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Pegaso 650 UK 1079-1



workshop manual



aprilia part# 8140638

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0.1 UPDATE OF RELEASE 00/2002-02

Date of the first edition (Release 00) and of the following Releases:

First edition (Release 00) february 2002

0.1.1 INFORMATION ON THE UPDATING OF THE MANUAL

The manual must be updated every time a new “Release” is received.

Insert the pages of the last Release in the manual and eliminate the corresponding obsolete pages (even if belonging to a previous Release).

⚠ WARNING

The failure to update the manual and to eliminate the obsolete pages makes it more difficult to consult the manual and may lead to the performance of incorrect operations on the vehicle, with serious consequences for the safety of the vehicle and of persons and property.

The manual consists of # 10 sections, for a total amount of # 320 pages, as listed below.

NOTE For the nomenclature of the standard page of the manual (and specifically for the definition of the page number) see 0.2 (HOW TO CONSULT THE MANUAL).

0.1.2 UPDATED MANUAL GENERAL LIST

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0 - 2	-00	00	1 - 26	-00	00
0 - 3	-00	00	1 - 27	-00	00
0 - 4	-00	00	1 - 28	-00	00
0 - 5	-00	00	2 - 1	-00	00
0 - 6	-00	00	2 - 2	-00	00
0 - 7	-00	00	2 - 3	-00	00
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0 - 9	-00	00	2 - 5	-00	00
0 - 10	-00	00	2 - 6	-00	00
1 - 1	-00	00	2 - 7	-00	00
1 - 2	-00	00	2 - 8	-00	00
1 - 3	-00	00	2 - 9	-00	00
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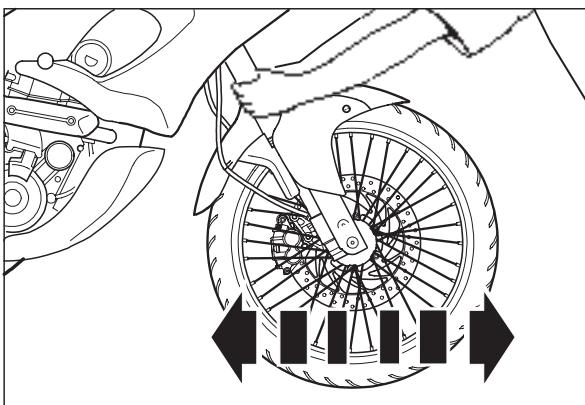
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0.2 HOW TO CONSULT THE MANUAL



8 [**2.22 STEERING**
 Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).
 For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:
 – Steering bearings and steering clearance.
 To assure improved handling, the steering is equipped with rolling bearings.
 The steering must be adjusted correctly to provide smooth rotation of the handlebar and safe driving.
 Tight steering hinders the smooth rotation of the handlebar whereas slack steering implies inadequate stability.



9 [**2.22.1 CHECKING THE BEARING SLACK STEERING**
 ♦ Position the vehicle on the centre stand **OPT.**
 ♦ Shake the fork in the direction of travel.
 10 [♦ In the event any slack is encountered, adjust the steering, see 2.22.2 (ADJUSTING THE BEARING SLACK STEERING).



2.22.2 ADJUSTING THE BEARING SLACK STEERING
 Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

11 [♦ Position the vehicle on the centre stand **OPT.**
 ♦ ★ Loosen the screw (1).
 ♦ Loosen the upper nut (2).
 ♦ Adjust the metal ring (3) with the appropriate spanner to take up the slack.
 ♦ Repeat the check until the problem appears to be solved.
 ♦ Tighten the upper nut (2) thoroughly.
Steering tube nut driving torque: 100 Nm (10 kgm).
 ♦ ★ Tighten the screw (1).
Upper plate screw driving torque: 50 Nm (5 kgm).

⚠ WARNING
 Once the operation is complete, make sure that the rotation of the handlebar is smooth in order to avoid damage to the balls and the loss of manoeuvrability of the vehicle.



- 1) Vehicle (or engine) model
- 2) Section
- 3) Release consecutive number ("00" indicates the first edition)
- 4) Year and month of publication of the Release
- 5) Section number
- 6) Section page consecutive number

- 7) Updated page consecutive number
- 8) Chapter title (numbered consecutively)
- 9) Paragraph title (numbered consecutively)
- 10) Description of the operation (always preceded by a rhombus)
- 11) Description of the operation: the star means that the operation must be repeated on the other side of the vehicle

0.3 FOREWORD

- This manual supplies the main information for normal servicing procedures.
- In the future, the information and illustrations that make up this manual will be updated by means of "Releases", see 0.1 (UPDATE OF RELEASE 00/2002-02).
- This publication is intended for the **aprilia** Dealers and their qualified engineers; many notions were voluntarily omitted, because they were considered superfluous. Since it is not possible to include complete mechanical information in this publication, the persons using this manual must have a basic mechanical training and a basic knowledge of the procedures regarding motor vehicles repair systems. Without this knowledge, the repair or servicing of the vehicle may be ineffective or even dangerous. The manual does not describe all the procedures for the repair and servicing of the vehicle in detail, therefore it is important to be particularly careful, in order to avoid any damage to components and persons. In order to grant its customers more and more satisfaction in the use of the vehicle, **aprilia s.p.a.** will keep improving its products and the relevant documentation. The main technical modifications and the modifications in the vehicle repair procedures are communicated to all **aprilia** Outlets and Branches the world over. These modifications will be described in the successive editions of this manual. In case of need or in case there are any doubts regarding the repair and servicing procedures, contact the **aprilia** Consumer Service (A.C.S.), which will give you any information required and will also inform you about any updating and technical modifications of the vehicle.

aprilia s.p.a. reserves the right to modify its models at any time, without prejudice to the main characteristics here described.

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For further information, see 0.4 (REFERENCE MANUALS).

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0.4 REFERENCE MANUALS**0.4.1 ENGINE SERVICE AND REPAIR MANUALS**

aprilia part# (description)
8140138 I E F
8140139 I D UK

0.4.2 SPARE PARTS CATALOGUES

aprilia part# (description)
2611 I UK

0.4.3 SPECIAL TOOL MANUALS

aprilia part# (description)
8202278 I F D E UK

0.4.4 USE AND MAINTENANCE MANUALS

aprilia part# (description)
8104311 I F D
8104312 P E UK
8104313 NL DK GR

0.5 SAFETY WARNINGS

The following precautionary warnings are used throughout this manual in order to convey the following messages:

⚠ Safety warning. When you find this symbol on the vehicle or in the manual, be careful to the potential risk of personal injury. Non-compliance with the indications given in the messages preceded by this symbol may result in grave risks for your and other people's safety and for the vehicle!

⚠ WARNING

Indicates a potential hazard which may result in serious injury or even death.

⚠ CAUTION

Indicates a potential hazard which may result in minor personal injury or damage to the vehicle.

NOTE The word "NOTE" in this manual precedes important information or instructions.

0.5.1 PRECAUTIONS AND GENERAL INFORMATION

Follow with care these recommendations when repairing, disassembling and reassembling the vehicle.

⚠ WARNING

The use of naked flames is forbidden for any type of operation.

Before beginning any maintenance operation or any inspection of the vehicle, stop the engine, extract the key from the ignition block, wait until the engine and the exhaust system have cooled down and if possible lift the vehicle by means of the proper equipment, on firm and flat ground.

Keep away from the red-hot parts of the engine and of the exhaust system, in order to avoid burns.

⚠ WARNING

Do not hold any mechanical piece or other parts of the vehicle with your mouth: the components are not edible and some of them are noxious or even toxic.

If not expressly indicated otherwise, for the reassembly of the units repeat the disassembly operations in reverse order.

Any reference to operations from other chapters must be interpreted logically in order to avoid components being removed unnecessarily.

Do not use polishing pastes on matt paints.

Never use fuel as a solvent for cleaning the vehicle.

Do not use alcohol, petrol or solvents to clean the rubber and plastic parts and the saddle: use only water and mild soap.

Disconnect the negative cable (-) from the battery when electric welding.

When two or more persons are working together, make sure that each is working in safe conditions.

Carefully read 1.2 (INSTRUCTIONS FOR USE OF FUEL, LUBRICANTS, COOLANT AND OTHER COMPONENTS).

0.5.2 BEFORE THE DISASSEMBLY OF THE COMPONENTS

- Remove any dirt, mud, dust and foreign matters from the vehicle before disassembling the components.
- Use, when necessary, the special tools designed for this vehicle.

0.5.3 DISASSEMBLING THE COMPONENTS

- Do not loosen and/or tighten the screws and nuts using pliers or other tools: instead, always use the proper spanner.
- Before disconnecting the joints (pipes, cables, etc.), mark the positions on all of them and mark them with different distinguishing signs. Each piece must be marked clearly, in order not to have problems during installation.
- Clean and wash carefully any disassembled parts with low inflammability detergents.
- Keep the parts that are used in pairs together, since they have adapted to each other following the normal wear. Some components must be used together or replaced completely.
- Keep away from heat sources.

0.5.4 REASSEMBLING THE COMPONENTS

⚠ CAUTION

Never use a seeger ring twice. When a seeger ring is removed, it must be replaced with a new one. When assembling a new seeger ring be careful not to stretch its ends more than strictly necessary to put it on the shaft.

After installing a seeger ring, make sure that it is completely and firmly inserted in its seat.

Do not use compressed air to clean the bearings.

NOTE The bearings must rotate freely, without halting a/o noise otherwise they must be replaced.

- Use only original **aprilia** SPARE PARTS.
- Use the recommended lubricants.
- Whenever possible, lubricate the parts before reassembly.
- When tightening screws and nuts, begin with those having greater diameters or with inner ones, proceeding diagonally. Tighten screws or nuts in successive passages before applying driving torque.
- Always replace lock nuts, seals, sealing rings, snap rings, O-rings, split pins and screws, whenever the thread appears damaged, with new ones.
- Before the assembly, clean all the connection surfaces, the oil seal edges and the gaskets. Apply a thin layer of lithium-based grease on the oil seal edges. Put back the oil seals and the bearings with the mark or serial number facing towards the outside (visible side).

Follow ►

Follow ►

- When installing the bearings, lubricate them abundantly.
- Make sure that each component has been reassembled correctly.
- After a repair or periodic maintenance operation, carry out the preliminary checks and test the vehicle in a private area or, in any case, in a low-traffic area.

0.6 HOW TO USE YOUR SERVICE AND REPAIR MANUAL

0.6.1 ADVICE FOR CONSULTATION

- This manual is divided into section and chapters, each one of which corresponds to a category of main components. To consult them, see the sections' index, see page 0-1.
- If not expressly indicated otherwise, for the reassembly of the units repeat the disassembly operations in reverse order.
- The terms "right" and "left" are referred to the rider seated on the vehicle in the normal riding position.
- For normal maintenance operations and for the use of the vehicle, consult the "USE AND MAINTENANCE" manual.
- ★ **The operations preceded by this symbol must be repeated on the opposite side of the vehicle.**

In this manual the various versions are indicated by the following symbols:

- ASD** automatic light switching version (Automatic Switch-on Device)
- OPT** optional
-  catalytic version

VERSION:

- | | | |
|--------------------------|------------------------|-------------------------------------|
| I Italy | GR Greece | MAL Malaysia |
| UK United Kingdom | NL Holland | RCH Chile |
| A Austria | CH Switzerland | HR Croatia |
| P Portugal | DK Denmark | AUS Australia |
| SF Finland | J Japan | USA United States of America |
| B Belgium | SGP Singapore | BR Brazil |
| D Germany | SLD Slovenia | RSA South Africa |
| F France | IL Israel | NZ New Zealand |
| E Spain | ROK South Korea | CDN Canada |

0.7 ABBREVIATIONS / SYMBOLS / INITIALS

#	= number
<	= is less than
>	= is greater than
≤	= is equal to or less than
≥	= is equal to or greater than
~	= approximately
∞	= infinity
°C	= degrees Celsius (centigrade)
°F	= degrees Fahrenheit
±	= plus or minus
a.c.	= alternating current
A	= ampère
Ah	= ampere per hour
API	= American Petroleum Institute
HV	= high voltage
AV/DC	= AntiVibration Double Countershaft
bar	= unit of pressure (1 bar = 100 kPa)
d.c.	= direct current
cm ³	= cubic centimetres
CO	= carbon monoxide
CPU	= Central Processing Unit
DIN	= German industrial normative (Deutsche Industrie Norm)
DOHC	= Double Overhead Camshaft
ECU	= Engine Control Unit
rpm	= revolutions per minute
HC	= unburnt hydrocarbons
ISC	= idle speed control
ISO	= International Standardization Organization
kg	= kilograms
kgm	= kilograms per metre (1 kgm = 10 Nm)
km	= kilometres
km/h	= kilometres an hour
kΩ	= kilo-ohms
kPa	= kiloPascal (1 kPa = 0.01 bar)
KS	= clutch side (Kupplungseite)
kW	= kilowatt
ℓ	= litres
LAP	= lap (race course)
LED	= Light Emitting Diode
LEFT SIDE	= left side
m/s	= metres an second
MAX	= maximum
mbar	= millibar (1mbar = 0.1 kPa)
mi	= mile
MIN	= minimum
MPH	= miles per hour
MS	= flywheel side (Magnetoseite)
MΩ	= megaohm
N.A.	= not available (Not Available)
N.O.M.M.	= "Motor" method octane number
N.O.R.M.	= "Research" method octane number
Nm	= newton per meter (1 Nm = 0.1 kgm)
Ω	= ohm

PICK-UP	= pick-up
BDC	= bottom dead centre
TDC	= top dead centre
PPC	= Pneumatic Power Clutch
RIGHT SIDE	= right side
SAE	= Society of Automotive Engineers
TEST	= diagnostics test
T.B.E.I.	= convex socket head
T.C.E.I.	= hexagonal socket head
T.E.	= hex-head
T.P.	= flat head
TSI	= Twin Spark Ignition
UPSIDE-DOWN	= upside-down rods
V	= volt
W	= watt
Ø	= diameter

NOTE

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GENERAL INFORMATION

1

GENERAL INFORMATION

1

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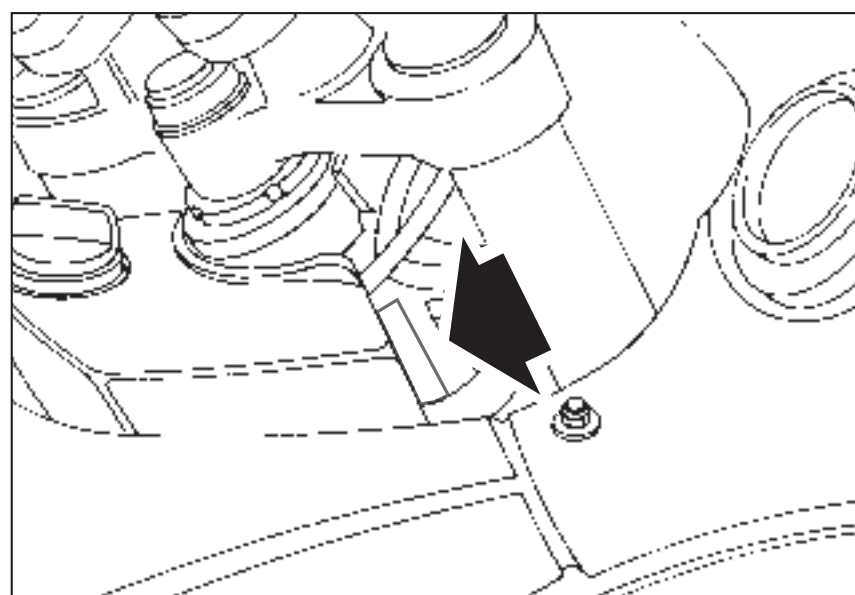
1.1 POSITION OF THE SERIAL NUMBERS

These numbers are necessary for the registration of the vehicle.

Do not alter the identification numbers if you do not want to incur severe penal and administrative sanctions. In particular, the alteration of the frame number results in the immediate invalidity of the guarantee.

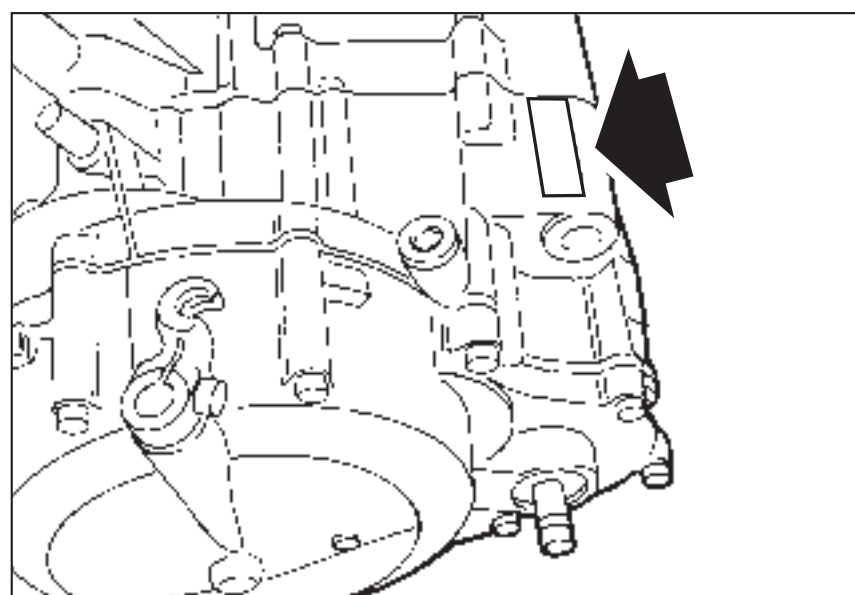
1.1.1 FRAME NUMBER

The frame number is stamped on the right side of the steering column.



1.1.2 ENGINE NUMBER

The engine number is stamped on the rear part of the engine, near the pinion.



1.2 INSTRUCTIONS FOR USE OF FUEL, LUBRICANTS, COOLANT AND OTHER COMPONENTS

1.2.1 FUEL

⚠ WARNING

The fuel used for internal combustion engines is extremely inflammable and in particular conditions it can become explosive.

It is important to carry out the refuelling and the maintenance operations in a well-ventilated area, with the engine off.

Do not smoke while refuelling or near fuel vapours, in any case avoid any contact with naked flames, sparks and any other heat source to prevent the fuel from catching fire or from exploding.

Further, prevent fuel from flowing out of the fuel filler, as it could catch fire when getting in contact with the red-hot surfaces of the engine.

In case some fuel has accidentally been spilt, make sure that the area has completely dried and before starting the vehicle verify that there is no fuel inside the fuel filler neck.

Since petrol expands under the heat of the sun and due to the effects of sun radiation.

Never fill the tank to the brim.

Screw the plug up carefully after refuelling.

Avoid any contact of the fuel with the skin and the inhalation of vapours; do not swallow fuel or pour it from a receptacle into another by means of a tube.

DO NOT DISPOSE OF FUEL IN THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

Use only premium grade unleaded petrol, min. O.N. 95 (N.O.R.M.) and 85 (N.O.M.M.).

1.2.2 ENGINE OIL

⚠ WARNING

Engine oil may cause serious damage to the skin if handled daily and for long periods.

Wash your hands carefully after use.

Do not dispose of the oil in the environment.

Deliver it to or have it collected by the nearest oil salvage center or by the supplier.

In case any maintenance operation has to be carried out, it is advisable to use latex gloves.

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Motor oil.

For the kind of engine oil to be used, see 1.6 (LUBRICANT CHART) under the heading:

– Motor oil.

1.2.3 FORK OIL

⚠ WARNING

Fork oil may cause serious damage to the skin if handled daily and for long periods.

Wash your hands carefully after use.

Do not dispose of the oil in the environment.

Deliver it to or have it collected by the nearest oil salvage center or by the supplier.

In case any maintenance operation has to be carried out, it is advisable to use latex gloves.

By changing the damper settings and/or the viscosity of the oil contained in them, the suspension response may be altered partially.

Standard oil viscosity: SAE 20 W.

The viscosity ratings which can be chosen based on the type of fork stiffness desired (SAE 5W soft, 20W stiff).

The two products can be used in different percentages until the desired response is obtained.

F.A. is that your viscosity alters little with changes in temperature and their damping response therefore remains constant.

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Fork oil.

For the kind of fork oil to be used, see 1.6 (LUBRICANT CHART) under the heading:

– Fork oil.

1.2.4 BRAKE FLUID

NOTE This vehicle is provided with front and rear disc brakes, with separate hydraulic circuits. The following information refers to a single braking system, but is valid for both.

⚠ WARNING

If the brake fluid gets in contact with the skin or the eyes, it can cause serious irritations.

Carefully wash the parts of your body that get in contact with the liquid. Consult a doctor or an oculist if the liquid gets in contact with your eyes.

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

When using the brake fluid, take care not to spill it on the plastic or painted parts, since it can damage them.

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Brake fluid.

For the kind of brake fluid to be used, see 1.6 (LUBRICANT CHART) under the heading:

– Brake fluid.

⚠ CAUTION

To avoid serious damage to the braking system, do not use fluids other than the recommended ones nor mix different fluids for topping up.

Do not use brake fluid taken from old or already opened containers.

Sudden variations in clearance or an elastic resistance in the brake levers may be due to trouble in the hydraulic circuits.

Make sure that the brake discs and the friction pads are completely free of grease or oil, especially after maintenance or checking operations.

Check that the brake cables are neither twisted nor worn out.

Prevent water or dust from accidentally getting into the circuit.

In case maintenance operations are to be performed on the hydraulic circuit, it is advisable to use latex gloves.

1.2.5 COOLANT

⚠ WARNING

The coolant is noxious: do not swallow it; if the coolant gets in contact with the skin or the eyes, it can cause serious irritations. If the coolant gets in contact with your skin or eyes, rinse with plenty of water and consult a doctor.

If it is swallowed, induce vomit, rinse mouth and throat with plenty of water and consult a doctor without delay.

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

⚠ WARNING

Be careful not to spill the coolant on the red-hot parts of the engine: it may catch fire and send out invisible flames.

In case any maintenance operation should be required, it is advisable to use latex gloves.

Do not use the vehicle if the coolant is below the minimum prescribed level.

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Coolant.

The coolant is composed of 50% water and 50% anti-freeze. This mixture is ideal for most running temperatures and ensures good protection against corrosion.

It is advisable to keep the same mixture in the hot season as well, since in this way losses due to evaporation are reduced and it is not necessary to top up so frequently.

The mineral salt deposits left in the radiator by evaporated water are thus lessened and the efficiency of the cooling system remains unaltered.

If the outdoor temperature is below 0°, check the cooling circuit frequently and if necessary increase the anti-freeze concentration (up to maximum 60%).

For the cooling solution use distilled water, in order not to damage the engine.

For the kind of coolant to be used, see 1.6 (LUBRICANT CHART) under the heading:

– Engine coolant.

On the basis of the desired freezing temperature of the coolant mixture, add to the water the percentage of coolant indicated in the following table:

Freezing point °C	Coolant of the volume %
-20	35
-30	45
-40	55

NOTE The characteristics of the various antifreeze liquids are different. Be sure to read the label on the product to learn the degree of protection it guarantees.

⚠ CAUTION

Use only antifreeze and anticorrosive without nitrite in order to ensure protection at at least -35 °C.

1.2.6 CLUTCH FLUID

NOTE This vehicle is provided with hydraulic clutch control.

⚠ WARNING

If the clutch fluid gets in contact with the skin or the eyes, it can cause serious irritations.

Carefully wash the parts of your body that get in contact with the liquid. Consult a doctor or an oculist if the liquid gets in contact with your eyes.

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

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

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Clutch wear.

⚠ CAUTION

To avoid serious damage to the system, do not use fluids other than the recommended ones nor mix different fluids for topping up.

Do not use clutch fluid taken from old or already opened containers.

Sudden variations in clearance or an elastic resistance in the clutch levers may be due to trouble in the hydraulic circuits.

Check that the clutch hoses are not twisted or worn. Prevent water or dust from accidentally getting into the circuit.

In case maintenance operations are to be performed on the hydraulic circuit, it is advisable to use latex gloves.

1.2.7 CARBON MONOXIDE

If it is necessary to let the engine run in order to carry out some work, make sure that the area in which you are operating is properly ventilated.

Never run the engine in enclosed spaces.

If it is necessary to work indoors, use an exhaust evacuation system.

⚠ WARNING

The exhaust fumes contain carbon monoxide, a poisonous gas that can cause loss of consciousness and even death.

Run the engine in an open area or, if it is necessary to work indoors, use an exhaust evacuation system.

1.2.8 HOT COMPONENTS

⚠ WARNING

The engine and the components of the exhaust system become very hot and remain hot for some time after the engine has been stopped.

Before handling these components, wear insulating gloves or wait until the engine and the exhaust system have cooled down.

1.3 RUNNING-IN RULES

The running-in of the engine is essential to ensure its duration and correct functioning.

If possible, drive on hilly roads and/or roads with many bends, so that the engine, the suspensions and the brakes undergo a more effective running-in.

During running-in, change speed.

In this way the components are first "loaded" and then "relieved" and the engine parts can thus cool down.

Even if it is important to stress the engine components during running-in, take care not to exceed.

⚠ CAUTION

Only after the first 2000 km (1250 mi) of running-in is it possible to obtain the best performance.

Keep to the following indications:

- ◆ Do not open the throttle completely if the speed is low, both during and after the running-in.
- ◆ During the first 500 km (312 mi) put on the brakes with caution, avoiding sharp and prolonged brakings. This ensures a correct bedding-in of the pads on the brake disc.
- ◆ During the first 500 km (312 mi) never exceed 4000 rpm. (see table).

⚠ CAUTION

After the first 2000 km (1250 mi) perform the checking operations indicated in the "after running-in" column, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) in order to avoid injuring yourself or others a/o damaging the vehicle.

- ◆ Between the first 1000 km (625 mi) and 2000 km (1250 mi) drive more briskly, change speed and use the maximum acceleration only for a few seconds, in order to ensure better coupling of the components; never exceed 7500 rpm (see table).
- ◆ After the first 2000 km (1250 mi) you can expect better performance from the engine, however, without exceeding the maximum allowed (6250 rpm).

Engine maximum rpm recommended	
Mileage km (mi)	rpm
0 – 500 (0 – 312)	4000
500 – 1000 (312 – 625)	5000
1000 – 2000 (625 – 1250)	5500
over 2000 (1250)	6250

1.4 SPARE PARTS

For any replacement, use **aprilia** Genuine Spare Parts only.

aprilia Genuine Spare Parts are high-quality parts, expressly designed and manufactured for **aprilia** vehicles.

⚠ CAUTION

Failure to use **aprilia Genuine Spare Parts may result in incorrect performance and damages.**

1.5 TECHNICAL SPECIFICATIONS

DIMENSIONS	
Max. length	2214 mm
Max. width	910 mm
Max. height (front part of the fairing included)	1253 mm
Seat height	815 mm
Distance between centres	1466 mm
Min. ground clearance	200 mm
Weight ready for starting (fuel and fluid included)	200 kg
ENGINE	
Model	655 EFI
Type	one-cylinder, 4-stroke with 5 valves, 2 camshafts at the head
Number of cylinders	1
Total displacement	652 cm ³
Max. rated power (to driving shaft)	34 kW at 6750 rpm
Max. torque	56 Nm (9.3 kgm) at 5550 rpm
Bore/stroke	100 mm/83 mm
Compression ratio	9 ± 0.5: 1
Camshaft during intake stroke	225°, with valve clearance 1 mm
Camshaft during exhaust stroke	234°, with valve clearance 1 mm
Valve advance (with valve clearance 1mm)	5° before TDC 40° after BDC 47° before TDC 7° after BDC
stroke opening during intake	
stroke closing during intake	
stroke opening during exhaust	
stroke closing during exhaust	
Valve clearance during intake stroke	0.10 – 0.19 mm
Centre inlet valve clearance:	0.07 – 0.10 mm measured between roller and camshaft
Valve clearance during exhaust stroke	0.10 – 0.19 mm
# Engine revolutions at minimum rpm	1350 ± 100 rpm
Ignition	SAGEM - inductive ignition system
Starting	electric
Spark advance	At start: 10° before TDC, additional advance depending on specific consumption levels
Starter motor gear ratio	$i = 49/9 * 30/11 * 64/30 = 31.677$
Clutch	multidisc in oil bath - # 7 steel discs; thickness 1.5 mm - # 7 friction discs; thickness 3.5 mm
Transmission	Mechanical, 5 gears with foot control on the left side of the engine
Lubrication system	dry pan with separate oil tank
Air cleaner	with dry filter cartridge
Cooling	liquid-cooled
Thermal expansion valve opening start temperature	60 °C
Engine dry weight	~ 49 kg

Follow ►

Follow ►

CAPACITY					
Fuel (reserve included)	21 ℓ				
Fuel reserve	5 ℓ				
Engine oil	oil change 2150 cm ³ - oil and oil filter change 2200 cm ³				
Fork oil (per rod)	570 cm ³				
Coolant	1.4 ℓ (50% water + 50% antifreeze with ethylene glycol)				
Seats	2				
Vehicle max. load (driver + passenger + luggage)	180 kg				
DRIVE					
GEAR RATIOS	Ratio	Primary	Secondary	Final ratio	Total ratio
	1 ^a	37/72 = 1: 1.946	12/33 = 1: 2.750	16/46 = 1: 2.875	15.385
	2 ^a		16/28 = 1: 1.750		9.791
	3 ^a		16/21 = 1: 1.312		7.34
	4 ^a		22/23 = 1: 1.045		5.846
	5 ^a		24/21 = 1: 0.875		4.895
# sprocket teeth	16				
Drive chain	Endless type (with no connection link) with sealed links, model 525, dimensions 5/8" x 5/16"				
FUEL SUPPLY SYSTEM					
Type	electronic injection				
Choke	Ø 34 mm				
FUEL SUPPLY					
Type	indirect injection (MULTIPOINT)				
Fuel	Unleaded petrol according to the DIN 51 607 standard, min. O.N. 95 (N.O.R.M.) and 85 (N.O.M.M.)				
FRAME					
Type	composite structure in steel and light alloy, with removable cradle and saddle pillar				
Steering inclination angle	28°				
Fore stroke	109 mm				
SUSPENSIONS					
Front	telescopic adjustable fork with hydraulic operation, rod Ø 45 mm				
Stroke	170 mm				
Rear	oscillating rear fork with differentiated profile arms and hydraulic adjustable mono-shock absorber				
Wheel stroke	165 mm				
BRAKES					
Front	disc brake – Ø 300 mm – with hydraulic transmission				
Rear	disc brake – Ø 240 mm – with hydraulic transmission				
WHEEL RIMS					
Type	light alloy with spokes				
Front	2.50 x 19"				
Rear	3.00 x 17"				

Follow ►

Follow ►

TYRES	
FRONT	100/90 – 19 57 H
alternative	100/90 – R19 57 H; 100/90 – 19 57 S; 100/90 – 19 57 T
Inflation pressure - solo rider	
off-road driving	190 kPa (1.9 bar)
asphalted road	190 kPa (1.9 bar)
Inflation pressure rider with passenger	
off-road driving	190 kPa (1.9 bar)
asphalted road	190 kPa (1.9 bar)

REAR	130/80 – R17 65 H
alternative	140/70 – 17 66 H; 130/80 – 17 65 S; 130/80 – 17 65 T; 130/80 – 17 65 H
Inflation pressure - solo rider	
off-road driving	210 kPa (2.1 bar)
asphalted road	210 kPa (2.1 bar)
Inflation pressure rider with passenger	
off-road driving	210 kPa (2.1 bar)
asphalted road	230 kPa (2.3 bar)

SPARK PLUGS	
Standard	NGK R DR8EB
Spark plug gap	0.6 – 0.7 mm
Resistance	5 kΩ

ELECTRIC SYSTEM	
Battery	12 V – 12 Ah
Fuses	7.5 A – 15 A – 20 A
Generator (with permanent magnet)	12 V – 400 W

BULBS	
Low beam bulb/high beam	12 V – 55/60 W
High beam	12 V – 60 W
Front parking light	12 V – 3 W
Direction indicators	12 V – 10 W
Rear parking lights/Stoplight	12 V – 5/21 W
Number plate light	12 V – 3 W
Revolution counter	12 V – 2 W
Speedometer	12 V – 2 W
Coolant temperature indicator	12 V – 2 W

WARNING LIGHTS	
Neutral	12 V – 3 W
Direction indicators	12 V – 3 W
Fuel reserve	12 V – 3 W
High beam	12 V – 2 W
Engine oil pressure	12 V – 3 W
Red line	12 V – 3 W





1.6 LUBRICANT CHART





Engine oil (recommended):  SUPERBIKE 4, SAE 5W-40 or  Agip 4T FORMULA RACING, SAE 5W-40.

As an alternative to the recommended oil, it is possible to use high-quality oils with characteristics in compliance with or superior to the CCMC G-4, A.P.I. SG specifications.

Fork oil (recommended):  F.A. 5W or  F.A. 20 W fork oil;

an alternative  Agip FORK 5W or  Agip FORK 20W fork oil.

If you need an oil with intermediate characteristics in comparison with the  F.A. 5W and  F.A. 20 W or  Agip FORK 5W and  Agip FORK 20W, these can be mixed as indicated below:

SAE 10W =  F.A. 5W 67% of the volume, +  F.A. 20W 33% of the volume or
 Agip FORK 5W 67% of the volume +  Agip FORK 20W 33% of the volume.

SAE 15W =  F.A. 5W 33% of the volume, +  F.A. 20W 67% of the volume or
 Agip FORK 5W 33% of the volume +  Agip FORK 20W 67% of the volume.

Bearings and other lubrication points (recommended):  AUTOGREASE MP or  Agip GREASE 30.

As an alternative to the recommended product, use high-quality grease for rolling bearings, working temperature range -30 °C...+140 °C, dripping point 150 °C...230 °C, high protection against corrosion, good resistance to water and oxidation.

Protection of the battery poles: neutral grease or Vaseline.

Spray grease for chains (recommended):  CHAIN SPRAY or  Agip CHAIN LUBE.

WARNING

Use new brake fluid only.

Brake fluid (recommended):  F.F., DOT 5 (compatible with DOT 4) or  Agip BRAKE 5.1, DOT 5 (compatible with DOT 4).

WARNING

Use only antifreeze and anticorrosive without nitrite, ensuring protection at -35 °C at least.

Engine coolant (recommended):  ECOBLU -40 °C or  Agip COOL.

1.7 SPECIAL TOOLS OPT

In order to perform assembly, reassembly and settings correctly, special tools suitable for the task must be used. The use of special tools avoids the potential risk of damage as a result of inappropriate tools and/or improvised methods.

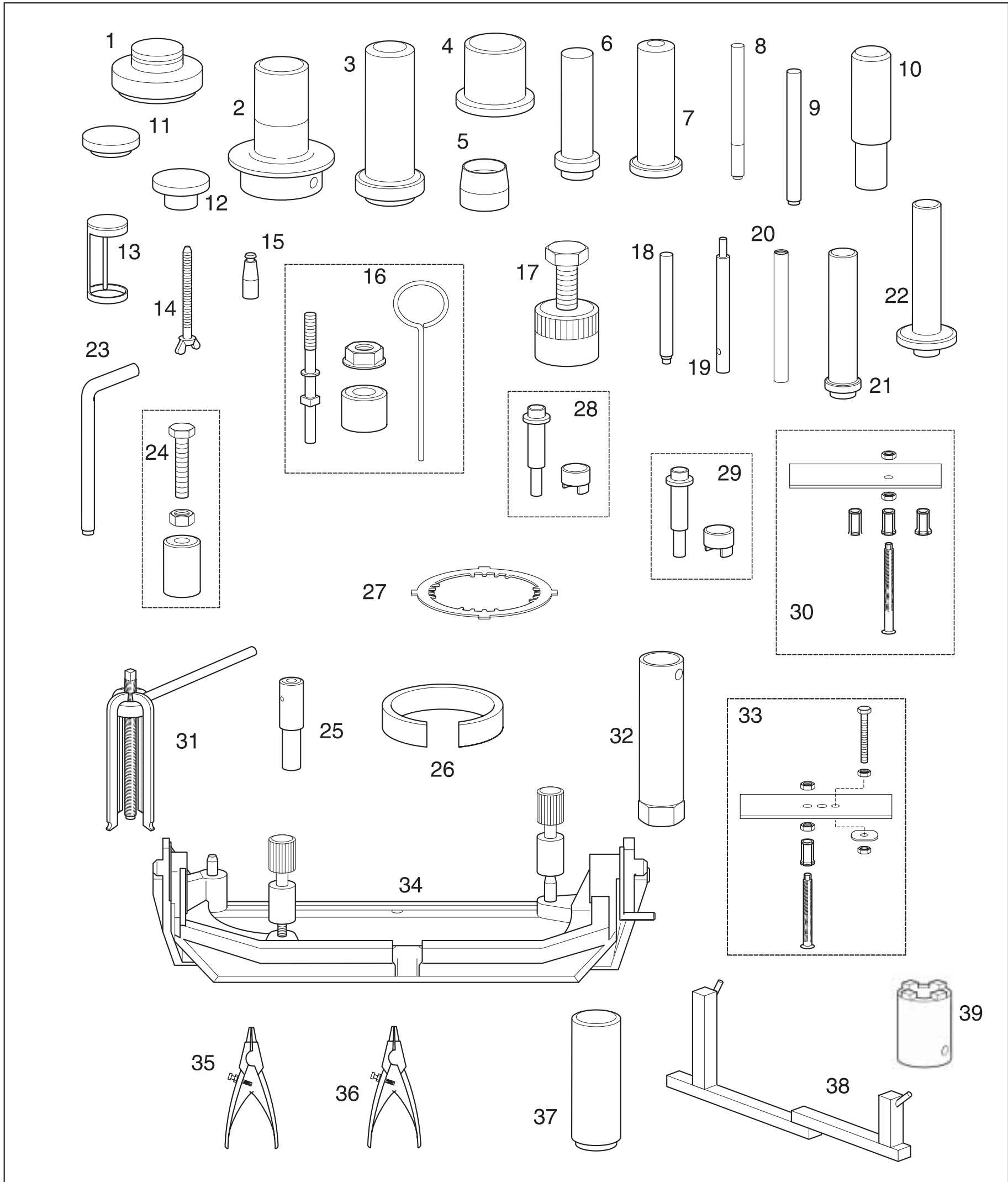
Below is a list of the special tools designed especially for this specific vehicle.

If necessary, request the special tools, see **aprilia** part# 8202278 **I F D E UK**.

⚠ CAUTION

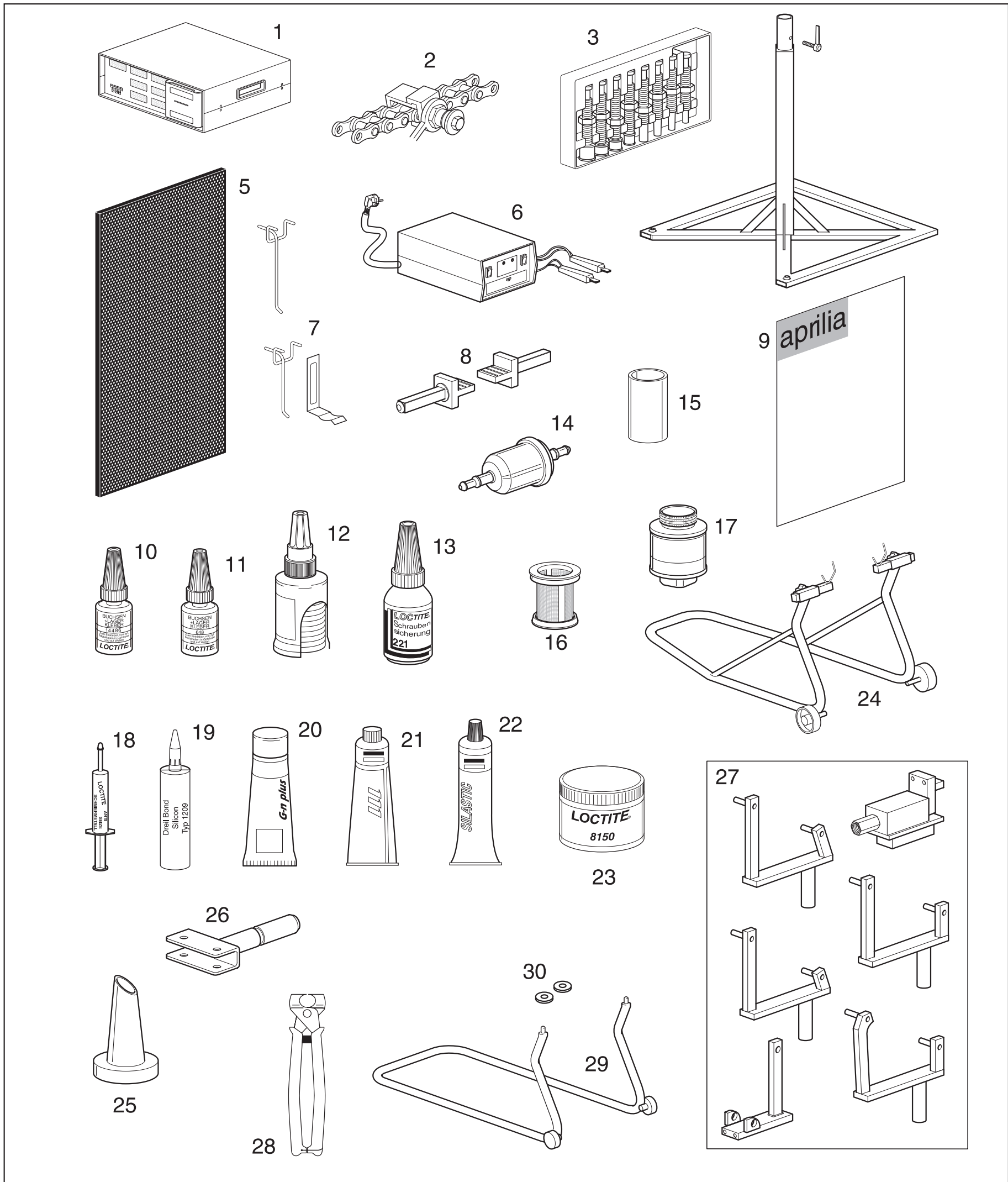
Before using the special tools, consult any documents attached.

1.7.1 SPECIFIC TOOLS



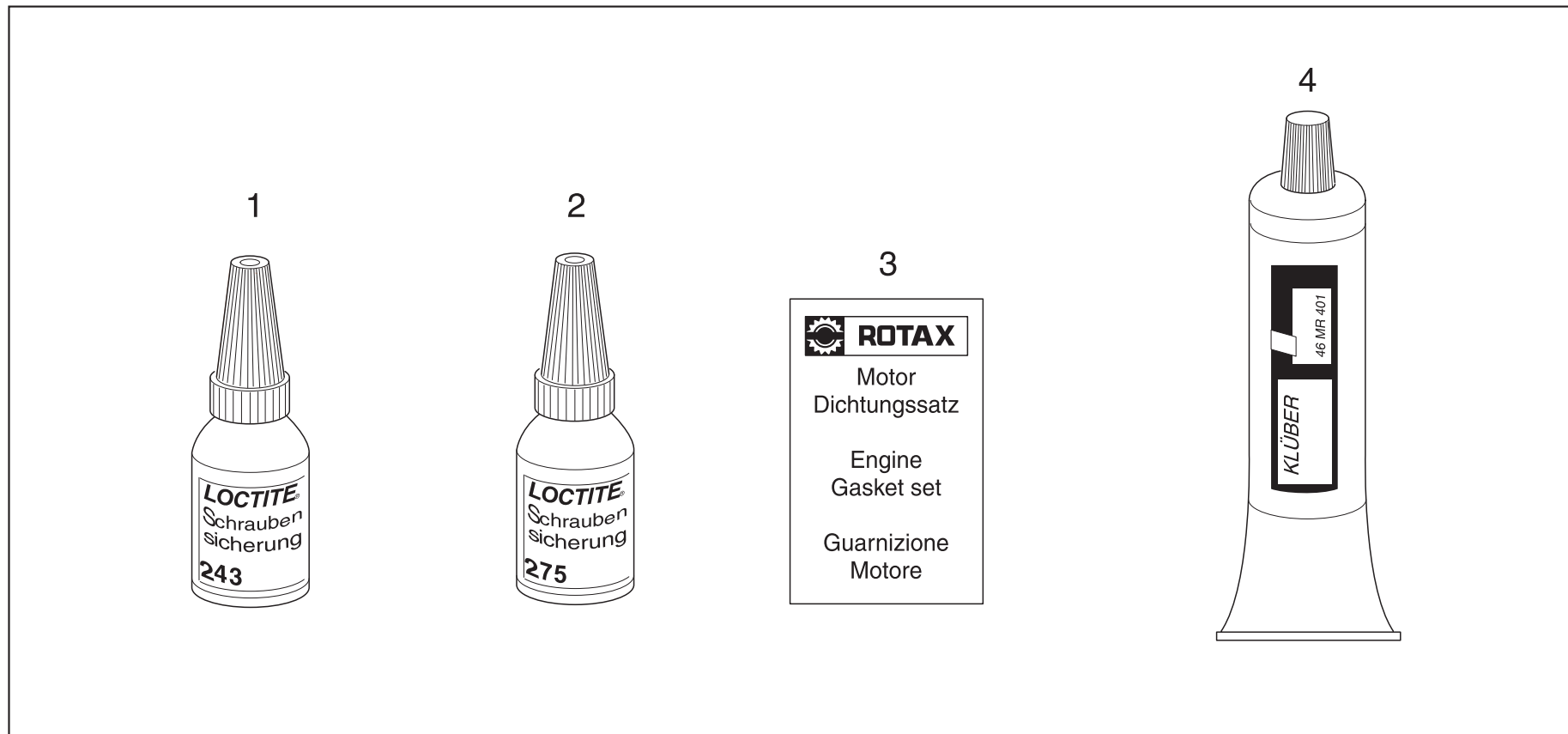
Pos.	aprilia part# (tool description)
1	0277520 (pad)
2	0277525 (pad)
3	0277861 (pad per retén de aceite)
4	0277304 [oil seal pad (secondary shaft)]
5	0277970 (secondary shaft guide bush)
6	0277222 [oil seal pad (countershaft)]
7	0276770 [oil seal pad (water pump shaft)]
8	0277235 [roller cage pad (disengaging shaft)]
9	0277230 [roller cage pad (disengaging shaft)]
10	0276307 (guide pad for piston pin)
11	0876557 (protection cap for drive shaft with bushes)
12	0877410 (protection cap for drive shaft with bearings - flywheel side)
13	0276477 (valve spring compression tool)
14	0240880 (threaded bolt to lock the drive shaft at the TDC.)
15	0277300 [oil seal bush (disengaging shaft)]
16	0277280 (extractor for clutch disengagement rod bearing)
17	0976235 (flywheel extractor)
18	0277090 [oil seal pad (revolution counter shaft)]
19	0277510 (valve guide pad)
20	0277210 (pad for valve guide oil seal)
21	0277850 [oil seal pad (countershaft)]
22	0277227 [oil seal pad (transmission selector shaft)]
23	0277270 (balance shaft split gear centering pin)
24	0277205 (extractor for idler gear pin)
25	0277302 [oil seal pad (disengaging shaft)]
26	0276357 (ring compressor)
27	0277881 (clutch blocking tool)
28	0277242 (pad with 22 mm piston pin snap ring assembly bush)
29	0277240 (pad with 24 mm piston pin snap ring assembly bush)
30	0277265 (extractor for balance shaft, gearbox input and output shaft)
31	0277180 (transmission sleeve puller)
32	0276280 (18 mm plug socket spanner)
33	0276360 + 0242206 + 0277260 + 0240520 (extractor for output shaft bearing)
34	0277919 (type 655 engine support unit)
35	0277290 (bearing engine gearbox snap ring assembly nippers)
36	0277292 (bush engine gearbox snap ring assembly nippers)
37	0277250 (tool for disassembly flywheel cover)
38	8140427 {engine support to be used with: aprilia part# 8140187 (engine support stand), aprilia part# 8140428 (engine support kit), aprilia part# 8104101 [clamp support, to be applied to: aprilia part# 8140428 (engine support kit) + aprilia part# 8140187 (engine support stand)]}
39	8101945 (rear fork pin metal ring spanner)


1.7.2 GENERIC TOOLS



Pos.	aprilia part# (tool description)
1	8140196 (exhaust fume analyser)
2	8140192 (chain disassembly/reassembly tool)
3	8140180 (Kit for bearings in the range Ø10 mm to Ø 30 mm)
4	8140187 (engine support stand)
5	8140199 (tool holder panel)
6	8124838 (battery charger M.F.)
7	8140426 (panel hooks)
8	8140204 (support pins)
9	8202222 (panel adhesive sheet)
10	0897431 (LOCTITE® 14486)
11	0899788 [LOCTITE® 648 green (5 g)]
12	0899784 (LOCTITE® 574 orange)
13	0899785 [LOCTITE® 221 violet (10 cm ³)]
14	8140398 [inlet screen filter, spare part: aprilia part# 8140196 (exhaust fume analyser)]
15	8140395 [tubular screen filter, spare part: aprilia part# 8140196 (exhaust fume analyser)]
16	8140396 [tubular screen filter, spare part: aprilia part# 8140196 (exhaust fume analyser)]
17	8140397 [oxygen sensor, spare part: aprilia part# 8140196 (exhaust fume analyser)]
18	0297431 (LOCTITE® Anti-Seize 76710)
19	0297900 [Gasket paste (310 ml)]
20	0297433 [MOLYKOTE® G-N (50 g)]
21	0897161 (MOLYKOTE® 111)
22	0297386 [SILASTIC® 732 RTV (100 g)]
23	8116067 (LOCTITE® 8150 for screws)
24	8705021 (rear support stand)
25	8140394 [tapered rubber sensor, spare part for: aprilia part# 8140196 (exhaust fume analyser)]
26	8104101 [clamp support, to be applied to: aprilia part# 8140428 (engine support kit) + aprilia part# 8140187 (engine support stand)]
27	8140428 (engine support kit)
28	0277295 (hose clamp installation pliers)
29	8146486 (front support stand)
30	8140590 (washers for front support stand)

1.7.3 TOOLS USED FOR OTHER VEHICLES



Pos.	aprilia part# (tool description)
1	0897651 [LOCTITE® 243 Blue (10 cm ³)]
2	0898011 (fluorescent green LOCTITE® 275)
3	0294762 (Gaskets-set)
4	0297616 [Paste Klueber (60 gr)]
5	0297434 (LOCTITE® 767 Anti-Seize 15378)
6	8116050 (engine oil)
7	xxxxxxx N.A. (LOCTITE® 572)
8	8116053 (grease  Bimol Grease 481)
9	8116038 (grease LUBERING ST)
10	xxxxxxx N.A. (AP-LUBE temporary lubricant)
11	xxxxxxx N.A. (DID CHAIN LUBE grease)
12	8116031 ("Biosolvent" frame detergent)
13	8116945 ("ACRILON 28" cyanoacrylic glue)
14	xxxxxxx N.A. (MOTUL MOTOWASH degreaser)
15	xxxxxxx N.A. (Alcohol)

1.8 POSITIONING THE VEHICLE ON THE SUPPORT STAND

1.8.1 POSITIONING THE VEHICLE ON THE REAR SUPPORT STAND **OPT**

NOTE Have the appropriate special tool **OPT** to hand:

- **aprilia** part# 8705021 (rear support stand);
- **aprilia** part# 8140204 (support pins).
- ◆ Loosen the knob (1).
- ◆ Withdraw the fork support (2) and extract it from the stand seat.
- ◆ Insert the support pin (3).
- ◆ Repeat the previous operations on the opposite side of the stand.
- ◆ Remove the two drive chain guards, see 7.1.29 (REMOVING THE DRIVE CHAIN GUARDS).
- ◆ Pull the front brake lever (4) thoroughly, and position a plastic clamp (6), interposing a small piece of cardboard (5), in such a way as to keep the front brake lever pulled.

⚠ WARNING

Raise the vehicle by means of the two rear fork arms only.

- ◆ Insert the stand from the rear side of the vehicle and position it so that the two support pins (3) rest on the lower part of the rear fork rods:
 - the right support (**Pos.A**);
 - the left support (**Pos.B**).
- ◆ Withdraw the support pins (3) and make them hit against the rear fork.
- ◆ Tighten the two knobs (1).
- ◆ Push the stand forward (7) until the support pin (3) rests, on the right side, against the rear fastening plate of the lower chain guard.

NOTE Have someone help you keep the vehicle in vertical position with the two wheels on the ground.

⚠ WARNING

Grasping the stand in another way than indicated in the figure may cause your fingers to be crushed between the stand and the ground.

- ◆ Grasp the terminal central part of the stand (7) (**Pos.C**).
- ◆ Push the stand (7) downwards until it reaches the end of its stroke (see figure).

1.8.2 POSITIONING THE VEHICLE ON THE FRONT SUPPORT STAND **OPT**

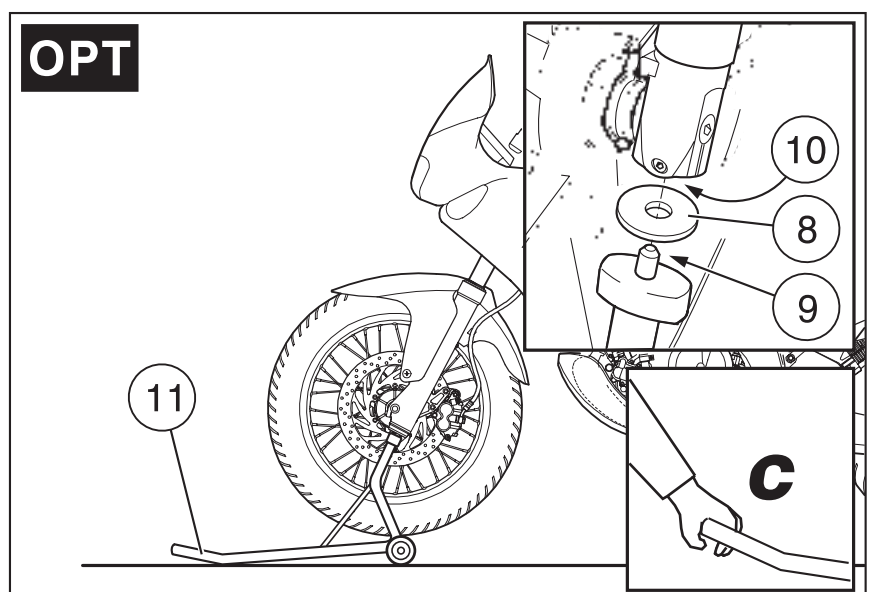
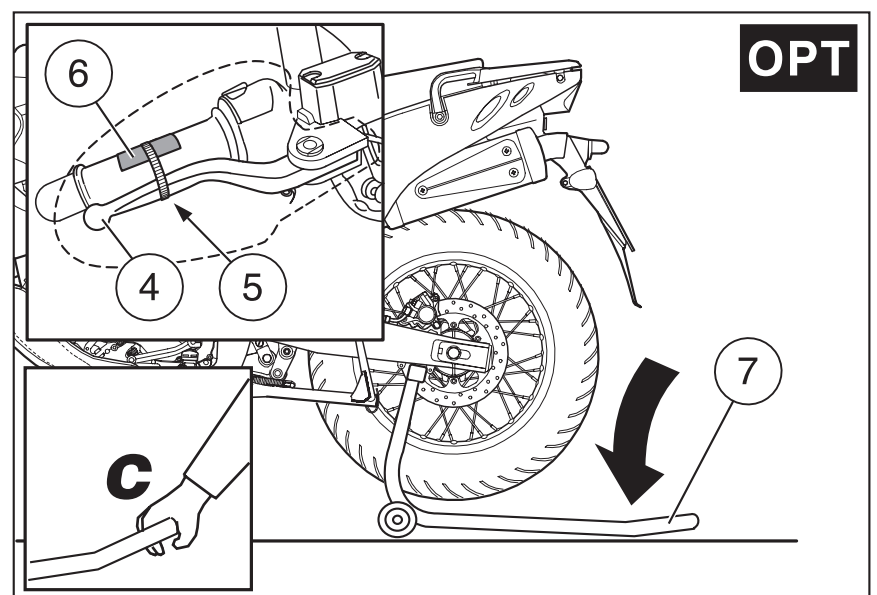
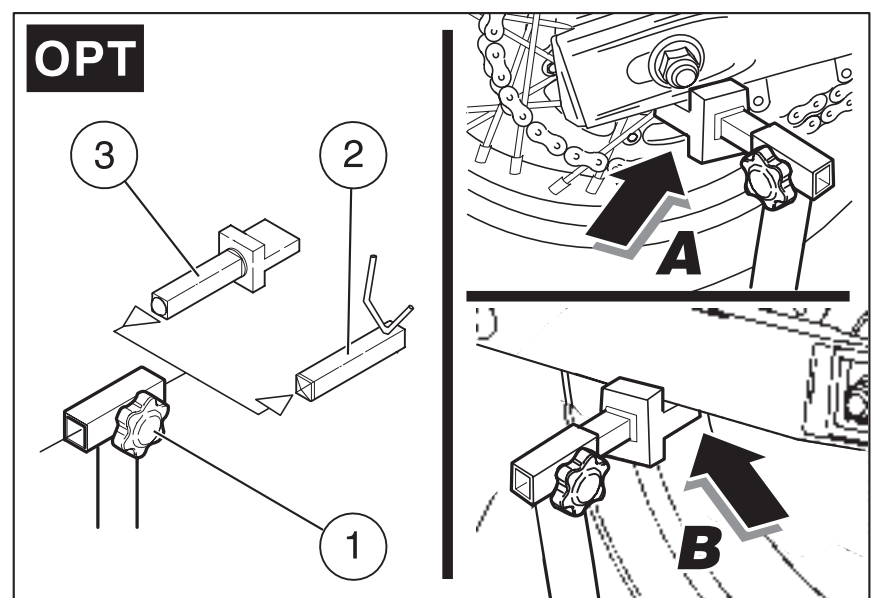
NOTE Have the appropriate special tool **OPT** to hand:

- **aprilia** part# 8146486 (front support stand);
- **aprilia** part# 8140590 (washers for front support stand).
- ◆ Position the vehicle on the appropriate rear support stand, see 1.8.1 (POSITIONING THE VEHICLE ON THE REAR SUPPORT STAND **OPT**).
- ◆ Position the two special washers (8) on the upper ends (9) of the stand.
- ◆ Insert the two ends of the stand (9) in the two holes (10) positioned on the lower ends of the front fork.

⚠ WARNING

Grasping the stand in another way than indicated in the figure may cause your fingers to be crushed between the stand and the ground.

- ◆ Grasp the terminal central part of the stand (11) (**Pos.C**).











- ◆ Push the stand (11) downwards until it reaches the end of its stroke.

1.9 CONSUMABLES

Only use the products given below for any maintenance work.

The materials mentioned have been tested for many years and are suitable for all the application conditions indicated by the manufacturer.

1.9.1 PRODUCT PROPERTIES

aprilia part# (product)	Use and properties
<p>aprilia part# 0897651 [LOCTITE® 243 Blue (10 cm³)]</p> 	<p>Adhesive in paste for screws and nuts up to M36 and for couplings with medium hold. It can be used on parts which have not been completely degreased. The hardening time depends on the temperature and the material (maximum one hour). Resistance to temperatures in the range – 55 to 150 °C (– 99 to 302 °F).</p>
<p>aprilia part# 0898011 (fluorescent green LOCTITE® 275)</p> 	<p>It prevents the loosening of the threaded components and the fluid leakages due to vibrations. It must be used on clean, degreased and non-oxidized components. Apply a quantity sufficient to cover all the threaded part.</p>
<p>aprilia part# 0899788 [LOCTITE® 648 green (5 g)]</p> 	<p>Paste for strong fastening of screws. The hardening time depends on the temperature and the material (maximum twelve hours). Resistance to temperatures in the range -55 to 175 °C (– 99 to 347 °F). In order to release the part glued, it may be necessary to heat the coupled parts to a temperature of 250 °C (482 °F).</p>
<p>aprilia part# 0899784 (LOCTITE® 574 orange)</p> 	<p>Solvent-free seal in paste, to be used instead of seals where there is a high friction factor and where a precise distance is required between the two components. Applied in its liquid state, it hardens after assembly on contact with the metal within a few hours. A seal is created whose surface structure adapts to the surfaces to be sealed. Resistance to temperatures in the range – 55 to 200 °C (– 99 to 392 °F); where applied, it seals the surfaces against corrosion.</p>
<p>aprilia part# 8116067 (LOCTITE® 8150 for screws)</p> 	<p>Paste to be used on components subjected to high temperature.</p>
<p>aprilia part# 0297434 (LOCTITE® 767 Anti-Seize 15378)</p> 	<p>Lubricant and anticorrosion resistant to high temperatures. It must be sprayed on both components and makes sure the sliding surfaces remain maintenance free for a long time. It prevents corrosion.</p>
<p>aprilia part# 0297433 [MOLYKOTE® G-N (50 g)]</p> 	<p>Lubricating paste to be used on support points subjected to heavy loads, for standard lubrication and on couplings under pressure, in order to prevent corrosion which would prevent subsequent disassembly. To apply on the two surfaces.</p>
<p>aprilia part# 0297386 [SILASTIC® 732 RTV (100 g)]</p> 	<p>It is used as a sealant, preventing water from getting inside the flywheel cover.</p>

1.10 FASTENING ELEMENTS

1.10.1 JOINTS WITH HOSE CLAMPS AND SCREW CLAMPS

Carefully read 1.2 (INSTRUCTIONS FOR USE OF FUEL, LUBRICANTS, COOLANT AND OTHER COMPONENTS).

⚠ CAUTION

Remove **ONLY** the clamps indicated in the maintenance procedures.

This text is not to be intended as an authorization to arbitrarily remove the clamps present on the vehicle.

⚠ WARNING

Before removing a clamp, make sure that the removal does not involve any fluid leakage; if so, provide for preventing such leakages and protect the components positioned near the joint.

HOSE CLAMPS

For the removal it is sufficient to use simple pliers, while for the installation it is necessary to use a special tool (see below).

Before removing a clamp, prepare the material necessary for the correct reassembly.

NOTE Have the appropriate special tool **OPT** to hand:
– **aprilia** part# 0277295 (hose clamp installation pliers).

⚠ CAUTION

Upon installation, replace the hose clamp that has been removed with a new one having the same dimensions, see 0.4.2 (SPARE PARTS CATALOGUES).

Do not attempt to reinstall the removed hose clamp, since it is unusable.

Do not replace the removed hose clamp with a screw clamp or with other types of clamp.

⚠ CAUTION

Proceed with care, in order not to damage the joint components.

◆ Work with the pliers on the head of the hose clamp, forcing until you release it.

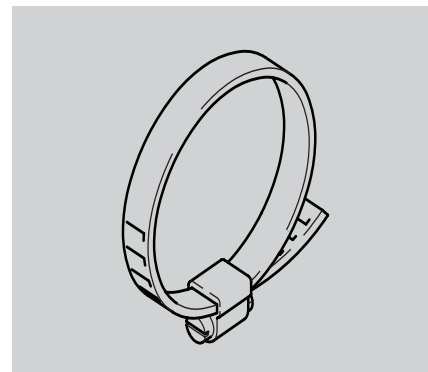
SCREW CLAMPS

For the removal and installation it is sufficient to use a simple screwdriver.

⚠ CAUTION

Check the conditions of the screw clamp and if necessary replace it with a new one of the same type and dimensions, see 0.4.2 (SPARE PARTS CATALOGUES).

When fastening the clamp, make sure that the joint is sufficiently stable.



1.10.2 GENERAL SPECIFICATIONS OF THE DRIVING TORQUES

The following table indicates the standard driving torques for screws and bolts with metric ISO thread.

Screw or bolt thread	Spanner	Driving torque	
		Nm	kgm
M 6	10	6	0.6
M 8	12	15	1.5
M 10	14	30	3.0
M 12	17	55	5.5
M 14	19	85	8.5
M 16	22	130	13.0

For specific joints or couplings of the vehicle, see 1.10.3 (DRIVING TORQUES).

If not specified otherwise, the indicated driving torques are valid for clean and dry threads, at room temperature.

NOTE In order to avoid any deformation and/or imperfect coupling, tighten the screws or bolts by proceeding as described below:

- ◆ Manually screw all the fastening elements.
- ◆ Applying half the prescribed driving torque, tighten the elements that are diametrically opposite each other: (A) and (B); (C) and (D).
- ◆ Repeat the previous operation by applying the prescribed driving torque.

NOTE In this way the pressure exerted by the fastening elements will be uniformly distributed on the joint surface.

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Nut, bolt, screw tightening.

CAUTION

The fastening elements featured in the table must be torqued to specification using a torque spanner and LOCTITE® applied, where indicated.

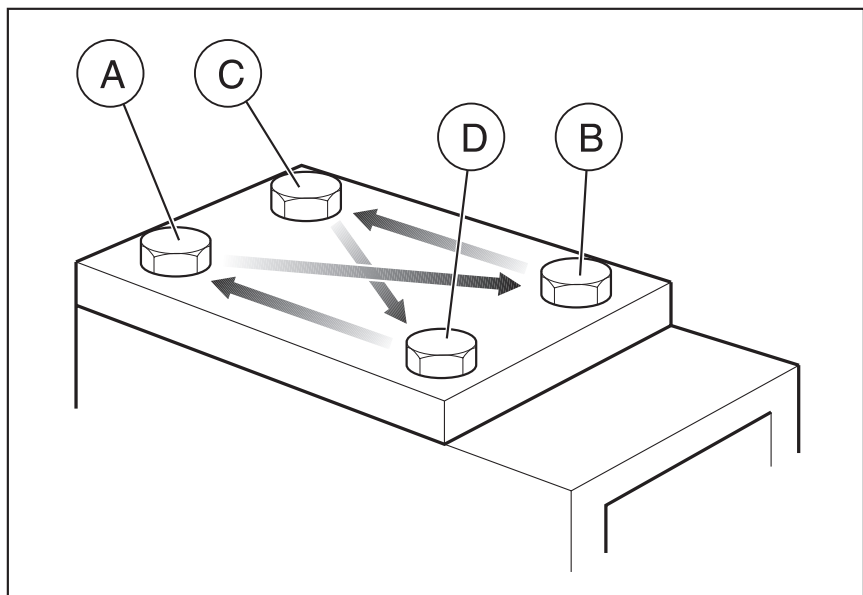
1.10.3 DRIVING TORQUES

NOTE

- L243 = fasten with LOCTITE® 243
- L572 = fasten with LOCTITE® 572
- L8150 = fasten with LOCTITE® 8150
- man. = fasten by hand

Steel/aluminium fastening screws with similar coefficient of elasticity

SCREW	Nm	kgm
M4	3	0.3
M5	6	0.6
M6	10	1.0
M8	25	2.5
M10	50	5.0
M12	86	8.6



FRAME					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Plates/triangle frame fastening	2	M10x100	70	7.0	
Inner shock absorber support to side plates	2	M10X45	70	7.0	
Triangle frame/cradle	2	M10X65	50	5.0	
Shock absorber support inner screws to side plates	2	M8X20	25	2.5	
Right and left engine upper coupling plate	2	M8X65	25	2.5	
Fuel tank rear support	1	M8X12	25	2.5	
Oil drain plug	1	M8X12	20	2.0	
Fairing support frame	2	M6X30	12	1.2	
Idling speed adjustment cable support guide	1	M6X12	10	1.0	
Connecting element support to right and left side plates	3	M10X55	80	8.0	
Fastening of engine to frame	1	M10X65	50	5.0	
Engine rear lower support	1	M10X115	50	5.0	
Connecting rod on support	1	M10X75	50	5.0	
Cradle/triangle frame	2	M10X65	50	5.0	
Saddle support	4	M8X20	25	2.5	
Chain slide roller	1	M8X50	20	2.0	
Connector plate to fairing support frame	1	M5X16	20	2.0	
Triangle frame guard	1	M5X12	20	2.0	

FOOTRESTS					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Left front screw that fastens footboard to engine cradle	1	M10	50	5.0	
Engine cradle lower fastening	2	M10	50	5.0	
Footrests on support	2	M10X40	80	8.0	
Footboard support to saddle pillar	4	M8X25	25	2.5	

STAND					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Stand screw	1	M10	10	1.0	
Stand nut	1	M10X1.25	30	3.0	
Rotary switch	1	M6X20	7	0.7	

FORK					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Linkage	1	M12X108	100	10.0	
Ring nut	1	M17X1	35	3.5	
Chain tightener	2	M8X70	10	1.0	
Single connection elements	1	M10X38	50	5.0	
Single connection elements	1	M10X47	50	5.0	
Shock absorber guard	2	M4.8X19	20	2.0	
Rear fork pin	1	-	100	10.0	

FRONT SUSPENSION					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Stiffening plate	4	M6X20	12	1.2	
Handlebar on plate	4	M8X30	25	2.5	
Steering head	1	Flanged nut	100	10.0	
Water guard	3	M6x16	10	1.0	
Steering metal ring	1	-	7	0.7	

REAR SUSPENSION					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Shock absorber upper support	1	M10X60	35	3.5	
Shock absorber lower support	1	M10X47	35	3.5	
Inlet manifold	4	M6X20	1.2	0.12	
Cradle/engine	1	M10X110	50	5.0	

ENGINE					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Inlet manifold	4	M6X20	12	1.2	
Cradle/engine	1	M10X110	50	5.0	
Cradle/engine	1	M10X95	50	5.0	
Pick up cover	2	M6X12	12	1.2	
Gear lever	1	M6X20	10	1.0	
Cylinder cover	2	M6X25	8	0.8	
Oil sump guard	4	M6X16	6	0.6	
Pinion cover	3	M6X25	5	0.5	

AIR FILTER CASING					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Breather pipe clamps	2	3.9x14	3	0.3	
Fastening air filter casing	2	M6x30	6	0.6	
Filter case to lower saddle pillar	1	M6x12	7	0.7	
Air temperature sensor	1	–	3	0.3	

EXHAUST SYSTEM					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Exhaust pipes	4	M8	25	2.5	
Left silencer	2	M8X16	25	2.5	
Left silencer	1	M8X20	25	2.5	
Right silencer	2	M8X16	25	2.5	
Right silencer	1	M8X20	25	2.5	
Silencer guards	6	M6X16	8	0.8	
Silencer/exhaust pipe clamps	3	–	12	1.2	

RADIATOR					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Lower fastening radiator	2	M6X12	12	1.2	
Cable guide	2	M6X30	12	1.2	
Expansion tank	2	M6X16	7	0.7	
Fairing air intake	2	M5X16	2	0.2	
Electrofan on radiator	3	M6X16	5	0.5	
Thermal switch on radiator	1	–	30	3.0	

FRONT WHEEL					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Wheel pin	1	–	80	8.0	
Pin block to hub	2	M6X14	12	1.2	

Follow ►

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REAR WHEEL					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Wheel pin	1	M16X1.5	100	10.0	
Sprocket on sprocket holder	6	-	-	-	

FRONT BRAKE					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Brake caliper	2	M10X35	50	5.0	

REAR BRAKE					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Brake pump	2	M6X35	10	1.0	
Brake lever ball joint	1	M6	10	1.0	
Brake lever	1	M8X80	25	2.5	
	1	M8	15	1.5	
Oil tank	1	M6X12	3	0.3	

HANDLEBAR AND CONTROLS					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Switch	1	M8X16	25	2.5	

ELECTRIC SYSTEM					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Starter relay wiring	2	M6	4	0.4	
Horn support	1	M8X20	12	1.2	
Voltage regulator	2	M6X20	8	0.8	
Central unit to glove compartment	1	M5X25	3	0.3	
Direction indicators to front transparent part of the fairing	2	3.9X14	1.5	0.15	
Headlight on fairing	2	M4.2X20	2	0.2	
	2	M5X20	2	0.2	
Battery clamping bracket	1	M5X20	3	0.3	

LIGHTS/DASHBOARD					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Fastening to fairing support frame	3	M6	4	0.4	

FUEL TANK					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Fuel tank support rubber element to triangle frame	2	M8X12	25	2.5	
Fuel tank on support	1	M8X40	15	1.5	
Petrol pump flange to tank	10	M5X16	5	0.5	
Breather pipe unions	2	M5	4	0.4	

SADDLE					
Description	Q.ty	Screw/nut	Nm	kgm	Note
-	-	-	-	-	

Follow ►

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FAIRING					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Front fairing to tank	3	M6X16	25	2.5	
	2	M5X12	25	2.5	
	1	M5X9 on clip	25	2.5	
	2	M5X16 on clip	25	2.5	
Front transparent part of the fairing to dashboard fairing	2	M5X16 on rubber element	1.5	0.15	
Front transparent part of the fairing	2	M5X16 on rubber element	1.5	0.15	
Odometer cable guide to front fairing	1	M5X16	1	0.1	
Dashboard fairing to fuel tank	2	M5X9	25	2.5	
Dashboard fairing to fairing support frame	1	M5X12	25	2.5	

SIDES					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Sides	8	M5X12	3	0.3	

CONVEYORS					
Description	Q.ty	Screw/nut	Nm	kgm	Note
-	-	-	-	-	

LUGGAGE RACK					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Luggage rack on saddle support	2	M8X20	12	1.2	
Luggage rack on saddle support	1	M8X16	12	1.2	

SECURING LOCKS					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Fastening of saddle support	2	M6X30	10	1.0	
Cap to tank	3	M5X30	5	0.5	
Cap to tank	4	M5X1	5	0.5	

FRONT MUDGUARD					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Mudguard fastening	2	M5X12	7	0.7	
Mudguard lower fastening	2	M5X20	5	0.5	
Grommet fastening	1	M5X16	1	0.1	

REAR MUDGUARD					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Glove compartment to saddle pillar	1	M6X20	7	0.7	
	2	M6X25	7	0.7	
Glove compartment to filter case	2	M6X16	3	0.3	
	2	M6	3	0.3	
Number plate-holder to saddle pillar	2	M5X20	2	0.2	
Number plate-holder to glove compartment	2	M6X16	8	0.8	

CHAIN					
Description	Q.ty	Screw/nut	Nm	kgm	Note
Chain guide shoe	2	M4.8X13	5	0.5	
Casing chain case	1	M6X12	3	0.3	
Lower chain case to rear fork	2	M6X16	3	0.3	

Follow ►

1.11 INSTRUCTIONS FOR APPLYING TRANSFERS

When removing parts of the frame:

⚠ CAUTION

Handle the plastic and painted components with care to avoid scraping or damaging them.
Proceed with care.
Do not damage the tangs and/or their seats.

When applying the transfers, follow the instructions given below carefully.

It is advisable to use the following tools:

- relatively stiff spatula (1);

NOTE Generally, soft, squeegee-type spatulas do not remove enough water from under the transfer.

- sponge or sprayer (2) with water.

NOTE Add detergent to the water (1-3%) and shake until you get soap bubbles.

Apply as follows:

- ◆ Place the transfer (3) upside down on a work surface.
- ◆ Keeping the transfer spread out on the work surface, remove the protective backing (4) completely.

NOTE It is advisable to use a sprayer (2).

When using a sponge, dab the surface with the sponge, without pressing hard so as to avoid damaging the adhesive.

- ◆ Wet the surface of the adhesive with soapy water.
- ◆ Apply the transfer (3) on the surface to be decorated and move it into the right position.

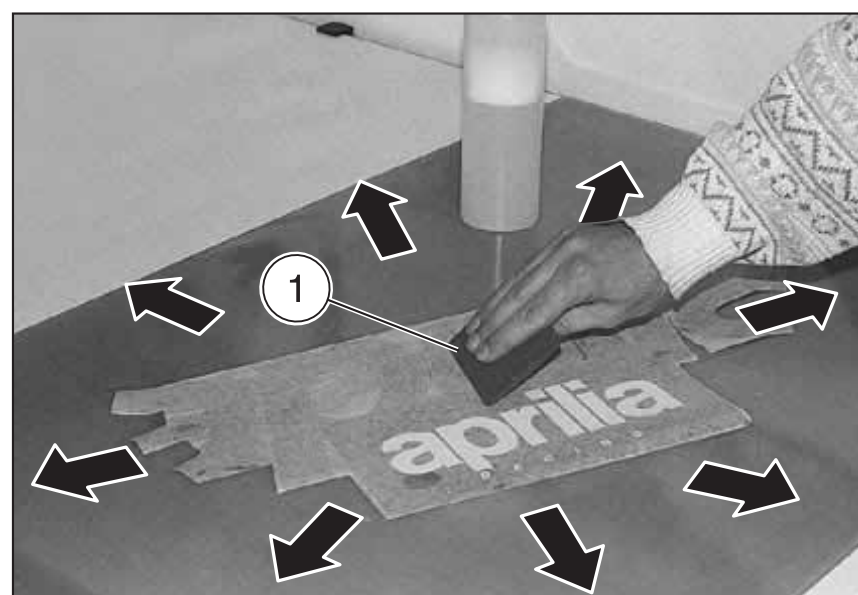
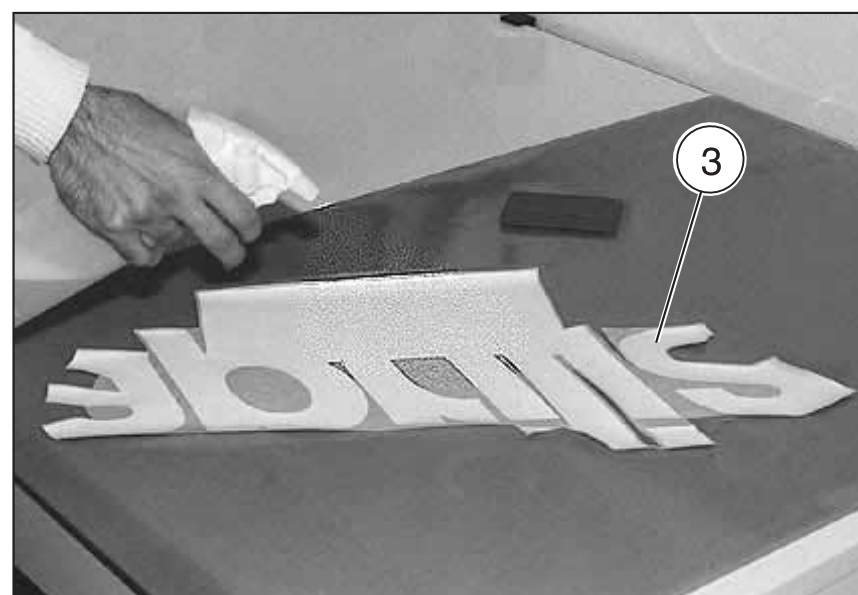
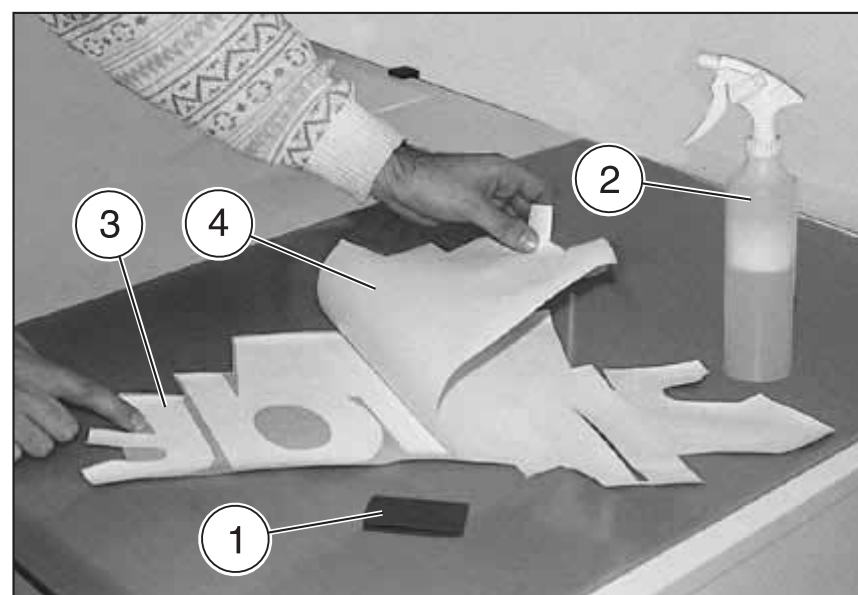
NOTE Always move the spatula in constant strokes from the centre of the transfer out.

- ◆ Using the spatula (1), press down reasonably hard and move the spatula across the surface of the transfer until the excess soap and water has been removed from underneath.

NOTE Do not lift the corners and/or sides of the transfer.

- ◆ Use an absorbent cloth and, working from the centre out, dry the transfer.
- ◆ Move the spatula over the transfer again with firm, even strokes, pressing down as hard as possible. Move the spatula in strokes from the centre out, taking special care with the corners and sides to make sure the whole surface sticks evenly.

Follow ►



Follow ►

NOTE Where the transfer features application tape (5)*, the tape must be removed 20-30 minutes after the application of the transfer.

* The application tape is used to facilitate the application of trademarks and letters, arranging them in the correct place on the surface to be decorated, and to give the self-adhesive more body during application.

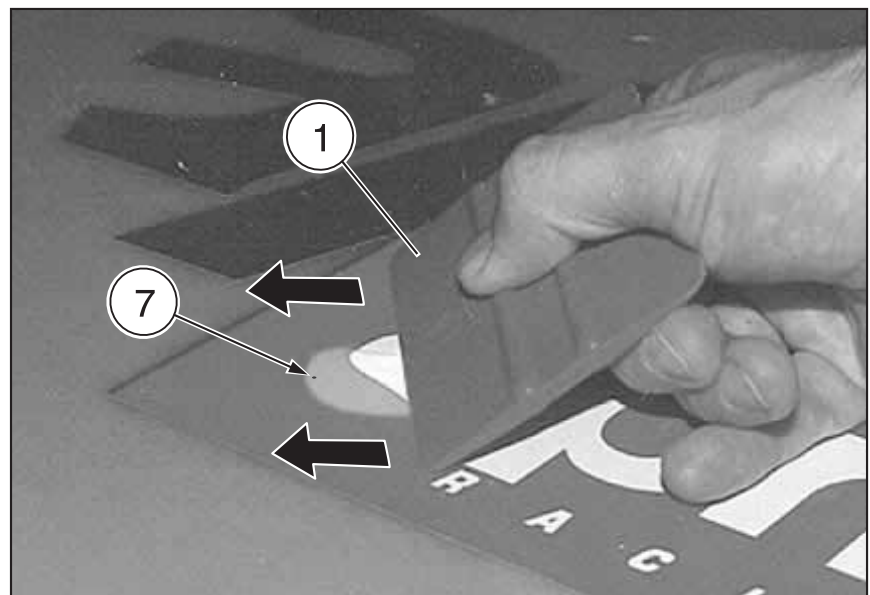
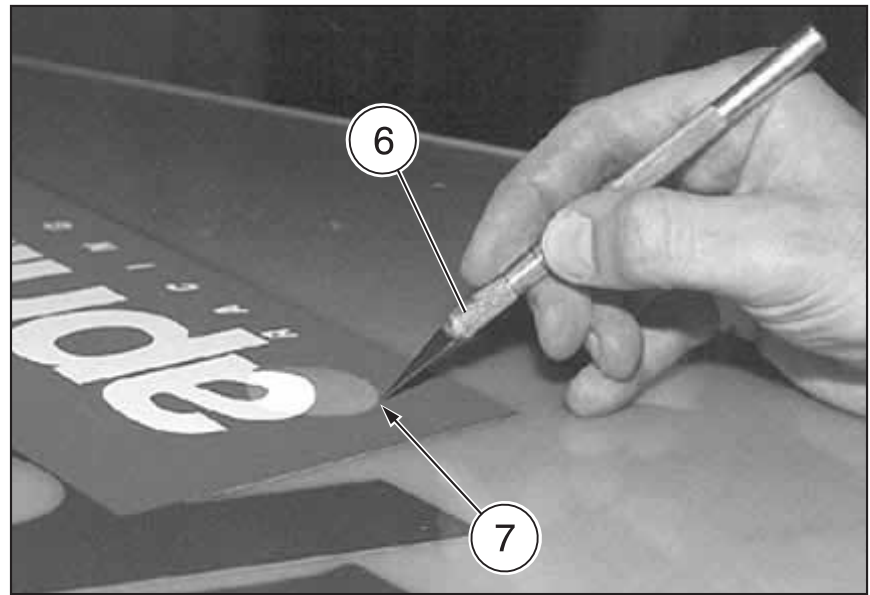
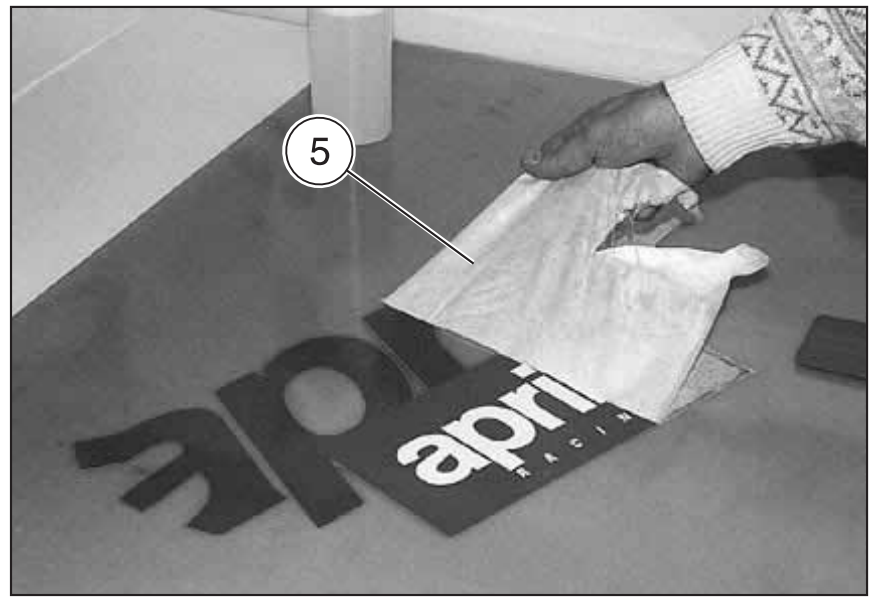
- ◆ Remove the application tape (5) from the surface of the transfer.
- ◆ In order to assure good adhesion, move the spatula over the transfer again, concentrating in particular on the edges and corners.

NOTE With the wet method, the final level of the transfer is reached approx. 48 hours after application.

- ◆ Once the application tape has been removed, make sure there are no air bubbles anywhere on the surface.

In the event air bubbles are encountered:

- ◆ Use a pin or paper cutter (6) to make a hole in the edge (7) of the air bubble.
- ◆ Using the spatula (1), work from the edge opposite the hole and push the bubble so the air escapes.



NOTE

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SERVICE AND SETTING UP

2

SERVICE AND SETTING UP

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2.0 INTRODUCTION

This section describes the procedures for periodic service on the principal components of the vehicle.

⚠ WARNING

Before beginning any maintenance operation or any inspection of the vehicle, stop the engine, extract the key from the ignition block, wait until the engine and the exhaust system have cooled down and if possible lift the vehicle by means of the proper equipment, on firm and flat ground.

Before proceeding, make sure that the room in which you are working is properly ventilated.

Keep away from the red-hot parts of the engine and of the exhaust system, in order to avoid burns.

If not expressly indicated otherwise, for the reassembly of the units repeat the disassembly operations in reverse order.

In case any maintenance operation should be required, it is advisable to use latex gloves.



2.1 PERIODIC SERVICE PLAN

aprilia recommends respecting the intervals indicated for the periodic service on the various components in order to ensure the best operating conditions of the vehicle, see 2.1.1 (REGULAR SERVICE INTERVALS CHART).

2.1.1 REGULAR SERVICE INTERVALS CHART

OPERATIONS TO BE CARRIED OUT BY THE **aprilia** Official Dealer (WHICH CAN BE CARRIED OUT EVEN BY THE USER).

KEY

- ① = check and clean, adjust, lubricate or change, if necessary;
- ② = clean;
- ③ = change;
- ④ = adjust.

NOTE Carry out the maintenance operations halving the intervals indicated, if the vehicle is used in rainy or dusty areas or on uneven surfaces.

(*) = Check every two weeks or according to the intervals indicated.

(**) = **OPT** (provided as standard equipment in the countries where required)

Component	After running-in [1000 km (625 mi)]	Every 6000 km (3750 mi) or 12 months	Every 12000 km (7500 mi) or 24 months
Battery – electrolyte level	①	①	–
Spark plug	–	①	③
Air cleaner	–	①	③
Engine oil filter	③	③	–
Engine oil filter (on oil tank)	②	–	②
Fork	①	–	①
Light operation/direction	–	①	–
Light system	①	①	–
Safety switches			
Brake fluid	–	①	–
Coolant	–	–	①
Engine oil	③	③ (*)	–
Side bag coupling pins (**)	–	①	–
Tyres	every 1000 km (625 mi): ①		
Tyre pressure (*)	every 1000 km (625 mi): ④		
Engine idling rpm	④	④	–
Securing locks for the side bags and the rear case (**)	–	①	–
Diagnostic warning light	at every start: ①		
Engine oil pressure Warning light	at every start: ①		
Flexible couplings	on each replacement of the final drive unit: ③		
Drive chain tension and lubrication	every 500 km (375 mi): ①		
Brake pad wear	①	before every trip and every 2000 km (1250 mi): ①	
Flexible coupling wear and flexible coupling unit slack	–	–	①

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OPERATIONS TO BE CARRIED OUT BY THE aprilia Official Dealer.

KEY

- ① = check and clean, adjust, lubricate or change, if necessary;
- ② = clean;
- ③ = change;
- ④ = adjust.

NOTE Carry out the maintenance operations halving the intervals indicated, if the vehicle is used in rainy or dusty areas or on uneven surfaces.

(*) = Check every two weeks or according to the intervals indicated.

(**) = **OPT** (provided as standard equipment in the countries where required)

Component	After running-in [1000 km (625 mi)]	Every 6000 km (3750 mi) or 12 months	Every 12000 km (7500 mi) or 24 months
Rear shock absorber	–	–	①
Carburation, CO adjustment	①	①	–
Timing chain	–	①	–
Transmission cables and controls	①	①	–
Wheel centering	–	①	–
Rear suspension linkage bearings	–	–	①
Steering bearings and steering clearance	①	①	–
Wheel bearings	–	①	–
Brake discs	①	①	–
Fuel pump filter	every 15000 km (9375 mi): ①		
General running of the vehicle	①	①	–
Clutch clearance	④	④	–
Adjusting the valve clearance	④	–	④
Braking systems	①	①	–
Cooling system	–	①	–
Brake fluid	every 2 years: ③		
Coolant			
Fork oil	every 12000 km (7500 mi): ③		
Fork oil seals	after the first 30000 km (18750 mi) and successively every 22500 km (14000 mi): ③		
Brake pads	if worn: ③		
Wheel/Tyres	①	①	–
Nut, bolt, screw tightening	①	①	–
Suspensions and attitude	①	–	①
Spoke tension	①	①	–
Final transmission (chain, crown and pinion)	–	①	–
Fuel pipes	–	①	every 4 years: ③
Clutch wear	–	①	–

2.2 POINTS REQUIRING LUBRICATION

Correct lubrication is important for good performance and the long life of the vehicle.

NOTE Before lubricating, completely clean all parts, removing rust, grease, dirt and dust.

NOTE The exposed parts subject to rust are to be lubricated with motor oil or grease, see 1.6 (LUBRICANT CHART).

The points to be lubricated are indicated in the "LUBRICATION CHART".

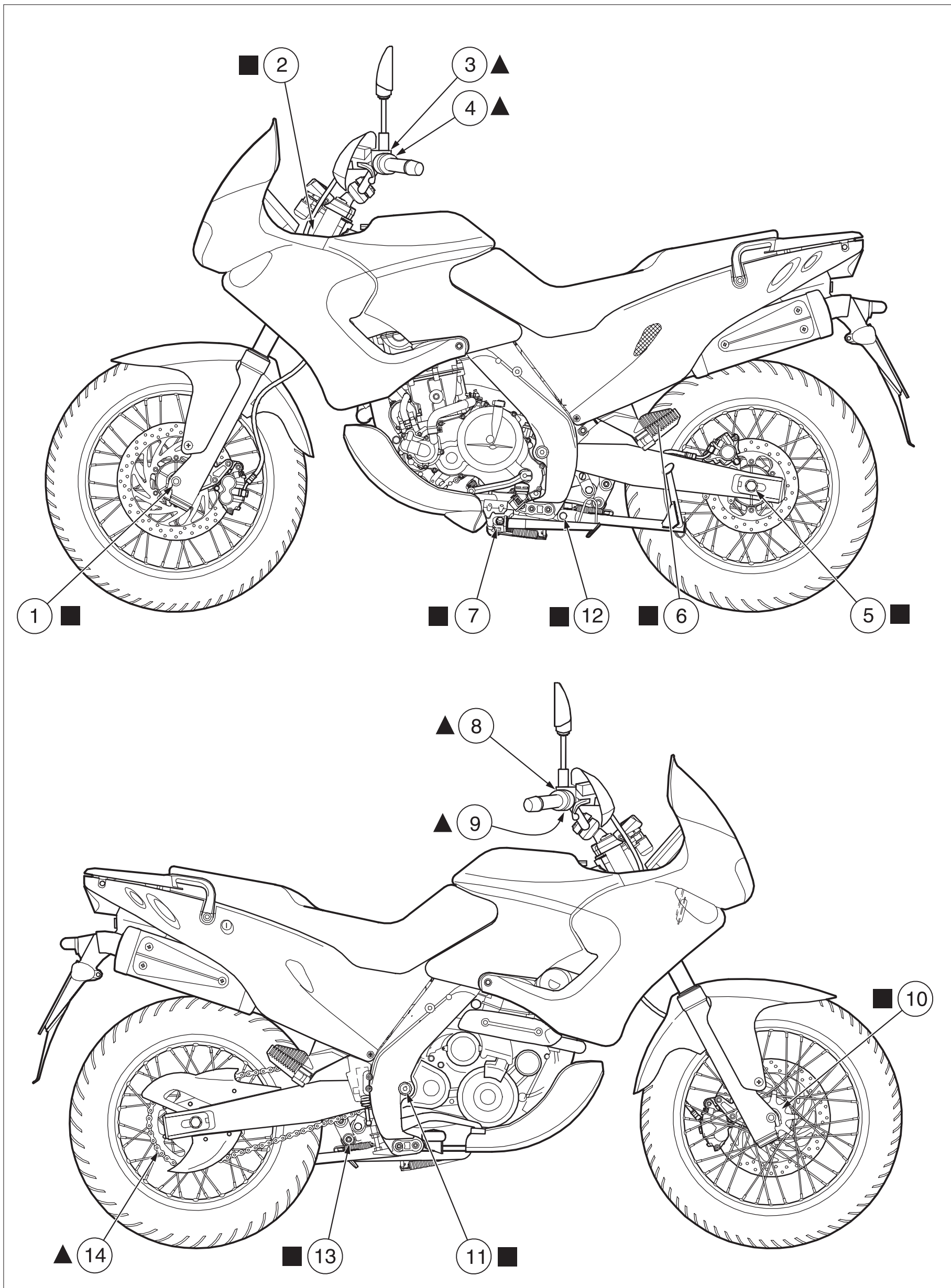
LUBRICATION CHART KEY

- 1) Front wheel pin and bearings
- 2) Steering bearings
- 3) Clutch lever pin/clutch cable
- 4) Lever cable for cold starting
- 5) Rear wheel pin and bearings
- 6) Pin passenger footrest
- 7) Side stand pin
- 8) Throttle grip
- 9) Accelerator cables
- 10) Speedometer/odometer control
- 11) Rear fork pin
- 12) Centre stand fulcrum screws **OPT** (n° 2 grease nipples)
- 13) Rear suspension leverage
- 14) Drive chain

■ = Grease

▲ = Oil

LUBRICATION CHART



2.3 BATTERY

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

There are two kinds of commercially available batteries:

- batteries requiring **maintenance** featuring cell plugs;
- **maintenance-free** batteries with no cell plugs as they do not call for the electrolyte level to be checked and topped up.

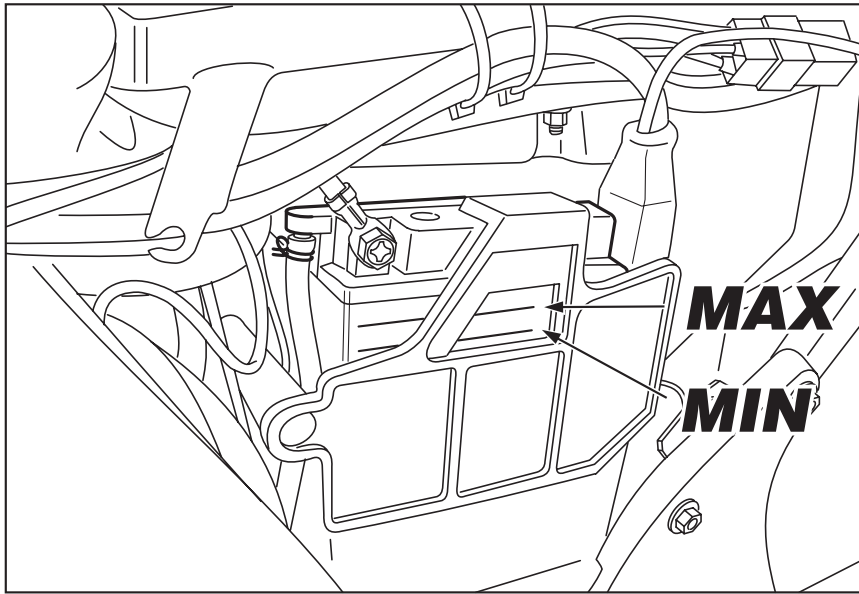
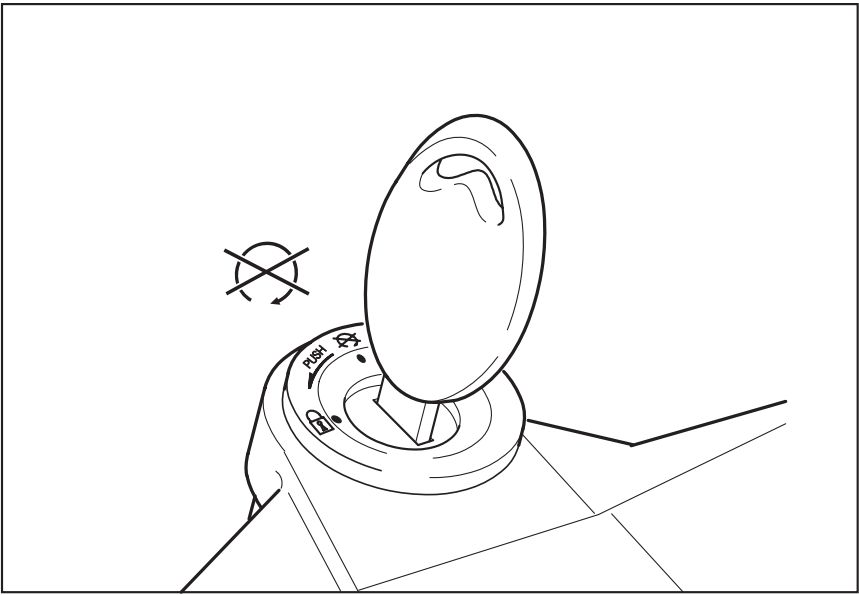
NOTE This vehicle is equipped with a battery that requires maintenance and therefore some maintenance operations will have to be carried out.

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- **Battery-electrolyte level.**

When changing batteries, replace with a battery of the same type.

For further information, see 6.15 (BATTERY).



CAUTION

Never invert the connection of the battery cables. Connect and disconnect the battery with the ignition switch in position "⊗", otherwise some components may be damaged.

Connect first the positive cable (+) and then the negative cable (-).

Disconnect following the reverse order.

NOTE Check battery voltage with a portable tester.

NOTE If voltage is less than 12V, the battery must be recharged.

2.3.1 CHECKING THE ELECTROLYTE LEVEL

Carefully read 2.3 (BATTERY).

To check the electrolyte level, proceed as follows:

- ◆ Make sure that the ignition switch is in position "⊗".
- ◆ Remove the left cover, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).
- ◆ Make sure that the fluid level is included between the two "MIN" and "MAX" notches stamped on the battery side.

If necessary, proceed as follows:

- ◆ Remove the battery, see 7.1.8 (REMOVING THE BATTERY).
- ◆ Remove the element plugs.

CAUTION

Do not exceed the "MAX" mark, since the electrolyte level increases during the recharge.

- ◆ Top up the fluid by adding only distilled water.
- ◆ Put back the left cover, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).

2.3.2 CHECKING AND CLEANING THE TERMINALS

Carefully read 2.3 (BATTERY).

- ◆ Make sure that the ignition switch is in position "⊗".
- ◆ Remove the left cover, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).
- ◆ Remove the red protection element (1).
- ◆ Make sure that the cable terminals (2) and the battery terminals (3) are:
 - in good conditions (and not corroded or covered with deposits);
 - covered with neutral grease or vaseline.

Follow ►


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If necessary, proceed as follows:

- ◆ Remove the battery, see 7.1.8 (REMOVING THE BATTERY).
- ◆ Brush the cable terminals (2) and the battery terminals (3) with a wire brush, in order to eliminate any trace of corrosion.
- ◆ Install the battery, see 7.1.8 (REMOVING THE BATTERY).
- ◆ Put back the left cover, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).

2.3.3 RECHARGING THE BATTERY

Carefully read 2.3 (BATTERY).

NOTE If the start relay emits a vibration-type noise when the start pushbutton is pressed “

NOTE Do not remove the battery plugs: without plugs the battery may be damaged.

- ◆ Remove the battery, see 7.1.8 (REMOVING THE BATTERY).
- ◆ Prepare an appropriate battery charger.
- ◆ Set the charger for the desired type of recharge (see table).
- ◆ Connect the battery to a battery charger.

⚠ WARNING

During the recharging, make sure that the room is properly ventilated.

- ◆ Switch on the battery charger.

Type of recharge	Volt (V)	Ampère (A)	Time (hours)
Normal	12	1.2	8 – 10
Quick	12	12	0.5

2.3.4 LONG INACTIVITY OF THE BATTERY

Carefully read 2.3 (BATTERY).

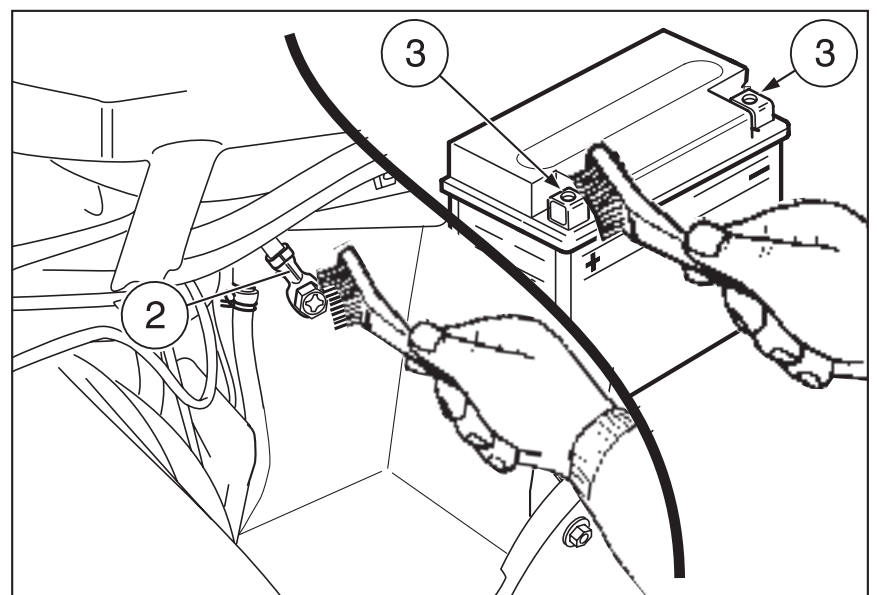
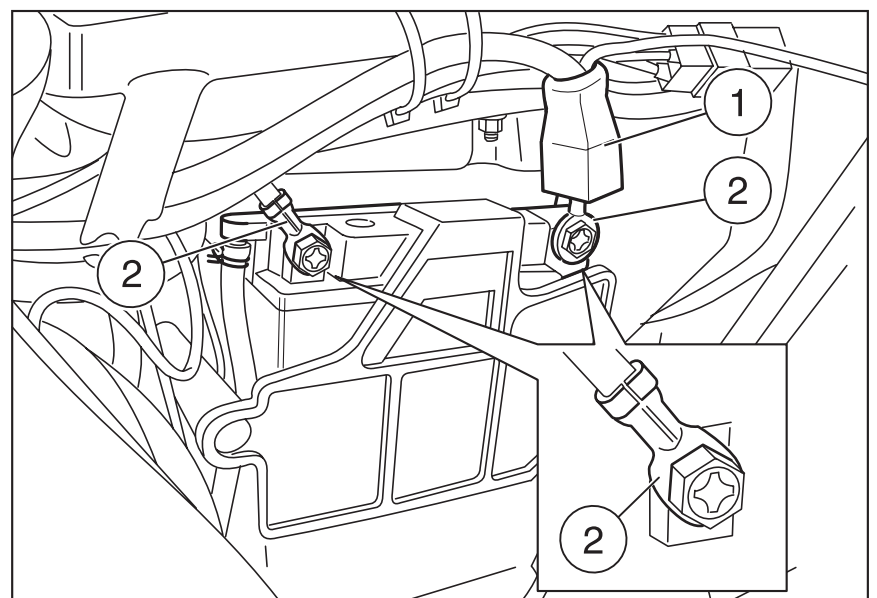
If the vehicle remains unused for more than fifteen days, it is necessary to recharge the battery, in order to prevent its sulphation, see 2.3.3 (RECHARGING THE BATTERY):

- ◆ Remove the battery, see 7.1.8 (REMOVING THE BATTERY) and put it in a cool and dry place.

It is important to check the charge periodically (about once a month), during the winter or when the vehicle remains unused, in order to prevent the deterioration of the battery.

- ◆ Recharge it completely with a normal charge, see 2.3.3 (RECHARGING THE BATTERY).

If the battery remains on the vehicle, disconnect the cables from the terminals.



2.4 ELECTRIC COMPONENTS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Light operation/direction;
- Light system;
- Safety switches;
- Diagnostic warning light;
- Engine oil pressure warning light.

For the check, proceed as follows:

- ◆ Position the vehicle on the stand.
- ◆ Check all the lighting devices are working.
- ◆ Check the direction of the headlight beam is correct, see 6.17 (ADJUSTING THE VERTICAL HEADLIGHT BEAM).
- ◆ Make sure all connectors are inserted properly.
- ◆ Make sure all switches are correctly fastened and in proper working order, see:
 - 6.7.5 (CHECKING THE SIDE STAND AND THE SAFETY SWITCH).
 - 6.8 (SWITCHES).
- ◆ Check the correct tightening and the operation of the air sensor.

⚠ CAUTION

The sensitive area on the sensors must be kept clean at all times. Any mud, dirt etc. on them is liable to alter the measurements and the subsequent data transfer.

2.5 JUMP-STARTING

Carefully read 2.3 (BATTERY).

⚠ WARNING

The vehicle should only be jump-started when the vehicle's battery is partially/completely flat and recharging is not possible.

Do not attempt to start the vehicle by pushing or towing it.

The vehicle providing assistance must have a battery (the recharge source) with exactly the same rated voltage (data to be found on the battery) as the battery of the vehicle to be started, see 1.5 (TECHNICAL SPECIFICATIONS).

Follow the procedure below to the letter so as to avoid the danger of the battery exploding and possibly injuring people and/or property (this is liable to compromise the electric components of both vehicles).

- ◆ Prepare the auxiliary vehicle, in such a way as to have access to the battery of the same.
- ◆ Make sure that the ignition switch is in position "⊗".
- ◆ Remove the left cover, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).

NOTE Leave the battery cables of both vehicles connected.

⚠ CAUTION

Take care never to let the clamps of one cable touch those of another.

- ◆ Remove the red protection element (1).

NOTE Always connect the positive poles (+) first, following the order indicated below.

⚠ WARNING

The jump leads must not be placed near any moving parts on either vehicle.

- ◆ Connect one end of jump lead to the positive pole (+) of the battery on the vehicle providing assistance (A); and the other end on the positive pole (+) of the battery on the vehicle to be started (B).
- ◆ Connect one end of the other jump lead to the negative pole (-) of the battery on the vehicle providing assistance (A); and earth the other end on the frame (far from the battery) of the vehicle to be started (B).

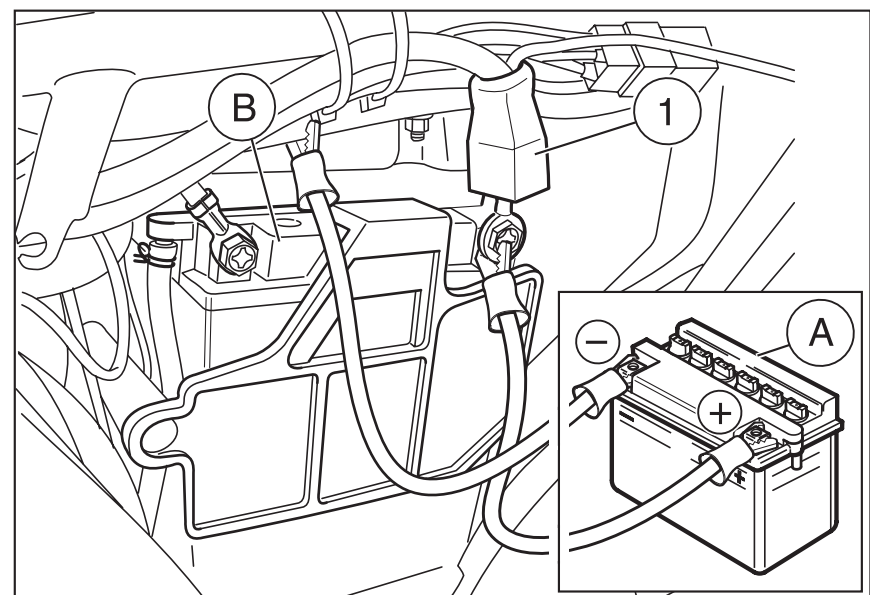
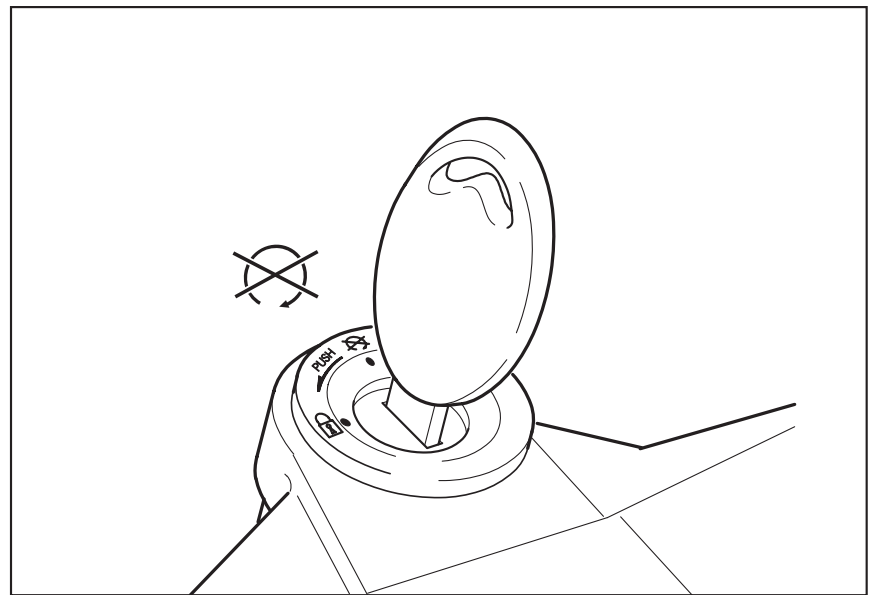
DO NOT CONNECT TO THE NEGATIVE POLE (-).

- ◆ Start the engine of the auxiliary vehicle.

NOTE During the starting phase, the engine of the auxiliary vehicle must keep running.

- ◆ Proceed to the starting of the broken-down vehicle.

NOTE Attempt to start the vehicle for no more than ten seconds at a time, where necessary, repeating the attempt at intervals of approx. one minute.



NOTE Once started, keep both engines running for approx. two minutes.

- ◆ Stop both engines.
- ◆ Disconnect the negative booster cable (-) from both batteries.
- ◆ Disconnect the positive booster cable (+) from both batteries.

2.6 SPARK PLUG

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Spark plug.

To reach the spark plug:

⚠ CAUTION

Let the engine cool down until it reaches room temperature.

Never disconnect the spark plug cap with the engine running, since you may get an electric shock from the ignition system.

- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).

For the removal, proceed as follows:

- ◆ Remove the cap (1) of the spark plug (2).
- ◆ Remove any trace of dirt from the spark plug base.
- ◆ Introduce 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.

For the check and cleaning:

Key:

- centre electrode (3);
- insulating (4);
- side electrode (5).

- ◆ Make sure that there are neither carbon deposits, nor corrosion marks on the electrodes and on the insulating material; if necessary, clean them with a pressurized air jet.

If the spark plug has crackings on the insulating material, corroded electrodes, excessive deposits or the tip (6) of the central electrode (3) is rounded, it must be changed.

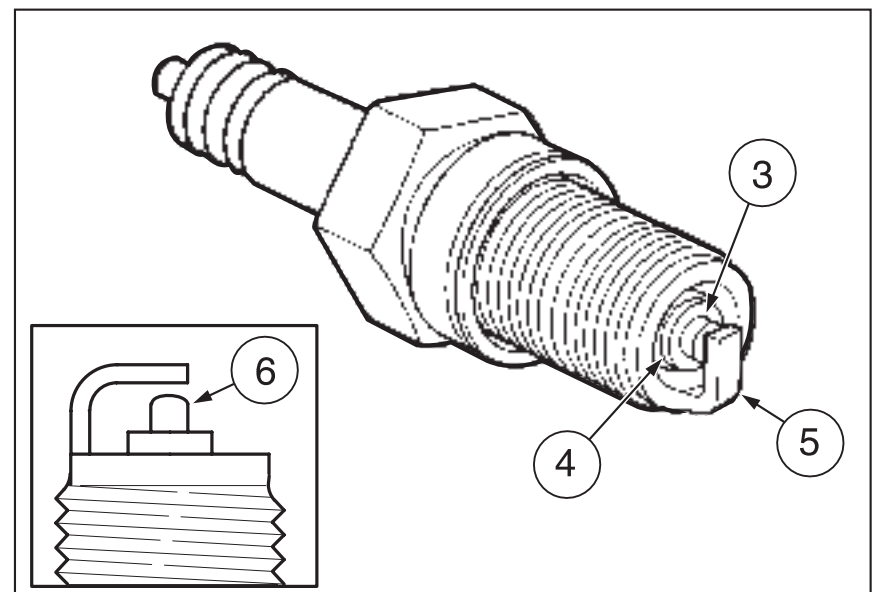
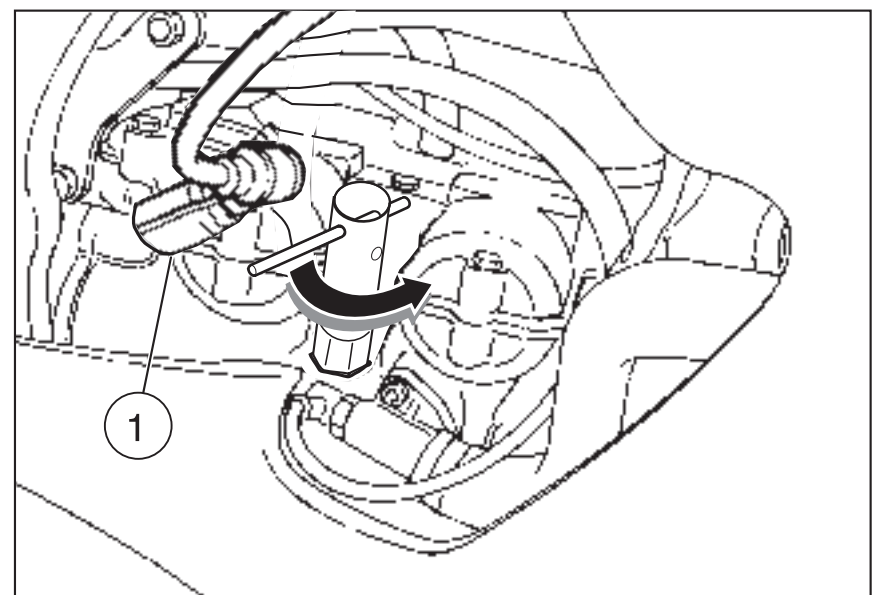
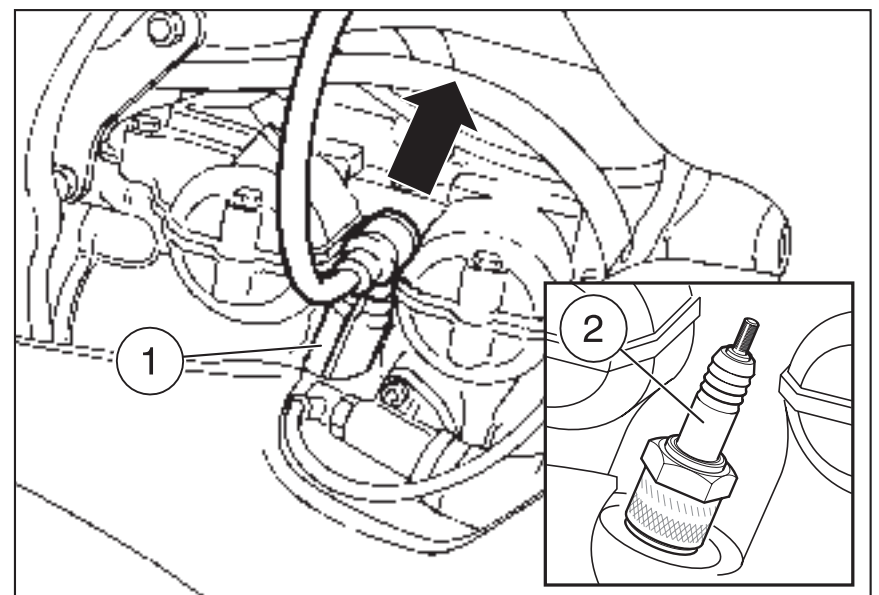
⚠ CAUTION

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, see 1.5 (TECHNICAL SPECIFICATIONS), in order not to compromise the life and performance of the engine.

Follow ►



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⚠ CAUTION

To check the spark plug gap, use a wire thickness gauge (7) to avoid damaging the platinum covering.

- ◆ Check the spark plug gap with a wire thickness gauge (7).

⚠ CAUTION

Do not try to recover the spark plug gap in any way.

The gap must be **0.6 – 0.7 mm**, otherwise it is necessary to change the spark plug.

- ◆ Make sure that the washer (8) is in good conditions.

For the installation:

- ◆ With the washer on (8), 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.

Spark plug driving torque: 20 Nm (2 kgm).

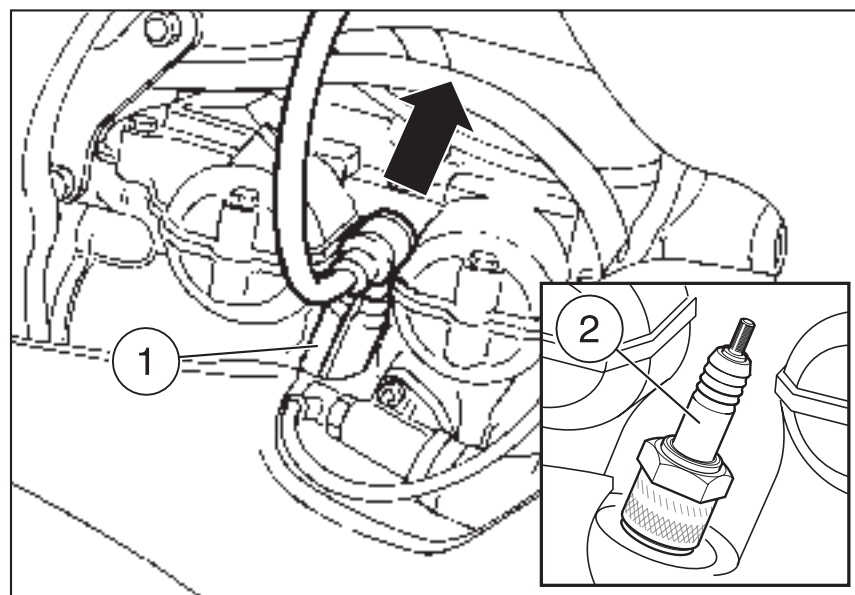
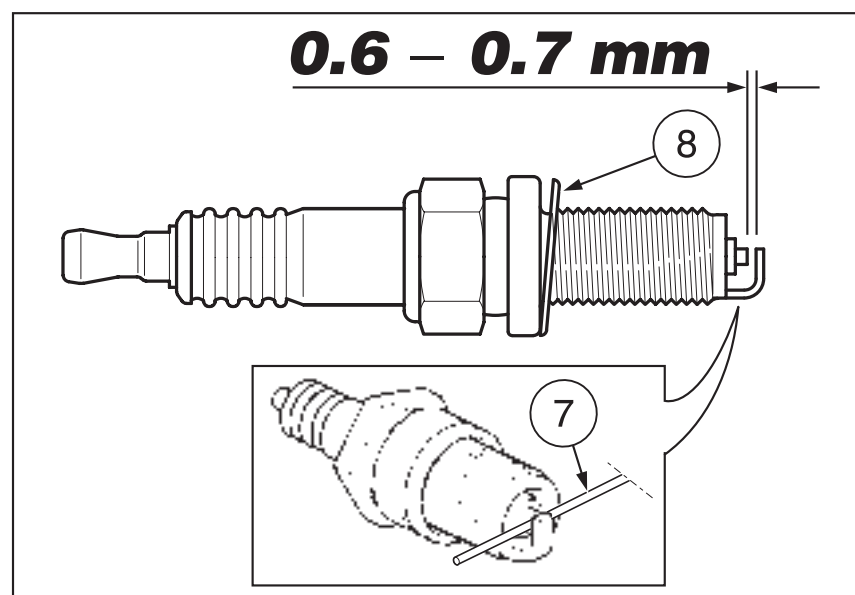
⚠ CAUTION

The spark plug must be well tightened, otherwise the engine may overheat and be seriously damaged.

⚠ CAUTION

Make sure that the cap (1) is correctly connected to the spark plug (2). Due to the vibrations of the engine, the incorrect position would cause the disconnection of the spark plug cap, with serious damage to the engine.

- ◆ Correctly insert the cap (1) in the spark plug (2), until you hear the click.
- ◆ Put back the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).



2.7 DRAINING THE FUEL TANK

Carefully read 1.2.1 (FUEL).

Fuel pipes:

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART).

⚠ WARNING

Risk of fire.

Wait until the engine and exhaust silencer have completely cooled down.

Fuel vapours are noxious for your health.

Before proceeding, make sure that the room in which you are working is properly ventilated.

Do not inhale fuel vapours.

Do not smoke and do not use naked flames.

Do not dispose of fuel in the environment.

- ◆ Stop the engine and wait until it has cooled down.
- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).

NOTE Position the fuel tank with the filler cap facing upwards.

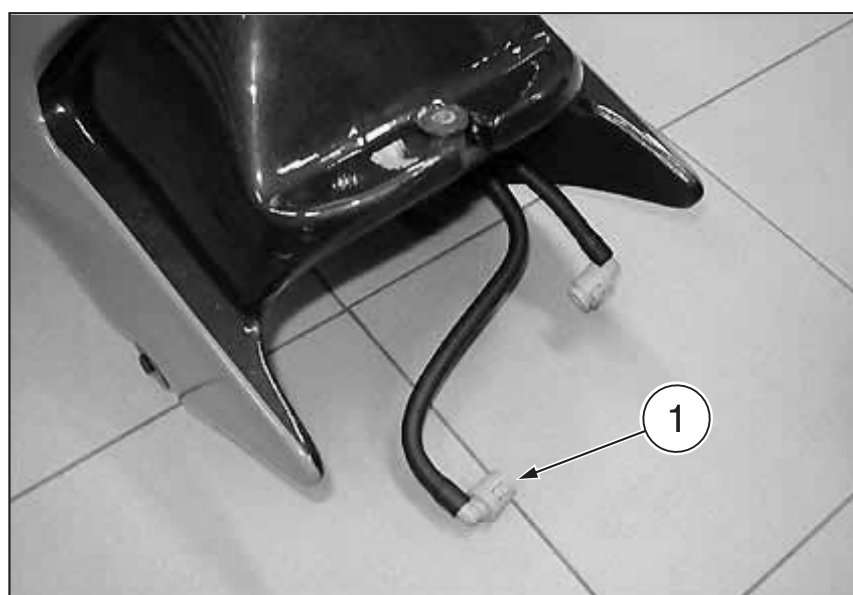
- ◆ Prepare a container with capacity exceeding the fuel quantity present in the tank and put it on the ground on the left side of the vehicle.

NOTE Prepare a pipe complete with rapid male coupling.

- ◆ Place the free end of the pipe inside the container prepared beforehand.
- ◆ Insert the male quick-release coupling of the delivery pipe all the way into the quick-release receptacle (1). The petrol starts draining out immediately.
- ◆ Open the tank cap (2).
- ◆ Wait until all the petrol has drained out of the tank.

Once all the petrol has drained out:

- ◆ Disconnect the pipe that was previously connected.
- ◆ Put back the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).
- ◆ Close the tank cap again.



2.8 AIR CLEANER

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Air cleaner.

⚠ CAUTION

The partial cleaning of the filter does not exclude or postpone the replacement of the filter itself.

Do not start the engine if the air cleaner has been removed.

Do not clean the filtering element with petrol or solvents, since they may cause a fire in the fuel supply system, with serious danger for the persons in the vicinity and for the vehicle.

DO NOT DISPOSE OF POLLUTING SUBSTANCES OR COMPONENTS IN THE ENVIRONMENT.

- ◆ On each maintenance operation, remove the small plug (1), drain the contents into a container and then deliver it to a salvage center.

REMOVAL

- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Rotate the air conveyor (1) clockwise, then lift and remove it.
- ◆ Check the conditions of the gasket (2) and change it if it is damaged.
- ◆ Extract the air cleaner (3).

⚠ CAUTION

Plug the opening with a clean cloth, in order to prevent any foreign matter to get into the suction ducts.

Make sure that the filtering element is positioned correctly, in such a way as to prevent non-filtered air from entering.

Remember that the untimely wear of the piston segments and the cylinder may be caused by a faulty or incorrectly positioned filtering element.

PARTIAL CLEANING

⚠ CAUTION

Do not press or strike the metal net of the air cleaner (3).

Do not use screwdrivers or alike.

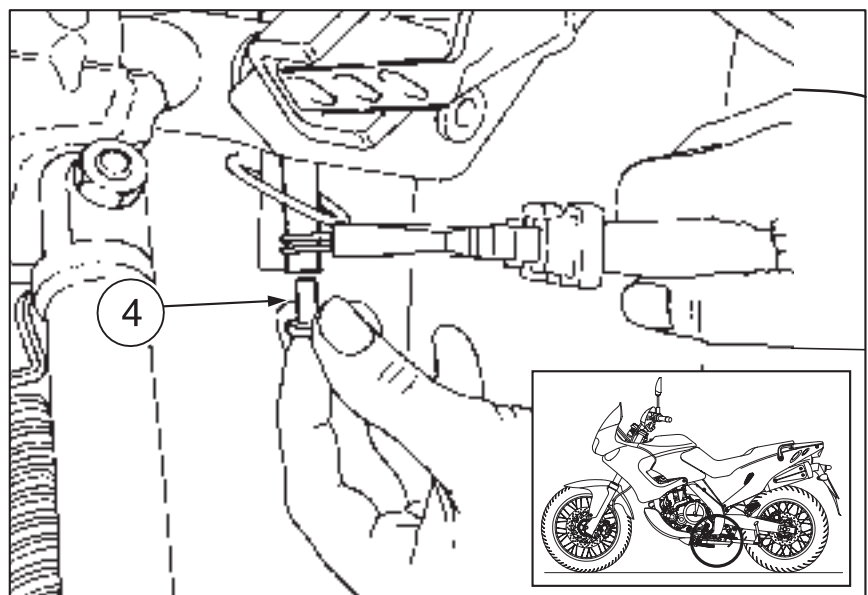
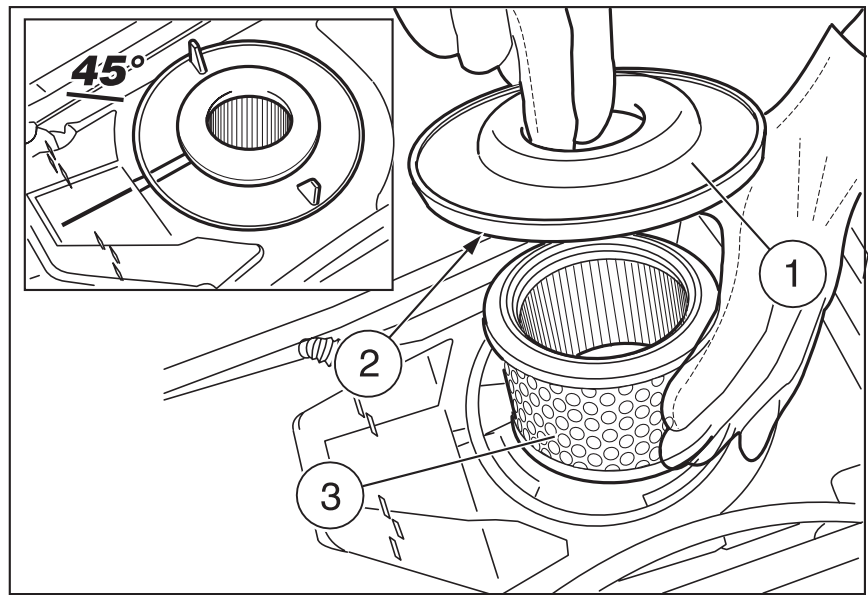
- ◆ Seize the air cleaner (3) vertically and strike it more than once on a clean surface.
- ◆ If necessary, clean the air cleaner (3) with a compressed air jet (directing it from the inside towards the outside of the filter).

⚠ CAUTION

When cleaning the filtering element, make sure that there are no tears.

Otherwise, change the filtering element.

- ◆ Clean the outer part of the air cleaner (3) with a clean cloth.



CHANGING

⚠ CAUTION

Do not use filters that have already been used.

- ◆ Replace the air cleaner (3) with a new one of the same type.
- ◆ Put back the saddle, see 7.1.7 (REMOVING THE SADDLE).
- ◆ Remove the plug (4). Empty its content into a container and deliver it to a salvage centre.

⚠ CAUTION

Do not use filters that have already been used.

Make sure that the filtering element is positioned correctly, in such a way as to prevent non-filtered air from entering.

Remember that the untimely wear of the piston segments and the cylinder may be caused by a faulty or incorrectly positioned filtering element.

If the vehicle is used in dusty areas, clean the filtering element more frequently.

Using the vehicle without the filtering element, or with the element damaged, considerably increases wear and tear on the engine.

Make sure the filtering element is always in perfect condition. The life of the engine depends, for the most part, on this component.

2.9 ACCELERATOR

2.9.1 CHECKING THE OPERATION OF THE ACCELERATOR CONTROL

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Transmission cables and controls.

For the check, proceed as follows:

⚠ WARNING

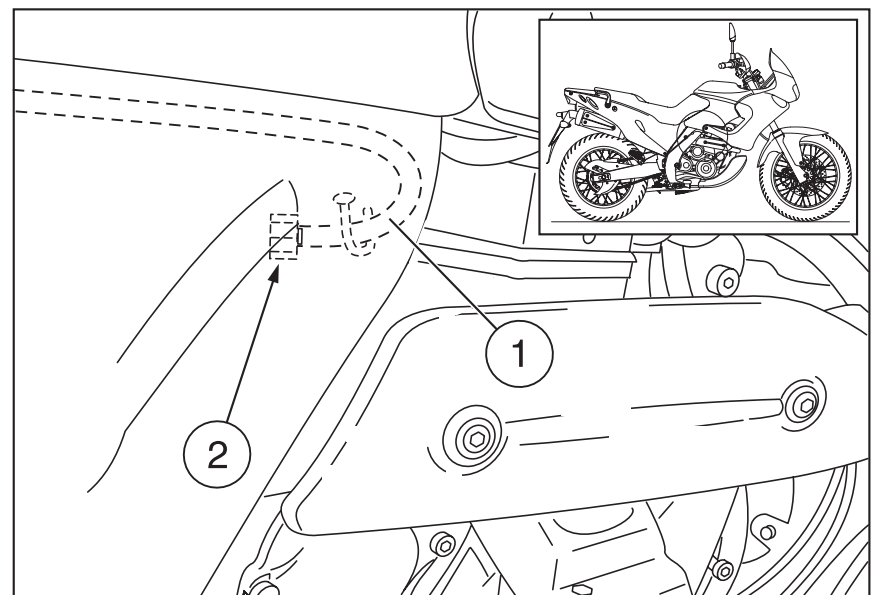
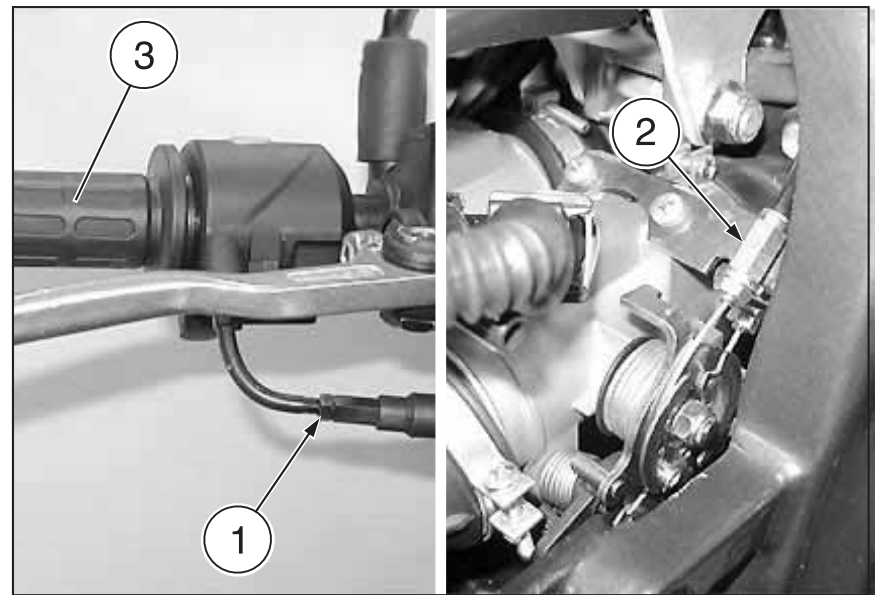
The use of the vehicle with damaged, excessively bent or twisted accelerator cable may hinder the regular operation of the accelerator and make you lose control of the vehicle while riding.

Make sure that the rotation of the handlebar does not modify the engine idle speed and that the throttle grip returns smoothly and automatically to its original position after being released.

If necessary, proceed as follows:

NOTE For the lubrication of the components use the specific lubricant available on the market.

- ◆ Check the correct position and the lubrication of the following components:
 - sheath;
 - throttle grip adjuster (1);
 - throttle unit adjuster (2);
 - cable couplings (ends);
 - accelerator control (3).
- ◆ Check the idle speed, 2.9.2 (IDLING ADJUSTMENT).
- ◆ Check the accelerator control adjustment, 2.9.3 (ADJUSTING THE ACCELERATOR CONTROL).



2.9.2 IDLING ADJUSTMENT

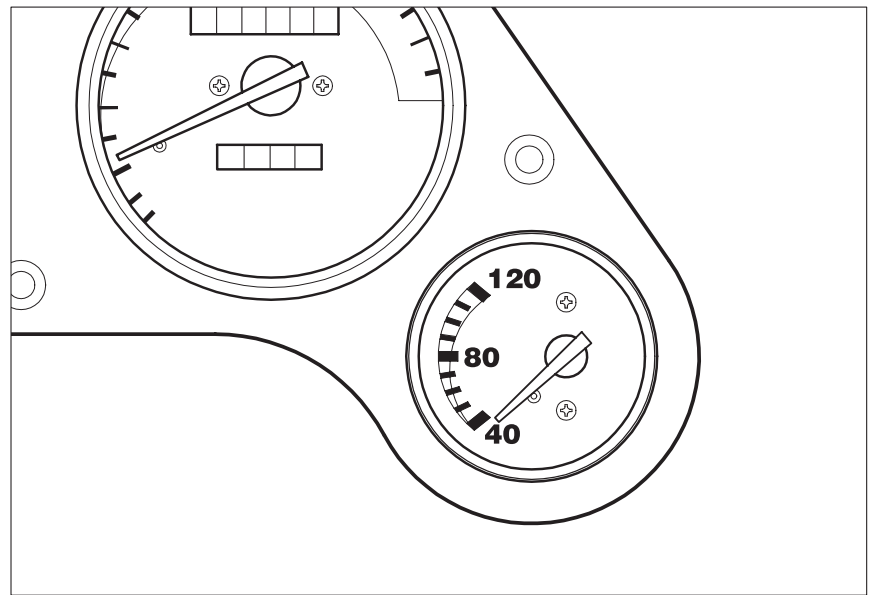
Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

NOTE In case of start at low ambient temperature [near or below 0 °C (32 °F)] and in any case if the normal operating temperature has not been reached, anomalies may be noticed in the engine idling speed. This is normal, the engine idling speed returns to a regular value when the engine reaches its normal running temperature.

For a correct check of the engine idling speed, proceed as follows:

- ◆ Ride for a few miles until reaching the normal running temperature.
- ◆ Position the gear lever in neutral (green warning light “N” on).
- ◆ Check the engine idling rpm on the revolution counter. The engine idling speed must be about 1350 ± 100 rpm.

If the engine idling speed falls within the values indicated, do not perform any operation to modify it.



CAUTION

An excessive increase in the engine idling speed may cause irregularities in the operation of the engine and damage the engine and other components.

If necessary, proceed as follows:

CAUTION

For a correct adjustment of the engine idling speed it is absolutely necessary to respect the times and the engine temperature interval indicated below.

CAUTION

Risk of burns.
Some parts of the vehicle reach very high temperatures (for example, the exhaust pipe and to a lesser extent the exhaust pipe guard).

Wear safety gloves to protect yourself from the high-temperature parts of the vehicle.

Proceed with care and absolutely avoid any contact with the exhaust pipe guard.

The coolant temperature in the engine must absolutely be included between 78 °C (172 °F) and 94 °C (201 °F). To identify the correct interval, check the position of the pointer on the coolant temperature indicator when the fan is operated; considering that the fan starts at 94 °C (201 °F), keep this value as reference point for the upper limit of the interval and determine the position of the pointer on the instrument; at this point it is possible to find the initial temperature of 78 °C (172 °F) to carry out the adjustments.

- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Release the idling speed adjustment cable (1) from the cable guide positioned behind the right standard of the frame.
- ◆ Fasten (not rigidly) the idling speed adjustment cable to the spark plug cable with a clamp, positioning the clamp between the knob and the plastic washer.

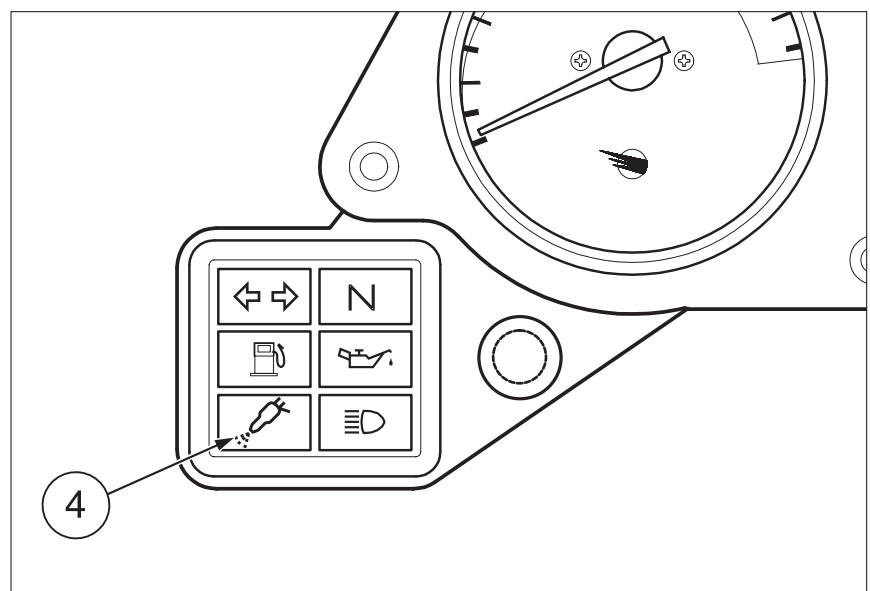
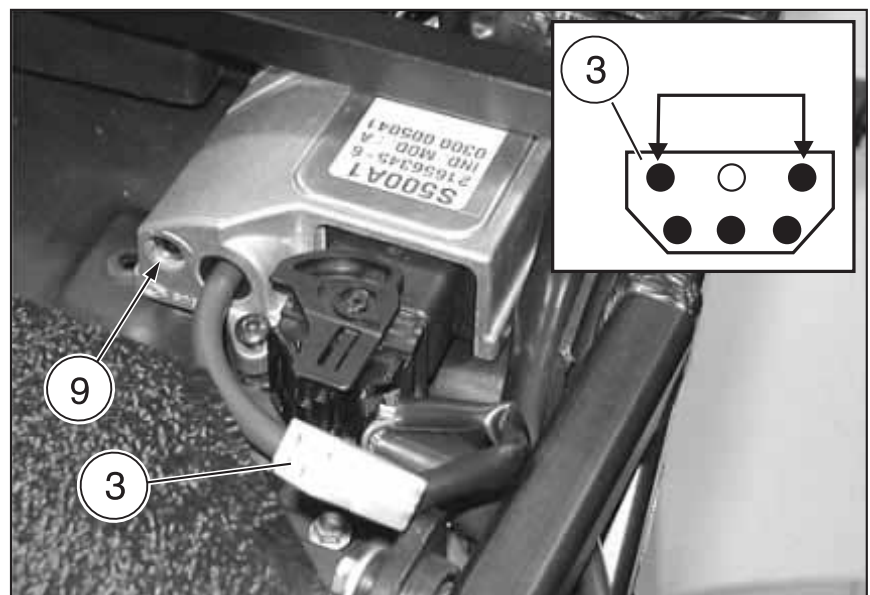
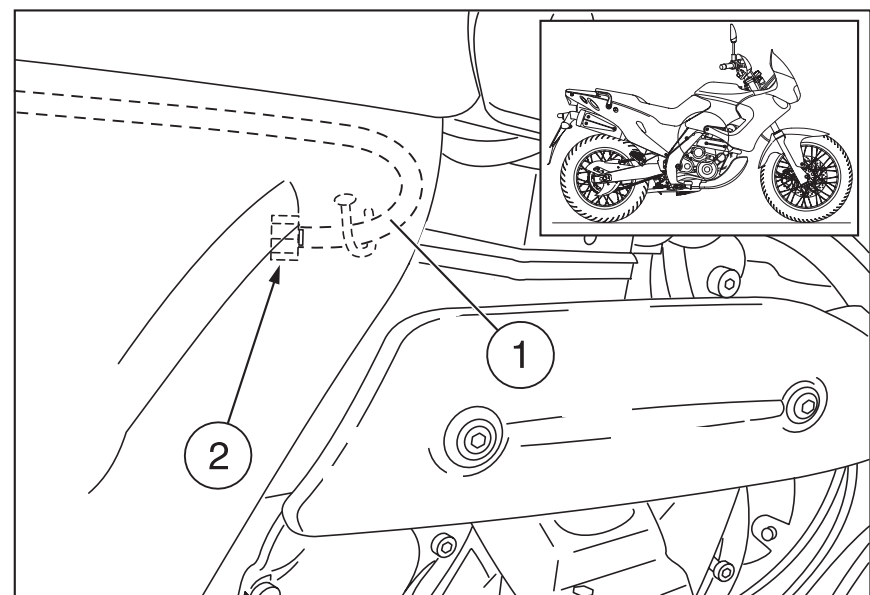
NOTE The successive operations must be carried out very quickly, in order to maintain the temperature values within the interval prescribed and to avoid losing the adjustments made.

- ◆ Bring the engine temperature to 78 °C (172° F).
- ◆ Stop the engine.

CAUTION

Do not restart the engine.

- ◆ Put the gearshift into neutral.
- ◆ Turn the ignition switch to position “O”.



- ◆ Turn the engine stop switch to position "O".

NOTE The "workshop mode" interrupts the operation of the injection system, the coil and the fuel pump for safety reasons.

- ◆ Short-circuit the two contacts of the central unit electric connector (3) (see figure) for twelve seconds, in order to activate the "workshop mode".

At this point:

- The diagnostic warning light (4) positioned on the dashboard will blink for five seconds, confirming in this way that the "workshop mode" has been successfully activated.

- ◆ Turn the adjusting knob (2).
 - BY SCREWING IT (clockwise), you increase the rpm;
 - BY UNSCREWING IT (anticlockwise), you decrease the rpm;

At this point reach the correct idling speed.

Diagnostic warning light on (steady) = idling speed high
 Diagnostic warning light off = idling speed low
 Diagnostic warning light blinking = idling speed correct [1350 +/- 100 rpm]

- ◆ Short-circuit the two contacts of the central unit electric connector (3) (see figure) for twelve seconds, in order to exit from the "workshop mode".
- ◆ Twist the throttle grip, accelerating and decelerating a few times to make sure that it functions correctly and to check if the idling speed is constant.
- ◆ Check the CO value, see 4.9.10 (CO ADJUSTMENT).

NOTE If the engine stops suddenly at low speed, perform the operations indicated in SUDDEN STOPS.

SUDDEN STOPS

To avoid sudden stops of the engine, it is advisable to set the idling speed at the maximum value allowed by the central unit and to reach a CO value suitable for the good operation of the vehicle.

- NOTE** Have the appropriate special tools **OPT** to hand:
- aprilia part# 8140196 (exhaust fume analyser) (5).

⚠ WARNING

Fuel vapours are noxious for your health. Before proceeding, make sure that the room in which you are working is properly ventilated. Do not inhale fuel vapours. Avoid any contact of the fuel with the skin. Do not smoke and do not use naked flames. Do not dispose of fuel in the environment.

- ◆ Unscrew and remove the two screws (6).
- ◆ Remove the protection element (7).

Plug driving torque (exhaust pipe): 25 Nm (2.5 kgm).

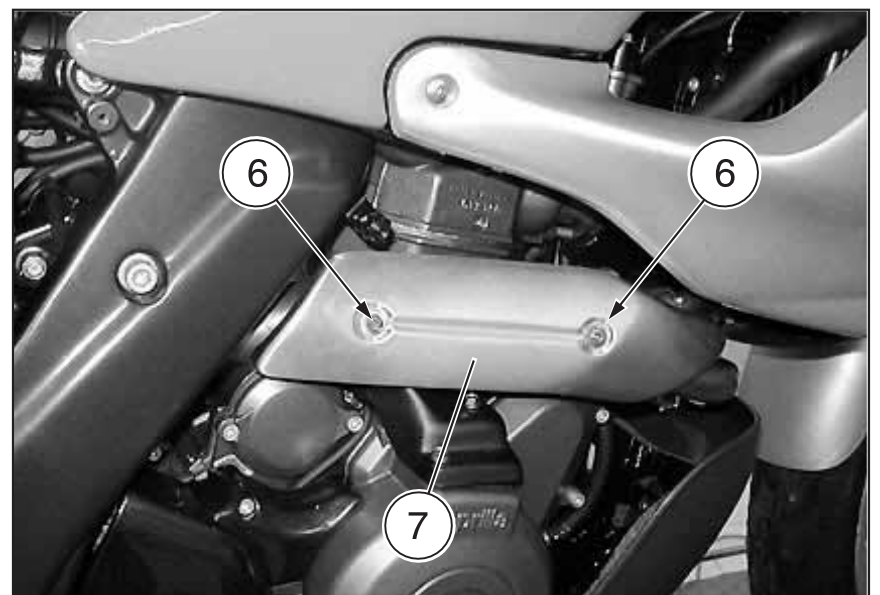
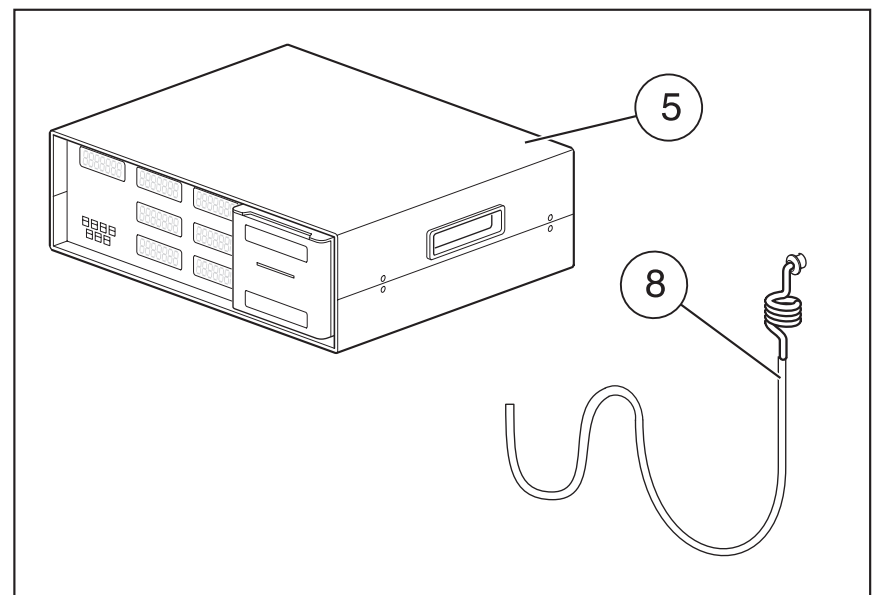
- ◆ Unscrew and remove the cap (8) on exhaust pipe.

NOTE Upon reassembly, apply LOCTITE® 8150 to the cap (8).

- ◆ Connect the exhaust gas tester pipes (8):
 - the rigid pipe to the appropriate intake on the exhaust pipe;
 - connect the other pipe to the exhaust gas tester (5).
- ◆ Short-circuit the two contacts of the central unit electric connector (3) (see figure) for twelve seconds, in order to activate the "workshop mode".

NOTE Idling speed tolerance range 1350+/-100 rpm.

- ◆ Set the idling speed at the maximum value allowed:
 - 1450 rpm (diagnostic warning light blinking).
- ◆ Use the trimmer (9) of the central unit to check on the



analyzer (5) that the CO values correspond to those indicated.

NOTE CO values for the idling speed adjustment = 1% (tolerance: +1%, -0.5%) at 1350±1 rpm.

- ◆ Let the engine reach a temperature included between 70 °C and 80 °C (158 °F – 176 °F)
- ◆ Check the idling speed.

If necessary, proceed as follows:

- ◆ Adjust the CO value using the trimmer (9) on the central unit.
- ◆ Short-circuit the two contacts of the central unit electric connector (3) (see figure) for twelve seconds, in order to exit from the "workshop mode".

The diagnostic warning light (4) positioned on the dashboard will blink for five seconds, confirming in this way that the "workshop mode" has been successfully abandoned.

2.9.3 ADJUSTING THE ACCELERATOR CONTROL

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

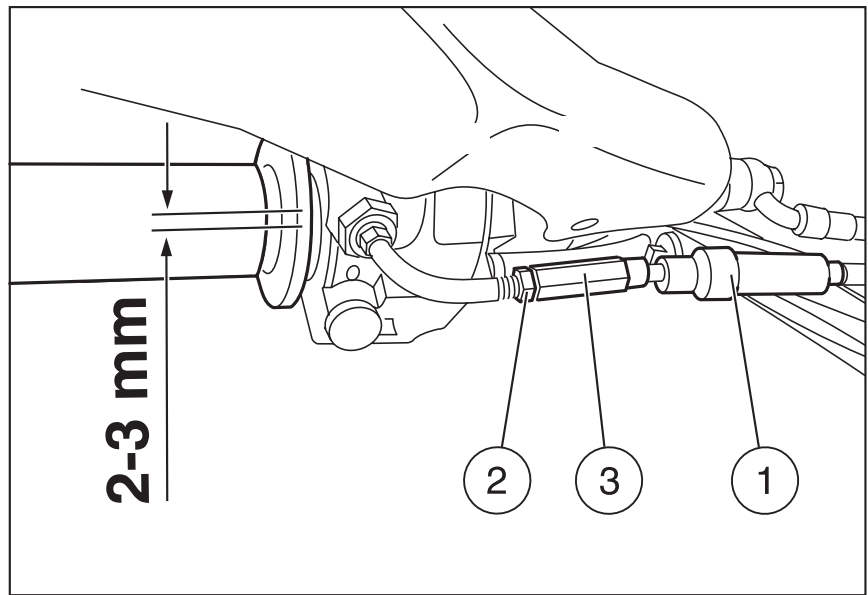
– Transmission cables and controls.

For the check, proceed as follows:

The idle stroke of the throttle grip must be 2 – 3 mm, measured on the edge of the grip itself.

If not, proceed as follows:

- ◆ Position the vehicle on the stand.
- ◆ Withdraw the protection element (1).
- ◆ Loosen the lock nut (2).
- ◆ Rotate the adjuster (3) in such a way as to restore the prescribed value.
- ◆ After the adjustment, tighten the lock nut (2) and check the idle stroke again.
- ◆ Put back the protection element (1).



CAUTION

After the adjustment, make sure that the rotation of the handlebar does not modify the engine idling rpm and that the throttle grip returns smoothly and automatically to its original position after being released.

2.10 COLD START CABLE

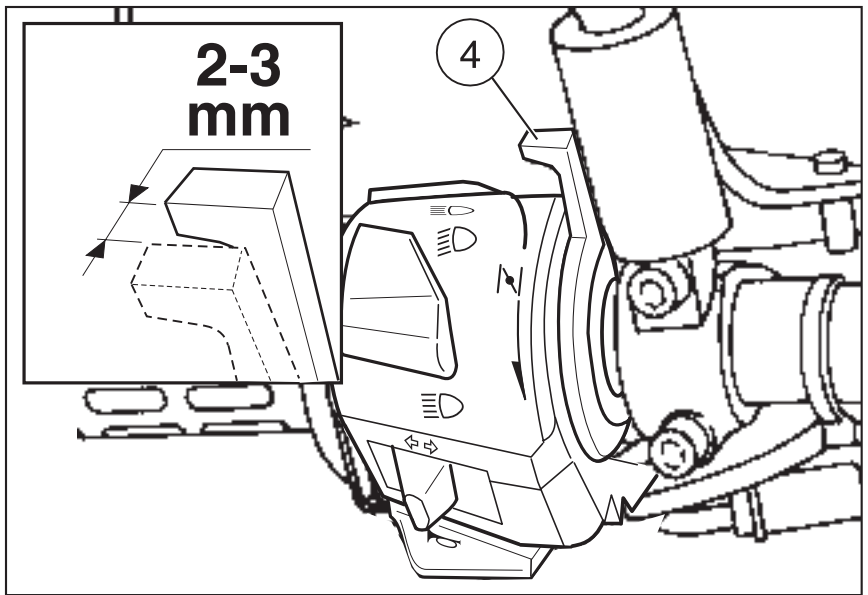
For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Transmission cables and controls.

The cold start cable must be adjusted so that the hand lever (4) has 2 – 3 mm of freeplay.

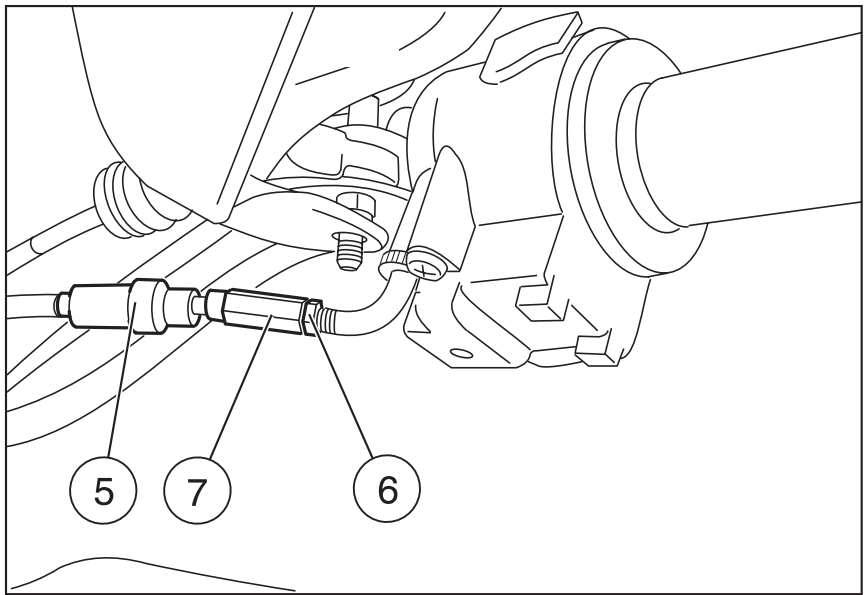
If not, proceed as follows:

- ◆ Position the vehicle on the stand.
- ◆ Withdraw the protection element (5).
- ◆ Loosen the lock nut (6).
- ◆ Rotate the adjuster (7) in such a way as to restore the prescribed value.
- ◆ After the adjustment, tighten the lock nut (6) and check the idle stroke again.
- ◆ Put back the protection element (5).



CAUTION

After the adjustment, make sure that the rotation of the handlebar does not modify the engine idling rpm.



2.11 CHECKING THE ENGINE OIL LEVEL AND TOPPING UP

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.2 (ENGINE OIL).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Motor oil;
- Engine oil filter;
- Engine oil filter (on oil tank).

For the check, proceed as follows:

NOTE Position the vehicle on the side stand on firm and level ground.

⚠ CAUTION

The engine oil level must be checked with warm engine.

If the check is carried out with cold engine, the oil level may temporarily lower below the "MIN" mark.

This is not a problem, provided that the engine oil pressure warning light LED "⚠" does not come on.

NOTE To warm the engine and have the engine oil reach the operating temperature, do not let the engine idle with the vehicle at rest. According to the correct procedure, it is advisable to carry out the check after a trip of approximately 15 km (10 mi) on a road outside town (this is sufficient for the engine oil to reach the operating temperature).

- ◆ Stop the engine.
- ◆ Keep the vehicle in vertical position, with the two wheels resting on the ground.
- ◆ Insert the plug-dipstick (1) completely in the inlet hole (2), **without screwing it**.
- ◆ Extract the plug-dipstick (1) again and read the oil level on the dipstick:

MAX = maximum level

MIN = minimum level.

The difference between "MAX" and "MIN" amounts to approximately 300 cm³.

- ◆ The level is correct when the oil almost reaches the "MAX" mark.

⚠ CAUTION

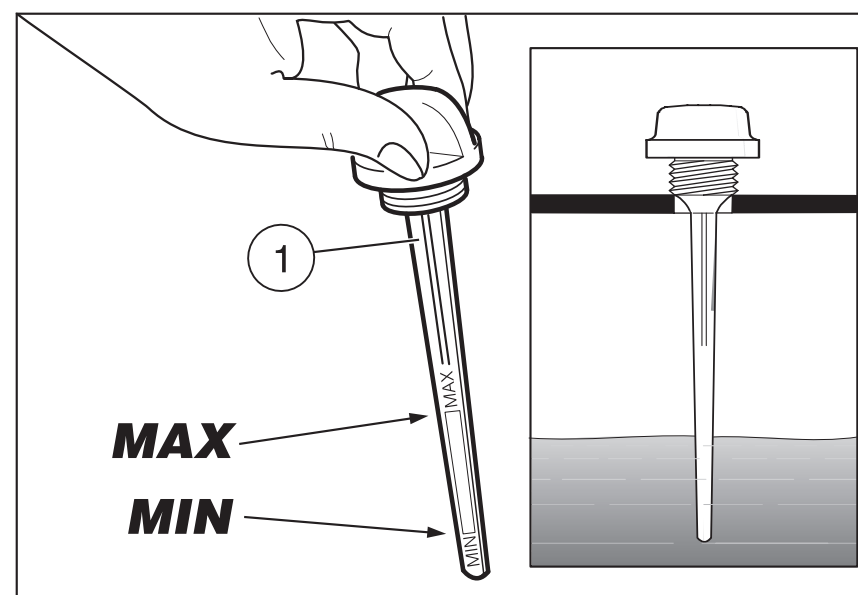
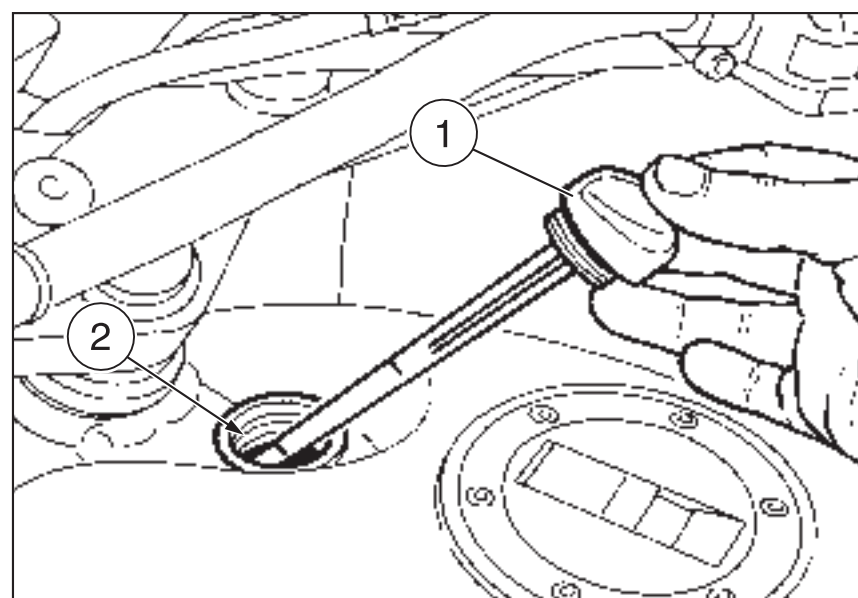
Never exceed the "MAX" mark, nor leave the oil below the "MIN" mark, in order to avoid serious damage to the engine.

If necessary, top up the engine oil by proceeding as follows:

⚠ CAUTION

Do not put additives or other substances into the oil. If you use a funnel or other similar items, make sure that they are perfectly clean.

- ◆ After extracting the plug-dipstick (1), top up the tank through the inlet hole (2) until reaching the correct level, see 1.6 (LUBRICANT CHART).



2.12 CHANGING THE ENGINE OIL AND THE OIL FILTER

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.2 (ENGINE OIL).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Motor oil.

ENGINE OIL DRAIN

NOTE To warm the engine and have the engine oil reach the operating temperature, do not let the engine idle with the vehicle at rest. According to the correct procedure, it is advisable to carry out the check after a trip of after covering approximately 15 km (10 mi) on a road outside town (this is sufficient for the engine oil to reach the operating temperature).

⚠ CAUTION

If the vehicle is used in dusty areas, change the oil more frequently.

⚠ WARNING

When warmed up, the engine contains hot oil; therefore, while carrying out the operations described here below be particularly careful, in order to avoid burns.

- ◆ Stop the engine.
- ◆ Keep the vehicle in vertical position, with the two wheels resting on the ground.
- ◆ Remove the oil sump guard, see 7.1.3 (REMOVING THE OIL SUMP GUARD).
- ◆ Position a container (1) with more than 2500 cm³ capacity in correspondence with the drain plug (2) positioned on the tank.
- ◆ Unscrew and remove the drain plug (2) positioned on the tank.
- ◆ Unscrew and remove the plug-dipstick (3).
- ◆ Drain the oil and let it drip into the container (1) for a few minutes.
- ◆ Check and if necessary replace the sealing washer of the drain plug (2) positioned on the tank.
- ◆ Screw and tighten the drain plug (2) on the tank.

Drain plug driving torque: 20 Nm (2.0 kgm).

- ◆ Move the container (1) and position it under the engine base, in correspondence with the drain plug positioned on the engine (4).
- ◆ Unscrew and remove the drain plug positioned on the engine (4).
- ◆ Drain the oil and let it drip into the container (1) for a few minutes.

⚠ CAUTION

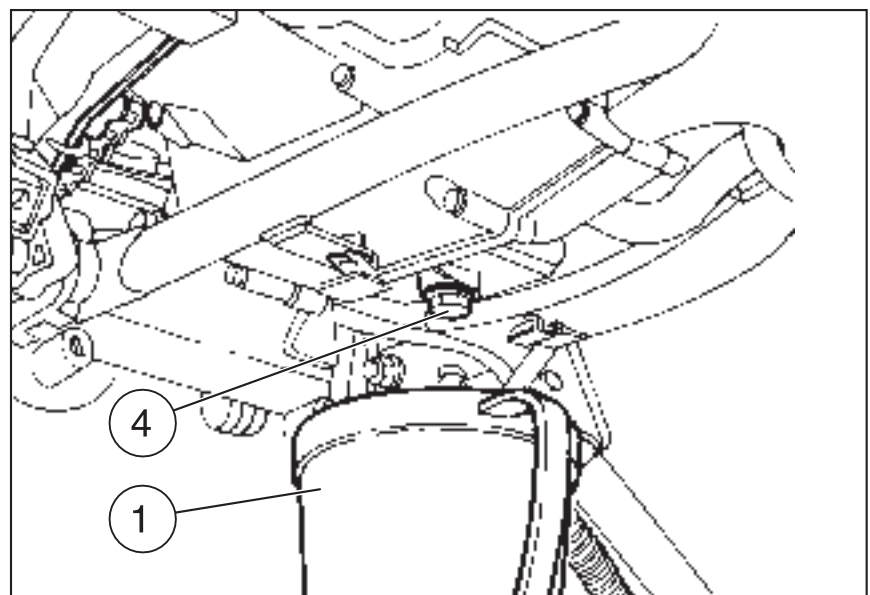
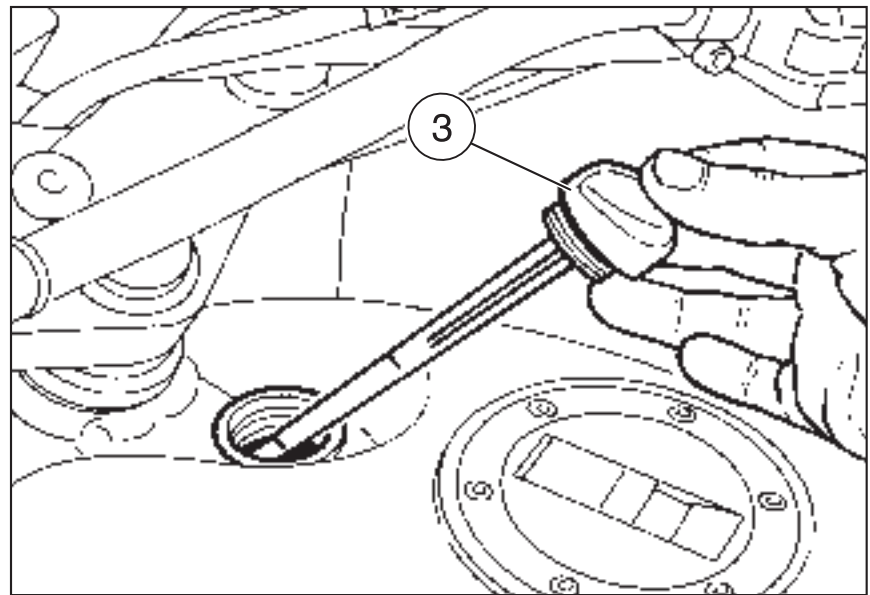
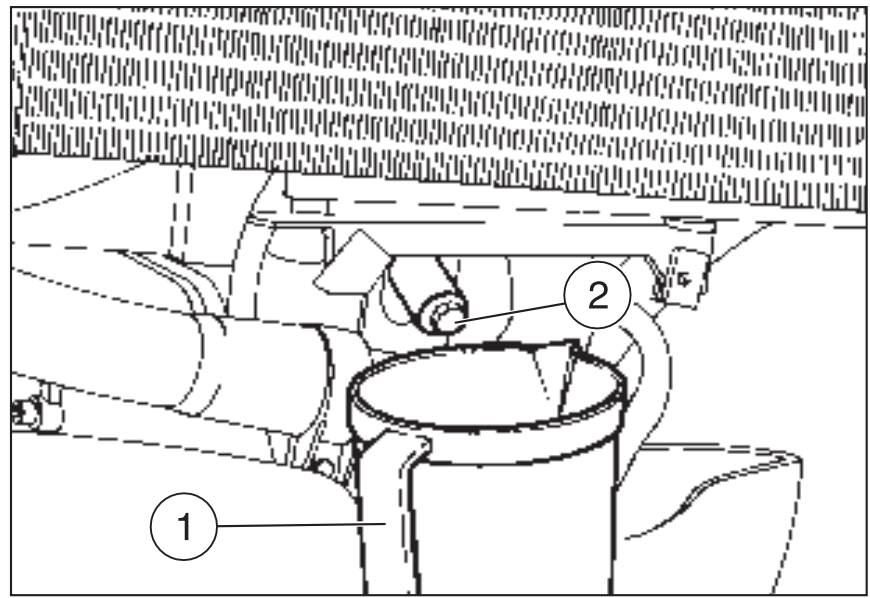
Do not dispose of the oil in the environment. Put it in a sealed container and take it to the filling station where you usually buy it or to an oil salvage center.

- ◆ Remove the metal residues from the drain plug (4) magnet.
- ◆ Screw and tighten the drain plug (4).

Drain plug positioned on the engine driving torque: 40 Nm (4.0 kgm).

- ◆ Clean the parts dirty with oil with a cloth.

Follow ►



Follow ►

CHANGING THE ENGINE OIL FILTER

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Engine oil filter.

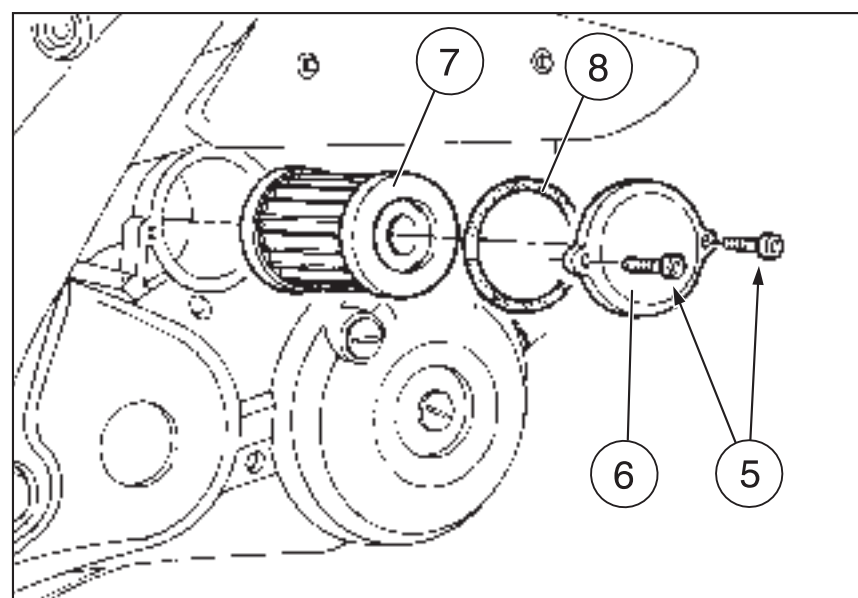
- ◆ Unscrew the two screws (5) and remove the cover (6).
- ◆ Remove the engine oil filter (7).

⚠ CAUTION

Do not use filters that have already been used.

- ◆ Spread an oil film on the sealing ring (8) of the new engine oil filter.
- ◆ Fit the new engine oil filter.
- ◆ Put back the cover (6), screw and tighten the two screws (5).

Driving torque of the engine oil filter cover screws: 11 Nm (1.1 kgm).

**CLEANING THE ENGINE OIL FILTER ON THE TANK**

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Engine oil filter (on oil tank).

NOTE Have the appropriate special tool **OPT** to hand:
– aprilia part# 0277295 (hose clamp installation pliers).

⚠ CAUTION

Upon installation, replace the hose clamp that has been removed with a new one having the same dimensions, see 0.4.2 (SPARE PARTS CATALOGUES).

Do not attempt to reinstall the removed hose clamp, since it is unusable.

Engine oil filter (on oil tank).

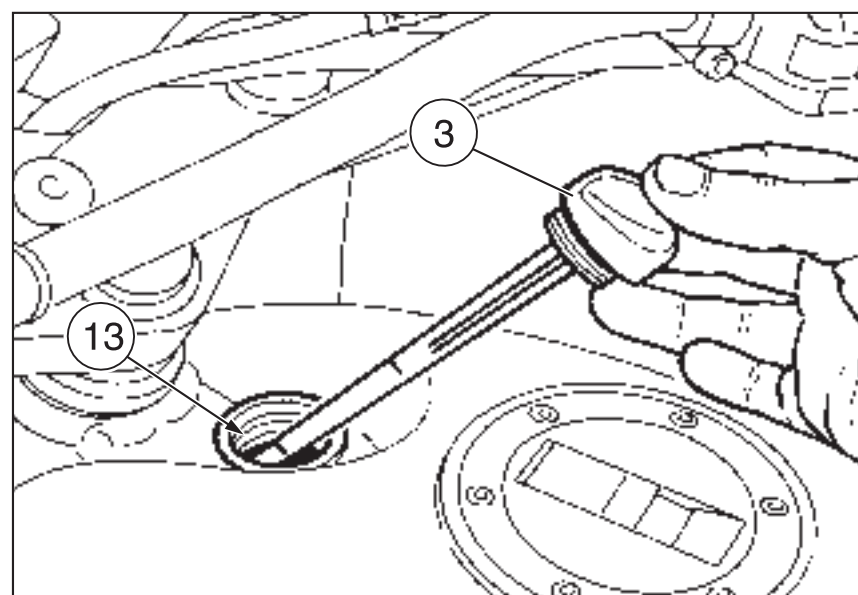
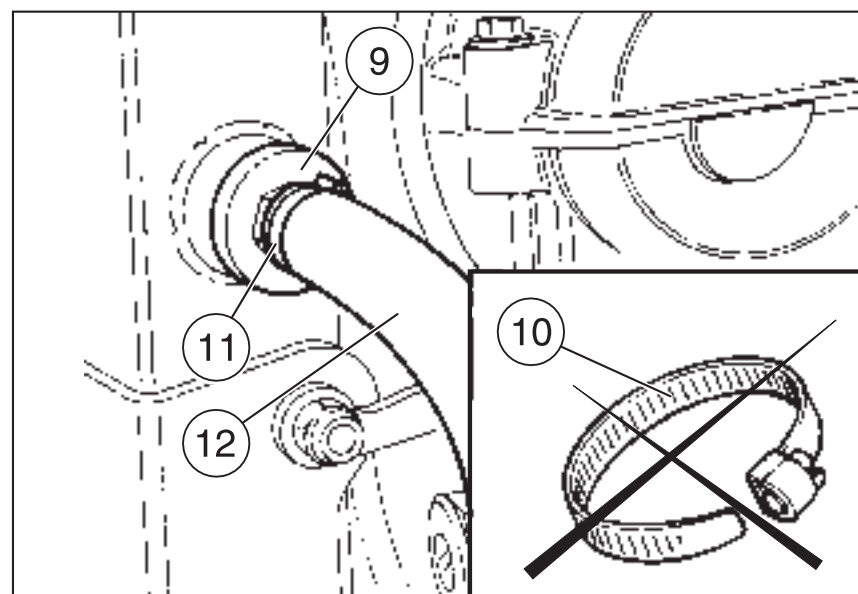
- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).
- ◆ Release the hose clamp (11).
- ◆ Disconnect the pipe (12).
- ◆ Unscrew and remove the engine oil filter (9) positioned on the tank and clean it with a jet of compressed air.
- ◆ Check the engine oil filter gasket (9) on the tank, screw it on and tighten up.

Engine oil filter on tank driving torque: 35 Nm (3.5 kgm).

- ◆ Connect the pipe (12) and install a new hose clamp.

⚠ CAUTION

Do not put additives or other substances into the oil. If you use a funnel or other similar items, make sure that they are perfectly clean.

**CHANGING THE ENGINE OIL**

- ◆ Pour about 1600 cm³ of engine oil through the filling opening (13), see 1.6 (LUBRICANT CHART).
- ◆ Screw the plug-dipstick (3).
- ◆ Put back the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).
- ◆ Put back the oil sump guard, see 7.1.3 (REMOVING THE OIL SUMP GUARD).
- ◆ Start the engine and let it idle for about one minute, in order to ensure the filling up of the engine oil circuit.
- ◆ Check the oil level and top up if necessary, see 2.11 (CHECKING THE ENGINE OIL LEVEL AND TOPPING UP).

2.12.1 BLEEDING THE OIL DELIVERY PUMP

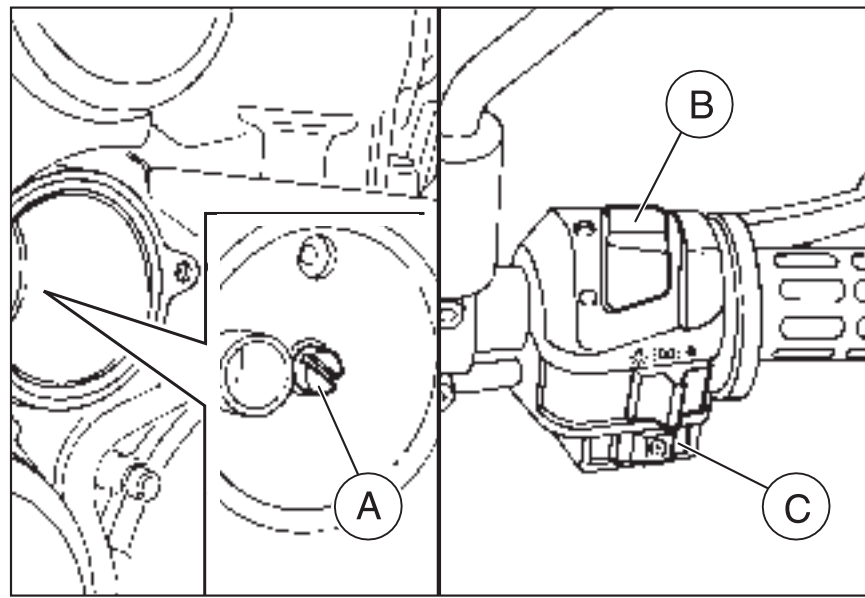
CAUTION

The bleeding must be always carried out when the oil has been completely drained from the tank and from the engine (engine overhaul).

CAUTION

The following operations must be carried out during the oil change, after removing the engine oil filter and before installing a new one.

- ◆ Unscrew and remove the small valve (A) positioned on the bottom of the engine oil filter compartment.
- ◆ Turn the ignition switch to position "O".
- ◆ Move the engine stop switch (B) to position "⊗".
- ◆ Press the start push button "Ⓢ" (C) and let the starter run until oil starts to flow out of the small valve seat (A) (a few seconds are sufficient).
- ◆ Insert the small valve (A) and tighten it completely.



2.13 CHECKING AND TOPPING UP COOLANT

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.5 (COOLANT).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Coolant.

CAUTION

Check the coolant level and top up the expansion tank with cold engine.

- ◆ Stop the engine and wait until it has cooled down.

NOTE Position the vehicle on the side stand on firm and level ground.

- ◆ Keep the vehicle in vertical position, with the two wheels resting on the ground.
- ◆ Make sure that the level of the fluid contained in the expansion tank (2) is included between the "MAX" and "MIN" marks.

MAX= maximum level

MIN= minimum level

If not, proceed as follows:

- ◆ Unscrew and remove the expansion tank filling cap (1).

WARNING

The coolant is noxious: do not swallow it; if the coolant gets in contact with the skin or the eyes, it can cause serious irritations.

Do not use your fingers or any other object to check if there is enough coolant.

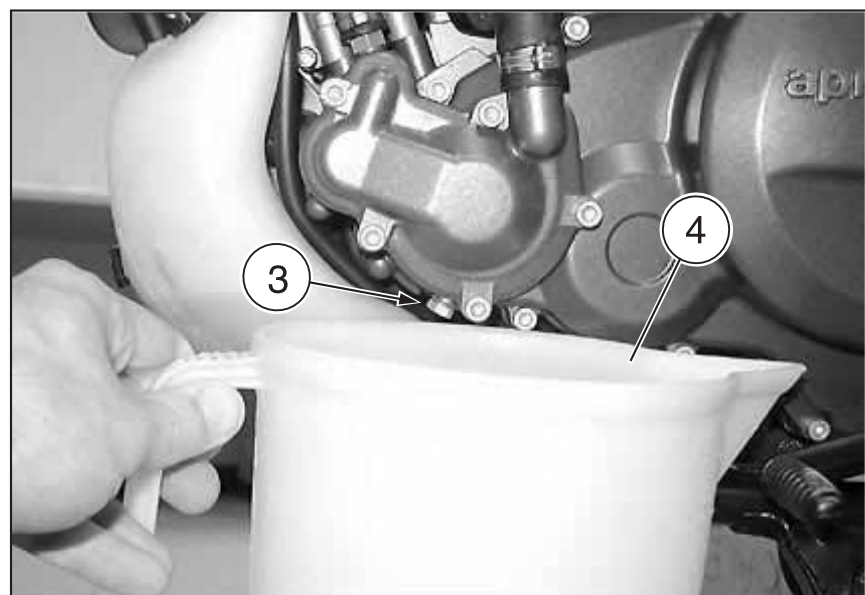
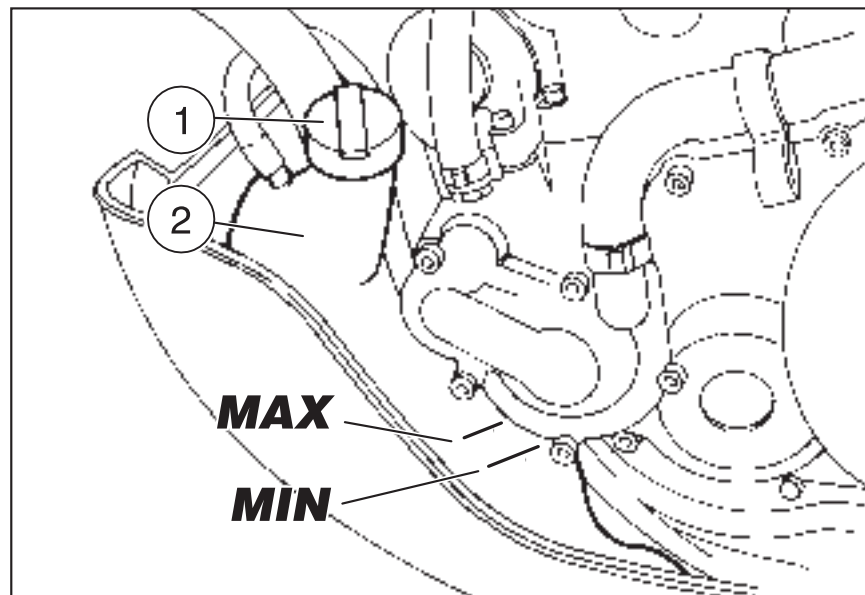
CAUTION

Do not put additives or other substances into the fluid. If you use a funnel or other similar items, make sure that they are perfectly clean.

- ◆ Top up the expansion tank by adding coolant, see 1.6 (LUBRICANT CHART), until this almost reaches the "FULL" level.

Do not exceed this level, otherwise the fluid will flow out while the engine is running.

- ◆ Put back the expansion tank filling cap (1).



