EAS10003

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EAS20008
FEATURES

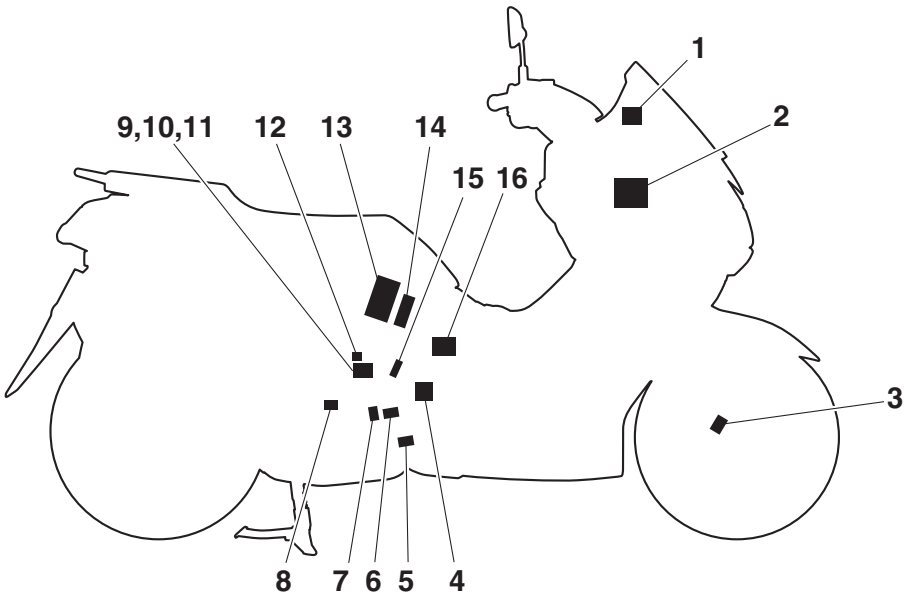
EAS30005
OUTLINE OF THE FI SYSTEM

The main function of a fuel supply system is to provide fuel to the combustion chamber at the optimum air-fuel ratio in accordance with the engine operating conditions and the atmospheric temperature. In the conventional carburetor system, the air-fuel ratio of the mixture that is supplied to the combustion chamber is created by the volume of the intake air and the fuel that is metered by the jet used in the respective carburetor.

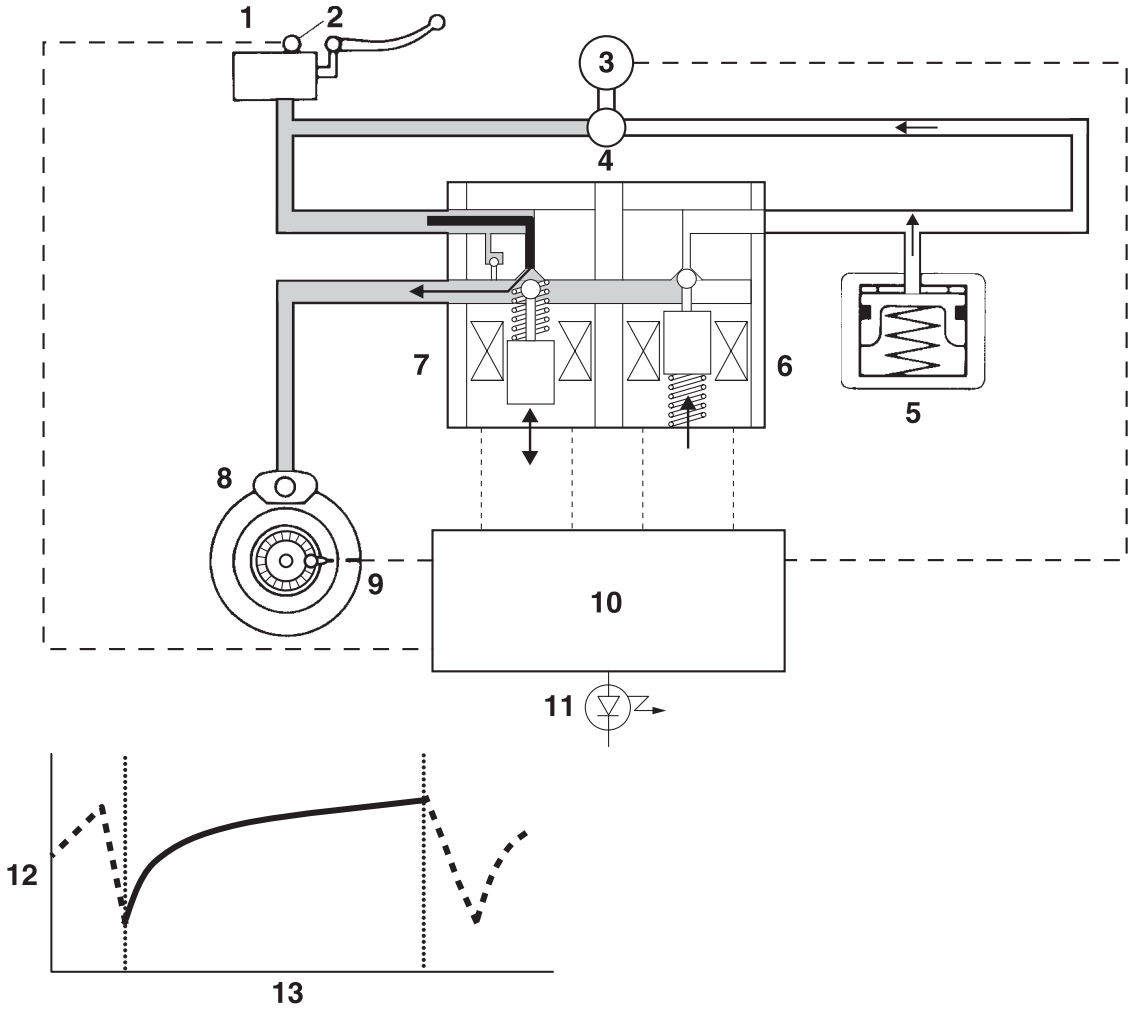
Despite the same volume of intake air, the fuel volume requirement varies by the engine operating conditions, such as acceleration, deceleration, or operating under a heavy load. Carburetors that meter the fuel through the use of jets have been provided with various auxiliary devices, so that an optimum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

