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0.1. FOREWORD

0.1.1. FOREWORD

- This manual provides the information required for normal servicing.
- This manual is intended for use by **aprilia** Dealers and their qualified mechanics. Certain information has been omitted intentionally, as this manual does not purport to provide a comprehensive treatise on mechanics. The persons who will use this manual must be fully conversant with the basics of mechanics and with the basic procedures of motorcycle repair. Repairing or inspecting a motorcycle when one does not possess such basic knowledge or training could result in improper servicing and make the motorcycle unsafe to ride. For the same reason, certain basic precautions have been omitted in the descriptions of repair and inspection procedures. Take special care to avoid damage to motorcycle components or injury to persons. **aprilia s.p.a.**'s mission is to constantly enhance the riding pleasure of final users through the on-going improvement of its products as well as of the relevant technical literature. All **aprilia** Points of Sale and Subsidiaries worldwide are kept updated on major engineering changes and modifications to repair procedures. Such changes and modifications are then reflected in the next release of the relevant manual. When in doubt about an inspection or repair procedure, please contact the **aprilia** CONSUMER SERVICE (A.C.S.) DEPARTMENT, who will be glad to provide full information on the procedure in question as well as on any updates or engineering changes affecting the motorcycle under consideration.

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For more detailed information, please read  [0.1.2.](#)

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0.1.2. REFERENCE MANUALS

ENGINE WORKSHOP MANUALS

aprilia part# (description)	
8140133 (926)	I F E
8140134 (943)	D UK

PARTS CATALOGUES

aprilia part# (description)	
340X	I
993.....	I

SPECIAL TOOLS CATALOGUES

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

OWNER'S MANUALS

aprilia part# (description)
Model years 1993
8102260 I
Model years 1994
8102260 I
8102319 D F UK
Model years 1995
8102476 I
8102530 D UK F
8102543 E
Model years 1996
8102685 I
8102682 D UK F
8102530 D UK F
8102683 P E NL
8102543 E
Model years 1997
8102685 I
8102682 D UK F
8102683 P E NL
8102530 D UK F
8102543 E
8102752 DK SF GR
8102753 DK NL P
Model years 1998
8102685 I
8102682 D UK F
8102683 P E NL
8102849 DK
8102934 D UK F AUS
Model years 1999
8102821 I F D
8102937 P E UK AUS
8102938 DK NL SF
8102939 GR J UK
Model years 2001
8202248 USA
8102821 I F D
8102937 P E UK AUS
8102938 DK NL SF
8102939 GR J UK
Model years 2002
8104465 I F D
8104466 P E UK
8104467 DK NL SF
8104468 GR J UK

0.1.3. ABBREVIATIONS/SYMBOLS/CONVENTIONS

#	= number
<	= is less than
>	= is more than
≤	= is less than or equal to
≥	= is more than or equal to
~	= approximately
∞	= infinite
°C	= degrees Celsius (centigrade)
°F	= degrees Fahrenheit
±	= plus or minus
a.c	= alternated current
A	=ampere
Ah	=ampere per hour
API	= American Petroleum Institute
HT	= High Tension
AV/DC	= Anti-Vibration Double Countershaft
bar	= pressure measurement (1 bar =100 kPa)
DC	= Direct Current
cu cm	= cubic centimetres
CO	= carbon oxide
CPU	= Central Processing Unit
DIN	= German industrial standards (Deutsche Industrie Norm)
DOHC	= Double Overhead Camshaft
ECU	= Electronic 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 per hour
kΩ	= kiloOhm
kPa	= kiloPascal (1 kPa =0.01 bar)
KS	= clutch side (from the German "Kupplungseite")
kW	= kiloWatt
/	=litres
LAP	= racetrack lap
LED	= Light Emitting Diode
LEFT	
SIDE	=left side
m/s	= metres per second
max	= maximum
mbar	= millibar (1 mbar =0.1 kPa)
mi	= miles
MIN	= minimum
MPH	= miles per hour
MS	= flywheel side (from the German "Magnetoseite")
MΩ	= megaOhm
N.A.	= Not Available
N.O.M.M.	= Motor Octane Number
N.O.R.M.	= Research Octane Number
Nm	= Newton per metre (1 Nm =0.1 kgm)
Ω	=ohm
PICK-UP	
BDC	= Bottom Dead Centre
TDC	= Top Dead Centre
PPC	= Pneumatic Power Clutch
RIGHT	
SIDE	= right side
SAE	= Society of Automotive Engineers
T.B.E.I.	= crowned-head Allen screw
T.C.E.I.	= cheese-headed Allen screw

T.E.	=hexagonal head
TEST	= diagnostic check
T.P.	=flat head screw
TSI	= Twin Spark Ignition
UPSIDE- DOWN	= inverted fork
V	=volt
W	=watt
Ø	= Diameter

GENERAL INFORMATION

1

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1.1. MANUAL LAYOUT

1.1.1. CONVENTIONS USED IN THE MANUAL

- This manual is divided in sections and subsections, each covering a set of the most significant components. For quick reference, see the sections index.
- Unless expressly specified otherwise, assemblies are reassembled by reversing the dismantling procedure.
- The terms “left” and “right” are referred to the motorcycle when viewed from the riding position.
- Motorcycle operation and basic maintenance are covered in the “OWNER’S MANUAL”.

In this manual any variants are identified with these symbols:

frame # ZD4DW.....(starting from Model Year 2001)

OPT option

✱ Catalysed version

- All versions

11Kw 11 Kw derated version

80Km 80Km/h speed

f.p Full-power version

MP National homologation

SF European homologations (EURO 1 limits)

VERSION:

I Italy	GR Greece	Mal Malaysia
UK United Kingdom	NL Netherlands	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	SLO Slovenia	RSA Republic of South Africa
F France	IL Israel	NZ New Zealand
E Spain	ROK South Korea	CDN Canada

1.1.2. SAFETY INFORMATION

The following conventions are used to identify safety information throughout the manual:



This symbol identifies safety-related information. Whenever you see this symbol in the manual or attached to the motorcycle, use utmost care to avoid the risk of injury. Disregarding the instructions identified by this symbol may put your safety, as well as that of other persons or of the motorcycle at risk!

**DANGER**

Disregarding these indications may lead to severe injury or death

**WARNING**

Disregarding these indications may lead to minor injury or motorcycle damage.

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

1.2. GENERAL RULES

1.2.1. BASIC SAFETY RULES

CARBON MONOXIDE

Should it be necessary to perform some operations with the vehicle running, make sure to work outdoors or in a well-aerated room.

Avoid starting the engine in closed or badly-ventilated rooms.

In case you are working indoors, make use of an exhaust gases scavenging system.



DANGER

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

FUEL



DANGER

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

DO NOT DISPOSE OF FUEL IN THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

HIGH-TEMPERATURE COMPONENTS

The engine and the exhaust system parts become hot and continue to be hot even for some time after the engine has been stopped.

Before handling these parts, wear insulating gloves or wait for the engine and the exhaust system to cool completely down.

USED GEARBOX AND FORK OILS



DANGER

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

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

Wash your hands carefully after use.

Put it in a sealed container and take it to the filling station where you usually buy it or to an oil salvage center.

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

DO NOT DISPOSE OF OIL IN THE ENVIRONMENT

KEEP AWAY FROM CHILDREN.

BRAKE FLUID



WARNING

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

When carrying out the maintenance operations on the braking system, use a clean cloth to cover these parts.

Always wear safety goggles when working on the braking system.

The brake fluid is highly irritant. Avoid contact with your eyes.

If the brake fluid gets in contact with the skin or the eyes, carefully wash the parts of your body that get in contact with the fluid and consult a doctor.

KEEP AWAY FROM CHILDREN.

COOLANT

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

**DANGER**

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

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

Even if toxic, coolant has a sweet flavour. Never leave it inside open containers or within the reach of animals to prevent the risk of drinking.

KEEP AWAY FROM CHILDREN.

Do not remove the radiator plug when the engine is hot. The coolant is under pressure and could cause severe burns.

HYDROGEN GAS AND BATTERY ELECTROLYTE**DANGER**

The battery electrolyte is a toxic, caustic substance containing sulphuric acid and thus able to cause severe burns in case of contact.

Always wear tight gloves and protective clothes when handling this fluid.

If the electrolyte gets in contact with the skin, carefully wash the parts of your body that get in contact with the fluid with abundant fresh water.

Always use a protection for your eyes since also a very small amount of the battery fluid can cause blindness. In the event of contact with your eyes, carefully wash them with water for fifteen minutes and then consult immediately an eye specialist.

Should you accidentally drink some fluid, drink abundant water or milk, then drink magnesia milk or vegetable oil and consult immediately a doctor. Battery releases explosive gases. Keep flames, sparks, cigarettes and any other heat source away from the battery. Make sure the room is well-aerated when servicing or recharging the battery.

KEEP AWAY FROM CHILDREN.

The battery fluid is corrosive

Do not pour it on the plastic parts.

Make sure that the electrolyte acid is suitable for the type of battery used.

GENERAL PRECAUTIONS AND INFORMATION

Follow these instructions closely when repairing, disassembling or reassembling the motorcycle or its components.

**DANGER**

Using bare flames is strictly forbidden when working on the motorcycle. Before servicing or inspecting the motorcycle: stop the engine and remove the key from the ignition switch; allow for the engine and exhaust system to cool down; where possible, lift the motorcycle using adequate equipment placed on firm and level ground. Be careful of any parts of the engine or exhaust system which may still be hot to the touch to avoid scalds or burns.

Never put any mechanical parts or other vehicle components in your mouth when you have both hands busy. None of the motorcycle components is edible. Some components are harmful to the human body or toxic.

Unless expressly specified otherwise, motorcycle assemblies are refitted or re-assembled by reversing the removal or dismantling procedure. Where a procedure is cross-referred to relevant sections in the manual, proceed sensibly to avoid disturbing any parts unless strictly necessary. Never attempt to polish matte-finished surfaces with lapping compounds.

Never use fuel instead of solvent to clean the motorcycle.

Do not clean any rubber or plastic parts or the seat with alcohol, petrol or solvents. Clean with water and neutral detergent.

Always disconnect the battery negative (–) lead before soldering any electrical components.

When two or more persons service the same motorcycle together, special care must be taken to avoid personal injury.

Read  1.3.1.

BEFORE DISASSEMBLING ANY COMPONENTS

- Clean off all dirt, mud, and dust and clear any foreign objects from the vehicle before disassembling any components.
- Use the model-specific special tools where specified.

DISASSEMBLING THE COMPONENTS

- Never use pliers or similar tools to slacken and/or tighten nuts and bolts. Always use a suitable spanner.
- Mark all connections (hoses, wiring, etc.) with their positions before disconnecting them. Identify each connection using a distinctive symbol or convention.
- Mark each part clearly to avoid confusion when refitting.
- Thoroughly clean and wash any components you have removed using a detergent with low flash point.
- Mated parts should always be refitted together. These parts will have seated themselves against one another in service as a result of normal wear and tear and should never be mixed up with other similar parts on refitting.
- Certain components are matched-pair parts and should always be replaced as a set.
- Keep the motorcycle and its components well away from heat sources.

REASSEMBLING THE COMPONENTS**DANGER**

Never reuse a circlip or snap ring. These parts must always be renewed once they have been disturbed. When fitting a new circlip or snap ring, take care to move the open ends apart just enough to allow fitment to the shaft.

Make a rule to check that a newly –fitted circlip or snap ring has located fully into its groove.

Never clean a bearing with compressed air.

NOTE All bearings must rotate freely with no hardness or noise. Replace any bearings that do not meet these requirements.

- Use ORIGINAL **aprilia** SPARE PARTS only.
- Use the specified lubricants and consumables.
- Where possible, lubricate a part before assembly.
- When tightening nuts and bolts, start with the largest or innermost nut/bolt and observe a cross pattern. Tighten evenly in subsequent steps until achieving the specified torque.
- Replace any self-locking nuts, gaskets, seals, circlips or snap rings, O-rings, split pins, bolts and screws which have a damaged thread.
- Lubricate the bearings abundantly before assembly.
- Make a rule to check that all components you have fitted are correctly in place.
- After repairing the motorcycle and after each service inspection, perform the preliminary checks, and then operate the motorcycle in a private estate area or in a safe area away from traffic.
- Clean all joint surfaces, oil seal edges and gaskets before assembly. Apply a light coat of lithium grease along the edges of oil seals. Fit oil seals and bearings with the marking or serial number facing outwards (in view).

ELECTRICAL CONNECTORS

To disconnect the electrical connector, follow the procedures below. Failure to comply with these procedures may lead to irreparable damages to the connector and the wiring as well. If present, press the special safety hooks.

**WARNING**

Do not pull cables to disconnect the two connectors.

- Grasp the two connectors and disconnect them by pulling them in the two opposite directions.
- In case of dirt, rust, moisture, etc., thoroughly clean the inside of the connectors with compressed air.
- Make sure that the cables are correctly fitted inside the connectors terminals.

NOTE The two connectors have just one correct positioning. Make sure to position them in the right direction.

- Then fit the two connectors. Make sure they are correctly coupled (a click will be heard).

TIGHTENING TORQUE SETTINGS**DANGER**

Always remember that the tightening torque settings of all wheel, brake, wheel shaft and other suspension parts play a fundamental role to ensure vehicle safety. Make sure that these values are always within the specified limits.

Check fastening parts tightening torque settings at regular intervals. Upon reassembly, always use a torque wrench.

Failure to comply with these recommendations could lead to the loosening and detachment of one of these parts with a consequent locking of the wheel or other serious troubles affecting the vehicle maneuverability, and thus the risk of falls and serious injuries or death.

1.3. DANGEROUS ELEMENTS

1.3.1. WARNINGS CONCERNING FUEL, LUBRICANTS, COOLANT AND OTHER COMPONENT PARTS

FUEL

**DANGER**

The fuel used to operate engines is highly flammable and becomes explosive under particular conditions.

Refuelling and engine service should take place in a well-ventilated area with the engine stopped. Do not smoke when refuelling or in the proximity of sources of fuel vapours. Avoid contact with bare flames, sources of sparks or any other source which may ignite the fuel or lead to explosion.

Take care not to spill fuel out of the filler, or it may ignite when in contact with hot engine parts. In the event of accidental fuel spillage, make sure the affected area is fully dry before starting the engine. Fuel expands from heat and when left under direct sunlight.

Never fill the fuel tank up to the rim. Tighten the filler cap securely after each refuelling.

Avoid contact with skin. Do not inhale vapours. Do not swallow fuel. Do not transfer fuel between different containers using a hose.

DO NOT RELEASE FUEL INTO 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.).

LUBRICANTS

**DANGER**

A good lubrication ensures the vehicle safety.

Failure to keep the lubricants at the recommended level or the use of a non-suitable new and clean type of lubricant can lead to the engine or gearbox seizure, thus leading to serious accidents, personal injury or even death.

Gear 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 oil into the environment.

Take it to the filling station where you usually buy it or to an oil salvage center.

**WARNING**

When filling the vehicle with this oil, take care not to spill it out since it could damage the vehicle paintwork.

In case of contact with oil, the tyres surface will become very slippery, thus becoming a serious danger for your safety.



In case of leaks, do not use the vehicle. Check and trace the cause of leaks and proceed to repair.


FRONT FORK FLUID

**DANGER**

Front suspension response can be modified to a certain extent by changing damping settings and/or selecting a particular grade of oil. Standard oil grade is SAE 20 W. Different oil grades can be selected to obtain a particular suspension response. (Choose SAE 5W for a softer suspension, 20W for a stiffer suspension).

The two grades can also be mixed in varying solutions to obtain the desired response.

 F.A. or  Agip FORK has special properties, which enable them to retain virtually the same viscosity regardless of temperature to give constant damping response.

(Recommended) front fork oil, see  1.8.1.

BRAKE FLUID

NOTE This vehicle is fitted with front and rear disc brakes. Each braking system is operated by an independent hydraulic circuit. The information provided below applies to both braking systems.

**DANGER**

Do not use the vehicle in case brakes are worn out or do not work properly! The brakes are the parts that most ensure your safety and for this reason they must always be perfectly working. Failure to comply with these recommendations will probably lead to a crash or an accident, with a consequent risk of personal injury or death.

A wet surface reduces brakes efficiency.

**DANGER**

In case of wet ground the braking distance will be doubled, since both brakes and tyres drives on the road surface are extremely reduced by the water present on the road surface.

Any water on brakes, after washing the vehicle or driving on a wet road surface or crossing puddles or gips, can wet brakes so as to greatly reduce their efficiency.

Failure to comply with these recommendations may lead to serious accidents, with a consequent risk of severe personal injuries or death.

Brakes are critical safety components. Do not ride the vehicle in case brakes are not working at their best.




Check for brakes proper operation before every trip.


Brake fluid is an irritant. Avoid contact with eyes or skin.

In the event of accidental contact, wash affected body parts thoroughly. In the event of accidental contact with eyes, contact an eye specialist or seek medical advice.

DO NOT RELEASE BRAKE FLUID INTO THE ENVIRONMENT.KEEP AWAY FROM CHILDREN.

When handling brake fluid, take care not to spill it onto plastic or paint-finished parts or they will damage.

Check brake fluid level after the first 1000 km (625 mi) and then every 4000 km (2485 mi). See  2.12.1 and  2.12.4; change brake fluid every year, see  2.12.2 .

(Recommended) brake fluid, see  1.8.1.

**DANGER**

Do not use any brake fluids other than the specified type. Never mix different types of fluids to top up level, as this will damage the braking system.

Do not use brake fluid from containers which have been kept open or in storage for long periods.

Any sudden changes in play or hardness in the brake levers are warning signs of problems with the hydraulic circuits.

Ensure that the brake discs and brake linings have not become contaminated with oil or grease. This is particularly important after servicing or inspections.

Make sure the brake lines are not twisted or worn.

Prevent accidental ingress of water or dust into the circuit.



Wear latex gloves when servicing the hydraulic circuit.

DISC BRAKES**DANGER**

The brakes are the parts that most ensure your safety and for this reason they must always be perfectly working; check them before every trip.

A dirty disc soils the pads.

Dirty pads must be replaced, while dirty discs must be cleaned with a high-quality degreaser.

Perform the maintenance operations with half the indicated frequency if the vehicle is used in rainy or dusty areas, on uneven surfaces or on racetracks, see  2.1.2. Check brake pads for wear, see  2.12.3. When the disc pads wear out, the level of the fluid decreases to automatically compensate for their wear. The front brake fluid reservoir is located on the right handlebar, near the front brake lever.

The rear brake fluid reservoir is located under the right fairing.

Do not use the vehicle if the braking system leaks fluid.

COOLANT**DANGER**

Coolant is toxic when ingested and is an irritant, contact with eyes or skin may cause irritation.

In the event of contact with eyes, rinse repeatedly with abundant water and seek medical advice. In the event of ingestion, induce vomiting, rinse mouth and throat with abundant water and seek medical advice immediately.



DO NOT RELEASE INTO THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

**DANGER**

Take care not to spill coolant onto hot engine parts. It may ignite and produce invisible flames. Wear latex gloves when servicing.

Do not ride when coolant is below the minimum level.

Check coolant level before each ride and every 1500 km (932 mi), see  2.10.1. Change coolant every two years, see  5.2.1.


Coolant mixture is a 50% solution of water and anti-freeze. This is the ideal solution for most operating temperatures and provides good corrosion protection.

This solution is also suited to the warm season, as it is less prone to evaporative loss and will reduce the need for top-ups.

In addition, less water evaporation means fewer minerals salts depositing in the radiator, which helps preserve the efficiency of the cooling system.

When temperature drops below zero degrees centigrade, check the cooling system frequently and add more anti-freeze (up to 60% maximum) to the solution.

Use distilled water in the coolant mixture. Tap water will damage the engine.

(Recommended) engine anti-freeze, see  1.8.1.

Refer to the chart given below and add water with the quantity of anti-freeze to obtain a solution with the desired freezing point:

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

NOTE Coolants have different specifications. The protection degree is written on the label.



WARNING

Use nitrate-free coolant only, with a protection until at least -35°C.

DRIVE CHAIN

Check drive chain operation, slack and lubrication at regular intervals, see  2.21.1.

The vehicle is equipped with an endless chain with a joint link.



WARNING

If too slack, the chain can come off the front or rear sprockets thus leading to serious accidents and damage to the vehicle, with consequent serious personal injury or death.

Do not use the vehicle if the chain tension has not been correctly adjusted.

To check chain, take it with your hand where it turns on the rear sprocket and pull it as to separate it from the crown itself.

If you can move the chain apart of the front sprocket for more than 3 mm (0.125 in), change chain, crown and pinion.



DANGER

If not properly maintained, chain can early wear out and lead to the damage of both crown and pinion. Perform chain maintenance operations more frequently if the vehicle is used on rainy or dusty areas.

TYRES



WARNING

If tyres are excessively inflated, the vehicle will be hard and uneasy to ride, thus making you feel not at your ease.

In addition the roadworthiness, mainly on wet surfaces and during cornering, will be impaired.

Flat tyres (insufficient pressure) can slip on the rim and make you lose the control of the vehicle.

In this case too, both vehicle roadworthiness, maneuverability and brake efficiency will be impaired.

Tyres changing, repair, maintenance and balancing must be carried out by specialized technicians using suitable equipment.

When new, tyres can have a thin slippery protective coating. Drive carefully for the first kilometers (miles). Never use rubber treating substances on tyres.

In particular, avoid contact with fluid fuels, leading to a rapid wear.

In case of contact with oil or fuel, do not clean but change tyres.



DANGER

Some of the factory-assembled tyres of 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.

Visually check if the tyres are worn and in this case have them changed.

If a tyre deflates while driving, stop immediately.

Avoid hard brakings or moves and do not close throttles too abruptly.

Slowly close throttle grip, move to the edge of the road and make use of the engine brake to slow down until coming to a halt.

Failure to comply with these recommendations can lead to serious accidents and consequent personal injuries or death.

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

1.4. RUNNING-IN

1.4.1. RUNNING-IN RECOMMENDATIONS

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.



WARNING

Only after the first 1500 km (932 mi) of running-in you can expect the best performance levels from the vehicle.

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 100 km (62 mi) pull 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 800 km (497 mi) never exceed 5000 rpm (see table).



WARNING

After the first 1000 km (621 mi), Dealer carry out the checks indicated in the column "After running-in", see [2.1.2](#), in order to avoid hurting yourself or other people and/or damaging the vehicle.

- Between the first 800 km (497 mi) and 1600 km (994 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 9000 rpm (see table).
- After the first 1600 km (994 mi) you can expect better performance from the engine, however, without exceeding the maximum allowed [11000 rpm].

Engine maximum rpm recommended	
Mileage km (mi)	rpm
0÷800 (497)	6000
800÷1600 (497÷994)	9000
over 1600 (994)	11000

1.5. VEHICLE IDENTIFICATION DATA

1.5.1. SERIAL NUMBERS LOCATION

The vehicle serial numbers are used for its homologation.

NOTE 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.

FRAME NUMBER

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



ENGINE NUMBER

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



1.6. USING TOOLS AND SPARE PARTS

1.6.1. SPARE PARTS

Should some parts be replaced, use aprilia Original Spare Parts only.
aprilia high-quality Original Spare Parts have been expressly designed and manufactured for aprilia vehicles.

**WARNING**

The use of aprilia non original spare parts can impair the vehicle performance or cause serious damage to the vehicle itself.






1.6.2. USE OF PRODUCTS

For all maintenance operations, use the product listed below only.

The listed materials have been tested for many years and are suitable for all the applications specified by the manufacturer.

NOTE Consumer goods, article number, are available upon request (see table) .

PRODUCT SPECIFICATIONS

Description	Use
Molykote 111 / N. ROTAX 897 161 	<ul style="list-style-type: none"> - Clearance between the two oil seals of the coolant pump. - Starting driving gears.
LOCTITE ANTI-SEIZE 76710 N. ROTAX 297 431 	<ul style="list-style-type: none"> - Crankshaft ball-bearing housings. - Countershaft ball-bearing housings. - Gearshafts ball-bearing housings.
Lubricate	<ul style="list-style-type: none"> - All ball bearings, sintered discs, gears, cylinder walls, if not otherwise specified.
Grease	<ul style="list-style-type: none"> - Oil seals lips, if not otherwise specified.
Gearbox oil	<ul style="list-style-type: none"> - Engine oil SAE 30, 0,6 l
Engine oil	<ul style="list-style-type: none"> - Premium 2-stroke engine oil
LOCTITE 221 / N. ROTAX 899 785 	<ul style="list-style-type: none"> - Countershaft bearing locking washer retaining oval-headed screw. Starter pedal gear washer retaining oval-headed screw (RX only). - Coupling gear stopper retaining socket head screw. - Electric starting device retaining socket head screws. - Oil pump retaining socket head screws. - All "Taptite" screws for casing and clutch cover reassembly.
LOCTITE 648 / N. ROTAX 899 788 	<ul style="list-style-type: none"> - Flywheel-to-crankshaft fixing hexagon nut. - Water tube into casing. - Electric starting device hole cover into casing (RX only)
Silastic 732 RTV / N. ROTAX 297386 	<ul style="list-style-type: none"> - Neutral indicator contact screw. - Ignition cable seal.

1.6.3. SPECIAL TOOLS

Special and suitable tools are required to carry out the disassembly and reassembly operations as well as for a correct setting up.

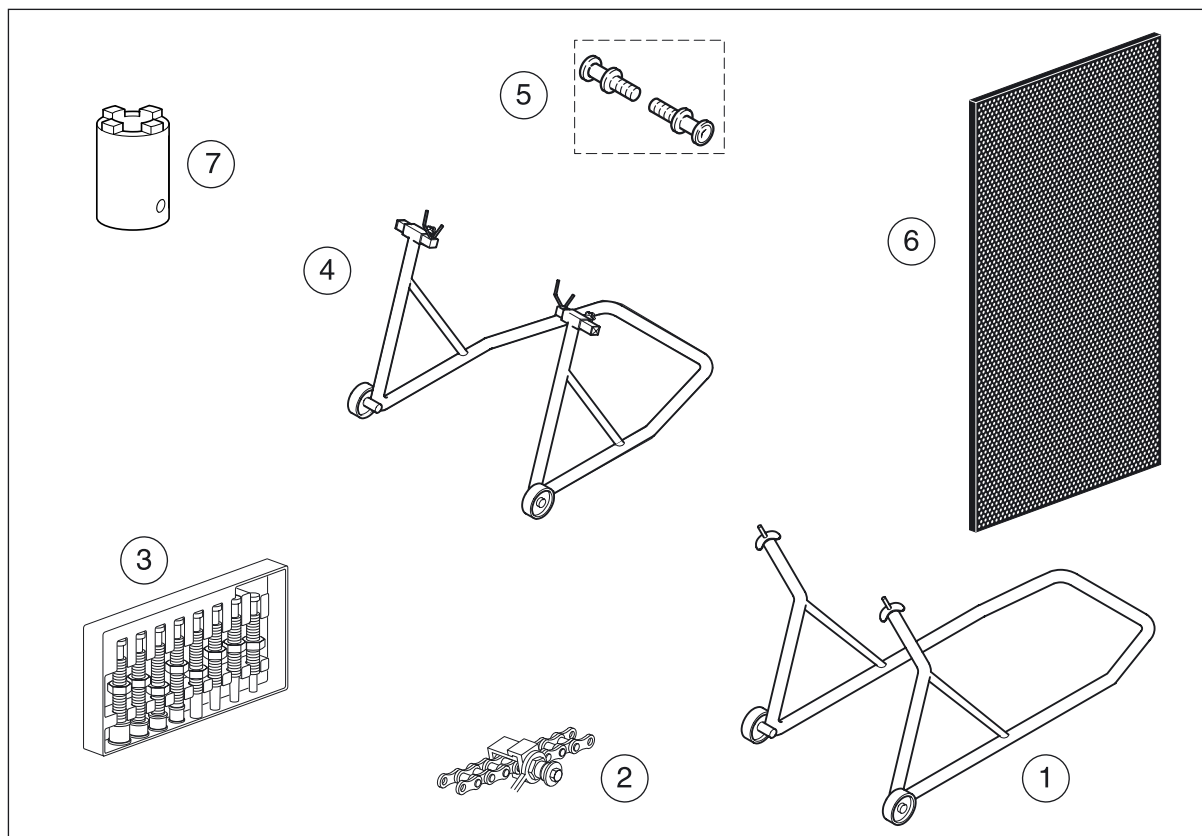
The use of special tools avoids any possible damage arising from the use of non-suitable tools and/or the implementation of improvised procedures. The special tools, designed for this vehicle, are listed hereinafter.

Should you require some special general tools, please refer to the special tools manual.



WARNING

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




Key:

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

1.6.4. GENERAL TIGHTENING TORQUE SETTINGS

The table shows the standard tightening torque settings for ISO thread screws and bolts.

Screw or bolt thread	Wrench	Tightening 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 special couplings on this vehicle, refer to  2.3.4.

If not otherwise specified, the tightening torque settings refer to clean, dry and ambient temperature threads.

NOTE *In order to avoid any possible deformation and/or wrong coupling, please tighten screws and bolts as follows:*

- Snug all fasteners by hand.
- Apply half of the recommended tightening torque value and tighten the opposite parts: (A) and (B); (C) and (D).
- Repeat the above operation by tightening to the specified torque value.

NOTE *The pressure on the fastening parts will be thus evenly distributed on the coupling surface.*

1.6.5. TECHNICAL DATA

DIMENSIONS	
Max. length	1950 mm
Max. length (with the optional rear mudguard extension).	2005 mm
Max. width	720 mm
Max. height (front part of the fairing included)	1135 mm
Seat height	805 mm
Wheel base	1345 mm
Min. ground clearance	163 mm
Weight ready for starting (fuel and fluids included)	139 kg
Seats	2
Vehicle max. load (rider + passenger + luggage)	180 kg
ENGINE	
Type	Single-cylinder, two-stroke, with reed intake system. Separate lubrication with automatic mixer at variable strength (1.0 – 3.0 %).
Number of cylinders	1
Total displacement	124.82 cu. cm
Bore/stroke	54 mm /54.5 mm
Compression ratio	12.5 ± 0.5: 1
"Squish"	1.5 mm
Engine idling rpm	1250 ± 100 rpm
Max. rotation speed rpm	11000 ± 100 rpm
Ignition	CDI with electronic timing
Starting	electric
Ignition advance	12° ± 2° at 2000 rpm
Clutch	Multidisc in oil bath, with manual control on the left side of the handlebar
Gearbox	Mechanical, 6 gears with foot control on the left side of the engine
Gearbox oil	600 cu. cm
Gearbox oil (FP)	600 cu. cm
Gearbox lubrication	Splash lubrication
Lubrication system	Separate lubrication with automatic mixer at variable strength (1.0 – 1.3%)
Mixer oil (with reserve)	1.4 l
Mixer oil reserve	0.35 l
Air cleaner	Sponge-type
Cooling system	Liquid-type
Coolant	0.8 l (50% water + 50% coolant with ethylene glycol)
Coolant pump capacity (with open thermostat)	20 l/min. at 10000 rpm
Thermostat starts opening at:	70°
Dry engine weight	24 kg

TRANSMISSION					
GEAR RATIOS	Ratio	Primary	Secondary	Final ratio	Total ratio
	1 st	19/63 = 1: 3.315	10/30 = 1: 3.000	17/40 = 1: 2.353	1: 23.406
	2 nd		14/29 = 1: 2.071		1: 16.161
	3 rd		17/27 = 1: 1.588		1: 12.391
	4 th		19/25 = 1: 1.316		1: 10.266
	5 th		21/24 = 1: 1.143		1: 8.916
	6 th		22/23 = 1: 1.045		1: 8.156
Drive chain			With joint link		

FUEL SUPPLY SYSTEM	
Type	Carburettor
FUEL SUPPLY	
Fuel	Premium-grade petrol according to DIN 51 600 (4 Stars - UK-), min. O.N. 98 (N.O.R.M.) and 88 (N.O.M.M.)
Fuel (AUS)	Premium-grade unleaded petrol according to DIN 51 607, min. O.N. 95 (N.O.R.M.) and 85 (N.O.M.M.)
Fuel (reserve included)	13 l
Fuel reserve	3.5 l (mechanical reserve)
FRAME	
Type	Stamped-plate, twin beam, with cast parts frame
Steering inclination angle	25° 30'
Trail	102 mm
SUSPENSIONS	
Front	telescopic fork with hydraulic operation
Fork oil	430 cu. cm (per leg)
Stroke	120 mm
Rear	Adjustable hydraulic monoshock
Wheel travel	44.5 mm
BRAKES	
Front	hydraulic disc brake - Ø 320 mm
Rear	hydraulic disc brake - Ø 220 mm
WHEEL RIMS	
Type	in light alloy
Front	3.00 x 17"
Rear	4.00 x 17"

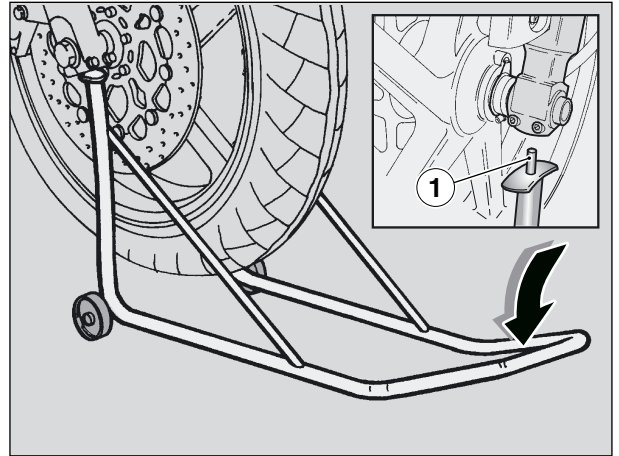
TYRES			
Wheel	Size	Pressure kPa (bar)	
		Rider only	Rider and passenger
Front (standard)	100/80 17" 52S 110/70 R 17" 54T 100/80 ZR 17"	180 (1.8)	180 ± 10 (1.8±0.1)
Posteriore (di serie)	130/70 17" 62S 140/60 ZR 17" 150/60 ZR 17"	200 (2.0)	230 ± 10 (2.3±0.1)

SPARK PLUGS	
Standard	NGK R BR10EG
Standard (FP)	NGK BR8EG
Spark plug gap	0.7 – 0.8 mm
ELECTRIC SYSTEM	
Battery	12 V - 9 Ah
Generator	12 V - 180 W
BULBS	
Low beam (halogen)	12 V - 55 W H1
High beam (halogen)	12 V - 55 W H3
Front parking light	12 V - 5 W
Direction indicators	12 V - 10 W
Rear parking lights/Number plate light/ Stoplight	12 V - 5 / 21 W
Revolution counter lighting	12 V - 2 W
Speedometer lighting	12 V - 2 W
Multifunction display	12 V - 3 W
WARNING LIGHTS	
Neutral	12 V - 2 W
Direction indicators	12 V - 2 W
Mixer oil reserve	LED
High beam	12 V - 2 W
Stand down	12 V - 2 W

1.7. STANDS

1.7.1. POSITIONING THE VEHICLE ON THE FRONT SERVICE STAND (OPT)

- Position the vehicle on the appropriate rear service stand (OPT), see [1.7.2.](#)
- Insert the two ends of the stand (1) in the two holes positioned on the lower ends of the front fork.
- Rest one foot on the front part of the stand.
- Push the stand downwards until it reaches the end of its stroke.

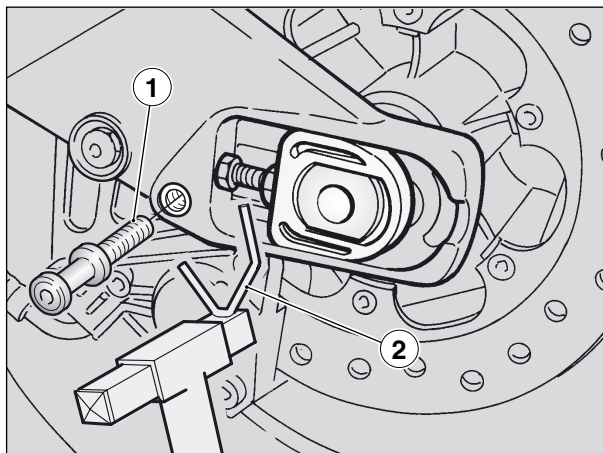


1.7.2. POSITIONING THE VEHICLE ON THE REAR SERVICE STAND (OPT)

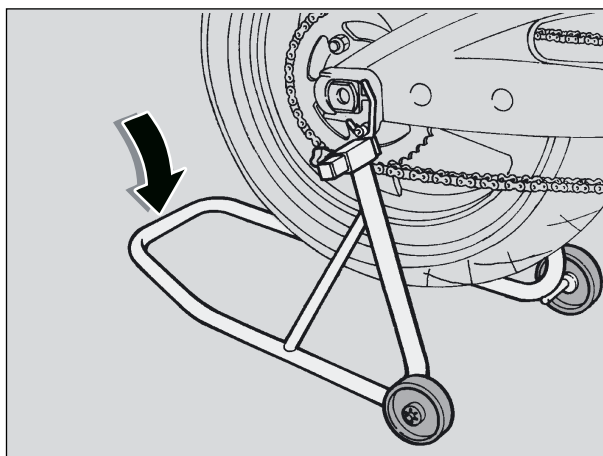
- Screw and tighten the pin (1) into its proper location on the rear swingarm.

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

- At the same time introduce the two seats on the stand (2) into the two pins (1) on the vehicle.































- Rest one foot on the rear part of the stand.
- Push the stand downwards until it reaches the end of its stroke.



1.8. PRODUCTS

1.8.1. LUBRICANT CHART

LUBRICANT	PRODUCT
Gear oil	RECOMMENDED:  F.C., SAE 75W - 90 or  GEAR SYNTH, SAE 75W - 90. As an alternative to the recommended oils, it is possible to use select oils having properties in compliance with or even above A.P.I. GL-4 specifications.
Mixer oil	RECOMMENDED:  MAX 2T COMPETITION or  SPEED 2T. As an alternative to the recommended oil, use select oils having properties in compliance with or even above ISO-L-ETC ++, A.P.I. TC ++ specifications.
Fork oil	RECOMMENDED: fork oil  F.A. 5W or  F.A. 20W, or  FORK 5W or  FORK 20W. Should you wish to reach an average behaviour between those offered by  F.A. 5W and by  F.A. 20W or by  FORK 5W and  FORK 20W., mix the products as follows: SAE 10W =  F.A. 5W 67% of the volume, +  F.A. 20W 33% of the volume  FORK 5W 67% del volume, +  FORK 20W 33% del volume. SAE 15W =  F.A. 5W 33% of the volume, +  F.A. 20W 67% of the volume  FORK 5W 33% del volume, +  FORK 20W 67% del volume.
Bearings and other lubrication points	RECOMMENDED:  AUTOGREASE MP or  GREASE 30. As an alternative to the recommended product, use select oil for rolling bearings, useful temperature range -30°C...+140°C, dripping point 150°C...230°C, highly anticorrosive, water and oxidization resistant.
Battery terminals	Neutral grease or vaseline .
Chain spray grease.	RECOMMENDED:  CHAIN SPRAY or  CHAIN LUBE.
Brake fluid	RECOMMENDED:  F.F., DOT 5 (DOT 4 compatible) or  BRAKE 5.1, DOT 5 (DOT 4 compatible). DANGER Use only new brake fluid.
Engine coolant	RECOMMENDED:  ECOBLU -40°C or  COOL. DANGER Use non-corrosive, nitrate-free coolant, with a protection of at least -35°C.

1.8.2. DECALS INSTRUCTIONS

Should some frame parts be removed:

**NOTE**

Plastic and painted parts shall be handled with care. Do not score or damage them.

Operate with care.

Do not damage keys and/or keyways.

When sticking decals, carefully follow the instructions listed herebelow.

Recommended tools:

- Medium-strength spatule (1);

NOTE Soft spatules, such as those used on windshield wipers, do not usually sufficiently remove the water under the decal.

- sponge or sprayer (2) with water.

NOTE Add some detergent (1-3%) to water and then shake it to produce foam bubbles.

To apply decals, proceed as follows:

- Position the decal (3) in upside-down position on the work bench.
- Keep the decal flat and pressed on the work bench and remove the protective film (4) completely.

NOTE The use of a sprayer (2) is recommended.

In case you are using a sponge, apply it on the surface without exerting any pressure in order not to damage the adhesive.

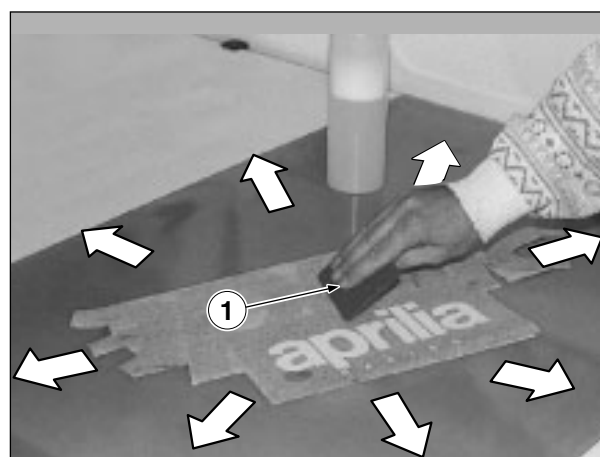
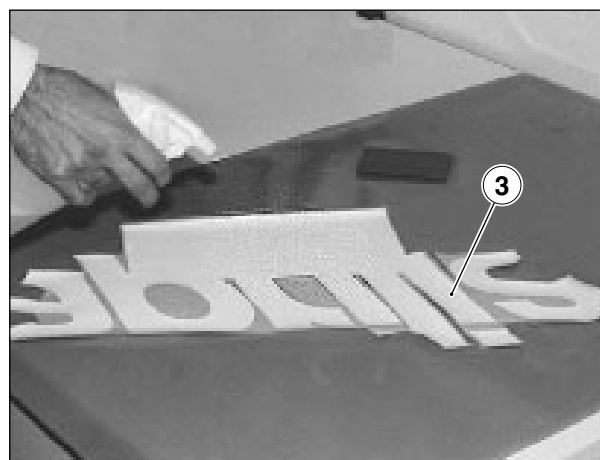
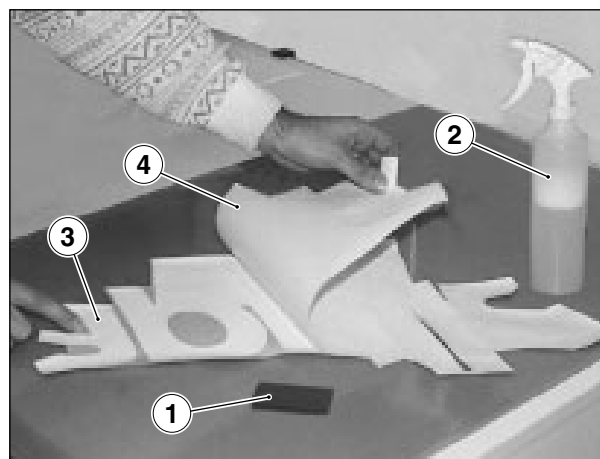
- Wet the adhesive surface with suds.
- Apply the decal (3) on the surface you wish to decorate and position it correctly.

NOTE Press the spatule with constant movements, working from the center towards the edge of the decal.

- Apply a moderate pressure on the decal surface with the spatule (1) until all the excess soap and water under the decal itself have been completely removed.

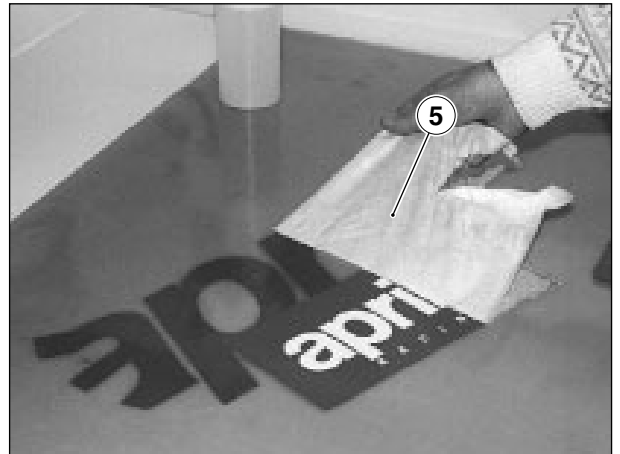
NOTE Do not lift the decal corners and/or edges.

- Using a cloth and working from inwards to outwards, dry the decal.
- Use again the spatule. Press as much as possible. Always work starting from the center to the outside and take special care to the corners and edges in order to ensure an even adhesion on the whole surface.



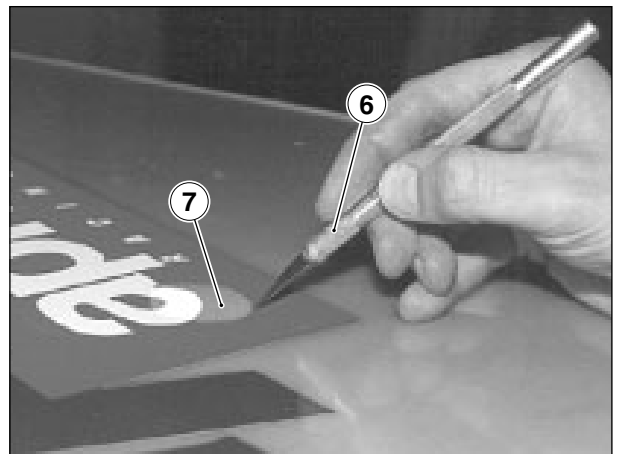
NOTE If present, remove the application tape (5) 20 to 30 minutes after applying the decal.

- Remove the application tape (5) from the decal surface.
- To ensure a good adhesion, use the spatule again by taking special care to the corners and edges.



NOTE When using the wet method, the decal final adhesion level will be reached around 48 hours after the application.

- After having removed the application tape, make sure that no blisters are present on the surface.
- Should some blisters be present, proceed as follows:
- Using a pin or a cutter (6) cut the blister (7).
 - Use the spatule (1) starting from the side opposite to the cut and press the blister to make the air come out.



The application tape is used to make the makes and letters application easier, namely to position them correctly on the surface you wish to decorate and to reinforce the adhesive during application.

ROUTINE MAINTENANCE

2

SUMMARY

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2.1. ROUTINE MAINTENANCE

2.1.1. INTRODUCTION

To keep your vehicle in top performance conditions, aprilia strongly recommends to respect the routine maintenance schedule for the different parts of the vehicle.

This section describes the routine maintenance operations for vehicle main components.



DANGER

Before beginning any service operations or inspection of the vehicle, switch off the engine and remove the key, wait until the engine and the exhaust system have cooled down and, if possible, lift the vehicles with the proper equipment onto firm and flat ground. Keep away from the red-hot parts of the engine and of the exhaust system, in order to avoid burns. 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 harmful or even toxic. If not expressly indicated otherwise, for the reassembly of the units repeat the disassembly operations in reverse order.

2.1.2. REGULAR SERVICE INTERVALS CHART

Parts	After running-in [1000 km (621 mi)]	Every 4000 km (2485 mi) or 12 months	Every 8000 km (4970 mi) or 24 months
Rear shock absorber	-	-	1
Battery – Terminals tightening – Electrolyte level	1	1	-
Spark plug	1	1	3
Carburetor	1	2	-
Drive chain (lubrication)	every 500 km (310 mi): 1		
Transmission cables and controls	1	1	-
RAVE Control Unit FP	1	-	4
Wheel truing	-	1	-
Steering bearings and steering clearance	1	1	-
Wheel bearings	-	1	-
Brake discs	1	1	-
Air cleaner	-	2	3
General running of the vehicle	1	1	-
Clutch clearance	4	4	-
Braking systems	1	1	-
Cooling system	1	1	-
Lighting system	1	1	-
Brake fluid	1	every 4000 km (2485 mi): 1/ every year: 3	
Coolant	every 1500 km (932 mi): 1/ every 2 years: 3		
Mixer oil level	every 500 km (310 mi): 1		
Front fork lubrication	every 8000 km (4970 mi): 1		
Gearbox oil	3	1	every 12000 km (7456 mi): 3
Fork oil and oil seal	every 12000 km (7456 mi): 3		
Headlamp aim and operation	-	1	-
Piston and piston rings	every 8000 km (4970 mi): 1 every 16000 km (9941 mi): 3		
Engine idling speed	4	4	-
Odometer driving gear	-	-	1
Wheels/Tyres and inflating pressure	1	1	-
Wheels/Tyres and inflating pressure	every 1000 km (621 mi): 1		
Nut, bolt, screw tightening	1	1	-
Exhaust silencer (catalised version excluded)	2	2	-
Front fork	every 500 km (310 mi): 1		
Mixer oil low LED warning light	1	1	-
Drive chain tensioning and lubrication	every 500 km (310 mi): 1		
Final transmission (chain, crown and pinion)	-	1	-
Fuel lines	-	1	every 4 years: 3
Braking system lines	-	1	every 4 years: 3
Mixer oil line	-	1	every 4 years: 3
Clutch wear	-	1	-
Front and rear brake pads wear	1	every 2000 km (1242 mi): 1	
Exhaust valve FP	1	2 + 4	-

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

Perform the maintenance operations more often if the vehicle is used in rainy or dusty areas, on uneven surfaces or on racetracks.

() = OPERATIONS TO BE MADE ALSO BY THE USER

(**) = Check every fifteen days or at the recommended intervals.

2.2. POINTS TO BE LUBRICATED

2.2.1. POINTS TO BE LUBRICATED

A good lubrication ensures vehicle smooth operation and durability.

NOTE Before lubrication, clean all parts from any rust deposits, grease, dirt or dust.

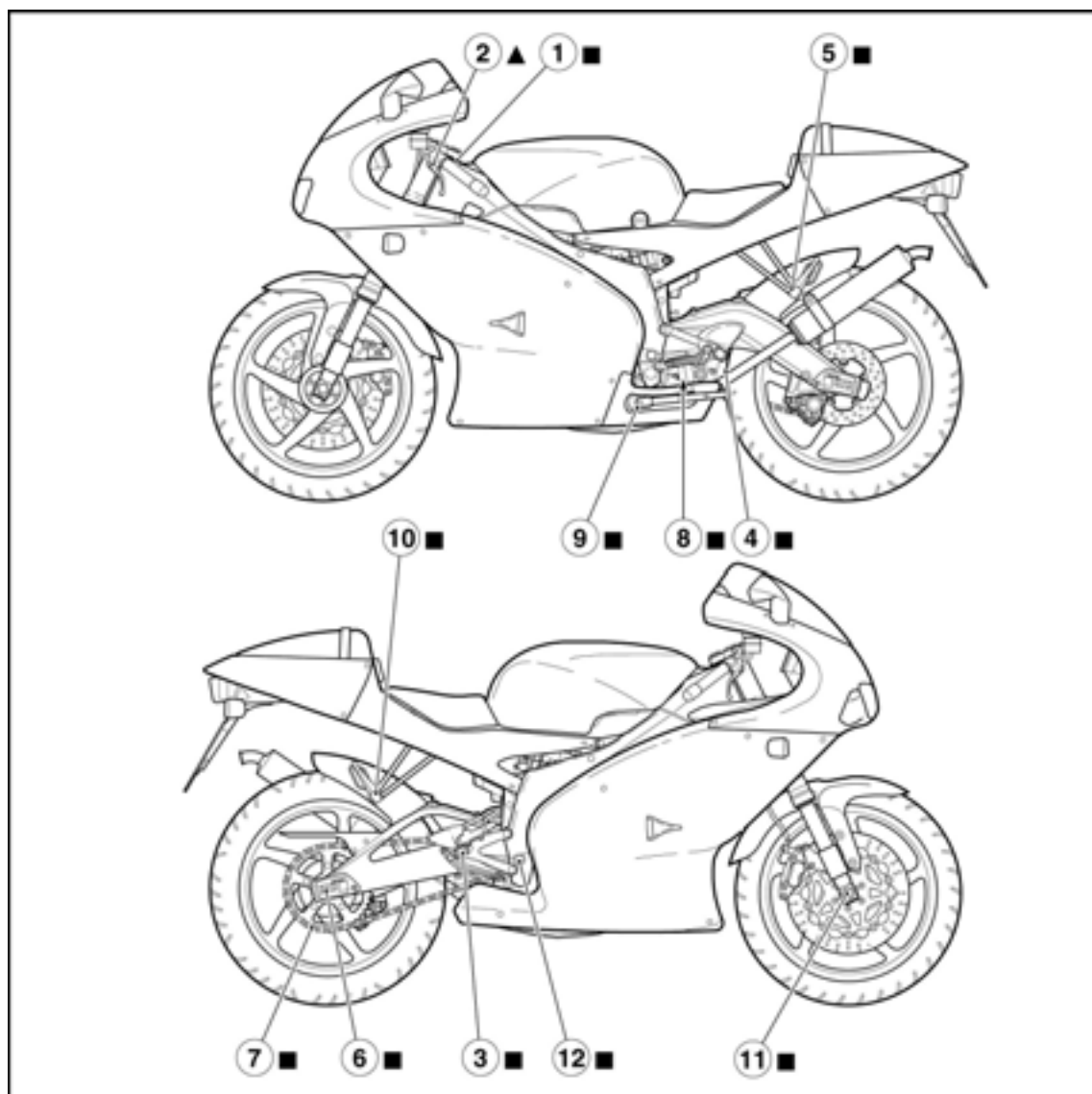
The points to be lubricated are specified in the "LUBRICATING CHART".

