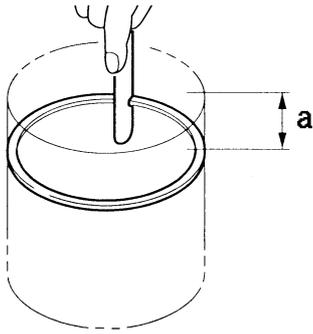
2. Install:

- Piston ring
 (into the cylinder)

NOTE:

Level the piston ring into the cylinder with the piston crown.

CYLINDER AND PISTONS



11221 101

a. 10 mm (0.39 in)

3. Measure:

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

NOTE:

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

	Piston ring end gap
	End gap (installed) 0.15–0.25 mm (0.0059–0.0098 in)
	Limit 0.50 mm (0.0197 in)
	End gap (installed) 0.40–0.50 mm (0.0157–0.0197 in)
	Limit 0.75 mm (0.0295 in)
	End gap (installed) 0.10–0.35 mm (0.0039–0.0138 in)

EAS24440

CHECKING THE PISTON PIN

The following procedure applies to all of the piston pins.

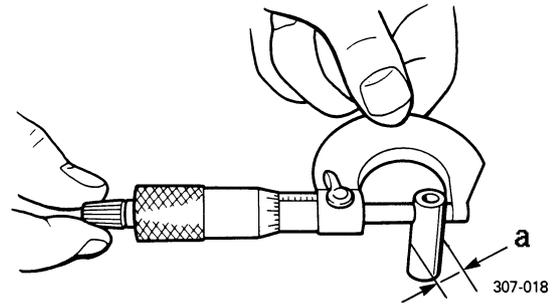
1. Check:

- Piston pin
Blue discoloration/grooves → Replace the piston pin and then check the lubrication system.

2. Measure:

- Piston pin outside diameter “a”
Out of specification → Replace the piston pin.

	Piston pin outside diameter 14.991–15.000 mm (0.5902–0.5906 in)
	Limit 14.971 mm (0.5894 in)

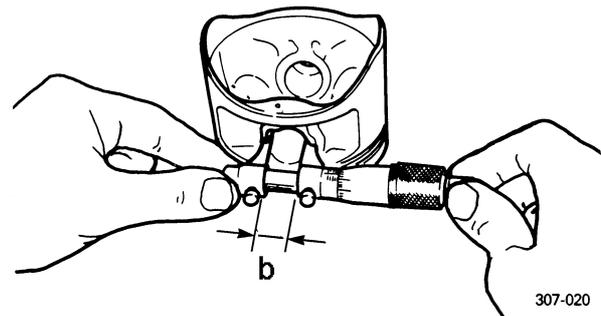


307-018

3. Measure:

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

	Piston pin bore inside diameter 15.002–15.013 mm (0.5906–0.5911 in)
	Limit 15.043 mm (0.5922 in)



307-020

4. Calculate:

- Piston-pin-to-piston-pin-bore clearance
Out of specification → Replace the piston pin and piston as a set.

Piston-pin-to-piston-pin-bore clearance = Piston pin bore diameter “b” - Piston pin outside diameter “a”

	Piston-pin-to-piston-pin-bore clearance 0.002–0.022 mm (0.00008–0.00087 in)
	Limit: 0.072 mm (0.0028 in)

EAS24470

INSTALLING THE PISTONS AND CYLINDERS

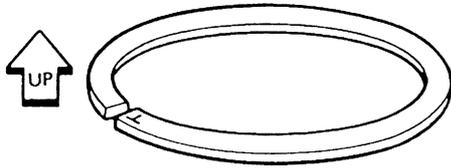
The following procedure applies to all of the pistons and cylinders.

1. Install:

- Top ring
- 2nd ring
- Oil ring

CYLINDER AND PISTONS

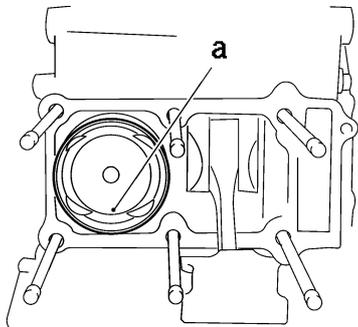
NOTE: _____
 Be sure to install the top and 2nd rings so that the manufacturers marks or numbers face up.



2. Install:

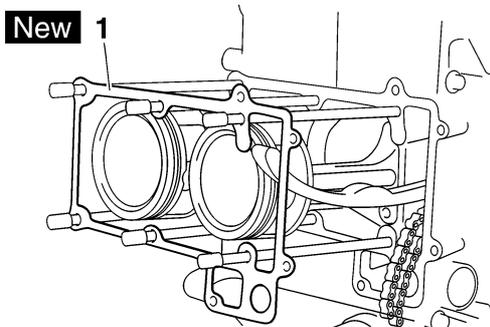
- Piston
- Piston pin
- Piston pin clips **New**

NOTE: _____
 • Apply engine oil onto the piston pin.
 • Make sure the arrow mark “a” on the piston points towards the exhaust side of the engine.
 • Before installing the piston pin clip, cover the crankcase opening with a clean rag to prevent the piston pin clip from falling into the crankcase.



3. Install:

- Gasket “1” **New**
- Dowel pins



4. Lubricate:

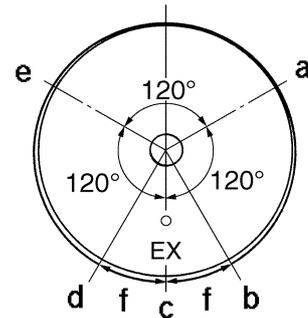
- Piston
- Piston rings

- Cylinder (with the recommended lubricant)



5. Offset:

- Top ring
 - 2nd ring
 - Oil ring
- Offset the piston ring end gaps as shown.



- a. Top ring end
- b. Upper oil ring rail end
- c. Oil ring expander end
- d. Lower oil ring rail end
- e. 2nd ring end
- f. 20 mm (0.79 in)

6. Install:

- Cylinder
- Timing chain guide (exhaust side)

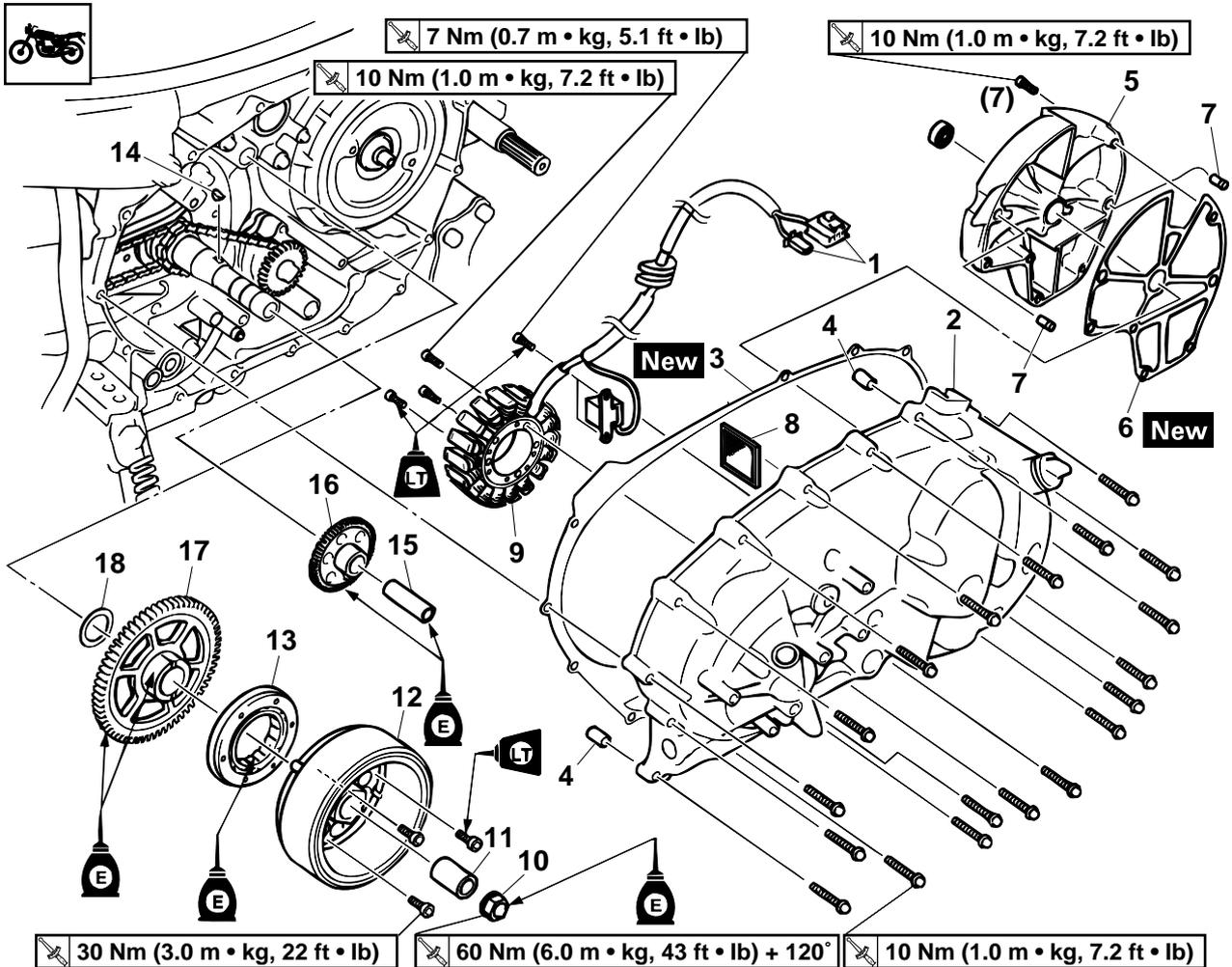
NOTE: _____
 Pass the timing chain through the timing chain cavity.

GENERATOR AND STARTER CLUTCH

EAS24480

GENERATOR AND STARTER CLUTCH

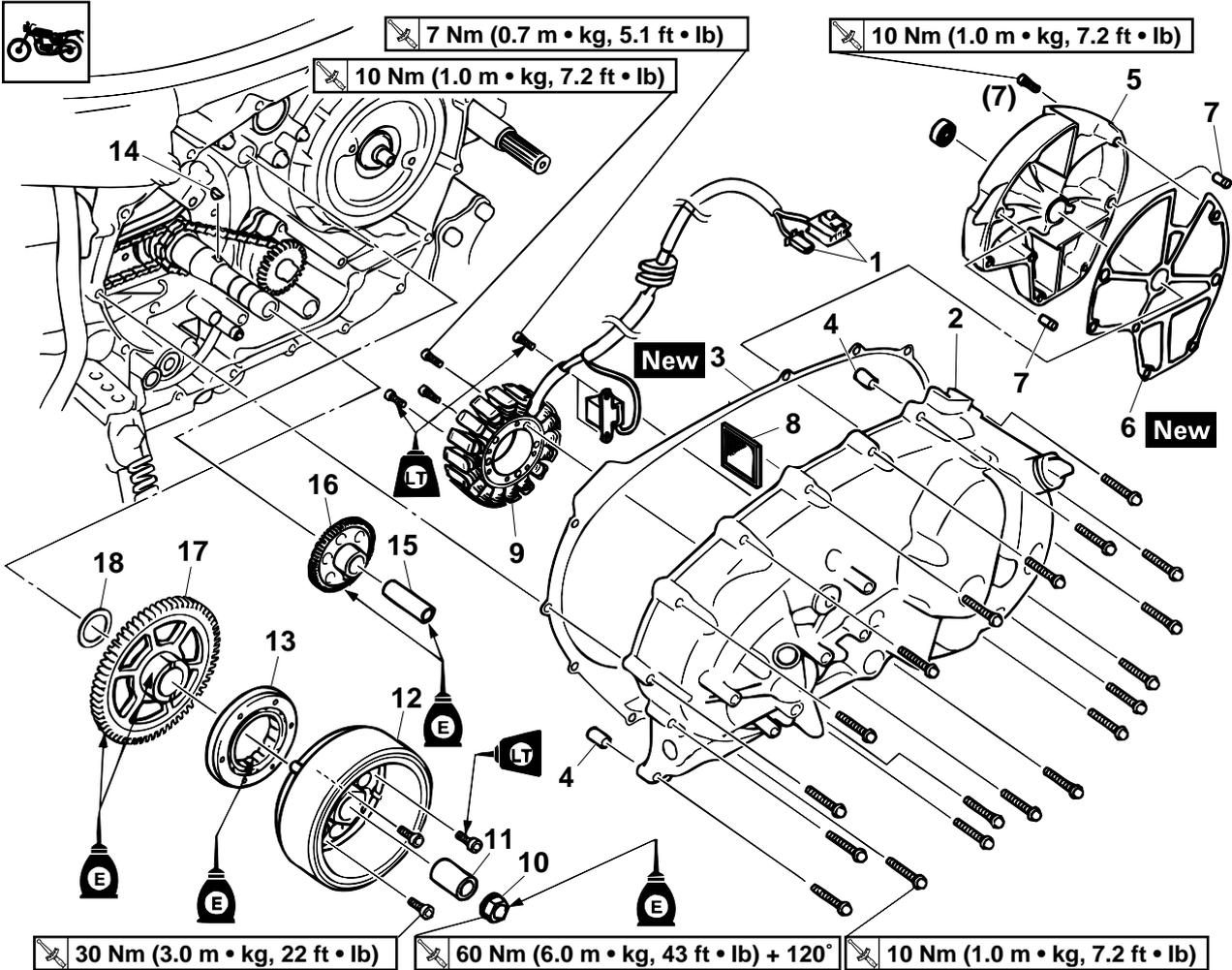
Removing the starter clutch and A.C. magneto rotor



Order	Job/Parts to remove	Q'ty	Remarks
	Left side panel/lower side cover moulding/foot-rest board		Refer to "GENERAL CHASSIS" on page 4-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-13.
	Water pump assembly		Refer to "WATER PUMP" on page 6-7.
1	Starter coil assembly coupler	2	Disconnect.
2	A.C. magneto cover	1	
3	A.C. magneto cover gasket	1	
4	Dowel pin	2	
5	Oil tank	1	
6	Gasket	1	
7	Dowel pin	2	
8	Oil strainer	1	
9	Starter coil assembly	1	
10	A.C. magneto rotor nut	1	
11	Spacer	1	
12	A.C. magneto rotor	1	

GENERATOR AND STARTER CLUTCH

Removing the starter clutch and A.C. magneto rotor



Order	Job/Parts to remove	Q'ty	Remarks
13	Starter clutch	1	
14	Woodruff key	1	
15	Starter clutch idle gear shaft	1	
16	Starter clutch idle gear	1	
17	Starter clutch gear	1	
18	Washer	1	
			For installation, reverse the removal procedure.

GENERATOR AND STARTER CLUTCH

EAS24530

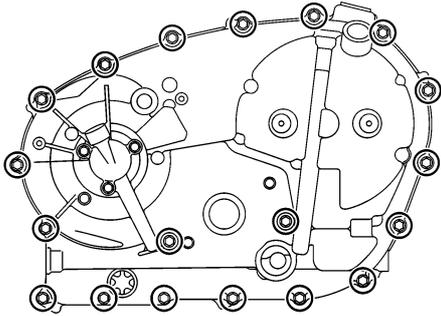
REMOVING THE A.C. MAGNETO ROTOR

1. Remove:

- A.C. magneto rotor cover

NOTE:

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern.
After all of the bolts are fully loosened, remove them.



2. Remove:

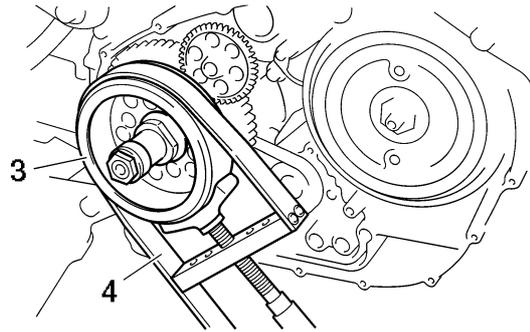
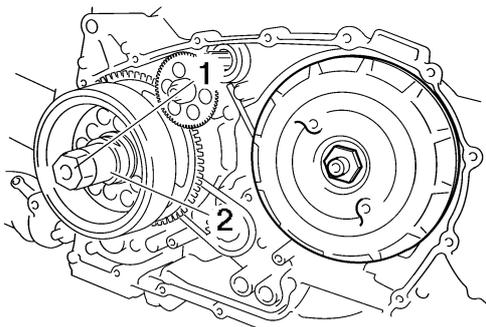
- A.C. magneto rotor nut "1"
- Spacer "2"

NOTE:

- While holding the A.C. magneto rotor "3" with the rotor holding tool "4", loosen the pickup coil rotor bolt.
- Do not allow the sheave holder to touch the projection on the A.C. magneto rotor.



Sheave holder
90890-01701
Primary clutch holder
YS-01880-A



3. Remove:

- A.C. magneto rotor "1"
(with the flywheel puller set "2")
- Woodruff key

NOTE:

- Remove the A.C. magneto rotor "1" using the flywheel puller.
- Center the flywheel puller over the A.C. magneto rotor. Make sure after installing the holding bolts that the clearance between the flywheel puller and the A.C. magneto rotor is the same everywhere. If necessary, one holding bolt maybe turned out slightly to adjust the flywheel puller's position.

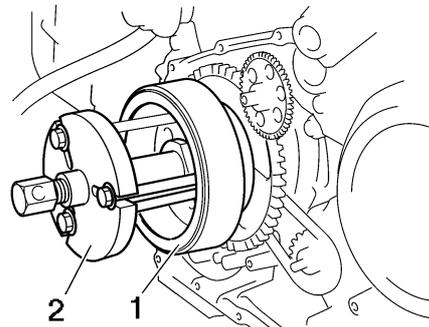
ECA15B1038

CAUTION:

Cover the crankshaft end with the box wrench for protection.



Flywheel puller
90890-01362
Heavy duty puller
YU-33270-B



EAS24570

CHECKING THE STARTER CLUTCH

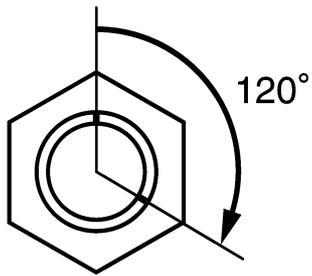
1. Check:

- Starter clutch
Damage/wear → Replace.

2. Check:

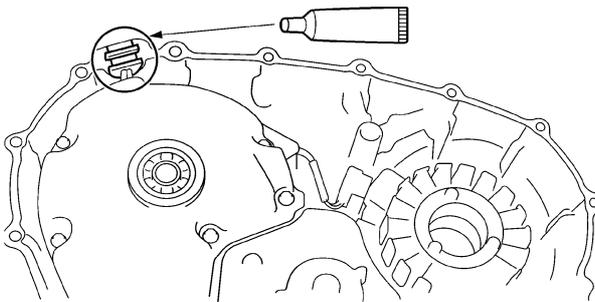
- Starter clutch idle gear
- Starter clutch drive gear

GENERATOR AND STARTER CLUTCH



3. Apply:
- Sealant
(onto the crankshaft position sensor lead grommet)

	Yamaha bond No. 1215 (Three Bond No.1215®) 90890-85505
---	---



4. Install:
- A.C. magneto rotor cover

	A.C. magneto rotor cover bolt 10 Nm (1.0 m•kg, 7.2 ft•lb)
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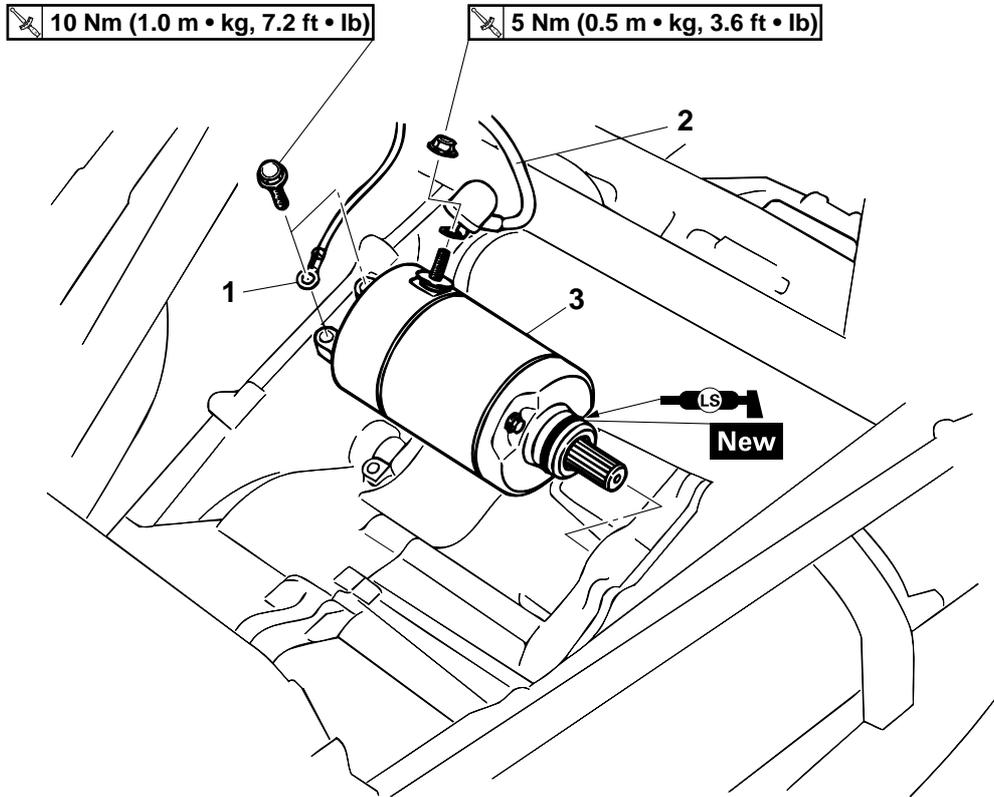
NOTE: _____
Tighten the A.C. magneto rotor cover bolts in stages and in a crisscross pattern.

ELECTRIC STARTER

EAS24780

ELECTRIC STARTER

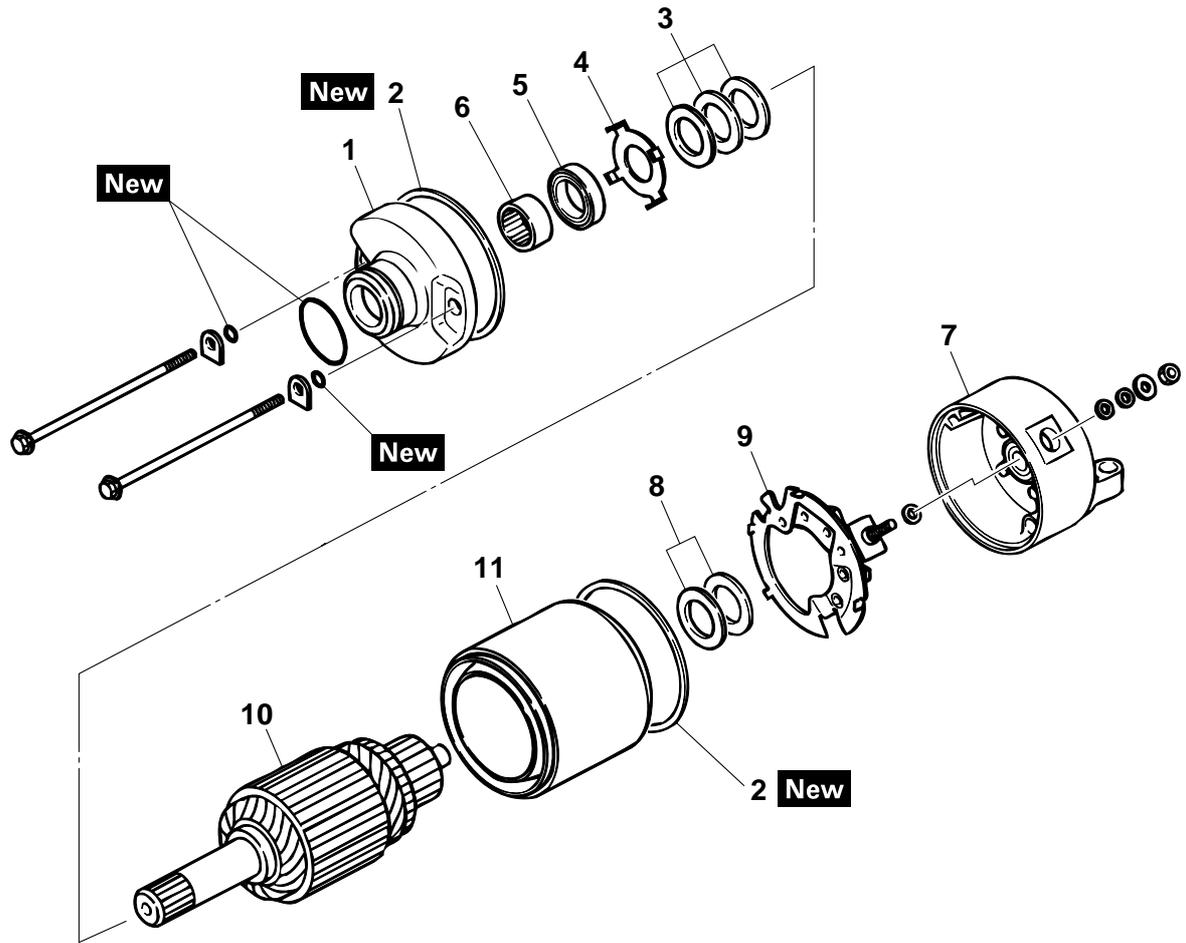
Removing the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
	Fuel tank		Refer to "FUEL TANK" on page 7-1.
1	Negative battery lead	1	
2	Starter motor lead	1	
3	Starter motor	1	
			For installation, reverse the removal procedure.

ELECTRIC STARTER

Disassembling the starter motor



Order	Job/Parts to remove	Q'ty	Remarks
1	Front bracket	1	
2	O-ring	2	
3	Shims	1	
4	Lock washer	1	
5	Oil seal	1	
6	Bearing	1	
7	Rear bracket	1	
8	Shims	1	
9	Brush holder set	1	
10	Armature assembly	1	
11	Starter motor yoke	1	
			For assembly, reverse the disassembly procedure.

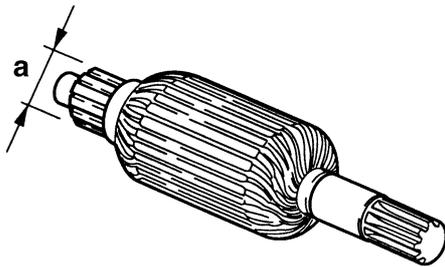
ELECTRIC STARTER

EAS24790

CHECKING THE STARTER MOTOR

1. Check:
 - Commutator
Dirt → Clean with 600 grit sandpaper.
2. Measure:
 - Commutator diameter "a"
Out of specification → Replace the starter motor.

	Limit 27.0 mm (1.06 in)
---	--



3. Measure:
 - Mica undercut "a"
Out of specification → Scrape the mica to the proper measurement with a hacksaw blade that has been ground to fit the commutator.

	Mica undercut (depth) 0.70 mm (0.03 in)
---	--

NOTE:
The mica of the commutator must be undercut to ensure proper operation of the commutator.



4. Measure:
 - Armature assembly resistances (commutator and insulation)
Out of specification → Replace the starter motor.

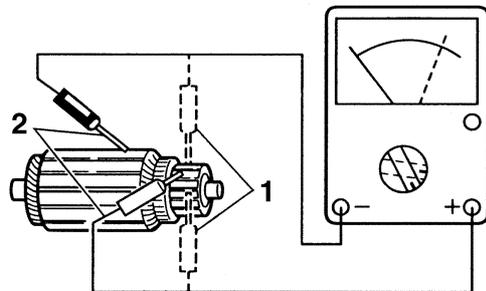


- a. Measure the armature assembly resistances

with the pocket tester.

	Pocket tester 90890-03112 Analog pocket tester YU-03112-C Digital circuit tester 90890-03174 Model 88 Multimeter with tachometer YU-A1927
---	--

	Armature coil Commutator resistance "1" 0.0015–0.0025 Ω at 20°C (68°F) Insulation resistance "2" Above 1 MΩ at 20°C (68°F)
---	---

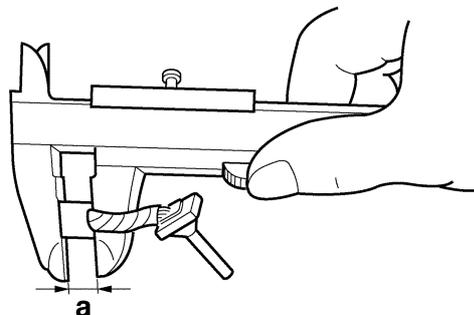


- b. If any resistance is out of specification, replace the starter motor.



5. Measure:
 - Brush length "a"
Out of specification → Replace the brushes as a set.

	Limit 4.00 mm (0.16 in)
---	--



6. Measure:
 - Brush spring force
Out of specification → Replace the brush

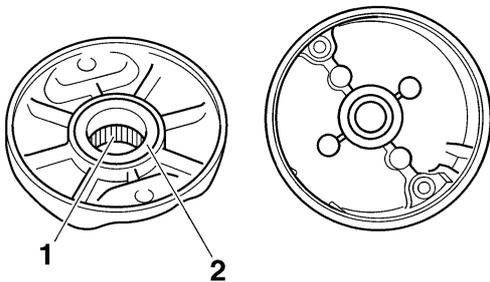
springs as a set.



Brush spring force
7.65–10.01 N (27.54–36.03 oz)
(780–1021 gf)

2. Connect:
- Starter motor lead

7. Check:
- Gear teeth
Damage/wear → Replace the gear.
8. Check:
- Bearing "1"
 - Oil seal "2"
- Damage/wear → Replace the defective part(s).



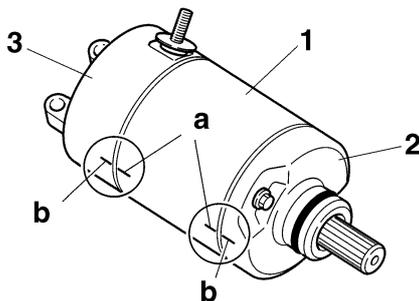
EAS24800

ASSEMBLING THE STARTER MOTOR

1. Install:
- Starter motor yoke "1"
 - Starter motor front cover "2"
 - Starter motor rear cover "3"

NOTE:

Align the match marks "a" on the starter motor yoke with the match marks "b" on the front and starter motor rear covers.



EAS24810

INSTALLING THE STARTER MOTOR

1. Install:
- Starter motor
 - Starter motor bolts

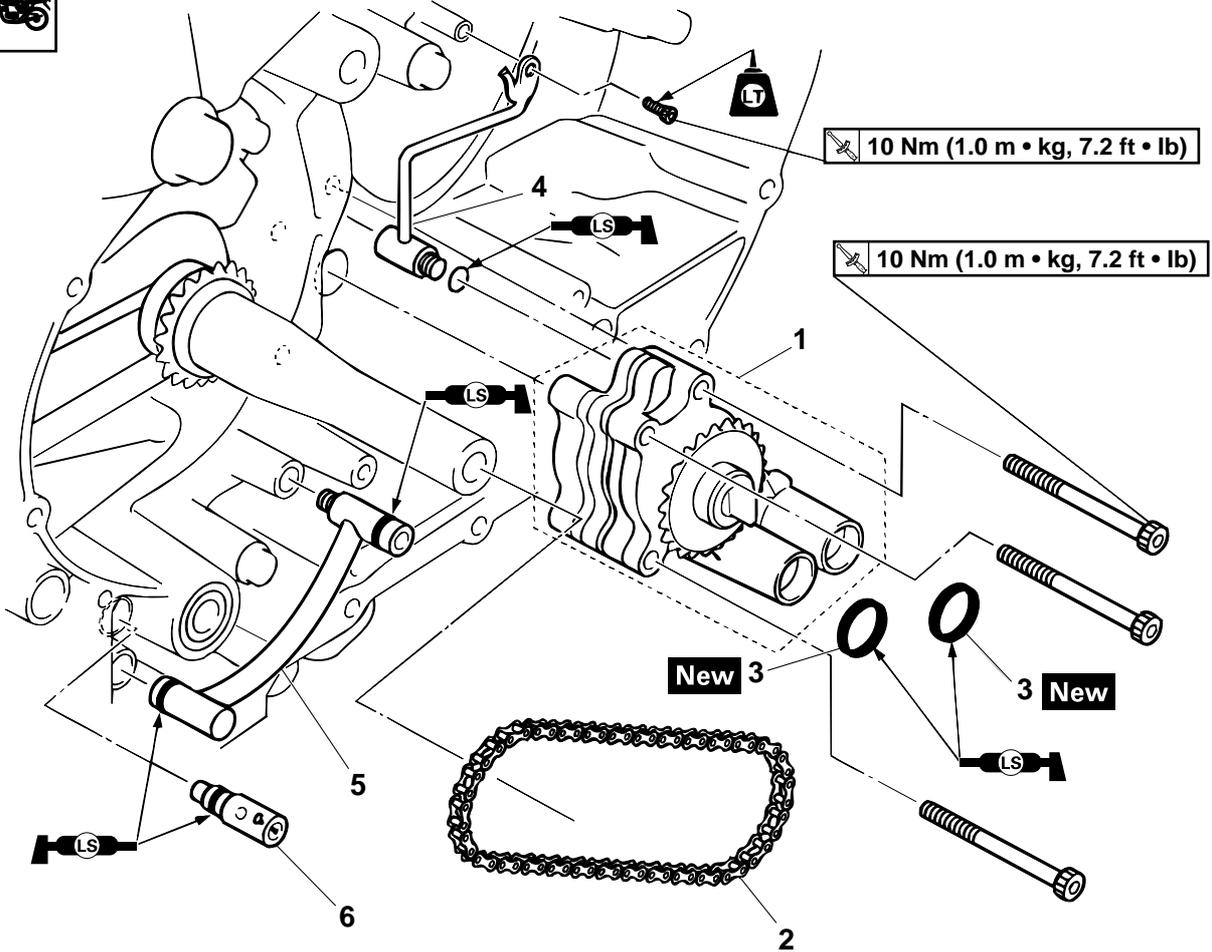


Starter motor bolt
10 Nm (1.0 m•kg, 7.2 ft•lb)

EAS24900

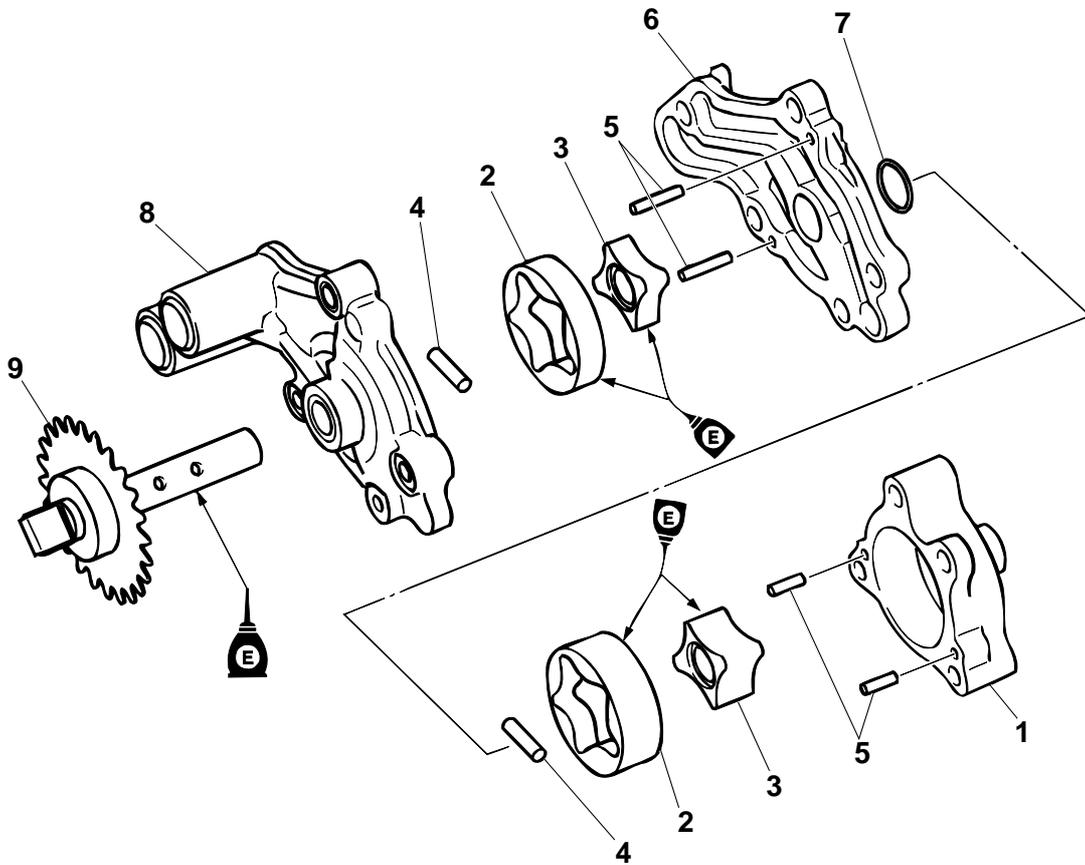
OIL PUMP

Removing the oil pump



Order	Job/Parts to remove	Q'ty	Remarks
	Left side panel/lower side cover moulding/foot-rest board		Refer to "GENERAL CHASSIS" on page 4-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-13.
	A.C. magneto cover/Starter clutch gear		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-30.
1	Oil pump assembly	1	
2	Oil pump drive chain	1	
3	O-ring	2	
4	Oil delivery pipe	1	
5	Oil delivery pipe	1	
6	Relief valve assembly	1	
			For installation, reverse the removal procedure.

Disassembling the oil pump



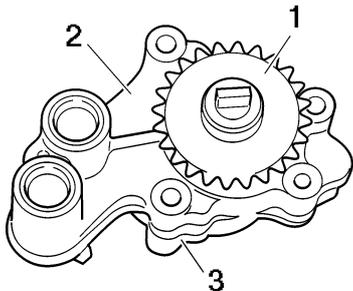
Order	Job/Parts to remove	Q'ty	Remarks
1	Oil pump housing	1	
2	Oil pump outer rotor	2	
3	Oil pump inner rotor	2	
4	Pin	2	
5	Dowel pin	4	
6	Oil pump housing center	1	
7	Washer	1	
8	Oil pump cover	1	
9	Oil pump driven gear	1	
			For installation, reverse the removal procedure.

EAS24960

CHECKING THE OIL PUMP

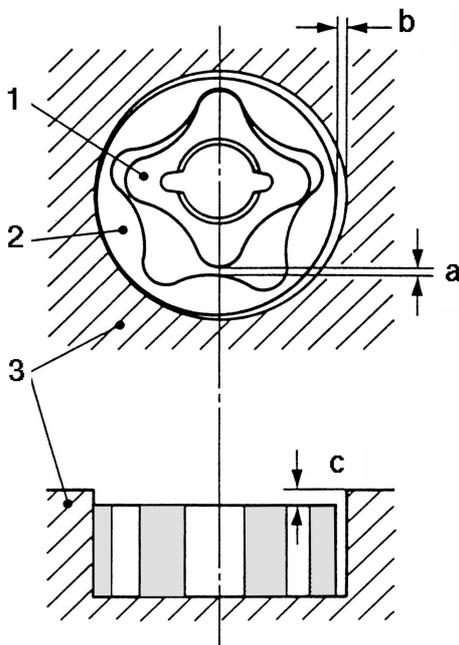
1. Check:

- Oil pump drive gear "1"
 - Oil pump housing "2"
 - Oil pump cover "3"
- Cracks/damage/wear → Replace the defective part(s).



2. Measure:

- Inner-rotor-to-outer-rotor-tip clearance "a"
 - Outer-rotor-to-oil-pump-housing clearance "b"
 - Oil-pump-housing-to-inner-rotor-and-outer-rotor clearance "c"
- Out of specification → Replace the oil pump.



1. Inner rotor
2. Outer rotor
3. Oil pump housing

315-001



Inner-rotor-to-outer-rotor-tip clearance

0.040–0.120 mm (0.0016–0.0047 in)

Limit

0.20 mm (0.0079 in)

Outer-rotor-to-oil-pump-housing clearance

0.045–0.085 mm (0.0018–0.0033 in)

Limit

0.155 mm (0.0061 in)

Oil-pump-housing-to-inner-and-outer-rotor clearance

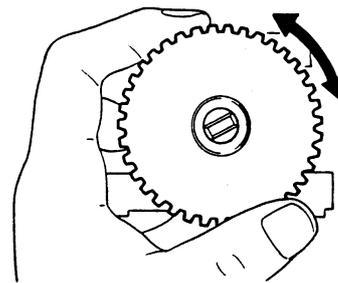
0.11–0.23 mm (0.0043–0.0091 in)

Limit

0.30 mm (0.0118 in)

3. Check:

- Oil pump operation
- Rough movement → Repeat steps (1) and (2) or replace the defective part(s).



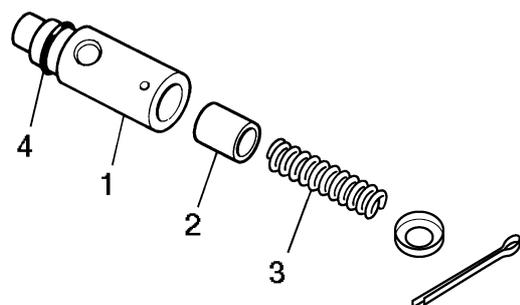
EAS24970

CHECKING THE RELIEF VALVE

1. Check:

- Relief valve body "1"
- Relief valve "2"
- Spring "3"
- O-ring "4"

Damage/wear → Replace the defective part(s).

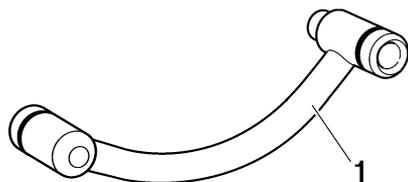


EAS24980

CHECKING THE OIL DELIVERY PIPES

The following procedure applies to all of the oil delivery pipes.

1. Check:
 - Oil delivery pipe "1"
 - Damage → Replace.
 - Obstruction → Wash and blow out with compressed air.



EAS24990

CHECKING THE OIL STRAINER

1. Check:
 - Oil strainer
 - Damage → Replace.
 - Contaminants → Clean with solvent.

EAS15B4368a

CHECKING THE OIL PUMP DRIVE CHAIN

1. Check:
 - Oil pump drive chain
 - Cracks/stiffness → Replace the oil pump chain, oil pump drive and driven sprocket as a set.



EAS25000

ASSEMBLING THE OIL PUMP

1. Lubricate:
 - Inner rotor
 - Outer rotor
 - Oil pump shaft

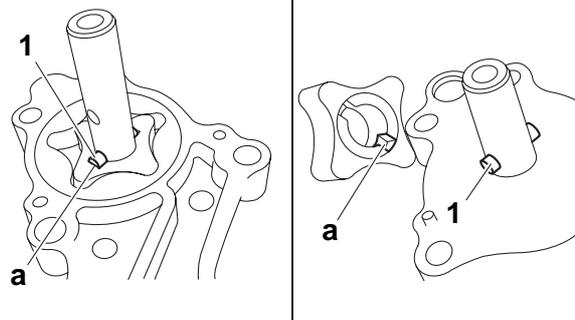
(with the recommended lubricant)



2. Install:
 - Pins
 - Inner rotors

NOTE:

When installing the inner rotor, align the pin "1" in the oil pump shaft with the groove "a" in the inner rotor.



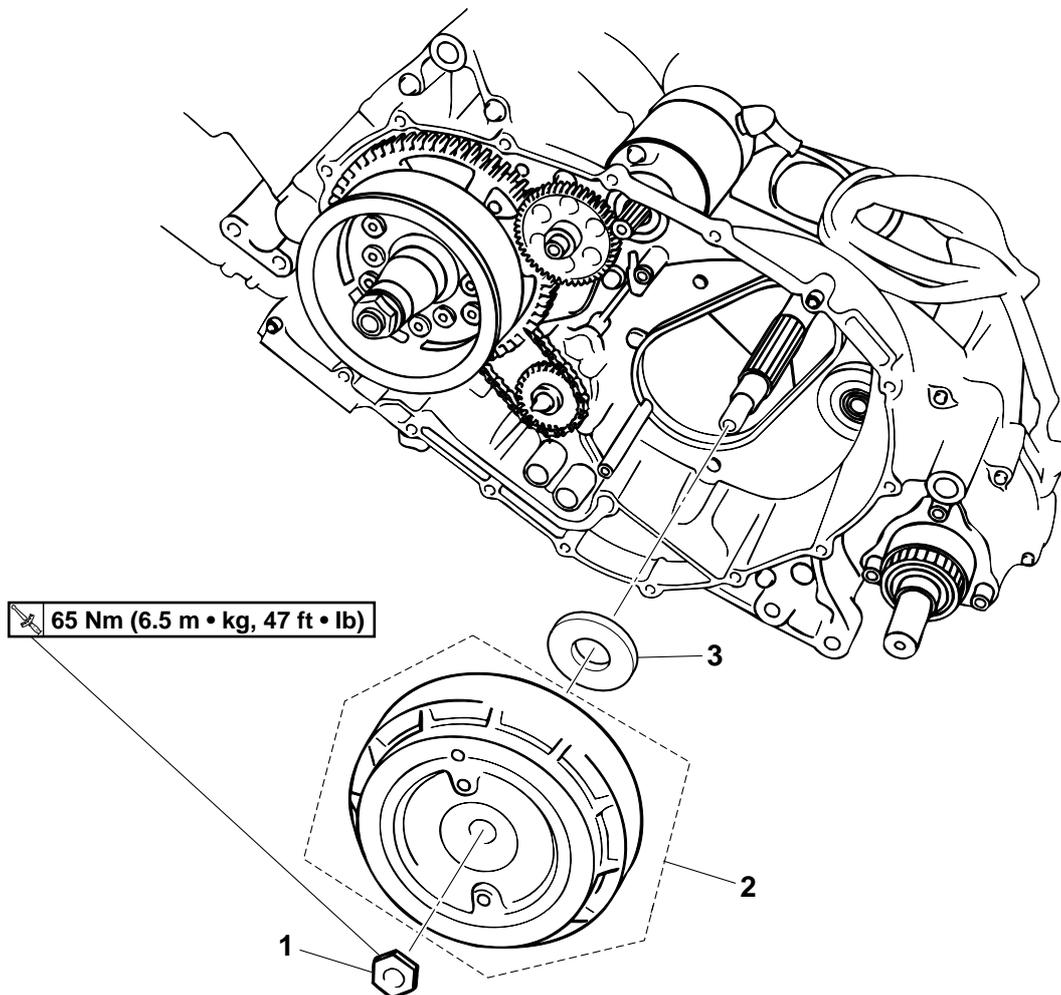
3. Check:
 - Oil pump operation

Refer to "CHECKING THE OIL PUMP" on page 5-41.

EAS25060

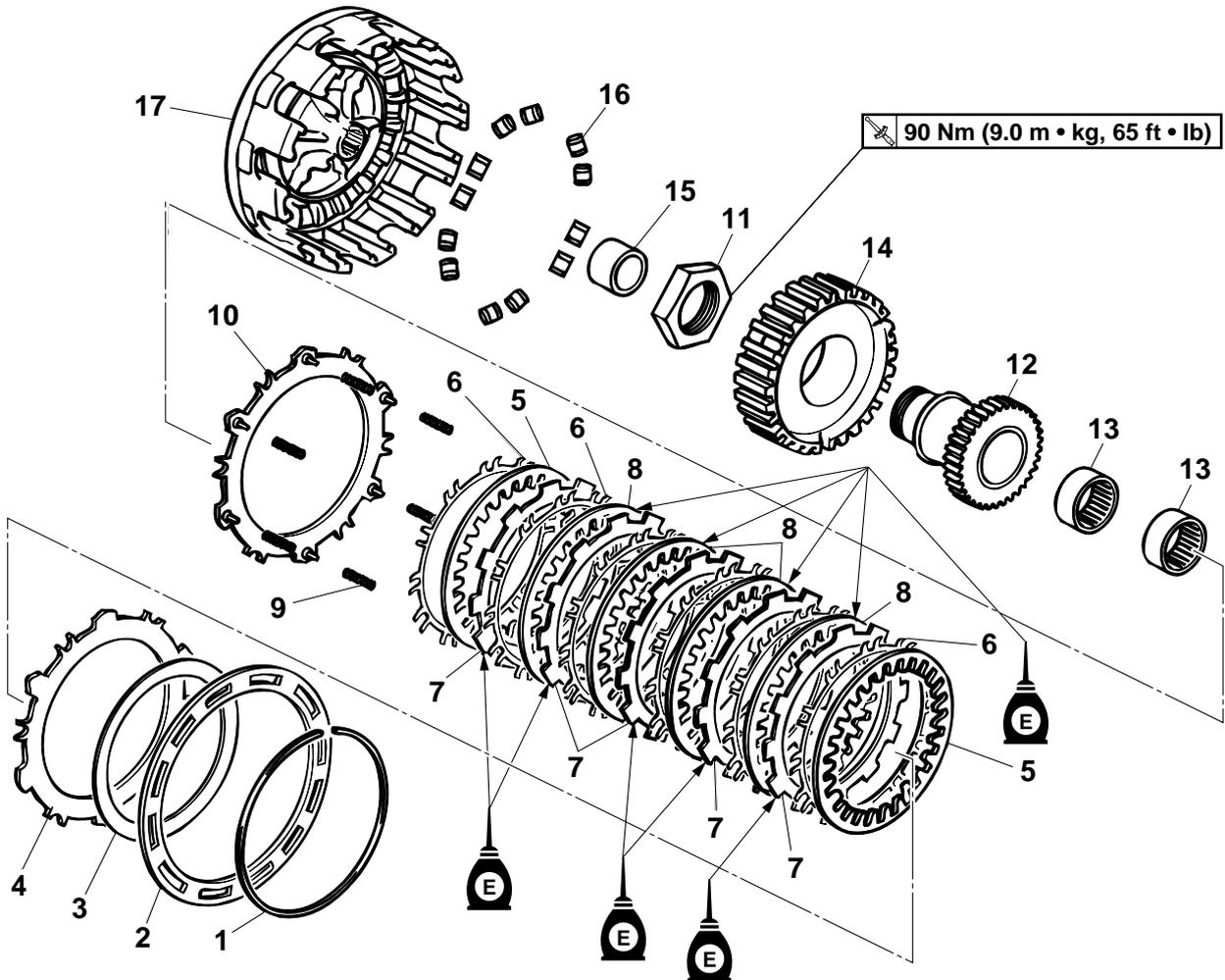
CLUTCH

Removing the clutch



Order	Job/Parts to remove	Q'ty	Remarks
	A.C. magneto cover		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-30.
1	Clutch assembly nut	1	
2	Clutch assembly	1	
3	Washer	1	
			For installation, reverse the removal procedure.

Disassembling the clutch



Order	Job/Parts to remove	Q'ty	Remarks
1	Circlip	1	
2	Spring stopper plate	1	
3	Clutch damper spring "2"	1	
4	Pressure plate	1	
5	Clutch plate "2"	2	
6	Clutch damper spring "1"	6	
7	Friction plate	5	
8	Clutch plate "1"	4	
9	Clutch spring	6	
10	Thrust plate	1	
11	Clutch boss nut	1	
12	Primary drive gear	1	
13	Bearing	2	
14	Clutch boss	1	
15	Collar	1	
16	Weight	12	
17	Clutch housing	1	
			For assembly, reverse the removal procedure.

EAS25070

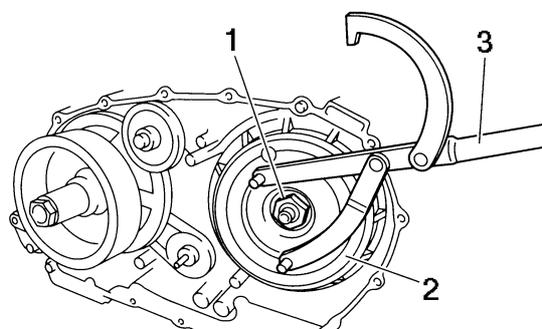
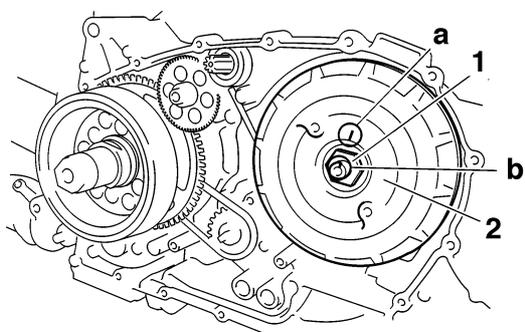
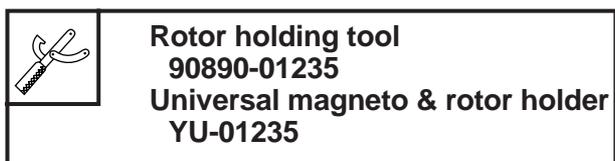
REMOVING THE CLUTCH

1. Remove:

- Clutch assembly nut "1"
- Clutch assembly "2"

NOTE:

- Before removal, apply "a" and "b" alignment marks.
- While holding the clutch assembly with the rotor holding tool "3", loosen the clutch assembly nut.
- Align these marks during reassembly.



EAS15B4001

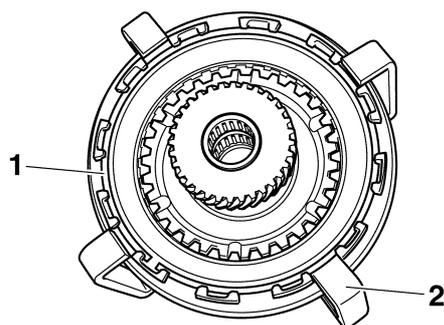
DISASSEMBLING THE CLUTCH

1. Remove:

- Circlip "1"

NOTE:

Install the clutch spring compressor "2" onto the clutch assembly as shown. Then, compress the spring, and remove the circlip.

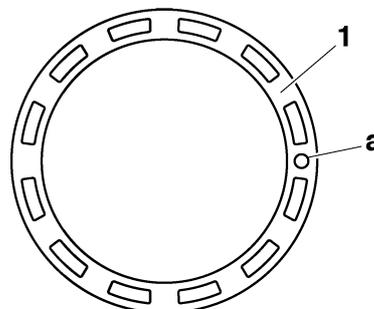


2. Remove:

- Spring stopper plate "1"
- Clutch damper spring 2
- Pressure plate
- Clutch plate "2"
- Friction plate
- Clutch plate 1
- Clutch damper spring 1
- Thrust plate
- Clutch springs

NOTE:

One to three holes "a" are drilled in the spring stopper plate to adjust the balance of the clutch assembly. Before removing the spring stopper plate, make alignment marks on both the plate and the clutch housing so that the plate can be reinstalled in its original position.



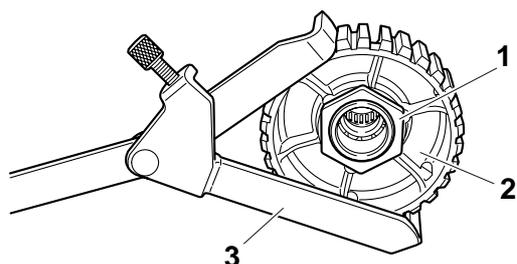
3. Remove:

- Clutch boss nut "1"

NOTE:

While holding the clutch boss "2" with the clutch holding tool "3", loosen the clutch boss nut.





EAS25100

CHECKING THE FRICTION PLATES

The following procedure applies to all of the friction plates.