CAUTION

In case of excessive consumption of coolant and in case the tank (2) remains empty, make sure that there are no leaks in the circuit.

2.14 CHANGING THE COOLANT

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.5 (COOLANT).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Coolant.

- ◆ Remove the oil sump guard, see 7.1.3 (REMOVING THE OIL SUMP GUARD).
- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).
- ◆ Place a container (4) under the drain screw (3) to catch the coolant (capacity over 2.5 ℓ).
- ◆ Unscrew and remove the drain screw (3) retrieving the copper washer.

⚠ CAUTION

Do not remove the filler cap (1) when the engine is hot as the coolant is under pressure and is very hot.

- ◆ To facilitate the fluid outflow, remove the circuit filling cap (5) and successively the expansion tank filling cap (1) positioned on the expansion tank.

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

- ◆ Reassemble the drain screw (3) with a new copper washer.

Driving torque of the coolant drain screw: 12 Nm (1.2 kgm).

- ◆ Top up through the filler neck (6) until full.
- ◆ Squeeze and release the couplings (7) (8) a few times with your hands so as to create a slight pressure and enable the coolant to flow into the pipes.
- ◆ Top up again until full.

NOTE The level is correct when the coolant stabilizes immediately below the filler neck (6).

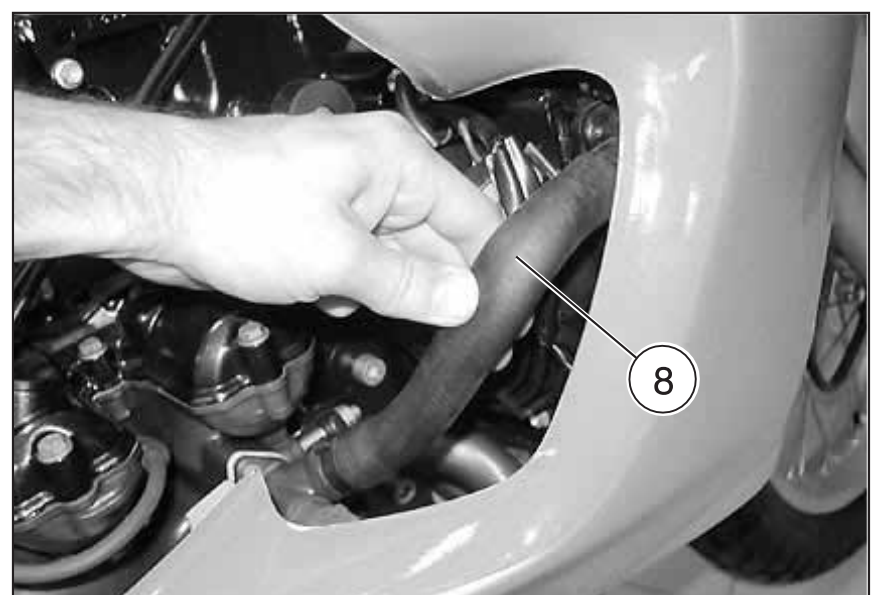
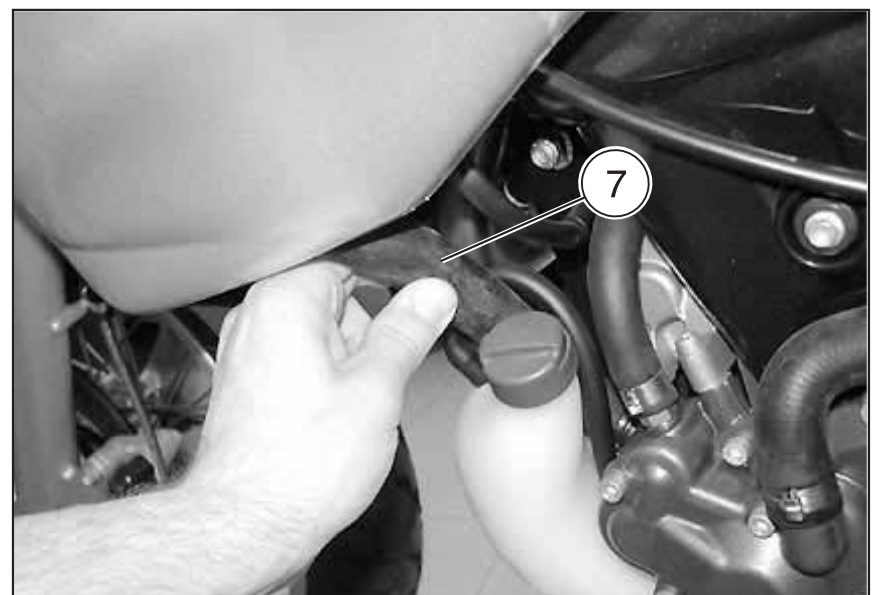
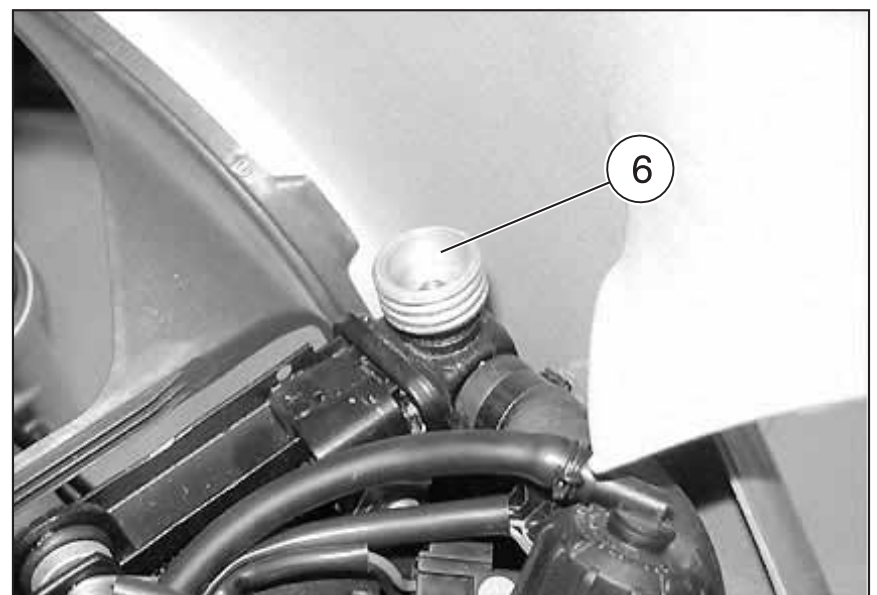
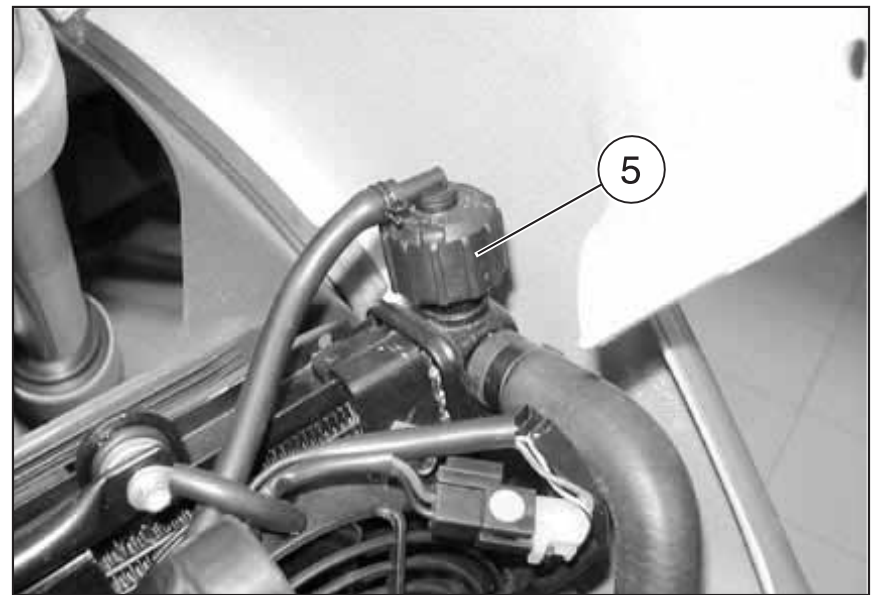
- ◆ Refit the circuit filler cap (5).
- ◆ Top up the coolant in the expansion tank, see 2.13 (CHECKING AND TOPPING UP COOLANT).
- ◆ Start the engine and let it run for a few minutes, then allow it to cool and check the level of coolant in the expansion tank again.
- ◆ If necessary, top up, see 2.13 (CHECKING AND TOPPING UP COOLANT).

Total quantity:

1.4 ℓ (including the expansion tank).

NOTE The bleeding of the system is not required for this vehicle.

For further information, see section 5 (COOLING SYSTEM).



2.15 CHECKING THE FRONT BRAKE FLUID LEVEL AND TOPPING UP

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.4 (BRAKE FLUID).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Brake fluid.

⚠ CAUTION

If the brake lever features excessive free play, if it is excessively spongy or in the event of air bubbles in the circuit, bleed the system, see 2.17 (BLEEDING THE BRAKING SYSTEMS).

The leak of brake fluid damages painted or plastic surfaces.

Before setting out, make sure that the hoses are not twisted or holed and that there are no leakage from the connectors.

Do not use or mix different types of silicone or oil-based liquids.

Do not use brake fluids taken from old containers, or not sealed.

Prevent water or dust from accidentally getting into the circuit.

CHECK

NOTE Position the vehicle on firm and flat ground.

- ◆ Keep the vehicle in vertical position and turn the handlebar, so that the fluid contained in the tank is parallel to the brake fluid tank cover.
- ◆ Make sure that the fluid level exceeds the "MIN" mark.
MIN= minimum level.

If the fluid does not reach at least the "MIN" mark:

⚠ CAUTION

When the disc pads wear out, the level of the fluid decreases progressively to compensate for their wear.

- ◆ Check the brake pad wear, see 2.21 (CHECKING THE BRAKE PAD WEAR) and the disc wear.

If the pads and/or the disc do not need replacing, provide for topping up.

TOPPING UP

⚠ CAUTION

The brake fluid may flow out of the tank. Do not operate the front brake lever if the screws (1) (2) are loose or, most important, if the brake fluid tank cover has been removed.

⚠ CAUTION

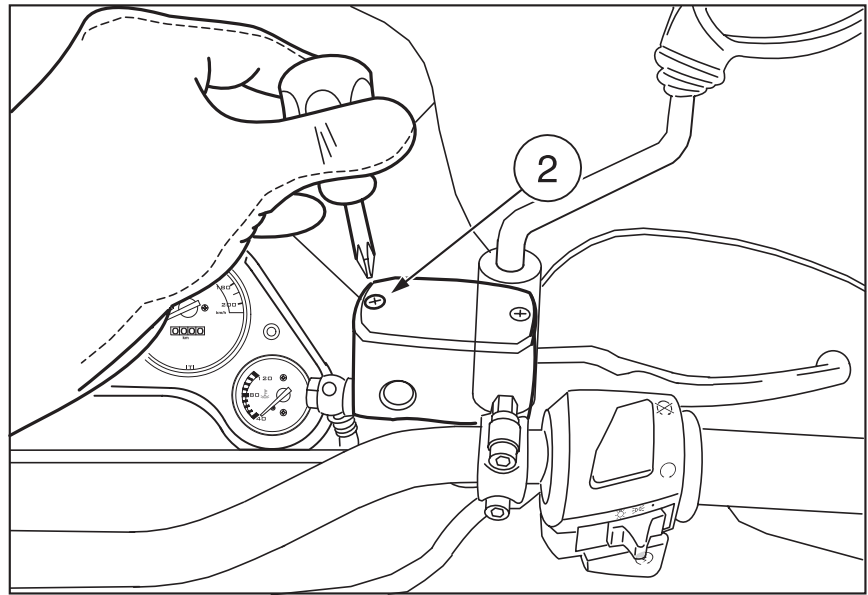
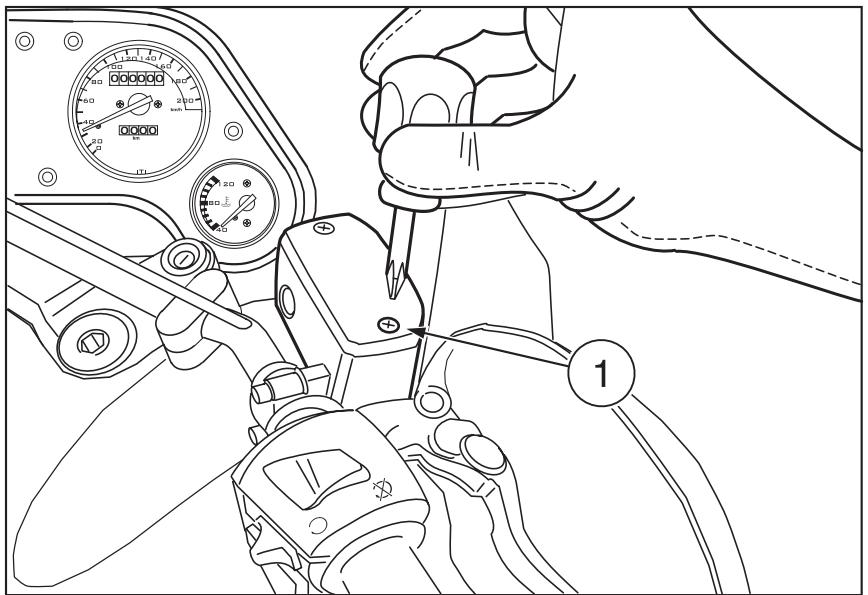
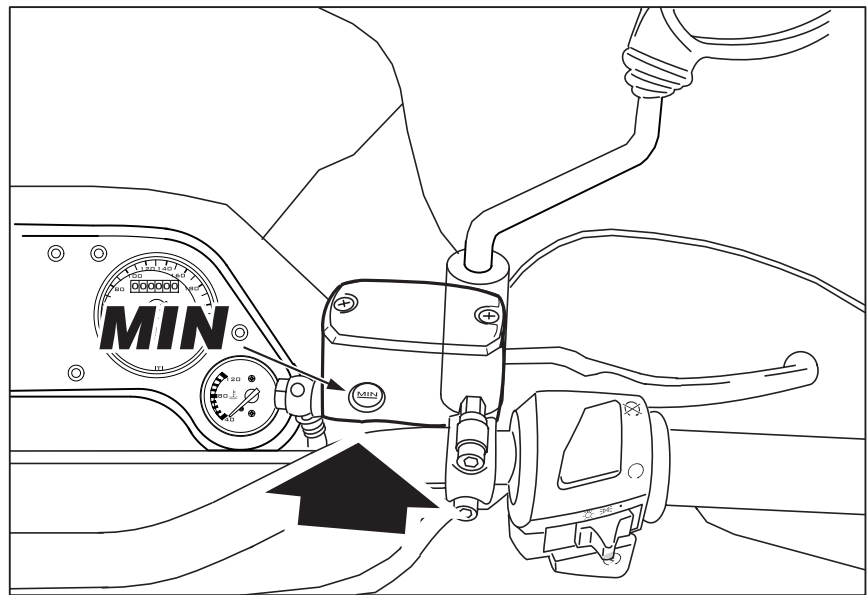
Position a cloth under the brake reservoir, in case some fluid should be spilled.

- ◆ Keep the vehicle in vertical position and turn the handlebar, so that the fluid contained in the tank is parallel to the brake fluid tank cover.
- ◆ Unscrew the screw (1), using a short, cross-tip screwdriver.
- ◆ Unscrew the screw (2).

⚠ WARNING

Avoid any prolonged exposure of the brake fluid to the air.

The brake fluid is hygroscopic and when in contact with the air it absorbs its humidity.



Pegaso 650 I.E.

Leave the brake fluid tank open **ONLY** for the time necessary for topping up.

- ◆ Raise and remove the cover (3) together with the screws (1) (2).
- ◆ Remove the gasket (4).

⚠ CAUTION

In order not to spill the brake fluid while topping up, do not shake the vehicle.

Do not put additives or other substances into the fluid. If you use a funnel or other similar items, make sure that they are perfectly clean.

NOTE In order to reach the “MAX” level, top up until covering the glass (5) completely, with the brake fluid reservoir rim parallel to the ground.

- ◆ Fill the tank (6) with brake fluid, see 1.6 (LUBRICANT CHART), until reaching the correct level.

⚠ CAUTION

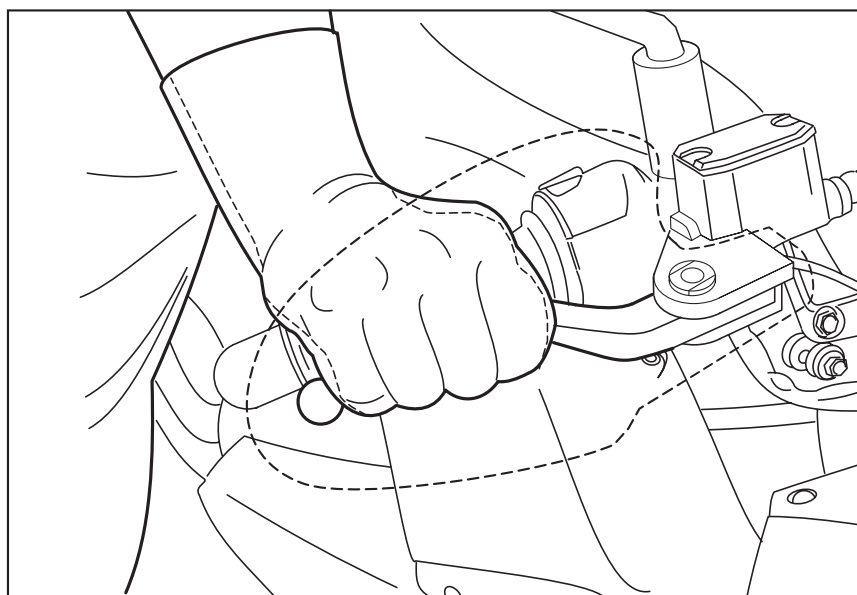
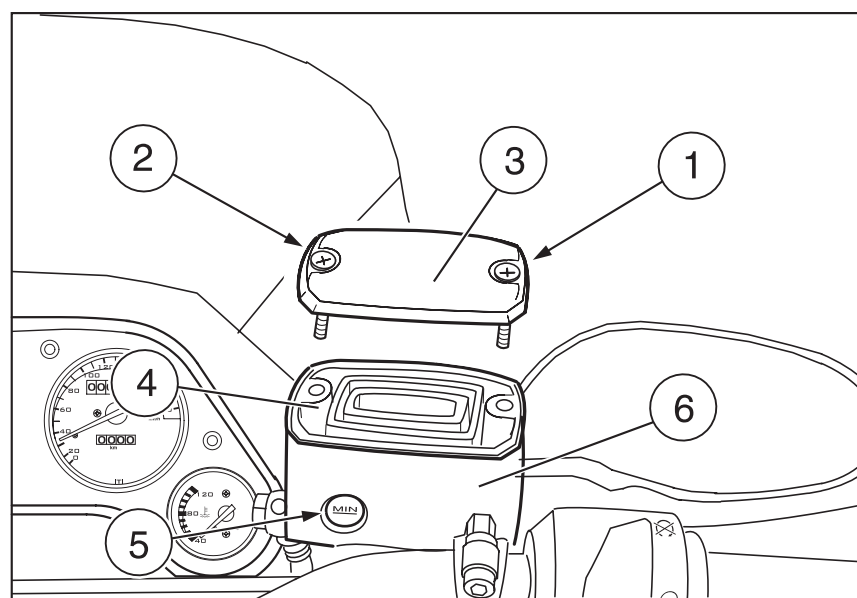
Do not exceed the “MAX” level while topping up. It is advisable to top up until reaching the “MAX” level only with new pads.

Do not reach the “MAX” level with worn out pads, since this will cause a fluid outflow when the pads are changed.

- ◆ Put back the gasket (4) in its seat correctly.
- ◆ Put back the cover (3).
- ◆ Screw and tighten the screw (2).
- ◆ Screw and tighten the screw (1).

⚠ WARNING

Check the braking efficiency.



2.16 CHECKING AND TOPPING UP THE REAR BRAKE FLUID

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Brake fluid.

⚠ CAUTION

If the brake lever features excessive free play, if it is excessively spongy or in the event of air bubbles in the circuit, bleed the system, see 2.17 (BLEEDING THE BRAKING SYSTEMS).

The leak of brake fluid damages painted or plastic surfaces.

Before setting out, make sure that the hoses are not twisted or holed and that there are no leakage from the connectors.

Do not use or mix different types of silicone or oil-based liquids.

Do not use brake fluids taken from old containers, or not sealed.

Prevent water or dust from accidentally getting into the circuit.

CHECK

- ◆ Remove the right side panel, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).
- ◆ Keep the vehicle in vertical position.
- ◆ Make sure that the fluid level exceeds the "MIN" mark.

MIN= minimum level
MAX= maximum level

If the fluid does not reach at least the "MIN" mark:

⚠ CAUTION

When the disc pads wear out, the level of the fluid decreases progressively to compensate for their wear.

- ◆ Check the brake pad wear, 2.21 (CHECKING THE BRAKE PAD WEAR) and the disc wear.

If the pads and/or the disc do not need replacing, provide for topping up.

TOPPING UP

Carefully read 1.2.4 (BRAKE FLUID).

⚠ CAUTION

The brake fluid may flow out of the tank. Do not pull the rear brake lever if the brake fluid tank cover has been removed.

⚠ WARNING

Avoid any prolonged exposure of the brake fluid to the air.

The brake fluid is hygroscopic and when in contact with the air it absorbs its humidity.

Leave the brake fluid tank open ONLY for the time necessary for topping up.

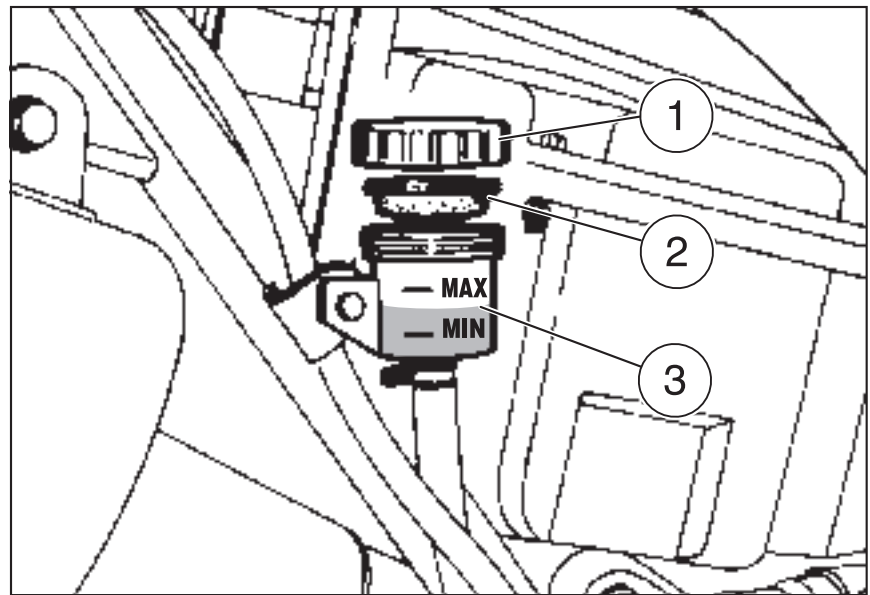
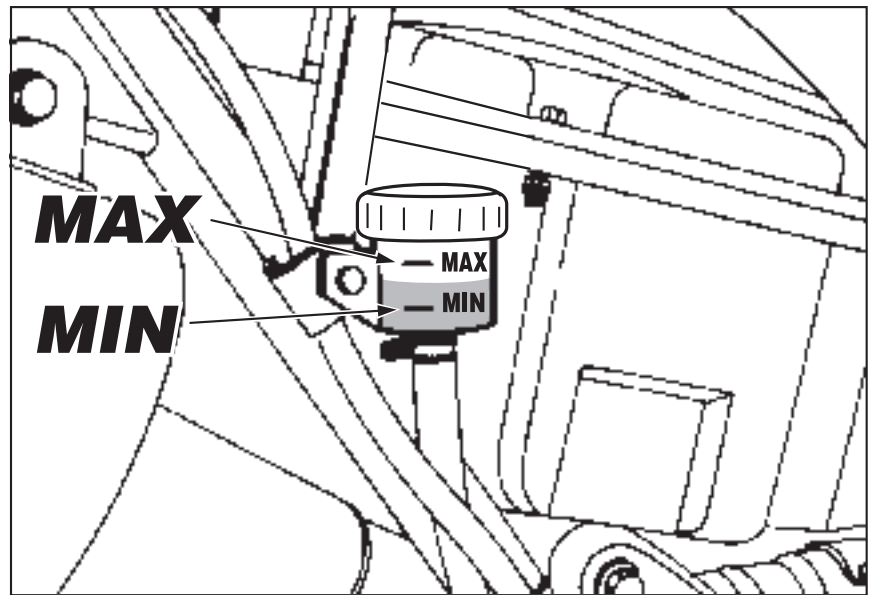
- ◆ Unscrew and remove the plug (1).
- ◆ Remove the gasket (2).

⚠ CAUTION

In order not to spill the brake fluid while topping up, keep the fluid in the tank parallel to the tank rim (in horizontal position).

Do not put additives or other substances into the fluid.

If you use a funnel or other similar items, make sure that they are perfectly clean.



- ◆ Fill the tank (3) with brake fluid, see 1.6 (LUBRICANT CHART), until reaching the correct level between the "MIN" and "MAX" marks.

⚠ CAUTION

It is advisable to top up until reaching the "MAX" level only with new pads.

Do not reach the "MAX" level with worn out pads, since this will cause a fluid outflow when the pads are changed.

Check the braking efficiency.

2.17 BLEEDING THE BRAKING SYSTEMS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.6 (CLUTCH FLUID).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Braking systems;
- Brake fluid.

The air present in the hydraulic system acts as a bearing, absorbing most of the pressure exerted by the brake pump and reducing the effectiveness of the caliper action during braking.

The presence of air is revealed by the "sponginess" of the brake lever and with the reduced braking capacity.

⚠ WARNING

Considering the danger for both rider and vehicle, it is absolutely essential to bleed the hydraulic circuit once the brakes have been refitted and the braking system restored to its normal conditions.

If the brake fluid gets in contact with the skin or the eyes, it can cause serious irritations.

Carefully wash the parts of your body that get in contact with the liquid. Consult a doctor or an oculist if the liquid gets in contact with your eyes.

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

⚠ CAUTION

Handle brake fluid with care; it may chemically alter painted surfaces and the parts in plastic, rubber, etc. In case any maintenance operation has to be carried out, it is advisable to use latex gloves.

When using the brake fluid, take care not to spill it on the plastic or painted parts, since it can damage them.

NOTE This vehicle is provided with disc brakes with two, front and rear braking systems having separate hydraulic circuits.

The front braking system is with single disc (left side).
The rear braking system is with single disc (right side).

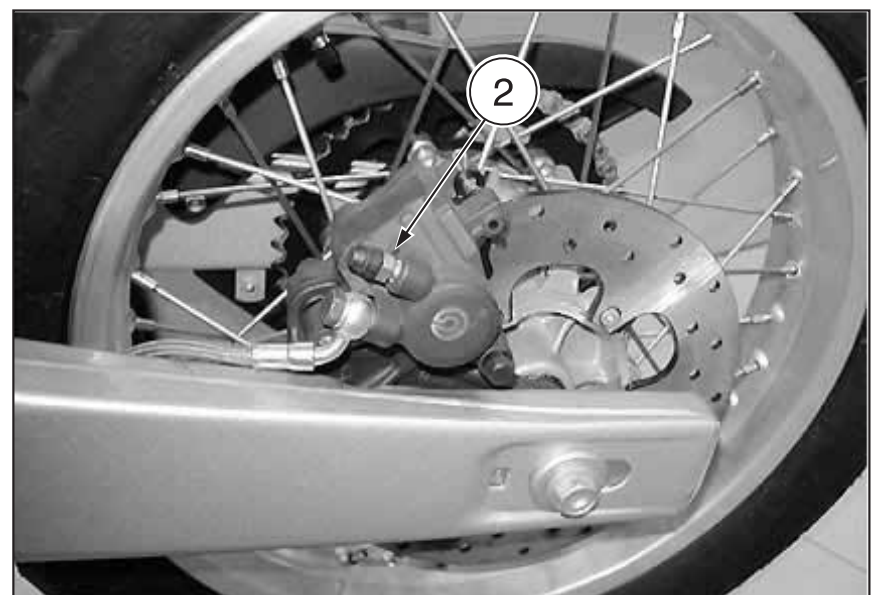
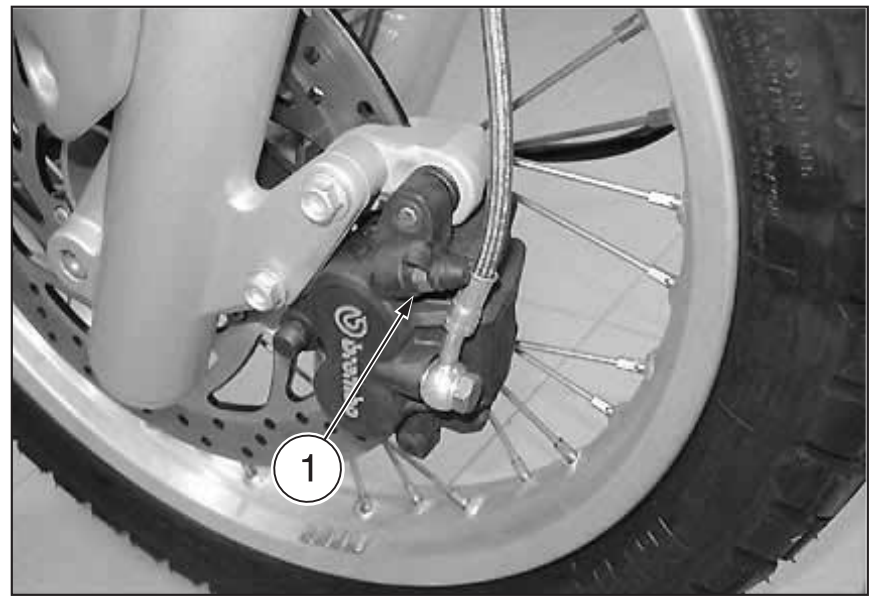
FRONT BRAKING SYSTEM

The front braking system is equipped with a single bleeder valve (1) positioned on the front brake caliper.

REAR BRAKING SYSTEM

The rear braking system is equipped with a single bleeder valve (2) positioned on the rear brake caliper.

Follow ►



Follow ►

2.17.1 BLEEDING OPERATIONS

There are three bleeding procedures to be carried out in the order indicated below:

1°) BLEEDING THE SYSTEMS

NOTE The description of the system bleeding procedures also includes instructions on how to find out if it is necessary to bleed the brake caliper and the brake pump.

2°) BRAKE CALIPER BLEEDING

3°) BRAKE PUMP BLEEDING

CAUTION

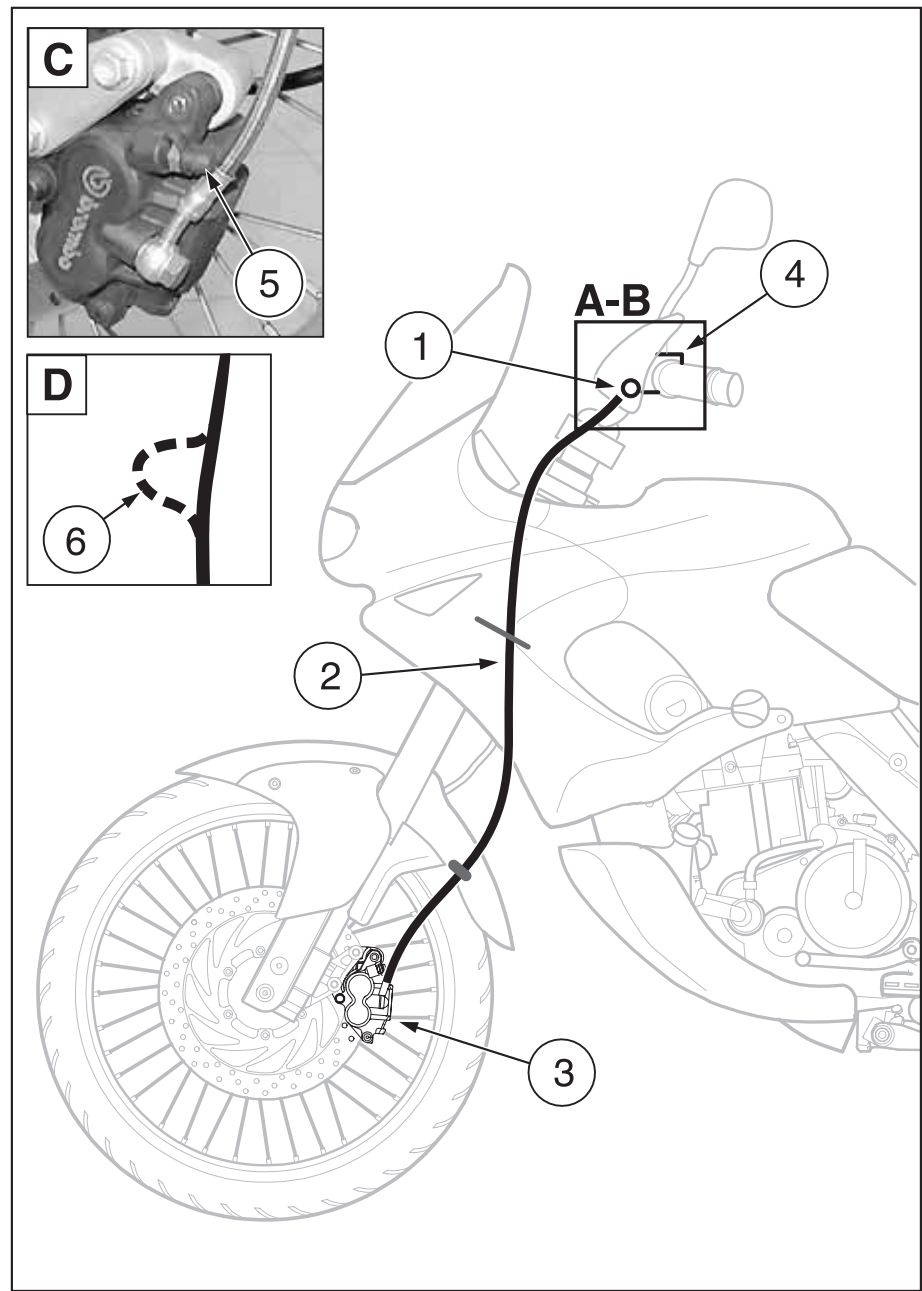
Do not reverse the order indicated above.

GENERAL CONDITIONS

Before proceeding, make sure that the conditions indicated below are respected:

NOTE Carry out the bleeding operations with the vehicle positioned on the side stand and on firm and flat ground.

- A) the brake pump (1) must be in a higher position with respect to the entire brake pipe (2) and to the brake caliper (3), or at least the height difference must be reduced to the minimum;
- B) the brake fluid reservoir (4) must be in a higher position with respect to the brake pump (1);
- C) the caliper bleeder valve (5) must be in a higher position than the caliper itself (3);
- D) the brake pipe must not present curves in the shape of an "overturned U" (6).

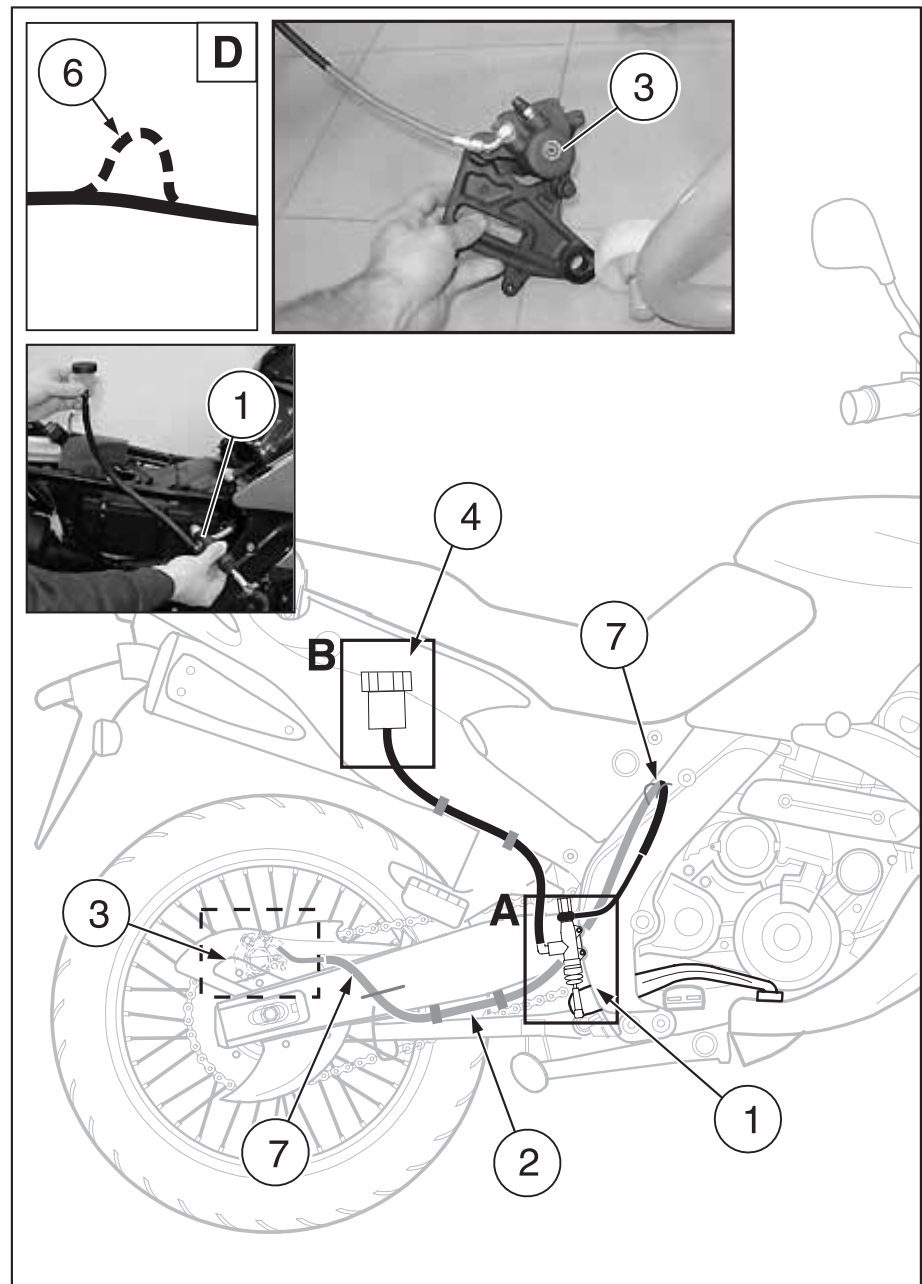


Only for the rear braking system.

With reference to condition (D): to comply with condition (D) it is necessary to eliminate the curves (7) by removing the rear brake caliper (3) and the rear brake pump (1).

- ◆ Partially remove the rear brake caliper, see 7.6.5 (REMOVING THE REAR BRAKE CALIPER).
- ◆ Partially remove the rear brake pump, see 7.6.4 (REMOVING THE REAR BRAKE PUMP).

NOTE During the bleeding operations keep the rear brake pipe as straight as possible.



Follow ►

BLEEDING THE SYSTEMS

NOTE Do not work on both braking systems at the same time. The operations refer to a single braking system, but are valid for both (with the differences indicated).

NOTE Do not close the brake fluid reservoir after topping up, since for the bleeding operations it is necessary to top up the brake fluid reservoir more than once.

- ◆ Top up the brake fluid tank, see 2.15 (CHECKING THE FRONT BRAKE FLUID LEVEL AND TOPPING UP) or 2.16 (CHECKING AND TOPPING UP THE REAR BRAKE FLUID).

⚠ WARNING

Always wear goggles or a protective screen for the eyes: when the brake lever (or the brake pads) is operated, part of the brake fluid may be sprayed out of the brake fluid reservoir.

⚠ CAUTION

Position a clean cloth under the brake fluid reservoir to protect the components positioned in the surrounding area.

NOTE For the rear braking system only. Position a metal spacer having the same thickness as the brake disc between the brake pads.

- ◆ Slowly operate the brake lever (8) (for the front brake, or the brake pump rod for the rear brake) more than once, in order to fill the system with brake fluid and to carry out a first partial bleeding.

⚠ CAUTION

Make sure that the brake fluid level is always included between the MIN and MAX marks; otherwise, provide for topping up.

⚠ WARNING

Do not turn the handlebar in different positions. The brake fluid may flow out of the tank from the tank.

- ◆ Remove the protection cap (9) from the bleeder valve (5).
- ◆ Connect a transparent pipe (10) to the bleeder valve (5).
- ◆ Position the free end of the transparent pipe (10) into a container (11).
- ◆ * Pull the brake lever (8) (for the front brake, or the brake pump rod for the rear brake) moderately and thoroughly, then keep it completely pulled.

⚠ WARNING

Check the brake fluid level in the tank. Top up before draining the brake fluid reservoir completely. The complete drainage of the fluid causes the inlet of air into the hydraulic circuit.

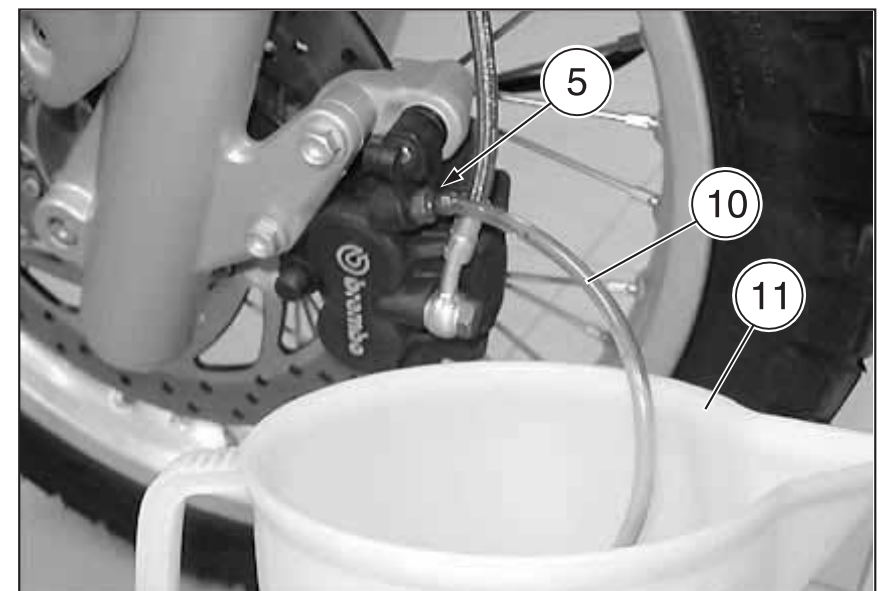
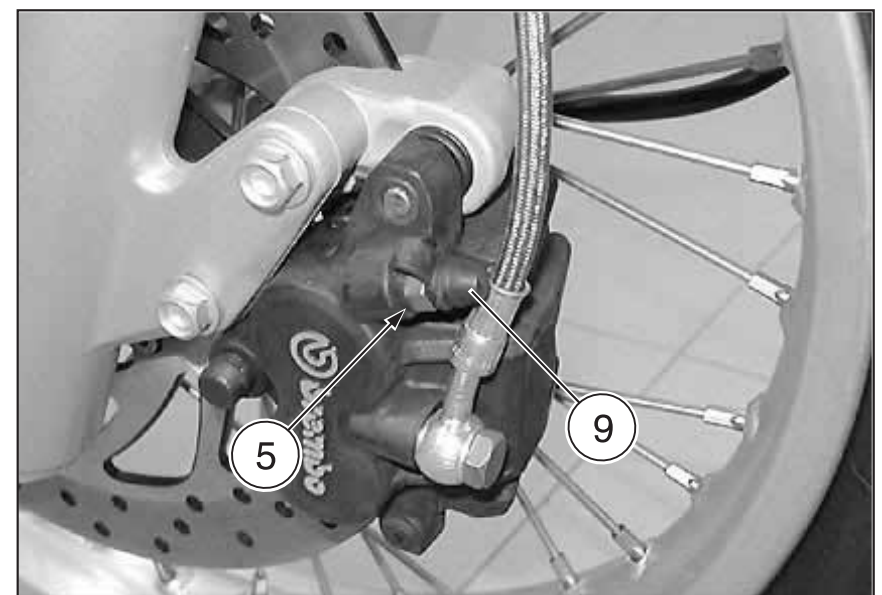
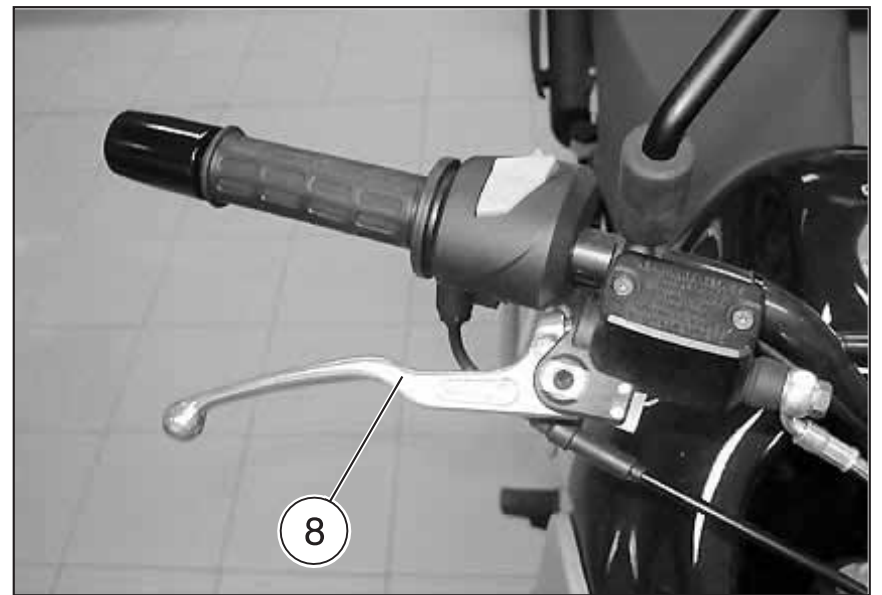
NOTE Always keep the brake lever (8) (for the front brake, or the brake pump rod for the rear brake) completely pulled.

⚠ CAUTION

Do not dirty the brake pads or disc with brake fluid.

⚠ CAUTION

Before releasing the brake lever (8) (for the front brake, or the brake pump rod for the rear brake), tighten the bleeder valve (5) to prevent air from getting into the hydraulic circuit.



- ◆ * Loosen the bleeder valve (5) and tighten it when a small quantity of brake fluid (sufficient to verify the presence of air bubbles) has flown out of the same.

Follow ►

Follow ►

- ◆ * Release the brake lever (8) (for the front brake, or the brake pump rod for the rear brake) and pull it three or four times.
- ◆ Repeat the operations marked with "*", until no air bubbles can be seen in the brake fluid that flows out of the bleeder valve.

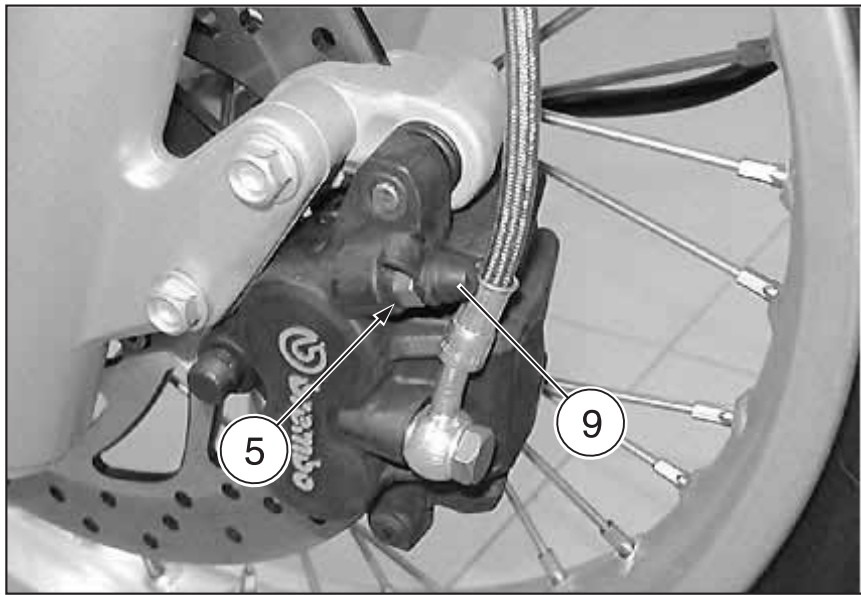
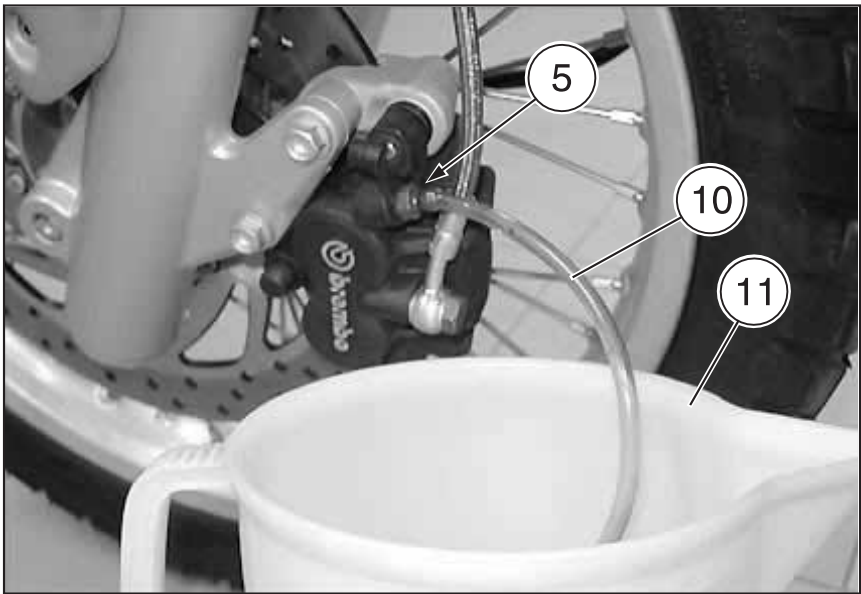
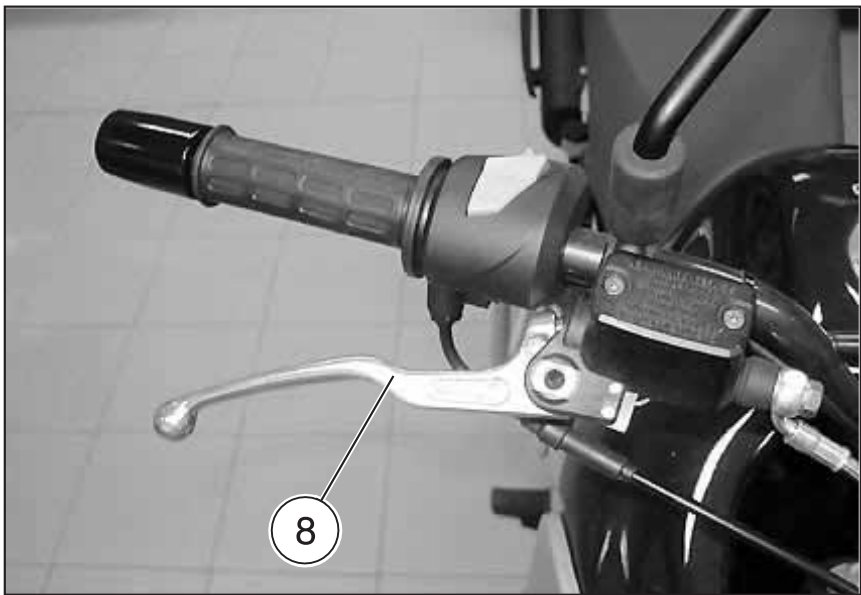
NOTE During the performance of these operations, more and more resistance will be met when operating the brake lever (8) (for the front brake, or the brake pump rod for the rear brake). The resistance is due to the air escape from the braking system.

If no air bubbles can be noticed in the brake fluid:

- ◆ Top up the brake fluid tank, see 2.15 (CHECKING THE FRONT BRAKE FLUID LEVEL AND TOPPING UP) or 2.16 (CHECKING AND TOPPING UP THE REAR BRAKE FLUID).
- ◆ Correctly close the rear brake reservoir.

CHECK THE BLEEDING SYSTEMS

- a) If no air bubbles can be noticed in the fluid that flows out of the bleeder valve, but the brake lever (8) (for the front brake, or brake pump rod for the rear brake) is still too soft to operate, it is necessary to:
- bleed the brake caliper, see BLEEDING THE BRAKE CALIPER;
 - bleed the brake pump, see BLEEDING THE FRONT BRAKE PUMP or BLEEDING THE REAR BRAKE PUMP;



⚠ CAUTION

Carry out these operations in the order indicated. The performance of one of the two operations does not exclude the performance of the other.

- b) If the resistance met when pulling the brake lever (8) (for the front brake, or the brake pump rod for the rear brake) is correct, this means that the system does not need further bleeding.

⚠ CAUTION

Clean the transparent pipe (for its whole length) and the bleeder valve, removing any residue of brake fluid.

- ◆ Remove the transparent pipe (10).
- ◆ **Only for the rear braking system:**
 - Put back the rear brake caliper, see 7.6.5 (REMOVING THE REAR BRAKE CALIPER).
 - Reassemble the rear wheel, see 7.3.1 (REMOVING THE REAR WHEEL).
- ◆ Tighten the bleeder (5) to prescribed driving torque.

Brake front caliper bleeder valve driving torque: 15 Nm (1.5 kgm).

- ◆ Position the protection cap (9) on the bleeder valve (5).

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

- ◆ Empty the container (11) into a suitable receptacle for the collection of used brake fluid.

Carefully read 2.17.2 (CHECKS TO BE CARRIED OUT AFTER BLEEDING THE BRAKING SYSTEMS).

Follow ►

Follow ►

BLEEDING THE BRAKE CALIPER

NOTE Do not work on both braking systems at the same time. The operations refer to a single braking system, but are valid for both (with the differences indicated).

For the front braking system, the operations described should be carried out on both brake calipers.

Do not remove the two front brake calipers at the same time.

- ◆ **Only for the front braking system.** Partially remove the front brake caliper, see 7.5.5 (REMOVING THE FRONT BRAKE CALIPERS).
- ◆ **For the rear braking system only.** The rear brake caliper has already been removed during the bleeding of the system.
- ◆ Make sure that the transparent pipe (10) is connected to the bleeder valve (5) and that the free end of the pipe is into the container (11).

CAUTION

Do not use tools (screwdrivers, punches, etc.) that may damage the pads.

Proceed with care, in order not to damage the brake pads.

- ◆ ✘ Open the brake pads (13) (Pos.A) and keep them in this position by means of a fork spanner (12).

CAUTION

Before releasing the brake pads, tighten the bleeder valve (5) to prevent air from getting into the hydraulic circuit.

- ◆ ✘ Loosen the bleeder valve (5) and tighten it when a small quantity of brake fluid (sufficient to verify the presence of air bubbles) has flown out of the same.

If air bubbles can be noticed in the brake fluid:

CAUTION

Clean and degrease the metal spacer (14), in order to avoid dirtying the brake pads.

- ◆ Position a metal spacer (14) having the same thickness as the brake disc between the brake pads.
- ◆ Pull the brake lever (9) (for the front brake, or the brake pump rod for the rear brake) until feeling the presence of pressure in the system.

CAUTION

Make sure that the brake fluid level is always included between the MIN and MAX marks; otherwise, provide for topping up.

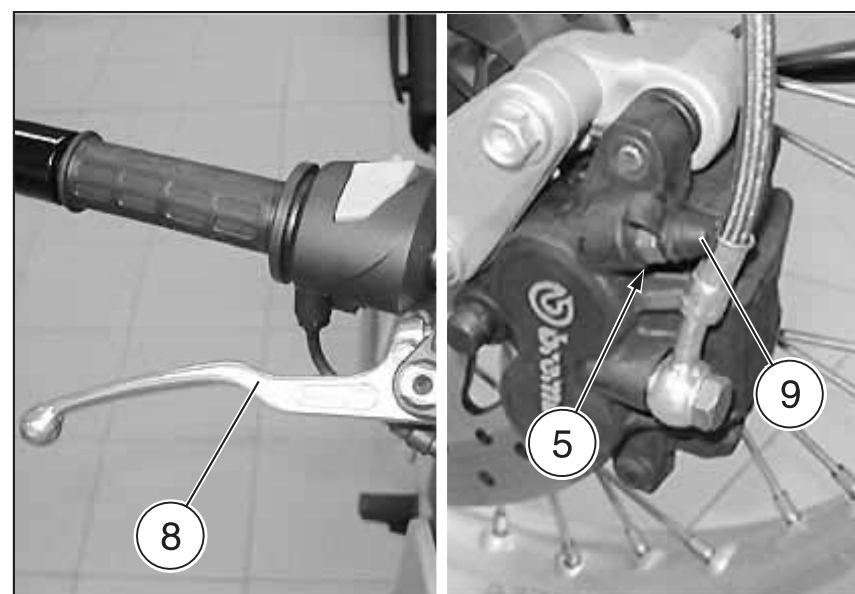
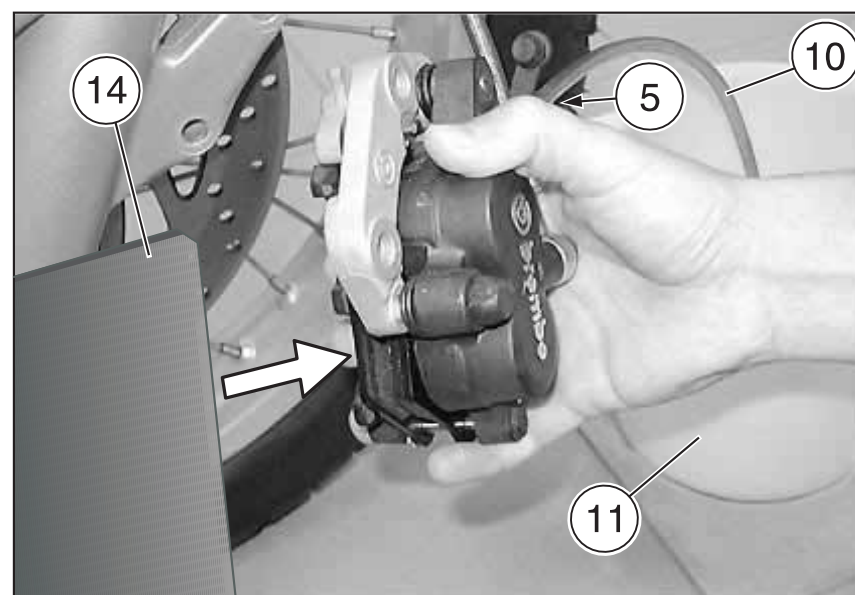
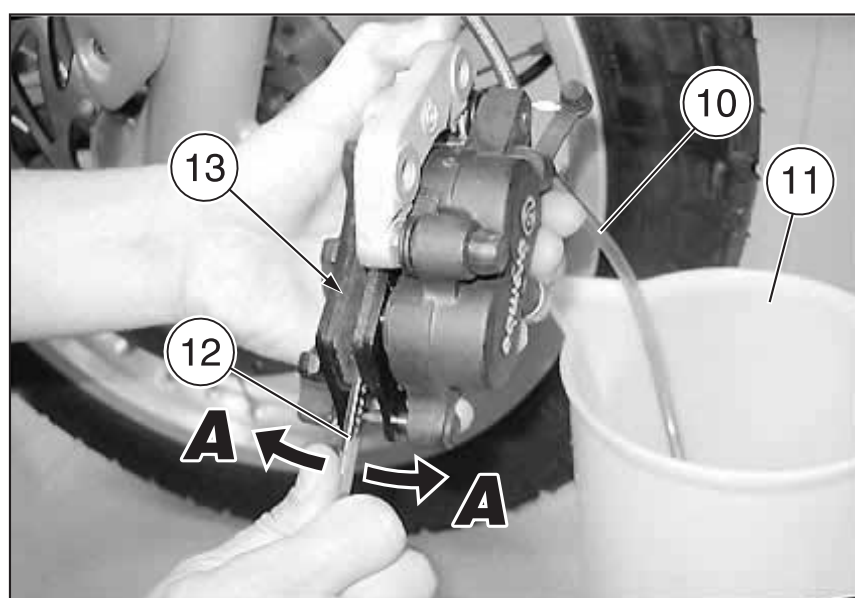
- ◆ Repeat the operations marked with "✘".

If no air bubbles can be noticed in the brake fluid:

The bleeding of the brake caliper has been carried out correctly.

CAUTION

Clean the transparent pipe (for its whole length) and the bleeder valve, removing any residue of brake fluid.



- ◆ Remove the transparent pipe (10).
- ◆ Tighten the bleeder (5) to prescribed driving torque.

Brake front caliper bleeder valve driving torque: 15 Nm (1.5 kgm).

- ◆ Position the protection cap (9) on the bleeder valve (5).
- ◆ Bleed the brake pump, see BLEEDING THE FRONT BRAKE PUMP or BLEEDING THE REAR BRAKE PUMP;

Follow ►

Follow ►

BLEEDING THE FRONT BRAKE PUMP

NOTE Do not close the front brake fluid reservoir after topping up, since for the bleeding operations it is necessary to top up the brake fluid reservoir more than once.

- ◆ Top up the brake fluid tank, see 2.15 (CHECKING THE FRONT BRAKE FLUID LEVEL AND TOPPING UP).

⚠ WARNING

Always wear goggles or a protective screen for the eyes: when the brake lever (or the brake pads) is operated, part of the brake fluid may be sprayed out of the brake fluid reservoir.

⚠ CAUTION

Position a clean cloth under the brake fluid reservoir to protect the components positioned in the surrounding area.

Be careful to avoid any brake fluid leakage from the reservoir.

⚠ CAUTION

Do not use tools (screwdrivers, punches, etc.) that may damage the pads.

Proceed with care, in order not to damage the brake pads.

- ◆ ■ Open the front brake pads (13) (Pos.A) and keep them in this position by means of a fork spanner (12), then check if air bubbles come out of the hole (15) provided on the front brake fluid reservoir (4).

If air bubbles can be noticed in the brake fluid:

⚠ CAUTION

Clean and degrease the metal spacer (14), in order to avoid dirtying the brake pads.

- ◆ Position a metal spacer (14) having the same thickness as the brake disc between the brake pads.
- ◆ Pull the front brake lever (8) until feeling the presence of pressure in the system.

⚠ CAUTION

Make sure that the brake fluid level is always included between the MIN and MAX marks; otherwise, provide for topping up.

- ◆ Repeat the operations marked with "■".

If no air bubbles can be noticed in the brake fluid:

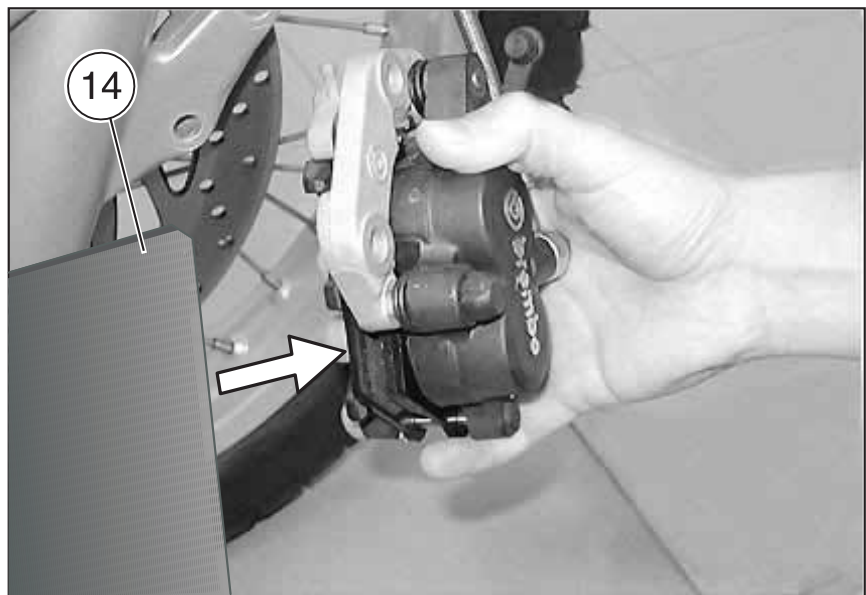
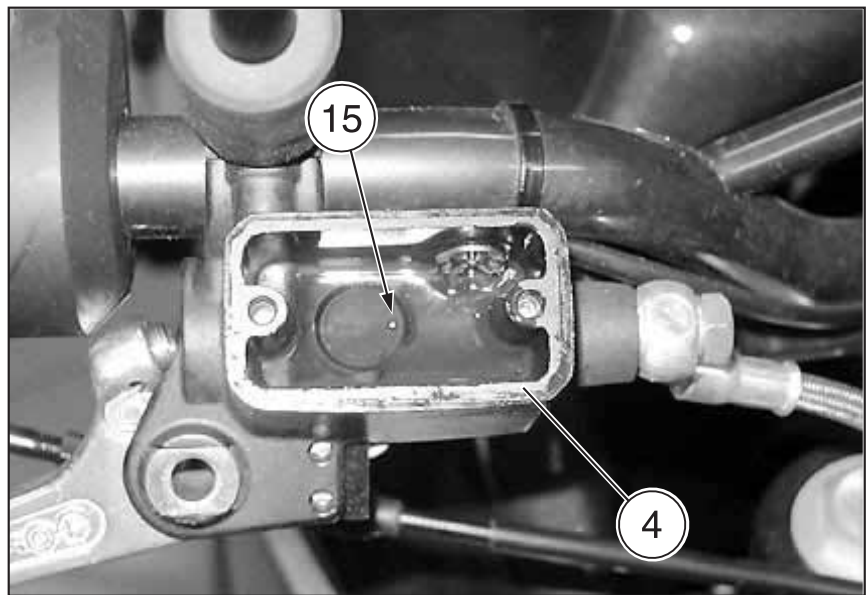
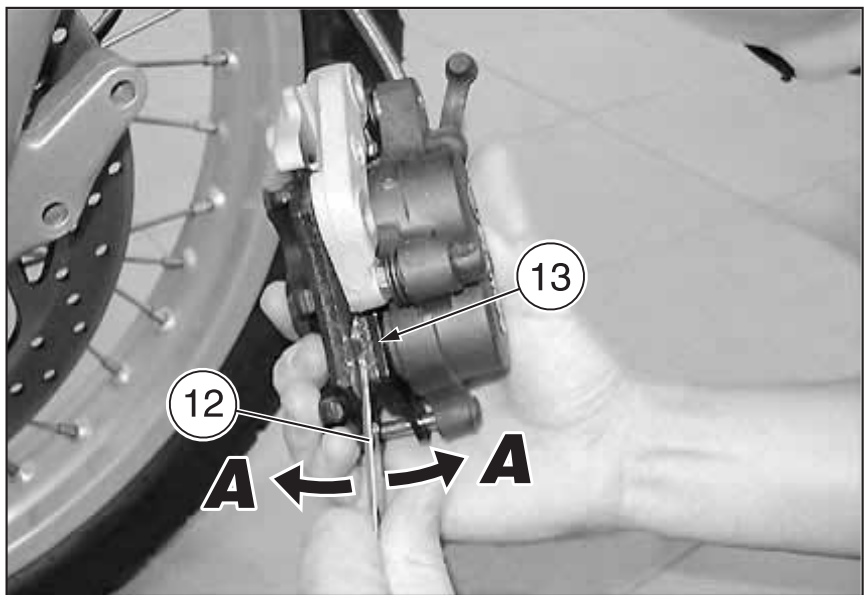
The bleeding of the front brake pump has been carried out correctly.

- ◆ Put back the front brake calipers, see 7.5.4 (REMOVING THE FRONT BRAKE PUMP).
- ◆ Top up the front brake fluid tank, see 2.15 (CHECKING THE FRONT BRAKE FLUID LEVEL AND TOPPING UP).
- ◆ Correctly close the front brake reservoir (4).

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

Carefully read 2.17.2 (CHECKS TO BE CARRIED OUT AFTER BLEEDING THE BRAKING SYSTEMS).

Follow ►



Follow ►

BLEEDING THE REAR BRAKE PUMP

NOTE Do not close the brake fluid reservoir after topping up, since for the bleeding operations it is necessary to top up the brake fluid reservoir more than once.

- ◆ Top up the rear brake fluid tank, see 2.16 (CHECKING AND TOPPING UP THE REAR BRAKE FLUID).

▲ WARNING

Always wear goggles or a protective screen for the eyes: when the brake lever (or the brake pads) is operated, part of the brake fluid may be sprayed out of the brake fluid reservoir.

▲ CAUTION

Do not force the brake pipes.

- ◆ Move the brake pump, positioning the brake pump rod (16) higher than the brake pump (Pos.B).

▲ CAUTION

Do not use tools (screwdrivers, punches, etc.) that may damage the pads.

Proceed with care, in order not to damage the brake pads.

Be careful to avoid any brake fluid leakage from the reservoir.

- ◆ ▲ Open the rear brake pads (17) (Pos.A) and keep them in this position by means of a fork spanner (12), then check if air bubbles come out of the hole (18) provided on the rear brake fluid reservoir (19).

If air bubbles can be noticed in the brake fluid:

▲ CAUTION

Clean and degrease the metal spacer (14), in order to avoid dirtying the brake pads.

- ◆ Position a metal spacer (14) having the same thickness as the brake disc between the brake pads.
- ◆ Push the brake pump rod (16) firmly towards the brake pump (Pos.C), until feeling the presence of pressure in the system.

▲ CAUTION

Make sure that the brake fluid level is always included between the MIN and MAX marks; otherwise, provide for topping up.

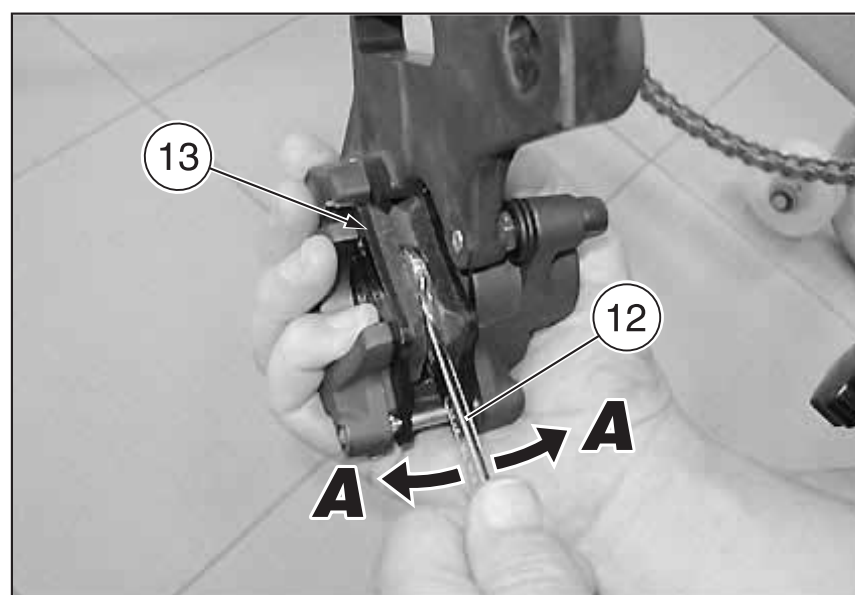
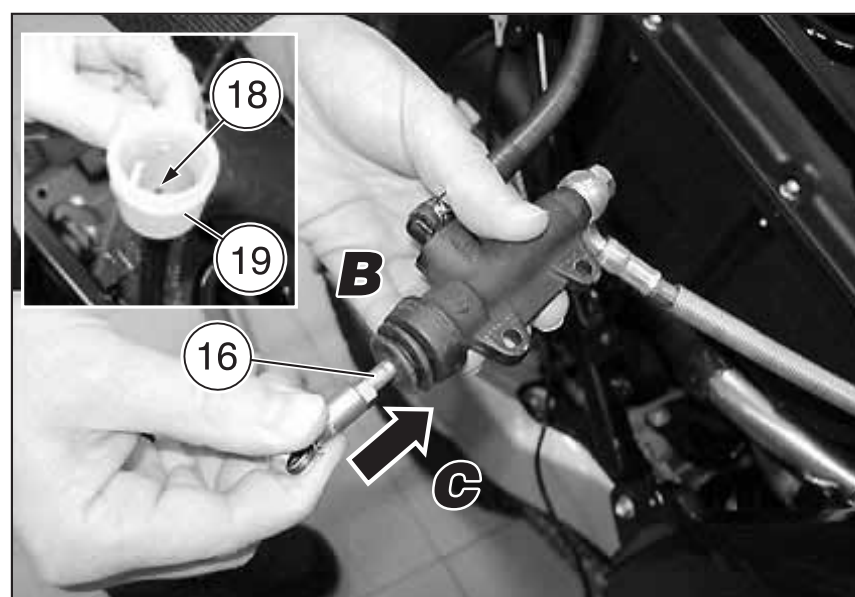
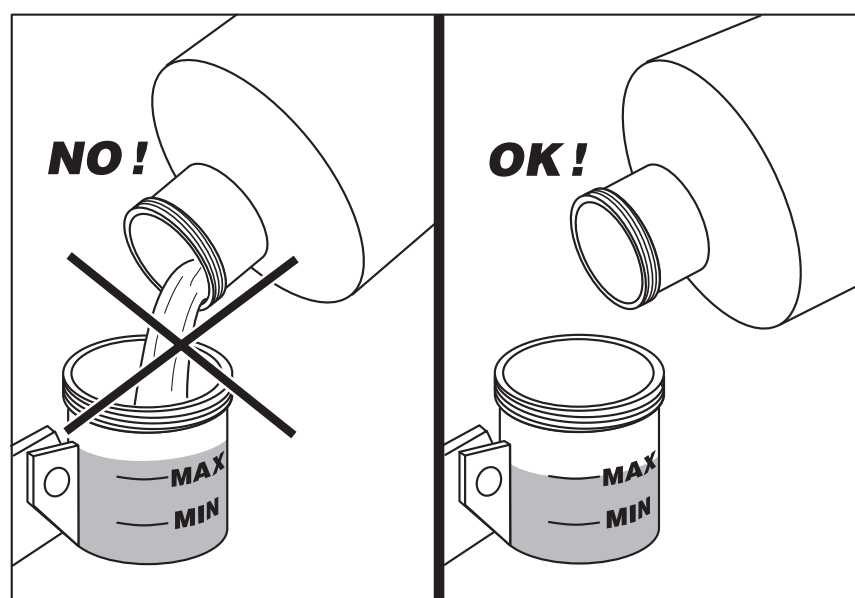
- ◆ Remove the spacer (14).
- ◆ Repeat the operations marked with “▲”.

If no air bubbles can be noticed in the brake fluid:

The bleeding of the rear brake pump has been carried out correctly.

- ◆ Remove the rear brake pump, see 7.6.4 (REMOVING THE REAR BRAKE PUMP).

Follow ►



Follow ►

- ◆ Put back the rear brake caliper, see 7.6.5 (REMOVING THE REAR BRAKE CALIPER).
- ◆ Reassemble the rear wheel, see 7.3.1 (REMOVING THE REAR WHEEL).
- ◆ Top up the rear brake fluid tank, see 2.16 (CHECKING AND TOPPING UP THE REAR BRAKE FLUID).
- ◆ Correctly close the rear brake reservoir (19).

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

Carefully read 2.17.2 (CHECKS TO BE CARRIED OUT AFTER BLEEDING THE BRAKING SYSTEMS).

2.17.2 CHECKS TO BE CARRIED OUT AFTER BLEEDING THE BRAKING SYSTEMS

After bleeding the braking systems, keep to the following indications.

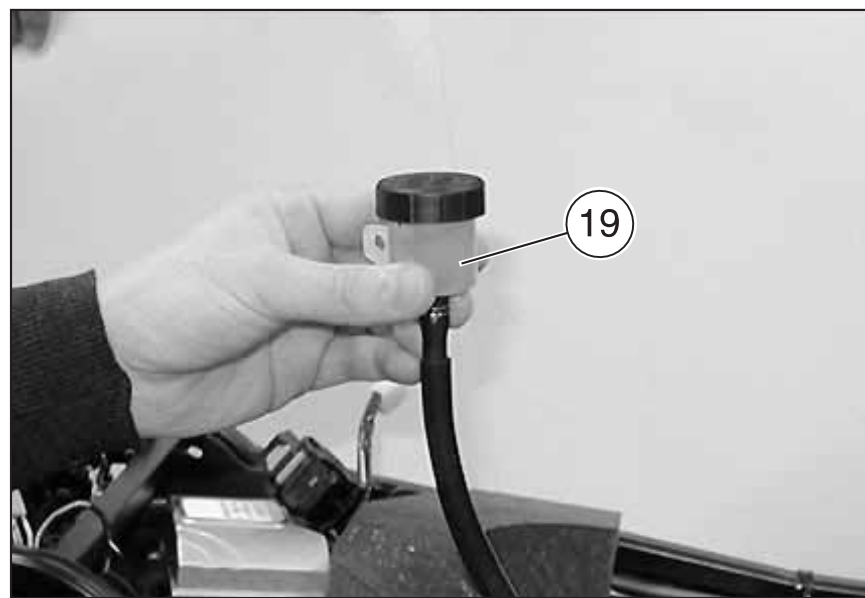
Make sure that the brake discs and the brake pads are completely free of grease or oil.

⚠ WARNING

Pull the brake lever (for the front brake, or the brake pump rod for the rear brake) repeatedly and verify the correct operation of the braking system.

⚠ WARNING

Have a test ride at moderate speed in a low-traffic area.



2.18 CHANGING THE FRONT BRAKE FLUID

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.4 (BRAKE FLUID).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Brake fluid.

⚠ CAUTION

Handle brake fluid with care; it may chemically alter painted surfaces and the parts in plastic, rubber, etc.

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

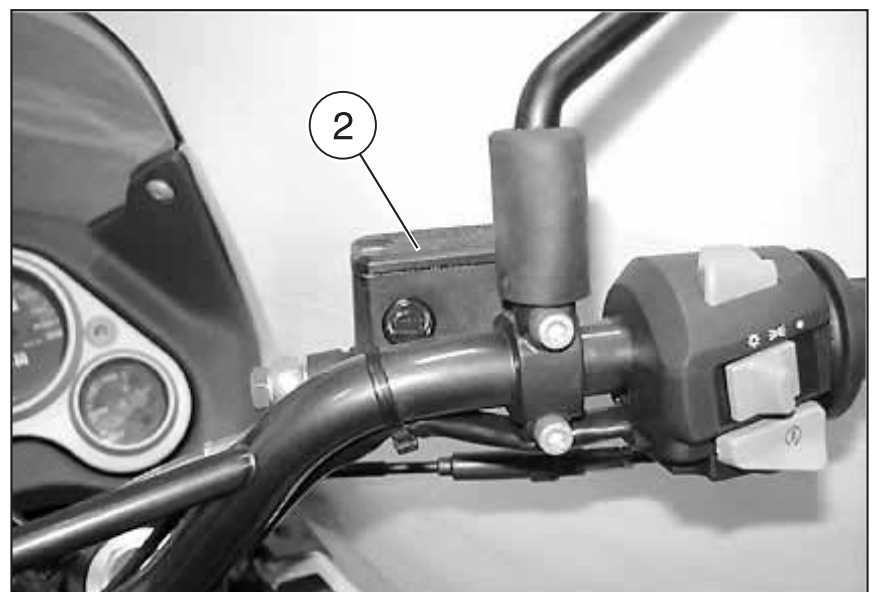
- ◆ Remove the plastic protection cap.
- ◆ Insert a transparent plastic tube on the bleeder (1) of the caliper and put the other end of the tube in a container.
- ◆ ★ Loosen the bleeder (1) approx. one turn.

NOTE Make sure that there is always fluid in the tank during the operation; otherwise, once finished, the system will need bleeding, see 2.17 (BLEEDING THE BRAKING SYSTEMS).

- ◆ Keep an eye on the tank (2) as the fluid flows out and tighten the bleeder (1) before it empties entirely.
- ◆ Top up the tank (2), see 2.15 (CHECKING THE FRONT BRAKE FLUID LEVEL AND TOPPING UP).
- ◆ Loosen the bleeder (1) again approx. half a turn.
- ◆ Watch as the liquid flows out through the tube and as soon as the colour of the fluid starts to change (from dark to light), tighten the bleeder (1) again and remove the tube.

Brake front caliper bleeder valve driving torque: 15 Nm (1.5 kgm).

- ◆ Refit the rubber protection cap.
- ◆ Top up the fluid tank (2) to the right level, see 2.15 (CHECKING THE FRONT BRAKE FLUID LEVEL AND TOPPING UP).



2.19 CHANGING THE REAR BRAKE FLUID

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.4 (BRAKE FLUID).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Brake fluid.

⚠ CAUTION

Handle fluid with care; it may chemically alter painted surfaces and the parts in plastic, rubber, etc.

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

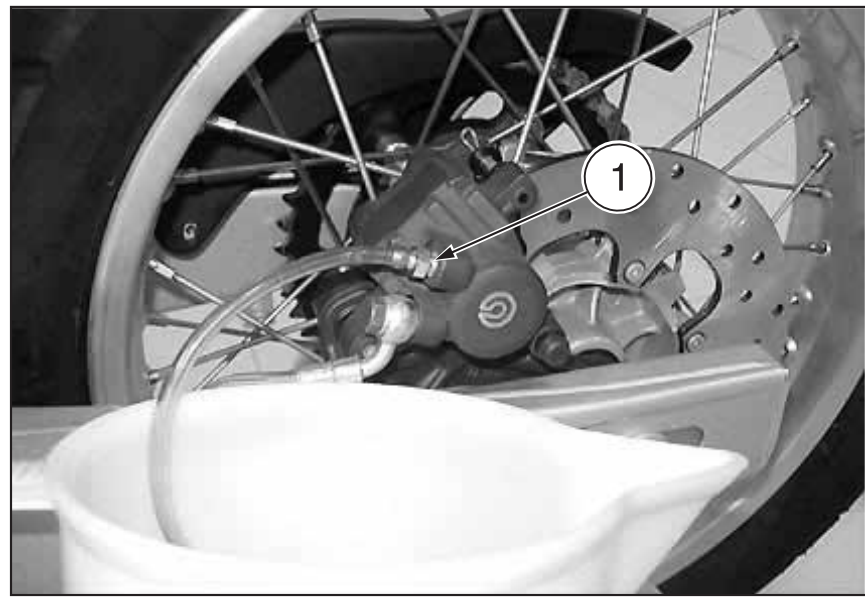
- ◆ Remove the plastic protection cap.
- ◆ Insert a transparent plastic tube on the bleeder (1) of the caliper and put the other end of the tube in a container.
- ◆ Loosen the bleeder (1) approx. one turn.

NOTE Make sure that there is always fluid in the tank during the operation; otherwise, once finished, the system will need bleeding, see 2.17 (BLEEDING THE BRAKING SYSTEMS).

- ◆ Keep an eye on the tank (2) as the fluid flows out and tighten the bleeder (1) before it empties entirely.
- ◆ Top up the tank (2), see 2.16 (CHECKING AND TOPPING UP THE REAR BRAKE FLUID).
- ◆ Loosen the bleeder (1) again approx. half a turn.
- ◆ Watch as the liquid flows out through the tube and as soon as the colour of the fluid starts to change (from dark to light), tighten the bleeder (1) again and remove the tube.

Brake rear caliper bleeder valve driving torque: 15 Nm (1.5 kgm).

- ◆ Refit the rubber protection cap.
- ◆ Top up the fluid tank (2) to the right level, see 2.16 (CHECKING AND TOPPING UP THE REAR BRAKE FLUID).



2.20 ADJUSTING THE REAR BRAKE CONTROL LEVER CLEARANCE

The brake control lever is positioned ergonomically during the assembly of the vehicle.

If necessary, it is possible to adjust the brake control lever clearance:

- ◆ Loosen the lock nut (1).
- ◆ Screw the brake adjuster (2) completely.
- ◆ Screw the lock nut (3) completely on the pump control rod (4).
- ◆ Screw the pump control rod (4) completely, then unscrew it by giving 3 – 4 turns.
- ◆ Screw the brake adjuster (2) until the brake pedal reaches the desired height.
- ◆ Lock the brake adjuster (2) by means of the lock nut (1).
- ◆ Unscrew the pump control rod (4) and bring it in contact with the pump piston.
- ◆ Screw the rod in order to ensure a minimum clearance of 0.5 – 1 mm between the pump control rod (4) and the pump piston.

⚠ CAUTION

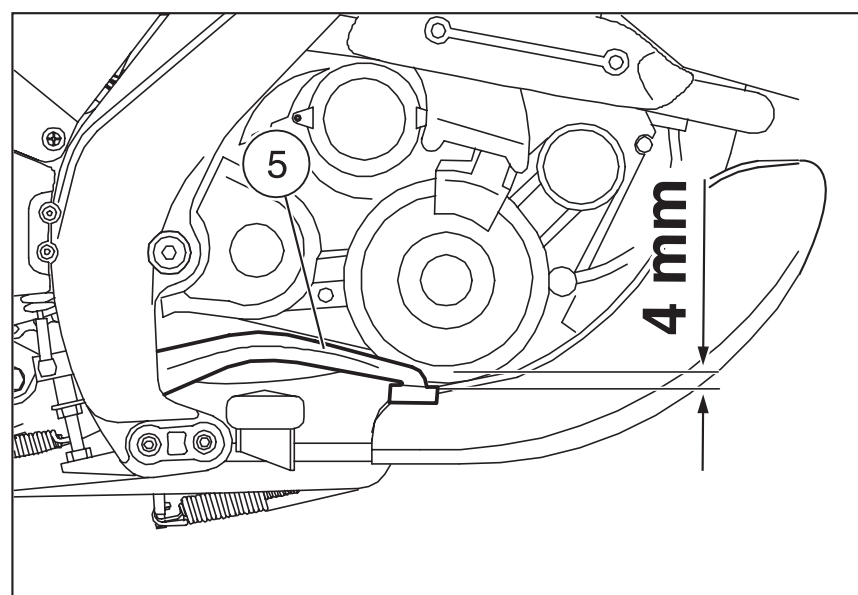
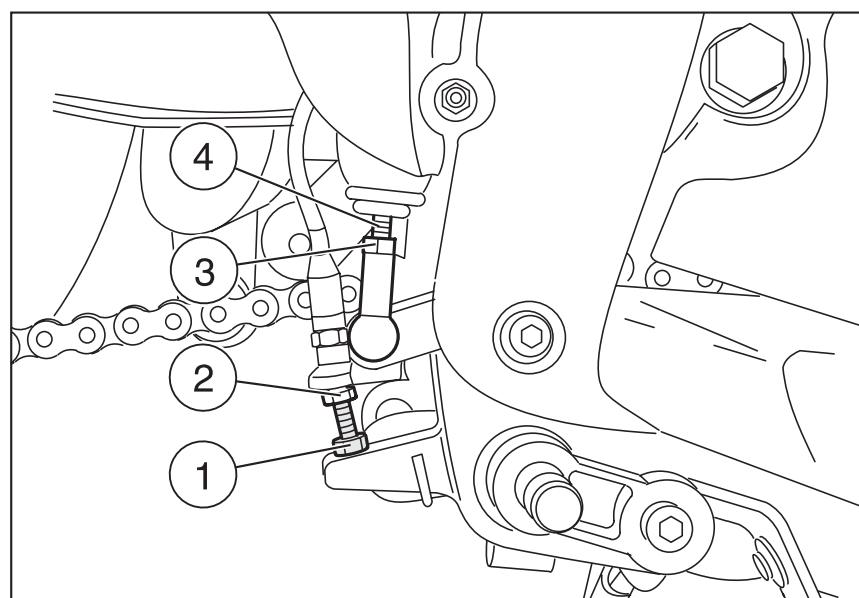
Make sure that there is a certain idle stroke in the movement of the lever (5), to prevent the brake from remaining applied and the consequent untimely wear of the braking elements.

Lever (5) idle stroke: 4 mm (measured at the lever end).

- ◆ Lock the pump control rod (4) by means of the lock nut (3).

⚠ CAUTION

After the adjustment, make sure that the wheel rotates freely with released brake.
Check the braking efficiency.



2.21 CHECKING THE BRAKE PAD WEAR

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Brake pad wear.

The wear of the disc brake pads depends on the use, on the kind of drive and on the road.

NOTE The following information refer to a single braking system, but are valid for both.

⚠ WARNING

This vehicle is equipped with a double-disc front braking system (right side and left side).

Always check all the pads of both the front brake calipers.

Checking the pads of one front caliper only may affect the stability and safety of the vehicle, with serious risks for persons, property and the vehicle itself.

To carry out a rapid checking of the wear of the pads, proceed as follows:

- ◆ Position the vehicle on the stand.
- ◆ Carry out a visual check between the disc and the pads, proceeding:
 - from below, on the front part, for the front brake caliper (1);
 - from above, on the rear part, for the rear brake calipers (2).

⚠ CAUTION

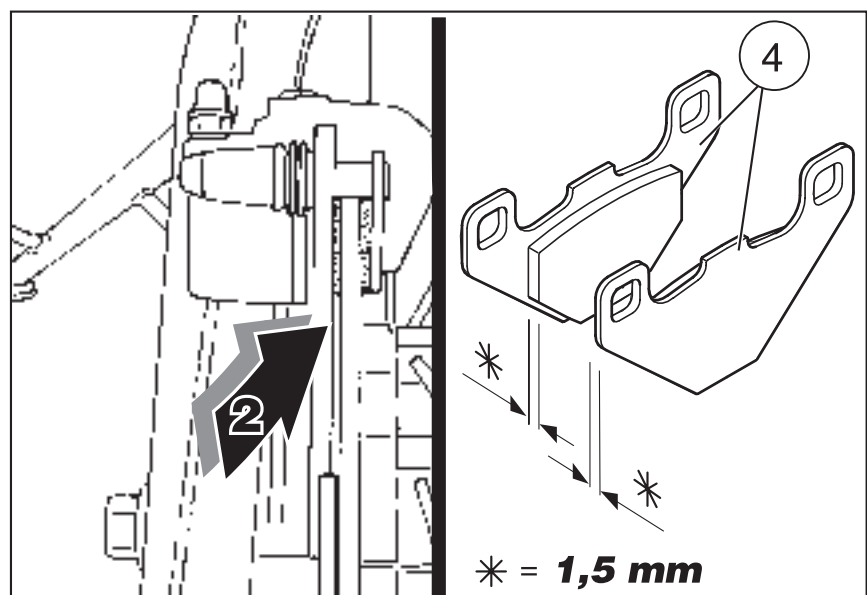
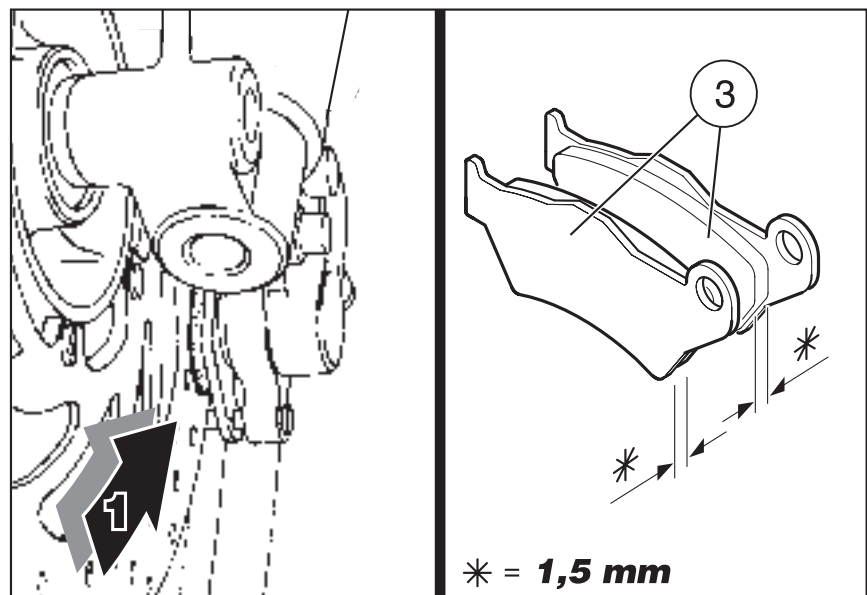
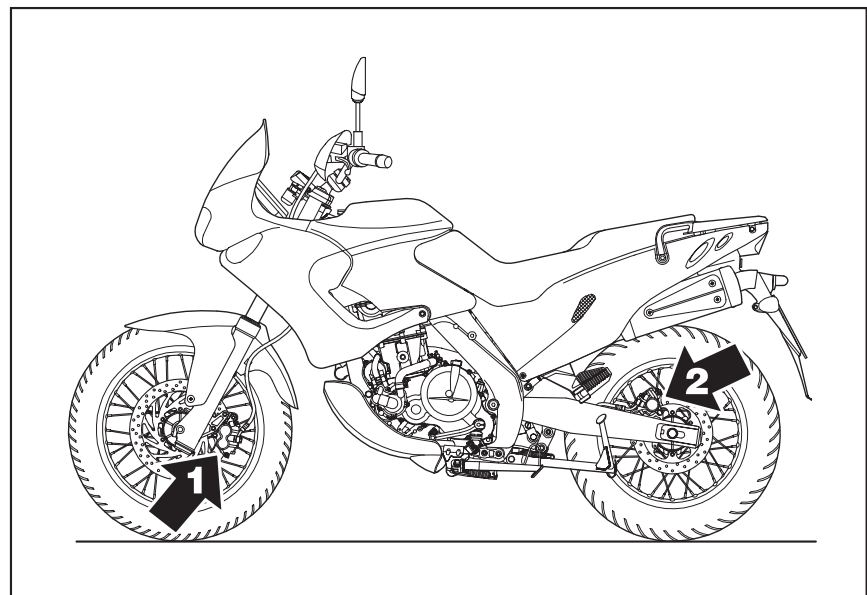
The excessive wear of the friction material would cause the contact of the pad metal support with the disc, with consequent metallic noise and production of sparks from the caliper; braking efficiency, safety and soundness of the disc would thus be negatively affected.

If the thickness of the friction material [even of one front (3) or rear pad (4) only] has reduced to about 1.5 mm (or even if only one of the wear indicators is not visible any longer):

- for the front brake caliper have both front brake caliper pads changed, see 7.5.1 (CHANGING THE FRONT BRAKE PADS (models up to 2001)).
- for the rear brake caliper have both rear brake caliper pads changed, see 7.6.1 (CHANGING THE REAR BRAKE PADS).

⚠ WARNING

Have the pads changed by your **aprilia** Official Dealer.



2.22 STEERING

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

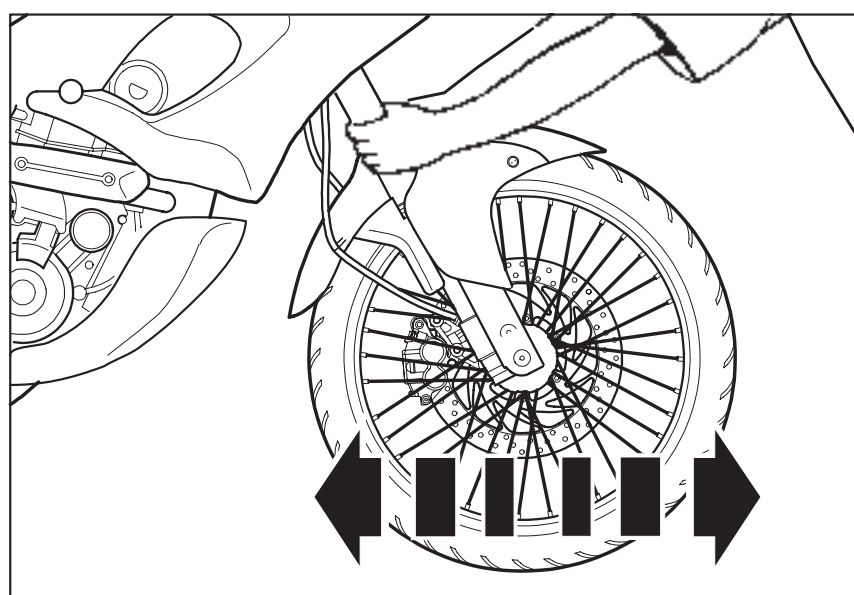
For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Steering bearings and steering clearance.

To assure improved handling, the steering is equipped with rolling bearings.

The steering must be adjusted correctly to provide smooth rotation of the handlebar and safe driving.

Tight steering hinders the smooth rotation of the handlebar whereas slack steering implies inadequate stability.



2.22.1 CHECKING THE BEARING SLACK STEERING

- ◆ Position the vehicle on the centre stand **OPT**.
- ◆ Shake the fork in the direction of travel.
- ◆ In the event any slack is encountered, adjust the steering, see 2.22.2 (ADJUSTING THE BEARING SLACK STEERING).

2.22.2 ADJUSTING THE BEARING SLACK STEERING

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the centre stand **OPT**.
- ◆ ★ Loosen the screw (1).
- ◆ Loosen the upper nut (2).
- ◆ Adjust the metal ring (3) with the appropriate spanner to take up the slack.
- ◆ Repeat the check until the problem appears to be solved.
- ◆ Tighten the upper nut (2) thoroughly.

Steering tube nut driving torque: 100 Nm (10 kgm).

- ◆ ★ Tighten the screw (1).

Upper plate screw driving torque: 50 Nm (5 kgm).



⚠ WARNING

Once the operation is complete, make sure that the rotation of the handlebar is smooth in order to avoid damage to the balls and the loss of manoeuvrability of the vehicle.

2.23 REAR FORK

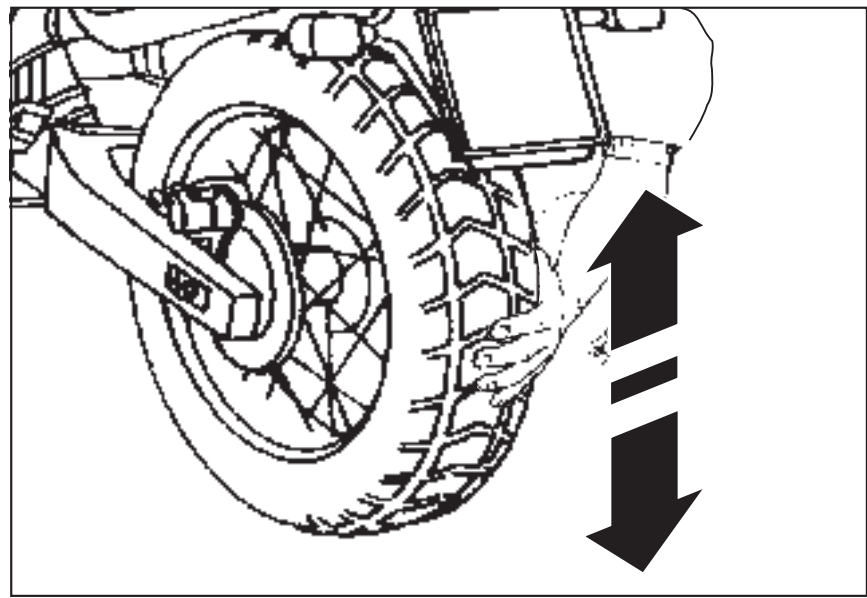
Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Rear suspension linkage bearings.

For the check, proceed as follows:

- ◆ Position the vehicle on the centre stand **OPT**.
- ◆ Shake the fork in the direction of travel (see figure).
If you find any slack, adjust the rear fork, see 2.23.1 (ADJUSTING THE REAR FORK).
If the slack persists, adjust the bearings, see 7.9.6 (DISASSEMBLING THE REAR FORK GASKETS).



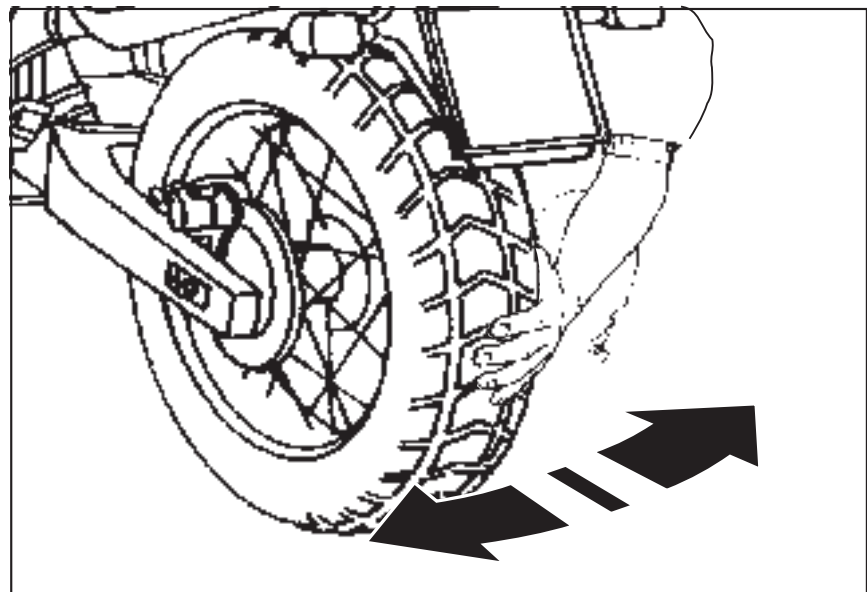
2.23.1 ADJUSTING THE REAR FORK

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the centre stand **OPT**.
- ◆ Lock the adjuster ring (1).

NOTE Have the appropriate special tool **OPT** to hand:
- **aprilia** part# 8101945 (rear fork pin metal ring spanner).

- ◆ Use the special setscrew spanner to loosen the lock ring (2) completely.
- ◆ Tighten the adjusting bush (1) until it contacts the rear fork, then give it another 1/4 turn.



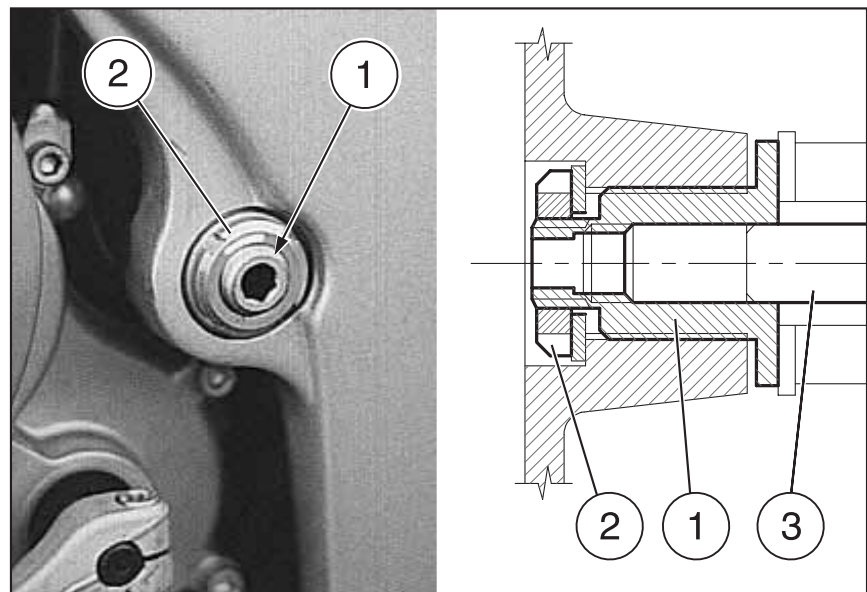
Adjusting bush (1) tightening: contact + 1/4 turn.

- ◆ Lock the adjusting bush (1), tighten the rear fork pin (3).

Rear fork pin driving torque: 100 Nm (10 kgm).

- ◆ Hold the adjusting bush (1) and screw the locking metal ring (2) at the same time.

Rear fork metal ring driving torque: 35 Nm (3.5 kgm).



2.24 INSPECTING THE FRONT AND REAR SUSPENSION

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

2.24.1 FRONT SUSPENSION

The front suspension consists of an hydraulic fork connected to the steering column by means of two plates.

The standard setting of the front fork is adjusted in such a way as to be suitable for most driving conditions, at high and low speed, for the transport of the rider with luggage.

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Suspensions and attitude;
- Fork;
- Fork oil;
- Fork oil seals;
- Nut, bolt, screw tightening.

For the check, proceed as follows:

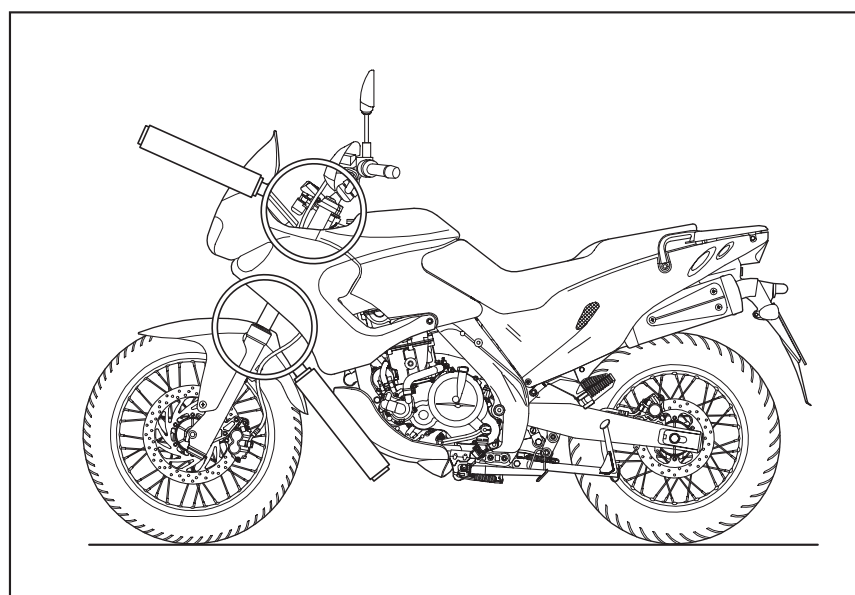
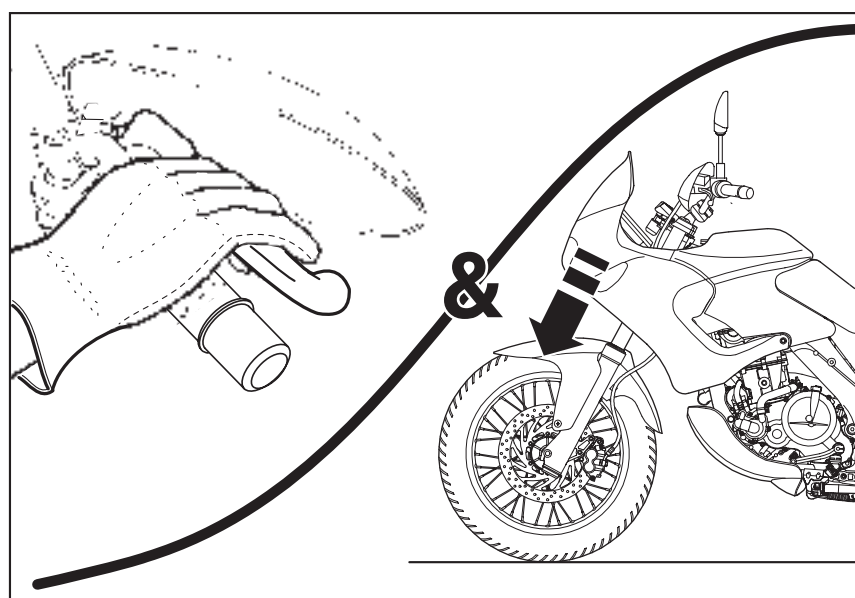
- ◆ With pulled front brake lever, press the handlebar repeatedly, thrusting the fork downwards. The stroke must be gentle and there must be no trace of oil on the rods.

If the fork reaches the end of stroke, this means that it is necessary to check the oil level in the rods, see 7.8.1 (CHECKING THE OIL LEVEL).

Make sure the fork does not feature oil leaks and that the outer surface of the tubes is not marked with scratches or grooves.

If this is the case, replace all the damaged parts that cannot be repaired, see 7.8.4 (DISASSEMBLING THE SLIDER-TUBE ASSEMBLIES).

- ◆ Check the fastening of all the components and the functionality of the front suspension joints.



2.25 INSPECTING THE REAR SUSPENSION

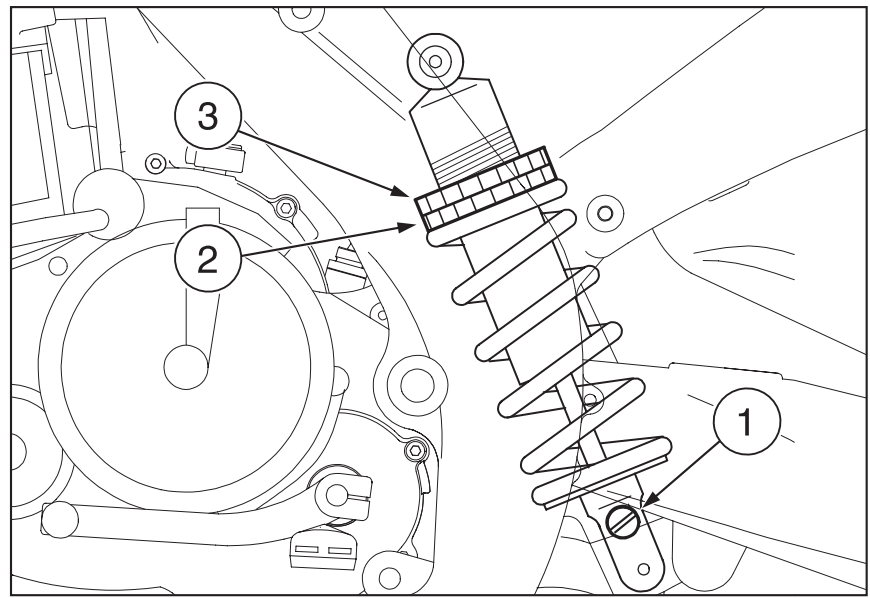
2.25.1 REAR SUSPENSION

The rear suspension consists of a spring-shock absorber unit, fixed to the frame by means of a uni-ball and to the rear fork by means of lever systems.

The rear suspension consists of a spring-shock absorber unit, fixed to the frame by means of a uni-ball and to the rear fork by means of lever systems.

For the setting of the vehicle attitude, the shock absorber is provided:

- with a screw adjuster (1) for the adjustment of the hydraulic braking with extended shock absorber;
- an adjusting ring nut (2) and a locking ring nut (3) for the adjustment of the spring preload.



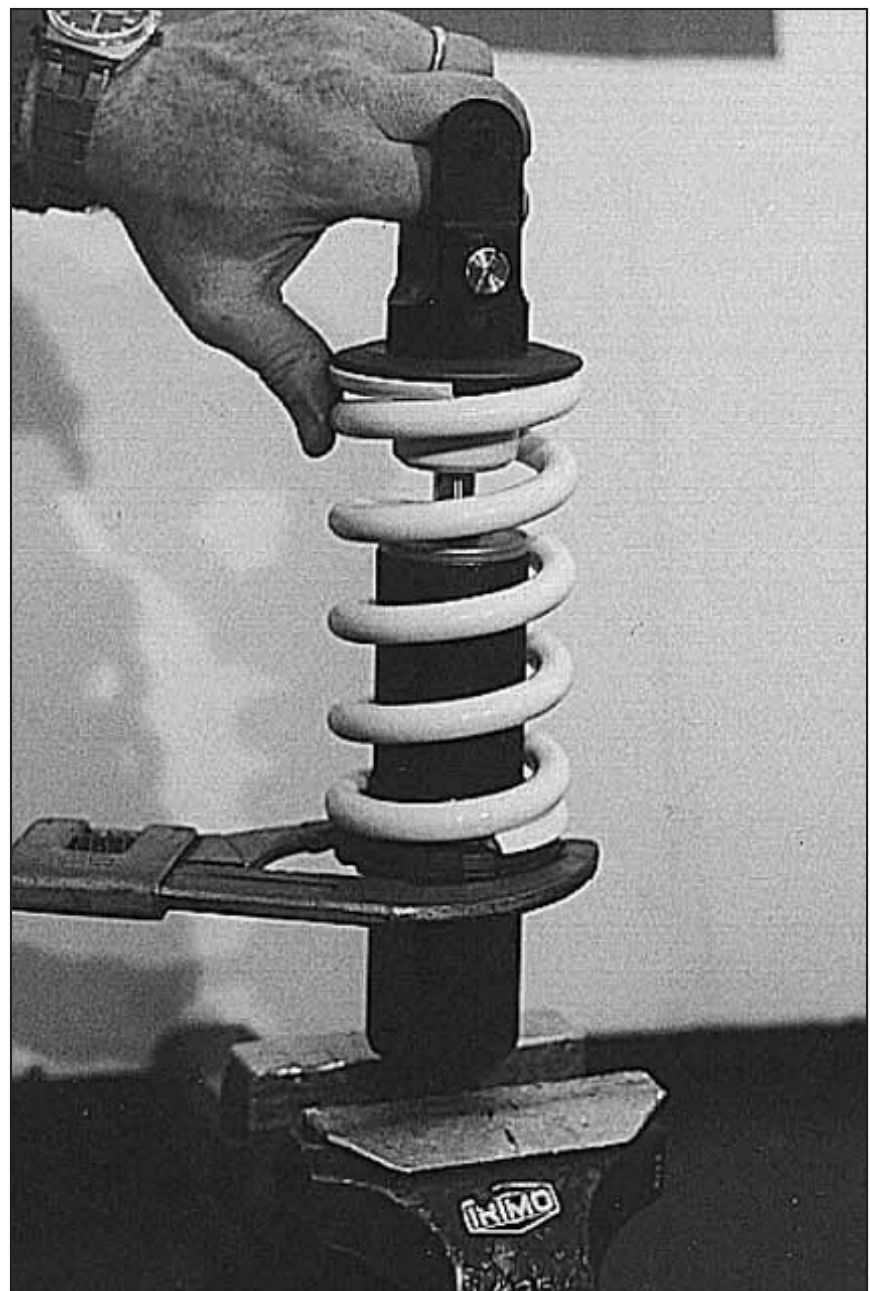
Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Suspensions and attitude;
 - Rear shock absorber;
 - Nut, bolt, screw tightening.
- ◆ Check all the rear suspension joints are working properly and that the relevant components are properly tightened.

2.25.2 ADJUSTING THE REAR SHOCK ABSORBER

- ◆ Remove the rear shock absorber, see 7.10.1 (REMOVING THE SHOCK ABSORBER).
- ◆ Position the shock absorber on a vice, as indicated in the figure.



⚠ CAUTION

For the adjustment, always start from the most rigid setting.

Do not rotate the screw adjuster (1) beyond its limit position, to avoid damaging the thread.

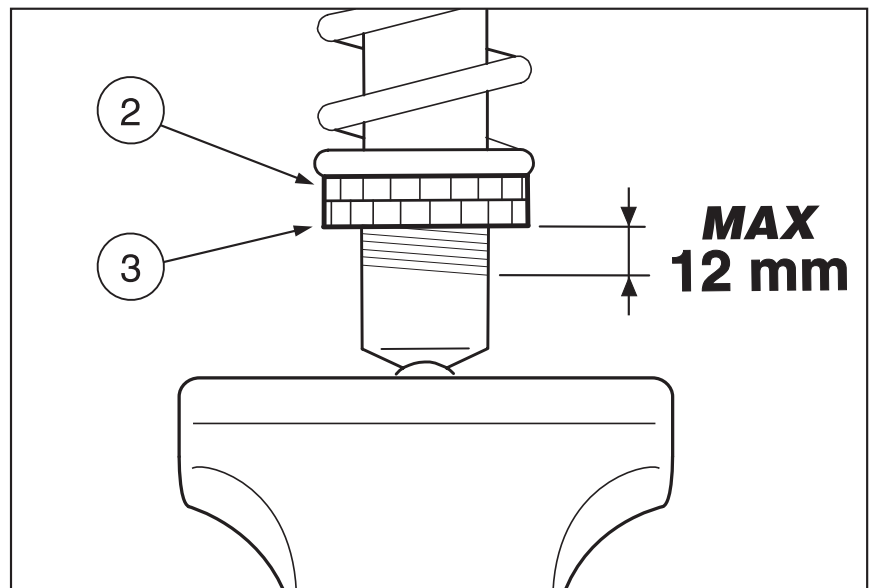
Make sure that the screw adjuster (1) always snaps and is not in any intermediate position.

The adjusting ring nut must not be screwed more than 12 mm from the beginning of the thread (see figure).

If this measure is exceeded, even the slightest unevenness on the road surface will cause sudden jerks and it will be useless to adjust the screw (1).

- ◆ Slightly unscrew the locking ring nut (3) by means of the appropriate spanner.
- ◆ Act on the adjusting ring nut (2) (shock absorber spring preload adjustment) (see figure).
- ◆ If necessary, adjust the screw (1) (adjustment of the hydraulic braking with extended shock absorber) (see table).
- ◆ Once the optimal attitude has been obtained, tighten the locking ring nut (3) completely.

Follow ►



Follow ►

⚠ CAUTION

Adjust the spring preload and the hydraulic braking with extended shock absorber according to the conditions of use of the vehicle.

When the spring preload is increased, it is necessary to increase also the hydraulic braking with extended shock absorber, in order to avoid sudden jerks while riding.

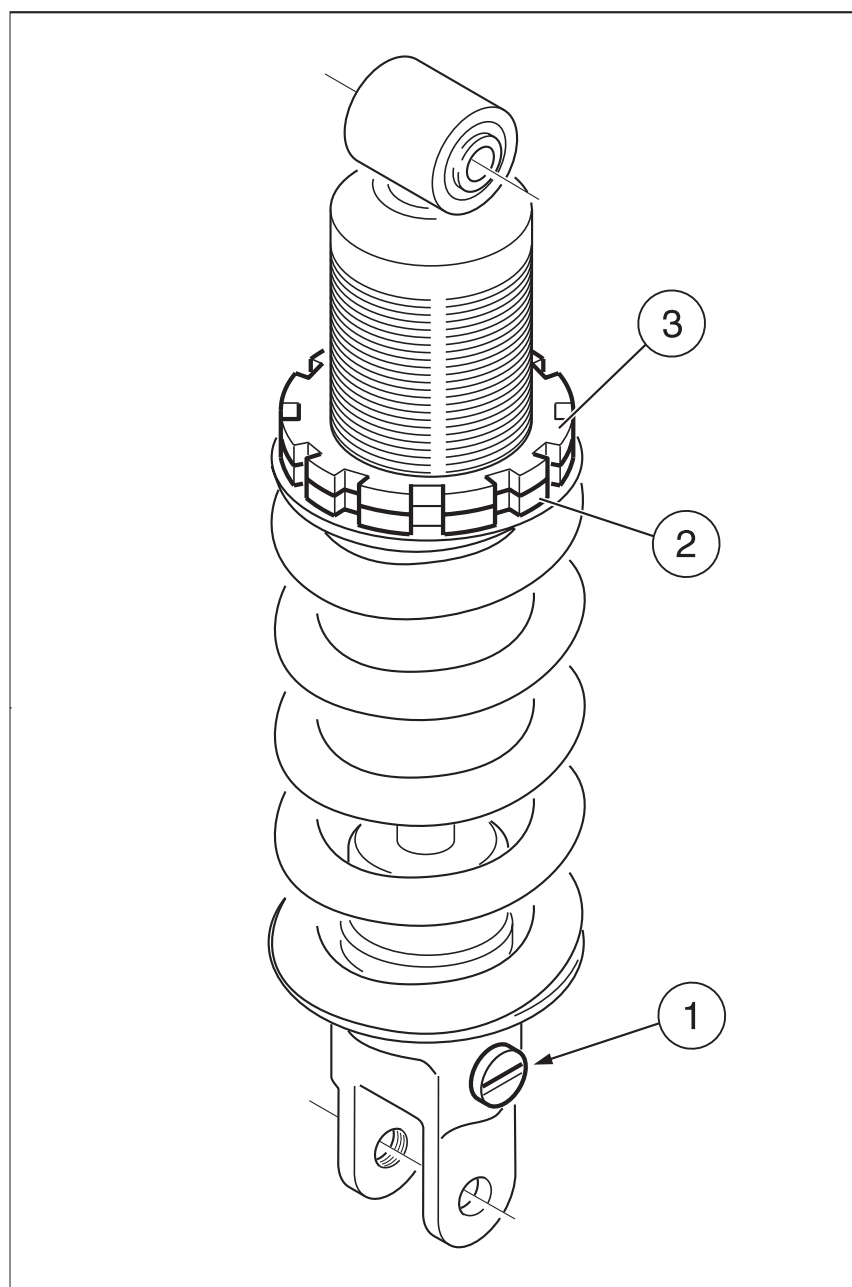
⚠ WARNING

If the vehicle attitude is set for full-load riding, it is advisable not to rotate the screw (1) leftwards (anticlockwise), in order to avoid sudden jerks while riding.

Gradually turn the screw adjuster (1) giving 2 – 3 clicks per time, and the adjusting ring nut (2) giving one turn per time.

◆ Put back the rear shock absorber, see 7.10.1 (REMOVING THE SHOCK ABSORBER).

Test the vehicle repeatedly on the road, until obtaining the optimal adjustment.



REAR SHOCK ABSORBER ADJUSTMENT TABLE

Screw adjuster (1)	By screwing it (clockwise) (H)	By unscrewing it (anticlockwise) (S)
Function	Increase of the hydraulic braking with extended shock absorber	Decrease of the hydraulic braking with extended shock absorber
Attitude	The vehicle is more rigid	The vehicle is less rigid
Recommended kind of road	Roads with uneven surface	Smooth or normal roads
Note	Ride with passenger and luggage, if any.	Drive without passenger

Adjusting ring nut (2)	By screwing it	By unscrewing it
Function	Spring preload increase	Spring preload decrease
Attitude	The vehicle is more rigid	The vehicle is less rigid
Recommended kind of road	Smooth or normal roads	Roads with uneven surface
Note	Ride with passenger and luggage, if any.	Drive without passenger

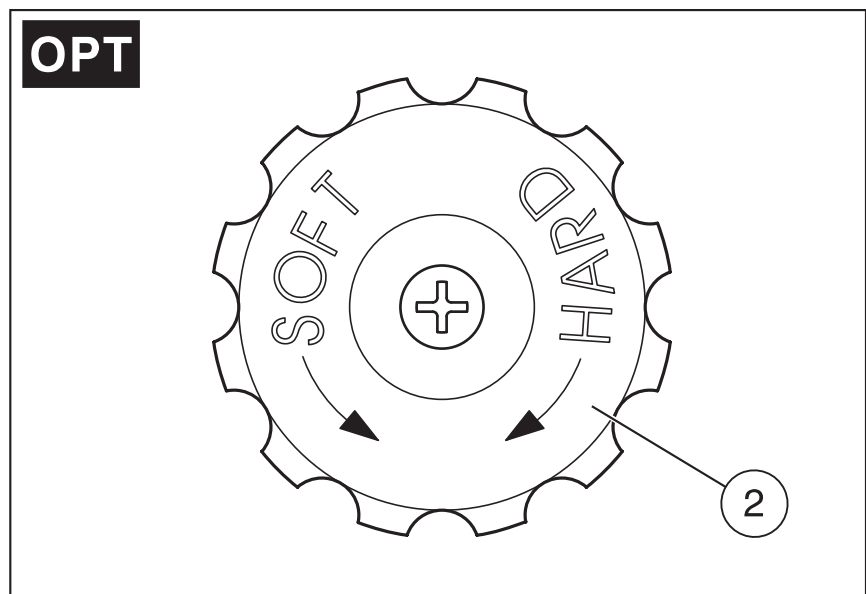
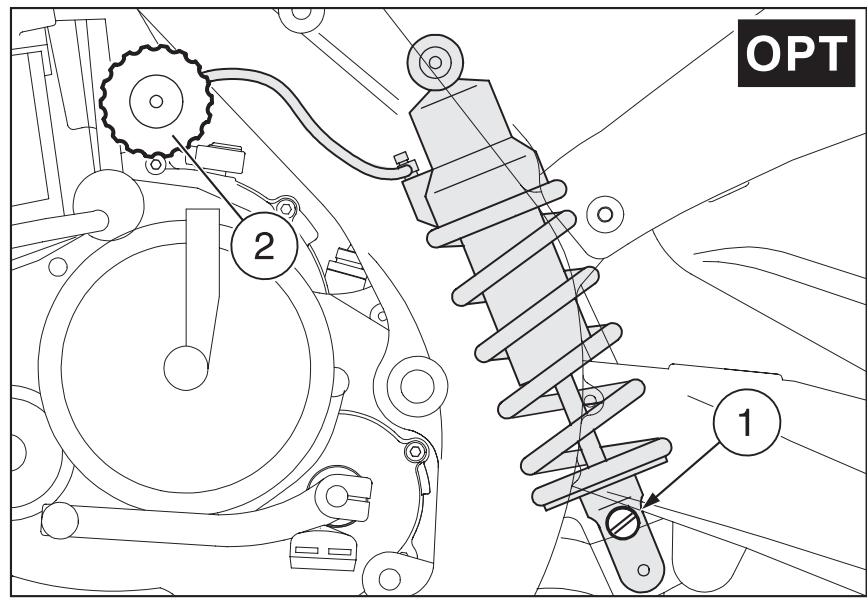
2.25.3 REAR SUSPENSION WITH HYDRAULIC PRELOAD ADJUSTMENT OPT

With this type of suspension it is possible to adjust the spring preload and the hydraulic braking with extended shock absorber.

⚠ CAUTION

Adjust the spring preload and the hydraulic braking with extended shock absorber according to the conditions of use of the vehicle.

When the spring preload is increased, it is necessary to increase also the hydraulic braking with extended shock absorber, in order to avoid sudden jerks while riding.



REAR SHOCK ABSORBER ADJUSTMENT TABLE

Rear shock absorber	Standard adjustment (INTERMEDIATE) for normal load (for example, rider and passenger)	SOFT adjustment for light load (for example, rider only)	HARD adjustment for heavy load (for example, rider, passenger and luggage)
Hydraulic adjustment with extended shock absorber, screw (1)	starting from the SOFT adjustment position, rotate the knob clockwise, giving it 25 clicks.	turn completely anticlockwise (SOFT)	turn completely clockwise (HARD)
Spring preload, knob (2)	starting from the soft adjustment position (anticlockwise), rotate the knob clockwise, giving it a full turn (9 clicks)	turn completely anticlockwise	turn completely clockwise

2.25.4 CHECKING THE REAR SUSPENSION LINKAGE

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

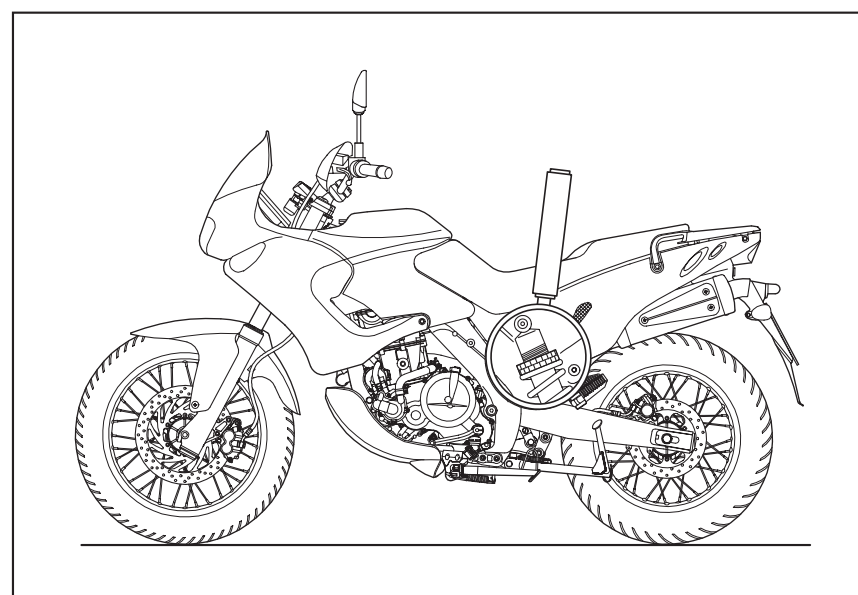
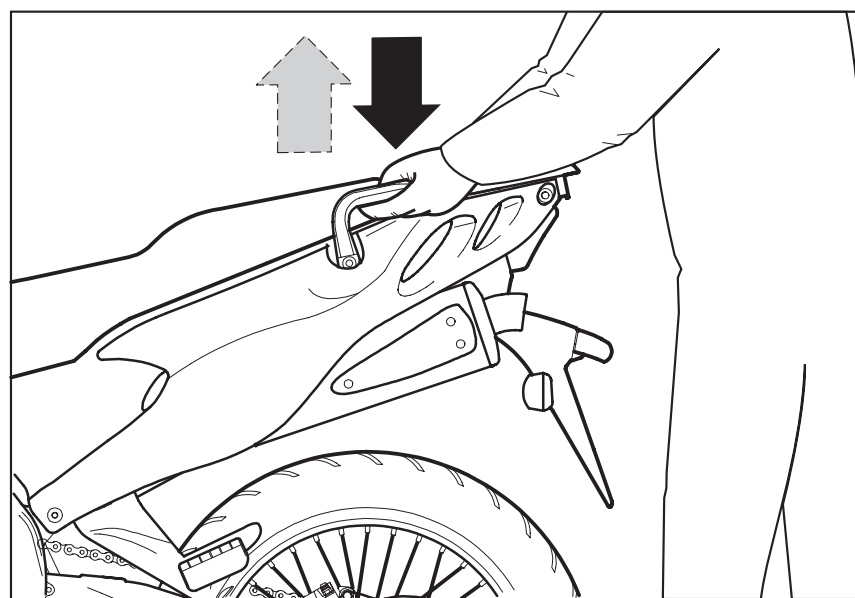
For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Rear suspension linkage bearings.

For the check, proceed as follows:

NOTE Have someone help you keep the vehicle up-right during this operation.

- ◆ Grip the rear part of the vehicle firmly (see figure), press down and release a few times.
- ◆ If the movement is not smooth and is accompanied by squeaks and/or if you notice any slack, change the bearings of the rear suspension linkage, see 7.10.3 (DISASSEMBLING THE REAR SUSPENSION LINKAGE).
- ◆ If, after you pressed the vehicle downwards, it returns to its original position very slowly, check if the rear suspension is adjusted correctly, see 2.25.2 (ADJUSTING THE REAR SHOCK ABSORBER) and 2.25.3 (REAR SUSPENSION WITH HYDRAULIC PRELOAD ADJUSTMENT **OPT**).
- ◆ If, after the adjustment, the defect persists, this means that the shock absorber bumps through and must therefore be changed.



2.26 FRONT WHEEL

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Wheel bearings;
- Wheel centering.

For the check, proceed as follows:

- ◆ Position the vehicle on the special front support stand **OPT**.
- ◆ Spin the wheel in either direction by hand.
- ◆ Make sure that the wheel rotation is regular and that there are no obstacles or noise, otherwise change the bearings, see 7.2.10 (DISASSEMBLING THE FRONT WHEEL BEARINGS).

NOTE Should any wobbling be noticed as the wheel spins, check the relevant components, see 7.2.2 (CHECKING THE FRONT WHEEL COMPONENTS).

NOTE If, after various spins, the wheel continues to stop in the same place, the wheel needs balancing.



2.27 REAR WHEEL

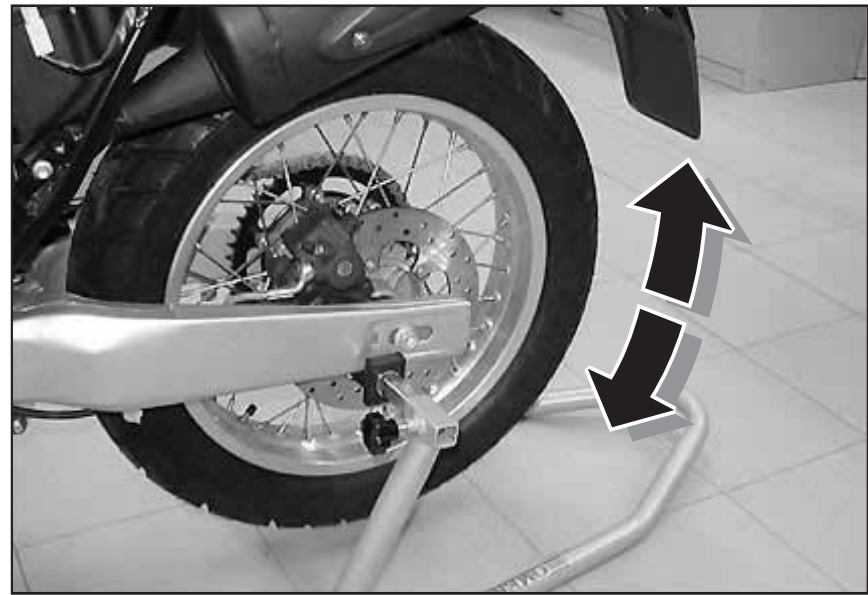
Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Wheel bearings;
- Wheel centering.

For the check, proceed as follows:

- ◆ Position the vehicle on the appropriate rear support stand, see 1.8.1 (POSITIONING THE VEHICLE ON THE REAR SUPPORT STAND **OPT**).
- ◆ Spin the wheel in either direction by hand.
- ◆ Make sure that the wheel rotation is regular and that there are no obstacles or noise, otherwise change the bearings, see 7.2.10 (DISASSEMBLING THE FRONT WHEEL BEARINGS).
- ◆ Should any wobbling be noticed as the wheel spins, check the relevant components, see 7.2.2 (CHECKING THE FRONT WHEEL COMPONENTS).
- ◆ If, after various spins, the wheel continues to stop in the same place, the wheel needs balancing.



2.28 EXHAUST MANIFOLD NUTS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Nut, bolt, screw tightening.

For the tightening:

⚠ WARNING

Let the engine cool down until it reaches room temperature.

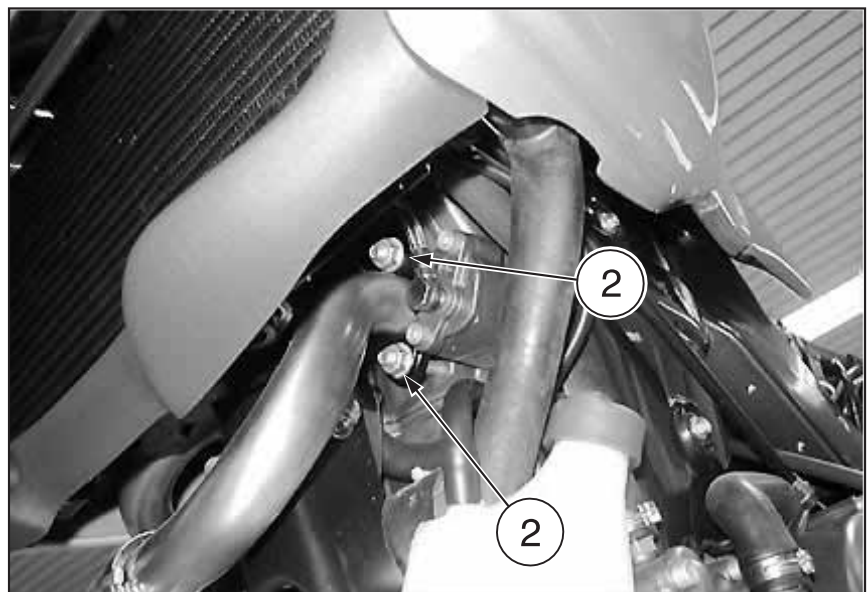
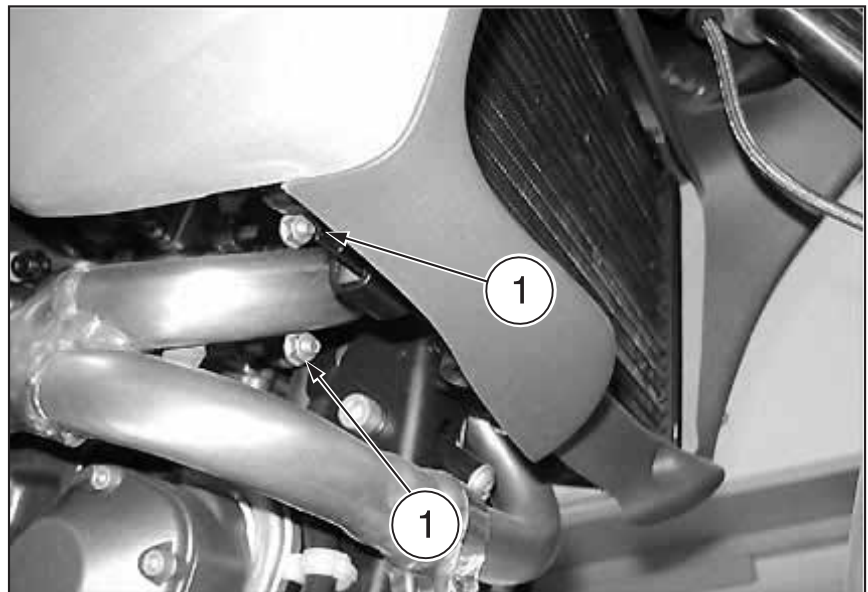
Work on the front lower part.

Right exhaust manifold nut driving torque: 25 Nm (2.5 kgm).

- ◆ Tighten the two nuts (1) of the right exhaust manifold.

Left exhaust manifold nut driving torque: 25 Nm (2.5 kgm).

- ◆ Tighten the two nuts (2) of the left exhaust manifold.



2.29 DRIVE CHAIN

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Final transmission (chain, crown and pinion).

The vehicle is equipped with an endless chain, in which a ring link joint is not used.

Chain type: see 1.5 (TECHNICAL SPECIFICATIONS).

⚠ CAUTION

The drive chain is provided with O rings among the links, in order to keep the grease inside them.

Carry out the adjustment, lubrication, cleaning and change of the chain with great care.

- ◆ Position the vehicle on the appropriate rear support stand, see 1.8.1 (POSITIONING THE VEHICLE ON THE REAR SUPPORT STAND **OPT**).
- ◆ Position the gear lever in neutral.
- ◆ Turn the rear wheel slowly by hand.
- ◆ Further, check the chain and sprockets and make sure that they do not present:
 - damaged rollers;
 - loose pins;
 - dry, rusty, crushed or seized links;
 - excessive wear;
 - lacking O rings;
 - sprocket or teeth excessively worn or damaged.

⚠ CAUTION

If the chain rollers are damaged, the pins are loose and/or the O rings are damaged or lacking, it is necessary to change the whole chain unit (both sprockets and chain), see 7.3.2 (REMOVING THE FINAL DRIVE UNIT).

2.29.1 CHECKING THE DRIVE CHAIN SLACK

To check the slack, proceed as follows:

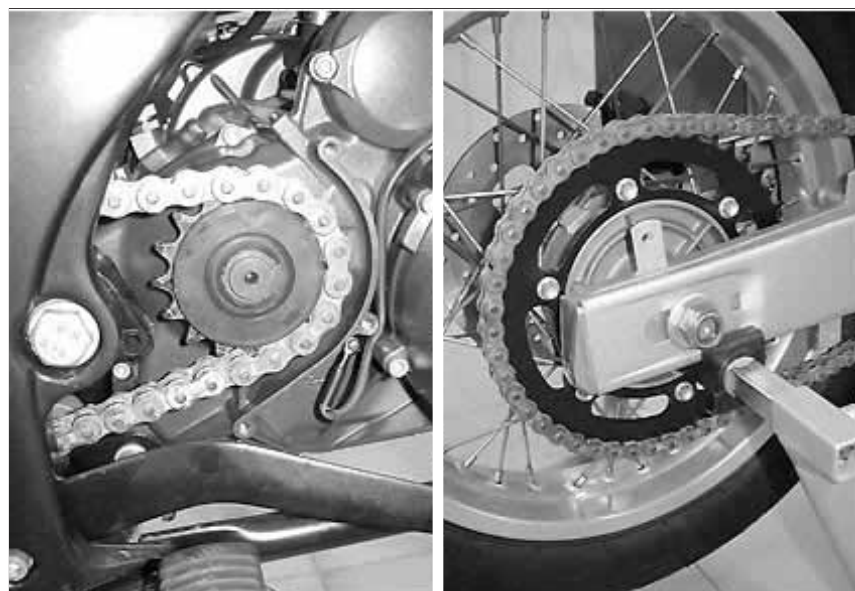
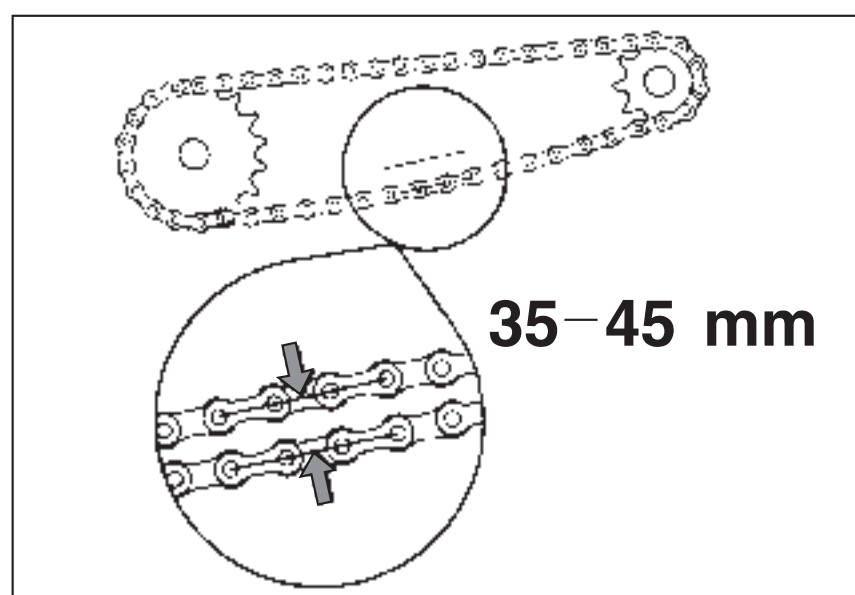
- ◆ Stop the engine.
- ◆ Position the vehicle on the appropriate rear support stand, see 1.8.1 (POSITIONING THE VEHICLE ON THE REAR SUPPORT STAND **OPT**).
- ◆ Position the gear lever in neutral.
- ◆ Make sure that the vertical oscillation, in an intermediate point between pinion and crown in the lower part of the chain, is included between **35 – 45 mm**.
- ◆ Rotate the wheel manually, in such a way as to check the vertical oscillation of the chain even in other positions; the slack must be constant in all the wheel rotation phases.

⚠ CAUTION

If in some positions the slack is higher than in others, this means that there are crushed or seized links.

To prevent the risk of seizures, lubricate the chain frequently, see 2.29.4 (DRIVE CHAIN TENSION AND LUBRICATION).

If the clearance is slack is uniform, but higher than **45 mm** or lower than **35 mm**, adjust it, see 2.29.3 (ADJUSTING THE DRIVING CHAIN).



⚠ CAUTION

An excessive slackening of the chain may cause noise or make the chain rattle, with consequent wear of the shoe and of the chain guide plate.

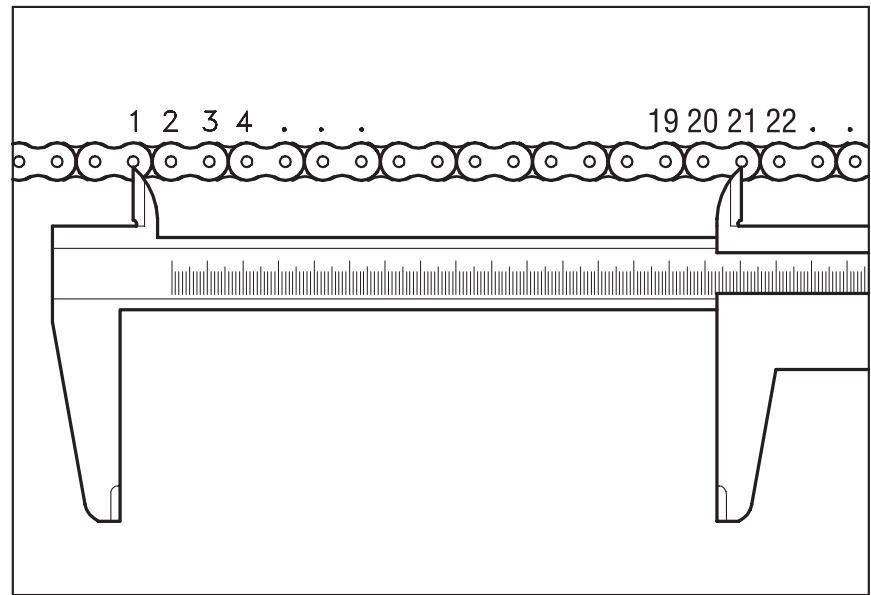
Incorrect maintenance may cause the untimely wear of the chain and/or damages to the pinion and/or the crown.

Carry out the maintenance operations more frequently if you use the vehicle in difficult conditions or on dusty and/or muddy roads.

2.29.2 CHECKING THE DRIVING CHAIN, PINION AND SPROCKET WEAR

- ◆ To put a driving chain under tension, see 2.29.3 (ADJUSTING THE DRIVING CHAIN).
- ◆ Count 21 pins (20 steps) on a branch of the chain and measure the distance between the two end pins.
If the distance is larger than the limit indicated below, replace the chain, see 7.11 (DISASSEMBLING THE DRIVING CHAIN).

Wear limit: 304 mm (MAX 0.5%).



2.29.3 ADJUSTING THE DRIVING CHAIN

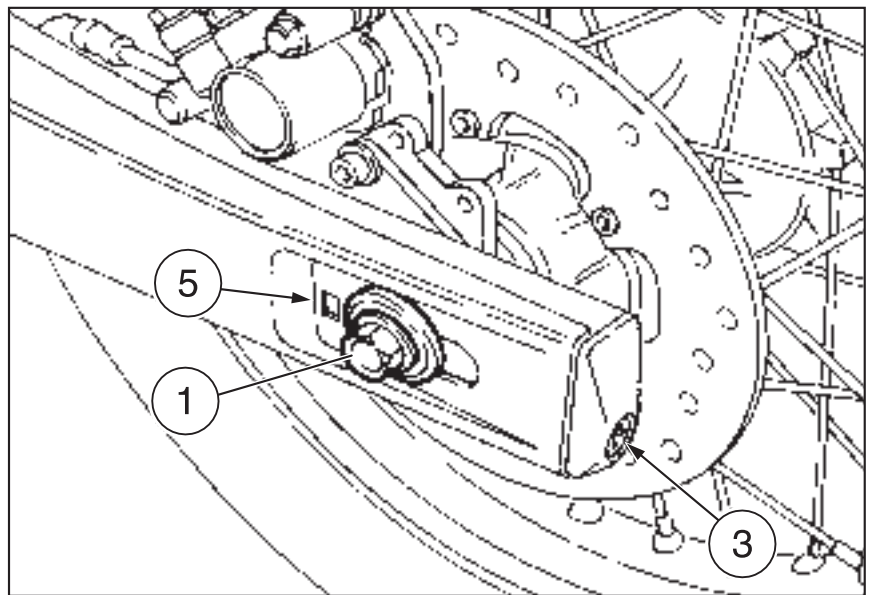
If after the check it is necessary to adjust the chain tension, slacken the chain to increase the slack, tighten the chain to decrease it.

- ◆ Position the vehicle on the appropriate rear support stand, see 1.8.1 (POSITIONING THE VEHICLE ON THE REAR SUPPORT STAND **OPT**).
- ◆ Lock the rotation of the wheel pin (1) with the appropriate key.
- ◆ Loosen the nut (2).

NOTE Numbered reference marks connected with the movement of the adjusters (3) (4) are provided for the wheel centering.

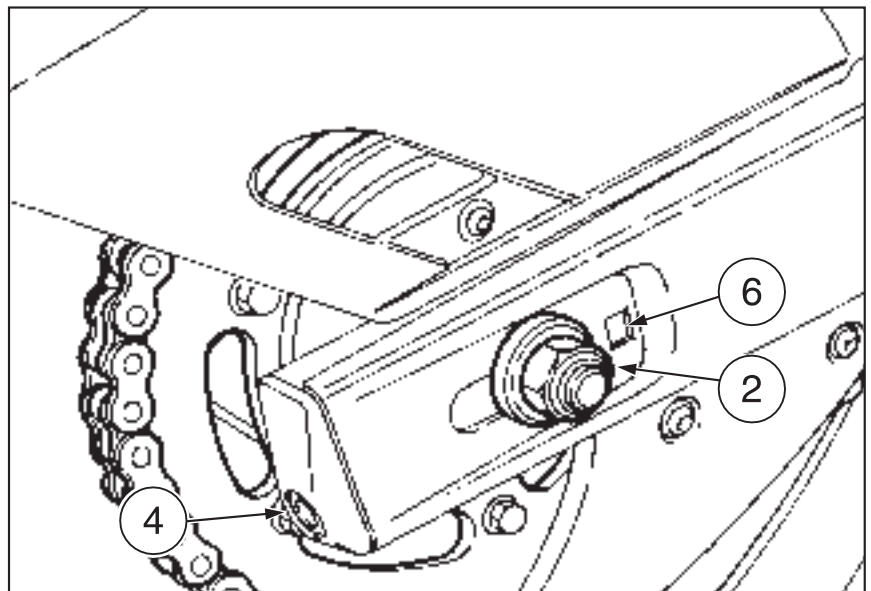
These reference marks can be seen by looking inside two slots (5) (6) positioned on the rear fork rods, before the wheel pin.

- ◆ Act on the left (3) and right (4) adjusters and adjust the chain slack, making sure, on both sides of the vehicle, that the same reference marks can be seen when looking inside the slots (5) (6).
- ◆ Lock the rotation of the wheel pin (1) with the appropriate key.
- ◆ Tighten the nut (2).



Rear wheel nut driving torque: 100 Nm (10 kgm).

- ◆ Check the chain slack, see 2.29.1 (CHECKING THE DRIVE CHAIN SLACK).



2.29.4 DRIVE CHAIN TENSION AND LUBRICATION

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Drive chain tension and lubrication.

Never wash the chain with water jets, steam jets, high-pressure water jets and highly inflammable solvents.

- ◆ Wash the chain with naphtha or kerosene. If it tends to rust quickly, intensify the maintenance intervals.

⚠ CAUTION

Do not use trichloroethylene, petrol, or other similar liquids: their dissolving power may be excessive for this chain and, even more important, they are liable to damage the O-rings that hold the grease in the gaps between the rollers and the pins.

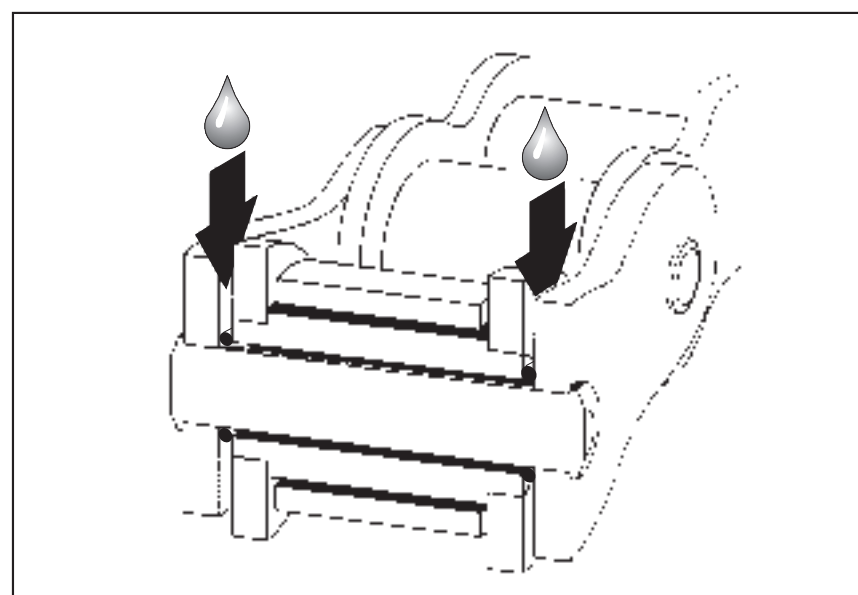
- ◆ After washing the chain and letting it dry, lubricate it with spray grease for chains provided with sealing rings, see 1.6 (LUBRICANT CHART).

NOTE Do not use the vehicle soon after lubricating the chain, since due to the centrifugal force the lubricant would be sprayed outwards and dirty the surrounding areas.

⚠ CAUTION

The lubricants for chains available on the market may contain substances that are dangerous for the rubber sealing rings of the chain.

For the replacement it is advisable to use a chain of the same type, see 1.5 (TECHNICAL SPECIFICATIONS).



2.29.5 INSPECTING THE DRIVING CHAIN SHOE

- ◆ Position the vehicle on the stand.
- ◆ Make sure the shoe (1) is not worn or damaged; if so, replace with a new one, see 7.1.40 (REMOVING THE CHAIN ROLLERS AND SHOE).

2.30 TYRES

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Wheel/Tyres.

This vehicle is provided with tubeless tyres.

2.30.1 CONDITION OF TREAD

⚠ CAUTION

Check the surface and the wear of the tyres, since tyres in bad conditions can impair both the grip and the controllability of the vehicle.

Change the tyre when it is worn out or in case of puncture on the tread side, if the puncture is larger than 5 mm.

Some types of tyres homologated for this vehicle are provided with wear indicators.

There are several kinds of wear indicators.

For more information on how to check the wear, contact your Dealer.

Do not install tyres with air tube on rims for tubeless tyres and viceversa.

Make sure that the inflation valves (1) always have their sealing caps on, to prevent the tyres from suddenly going flat.

Change, repair, maintenance and balancing operations are very important and therefore they must be performed by qualified technicians with appropriate tools.

MINIMUM TREAD DEPTH LIMIT (A):

front and rear 2 mm (USA 3 mm) and in any case not less than prescribed by the regulations in force in the country where the vehicle is used.

2.30.2 INFLATION PRESSURE

⚠ CAUTION

Periodically check the tyre inflation pressure at room temperature, see 1.5 (TECHNICAL SPECIFICATIONS). If the tyres are hot, the measurement is not correct.

Carry out the measurement especially before and after long rides.

If the inflation pressure is too high, the ground unevenness cannot be dampened and is therefore transmitted to the handlebar, thus compromising the driving comfort and reducing the road holding during turns.

If, on the contrary, the inflation pressure is too low, the tyre sides are under greater stress and the tyre itself may slip on the rim or it may become loose, with consequent loss of control of the vehicle. In case of sudden braking the tyres could even come off the rims. Further, the vehicle could skid while turning.

⚠ CAUTION

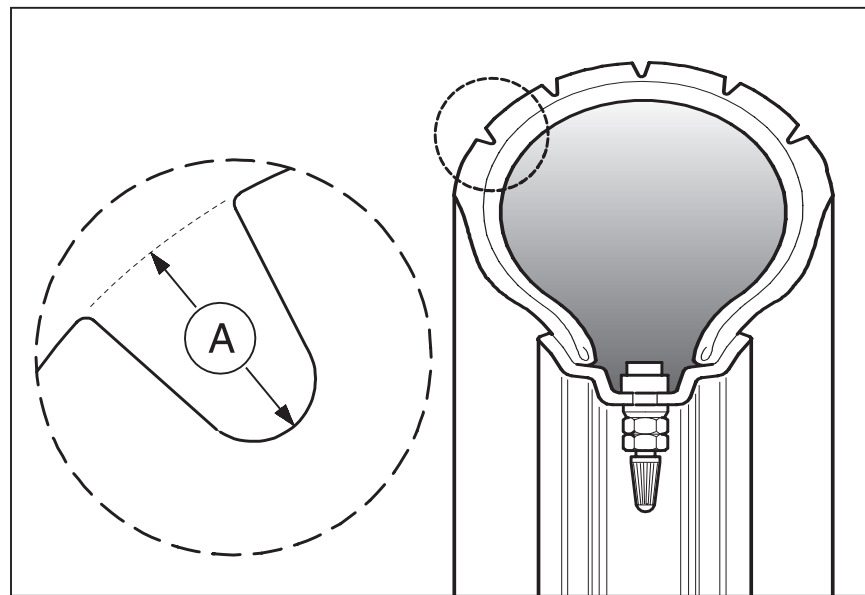
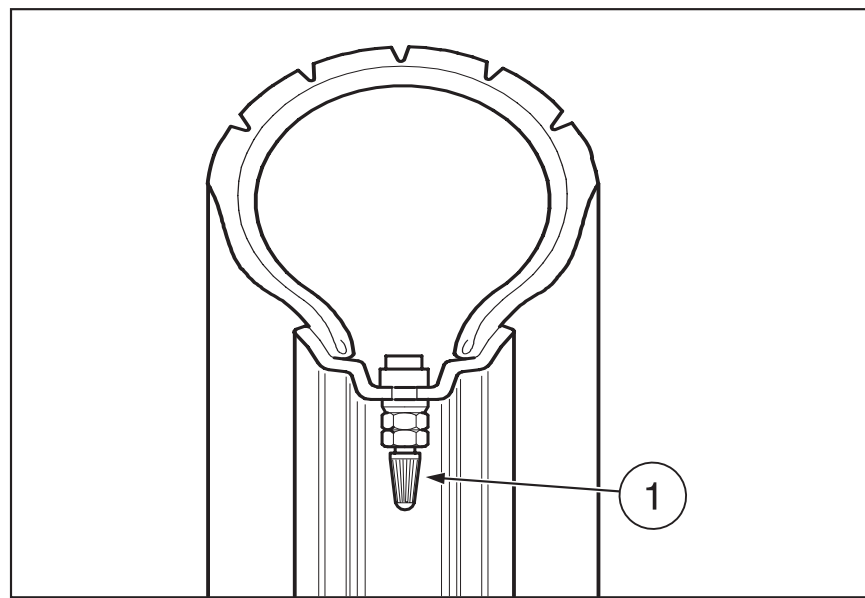
After repairing a tyre, have the wheels balanced.

If the tyres are new, they may still be covered with a slippery film: drive carefully for the first miles.

Do not oil the tyres with unsuitable fluids.

⚠ CAUTION

The size of the tyres is indicated in the log-book and any dissimilarity is punishable by law.



Using tyres with different dimensions may cause the instability of the vehicle, endangering its driving safety and manoeuvrability.

Use only tyres recommended by **aprilia**, see 1.5 (TECHNICAL SPECIFICATIONS).

For further information, see 7.4 (TYRES).

2.31 FUEL PIPES

Carefully read 1.2.1 (FUEL).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Fuel pipes.

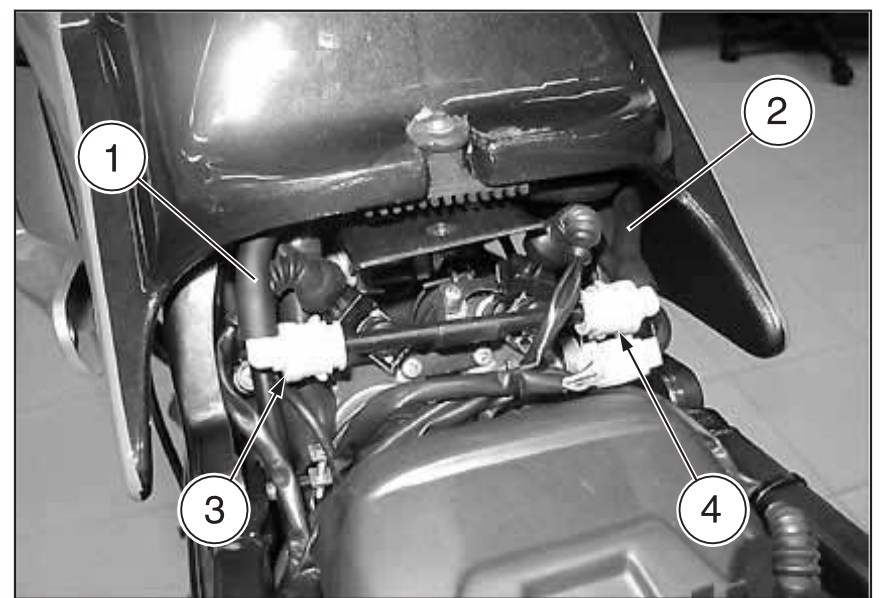
If you should encounter signs of wear, cracking, etc., replace the fuel pipes.

- High-pressure delivery pipe (1) [~ 650 kpa (6.5 bar)].
- Return pipe (2).

NOTE Check the correct position of the pipes (1) (2).

NOTE Make sure that the female rapid couplings (3) (4) (5) (6) are correctly fitted in the corresponding male couplings.

For further information, see section 4 (FUEL SUPPLY SYSTEM).



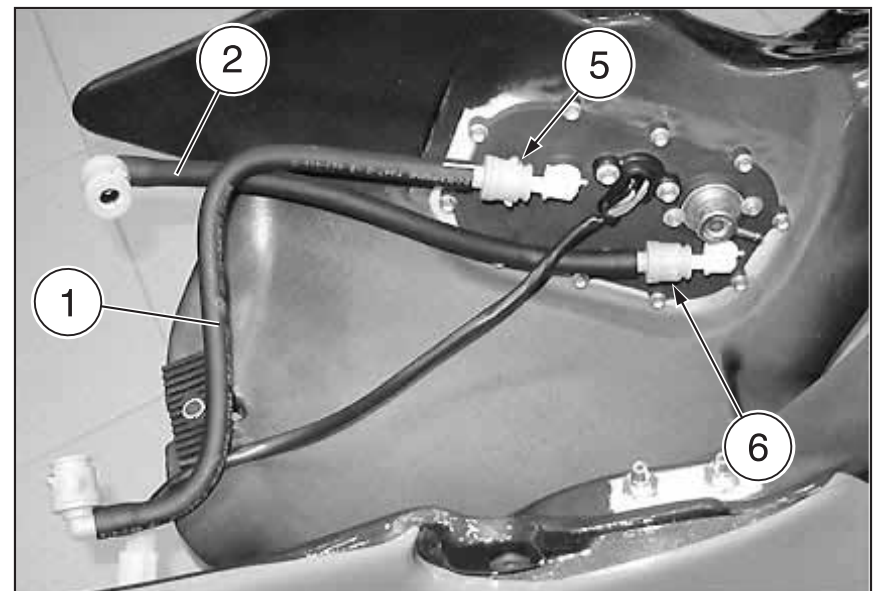
2.32 BRAKE PIPES

Carefully read 1.2.4 (BRAKE FLUID) and 1.2.6 (CLUTCH FLUID).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Braking systems.

If you should encounter signs of wear, cracking, etc., replace the pipes.



2.33 COOLING SYSTEM PIPES

Carefully read 1.2.5 (COOLANT).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Cooling system.

If you should encounter signs of wear, cracking, etc., replace the cooling system pipes.

2.34 CHECKING THE STAND

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 6.8 (SWITCHES).

The vehicle is provided with:

- side stand (1);
- centre stand (2) **OPT** (supplied as standard equipment in the countries where required).

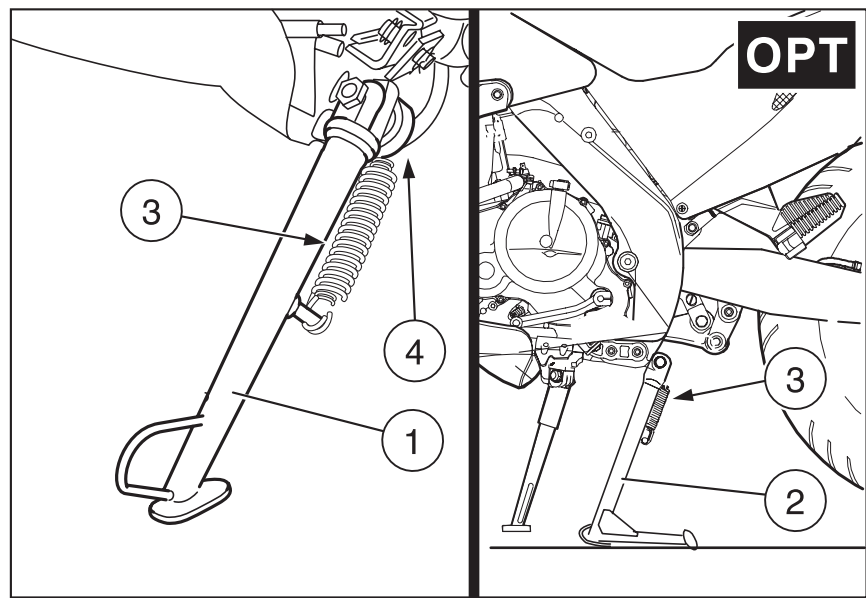
The stand has two positions:

- normal or lifted;
- extended.

It is the rider who must provide for extending and lifting the stand.

The stand must rotate without hindrances.

The springs (3) provide for keeping the stand in the desired position (extended or lifted).



SIDE STAND

- ◆ Position the vehicle on the centre stand **OPT**.
- ◆ The springs (3) must not be damaged, worn, rusty or weakened.
- ◆ Make sure that the stand presents no slack in either position (extended and lifted).
- ◆ Lower the stand, making sure that the springs provide for extending it completely.
- ◆ Move the stand to let it up and release it halfway to make sure that the springs provide for lifting it completely.
- ◆ The side stand must rotate freely, if necessary grease the joint, see 1.6 (LUBRICANT CHART).

⚠ WARNING

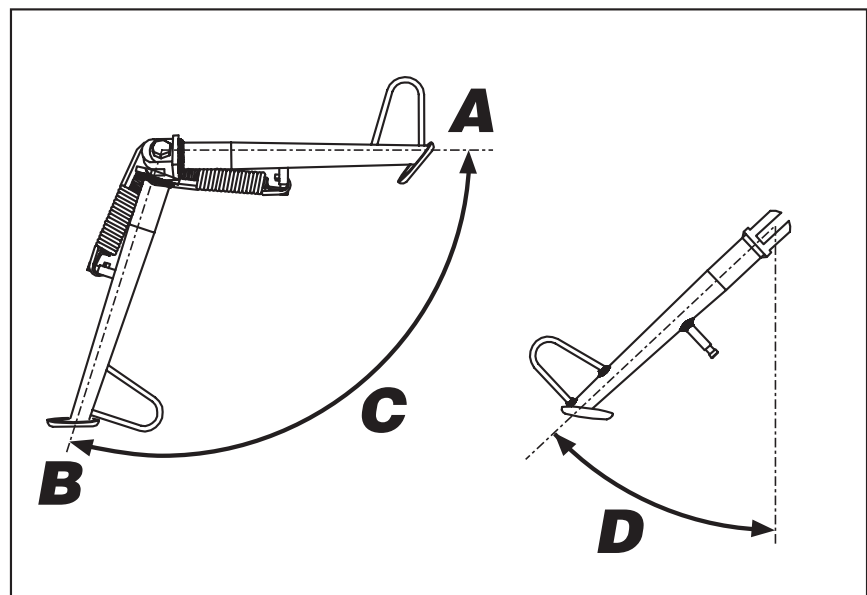
If the side stand has wrong rotation and inclination angles, when the vehicle is parked the stability of the vehicle may be affected, with the consequent risk of overturning of the vehicle itself.

- ◆ Check the angle of rotation (C) of the stand between the two positions (A) and (B).

Stand rotation angle: 106° ± 3°.

- ◆ With the stand in position (B), check its inclination angle (D) with respect to the vertical axis.
- ◆ **Stand inclination angle: 47° ± 3°.**

The side stand (1) is provided with a safety switch (4) that has the function to prevent or interrupt the operation of the engine with the gears on and the side stand (1) down.



Pegaso 650 I.E.

CENTRE STAND ^{OPT} (supplied as standard equipment in the countries where required)

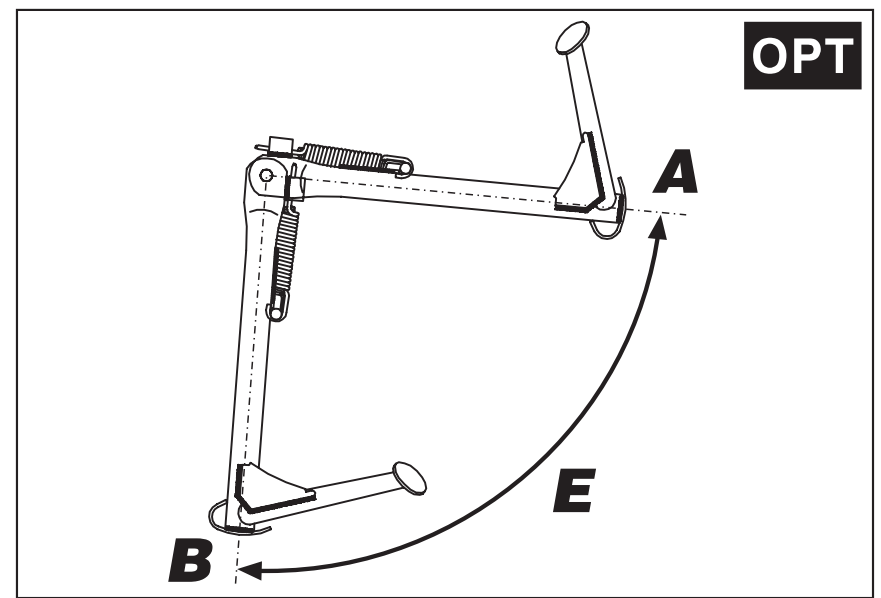
- ◆ Position the vehicle on the side stand.
- ◆ The springs (3) must not be damaged, worn, rusty or weakened.
- ◆ Make sure that when lifted the stand presents no slacks.
- ◆ Move the stand and release it, making sure that the springs lift it completely.
- ◆ The side stand must rotate freely, if necessary grease the joint, see 1.6 (LUBRICANT CHART).

⚠ WARNING

If the side stand has wrong rotation and inclination angles, when the vehicle is parked the stability of the vehicle may be affected, with the consequent risk of overturning of the vehicle itself.

- ◆ Check the angle of rotation (E) of the stand between the two positions (A) and (B).

Stand rotation angle: $100^\circ \pm 3^\circ$.



2.35 NUT, BOLT, SCREW TIGHTENING

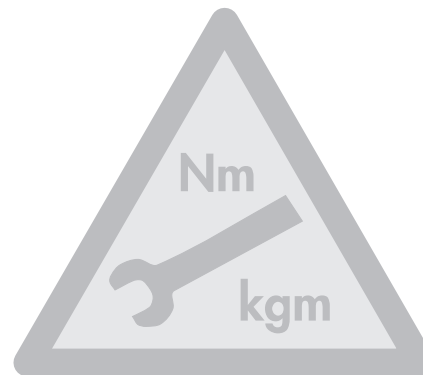
Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.10 (FASTENING ELEMENTS).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Nut, bolt, screw tightening.

Check all the fastening elements carefully, especially all those components essential for safety, i.e:

- handlebar;
- front brake lever;
- clutch lever;
- fuel delivery pipe;
- front fork to plates;
- front fork / wheel pin clamps;
- front wheel;
- front brake pipe fittings front brake;
- front brake disc;
- front brake caliper;
- engine;
- pinion;
- rear brake lever;
- rear fork;
- rear fork leverage;
- rear shock absorber;
- rear wheel;
- rear brake disc;
- rear brake caliper;
- rear brake pipe fittings brake.

**⚠ CAUTION**

The fastening elements must be torqued to specification and LOCTITE® applied, where indicated, see 1.10.3 (DRIVING TORQUES).

ENGINE

3

ENGINE

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3.1 TECHNICAL INFORMATION

3.1.1 TECHNICAL DATA

See 1.5 (TECHNICAL SPECIFICATIONS).

3.1.2 MAINTENANCE INTERVALS

See 2.1.1 (REGULAR SERVICE INTERVALS CHART).

3.1.3 TROUBLESHOOTING

See 8.1 (TROUBLESHOOTING).

3.1.4 SEALANTS

See 1.9 (CONSUMABLES).

3.1.5 LUBRICANTS

See 1.6 (LUBRICANT CHART).

3.1.6 SPECIAL TOOLS

See 1.7 (SPECIAL TOOLS **OPT**).

3.1.7 DRIVING TORQUE

See 1.10 (FASTENING ELEMENTS).

3.1.8 PRECONDITIONS TO BE MET WHEN PERFORMING MAINTENANCE AND REPAIR WORK

⚠ WARNING

During the assembly phase, bear in mind the engines weight (approx. 50 kg) and centre of gravity: support accordingly.

Take care around any potentially hazardous points where you might be squashed or cut.

⚠ CAUTION

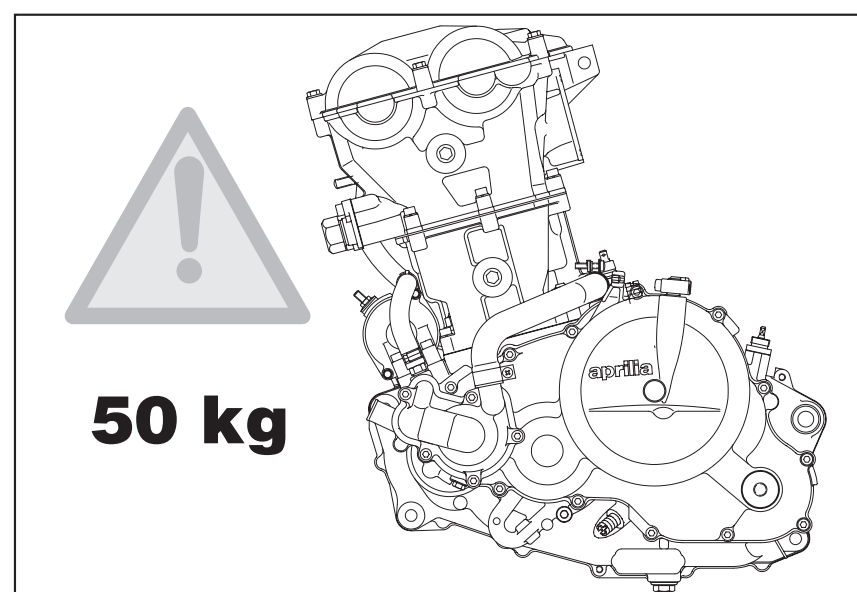
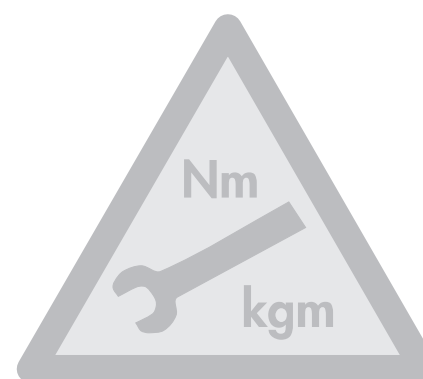
The maintenance of engines and systems calls for specific experience and the use of special tools.

Any maintenance and repair work must be performed by suitably trained technical personnel only.

NOTE Comply with the instructions furnished by the manufacturer of the vehicle.

3.1.9 GENERAL INDICATIONS ON MAINTENANCE AND REPAIR WORK

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).



3.2 ENGINE PARTS WHICH CAN BE DISASSEMBLED WITHOUT REMOVING THE ENGINE FROM THE FRAME

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

The parts underlined can be removed and refitted without removing the engine from the frame.

⚠ CAUTION

This chapter describes the relevant procedures progressively and in sequential order.

Any reference to operations from other chapters must be interpreted logically in order to avoid components being removed unnecessarily.

Only perform those operations necessary to remove the component in question.



TOP SIDE

- Tappet cover (1), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Camshafts (2), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Chain (3) and chain tightener (4) timing drive, see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Engine oil pressure sensor (5), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Revolution counter control (6), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Clutch control lever (7), see 3.2.4 (REMOVING THE CLUTCH LEVER).



FRONT SIDE

- Exhaust pipes, see 3.2.1 (REMOVING THE EXHAUST PIPES).
- Starter motor (8), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Starter control (9), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).

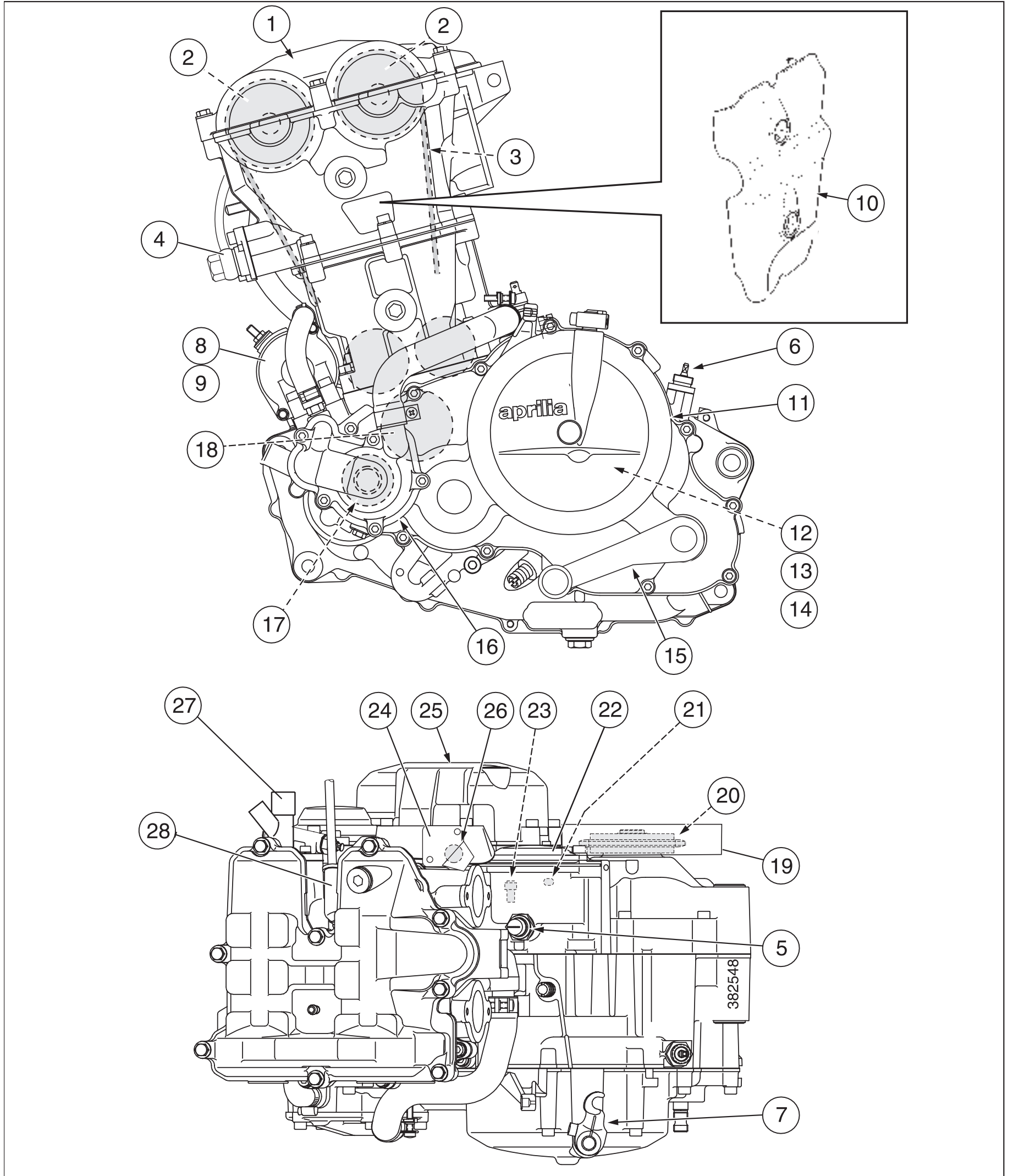
LEFT SIDE

- Cylinder cover (10), see 3.2.6 (REMOVING THE CYLINDER COVER).
- Clutch cover (11), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Clutch (12) and primary transmission (13), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Oil pump and oil pump control (14), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Gearshift lever (15), see 3.2.2 (REMOVING THE GEAR LEVER).
- Coolant pump (16) and coolant pump control, see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Thermal expansion valve (17), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Timing drive (18), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).

- Engine oil filter (22), see 2.12 (CHANGING THE ENGINE OIL AND THE OIL FILTER).
- Neutral gear switch (23), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Drive shaft position sensor guard (24), see 3.2.5 (REMOVING THE DRIVE SHAFT POSITION SENSOR GUARD).
- Flywheel cover (25) and ignition system, see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Driving shaft position sensor (26), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Coolant thermistor (27), see 5.5 (REMOVING THE COOLANT THERMISTOR).
- Spark plug (28), see 2.6 (SPARK PLUG).

RIGHT SIDE

- Drive pinion protection case (19), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).
- Drive pinion (20), see 7.1.39 (REMOVING THE DRIVE PINION).
- Lubrication circuit vent valve (21), see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).



3.2.1 REMOVING THE EXHAUST PIPES

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

⚠ WARNING

Let the engine cool down until it reaches room temperature.

- ◆ Remove the right panel, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).
- ◆ Remove the radiator, see 5.2 (REMOVING THE RADIATOR).
- ◆ Unscrew and remove the two screws (1) (2).
- ◆ Remove the radiator support (3).
- ◆ Unscrew and remove the two screws (4) (5), taking the washers.
- ◆ Remove the protection cover (6).
- ◆ Partially unscrew the two screws (7) (8) positioned on the clamps (9) (10).
- ◆ ★ Unscrew and remove the two nuts (11) fastening the flange of the exhaust pipe to the cylinder.

Exhaust pipe flange nut driving torque: 25 Nm (2.5 kgm).