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

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



1. Engine trouble warning light
2. ABS ECU
3. Front wheel sensor
4. VVA (variable valve actuator) solenoid
5. O_2 sensor
6. Spark plug
7. Coolant temperature sensor
8. Crankshaft position sensor
9. Intake air temperature sensor
10. Intake air pressure sensor
11. Throttle position sensor
12. ISC (Idle Speed Control) unit
13. Battery
14. ECU (Engine Control Unit)
15. Fuel injector
16. Ignition coil



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

EAS30712
ABS WARNING LIGHT AND OPERATION

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

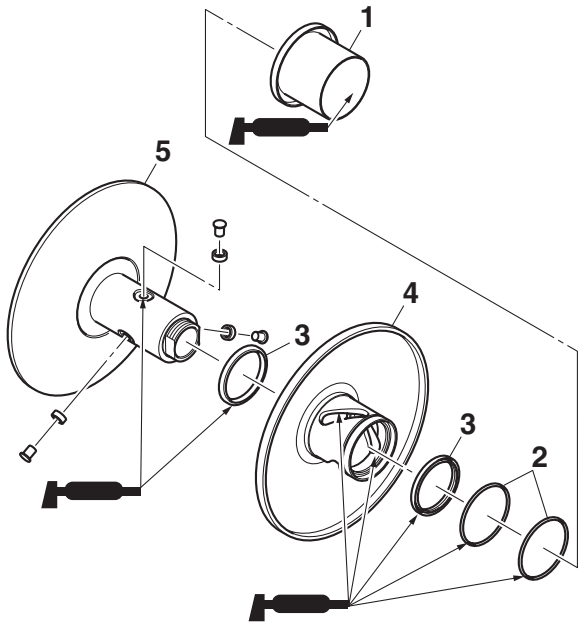
EAS20018
LUBRICATION POINTS AND LUBRICANT TYPES

EAS30018
ENGINE

Lubrication point	Lubricant
Bearings	E
O-rings	LS
O-rings (cam shaft)	M
Oil seals	LS
Rocker arm stopper pin	M
Cylinder head nut contact face and stud bolt thread	M
Camshaft lobes	M
Decompression cam	M
Rocker arm shafts	M
Valve stems and valve guide (intake and exhaust)	M
Valve stem seals	E
Valve stem ends (intake and exhaust)	M
Rocker arm valve inner surface	M
Camshaft sprocket	M
Connecting rod big end face	E
Piston pin outer surface	E
Piston, piston ring, and cylinder inner surface	E
Crank pin	E
Cam chain sprocket inner surface	M
Oil pump drive gear inner surface	M
Oil pump shaft	E
O-ring (fuel injector)	E
Starter wheel and bearing	E
Starter clutch idle gear inner surface	M
Drive axle and bearings	LS
Crankshaft threads and conical spring washer outer mating surface	LS
Timing chain tensioner bolts	Yamaha bond No.1215®
Crankcase mating surfaces	Yamaha bond No.1215®
Crankcase bolt	Yamaha bond No.1215®

2. Disassemble:
   • Secondary sheave assembly
   Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-34.
3. Lubricate:
   • Spring seat"1"
   • O-rings "2"
   • Oil seals "3"
   • Secondary sliding sheave"4"
   • Secondary fixed sheave"5"

Recommended lubricant
Shell dolium grease R®



4. Assemble:
   • Secondary sheave assembly
   Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-34.
5. Install:
   • Secondary sheave assembly
   Refer to "V-BELT AUTOMATIC TRANSMISSION" on page 5-34.
   • Air filter case
   Refer to "AIR FILTER CASE" on page 7-7.

EAS30658
CHECKING THE BRAKE LIGHT SWITCHES
1. Check:
   • Front brake light switch operation
   • Rear brake light switch operation
   When operating the brake levers, confirm that the brake light comes on.
   Faulty → Refer to "CHECKING THE SWITCHES" on page 8-95.

EAS30660
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

TIP

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

EAS30861
CHECKING THE THROTTLE GRIP OPERATION
1. Check:
   • Throttle cables
   Damage/deterioration → Replace.
   • Throttle cable installation
   Incorrect → Reinstall the throttle cables.
   Refer to "HANDLEBAR" on page 4-69.
2. Check:
   • Throttle grip movement
   Rough movement → Lubricate or replace the defective part(s).