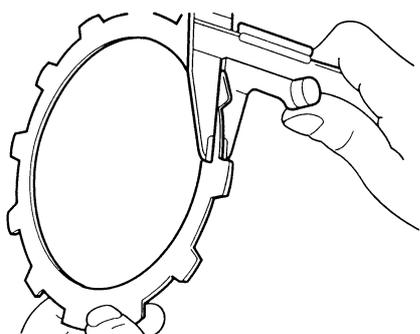
1. Check:
 - Friction plate
Damage/wear → Replace the friction plates as a set.
2. Measure:
 - Friction plate thickness
Out of specification → Replace the friction plates as a set.

NOTE:

Measure the friction plate at four places.



Friction plate thickness
2.75–3.05 mm (0.108–0.120 in)
Wear limit
2.65 mm (0.1043 in)



11411101

EAS25110

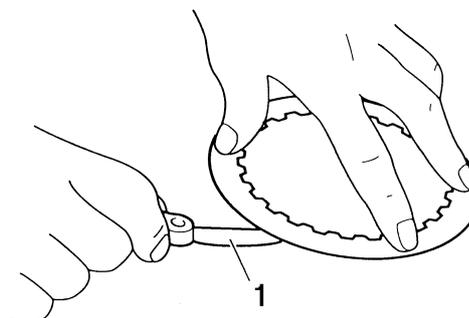
CHECKING THE CLUTCH PLATES

The following procedure applies to all of the clutch plates.

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



Warpage limit
0.10 mm (0.0039 in)



11411901

EAS25130

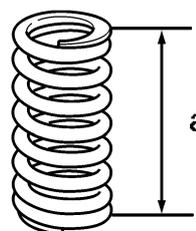
CHECKING THE CLUTCH SPRING PLATE

The following procedure applies to all of the clutch springs.

1. Check:
 - Clutch plate spring
Damage → Replace.
2. Measure:
 - Clutch spring free height
Out of specification → Replace the clutch plate spring.



Clutch spring limit
25.4 mm (1.00 in)



11171901

3. Measure:
 - Clutch damper spring 1 “b”
Out of specification → Replace the clutch damper spring 1.
 - Clutch damper spring 2 “c”
Out of specification → Replace the clutch damper spring 2.



Clutch spring height "c"
4.70 mm (0.19 in)
Minimum height
4.40 mm (0.17 in)
Clutch spring height "b"
3.30 mm (0.13 in)
Minimum height
2.9 mm (0.11 in)



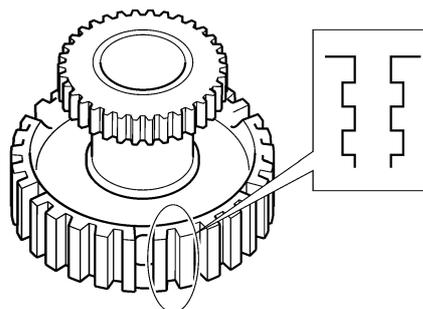
EAS25160

CHECKING THE CLUTCH BOSS

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

NOTE: _____

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



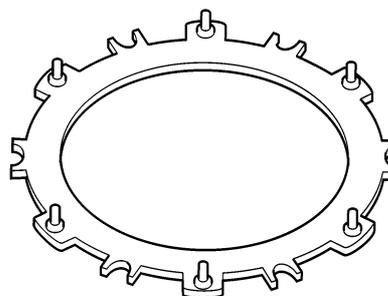
EAS25170

CHECKING THE PRESSURE PLATE

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

NOTE: _____

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



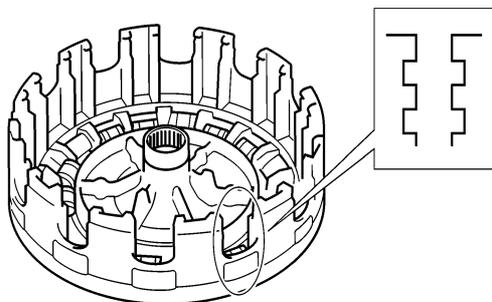
EAS25150

CHECKING THE CLUTCH HOUSING

- Check:
 - Clutch housing dogs "1"
Damage/pitting/wear → Deburr the clutch housing dogs or replace the clutch housing.

NOTE: _____

Pitting on the clutch housing dogs will cause erratic clutch operation.



EAS15B4286b

CHECKING THE WEIGHT

- Check:
 - Weight
Cracks/wear/scaling/chipping → Replace.
Out of specification → Replace.



Weight outside diameter
16.0 mm (0.63 in)
Limit: 15.5 mm (0.61 in)

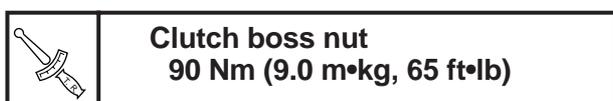
EAS15B4586b

ASSEMBLING THE CLUTCH

- Lubricate:
 - Friction plates
 - Clutch plates
(with the recommended lubricant)

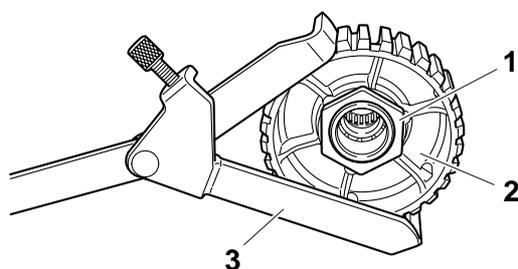


- Install:
 - Clutch boss
 - Primary drive gear
 - Clutch boss nut "1"
- Tighten:
 - Clutch boss nut

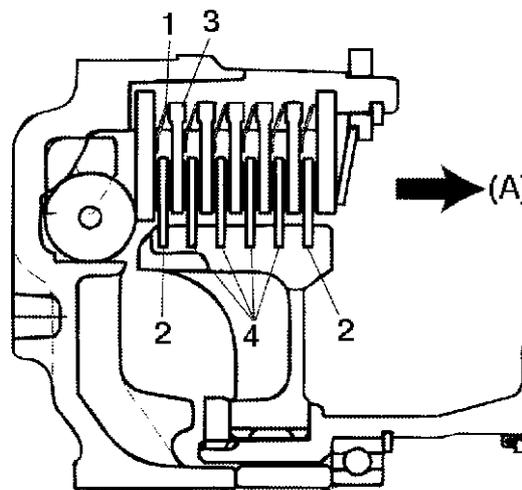


NOTE:

While holding the clutch boss "2" with the clutch holding tool "3", tighten the clutch boss nut.



- Install:
 - Clutch damper spring 1 "1"
 - Clutch plate 2 "2"
 - Friction plate "3"
 - Clutch plate 1 "4"

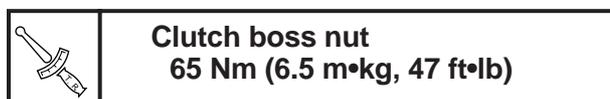


A. Engine side

EAS15B4286c

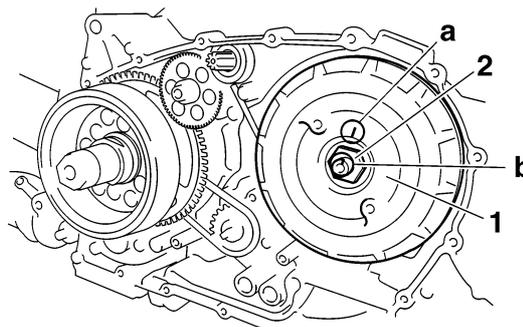
INSTALLING THE CLUTCH

- Install:
 - Clutch assembly "1"
 - Clutch assembly nut "2"

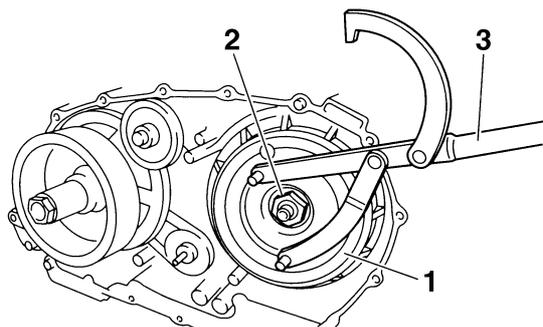


NOTE:

- Align the "a" and "b" during reassembly.
- While holding the clutch assembly with the rotor holding tool "3", tighten the clutch assembly nut.



CLUTCH

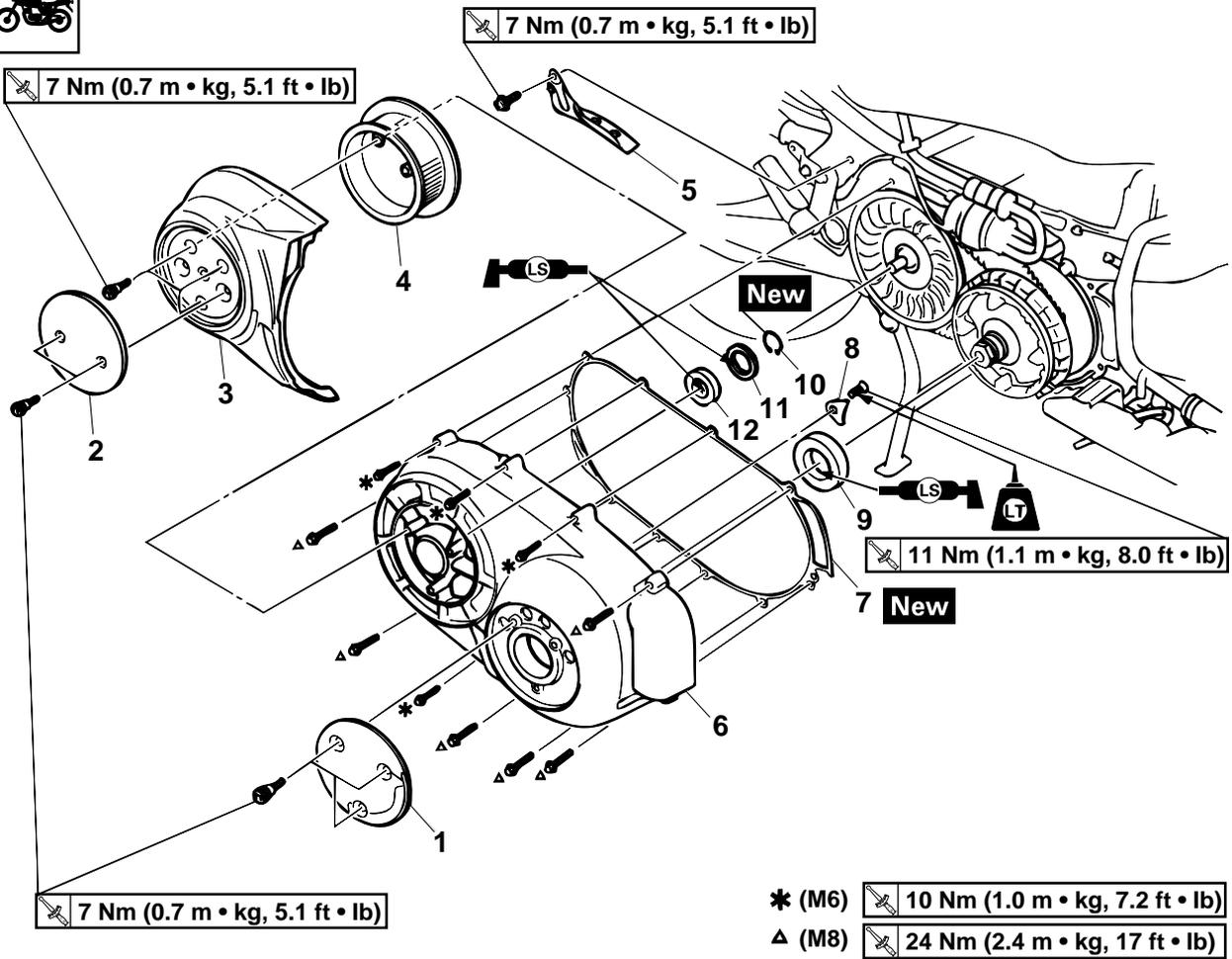


V-BELT AUTOMATIC TRANSMISSION

EAS24610

V-BELT AUTOMATIC TRANSMISSION

Removing the V-belt case

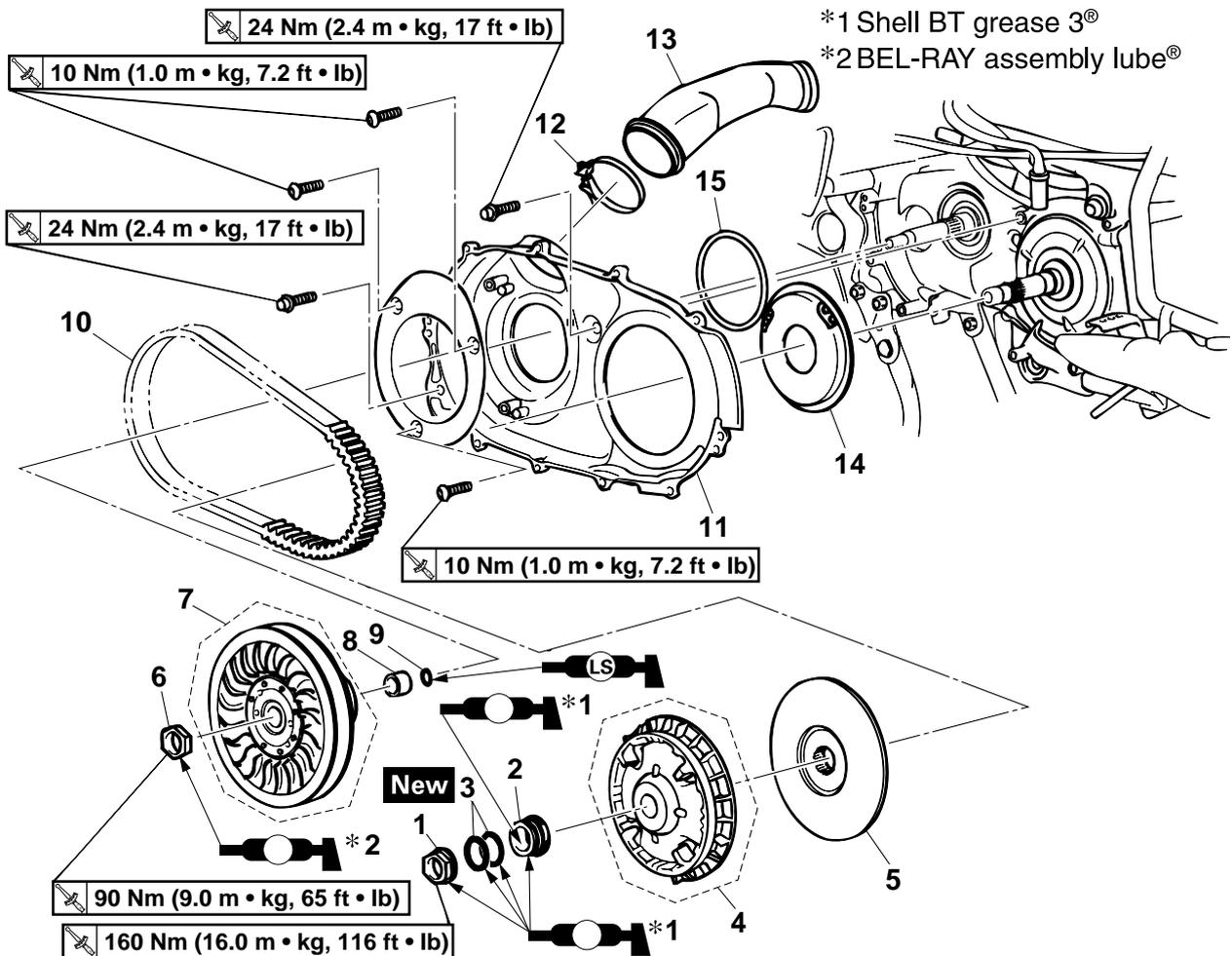


- * (M6) 10 Nm (1.0 m • kg, 7.2 ft • lb)
- Δ (M8) 24 Nm (2.4 m • kg, 17 ft • lb)

Order	Job/Parts to remove	Q'ty	Remarks
	Muffler		Refer to "ENGINE REMOVAL" on page 5-1.
1	V-belt case cover "1"	1	
2	V-belt case cover "2"	1	
3	V-belt case air filter cover	1	
4	V-belt case air filter element	1	
5	Lead holder	1	
6	V-belt case	1	
7	V-belt case gasket	1	
8	Bearing retainer	1	
9	Bearing	1	
10	Circlip	1	
11	Oil seal	1	
12	Bearing	1	
			For installation, reverse the removal procedure.

V-BELT AUTOMATIC TRANSMISSION

Removing the V-belt and primary/secondary sheave

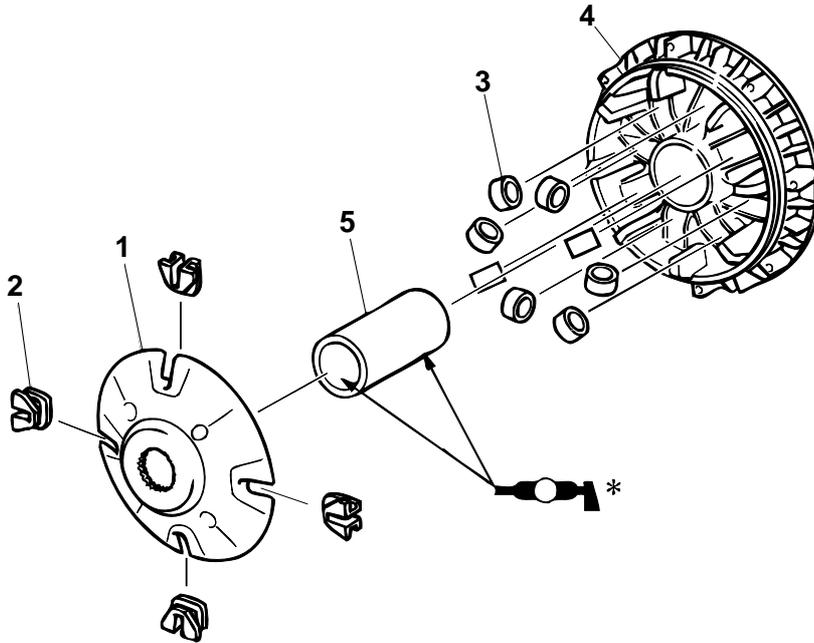


Order	Job/Parts to remove	Q'ty	Remarks
1	Primary sheave nut	1	
2	Spacer	1	
3	O-ring	2	
4	Primary sheave assembly	1	
5	Primary fixed sheave	1	
6	Secondary sheave nut	1	
7	Secondary sheave assembly	1	
8	Collar	1	
9	O-ring	1	
10	V-belt	1	
11	Right crankcase cover	1	
12	V-belt case air duct joint clamp	1	
13	V-belt case air duct	1	
14	Plate	1	
15	V-belt case air duct seal	1	
			For installation, reverse the removal procedure.

V-BELT AUTOMATIC TRANSMISSION

Disassembling the primary sheave

* BEL-RAY assembly lube®

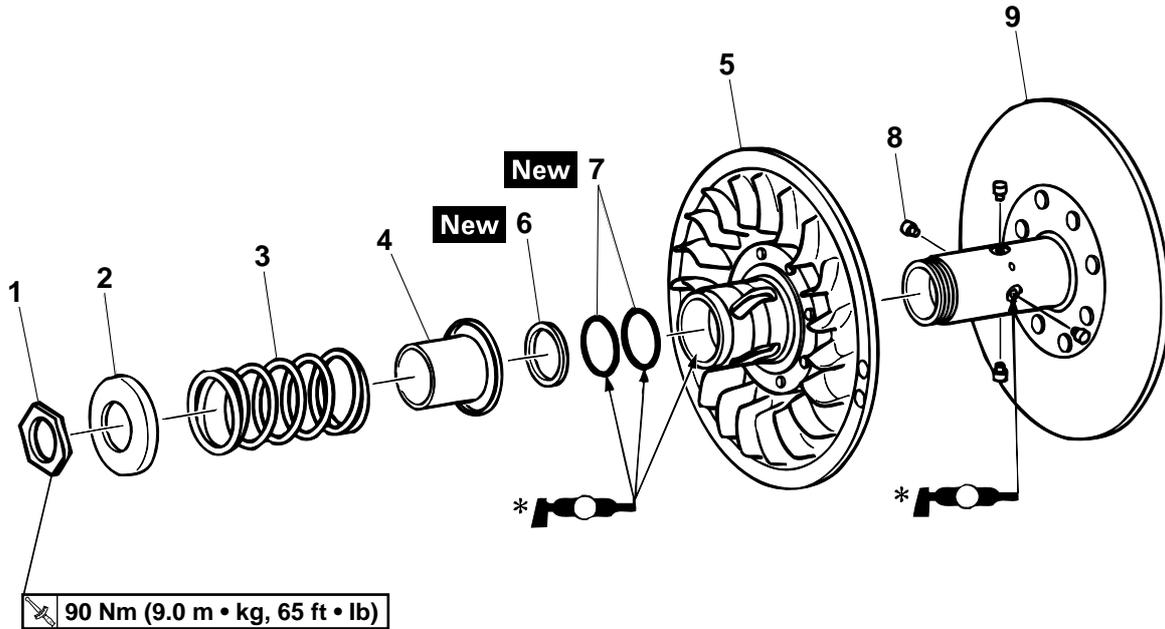


Order	Job/Parts to remove	Q'ty	Remarks
1	Cam	1	
2	silinder	4	
3	Weight	8	
4	Primary sliding sheave	1	
5	Collar	1	
			For installation, reverse the disassembly procedure.

V-BELT AUTOMATIC TRANSMISSION

Disassembling the secondary sheave

* BEL-RAY assembly lube®



Order	Job/Parts to remove	Q'ty	Remarks
1	Secondary sheave spring seat nut	1	
2	Upper spring seat	1	
3	Compression spring	1	
4	Spring seat	1	
5	Secondary sliding sheave	1	
6	Oil seal	1	
7	O-ring	2	
8	Guide pin	4	
9	Secondary fixed sheave	1	
			For assembly, reverse the disassembly procedure.

V-BELT AUTOMATIC TRANSMISSION

EAS24620

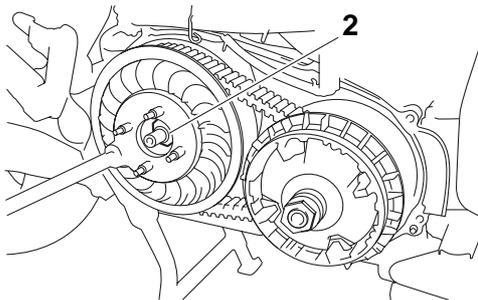
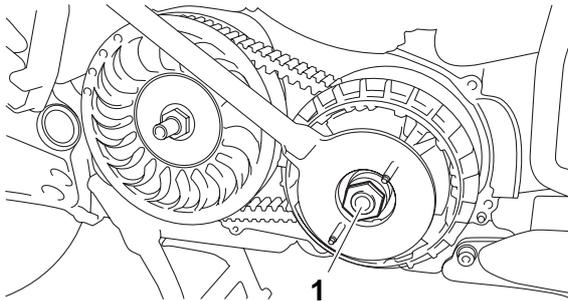
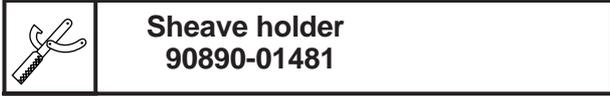
REMOVING THE PRIMARY SHEAVE

1. Remove:

- Primary sheave nut "1"
- Secondary sheave nut "2"

NOTE:

While holding the primary and secondary sheave with the sheave holder, loosen the nut.

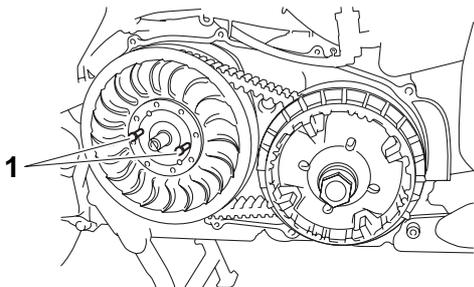


2. Install:

- Bolts "1"

NOTE:

Insert M6 bolts (more than 45 mm (1.77 in)) into the holes of the secondary sheave assembly, and then tighten the bolts to open the secondary sheave assembly.



EAS24630

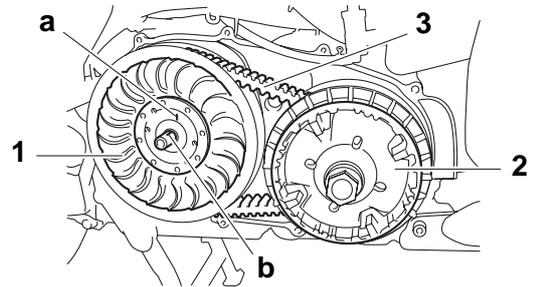
REMOVING THE SECONDARY SHEAVE

1. Remove:

- Secondary sheave assembly "1"
- Primary sheave assembly "2"
- V-belt "3"

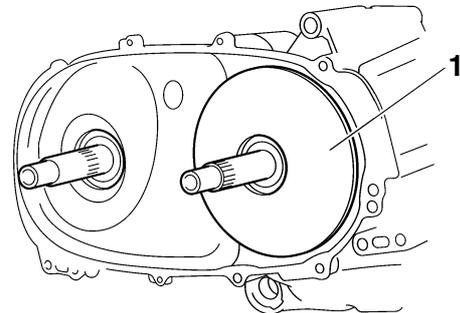
NOTE:

- Before removal, apply "a" and "b" alignment marks.
- Align these marks during reassembly.
- Remove the primary sliding sheave, secondary sheave assembly and V-belt together.



2. Remove:

- Primary fixed sheave "1"

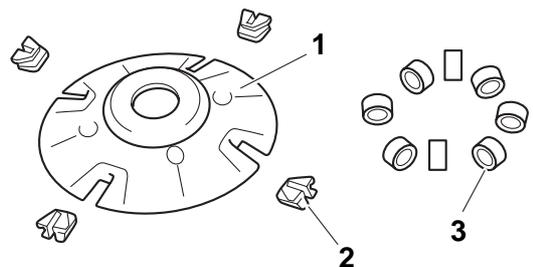


EAS15B4002

DISASSEMBLING THE PRIMARY SHEAVE

1. Remove:

- Cam "1"
- Slider "2"
- Weight "3"



V-BELT AUTOMATIC TRANSMISSION

EAS24640

DISASSEMBLING THE SECONDARY SHEAVE

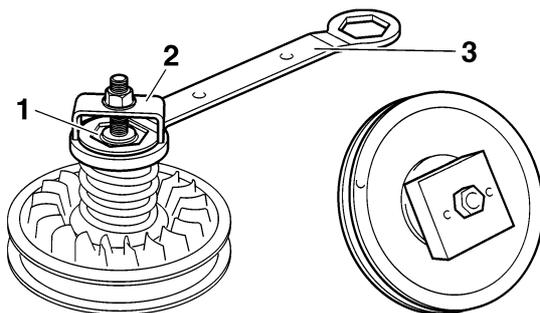
- Remove:
 - Spring seat "1"

NOTE:

Install the sheave spring compressor "2" onto the secondary sheave as shown. Then, compress the spring, and remove the secondary sheave spring seat nut "1" with locknut wrench "3".



Sheave spring compressor
90890-04134
YM-04134
Locknut wrench
90890-01348
YM-01348
Sheave fixed block
90890-04135
Sheave fixed bracket
YM-04135



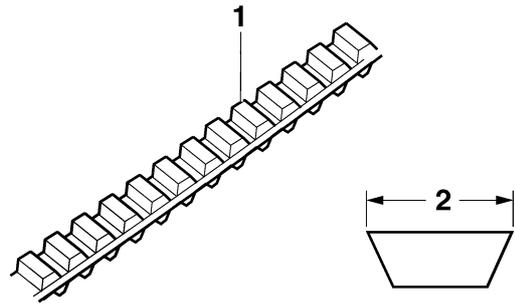
EAS24670

CHECKING THE V-BELT

- Check:
 - V-belt "1"
 - Cracks/damage/wear → Replace.
 - Grease/oil → Clean the primary and secondary sheave.
- Measure:
 - V-belt width "2"
 - Out of specification → Replace.



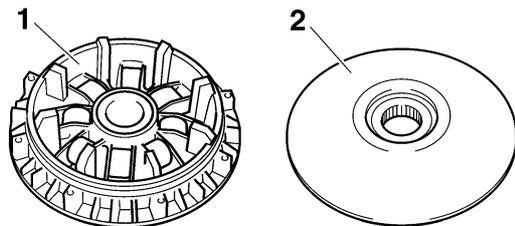
V-belt width
32.0 mm (1.26 in)
Limit
30.5 mm (1.20 in)



EAS24680

CHECKING THE PRIMARY SHEAVE

- Check:
 - Primary sliding sheave "1"
 - Primary fixed sheave "2"
 - Cracks/damage/wear → Replace the primary sliding sheave and primary fixed sheave as a set.



EAS15B4003

CHECKING THE V-BELT CASE AIR DUCT

- Check:
 - V-belt case air duct
 - Cracks/damage → Replace.

EAS24690

CHECKING THE PRIMARY SHEAVE WEIGHTS

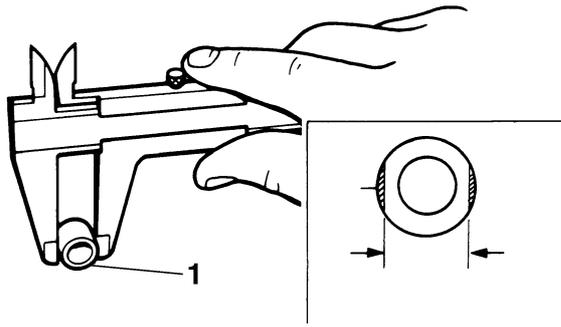
The following procedure applies to all of the primary sheave weights.

- Check:
 - Primary sheave weight
 - Cracks/damage/wear → Replace.



Primary sheave weight outside diameter
25.0 mm (0.98 in)
Limit
24.5 mm (0.96 in)

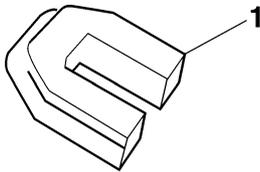
V-BELT AUTOMATIC TRANSMISSION



EAS24700

CHECKING THE SLIDER

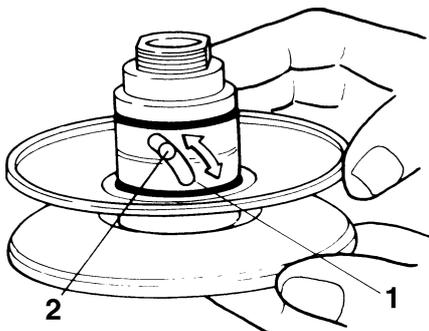
- Check:
 - Slider "1"
 Cracks/damage/wear → Replace.



EAS24710

CHECKING THE SECONDARY SHEAVE

- Check:
 - Secondary fixed sheave
 - Secondary sliding sheave
 Cracks/damage/wear → Replace the secondary fixed and sliding sheaves as a set.
- Check:
 - Torque cam groove "1"
 Damage/wear → Replace the secondary fixed and sliding sheaves as a set.
- Check:
 - Guide pin "2"
 Damage/wear → Replace the secondary fixed and sliding sheaves as a set.



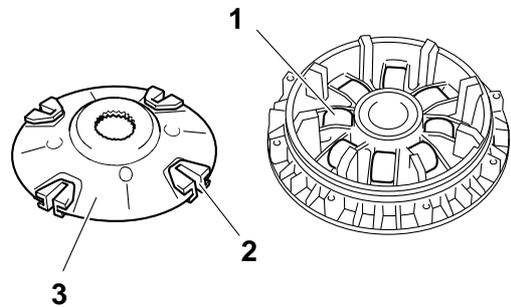
EAS24720

ASSEMBLING THE PRIMARY SHEAVE

- Clean:
 - Primary fixed sheave
 - Primary sliding sheave
 - Collar
 - Weights
 - Sliders
 - Cam
- Install:
 - Weights "1"
 - Sliders "2"
 - Cam "3"

NOTE:

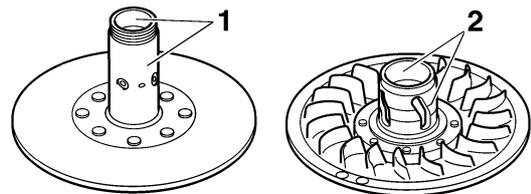
Do not apply the grease inside of the primary sheave.



EAS24730

ASSEMBLING THE SECONDARY SHEAVE

- Lubricate:
 - Secondary fixed sheave shaft's outer and inner surfaces "1"
 - Secondary sliding sheave's outer and inner surfaces "2"
 - Grease nipple groove
 - Oil seals **New** (with the recommended lubricant)



- Install:
 - Secondary sliding sheave "1"

V-BELT AUTOMATIC TRANSMISSION

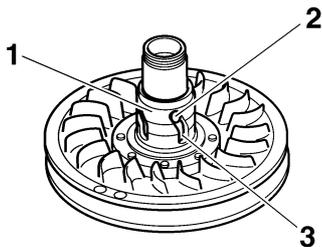
3. Install:

- Guide pin "2"

4. Lubricate:

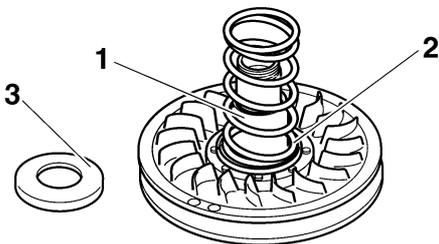
- Guide pin groove "3"
- O-ring **New**
(with the recommended lubricant)

	Recommended lubricant BEL-RAY assembly lube
---	--



5. Install:

- Spring seat "1"
- Compression spring "2"
- Upper spring seat "3"



6. Tighten:

- Secondary sheave spring seat nut

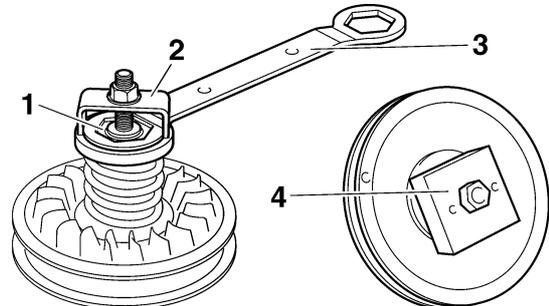
NOTE:

Attach the sheave spring compressor "2" onto the secondary sheave as shown. Then compress the spring, and tighten the secondary sheave spring seat nut "1" with locknut wrench "3".

	Sheave spring compressor 90890-04134 YM-04134 Locknut wrench 90890-01348 YM-01348 Sheave fixed block 90890-04135 Sheave fixed bracket YM-04135
---	---



Secondary sheave spring seat nut
90 Nm (9.0 m•kg, 65 ft•lb)



EAS15B4009

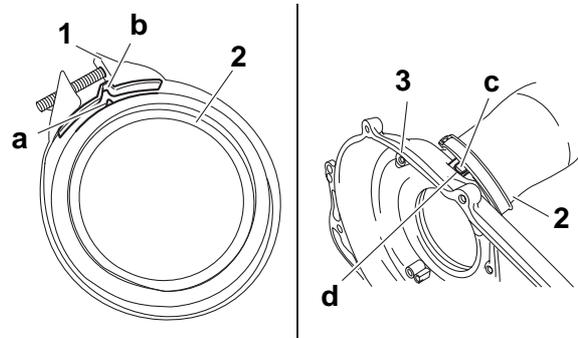
INSTALLING THE PRIMARY SHEAVE ASSEMBLY, SECONDARY SHEAVE ASSEMBLY AND V-BELT

1. Install:

- V-belt case air duct joint clamp "1"
- V-belt case air duct "2"

NOTE:

- Align the projection "a" in the V-belt case air duct "2" with the slot "b" on the V-belt case air duct joint clamp "1".
- Align the projection "c" in the V-belt case air duct joint clamp "1" with the slot "d" in the right crankcase cover "3".



2. Install:

- primary fixed sheave "1"
- V-belt "2"
- secondary sheave assembly "3"

ECA15B1004

CAUTION:

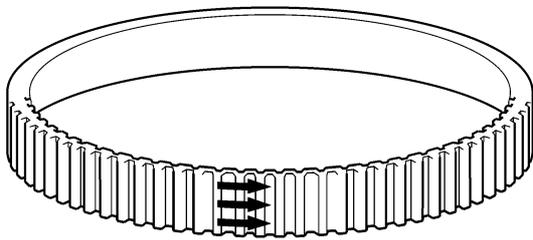
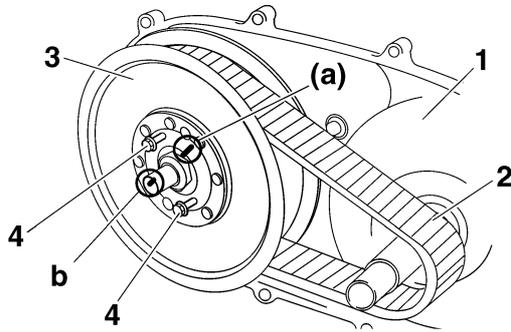
Do not allow grease to contact the V-belt, primary and secondary pulleys.

NOTE:

- When installing the belt, screw M6 (more than 45 mm (1.77 in)) bolts "4" to spread apart the secondary sheave and then install the belt. Make sure the belt pullout direction is correct.

V-BELT AUTOMATIC TRANSMISSION

- Install the V-belt and secondary sheave assembly onto the primary sheave side.
- Align the “a” and “b” during reassembly.



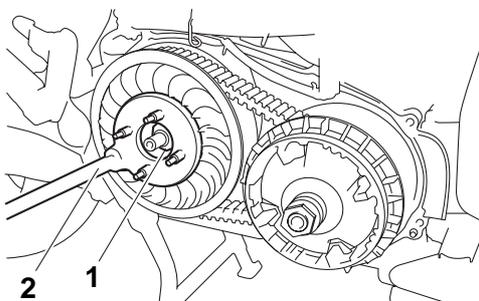
3. Tighten:
- Secondary sheave nut “1”

NOTE:

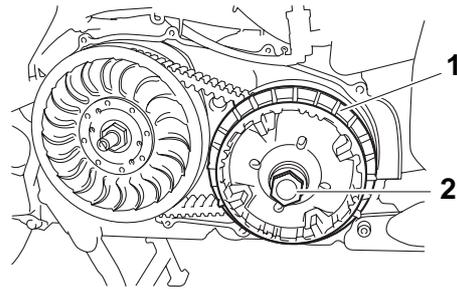
While holding the secondary sheave with the sheave holder “2”, tighten the secondary sheave nut “1”.

	Secondary sheave nut 90 Nm (9.0 m•kg, 65 ft•lb)
---	---

	Sheave holder 90890-01481
---	-------------------------------------



4. Install:
- primary sliding sheave “1”
 - O-rings
 - spacer
 - primary sheave nut “2”



5. Tighten:
- Primary sheave nut “1”

	Primary sheave nut 160 Nm (16.0 m•kg, 115 ft•lb)
---	--

ECA15B1005

CAUTION:

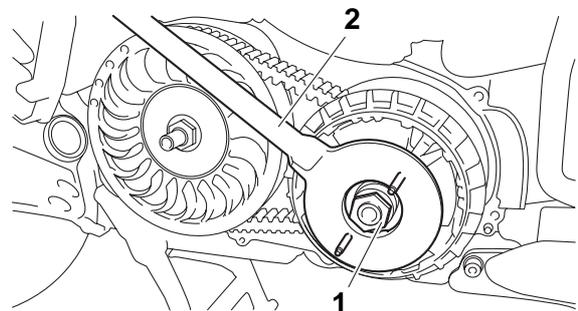
- Before tightening the nut to remount the primary sheave, make sure that the serrations of the cam are fitted firmly into the serrations of the crankshaft. Also, make sure that cam is properly seated.
- Apply grease to the thread and seat of the primary sheave nut.

	Recommended lubricant Shell BT grease 3®
---	--

NOTE:

While holding the primary sheave with the sheave holder “2”, tighten the primary sheave nut “1”.

	Sheave holder 90890-01481
---	-------------------------------------

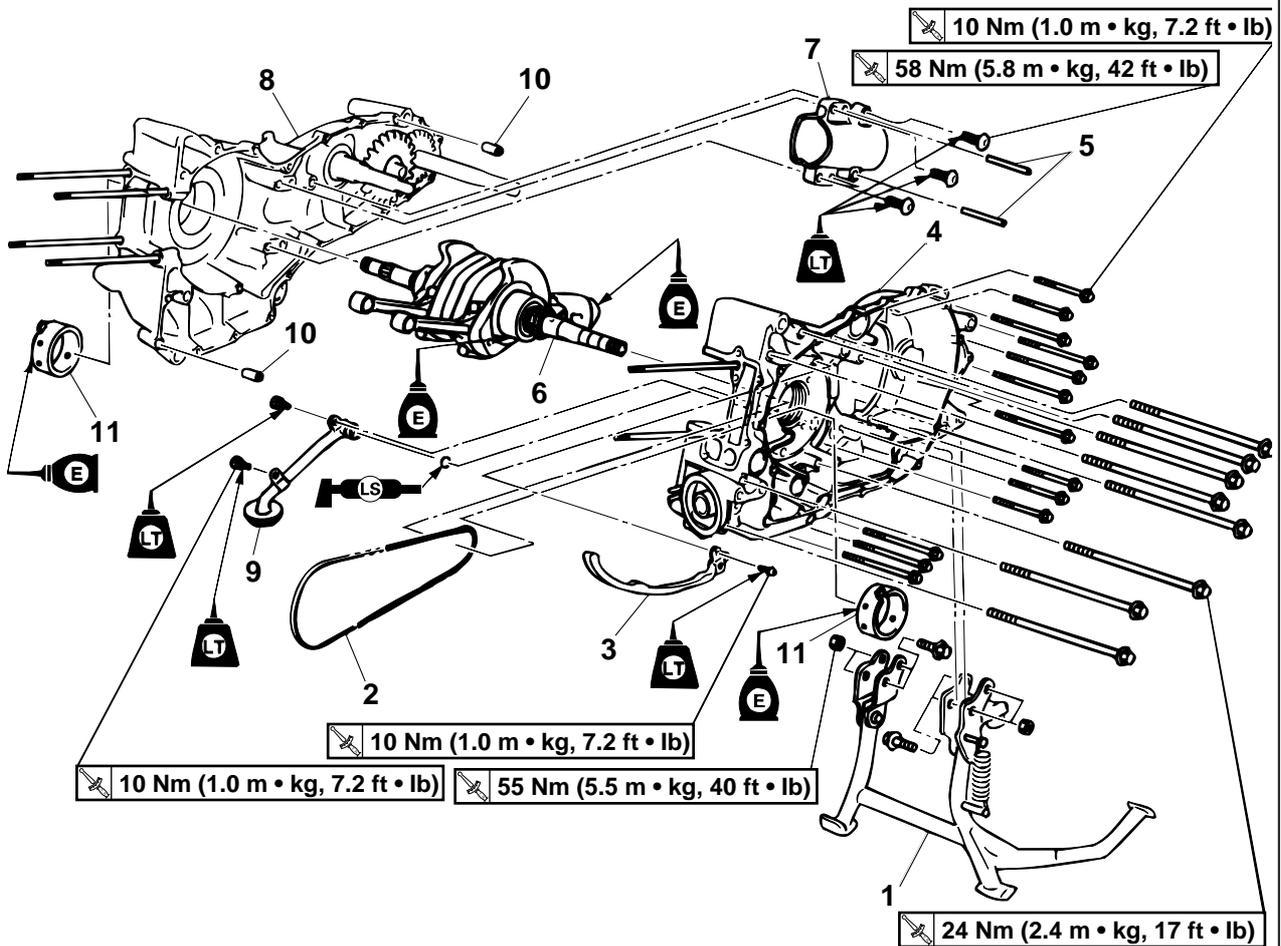


CRANKCASE AND CRANKSHAFT

EAS25960

CRANKCASE AND CRANKSHAFT

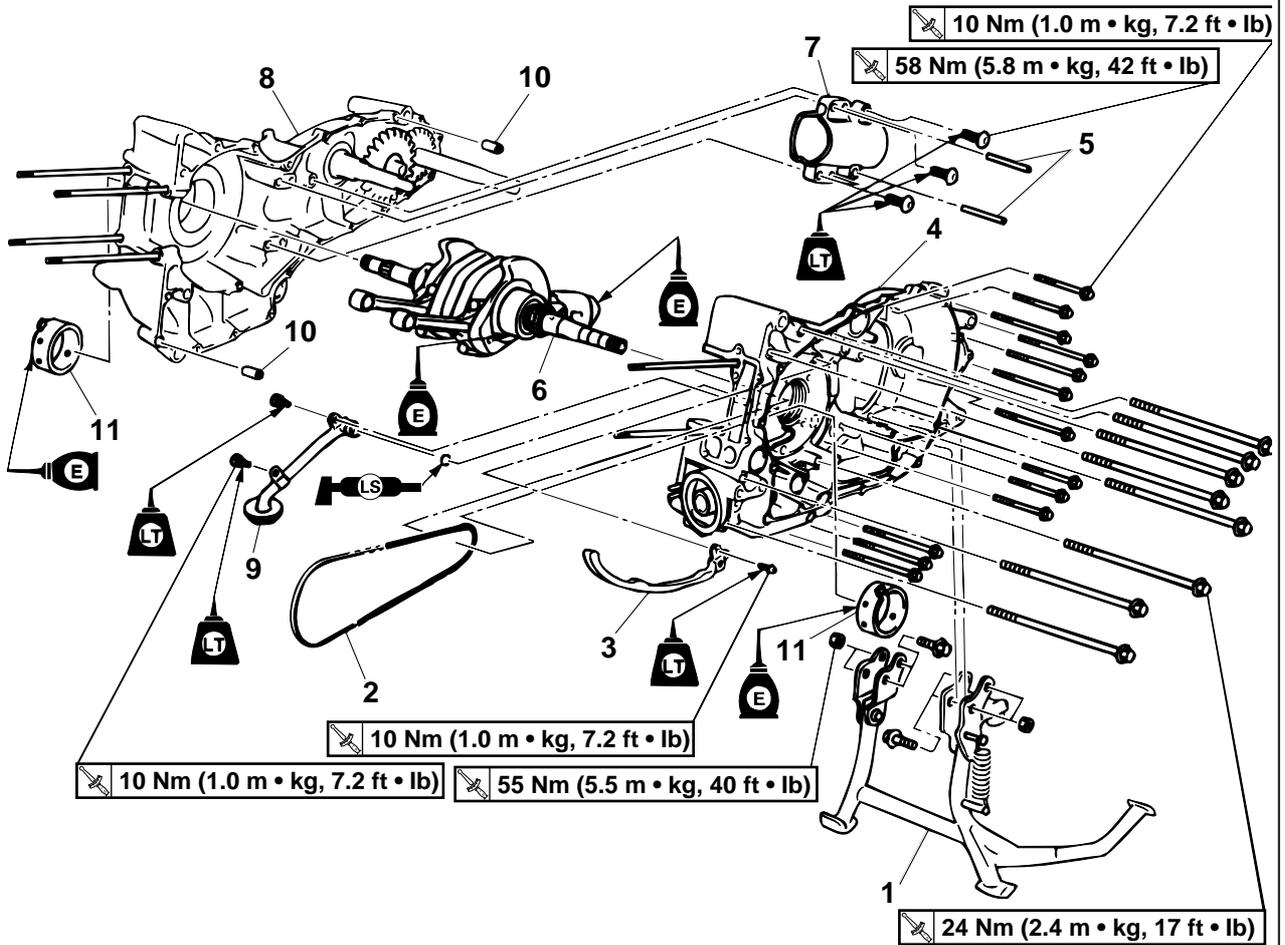
Removing the crankshaft assembly



Order	Job/Parts to remove	Q'ty	Remarks
	Engine		Refer to "ENGINE REMOVAL" on page 5-1.
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-14.
	Cylinder/piston		Refer to "CYLINDER AND PISTONS" on page 5-25.
	Starter clutch/A.C. magneto rotor		Refer to "GENERATOR AND STARTER CLUTCH" on page 5-30.
	Clutch		Refer to "CLUTCH" on page 5-43.
	Oil pump		Refer to "OIL PUMP" on page 5-39.
	Right crankcase cover		Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-50.
1	Centerstand assembly	1	
2	Timing chain	1	
3	Timing chain guide (intake side)	1	
4	Left crankcase	1	
5	Dowel pin	2	
6	Crankshaft assembly	1	
7	Balancer cylinder	1	
8	Right crankcase	1	
9	Oil strainer	1	
10	Dowel pin	2	

CRANKCASE AND CRANKSHAFT

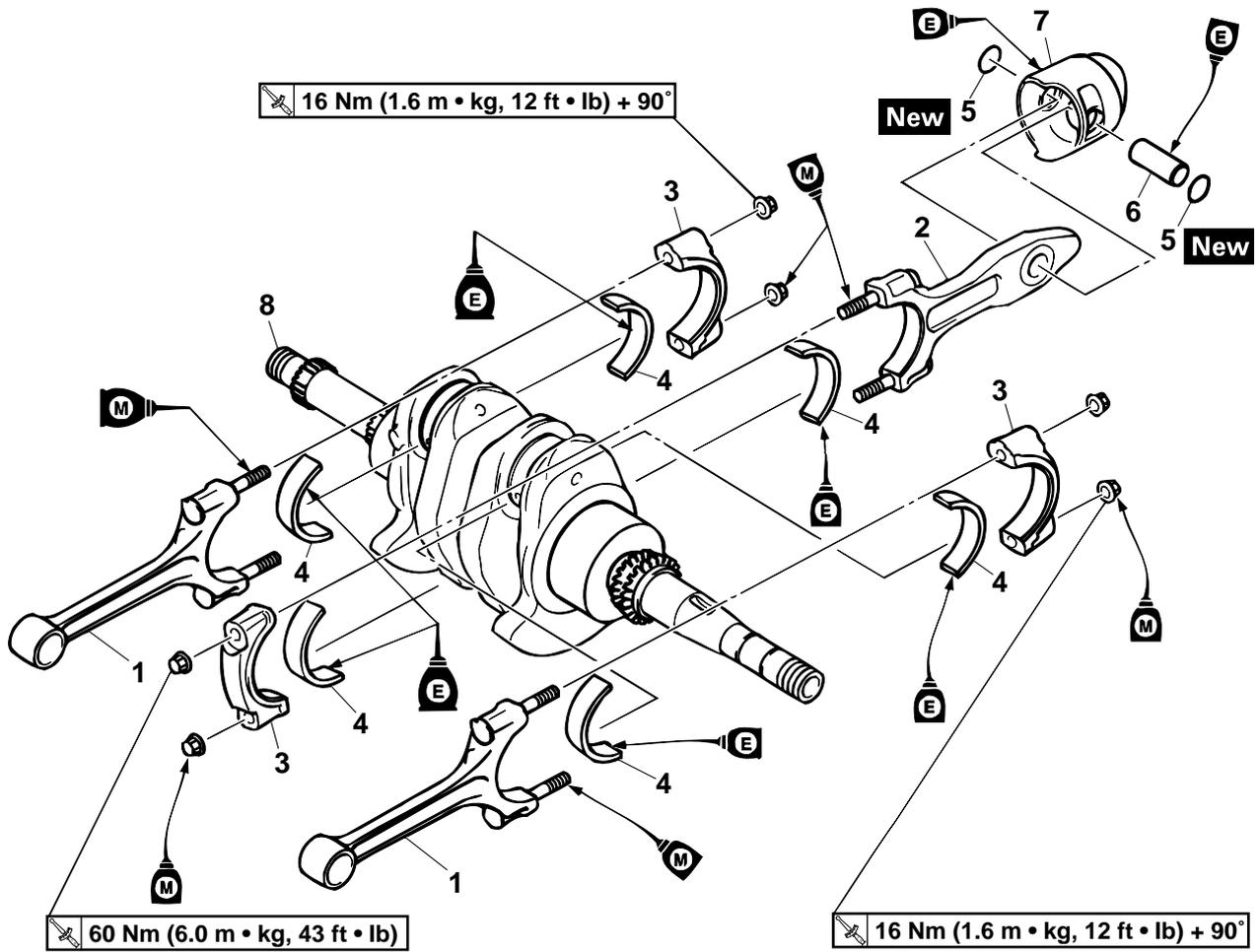
Removing the crankshaft assembly



Order	Job/Parts to remove	Q'ty	Remarks
11	Crankshaft main journal bearing	2	
			For installation, reverse the removal procedure.

CRANKCASE AND CRANKSHAFT

Removing the connecting rod



Order	Job/Parts to remove	Q'ty	Remarks
1	Connecting rod	2	
2	Connecting rod (balancer)	1	
3	Connecting rod cap	3	
4	Big end bearing	3	
5	Circlip	2	
6	Piston pin	1	
7	Balancer piston	1	
8	Crankshaft	1	
			For installation, reverse the removal procedure.

CRANKCASE AND CRANKSHAFT

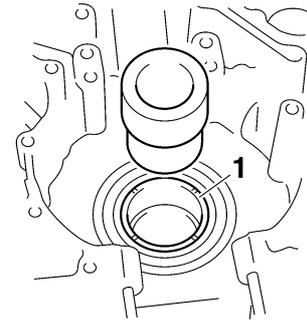
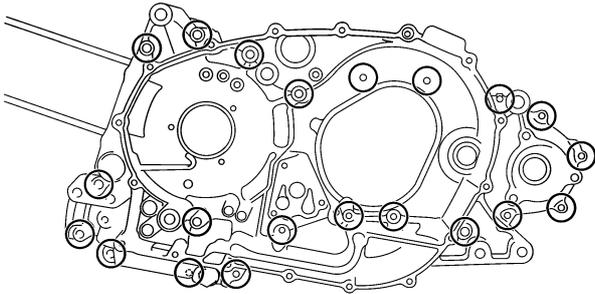
EAS25560

DISASSEMBLING THE CRANKCASE

1. Remove:
 - Crankcase bolts

NOTE:

Loosen each bolt 1/4 of a turn at a time, in stages and in a crisscross pattern. After all of the bolts are fully loosened, remove them.



2. Remove:
 - Left crankcase

ECA13900

CAUTION:

Tap on one side of the crankcase with a soft-face hammer. Tap only on reinforced portions of the crankcase, not on the crankcase mating surfaces. Work slowly and carefully and make sure the crankcase halves separate evenly.

3. Remove:
 - Dowel pins

EAS26050

REMOVING THE CRANKSHAFT JOURNAL BEARING

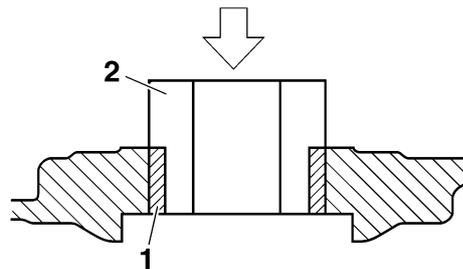
1. Remove:
 - Crankshaft assembly
 - Crankshaft main journal bearings "1"

NOTE:

Remove the main journal bearing by the plane bearing installer "2".



Plane bearing installer
90890-04139



NOTE:

Identify the position of each crankshaft main journal bearing so that it can be reinstalled in its original place.

EAS26010

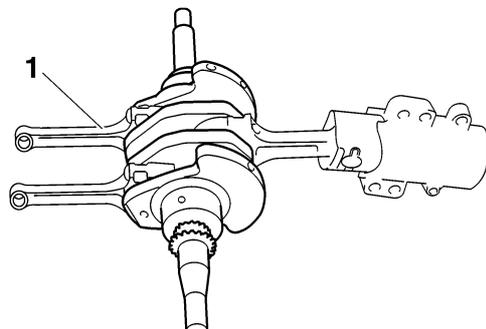
REMOVING THE CONNECTING RODS

The following procedure applies to all of the connecting rods.

1. Remove:
 - Connecting rod "1"
 - Big end bearings

NOTE:

Identify the position of each big end bearing so that it can be reinstalled in its original place.



EAS25580

CHECKING THE CRANKCASE

1. Thoroughly wash the crankcase halves in a mild solvent.
2. Thoroughly clean all the gasket surfaces and crankcase mating surfaces.