LUBRICATING CHART

1. Steering bearing
2. Clutch lever pin
3. Rider right footpeg pin
4. Rider left footpeg pin
5. Passenger left footpeg pin
6. Rear wheel shaft and bearings
7. Drive chain
8. Rear suspension levers
9. Side stand spindle
10. Passenger right footpeg pin
11. Front wheel shaft and bearings
12. Rear swingarm spindle

■ = Grease

▲ = Oil

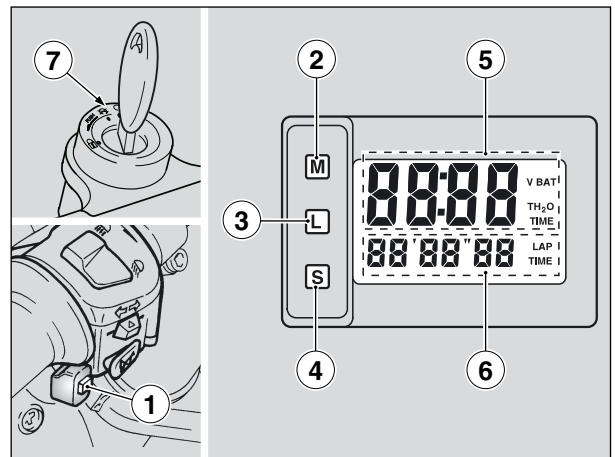


2.3. MULTIFUNCTION COMPUTER

2.3.1. MULTIFUNCTION COMPUTER

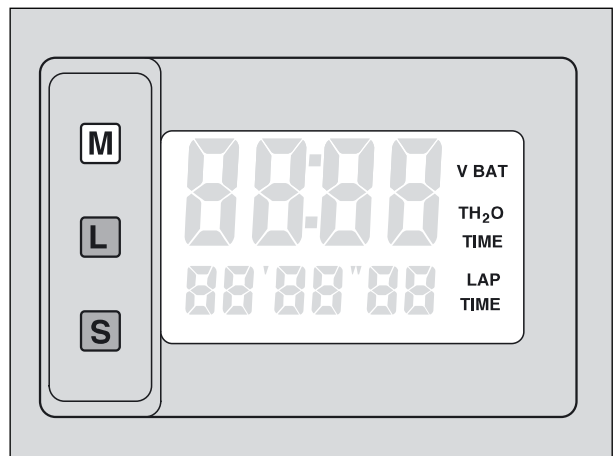
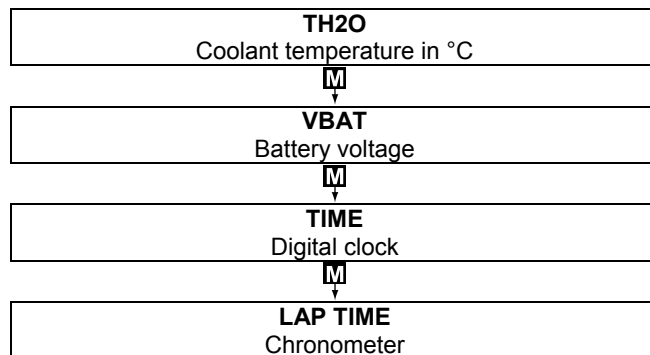
KEY

- 13. LAP push button
- 14. MODE push button (M)
- 15. LOCK push button (L)
- 16. START push button (S)
- 17. Upper display
- 18. Lower display



FUNCTIONS DESCRIPTION

- Turn ignition switch (7) to "ON".
- Press the push button M repeatedly so as to make the following functions appear in the following order:



TH₂O (coolant temperature)

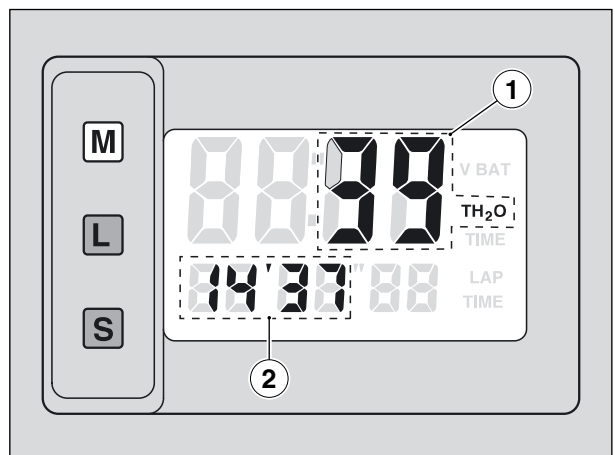
- By pressing once the function key M, the coolant temperature (1) is shown in the upper part of the display in degrees centigrade (°C); while the current time (2) is shown in the lower part of the display.
- When the temperature is over 100°C, the upper part of the display blinks even if a function other than "TH₂O" has been set.
- When the temperature is below 30°C, the writing "cold" appears on the display.
- Thermometer range: 0 ÷ 130°C.



WARNING

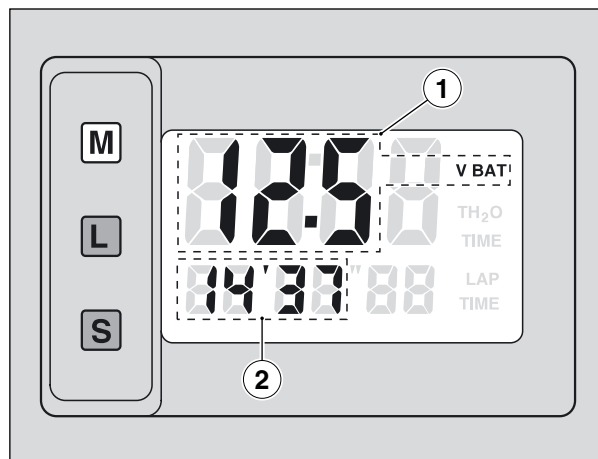
The engine could be seriously damaged in case of a temperature exceeding the max. allowed one (130°C).

Should the writing "LLL" appear on the display, check the coolant thermistor and/or the electric circuit connection.

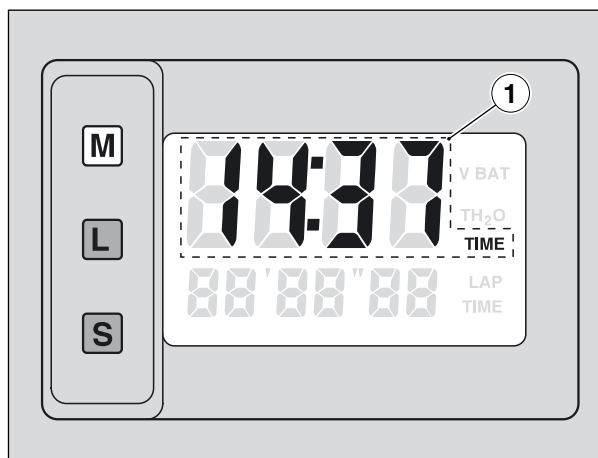


VBAT (battery voltage)

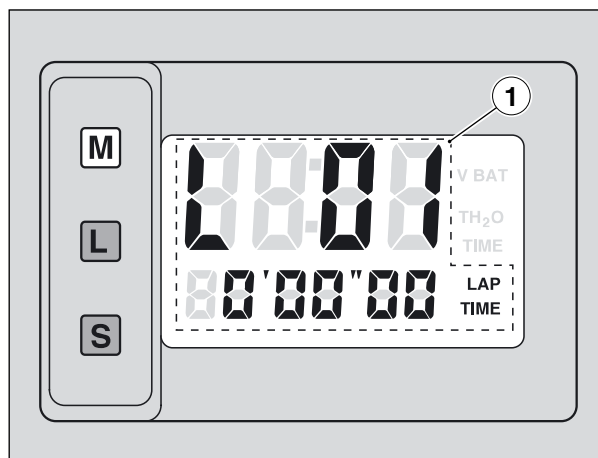
- If the push button **M** is pressed once more, the battery voltage expressed in volt (1) appears on the display.
- The recharge circuit functions correctly if at 4000 rpm the battery voltage with low beam on is included between 13 and 15 V.
- The current hour (2) is shown in the lower part of the display.


TIME (hour / minutes setting)

- If the push button **M** is pressed for the third time, the hour and minutes are displayed (1).
- To modify the settings, proceed as follows:
- Press the key **L**, the hour segments start blinking.
- Press key **S**, to increase the value.
- To set the minutes setting, press key **M**, the minute segments start blinking.
- Press key **S**, to increase the value
- To store the hour and minutes settings, proceed as follows.
- Press the center key **L**.


LAP TIME (chronometer)

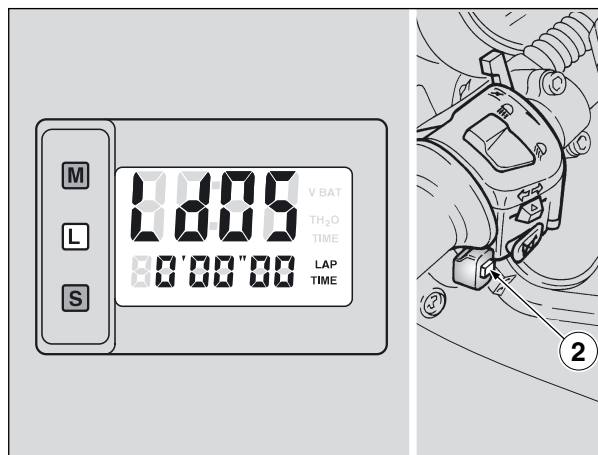
- When the function key **M** is pressed for the fourth time, the "LAP TIME" function (1) is displayed. This function makes it possible to measure the time per lap with the vehicle on a racetrack or to store the data, in such a way as to be able to consult them successively.



"LAP TIME" function instructions for use (only in case of competitions in private areas).

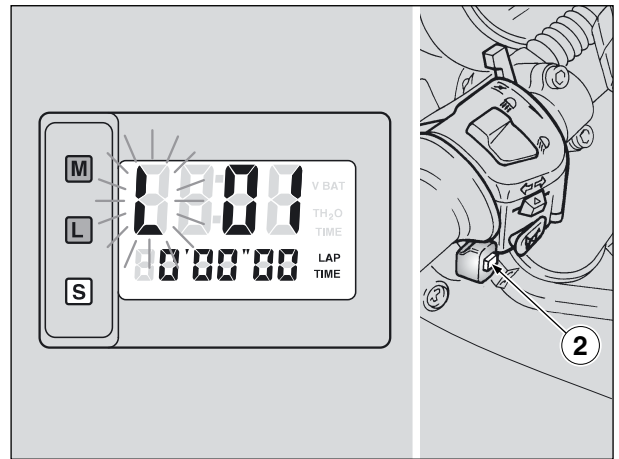
- To operate the chronometer, press the key **S**.
- The wording "L" (Lap) will blink on the display.
- To start timing, press the "LAP" push button (2) on the left handlebar.
- To display the lap time, press the push button "LAP" (2) again.
- The "LAP" push button (2) is not enabled for 15 seconds and the last time stored is shown on the display, after which, the chronometer with the current timing is displayed.
- To leave the chronometer function, press key **S**.

NOTE It is possible to store max. 10 times. The "L 10" time will be displayed as the last time measured.



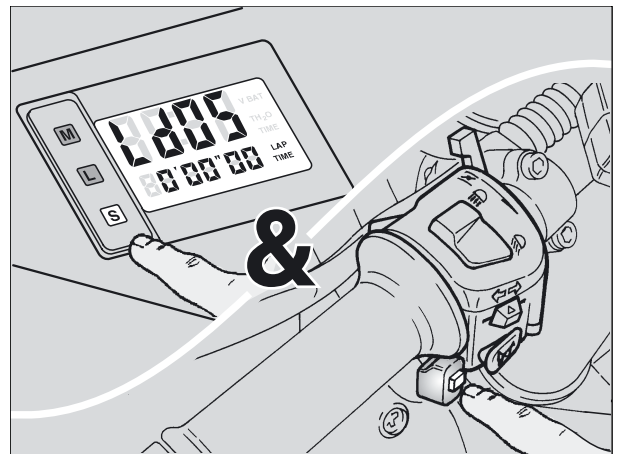
Recalling the lap times (LAP MEMORY).

- To recall lap times, press key **L**.
- The "Ld" wording will appear on the display.
- To scroll the stored lap times, press the "LAP" (2) push button.
- The wording "Ld 01" corresponds to the lap No.1, the wording "Ld 02" corresponds to lap No. 2, etc...













Deleting stored data.

- To delete stored data, press key **L**.
- The wording "L 10" or "L 09" or "L 08", etc. will be displayed.
- Now press push button **S** and, while keeping it pressed, press also the "LAP" (1) key on the left handlebar.
- The stored data will be immediately deleted.



2.3.2. INSTRUMENTS AND INDICATORS TABLE

Description		Function	
Direction indicator warning light (↔)		Blinks when the direction indicators are on.	
High beam warning light (≡)		Comes on when the front high beam bulb is on or when the passing is operated.	
Revolution counter (rpm)		Indicates the number of revolutions of the engine per minute.  WARNING Never exceed the engine max. speed rate, see  1.4.1.	
Side stand down warning light (I)		Comes on when the side stand is down.	
Low mixer oil LED warning light (⚡)		Comes on when the quantity of mixer oil is about 0.35 l.  WARNING If the LED light comes on, the mixer oil is in reserve. In this case, top up as soon as possible.	
Neutral indicator warning light (N)		Comes on when the gear is in neutral.	
Trip meter		Indicates the partial number of kilometres covered. Reset it using the special knob.	
Trip meter resetting knob.		To reset the partial number of kilometers, turn it counter-clockwise.	
Total kilometers odometer		Indicates the total number of kilometers covered.	
Speedometer (km/h)		Indicates the driving speed	
Multifunction digital display	Coolant temperature (°C) (⚡)	It displays the temperature of the coolant in the engine, see  2.3.1. If a temperature of 115°C - 130°C is displayed, stop the engine and check the coolant level, see  2.10.1.  WARNING If the maximum allowed temperature (130°C), is exceeded, the engine may be seriously damaged. If the writing “LLL” is displayed, check the coolant thermistor and/or electrical connection circuit.	To alternate displays, see  2.3.1.
	Clock	Indicates the hour and minutes according to the pre-setting, see  2.3.1.	
	Battery voltage (V BAT)	Indicates the battery voltage, see  2.3.1.	
	Chronometer	Indicates the various timings according to the pre-setting, see  2.3.1.	

2.3.3. NUT, BOLT, SCREW TIGHTENING

Check after the first 1000 km (621 mi) and then every 4000 km (2485 mi) or 12 months.

Check all fastening parts with accuracy. Mainly check all safety-related components and, in particular:

Handlebar-to-upper plate fastener;

Front brake control lever;

Clutch control lever;

Fuel delivery line;

Plate-to-front fork fastener;

Front wheel shaft fork clamps;

Front wheel;

Front brake line couplings;

Front brake disc;

Front brake caliper;

Engine;

Sprocket;

Rear brake control lever;

Rear swingarm;

Rear swingarm levers;

Rear shock absorber;

Rear wheel;


Rear brake disc;


Rear brake caliper;

Rear brake line couplings.



WARNING

The fastening elements shall be tightened to the specified torque value. Apply LOCTITE ONLY where indicated, see  2.3.4.

Lubricate only the parts specified in the table  2.3.4.

2.3.4. FASTENING ELEMENTS

Check and, if necessary, tighten after the first 1000 km (621 mi) and after every 4000 km (2485 mi) or 12 months.

**WARNING**

The fastening elements specified in the table must be tightened to the specified torque value using a torque wrench and, where recommended, applying LOCTITE®.

The highlighted parts () are safety components.

Notes:

L243 = tighten with Loctite® 243

Lub = lubricate

FRAME					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Frame head connector screw	4	Tcei M8x20	22	2.2	
Seat holder-to-frame fastener	4	Tcei M8x25	22	2.2	
Instrument holding subframe-to-frame fastener	2	Te fi M6x45	10	1.0	
Filter box-to-seat holder fastener	2	Te fi M6x20	5	0.5	
Splitter-to-frame fitting	2	Te fi M6x20	10	1.0	
FOOTPEGS					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Passenger footpeg mount	4	Tcei M8x30	22	2.2	
Passenger footpeg mount	4	Tcei M8x20	22	2.2	
Pilot left footpeg guard	2	Te fi M5x15	3	0.3	
Rider footpeg guard	4	M8 nut	13	1.3	
Pilot upper footpeg mount	2	Tcei M8x35	22	2.2	
Passenger footpeg mount	4	M8 nut	13	1.3	
STAND					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Flanged screw stand connector	2	Te fi M8x35	22	2.2	
Stand connector	2	M8 nut	13	1.3	
Side stand spindle	1	M10x1.25	10	1.0	
Stand spindle lower nut	1	M10x1.25	25	2.5	
Switch fastening screw	1	Te fi M6x16	10	1.0	L243
SWINGARM					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Chain slider / brake line clamp	5	Tbei M5x12	2	0.2	
Lower rear mudguard	2	Te fi M6x16	5	0.5	
Swingarm pivot shaft fastener	1	Swingarm pivot shaft	100	10.0	
Ring nut adjusting bushing	1	Bushing	12	1.2	lub
Chain slider	1	Tbei M5x16	2	0.2	
Swingarm pivot shaft adjustment	1	Ring nut	35	3.5	
FRONT SUSPENSION					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Leg-to-plate fastener	4	Tcei M8x30	25	2.5	
Leg-to-plate fastener	2	Tcei M8x25	25	2.5	
Steering tube nut	1	Steering tube screw	80	8.0	
REAR SUSPENSION					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Rear shock absorber-to- frame fastener	1	Tcei M10x80	50	5.0	lub
Single conrod-to-frame fastener	1	Tcei M10x120	50	5.0	lub
Twin conrod-to-single conrod fastener	1	Tepf M10x75	50	5.0	lub
Twin conrod-to-swingarm fastener	1	Tcei M12x78.5	80	8.0	lub
Rear shock absorber-to-twin conrod fastener	1	Tepf M8x40	25	2.5	lub
Lower self-locking nut	1	M12	110	11.0	
Lower self-locking nut	1	M8	22	2.2	
Flanged self-locking nut	3	M10	50	5.0	

ENGINE					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Tcei screw frame head connector	4	Tcei M8x20	22	2.2	
Upper front engine mount	1	Tcei M10x120	50	5.0	
Lower front engine mount	1	Tepf M10x205	50	5.0	
Rear engine mount	1	Tcei M8x85	22	2.2	
Gearbox transmission conrod mounting	1	Te fi M6x20	10	1.0	
Lower rear fastener	1	Te fi M8x70	22	2.2	
Left M6 nut	1	M6	5	0.5	
Sprocket guard casing fixing	2	Tcei M6x20	5	0.5	
M6 nut	1	M6	5	0.5	
FILTER BOX					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Filter box fixing	2	Te fi M6x25	5	0.5	
EXHAUST SYSTEM					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Muffler central part mounting (holder)	1	Tcei M8x70	22	2.2	
Muffler-to-mount fixing	1	Tcei M8x50	22	2.2	
Clamp-on-rubber bushing fixing	1	Tcei M8x12	22	2.2	
Rubber bushing-on-mounts fixing	3	M8 nut	22	2.2	
COOLING SYSTEM					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Water breather fastener	1	Tcb 5.5x15.9	2	0.2	
Radiator fixing with frame mount	1	Te fi M6x16	10	1.0	
Breather screw-on-radiator fixing	1	Te fi M6x12	7	0.7	
Expansion tank mounting	1	Te fi M6x16	3	0.3	
FRONT WHEEL					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Front wheel shaft fixing	1	Shaft screw	80	8.0	
Legs-to-wheel shaft fixing	4	Tcei M6	10	1.0	
REAR WHEEL					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Rear wheel shaft fixing	1	Shaft nut	100	10.0	
FRONT BRAKE					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Mount-to-plate fixing	1	Te fi M6x16	7	0.7	
Front brake oil tank fixing	2	Te fi M5x16	3	0.3	
Front brake disc fixing	6	Te fi M8x20	22	2.2	L243
Brake caliper mounting	2	Te fi M8x35	22	2.2	lub
Brake oil line-on-caliper fixing	1	M10x12 spec	20	2.0	
REAR BRAKE					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Tube tie-on-swingarm fixing	2	Te fi M5x12	3	0.3	
Rear brake oil tank fixing	1	Te fi M6x16	7	0.7	
Rear brake disc fixing	6	Te fi M6x20	10	1.0	L243
Brake oil line-on-caliper fixing	1	M10x12 spec	20	2.0	
Brake lever adjuster	1	Te fi M6x25	10	1.0	
Rear brake master cylinder and guard mounting	2	Te fi M6x35	10	1.0	
Brake caliper mounting	1	Te fi M8x20	22	2.2	
Brake caliper mounting	1	Te fi M8x30	22	2.2	
HANDLEBARS AND CONTROLS					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Damping pads fastening	2	Tcei M6x60	10	1.0	
Control box-to-handlebar fixing	4	Tcei M5	3	0.3	

ELECTRICAL PARTS					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Battery box mount plate mounting	4	Te fi M5x25	5	0.5	
	1	Te fi M6x16	5	0.5	
Horn mounting	1	Te fi M8x16	22	2.2	
Frame / battery box fixing	4	Tcei M8x30	22	2.2	
Oil tank and tail guard mounting	1	Te fi M6x20	5	0.5	
Fuse mount-to-frame mounting	2	Tcei M6x20	5	0.5	
Front headlamp-to-front fairing fixing	3	Swp 5x20	2	0.2	
Coil-on-mount mounting	2	Te fi M6x45	10	1.0	
Voltage regulator assembling	2	Te fi M6x25	10	1.0	
Battery box fixing	2	Te fi M6x12	5	0.5	
HEADLAMP AND INSTRUMENT PANEL					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Tail light-to-number plate holder mount fixing	2	Tcb 4.8x13	2	0.2	
Tail light-on-mount fixing	2	Tcb 4.2x25	2	0.2	
TANK					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Front part tank fixing	1	Tcei M6x50	7	0.7	
Rear part fuel tank assembling	1	Tepf M6x70	7	0.7	
Rear brake oil tank fixing	1	Te fi M6x16	3	0.3	
Tank plug fixing	3	Tcei M5x30	5	0.5	
Spacer / tank plug fixing	6	Tcei M5x16	3	0.3	
Fuel cock-to-tank fixing	2	Te fi M5x12	3	0.3	
SEAT					
Description	Q.ty	Screw/Nut	Nm	Kgm	Notes
Passenger seat-on-tail guard fixing	7	Swp 3.9x10	2	0.2	
Passenger seat-to-tail guard front fixing	2	M5 nut	2	0.2	
Passenger seat strap fixing	2	Te fi M6x20	5	0.5	
Passenger seat strap fixing	2	M6 nut	5	0.5	
Passenger seat strap fixing	2	fi M6 nut	5	0.5	

Steel / aluminium screws with similar elastic pitches

SCREW	Nm	Kgm
M4	3	0.3
M5	6	0.6
M6	12	1.2
M8	25	2.5
M10	50	5.0
M12	80	8.0

2.4. BATTERY

2.4.1. BATTERY

Carefully read  1.2.1.

Two different types of battery are available on the market:
battery needing to be maintained with plugs;
maintenance-free battery without plugs needing no electrolyte level check and topping up.
After the first 1000 km (621 mi) and then every 4000 km (2485 mi) or 12 months, check the electrolyte level and the terminals correct tightening.



DANGER

The battery electrolyte is a toxic, caustic substance containing sulphuric acid and thus able to cause severe burns in case of contact. Always wear protective clothes, a mask and/or safety goggles when handling this fluid.

If the electrolyte gets in contact with the skin, carefully wash the parts of your body that get in contact with the fluid with abundant fresh water.

In the event of contact with your eyes, carefully wash them with water for fifteen minutes and then consult immediately an eye specialist.

Should you accidentally drink some fluid, drink abundant water or milk, then drink magnesia milk or vegetable oil and consult immediately a doctor.

Battery releases explosive gases.

Keep flames, sparks, cigarettes and any other heat source away from the battery.

During recharging or use, make sure that the room is properly ventilated and avoid inhaling the gases released during recharging.

KEEP AWAY FROM CHILDREN.

Take care not to lean the vehicle to avoid dangerous spills of the battery fluid.



WARNING

Never invert the connection of the battery cables.


Connect and disconnect the battery with the ignition switch in position "X".

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

Disconnect following the reverse order.

2.4.2. CHECKING AND CLEANING THE TERMINALS


Carefully read  [2.4.1.](#)

- Make sure that the ignition switch is in position "X".
- Raise the fuel tank, see  [2.9.1.](#)
- Make sure that the cable terminals (1) and the battery terminals (2) are:

in good conditions (and not corroded or covered with deposits);

covered with neutral grease or vaseline.


If necessary, proceed as follows:

- Disconnect the negative cable (-) first and then the positive one (+).
- Brush the wire with a wire brush, in order to eliminate any trace of corrosion.
- Reconnect the positive terminal (+) first and then the negative one (-).
- Cover the terminals of the cables and of the battery with neutral grease or vaseline.
- Refit the fuel tank, see  [4.1.1.](#)




2.4.3. CHECKING THE BATTERY ELECTROLYTE LEVEL

Carefully read  2.4.1.

- Lift the fuel tank, see  2.9.1.
- Keep the vehicle in vertical position, with the two wheels resting on the ground.
- Make sure that the fluid level is included between the “MIN” and “MAX” marks, etched on the battery side.

If this is not the case:

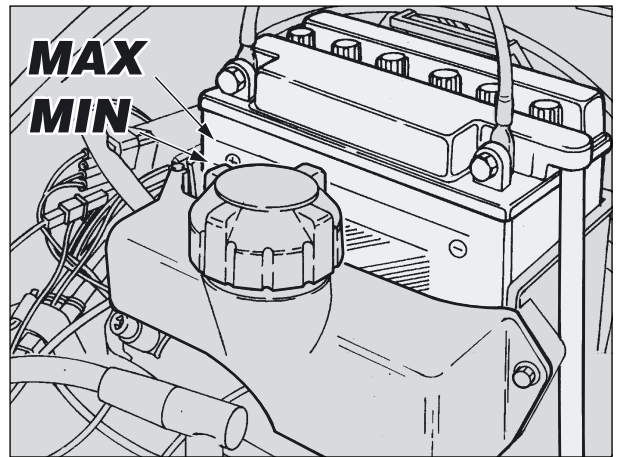
- Remove the battery,  7.2.1.
- Remove battery plugs.



WARNING

Top up the electrolyte using distilled water only. Do not fill above the “MAX” mark as the level increases during recharging.

- Top up with distilled water.





2.4.4. RECHARGING THE BATTERY

Carefully read  [2.4.1.](#)

NOTE If the battery is almost fully flat, when the starting button "O" is pressed, the starting relay will issue a vibrating noise.

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

- Remove the battery, see  [7.2.1.](#)
- Remove plugs.
- Check the battery electrolyte level, see  [2.4.3.](#)
- Connect the battery with a battery charger.
- Recharge the battery with 1/10th of its amperage.
- Once finished, check the electrolyte level once more and, if necessary, top up using distilled water.
- Refit battery plugs.

**WARNING**

Reassemble the battery only 5 to 10 minutes after disconnecting the recharge apparatus, since the battery continues to produce gas for a short lapse of time.

2.4.5. LONG INACTIVITY OF THE BATTERY

Carefully read  [2.4.1.](#)






WARNING

If the vehicle remains unused for more than twenty days, disconnect the 20A fuses, in order to avoid the deterioration of the battery caused by the current consumption due to the multifunction computer.

The removal of the 20A fuses requires the setting to zero of the following functions: digital clock and red line setting.

To reset these functions, see  [2.3.1.](#)

- If the vehicle remains unused for more than fifteen days, it is necessary to recharge the battery, in order to prevent its sulphation, see  [2.4.4.](#)
- Remove the battery, see  [7.2.1.](#), 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  [2.4.4.](#)


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

2.5. ELECTRICAL PARTS

2.5.1. ELECTRICAL PARTS


Carefully read  1.2.1.

Check after the first 1000 km (621 mi) and then every 4000 km (2485 mi) or 12 months.

- Position the vehicle on the stand.
- Make sure that all lighting devices are working properly.
- Check for headlight correct aiming,  8.15.1.
- Make sure that all connectors are well fitted.
- Make sure that all switches are correctly fitted and operational:

 8.12.1.

 8.8.1.

- Check for speedometer sensors correct fitting and operation.  8.7.1.



WARNING

The sensors sensitive area must be always clean. Any mud, dirt or other deposit could alter the readings and the following data transmission.

2.6. SPARK PLUGS

2.6.1. SPARK PLUGS

TIGHTENING TORQUE SETTINGS

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

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

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

To reach the spark plug, proceed as follows:



DANGER

Let the engine cool down until it reaches room temperature.

- Lift the fuel tank, see [2.9.1.](#)

For the removal and cleaning, proceed as follows:



DANGER

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

- Remove the spark plug (2) cap (1).
- Remove any trace of dirt from the spark plug base.
- Fit the special spanner provided in the tool kit on the spark plug.
- Unscrew the spark plug and extract it from its seat, taking care to prevent dust or other substances from getting inside the cylinder.
- Make sure that there are neither carbon deposits, nor corrosion marks on the electrodes and on the insulating material; if necessary, clean them with the special spark plugs cleaners and/or a metal brush.
- If the spark plug has crackings on the insulating material, corroded electrodes, excessive deposits on the rounded tip of the central electrode (3), it must be changed.



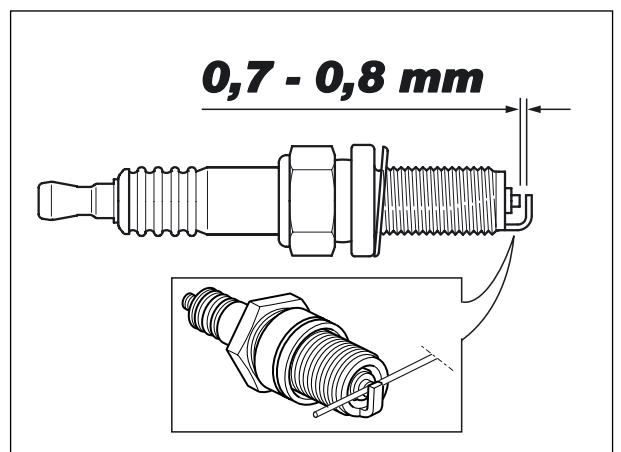
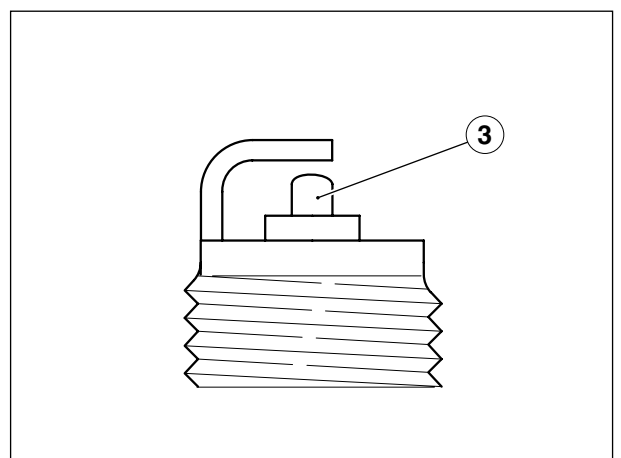
WARNING

When changing the spark plug, check the thread pitch and length.

If the threaded part is too short, the carbon deposits will accumulate on the thread seat, and therefore the engine may be damaged during the installation of the right spark plug. Use the recommended type of spark plugs only, in order not to compromise the life and performance of the engine.

To check the spark plug gap, use a wire feeler gauge to avoid damaging the platinum covering.

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



**WARNING**

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

Use the recommended type of spark plugs only, in order not to compromise the life and performance of the engine.

- Position the spark plug (2) cap (1) properly, so that it does not come off due to the vibrations of the engine.

**DANGER**

Make sure that the spark plug (2) cap (1) is correctly positioned on the spark plug itself.

- Refit the fuel tank.



2.7. AIR CLEANER

2.7.1. AIR CLEANER

- Check the air cleaner every 4000 km (2485 mi) or 12 months, change it every 8000 km (4970 mi) or more frequently if the vehicle is used on dusty or wet roads.
- It is possible to clean the air cleaner partially after using the vehicle on this kind of roads.




WARNING

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.

CLEANING

- Remove the air cleaner, see  4.2.1.
- Wash the filtering element with clean, not inflammable solvents or with solvents having a high volatility point and let it dry with extreme care.
- Apply filter oil or a thick oil (SAE 80W - 90) on the whole surface, then wring it to remove the oil in excess.



WARNING

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

Otherwise, change the filtering element.

NOTE The filtering element must be wet but not dripping.

- Clean the outer part of the air cleaner with a clean cloth.
- Clean the inside of the filter box with a clean cloth.
- Clean the intake funnels.

CHANGING



WARNING

Do not use filters that have already been used.

- Replace the air cleaner with a new one of the same type.

2.8. TUBES

2.8.1. TUBES

FUEL

Check fuel lines every 4000 km (2485 mi) or 12 months.
Change them every four years.

**WARNING**

**In case of wear, cracking or other damage,
change the fuel lines.**

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

MIXER OIL

Carefully read  1.2.1

Check mixer oil pipes every 4000 km (2485 mi) or 12 months. Change them every four years.

**WARNING**

**In case of wear, cracking or other damage,
change the oil pipes.**

In case of wear, cracking or other damage, change the lines.

BRAKES

Carefully read  1.3.1.

Check the brake lines every 4000 km (2485 mi) or 12 months. Change them every four years.

**WARNING**

**In case of wear, cracking or other damage,
change the brake lines.**

COOLING SYSTEM

Carefully read  1.3.1.

Check the cooling system tubes after the first 1000 km every 4000 km (2485 mi) or 12 months.

**WARNING**

**In case of wear, cracking or other damage,
change the cooling system tubes.**


2.9. FUEL TANK

2.9.1. LIFTING THE FUEL TANK

Carefully read  [1.2.1](#)

TIGHTENING TORQUE SETTINGS

Tank front screw (1) 7 Nm (0.7 kgm).

- Turn the fuel cock to the “OFF” position.
 - Remove the seat, see  [7.1.1](#).
 - Unscrew and remove the screw (1). Keep the bushing.
 - Take the tank rod from the tool kit.
-
- Lift the front part of the fuel tank and introduce the rod into the special housings.



2.10. COOLANT

2.10.1. CHECKING AND TOPPING UP THE COOLANT LEVEL

Carefully read  1.2.1 and  1.3.1


- Check the coolant level before starting and change it every two years.

**WARNING**

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

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

NOTE Place the vehicle on a firm and flat surface.

- Lift the fuel tank, see  2.9.1.
- Keep the vehicle in vertical position, with the two wheels resting on the ground.
- Make sure that the coolant contained in the expansion reservoir (1) is included between the "MIN" and "MAX" marks (see figure).

If not, proceed as follows:


- Unscrew and remove the filling cap (2).

**DANGER**

The coolant is toxic: 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.

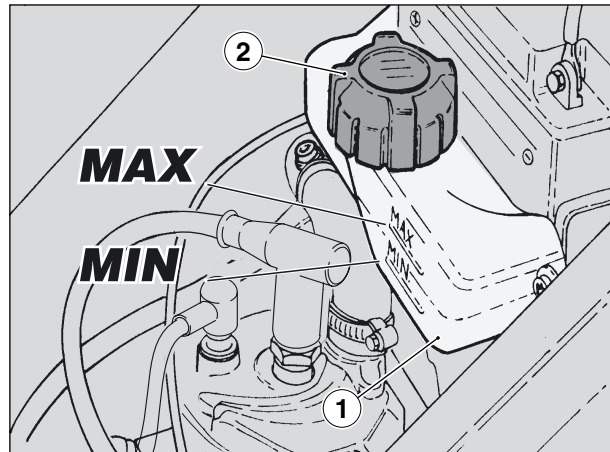
**WARNING**

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 reservoir by adding coolant, see  1.8.1, until this almost reaches the "MAX" level.
- Do not exceed this level, otherwise the fluid will flow out while the engine is running.
- Put back the filling cap (2).

**WARNING**

In case of excessive consumption of coolant and in case the expansion reservoir (1) remains empty, make sure that there are no leaks in the circuit.



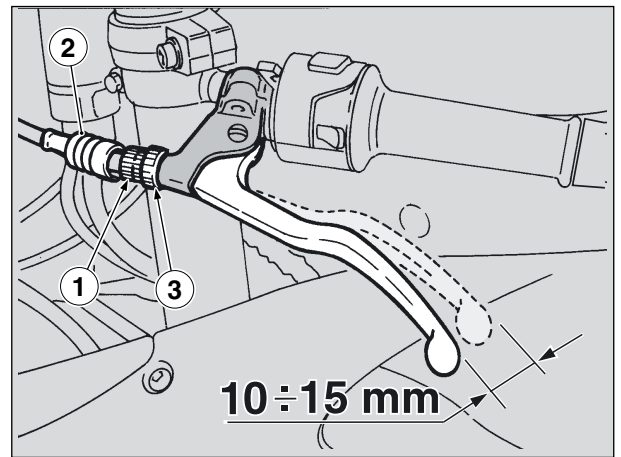
2.11. CLUTCH

2.11.1. ADJUSTING THE CLUTCH

Clutch shall be adjusted when the engine is coming to a stop or when the vehicle tends to move with the clutch lever pulled and a gear is engaged or, if the clutch is "slipping", the deceleration will be delayed if compared to the engine rpm. Minor adjustments can be made using the adjuster (1):

NOTE Take the special tool (0276040)

- Slide out the protective guard (2).
- Loosen the ring nut (3).
- Turn the adjuster (1) until reaching a free play on the clutch lever end of about 10 to 15 mm.



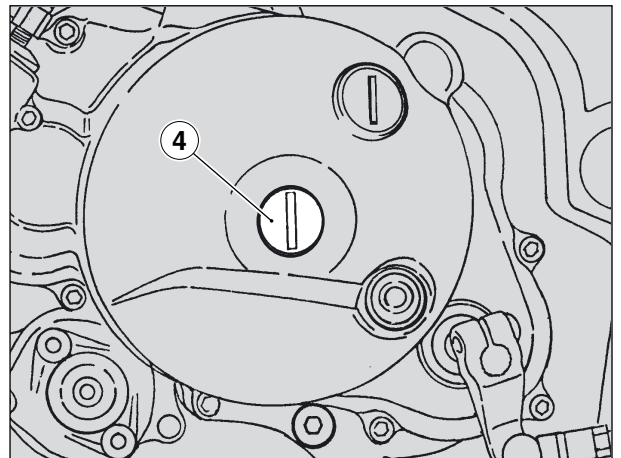
- Tighten the ring nut (3), lock the adjuster (1).
- Check the free play on the clutch lever end.
- Refit the protective guard (2).

In case the adjuster (1) is fully tightened, fully loose or if the free play cannot be set to a correct value, proceed as follows:

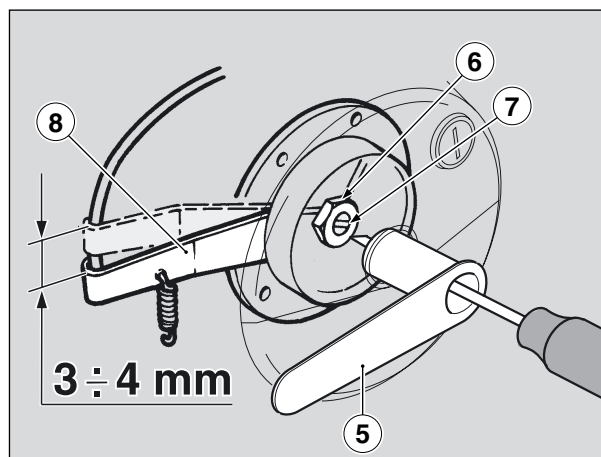
- Slide out the guard (2).
- Fully tighten the ring nut (3) on the adjuster (1).
- Fully tighten the adjuster (1).
- Remove the left side fairing, see

 [7.1.2.](#)

- Undo and remove the cap (4).



- Use the special wrench (5) to loosen the inner nut (6).
- Fit a flat screwdriver into the special wrench (5) and fully screw the adjuster (7).
- Loosen the adjuster (7) by half of a turn, namely **3 to 4 mm** of the lever travel (8).
- Keep the adjuster (7) locked using the flat screwdriver, turn the special wrench (5) and tighten the inner nut (6).
- Screw the cap (4).
- Check the clutch lever end free play (**10 to 15 mm**).
- Refit the left side fairing.
- Start the engine.
- Pull the clutch lever fully and engage the first gear.



Make sure that the engine does not stop and that the vehicle does not tend to move, or that the clutch does not “slip” during acceleration or running.

NOTE Check that the clutch cable is in good conditions: the sheaths should be free from squeezing or wear.

- To avoid early wear or corrosion, lubricate the clutch cable with suitable lubricant at regular intervals, see [1.8.1](#)

2.12. BRAKE FLUID


2.12.1. CHECKING AND TOPPING UP THE FRONT BRAKE FLUID LEVEL

Carefully read  1.2.1 and  1.3.1.

Check the brake fluid after the first 1000 km (621 mi) and then every 4000 km (2485 mi) or 12 months, change it every year.



WARNING

In case of excessive stroke of the brake lever, excessive elasticity, or air bubbles, bleed the air out of the circuit, see  2.12.5.

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

Before starting, check that the brake lines are neither twisted nor worn out and that the connectors are not leaking.

Do not use or mix different types of silicone or oil fluids.

Do not use neither old brake fluid nor fluid taken from containers opened for a long time.

Prevent water or dust from accidentally getting into the circuit.

CHECK


NOTE Place the vehicle on a firm and flat surface.

- Position the vehicle on the stand and steer the handlebar completely rightwards.
- Make sure that the fluid level exceeds the "MIN" mark.
- If the fluid does not reach at least the "MIN" mark, proceed as follows:



WARNING

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

- Check the brake pad wear, see  2.12.3.
- If the pads and/or the disc do not need replacing, provide for topping up.

TOPPING UP



WARNING

The brake fluid may flow out of the tank. Do not operate the front brake lever if the brake fluid tank plug is loose or has been removed. Use a cloth under the brake fluid tank.

- Unscrew and remove the cover (1).

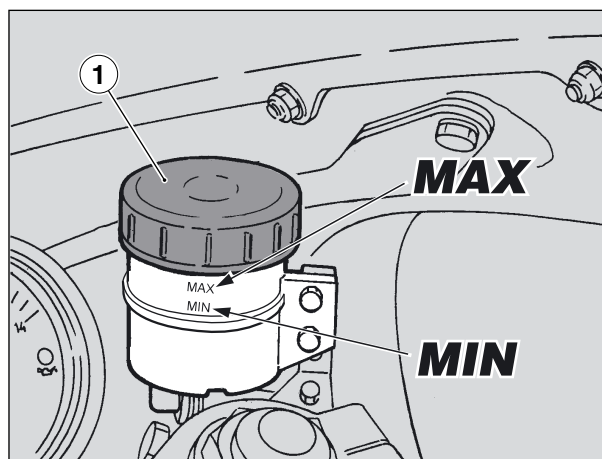


WARNING

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.

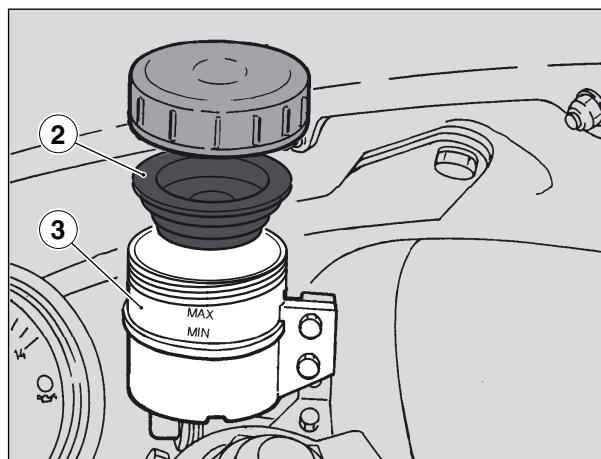
Leave the brake fluid tank open ONLY for the time necessary for topping up.



- Remove the gasket (2).

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

- Top up tank (3) with brake fluid, see [1.8.1](#) until reaching the correct level between the "MIN" and "MAX" marks.



WARNING

Do not exceed the "MAX" level while topping up.

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

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

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

- To refit components, follow the disassembly procedure in reverse order.

2.12.2. CHANGING THE BRAKE FLUID

Carefully read  1.2.1. and  1.3.1.

- Brake fluid must be changed every year.

NOTE These operations apply to both front and rear brakes.






WARNING



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

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

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

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

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

- Refit the rubber cap.
- Top up fluid inside tank, see  [2.12.1](#) and  [2.12.4.](#)



2.12.3. CHECKING THE BRAKE PAD WEAR

Carefully read [1.2.1](#), [1.3.1](#) and [2.1.2](#).

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

Check the brake pad wear after the first 1000 km (621 mi) and successively every 2000 km (1242 mi).

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



WARNING

Check the wear of the brake pads, especially before every trip.



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

- Position the vehicle on the stand.
- Carry out a visual check between the caliper and the pads, proceeding:

from below, on the front part, for the front brake calipers (1);
from below, on the rear part, for the rear brake calipers (2).



WARNING

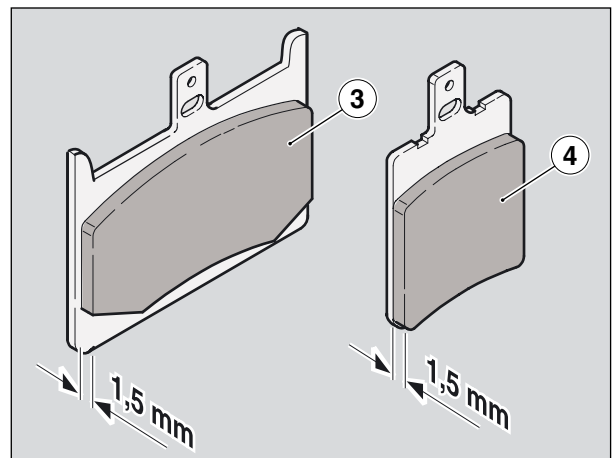
The excessive wear of the friction material would cause the contact of the pad metal support with the disc, with consequent metallic noise and production of sparks from the caliper; braking efficiency, safety and soundness of the disc would thus be negatively affected.



- If the thickness of the friction material (even of a single pad) has reduced to about 1.5 mm (0.05 in), have both pads changed.

Front brake pad (3).

Rear brake pad (4).




2.12.4. CHECKING AND TOPPING UP THE REAR BRAKE FLUID

Carefully read  1.2.1 and see  1.3.1.

Check the brake fluid after the first 1000 km (621 mi) and then every 4000 km (2485 mi) or 12 months, change it every year.



WARNING

In case of excessive stroke of the brake lever, excessive elasticity, or air bubbles, bleed the air out of the circuit, see  2.12.5.

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

Before starting, check that the brake lines are neither twisted nor worn out and that the connectors are not leaking.

Do not use or mix different types of silicone or oil fluids.

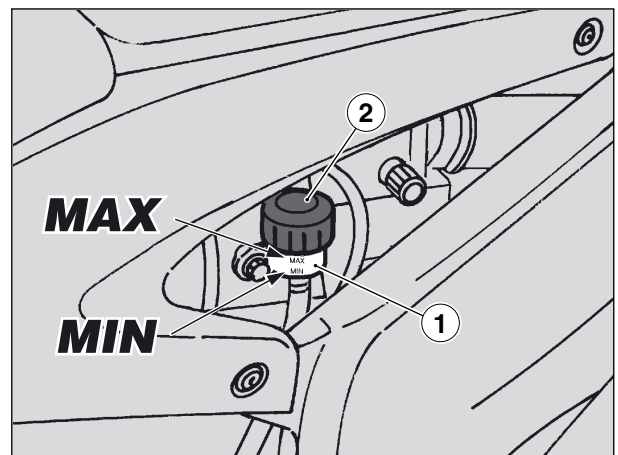
Do not use neither old brake fluid nor fluid taken from containers opened for a long time.

Prevent water or dust from accidentally getting into the circuit.

CHECK

NOTE Place the vehicle on a firm and flat surface.

- Keep the vehicle in vertical position, so that the fluid contained in the tank (1) is parallel to the plug (2).
- Make sure that the fluid level exceeds the "MIN" mark.
- If the fluid does not reach at least the "MIN" mark, top up as follows.



TOPPING UP



WARNING

The brake fluid may flow out of the tank. Do not operate the rear brake lever if the brake fluid tank plug is loose or has been removed.

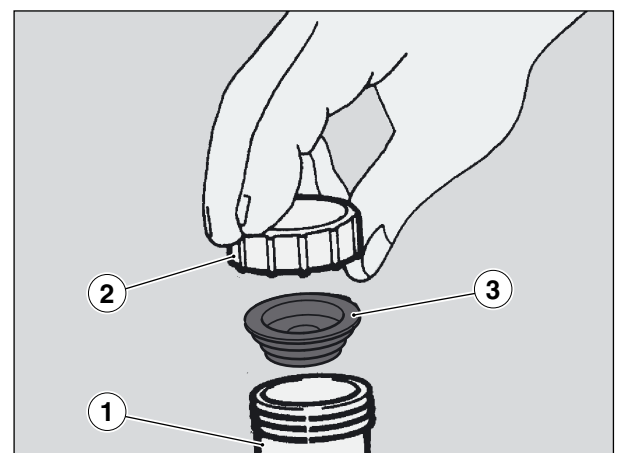
- Undo and remove plug (2).



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



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

- Remove the gasket (3).
- Using a syringe, top up fluid inside the brake tank (1), see [1.8.1](#), until reaching the correct level between the "MIN" and "MAX" reference marks.

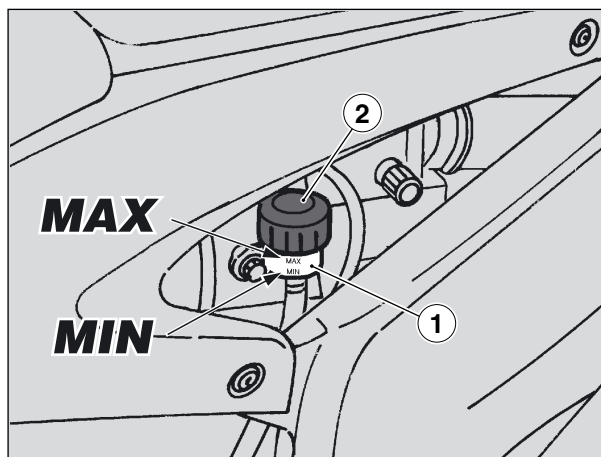
**WARNING**

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

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

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

- To refit components, follow the disassembly procedure in reverse order.



2.12.5. BLEEDING THE BRAKING SYSTEMS

Carefully read  1.2.1 and  1.3.1.

For maintenance operations, see  2.1.2.

The air, if any, present inside the hydraulic circuit will serve as “pad” by absorbing most of the pressure coming from the brake master cylinder and thus reducing the calipers efficiency during braking.

If some air is present inside the circuit, the brake control is “spongy” and the braking efficiency is reduced.



DANGER


Safety critical operation. In order to avoid any damage to both rider and vehicle, after brake reassembly and after having restored the braking system standard operation, make sure that all air is bled out of the hydraulic circuit. 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 fluid. Consult a doctor or an eye specialist if the fluid gets in contact with your eyes.




WARNING

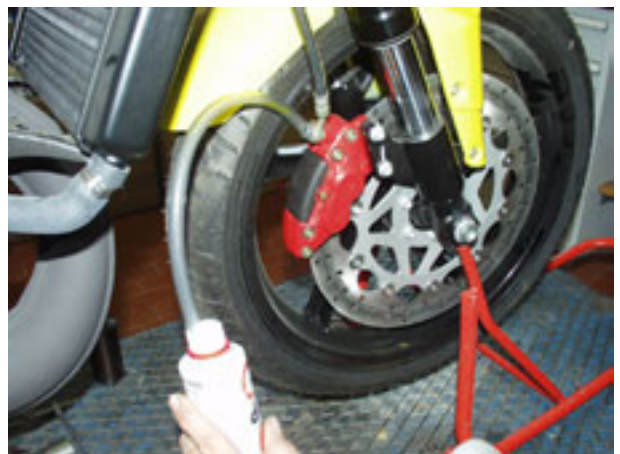
Handle the brake fluid with extreme care: it may damage the vehicle paintwork and the plastic, rubber and other parts. In case maintenance operations are to be performed on the hydraulic circuit, it is advisable to use latex gloves. When using the brake fluid, take care not to spill it on the plastic or painted parts, since it can damage them.

FRONT BRAKE

- Top up fluid inside brake tank, see  2.12.1.
- Remove the rubber cap (1) from the bleed valve (2).
- Insert one end of a transparent plastic tubing inside the caliper bleed valve (2) and the other end in a container for collection.
- Operate the brake lever repeatedly, then keep it fully pulled.
- Loosen the bleed valve by $\frac{1}{4}$ of a turn so that the brake fluid can flow inside the container. The tension on the brake lever will thus be eliminated and you will be able to take it to the end of stroke.
- Repeat this last procedure until no air bubbles can be seen inside the fluid flowing inside the container.

NOTE When bleeding the hydraulic circuit, fill the tank with the suitable quantity of brake fluid. Make sure that during this procedure some brake fluid is always present inside the tank.

- Tighten the bleed valve (2) and remove the plastic tubing.
- Top up to the correct brake fluid level, see  2.12.1.
- Refit the rubber cap (1).



