1.2. GENERAL RULES

1.2.1. BASIC SAFETY RULES

CARBON MONOXIDE
Should it be necessary to perform some operations with the vehicle running, make sure to work outdoors or in a well-aerated room.
Avoid starting the engine in closed or badly-ventilated rooms.
In case you are working indoors, make use of an exhaust gases scavenging system.

DANGER
Exhaust gases contain carbon monoxide, which is extremely toxic if inhaled and may cause loss of consciousness or even lead to death by asphyxia.

FUEL

DANGER
The fuel used to operate engines is highly flammable and becomes explosive under particular conditions. Refuelling and engine service should take place in a well-ventilated area with the engine stopped. Do not smoke when refuelling or in the proximity of sources of fuel vapours, avoid flames, sparks and any element that could ignite fuel or provoke explosions.

DO NOT DISPOSE OF FUEL IN THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

HIGH-TEMPERATURE COMPONENTS
The engine and the exhaust system parts become hot and continue to be hot even for some time after the engine has been stopped.
Before handling these parts, wear insulating gloves or wait for the engine and the exhaust system to cool completely down.

USED GEARBOX AND FORK OILS

DANGER
In case any maintenance operation should be required, it is advisable to use latex gloves.
Gear oil may cause serious damage to the skin if handled daily and for long periods.
Wash your hands carefully after use.
Put it in a sealed container and take it to the filling station where you usually buy it or to an oil salvage center.
In case any maintenance operation should be required, it is advisable to use latex gloves.

DO NOT DISPOSE OF OIL IN THE ENVIRONMENT

KEEP AWAY FROM CHILDREN.

BRAKE FLUID

WARNING
When using the brake fluid, take care not to spill it on the plastic, rubber or painted parts, since it can damage them.
When carrying out the maintenance operations on the braking system, use a clean cloth to cover these parts.
Always wear safety goggles when working on the braking system.
The brake fluid is highly irritant. Avoid contact with your eyes.
If the brake fluid gets in contact with the skin or the eyes, carefully wash the parts of your body that get in contact with the fluid and consult a doctor.

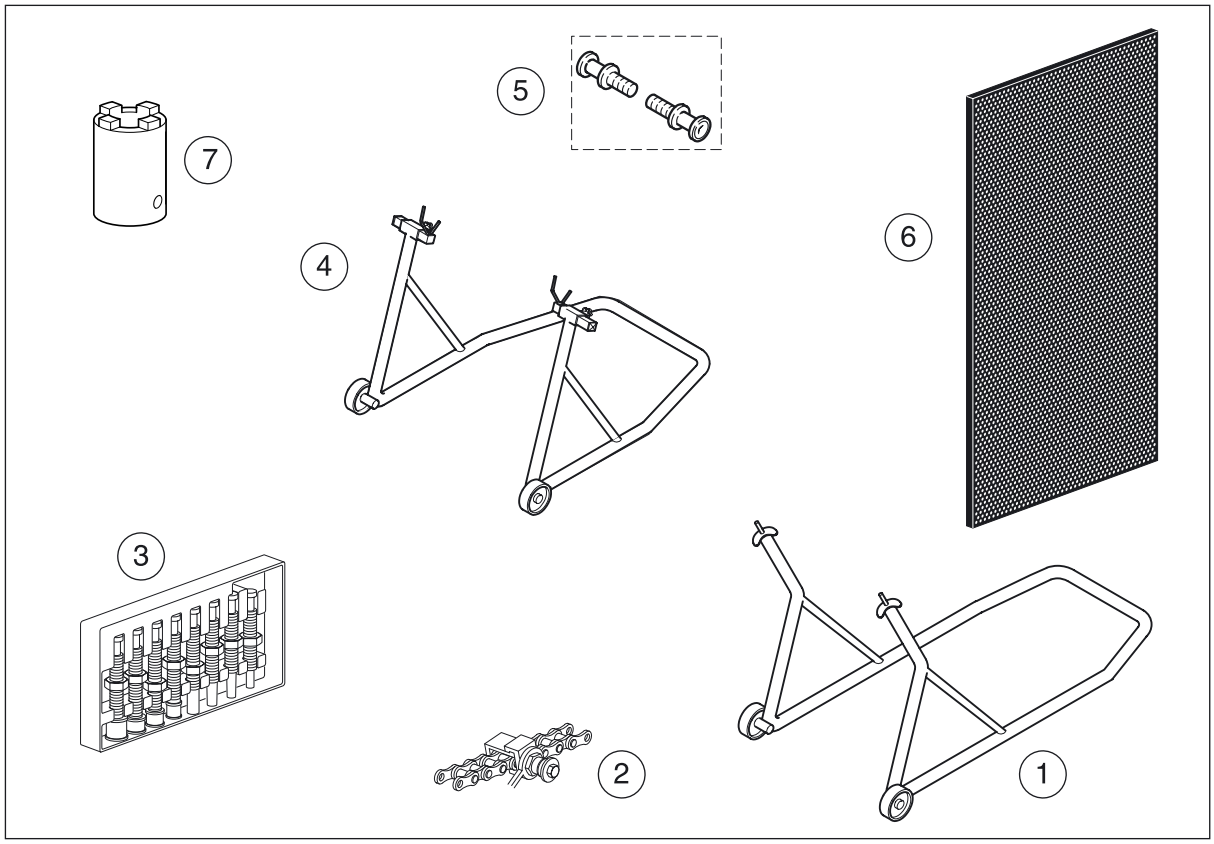
KEEP AWAY FROM CHILDREN.

COOLANT
The coolant is composed of ethylene glycol that, under certain conditions, can become inflammable and send out invisible flames causing severe burns.

1.6.3. SPECIAL TOOLS

Special and suitable tools are required to carry out the disassembly and reassembly operations as well as for a correct setting up.
The use of special tools avoids any possible damage arising from the use of non-suitable tools and/or the implementation of improvised procedures. The special tools, designed for this vehicle, are listed hereinafter.
Should you require some special general tools, please refer to the special tools manual.

WARNING
Before using any special tool, please refer to the documents coming with the tool itself.



Key:

Position	Tool name and function	Part No.
1	Front service stand	8146486
2	Tool for chain assembly/disassembly	8140192
3	Ø10 mm to Ø 30 mm bearing pulling kit	8140180
4	Rear service stand	8705021
5	Rear service stand surface mounts	8140204
6	Tool-holding panel	8140199
7	Swingarm pivot shaft ring nut wrench	8101945

ROUTINE MAINTENANCE 2

2.3.3. NUT, BOLT, SCREW TIGHTENING

Check after the first 1000 km (621 mi) and then every 4000 km (2485 mi) or 12 months.
Check all fastening parts with accuracy. Mainly check all safety-related components and, in particular:
Handlebar-to-upper plate fastener;
Front brake control lever;
Clutch control lever;
Fuel delivery line;
Plate-to-front fork fastener;
Front wheel shaft fork clamps;
Front wheel;
Front brake line couplings;
Front brake disc;
Front brake caliper;
Engine;
Sprocket;
Rear brake control lever;
Rear swingarm;
Rear swingarm levers;
Rear shock absorber;
Rear wheel;
Rear brake disc;
Rear brake caliper;
Rear brake line couplings.

WARNING
The fastening elements shall be tightened to the specified torque value. Apply LOCTITE ONLY where indicated, see 2.3.4.
Lubricate only the parts specified in the table 2.3.4.

2.6. SPARK PLUGS

2.6.1. SPARK PLUGS

TIGHTENING TORQUE SETTINGS
Spark plug tightening torque: 20 Nm (2.0 kgm).

Check the spark plug after the first 1000 km (621 mi) and then after 4000 km (2485 mi), change it every 8000 km (4970 mi).

- Periodically remove the spark plug and clean it carefully, removing carbon deposits; change it if necessary.

To reach the spark plug, proceed as follows:

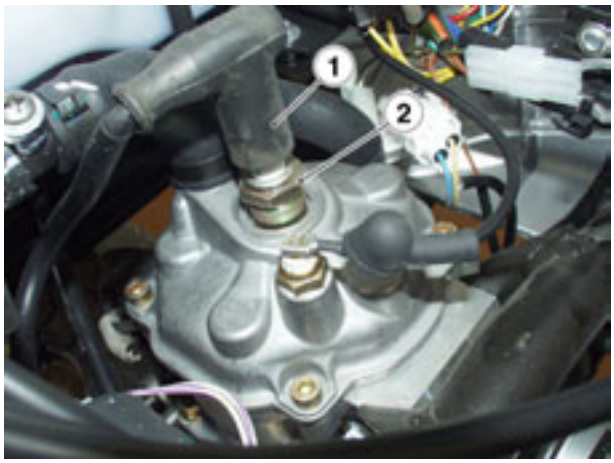
DANGER
Let the engine cool down until it reaches room temperature.