CRANKCASE AND CRANKSHAFT

3. Check:

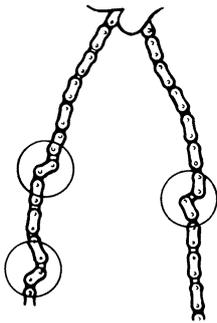
- Crankcase
Cracks/damage → Replace.
- Oil delivery passages
Obstruction → Blow out with compressed air.

EAS15B4207

CHECKING THE TIMING CHAIN

1. Check:

- Timing chain
Damage/stiffness → Replace the timing chain and camshaft sprockets as a set.



EAS26090

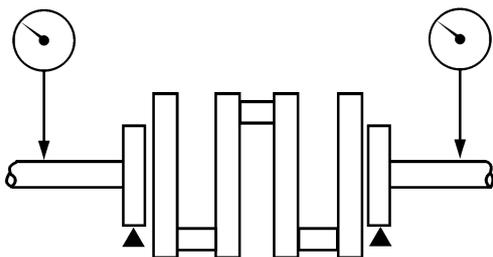
CHECKING THE CRANKSHAFT AND CONNECTING RODS

1. Measure:

- Crankshaft runout
Out of specification → Replace the crankshaft.



Runout limit C
0.030 mm (0.0012 in)



2. Check:

- Crankshaft journal surfaces
- Crankshaft pin surfaces
- Bearing surfaces
Scratches/wear → Replace the crankshaft.

3. Measure:

- Crankshaft-pin-to-big-end-bearing clearance
Out of specification → Replace the big end bearings.



Journal oil clearance (using plastigauge®)
0.040–0.082 mm (0.0016–0.0032 in)

The following procedure applies to all of the connecting rods.

ECA13930

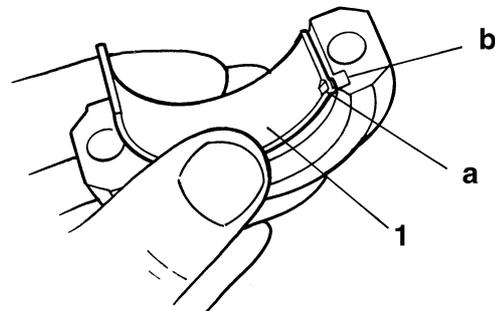
CAUTION:

Do not interchange the big end bearings and connecting rods. To obtain the correct crankshaft-pin-to-big-end-bearing clearance and prevent engine damage, the big end bearings must be installed in their original positions.

- Clean the big end bearings, crankshaft pins, and the inside of the connecting rod halves.
- Install the big end upper bearing into the connecting rod and the big end lower bearing into the connecting rod cap.

NOTE:

Align the projections “a” on the big end bearings with the notches “b” in the connecting rod and connecting rod cap.

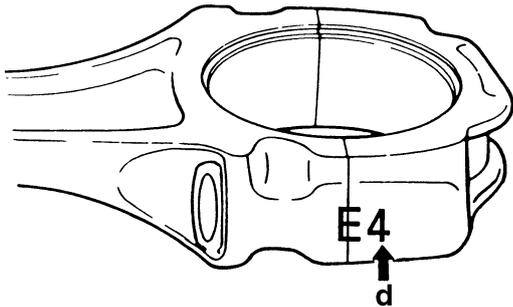
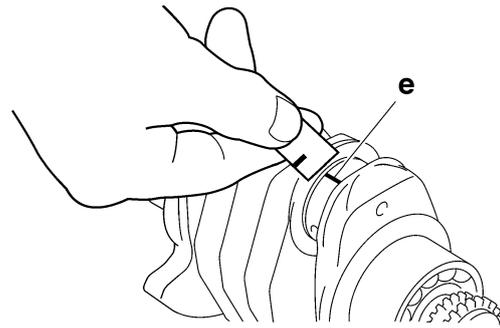
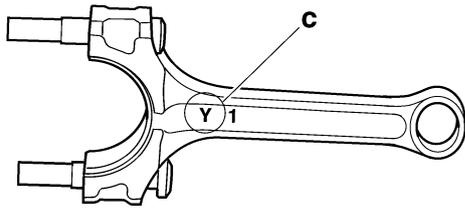


- Put a piece of Plastigauge® on the crankshaft pin.
- Assemble the connecting rod halves.

NOTE:

- Do not move the connecting rod or crankshaft until the clearance measurement has been completed.
- Lubricate the bolts threads and nut seats with molybdenum disulfide grease.
- Make sure the “Y” mark “c” on the connecting rod faces towards the left side of the crankshaft.
- Make sure the characters “d” on both the connecting rod and connecting rod cap are aligned.

CRANKCASE AND CRANKSHAFT



4. Select:

- Big end bearings (“P₁”, “P₂”, “P₃”)

NOTE:

- The numbers “A” stamped into the crankshaft web and the numbers “1” on the connecting rods are used to determine the replacement big end bearing sizes.
- “P₁”, “P₂”, “P₃” refer to the bearings shown in the crankshaft illustration.

g. Tighten the connecting rod nuts.

ECA15B1040

CAUTION:

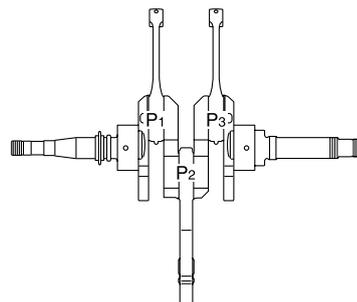
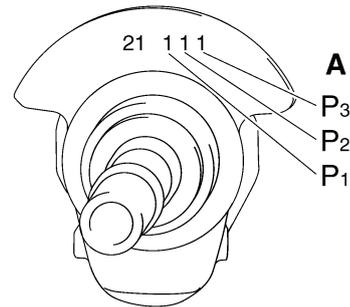
- When tightening the connecting rod nuts, be sure to use an F-type torque wrench.
- After tightening the connecting rod nut to the specified torque, turn the connecting rod nut another +90°.

Refer to “INSTALLING THE CONNECTING RODS” on page 5-67.



Connecting rod nut
16 Nm (1.6 m•kg, 11 ft•lb)

- h. Remove the connecting rod and big end bearings.
Refer to “REMOVING THE CONNECTING RODS” on page 5-62.
- i. Measure the compressed Plastigauge® width “e” on the crankshaft pin.
If the crankshaft-pin-to-big-end-bearing clearance is out of specification, select replacement big end bearings.

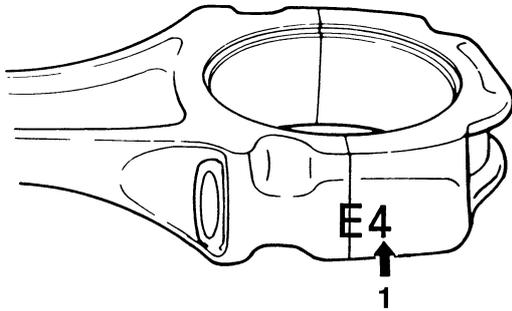


For example, if the connecting rod “P₁” and the crankshaft web “P₁” numbers are “4” and “1” respectively, then the bearing size for “P₁” is:

<p>“P₁” (connecting rod) - “P₁” (crankshaft)</p> <p>=</p> <p>4 - 1 = 3 (brown)</p>
--

CRANKCASE AND CRANKSHAFT

 **Bearing color code**
1.Blue 2.Black 3.Brown 4.Green



5. Measure:
- Crankshaft-journal-to-crankshaft-journal bearing clearance.
Out of specification → Replace the crankshaft journal bearings.

 **Crankshaft-journal-to-crankshaft-journal bearing clearance**
0.04–0.082 mm (0.0016–0.0032 in)



The following procedure applies to all of the journal bearing.

ECA15B1027

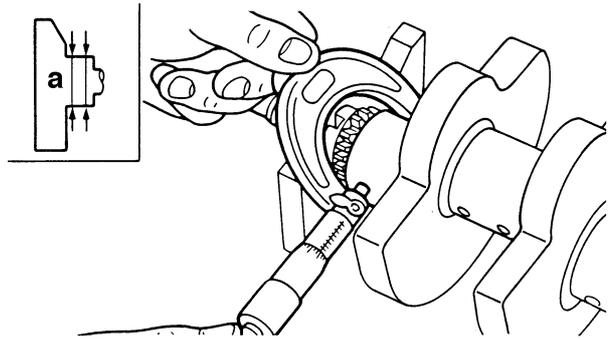
CAUTION: _____

On the journal, the larger value is used as a basis for calculation of the oil clearance, and on the journal bearing, the smaller value is used.

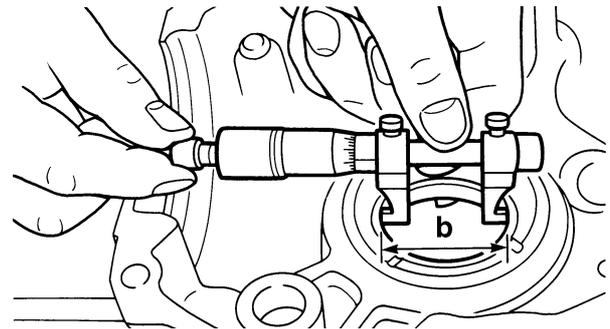
- j. Clean the surface of main journal and journal bearings.
- k. Check the bearing surface. If the bearing surface is worn or scratched, the bearings should be replaced.

NOTE: _____
If either of the right or left journal bearing is worn or scratched, both bearings should be replaced as a set.

- l. Measure the outside diameter “a” of each main journal at two places. If it is out of specification, replace the crankshaft.



- m. Measure the inside diameter “b” of each journal bearing at two places.



- n. If journal bearing inside diameter is “45.03” and crankshaft journal outside diameter is “44.98”, then the main journal oil clearance is:

Main journal oil clearance: Journal bearing inside diameter– Main journal outside diameter = 45.03–44.98 = 0.05 mm
--

If the oil clearance is out of specification, select a replacement bearings.



- 6. Select:
 - Crankshaft journal bearings (J1, J2)

NOTE: _____
 • The numbers “a” stamped into the crankshaft web and the numbers “1” on the crankcase are used to determine the replacement crankshaft journal bearing size.
 • “J1, J2” refer to the bearings shown in the crankshaft illustration.

CRANKCASE AND CRANKSHAFT

EAS26150

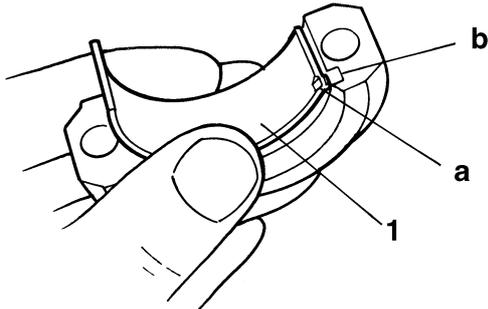
INSTALLING THE CONNECTING RODS

1. Install:

- Big end bearings "1"

NOTE:

- Align the projections "a" on the big end bearings with the notches "b" in the connecting rods and connecting rod caps.
- Be sure to reinstall each big end bearing in its original place.

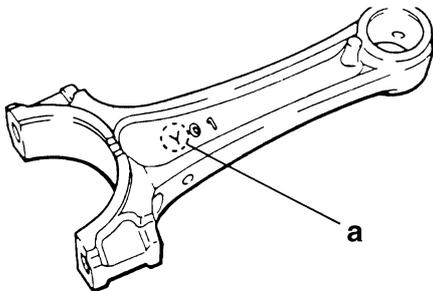


2. Install:

- Connecting rods

NOTE:

- The stamped "Y" mark "a" on the connecting rods should face towards the left side of the crankcase.
- Install each connecting rod in its original place.

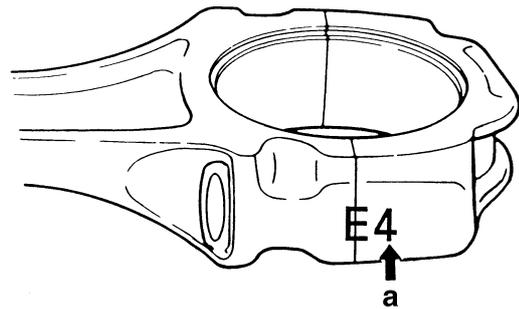


3. Install:

- Connecting rod cap

NOTE:

Be sure that the characters "a" on the side of the cap and connecting rod are aligned.



4. Tighten:

- Connecting rod nuts

NOTE:

Apply molybdenum disulfide grease to the rod cap bolt threads and nut surfaces.

EWA13390

WARNING

- Replace the connecting rod bolts and nuts with new ones.
- Clean the connecting rod bolts and nuts.

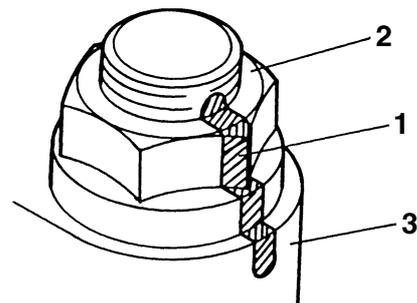
NOTE:

Tighten the connecting rod bolts using the following procedure.

- Clean the connecting rod bolts and nuts.
- Tighten the connecting rod nuts with a torque wrench.

	Connecting rod nut 16 Nm (1.6 m•kg, 11 ft•lb) + 90°
---	--

- Put a mark "1" on the corner of the connecting rod nut "2" and the connecting rod "3".



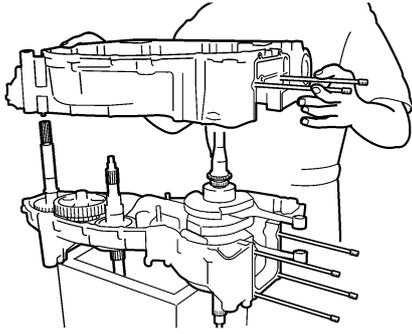
- After tightening the connecting rod nut to the specified torque, turn the connecting rod nut clockwise another 90°.

EWA13400

WARNING

If the connecting rod nut is tightened more than the specified angle, do not loosen the nut and then retighten it. Instead, replace the

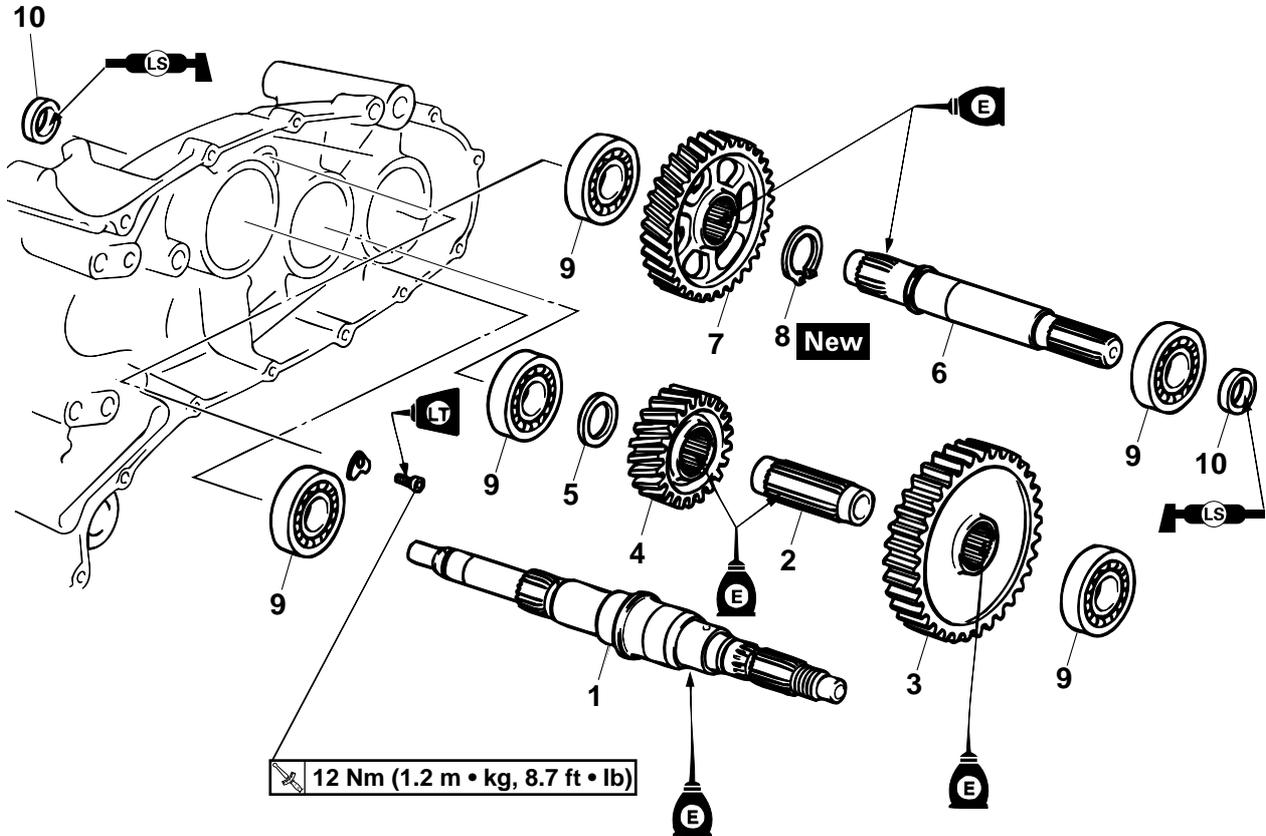
CRANKCASE AND CRANKSHAFT



EAS26240

TRANSMISSION

Removing the transmission, shift drum assembly, and shift forks

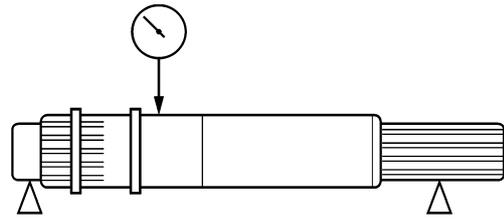
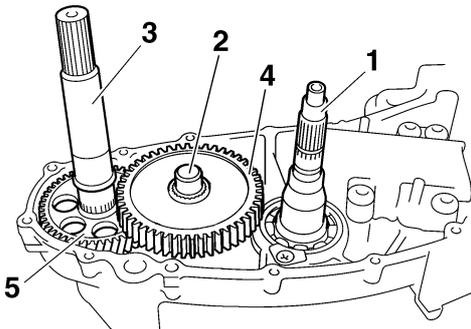


Order	Job/Parts to remove	Q'ty	Remarks
	Left crankcase		Refer to "CHECKING THE CRANKCASE" on page 5-62.
1	Secondary shaft	1	
2	Main axle	1	
3	Primary driven gear	1	
4	First pinion gear	1	
5	Washer	1	
6	Drive axle	1	
7	First wheel gear	1	
8	Circlip	1	
9	Bearing	5	
10	Oil seal	2	
			For installation, reverse the removal procedure.

EAS26250

REMOVING THE TRANSMISSION

1. Remove:
 - Left crankcase
Refer to "CRANKCASE AND CRANK-SHAFT" on page 5-59.
2. Remove:
 - Secondary shaft; "1"
 - Main axle "2"
 - Drive axle "3"
 - Primary driven gear "4"
 - First wheel gear "5"
 - First pinion gear



3. Measure:
 - Secondary shaft runout
(with a centering device and dial gauge)
Out of specification → Replace the secondary shaft.

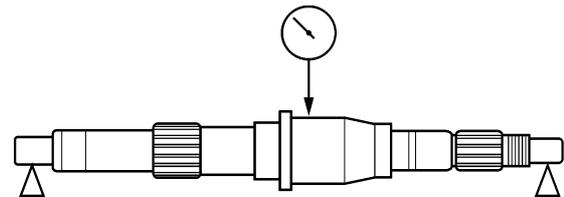
	Maximum secondary shaft runout 0.08 mm (0.0031 in)
---	---

EAS26300

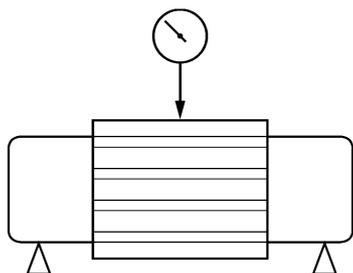
CHECKING THE TRANSMISSION

1. Measure:
 - Main axle runout
(with a centering device and dial gauge)
Out of specification → Replace the main axle.

	Main axle runout 0.08 mm (0.0031 in)
---	---

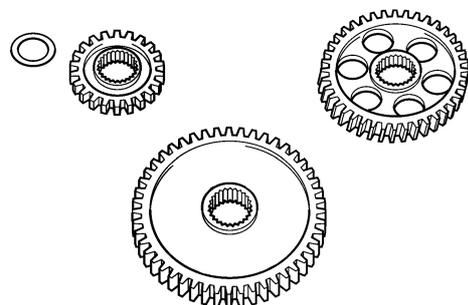


4. Check:
 - Transmission gear movement
Rough movement → Replace the defective part(s).
5. Check:
 - Circlips
Bends/damage/looseness → Replace.



2. Measure:
 - Drive axle runout
(with a centering device and dial gauge)
Out of specification → Replace the drive axle.

	Drive axle runout 0.08 mm (0.0031 in)
---	--

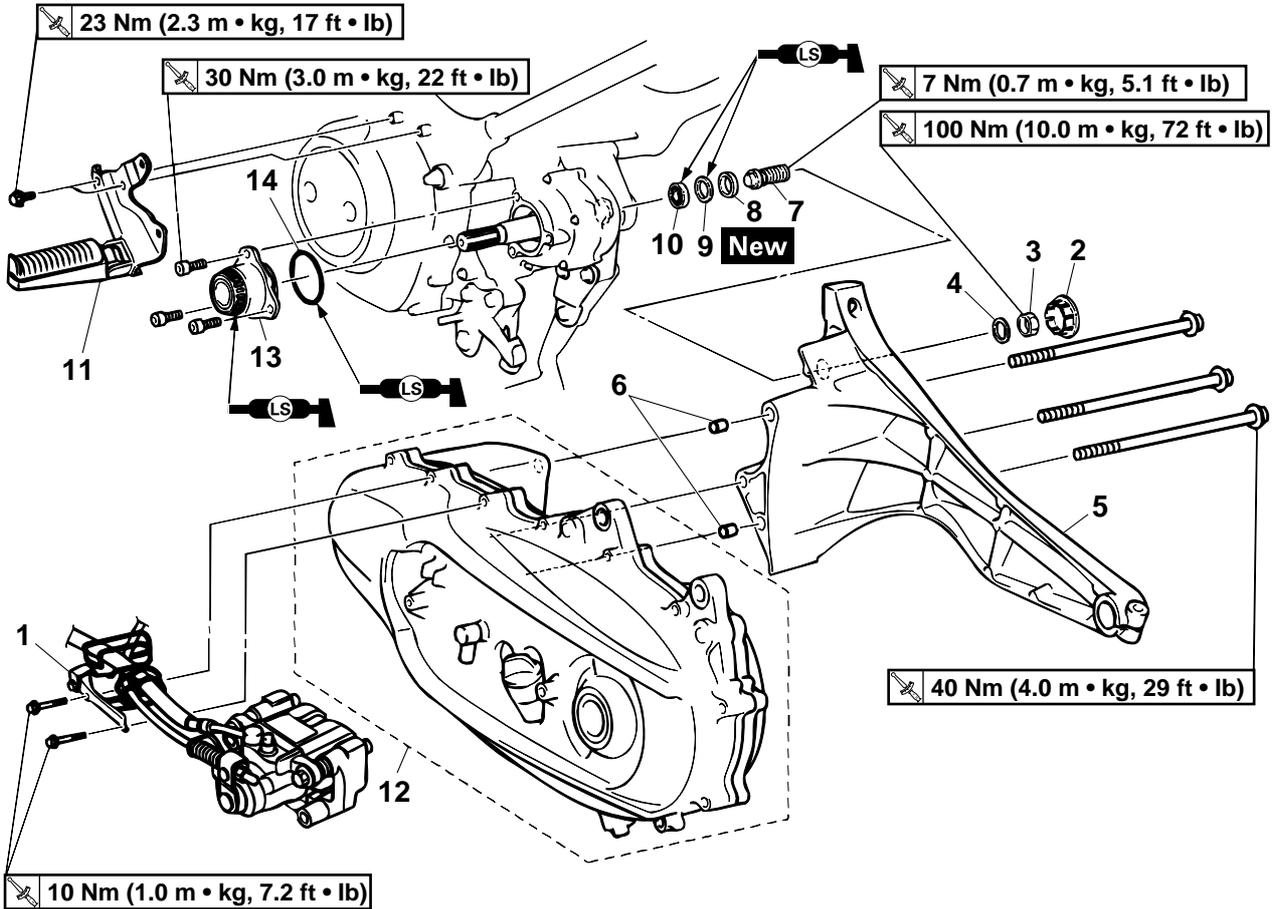


CHAIN DRIVE TRANSMISSION

EAS24750

CHAIN DRIVE TRANSMISSION

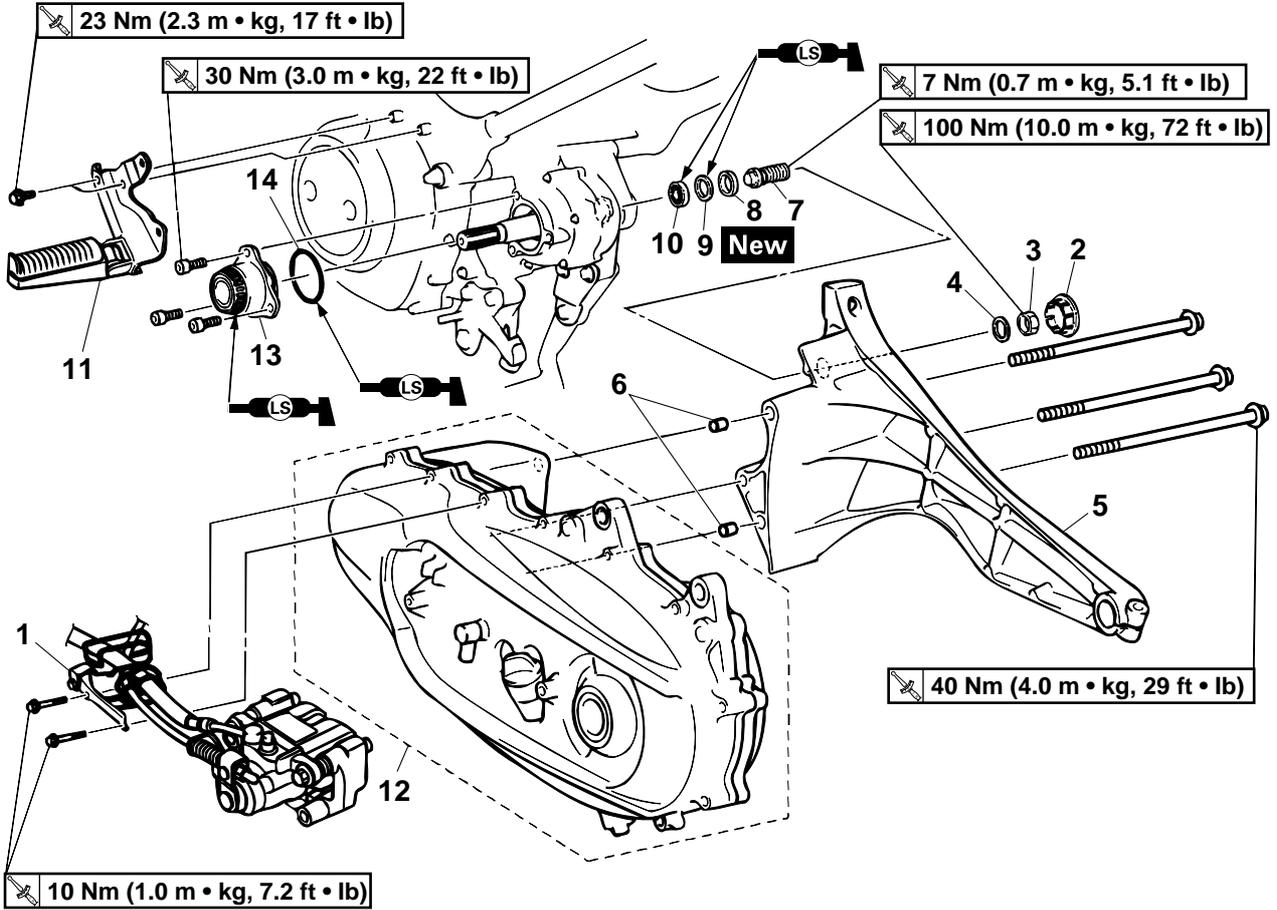
Removing primary and secondary drive chains



Order	Job/Parts to remove	Q'ty	Remarks
	Chain drive oil		Drain. Refer to "CHECKING THE CHAIN DRIVE OIL LEVEL" on page 3-26.
	Rear shock absorber		Refer to "REAR SHOCK ABSORBER ASSEMBLY" on page 4-68.
	Rear brake caliper/rear wheel		Refer to "REAR WHEEL" on page 4-16.
1	Rear brake hose/rear brake lock lever cable holder	1/1	
2	Cover	1	
3	Nut	1	
4	Washer	1	
5	Swingarm	1	
6	Dowel pin	2	
7	Pivot shaft	1	
8	Collar	1	
9	Oil seal	1	
10	Bearing	1	
11	Left rear footrest	1	
12	Chain drive assembly	1	
13	Chain drive holder assembly	1	

CHAIN DRIVE TRANSMISSION

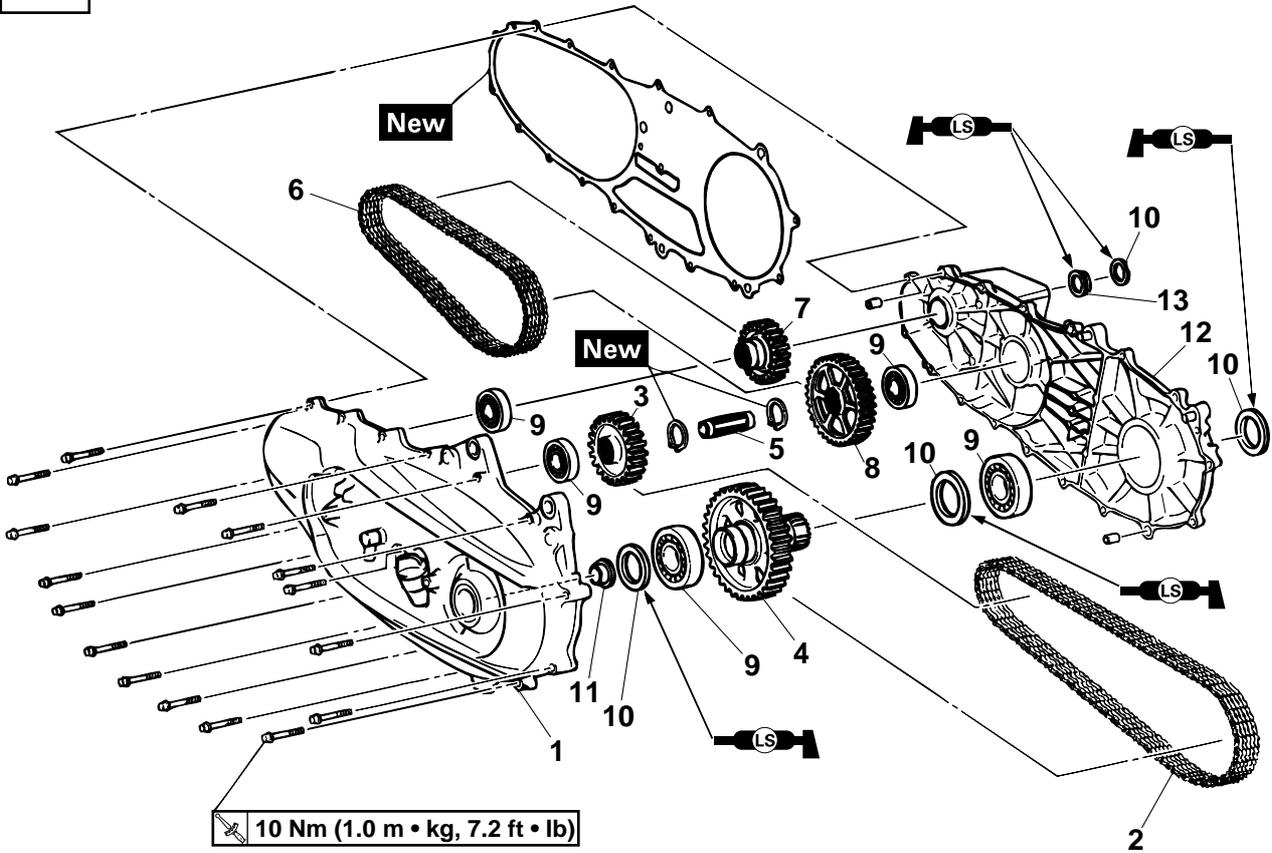
Removing primary and secondary drive chains



Order	Job/Parts to remove	Q'ty	Remarks
14	O-ring	1	
			For installation, reverse the removal procedure.

CHAIN DRIVE TRANSMISSION

Removing primary and secondary drive chains



Order	Job/Parts to remove	Q'ty	Remarks
1	Chain drive case (outer)	1	
2	Secondary drive chain	1	
3	Secondary drive gear	1	
4	Secondary driven gear	1	
5	Middle shaft	1	
6	Primary drive chain	1	
7	Primary drive gear	1	
8	Primary driven gear	1	
9	Bearing	5	
10	Oil seal	4	
11	Collar	1	
12	Chain drive case (inner)	1	
13	Retainer	1	
			For installation, reverse the removal procedure.

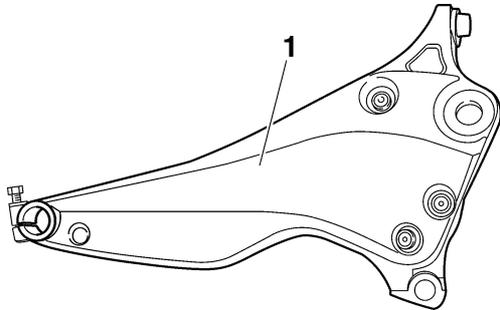
CHAIN DRIVE TRANSMISSION

EAS15B4006

CHECKING THE SWINGARM

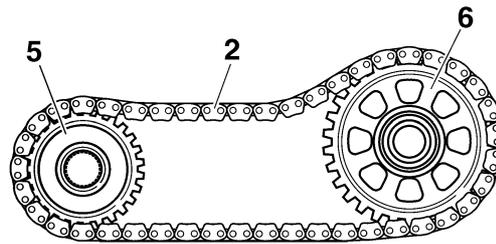
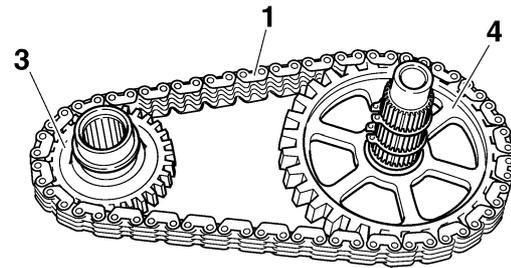
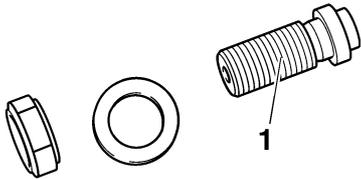
1. Check:

- swingarm "1"
- Damage/wear → Replace.



2. Check:

- Pivot shaft "1"
 - Collar
 - Bearing
 - Oil seal
- Damage/wear → Replace.



EAS15B4008

ASSEMBLING THE CHAIN DRIVE ASSEMBLY

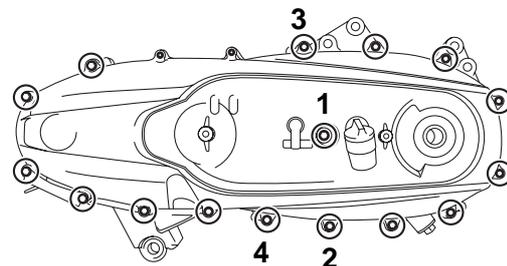
1. Install:

- Chain drive case (outer)

	Chain drive case bolt 10 Nm (1.0 m E kg, 7.2 ft E lb)
--	--

NOTE:

First, tighten the chain drive case bolts that are numbered in the illustration in the order shown, and then tighten the unnumbered bolts in a crisscross pattern.



EAS24760

CHECKING THE CHAIN DRIVE ASSEMBLY

1. Check:

- Primary drive chain "1"
 - Secondary drive chain "2"
- Damage/stiffness → Replace the drive chain and its respective gears as a set.

2. Check:

- Primary/secondary drive gear "3"
 - Primary/secondary driven gear "4"
 - Secondary drive gear "5"
 - Secondary driven gear "6"
- Damage/wear → Replace the respective drive gears and respective drive chains as a set.

EAS24770

INSTALLING THE CHAIN DRIVE

1. Install:

- Chain drive assembly
- Swingarm
- Pivot shaft
- Washer
- Nut

CHAIN DRIVE TRANSMISSION

2. Tighten:
- Swingarm bolt

	Swingarm bolt 40 Nm (4.0 m•kg, 29 ft•lb)
---	---

3. Adjust:
- Pivot shaft
 - Nut

	Pivot shaft 7 Nm (0.7 m•kg, 5.1 ft•lb)
	Nut 100 Nm (10.0 m•kg, 72 ft•lb)

NOTE:

- With your fingers, screw in the pivot shaft until it touches the collar and then tighten the pivot shaft to the tightening torque.
- Tighten the nut to the tightening torque.
- Install the shock absorber and rear wheel after the swingarm is installed.

4. Fill:
- Chain drive oil
5. Check:
- Chain drive oil level
- Refer to "CHECKING THE CHAIN DRIVE OIL LEVEL" on page 3-26.

CHAIN DRIVE TRANSMISSION

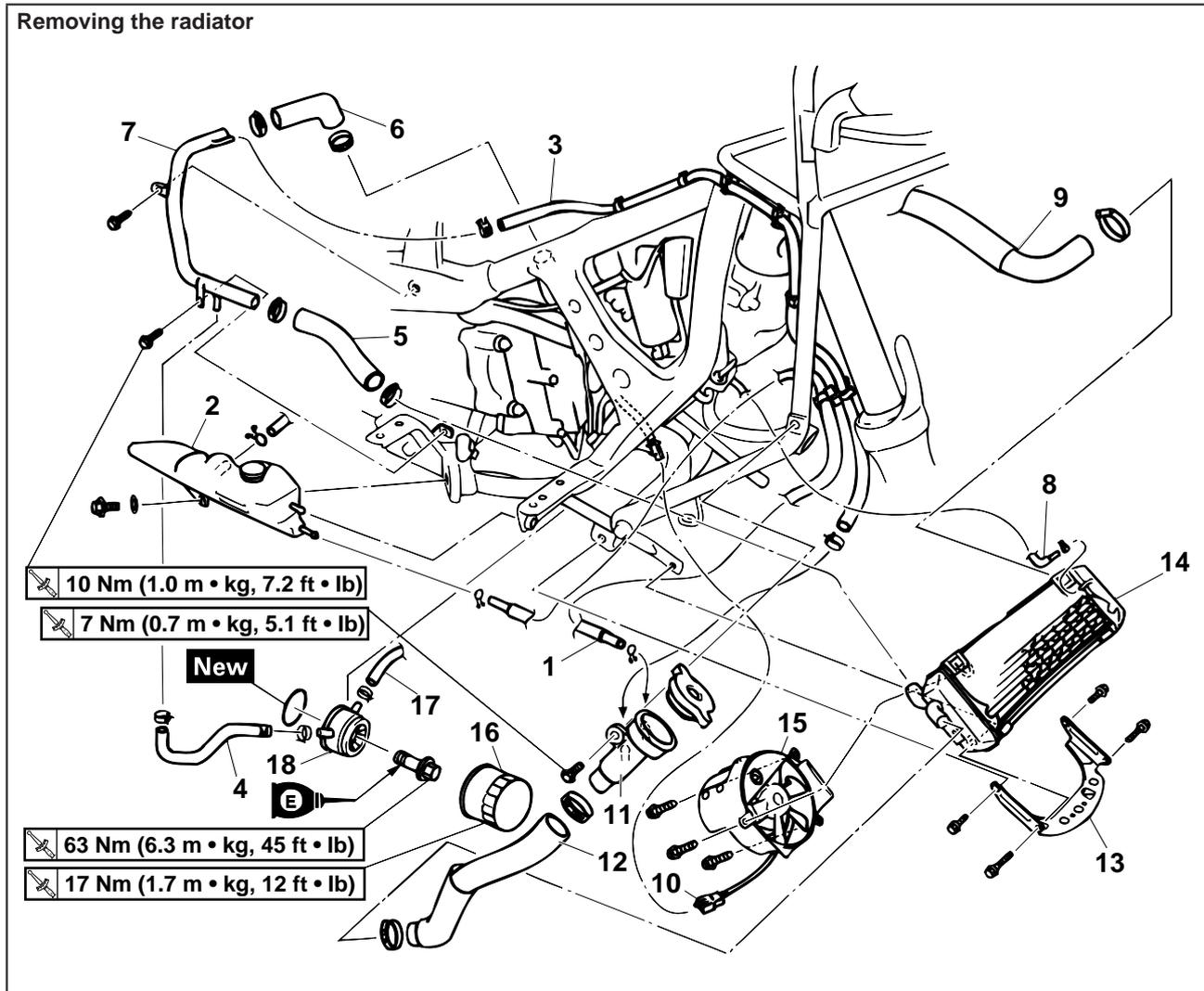
COOLING SYSTEM

RADIATOR	6-1
CHECKING THE RADIATOR.....	6-3
CHECKING THE OIL COOLER	6-3
INSTALLING THE OIL COOLER AND RADIATOR	6-3
THERMOSTAT	6-5
CHECKING THE THERMOSTAT.....	6-6
INSTALLING THE THERMOSTAT ASSEMBLY	6-6
WATER PUMP	6-7
DISASSEMBLING THE WATER PUMP.....	6-9
CHECKING THE WATER PUMP	6-9
ASSEMBLING THE WATER PUMP.....	6-9
INSTALLING THE WATER PUMP	6-11

EAS26380

RADIATOR

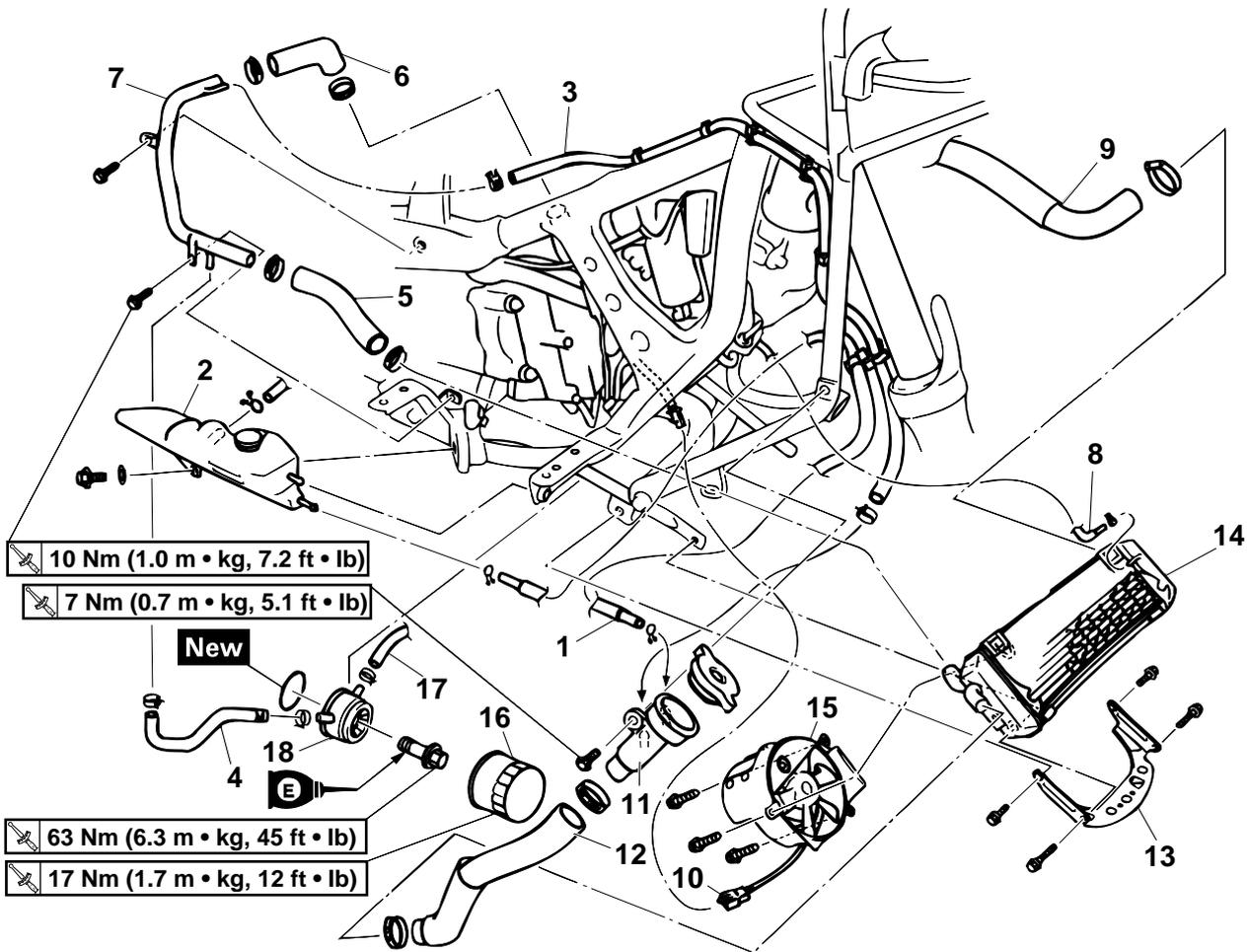
Removing the radiator



Order	Job/Parts to remove	Q'ty	Remarks
	Leg shield/footrest board/inner fender		Refer to "GENERAL CHASSIS" on page 4-1.
	Engine oil		Drain. Refer to "CHANGING THE ENGINE OIL" on page 3-13.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
1	Coolant reservoir hose	1	
2	Coolant reservoir	1	
3	Cooling system air bleed hose	1	
4	Oil cooler outlet hose	1	
5	Radiator inlet hose	1	
6	Thermostat outlet hose	1	Disconnect.
7	Coolant pipe	1	
8	Fast idle outlet hose	1	Disconnect.
9	Radiator outlet hose	1	Disconnect.
10	Radiator fan motor coupler	1	Disconnect.
11	Radiator filler neck	1	
12	Radiator filler hose	1	
13	Stay	1	

RADIATOR

Removing the radiator

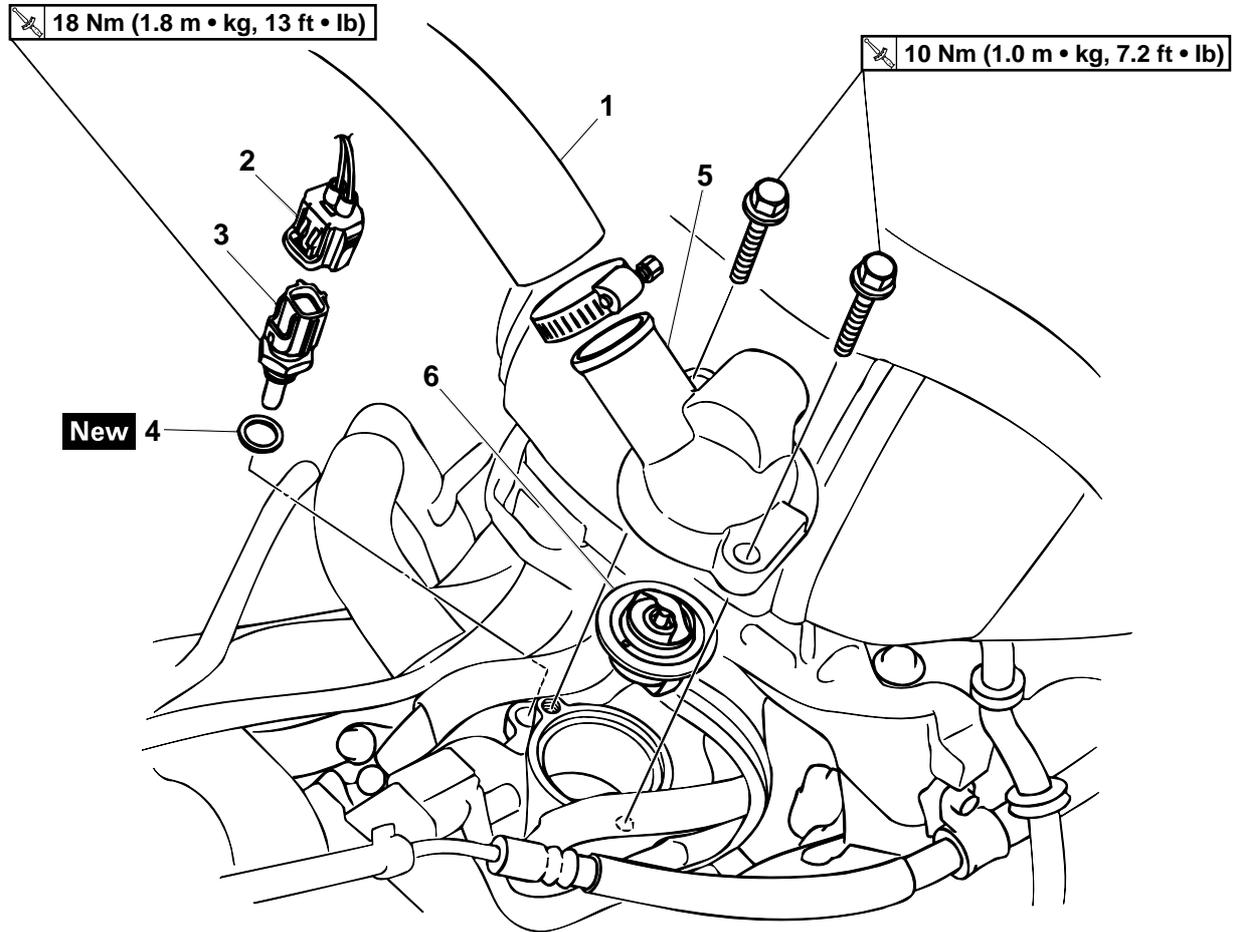


Order	Job/Parts to remove	Q'ty	Remarks
14	Radiator	1	
15	Radiator fan	1	
16	Oil filter cartridge	1	
17	Oil cooler inlet hose	1	Disconnect.
18	Oil cooler	1	
			For installation, reverse the removal procedure.

EAS26440

THERMOSTAT

Removing the thermostat assembly



Order	Job/Part	Q'ty	Remarks
	Center cover/side cover		Refer to "GENERAL CHASSIS" on page 4-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
1	Thermostat outlet hose	1	Disconnect.
2	Coolant temperature sensor coupler	1	Disconnect.
3	Coolant temperature sensor	1	
4	Copper washer	1	
5	Thermostat cover	1	
6	Thermostat	1	
			For installation, reverse the removal procedure.

THERMOSTAT

EAS26450

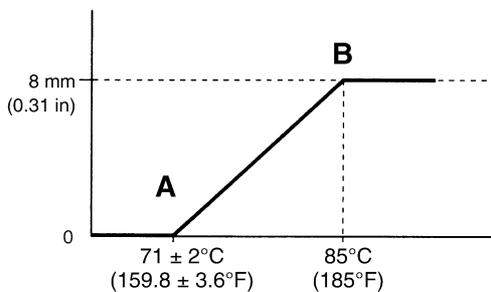
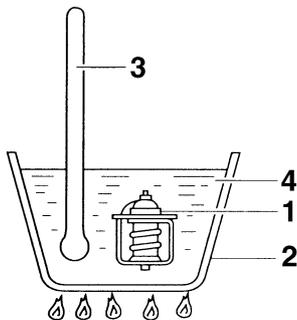
CHECKING THE THERMOSTAT

1. Check:
 - Thermostat
Does not open at 70.5–73.5°C (159–164°F)
→ Replace.



- a. Suspend the thermostat “1” in a container “2” filled with water.
- b. Slowly heat the water.
- c. Place a thermometer “3” in the coolant.
- d. While stirring the water “4”, observe the thermostat and thermometer’s indicated temperature.

NOTE:
If the accuracy of the thermostat is in doubt, replace it. A faulty thermostat could cause serious overheating or overcooling.



- A. Fully close
- B. Fully open



2. Check:
 - Thermostat housing cover
Cracks/tears → Replace.

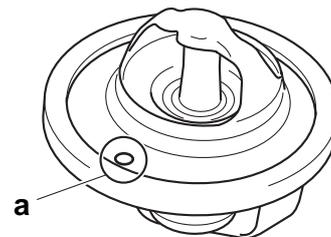
EAS26480

INSTALLING THE THERMOSTAT ASSEMBLY

1. Install:
 - Thermostat
 - Thermostat cover

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

NOTE:
Install the thermostat with its breather hole “a” facing forward.



2. Install:
 - Copper washer
 - Coolant temperature sensor **New**

	Coolant temperature sensor 18 Nm (1.8 m•kg, 13 ft•lb)
--	---

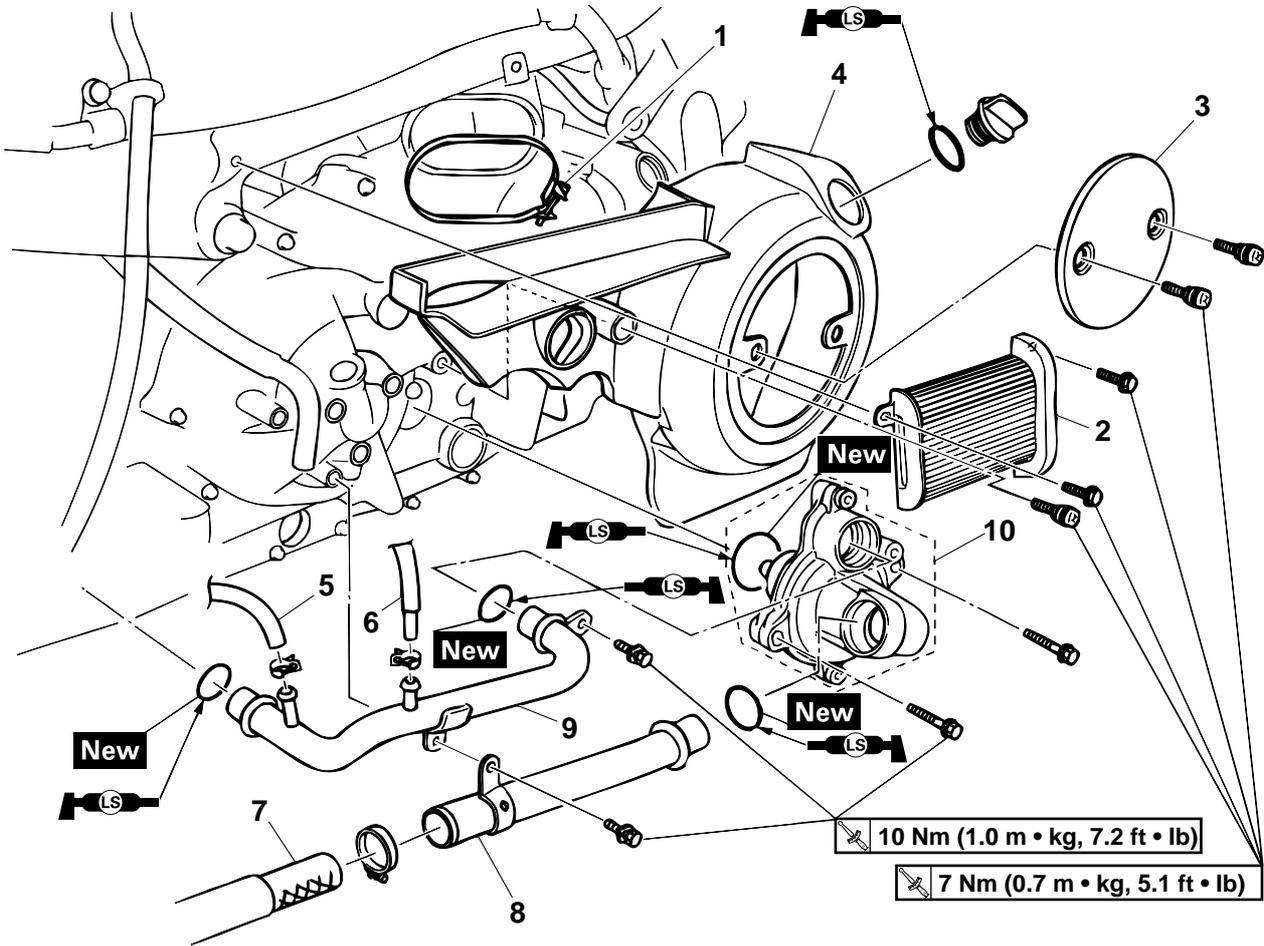
3. Fill the coolant with the specified amount.
 - Cooling system
Refer to “CHANGING THE COOLANT” on page 3-19.
4. Check:
 - Cooling system
Leaks → Repair or replace the faulty part.
5. Measure:
 - Radiator cap opening pressure
Below the specified pressure → Replace the radiator cap.
Refer to “CHECKING THE RADIATOR” on page 6-3.