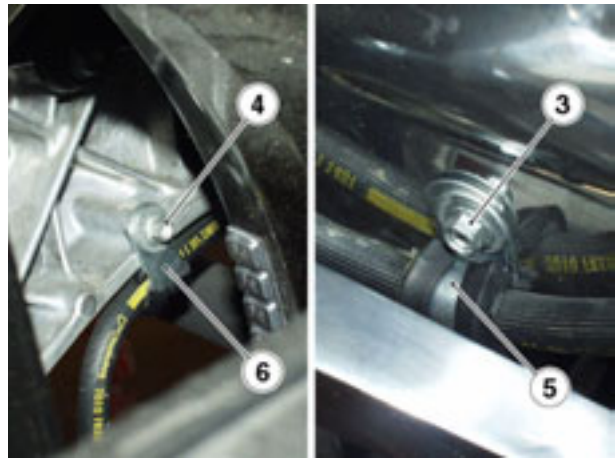
REAR BRAKE

TIGHTENING TORQUE VALUES

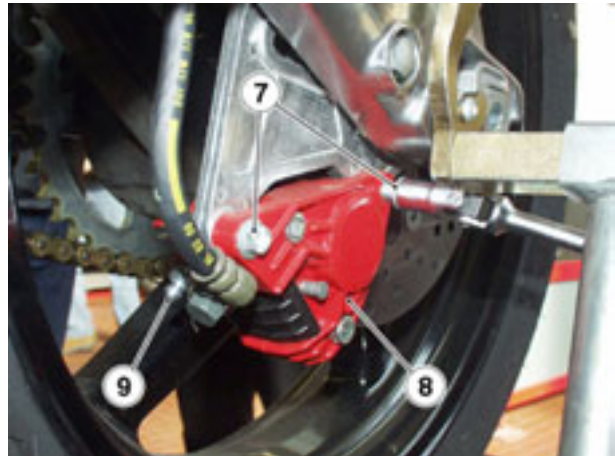
Screws (3-4) 3 Nm (0.3 kgm)

Screws (7) 22 Nm (2.2 kgm)

- Top up brake fluid inside tank, see [2.12.4.](#)
- Undo and remove the two screws (3-4). Keep the two cable guides (5-6) with washers.
- Undo and remove the two screws (7). Keep the brake caliper (8). Before refitting apply Loctite® on screw threads (7).
- Position the brake caliper (8) as high as possible.
- Remove the rubber cap from the bleed valve (9).



- Insert one end of a transparent plastic tubing inside the caliper bleed valve (9) and the other end in a container for collection.
- Operate the brake lever repeatedly, then keep it fully pulled.
- Loosen the bleed valve by ¼ of a turn so that the brake fluid can flow inside the container. The tension on the brake lever will thus be eliminated and you will be able to take it to the end of stroke.
- Repeat this last procedure until no air bubbles can be seen inside the fluid flowing inside the container.



NOTE When bleeding the hydraulic circuit, fill the tank with the suitable quantity of brake fluid. Make sure that during this procedure some brake fluid is always present inside the tank.

- Tighten the bleed valve (10) and remove the plastic tubing.
- Top up to the correct brake fluid level, see [2.12.4.](#)
- Refit the rubber cap (1).



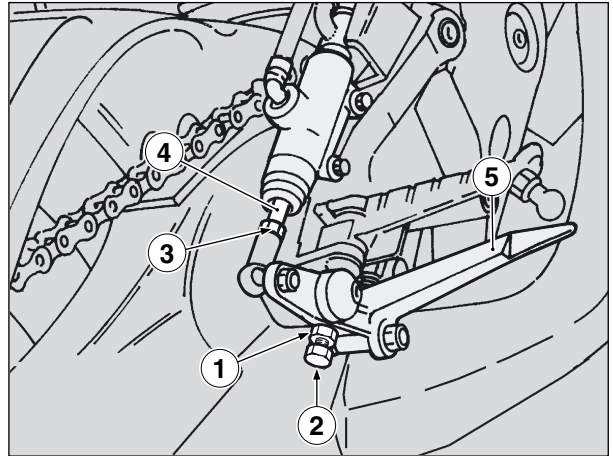
2.13. ADJUSTING THE REAR BRAKE CONTROL LEVER

2.13.1. ADJUSTING THE REAR BRAKE CONTROL LEVER

The brake pedal is placed in an ergonomic position during vehicle assembly.

If necessary, the brake pedal height can be adjusted to fit your riding position:

- Loosen the check nut (1).
- Fully loosen the brake adjuster (2).
- Tighten the lock nut (3) on the master cylinder control rod (4).
- Tighten the master cylinder control rod (4) and then unscrew it by 3 to 4 turns.
- Screw the brake adjuster (2) until the brake pedal (5) is in the desired position.
- Lock the brake adjuster (2) with the check nut (1).
- Unscrew the master cylinder control rod (4) and make it contact the master cylinder piston.
- Screw the rod again so as to obtain a min. clearance of 0.5 to 1 mm between the master cylinder rod (4) and piston.



WARNING

To avoid the early wear of braking parts, make sure that the brake lever has some free play.

Brake adjuster and brake end of stroke clearance: 0.5 to 1 mm

- Lock the brake master cylinder rod using the check nut (3).



WARNING

Once you have finished the adjusting operation, make sure that, when the brake lever is released, the wheel can rotate freely.

2.14. ADJUSTING THE GEARBOX LEVER

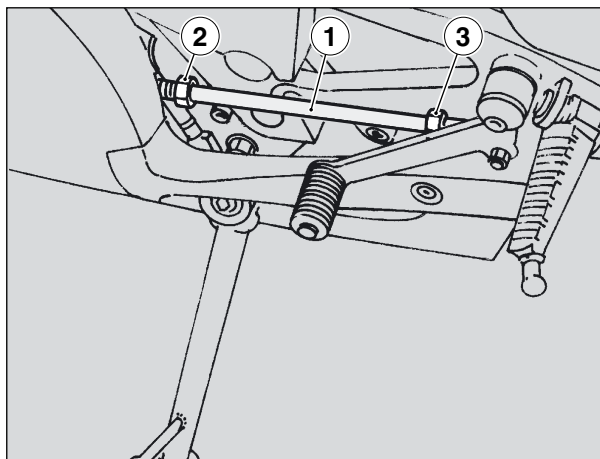
2.14.1. ADJUSTING THE GEARBOX LEVER

The gearbox lever can be adjusted using the transmission rod (1). Proceed as follows:

- Loosen the nuts (2, 3).
- Rotate the transmission rod and adjust the gearbox lever height.
- Tighten the nuts (2, 3).

The gearbox lever pin is constantly greased thanks to the special slot and the two oil seals.

NOTE In case of disassembly, lubricate and do not damage the oil seals.



2.15. THROTTLE

2.15.1. THROTTLE

Inspect after the first 1000 km (621 mi) and every 4000 km (2485 mi) or 12 months afterwards.

CHECKING FOR THROTTLE PROPER OPERATION



CAUTION

Throttle operation may be impaired when the throttle cables are damaged, bent in tight turns or twisted. Using the motorcycle in this condition may lead to loss of control while riding.

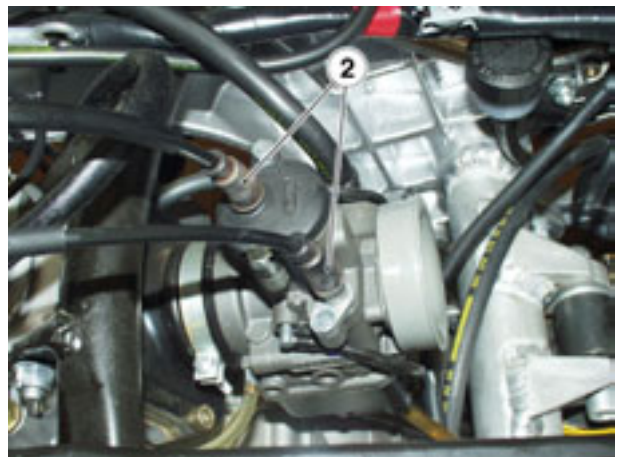
- Turn the handlebars and ensure that idling speed is unaffected by handlebar movement. Open the throttle and ensure that the twistgrip springs back to the closed position smoothly when released.

If needed:

- Make sure the components listed below are in the proper position and well lubricated:
cable sheath;
twistgrip adjuster (1);

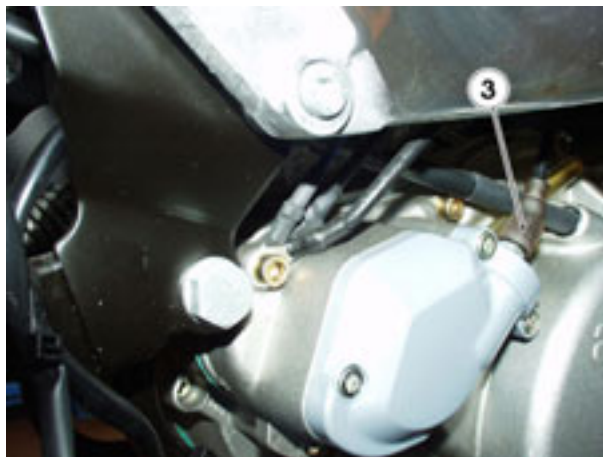


throttle body adjusters (2);



mixer oil pump adjuster (3);
 cable end-caps;
 throttle control.

- Check throttle cable play adjustment, see [2.15.1](#).

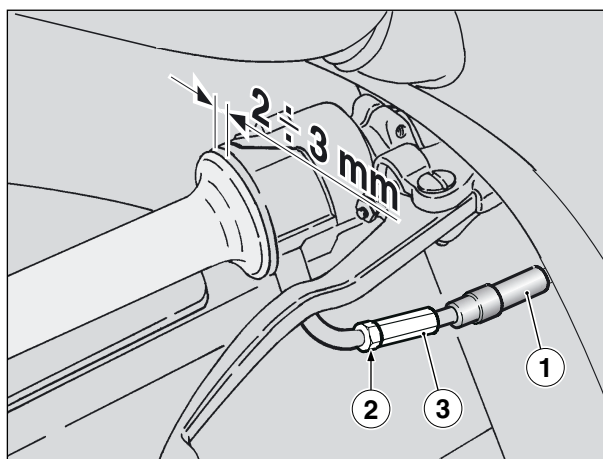


THROTTLE CABLE PLAY ADJUSTMENT

There should be 2–3 mm free play in the throttle twistgrip cable (measured at twistgrip edge).

If not so:

- Place the motorcycle on the stand.
- Slip off the rubber gaiter (1).
- Loosen the locknut (2).
- Rotate the adjuster (3) until setting the specified free play.
- After adjusting, tighten the locknut (2) and check free play again.
- Refit the rubber gaiter (1).



WARNING

Turn the handlebars and ensure that idling speed is unaffected by handlebar movement. Open the throttle and ensure that the twistgrip springs back to the closed position smoothly when released.

2.15.2. IDLING ADJUSTMENT

Adjust as follows whenever idling speed seems erratic.

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

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

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

ROTATE CLOCKWISE to increase idling speed.

ROTATE ANTI-CLOCKWISE to decrease idling speed.

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



2.15.3. COLD-START CABLE PLAY ADJUSTMENT

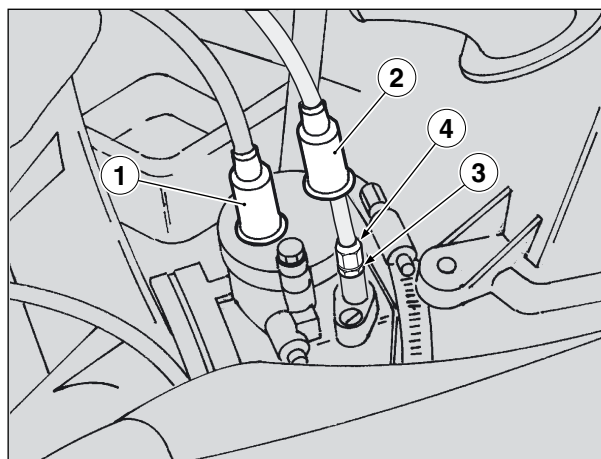
There should be 2-3 mm free play in the cold-start cable.

Play is adjusted as follows:

- Place the motorcycle on the stand.
- Lift the fuel tank; see [2.9.1](#).
- Adjust working from the left side of the motorcycle.

NOTE DO NOT disturb the rubber gaiter of the throttle cable (1).

- Slip off the rubber gaiter (2).
- Slacken the nut (3).
- Work the adjuster (4) located on the carburetor.
- When finished:
- Tighten the nut (3) to lock the adjuster (4) and refit the rubber gaiter (2).



2.16. FRONT END

2.16.1. STEERING

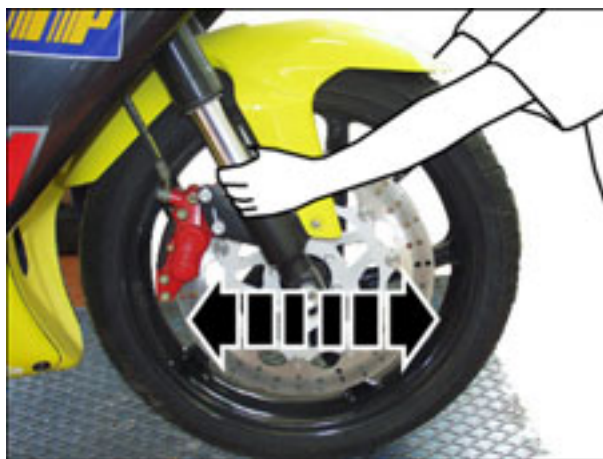
Inspect after the first 1000 km (621 mi) and every 4000 km (2485 mi) or 12 months afterwards.

The steering is fitted with rolling bearings to ensure smooth handling.

Proper steering adjustment is vital to smooth steering movement and safe riding. Any hardness in the steering will impair handling, whereas a soft steering will result in poor stability.

CHECKING PLAY IN THE BEARINGS

- Put the vehicle on the centre stand.
- Rock the fork back and forth in the direction of travel.
- If you feel any play, adjust the bearings.



ADJUSTING PLAY IN THE BEARINGS

TORQUE WRENCH SETTINGS

Top bush (3) 80 Nm (8.0 kgm).

- Slacken but do not remove the two bolts (1) securing the top yoke (2).
- Release and remove the top bush (3).
- Tap the underside of the top yoke (2) gently to lift out the top yoke together with handlebar and steering lock/ignition switch.
- Lean the top yoke (2) forward. Place a cloth underneath the top yoke to protect the instrument panel.
- Slacken the adjusting ring (4) fully using a locking spanner. Tighten the adjusting ring (4) to the specified torque to take up play.
- Refit the top yoke (2) and position it correctly.
- Smear the thread and underside of the bush (3) with oil.
- Tighten the top bush (3).
- Slacken the bush (3) and then re-tighten to the specified torque. This will ensure correct torque.
- Tighten the two bolts (1).



WARNING

When finished, ensure that the handlebars turn smoothly or the sliding surfaces will damage resulting in poor handling.



2.16.2. FRONT SUSPENSION

The front suspension is managed by a hydraulic fork, which is held to the steering stem by two yokes.

NOTE *Vehicle set-up may not be modified.*

Change front fork oil every 12,000 km (7456 mi).
The following inspections should be performed every 8000 km (5000 mi):


- Keep the front brake lever squeezed in and press down repeatedly on the handlebars to compress the front fork. The front fork should compress in a smooth motion. Inspect the fork legs for any traces of oil.



If the front fork has a tendency to bottom out, change oil; see

 [7.10.4.](#)

Check the front fork for oil leaks and inspect the surface of the fork legs for cracks or scoring.

Any damaged components should be repaired or – where repair is not feasible – renewed; see  [7.10.3.](#)





- Ensure that all parts are properly tightened and test the front suspension for proper operation.

2.17. TAIL SECTION

2.17.1. REAR SWINGING ARM INSPECTION

Periodically check that the nut-and-spindle assembly and the needle roller bearings of the swinging arm are properly tightened.

Inspection procedure:

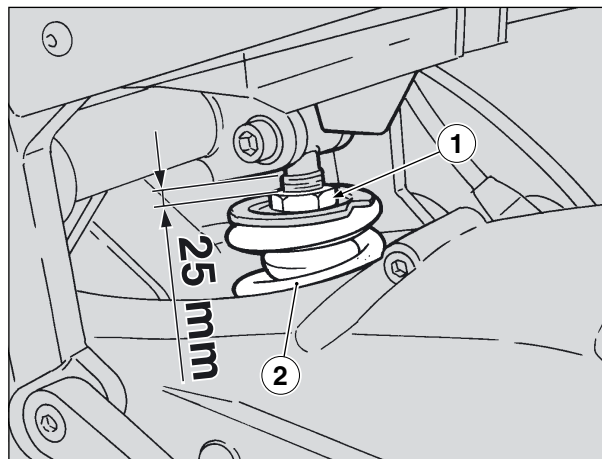
- Place the motorcycle on the front service stand (OPT); see  [1.7.1.](#)
- Remove the fuel tank; see  [4.1.1.](#)
- Fix the slings to the frame at the engine top mounting point.
- Lift hoist arm until stretching the slings taut.
- Push and pull the rear wheel up and down, then rock it from side to side. If you feel any play, adjust the swinging arm; see  [2.17.3](#)
- If this fails to eliminate play, change the bearings; see  [7.11.2.](#)

2.17.2. REAR SUSPENSION

Read [1.2.1](#) carefully.

The rear suspension is managed by a spring/damper unit that is connected to the frame and to the rear swinging arm through silent-blocks and a linkage system, respectively. To modify vehicle response, the rear shock absorber is fitted with an adjuster nut (1) which controls spring preload (2).

NOTE Vehicle geometry may be varied to meet rider's preferences by changing front ride height.



REAR SHOCK ABSORBER ADJUSTMENT

Factory setting is designed to suit the broadest possible range of riding conditions, meaning low and high speed, whether riding solo or carrying a full load.

However, rear suspension setting may be modified to suit specific needs in accordance with vehicle usage.



DANGER

Allow the engine and silencer to cool down completely before working the adjusters. Never tighten the adjuster nut any deeper than 25 mm from the beginning of the thread (see figure). Exceeding this dimension will result in sudden jerking whenever you come across any small changes in the road surface.

Work the adjuster nut (1) (shock absorber spring preload adjustment) (see table).



WARNING

Rotate the adjuster nut (1) gradually one turn at a time. Test ride the motorcycle repeatedly until achieving the ideal setting.

REAR SHOCK ABSORBER SETTING TABLE

Adjuster nut (1)	Tighten	Slacken
Purpose	Increase spring preload	Decrease spring preload
Vehicle response	Stiffer	Softer
Recommended for	Smooth pavement, regular road surface	Uneven or loose road surface
Notes	Riding with a passenger	Riding solo

2.17.3. REAR SWINGING ARM ADJUSTMENT



Read  1.2.1 carefully.

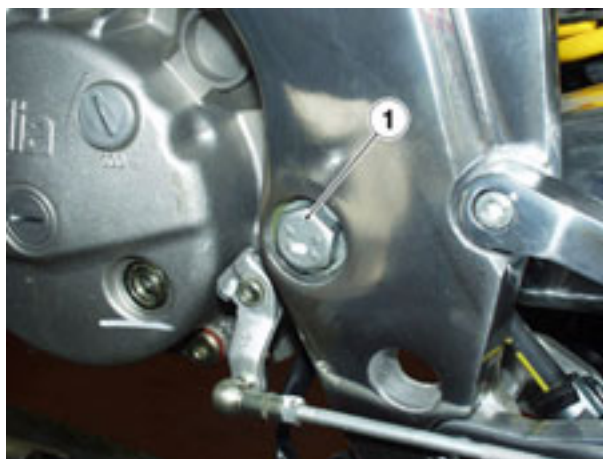
TORQUE WRENCH SETTINGS

Spindle (1) 100 Nm (10.0 kgm).

Lockring (2) 35 Nm (3.5 kgm).

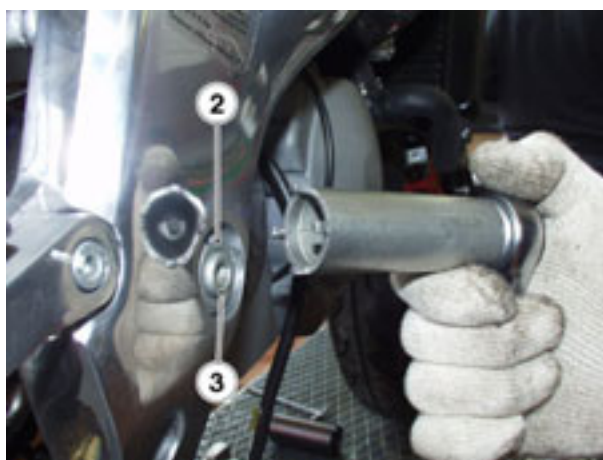
Lockring adjusting bush (3) 12 Nm (1.2 kgm).

- Put the motorcycle on the front wheel stand (OPT),  1.7.1.
- Remove the fuel tank; see  4.1.1.
- Fix the slings to the frame at the engine top mounting point.
- Lift the hoist arm until stretching the slings taut.
- Slacken the spindle (1) working from the left side.



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

- Working from the right-hand side of the motorcycle, slacken the lockring (2) fully using the special socket.
- Tighten the adjusting bush (3) to the specified torque.
- Tighten the lockring (2) using the special socket.
- Tighten the spindle (1).





2.17.4. INSPECTING THE REAR SUSPENSION LINKAGE SYSTEM

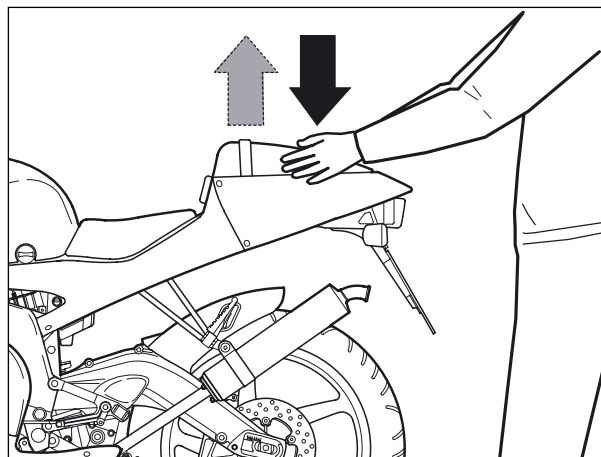
Read  1.2.1 carefully.

Check bearings every 4000 km (2485 mi).

NOTE An assistant will be required to keep the vehicle upright during the procedure.

- Hold the tail of the motorcycle firmly with your hands. Press down and release repeatedly.
- If you feel any hardness or play, or hear squeaking noises, change the bearings of the rear suspension linkage system; see  7.12.3.
- Press down the vehicle tail. If the tail is slow to spring back up when released, check rear suspension adjustment; see  2.17.2.

If the problem persists after the adjustment, it means that the shock absorber is depressurised. Charge the shock absorber.






2.18. WHEELS

2.18.1. WHEELS

Read  [1.2.1](#) carefully.

FRONT WHEEL




Check every 4000 km (2485 mi).

- Place the vehicle on the front wheel stand; see  [1.7.1](#).
- Rotate the wheel manually in both directions.
- The wheel should be spinning smoothly, with no hardness or unusual noise. If not so, change the bearings; see  [7.5.3](#).
- If you detect any wobble, inspect wheel and affected components; see  [7.5.4](#).
- A spinning wheel that always stops in exactly the same position needs balancing.



REAR WHEEL

Check every 4000 km (2485 mi).

- Place the vehicle on the rear wheel stand; see  [1.7.2](#).
- Rotate the wheel manually in both directions.
- The wheel should be spinning smoothly, with no hardness or unusual noise. If not so, change the bearings; see  [7.6.3](#).
- If you detect any wobble, inspect wheel and affected components; see  [7.6.5](#).
- A spinning wheel that always stops in exactly the same position needs balancing.



2.19. TYRES

2.19.1. TYRES

Check tyre condition after the first 1000 km (621 mi) and every 4000 km (2685 mi) or 8 months afterwards.

It is a good rule to measure tyre inflation pressures before and after a long trip.

Tyre inflation pressures should be checked monthly with the tyres at ambient temperature.

This vehicle is fitted with tubeless tyres.

For inflation pressures, see  1.7.1.

TREAD CONDITION



WARNING

Inspect tread surface and check for wear. Badly worn tyres adversely affect traction and handling.

Always change a worn tyre. A tyre that becomes punctured in the tread area should be changed when the puncture is larger than 5 mm.

Some of the tyre types approved for this vehicle are fitted with wear indicators.

There are various types of wear indicators.

Enquire about correct wear inspection procedure with your supplier.

Never use tube tyres on tubeless tyre rims, or viceversa.

Always check that the caps are in place on the valves (1), or the tyres may deflate suddenly.


Tyre replacement and repair, and wheel servicing and balancing are delicate operations. They should be carried out using adequate tools and are best left to experienced mechanics.

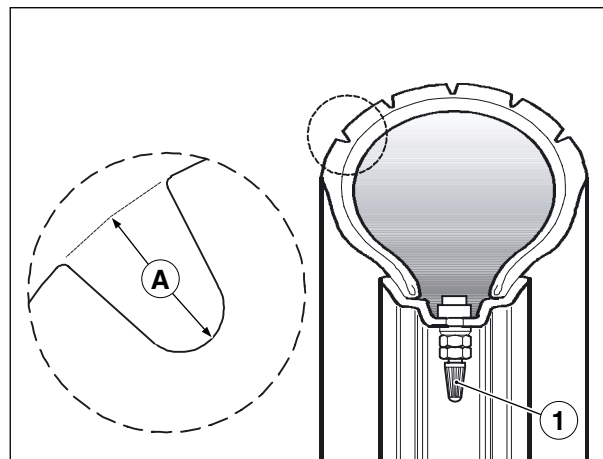
The wheel must be balanced after each tyre repair.

New tyres may be coated with an oily film. Drive carefully until covering several kilometres. Never apply non-specific products to the tyres.

Approved tyre sizes are reported in the registration document. Installing non-approved tyres is a legal offence.

Using tyres other than the specified sizes may change vehicle behaviour, impair handling and make the vehicle unsafe to ride.

Use only the first-equipment tyre types selected by aprilia; see  1.7.1.



MINIMUM RECOMMENDED TREAD DEPTH (A):

Front and rear tyre 2 mm (2 mm).

2.20. EXHAUST SYSTEM

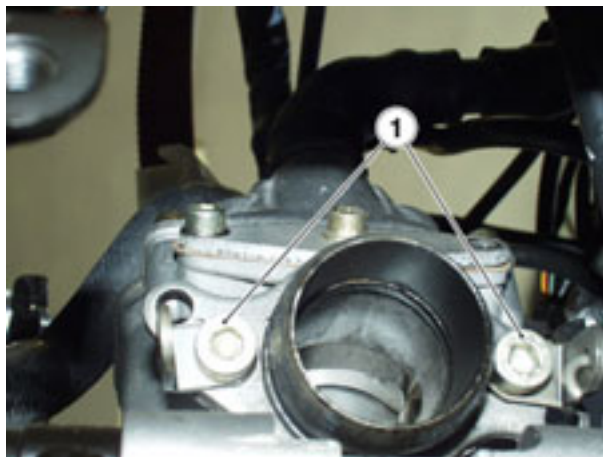
2.20.1. EXHAUST MANIFOLD NUTS

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

**DANGER**

Allow the engine to cool down to ambient temperature.

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

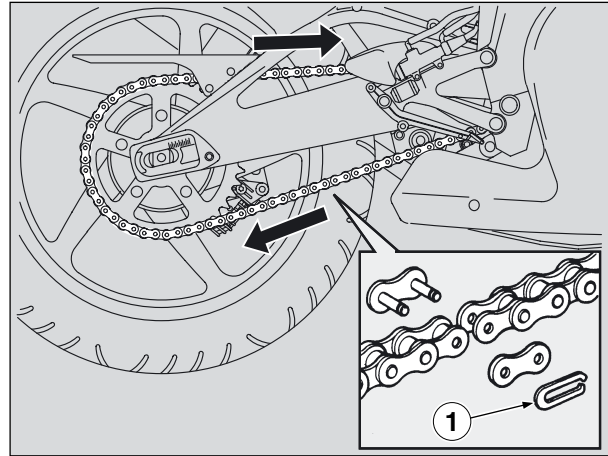


2.21. DRIVE CHAIN


2.21.1. DRIVE CHAIN

Read  [1.2.1](#) carefully.

Inspect and lubricate as required every 500 km (310 mi).
This motorcycle is equipped with a master link chain.
When dismantling and refitting the chain, be sure to install the master link clip (1) with the open end pointing away from the direction of chain movement (see figure).



WARNING

Too much slack may cause the chain to jump off the sprocket, leading to an accident or severe motorcycle damage.
Check chain slack regularly and adjust as required; see  [2.21.3](#).
Improper maintenance may lead to early wear of the chain and/or sprocket damage.
Service the final drive more frequently when the motorcycle is used in demanding conditions or on dusty/muddy roads.


DRIVE CHAIN INSPECTION

- Place the vehicle on the stand.
- Put the gearbox in neutral.
- Rotate the rear wheel manually and slowly.
- Visually inspect chain, front and rear sprockets looking for:

damaged chain rollers;
loose chain link pins;
dry, rusty, warped or seized links;
exceeding wear;
missing O-rings;
exceedingly worn or damaged sprocket teeth.



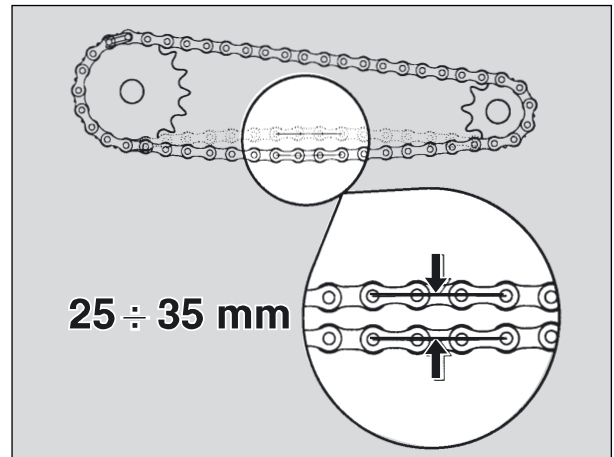
WARNING

If chain rollers are damaged, chain link pins are loose and/or any O-rings are missing or deteriorated, renew the drive chain and the front and rear sprockets as a set; see  [7.6.4](#).

2.21.2. CHAIN SLACK INSPECTION

To check chain slack:

- Stop the engine.
- Place the vehicle on the stand.
- Put the gearbox in neutral.
- Check chain slack in the lower straight portion of chain. The vertical movement of the chain midway between the sprockets should be approximately **25 - 35 mm**.
- Wheel the motorcycle forward to check slack at various sections of the chain. Slack should be the same throughout one full turn of the wheel.



WARNING

If slack is greater at particular positions of the chain, it means that some links are warped or have seized. To prevent seizure, lubricate the chain frequently; see [2.21.5](#).

Chain slack must be adjusted whenever outside the specified range of 25 - 35 mm, even when it is consistent at all positions of the chain. See [2.21.3](#).



WARNING

Exceeding slack in the chain may cause the chain to rattle or knock, resulting in a worn chain slider and guide.

Improper maintenance may lead to early wear of the chain and/or sprocket damage.

Service the final drive more frequently when the motorcycle is used in demanding conditions or on dusty/muddy roads.

2.21.3. ADJUSTING THE DRIVE CHAIN

TORQUE WRENCH SETTINGS

Rear wheel spindle nut 100 Nm (10.0 kgm).

If inspection proved the need for adjustment, set drive chain as follows:

- Position the vehicle on the rear wheel stand (OPT), [1.7.2.](#)
- Completely loosen nut (1).

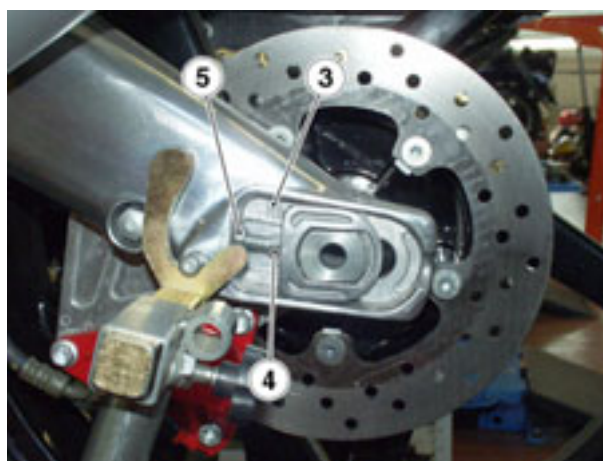
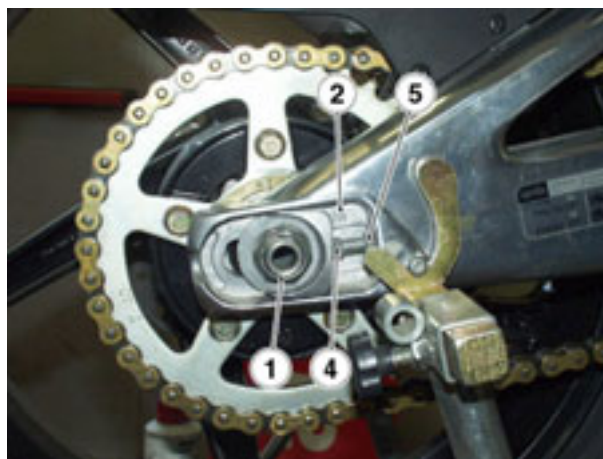


WARNING

For and easier wheel centering, there are two fixed references (2-3) on the inner face of tensioner seats, on swinging arms, before wheel spindle.

- Loosen the two locknuts (4).
- Use adjusters (5) to set chain slack and check on either sides that references (2-3) match.
- Tighten the two locknuts (4).
- Tighten nut (1).

Check chain slack, see [2.21.2.](#)



2.21.4. CHECKING CHAIN AND SPROCKETS FOR WEAR

Visually inspect chain, front and rear sprockets looking for:

- Damaged chain rollers.
- Loose chain link pins.
- Dry, rusty, warped or seized links.
- Exceeding wear.
- Missing O-rings.
- Exceedingly worn or damaged sprocket teeth.



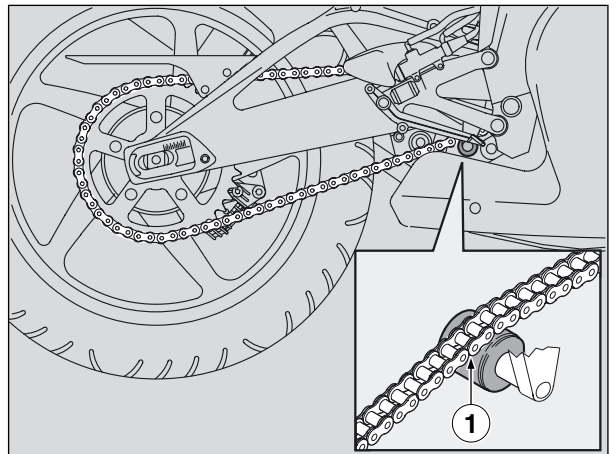
WARNING

If chain rollers are damaged, chain link pins are loose, renew the drive chain and the front and rear sprockets as a set.

The chain should be lubricated frequently, especially after finding any dry or rusty components.

Lubricate and repair any warped or seized chain links.

- Check the chain tensioner roller (1) for wear.
- Lastly, check the slider that protects the swinging arm for wear.



2.21.5. CLEANING AND LUBRICATION**WARNING**

Use the utmost care when adjusting, lubricating, washing or replacing the chain.

Lubricate the chain every 500 km (310 mi) and whenever it seems appropriate.

Lubricate with aerosol lubricant for chains or SAE 80W-90 oil.

Never wash the drive chain using steam cleaners, high-pressure water nozzles or highly flammable solvents.

NOTE *Do not ride when you have only just lubricated the chain. Centrifugal force would cause the newly applied lubricant to fly all over adjacent vehicle parts.*

2.21.6. CHAIN SLIDER INSPECTION

- Place the vehicle on the stand.
- Check the chain slider (1) for damage or wear. Replace as required; see [7.1.15](#).



LUBRICATION

3

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3.1 REMOVING THE ENGINE OIL TANK

3.1.1 REMOVING THE ENGINE OIL TANK

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

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

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

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

- Release the clip (2).



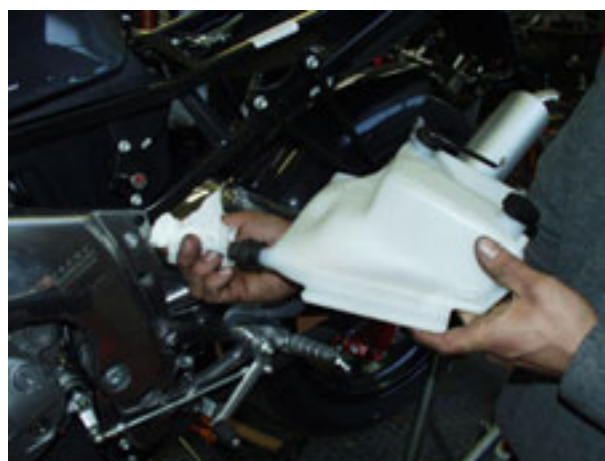
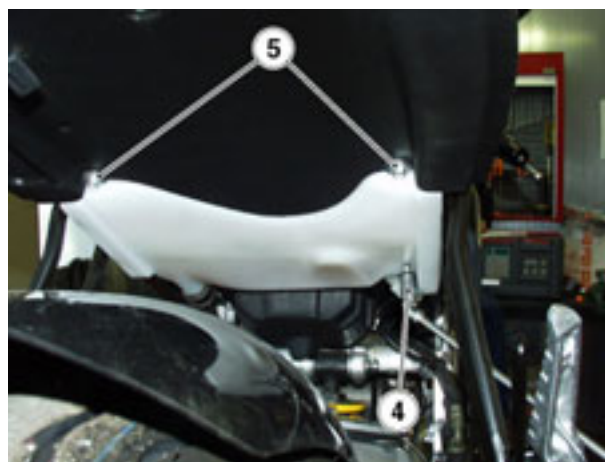
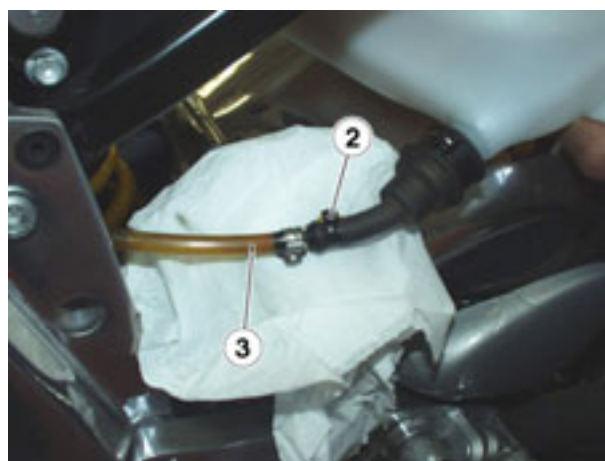
WARNING

Change the clip (2) on refitting.

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

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

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



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FUEL SYSTEM

4

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4.1. FUEL TANK


4.1.1. FUEL TANK REMOVAL

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Fuel tank rear mounting bolt (3) 7 Nm (0.7 Kgm).

NOTE It is not necessary to drain the fuel.

- Lift the fuel tank; see  2.9.1.
- Withdraw the fuel hose (1) from the carburetor.
- Cut the ties and withdraw the fuel tank drain hoses.



- Remove the rod and lower the tank.




- Undo the nut (2) and remove the screw (3).
- Collect the washer (4), the two grommets (5) and the back spacer (6).
- Remove the fuel tank.



4.1.2. DRAINING THE FUEL TANK

Read  [1.3.1](#) carefully.

**DANGER****Fire hazard!****Allow the engine and exhaust silencers to cool down completely.****Fuel vapours are harmful to human health.****Ensure that the room is well ventilated before proceeding.****Do not inhale fuel vapours.****Do not smoke or use bare flames near fuel vapours.****Do not release fuel into the environment.**

- Remove the fuel tank; see  [4.1.2](#).
- Prepare a fire-proof metal jerry-can of more than adequate capacity to contain the amount of fuel in the tank and place it on the ground.
- Place the free end of the hose into the canister you will have prepared previously.
- Open the filler cap.
- Wait until all fuel has drained out of the fuel tank.



Once the fuel tank is empty:

- Lower the fuel tank.
- Refit and close the filler cap.

4.1.3. COMPLETE REMOVAL OF THE FUEL COCK**TORQUE WRENCH SETTINGS**

Fuel cock retaining screws 3 Nm (0.3 kgm)

Read  1.2.1 and  1.3.1 carefully.

- Drain the fuel tank; see  4.1.2.
- Remove the fuel tank; see  4.1.1.
- Release and remove the two screws (1).
- Remove the complete fuel cock (2).



4.2. AIR CLEANER

4.2.1. AIRBOX REMOVAL

TORQUE WRENCH SETTINGS

Screws (1) 5 Nm (0.5 Kgm).
Screws (2) 5 Nm (0.5 Kgm).

- Remove the fuel tank; see [4.1.1.](#)
- Release and remove the two screws (1).
- Release and remove the two screws (2) and collect the nuts from beneath the screws.
- Remove the airbox cover (3).



- Slacken the clip (4).



- Remove the airbox complete with air cleaner.



NOTE Block off the carburetor opening with a clean cloth to prevent the ingress of debris into the intake ducts.

4.2.2. AIR CLEANER REMOVAL

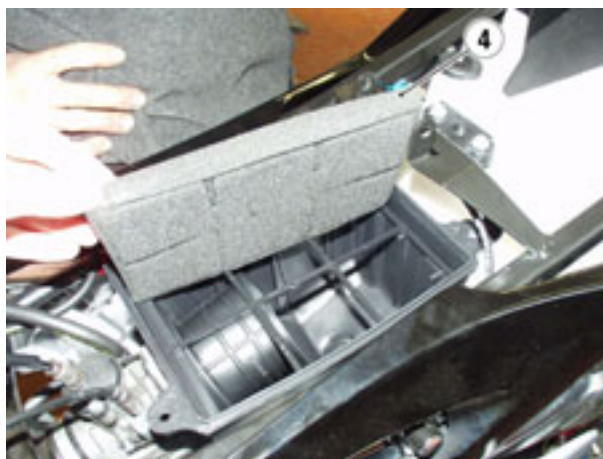
TORQUE WRENCH SETTINGS

Screws (1) 5 Nm (0.5 Kgm).
Screws (2) 5 Nm (0.5 Kgm).

- Lift the fuel tank; see [2.9.1.](#)
- Release and remove the two screws (1).
- Release and remove the two screws (2) and collect the nuts from beneath the screws.
- Remove the airbox cover (3).



- Remove the air cleaner (4) together with its meshing.



NOTE Block off the opening with a clean cloth to prevent the ingress of debris into the intake ducts.

On refitting, be sure to remove the cloth and any other objects you may have placed inside the airbox before positioning the airbox cover (3).

Make sure the air cleaner is positioned correctly, otherwise it will let unfiltered air into the engine.

4.3. CARBURETOR

4.3.1. CARBURETOR REMOVAL

Read  1.2.1 and  1.3.1 carefully.

- Remove the airbox.
- Slacken the clip (1).
- Ease the carburetor (2) off the intake manifold.
- Block off the intake manifold with a cloth to prevent the ingress of debris into the engine.



- Release and remove the two screws (3).
- Remove the throttle cable complete with needle and slide.
- Release and remove the screw (4) and remove the complete throttle cable.
- Remove the hose (5) of the mixer oil pump.

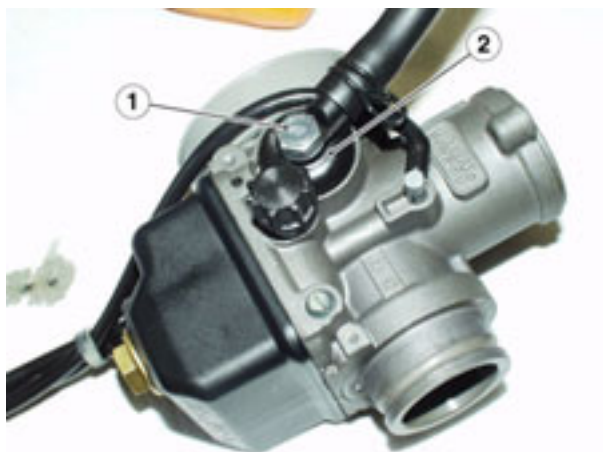
NOTE Place some paper underneath the hose (5) to collect any oil spillage.



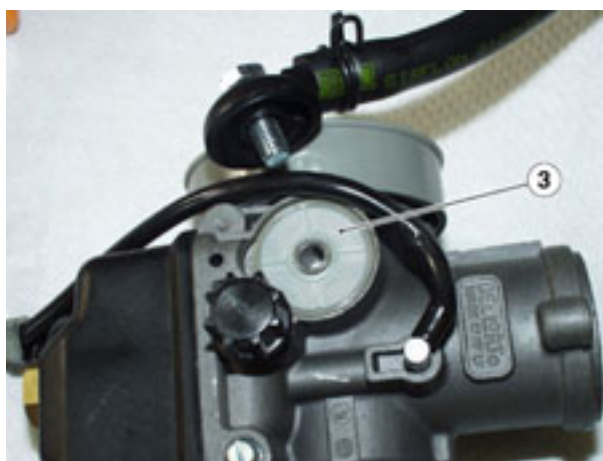
4.3.2. REMOVING THE FUEL FEED FILTER

Read [1.2.1](#) and [1.3.1](#) carefully.

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



- Remove the fuel filter (3).



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

4.3.3. CARBURETOR SPECIFICATIONS 1999-2002

Description	Dimensions	Countries	Model
Carburetor	phbh 28 bd	B-D-E-F-I-SF	11kW-MP
	phbh 28-bd	AUS-B-D-DK-E-GR-J-NL-P-SGP-UK	f.p.
	phbH 28-Rd	CH	f.p.-MP
	phbh 28 bd	-	11 kW -SF
	phbH 28-Bd	D	80km
	phbH 28-Bd	A	11 kW -MP
Tapered needle	25/3a	A-AA-AUS-B-D-DK-E-EU-F-GR-I-J-JJ-NL-P-SF-SGP-UK	-
	56/2aX	CH-EU	-
Throttle valve return spring		A-AA-AUS-B-D-DK-E-EU-F-GR-I-J-JJ-NL-P-SF-SGP-U	
Throttle valve	40	B-D-E-F-I-SF	11 kW -MP
	50	A	11 kW -MP
	45	-	11 kW -SF
	50	AA-AUS-B-D-DK-E-EU-GR-J-JJ-NL-P-SGP-UK	f.p.
	55	CH-EU	f.p.
	50	D	80km
Idle emulsioner jet	50	CH-EU	f.p.
	62	-	f.p.
	62	-	11 kW -SF
	65	-	11 kW -MP
	65	B-D-E-F-I-SF	11 kW -MP
	62	-	f.p.
	65	A	11 kW -MP
	65	D	80km
	62	/	11 kW -SF
Atomizer	BN 266	AA-AUS-B-D-DK-E-EU-GR-J-JJ-NL-P-SGP-UK	f.p.
	T 262	CH	f.p.-MP
	BN 264	D	80km
	BN 264	-	11 kW
Starter jet	70	-	-
Main jet	115	D	80km
	110	B-D-E-F-I-SF	11 kW -MP
	115	-	11 kW -SF
	115	A	11 kW -MP
	115	CH	f.p.-MP
	120	AUS-B-D-DK-E-GR-J-NL-P-SGP-UK	f.p.
Needle valve	250	/	/
Power jet	90	CH	f.p.-MP

COOLING SYSTEM

5

SUMMARY

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5.1. COOLING SYSTEM DIAGRAM

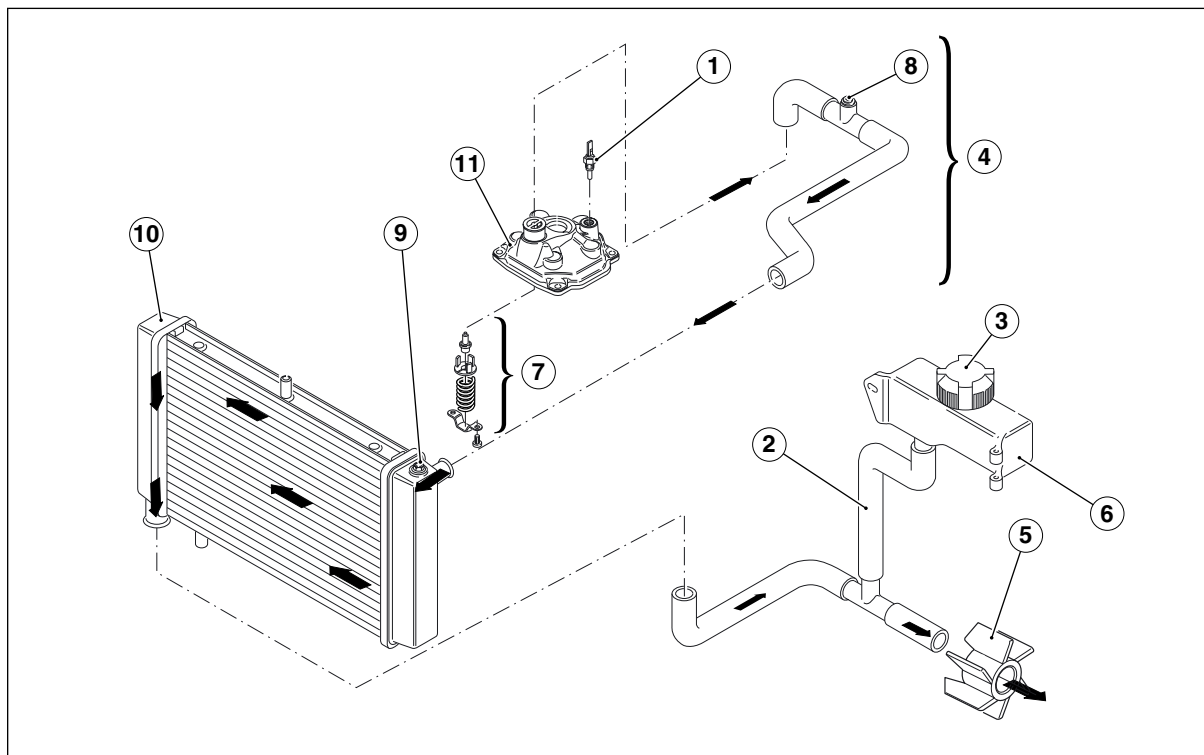
5.1.1. COOLING SYSTEM DIAGRAM

An engine-driven centrifugal pump accommodated in the engine circulates coolant through the system. The pump takes in the coolant from the bottom section of the radiator and directs it through the ducts into the cylinders and cylinder heads to cool down engine internals.

When coolant expands from heat, the expansion reservoir takes up excess coolant.

"LOW" and "FULL" level marks facilitate coolant level inspection and top-up; see [2.10.1](#).

See [1.3.1](#) for more details on coolant.



Key:



1. Cylinder thermistor
2. Expansion reservoir connection tubing
3. Plain radiator cap (no breather)
4. Radiator to thermal expansion valve tube
5. Centrifugal pump (intake)
6. Expansion reservoir
7. 70° thermostat
8. Breather union
9. Radiator breather
10. Radiator
11. Cylinder head cover

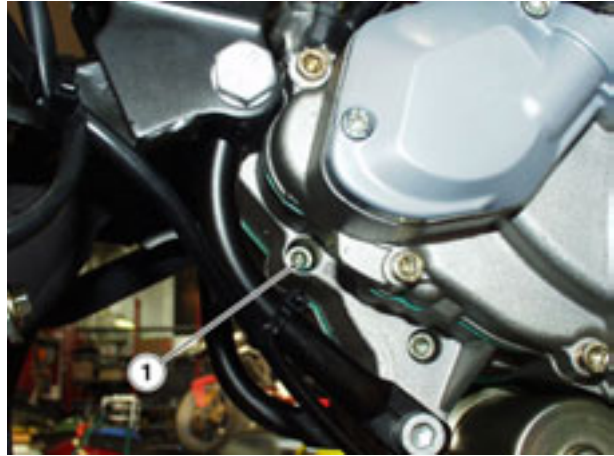
5.2. COOLANT

5.2.1. COOLANT CHANGE

Read  [1.2.1](#) and  [1.3.1](#) carefully.

Change coolant every two years.

- Remove the left-hand side fairing; see  [7.1.2](#).
- Lift the fuel tank; see  [2.9.1](#).
- Place a container with capacity greater than 1 litre under the drain plug (1) to collect coolant.
- Release and remove the drain plug (1).




- Remove the cap (2) of the expansion reservoir (3) to facilitate drainage.


DO NOT RELEASE COOLANT INTO THE ENVIRONMENT.

- Refit the drain plug (1).
- Fill the expansion reservoir (3) up to maximum level.



- Slacken the screw (4) on the radiator.
- Wait until coolant drains out and then tighten the screw (4).
- Top up with coolant; see  [2.10.1](#).



- Slacken the screw (5) on the union.
- Wait until coolant drains out and then tighten the screw (5).
- Top up with coolant again if needed; see  [2.10.1](#).



5.3. RADIATOR



5.3.1. RADIATOR

Read  [1.2.1](#) and  [1.3.1](#) carefully.

TORQUE WRENCH SETTINGS

Radiator to frame mounting screw (3): 10 Nm (1.0 kgm).

REMOVAL

- Drain all coolant from the cooling circuit; see  [5.2.1](#).
- Remove the right-hand side fairing; see  [7.1.2](#).
- Release the hose clip nipple (1) and withdraw the hose from the radiator.
- Release the hose clip nipple (2) and withdraw the hose from the radiator.
- Release and remove the screw (3).



WARNING

Take care not to damage the radiator fins.

- Tilt the radiator slightly forward while lifting until the two bottom mounting bosses are clear of their holes in the radiator bracket.
- Remove the radiator.



WARNING

Block off the openings of the hoses to prevent the ingress of dirt.


INSTALLATION



WARNING

Remove any build-up, dirt, etc. caught between the radiator fins blowing with compressed air. Straighten any bent fins using a small flat-blade screwdriver. Renew the hoses if cracked or sheared. Before refitting the radiator, wash it inside using clean water only.

NOTE Change the grommets mounted on the radiator bracket if damaged.

- Locate the radiator to the bracket and secure it with the screw (3).
- Connect the pipes to the radiator using two new clips.
- Fill the cooling circuit; see  [5.2.1](#).




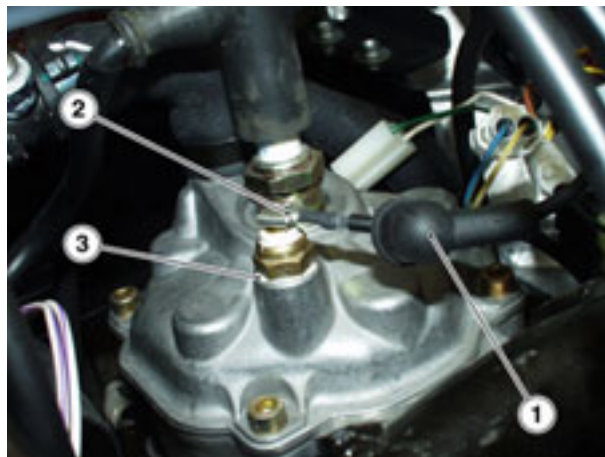
5.4. THERMISTOR

5.4.1. COOLANT THERMISTOR


Read  [1.2.1](#) and  [1.3.1](#) carefully.