- Lift the fuel tank, see 2.9.1.

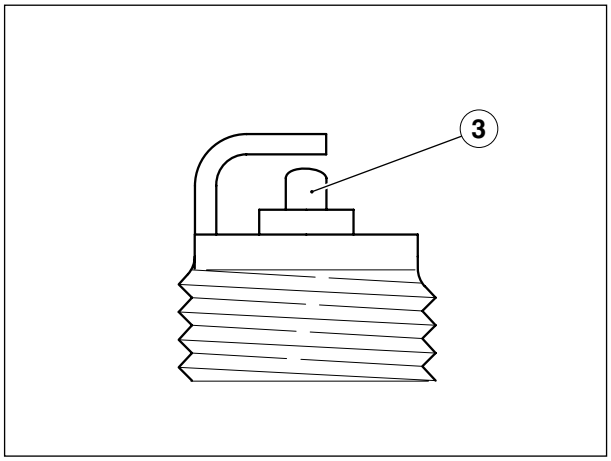
For the removal and cleaning, proceed as follows:

DANGER
Do not disconnect the spark plug cap with the engine running. The starting system could generate a strong discharge.

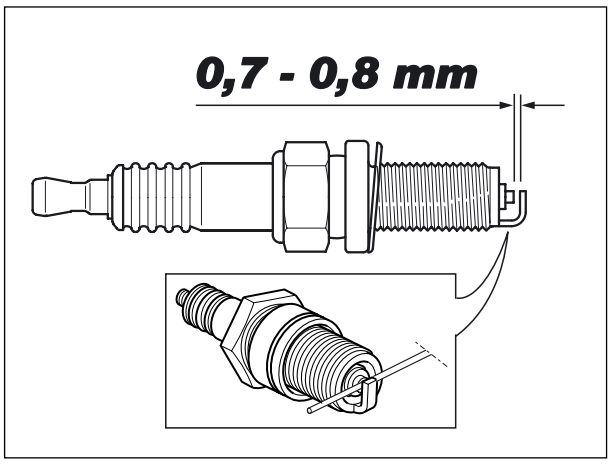
- Remove the spark plug (2) cap (1).
- Remove any trace of dirt from the spark plug base.
- Fit the special spanner provided in the tool kit on the spark plug.
- Unscrew the spark plug and extract it from its seat, taking care to prevent dust or other substances from getting inside the cylinder.



- Make sure that there are neither carbon deposits, nor corrosion marks on the electrodes and on the insulating material; if necessary, clean them with the special spark plugs cleaners and/or a metal brush.
- If the spark plug has crackings on the insulating material, corroded electrodes, excessive deposits on the rounded tip of the central electrode (3), it must be changed.



WARNING
When changing the spark plug, check the thread pitch and length.
If the threaded part is too short, the carbon deposits will accumulate on the thread seat, and therefore the engine may be damaged during the installation of the right spark plug.
Use the recommended type of spark plugs only, in order not to compromise the life and performance of the engine.
To check the spark plug gap, use a wire feeler gauge to avoid damaging the platinum covering.



- Check the spark plug gap with a wire feeler gauge.
- The gap must be 0.6 - 0.7 mm. If not, adjust it by bending the earth electrode with extreme care.
- Make sure that the washer is in good conditions. With the washer on, screw the spark plug by hand in order not to damage the thread.
- Tighten the spark plug by means of the spanner you will find in the tool kit, giving it half a turn to compress the washer.

2.12.2. CHANGING THE BRAKE FLUID

Carefully read 1.2.1. and 1.3.1.

- Brake fluid must be changed every year.

NOTE *These operations apply to both front and rear brakes.*

WARNING
When using the fluid, take care not to spill it on the plastic and painted parts, since it damages them.

- Remove the rubber cap.
- Insert one end of a transparent plastic tubing inside the caliper bleed valve (1-2) and the other end in a container for collection.

- Loosen the bleed valve (1-2) of about one turn.

NOTE *While carrying out this operation, check that some fluid is always present inside the tank. If this is not the case, once the operation is over, the air must be bled out, 2.12.5.*

- Check that the fluid is flowing on the tank and, before emptying, tighten the bleed valve (1-2).
- Top up, see 2.12.1 and 2.12.4.
- Loosen again the bleed valve (1-2) by about half of a turn.
- Check that the fluid comes out of the plastic tubing and, as soon as the fluid colour changes (from a darker to a lighter colour) tighten the bleed valve (1-2) and remove the tubing.

- Refit the rubber cap.
- Top up fluid inside tank, see 2.12.1 and 2.12.4.

2.15.2. IDLING ADJUSTMENT

Adjust as follows whenever idling speed seems erratic.

- Ride a few kilometres until warming engine up to regular operating temperature.
- Place the gearbox in neutral.
- Look at engine idle speed (rpm) on the rev counter.

Engine idling speed should be about 1250 ± 100 rpm.
If needed:

- Place the motorcycle on the stand.
- Rotate the knob (1).

ROTATE CLOCKWISE to increase idling speed.
ROTATE ANTI-CLOCKWISE to decrease idling speed.

- Flip the throttle twistgrip open and closed repeatedly to check for proper operation. Idling speed should remain stable.

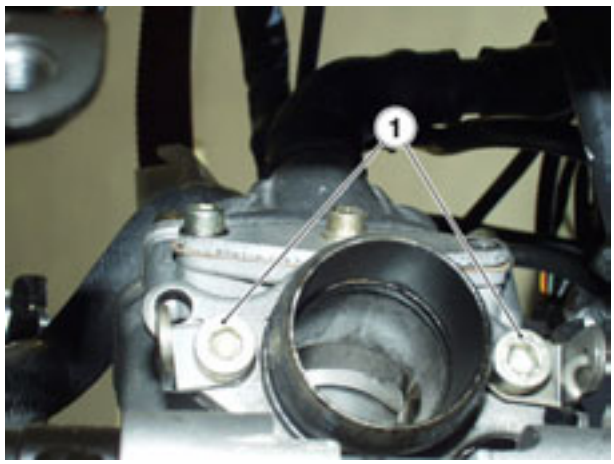
2.20. EXHAUST SYSTEM

2.20.1. EXHAUST MANIFOLD NUTS

Tighten the exhaust manifold nuts after the first 1000 km (621 mi) and every 4000 km (2485 mi) or 12 months afterwards.

DANGER
Allow the engine to cool down to ambient temperature.

- Lift the fuel tank; see 2.9.1.
- Remove the battery mount; see 7.2.1.
- Tighten the two nuts (1) of the exhaust manifold.



3.1 REMOVING THE ENGINE OIL TANK

3.1.1 REMOVING THE ENGINE OIL TANK

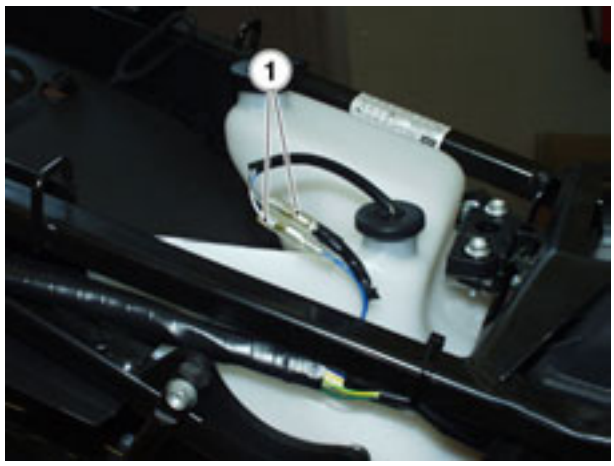
Read 1.2.1 **carefully**.