⚠ CAUTION

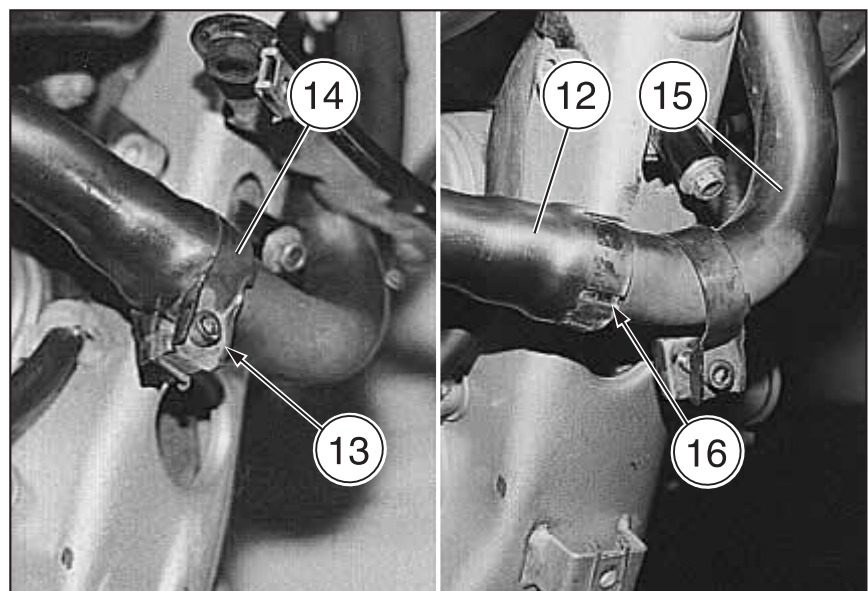
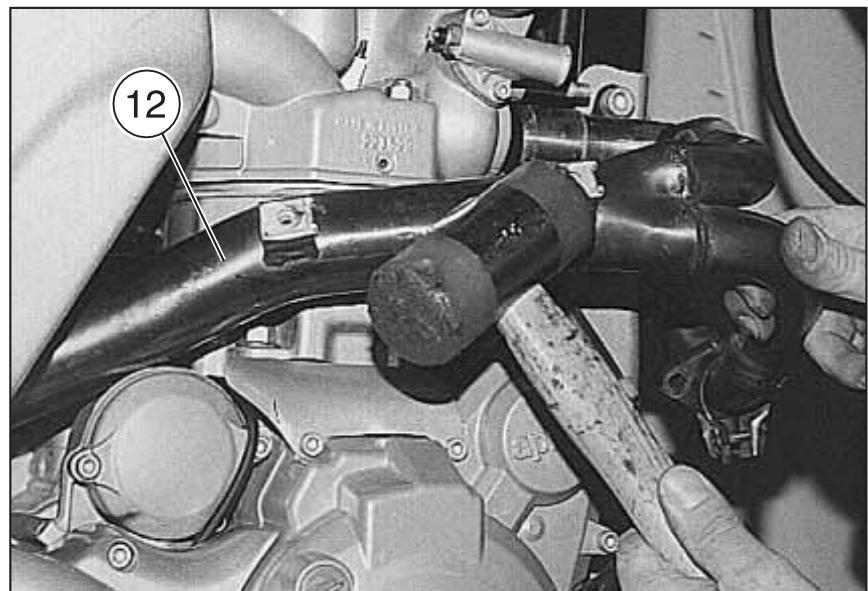
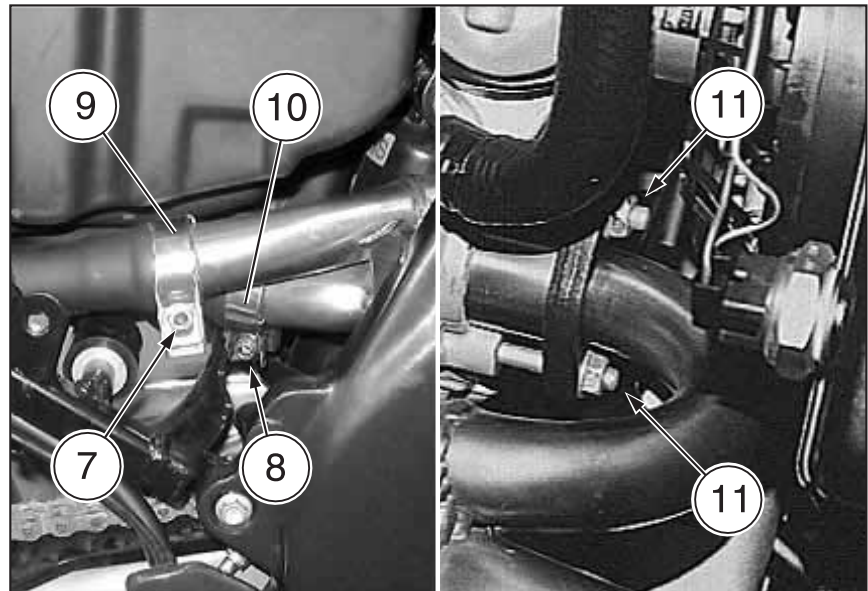
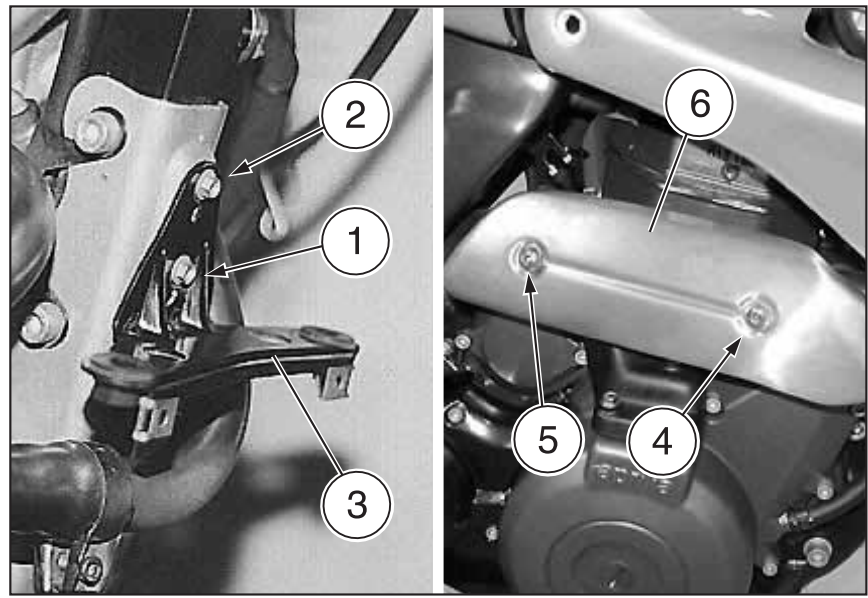
When slipping the exhaust pipe (12) off the cylinder, take care not to damage the thread of the fastening stud bolts.

- ◆ Move the exhaust pipe unit (12) forward, in order to be able to withdraw the pipes from the seats on the cylinder.

NOTE To make it easier to withdraw the exhaust pipe unit (12), strike slightly one of the two supports of the protection cover with a rubber hammer (see figure).

- ◆ Partially unscrew the screw (13) positioned on the clamp (14).
- ◆ Withdraw the pipe (15) from the exhaust pipe unit (12).
- ◆ If the graphite sealing ring (16) has deteriorated, change it.

Follow ►



Follow ►

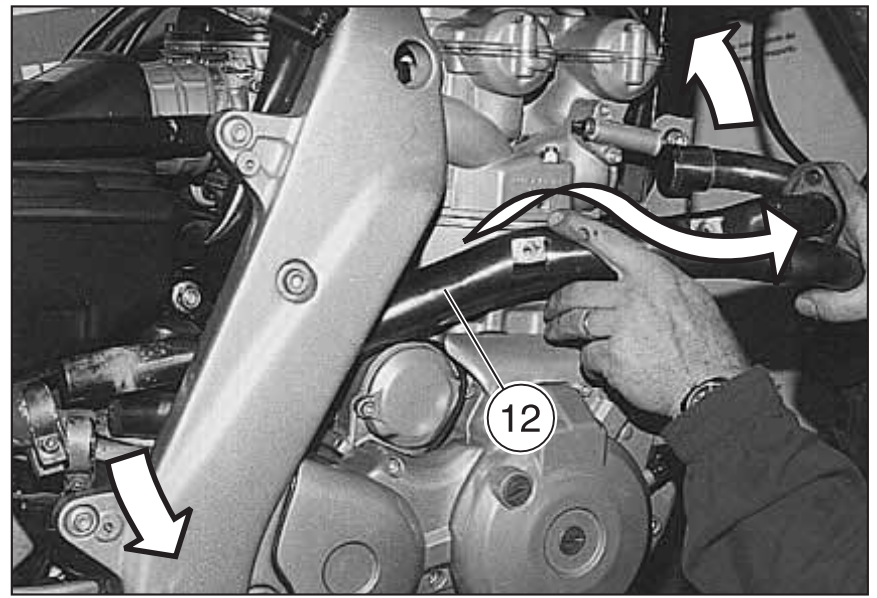
- ◆ Remove the exhaust pipe unit (12) by withdrawing it from its front part.

NOTE Move the exhaust pipe unit (12) gradually, trying to find the best combination of movements and withdraw it correctly (raise the front part, lower the rear part and move the whole so that it carries out a forward screwing movement; the rear lower part must pass through the turns of the rear shock absorber spring) (see figure).

⚠ CAUTION

Check and, where necessary, replace the gaskets (17) (18) with two new ones of the same type.

Plug the engines exhaust pipe openings so as to prevent any foreign bodies entering.



3.2.2 REMOVING THE GEAR LEVER

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

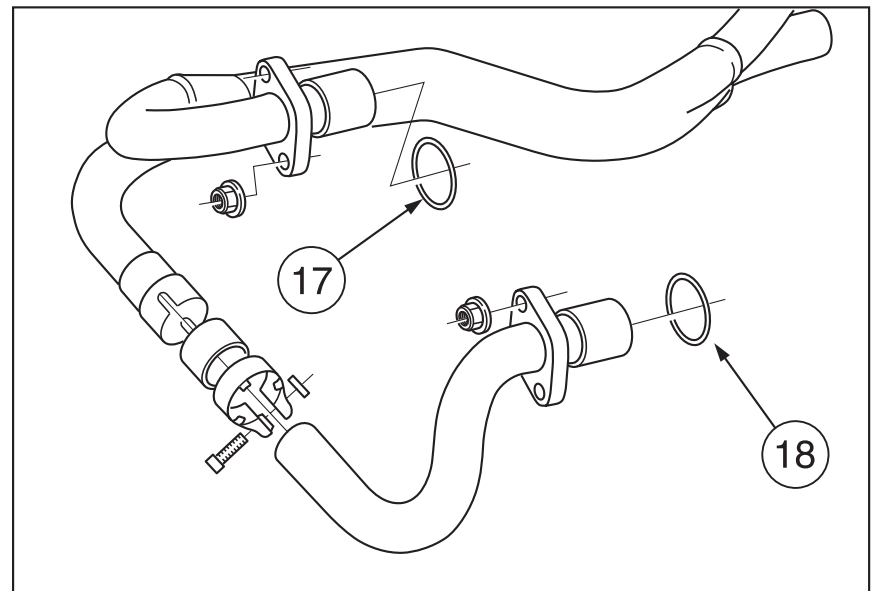
⚠ CAUTION

Before removing the lever, mark lever and shaft (see figure), in order to be able to position it correctly upon reassembly.

- ◆ Position the vehicle on the stand.
- ◆ Loosen and remove the screw (19).

Shifting lever screw driving torque: 10 Nm (1.0 kgm).

- ◆ Slide the gearshift lever (20).



3.2.3 REMOVING THE DRIVE PINION PROTECTION CASING

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

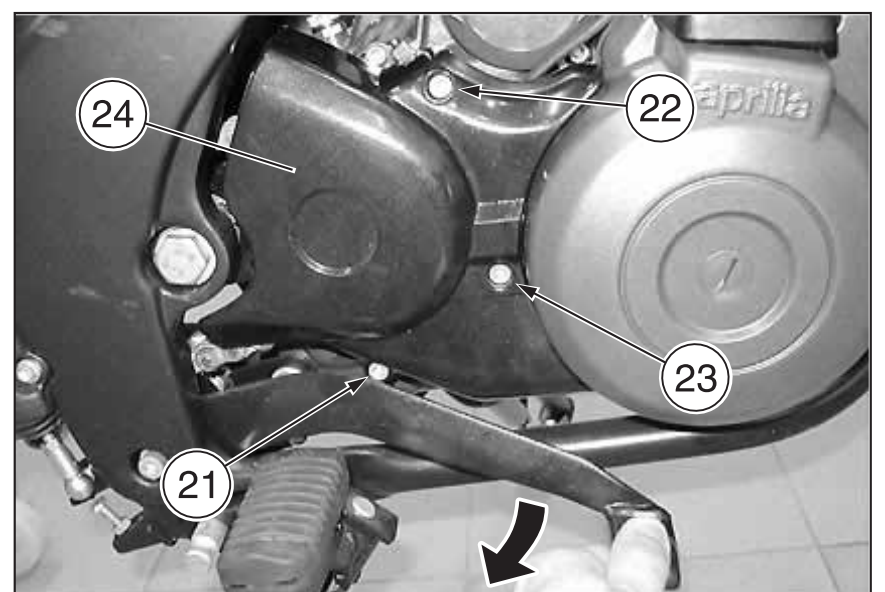
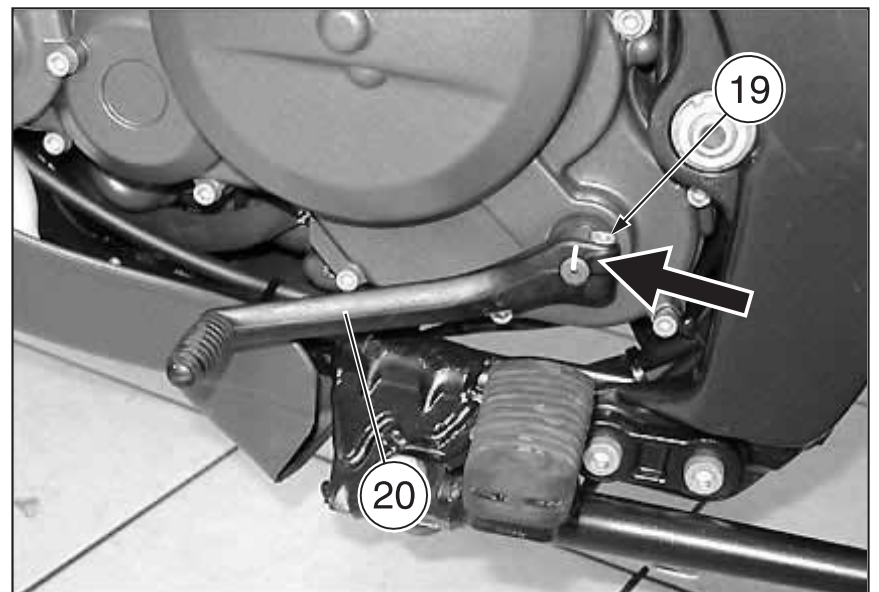
⚠ WARNING

Let the engine cool down until it reaches room temperature.

- ◆ Position the vehicle on the stand.
- ◆ Unscrew the screw (21), keeping the rear brake pedal pressed downwards.
- ◆ Unscrew and remove the two screws (22) (23).

Pinion casing screw driving torque: 5 Nm (0.5 kgm).

- ◆ Remove the casing (24), raising it slightly and turning it towards the outside.



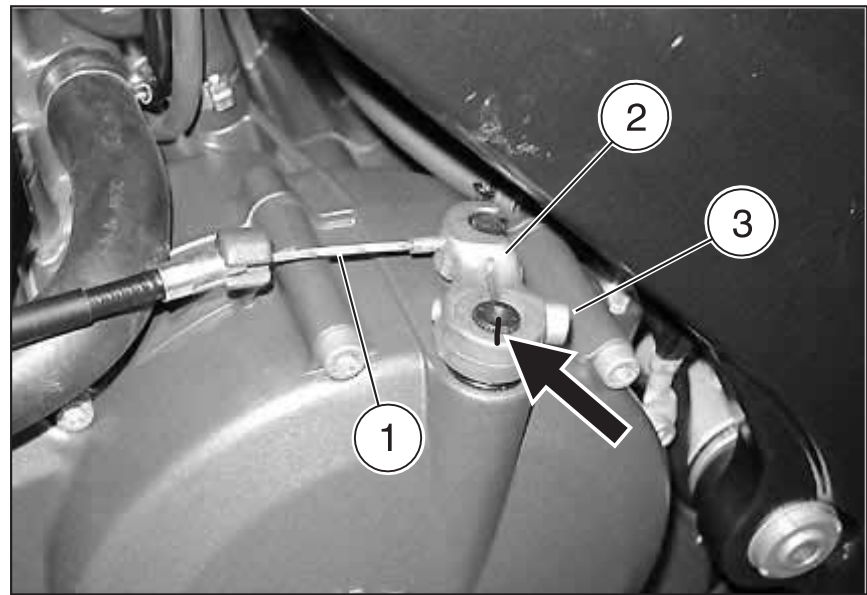
3.2.4 REMOVING THE CLUTCH LEVER

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

⚠ CAUTION

Before removing the lever, mark lever and shaft (see figure), in order to be able to position it correctly upon reassembly.

- ◆ Release the clutch control cable (1) from the lever (2).
- ◆ Loosen and remove the screw (3).
- ◆ Slide the clutch lever (2).



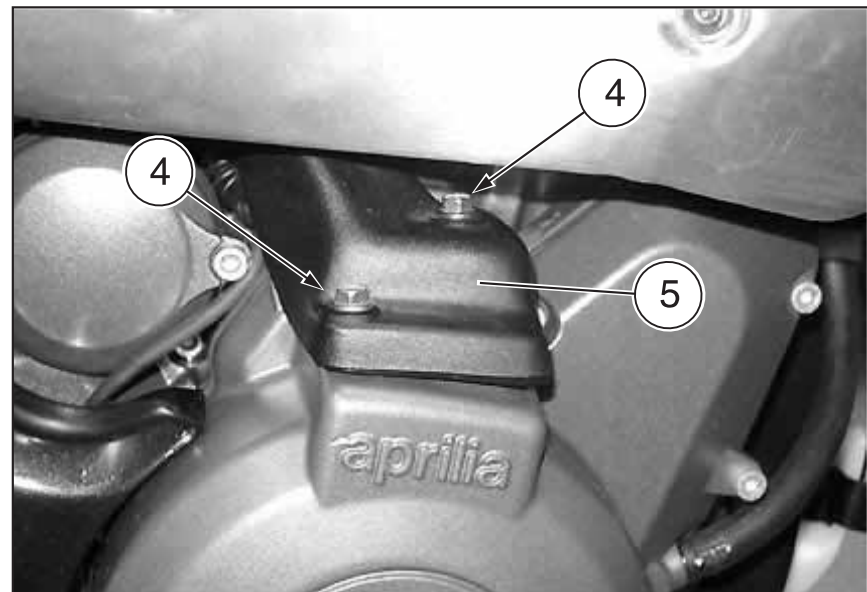
3.2.5 REMOVING THE DRIVE SHAFT POSITION SENSOR GUARD

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

⚠ WARNING

Let the engine cool down until it reaches room temperature.

- ◆ Unscrew and remove the screws (4).
- ◆ Remove the sensor protector (5).



3.2.6 REMOVING THE CYLINDER COVER

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

⚠ WARNING

Let the engine cool down until it reaches room temperature.

- ◆ Position the vehicle on the stand.
- ◆ Remove the front fairing, see 7.1.24 (REMOVING THE FRONT FAIRING).
- ◆ Unscrew and remove the screws (6).

Cylinder cover screw driving torque: 8 Nm (0.8 kgm).

- ◆ Retrieve the washer (7), the bushes (8) and the rubber elements (9).
- ◆ Remove the cylinder cover (10).
- ◆ Retrieve the insulating washers (11).

⚠ CAUTION

If the deadening material inside the cylinder cover (10) has deteriorated, change it.

- ◆ Check the deadening material inside the cylinder cover (10).

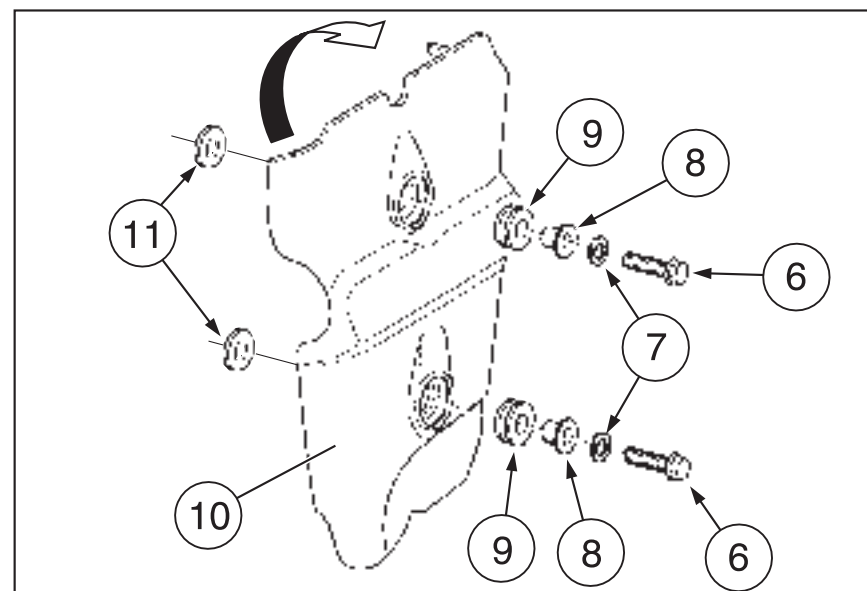
If it's deteriorated:

- ◆ Remove it completely.

⚠ WARNING

Do not use alcohol or other solvents to clean the plastic or rubber parts of the vehicle; use only water and soap.

- ◆ Clean the inside of the cylinder cover (10).
- ◆ Position the new deadening material, glueing it correctly inside the cylinder cover (10).



3.3 REMOVING THE WHOLE ENGINE FROM THE FRAME

⚠ CAUTION

The engine must be removed by an authorized centre or by an **aprilia** Official Dealer only.

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

⚠ CAUTION

The removal of the engine is a particularly complex operation. Therefore, inspect the vehicle carefully before proceeding.


This chapter describes the relevant procedures progressively and in sequential order.

Any reference to operations from other chapters must be interpreted logically in order to avoid components being removed unnecessarily.

Only perform those operations necessary to remove the component in question.

Before going ahead with the following operations, bear in mind that the engine must be removed from the left side; the equipment for the job must therefore be gathered and set in place beforehand.

Dry weight of the engine ~ 50 kg.

- ◆ Turn the ignition switch to position “

⚠ CAUTION

When refitting, first connect the positive cable (+) and then the negative one (–).

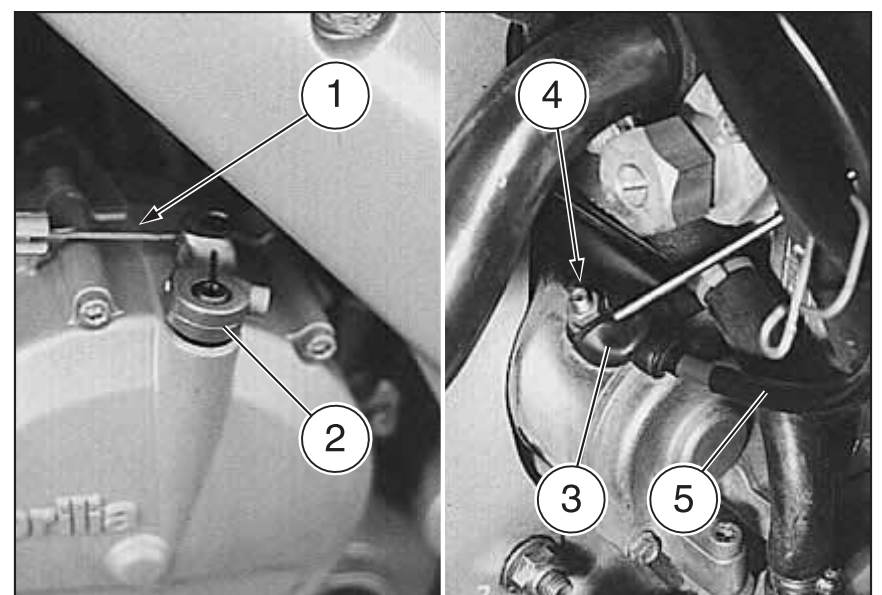
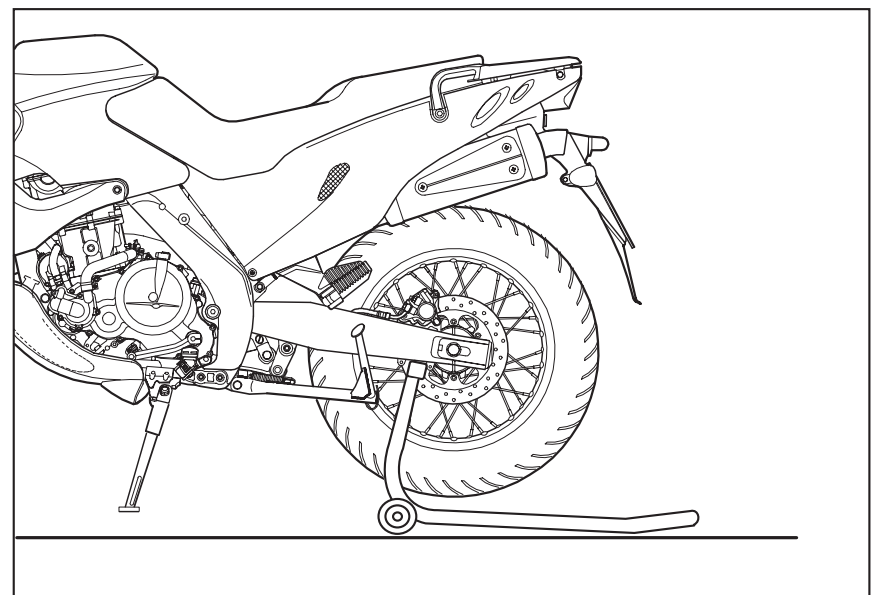
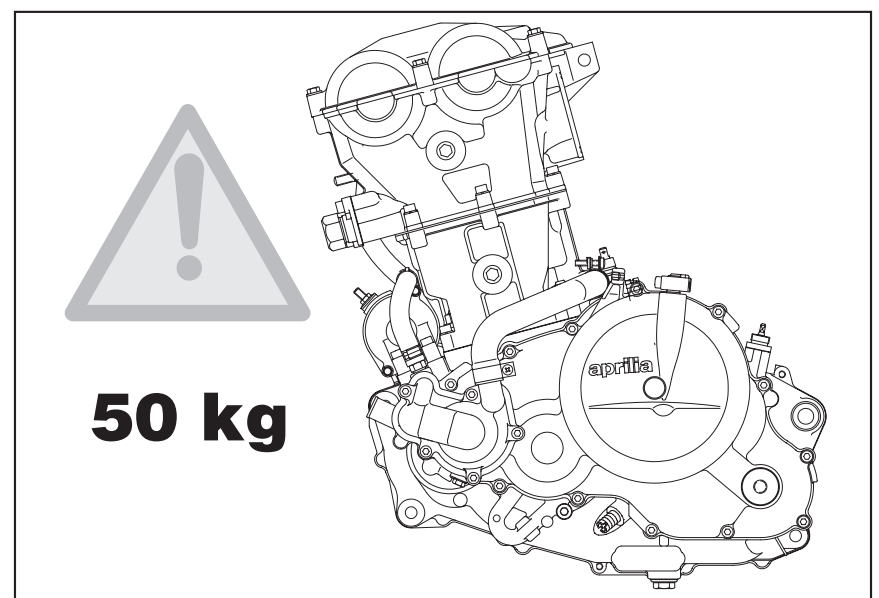
- ◆ Drain the engine oil tank completely, see 2.12 (CHANGING THE ENGINE OIL AND THE OIL FILTER).
- ◆ Remove the exhaust pipes, see 3.2.1 (REMOVING THE EXHAUST PIPES).
- ◆ Remove the expansion tank, see 5.6 (REMOVING THE EXPANSION TANK).
- ◆ Remove the gearshift pedal 3.2.2 (REMOVING THE GEAR LEVER).
- ◆ Disengage the clutch cable (1) from the lever (2).

⚠ CAUTION

Mark cables, couplings, pipes, etc., in order to avoid misplacing them upon reassembly.

- ◆ Raise the protection element (3), unscrew and remove the nut (4) and disconnect the starter cable (5).

Follow ►



Follow ►

⚠ CAUTION

To clean the outer parts of the engine use a degreaser, brushes and wipers.
 Avoid damaging rubber and plastic parts with corrosive or penetrating detergents and solvents.

Should the use of a steam cleaner prove necessary, do not point the high-pressure jets of water, steam or air at the following parts: wheel hubs, controls on the right and left handlebars, brake pumps, instruments and gauges, silencer openings, document compartment, ignition switch/steering lock, electrical components.

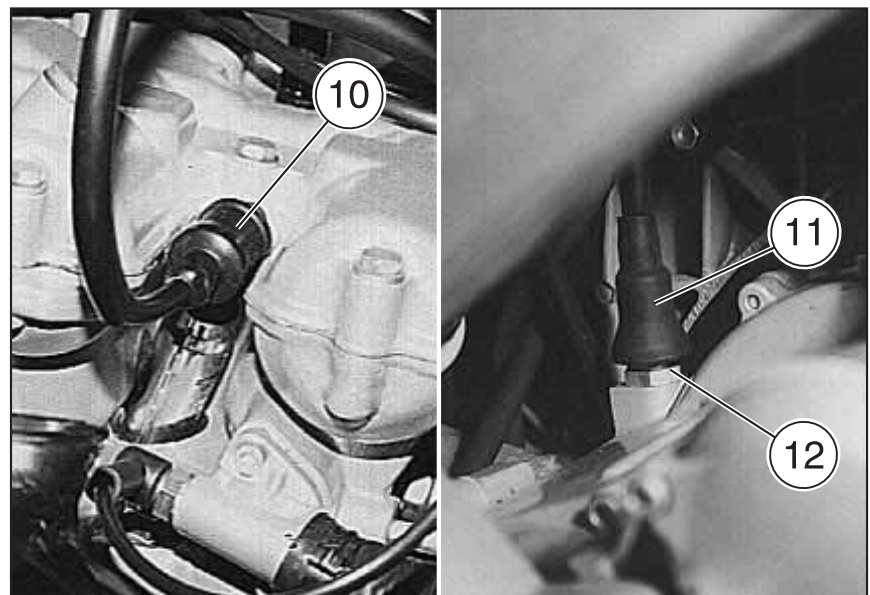
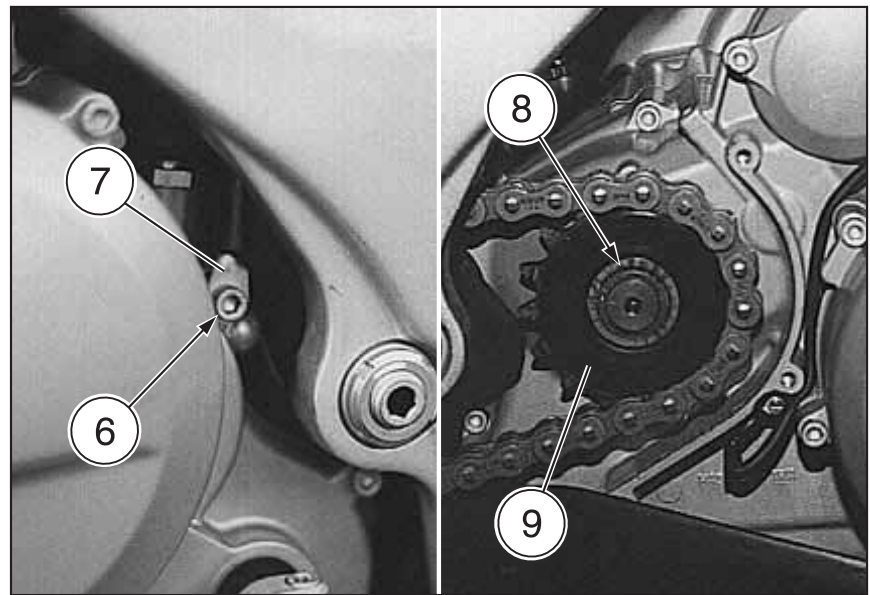
- ◆ Clean the outside of the engine thoroughly.
- ◆ Unscrew and remove the screw (6) and disconnect the earth cable (7).
- ◆ Remove the drive pinion protection casing, see 3.2.3 (REMOVING THE DRIVE PINION PROTECTION CASING).
- ◆ Remove the stop ring (8).
- ◆ Slide the drive pinion (9), complete with chain, off the shaft.

NOTE If it is difficult to withdraw the drive pinion (9), slacken the chain slightly, see 2.29.3 (ADJUSTING THE DRIVING CHAIN).

- ◆ Remove the drive pinion (9).

NOTE When reassembling, apply Anti-Seize LOC-TITE® on the inner toothing of the drive pinion (9).

- ◆ Disconnect the spark plug cap (10).
- ◆ Raise the protection element (11), unscrew the metal ring and withdraw the revolution counter control cable (12).

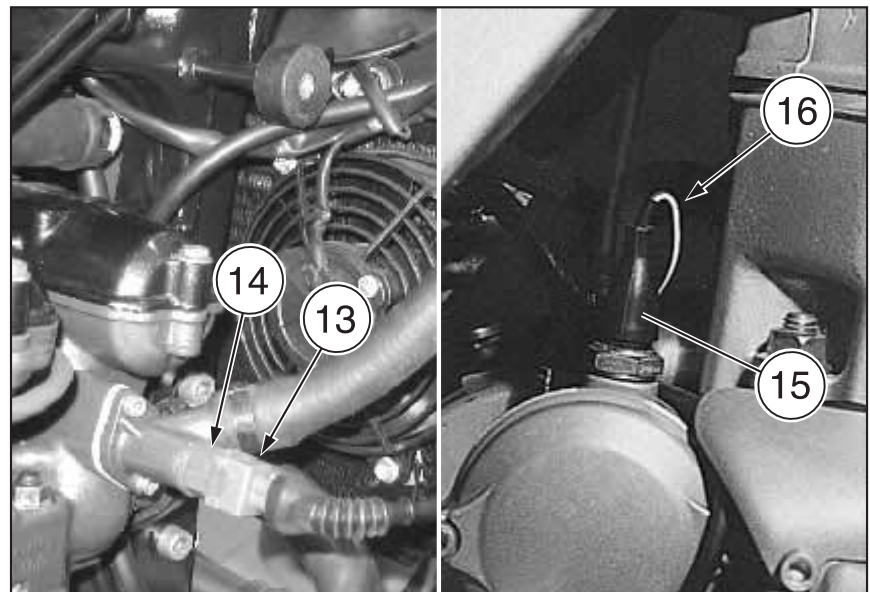


⚠ CAUTION

When refitting, make sure the electric connectors are plugged in properly.

- ◆ Disconnect the connector (13) of the coolant thermistor (14).
- ◆ Pull the protection element (15) aside and disconnect the oil pressure sensor cable (16).
- ◆ Disconnect the connector (17) of the drive shaft position sensor (18).

Follow ►



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- ◆ Unscrew the screw (19), disconnecting the neutral switch cable (20).
- ◆ Disconnect the connector of the alternator (21) (left side of the vehicle).

NOTE The alternator cables must be completely released and upon reassembly they must be placed in their original position.

- ◆ Remove the complete throttle body, see 4.9.2 (REMOVING THE THROTTLE BODY).

NOTE Have the appropriate special tool **OPT** to hand:
– **aprilia** part# 0277295 (hose clamp installation pliers).

⚠ CAUTION

Upon reassembly, replace the hose clamps that have been removed with new ones having the same dimensions, see 0.4.2 (SPARE PARTS CATALOGUES).

Do not attempt to reinstall the removed hose clamps, since they are unusable.

Do not replace the hose clamps that have been removed with screw clamps or clamps of any other type.

- ◆ Loosen the hose clamps (22) (23) (24) (25) (26) (27).
- ◆ Withdraw the oil breather pipe (28) (on the flywheel casing).

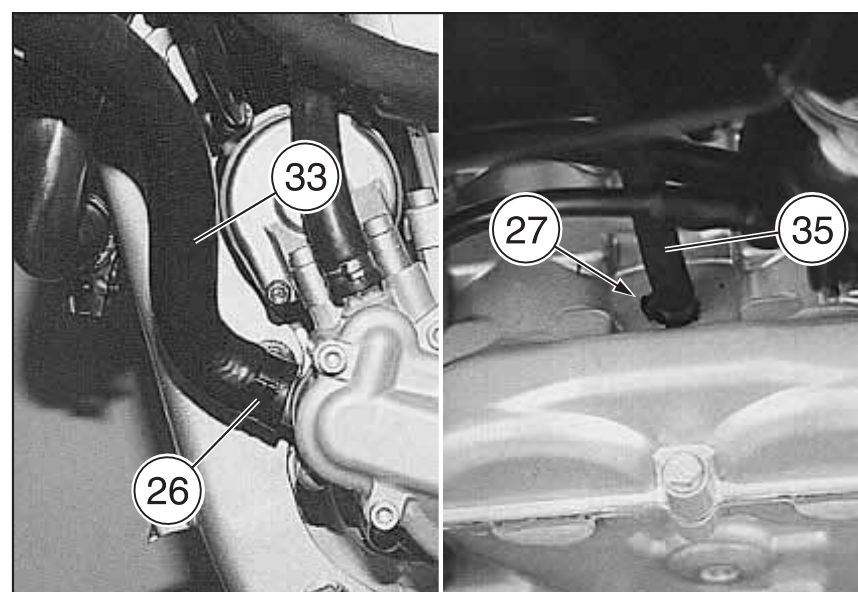
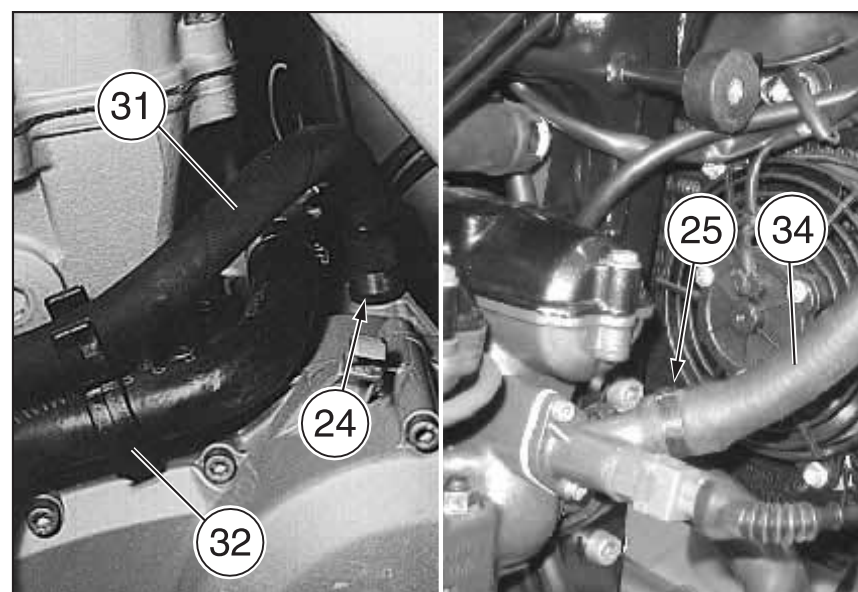
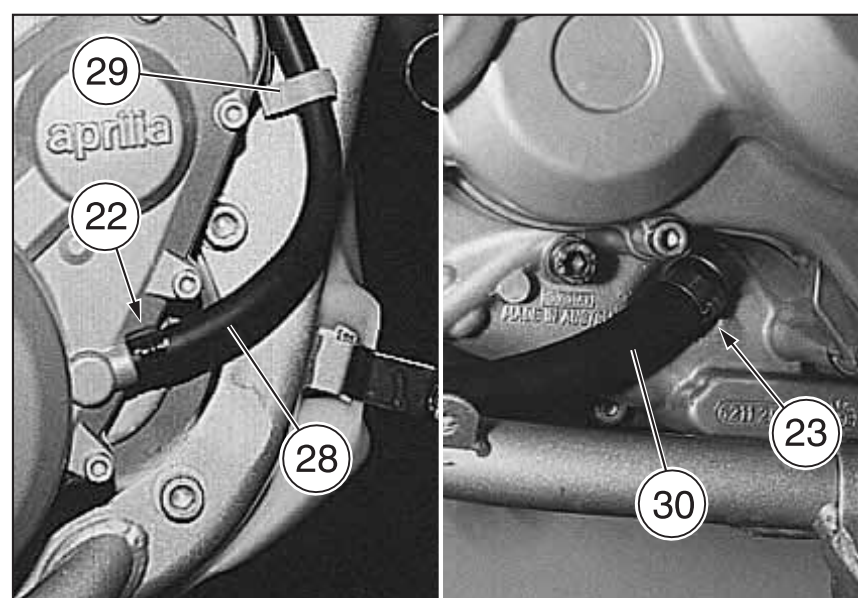
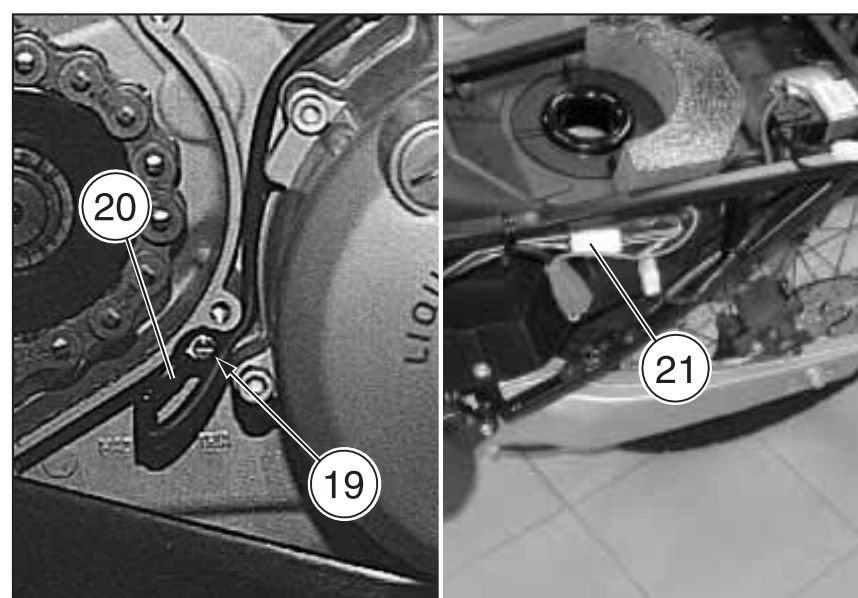
NOTE Release the pipe from the coupling (29) on the cradle.

- ◆ Withdraw the engine oil pipe (30) from the engine (from engine to tank).
- ◆ Withdraw the engine oil pipe (31) from the engine (from tank to engine).

NOTE Release the pipe from the coupling (32).

- ◆ Withdraw the coolant coupling (33) (pump inlet).
- ◆ Withdraw the coolant coupling (34) (pump outlet).
- ◆ Withdraw the engine oil breather pipe (35) (on the tap-pet cover).

Follow ►



Follow ►

⚠ CAUTION

Free all the cables and pipes from the respective clamps located at intervals along their routes.

Procure an equal number of clamps to be used for re-fitting.

Plug all openings on the engine, pipes and couplings to prevent foreign bodies getting in.

- ◆ Gather the electric cables together and secure them in place with adhesive tape so that they do not get in the way of the engine being lifted out from underneath.
- ◆ Sling the engine as indicated in the figure and fix the straps to a hoist to support it (the straps should pass over the left side of the frame).

⚠ WARNING

The straps (A) and the hoist must be capable of supporting the engine, which weighs approximately 50 kg, in total safety.

- ◆ Unscrew and remove the two nuts (36) (37) and withdraw the two screws (38) (39) that fasten the frame to the front part of the cradle.

Driving torque of the screw that fastens the upper part of the cradle: 50 Nm (5.0 kgm)

- ◆ ★ Take the pipe holding plate (40).

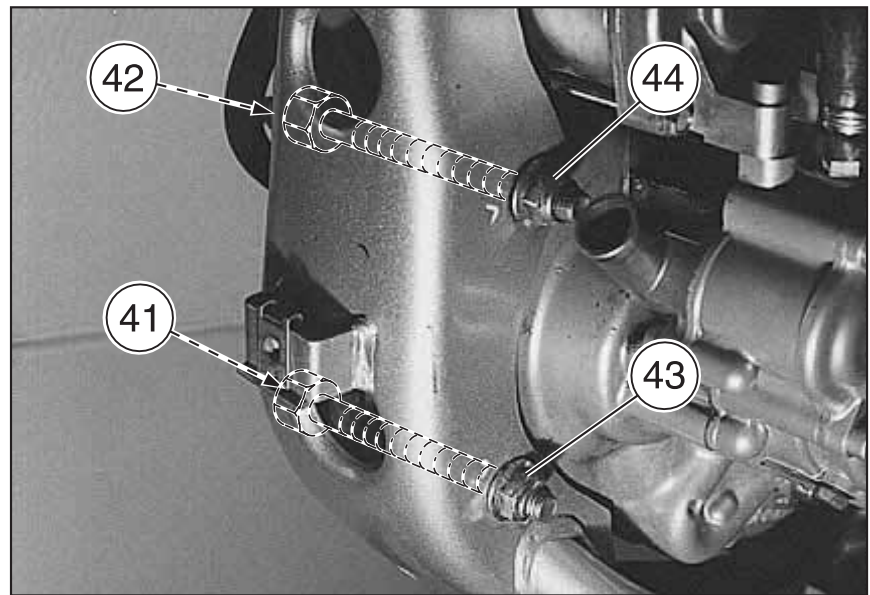
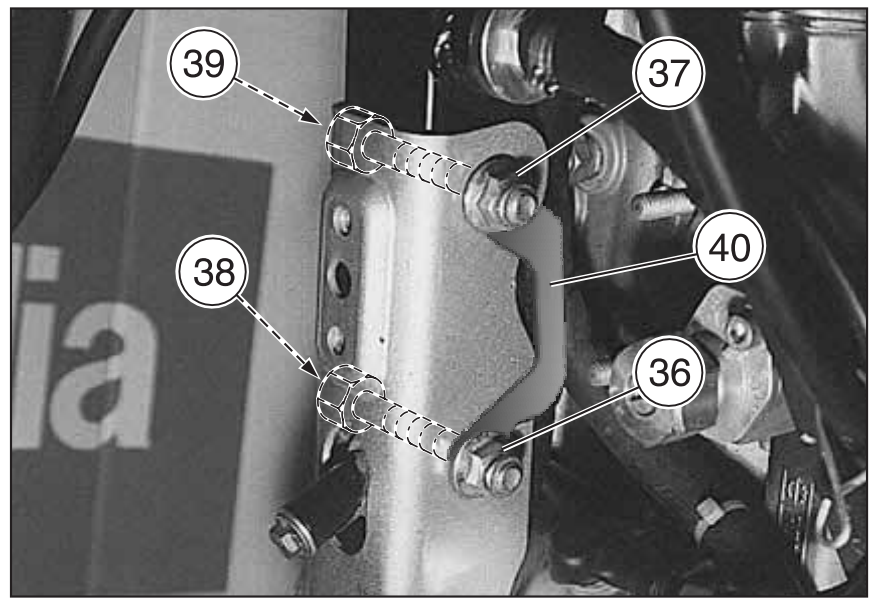
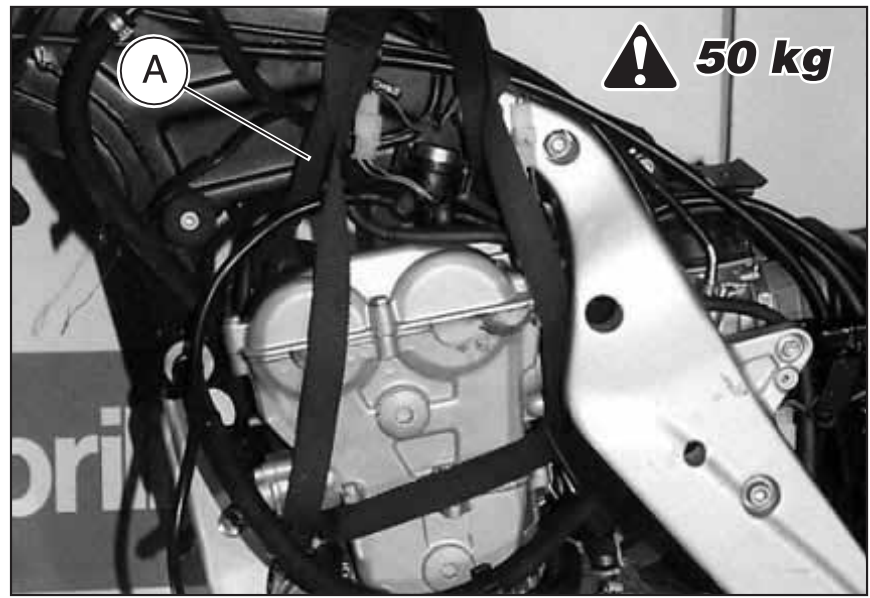
⚠ CAUTION

Upon reassembly of the pipe holding plate, position the oil breather pipe (28), the engine oil pipe (30) and the coolant compensation pipe correctly with respect to one another.

- ◆ Unscrew and remove the two nuts (41) (42) and withdraw the two screws (43) (44) that fasten the engine to the cradle.

Driving torque of the screw that fastens the lower part of the cradle: 50 Nm (5.0 kgm).

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- ◆ ★ Unscrew and remove the nut (45) and withdraw the screw (46) that fastens the frame to the rear part of the cradle.

Driving torque of the screw that fastens the rear part of the cradle: 50 Nm (5.0 kgm).

- ◆ Remove the cradle (47) (complete with side stand and expansion tank front support) by moving it forward.

NOTE When reassembling the cradle (48), position the coolant compensation pipe and the engine oil pipe (30) inside it.

NOTE (X) For the reassembly the engine on the frame, from this point on follow the specific procedures, see 3.5 (REFITTING THE WHOLE ENGINE ON THE FRAME).

- ◆ Partially unscrew the pin (49), holding the bush (48) in its position.

Fork pin driving torque: 100 Nm (10.0 kgm).

- ◆ Hold the bush (48) in its position, unscrew and remove the locking metal ring (50) using the appropriate socket spanner, see 1.7 (SPECIAL TOOLS **OPT**), then take the washer.
- ◆ Unscrew the adjusting bush (48) completely.

⚠ CAUTION

The rear fork pin (49) must not be withdrawn completely: part of the pin must remain inserted in its seat, in order to maintain the coupling frame/fork on the right side and to prevent the rear wheel/fork assembly from moving downwards and becoming misaligned.

Any successive reassembly operation would be particularly difficult.

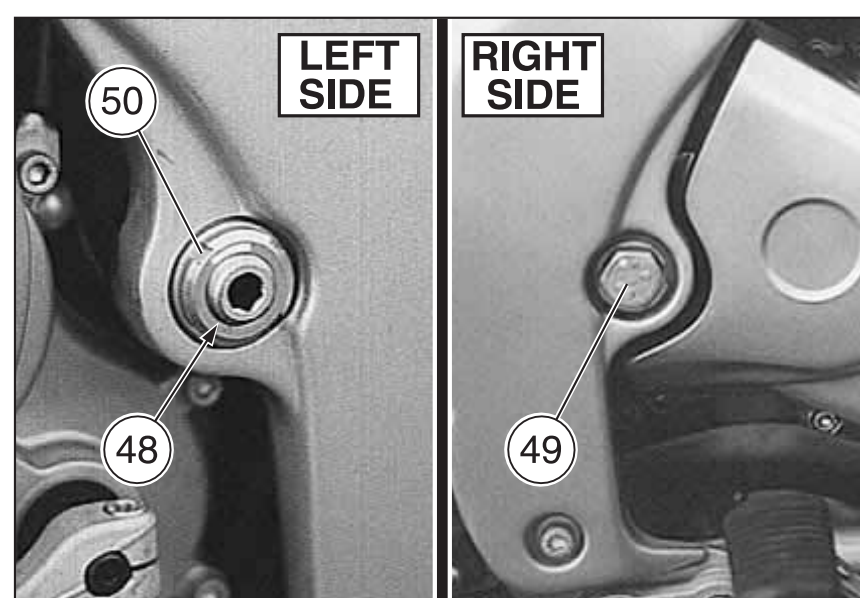
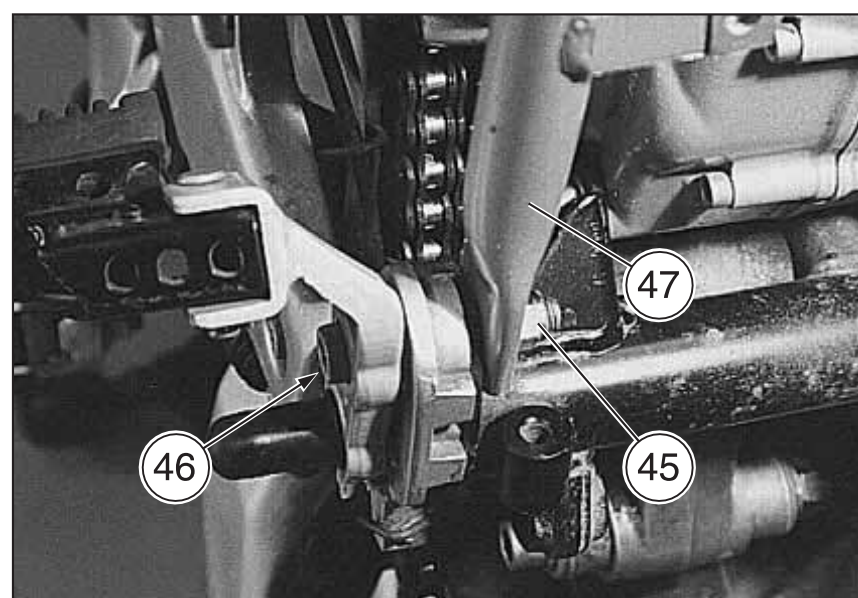
- ◆ Unscrew the pin (49) completely.
- ◆ Insert the appropriate tool in the adjusting bush (48), see 1.7 (SPECIAL TOOLS **OPT**).
- ◆ Using a rubber hammer, slightly strike the tool until it touches the adjusting bush (48).

⚠ WARNING

Due to the weight (approx. 50 kg) and dimensions of the engine, the following operations must be performed by two persons. Make sure that the operating procedure before starting work.

The removal must be carried out with the greatest care.

Follow ►



Follow ►

- ◆ Unscrew and remove the nut (53) and withdraw the rear lower screw (51) that fastens the engine to the frame.

Small pedal screw driving torque: 50 Nm (5.0 kgm).

⚠ CAUTION

Once the screw (51) has been withdrawn, the engine will tend to turn slightly forward with fulcrum on the screw (52).

NOTE To make it easier to withdraw the screw (51), slightly raise the engine.

- ◆ Unscrew and remove the nut (54) and withdraw the upper screw (52) that fastens the engine to the frame, taking the washer.

⚠ CAUTION

Clear the floor, on which the engine is to be set down, of any tools and clean thoroughly.

⚠ WARNING

The engine is now completely free and has nothing fastening it. Handle with care: watch your fingers and limbs.

Grasp the engine on both sides, where it can be held firmly, and extract it gradually from the left side, trying to find the optimal combination of movements.

- ◆ Lower the hoist arm until the engine is gently set down on the floor.
- ◆ Secure the engine so that it does not fall over if poorly balanced.

NOTE If the engine is to be worked on, set it on the relevant stand (55), see 3.3.1 (POSITIONING THE ENGINE ON THE ENGINE SUPPORT STAND).

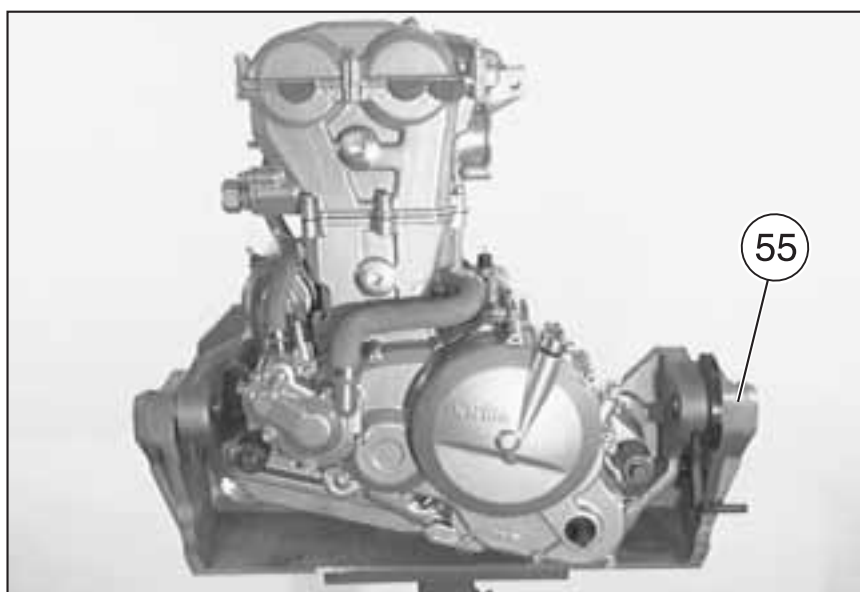
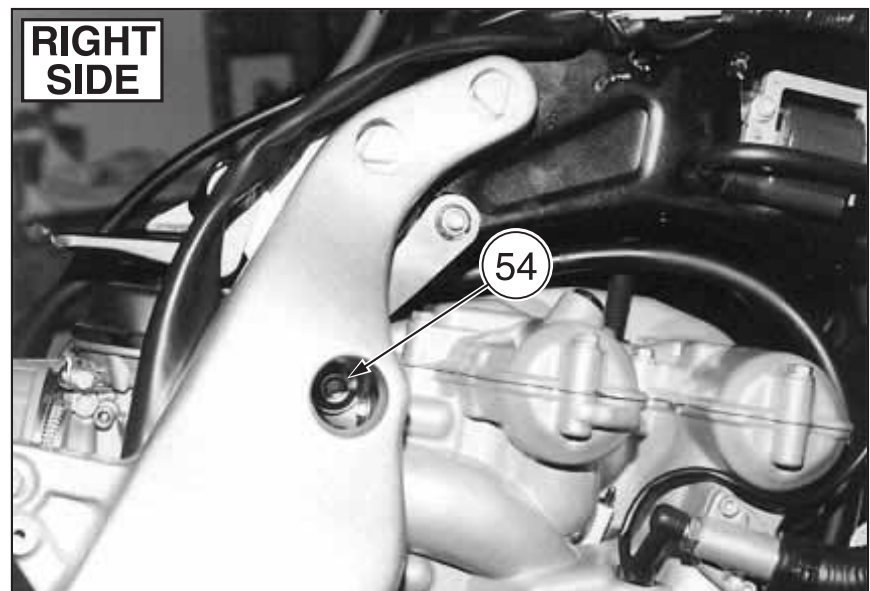
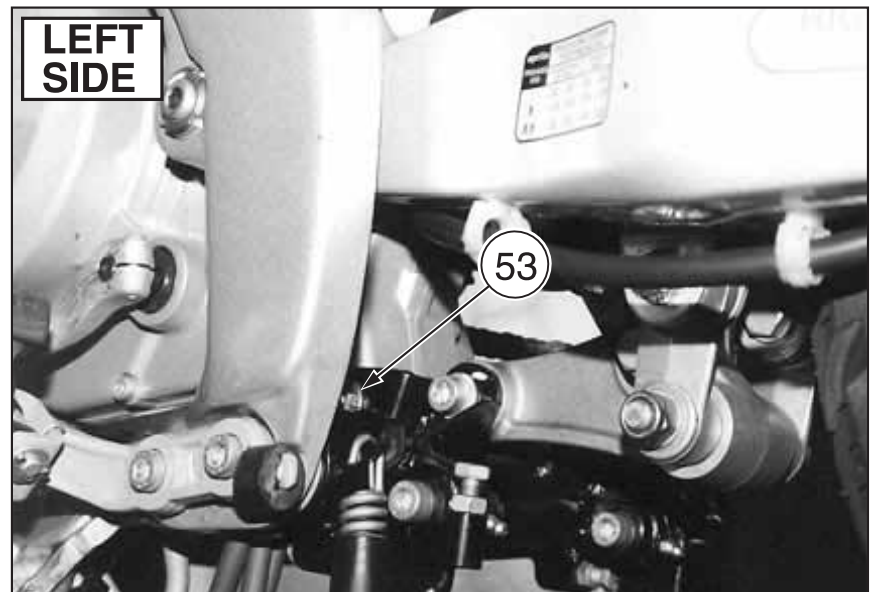
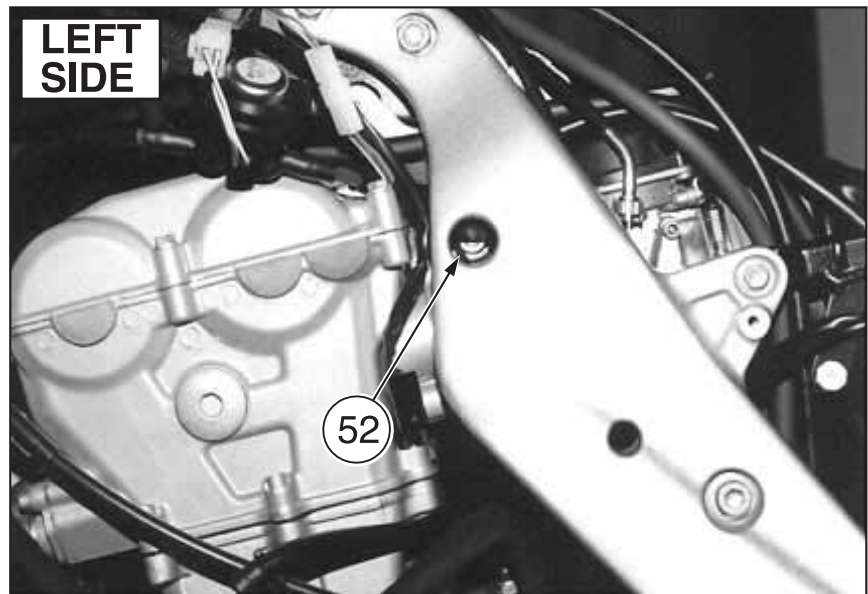
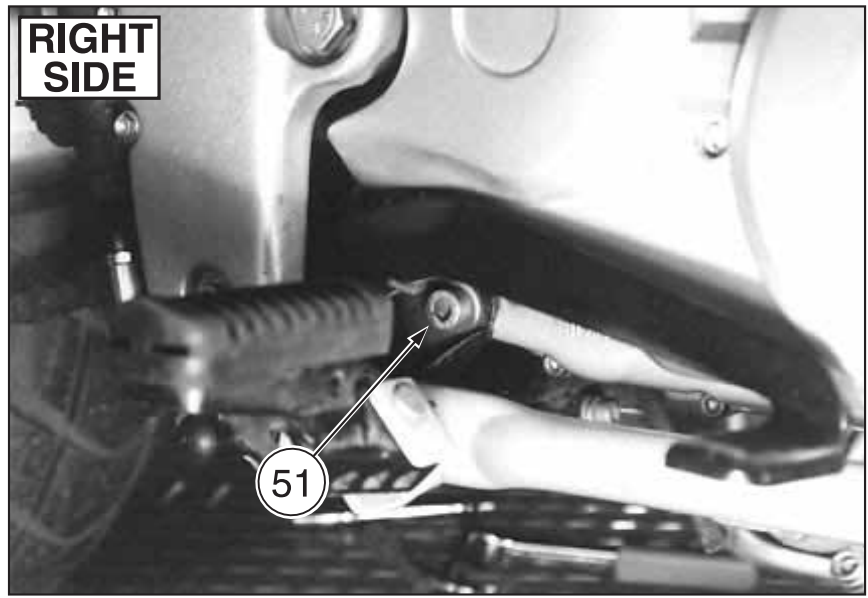
⚠ CAUTION

If no work is to be performed on the engine, leave it rested on the floor and attached to the bands (A) and hoist for extra safety.

- ◆ Complete the cleaning of the engine outside with the utmost care.

⚠ CAUTION

Use a detergent, brushes and rags to clean the engines outer surfaces. Avoid damaging rubber and plastic parts with corrosive or penetrating detergents and solvents.



3.3.1 POSITIONING THE ENGINE ON THE ENGINE SUPPORT STAND

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

NOTE Have the appropriate special tools **OPT** to hand:

- **aprilia** part# 0277919 (type 655 engine support unit) (1);
- **aprilia** part# 8140187 (engine support stand) (2).
- ◆ Remove the entire engine from the frame, see 3.3 (REMOVING THE WHOLE ENGINE FROM THE FRAME).

⚠ WARNING

The entire engine and hoist setup must be stable, ensuring that the subsequent operations can be performed safely.

- ◆ Raise the hoist arm, lifting the engine at approximately 1 meter from the ground.
- ◆ Install the engine support (1) on the engine.

⚠ WARNING

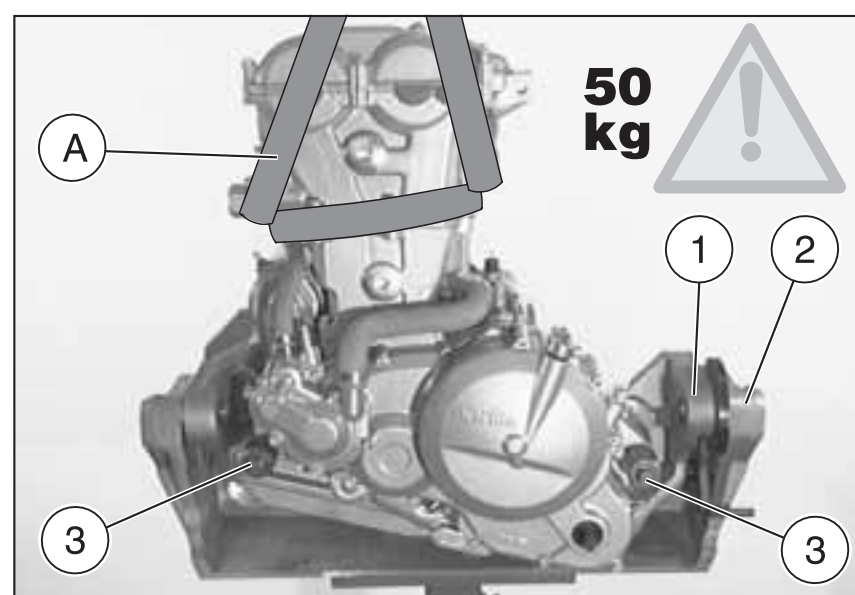
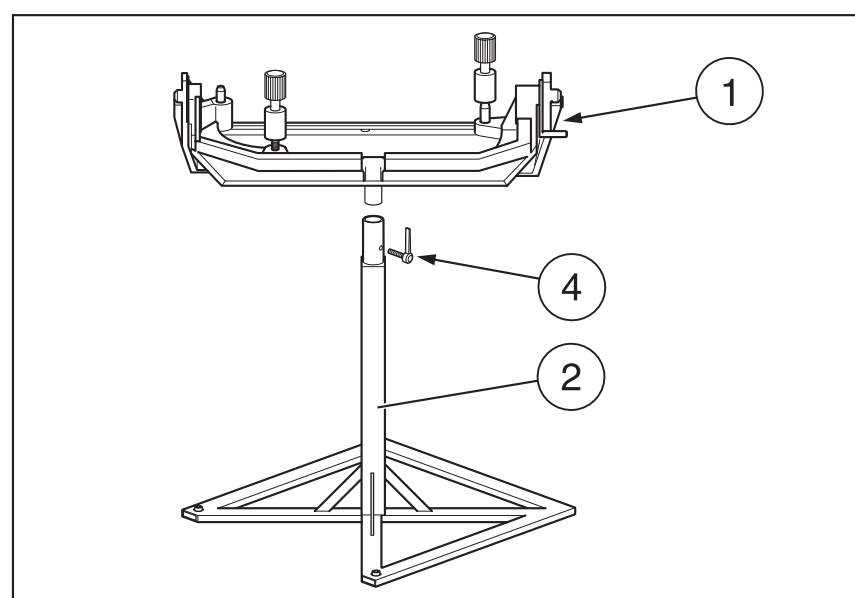
Tighten the screws (3) thoroughly, since the incomplete tightening of the screws (3) may cause the engine to fall down, with consequent damage to persons, property and the engine itself.

- ◆ Screw and tighten the screws (3).
- ◆ Assemble the engine support stand (2) with the engine support (1) and insert the safety pin (4) in the appropriate seat.
- ◆ Clear and clean the area on which the stand-engine assembly will be positioned.
- ◆ Using the hoist, move the stand-engine assembly to the desired area.
- ◆ Lower the hoist arm and rest the stand-engine assembly on the area prepared for this purpose.

⚠ WARNING

Before releasing the hoist straps, make sure that the stand-engine assembly is stable. The overturning of the assembly may damage persons, property and the assembly itself (engine included).

- ◆ Release the engine from the straps (A).



3.4 DISASSEMBLING THE ENGINE

For the disassembly of the engine, refer to the service and repair manual, see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).

3.5 REFITTING THE WHOLE ENGINE ON THE FRAME

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

NOTE In order to refit the whole engine on the frame, the same procedure used for its removal must be followed in the reverse order, see 3.3 (REMOVING THE WHOLE ENGINE FROM THE FRAME).

Nonetheless, before commencing, the operations indicated below must be performed.

- ◆ Sling the engine as indicated in the figure and fix the straps to a hoist to support it.

⚠ WARNING

The straps and the hoist must be capable of supporting the engine, which weighs approximately 50 kg, in total safety.

⚠ WARNING

Due to the weight (approx. 50 kg) and dimensions of the engine, the following operations must be performed by two persons. Make sure that the operating procedure before starting work.

The reassembly operation must be carried out with the greatest care.

Handle with care.

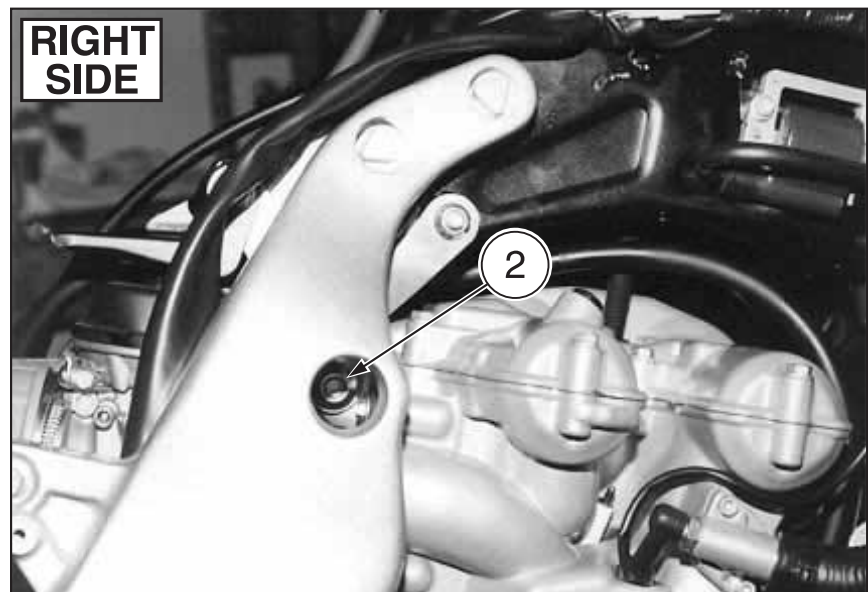
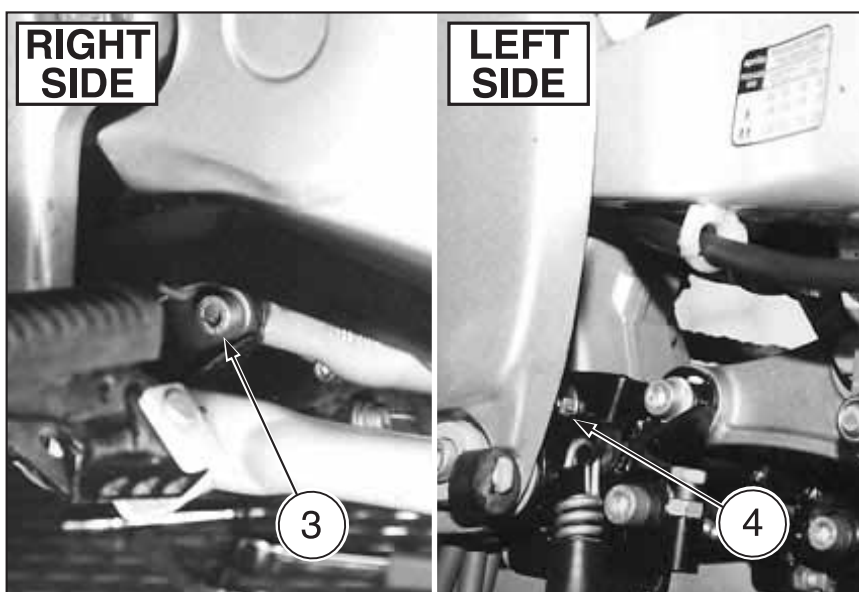
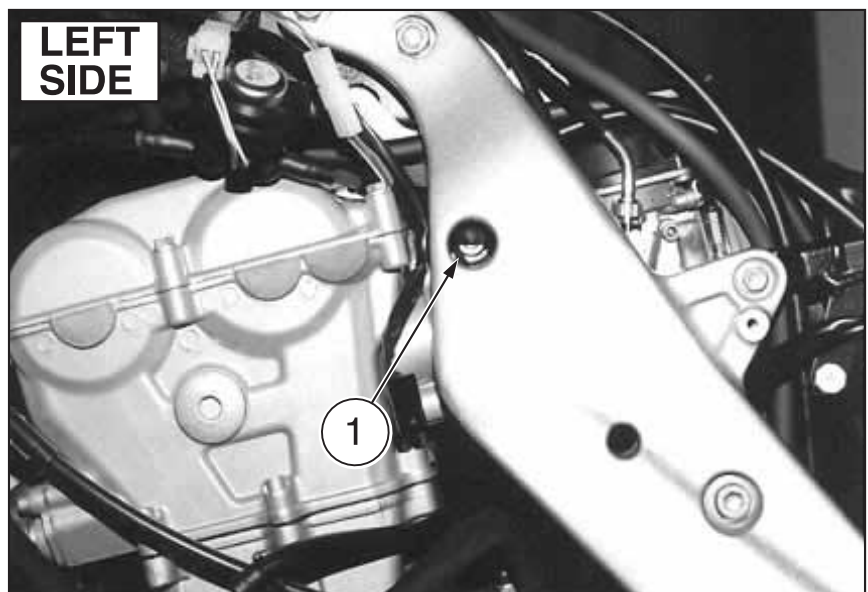
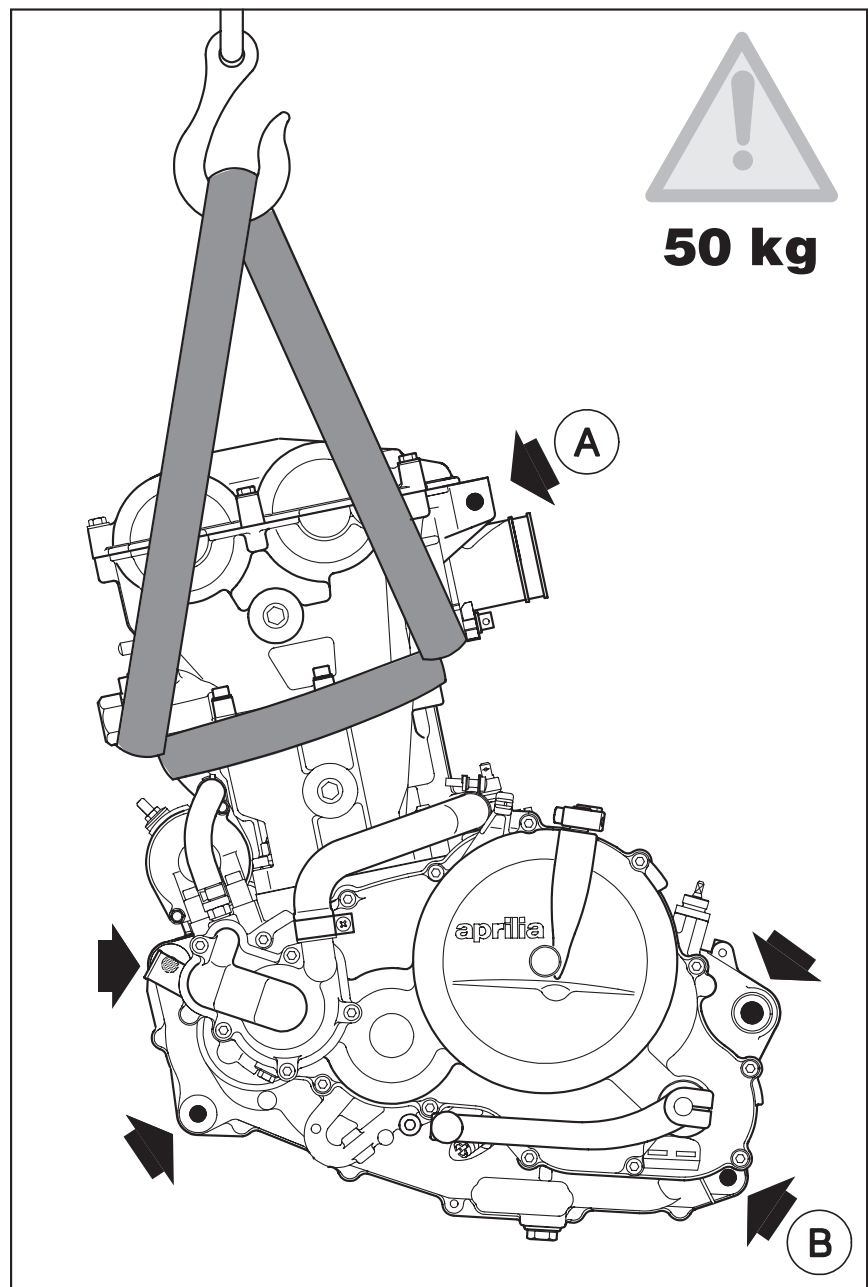
Watch your fingers and limbs.

- ◆ Grasp the engine firmly and position it correctly on the frame, on the left side of the vehicle.
- ◆ Nudge the engine along gradually until the engine/frame fastening holes (A) are perfectly aligned.
- ◆ Introduce the screw (1) with the washer and screw the engine/frame upper fastening nut (2), without tightening it.
- ◆ Push the engine from the front lower side, making it turn slightly backwards with fulcrum on the fastening point (A), until the rear lower holes for the fastening of the engine to the frame (B) are aligned, and at the same time introduce the fastening screw (3) and screw the nut (4).

Small pedal screw driving torque: 50 Nm (5.0 kgm).

- ◆ Tighten the nut (2).

Follow ►



Follow ►

⚠ CAUTION

In the first phase the pin (5), the adjusting bush (6) and the locking metal ring (7) must be screwed manually.

- ◆ Introduce and screw the frame/engine/rear fork fastening pin (5) with the appropriate socket spanner, at the same time holding the adjusting bush (6) in its position.
- ◆ Screw the adjusting bush (6) until it touches the rear fork, then give it another 1/4 turn.

Adjusting bush (6) tightening: contact + 1/4 turn.

- ◆ Lock the adjusting bush (6), tighten the rear fork pin (5).

Fork pin driving torque: 100 Nm (10 kgm).

- ◆ Refit the washer.
- ◆ Hold the adjusting bush (6) in its position and screw the locking metal ring (7) at the same time.

Fork metal ring driving torque: 35 Nm (3.5 kgm).

⚠ CAUTION

From this point on, reassemble the engine on the frame following the removal procedure in the reverse order, starting from NOTE (X), see 3.3 (REMOVING THE WHOLE ENGINE FROM THE FRAME).

NOTE Have the appropriate special tool **OPT** to hand:
– aprilia part# 0277295 (hose clamp installation pliers).

⚠ CAUTION

Upon reassembly, replace the hose clamps that have been removed with new ones having the same dimensions, see 0.4.2 (SPARE PARTS CATALOGUES).

Do not attempt to reinstall the removed hose clamps, since they are unusable.

Do not replace the hose clamps that have been removed with screw clamps or clamps of any other type.

Once the engine refitting procedure is complete, perform the operations indicated below.

- ◆ Make sure all the nuts/screws securing the engine are properly torqued.
- ◆ Top up the coolant, see 2.13 (CHECKING AND TOPPING UP COOLANT).
- ◆ Top up the motor oil, see 2.11 (CHECKING THE ENGINE OIL LEVEL AND TOPPING UP).
- ◆ Check the driving chain is taught and, where necessary, adjust, see 2.29.1 (CHECKING THE DRIVE CHAIN SLACK) and 2.29.3 (ADJUSTING THE DRIVING CHAIN)

⚠ CAUTION

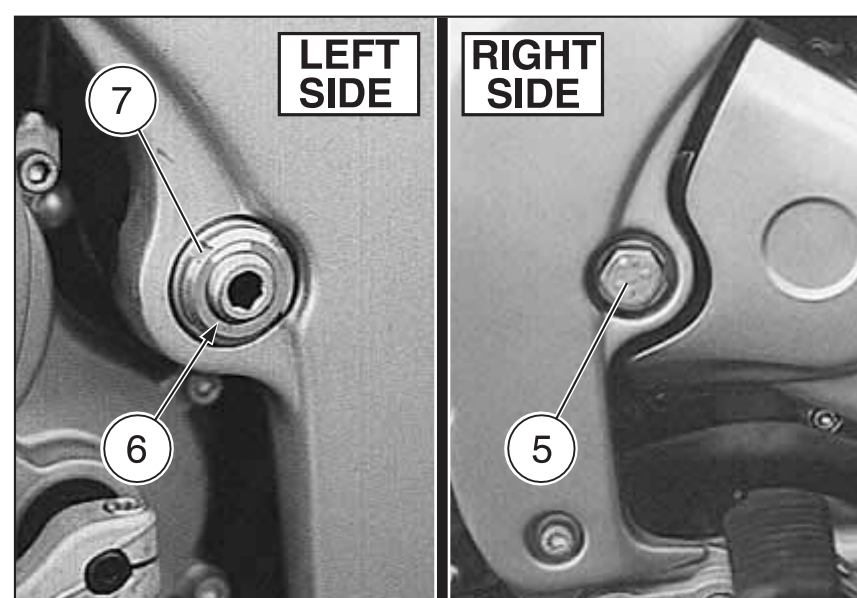
Perform a general check of all the components affected by the procedure, in particular make sure:

- the electric cables are fastened with relevant clamps;

⚠ CAUTION

None of the cables must be twisted and/or squashed.

- the electric connectors are plugged in properly;
- the pipes and couplings are connected properly and secured with relevant clamps;



- the throttle cable and cold-start cable slide freely and are not pulled too tight when the handlebar is turned;
- the gearshift lever is positioned correctly;
- the rear brake lever is positioned correctly.

- ◆ If the engine has been overhauled, bleed the engine oil pump, see 2.12.1 (BLEEDING THE OIL DELIVERY PUMP).

NOTE

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FUEL SUPPLY SYSTEM

4

FUEL SUPPLY SYSTEM

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4

4.1 FUEL TANK

The filler cap is to be found on the top of the tank, whilst the bottom part houses:

- the fuel supply pump unit;
- a pipe for draining water from the filler cap in the event of rain or during washing;
- a pipe for draining off petrol in the event the tank is overfilled.

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.1 (FUEL).

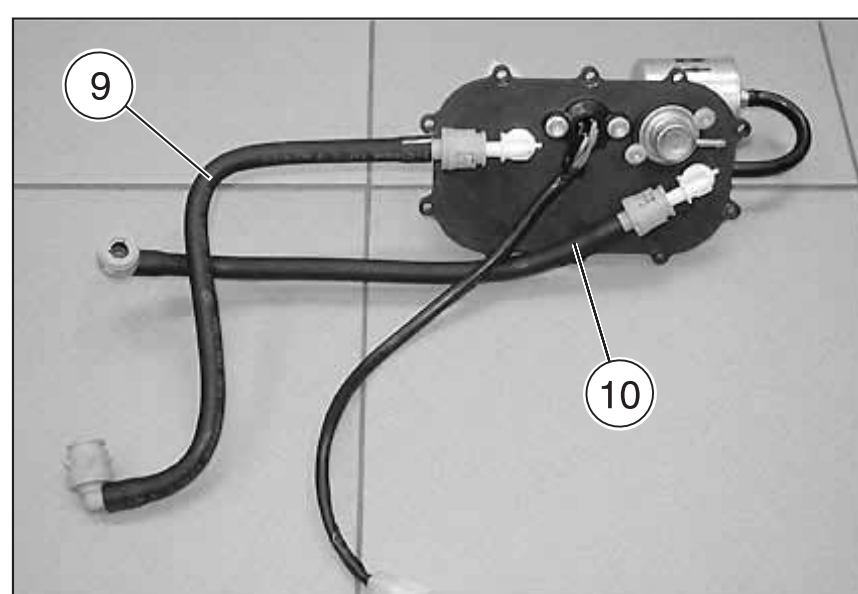
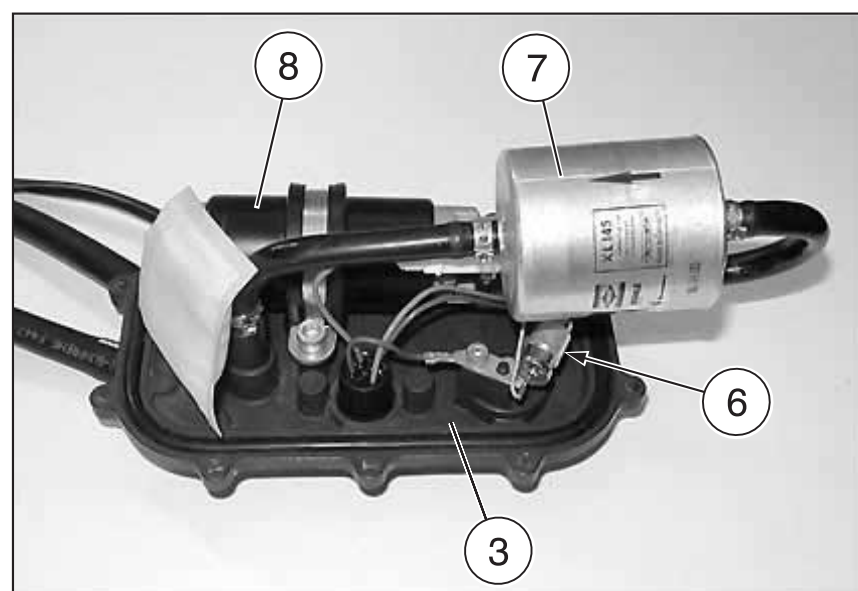
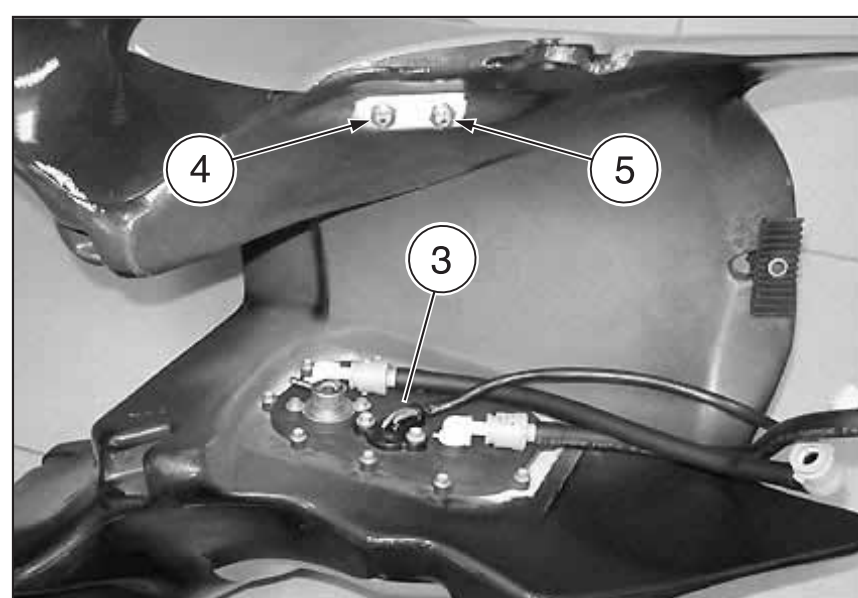
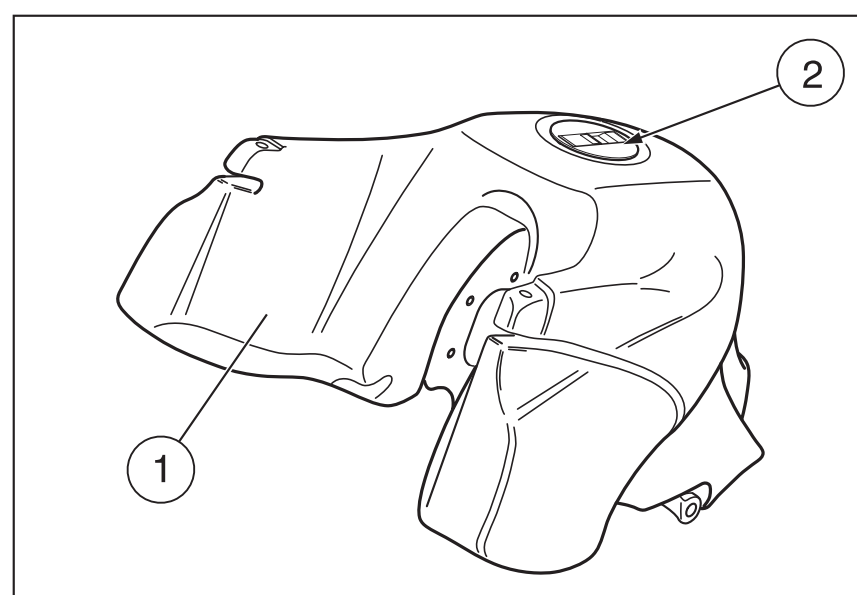
⚠ WARNING

Fuel vapours are noxious for your health. Before proceeding, make sure that the room in which you are working is properly ventilated. Do not inhale fuel vapours.

Avoid any contact of the fuel with the skin. Do not smoke and do not use naked flames. Do not dispose of fuel in the environment.

Key

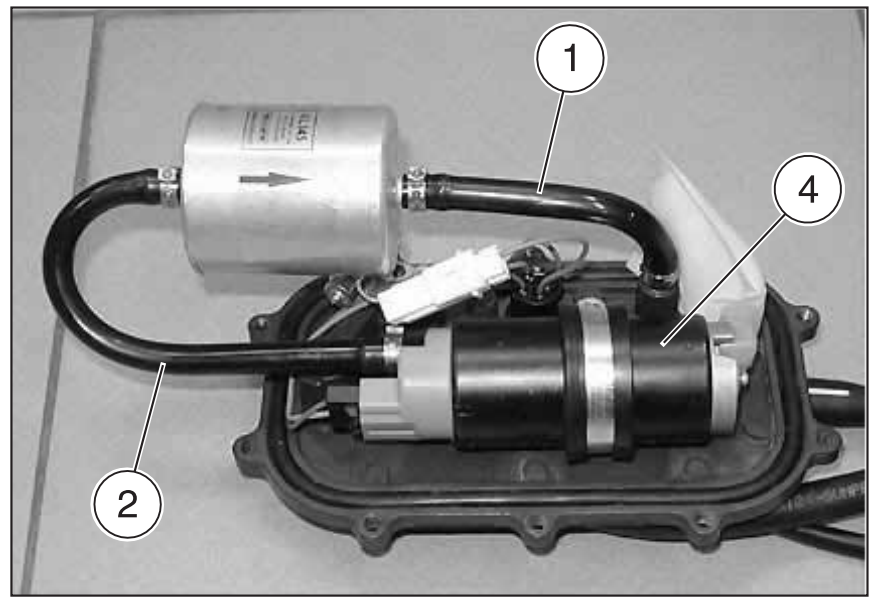
- 1) Fuel tank
- 2) Filler cap
- 3) Fuel supply pump unit
- 4) Filler cap water drainage pipe
- 5) Fuel "overflow" drainage pipe
- 6) Fuel level sensor
- 7) Fuel delivery filter
- 8) Fuel supply pump
- 9) Fuel delivery pipe
- 10) Fuel return pipe



4.1.1 MAINTENANCE

- ◆ When the fuel supply pump is to be removed, see 4.3 (REMOVING THE WHOLE FUEL SUPPLY PUMP UNIT), it is advisable to make sure the pipes (1) (2) are intact and that the following are working properly:
 - fuel level sensor (3), see 6.12.2 (FUEL LEVEL INDICATOR);
 - fuel supply pump (4), see 6.6.1 (CHECKING THE FUEL PUMP).
- ◆ Change the delivery filter (5), see 4.5 (REMOVING THE DELIVERY FILTER).

NOTE During this procedure, it is also advisable to wash the tank completely.



4.1.2 CHECKING THE FUEL SUPPLY

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Fuel pipes.

⚠ WARNING

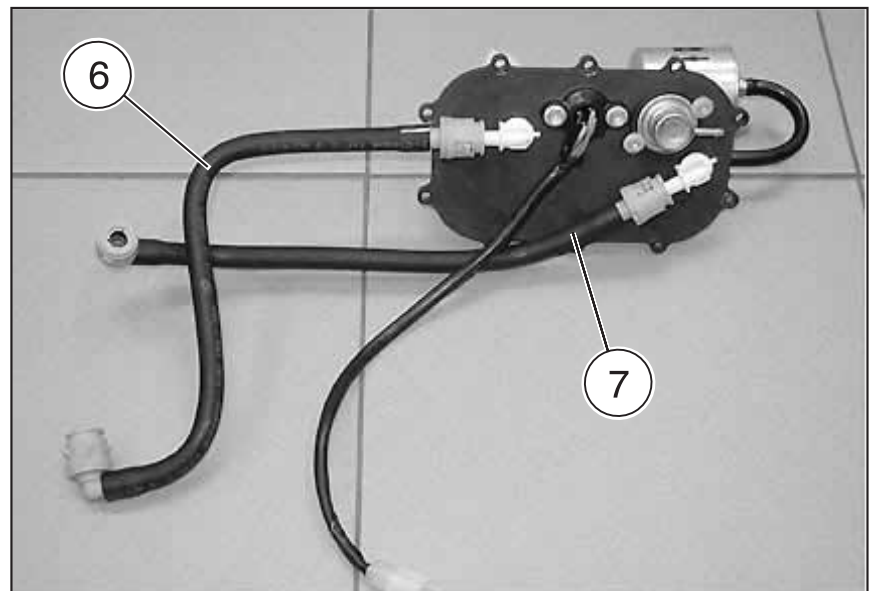
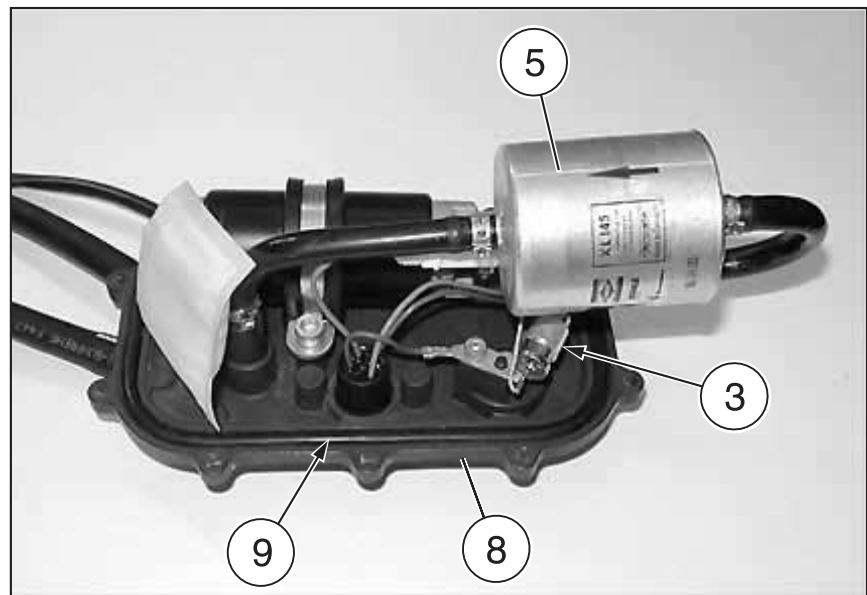
Check the delivery pipe (6), return pipe (7) and relevant rapid couplings extremely carefully; the operating maximum pressure of the delivery pipe (6) is approx. 650 kPa (6.5 bar).

Any fuel pipes featuring cracks or cuts must be replaced, without exception.

Fuel leaking from the flange (8) might be due to a damaged O-ring (9), consequently:

- ◆ Remove the whole fuel supply pump unit, see 4.3 (REMOVING THE WHOLE FUEL SUPPLY PUMP UNIT), check its state of repair and, where necessary, replace it.
- ◆ Open the filler cap and make sure the vent on the tank is not clogged. Where necessary, unclog it using a compressed air jet.

NOTE For further details see 6.6.1 (CHECKING THE FUEL PUMP).



4.2 DRAINING THE FUEL TANK

See 2.7 (DRAINING THE FUEL TANK) for the fuel tank draining procedure.

4.3 REMOVING THE WHOLE FUEL SUPPLY PUMP UNIT

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS), 1.2.1 (FUEL) and 4.1.1 (MAINTENANCE).

- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).

⚠ CAUTION

Handle the fuel tank with care and avoid scraping or damaging them.

NOTE Set the tank on a clean surface with the pump unit facing up.

- ◆ Unscrew and remove the screws (1).

NOTE When reassembling, screw all the screws on manually and tighten them in a crisscross pattern in the following order: A → B → C → D → E → F → G → H → I → L.

Petrol pump flange screw driving torque: 5 Nm (0.5 kgm).

⚠ CAUTION

When removing the pump unit (2), take care not to damage the pipes and the fuel level sensor (3), and the filtering mesh (4).

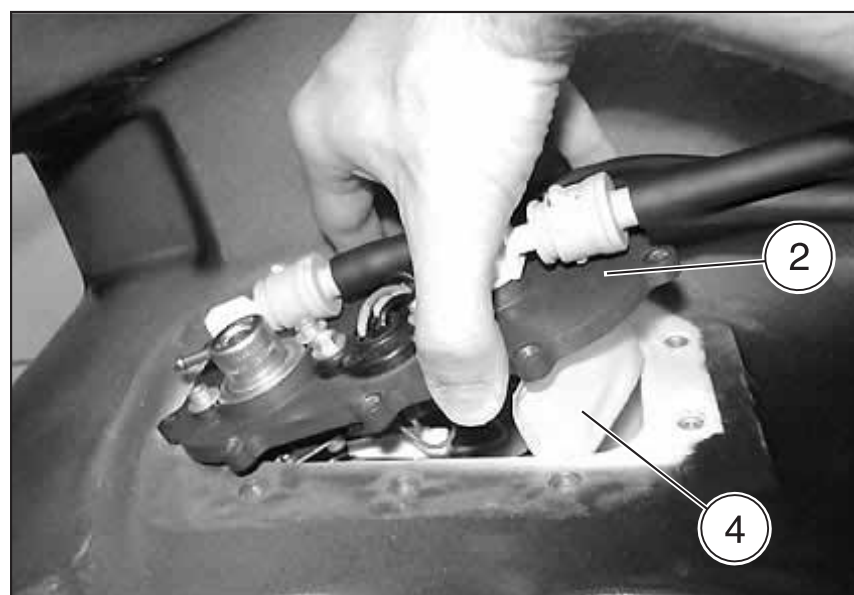
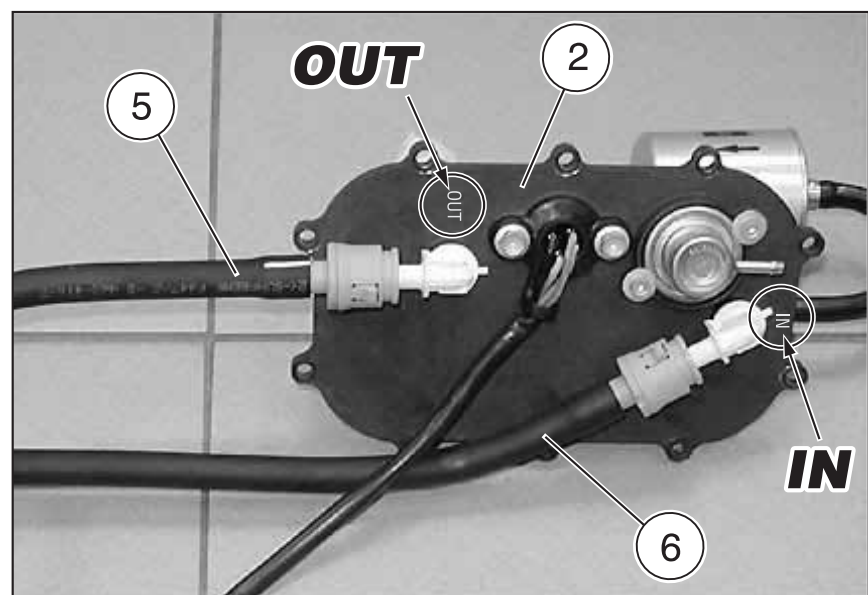
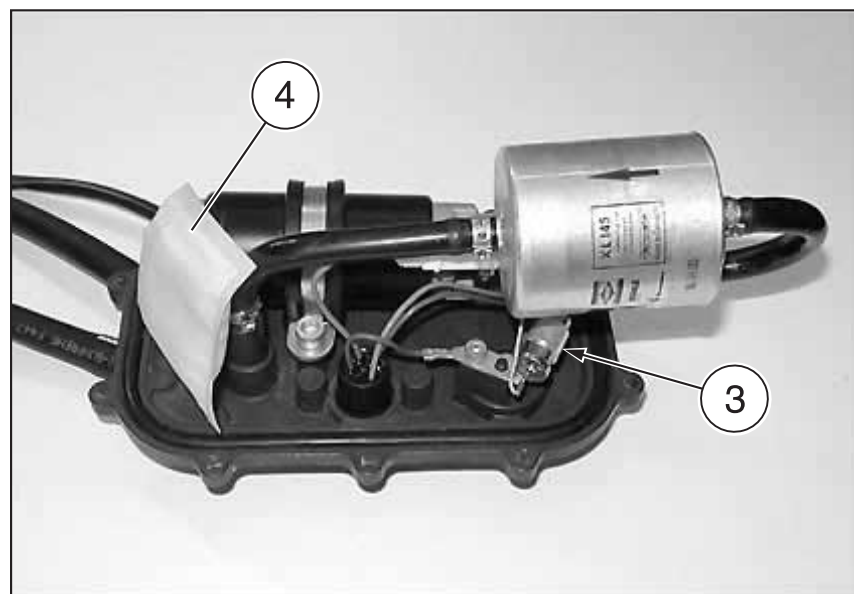
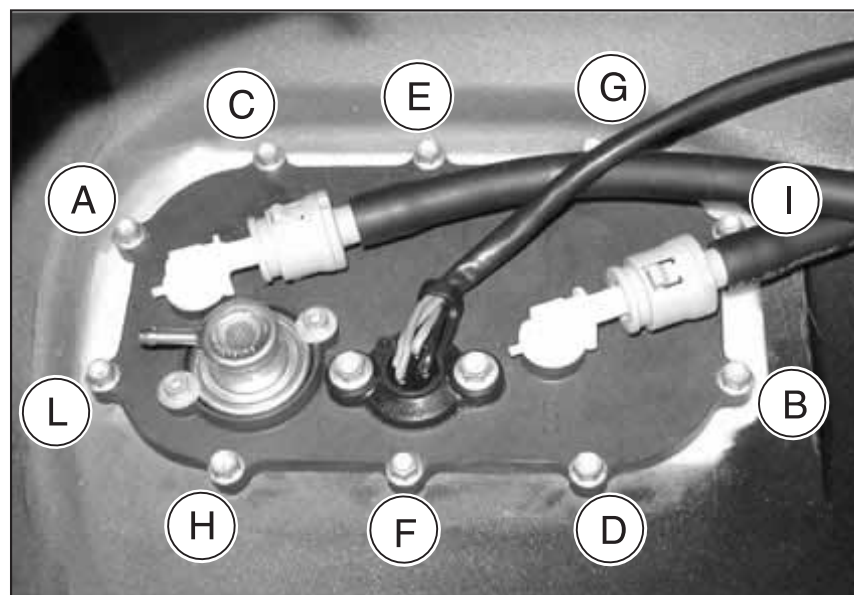
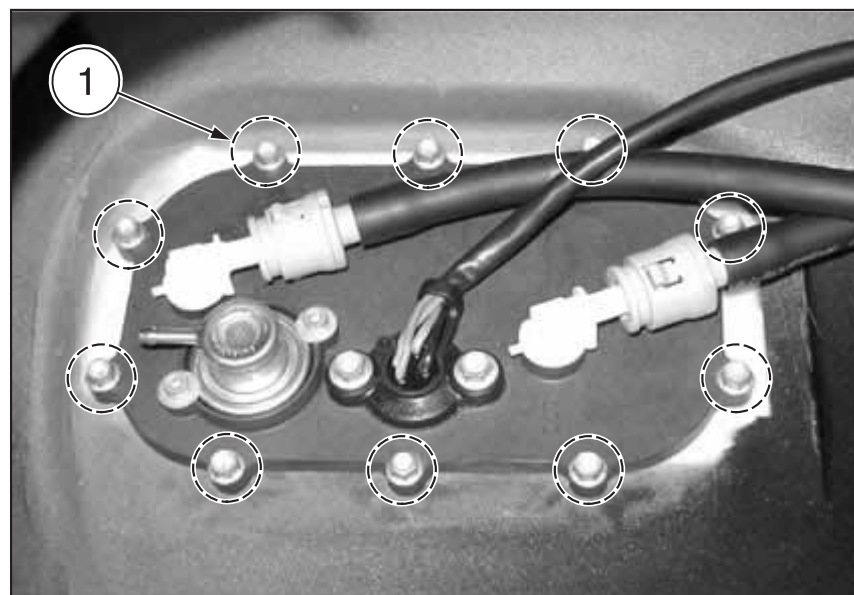
- ◆ Raise the rear part of the pump unit (2), extracting the filtering screen (4) from the tank.
- ◆ Withdraw the pump unit (2) completely.

⚠ WARNING

The delivery pipe (5) and the return pipe (6) remain connected to the pump unit (2).

Do not invert the position of the pipes (5) (6).

If it is necessary to remove the two pipes, before removal mark them with IN and OUT, as indicated by the writing stamped on the pump flange (8).



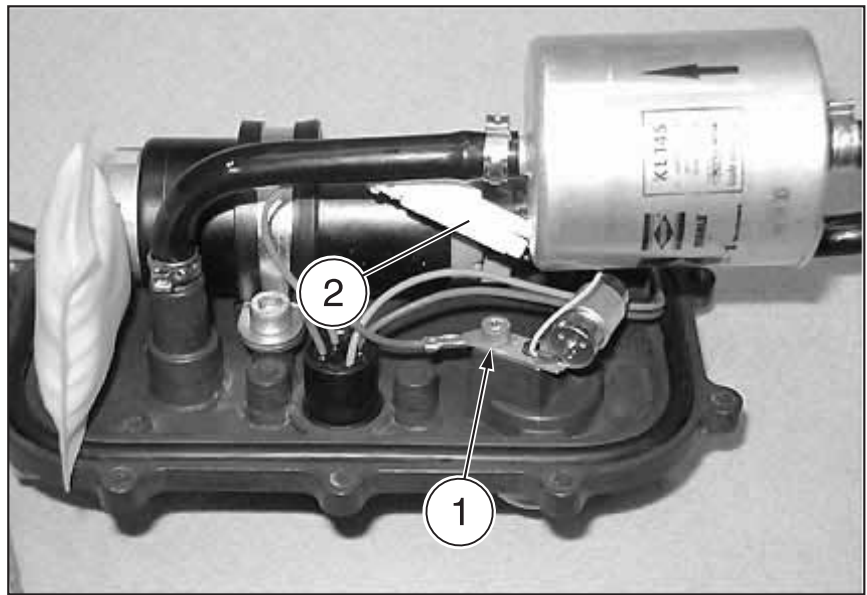
4.4 REMOVING THE FUEL LEVEL SENSOR

◆ Remove the whole fuel supply pump unit, see 4.3 (REMOVING THE WHOLE FUEL SUPPLY PUMP UNIT).

NOTE Before removing the screw (1), observe the position of the components, in order to be able to reassemble them correctly.

- ◆ Unscrew and remove the screw (1).
- ◆ Disconnect the electric connector (2).
- ◆ Remove the fuel level sensor (3).

NOTE Upon reassembly, position the fuel level sensor (3) and the electric terminal (4) correctly in their seats.



4.5 REMOVING THE DELIVERY FILTER

◆ Remove the whole fuel supply pump unit, see 4.3 (REMOVING THE WHOLE FUEL SUPPLY PUMP UNIT).

NOTE Have the appropriate special tool **OPT** to hand:
 – **aprilia** part# 0277295 (hose clamp installation pliers).

CAUTION

Upon installation, replace the hose clamp that has been removed with a new one having the same dimensions, see 0.4.2 (SPARE PARTS CATALOGUES).

Do not attempt to reinstall the removed hose clamp, since it is unusable.

Do not replace the removed hose clamp with a screw clamp or with other types of clamp.

- ◆ Release the hose clamp (5).
- ◆ Slip the pipe (6) off the filter (7).
- ◆ Release the hose clamp (8).
- ◆ Slip the filter (7) off the pipe (9).

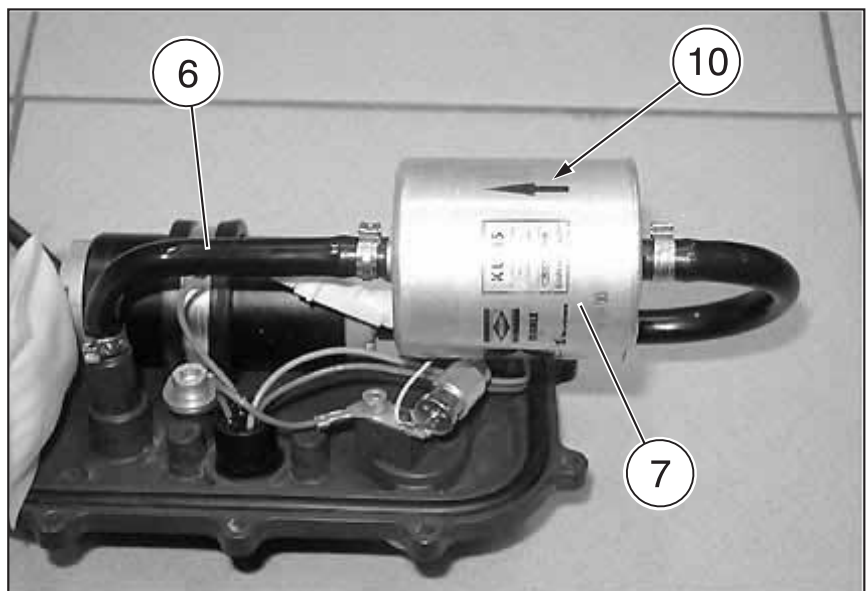
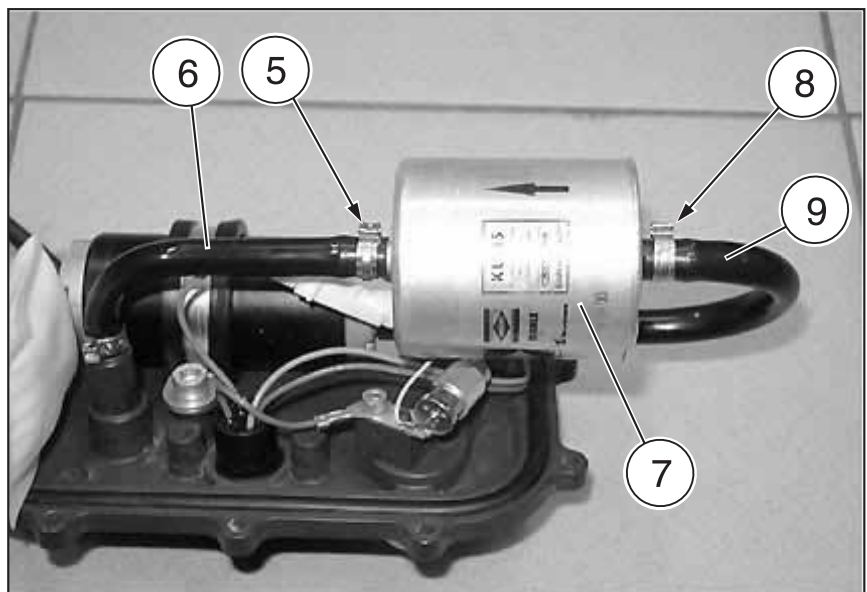
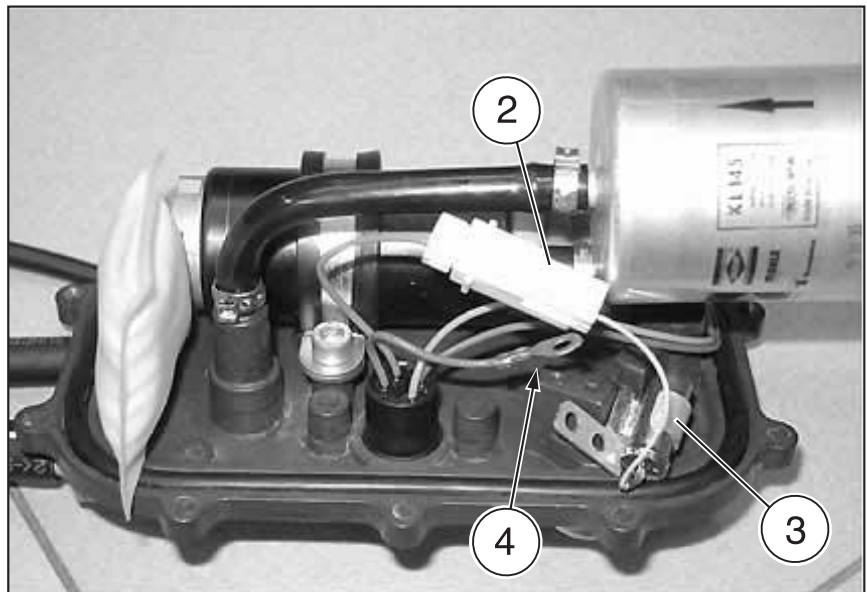
CAUTION

Do not use filters that have already been used.

- ◆ Replace the filter (7) with a new one of the same type.

NOTE The arrow (10) stamped on the filter (7) indicates the direction of flow of the fuel.

Upon reassembly, take care to position the filter correctly: the arrow (10) must be directed towards the pipe (6), (see figure).



4.6 REMOVING THE FUEL SUPPLY PUMP

- ◆ Remove the whole fuel supply pump unit, see 4.3 (REMOVING THE WHOLE FUEL SUPPLY PUMP UNIT).

NOTE Have the appropriate special tool **OPT** to hand:
– aprilia part# 0277295 (hose clamp installation pliers).

⚠ CAUTION

Upon installation, replace the hose clamp that has been removed with a new one having the same dimensions, see 0.4.2 (SPARE PARTS CATALOGUES).

Do not attempt to reinstall the removed hose clamp, since it is unusable.

Do not replace the removed hose clamp with a screw clamp or with other types of clamp.

- ◆ Release the hose clamp (1).
- ◆ Pull the fuel pipe (3) off the pump (2).
- ◆ Disconnect the electric connector (4).

⚠ CAUTION

When reassembling, make sure the electric connector (4) is plugged in properly.

- ◆ Unscrew and remove the screw (5).

Fuel pump screw driving torque: 10 Nm (1.0 kgm).

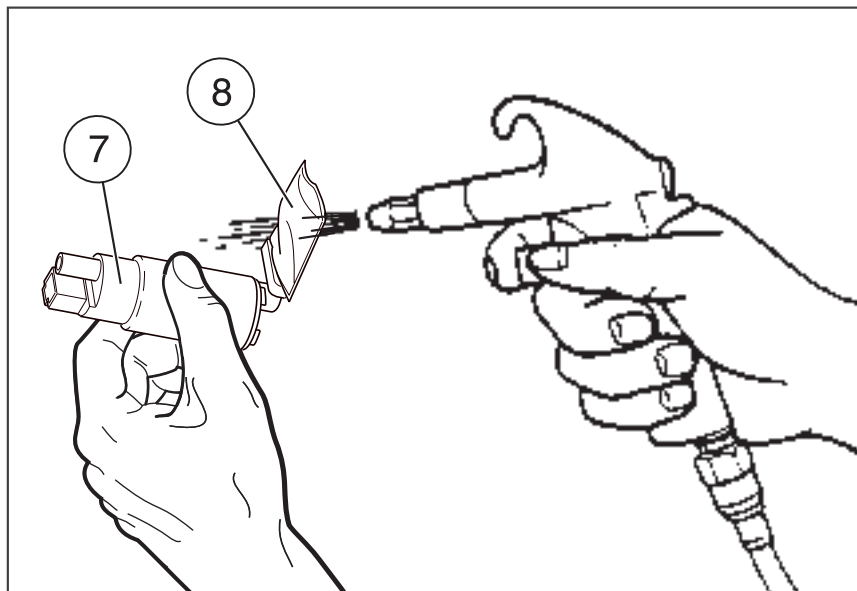
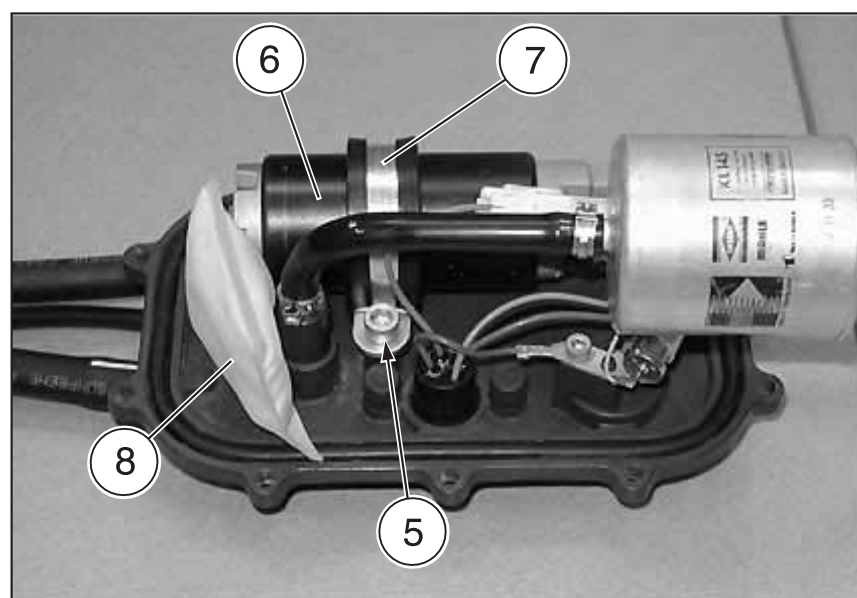
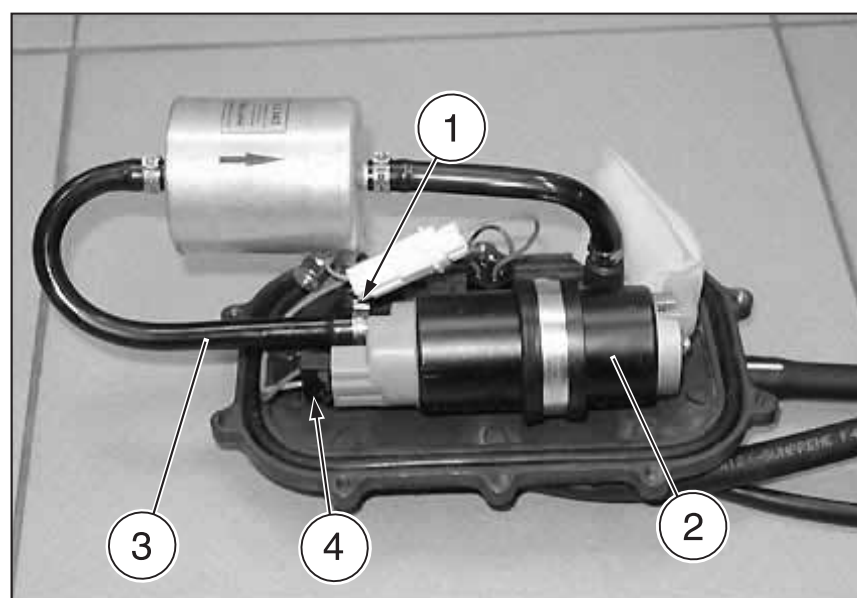
⚠ CAUTION

When performing the operations below, take care not to entangle the electric cables.

- ◆ Remove the fuel pump (6), taking the clamp (7).

⚠ CAUTION

If the filtering mesh (8) features traces of sediments, clean it using a compressed air jet directed so that the impurities do not get inside.



4.7 REMOVING THE PETROL PRESSURE REGULATOR

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).
- ◆ Unscrew and remove the two screws (1), taking the washers.

Pressure regulator screw driving torque: 3 Nm (0.3 kgm).

⚠ CAUTION

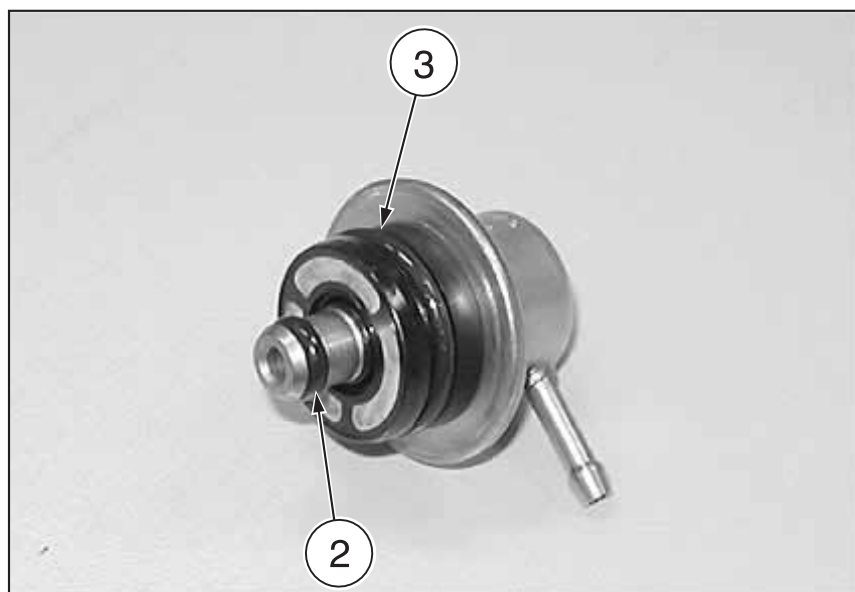
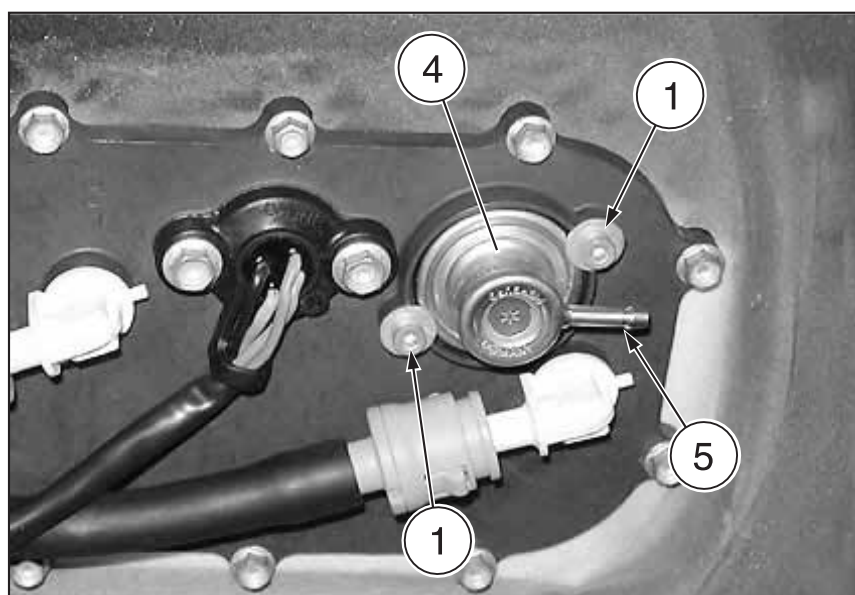
The seals (2) (3) offer resistance to the removal of the petrol pressure regulator (4). Proceed with care.

- ◆ Remove the fuel pressure regulator (4) from the slider by alternately levering on more points with a cut-tipped screwdriver.

NOTE Upon reassembly, replace the seals (2) (3) with new ones.

⚠ CAUTION


Do not try to remove the petrol pressure regulator (4) by forcing on the pin (5).



4.8 ENGINE MANAGEMENT

4.8.1 FOREWORD

The "heart" of the engine's management consists in the electronic Engine Control Unit which manages and optimizes the ignition and injection of the fuel.

- The ignition management depends on the specific consumption levels. The engine control unit measures the exact ignition angle based on the engine rpm signals and on the position of the throttle valves (quantity of air).
- The engine control unit manages the injection time (quantity of fuel) based on the rpm signal, the throttle valve signal (quantity of air, pressure of induction pipe) and correction factors of the various sensors.
- Every time the engine is switched on, the engine control unit checks the sensors and ignition coils, making sure they are working correctly. In case of anomaly, the diagnostic warning light "  " positioned on the dashboard will blink.
- If the vehicle falls down, the safety devices provided inside the electronic unit interrupt the ignition and the injection of fuel.
When the vehicle is set on the side stand and a gear is engaged, ignition is stopped, preventing the vehicle from starting.

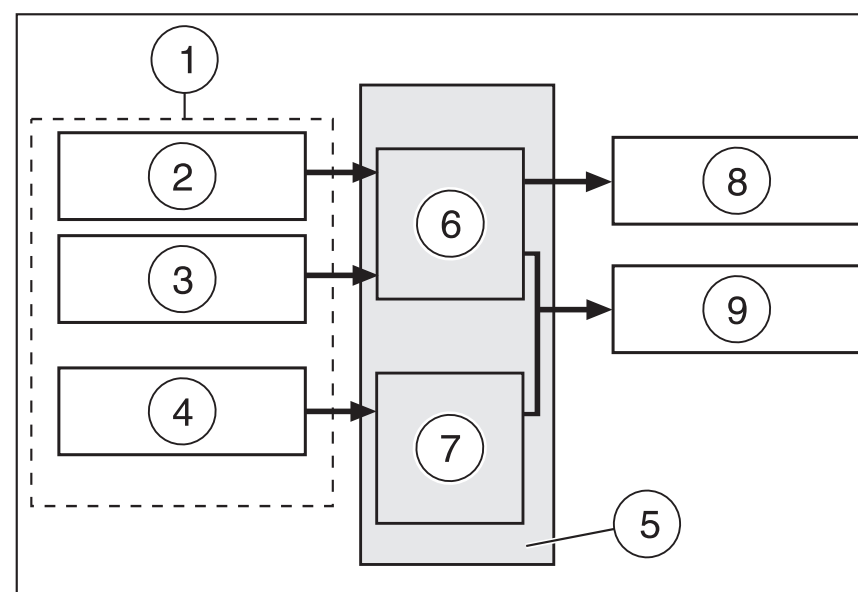
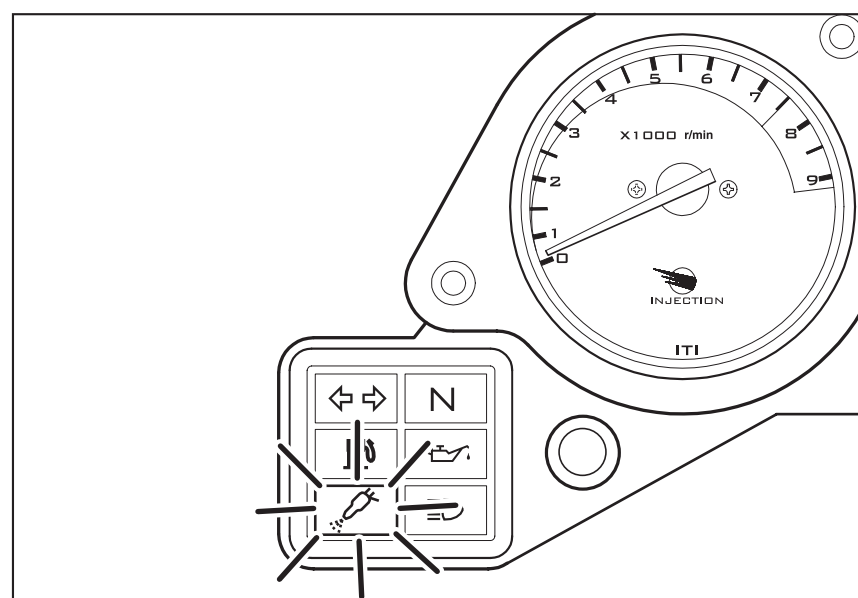
CAUTION

Any modifications or variations made to the exhaust system, intake system or the engine control unit may result in serious damage to the engine.

The assembly, modification or use of non-original parts shall cause any warranty to become void and shall exempt the manufacturer from any liability.

Key

- 1) Signals
- 2) Driving shaft position sensor (engine rpm)
- 3) Throttle valve sensor (throttle valve position)
- 4) Other sensors
- 5) Electronic unit
- 6) Standard data
- 7) Correction factors
- 8) Ignition coil (ignition angle)
- 9) Injector (injection time)



4.8.2 SENSORS

Driving shaft position sensor (2)

Location: in the ignition cover (10).

The signals are emitted by the transducers located on the rotor.

The engine speed and the position of the driving shaft are calculated based on the signals emitted.

Throttle valve potentiometer (3)

Location: on the throttle body (11).

The throttle valve potentiometer measures the position of said valves and acts as the main parameter in determining the injection time and ignition angle.

Coolant temperature sensor (12)

Location: on head cylinder (13).

The temperature sensor detects the coolant temperature and is required to correct the injection time. The injection time is increased if the coolant has not yet reached the working temperature.

Air temperature sensor (14)

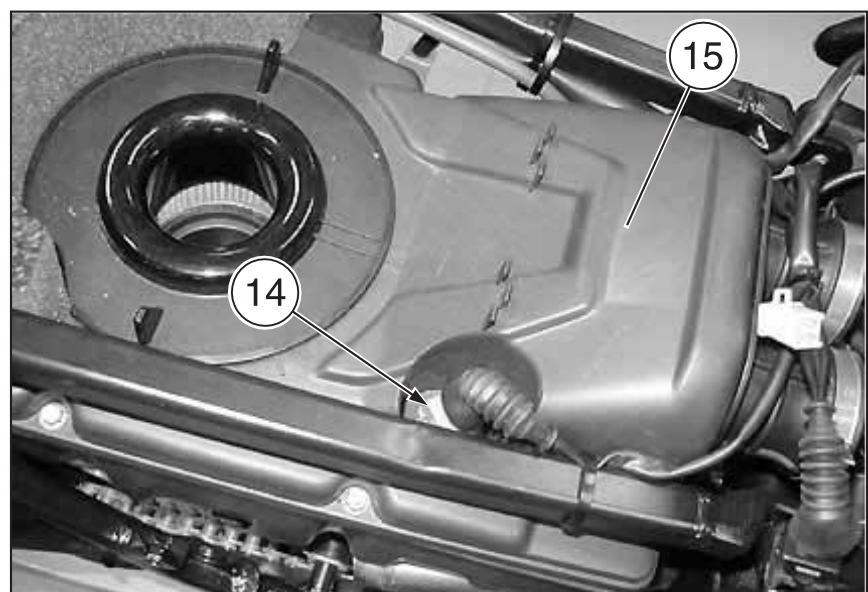
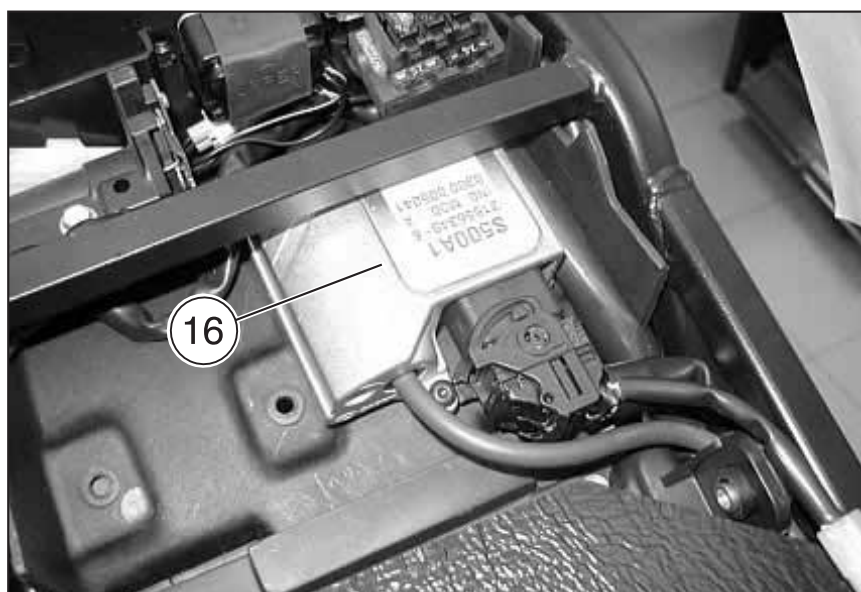
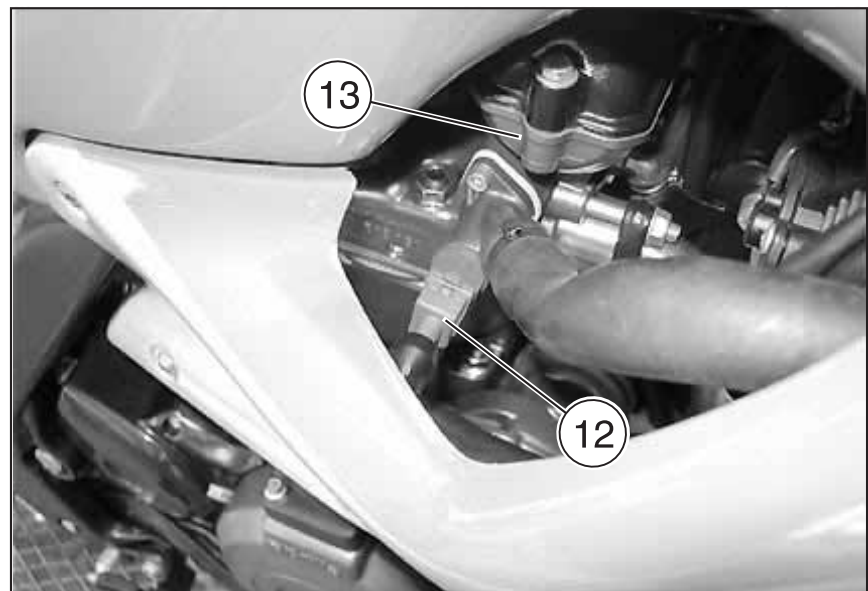
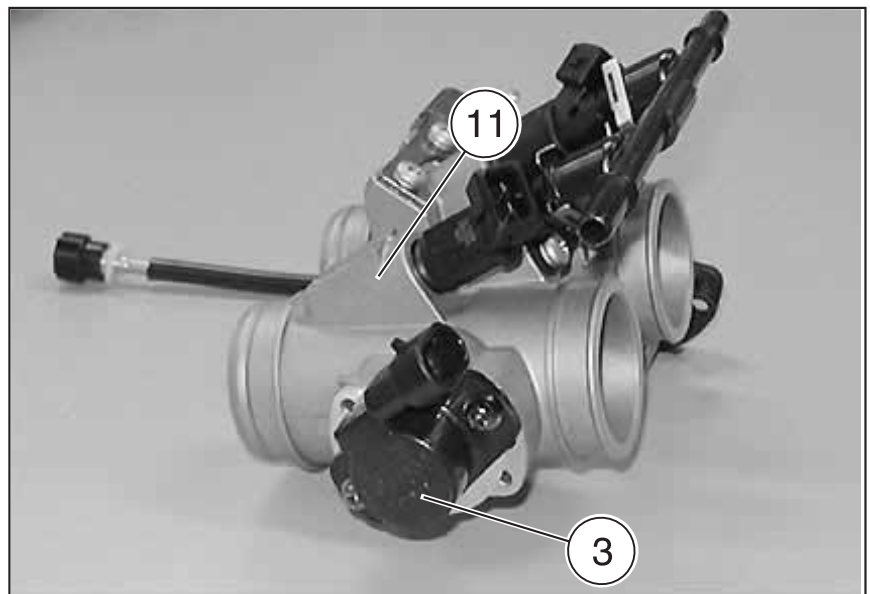
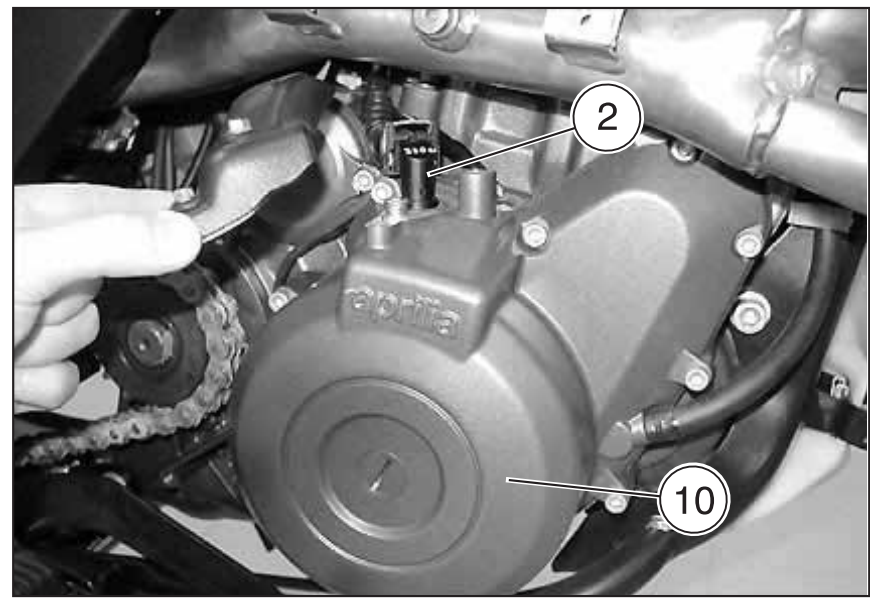
Location: on the air filter casing cover (15).

The resistance measured by the thermistor is converted into a voltage signal and is required by the engine control unit to correct the injection time.

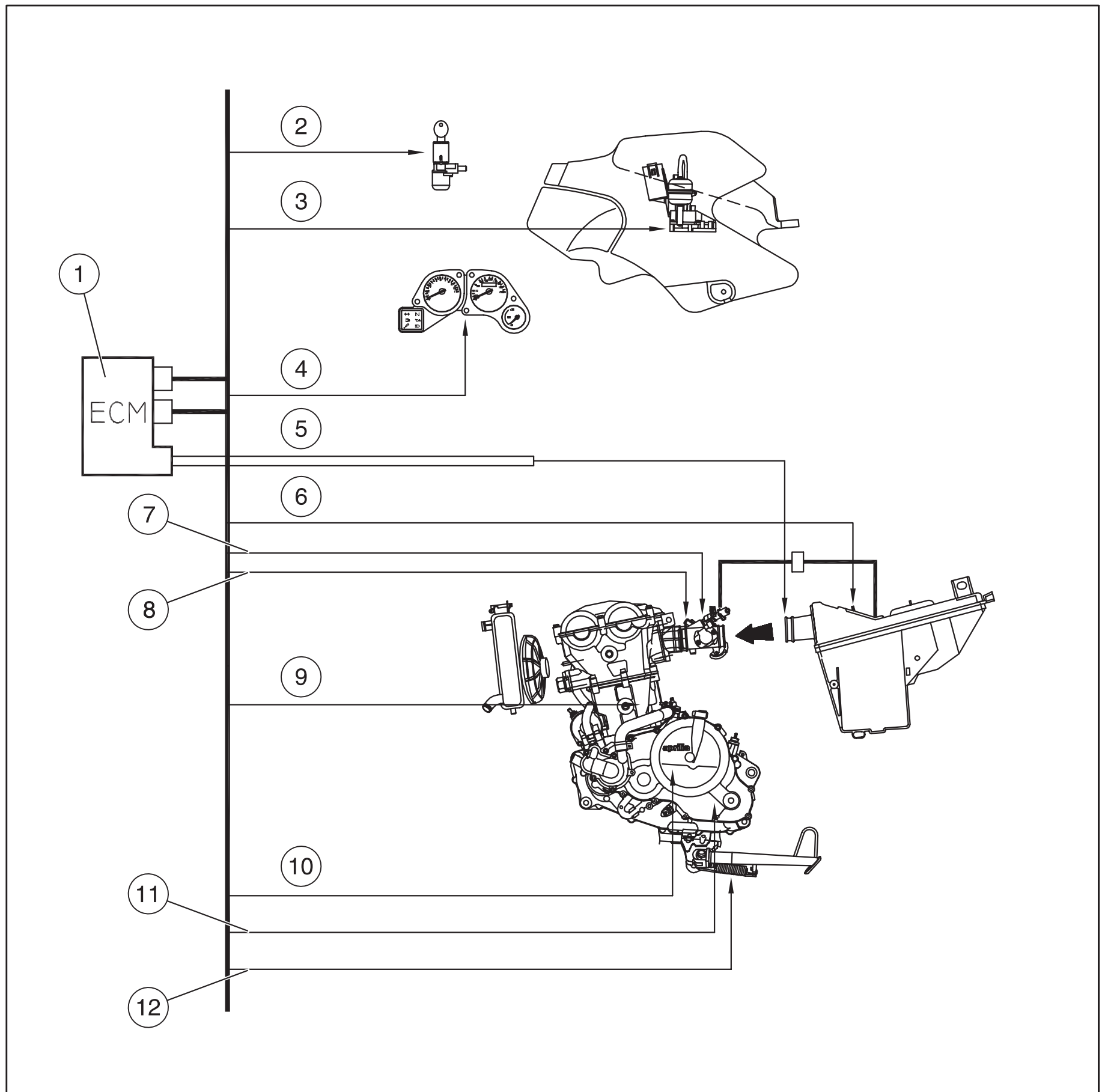
Atmospheric pressure sensor

Location: inside the engine control unit (16).

The intake pressure measured by the sensor is converted into a voltage signal and is required by the engine control unit to correct the injection time.



4.8.3 INJECTION SYSTEM DIAGRAM

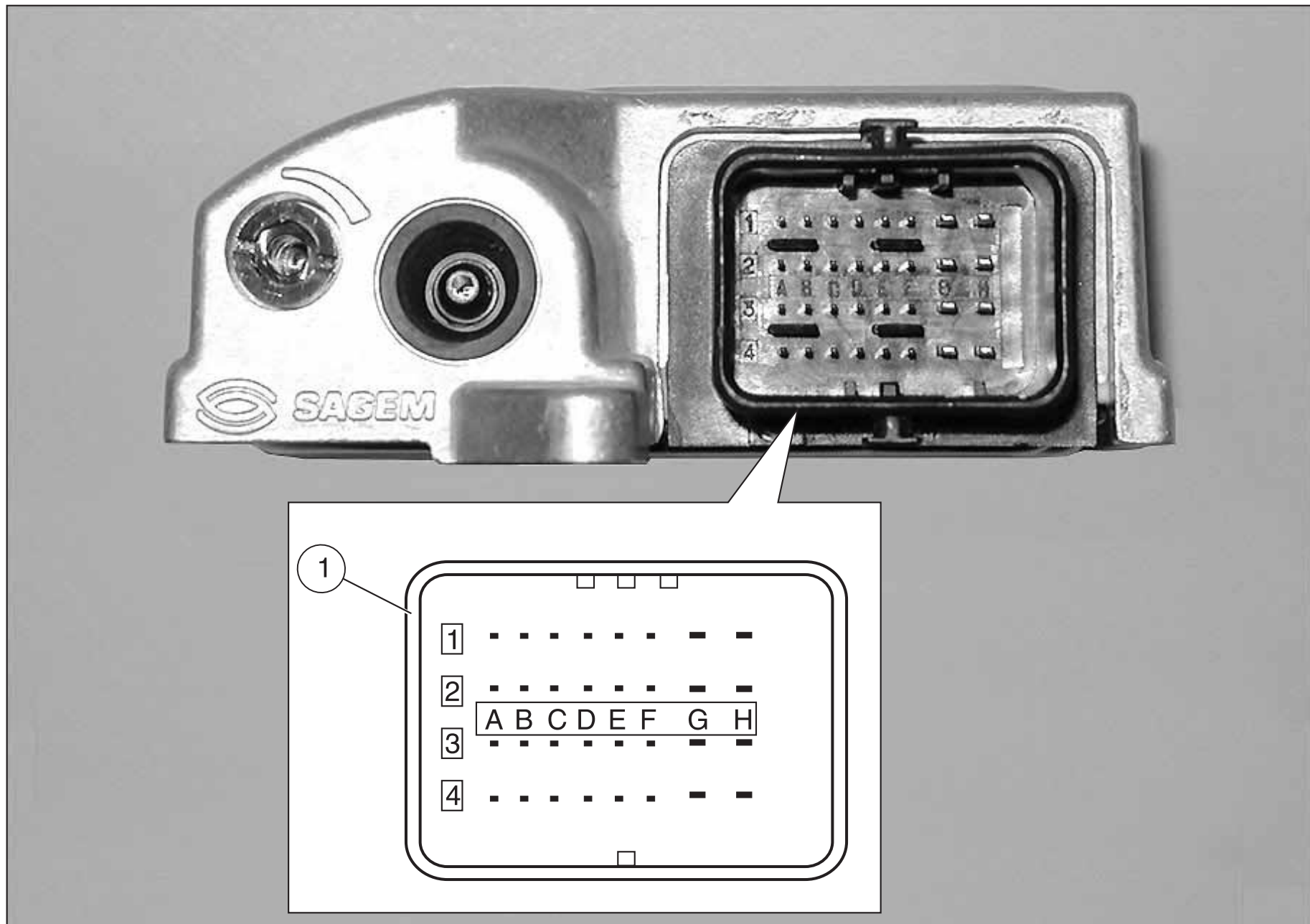


Key

- | | |
|--|--|
| 1) Electronic unit | 7) To the throttle valve position sensor |
| 2) To the ignition switch | 8) To the injectors |
| 3) To the fuel pump | 9) To the coolant temperature sensor |
| 4) To the dashboard (diagnostic warning light) | 10) To the driving shaft position sensor |
| 5) To the atmospheric pressure sensor (ECU inside) | 11) To the neutral switch sensor |
| 6) To the air temperature sensor | 12) To the safety switch on the side stand |

4.8.4 ELECTRONIC UNIT CONNECTOR

For further information, see 6.5.1 (CONNECTIONS TO THE ENGINE CONTROL UNIT).



Connector	
Terminal labelling	Connections
F2	Diagnostic warning light
E2	Coolant temperature indicator
G2 H4	Fuel pump
G3 H4	Injector 2
G4 H4	Injector 1
A4 A3 B4	Throttle valve position sensor
D2 B4	Coolant temperature thermistor
E2 B4	Air thermistor
H2 H4	Coil
A1 B1 D1 C1 H1	Diagnostic connection

4.8.5 AUTOMATIC TESTING

See 6.5 (IGNITION/INJECTION SYSTEM).

4.8.6 ELECTRONIC SYSTEM TROUBLESHOOTING ACCORDING TO THE INFORMATION PROVIDED BY THE DIAGNOSTIC WARNING LIGHT

⚠ WARNING

Take care around the high voltage in the ignition system.

Never disconnect connections with the engine running.

Whenever work is performed in the ignition system, always make sure the ignition switch is set to "⊗" and the battery disconnected, unless otherwise indicated (when disconnecting the battery, disconnect the negative pole "-" first).

⚠ CAUTION

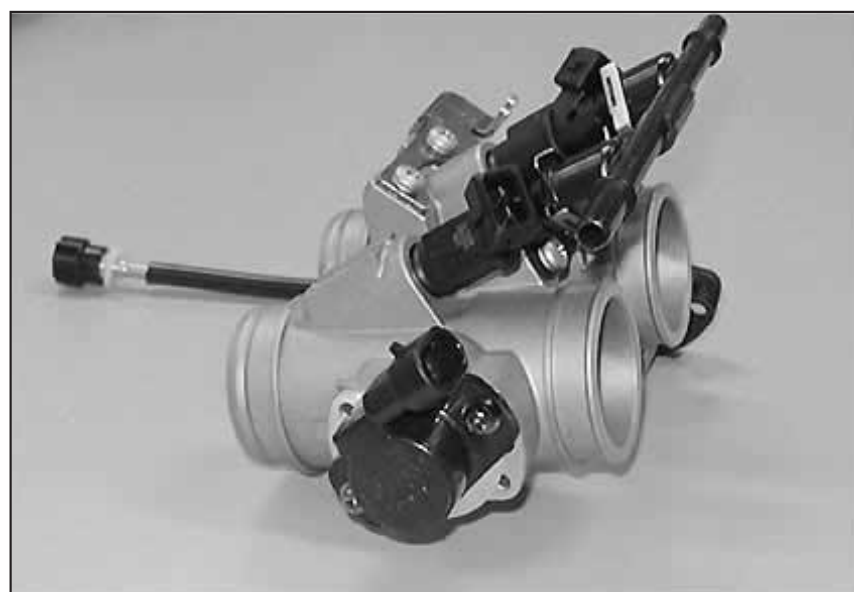
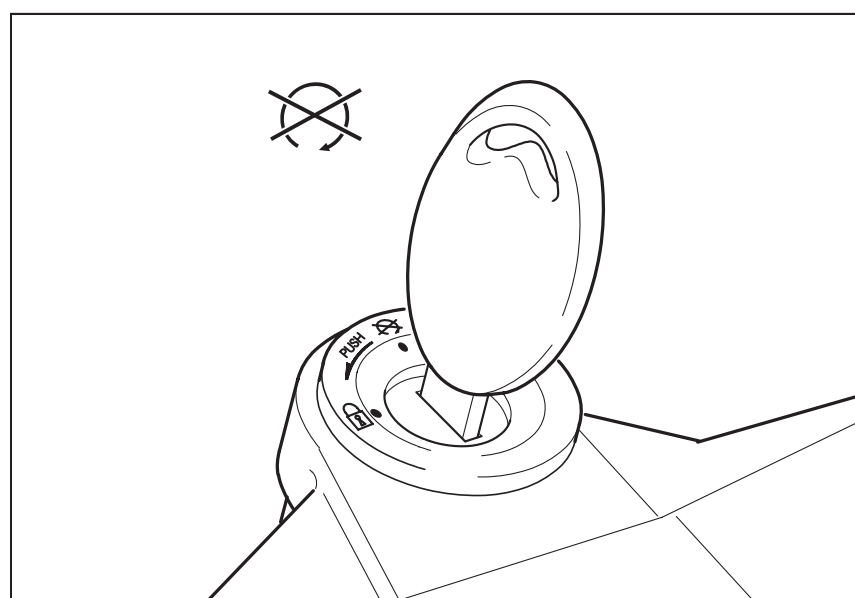
All measurements must be taken with the components at a temperature of 20 °C (68 °F).

General instructions regarding the elimination of faults: as soon as the fault has been located, remove the defective component.

4.8.7 DRIVING SHAFT POSITION SENSOR

Fault code "22".

See 6.5.10 (CHECKING THE PICK-UP).



4.9 THROTTLE BODY

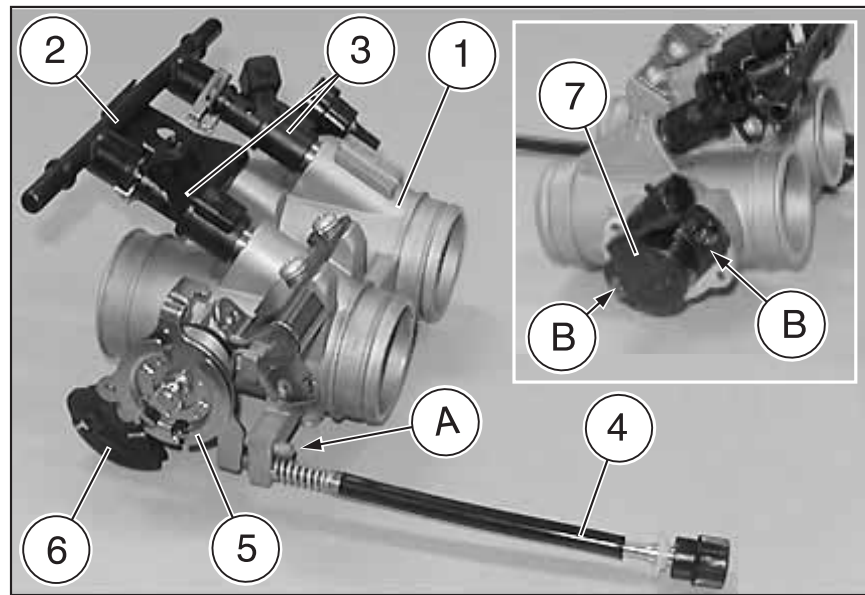
⚠ CAUTION

The screw for the basic setting of the throttle valves (A) is painted and cannot be adjusted.

The two screws (B) fastening the throttle valve sensor are painted and can only be removed in the event the actual sensor is replaced.

The throttle body comprises the following units:

- throttle body (1);
- manifold (fuel rail) (2) complete with injectors (3);
- idling speed adjustment cable (4);
- throttle valve control lever (5);
- cold start lever (6);
- throttle valve sensor (7).



4.9.1 REMOVING THE INJECTORS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

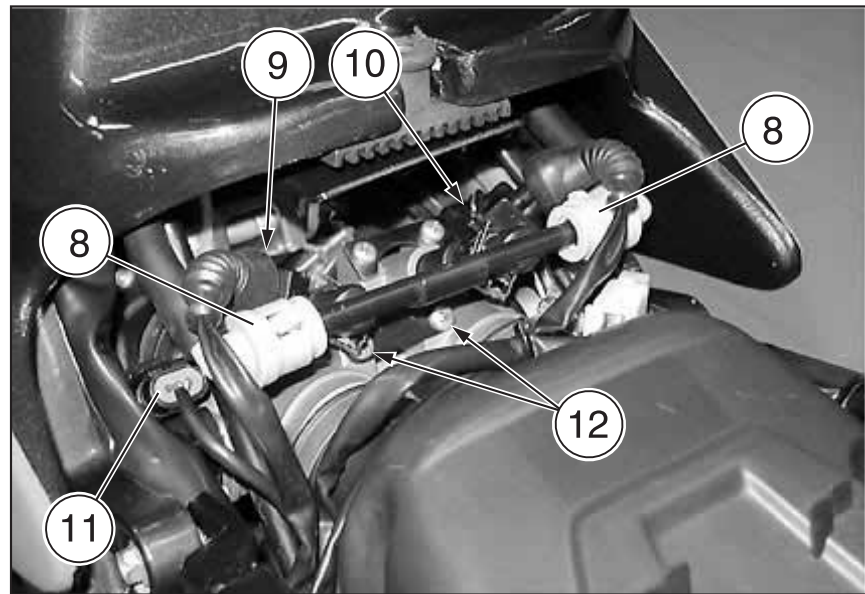
The removal and reassembly of the injectors can be carried out with the throttle body mounted on the vehicle.

- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Disconnect the two rapid couplings (8).

⚠ WARNING

Mark the electrical connectors (9) (10) so as to prevent them being mixed up by mistake during refitting.

- ◆ Disconnect the electric connectors (9) (10).
- ◆ Disconnect the electric connector (11) of the throttle valve sensor.
- ◆ Unscrew and remove the two screws (12), taking the washers.
- ◆ Remove the manifold (fuel rail) (2) together with the injectors (3) from the throttle body.
- ◆ Release the two clip (13).
- ◆ Remove the two injectors (3) from the manifold (fuel rail) (2).



To reassemble:

⚠ CAUTION

Replace all the gaskets, O-rings, torsion springs, bushes and seals. These components are supplied with the repair kit.

NOTE The seals (14) (15) have different dimensions, therefore do not invert them upon reassembly.

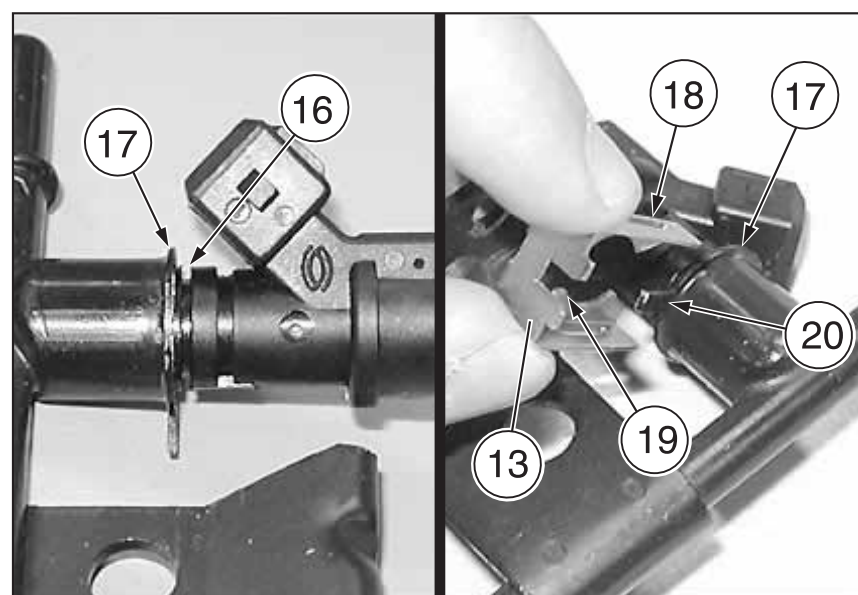
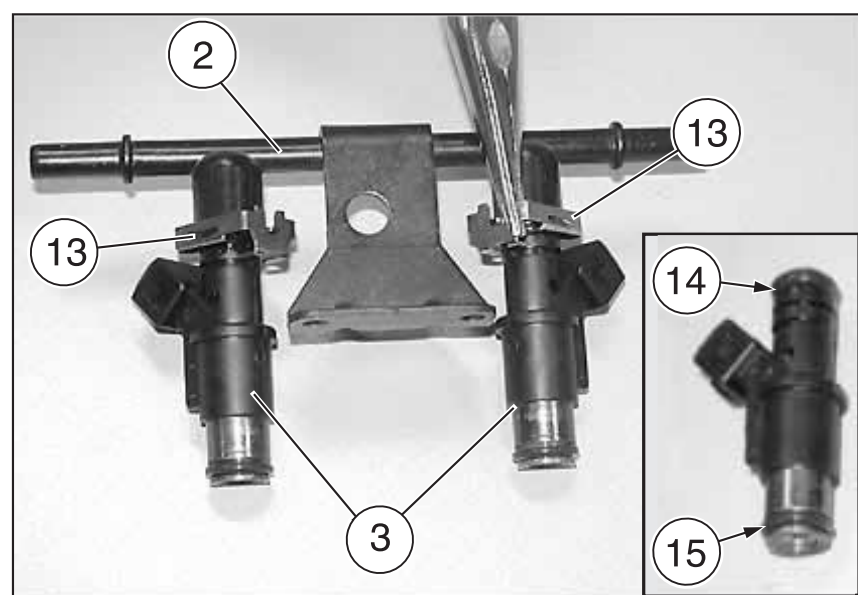
- ◆ Fit the new seals (14) (15) on both injector.
- ◆ Install the injectors (3) on the manifold (fuel rail), aligning the groove (16) with the edge of the injector seat (17), (see figure).

NOTE Install the clips (13) making the seats (18) coincide with the injector seat edge (17) and the seat (19) coincide with the tang (20).

- ◆ Install the clips (11) correctly .
- ◆ Install the manifold (fuel rail) (2) complete with injectors (3) on the throttle body (1).
- ◆ Screw and tighten the screws (12).
- ◆ Connect the two rapid couplings (8) correctly.
- ◆ Connect the two connectors (9) (10) correctly .

See 6.5.5 (CHECKING THE INJECTORS) for the checking procedure.

- ◆ Put back the saddle, see 7.1.7 (REMOVING THE SADDLE).



4.9.2 REMOVING THE THROTTLE BODY

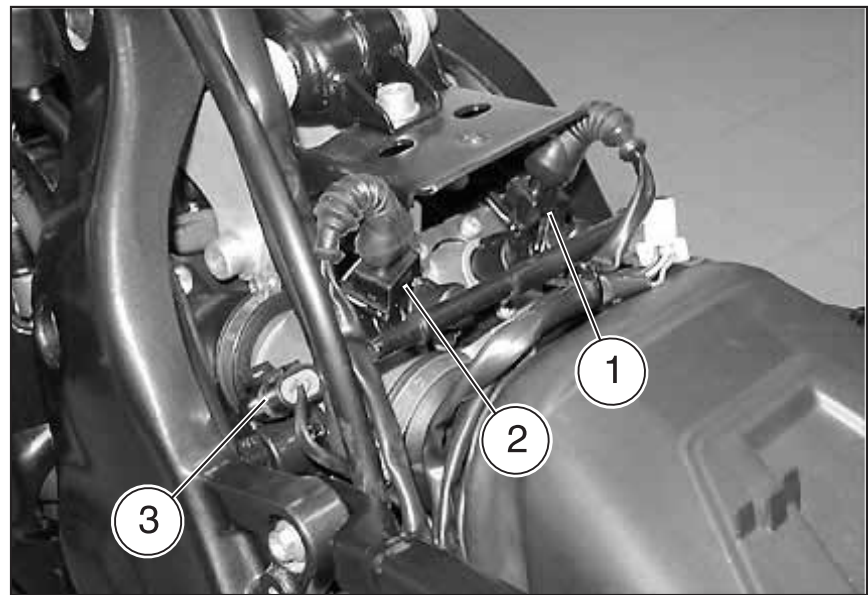
Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).
- ◆ Partially remove the saddle support, see 7.1.36 (REMOVING THE SADDLE SUPPORT).

⚠ WARNING

Mark the electrical connectors (1) (2) so as to prevent them being mixed up by mistake during refitting.

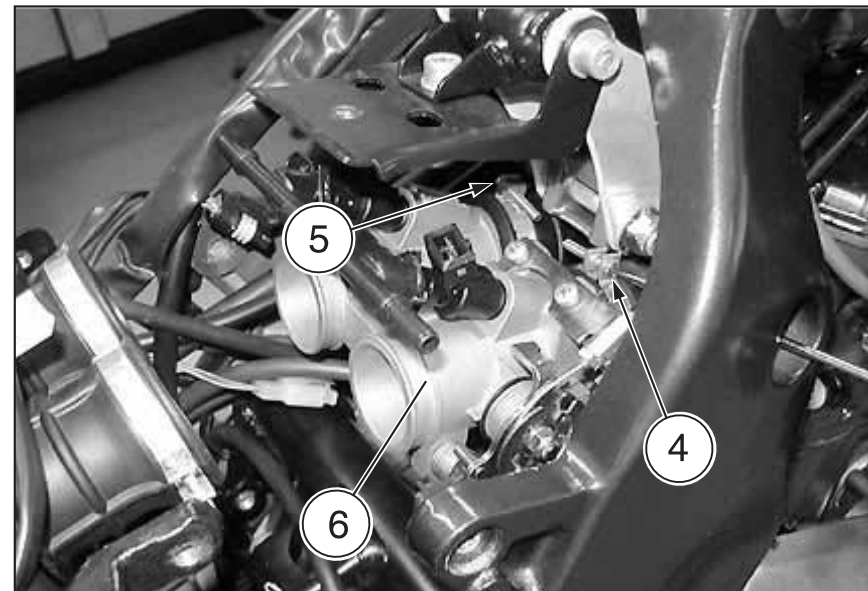
- ◆ Disconnect the electric connectors:
 - right injector (1);
 - left injector (2);
 - throttle body sensor (3);



⚠ CAUTION

When reassembling, make sure the electric connectors are plugged in properly.

- ◆ Loosen the two clamps (4) (5).



⚠ CAUTION

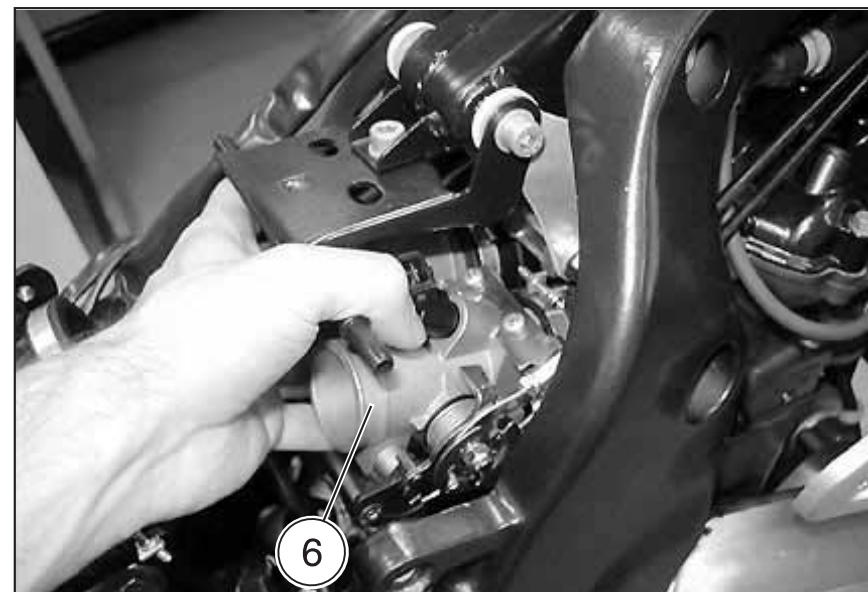
Proceed with care. Do not force the cables. The throttle body (6) remains constrained to the accelerator cable and to the cold start cable.

- ◆ Grip the throttle body (6) firmly and hitch it one way and the other slide it off the intake flanges.
- ◆ Disconnect the throttle cable (7).

⚠ CAUTION

Upon reassembly, make sure that the accelerator control cable regulator is correctly fastened to the corresponding coupling, then check and if necessary adjust the slack, see 2.9.3 (ADJUSTING THE ACCELERATOR CONTROL).

- ◆ Disconnect the cold-start control cable (8).



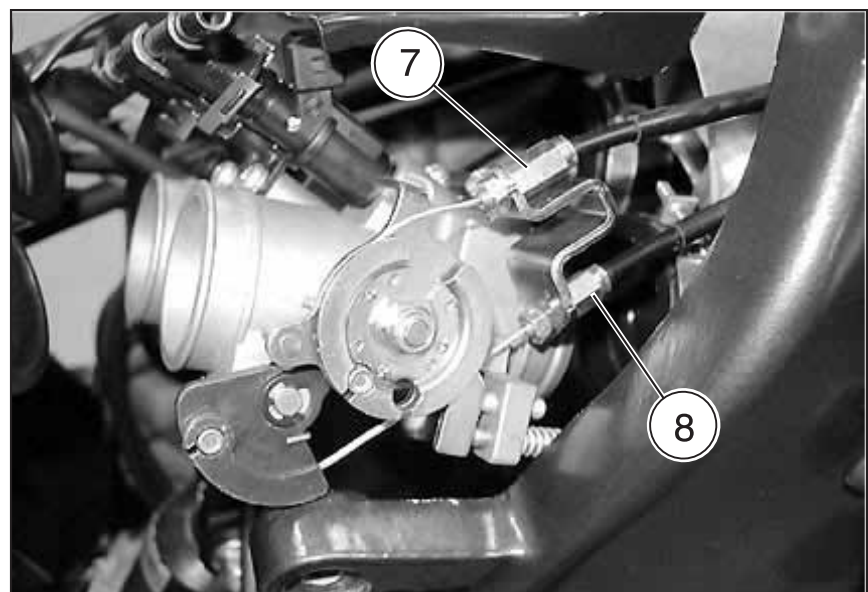
⚠ CAUTION

When reassembling, make sure the cold-start control cable adjuster is properly fastened to the respective coupling and check and, where necessary, restore the correct freeplay, see 2.10 (COLD START CABLE).

⚠ CAUTION

Upon reassembly:

- the throttle body (6) must be fitted perfectly on the intake flanges;
- the clamps (4) (5) must be properly tightened.
- do not invert the position of the electrical connectors (1) (2).



4.9.3 REMOVING THE THROTTLE BODY COMPONENTS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 4.9 (THROTTLE BODY).

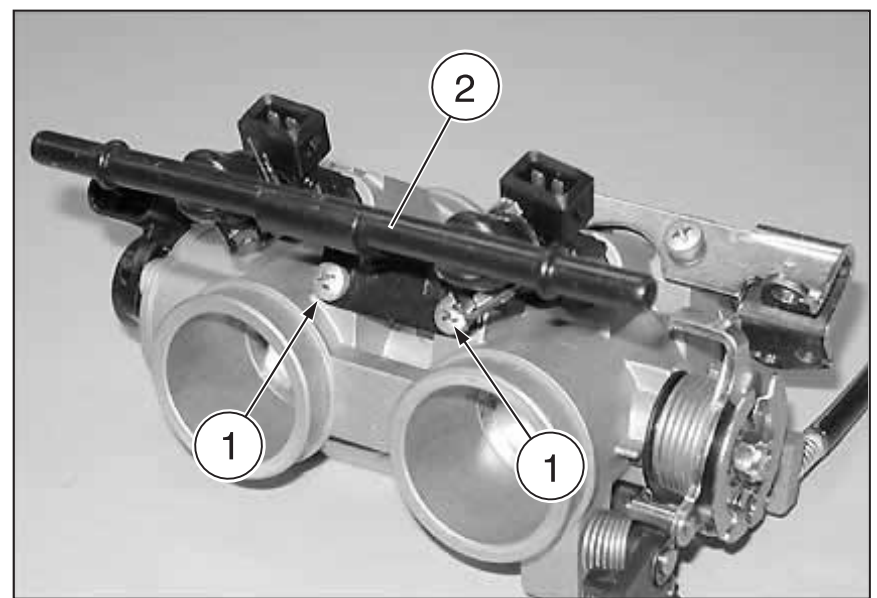
- ◆ Remove the complete throttle body, see 4.9.2 (REMOVING THE THROTTLE BODY).

REMOVING THE MANIFOLD (FUEL RAIL) TOGETHER WITH THE INJECTORS

- ◆ Unscrew and remove the two screws (1), taking the washers.
- ◆ Remove the manifold (fuel rail) (2) complete with injectors.

For the removal of the injectors, see 4.9.1 (REMOVING THE INJECTORS).

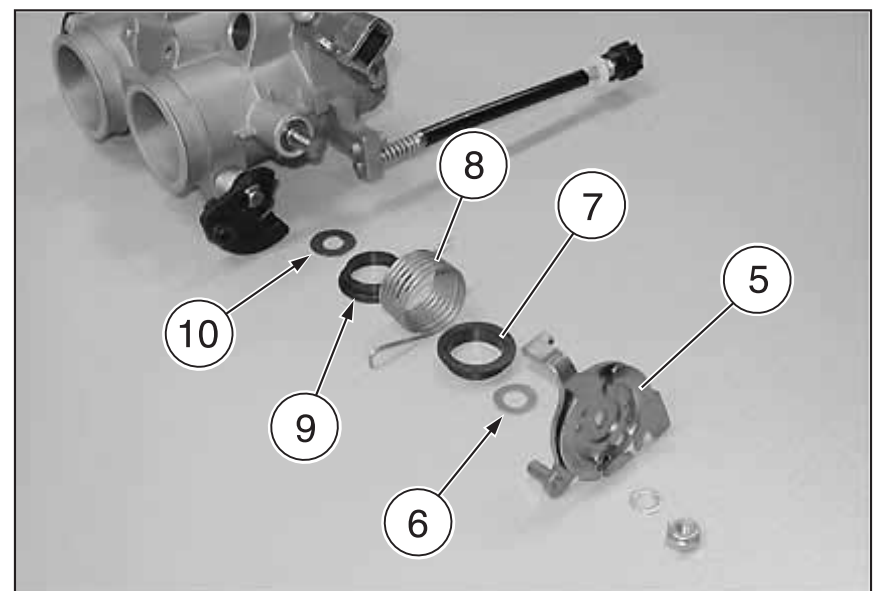
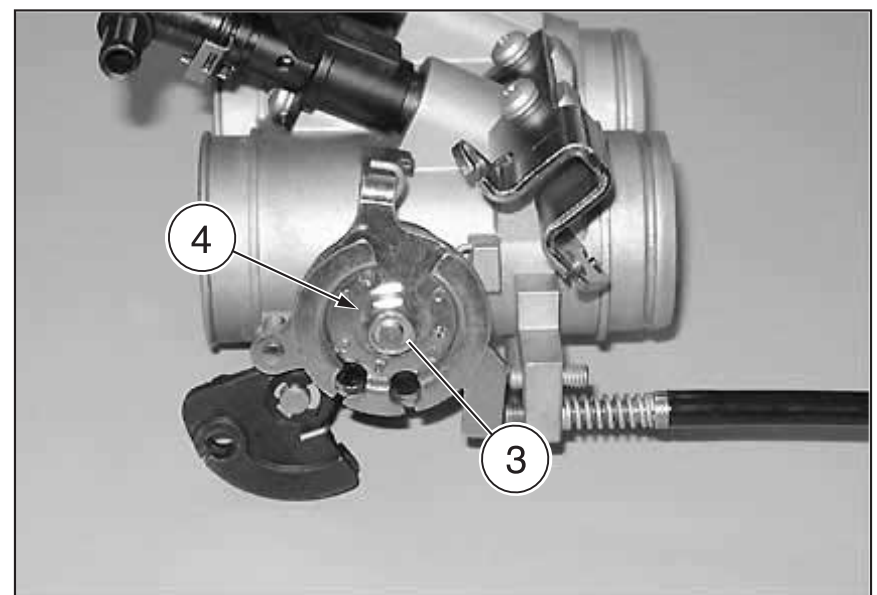
To reassemble, see 4.9.6 (ASSEMBLING THE THROTTLE BODY).



REMOVING THE THROTTLE VALVE CONTROL LEVER

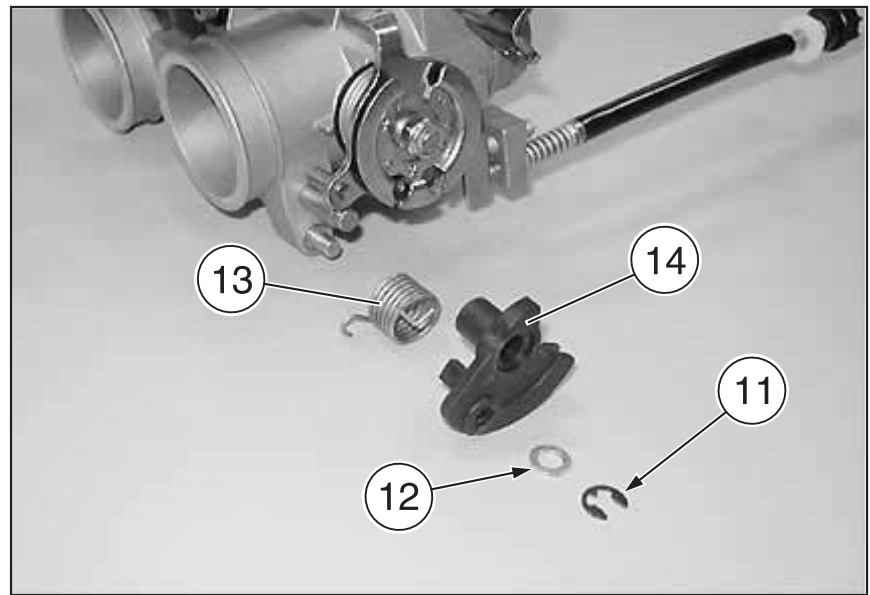
- ◆ Unscrew and remove the nut (3), taking the washer (4).
- ◆ Remove, in the order indicated:
 - throttle valve control lever (5);
 - spring washer (6);
 - bush (7);
 - spring (8);
 - bush (9);
 - washer (10).

To reassemble, see 4.9.6 (ASSEMBLING THE THROTTLE BODY).



REMOVING THE COLD START LEVER

- ◆ Remove the snap ring (11), taking the washer (12).
- ◆ Release the spring (13) of the cold start control lever (14).
- ◆ Remove the cold start lever (14), trying to find the best position from which it can be withdrawn.



REMOVING THE THROTTLE VALVE SENSOR

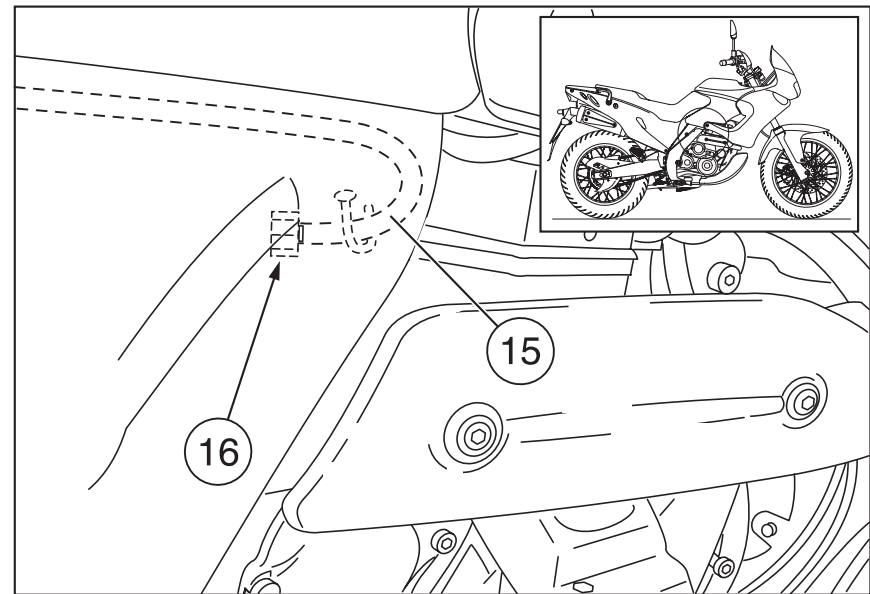
For the replacement and the setting, see 4.9.9 (CHANGING AND ADJUSTING THE THROTTLE VALVE POTENTIOMETER).

4.9.4 REMOVING THE IDLING SPEED ADJUSTMENT CABLE

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

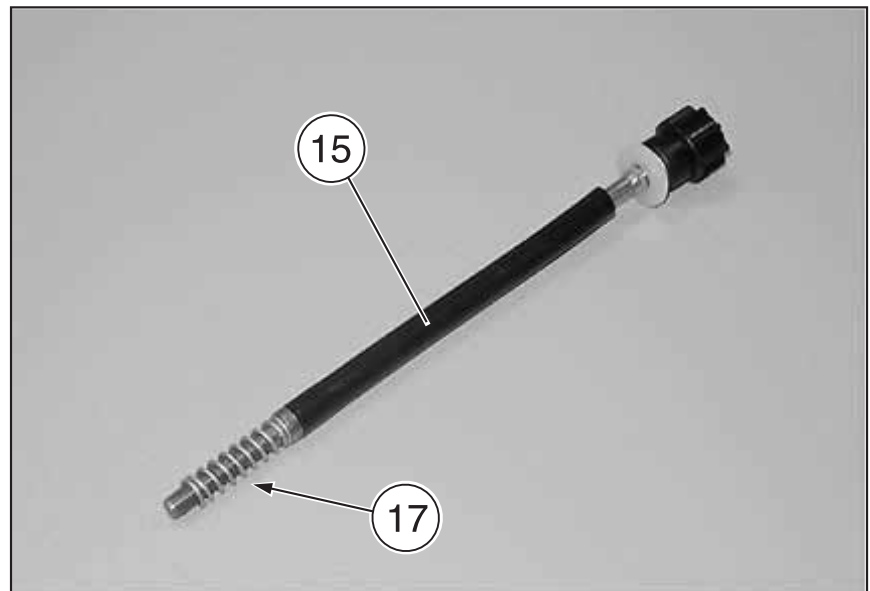
The removal and reassembly of the idling adjustment cable can be carried out with the throttle body mounted on the vehicle.

- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Release the idling speed adjustment cable (15) from the cable guide positioned behind the right standard of the frame.
- ◆ Unscrew completely by means of the adjusting knob (16).
- ◆ Remove the idling speed adjustment cable (15), together with the spring (17).



⚠ CAUTION

Upon reassembly, adjust the idling speed, see 2.9.2 (IDLING ADJUSTMENT).



4.9.5 INSPECTING THE THROTTLE BODY

TESTING THE INJECTOR

⚠ WARNING

The fuel is explosive and highly inflammable. Keep fuel away from ignition sparks, heat and flames.

NOTE The injection valves may also be checked whilst fitted.

◆ Check the following components:

- wiring and connections;
- injector or injection signal of the engine control unit, see 6.5 (IGNITION/INJECTION SYSTEM).

Checking injector resistance:

See 6.5.5 (CHECKING THE INJECTORS).

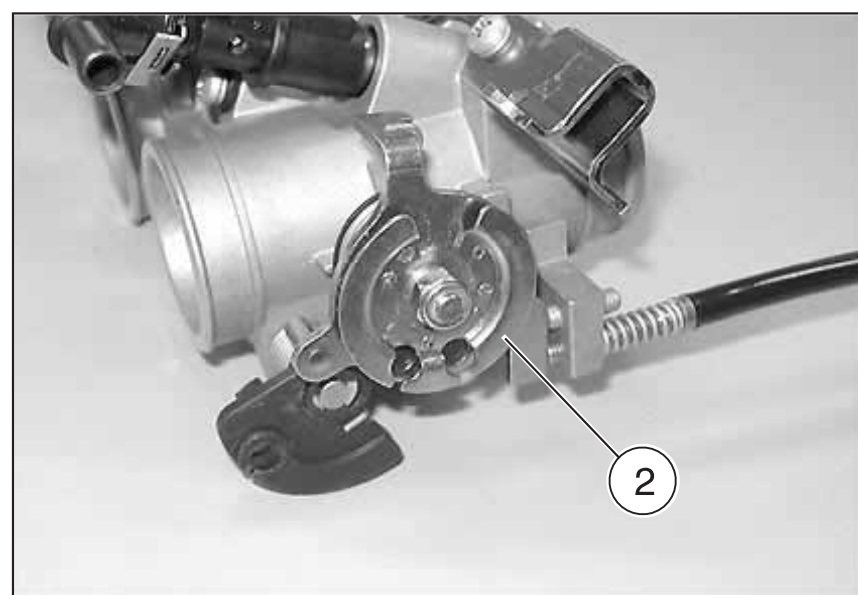
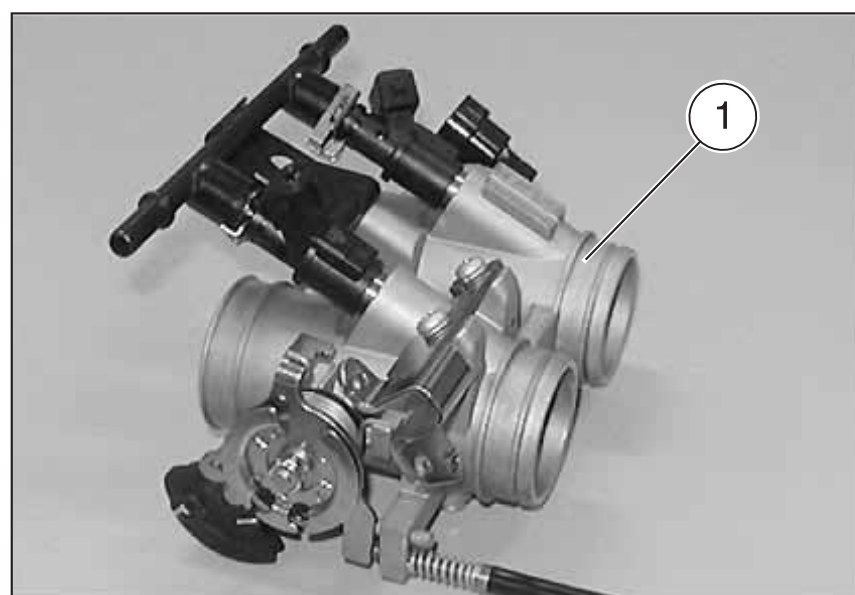
THROTTLE BODY

⚠ CAUTION

Use neutral detergents only.

For cleaning, use a product for removing sealing, a degreasing product or a detergent for cleaning when cold.

- ◆ Clean all the openings and pipes of the throttle body (1) using compressed air.
- ◆ Check the throttle valves unit and the cable fastening mechanism (2), watching out for any signs of mechanical damage.
- ◆ Check the soundness of the cable support plate (3).



4.9.6 ASSEMBLING THE THROTTLE BODY

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

CAUTION

After disassembling the throttle body, replace all the gaskets, O-rings, torsion springs, bushes and seals. These components are supplied with the repair kit.

REASSEMBLING THE COLD START LEVER

- ◆ Install the spring (2) and the cold start control (3) on the fulcrum pin (1).

CAUTION

Make sure that the ends of the spring (2) are coupled to the pin (4) and to the cold start control (3), respectively, (see figure).

- ◆ Turn the cold start control (3), so that the pin (4) is positioned between the two tangs (5) (6).
- ◆ Fit the washer (7).

CAUTION

Following disassembly, the seeger rings must always be replaced.

- ◆ Correctly position the snap ring (8).

REASSEMBLING THE THROTTLE VALVE CONTROL LEVER

NOTE Smear a film of grease over the surfaces of the fulcrum pin (9), see 1.6 (LUBRICANT CHART).