REMOVAL

- Lift the fuel tank; see  [4.1.1](#).
- Remove the rubber cover (1).
- Disconnect the electrical connector (2).
- Unscrew and remove the thermistor (3).



INSTALLATION

- Smear the thread of a new thermistor with LOCTITE® 574.
- Screw the new thermistor (3) finger-tight and then tighten.
- If any coolant has been spilled during the removal procedure, top up to correct level when finished; see  [2.10.1](#).

5.5. THERMOSTAT

5.5.1. 70° THERMOSTAT



Read  [1.2.1](#) and  [1.3.1](#) carefully.

TORQUE WRENCH SETTINGS

Cylinder head cover screws (5): 10 Nm (1.0 kgm)

Thermostat bridge retaining screws (6): 6 Nm (0.6 kgm)

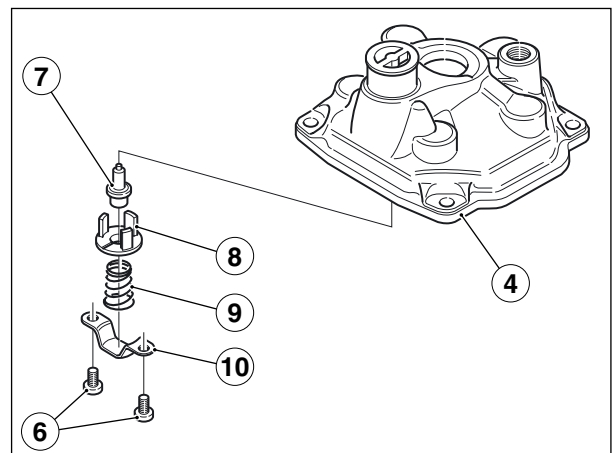
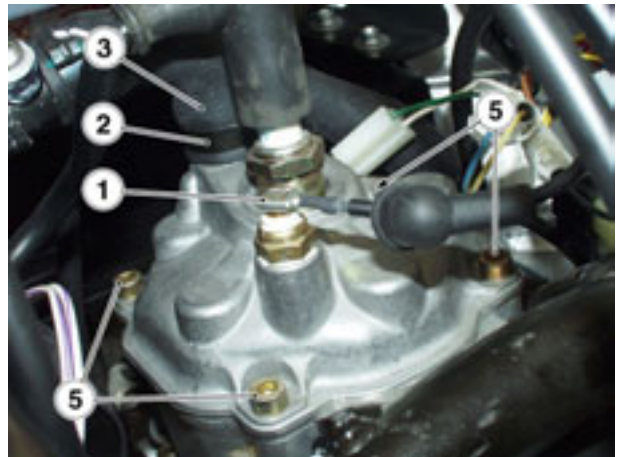
REMOVAL

- Drain all coolant from the cooling circuit; see  [5.2.1](#).
- Remove the spark plug; see  [2.6.1](#).
- Disconnect the electrical connector (1) at the thermistor end.
- Slacken the clip (2).
- Withdraw the hose (3) from the cylinder head cover (4).
- Release and remove the four screws (5).
- Remove the cylinder head cover (4).
- Release and remove the two screws (6).
- Remove the thermostat (7) and collect bridge (10), spring (9) and thermostat mount (8).



WARNING


Block off the openings to prevent the ingress of dirt.



INSTALLATION

- Fit – in the order - thermostat (7), thermostat mount (8), spring (9) and thermostat bridge (10) into the cylinder head cover (4).
- Tighten the two screws (6).
- Refit the cylinder head cover (4).
- Tighten the four screws (5).

NOTE Be sure to have the special clip tweezers (no. 0277295) ready at hand and renew all clips using the same type fitted originally.

- Refit the hose (3) into the cylinder head cover (4).
- Refit the spark plug.
- Connect the connector (1) to the thermistor.
- Fill the cooling circuit; see  [5.2.1](#).


5.6. EXPANSION RESERVOIR

5.6.1. EXPANSION RESERVOIR

TORQUE WRENCH SETTINGS

Expansion reservoir retaining screw (1) 3 Nm (0.3 kgm).

REMOVAL

- Drain the cooling circuit; see  5.2.1.
- Release and remove the screw (1).
- Remove the clip (2).
- Disconnect the tube (3) from the expansion reservoir (4).
- Remove the expansion reservoir (4).




WARNING

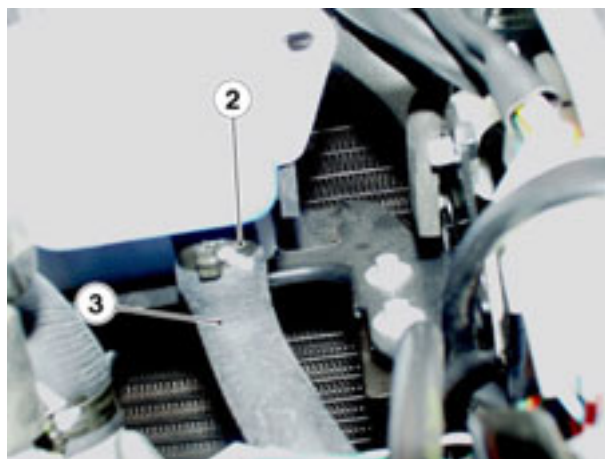
Store the expansion reservoir (4) in a safe place.

INSTALLATION

- Position the expansion reservoir (4).

NOTE Be sure to have the special clip tweezers (no. 0277295) ready at hand and renew all clips using the same type fitted originally.

- Refit the tube (3) to the expansion reservoir (4).
- Tighten the screw (1).
- Fill the cooling circuit; see  5.2.1.



ENGINE

6

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6.1. EXHAUST SYSTEM

6.1.1. EXHAUST PIPE REMOVAL

TORQUE WRENCH SETTINGS

Screws (1-2)	22 Nm (2.2 Kgm)
Screw (3)	20 Nm (2.0 Kgm)

- Remove both side fairings; see [7.1.2.](#)
- Remove the fairing air dam; see [7.1.3.](#)
- Unhook the two springs from the exhaust flange on the cylinder.



- Release and remove the screw (1) and collect the two washers and the nut.



- Release and remove the screw (2) on the left-hand passenger footpeg bracket and collect the washer and the nut.
- Remove the exhaust pipe together with its clamp.



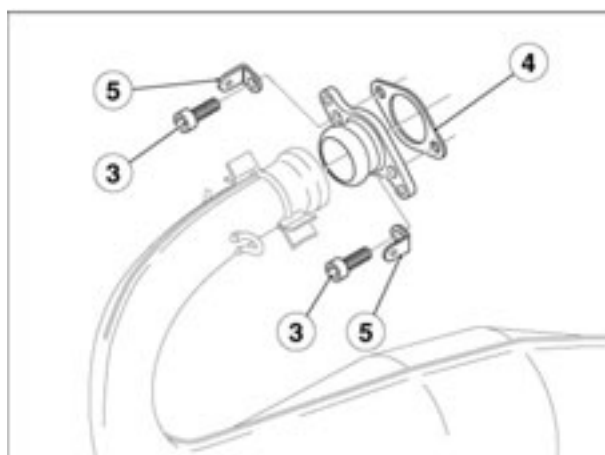
If needed, remove the exhaust flange as follows:

- Release and remove the two screws (3) and collect the lap plate.
- Remove the exhaust flange and collect the seal (4).



WARNING

On refitting, use a new exhaust flange seal (4) and check that the mounting brackets (5) are correctly positioned.



6.2. ENGINE

6.2.1. GENERAL INFORMATION

Type	2-stroke single-cylinder engine with intake reed valve. Separate lubrication with variable-rate automatic mixer (1.0 – 3.0%).
Cylinders	1
Total displacement	124.82 cu cm
Bore/stroke	54 mm / 54.5 mm
Compression ratio	12.5 ± 0.5 : 1
Starter	electric
Engine idling speed (rpm)	1250 ± 100 rpm
Clutch	Wet multi-plate clutch operated by manual control on left handlebar
Cooling	liquid cooling
Gearbox	6-speed mechanical transmission with control pedal on left side of engine
Carburetor	DELL'ORTO PHBH 28
Ignition	CDI
Spark advance	12° ± 2° at 2000 rpm

6.2.2. ENGINE COMPONENTS THAT CAN BE REMOVED WITH THE ENGINE INSTALLED IN THE FRAME

The parts listed below can be removed leaving the engine in the frame.

LEFT SIDE OF ENGINE

- Clutch cover
- Mixing pump
- Coolant pump
- Balancing shaft gear
- Kick-starter (where fitted)
- Clutch

CENTRAL AREA OF ENGINE

- Carburetor
- Radiator
- Exhaust pipe
- Cylinder head
- Piston
- "RAVE" valve (fitted to "f.p." models only)
- Reed valve
- Starter motor (low in the centre)

RIGHT SIDE OF ENGINE

- Drive chain and front chain sprocket
- Ignition flywheel
- Pick-up
- Starter gear

6.2.3. ENGINE REMOVAL

Read  [1.2.1](#) carefully.


TORQUE WRENCH SETTINGS

Bolt (1)	10 Nm (1.0 kgm)
Sprocket cover screws (3)	5 Nm (0.5 kgm)
Engine rear mounting bolt (11)	22 Nm (2.2 kgm)
Engine front mounting nut (12)	50 Nm (5.0 kgm)
Front upper nut (13)	50 Nm (5.0 kgm).



WARNING





The engine is removed by lowering it from the frame. Make sure to have all necessary equipment ready at hand and in place before proceeding.

Before taking the engine out of the frame, clean it with a steam cleaner and drain all coolant; see  [5.2.1](#).

NOTE Certain procedures include cross-references to relevant sections of the manual. Some of the operations described there may not be strictly required for the job at hand. Proceed sensibly to avoid redundant work, that is, always make sure you really need to remove a particular component before proceeding.

Engine removal procedures are listed in the proper sequence in this section.

NOTE You will need a hoist and suitable slings to lift the engine.

- Put the motorcycle on front wheel stand (OPT); see  [1.7.1](#).
- Fix the slings to the rider footpegs.
- Lift the hoist arm until stretching the slings taut.
- Remove the exhaust system; see  [6.1.1](#).
- Remove the carburetor and leave it connected to throttle and cold-start cables; see  [4.3.1](#).
- Remove the radiator; see  [5.3.1](#).
- Slacken the screw (1) and withdraw the gearbox link rod. The link rod is retained to the gear shift lever by the rod.



- Release the tie (2).

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

- Disconnect the oil tubes and block them off.
- Disconnect the throttle cable at the mixture oil pump end; see [7.3.2.](#)
- Perform the first five steps of the procedure described at paragraph [5.5.1](#)
- Disconnect the clutch cable at the engine end only; see [7.3.4.](#)
- Remove the battery and battery box mount together; see [7.2.1.](#)



- Release and remove the two screws (3) and remove the sprocket cover.



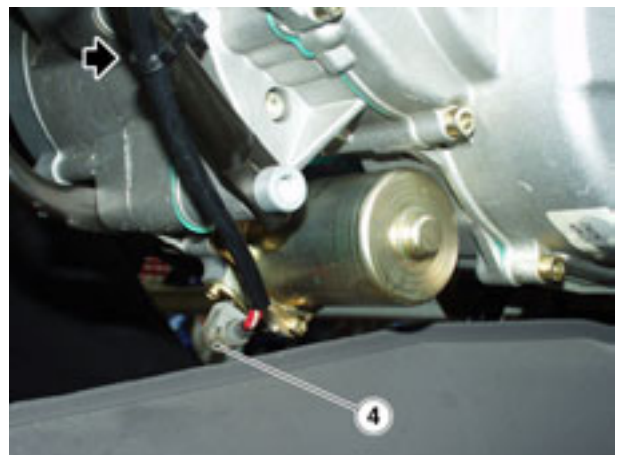
- Remove the circlip.

NOTE Slacken the drive chain to aid removal of the chain sprocket.

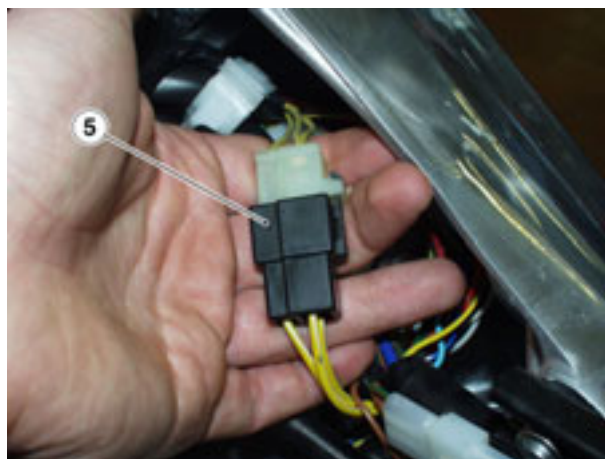
- Slide the chain sprocket and the drive chain off the shaft.



- Disconnect the following electrical connectors in the order:
 - Starter motor (4) – release the wiring from the ties.



- Generator (5)



- Pick-up (6).



- ECU ground (7).



- Neutral light switch (8).



RS 125

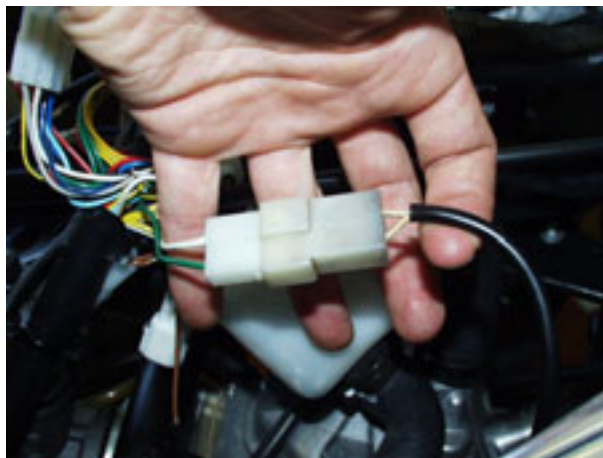
- Release and remove the screw (9) and disconnect the grounding connectors of the system.
- Partially remove the swinging arm spindle; see [7.11.1.](#)

NOTE You need not remove the swinging arm completely.



When you are removing the engine of a full-power (f.p.) vehicle:

- Disconnect the RAVE valve connector.

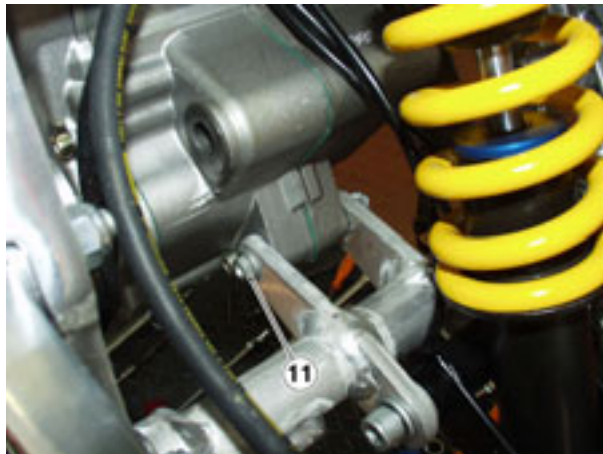


- Release and remove the two screws (10).

NOTE Release all cables and hoses from the ties and clips along their full length.



- Release and remove the rear lower mounting bolt (11) and collect nut and washer.



- Undo and remove the nut (12) working from the right side of the motorcycle and collect the washer.
- Remove the bolt from the opposite side.

**WARNING**

The engine is heavy and you will need an assistant to help during the next steps of the procedure. Plan work ahead together.

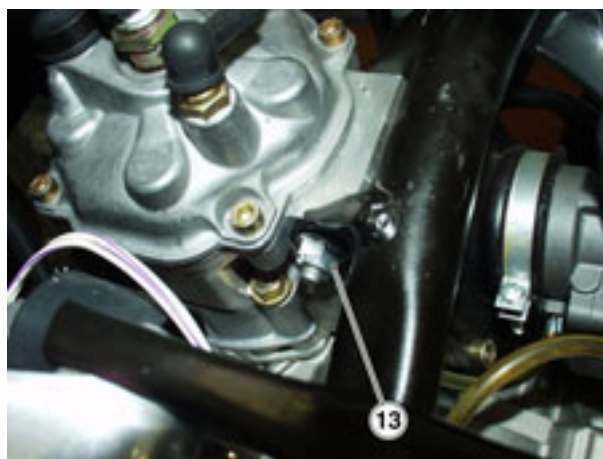
- Undo and remove the nut (13) and collect the washer.

**DANGER**

The engine is retained to the frame by the upper mounting bolt only.
Use great care and be careful of your fingers and limbs.

Choose the location where you will place the engine and clear the floor area from any tools.

- Support the engine and remove the bolt.
- Lower the engine until placing it safely on the floor.



6.2.4. INSTALLING THE ENGINE INTO THE FRAME

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

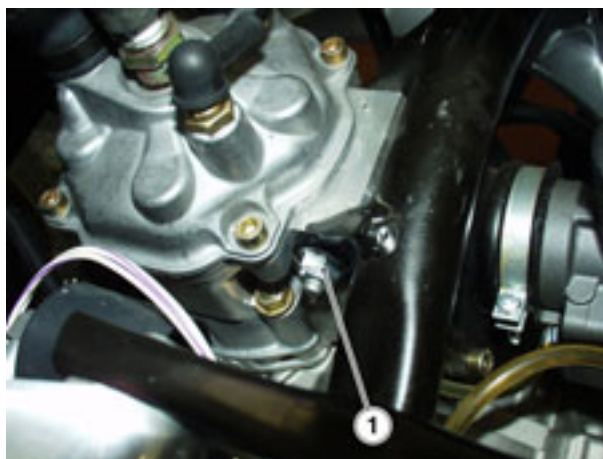
Top engine nut (1)	50 Nm (5.0 kgm)
Front engine nut (2)	50 Nm (5.0 kgm)
Rear engine bolt (3)	22 Nm (2.2 kgm)
Sprocket cover screws (10)	5 Nm (0.5 kgm)
Screw (13)	10 Nm (1.0 kgm)



CAUTION

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

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



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



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

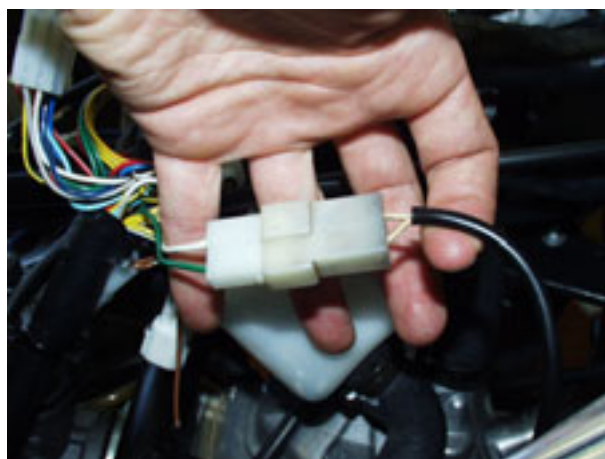


NOTE The next two operations are only required on full-power (f.p.) engines:

- Secure the RAVE valve by the two screws (14).



- Connect the RAVE valve connector.
- Refit the swinging arm spindle; see [7.11.5.](#)



- Connect the following electrical connectors in the order:
 - System grounding connectors; fix them with the screw (4).



- Neutral light switch (5).



- ECU ground (6).



- Pick-up (7).



- Generator (8).



- Starter motor (9).



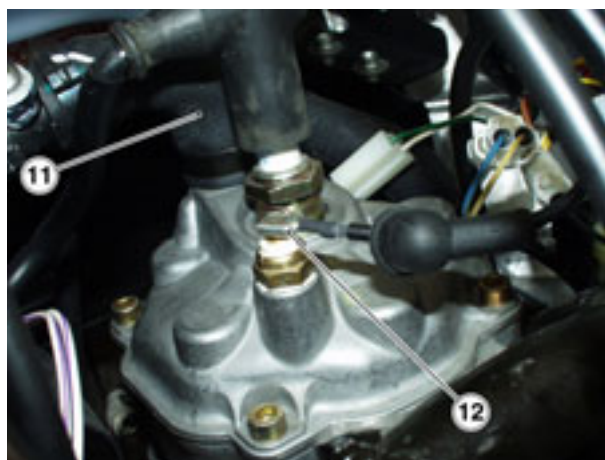
- Fit the front chain sprocket to the shaft together with the drive chain.
- Fit the circlip.



- Position the sprocket cover and secure it with the two screws (10).
- Connect the throttle cable to the mixer oil pump; see [7.3.2.](#)






- Fit the hose (11) to the cylinder head cover and fix it with a new clip.
- Refit the spark plug and connect the cap correctly.
- Connect the electrical connector (12) at the thermistor end.
- Connect the clutch cable at the engine end; see [7.3.4](#)
- Install the battery and connect it to the system; see [7.2.1.](#)





- Connect the oil tubes using a new clip.



- Position the gearbox link rod and tighten the screw (13).
- Install the exhaust system; see  6.1.1. Install the carburetor; see  4.3.1.
- Install the radiator; see  5.3.1.

When finished with engine installation, go on to the next operations.

- Check that all engine mounting bolts and nuts are at the correct torque.
- Top up coolant level; see  2.10.1
- Check drive chain slack and adjust as required; see  2.21.3.

NOTE Inspect any components you have disturbed and check that:

- electrical leads are secured correctly with the suitable ties;

**WARNING**

The leads should not be twisted or trapped under any components.

- electrical connectors are connected to the matching connectors;
- hoses and hose couplings are inserted correctly and fixed with suitable clips;
- throttle and cold-start cables slide freely and do not bind when you turn the handlebar.



6.3. RAVE

6.3.1. RAVE VALVE SPECIFICATIONS

The RAVE exhaust valve is operated by a solenoid via a Bowden cable.

The engine control unit operates the solenoid within a predetermined range of engine rpm. The ECU uses primary circuit frequency to calculate engine rpm.

NOTE *The RAVE exhaust valve has been designed for racing and motorcycles equipped with it are not street-legal in some countries.*

“RAVE” valve operation

- The RAVE exhaust valve opens between 500 and 2500 rpm to allow for valve stem self-cleaning.
- It closes between 2550 rpm and operation point (about 8000 rpm, depending on engine version).
- Above the operation point, the valve stays open.

RAVE valve operation points:

Strada.....8000 - 8100 rpm.

Sport Pro.....8300 - 8400 rpm.

6.3.2. SPECIAL TOOLS

Exhaust valve extractor : ROTAX part no. 277 445





6.3.3. (RAVE) EXHAUST VALVE REMOVAL

Read  [1.2.1](#) carefully.

TORQUE WRENCH SETTINGS

RAVE valve screws (2) 10 Nm (1.0 kgm)

- Remove the fuel tank; see  [4.1.1.](#)
- Remove the battery and battery box mount; see  [7.2.1.](#)

PARTIAL REMOVAL

- Slip off the dust cover (1).
- Release and remove both screws (2) and collect the locking washers.

If the valve moves freely:

- Extract the exhaust valve assembly together with the Bowden cable.
- Rotate the valve stem housing (3) through 180° and disconnect the Bowden cable (4).


If the valve is locked in the open position (because of combustion residue):

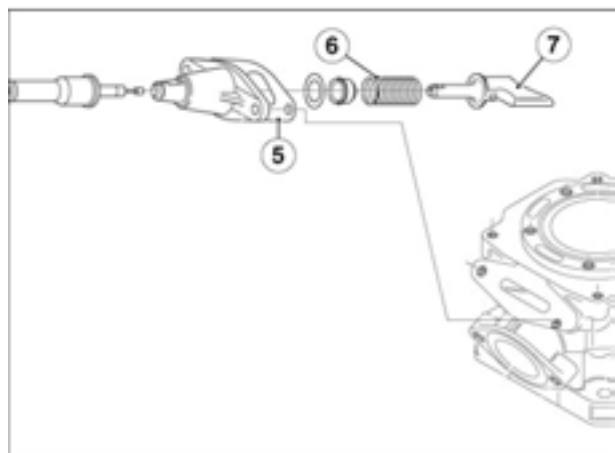
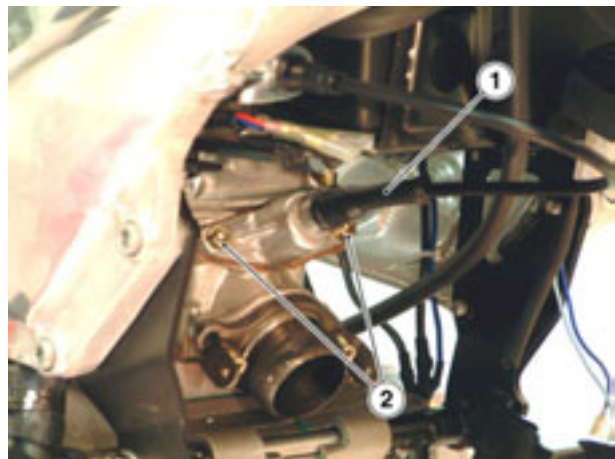
- Push back the valve stem housing (3) using a screwdriver.



WARNING

Push gently or the sealing surface will damage.

- Rotate the valve stem housing (3) through 180° and disconnect the Bowden cable (4).
- Remove the valve stem housing (3) and collect spring (6) and seal (5).
- Remove the exhaust valve (7) using the valve extractor; see  [6.3.2.](#)

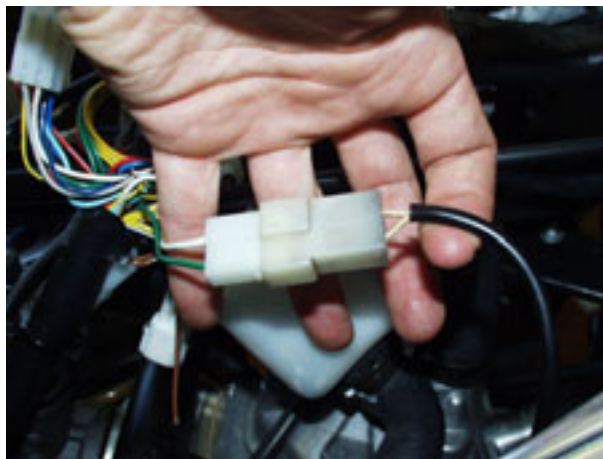


COMPLETE REMOVAL

- Release and remove both screws of the RAVE valve and collect the locking washers.
- Extract the exhaust valve assembly from the cylinder.



- Disconnect the control unit connector at the wiring harness end.



- Release and remove both screws (8) from the battery bracket.
- Remove the complete RAVE valve.



6.3.4. COMPONENT INSPECTION**SEALS**

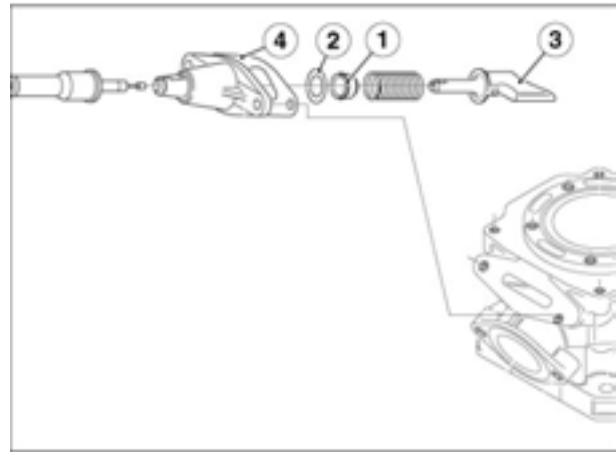
- Check the valve stem seal (1) and the O-ring (2) (located inside the valve housing) for wear or damage.

EXHAUST VALVE

- Remove any combustion residue from the exhaust valve (3) and the valve duct in the cylinder.
- Check the valve for wear or damage.

CYLINDER GASKET

- Change the cylinder gasket (4) on assembly.

**SOLENOID**

- See  [8.11.1](#) for control unit inspection.

6.3.5. (RAVE) EXHAUST VALVE INSTALLATION

Read [1.2.1](#) carefully.

TORQUE WRENCH SETTINGS

RAVE valve screws (1) 10 Nm (1.0 kgm)

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



COMPLETE VALVE INSTALLATION

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

NOTE Change the seal (5) on assembly.

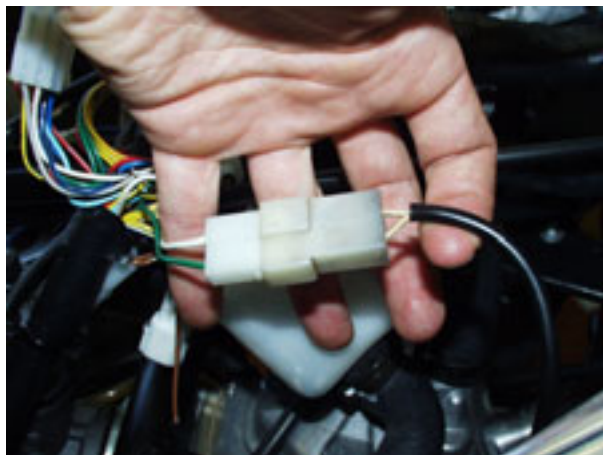
- Use the two screws (1) with washers of the fixed slide to secure the exhaust valve assembly.



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



- Connect the control unit connector to the wiring harness.



INSTALLATION AFTER PARTIAL REMOVAL

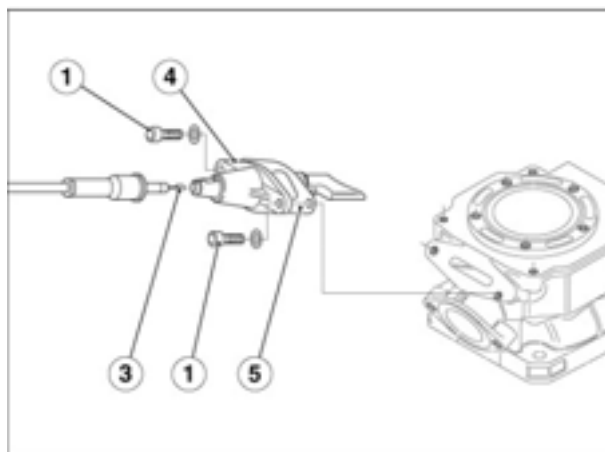
- Connect the Bowden cable (3) to the valve stem housing (4).
- Rotate the valve stem housing (4) through 180°.

NOTE The cable anchor point must be pointing downwards.

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

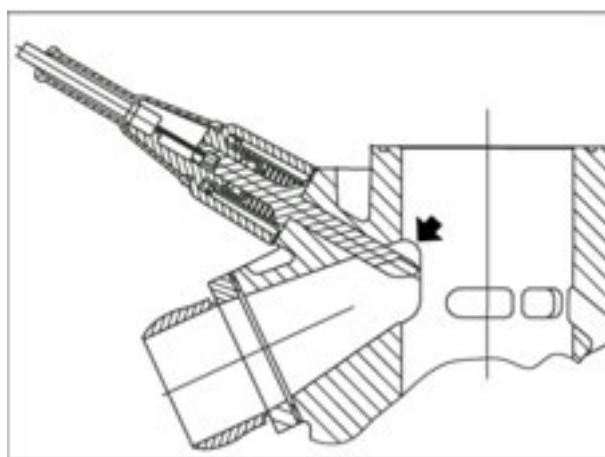
NOTE Change the seal (5) on assembly.

- Tighten the two screws (1) with washers of the exhaust valve assembly.

**WARNING**

Check the exhaust valve assembly as follows after installation.

- With the valve fully open, the valve stem must be flush with the exhaust port. This inspection must be done with the exhaust flange removed; see [6.1.1](#);
- Make sure the exhaust valve moves freely.



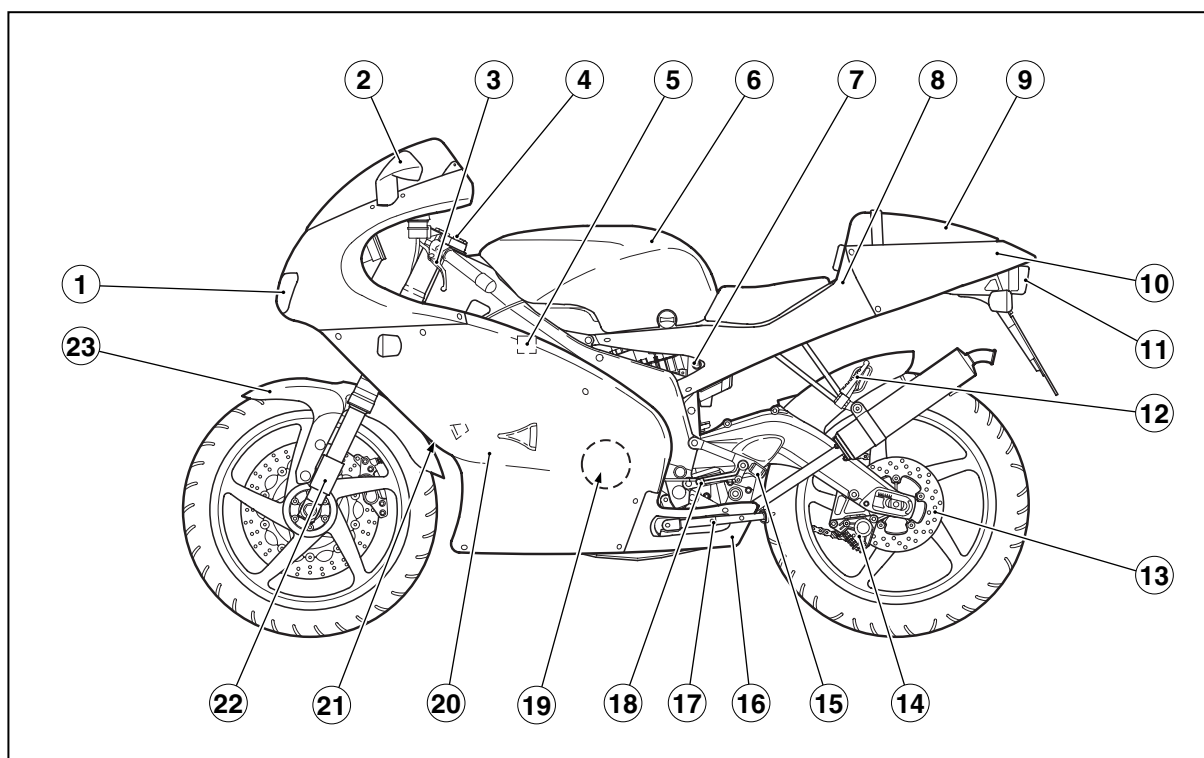
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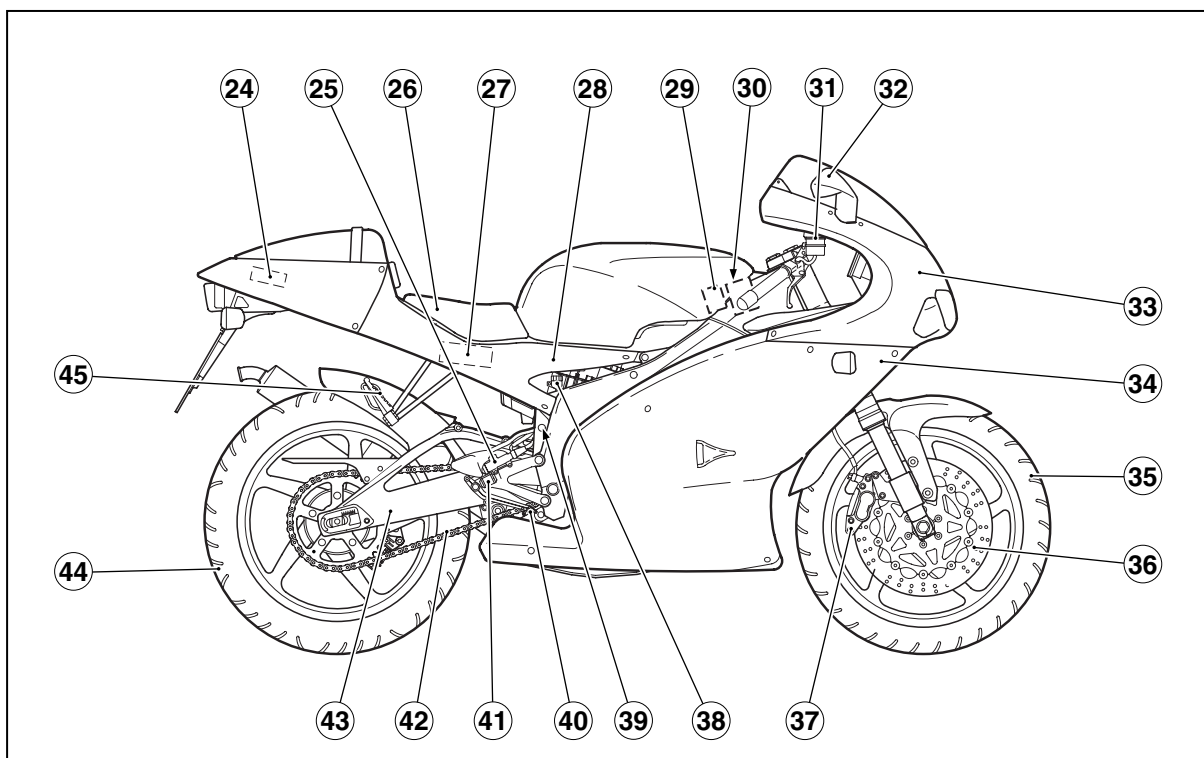
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7.1. CHASSIS**7.1.1. CHASSIS**

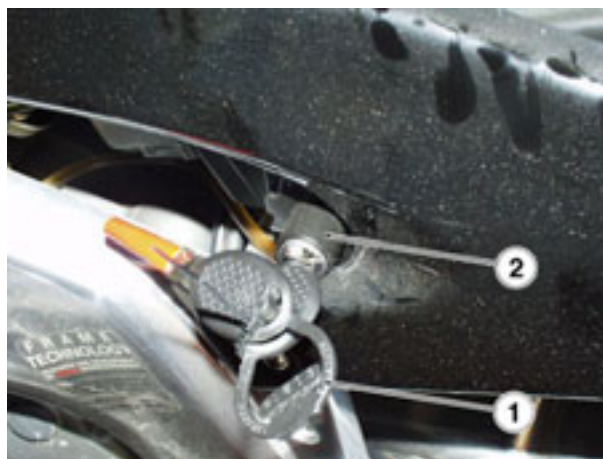
1. Headlight
2. Left rearview mirror
3. Clutch control
4. Ignition switch / steering lock / parking lights
5. Fuse carrier
6. Fuel tank
7. Seat lock
8. Left-hand seat subframe cover
9. Passenger seat
10. Tail section
11. Tail light
12. Left-hand passenger footpeg (spring-loaded, snaps open/closed)
13. Rear brake disc
14. Rear brake caliper
15. Left-hand rider footpeg
16. Left fairing cover
17. Side stand
18. Gear shift lever
19. Gearbox oil sight glass
20. Left body panel
21. Warning horn
22. Front fork
23. Front mudguard



- 24. Engine Control Unit
- 25. Rear brake master cylinder
- 26. Rider seat
- 27. Air cleaner
- 28. Right-hand seat subframe cover
- 29. Coolant expansion reservoir
- 30. Battery
- 31. Front brake fluid reservoir
- 32. Right rearview mirror
- 33. Front fairing
- 34. Right body panel
- 35. Front wheel
- 36. Front brake disc
- 37. Front brake caliper
- 38. Rear brake fluid reservoir
- 39. Rear shock absorber
- 40. Rear brake lever
- 41. Right rider footpeg
- 42. Drive chain
- 43. Rear swinging arm
- 44. Rear wheel
- 45. Right passenger footpeg (spring-loaded, snaps open/closed)

7.1.2. RIDER SEAT REMOVAL

- Insert the key (1) into the lock (2) and turn counter clockwise.

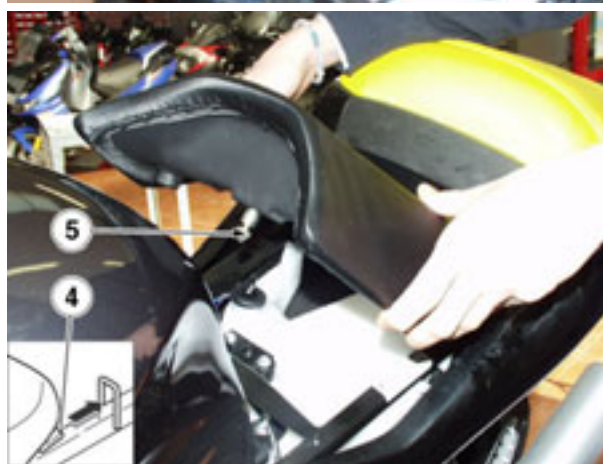


- Lift and remove the seat.
- Remove the lid (3).



INSTALLATION

- Locate the tabs (4) at the seat rear end into the suitable recesses.
- Locate the anchor point (5) into its seat. Lower the seat and press down and the latch will engage.



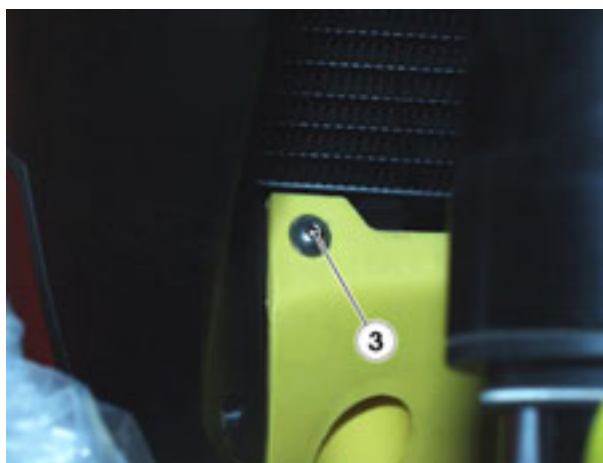
NOTE Make sure the seat is positioned correctly and safely engaged before riding.

7.1.3. REMOVING THE SIDE FAIRINGS**TORQUE WRENCH SETTINGS**

Screws (1-3-7-9) 3 Nm (0.3 Kgm)
Screws (12) 2 Nm (0.2 Kgm)

RIGHT-HAND SIDE FAIRING

- Release and remove the six screws (1).
 - Withdraw the pin (2).
-
- Release and remove the two screws (3) at the front end.



- Disconnect the two electrical connectors (4) of the direction indicator.
- Remove the right side fairing (5).



LEFT-HAND SIDE FAIRING

- Put the motorcycle on the rear wheel stand (OPT), see [1.7.2.](#)
- Lower the side stand.
- Disconnect the speedometer cable (6).



- Release and remove the six screws (7).
- Withdraw the pin (8).
- Release and remove the two screws (9) at the front end.



- Disconnect the two electrical connectors (10) of the direction indicator.
- Remove the left side fairing (11) sliding it along the side stand.



The following applies to both side fairings:

- If you need to remove the inner protection (13), release and remove the four screws (12).



7.1.4. AIR DAM REMOVAL**TORQUE WRENCH SETTINGS**

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

- Release and remove the two side screws (1) on either side.
- Release and remove the two screws (2).
- Release and remove the two screws (3).
- Remove the air dam.



7.1.5. FRONT FAIRING REMOVAL

TORQUE WRENCH SETTINGS

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

Repeat these three steps on either side:

- Release and remove the two screws (1).
- Remove the rearview mirror (2).



- Release and remove the three screws on the side fairing (3).



- Release and remove the screw (4).

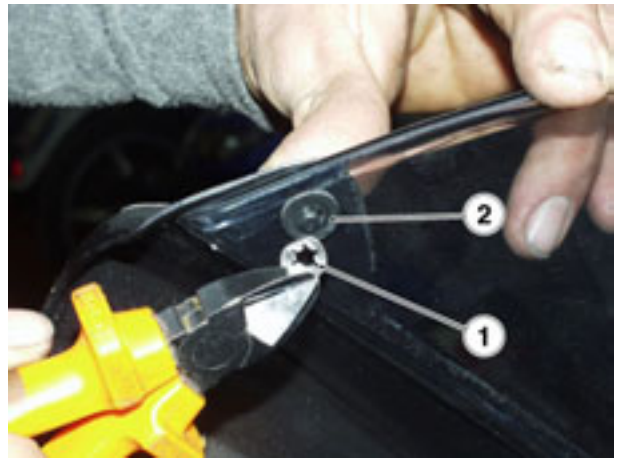


- Disconnect the headlight connector (5).
- Remove front fairing and headlamp together.



7.1.6. WINDSCREEN REMOVAL

- Working from inside the front fairing, remove the seven washers (1) and collect the seals (2).



- Remove the seven retaining pins (3).
- Remove the windscreen.



NOTE Fit new washers (1) on assembly.

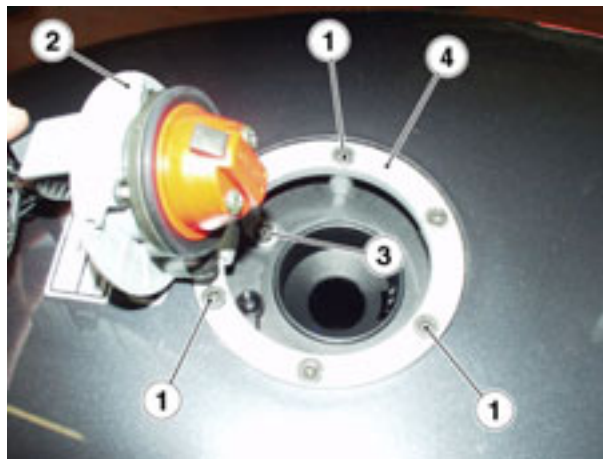
7.1.7. FUEL TANK FILLER CAP REMOVAL**TORQUE WRENCH SETTINGS**

Screws (1) 5 Nm (0.5 kgm)
Screws (3) 3 Nm (0.3 kgm)

- Put the motorcycle on the stand.
- Release and remove the three screws (1).

NOTE The other three screws are there for aesthetic purposes only and can be left in place.

- Open the filler cap (2).

**WARNING**

Be careful when removing the screw (3). Take care not to drop it into the fuel tank.

- Release and remove the screw (3).
- Remove the filler cap (2) together with the flange (4).

**WARNING**

Block off the filler opening to prevent the ingress of dirt.

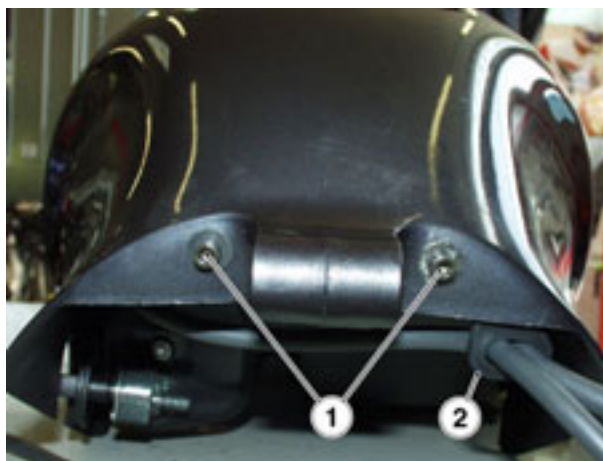
7.1.8. FUEL TANK FAIRING REMOVAL**TORQUE WRENCH SETTINGS**

Fuel tank fairing screws (1) 3 Nm (0.3 Kgm).

- Remove the fuel tank and place it on a work bench; see [4.1.2.](#)
- Release and remove the two screws (1). Collect the washers and the rubber spacer (2).

NOTE Fit the rubber spacer (2) in the correct position on assembly.

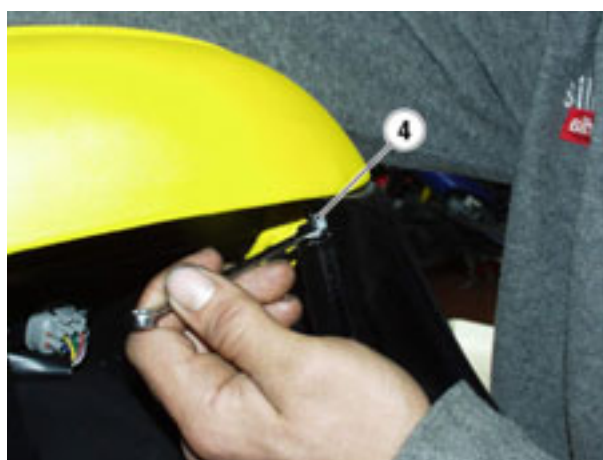
- Remove the filler cap; see [7.1.6.](#)
- Remove the tank fairing and collect bush (3) and grommet (4) at the front end.



7.1.9. SEAT SUBFRAME COVER REMOVAL**TORQUE WRENCH SETTINGS**

Front screws (1)	3 Nm (0.3 Kgm).
Rear screws (2)	2 Nm (0.2 Kgm).
Inner screw (3)	3 Nm (0.3 Kgm).
Nut (4)	5 Nm (0.5 Kgm).

- Remove the seat; see [7.1.1.](#)
- Release and remove the two front screws (1).
- Release and remove the two rear screws (2).
- Release and remove the inner screw (3) and collect the nut.
- Undo and remove the nut (4).
- Remove the seat subframe cover.



NOTE If needed, repeat the process for the other seat subframe cover.

7.1.10. TAIL REMOVAL**TORQUE WRENCH SETTINGS**

Inner nuts (1)	5 Nm (0.5 Kgm).
Screws (2)	2 Nm (0.2 Kgm).
Screws (3)	2 Nm (0.2 Kgm).

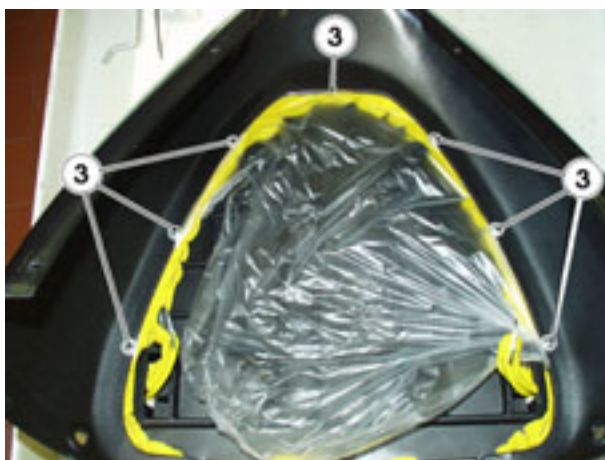
- Remove both seat subframe covers; see [7.1.8.](#)
- Undo and remove the two inner nuts (1) and collect the screws.



- Release and remove the two screws (2) on both sides.



- Remove the tail section complete with passenger seat. To remove the passenger seat and the strap:
- Release and remove the seven screws (3).



7.1.11. REMOVING THE FRONT MUDGUARD**TORQUE WRENCH SETTINGS**

Screws (1) 2 Nm (0.2 Kgm).

- Release and remove the two screws (1) on both sides.
- Remove the front mudguard.



7.1.12. REMOVING THE REAR MUDGUARD

- Release and remove the screw (1) on both sides.
- Remove the rear mudguard.



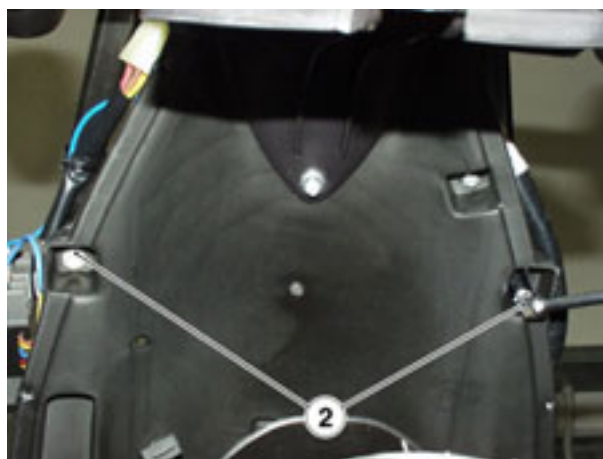
7.1.13. REMOVING THE SEAT END COVER**TORQUE WRENCH SETTINGS**

Screws (1)	2 Nm (0.2 Kgm).
Screws (2)	3 Nm (0.3 Kgm).
Screws (4)	3 Nm (0.3 Kgm).

- Remove the seat; see [7.1.1.](#)
- Release and remove the two screws (1) on both sides.



- Release and remove the four screws (2).
- Lower the seat end cover.



- Remove the flasher (3) from its housing.