TORQUE WRENCH SETTINGS

Screw (4)	5 Nm (0.5 kgm)
Screws (5)	3 Nm (0.3 kgm)

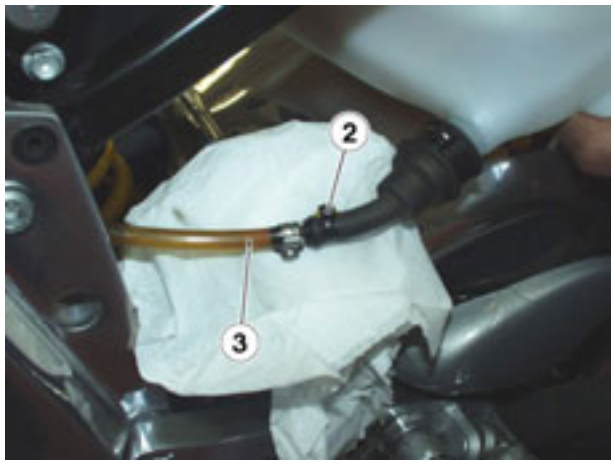
- Remove the seat; see 7.1.1.
- Disconnect the two connectors (1).

NOTE *Place some paper underneath the fitting to collect any oil spillage.*

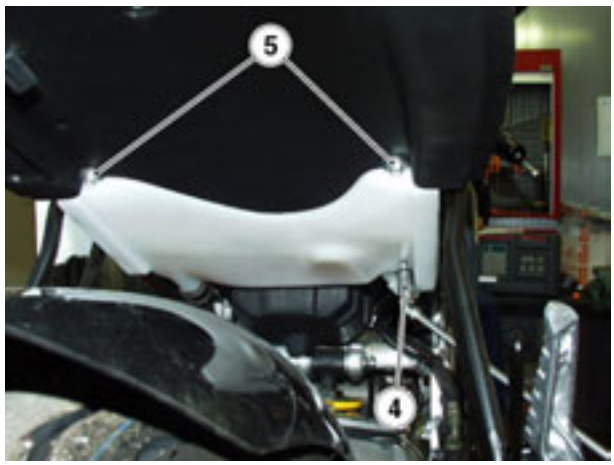


- Release the clip (2).

WARNING
Change the clip (2) on refitting.



- Disconnect the tank hose and block it off.
- Place the hose (3) in a vertical position to avoid spilling oil.



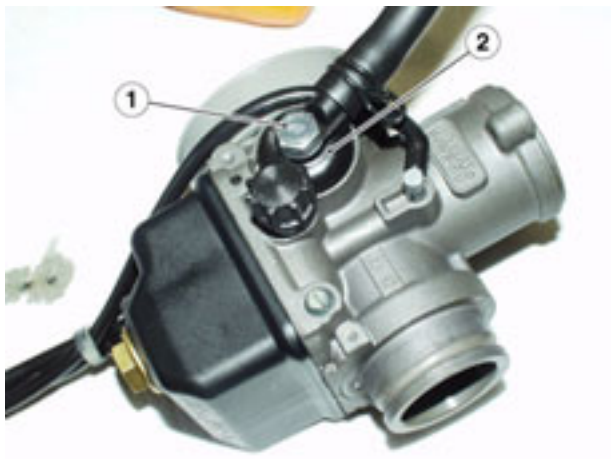
- Release and remove the screw (4).
- Release and remove the two screws (5).

- Push down the tank and remove it from the left side of the vehicle.

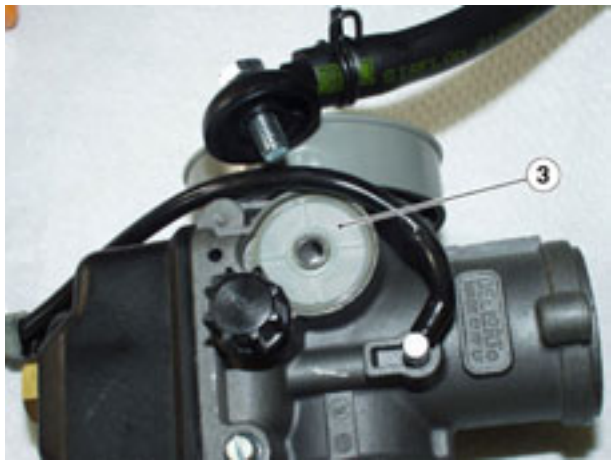
4.3.2. REMOVING THE FUEL FEED FILTER

Read 1.2.1 **and** 1.3.1 **carefully.**

- Close the fuel cock.
- Lift the fuel tank; see 2.9.1.
- Release and remove the screw (1).
- Remove the cap (2).



- Remove the fuel filter (3).



NOTE *Place some paper under the cap to collect any fuel spillage.*

ENGINE 6

6.2.4. INSTALLING THE ENGINE INTO THE FRAME

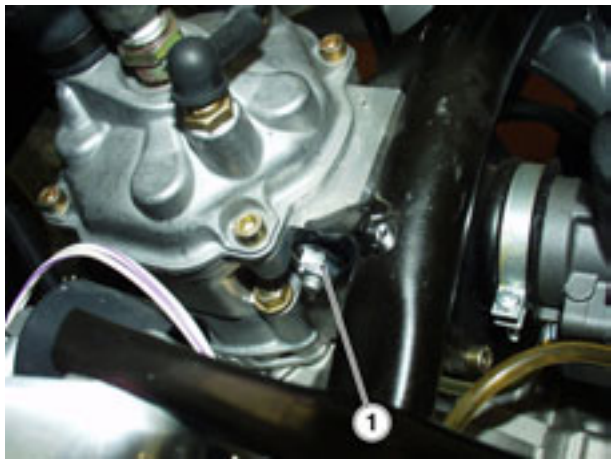
Read 1.2.1 **carefully.**

TORQUE WRENCH SETTINGS

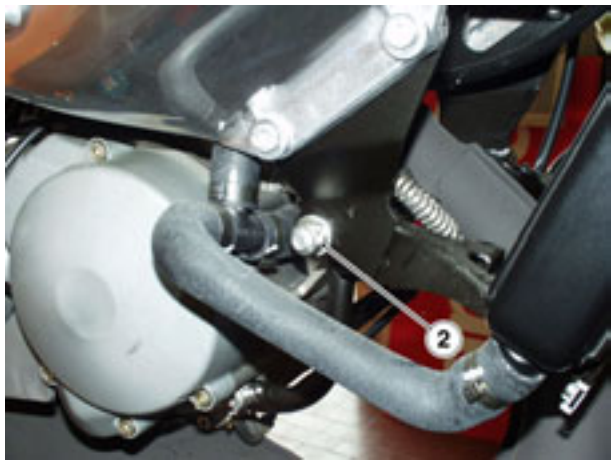
Top engine nut (1)	50 Nm (5.0 kgm)
Front engine nut (2)	50 Nm (5.0 kgm)
Rear engine bolt (3)	22 Nm (2.2 kgm)
Sprocket cover screws (10)	5 Nm (0.5 kgm)
Screw (13)	10 Nm (1.0 kgm)

CAUTION
Handle the engine with care and be careful of your finger and limbs.

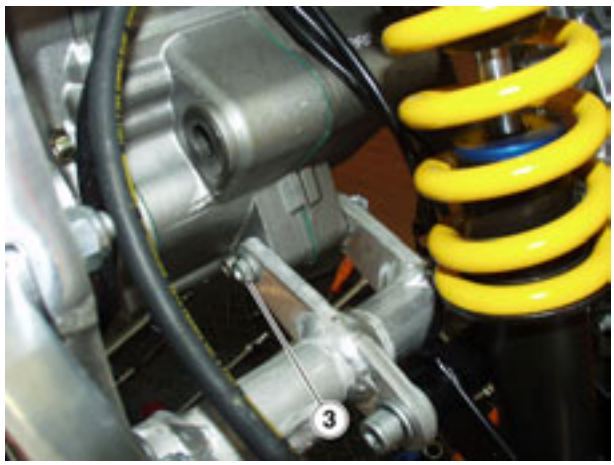
- Shift the engine in small motions until matching the mounting holes perfectly.
- Insert the top mounting bolt with the washer and tighten the nut (1).



- Insert the front mounting bolt, fit the washer and tighten the nut (2).



- Insert the rear mounting bolt (3), fit the washer and tighten the nut.