WATER PUMP

EAS26500

WATER PUMP

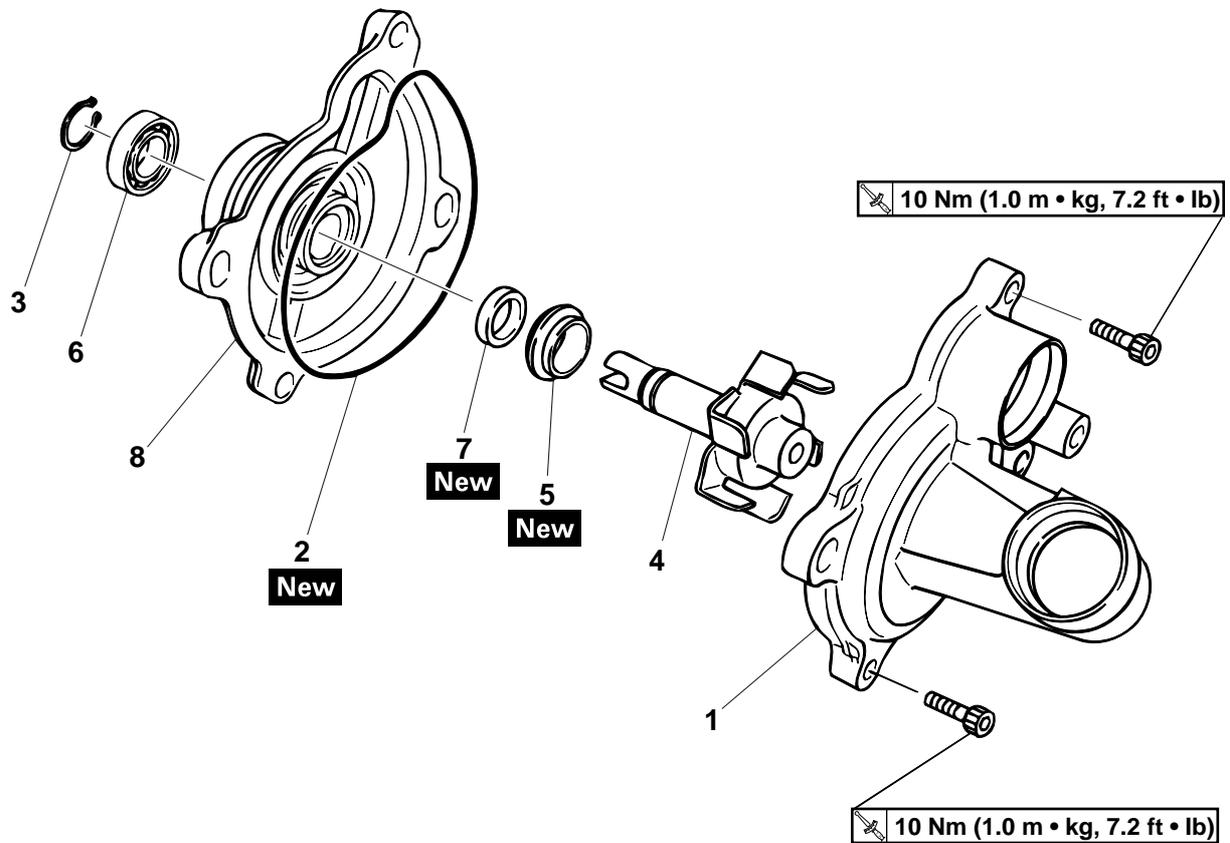
Removing the water pump



Order	Job/Parts to remove	Q'ty	Remarks
	Left upper side cover moulding/left footrest board		Refer to "GENERAL CHASSIS" on page 4-1.
	Coolant		Drain. Refer to "CHANGING THE COOLANT" on page 3-19.
1	V-belt case air filter element clamp joint	1	
2	V-belt case air filter element (left)	1	
3	Generator cover protector cover	1	
4	Generator cover protector	1	
5	Oil cooler inlet hose	1	
6	Coolant hose	1	
7	Radiator outlet hose	1	
8	Water pump inlet pipe	1	
9	Water pump outlet pipe	1	
10	Water pump assembly	1	
			For installation, reverse the removal procedure.

WATER PUMP

Disassembling the water pump



Order	Job/Parts to remove	Q'ty	Remarks
			NOTE: _____ It is not necessary to remove the impeller shaft, unless the coolant level is extremely low or coolant contains engine oil. _____
1	Water pump housing cover	1	
2	O-ring	1	
3	Circlip	1	
4	Impeller shaft	1	
5	Water pump seal	1	
6	Bearing	1	
7	Oil seal	1	
8	Water pump housing	1	
			For assembly, reverse the disassembly procedure.

EAS26510

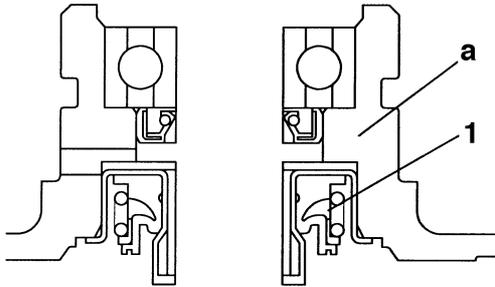
DISASSEMBLING THE WATER PUMP

1. Remove:

- Water pump seal "1"

NOTE:

Remove the water pump seal from the inside of the water pump housing.



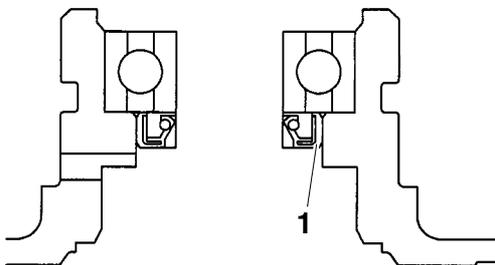
a. Water pump housing

2. Remove:

- Oil seal "1"
(with a thin, flat-head screwdriver)

NOTE:

Remove the oil seal from the outside of the water pump housing.

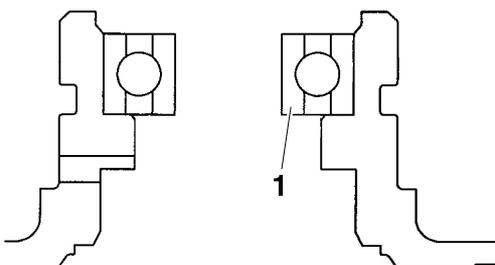


3. Remove:

- Bearing "1"

NOTE:

Remove the bearing from inside of the water pump housing.

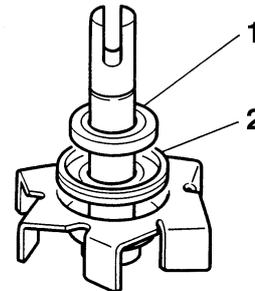


4. Remove:

- Rubber damper holder "1"
- Rubber damper "2"
(from the impeller, with a thin, flat-head screwdriver)

NOTE:

Do not scratch the impeller shaft.

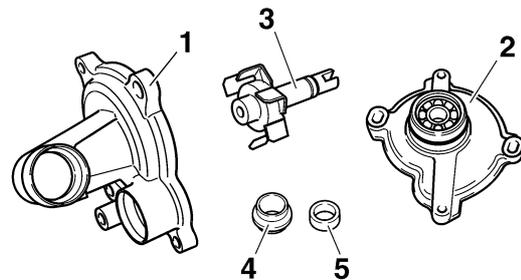


EAS26550

CHECKING THE WATER PUMP

1. Check:

- Water pump housing cover "1"
 - Water pump housing "2"
 - Impeller shaft "3"
 - Water pump seal "4"
 - Oil seal "5"
 - Rubber damper
 - Rubber damper holder
- Cracks/damage/wear → Replace.



EAS26570

ASSEMBLING THE WATER PUMP

1. Install:

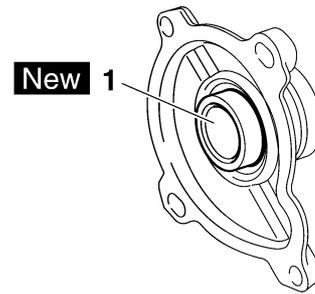
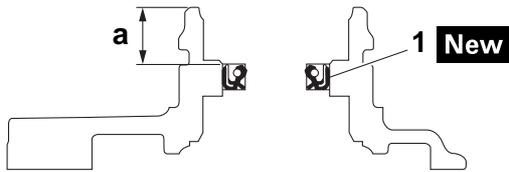
- Oil seal "1"
(to the water pump housing)

NOTE:

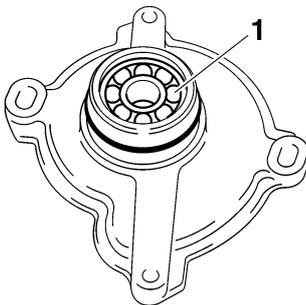
- Install the oil seal with a socket that matches its outside diameter.
- Before installing the oil seal, apply tap water or coolant onto its outer surface.



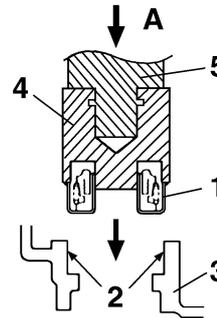
Installed depth of oil seal "a"
11.5 mm (0.45 in)



2. Install:
- Bearing "1"



A. Push down



3. Install:
- Water pump seal "1" **New**

ECA15B1029

CAUTION: _____

Never apply oil or grease onto the water pump seal surface.

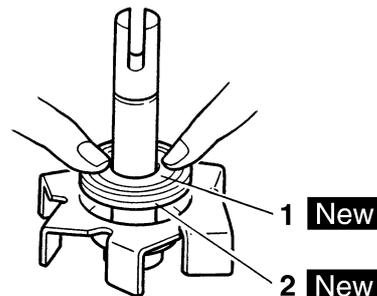
NOTE: _____

- Install the water pump seal with the special tools.
- Before installing the water pump seal, apply Yamaha bond No.1215 or Sealant (Quick Gas- ketR) "2" to the water pump housing "3".

4. Install:
- Rubber damper "1" **New**
 - Rubber damper holder "2" **New**

NOTE: _____

Before installing the rubber damper, apply tap water or coolant onto its outer surface.



Mechanical seal installer
90890-04078
Water pump seal installer
YM-33221-A
Middle driven shaft bearing driver
90890-04058
Bearing driver 40 mm
YM-04058
Yamaha bond No. 1215 (Three Bond No.1215®)
90890-85505

5. Measure:
- Tilt
Out of specification → Repeat steps (3) and (4).

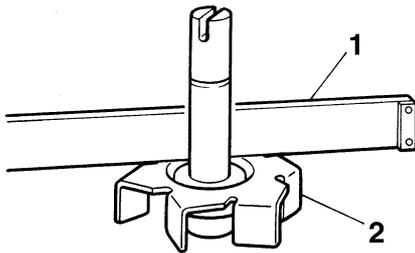
ECA15B1030

CAUTION: _____

Make sure that the rubber damper and rubber damper holder are flush with the impeller.



Maximum impeller shaft tilt
0.15 mm (0.006 in)



1. Straightedge
2. Impeller

EAS26600

INSTALLING THE WATER PUMP

1. Install:

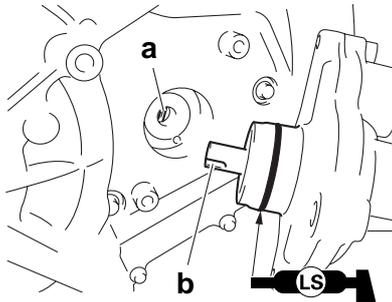
- Water pump assembly



**Water pump assembly bolt
10 Nm (1.0 m•kg, 7.2 ft•lb)**

NOTE:

Align the projection “a” at the oil pump shaft and water pump shaft groove “b”.



2. Fill:

• Cooling system

(with the specified amount of the recommended coolant)

Refer to “CHANGING THE COOLANT” on page 3-19.

3. Check:

• Cooling system

Leaks → Repair or replace any faulty part.

4. Measure:

• Radiator cap opening pressure

Below the specified pressure → Replace the radiator cap.

Refer to “CHECKING THE RADIATOR” on page 6-3.

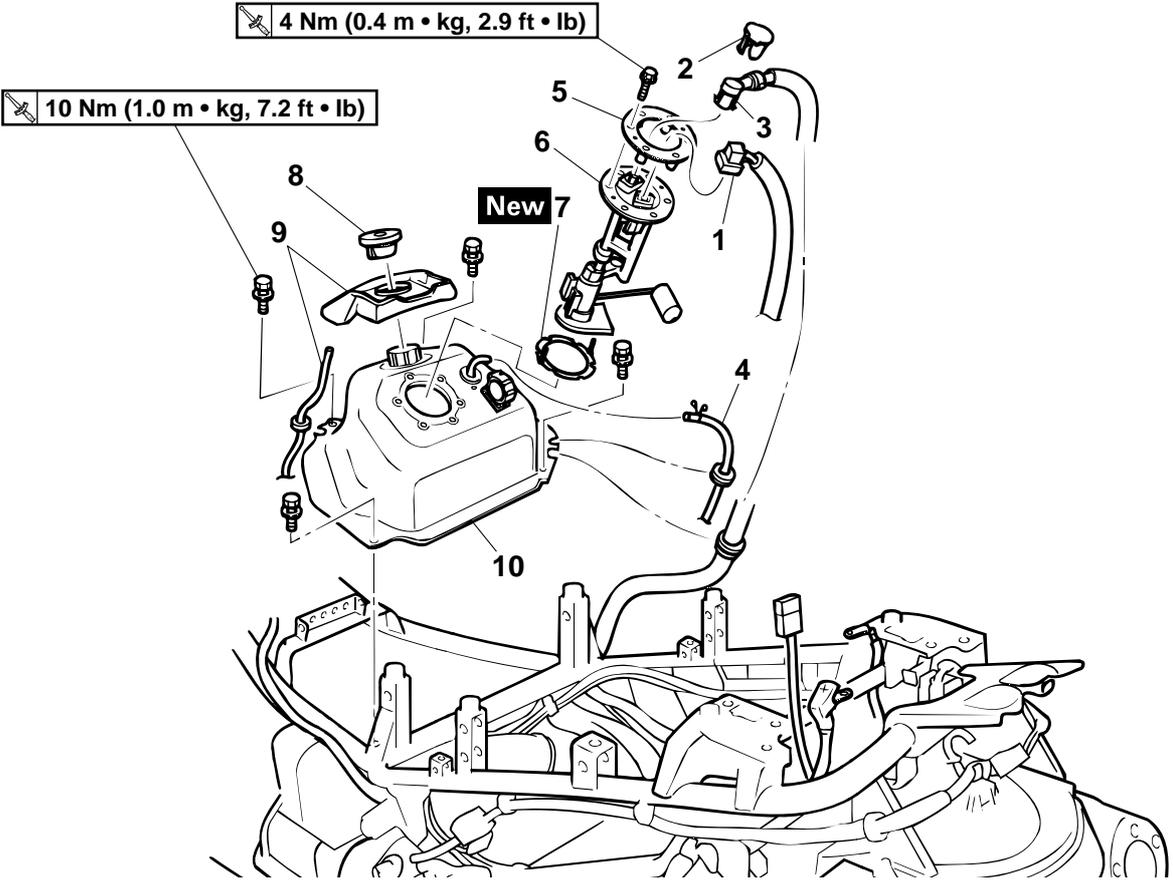
FUEL SYSTEM

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EAS26620

FUEL TANK

Removing the fuel tank



Order	Job/Parts to remove	Q'ty	Remarks
	Strage box		Refer to "GENERAL CHASSIS" on page 4-1.
1	Fuel pump coupler	1	
2	Fuel hose connector cover	1	
3	Fuel hose	1	
4	Fuel tank breather hose	1	
5	Fuel pump bracket	1	
6	Fuel pump	1	
7	Fuel pump gasket	1	
8	Fuel tank cap	1	
9	Fuel overflow tray/fuel over flow hose	1/1	
10	Fuel tank	1	
			For installation, reverse the removal procedure.

EAS26630

REMOVING THE FUEL TANK

1. Extract the fuel in the fuel tank through the fuel tank cap with a pump.
2. Remove:
 - Fuel hose connector cover “1”
3. Disconnect:
 - Fuel hose “2”
 - Fuel pump coupler “3”
 - Fuel tank breather hose “4”

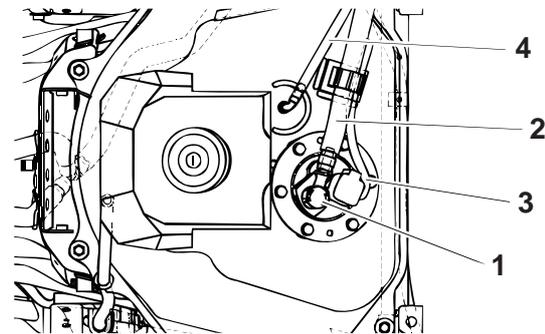
ECA15B1031

CAUTION:

- Be sure to disconnect the fuel hose by hand. Do not forcefully disconnect the hose with tools.
- Although the fuel has been removed from the fuel tank, be careful when removing the fuel hoses, since there may be fuel remaining in it.
- Do not disconnect the fuel hose except the fuel hose connector of the fuel pump feeding side.

NOTE:

Before removing the hoses, place a few rags in the area under where it will be removed.



4. Remove:
 - Fuel tank

EAS26640

REMOVING THE FUEL PUMP

1. Remove:
 - Fuel pump bracket
 - Fuel pump
 - Fuel pump gasket

ECA14720

CAUTION:

- Do not drop the fuel pump or give it a strong shock.
- Do not touch the base section of the fuel sender.

EAS26710

INSTALLING THE FUEL PUMP

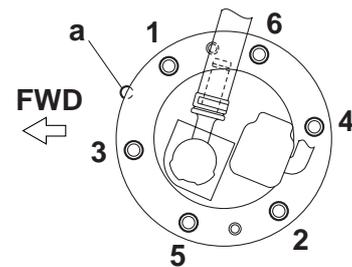
1. Install:
 - Fuel pump gasket **New**
 - Fuel pump
 - Fuel pump bracket



Fuel pump bracket bolt
4 Nm (0.4 m•kg, 2.9 ft • lb)

NOTE:

- Do not damage the installation surfaces of the fuel tank when installing the fuel pump.
- Always use a new fuel pump gasket.
- Align the projection “a” on the fuel pump with the projection in the fuel tank.
- Tighten the bolts to the specified torque in the proper tightening sequence as shown.
- Install the fuel pump in the direction shown in the illustration.



EAS15B4013

INSTALLING THE FUEL TANK

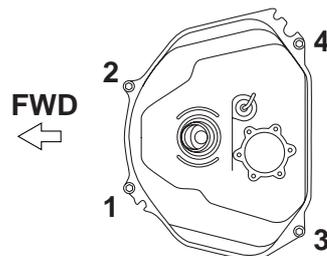
1. Install:
 - Fuel tank



Fuel tank bolt
10 Nm (1.0 m•kg, 7.2 ft•lb)

NOTE:

Tighten the bolts to the specified torque in the proper tightening sequence as shown.



2. Connect:
 - Fuel hose

- Fuel breather hose
- Fuel pump coupler

ECA15B1032

CAUTION:

- **Be sure to connect the fuel hose by hand. Do not forcefully connect the hose with tools.**
 - **When installing the fuel hose, make sure that it is securely connected, and that the fuel hose holders are in the correct position, otherwise the fuel hose will not be properly installed.**
-

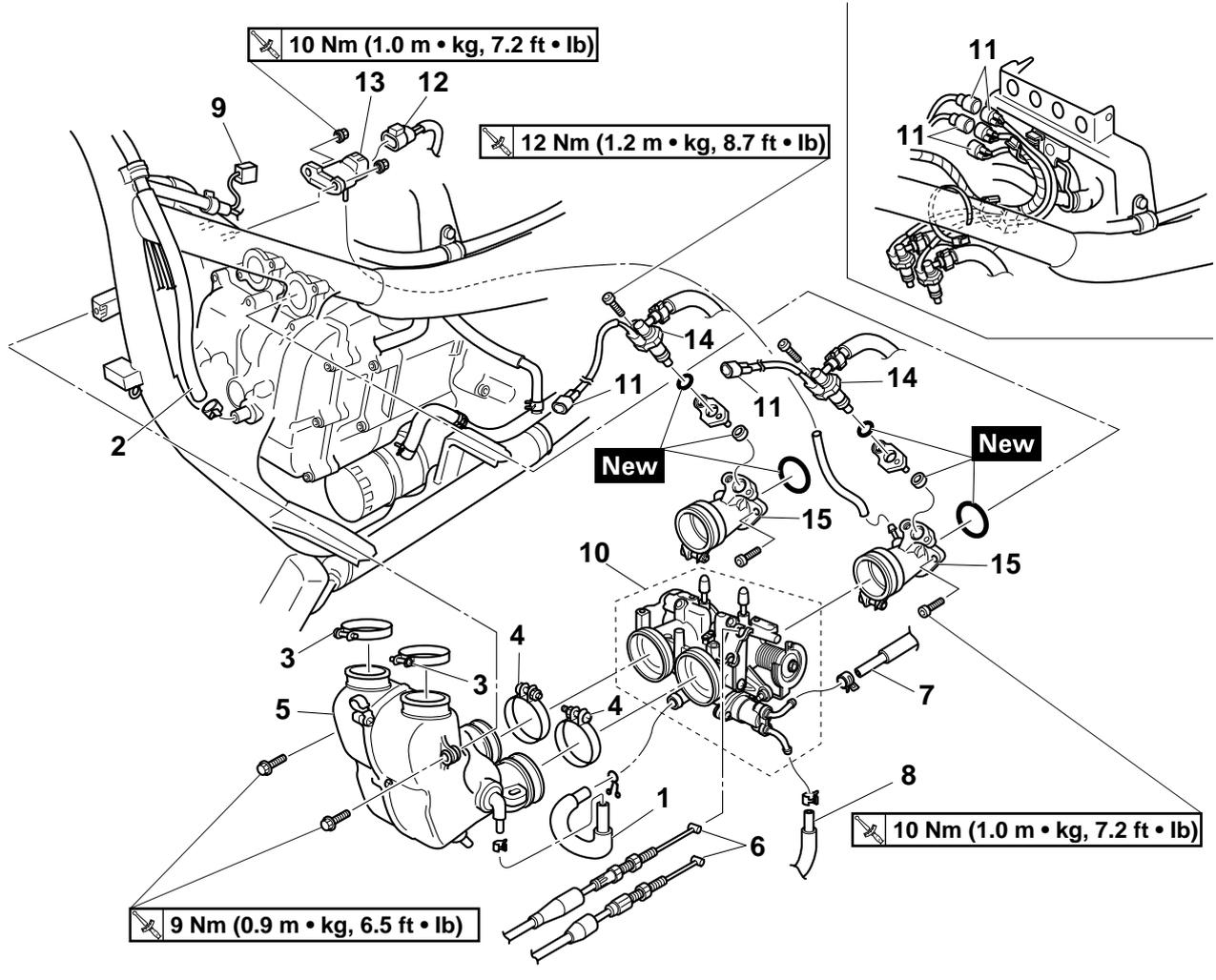
3. Install:

- Fuel pump connector cover

EAS26970

THROTTLE BODIES

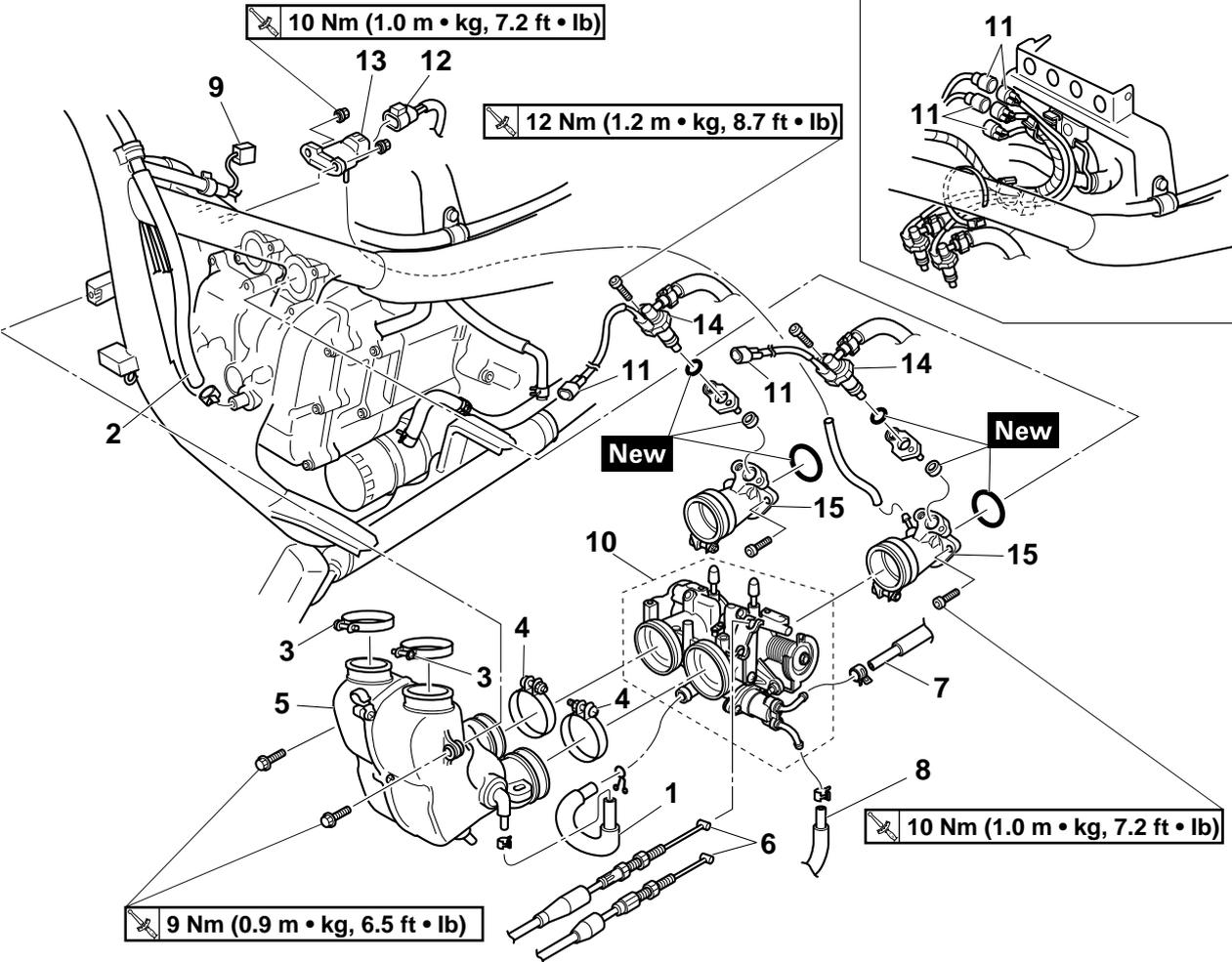
Removing the throttle bodies



Order	Job/Parts to remove	Q'ty	Remarks
	Footrest board		
	Leg shield		
	Inner fender		
1	Air vent hose	1	
2	Crankcase breather hose	1	Disconnect.
3	Silencer joint clamp	2	Loosen.
4	Throttle body joint clamp	2	Loosen.
5	Silencer	1	
6	Throttle cable	2	Disconnect.
7	Fast idle inlet hose	1	Disconnect.
8	Fast idle outlet hose	1	Disconnect.
9	Throttle position sensor coupler	1	Disconnect.
10	Throttle body assembly	1	
11	Fuel injector coupler	2	Disconnect.
12	Intake air pressure sensor coupler	1	Disconnect.
13	Intake air pressure sensor	1	
14	Fuel injector (with fuel hose)	2	
15	Intake manifold	2	

THROTTLE BODIES

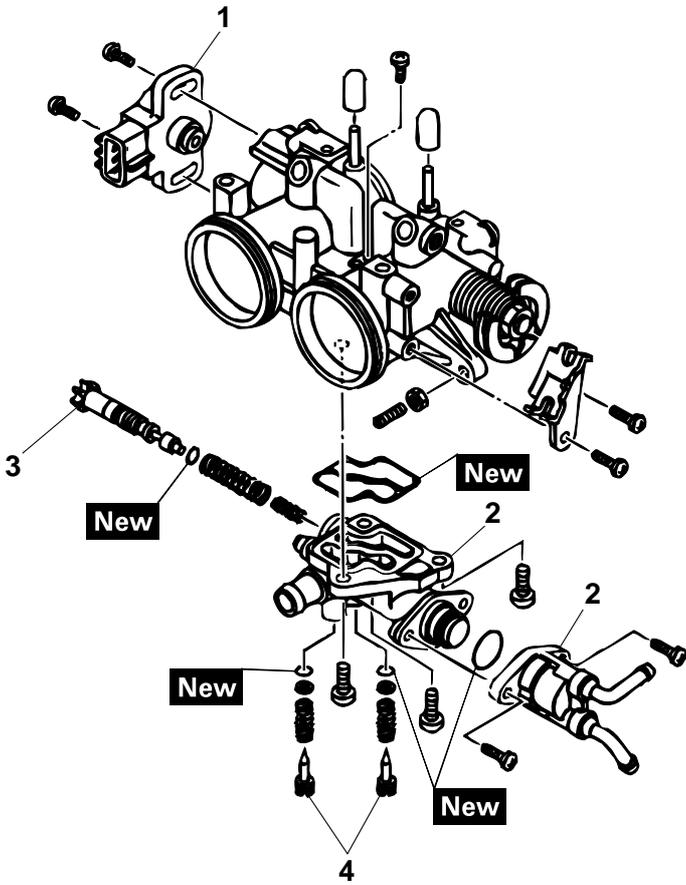
Removing the throttle bodies



Order	Job/Parts to remove	Q'ty	Remarks
			For installation, reverse the removal procedure.

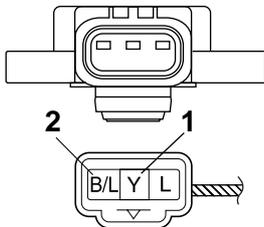
THROTTLE BODIES

Disassembling the throttle bodies

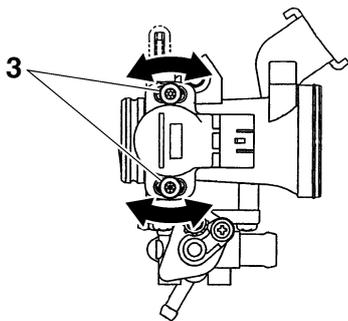


Order	Job/Parts to remove	Q'ty	Remarks
			NOTE: _____ Before disassembling the throttle body, make sure to note the number of times the air screw is turned out from the seated position to its set position. _____
1	Throttle position sensor	1	
2	Fast idle plunger	1	
3	Idle adjust screw	1	
4	Air screw	2	
			For installation, reverse the removal procedure.

Tester positive probe
Yellow "1"
Negative tester probe
Black/Blue "2"



- d. Measure the throttle position sensor voltage.
- e. Loosen the throttle position sensor screws "3".



- f. Adjust the throttle position sensor angle so that the voltage is within the specified range.

	Throttle position sensor voltage (closed position) 0.63–0.73V (Yellow–Black/Blue)
---	---

- g. After adjusting the throttle position sensor angle, tighten the throttle position sensor screws.



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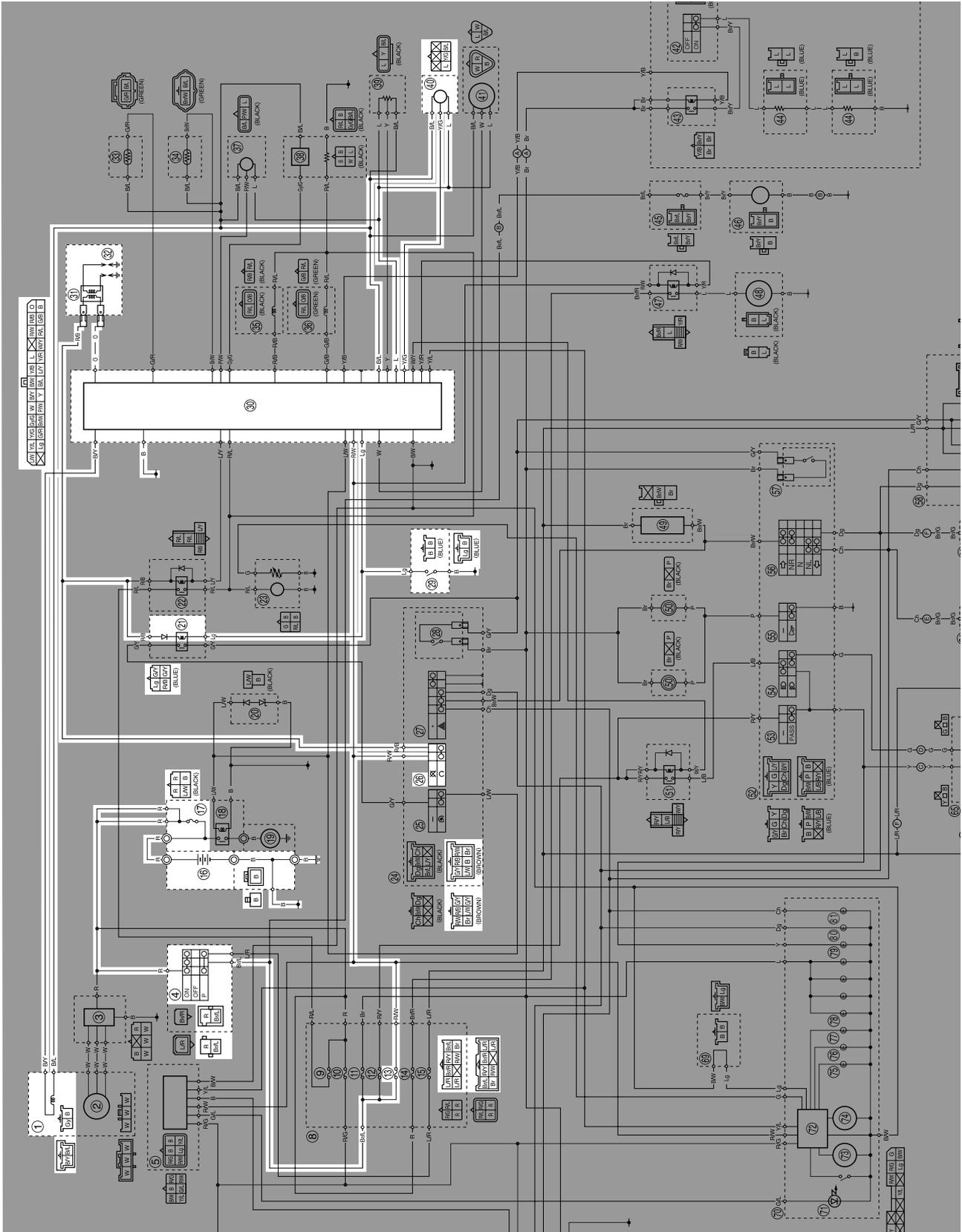
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EAS27090

IGNITION SYSTEM

EAS27110

CIRCUIT DIAGRAM



1. Crankshaft position sensor
4. Main switch
13. Ignition fuse
16. Battery
17. Main fuse
21. Starting circuit cut-off relay 1
26. Engine stop switch
29. Sidestand switch
30. ECU (engine)
31. Ignition coil
32. Spark plug
40. Lean angle sensor

EAS27140

TROUBLESHOOTING

The ignition system fails to operate (no spark or intermittent spark).

NOTE:

Before troubleshooting, remove the following part(s):

1. Battery cover
2. Rear cover
3. Front cowling
4. Leg shield
5. Footrest board
6. Inner fender

<p>1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-106.</p>	NG→	<p>Replace the fuse(s).</p>
OK↓		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-107.</p>	NG→	<ul style="list-style-type: none"> ● Clean the battery terminals. ● Recharge or replace the battery.
OK↓		
<p>3. Check the spark plug. Refer to "CHECKING THE SPARK PLUGS" on page 3-9.</p>	NG→	<p>Re-gap or replace the spark plug.</p>
OK↓		
<p>4. Check the spark plug gap. Refer to "CHECKING THE SPARK PLUG GAP" on page 8-113.</p>	OK→	<p>Ignition system is OK.</p>
NG↓		
<p>5. Check the spark plug cap. Refer to "CHECKING THE SPARK PLUG CAPS" on page 8-112.</p>	NG→	<p>Replace the spark plug caps.</p>
OK↓		
<p>6. Check the ignition coils. Refer to "CHECKING THE IGNITION COIL" on page 8-113.</p>	NG→	<p>Replace the ignition coils.</p>
OK↓		
<p>7. Check the crankshaft position sensor. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-114.</p>	NG→	<p>Replace the crankshaft position sensor.</p>
OK↓		
<p>8. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-101.</p>	NG→	<p>Replace the main switch.</p>
OK↓		
<p>9. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-101.</p>	NG→	<p>Replace the right handlebar switch.</p>
OK↓		

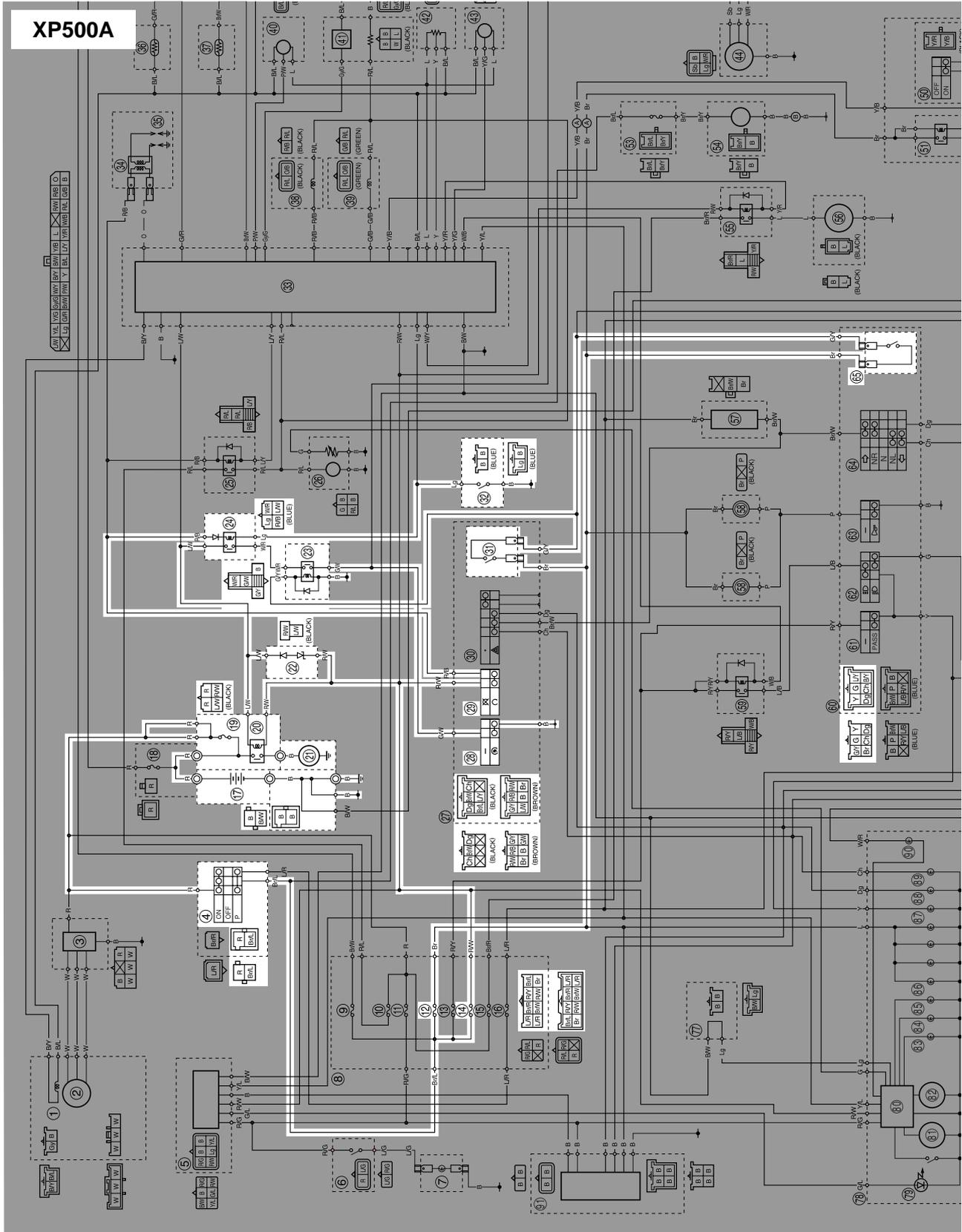
IGNITION SYSTEM

10. Check the sidestand switch. Refer to "CHECKING THE SWITCHES" on page 8-101.	NG→	Replace the sidestand switch.
OK↓		
11. Check the starting circuit cut-off relay 1 (Diode). Refer to "CHECKING THE RELAYS" on page 8-110.	NG→	Replace the starting circuit cut-off relay 1.
OK↓		
12. Check the lean angle sensor. Refer to "CHECKING THE LEAN ANGLE SENSOR" on page 8-114.	NG→	Replace the lean angle sensor.
OK↓		
13. Check the entire ignition system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-1.	NG→	Properly connect or repair the ignition system's wiring
OK↓		
Replace the ECU.		

ELECTRIC STARTING SYSTEM

- 4. Main switch
- 11. Signaling system fuse
- 13. Ignition fuse
- 16. Battery
- 17. Main fuse
- 18. Starter relay
- 19. Starter motor
- 20. Diode
- 21. Starting circuit cut-off relay 1
- 25. Start switch
- 26. Engine stop switch
- 28. Front brake light switch
- 29. Sidestand switch
- 57. Rear brake light switch

ELECTRIC STARTING SYSTEM



ELECTRIC STARTING SYSTEM

- 4. Main switch
- 12. Signaling system fuse
- 14. Ignition fuse
- 17. Battery
- 19. Main fuse
- 20. Starter relay
- 21. Starter motor
- 22. Diode
- 23. Starting circuit cut-off relay 2
- 24. Starting circuit cut-off relay 1
- 28. Start switch
- 29. Engine stop switch
- 31. Front brake light switch
- 32. Sidestand switch
- 65. Rear brake light switch

ELECTRIC STARTING SYSTEM

EAS27180

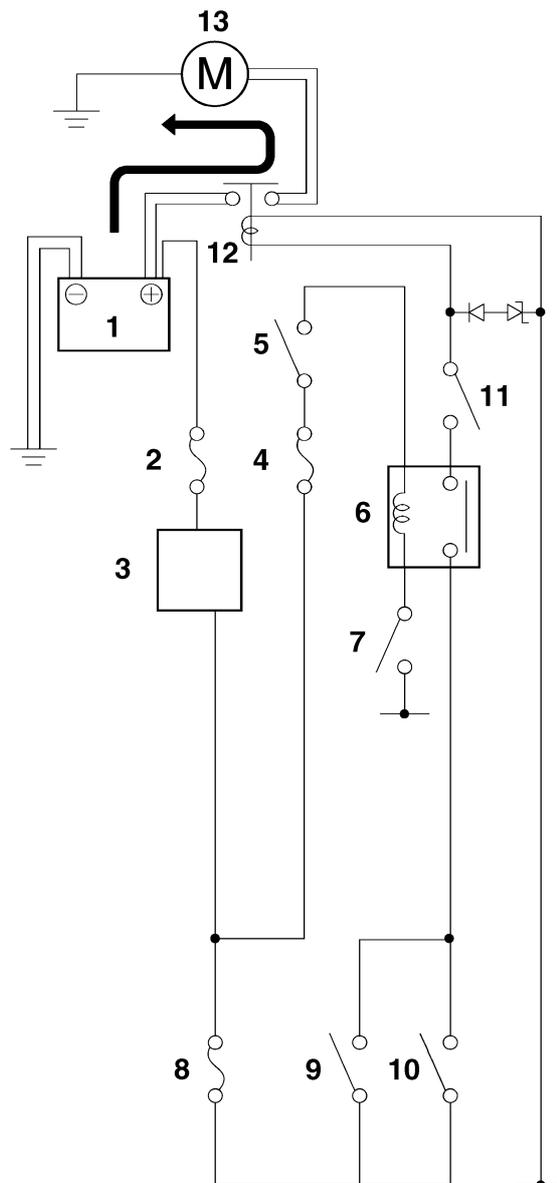
STARTING CIRCUIT CUT-OFF SYSTEM OPERATION

If the engine stop switch is set to “○” and the main switch is set to “ON” (both switches are closed), the starter motor can only operate if at least one of the following conditions is met:

- A brake lever is pulled to the handlebar (the brake light switch is closed) and the side-stand is up (the sidestand switch is closed).

The starting circuit cut-off relay prevents the starter motor from operating when neither of these conditions has been met. In this instance, the starting circuit cut-off relay is open so current cannot reach the starter motor. When at least one of the above conditions has been met the starting circuit cut-off relay is closed and the engine can be started by pressing the starter switch.

XP500

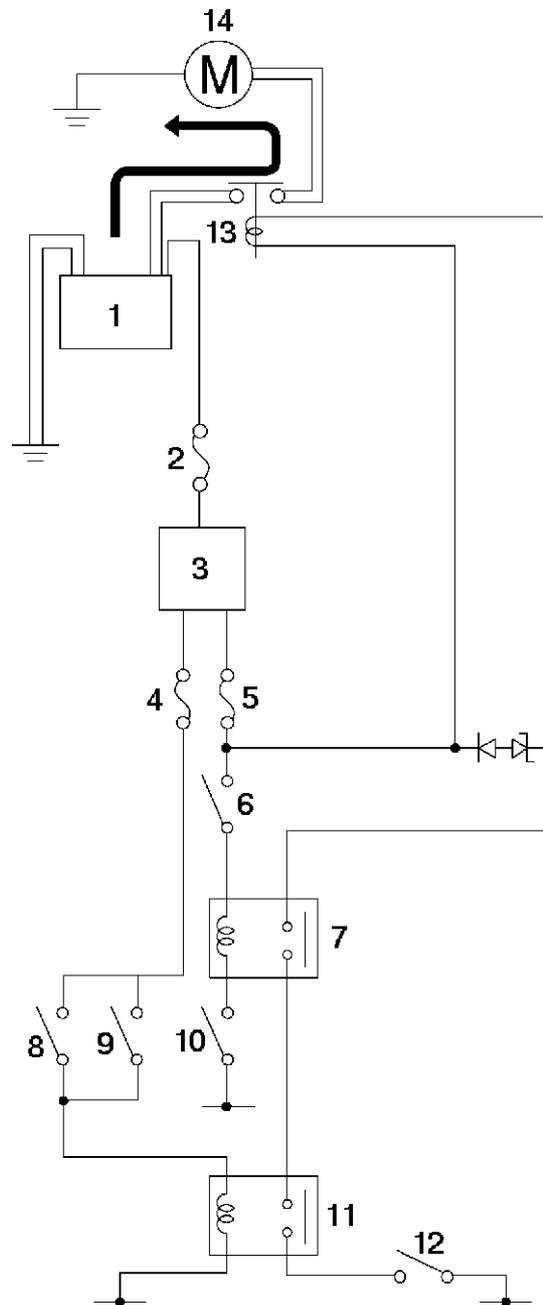


ELECTRIC STARTING SYSTEM

1. Battery
2. Main fuse
3. Main switch
4. Ignition fuse
5. Engine stop switch
6. Starting circuit cut-off relay 1
7. Sidestand switch
8. Signaling system fuse
9. Front brake switch
10. Rear brake switch
11. Start switch
12. Starter relay
13. Starter motor

ELECTRIC STARTING SYSTEM

XP500A



ELECTRIC STARTING SYSTEM

1. Battery
2. Main fuse
3. Main switch
4. Signaling system fuse
5. Ignition fuse
6. Engine stop switch
7. Starting circuit cut-off relay 1
8. Front brake switch
9. Rear brake switch
10. Sidestand switch
11. Starting circuit cut-off relay 2
12. Start switch
13. Starter relay
14. Starter motor

ELECTRIC STARTING SYSTEM

EAS27190

TROUBLESHOOTING

The starter motor fails to turn.

NOTE:

Before troubleshooting, remove the following part(s):

1. Front cowling
2. Leg shield
3. Footrest board
4. Fuel tank

1. Check the fuses. (Main and ignition) Refer to "CHECKING THE FUSES" on page 8-106.	NG→	Replace the fuse(s).
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-107.	NG→	<ul style="list-style-type: none">● Clean the battery terminals.● Recharge or replace the battery.
OK↓		
3. Check the starter motor operation. Refer to "CHECKING THE STARTER MOTOR OPERATION" on page 8-115.	OK→	Starter motor is OK. Perform the electric starter system trouble shooting, starting with step 5.
NG↓		
4. Check the starter motor. Refer to "CHECKING THE STARTER MOTOR" on page 5-37.	NG→	Repair or replace the starter motor.
OK↓		
5. Check the starting circuit cut-off relay 1. Refer to "CHECKING THE RELAYS" on page 8-110.	NG→	Replace the starting circuit cut-off relay 1.
OK↓		
6. Check the starting circuit cut-off relay 1 (Diode). Refer to "CHECKING THE RELAYS" on page 8-110.	NG→	Replace the starting circuit cut-off relay 1.
OK↓		
7. Check the starting circuit cut-off relay 2 (XP500A). Refer to "CHECKING THE RELAYS" on page 8-110.	NG→	Replace the starting circuit cut-off relay 2 (XP500A).
OK↓		
8. Check the starter relay. Refer to "CHECKING THE RELAYS" on page 8-110.	NG→	Replace the starter relay.
OK↓		
9. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-101.	NG→	Replace the main switch.
OK↓		
10. Check the engine stop switch. Refer to "CHECKING THE SWITCHES" on page 8-101.	NG→	Replace the right handlebar switch.

ELECTRIC STARTING SYSTEM

OK↓

11. Check the sidestand switch.
Refer to "CHECKING THE SWITCHES" on page 8-101.

NG→

Replace the sidestand switch.

OK↓

12. Check the brake light switch.
Refer to "CHECKING THE SWITCHES" on page 8-101.

NG→

Replace the brake light switch.

OK↓

13. Check the start switch.
Refer to "CHECKING THE SWITCHES" on page 8-101.

NG→

Replace the right handlebar switch.

OK↓

14. Check the entire starting system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-5.

NG→

Properly connect or repair the starting system's wiring

OK↓

The starting system circuit is OK.

CHARGING SYSTEM

- 2. AC magneto
- 3. Rectifier/regulator
- 16. Battery
- 17. Main fuse

CHARGING SYSTEM

EAS27220

TROUBLESHOOTING

The battery is not being charged.

NOTE:

Before troubleshooting, remove the following part(s):

1. Rear cover
2. Battery cover
3. Left side cover moulding
4. Left side cover

1. Check the fuse. (Main) Refer to "CHECKING THE FUSES" on page 8-106.	NG→	Replace the fuse.
OK↓		
2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-107.	NG→	<ul style="list-style-type: none">● Clean the battery terminals.● Recharge or replace the battery.
OK↓		
3. Check the stator coil. Refer to "CHECKING THE STATOR COIL" on page 8-115.	NG→	Replace the stator assembly.
OK↓		
4. Check the charging voltage. Refer to "CHECKING THE CHARGING VOLTAGE" on page 8-116.	OK→	Charging voltage is OK.
NG↓		
5. Check the entire charging system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-15.	NG→	Properly connect or repair the charging system's wiring.
OK↓		
Replace the rectifier/regulator.		

- 4. Main switch
- 6. Strage box light switch
- 7. Strage box light
- 10. Back-up fuse
- 11. Signal fuse
- 12. Headlight fuse
- 15. Lighting system fuse
- 16. Battery
- 17. Main fuse
- 30. ECU (engine)
- 51. Headlight relay
- 53. Pass switch
- 54. Dimmer switch
- 61. Tail/brake light
- 62. Licence plate light
- 66. Auxiliary light
- 67. Headlight (high beam)
- 68. Headlight (low beam)
- 78. Meter light
- 79. High beam indicator light

EAS27260

TROUBLESHOOTING

Any of the following fail to light: headlight, high beam indicator light, taillight, strage box light, license light or meter light.

NOTE:

Before troubleshooting, remove the following part(s):

1. Battery cover
2. Rear cover
3. Front cowling
4. Handlebar cover

<p>1. Check the each bulbs and bulb sockets condition. Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-105.</p>	<p>NG→</p>	<p>Replace the bulb(s) and bulb socket(s).</p>
<p>OK↓</p>		
<p>2. Check the fuses. (Main, headlight, backup and lighting system) Refer to "CHECKING THE FUSES" on page 8-106.</p>	<p>NG→</p>	<p>Replace the fuse(s).</p>
<p>OK↓</p>		
<p>3. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-107.</p>	<p>NG→</p>	<ul style="list-style-type: none"> ● Clean the battery terminals. ● Recharge or replace the battery.
<p>OK↓</p>		
<p>4. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-101.</p>	<p>NG→</p>	<p>Replace the main switch.</p>
<p>OK↓</p>		
<p>5. Check the dimmer switch. Refer to "CHECKING THE SWITCHES" on page 8-101.</p>	<p>NG→</p>	<p>Replace the left handlebar switch.</p>
<p>OK↓</p>		
<p>6. Check the pass switch. Refer to "CHECKING THE SWITCHES" on page 8-101.</p>	<p>NG→</p>	<p>Replace the left handlebar switch.</p>
<p>OK↓</p>		
<p>7. Check the headlight relay. Refer to "CHECKING THE RELAYS" on page 8-110.</p>	<p>NG→</p>	<p>Replace the headlight relay.</p>
<p>OK↓</p>		
<p>8. Check the strage box light switch. Refer to "CHECKING THE SWITCHES" on page 8-101.</p>	<p>NG→</p>	<p>Replace the strage box light switch.</p>
<p>OK↓</p>		
<p>9. Check the entire lighting system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-19.</p>	<p>NG→</p>	<p>Properly connect or repair the lighting system's wiring.</p>
<p>OK↓</p>		
<p>Replace the ECU.</p>		

- 4. Main switch
- 10. Backup fuse (storage box light, immobilizer unit and meter assembly)
- 11. Signaling system fuse
- 15. Lighting system fuse
- 16. Battery
- 17. Main fuse
- 23. Fuel pump
- 27. Hazard switch
- 28. Front brake light switch
- 30. ECU (engine)
- 41. Speed sensor
- 49. Turn signal/hazard relay
- 50. Horn
- 55. Horn switch
- 56. Turn signal switch
- 57. Rear brake light switch
- 59. Rear turn signal light (right)
- 60. Rear turn signal light (left)
- 61. Tail/brake light
- 63. Front turn signal light (right)
- 64. Front turn signal light (left)
- 69. V-belt replacement reset coupler
- 72. Multi-function display
- 73. Speedometer
- 74. Tachometer
- 75. Engine oil change indicator light
- 76. V-belt replacement indicator light
- 77. Engine trouble warning light
- 80. Right turn signal indicator light
- 81. Left turn signal indicator light

EAS27290

TROUBLESHOOTING

- Any of the following fail to light: turn signal light, brake light or an indicator light.
- The horn fails to sound.
- The speedometer fails to operate.
- The V-belt replacement indicator fails to come on.
- The fuel meter(meter assembly) fails to operate.