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



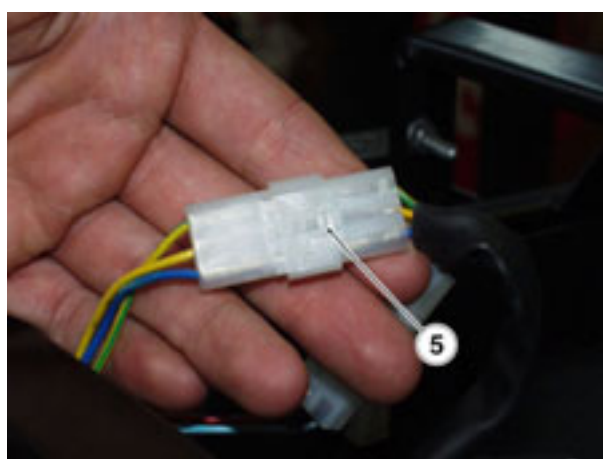
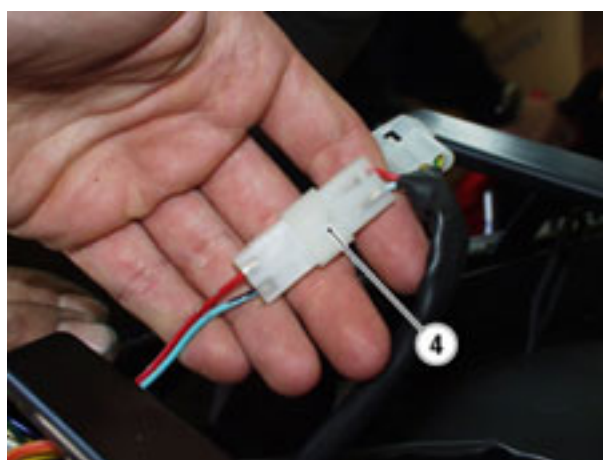
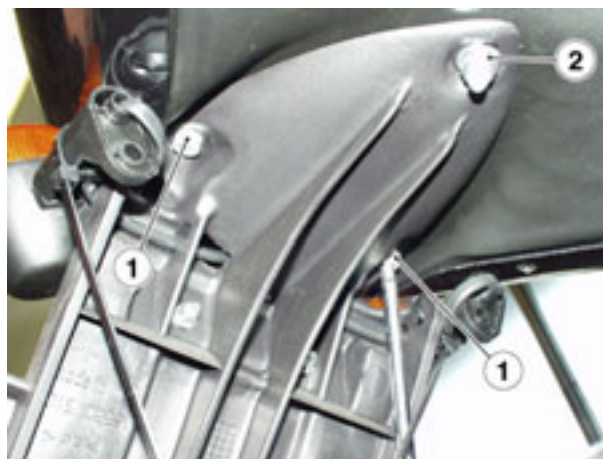
7.1.14. REMOVING THE NUMBER PLATE BRACKET

Read  **1.2.1** carefully.

TORQUE WRENCH SETTINGS

Screws (1) 3 Nm (0.3 kgm)
Nut (2) 3 Nm (0.3 kgm)

- Release and remove the two screws (1).
- Undo and remove the nut (2).
- Disconnect the four connectors of the rear direction indicators (3).
- Disconnect the number plate light connector (4).
- Disconnect the tail light connector (5).
- Remove the number plate bracket together with direction indicators and tail light.



7.1.15. CHAIN GUARD REMOVAL**TORQUE WRENCH SETTINGS**

Screws (1) 2 Nm (0.2 kgm)

- Release and remove the two screws (1).
- Remove the chain guard (2).

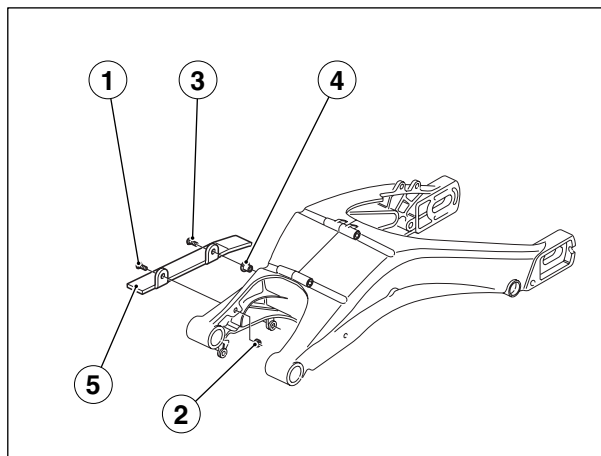


7.1.16. UPPER CHAIN SLIDER REMOVAL**TORQUE WRENCH SETTINGS**

Screw (1) 2 Nm (0.2 kgm)
Screw (3) 2 Nm (0.2 kgm)

NOTE The chain slider is best accessed after splitting the drive chain; see [7.13.1](#).

- Release and remove the screw (1) and collect the nut (2).
- Release and remove the screw (3) and collect the grommet (4).
- Remove the upper chain slider (5).

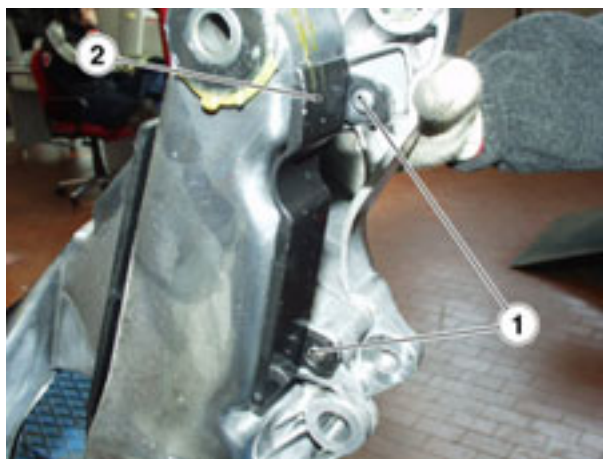


7.1.17. LOWER CHAIN SLIDER REMOVAL**TORQUE WRENCH SETTINGS**

Screws (1) 2 Nm (0.2 kgm)

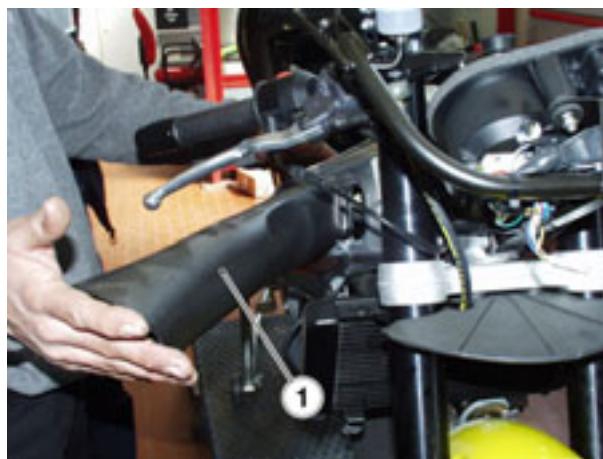
NOTE The chain slider is best accessed after splitting the drive chain; see [7.13.1](#).

- Release and remove the two screws (1).
- Remove the lower chain slider (2).



7.1.18. AIR SCOOP REMOVAL

- Remove the front fairing; see [7.1.4.](#)
- Remove the air scoop (1).




7.2. ELECTRIC COMPONENTS


7.2.1. BATTERY REMOVAL

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Screw (2) 3 Nm (0.3 kgm)

NOTE When the battery is removed, the digital clock will be reset to zero. See clock setting instructions at paragraph  2.3.1.

- Lift the fuel tank; see  2.7.1.
- Disconnect the negative lead (-) and the positive lead (+) in the order.
- Remove the battery breather tube (1).
- Release and remove the screw (2).
- Move aside the coolant expansion reservoir (3).
- Take the battery out its mount. Place the battery on a level surface, in a cool, dry place.



WARNING

On refitting, pay particular attention to the breather tube. Make sure to connect the positive (+) lead first, then the negative (-) lead.



- If needed, release and remove the screw (4) and remove the battery box mount.



7.2.2. REMOVING THE ENGINE CONTROL UNIT**TORQUE WRENCH SETTINGS**

Screw (2) 3 Nm (0.3 kgm)

- Remove the tail section; see [7.1.9](#).
- Disconnect the connector (1).
- Release and remove the two screws (2) and collect the nuts underneath.
- Remove the Engine Control Unit.



7.2.3. VOLTAGE RECTIFIER REMOVAL

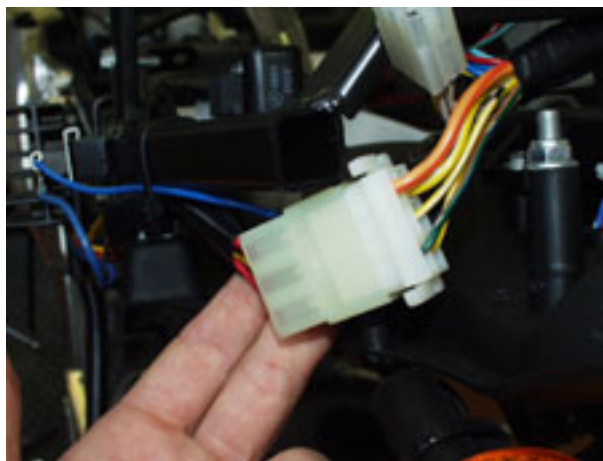
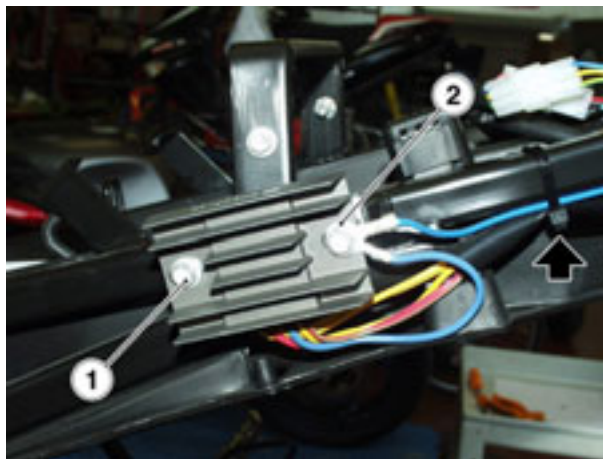
TORQUE WRENCH SETTINGS

Screw (1-2) 10 Nm (1.0 Kgm)

- Remove the tail section; see [7.1.9.](#)
- Release the wiring from the clip.
- Release and remove the screw (1) and collect the washer.
- Release and remove the screw (2).

NOTE Refit the two grounding wires under the screw (2) on assembly.

- Disconnect the connector.
- Remove the voltage rectifier.




7.2.4. REMOVING THE RIGHT-HAND LIGHT DIP SWITCH

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Screws (2) 3 Nm (0.3 kgm)

- Lift the fuel tank; see  2.9.1.
- Disconnect the two connectors (1) of the right-hand light dip switch.
- Release and remove the two screws (2) securing the two shells at the bottom end.
- Separate the two shells.



WARNING

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

- Disconnect the throttle cable (3).
- Release the wiring from the clips and remove the right-hand light dip switch.




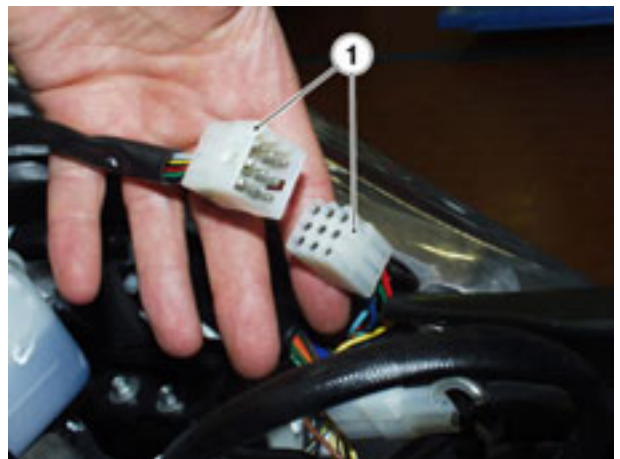
7.2.5. REMOVING THE LEFT-HAND LIGHT DIP SWITCH

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Screws (2) 3 Nm (0.3 kgm)

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



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



- Separate the two shells.



WARNING

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



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





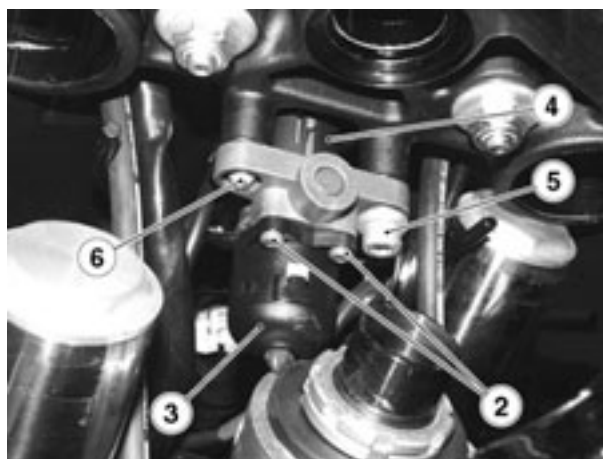
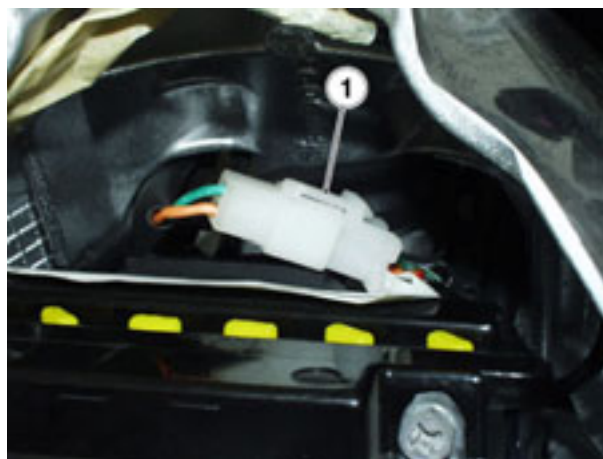
7.2.6. REMOVING THE IGNITION SWITCH/STEERING LOCK

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS


Screw (5-6) 25 Nm (2.5 kgm)

- Remove the top yoke; see  2.16.1.
- Lift the fuel tank; see  2.9.1.
- Disconnect the connector (1) of the ignition switch assembly at the main wiring harness.
- Release and remove the two screws (2).
- Pull the switch (3) in a downward motion to remove.
- If you need to remove the ignition switch/steering lock (4) completely:
 - Perform the first five steps.
 - Release and remove the two screws (5-6).
 - Pull the ignition switch/steering lock (4) in a downward motion to remove.



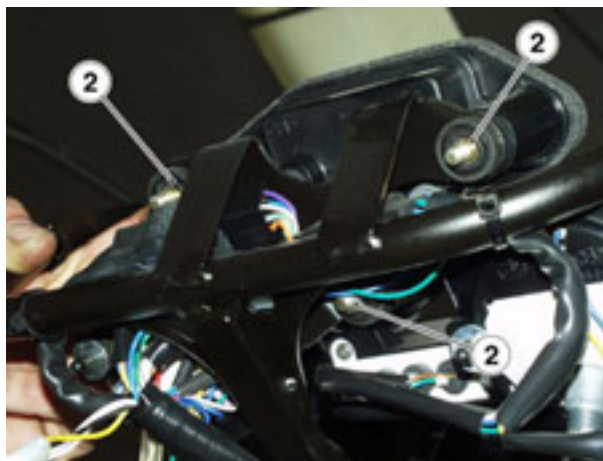
7.2.7. REMOVING THE INSTRUMENT PANEL

Read  1.2.1 carefully.

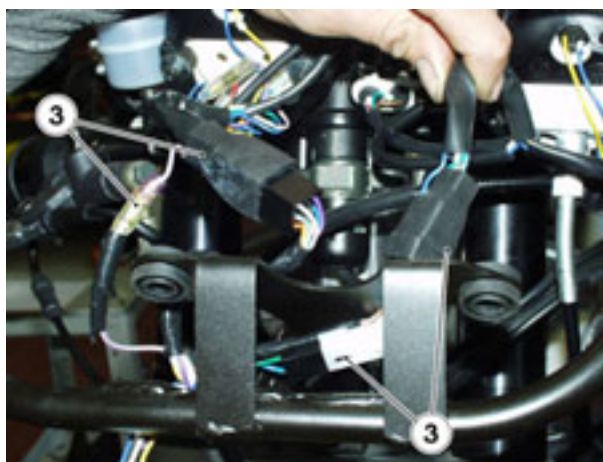
- Remove the front fairing; see  7.1.4.
- Disconnect the speedometer cable (1) and remove it from the left fairing.



- Undo and remove the three nuts (2) and collect the washers.
- Release the instrument panel wiring from the ties.



- Disconnect the four connectors (3).
- Remove the instrument panel.



NOTE Remove the individual components if required.

MULTI-FUNCTION COMPUTER

- Disconnect the two connectors (4).



- Release and remove the three screws (5) and collect the bushes.
- Lift the sponge.

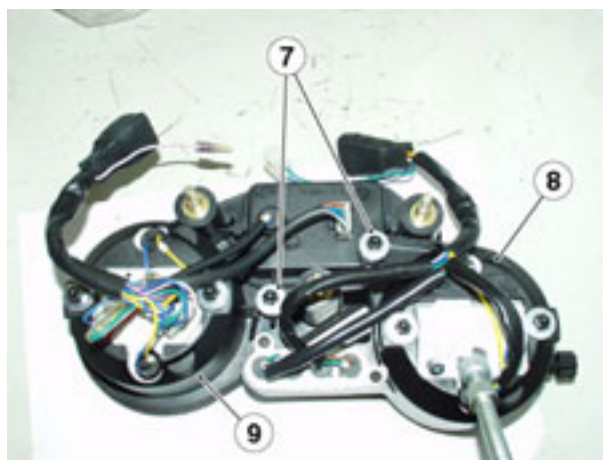


- Release and remove the two screws (6).
- Remove the multi-function computer.



SPEEDOMETER – REV COUNTER

- Undo and remove the two nuts (7) and collect the washers.
- Separate the speedometer – warning light holder (8) from the rev counter – multi-function computer (9).




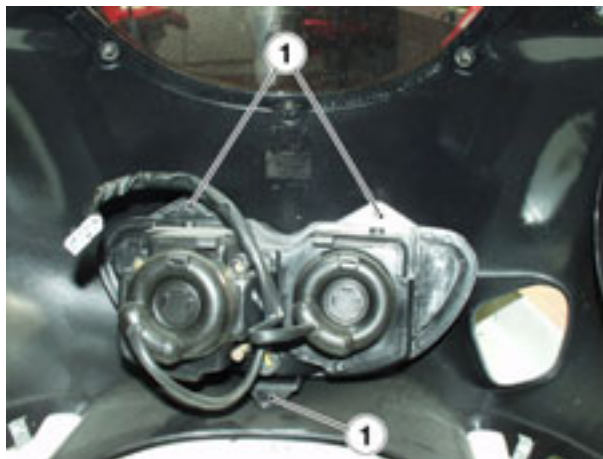
7.2.8. HEADLIGHT REMOVAL


Read  [1.2.1](#) carefully.

TORQUE WRENCH SETTINGS

Screws (1) 2 Nm (0.2 kgm)

- Remove the front fairing; see  [7.1.4](#).
- Release and remove the three screws (1).
- Remove the headlight.



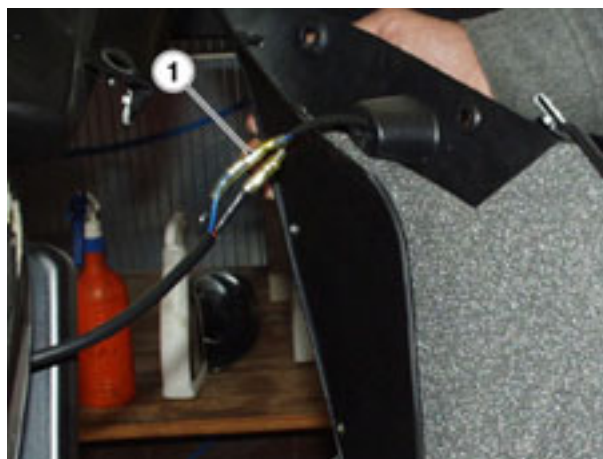
NOTE See  [8.15.1](#) for instructions on how to replace the bulbs.

7.2.9. REMOVING THE FRONT DIRECTION INDICATORS

Read  1.2.1 carefully.

- Disconnect the connector (1).

NOTE It is not necessary to remove the fairing.




- Release and remove the screw (2).
- Remove the direction indicator.



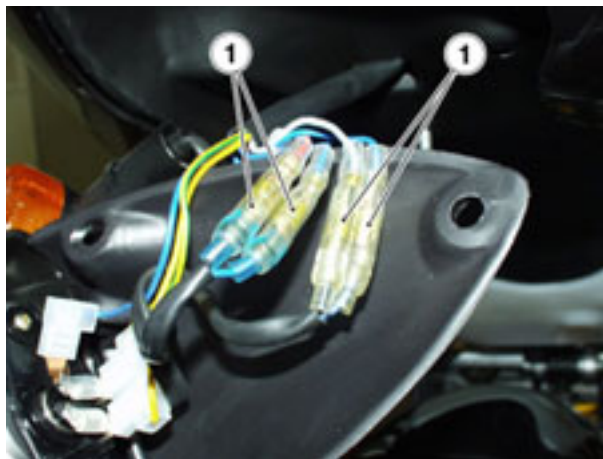
7.2.10. REMOVING THE REAR DIRECTION INDICATORS

Read  1.2.1 carefully.

- Remove the number plate bracket but leave it attached to the wiring; see  7.1.13.
- Disconnect the pair of connectors (1) of the direction indicator you wish to remove. Look at the colour to identify the connectors:

Right indicator: red-blue

Left indicator: light blue-blue



- Release and remove the screw (2).
- Remove the direction indicator.




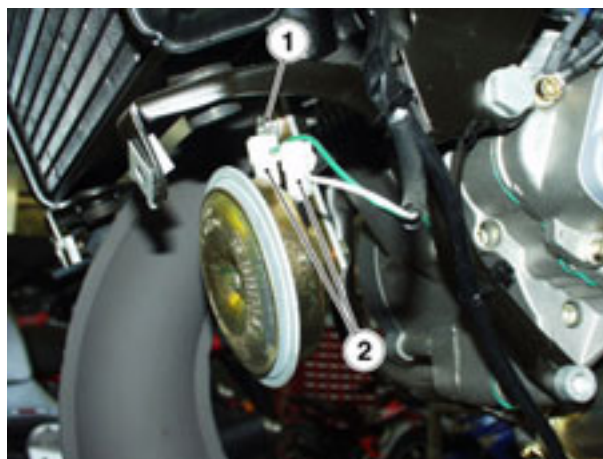
7.2.11. WARNING HORN REMOVAL

Read  [1.2.1](#) carefully.

TORQUE WRENCH SETTINGS

Screw (2) 22 Nm (2.2 kgm)

- Remove the air dam; see  [7.1.3](#).
- Disconnect the two connectors (1).
- Release and remove the screw (2).
- Remove the horn.



7.2.12. REMOVING THE TAIL LIGHT

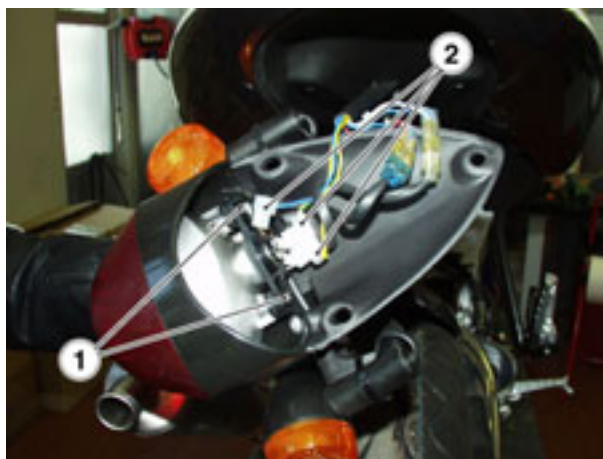
Read [1.2.1](#) carefully.

- Remove the number plate bracket but leave it attached to the wiring; see [7.1.13](#).
- Disconnect the three tail light connectors (1).

**WARNING**

Make sure to refit the connectors (1) to the matching connectors on assembly.

- Release and remove the two screws (2).
- Remove the tail light.



7.3. CONTROLS

7.3.1. REMOVING THE THROTTLE CONTROL

Read  [1.2.1](#) carefully.

TORQUE WRENCH SETTINGS

Screws (1) 3 Nm (0.3 kgm)
Screws (3) 10 Nm (1.0 kgm)

- Release and remove the two screws (1) securing the two shells from the bottom.

- Separate the two shells.




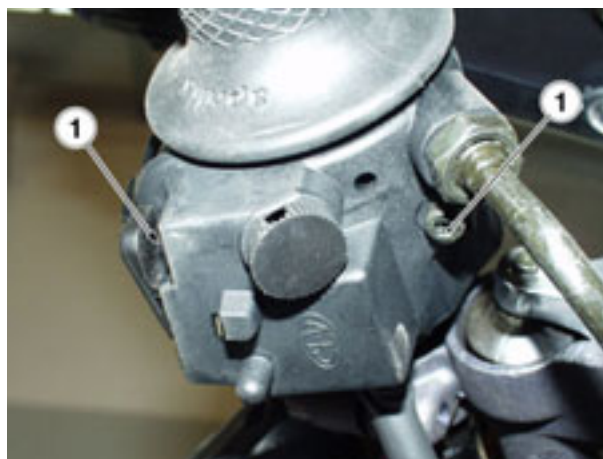
WARNING

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

- Disconnect the throttle cable (2).

- Unscrew the screw (3) and remove the counterweight.
- Slide the twistgrip off the handlebar. Use an air gun to aid removal.
- Slide the throttle control off the handlebar.

NOTE Check throttle cable free play on refitting and adjust as required; see  [2.15.1](#).



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

TORQUE WRENCH SETTINGS

Screw (2) 5 Nm (0.5 Kgm)

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

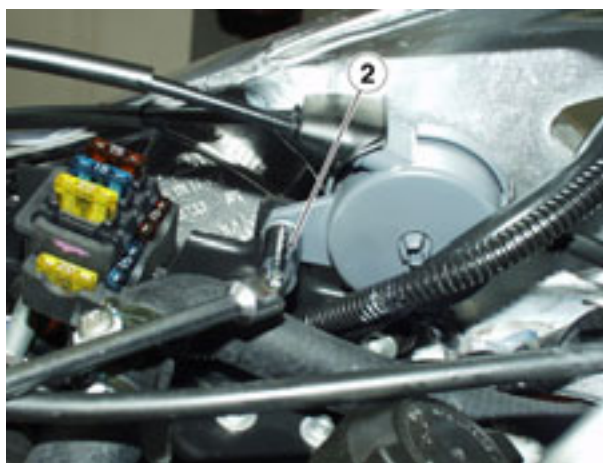
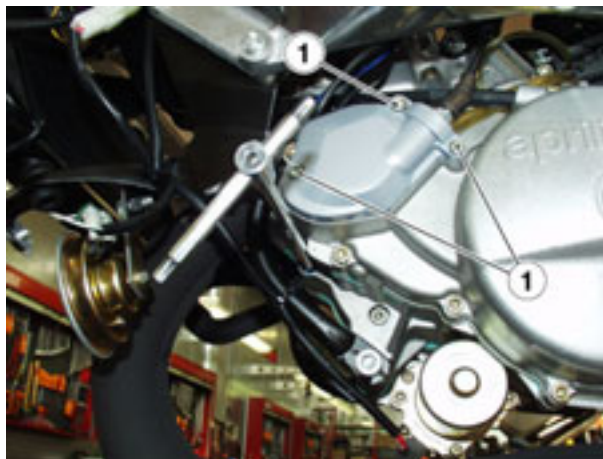
- Loosen and remove screw (2) from frame inner face, on vehicle left side.
- Remove throttle cables pulley cover.

- Slide out throttle cable from oil pump.



WARNING

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



7.3.3. REMOVING THE FRONT BRAKE CONTROL

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Reservoir retaining screw (1) 7 Nm (0.7 kgm)

PARTIAL REMOVAL

- Release and remove the reservoir retaining screw (1).
- Release and remove the two screws (2) securing the front brake control.

NOTE Mark clamp position on the handlebar before removal to ensure correct positioning on assembly.



Remove the clamp and slide the front brake control aside. The front brake control is still retained by hose and wiring.




WARNING

Do not pull on hoses and wiring.

Keep the front brake fluid reservoir in a vertical position to avoid spilling brake fluid, leading to a dangerous condition.

COMPLETE REMOVAL

- Drain the front brake circuit; see  2.12.2.
- When all fluid has drained out, release and remove the screw (3) and collect the two sealing washers.

NOTE Renew the two sealing washers on assembly. Use washers of the same type fitted originally.

- Slide a plastic bag onto the fitting (4) and seal the bag using adhesive tape.
- Prise the two connectors of the front brake light switch (5) off their seating in the front brake control using a small flat-blade screwdriver and remove.



- Release and remove the reservoir mounting screw (1).
- Release and remove the two screws (2) securing the front brake control.

NOTE Mark clamp position on the handlebar before removal to ensure correct positioning on assembly.

- Remove the clamp.
- Remove the front brake control together with the front brake fluid reservoir.

7.3.4. REMOVING THE FRONT BRAKE CONTROL

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Reservoir retaining screw (1) 7 Nm (0.7 kgm)

PARTIAL REMOVAL

- Release and remove the reservoir retaining screw (1).
- Release and remove the two screws (2) securing the front brake control.

NOTE Mark clamp position on the handlebar before removal to ensure correct positioning on assembly.




Remove the clamp and slide the front brake control aside. The front brake control is still retained by hose and wiring.



WARNING

Do not pull on hoses and wiring.
Keep the front brake fluid reservoir in a vertical position to avoid spilling brake fluid, leading to a dangerous condition.

COMPLETE REMOVAL

- Drain the front brake circuit; see  2.12.2.
- When all fluid has drained out, release and remove the screw (3) and collect the two sealing washers.

NOTE Renew the two sealing washers on assembly. Use washers of the same type fitted originally.

- Slide a plastic bag onto the fitting (4) and seal the bag using adhesive tape.
- Prise the two connectors of the front brake light switch (5) off their seating in the front brake control using a small flat-blade screwdriver and remove.



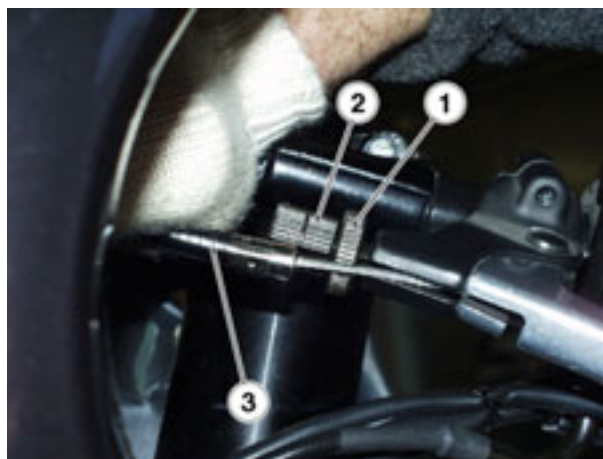
- Release and remove the reservoir mounting screw (1).
- Release and remove the two screws (2) securing the front brake control.

NOTE Mark clamp position on the handlebar before removal to ensure correct positioning on assembly.

- Remove the clamp.
- Remove the front brake control together with the front brake fluid reservoir.

7.3.5. REMOVING THE CLUTCH CABLE

- Slacken the lockring (1) fully.
- Tighten the adjuster (2) fully.
- Detach the clutch cable (3) from the lever.



- Remove the left fairing; see [7.1.2.](#)
- Undo and remove the gearbox oil filler cap (4).



- With a small flat screwdriver, prise off the clutch cable (3) until releasing it from its anchor point.
- Withdraw the clutch cable (3).

**WARNING**

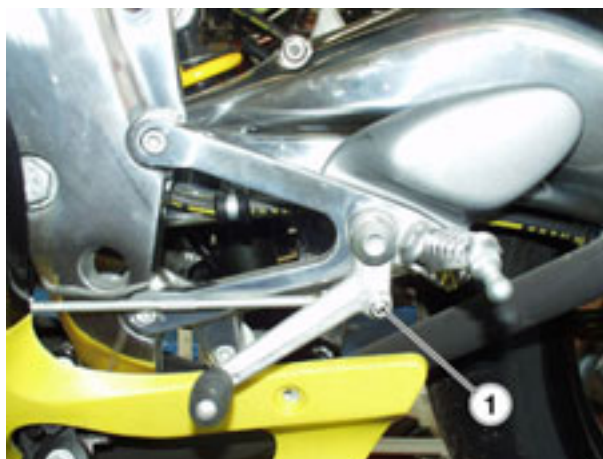
Check clutch lever play on refitting; see [2.11.1.](#)

7.3.6. COMPLETE REMOVAL OF THE GEAR SHIFT LEVER**TORQUE WRENCH SETTINGS**

Nut (1)	5 Nm (0.5 Kgm)
Screw (4)	10 Nm (1.0 Kgm)

PARTIAL REMOVAL:

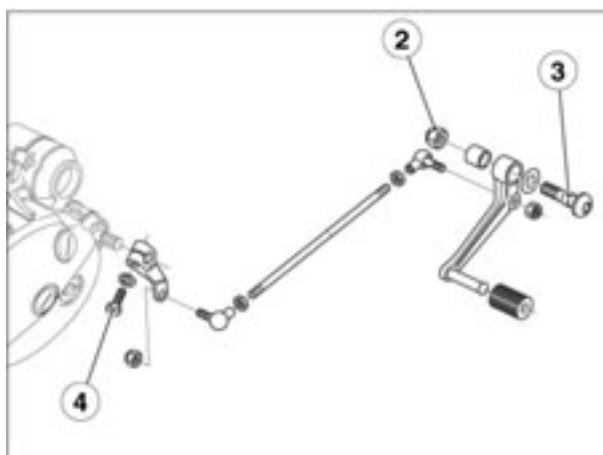
- Undo and release the nut (1).
- Slide the actuating rod off the lever.



- Undo and remove the nut (2).
- Remove the gear shift lever and collect spindle (3) and Belleville washer.

COMPLETE REMOVAL:

- Remove the left fairing; see [7.1.2.](#)
- Slacken the screw (4) and withdraw the gearbox link rod.
- Undo and remove the nut (2).
- Remove the complete gear shift lever and collect spindle (3) and Belleville washer.



7.3.7. REMOVING THE REAR BRAKE LEVER**TORQUE WRENCH SETTINGS**

Lever adjuster screw 10 Nm (1.0 Kgm)

- Unhook the spring (1).
- Release and remove the pivot bolt (2) and collect the washer.
- Remove the rear brake lever.



7.4. CHASSIS


7.4.1. REMOVING THE HANDLEBARS

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Screw (1) 10 Nm (1.0 kgm)

LEFT HANDLEBAR



- Slacken the screw (1) and remove the counterweight (2).
- Fit the nozzle of an air gun between twistgrip (3) and handlebar.
- Blow while twisting the nozzle tip. At the same time, grasp the twistgrip (3) with the other hand and pull outwards to remove.
- Remove the left light dip switch from the handlebar; see  7.2.5.

NOTE You need not detach the connector from the wiring.


- Release and remove the two screws (4).
- Remove the clamp and move the clutch control aside. The clutch control is retained by the clutch hose.

- Release and remove the screw (5).
- Remove the left handlebar.

RIGHT HANDLEBAR

- Remove the throttle control; see  7.3.1.
- Remove the right light dip switch from the handlebar; see  7.2.4.

NOTE You need not detach the connector from the wiring.

- Remove the front brake control partially; see  7.3.3.
- Release and remove the screw (6).
- Remove the right handlebar.




7.4.2. REMOVING THE INSTRUMENT PANEL SUB-FRAME

Read  1.2.1 carefully.

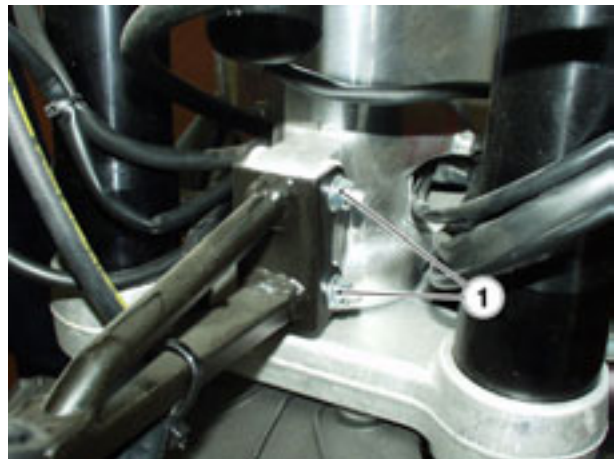
TORQUE WRENCH SETTINGS

Nuts (1) 10Nm (1.0 kgm)

- Remove the instrument panel; see  7.2.7.
- Release the tie securing the wiring to the instrument panel subframe.





- Release and remove the two nuts (1) and collect the washers.
- Remove the two bolts.
- Remove the subframe.



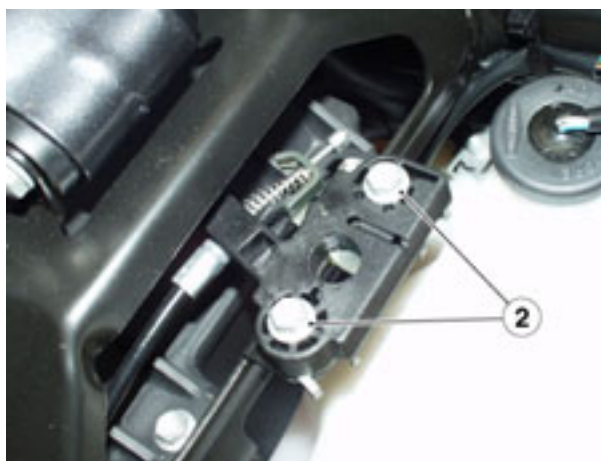
7.4.3. REMOVING THE SEAT LATCH**TORQUE WRENCH SETTINGS**

Screws (1) 10 Nm (1.0 kgm)

- Remove the seat; see  7.1.1.
- Remove the left cover of the seat subframe; see  7.1.8.
- Release and remove the two bolts (1) and collect the two nuts.



- Release and remove the two screws (2).



- Remove the complete latch.



7.4.4. REMOVING THE RIGHT-HAND RIDER FOOTPEG BRACKET

TORQUE WRENCH SETTINGS

Screw (1)	3 Nm (0.3 Kgm)
Screws (2)	10 Nm (1.0 Kgm)
Screws (3)	22 Nm (2.2 Kgm)
Screw (5)	2 Nm (0.2 Kgm)

- Release and remove the screw (1).
- Release and remove the two screws (2) and collect nuts, bushes, washers and guard (4).
- Release and remove the two screws (3).
- Remove the rider footpeg bracket together with brake master cylinder actuating rod, brake lever and rider footpeg.
- If needed, unscrew the screw (5) and remove the chain tensioner.



7.4.5. REMOVING THE LEFT-HAND RIDER FOOTPEG BRACKET

TORQUE WRENCH SETTINGS

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

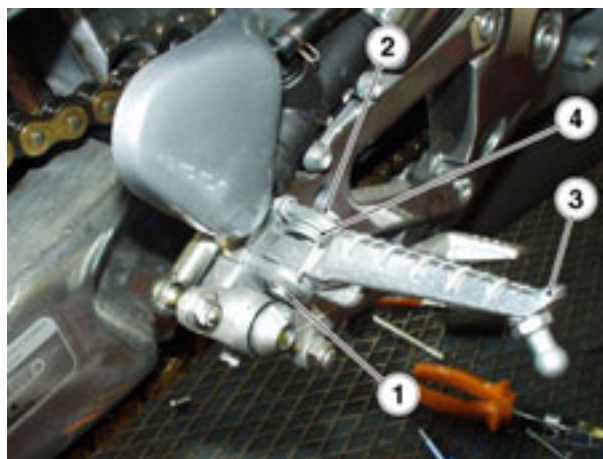
- Undo and remove the nut (1).
- Release and remove the two screws (2).
- Remove the rider footpeg bracket complete with gear shift lever and footpeg.
- If needed, remove the guard (4) and release and remove the two inner screws (3).



7.4.6. REMOVING THE RIDER FOOTPEG

Read  **1.2.1** carefully.

- Remove the retaining ring (1).
- Withdraw the spindle (2).
- Collect footpeg (3) and spring (4).



NOTE Repeat the process to remove the other rider footpeg if needed.

7.4.7. REMOVING THE PASSENGER FOOTPEG BRACKETS

TORQUE WRENCH SETTINGS

Screws (1) 13 Nm (1.3 Kgm)

NOTE The following procedure applies to both footpeg brackets.

- Remove the side body panel; see [7.1.8.](#)
- Release and remove the two screws (1) and collect the nuts.
- Remove the passenger footpeg bracket.



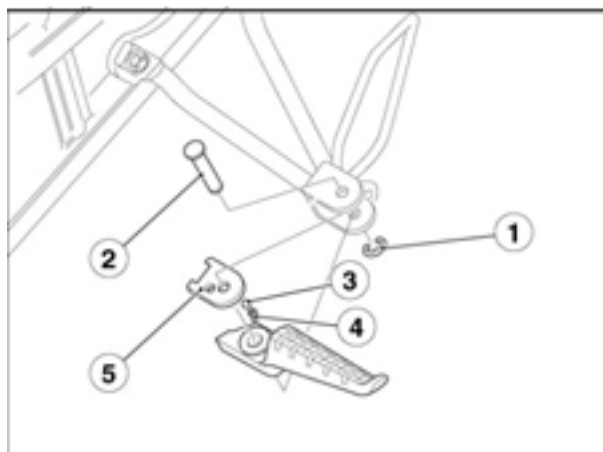
7.4.8. PASSENGER FOOTPEG REMOVAL

- Remove the retaining ring (1).
- Withdraw the spindle (2).

**WARNING**

The ball (3) sits on a spring (4) and might be thrown out due to spring action on disassembly. Proceed carefully and make sure to collect the ball.

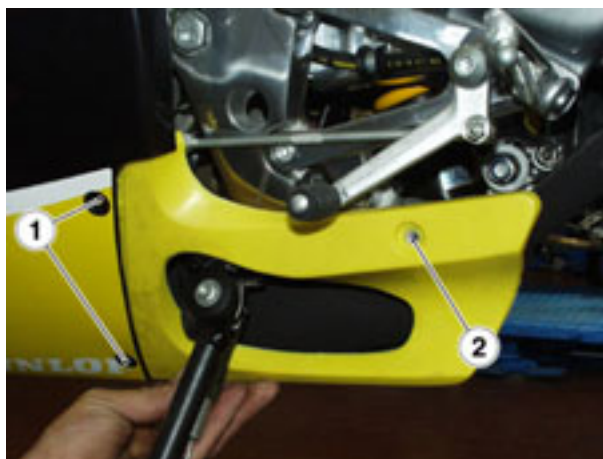
- Remove the footpeg and collect the shim (5), the ball (3) and the spring (4).



7.4.9. SIDE STAND REMOVAL**TORQUE WRENCH SETTINGS**

Screws (1)	2 Nm (0.2 Kgm)
Screw (2)	3 Nm (0.3 Kgm)
Stand bracket bolts (3)	22 Nm (2.2 Kgm)
Stand switch screw	10 Nm (1.0 Kgm)
Stand pivot bolt	10 Nm (1.0 Kgm)







- Place the motorcycle on the rear wheel stand (OPT); see [1.7.2.](#)
- Lower the side stand.
- Release and remove the two screws (1).
- Release and remove the screw (2).
- Remove the fairing cover.
- Disconnect the side stand connector on the right side of the motorcycle.
- Release and remove the two bolts (3) and collect the nuts at the opposite end.
- Remove the side stand complete with switch and bracket.



7.4.10. SEAT SUBFRAME REMOVAL

TORQUE WRENCH SETTINGS

Screw (1) 7 Nm (0.7 Kgm)
Screws (2) 22 Nm (2.2 Kgm)

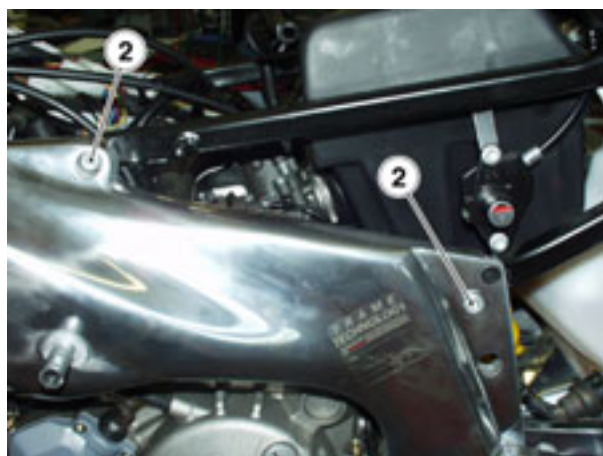
- Remove the voltage regulator; see  7.2.3.
- Remove the seat subframe lower moulded cover; see  7.1.12.
- Remove the airbox; see  4.2.2.
- Remove the oil tank; see  3.1.1.
- Remove both passenger footpeg brackets; see  7.4.7.
- Remove the seat latch; see  7.4.7.
- Release and remove the screw (1) and collect the nut.
- Move aside the rear brake fluid reservoir.



WARNING

Keep the rear brake fluid reservoir in a vertical position to avoid spilling brake fluid. Any brake fluid spills could lead to a dangerous condition.

- Release the seat subframe from all wiring ties.
- Release and remove the two screws (2) working on both sides of the motorcycle.
- Remove the seat subframe.






7.4.11. FRAME REMOVAL

Read  [1.2.1](#) carefully.

TORQUE WRENCH SETTINGS

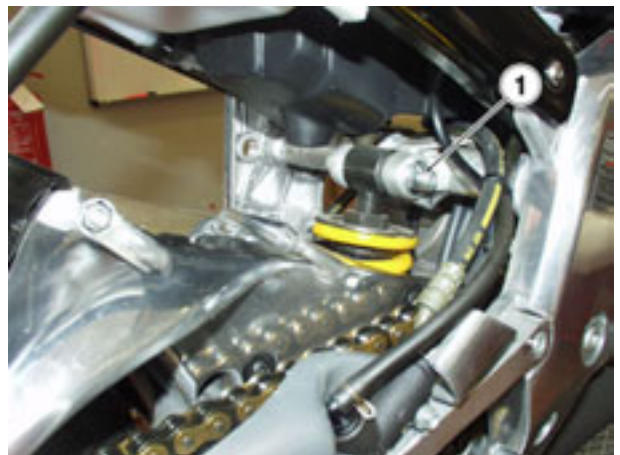
Shock absorber to frame (1)	50 Nm (5.0 kgm)
Linkages to frame (2)	50 Nm (5.0 kgm)
Footpeg bracket screws (3)	22 Nm (2.2 Kgm)
Upper screws (5)	22 Nm (2.2 Kgm)




NOTE Each procedure is cross-referred to the relevant section of the manual and some of the operations described there may not be necessary for the job at hand. To avoid redundant work, always make sure you really need to remove a particular component before proceeding.

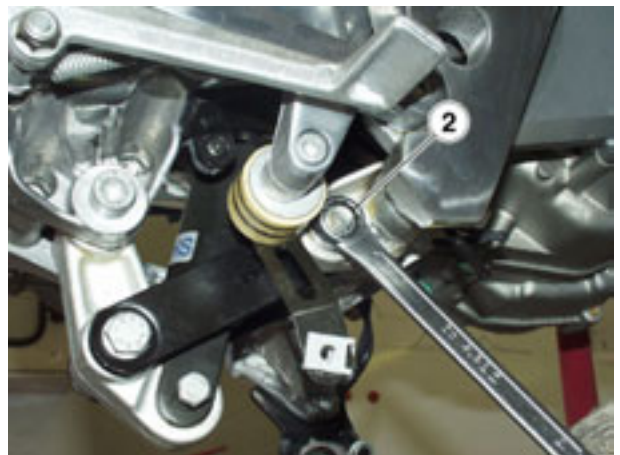
- Remove the engine from the frame; see  [6.2.3](#)
- Remove the instrument panel subframe; see  [7.4.2](#)
- Remove the front end complete with front wheel assembly; see  [7.9.2](#)
- Disconnect the two horn connectors.



- Working from the right-hand side, undo and remove the top nut (1).
- Remove the bolt from the opposite end and collect the washer.



- Working from the right-hand side, undo and remove the nut (2).
- Remove the bolt from the opposite end and collect the washer.
- Remove the rear swinging arm together with the shock absorber; see  [7.11.1](#).
- Remove the side stand; see  [7.4.9](#).
- Remove the right-hand rider footpeg bracket; see  [7.4.4](#).



- Release and remove the two screws (3).
- Remove the left-hand rider footpeg bracket.



- Disconnect the connector of the starter relay.



- Disconnect the connector of the left light dip switch.



- Disconnect the two connectors of the right light dip switch.



- Disconnect coil connector and grounding cable.



- Remove the seat subframe complete with carburetor, oil tank and airbox, see [7.4.10](#)
- Working on both sides of the motorcycle, release and remove the two screws (4) at the front end.
- Remove the two radiator brackets mounted to the battery frame.



- Working on both sides of the motorcycle, release and remove the two upper screws (5).
- Remove the frame head plate.



7.4.12. FRAME INSTALLATION

Read  [1.2.1](#) carefully.





TORQUE WRENCH SETTINGS

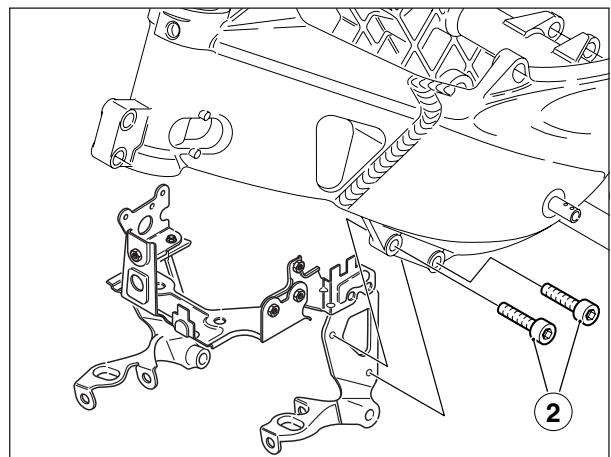
Upper screws (1)	22 Nm (2.2 Kgm)
Footpeg bracket screws (3)	22 Nm (2.2 Kgm)
Shock absorber to frame (4)	50 Nm (5.0 kgm)
Linkages to frame (5)	50 Nm (5.0 kgm)



NOTE Each procedure is cross-referred to the relevant section of the manual and some of the operations described there may not be necessary for the job at hand. To avoid redundant work, always make sure you really need to remove a particular component before proceeding.

- Position the frame head plate.
- Working on both sides of the motorcycle, tighten the two upper screws (1).



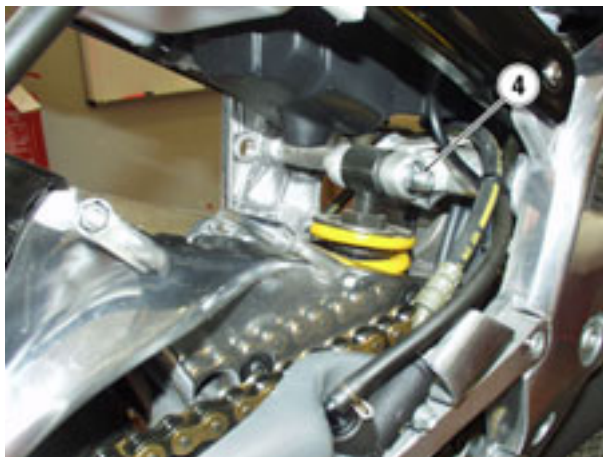
- Locate the two radiator brackets to the battery frame.
- Working on both sides of the motorcycle, tighten the two screws (2) at the front end.
- Install the seat subframe; see  [7.4.10](#).
- Install the side stand; see  [7.4.9](#).
- Install the front end; see  [7.9.4](#).
- Install the instrument panel/front fairing subframe; see  [7.4.2](#)



- Install the right-hand rider footpeg bracket; see  [7.4.4](#).
- Position the left-hand rider footpeg bracket.
- Tighten the two screws (3).
- Install the engine; see  [6.2.4](#)



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



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



- Connect the following electrical connectors in the order:
 - coil and coil ground;



- horn;



- starter relay;



- left light dip switch;



- both connectors of the right light dip switch.

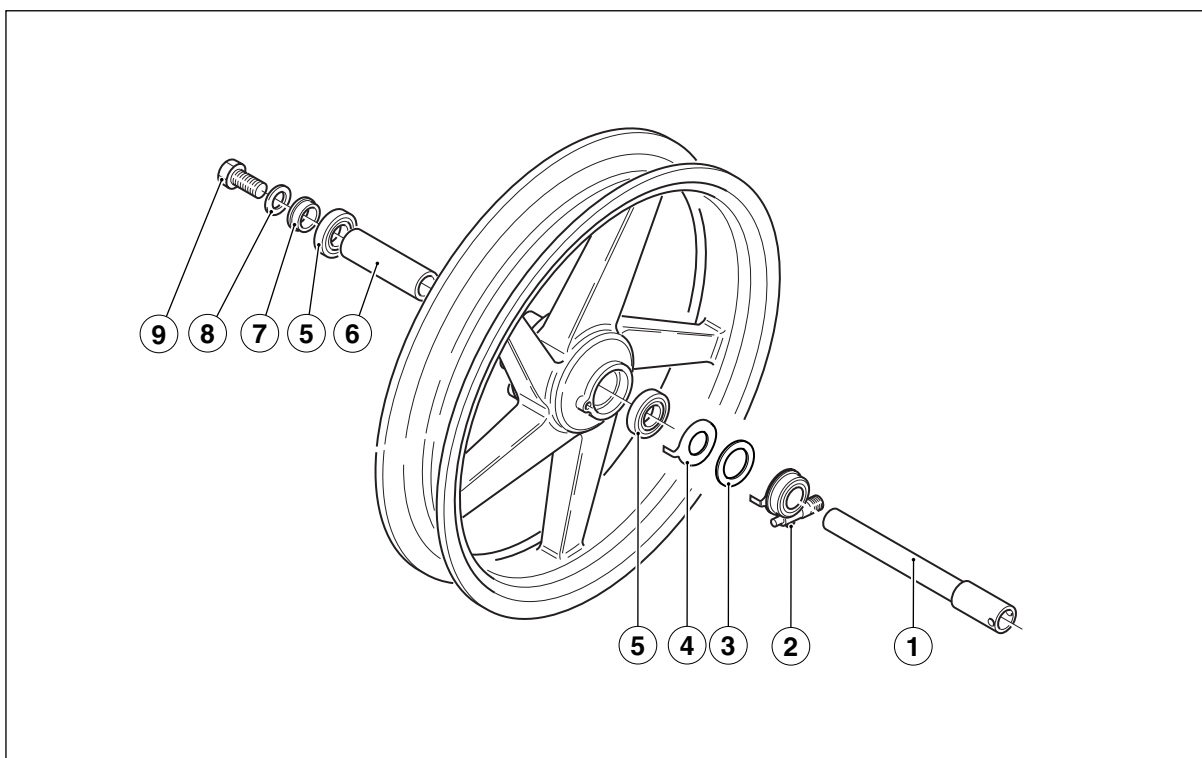
After re-installing the frame, check the following:

- Ensure that all components are fastened securely.
 - Check that wiring and cables are properly routed and fastened.
 - Ensure that all electrical connectors are properly fitted to the matching connectors.
 - Turn the handlebars and check that cables and tubes do not bind.
- Refit the fairings.