6.3.5. (RAVE) EXHAUST VALVE INSTALLATION

Read 1.2.1 **carefully.**

TORQUE WRENCH SETTINGS
RAVE valve screws (1) 10 Nm (1.0 kgm)

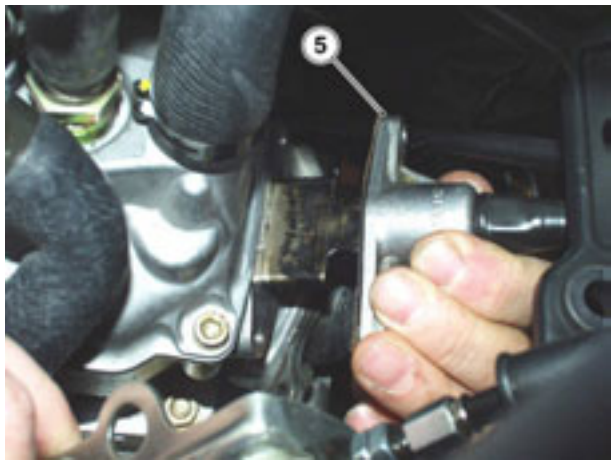
- Remove the fuel tank; see 4.1.1.
- Remove the battery together with the battery box mount; see 7.2.1.
- When installing a RAVE valve to a derated engine, first remove the fixed slide. This is done by unscrewing the two screws (1). Collect the washers.

COMPLETE VALVE INSTALLATION

- Insert the exhaust valve assembly complete with seal (5) into the cylinder.

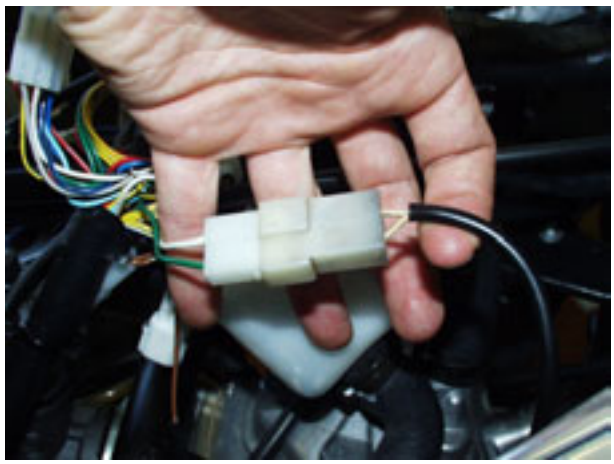
NOTE *Change the seal (5) on assembly.*

- Use the two screws (1) with washers of the fixed slide to secure the exhaust valve assembly.



- Fit the control unit to the battery bracket using the two screws (2).

- Connect the control unit connector to the wiring harness.



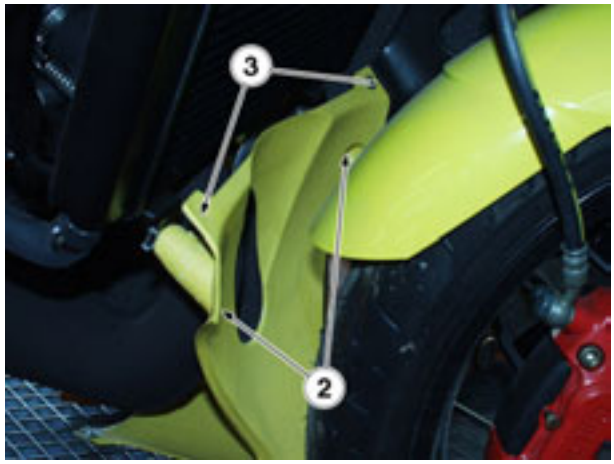
7.1.4. AIR DAM REMOVAL

TORQUE WRENCH SETTINGS

Screws (1-2-3)	3 Nm (0.3 Kgm)

- Release and remove the two side screws (1) on either side.

- Release and remove the two screws (2).
- Release and remove the two screws (3).
- Remove the air dam.



- Remove the number plate bracket; see 7.1.13.
- Unscrew the two screws (4) and collect the nut.
- Remove the ECU.
- Pull the seat end cover in a rearward motion to remove.

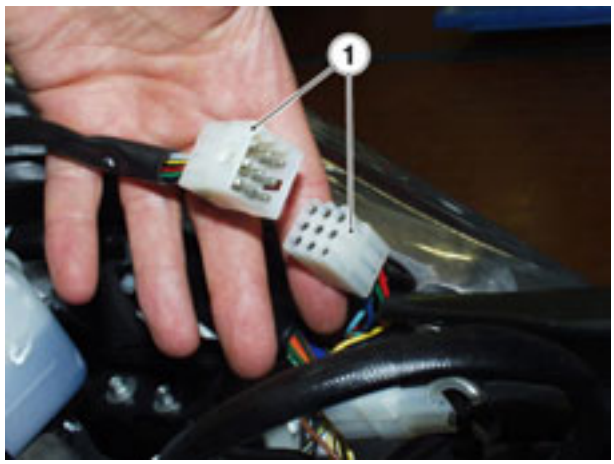
7.2.5. REMOVING THE LEFT-HAND LIGHT DIP SWITCH

Read 1.2.1 **carefully.**

TORQUE WRENCH SETTINGS

Screws (2)	3 Nm (0.3 kgm)

- Lift the fuel tank; see 2.9.1.
- Disconnect the connector (1) of the left-hand light dip switch.

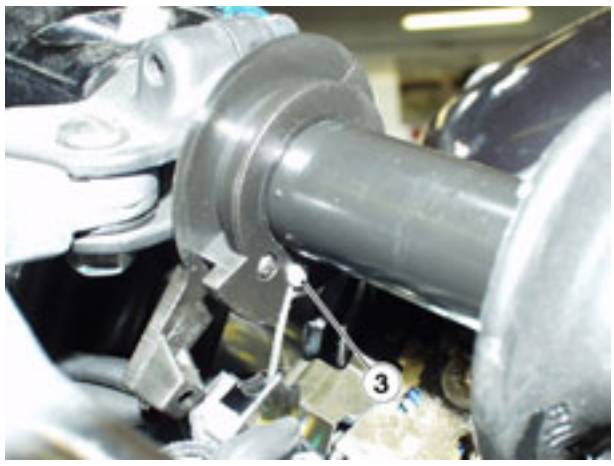


- Release and remove the two screws (2) securing the two shells at the bottom end.

- Separate the two shells.

WARNING
On refitting, position the bottom shell first, making sure the locating peg becomes fully seated into the handlebar hole.

- Disconnect the cold-start cable (3).
- Release the wiring from the clips and remove the left-hand light dip switch.

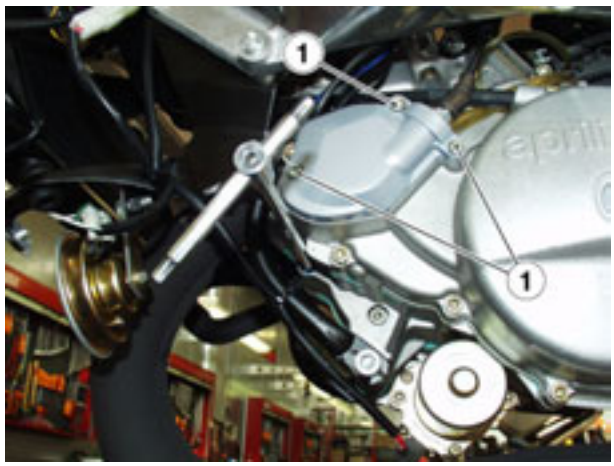


7.3.2. REMOVING THE THROTTLE CABLE FROM INTERMEDIATE PULLEY TO OIL PUMP

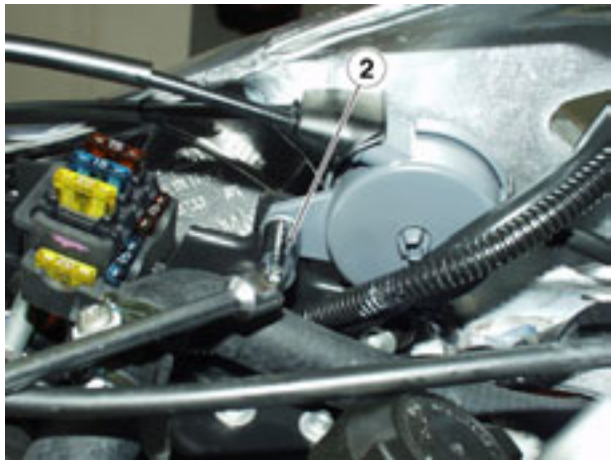
TORQUE WRENCH SETTINGS

Screw (2)	5 Nm (0.5 Kgm)

- Lift the fuel tank, see 2.9.1.
- Remove the left fairing, see 7.1.2.
- Loosen and remove the three screws (1) and remove oil pump cover.
- Slide out the throttle cable.