NOTE:

Before troubleshooting, remove the following part(s):

1. Battery cover
2. Rear cover
3. Front cowling
4. Handlebar cover

<p>1. Check the fuses. (Main, ignition, signaling, backup and lighting system) Refer to "CHECKING THE FUSES" on page 8-106.</p>	<p>NG→</p>	<p>Replace the fuse(s).</p>
<p>OK↓</p>		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-107.</p>	<p>NG→</p>	<ul style="list-style-type: none"> ● Clean the battery terminals. ● Recharge or replace the battery.
<p>OK↓</p>		
<p>3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-101.</p>	<p>NG→</p>	<p>Replace the main switch.</p>
<p>OK↓</p>		
<p>4. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-23.</p>	<p>NG→</p>	<p>Properly connect or repair the signaling system's wiring.</p>
<p>OK↓</p>		
<p>This circuit is OK.</p>		

CHECK THE SIGNALING SYSTEM

The horn fails to sound.

<p>1. Check the horn switch. Refer to "CHECKING THE SWITCHES" on page 8-101.</p>	<p>NG→</p>	<p>Replace the left handlebar switch.</p>
<p>OK↓</p>		
<p>2. Check the horn. Refer to "CHECKING THE HORN" on page 8-116.</p>	<p>NG→</p>	<p>Replace the horn.</p>
<p>OK↓</p>		
<p>3. Check the entire signaling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-23.</p>	<p>NG→</p>	<p>Properly connect or repair the signaling system's wiring.</p>
<p>OK↓</p>		
<p>This circuit is OK.</p>		

SIGNALING SYSTEM

The tail/brake light fails to come on.

1. Check the tail/brake light bulb and socket.
Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-105.

NG→

Replace the tail/brake light bulb, socket or both.

OK↓

2. Check the brake light switch.
Refer to "CHECKING THE SWITCHES" on page 8-101.

NG→

Replace the brake light switch.

OK↓

3. Check the entire signaling system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-23.

NG→

Properly connect or repair the signaling system's wiring.

OK↓

This circuit is OK.

The turn signal light, turn signal indicator light or both fail to blink.

1. Check the turn signal/turn signal indicator light bulb and socket.
Refer to "CHECKING THE BULBS AND BULB SOCKETS" on page 8-105.

NG→

Replace the turn signal indicator light bulb, socket or both.

OK↓

2. Check the turn signal switch.
Refer to "CHECKING THE SWITCHES" on page 8-101.

NG→

Replace the left handlebar switch.

OK↓

3. Check the hazard switch.
Refer to "CHECKING THE SWITCHES" on page 8-101.

NG→

Replace the right handlebar switch.

OK↓

4. Check the turn signal/hazard relay.
Refer to "CHECKING THE RELAYS" on page 8-110.

NG→

The turn signal relay is faulty and must be replaced.

OK↓

5. Check the entire signaling system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-23.

NG→

Properly connect or repair the signaling system's wiring.

OK↓

This circuit is OK.

The V-belt replacement indicator fails to come on.

1. Check the V-belt replacement indicator reset coupler.
Refer to "CHECKING THE V-BELT RESET COUPLER" on page 8-121.

NG→

Replace the V-belt replacement indicator reset coupler.

OK↓

SIGNALING SYSTEM

2. Check the entire signaling system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-23.

NG→

Properly connect or repair the signaling system's wiring.

OK↓

Replace the meter assembly.

The fuel meter fails to come.

1. Check the fuel sender.
Refer to "CHECKING THE FUEL SENDER" on page 8-117.

NG→

Replace the fuel pump assembly.

OK↓

2. Check the entire signaling system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-23.

NG→

Properly connect or repair the signaling system's wiring.

OK↓

Replace the meter assembly.

The speedometer fails to operate.(XP500)

1. Check the speed sensor.
Refer to "CHECKING THE SPEED SENSOR" on page 8-117.

NG→

Replace the speed sensor.

OK↓

2. Check the entire signaling system's wiring.
Refer to "CIRCUIT DIAGRAM" on page 8-23.

NG→

Properly connect or repair the signaling system's wiring.

OK↓

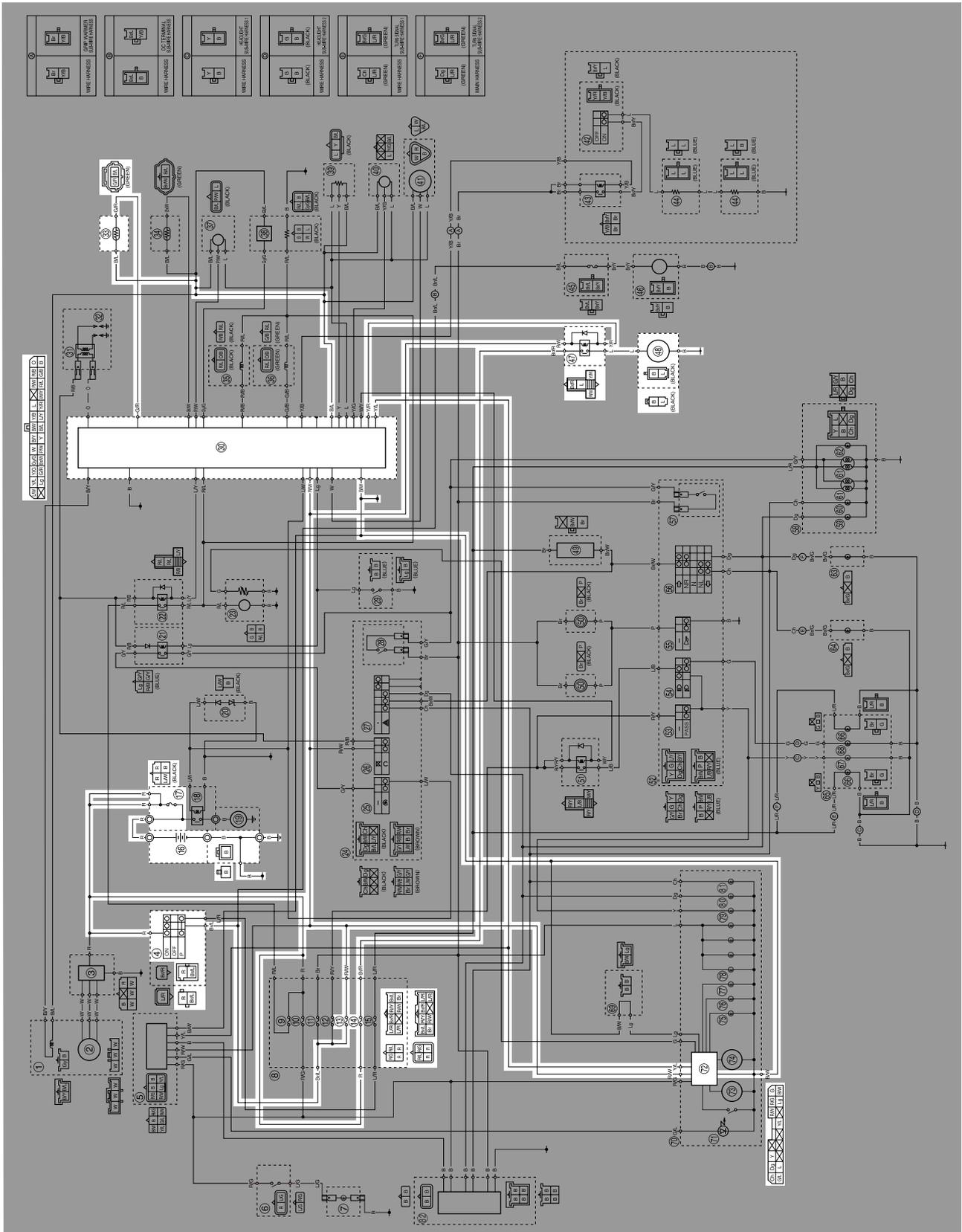
Replace the meter assembly or ECU.

EAS27300

COOLING SYSTEM

EAS27310

CIRCUIT DIAGRAM



- 4. Main switch
- 13. Ignition fuse
- 14. Radiator fan motor fuse
- 16. Battery
- 17. Main fuse
- 30. ECU (engine)
- 33. Coolant temperature sensor
- 47. Radiator fan motor relay
- 48. Radiator fan motor
- 72. Multi-function display

EAS27320

TROUBLESHOOTING

NOTE:

Before troubleshooting, remove the following part(s):

1. Battery cover
2. Rear cover
3. Footrest board
4. Leg shield
5. Inner fender

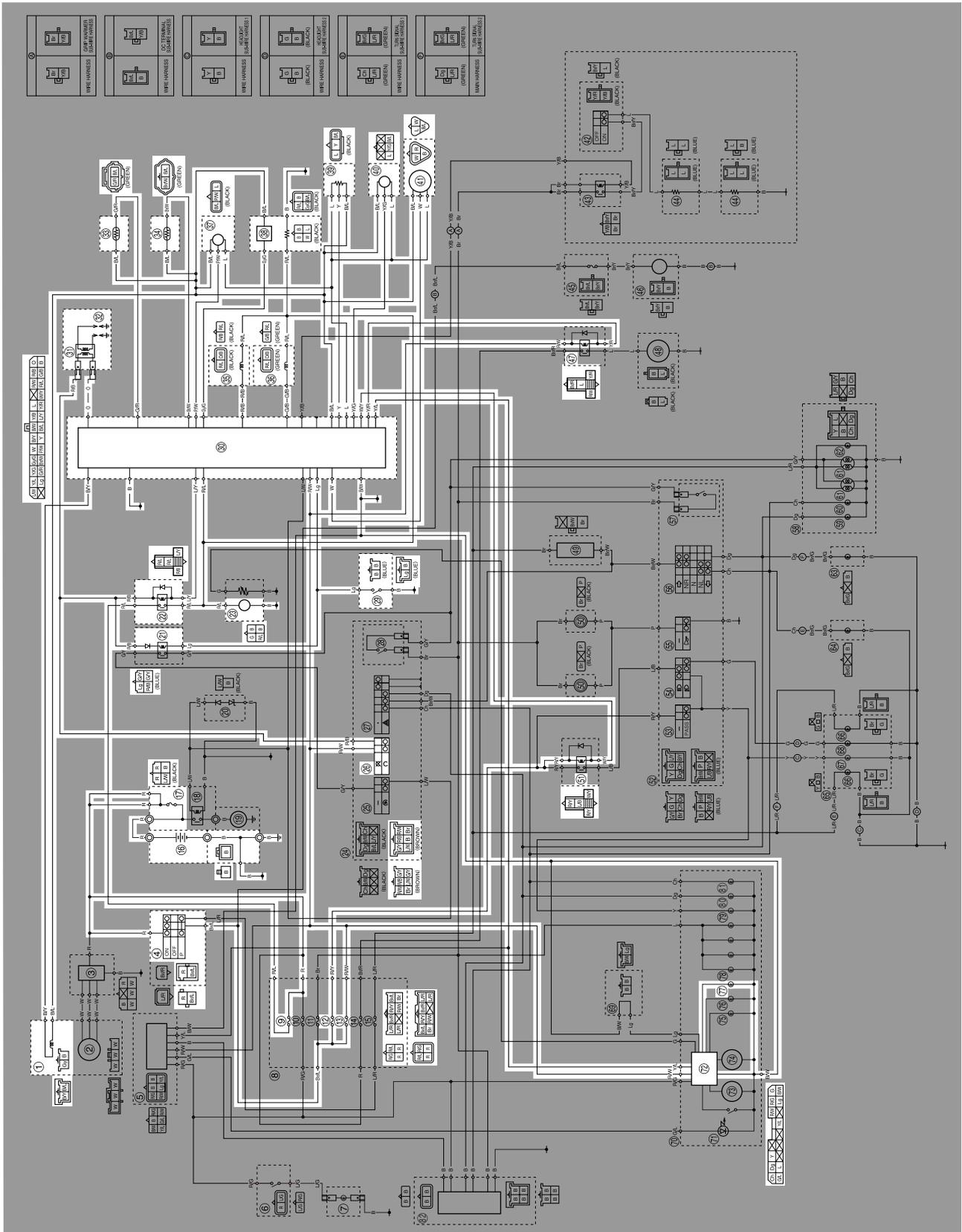
<p>1. Check the fuses. (Main, ignition and radiator fan motor) Refer to "CHECKING THE FUSES" on page 8-106.</p>	NG→	<p>Replace the fuse(s).</p>
OK↓		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-107.</p>	NG→	<ul style="list-style-type: none"> ● Clean the battery terminals. ● Recharge or replace the battery.
OK↓		
<p>3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-101.</p>	NG→	<p>Replace the main switch.</p>
OK↓		
<p>4. Check the radiator fan motor. Refer to "CHECKING THE RADIATOR FAN MOTOR" on page 8-118.</p>	NG→	<p>Replace the radiator fan motor.</p>
OK↓		
<p>5. Check the radiator fan motor relay. Refer to "CHECKING THE RELAYS" on page 8-110.</p>	NG→	<p>Replace the radiator fan motor relay.</p>
OK↓		
<p>6. Check the coolant temperature sensor. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-118.</p>	NG→	<p>Replace the coolant temperature sensor.</p>
OK↓		
<p>7. Check the entire cooling system's wiring. Refer to "CIRCUIT DIAGRAM" on page 8-29.</p>	NG→	<p>Properly connect or repair the cooling system's wiring.</p>
OK↓		
<p>Replace the ECU or meter assembly.</p>		

EAS27330

FUEL INJECTION SYSTEM

EAS27340

CIRCUIT DIAGRAM



FUEL INJECTION SYSTEM

1. Crankshaft position sensor
4. Main switch
9. Electrical fuel injection fuse
12. Headlight fuse
13. Ignition fuse
16. Battery
17. Main fuse
21. Starter circuit cut-off relay 1
22. Fuel injection system relay
23. Fuel pump
26. Engine stop switch
29. Sidestand switch
30. ECU (engine)
31. Ignition coil
32. Spark plug
33. Coolant temperature sensor
34. Intake air temperature sensor
35. Fuel injector #1
36. Fuel injector #2
37. Intake air pressure sensor
38. O₂ sensor
39. Throttle position sensor
40. Lean angle sensor
41. Speed sensor
47. Radiator fan motor relay
51. Headlight relay
72. Multi-function display

FUEL INJECTION SYSTEM

EAS27350

ECU SELF-DIAGNOSTIC FUNCTION

The ECU (engine) is equipped with a self-diagnostic function in order to ensure that the fuel injection system is operating normally. If this function detects a malfunction in the system, it immediately operates the engine under substitute characteristics and illuminates the engine trouble warning light to alert the rider that a malfunction has occurred in the system. Once a malfunction has been detected, a fault code is stored in the memory of the ECU (engine).

- To inform the rider that the fuel injection system is not functioning, the engine trouble warning light flashes when the start switch is being pushed to start the engine.
- If a malfunction is detected in the system by the self-diagnostic function, the ECU (engine) provides an appropriate substitute characteristic operation, and alerts the rider of the detected malfunction by illuminating the engine trouble warning light.
- After the engine has been stopped, the lowest fault code number appears on the clock LCD. Once a fault code has been displayed, it remains stored in the memory of the ECU (engine) until it is deleted.

Engine trouble warning light indication and FI system operation

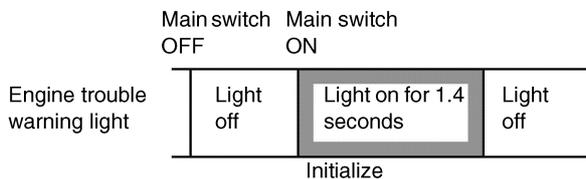
Warning light indication	ECU (engine) operation	FI operation	Vehicle operation
Flashing*	Warning provided when unable to start engine	Operation stopped	Cannot be operated
Remains on	Malfunction detected	Operated with substitute characteristics in accordance with the description of the malfunction	Can or cannot be operated depending on the fault code

* The warning light flashes when any one of the conditions listed below is present and the start switch is pushed:

12: Crankshaft position sensor	41: Lean angle sensor (open or short-circuit)
19: Sidestand switch (open circuit in the wire to the ECU (engine))	50: ECU (engine) internal malfunction (faulty ECU (engine) memory)
30: Lean angle sensor (latch up detected)	

Checking for a defective engine trouble warning light bulb

The engine trouble warning light comes on for 1.4 seconds after the main switch has been turned to "ON" and when the start switch is being pushed. If the warning light does not come on under these conditions, the warning light bulb may be defective.



EAS27382

FAIL-SAFE ACTIONS (SUBSTITUTE CHARACTERISTICS OPERATION CONTROL)

If the ECU (engine) detects an abnormal signal from a sensor while the vehicle is being driven, the ECU (engine) illuminates the engine trouble warning light and provides the engine with alternate operating instructions that are appropriate for the type of malfunction.

When an abnormal signal is received from a sensor, the ECU (engine) processes the specified values that are programmed for each sensor in order to provide the engine with alternate operating instructions

FUEL INJECTION SYSTEM

that enable the engine to continue to operate or stop operating, depending on the conditions. The ECU (engine) takes fail-safe actions in two ways: one in which the sensor output is set to a prescribed value, and the other in which the ECU (engine) directly operates an actuator. Details on the fail-safe actions are given in the table below.

Self-Diagnostic Function

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
12	Crankshaft position sensor	No normal signals are received from the crankshaft position sensor.	Unable	Unable
13	Intake air pressure sensor (open or short circuit)	Intake air pressure sensor-open or short circuit detected.	Able	Able
14	Intake air pressure sensor (pipe system)	Intake air pressure sensor-pipe system malfunction (clogged or detached hose).	Able	Able
15	Throttle position sensor (open or short circuit)	Throttle position sensor-open or short circuit detected.	Able	Able
16	Throttle position sensor (stuck)	The throttle position sensor is stuck.	Able	Able
19	Sidestand switch (open circuit wire harness to ECU (engine))	Open circuit is detected in the input line from the sidestand switch to the ECU (engine).	Unable	Unable
21	Coolant temperature sensor	Coolant temperature sensor-open or short circuit detected.	Able	Able
22	Intake air temperature sensor	Intake air temperature sensor-open or short circuit detected.	Able	Able
24	O ₂ sensor	No normal signal is received from the O ₂ sensor.	Able	Able
30	Lean angle sensor	Latch up detected. No normal signal is received from the lean angle sensor.	Unable	Unable
33	Ignition coil (faulty ignition)	Malfunction detected in the primary wire of the ignition coil.	Unable	Unable
37	FID valve (stuck fully open)	Engine speed is high when the engine is idling.	Able	Able
41	Lean angle sensor (open or short circuit)	Lean angle sensor-open or short circuit detected.	Unable	Unable
43	Fuel system voltage (monitor voltage)	The ECU (engine) is unable to monitor the battery voltage (an open circuit in the line to the ECU (engine)).	Able	Able
44	Error in writing the amount of CO adjustment on EEPROM	Error is detected while reading or writing on EEPROM (CO adjustment value).	Able	Able
46	Vehicle system power supply (Monitoring voltage)	Power supply to the fuel injection system is not normal.	Able	Able
50	ECU (engine) internal malfunction (memory check error)	Faulty ECU (engine) memory. (When this malfunction is detected in the ECU (engine), the fault code number might not appear on the meter.)	Unable	Unable

FUEL INJECTION SYSTEM

Communication error with the meter

Fault code No.	Item	Symptom	Able / unable to start	Able / unable to drive
Er-1	ECU (engine) internal malfunction (output signal error)	No signals are received from the ECU (engine).	Unable	Unable
Er-2	ECU (engine) internal malfunction (output signal error)	No signals are received from the ECU (engine) within the specified duration.	Unable	Unable
Er-3	ECU (engine) internal malfunction (output signal error)	Data from the ECU (engine) cannot be received correctly.	Unable	Unable
Er-4	ECU (engine) internal malfunction (input signal error)	Non-registered data has been received from the meter.	Unable	Unable

EAS27400

TROUBLESHOOTING METHOD

The engine operation is not normal and the engine trouble warning light comes on.

1. Check:
 - Fault code number



- a. Check the fault code number displayed on the meter.
- b. Identify the system with the malfunction. Refer to "Self-Diagnostic Function table".
- c. Identify the probable cause of malfunction. Refer to "Diagnostic monitoring code table".



2. Checking and repair the probable case of malfunction.

Fault code No. YES	Fault code No. NO
Check and repair. Refer to "TROUBLESHOOTING DETAILS" on page 8-45. Monitor the operation of the sensors and actuators in the diagnostic mode. Refer to "Sensor operation table".	Check and repair. Refer to "TROUBLESHOOTING DETAILS" on page 8-45.

3. Perform ECU (engine) reinstatement action. Refer to "Reinstatement method" of table in "TROUBLESHOOTING DETAILS" on page 8-45.
4. Turn the main switch to "OFF" and back to "ON", then check the fault code number is not displayed.

NOTE:

If other fault code displayed, repeat steps (1) to (4) until all fault code number is not displayed.

5. The Malfunction history is stored even if the main switch is turned OFF. The malfunction history must be erased in the diagnostic mode. Refer to "Sensor operation table (Diagnostic code No.62)".

The engine operation is not normal but the engine trouble warning light does not come on.

1. Check the operation of following sensors and actuators in the Diagnostic mode. Refer to "Sensor operation table".

01: Throttle position sensor (throttle angle)
30: Ignition coil
36: Injector #1
37: Injector #2

If malfunction the sensors or actuators, repair or replace it.

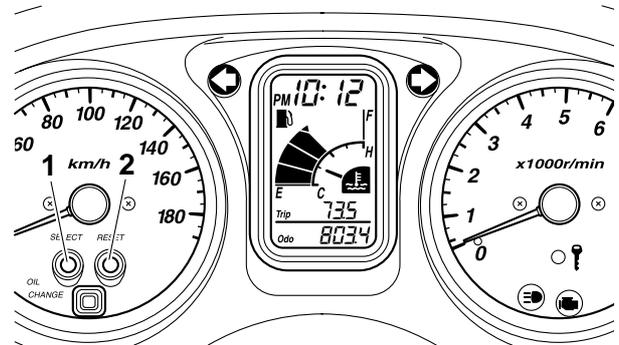
If not malfunction the sensors and actuators, check and repair the engine inner parts.

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DIAGNOSTIC MODE

Setting the diagnostic mode

1. Turn the main switch to "OFF" and set the engine stop switch to "O".
2. Disconnect the wire harness coupler from the fuel pump.
3. Simultaneously press and hold the "SELECT" "1" and "RESET" "2" buttons, turn the main switch to "ON", and continue to press the buttons for 8 seconds or more.



NOTE:

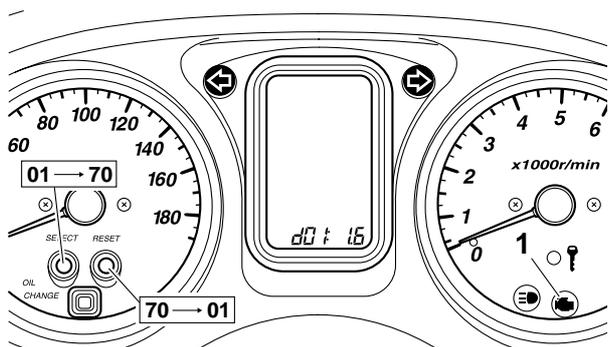
- All displays on the meter disappear except the clock and tripmeter displays.
 - "diag" appears on the clock LCD.
4. Press the "SELECT" button to select the CO adjustment mode "CO" or the diagnostic monitoring mode "diag".
 5. After selecting "diag", simultaneously press the "SELECT" and "RESET" buttons for 2 seconds or more to execute the selection.
 6. Set the engine stop switch to "X".
 7. Select the diagnostic code number that applies to the item that was verified with the fault code number by pressing the "SELECT" and "RESET" buttons.

NOTE:

The diagnostic code number appears on the clock LCD (01-70).

- To decrease the selected diagnostic code number, press the "RESET" button. Press the "RESET" button for 1 second or longer to automatically decrease the diagnostic code numbers.
- To increase the selected diagnostic code number, press the "SELECT" button. Press the "SELECT" button for 1 second or longer to automatically increase the diagnostic code number.

bers.



8. Verify the operation of the sensor or actuator.

- Sensor operation

The data representing the operating conditions of the sensor appears on the trip LCD.

- Actuator operation

Set the engine stop switch to “○” to operate the actuator.

NOTE:

If the engine stop switch is set to “○”, set it to “OFF”, and then set it to “○” again.

9. Turn the main switch to “⊗” to cancel the diagnostic mode.

FUEL INJECTION SYSTEM

Diagnostic code table

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
12	No normal signals are received from the crankshaft position sensor.	<ul style="list-style-type: none"> ● Open or short circuit in wire harness. ● Defective crankshaft position sensor. ● Malfunction in pickup rotor. ● Malfunction in ECU (engine). ● Improperly installed sensor. 	—
13	Intake air pressure sensor-open or short circuit detected.	<ul style="list-style-type: none"> ● Open or short circuit in wire sub lead. ● Open or short circuit in wire harness. ● Defective intake air pressure sensor. ● Malfunction in ECU (engine). 	03
14	Intake air pressure sensor-pipe system malfunction (clogged or detached hose).	<ul style="list-style-type: none"> ● Intake air pressure sensor hose is detached, clogged, kinked, or pinched. ● Malfunction of the intake air pressure sensor in the intermediate electrical potential. ● Malfunction in ECU (engine). 	03
15	Throttle position sensor-open or short circuit detected.	<ul style="list-style-type: none"> ● Open or short circuit in wire sub lead. ● Open or short circuit in wire harness. ● Defective throttle position sensor. ● Malfunction in ECU (engine). ● Improperly installed throttle position sensor. 	01
16	Stuck throttle position sensor detected.	<ul style="list-style-type: none"> ● Stuck throttle position sensor. ● Malfunction in ECU (engine). 	01
19	Open circuit is detected in the input line from the sidestand switch to the ECU (engine).	<ul style="list-style-type: none"> ● Open or short circuit in wire harness. ● Malfunction in ECU (engine). 	20
21	Coolant temperature sensor-open or short circuit detected.	<ul style="list-style-type: none"> ● Open or short circuit in wire harness. ● Defective coolant temperature sensor. ● Malfunction in ECU (engine). ● Improperly installed coolant temperature sensor. 	06
22	Intake air temperature sensor-open or short circuit detected.	<ul style="list-style-type: none"> ● Open or short circuit in wire harness. ● Defective intake temperature sensor. ● Malfunction in ECU (engine). ● Improperly installed intake air temperature sensor. 	05
24	No normal signal is received from the O ₂ sensor.	<ul style="list-style-type: none"> ● Open or short circuit in wire harness. ● Defective O₂ sensor. ● Malfunction in ECU (engine). ● Improperly installed O₂ sensor. 	—
30	Latch up detected. No normal signal is received from the lean angle sensor.	<ul style="list-style-type: none"> ● The vehicle has overturned. ● Defective lean angle sensor. ● Malfunction in ECU (engine). ● Improperly installed lean angle sensor. 	08

FUEL INJECTION SYSTEM

Fault code No.	Symptom	Probable cause of malfunction	Diagnostic code No.
33	Malfunction detected in the primary wire of the ignition coil.	<ul style="list-style-type: none"> ● Open or short circuit in wire harness. ● Malfunction in ignition coil. ● Malfunction in ECU (engine). ● Malfunction in a component of ignition cut-off circuit system. 	30
37	Faulty the FID valve.	<ul style="list-style-type: none"> ● Stuck the FID valve (when fully open). ● Malfunction in ECU (engine). 	01
41	Lean angle sensor-open or short circuit detected.	<ul style="list-style-type: none"> ● Open or short circuit in wire harness. ● Defective lean angle sensor. ● Malfunction in ECU (engine). 	08
43	The ECU is unable to monitor the battery voltage (an open circuit in the line to the ECU (engine)).	<ul style="list-style-type: none"> ● Open circuit in wire harness. ● Malfunction in ECU (engine). ● Defective fuel injection system relay. 	50
44	Error is detected while reading or writing on EEPROM (CO adjustment value).	<ul style="list-style-type: none"> ● Malfunction in ECU (engine). (The CO adjustment value is not properly written on or read from the internal memory). 	60
46	Power supply to the fuel injection system is not normal.	Malfunction in the charging system. Refer to "CHARGING SYSTEM" on page 8-15.	—
50	Faulty ECU (engine) memory. (When this malfunction is detected in the ECU (engine), the fault code number might not appear on the meter.)	<ul style="list-style-type: none"> ● Malfunction in ECU (engine). (The program and data are not properly written on or read from the internal memory.) 	—
Er-1	No signals are received from the ECU.	<ul style="list-style-type: none"> ● Open or short circuit in communication line. ● Malfunction in meter unit. ● ECU (engine) is defective 	—
Er-2	No signals are received from the ECU (engine) within the specified duration.	<ul style="list-style-type: none"> ● Open or short circuit in communication line. ● Malfunction in meter unit. ● ECU (engine) is defective 	—
Er-3	Data from the ECU (engine) cannot be received correctly.	<ul style="list-style-type: none"> ● Open or short circuit in communication line. ● Malfunction in meter unit. ● ECU (engine) is defective 	—
Er-4	Non-registered data has been received from the meter.	<ul style="list-style-type: none"> ● Open or short circuit in communication line. ● Malfunction in meter unit. ● ECU (engine) is defective 	—

FUEL INJECTION SYSTEM

Sensor operation table

Switch the meter display from the regular mode to the diagnostic mode. To switch the display, refer to "DIAGNOSTIC MONITORING MODE".

Diagnostic monitoring code No.	Item	Meter display	Checking method
01	Throttle angle ● Fully closed position ● Fully opened position	(15–16) (97–102)	Check with throttle fully closed. Check with throttle fully open.
03	Pressure difference (atmospheric pressure-intake air pressure)	Displays the intake air pressure.	Turn On the engine stop switch, then operate the throttle while pressing the start switch. (If the display value changes, the performance is OK.)
05	Intake air temperature	Displays the intake air temperature.	Compare the actually measured intake air temperature with the meter display value. (*2)
06	Coolant temperature	Displays the coolant temperature.	Compare the actually measured coolant temperature with the meter display value.
07	Vehicle speed pulse	0–999	Check that the number changes (integrating) when the rear wheels are rotated.
08	Lean angle sensor ● Upright ● Overturned	0.4–1.4 V 3.8–4.2 V	Remove the lean angle sensor and incline it more than 65 degrees.
09	Fuel system voltage (battery voltage)	Approximately 12.0 V	Compare with the actually measured battery voltage. (If the battery voltage is lower, perform recharging.)
20	Sidestand switch ● Stand retracted ● Stand extended	ON OFF	Turn ON/OFF the Sidestand switch.
60	EEPROM fault code display ● No fault ● Fault detected	00 01 or 02 (Fault detection cylinder) ● (If both cylinders are defective, the display alternates every two seconds.)	—

FUEL INJECTION SYSTEM

Diagnostic monitoring code No.	Item	Meter display	Checking method
61	Malfunction history code display <ul style="list-style-type: none"> ● No history ● History exists 	00 12-50 (Fault detection code) <ul style="list-style-type: none"> ● (If code numbers more than one are detected, the display alternates every two seconds to show all the detected code numbers. When all code numbers are shown, the display repeats the same process.) 	—
62	Malfunction history code erasure <ul style="list-style-type: none"> ● No history ● History exists 	00 00-17 (Memory numbers of the fault detection)	— To erase the history, turn ON the engine stop switch.
70	Control number	00-255	—

*1 If it is not possible to check the intake temperature, use the ambient temperature as reference (use the compared values for reference).

Actuator operation table

Diagnostic monitoring code No.	Item	Actuation	Checking method
30	Ignition coil	Actuates the ignition coil for five times every second. Illuminates the engine trouble warning light.	Check the spark five times. <ul style="list-style-type: none"> ● Connect an ignition checker.
36	Injector #1	Actuates the injector #1 for five times every second. Illuminates the engine trouble warning light.	Check the operating sound of the injector #1 five times.
37	Injector #2	Actuates the injector #2 for five times every second. Illuminates the engine trouble warning light.	Check the operating sound of the injector #2 five times.
50	Fuel injection system relay	Actuates the fuel injection system relay for five times every second. Illuminates the engine trouble warning light. (The engine trouble warning light is OFF when the relay is ON, and the engine trouble warning light is ON when the relay is OFF).	Check the operating sound of the fuel injection system relay five times.

FUEL INJECTION SYSTEM

Diagnostic monitoring code No.	Item	Actuation	Checking method
51	Radiator fan motor relay	Actuates the radiator fan motor relay for five cycles every five-second. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the Radiator fan motor relay five times.
52	Headlight relay	Actuates the headlight relay for five times every five-second. (ON 2 seconds, OFF 3 seconds) Illuminates the engine trouble warning light.	Check the operating sound of the headlight relay five times.
57	Grip warmer relay	Actuates the grip warmer relay. (the light is off when the relay is off, and the light is on when the relay is on) Illuminates the engine trouble warning light.	Check the operating sound of the grip warmer relay 1 time.

FUEL INJECTION SYSTEM

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TROUBLESHOOTING DETAILS

This section describes the measures per fault code number displayed on the meter. Check and service the items or components that are the probable cause of the malfunction following the order given. After the check and service of the malfunctioning part has been completed, reset the meter display according to the reinstatement method.

Fault code No.:

Code number displayed on the meter when the engine failed to work normally. Refer to "Self-Diagnostic Function table".

Diagnostic code No.:

Diagnostic code number to be used when the diagnostic mode is operated. Refer to "DIAGNOSTIC MODE" on page 8-38.

Fault code No.	12	Symptom	No normal signals are received from the crankshaft position sensor.	
Diagnostic code No.				
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Installed condition of crankshaft position sensor	Check the installed area for looseness or pinching.	Cranking the engine.	
2	Connected state of connector <ul style="list-style-type: none"> ● Crankshaft position sensor coupler ● Main wire harness ECU (engine) coupler 	<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 		
3	Open or short circuit in wire harness.	<ul style="list-style-type: none"> ● Repair or replace if there is an open or short circuit. ● Between the sensor coupler and ECU coupler. (Black/Yellow–Black/Yellow) (Black/Blue–Black/Blue) 		
4	Defective crankshaft position sensor.	<ul style="list-style-type: none"> ● Replace if defective. Refer to "CHECKING THE CRANKSHAFT POSITION SENSOR" on page 8-114.		

FUEL INJECTION SYSTEM

Fault code No.	13	Symptom	Intake air pressure sensor-open or short circuit detected.	
Diagnostic code No.	03	Intake air pressure sensor		
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Connected state of connector ● Intake air pressure sensor coupler ● Main wire harness ECU (engine) coupler	<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 	Cranking the engine.	
2	Open or short circuit in wire harness.	<ul style="list-style-type: none"> ● Repair or replace if there is an open or short circuit. ● Between sensor coupler and ECU coupler (Black/Blue–Black/Blue) (Pink/White–Pink/White) (Blue–Blue) 		
3	Defective intake air pressure sensor	<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No.03) ● Replace if defective. Refer to “CHECKING THE INTAKE AIR PRESSURE SENSOR” on page 8-120.		

FUEL INJECTION SYSTEM

Fault code No.	14	Symptom	Intake air pressure sensor-pipe system malfunction (clogged or detached hose).	
Diagnostic code No.	03	Intake air pressure sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Intake air pressure sensor hose		<ul style="list-style-type: none"> ● Check the Intake air pressure sensor hose condition. ● Repair or replace the sensor hose. 	Starting the engine and operating it at idle.
2	Intake air pressure sensor malfunction at intermediate electrical potential.		<ul style="list-style-type: none"> ● Check and repair the connection. ● Replace it if there is a malfunction. 	
3	Connected state of connector <ul style="list-style-type: none"> ● Intake air pressure sensor coupler ● Main wire harness ECU (engine) coupler 		<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 	
4	Defective intake air pressure sensor		<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No.03) ● Replace if defective. Refer to "CHECKING THE INTAKE AIR PRESSURE SENSOR" on page 8-120.	

FUEL INJECTION SYSTEM

Fault code No.	15	Symptom	Throttle position sensor-open or short circuit detected.	
Diagnostic code No.	01	Throttle position sensor		
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Installed condition of throttle position sensor.	<ul style="list-style-type: none"> ● Check the installed area for looseness or pinching. ● Check that is installed in the specified position. 	Turning the main switch ON.	
2	Connected state of connector <ul style="list-style-type: none"> ● Throttle position sensor coupler ● Main wire harness ECU (engine) coupler 	<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 		
3	Open or short circuit in wire harness.	<ul style="list-style-type: none"> ● Repair or replace if there is an open or short circuit. ● Between sensor coupler and ECU (engine) coupler (Black/Blue-Black/Blue) (Yellow-Yellow) (Blue-Blue) 		
4	Throttle position sensor lead wire open circuit output voltage check.	<ul style="list-style-type: none"> ● Check for open circuit and replace the throttle position sensor. (Black/Blue-Yellow) 		
Open circuit item		Output voltage		
Ground wire open circuit		5 V		
Output wire open circuit		0 V		
Power supply wire open circuit		0 V		
5	Defective throttle position sensor.	<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No.01) ● Replace if defective. Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 8-119.		

FUEL INJECTION SYSTEM

Fault code No.	16	Symptom	Stuck throttle position sensor detected.	
Diagnostic monitoring code No.		01	Throttle position sensor	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed condition of throttle position sensor.		<ul style="list-style-type: none"> ● Check the installed area for looseness or pinching. ● Check that is installed in the specified position. 	Reinstated by starting the engine, operating it at idle, and then racing it.
2	Defective throttle position sensor.		<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No.01) ● Replace if defective. Refer to "CHECKING THE THROTTLE POSITION SENSOR" on page 8-119.	

Fault code No.	19	Symptom	Open circuit is detected in the input line from the sidestand switch to the ECU (engine).	
Diagnostic code No.		20	Sidestand switch	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connected state of connector <ul style="list-style-type: none"> ● Main wire harness ECU (engine) coupler 		<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 	Reinstated by retracting the sidestand. Reinstated by reconnecting the wiring.
2	Open or short circuit in wire harness.		<ul style="list-style-type: none"> ● Repair or replace if there is an open or short circuit. ● Between ECU (engine) and sidestand switch (Light green–Light green) 	
3	Defective sidestand switch		<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No.20) ● Replace if defective. Refer to "CHECKING THE SWITCHES" on page 8-101.	

FUEL INJECTION SYSTEM

Fault code No.	21	Symptom	Coolant temperature sensor-open or short circuit detected.	
Diagnostic code No.	06	Coolant temperature sensor		
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Installed condition of coolant temperature sensor		Check the installed area for looseness or pinching.	Turning the main switch ON.
2	Connected state of connector ● Coolant temperature sensor coupler ● Main wire harness ECU (engine) coupler		<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 	
3	Open or short circuit in wire harness.		<ul style="list-style-type: none"> ● Repair or replace if there is an open or short circuit. ● Between sensor coupler and ECU coupler (Black/Blue-Black/Blue) (Green/Red-Green/Red) 	
4	Defective coolant temperature sensor.		<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No.06) ● Replace if defective. Refer to "CHECKING THE COOLANT TEMPERATURE SENSOR" on page 8-118.	

FUEL INJECTION SYSTEM

Fault code No.	22	Symptom	Intake air temperature sensor-open or short circuit detected.	
Diagnostic code No.	05	Intake air temperature sensor		
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Installed condition of intake air temperature sensor	Check the installed area for looseness or pinching.	Turning the main switch ON.	
2	Connected state of connector <ul style="list-style-type: none"> ● Intake air temperature sensor coupler ● Main wire harness ECU (engine) coupler 	<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 		
3	Open or short circuit in wire harness.	<ul style="list-style-type: none"> ● Repair or replace if there is an open or short circuit. ● Between sensor coupler and ECU coupler (Black/Blue–Black/Blue) (Brown/White–Brown/White) 		
4	Defective intake air temperature sensor.	<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No.05) ● Replace if defective. Refer to “CHECKING THE INTAKE AIR TEMPERATURE SENSOR” on page 8-120.		

FUEL INJECTION SYSTEM

Fault code No.	24	Symptom	No normal signal is received from the O₂ sensor.	
Diagnostic code No.	—			
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Installed condition of O ₂ sensor	Check the installed area for looseness or pinching.	As the returning method start method, start and warm up the engine until the coolant temperature rises over 60°C (40°F). Then, maintain the engine speed at 2000 r/min to 3000 r/min until the warning light goes off. When the warning light goes off, the reset operation is finished.	
2	Connected state of connector <ul style="list-style-type: none"> ● O₂ sensor coupler ● Main wire harness ECU (engine) coupler 	<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 		
3	Open or short circuit in wire harness.	<ul style="list-style-type: none"> ● Repair or replace if there is an open or short circuit. ● Between sensor coupler and ECU coupler (Black/Blue–Black/Blue) (Gray/Green–Gray/Green) (Red/Blue–Red/Blue) (Black–Black) 		
4	Check fuel pressure	Refer to “CHECKING THE PRESSURE REGULATOR OPERATION” on page 7-7.		
5	Defective O ₂ sensor	Replace if defective.		

Fault code No.	30	Symptom	Latch up detected. No normal signal is received from the lean angle sensor.	
Diagnostic code No.	08		Lean angle sensor	
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	The vehicle has overturned.	Raise the vehicle upright.	Turning the main switch ON (however, the engine cannot be restarted unless the main switch is first turned OFF).	
2	Installed state of the lean angle sensor.	Check the installed direction and condition of the sensor.		
3	Defective lean angle sensor.	<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No.08) ● Replace if defective. Refer to “CHECKING THE LEAN ANGLE SENSOR” on page 8-114.		

FUEL INJECTION SYSTEM

Fault code No.	33	Symptom	Malfunction detected in the primary wire of the ignition coil.	
Diagnostic code No.	30	Ignition coil		
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Connected state of connector <ul style="list-style-type: none"> ● Ignition coil primary side coupler (Orange) ● Main wire harness ECU (engine) coupler 	<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 	Starting the engine and operating it at idle.	
2	Open or short circuit in wire harness.	<ul style="list-style-type: none"> ● Repair or replace if there is an open or short circuit. ● Between ignition coil coupler and ECU coupler (Orange-Orange) (Red/Black-Red/Black) 		
3	Defective ignition coil	<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No.30) ● Replace if defective. Refer to "CHECKING THE IGNITION COIL" on page 8-113.		

Fault code No.	37	Symptom	Engine speed is high when the engine is idling.	
Diagnostic monitoring code No.	01	Throttle position sensor		
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Stuck FID valve detected.	<ul style="list-style-type: none"> ● Check the throttle body. Refer to "THROTTLE BODIES" on page 7-4.	Reinstated by starting the engine and operating it at idle for about 5 minutes. Do not turn the throttle grip.	
2	Defective throttle fully closed.	<ul style="list-style-type: none"> ● Check the throttle body. Refer to "THROTTLE BODIES" on page 7-4.		

FUEL INJECTION SYSTEM

Fault code No.	41	Symptom	Lean angle sensor-open or short circuit detected.	
Diagnostic code No.	08	Lean angle sensor		
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Connected state of connector ● Lean angle sensor coupler ● Main wire harness ECU (engine) coupler	<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 	Reinstated immediately when it becomes normal.	
2	Open or short circuit in wire harness.	<ul style="list-style-type: none"> ● Repair or replace if there is an open or short circuit. ● Between sensor coupler and ECU coupler (Black/Blue–Black/Blue) (Yellow/Green–Yellow/Green) (Blue–Blue) 		
3	Defective lean angle sensor	<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No.08) ● Replace if defective. 		

Fault code No.	43	Symptom	The ECU (engine) is unable to monitor the battery voltage.	
Diagnostic code No.	50	Fuel injection system relay		
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Connected state of connector ● Fuel injection system relay coupler ● Main wire harness ECU (engine) coupler	<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 	Starting the engine and operating it at idle.	
2	Defective fuel injection system relay	Replace if defective.		
3	Open or short circuit in the wire harness.	<ul style="list-style-type: none"> ● Repair or replace if there is an open or short circuit. ● Between the fuse box coupler and ECU coupler (Red/Blue–Red/Blue) ● Between the fuse box coupler and battery terminal (Red–Red) 		
4	Malfunction or open circuit in fuel injection system relay	<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No. 50) ● Replace if defective. ● If there is no malfunction with the fuel injection system relay, replace the ECU (engine). 		

FUEL INJECTION SYSTEM

Fault code No.	44	Symptom	Error is detected while reading or writing on EEPROM (CO adjustment value).	
Diagnostic code No.	60	EEPROM improper cylinder indication		
Order	Item/components and probable cause	Check or maintenance job	Reinstatement method	
1	Malfunction in ECU (engine)	<ul style="list-style-type: none"> ● Execute the diagnostic monitoring mode. (Code No. 60) ● Check the faulty cylinder. (If there are multiple cylinders, the number of the faulty cylinders appears alternately at 2-second intervals.) ● Readjust the CO of the displayed cylinder. Refer to "ADJUSTING THE EXHAUST GAS VOLUME" on page 3-7. ● Replace ECU (engine) if defective. 	Turning the main switch ON	

FUEL INJECTION SYSTEM

Fault code No.	46	Symptom	Power supply to the FI system relay is not normal.	
Diagnostic monitoring code No.		—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Connected state of connector. ● Main wire harness ECU (engine) coupler		<ul style="list-style-type: none"> ● Check the coupler for any pins that may have pulled out. ● Check the locking condition of the coupler. ● If there is a malfunction, repair it and connect it securely. 	Starting the engine and operating it at idle.
2	Faulty battery		<ul style="list-style-type: none"> ● Replace or change the battery Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-107. 	
3	The malfunction of the rectifier/regulator		<ul style="list-style-type: none"> ● Replace if defective. Refer to "CHARGING SYSTEM" on page 8-15. 	
4	Open or short circuit in wire harness.		<ul style="list-style-type: none"> ● Repair or replace if there is an open or short circuit. ● Between battery terminal and main switch coupler (Red-Red) ● Between main switch coupler and fuse box coupler (Brown/Blue-Brown/Blue) ● Between fuse box coupler and ECU (engine) coupler (Red/White-Red/White) 	

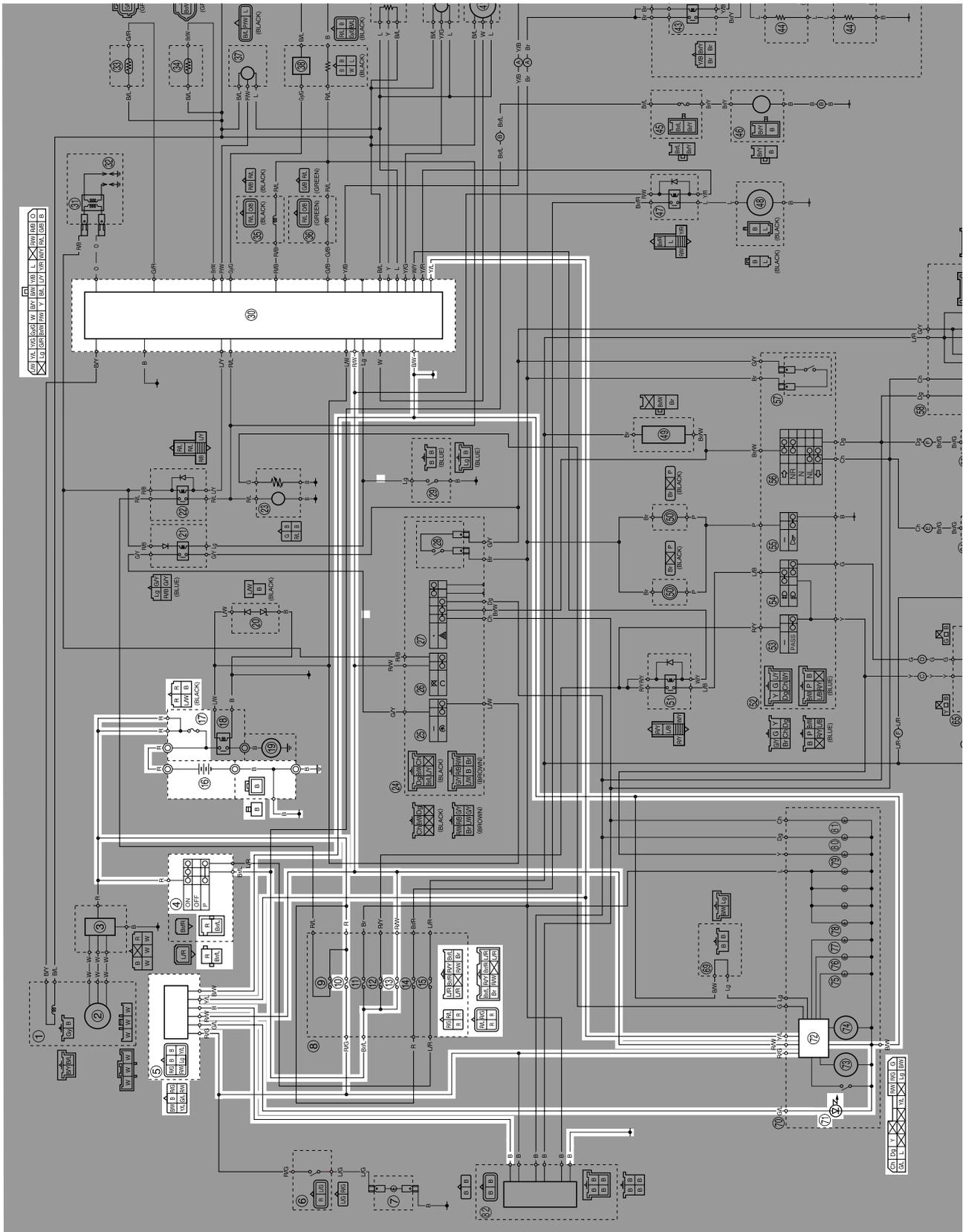
Fault code No.	50	Symptom	Faulty ECU (engine) memory. (When this malfunction is detected in the ECU (engine), the fault code number might not appear on the meter.)	
Diagnostic code No.		—	—	
Order	Item/components and probable cause		Check or maintenance job	Reinstatement method
1	Malfunction in ECU (engine)		Replace the ECU (engine).	Turning the main switch ON

EAS27640

IMMOBILIZER SYSTEM

EAS27650

CIRCUIT DIAGRAM



IMMOBILIZER SYSTEM

- 4. Main switch
- 5. Immobilizer unit
- 10. Backup fuse (storage box light, immobilizer unit and meter assembly)
- 13. Ignition fuse
- 16. Battery
- 17. Main fuse
- 30. ECU (engine)
- 71. Immobilizer system indicator light
- 72. Multi-function meter

EAS27671

GENERAL INFORMATION

This vehicle is equipped with an immobilizer system to help prevent theft by re-registering codes in the standard keys. This system consists of the following:

- a code re-registering key (with a red bow)
- two standard keys (with a black bow) that can be re-registered with new codes
- a transponder (installed in the red key bow)
- an immobilizer unit
- the ECU
- an immobilizer system indicator light

The key with the red bow is used to register codes in each standard key. Do not use the key with the red bow for driving. It should only be used for re-registering new codes in the standard keys. The immobilizer system cannot be operated with a new key until the key registered with a code. If you lose the code re-registering key, the ECU and main switch (equipped with the immobilizer unit) need to be replaced.

Therefore, always use a standard key for driving. (See caution below.)

NOTE:

Each standard key is registered during production, therefore re-registering at purchase is not necessary.

ECA14971

CAUTION:

- **DO NOT LOSE THE CODE RE-REGISTERING KEY!** If the code re-registering key is lost, registering new codes in the standard keys is impossible. The standard keys can still be used to start the vehicle. However, if code re-registering is required (e.g., if a new standard key is made or all keys are lost) the entire immobilizer system must be replaced. Therefore, it is highly recommended to use either standard key for driving, and to keep the code re-registering key in a safe place.
 - Do not submerge the keys in water.
 - Do not expose the keys to excessively high temperatures.
 - Do not place the keys close to magnets (this includes, but is not limited to, products such as speakers, etc.).
 - Do not place heavy items on the keys.
 - Do not grind the keys or alter their shape.
 - Do not disassemble the key bows.
 - Do not put two keys of any immobilizer system on the same key ring.
 - Keep the standard keys as well as other immobilizer system keys away from the code re-registering key.
 - Keep other immobilizer system keys away from the main switch as they may cause signal interference.
-

EAS27691

PART REPLACEMENT AND KEY CODE REGISTRATION REQUIREMENTS

In the course of use, you may encounter the following cases where replacement of parts and registration of code re-registering/standard keys are required.

NOTE:

Each standard key is registered during production, therefore re-registering at purchase is not necessary.

IMMOBILIZER SYSTEM

	Parts to be replaced					Key registration requirement
	Main switch/ immobilizer unit		Standard key	ECU	Accessory lock* and key	
	Main switch	Immobilize r unit				
Standard key is lost			√			New standard key
All keys have been lost (including code re-reg- istering key)		√	√	√	√	Code re-registering key and standard keys
ECU is defective				√		Code re-registering key and standard keys
Immobilizer unit is defective		√				Code re-registering key and standard keys
Main switch is defective		√	√	√	√	Code re-registering key and standard keys
Accessory lock* is defective					√	Not required

* Accessory locks mean the seat lock and fuel tank cap.

Code re-registering key registration:

When the immobilizer unit or ECU is replaced, the code re-registering key must be registered to the unit.

To register a code re-registering key:

1. Turn the main switch to "ON" with the code re-registering key.

NOTE:

Check that the immobilizer system indicator light comes on for one second, then goes off. When the immobilizer system indicator light goes off, the code re-registering key has been registered.

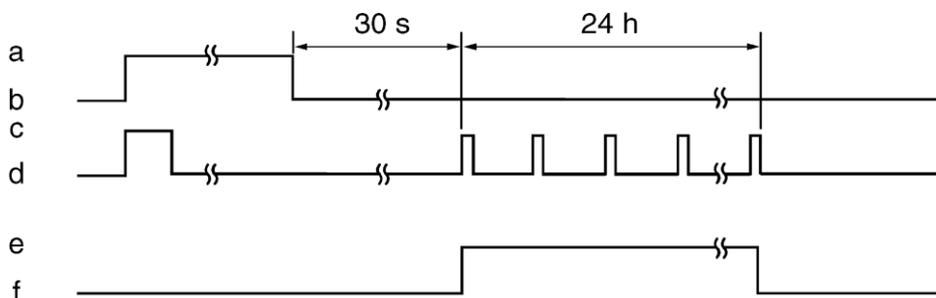
2. Check that the engine can be started.

3. Register the standard key, following the instructions in the section below.

Standby mode:

To enable the immobilizer system, turn the ignition key to "OFF". 30 seconds later, the indicator light will start flashing continuously in the standby flashing mode pattern for up to 24 hours. After that time, the indicator light will stop flashing, but the immobilizer system is still enabled.

Standby mode



- a. Main switch "ON"
- b. Main switch "OFF"
- c. LED on

- d. LED off
- e. Standby mode on
- f. Standby mode off

Standard key registration:

Standard key registration is required when a standard key is lost and needs to be replaced, or when

IMMOBILIZER SYSTEM

the code re-registering key is re-registered after the immobilizer unit or ECU are replaced.

NOTE:

Do not start the engine with a standard key that has not been registered. If the main switch is turned "ON" with a standard key that has not been registered, the immobilizer system indicator light flashes to indicate fault code "52". (Refer to "SELF-DIAGNOSIS FAULT CODE INDICATION" on page 8-62).