Install, in the order indicated:

- washer (10);
- bush (11);
- spring (12);
- bush (13);
- spring washer (14);
- throttle valve control lever (15).

CAUTION

Make sure that the ends of the torsion spring (12) are coupled to the antirotation seat (16) and to the throttle valve control lever (15), (see figure).

- ◆ Fit the washer (16).

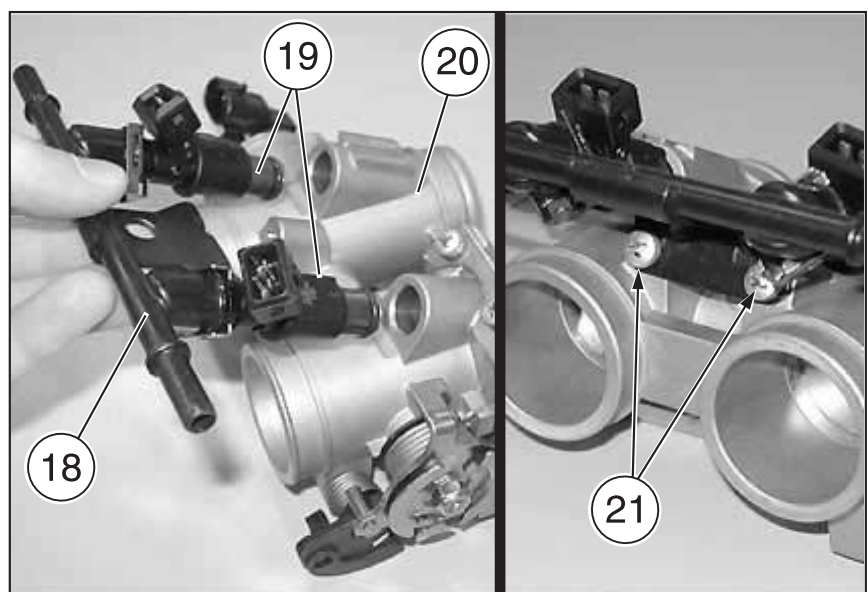
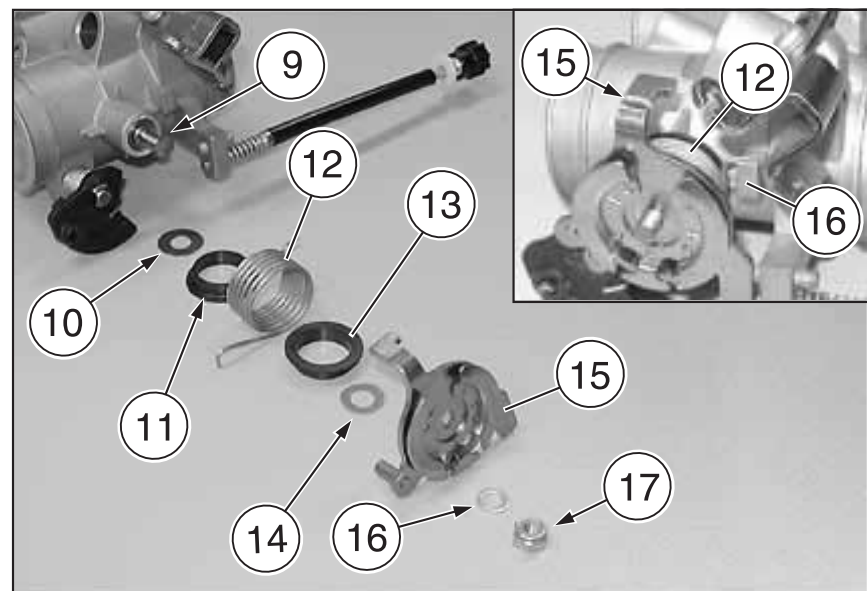
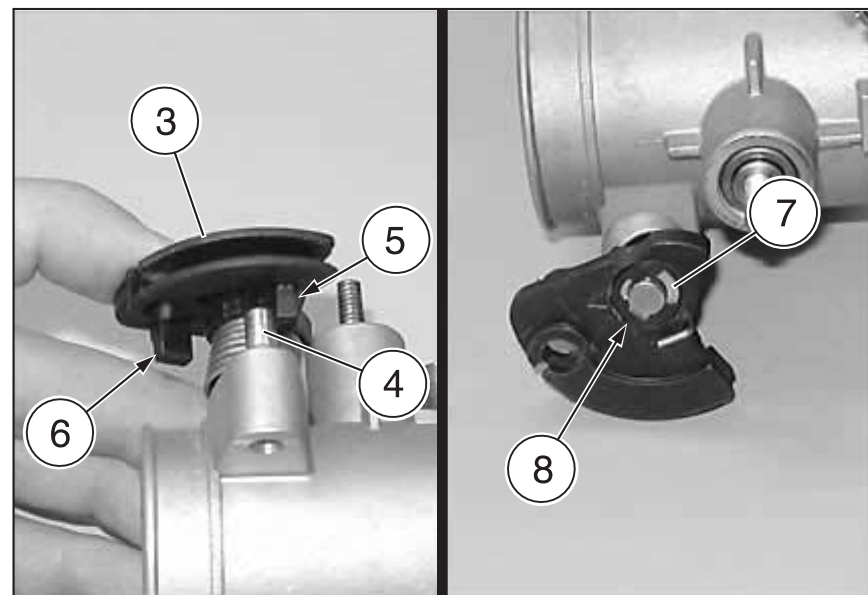
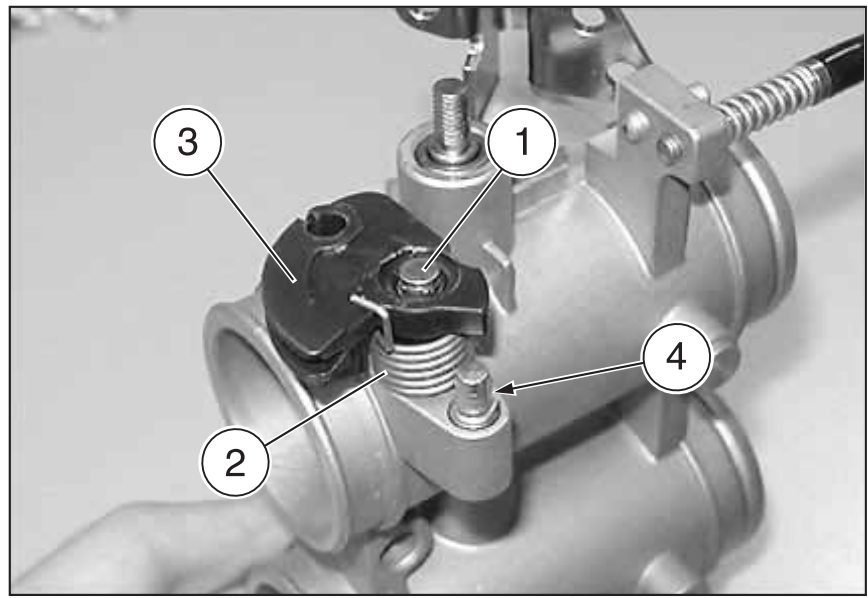
NOTE Apply LOCTITE® 243 on the thread of the nut (17).

- ◆ Screw the nut (17) and tighten it.

For the settings, see 4.9.8 (ADJUSTING THE THROTTLE BODY).

REASSEMBLING THE MANIFOLD TOGETHER WITH THE INJECTORS

- ◆ Correctly install the manifold (fuel rail) (18) complete with injectors (19) on the throttle body (20).
- ◆ Screw and tighten the two screws (21).



4.9.7 CHECKING THROTTLE VALVE CONTROL SHAFT END PLAY

- ◆ Remove the throttle body, see 4.9.2 (REMOVING THE THROTTLE BODY).

⚠ CAUTION

For the correct measurement of the axial clearance of the throttle valve control shaft, it is necessary to remove the spring (1), the bushes (2) (3) and the two washers (4) (5).

- ◆ Unscrew and remove the nut (6), taking the washer
- ◆ Remove, in the order indicated:
 - throttle valve control lever (7);
 - spring washer (4);
 - bush (2);
 - spring (1);
 - bush (3);
 - washer (5).

- ◆ Reassemble the throttle valve control lever (7) correctly.
- ◆ Screw the nut (6).

NOTE Have an appropriate thickness gauge (8) to hand with a 0.05 mm scale.

With throttle valves closed (A):

- ◆ Use the thickness gauge (8) to measure the minimum play between the lever (7) and the contact surface (9) on the throttle body in a number of points.

End play: min. 0.1 mm.

⚠ CAUTION

If the minimum value measured is lower than 0.1 mm, the throttle body must be replaced, see 0.4.2 (SPARE PARTS CATALOGUES).

With throttle valves open (B):

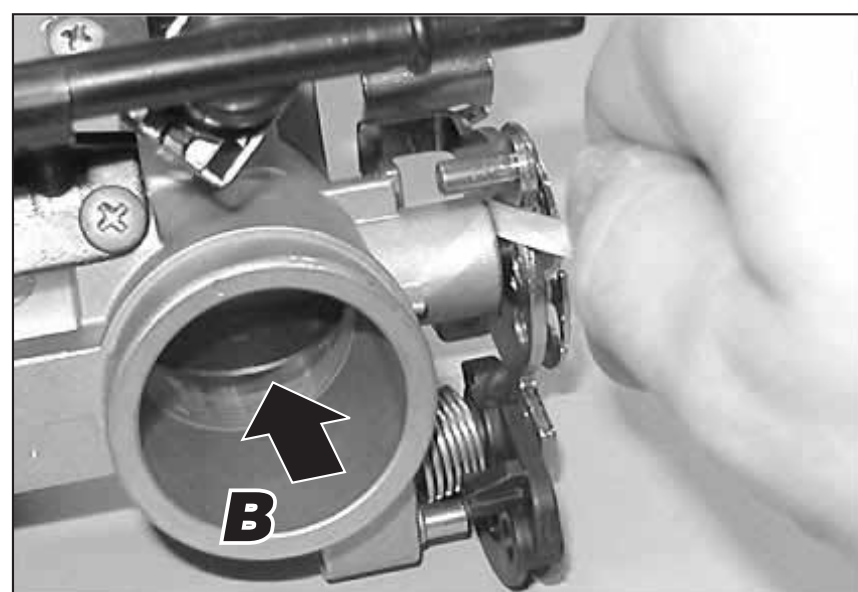
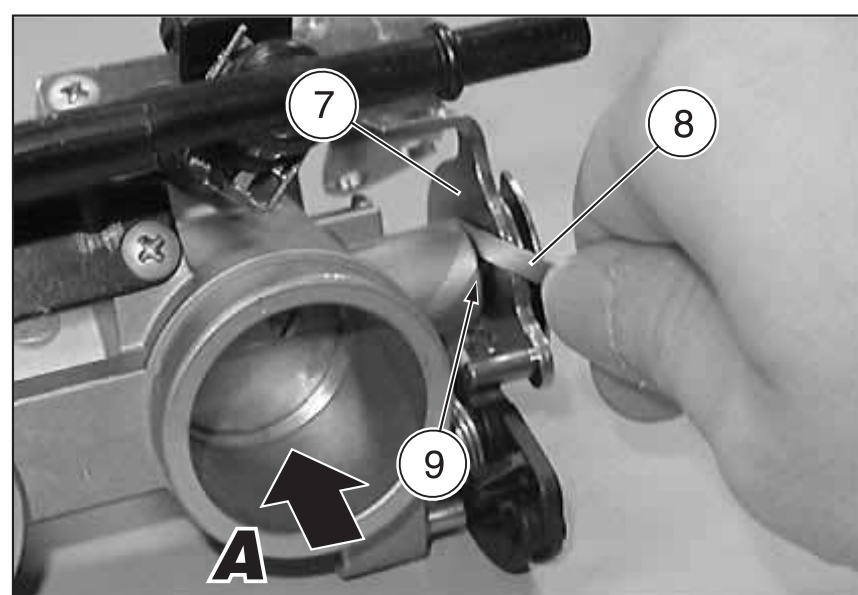
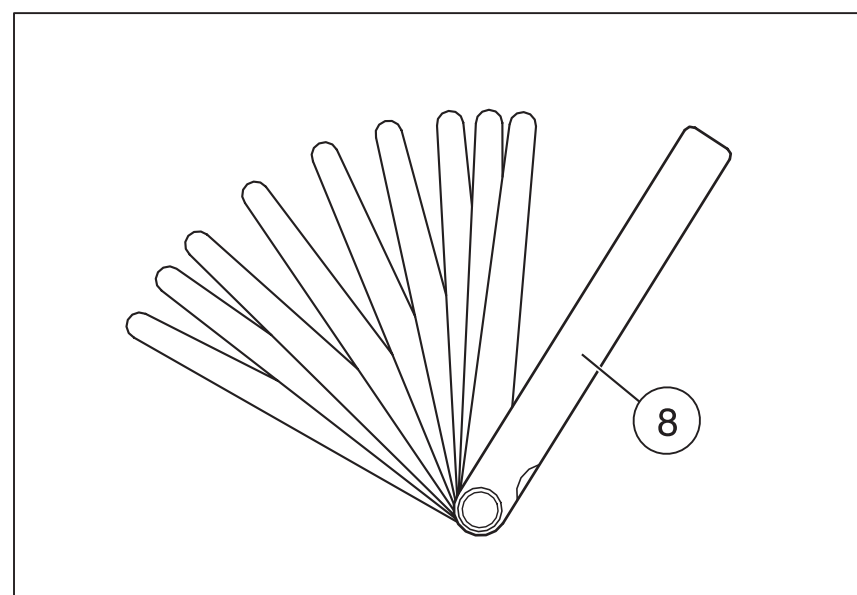
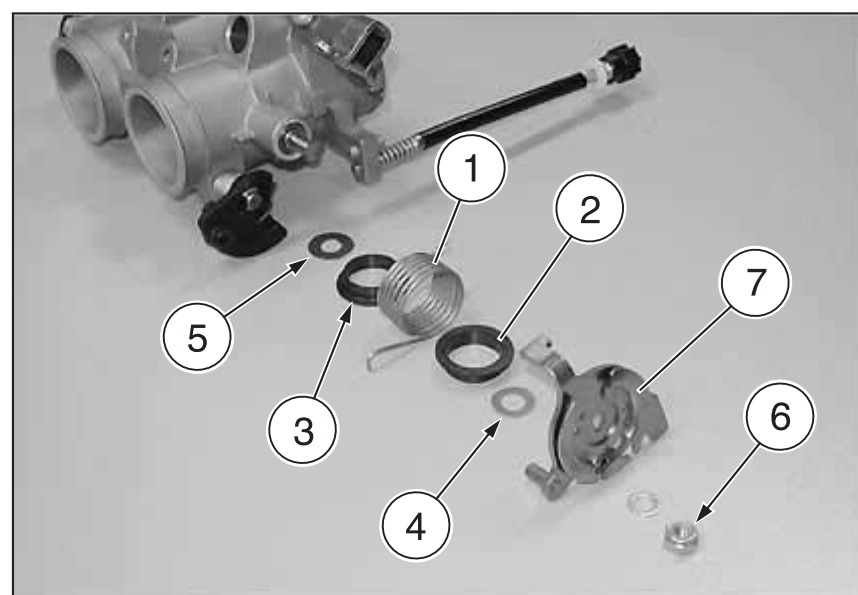
- ◆ Repeat the above procedure.

End play: min. 0.15 mm.

⚠ CAUTION

If the minimum value measured is lower than 0.15 mm, the throttle body must be replaced, see 0.4.2 (SPARE PARTS CATALOGUES).

- ◆ Correctly reassemble the parts that were previously removed.



4.9.8 ADJUSTING THE THROTTLE BODY

- ◆ Remove the throttle body, see 4.9.2 (REMOVING THE THROTTLE BODY).

SETTING IDLING

CAUTION

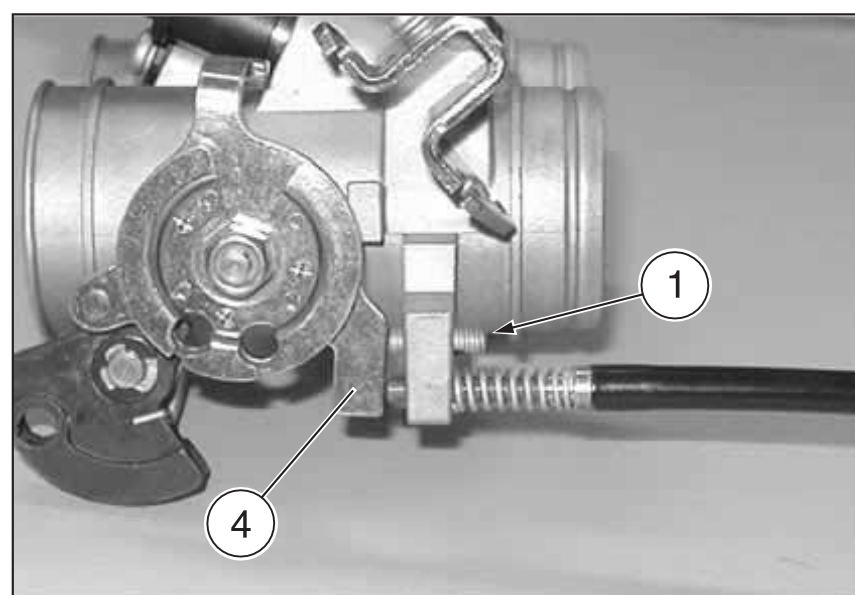
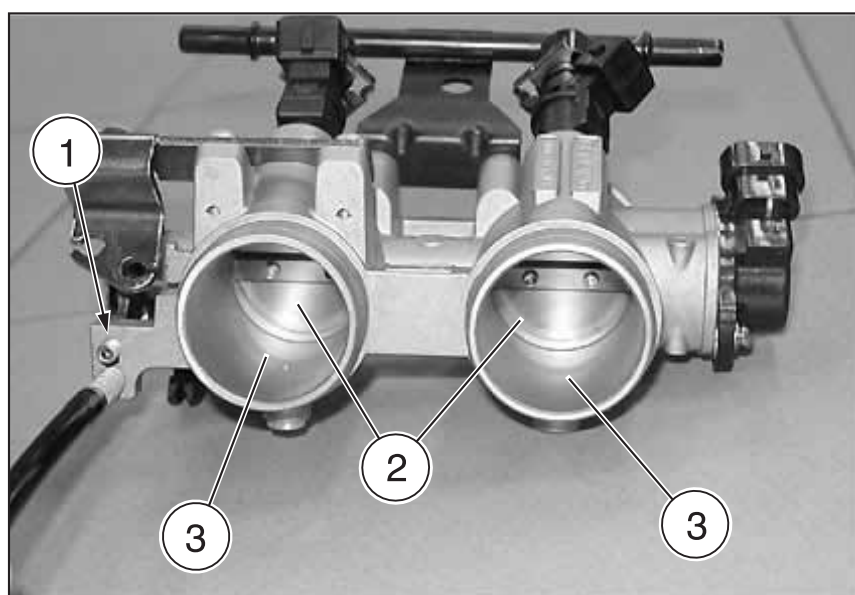
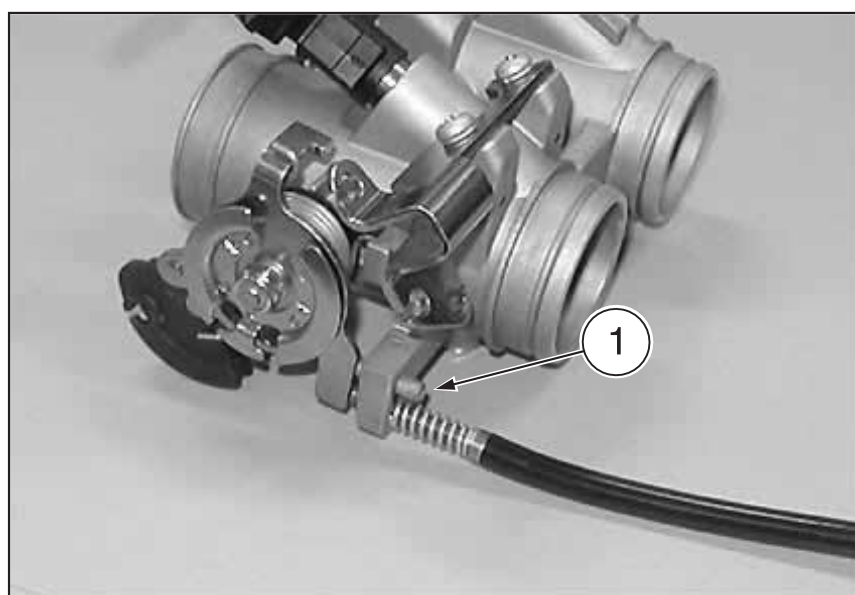
The screw (1) of the throttle valve end of stroke is painted and must not be adjusted.

The adjusting screw (1) can be set again only in case of complete replacement of the throttle valve lever and of the throttle body.

- ◆ Unscrew the adjusting screw (1) of the throttle valve end of stroke, until the throttle valves (2) adhere to the throttle body (3).
- ◆ Screw the adjusting screw (1) until it touches the stop onto the throttle valve control lever (4), and turn it another 1/2 – 3/4 turn.

Idling setting: 1/2 – 3/4 turn.

- ◆ Mark the new position of the screw (1).



4.9.9 CHANGING AND ADJUSTING THE THROTTLE VALVE POTENTIOMETER

With the engine switched off:

- ◆ Remove the throttle body, see 4.9.2 (REMOVING THE THROTTLE BODY).
- ◆ Disconnect the four-way connector (coloured black) (1).

⚠ CAUTION

The two screws (2) fastening the throttle valve potentiometer are painted and can only be removed or slacken in the event the actual sensor is replaced.

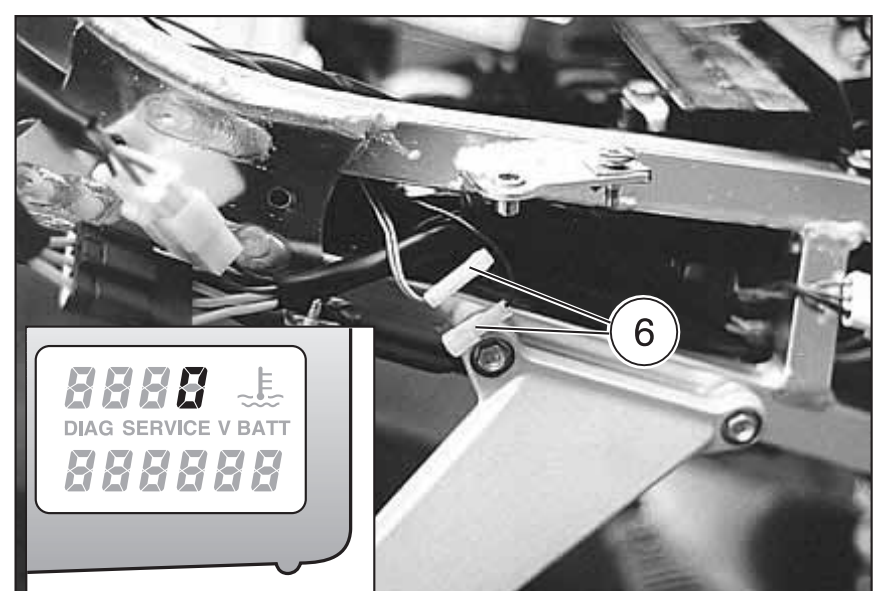
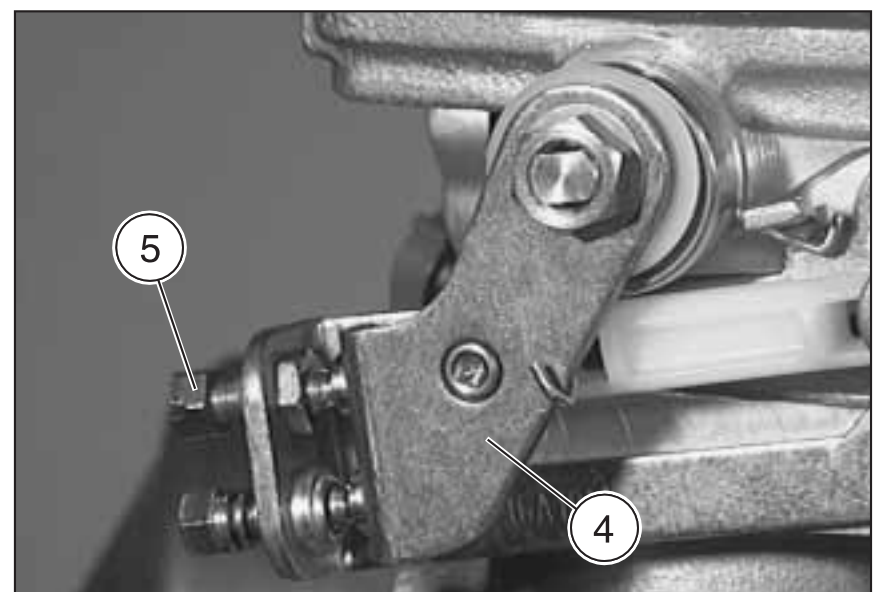
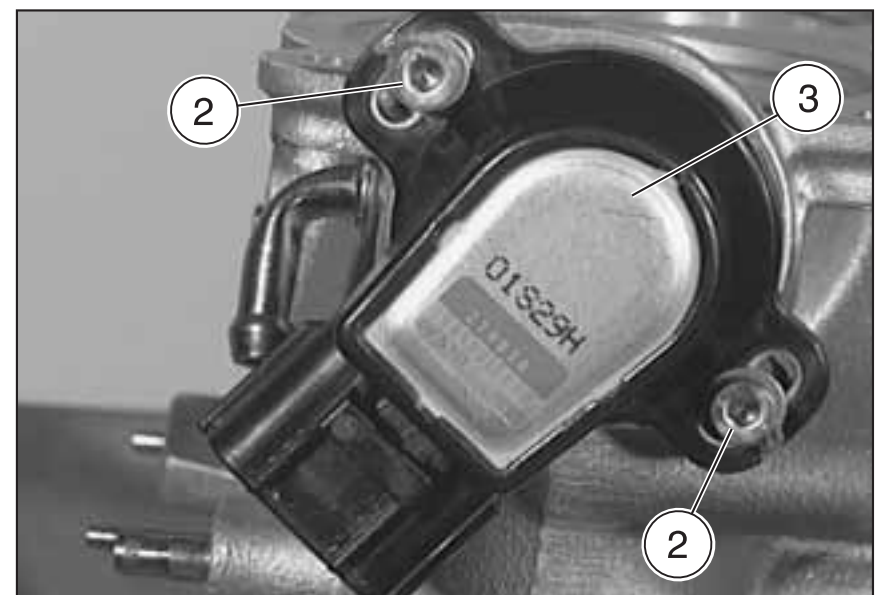
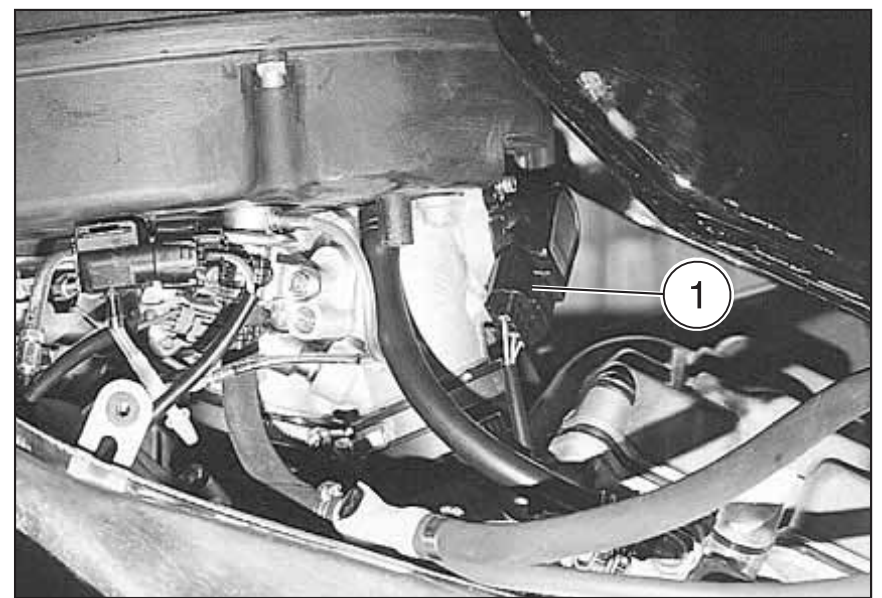
NOTE In order to make it easier to unscrew the screws (2) secured using LOCTITE® 243, heat them first with a hot air blower.

- ◆ Unscrew and remove the screws (2).
- ◆ Remove the potentiometer (3).

⚠ CAUTION

After reassembly, adjust the idling speed, see 2.9.2 (IDLING ADJUSTMENT).

For further information, see 6.5.6 (CHECKING THE THROTTLE VALVE POTENTIOMETER).



4.9.10 CO ADJUSTMENT

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.1 (FUEL).

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Carburation, CO adjustment

The cylinders must be synchronized whenever the engine runs smoothly no longer when idling.

- ◆ Ride for a few miles until reaching the normal running temperature.

CAUTION

The CO adjustment must be carried out with warmed-up engine:

- coolant temperature 78 °C (173 °F);
- room temperature 20-30 °C (68-86 °F).

NOTE Have the appropriate special tools **OPT** to hand:

- aprilia part# 8140196 (exhaust fume analyser) (1).

WARNING

Fuel vapours are noxious for your health. Before proceeding, make sure that the room in which you are working is properly ventilated. Do not inhale fuel vapours.

Avoid any contact of the fuel with the skin. Do not smoke and do not use naked flames. Do not dispose of fuel in the environment.

- ◆ Unscrew and remove the two screws (3).
- ◆ Remove the protection element (4).

Cap (5) driving torque: 25 Nm (2.5 kgm).

- ◆ Unscrew and remove the cap (5) on exhaust pipe.

NOTE Upon reassembly, apply LOCTITE® 8150 to the plug cap (5).

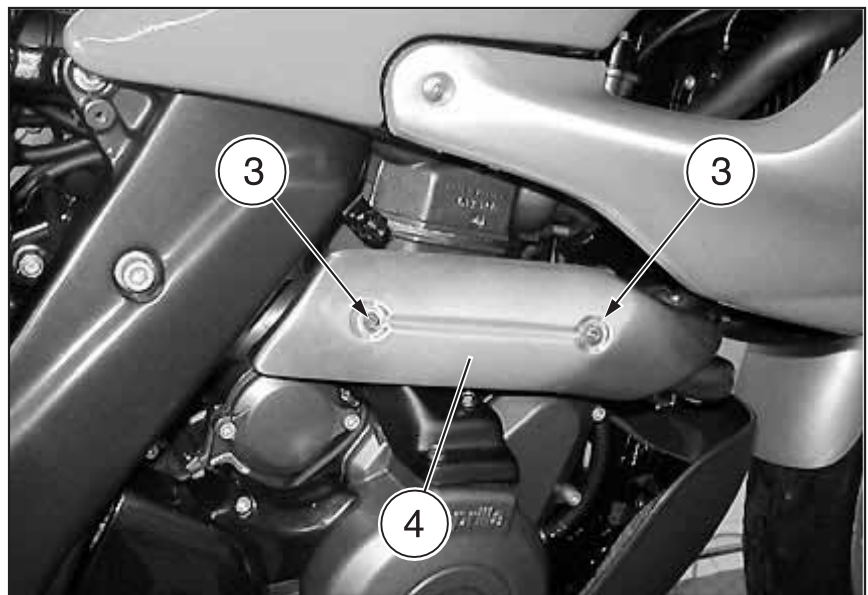
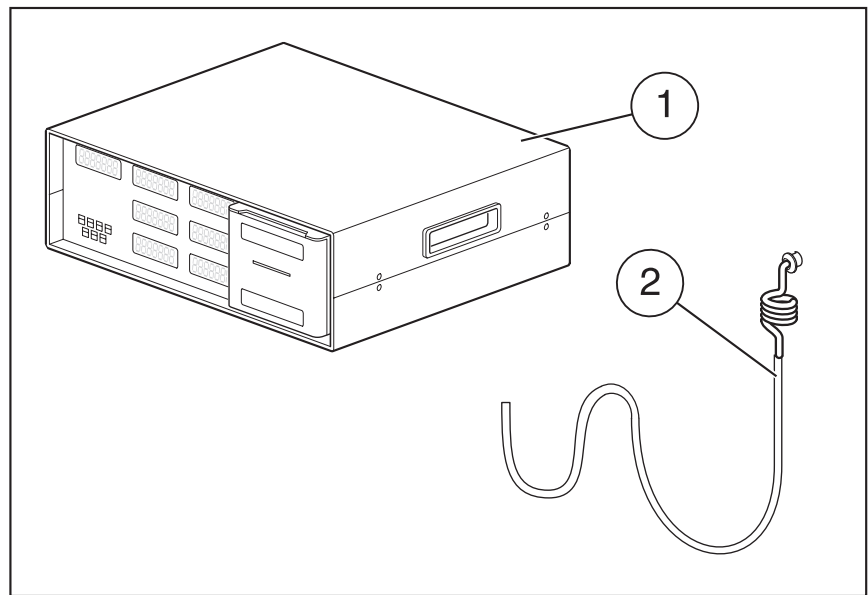
- ◆ Connect the exhaust gas tester pipes (2):
 - the rigid pipe to the appropriate coupling on the exhaust pipe;
 - connect the other pipe to the exhaust gas tester (1).
- ◆ Start the engine and make sure the idling rpm is 1350 ± 100 rpm. If this is not the case, adjust accordingly, see 2.9.2 (IDLING ADJUSTMENT).
- ◆ Check the tester (1) for the CO values. They should correspond to the values indicated.

NOTE CO values for the idling speed adjustment = 1% (tolerance: +1%, -0.5%) at 1350 ± 100 rpm.

- ◆ If the CO value measured differs from the value indicated, restore the correct value by means of the trimmer (6).

- ◆ Check the idling rpm and, if it does not correspond to 1350 ± 100 rpm, adjust accordingly, see 2.9.2 (IDLING ADJUSTMENT) and then check the CO values again and, where necessary, repeat the previous procedure.

NOTE If it is not possible to obtain the preset CO values, the sparking plugs must be replaced, see 2.6 (SPARK PLUG).



COOLING SYSTEM

5

COOLING SYSTEM

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5

5.1 DESCRIPTION

The centrifugal pump (positioned inside the engine and driven by the latter) draws coolant and distributes it to the galleries in the cylinders and in the heads in order to cool the internal parts of the engine.

The heated fluid that flows out of the head meets:

- the thermistor (1) that takes its temperature and transmits the measured value to the coolant temperature indicator (2) (on the dashboard) that in turn displays it;
- the radiator (3), through the coupling (4). The liquid first occupies the upper half of the radiator and then reaches its lower half and flows out of the coupling (5);
- the thermal expansion valve (of the type with heat-sensitive wax tablet) that, according to the fluid temperature, adjusts its flow into the radiator (3).

At 60 – 70 °C the thermal expansion valve starts opening; at approximately 85 °C the valve opens completely and lets the fluid flow out at the maximum flow rate.

For further information, refer to the engine service and repair manual, see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).

The radiator is provided with the thermal switch (6) that is activated and starts the electric fan (7) if the fluid temperature in this area reaches 90 °C.

When, thank to the action of the electric fan, the fluid temperature lowers to 80 °C, the thermal switch stops the electric fan.

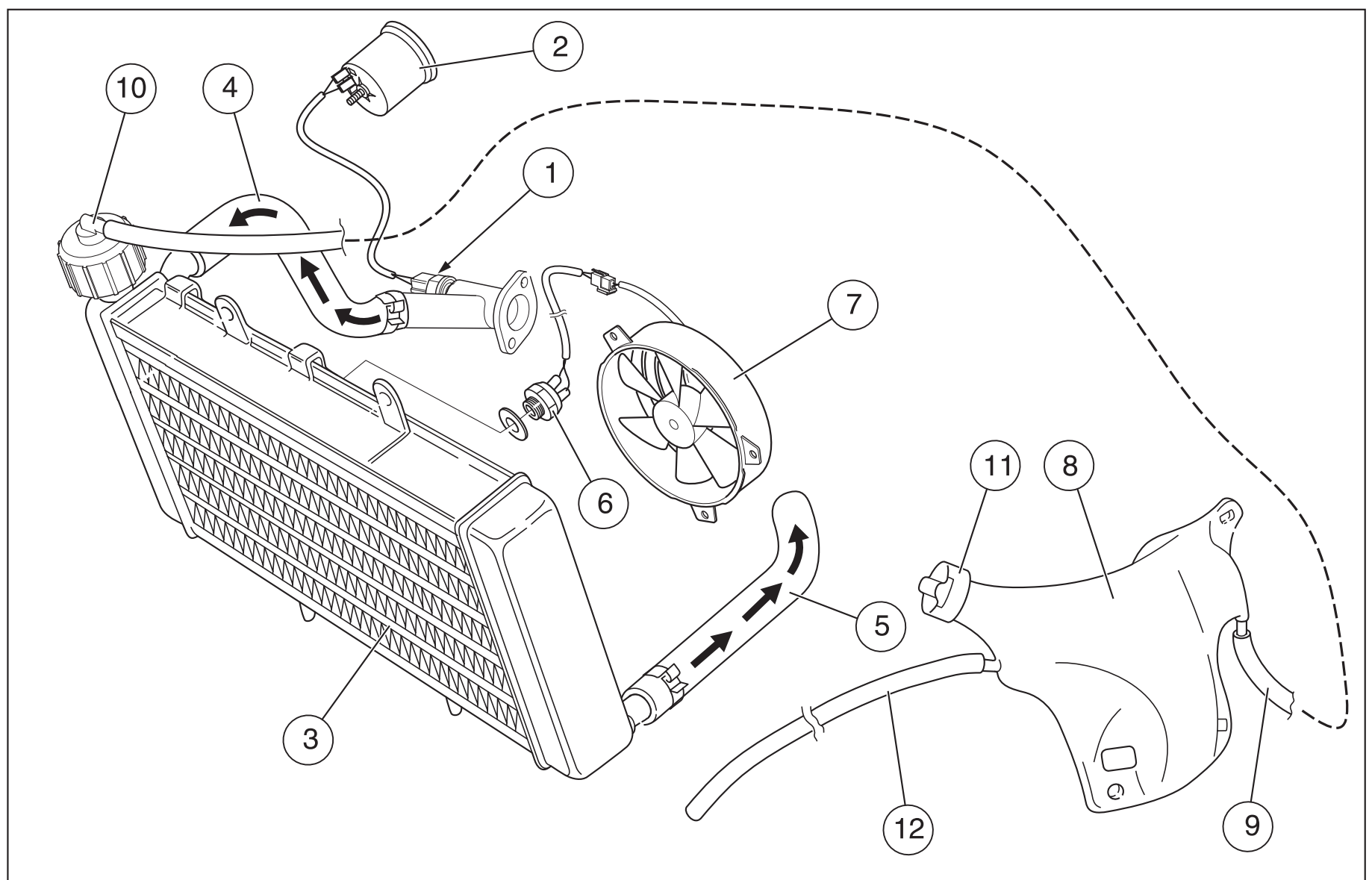
The increase in the fluid volume (caused by the temperature increase) is compensated for in the expansion tank (8), through the pipe (9).

To check and top up the coolant, refer to the “MIN” and “MAX” reference marks, see 2.13 (CHECKING AND TOPPING UP COOLANT).

For any information regarding the coolant, see 1.2.5 (COOLANT).

Key

- 1) Air thermistor
- 2) Coolant temperature indicator
- 3) Radiator
- 4) Radiator inlet coupling
- 5) Radiator outlet coupling
- 6) Thermal switch
- 7) Electrofan
- 8) Expansion tank
- 9) Compensation pipe
- 10) Radiator cap
- 11) Expansion tank cap
- 12) Breather pipe



5.2 REMOVING THE RADIATOR

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.5 (COOLANT).

- ◆ Turn the ignition switch to position “”.
- ◆ Drain the cooling circuit completely, see 2.14 (CHANGING THE COOLANT).
- ◆ Remove the front fairing, see 7.1.24 (REMOVING THE FRONT FAIRING).
- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).
- ◆ Remove the air conveyor, see 7.1.35 (REMOVING THE AIR CONVEYOR).

Right side

CAUTION

When refitting, make sure the electric connectors are plugged in properly.

- ◆ Disconnect the coolant thermistor electric connector (1).
- ◆ Disconnect the electric connector (2) of the electrofan (3).
- ◆ Disconnect the two electric connectors (4) (5) from the thermal switch (6).

Thermal switch driving torque: 30 Nm (3.0 kgm).

- ◆ Move the pipe clamp (7) and withdraw the compensation pipe (8) from the radiator cap.
- ◆ Release the pipes and the cables from the cable guide (9).

NOTE Have the appropriate special tool **OPT** to hand:
 – aprilia part# 0277295 (hose clamp installation pliers).

CAUTION

Upon installation, replace the hose clamp that has been removed with a new one having the same dimensions, see 0.4.2 (SPARE PARTS CATALOGUES).

Do not attempt to reinstall the removed hose clamp, since it is unusable.

Do not replace the removed hose clamp with a screw clamp or with other types of clamp.

- ◆ Release the hose clamp (10).
- ◆ Pull the pipe (11) off the radiator (12).
- ◆ Unscrew and remove the self-locking nut (13).

Radiator upper screw driving torque: 12 Nm (1.2 kgm).

- ◆ Withdraw the screw (14), taking the cable guide (9), the washer and if necessary the bushing and the rubber element.

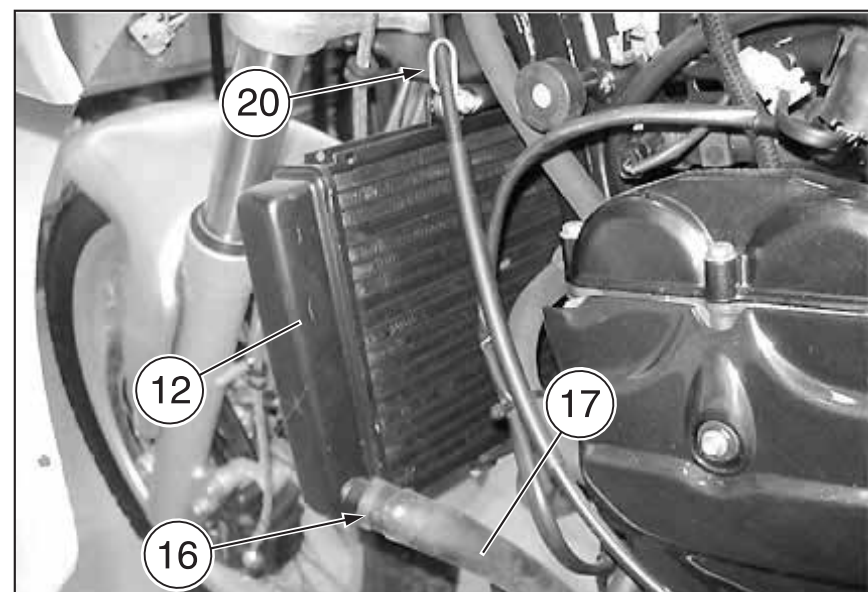
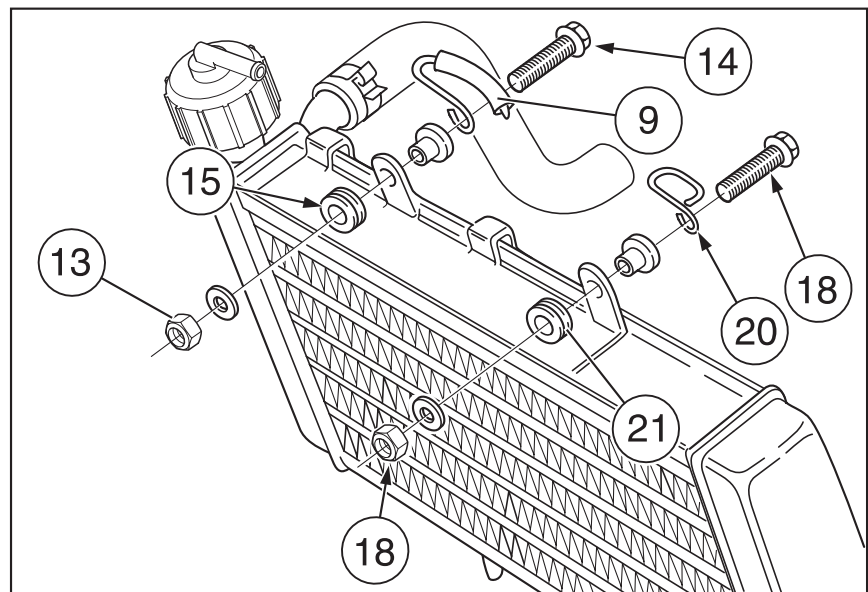
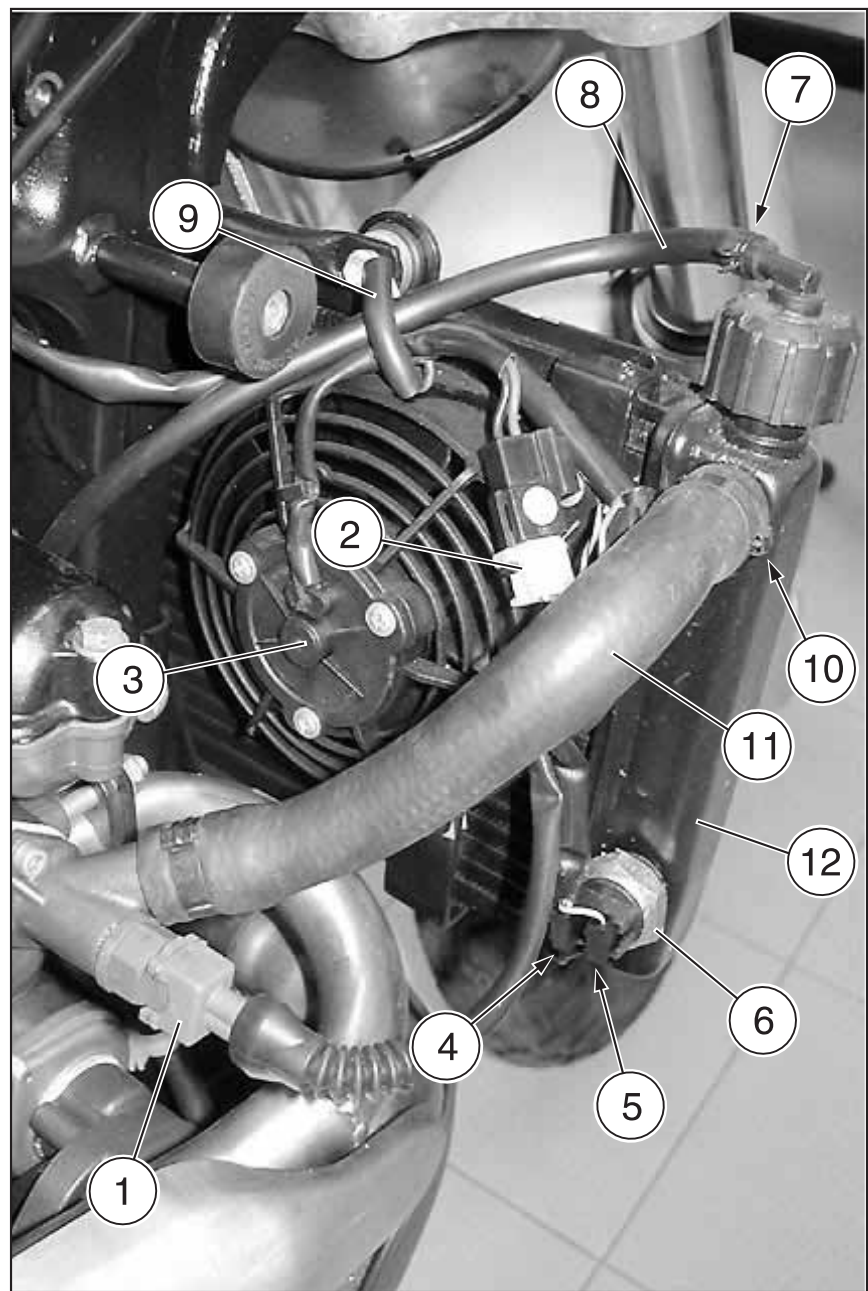
NOTE Upon reassembly, position the cable guide ring (9) correctly.

NOTE If the rubber element (15) is damaged, replace it.

Left side

- ◆ Release the hose clamp (16).
- ◆ Pull the pipe (17) off the radiator (12).
- ◆ Unscrew and remove the self-locking nut (18).

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Pegaso 650 I.E.

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- ◆ Withdraw the screw (19), taking the cable guide (20), the washer and if necessary the bushing and the rubber element.

NOTE Upon reassembly, position the cable guide ring (20) correctly.

NOTE If the rubber element (21) is damaged, replace it.

⚠ CAUTION

Proceed with care.

Do not damage the radiator fins.

- ◆ Tilt the radiator (12) slightly forwards and at the same time lift it, sliding the two lower anchorage pins (23) (24) from their slot on the radiator mount (22).
- ◆ Remove the radiator (12) complete with the electrofan.

⚠ CAUTION

Plug the coupling openings, in such a way as to prevent any foreign matters from getting in.

NOTE If the rubber elements (25) are damaged, replace them.

If necessary, proceed as follows:

- ◆ Remove the cooling electrofan, see 5.3 (REMOVING THE COOLING ELECTROFANS).

⚠ CAUTION

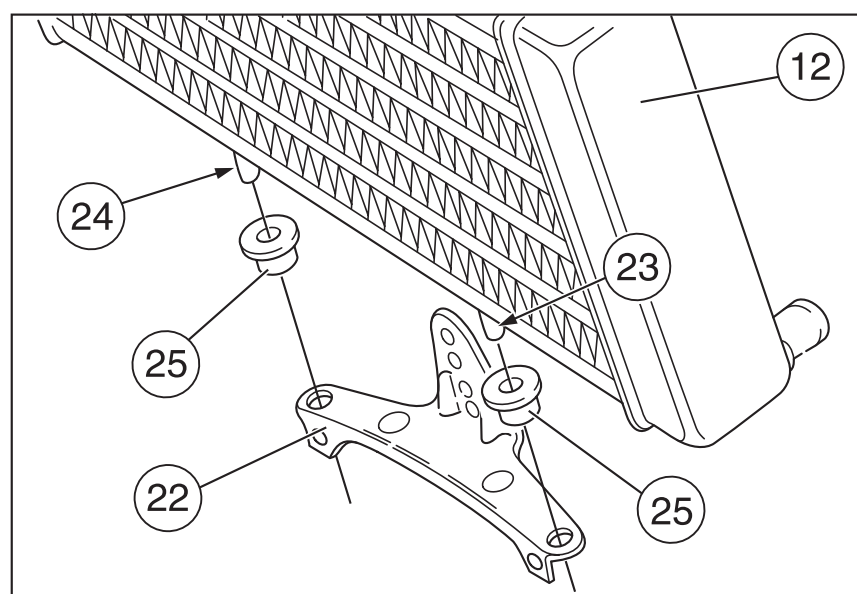
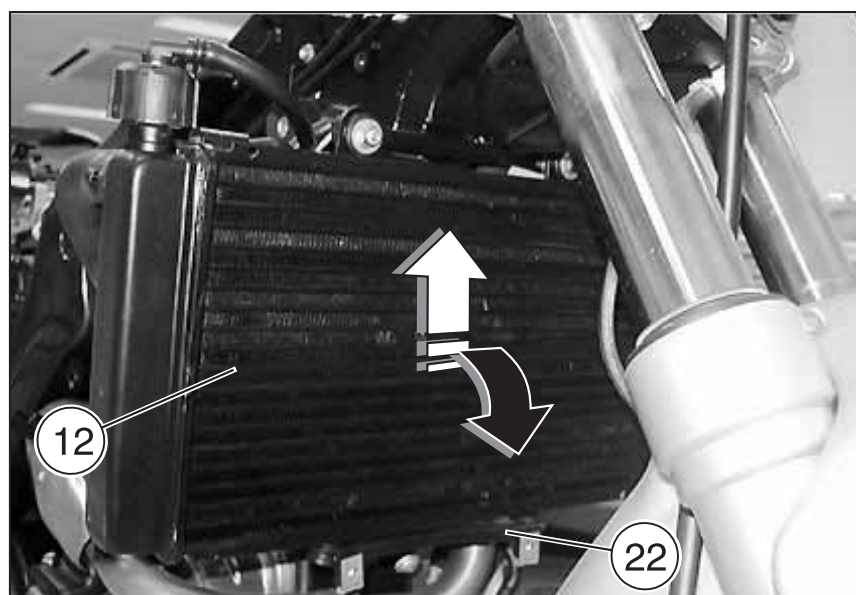
Foreign bodies, filth, etc. sticking to the radiator fins must be removed by means of a jet of compressed air.

Any bent fins are to be straightened using a small flat-tip screwdriver.

If the couplings (11) (17) feature cuts and/or cracks, they must be replaced.

Before reassembly, thoroughly wash the inside of the radiator with clean water only.

NOTE Where necessary, remove the other radiator.



5.3 REMOVING THE COOLING ELECTROFANS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Turn the ignition switch to position "⊗".
- ◆ Remove the front fairing, see 7.1.24 (REMOVING THE FRONT FAIRING).
- ◆ Disconnect the electric connector (1).

⚠ CAUTION

Upon reassembly, make sure that the electric connector (1) is correctly coupled.

- ◆ Release the cable (2) from the cable guide (3).

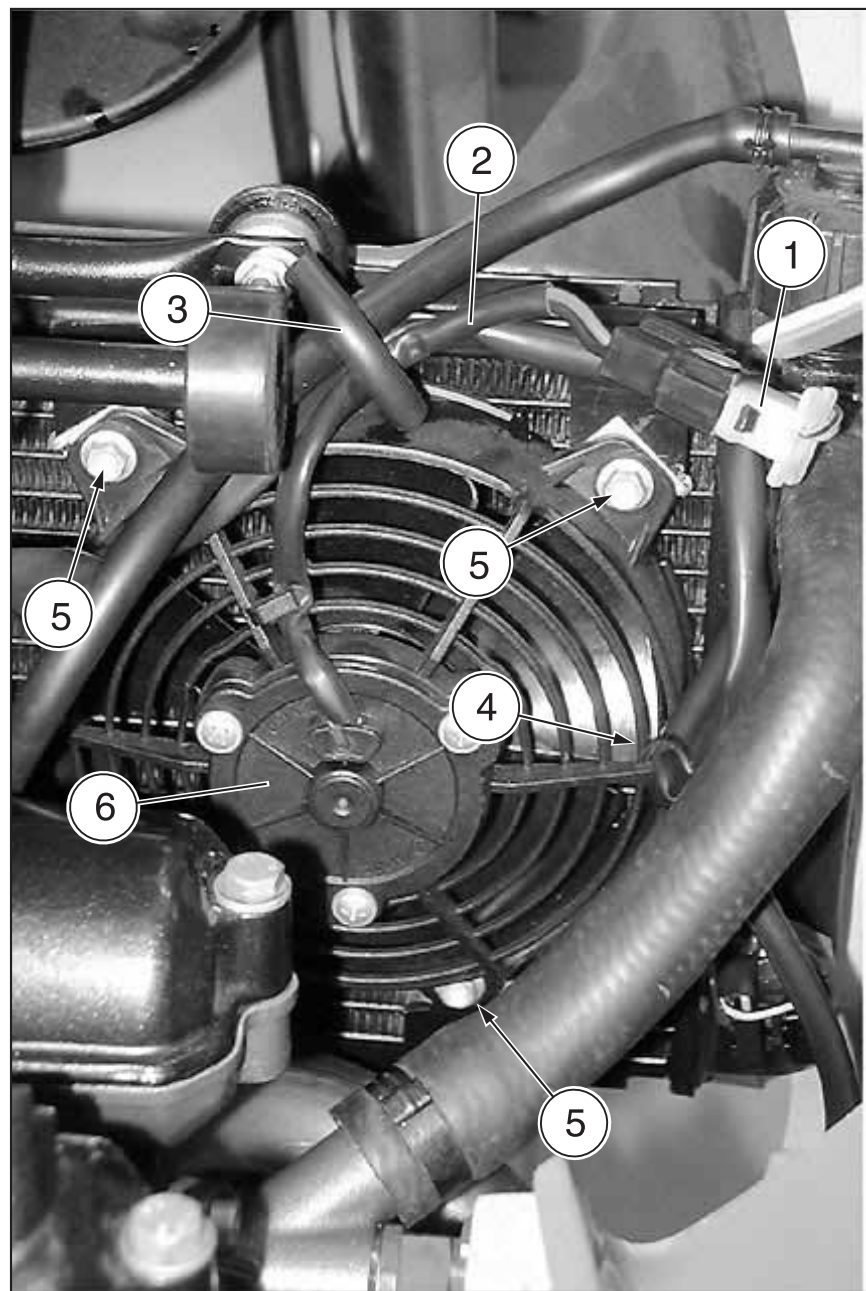
⚠ CAUTION

Prepare a clamp to be used for the reassembly.

- ◆ Cut the clamp (4) and release the cables.
- ◆ Unscrew and remove the three screws (5).

Electric fan screw driving torque: 5 Nm (0.5 kgm).

- ◆ Remove the electrofan (6).



5.4 REMOVING THE COOLANT THERMAL SWITCH

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.5 (COOLANT).

- ◆ Turn the ignition switch to position "⊗".
- ◆ Remove the front fairing, see 7.1.24 (REMOVING THE FRONT FAIRING).
- ◆ Disconnect the electric connectors (1) (2) from the thermal switch (3).
- ◆ Partially drain the coolant (approximately half the contents of the coolant tank), see 2.14 (CHANGING THE COOLANT).

⚠ CAUTION

The level of the remaining fluid must be below the hole where the thermal switch is connected.

⚠ CAUTION

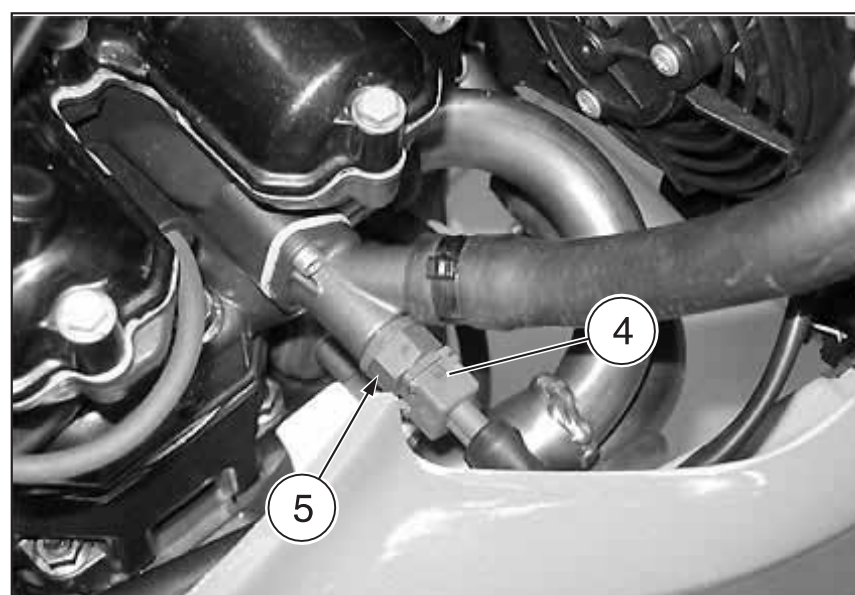
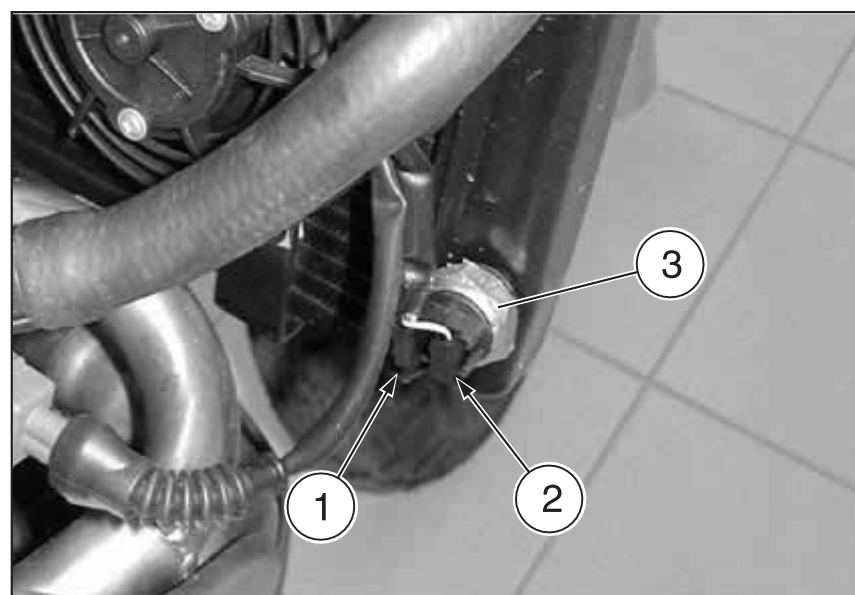
When reassembling, make sure the electric connectors (1) (2) are plugged in properly.

- ◆ Prepare a new thermal switch and apply LOCTITE® 572 on its thread.
- ◆ Unscrew and remove the thermal switch (3) and retrieve the gasket.
- ◆ Insert the gasket on the new thermal switch.
- ◆ Screw the thermal switch (3) on by hand before tightening it.

Thermal switch driving torque: 30 Nm (3.0 kgm).

NOTE See 6.9.3 (CHECKING THE THERMAL SWITCH OPERATION) for further details on the thermal switch.

- ◆ Top up, see 2.13 (CHECKING AND TOPPING UP COOLANT).



5.5 REMOVING THE COOLANT THERMISTOR

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.5 (COOLANT).

- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).

⚠ WARNING

Let the engine cool down until it reaches room temperature.

- ◆ Disconnect the electric connector (4).

⚠ CAUTION

Upon reassembly, make sure that the electric connector (4) is correctly coupled.

- ◆ Prepare a new thermistor and apply LOCTITE® 574 on its thread.
- ◆ Unscrew and remove the thermistor (5).
- ◆ Screw the thermistor (5) on by hand before tightening it.

Thermistor driving torque: 30 Nm (3.0 kgm).

⚠ CAUTION

Do not remove the radiator cap and/or the expansion tank cap, in order to prevent the coolant from flowing out.

5.6 REMOVING THE EXPANSION TANK

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 1.2.5 (COOLANT).

- ◆ Position the vehicle on the stand.

⚠ WARNING

Let the engine cool down until it reaches room temperature.

- ◆ Remove the oil sump guard, see 7.1.3 (REMOVING THE OIL SUMP GUARD).
- ◆ Withdraw the breather pipe (1) from the union.
- ◆ Unscrew and remove the fastening screw (2) and retrieve the bush.

Coolant tank front screw driving torque: 10 Nm (1.0 kgm).

- ◆ Unscrew and remove the fastening screw (3) and retrieve the washer.

Coolant tank side screw driving torque: 10 Nm (1.0 kgm).

⚠ CAUTION

Proceed with care. Do not force the pipes

- ◆ Partially remove the coolant tank (4).
- ◆ Take the pan guard front support (5).

NOTE Upon reassembly, make sure that the front support of the pan guard (5) is positioned correctly.

- ◆ Release the breather pipe (6) from its seat.

NOTE Upon reassembly, position the breather pipe (6) correctly in its seat.

- ◆ Unscrew and remove the filling cap (7).

⚠ WARNING

The coolant is noxious: do not swallow it; if the coolant gets in contact with the skin or the eyes, it can cause serious irritations.

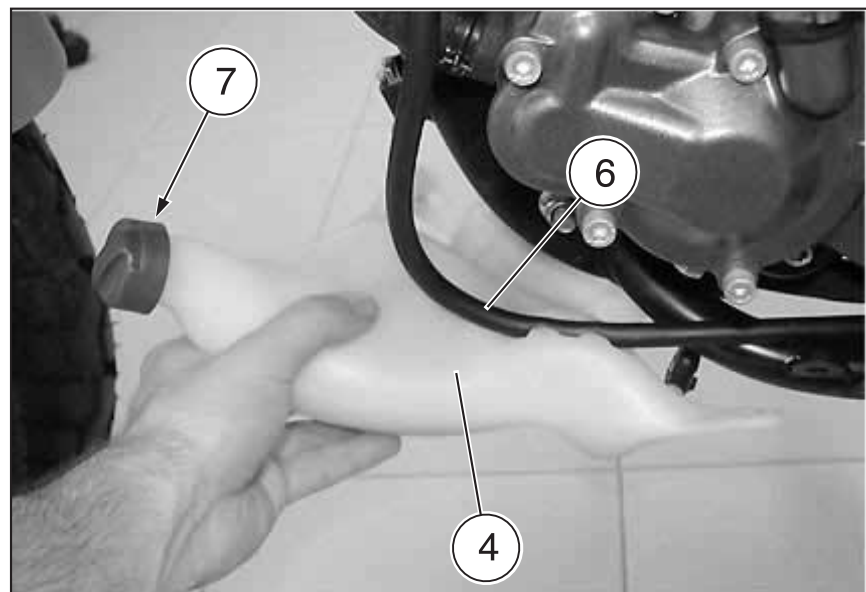
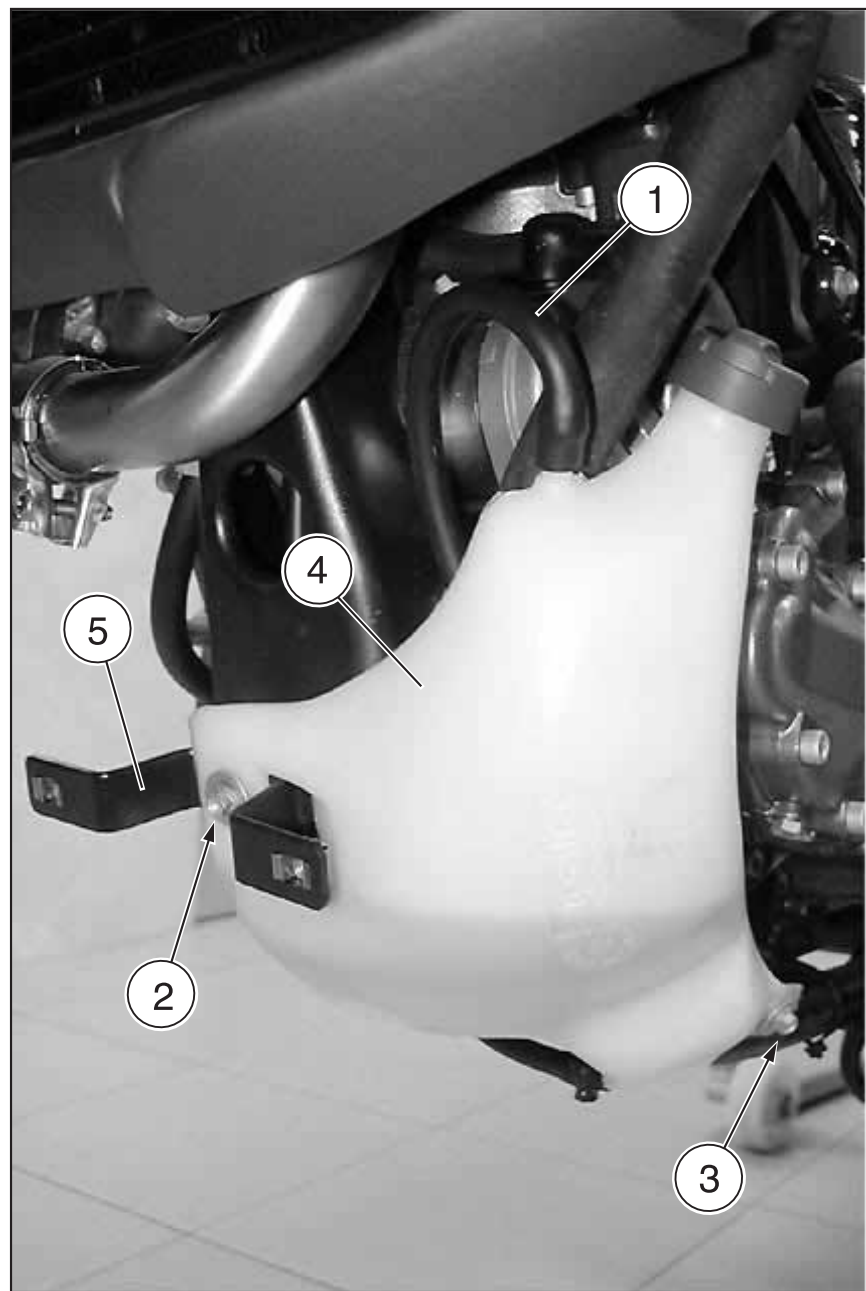
If the fluid gets in contact with your skin or eyes, rinse with plenty of water and consult a doctor. If it is swallowed, induce vomit, rinse mouth and throat with plenty of water and consult a doctor without delay.

KEEP AWAY FROM CHILDREN.

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

- ◆ Drain the coolant tank (4) completely, gathering the coolant into a container.
- ◆ Put back the filling cap (7).

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NOTE Have the appropriate special tool **OPT** to hand:
– **aprilia** part# 0277295 (hose clamp installation pliers).

⚠ CAUTION

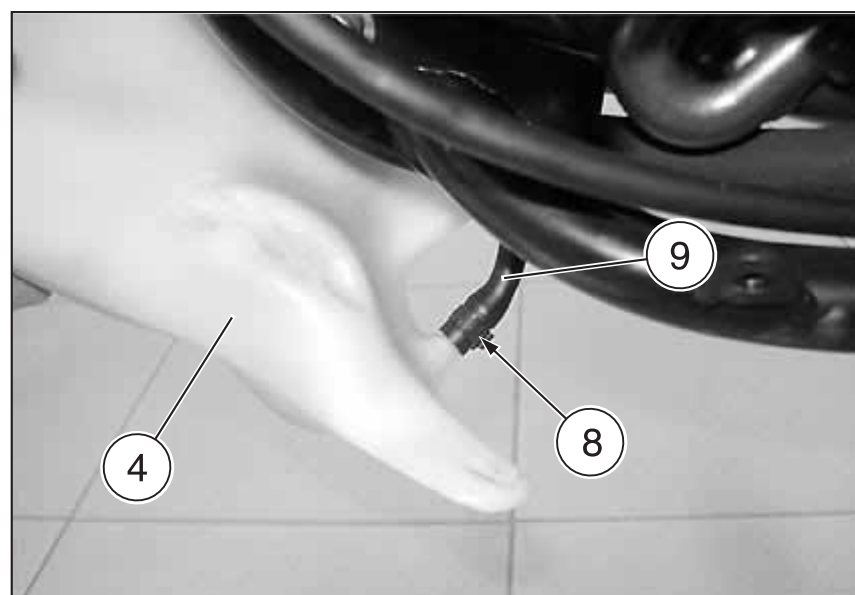
Upon installation, replace the hose clamp that has been removed with a new one having the same dimensions, see 0.4.2 (SPARE PARTS CATALOGUES).

Do not attempt to reinstall the removed hose clamp, since it is unusable.

Do not replace the removed hose clamp with a screw clamp or with other types of clamp.

- ◆ Release the hose clamp (8).
- ◆ Withdraw the pipe (9) from the coolant tank (4).
- ◆ Take the coolant tank (4).

NOTE After reassembly, restore the correct coolant level, see 2.13 (CHECKING AND TOPPING UP COOLANT).



5.7 COOLANT PUMP

For further information on the coolant pump, refer to the engine service and repair manual, see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).

5.8 THERMAL EXPANSION VALVE

For further information on the thermal expansion valve, refer to the engine service and repair manual, see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).

NOTE

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ELECTRIC SYSTEM

ELECTRIC SYSTEM

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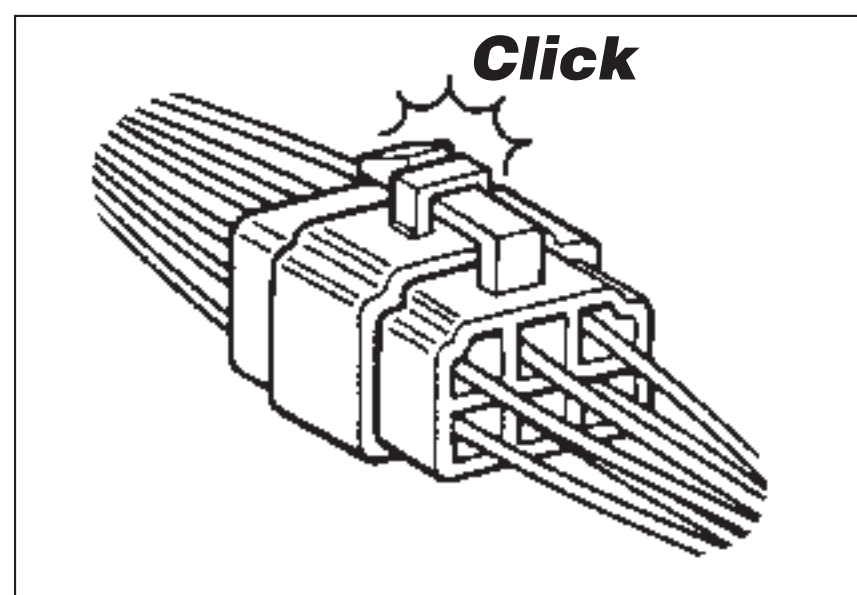
6.1 INTRODUCTION

The following key will be useful in consulting this section.

NOTE The numbering to be found on the specific wiring diagrams corresponds to that on the general wiring diagram.

6.1.1 CABLE COLOURS

Ar	Orange
Az	Light blue
B	Blue
Bi	White
G	Yellow
Gr	Grey
M	Brown
N	Black
R	Red
Ro	Pink
V	Green
Vi	Violet



6.1.2 ELECTRICAL CONNECTORS

The disconnection of two electrical connectors must be carried out by proceeding as follows:

- ◆ Press the appropriate safety couplings, if provided.

⚠ CAUTION

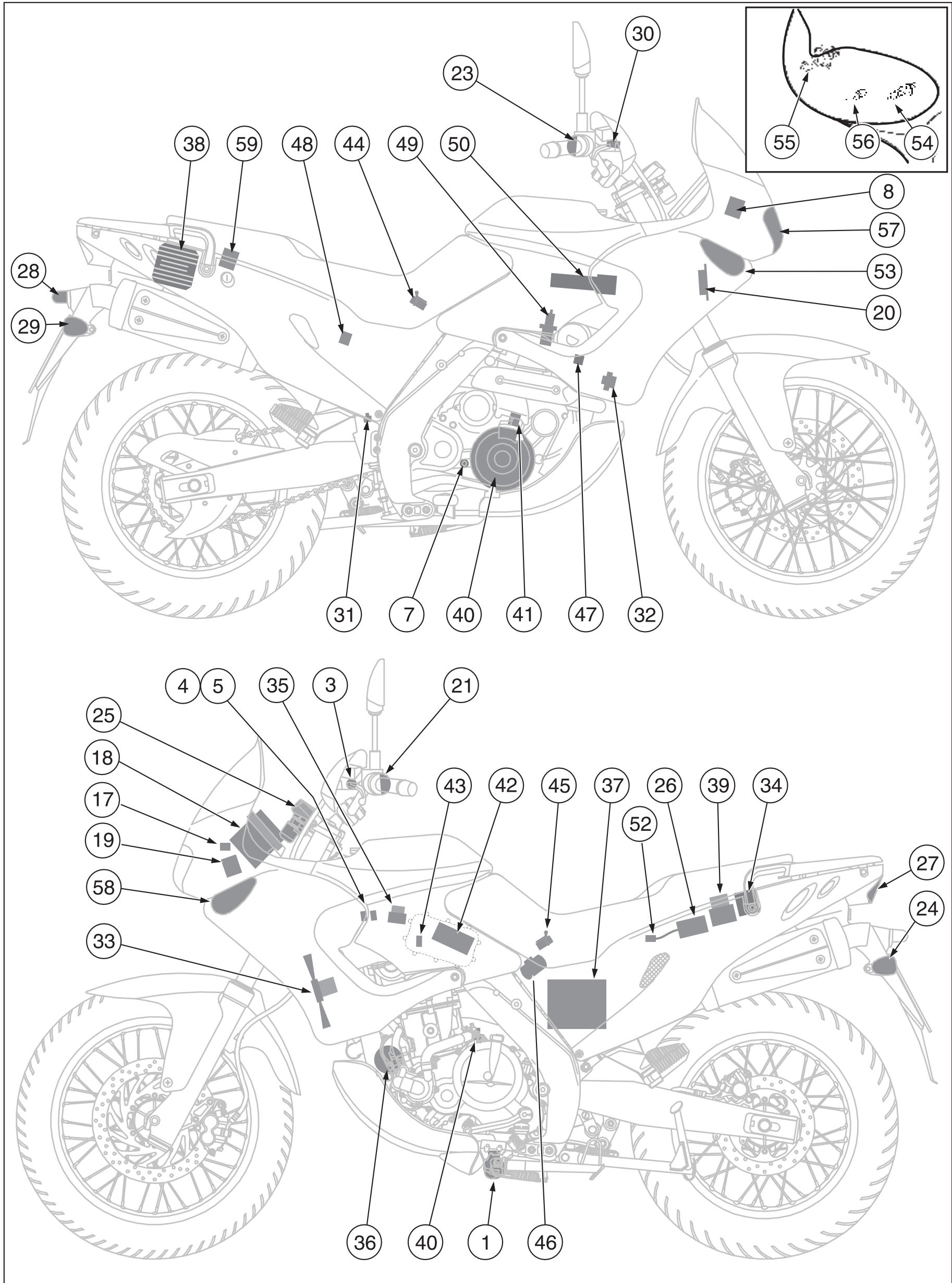
Do not pull the cables to disconnect the two connectors.

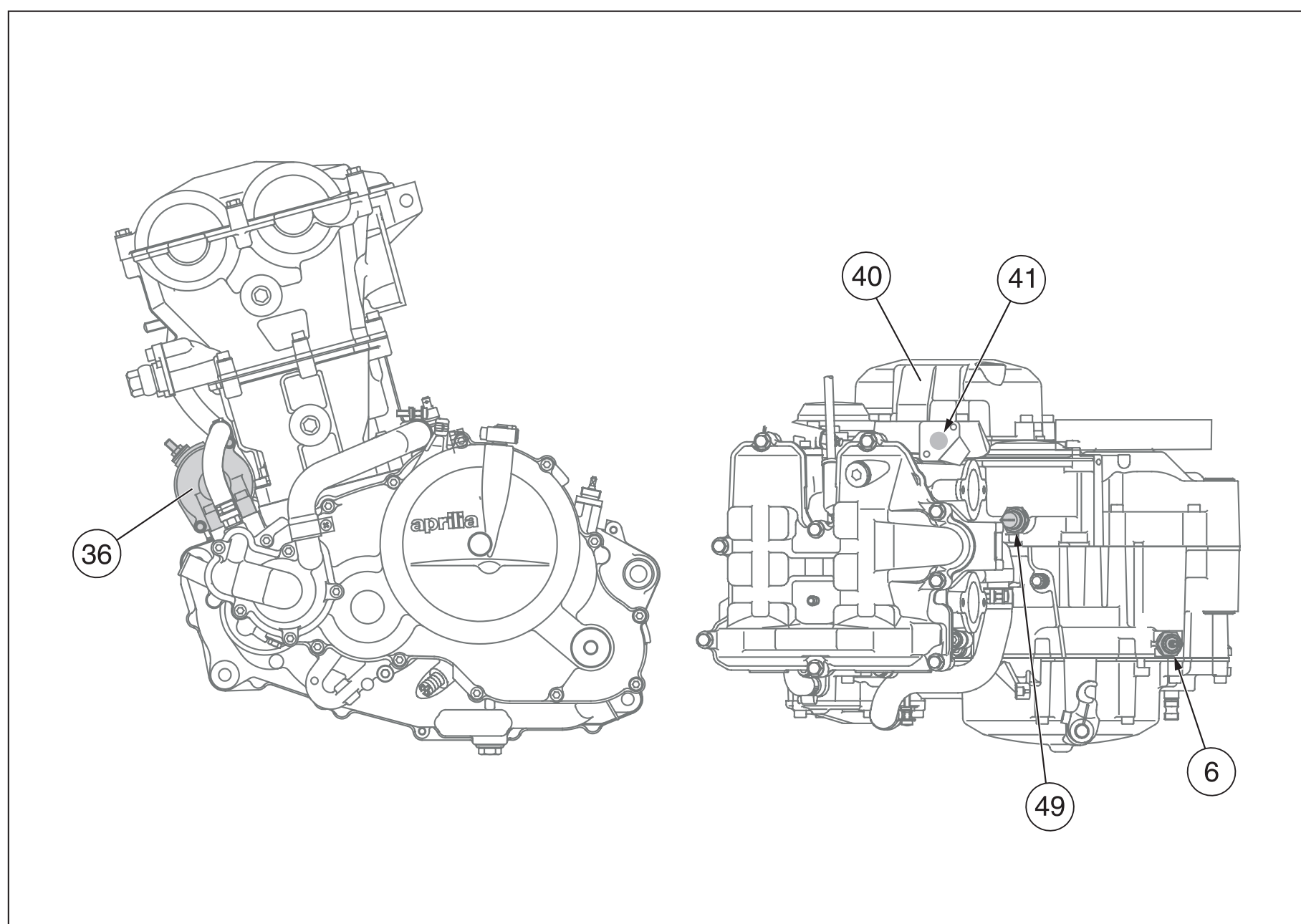
- ◆ Grasp the two connectors and disconnect them by pulling in opposite directions.
- ◆ If dirt, rust, dampness, etc. can be noticed, carefully clean the inside of the connector by means of a pressurized air jet.
- ◆ Make sure that the cables are correctly crimped to the terminals positioned inside the connectors.

NOTE The two connectors have one insertion direction only, therefore it is important to couple them in the correct direction.

- ◆ Insert the two connectors, making sure that the coupling direction is correct (if the appropriate safety couplings are provided, the typical "click" sound will be heard).

6.2 ELECTRIC COMPONENTS LAYOUT





Key

NOTE The numbering corresponds to that on the general wiring diagram.

- | | |
|---------------------------------------|-------------------------------------|
| 1) Side stand switch | 34) Injection relay |
| 2) Multiple connectors | 35) Start relay |
| 3) Clutch control lever switch | 36) Starter |
| 4) Diode 1 | 37) Battery |
| 5) Diode 2 | 38) Voltage regulator |
| 6) Engine oil pressure switch | 39) Fuses |
| 7) Neutral gear switch | 40) Generator |
| 8) Light relay | 41) Pick up |
| 17) Dashboard resistance | 42) Fuel pump |
| 18) Dashboard | 43) Low fuel sensor |
| 19) Blinking | 44) Injector 2 |
| 20) Horn | 45) Injector 1 |
| 21) Left dimmer switch | 46) Throttle valve position sensor |
| 22) Ignition switch | 47) Coolant temperature thermistor |
| 23) Right dimmer switch | 48) Air thermistor |
| 24) Rear left direction indicator | 49) Spark plug |
| 26) Electronic unit | 50) Coil |
| 27) Rear light | 52) Diagnostic connection |
| 28) Number plate bulb | 53) Front right direction indicator |
| 29) Rear right direction indicator | 54) High beam bulbs |
| 30) Front stoplight switch | 55) Low beam bulb/high beam |
| 31) Rear stoplight switch | 56) Front parking light bulb |
| 32) Thermal switch cooling electrofan | 57) Headlight |
| 33) Cooling electrofan | 58) Front left direction indicator |
| | 59) Fall sensor |

6.3 CHECKING THE RECHARGING SYSTEM

CABLE COLOURS

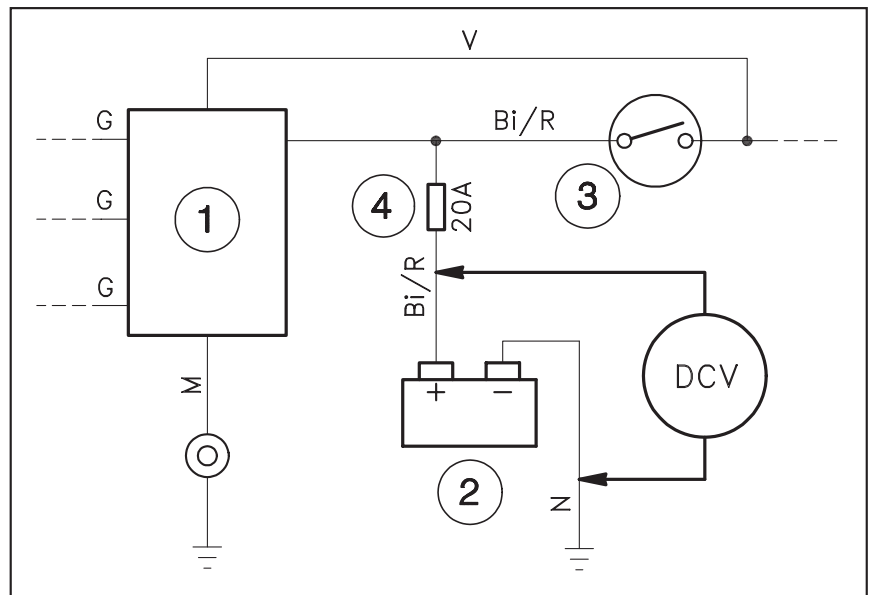
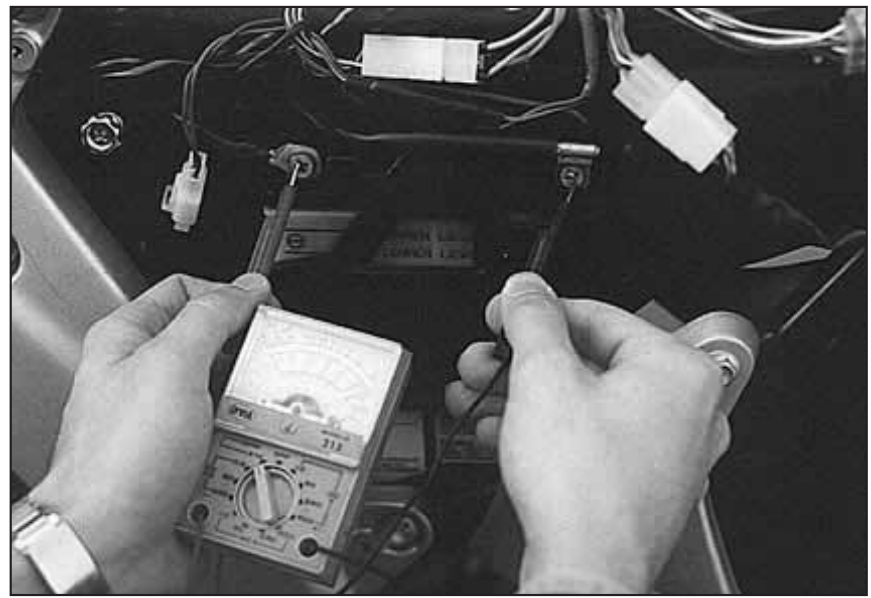
- Ar** Orange
- Az** Light blue
- B** Blue
- Bi** White
- G** Yellow
- Gr** Grey
- M** Brown
- N** Black
- R** Red
- Ro** Pink
- V** Green
- Vi** Violet

6.3.1 CHECKING THE RECHARGING VOLTAGE

- ◆ Check the electrolyte level, see 2.3.1 (CHECKING THE ELECTROLYTE LEVEL).
- ◆ Check battery voltage, see 2.3.3 (RECHARGING THE BATTERY).
- ◆ Start the engine and let it run until it reaches 5000 rpm.
- ◆ Set the light switch to “☉” and dimmer switch to “☐”.
- ◆ Using a pocket tester, measure the direct voltage between the positive (+) and negative (-) terminals.

If the tester indicates voltage values lower than 13V or higher than 15V:

- ◆ Check the loadless operation and the continuity of the alternator, see 6.3.2 (CHECKING THE ALTERNATOR LOADLESS OPERATION) and 6.3.3 (CHECKING THE ALTERNATOR CONTINUITY).
- ◆ Also check the voltage regulator, see 6.3.4 (CHECKING THE VOLTAGE REGULATOR).



Second figure key

- 1) Voltage regulator
- 2) Battery
- 3) Ignition switch (☉ - ☒ - ☐)
- 4) 20A fuse

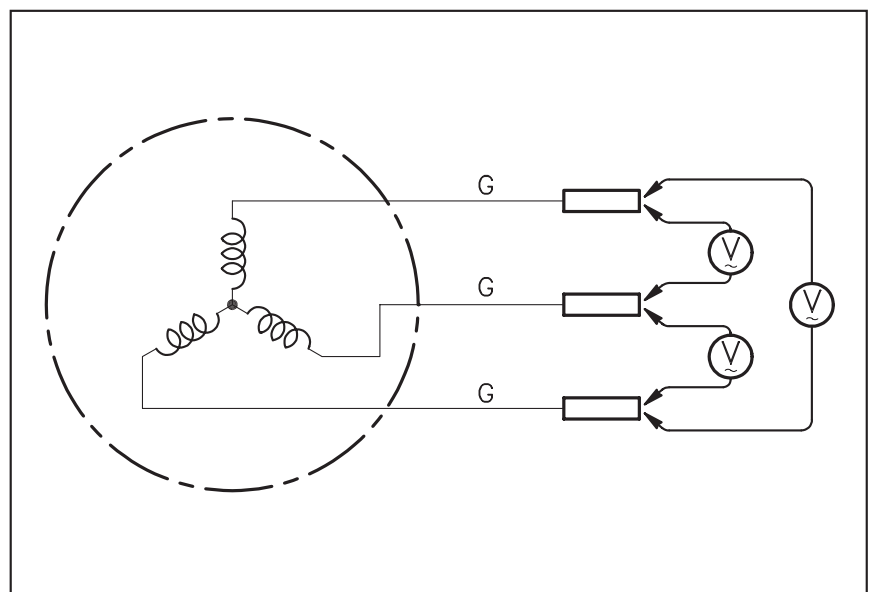
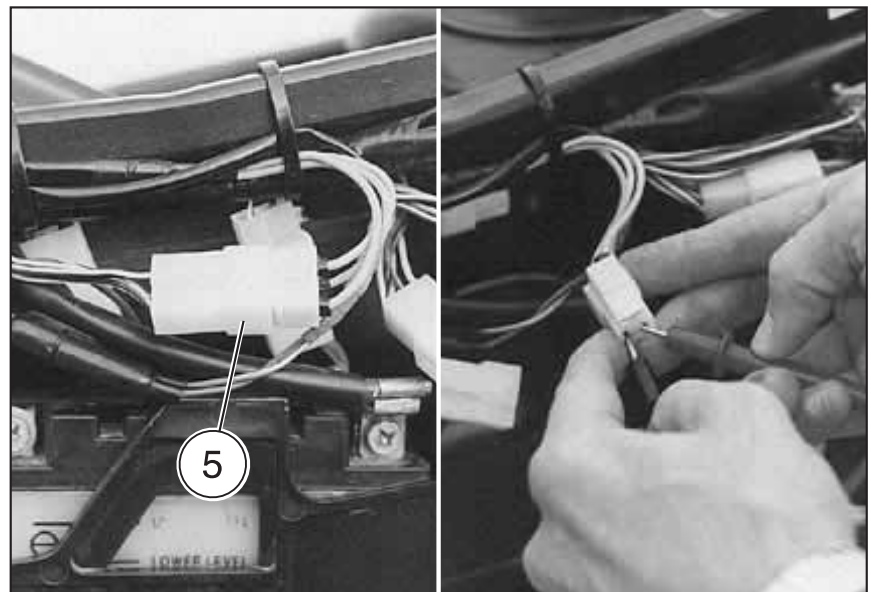
Standard charging voltage:
13 ÷ 15 V (c.c.) at 5000 rpm.

6.3.2 CHECKING THE ALTERNATOR LOADLESS OPERATION

- ◆ Remove the left cover, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).
- ◆ Disconnect the alternator cable connector (5).
- ◆ Start the engine and let it run until it reaches 5000 rpm.
- ◆ Using a pocket tester, measure the voltage (alternating current a.c.) from the three internal male terminals [yellow cables (G)] in rotation.

If the value indicated by the tester is lower than 70 V, the alternator is faulty.

Standard loadless voltage:
more than 70 V (a.c.) at 5000 rpm.



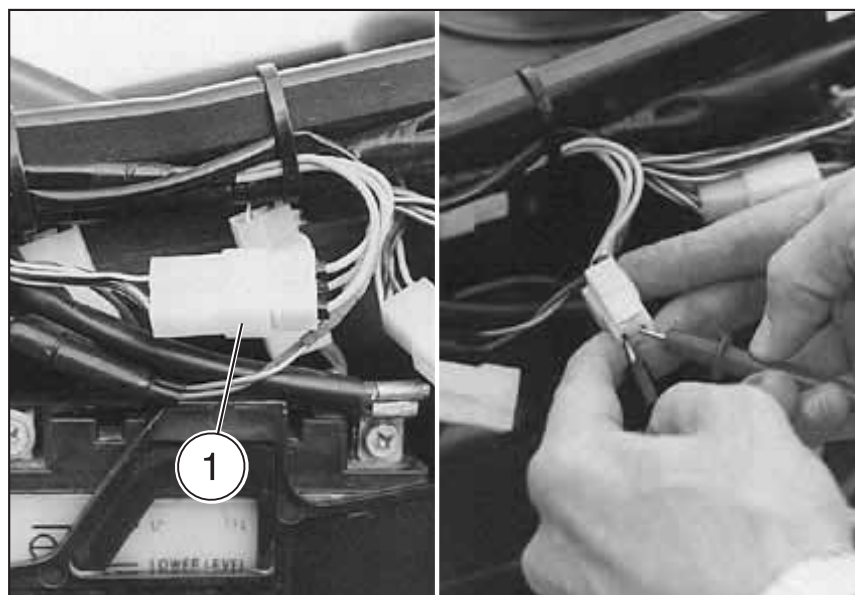
6.3.3 CHECKING THE ALTERNATOR CONTINUITY

With the engine switched off:

- ◆ Remove the left cover, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).
- ◆ Disconnect the alternator cables connector (1).
- ◆ Using a pocket tester, check for breaks between the cables of the stator [on the internal female terminals, yellow cables (G)].
Also check the isolation of the stator mount.

Standard resistance value: 0.1 – 1Ω

Standard resistance value (between cables and stator mount): ∞ (infinity).



6.3.4 CHECKING THE VOLTAGE REGULATOR

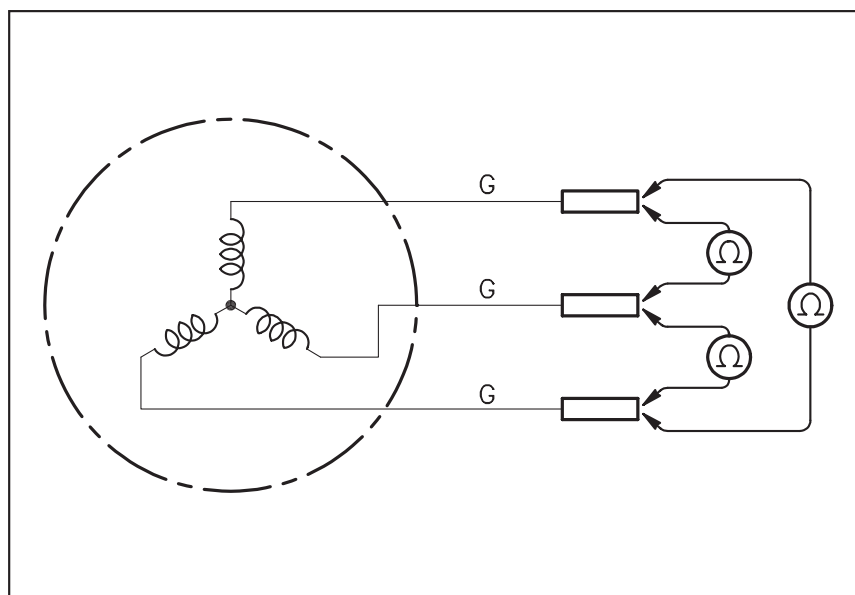
- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Disconnect the connectors (2) (3).
- ◆ Unscrew and remove the screw (4) and disconnect the terminal of the cable (5) and of the cable (6) (earth cables).

⚠ CAUTION

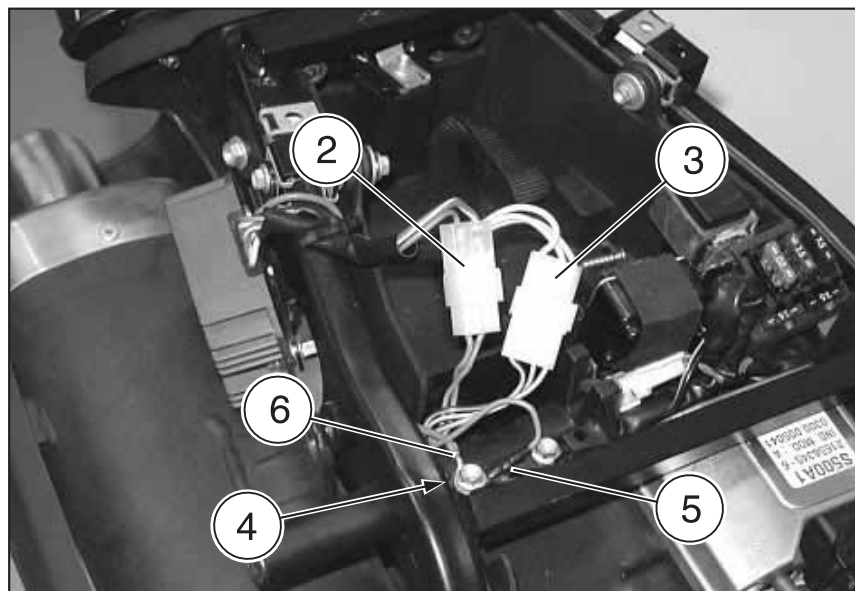
Upon reassembly, reconnect the cables (5) and (6).

- ◆ Using a pocket tester (scale x 1KΩ), measure the resistance between the cables indicated in the table below from the regulator side (internal male terminals).

If the resistance measured is incorrect, replace the regulator.

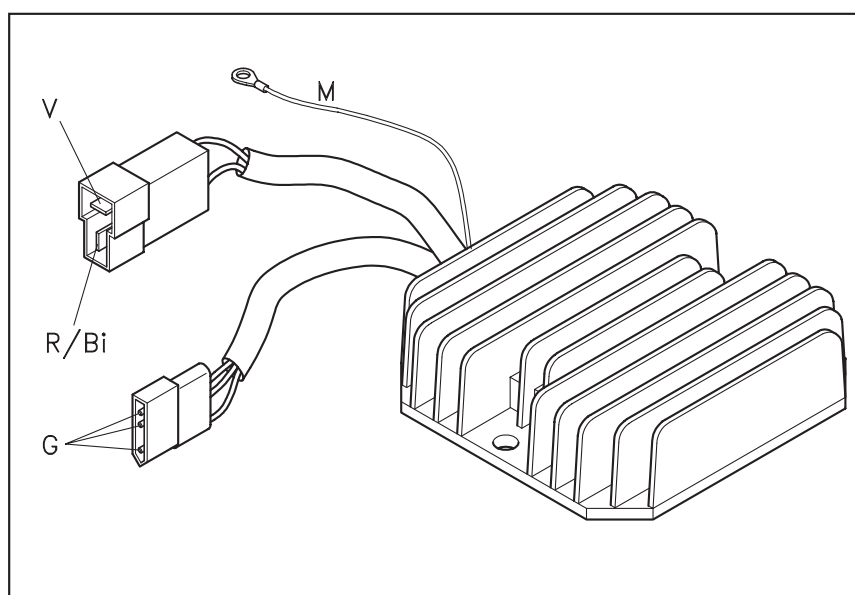


		Positive terminal (+) of the tester on:						
		G	G	G	V	R/Bi	M	
Negative terminal (-) of the tester on:	G		∞	∞	1 – ∞	∞	1 – ∞	
	G	∞		∞	1 – ∞	∞	1 – ∞	
	G	∞	∞		1 – ∞	∞	1 – ∞	
	V	∞	∞	∞		∞	1 – ∞	
	R/Bi	1 – ∞	1 – ∞	1 – ∞	2 – ∞		2 – ∞	
	M	∞	∞	∞	1 – ∞	1 – ∞		



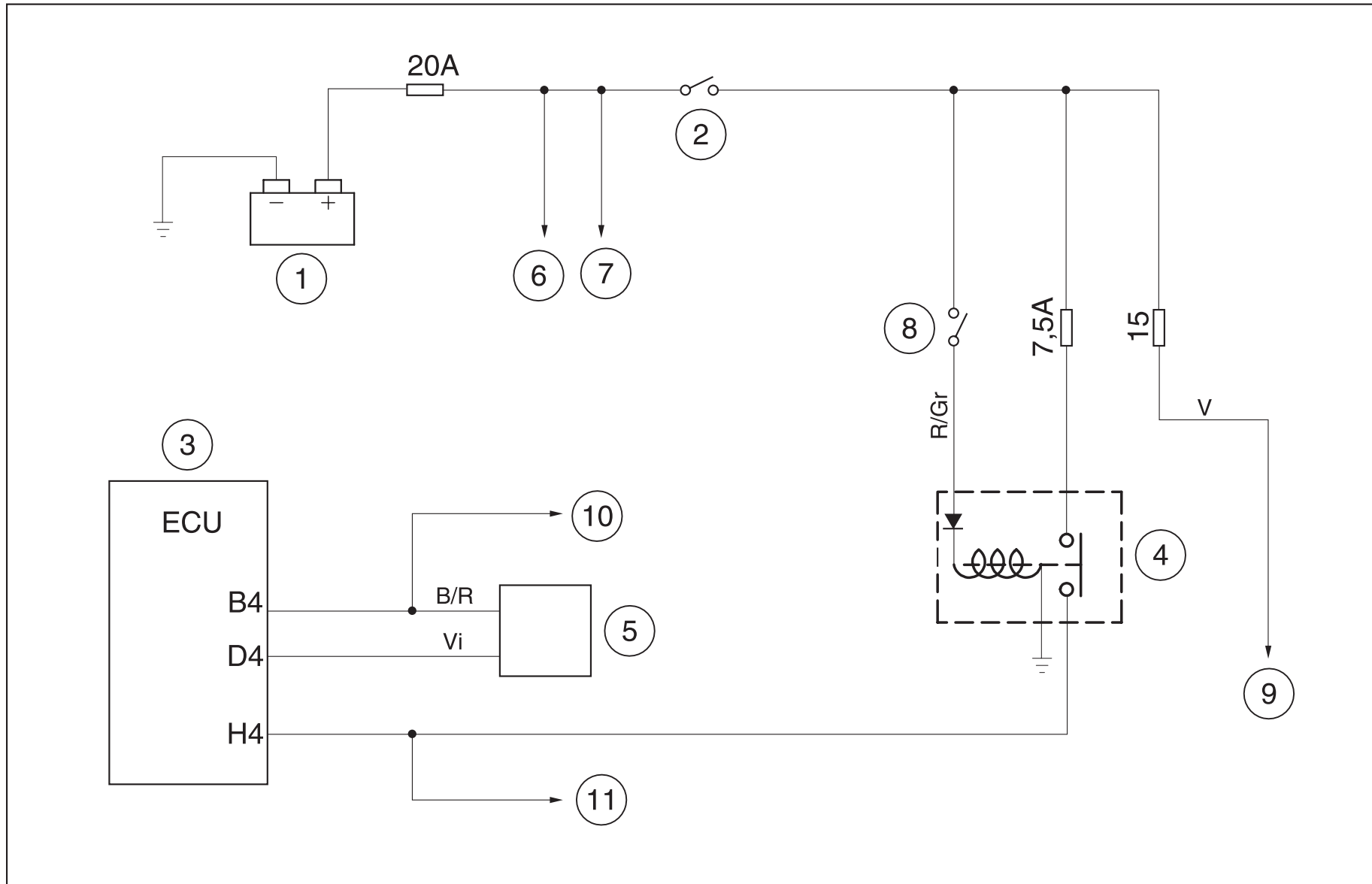
⚠ CAUTION

This measuring method is approximate; if possible, check the correct operation of the recharging system using another regulator in perfect condition.



6.4 INJECTION SYSTEM

6.4.1 INJECTION POWER SUPPLY DIAGRAM



Key

- | | |
|-------------------------|--|
| 1) Battery | 7) To the cooling fans |
| 2) Ignition key | 8) Kill switch |
| 3) Unit | 9) Light loads |
| 4) Injection relay | 10) To the water temperature thermistor, the air temperature thermistor, the accelerator sensor. |
| 5) Fall sensor | 11) Fuel pump, injectors, coil power supply. |
| 6) To voltage regulator | |

6.4.2 TROUBLESHOOTING

- ◆ Make sure that the 20 A main fuse and the 7.5 A fuse are in good condition.
- ◆ Verify the correct operation of the Kill switch device, see 6.7 (IGNITION SAFETY SYSTEM) and of the key, see 6.5 (IGNITION/INJECTION SYSTEM).
- ◆ Check the injection relay, see 6.4.3 (CHECKING THE INJECTION RELAY).
- ◆ Check the fall sensor, see 6.4.4 (CHECKING THE FALL SENSOR).

6.4.3 CHECKING THE INJECTION RELAY

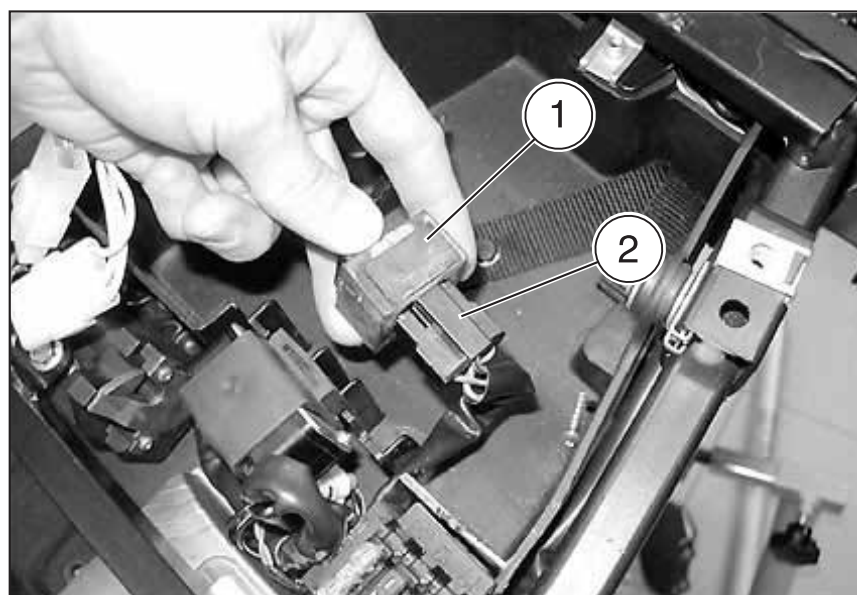
In order to check the operation of the relay:

- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Remove the injection relay (1) from its seat.
- ◆ Disconnect the connector (2).
- ◆ Power the two internal male terminals (85) (86) at 12 V.
- ◆ Using a tester (set as an ohmmeter), check for breaks between the other two terminals (87) (30).

Correct value with relay powered: 0 Ω

Correct value with relay not powered: ∞ Ω

If the values do not correspond to those indicated, change the relevant relay.



⚠ CAUTION

Respect the polarity, supplying power with the "+" pole to the terminal (86) and with the "-" pole to the terminal (85), inside there is a diode.

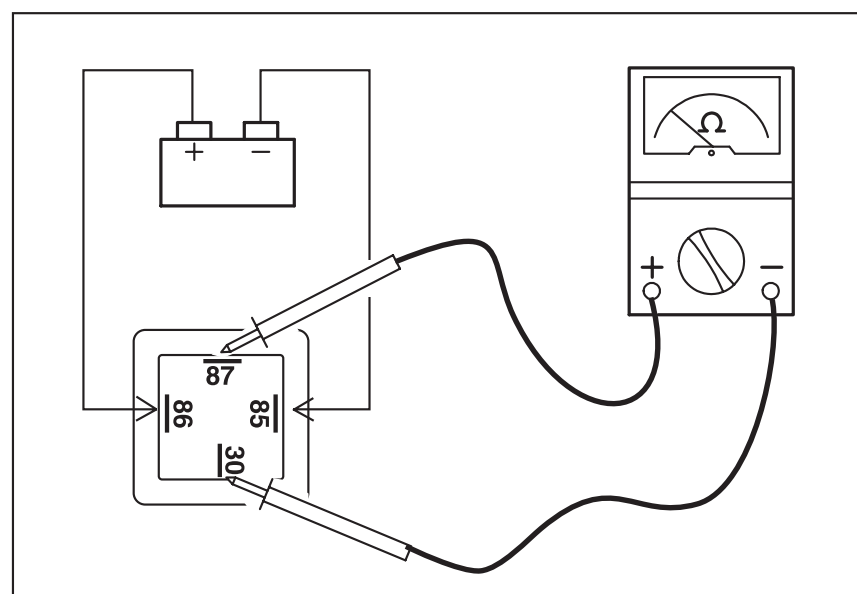
6.4.4 CHECKING THE FALL SENSOR

With the engine switched off:

- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).

Check whether the sensor (3) is fitted correctly (with the arrow inscribed on the rubber element pointing up).

- ◆ Disconnect the two-way connector (4) (coloured white/grey) and take the measurements (on the sensor-side terminals).



⚠ CAUTION

Upon reassembly, make sure that the electric connector (4) is correctly coupled.

- ◆ Using a pocket tester (scale x 100 kΩ), measure the resistance between the terminals of the black and white/black (N - Bi/N) cables.

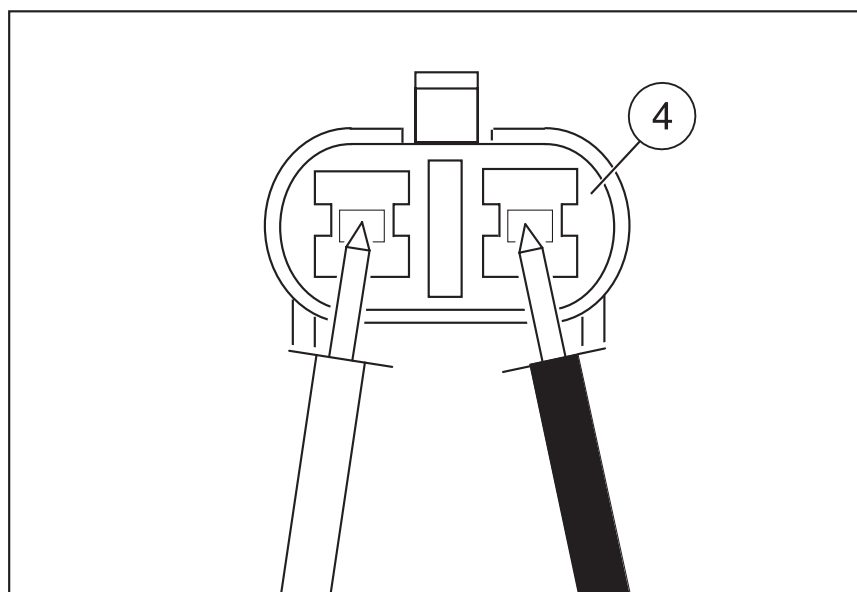
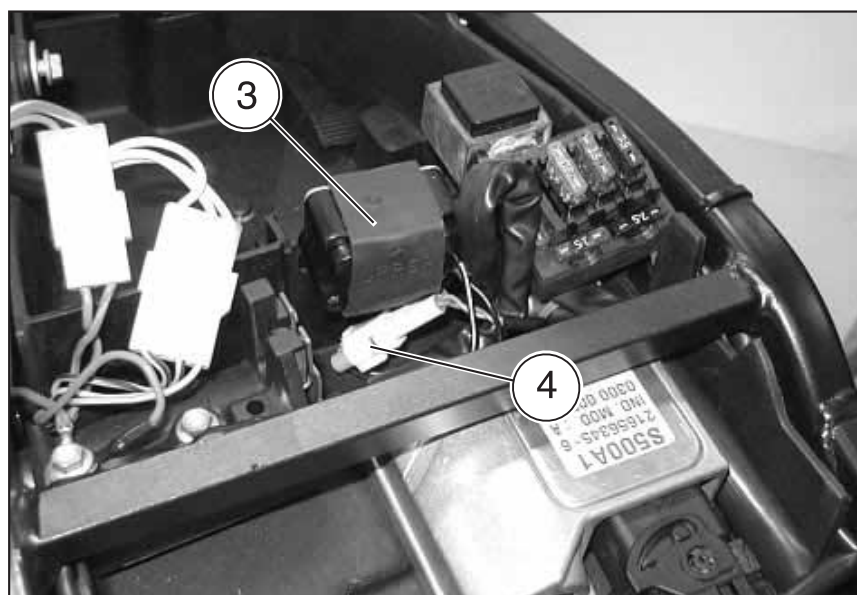
Standard value: resistance 62 kΩ ± 15 %.

- ◆ Remove the sensor (3) complete with rubber element from its housing and tilt it sideways at an angle of over 45° (simulating the condition of a vehicle resting on the ground).

Standard value: 0 – 1 Ω.

If the resistance is any value other than that prescribed, the sensor (4) must be changed.

- ◆ Repeat the procedure, tilting the sensor in the opposite direction.

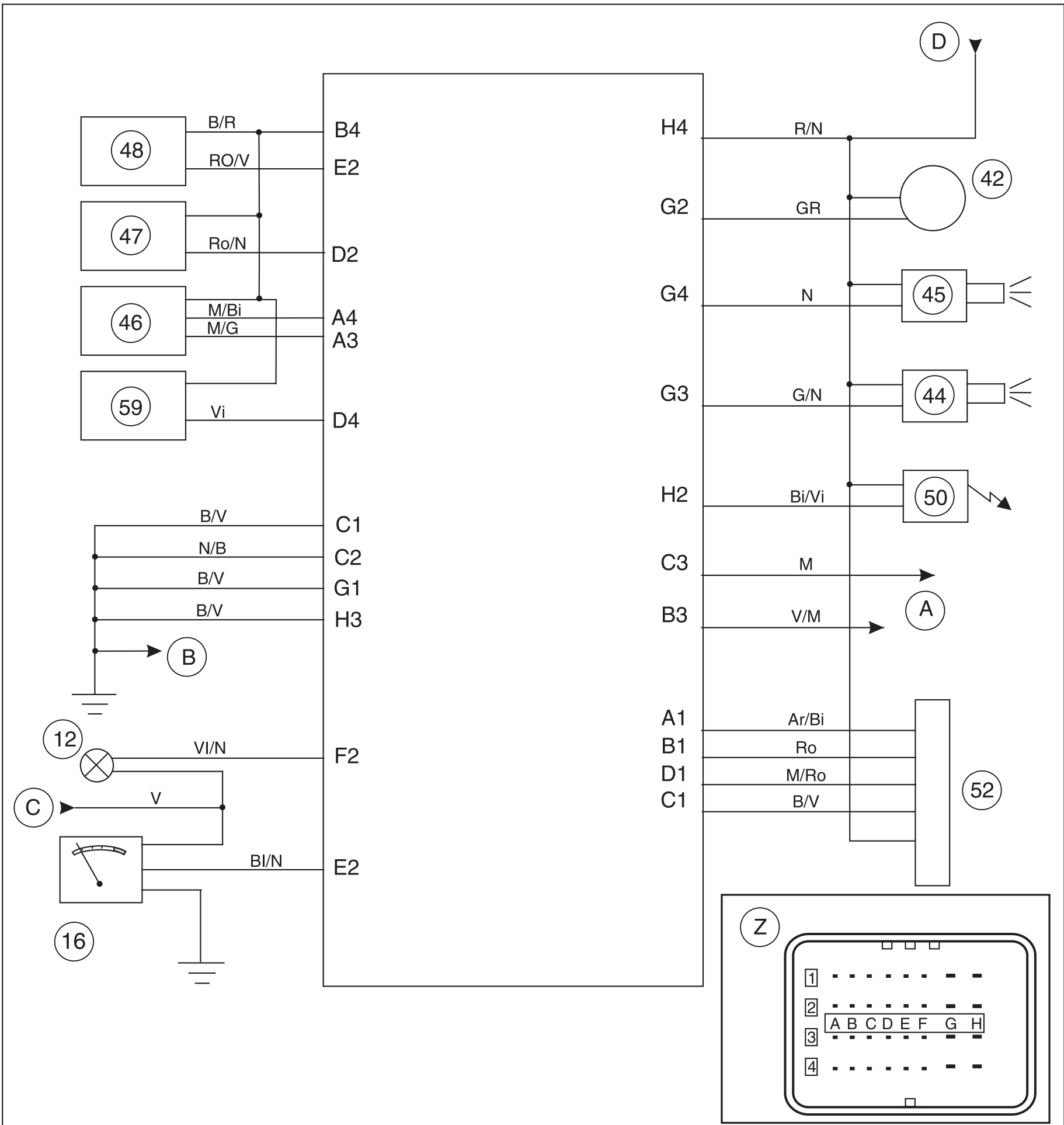


6.5 IGNITION/INJECTION SYSTEM

6.5.1 CONNECTIONS TO THE ENGINE CONTROL UNIT

NOTE See 6.2 (ELECTRIC COMPONENTS LAYOUT) for the positioning of the components.

For further information, see 4.8.4 (ELECTRONIC UNIT CONNECTOR).



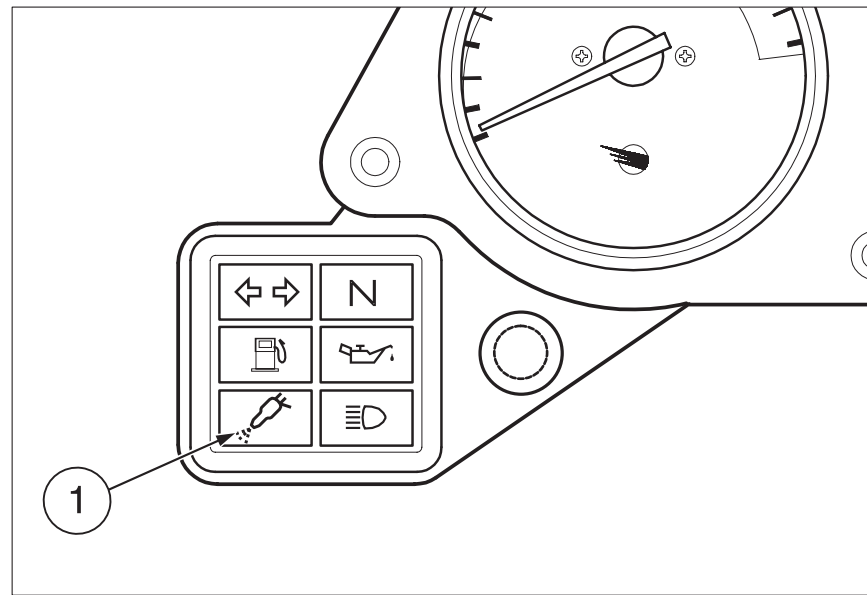
- Z) Electronic unit connector (32-way)
- B) Pick-up shielding
- C) To the ignition switch
- D) Injection relay

Position	Component	Terminal	Nominal value	Cable colours
12	Injection warning light	F2	/	Vi / N
16	Coolant temperature indicator	E2	/	Bi / N
42	Fuel pump	G2 H4	/	Gr R / N
44	Injector 2	G3 H4	11 – 17 Ω	G / N R / N
45	Injector 1	G4 H4	11 – 17 Ω	N R / N
46	Accelerator sensor	A4 A3 B4	2.8 – 3.4 K Ω (Angle variable)	M / Bi M / G B / R
47	Water thermistor	D2 B4	1.9 – 2.9 K Ω	Ro / N B / R
48	Air thermistor	E2 B4	1.9 – 2.9 K Ω	Ro / V B / R
50	Coil	H2 H4	4 – 5 Ω	Bi / Vi R / N
52	Diagnostic connector	A1 B1 D1 C1 H4	/	Ar / Bi Ro M / Ro B / V R / N
A	Starting safety logic	C3 B3	/	M V / M

6.5.2 TROUBLESHOOTING

- ◆ Position the vehicle on the stand.
- ◆ Turn the ignition switch to position "O".

The diagnostic warning light "⚡" (1) comes on.



⚠ CAUTION
 Do not carry out any operation on the components of the vehicle with the ignition switch in position "O".
 With the engine stop switch in position "⊗", it comes on whenever the ignition switch is brought to position "O" and remains on, with low light intensity, thus testing the correct operation of the injection circuit.

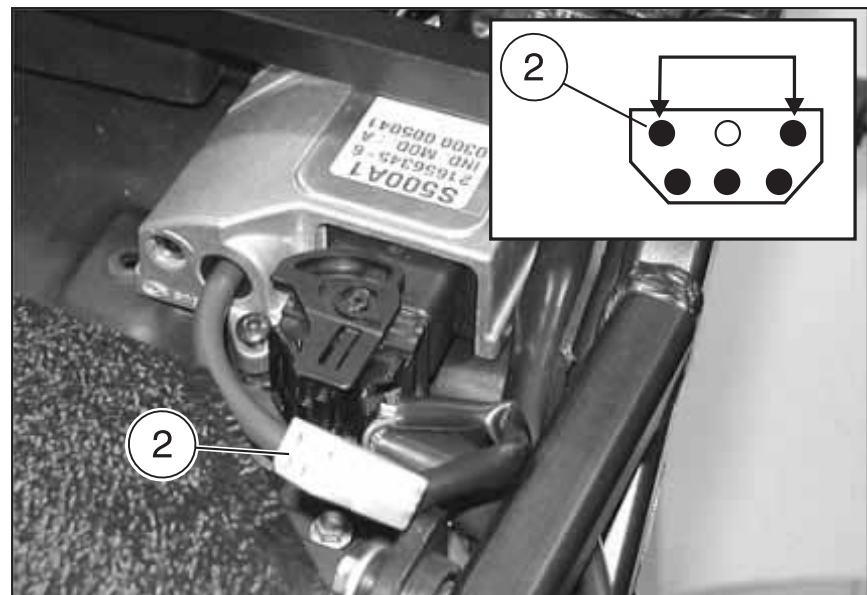
- ◆ Start the engine.
- If the diagnostic warning light "⚡" (1) goes out a few seconds after the engine start, this means that the central unit has not detected any anomaly.
 If the diagnostic warning light "⚡" remains on after the engine start or comes on during the normal operation of the engine, this means that the electronic unit has detected an anomaly.

6.5.3 FAILURE CODE VERIFICATION

- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).

⚠ CAUTION
 Do not start the engine.

- ◆ Put the gearshift into neutral.
- ◆ Turn the ignition switch to position "O".
- ◆ Turn the engine stop switch to position "O".
- ◆ Short-circuit the two contacts of the central unit electric connector (2) (see figure) for twelve seconds, in order to activate the "workshop mode".



NOTE The "workshop mode" interrupts the operation of the injection system, the coil and the fuel pump for safety reasons.

At this point:

- the diagnostic warning light (1) positioned on the dashboard will blink for five seconds, confirming in this way that the "workshop mode" has been successfully activated.

NOTE Each failure code consists of 2 digits.

The failure codes correspond to the blinking of the warning light, according to the following codification:

EXAMPLE: failure code 53 = 5 long blinks + 3 short blinks.

NOTE Between two different failure codes the warning light remains off for 3 seconds.

- ◆ Refer to the following table to verify the correspondence between the failure code and the problem that is being dealt with.

NOTE Short-circuit the two contacts of the central unit electric connector (2) (see figure) for twelve seconds, in order to exit from the "workshop mode".
 The diagnostic warning light (1) positioned on the dashboard will blink for five seconds, confirming in this way that the "workshop mode" has been successfully abandoned.

FAILURE CODE TABLE

Fault code	Warning light on	Blinks		Failure description
		long	short	
11	YES	1	1	barometric pressure sensor circuit
12	YES	1	2	TPS - throttle position sensor
13	YES	1	3	
14	YES	1	4	
15	YES	1	5	engine temperature sensor
16	YES	1	6	intake air temperature sensor
17	YES	1	7	
21	YES	2	1	
22	YES	2	2	pick-up sensor circuit
23	YES	2	3	sensor power supply circuit, live
24	YES	2	4	battery voltage too low
25	YES	2	5	battery voltage too high
31	YES	3	1	injector 1 circuit
32	YES	3	2	
33	YES	3	3	
34	YES	3	4	injector 2 circuit
35	YES	3	5	
36	YES	3	6	
41	YES	4	1	
42	YES	4	2	coil
43	YES	4	3	
51	YES	5	1	
52	YES	5	2	fuel pump relay
53	YES	5	3	
54	NO	5	4	
55	NO	5	5	coolant temperature indicator
61	YES	6	1	injection relay
62	YES	6	2	
63	YES	6	3	
64	NO	6	4	CALIFORNIA ONLY
65	NO	6	5	
66	NO	6	6	
75	YES	7	5	
76	YES	7	6	CO potentiometer
77	YES	7	7	
79	YES	7	9	

6.5.4 ELIMINATING ELECTRONIC SYSTEM FAULTS

⚠ CAUTION

Take care around the high voltage in the ignition system.

Never disconnect connections with the engine running.

Whenever work is performed in the ignition system, always make sure the ignition switch is set to "⊗" and the battery disconnected, unless otherwise indicated (when disconnecting the battery, disconnect the negative pole "-" first).

⚠ CAUTION

All measurements must be taken with the components at a temperature of 20 °C (68 °F). General instructions regarding the elimination of faults: as soon as the fault has been located, remove the defective component.

Perform the checks indicated in the following chapters:

- 6.5.10 (CHECKING THE PICK-UP);
- 6.5.6 (CHECKING THE THROTTLE VALVE POTENTIOMETER);
- 6.5.8 (CHECKING THE COOLANT THERMISTOR OPERATION).

If the engine does not start and the diagnostics fail to detect any fault, check (in the given order) whether:

- the fuel pump is working properly, see 6.6.1 (CHECKING THE FUEL PUMP);
- the injectors are working properly, see 6.5.5 (CHECKING THE INJECTORS);
- the ignition switch is working properly, see 6.8 (SWITCHES);
- the engine shutoff switch is working properly, see 6.8 (SWITCHES);
- the main 20 A fuses and secondary 15 A and 7.5 A fuses have blown, see 6.18 (CHANGING THE FUSES);
- the battery is working properly, see 2.3 (BATTERY) and 6.15 (BATTERY);
- the safety logic is working properly, see 6.7 (IGNITION SAFETY SYSTEM);
- the fall sensor is working properly, see 6.4.4 (CHECKING THE FALL SENSOR).
- injection relay efficiency, see 6.4.3 (CHECKING THE INJECTION RELAY).



6.5.5 CHECKING THE INJECTORS

With the engine switched off:

- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).

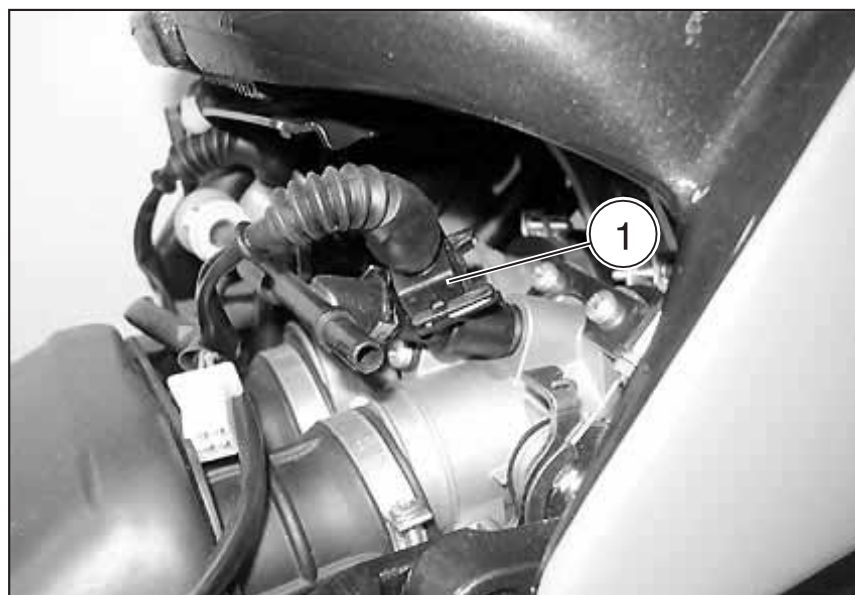
NOTE The following procedure refers to a single injector, though it is applicable to both.

- ◆ Disconnect the two-way connector (1) (coloured black) and take the measurements (on the injector-side terminals).
- ◆ Using a pocket tester (scale 100 Ω), measure the resistance between the terminals of the injector.

Standard value: 11.5 – 13 Ω to 20 °C (68 °F).

If the resistance is infinite (∞) or lower than the prescribed level, the injector (2) must be changed.

- ◆ Repeat the procedure for the other injector.



6.5.6 CHECKING THE THROTTLE VALVE POTENTIOMETER

With the engine switched off:

- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Disconnect the three-way connector (3) (coloured black).

⚠ CAUTION

Upon reassembly, make sure that the electric connector (3) is correctly coupled.

- ◆ Turn the ignition switch to position "⊗".
- ◆ Using a tester (k Ω scale), measure the resistance between the potentiometer terminals (4); measurement (X) (Y).

SIZE (X)

Resistance between the two terminals, "A" (5) and "B" (6), whatever the position of the throttle valves:

Standard value: 1.2 k Ω \pm 10%.

SIZE (Y)

Resistance between the terminals, "A" (5) and "C" (7):

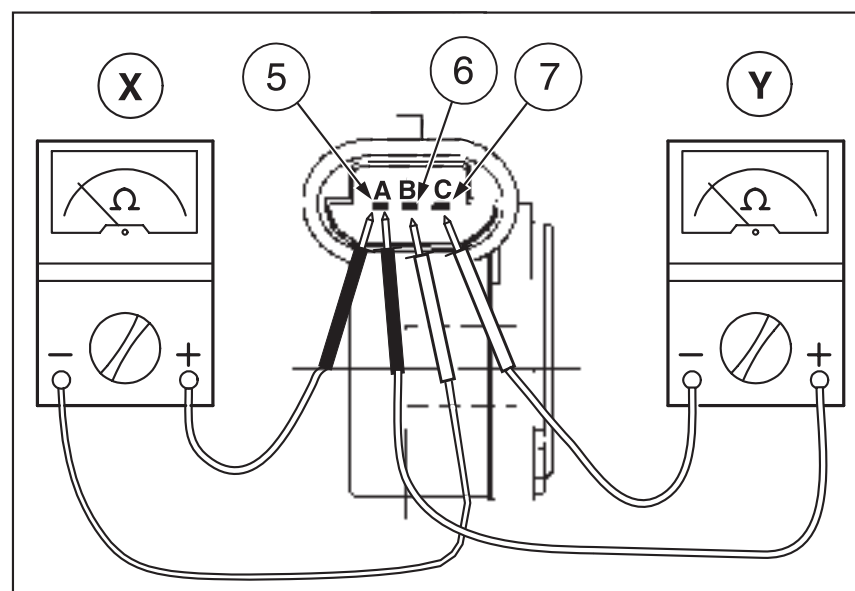
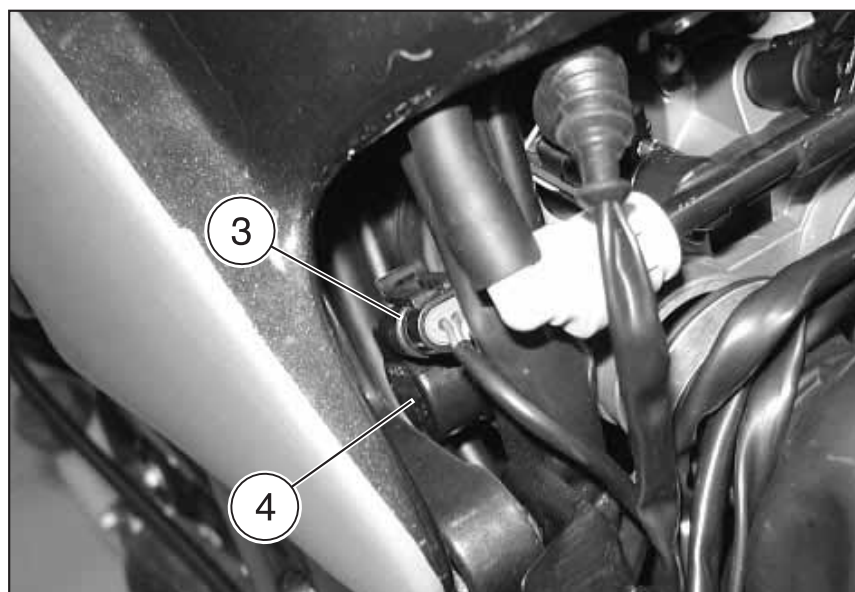
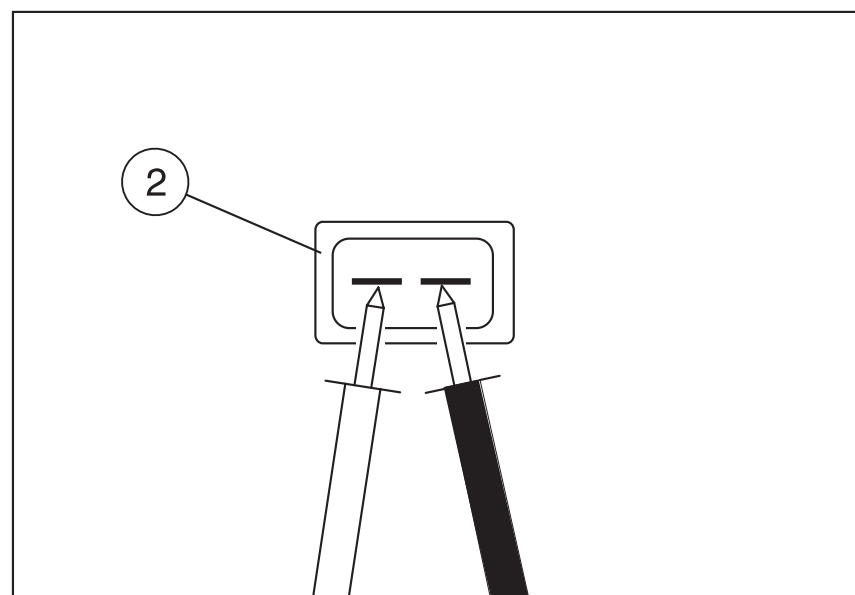
Starting with the throttle valve fully closed, accelerating progressively until completely open, the resistance should vary as follows.

Standard value

- with throttle valves closed 1.2 k Ω \pm 10%;
- with throttle valves open 2.4 k Ω \pm 10%.

NOTE If the measurements result in any resistance values other than those given, replace the potentiometer (4).

NOTE For the reassembly or replacement of the potentiometer (2), see 4.9.9 (CHANGING AND ADJUSTING THE THROTTLE VALVE POTENTIOMETER).



6.5.7 CHECKING THE AIR THERMISTOR OPERATION

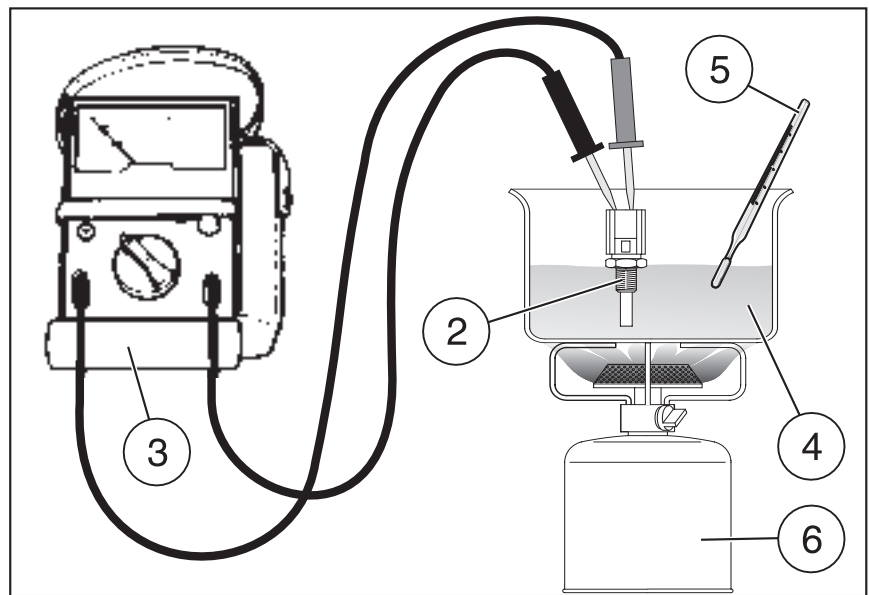
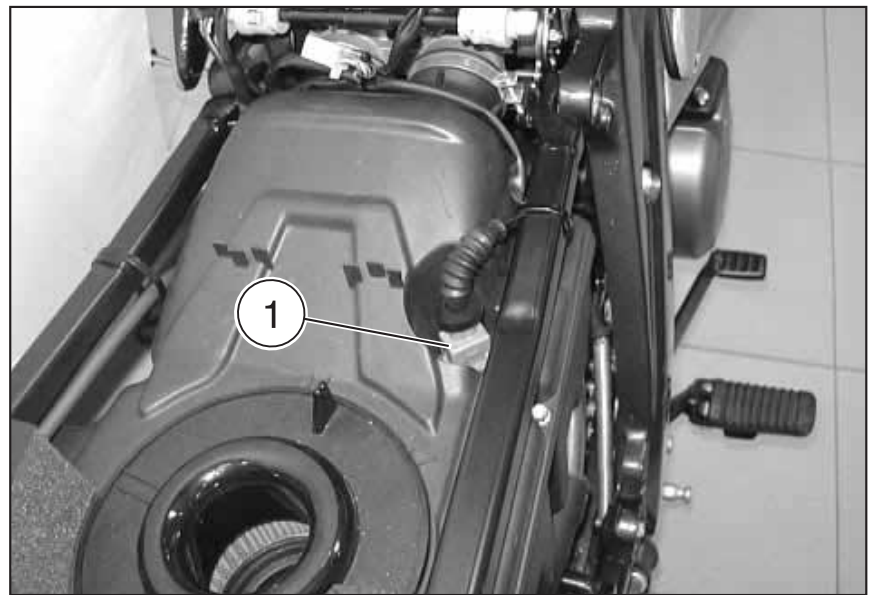
- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Disconnect the two-way connector (1) (coloured green).

⚠ CAUTION

Upon reassembly, make sure that the electric connector (1) is correctly coupled.

- ◆ Unscrew and remove the thermistor (2).
- ◆ Connect a tester (3) (set as an ohmmeter) to the thermistor (2), as illustrated in the figure.
- ◆ Immerse the thermistor in a container (4) holding water.
- ◆ Immerse a thermometer (5) with a 0 to 150 °C (32 to 302 °F) range in the same container.
- ◆ Place the container on a burner (6) and slowly warm up the liquid.
- ◆ Check the temperature indicated on the thermometer (5) and the thermistor value indicated by the tester.

Make sure that the value varies according to the temperature, as indicated.



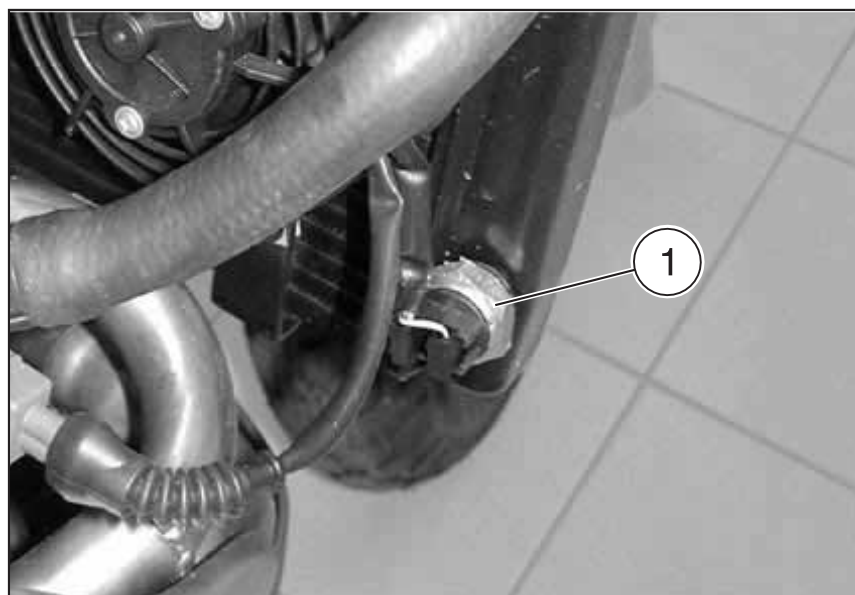
Water temperature		Standard values (Ω) (± 10%)
(°C)	(°F)	
0	32	5457
20	68	2375
40	104	1111
60	140	563.8
80	176	306.4
100	212	176.7

NOTE If when the temperature changes the standard values do not change or differ excessively from those indicated in the table, change the thermistor (2).

6.5.8 CHECKING THE COOLANT THERMISTOR OPERATION

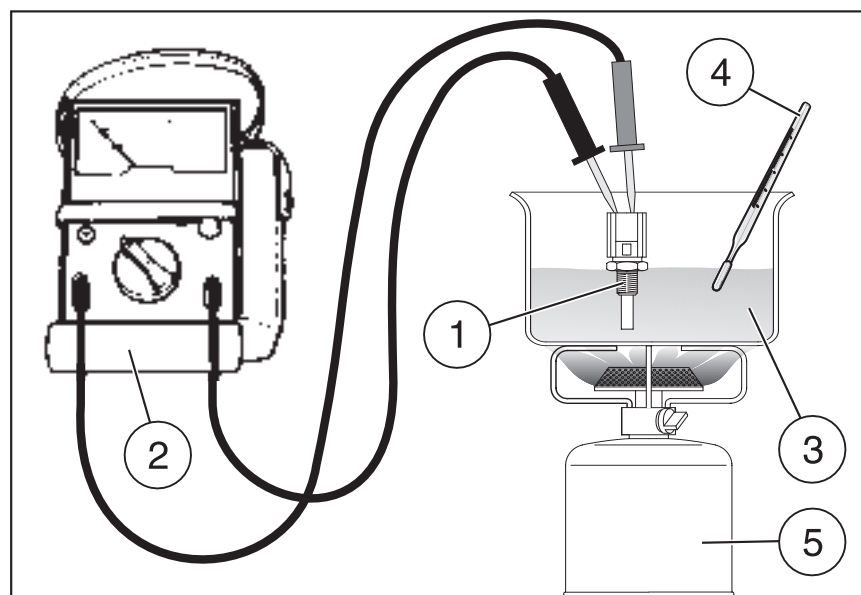
- ◆ Remove the thermistor (1), see 5.5 (REMOVING THE COOLANT THERMISTOR).
- ◆ Connect a tester (2) (set as an ohmmeter) to the thermistor (1), as illustrated in the figure.
- ◆ Immerse the thermistor (1) in a container (3) holding coolant.
- ◆ Immerse a thermometer (4) with a 0 to 150 °C (32 to 302 °F) range in the same container.
- ◆ Place the container on a burner (5) and slowly warm up the liquid.
- ◆ Check the temperature indicated on the thermometer (4) and the thermistor (1) value indicated by the tester.

Make sure that the value varies according to the temperature, as indicated.



Water temperature		Standard values (Ω) ($\pm 10\%$)
(°C)	(°F)	
0	32	5896
20	68	2500
40	104	1175
60	140	595.5
80	176	322.5
100	212	186.6

NOTE If when the temperature changes the standard values do not change or differ excessively from those indicated in the table, change the thermistor (1).



6.5.9 CHECKING THE IGNITION COIL

- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).
- ◆ Disconnect the connector (1) from the ignition coil (2).

CAUTION

Upon reassembly, make sure that the electric connector (1) is correctly coupled.

- ◆ Pull the cable (3) of the coil (2).
- ◆ Measure the values of (A) and (B) indicated in the figure by means of a pocket tester.

It is important to check the continuity of the primary and secondary windings. The reading in Ohms does not necessarily have to be exact but if the windings are sound, the resistance values must correspond approximately to those indicated.

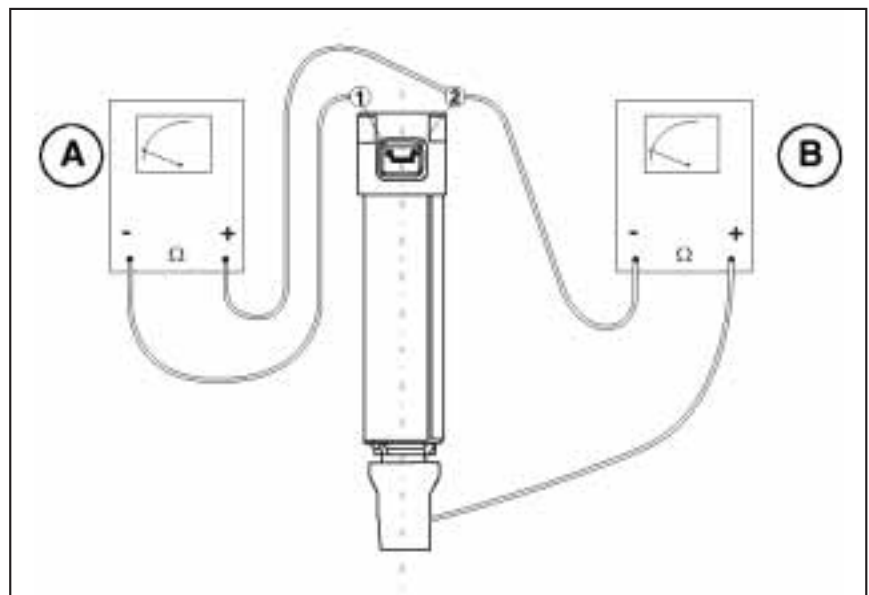
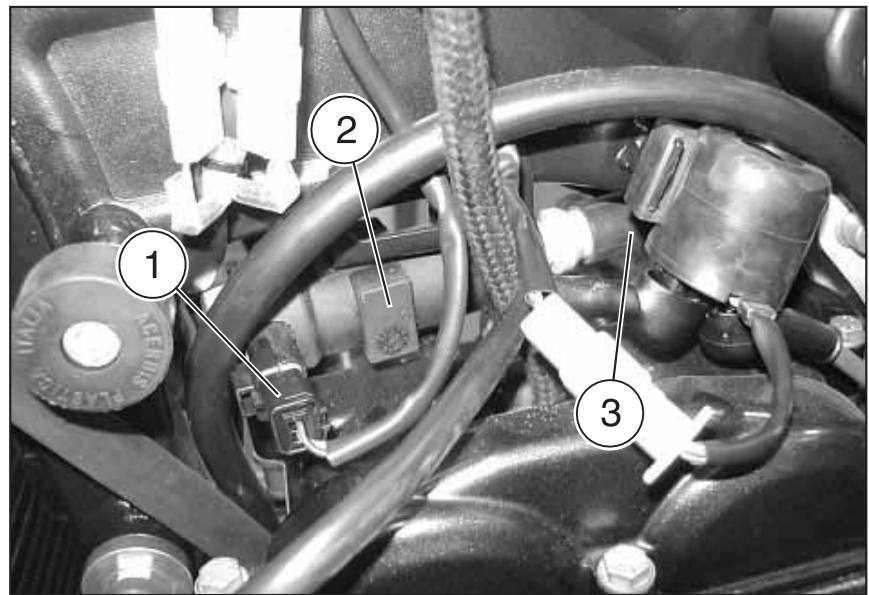
Standard values:

Measurement (A): $0.6 \Omega \pm 10\%$;

Measurement (B): $10 \text{ k}\Omega \pm 10\%$.

CAUTION

This measuring method is approximate; if possible, check the correct operation of the coil by replacing it with another one in perfect condition.



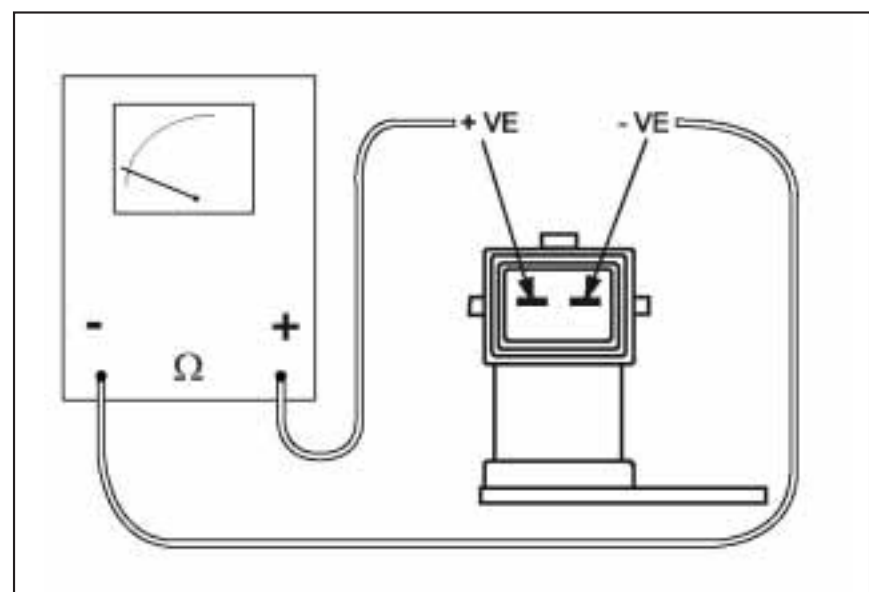
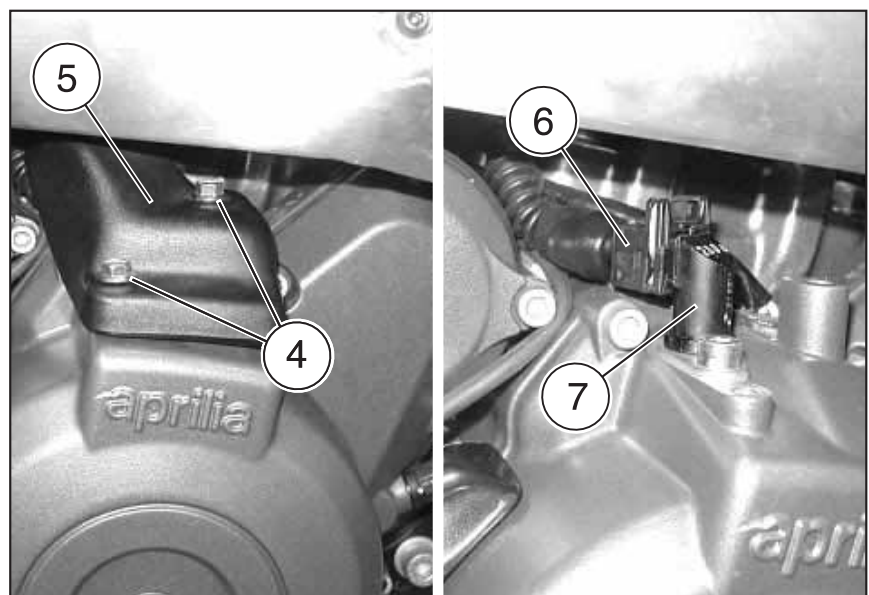
6.5.10 CHECKING THE PICK-UP

With the engine switched off:

- ◆ Unscrew and remove the two screws (4).
- ◆ Remove the protection element (5).
- ◆ Disconnect the two-way connector (6) and carry out the measurements directly on the sensor (7).
- ◆ With a tester (scale x 1000 Ω) measure the resistance between the sensor terminals, respecting the polarity (see figure).

Standard value: $560 \Omega \pm 10\%$.

NOTE If the resistance is infinite (∞) or different from the value prescribed, it is necessary to change the sensor.



6.6 FUEL PUMP SYSTEM

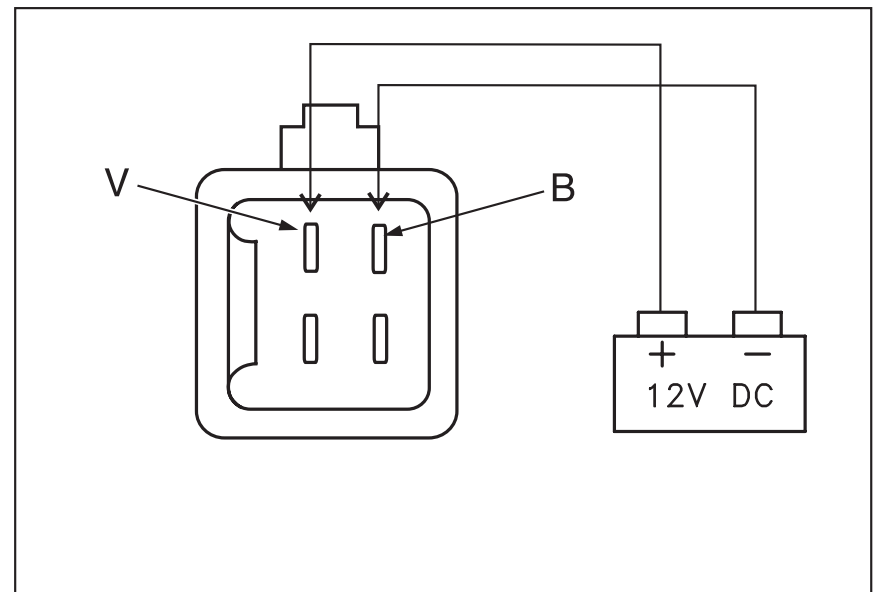
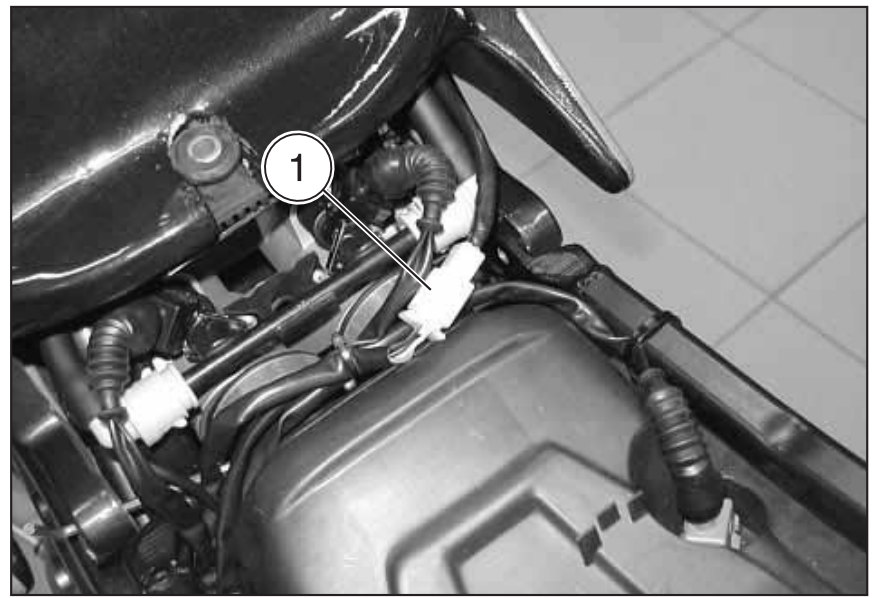
6.6.1 CHECKING THE FUEL PUMP

- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Disconnect the four-way connector (1) positioned near the injectors.

⚠ CAUTION

When reassembling, make sure the connector (1) is plugged in properly.

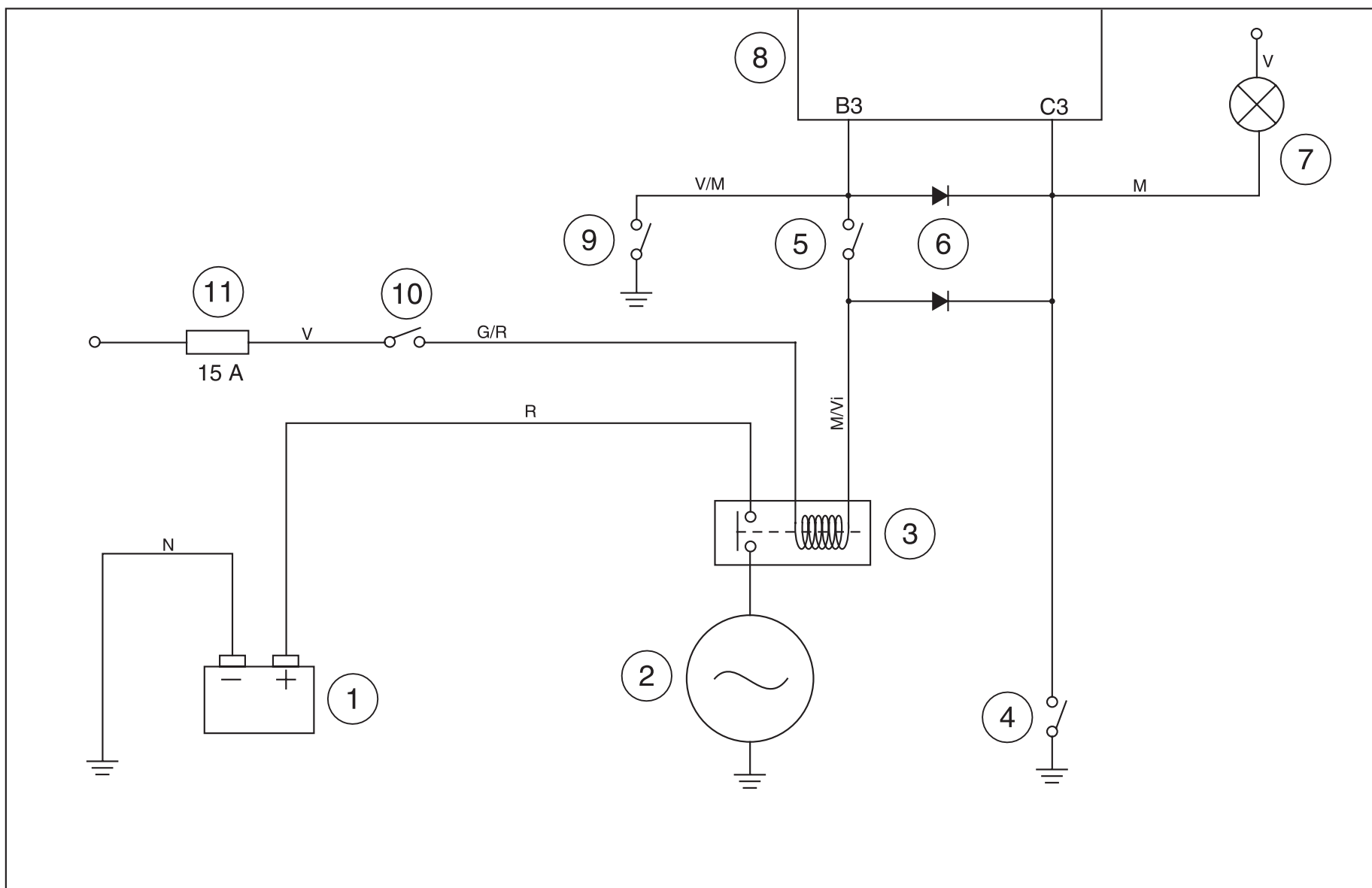
- ◆ Power the positive (+) green (V) and negative (-) blue (B) cables with a voltage of 12 V (d.c.) (from the pump unit side).
- ◆ Make sure the pump is working and produces the characteristic humming sound and check the pressure gauge gives a supply pressure reading of at least 350 kPa (3.5 bar).



6.7 IGNITION SAFETY SYSTEM

6.7.1 WIRING DIAGRAM

NOTE See 6.2 (ELECTRIC COMPONENTS LAYOUT) for the positioning of the components.



Wiring diagram key

- 1) Battery
- 2) Starter
- 3) Start relay
- 4) Neutral gear switch
- 5) Clutch control lever switch
- 6) Diode module
- 7) Neutral warning light (LED)
- 8) Unit
- 9) Stand switch
- 10) Start push button
- 11) Secondary fuses (15 A)

6.7.2 STARTING SAFETY OPERATING LOGIC

NOTE With the engine shutoff switch in position “⊗” the starter motor does not turn over.

GEAR POSITION	STAND POSITION	CLUTCH LEVER	ENGINE IGNITION	STARTER
IN NEUTRAL	UP	PULLED UP	WORKING	TURNING OVER
		RELEASED		
	DOWN	PULLED UP		
		RELEASED		
GEAR ENGAGED	UP	PULLED UP	NOT WORKING	NOT TURNING OVER
		RELEASED		
	DOWN	PULLED UP		
		RELEASED		

6.7.3 CHECKING THE STARTING RELAY

In order to check the operation of the relay:

- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).

⚠ CAUTION

If the rubber element proves damaged, replace it.

- ◆ Disconnect the two-way connector (1) (coloured white).

⚠ CAUTION

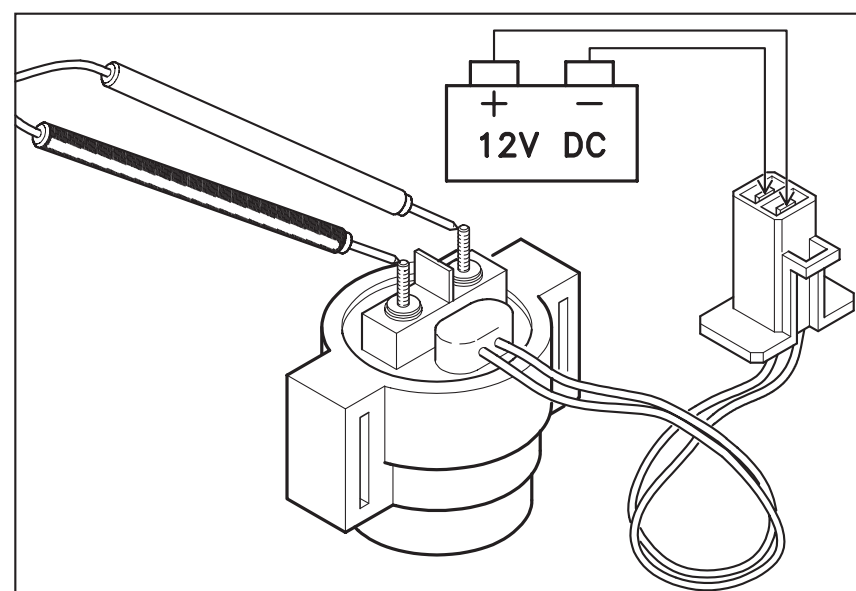
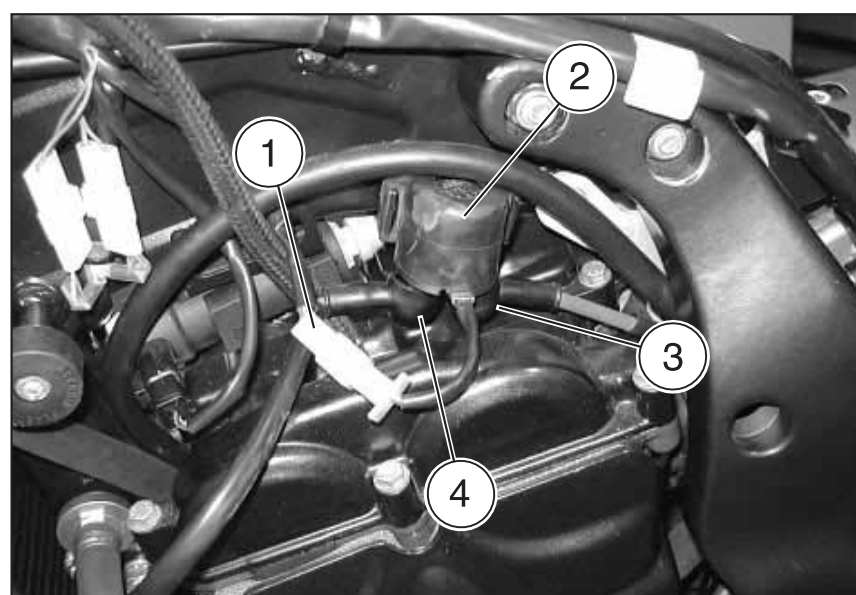
Upon reassembly, make sure that the electric connector (1) is correctly coupled.

- ◆ Withdraw the relay (2) from the appropriate couplings.
- ◆ Slip off the two rubber protections (3) (4).
- ◆ Disconnect the cables from the relevant terminals on the relay (2).
- ◆ From the relay side, power the two internal terminals of connector (1) at 12V.
- ◆ Using a tester (acting as ohmmeter), check the for breaks between the two screw contacts on the relay (2).

Correct value with relay powered: 0 Ω

Correct value with relay not powered: ∞ Ω

If the resulting values do not correspond to those indicated, change the relay (2).



6.7.4 CHECKING THE DIODE OPERATION

- ◆ Remove the fuel tank, see 7.1.1 (REMOVAL OF THE FUEL TANK).
- ◆ Disconnect the two-way connector (1).

CAUTION

Upon reassembly, make sure that the electric connector (1) is correctly coupled.

Using a tester (in diode test mode), check the values between the two male terminals in the diode, as illustrated in the figure.

Correct value (measurement A): 0 – 1 Ω

Correct value (measurement B): ∞

In the event the tester does not feature the diode test mode, power with a voltage of 12 V, placing a 12 V – 2 W bulb on the positive cable and connecting the diode as illustrated in the figure.

CAUTION

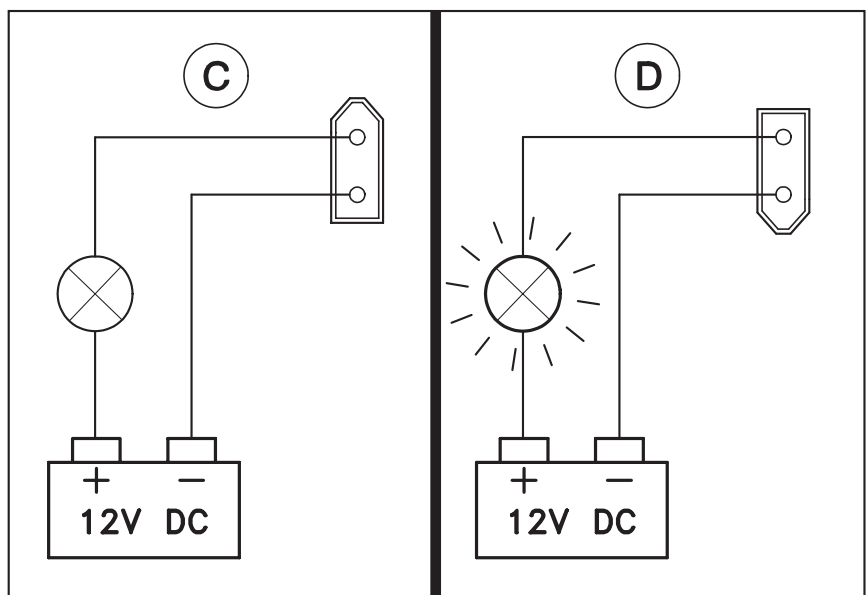
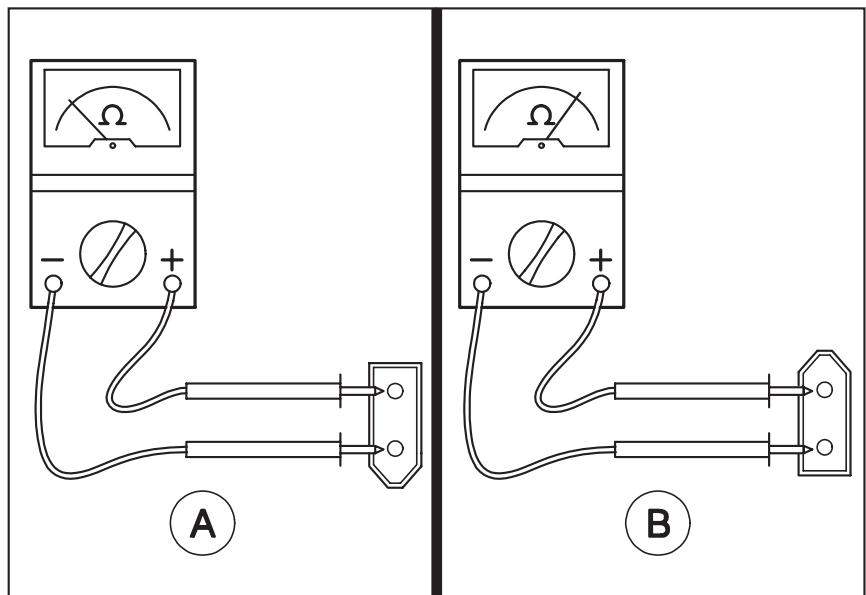
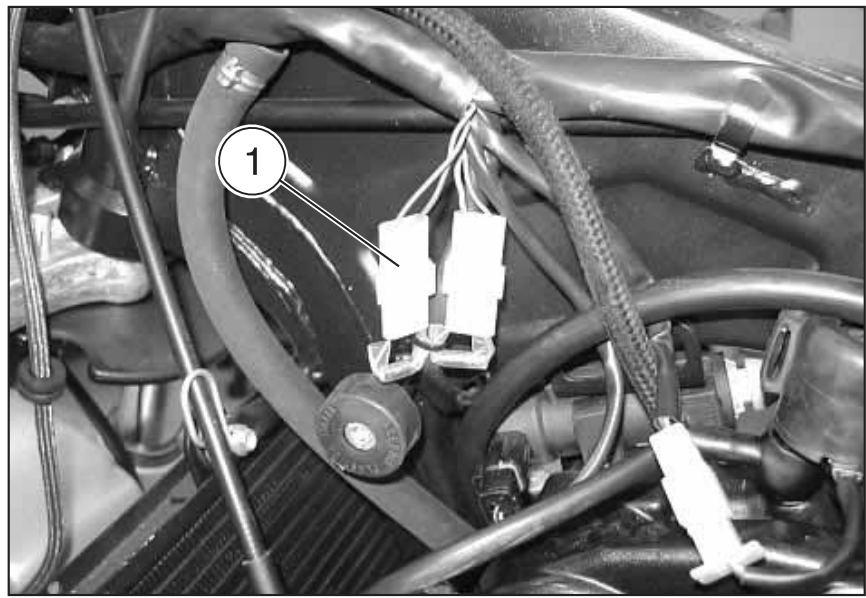
Do not use bulbs over 2 W, since the diode may be damaged.

Test (C): the bulb does not light up.

Test (D): the bulb lights.

If the resulting values do not correspond to the those indicated, change the diode.

- ◆ Repeat the procedure for the other diode.



6.7.5 CHECKING THE SIDE STAND AND THE SAFETY SWITCH

The side stand (1) must rotate without hindrances.

Carry out the following checks:

- ◆ The springs (2) must not be damaged, worn, rusty or weakened.
- ◆ The side stand must rotate freely, if necessary grease the joint, see 1.6 (LUBRICANT CHART).

The side stand (1) is provided with a safety switch (3) that has the function to prevent or interrupt the operation of the engine with the gears on and the side stand (1) down.

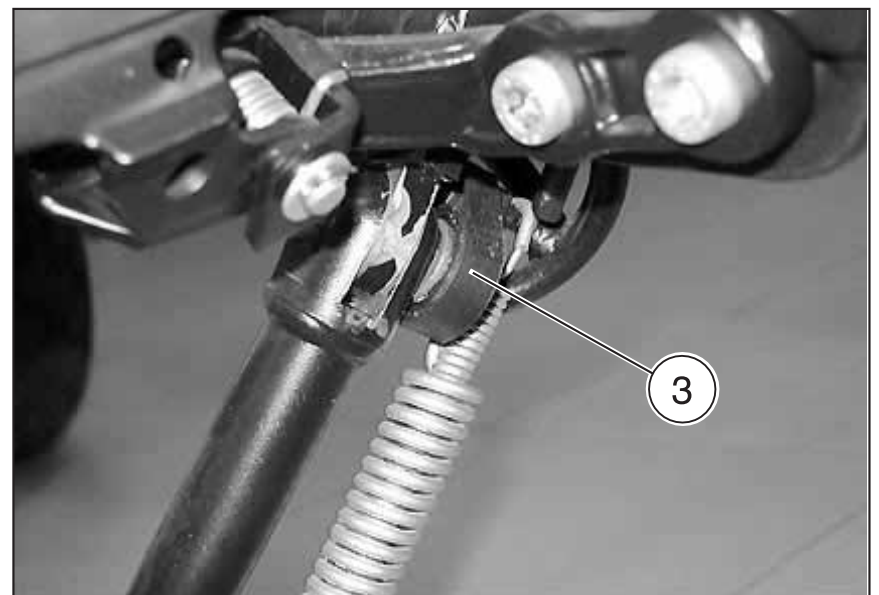
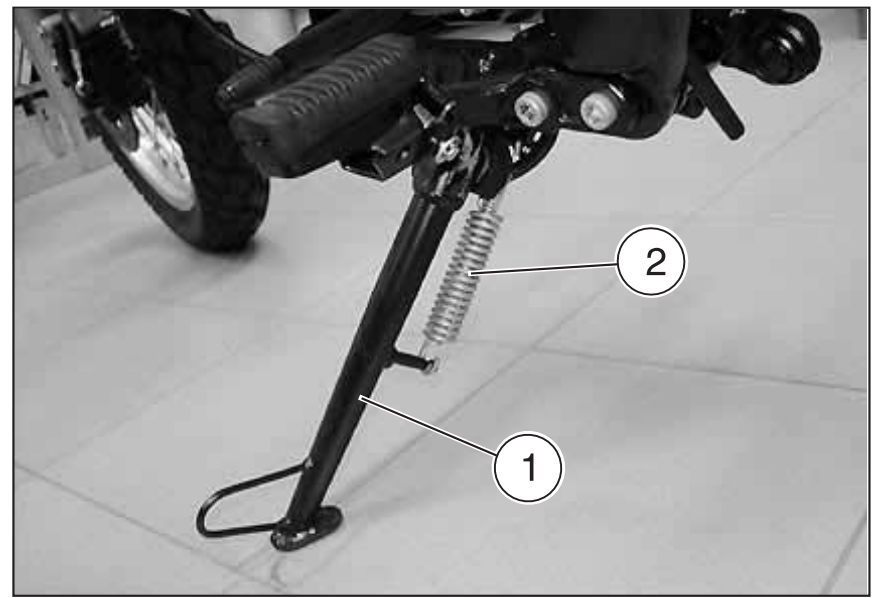
To check the proper functioning of the safety switch (3), proceed as follows:

- ◆ Seat on the vehicle in driving position.
- ◆ Fold the side stand (1).
- ◆ Start the engine.
- ◆ With released throttle grip and engine idling, pull the clutch lever completely. Engage the first gear, pushing the gear lever downwards.
- ◆ Lower the side stand (1), thus operating the safety switch (3).

At this point:

- the engine must stop.

Should this fail to happen, replace the switch (3).

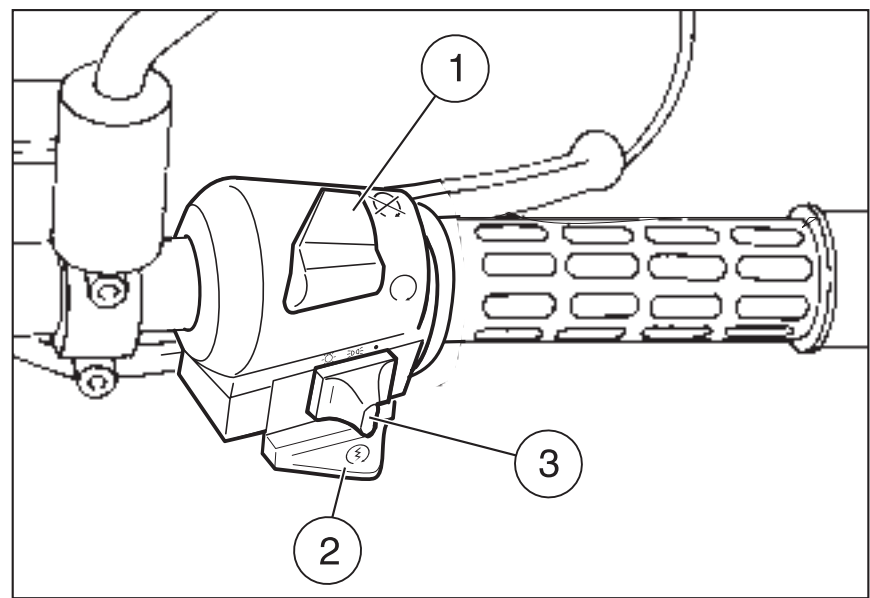


6.8 SWITCHES

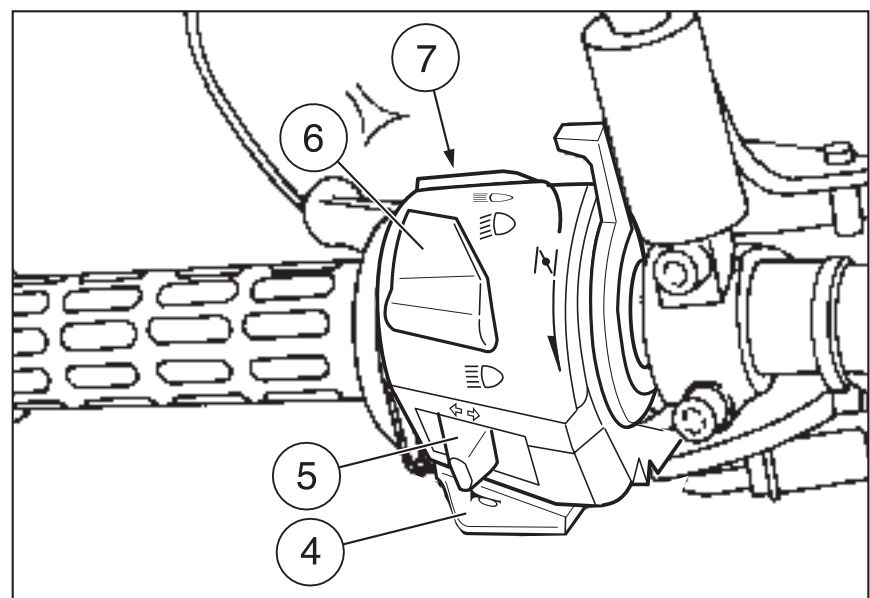
Using a tester, check the continuity of the switches, referring to the specific diagram below.
Should any anomalies be encountered, change the corresponding switch set.