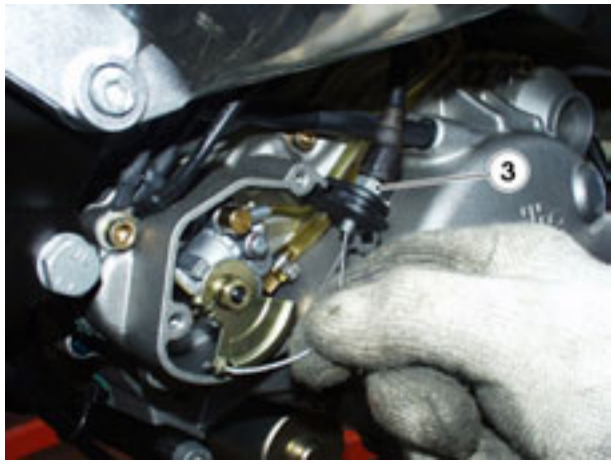


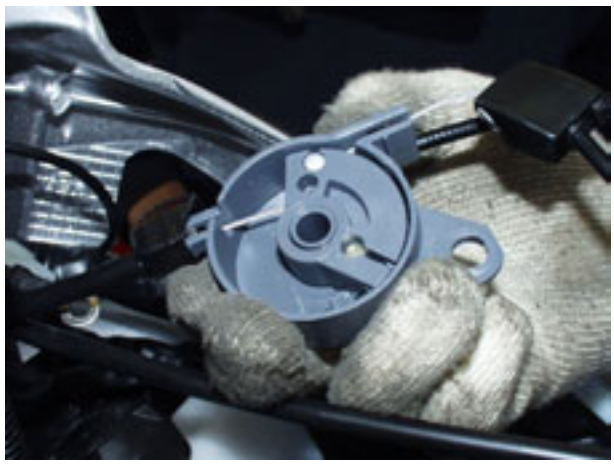
- Loosen and remove screw (2) from frame inner face, on vehicle left side.
- Remove throttle cables pulley cover.



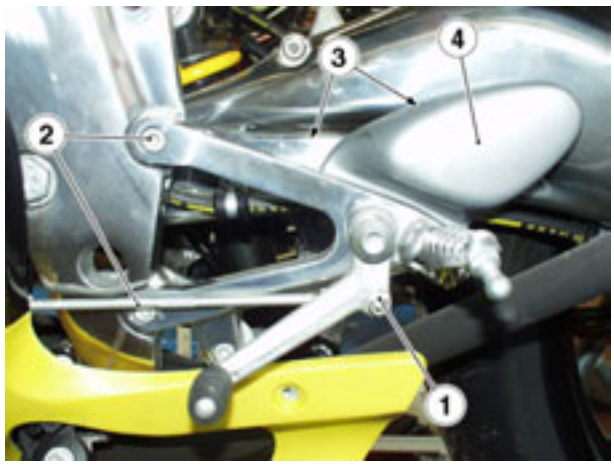
- Slide out throttle cable from oil pump.

WARNING
Upon reassembly, adjust throttle cable tension by turning nut (3) on the oil pump.





7.4.5. REMOVING THE LEFT-HAND RIDER FOOTPEG BRACKET

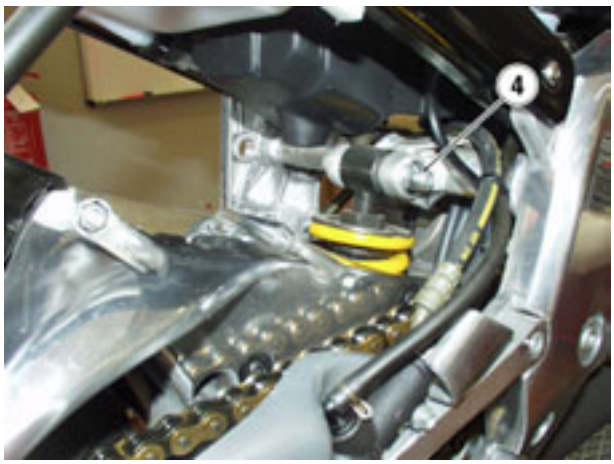


TORQUE WRENCH SETTINGS

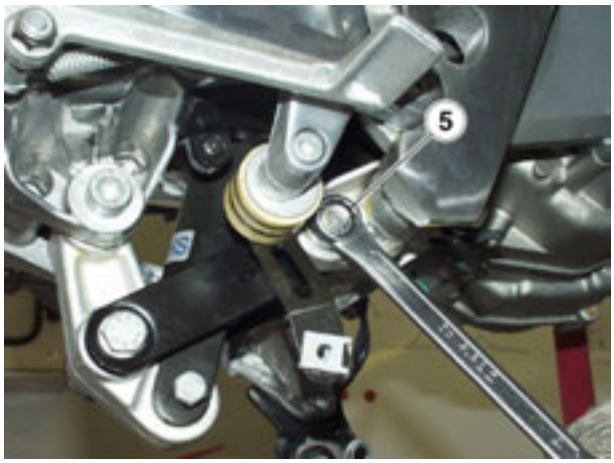
Nut (1)	5 Nm (0.5 Kgm)
Screws (2)	22 Nm (2.2 Kgm)
Screws (3)	3 Nm (0.3 Kgm)

- Undo and remove the nut (1).
- Release and remove the two screws (2).
- Remove the rider footpeg bracket complete with gear shift lever and footpeg.
- If needed, remove the guard (4) and release and remove the two inner screws (3).

- Position the rear swinging arm complete with shock absorber.
- Insert the swinging arm spindle.
- Insert the shock absorber top bolt (4) from the left side and tighten the nut.



- Locate the linkages to the frame.
- Insert the bolt from the left side and tighten the nut (5).
- Adjust the swinging arm; see 2.17.3.



- Connect the following electrical connectors in the order:

- coil and coil ground;

- horn;

7.6.2. REMOVING THE COMPLETE REAR WHEEL

Read 1.2.1 **carefully.**

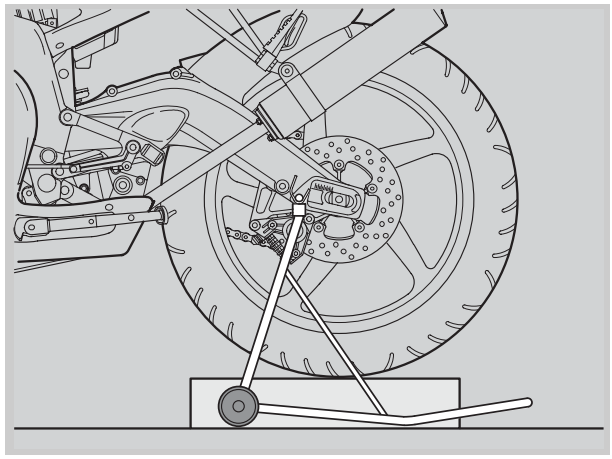
TORQUE WRENCH SETTINGS

Wheel spindle nut (1): 100 Nm (10.0 kgm)

WARNING
To avoid the risk of burns, allow the engine and silencer to cool down completely before proceeding.
Use great care during removal, to avoid damage to the brake line, brake disc and brake pads.

NOTE *Be sure to have the rear wheel stand ready at hand before proceeding to the remove the rear wheel.*

- Place the motorcycle on the rear wheel stand; see 1.7.2.
- Place a support under the tyre to hold the wheel in position once released.



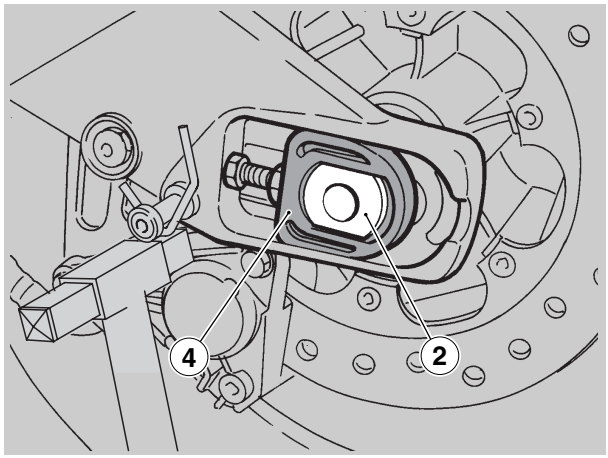
- Undo and remove the nut (1) and collect the washer.
- Withdraw the wheel spindle (2) from the left-hand side.