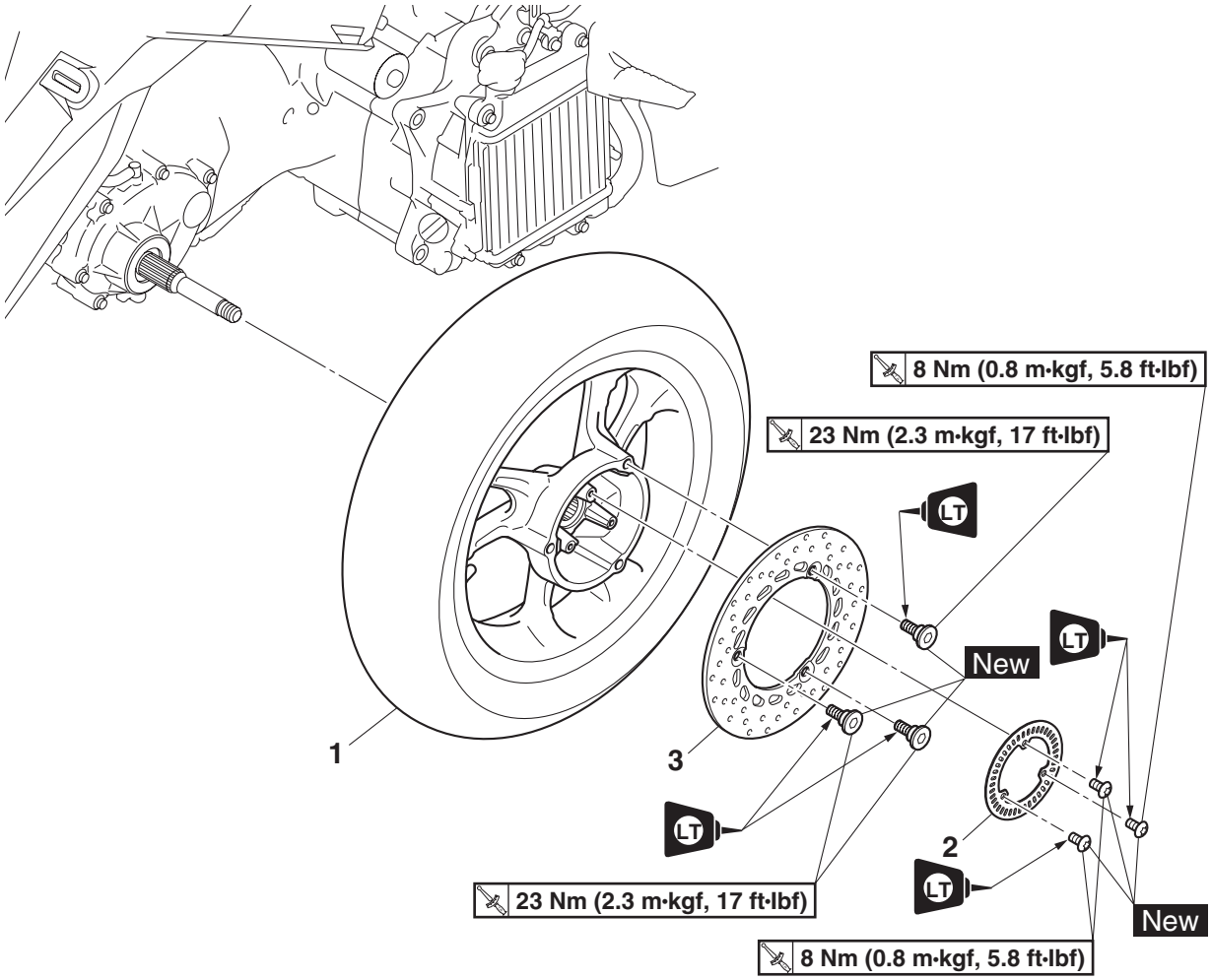
Recommended lubricant
Suitable cable lubricant

TIP

With the engine stopped, turn the throttle grip slowly and release it. Make sure that the throttle grip turns smoothly and returns properly when released.
Repeat this check with the handlebar turned all the way to the left and right.

EAS20029
REAR WHEEL

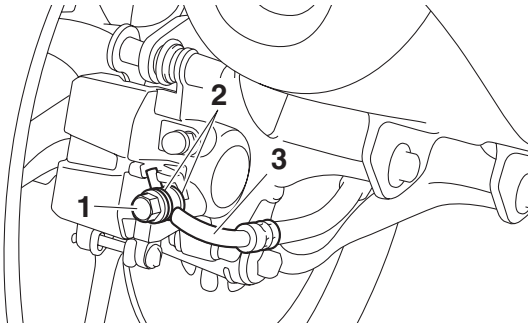
Removing the rear wheel and brake disc



Order	Job/Parts to remove	Q'ty	Remarks
	Battery		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Front side covers		Refer to "GENERAL CHASSIS (2)" on page 4-4.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-7.
	Storage box		Refer to "GENERAL CHASSIS (4)" on page 4-9.
	Muffler		Refer to "ENGINE REMOVAL" on page 5-3.
	Radiator cover		Refer to "RADIATOR" on page 6-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 7-7.
	Swingarm assembly		Refer to "REAR SHOCK ABSORBER ASSEMBLIES AND SWINGARM" on page 4-88.
1	Rear wheel	1	
2	Rear wheel sensor rotor	1	
3	Rear brake disc	1	

TIP

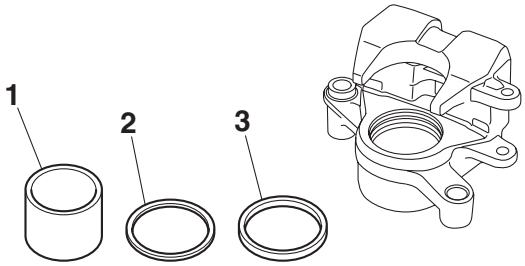
Put the end of the brake hose into a container and pump out the brake fluid carefully.