6.8.1 RIGHT SIDE SWITCH SET

- 1) Engine stop switch
- 2) Start push button
- 3) Light switch (not provided for ASD)



Pos.	Cables						
	R	R/N	V/N	G/R	G/N	V	G
●							
☀			○—○			○—○	
☞☝						○—○	
⚡				○—○			
○	○—○						
⊗							



6.8.2 LEFT SIDE SWITCH SET

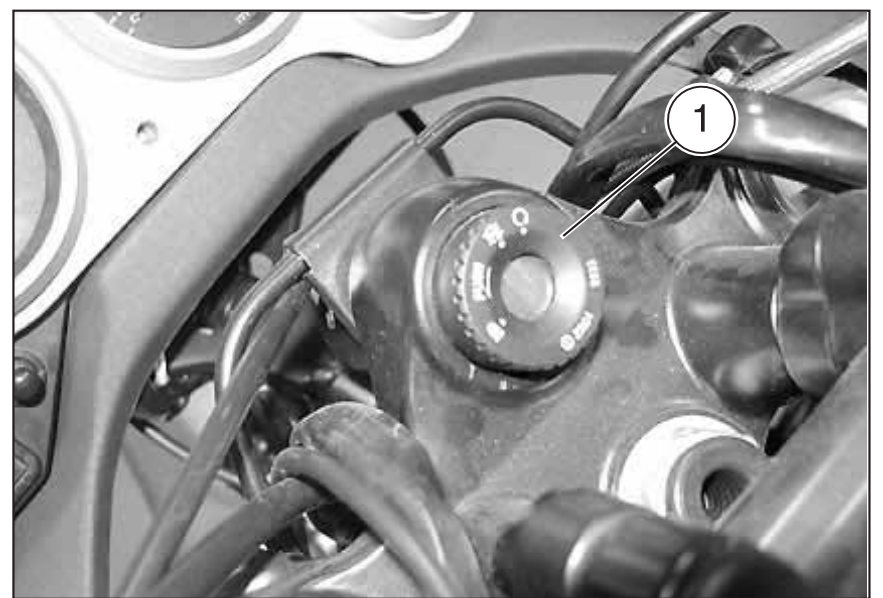
- 4) Horn push button
- 5) Direction indicator switch
- 6) Dimmer switch
- 7) High beam signalling push button

Pos.	Cables								
	Gr	B	B/N	Az	R	V/N	Bi	N	G/N
📣	○—○								
↶			○—○						
↷			○—○		○—○				
☞☝						○—○			
☞☝							○—○		○—○
☞☝								○—○	○—○

6.8.3 SINGLE SWITCHES

1) Ignition switch

Pos.	Cables		
		AV	V
○		○—○	
⊗	○—○		
⊙	○—○		

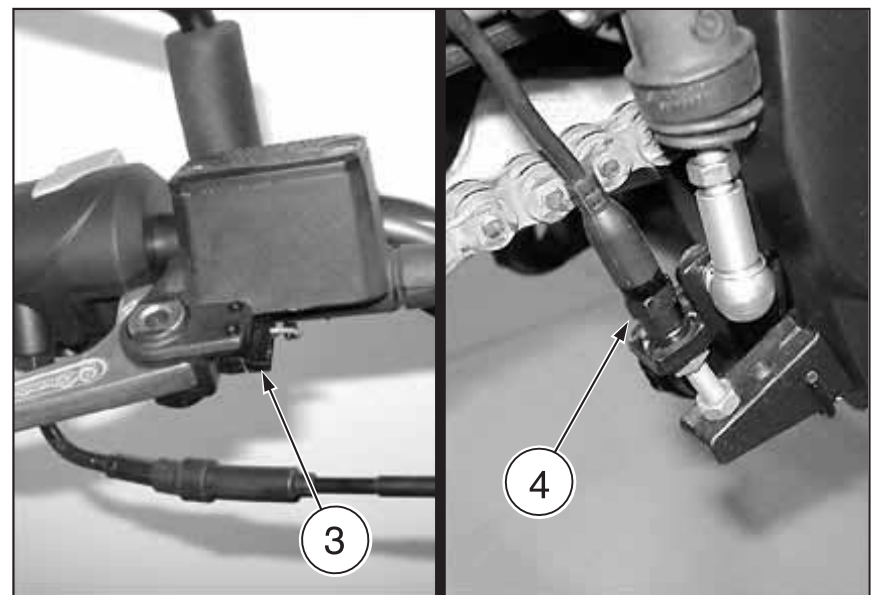


2) Front brake stoplight switch

Pos.	Cables	
	Gr	N
Operating	○—○	

3) Rear brake stoplight switch

Pos.	Cables	
	G	G
Operating	○—○	

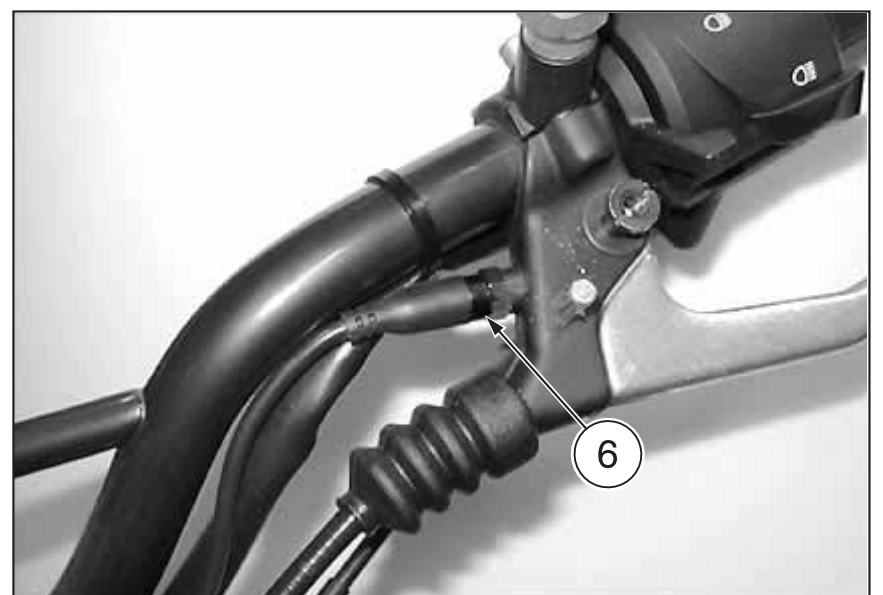


4) Neutral gear switch

Pos.	Cables	
	Screw	⊥
Neutral	○—○	

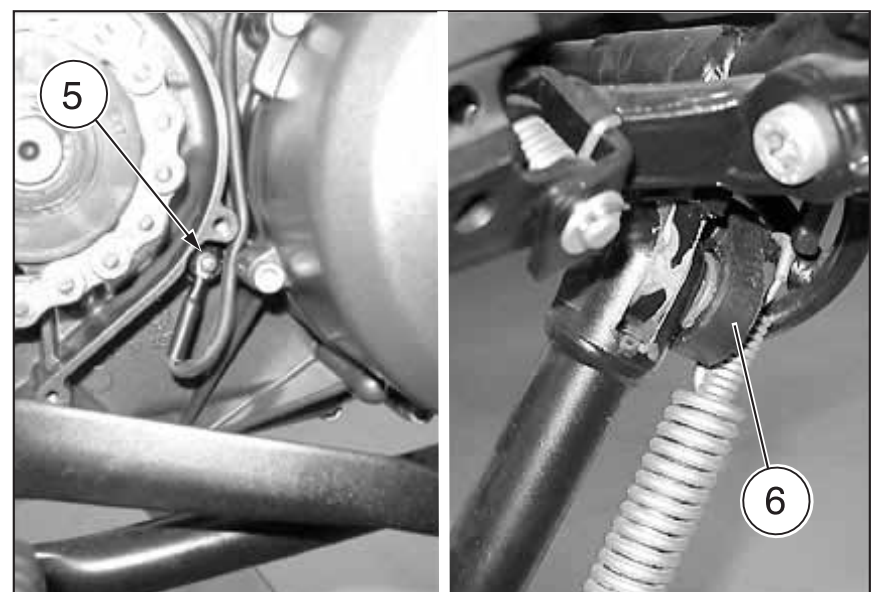
5) Stand switch

Stand	Cables		
	M	V	N
Down	○—○		
Up		○—○	



6) Clutch lever switch

Pos.	Cables	
	G	G
Operating	○—○	

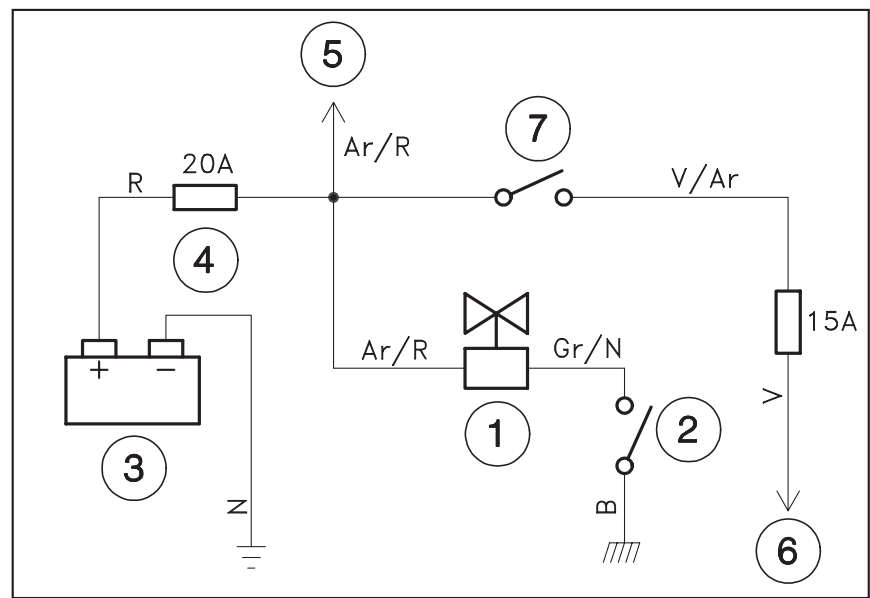


6.9 COOLING ELECTROFAN

6.9.1 WIRING DIAGRAM

Wiring diagram key

- 1) Electrofan
- 2) Thermal switch
- 3) Battery
- 4) Fuse (20A)
- 5) To voltage regulator
- 6) To the light loads
- 7) Ignition switch (○ - ⊗ - ⊕)



6.9.2 CHECKING THE ELECTROFAN OPERATION

To check operation of electrofan (1):

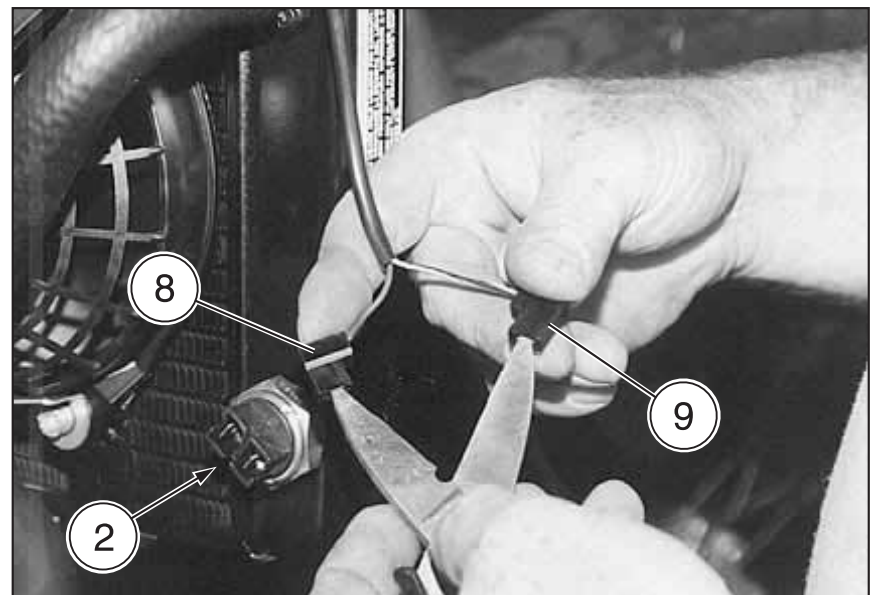
- ◆ Disconnect the two electric connectors (8) (9) from the thermal switch (2) and connect them together.

If the electrofan does not work:

- ◆ Make sure the connector (10) is correctly inserted.
- ◆ Rotate the fan manually, making sure the blades do not touch the mount.

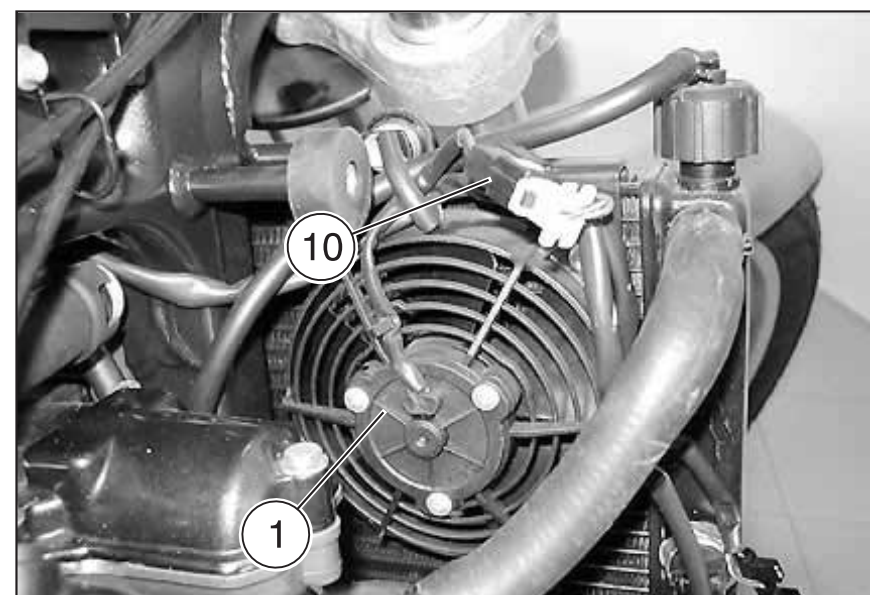
If the rotation is free from hindrances:

- ◆ Check the recharge system, see 6.3 (CHECKING THE RECHARGING SYSTEM) and the 20A fuse, see 6.18 (CHANGING THE FUSES).



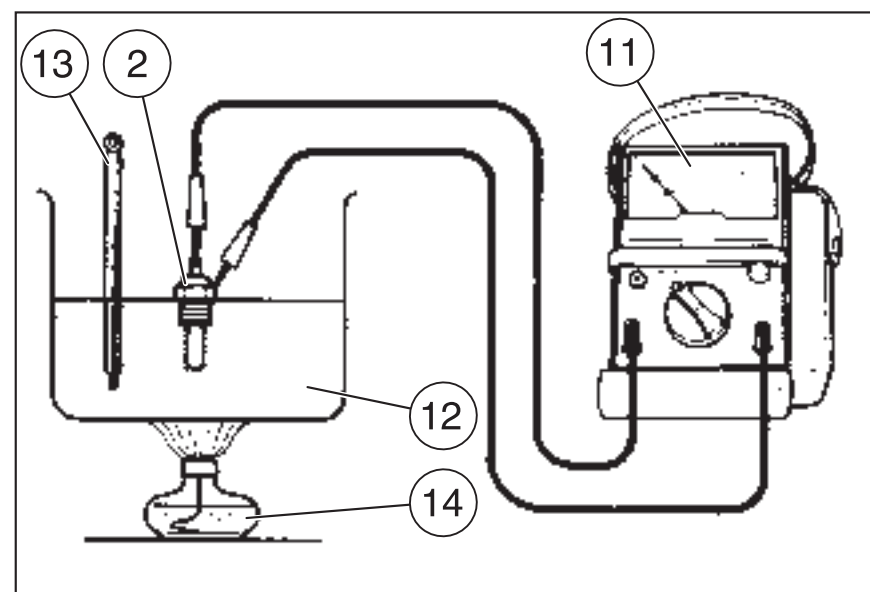
6.9.3 CHECKING THE THERMAL SWITCH OPERATION

- ◆ Remove the thermal switch (2), see 5.5 (REMOVING THE COOLANT THERMISTOR).
- ◆ Connect a tester (11) (set as an ohmmeter) to the thermal switch (2) as illustrated in the figure.
- ◆ Immerse the thermal switch (12) in a container holding coolant.
- ◆ Immerse a thermometer (13) with a 0 to 150 °C range in the same container.
- ◆ Place the container on a burner (14) and slowly warm up the liquid.
- ◆ Make sure that the temperature indicated by the thermometer and the value of the thermal switch indicated on the tester correspond to the data provided in the table.



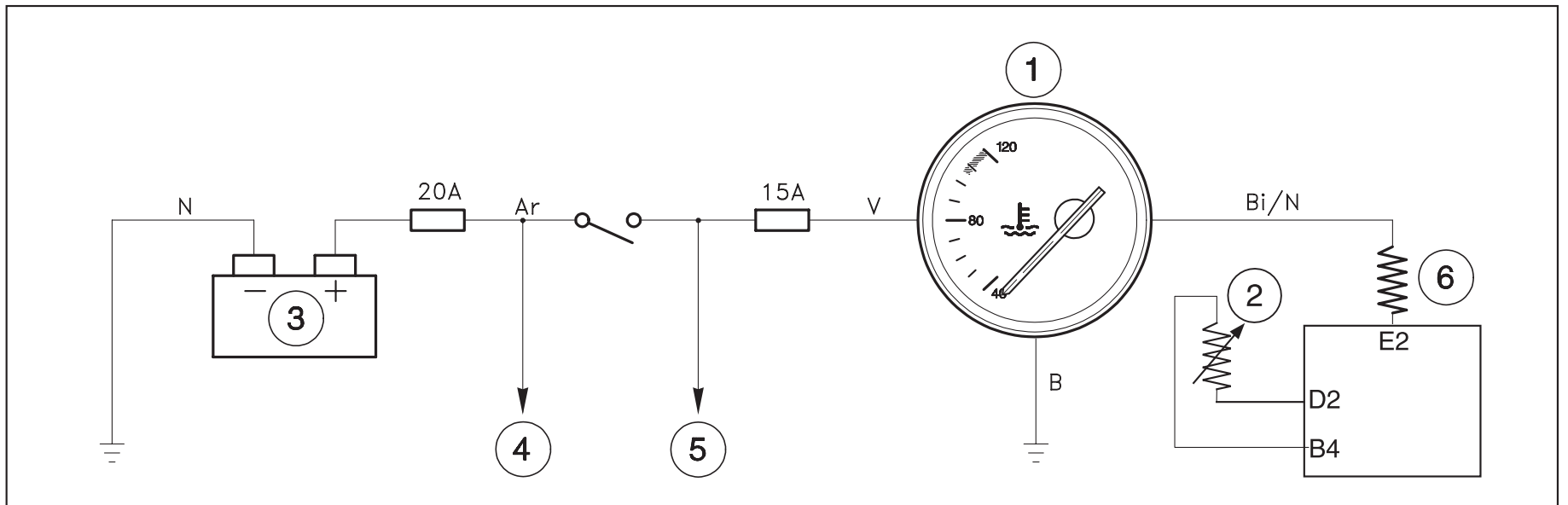
Coolant temperature (°C)	Standard values (Ω)
below 95 °C	∞
over 90 °C	0

If the values depart excessively from those indicated in the table, change the thermal switch.



6.10 COOLANT TEMPERATURE INDICATOR

6.10.1 WIRING DIAGRAM

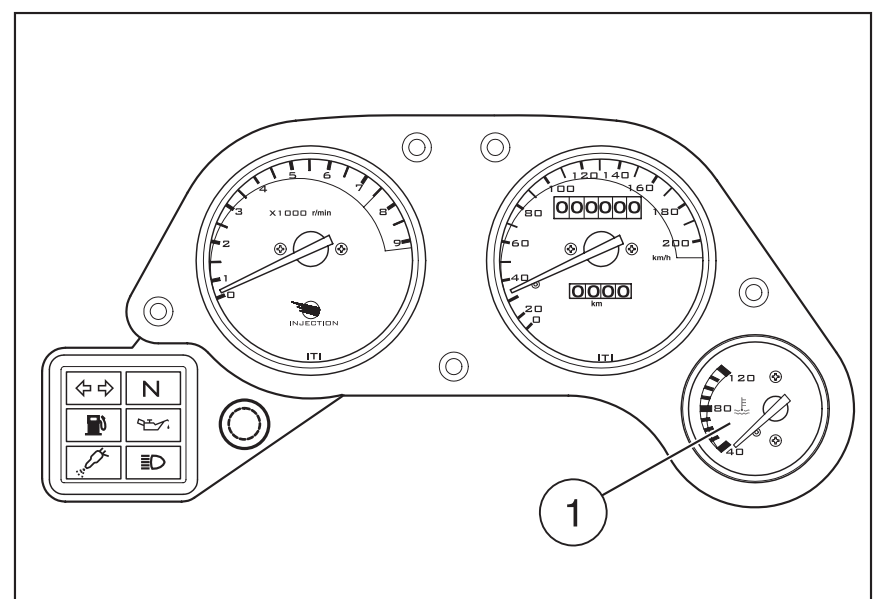


Wiring diagram key

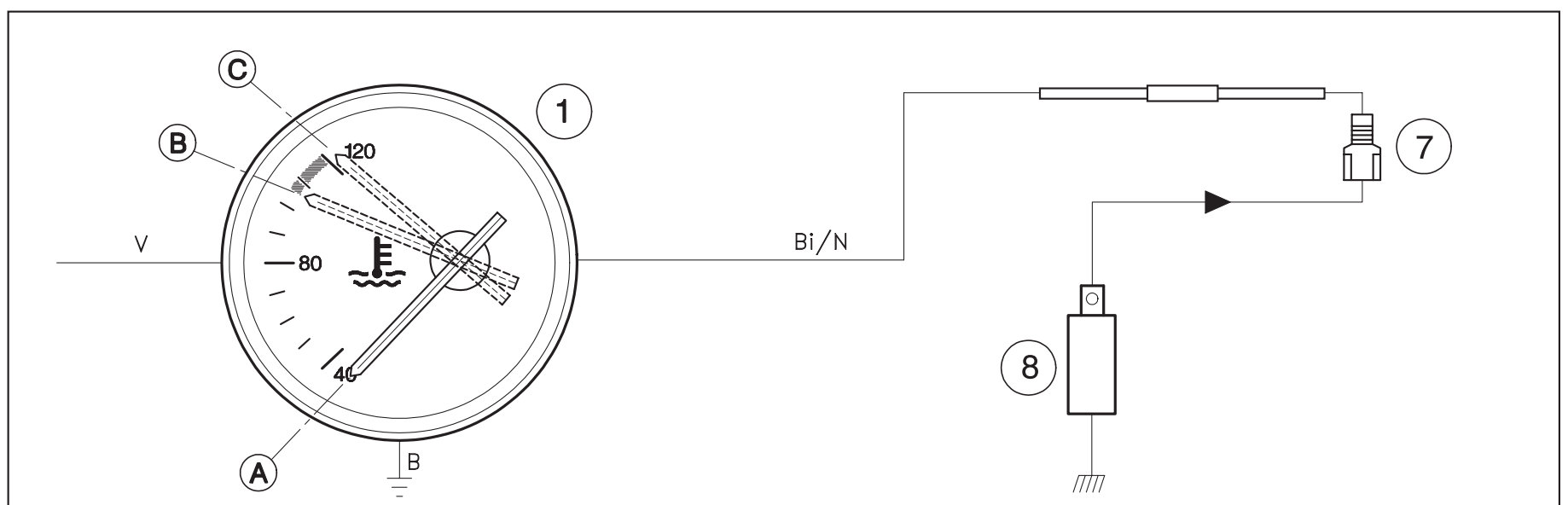
- 1) Coolant temperature indicator (1)
- 2) Air thermistor
- 3) Battery
- 4) To the cooling fan and voltage regulator
- 5) To the ignition
- 6) Resistance

6.10.2 CHECKING THE INSTRUMENT

- ◆ Remove the front fairing, see 7.1.24 (REMOVING THE FRONT FAIRING).
- ◆ Disconnect the connector (7) (coloured white/black Bi/N).
- ◆ Connect three 1000 ohm / 65 ohm / 0 ohm resistances (8) in succession to the terminal (dashboard side).
- ◆ Turn the ignition switch to position "O".
- ◆ Make sure that the pointer is positioned as indicated in the figure and in the table (A – B – C).



Resistance connected	Pointer position $\pm 3^\circ$
1000 Ω	40° C (A)
65 Ω	Beginning of the red area (B)
0 Ω	> 100 °C



6.11 CHECKING THE ENGINE OIL PRESSURE SENSOR

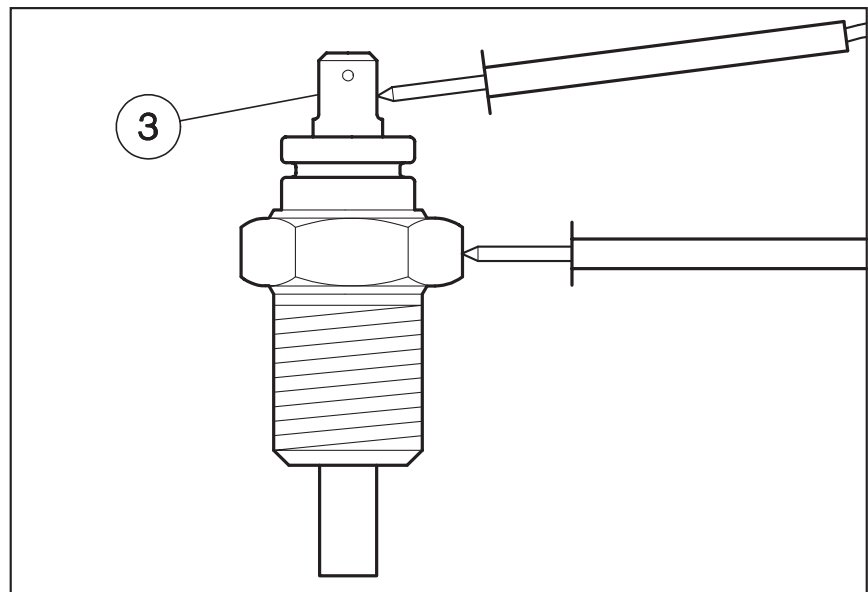
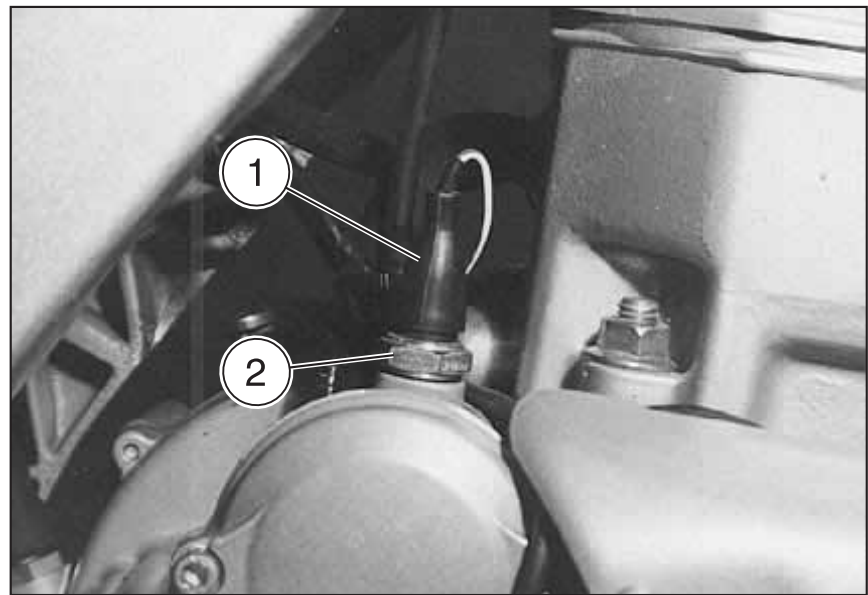
To check operation of sensor:

- ◆ Slip off the rubber protection (1).
- ◆ Disconnect the electric terminal from the sensor (2).
- ◆ With a tester (scale x 100 Ω) check for breaks between the tongued terminal (3) and the casing of the sensor.

Correct value with engine off: 0 Ω

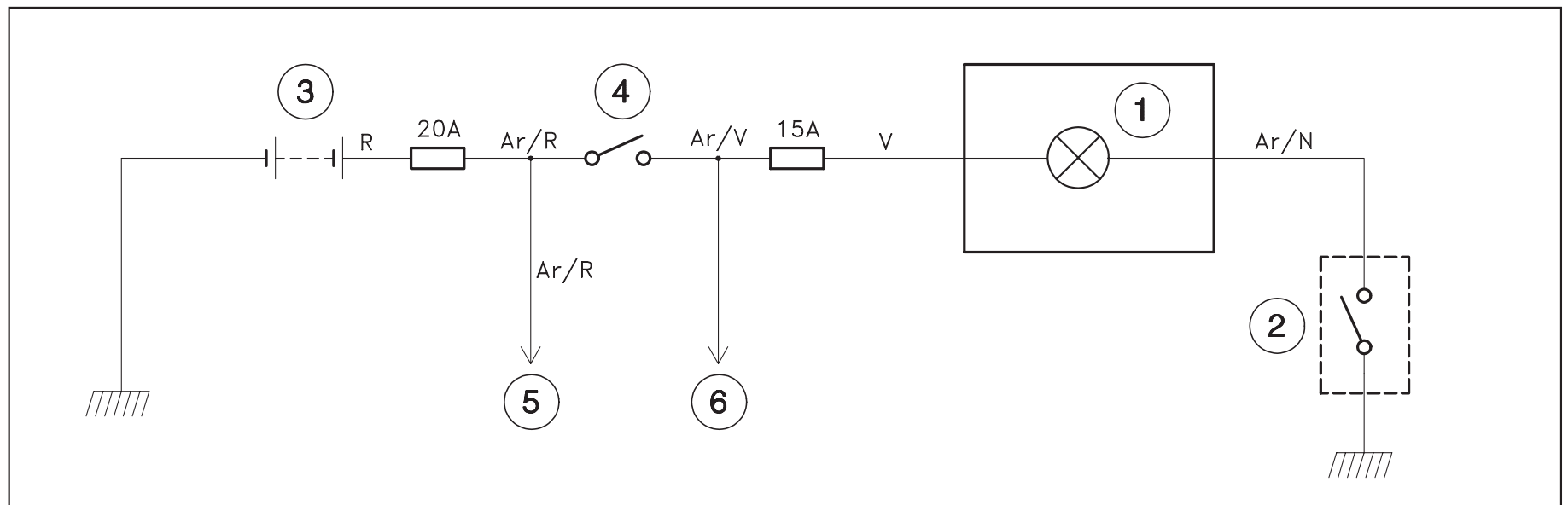
Correct value with engine running: $\infty \Omega$

If the values do not correspond to those indicated, check that the engine oil level is correct, and change the sensor, if necessary.



6.12 FUEL LEVEL CIRCUIT

6.12.1 WIRING DIAGRAM



Wiring diagram key

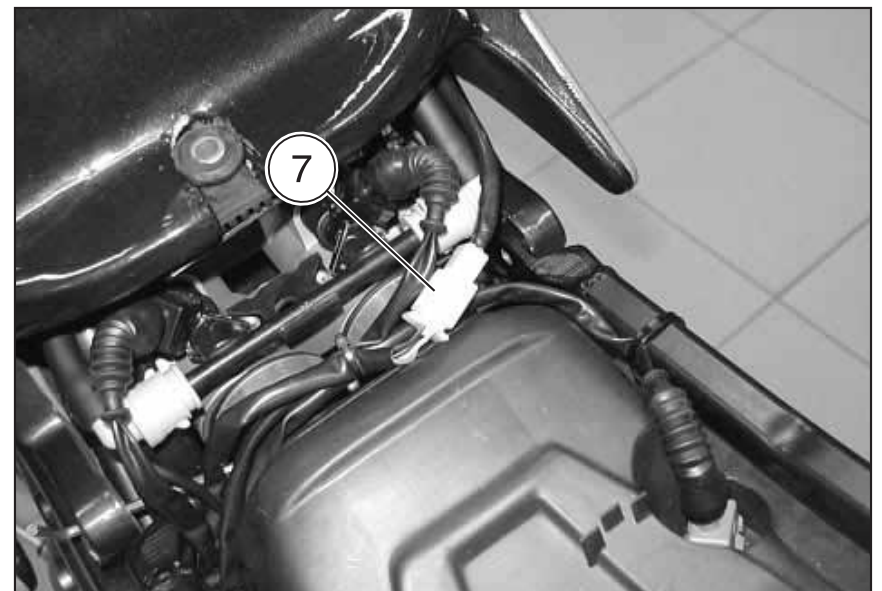
- 1) Low fuel warning light (⊗) (coloured amber)
- 2) Fuel level sensor
- 3) Battery
- 4) Ignition switch (○ - ⊗ - ⊕)
- 5) To voltage regulator
- 6) To ignition/injection

6.12.2 FUEL LEVEL INDICATOR

- ◆ Disconnect the electric connector (four-way) (7) of the fuel pump unit (2).

Checking the operation of the low fuel warning light

- ◆ Directly connect (resistance 0 Ω) the orange/black cables (Ar/N) and the blue cable (B) of the connector (7) (wiring side); make sure that the low fuel warning light comes on.



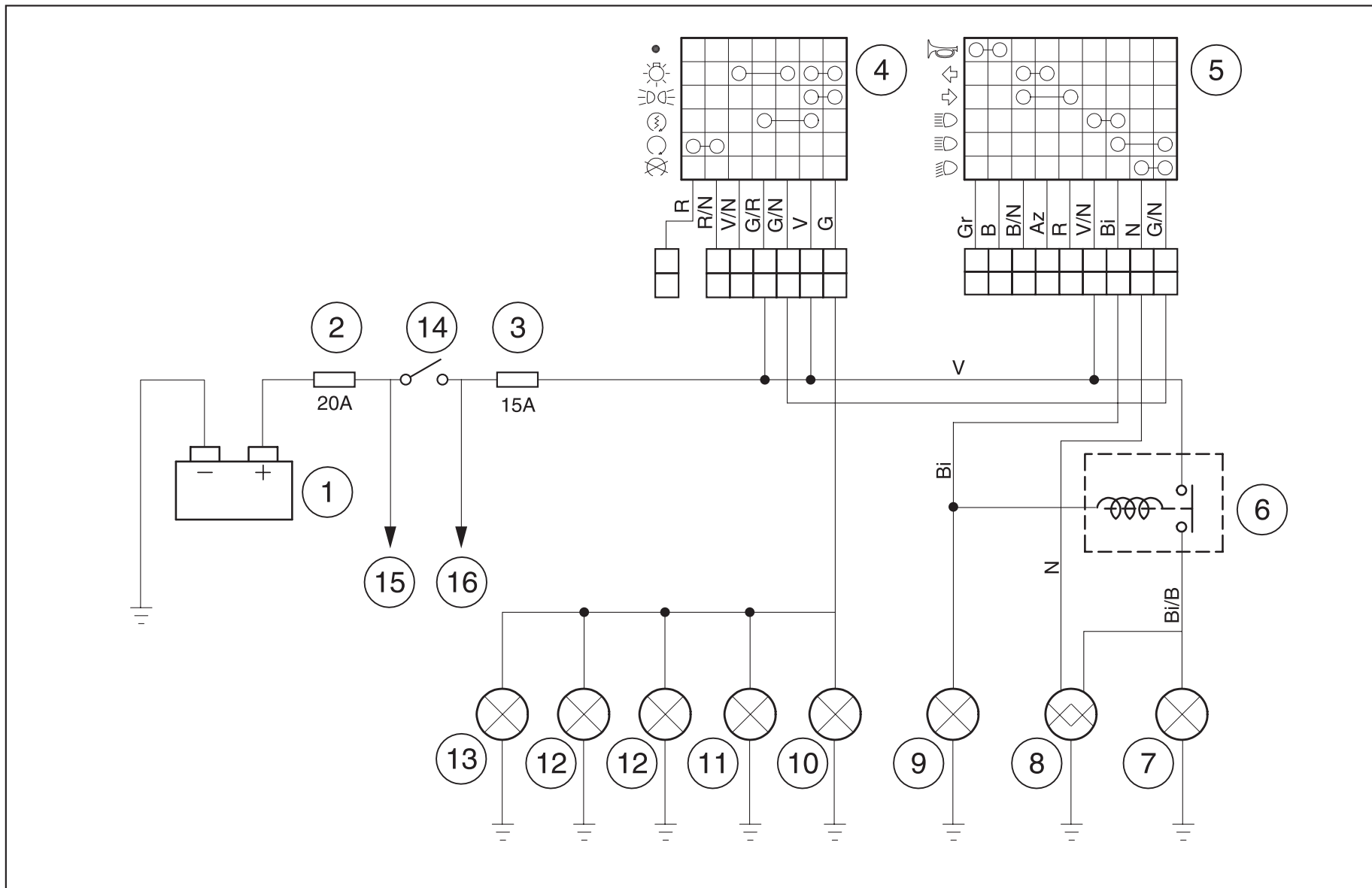
Between the cables	Resistance	Indication correct
orange/black (Ar/N) - blue (B)	0 Ω	warning light on

If the low fuel warning light "⊗" does not come on, change the fuel level sensor, see 4.4 (REMOVING THE FUEL LEVEL SENSOR).

6.13 LIGHT SYSTEM

6.13.1 WIRING DIAGRAM

NOTE See 6.2 (ELECTRIC COMPONENTS LAYOUT) for the positioning of the components.



Key:

- 1) Battery
- 2) Fuses (20 A)
- 3) Fuses (15 A)
- 4) Right dimmer switch
- 5) Left dimmer switch
- 6) High beam relay
- 7) High beam bulbs
- 8) Low/high beam bulbs
- 9) High beam warning light
- 10) Bulbs for dashboard lighting
- 11) Front parking light bulb
- 12) Rear parking light bulb
- 13) Number plate light
- 14) Ignition switch
- 15) To voltage regulator
- 16) To the injection

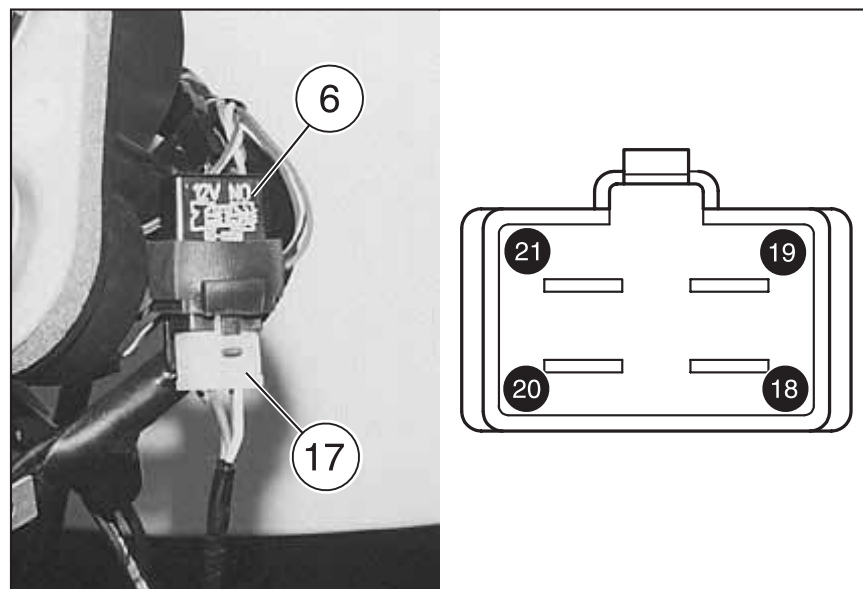
6.13.2 CHECKING THE HIGH BEAM RELAY

In order to check the operation of the relay:

- ◆ Remove the dashboard fairing, see 7.1.27 (REMOVING THE DASHBOARD FAIRING).
- ◆ Disconnect the connector (17) from the relay (6).
- ◆ Power with a battery the two internal male terminals (18) (19) at 12 V.
- ◆ Using a tester (set as an ohmmeter), check for breaks between the other two terminals (20) (21).

Correct value with relay powered: 0 Ω
Correct value with relay not powered: ∞ Ω

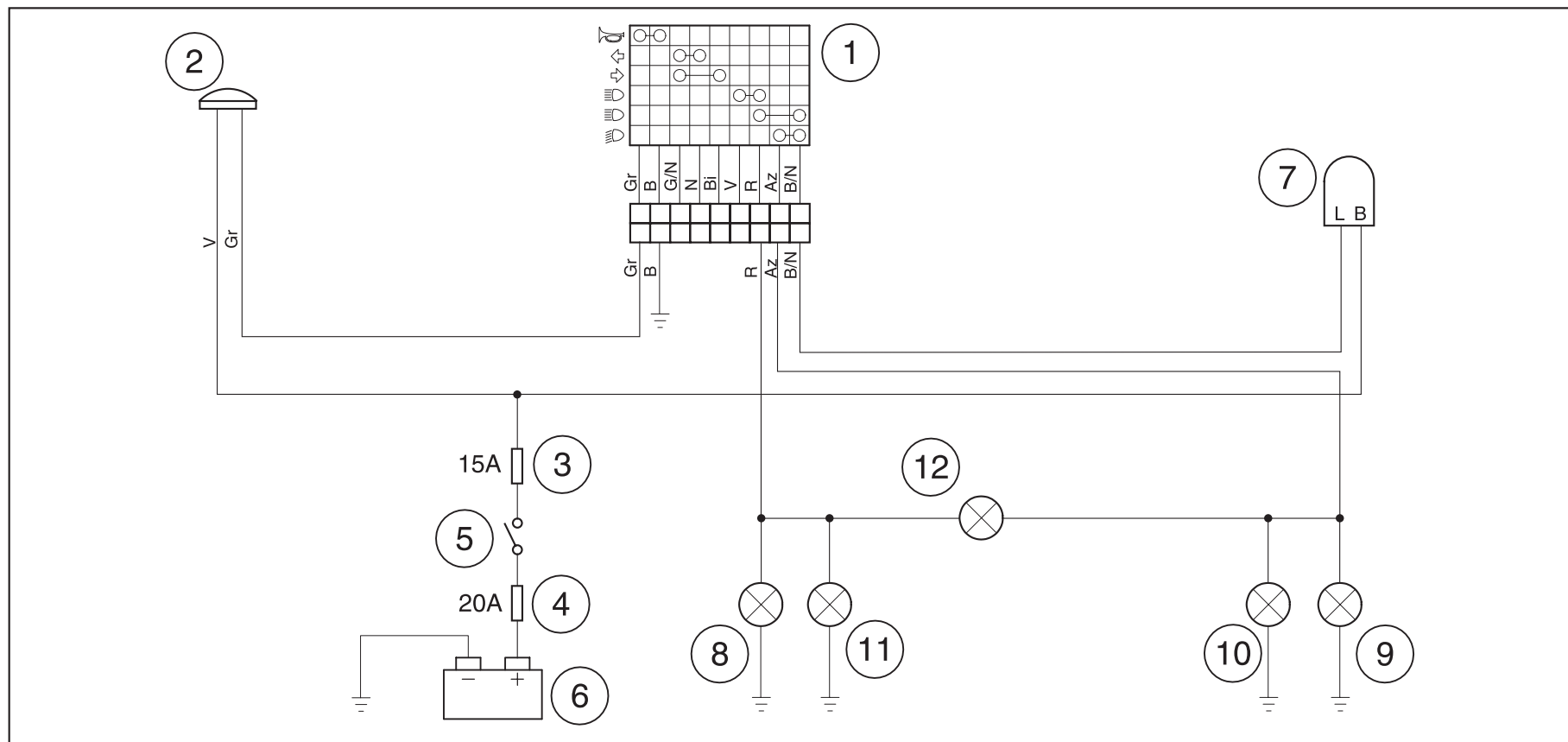
If the resulting values do not correspond to those indicated, change the relay.



6.14 ACOUSTIC AND VISUAL SIGNALLING SYSTEM

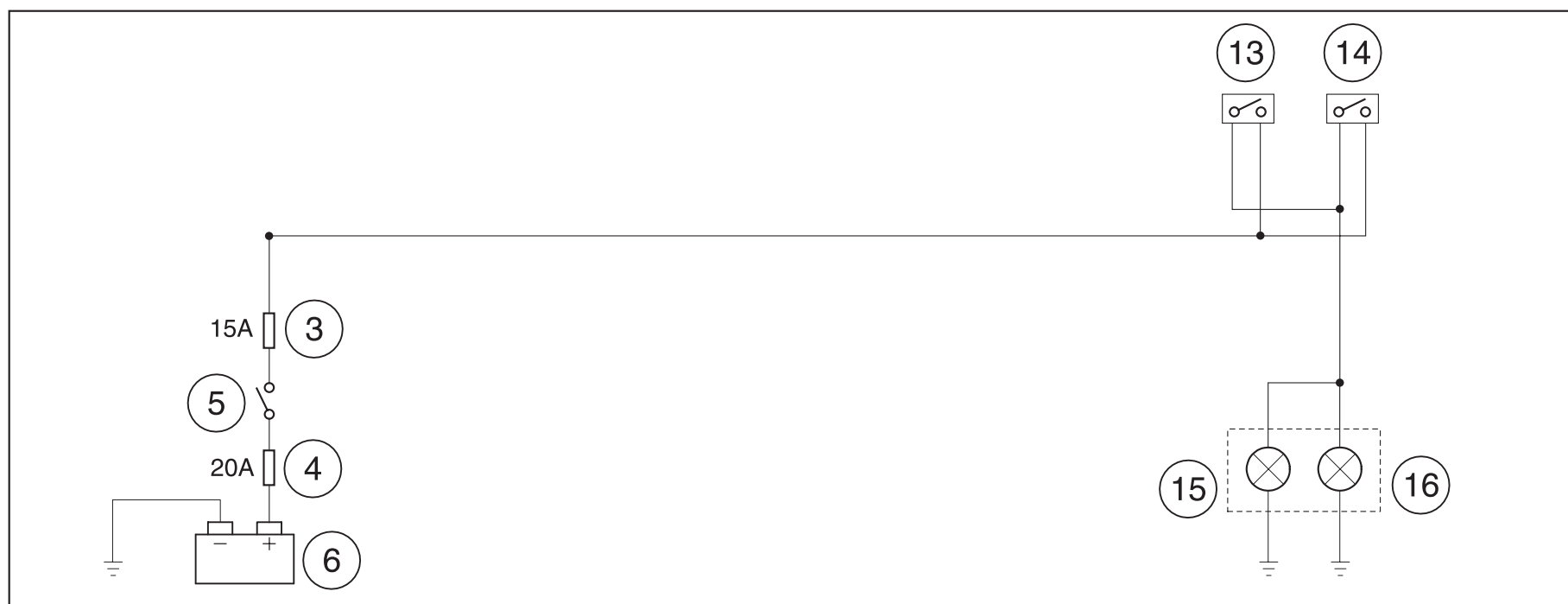
6.14.1 WIRING DIAGRAM

NOTE See 6.2 (ELECTRIC COMPONENTS LAYOUT) for the positioning of the components.



Key:

- | | |
|-----------------------|--|
| 1) Left dimmer switch | 7) Blinking |
| 2) Horn | 8) Rear right direction indicator bulb |
| 3) Fuse (15A) | 9) Rear left direction indicator bulb |
| 4) Fuse (20 A) | 10) Front left direction indicator bulb |
| 5) Ignition switch | 11) Front right direction indicator bulb |
| 6) Battery | 12) Direction indicator warning light |

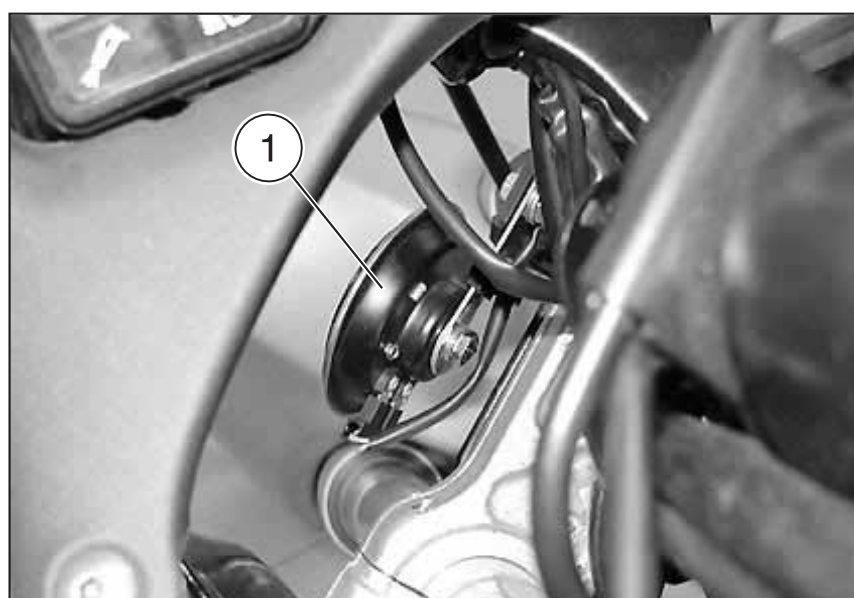


Key:

- | | |
|--------------------|----------------------------|
| 3) Fuse (15 A) | 13) Front stoplight switch |
| 4) Fuse (20 A) | 14) Rear stoplight switch |
| 5) Ignition switch | 15) Rear light bulb |
| 6) Battery | 16) Stoplight |

6.14.2 CHECKING THE OPERATION OF THE HORN

- ◆ Remove the front fairing, see 7.1.24 (REMOVING THE FRONT FAIRING).
- ◆ Power the two internal horn connector (1) at 12 V.
- ◆ If necessary, use the appropriate screw adjuster.

**6.14.3 CHECKING THE BLINKING OPERATION**

If none of the direction indicator bulbs works, this means that there probably is a problem in the blinking unit.

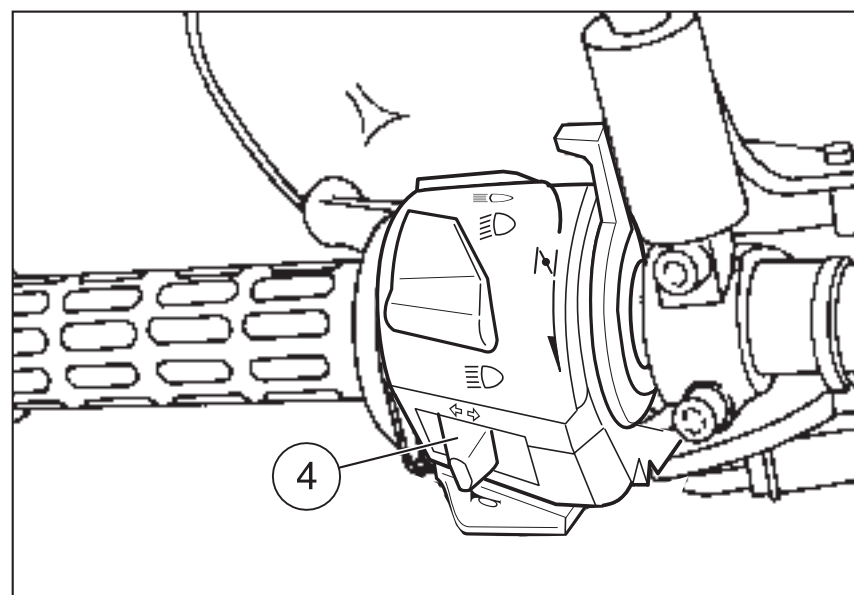
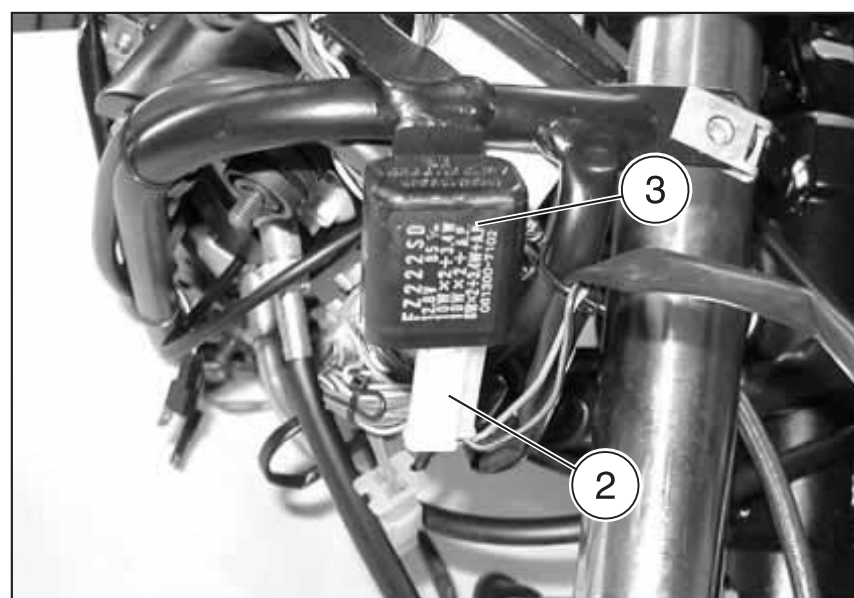
To check operation of blinking:

- ◆ Remove the front fairing, see 7.1.24 (REMOVING THE FRONT FAIRING).
- ◆ Disconnect the connector (2) of the blinking unit (3).
- ◆ Connect the connector (2) through a jumper.
- ◆ Operate the direction indicator control (4).

If the lights remain on without interruption, change the blinking unit (3).

- ◆ If necessary, check:
 - the main fuses (20 A) and the electrical system.

If one bulb of the direction indicators is damaged, the other bulb and the warning light on the dashboard remain continuously on whenever the control (4) is operated.



6.15 BATTERY

When changing batteries, replace with a battery of the same type, see 1.5 (TECHNICAL SPECIFICATIONS)

Carefully read 2.3 (BATTERY).

6.15.1 ACTIVATING THE BATTERY

- ◆ Remove the battery, see 7.1.8 (REMOVING THE BATTERY).

⚠ WARNING

The electrolyte in the battery is toxic and caustic and may cause burns on contact with the skin as it contains sulphuric acid.

Wear protective clothing, a face mask and/or goggles during service operations.

In case of contact with the skin, rinse with plenty of water.

In case of contact with the eyes, wash with large quantities of water for fifteen minutes and consult an oculist without delay.

If the liquid is accidentally swallowed, drink large amounts of water or milk, then continue drinking milk of magnesia or vegetable oil and promptly call a doctor.

The battery gives off explosive gases; keep it away from flames, sparks, cigarettes and any other source of heat.

During the recharging or the use, make sure that the room is properly ventilated and avoid inhaling the gases released during the recharging.

KEEP AWAY FROM CHILDREN.

Follow ►



Follow ►

- ◆ Remove the element plugs (1).
- ◆ Fill the cells with electrolyte until reaching the **MAX** level.

NOTE It is advisable to use an electrolyte with specific weight 1.3.

- ◆ Subject the battery to a trickle charge cycle, see 2.3.3 (RECHARGING THE BATTERY).
- ◆ Refit the battery on the vehicle on being returned to the customer.

6.15.2 BATTERY MAINTENANCE

- ◆ In case of a long period of inactivity of the vehicle (winter season), charge the battery completely at least once a month, using a slow recharge.
- ◆ Periodically (approximately once a month) top up the electrolyte with distilled water only.

⚠ CAUTION

During the summer, check the electrolyte level more frequently, since evaporation is quicker due to the outside temperature increase.

- ◆ Smear a film of neutral grease or vaseline on the terminals.

6.15.3 CHECKING THE BATTERY

Should any anomalies be encountered, first check the recharging circuit, making sure that it is working correctly, see 6.3 (CHECKING THE RECHARGING SYSTEM).

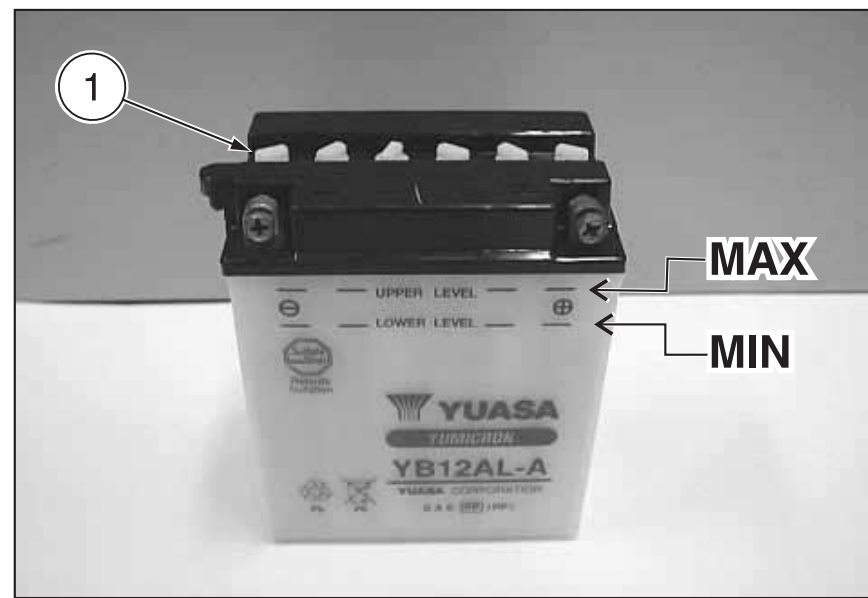
In addition, make sure that:

- ◆ The cells do not show signs of sulphation (whitish colour).
- ◆ The electrolyte level is included between the MIN and MAX notches.
- ◆ There are no signs of damage (external case cracked) and no electrolyte leak.
- ◆ The cables are firmly connected to the clamps.
- ◆ Proceed with the trickle charge, see 2.3.3 (RECHARGING THE BATTERY).

⚠ CAUTION

After the recharge, check the density of the electrolyte with a densitometer.

If in any cell the density is lower than 1.26 and the no-load voltage is lower than 12 V, it is absolutely necessary to change the battery.



6.16 CHANGING THE BULBS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

⚠ WARNING

Risk of fire.
Keep fuel and other flammable substances away from the electrical components.

⚠ CAUTION

Before changing a bulb, move the ignition switch to position "⊗" and wait a few minutes, so that the bulb cools down.

Change the bulb wearing clean gloves or using a clean and dry cloth.

Do not leave fingerprints on the bulb, since these may cause its overheating and consequent breakage. If you touch the bulb with bare hands, remove any fingerprint with alcohol, in order to avoid any damage.

DO NOT FORCE THE ELECTRIC CABLES.

NOTE Before changing a bulb, check the fuses, see 6.18 (CHANGING THE FUSES).

6.16.1 CHANGING THE HEADLIGHT BULBS

Carefully read 6.16 (CHANGING THE BULBS).

The headlight contains:

- one high beam bulb (1) (left side);
- one parking light bulb (2) (lower).
- one low beam bulb/high beam (3) (right side).

To change, proceed as follows:

- ◆ Position the vehicle on the stand.

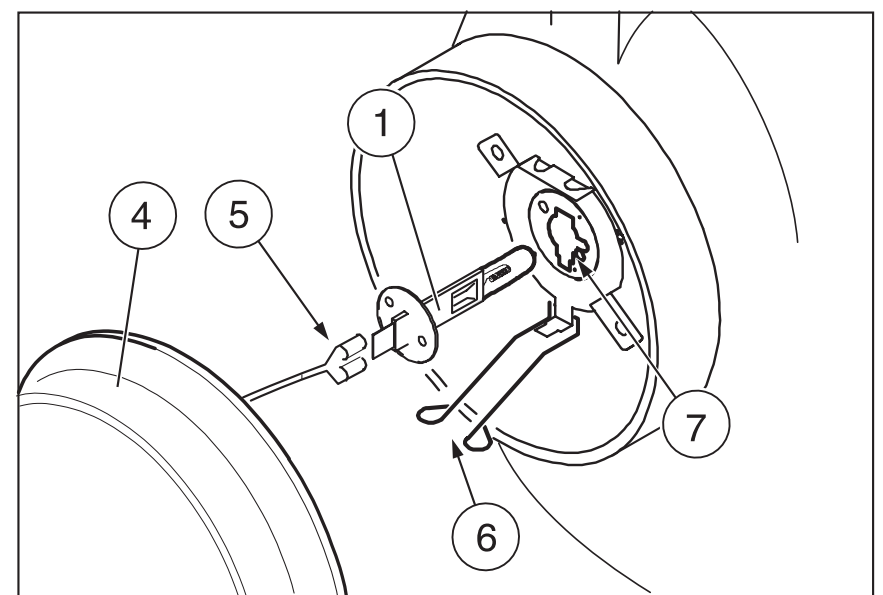
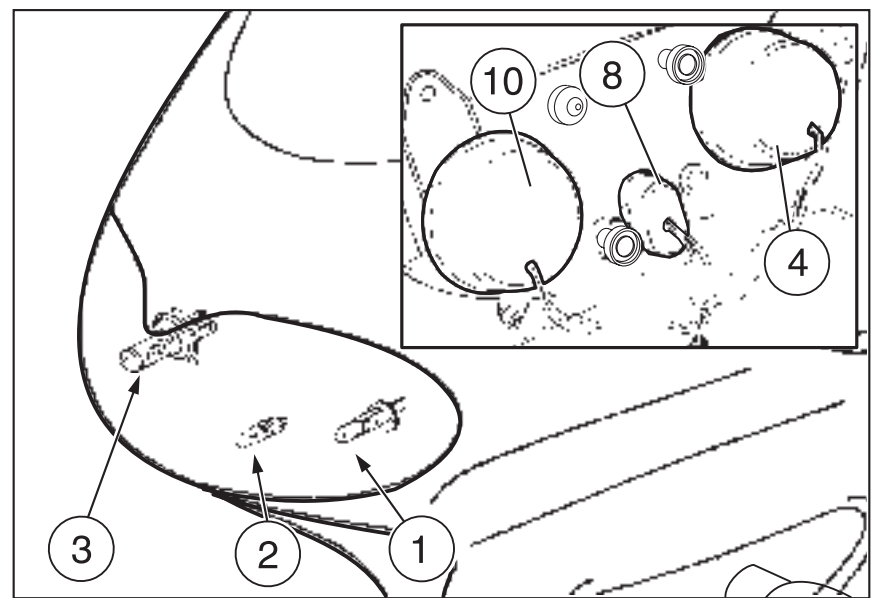
NOTE Proceed on the side of the bulb to be changed.

HIGH BEAM BULBS

- ◆ Move the protection element (4) with your hands.
- ◆ Grasp the electric terminal (5), pull it and disconnect it from the bulb (1).
- ◆ Release the check spring (6) positioned at the rear of the bulb socket (7).
- ◆ Extract the bulb (1) from its seat and replace it with a new one of the same type.

NOTE Insert the bulb in the bulb socket, making the relevant positioning seats coincide.

Follow ►



Follow ►

PARKING LIGHT BULB

- ◆ Move the protection element (8) with your hands.

⚠ CAUTION

To extract the bulb socket, do not pull the electric wires.

- ◆ Grasp the parking light bulb socket (9), pull it and remove it from its seat.
- ◆ Withdraw the bulb (2) and replace it with one of the same type.

LOW BEAM BULB/HIGH BEAM

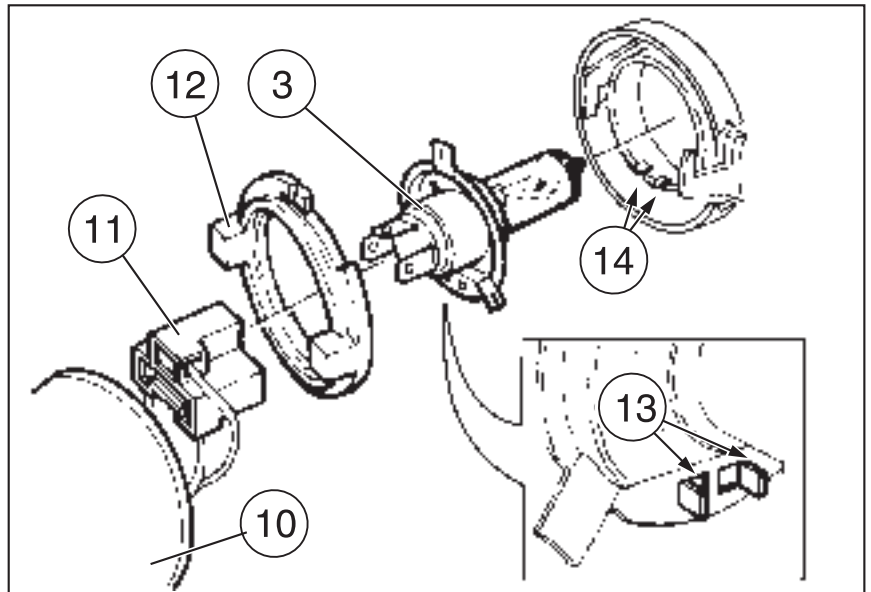
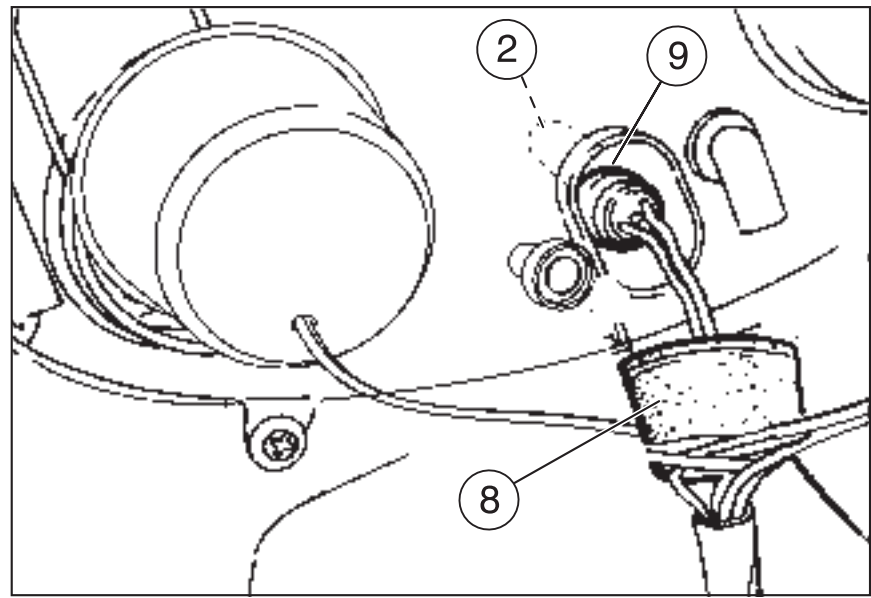
- ◆ Move the protection element (10) with your hands.

⚠ CAUTION

To extract the bulb electric connector, do not pull its electric wires.

- ◆ Grasp the bulb electric connector (11), pull it and disconnect it from the bulb (3).
- ◆ Rotate the bulb socket (12) anticlockwise and extract it from its seat.
- ◆ Press the bulb (3) slightly and rotate it anticlockwise.
- ◆ Extract the bulb (3) from its seat and replace it with a new one of the same type.

NOTE Insert the bulb in the bulb socket, making the appropriate tangs (13) coincide with the relevant seats (14) on the reflector.



6.16.2 CHANGING THE FRONT DIRECTION INDICATOR BULBS

Carefully read 6.16 (CHANGING THE BULBS).

- ◆ Position the vehicle on the stand.
- ◆ Unscrew and remove the two screws (1).
- ◆ Remove the protection screen (2).

⚠ CAUTION

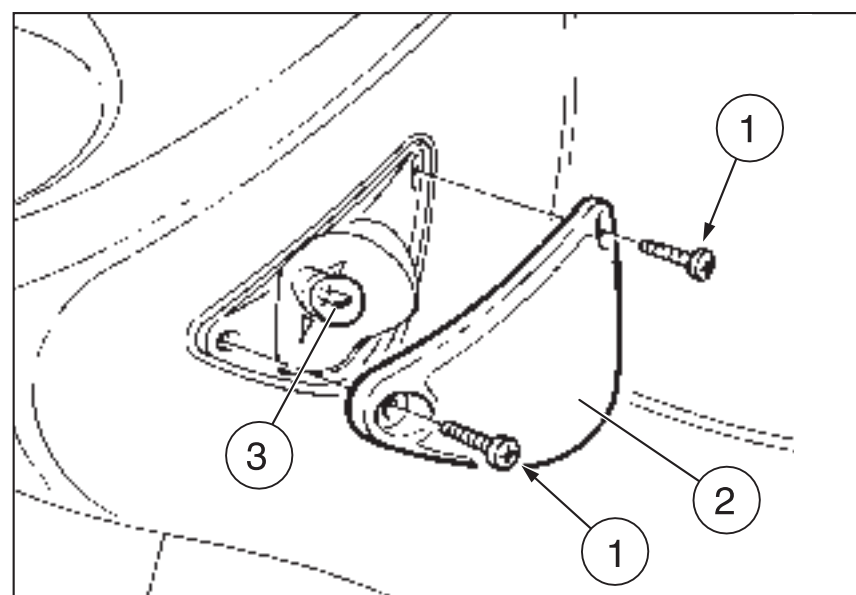
Upon reassembly, correctly position the protection screen in its seat. Tighten the screw (1) moderately and carefully, to avoid damaging the protection screen.

- ◆ Press the bulb (3) slightly and rotate it anticlockwise.
- ◆ Extract the bulb (3) from its seat.

⚠ CAUTION

Insert the bulb in the bulb socket, making the two bulb pins coincide with the relevant guides on the socket.

- ◆ Correctly install a new bulb of the same type.



6.16.3 CHANGING THE REAR DIRECTION INDICATOR BULBS

Carefully read 6.16 (CHANGING THE BULBS).

- ◆ Position the vehicle on the stand.
- ◆ Unscrew and remove the screw (4).

⚠ CAUTION

While removing the protection screen, proceed carefully in order not to break the cog.

- ◆ Remove the protection screen (5).

⚠ CAUTION

Upon reassembly, correctly position the protection screen in its seat. Tighten the screw (4) moderately and carefully, to avoid damaging the protection screen.

- ◆ Press the bulb (6) slightly and rotate it anticlockwise.
- ◆ Extract the bulb (6) from its seat.

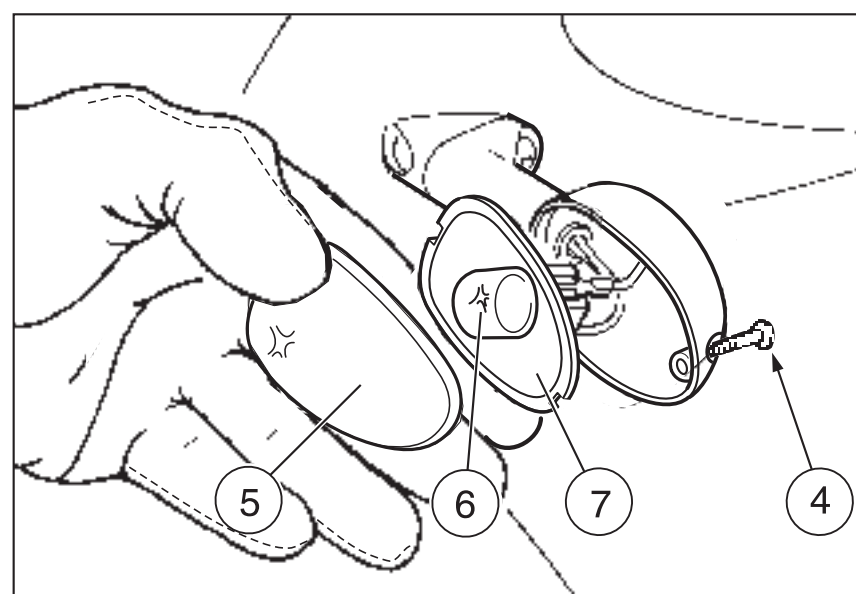
⚠ CAUTION

Insert the bulb in the bulb socket, making the two bulb pins coincide with the relevant guides on the socket.

- ◆ Correctly install a new bulb of the same type.

⚠ CAUTION

If the bulb socket (7) goes out of its seat, insert it correctly, making the bulb socket opening coincide with the screw seat.



6.16.4 CHANGING THE REAR LIGHT BULB

Carefully read 6.16 (CHANGING THE BULBS).

NOTE The rear light houses two parking light/stoplight bulbs (1).

The following operations refer to a single bulb, but are valid for both.

Before changing a bulb, check the efficiency of the stop-light switches, see 6.8.3 (SINGLE SWITCHES).

- ◆ Position the vehicle on the stand.
- ◆ Unscrew and remove the two screws (2).
- ◆ Remove the protection screen (3).

NOTE Upon reassembly, correctly position the protection screen in its seat.

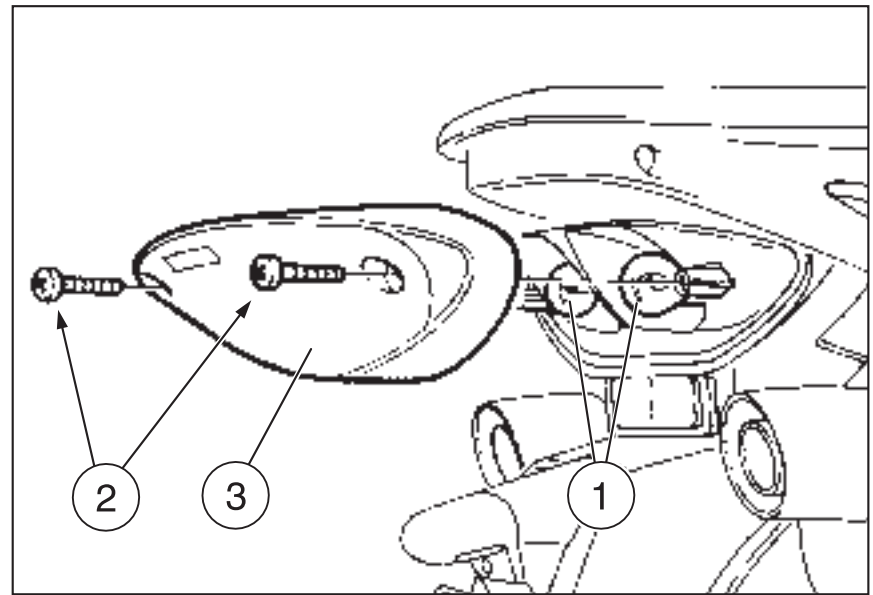
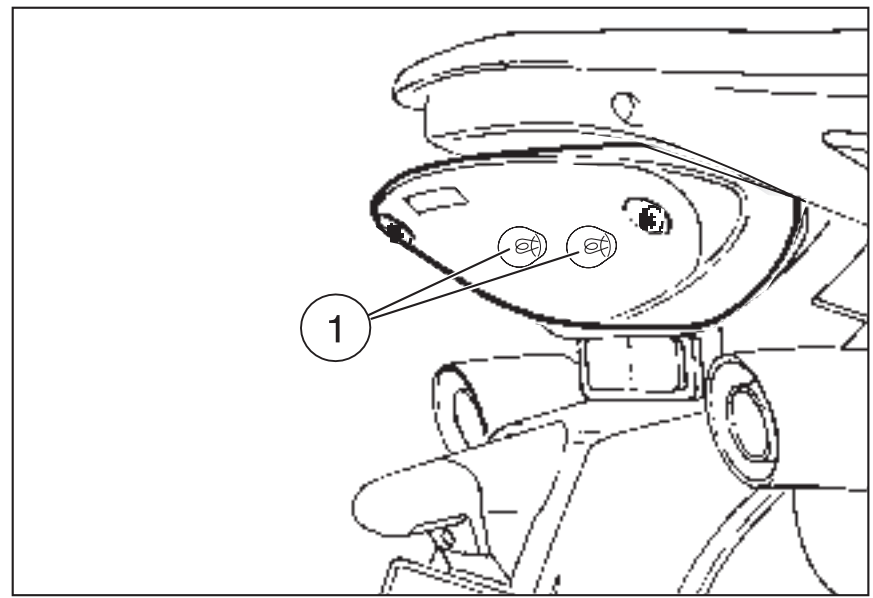
Tighten the screw (2) carefully, without exerting too much pressure, in order to avoid damaging the protection screen.

- ◆ Press the bulb (1) slightly and rotate it anticlockwise.
- ◆ Extract the bulb (1) from its seat.

CAUTION

Insert the bulb in the bulb socket, making the two bulb pins coincide with the relevant guides on the socket.

- ◆ Correctly install a new bulb of the same type.



6.16.5 CHANGING THE NUMBER PLATE BULB

Carefully read 6.16 (CHANGING THE BULBS).

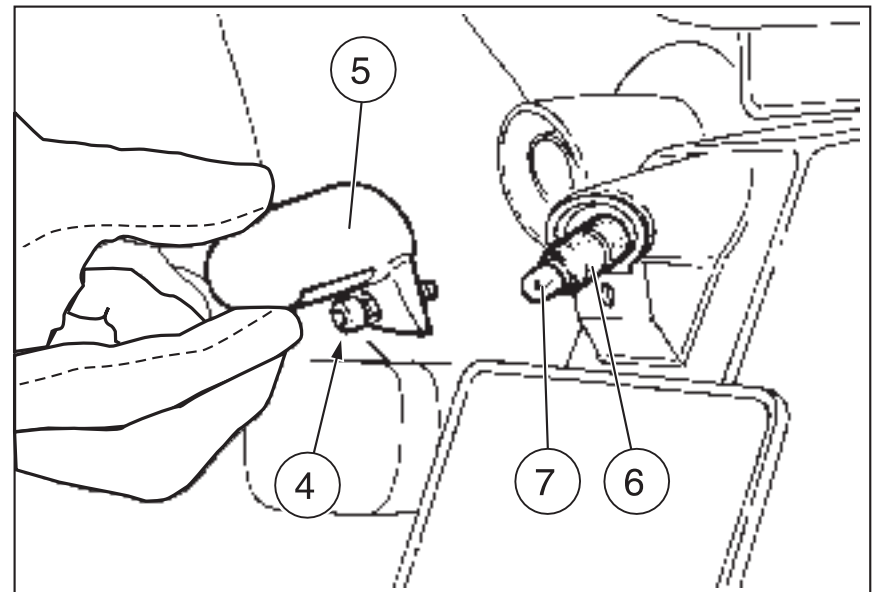
To change, proceed as follows:

- ◆ Position the vehicle on the stand.
- ◆ Unscrew and remove the screw (4), taking the nut.
- ◆ Remove the light unit (5).

CAUTION

Do not pull the electric wires to extract the bulb socket.

- ◆ Grasp the bulb socket (6), pull it and remove it from its seat.
- ◆ Withdraw the bulb (7) and replace it with a new one of the same type.



6.16.6 CHANGING THE DASHBOARD BULBS

To change, proceed as follows:

- ◆ Position the vehicle on the stand.
- ◆ Remove the front fairing, see 7.1.24 (REMOVING THE FRONT FAIRING).
- ◆ Slide out the relevant rubber bulb holder and, where necessary, replace the bulb.

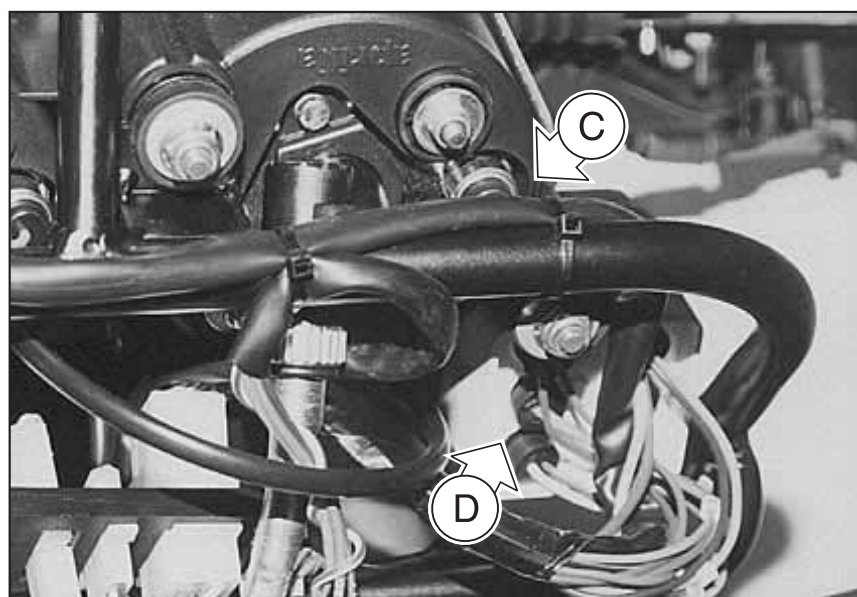
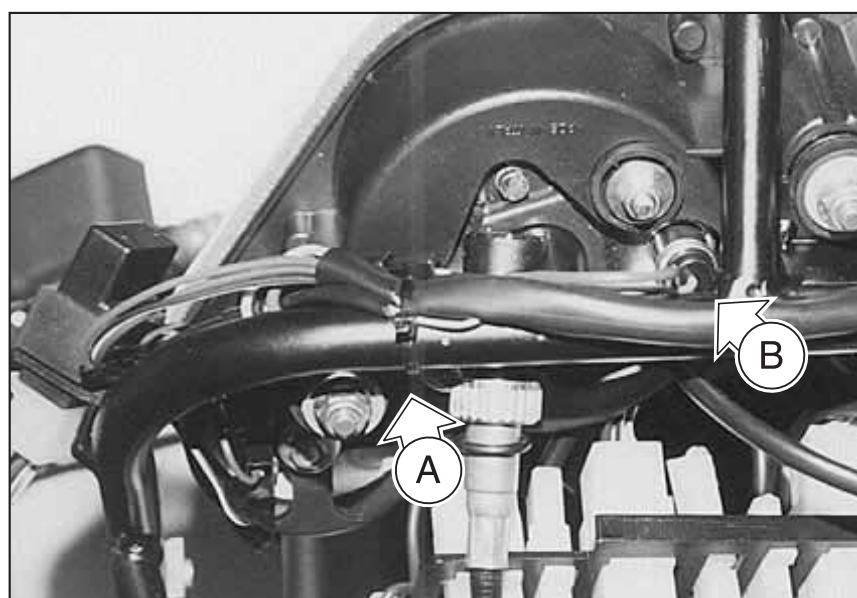
One bulb under the coolant temperature indicator (A).

One bulb under the speedometer/odometer (B).

One bulb under the revolution counter (C).

Six bulbs under the warning light panel (D).

Warning light	Description
↔	direction indicators
⛽	fuel reserve
🔧	diagnostics
N	neutral
🛢	engine oil pressure
☰	High beam



6.17 ADJUSTING THE VERTICAL HEADLIGHT BEAM

NOTE To check the direction of the headlight beam, specific procedures must be adopted, in accordance with the regulations in force in the country where the vehicle is used.

To rapidly check the correct direction of the beam, place the vehicle on flat ground, 10 m away from a wall.

Turn on the low beam, sit on the vehicle and make sure that the beam projected on the wall is slightly under the horizontal line of the headlight (about 9/10th of the total height).

To adjust the headlight beam:

- ◆ Position the vehicle on the stand.
- ◆ Working on the lower side of the front part of the fairing, act on the appropriate screw (1) with the spanner (8 mm) provided in the tool kit.

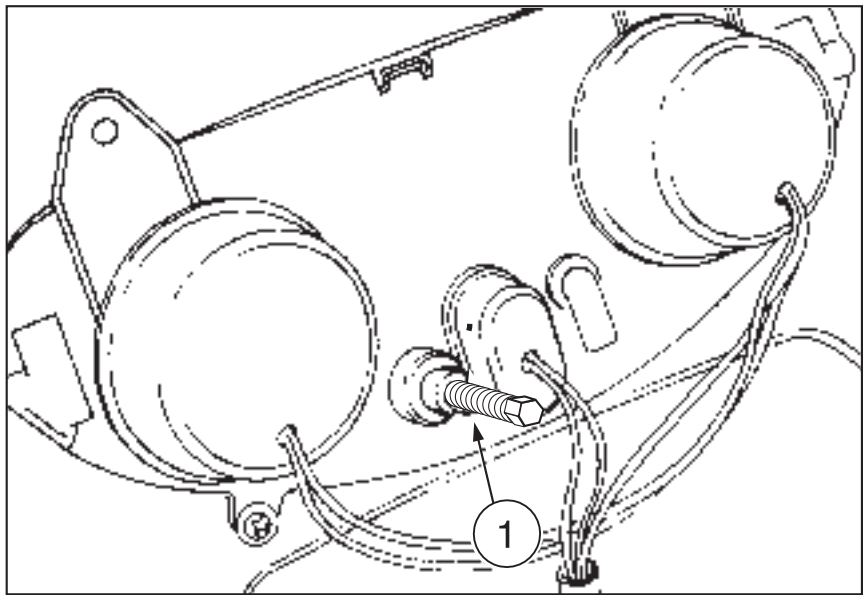
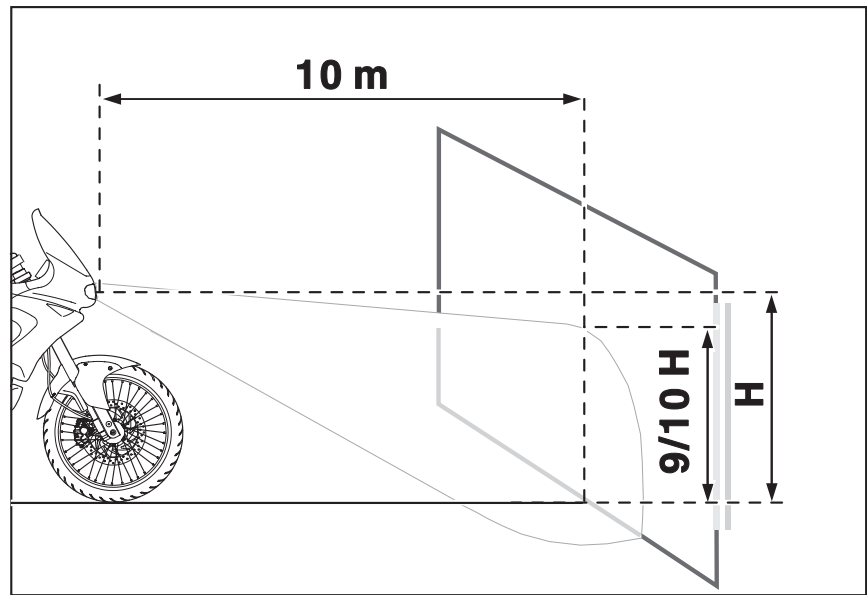
BY ROTATING IT CLOCKWISE, you set the beam upwards.

BY ROTATING IT ANTICLOCKWISE, you set the beam downwards.

After the adjustment:

⚠ WARNING

Make sure that the vertical adjustment of the headlight beam is correct.



6.18 CHANGING THE FUSES

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

⚠ CAUTION

Do not repair faulty fuses.

Never use fuses different from the recommended ones.

The use of unsuitable fuses may cause damages to the electric system or, in case of short circuit, even a fire.

NOTE If a fuse blows frequently, there probably is a short circuit or an overload in the electric system.

If an electric component does not work or works irregularly, or if the vehicle fails to start, it is necessary to check the fuses.

For the check, proceed as follows:

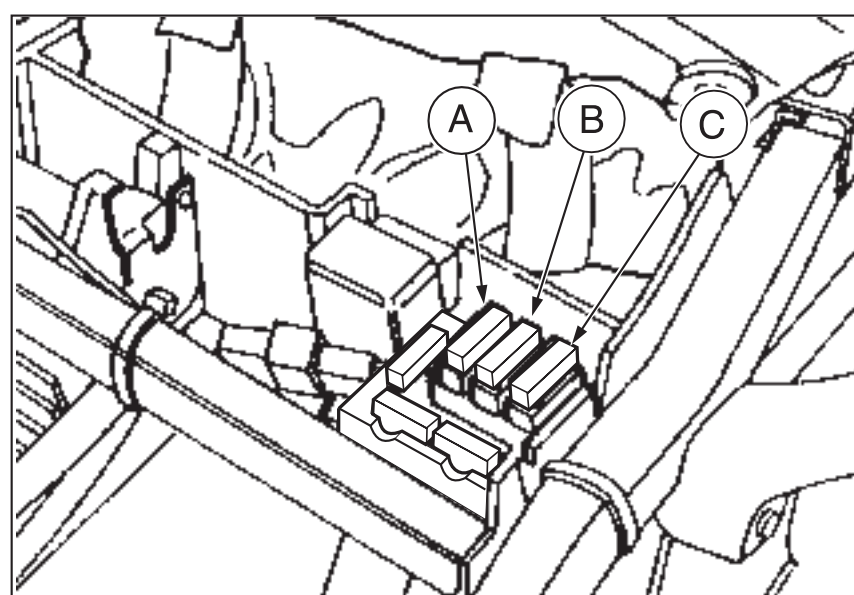
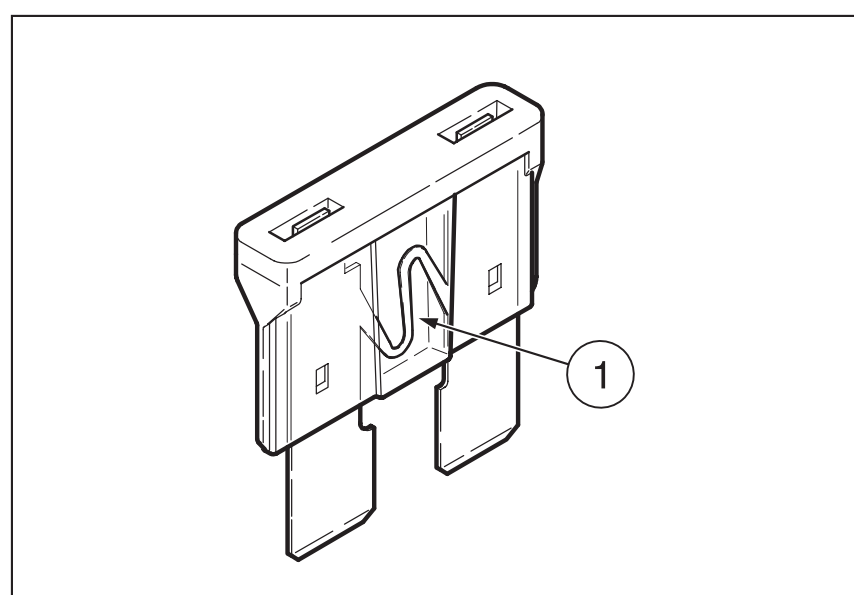
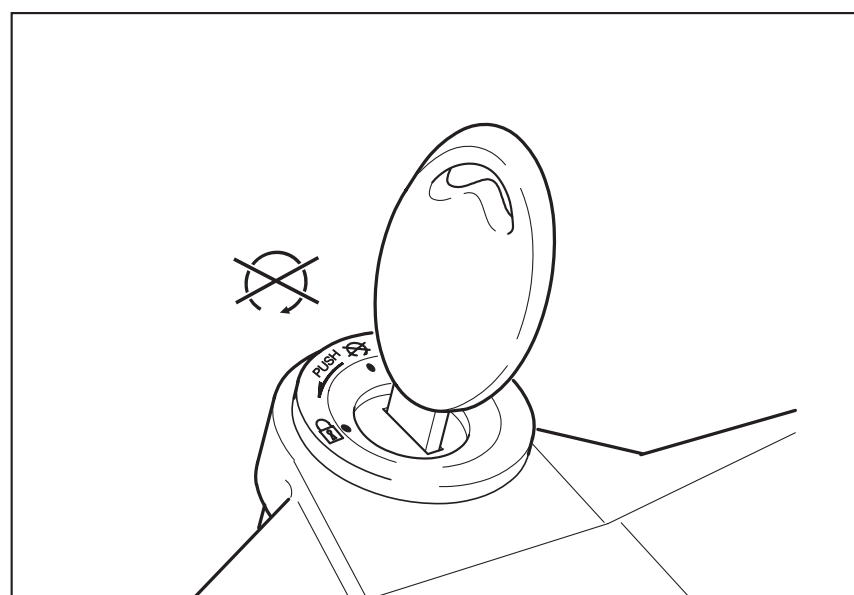
- ◆ Turn the ignition switch to position "⊗", to avoid any accidental short circuit.
- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Extract the fuses one by one and check if the filament (1) is broken.
- ◆ Before replacing a fuse, try to find out the cause of the trouble, if possible.
- ◆ Replace the damaged fuse with a new one having the same amperage.

NOTE If you use one of the spare fuses, put a new fuse in the proper seat.

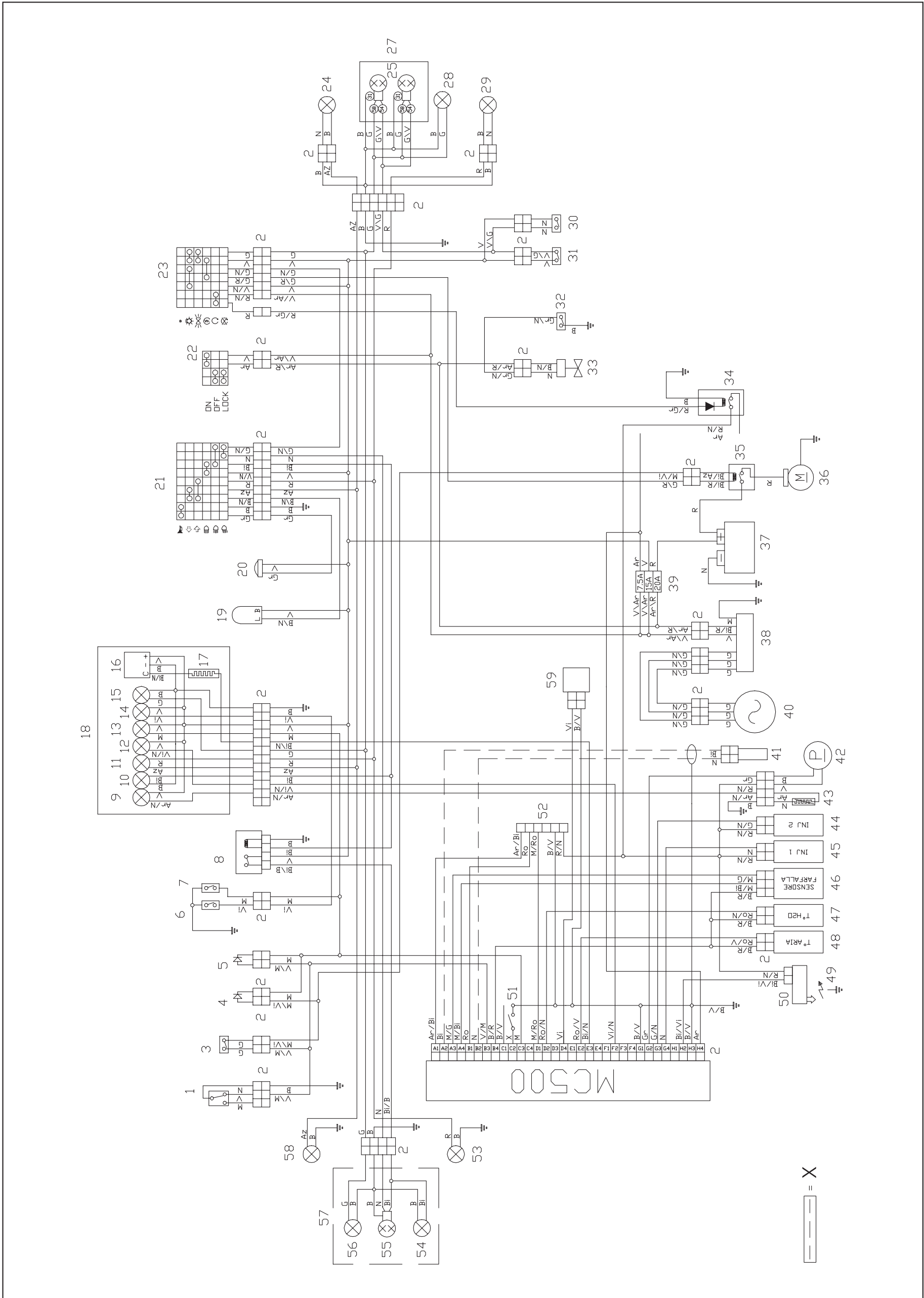
ARRANGEMENT OF THE FUSES

- A) Fuse 20 A (yellow) – From battery to: ignition switch, voltage regulator, electric cooling fan.
- B) Fuse 15 A (light blue) – From ignition switch to: all light loads.
- C) Fuse 7.5 A (red) – From ignition switch to: ignition, starting safety logic.

NOTE Three fuses are spare fuses.



6.19 WIRING DIAGRAM



Key

- | | |
|---------------------------------------|--|
| 1) Side stand switch | 31) Rear stoplight switch |
| 2) Multiple connectors | 32) Thermal switch cooling electrofan |
| 3) Clutch control lever switch | 33) Cooling electrofan |
| 4) Diode 1 | 34) Injection relay |
| 5) Diode 2 | 35) Start relay |
| 6) Engine oil pressure switch | 36) Starter |
| 7) Neutral gear switch | 37) Battery |
| 8) Light relay | 38) Voltage regulator |
| 9) Low fuel warning light | 39) Fuses |
| 10) High beam warning light | 40) Generator |
| 11) Direction indicator warning light | 41) Pick up |
| 12) Diagnostic warning light | 42) Fuel pump |
| 13) Neutral warning light | 43) Low fuel sensor |
| 14) Engine oil pressure warning light | 44) Injector 2 |
| 15) Dashboard bulbs | 45) Injector 1 |
| 16) Coolant temperature indicator | 46) Throttle valve position sensor |
| 17) Dashboard resistance | 47) Coolant temperature thermistor |
| 18) Dashboard | 48) Air thermistor |
| 19) Blinking | 49) Spark plug |
| 20) Horn | 50) Coil |
| 21) Left dimmer switch | 51) Octane number selection (not provided as standard equipment) |
| 22) Ignition switch | 52) Diagnostic connection |
| 23) Right dimmer switch | 53) Front right direction indicator |
| 24) Rear left direction indicator | 54) High beam bulbs |
| 25) Parking light bulb/rear stoplight | 55) Low beam bulb/high beam |
| 26) Electronic unit | 56) Front parking light bulb |
| 27) Rear light | 57) Headlight |
| 28) Number plate bulb | 58) Front left direction indicator |
| 29) Rear right direction indicator | 59) Fall sensor |
| 30) Front stoplight switch | X) Shielded cables |

CABLE COLOURS

Ar	Orange
Az	Light blue
B	Blue
Bi	White
G	Yellow
Gr	Grey
M	Brown
N	Black
R	Red
Ro	Pink
V	Green
Vi	Violet
Ro	Pink

CHASSIS

7

CHASSIS

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7.9.6 DISASSEMBLING THE REAR FORK GASKETS 7-86-00

7.9.7 REASSEMBLING THE REAR FORK 7-87-00

7.10 REAR SUSPENSION 7-88-00

7.10.1 REMOVING THE SHOCK ABSORBER 7-88-00

7.10.2 CHECKING THE COMPONENTS 7-89-00

7.10.3 DISASSEMBLING THE REAR SUSPENSION LINKAGE 7-90-00

7.10.4 DISASSEMBLING THE SUSPENSION LINKAGE 7-90-00

7.11 DISASSEMBLING THE DRIVING CHAIN 7-91-00

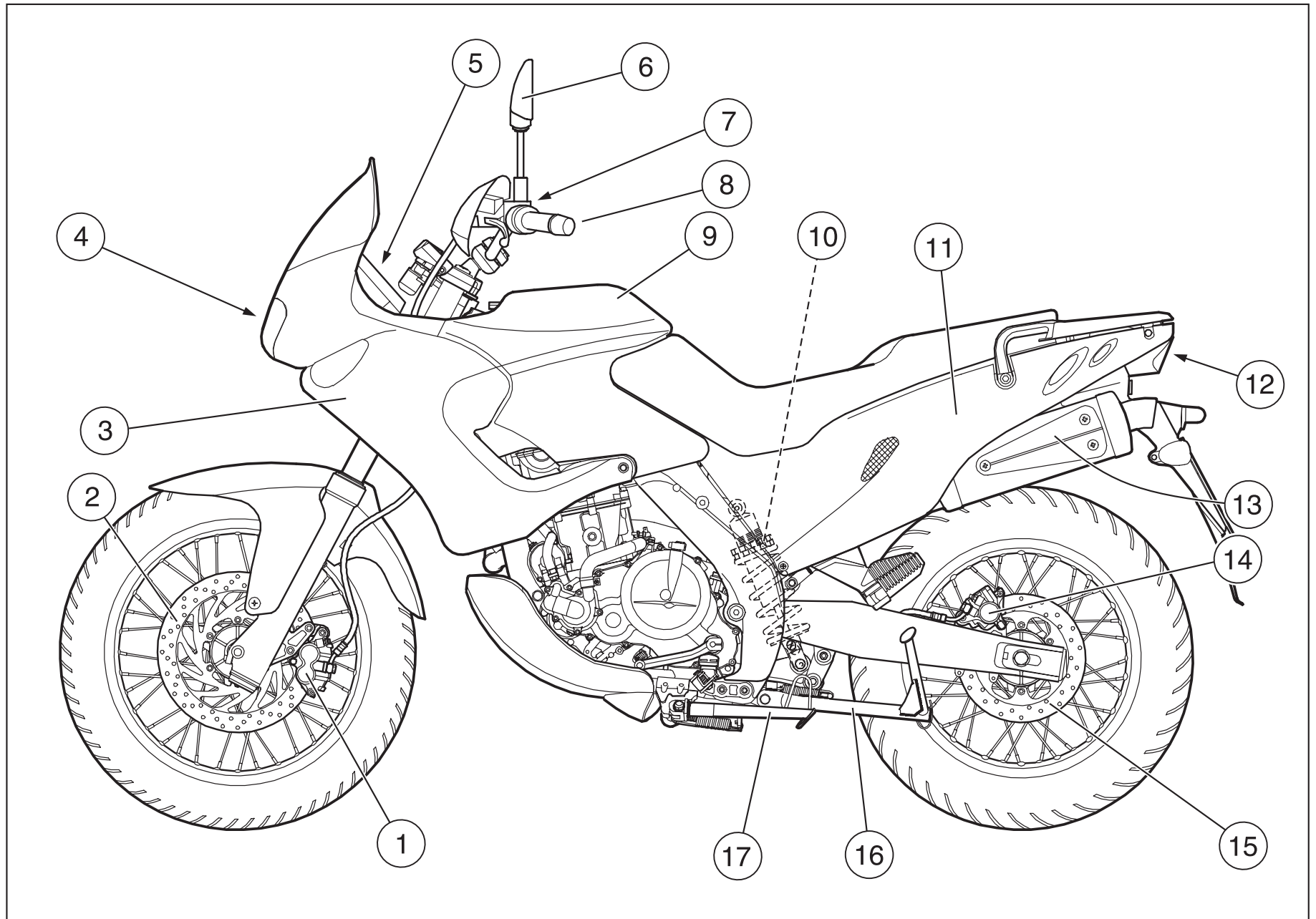
7.11.1 CHAIN BREAKER/RIVET TOOL **OPT** 7-91-00

7.11.2 BREAKING THE CHAIN 7-92-00

7.11.3 POSITIONING THE JOINING LINK 7-93-00

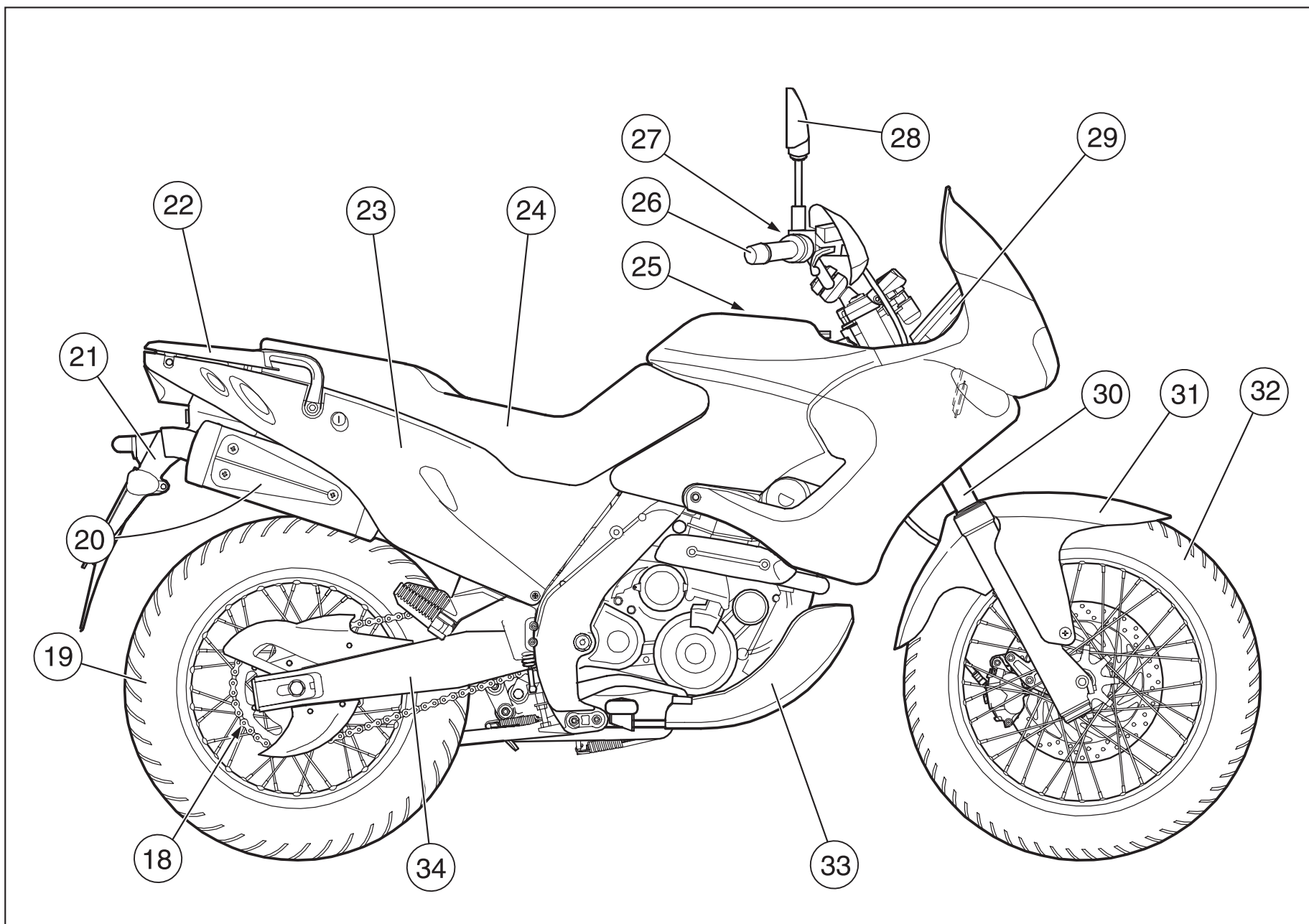
7.11.4 RIVETTING THE PINS 7-93-00

7.1 BODY



Key

- 1) Front brake caliper
- 2) Front brake disc
- 3) Front fairing
- 4) Headlight
- 5) Dashboard
- 6) Ignition switch/steering lock
- 7) Left rear-view mirror
- 8) Controls on the left part of the handlebar
- 9) Left handgrip
- 10) Fuel tank
- 11) Shock absorber
- 12) Left side cover
- 13) Rear light
- 14) Left exhaust silencer
- 15) Rear brake caliper
- 16) Rear brake disc
- 17) Centre stand **OPT**
- 18) Side stand

**Key**

- 19) Drive chain
- 20) Rear wheel
- 21) Right exhaust silencer
- 22) Number plate holder
- 23) Rear luggage rack
- 24) Right side cover
- 25) Saddle
- 26) Fuel tank filler cap
- 27) Right handgrip (throttle grip)
- 28) Controls on the right part of the handlebar
- 29) Right rear-view mirror
- 30) Dashboard fairing
- 31) Front fork
- 32) Front mudguard
- 33) Front wheel
- 34) Oil sump guard
- 35) Rear fork

7.1.1 REMOVAL OF THE FUEL TANK

Carefully read 1.2.1 (FUEL) and 4.1 (FUEL TANK).

⚠ WARNING

Risk of fire.

Wait until the engine and the exhaust silencer have completely cooled down.

Fuel vapours are noxious for your health.

Before proceeding, make sure that the room in which you are working is properly ventilated.

Do not inhale fuel vapours.

Do not smoke and do not use naked flames.

DO NOT DISPOSE OF FUEL IN THE ENVIRONMENT.

- ◆ Turn the ignition switch to position "⊗".
- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Unscrew and remove the centre screw (1).

Tank rear screw driving torque: 15 Nm (1.5 kgm).

- ◆ Take the washer (2) and the rubber pad (3).
- ◆ ★ Unscrew and remove the three screws (4).

Tank side screw driving torque: 5 Nm (0.5 kgm).

- ◆ Disconnect the electric connector (5) from the fuel pump.

⚠ CAUTION

Upon reassembly, make sure that the electric connector (5) is correctly coupled.

⚠ WARNING

Position a clean cloth under the rapid couplings (6) and (7), in order to absorb the small quantity of fuel that will flow out of them after disconnection.

- ◆ Release and disconnect the rapid couplings (6) (7).

⚠ WARNING

Upon reassembly, make sure that the rapid couplings (6) (7) are inserted correctly.

Working from the left-hand side of the vehicle:

- ◆ Move the fairing (8) moderately towards the outside.

NOTE Mark the two pipes (9) (10) in order to be able to insert them in the relevant union upon reassembly.

- ◆ Withdraw the two pipes (9) (10) downwards:
 - pipe (9) = fuel tank overflow;
 - pipe (10) = water drainage from tank cap.

⚠ WARNING

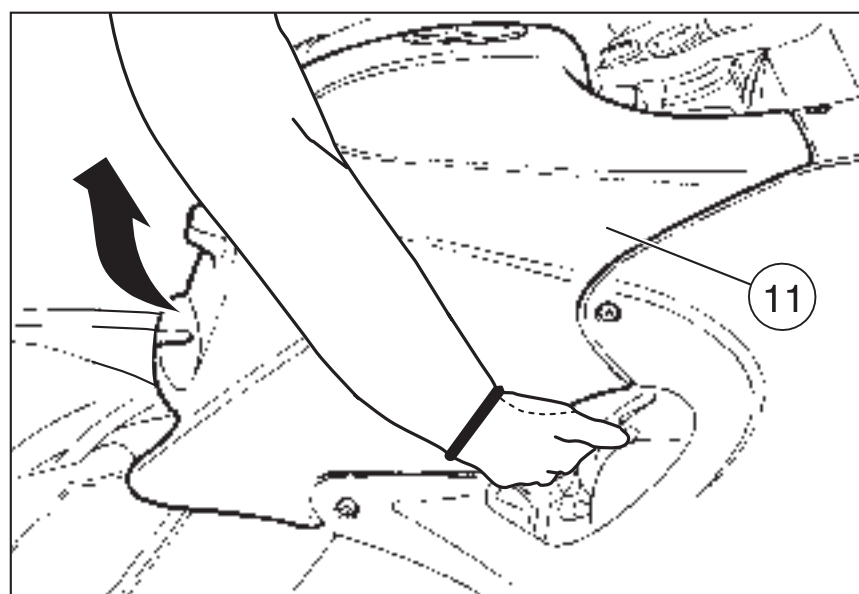
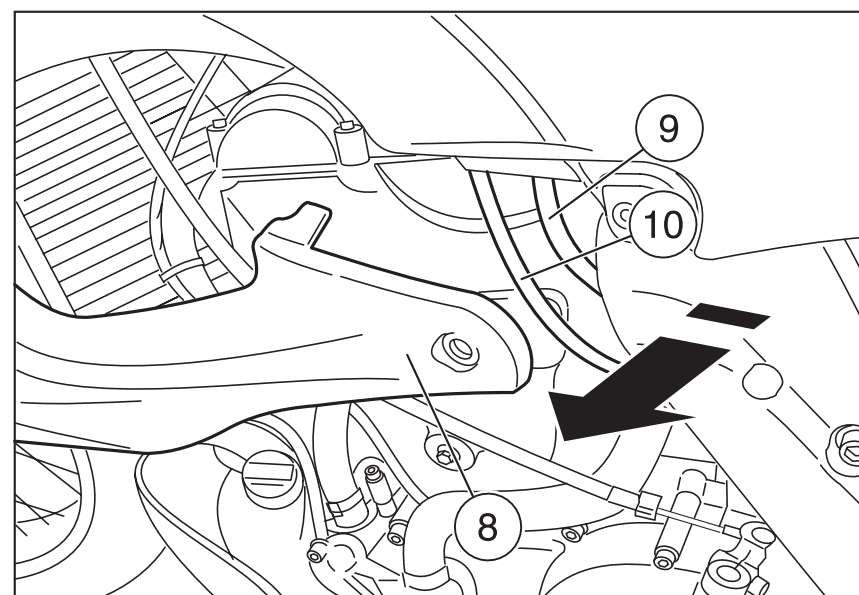
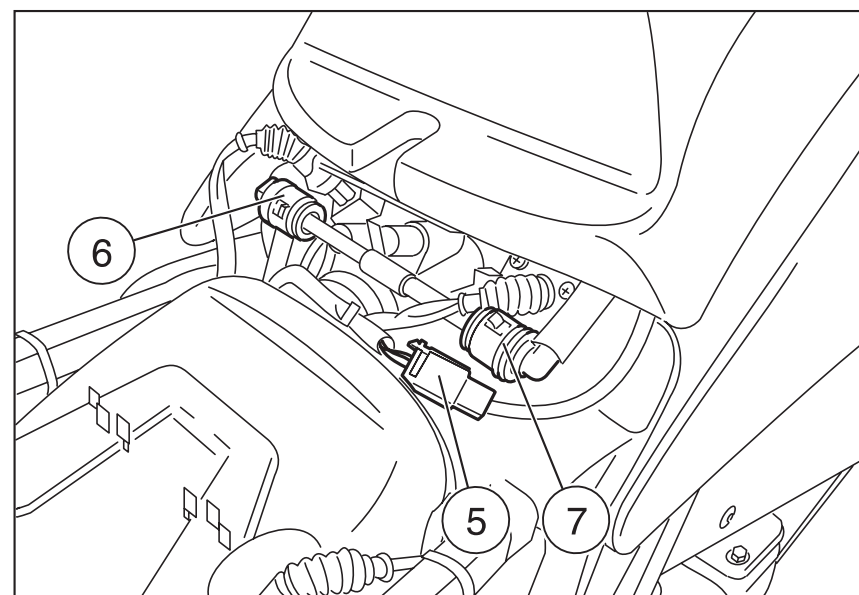
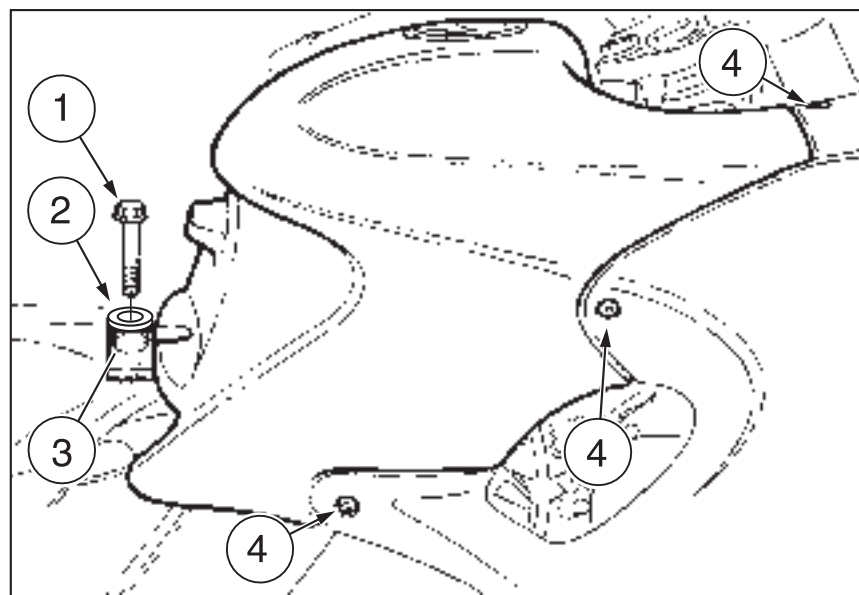
When reassembling, make sure the pipes are plugged in properly (9) (10).

⚠ CAUTION

Handle the plastic and painted components with care to avoid scraping or damaging them.

- ◆ Grasp the tank (11) and, pulling it backwards, withdraw it from the two front supports.
- ◆ Raise and remove the tank (11).

Follow ►



Follow ►

⚠ WARNING

Position the tank in a safe place, with the cap facing upwards; neither overturn, nor tilt it, since the filler-cap is not tight and the fuel would flow out of the tank.

7.1.2 REMOVING THE FUEL TANK FILLER CAP

Carefully read 1.2.1 (FUEL) and 4.1 (FUEL TANK).

⚠ WARNING

Fuel vapours are noxious for your health. Before proceeding, make sure that the room in which you are working is properly ventilated. Do not inhale fuel vapours. Do not smoke and do not use naked flames. Do not dispose of fuel in the environment.

FIRE AND/OR EXPLOSION HAZARD.

- ◆ Position the vehicle on the stand.
- ◆ Unscrew and remove the three screws (1).

Fuel tank filler cap screw driving torque: 5 Nm (0.5 kgm).

NOTE The other three screws can be left on the vehicle as they are just for show.

- ◆ Open the cap (2).

⚠ CAUTION

When removing the screw (3), take care not to allow it to fall inside the tank.

- ◆ Unscrew and remove the screw (3).

Filler cap inner screw (3) driving torque: 5 Nm (0.5 kgm).

- ◆ Remove the cap (2) together with the metal ring (4).

⚠ CAUTION

Plug the tank opening so as to prevent any foreign bodies falling in.

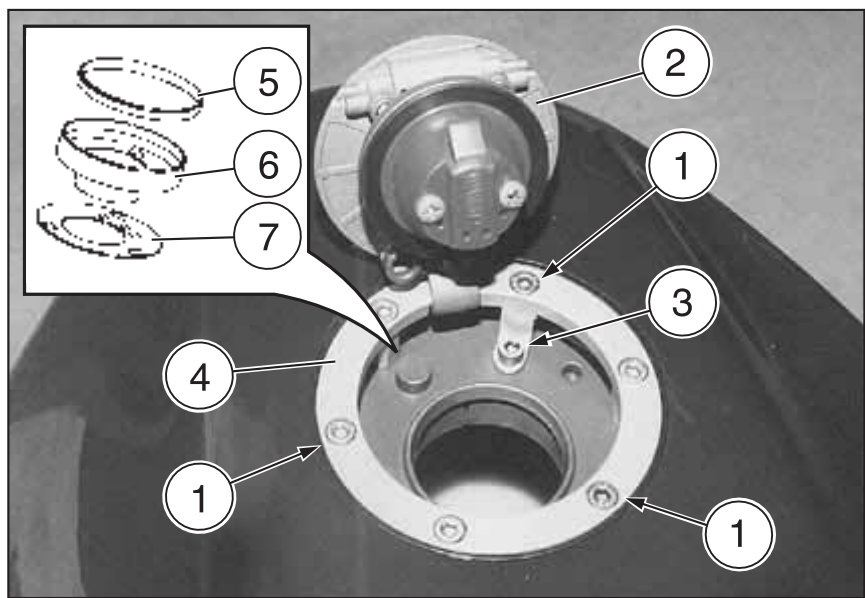
- ◆ Remove, in the order indicated:
 - gasket (5);
 - cup (6);
 - cup gasket (7).

⚠ CAUTION

Upon reassembly, position the cup gasket (7) and the cup (6) correctly, so that the holes coincide.

⚠ WARNING

Plug the tank opening so as to prevent any foreign bodies falling in.



7.1.3 REMOVING THE OIL SUMP GUARD

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

⚠ WARNING

Wait until the engine and the exhaust silencer have completely cooled down.

- ◆ Position the vehicle on the stand.
- ◆ Unscrew and remove the four screws (1).

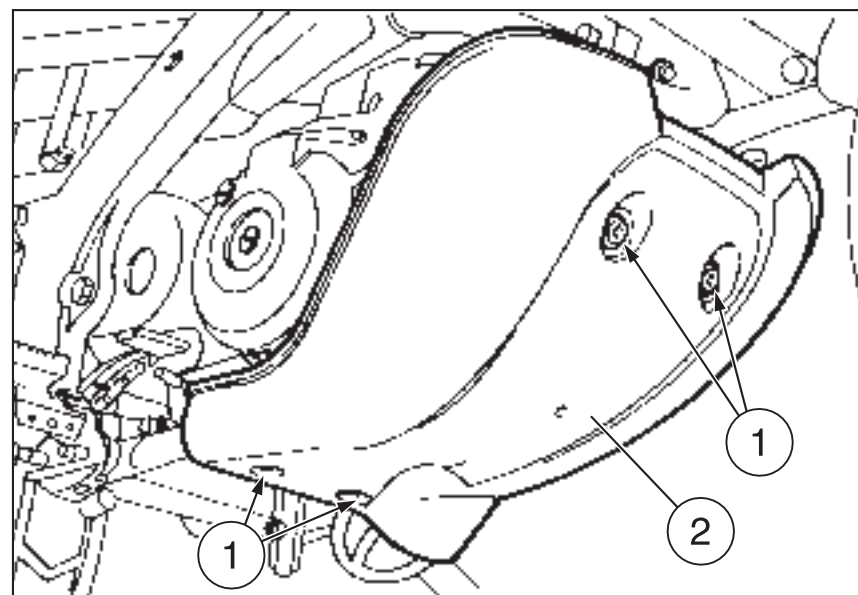
Oil sump guard screw driving torque: 6 Nm (0.6 kgm).

⚠ CAUTION

Handle the plastic and painted components with care to avoid scraping or damaging them.

- ◆ Remove the oil sump guard (2).

NOTE If the deadening material inside the oil sump guard (2) is deteriorated, contact an **aprilia** Official Dealer to have it changed.



7.1.4 REMOVING THE RIGHT AND LEFT SIDES

Carefully read 0.5.4 (REASSEMBLING THE COMPONENTS).

⚠ WARNING

Wait until the engine and the exhaust silencer have completely cooled down.

- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Unscrew and remove the four screws (3).

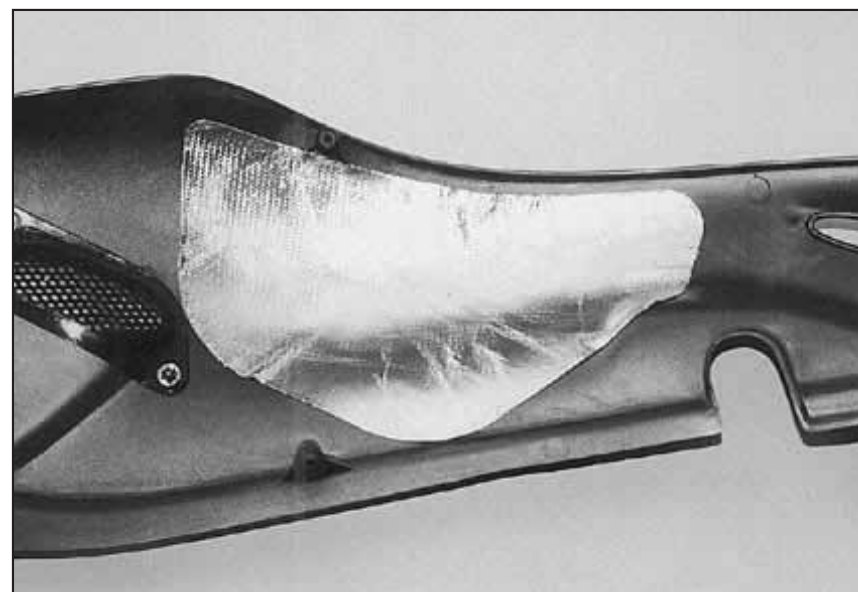
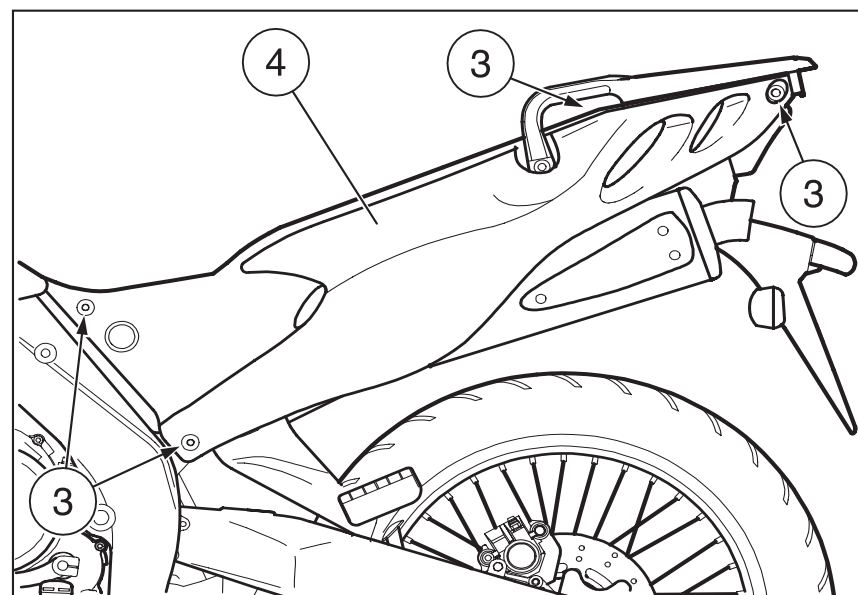
Side cover screw driving torque: 3 Nm (0.3 kgm).

- ◆ Remove the side cover (4).

⚠ CAUTION

Handle the plastic and painted components with care to avoid scraping or damaging them.

NOTE If the heat-resistant material inside the oil sump guard is deteriorated, replace it.



7.1.5 REMOVING THE REAR LUGGAGE RACK

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the side panels, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).
- ◆ ★ Unscrew and remove the screw (1).

Luggage rack side screw driving torque: 12 Nm (1.2 kgm).

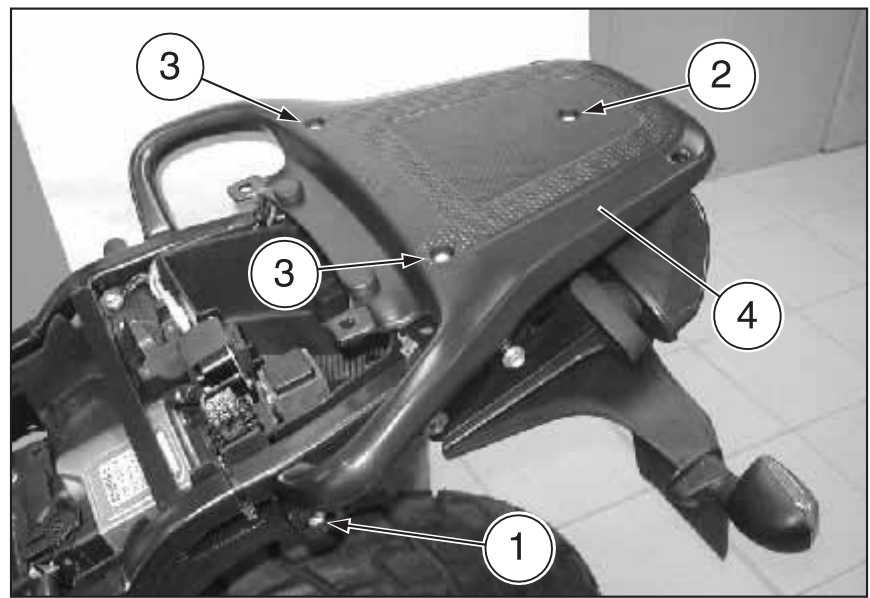
- ◆ Unscrew and remove the screw (2).

Rear luggage rack screw driving torque: 8 Nm (0.8 kgm).

- ◆ Unscrew and remove the two screws (3).

Front luggage rack screw driving torque: 10 Nm (1.0 kgm).

- ◆ Remove the luggage rack (4) and take the bushes and the rubber elements.



7.1.6 REMOVING THE FRONT MUDGUARD GROUP

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the stand.

CAUTION

Handle the painted components with care and avoid scraping or damaging them.

- ◆ ★ Unscrew and remove the screw (5).

Front mudguard upper screw driving torque: 7 Nm (0.7 kgm).

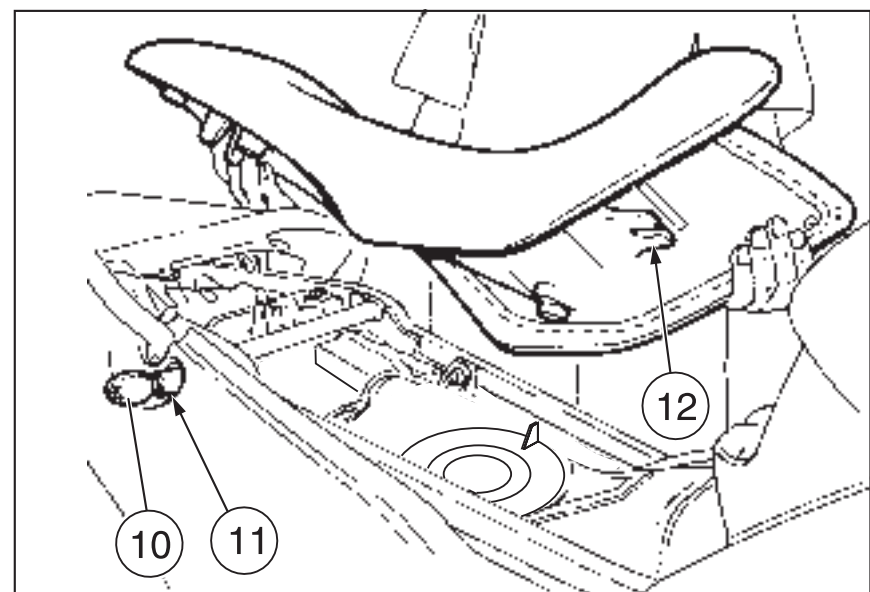
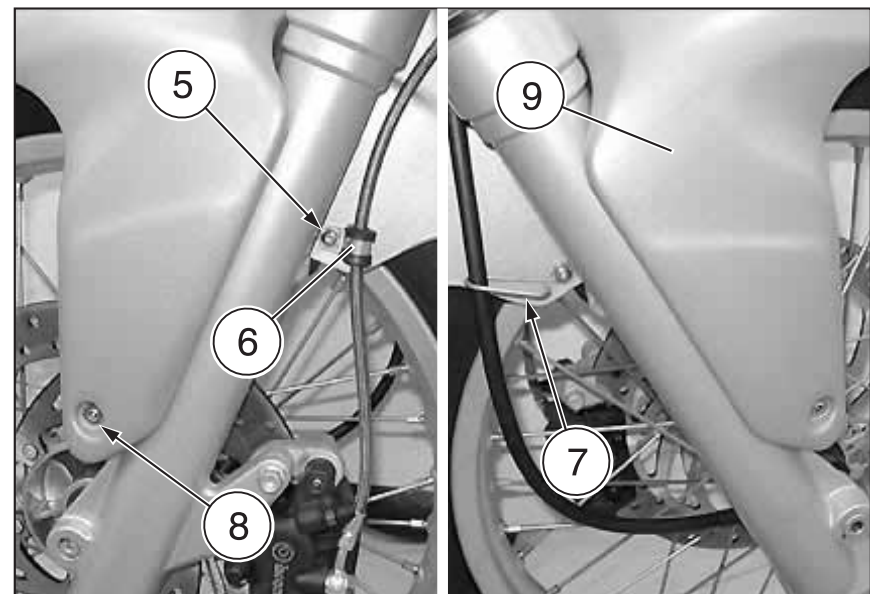
CAUTION

Upon reassembly, position the clamp (6) and the cable guide (7) correctly.

- ◆ ★ Unscrew and remove the screw (8).

Front mudguard lower screw driving torque: 5 Nm (0.5 kgm).

- ◆ Remove the front mudguard (9).



7.1.7 REMOVING THE SADDLE

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the stand.
- ◆ Insert the key (10) in the saddle lock (11).
- ◆ Turn the key (10) clockwise and raise and remove the saddle.

NOTE Before lowering and locking the saddle, make sure that you have not left the key in the glove/tool kit compartment.

To lock the saddle:

- ◆ Position the tangs (12) in the seat, lower and press the saddle, making the lock snap.

WARNING

Before leaving, make sure that the saddle is properly locked.

7.1.8 REMOVING THE BATTERY

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.3 (BATTERY).

- ◆ Make sure that the ignition switch is in position "⊗".
- ◆ Remove the left cover, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).
- ◆ Unscrew and remove the screw (1).

Driving torque of the battery cover screw: 3 Nm (0.3 kgm).

- ◆ Remove the battery cover (2).
- ◆ Unscrew and remove the screw (3) on the negative terminal (-).
- ◆ Move the negative cable (4) sideways.
- ◆ Remove the red protection element (5).
- ◆ Unscrew and remove the screw (6) on the positive terminal (+).
- ◆ Move the positive cable (7) sideways.

⚠ CAUTION

Do not force the electric cables.

- ◆ Withdraw the breather pipe (8).
- ◆ Grasp the battery (9) firmly and remove it from its compartment, by bending it towards the outside and lifting it.

⚠ WARNING

Once it has been removed, the battery must be stored in a safe place and kept away from children.

- ◆ Position the battery on a flat surface, in a cool and dry place.
- ◆ Put back the left cover, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).

⚠ WARNING

Upon reassembly, connect first the positive cable (+) and then the negative cable (-).

INSTALLATION

- ◆ Make sure that the ignition switch is in position "⊗".

NOTE The battery (9) must be positioned in its compartment with the terminals directed towards the outside part of the vehicle.

- ◆ Put the battery (9) in its compartment.

⚠ WARNING

Upon reassembly, connect first the positive cable (+) and then the negative cable (-).

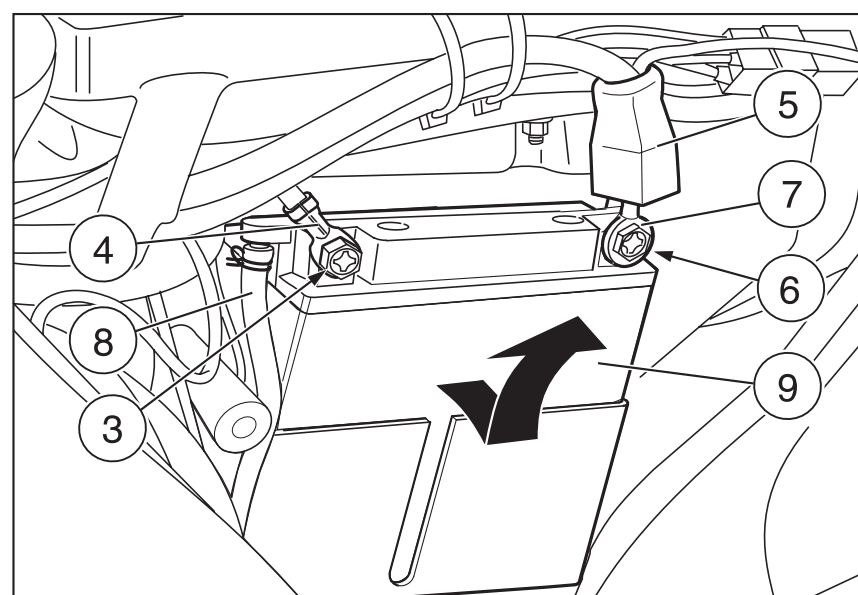
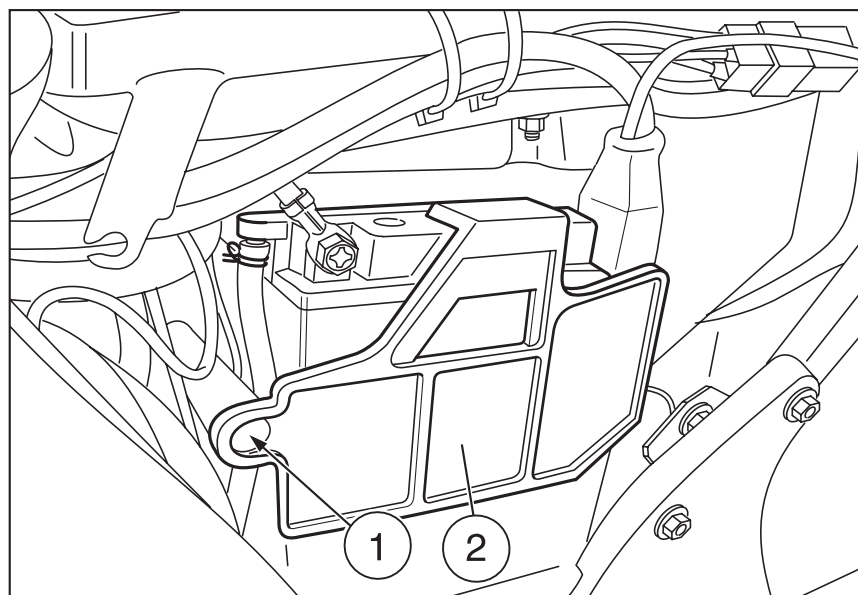
- ◆ Connect the positive terminal (+) by means of the screw (6).
- ◆ Connect the negative terminal (-) by means of the screw (3).
- ◆ Put back the red protection element (5).

⚠ CAUTION

Upon reassembly always connect the battery breather pipe, to prevent the sulphuric acid vapours from corroding the electric system, painted parts, rubber elements or gaskets when they exit the breather pipe itself.

- ◆ Put back the breather pipe (8).
- ◆ Put back the battery cover (6).
- ◆ Position and tighten the screw (1).

Put back the left cover, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).



7.1.9 REMOVING THE AIR CLEANER CASE

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the centre stand **OPT**.
- ◆ Remove the battery, see 7.1.8 (REMOVING THE BATTERY).
- ◆ Remove the exhaust silencers, see 7.1.34 (REMOVING THE EXHAUST SILENCERS).

NOTE Have the appropriate special tool **OPT** to hand:
 – **aprilia** part# 0277295 (hose clamp installation pliers).

CAUTION

Upon installation, replace the hose clamp that has been removed with a new one having the same dimensions, see 0.4.2 (SPARE PARTS CATALOGUES). Do not attempt to reinstall the removed hose clamp, since it is unusable.

Do not replace the removed hose clamp with a screw clamp or with other types of clamp.

- ◆ Release the hose clamp (1).
- ◆ Disconnect the pipe (2).
- ◆ Disconnect the pipe (3).

NOTE To make it easier to withdraw the pipes (4) (5), first withdraw the oil breather pipe (4) and then the petrol breather pipe (5).

- ◆ Withdraw the two pipes (4) (5) from the clamp (6) and from the cable guide (7).

NOTE Upon reassembly, position the pipes correctly.

- ◆ Remove the battery case (8).
- ◆ Unscrew and remove the screw (9), taking the nut and the washers.

Filter case lower screw driving torque: 7 Nm (0.7 kgm).

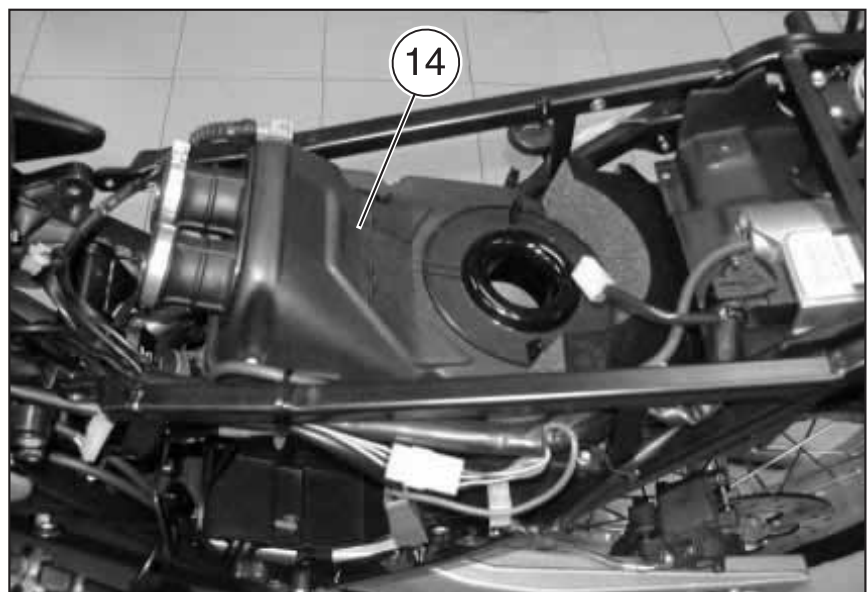
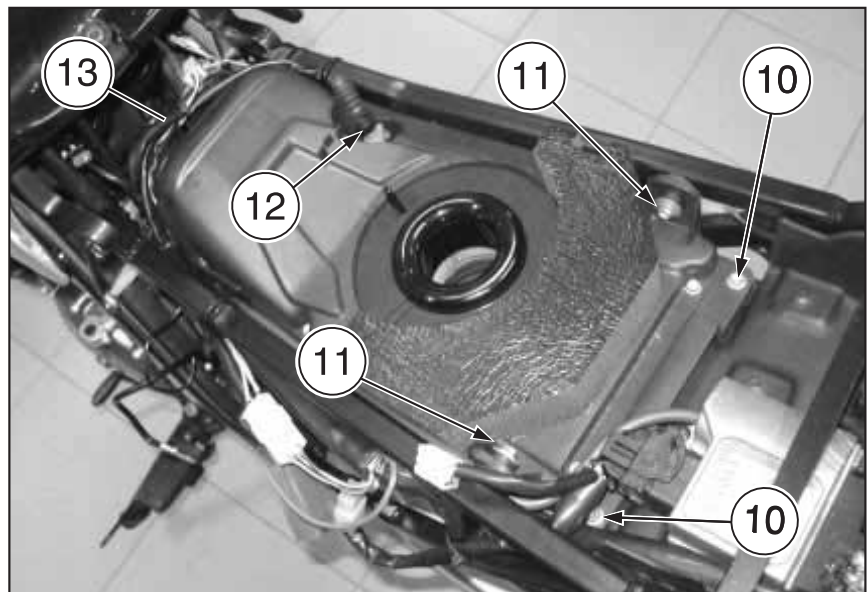
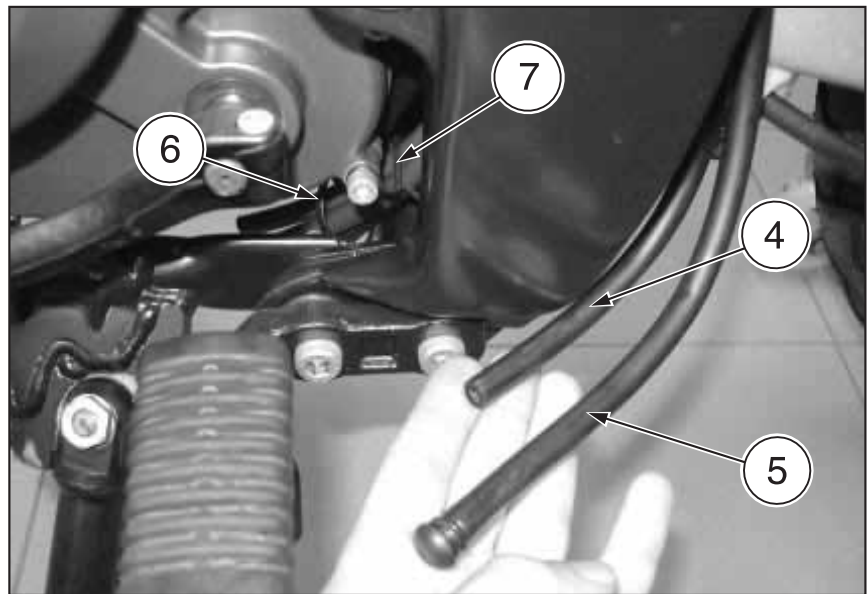
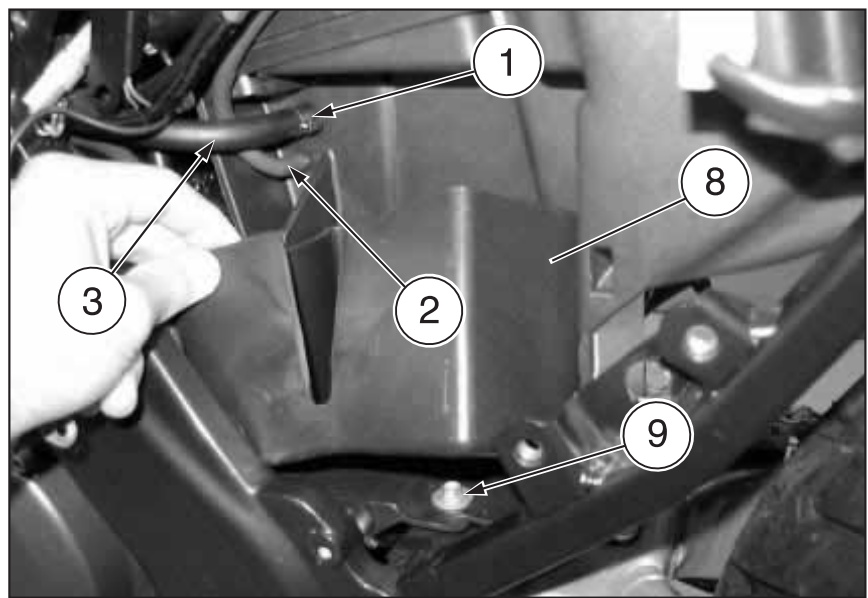
- ◆ Unscrew and remove the two screws (10), taking the relevant nuts.

Filter case rear screw driving torque: 10 Nm (1.0 kgm).

- ◆ Unscrew and remove the two screws (11), taking the rubber elements and the bushes.

Filter case upper screw driving torque: 6 Nm (0.6 kgm).

- ◆ Disconnect the air temperature sensor connector (12).
- ◆ Partially remove the saddle support, see 7.1.36 (REMOVING THE SADDLE SUPPORT).
- ◆ Move the filter case (13) forward, lower the rear part and withdraw it from behind.
- ◆ Rotate and remove the air conveyor (15) and clean the filtering element, see 2.8 (AIR CLEANER).
- ◆ Unscrew and remove the seven screws (16), taking the relevant nuts.
- ◆ Remove the filter case cover (17).
- ◆ Check and if necessary change the following components:
 - plug gasket (18).
 - gasket filter casing (19);
 - inlet coupling (20);
 - Acoustic insulation edging (21).
- ◆ Carefully clean the inside of the filter case.



7.1.10 REMOVING THE ELECTRONIC UNIT

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Turn the ignition switch to position "⊗".
- ◆ Put back the rider saddle, see 7.1.7 (REMOVING THE SADDLE).
- ◆ Disconnect the pipe (22).
- ◆ Unscrew and remove the screw (23), taking the relevant nut.

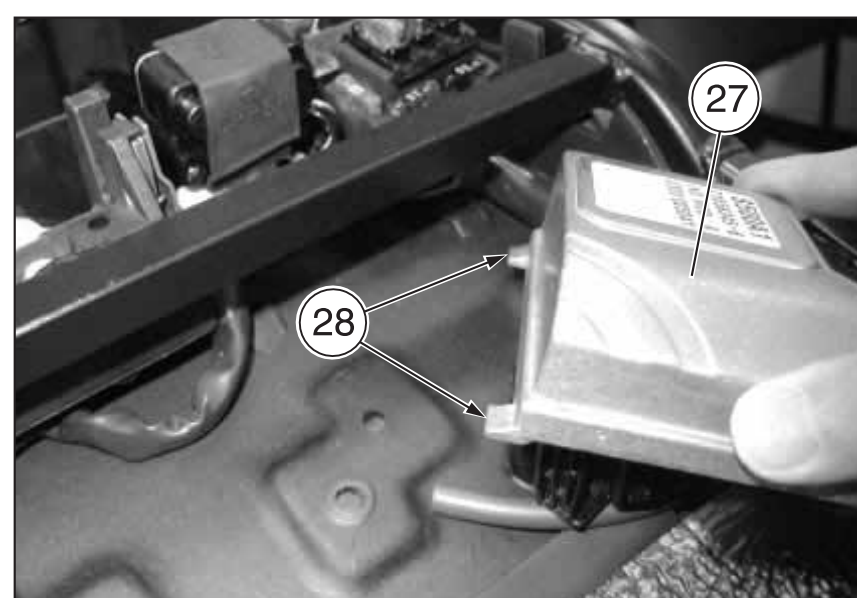
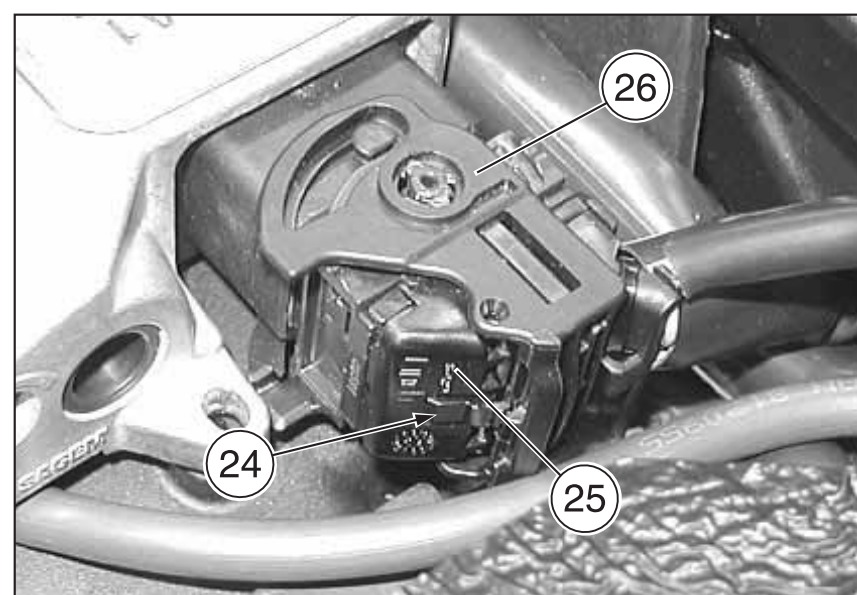
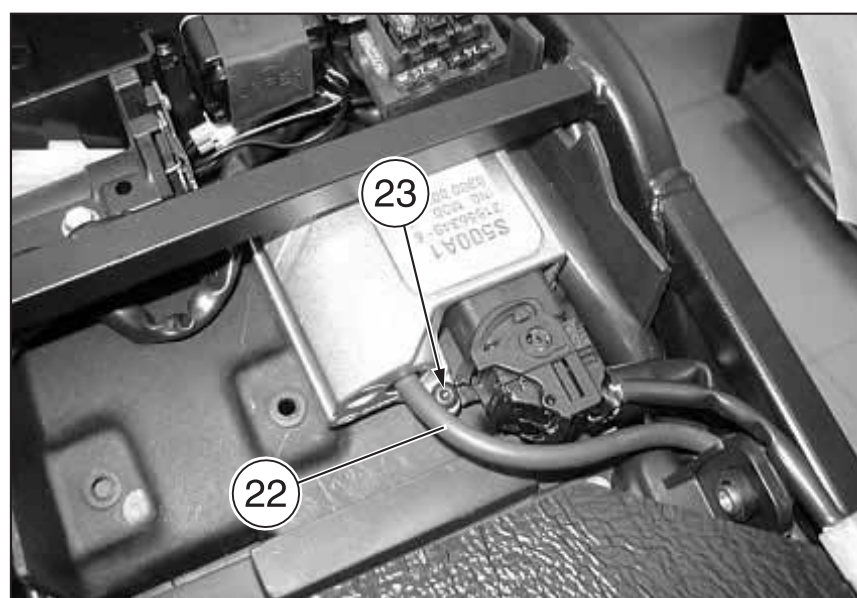
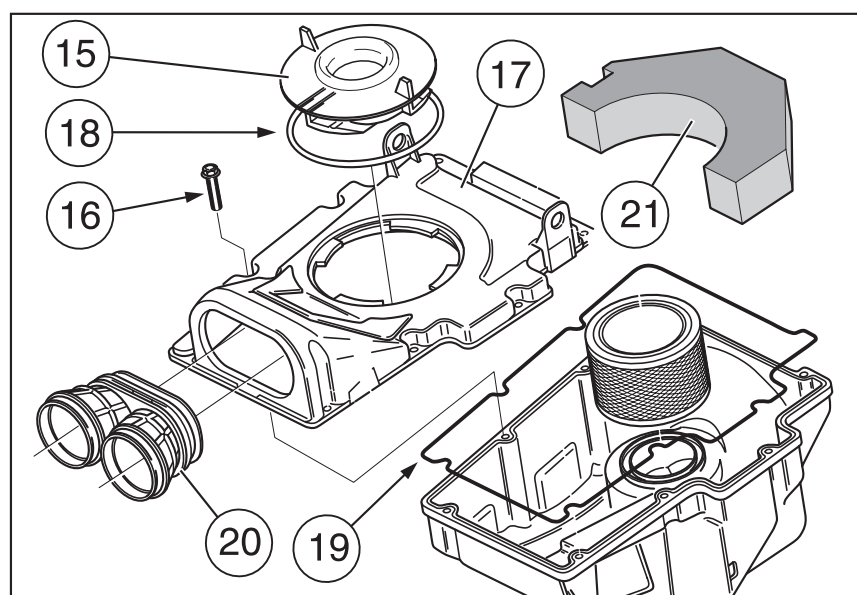
Unit screw driving torque: 3 Nm (3.0 kgm).

- ◆ Press the tang (24) of the connector (25) and rotate the coupling (26) completely.
- ◆ Disconnect the connector (25).

NOTE When reassembling, make sure the connector (25) is plugged in properly.

- ◆ Remove the electronic unit (27).

NOTE Upon reassembly, take care to position the tangs (28) correctly in their seats.



7.1.11 REMOVING THE ANTIVIBRATION WEIGHT

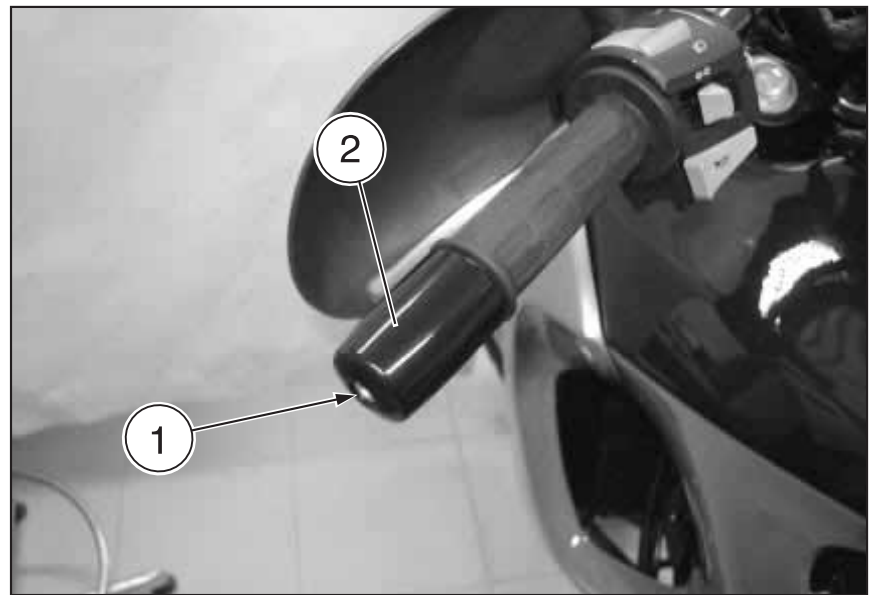
Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

NOTE The following information refers to one unit only, but is valid for both.

- ◆ Position the vehicle on the stand.
- ◆ Unscrew and remove the screw (1).

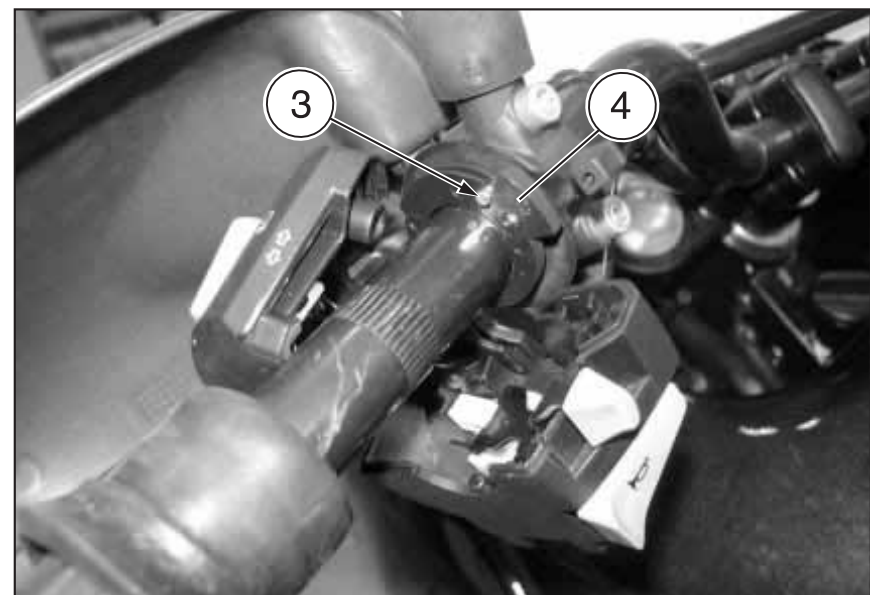
Antivibration weight screw driving torque: 10 Nm (1.0 kgm).

- ◆ Remove the antivibration weight (2).



7.1.12 REMOVING THE COLD-START CONTROL

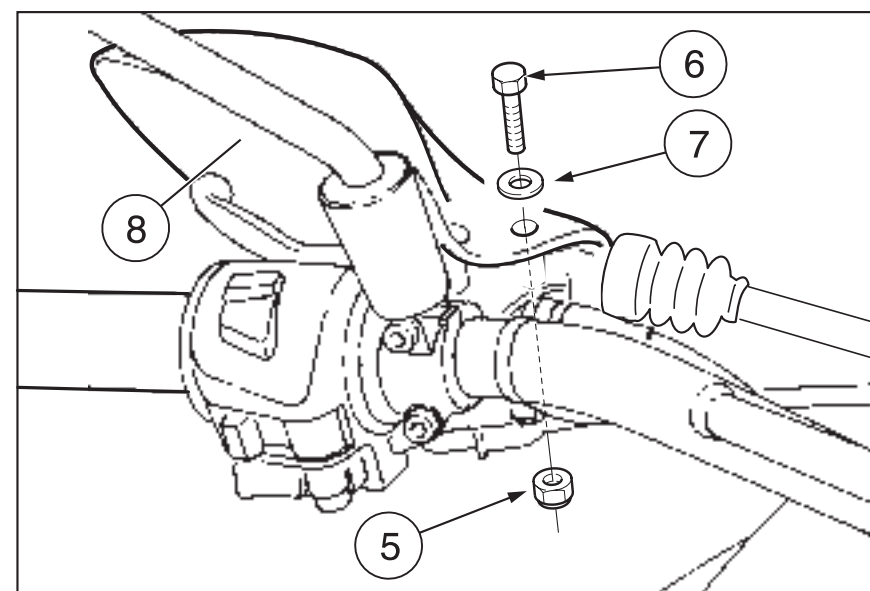
- ◆ Remove the handlebar left grip, see 7.1.14 (REMOVING THE HANDGRIP).
- ◆ Partially remove the electric controls on the left side, see 7.1.16 (REMOVING THE ELECTRIC CONTROLS ON THE LEFT SIDE OF THE HANDLEBAR).
- ◆ Disconnect the cold-start cable (3).
- ◆ Pull the cold-start control (4).



7.1.13 REMOVING THE HAND GUARDS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Lock the rotation of the nut (5).
- ◆ Unscrew and remove the screw (6), taking the washer (7).
- ◆ Remove the hand guards (8).



7.1.14 REMOVING THE HANDGRIP

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

NOTE The following information refers to one unit only, but is valid for both.

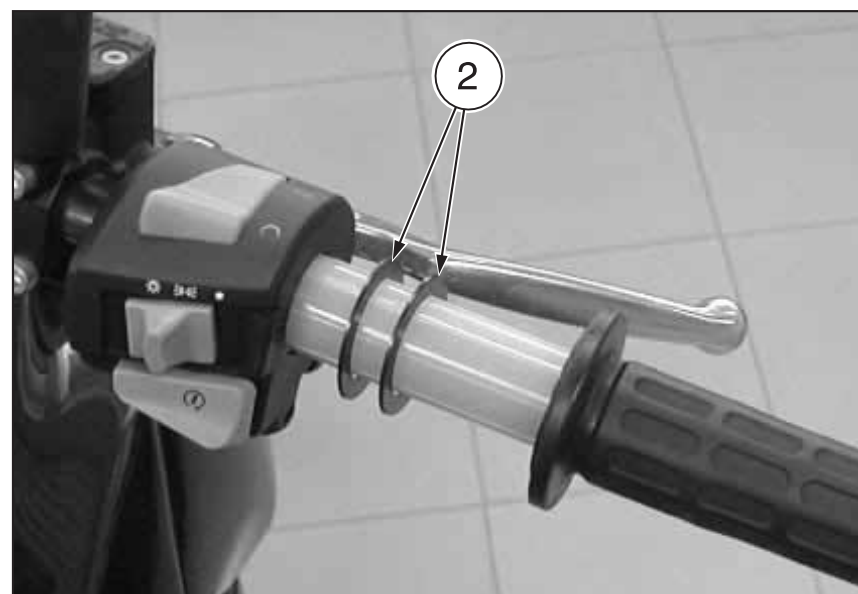
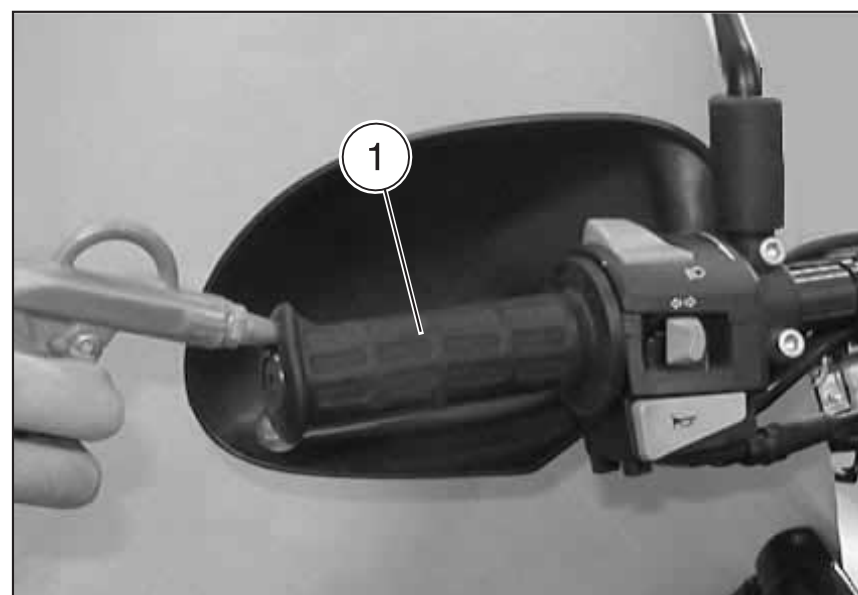
- ◆ Remove the antivibration weight unit from the handlebar, see 7.1.11 (REMOVING THE ANTIVIBRATION WEIGHT).
- ◆ Insert the nozzle of a compressed air gun between the grip (1) and the handlebar.
- ◆ Blow air, moving the gun's nozzle with a rotary movement and, at the same time, seize the other grip (1) with the other hand and slide it off.

For the right grip only:

- ◆ Retrieve the two slide washers (2).

⚠ CAUTION

Upon reassembly, do not forget to reinstall the two slide washers (2).



7.1.15 REMOVING THE CLUTCH LEVER

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

COMPLETE REMOVAL

- ◆ Remove the left hand guards, see 7.1.13 (REMOVING THE HAND GUARDS).
- ◆ Withdraw the protection element (1).
- ◆ Loosen the ring nut (2).
- ◆ Screw the adjuster (3) completely.
- ◆ Make the slots (4) (5) (6) coincide.

CAUTION

Let the engine cool down until it reaches room temperature.

- ◆ Release the clutch cable (6) (engine side) from the coupling (7).
- ◆ Disengage the clutch cable (8) from the clutch lever (9).
- ◆ Unscrew and remove the safety switch (10).

NOTE Before removing the U bolt (11), mark its position on the handlebar so it can be refitted in the right place.

- ◆ Unscrew and remove the two screws (12).

U-bolt screw driving torque: 10 Nm (1.0 kgm).

- ◆ Remove the U-bolt (11) (complete with rear-view mirror) and take the clutch control (13).

PARTIAL REMOVAL

NOTE Before removing the U bolt (11), mark its position on the handlebar so it can be refitted in the right place.

- ◆ Unscrew and remove the two screws (12).

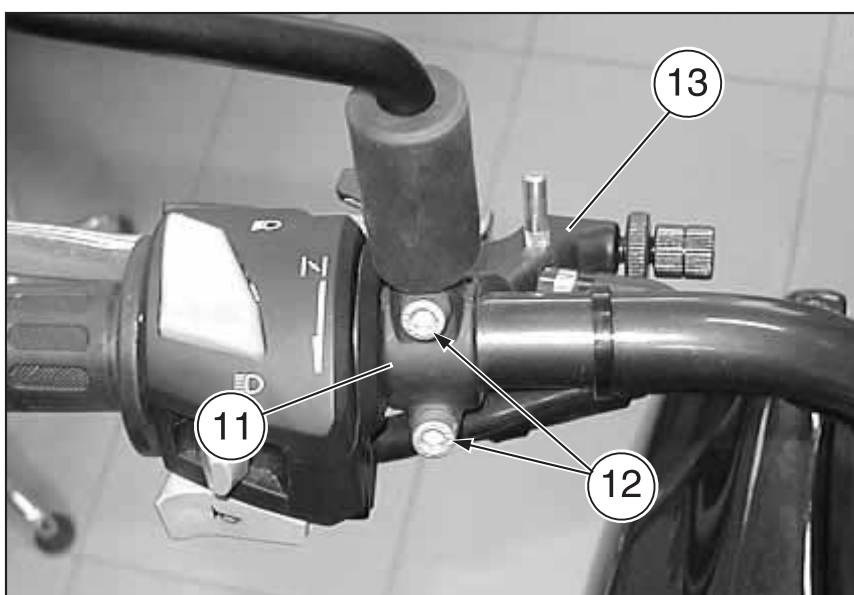
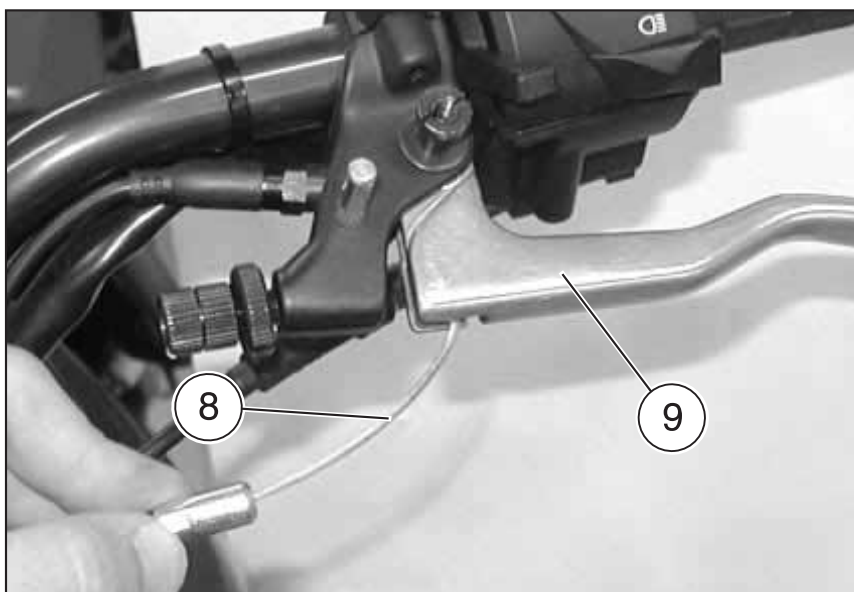
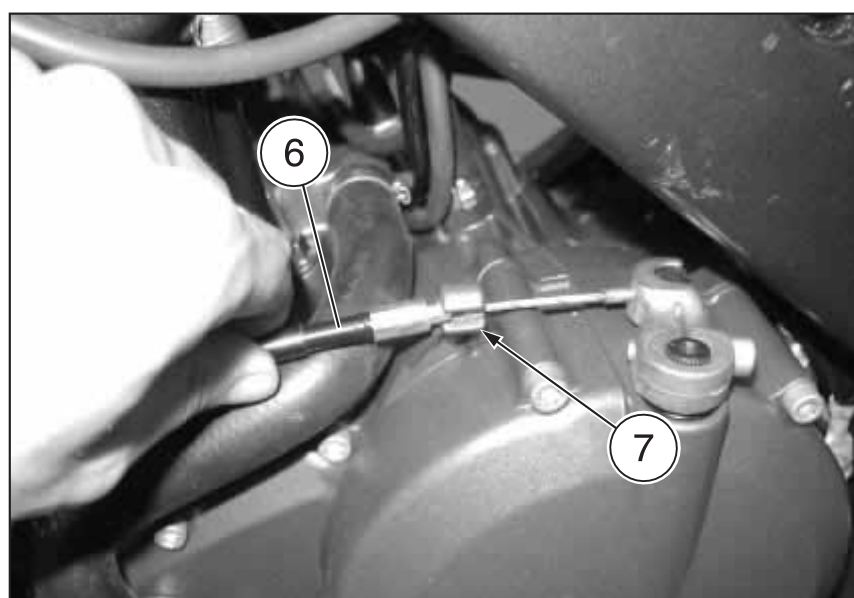
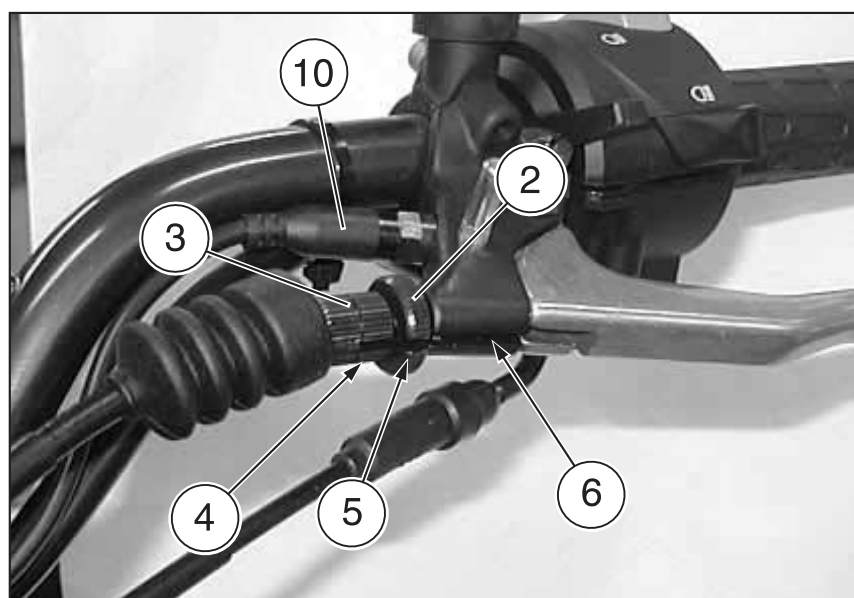
U-bolt screw driving torque: 10 Nm (1.0 kgm).

- ◆ Remove the U-bolt (11), complete with rear-view mirror.

CAUTION

Do not force pipes and cables.

- ◆ Partially remove the clutch control (13), complete with hand guard.



7.1.16 REMOVING THE ELECTRIC CONTROLS ON THE LEFT SIDE OF THE HANDLEBAR

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the stand.
- ◆ Turn the ignition switch to position "⊗".

PARTIAL REMOVAL

NOTE The screw (1) is longer than the screw (2). Upon reassembly, take care to position them correctly.

- ◆ Unscrew and remove the two screws (1) (2) fastening the two halves of the casing (3) (4) at the bottom.

Electric controls screw driving torque: 2 Nm (0.2 kgm).

- ◆ Split the two halves of the casing (3) (4) apart.

⚠ CAUTION

When reassembling, first set the lower half of the casing (4) in place, making sure the special locating dowel enters the relevant hole on the handlebar.

COMPLETE REMOVAL

- ◆ Carry out the partial removal, see above.
- ◆ Free the cabling from the two clamps (5) (6).

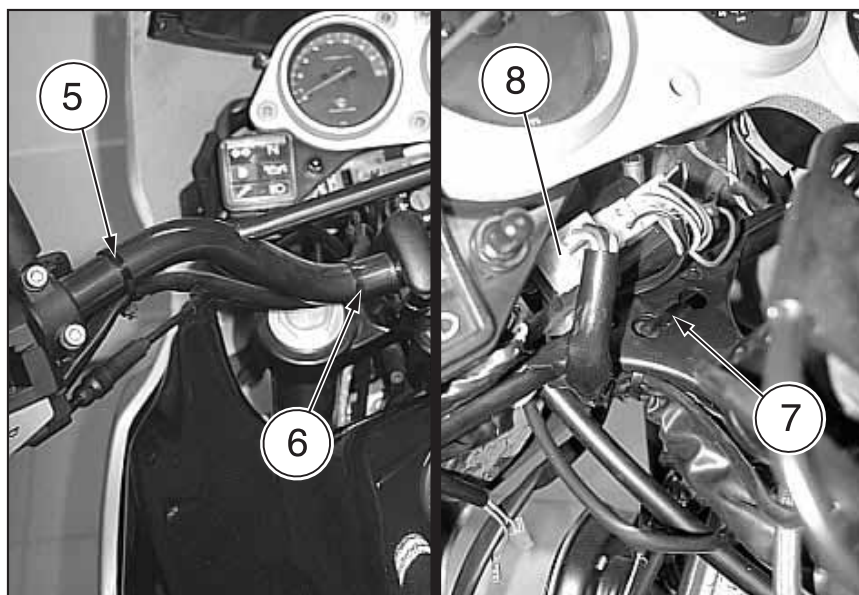
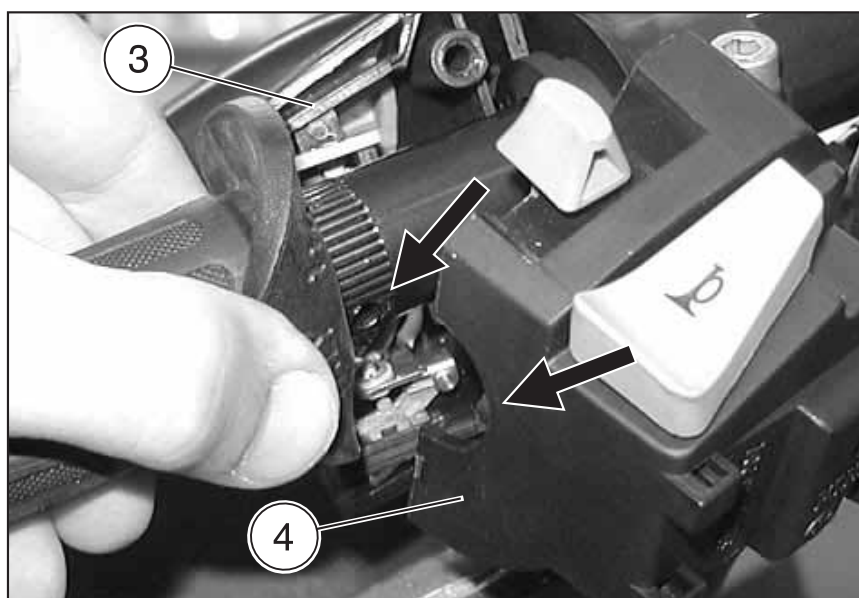
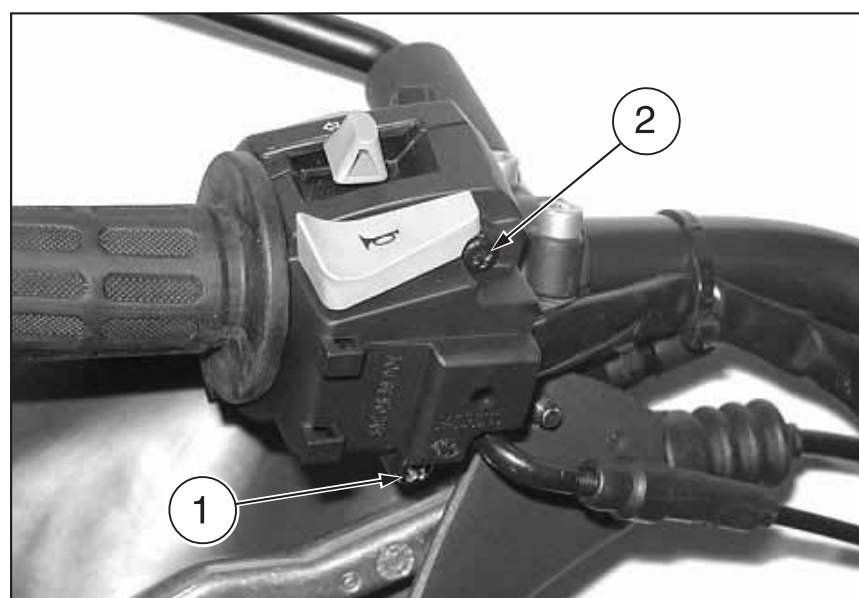
NOTE Prepare the same number of clamps, which will be required for reassembly.

- ◆ Remove the dashboard fairing, see 7.1.27 (REMOVING THE DASHBOARD FAIRING).
- ◆ Release the wiring from the fastening clamp (7).
- ◆ Disconnect the left-hand dip switch electric connector (8).

⚠ CAUTION

When reassembling, make sure the connector (8) is plugged in properly.

- ◆ Remove the two halves of the casing (3) (4).



7.1.17 REMOVING THE THROTTLE GRIP

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

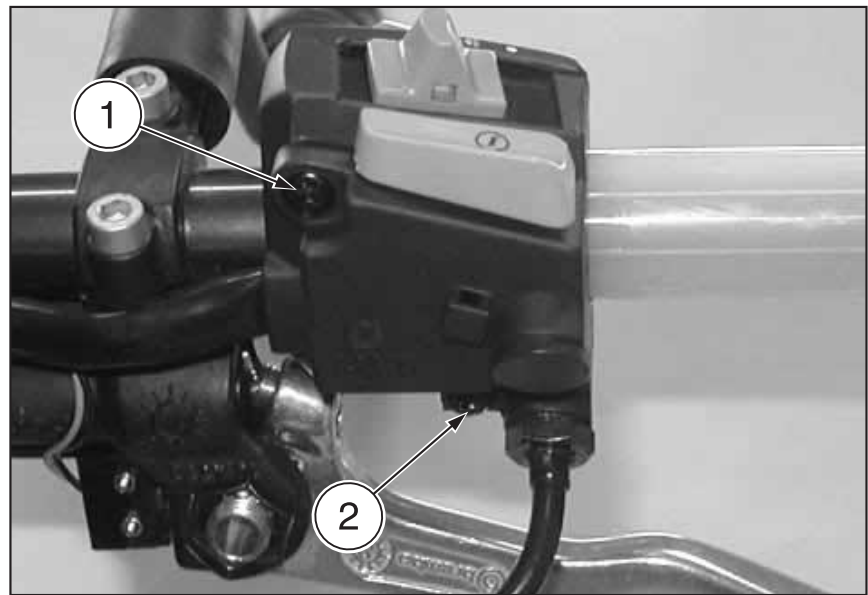
- ◆ Remove the right antivibration weight unit, see 7.1.11 (REMOVING THE ANTIVIBRATION WEIGHT).
- ◆ Remove the right handgrip, see 7.1.14 (REMOVING THE HANDGRIP).

NOTE The screw (1) is longer than the screw (2). Upon reassembly, take care to position them correctly.

- ◆ Unscrew and remove the two screws (1) (2) fastening the two halves of the casing (3) (4) at the bottom.

Electric controls screw driving torque: 2 Nm (0.2 kgm).

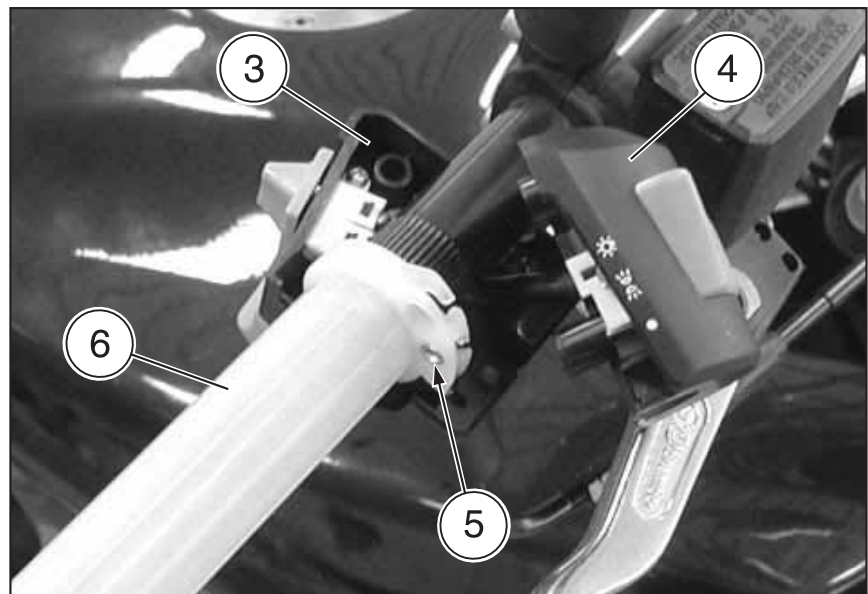
- ◆ Split the two halves of the casing (3) (4) apart.



CAUTION

When reassembling, first set the lower half of the casing (3) in place, making sure the special locating dowel enters the relevant hole on the handlebar.

- ◆ Disconnect the throttle cable (5).
- ◆ Pull the throttle grip (6).



7.1.18 REMOVING THE FRONT BRAKE LEVER

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

COMPLETE REMOVAL

- ◆ Drain the front braking system, see 7.5.6 (DRAINING THE BRAKING SYSTEMS).
- ◆ Unscrew and remove the front brake lever connection screw (7) and take the two sealing washers (8).

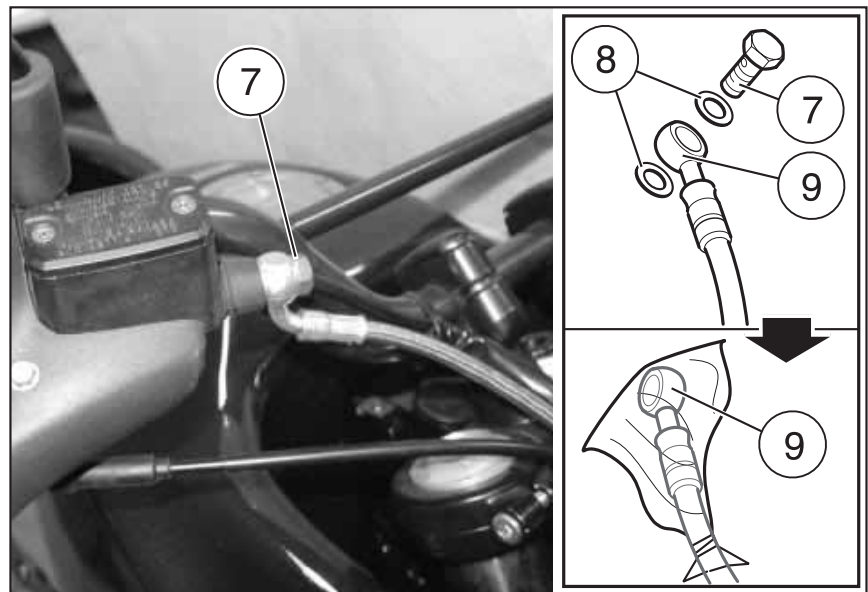
Front brake lever connection screw (7) driving torque: 20 Nm (2.0 kgm).

CAUTION

Upon reassembly, replace the two sealing washers with two new washers of the same type.

- ◆ Put a nylon bag on the connection (9) and seal it with adhesive tape.

Follow ►



Pegaso 650 I.E.

Follow ►

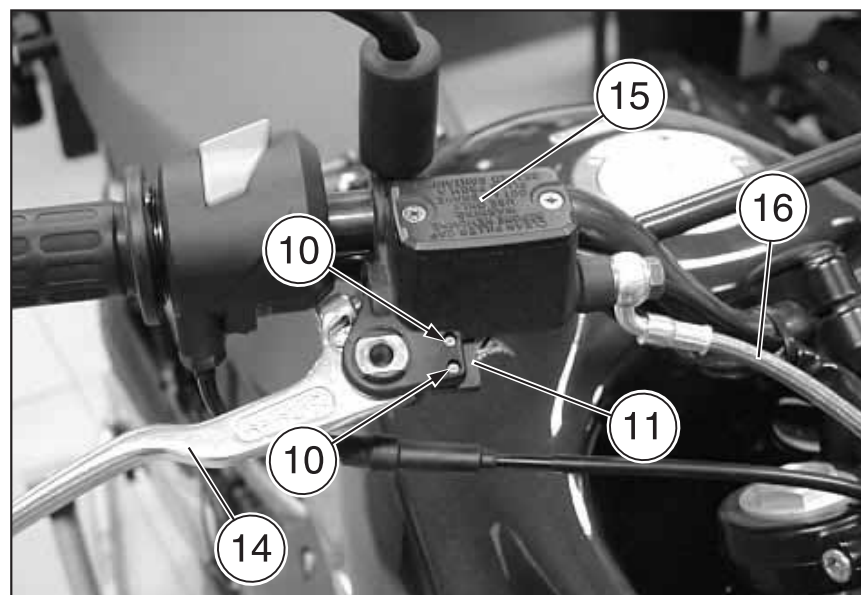
- ◆ Remove the right hand guards, see 7.1.13 (REMOVING THE HAND GUARDS).
- ◆ Unscrew and remove the two screws (10) that fasten the stop light switch (11) and take the nuts.

NOTE Before removing the U bolt (12), mark its position on the handlebar so it can be refitted in the right place.

- ◆ Unscrew and remove the two U bolt screws (13).

U bolt screw driving torque: 10 Nm (1.0 kgm).

- ◆ Remove the U bolt (12).
- ◆ Remove the front brake control (14) complete with front brake reservoir (15).



PARTIAL REMOVAL

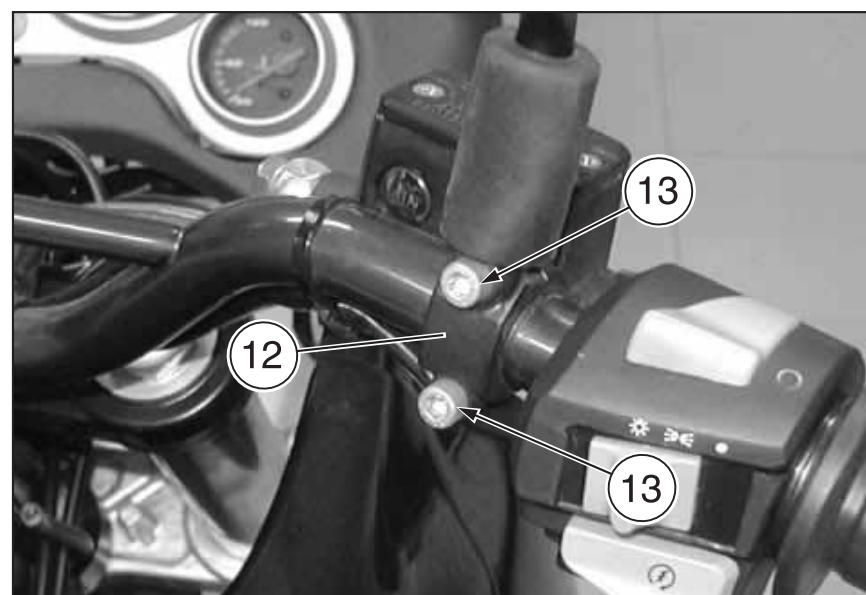
NOTE Before removing the U bolt (12), mark its position on the handlebar so it can be refitted in the right place.

- ◆ Unscrew and remove the two U bolt screws (13).

U bolt screw driving torque: 10 Nm (1.0 kgm).

- ◆ Remove the U bolt (12).
- The following elements remain connected to the front brake control (14) complete with front brake reservoir (15).

- front brake fluid pipe (16);
- the rear brake light switch (10).

**⚠ CAUTION**

Do not force pipes and cables.
To avoid dangerous brake fluid leakages, keep the front brake reservoir (15) in operating position (vertical).

- ◆ Partially remove the front brake lever (14).

7.1.19 REMOVING THE ELECTRIC CONTROLS ON THE RIGHT SIDE OF THE HANDLEBAR

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the stand.
- ◆ Turn the ignition switch to position "⊗".