1. Check that the immobilizer system indicator light signals the standby mode.
2. Using the code re-registering key, turn the main switch to "ON", then "OFF", and then remove the key within 5 seconds.
3. Insert the first standard key to be registered into the main switch, then turn the key to "ON" within 5 seconds to activate the key registration mode.

NOTE:

The existing standard key code is erased from the memory when the key registration mode is activated. When the key registration mode is activated, the immobilizer system indicator light flashes rapidly.

4. While the indicator light is flashing, turn the main switch to "OFF", remove the key, and within 5 seconds, insert the second standard key to be registered into the main switch.

NOTE:

If the immobilizer system indicator light stops flashing 5 seconds after the first standard key is registered, the registration mode is deactivated. If this occurs, the second standard key cannot be registered, and steps 2 to 4 need to be repeated to register both standard keys.

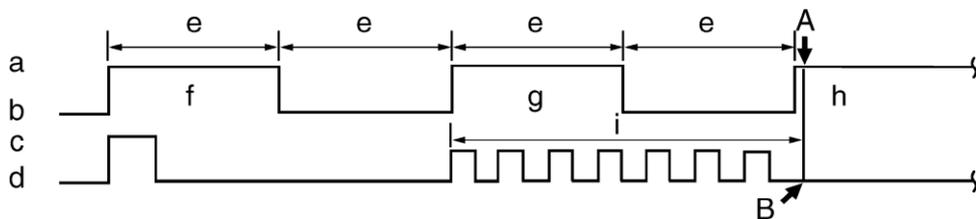
5. Turn the main switch to "ON".

NOTE:

When the indicator light goes off, the registration is complete.

6. Check that the engine can be started with the two registered standard keys.

Standard key registration

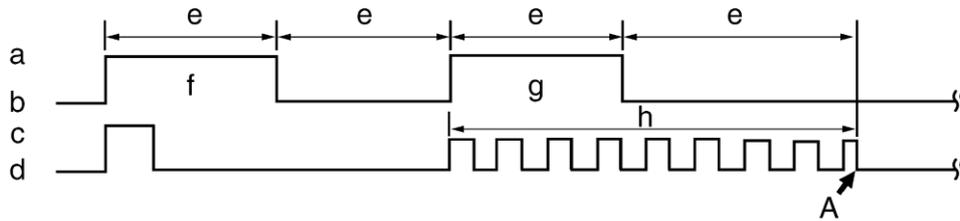


- | | |
|----------------------------|--|
| a. Main switch "ON" | h. Second standard key |
| b. Main switch "OFF" | i. Registration mode |
| c. LED on | A. Registration of the second standard key is complete. |
| d. LED off | B. Immobilizer system indicator light stops flashing when the registration of the second standard key is complete. |
| e. Less than 5.0 s | |
| f. Code re-registering key | |
| g. First standard key | |

Voiding the standard key code:

If a standard key has been lost, it is possible to disable its use by re-registering the remaining standard key. Standard key registration erases the stored standard key code from the memory, thus disabling the lost standard key. To re-register, refer to "Standard key registration".

Standard key code voiding method



- a. Main switch "ON"
- b. Main switch "OFF"
- c. LED on
- d. LED off
- e. Less than 5.0 s
- f. Code re-registering key
- g. Remaining standard key
- h. Registration mode
- A. If the immobilizer system indicator light stops flashing 5 seconds after the first standard key is registered, the second standard key cannot be registered.

EAS27701

TROUBLESHOOTING

When the main switch is turned to "ON", the immobilizer system indicator light does not come on nor flashes.

<p>1. Check the fuses. (Main, ignition and backup) Refer to "CHECKING THE FUSES" on page 8-106.</p>	NG→	Replace the fuse(s).
OK↓		
<p>2. Check the battery. Refer to "CHECKING AND CHARGING THE BATTERY" on page 8-107.</p>	NG→	<ul style="list-style-type: none"> ● Clean the battery terminals. ● Recharge or replace the battery.
OK↓		
<p>3. Check the main switch. Refer to "CHECKING THE SWITCHES" on page 8-101.</p>	NG→	Replace the main switch/immobilizer unit.
OK↓		
<p>4. Check the entire immobilizer system wiring. Refer to "CIRCUIT DIAGRAM" on page 8-57.</p>	NG→	Properly connect or repair the immobilizer system wiring.
OK↓		
<ul style="list-style-type: none"> ● Check the condition of the each immobilizer system circuits. ● Refer to "SELF-DIAGNOSIS FAULT CODE INDICATION" on page 8-62. 		

EAS27721

SELF-DIAGNOSIS FAULT CODE INDICATION

When a system failure occurs, the error code number is indicated in the LCD display of meter and the immobilizer system indicator light blinks at the same time. The pattern of blinking also shows the error code.

IMMOBILIZER SYSTEM

Fault code	Part	Symptom	Cause	Action
51	IMMOBILIZER UNIT	Code cannot be transmitted between the key and immobilizer unit.	<ul style="list-style-type: none"> ● Radio wave interference caused by objects around the keys and antennas. ● Immobilizer unit malfunction. ● Key malfunction. 	<ul style="list-style-type: none"> ● Keep magnets, metal objects, and other immobilizer system keys away from the keys and antennas. ● Replace the main switch/immobilizer unit. ● Replace the key.
52	IMMOBILIZER UNIT	Codes between the key and immobilizer unit do not match.	<ul style="list-style-type: none"> ● Signal received from other transponder (failed to recognize code after ten consecutive attempts). ● Signal received from unregistered standard key. 	<ul style="list-style-type: none"> ● Place the immobilizer unit at least 50 mm away from the transponder of other vehicles. ● Register the standard key.
53	IMMOBILIZER UNIT	Codes cannot be transmitted between the ECU and the immobilizer unit.	<p>Noise interference or disconnected lead/cable.</p> <ul style="list-style-type: none"> ● Interference due to radio wave noise. ● Disconnected communication harness. ● Immobilizer unit malfunction. <p>ECU malfunction.</p>	<ul style="list-style-type: none"> ● Check the wire harness and connector. ● Replace the main switch/immobilizer unit. ● Replace the ECU.
54	IMMOBILIZER UNIT	Codes transmitted between the ECU and the immobilizer unit do not match.	<p>Noise interference or disconnected lead/cable.</p> <ul style="list-style-type: none"> ● Interference due to radio wave noise. ● Disconnected communication harness. ● Immobilizer unit malfunction. ● ECU failure. <p>(The ECU or immobilizer unit was replaced with a used unit from another vehicle.)</p>	<ul style="list-style-type: none"> ● Register the code re-registering key. ● Check the wire harness and connector. ● Replace the main switch/immobilizer unit. ● Replace the ECU.
55	IMMOBILIZER UNIT	Key code registration malfunction.	Same standard key was attempted to be registered two consecutive times.	Register another standard key.

IMMOBILIZER SYSTEM

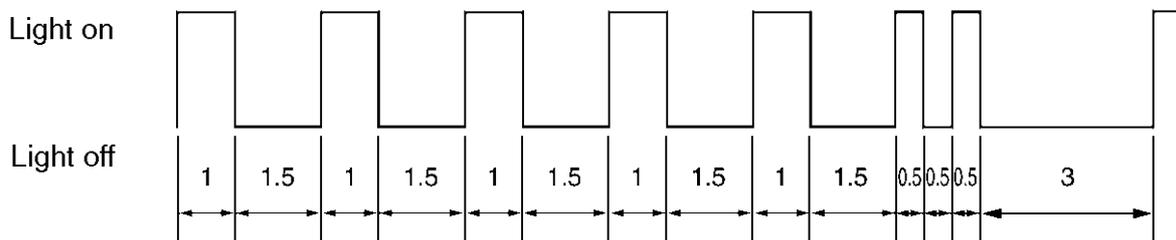
Fault code	Part	Symptom	Cause	Action
56	ECU	Undefinition code is received.	Noise interference or disconnected lead/cable.	<ul style="list-style-type: none"> ● Check the wire harness and connector. ● Replace the main switch/immobilizer unit. ● Replace the ECU.

Immobilizer system indicator light fault code indication

Digit of 10 : Cycles of "1" sec. ON and 1.5 sec. OFF.

Digit of "1" : Cycles of 0.5 sec. ON and 0.5 sec. OFF.

Example: fault code 52



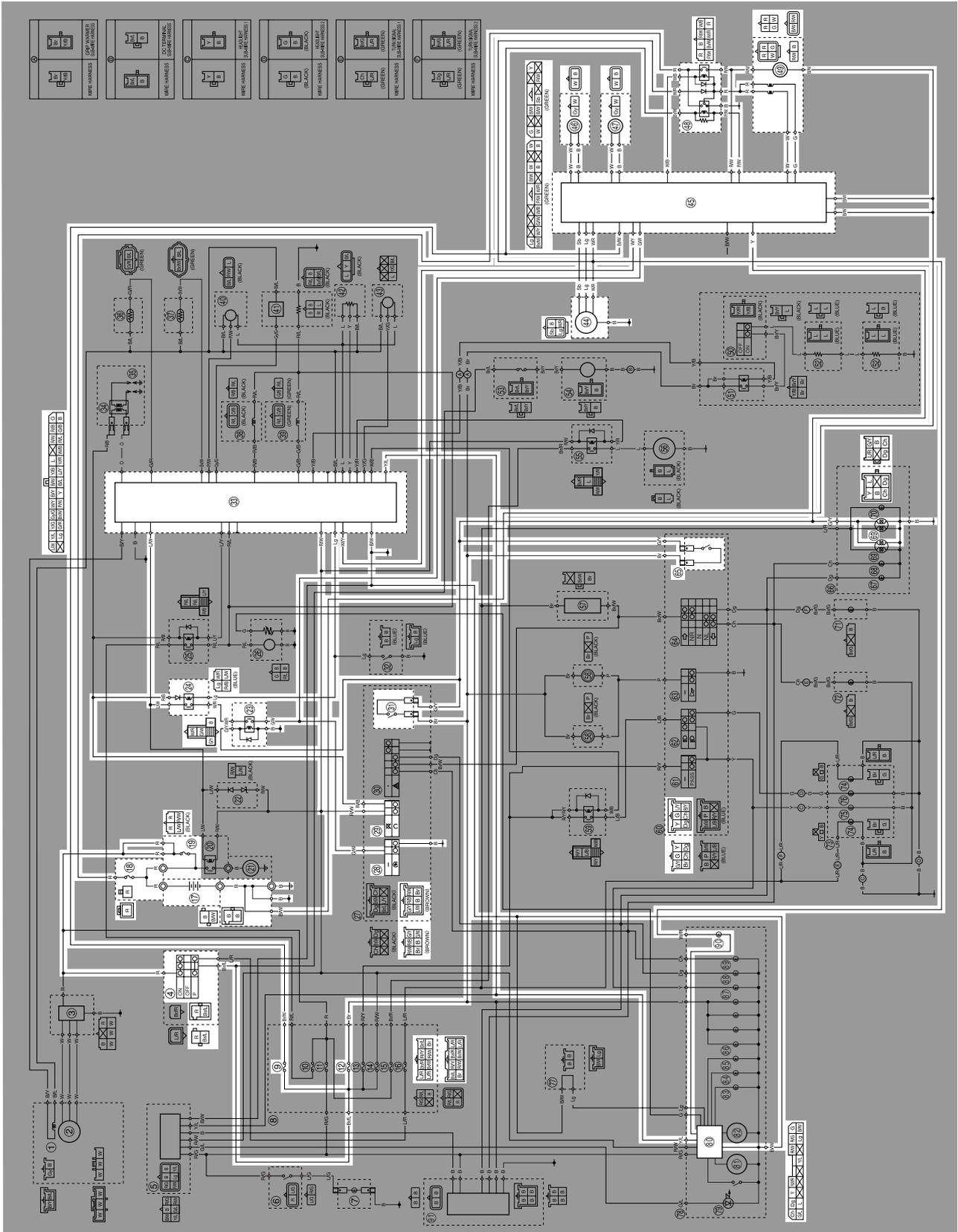
ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

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ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

EAS27730

CIRCUIT DIAGRAM



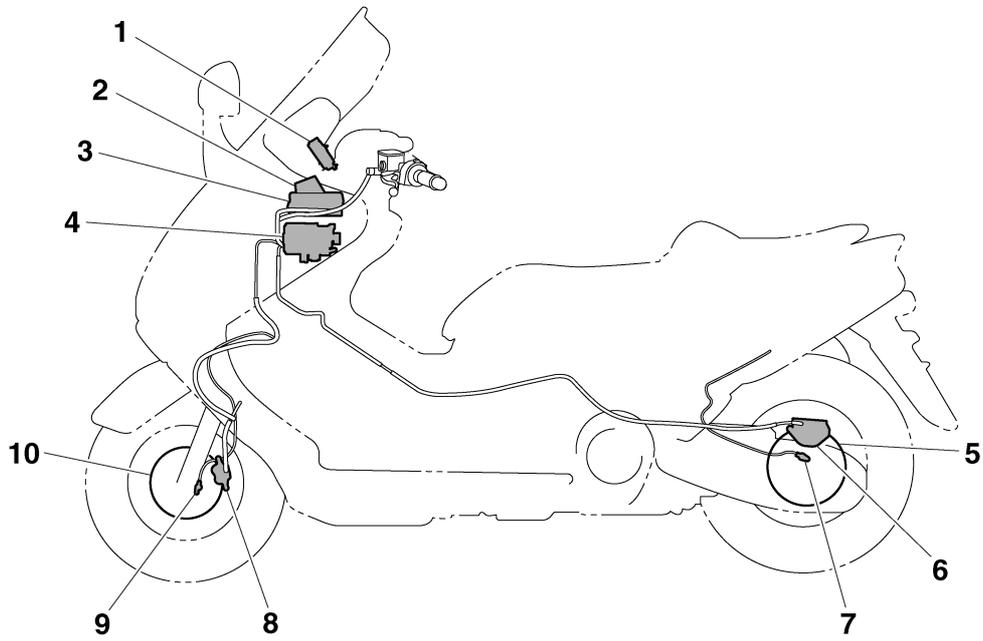
ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

- 4. Main switch
- 9. ABS control unit fuse
- 12. Signaling system fuse
- 17. Battery
- 18. ABS motor fuse
- 19. Main fuse
- 23. Starting circuit cut-off relay 2
- 24. Starting circuit cut-off relay 1
- 28. Start switch
- 29. Engine stop switch
- 31. Front brake light switch
- 32. ECU (engine)
- 44. ABS test coupler
- 45. ECU (ABS)
- 46. Front wheel sensor
- 47. Rear wheel sensor
- 48. Fail-safe relay
- 58. Hydraulic unit
- 65. Rear brake light switch
- 69. Tail/brake light
- 72. Multi-function display
- 90. ABS warning light

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

EAS27740

ABS COMPONENTS CHART



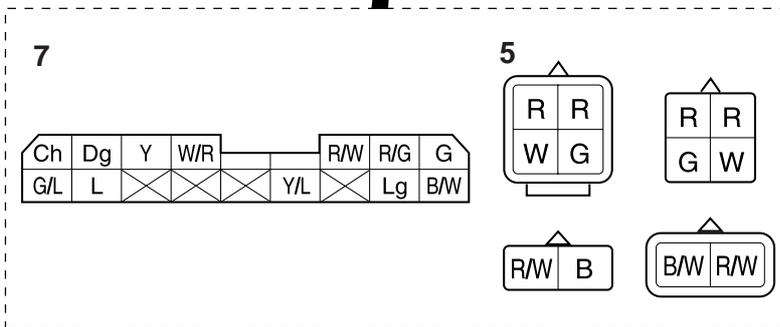
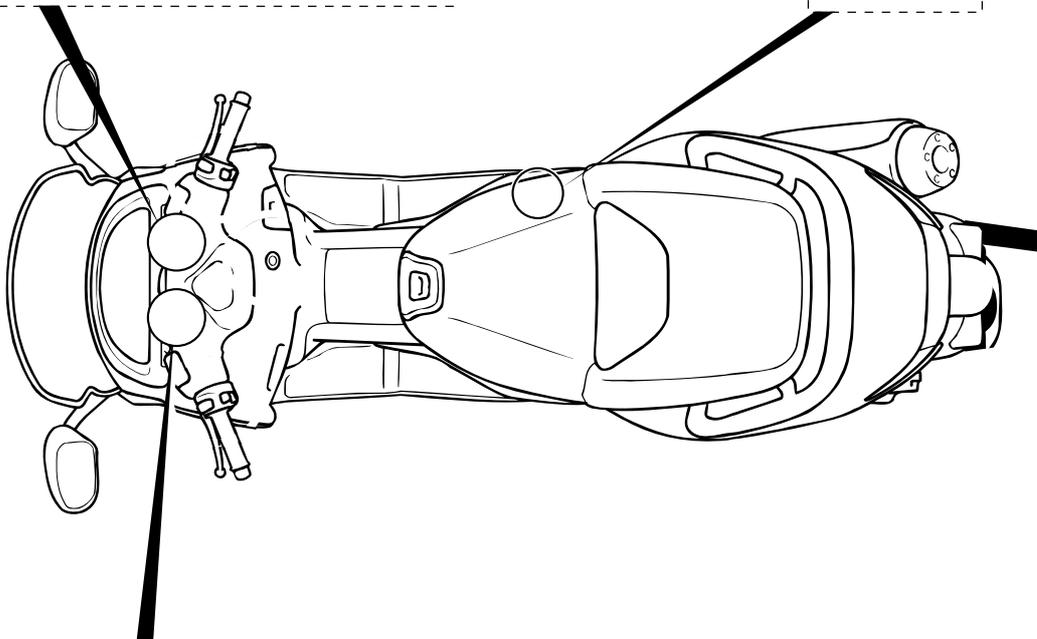
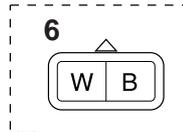
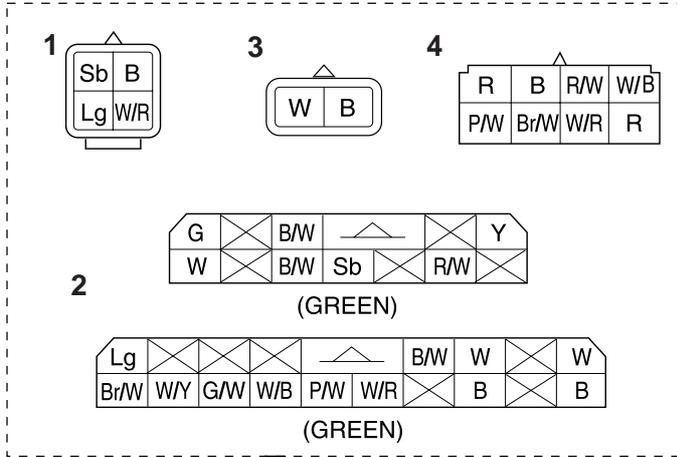
ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

1. ABS warning light
2. Fail-safe relay
3. Electronic control unit (ECU)
4. Hydraulic unit
5. Rear disc rotor
6. Rear brake caliper
7. Rear wheel sensor
8. Front brake caliper
9. Front wheel sensor
10. Front disc rotor

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

EAS27750

ABS CONNECTOR LOCATION CHART



ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

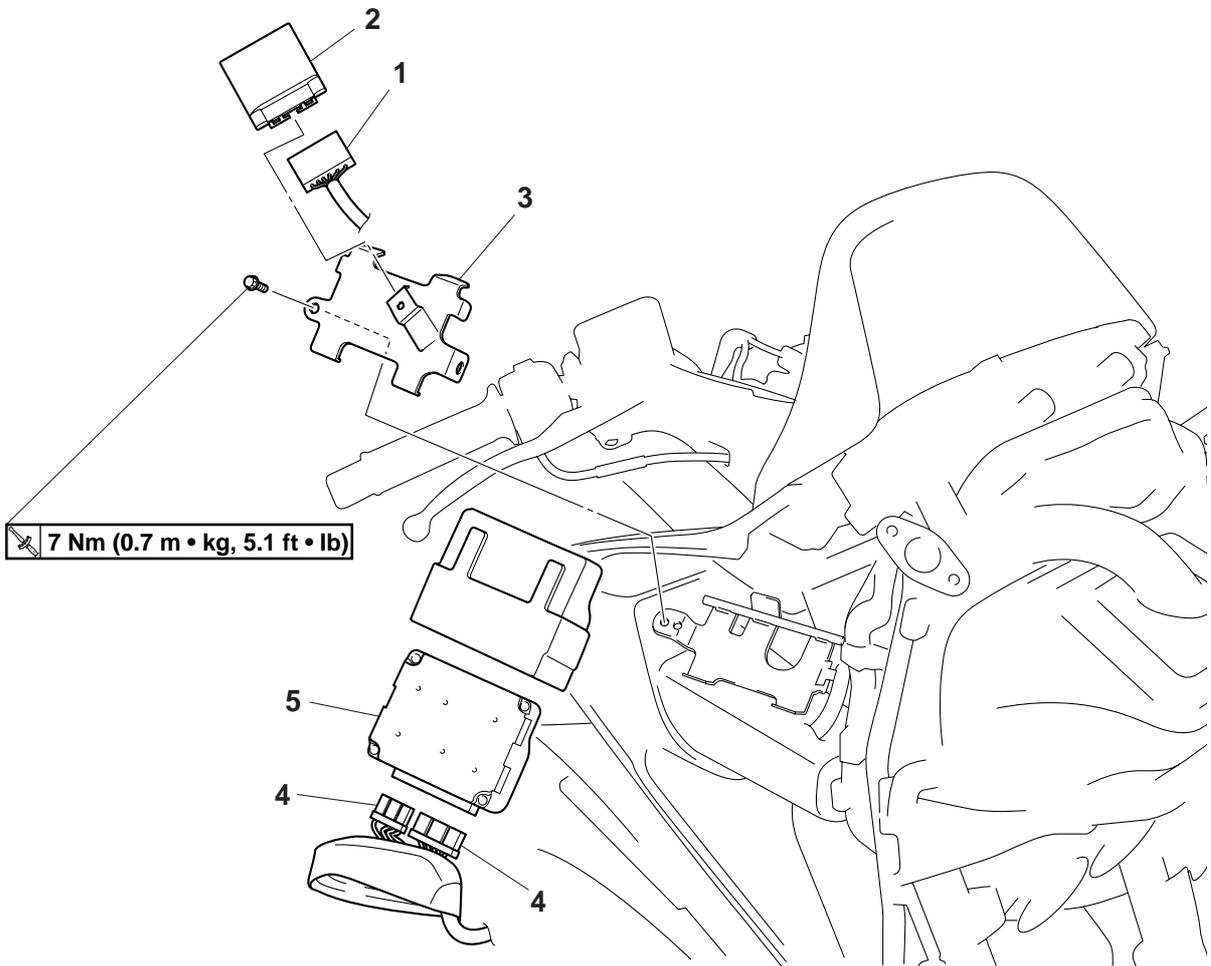
1. ABS test coupler
2. ECU (ABS) coupler
3. Front wheel sensor coupler
4. Fail-safe relay coupler
5. Hydraulic unit coupler
6. Rear wheel sensor coupler
7. Multi-function coupler

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

EAS27760

ECU (ABS) AND FAIL-SAFE RELAY CHART

Removing the ECU (ABS) and fail-safe relay



Order	Job/Parts to remove	Q'ty	Remarks
	Front cowling		Refer to "GENERAL CHASSIS" on page 4-1.
1	Fail-safe relay coupler	1	Disconnect.
2	Fail-safe relay	1	
3	Upper ECU (ABS) bracket	1	
4	ECU (ABS) coupler	1	Disconnect.
5	ECU (ABS)	1	

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

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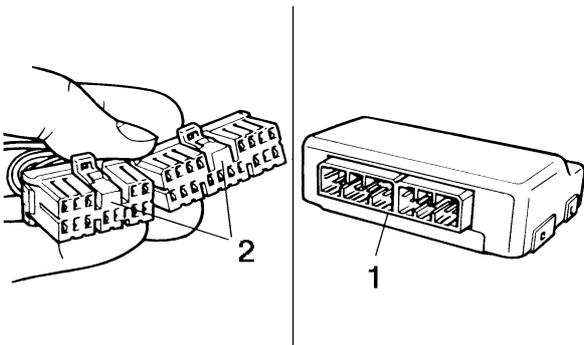
[D-1] MAINTENANCE OF THE ECU (ABS) Checking the ECU (ABS)

1. Check:

- Terminals "1" of the ECU (ABS)
Cracks/damages → Replace ECU (ABS)
- Terminals "2" of the ECU (ABS) coupler
Connection defective, contaminated,
come-off → Correct or clean.

NOTE:

If the ECU (ABS) couplers are clogged with mud or dirt, clean with compressed air.

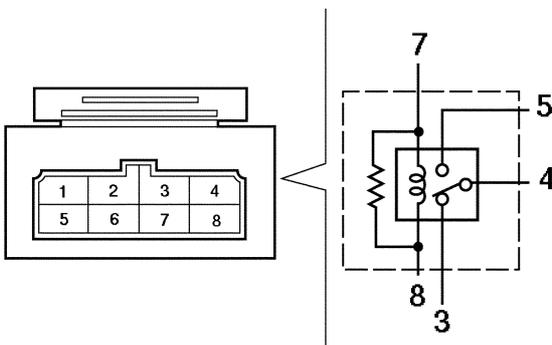


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[D-2] MAINTENANCE OF THE ABS FAIL-SAFE RELAY CHECKING THE FAIL-SAFE RELAY

1. Check:

- Solenoid relay for continuity
Connect the pocket tester ($\Omega \times 1$) to the terminals.
Check for continuity between terminals "3" and "4" of the solenoid relay.
Positive tester probe Terminal → "3"
Negative tester probe Terminal → "4"
Tester reading is " ∞ ". → Replace the fail-safe relay.
- Check for continuity between terminals "7" and "8" of the solenoid relay.
Positive tester probe Terminal → "7"
Negative tester probe Terminal → "8"



	Solenoid relay resistance 150–450 Ω
--	--

Tester reading is " ∞ ". → Replace the fail-safe relay.

Operation of solenoid relay

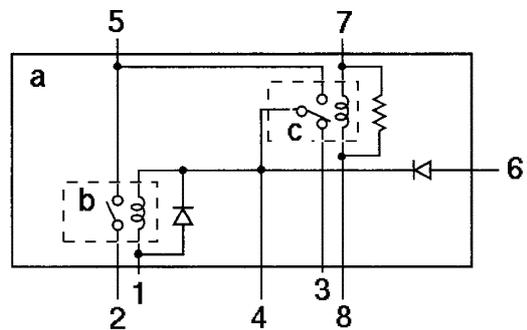
Terminal number	3	4	5	7	8
Normal condition	○	○		○	○
Connect the battery to terminals 7 and 8			○	○	

- Connect the positive battery terminal to terminal "7" and the negative battery terminal to terminal "8", and then check for continuity between terminals "4" and "5" of the solenoid relay.

Positive tester probe → Terminal "4"

Negative tester probe → Terminal "5"

Tester reading is " ∞ ". → Replace the fail-safe relay.



- a. Fail-safe relay
- b. ABS motor relay
- c. Solenoid relay

2. Check:

- ABS motor relay for continuity
Connect the pocket tester ($.\Omega \times 1$) to the terminals of the ABS motor relay.
Check for continuity between terminals "1" and "6" of the ABS motor relay.
Positive tester probe Terminal
Negative tester probe Terminal
Tester reading is " ∞ ". → Replace the fail-safe relay.

	ABS motor relay resistance 50–150 Ω
--	--

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

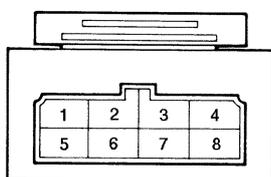
- Connect the positive battery terminal to terminal “6” and the negative battery terminal to terminal “1”, and then check for continuity between terminals “2” and “5” of the ABS motor relay.

Positive tester probe → Terminal “2”

Negative tester probe → Terminal “5”

Tester reading is “∞”. → Replace the fail-safe relay.

- When connecting the battery and the ABS motor relay terminals, be careful not to short-circuit the positive and negative battery terminals.



Operation of ABS motor relay

○—○ Continuity

Terminal number	1	2	5	6	
Normal condition	○			○	
Connect the battery to terminals 6 and 1		○	○		

EAS15B4887b

[D-3] MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR CHECKING THE FRONT WHEEL SENSOR AND SENSOR ROTOR

Refer to “CHECKING THE FRONT WHEEL SENSOR AND SENSOR ROTOR (XP500A)”.

EAS15B4887c

[D-4] MAINTENANCE OF THE REAR WHEEL SENSOR AND SENSOR ROTOR CHECKING THE REAR WHEEL SENSOR AND SENSOR ROTOR

Refer to “CHECKING THE FRONT WHEEL SENSOR AND SENSOR ROTOR (XP500A)”.

EAS15B4887d

[D-5] MAINTENANCE OF THE HYDRAULIC UNIT

ECA15B1006

CAUTION:

Do not remove the hydraulic unit to check the resistance of the solenoid valves and the ABS motor for continuity.

Checking the resistance of the solenoid valves and ABS motor for continuity

ECA15B1007

CAUTION:

When check the hydraulic unit solenoid relay and ABS motor, do not remove the brake hoses.

1. Measure:

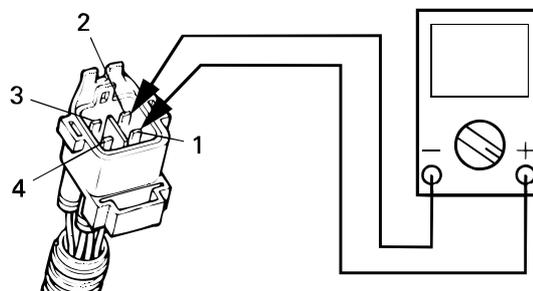
- Resistance of the solenoid valve (front)
Connect a pocket tester ($\Omega \times 1$) to the terminals of the solenoid valve (front).

Positive tester probe → Terminal “1”

Negative tester probe → Terminal “2”

	Solenoid valve resistance 2.96–3.20 at 20 °C (68 °F)
--	--

Out of specification Replace the hydraulic unit.



2. Measure:

- Resistance of the solenoid valve (rear)
Connect the pocket tester ($\Omega \times 1$) to the terminals of solenoid valve (rear).

Positive tester probe → Terminal “4”

Negative tester probe → Terminal “3”

	Solenoid valve resistance 2.96–3.20 at 20 °C (68 °F)
--	--

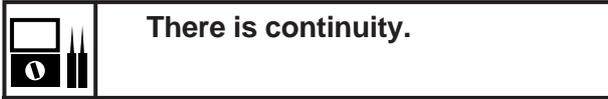
Out of specification → Replace the hydraulic unit.

3. Check:

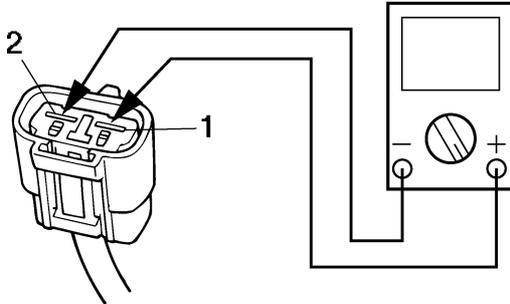
- ABS motor for continuity
Connect the pocket tester ($\Omega \times 1$) to the terminals of the ABS motor coupler.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

Positive tester probe Terminal "1"
Negative tester probe Terminal "2"



No continuity → Replace the hydraulic unit.



ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

EAS27790

ABS TROUBLESHOOTING OUTLINE

This section describes the troubleshooting about ABS in details. Read carefully this service manual before repairing various malfunctions, understand and perform the service.

Electronic control unit (ECU) has the self diagnostic function. When failures occur in the system, the ABS warning light on the meter assembly indicates a malfunction.

Troubleshooting mentioned below describes the cause pursuing and service method according to the indication by the multifunction display. For troubleshooting other than these items, perform by following the normal service method.

EWA13880



When maintenance or checks have been performed on components related to the ABS, be sure to perform a final check before delivering the vehicle to the customer. (Refer to “[D-6] FINAL CHECK”.)

ABS warning light goes on and the ABS condition

- When the ABS warning light keeps going on → It works as a normal brake.
 - Detecting the malfunction by means of the ABS self diagnostic function.
- Light goes on and off at the time of starting → ABS operation is normal.
 - ABS warning light goes on for 2 seconds every time the main switch is turned on and goes off afterward.
- When the ABS warning light flashes → ABS operation is normal.
 - Brake switch is defective or improperly adjusted.
 - Rear wheel is racing.
 - Continuous riding on extremely uneven roads.
 - Defective starter motor monitor.
 - Other defective

Self diagnosis and services

The ECU (ABS) has a self diagnostic function. By utilizing this function, quick and secure services are possible. Previously occurred error phenomenon can be checked since it also installs the memory for storing malfunction history.

“In case malfunctions are detected”

It is disabled to call the malfunction code by using the malfunction display since the ABS warning light already goes on. Connect the test coupler adapter to the test connector, connect a pocket tester to the terminal of light green lead and check by its pointing needle movement.

Refer to “[B-5] MALFUNCTION CHECK BY THE ABS SELF DIAGNOSIS (PRESENT MALFUNCTION)” on page 8-80.

“In case any malfunctions are not detected”

The multifunction display indicates all the malfunction codes recorded in the ECU (ABS). You can check it by using a pocket tester. Note everything if more than two items of malfunction codes are recorded.

“Deleting the malfunction code”

When the malfunction service is finished, check the normal operation of vehicle then delete the malfunction code (Refer to “[D-6] FINAL CHECK” on page 8-95). By deleting the malfunction code memory, it is possible to pursue the cause correctly if the next defective phenomenon occurred.

Self diagnosis by ECU (ABS)

ECU (ABS) performs the static check for whole system when the main switch is turned on. It is also possible to check the malfunction while riding. It is possible to check the recorded malfunction data by using a pocket tester or the multifunction display of meter by setting the ECU (ABS) to the self diagnostic mode since all malfunctions which has been once detected are recorded.

Differences between the normal handling and services on a vehicle

- Care should be taken not to damage components by shocks and pulling too much since the ABS components are precisely adjusted.
- ECU (ABS), HU, Wheel sensors and fail-safe relay cannot be disassembled.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

- Malfunction history in ECU (ABS) is recorded. Delete it when the service is finished. (This is because the past malfunction contents will be redundantly displayed when the same malfunction occurred again.)

EAS27800

BASIC INSTRUCTION FOR TROUBLESHOOTING

EWA14030

WARNING

- **Execute the troubleshooting on each malfunction from [A] to [D] in sequence.**
 - **Use the sufficiently charged regular batteries only.**
-

[A] Malfunction check by the ABS warning light

[B] Detail check of malfunction

Results by self diagnosis are displayed by the multifunction display or a pocket tester according to the ECU's operation.

[C] Supposing the malfunction cause and position

Find the malfunction cause by reasoning the place and situation where it occurred.

[D] ABS system services

Execute the final check after disassembly and assembly.

EWA14040

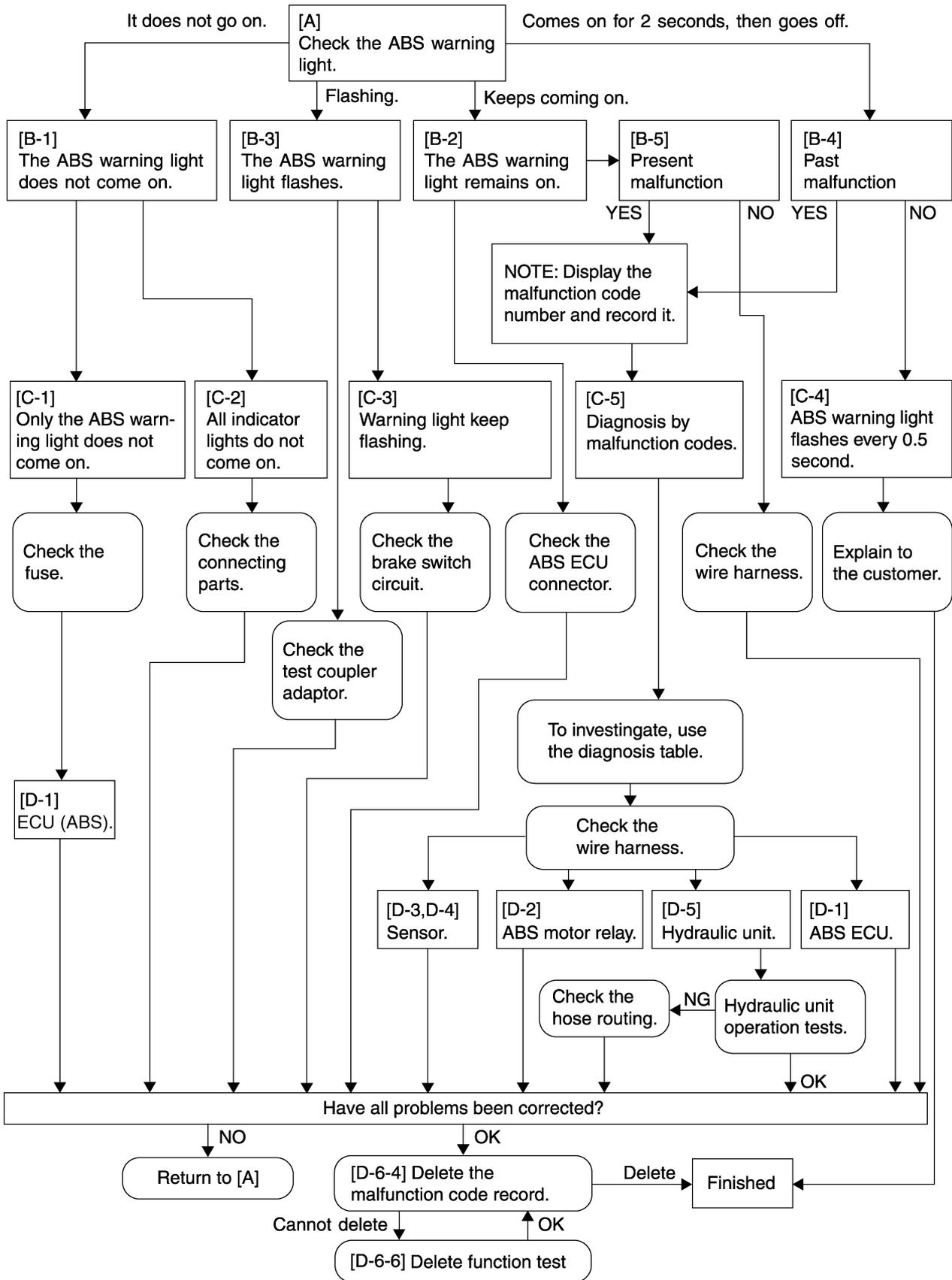
WARNING

Perform the troubleshooting [A] → [B] → [C] → [D] in order. Be sure to follow the order since it results in the wrong diagnosis if the order is differently taken or omitted.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

EAS27810

BASIC PROCESS FOR TROUBLESHOOTING



ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

NOTE:

Do not delete the malfunction code during the troubleshooting procedures. Be sure to delete it when the service is finished.

EWA14050

Always execute the “final check” when the components related to ABS are checked and serviced.

EAS27830

[A] ABS MALFUNCTION CHECK USING THE ABS WARNING LIGHT

Turn the main switch to “ON”. (Do not start the engine.)

1. The ABS warning light does not come on. [B-1]
2. The ABS warning light remains on. [B-2]
3. The ABS warning light flashes. [B-3]
4. The ABS warning light comes on for 2 seconds, then goes off. [B-4]

EAS15B3008

[B] DETAILED ABS MALFUNCTION CHECK

EAS15B3009

[B-1] THE ABS WARNING LIGHT DOES NOT COME ON

Do other indicators operate normally?

1. Yes [C-1]
2. No [C-2]

EAS15B3010

[B-2] THE ABS WARNING LIGHT REMAINS ON

NOTE:

Check following the steps in sequence.

-
1. Battery voltage low
Charge, inspect or replace the battery.
 2. Malfunction codes displayed. Check the malfunction codes using the ABS test coupler adaptor.
Perform troubleshooting corresponding to the malfunction codes. [B-5]
 3. Wire harness, ECU (ABS) and meter coupler are disconnected.
Connect the coupler securely until a “click” sound is heard.
 4. Check the disconnection between the ECU (ABS) and meter (ABS warning light).
Check the conductivity of the wire harness and repair or replace the failure part.
 5. Meter circuit malfunction
Check by the following procedures.
 - Remove the ECU (ABS) and connect the ABS test coupler adaptor.
 - Connect the white/red lead from the test coupler adaptor to the GND terminal and set the main switch to “ON”.
 - Does the ABS warning light go off?
 - Yes → Replace the ECU (ABS).
 - No → Replace the meter.

EAS15B3031

[B-3] THE ABS WARNING LIGHT FLASHES

NOTE:

Check the battery voltage before proceeding.

Check the test coupler located in the front cowling. Is the T/C terminal ground?

1. Yes → Disconnect the grounding lead from the T/C terminal and install the protective cap onto the test coupler.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

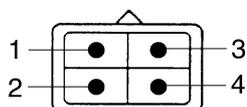
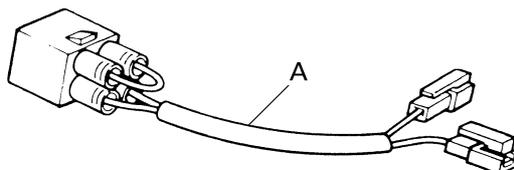
NOTE:

When the test coupler adaptor is connected to test coupler, the T/C terminal is grounded.

2. No → [C-3]

Arrangement and the function of test couplers

- ECU becomes the malfunction diagnostic mode when the T/C terminal is grounded.
- Malfunction code which the ECU generated in the malfunction diagnostic mode (rise and fall of voltage) is output at the T/F terminal.
- ABS warning light terminal is used when checking the ABS warning light circuit.
- To ground the T/C terminal, connect the test coupler adaptor “A” with the test coupler. Before connecting, check if the battery is sufficiently charged.



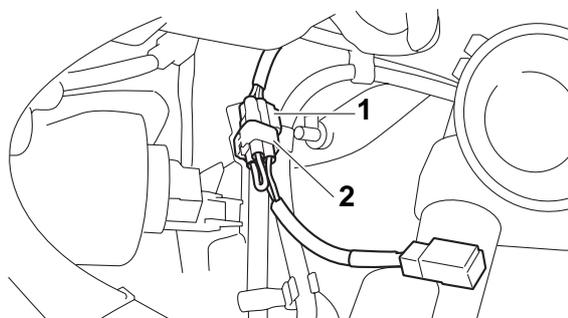
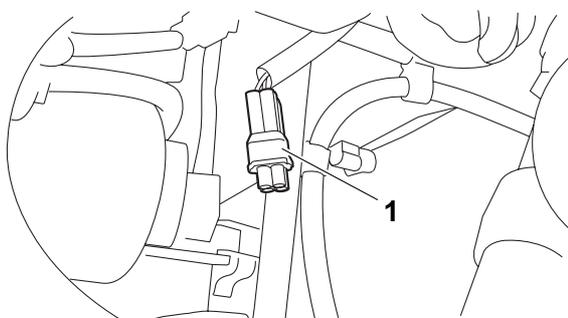
- 1. T/C terminal (sky-blue)
- 2. T/F terminal (light green)

- 3. Grounding (black)
- 4. ABS warning light terminal (white/red)

EAS27860

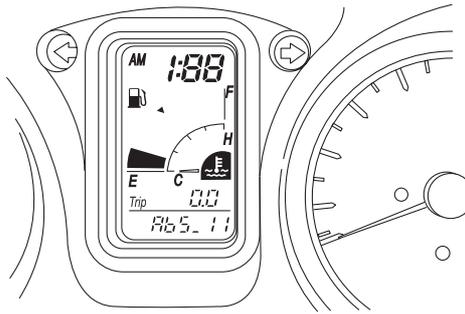
[B-4] MALFUNCTION CHECK BY THE ABS SELF DIAGNOSIS (PAST MALFUNCTION)

Check the location of test coupler “1”. Remove the protective cap and connect the ABS test coupler adaptor “2” to the test coupler. The T/C terminal (sky-blue) is now connected to the ground.



- Indicate the malfunction code (Example: malfunction code 11)

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)



- ABS warning light flashes every 0.5 second for more than 6 seconds. → [C-4, C-5]

If the ABS warning light flashes every 0.5 second, the malfunction code of a past malfunction has not been stored in the memory of the ECU (ABS). If a malfunction code is displayed on the multifunction display, the ABS warning light flashes. Make sure that the customer understands the possible conditions when the ABS warning light comes on.

ECA15B1033

CAUTION:

- When checking for ABS malfunctions, the odometer and bottom tripmeter are not displayed.
 - When checking for fuel injection system malfunctions or adjusting the exhaust gas volume, the ABS malfunction codes are not displayed.
-

EAS27870

[B-5] MALFUNCTION CHECK BY THE ABS SELF DIAGNOSIS (PRESENT MALFUNCTION)

NOTE:

Before proceeding to read the part of "Arrangement and the function of test coupler".

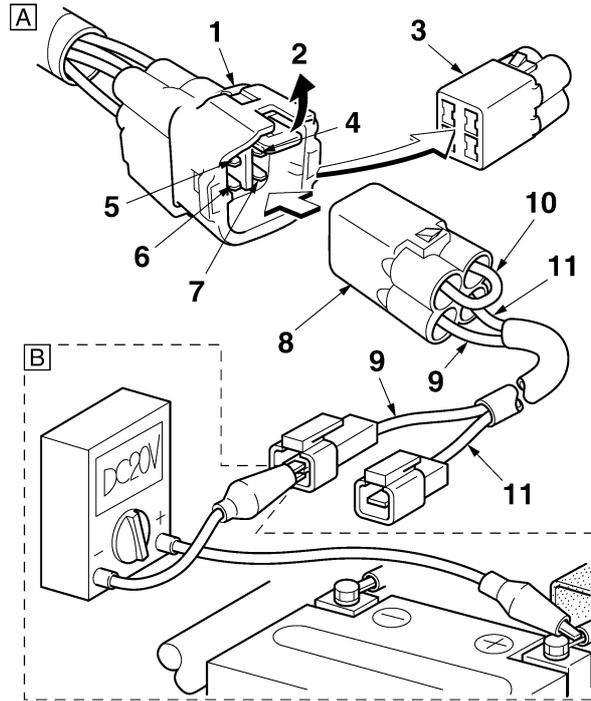
Remove the side cowling (right) and check the location of test coupler. Connect the test coupler adapter with the test coupler in order to ground the T/C terminal (sky-blue). (Figure-"A")

Set the range of pocket tester to DC 20 V. Connect the negative (-) terminal of tester to the T/F terminal (light green) and positive (+) terminal to the positive (+) terminal of battery. (Figure-"B") Read the tester indication. (Figure-"C")

NOTE:

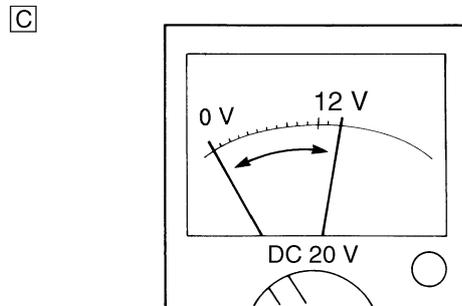
Read the code through this means so that the "current malfunction" code is not indicated on the meter.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)



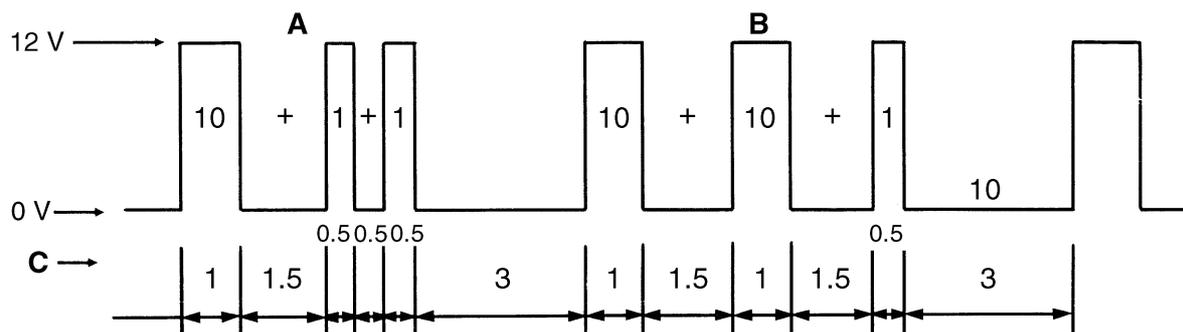
1. ABS test coupler
2. Lock plate
3. Protective cap
4. Grounding
5. T/C terminal
6. T/F terminal

7. ABS warning light terminal (white/red)
8. Test coupler adapter
9. (Light green)
10. (Black)
11. (White/red)



As an example, “10 digits/1 digit pattern” of tester reading is shown below.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)



A. This example is the pattern which shows malfunction code 12.

B. This example is the pattern which shows malfunction code 21.

C. Time (second)

EAS15B3011

[C] DETERMINING THE CAUSE AND LOCATION OF THE MALFUNCTION

EAS15B3012

[C-1] ONLY THE ABS WARNING LIGHT DOES NOT COME ON WHEN THE MAIN SWITCH IS SET TO "ON"

NOTE:

Check following the steps in sequence.

1. Visual check

- Check the ABS fuse.

Determine the cause of the blown fuse and repair. Replace with a new fuse. (Refer to "CHECKING THE FUSES" in chapter 3.)

- Check the wire harness (ABS system circuit) couplers.

Check that the wire harness (ABS system circuit) couplers are securely connected.

- Check the connection of the wire harness (ABS system circuit) to the ECU (ABS).

Check that the wire harness (ABS system circuit) is securely connected to the ECU (ABS).

2. Confirmation using the test coupler adaptor

- Connect the test coupler adaptor to the test coupler. (Refer to "[B-5] ABS malfunction check using the ABS self-diagnosis (present malfunction)".)

- Ground the warning light terminal (white/red) of the test coupler adaptor or connect the warning light terminal to the negative battery terminal.

If the ABS warning light comes on, the wire harness (ABS system circuit) may be disconnected.

If the ABS warning light does not come on, the ABS warning light lead may be disconnected or the contact of the ABS warning light may be defective.

- Remove the ECU (ABS) coupler and check the ECU (ABS) coupler and test coupler adaptor ends of the white/red lead for continuity.

If there is continuity, the ECU (ABS) is defective. → Replace the ECU (ABS). (Refer to "[D-1] Maintenance of the ECU (ABS)".)

If there is no continuity, the warning light circuit in the wire harness (ABS system circuit) is defective. Disconnection or short → Correct. (Refer to "CIRCUIT DIAGRAM".)

EAS15B3013

[C-2] ABS WARNING LIGHT AND ALL OTHER INDICATORS DO NOT COME ON

NOTE:

Check following the steps in sequence.

1. Check the power supply system.

- Check that the battery is connected correctly.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

- Check the battery voltage. (Refer to “CHECKING AND CHARGING THE BATTERY” on page 8-107.)
 - Check if the main fuse or signal fuse is blown. If the main fuse is blown, determine the cause and repair.
Replace with a new fuse. (Refer to “CHECKING THE FUSES” on page 8-106.)
2. Check the connections.
- Check that the main fuse coupler is securely connected.
 - Check that the main switch coupler is securely connected.
 - Check that the meter assembly coupler is securely connected. (Refer to “ABS CONNECTOR LOCATION CHART” on page 8-69.)
- When these checks are finished, return to [A] and check the ABS again.

EAS15B3014

[C-3] ABS WARNING LIGHT FLASHES

With the engine off, check the front and rear brake switches.

Check if the brake light comes on when the front or rear brake is applied.

1. The light does not come on for only one brake.
 - The corresponding brake switch connector is disconnected. (Refer to “CIRCUIT DIAGRAM”.)
 - The corresponding brake switch is defective.
2. The light does not come on for either brake.
 - The wire harness (ABS system circuit) may be disconnected or the fuse may be blown. Check the fuse and make sure the wire harness (ABS system circuit) (brown lead) is connected to the power source end of the brake switch. (Refer to “CIRCUIT DIAGRAM”.)
3. The brake light comes on.
 - The wire harness (ABS system circuit) couplers may be disconnected.
4. Adjust the rear brake switch to the specified setting.

EAS15B3015

[C-4] ABS WARNING LIGHT FLASHES EVERY 0.5 SECOND

If the ABS warning light flashes every 0.5 second, the malfunction code of a past malfunction has not been stored in the memory of the ECU (ABS). If a malfunction code is displayed on the multifunction display, the ABS warning light flashes. Make sure that the customer understands the possible conditions when the ABS warning light comes on.

1. Voltage drop
For the ABS to operate correctly, the voltage should be always higher than the specified voltage. If the voltage drops to lower than 10 V, the ABS warning light comes on and the ABS does not operate. When the voltage recovers to higher than 10 V, the ABS operates. However, the magneto, battery and rectifier/regulator must be checked. Follow the regular procedures for service of the power supply system.
2. ABS is stopped by the ECU (ABS)
The ECU (ABS) may stop the ABS operation if it is exposed to extremely strong electromagnetic waves or static electricity.
When the ECU (ABS) is no longer exposed to the electromagnetic waves, static electricity, and the ABS warning light is not flashing, there is no effect on the operation of the ABS. Explain to the customer that the ABS will operate normally.

EAS27880

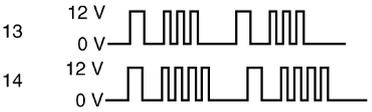
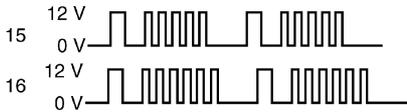
[C-5] DIAGNOSIS BY THE MALFUNCTION CODE

Malfunction codes are used to determine the malfunctions that have occurred. (Refer to “[B-4] MALFUNCTION CHECK BY THE ABS SELF-DIAGNOSIS (PAST MALFUNCTION)” and “[B-5] MALFUNCTION CHECK BY THE ABS SELF-DIAGNOSIS (PRESENT MALFUNCTION)”.) The malfunction codes are explained in the following table.