EAS30187

DISASSEMBLING THE REAR BRAKE CALIPER

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



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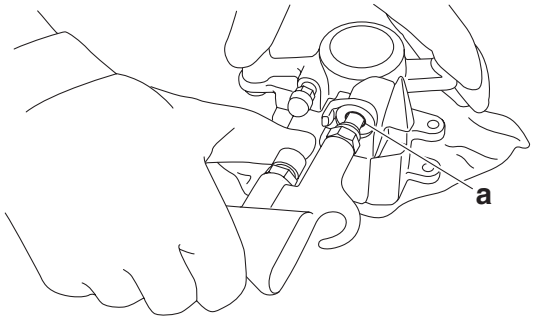
a. Blow compressed air into the brake hose joint opening “a” to force out the piston from the brake caliper.

EWA13550

⚠ WARNING

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



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

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EAS30188

CHECKING THE REAR BRAKE CALIPER

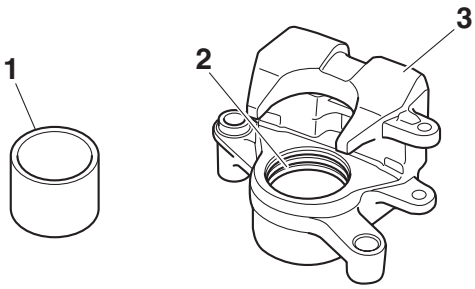
Recommended brake component replacement schedule	
Brake pads	If necessary
Piston seal	Every two years
Piston dust seal	Every two years
Brake hose	Every four years
Brake fluid	Every two years and whenever the brake is disassembled

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

EWA17070

⚠ WARNING

Whenever a brake caliper is disassembled, replace the brake caliper piston dust seal and brake caliper piston seal.