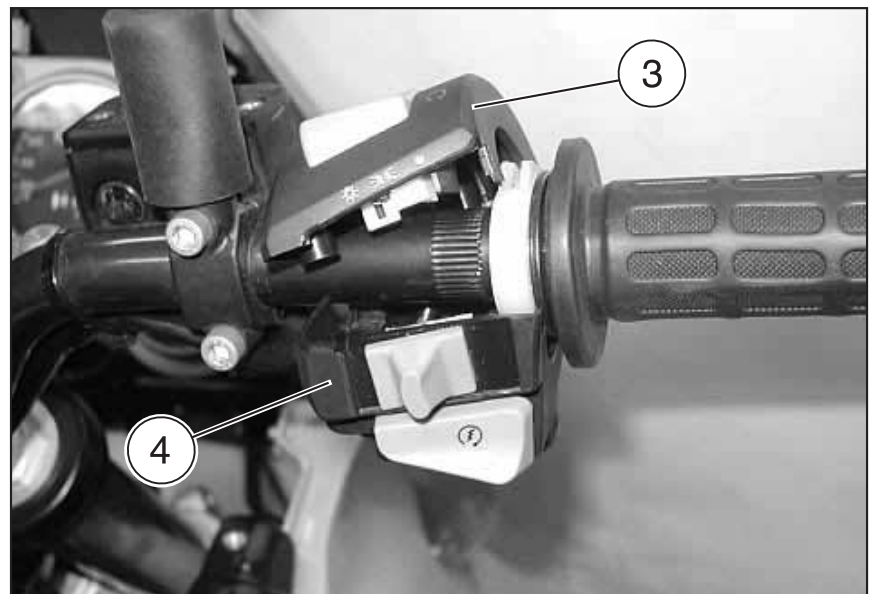
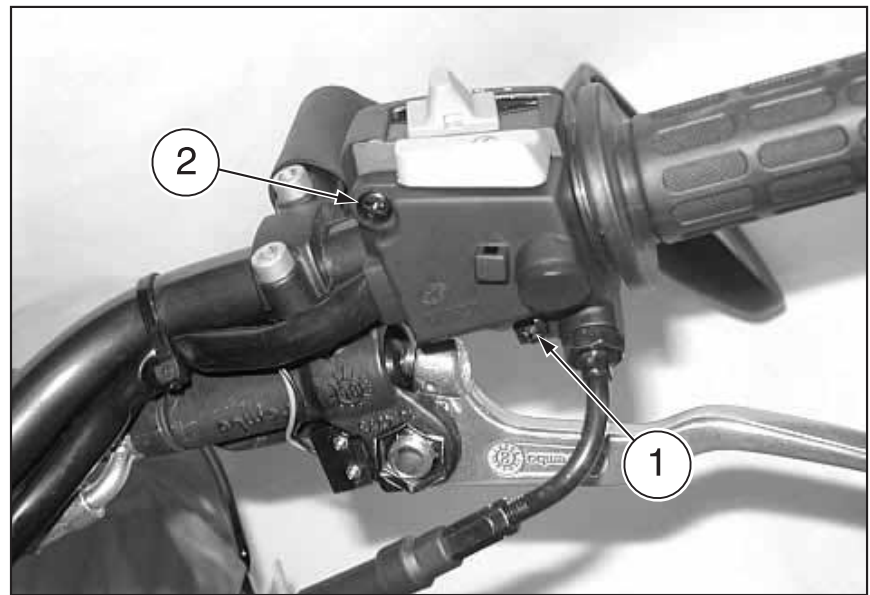
PARTIAL REMOVAL

NOTE The screw (1) is longer than the screw (2). Upon reassembly, take care to position them correctly.

- ◆ Unscrew and remove the two screws (1) (2) fastening the two halves of the casing (3) (4) at the bottom.

Electric controls screw driving torque: 2 Nm (0.2 kgm).

- ◆ Split the two halves of the casing (3) (4) apart and remove them.



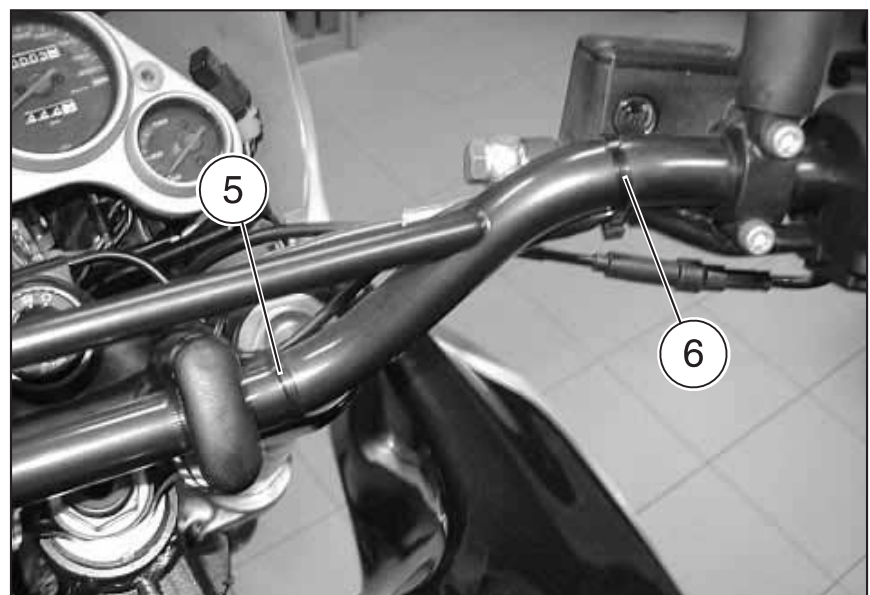
CAUTION
When reassembling, first set the lower half of the casing (4) in place, making sure the special locating dowel enters the relevant hole on the handlebar.

COMPLETE REMOVAL

- ◆ Carry out the partial removal, see above.
- ◆ Free the cabling from the two clamps (5) (6).

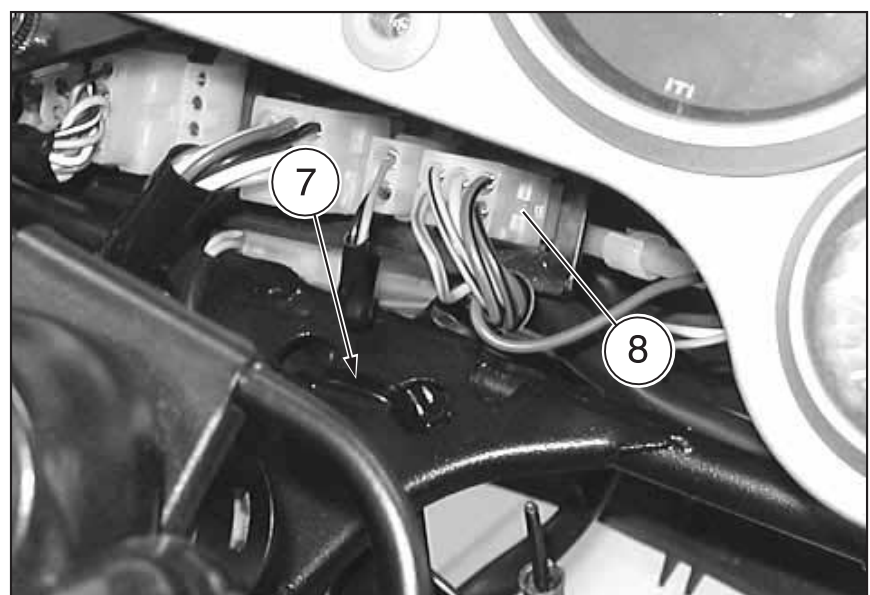
NOTE Prepare the same number of clamps, which will be required for reassembly.

- ◆ Remove the dashboard fairing, see 7.1.27 (REMOVING THE DASHBOARD FAIRING).
- ◆ Release the wiring from the fastening clamp (7).
- ◆ Disconnect the right dip switch electric connector (8).



CAUTION
When reassembling, make sure the connector (8) is plugged in properly.

- ◆ Remove the two halves of the casing (3) (4).



7.1.20 REMOVING THE IGNITION SWITCH/ STEERING LOCK

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

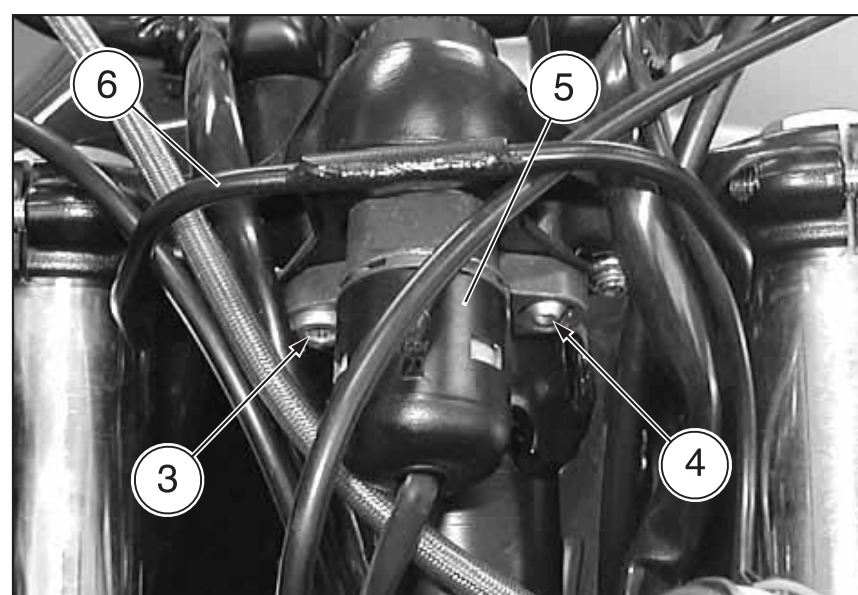
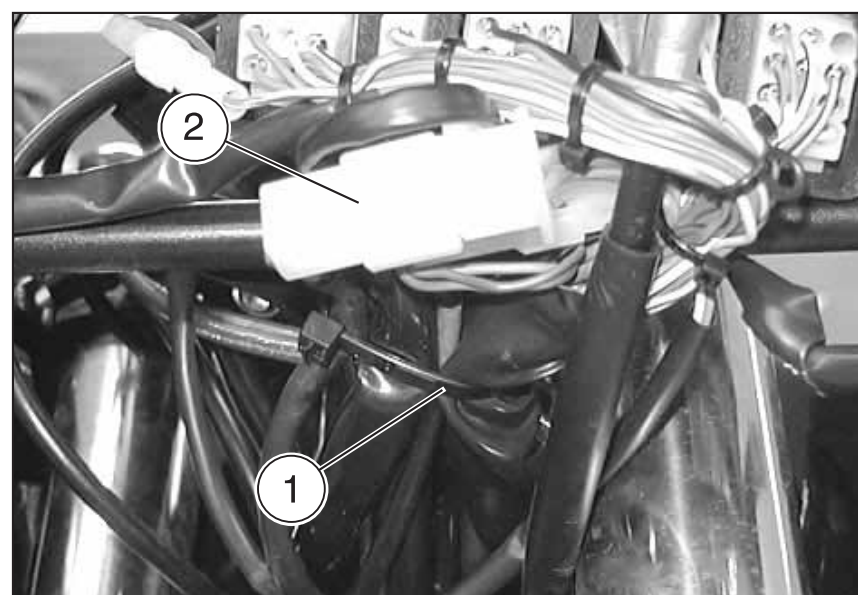
- ◆ Position the vehicle on the stand.
- ◆ Turn the steering all the way over to the left.
- ◆ Turn the ignition switch to position "⊗".
- ◆ Release the wiring from the fastening clamp (1).

NOTE Prepare a clamp to be used for the reassembly.

- ◆ Disconnect the electric connector (2).
- ◆ Unscrew and remove the screw (3).
- ◆ Use a chisel to cut into the head of the special screw (4) and turn it until it loosens.
- ◆ Unscrew the screw (4) by hand and remove it.

NOTE When reassembling, use another screw of the same type, tightening it until the head comes off.

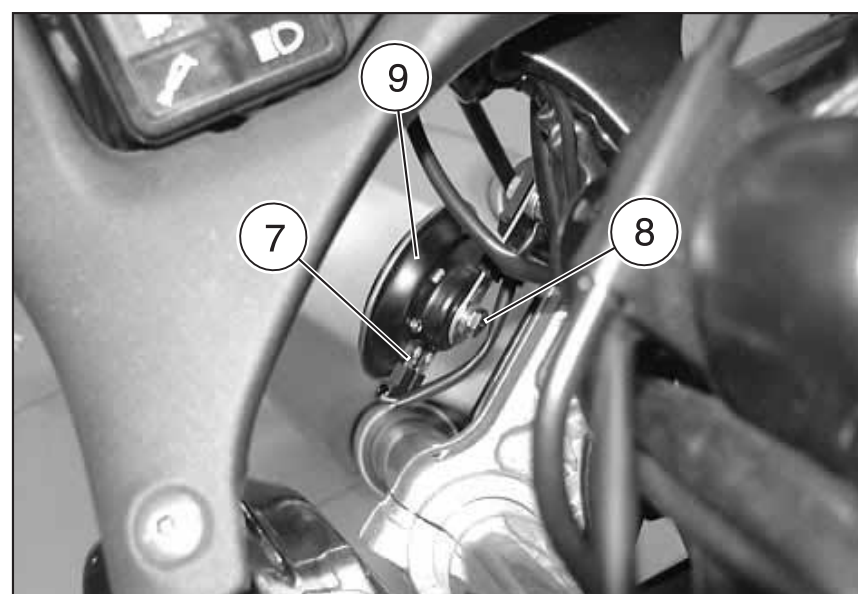
- ◆ Remove the ignition switch/steering lock (5), withdrawing it from below and retrieve the cable guide arch (6).



7.1.21 REMOVING THE HORN

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

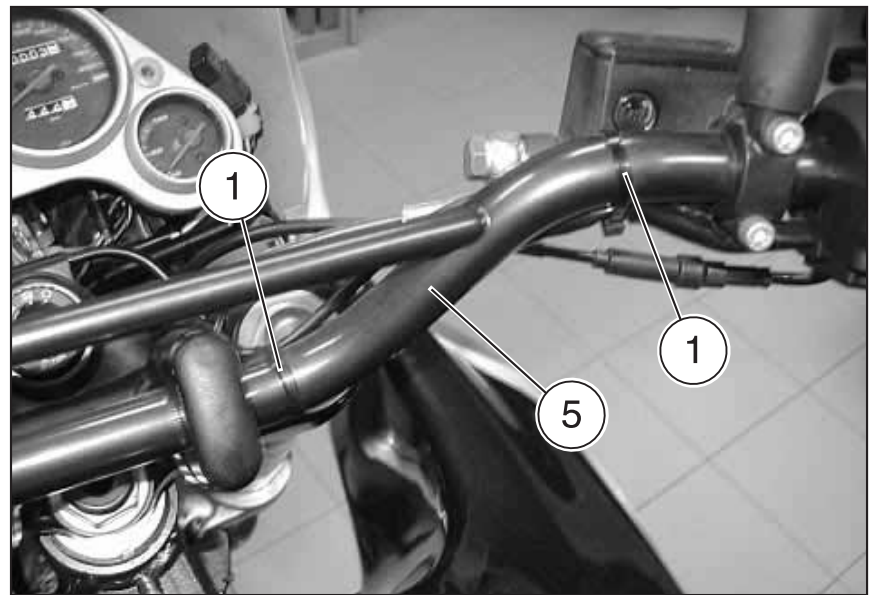
- ◆ Rotate the handlebar completely leftwards.
- ◆ Disconnect the two electric terminals (7) of the horn.
- ◆ Unscrew and remove the nut (8).
- ◆ Remove the horn (9).



7.1.22 REMOVING THE HANDLEBAR

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the grips, see 7.1.14 (REMOVING THE HANDGRIP).
- ◆ Partially remove the electric controls, see 7.1.19 (REMOVING THE ELECTRIC CONTROLS ON THE RIGHT SIDE OF THE HANDLEBAR) and 7.1.16 (REMOVING THE ELECTRIC CONTROLS ON THE LEFT SIDE OF THE HANDLEBAR).
- ◆ Remove the throttle grip, see 7.1.17 (REMOVING THE THROTTLE GRIP).
- ◆ ★ Release the cables from the fastening clamps (1).



CAUTION

Prepare the same number of clamps, which will be required for reassembly.

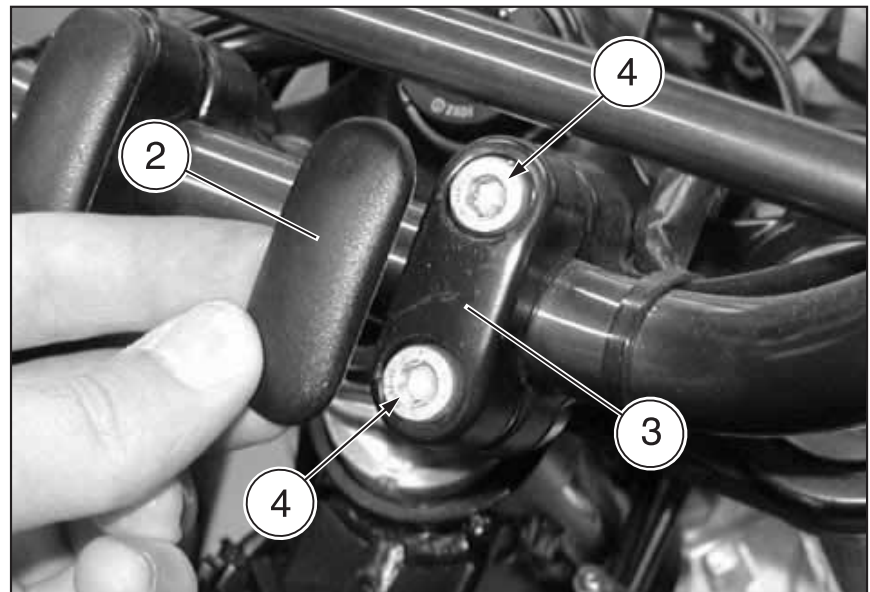
- ◆ ★ Remove the rubber protection element (2).

NOTE Before removing the U bolt (3), mark its position on the handlebar so it can be refitted in the right place.

- ◆ ★ Unscrew and remove the two screws (4).

Handlebar U bolt screw driving torque: 25 Nm (2.5 kgm).

- ◆ ★ Remove the U bolt (3).
- ◆ Remove the handlebar (5).



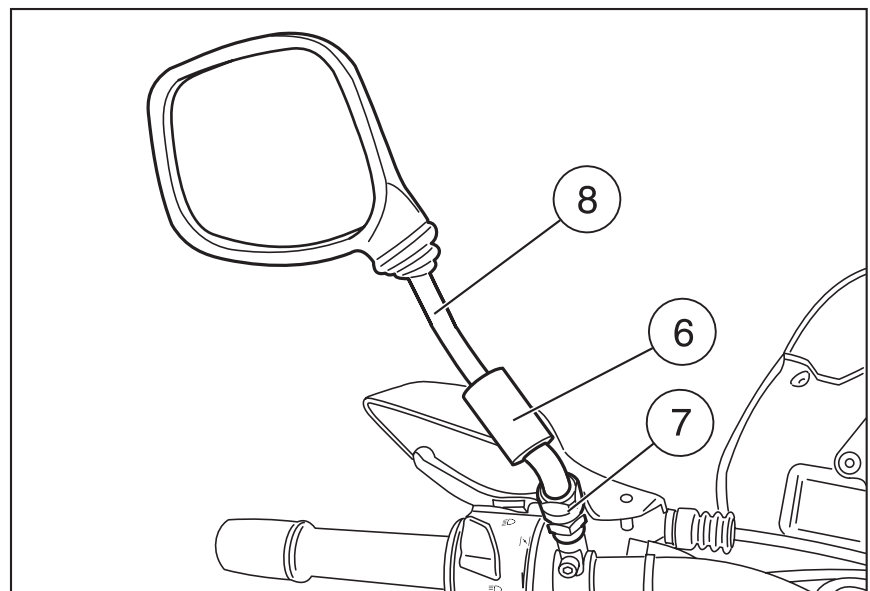
7.1.23 REMOVING THE REAR-VIEW MIRRORS

- ◆ Position the vehicle on the stand.
- ◆ Raise the protection element (6).
- ◆ Loosen and remove the stop nut (7).

CAUTION

Upon reassembly, before tightening the lock nut (7), make sure that the rear-view mirror support rod is directed in such a way as to be aligned with the handlebar.

- ◆ Withdraw the entire rear-view mirror unit (8) upwards and remove it.
- ◆ Repeat these operations to remove the other rear-view mirror.



7.1.24 REMOVING THE FRONT FAIRING

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

⚠ WARNING

Let the engine cool down until it reaches room temperature.

- ◆ Remove the dashboard fairing, see 7.1.27 (REMOVING THE DASHBOARD FAIRING).
- ◆ Disconnect the electric connector (1) of the headlight.
- ◆ ★ Disconnect the electric connectors of the front direction indicators (2) (3).
- ◆ ★ Unscrew and remove the screw (4), retrieving the rubber element if necessary.

Front fairing rear screw driving torque: 25 Nm (2.5 kgm).

- ◆ ★ Unscrew and remove the screw (5).

Front fairing side screw driving torque: 25 Nm (2.5 kgm).

- ◆ Unscrew and remove the screw (6).

Front fairing upper screw driving torque: 25 Nm (2.5 kgm).

- ◆ Unscrew and remove the screws (7).

Front fairing front screw driving torque: 25 Nm (2.5 kgm).

- ◆ Unscrew and remove the screw (8), releasing the cable guide collar (9) and if necessary take the rubber element.

NOTE Upon reassembly, position the cable guide collar (9) correctly.

⚠ CAUTION

Proceed with care.

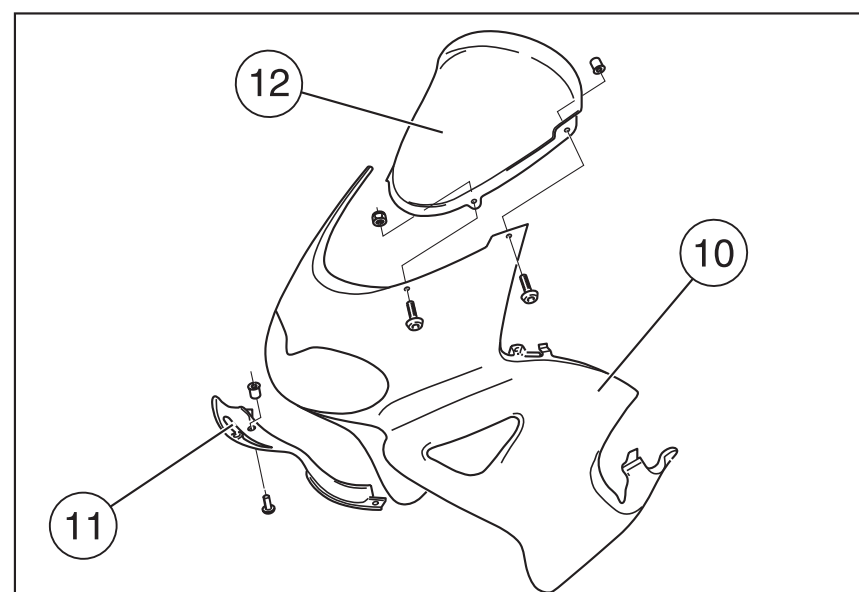
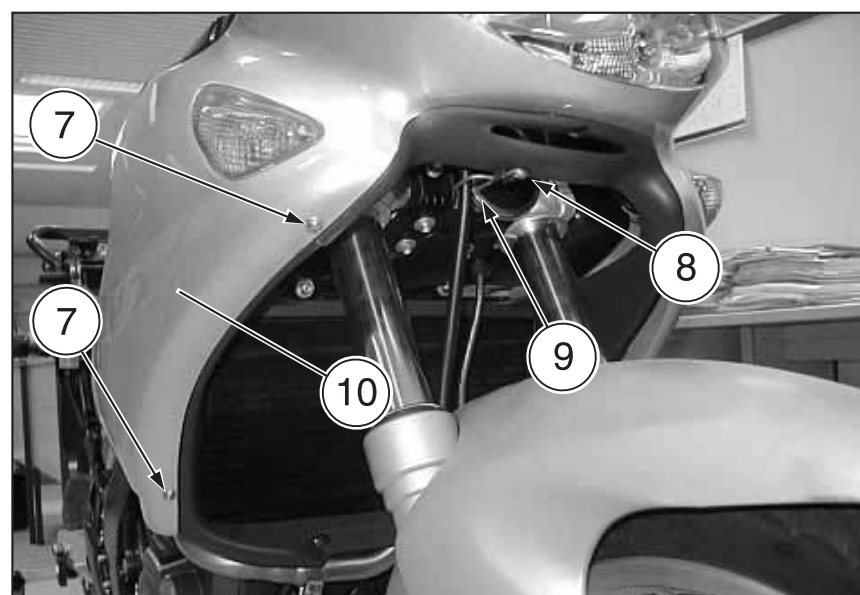
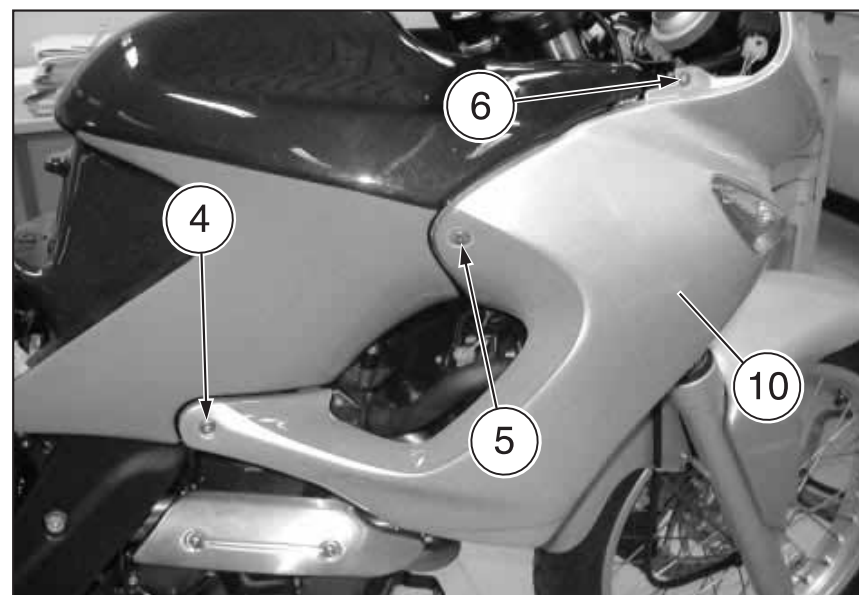
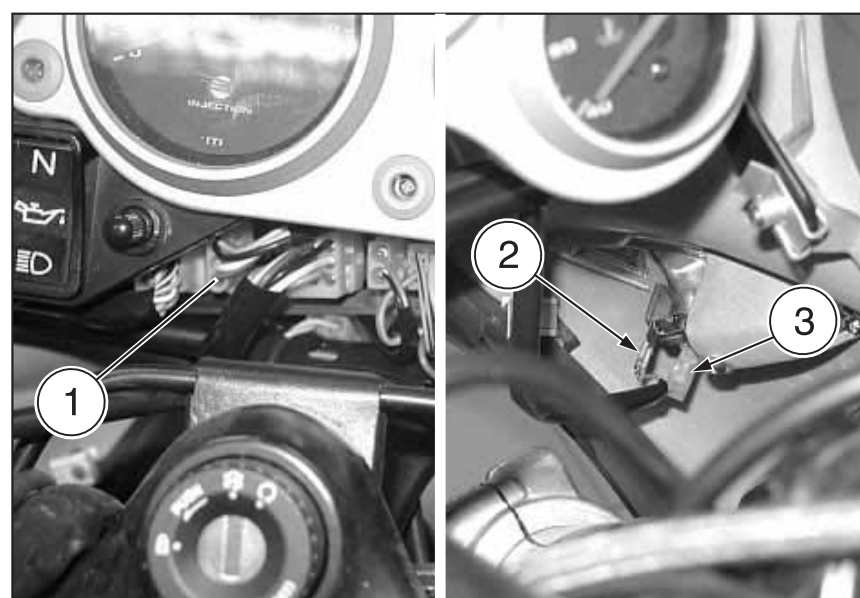
Do not damage the tangs and/or their seats.

Handle the painted components with care and avoid scraping or damaging them.

- ◆ Slightly open the lower part of the fairing and at the same time move it slightly forward.
- ◆ Remove the fairing (10), complete with headlight, front direction indicators, screen (11) and transparent front part of the fairing (12).

NOTE Upon reassembly, position the front fairing correctly, making all the coupling and fastening points coincide.

- ◆ Where necessary, remove the headlight, see 7.1.25 (REMOVING THE HEADLIGHT) and the direction indicators, see 7.1.43 (REMOVING THE FRONT DIRECTION INDICATORS).



7.1.25 REMOVING THE HEADLIGHT

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

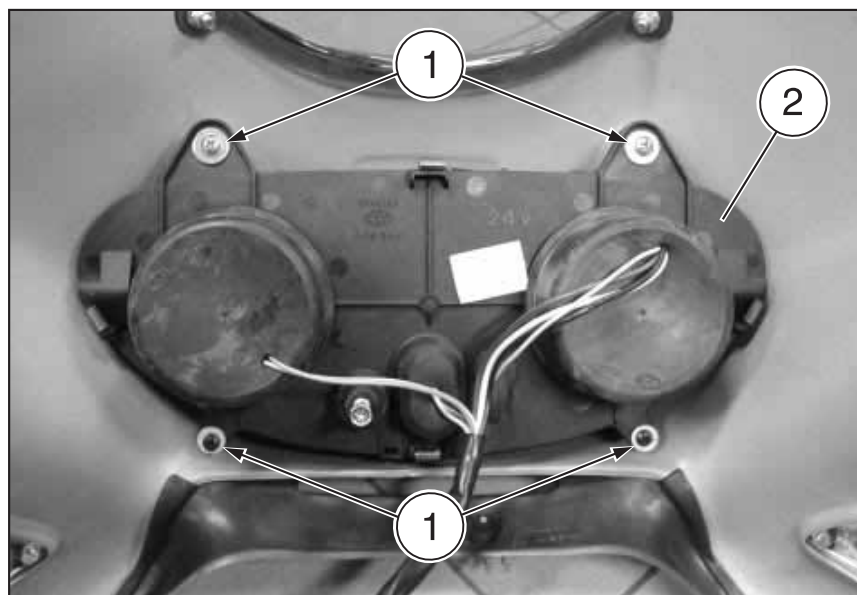
- ◆ Remove the front fairing, see 7.1.24 (REMOVING THE FRONT FAIRING).
- ◆ Unscrew and remove the four screws (1), taking the washers.

Headlight screw driving torque: 2 Nm (0.2 kgm).

⚠ CAUTION

Upon reassembly, tighten the screws (1) moderately, since they are fixed on plastic.

- ◆ Remove the headlight group (2).



7.1.26 REMOVING THE DASHBOARD

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the front fairing, see 7.1.24 (REMOVING THE FRONT FAIRING).

⚠ CAUTION

Observe the position of the components, in order to be able to reassemble them correctly.

- ◆ Disconnect the three electric connectors (3) under the coolant temperature indicator.
- ◆ Withdraw the three instrument lighting bulbs (4).

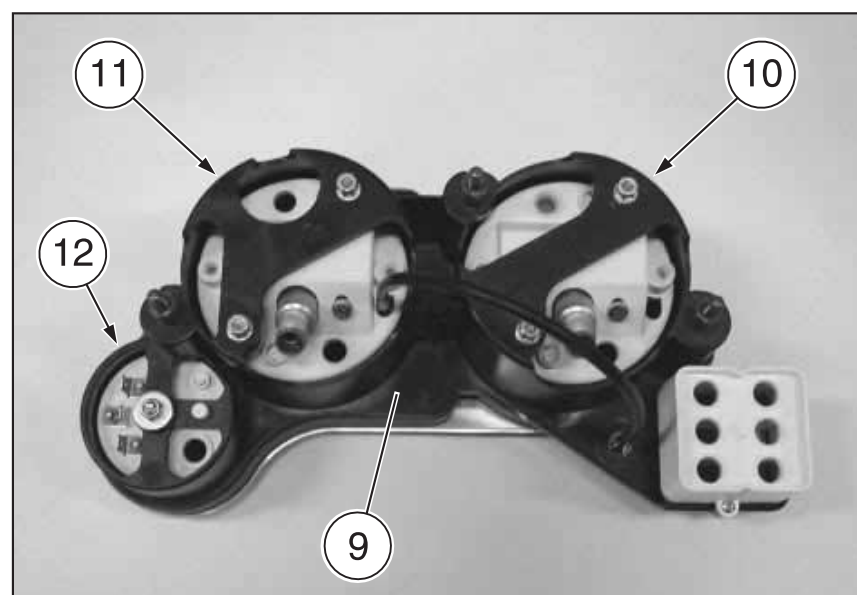
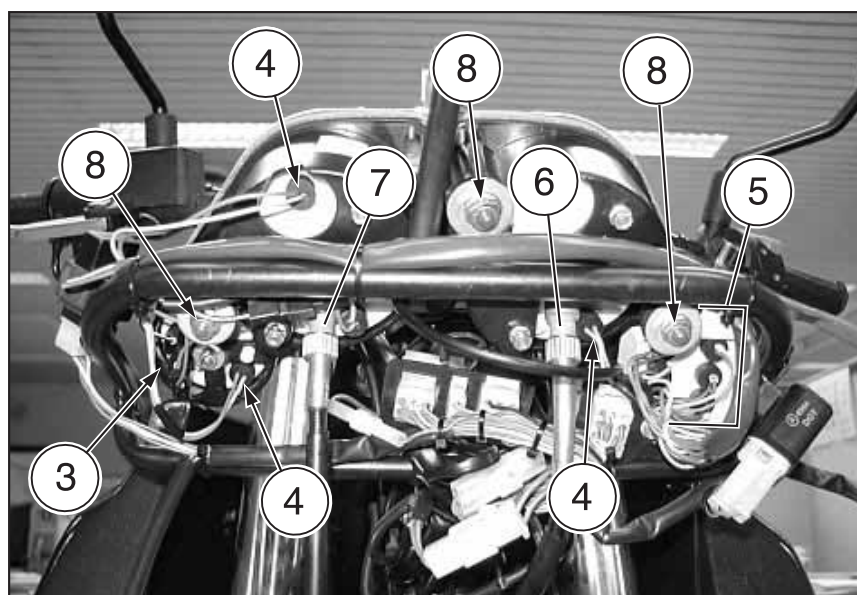
⚠ CAUTION

The bulbs (5) are marked by a number. Upon reassembly, position them in correspondence with the numbers stamped on the bulb seat.

- ◆ Withdraw the six warning light bulbs (5).
- ◆ Disconnect the control revolution counter (6).
- ◆ Disconnect the speedometer/odometer control (7).
- ◆ Loosen and remove the three fastening nuts (8) and take the rubber elements.

Dashboard nut driving torque: 4 Nm (0.4 kgm).

- ◆ Remove the dashboard (9), complete with instruments:
 - revolution counter (10);
 - speedometer/odometer (11);
 - coolant temperature indicator (12).



7.1.27 REMOVING THE DASHBOARD FAIRING

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the stand.
- ◆ ★ Unscrew and remove the screw (1).

Dashboard fairing lower screw driving torque: 25 Nm (2.5 kgm).

- ◆ ★ Unscrew and remove the screw (2).

Fairing side screw driving torque: 1.5 Nm (0.15 kgm).

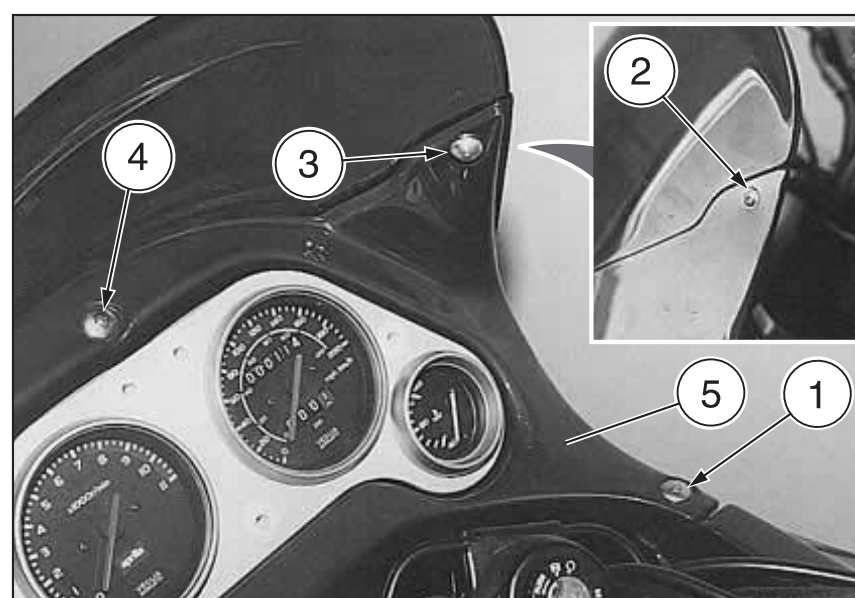
- ◆ ★ Retrieve the special nut (3).
- ◆ Unscrew and remove the screw (4).

Dashboard fairing upper screw driving torque: 25 Nm (2.5 kgm).

⚠ CAUTION

Handle the painted components with care and avoid scraping or damaging them.

NOTE Remove the dashboard fairing (5), by raising it.



7.1.28 REMOVING THE DASHBOARD MOUNT

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the dashboard, see 7.1.26 (REMOVING THE DASHBOARD).

⚠ CAUTION

Upon reassembly, place the cables and the clamps in the same position.

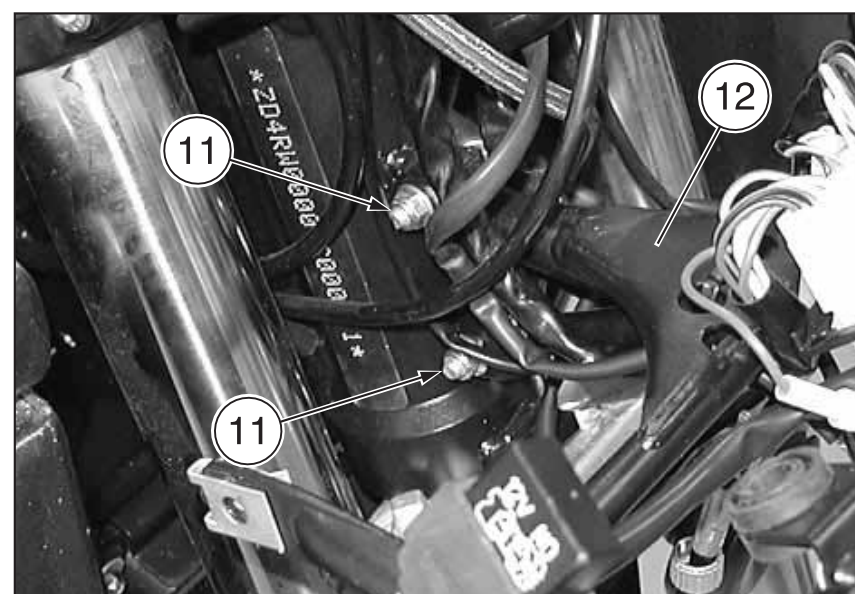
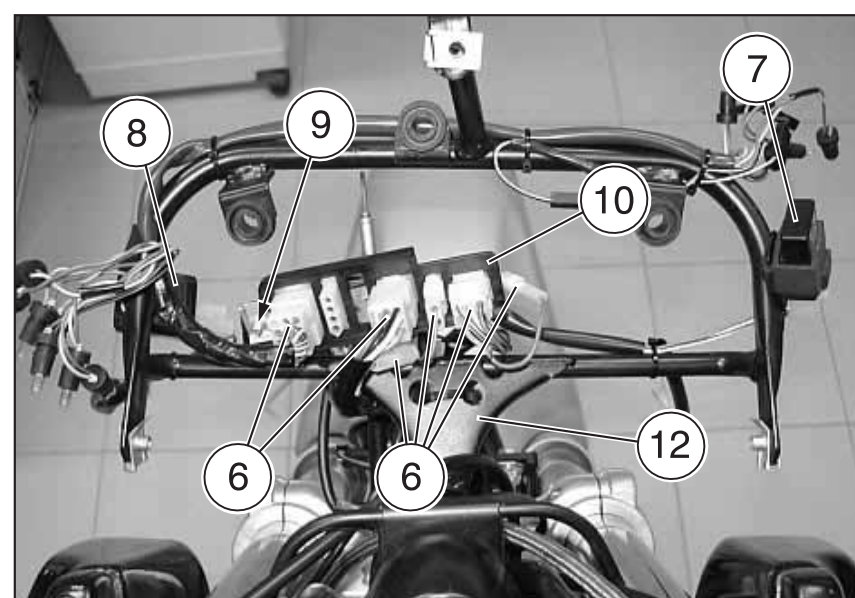
- ◆ Release the cables from all the fastening clamps (six).

NOTE Prepare the same number of clamps, which will be required for reassembly.

- ◆ Disconnect the six electric connectors (6).
- ◆ Withdraw the high beam relay (7) from its coupling.
- ◆ Withdraw the blinking unit (8) from its coupling.
- ◆ Unscrew and remove the screw (9), releasing the support (10) of the electric connectors.
- ◆ Loosen and remove the two nuts (11) and withdraw the relevant screws from the opposite side.

Dashboard mount screw-nut driving torque: 12 Nm (1.2 kgm).

- ◆ Remove the dashboard mount (12).



7.1.29 REMOVING THE DRIVE CHAIN GUARDS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the stand.

⚠ CAUTION

Handle the plastic and painted components with care to avoid scraping or damaging them.

DRIVE CHAIN UPPER GUARD

- ◆ Unscrew and remove the two screws (1).
- ◆ From the opposite side, unscrew and remove the screw (2).
- ◆ Lift and remove the upper guard (3).

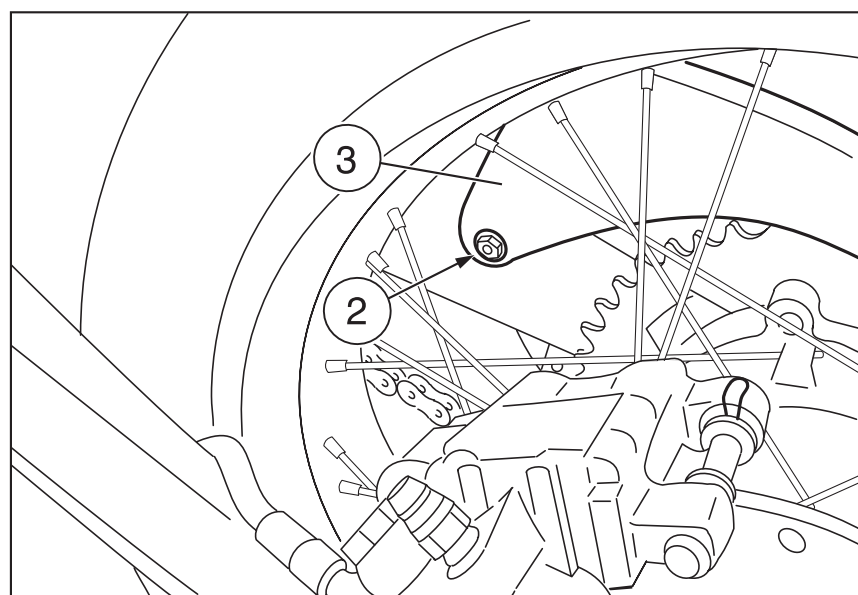
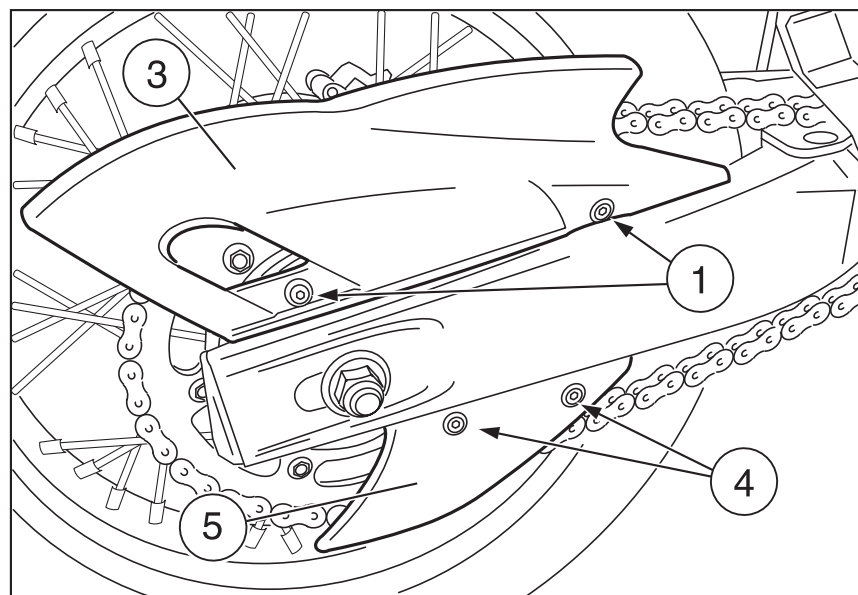
Upper chain guard screw driving torque: 3 Nm (0.3 kgm).

DRIVE CHAIN LOWER GUARD

- ◆ Unscrew and remove the two screws (4).

Lower chain guard screw driving torque: 3 Nm (0.3 kgm).

- ◆ Remove the lower protection element (5).

**7.1.30 REMOVING THE SADDLE LOCK**

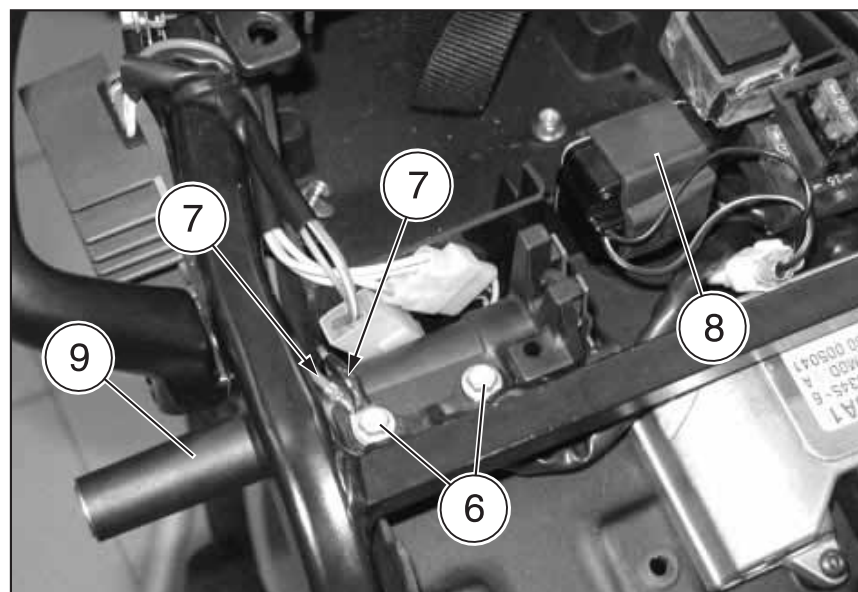
- ◆ Remove the saddle, see p 7.1.7 (REMOVING THE SADDLE).
- ◆ Unscrew the two screws (6), taking the nuts.

Saddle lock screw driving torque: 10 Nm (1.0 kgm).

⚠ CAUTION

Upon reassembly, position the terminals of the electric cables (7) correctly in the relevant fastening position.

- ◆ Release the fall sensor (8) from its coupling.
- ◆ Remove the saddle lock (9).



7.1.31 REMOVING THE NUMBER PLATE HOLDER

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the panels, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).
- ◆ Disconnect the electric connector (1) (on left side of vehicle).
- ◆ Release the wiring from the two fastening clamps (2).

NOTE Prepare the same number of clamps, which will be required for reassembly.

- ◆ Unscrew and remove the screw (3).

Voltage regulator screw driving torque: 8 Nm (0.8 kgm).

⚠ CAUTION

Do not force the electric cables.

- ◆ Partially remove the voltage regulator (4).
- ◆ ★ Unscrew and remove the screw (5), taking the nut and the washer.

Side number plate holder screw driving torque: 8 Nm (0.8 kgm).

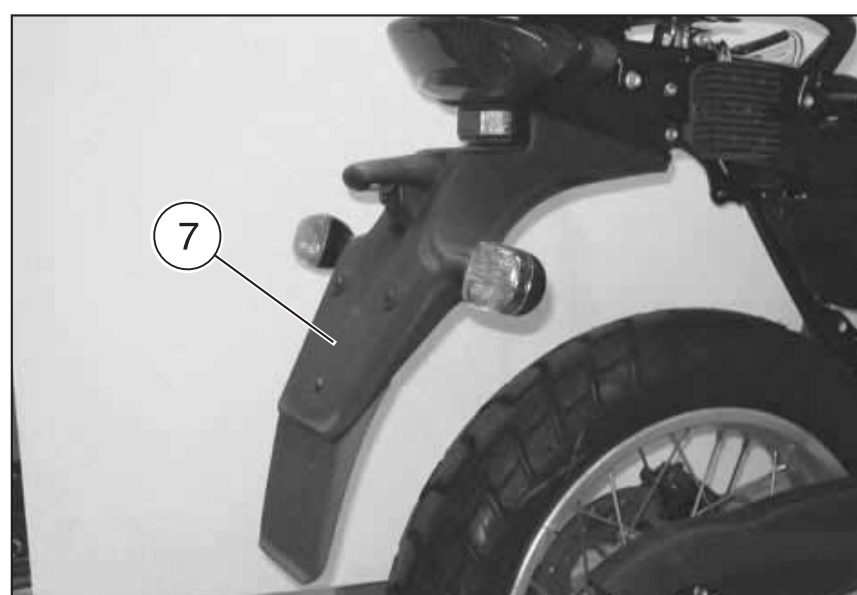
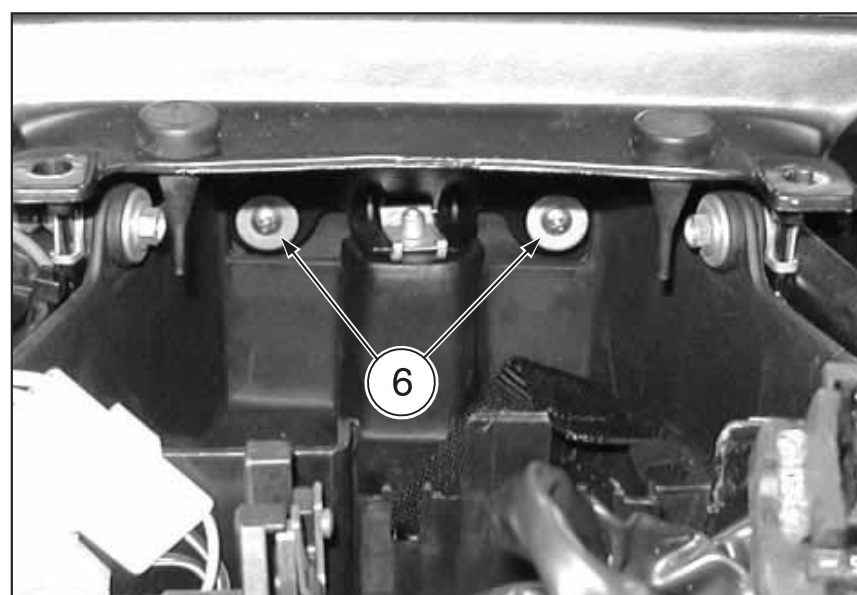
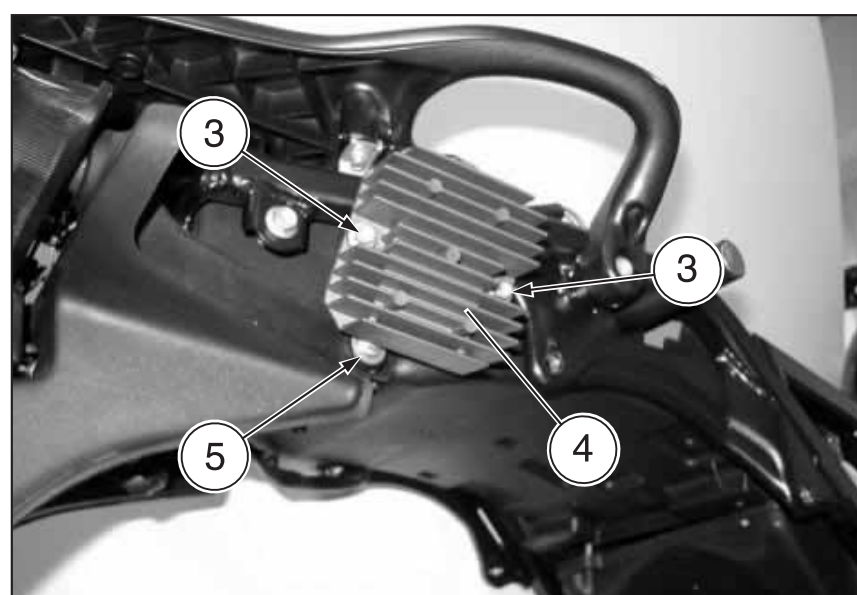
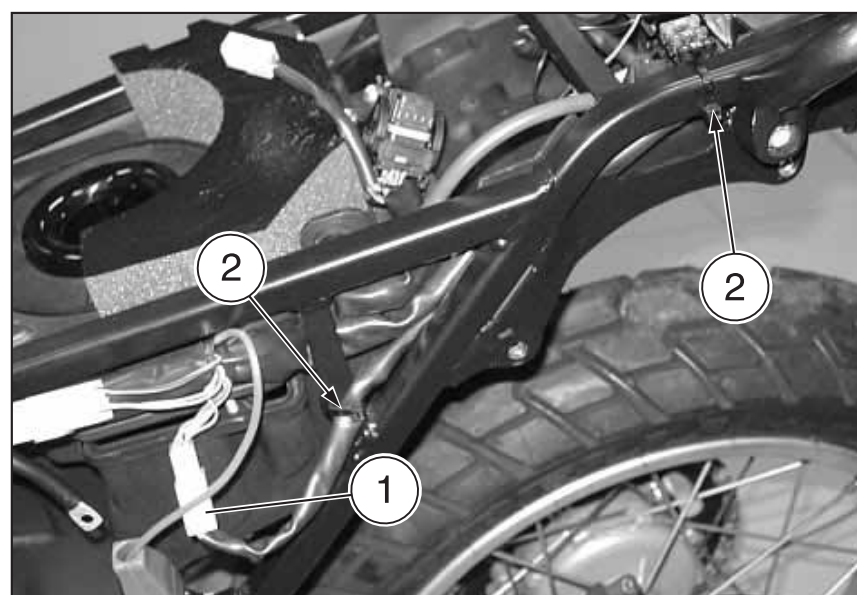
- ◆ Unscrew and remove the two screws (6), taking the washers and if necessary the rubber elements.

Front number plate holder screw driving torque: 2 Nm (0.2 kgm).

⚠ CAUTION

Upon reassembly, tighten the two screws (6) moderately, since it is fixed on plastic.

- ◆ Remove the number plate-holder (7) complete with rear direction indicators, number plate light and rear light.
- ◆ To remove the rear light, see 7.1.37 (REMOVING THE REAR LIGHT).



7.1.32 REMOVING THE GLOVE COMPARTMENT

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the electronic unit, see 7.1.10 (REMOVING THE ELECTRONIC UNIT).
- ◆ Remove the number plate holder, see 7.1.31 (REMOVING THE NUMBER PLATE HOLDER).

⚠ CAUTION

Take note of the layout of the electric cables, in order to be able to position them correctly upon reassembly.

- ◆ Withdraw the following parts from their seats:
 - injection relay (1);
 - main fuse carrier (2);
 - fall sensor (3).
- ◆ Unscrew and remove the two screws (4), taking the nuts.

Rear air filter casing screw driving torque: 10 Nm (1.0 kgm).

⚠ CAUTION

When reassembling, make sure the electric components and relevant wiring are refitted correctly.

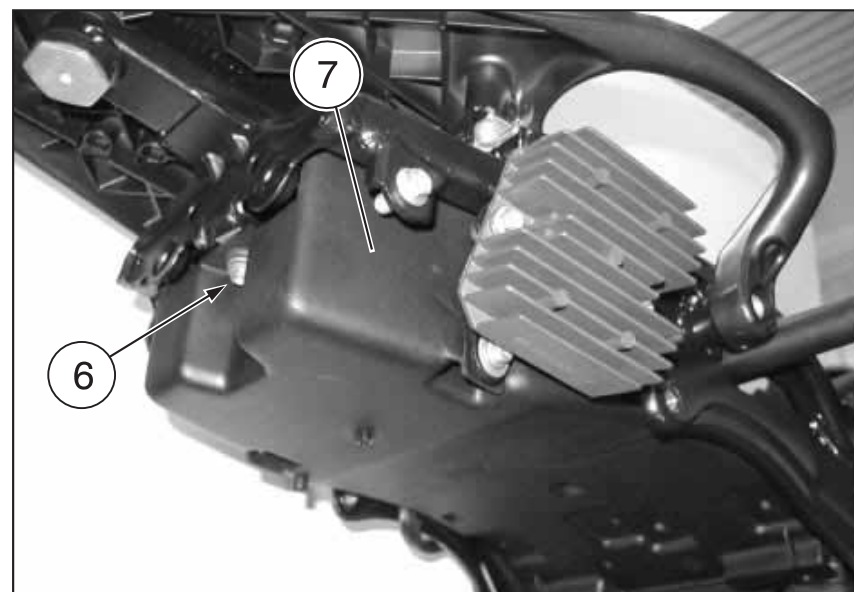
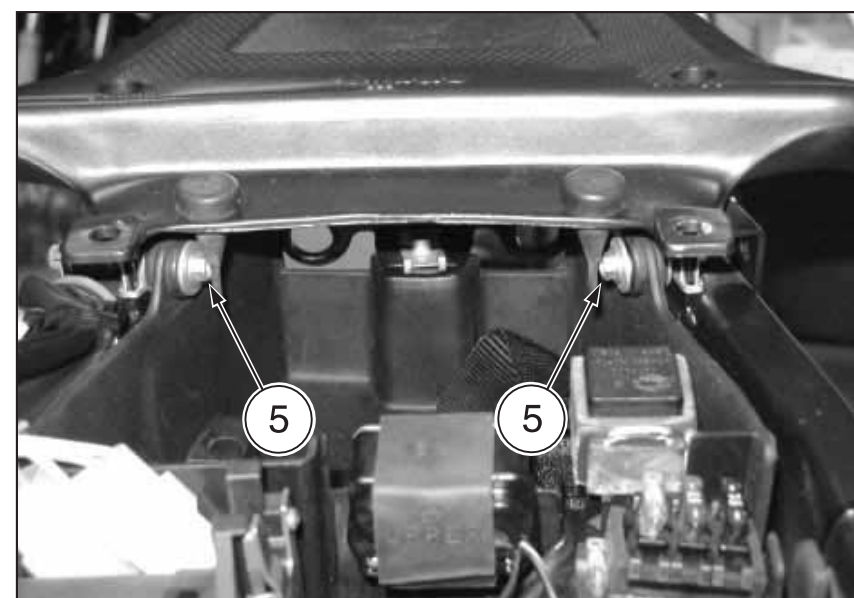
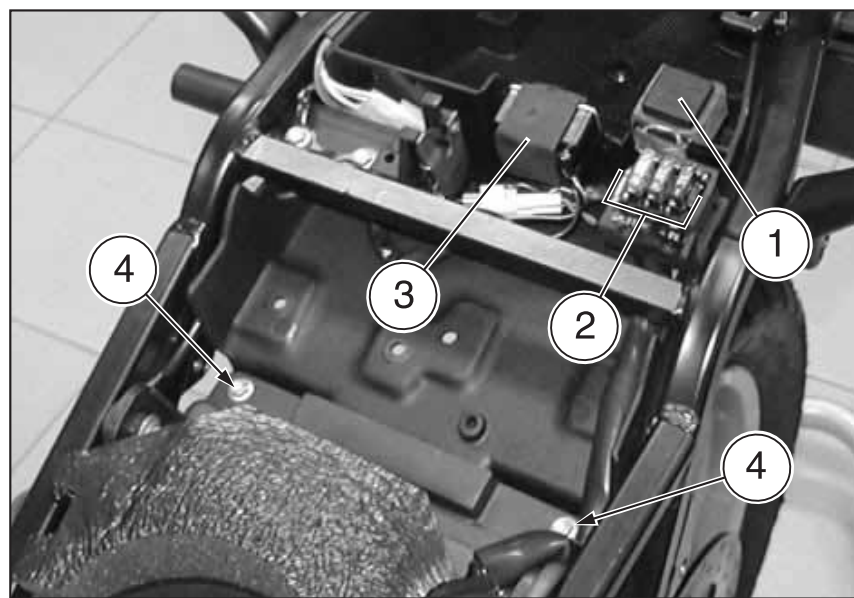
- ◆ Unscrew and remove the two screws (5), taking the bushes and if necessary the rubber element.

Glove compartment side screw driving torque: 6 Nm (0.6 kgm).

- ◆ Working on the lower part with a socket spanner, unscrew and remove the screw (6), take the bush and if necessary the rubber element.

Glove compartment lower screw driving torque: 7 Nm (0.7 kgm).

- ◆ Lower the glove compartment (7) and remove it, withdrawing it from behind.



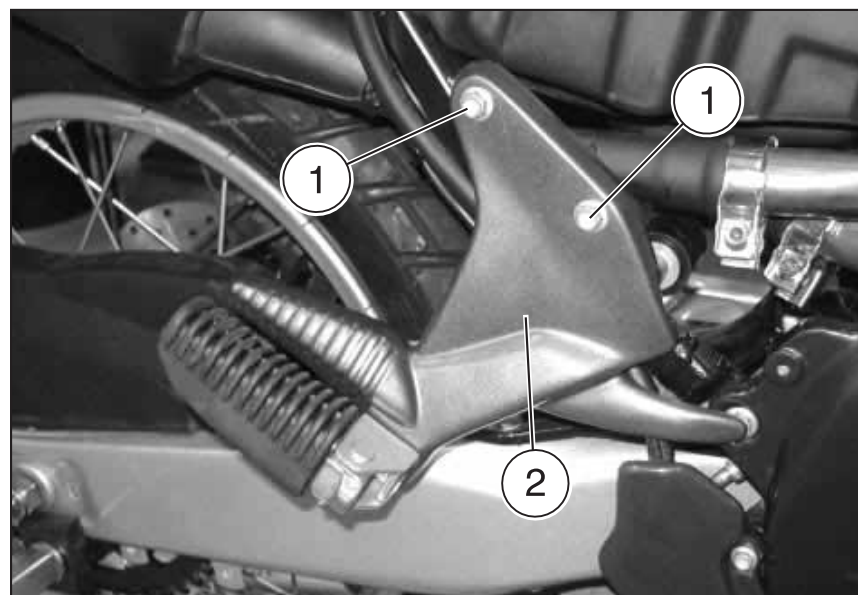
7.1.33 REMOVING THE PASSENGER FOOTREST GROUP

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the side panels, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).
- ◆ ★ Unscrew and remove the two screws (1).

Passenger footrest screw driving torque: 25 Nm (2.5 kgm).

- ◆ Remove the entire passenger footrest unit (2).



7.1.34 REMOVING THE EXHAUST SILENCERS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

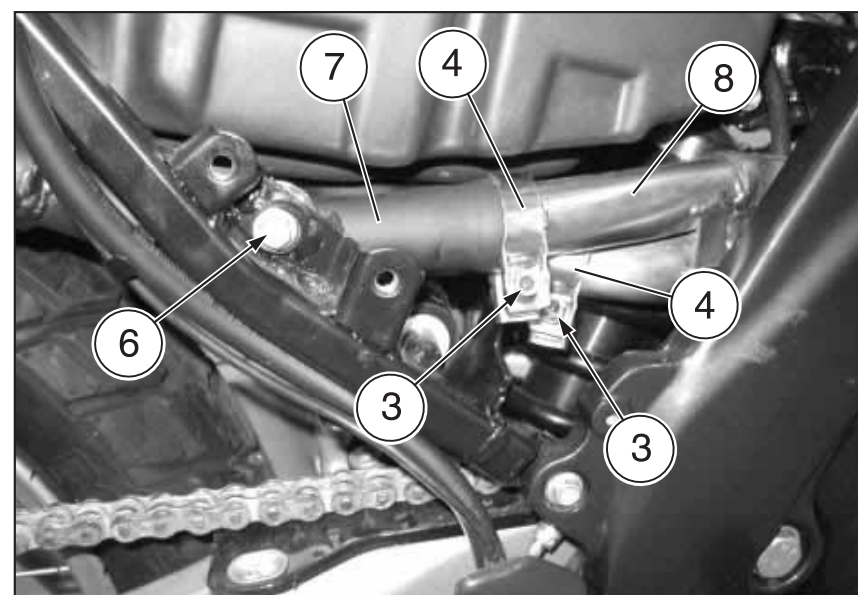
- ◆ Remove the passenger footrest unit, see 7.1.33 (REMOVING THE PASSENGER FOOTREST GROUP).
- ◆ Partially unscrew the two screws (3) on the two clamps (4).
- ◆ ★ Unscrew and remove the two screws (5).

Exhaust silencer rear screw driving torque: 25 Nm (2.5 kgm).

- ◆ ★ Unscrew and remove the screw (6).

Exhaust silencer front screw driving torque: 25 Nm (2.5 kgm).

- ◆ ★ Withdraw the exhaust silencer (7) from the corresponding exhaust pipe (8).
- ◆ ★ Remove the exhaust silencer (7).



⚠ CAUTION

Plug the exhaust pipes openings so as to prevent any foreign bodies entering.

7.1.35 REMOVING THE AIR CONVEYOR

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

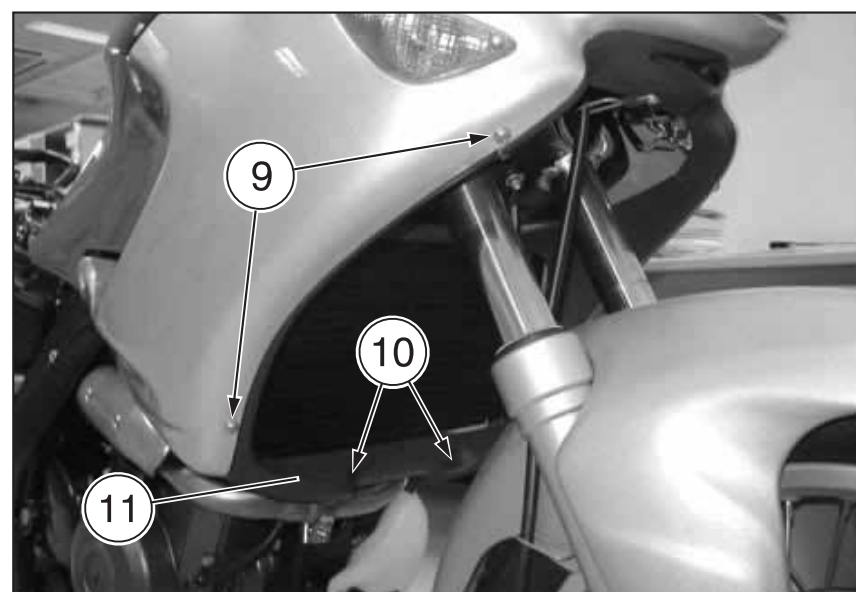
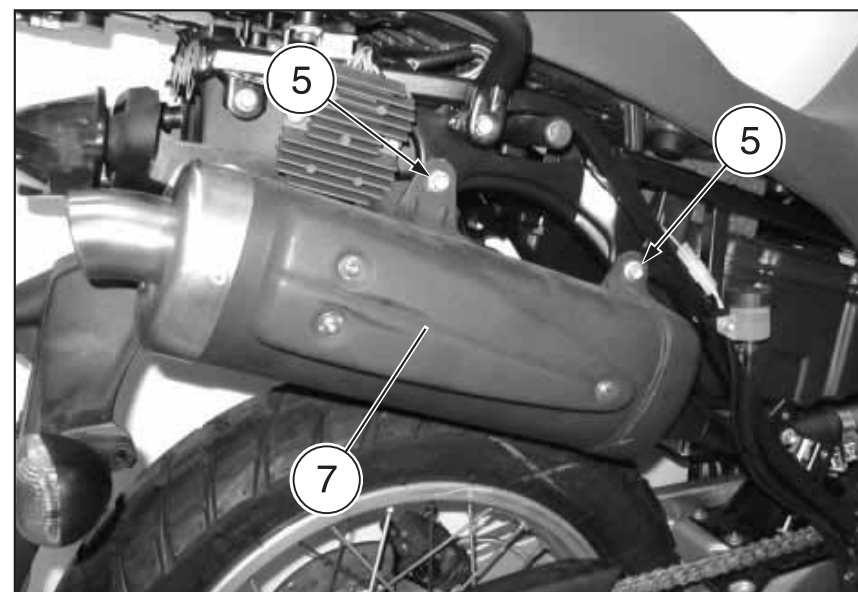
- ◆ ★ Unscrew and remove the two screws (9).

Front fairing front screw driving torque: 25 Nm (2.5 kgm).

- ◆ Unscrew and remove the two screws (10).

Air conveyor lower screw driving torque: 20 Nm (2.0 kgm).

- ◆ Remove the air conveyor (11).



7.1.36 REMOVING THE SADDLE SUPPORT

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the centre stand **OPT**.

PARTIAL REMOVAL

- ◆ Remove the exhaust silencers, see 7.1.34 (REMOVING THE EXHAUST SILENCERS).
- ◆ Loosen the two clamps (1) (2).
- ◆ ★ Loosen the saddle pillar lower fastening screw (3), giving it approximately one turn.

Saddle pillar lower screw driving torque: 25 Nm (2.5 kgm).

- ◆ ★ Unscrew and remove the saddle pillar upper fastening screw (4) and take the washer.

Saddle pillar upper screw driving torque: 25 Nm (2.5 kgm).

- ◆ Strike the luggage rack with the palm of your hand until the whole saddle pillar/filter case assembly rotates slightly downwards (with fulcrum in point "A"), thus releasing the two couplings (5) (6) from the throttle body.

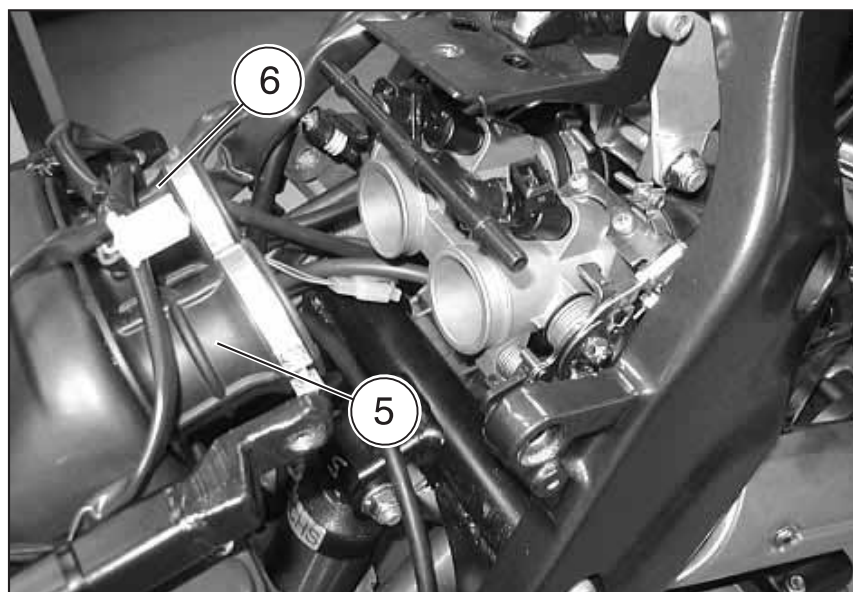
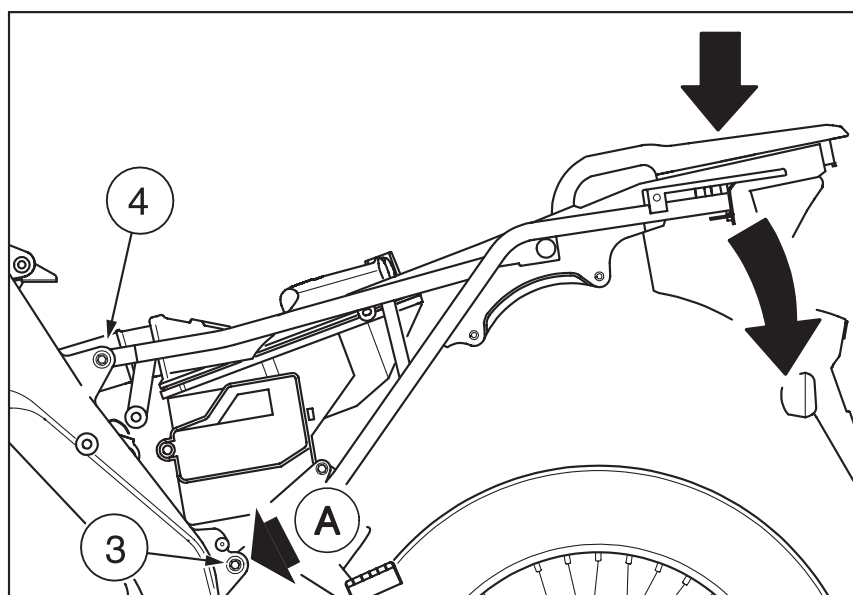
⚠ CAUTION

**Do not force the electric cables.
Do not make the saddle pillar/filter case assembly rotate more than necessary.**

- ◆ ★ Temporarily tighten the screw (3), in such a way as to hold the saddle pillar assembly in its position.

⚠ CAUTION

Plug the throttle body openings so as to prevent any foreign bodies entering.



Pegaso 650 I.E.**COMPLETE REMOVAL**

- ◆ Slightly open the two tangs (7), releasing the pipe and the electric cable.
- ◆ Unscrew and remove the screw (8) and take the washer.

Rear brake fluid tank screw driving torque: 3 Nm (0.3 kgm).

⚠ CAUTION

Take care to keep the rear brake reservoir (9) in vertical position, so that it does not overturn and the fluid does not flow out.

- ◆ Disconnect the electric connector (10).
- ◆ Loosen the clamps (11) (12) (13).
- ◆ Release the clamp (14).

⚠ CAUTION

Procure an equal number of clamps to be used for re-fitting.

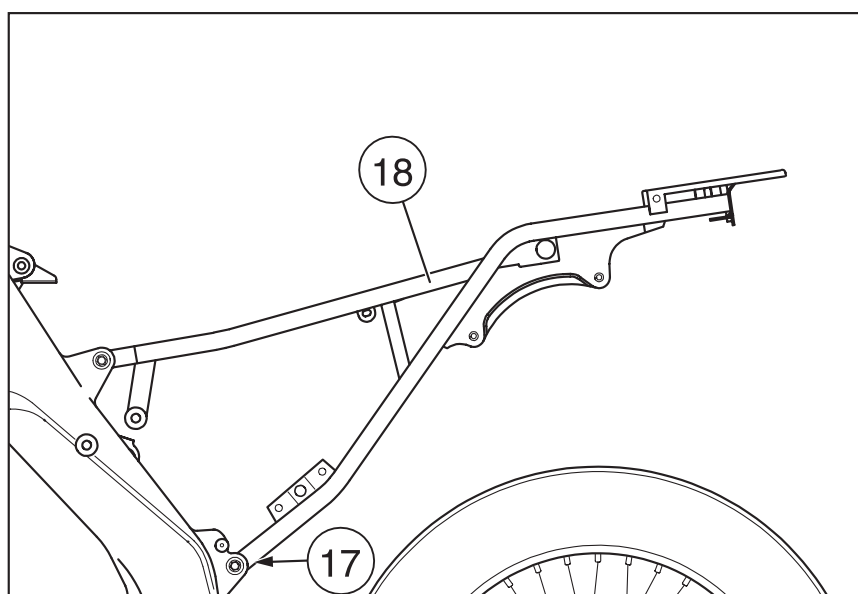
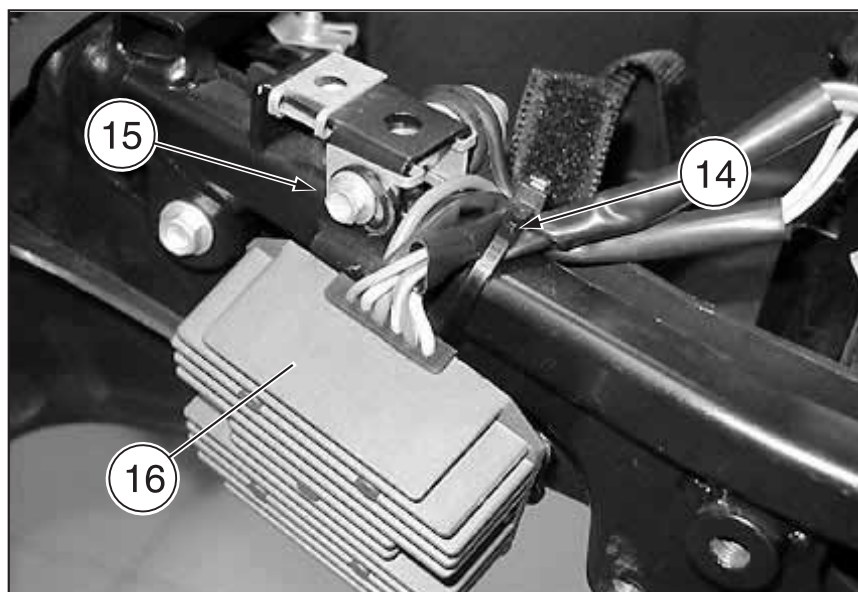
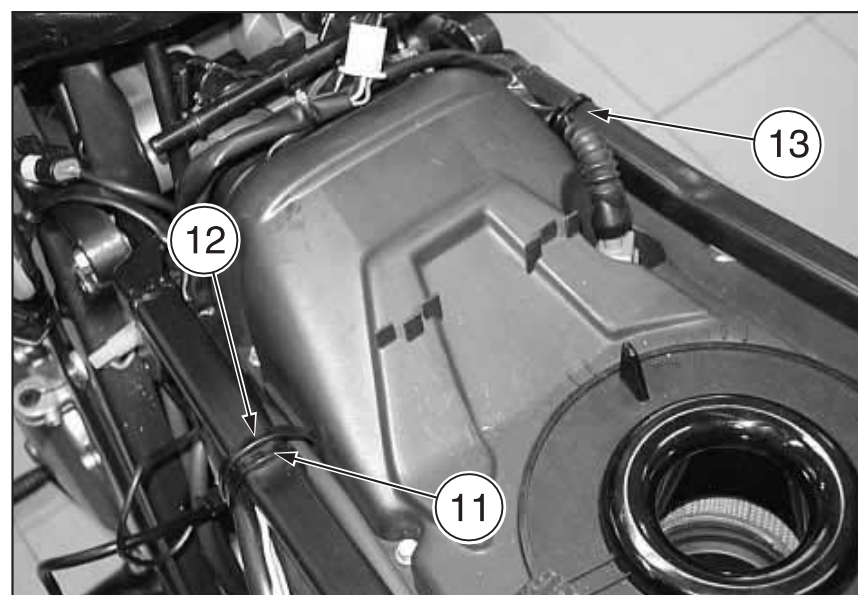
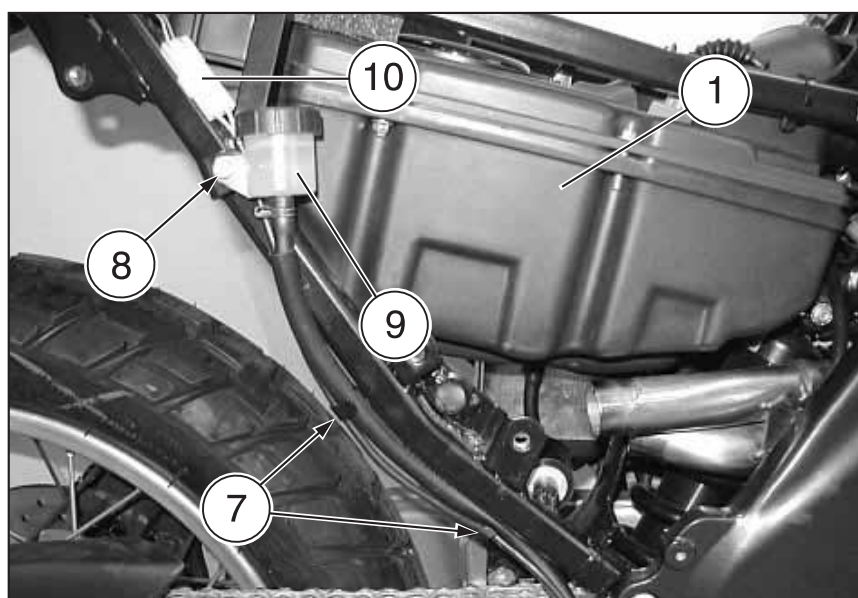
- ◆ Unscrew and remove the screw (15).

Regulator support screw driving torque: 10 Nm (1.0 kgm).

- ◆ Remove the voltage regulator (16), complete with support.
- ◆ Carry out the partial removal of the saddle pillar (see above).
- ◆ Remove the saddle lock, see 7.1.30 (REMOVING THE SADDLE LOCK).
- ◆ Remove the luggage rack, see 7.1.5 (REMOVING THE REAR LUGGAGE RACK).
- ◆ Remove the glove compartment, see 7.1.32 (REMOVING THE GLOVE COMPARTMENT).
- ◆ Remove the filter casing (1), see 7.1.9 (REMOVING THE AIR CLEANER CASE).
- ◆ ★ Unscrew and remove the screw (17) and take the washer.

Saddle pillar lower screw driving torque: 25 Nm (2.5 kgm).

- ◆ Remove the saddle support (18).



7.1.37 REMOVING THE REAR LIGHT

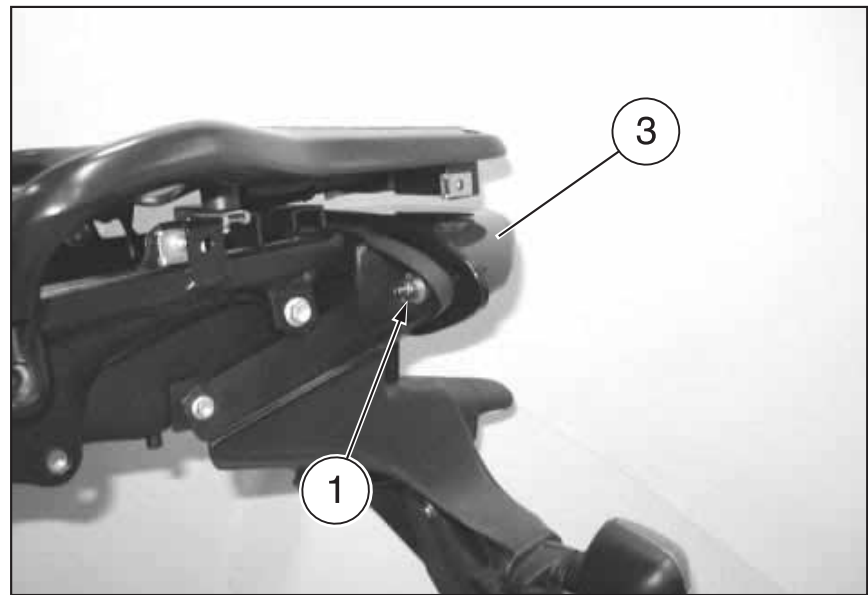
Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the panels, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).
- ◆ ★ Unscrew and remove the nut (1), take the washer and if necessary the bush and the rubber element.

Rear light side screw driving torque: 10 Nm (1.0 kgm).

- ◆ Working under the glove compartment with a socket spanner, unscrew and remove the nut (2) and if necessary take the bushes and the rubber element.

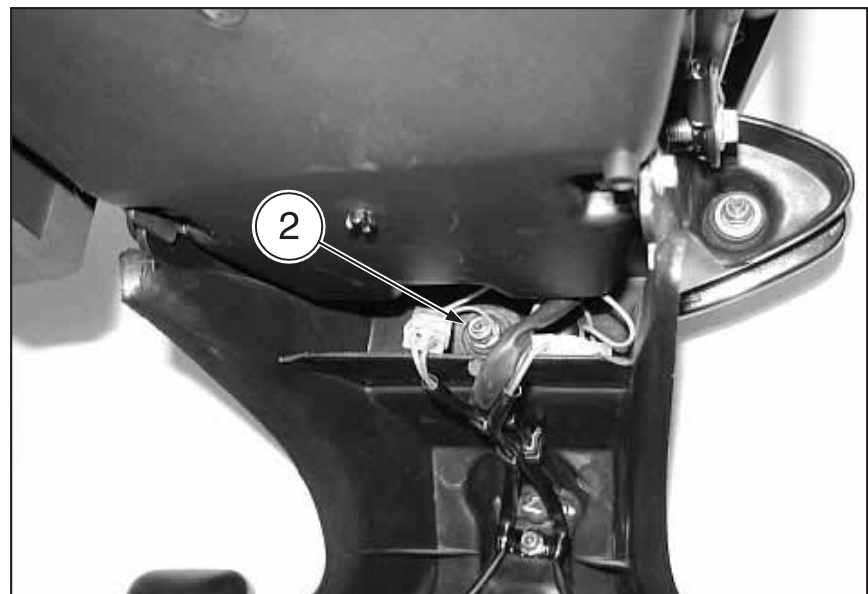
Rear light centre screw driving torque: 10 Nm (1.0 kgm).



⚠ CAUTION

Mark the electric connectors, in order to be able to reconnect them correctly later on.

- ◆ Disconnect the electric connectors.
- ◆ Remove the rear light (3).



7.1.38 REMOVING THE DRIVING CHAIN

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.29 (DRIVE CHAIN).

- ◆ Remove the drive chain guards, see 7.1.29 (REMOVING THE DRIVE CHAIN GUARDS).
- ◆ Remove the rear fork together with the wheel, the suspension unit and the brake unit, see 7.9.1 (REMOVING THE REAR FORK).
- ◆ Remove the drive chain (4).

⚠ CAUTION

If the chain is considerably worn, change it together with the drive pinion, see 7.1.40 (REMOVING THE CHAIN ROLLERS AND SHOE) and the crown, see 7.3 (REAR WHEEL).



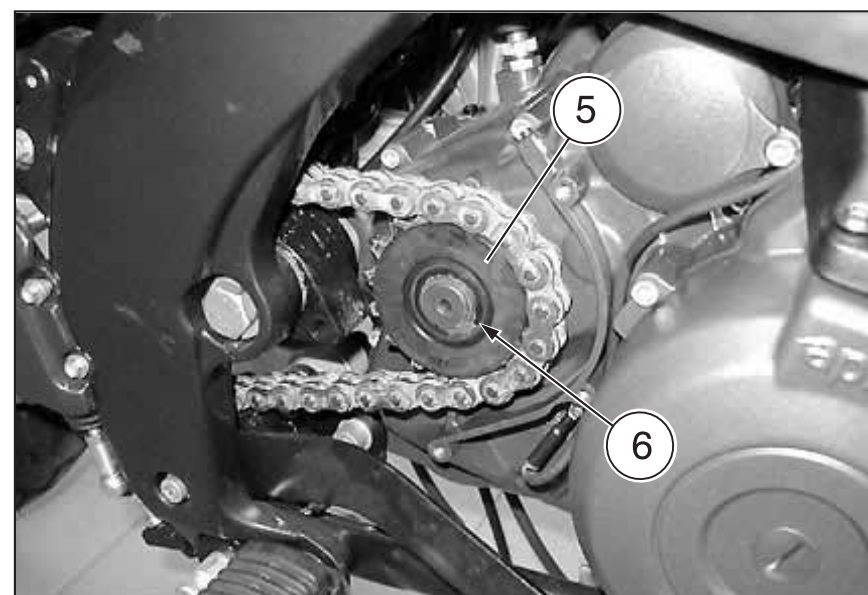
7.1.39 REMOVING THE DRIVE PINION

- ◆ Remove the drive pinion protection casing, see 3.2.3 (REMOVING THE DRIVE PINION PROTECTION CASING).
- ◆ Remove the stop ring (5).
- ◆ Slide the drive pinion (6), complete with chain, off the shaft.

NOTE If it is difficult to withdraw the drive pinion (6), slacken the chain slightly, see 2.29.3 (ADJUSTING THE DRIVING CHAIN).

- ◆ Remove the drive pinion (6).

NOTE When reassembling, apply Anti-Seize LOC-TITE® on the inner toothing of the drive pinion (6).



7.1.40 REMOVING THE CHAIN ROLLERS AND SHOE

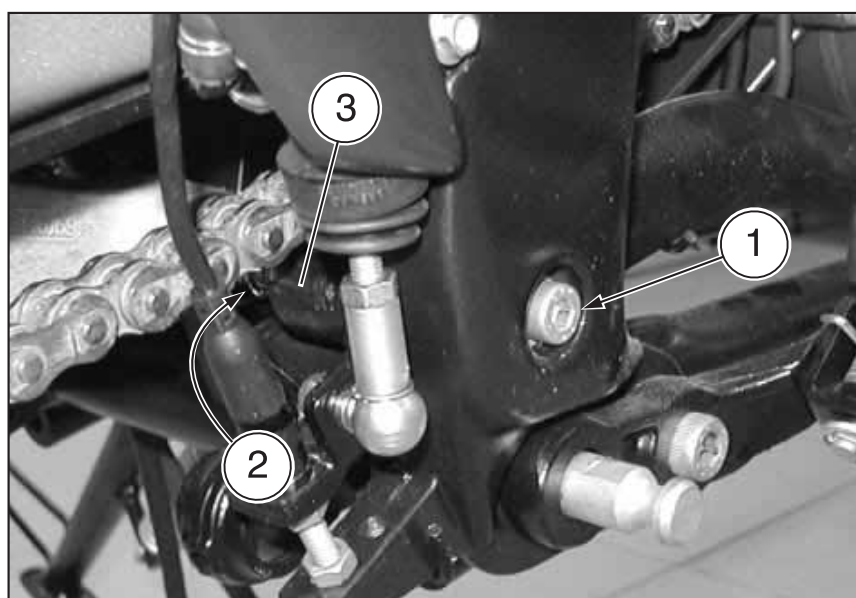
Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

REMOVING THE LOWER ROLLER

- ◆ Position the vehicle on the stand.
- ◆ Unscrew and partially withdraw the screw (1) (leave the screw inserted as much as necessary to keep the rear brake pedal in its position) and take the nut (2).

Chain lower roller screw driving torque: 25 Nm (2.5 kgm).

- ◆ Retrieve the washer, the roller (3) and the special spacing bush (plastic material + metal).

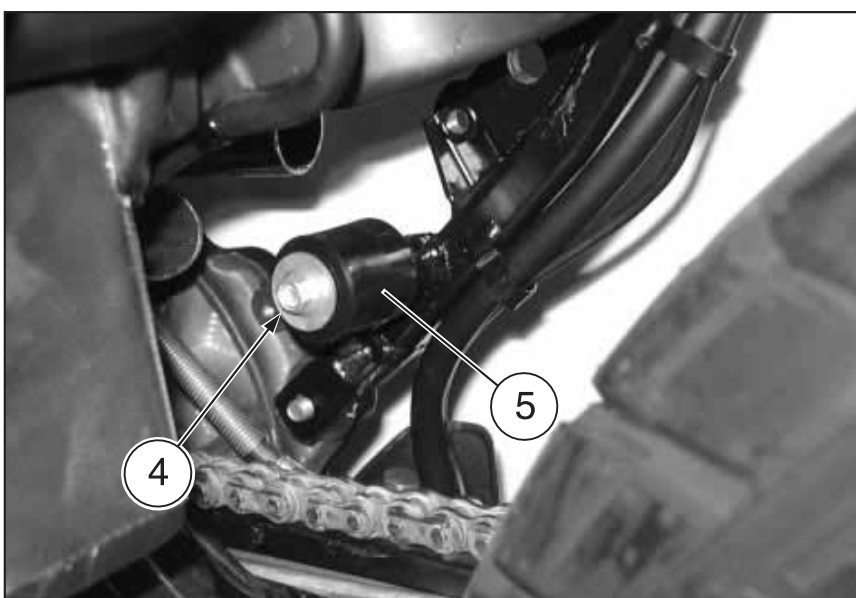


REMOVING THE UPPER ROLLER

- ◆ Position the vehicle on the stand.
- ◆ Unscrew and remove the screw (4).

Chain upper roller screw driving torque: 20 Nm (2.0 kgm).

- ◆ Retrieve the two washers, the roller (5) and the special spacing bush (plastic material + metal).

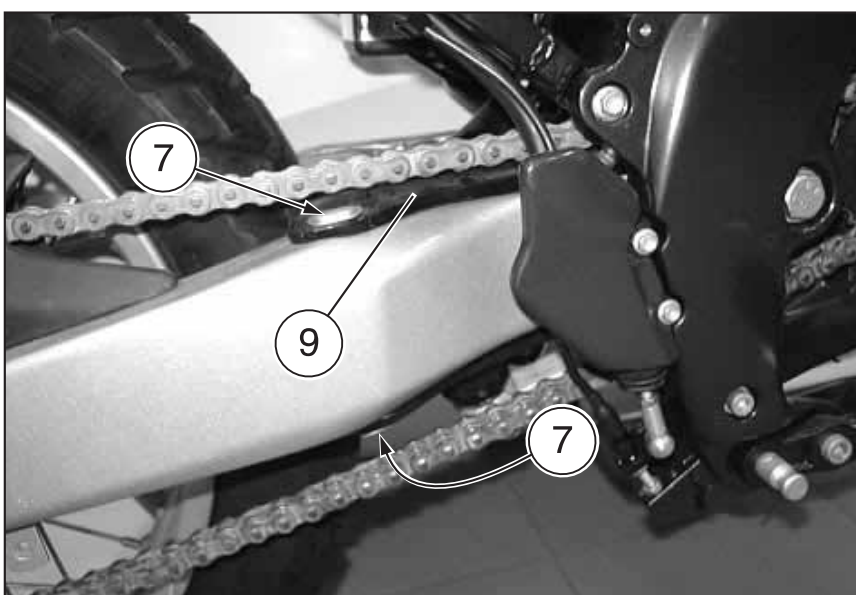
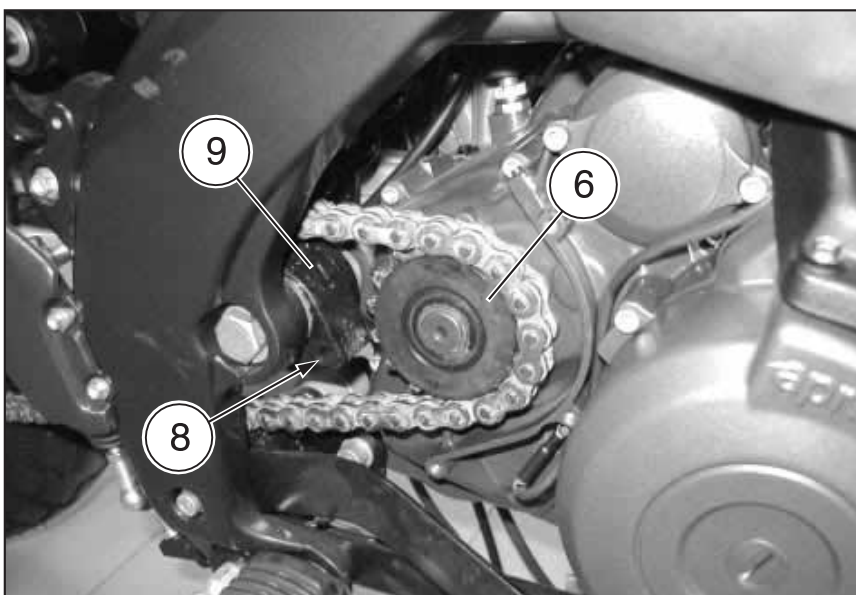


REMOVING THE SHOE

- ◆ Remove the pinion (6), see 7.1.39 (REMOVING THE DRIVE PINION)
- ◆ Unscrew and remove the two screws (7).

Driving chain shoe screw driving torque: 5 Nm (0.5 kgm).

- ◆ Introduce a screwdriver in the appropriate hole (8).
- ◆ Remove the shoe (9), withdrawing it from the front.



7.1.41 REMOVING THE SIDE STAND

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the centre stand **OPT**, or on an appropriate support stand fastened to the centre stand couplings.

CAUTION

Proceed with the stand up.

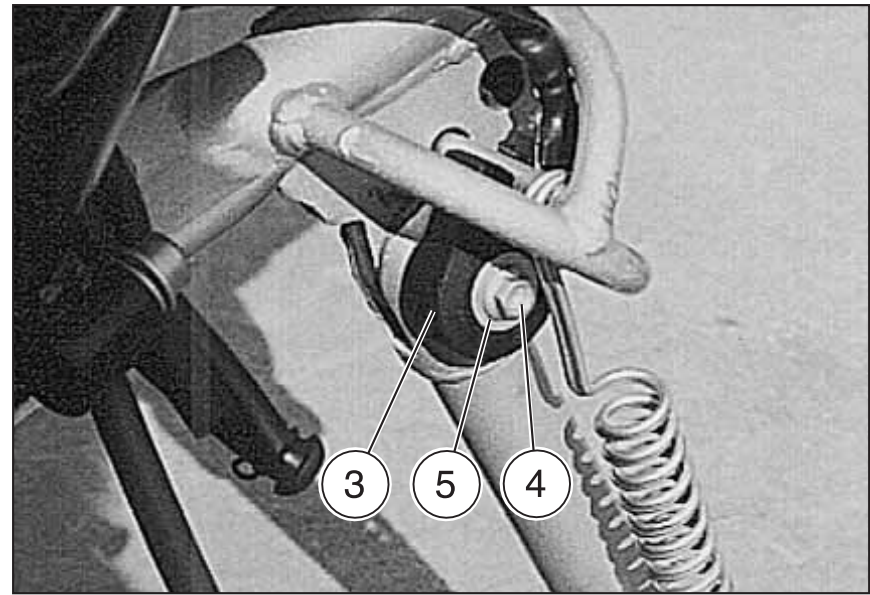
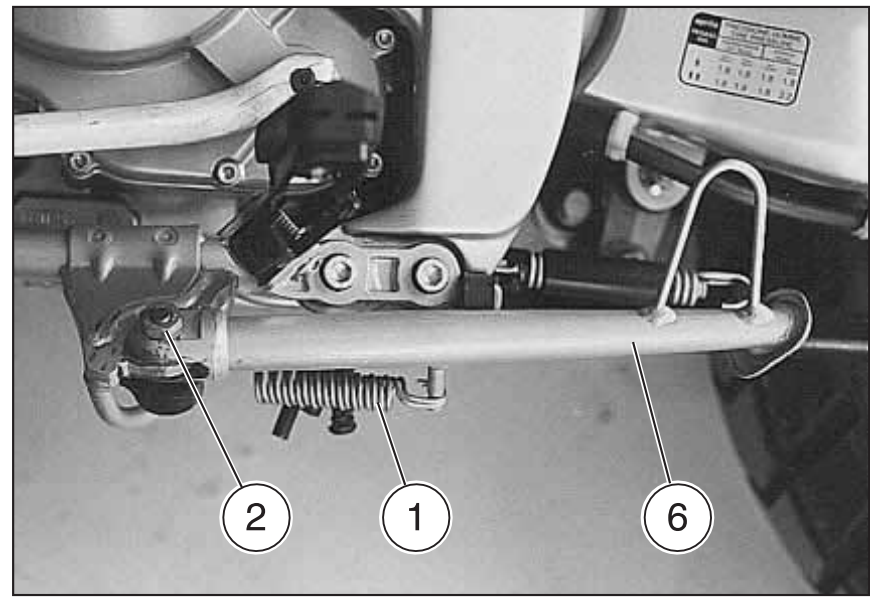
- ◆ Disconnect the two springs (1).
- ◆ Loosen and remove the nut (2), taking the washer.

Side stand nut driving torque: 30 Nm (3 kgm).

CAUTION

Proceed with care, in order to avoid damaging the switch (3).

- ◆ Unscrew and remove the screw (4).
- ◆ Slide out the switch (3).
- ◆ Slide out the pin (5).
- ◆ Remove the stand (6)



7.1.42 REMOVING THE CENTRE STAND **OPT**

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the side stand.

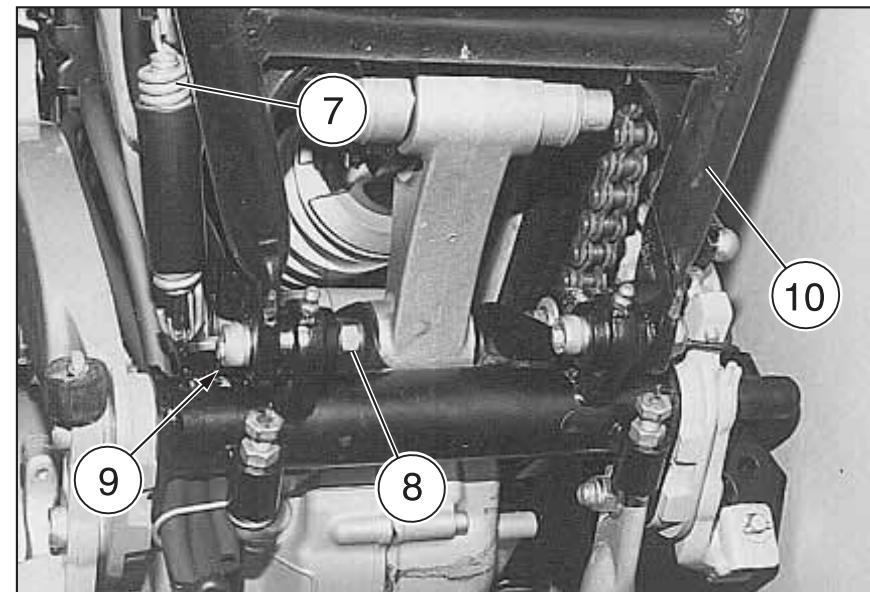
CAUTION

Proceed with the stand up.

- ◆ Disconnect the two springs (7).
- ◆ ★ Loosen and remove the nut (8).
- ◆ ★ Slide out the screw (9).

Centre stand nut/screw driving torque: 80 Nm (8 kgm).

- ◆ Remove the stand (10).



7.1.43 REMOVING THE FRONT DIRECTION INDICATORS

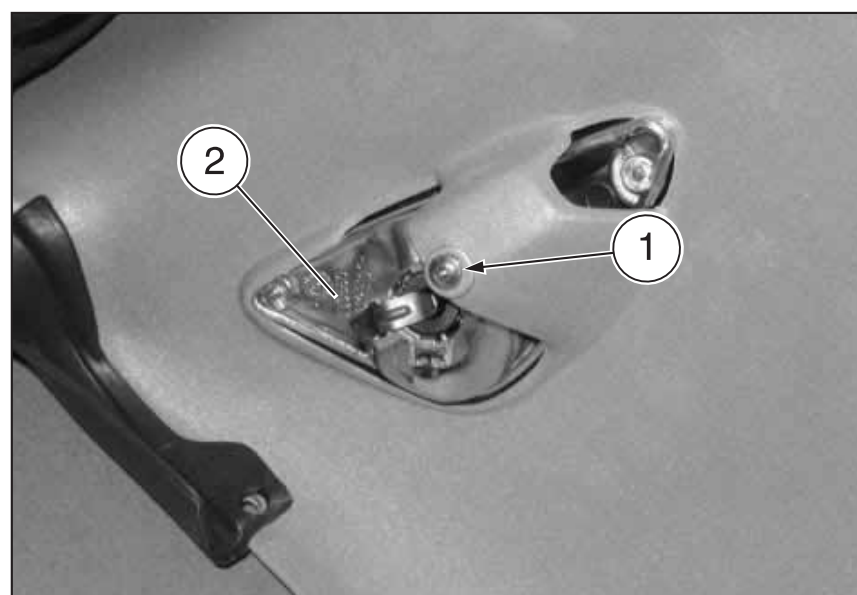
- ◆ Remove the front fairing, see 7.1.24 (REMOVING THE FRONT FAIRING).
- ◆ ★ Unscrew and remove the screw (1) and take the washer.

Front direction indicator screw driving torque: 1.5 Nm (0.15 kgm).

⚠ CAUTION

Upon reassembly, tighten the screw (1) moderately, since it is fixed on plastic.

- ◆ ★ Remove the complete direction indicator (2).



7.1.44 REMOVING THE REAR DIRECTION INDICATORS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Position the vehicle on the stand.
- ◆ Unscrew and remove the screw (3).
- ◆ Remove the glass guard (4).

⚠ CAUTION

Upon reassembly, tighten the screw (3) moderately and with care, in order to avoid damaging the glass guard.

⚠ CAUTION

Handle with care.

Do not force the electric cables.

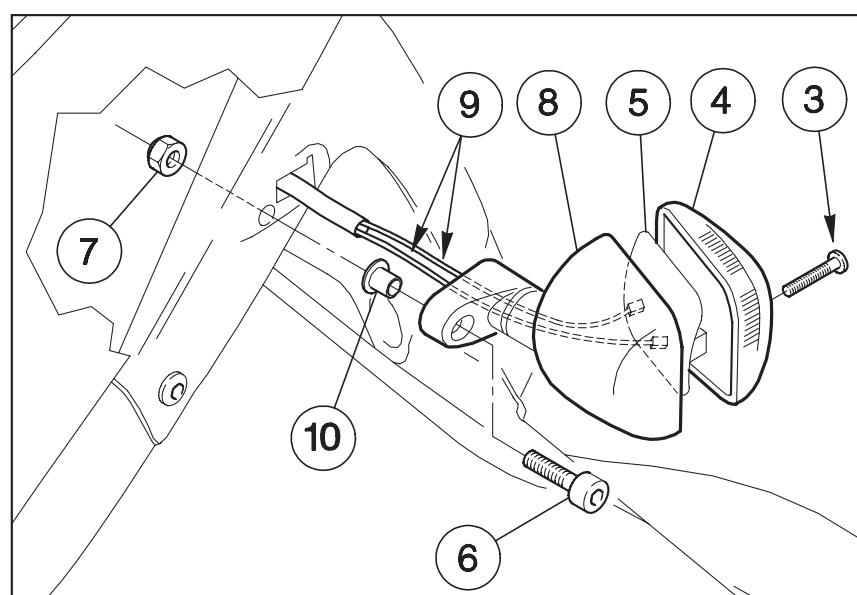
- ◆ Extract the reflector (5) as much as necessary to disconnect the two electric terminals.
- ◆ Unscrew the screw (6) and retrieve the nut (7).

Rear direction indicator screw driving torque: 6 Nm (0.6 kgm).

- ◆ Remove the indicator support (8) and withdraw it from the cables (9).

⚠ CAUTION

Upon reassembly, position the bush (10) correctly in the indicator support seat.



7.1.45 REMOVING THE FRAME

CAUTION

The frame (1) must be removed by an authorized centre or by an **aprilia** Official Dealer only.

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

CAUTION

The removal of the frame is a particularly complex operation. Therefore, inspect the vehicle carefully before proceeding.

This chapter describes the relevant procedures progressively and in sequential order.

Any reference to operations from other chapters must be interpreted logically in order to avoid components being removed unnecessarily.

Only perform those operations necessary to remove the component in question.

WARNING

Do not unscrew or tamper with the two screws and the relevant frame assembling nuts for any reason whatsoever (see figure).

- ◆ Remove the engine, see 3.3 (REMOVING THE WHOLE ENGINE FROM THE FRAME).
- ◆ Remove the rear brake pedal, see 7.1.40 (REMOVING THE CHAIN ROLLERS AND SHOE).
- ◆ Remove the dashboard mount, see 7.1.28 (REMOVING THE DASHBOARD MOUNT).
- ◆ Remove the saddle support complete, see 7.1.36 (REMOVING THE SADDLE SUPPORT).
- ◆ Remove the rear fork together with the wheel, the suspension unit and the brake unit, see 7.9.1 (REMOVING THE REAR FORK).
- ◆ Unscrew and remove the screw (1).

Frame guard screw driving torque: 25 Nm (2.5 kgm).

- ◆ Remove the frame guard (2).
- ◆ Disconnect the electrical connectors on left side of vehicle.

CAUTION

Mark the cables and pipes so as to prevent them being swapped over by mistake during refitting. For further information on the layout of cables and pipes, see 8.2 (RUN, FASTENING, WIRING, CABLES AND PIPES).

CAUTION

Release cables and pipes from the tangs on the frame and on the shock absorber upper support and withdraw them from the collars on the components that will be removed.

- ◆ Unscrew and remove the stoplight switch (3).

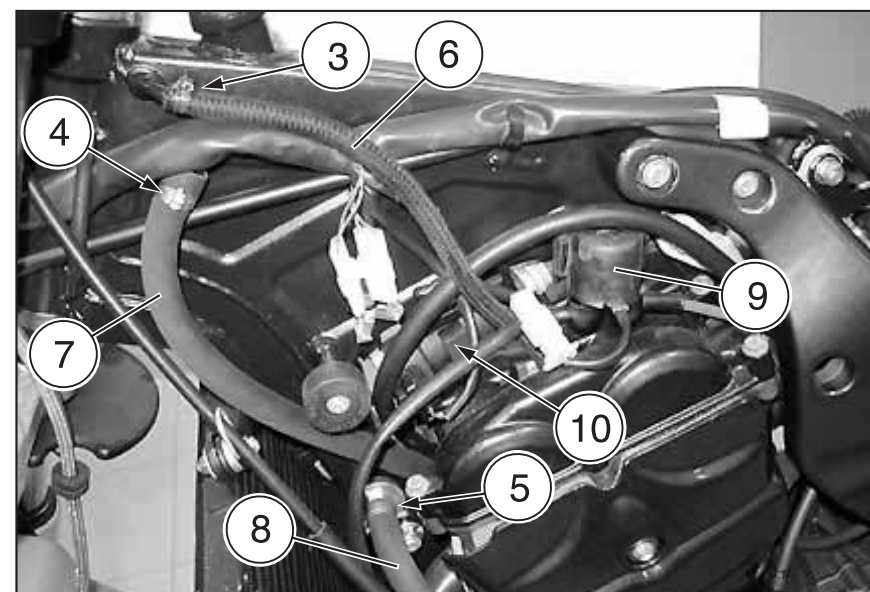
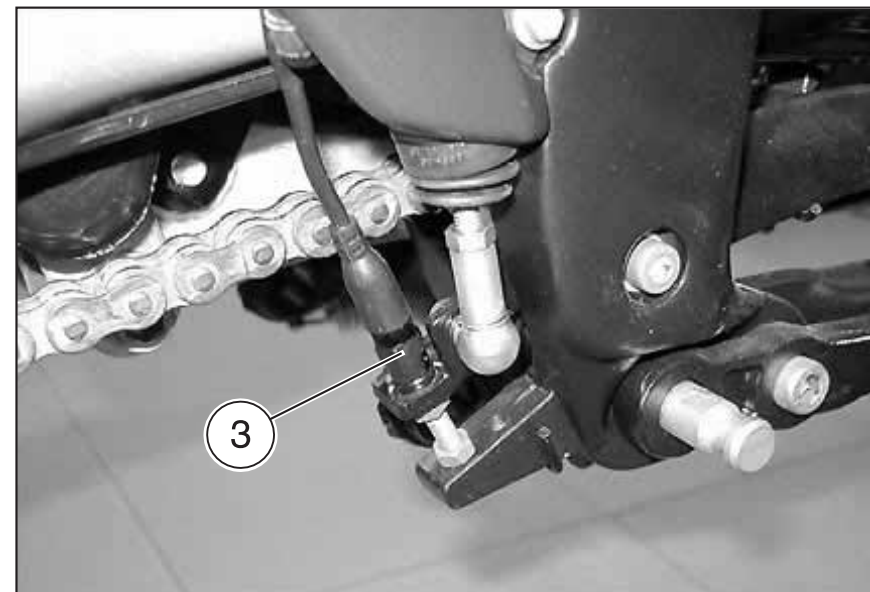
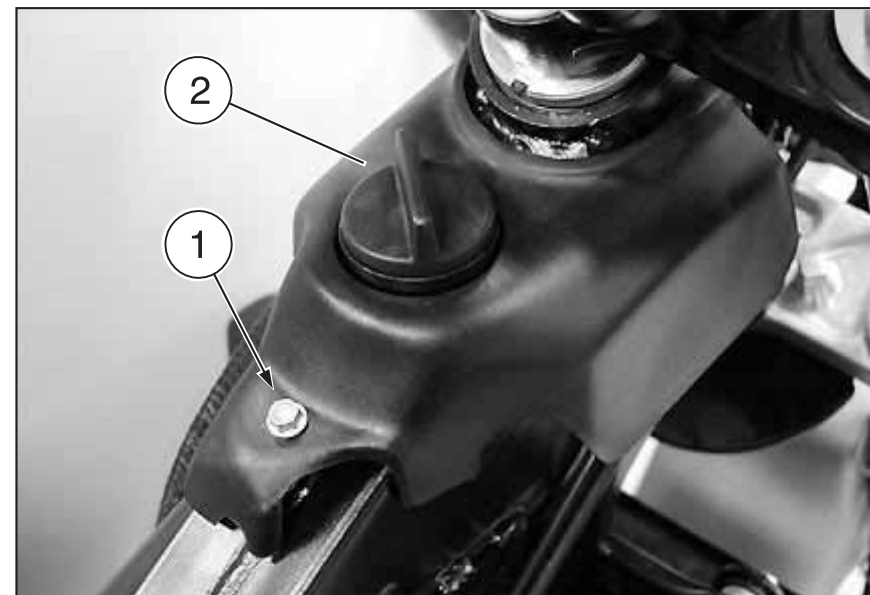
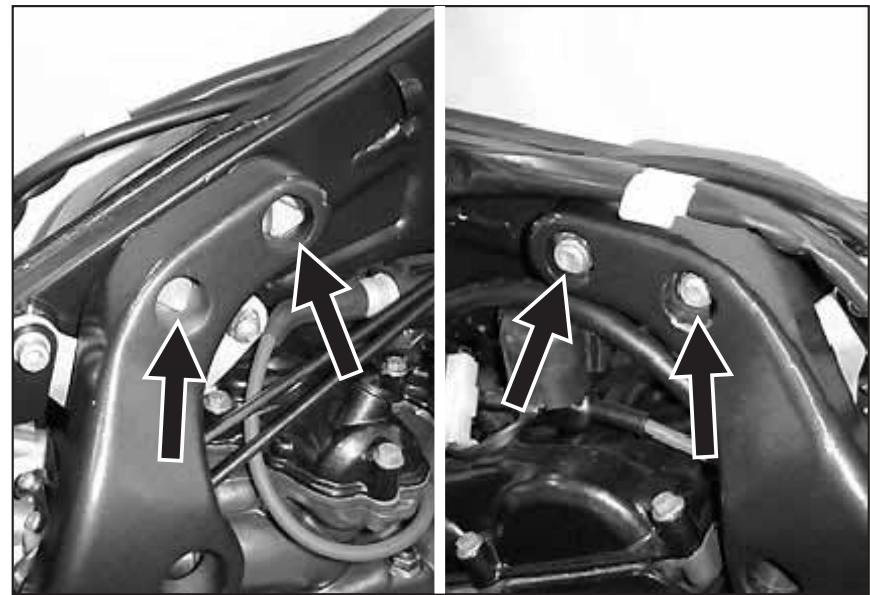
CAUTION

Release all the cables from the fastening clamps positioned along them. Prepare the same number of clamps, which will be required for reassembly.

NOTE Have the appropriate special tool **OPT** to hand:
 – **aprilia** part# 0277295 (hose clamp installation pliers).

CAUTION

Upon installation, replace the hose clamp that has been removed with a new one having the same dimensions, see 0.4.2 (SPARE PARTS CATALOGUES).



Follow ▶

Follow ►

Do not attempt to reinstall the removed hose clamp, since it is unusable.

Do not replace the removed hose clamp with a screw clamp or with other types of clamp.

- ◆ Cut the head of the pipe clamps (3) (4) (5) in the given order.
- ◆ Withdraw the oil breather pipe (6) and the engine oil pipes (7) (8) in the given order.
- ◆ Release the start relay (9) from its coupling.
- ◆ Release the coil HT (10) from its coupling.
- ◆ Place the frame in an appropriate sling (11) and attach the bands to a hoist for support.

⚠ WARNING

The straps and the hoist must be suitable for supporting the frame and the front part of the vehicle in total safety.

- ◆ Raise the frame together with the front part of the vehicle (wheel + mudguard + fork + handlebar with controls) as much as necessary to have enough space to withdraw the front part of the vehicle.
- ◆ Withdraw the front part of the vehicle (13) from the steering tube (14), see 7.7 (STEERING).
- ◆ ★ Unscrew and remove the screw (15) and retrieve the two washers.

Driving torque of the upper screw of the shock absorber upper support: 70 Nm (7.0 kgm).

- ◆ ★ Unscrew and remove the screw (16) and take the washer.

Driving torque of the lower screw of the shock absorber upper support: 25 Nm (2.5 kgm).

- ◆ Remove the shock absorber upper support (17).
- ◆ ★ Unscrew and remove the screw (18).

Double connection element support screw driving torque: 80 Nm (8 kgm).

- ◆ Retrieve the rider footrest and the double connection element support (19), complete with centre stand, if this is provided **OPT**.
- ◆ Unscrew and remove the oil plug (20) and retrieve the O-ring (21).
- ◆ Unscrew and remove the oil filter (22) and retrieve the O-ring (23).

Oil filter driving torque: 35 Nm (3.5 kgm).

- ◆ Unscrew and remove the oil drain plug (24) and take the sealing washer (25).

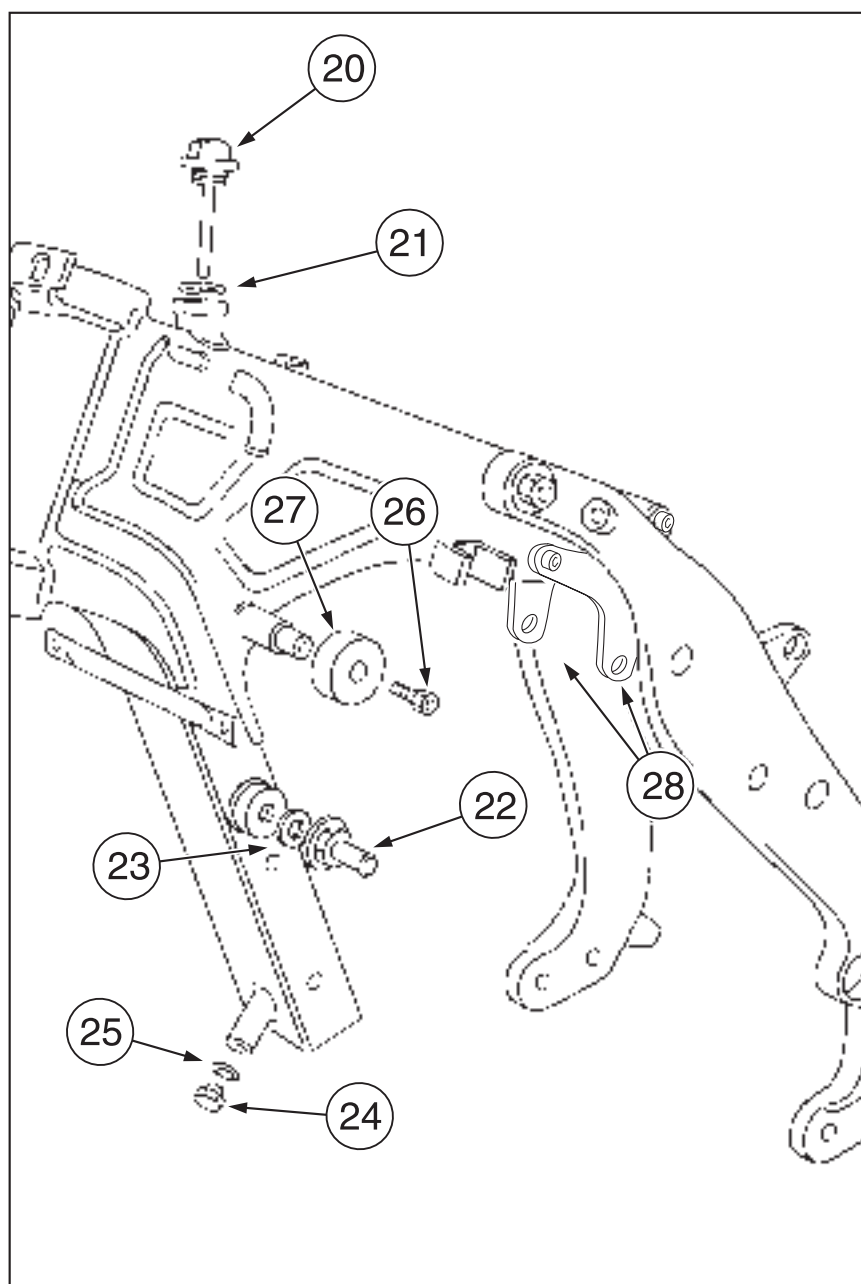
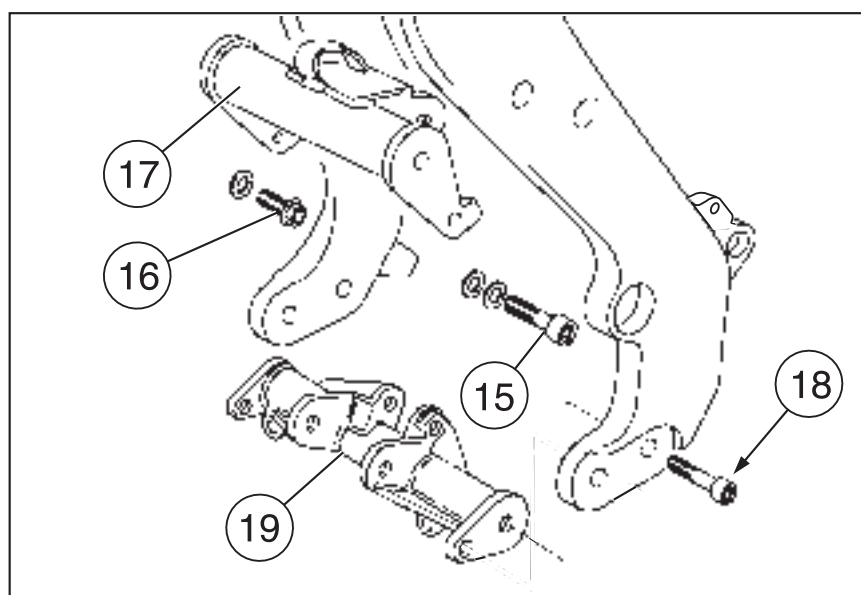
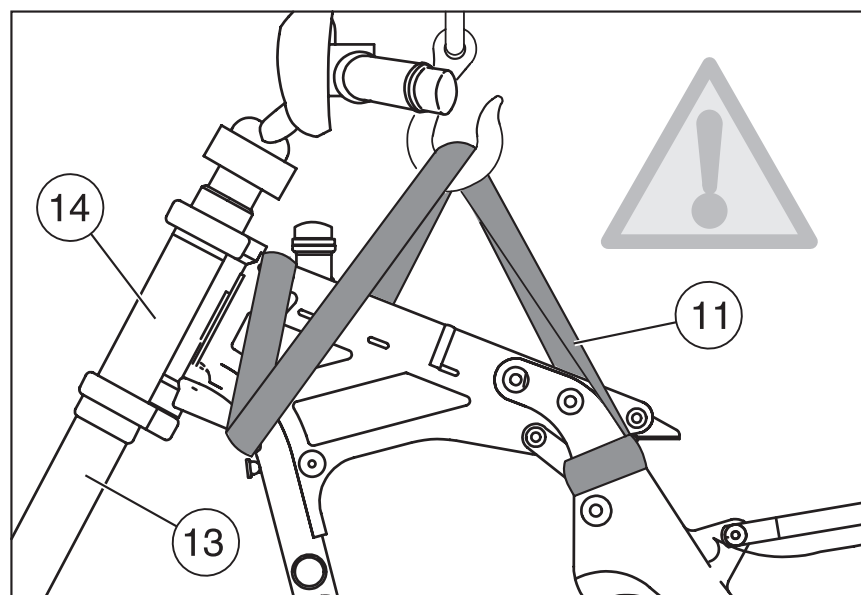
Oil drain plug driving torque: 20 Nm (2.0 kgm).

- ◆ Unscrew and remove the screw (26) and take the pad (27).
- ◆ Loosen and remove the nut, withdraw the screw and take the washer and the two engine support plates (28).

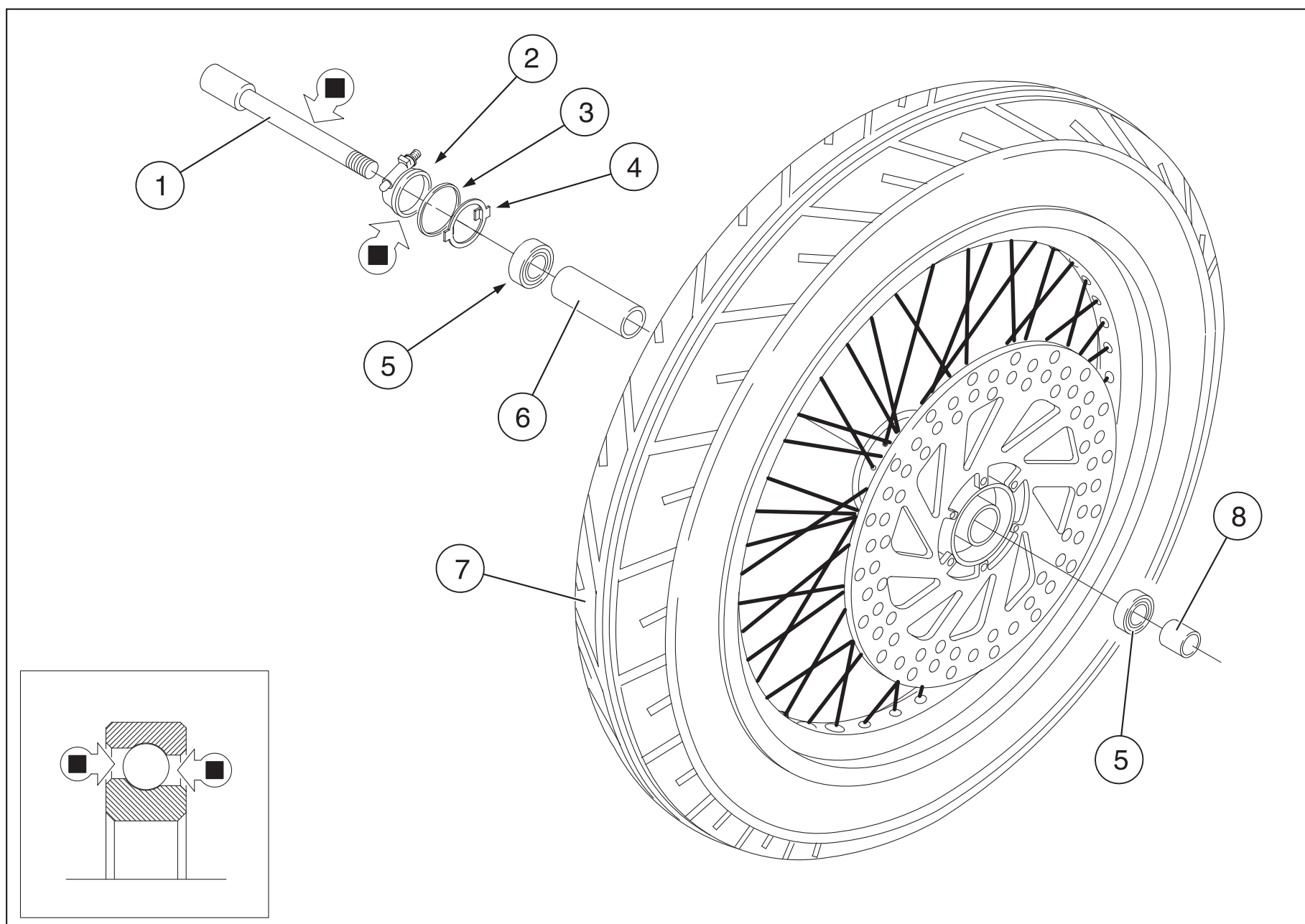
Engine support plate fastening nut/screw driving torque: 25 Nm (2.5 kgm).

Once the frame has been completely reinstalled, proceed as follows:

- ◆ Check and if necessary adjust the steering bearing slack, see 2.22.1 (CHECKING THE BEARING SLACK STEERING) and 2.22.2 (ADJUSTING THE BEARING SLACK STEERING).
- ◆ Check and if necessary adjust the rear fork, see 2.23 (REAR FORK) and 2.23.1 (ADJUSTING THE REAR FORK).
- ◆ Make sure that pipes and cables are positioned and fastened correctly.
- ◆ Make sure that the rear brake pedal is positioned correctly, see 2.20 (ADJUSTING THE REAR BRAKE CONTROL LEVER CLEARANCE).



7.2 FRONT WHEEL



Key

- 1) Wheel pin
- 2) Speedometer/odometer control
- 3) Speedometer/odometer control sealing ring
- 4) Traction ring
- 5) Bearings
- 6) Inner spacer
- 7) Complete wheel
- 8) Outer spacer

■ = GREASE, see 1.6 (LUBRICANT CHART).

7.2.1 REMOVING THE FRONT WHEEL

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.26 (FRONT WHEEL).

⚠ CAUTION

While disassembling and reassembling the wheel, be careful not to damage the brake pipes, the disc and the pads.

⚠ WARNING

Riding with damaged rims may be dangerous for the rider, other persons and the vehicle. Check the conditions of the wheel rim and change it if it is damaged.

NOTE Weight without driver (ready for starting): 200 kg.

DISASSEMBLY

- ◆ Set the vehicle on the relevant front support stand, see 1.8 (POSITIONING THE VEHICLE ON THE SUPPORT STAND).
- ◆ Put a support (1) under the tyre, in such a way as to keep the wheel in its position after loosening it.

⚠ CAUTION

Make sure that the vehicle is stable.

- ◆ Partially unscrew the two screws (2) (right side).

Front wheel pin clamp screw driving torque: 12 Nm (1.2 kgm).

- ◆ Unscrew the wheel pin (3) completely.

Front wheel pin screw driving torque: 80 Nm (8.0 kgm).

NOTE To facilitate the extraction of the wheel pin, slightly raise the wheel.

- ◆ Support the front wheel and manually withdraw the wheel pin (3).
- ◆ Take the left spacer ring (4) (left side).

NOTE Upon removal, check the position of the tachometer/odometer transmission cable, since this will be useful for the reassembly.

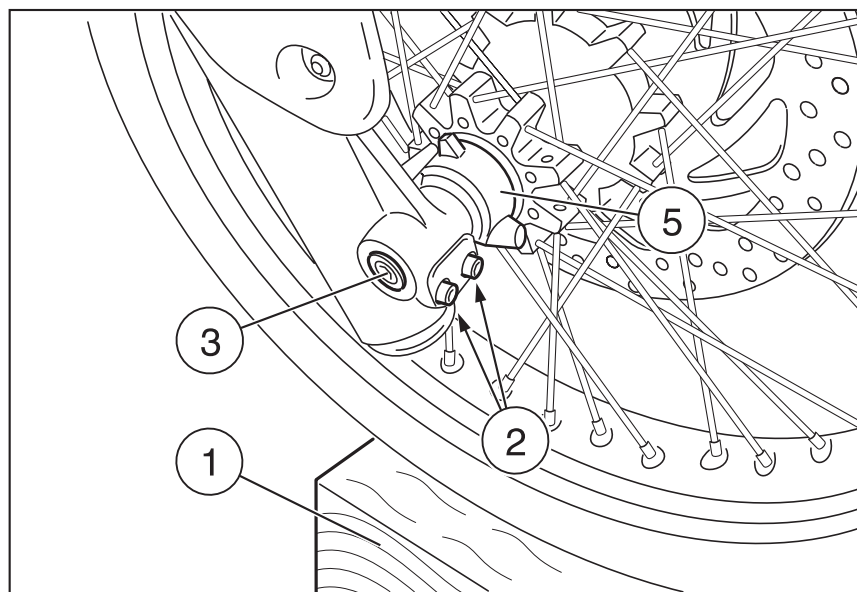
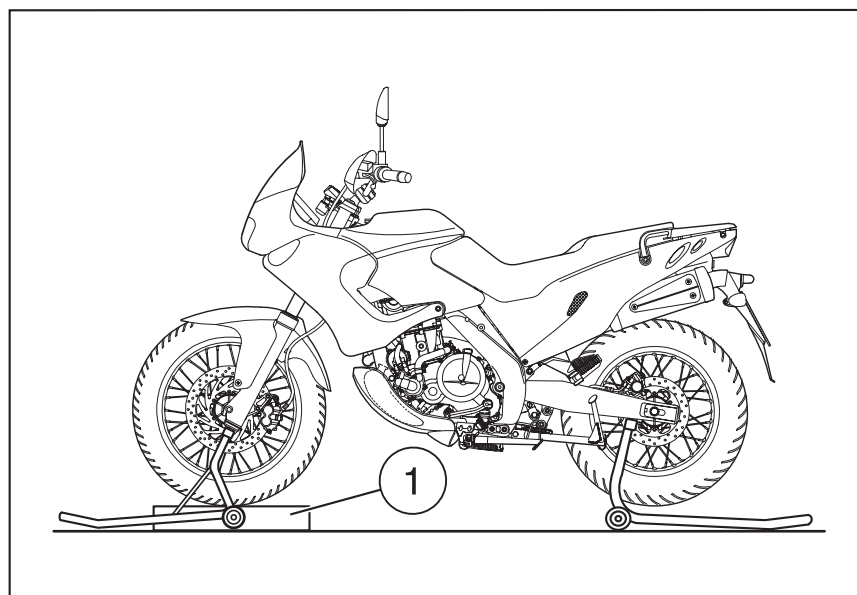
- ◆ Remove the speedometer/odometer control (5) from the wheel seat.

NOTE Remove the wheel, withdrawing the disc from the brake caliper with care.

- ◆ Remove the wheel by withdrawing it from the front.

⚠ CAUTION

Never pull the front brake lever after removing the wheel, otherwise the caliper pistons may go out of their seats, thus causing the outflow of the brake fluid.



7.2.2 CHECKING THE FRONT WHEEL COMPONENTS

⚠ CAUTION

Make sure that all the components are intact, particularly the following.

7.2.3 FRONT WHEEL BEARINGS

Carry out the check with the bearings mounted on the wheel.

CHECKING THE ROTATION

- ◆ Manually rotate the inner ring (1) of each single bearing. The rotation must be regular, smooth and noiseless.

If one or both bearings is/are not in compliance with the check parameters:

- ◆ Wash the bearings with a clean detergent.

⚠ CAUTION

Prevent the compressed air from making the bearings turn, since this would damage them.

- ◆ Dry the bearings with compressed air.
- ◆ Repeat the rotation check on both bearings.

If one or both bearings is/are not in compliance with the check parameters:

- ◆ Change both wheel bearings, see 7.2.11 (ASSEMBLING THE FRONT WHEEL BEARINGS).

⚠ WARNING

Always change both bearings.
Always replace the bearings with bearings of the same type.

CHECKING THE END AND RADIAL PLAY

- ◆ Check the radial play and the end play.

End play: a minimum end play is allowed.

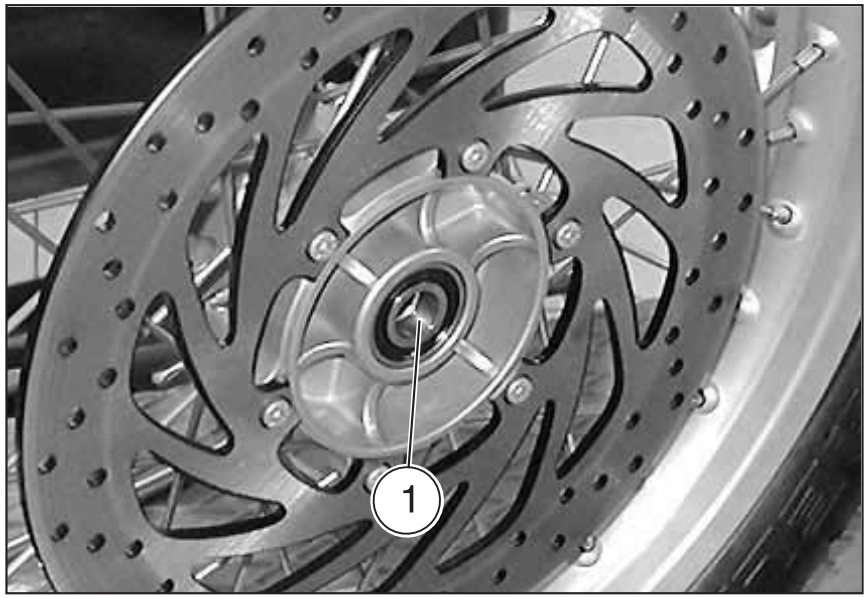
Radial play: none.

If one or both bearings is/are not in compliance with the check parameters:

- ◆ Change both wheel bearings, see 7.2.11 (ASSEMBLING THE FRONT WHEEL BEARINGS).

⚠ WARNING

Always change both bearings.
Always replace the bearings with bearings of the same type.



7.2.4 FRONT WHEEL GASKETS

- ◆ Check the conditions of the gasket (1); if it is damaged or excessively worn, change it.

⚠ WARNING

Always change both seals.
Always replace the gaskets with gaskets of the same type.

7.2.5 FRONT WHEEL PIN

- ◆ Check the eccentricity of the pin wheel (2) by means of a comparator. If the eccentricity exceeds the limit value, change the pin wheel (2).

Maximum eccentricity: 0.25 mm.

7.2.6 FRONT WHEEL RIM

- ◆ Using a comparator, make sure that the radial (A) and axial (B) eccentricity of the rim (3) do not exceed the limit value.

Excessive eccentricity is usually caused by worn or damaged bearings.

If, after changing the bearings, the value does not fall within the indicated limit, change the rim (3).

Maximum radial and axial eccentricity: 2 mm.

7.2.7 FRONT TYRE

- ◆ Check the state of the tyre, see 2.30 (TYRES) and 7.4 (TYRES).

7.2.8 FRONT BRAKE DISC

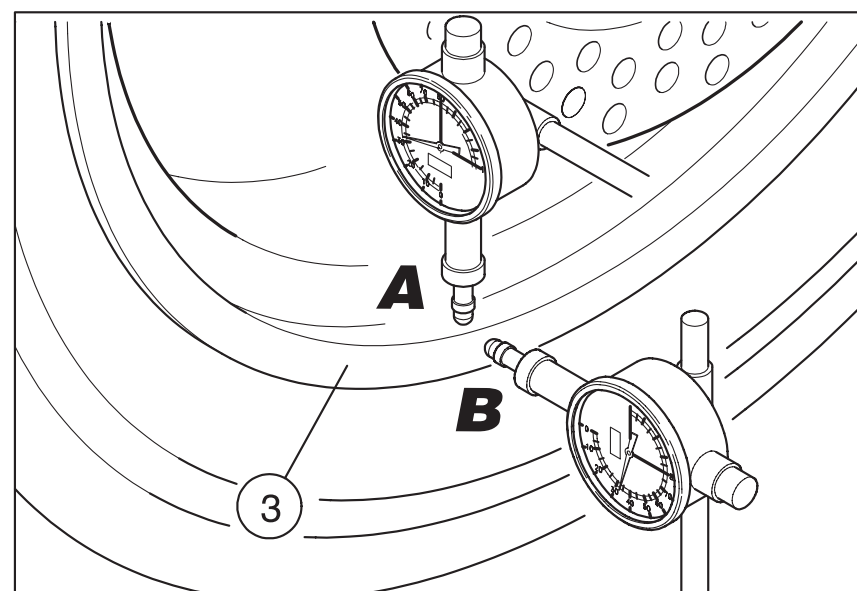
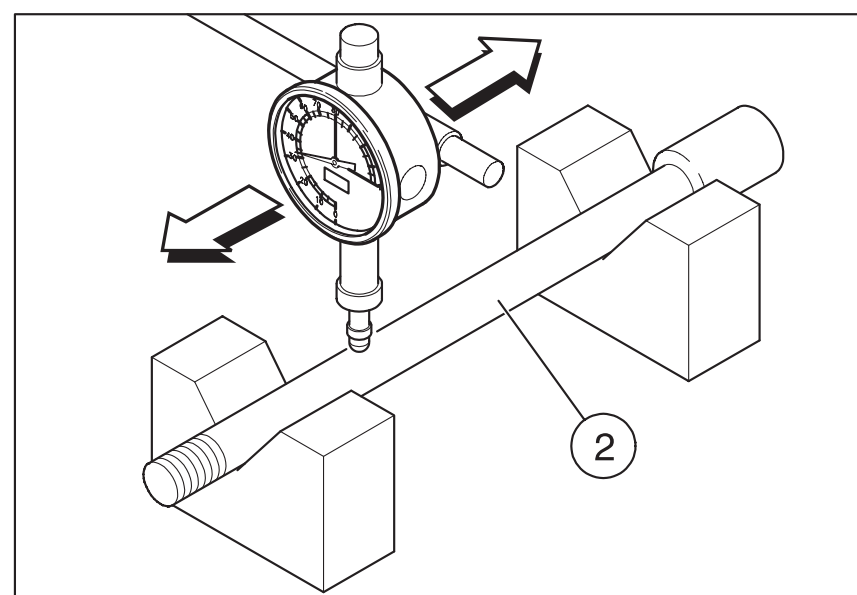
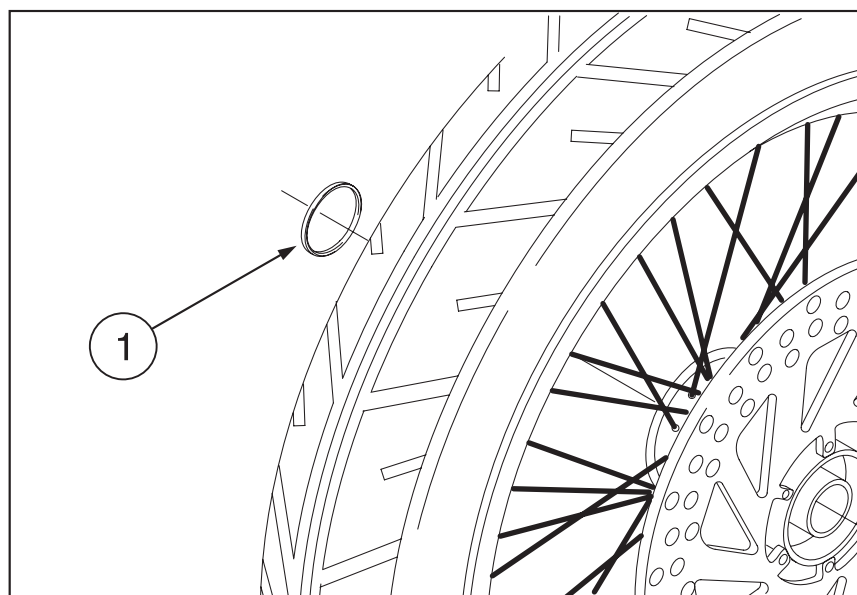
- ◆ Check the front brake disc, see 7.5.2 (CHECKING THE FRONT BRAKE DISC).

7.2.9 SPEEDOMETER CONTROL

- ◆ Make sure that there are no signs of damage and/or excessive wear.

⚠ CAUTION

Apply some grease inside the speedometer control, see 1.6 (LUBRICANT CHART).



7.2.10 DISASSEMBLING THE FRONT WHEEL BEARINGS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the front wheel, see 7.2.1 (REMOVING THE FRONT WHEEL).
- ◆ Use a cloth to clean both sides of the hub.

Work on the right side of the wheel:

- ◆ Remove the speedometer/odometer control seal (1).
- ◆ Remove the traction ring (2).

NOTE Have the appropriate special tool **OPT** to hand:
– **aprilia** part# 8140180 (Kit for bearings in the range Ø10 mm to Ø 30 mm).

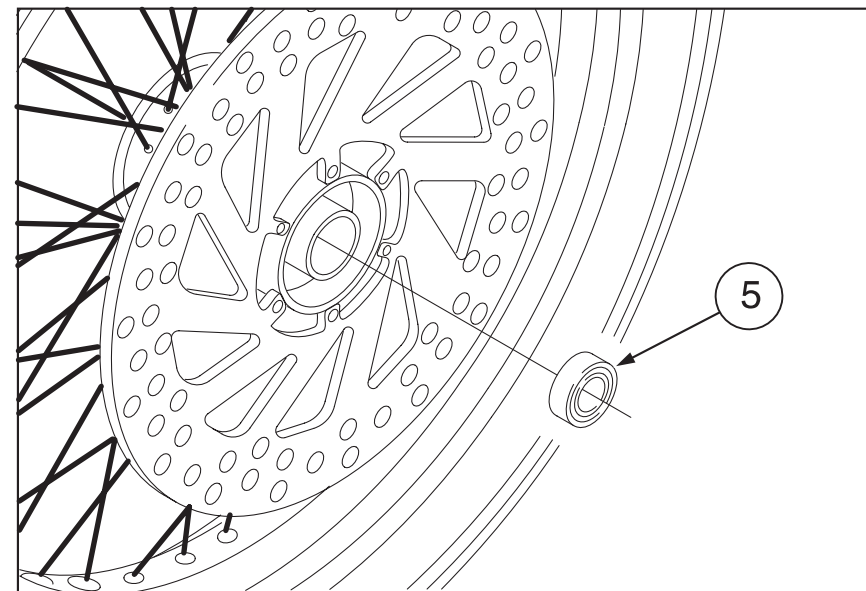
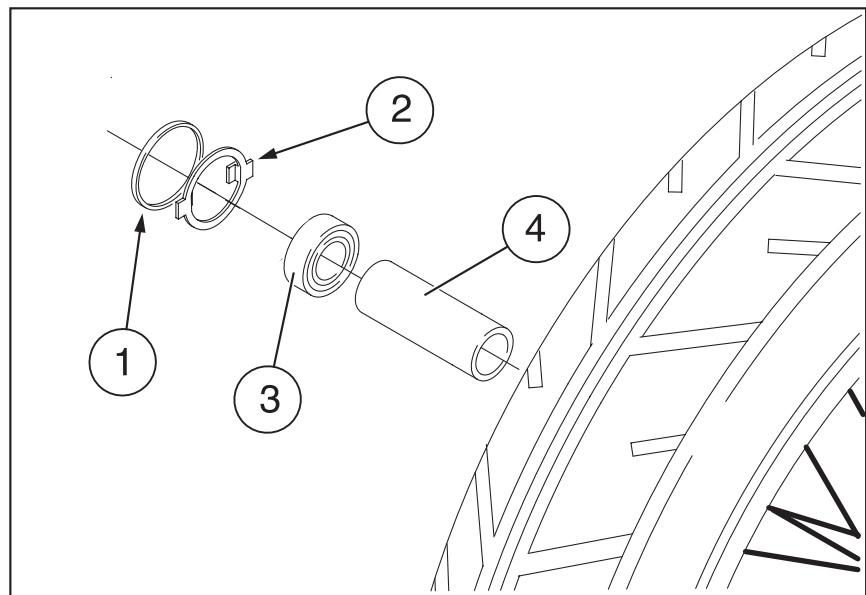
- ◆ Use a special extractor to extract the right bearing (3).
- ◆ Retrieve the inner spacer (4).

Work from the left-hand side of the wheel:

NOTE Have the appropriate special tool **OPT** to hand:
– **aprilia** part# 8140180 (Kit for bearings in the range Ø10 mm to Ø 30 mm).

- ◆ Use a special extractor to extract the left bearing (5).
- ◆ Thoroughly clean the inside of the hub.

NOTE Wash all the components with a clean detergent.



7.2.11 ASSEMBLING THE FRONT WHEEL BEARINGS

If provided:

- ◆ Remove the front wheel bearings, see 7.2.10 (DISASSEMBLING THE FRONT WHEEL BEARINGS).

Work from the right-hand side of the wheel:

NOTE Have the appropriate special tool **OPT** to hand:
 – **aprilia** part# 8140180 (Kit for bearings in the range $\varnothing 10$ mm to $\varnothing 30$ mm).

- ◆ Using the appropriate pad, insert the right bearing (1) completely.

NOTE The right bearing must be inserted until its contact with the wheel hub shoulder is complete.

- ◆ Insert the traction ring (2).

NOTE The traction ring (2) is provided only on the right side of the wheel.

Work from the left-hand side of the wheel:

- ◆ Insert the spacer (3).

NOTE Have the appropriate special tool **OPT** to hand:
 – **aprilia** part# 8140180 (Kit for bearings in the range $\varnothing 10$ mm to $\varnothing 30$ mm).

- ◆ Use a special pad to insert the left bearing (4).

NOTE The complete insertion of the left bearing (4) will bring the following components into contact:

- right bearing (1);
- spacer (3);
- left bearing (4).

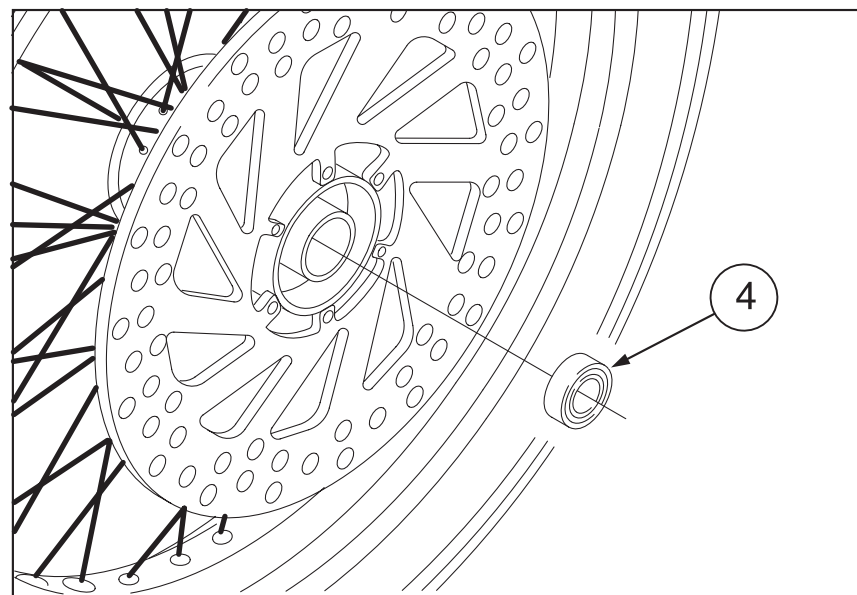
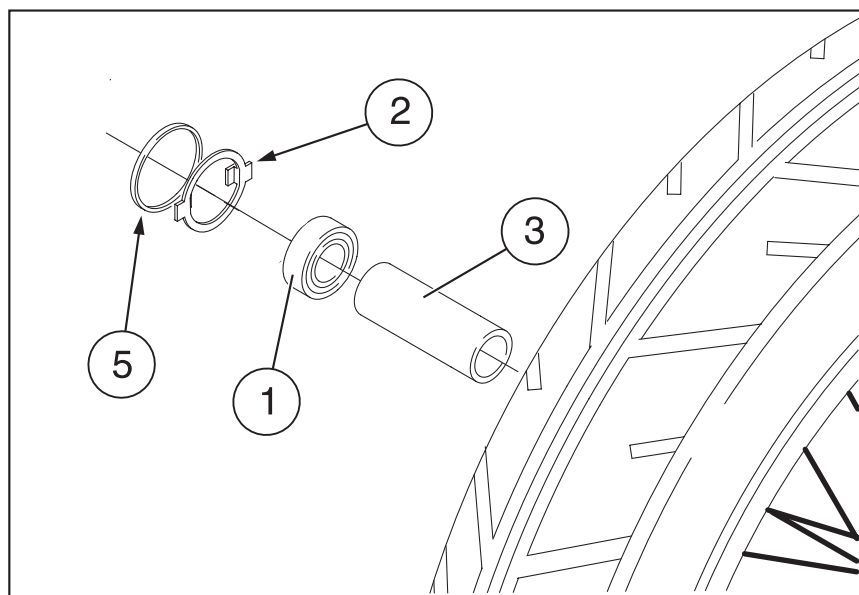
CAUTION

After the contact with the right bearing (1) do not push further, in order to avoid forcing the traction ring (2).

NOTE Once the left bearing (4) has been inserted, check the coaxiality of the following components:

- right bearing (1);
- spacer (3);
- left bearing (4).

- ◆ Install a new speedometer/odometer control seal (5).



7.2.12 INSTALLING THE FRONT WHEEL

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Spread a film of lubricating grease on the whole length of the wheel pin (1), grease the inside of the speedometer/odometer control (2), see 1.6 (LUBRICANT CHART).
- ◆ Position the tang of the speedometer/odometer control (3) in the appropriate seat of the wheel hub.
- ◆ Position the odometer control seat correctly, in correspondence with the special antirotation pin (4).

⚠ CAUTION

While reassembling the wheel, be careful not to damage the brake pipes, discs and pads.

- ◆ Position the wheel between the fork rods on the support (5).

⚠ CAUTION

Proceed with care while inserting the disc in the brake caliper.

⚠ WARNING

Danger of injury. Do not introduce your fingers to align the holes.

- ◆ Move the wheel until its central hole and the holes on the fork are aligned.
- ◆ Position the spacer ring (6) between the wheel hub and the fork left rod.
- ◆ Introduce the wheel pin (1) completely from the right side and tighten it.

Front wheel pin driving torque: 80 Nm (8.0 kgm).

- ◆ Remove the support (5) that upon disassembly was put under the tyre.

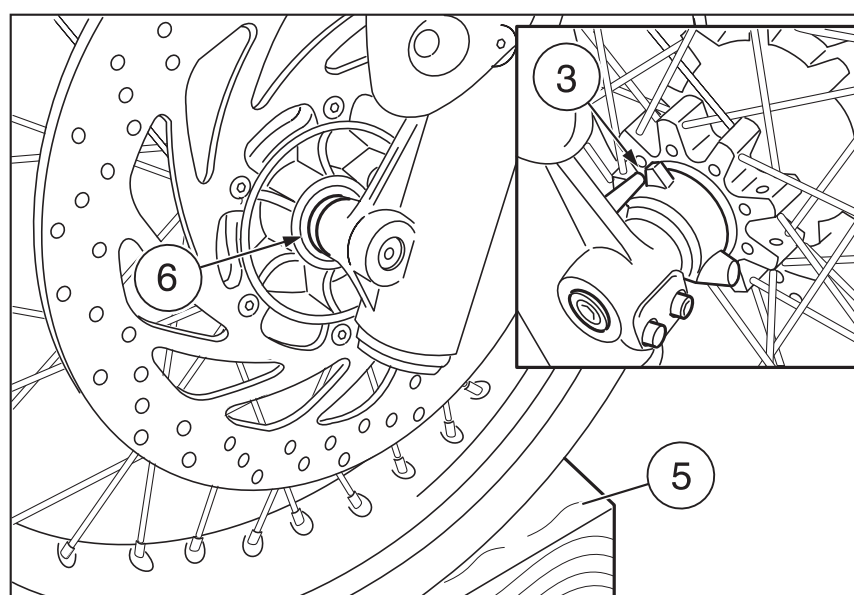
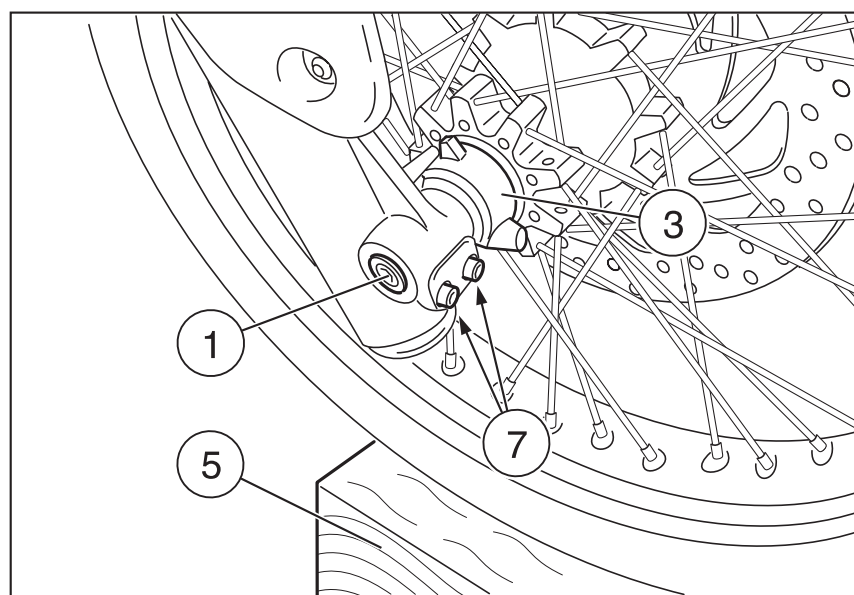
⚠ WARNING

Due to the weight and dimensions of the vehicle, the following operation must be performed by two persons.

NOTE Weight without driver (ready for starting): 200 kg.

- ◆ Remove the front support stand, see 1.8 (POSITIONING THE VEHICLE ON THE SUPPORT STAND).
- ◆ Remove the rear support stand, see 1.8 (POSITIONING THE VEHICLE ON THE SUPPORT STAND).
- ◆ With pulled front brake lever, press the handlebar repeatedly, thrusting the fork downwards. In this way the fork rods will settle properly.
- ◆ Position the vehicle on the stand, see 1.8 (POSITIONING THE VEHICLE ON THE SUPPORT STAND).
- ◆ Tighten the two wheel pin clamp screws (7) (right side).

Front wheel pin clamp screw driving torque: 12 Nm (1.2 kgm).

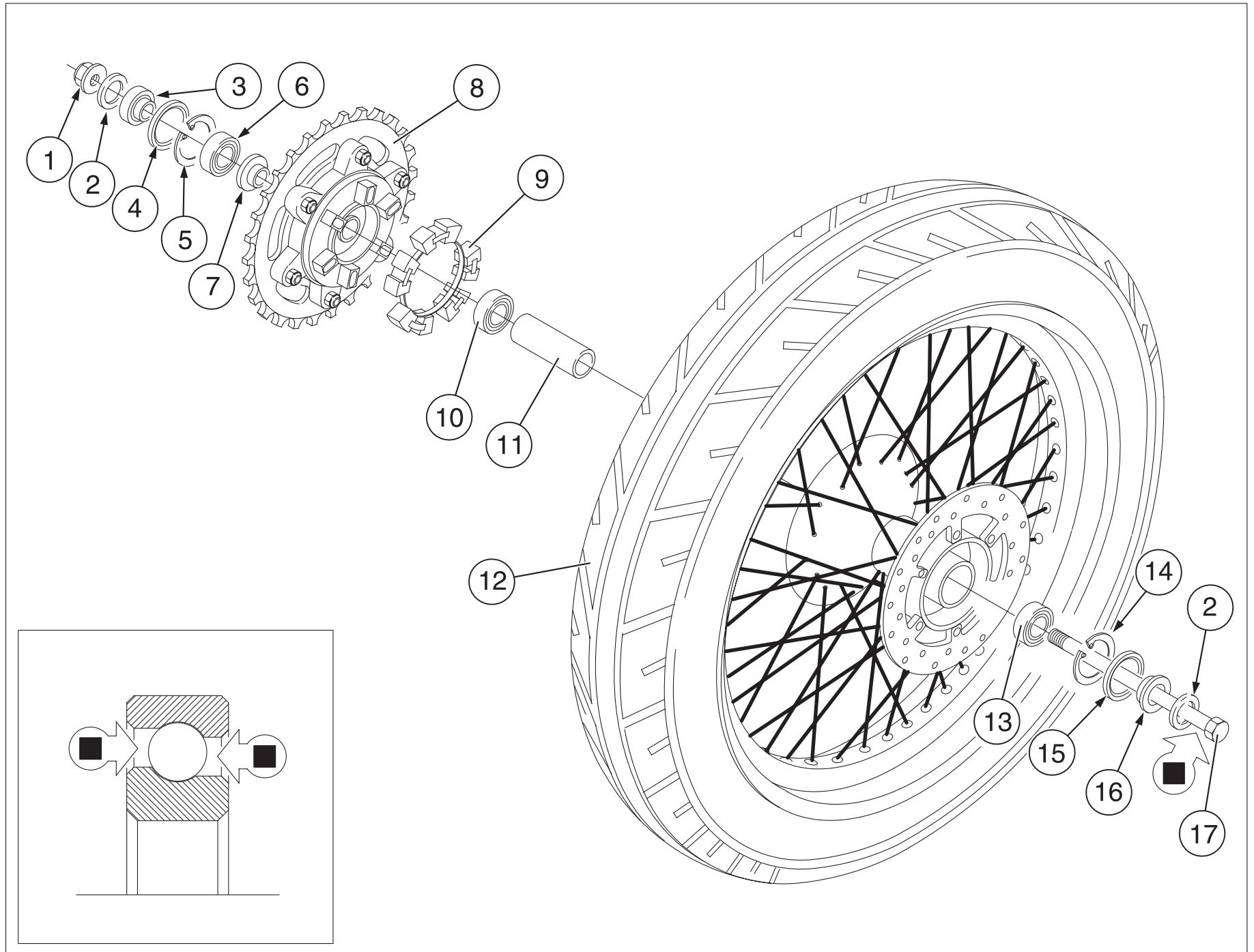


- ◆ Make sure that the following components are not dirty:
 - tyre;
 - wheel;
 - brake disc.

⚠ WARNING

After reassembly, pull the front brake lever repeatedly and check the correct functioning of the braking system.

7.3 REAR WHEEL



Key

- 1) Nut
- 2) Washer
- 3) Right side spacer
- 4) Right seal
- 5) Right seeger ring
- 6) Flexible coupling bearing
- 7) Outer spacer
- 8) Crown complete with flexible coupling hub
- 9) Flexible couplings
- 10) Bearing
- 11) Central spacer
- 12) Complete wheel
- 13) Bearing
- 14) Left seeger ring
- 15) Left seal
- 16) Left side spacer
- 17) Rear wheel pin

■ = GREASE, see 1.6 (LUBRICANT CHART).

7.3.1 REMOVING THE REAR WHEEL

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.27 (REAR WHEEL).

⚠ WARNING

Wait until the engine and the exhaust silencer have completely cooled down.

While disassembling and reassembling the wheel, be careful not to damage the brake pipe, the disc and the pads.

- ◆ Position the vehicle on the appropriate rear support stand, see 1.8 (POSITIONING THE VEHICLE ON THE SUPPORT STAND).
- ◆ Remove the drive chain upper guard, see 7.1.29 (REMOVING THE DRIVE CHAIN GUARDS).
- ◆ Put a support (1) under the tyre, in such a way as to keep the wheel in its position after loosening it.
- ◆ Lock the rotation of the wheel pin (2) with the appropriate key.
- ◆ Unscrew and remove the nut (3) and retrieve the washer (4).

Rear wheel nut driving torque: 100 Nm (10 kgm).

NOTE To facilitate the extraction of the wheel pin, slightly raise the wheel.

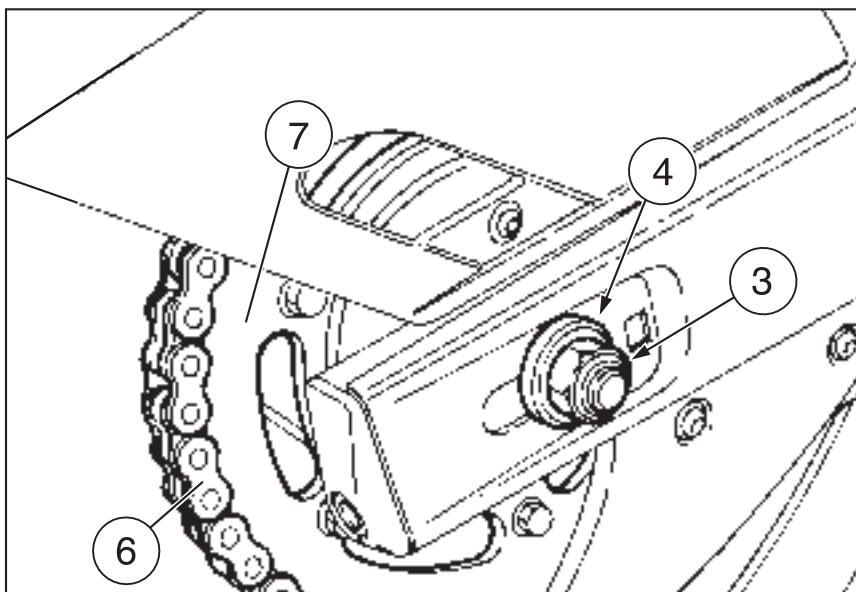
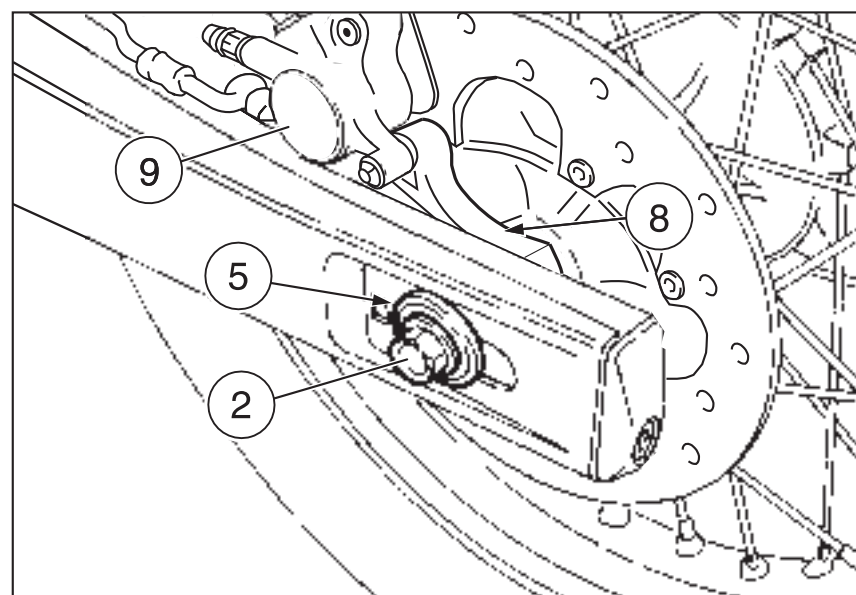
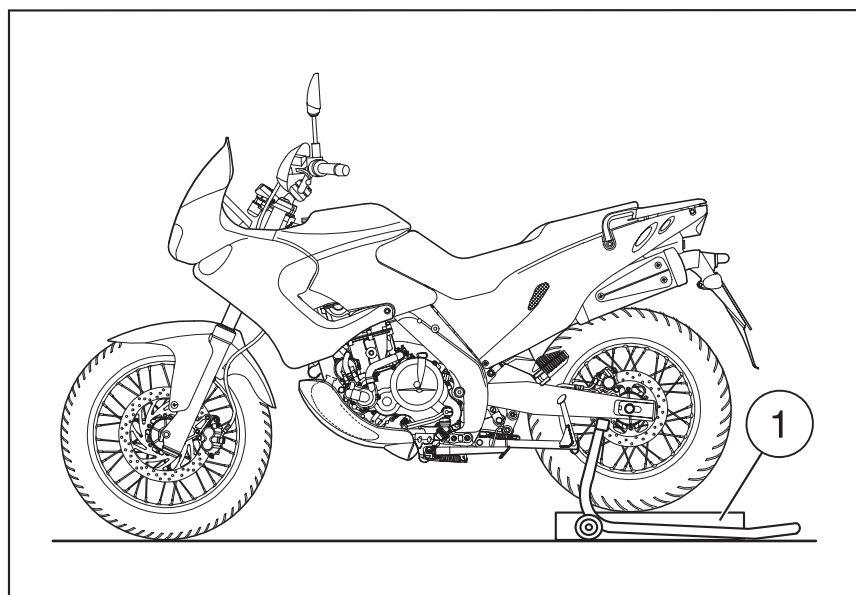
- ◆ Withdraw the wheel pin (2) from the left side and take the washer (5).

NOTE Lower the drive chain (6) outside the crown gear (7).

- ◆ Make the wheel advance and release the drive chain (6) from the crown gear (7).
- ◆ Withdraw the wheel from the rear fork from behind, carefully withdrawing the disc from the brake caliper.

⚠ CAUTION

Do not operate the rear brake lever after removing the wheel, since the pins may go out of their seats and cause brake fluid leakages.



7.3.2 REMOVING THE FINAL DRIVE UNIT

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the rear wheel, see 7.3.1 (REMOVING THE REAR WHEEL).

NOTE The support plate (8) complete with brake caliper (9) remains mounted on the left side of the rear fork.

Proceed with care. If the final drive unit (10) is installed on the flexible coupling holder (11), do not overturn or rotate the rear wheel in horizontal position on the rear sprocket side, since the final drive unit would come off and fall down, with the risk of damaging the rear sprocket (7).

NOTE The removal of the final drive unit isn't necessary if the wheel is in the normal running position (vertical) or in horizontal position with the rear sprocket facing upwards and in both cases secured against overturning.

NOTE Do not unscrew the six nuts (12). The whole final drive unit must be withdrawn from the flexible coupling holder.

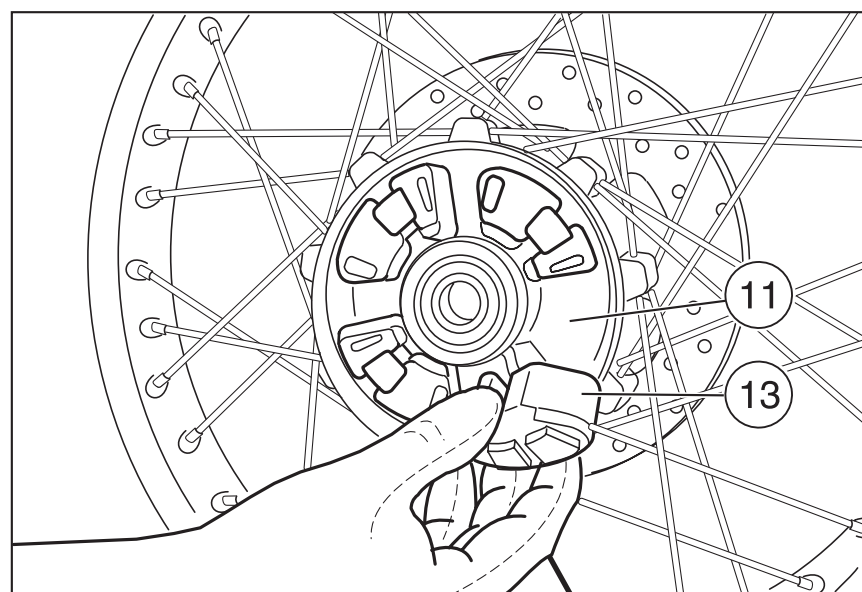
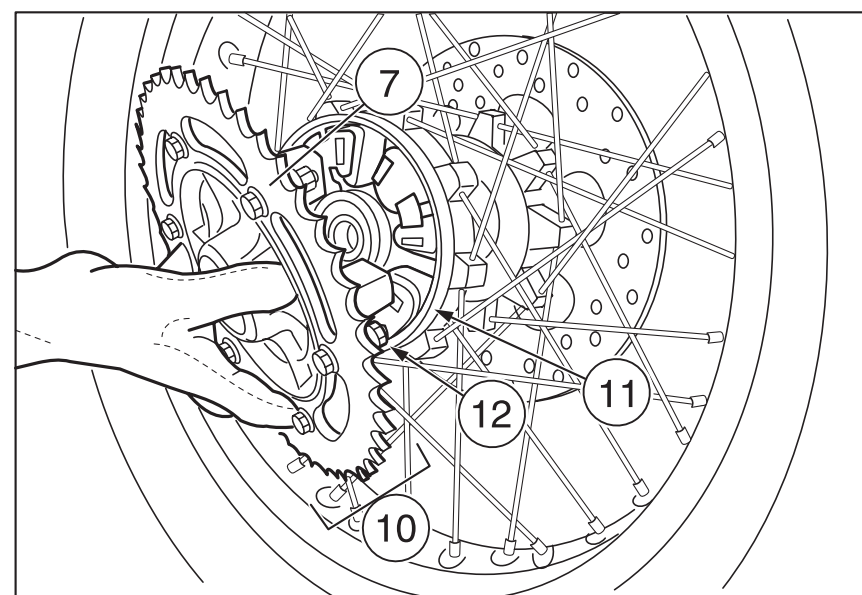
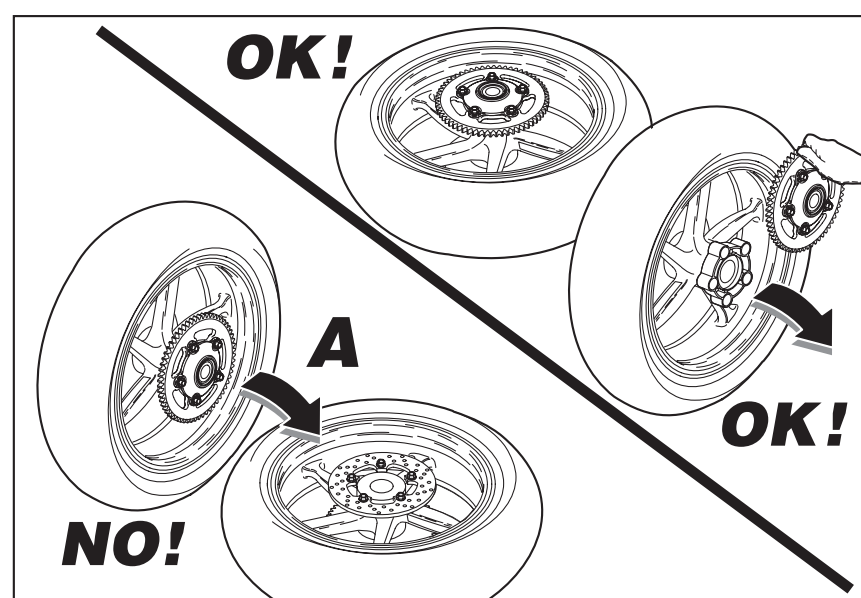
- ◆ Withdraw the final transmission unit (10), keeping it parallel to the wheel axis.
- ◆ Remove the four flexible couplings (13) from the flexible coupling holder (11).

NOTE Check the conditions of the four flexible couplings (13); if they are damaged or excessively worn, change them, see 2.1.1 (REGULAR SERVICE INTERVALS CHART).

REASSEMBLY

NOTE Insert the final transmission unit, parallel to the wheel axis, introducing the drive pins in the relevant seats, between a flexible coupling and the other.

- ◆ Position the four flexible couplings (13) in the relevant seats in the flexible coupling holder (11).
- ◆ Insert the final drive unit in the flexible coupling holder (11).



7.3.3 CHECKING THE REAR WHEEL COMPONENTS

⚠ CAUTION

Make sure that all the components are intact, particularly the following.

7.3.4 REAR WHEEL BEARINGS

Carry out the check with the bearings mounted on the wheel.

CHECKING THE ROTATION

- ◆ Manually rotate the inner ring (1) of each single bearing. The rotation must be regular, smooth and noiseless.

If one or both bearings is/are not in compliance with the check parameters:

- ◆ **For the left side bearing only.** Remove the speedometer/odometer control seal (2).
- ◆ Wash the bearings with a clean detergent.

⚠ CAUTION

Prevent the compressed air from making the bearings turn, since this would damage them.

- ◆ Dry the bearings with compressed air.
- ◆ Repeat the rotation check on both bearings.

If one or both bearings is/are not in compliance with the check parameters:

- ◆ Change both wheel bearings, see 7.3.14 (ASSEMBLING THE REAR WHEEL BEARINGS).

⚠ WARNING

Always change both bearings.

Always replace the bearings with bearings of the same type.

CHECKING THE END AND RADIAL PLAY

- ◆ Check the radial play and the end play.

End play: a minimum end play is allowed.

Radial play: none.

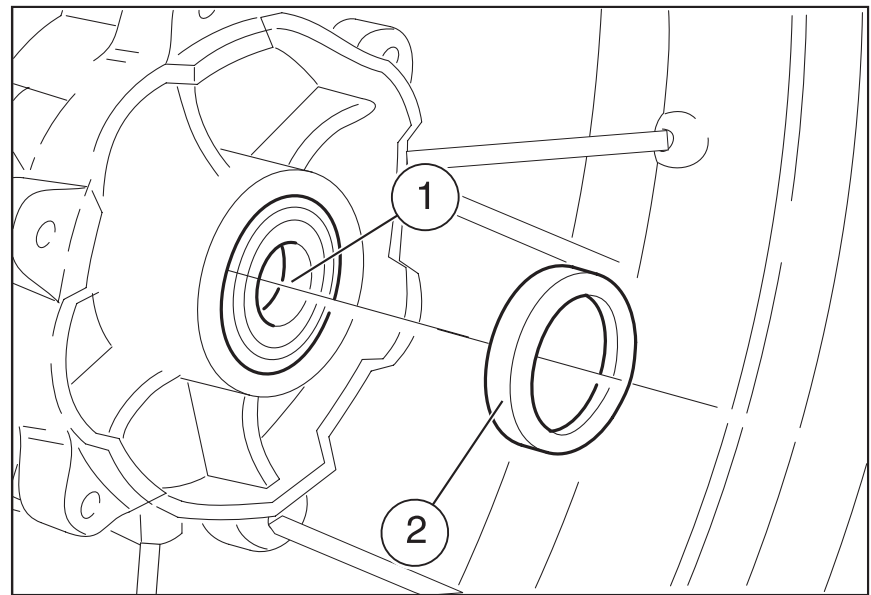
If one or both bearings is/are not in compliance with the check parameters:

- ◆ Change both wheel bearings, see 7.3.14 (ASSEMBLING THE REAR WHEEL BEARINGS).

⚠ WARNING

Always change both bearings.

Always replace the bearings with bearings of the same type.



7.3.5 REAR WHEEL GASKETS

- ◆ Check the conditions of the gasket (1); if it is damaged or excessively worn, change it.

⚠ WARNING

**Always change both seals.
Always replace the gaskets with gaskets of the same type.**

7.3.6 REAR WHEEL PIN

- ◆ Check the eccentricity of the pin wheel (2) by means of a comparator. If the eccentricity exceeds the limit value, change the pin wheel (2).

Maximum eccentricity: 0.25 mm.

7.3.7 REAR WHEEL RIM

- ◆ Using a comparator, make sure that the radial (A) and axial (B) eccentricity of the rim (3) do not exceed the limit value.

Excessive eccentricity is usually caused by worn or damaged bearings.

If, after changing the bearings, the value does not fall within the indicated limit, change the rim (3).

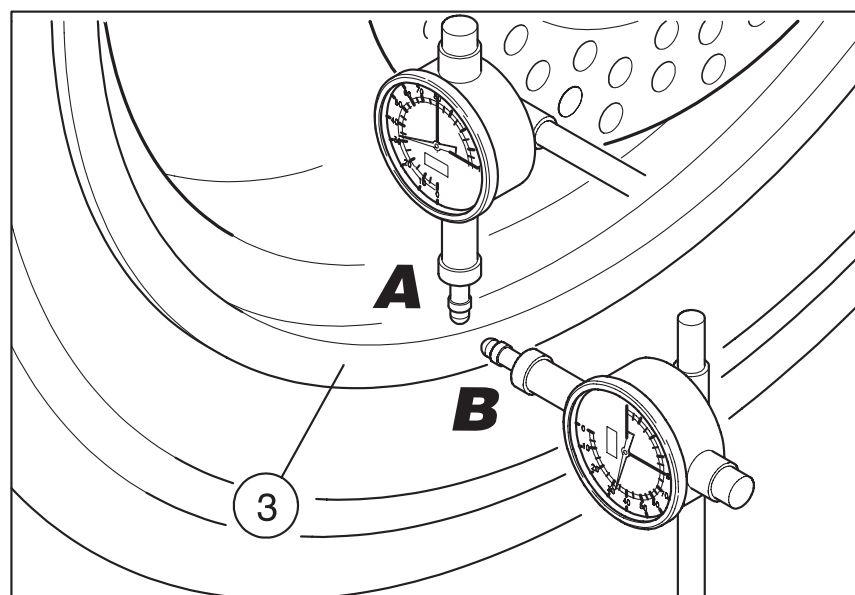
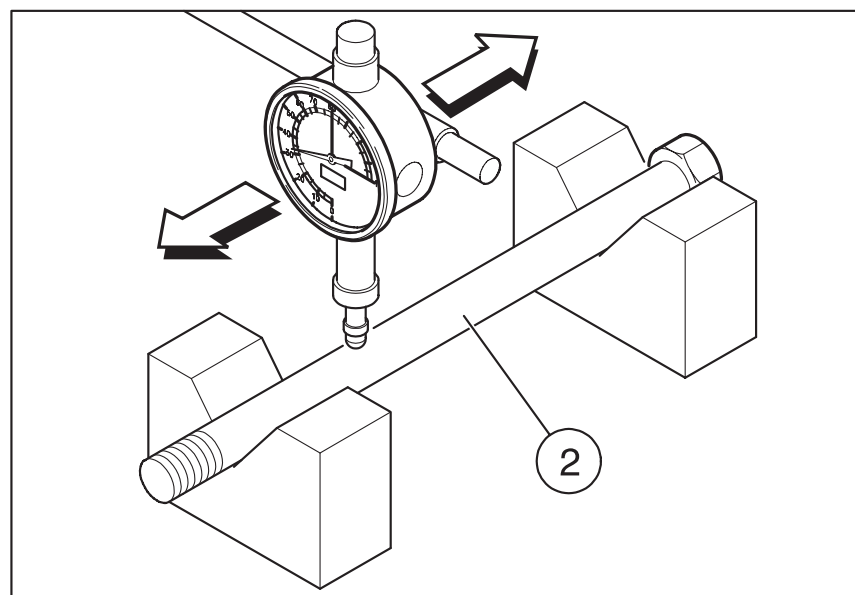
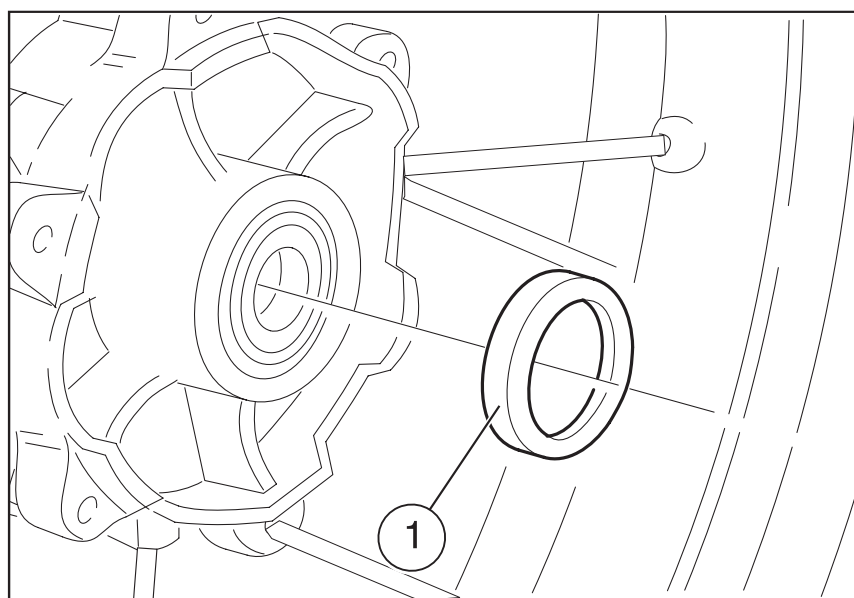
Maximum radial and axial eccentricity: 2 mm.