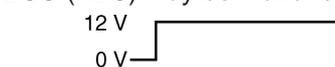
NOTE:

Record all of the malfunction codes displayed and check the check points.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

Malfunction code	Problem	Check point	Reference
11*	Front wheel sensor signal is not received properly. 	<ul style="list-style-type: none"> ● Installation of the front wheel sensor ● Front wheel sensor lead and coupler ● ABS wireharness circuit ● Front wheel sensor rotor 	Malfunction code 11
12	Rear wheel sensor signal is not received properly. 	<ul style="list-style-type: none"> ● Installation of the rear wheel sensor ● Rear wheel sensor lead and coupler ● ABS wireharness circuit ● Rear wheel sensor rotor 	Malfunction code 12
13 (front) 14 (rear)	Incorrect signal is detected by the front (13) or rear (14) wheel sensor. 	<ul style="list-style-type: none"> ● Wheel sensor installation ● Wheel sensor housings ● Wheel sensor rotors 	Malfunction codes 13 (front wheel) and 14 (rear wheel)
15 (front) 16 (rear)	No continuity in the front (15) or rear (16) wheel sensor circuits 	<ul style="list-style-type: none"> ● Continuity of sensor circuits ● ABS wireharness circuit ● Connection of sensor coupler 	Malfunction codes 15 (front wheel sensor) and 16 (rear wheel sensor)
21	Disconnection and short-circuit of hydraulic unit solenoid 	<ul style="list-style-type: none"> ● Wire harness circuit ● Hydraulic unit solenoid coupler ● Hydraulic unit solenoid ● Battery terminal is disconnect 	Malfunction code 21
31	Disconnection is detected between the battery and ECU (ABS) system. 	<ul style="list-style-type: none"> ● Fuse (ABS motor) ● ABS wireharness circuit (between the battery and ECU (ABS)) ● ECU (ABS) coupler 	Malfunction code 31
32	Circuit malfunction of ECU (ABS) is detected. Upstream side of the solenoid relay 	<ul style="list-style-type: none"> ● Wire harness circuit ● Replace the ECU (ABS). 	Malfunction code 32
33	Defective operation of the ABS motor is detected. (ABS motor stops and will not rotate.) 	<ul style="list-style-type: none"> ● ABS wireharness circuit ● ABS motor coupler ● Fail-safe relay ● ABS motor circuit ● ABS motor fuse 	Malfunction code 33

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

Malfunction code	Problem	Check point	Reference
34	Defective operation of the ABS motor is detected. (ABS motor keeps running and will not stop.) 	<ul style="list-style-type: none"> ● Fail-safe relay ● ABS wireharness circuit ● ABS motor circuit 	Malfunction code 34
41	Front wheel will not recover from the locking tendency even though the signal is continuously transmitted from the ECU (ABS) to release the hydraulic state (when the battery voltage is normal). 	<ul style="list-style-type: none"> ● Brake dragging ● Hydraulic unit operation test 2 [D-6-3-2] ● Front wheel brake line 	Malfunction code 41
42	Rear wheel will not recover from the locking tendency even though the signal is continuously transmitted from the ECU (ABS) to release the hydraulic state (when the battery voltage is normal). 	<ul style="list-style-type: none"> ● Brake dragging ● Hydraulic unit operation test 2 [D-6-3-2] ● Rear wheel brake line 	Malfunction code 42
51	Front wheel will not recover from the locking tendency even though the signal is continuously transmitted from the ECU (ABS) to release the hydraulic state (when the battery voltage is low). 	<ul style="list-style-type: none"> ● Brake dragging ● Hydraulic unit operation test 2 [D-6-3-2] ● Front wheel brake line ● Battery voltage 	Malfunction code 51
52	Rear wheel will not recover from the locking tendency even though the signal is continuously transmitted from the ECU (ABS) to release the hydraulic state (when the battery voltage is low). 	<ul style="list-style-type: none"> ● Brake dragging ● Hydraulic unit operation test 2 [D-6-3-2] ● Rear wheel brake line ● Battery voltage 	Malfunction code 52
Present malfunction (test always indicates 12 V)	ECU (ABS) may be malfunctioning 	<ul style="list-style-type: none"> ● ABS wireharness circuit (test coupler circuits) ● ECU (ABS) (Replace) 	Maintenance of the ECU (ABS) [D-1]

* Malfunction code 11 is indicated if the rear wheel rotates for more than 20 seconds with the front wheel stopped.

NOTE:

Malfunction code 15 (front wheel sensor) or 16 (rear wheel sensor) is displayed if a defective connection to either the front or rear sensor is detected whether or not the vehicle is ridden.

Malfunction code 11 (Front wheel sensor signal is not received properly.)

Turn the main switch to "OFF", then back to "ON" after removing the test coupler adapter.

1. ABS warning light remains on.

→ Defective connection in the front wheel sensor circuit.

- Front wheel sensor coupler is disconnected. → [D-3]

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

- Front wheel sensor lead or internal circuit is broken. → [D-3]
 - Wire harness (ABS) sensor circuit is broken. → (Refer to “CIRCUIT DIAGRAM” on page 8-65.)
 - ECU (ABS) coupler terminal is disconnected. → [D-1]
2. ABS warning light goes on for 2 seconds then goes off.
- With the front wheel stopped, the rear wheel was rotated for more than 20 seconds. This is not a malfunction.
 - Signal is not generated at the front wheel sensor.
 - Front wheel sensor is not installed properly. → [D-3]
 - Front wheel sensor rotor is defective. → [D-3]
 - Front wheel sensor circuit is short-circuited.
 - Front wheel sensor or lead is short-circuited. → [D-3]
 - Wire harness (ABS) sensor circuit is short-circuited. → (Refer to “CIRCUIT DIAGRAM” on page 8-65.)
 - Front wheel sensor output drops.
 - Sensor signal output may drop due to failure on bearings, wheel axle, wheel or sensor housing of front wheel. Check these components when installed for looseness, distortion, and bends.

Malfunction code 12 (Rear wheel sensor signal is not received properly.)

Turn the main switch to “OFF”, then back to “ON” after removing the test coupler adapter.

1. ABS warning light remains on.
- Defective connection in the rear wheel sensor circuit.
 - Rear wheel sensor coupler is disconnected. → [D-4]
 - Rear wheel sensor lead or internal circuit is broken. → [D-4]
 - Wire harness (ABS) sensor circuit is disconnected. → (Refer to “CIRCUIT DIAGRAM” on page 8-65.)
 - ECU (ABS) coupler terminal is disconnected. → [D-1]
2. ABS warning light goes on for 2 seconds then goes off.
- With the rear wheel stopped, the front wheel was rotated at a speed faster than 11 km/h. This is not a malfunction.
 - Signal is not generated at the rear wheel sensor.
 - Rear wheel sensor is not installed properly. → [D-4]
 - Rear wheel sensor rotor is defective. → [D-4]
 - Rear wheel sensor circuit is short-circuited.
 - Rear sensor or lead is short-circuited. → [D-4]
 - Wire harness (ABS) sensor circuit is short-circuited. → (Refer to “CIRCUIT DIAGRAM” on page 8-65.)
 - Rear wheel sensor output drops.
 - Sensor signal output may drop due to failure of the bearing, wheel, or brake caliper bracket of the rear wheel. Check these components when installed for looseness, distortion, and bends.

NOTE:

If the vehicle is ridden on extremely uneven roads continuously, the ABS warning light may flash and malfunction code 11 or 12 may be recorded depending on the condition.

Malfunction code 13 (front wheel) and malfunction code 14 (rear wheel) (Incorrect signal is detected by the front (13) or rear (14) wheel sensor.)

1. The wheel sensors or sensor rotors are not properly installed.
- Installation of the front or rear wheel sensor
 - Check that the wheel sensor is properly installed in the housing. → [D-3, 4]
 - Check if there is looseness between the housing and the front wheel. → [D-3, 4]
 - Check if there is looseness rear brake caliper bracket and the rear wheel. → [D-3, 4]
 - Installation of the front or rear wheel sensor rotor
 - Check that the sensor rotor is correctly pressed in the front wheel. → [D-3, 4]
 - Check that the sensor rotor is correctly install to the rear wheel. → [D-3, 4]
 - Check the rotor and inside the rotor housing for foreign materials. → [D-3, 4]
2. Teeth surfaces of the sensor rotors are defective.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

- Check for flaws on the teeth surfaces of the front or rear wheel sensor rotors. Also, check for any foreign materials. → [D-3, 4]
- 3. Sensor output has dropped.
 - Sensor signal output may drop due to failure of the bearings, wheel axle, rear brake caliper bracket wheel or sensor housing of (front) the front or rear wheel. Check these components when installed for looseness, distortion, and bends.

Malfunction code 15 (front wheel sensor) and malfunction code 16 (rear wheel sensor) (No continuity in the front or rear wheel sensor circuits.)

Broken front or rear wheel sensor circuit is detected.

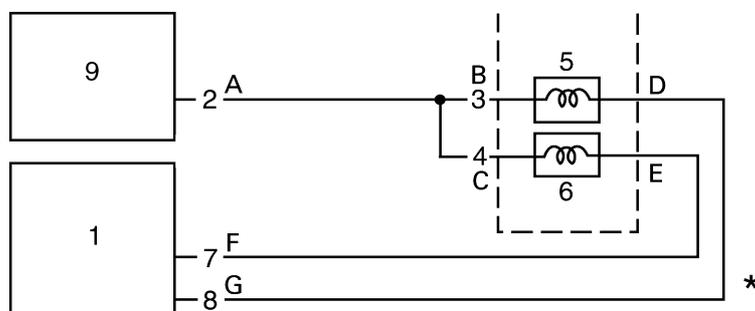
- Front or rear wheel sensor coupler is broken. → [D-3, 4]
- Front or rear wheel sensor or lead is broken. → [D-3, 4]
- Front or rear wheel sensor circuit is broken. → (Refer to "CIRCUIT DIAGRAM".)
- Wire harness (ABS system circuit) is disconnected from the ECU (ABS) coupler terminal. → [D-1]

NOTE:

- Check that both the front and rear wheel sensor couplers are connected securely.
- If the vehicle is ridden after malfunction code 15 (front wheel sensor) or 16 (rear wheel sensor) is displayed, the malfunction code will be overwritten from 15 to 11 (front wheel sensor signal) or from 16 to 12 (rear wheel sensor signal).

Malfunction code 21 (Disconnection and short-circuit of hydraulic unit solenoid.)

1. Hydraulic unit solenoid coupler
 - Check if the hydraulic unit solenoid coupler terminal is disconnected. (Refer to "ABS CONNECTOR LOCATION CHART" on page 8-69.)
2. Hydraulic unit solenoid
 - Check the front and rear wheel solenoids for continuity → [D-5]
 - Check the insulation of all solenoid terminals and the negative battery terminal. → [D-5]
3. Wire harness (ABS)
 - Check the hydraulic unit solenoid circuits for continuity. (See the illustration below.)



- | | |
|-------------------|--------------------|
| 1. ECU (ABS) | 6. Rear solenoid |
| 2. White/Brown | 7. White/Blue |
| 3. Red | 8. Green |
| 4. Red | 9. Fail-safe relay |
| 5. Front solenoid | |

*Continuity between: "A"–"B", "A"–"C", "D"–"G", "E"–"F"

- Check the insulation of the hydraulic unit solenoid circuits and the negative battery terminal.
- 4. Battery
 - Battery terminal is disconnected

Malfunction code 31 (Disconnection is detected between the fail-safe relay and the hydraulic unit solenoid.)

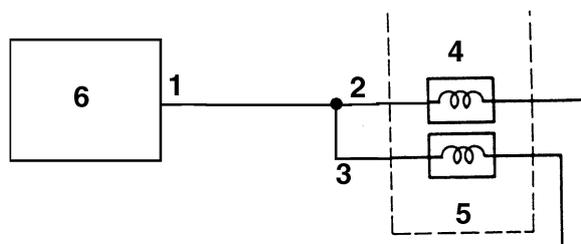
NOTE:

Check following the steps in sequence.

1. ABS motor fuse
 - Check if the ABS motor fuse beside the battery is blown.
2. Hydraulic unit solenoid coupler

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

- Check if the hydraulic unit solenoid coupler located in the front cowling is connected properly.
3. Wire harness (ABS system circuit)
- Check the pink/white leads between the ECU (ABS) and the fail-safe relay for continuity. (Refer to "CIRCUIT DIAGRAM".)
 - ECU (ABS) coupler terminal (pink/white) is disconnected. → [D-1]
 - Check the red leads between "1" and "2", and between "1" and "3" of the hydraulic unit solenoid circuits for continuity.



1. Red
2. Red
3. Red

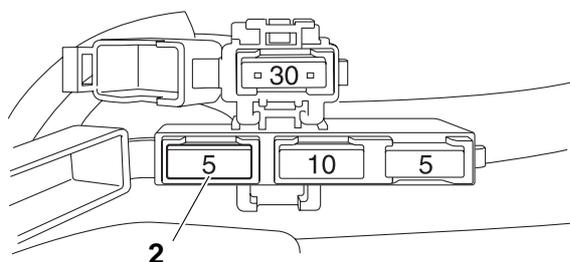
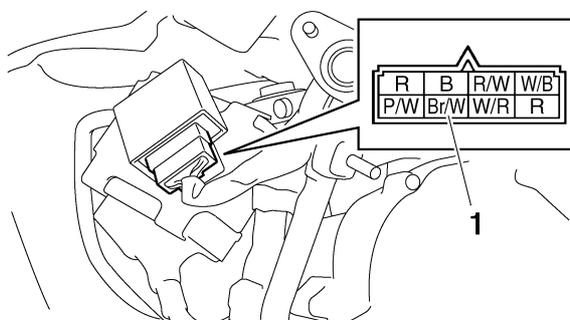
4. Front solenoid
5. Rear solenoid
6. Fail-safe relay

4. Fail-safe relay

- Check if the fail-safe relay operates correctly. → [D-2]

5. Wire harness

- Check for continuity between the red terminal of the fail-safe relay coupler and the positive battery terminal.
- Remove the ABS fuse and check for continuity between the brown/white "1" lead of the fail-safe relay coupler and the ABS fuse "2". (See the illustration below.)



1. Check for continuity between these two points

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

Malfunction code 32 (Circuit malfunction of ECU (ABS) is detected. Upstream side of the solenoid relay.)

NOTE: _____

Check following the steps in sequence.

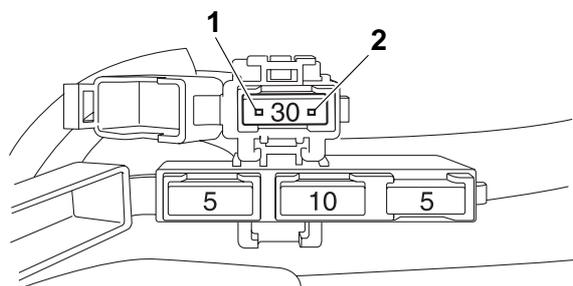
1. Fail-safe relay
 - Check if the fail-safe relay operates correctly. → [D-2]
2. Wire harness (ABS system circuit)
 - Disconnect the couplers from the fail-safe relay and the ECU (ABS), and then check the insulation of the fail-safe relay coupler between the red and red terminals.

Malfunction code 33 (Defective operation of the ABS motor is detected. [ABS motor stops and will not rotate.]

NOTE: _____

Check following the steps in sequence.

1. ABS motor fuse
 - Check if the ABS motor fuse beside the battery is blown.
2. Fail-safe relay
 - Check if the fail-safe relay operates correctly. → [D-2]
3. Wire harness
 - Remove the fail-safe relay and the ABS motor fuse, and then check for continuity between the red (Refer to “ABS CONNECTOR LOCATION CHART” on page 8-69 in fail-safe relay coupler drawing.) terminal of the wire harness (ABS) and the wire harness (ABS) end (terminal A shown in the illustration) of the ABS motor fuse terminal in the side of the stay. (Refer to “ABS CONNECTOR LOCATION CHART” on page 8-69.)



1. Terminal A

2. Terminal B

- Check for continuity between the positive battery terminal and the battery end of the ABS motor fuse terminal (terminal B shown in the above illustration).
- Remove the ECU (ABS) and the fail-safe relay from the wire harness (ABS), and then check for continuity between the white/black lead terminals of ECU (ABS) coupler and the red/white lead terminals of ABS motor coupler.

Malfunction code 34 (Defective operation of the ABS motor is detected. [ABS motor keeps running and will not stop.]

NOTE: _____

Check following the steps in sequence.

1. ABS motor
 - Check if the ABS motor coupler located in the front cowling is connected properly.
 - Check the ABS motor for continuity. → [D-5]
2. Wire harness (ABS)
 - Remove the ABS motor coupler and check for continuity between the black/white terminal of the ABS motor coupler of the wire harness (ABS) and the negative battery terminal.
 - Remove the ECU (ABS) coupler and check for continuity between the red/white terminal of the ECU

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

(ABS) coupler and the red/white terminal of the ABS motor coupler. → [D-1]

- Remove the fail-safe relay and check for continuity between the red/white terminal of the ABS motor coupler of the wire harness (ABS) and the positive battery terminal.

3. Fail-safe relay

- Check if the fail-safe relay operates correctly. → [D-2]

Malfunction code 41 (Front wheel will not recover from the locking tendency even though the signal is continuously transmitted from the ECU (ABS) to release the hydraulic state [when the battery voltage is normal].)

NOTE:

Check following the steps in sequence.

1. Rotation of the front wheel

- Check that there is no brake disc drag on the front wheel and make sure it rotates smoothly.
- Check the front wheel axle for loose bearings and bends, and the brake disc for distortion.

2. Brake master cylinder and brake caliper

- Check that the brake fluid pressure is correctly transmitted to the brake caliper when the brake lever is operated and that the pressure decreases when the lever is released.

3. Brake fluid

- Visually check the brake fluid in the brake master cylinder reservoir and the fluid for water, foreign materials, solidification and contamination.
- Check for air in the brake hose lines.

4. Brake hose lines

- Check the brake hose lines for kinks and deterioration.

EWA15B3005



Only use genuine Yamaha parts. Using other brake pipes, hoses and union bolts may close the brake hose lines.

- Check that the connections of the brake hose lines from the brake master cylinder to the hydraulic unit and to the front brake caliper from the hydraulic unit are correct.

EWA15B3006

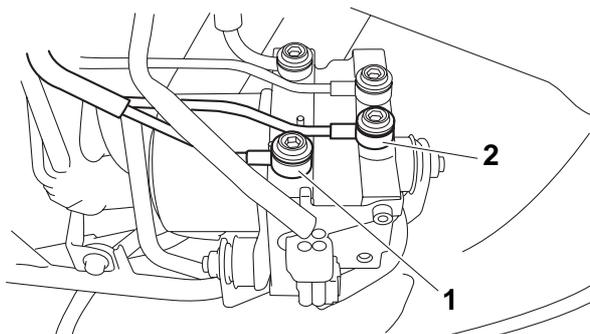


The front brake will not function properly if the connections are reversed.

- **Front brake hose “1” outlet: to the front brake caliper**
- **Front brake hose “2” inlet: from the front brake master cylinder**

NOTE:

- If the front brake hose inlet and outlet connections are reversed on the hydraulic unit, the brake lever is pulled to full stroke without responding and will be pushed back slowly without pulsating when the final check in [D-6] is performed.
- If the front and rear brake hose connections are reversed on the hydraulic unit, the pulsating action in the right hand brake lever and left hand brake lever will be performed in the reverse order when the final check in [D-6] is performed.



ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

5. Hydraulic unit solenoid coupler terminal

- Check if the front and rear hydraulic unit solenoid coupler terminals (hydraulic unit and wire harness [ABS]) are reversed.

	Terminal color	
	Solenoid side	Wire harness side (ABS)
Front	Red, Green	Red, White
Rear	Red, White	Red, Green

6. Hydraulic unit

If the malfunction is not corrected after performing steps 1 to 5, replace the hydraulic unit. Be sure to connect the brake hoses and couplers correctly and securely. Check the hydraulic unit operation. (Refer to “[D-6] FINAL CHECK” on page 8-95.)

Malfunction code 42 (Rear wheel not recover from the locking tendency even though the signal is continuously transmitted from the ECU (ABS) to release the hydraulic state [when the battery voltage is normal].)

Check the following:

1. Rotation of the rear wheel
 - Check that there is no brake drag on the rear wheel and make sure it rotates smoothly.
 - Check for brake disc distortion.
2. Brake master cylinder and brake caliper
 - Check that the brake fluid pressure is correctly transmitted to the brake disc when the left hand brake lever is operated and that the pressure decreases when the lever is released.
3. Brake fluid
 - Visually check the brake fluid in the brake master cylinder reservoir and check the fluid for water, foreign materials, solidification and contamination.
 - Check for air in the brake hose lines.
4. Brake hose lines
 - Check the brake hose lines for kinks and deterioration (particularly between the hydraulic unit and the rear brake caliper).

EWA15B3005



Only use genuine Yamaha parts. Using other brake pipes, hoses and union bolts may close the brake hose lines.

- Check that the connections of the brake hose lines from the brake master cylinder to the hydraulic unit and to the rear brake caliper from the hydraulic unit are correct.

EWA15B3007



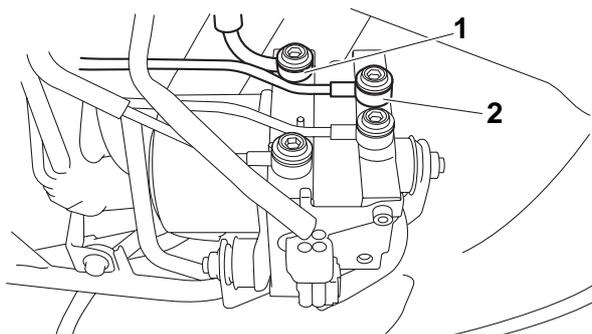
The rear brake will not function properly if the connections are reversed.

- **Rear brake hose “1” outlet: to the rear brake caliper**
- **Rear brake hose “2” inlet: from the rear brake master cylinder**

NOTE:

- If the rear brake hose inlet and outlet connections are reversed on the hydraulic unit, the left hand brake lever is pulled to full stroke without responding and will be pushed back slowly without pulsating when the final check is performed.
- If the front and rear brake hose connections are reversed on the hydraulic unit, the pulsating action in the right hand brake lever and left hand brake lever will be performed in the reverse order when the final check is performed.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)



5. Hydraulic unit solenoid coupler terminal

- Check if the front and rear hydraulic unit solenoid coupler terminals (hydraulic unit and wire harness [ABS]) are reversed.

	Terminal color	
	Solenoid side	Wire harness side (ABS)
Front	Red, green	Red, white
Rear	Red, white	Red, green

6. Hydraulic unit

If the malfunction is not corrected after performing steps 1 to 5, replace the hydraulic unit. Be sure to connect the brake hose lines and couplers correctly and securely. Check the hydraulic unit operation. (Refer to “[D-6] FINAL CHECK” on page 8-95.)

Malfunction code 51 (Front wheel will not recover from the locking tendency even though the signal is continuously transmitted from the ECU (ABS) to release the hydraulic state [when the battery voltage is low].)

Check the following:

1. Rotation of the front wheel
Refer to “Malfunction code 41”.
2. Brake master cylinder and brake caliper
Refer to “Malfunction code 41”.
3. Brake fluid
Refer to “Malfunction code 41”.
4. Brake hose lines
Refer to “Malfunction code 41”.
5. Hydraulic unit solenoid coupler terminals
Refer to “Malfunction code 41”.
6. Hydraulic unit
Refer to “Malfunction code 41”.
7. Battery voltage
Measure the battery voltage.

Malfunction code 52 (Rear wheel will not recover from the locking tendency even though the signal is continuously transmitted from the ECU (ABS) to release the hydraulic state [when the battery voltage is low].)

Check the following:

1. Rotation of the rear wheel
Refer to “Malfunction code 42”.
2. Brake master cylinder and brake caliper
Refer to “Malfunction code 42”.
3. Brake fluid
Refer to “Malfunction code 42”.

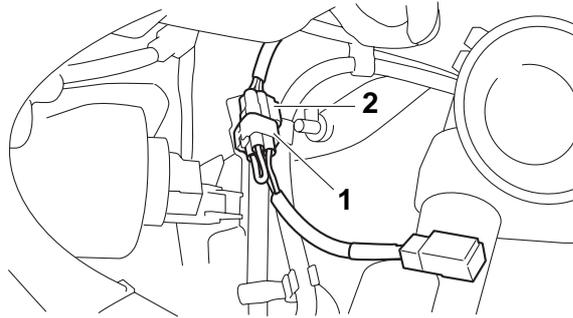
ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

4. Brake hose lines
Refer to "Malfunction code 42".
5. Hydraulic unit solenoid coupler terminals
Refer to "Malfunction code 42".
6. Hydraulic unit
Refer to "Malfunction code 42".
7. Battery voltage
Measure the battery voltage.

EAS15B3036

[D-6-4] DELETING THE MALFUNCTION CODE

1. Connect the test coupler adapter "1" to the test coupler "2". Refer to "[B-5] MALFUNCTION CHECK BY THE ABS SELF DIAGNOSIS (PRESENT MALFUNCTION)"



2. Turn the main switch on.
 - The multifunction display indicates previously recorded malfunction codes.

NOTE:

The ABS error code is not displayed during the diagnosis of the fuel injection.

3. Turn the engine stop switch off.

ECA15B3026

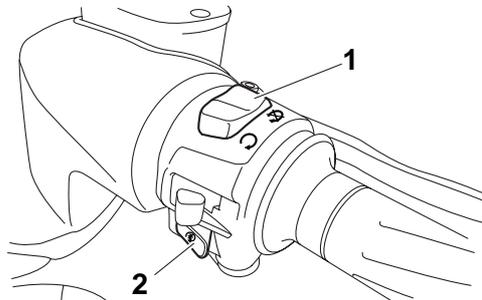
CAUTION:

If the starter switch is pushed without turning the engine stop switch off, it may damage the starting motor gears or other parts, therefore be sure to turn it off.

4. Push the starter switch "2" more than 10 times in 4 seconds to delete the malfunction codes.

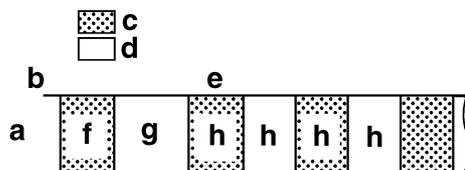
NOTE:

The multifunction meter display switches to the ODO/TRIP display and the ABS warning light flashes in 0.5 second intervals when the malfunction codes are deleted.



5. Turn the main switch off.
6. Turn the main switch on again.
 - Check that the ABS warning light goes on for 2 seconds, then goes out for 3 seconds and starts flashing.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)



- a. ABS warning light
- b. ON
- c. Main switch on
- d. Main switch off
- e. Flashing
- f. 2 seconds
- g. 3 seconds
- h. 0.5 seconds

7. Turn the main switch off.
8. Disconnect the test coupler adaptor from the test coupler and install the protective cap onto the test coupler.

NOTE:

Do not forget to install the protective cap onto the test coupler.

ECA15B3027

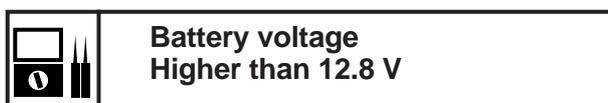
CAUTION:

Since the ECU (ABS) remains in the memory until the malfunction code is deleted, always delete the malfunction code when the service work is finished.

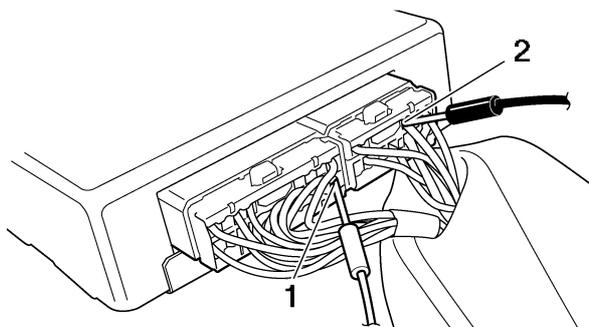
EAS15B3038

[D-6-6] DELETE FUNCTION TEST

1. Place the vehicle on the centerstand.
2. Set the main switch to "OFF".
3. Connect the test coupler adaptor to the test coupler.
4. Set the main switch to "ON".
5. Check:
 - ECU (ABS) voltage
Connect the pocket tester (DC 20 V) to the ECU (ABS) coupler.
Tester positive probe → Brown/White "1"
Tester negative probe → Black "2"



Lower than 12.8 V → Charge or replace the battery.



ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

6. Check:

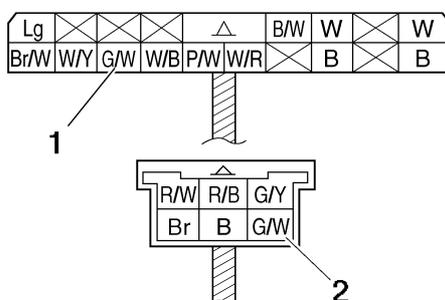
- ECU (ABS)-to-start-switch-lead continuity

Connect the pocket tester ($\Omega \times 1$) to the ECU (ABS) coupler and start switch coupler.

Tester positive probe → **Green/White “1” (ECU (ABS))**

Tester negative probe → **Green/White “2” (start switch)**

No continuity → Replace or repair the wire harness.



7. Check:

- ECU (ABS) voltage

Connect the pocket tester (DC 20 V) to the ECU (ABS) coupler.

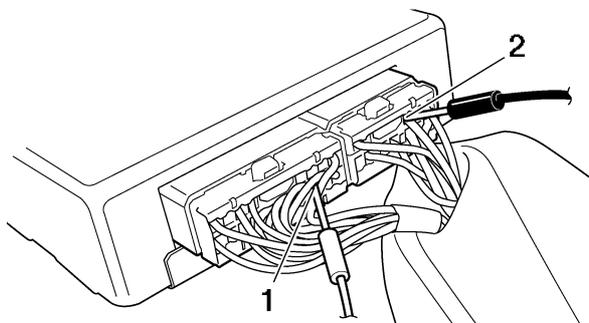
Tester positive probe → **White/Blue “2”**

Tester negative probe → **Black “1”**

Push the start switch.



Out of specification → Replace the handlebar switch.



8. If the above-mentioned check are within specification, replace the ECU (ABS).

EAS15B3016

[D-6] FINAL CHECK

Checking procedures

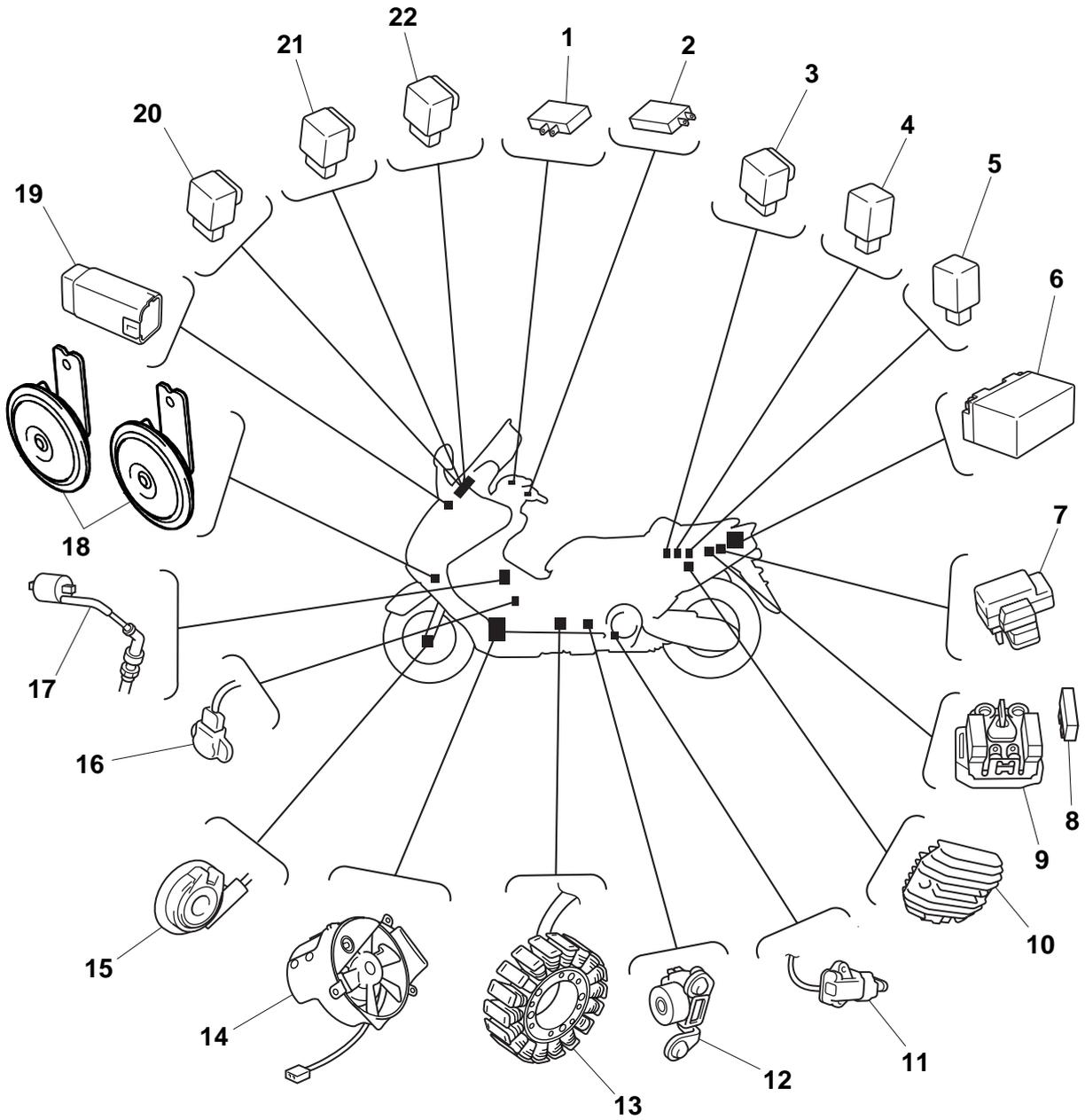
1. Check the brake fluid level in the brake master cylinder reservoir and brake fluid reservoir.
Refer to “CHECKING THE BRAKE FLUID LEVEL” on page 3-22.
2. Check the wheel sensor housings and wheel sensors for proper installation.
Refer to “FRONT WHEEL” on page 4-6 and “REAR WHEEL” on page 4-16.
3. Perform hydraulic unit operation test “1” or “2”.
Refer to “HYDRAULIC UNIT OPERATION TEST” on page 4-49.
4. Delete the malfunction codes.
Refer to “[D-6-4] DELETING THE MALFUNCTION CODE” on page 8-93.
5. Perform a trial run.
Refer to “TRIAL RUN” on page 4-52.

ABS (ANTI-LOCK BRAKE SYSTEM) (XP500A)

ELECTRICAL COMPONENTS

EAS27970

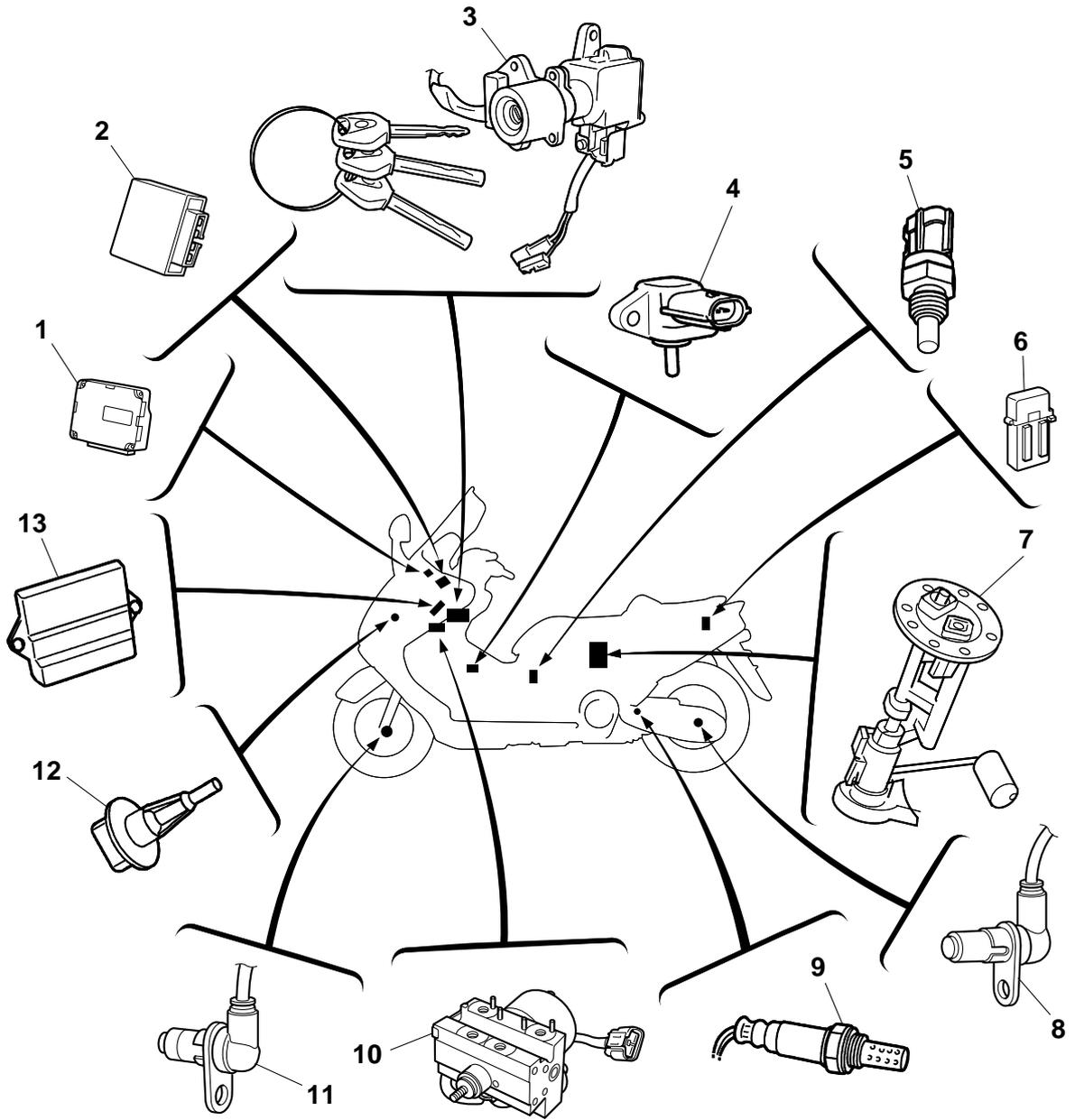
ELECTRICAL COMPONENTS



ELECTRICAL COMPONENTS

1. Front brake light switch
2. Rear brake light switch
3. Turn signal/hazard relay
4. Starting circuit cut-off relay 1
5. Starting circuit cut-off relay 2 (XP500A)
6. Battery
7. Fuse box
8. Main fuse
9. Starter relay
10. Rectifier/regulator
11. Sidestand switch
12. Crankshaft position sensor
13. Stator coil
14. Radiator fan
15. Speed sensor (XP500)
16. Throttle position sensor
17. Ignition coil
18. Horn
19. Lean angle sensor
20. Fuel injection system relay
21. Headlight relay
22. Radiator fan motor relay

ELECTRICAL COMPONENTS



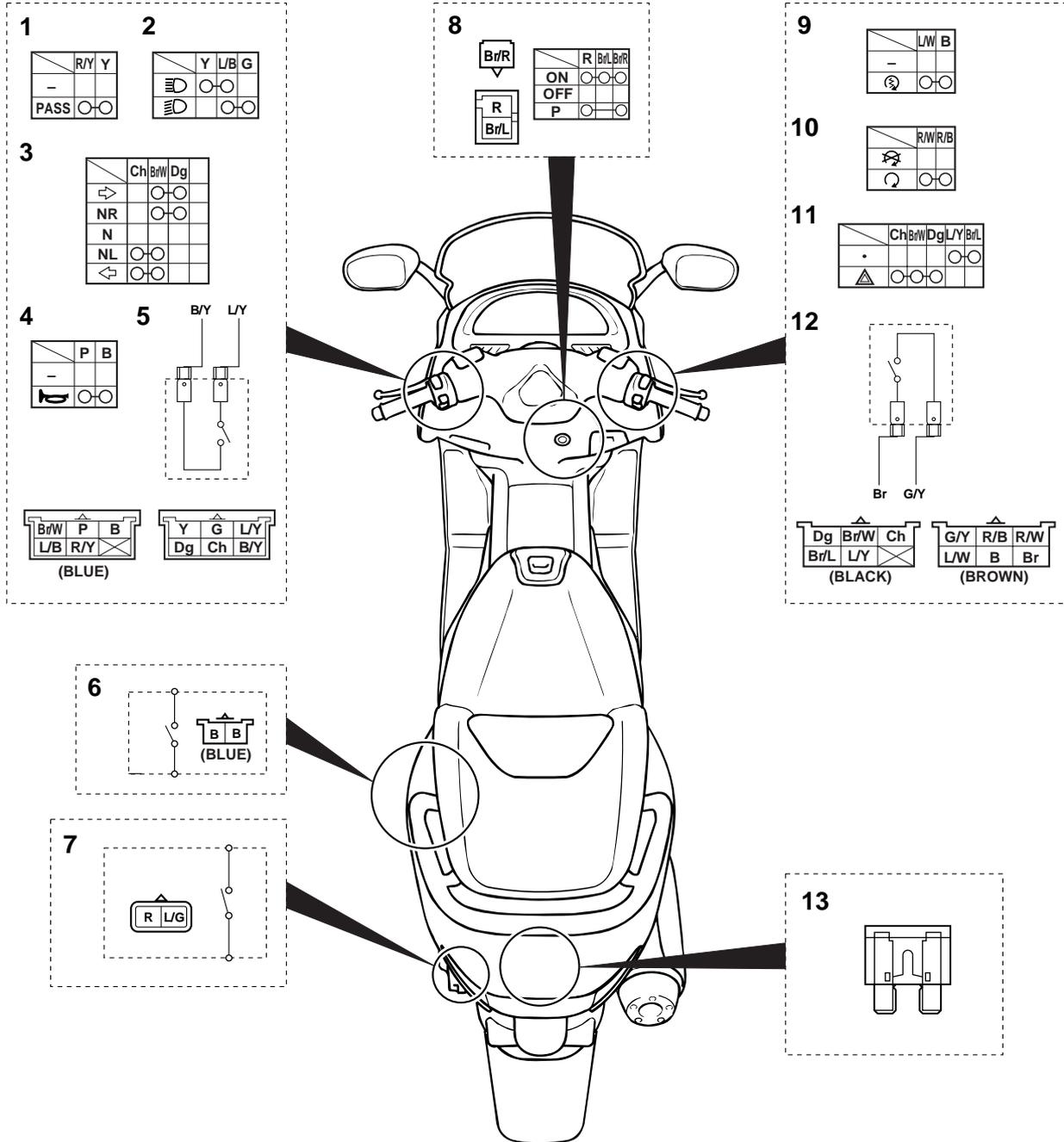
ELECTRICAL COMPONENTS

1. ECU (ABS) (XP500A)
2. Fail-safe relay (XP500A)
3. Main switch/immobilizer unit
4. Intake air pressure sensor
5. Coolant temperature sensor
6. ABS motor fuse
7. Fuel pump
8. Rear wheel sensor (XP500A)
9. O₂ sensor
10. Hydraulic unit (XP500A)
11. Front wheel sensor (XP500A)
12. Intake air temperature sensor
13. ECU (engine)

ELECTRICAL COMPONENTS

EAS27980

CHECKING THE SWITCHES



ELECTRICAL COMPONENTS

1. Pass switch
2. Dimmer switch
3. Turn signal switch
4. Horn switch
5. Rear brake light switch
6. Sidestand switch
7. Storage box light switch
8. Main switch
9. Start switch
10. Engine stop switch
11. Hazard switch
12. Front brake light switch
13. Fuse

ELECTRICAL COMPONENTS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, check the wiring connections and if necessary, replace the switch.

ECA14370

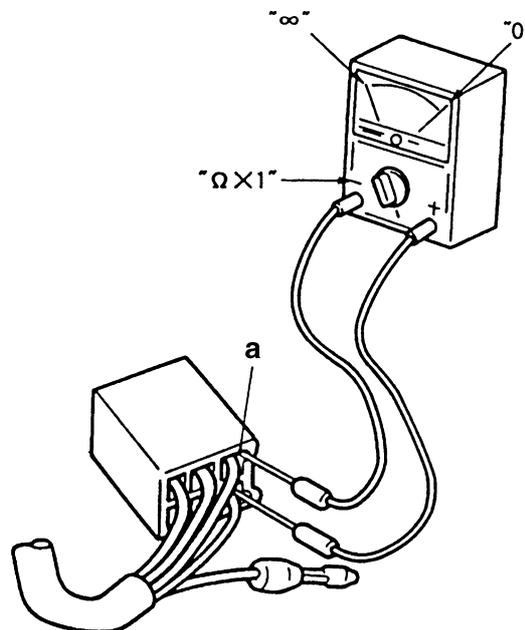
CAUTION:

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



NOTE:

- Before checking for continuity, set the pocket tester to "0" and to the " $\Omega \times 1$ " range.
- When checking for continuity, switch back and forth between the switch positions a few times.



The terminal connections for switches (e.g., main switch, engine stop switch) are shown in an illustration similar to the one on the left.

The switch positions "a" are shown in the far left column and the switch lead colors "b" are shown in the top row in the switch illustration.

NOTE:

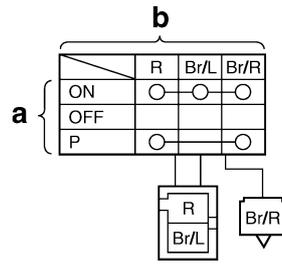
"○—○" indicates a continuity of electricity between switch terminals (i.e., a closed circuit at the respective switch position).

The example illustration on the left shows that:

There is continuity between black and black/white when the switch is set to "OFF".

There is continuity between red, brown/blue and brown/red when the switch is set to "ON".

ELECTRICAL COMPONENTS



EAS27990

CHECKING THE BULBS AND BULB SOCKETS

Check each bulb and bulb socket for damage or wear, proper connections, and also for continuity between the terminals.

Damage/wear → Repair or replace the bulb, bulb socket or both.

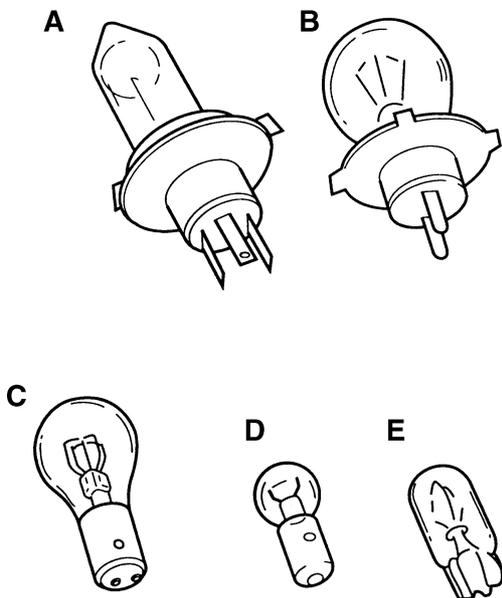
Improperly connected → Properly connect.

No continuity → Repair or replace the bulb, bulb socket or both.

Types of bulbs

The bulbs used on this vehicle are shown in the illustration on the left.

- Bulbs “A” and “B” are used for the headlights and usually use a bulb holder that must be detached before removing the bulb. The majority of these types of bulbs can be removed from their respective socket by turning them counterclockwise.
- Bulbs “C” is used for turn signal and tail/brake lights and can be removed from the socket by pushing and turning the bulb counterclockwise.
- Bulbs “D” and “E” are used for meter and indicator lights and can be removed from their respective socket by carefully pulling them out.



Checking the condition of the bulbs

The following procedure applies to all of the bulbs.

1. Remove:

- Bulb

EWA13320



WARNING

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

ECA14380

CAUTION:

- Be sure to hold the socket firmly when removing the bulb. Never pull the lead, otherwise it may be pulled out of the terminal in the coupler.
- Avoid touching the glass part of the headlight bulb to keep it free from oil, otherwise the transparency of the glass, the life of the bulb, and the luminous flux will be adversely affected. If the headlight bulb gets soiled, thoroughly it with a cloth moistened with alcohol or lacquer thinner.

2. Check:

- Bulb (for continuity)
(with the pocket tester)
No continuity → Replace.

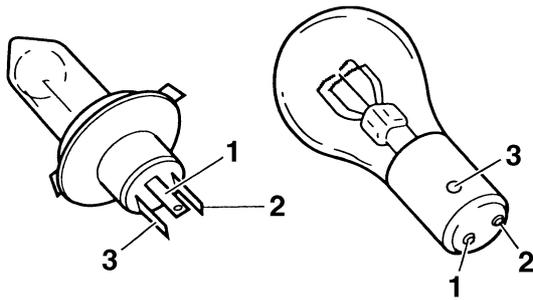


Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

NOTE:

Before checking for continuity, set the pocket tester to “0” and to the “Ω × 1” range.

- Connect the positive tester probe to terminal “1” and the negative tester probe to terminal “2”, and check the continuity.
- Connect the positive tester probe to terminal “1” and the negative tester probe to terminal “3”, and check the continuity.
- If either of the readings indicate no continuity, replace the bulb.



Checking the condition of the bulb sockets

The following procedure applies to all of the bulb sockets.

1. Check:
 - Bulb socket (for continuity) (with the pocket tester)
 No continuity → Replace.



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

NOTE: _____

Check each bulb socket for continuity in the same manner as described in the bulb section; however, note the following.

- a. Install a good bulb into the bulb socket.
- b. Connect the pocket tester probes to the respective leads of the bulb socket.
- c. Check the bulb socket for continuity. If any of the readings indicate no continuity, replace the bulb socket.

EAS28000

CHECKING THE FUSES

The following procedure applies to all of the fuses.

ECA13680

CAUTION:

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

1. Remove:
 - Grab bar
 - Rear cover
 - Battery cover
 Refer to “GENERAL CHASSIS” on page 4-1.

2. Check:

- Fuse

- a. Connect the pocket tester to the fuse and check the continuity.

NOTE: _____

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



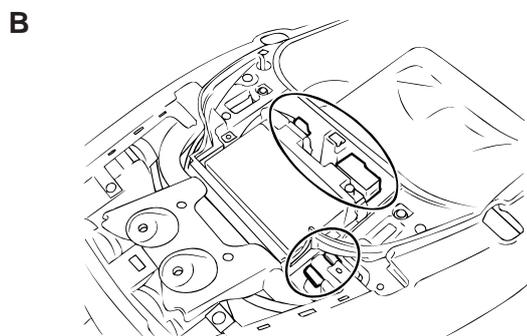
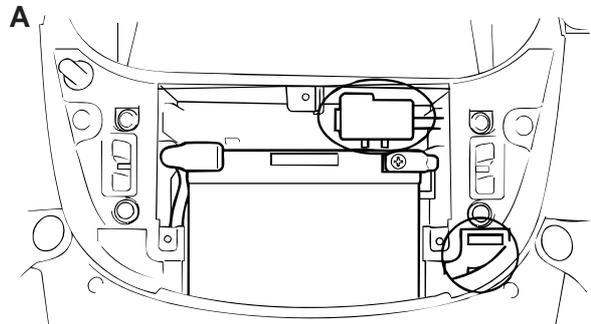
Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

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

3. Replace:

- Blown fuse

- a. Set the main switch to “OFF”.
- b. Install a new fuse of the correct amperage rating.
- c. Set on the switches to verify if the electrical circuit is operational.



- A. XP500
- B. XP500A

- d. If the fuse immediately blows again, check the electrical circuit.

ELECTRICAL COMPONENTS

Fuses	Amperage rating	Q'ty
Main	30A	1
Headlight	15A	1
Signal	20A (XP500) 15A (XP500A)	1
Ignition	10A	1
Radiator fan motor	15A	1
Hazard	10A	1
Fuel injection	10A	1
Backup	10A	1
ABS motor (XP500A)	30A	1
ABS control unit (XP500A)	5A	1
Backup fuse (storage box light, immobilizer unit, and meter assembly)	10A	1
Reserve	30A	1
Reserve	20A (XP500)	1
Reserve	15A	1
Reserve	10A	1
Reserve	5A (XP500A)	1

EWA13310

WARNING

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



4. Install:

- Battery cover
- Rear cover
- Grab bar

Refer to "GENERAL CHASSIS" on page 4-1.

EAS28030

CHECKING AND CHARGING THE BATTERY

EWA13290

WARNING

Batteries generate explosive hydrogen gas

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

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

FIRST AID IN CASE OF BODILY CONTACT: EXTERNAL

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

INTERNAL

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

ECA13660

CAUTION:

- This is a sealed battery. Never remove the sealing caps because the balance between cells will not be maintained and battery performance will deteriorate.
- Charging time, charging amperage and charging voltage for an MF battery are different from those of conventional batteries. The MF battery should be charged as explained in the charging method illustrations. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

NOTE:

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

1. Remove:

- Battery cover

Refer to "GENERAL CHASSIS" on page 4-1.

ELECTRICAL COMPONENTS

the machine is stopped.

- b. Connect a charged and AMP meter to the battery and start charging.

NOTE:

Set the charging voltage at 16–17 V. If the setting is lower, charging will be insufficient. If too high, the battery will be over-charged.

- c. Make sure that the current is higher than the standard charging current written on the battery.

NOTE:

If the current is lower than the standard charging current written on the battery, set the charging voltage adjust dial at 20–24 V and monitor the amperage for 3–5 minutes to check the battery.

**Reach the standard charging current
Battery is good.
Does not reach the standard charging current
Replace the battery.**

- d. Adjust the voltage so that the current is at the standard charging level.
- e. Set the time according to the charging time suitable for the open-circuit voltage. Refer to “Battery condition checking steps”.
- f. If charging requires more than 5 hours, it is advisable to check the charging current after a lapse of 5 hours. If there is any change in the amperage, readjust the voltage to obtain the standard charging current.
- g. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

Charging method using a constant voltage charger

- a. Measure the open-circuit voltage prior to charging.

NOTE:

Voltage should be measured 30 minutes after the machine is stopped.

- b. Connect a charger and AMP meter to the battery and start charging.

- c. Make sure that the current is higher than the standard charging current written on the battery.

NOTE:

If the current is lower than the standard charging current written on the battery, This type of battery charger cannot charge the MF battery. A variable voltage charger is recommended.

- d. Charge the battery until the battery’s charging voltage is 15 V.

NOTE:

Set the charging time at 20 hours (maximum).

- e. Measure the battery open-circuit voltage after leaving the battery unused for more than 30 minutes.

12.8 V or more --- Charging is complete.
12.7 V or less --- Recharging is required.
Under 12.0 V --- Replace the battery.

6. Install:

- Battery

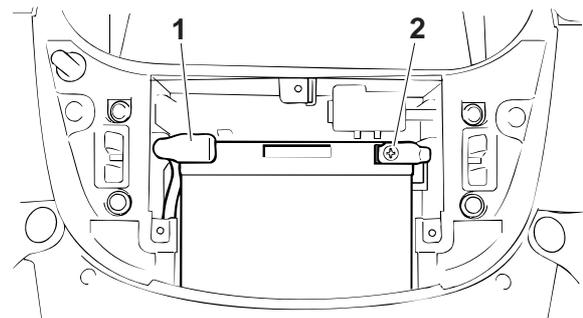
7. Connect:

- Battery leads
(to the battery terminals)

ECA13630

CAUTION:

First, connect the positive battery lead “1”, and then the negative battery lead “2”.



8. Check:

- Battery terminals
Dirt → Clean with a wire brush.
Loose connection → Connect properly.

9. Lubricate:

- Battery terminals

 **Recommended lubricant
Dielectric grease**

10. Install:

- Battery cover

Refer to "GENERAL CHASSIS" on page 4-1.

EAS28040

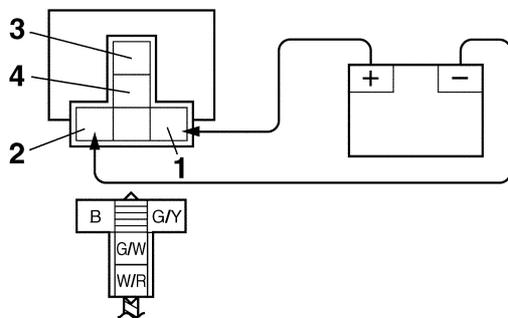
CHECKING THE RELAYS

Check each switch for continuity with the pocket tester. If the continuity reading is incorrect, replace the relay.



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

1. Disconnect the relay from the wire harness.
2. Connect the pocket tester ($\Omega \times 1$) and battery (12 V) to the relay terminal as shown. Check the relay operation. Out of specification → Replace.

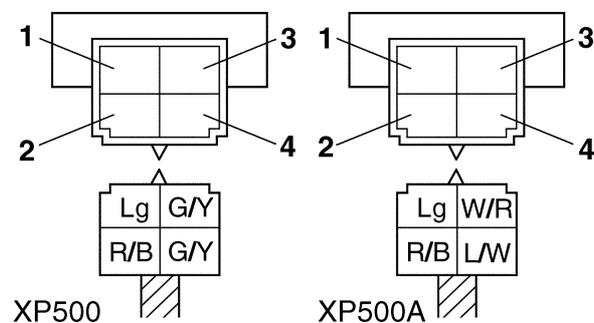


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



Relay operation
Continuity/No continuity
(between "3" to "4")

Starting circuit cut-off relay 1

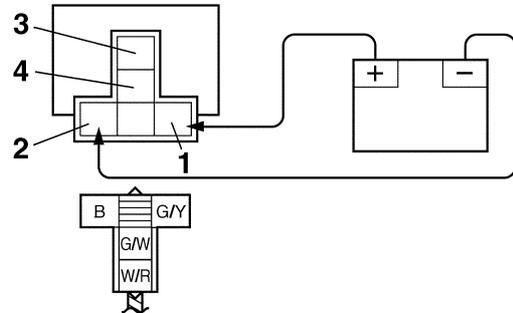


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



Result
Continuity → OK
No continuity → Replace.