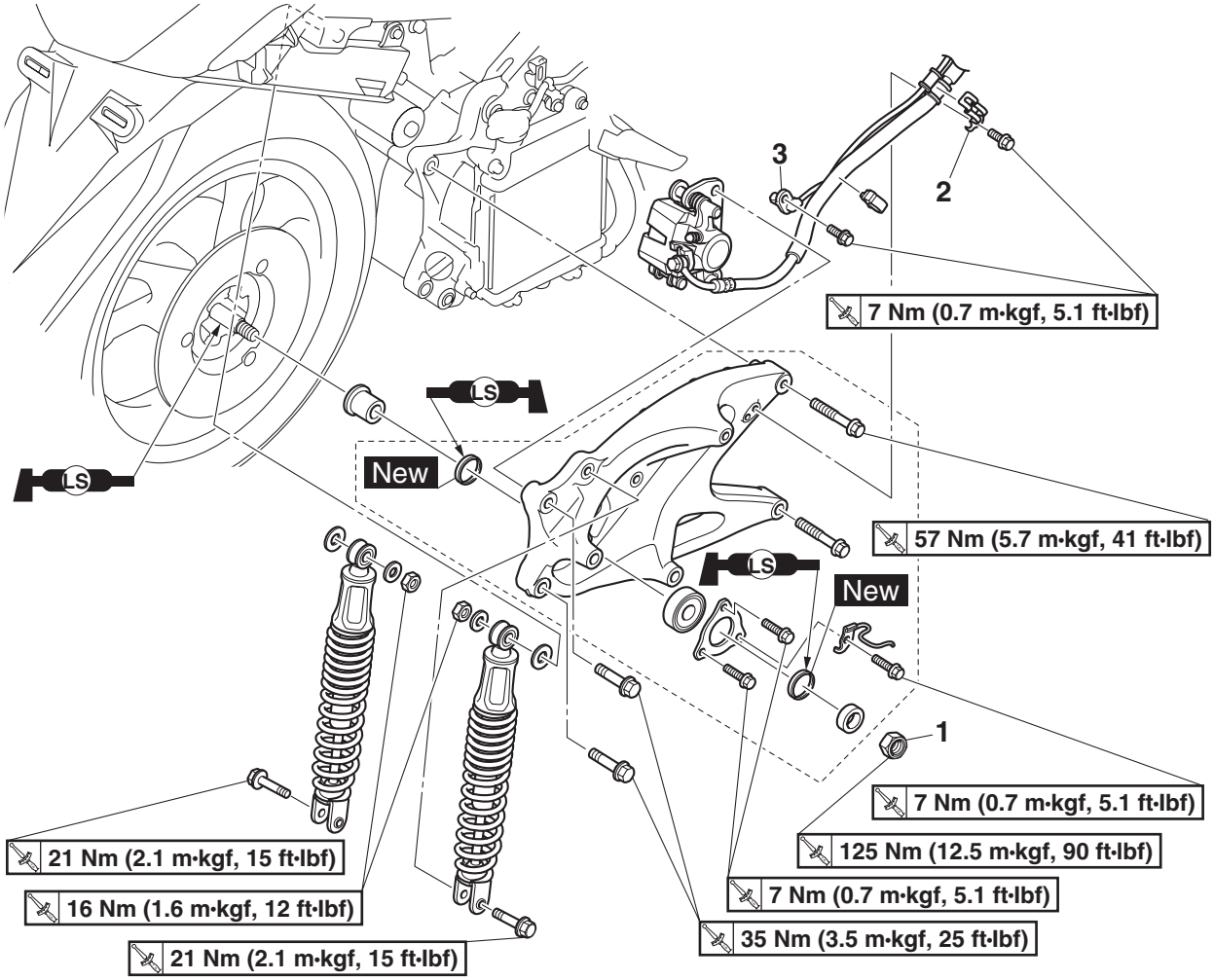


2. Check:
   - Brake caliper bracket
     Cracks/damage → Replace.

EAS20189

REAR SHOCK ABSORBER ASSEMBLIES AND SWINGARM

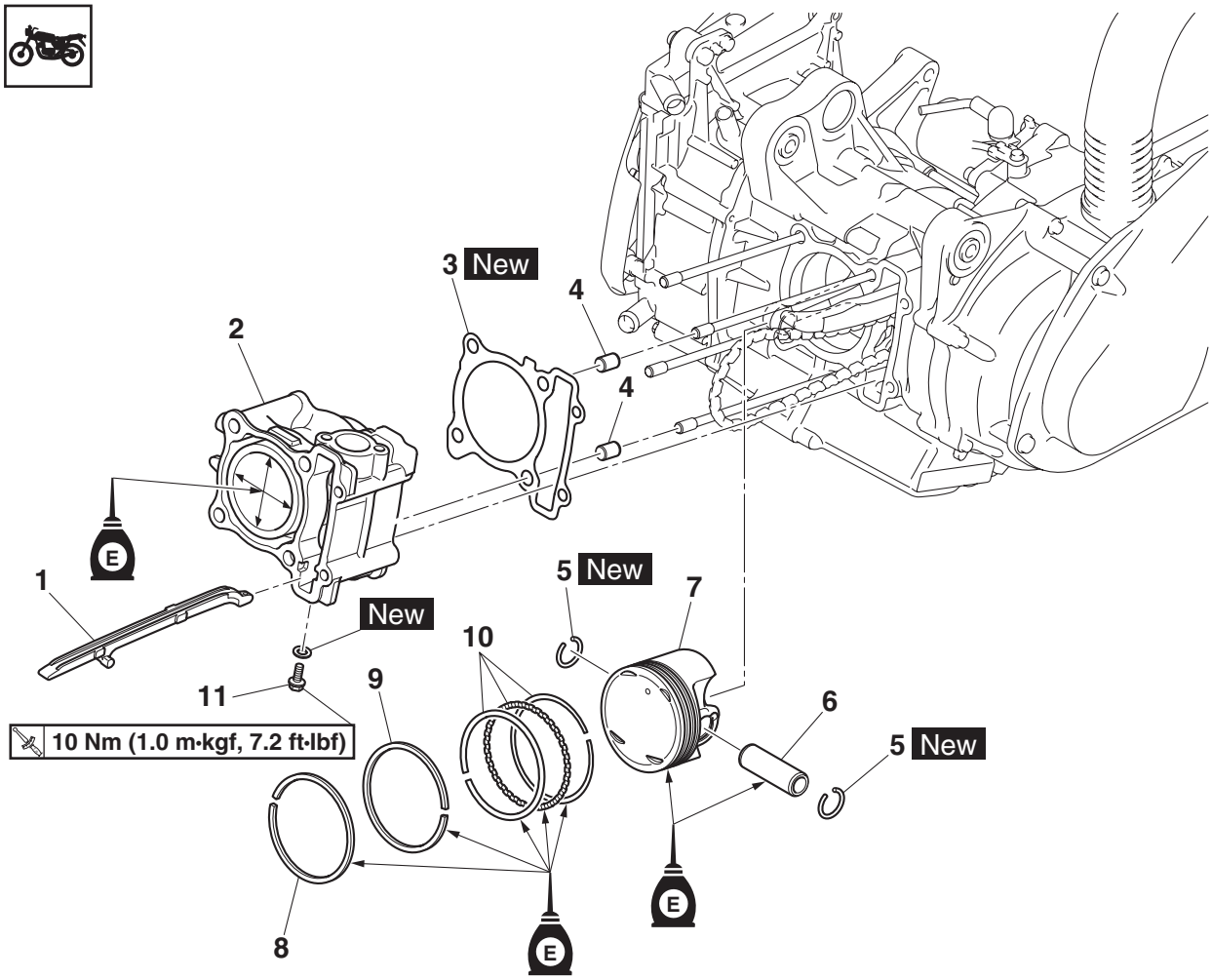
Removing the rear shock absorber assemblies and swingarm



Order	Job/Parts to remove	Q'ty	Remarks
	Battery		Refer to "GENERAL CHASSIS (1)" on page 4-1.
	Front side covers		Refer to "GENERAL CHASSIS (2)" on page 4-4.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-7.
	Storage box		Refer to "GENERAL CHASSIS (4)" on page 4-9.
	Muffler		Refer to "ENGINE REMOVAL" on page 5-3.
	Radiator cover		Refer to "RADIATOR" on page 6-1.
	Air filter case		Refer to "AIR FILTER CASE" on page 7-7.
1	Rear wheel axle nut	1	
2	Rear brake hose holder (rear side)	1	
3	Rear wheel sensor	1	