7.3.8 REAR TYRE

- ◆ Check the state of the tyre, see 2.30 (TYRES) and 7.4 (TYRES).

7.3.9 REAR BRAKE DISC

- ◆ Check the rear brake disc, see 7.6.2 (CHECKING THE REAR BRAKE DISC).



7.3.10 FINAL DRIVE UNIT BEARINGS

Carry out the check with the bearings mounted on the final drive unit.

CHECKING THE ROTATION

- ◆ Remove the right spacer (1).
- ◆ Manually rotate the inner ring of each single bearing. The rotation must be regular, smooth and noiseless.

If the bearing is not in compliance with the check parameters:

- ◆ Remove the seal (2).
- ◆ Wash the bearing with a clean detergent.

⚠ CAUTION

Prevent the compressed air from making the bearings turn, since this would damage them.

- ◆ Dry the bearing with compressed air.

If the bearing is not in compliance with the check parameters:

- ◆ Change the final drive unit bearing, see 7.3.16 (ASSEMBLING THE FINAL DRIVE UNIT BEARINGS).

⚠ WARNING

**Always change both bearings.
Always replace the bearings with bearings of the same type.**

CHECKING THE END AND RADIAL PLAY

- ◆ Check the radial play and the end play.

End play: a minimum end play is allowed.

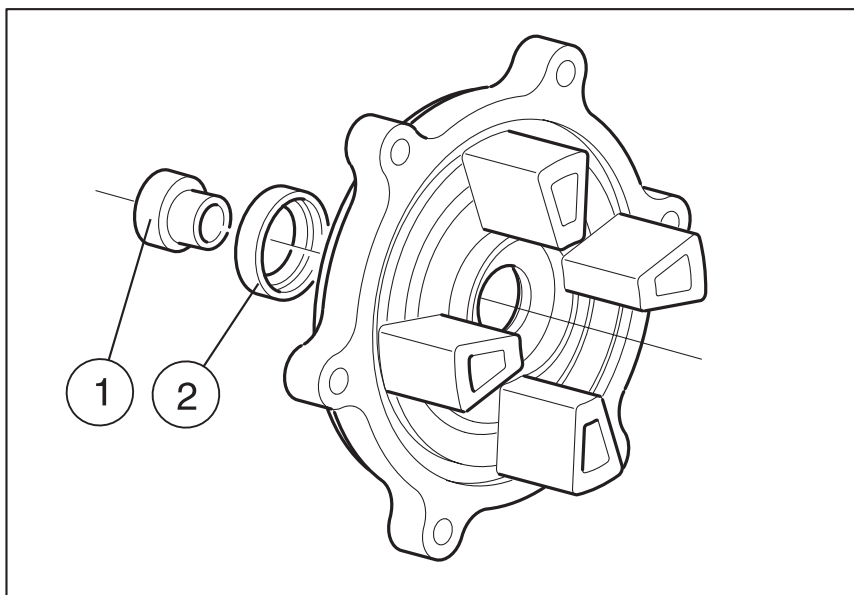
Radial play: none.

If the bearing is not in compliance with the check parameters:

- ◆ Change the final drive unit bearing, see 7.3.16 (ASSEMBLING THE FINAL DRIVE UNIT BEARINGS).

⚠ WARNING

**Always change both bearings.
Always replace the bearings with bearings of the same type.**

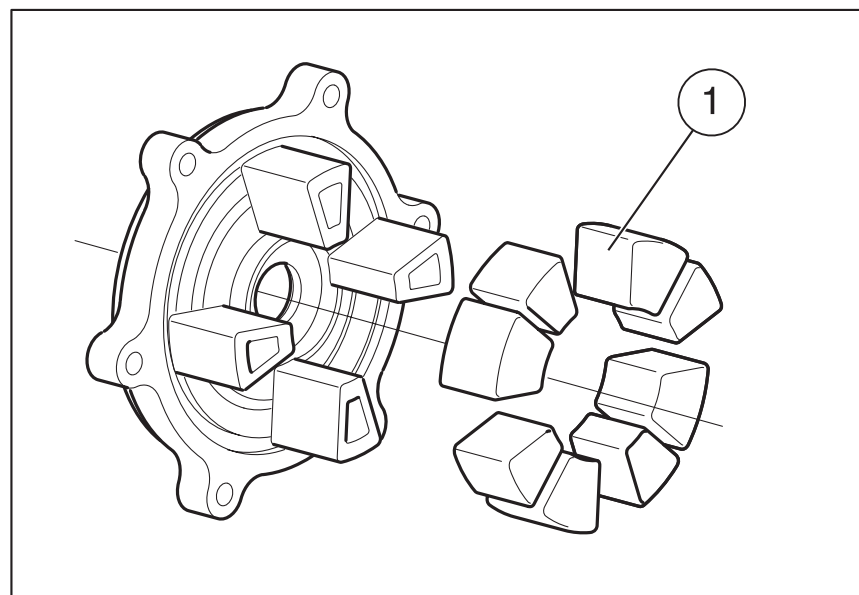


7.3.11 FLEXIBLE COUPLINGS

- ◆ Make sure the rubber elements (1) of the flexible couplings are not damaged and/or feature excessive wear. If necessary, change the flexible coupling rubber elements (1).
- ◆ Fit the whole final drive unit complet (2) on the wheel.
- ◆ Manually rotate the crown gear (3) in both directions and check the slack between the flexible coupling rubber elements (1) and the final drive unit (2).

If slack is excessive:

- ◆ Change all the flexible coupling rubber elements (1).



7.3.12 SPROCKET

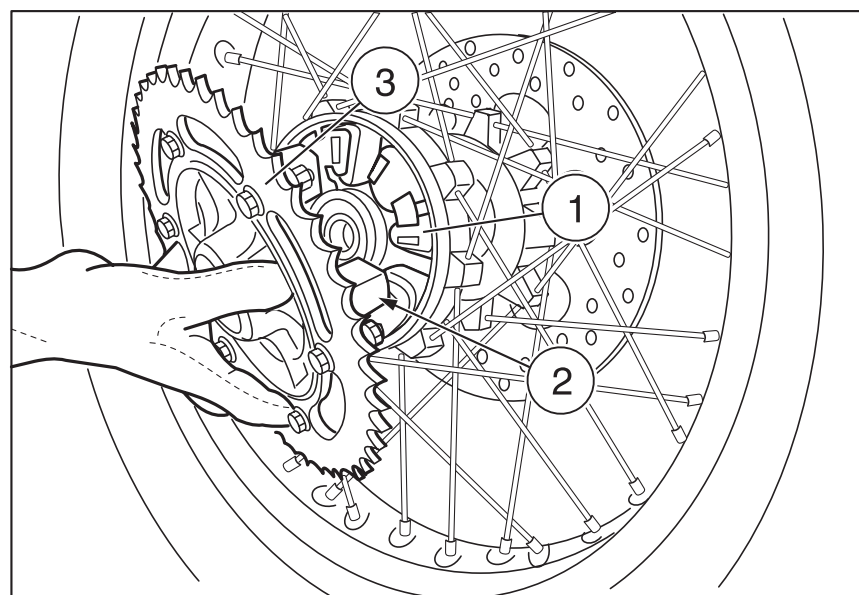
- ◆ Check the state of the sprocket's teeth.

If there are signs of excessive wear:

- ◆ Change the crown gear (3), see 7.3.17 (REMOVING THE CROWN GEAR), the drive pinion, see 7.1.39 (REMOVING THE DRIVE PINION) and the drive chain, see 7.11 (DISASSEMBLING THE DRIVING CHAIN).

⚠ CAUTION

To avoid the untimely wear of the new components, crown, pinion and drive chain must be replaced all together.



7.3.13 DISASSEMBLING THE REAR WHEEL BEARINGS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the rear wheel, see 7.3.1 (REMOVING THE REAR WHEEL).
- ◆ Use a cloth to clean both sides of the hub.

Work from the right-hand side of the wheel:

NOTE Have the appropriate special tool **OPT** to hand:
 – **aprilia** part# 8140180 (Kit for bearings in the range $\varnothing 10$ mm to $\varnothing 30$ mm).

- ◆ Use a special extractor to extract the right bearing (1).
- ◆ Retrieve the inner spacer (2).

Work from the left-hand side of the wheel:

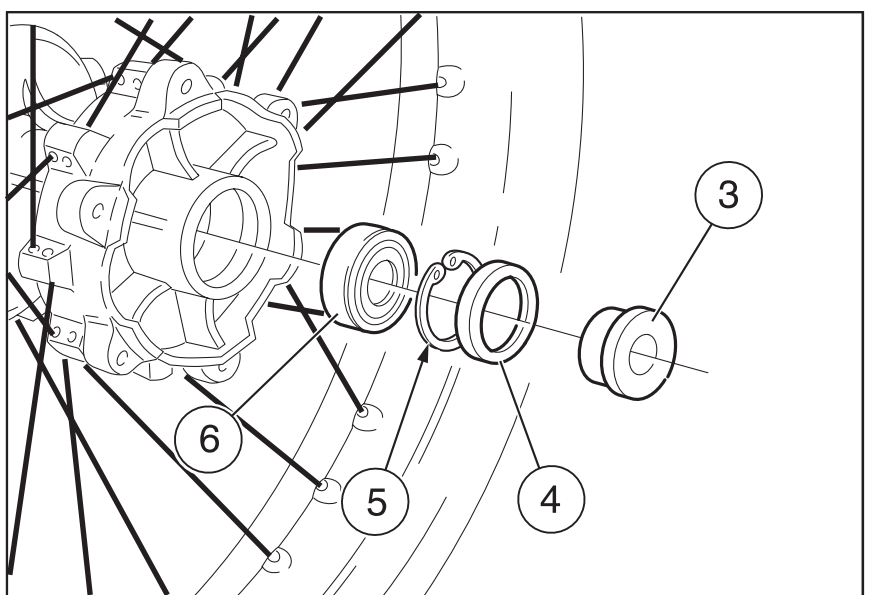
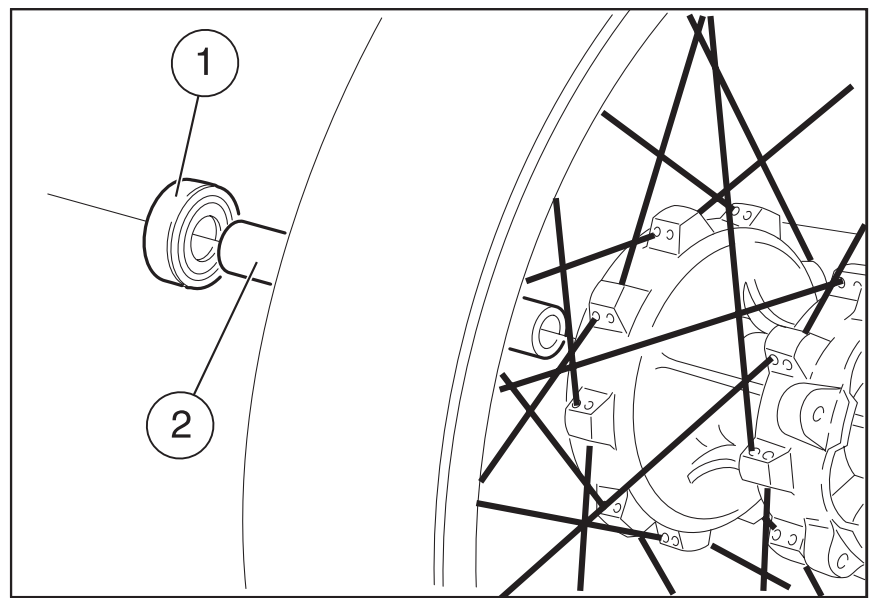
- ◆ Remove the left spacer (3).
- ◆ Remove the seal (4).
- ◆ Remove the snap ring (5).

NOTE The elastic ring (5) is provided only on the left side of the wheel.

NOTE Have the appropriate special tool **OPT** to hand:
 – **aprilia** part# 8140180 (Kit for bearings in the range $\varnothing 10$ mm to $\varnothing 30$ mm).

- ◆ Use a special extractor to extract the left bearing (6).
- ◆ Thoroughly clean the inside of the hub.

NOTE Wash all the components with a clean detergent.



7.3.14 ASSEMBLING THE REAR WHEEL BEARINGS

If provided:

- ◆ Remove the rear wheel bearings, see 7.3.13 (DISASSEMBLING THE REAR WHEEL BEARINGS).

Work from the left-hand side of the wheel:

NOTE Have the appropriate special tool **OPT** to hand:

- **aprilia** part# 8140180 (Kit for bearings in the range $\varnothing 10$ mm to $\varnothing 30$ mm).

- ◆ Using the appropriate pad, insert the left bearing (1) completely.

NOTE The right bearing must be inserted until its contact with the wheel hub shoulder is complete.

- ◆ Insert the elastic ring (2).

NOTE The elastic ring (2) is provided only on the left side of the wheel.

Work from the right-hand side of the wheel:

- ◆ Insert the spacer (3).

NOTE Have the appropriate special tool **OPT** to hand:

- **aprilia** part# 8140180 (Kit for bearings in the range $\varnothing 10$ mm to $\varnothing 30$ mm).

- ◆ Use a special pad to insert the right bearing (4).

NOTE The complete insertion of the right bearing (4) will bring the following components into contact:

- left bearing (1);
- spacer (3);
- right bearing (4).

⚠ CAUTION

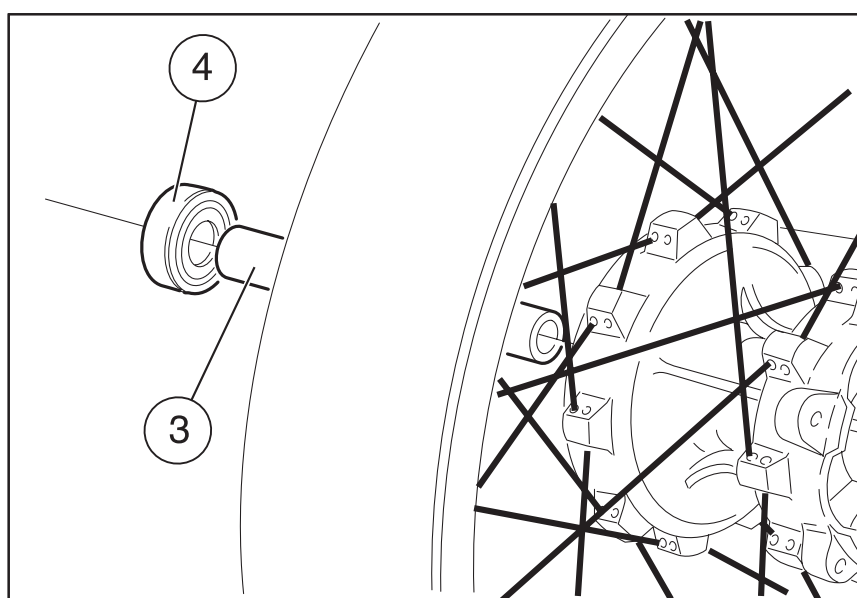
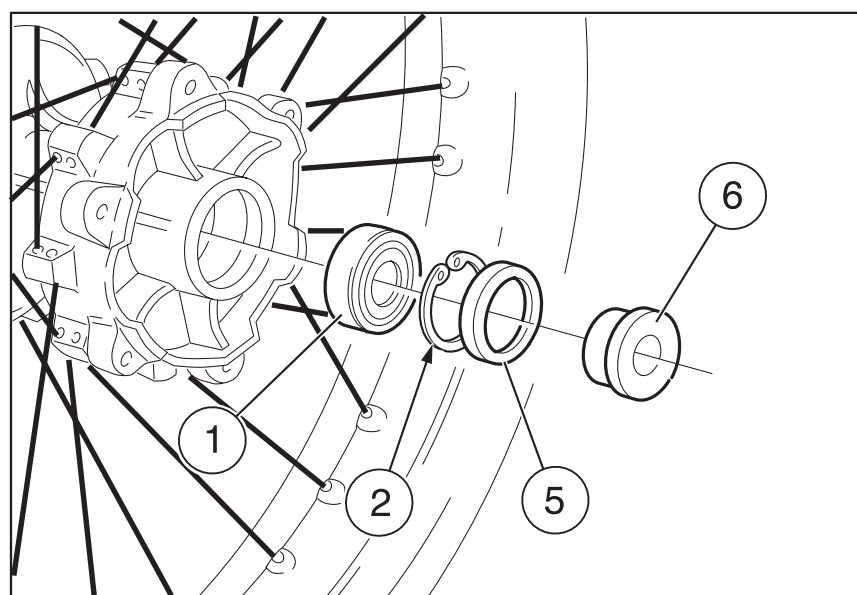
After the contact with the left bearing (1), do not push further, in order to avoid forcing the elastic ring (2).

NOTE Once the right bearing (4) has been inserted, check the coaxiality of the following components:

- left bearing (1);
- spacer (3);
- right bearing (4).

Work from the left-hand side:

- ◆ Install a new seal (5).
- ◆ Insert the spacer ring (6) with its longer diameter towards the outside of the vehicle.



7.3.15 DISASSEMBLING THE FINAL DRIVE UNIT BEARINGS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

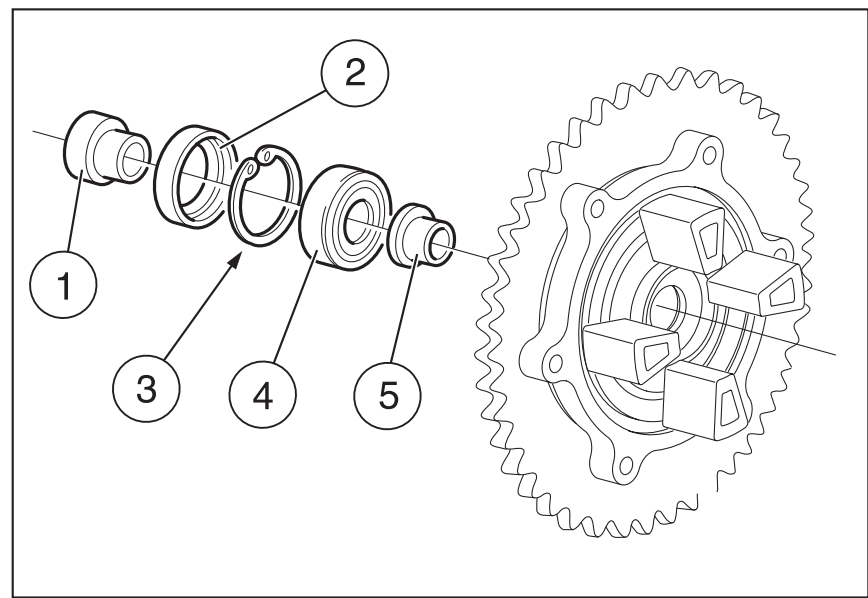
- ◆ Remove the final drive unit, see 7.3.2 (REMOVING THE FINAL DRIVE UNIT).
- ◆ Use a cloth to clean both sides of the hub.
- ◆ Remove the right spacer (1).
- ◆ Remove the seal (2).
- ◆ Remove the snap ring (3).

NOTE The elastic ring (3) is provided only on the right side of the final drive unit.

NOTE Have the appropriate special tool **OPT** to hand:
– **aprilia** part# 8140180 (Kit for bearings in the range Ø10 mm to Ø 30 mm).

- ◆ Use a special extractor to extract the right bearing (4).
- ◆ Retrieve the inner spacer (5).
- ◆ Thoroughly clean the inside of the hub.

NOTE Wash all the components with a clean detergent.



7.3.16 ASSEMBLING THE FINAL DRIVE UNIT BEARINGS

If provided:

- ◆ Remove the final drive unit bearings, see 7.3.15 (DIS-ASSEMBLING THE FINAL DRIVE UNIT BEARINGS).

Work from the right-hand side:

- ◆ Insert the inner spacer (1).

NOTE Have the appropriate special tool **OPT** to hand:
 – **aprilia** part# 8140180 (Kit for bearings in the range $\varnothing 10$ mm to $\varnothing 30$ mm).

- ◆ Use a special pad to insert the bearing (2).

NOTE The complete insertion of the bearing (2) will bring the following components into contact:

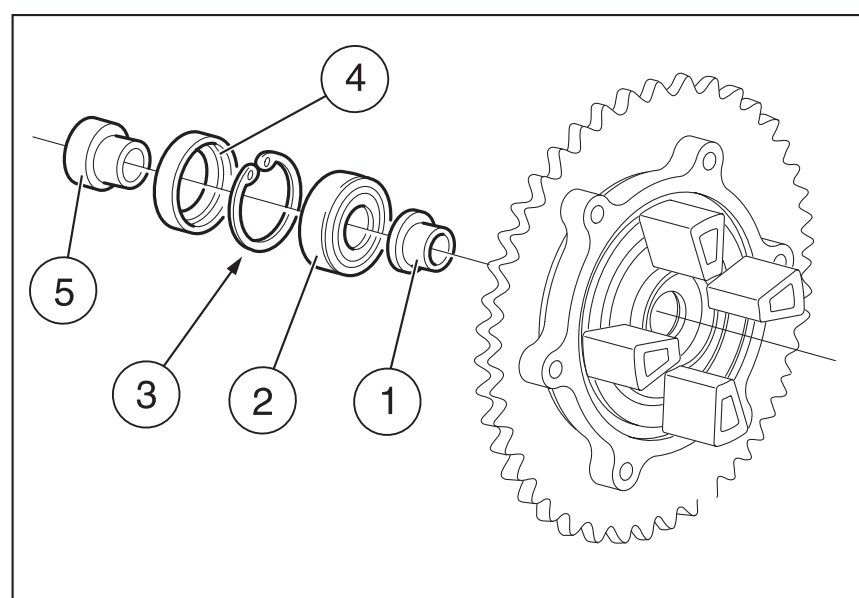
- inner spacer (1);
- left bearing (2).

- ◆ Insert the elastic ring (3).

NOTE The elastic ring (3) is provided only on the right side of the final drive unit.

- ◆ Install a new seal (4).

- ◆ Insert the right spacer (5) with the longer diameter towards the outside of the vehicle.



7.3.17 REMOVING THE CROWN GEAR

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the final drive unit, see 7.3.2 (REMOVING THE FINAL DRIVE UNIT).
- ◆ Lock the rotation of the screw (1), unscrew and remove the six self-locking nuts (2).

Crown gear self-locking nut driving torque: 50 Nm (5.0 kgm).

CAUTION

The self-locking nuts (2) must be replaced on each removal of the crown gear.

Replace the self-locking nuts (2) with nuts of the same type.

- ◆ Remove the crown holder (3).
- ◆ Clean the crown gear (4) and the crown holder (3) with clean detergent.

Reassembly:

- ◆ Insert the six screws (2) in the crown gear (4).
- ◆ Install the crown holder on the crown unit.
- ◆ Screw the six self-locking nuts (2) manually.

CAUTION

It is forbidden to install the final drive unit (5) on the wheel to tighten the self-locking nuts.

CAUTION

To protect the crown gear, install guards (in wood or aluminium) on the vice jaws. Lock only the crown gear in the vice, be careful not to lock any other component of the final drive unit.

- ◆ Lock the crown gear in the vice.

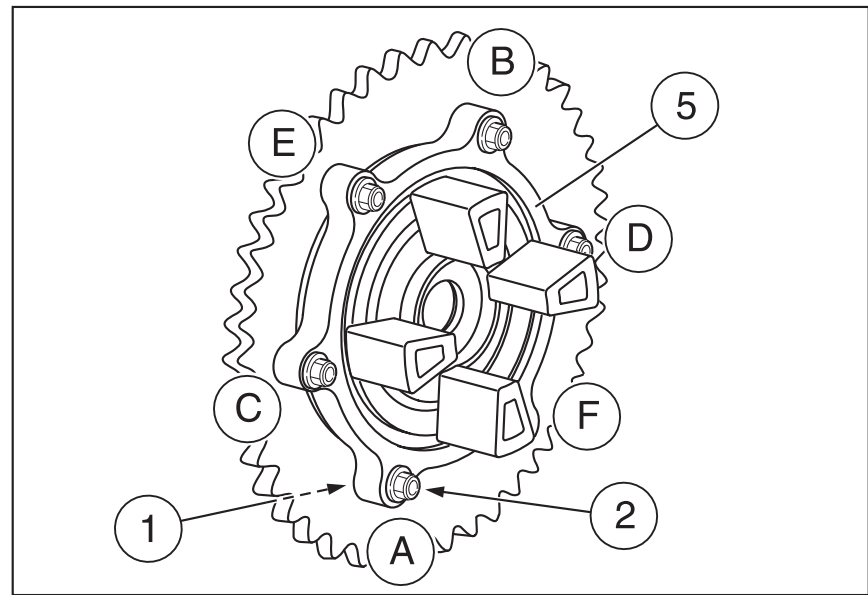
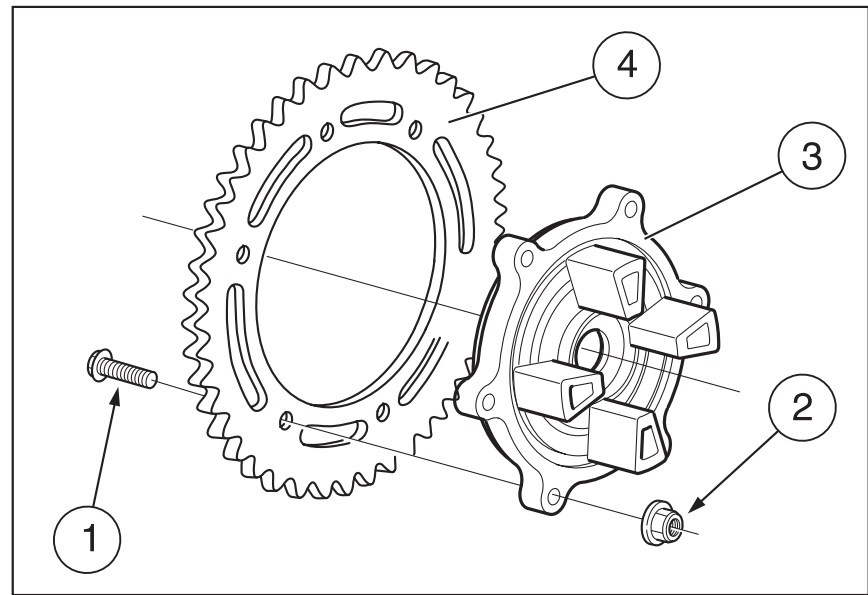
NOTE To avoid any deformation and/or incorrect coupling, carry out the tightening as described below:

- ◆ Lock the rotation of the screw (1) and tighten the self-locking nuts (2) in the given order, applying half the prescribed driving torque: (A) (B) (C) (D) (E) (F).
- ◆ Repeat the previous operation by applying the prescribed driving torque.

NOTE In this way the pressure exerted by the fastening elements will be uniformly distributed on the joint surface.

CAUTION

Check the wear of the flexible coupling rubber elements and if they are worn replace them with new ones of the same type.



7.3.18 INSTALLING THE REAR WHEEL

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

If the final drive unit has been removed:

- ◆ Put back the final drive unit, see 7.3.2 (REMOVING THE FINAL DRIVE UNIT).

⚠ CAUTION

Before proceeding with the reassembly, make sure that support plate (8) of the brake caliper (9) is positioned correctly; the plate slot must be inserted in the appropriate stop pin in the inner part of the rear fork right rod.

Insert the disc in the brake caliper carefully.

- ◆ Position the wheel between the rear fork rods on the support (1).

⚠ WARNING

Do not introduce your fingers between the chain and the crown gear.

- ◆ Make the wheel advance and position the drive chain (6) on the crown gear (7).
- ◆ Uniformly apply a moderate quantity of grease on the wheel pin (2), see 1.6 (LUBRICANT CHART).

⚠ WARNING

Danger of injury.

Do not introduce your fingers to align the holes.

- ◆ Move the wheel backwards, until its central hole and the holes on the rear fork are aligned.
- ◆ Rotate the support plate (8), complete with brake caliper (9) and with fulcrum on the stop pin, until it is aligned with the holes.
- ◆ Insert the washer (5) in the wheel pin (2).
- ◆ Introduce the wheel pin (2) completely from the left side.

NOTE Make sure that the wheel pin (2) is completely inserted.

- ◆ Position the washer (4) and tighten the wheel nut (3) manually.
- ◆ Lock the rotation of the wheel pin (2) with the appropriate key and tighten the nut (3).

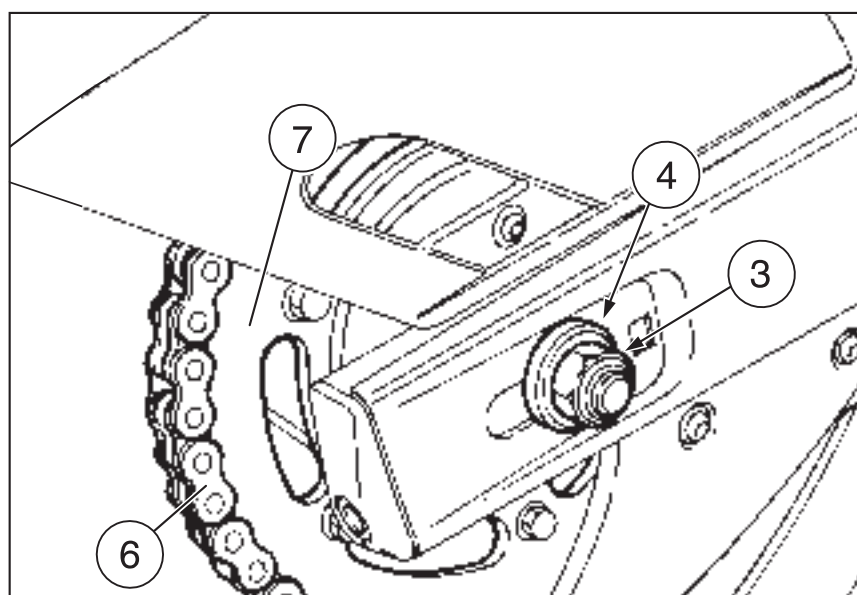
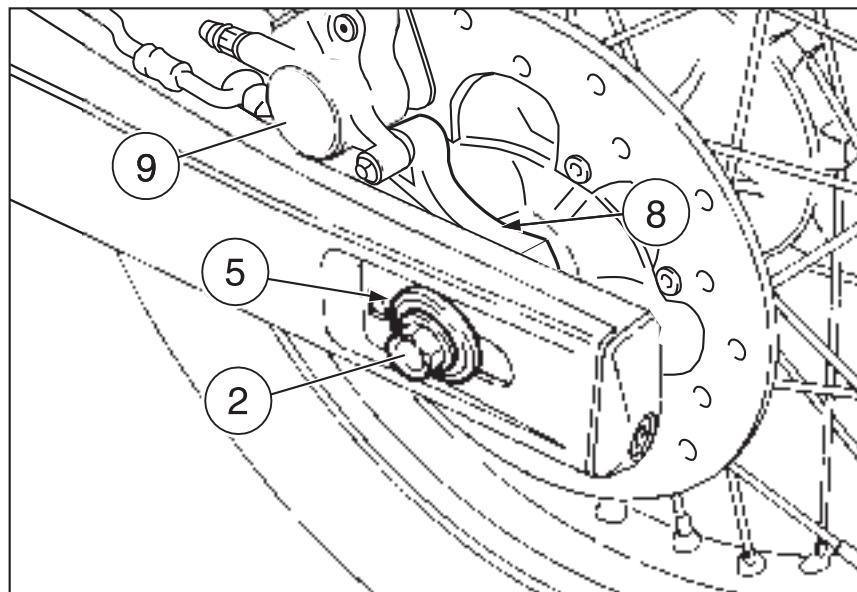
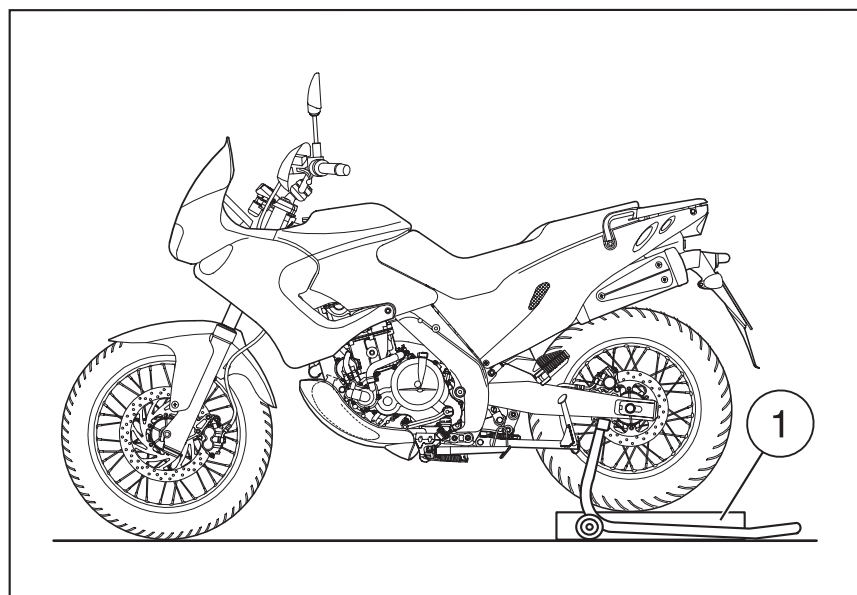
Rear wheel pin driving torque: 100 Nm (10 kgm).

- ◆ Make sure that the following components are not dirty:
 - tyre;
 - wheel;
 - brake disc.

⚠ CAUTION

After reassembly, pull the rear brake lever repeatedly and check the correct functioning of the braking system.

Check the wheel centering.



7.4 TYRES

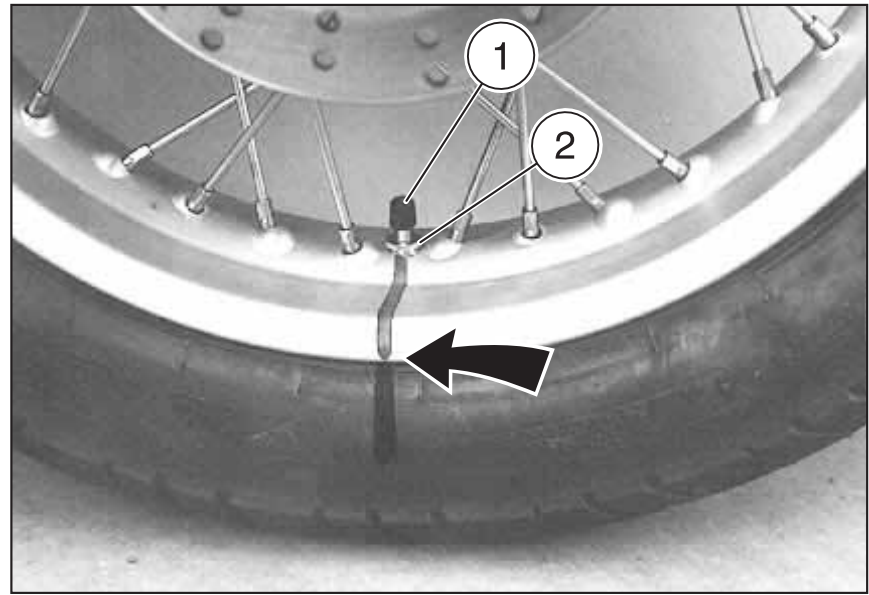
7.4.1 TYRE DISASSEMBLY

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.30 (TYRES).

- ◆ Unscrew and remove the closing cap (1).
- ◆ Deflate the inner tube completely.
- ◆ Unscrew and remove the valve lock ring (2).

NOTE Mark the tyre with chalk, to show its position with respect to the rim and to the rotation direction.

- ◆ Proceed to the disassembly of the tyre using special equipment and following specific procedures.



7.4.2 CHECKING THE COMPONENTS

RIM

Before checking the rim, eliminate all rubber or rust residues.

If one or more of the listed defects are present, change the rim.

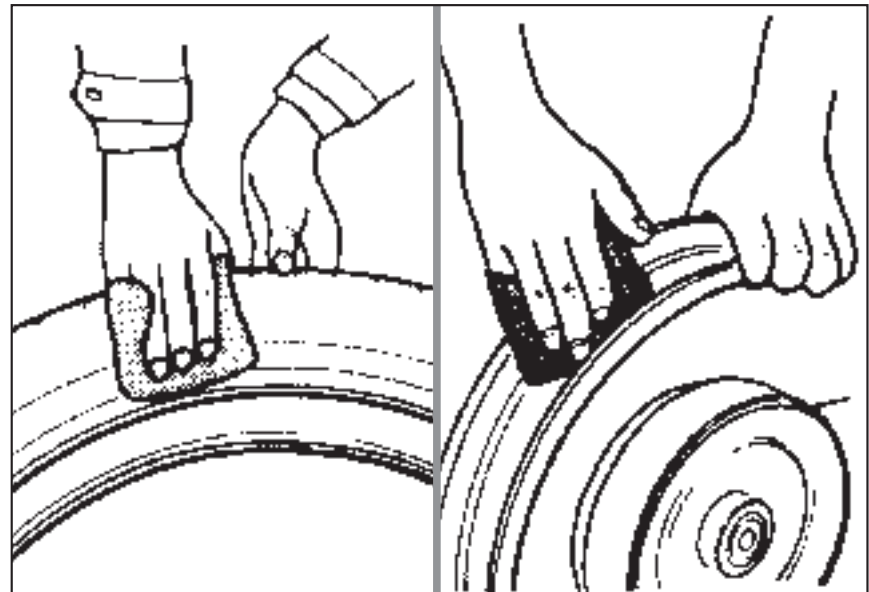
- Deformation or cracking;
- Marks/lines or defects.

For further information, see 7.2.2 (CHECKING THE FRONT WHEEL COMPONENTS).

TYRE

Thoroughly check the tyre after removing it. If one or more of the listed defects are present, do not repair the tyre, but change it.

- Hole or crack exceeding 5 mm in diameter or length;
- Mark or cracking on the side;
- Tread depth less than 2 mm;
- Ply unglued;
- Separated tread;
- Deformation or wear of tread not uniform;
- Marks/lines on the bead;
- Damage due to skidding (flattened areas);
- Anomalies in the inner seal.



⚠ CAUTION

When repairing a punctured tyre, follow the instructions and use only the components recommended for repairing.

For further information, see 2.30 (TYRES).

7.4.3 ASSEMBLING THE TYRE

- ◆ Eliminate any trace of dirt or rust from the valve seat.
- ◆ Apply the special lubricant for tyres, or soapy water, to the beads of the tyre.

⚠ CAUTION

Never apply grease, oil or petrol to the beads of the tyre for any reason whatsoever.

If a disassembled tyre is to be reassembled, make sure that the arrow stamped on it is pointed in the wheel rotation direction and make the chalk mark made on the tyre upon disassembly coincide with the mark on the rim.

- ◆ Proceed to the assembly of the tyre using special equipment and following specific procedures.

NOTE Before inflating the tyre, make sure that the mark on the tyre still coincides with the mark on the rim.

- ◆ Make the tyre bounce several times and at the same time rotate it (A). This operation pushes the beads towards the seats on the rim, thus facilitating the inflation of the tyre.

⚠ WARNING

The tyre it may explode, causing serious injuries. Never sit on the tyre while inflating it.

- ◆ Slightly inflate the tyre; do not over inflate.

NOTE Check the "line" of the rim on the tyre side. It must be equidistant from the edge of the rim along its entire circumference.

If the distance between the line of the tyre and the rim varies along the circumference, this means that the bead is not positioned properly.

In this case, deflate the tyre completely and separate both beads from the rim.

Spread the special lubricant on the beads and inflate the tyre again.

⚠ WARNING

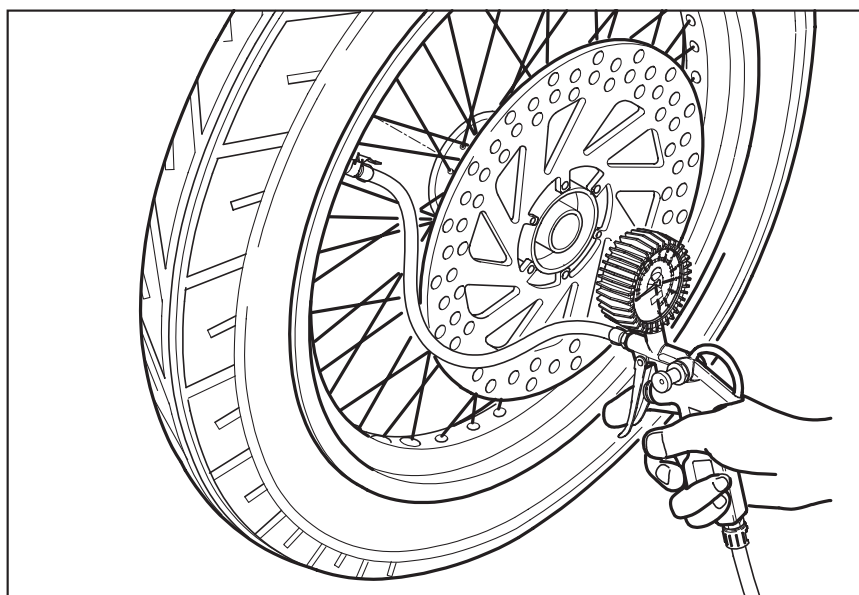
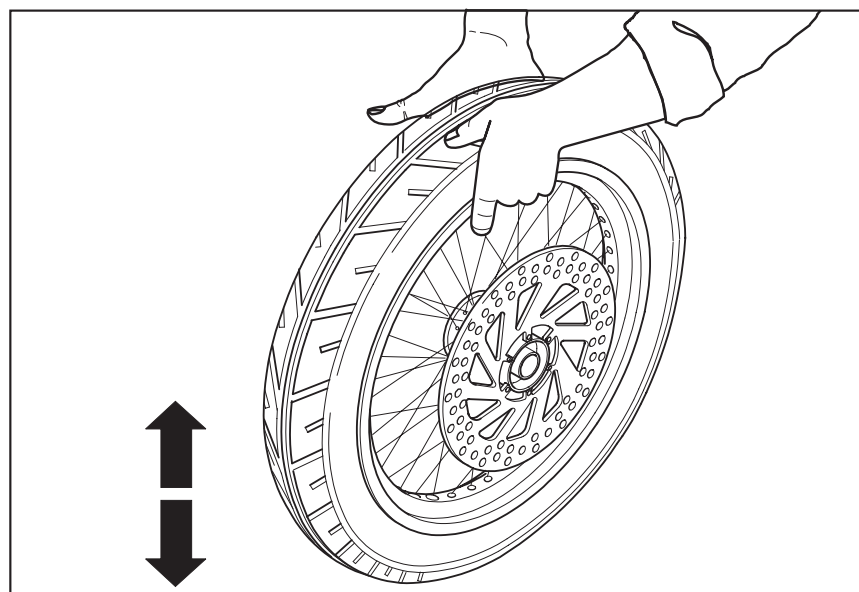
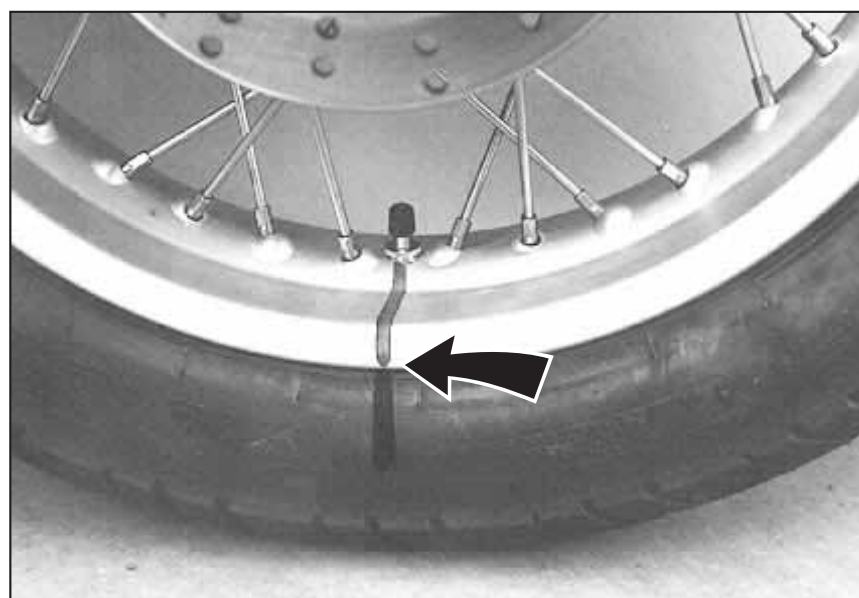
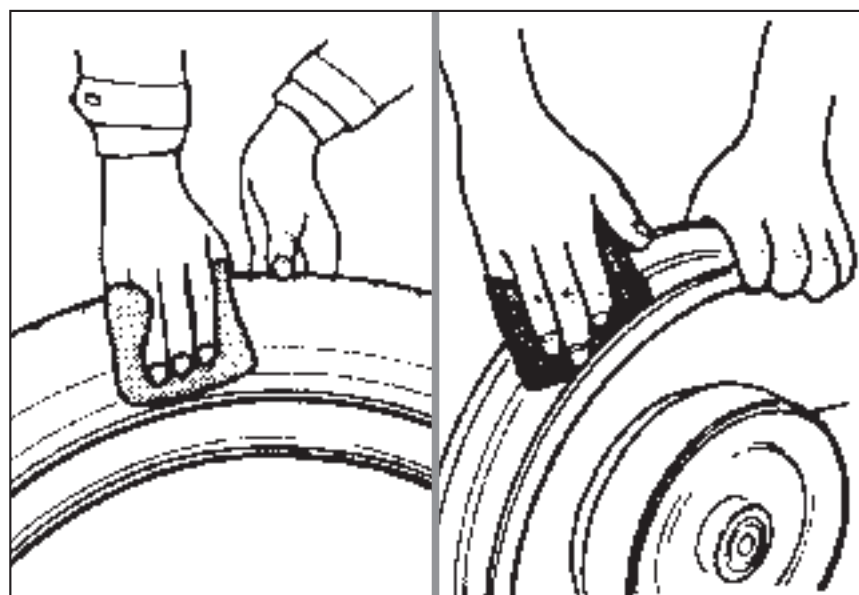
The tyre it may explode, causing serious injuries. Never sit on the tyre while inflating it.

- ◆ When the tyre is properly installed on the rim, regulate the pressure to the prescribed value, see 1.5 (TECHNICAL SPECIFICATIONS).
- ◆ Check the wheel centering.

⚠ WARNING

Do not exceed 50 km/h in the first 24 hours following the repair of the tyre; the insert or the patch might not be completely glued.

Do not exceed the speed of 130 km/h with a repaired tyre.



7.5 FRONT BRAKE

NOTE This vehicle is provided with disc brakes with two, front and rear braking systems having separate hydraulic circuits.

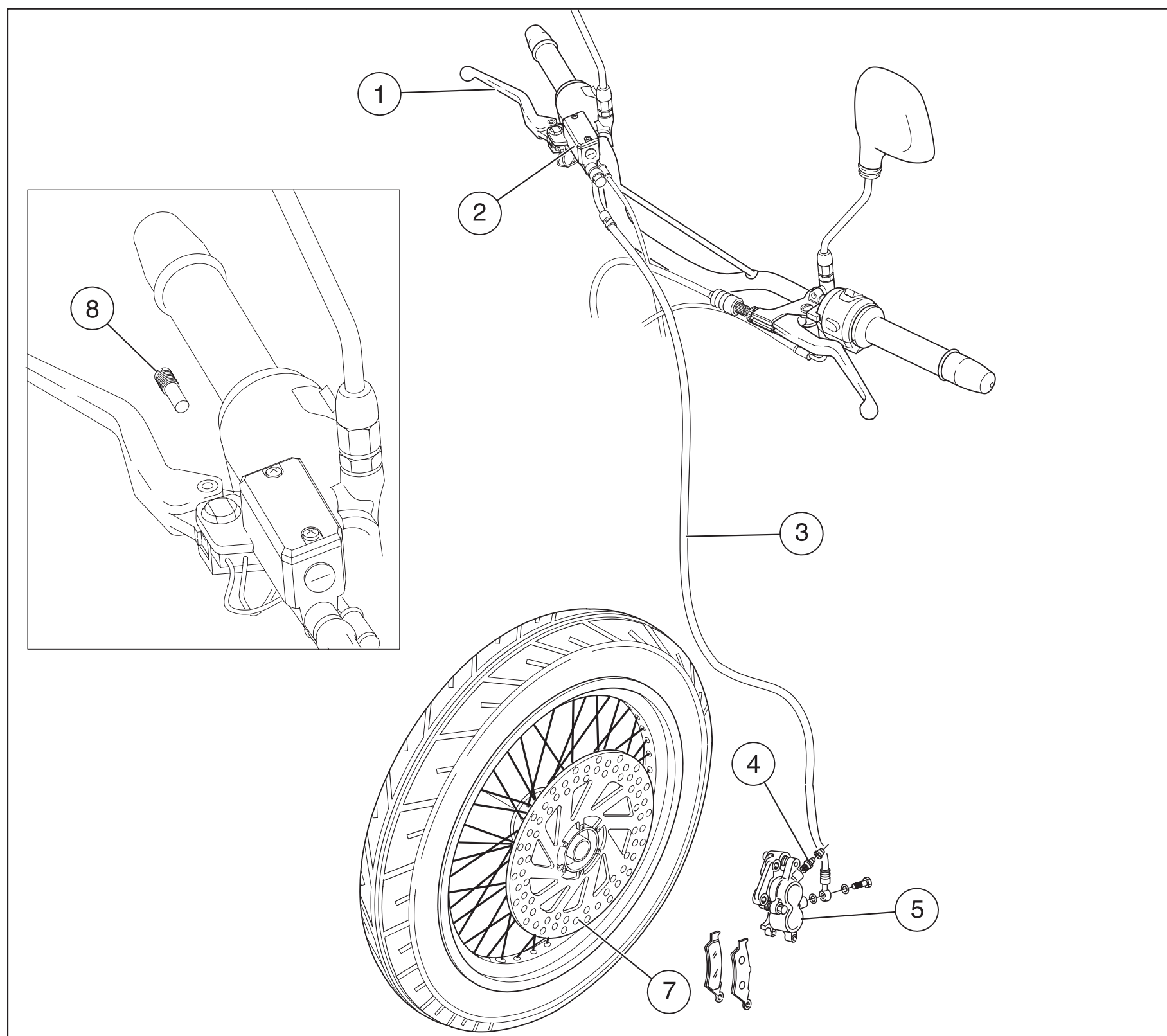
The front braking system is with single disc (left side).

The rear braking system is with single disc (left side).

The rear brake reservoir is positioned on the right side of the vehicle, near the rear brake control lever.

⚠ WARNING

Do not use the vehicle if the braking system leaks fluid.

**Key**

- 1) Brake control lever
- 2) Pump/brake fluid tank
- 3) Brake fluid pipe
- 4) Bleeder
- 5) Brake caliper
- 6) Brake pads
- 7) Brake disc
- 8) Brake pump adjusting screw

For further details, see:

- 1.2.4 (BRAKE FLUID);
- 2.15 (CHECKING THE FRONT BRAKE FLUID LEVEL AND TOPPING UP);
- 2.17 (BLEEDING THE BRAKING SYSTEMS);
- 2.21 (CHECKING THE BRAKE PAD WEAR);
- 8.4.5 (FRONT BRAKING SYSTEM).

⚠ CAUTION

When disassembling/reassembling the brake caliper, replace the caliper fastening screws with two new ones of the same type.

7.5.1 CHANGING THE FRONT BRAKE PADS (models up to 2001)

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.21 (CHECKING THE BRAKE PAD WEAR).

- ◆ Position the vehicle on the stand.
- ◆ Pull out the flexible stop pin (1).
- ◆ Push out the pin (2) with a punch (from the left towards the right).
- ◆ Extract the two pads (3).

⚠ CAUTION

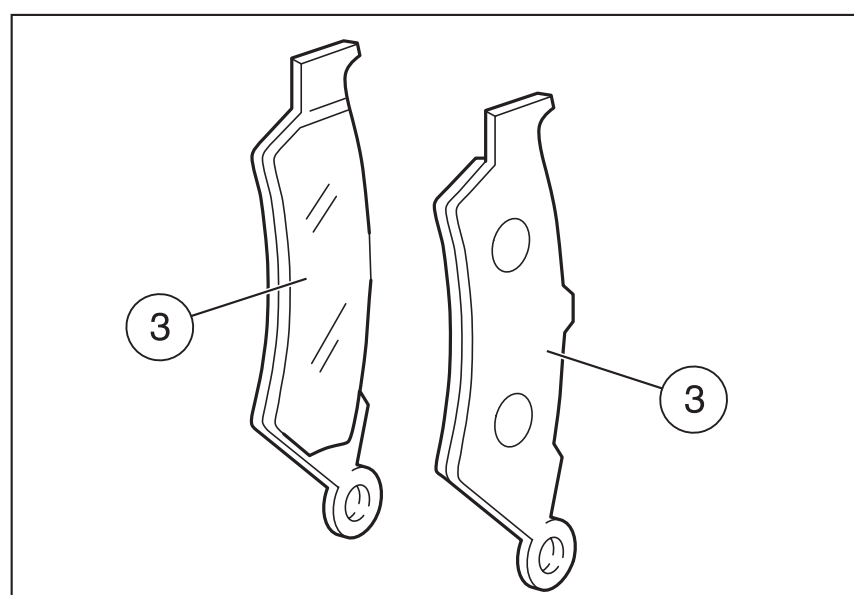
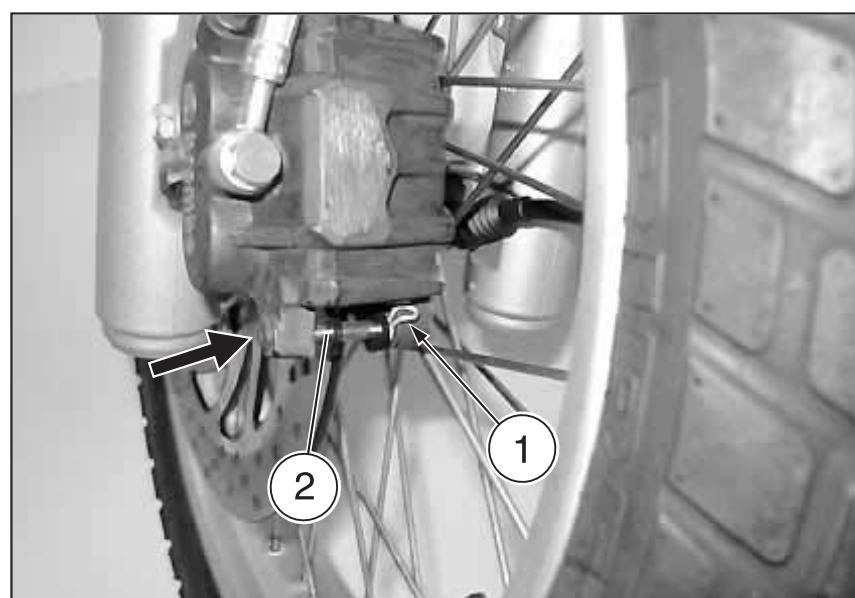
Do not pull the brake lever once the pads have been removed as the caliper pins are liable to come out of their slot, resulting in the spillage of brake fluid.

- ◆ Insert two new pads.

⚠ WARNING

Always change both pads and make sure that they are correctly positioned inside the caliper.

- ◆ Insert the pin (2).
- ◆ Introduce the flexible stop pin (1).
- ◆ Check the brake fluid level, see 2.15 (CHECKING THE FRONT BRAKE FLUID LEVEL AND TOPPING UP).



7.5.2 CHECKING THE FRONT BRAKE DISC

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

– Brake discs.

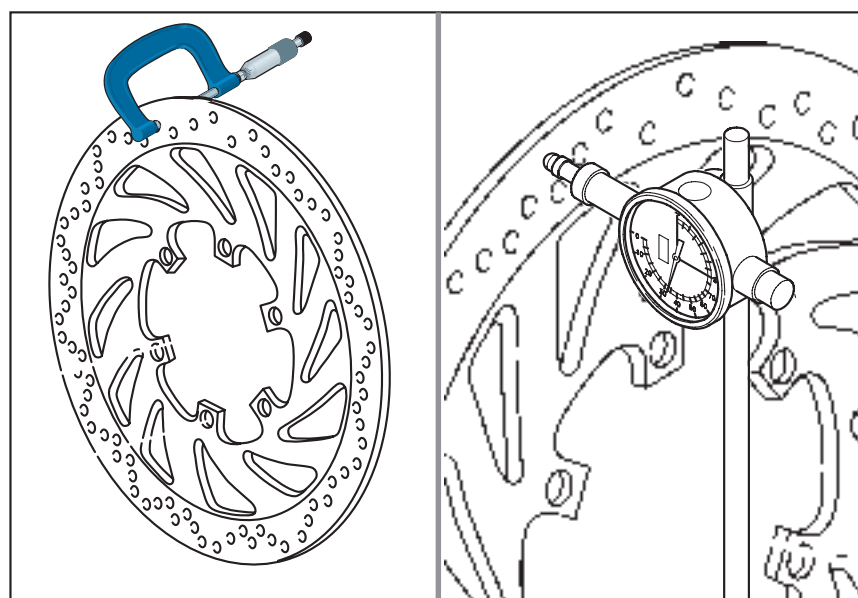
2.1.1 (REGULAR SERVICE INTERVALS CHART).

- ◆ Check the wear on the disc by measuring the minimum thickness in several places by means of a micrometer. If the minimum thickness is below the minimum value, even in a single point, change the disc.

Brake disc min. thickness: 4.5 mm.

- ◆ Using a comparator, make sure that the maximum wobbling of the disc does not exceed the limit value, otherwise change it, see 7.5.3 (REMOVING THE FRONT BRAKE DISC).

Brake disc max. wobbling: 0.3 mm.



7.5.3 REMOVING THE FRONT BRAKE DISC

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the front wheel, see 7.2.1 (REMOVING THE FRONT WHEEL).

To unscrew the screws (1), it is advisable to use a percussion screwdriver, thanks to which it will be possible to detach the screws from the LOCTITE® 243.

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

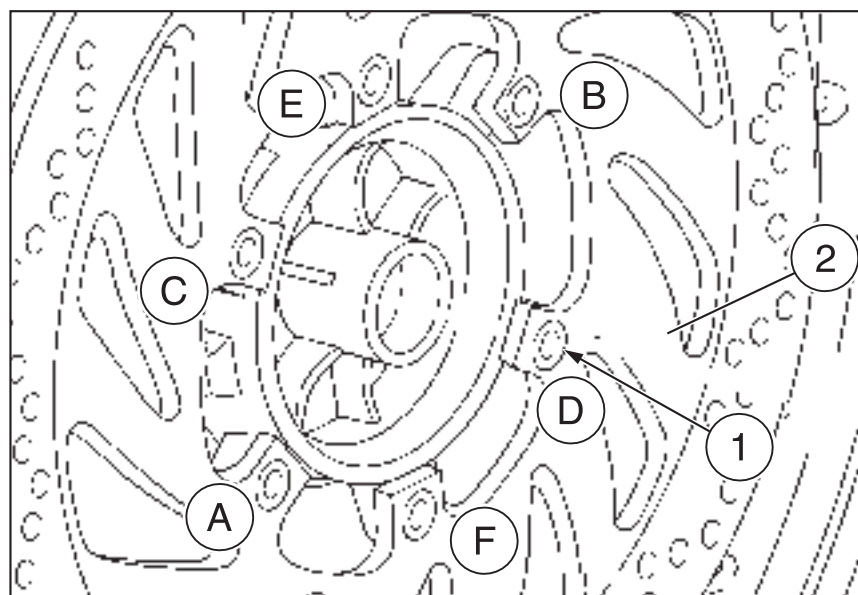
⚠ CAUTION

When reassembling, apply LOCTITE® 243 on the thread of the brake disc screws (1).

NOTE When reassembling, screw all the screws (1) on manually and tighten them in a crisscross pattern in the following order: A-B-C-D-E-F.

Front brake disc screw driving torque: 12 Nm (1.2 kgm).

- ◆ Remove the brake disc (2).



7.5.4 REMOVING THE FRONT BRAKE PUMP

See 7.1.18 (REMOVING THE FRONT BRAKE LEVER).

7.5.5 REMOVING THE FRONT BRAKE CALIPERS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

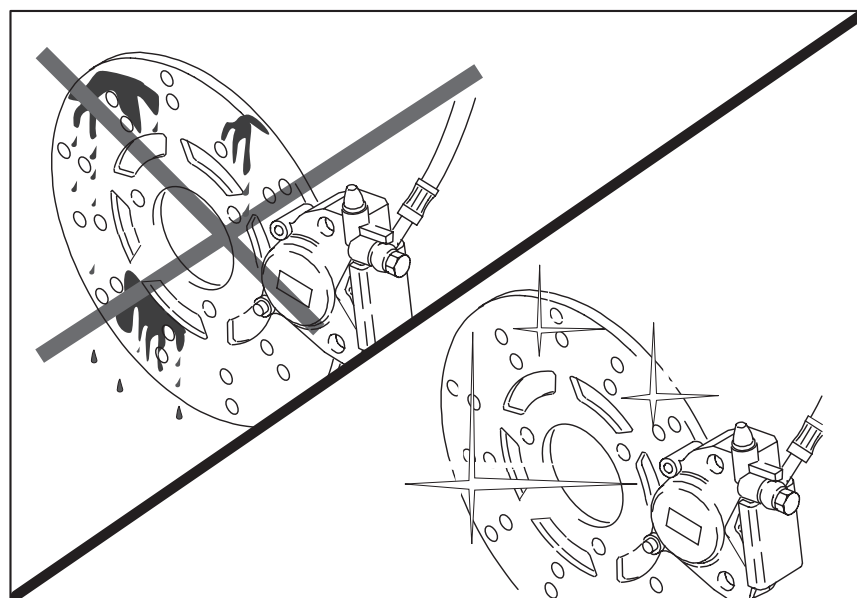
⚠ WARNING

A dirty disc soils the pads, with consequent reduction of the braking efficiency. Dirty pads must be replaced, while dirty discs must be cleaned with a high-quality degreaser.

⚠ CAUTION

While disassembling and reassembling the wheel, be careful not to damage the brake pipes, the discs and the pads.

- ◆ Position the vehicle on the stand.



COMPLETE REMOVAL

- ◆ Drain the front braking system, see 7.5.6 (DRAINING THE BRAKING SYSTEMS).

⚠ CAUTION

Handle brake fluid with care; it may chemically alter painted surfaces and the parts in plastic, rubber, etc. Use latex gloves.

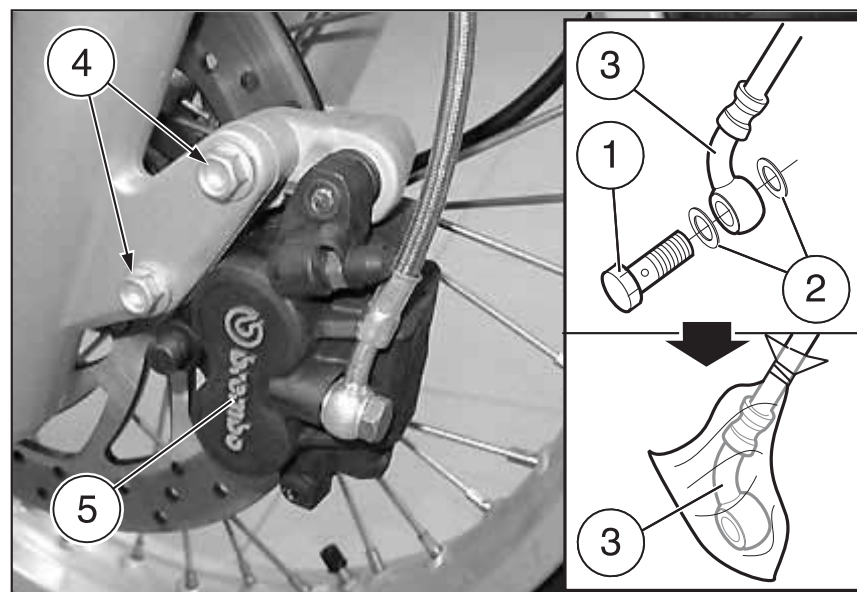
Driving torque of the front brake caliper connection screw: 20 Nm (2.0 kgm).

- ◆ Unscrew and remove the brake caliper connection screw (1) and take the two sealing washers (2).

⚠ CAUTION

Upon reassembly, replace the two sealing washers with two new washers of the same type.

- ◆ Put a nylon bag on the coupling (3) and fix it to the brake pipe with adhesive tape.
- ◆ Follow the procedure of PARTIAL REMOVAL.



PARTIAL REMOVAL

⚠ CAUTION

Make sure that the vehicle is stable.

- ◆ Have someone keep the handlebar steady in running position, so that the steering is locked.

Front brake caliper screw driving torque: 50 Nm (5.0 kgm).

- ◆ Unscrew and remove the two screws (4) that fasten the front brake caliper (5).

Follow ►

Follow ►

⚠ CAUTION

Proceed with care, in order not to damage the brake pads.

- ◆ Withdraw the brake caliper (5) from the disc, leaving the caliper constrained to the pipe (6) (or releasing it if you are carrying out a COMPLETE REMOVAL).

⚠ CAUTION

Never pull the front brake lever after removing the calipers, otherwise the pistons may go out of their seats, thus causing the outflow of the brake fluid.

REASSEMBLY

⚠ WARNING

Danger of injury. Do not introduce your fingers to align the holes.

⚠ CAUTION

Proceed with care, in order not to damage the brake pads.

- ◆ Insert the brake caliper (5) on the disc and position it so that its fastening holes and the holes on the support are aligned.

⚠ WARNING

Upon reassembly of the brake caliper, replace the caliper fastening screws (4) with two new screws of the same type.

- ◆ Screw and tighten the two screws (4) that fasten the brake caliper.

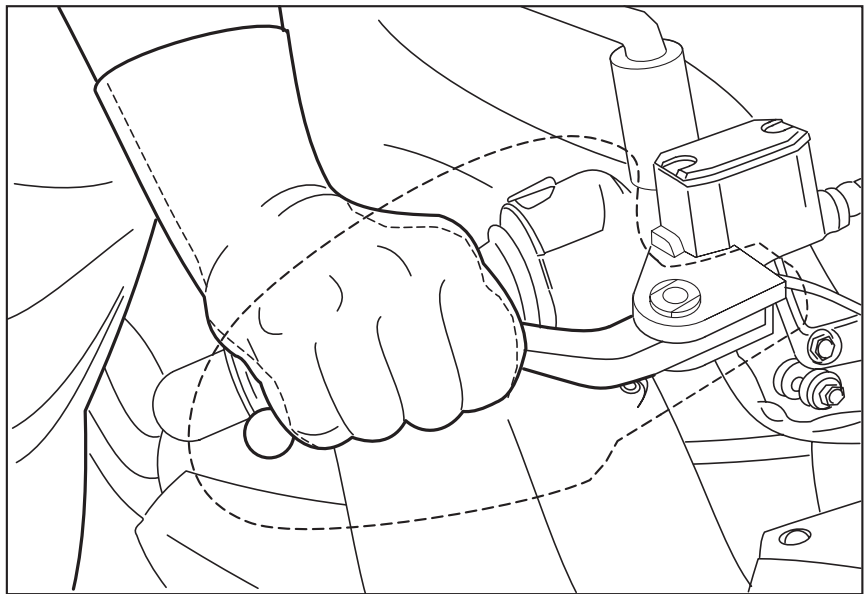
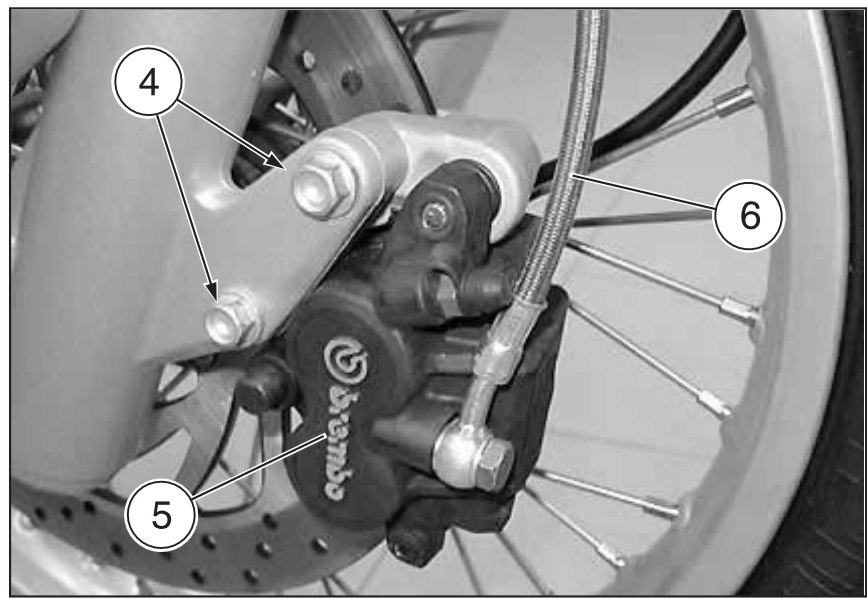
Front brake caliper screw driving torque: 50 Nm (5.0 kgm).

In case of complete removal:

- ◆ Carry out the COMPLETE REMOVAL operations in the reverse order.

⚠ WARNING

After reassembly, pull the front brake lever repeatedly and check the correct functioning of the braking system.



7.5.6 DRAINING THE BRAKING SYSTEMS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

⚠ CAUTION

Use latex gloves.

Handle brake fluid with care; it may chemically alter painted surfaces and the parts in plastic, rubber, etc.

DO NOT DISPOSE OF THE FLUID IN THE ENVIRONMENT.

⚠ WARNING

Considering the danger for both rider and vehicle, it is absolutely essential to bleed the hydraulic circuit once the brakes have been refitted and the braking system restored to its normal conditions, see 2.17 (BLEEDING THE BRAKING SYSTEMS).

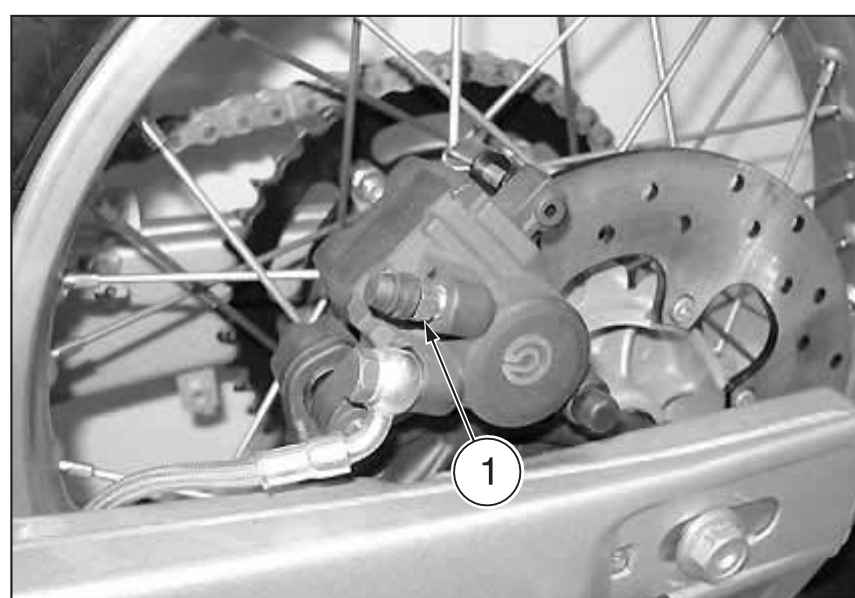
- ◆ Position the vehicle on the side stand.
- ◆ Remove the plastic protection cap.
- ◆ Insert a small rubber pipe on the bleeder valve (1).
- ◆ Introduce the free end of the small rubber pipe into a clean container for the collection of the fluid.
- ◆ Loosen the bleeder (1) one turn.
- ◆ Slowly pull the brake lever (for the front brake) or the brake pedal (for the rear brake) thoroughly. Repeat the operation until all the brake fluid has flown into the container.
- ◆ Tighten the bleeder (1).

Bleeder driving torque: 15 Nm (1.5 kgm).

⚠ CAUTION

Clean the small rubber pipe (on its whole length) and the bleeder valve, removing any residue of brake fluid.

- ◆ Remove the small rubber pipe and clean it.
- ◆ Refit the rubber protection cap.
- ◆ Plug the container.



7.6 REAR BRAKE

NOTE This vehicle is provided with disc brakes with two, front and rear braking systems having separate hydraulic circuits.
The rear braking system is with single disc (right side).

⚠ WARNING

Do not use the vehicle if the braking system leaks fluid.

Key

- 1) Brake fluid tank
- 2) Brake fluid pipe from tank to pump
- 3) Pedal adjusting screw
- 4) Brake disc
- 5) Bleeder
- 6) Brake caliper
- 7) Brake pads
- 8) Brake fluid pipe from pump to caliper
- 9) Rear brake light switch
- 10) Brake pedal
- 11) Brake pump

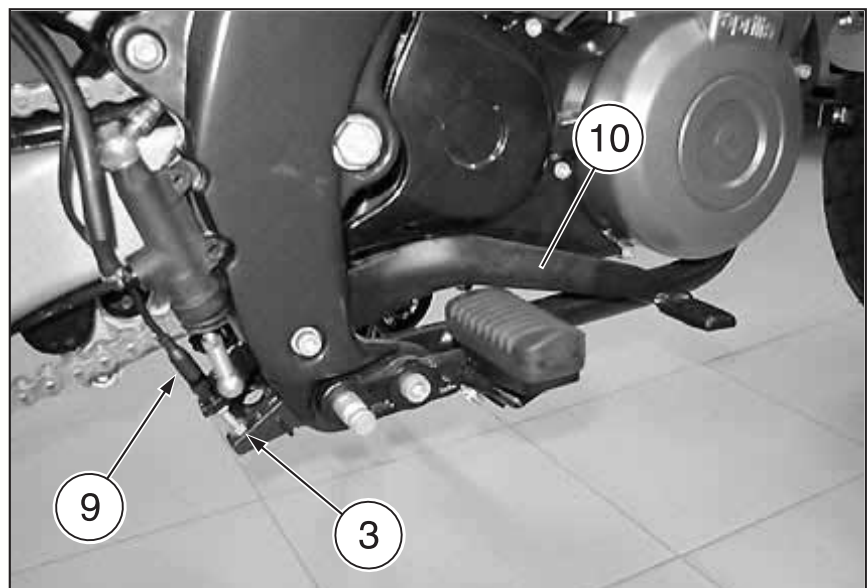
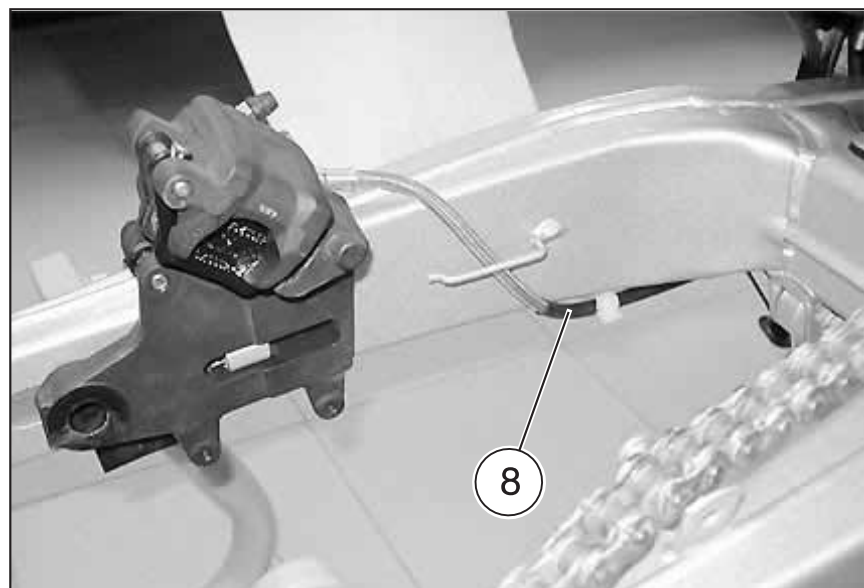
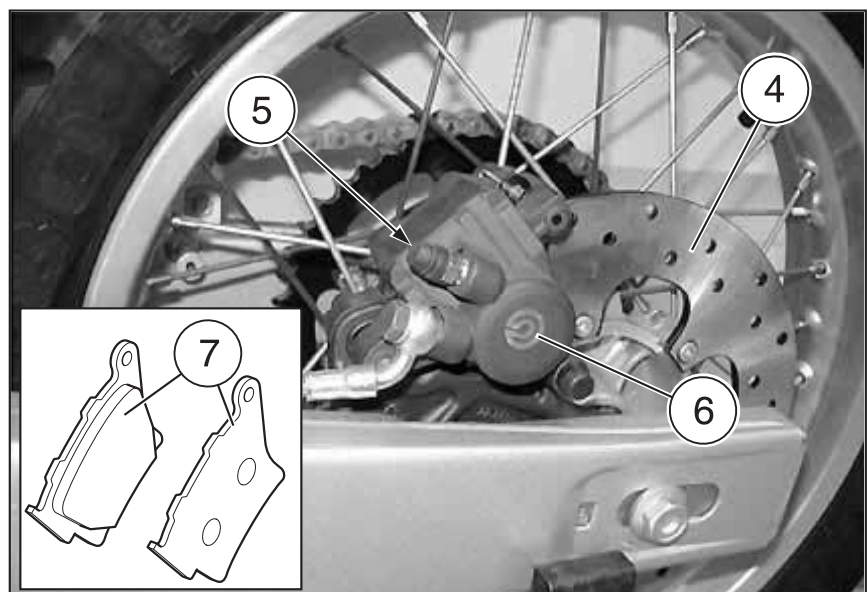
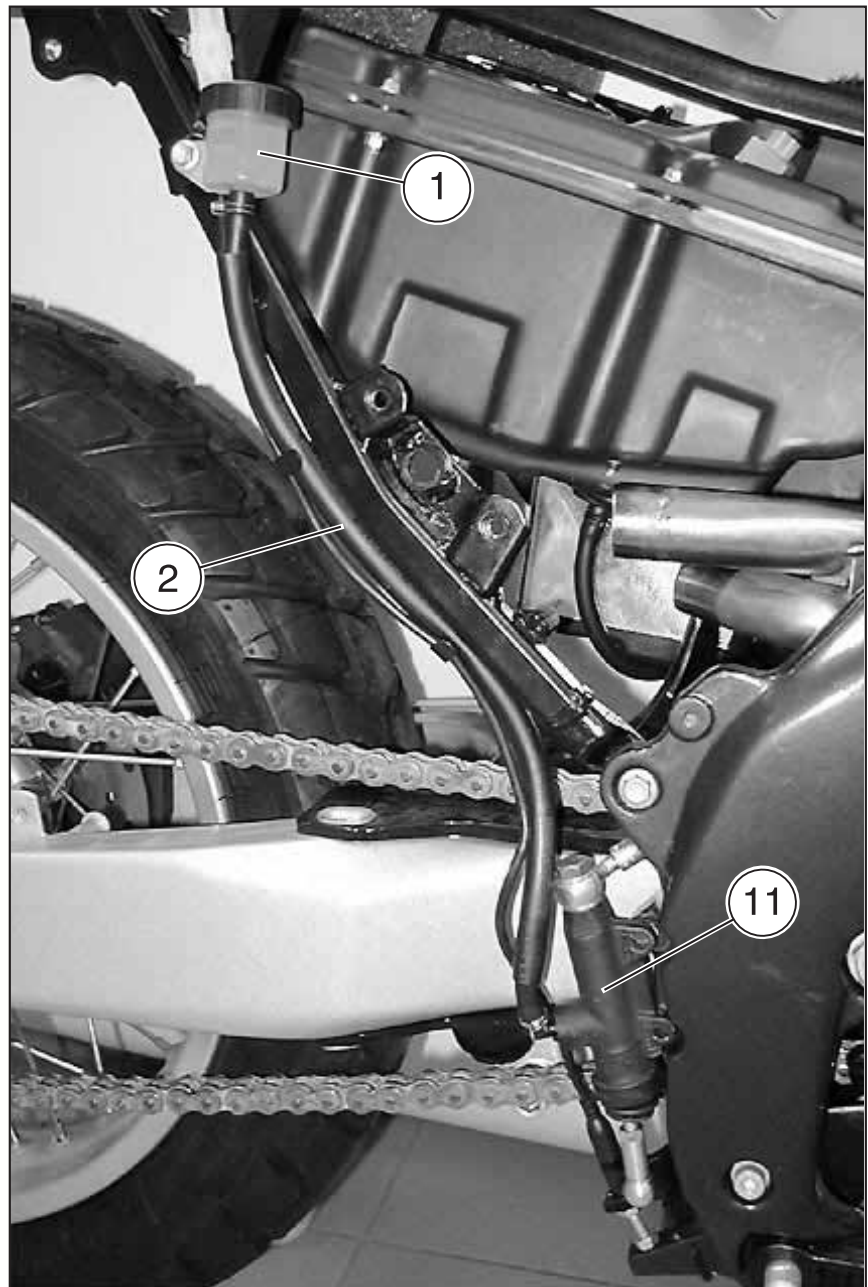
The rear brake reservoir is positioned under the right fairing; to reach it, remove the right fairing, see 7.1.4 (REMOVING THE RIGHT AND LEFT SIDES).

For further details, see:

- 1.2.4 (BRAKE FLUID);
- 2.16 (CHECKING AND TOPPING UP THE REAR BRAKE FLUID);
- 2.17 (BLEEDING THE BRAKING SYSTEMS);
- 2.20 (ADJUSTING THE REAR BRAKE CONTROL LEVER CLEARANCE);
- 2.21 (CHECKING THE BRAKE PAD WEAR);
- 8.4.6 (REAR BRAKING SYSTEM).

⚠ CAUTION

When disassembling/reassembling the brake caliper, replace the caliper fastening screws with two new ones of the same type.



7.6.1 CHANGING THE REAR BRAKE PADS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.21 (CHECKING THE BRAKE PAD WEAR).

- ◆ Position the vehicle on the stand.
- ◆ Pull out the flexible stop pin (1).
- ◆ Push out the pin (2) with a punch (from the left towards the right).
- ◆ Extract the two pads (3).

⚠ CAUTION

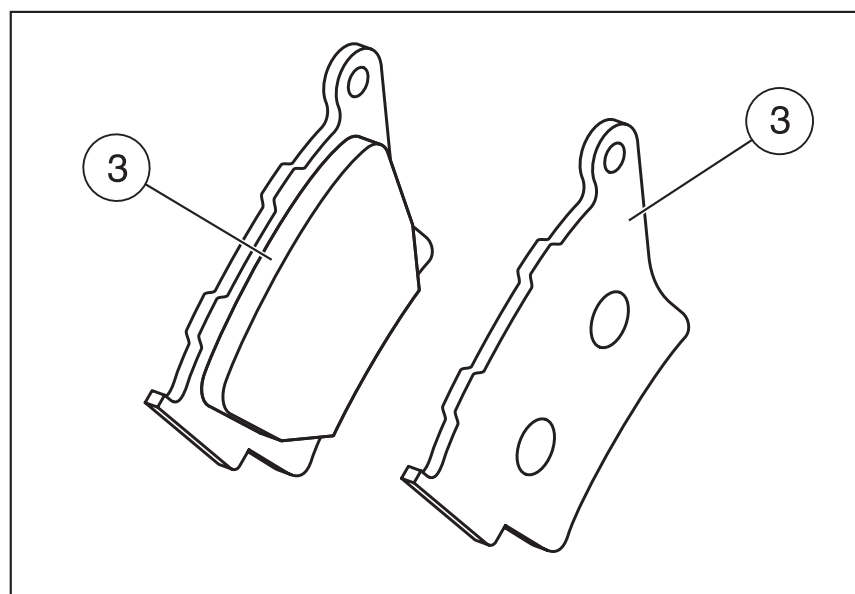
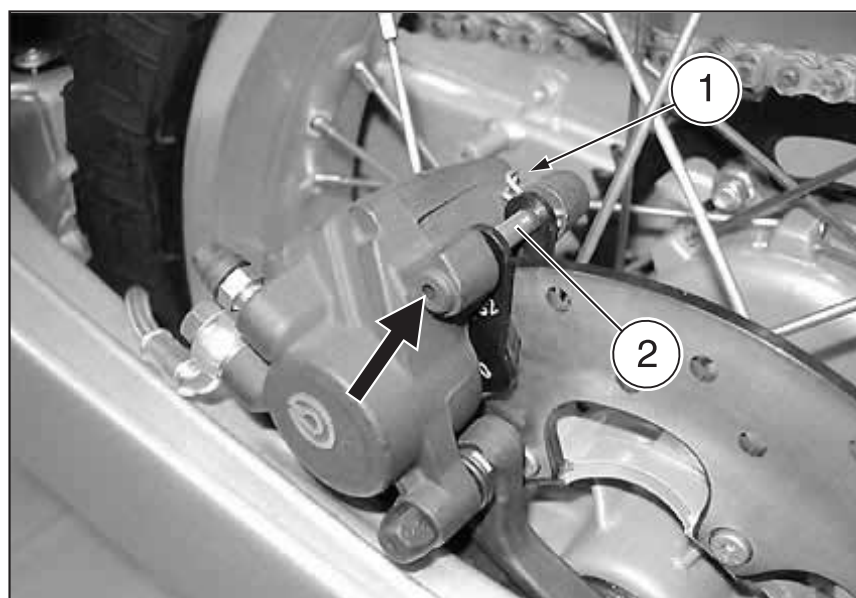
Do not pull the brake lever once the pads have been removed as the caliper pins are liable to come out of their slot, resulting in the spillage of brake fluid.

- ◆ Insert two new pads.

⚠ WARNING

Always change both pads and make sure that they are correctly positioned inside the caliper.

- ◆ Insert the pin (2).
- ◆ Introduce the flexible stop pin (1).
- ◆ Check the brake fluid level, see 2.15 (CHECKING THE FRONT BRAKE FLUID LEVEL AND TOPPING UP).



7.6.2 CHECKING THE REAR BRAKE DISC

For the maintenance intervals, see 2.1.1 (REGULAR SERVICE INTERVALS CHART) under:

- Brake discs.

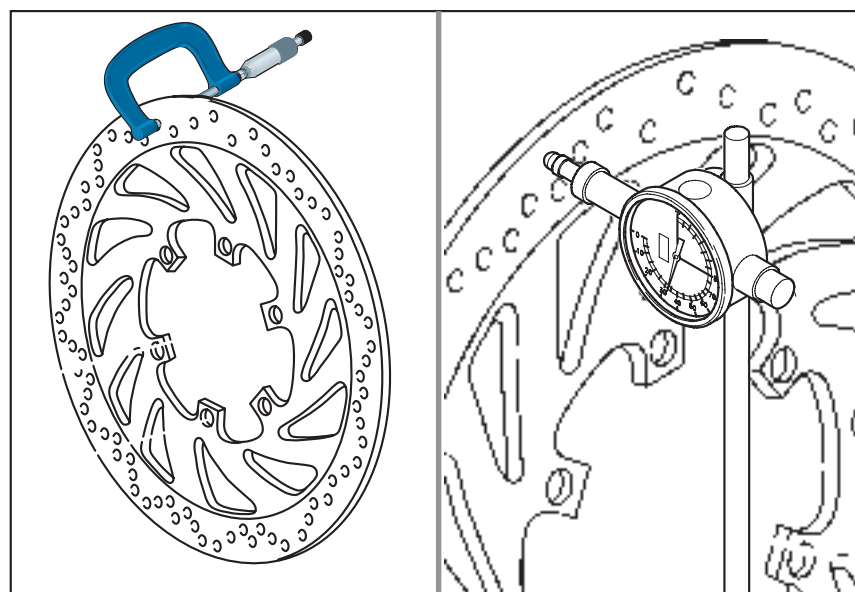
NOTE These operations must be performed with the brake disc installed on the wheel.

- ◆ Check the wear on the disc by measuring the minimum thickness in several places by means of a micrometer. If, even in one point of the disc only, the minimum thickness is below the minimum value, change the disc see 7.6.3 (REMOVING THE REAR BRAKE DISC).

Brake disc min. thickness: 4.5 mm.

- ◆ Using a comparator, make sure that the maximum wobbling of the disc does not exceed the limit value, otherwise change it, see 7.6.3 (REMOVING THE REAR BRAKE DISC).

Brake disc max. wobbling: 0.3 mm.



7.6.3 REMOVING THE REAR BRAKE DISC

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the rear wheel, see 7.3.1 (REMOVING THE REAR WHEEL).

NOTE To unscrew the screws (1), it is advisable to use a percussion screwdriver, thanks to which it will be possible to detach the screws from the LOCTITE® 243.

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

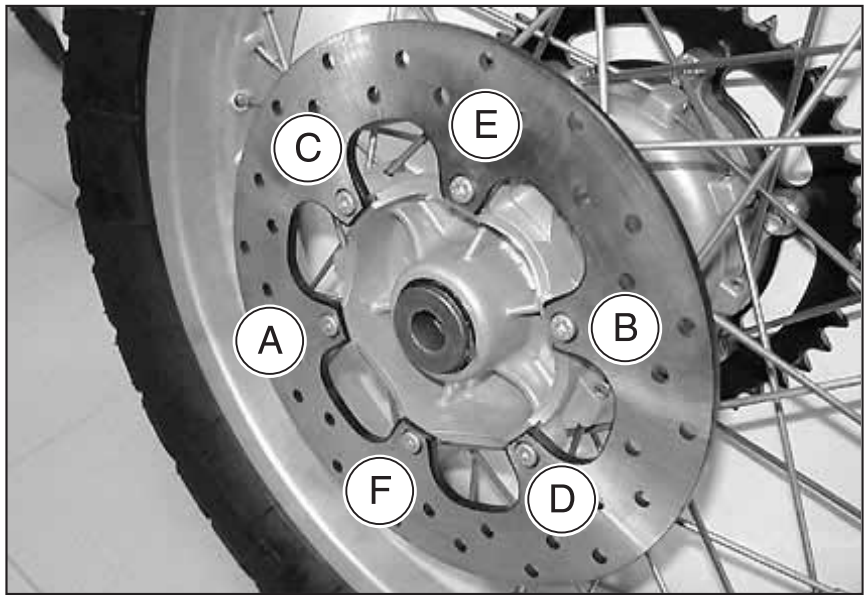
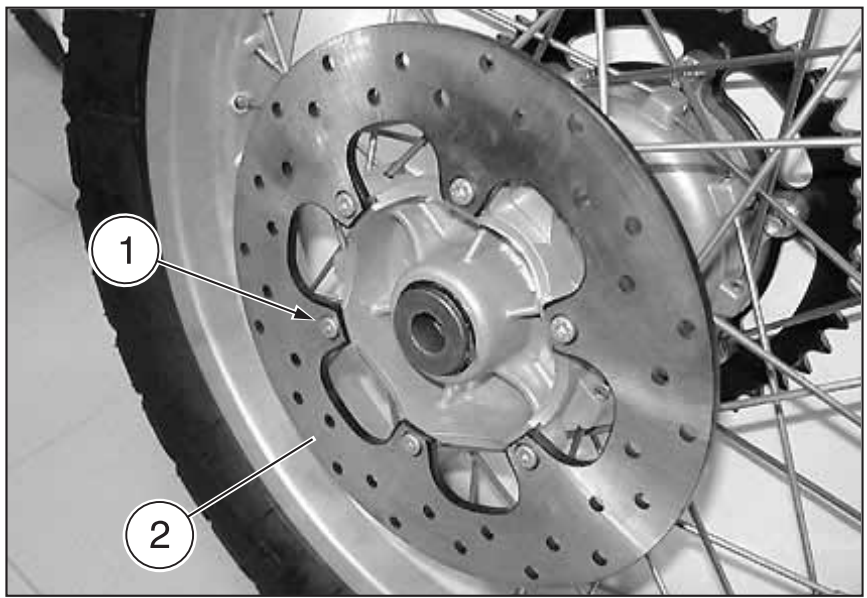
CAUTION

When reassembling, apply LOCTITE® 243 on the thread of the brake disc screws (1).

NOTE When reassembling, screw all the screws on manually and tighten them in a crisscross pattern in the following order: A-B-C-D-E-F.

Rear brake disc screw driving torque: 12 Nm (1.2 kgm).

- ◆ Remove the brake disc (2).



7.6.4 REMOVING THE REAR BRAKE PUMP

COMPLETE REMOVAL

- ◆ Drain the rear braking system, see 7.5.6 (DRAINING THE BRAKING SYSTEMS).

CAUTION

Handle brake fluid with care; it may chemically alter painted surfaces and the parts in plastic, rubber, etc. Use latex gloves.

- ◆ Unscrew and remove the two screws (1), taking the bushes and the nuts.

Rear brake pump screw driving torque: 10 Nm (1.0 kgm).

- ◆ Remove the protection element (2).

CAUTION

Upon reassembly, correctly position the cable (3) in the seat (4).

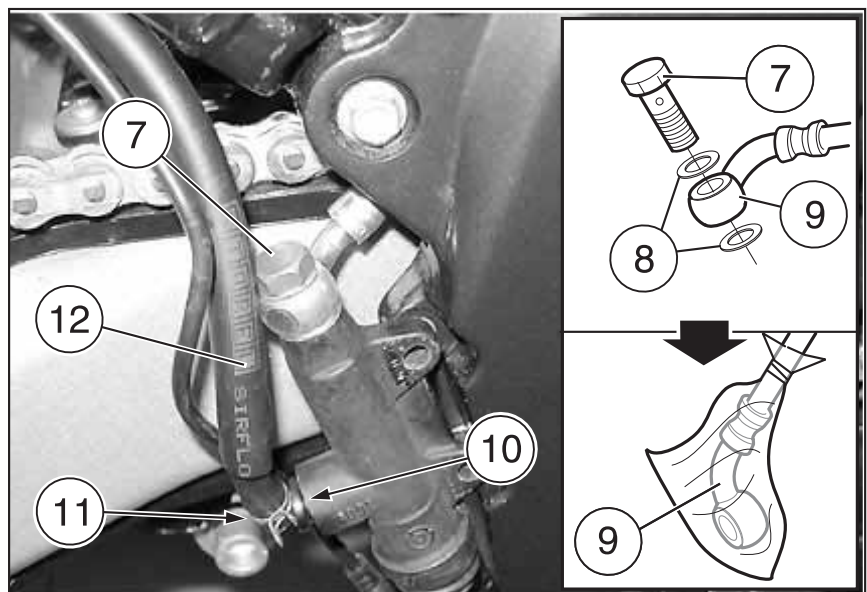
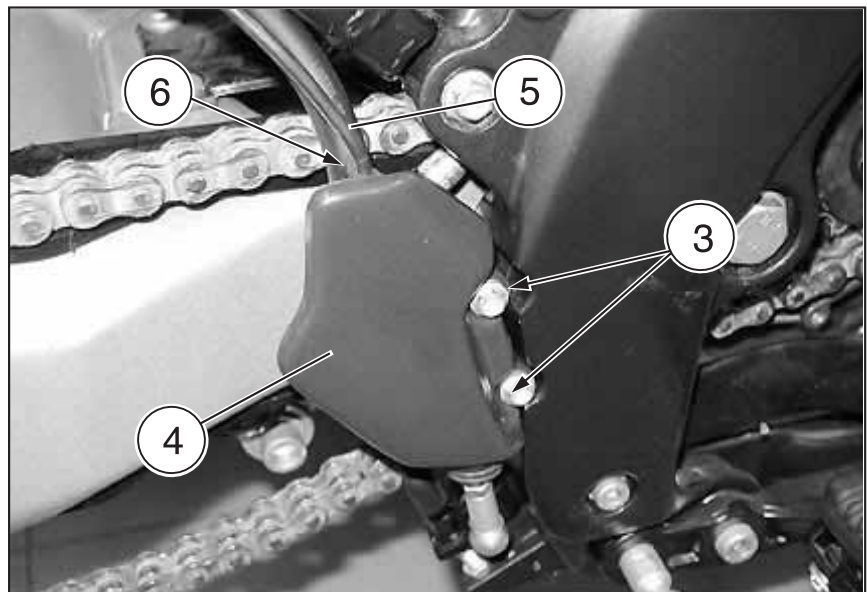
- ◆ Unscrew and remove the rear brake pump connection screw (5) and take the two sealing washers (6).

Rear brake pump connection screw (5) driving torque: 20 Nm (2.0 kgm).

CAUTION

Upon reassembly, replace the two sealing washers with two new washers of the same type.

- ◆ Put a nylon bag on the coupling (7) and fix it to the brake pipe with adhesive tape.
- ◆ Release the clamp (8).



⚠ CAUTION

Prepare a new clamp to replace the original.

- ◆ Loosen and move the pipe clamp (9).
- ◆ Slide the pipe (10) from its fitting on the pump.
- ◆ Put a nylon bag on the pipe (10) and fix it to the pipe with adhesive tape.
- ◆ Carry out the first five operations indicated for the PARTIAL REMOVAL.

NOTE When reassembling, top up the brake fluid, see 2.16 (CHECKING AND TOPPING UP THE REAR BRAKE FLUID) and bleed the braking system, see 2.17 (BLEEDING THE BRAKING SYSTEMS).

PARTIAL REMOVAL

- ◆ Unscrew and remove the two screws (1), taking the bushes and the nuts.

Rear brake pump screw driving torque: 10 Nm (1.0 kgm).

- ◆ Remove the protection element (2).

⚠ CAUTION

Upon reassembly, correctly position the cable (3) in the seat (4).

- ◆ Release the spring (11) and remove it from the ball joint (12).
- ◆ Release the ball joint (12) from the seat.

⚠ CAUTION

Do not force the brake pipes.

- ◆ Remove the pump (13), leaving it constrained to the coupling (7) and to the pipe (10) (or releasing it if you are carrying out a COMPLETE REMOVAL).
- ◆ Remove the right passenger footrest unit, see 7.1.33 (REMOVING THE PASSENGER FOOTREST GROUP).

COMPLETE REMOVAL

- ◆ Slightly open the two tangs (15), releasing the pipe and the electric cable.
- ◆ Unscrew and remove the screw (16) and take the washer.

Rear brake fluid tank screw driving torque: 3 Nm (0.3 kgm).

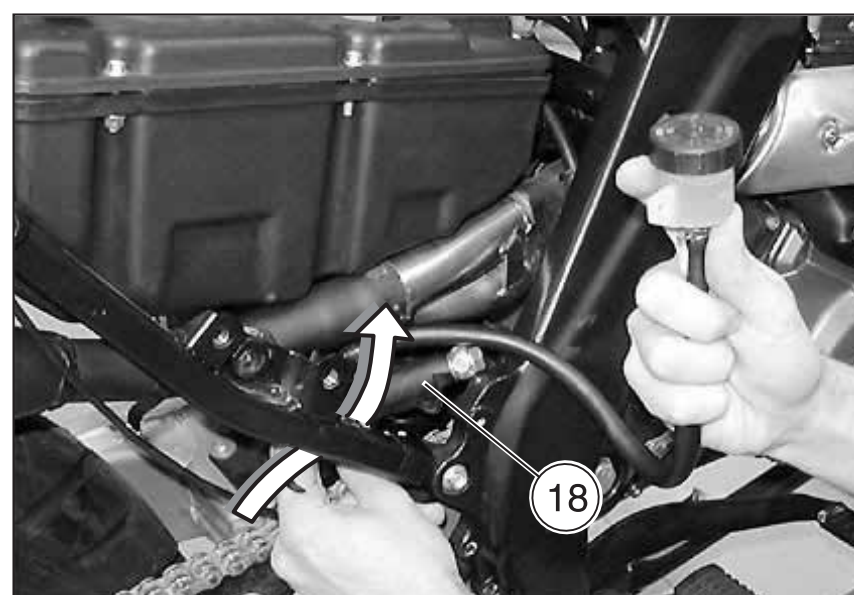
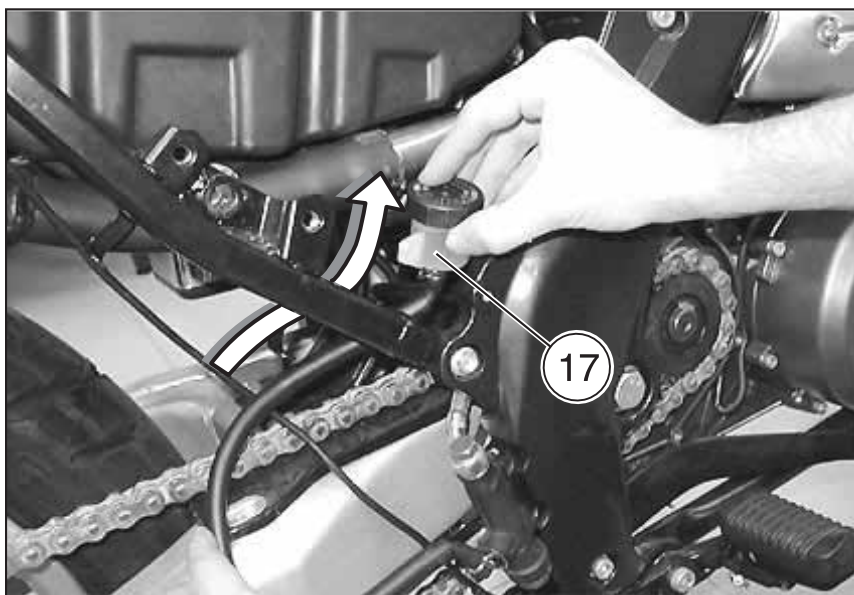
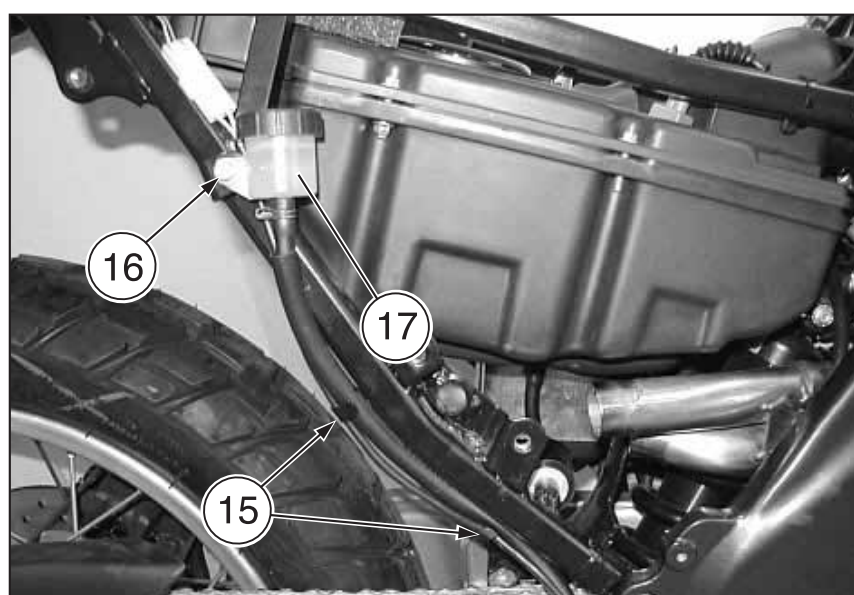
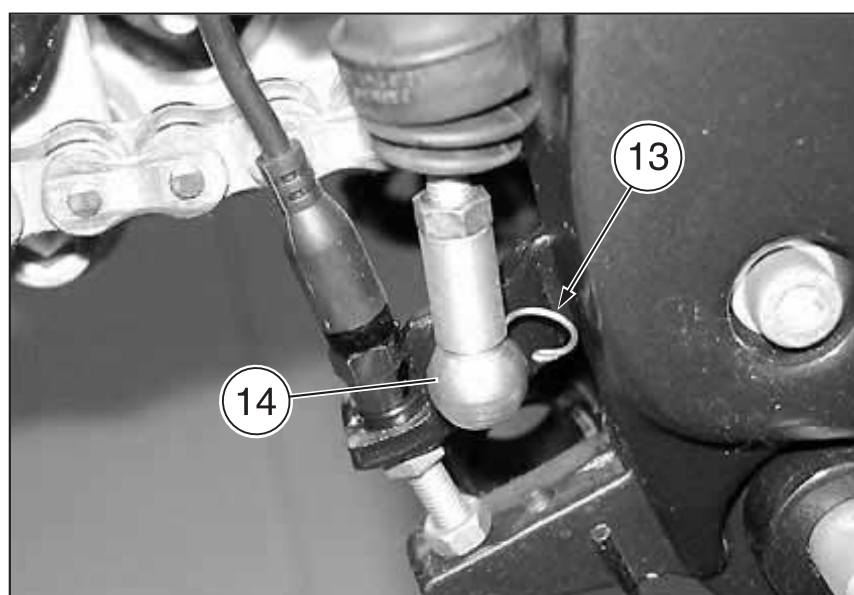
⚠ CAUTION

Do not force the brake pipe.

⚠ CAUTION

When moving the rear brake reservoir (17), keep it in vertical position, in such a way as to prevent air bubbles from getting into the braking system.

- ◆ Grasp the rear brake reservoir (17) and pass it between the saddle pillar and the exhaust silencer pipes (see figure).
- ◆ Repeat the previous operation for the rear brake pump (18) (see figure).



7.6.5 REMOVING THE REAR BRAKE CALIPER

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

⚠ WARNING

A dirty disc soils the pads, with consequent reduction of the braking efficiency. Dirty pads must be replaced, while dirty discs must be cleaned with a high-quality degreaser.

⚠ CAUTION

Before carrying out the following operations, let the engine and the silencer cool down until they reach room temperature, in order to avoid burns.

While disassembling and reassembling the wheel, be careful not to damage the brake pipe, the disc and the pads.

- ◆ Position the vehicle on the side stand.

For the partial removal, perform ONLY the operations indicated in paragraph "PARTIAL REMOVAL" (excluding the "COMPLETE REMOVAL").

COMPLETE REMOVAL

- ◆ Drain the rear braking system, see 7.5.6 (DRAINING THE BRAKING SYSTEMS).

⚠ CAUTION

Handle brake fluid with care; it may chemically alter painted surfaces and the parts in plastic, rubber, etc. Use latex gloves.

Driving torque of the rear brake pipe caliper connection screw: 20 Nm (2.0 kgm).

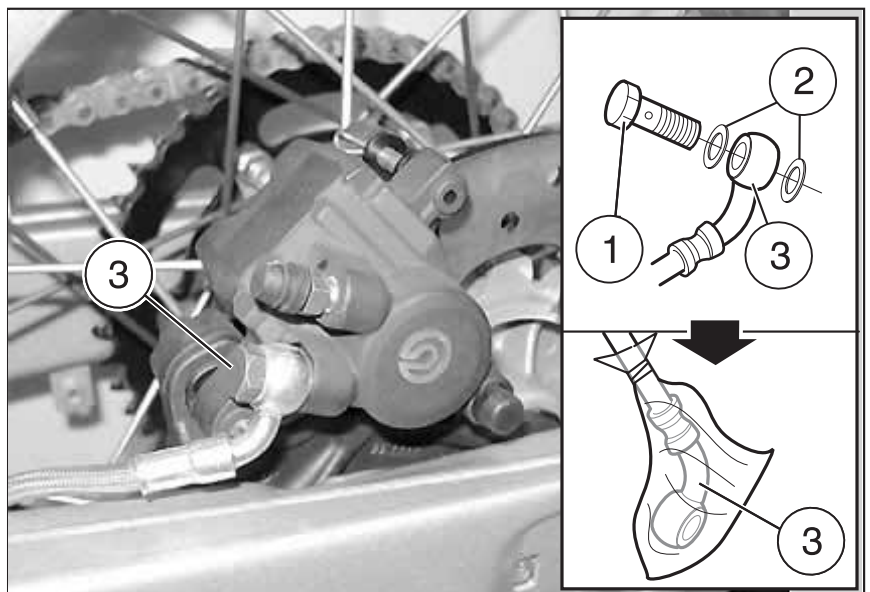
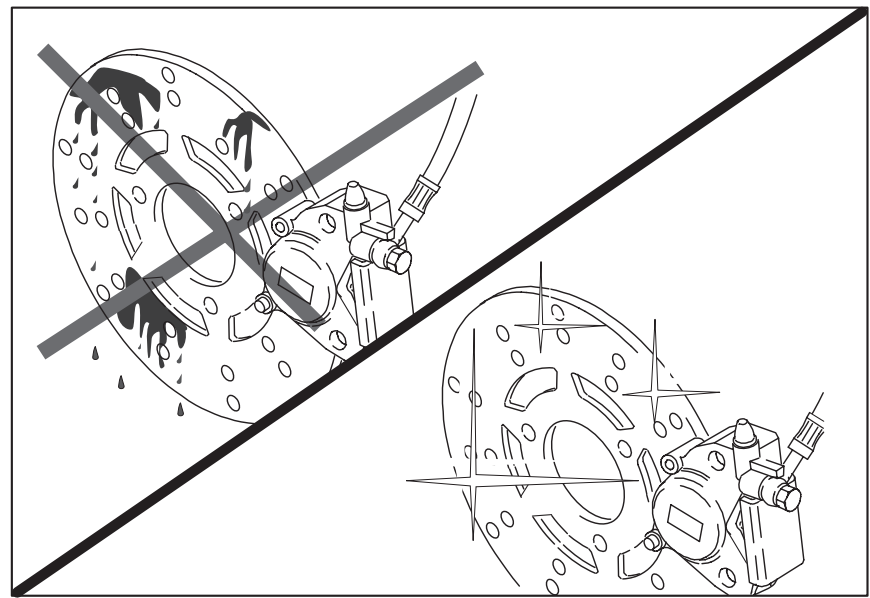
- ◆ Unscrew and remove the brake caliper connection screw (1) and take the two sealing washers (2).

⚠ CAUTION

Upon reassembly, replace the two sealing washers with two new washers of the same type.

- ◆ Put a nylon bag on the coupling (3) and fix it to the brake pipe with adhesive tape.
- ◆ Follow the procedure of PARTIAL REMOVAL.

Follow ►



Follow ►

PARTIAL REMOVAL

- ◆ Remove the rear wheel, see 7.3.1 (REMOVING THE REAR WHEEL).
- ◆ Withdraw the brake caliper (4) (complete with plate), leaving it constrained to the pipe (5) (or releasing it if you are carrying out a COMPLETE REMOVAL).

⚠ CAUTION

Never pull the rear brake lever after removing the calipers, otherwise the pistons may go out of their seats, thus causing the outflow of the brake fluid.

REASSEMBLY

See 7.3.18 (INSTALLING THE REAR WHEEL).

In case of complete removal:

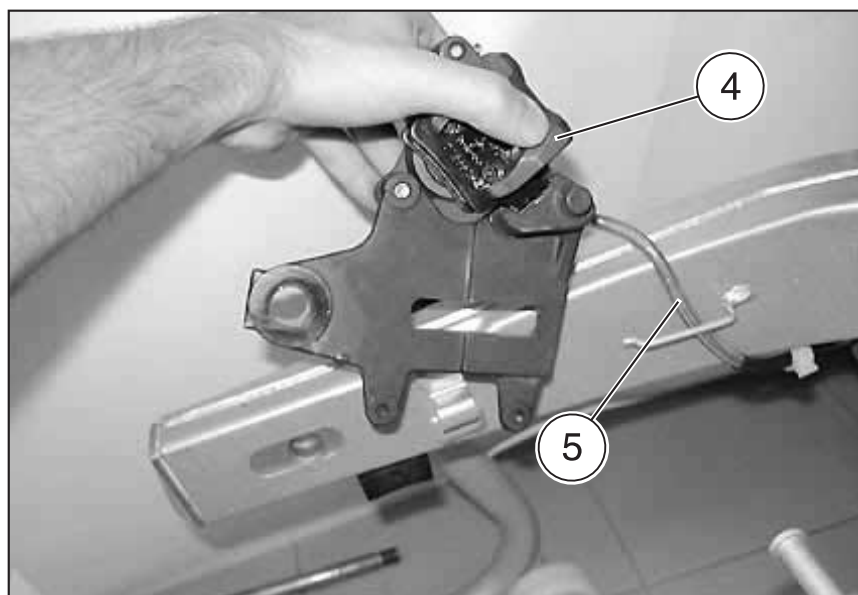
- ◆ Carry out the COMPLETE REMOVAL operations in the reverse order.

⚠ WARNING

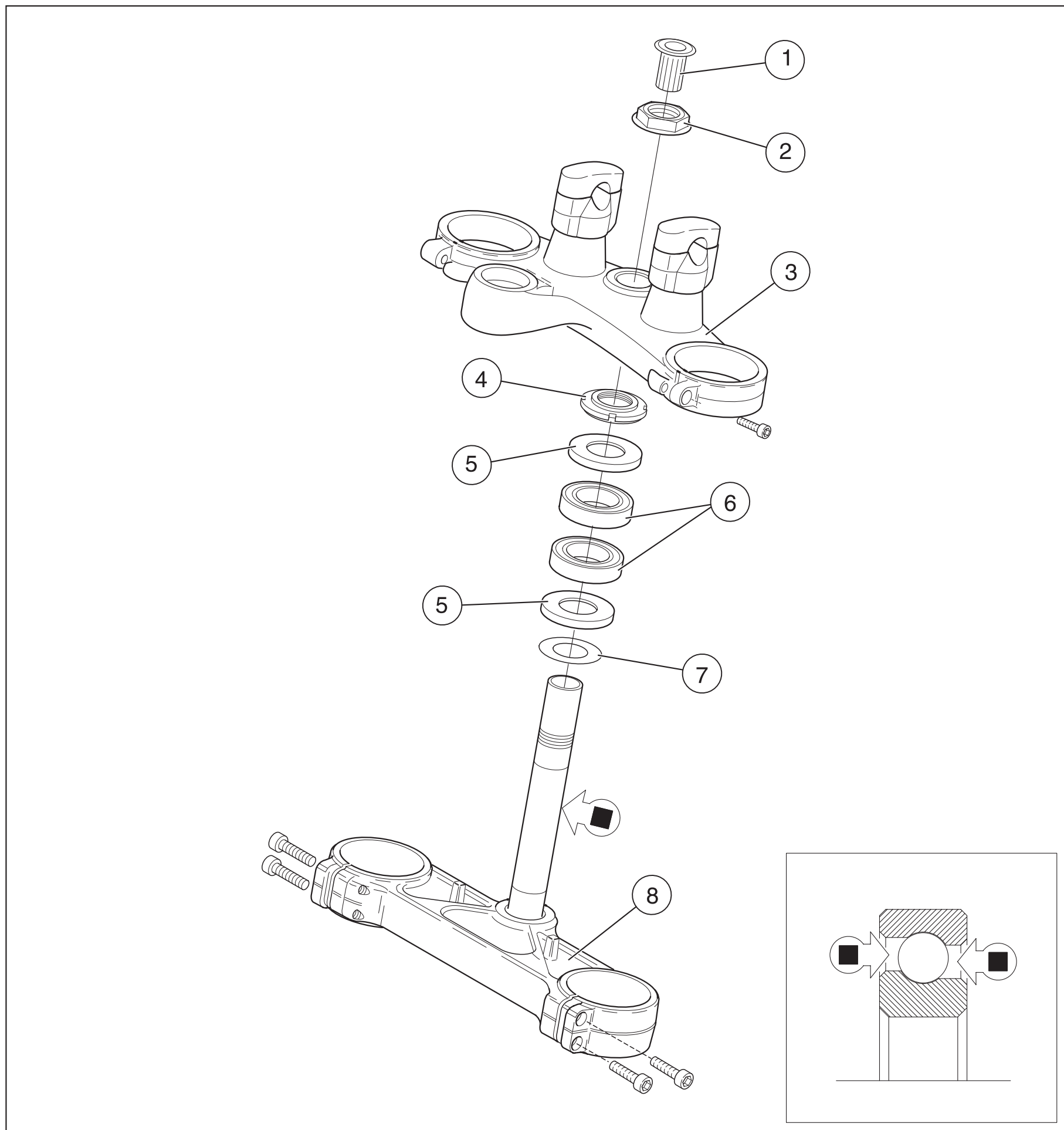
After reassembly, pull the rear brake lever repeatedly and check the correct functioning of the braking system.

7.6.6 DRAINING THE REAR BRAKING SYSTEM

See 7.5.6 (DRAINING THE BRAKING SYSTEMS).



7.7 STEERING



Key

- 1) Rubber element
- 2) Steering tube screw
- 3) Upper plate
- 4) Ring nut
- 5) Sealing ring
- 6) Bearing
- 7) Washer
- 8) Lower plate

For further details, see:

- 2.22 (STEERING);
- 2.24 (INSPECTING THE FRONT AND REAR SUSPENSION).

■ = GREASE, see 1.6 (LUBRICANT CHART).

7.7.1 REMOVING THE FORK TOGETHER WITH THE FRONT WHEEL

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.22 (STEERING).

⚠ WARNING

Keep the lifting platform completely lowered, raising it only when indicated.

- ◆ Position the vehicle on the centre stand **OPT** on a lifting platform, with the front wheel sticking out over the edge of the platform.

⚠ WARNING

Lower and anchor the rear part of the vehicle, in such a way as to keep the rear wheel resting on the ground and the front wheel raised.

Make sure that the vehicle is stable.

- ◆ Place a support under the front wheel.
- ◆ Remove the oil sump guard, see 7.1.3 (REMOVING THE OIL SUMP GUARD).
- ◆ Partially remove the front brake caliper, see 7.5.5 (REMOVING THE FRONT BRAKE CALIPERS).

⚠ CAUTION

Never pull the front brake lever after removing the calipers, otherwise the pistons may go out of their seats, thus causing the outflow of the brake fluid.

- ◆ Unscrew and remove the screw (1), releasing the clamp (2).
- ◆ Unscrew and remove the screw (3), releasing the collar (4).
- ◆ Disconnect the two electrical connectors (5) of the horn.

NOTE The following procedure does not necessarily have to be performed with the front fairing removed, though it is advisable to remove it in order to gain more room for manoeuvre, see 7.1.24 (REMOVING THE FRONT FAIRING).

- ◆ Working on the lower part of the front fairing, disconnect the odometer/speedometer control (6) from the dashboard and withdraw it from the collar.
- ◆ ★ Unscrew the screw (7).

Upper plate screw driving torque: 50 Nm (5 kgm).

- ◆ Loosen and remove the upper nut (8).

Steering tube nut driving torque: 100 Nm (10 kgm).

⚠ CAUTION

Use a suitable support to sustain the handlebar, which remains connected to the vehicle through the cables and the brake pipe.

Proceed with care.

Do not force the electric cables or the brake pipe.

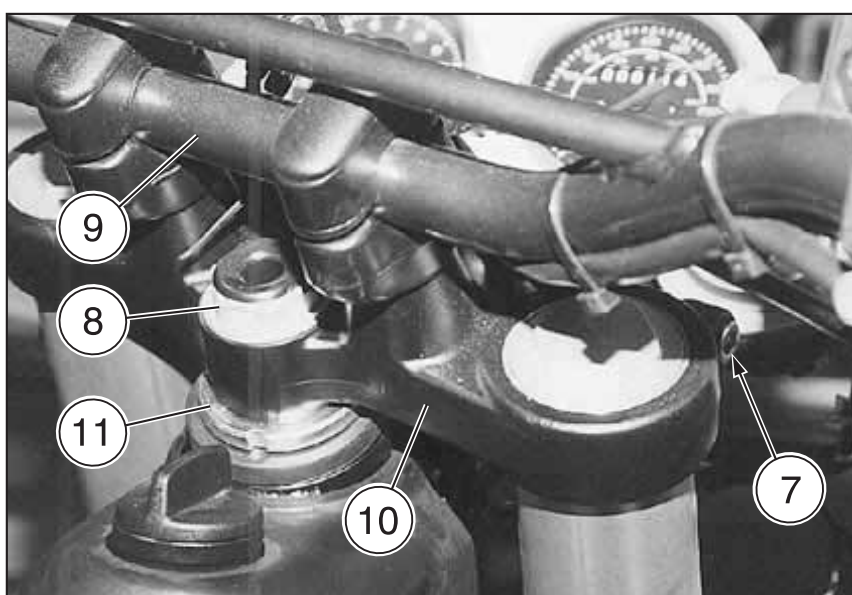
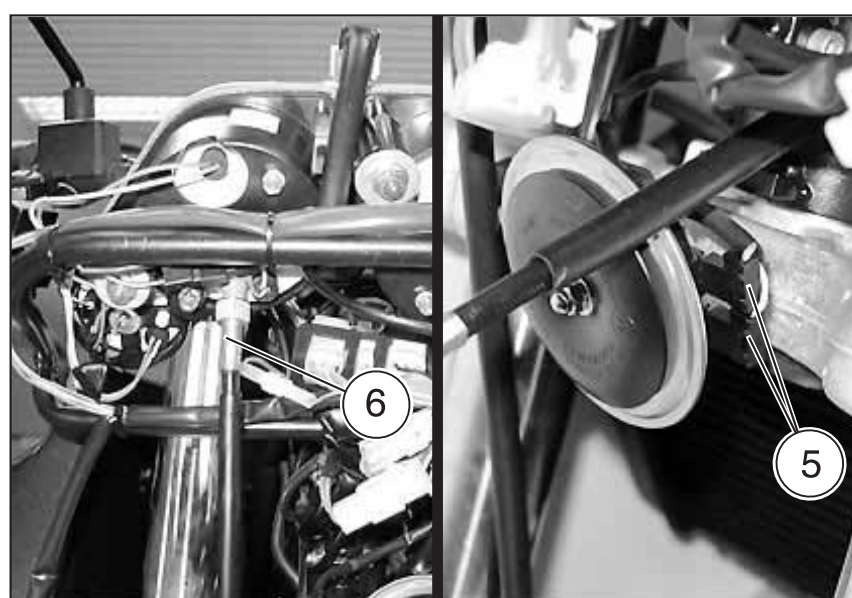
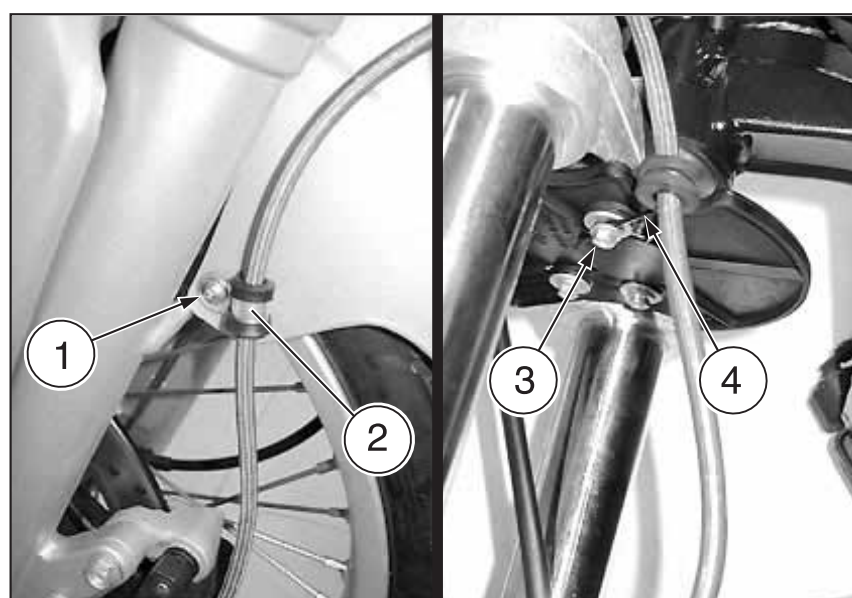
- ◆ Raise the handlebar (9) complete with upper plate (10), withdrawing the latter from the fork.
- ◆ Fold the handlebar (9) complete with upper plate (10) forward and fix it temporarily.

⚠ CAUTION

When reassembling the upper plate (10), insert it in the fork tube until their upper edges coincide.

- ◆ Use the relevant socket spanner to loosen and remove the adjuster ring (11).

Follow ►



Follow ►

⚠ CAUTION

Due to the weight of the forecarriage, the following operations require the assistance of another operator.

Fix the operating procedure before starting work.

The removal must be carried out with the greatest care.

Support the forecarriage to prevent it accidentally dropping.

Whilst removing the forecarriage, take care not to let the brake fluid pipe get entangled.

- ◆ With one operator holding the forecarriage in place, raise the lifting platform slowly until the forecarriage steering head slides off.
- ◆ Remove the front part of the vehicle and store it in a safe place.
- ◆ Lower the lifting platform completely.
- ◆ Remove the upper sealing ring (13).
- ◆ Remove the lower sealing ring (14).
- ◆ Remove the washer (15).

⚠ CAUTION

Wash all the components with a clean detergent.

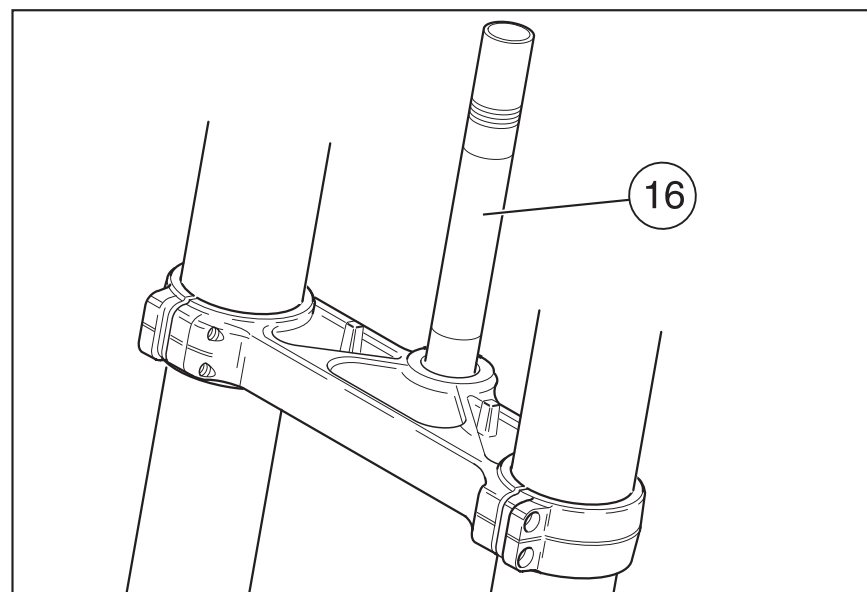
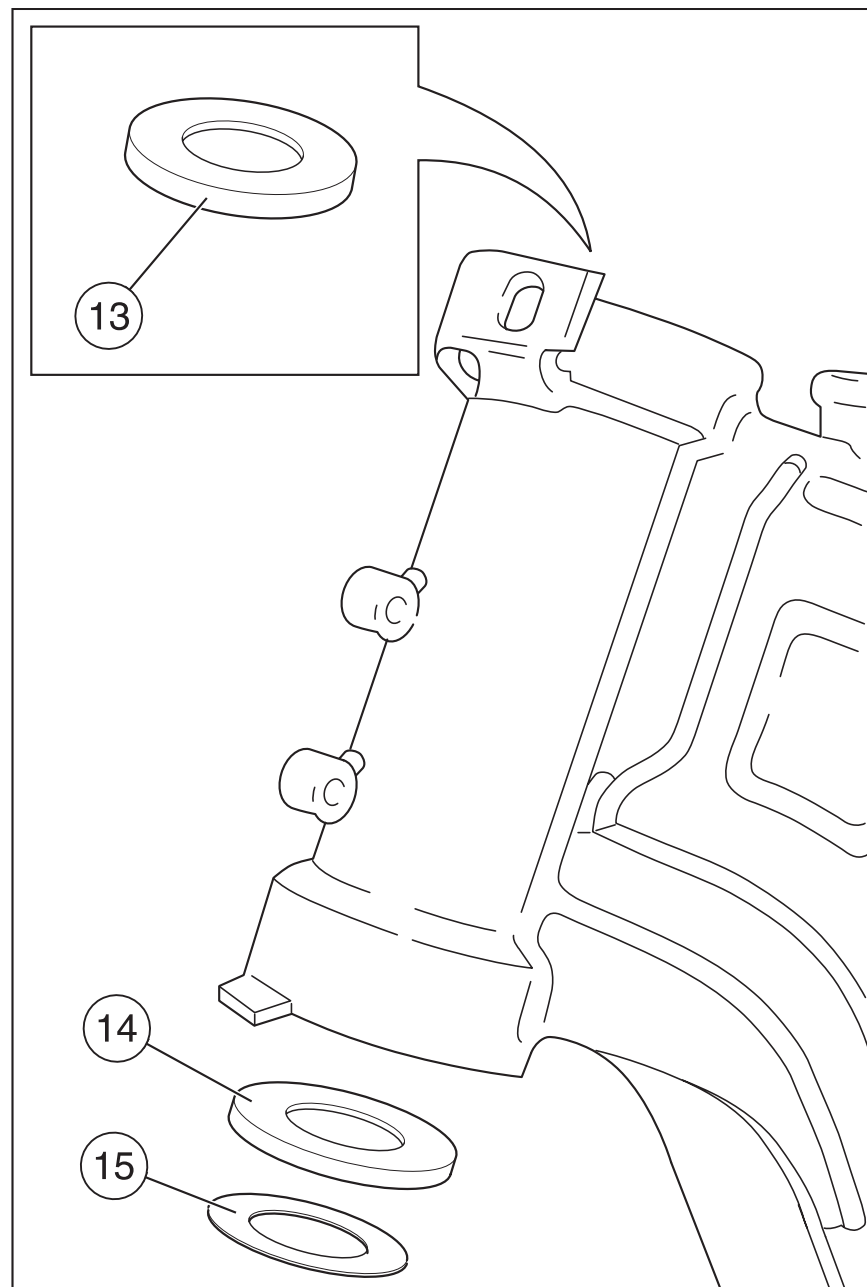
REASSEMBLY

NOTE When reassembling, the vehicle and the forecarriage must be positioned as for disassembly and the disassembly procedure then followed in reverse order.

- ◆ Smear a film of grease over the entire length of the pin (16), see 1.6 (LUBRICANT CHART).

NOTE Before tightening the adjuster ring completely, turn the steering a number of times both ways so as to enable the bearings to set.

- ◆ Proceed to adjust the bearing slack, see 2.22.2 (ADJUSTING THE BEARING SLACK STEERING).
- ◆ Make sure that turning the handlebars does not result in any of the cables or pipes being pulled too tight, and that none are entangled and/or overlap incorrectly.
- ◆ Top up the brake fluid, see 2.15 (CHECKING THE FRONT BRAKE FLUID LEVEL AND TOPPING UP).



7.7.2 CHECKING THE COMPONENTS

⚠ CAUTION

Make sure that all the components are intact, particularly the following.

7.7.3 STEERING BEARINGS

Carry out the check with the bearings mounted on the steering tube.

CHECKING THE ROTATION

- ◆ Manually rotate the inner ring of each single bearing. The rotation must be regular, smooth and noiseless.
- If one or both bearings is/are not in compliance with the check parameters:
- ◆ Wash the bearings with a clean detergent.

⚠ CAUTION

Prevent the compressed air from making the bearings turn, since this would damage them.

- ◆ Dry the bearings with compressed air.
 - ◆ Repeat the rotation check on both bearings.
- If one or both bearings is/are not in compliance with the check parameters:
- ◆ Change both steering tube bearings, see 7.7.5 (REMOVING THE STEERING BEARINGS).

⚠ WARNING

Always change both bearings.
Always replace the bearings with bearings of the same type.

CHECKING THE END AND RADIAL PLAY

- ◆ Check the radial play and the end play.
- End play: a minimum end play is allowed.**
- Radial play: none.**

If one or both bearings is/are not in compliance with the check parameters:

- ◆ Change both steering tube bearings, see 7.7.5 (REMOVING THE STEERING BEARINGS).

⚠ WARNING

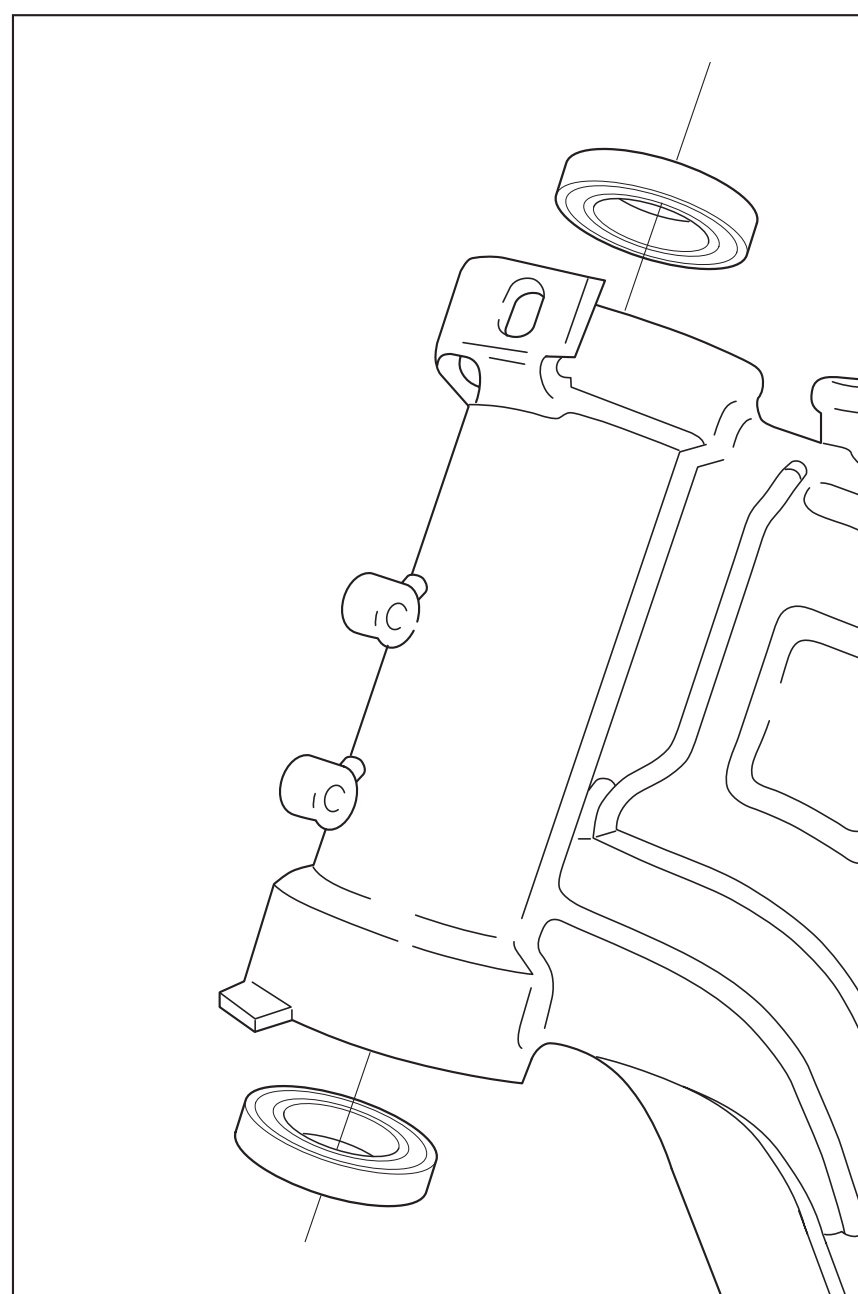
Always change both bearings.
Always replace the bearings with bearings of the same type.

7.7.4 STEERING GASKETS

- ◆ Make sure the seals are intact; should they prove damaged or feature signs of excessive wear, change them.

⚠ CAUTION

Always change both seals.
Always replace the gaskets with gaskets of the same type.



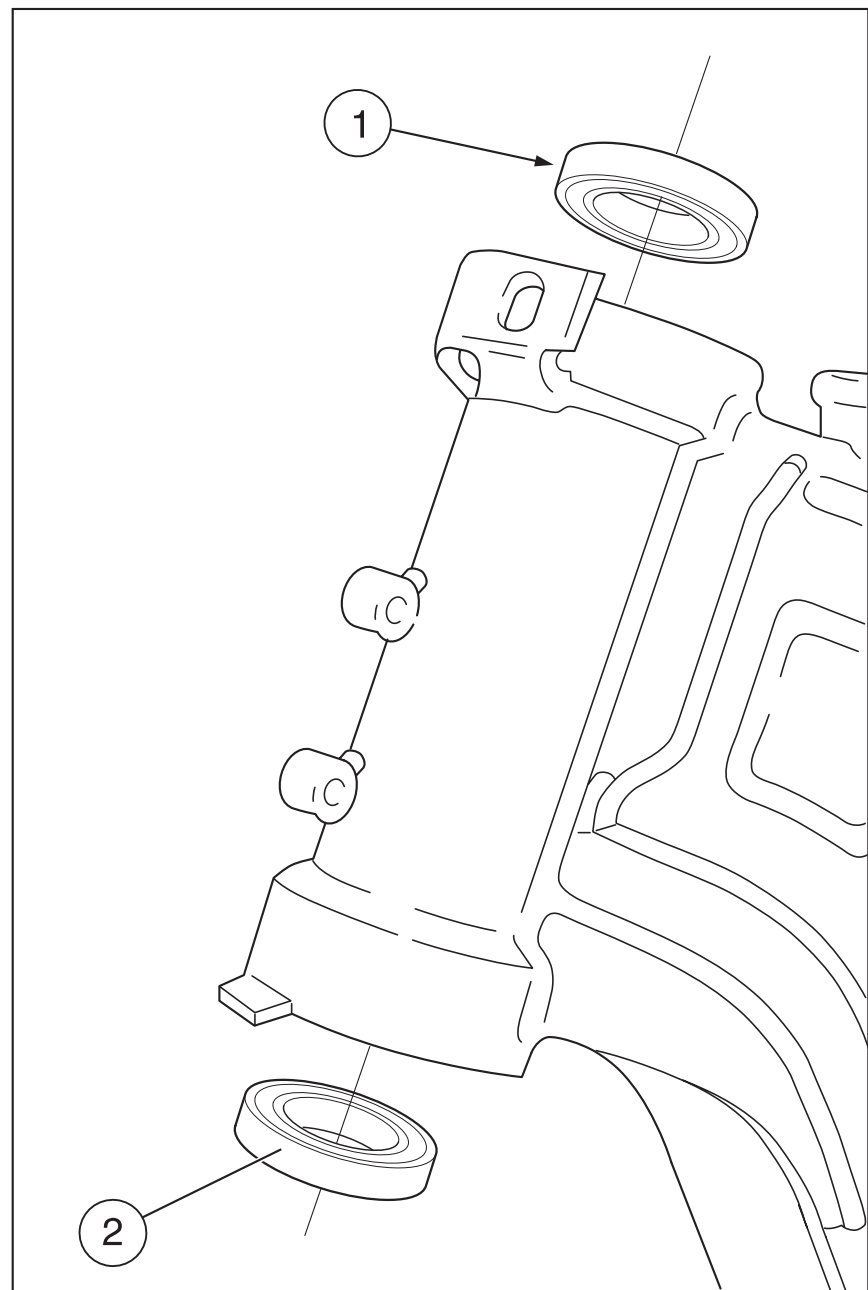
7.7.5 REMOVING THE STEERING BEARINGS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

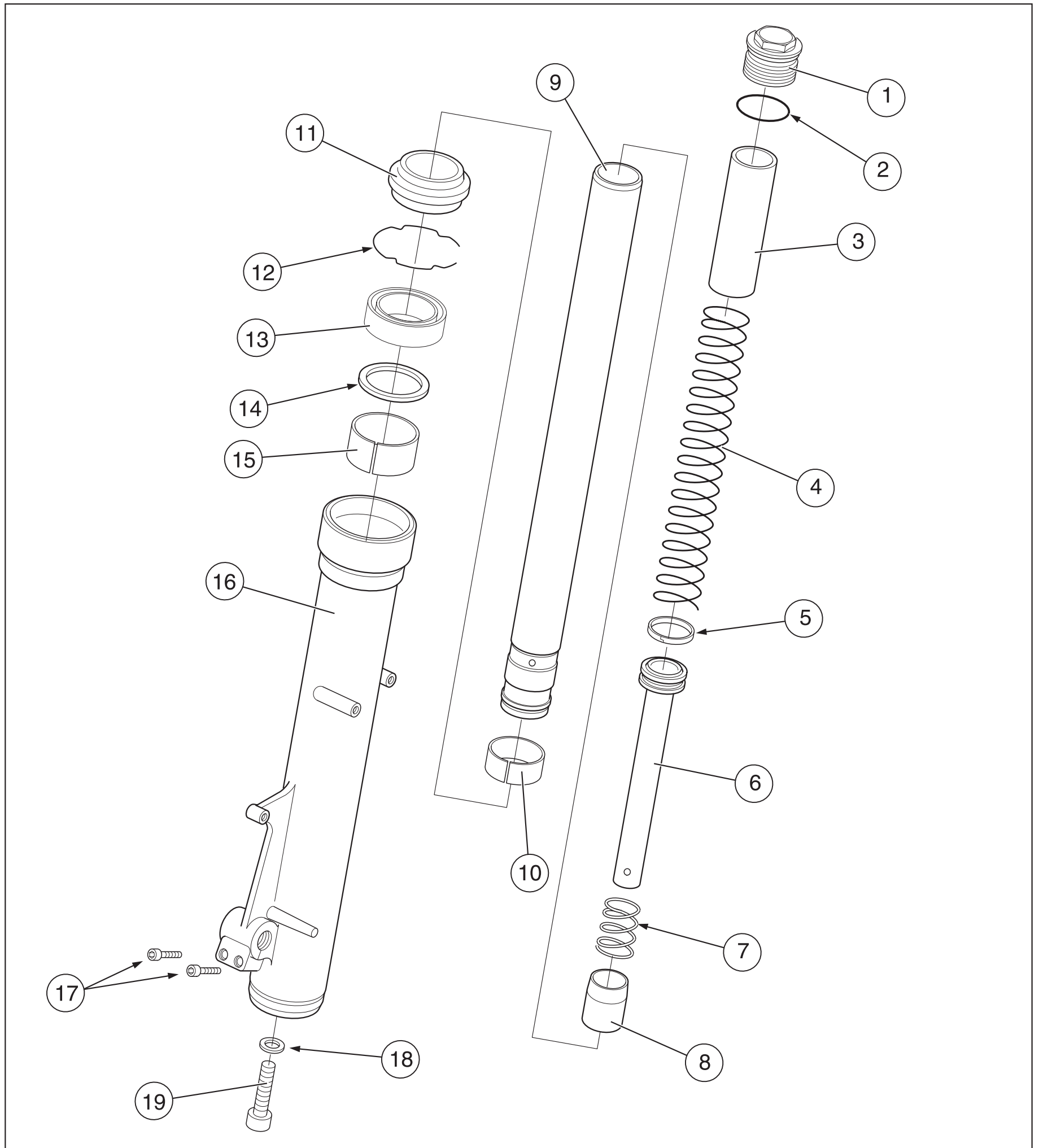
- ◆ Remove the fork together with the front wheel, see 7.7.1 (REMOVING THE FORK TOGETHER WITH THE FRONT WHEEL).
- ◆ Use a special extractor to extract the upper bearing (1).
- ◆ Use a special extractor to remove the lower bearing (2).

⚠ CAUTION

When reassembling, use a drift with the same diameter as the outer race to insert the bearings.
Do not strike the balls and/or the inner race.
Make sure the bearings are perfectly in contact.
Wash all the components with a clean detergent.



7.8 FRONT FORK



Key

- | | |
|------------------------|---------------------------------------|
| 1) Tube plug | 11) Antidust |
| 2) O-ring | 12) Retainer ring |
| 3) Preload tube | 13) Sealing ring |
| 4) Spring | 14) Cap |
| 5) Ring D39.5 | 15) Guide bush |
| 6) Pumping element rod | 16) Slider |
| 7) Spring | 17) Screw (for the right slider only) |
| 8) Bottom pad | 18) Washer |
| 9) Tube | 19) Pumping element screw |
| 10) Slide bush | |

7.8.1 CHECKING THE OIL LEVEL

Carefully read 1.2.3 (FORK OIL) and 7.8 (FRONT FORK).

If the fork reaches the end of stroke, this means that it is necessary to check the oil level in the fork tubes.

- ◆ ★ Unscrew and remove the plug (1) and retrieve the O-ring (2).

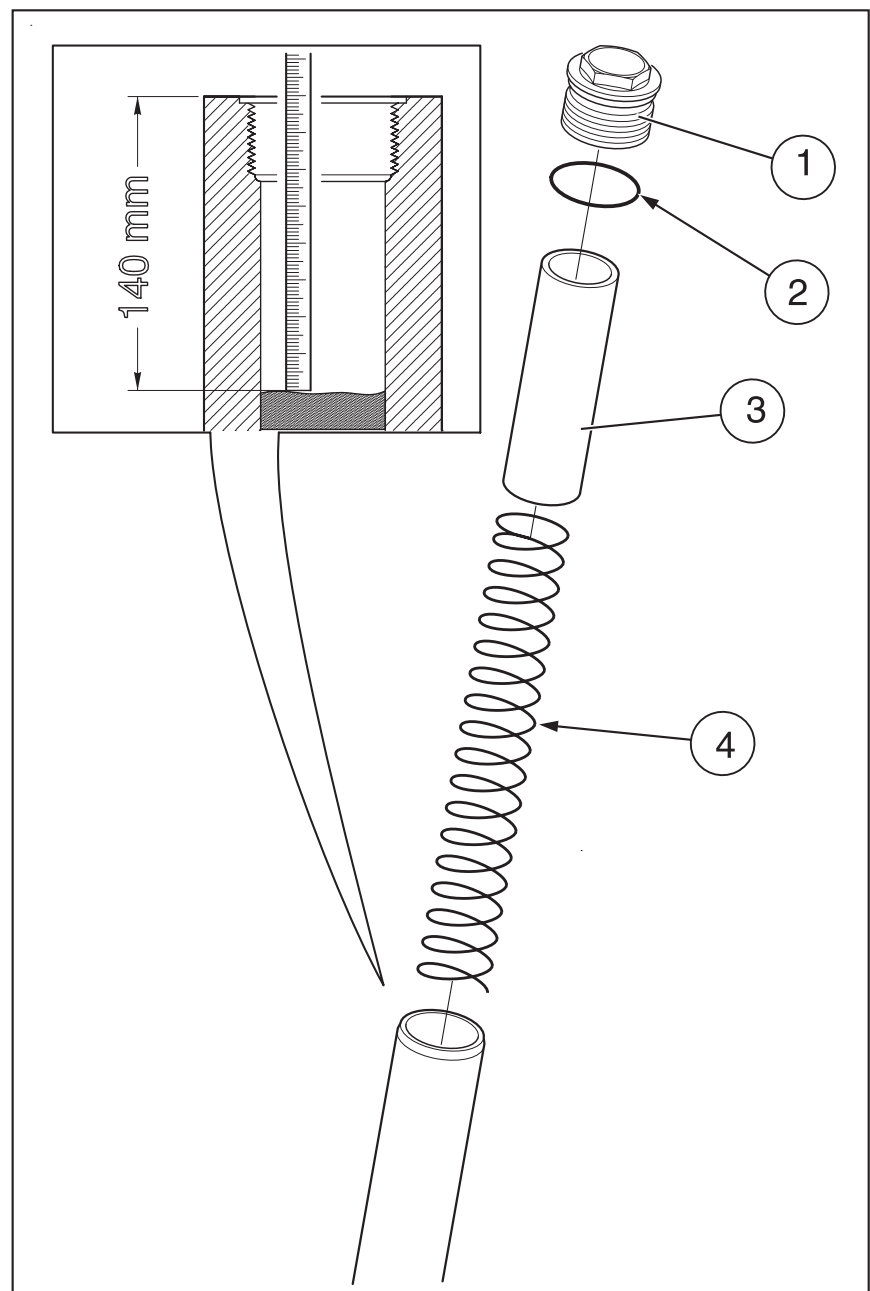
Fork tube plug driving torque: 20 Nm (2 kgm).

CAUTION

The preload tube (3) and the spring (4) are immersed in oil.

Avoid dripping oil during the extraction.

- ◆ ★ Withdraw the preload tube (3).
- ◆ ★ the spring (4).
- ◆ Bring the fork to the end of stroke, insert a graduated dipstick (metre) in the tube and make sure that the clearance between the upper edge of the tube and the oil level amounts to 140 mm.
- ◆ ★ If necessary, top up the fluid, see 1.6 (LUBRICANT CHART).



7.8.2 CHANGING THE FORK OIL

Carefully read 1.2.3 (FORK OIL).

- ◆ Carry out the operations marked with the symbol “*” described at 7.8.4 (DISASSEMBLING THE SLIDER-TUBE ASSEMBLIES).

7.8.3 REMOVING THE SLIDER-TUBE ASSEMBLIES

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.24 (INSPECTING THE FRONT AND REAR SUSPENSION).

NOTE The following operations refer to a single slider-tube assembly, but are valid for both.

- ◆ Remove the front wheel, see 7.2.1 (REMOVING THE FRONT WHEEL).
- ◆ Remove the rear mudguard, see 7.1.6 (REMOVING THE FRONT MUDGUARD GROUP).
- ◆ **For the left slider only.** Remove the front brake caliper, see 7.5.5 (REMOVING THE FRONT BRAKE CALIPERS).
- ◆ ★ Loosen the plug (5).

Fork tube plug driving torque: 20 Nm (2 kgm).

- ◆ Loosen the screw (6) that locks the upper plate (7) to the tube (8).

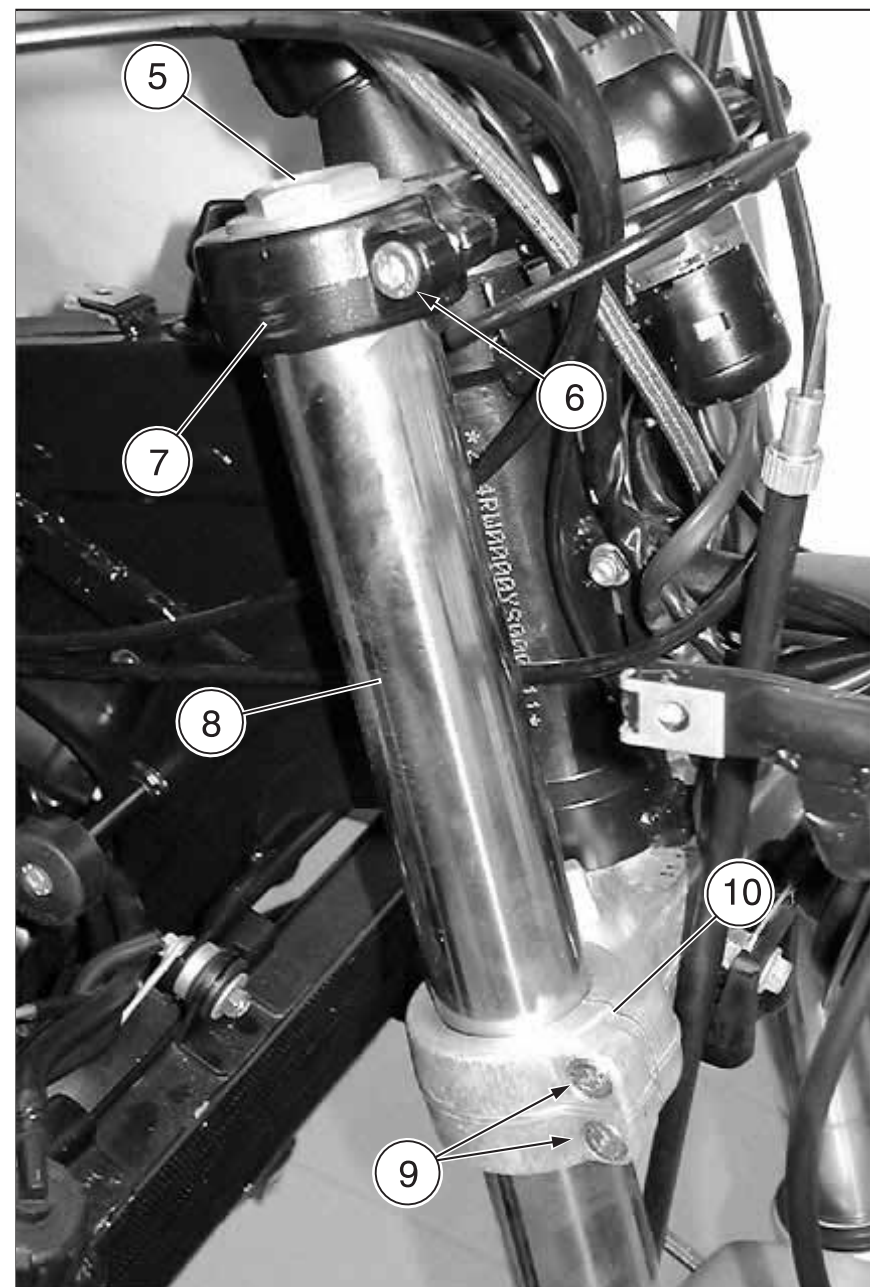
Upper plate screw driving torque: 50 Nm (5.0 kgm).

- ◆ Loosen the two screws (9) that lock the lower plate (10) to the tube (8).

Lower plate screw driving torque: 25 Nm (2.5 kgm).

- ◆ Withdraw the slider together with the tube (4) from the upper plate (3) and from the lower plate (6).

NOTE If necessary, remove the other slider-tube assembly.



7.8.4 DISASSEMBLING THE SLIDER-TUBE ASSEMBLIES

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS), 1.2.3 (FORK OIL) and 2.24 (INSPECTING THE FRONT AND REAR SUSPENSION).

NOTE The right and left slider-tube assemblies have the same inner components. The operations described below are referred to a single wheel-holder tube - slider unit, but are valid for both. The operations marked with the symbol “*” are valid also for the fork oil change.

- ◆ * Remove the slider-tube assembly, see 7.8.3 (REMOVING THE SLIDER-TUBE ASSEMBLIES).
- ◆ * Carefully clean the entire slider-tube assembly.
- ◆ Prepare a container with capacity exceeding 570 cm³.

⚠ CAUTION

The disassembly must be performed very carefully.

- ◆ Position the tube (1) on a vice, interposing clamps made of soft material (aluminium).

⚠ CAUTION

The slider-tube assembly contains oil; neither overturn, nor incline it excessively during disassembly.

- ◆ Unscrew and remove the tube upper plug (2).

Fork tube plug driving torque: 20 Nm (2.0 kgm).

⚠ CAUTION

Upon reassembly, replace the O-ring (3).

- ◆ * Remove the preload tube (4).
- ◆ Remove the spring (5).
- ◆ * Remove the slider-tube assembly from the vice.

⚠ CAUTION

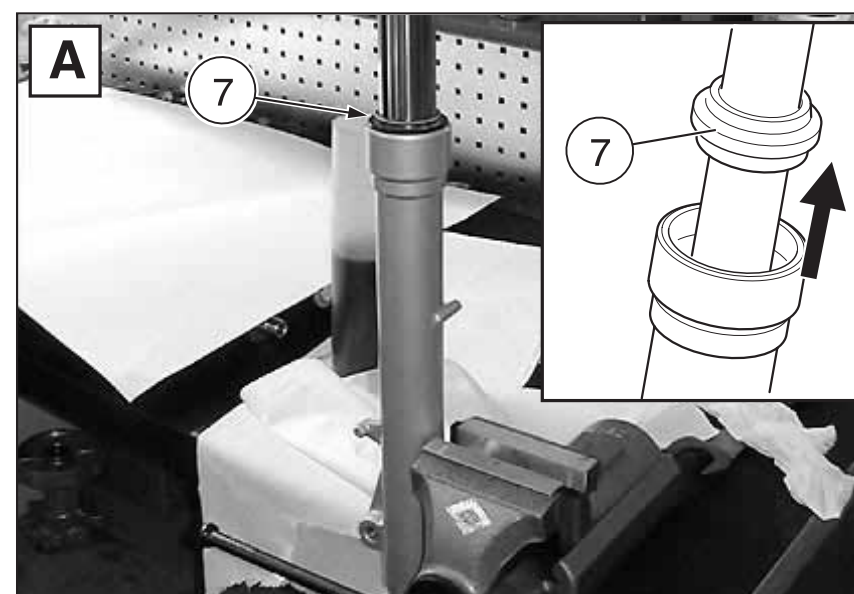
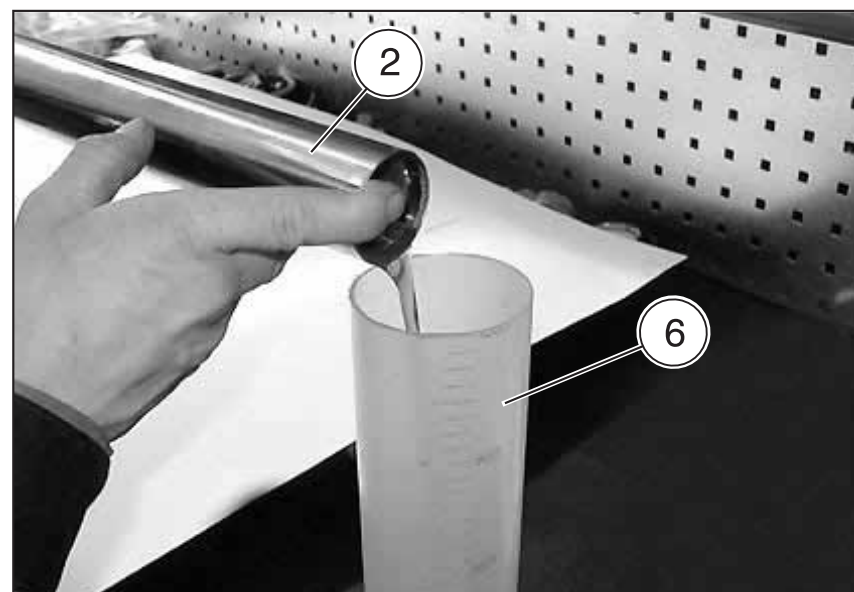
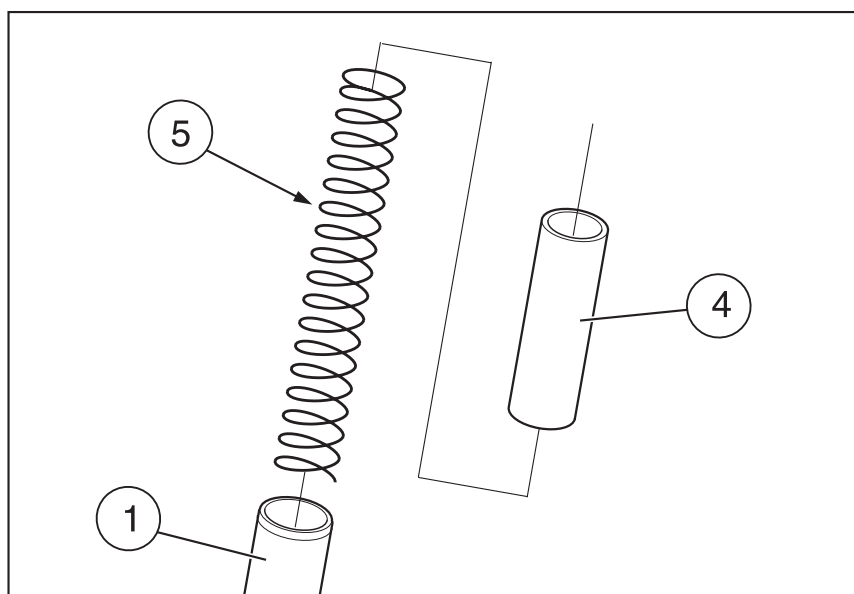
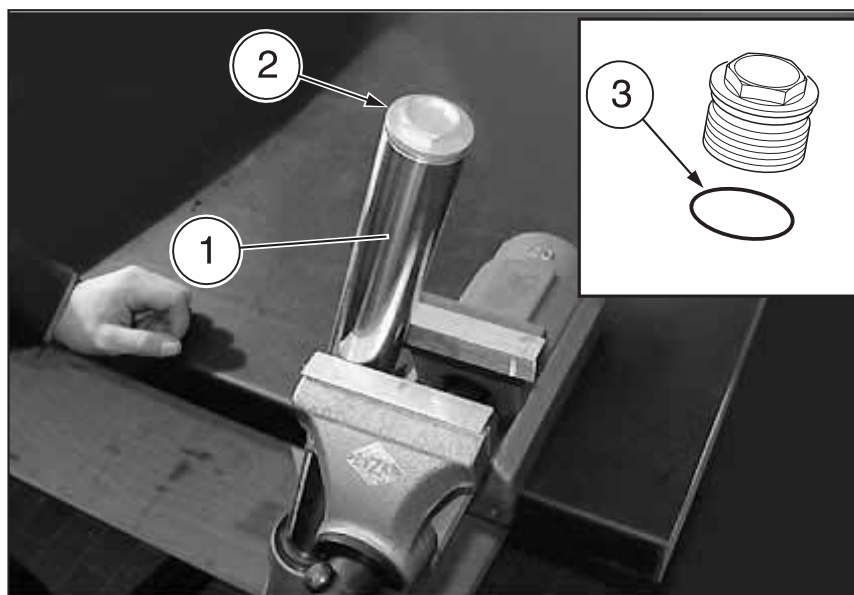
It is advisable to use latex gloves.

- ◆ * Overturn the slider-tube assembly (2), draining the oil into the container (6).

NOTE To let all the oil flow out, pump the tube (1) into the slider slowly more than once.

- ◆ Position the slider-tube assembly in the vice as indicated in the figure (A).
- ◆ Remove the antidust gasket (7) from the slider by alternately levering on more points with a cut-tipped screwdriver.

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Follow ►

- ◆ Remove the stop ring (8) by means of a cut-tipped screwdriver.

⚠ CAUTION

Wash all the components with a clean detergent.

- ◆ Position the slider-tube assembly in the vice as indicated in the figure (B).

⚠ CAUTION

It may be difficult to unscrew the screw (9) completely; in this case, prevent the tube from rotating.

- ◆ Unscrew and remove the screw (9), taking the washer.

Right slider centre screw driving torque: 50 Nm (5.0 kgm).

- ◆ Remove the tube (10) and withdraw the following components:

- bottom pad (11);
- pumping element (12) complete with spring (13).

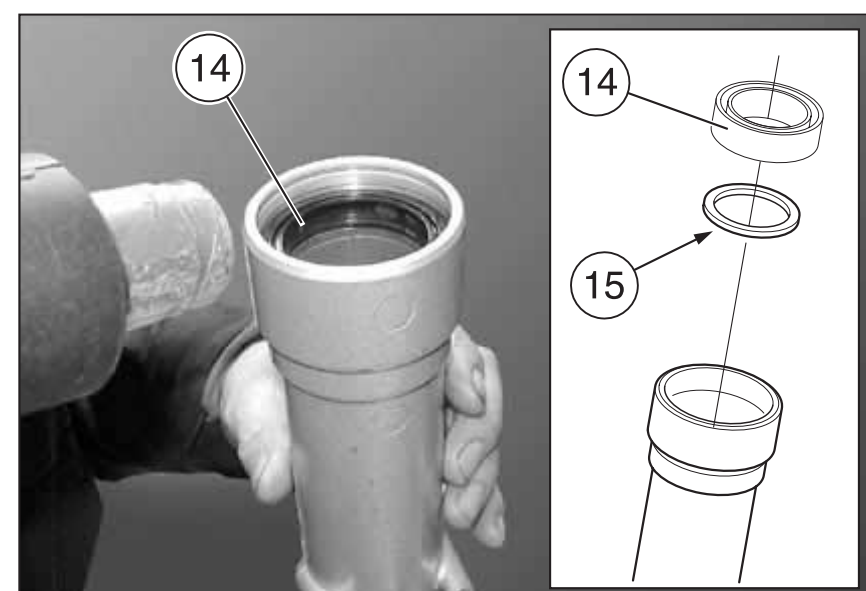
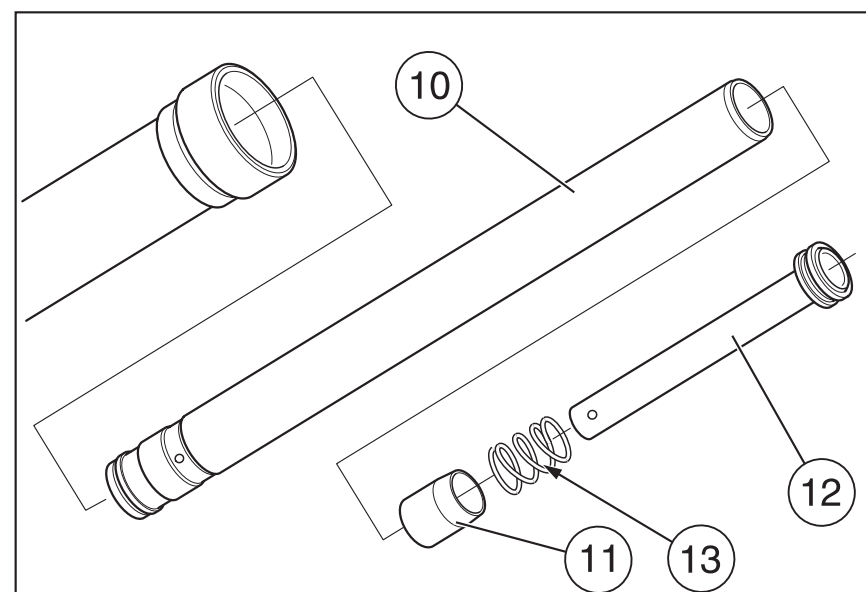
- ◆ Position the slider in a vice with the opening facing upwards.

⚠ CAUTION

To extract the sealing ring (14), heat the outer part of the slider with a jet of hot air.

- ◆ Withdraw and remove the following components:

- sealing ring (14);
- cap (15).



7.8.5 CHECKING THE COMPONENTS

TUBE

- ◆ Check the sliding surface, which must be neither lined, nor scratched.
Slight lines can be eliminated by sanding the surface with wet sandpaper (grain 1).
If the lines are deep, change the tube (1).
- ◆ By means of a comparator, make sure that any curving of the tube (1) be lower than the limit value.
If it exceeds the limit value, change the tube.

Curving limit: 0.2 mm.

⚠ WARNING

NEVER straighten a curved tube, since its structure would be weakened, thus making the use of the vehicle quite dangerous.

- ◆ Check the condition of the slide bush (2) and if it is damaged replace it using a special extractor.

SLIDER

- ◆ Make sure that there are neither damages, nor cracks. Otherwise, change it.
- ◆ Check the condition of the guide bush (3) and if it is damaged replace it using a special extractor.

SPRING

- ◆ Check the integrity of the spring (4), making sure that its length does not exceed the limit value.
- ◆ If the length does not correspond to the limit value, change the spring (4).

Minimum length of the spring when not compressed: 348.5 mm.

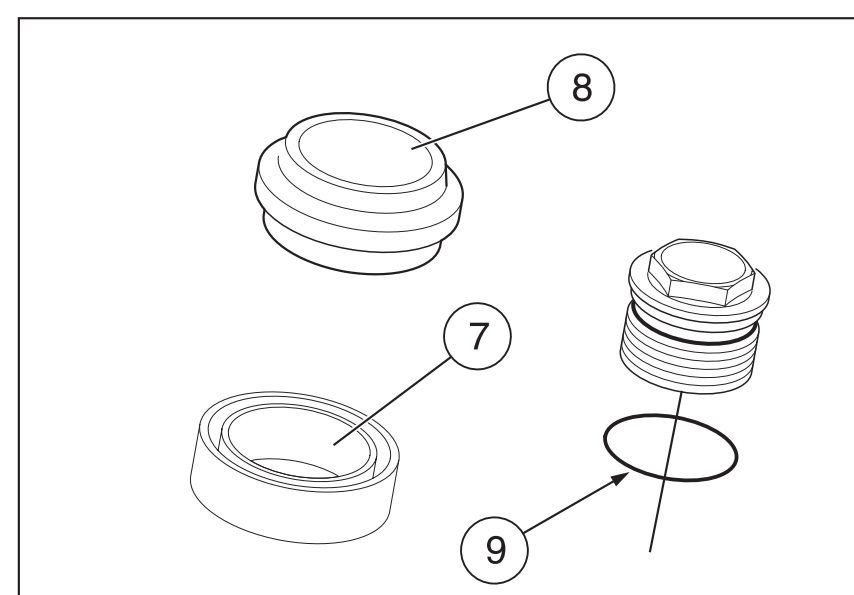
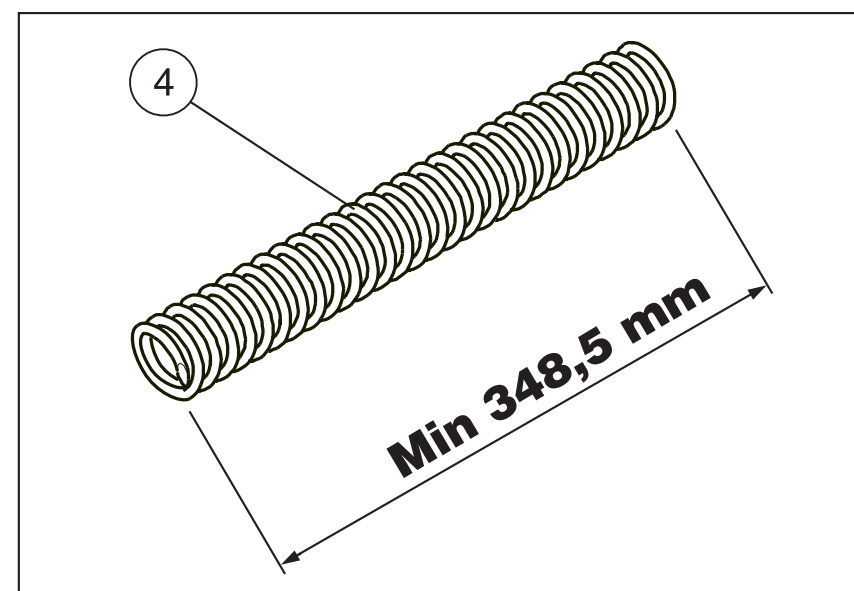
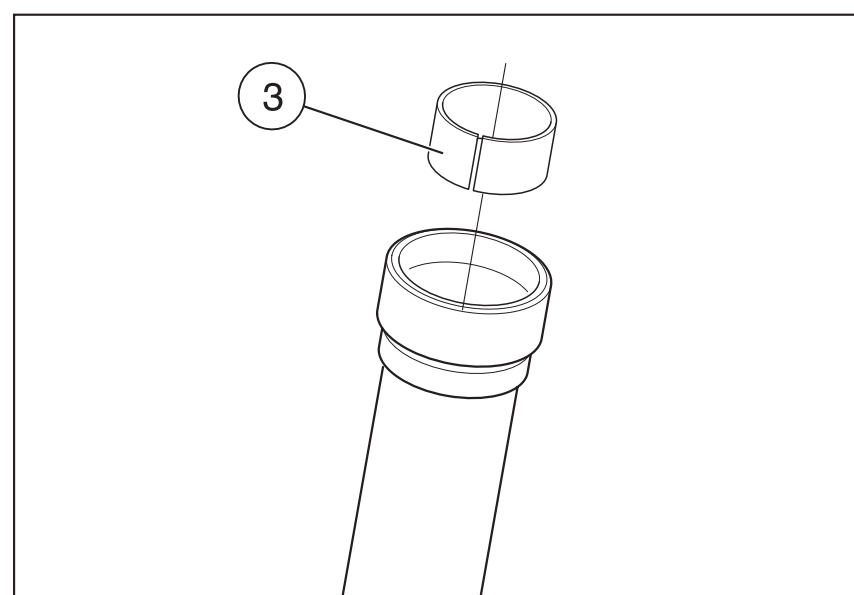
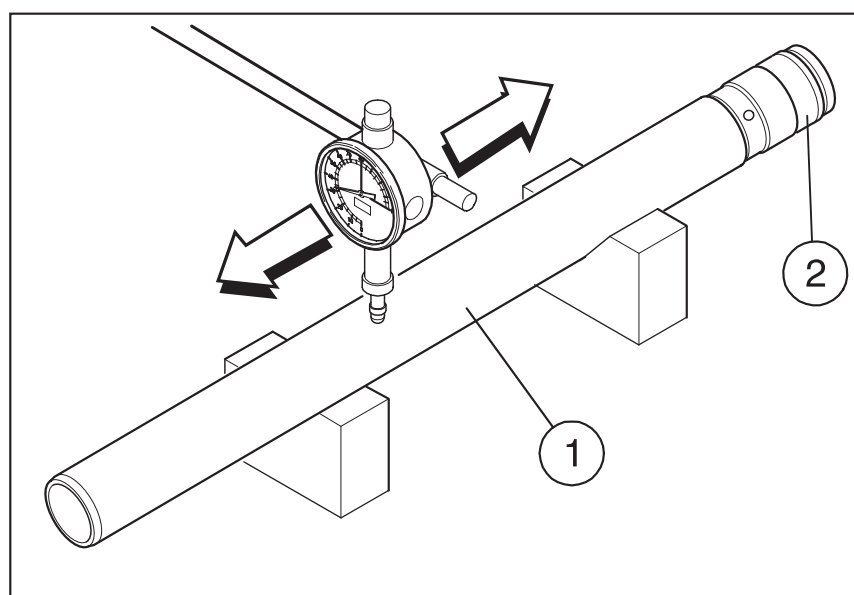
PUMPING ELEMENT

NOTE The pumping element (5) must not be removed.

- ◆ Check the condition of the pumping element (5) and if it is damaged replace it completely.
- ◆ Check the integrity of the spring (6).

SEALS

- ◆ Replace the following components with new ones:
 - sealing ring (7);
 - antidust (8);
 - O-ring (9).



7.8.6 REASSEMBLING THE WHEEL-HOLDER TUBE - SLIDER UNIT

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS), 1.2.3 (FORK OIL) and 2.24 (INSPECTING THE FRONT AND REAR SUSPENSION).

NOTE The operations marked with the symbol “*” are valid also for the fork oil change.

CAUTION

Upon reassembly, proceed with the greatest care and make sure that the sliding surfaces are in perfect conditions (there must no be signs of wear, lines, etc.), otherwise change the component. Be careful to prevent any foreign matter from getting inside.

Do not reuse any oil that has already been drained.

Always replace the gaskets.

The reassembly must be carried out with the greatest care.

- ◆ Before reinstalling the gaskets and the bushes, spread a film of fork oil on them, see 1.6 (LUBRICANT CHART).
- ◆ If it has been removed, install the slide bush (2) on the tube (1), using a special pad.
- ◆ Insert the bottom pad (4) on the base of the pumping element (3).

CAUTION

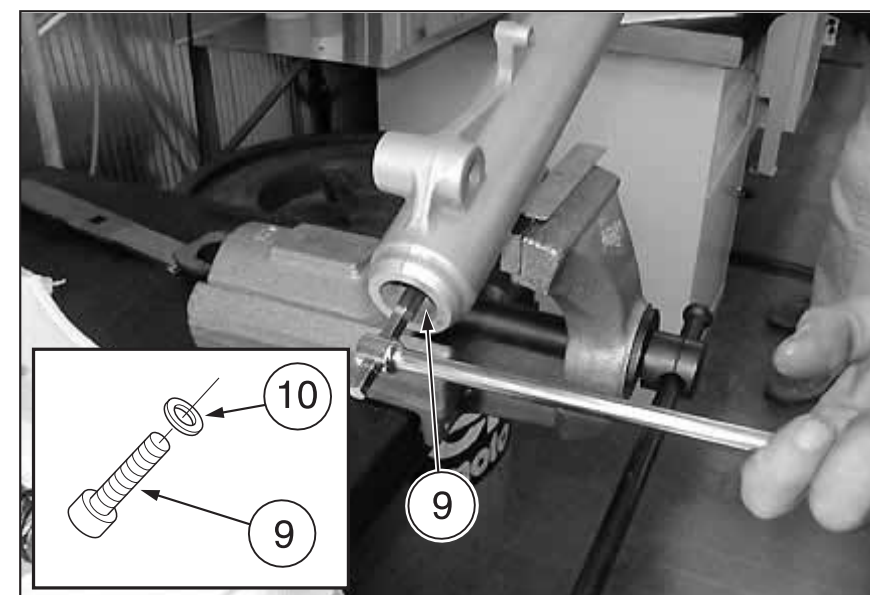
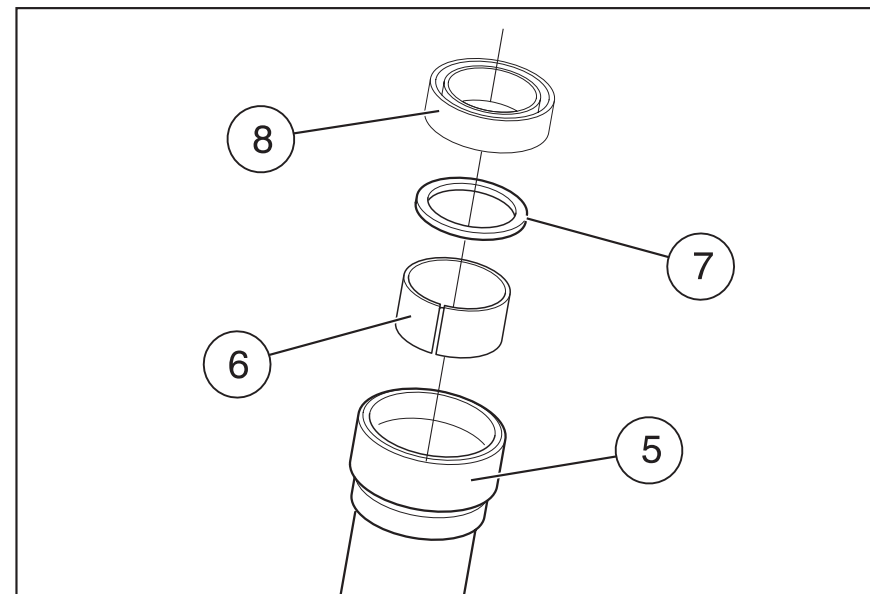
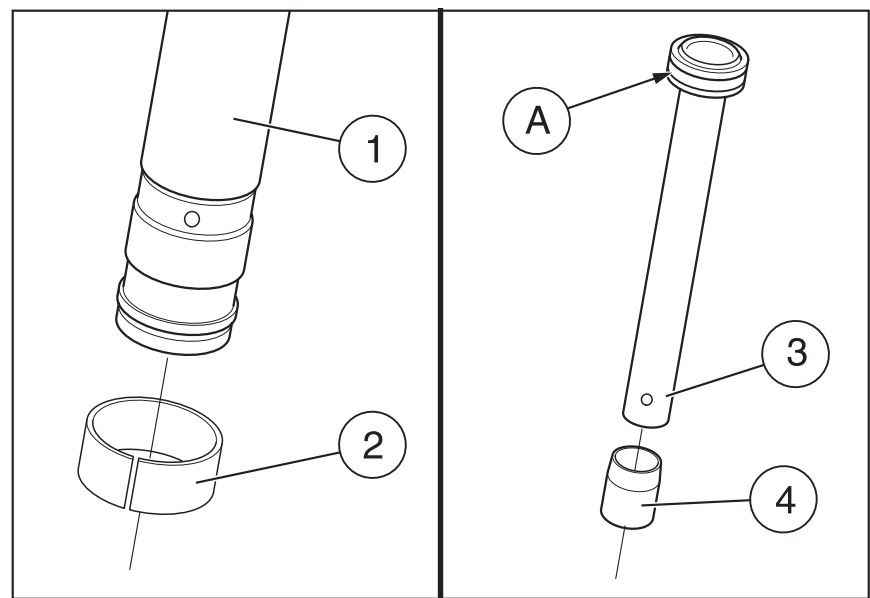
If the ring (A) on the pumping element is worn, change it.

- ◆ Introduce the whole pumping element (3) into the tube (1).
- ◆ Position the slider (5) in the vice, interposing jaws made of a soft material (aluminium).
- ◆ If it has been removed, install the guide bush (6) on the slider, using a special pad.
- ◆ Insert the cap (7).
- ◆ Install the new sealing ring (8).
- ◆ Insert the tube assembly (1) into the slider (5).
- ◆ Position the copper washer (10) on the centre screw (9).
- ◆ Insert and tighten the centre screw (9).

Right slider centre screw driving torque: 50 Nm (5.0 kgm).

- ◆ Apply adhesive tape to the end of the slider without making it overlap, in such a way as to protect the gasket upon reassembly.

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NOTE Make sure that the gasket spring (11) is correctly positioned on the gasket (12).

- ◆ Insert the following components on the tube (1), in the given order:
 - stop ring (13).
 - antidust gasket (12);
- ◆ Insert the stop ring (13) in the appropriate seat on the slider (5).
- ◆ Push the antidust gasket (12) in the appropriate seat on the slider (5) and make sure that it is correctly positioned.
- ◆ * Grasp the tube (1) and move it slowly and alternately more than once.

⚠ CAUTION

The tube (1) must slide inside the slider (5) smoothly, without finding any obstacle; if this does not happen, it means that the guide bushing (6), the slide bushing (2) or the gasket (3) are damaged.

- ◆ * Keep the slider-tube assembly (5) in vertical position.
- ◆ * Push the tube (1) to the end of its stroke.
- ◆ * Pour fork oil inside the tube, see 1.6 (LUBRICANT CHART) until reaching the correct level, which can be measured by introducing a graduated stick (14) in the tube.