7.5. FRONT WHEEL

7.5.1. FRONT WHEEL DIAGRAM

**Key**

1. Wheel spindle
2. Speedometer drive
3. Seal
4. Drive ring
5. Front wheel bearing
6. Bearing spacer
7. Front wheel right-hand outer spacer
8. Washer
9. Wheel spindle special bolt

NOTE Grease the wheel spindle (1).

7.5.2. REMOVING THE COMPLETE FRONT WHEEL

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Brake caliper mounting bolts (1) 22 Nm (2.2 kgm).



Wheel spindle bolt (2) 80 Nm (8 kgm).

Wheel spindle clamp screws (3) 12 Nm (1.2 kgm)



WARNING

Use great care during wheel removal to avoid damaging the brake lines, discs and pads.

- Place the motorcycle on the special rear wheel stand (OPT); see  1.7.2.
- Place the motorcycle on the special front wheel stand (OPT); see  1.7.1.

NOTE Ensure that the motorcycle is safely supported and stable.

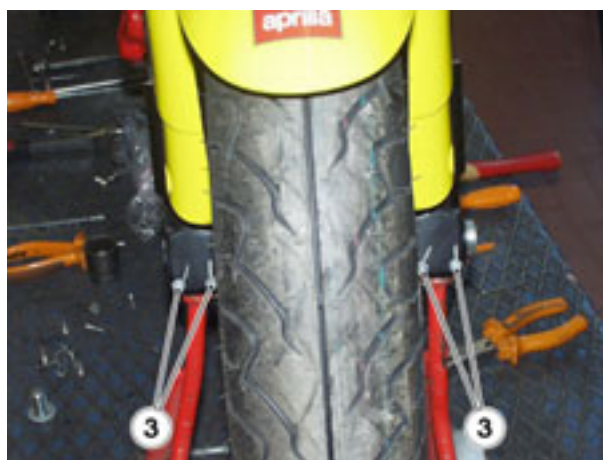
- Have an assistant hold the handlebars steady in position as in forward travel so that the steering cannot move.
- Release and remove the two mounting bolts (1) of the front brake caliper.
- Remove the brake caliper from the brake disc, but leave the caliper attached to the brake hose.



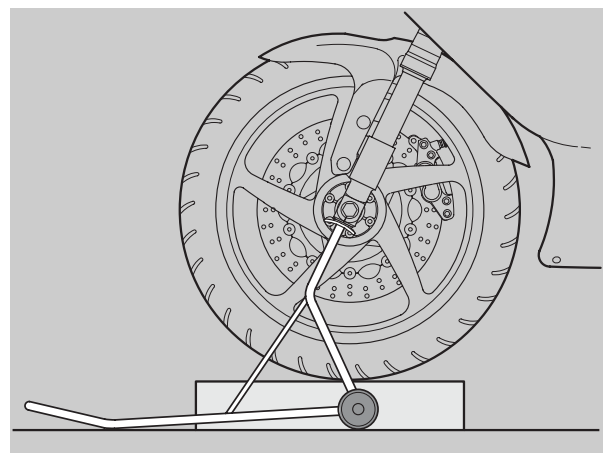
WARNING

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

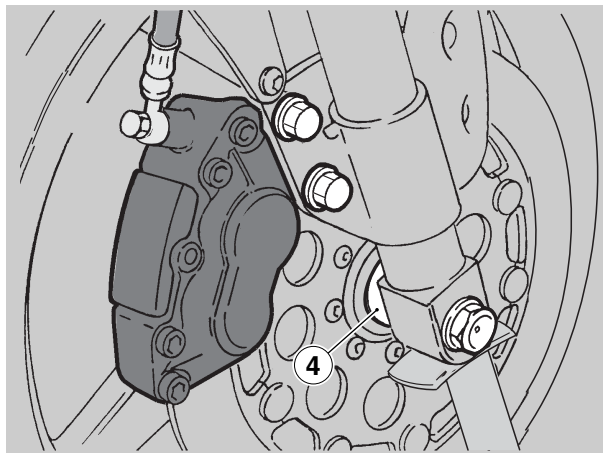
- Release and remove the screw (2) and collect the washer.
- Slacken but do not remove the four wheel spindle clamp bolts (3).



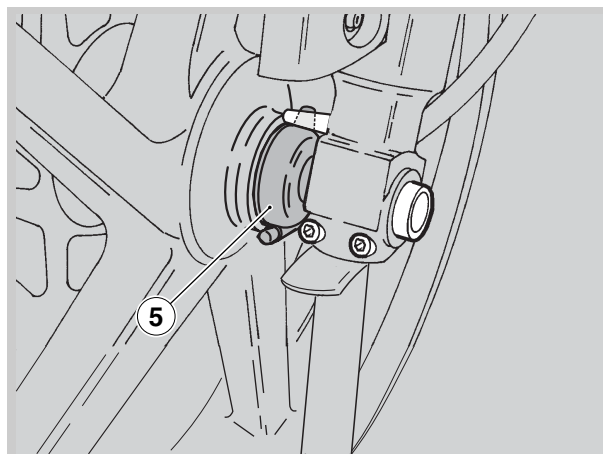
- Place a support under the wheel tyre to hold the wheel steady once released.
- Extract the wheel spindle from the left side.



- Remove the wheel pulling from the front and collect the spacer (4).




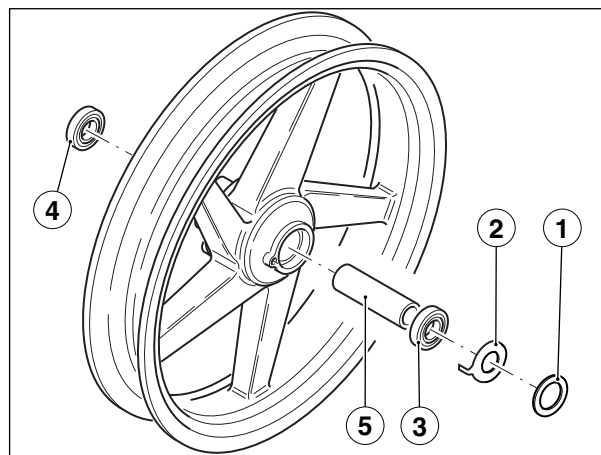
- Disengage the speedometer drive (5).



7.5.3. FRONT WHEEL DISASSEMBLY

Read  1.2.1 carefully.

- Remove the front wheel; see  7.5.2.
- Clean both ends of the wheel hub with a cloth.
- Remove the seals (1).
- Remove the drive ring (2).
- Remove the left-hand bearing (3) using a suitable bearing extractor.
- Remove the right-hand bearing (4) using a suitable bearing extractor.



WARNING

Inspect the bearings after each removal; see  7.5.4. Replace as required.

- Collect the inner spacer (5).
- Clean the wheel hub bore thoroughly.
- Wash all components using clean detergent.



WARNING

Refit the bearings using a drift with the same diameter as the bearing outer ring.
Do not tap the balls or the inner ring.
Make sure to push the following components into firm contact with the adjacent parts:

- right-hand bearing (4) with hub;
- spacer (5) with right-hand bearing (4);
- left-hand bearing (3) with spacer (5).

7.5.4. FRONT WHEEL COMPONENT INSPECTION

**WARNING**

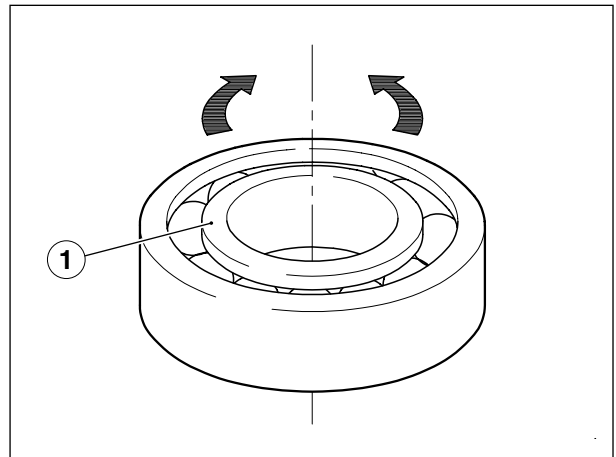
Check that all components are in perfect condition. Inspect the following components with special care.

BEARINGS

Rotate the inner ring (1) manually. The ring should turn smoothly, with no hardness or noise.

There should be no end float.

Replace any bearings that do not meet the above requirements.

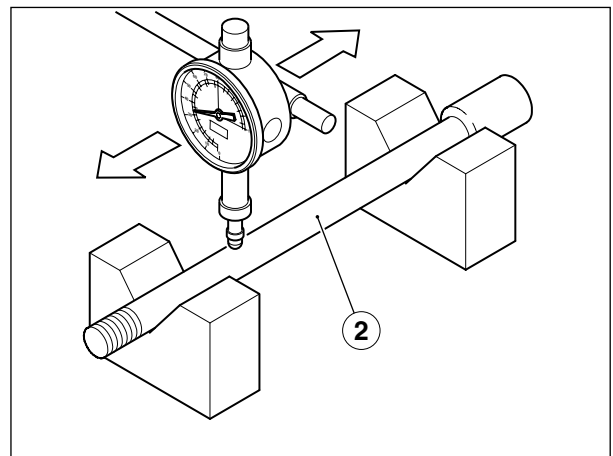
**SEALS**

Inspect the seals and replace if damaged or badly worn.

WHEEL SPINDLE

Check spindle (2) run-out using a dial gauge. Replace the spindle (2) when run-out exceeds the maximum limit allowed.

Wheel spindle run-out limit: 0.25 mm.

**WHEEL RIM**

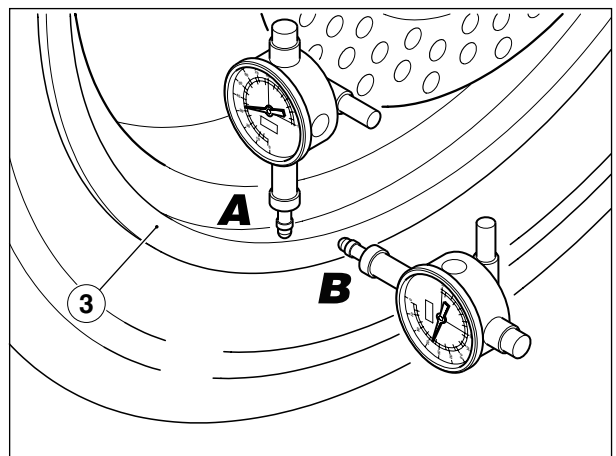
Use a dial gauge to ensure that wheel rim (3) radial (A) and axial (B) run-out does not exceed the maximum limit allowed.

Exceeding run-out is normally due to worn or damaged bearings.

Replace the bearings first, then check run-out again.

Replace the wheel rim (3) if it still exceeds the maximum limit allowed.

Wheel rim radial and axial run-out limit: 2 mm.

**TYRE**


Check tyre condition; see [2.19.1](#).

7.5.5. REFITTING THE COMPLETE FRONT WHEEL

Read  [1.2.1](#) carefully.

TORQUE WRENCH SETTINGS

Caliper mounting bolts (7)	22 Nm (2.2 kgm).
Wheel spindle bolt (6)	80 Nm (8 kgm).
Wheel spindle clamp screws (8)	12 Nm (1.2 kgm)

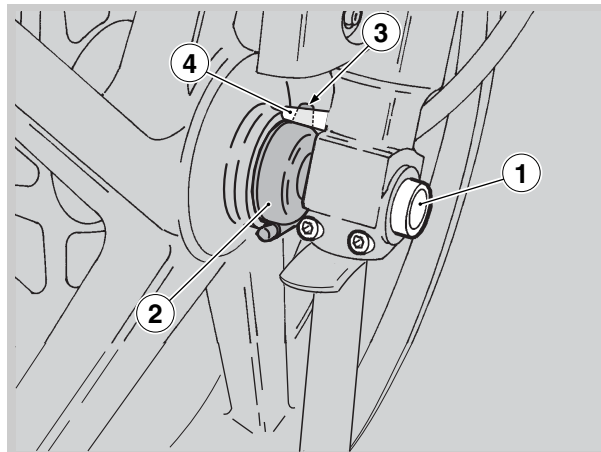
- Smear a light coat of grease over the total length of the wheel spindle (1); see  [1.8.1](#).



WARNING

Use great care when refitting the wheel to avoid damaging the brake lines, brake discs and brake pads.

- Position the housing (3) of the speedometer drive (2) correctly to the special anti-rotation peg (4).



NOTE The spacer (5) must have the larger diameter face pointing to the right fork leg.

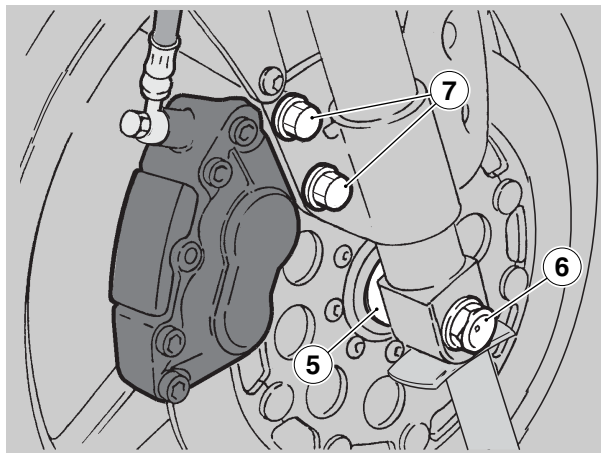
- Position the spacer (5) to the wheel.
- Place the wheel between the fork legs above the support.



DANGER

Do not attempt to align the holes by putting your fingers into the holes. This could result in severe personal injury.

- Move the wheel until the centre hole aligns with the holes in the forks.
- Slide the wheel spindle (1) fully home.



- Fit the washer and snug the screw (6) hand-tight.
- Lock out wheel spindle (1) rotation.
- Tighten the screw (6) fully.



WARNING

Use great care or you might damage the brake pads.

- Fit the brake caliper to the brake disc with the mounting holes aligned with the holes in the caliper carrier.



WARNING

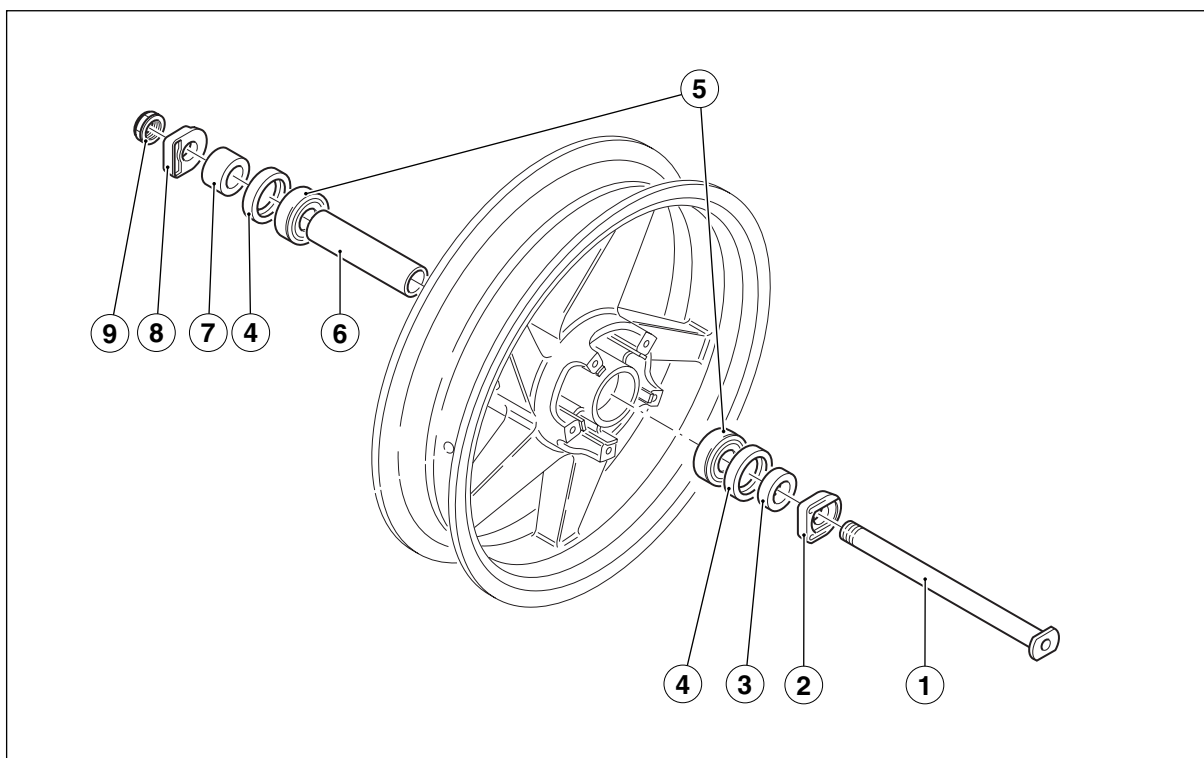
Replace both caliper mounting bolts (7) with new bolts of the same type fitted originally.

- Start the two caliper mounting bolts (7) in their holes and tighten.
- Hold in the front brake lever and press down on the handlebars repeatedly to pump the front fork up and down. This will allow the fork legs to seat themselves properly.
- Tighten the two wheel spindle clamp bolts (8) working on both sides.
- Remove the front wheel stand (OPT); see [1.7.1.](#)
- Remove the rear wheel stand (OPT); see [1.7.2.](#)

**WARNING**

After refitting the wheel, work the front brake lever repeatedly and check for proper operation of the brake.

Ensure that the wheel is properly centred.

7.6. REAR WHEEL**7.6.1. REAR WHEEL DIAGRAM****Key**

- 10. Rear wheel spindle
- 11. Left chain slider
- 12. Left outer spacer
- 13. Rear wheel oil seal
- 14. Rear wheel bearing
- 15. Rear wheel inner spacer
- 16. Wheel right outer spacer
- 17. Right chain slider
- 18. Rear wheel spindle nut

NOTE Grease the wheel spindle (1).

7.6.2. REMOVING THE COMPLETE REAR WHEEL

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

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




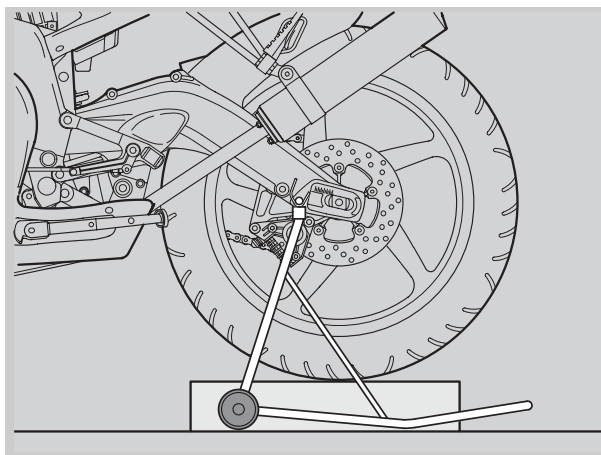
WARNING

To avoid the risk of burns, allow the engine and silencer to cool down completely before proceeding.

Use great care during removal, to avoid damage to the brake line, brake disc and brake pads.

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

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



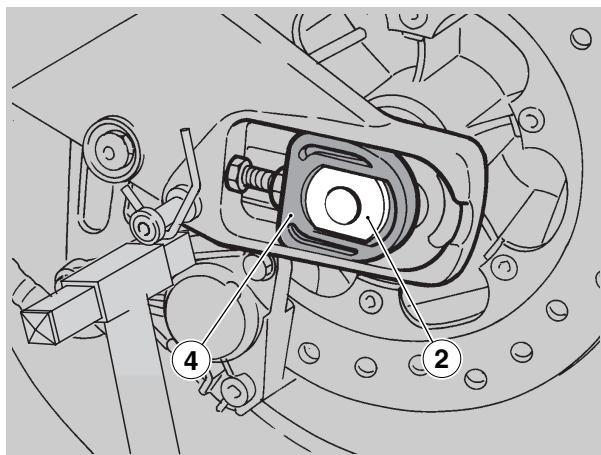
- Undo and remove the nut (1) and collect the washer.
- Withdraw the wheel spindle (2) from the left-hand side.

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

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

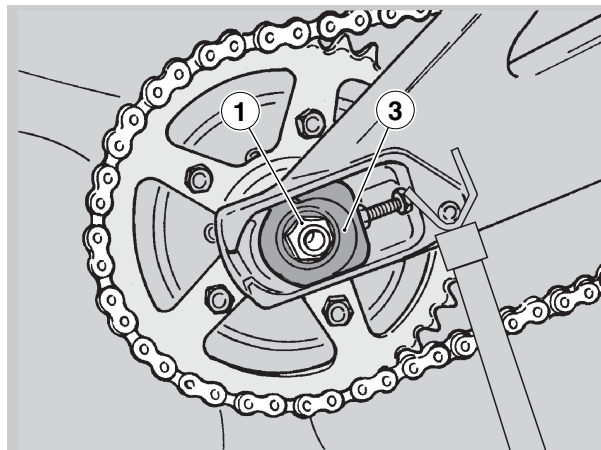
NOTE Take the chain off the rear sprocket routing it outboard of the sprocket.

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



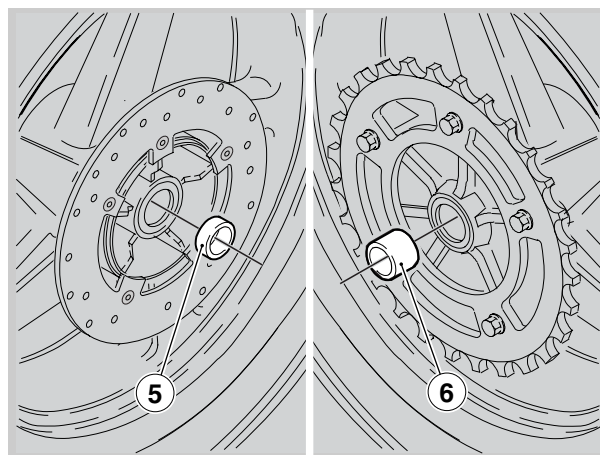
WARNING

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




NOTE Note the positions of the spacers (5) and (6) so as to refit them in the original position on assembly.

- Collect the left-hand spacer (5).
- Collect the right-hand spacer (6).



7.6.3. REAR WHEEL DISASSEMBLY

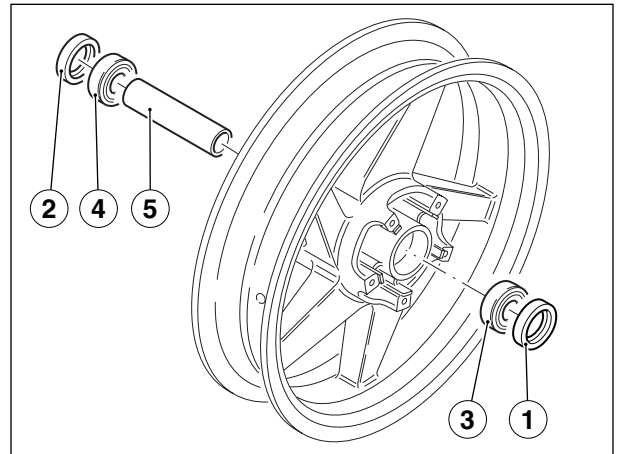
Read  [1.2.1](#) carefully.

- Remove the rear wheel; see  [7.6.2](#).
- Clean the wheel hub at both ends with a cloth. Remove the oil seals (1-2).
- Remove the right-hand bearing (3) and then the left-hand bearing (4) using a bearing extractor.

**WARNING**

Inspect the bearings after each removal and replace as required.

- Collect the inner spacer (5).
- Clean the hub bore thoroughly.



NOTE Wash all components with clean detergent.


**WARNING**

**Refit the bearings using a drift with the same diameter as the bearing outer ring.
Do not tap the balls or the inner ring.
Push the left-hand bearing (4) fully home.**

7.6.4. FINAL DRIVE REMOVAL

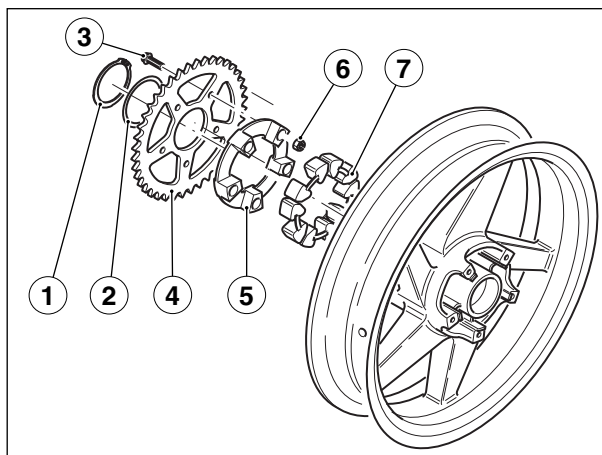
Read  [1.2.1](#) carefully.

DISASSEMBLY

- Remove the wheel; see  [7.6.2](#).

NOTE If you only need to remove the rear chain sprocket, simply perform the following five steps.

- Clean the wheel hub at both ends with a cloth.
- Remove the circlip (1).
- Remove the snap ring (2).
- Release and remove the five screws (3).



- Remove the rear sprocket (4).
- Clean the hub bore thoroughly.

NOTE Wash all components with clean detergent.

If needed:

- Remove the sprocket carrier (5) and collect the five nuts (6).
- Remove the cush-drive rubber (7).


REASSEMBLY

- With the sprocket carrier (5) removed, fit the rear sprocket (4) to the carrier and tighten the five nuts (6).



WARNING


Tighten the nuts in a cross pattern.

- Refit the cush-drive rubber (7) into the wheel.
- Refit the sprocket carrier (5) together with the rear sprocket (4) to the wheel.
- Refit the snap ring (2).
- Refit the circlip (1).
- Refit the wheel; see  [7.6.6](#).

7.6.5. INSPECTING THE REAR WHEEL COMPONENTS

**WARNING**



Check the condition of all components. Pay particular attention to those listed below.

BEARINGS, SEALS, WHEEL SPINDLE and WHEEL RIM;
see  7.5.4.

CUSH-DRIVE RUBBER

- Inspect the cush-drive rubber for damage or wear. Replace as required.
- Fit the cush-drive rubber into the wheel hub.
- Position the complete final drive assembly to the wheel. Rotate the rear chain sprocket manually in both directions and check cush-drive play in the hub. If you feel too much play, change the cush drive.


REAR CHAIN SPROCKET

- Check the toothing of the front and rear chain sprockets for wear. In the event excess wear is found, replace front and rear chain sprockets and drive chain as a set; see  7.6.4 and  7.13.1

**WARNING**

Drive chain and front and rear chain sprockets must always be replaced as a set. Failure to do so will lead to early wear of the newly fitted component(s).

TYRE

- Check tyre condition; see  2.19.1

7.6.6. REFITTING THE COMPLETE REAR WHEEL

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Wheel spindle nut (7): 100 Nm (10.0 kgm).



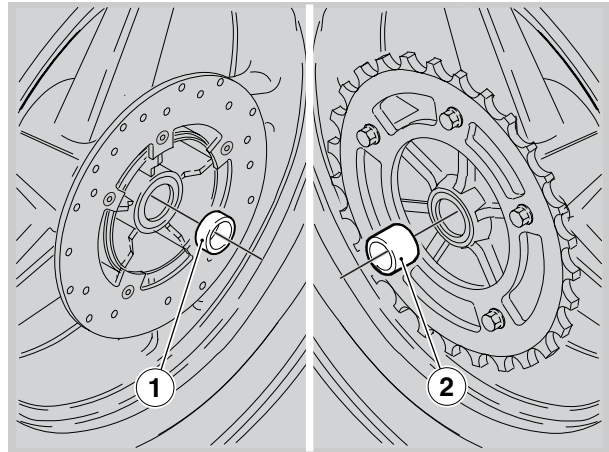
WARNING

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

- Grease the outer seating areas of the wheel hub moderately.

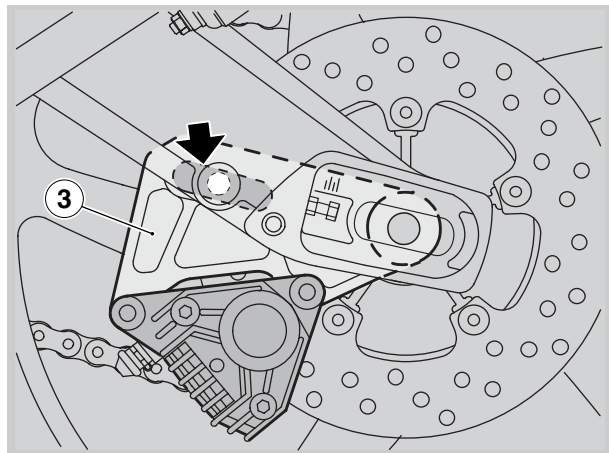
NOTE Ensure that the left-hand (1) and right-hand (2) spacers do not get mixed up. Refit each spacer in its original position.

- Fit the left-hand (1) and right-hand (2) spacers, each in its location on the wheel hub.



WARNING

Before proceeding to reassemble, check that the caliper carrier (3) is positioned correctly. The carrier slot must be sitting on the locating peg found on the inboard face of the left swinging arm.
Be careful when locating the brake disc to the caliper.



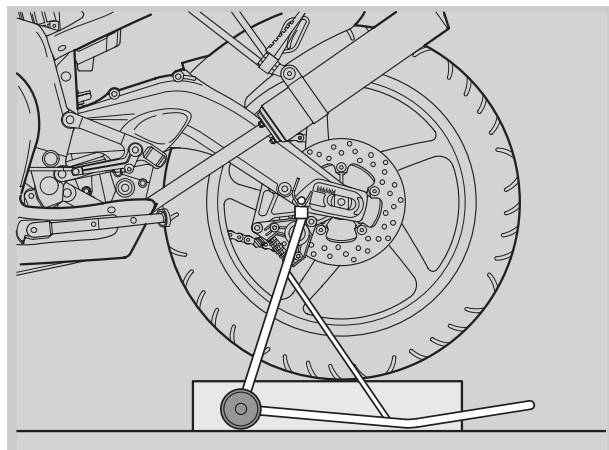
- Place the wheel between the swinging arms above the support.



DANGER

Do not put your fingers between chain and chain sprocket.

- Push the wheel forward and wrap the chain around the rear chain sprocket.
- Pull the wheel backwards until the centre hole matches the swinging arm holes.



NOTE Ensure that the right-hand (4) and left-hand (5) tensioners do not get mixed up. Refit each tensioner in its original position.

- Locate the right-hand chain tensioner (4) and the left-hand chain tensioner (5) to the swinging arm at the correct positions.
- Smear a light coat of grease evenly on the wheel spindle (6).
- Push the wheel spindle (6) fully home from the left side.

NOTE Make sure the wheel spindle (6) is fully in with the head fully seated into the left-hand chain tensioner (5).

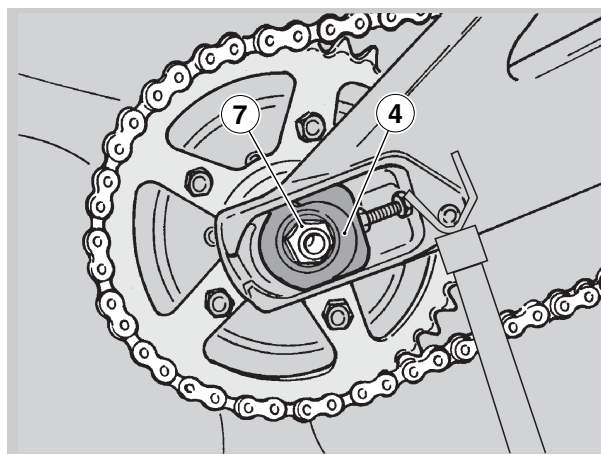
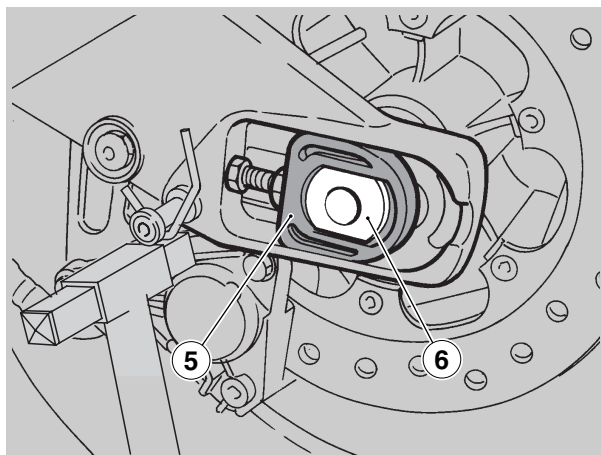
- Fit the washer and screw the nut (7) hand tight.
- Check chain slack; see [2.21.1](#).
- Tighten the nut (7).



WARNING

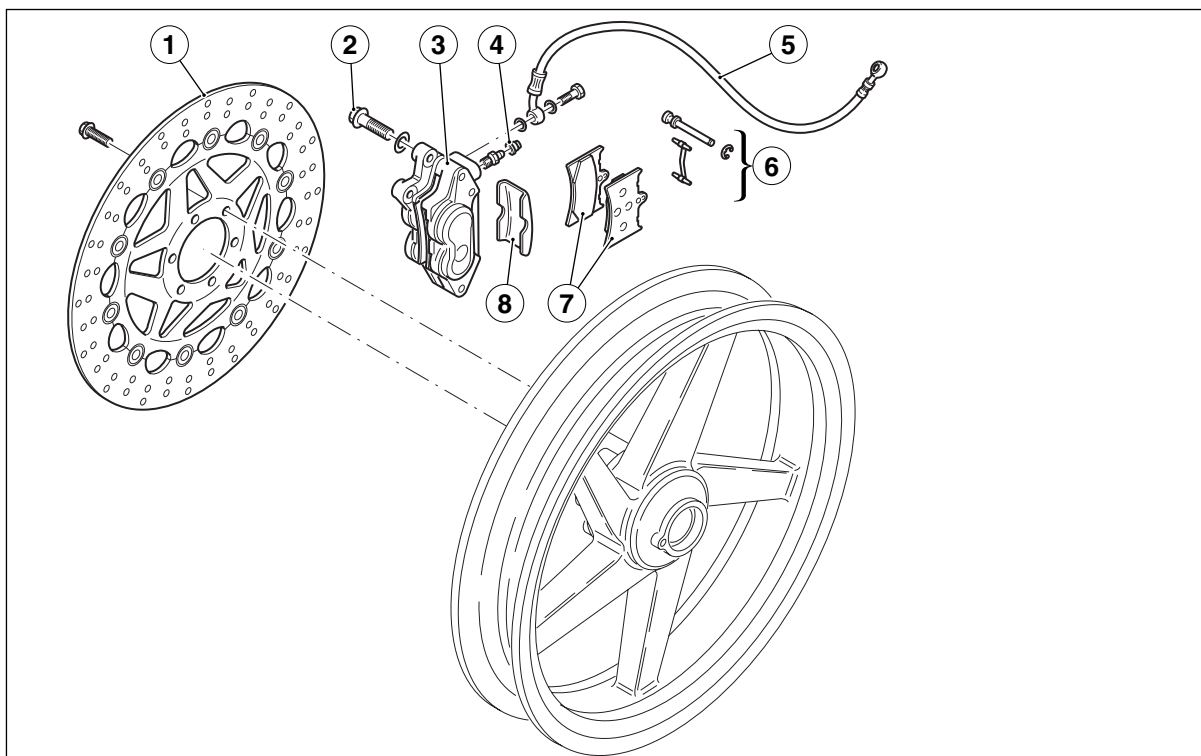
After reassembling, operate the rear brake lever repeatedly and check for proper operation of the brake.

Ensure that the wheel is perfectly centred.



7.7. FRONT BRAKE

7.7.1. FRONT BRAKE DIAGRAM



Key:

- 19. Brake disc
- 20. Brake caliper mounting bolt
- 21. Brake caliper
- 22. Bleed nipple
- 23. Brake fluid hose
- 24. Brake pad retainer
- 25. Brake pads
- 26. Brake pad cover

For detailed information:

- see [1.3.1](#);
- see [2.12.1](#);
- see [2.12.5](#);
- see [2.12.3](#).



WARNING

After each removal, change the brake caliper mounting bolts. Use two bolts of the same type fitted originally.

7.7.2. REPLACING THE FRONT BRAKE PADS

Read  1.2.1 and  2.12.3 carefully.

- Place the motorcycle on the side stand.
- Remove the brake caliper cover (1).



- Release the retaining ring (2).



- Withdraw the pin (3) and collect the clip.
- Remove the brake pads (4).

**WARNING**


Do not operate the brake lever with the brake pads removed, or the brake caliper pistons might fall out leading to loss of brake fluid.

- Fit two new brake pads taking care to align the holes with the caliper holes.

**WARNING**

The brake pads must always be replaced in pairs. Ensure they become properly seated in the brake caliper.



- Position the clip and insert the pin (3).
- Fit the retaining ring (2).
- Refit the caliper cover (1)
- Check brake fluid level; see  2.12.1.

7.7.3. FRONT BRAKE DISC INSPECTION

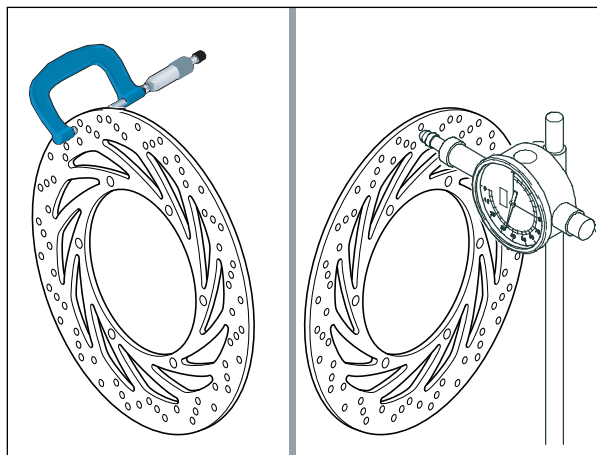
NOTE The operations described below are to be performed with the brake disc installed to the wheel.

- Check for wear measuring disc thickness with a micrometer gauge at different positions along the disc. When a disc is worn beyond the service limit even at just one position, the disc must be replaced.

Disc thickness limit: 4.5 mm.

- Check for disc run-out using a dial gauge. Replace disc when the maximum run-out measured exceeds the disc run-out limit; see [7.7.4.](#)

Disc run-out limit: 0.3 mm.




7.7.4. FRONT BRAKE DISC REMOVAL

Read  1.2.1 carefully.

TORQUE WRENCH SETTING

Screws (1) 22 Nm (2.2 kgm).

- Remove the front wheel; see  7.5.2.

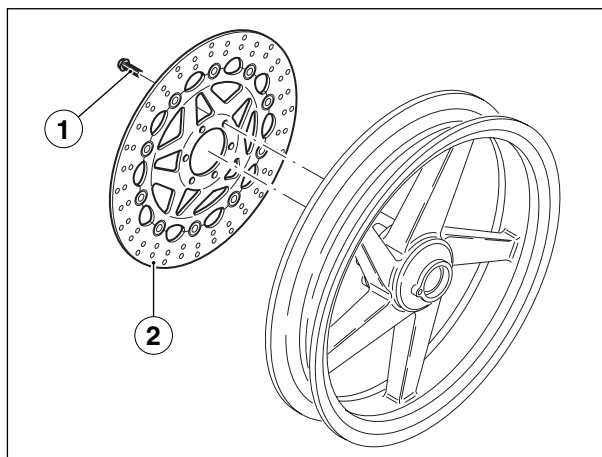
NOTE The screws (1) are retained with LOCTITE® 243. Use of an air gun is recommended to release the screws.

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



WARNING

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

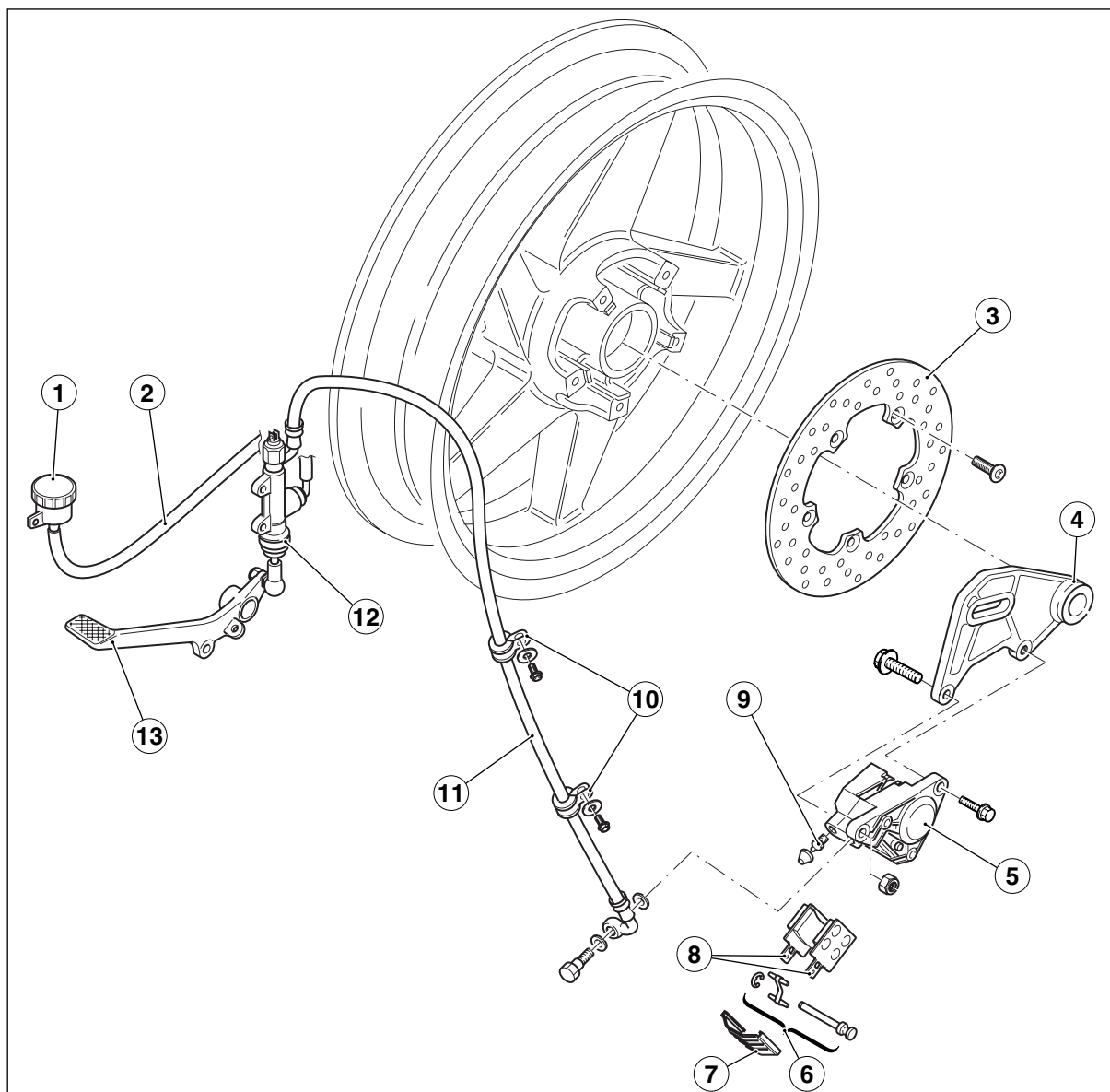


NOTE To refit, start all screws (1) manually in their holes and tighten in a cross pattern.

- Remove the brake disc (2).

7.8. REAR BRAKE






7.8.1. REAR BRAKE DIAGRAM



Key:

27. Brake fluid reservoir
28. Rubber hose - reservoir to pump
29. Brake disc
30. Brake caliper carrier
31. Brake caliper
32. Caliper pin and clip
33. Brake caliper cover
34. Pair of brake pads
35. Bleed nipple
36. Clips
37. Rear brake hose
38. Rear brake master cylinder
39. Rear brake lever

For detailed information:

- see  [1.3.1](#);
- see  [2.12.4](#);
- see  [2.12.5](#);
- see  [2.13.1](#);
- see  [2.12.3](#).



WARNING

After each removal, change the brake caliper mounting bolts. Use two bolts of the same type fitted originally.

7.8.2. REPLACING THE REAR BRAKE PADS

Read  [1.2.1](#) and  [2.12.3](#) carefully.

- Place the motorcycle on the stand.
- Remove the brake caliper cover (1).



- Release the retaining ring (2).



- Withdraw the pin (3) and collect the clip (4).
- Remove the brake pads (5).

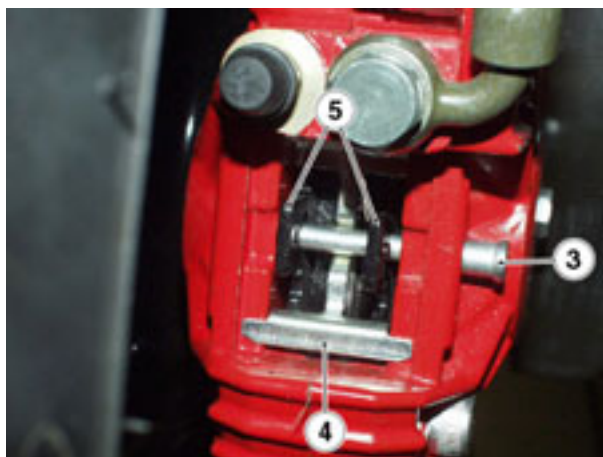
**WARNING**


Do not operate the brake lever with the brake pads removed, or the brake caliper pistons might fall out leading to loss of brake fluid.

- Fit two new brake pads taking care to align the holes with the caliper holes.

**WARNING**

The brake pads must always be replaced in pairs. Ensure they become properly seated in the brake caliper.




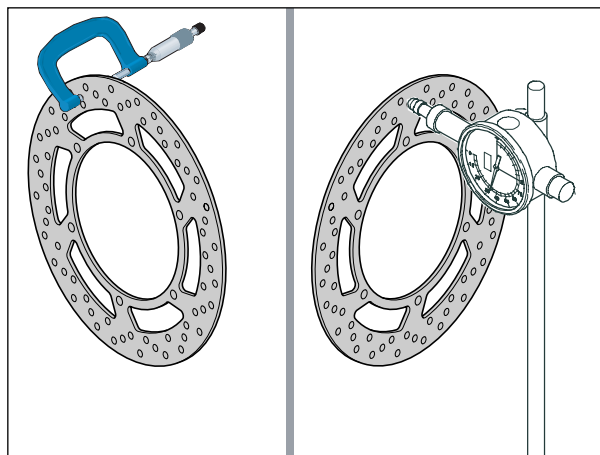
- Position the clip (4) and insert the pin (3).
- Fit the retaining ring (2).
- Refit the caliper cover (1)
- Check brake fluid level; see  [2.12.4](#).

7.8.3. REAR BRAKE DISC INSPECTION


NOTE The operations described below are to be performed with the brake disc installed to the wheel.

- Check for wear measuring disc thickness with a micrometer gauge at different positions along the disc. When a disc is worn beyond the service limit even at just one position, the disc must be replaced.

NOTE When a disc is worn beyond the service limit even at just one position, the disc must be replaced; see  7.8.4.



Disc thickness limit: 4.5 mm.

- Check for disc run-out using a dial gauge. Replace disc when the maximum run-out measured exceeds the disc run-out limit; see  7.8.4.


Disc run-out limit: 0.3 mm.

7.8.4. REAR BRAKE DISC REMOVAL

Read  1.2.1 carefully.

TORQUE WRENCH SETTING

Screws (1) 10 Nm (1.0 kgm).

- Remove the rear wheel; see  7.6.2.

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

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



WARNING

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

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

- Remove the brake disc (2).

7.8.5. REMOVING THE BRAKE MASTER CYLINDER**TORQUE WRENCH SETTINGS**

Screws (5) 10 Nm (1.0 kgm).

- Disconnect the brake light switch connector (1).
- Drain the rear brake circuit; see [2.12.2](#).
- When all fluid has drained out, unscrew and remove the connector (1).
- Detach the hose (2) to the rear brake master cylinder and collect the two sealing washers.

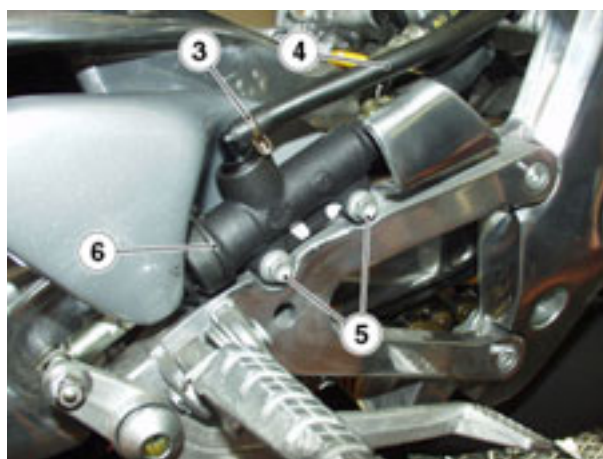


- Slacken the hose clip (3) and slide it aside.
- Detach the hose (4) from the master cylinder fitting.
- Release and remove the two screws (5).
- Remove the cylinder (6) sliding it forward.

**WARNING**

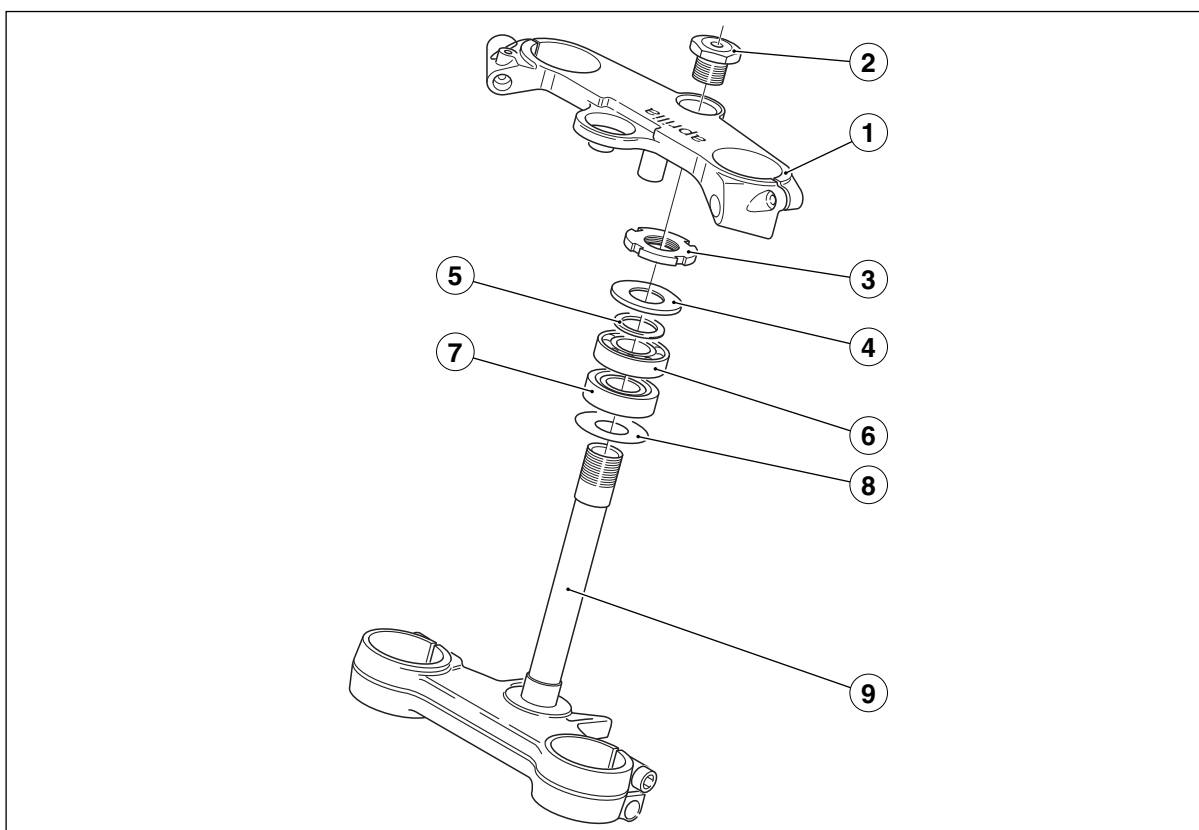
Avoid disturbing the pedal joint unless strictly necessary. When the joint has been removed, apply LOCTITE® 270 to the thread before refitting and tighten firmly.

NOTE After refitting, top up brake fluid level - see [2.12.4](#) and bleed the brake - see [2.12.5](#).




7.9. STEERING

7.9.1. STEERING DIAGRAM



Key:

- 40. Top yoke
- 41. Steering tube cap
- 42. Bottom lockring
- 43. Seal
- 44. Headstock washer
- 45. Ball bearing
- 46. Roller bearing
- 47. Bottom dust seal
- 48. Bottom yoke and steering stem




Always grease the bottom yoke and steering stem on refitting; see  1.8.1.