NOTE *Mark the positions of the right (3) and left (4) chain tensioners to refit them in the original position.*

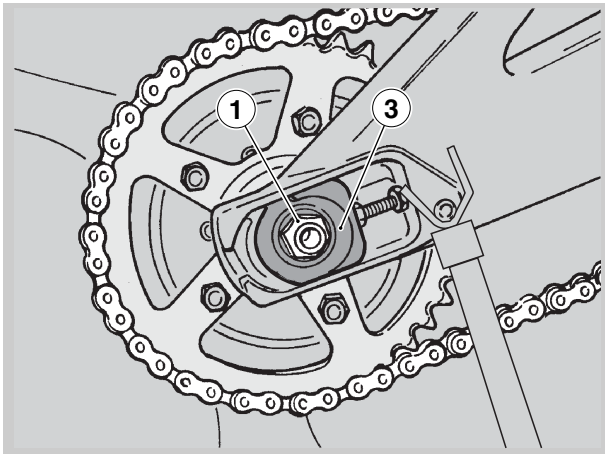
- Collect the right (3) and left (4) chain tensioners.

NOTE *Take the chain off the rear sprocket routing it outboard of the sprocket.*

- Push the wheel forward and release the drive chain from the rear sprocket.
- Slide the wheel off the swinging arm in a rearward motion. Be careful until the brake disc is clear of the caliper.



WARNING
Do not operate the rear brake lever when the calipers are not in place, or the pistons might fall out leading to brake fluid spillage.



7.7.4. FRONT BRAKE DISC REMOVAL

Read 1.2.1 **carefully.**

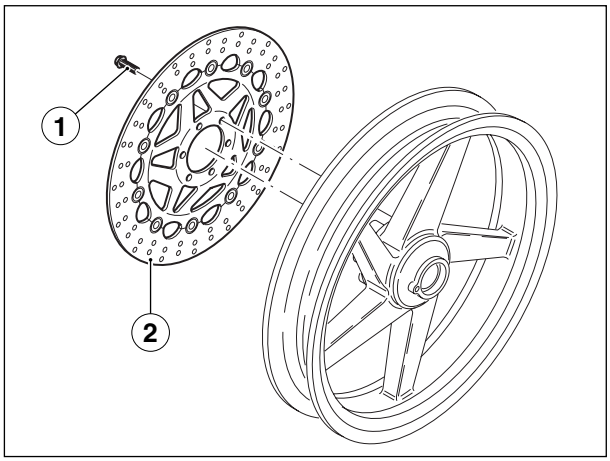
TORQUE WRENCH SETTING

Screws (1) 22 Nm (2.2 kgm).

- Remove the front wheel; see 7.5.2.

NOTE *The screws (1) are retained with LOCTITE® 243. Use of an air gun is recommended to release the screws.*

- Release and remove the six brake disc screws (1).



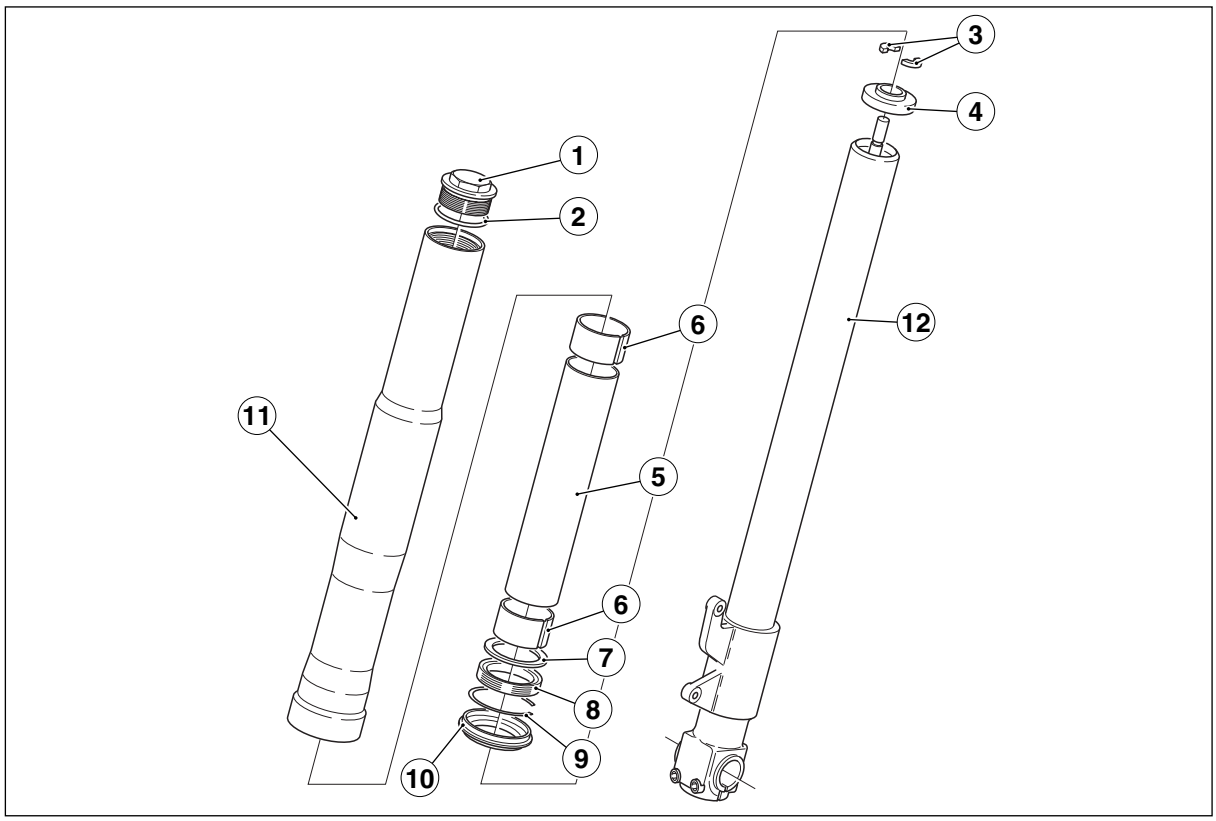
WARNING
Apply LOCTITE® 243 to the threads of the brake disc screws (1) on assembly.

NOTE *To refit, start all screws (1) manually in their holes and tighten in a cross pattern.*

- Remove the brake disc (2).

7.10. FRONT FORK

7.10.1. FRONT FORK DIAGRAM



Key:
49. Top cap
50. O-ring
51. Half ring
52. Spring cup
53. Spacer
54. Slide bush
55. Guide bush cup
56. Oil seal
57. Retaining ring
58. Dust seal with clip
59. Slider
60. Stanchion tube

- Slacken the engine-to-frame mounting bolt (4) to facilitate swinging arm removal.

NOTE *Make sure to have the special tool no. 8101945 (socket for swinging arm spindle adjustment) ready at hand.*

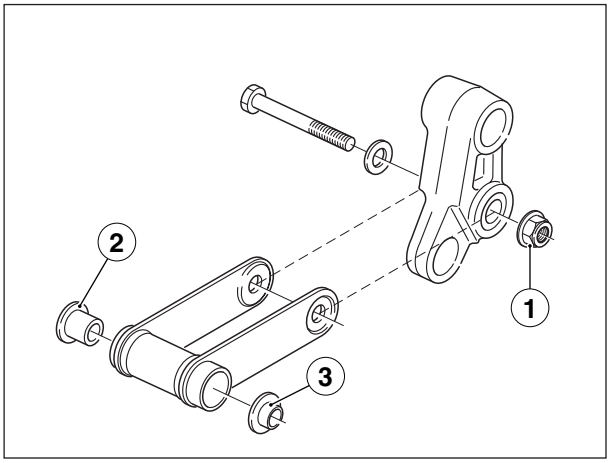
- Working from the right-hand side, slacken the lockring (5) fully using the special socket.
- Slacken the adjusting bush (6).

- Working from the left-hand side, release and remove the swinging arm spindle (7) and collect the two washers.
- Remove the swinging arm from the frame.