EAS20046
CYLINDER AND PISTON

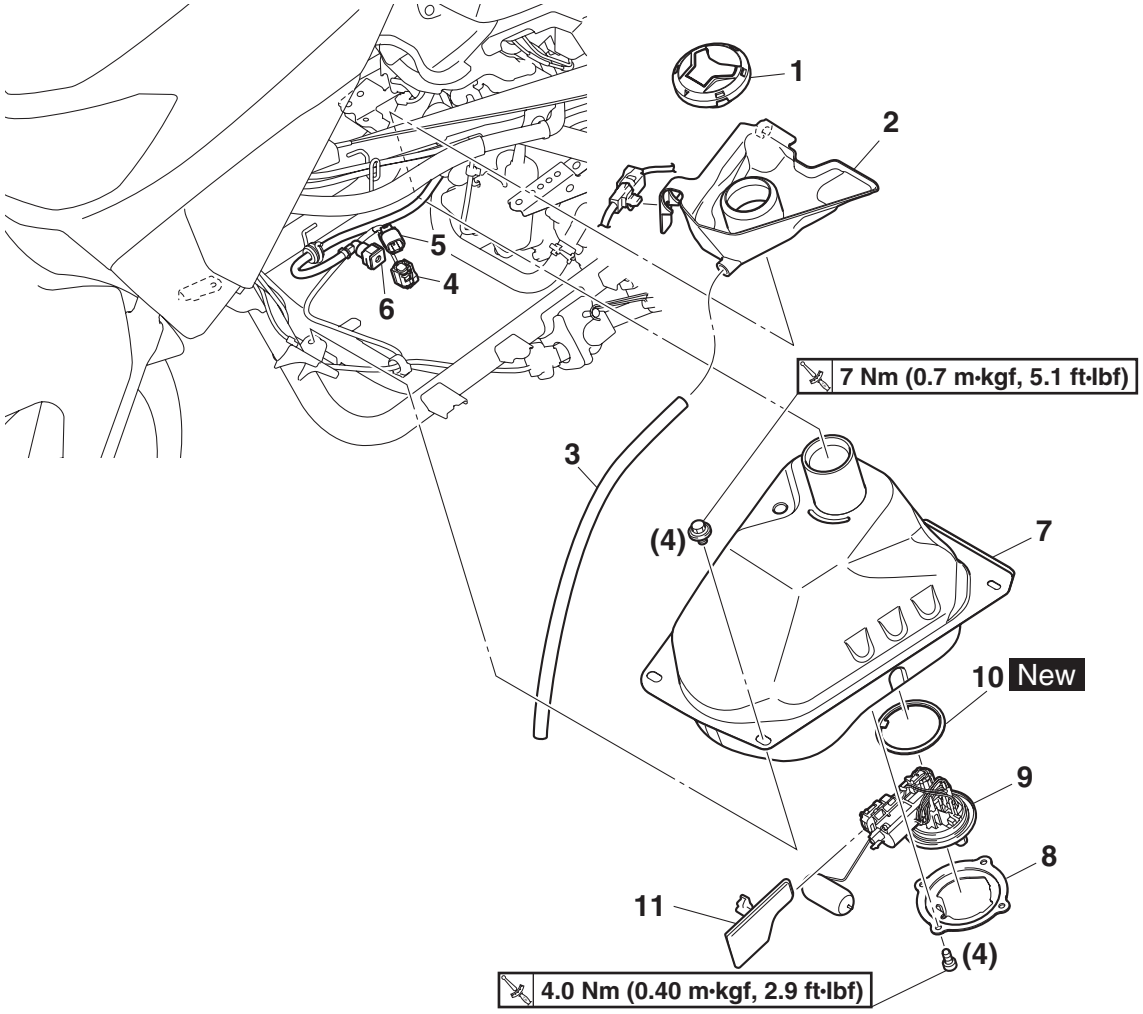
Removing the cylinder and piston



Order	Job/Parts to remove	Q'ty	Remarks
	Cylinder head		Refer to "CYLINDER HEAD" on page 5-9.
1	Timing chain guide (exhaust side)	1	
2	Cylinder	1	
3	Cylinder gasket	1	
4	Dowel pin	2	
5	Piston pin clip	2	
6	Piston pin	1	
7	Piston	1	
8	Top ring	1	
9	2nd ring	1	
10	Oil ring	1	
11	Coolant drain bolt (cylinder side)	1	

EAS20067
FUEL TANK

Removing the fuel tank



Order	Job/Parts to remove	Q'ty	Remarks
	Front side covers		Refer to "GENERAL CHASSIS (2)" on page 4-4.
	Fuel tank cover		Refer to "GENERAL CHASSIS (3)" on page 4-7.
	Center lower cover		Refer to "GENERAL CHASSIS (5)" on page 4-12.
1	Fuel tank cap	1	
2	Fuel tank overflow tray	1	
3	Fuel tank overflow hose	1	
4	Fuel sender coupler	1	Disconnect.
5	Fuel pump coupler	1	Disconnect.
6	Fuel hose	1	Disconnect.
7	Fuel tank	1	
8	Fuel pump bracket	1	
9	Fuel pump	1	
10	Fuel pump gasket	1	
11	Fuel filter	1	

4. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-19.	NG →	Properly connect or replace the wire harness.
OK ↓		
Replace the meter assembly.		

The coolant temperature warning light fails to come on.

1. Check the coolant temperature sensor. Refer to “CHECKING THE COOLANT TEMPERATURE SENSOR” on page 8-108.	NG →	Replace the coolant temperature sensor.
OK ↓		
2. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-19.	NG →	Properly connect or replace the wire harness.
OK ↓		
Replace the meter assembly or ECU. Refer to “REPLACING THE ECU (engine control unit)” on page 8-99.		