7.9.2. HEADSTOCK REMOVAL

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS


Brake caliper mounting bolts (1) 22 Nm (2.2 kgm)

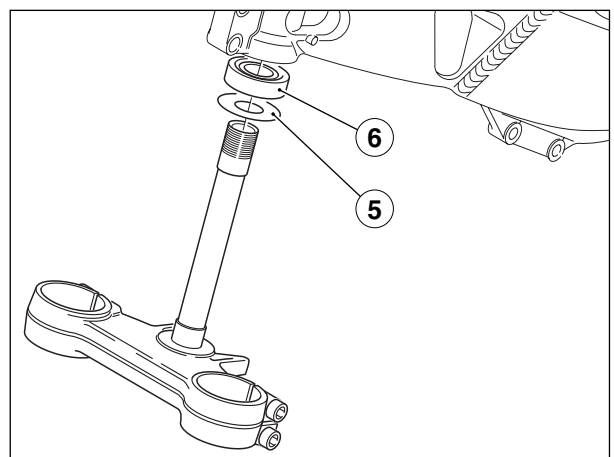
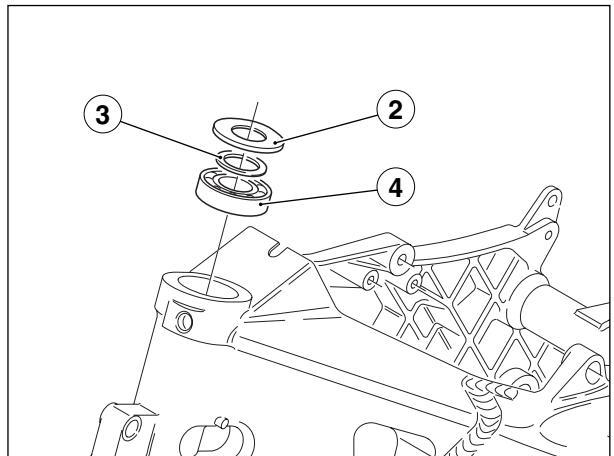
- Place the motorcycle on the rear wheel stand (OPT); see  1.7.2.
- Remove the air scoop; see  7.1.17.
- Connect the slings to the holes on the outside of the frame.
- Lift the hoist arm until stretching the slings taut.
- Remove the mudguard; see  7.1.10.
- Release and remove the two mounting bolts (1) of the front brake caliper.
- Remove the caliper from the disc but leave it attached to the hose.



WARNING

Do not operate the front brake lever with the brake caliper removed, or the brake caliper pistons might fall out leading to loss of brake fluid. The front end is heavy. An assistant will be required to support it. When working with an assistant, plan the whole procedure carefully together.

- While the assistant holds the front end steady, unscrew and remove the adjusting ring nut and perform the first five operations described at paragraph  2.16.1.
- Raise the hoist arm until lifting the front end clear of the steering tube.
- Collect the following parts in the order:
 - Oil seal (2);
 - Washer (3);
- Remove the ball bearing (4) using a suitable extractor;
- Bottom dust seal (5);
- Remove the roller bearing (6) using a suitable extractor.



7.9.3. COMPONENT INSPECTION**WARNING**

Check that all components are in perfect condition. Pay special attention to the components listed below.

BEARINGS

Rotate the inner ring manually. The ring should turn smoothly, with no hardness or noise.

There should be no end float.

Replace any bearings that do not meet the above requirements.

SEALS

Inspect the seals and replace if damaged or badly worn.

7.9.4. HEADSTOCK RE-ASSEMBLY

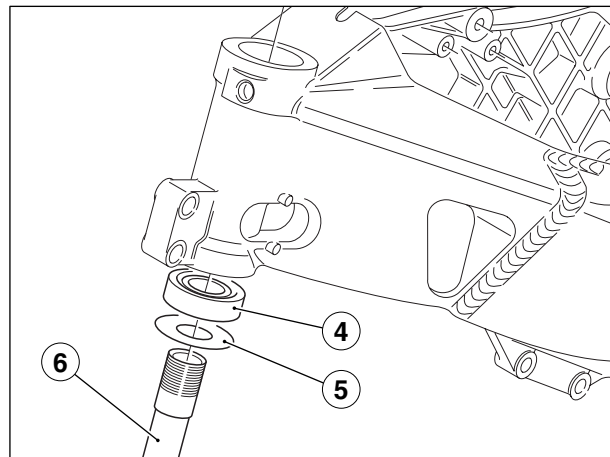
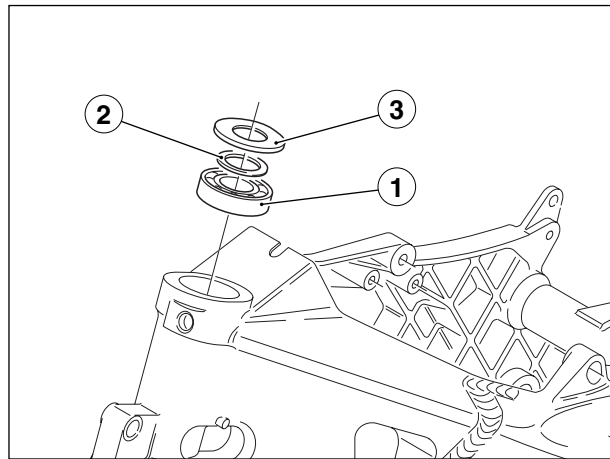
Read [1.2.1](#) carefully.

TORQUE WRENCH SETTINGS

Brake caliper mounting bolts 22 Nm (2.2 kgm)

NOTE Make sure to have a drift with the same diameter as the bearing outer ring available.

- Fit the bearing (1) to the top end of the steering tube using the drift.
- Position the washer (2) and the oil seal (3) in the order.
- Fit the bearing (4) to the bottom end of the steering tube using the drift.
- Position the bottom dust seal (5).
- Grease the steering stem and install the bottom yoke and steering stem (6); see [1.8.1](#).
- Before finally tightening the adjusting ring, turn the steering in both directions repeatedly. This will allow the bearings to seat themselves properly.
- Adjust play in the bearings; see [2.16.1](#).
- Turn the handlebars to ensure that cables and hoses are not twisted or twisted around one another.
- Lower the hoist arm.



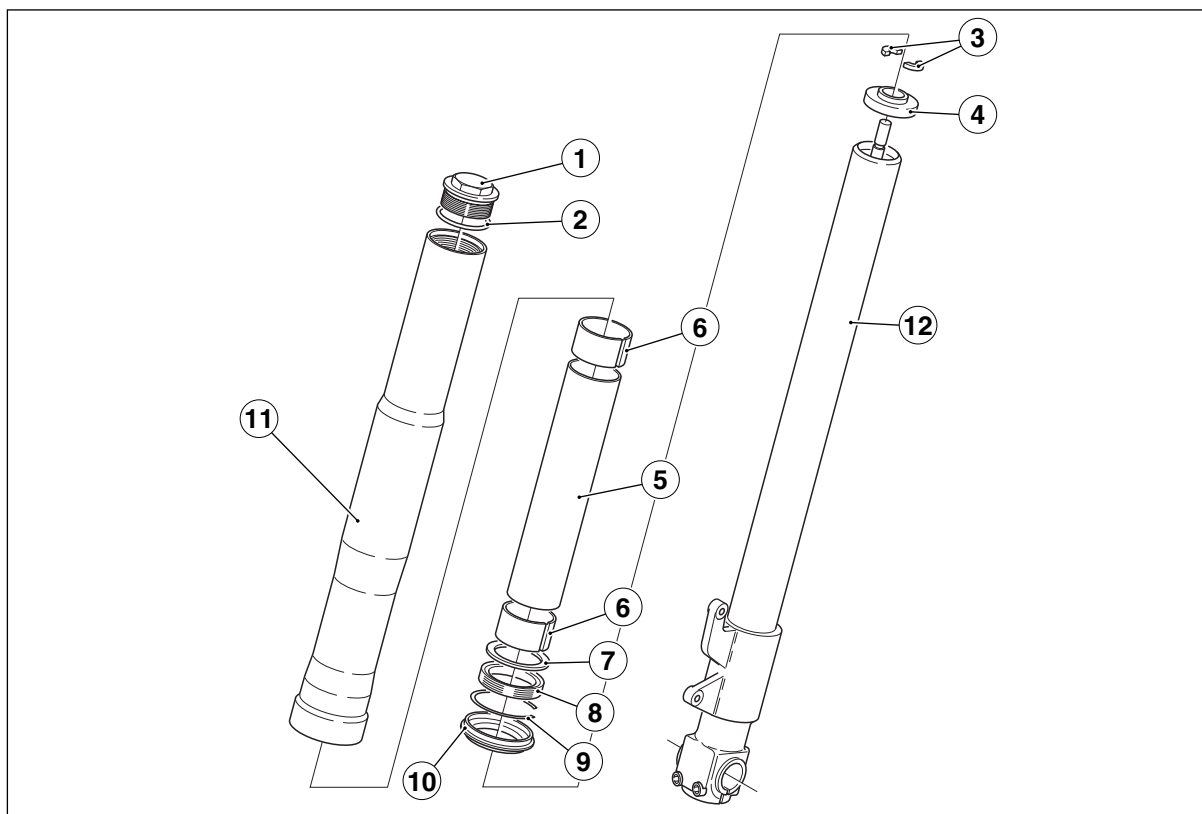
WARNING

Ensure that the rear wheel stand (OPT) is positioned correctly before removing the slings.

- Install the brake caliper to the brake disc.
- Install the mudguard; see [7.1.10](#)
- Detach the slings from the frame.
- Install the air scoop; see [7.1.17](#)
- Install the front fairing.

7.10. FRONT FORK

7.10.1. FRONT FORK DIAGRAM

**Key:**

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

7.10.2. REMOVING THE STANCHION TUBES – SLIDERS

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS



Top yoke bolt (1)	25 Nm (2.5 kgm)
Bottom yoke bolts (2)	25 Nm (2.5 kgm)

NOTE The operations described below apply to both fork legs.



WARNING

Service the fork legs one at a time. Always refit a fork leg in the correct position before removing the other.

- Perform the first seven steps of the procedure described at paragraph  7.9.2.
- Remove the front wheel; see  7.5.2.
- Place the slider in a vice with soft jaws.



WARNING

The stanchion-and-slider assembly contains oil. Do not turn it over or tilt it during removal.


- Slacken the bolt (1).
- Slacken the two bolts (2).
- Slide stanchion and slider off the top and bottom yokes.



7.10.3. DISASSEMBLING THE STANCHION TUBES – SLIDERS

Read  1.2.1 carefully.

NOTE The operations described below apply to both fork legs.

- Remove the stanchion tubes-sliders; see  7.10.2
- Clean the stanchion tubes-sliders thoroughly.

NOTE Make sure to have a container having a capacity greater than 430 cu. cm. ready at hand before proceeding.

- Place the slider in a vice with soft jaws.



WARNING

The stanchion-and-slider assembly contains oil.
Do not turn it over or tilt it during removal.

- Undo the top cap (1) carefully. Be sure not to damage the O-ring when removing the cap.



- Push the stanchion into the slider to give access to the two half-rings (2). Extract the half-rings.
- Extract the spring washer (3).



- Drain the oil into the container.



- Grasp the slider and pull firmly to separate slider and stanchion.



NOTE Take care not to damage the slider inner seating surface during removal of the different components.

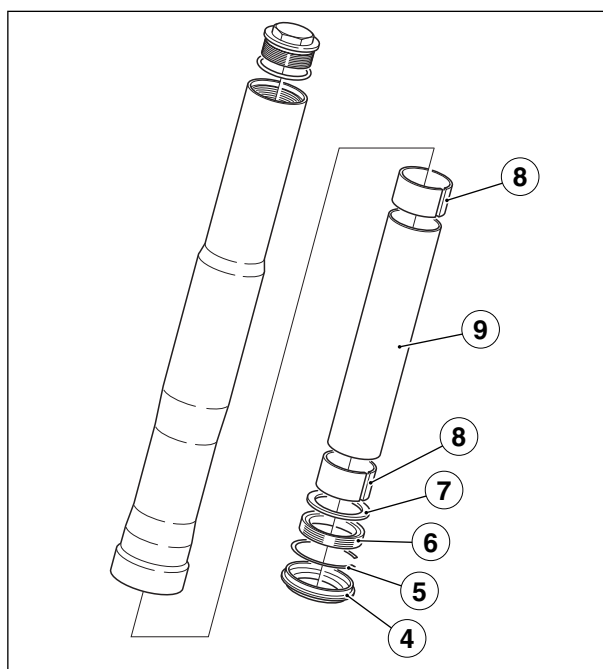
- Lever with a flat-blade screwdriver to remove the dust seal (4).
- Use a small screwdriver to remove the retaining ring (5) from inside the slider.
- Extract the oil seal (6) with the aid of a large screwdriver.
- Slide out the guide bush cap (7) from inside the slider.
- Tap the end of the slider firmly on a wooden bench to knock out the slide bushes (8) and the spacer (9).



WARNING

Keep the slider at right angles to the bench while tapping.

If the bushes are a tight fit in the slider, use a bush extractor, but be careful not to scratch the slider inner surface.



7.10.4. CHANGING FRONT FORK OIL

Read [1.2.1](#) carefully.

Oil quantity: 430 ± 2.5 cu cm; see [1.7.1](#).

Oil specifications; see [1.8.1](#).

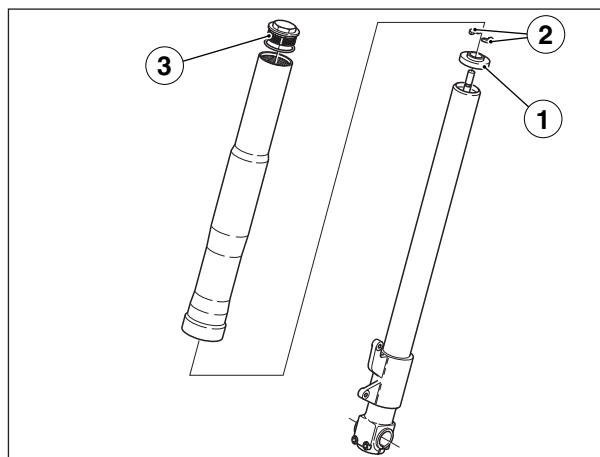
NOTE The operations described below apply to both fork legs.

DRAINING OIL

- Perform the first six steps of the procedure described at paragraph [7.10.3](#).

FILLING

- Place the slider upright in a vice with soft jaws.
- Fill fork fluid into the slider.
- Position the spring cup (1).
- Insert the two half-rings (2).
- Check the O-ring is in place and tighten the top cap (3).



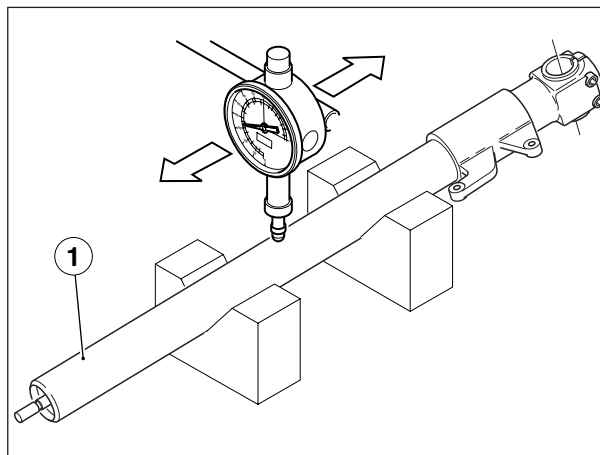
7.10.5. COMPONENT INSPECTION

Read  1.2.1 carefully.

STANCHION TUBE

- Inspect the sliding surface for scoring and/or scratching. Eliminate minor scoring with wet sand paper (grain size 1).
- Replace the stanchion (1) if badly scored.
- Check for stanchion (1) buckling using a dial gauge.
- Replace the stanchion if buckled beyond the service limit.

Service limit: 0.2 mm.

**DANGER**

Never attempt to straighten a buckled stanchion as this would weaken the overall structure leading to a dangerous riding condition.

SLIDER

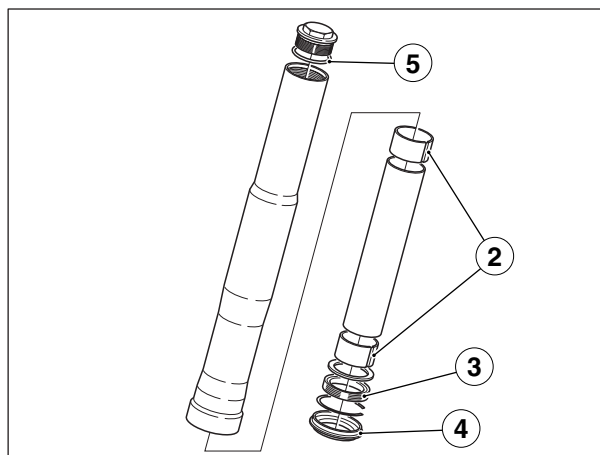
- Inspect for damage and/or cracking. Replace if damaged.
- Check the condition of the slide bushes (2).
- Change any component which is badly worn or damaged.

**WARNING**

Clean off any debris collected by the bushes taking care not to scratch the bush surface.

Renew the following components on assembly:

- oil seal (3);
- dust seal (4);
- top cap O-ring (5).



7.10.6. STANCHION TUBE – SLIDER ASSEMBLY

Read  1.2.1 carefully.

- Inspect the components; see  7.10.5.

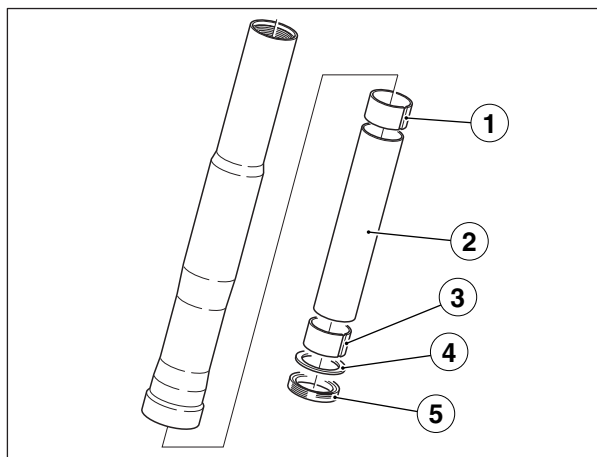
**WARNING**

Take care to prevent the ingress of dirt into slider and stanchion.

Never reuse the oil you have drained from the fork.

NOTE Apply a light film of fork oil to the bushes and seals before assembly.

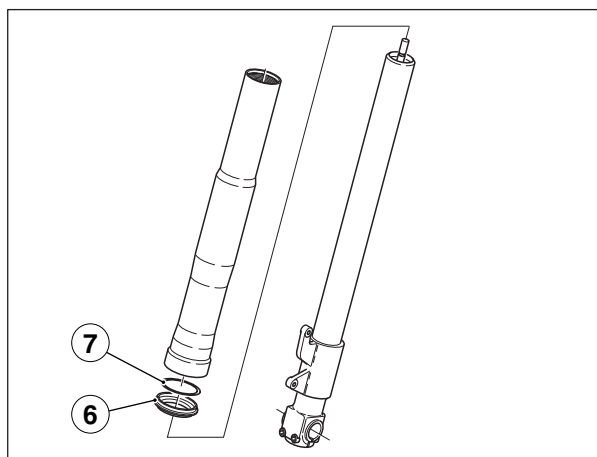
- Insert the slide bush (1) and push into the slider using the spacer (2).
- Insert the other slide bush (3). Push into place in the slider using a drift of adequate size.
- Insert the guide bush cup (4) into the slider and push it into contact with slide bush (3).
- Lubricate the oil seal (5).
- Push the oil seal (5) into contact with the guide bush cap (4). The concave side of the seal must be facing into the slider.



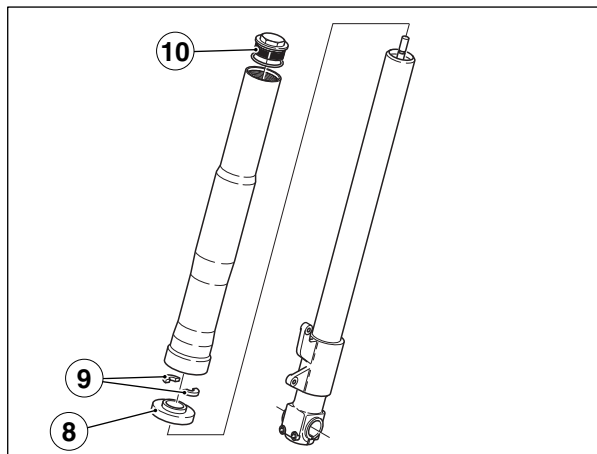
- Fit the following components to the stanchion in the order:
 - dust seal (6);
 - retaining ring (7);
- Place the stanchion in a vice with soft (aluminium) jaws.
- Fit the slider to the stanchion.
- Install the retaining ring (7) and dust seal (6) so that they become seated into the slider.
- Pour fork fluid into the slider.

Oil quantity: 430 ± 2.5 cu cm.

NOTE Oil level must be the same in both fork legs.



- Insert the spring cup (8) and the two half-rings (9) into their seats on the damping cylinder rod.
- Lift the slider.
- Make sure the O-ring is in place on the top cap (10).
- Screw the top cap (10) onto the slider and tighten.



7.10.7. INSTALLING STANCHIONS AND SLIDERS

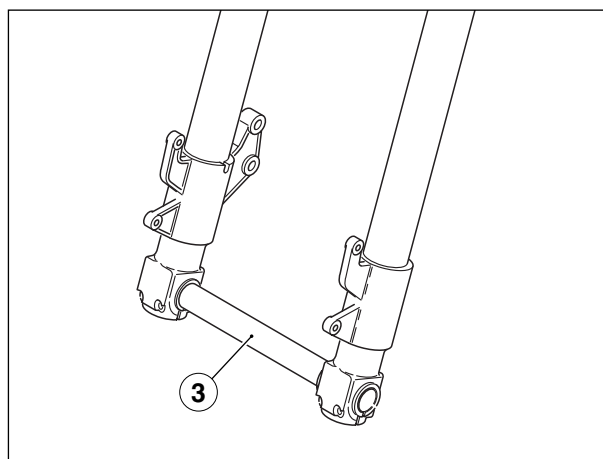
Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Top yoke bolt (5)	25 Nm (2.5 kgm)
Bottom yoke bolts (4)	25 Nm (2.5 kgm)

Slide the slider-and-stanchion assembly through the bottom (1) and top yokes (2).

- Insert the wheel spindle (3) into both fork legs to keep the holes aligned.



- Check that the slider is correctly seated in the bottom (1) and top yokes (2).



- Tighten the two bolts (4) securing the bottom yoke (1) to the slider.



- Tighten the bolt (5) securing the top yoke (2) to the slider.

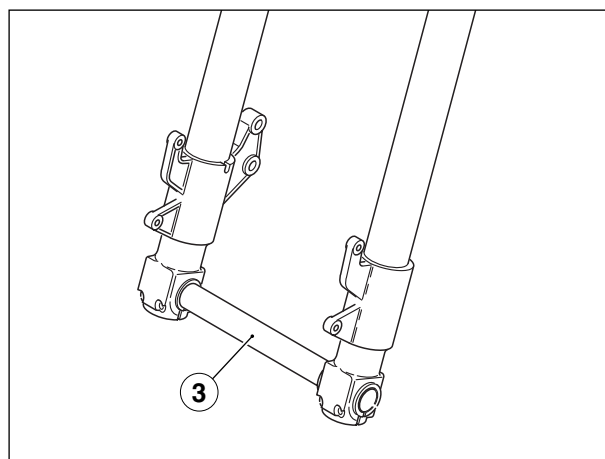


- Remove the wheel spindle (3).
- Refit the wheel; see [7.5.2](#).
- Lower the hoist arm.

**WARNING**

Make sure the rear wheel stand (OPT) is positioned correctly before detaching the slings.

- Detach the slings from the frame.
- When finished, operate the front brake and press down on the fork repeatedly.
- Fork operation should be smooth and progressive. There must be no traces of oil on the fork legs.



NOTE Check front suspension setting before riding the motorcycle.

- Install the mudguard; see [7.1.10](#)
- Install the air scoop; see [7.1.17](#).
- Install the front fairing.





7.11. REAR SWINGING ARM

7.11.1. REMOVING THE REAR SWINGING ARM

Read  1.2.1 carefully.

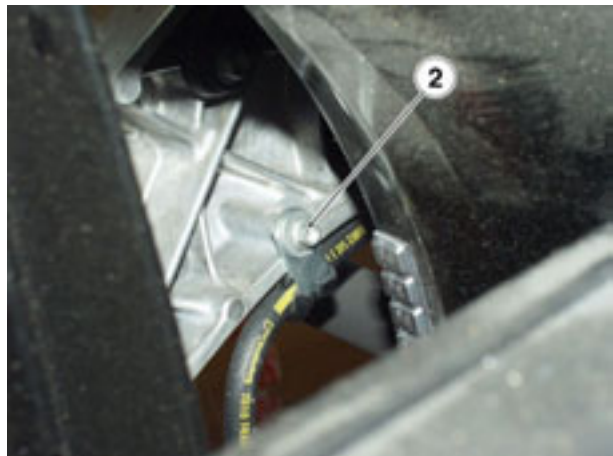
TORQUE WRENCH SETTINGS

Linkages to swinging arm (1)	80 Nm (8.0 kgm)
Brake hose clips (2-3)	3 Nm (0.3 kgm)
Rear screw (4)	22 Nm (2.2 kgm)
Lockring (5)	35 Nm (3.5 kgm)
Adjusting bush (6)	12 Nm (1.2 kgm)
Swinging arm spindle (7)	100 Nm (10.0 kgm).

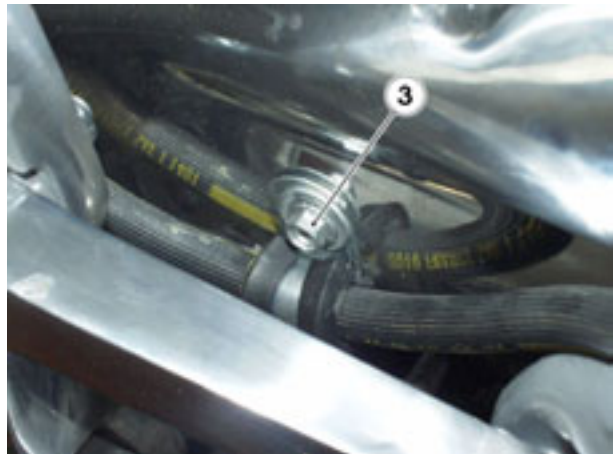
- Place the motorcycle on the front wheel stand (OPT); see  1.7.1.
- Remove the fuel tank; see  2.9.1.
- Fix the slings to the frame at the engine top mounting point.
- Raise the hoist arm until stretching the slings taut.
- Remove the drive chain; see  7.13.1.
- Remove the rear wheel; see  7.6.2.
- Working from the left-hand side, undo and remove the nut (1) and collect the washer.
- Withdraw the screw from the opposite end.
- Remove the linkages from the swinging arm.



- Release and remove the inner screw (2).
- Slip the hose clip off the swinging arm. The clip is still secured to the rear brake hose.



- Release and remove the outer screw (3).
- Slip the hose clip off the swinging arm. The clip is still secured to the rear brake hose.

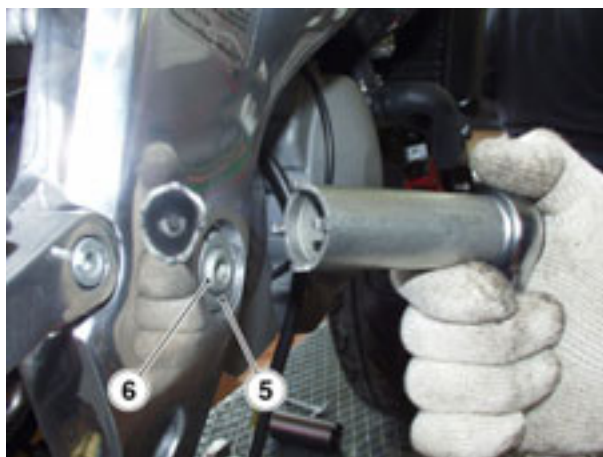


- Slacken the engine-to-frame mounting bolt (4) to facilitate swinging arm removal.



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

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




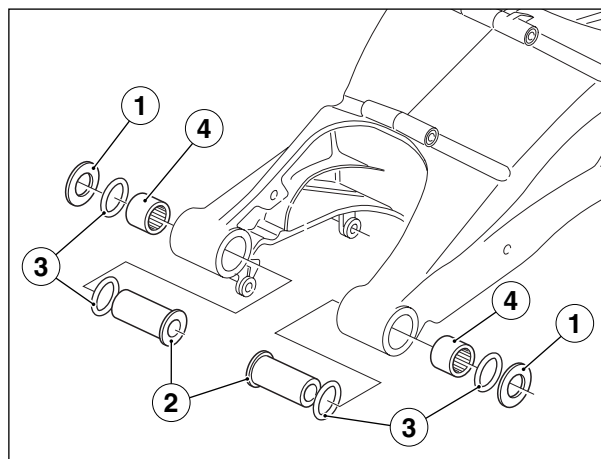
- Working from the left-hand side, release and remove the swinging arm spindle (7) and collect the two washers.
- Remove the swinging arm from the frame.



7.11.2. DISMANTLING THE SWINGING ARM

Read  [1.2.1](#) carefully.

- Remove the swinging arm; see  [7.11.2](#).
- Place the swinging arm on a work bench.
- Clean both sides of the bearing housings with a cloth.
- Remove the outer plastic washers (1).
- Slide both bushes of the needle roller bearings (2) off the swinging arm.
- Extract the four O-rings (3).
- Extract the needle roller bearings (4) using a drift with adequate diameter.



7.11.3. COMPONENT INSPECTION


NOTE Check all components for distortion, damage, cracking and denting. Replace any damaged components.

NEEDLE ROLLER BEARINGS

Rotate the roller cages manually. They must rotate smoothly, with no hardness or noise.

There should be no end float.

Replace any needle roller bearings that do not meet these requirements.

Grease the rollers; see  1.8.1.

SEALS

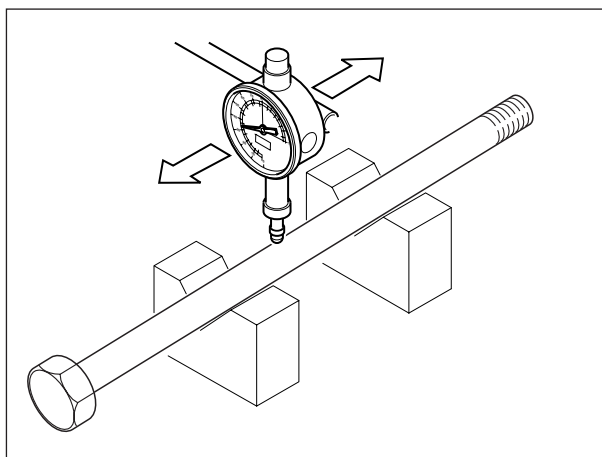
Check the condition of the seals. Replace any damaged or worn seals.

SWINGING ARM SPINDLE

Check spindle run-out using a dial gauge.

Replace spindle when run-out exceeds the allowed limit.

Spindle run-out limit: 0.3 mm.

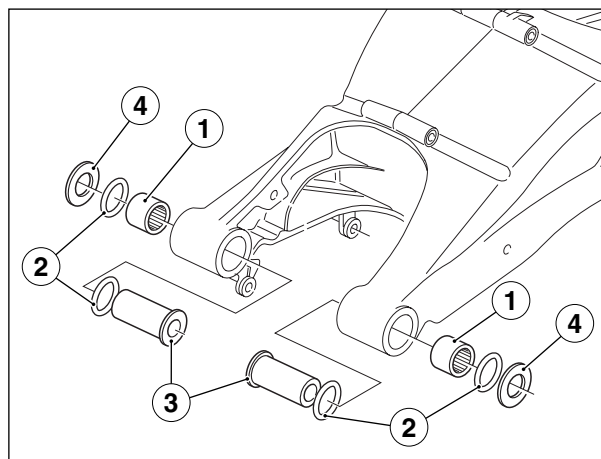


7.11.4. REASSEMBLING THE SWINGING ARM

Read  [1.2.1](#) carefully.

NOTE Change both needle roller bearings.

- Clean all components of the swinging arm articulated connection and apply lithium grease.
- Install two new needle roller bearings (1) using a drift with adequate diameter. The bearings must be centred axially in the bearing housing.
- Position the four O-rings (2).
- Slide the two bushes of the needle roller bearings (3) into the swinging arm.
- Position the outer plastic washers (4).



7.11.5. INSTALLING THE SWINGING ARM

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Swinging arm spindle (1)	100 Nm (10.0 kgm).
Adjusting bush (2)	12 Nm (1.2 kgm)
Lockring (3)	35 Nm (3.5 kgm)
Rear screw (4)	22 Nm (2.2 kgm)
Linkages to swinging arm (5)	80 Nm (8.0 kgm)
Brake hose clips (6-7)	3 Nm (0.3 kgm)

- Fit the two washers to the spindle (1).
- Smear the thread of the swinging arm spindle (1) with oil.

**WARNING**


The tail section is heavy. An assistant will be required to perform the following operations. When working with an assistant, plan the whole procedure carefully together.

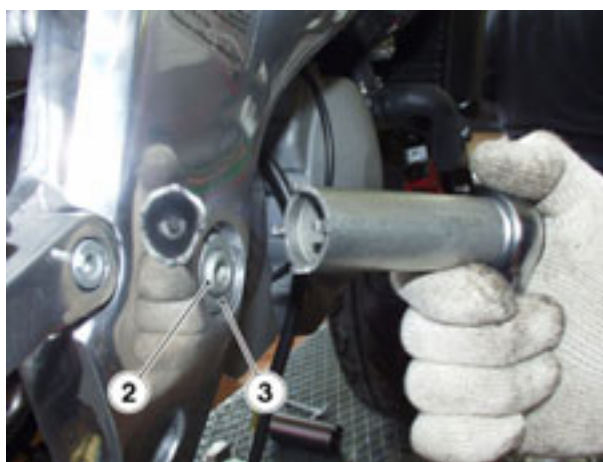
- Locate the swinging arm to the frame.
- Position the swinging arm so as to match the holes. At the same time, push the spindle (1) fully home from the left-hand side.



- Correct adjustment of swinging arm spindle play is obtained by screwing the adjusting bush (2) all the way in and tightening an additional 1/4 turn.

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

- Lock out bush (2) rotation and tighten the lockring (3) using the special tool.
- Adjust the rear swinging arm; see  2.17.3.



- Tighten the engine-to-frame mounting bolt (4).



- Position the linkages to the swinging arm.
- Insert the screw from the right-hand side.
- Position the washer and tighten the nut (5).



- Route the brake hose along the swinging arm.
- Secure the brake hose inner clip with the screw (6).



- Secure the brake hose outer clip with the screw (7).
- Install the rear wheel; see [7.6.6](#)
- Install the drive chain; see [7.13.2](#).
- Lower the hoist arm.
- Disconnect the slings from the frame.
- Install the fuel tank; see [4.1.1](#)





7.12. REAR SUSPENSION

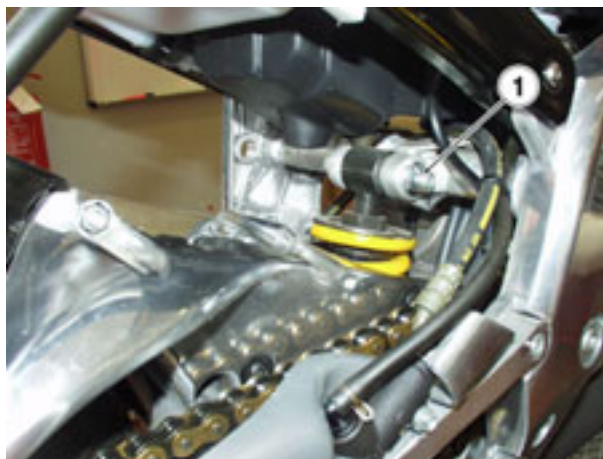
7.12.1. REAR SHOCK ABSORBER REMOVAL

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Shock absorber to frame (1)	50 Nm (5.0 kgm)
Linkages to frame (2)	50 Nm (5.0 kgm)
Shock absorber to linkages (3)	25 Nm (2.5 kgm)

- Place the motorcycle on the front wheel stand (OPT); see  1.7.1.
- Place the motorcycle on the rear wheel stand (OPT); see  1.7.2.
- Place a support between swinging arm and seat subframe to keep the shock absorber uncompressed.
- Working from the right-hand side, undo and remove the top nut (1).
- Withdraw the bolt from the opposite side and collect the washer.



- Working from the right-hand side, undo and remove the nut (2).
- Withdraw the bolt from the opposite side and collect the washer.



- Working from the left-hand side, undo and remove the nut (3).
- Withdraw the bolt from the opposite side.



- Pull the shock absorber in a downward motion to remove.



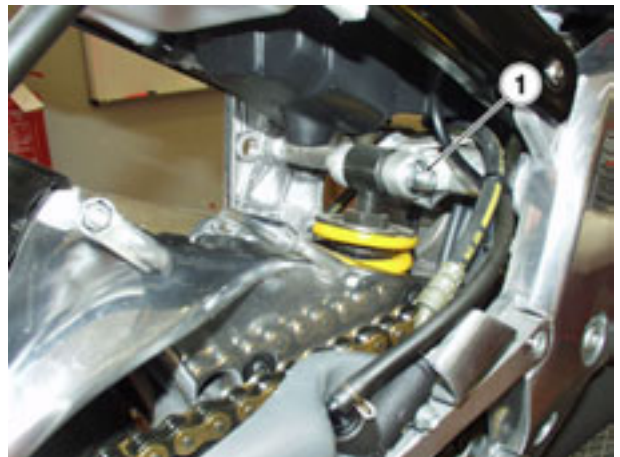
7.12.2. REAR SHOCK ABSORBER INSTALLATION

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Shock absorber to frame (1)	50 Nm (5.0 kgm)
Shock absorber to linkages (2)	25 Nm (2.5 kgm)
Linkages to frame (3)	50 Nm (5.0 kgm)

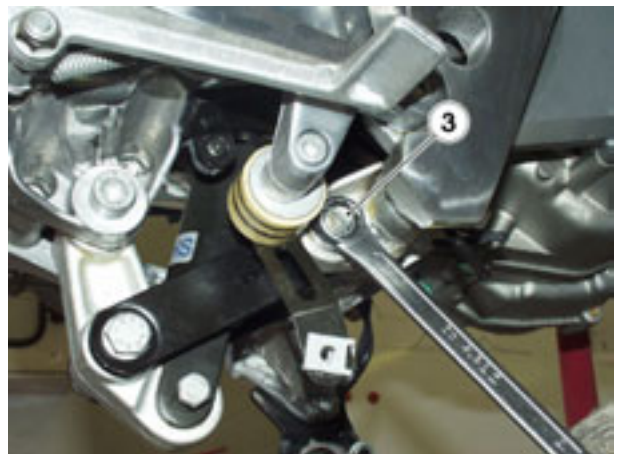
- Position the shock absorber inserting it from the bottom.
- Insert the top bolt of the shock absorber complete with washer from the left-hand side.
- Tighten the nut (1) on the opposite side.



- Position the linkage to the shock absorber.
- Insert the shock absorber bottom bolt from the right-hand side.
- Tighten the nut (2) on the opposite side.



- Locate the double connecting link to its seat in the frame.
- Insert the link-to-frame mounting bolt complete with washer from the left-hand side.
- Tighten the nut (3) on the opposite side.
- Remove the support between swinging arm and seat subframe.



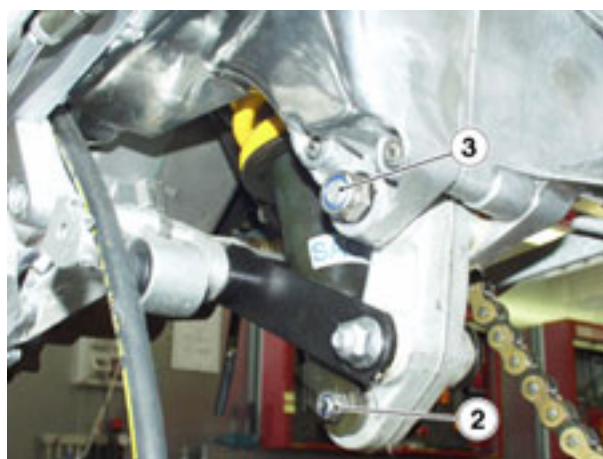
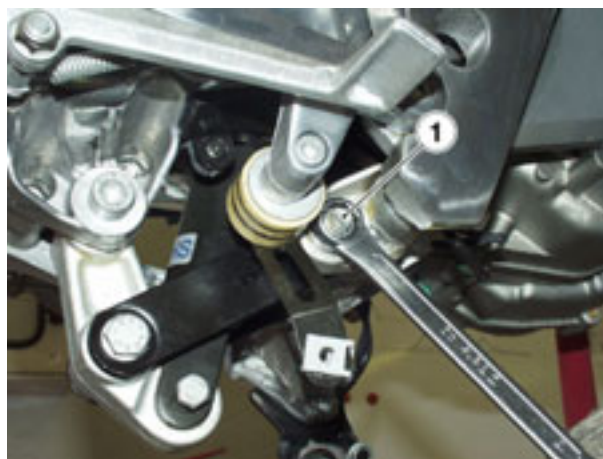
7.12.3. REMOVING THE REAR SUSPENSION LINKAGES

Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

Linkages to frame (1)	50 Nm (5.0 kgm)
Shock absorber to linkages (2)	25 Nm (2.5 kgm)
Linkages to swinging arm (3)	80 Nm (8.0 kgm)

- Working from the right-hand side, undo and remove the nut (1).
- Withdraw the bolt on the opposite side and collect the washer.
- Working from the left-hand side, undo and remove the nut (2).
- Withdraw the bolt on the opposite side.
- Working from the left-hand side, undo and remove the nut (3).
- Withdraw the bolt on the opposite side and collect the washer.
- Remove the complete linkage assembly.




7.12.4. DISMANTLING THE REAR SUSPENSION LINKAGE SYSTEM

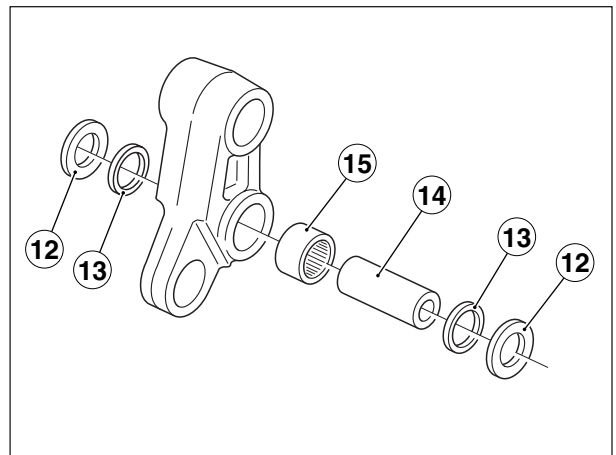
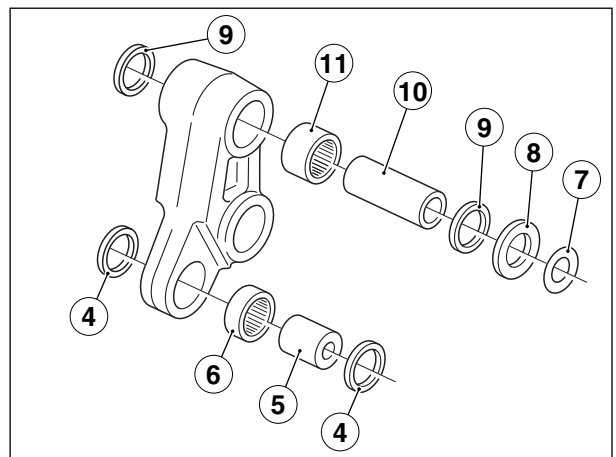
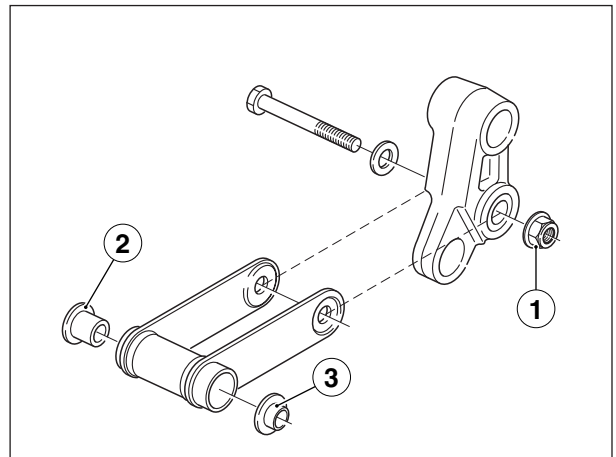
Read  1.2.1 carefully.

TORQUE WRENCH SETTINGS

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

- Remove the complete linkage assembly; see  7.12.3.
- Undo and remove the nut (1).
- Withdraw the bolt on the opposite side and collect the washer.
- Remove the single connecting link.
- Remove the right-hand (2) and left-hand bushes (3) from the single connecting link.
- Remove the oil seals (4) from the double connecting link.
- Withdraw the pin (5).
- Remove the roller bearing (6) using a suitable extractor.
- Remove the Belleville washer (7).
- Remove the seal (8).
- Remove both oil seals (9).
- Withdraw the pin (10).
- Remove the roller bearing (11) using a suitable extractor.
- Remove both seals (12).
- Remove both oil seals (13).
- Withdraw the pin (14).
- Remove the roller bearing (15) using a suitable extractor.

NOTE Wash all components with clean detergent.



7.12.5. COMPONENT INSPECTION

NOTE Visually inspect all components for distortion, damage, cracking and denting. Replace any damaged components.

ROLLER BEARINGS

Rotate the roller cages manually. They must rotate smoothly, with no hardness or noise.

There should be no end float.

Replace any roller cages that do not meet these requirements.

Apply grease to the bearing rollers; see  1.8.1.


SEALS

Check the condition of the seals. Replace any damaged or worn seals.

7.13. DRIVE CHAIN

7.13.1. REMOVING THE DRIVE CHAIN

Read  [1.2.1](#) carefully.


- Slacken the chain; see  [2.21.3](#).
- Rotate the rear wheel until locating the master link.
- Slip off the clip (1).
- Remove the link plate underneath.



- Remove the master link from the opposite end.
- Remove the chain.



WARNING

When the chain is worn, replace chain and front and rear sprockets as a set. See  [2.21.4](#).



7.13.2. REFITTING THE DRIVE CHAIN

Read  1.2.1 carefully.

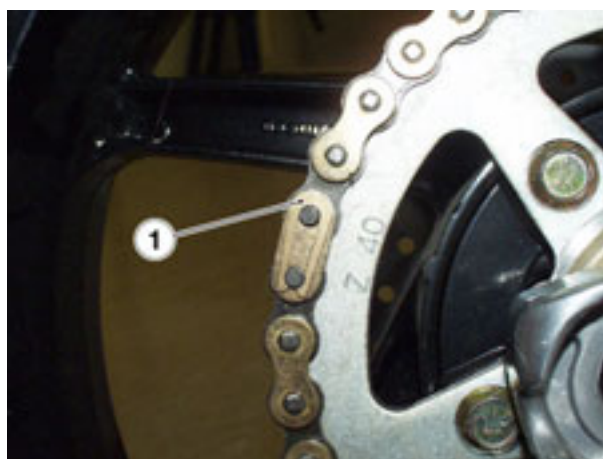
- Check that the chain is correctly positioned on the front and rear sprockets.
- The chain open ends should be in the lowermost portion of the chain midway between the sprockets.
- Overlap the two ends and slide the master link pins in place from the inboard side outwards.
- Locate the link plate to the pins.



- Fit the clip (1) to the pins.

**WARNING**

The master link clip (1) must be installed with the open end pointing away from the direction of chain movement.



ELECTRICAL SYSTEM

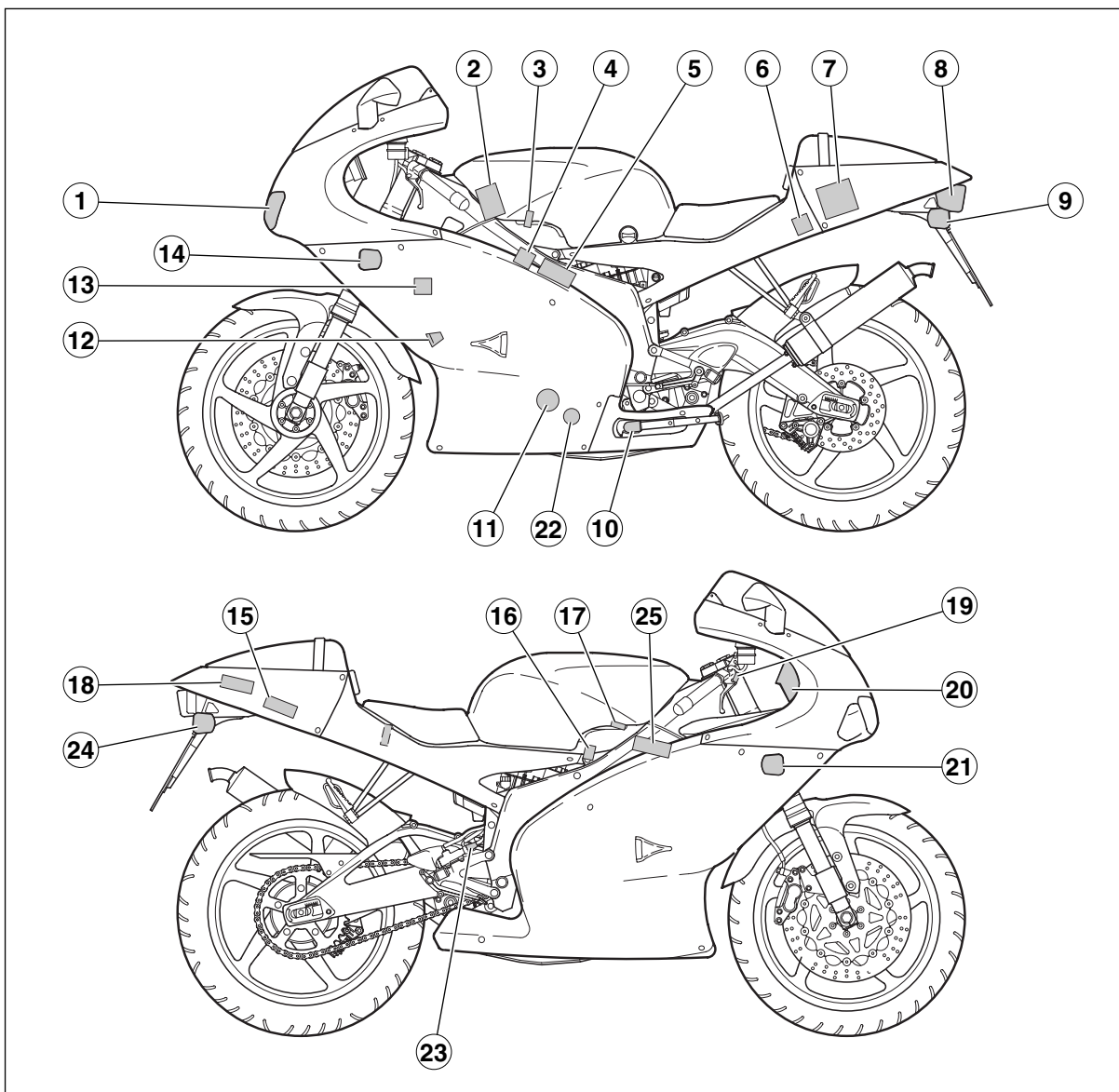
8

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8.1. LAYOUT OF COMPONENTS

8.1.1. LAYOUT OF ELECTRICAL COMPONENTS



Key:

1. Headlight
2. Battery
3. Spark plug
4. Fuses
5. Coil
6. Flasher
7. Voltage regulator
8. Tail light
9. Rear left indicator
10. Side stand switch
11. Starter motor
12. Warning horn
13. Starter relay
14. Front left indicator

15. CDI unit
16. Coolant thermistor
17. Diode
18. RAVE control unit (fp)
19. Front brake light switch
20. Instrument panel
21. Front right indicator
22. Neutral light switch
23. Rear brake light switch
24. Rear right indicator
25. Solenoid

8.2. FOREWORD

8.2.1. FOREWORD

Please read the following information before reading this section.

NOTE For ease of reference, the same numbering is used in the specific wiring diagrams and in the general schematics.

WIRING COLOUR CODES

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

ELECTRICAL CONNECTORS

Disconnect the electrical connectors as follows:

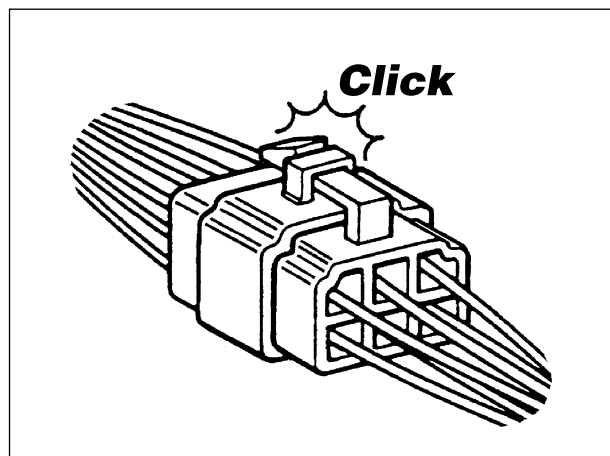
- Press down on the locking tab, where fitted.



WARNING

Never separate two connectors by pulling on the wiring.

- Grasp both connectors and pull them in opposite directions until they become separated.
- Remove any dirt, rust, moisture, etc. from inside the connector blowing with compressed air.
- Ensure that the wires are securely crimped to the terminals inside each connector.



NOTE A connector will only locate properly into the matching connector when it is inserted in the correct mounting position.


- When refitting, reconnect the two connectors and ensure that they become fully engaged (where fitted, the locking tab will click audibly into place).

8.3. BATTERY

8.3.1. BATTERY

Battery rating: 12V - 9 Ah


FIRST-TIME INSTALLATION AND MAINTENANCE


Remove the battery from the motorcycle; see  [7.2.1](#).