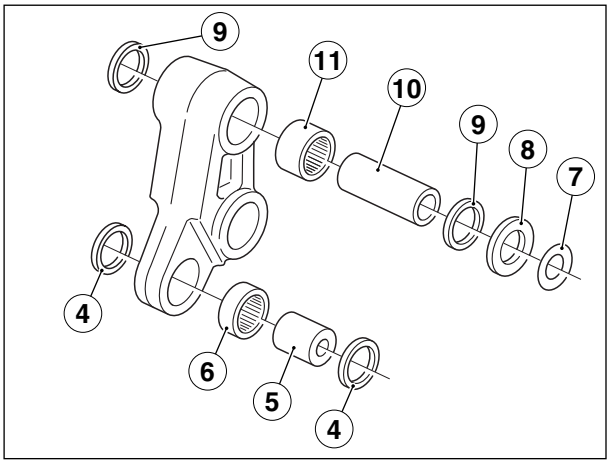
7.12.4. DISMANTLING THE REAR SUSPENSION LINKAGE SYSTEM

Read 1.2.1 **carefully.**

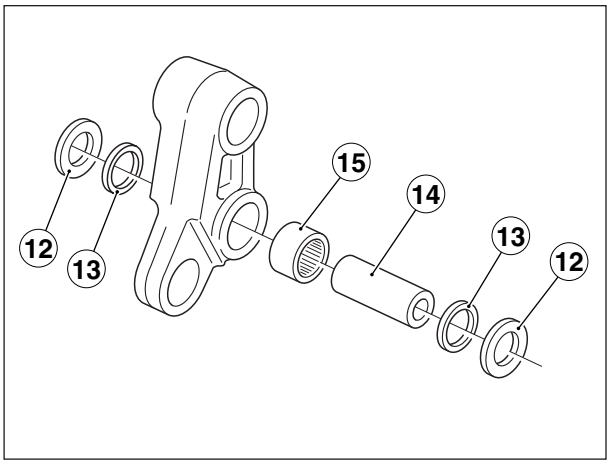
TORQUE WRENCH SETTINGS
Single to double connecting link (1) 50 Nm (5.0 kgm)



- Remove the complete linkage assembly; see 7.12.3.
- Undo and remove the nut (1).
- Withdraw the bolt on the opposite side and collect the washer.
- Remove the single connecting link.
- Remove the right-hand (2) and left-hand bushes (3) from the single connecting link.



- Remove the oil seals (4) from the double connecting link.
- Withdraw the pin (5).
- Remove the roller bearing (6) using a suitable extractor.
- Remove the Belleville washer (7).
- Remove the seal (8).
- Remove both oil seals (9).
- Withdraw the pin (10).
- Remove the roller bearing (11) using a suitable extractor.

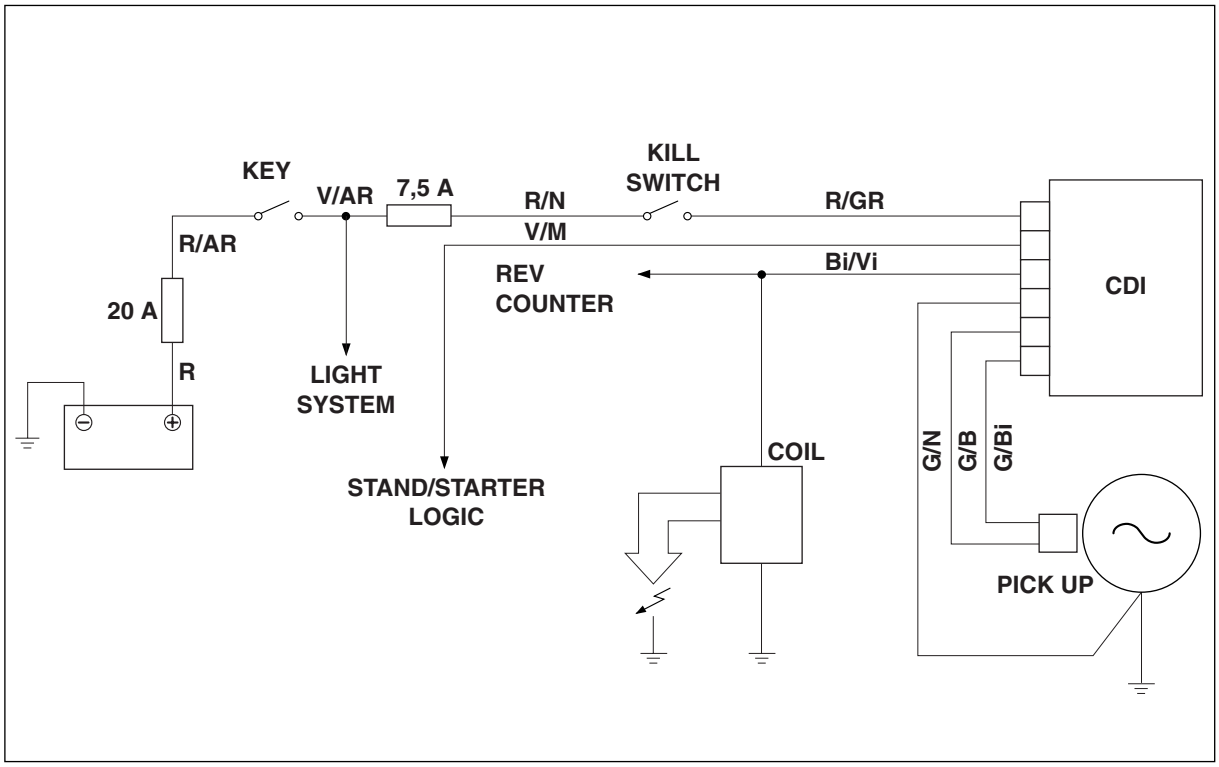


- Remove both seals (12).
- Remove both oil seals (13).
- Withdraw the pin (14).
- Remove the roller bearing (15) using a suitable extractor.

NOTE *Wash all components with clean detergent.*

8.4. IGNITION SYSTEM

8.4.1. IGNITION SYSTEM

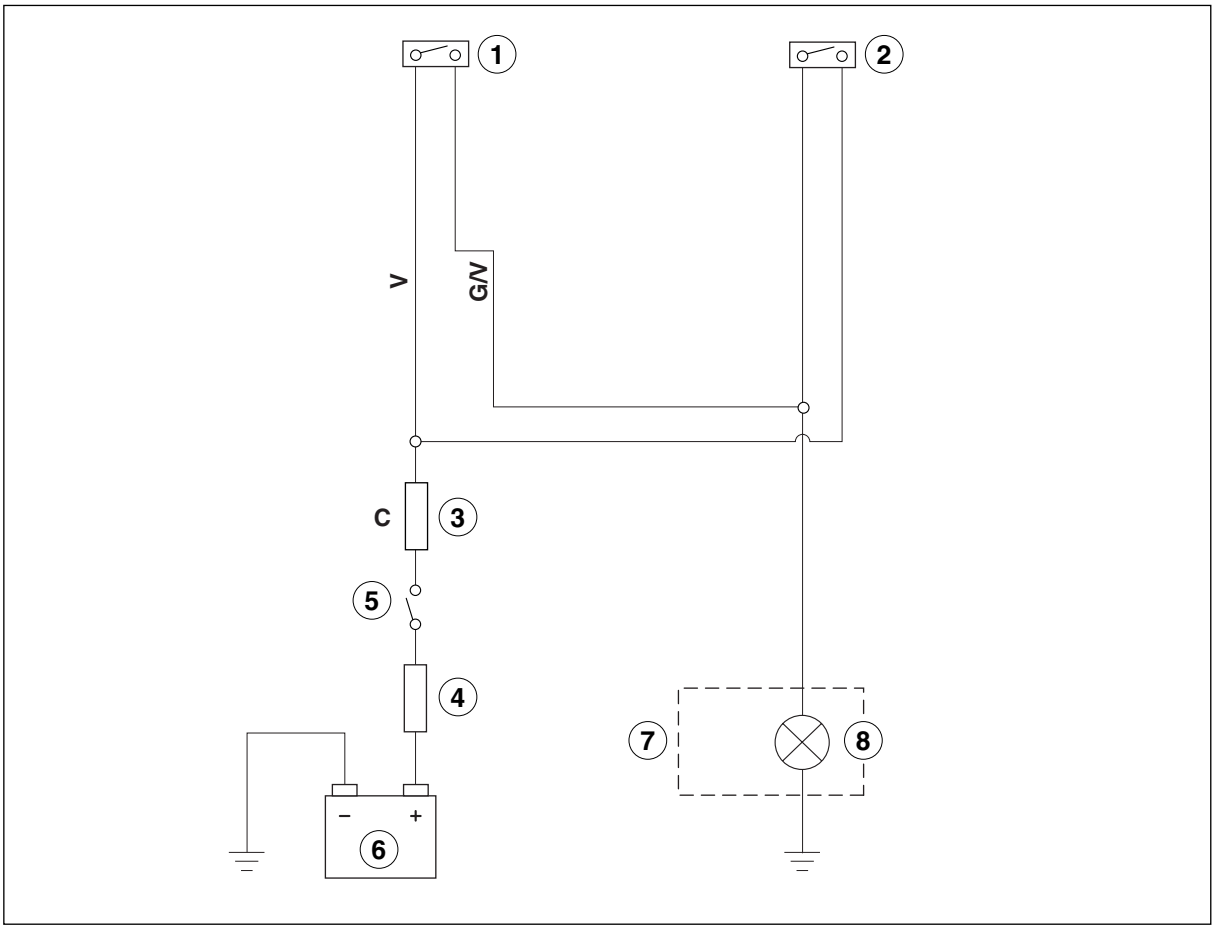


TROUBLESHOOTING

- Check that the 7.5A and 20A fuses are in good condition.
- Check the spark plug and replace as required.
- Check the high-tension cable and the spark plug cover.
- Check the coil.
- Check the pick-up.
- Connect the green-brown wire to ground. If the ignition works, check the stand logic circuit; see 8.12.1.
- Fit a substitute CDI unit known to be operating properly.