The fuel meter, fuel level warning light, or both fails to come on.

1. Check the fuel sender. Refer to “CHECKING THE FUEL SENDER” on page 8-107.	NG →	Replace the fuel pump.
OK ↓		
2. Check the entire signaling system wiring. Refer to “CIRCUIT DIAGRAM” on page 8-19.	NG →	Properly connect or replace the wire harness.
OK ↓		
Replace the meter assembly.		

The speedometer, V-belt replacement indicator, engine oil change indicator, instantaneous fuel consumption meter fails to operate.

1. Check the front wheel sensor. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-28.	NG →	Replace the front wheel sensor.
OK ↓		

Fault code No.		13	
Item		Intake air pressure sensor: open or short circuit detected.	
5	Defective intake air pressure sensor.	Execute the diagnostic mode. (Code No. 03) When engine is stopped: Atmospheric pressure at the current altitude and weather conditions is indicated. At sea level: Approx. 101 kPa (757.6 mmHg, 29.8 inHg) 1000 m (3300 ft) above sea level: Approx. 90 kPa (675.1 mmHg, 26.6 inHg) 2000 m (6700 ft) above sea level: Approx. 80 kPa (600.0 mmHg, 23.6 inHg) 3000 m (9800 ft) above sea level: Approx. 70 kPa (525.0 mmHg, 20.7 inHg) When engine is cranking: Make sure that the indication value changes. The value does not change when engine is cranking. → Replace the throttle body if defective. Refer to “THROTTLE BODY” on page 7-10.	Turn the main switch to “ON”. Fault code number is not displayed → Service is finished. Fault code number is displayed → Go to item 6.
6	Malfunction in ECU.	Replace the ECU. Refer to “REPLACING THE ECU (engine control unit)” on page 8-99.	

Fault code No. 14

ECA20500

NOTICE

Do not remove the throttle body sensor assembly from the throttle body.

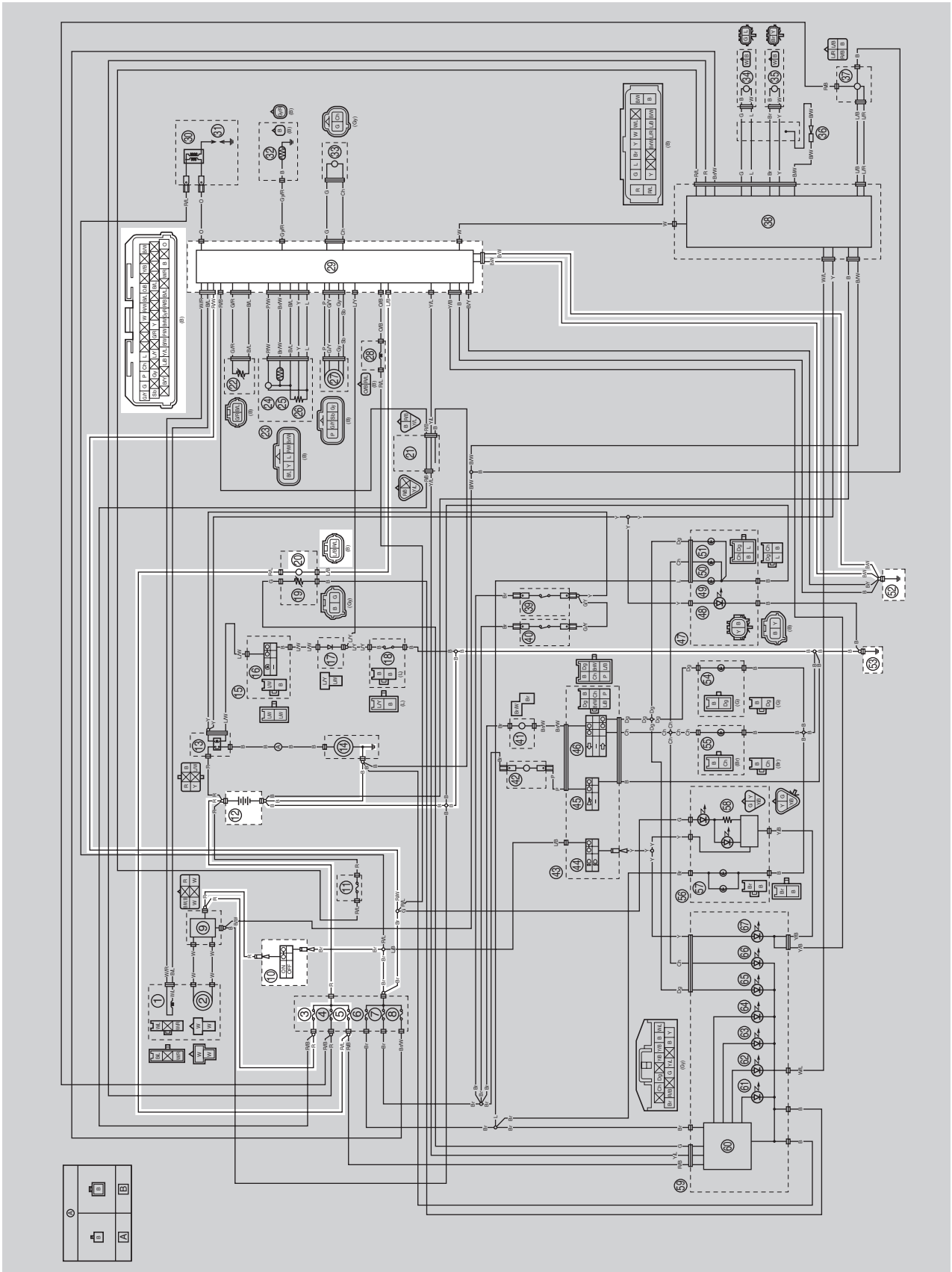
TIP

If fault code numbers “13” and “14” are both indicated, take the actions specified for fault code number “13” first.