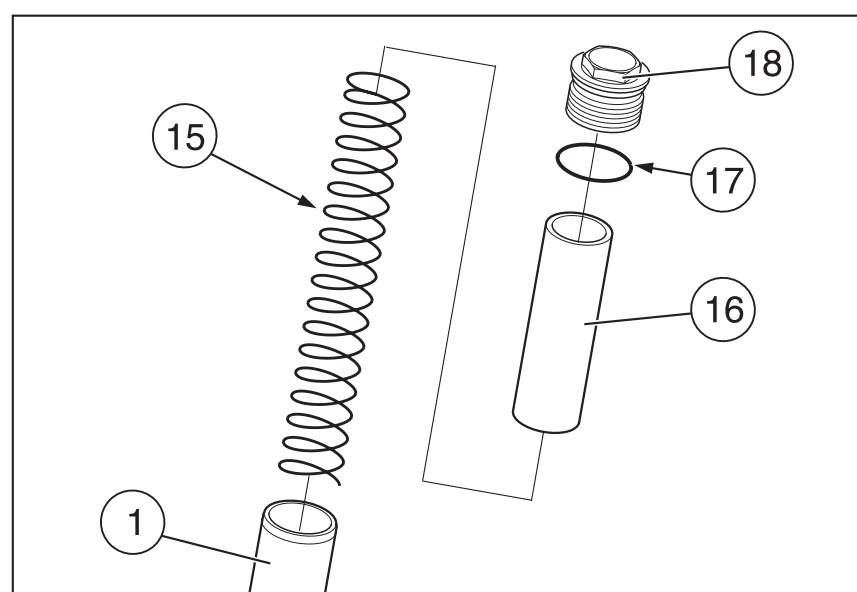
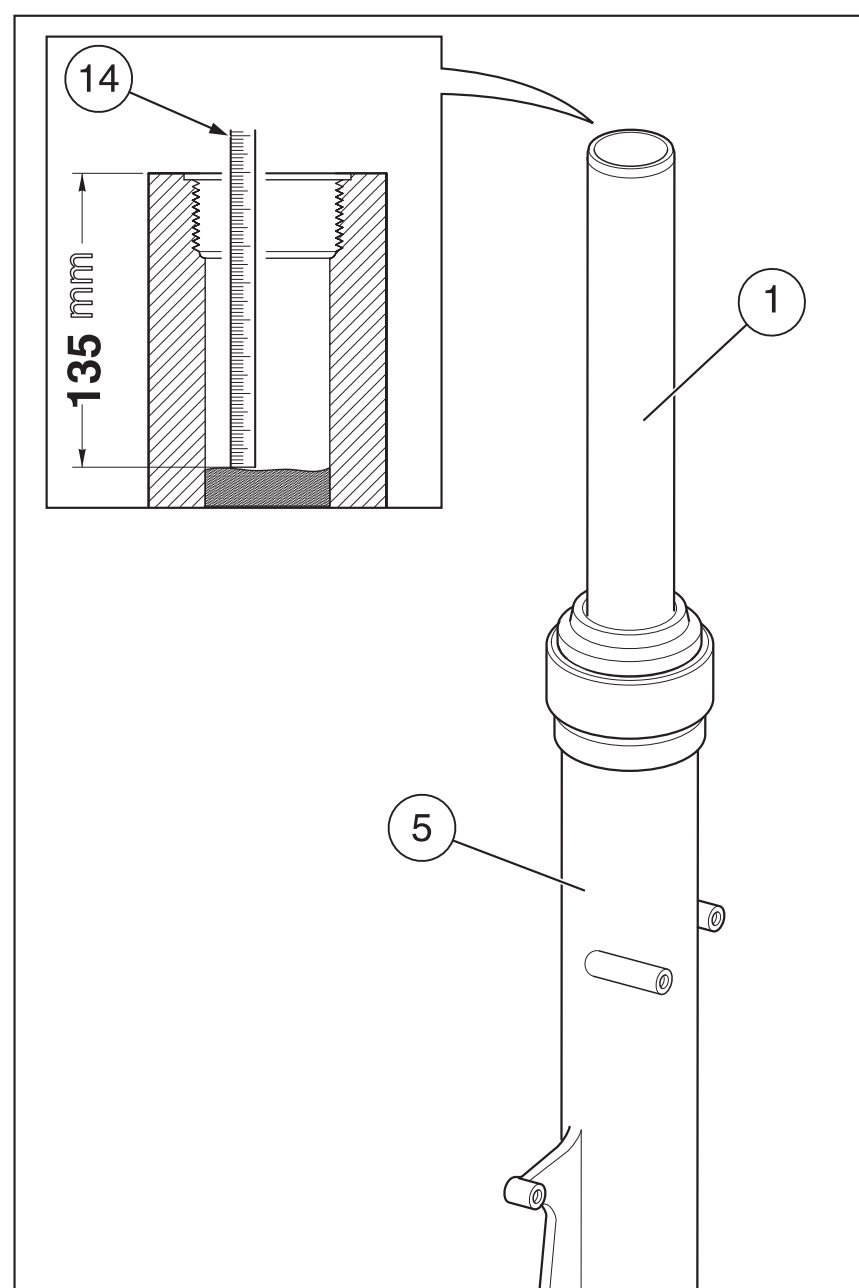
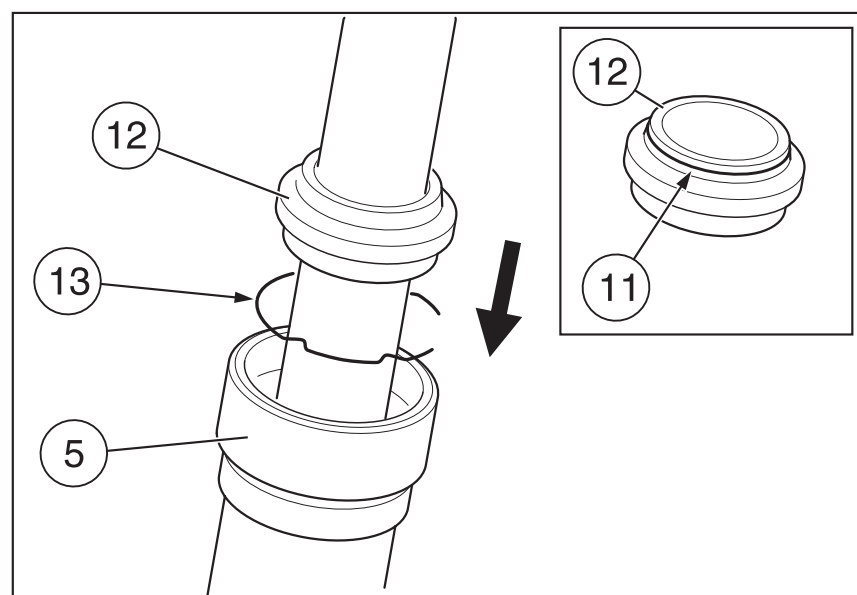
Oil quantity: $570 \pm 2 \text{ cm}^3$.

Oil level: $135 \pm 2 \text{ mm}$ (from the tube).

NOTE In order to obtain a correct measurement of the oil level, the tube (1) must be perfectly vertical. The oil level must be the same for both tubes.

- ◆ * Grasp the tube (1) and make it slide slowly and alternately, with a stroke of approx. 150 mm, about 10 times, thus letting out all the air that is inside the slider.
- ◆ * Push the tube (1) to the end of its stroke.
- ◆ * Wait for a few minutes and check the oil level again; top up if necessary.
- ◆ * Insert the following components in the tube (1) in the given order:
 - spring (15);
 - preload tube (16).
- ◆ * Correctly install the O-ring (17) on the plug (18).
- ◆ * Screw and tighten the tube upper plug (18).

Fork tube plug driving torque: 20 Nm (2.0 kgm).



7.8.7 INSTALLING THE SLIDER-TUBE ASSEMBLIES

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.24 (INSPECTING THE FRONT AND REAR SUSPENSION).

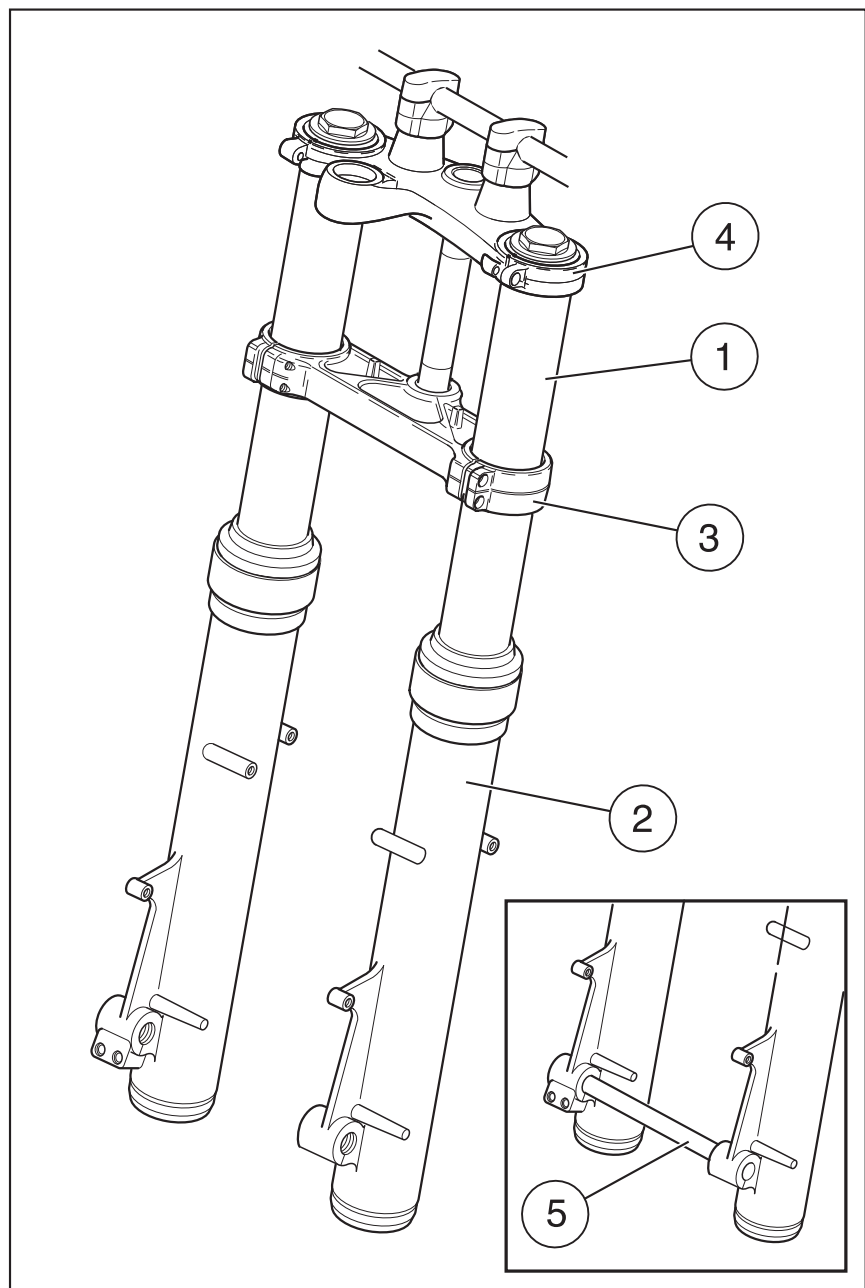
- ◆ ★ Insert the tube (1) complete with slider (2) in the lower plate (3) and in the upper plate (4).
- ◆ ★ Insert the wheel pin (5) on both tubes in order to align the hole of the wheel-holder tube (2) with the hole of the other wheel-holder tube.
- ◆ ★ Make sure that the tube (1) is correctly inserted on the lower plate (3) and on the upper plate (4).
- ◆ The tube must be inserted in the upper plate until its upper edge is aligned with the upper edge of the plate itself.
- ◆ ★ Tighten the two screws (6) that fix the lower plate (3) to the tube (1).

Lower plate screw driving torque: 25 Nm (2.5 kgm).

- ◆ ★ Tighten the screw (7) that fixes the upper plate (4) to the tube (1).

Upper plate screw driving torque: 50 Nm (5.0 kgm).

- ◆ Withdraw the wheel pin (5).
- ◆ Reassemble the wheel, see 7.2.1 (REMOVING THE FRONT WHEEL).
- ◆ Connect the speedometer/odometer control (8).
- ◆ Connect the two electric terminals (9) of the horn.
- ◆ If the front fairing has been removed, reinstall it, see 7.1.24 (REMOVING THE FRONT FAIRING).

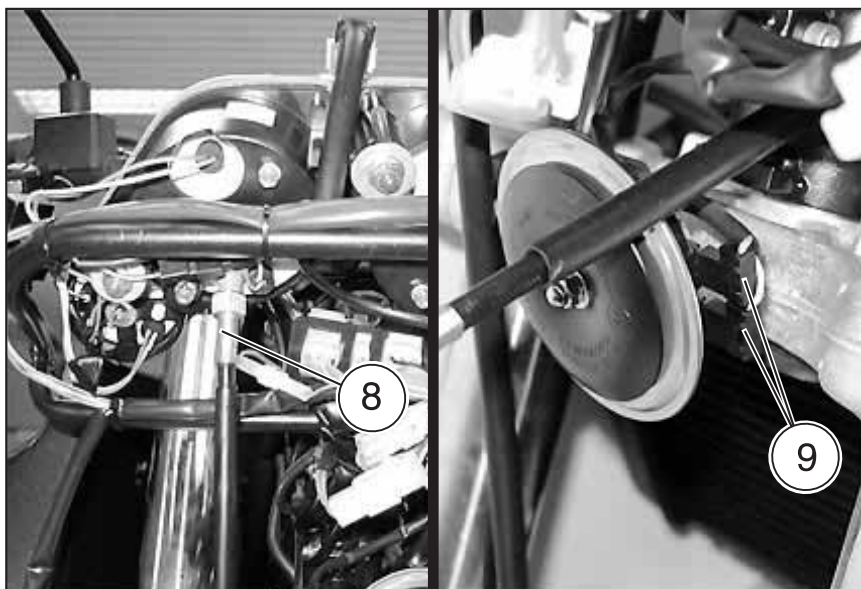
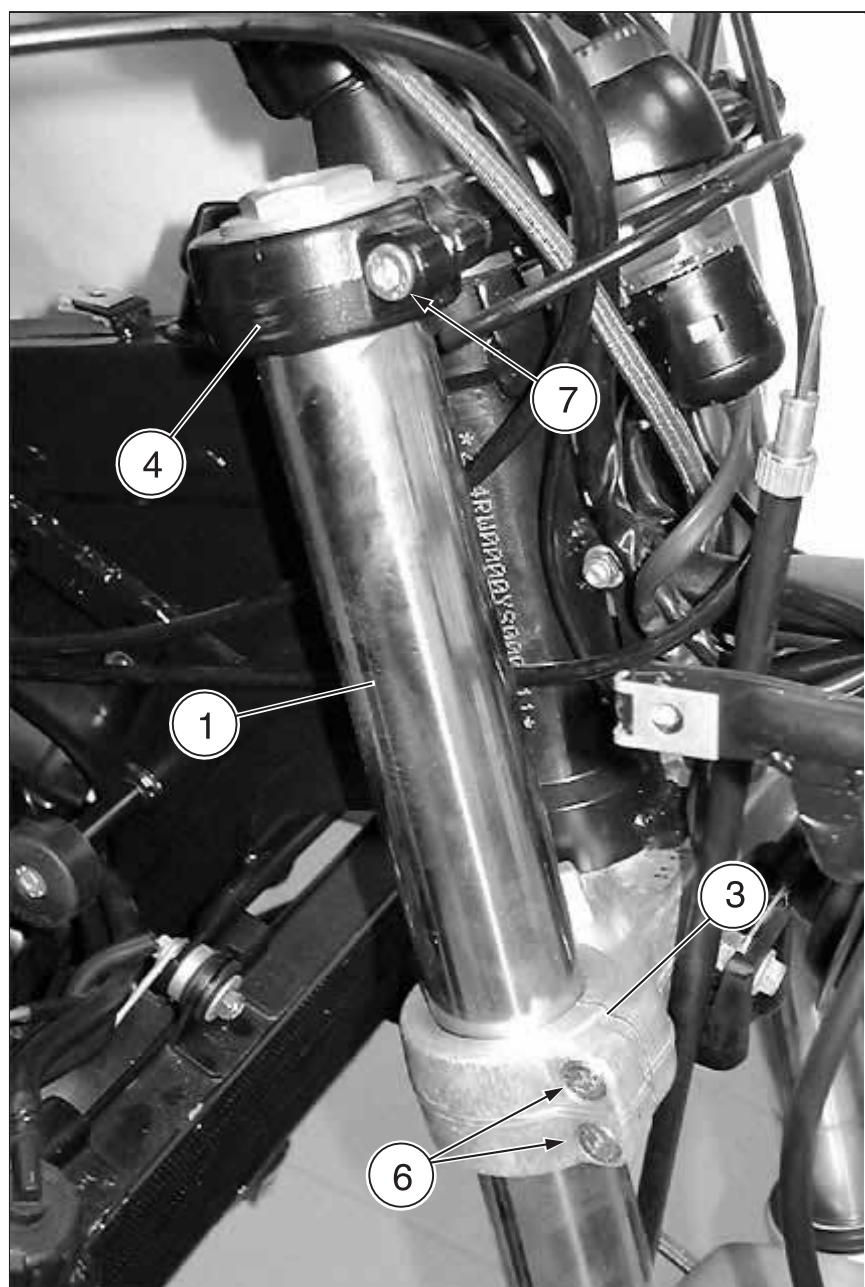


⚠ CAUTION

After the reassembly, operate the front brake and thrust the fork repeatedly downwards. The operation must be smooth and progressive and there must be no trace of oil on the tubes.

⚠ WARNING

Before using the vehicle, check to make sure the riding position is correct.



7.9 REAR FORK

7.9.1 REMOVING THE REAR FORK

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.23 (REAR FORK).

- ◆ Position the vehicle on the centre stand **OPT**.
- ◆ Remove the exhaust silencers, see 7.1.34 (REMOVING THE EXHAUST SILENCERS).
- ◆ Partially remove the rear brake pump, see 7.6.4 (REMOVING THE REAR BRAKE PUMP).
- ◆ Open the two tangs (1) and release the pipe.

⚠ CAUTION

Support the brake reservoir (2) in order to prevent it from falling down accidentally.

- ◆ Unscrew and remove the screw (3), taking the washer.

Rear brake fluid tank screw driving torque: 3 Nm (3.0 kgm).

⚠ CAUTION

The brake reservoir (2) must remain in vertical position, in order to prevent any air bubbles from getting into the circuit.

- ◆ Temporarily fasten the reservoir and the rear brake pump to the rear fork.
- ◆ Open the two tangs (4) (5) on the shock absorber upper support and release the brake pipe.
- ◆ Loosen and remove the nut (6).

Shock absorber upper screw-nut driving torque: 35 Nm (3.5 kgm).

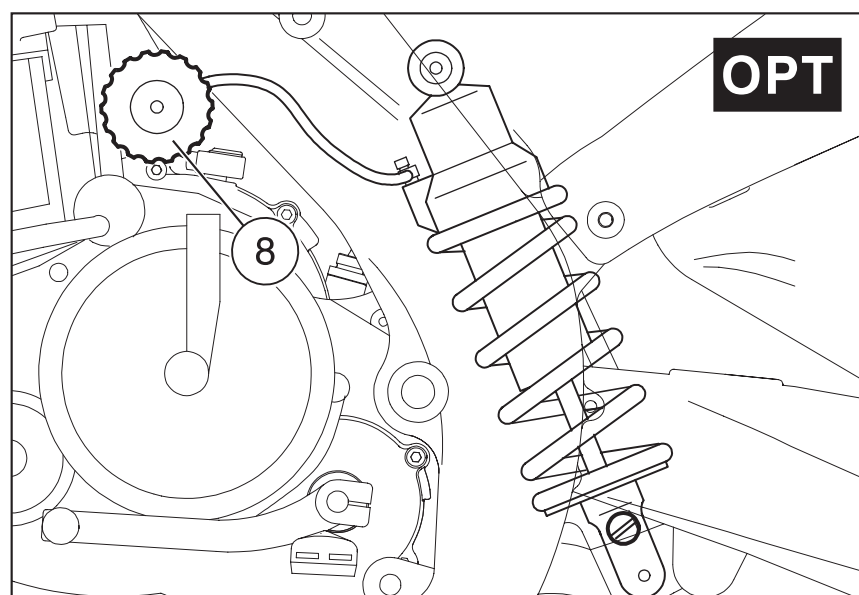
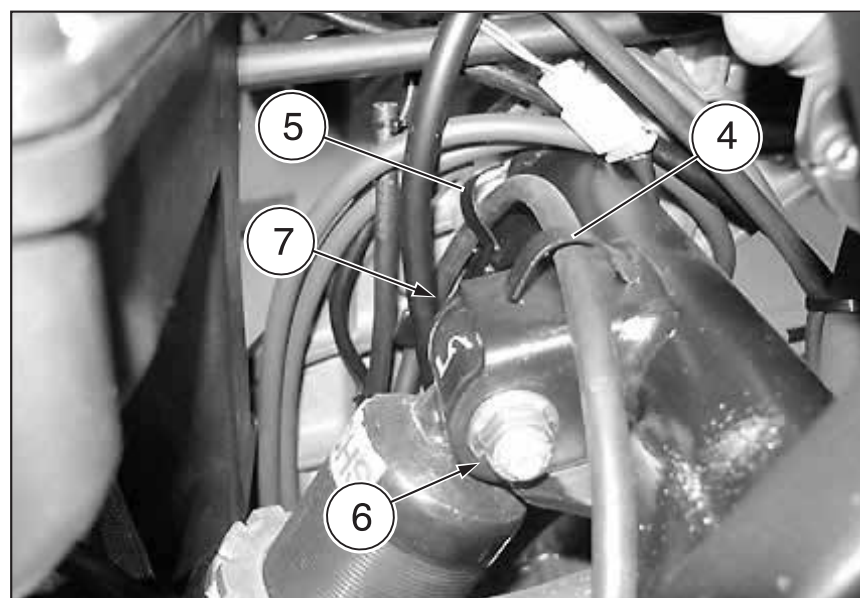
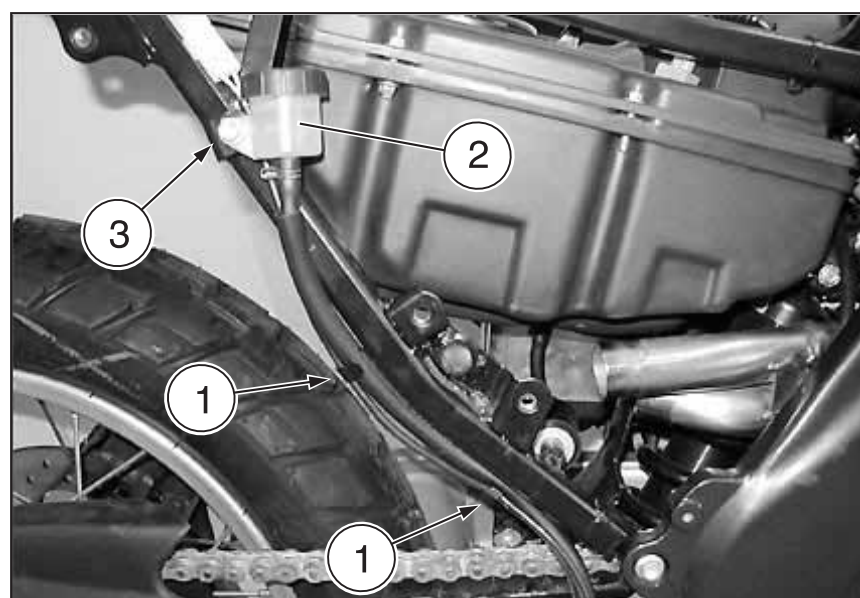
- ◆ Withdraw the screw (7) and take the washer.

NOTE To make it easier to withdraw the screw (7), slightly raise the rear fork.

NOTE In the version with rear suspension with hydraulic preload adjustment **OPT**, release the handwheel (8) by loosening the two nuts and withdraw the two fastening screws, taking the two spacers.

- ◆ Remove the drive pinion, see 7.1.39 (REMOVING THE DRIVE PINION).

Follow ►



Follow ►

- ◆ Loosen and remove the nut (9), taking the washer.

Double connection element front nut-screw driving torque: 50 Nm (5.0 kgm).

- ◆ Unscrew the screw (10) and retrieve the bush.

NOTE NOTA (A) For the reassembly the rear fork, from this point on follow the specific procedures, see 7.9.7 (REASSEMBLING THE REAR FORK).

- ◆ Partially unscrew the pin (12), holding the bush (11) in its position.

Fork pin driving torque: 100 Nm (10.0 kgm).

- ◆ Hold the bush (11) in its position, unscrew and remove the locking metal ring (13) using the appropriate socket spanner, see 1.7 (SPECIAL TOOLS **OPT**), then take the washer.

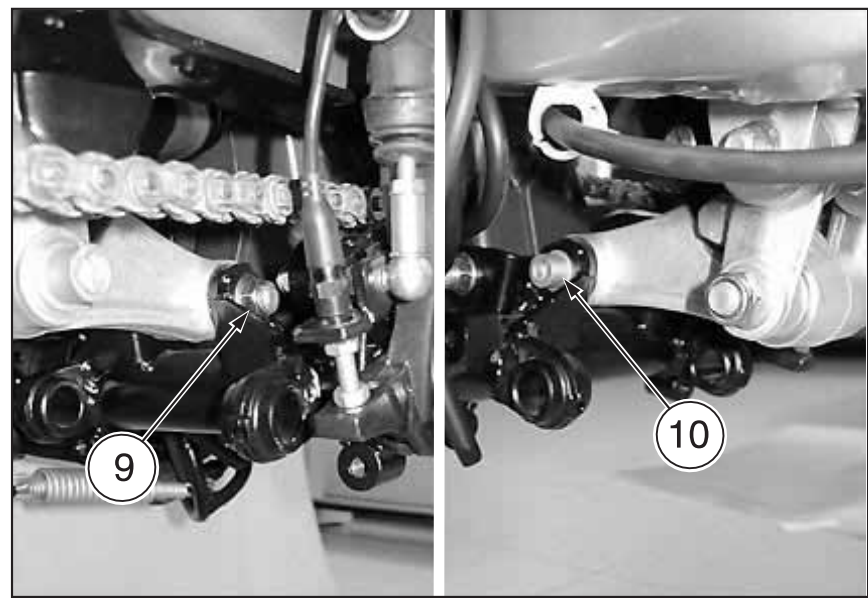
Fork pin metal ring driving torque: 35 Nm (3.5 kgm).

- ◆ Unscrew the pin completely.

⚠ CAUTION

Support the rear fork and the shock absorber frontally.

- ◆ Withdraw and remove the pin (12) and take the washers.
- ◆ Remove the rear fork together with the wheel, the suspension unit and the brake unit.



7.9.2 CHECKING THE COMPONENTS

⚠ CAUTION

Make sure that all the components are intact, particularly the following.

7.9.3 REAR FORK BEARINGS

Carry out the check with the bearings mounted on the rear fork.

CHECKING THE ROTATION

- ◆ Manually rotate the rollers (1) of each single bearing. The rotation must be regular, smooth and noiseless.

If one or both bearings is/are not in compliance with the check parameters:

- ◆ ★ Remove the seal (2).
- ◆ Wash the bearings with a clean detergent.

⚠ CAUTION

Prevent the compressed air from making the bearings turn, since this would damage them.

- ◆ Dry the bearings with compressed air.
- ◆ Repeat the rotation check on both bearings.

If one or both bearings is/are not in compliance with the check parameters:

- ◆ Change the rear fork bearings, see 7.9.6 (DISASSEMBLING THE REAR FORK GASKETS).

⚠ WARNING

Always change both bearings.
Always replace the bearings with bearings of the same type.

CHECKING THE END AND RADIAL PLAY

- ◆ Check the radial play and the end play.

End play: a minimum end play is allowed.

Radial play: none.

If one or both bearings is/are not in compliance with the check parameters:

- ◆ Change both rear fork bearings, see 7.9.6 (DISASSEMBLING THE REAR FORK GASKETS).

⚠ WARNING

Always change both bearings.
Always replace the bearings with bearings of the same type.

7.9.4 REAR FORK GASKETS

- ◆ Make sure the seals (2) are intact; should they prove damaged or feature signs of excessive wear, change them.

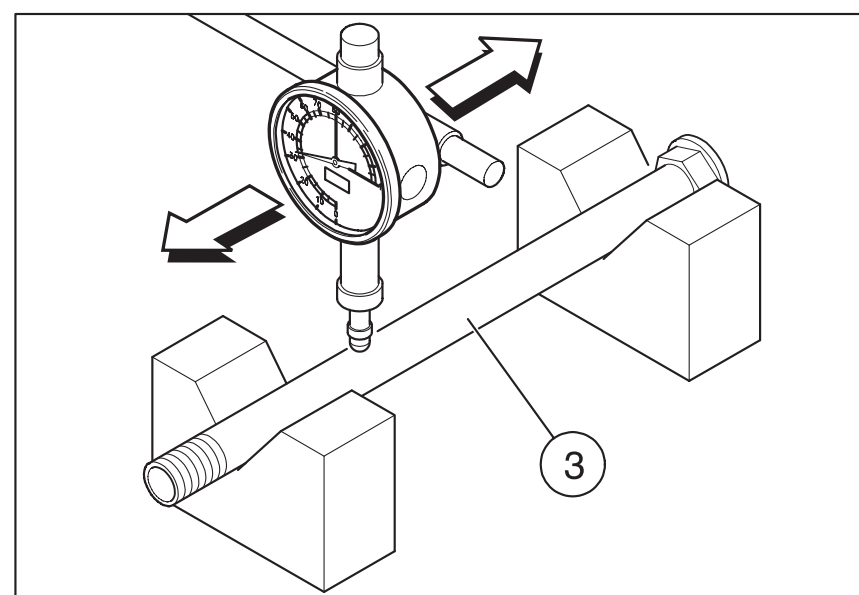
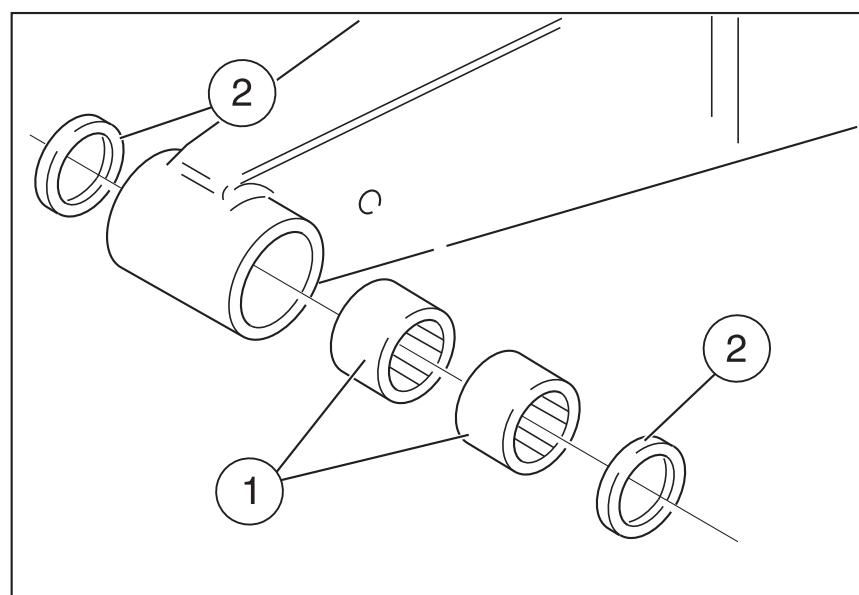
⚠ WARNING

Always change both seals.
Always replace the gaskets with gaskets of the same type.

7.9.5 REAR FORK PIN

- ◆ Check the eccentricity of the fork pin (3) by means of a comparator. If the eccentricity exceeds the limit value, change the fork pin (3).

Maximum eccentricity: 0.3 mm.



7.9.6 DISASSEMBLING THE REAR FORK GASKETS

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the fork, see 7.9.1 (REMOVING THE REAR FORK).
- ◆ Use a cloth to clean both sides of the bearing housings.

⚠ CAUTION

The bearings must be checked and, if necessary, changed every time they are disassembled.

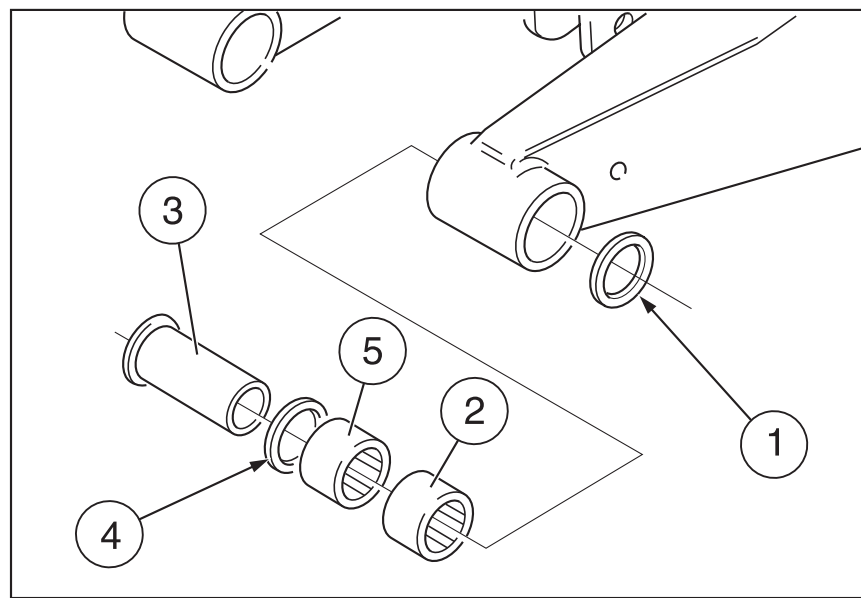
- ◆ ★ Remove the seal (1).
- ◆ Strike on a special pad (with the same diameter as the outer ring of the bearing) resting on the outer ring of the bearing (2).

NOTE Have the appropriate special tool **OPT** to hand:
– **aprilia** part# 8140180 (Kit for bearings in the range Ø10 mm to Ø 30 mm).

- ◆ Push outwards (from the outside towards the inside).
 - ★ the bush (3);
 - ★ the seal (4);
 - ★ the bearings (2) (5).
- ◆ ★ Thoroughly clean the inside of the bearing housing.

⚠ CAUTION

Wash all the components with a clean detergent.



7.9.7 REASSEMBLING THE REAR FORK

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.23.1 (ADJUSTING THE REAR FORK).

- ◆ Smear a film of grease over the entire length of the fork pin, see 1.6 (LUBRICANT CHART).

⚠ CAUTION

In the first phase the pin (1), the adjusting bush (2) and the locking metal ring (3) must be screwed manually.

NOTE Have the appropriate special tool **OPT** to hand:
– **aprilia** part# 8101945 (rear fork pin metal ring spanner).

- ◆ Introduce and screw the pin (1) that fastens frame/engine/rear fork with the appropriate socket spanner, at the same time holding the adjusting bush (2) in its position, see 1.7 (SPECIAL TOOLS **OPT**).
- ◆ Tighten the adjusting bush (2) until it comes into contact with the rear fork, then give it another 1/4 turn.

Adjusting bush tightening: contact + 1/4 turn.

- ◆ Tighten the rear fork pin (1), at the same time holding the adjusting bush (2) in its position.

Fork pin driving torque: 100 Nm (10 kgm).

- ◆ Refit the washer.
- ◆ Hold the adjusting bush (2) in its position and screw the locking metal ring (3) at the same time.

Fork pin metal ring driving torque: 35 Nm (3.5 kgm).

⚠ CAUTION

From this point on, reassemble the fork following the removal procedure in the reverse order, starting from NOTE (A), see 7.9.1 (REMOVING THE REAR FORK).



7.10 REAR SUSPENSION

7.10.1 REMOVING THE SHOCK ABSORBER

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.25.1 (REAR SUSPENSION).

- ◆ Remove the rear fork together with the wheel, the suspension unit and the brake unit, see 7.9.1 (REMOVING THE REAR FORK).
- ◆ Unscrew and remove the screw (1) and retrieve the washers.

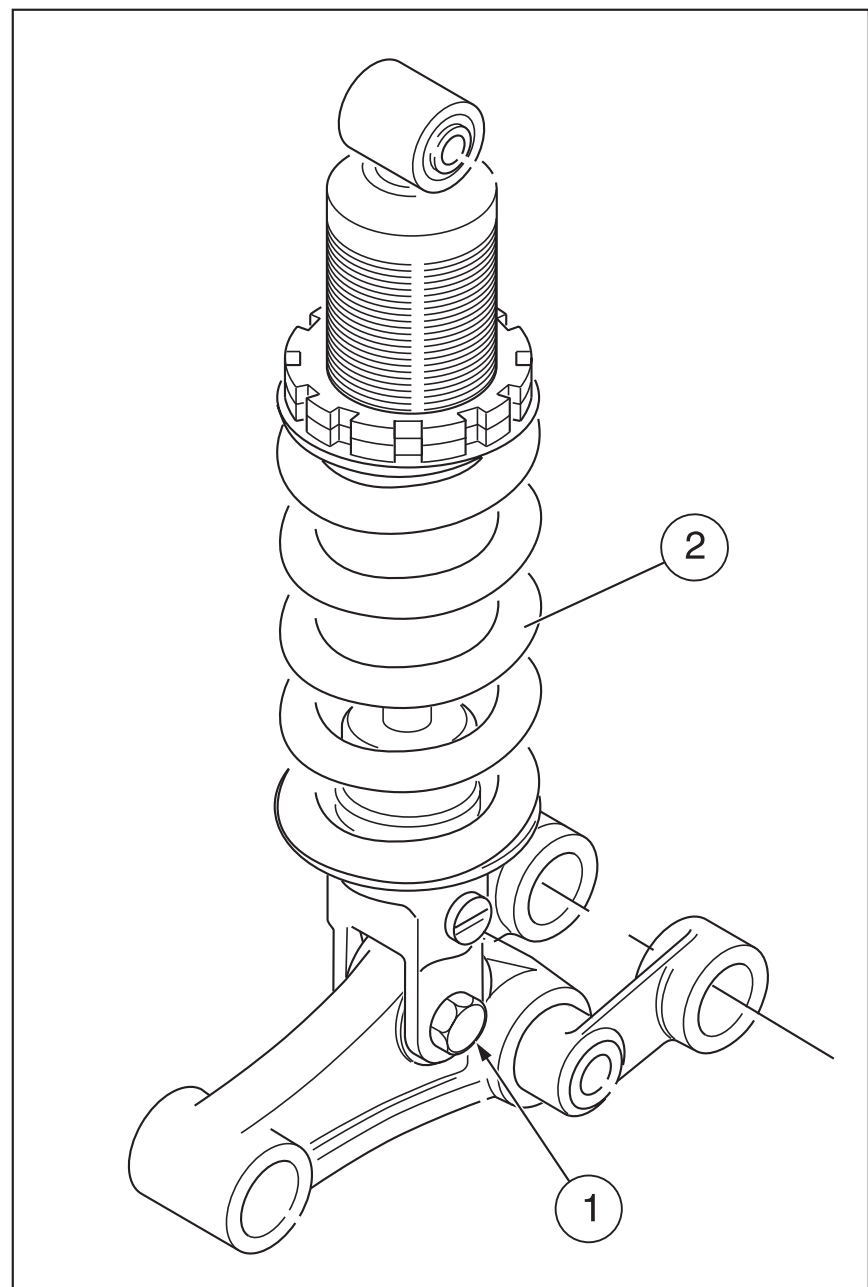
CAUTION

When tightening the screw (1), do not exceed the prescribed torque, since the screw is fixed directly on to the shock absorber.

Any damage to the thread inevitably requires the replacement of the entire shock absorber.

Rear shock absorber lower screw driving torque: 35 Nm (3.5 kgm).

- ◆ Remove the shock absorber (2).



7.10.2 CHECKING THE COMPONENTS

⚠ CAUTION

Make sure that none of the components appear to be visibly distorted, broken, cracked and/or dented.

Replace any damaged components.

BEARINGS

- ◆ Manually rotate the rollers. It should rotate smoothly without jamming and/or noise.
There should be no end play.
Any bearings featuring said defects should be changed.

⚠ CAUTION

Apply grease on the rollers, see 1.6 (LUBRICANT CHART).

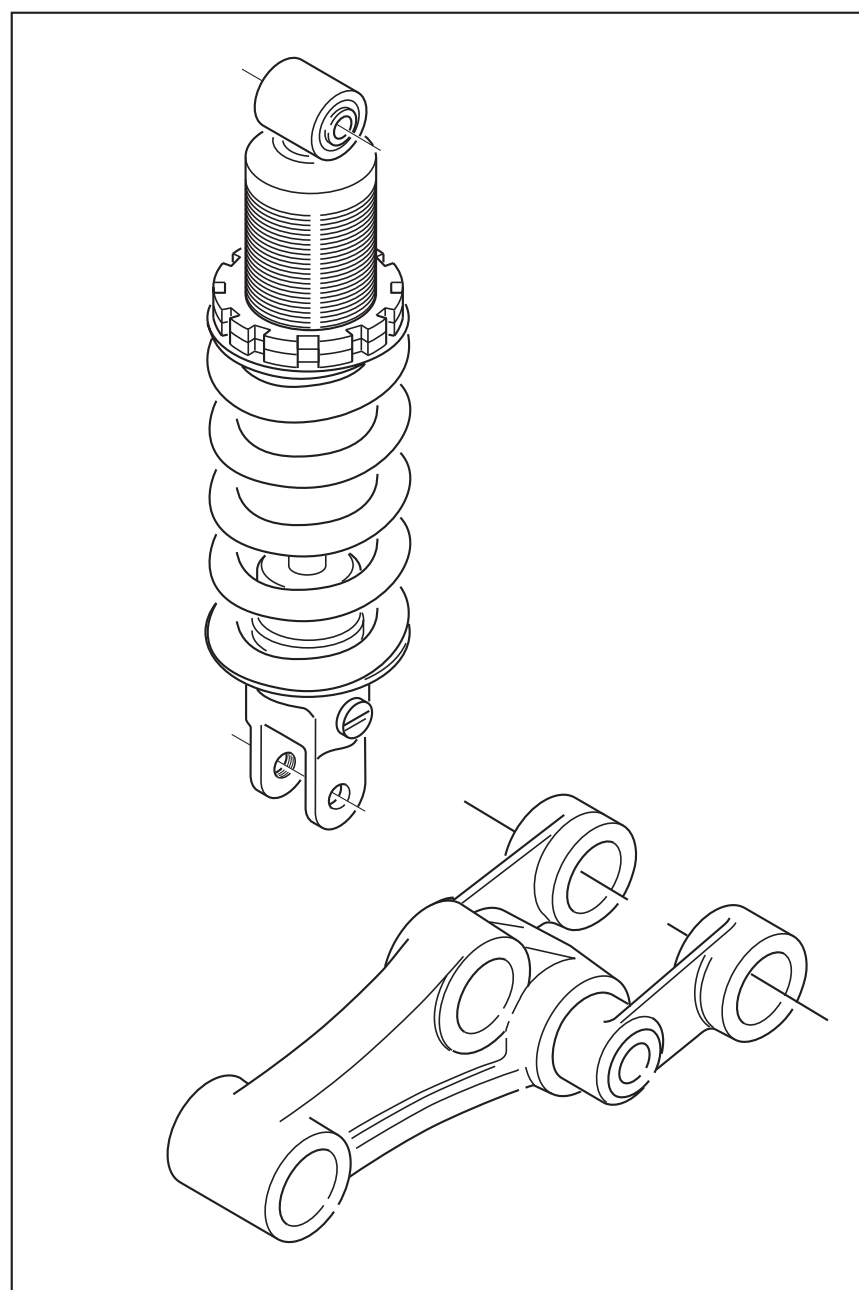
SEALS

- ◆ Make sure the seals are intact; should they prove damaged or feature signs of excessive wear, change them.

SHOCK ABSORBER

- ◆ Make sure that there are no oil leaks from the shock absorber and that its travel is smooth and gradual.
If this is not the case, change the shock absorber.

If necessary, proceed to the adjustment, see 2.25.2 (ADJUSTING THE REAR SHOCK ABSORBER) and 2.25.3 (REAR SUSPENSION WITH HYDRAULIC PRELOAD ADJUSTMENT **OPT**).



7.10.3 DISASSEMBLING THE REAR SUSPENSION LINKAGE

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.25.1 (REAR SUSPENSION).

- ◆ Remove the rear shock absorber, see 7.10.1 (REMOVING THE SHOCK ABSORBER).
- ◆ Unscrew and remove the nuts (1) (2).

Single connection element upper nut driving torque: 50 Nm (5.0 kgm).

CAUTION

The screw (3) on the left side of the vehicle is longer than the screw (4) on the right side. Upon reassembly, take care to position them correctly.

- ◆ Unscrew the screws (3) (4), taking the washers.
- ◆ Remove the whole suspension linkage unit (A).

NOTE When reassembling, grease the linkage fulcrum points, see 1.6 (LUBRICANT CHART), and be extremely careful to refit the components correctly, making sure that the joints move smoothly.

- ◆ Once reassembly is complete, check the assembly, see 2.25.4 (CHECKING THE REAR SUSPENSION LINKAGE).

7.10.4 DISASSEMBLING THE SUSPENSION LINKAGE

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS).

- ◆ Remove the rear connection element unit of the suspension, see 7.10.3 (DISASSEMBLING THE REAR SUSPENSION LINKAGE).
- ◆ ★ Remove the oil seal (5).
- ◆ ★ Remove the gudgeon pin (6).

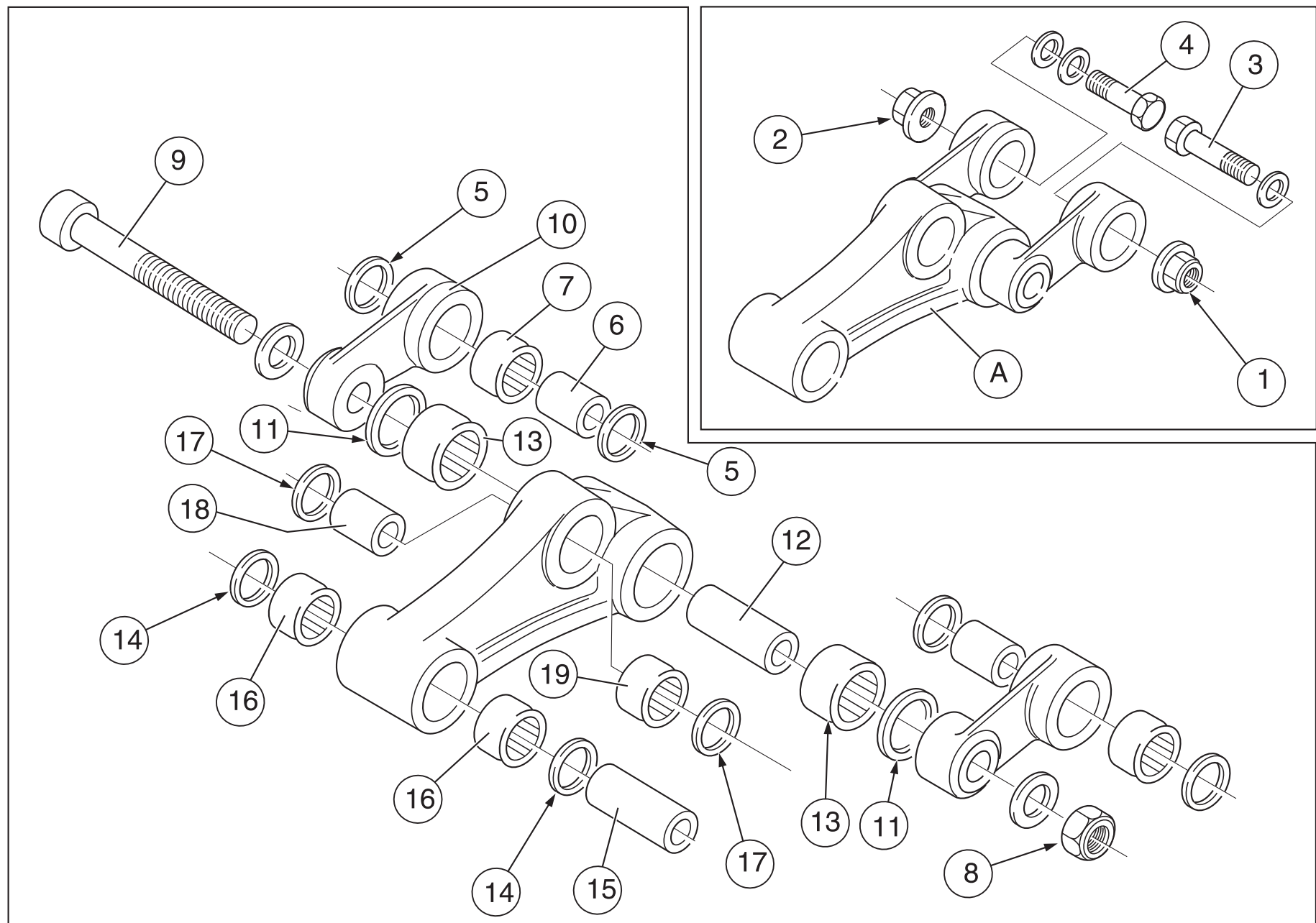
NOTE Have the appropriate special tool **OPT** to hand:
 – **aprilia** part# 8140180 (Kit for bearings in the range Ø10 mm to Ø 30 mm).

- ◆ ★ Use a special extractor to extract the roller bearing (7).
- ◆ Unscrew and remove the nut (8), taking the washer.

Single connection element lower nut driving torque: 50 Nm (5.0 kgm).

- ◆ Unscrew and remove the screw (9), taking the washer.
- ◆ ★ Retrieve the single connecting rod (10).
- ◆ Remove the two oil seal (11).
- ◆ Remove the gudgeon pin (12).
- ◆ Use a special extractor to extract the roller bearings (13).
- ◆ Remove the two oil seal (14).
- ◆ Remove the gudgeon pin (15).
- ◆ Use a special extractor to extract the roller bearing (16).
- ◆ Remove the two oil seal (17).
- ◆ Remove the gudgeon pin (18).
- ◆ Use a special extractor to extract the roller bearing (19).

NOTE Wash all the components with a clean detergent.



7.11 DISASSEMBLING THE DRIVING CHAIN

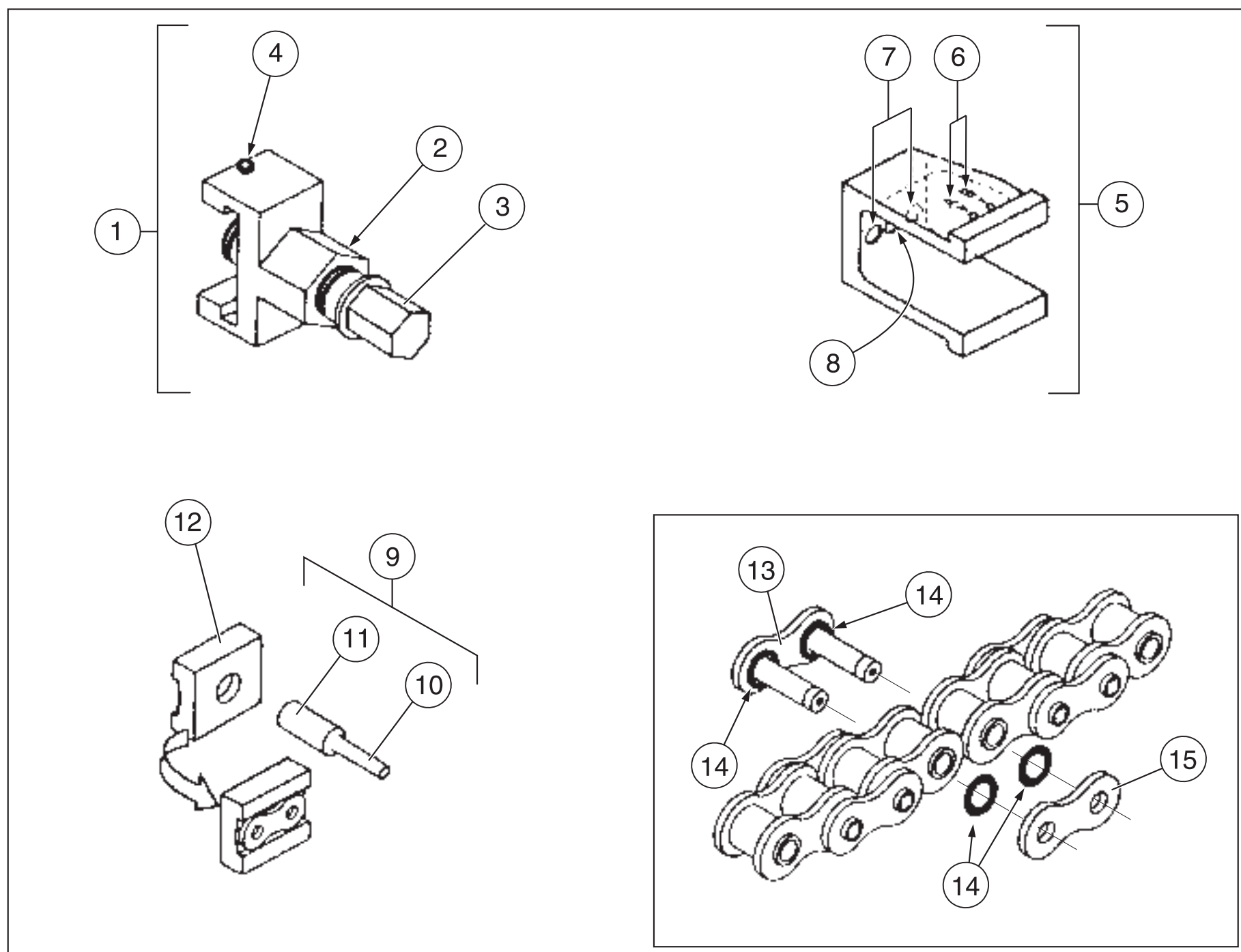
7.11.1 CHAIN BREAKER/RIVET TOOL **OPT**

NOTE Have the appropriate special tool **OPT** to hand:
– **aprilia** part# 8140192 (chain disassembly/reassembly tool).

NOTE This tool is designed for breaking/rejoining chains with rivet-type connecting links.

CAUTION

Only rivet-type connecting link chains should be fitted on this vehicle.



Key

- | | |
|---|-------------------|
| 1) Main body | 9) Pusher |
| 2) Fixed hexagonal seat (for 27 mm spanner) | 10) Breaking side |
| 3) Hex-head screw (for 19 mm spanner) | 11) Joining side |
| 4) Locating dowel | 12) Support plate |
| 5) Rivet tool | 13) Joining plate |
| 6) "A" and "B" reference marks | 14) O-rings |
| 7) Positioning holes for joining pins | 15) Rivet plate |
| 8) Pin exit hole | |

7.11.2 BREAKING THE CHAIN

Carefully read 0.5.1 (PRECAUTIONS AND GENERAL INFORMATIONS) and 2.29 (DRIVE CHAIN).

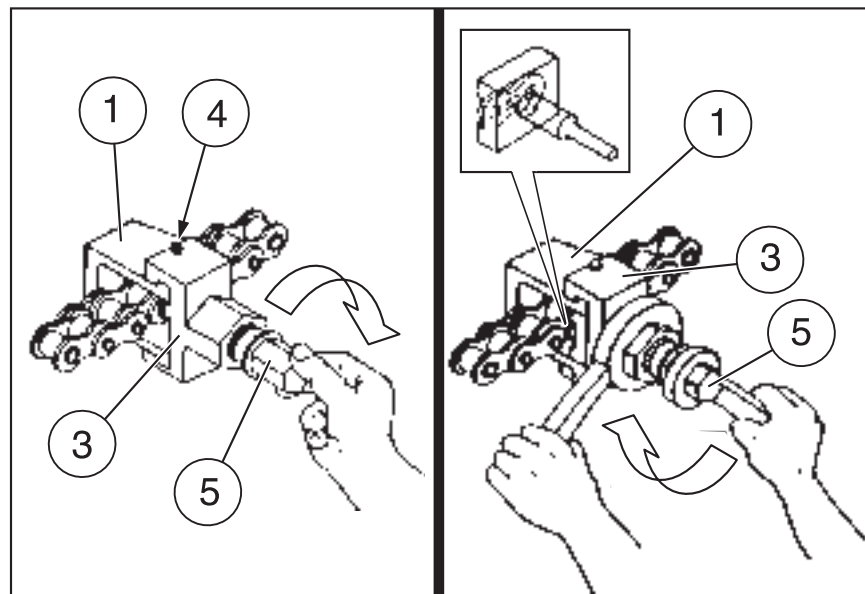
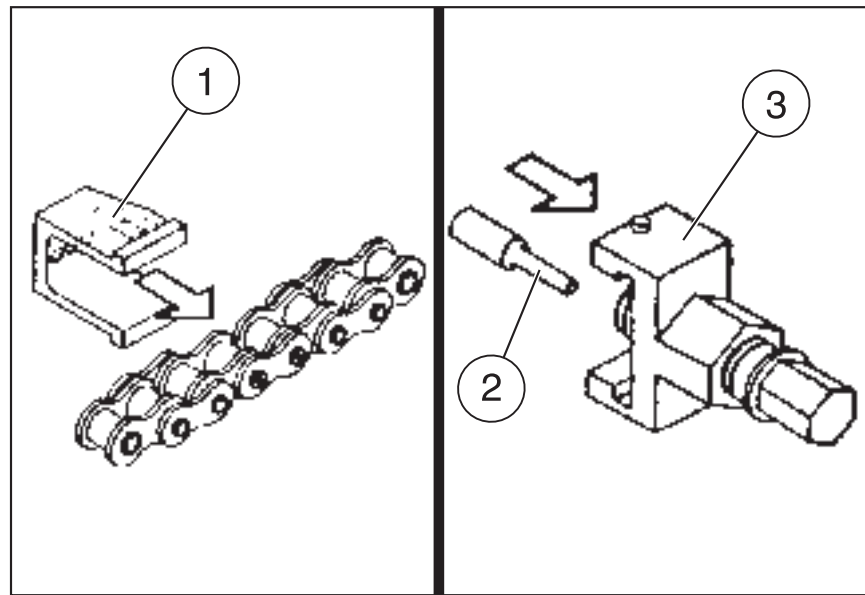
- ◆ Remove the pinion protection case, see 3.2.3 (REMOVING THE DRIVE PINION PROTECTION CASING).
- ◆ Slacken the chain, see 2.29.3 (ADJUSTING THE DRIVING CHAIN).
- ◆ Position the vehicle on the appropriate rear support stand, see 1.8.1 (POSITIONING THE VEHICLE ON THE REAR SUPPORT STAND **OPT**).

NOTE Make sure the tool is suitable for the chain type fitted on the vehicle and for the size of the chain's links.

- ◆ Place the rivet tool (1) on the chain at a point between the sprocket and pinion, on the chain's lower course.
- ◆ Move the rivet tool (1) so that its pin exit hole (the one in the centre) is lined up with the pin on the chain to be pushed out.
- ◆ Insert the pusher (2) on the main body (3), with the part featuring the greatest diameter first.
- ◆ Fit the main body (3) on the rivet tool (1).
- ◆ Move the main body (3) so that the locating dowel (4) is in line with mark "A" on the rivet tool (1).
- ◆ Turn the screw (5) by hand until the pusher (2) touches the pin to be pushed out.

NOTE Make sure the pusher (2) is perfectly in line with the pin to be pushed out.

- ◆ Use a 27 mm spanner, inserted on the fixed hexagonal seat of the central body (3), to hold the body still.
- ◆ Use a 19 mm spanner to turn the screw (5) until the pin on the chain is pushed out completely.
- ◆ Loosen the screw (5).
- ◆ Repeat the procedure, moving on to the adjacent pin on the same link.
- ◆ Remove the components of the disconnected link and the four O-rings.
- ◆ Remove the chain.



CAUTION

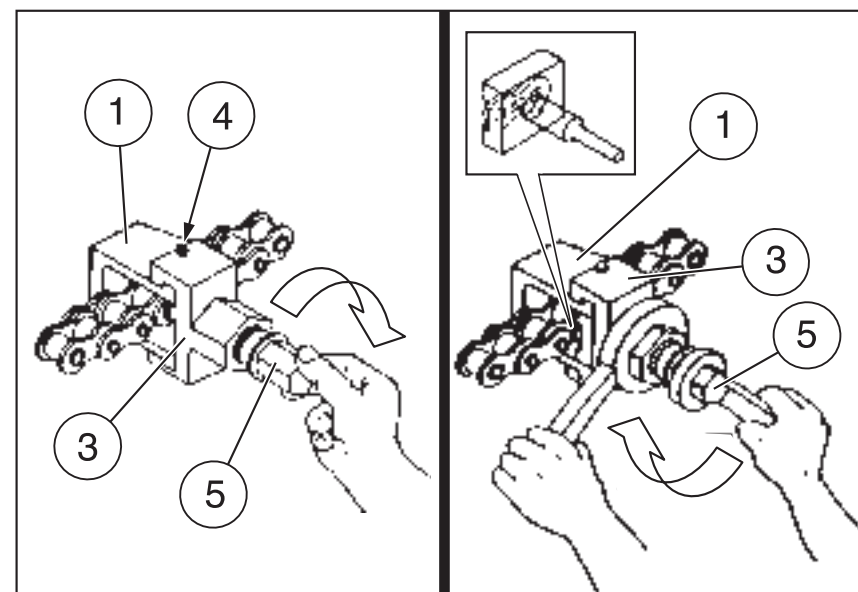
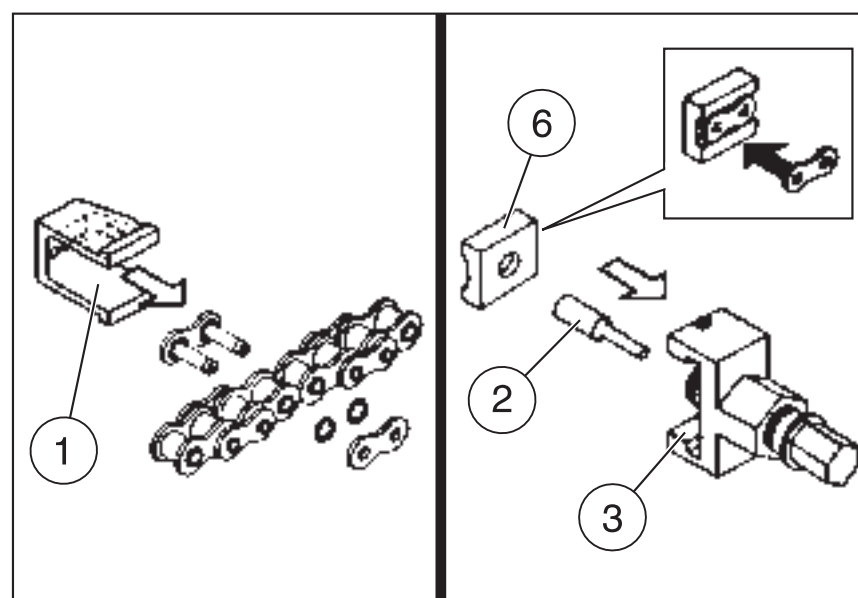
If the chain appears particularly worn, replace the whole unit (pinion, sprocket and chain), see 7.3.2 (REMOVING THE FINAL DRIVE UNIT).

7.11.3 POSITIONING THE JOINING LINK

CAUTION

Make sure the joining link is of the same type as the chain to be joined up.

- ◆ Position the chain on the vehicle with the two ends to be joined up at a point between the sprocket and pinion on the chain's lower course.
- ◆ Insert the two O-rings on the pins of the joining plate.
- ◆ Grease the two pins on the joining plate, see 1.6 (LUBRICANT CHART).
- ◆ Join together the two ends of the chain and insert the joining plate pins.
- ◆ Insert the two O-rings on the ends of the pins.
- ◆ Insert the rivet plate on the pins.
- ◆ Fit the support plate (6) on the rivet plate.
- ◆ Fit the rivet tool (1) on the chain.
- ◆ Move the rivet tool (1) so its holes (the ones at the side) are lined up with the heads of the pins on the joining plate.
- ◆ Insert the pusher (2) on the main body (3), with the area featuring the smallest diameter first.
- ◆ Fit the main body (3) on the rivet tool (1).
- ◆ Move the main body (3) so that the locating dowel (4) is in line with mark "A".
- ◆ Turn the screw (5) by hand until the pusher (2) touches the support plate (6).
- ◆ Use a 27 mm spanner, inserted on the fixed hexagonal seat of the central body (3), to hold the body still.
- ◆ Use a 19 mm spanner to turn the screw (5) as far as it will go.



7.11.4 RIVETTING THE PINS

With the tool already in place on the chain:

- ◆ Loosen the screw (5).
- ◆ Remove the main body (3) from the rivet tool (1).
- ◆ Remove the support plate (6).
- ◆ Refit the main body (3) on the rivet tool (1).
- ◆ Move the main body (3) so that the locating dowel (4) is lined up with mark "B" on the rivet tool (1).
- ◆ Turn the screw (5) by hand until the pusher (2) touches the pin to be rivetted.

NOTE Make sure the pusher (2) is perfectly in line with the pin to be rivetted.

CAUTION

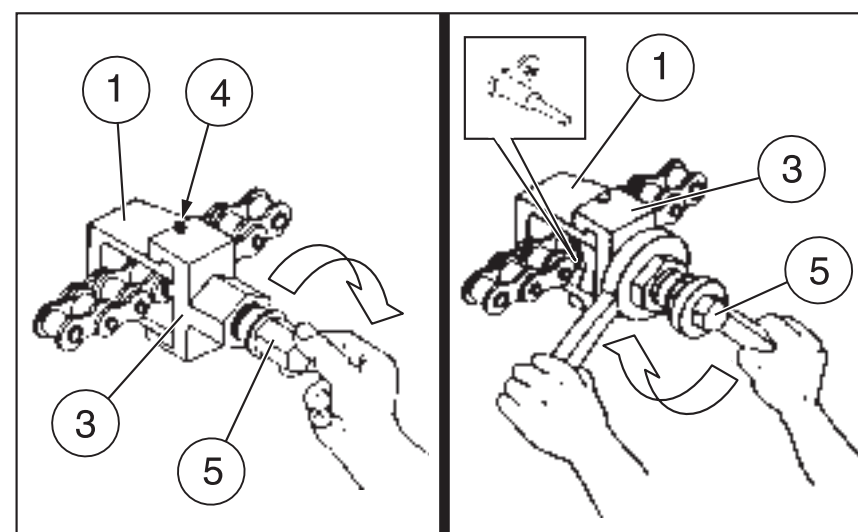
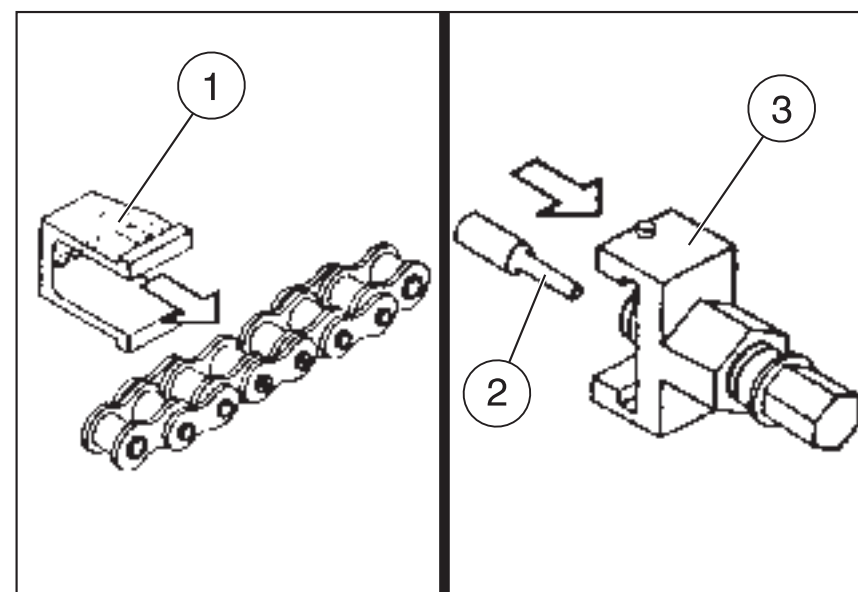
To have on goggles or glow screen for the eyes.

- ◆ Use a 27 mm spanner, inserted on the fixed hexagonal seat of the central body (3), to hold the body still.
- ◆ Use a 19 mm spanner to turn the screw (5) until the edge of the pin is rivetted.

CAUTION

Make sure that the rivetting on the pin has been performed correctly; the rivetted edge of the pin must touch the rivet plate evenly. The rivetted edge diameter must be 5.65 ± 0.15 mm max.

- ◆ Loosen the screw (5). Repeat the procedure, moving on to the adjacent pin on the same link.



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NOTE

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REPAIR INFORMATION

8

REPAIR INFORMATION

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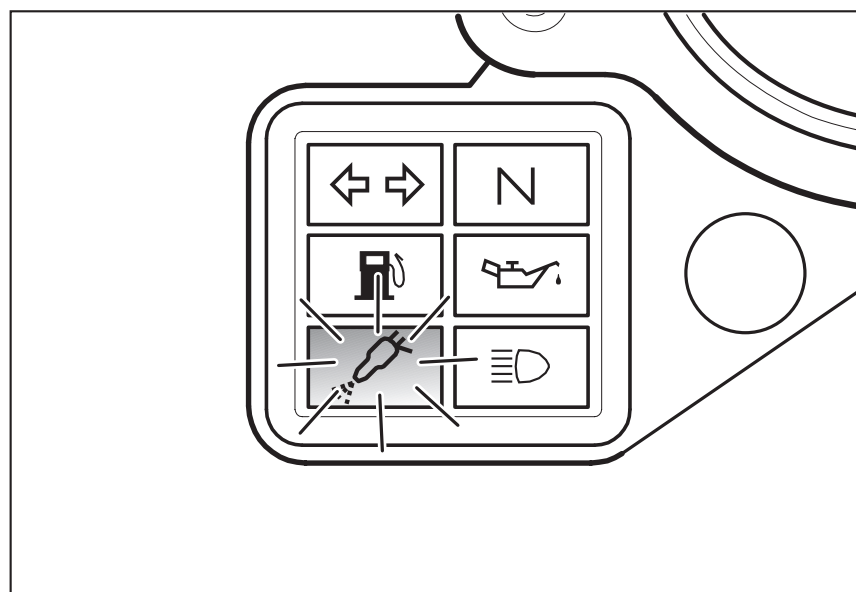
8.1 TROUBLESHOOTING

CAUTION

Any damage to the ignition coil, the drive shaft position sensor and the thermistors is automatically detected by the electronic unit; blinking of the warning light " " positioned on the dashboard.

For this reason, the malfunctions of these components are not repeated in the troubleshooting table; see relevant chapters in sect. 4 (FUEL SUPPLY SYSTEM) and sect. 6 (ELECTRIC SYSTEM).

NOTE In the following table, the operations marked with (*) must be carried out consulting the Engine service and repair manual, see 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS).



8.1.1 ENGINE

DEFECT	SYMPTOM AND POSSIBLE CAUSES	REMEDY
The engine does not start or has trouble starting	Engine shutoff switch set to "⊗"	Set to "○"
	Starting safety logic not satisfied	Check and restore the necessary conditions
	Fall sensor faulty	Replace
	Vent hole on tank cap clogged	Clean
	Battery charge insufficient	Recharge
	Battery damaged	Replace
	Free-wheel, gear free-wheel worn or faulty	Replace (*)
	Starter idler gears worn or faulty	Replace (*)
	Starter motor toothing broken	Replace (*)
	Spark plug dirty	Replace
	Spark plug wet	Clean or replace
	Spark plug loose	Tighten
	Spark plug are not to spec.	Replace
	Cold start cable not working	Check
	Fuel filters dirty or fuel supply pipes clogged	Clean or replace
	Fuel pump, relay or wiring faulty	Replace
	Fuel pressure regulator faulty	Replace
	Injectors faulty	Replace
	Valve clearance incorrect	Adjust (*)
	Camshaft timing faulty	Adjust (*)
	Valves, valve guides or valve seats worn	Replace
	Decompressor stops too late	Verify easy movement of decompressor, change decompressor spring (*)
	Piston segments worn	Replace the segments (*)
Cylinder worn	Replace the cylinder (*)	
Excessive clearance between pick-up and rotor	Adjust the clearance (*)	
Ignition system faulty	Check rotor, central unit stator, change faulty component (*)	
Engine stops too frequently	Spark plug dirty	Clean
	Ignition system faulty	Repair or replace (*)
	Cooling system pipes clogged	Replace
	Injectors clogged	Replace
	Air cleaner clogged	Clean
	Fuel filters clogged	Clean or replace

Follow ►

Follow ►

DEFECT	SYMPTOM AND POSSIBLE CAUSES	REMEDY
The engine has trouble idling	Idling rpm too low	Adjust
	Air cleaner dirty	Clean
	Intake coupling leaking	Replace
	Throttle valve shaft/housing worn	Replace
	CO content too low at idling speed	Check the injectors (clogged)
	Air infiltrations through inlet flanges	Change flange
	Excessive gap between spark plug electrodes	Change the spark plug
	See the subsection entitled (The engine does not start or has trouble starting) for other possible causes	
The engine runs irregularly at higher speeds	Fuel outflow union clogged, which reduces the fuel supply to the injectors	Clean and resupply the fuel system
	Intake conveyors and pipes clogged	Check
	Air penetrating through the throttle body or intake coupling	Replace
	Fuel pressure too low	Clean fuel system or change pump.
	Fuel supply pump faulty	Replace
	Camshafts worn	Replace (*)
	See the subsection entitled (The engine does not start or has trouble starting) for other possible causes	
Engine does not reach maximum rpm	Insufficient gap between spark plug electrodes	Adjust
	Injectors clogged	Replace
	Ignition coil faulty	Replace
	Ignition system faulty	Repair or replace (*)
	Air cleaner clogged	Clean
	Fuel pipes clogged	Clean
Exhaust gases dirty or oily	Sealing elements, valve guides, oil scrapers and gaskets worn or damaged	Check (*)
	Any porosity	Check (*)
Engine knocks when under stress	Ignition system faulty	Check rotor, central unit stator, change faulty component
	Spark plug thermal value incorrect	Install spark plug with the prescribed heat value
	Fuel octane rating too low	Use the prescribed fuel
Engine lacks power	Spark plug dirty	Clean or replace
	Spark plug are not to spec.	Replace
	Spark plug gap incorrect or ignition system faulty	Adjust or replace
	Insufficient valve clearance	Adjust (*)
	Exhaust system faulty	Replace
	Valve timing incorrect	Adjust (*)
	Faulty valve springs	Replace (*)
	Valve seats leaking	Reface seats (*)
	Intake couplings or intake system leaking	Replace
	Clutch slipping	Replace the clutch discs or springs (*)
	Motor oil not to spec.	Use motor oil conforming to spec.
	Air cleaner dirty	Replace
	Fuel pump faulty	Replace
	Fuel pressure too low	Replace the fuel pressure regulator or check the pump
	Injectors dirty	Replace
	Piston segments worn	Replace (*)
	Camshaft timing faulty	Adjust (*)
	Decompressor does not start	Check decompressor (*)
	Too much oil in the engine	Check oil non-return valve
	See the subsections entitled [The engine produces an excessive amount of exhaust fumes (blue smoke)] and (The clutch slips) for other possible causes	

Follow ►

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DEFECT	SYMPTOM AND POSSIBLE CAUSES	REMEDY
The engine overheats	Insufficient coolant in the cooling system, system leaking	Top up with coolant, subject the system to a pressure test
	Coolant not to specification	Use coolant conforming to specification
	Radiators dirty or coolant pipes clogged	Clean
	Air in the cooling system	Bleed
	Cooling fan motors faulty	Repair or replace
	Coolant thermal switch faulty	Replace
	Thermal expansion valve faulty (locked in closed position)	Replace
	Coolant pump or coolant pump control drive faulty	Replace (*)
	Insufficient engine oil in the system	Top up with motor oil
	Oil pump or oil pump control faulty, or oil circuit clogged	Replace or clean (*)
	Motor oil not to spec.	Use motor oil conforming to spec.
	Intake couplings or intake system leaking	Replace
	Injectors faulty	Replace
	Head gaskets faulty	Replace (*)
The engine temperature stays too low	Thermal expansion valve faulty (locked in open position)	Replace
The engine produces excessive exhaust fumes (blue smoke)	Too much oil in the engine	Drain excess oil, check oil level
	Valve stem gaskets worn	Replace (*)
	Valve stems or valve guides worn	Replace (*)
	Signs of scratches or scoring on the cylinder walls	Replace (*)
	Piston rings or cylinders worn	Replace (*)
	Head gasket leaking	Replace (*)
The engine vibrates	Engine fastening loose	Tighten
	Bearing or bearing housing worn	Replace
	Countershaft timing incorrect	Adjust (*)
Engine oil pressure too low ("oil" comes on)	Insufficient oil in the system	Top up with motor oil
	Oil not to spec.	Replace
	Oil pressure sensor faulty	Replace (*)
	Low-pressure circuit valve faulty (remains open)	Change valve spring (*)
	Oil pump control faulty	Replace (*)
	Oil pump worn	Replace (*)
Excessive engine oil pressure	Low-pressure circuit valve faulty (remains closed)	Change valve spring (*)
	Oil circuit clogged	Clean oil circuit
	Oil pressure sensor faulty	Replace (*)
The engine runs too noisily	The noise seems to be coming from the timing system	
	Chain tightener shoe worn	Replace (*)
	Excessive valve clearance	Adjust (*)
	Valve springs exhausted or broken	Replace (*)
	Decompressor does not stop	Change decompressor spring (*)
	End play in exhaust camshaft	Adjust the clearance (*)
	Bucket-type tappets or camshaft worn	Replace (*)
	Timing chain worn	Replace (*)
	Timing gears worn	Replace (*)
	Timing chain tightener faulty	Replace (*)
	The noise seems to be coming from the piston	
	Piston or cylinder worn	Replace (*)
	Gudgeon pin or connecting rod worn	Replace (*)

Follow ►

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DEFECT	SYMPTOM AND POSSIBLE CAUSES	REMEDY
The engine runs too noisily	Piston rings or grooves worn or broken	Replace (*)
	The noise seems to be coming from the clutch or clutch casing	
	Clutch discs worn	Replace (*)
	Sides of primary drive teeth worn	Change complete primary drive (*)
	Bell housing, clutch hub and spring carrier disc worn	Change worn component (*)
	Flexible couplings on clutch housing have excessive play	Replace (*)
	Noise with clutch engaged – clutch bearings worn	Replace (*)
	Primary transmission worn or broken	Replace (*)
	The noise seems to be coming from the flywheel casing	
	Timing gears worn or broken	Replace (*)
	The noise seems to be coming from the crank gear	
	Connecting rod bearings worn	Replace (*)
	Driving shaft bushes or countershaft bearings worn	Replace (*)
	Excessive end play in drive shaft or balance shaft	Adjust slack with special washer or shimming washers (*)
	Balance shaft gear unit faulty	Change split gears springs (*)
	The noise seems to be coming from the gearshift	
	Gears or propeller shafts worn or broken	Replace (*)
	Primary gear unit worn	Replace (*)
	Gearshift bearings worn	Replace (*)
	The noise is heard when the engine is started	
Freewheel gear, gear or housing worn or faulty	Replace (*)	
Double gear or intermediate gear of the starter motor worn	Replace (*)	
Starter motor tothing broken	Replace (*)	
The clutch “slips”	Clutch control adjusted incorrectly	Adjust
	Clutch clearance insufficient	Adjust clutch clearance
	Clutch discs worn or distorted	Replace (*)
	Clutch springs exhausted	Replace (*)
	Support plate worn or distorted	Replace (*)
	Motor oil not to spec.	Use motor oil conforming to spec.
The clutch does not “disengage”	Motor oil not to spec.	Use motor oil conforming to spec.
	Clutch discs stuck together	Clean or replace (*)
	Clutch discs or support plate distorted	Replace (*)
	Clutch housing worn	Replace (*)
The clutch sticks during engagement	Clutch control adjusted incorrectly	Adjust (*)
	Clutch discs worn or distorted	Replace (*)
	Clutch disc guide grooves inside clutch housing worn	Replace the clutch housing (*)
	Smooth disc guide grooves in clutch disc hub worn	Replace the disc hub (*)
	Thrust-bearing surfaces of the clutch housing or support plate worn	Replace (*)
Gears cannot be engaged or are difficult to engage	Engagement teeth of speed gears worn	Replace (*)
	Propeller shafts worn	Replace (*)
	Selector shaft gearshift mechanism faulty	Repair or replace (*)
	Mechanism spring broken or worn	Replace (*)
	Index lever spring broken or worn	Replace (*)
	Selector lever return spring broken or worn	Replace (*)
	The gearshift forks are worn or distorted	Replace (*)
	See the subsection entitled (The clutch does not “disengage”) for other possible causes	

Follow ►

Follow ►

DEFECT	SYMPTOM AND POSSIBLE CAUSES	REMEDY
The gears disengage when the vehicle is started or whilst accelerating hard	Gearshift gears worn	Replace (*)
	The gearshift forks are worn or distorted	Replace (*)
	The positioning springs are exhausted or broken	Replace (*)
	Gearchanging lacks coordination or is incomplete; the gearshift lever is distorted or adjusted incorrectly	When shifting up or down, always press the gearshift lever pedal down all the way; replace the gearshift lever (*)
Spark plug overheated, burnt or dirty	Spark plug are not to spec.	Replace
	Spark plug loose	Tighten
	Intake couplings or intake system leaking	Replace
	Fuel supply system faulty	Repair or replace
The battery alternator is not charged or is charged incorrectly	Battery faulty	Change the battery
	Voltage regulator faulty	Replace
	Break in current, short-circuit or earthing of alternator windings	Replace
	Break in cables or cables short-circuited, connections loose	Repair, change or tighten

8.1.2 ELECTRIC SYSTEM

DEFECT	SYMPTOM AND POSSIBLE CAUSES	REMEDY
Spark plug gets dirty too quickly with carbon deposits	Motor oil level incorrect	Check
	Unsuitable fuel	Use the prescribed fuel
	Carburation too rich	Adjust
	Idling speed too high	Adjust
	Air cleaner dirty	Clean
Spark plug gets dirty too quickly	Motor oil level incorrect	Check
	Spark plug unsuitable	Change spark plug with one of the type indicated
	Piston segments worn	Replace (*)
	Piston or cylinder worn	Replace (*)
Spark plug electrodes overheated or burnt	The engine overheats	Adjust
	Spark plug unsuitable	Change spark plug with one of the type indicated
	Spark plug loose	Tighten
	Carburation too rich	Adjust
Alternator does not charge	Connection terminals interrupted, in short circuit or loose	Repair, change or tighten
	Alternator coils in short circuit, earthed or interrupted	Replace
	Voltage regulator in short circuit or defective	Replace
The alternator does charge but the current intensity is lower than the prescribed value	The terminals are subject to short circuit, interruption or excessive separation	Repair or tighten
	Alternator stator coils earthed or interrupted	Replace
	Voltage regulator faulty	Replace
	Battery faulty	Replace
Alternator charges too much	Short circuit inside battery	Repair or replace
	Voltage regulator damaged or defective	Replace
	Unstable earth of voltage regulator	Replace
Charge not constant	Terminal insulation worn due to vibrations, with consequent temporary short circuits	Repair or replace
	Internal generator short circuits	Replace (*)
	Voltage regulator faulty	Replace

8.1.3 BATTERY

DEFECT	SYMPTOM AND POSSIBLE CAUSES	REMEDY
Battery runs down too quickly	Recharging system defective	Check the alternator, the regulator/rectifier, the circuit connections and carry out operations necessary to restore correct recharge
	Battery elements have lost much active potential consequent on excessive charge	Change the battery and repair charging system
	Presence of short circuits inside battery owing to excessive accumulation of sediments	Change the battery
	Old battery	Change the battery
Battery polarity inverted	Battery has been incorrectly connected to the system	Change the battery and make sure new one is connected properly

8.1.4 BRAKES

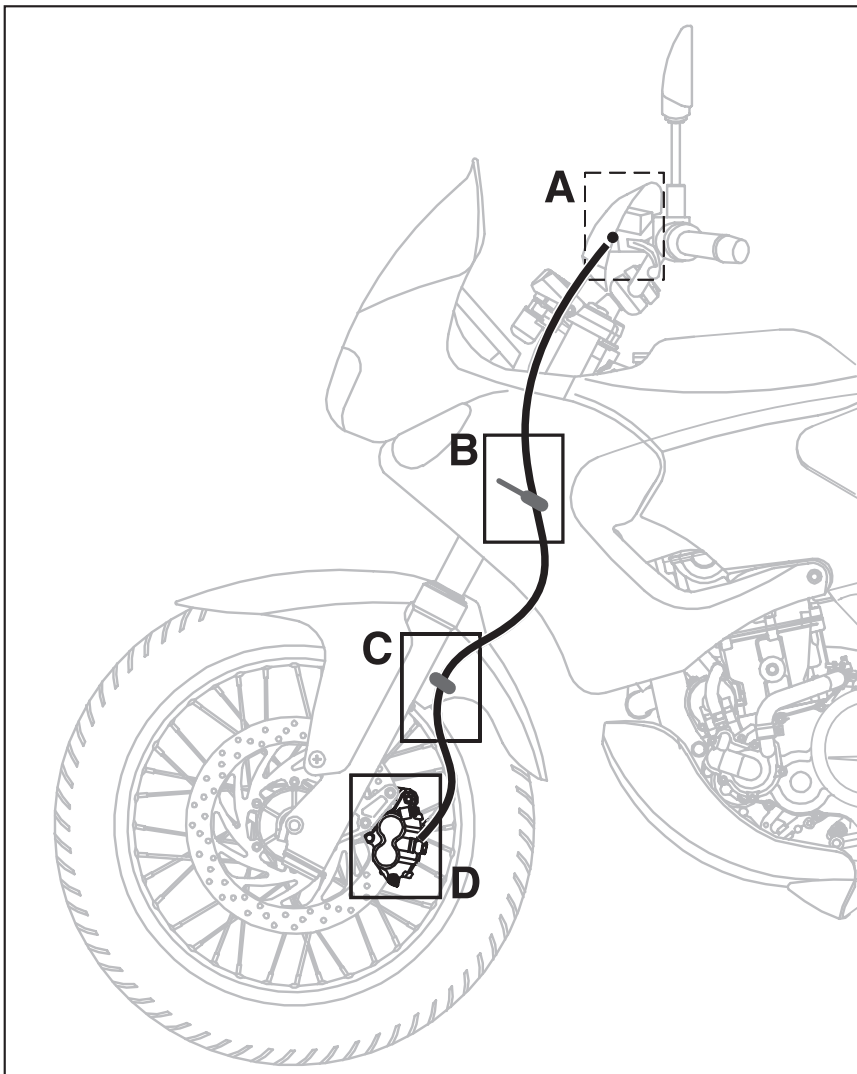
DEFECT	SYMPTOM AND POSSIBLE CAUSES	REMEDY
Poor braking power	Brake fluid leakage from hydraulic system	Repair or replace
	Brake pads worn	Change pads
	Contact surfaces of pads soiled by oil, grease or brake fluid	Change pads
	Brake discs worn	Change disc
	Air in hydraulic circuit	Bleed the circuit
	Brake discs dirty with oil, grease or brake fluid	Clean
	Foreign matter in brake fluid	Change brake fluid
	Brake pump return hole clogged	Disassemble and clean brake pump
Brakes squeak	Pad contact surfaces hardened	Restore surfaces with sandpaper
	Pads installed backwards	Install correctly
	Wheel bearing damaged	Replace
	Front or rear wheel pin loose	Tighten to prescribed driving torque
	Brake pads worn	Replace
Excessive stroke of brake lever	Air in hydraulic circuit	Bleed the circuit
	Insufficient brake fluid	Replace
	Unsuitable brake fluid	Replace
	Brake caliper pins locked	Disassemble and clean
Brake fluid leakage	Insufficient tightening of connection fittings	Tighten to prescribed driving torque
	Cracked pipes	Replace
	Pumping element and/or body worn	Change the pumping element and/or body

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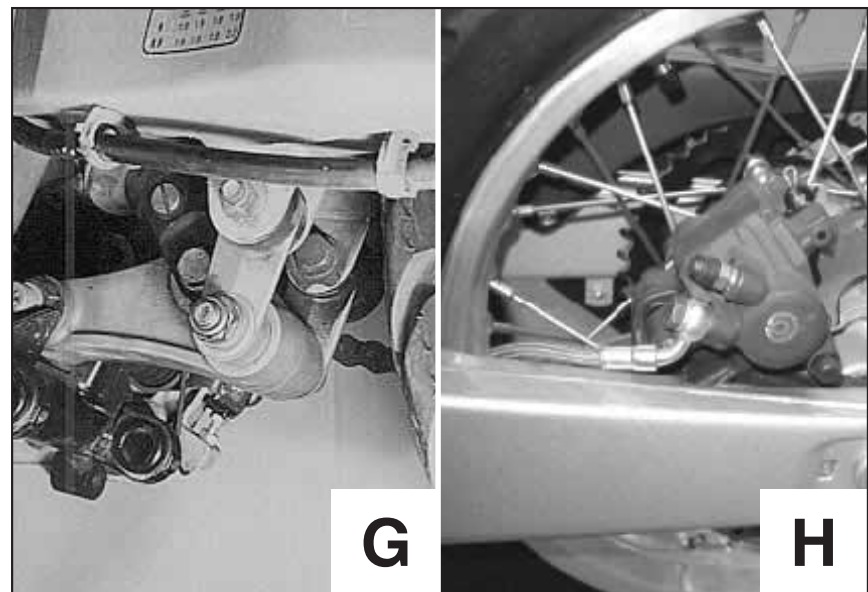
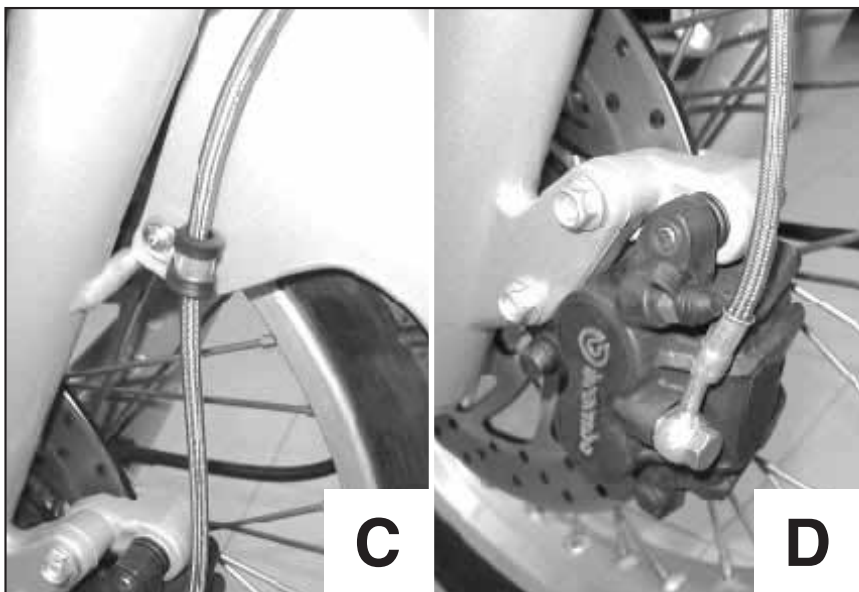
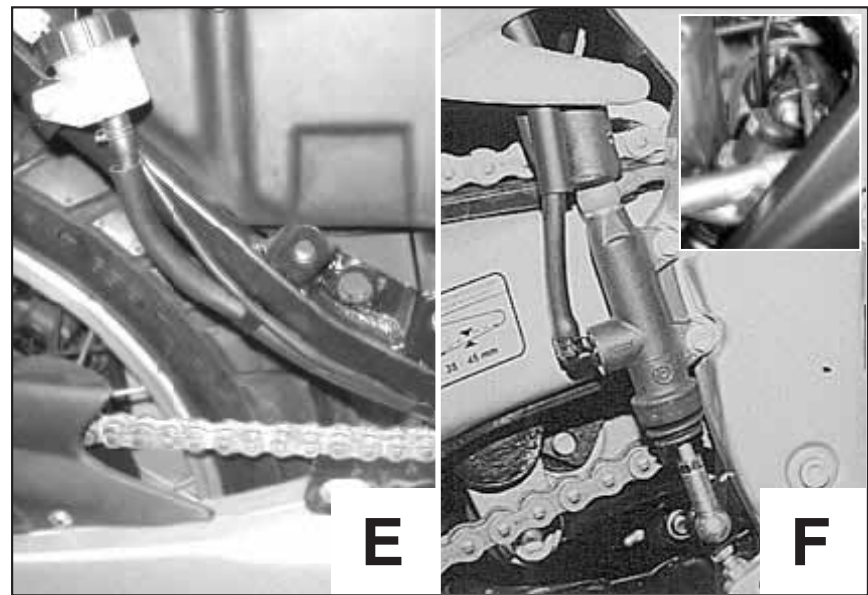
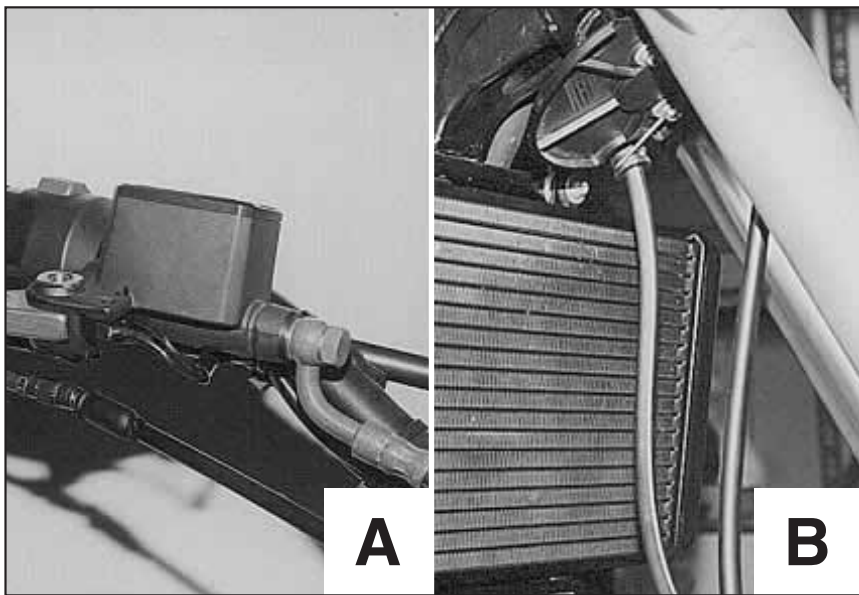
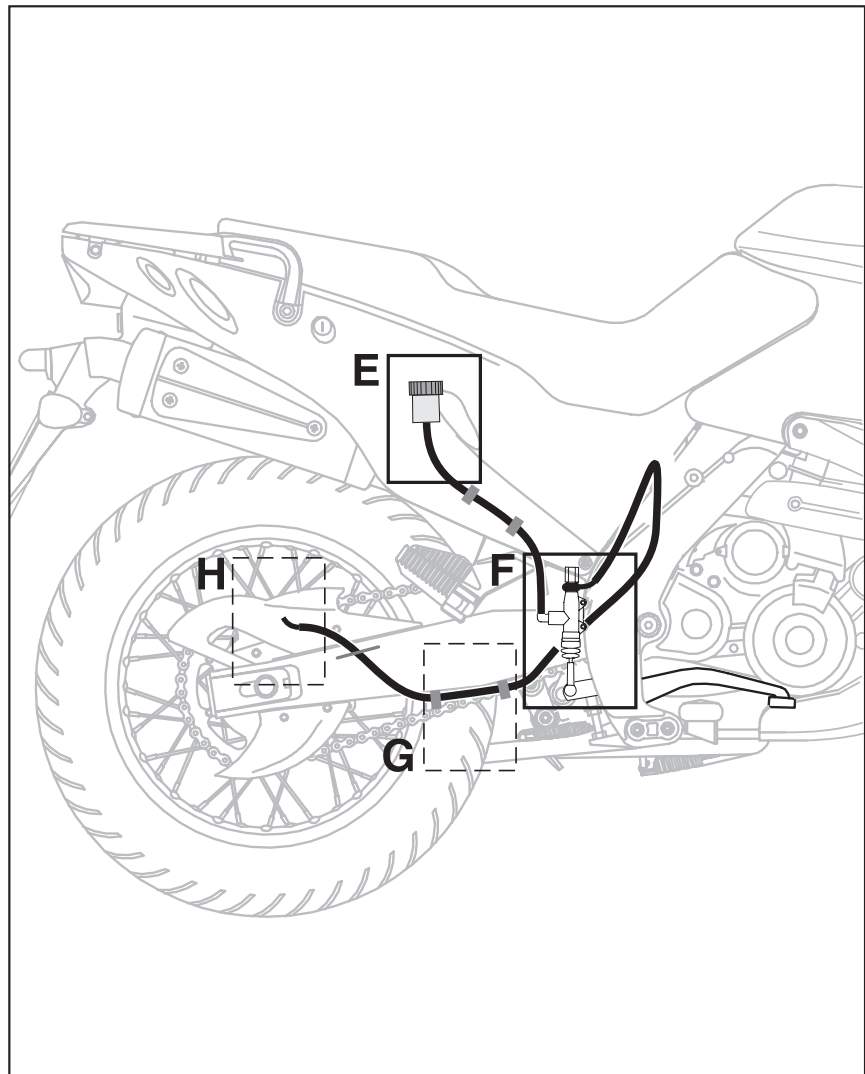
DEFECT	SYMPTOM AND POSSIBLE CAUSES	REMEDY
Hard steering	Steering adjustment ring nut too tight	Adjust
	Steering bearings broken	Replace
	Steering axis deformed	Replace
	Insufficient front tyre pressure	Adjust
Steering not fluid	Steering bearings damaged	Replace
Handlebar oscillates	Fork tube adjustment incorrect	Adjust
	Fork deformed	Replace
	Front wheel pin deformed or tyre deformed	Replace
	Front/rear wheel not balanced	Balance
Rear wheel oscillates	Wheel rim deformed	Replace
	Wheel bearings worn	Replace
	Tyre defective or unsuitable type	Replace
	Wheel pin nut loose	Tighten
	Fork oil unsuitable	Replace
Fork too soft	Fork oil unsuitable (viscosity too low)	Replace
	Springs weakened	Replace
	Fork oil insufficient	Top up
	Fork oil exhausted	Replace
Fork too rigid	Fork oil too viscous	Replace
	Too much oil in fork	Remove excess oil
Noisy fork	Fork oil insufficient	Top up
	Suspension coupling screws and nuts loose	Tighten
Rear wheel oscillates	Wheel rim deformed	Replace
	Wheel bearings worn	Replace
	Tyre defective or unsuitable type	Replace
	Fork bearings worn	Replace
	Suspension screws and nuts loose	Replace
	Rear brake fastening nut loose	Tighten
	Rear fork pin fastening ring loose	Tighten
Rear suspension too soft	Shock absorber spring weakened	Replace
	Adjusting devices incorrectly adjusted	Adjust
	Oil leakage from shock absorber	Replace
Rear suspension too rigid	Adjusting devices incorrectly adjusted	Adjust
	Shock absorber pin deformed	Replace
	Fork deformed	Replace
	Fork bearings worn	Replace
	Suspension roller bearings worn	Replace
Rear suspension noisy	Suspension screws and nuts loose	Tighten
	Fork bearings worn	Replace
	Suspension roller bearings worn	Replace

8.2 RUN, FASTENING, WIRING, CABLES AND PIPES

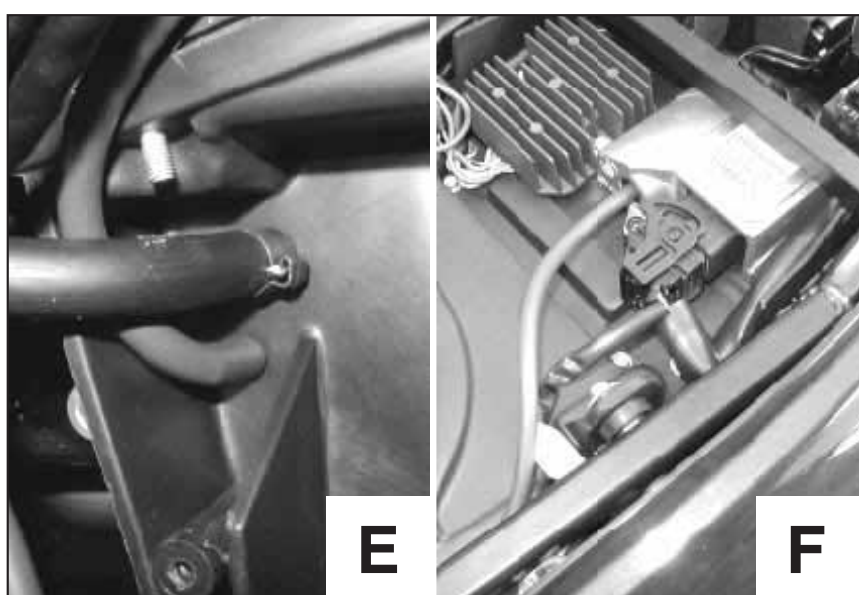
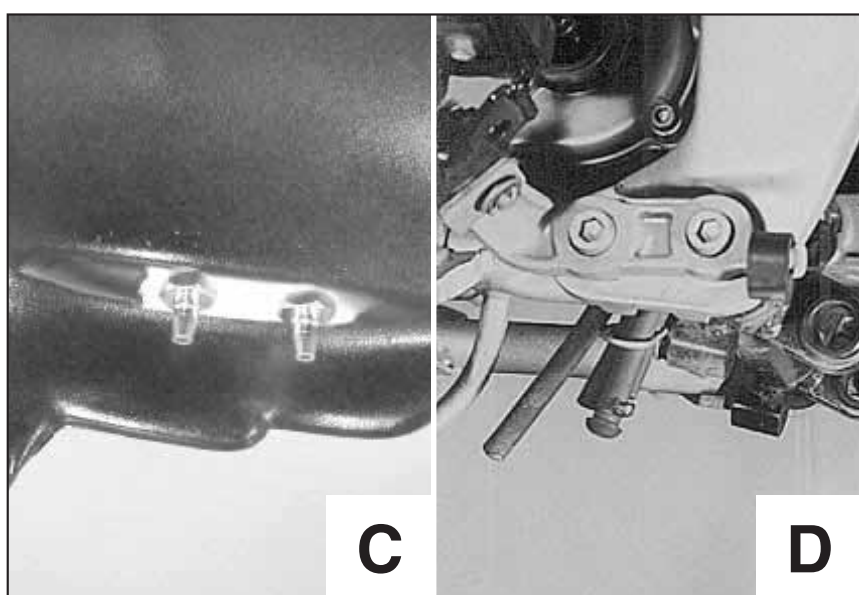
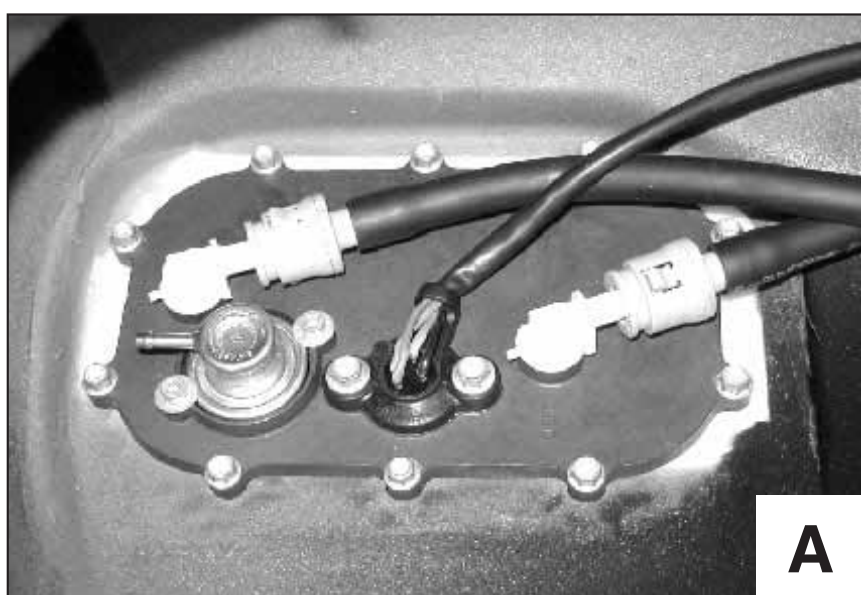
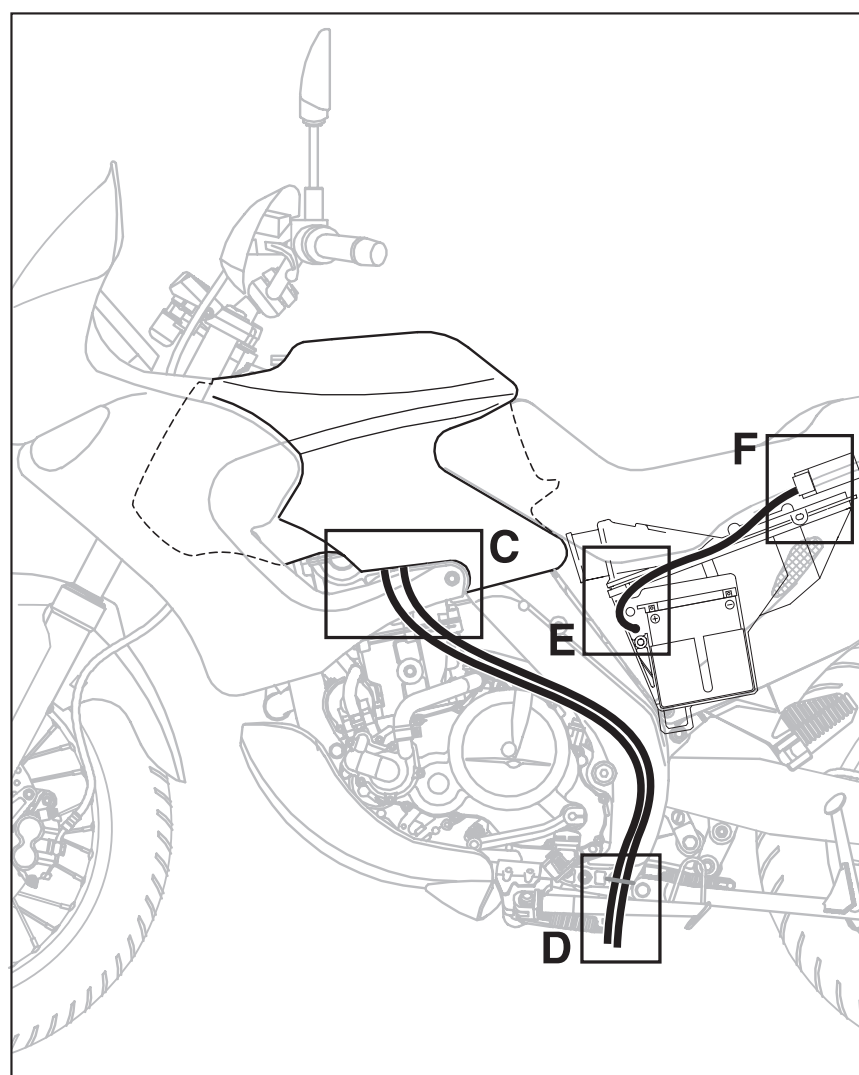
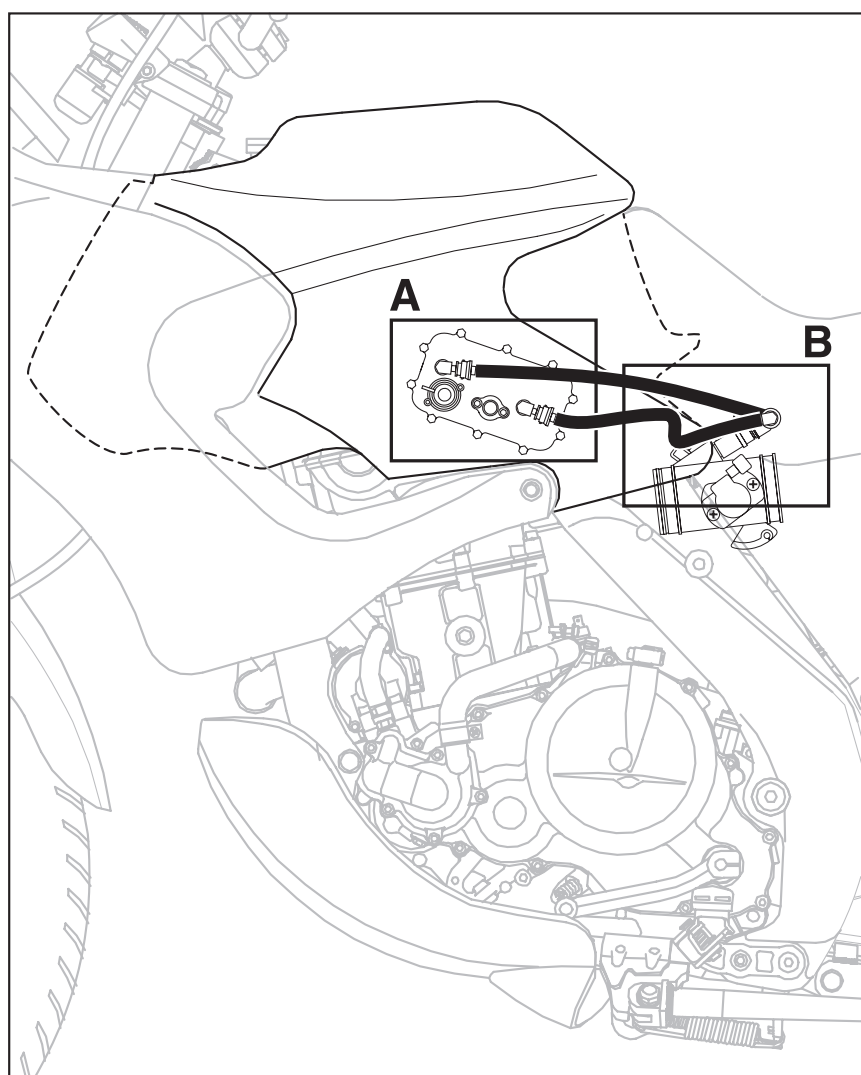
8.2.1 FRONT BRAKE PIPE



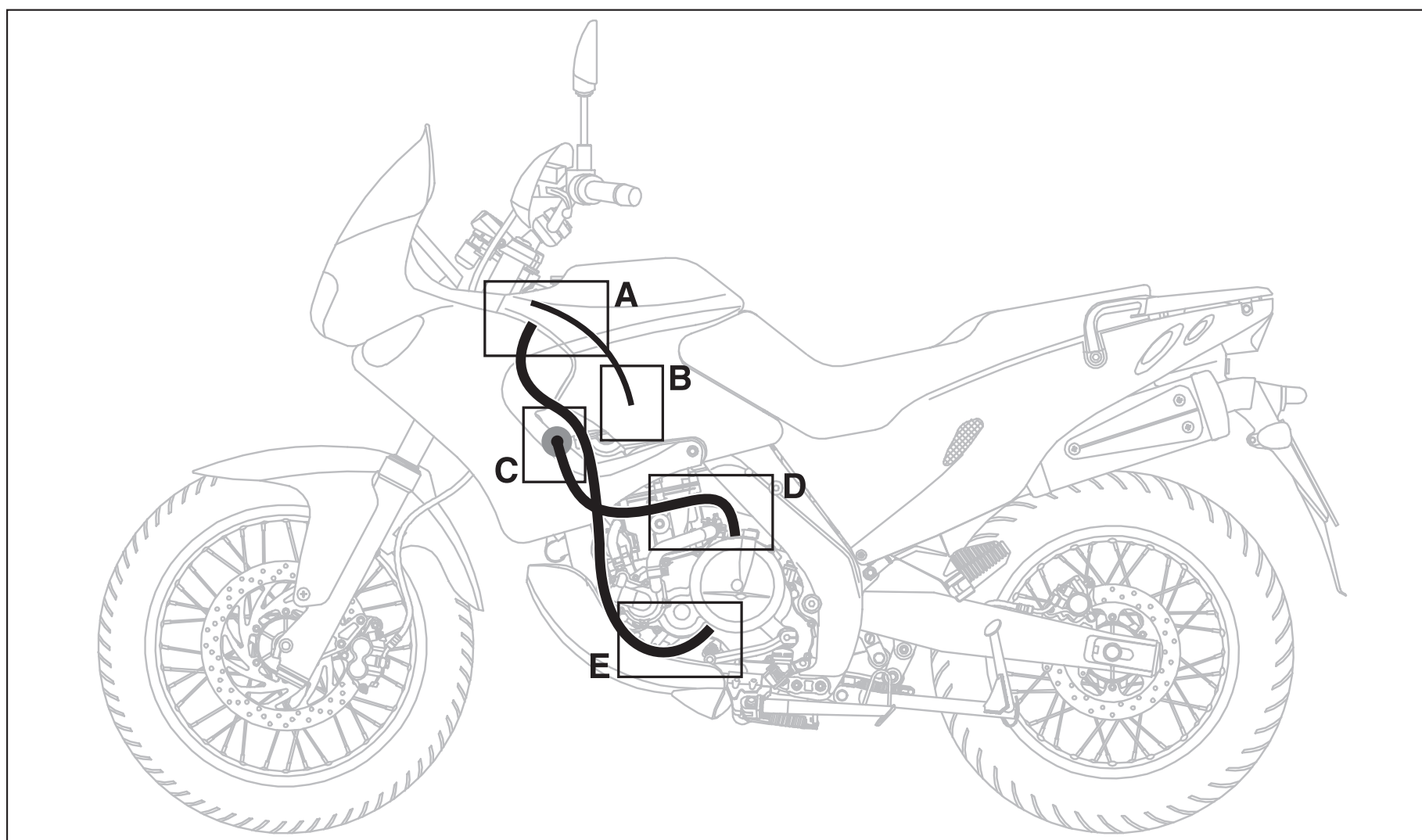
8.2.2 REAR BRAKE PIPES



8.2.3 FUEL SYSTEM PIPES

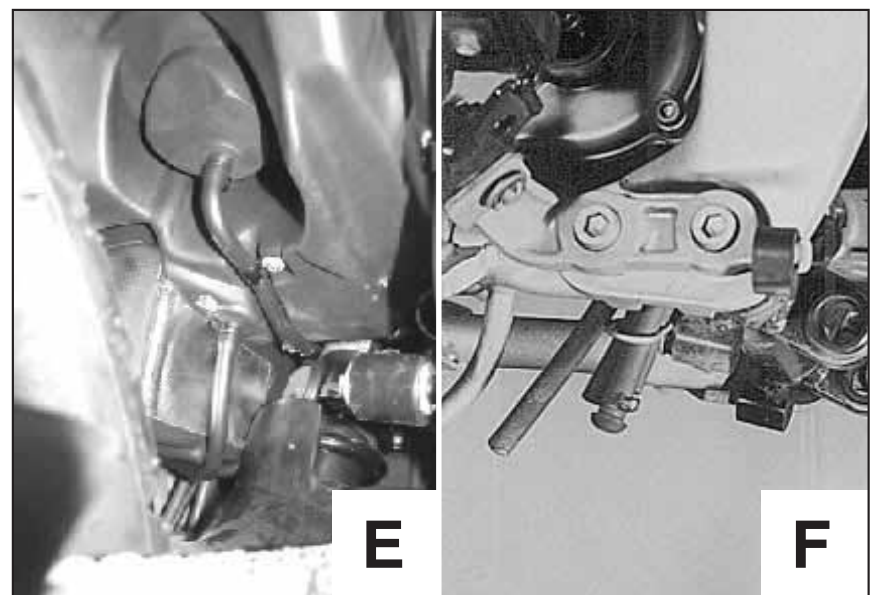
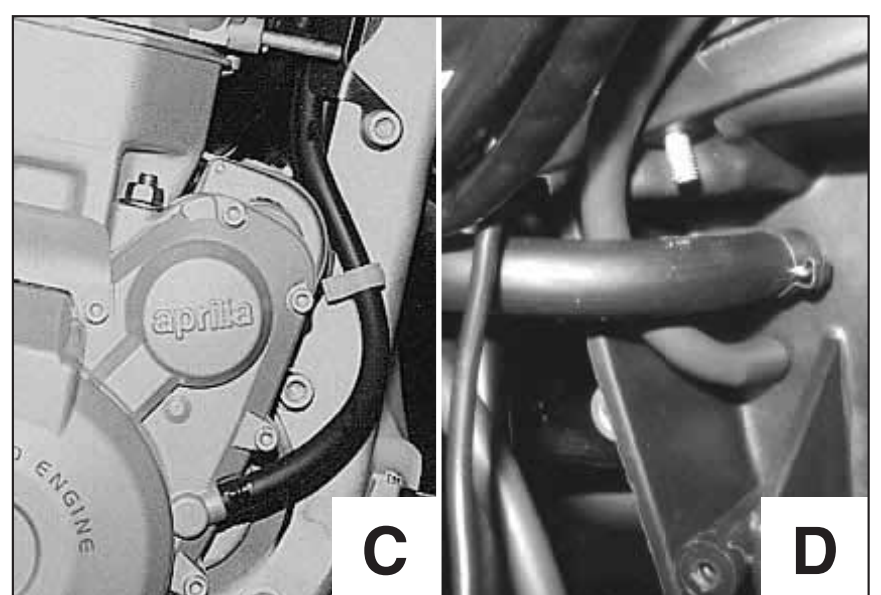
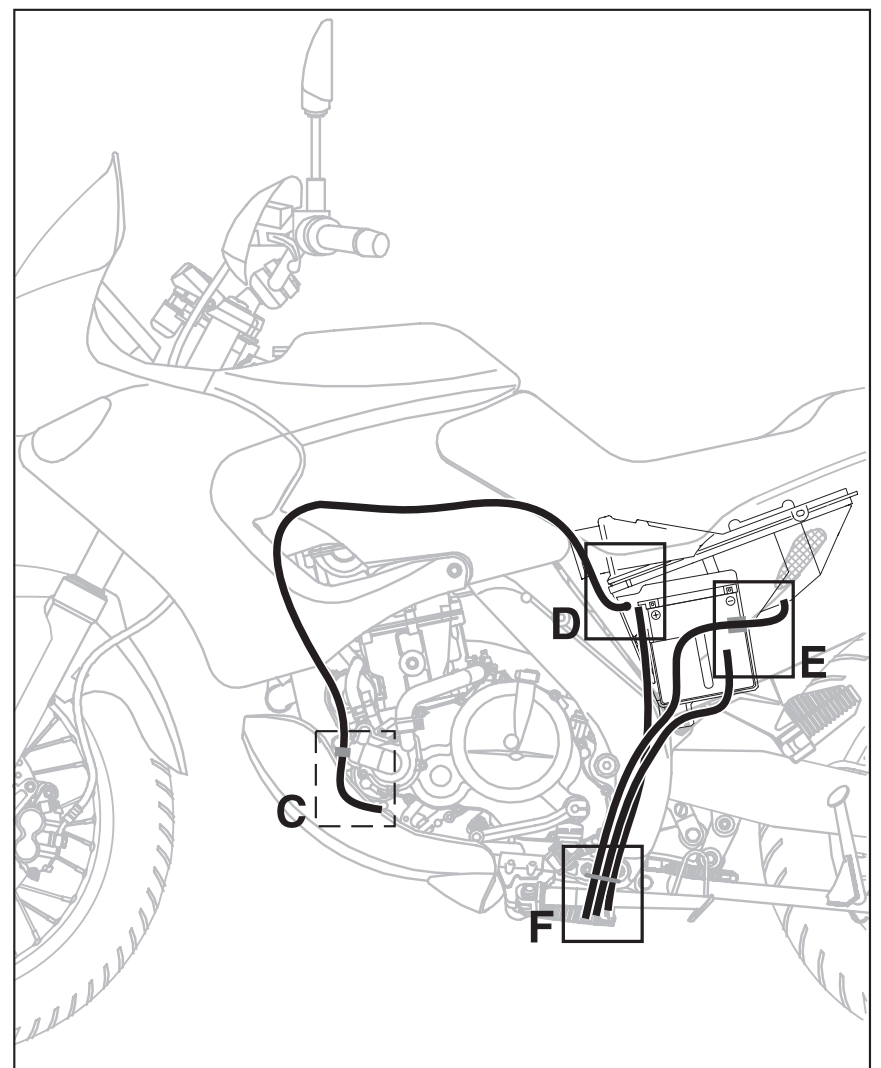
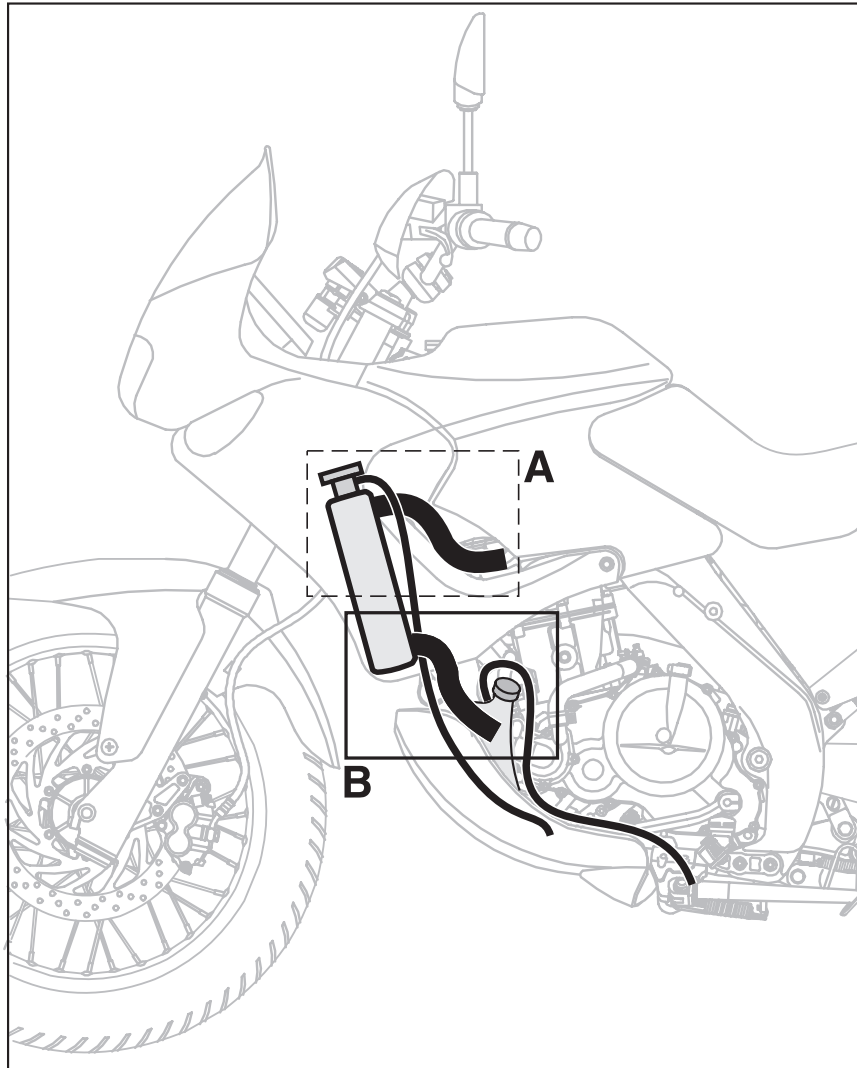


8.2.4 ENGINE OIL PIPES

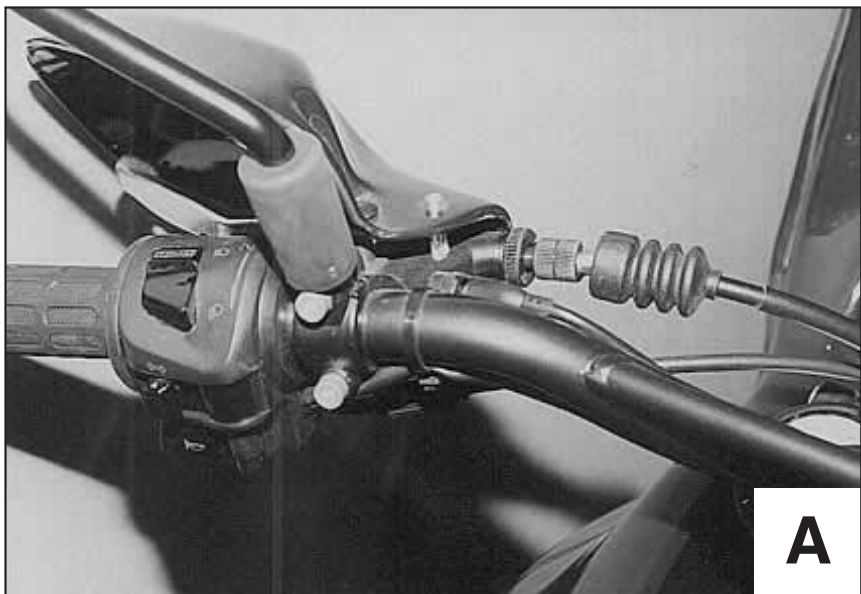
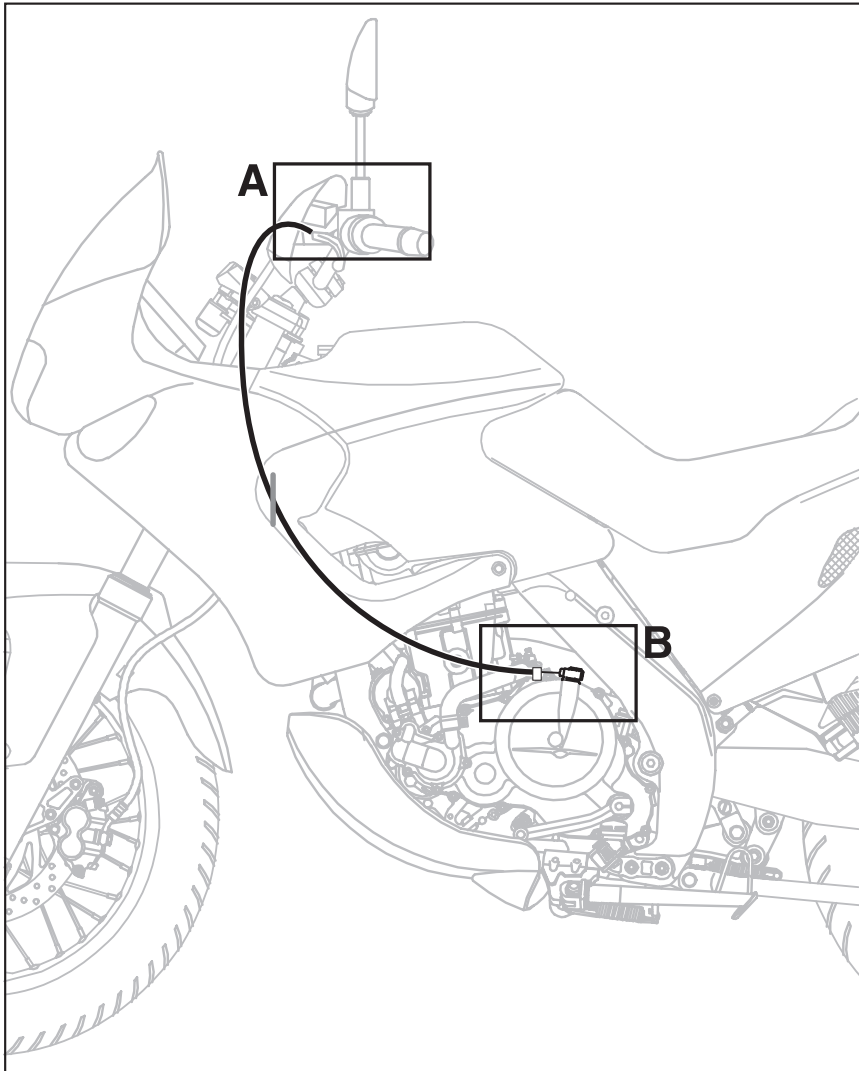


8.2.5 COOLING SYSTEM PIPES

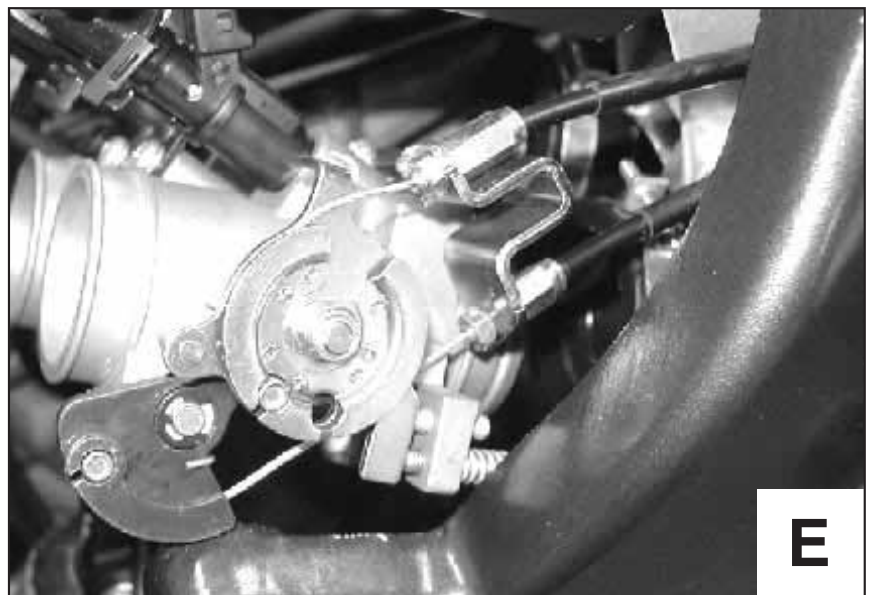
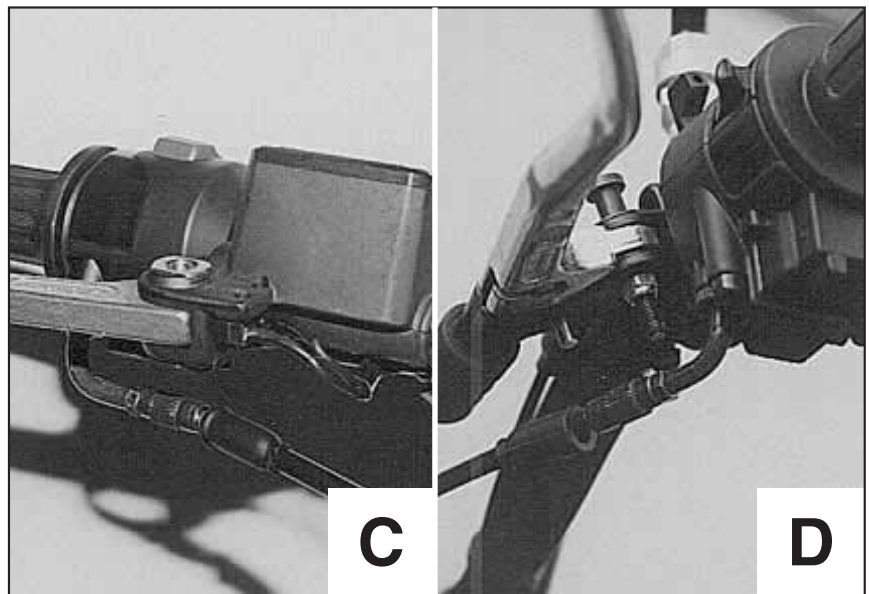
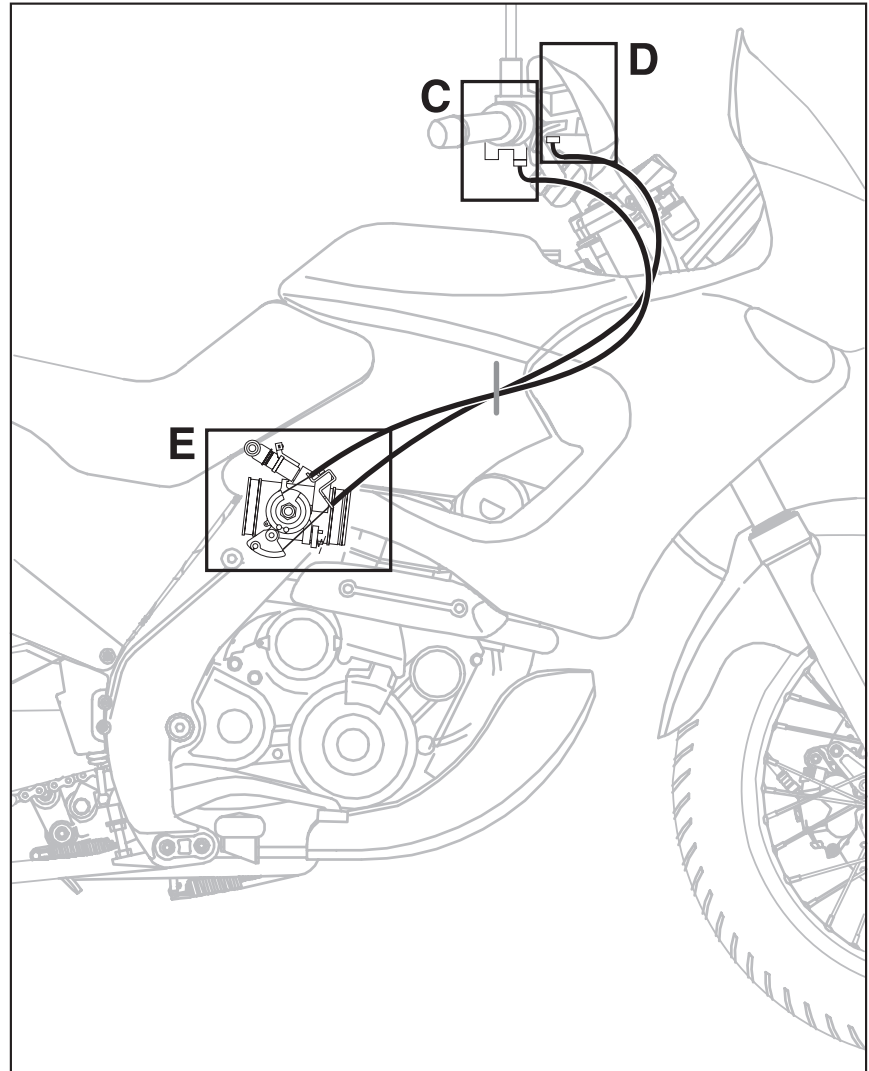
8.2.6 BREATHER AND IMPURITY DRAINAGE PIPES



8.2.7 CLUTCH CONTROL CABLE

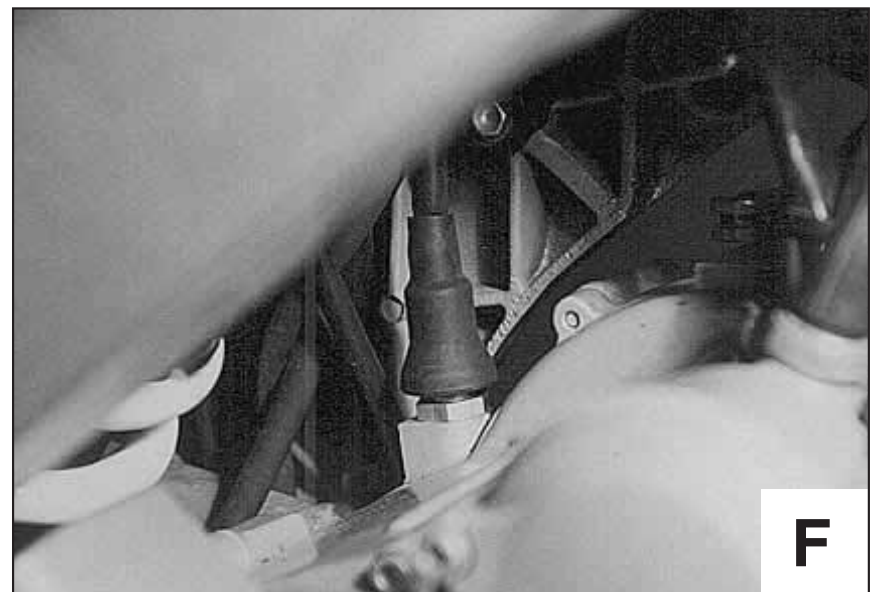
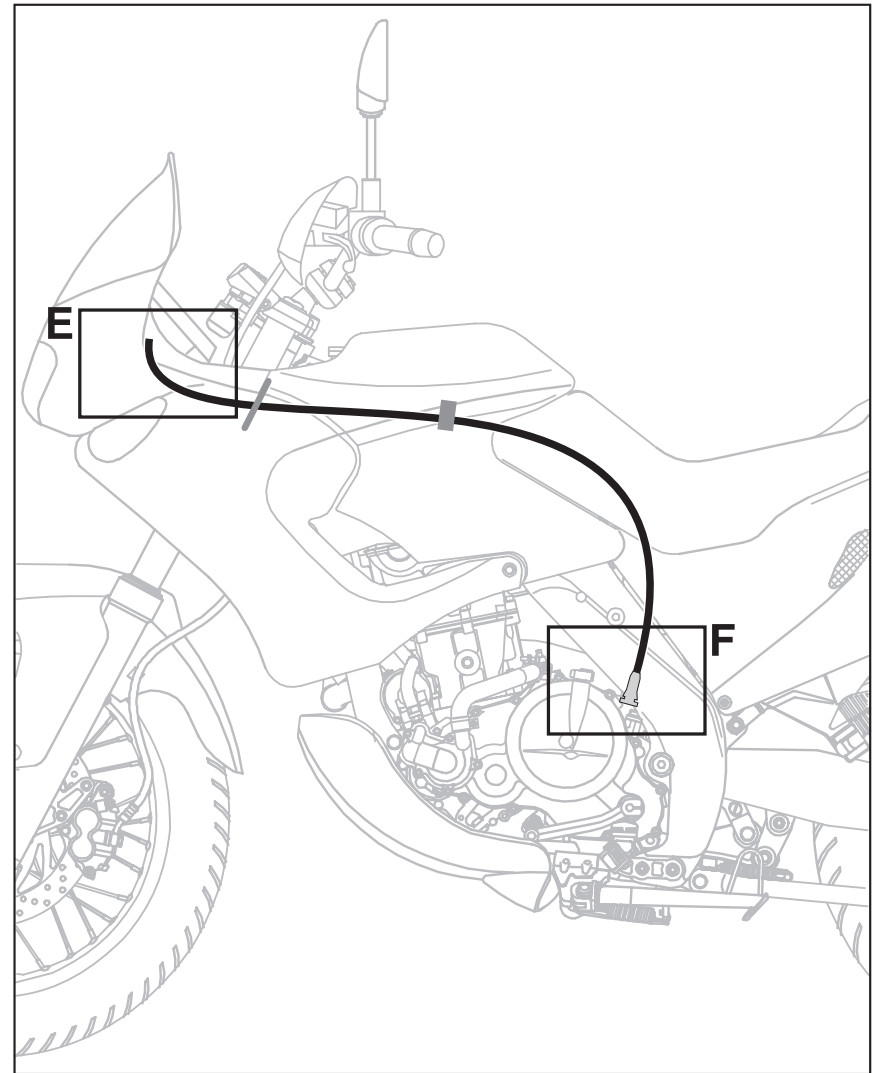
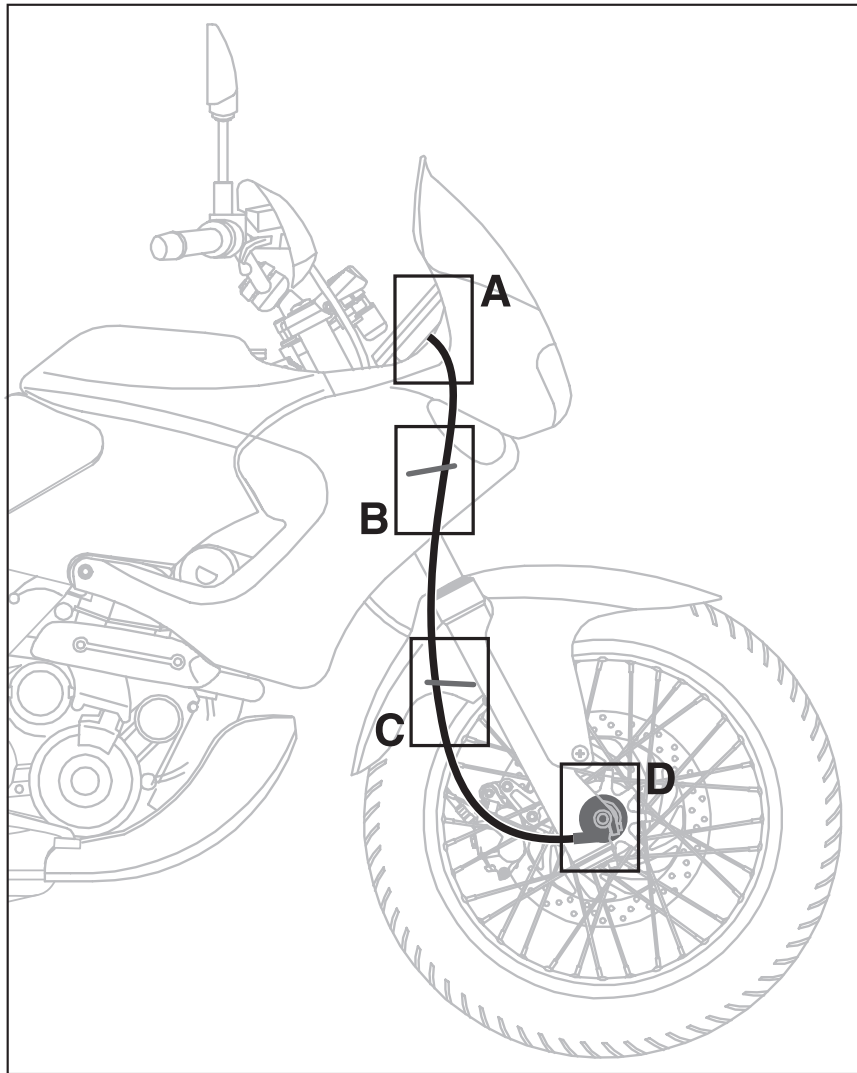


8.2.8 ACCELERATOR CONTROL CABLE AND COLD START CABLE

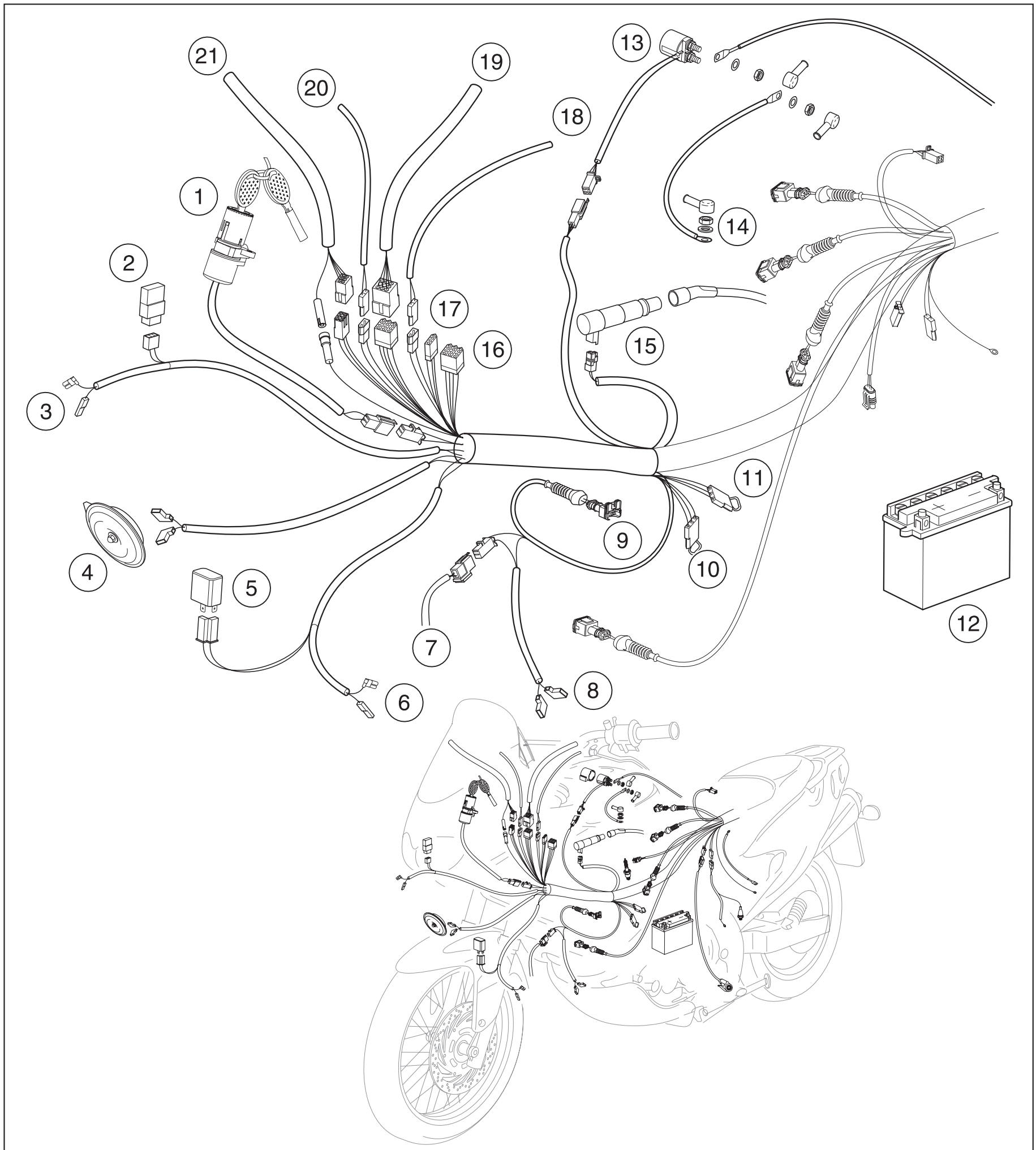


8.2.9 SPEEDOMETER-ODOMETER CABLE

8.2.10 REVOLUTION COUNTER CABLE



8.2.11 ELECTRIC CABLES

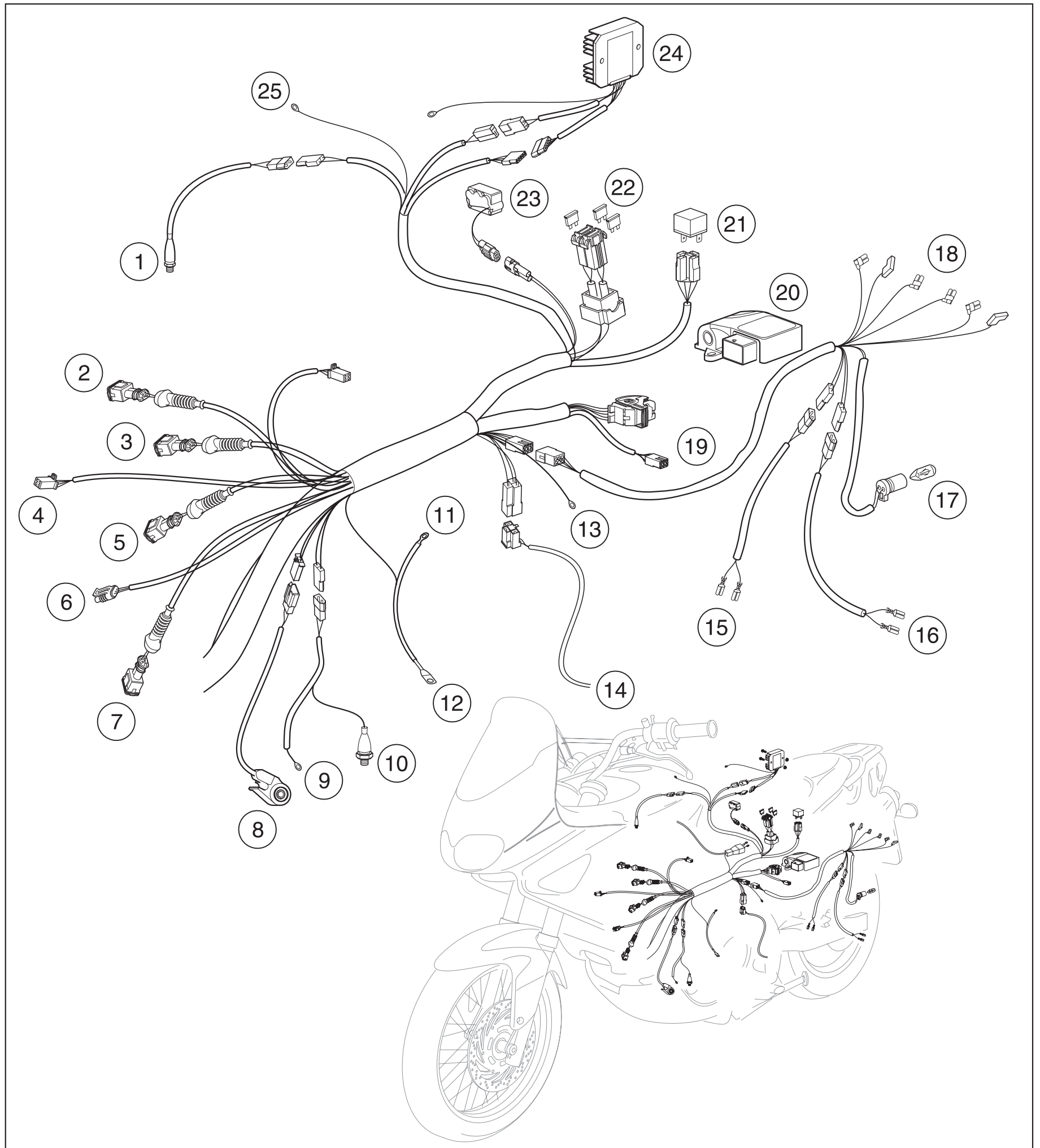


Key

- | | |
|---|--|
| 1) Ignition switch | 12) Battery |
| 2) Light relay | 13) Start relay |
| 3) Front right direction indicator connectors | 14) Starter |
| 4) Horn | 15) Coil |
| 5) Blinking | 16) Dashboard connector |
| 6) Front left direction indicator connectors | 17) Headlight connector |
| 7) To the electrofan | 18) To the clutch control lever switch |
| 8) Thermal switch connectors | 19) To the left dimmer switch |
| 9) Coolant temperature thermistor connector | 20) To the stoplight switch on the front brake control lever |
| 10) Diode 1 | 21) To the right dimmer switch |
| 11) Diode 2 | |

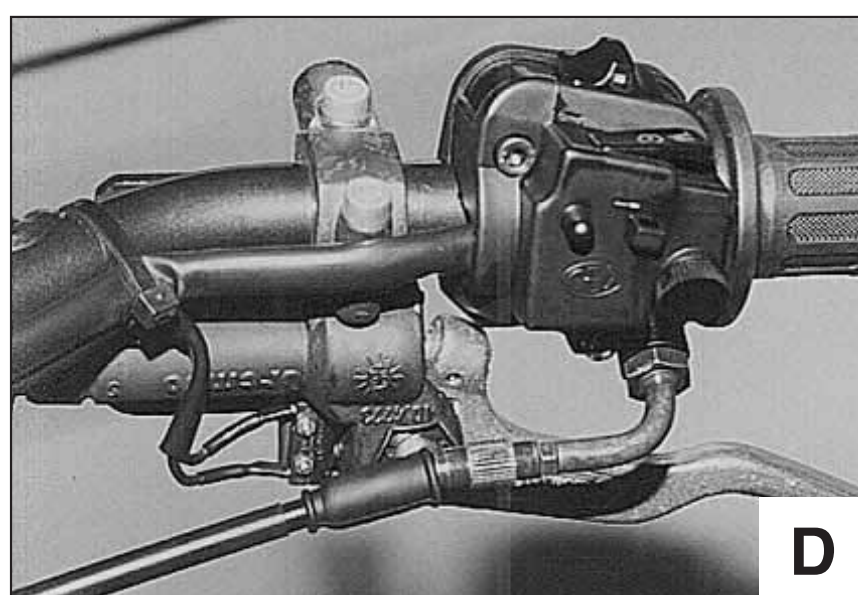
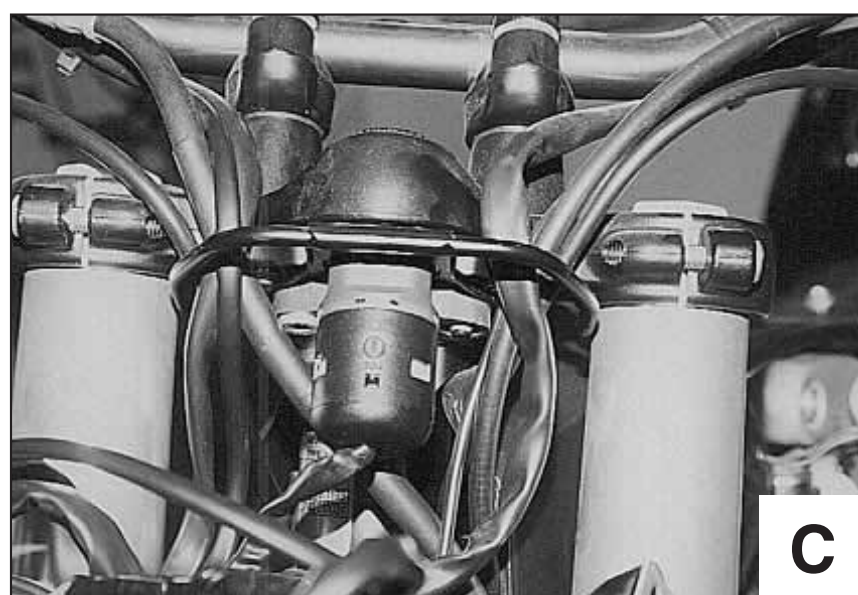
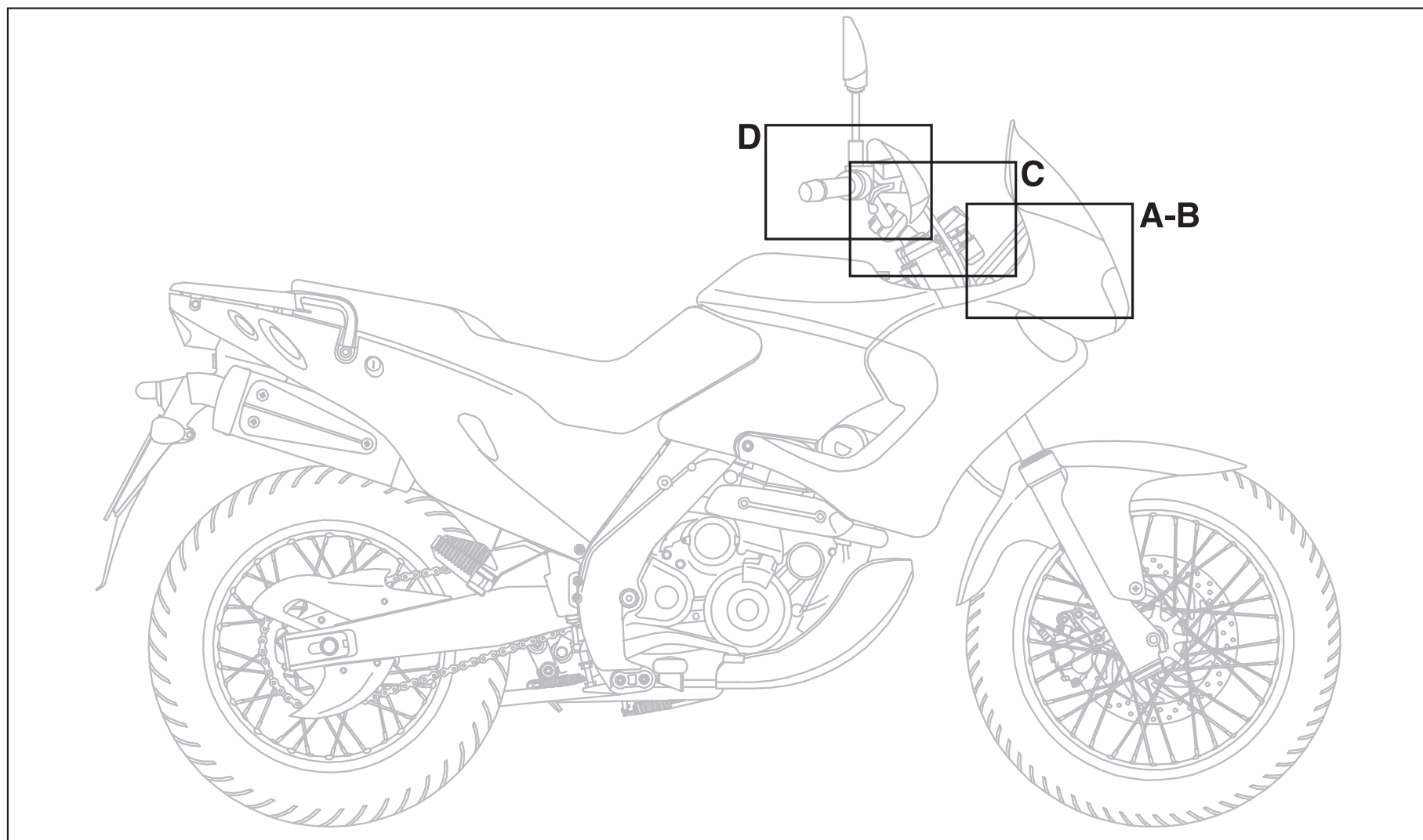
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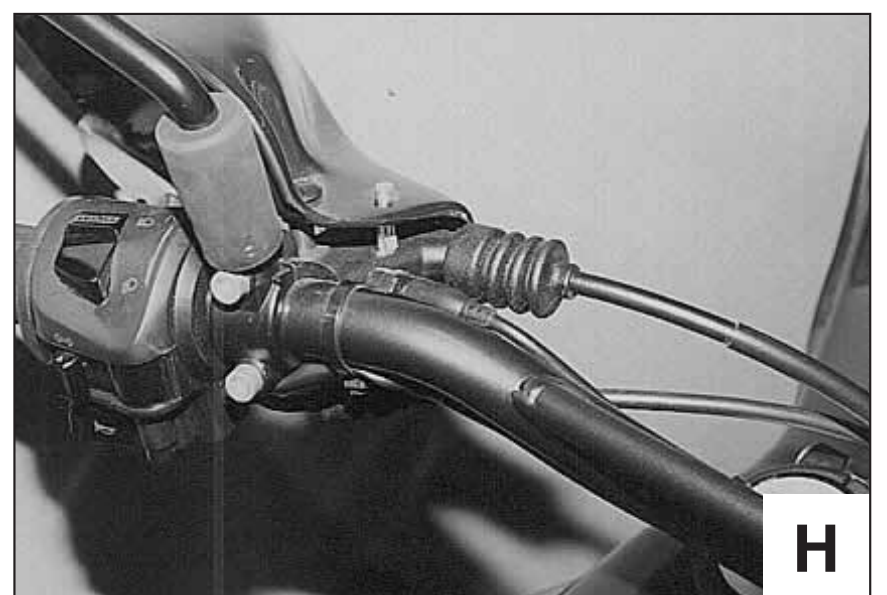
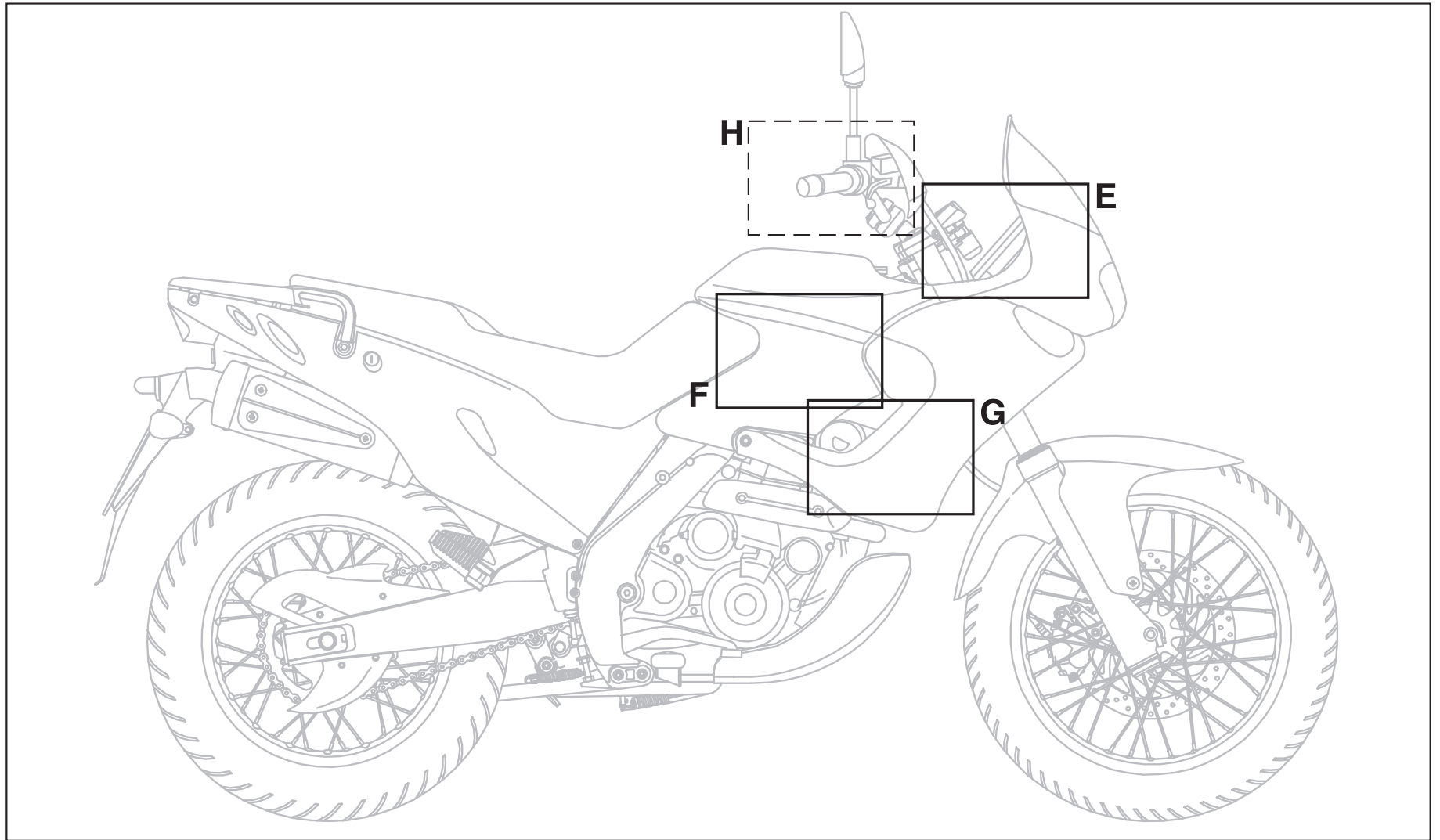
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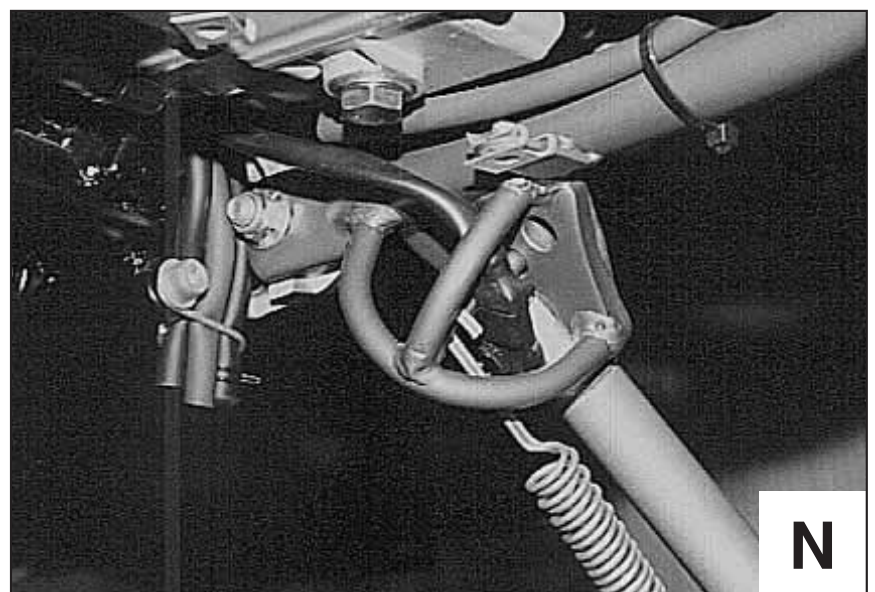
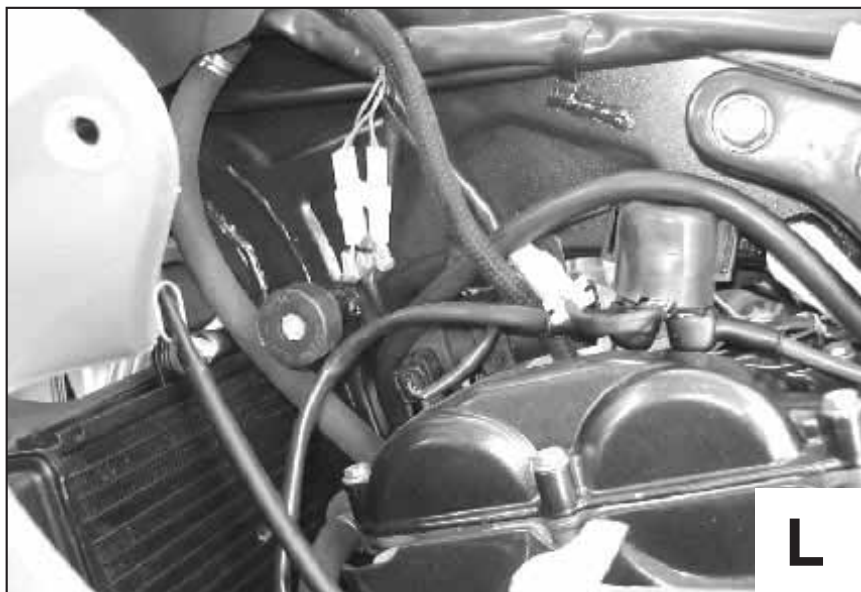
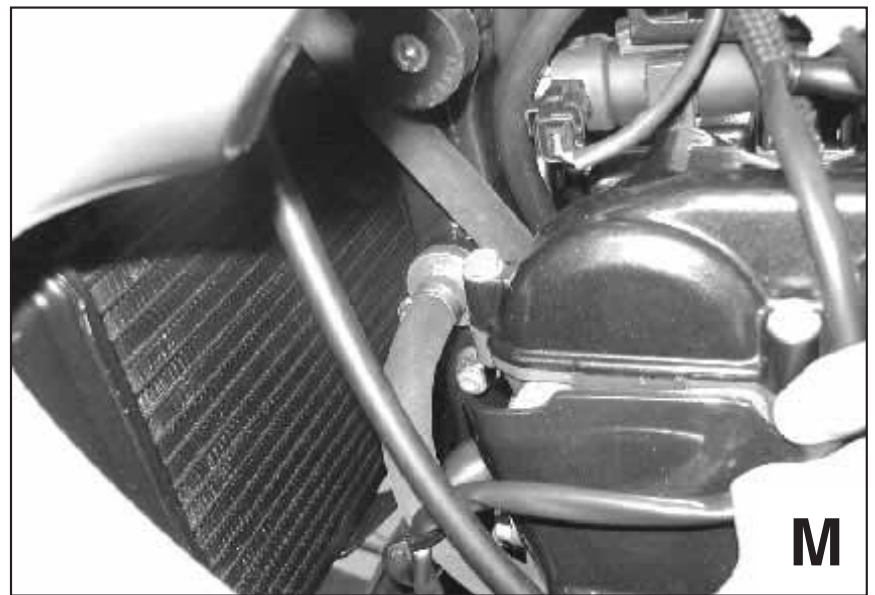
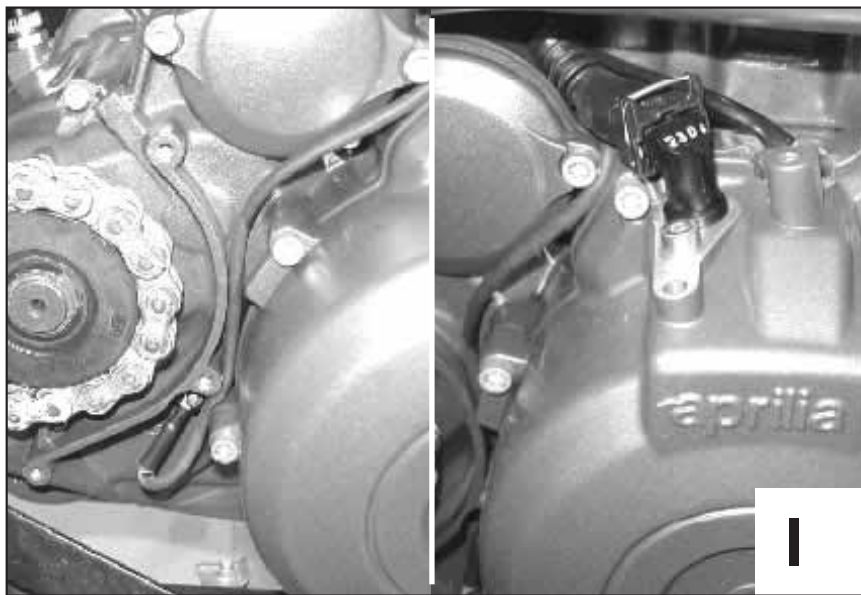
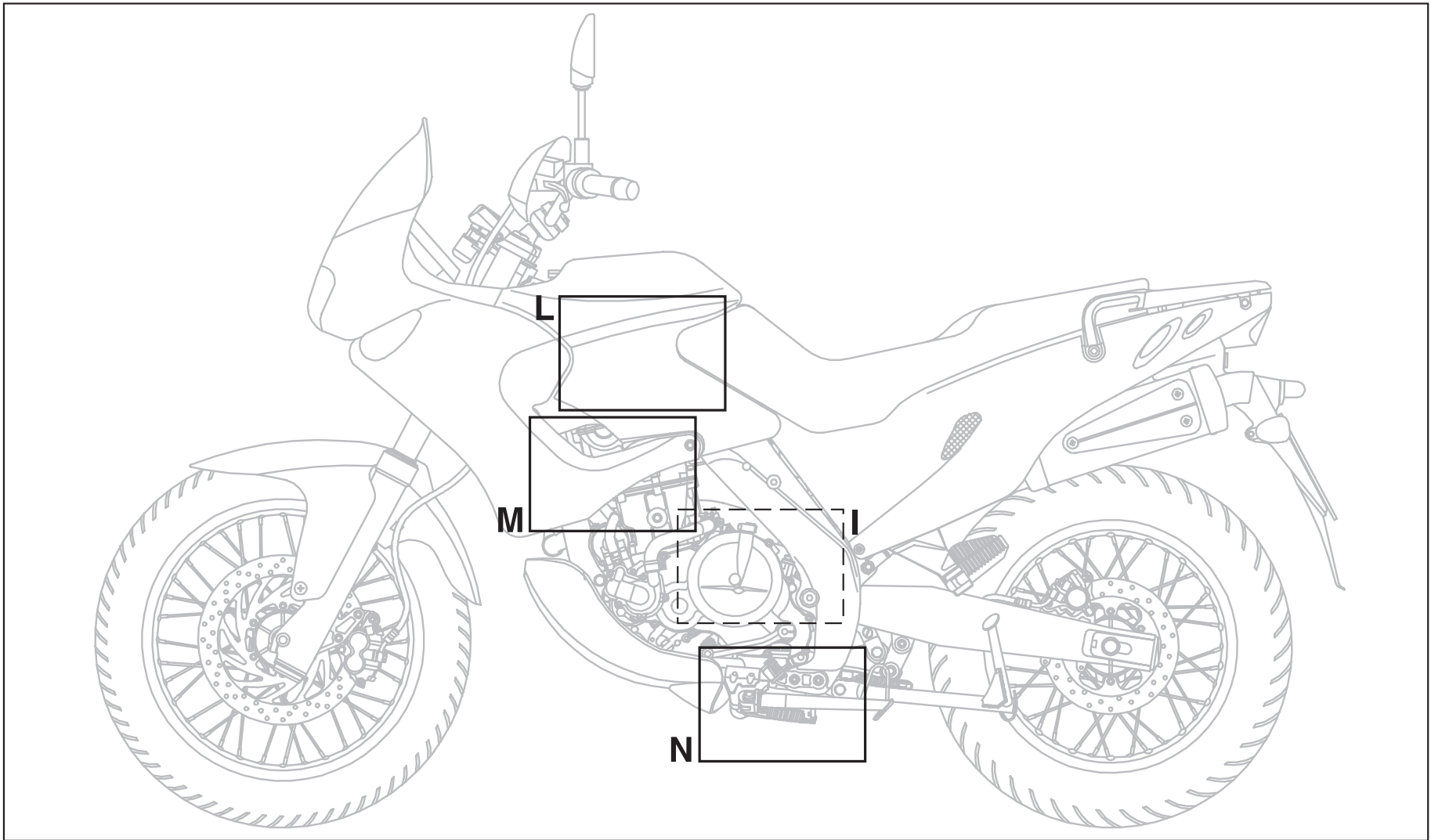


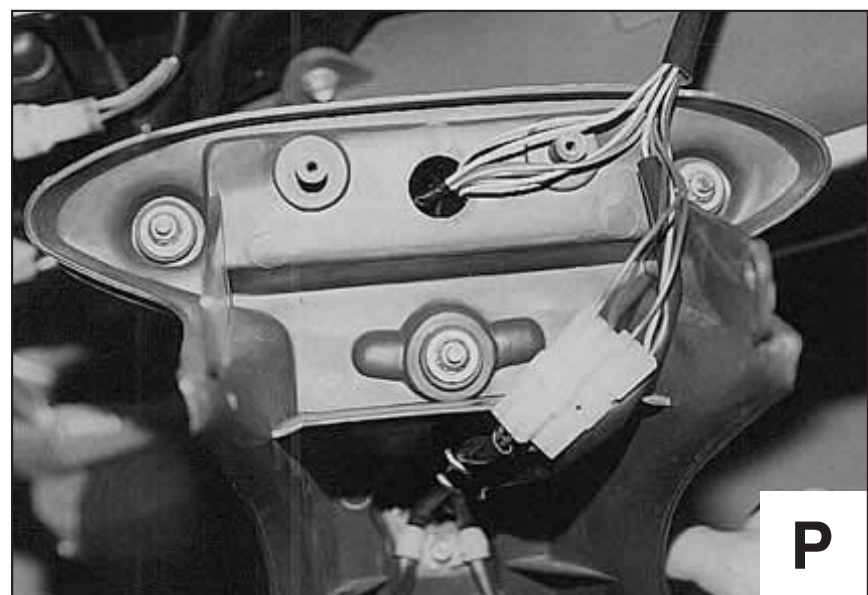
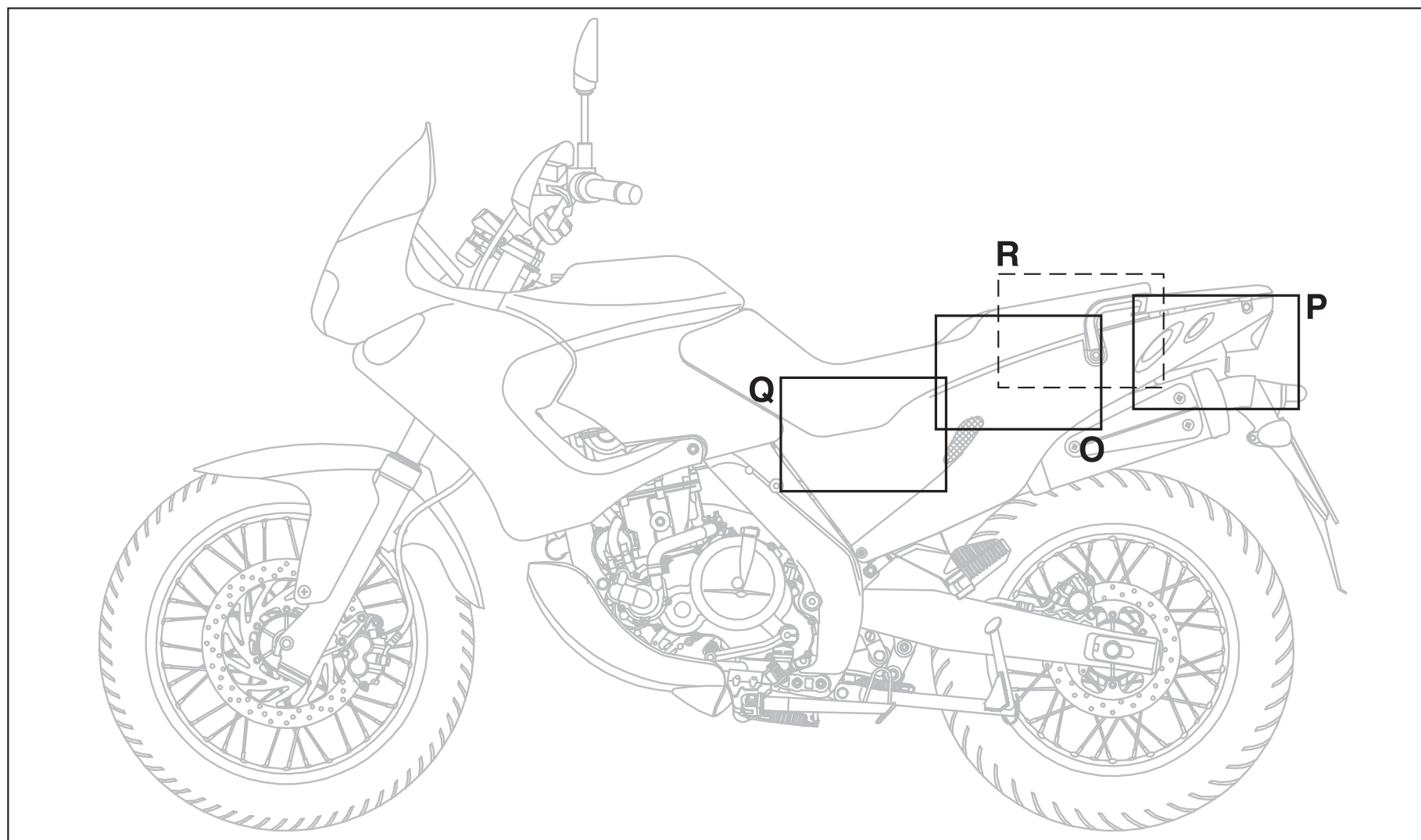
Key

- | | |
|---|------------------------------------|
| 1) Stoplight switch on the rear brake control lever | 14) To the generator |
| 2) Air thermistor connector | 15) Rear left indicator connector |
| 3) Driving shaft position connector | 16) Rear right indicator connector |
| 4) Fuel pump connector | 17) Number plate light |
| 5) Right injector connector | 18) Rear light connector |
| 6) Throttle valve potentiometer connector | 19) TEST connectors |
| 7) Left injector connector | 20) Electronic unit |
| 8) Side stand switch | 21) Fuel pump relay |
| 9) "Neutral" gearbox switch | 22) Fuses |
| 10) Engine oil pressure sensor | 23) Fall sensor |
| 11) Battery earth cable | 24) Voltage regulator |
| 12) Engine earth cable | 25) Earth |
| 13) Supply cable | |









8.3 CHECKING THE ELECTRICAL SYSTEM

See 6.2 (ELECTRIC COMPONENTS LAYOUT) and 8.2.11 (ELECTRIC CABLES) for the location of the electric components.

8.3.1 SPARK PLUGS (no spark)

First check:

- Check the spark plugs.

Second check:

- Check the 7.5 A fuses.
- See 6.5.9 (CHECKING THE IGNITION COIL).

Third check:

- See 6.5.10 (CHECKING THE PICK-UP).

8.3.2 BATTERY RECHARGING PROBLEMS

– See:

- 6.3.1 (CHECKING THE RECHARGING VOLTAGE).
- 6.3.2 (CHECKING THE ALTERNATOR LOADLESS OPERATION).
- 6.3.3 (CHECKING THE ALTERNATOR CONTINUITY).
- 6.3.4 (CHECKING THE VOLTAGE REGULATOR).
- 6.15.3 (CHECKING THE BATTERY).

8.3.3 IGNITION AND/OR STARTING PROBLEMS

Check the diagnostics system to be found in the vehicle, see 6.4.2 (TROUBLESHOOTING).

– Also see:

- 6.5.9 (CHECKING THE IGNITION COIL).
- 6.5.10 (CHECKING THE PICK-UP).
- 6.4.4 (CHECKING THE FALL SENSOR).
- 6.5.8 (CHECKING THE COOLANT THERMISTOR OPERATION).
- 6.5.7 (CHECKING THE AIR THERMISTOR OPERATION).
- 6.5.6 (CHECKING THE THROTTLE VALVE POTENTIOMETER).
- 6.5.5 (CHECKING THE INJECTORS).
- 6.6.1 (CHECKING THE FUEL PUMP).
- 6.7.2 (STARTING SAFETY OPERATING LOGIC).
- 6.7.3 (CHECKING THE STARTING RELAY).
- 6.7.5 (CHECKING THE SIDE STAND AND THE SAFETY SWITCH).
- 6.7.4 (CHECKING THE DIODE OPERATION).
- 6.8 (SWITCHES).
- 6.15.3 (CHECKING THE BATTERY).

8.3.4 AUXILIARY SYSTEM PROBLEMS

– See:

- 6.8 (SWITCHES).
- 6.13.2 (CHECKING THE HIGH BEAM RELAY).
- 6.9.2 (CHECKING THE ELECTROFAN OPERATION).
- 6.9.3 (CHECKING THE THERMAL SWITCH OPERATION).
- 6.12.2 (FUEL LEVEL INDICATOR).
- 6.10 (COOLANT TEMPERATURE INDICATOR).
- 6.11 (CHECKING THE ENGINE OIL PRESSURE SENSOR).
- 6.15.3 (CHECKING THE BATTERY).

8.4 TECHNICAL DATA AND SPECIFICATIONS

8.4.1 ENGINE

See 0.4.1 (ENGINE SERVICE AND REPAIR MANUALS) for the technical data and specifications.

8.4.2 THROTTLE BODY COMPONENTS

See 4.9 (THROTTLE BODY) for the technical data and specifications.

8.4.3 SUPPLY SYSTEM

- Fuel tank material = NYLON.
- Material of pipes entering/leaving the delivery filter (internal \varnothing = 7.5 mm – external \varnothing = 14.5 mm) = NBR-SF-NBR DIN 73379.
- High and low pressure pipe material = PVC - P - PBT PA12 SUNPRENE and ends with rapid coupling unions.

8.4.4 ELECTRIC SYSTEM

- Ignition switch = ZADI Q 933.
- Spark plug caps = SAGEM.
- Spark plug cap resistance = 5 k Ω .

For further information, see 1.5 (TECHNICAL SPECIFICATIONS) and Sect. 6 (ELECTRIC SYSTEM).

8.4.5 FRONT BRAKING SYSTEM

- Disc material = steel.
- Disc thickness = 5 mm (minimum 4.5 mm).
- Disc diameter = 300 mm.
- Number of caliper pins = 2 facing each other.
- Diameter of caliper pins = 30 mm (lower) + 32 mm (upper).
- Diameter rubber pipes (standard) = FERIT/FERODO ID 450.
- Pad friction material (alternative) = JB YA14 or JB YA 15i 14 or TT 2802.
- Diameter metal plait pipe = external \varnothing 10 mm – internal \varnothing 3.2 mm.
- Pump diameter = 13 mm.

8.4.6 REAR BRAKING SYSTEM

- Disc material = steel.
- Disc thickness = 5 mm (minimum 4.5 mm).
- Disc diameter = 240 mm.
- Number of caliper pins = 2 facing each other.
- Diameter of caliper pins = 34 mm.
- Diameter rubber pipes (standard) = FERIT/FERODO ID 450.
- Diameter metal plait pipes = external \varnothing 10 mm – internal \varnothing 3.2 mm.
- Pump diameter = 13 mm.

8.4.7 COOLING SYSTEM

See sect. 5 (COOLING SYSTEM)

- Working pressure = 90 – 120 kPa (0.9 – 1.2 bar).

8.4.8 WHEELS

Rims:

See 1.5 (TECHNICAL SPECIFICATIONS).

Rim eccentricity:

See 7.2.2 (CHECKING THE FRONT WHEEL COMPONENTS).

Wheel pin eccentricity:

See 7.2.2 (CHECKING THE FRONT WHEEL COMPONENTS).

Tyres:

See 1.5 (TECHNICAL SPECIFICATIONS) and 7.4 (TYRES).

8.4.9 FRONT SUSPENSION

See 1.5 (TECHNICAL SPECIFICATIONS), 2.24 (INSPECTING THE FRONT AND REAR SUSPENSION) and 7.8 (FRONT FORK).

8.4.10 REAR SUSPENSION

See 1.5 (TECHNICAL SPECIFICATIONS), 2.25 (INSPECTING THE REAR SUSPENSION), 7.9 (REAR FORK) and 7.10 (REAR SUSPENSION).

8.4.11 STEERING

See 2.22 (STEERING) and 7.7 (STEERING).

8.4.12 CAPACITIES - FLUID PROPERTIES

See 1.5 (TECHNICAL SPECIFICATIONS) and 1.6 (LUBRICANT CHART).

8.4.13 STRUCTURE (FRAME/SADDLE SUPPORT)

- Saddle support material = steel.
- Frame material = steel + light alloy.
- Frame weight = kg 9.9.
- Frame torsional stiffness = 6500 Nm/° (650 kgm/°).
- Saddle support weight = kg 2.3.

For further information, see 1.5 (TECHNICAL SPECIFICATIONS).

8.4.14 EXHAUST SYSTEM

-  Catalytic converter = 100 CPSI Pt/Rh 5/1.

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