Starting circuit cut-off relay 2 (XP500A)

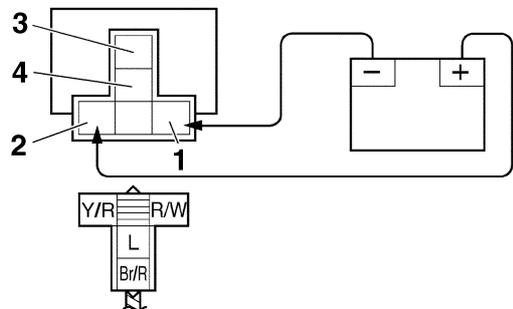


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



Result
Continuity → OK
No continuity → Replace.

Radiator fan motor relay

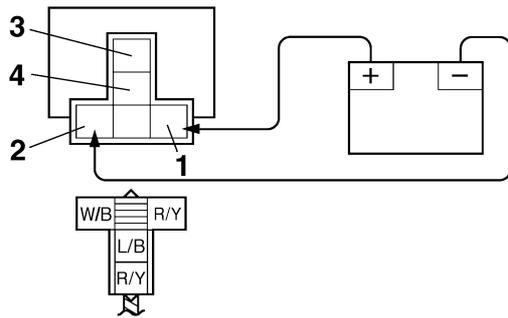


1. Positive battery terminal
2. Negative battery terminal
3. Positive tester probe
4. Negative tester probe



Result
Continuity → OK
No continuity → Replace.

Headlight relay



1. Positive battery terminal
2. Negative battery terminal
3. Tester positive probe
4. Negative tester probe



Result
Continuity → OK
No continuity → Replace.

EAS15B1010

CHECKING THE TURN SIGNAL/HAZARD RELAY

1. Check:
 - Turn signal/hazard relay input voltage
 Out of specification → The wiring circuit from the main switch to the turn signal/hazard relay coupler is faulty and must be repaired.



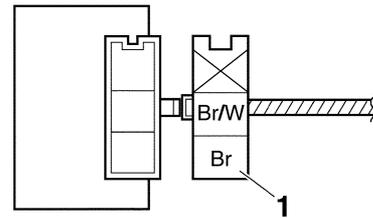
Turn signal/hazard relay input voltage
DC 12 V

- a. Connect the pocket tester (DC 20 V) to the turn signal/hazard relay terminal as shown.



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

Positive tester probe
Brown "1"
Negative tester probe
Ground



- b. Turn the main switch to "ON".
- c. Measure the turn signal/hazard relay input voltage.



2. Check:
 - Turn signal/hazard relay output voltage
 Out of specification → Replace.



Turn signal/hazard relay output voltage
DC 12 V

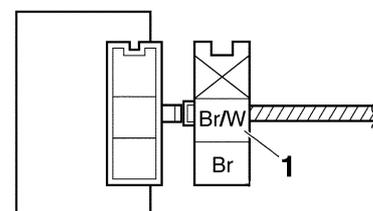


- a. Connect the pocket tester (DC 20 V) to the turn signal/hazard relay terminal as shown.



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

Positive tester probe
Brown/White "1"
Negative tester probe
Ground



- b. Turn the main switch to "ON".
- c. Measure the turn signal/hazard relay output voltage.



EAS28050

CHECKING THE DIODE

1. Check:

- Starting circuit cut-off relay 1 diode
Out of specification → Replace.

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

Continuity
Positive tester probe → Red/
Black "1"
Negative tester probe → Light
green "2"
No continuity
Positive tester probe → Red/
Black "2"
Negative tester probe → Light
green "1"

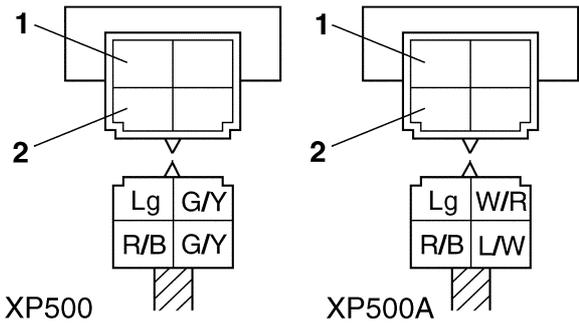


- Disconnect the starting circuit cut-off relay 1 from the wire harness.
- Connect the pocket tester ($\Omega \times 1$) to the starting circuit cut-off relay 1 as shown.
- Check the starting circuit cut-off relay 1 diode for continuity.

Positive tester probe
Light green "1"
Negative tester probe
Red/Black "2"

- Check the starting circuit cut-off relay diode for no continuity.

Positive tester probe
Red/Black "1"
Negative tester probe
Light green "2"



XP500

XP500A

NOTE:

When you switch the positive and negative tester probes, the readings in the above chart will be reversed.



EAS28070

CHECKING THE SPARK PLUG CAPS

The following procedure applies to all of the spark plug caps.

1. Check:

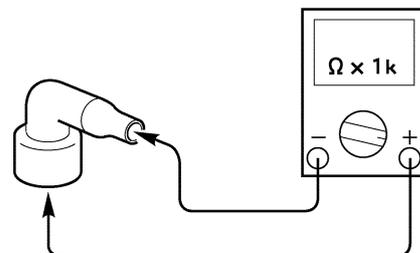
- Spark plug cap resistance
Out of specification → Replace.

Resistance
10.0 k Ω



- Remove the spark plug cap from the spark plug lead.
- Connect the pocket tester ($\Omega \times 1k$) to the spark plug cap as shown.

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



- Measure the spark plug cap resistance.



ELECTRICAL COMPONENTS

EAS28080

CHECKING THE IGNITION COIL

1. Check:

- Primary coil resistance
Out of specification → Replace.

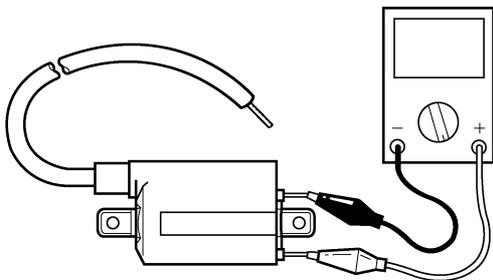


Primary coil resistance
1.87–2.53 Ω

- Disconnect the ignition coil connectors from the ignition coil terminals.
- Connect the pocket tester ($\Omega \times 1$) to the ignition coil as shown.



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



I8110104

Positive tester probe
Red/Black
Negative tester probe
Orange (gray)

- Measure the primary coil resistance.

2. Check:

- Secondary coil resistance
Out of specification → Replace.

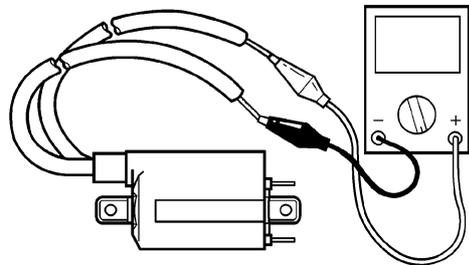


Secondary coil resistance
12.00–18.00 kΩ

- Disconnect the spark plug cap from the ignition coil.
- Connect the pocket tester ($\Omega \times 1k$) to the ignition coil as shown.



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



I8110104

Negative tester probe
Spark plug lead
Positive tester probe
Spark plug lead

- Measure the secondary coil resistance.

EAS28080b

CHECKING THE SPARK PLUG GAP

1. Check:

- Ignition spark gap
Out of specification → Replace.



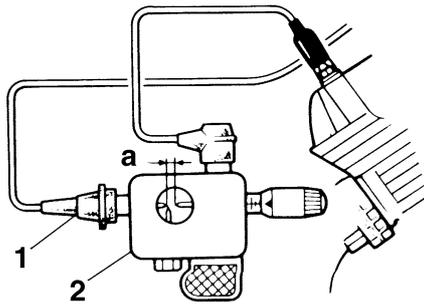
Minimum ignition spark gap
6 mm (0.24 in)

- Disconnect the spark plug cap “1” from the spark plug.
- Connect the ignition checker/dynamic spark tester “2” as shown.



Ignition checker
90890-06754
Opama pet-4000 spark checker
YM-34487

- Set the main switch to “ON”.
- Measure the ignition spark gap “a”.



1. Spark plug gap

- e. Crank the engine by pushing the starter switch and gradually increase the spark gap until a misfire occurs.



EAS28120

CHECKING THE CRANKSHAFT POSITION SENSOR

1. Disconnect:
 - Crankshaft position sensor coupler (from the wire harness)
2. Check:
 - Crankshaft position sensor resistance
Out of specification → Replace the crankshaft position sensor.



Crankshaft position sensor resistance
189–231 Ω (Gy-B)

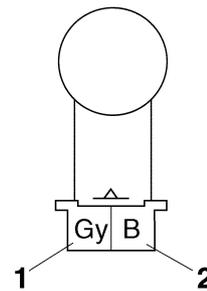


- a. Connect the pocket tester ($\Omega \times 100$) to the crankshaft position sensor coupler as shown.



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

Positive tester probe
Gray “1”
Negative tester probe
Black “2”



- b. Measure the crankshaft position sensor resistance.



EAS28130

CHECKING THE LEAN ANGLE SENSOR

1. Remove:
 - Lean angle sensor (from the bracket.)
2. Check:
 - Lean angle sensor out put voltage
Out of specification → Replace.



Lean angle sensor out put voltage
Less than 45° “a”: 0.4–1.4 V
More than 45° “b”: 3.8–4.2 V

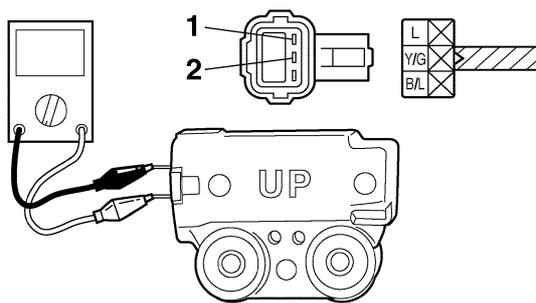


- a. Connect the lean angle sensor coupler to the wireharness.
- b. Connect the pocket tester (DC 20 V) to the lean angle sensor coupler as shown.

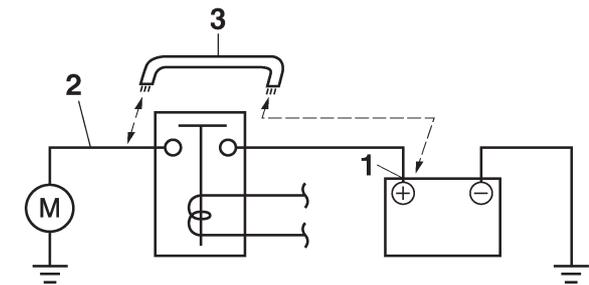
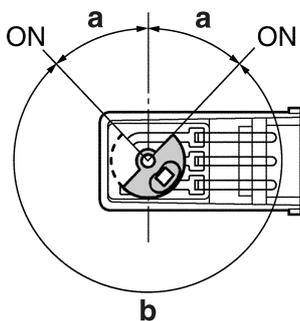


Pocket tester
90890-03112
Analog pocket tester
YU-03112-C

Tester positive probe
Blue “1”
Negative tester probe
Yellow/Green “2”



- c. When turn the lean angle sensor to 45°.
- d. Measure the lean angle sensor out put voltage.



- b. Check the starter motor operation.



EAS28150

CHECKING THE STATOR COIL

1. Disconnect:
 - Stator coil coupler (from the wire harness)
2. Check:
 - Stator coil resistance
 Out of specification → Replace the stator coil.

	Stator coil resistance 0.22–0.26 kΩ at 20 °C (68 °F)
--	--



- a. Connect the pocket tester ($\Omega \times 1$) to the stator coil coupler as shown.

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

Positive tester probe White "1" Negative tester probe White "2"
--

Positive tester probe White "1" Negative tester probe White "3"
--

Positive tester probe White "2" Negative tester probe White "3"
--

EAS15B1011

CHECKING THE STARTER MOTOR OPERATION

1. Check:
 - Starter motor operation
 Does not operate → Perform the electric starting system troubleshooting, starting with step 4.
 Refer to "TROUBLESHOOTING" on page 8-13.

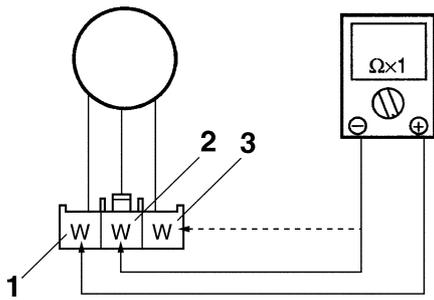


- a. Connect the positive battery terminal "1" and starter motor lead "2" with a jumper lead "3".

EWA13810

WARNING

- A wire that is used as a jumper lead must have at least the same capacity of the battery lead, otherwise the jumper lead may burn.
- This check is likely to produce sparks, therefore, make sure no flammable gas or fluid is in the vicinity.



b. Measure the stator coil resistance.



EAS28170

CHECKING THE CHARGING VOLTAGE

1. Check:

- Charging voltage
Out of specification → Correct the stator coil condition.
Refer to “CHECKING THE STATOR COIL” on page 8-115.

	Rectifier/regulator input voltage above 14 V at 5000 r/min
--	---

NOTE:

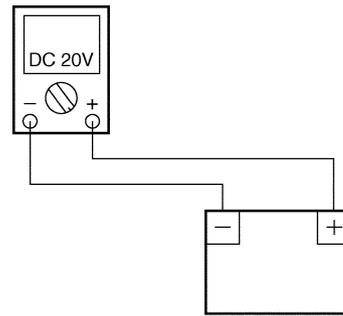
Make sure the battery is fully charged.



- Set the digital tachometer to the ignition coil of cylinder #1.
- Connect the pocket tester (AC 20 V) to the battery terminal as shown.

	Pocket tester 90890-03112 Analog pocket tester YU-03112-C Digital tachometer 90890-06760 YU-39951-B
--	--

Positive tester probe Positive battery terminal Negative tester probe Negative battery terminal
--



- Start the engine and let it run at approximately 5000 r/min.
- Measure the charging voltage.



EAS28180

CHECKING THE HORN

1. Check:

- Horn voltage
Out of specification → Properly connect or repair the signaling system’s wiring.

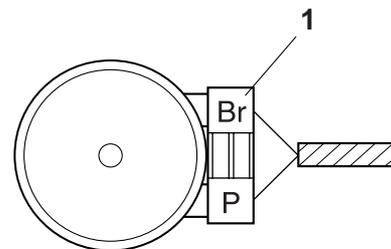
	Horn voltage 12V
--	-----------------------------



- Connect the pocket tester (20V DC) to the horn terminal.

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

Tester positive probe Brown “1” Negative tester probe Ground

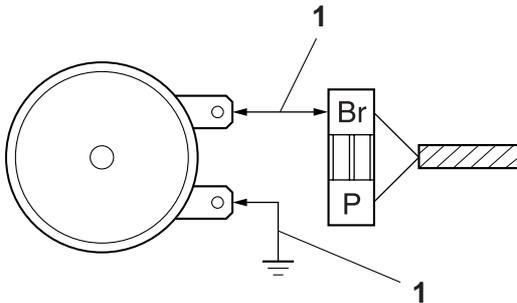


- Turn the main switch to “ON”.
- Measure the voltage (DC 12 V) of brown at the horn coupler.

2. Check:

- Operation of the horn
The horn fails to sound → check the step (3).

- Disconnect the horn coupler at the horn.
- Connect a jumper lead "1" to the brown terminal in the horn coupler and the horn terminal.



- Turn the main switch to "ON".
- Check that the horn does sound.

EAS28230

CHECKING THE FUEL SENDER

- Remove:
 - Fuel pump
(from the fuel tank)
- Disconnect:
 - Fuel sender coupler
(from the wire harness)
- Check:
 - Fuel sender resistance
Out of specification → Replace.



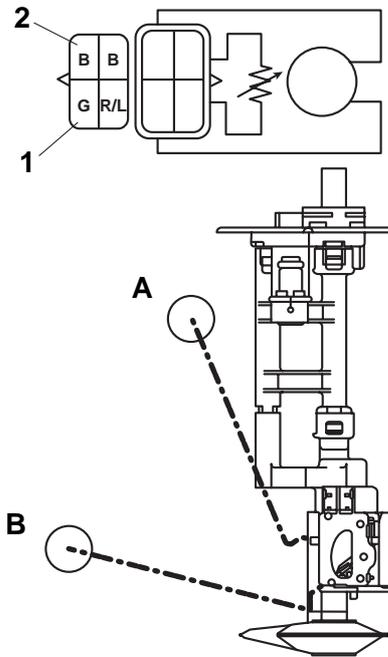
Fuel sender resistance (up position F "A")
 19–21Ω at 20°C (68°F)
Fuel sender resistance (down position E "B")
 137–143Ω at 20°C (68°F)

- Connect the pocket tester ($\Omega \times 1$) to the fuel sender terminal as shown.



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

Positive tester probe
 Green "1"
Negative tester probe
 Black "2"



- Measure the fuel sender resistance.

EAS28240

CHECKING THE SPEED SENSOR

- Check:
 - Speed sensor output voltage
Out of specification → Replace.



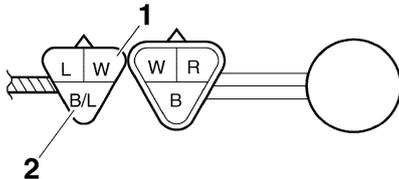
Output voltage reading cycle
 0 V–5 V–0 V–5 V–0 V

- Connect the pocket tester (DC 20 V) to the speed sensor coupler (wire harness side) as shown.



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

Tester positive probe
White "1"
Negative tester probe
Black/Blue "2"



- b. Turn the main switch to "ON".
- c. Elevate the rear wheel and slowly rotate it.
- d. Measure the voltage (5 V) of White and black/blue. With each full rotation of the rear wheel, the voltage reading should cycle from 0 V to 5 V to 0 V.

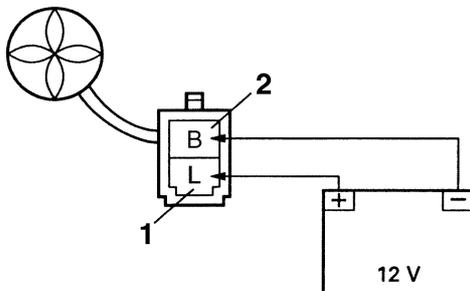
EAS28250

CHECKING THE RADIATOR FAN MOTOR

1. Check:
 - Radiator fan motor
Faulty/rough movement → Replace.

- a. Disconnect the radiator fan motor coupler from the wire harness.
- b. Connect the battery (DC 12 V) as shown.

Positive tester probe
Blue "1"
Negative tester probe
Black "2"



- c. Measure the radiator fan motor movement.



EAS28260

CHECKING THE COOLANT TEMPERATURE SENSOR

1. Remove:
 - Coolant temperature sensor
Refer to "THERMOSTAT" on page 6-5.

EWA14130

WARNING

- Handle the coolant temperature sensor with special care.
- Never subject the coolant temperature sensor to strong shocks. If the coolant temperature sensor is dropped, replace it.

2. Check:
 - Coolant temperature sensor resistance
Out of specification → Replace.



Coolant temperature sensor resistance

2.32–2.59 kΩ at 20 °C (68 °F)

0.310–0.326 kΩ at 80 °C (176 °F)

- a. Connect the pocket tester ($\Omega \times 1k$) to the coolant temperature sensor "1" as shown.



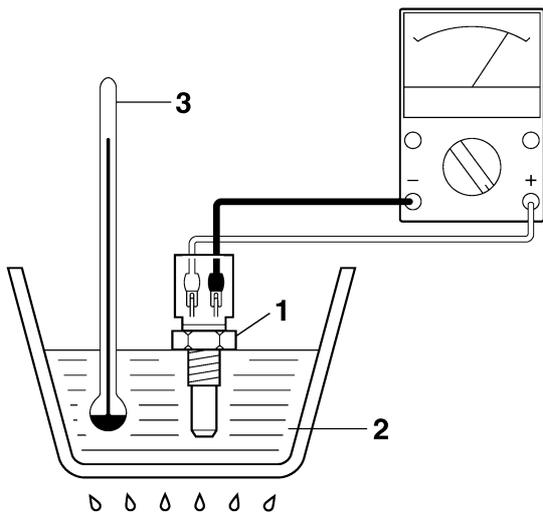
Pocket tester

90890-03112

Analog pocket tester

YU-03112-C

Tester positive probe
Green/Red
Negative tester probe
Black/Blue



b. Immerse the coolant temperature sensor in a container filled with coolant "2".

NOTE:
Make sure the coolant temperature sensor terminals do not get wet.

- c. Place a thermometer "3" in the coolant.
- d. Slowly heat the coolant, and then let it cool to the specified temperature indicated in the table.
- e. Check the coolant temperature sensor for continuity at the temperatures indicated in the table.



EAS28300

CHECKING THE THROTTLE POSITION SENSOR

1. Check:
 - Throttle position sensor

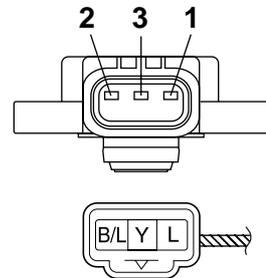


- a. Disconnect the throttle position sensor coupler from the throttle position sensor.
- b. Remove the throttle position sensor from the throttle body.
- c. Connect the pocket tester ($\Omega \times 1k$) to the throttle position sensor as shown.



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

Tester positive probe
Blue "1"
Negative tester probe
Black/Blue "2"



- d. Measure the throttle position sensor resistance.
Out of specification → Replace the throttle position sensor.



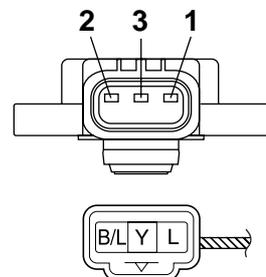
Maximum throttle position sensor resistance
4.0–6.0 k Ω at 20 °C (68 °F)
(Blue–Black/Blue)

- e. Connect the pocket tester to the throttle position sensor as shown.



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

Tester positive probe
Yellow "1"
Negative tester probe
Black/Blue "2"



- f. While slowly opening the throttle, check that the throttle position sensor resistance is within the specified range.
Resistance does not change or it changes

abruptly → Replace the throttle position sensor.

The slot is worn or broken → Replace the throttle position sensor.

NOTE:

Check mainly that the resistance changes gradually when turning the throttle, since the readings (from closed to wide-open throttle) may differ slightly from those specified.

	<p>Throttle position sensor resistance (0.52–0.9)–(4.0–6.0) kΩ at 20 °C (68 °F) (Yellow–Black/Blue)</p>
---	---

g. Install the throttle position sensor.



EAS28410

CHECKING THE INTAKE AIR PRESSURE SENSOR

1. Check:
 - Intake air pressure sensor output voltage
Out of specification → Replace.

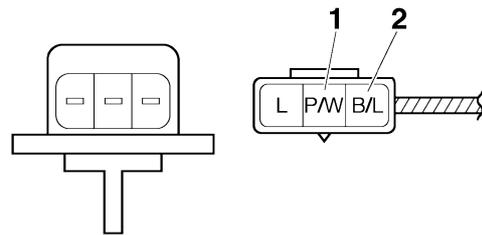
	<p>Intake air pressure sensor output voltage 2.21–2.69 V at 20°C (68°F)</p>
---	--



a. Connect the pocket tester (DC 20 V) to the intake air pressure sensor coupler (wire harness side) as shown.

	<p>Pocket tester 90890-03112 Analog pocket tester YU-03112-C</p>
---	---

<p>Tester positive probe Brown/White “1” Negative tester probe Black/Blue “2”</p>
--



- b. Turn the main switch to “ON”.
- c. Measure the intake air pressure sensor output voltage.



EAS28420

CHECKING THE INTAKE AIR TEMPERATURE SENSOR

EWA14110

WARNING

- Handle the intake air temperature sensor with special care.
- Never subject the intake air temperature sensor to strong shocks. If the intake air temperature sensor is dropped, replace it.

1. Check:
 - Intake air temperature sensor voltage
Out of specification → Replace.

	<p>Intake air temperature sensor voltage 13.3kPa (0.13 kgf/cm², 1.85 psi): 1.0 V Intake air temperature sensor voltage 120.0kPa (1.2 kgf/cm², 17.1S psi): 4.2 V</p>
---	--

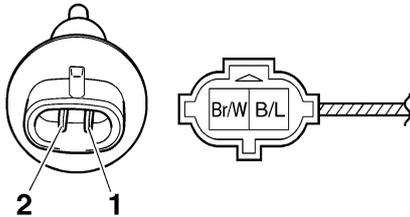


a. Connect the pocket tester (DC 20V) to the intake air temperature sensor terminal as shown.

	<p>Pocket tester 90890-03112 Analog pocket tester YU-03112-C</p>
---	---

ELECTRICAL COMPONENTS

Tester positive probe
Pink/White "1"
Negative tester probe
Black/Blue "2"



- b. Set the main switch to "ON".
- c. Measure the intake air temperature sensor voltage.

2. Install:
 - Intake air temperature sensor

EAS15B3019

CHECKING THE V-BELT RESET COUPLER

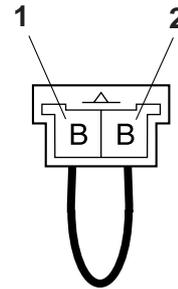
1. Check:
 - V-belt replacement indicator reset coupler for continuity
 - No continuity → Replace

- a. Connect the pocket tester ($\Omega \times 1$) to the V-belt replacement indicator reset coupler as shown.



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

Tester positive probe
Black "1"
Negative tester probe
Black "2"



2. Check:
 - V-belt reset coupler voltage
 - Out of specification → Replace.



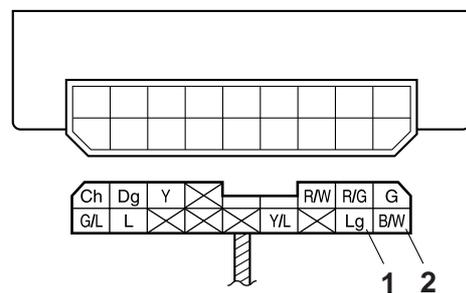
V-belt reset coupler voltage
12V

- a. Connect the pocket tester (20V DC) to the meter assembly coupler (wire harness side) as shown.



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

Tester positive probe
Light green "1"
Negative tester probe
Black/White "2"



- b. Turn the main switch to "ON".
- c. Measure the voltage of gray "1" and black "2" at the meter assembly coupler.

TROUBLESHOOTING

TROUBLESHOOTING	9-1
GENERAL INFORMATION	9-1
STARTING FAILURE/HARD STARTING	9-1
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EAS28450

TROUBLESHOOTING

EAS28460

GENERAL INFORMATION

NOTE:

The following guide for troubleshooting does not cover all the possible causes of trouble. It should be helpful, however, as a guide to basic troubleshooting. Refer to the relative procedure in this manual for checks, adjustments, and replacement of parts.

EAS28480

STARTING FAILURE/HARD STARTING

Engine

1. Cylinder(s) and cylinder head(s)
 - Loose spark plug
 - Loose cylinder head or cylinder
 - Damaged cylinder head gasket
 - Damaged cylinder gasket
 - Worn or damaged cylinder
 - Incorrect valve clearance
 - Improperly sealed valve
 - Incorrect valve-to-valve-seat contact
 - Incorrect valve timing
 - Faulty valve spring
 - Seized valve
2. Piston(s) and piston ring(s)
 - Improperly installed piston ring
 - Damaged, worn or fatigued piston ring
 - Seized piston ring
 - Seized or damaged piston
3. Air filter
 - Improperly installed air filter
 - Clogged air filter element
4. Crankcase and crankshaft
 - Improperly assembled crankcase
 - Seized crankshaft

Fuel system

1. Fuel tank
 - Empty fuel tank
 - Clogged fuel tank cap breather hole
 - Deteriorated or contaminated fuel
 - Clogged or damaged fuel hose
2. Fuel pump
 - Faulty fuel pump
 - Faulty fuel pump relay
3. Throttle body
 - Deteriorated or contaminated fuel
 - Sucked-in air

Electrical system

1. Battery
 - Discharged battery

- Faulty battery
2. Fuse(s)
 - Blown, damaged or incorrect fuse
 - Improperly installed fuse
 3. Spark plug(s)
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
 - Fouled spark plug
 - Worn or damaged electrode
 - Worn or damaged insulator
 - Faulty spark plug cap
 4. Ignition coil(s)
 - Cracked or broken ignition coil body
 - Broken or shorted primary or secondary coils
 - Faulty spark plug lead
 5. Ignition system
 - Faulty ECU (engine)
 - Faulty crankshaft position sensor
 6. Switches and wiring
 - Faulty main switch
 - Faulty engine stop switch
 - Broken or shorted wiring
 - Faulty front, rear or both brake light switches
 - Faulty start switch
 - Faulty sidestand switch
 - Improperly grounded circuit
 - Loose connections
 - Faulty lean angle sensor
 7. Starting system
 - Faulty starter motor
 - Faulty starter relay
 - Faulty starting circuit cut-off relay
 - Faulty starter clutch

EAS28500

INCORRECT ENGINE IDLING SPEED

Engine

1. Cylinder(s) and cylinder head(s)
 - Incorrect valve clearance
 - Damaged valve train components
2. Air filter
 - Clogged air filter element

Fuel system

1. Throttle body
 - Damaged or loose throttle body joint
 - Improperly synchronized throttle bodies
 - Improperly adjusted engine idling speed (idle adjust screw)
 - Improper throttle cable free play
 - Flooded throttle body

Electrical system

1. Battery
 - Discharged battery
 - Faulty battery

2. Spark plug(s)
 - Incorrect spark plug gap
 - Incorrect spark plug heat range
 - Fouled spark plug
 - Worn or damaged electrode
 - Worn or damaged insulator
 - Faulty spark plug cap
3. Ignition coil(s)
 - Faulty spark plug lead
4. Ignition system
 - Faulty ECU (engine)
 - Faulty crankshaft position sensor

EAS28510

POOR MEDIUM-AND-HIGH-SPEED PERFORMANCE

Refer to "STARTING FAILURE/HARD STARTING" on page 9-1.

Engine

1. Air filter
 - Clogged air filter element

Fuel system

1. Fuel pump
 - Faulty fuel pump

EAS28580

FAULTY CLUTCH

Engine operates but vehicle will not move

1. V-belt
 - Bent, damaged or worn V-belt
 - Slipping V-belt
2. Primary pulley cam and primary pulley slider
 - Damaged or worn primary pulley cam
 - Damaged or worn primary pulley slider
3. Clutch spring(s)
 - Damaged clutch spring
4. Transmission gear(s)
 - Damaged transmission gear

Clutch slips

1. Clutch shoe spring(s)
 - Damaged, loose or worn clutch shoe spring
2. Clutch shoe(s)
 - Damaged or worn clutch shoe
3. Primary sliding sheave
 - Seized primary sliding sheave

Poor starting performance

1. V-belt
 - V-belt slips
 - Oil or grease on the V-belt
2. Primary sliding sheave
 - Faulty operation
 - Worn pin groove
 - Worn pin
3. Clutch shoe(s)

- Bent, damaged or worn clutch shoe

Poor speed performance

1. V-belt
 - Oil or grease on the V-belt
2. Primary pulley weight(s)
 - Faulty operation
 - Worn primary pulley weight
3. Primary fixed sheave
 - Worn primary fixed sheave
4. Primary sliding sheave
 - Worn primary sliding sheave
5. Secondary fixed sheave
 - Worn secondary fixed sheave
6. Secondary sliding sheave
 - Worn secondary sliding sheave

EAS28600

OVERHEATING

Engine

1. Clogged coolant passages
 - Cylinder head(s) and piston(s)
 - Heavy carbon buildup
2. Engine oil
 - Incorrect oil level
 - Incorrect oil viscosity
 - Inferior oil quality

Cooling system

1. Coolant
 - Low coolant level
2. Radiator
 - Damaged or leaking radiator
 - Faulty radiator cap
 - Bent or damaged radiator fin
3. Water pump
 - Damaged or faulty water pump
 - Thermostat
 - Thermostat stays closed
 - Oil cooler
 - Clogged or damaged oil cooler
 - Hose(s) and pipe(s)
 - Damaged hose
 - Improperly connected hose
 - Damaged pipe
 - Improperly connected pipe

Fuel system

1. Throttle body
 - Damaged or loose throttle body joint
2. Air filter
 - Clogged air filter element

Chassis

1. Brake(s)
 - Dragging brake

Electrical system

1. Spark plug(s)

- Incorrect spark plug gap
 - Incorrect spark plug heat range
2. Ignition system
 - Faulty ECU (engine)

EAS28610

OVERCOOLING

Cooling system

1. Thermostat
 - Thermostat stays open

EAS28620

POOR BRAKING PERFORMANCE

- Worn brake pad
- Worn brake disc
- Air in hydraulic brake system
- Leaking brake fluid
- Faulty brake caliper kit
- Faulty brake caliper seal
- Loose union bolt
- Damaged brake hose
- Oil or grease on the brake disc
- Oil or grease on the brake pad
- Incorrect brake fluid level

EAS28660

FAULTY FRONT FORK LEGS

Leaking oil

- Bent, damaged or rusty inner tube
- Cracked or damaged outer tube
- Improperly installed oil seal
- Damaged oil seal lip
- Incorrect oil level (high)
- Loose damper rod assembly bolt
- Damaged damper rod assembly bolt copper washer
- Cracked or damaged cap bolt O-ring

Malfunction

- Bent or damaged inner tube
- Bent or damaged outer tube
- Damaged fork spring
- Worn or damaged outer tube bushing
- Bent or damaged damper rod
- Incorrect oil viscosity
- Incorrect oil level

EAS28670

UNSTABLE HANDLING

1. Handlebar
 - Bent or improperly installed handlebar
2. Steering head components
 - Improperly installed upper bracket
 - Improperly installed lower bracket (improperly tightened ring nut)
 - Bent steering stem
 - Damaged ball bearing or bearing race

3. Front fork leg(s)
 - Uneven oil levels (both front fork legs)
 - Unevenly tensioned fork spring (both front fork legs)
 - Broken fork spring
 - Bent or damaged inner tube
 - Bent or damaged outer tube
4. Swingarm
 - Worn bearing or bushing
 - Bent or damaged swingarm
5. Rear shock absorber assembly(-ies)
 - Faulty rear shock absorber spring
 - Leaking oil or gas
6. Tire(s)
 - Uneven tire pressures (front and rear)
 - Incorrect tire pressure
 - Uneven tire wear
7. Wheel(s)
 - Incorrect wheel balance
 - Deformed cast wheel
 - Damaged wheel bearing
 - Bent or loose wheel axle
 - Excessive wheel runout
8. Frame
 - Bent frame
 - Damaged steering head pipe
 - Improperly installed bearing race

EAS28710

FAULTY LIGHTING OR SIGNALING SYSTEM

Headlight does not come on

- Wrong headlight bulb
- Too many electrical accessories
- Hard charging
- Incorrect connection
- Improperly grounded circuit
- Poor contacts (main or light switch)
- Burnt-out headlight bulb

Headlight bulb burnt out

- Wrong headlight bulb
- Faulty battery
- Faulty rectifier/regulator
- Improperly grounded circuit
- Faulty main switch
- Faulty light switch
- Headlight bulb life expired

Tail/brake light does not come on

- Wrong tail/brake light bulb
- Too many electrical accessories
- Incorrect connection
- Burnt-out tail/brake light bulb

Tail/brake light bulb burnt out

- Wrong tail/brake light bulb
- Faulty battery

- Incorrectly adjusted rear brake light switch
- Tail/brake light bulb life expired

Turn signal does not come on

- Faulty turn signal switch
- Faulty turn signal relay
- Burnt-out turn signal bulb
- Incorrect connection
- Damaged or faulty wire harness
- Improperly grounded circuit
- Faulty battery
- Blown, damaged or incorrect fuse

Turn signal blinks slowly

- Faulty turn signal relay
- Faulty main switch
- Faulty turn signal switch
- Incorrect turn signal bulb

Turn signal remains lit

- Faulty turn signal relay
- Burnt-out turn signal bulb

Turn signal blinks quickly

- Incorrect turn signal bulb
- Faulty turn signal relay
- Burnt-out turn signal bulb

Horn does not sound

- Improperly adjusted horn
- Damaged or faulty horn
- Faulty main switch
- Faulty horn switch
- Faulty battery
- Blown, damaged or incorrect fuse
- Faulty wire harness

WIRING DIAGRAM**2007 XP500 WIRING DIAGRAM**

- 1.Crankshaft position sensor
- 2.A.C. magneto
- 3.Rectifier/regulator
- 4.Main switch
- 5.Immobilizer unit
- 6.Storage box light switch
- 7.Storage box light
- 8.Fuse box
- 9.Fuel injection system fuse
- 10.Backup fuse (storage box light, immobilizer unit and meter assembly)
- 11.Signaling system fuse
- 12.Headlight fuse
- 13.Ignition fuse
- 14.Radiator fan motor fuse
- 15.Lighting system fuse
- 16.Battery
- 17.Main fuse
- 18.Starter relay
- 19.Starter motor
- 20.Diode
- 21.Starting circuit cut-off relay 1
- 22.Fuel injection system relay
- 23.Fuel pump
- 24.Right handlebar switch
- 25.Start switch
- 26.Engine stop switch
- 27.Hazard switch
- 28.Front brake light switch
- 29.Sidestand switch
- 30.ECU (engine)
- 31.Ignition coil
- 32.Spark plug
- 33.Coolant temperature sensor
- 34.Intake air temperature sensor
- 35.Fuel injector #1
- 36.Fuel injector #2
- 37.Intake air pressure sensor
- 38.O₂ sensor
- 39.Throttle position sensor
- 40.Lean angle cut-off switch
- 41.Speed sensor
- 42.Grip warmer switch (optional)
- 43.Grip warmer relay (optional)
- 44.Grip warmer (optional)
- 45.Auxiliary DC jack fuse
- 46.Auxiliary DC jack
- 47.Radiator fan motor relay
- 48.Radiator fan motor
- 49.Turn signal/hazard relay
- 50.Horn
- 51.Headlight relay
- 52.Left handlebar switch
- 53.Pass switch
- 54.Dimmer switch
- 55.Horn switch
- 56.Turn signal switch
- 57.Rear brake light switch
- 58.Tail/brake light assembly
- 59.Rear turn signal light (right)
- 60.Rear turn signal light (left)
- 61.Tail/brake light
- 62.Licence plate light
- 63.Front turn signal light (right)
- 64.Front turn signal light (left)
- 65.Headlight assembly
- 66.Auxiliary light
- 67.Headlight (high beam)
- 68.Headlight (low beam)
- 69.V-belt replacement indicator reset coupler
- 70.Meter assembly
- 71.Immobilizer system indicator light
- 72.Multi-function display
- 73.Speedometer
- 74.Tachometer
- 75.Engine oil change indicator light
- 76.V-belt replacement indicator light
- 77.Engine trouble warning light
- 78.Meter light
- 79.High beam indicator light
- 80.Right turn signal indicator light
- 81.Left turn signal indicator light
- 82.Anti-theft alarm (optional)

2007 XP500A WIRING DIAGRAM

- | | |
|---|---|
| 1.Crankshaft position sensor | 50.Grip warmer switch (optional) |
| 2.A.C. magneto | 51.Grip warmer relay (optional) |
| 3.Rectifier/regulator | 52.Grip warmer (optional) |
| 4.Main switch | 53.Auxiliary DC jack fuse |
| 5.Immobilizer unit | 54.Auxiliary DC jack |
| 6.Storage box light switch | 55.Radiator fan motor relay |
| 7.Storage box light | 56.Radiator fan motor |
| 8.Fuse box | 57.Turn signal/hazard relay |
| 9.ABS control unit fuse | 58.Horn |
| 10.Fuel injection system fuse | 59.Headlight relay |
| 11.Backup fuse (storage box light, immobilizer unit and meter assembly) | 60.Left handlebar switch |
| 12.Signaling system fuse | 61.Pass switch |
| 13.Headlight fuse | 62.Dimmer switch |
| 14.Ignition fuse | 63.Horn switch |
| 15.Radiator fan motor fuse | 64.Turn signal switch |
| 16.Lighting system fuse | 65.Rear brake light switch |
| 17.Battery | 66.Tail/brake light assembly |
| 18.ABS motor fuse | 67.Rear turn signal light (right) |
| 19.Main fuse | 68.Rear turn signal light (left) |
| 20.Starter relay | 69.Tail/brake light |
| 21.Starter motor | 70.Licence plate light |
| 22.Diode | 71.Front turn signal light (right) |
| 23.Starting circuit cut-off relay 2 | 72.Front turn signal light (left) |
| 24.Starting circuit cut-off relay 1 | 73.Headlight assembly |
| 25.Fuel injection system relay | 74.Auxiliary light |
| 26.Fuel pump | 75.Headlight (high beam) |
| 27.Right handlebar switch | 76.Headlight (low beam) |
| 28.Start switch | 77.V-belt replacement indicator reset coupler |
| 29.Engine stop switch | 78.Meter assembly |
| 30.Hazard switch | 79.Immobilizer system indicator light |
| 31.Front brake light switch | 80.Multi-function display |
| 32.Sidestand switch | 81.Speedometer |
| 33.ECU (engine) | 82.Tachometer |
| 34.Ignition coil | 83.Engine oil change indicator light |
| 35.Spark plug | 84.V-belt replacement indicator light |
| 36.Coolant temperature sensor | 85.Engine trouble warning light |
| 37.Intake air temperature sensor | 86.Meter light |
| 38.Fuel injector #1 | 87.High beam indicator light |
| 39.Fuel injector #2 | 88.Right turn signal indicator light |
| 40.Intake air pressure sensor | 89.Left turn signal indicator light |
| 41.O ₂ sensor | 90.ABS warning light |
| 42.Throttle position sensor | 91.Anti-theft alarm (optional) |
| 43.Lean angle cut-off switch | |
| 44.ABS test coupler | |
| 45.ECU (ABS) | |
| 46.Front wheel sensor | |
| 47.Rear wheel sensor | |
| 48.Fail-safe relay | |
| 49.Hydraulic unit | |

COLOR CODE

B Black
Br Brown
Ch Chocolate
Dg Dark green
G Green
Gy Gray
L Blue
O Orange
P Pink
R Red
Sb Sky blue
W White
Y Yellow
B/G Black/Green
B/L Black/Blue
B/R Black/Red
B/W Black/White
B/Y Black/Yellow
Br/G Brown/Green
Br/L Brown/Blue
Br/R Brown/Red
Br/W Brown/White
G/B Green/Black
G/R Green/Red
G/W Green/White
G/Y Green/Yellow
Gy/G Gray/Green
Gy/R Gray/Red
L/B Blue/Black
L/R Blue/Red
L/W Blue/White
L/Y Blue/Yellow
O/B Orange/Black
P/W Pink/White
R/B Red/Black
R/G Red/Green
R/L Red/Blue

R/W Red/White
R/Y Red/Yellow
Sb/W Sky blue/White
W/B White/Black
W/R White/Red
W/Y White/Yellow
Y/B Yellow/Black
Y/G Yellow/Green
Y/L Yellow/Blue
Y/R Yellow/Red



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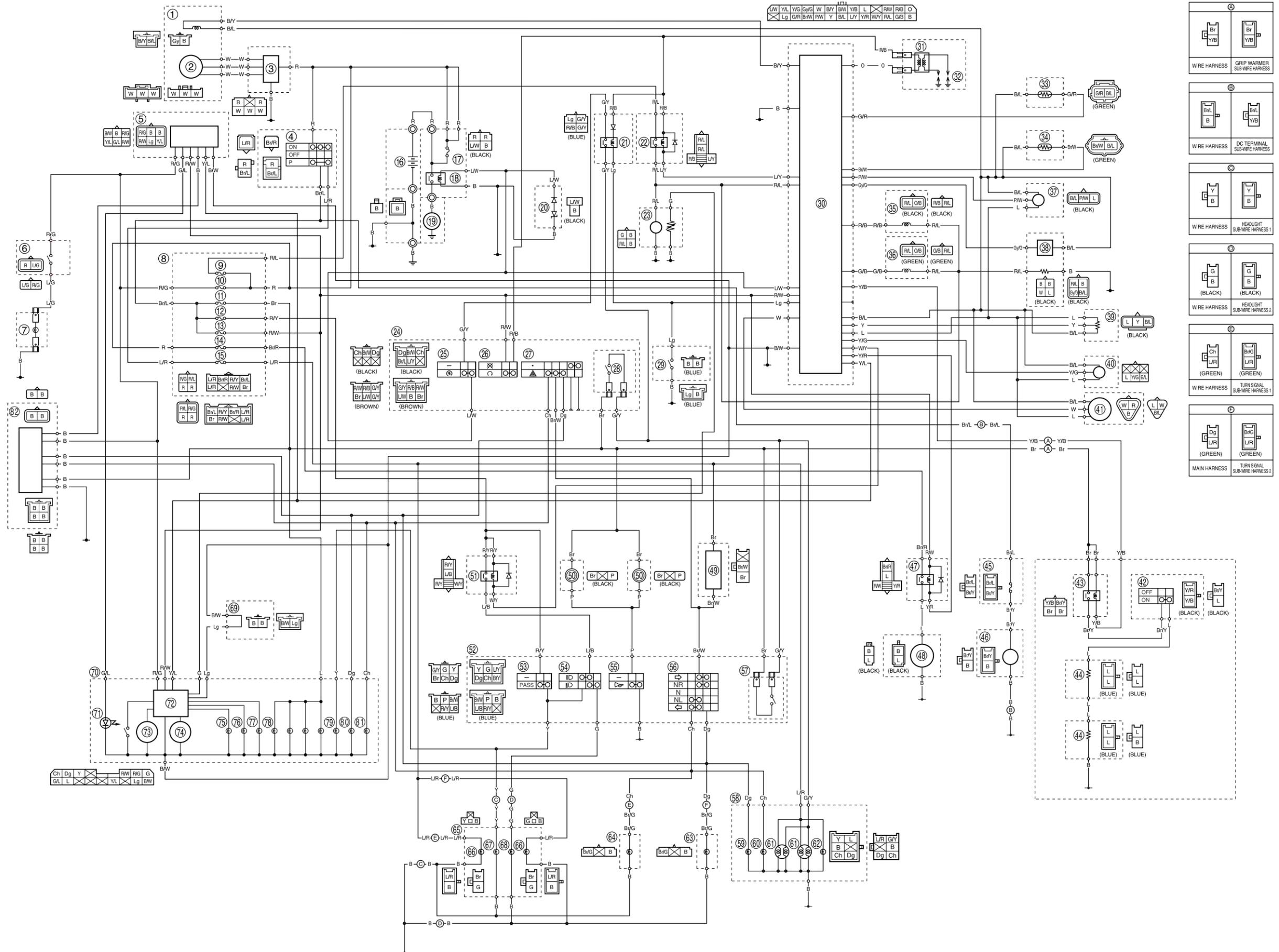
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WIRING DIAGRAM**

**XP500 2007
SCHÉMA DE CÂBLAGE**

**XP500 2007
SCHALTPLAN**

**SCHEMA ELETTRICO
XP500 2007**

**DIAGRAMA ELÉCTRICO DE LA
XP500 2007**



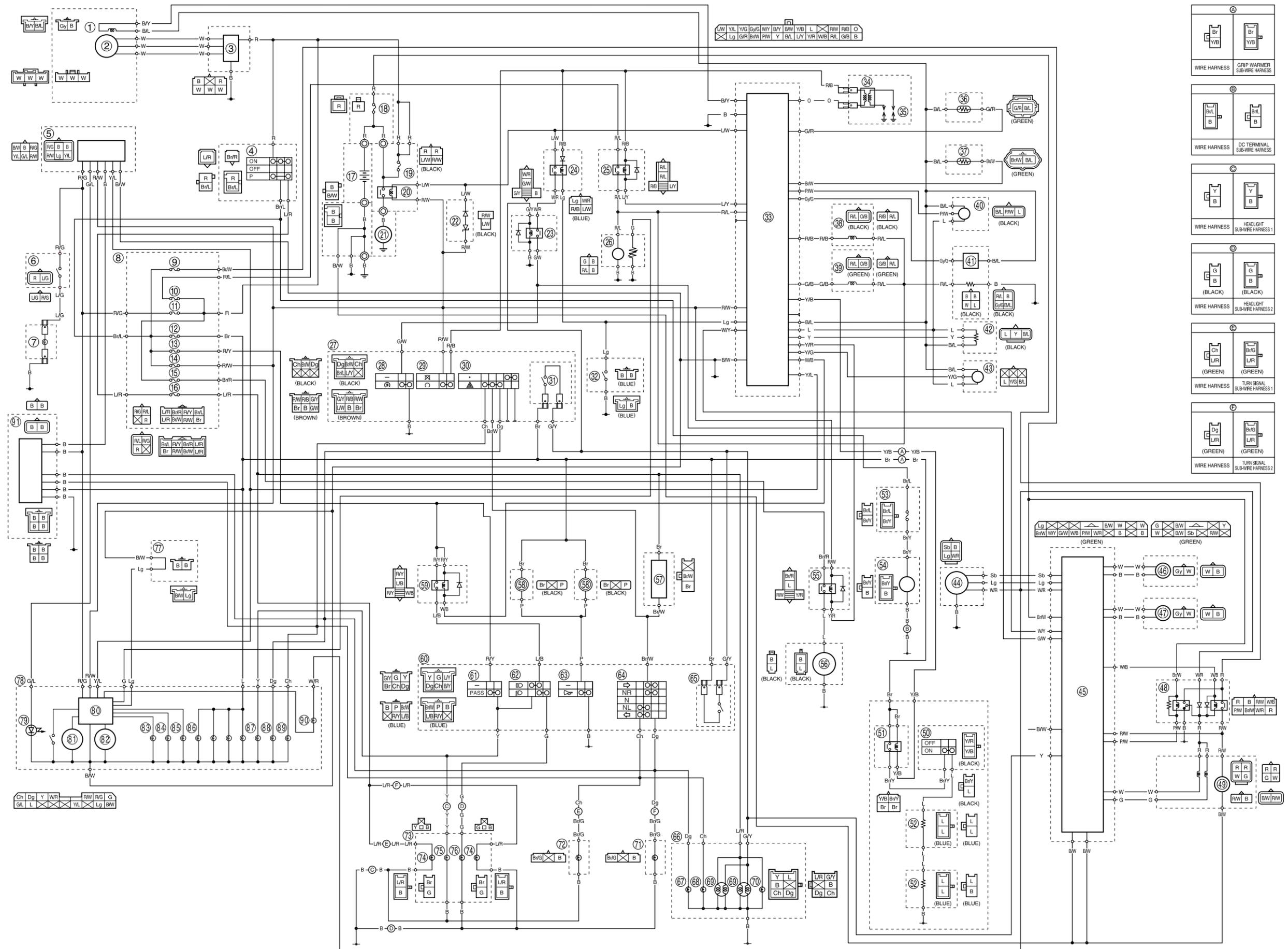
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WIRING DIAGRAM**

**XP500A 2007
SCHEMA DE CÂBLAGE**

**XP500A 2007
SCHALTPLAN**

**SCHEMA ELETTRICO
XP500A 2007**

**DIAGRAMA ELÉCTRICO DE LA
XP500A 2007**



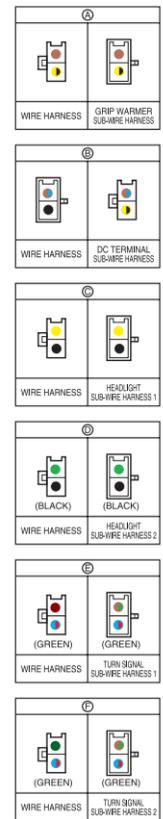
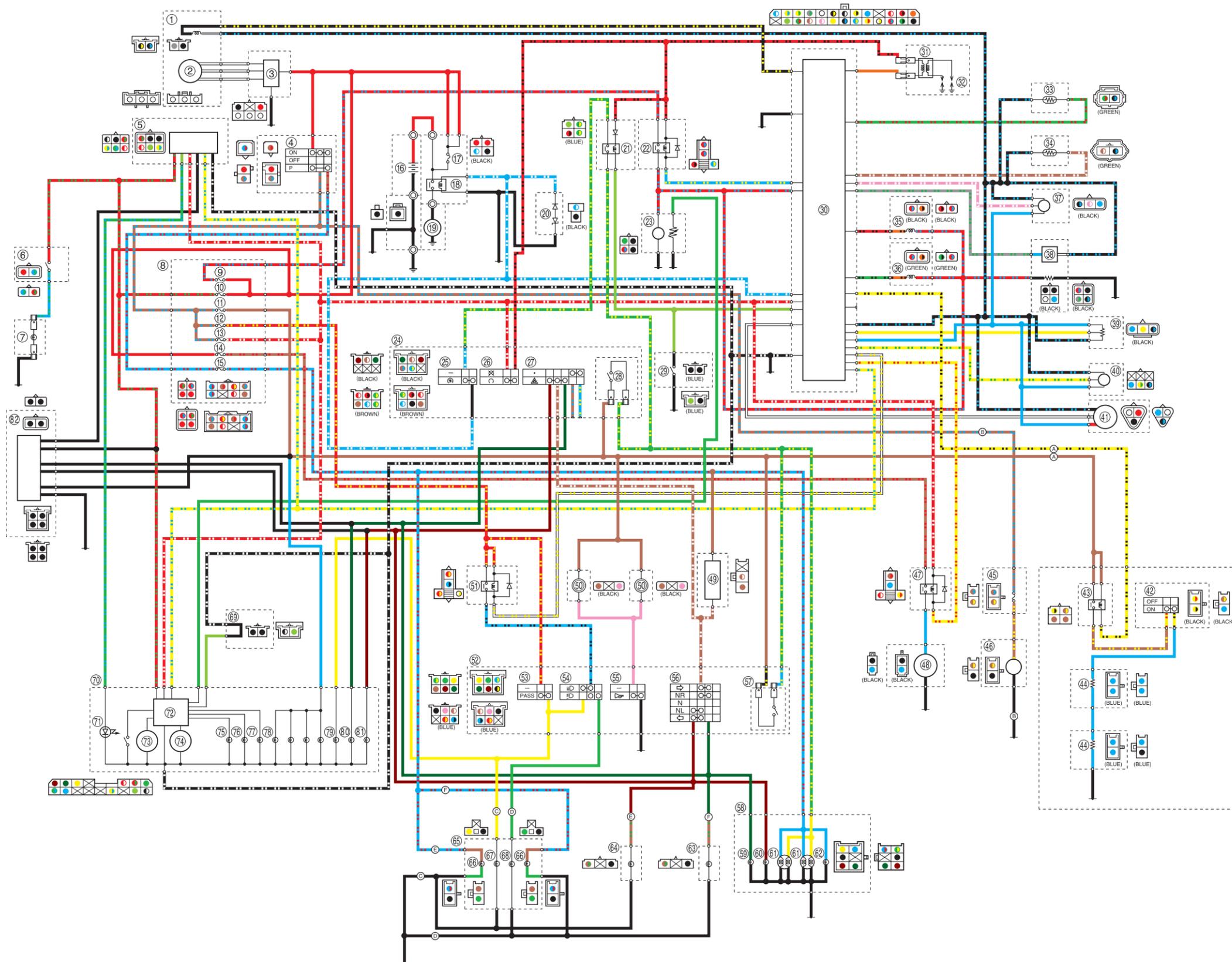
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