Fault code No.		14	
Item		Intake air pressure sensor: system malfunction (clogged hole or detached).	
Fail-safe system		Able to start engine	
		Able to drive vehicle	
Diagnostic code No.		03	
Tool display		Displays the intake air pressure.	
Procedure		Operate the throttle while pushing the start switch “⦾”. (If the display value changes, the performance is OK.)	
Item	**Probable cause of malfunction and check**	**Maintenance job**	**Confirmation of service completion**

EAS20081
FUEL PUMP SYSTEM

EAS30513
CIRCUIT DIAGRAM



Fault code No.	**17** **45**
Item	**Front wheel sensor (missing pulses)**
Symptom	**Front wheel sensor signal is not received properly. (Missing pulses are detected in the signal while the vehicle is traveling.)**

Order	Item/components and probable cause	Check or maintenance job
1	Foreign material adhered around the front wheel sensor	Check the surface of the sensor rotor and wheel sensor for foreign material, such as metal particles. Clean the sensor rotor and wheel sensor if necessary.
2	Incorrect installation of the front wheel	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE FRONT WHEEL” on page 4-27.
3	Defective sensor rotor or incorrect installation of the rotor	Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-28.
4	Defective front wheel sensor or incorrect installation of the sensor	Check the wheel sensor for damage and the installed condition of the sensor. Repair or replace the wheel sensor if necessary. Refer to “MAINTENANCE OF THE FRONT WHEEL SENSOR AND SENSOR ROTOR” on page 4-28.

Fault code No. 18, 46

TIP

If pulse gaps are detected when the vehicle is traveling at a speed of 30 km/h (19 mi/h) or more, fault code No. 18 will be recorded. If the vehicle is traveling at a speed of 29 km/h (18 mi/h) or less, fault code No. 46 will be recorded first and fault code No. 18 will be recorded if the condition continues.

Fault code No.	**18** **46**
Item	**Rear wheel sensor (missing pulses)**
Symptom	**Rear wheel sensor signal is not received properly. (Missing pulses are detected in the signal while the vehicle is traveling.)**

Order	Item/components and probable cause	Check or maintenance job
1	Foreign material adhered around the rear wheel sensor	Check the surface of the sensor rotor and wheel sensor for foreign material, such as metal particles. Clean the sensor rotor and wheel sensor if necessary.
2	Incorrect installation of the rear wheel	Check the components for looseness, distortion, and bends. Refer to “CHECKING THE REAR WHEEL” on page 4-34.
3	Defective sensor rotor or incorrect installation of the rotor	Check the surface of the sensor rotor for damage. Replace the sensor rotor if there is visible damage. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR ROTOR” on page 4-34.
4	Defective rear wheel sensor or incorrect installation of the sensor	Check the wheel sensor for damage and the installed condition of the sensor. Repair or replace the wheel sensor if necessary. Refer to “MAINTENANCE OF THE REAR WHEEL SENSOR ROTOR” on page 4-34.

• 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.

ECA20530
NOTICE

• This is a VRLA (Valve Regulated Lead Acid) 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 a VRLA (Valve Regulated Lead Acid) battery are different from those of conventional batteries. The VRLA (Valve Regulated Lead Acid) battery should be charged according to the appropriate charging method. If the battery is overcharged, the electrolyte level will drop considerably. Therefore, take special care when charging the battery.

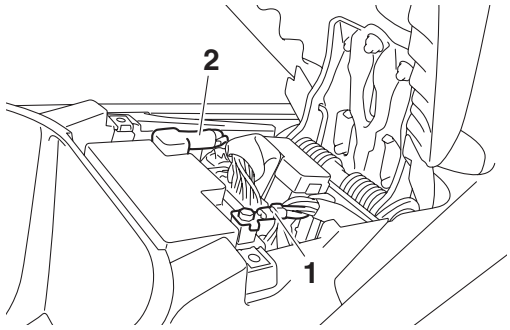
TIP

Since VRLA (Valve Regulated Lead Acid) 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 (1)" on page 4-1.
2. Disconnect:
   • Battery leads
   (from the battery terminals)

ECA13640
NOTICE

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



3. Remove:
   • Battery
4. Check:
   • Battery charge

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a. Connect a pocket tester to the battery terminals.

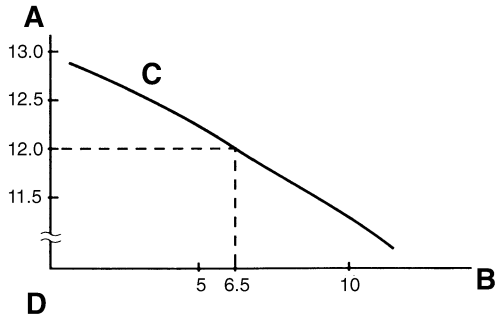
• Positive tester probe → positive battery terminal • Negative tester probe → negative battery terminal

TIP

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

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

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



A. Open-circuit voltage (V)
B. Charging time (hours)