8.9. BRAKE LIGHTS CIRCUIT

8.9.1. BRAKE LIGHTS CIRCUIT



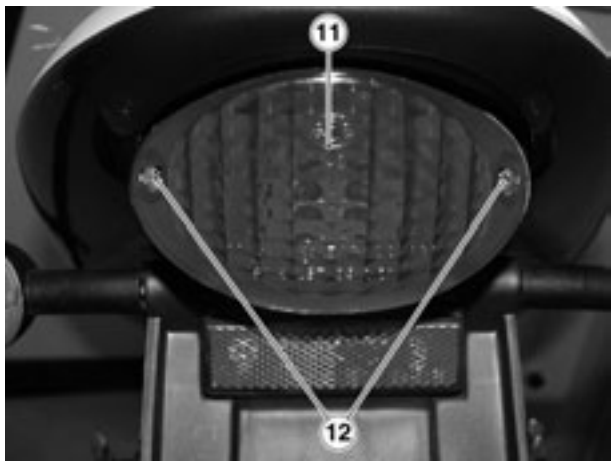
Key:

1. Front brake light switch
2. Rear brake light switch
3. Fuse (15 A)
4. Fuse (20 A)
5. Key
6. Battery
7. Tail light
8. Brake lights

TAIL LIGHT BULBS

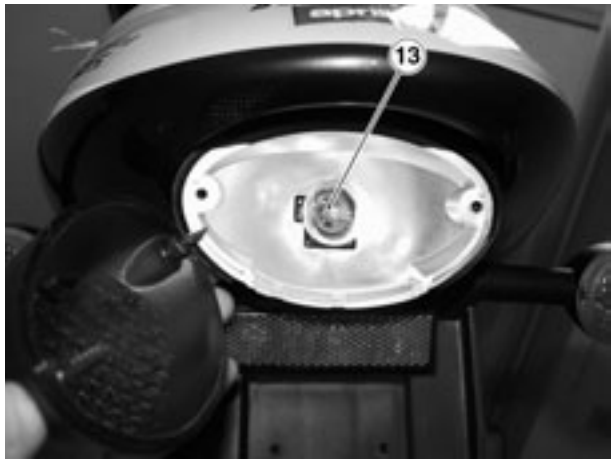
NOTE *Check the BRAKE light switches for proper operation before changing a bulb; see* 8.9.1.

- Place the motorcycle on the stand.
- Release and remove the two screws (12).
- Remove the guard (11).



- Push the bulb (13) gently and twist anti-clockwise.
- Extract the bulb (13).

WARNING
Fit the bulb into the bulb holder making sure the two bulb pegs locate into the slots in the bulb holder.



- Fit a new bulb of equal rating in the correct position.

NOTE *On refitting, make sure the guard locates correctly into its seat. Tighten the screws (12) carefully and do not overtighten to avoid damage to the guard.*

FRONT AND REAR INDICATOR BULBS

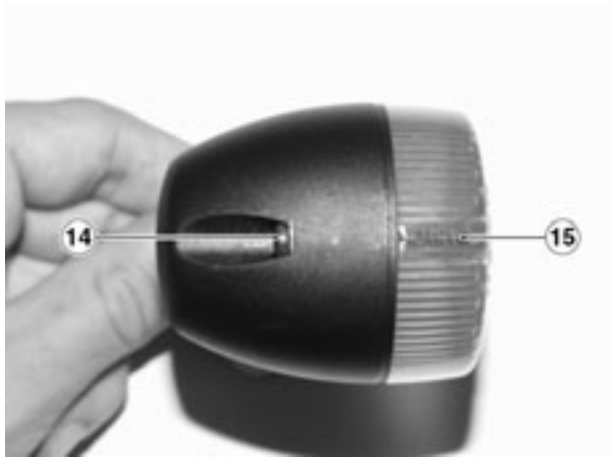
- Place the motorcycle on the stand.
- Release and remove the screw (14).

NOTE *Be careful when removing the guard, or the locating tab might break off.*

- Remove the guard (15).

NOTE *On refitting, make sure the guard locates correctly into its seat. Tighten the screw (14) carefully and do not overtighten to avoid damage to the guard.*

Push the bulb (16) gently and twist anti-clockwise.

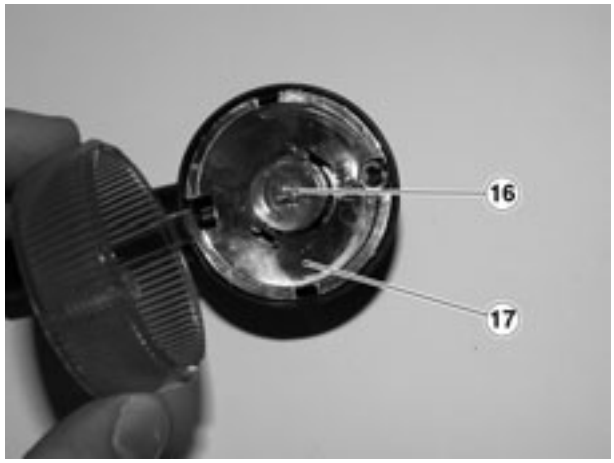


- Extract the bulb.

NOTE *Make sure the locating pegs locate properly into the slots in the bulb holder when fitting the bulb.*

- Fit the new bulb of equal rating in the correct position.

NOTE *In the event the bulb holder (17) comes off, refit it correctly with the slotted open end matching the screw hole.*



9.1.2. CARBURETOR

Trouble	Symptom and possible causes	Remedy
Difficulties on starting	Starter jet obstructed.	Clean.
	Starter duct obstructed.	Clean.
	Air leaking past the gasket between cold-start body and carburetor.	Check and tighten.
	Cold-start shutter is malfunctioning.	Repair.
Erratic operation at idling speed or in the low speed range	Idle jet obstructed or loose.	Check and clean..
	Air leaking past the S.I.P.C. tube of carburetor or cold-start device.	Check.
	Idle outlet or by-pass hole obstructed.	Check and clean.
	Cold-start shutter does not close fully.	Check and adjust.
Erratic operation in the mid-to-high speed range	Main jet obstructed.	Check and clean.
	Build-up sticking to tapered needle.	Check and clean.
	Throttle valve malfunctioning.	Check throttle valve operation.
	Filter obstructed.	Inspect and clean.
Erratic overflow and fuel level	Needle valve worn or damaged.	Replace.
	Float is malfunctioning.	Check and adjust.
	Debris build-up on needle valve.	Clean.
	Fuel level too high or too low.	Adjust float height.
	Carburetor breather hose obstructed.	Clean.
	Needle valve spring broken. .	Replace

9.1.3. RADIATOR

Trouble	Symptom and possible causes	Remedy
Engine overheats	Coolant insufficient.	Top up.
	Radiator fins obstructed by dirt or debris.	Clean.
	Thermostat faulty, jammed in the closed position.	Replace.
	Coolant passages obstructed.	Clean.
	Air in the cooling circuit.	Bleed the circuit.
	Coolant pump faulty.	Replace.
	Coolant used does not meet specification.	Change coolant.
Engine will not warm up to regular operating temperature	Thermostat faulty, jammed in the fully open position.	Replace.
	Very low ambient temperature.	Fit cowl to radiator.