- Remove plugs and breather cap.
- Fill cells with fluid having a specific weight of 1.3.
- Slow-charge the battery (at 1/10th of the battery amperage) for at least 10 hours and then refit on the vehicle upon delivery to the customer, i.e. when it is expected to use the vehicle for a certain mileage.
- Fit the battery on the vehicle, connect the terminals and breather hose.
- In case of long inactivity of the vehicle, it is important to charge the battery periodically (at least once a month) for about 10 hours (e.g. during the winter).

Periodically top up (once a month) with distilled water only.

INSPECTION

In the event of abnormal operation, check the charge system first; see  [8.5.1](#).

- To check the battery:
- Remove the battery from the vehicle, see  [7.2.1](#) and proceed as follows:

Visually check for:

- extensive sulphation (typically evident due to one or more parts that become white);
- electrolyte level between "MIN" and "MAX" marks;
- leaks from outer casing (housing).

Slow-charge the battery for at least 10 hours.

After the charge, use a densimeter to check electrolyte density in each cell. If density is less than 1.26 in any of the cells or if the loadless voltage is below 12V, replace the battery.

RETURN UNDER WARRANTY

The warranty is invalidated when:

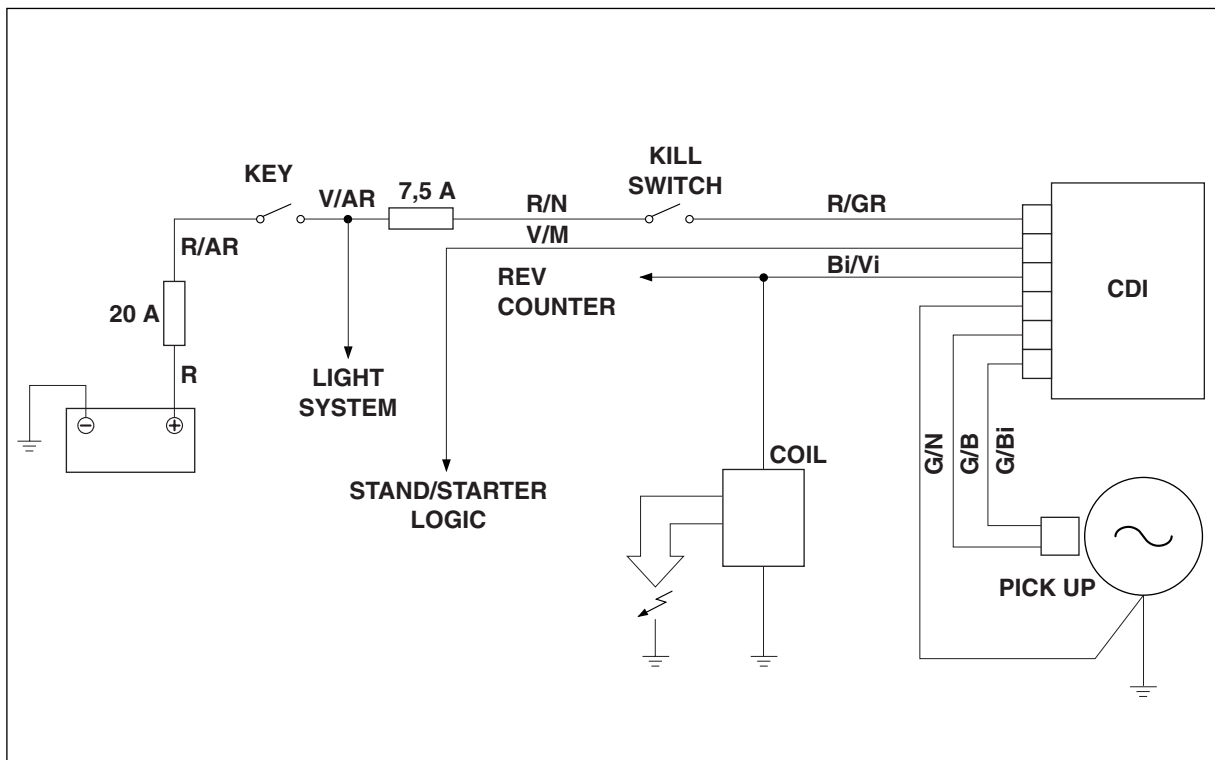
- The battery is damaged (dented housing, bent terminals, etc.);
- The battery is affected by extensive sulphation (normally due to improper installation procedure and/or use).
- Electrolyte low level (for delivery purposes, just fit the relevant rubber plug onto breather port).

SAFETY RULES**WARNING**

Battery electrolyte fluid contains sulphuric acid. Keep away from the skin and clothes. Keep the battery well away from any sources of ignition, such as flames, sparks, or any heat sources because hydrogen output might ignite.

8.4. IGNITION SYSTEM

8.4.1. IGNITION SYSTEM



TROUBLESHOOTING

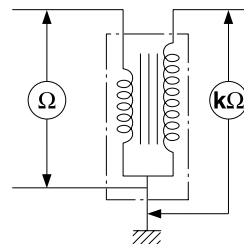
- Check that the 7.5A and 20A fuses are in good condition.
- Check the spark plug and replace as required.
- Check the high-tension cable and the spark plug cover.
- Check the coil.
- Check the pick-up.
- Connect the green-brown wire to ground. If the ignition works, check the stand logic circuit; see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

TEST READINGS

Ignition coil test

The coils may be checked using a hand-held multimeter. Check for continuity of the primary and secondary windings. The resistance readings found need not match standard values exactly. If the windings are in good working order, resistance readings should approximate the standard values.

Coil winding resistance	
Primary	0.11 – 0.21 ohm
Secondary	4.3 – 8.1 kOhm

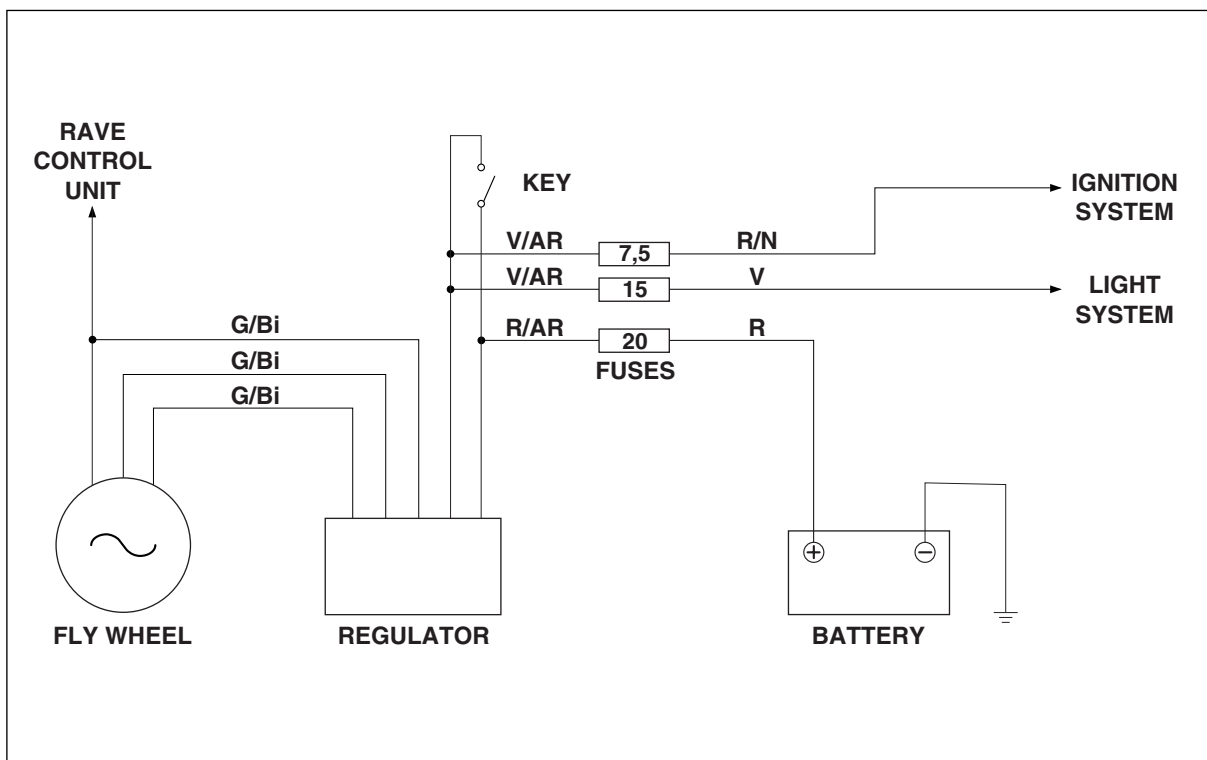
**Pick-up test**

- Disconnect the connector of the pick-up terminals.
- Measure resistance across the terminals of the yellow/blue and yellow/green wires using a multimeter set to the 1000-ohm range. Correct reading is in the 190-300 ohm range.
- Infinite resistance or a reading below the specified range indicates a faulty pick-up. Replace pick-up.



8.5. CHARGE SYSTEM

8.5.1. CHARGE SYSTEM LAYOUT AND POWER SUPPLY



CHARGE SYSTEM TEST

- Start the engine and rev it up to 6000 rpm.
- Measure DC voltage across battery terminals using a multimeter set to the DC voltage scale.
- Switch on the low beam lights.
- Correct voltage reading is 13.5 to 15 Volts.



TROUBLESHOOTING

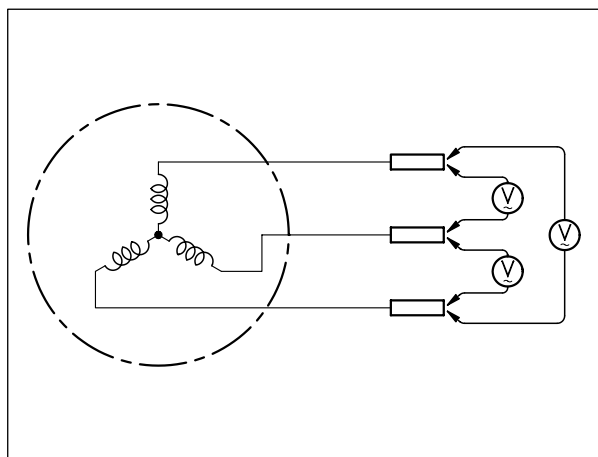
- Check the condition of the 20A fuse.
- Check the connections of flywheel, regulator and fuse leads.
- Check the flywheel.
- Check the battery; see [8.3.1.](#)
- Replace the regulator with one known to work properly.

TEST READINGS

Flywheel test

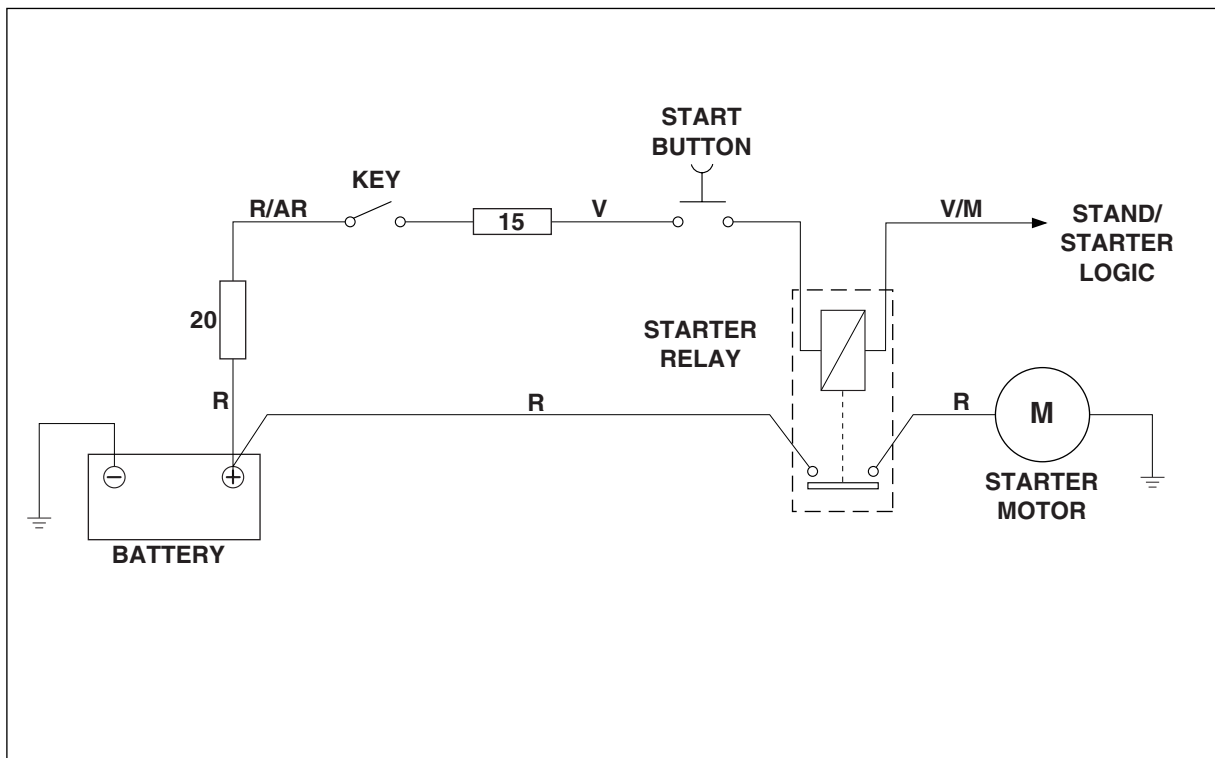
- Disconnect the alternator wiring connector.
- Start the engine and rev it up to 5,000 rpm.
- Measure AC voltage across the three yellow wires using a hand-held multimeter. A reading below 53 V indicates a faulty alternator.

Standard loadless voltage: over 53 VAC at 6000 rpm.



8.6. STARTER CIRCUIT

8.6.1. STARTER CIRCUIT



TROUBLESHOOTING

- Check the condition of the fuses.
- Check the starter button.
- Check the starter relay.
- Check the starter motor.
- Connect the green-brown wire to ground. If the starter is still working, check the stand/starter logic circuit; see [8.12.1.](#)

TEST READINGS

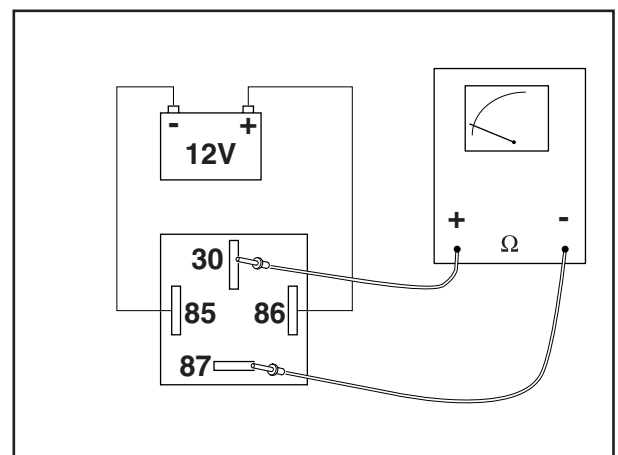
Starter relay test

- To test relay operation:
- Feed 12 Volts to the two male terminals (85 - 86).
- Check for continuity between the other two terminals (87 - 30) using a multimeter set to the ohm range.

Correct reading when relay is fed: 0 Ω

Correct reading when relay is not fed: $\infty \Omega$

Replace the relay under testing if the readings obtained deviate from those specified.



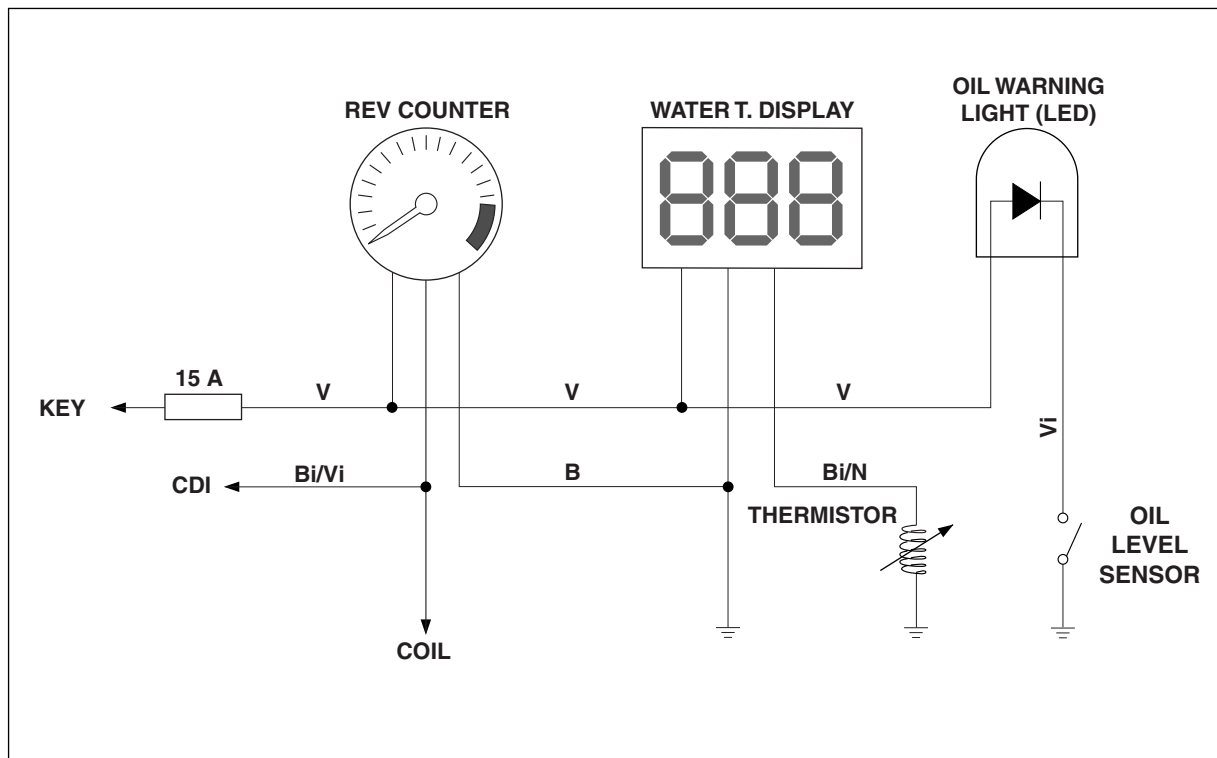
Starter motor test

- Connect a 12-V 9-AH battery to the starter motor.
- Measure current draw during regular operation (after 5 seconds) using a DC ampere meter.

Correct reading: 50 - 60 A.

8.7. SENSORS AND REV COUNTER

8.7.1. SENSORS AND REV COUNTER CIRCUIT



TROUBLESHOOTING

- Check the condition of the 15A fuse.
- Check wiring connection.

Rev counter

- Fit a substitute rev counter known to operate properly.

Coolant temperature

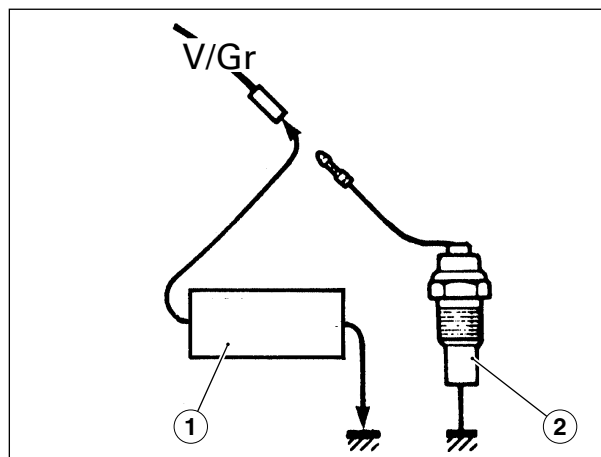
- Disconnect the green-grey terminal wire and connect three resistors rated 1,000 Ω , 50 Ω and 15 Ω , respectively as shown.
- When the ignition key is turned to ON, the following temperature readings or messages will appear on the display.

Resistor rating	Display indication
1,000 Ω	COLD
50 Ω	90-95° C
15 Ω	120-130° C

- If display indications are correct, change the thermistor.
- Otherwise change the display.

Key:

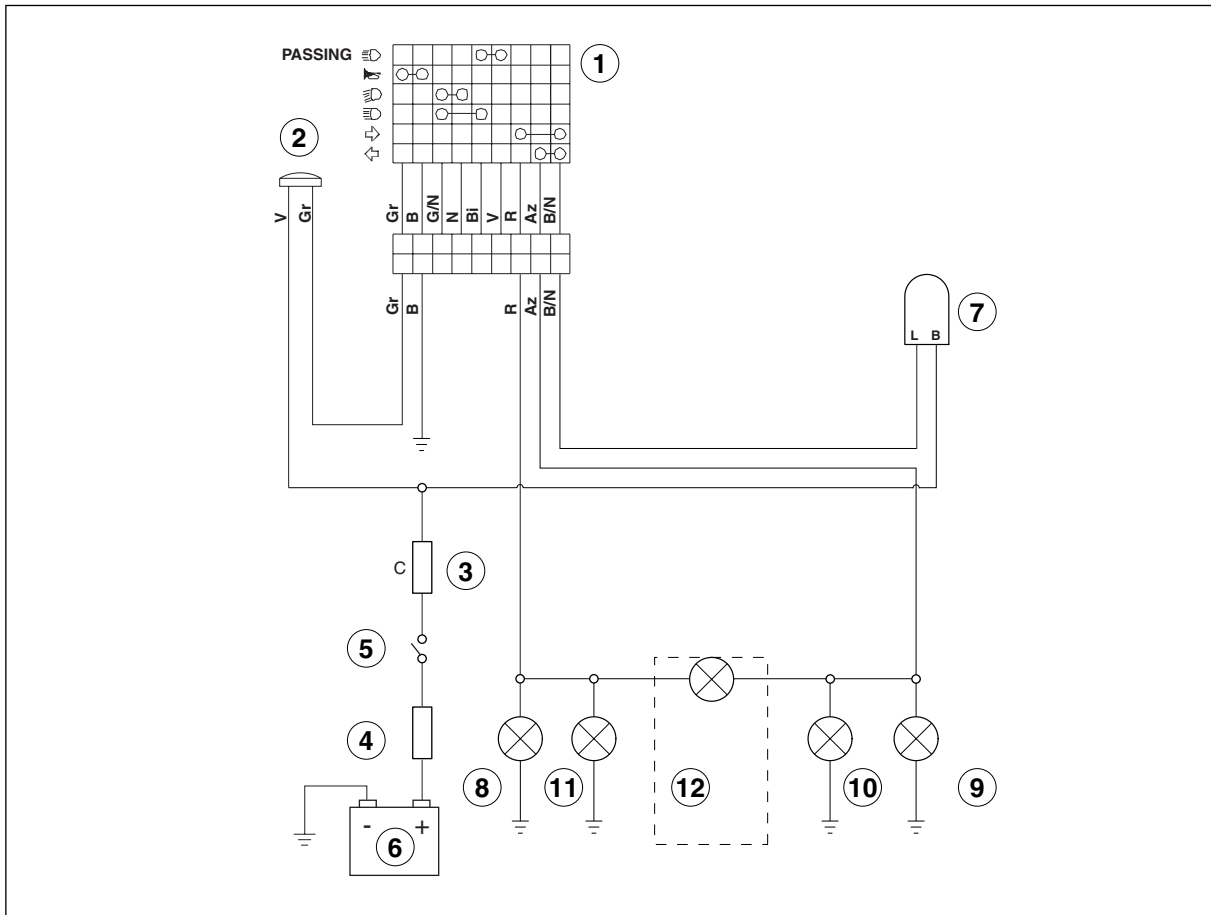
- 1) Resistor
- 2) Thermistor

**Oil level sensor test**

- Disconnect all leads at the wiring harness end and remove the sensor from the frame.
- Attach a multimeter set to the ohm range to the sensor.
- Hold sensor vertically. Correct reading: 0 Ω .
- Turn sensor over. Correct reading: infinite resistance.

8.8. VISUAL AND ACOUSTIC SIGNALS

8.8.1. VISUAL AND ACOUSTIC SIGNALLING SYSTEM

**Key:**

1. Left-hand light dip switch
2. Warning horn
3. Fuse (15A)
4. Fuse (20A)
5. Key
6. Battery
7. Flasher
8. Rear right indicator bulb
9. Rear left indicator bulb
10. Front right indicator bulb
11. Front left indicator bulb
12. Indicator light

Warning horn test

To test warning horn operation:

Flasher test

When none of the direction indicators is working, there might be a problem with the flasher.

To test flasher operation:

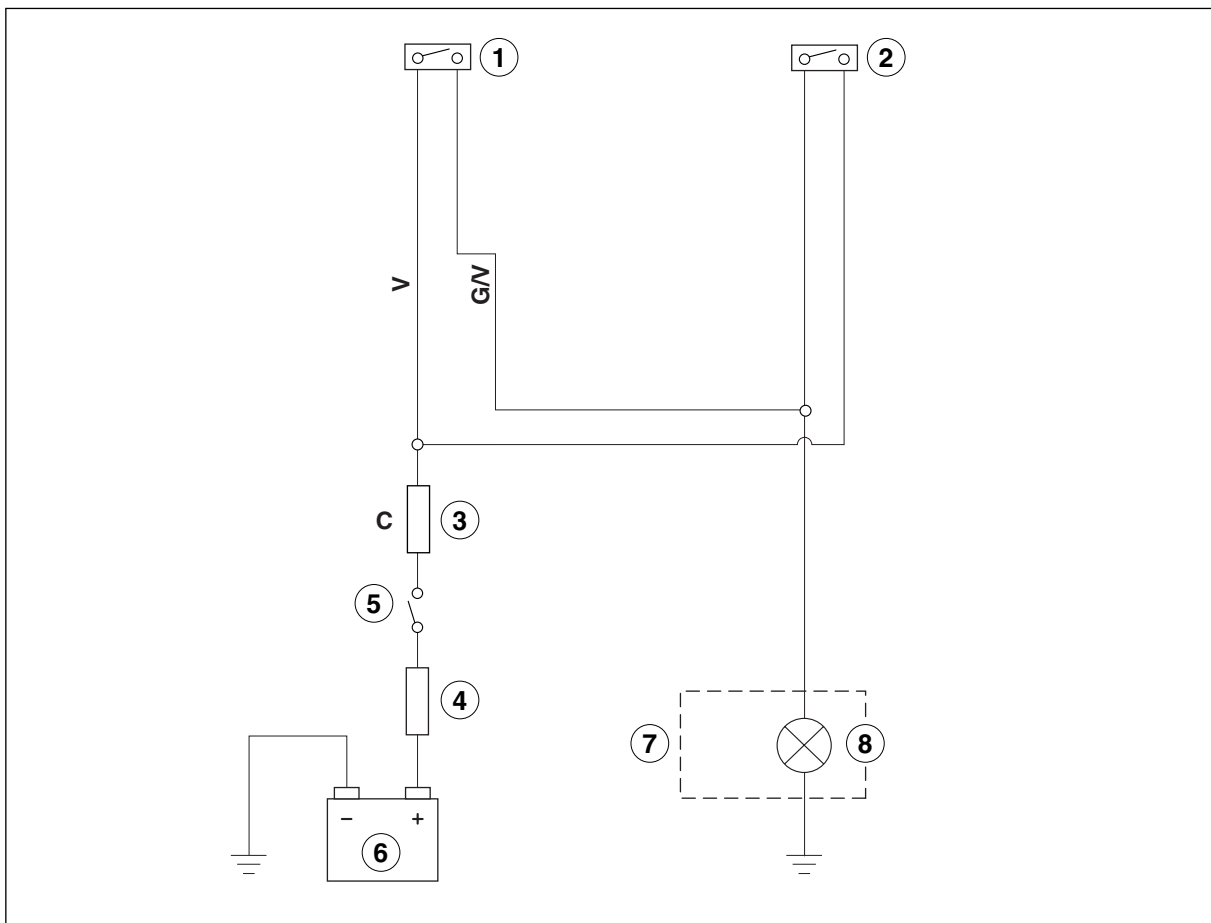
If the indicator lights come on but do not flash, replace the flasher (2).

When the bulb of a direction indicator burns out, each time the control (3) is operated the other indicator and the repeater light on the instrument panel will come on but will not flash.



8.9. BRAKE LIGHTS CIRCUIT

8.9.1. BRAKE LIGHTS CIRCUIT

**Key:**

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

TROUBLESHOOTING


- Check the condition of the 15A and 20A fuses.
- Check the condition of the brake light bulb.

Switches


Check switches for continuity using a multimeter. Please refer to the relevant diagram.

Replace any switch assembly found to deviate from the specified mode of operation.

Front brake light switch

Position	Wires	
	V	V/G
Activated		

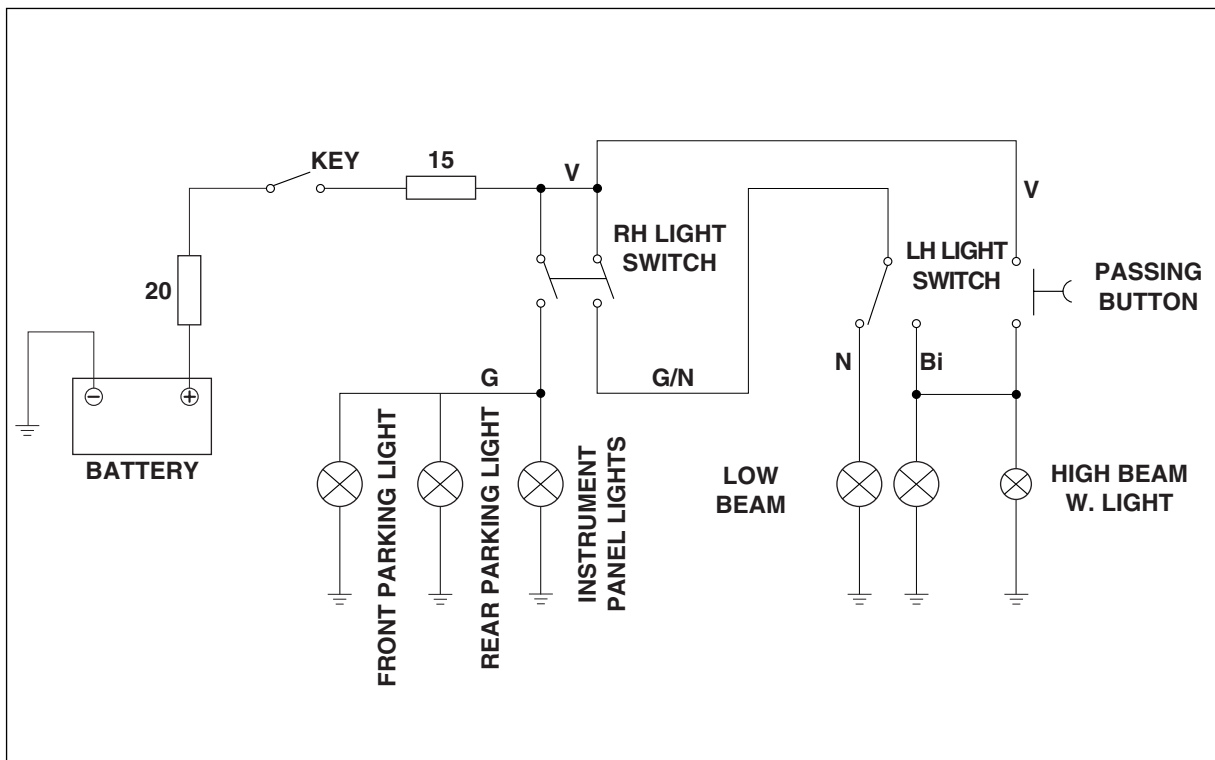
**Rear brake light switch**

Position	Wires	
	V	V/G
Activated		



8.10. LIGHT CIRCUIT

8.10.1. LIGHT CIRCUIT

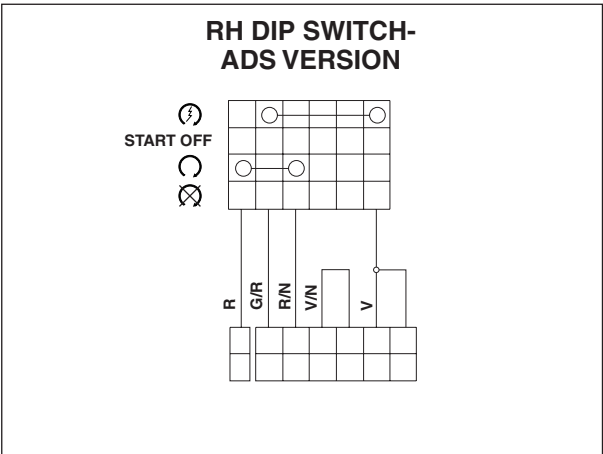
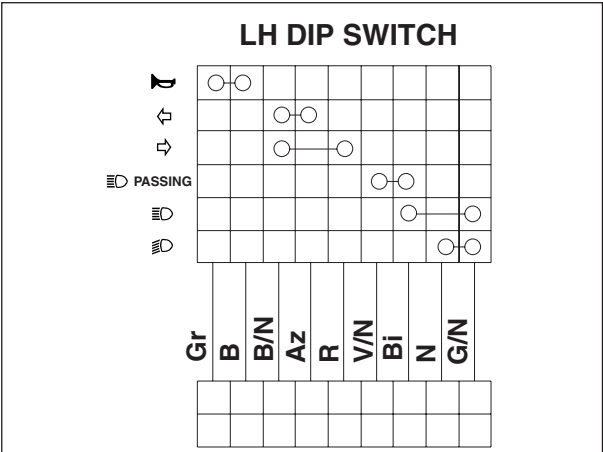
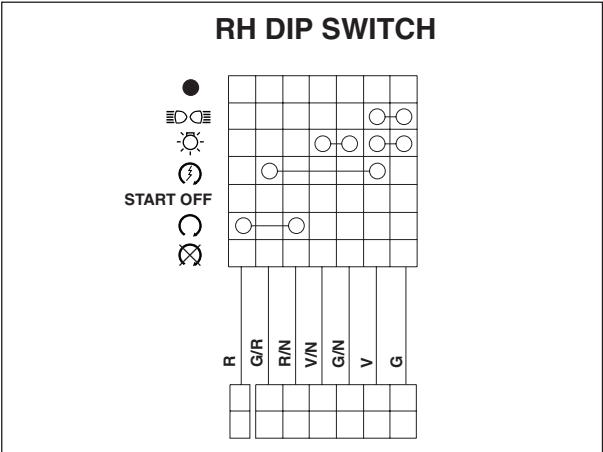


TROUBLESHOOTING

- Check the condition of the 15A and 20A fuses.
- Check the right and left light dip switches for proper operation.
- Check bulb operation.

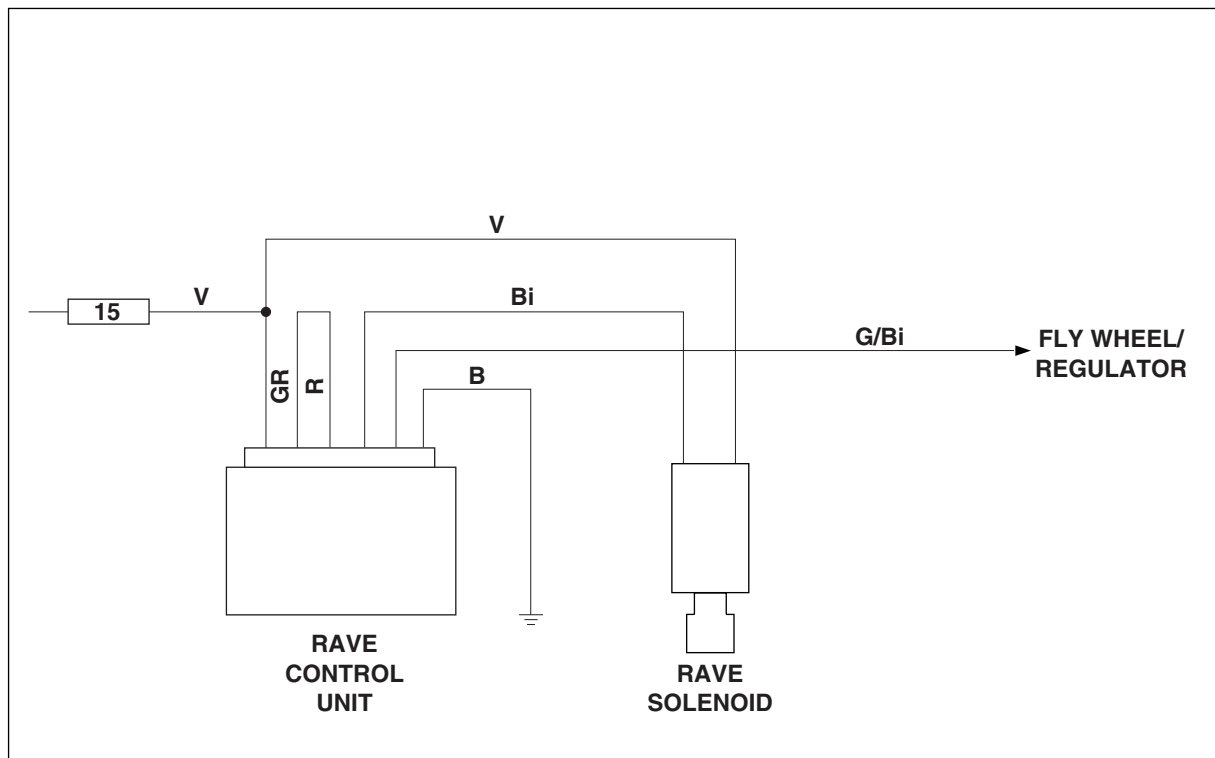
LIGHT DIP SWITCH TEST

Check for continuity across the contacts using a multimeter set to the ohm range. Please refer to the relevant diagram.



8.11. RAVE VALVE

8.11.1. RAVE VALVE CIRCUIT



The RAVE control unit operates the solenoid to open the valve at the exhaust end at 8100 rpm.

TROUBLESHOOTING



- Check the condition of the 15 A fuse.
- Attach a 12V battery direct to the solenoid to check for proper operation.
- Check the flywheel; see [8.6.1](#).
- Fit a substitute regulator known to operate correctly.
- Fit a substitute RAVE control unit known to operate correctly.



WARNING

Cut the jumper across the grey and red wires of the RAVE control unit and the solenoid will operate the valve at 7,800 rpm.

CONTROL UNIT

- Remove the fuel tank; see  4.1.1.
- Remove the battery and battery box mount together; see  7.2.1.
- Disconnect the connector.
- Start the engine and switch on the low beam.
- Speed up engine up to 2500 rpm.
- Measure voltage across the green (V) and blue (B) wires using a multimeter:

Correct reading = 12.25 ± 1 VDC.



- Measure voltage across the yellow (G) and blue (B) wires using a multimeter:

Correct reading = 8.5 ± 1 VAC.

NOTE Any readings other than the specified values indicate a fault in the system, not in the control unit.

SOLENOID

- Check that the piston moves freely.
- Start the engine and let it idle.
- Measure resistance across the wires using a multimeter:

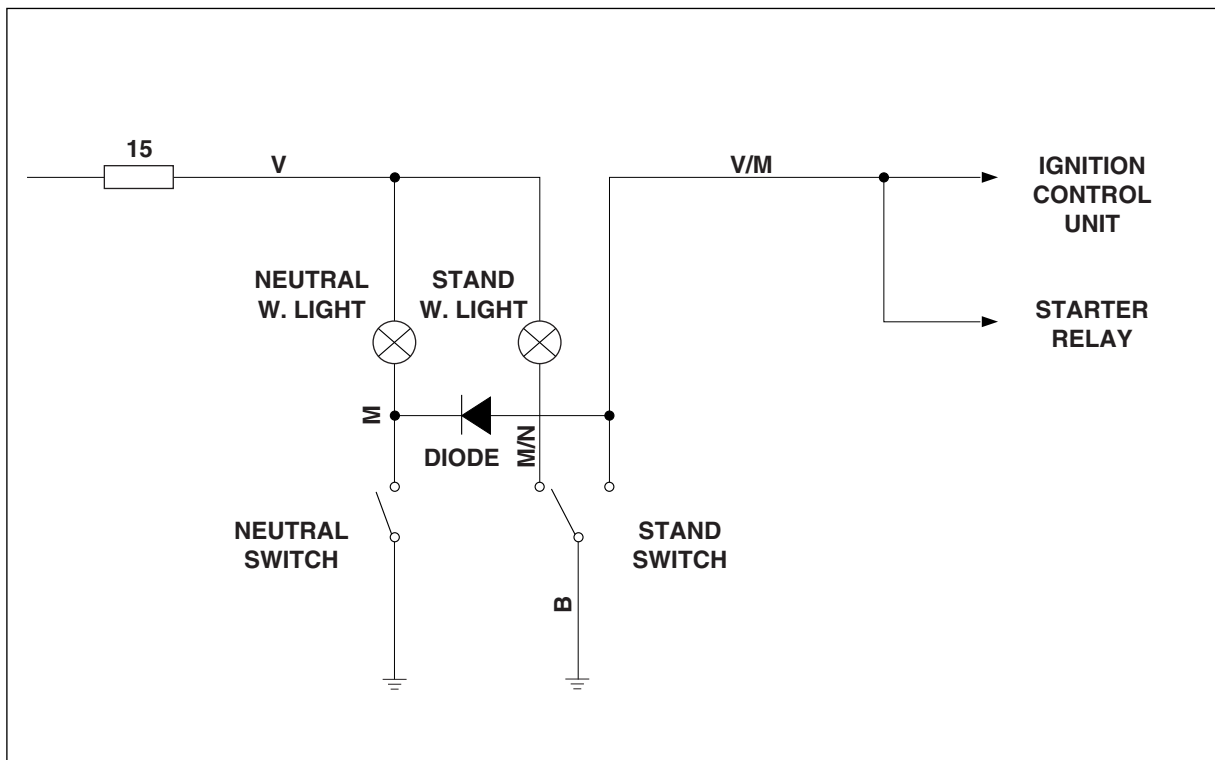
Correct reading = $2.2 \text{ Ohms} \pm 10\%$.

- Measure voltage across the solenoid wires using a multimeter:

Correct reading = 11.5 ± 1 V at idling speed during a single one-second pulse. After this initial pulse, reading should drop to 5.5 ± 1 VDC.

8.12. STAND

8.12.1. STAND LOGIC CIRCUIT



Engine starting and ignition are inhibited when the stand is down and/or a gear is engaged.


TROUBLESHOOTING

- Check the condition of the 15 A fuses.
- Check the neutral light switch.
- Check the stand switch.
- Check the diode.
- Check the starter relay; see [8.6.1](#).
- Fit a substitute CDI unit known to be operating correctly.



TEST READINGS

Check for continuity across the contacts using a multimeter set to the ohm range. Refer to the diagrams below.

Neutral light switch test

Pos.	Wires	
	SCREW	V/G
Neutral		

Stand test

Stand position	Wires		
	M	V	N
Down			
Up			

DIODE TEST

To test diode operation:

- Disconnect the two-way connector (1) (coloured white).

**WARNING**

Make sure to refit the connector (1) to the matching connector on assembly

Place a multimeter in the diode-test mode and measure across the two male terminals accommodated inside the diode as shown in the diagram.



Correct reading (layout A): 0 – 1 Ω .

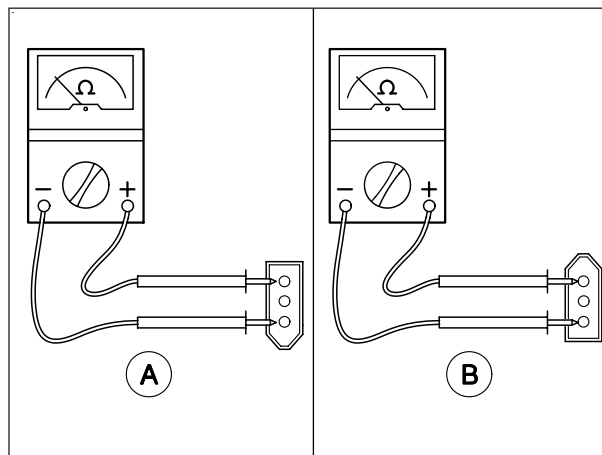
Correct reading (layout B): ∞ .

If your multimeter does not include a diode-test feature, feed 12 Volts to the diode, fit a 12 V - 2 W bulb to the positive lead and connect the leads to the diode as shown in the diagram.



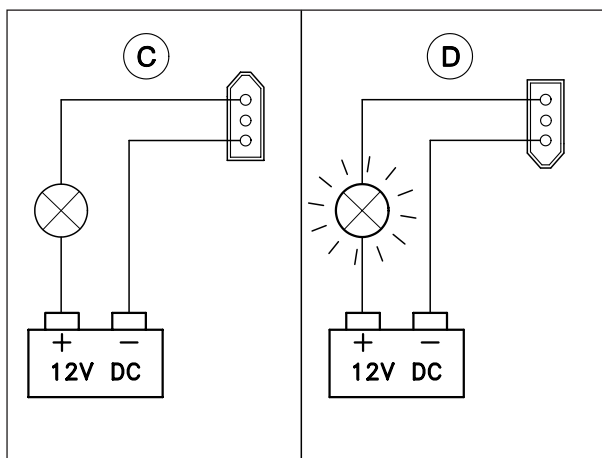
WARNING

Do not use a bulb rated higher than 2 W or the diode will damage.



Test (C): the bulb stays off.

Test (D): the bulb comes on.




8.13. BULB REPLACEMENT

8.13.1. BULB REPLACEMENT

Read  1.2.1 carefully.




WARNING

Before proceeding to change a bulb, rotate the ignition switch to “”.

Wear clean gloves or use a clean, dry cloth to handle bulbs. Do not put your fingerprints on a bulb, as this may cause overheating leading to failure. If you happen to touch a bulb with your fingers, remove any fingerprints with alcohol to avoid early failure.

DO NOT PULL ON THE WIRING.

- Place the motorcycle on the stand.

NOTE Check the fuses before changing a bulb; see  8.14.1.

Replacement procedures:

PARKING LIGHT BULB



WARNING

Never pull on the wiring to extract a bulb holder.

- Working from the rear end of the front fairing, grasp the bulb holder (1) and pull until clear of its seat.
- Withdraw the parking light bulb (2) and fit a new bulb of equal rating.

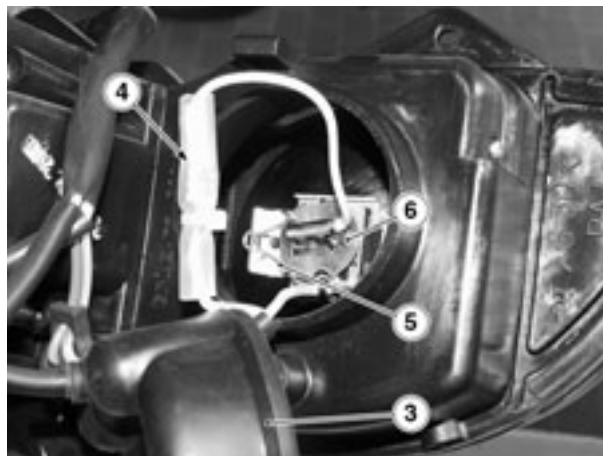


HIGH BEAM BULB

- Working from the rear right end of the front fairing, slip off the dust cover (3) with your fingers.
- Withdraw the electrical connector (4).
- Release the retainer (5) at the rear of the bulb holder (6).
- Extract the bulb.

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

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

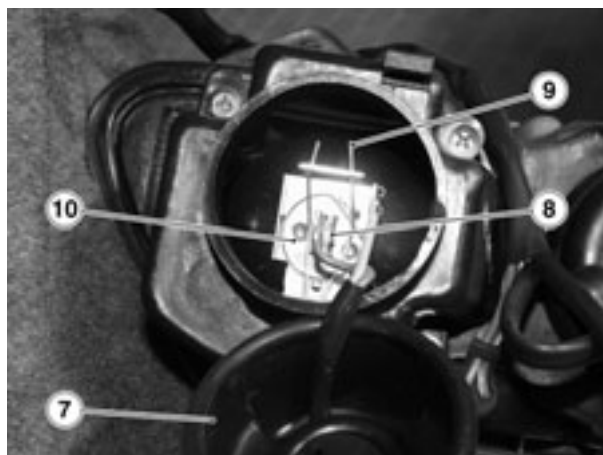


LOW BEAM BULB

- Working from the rear left end of the front fairing, slip off the dust cover (7) with your fingers.
- Withdraw the connector (8).
- Release the retainer (9) at the rear of the bulb holder (10).
- Extract the bulb.

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

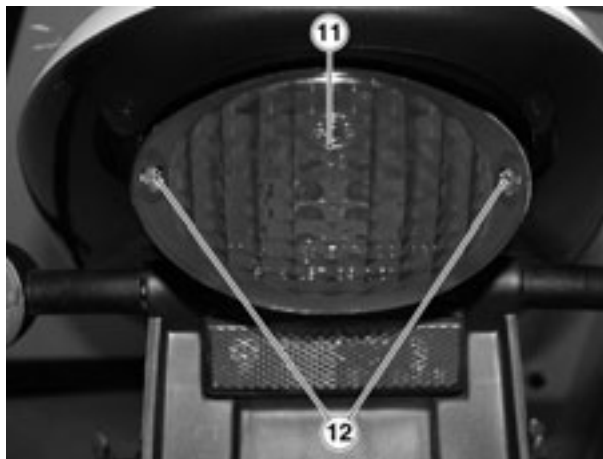
- Fit a new bulb of equal rating in the correct position.



TAIL LIGHT BULBS

NOTE Check the BRAKE light switches for proper operation before changing a bulb; see [8.9.1.](#)

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



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

**WARNING**

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

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

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



FRONT AND REAR INDICATOR BULBS

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

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

- Remove the guard (15).

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

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

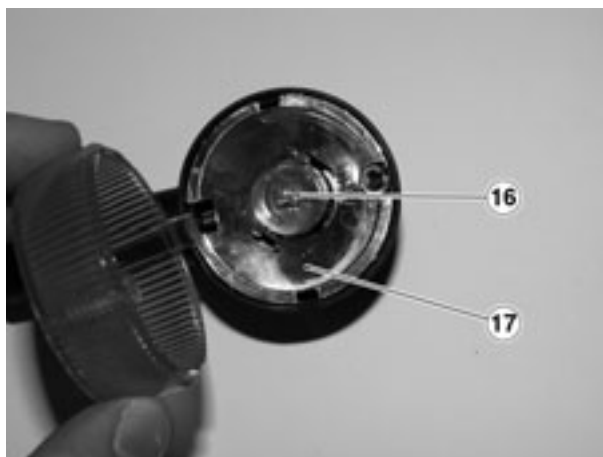


- Extract the bulb.

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

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

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



8.14. REPLACING THE FUSES

8.14.1. REPLACING THE FUSES

**WARNING**



Never attempt to repair a defective fuse.


Never use a fuse of a rating other than specified.

This could damage the electrical system or cause a short circuit, with the risk of fire.

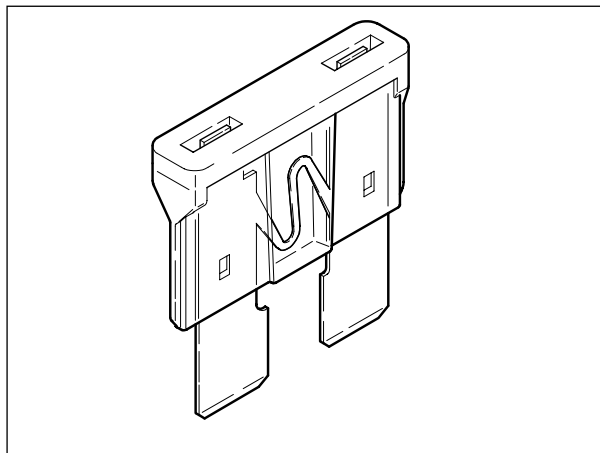
NOTE When the fuses fitted in a particular position keep blowing frequently, there might be a short circuit or overloading.

Checking the fuses is recommended whenever an electrical component fails to operate or is malfunctioning, or when the engine does not start.

- Set the ignition switch to “”. This will prevent accidental short circuits.
- Lift the fuel tank; see  2.9.1.

NOTE When the 20A fuse is removed, the digital clock will be reset to zero. Please read  2.3.1 for instructions on how to set the clock again.

- Extract all fuses one by one and check for blown fuses.
- When you find a blown fuse, determine and rectify the cause (if possible) before fitting a new fuse.
- Replace any failed fuses with a fuse of equal current rating.



NOTE When you use one of the spare fuses, remember to add a new fuse of equal rating to the spare fuse holder.

ARRANGEMENT OF THE FUSES

9. 20-A fuse

From battery to ignition switch, voltage regulator and clock.

10. 15-A fuse

From ignition switch to all light loads and warning horn, solenoids (**fp**) and RAVE motor.

11. 7.5-A fuse

From ignition switch to ignition and starter lockout system.

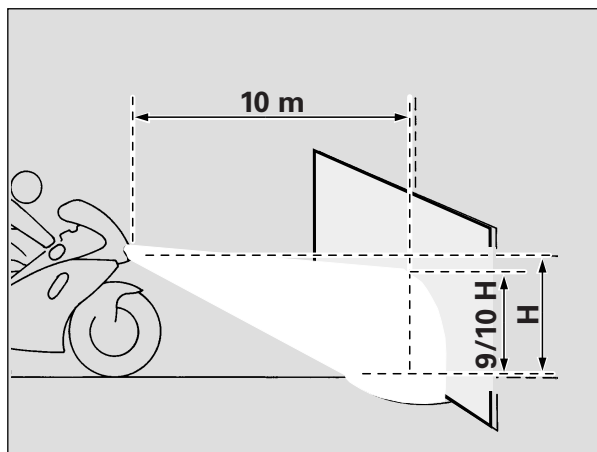
NOTE There is one spare fuse.



8.15. BEAM SETTING

8.15.1. BEAM HEIGHT SETTING

This is a quick beam-setting inspection procedure. Place the motorcycle ten metres away from a vertical wall. It is important that the motorcycle be on level ground. Switch on the low beam and sit astride the motorcycle. The light spot on the wall should be just below the horizontal line of the headlight (about nine/tenths of overall height).



To set beam height:

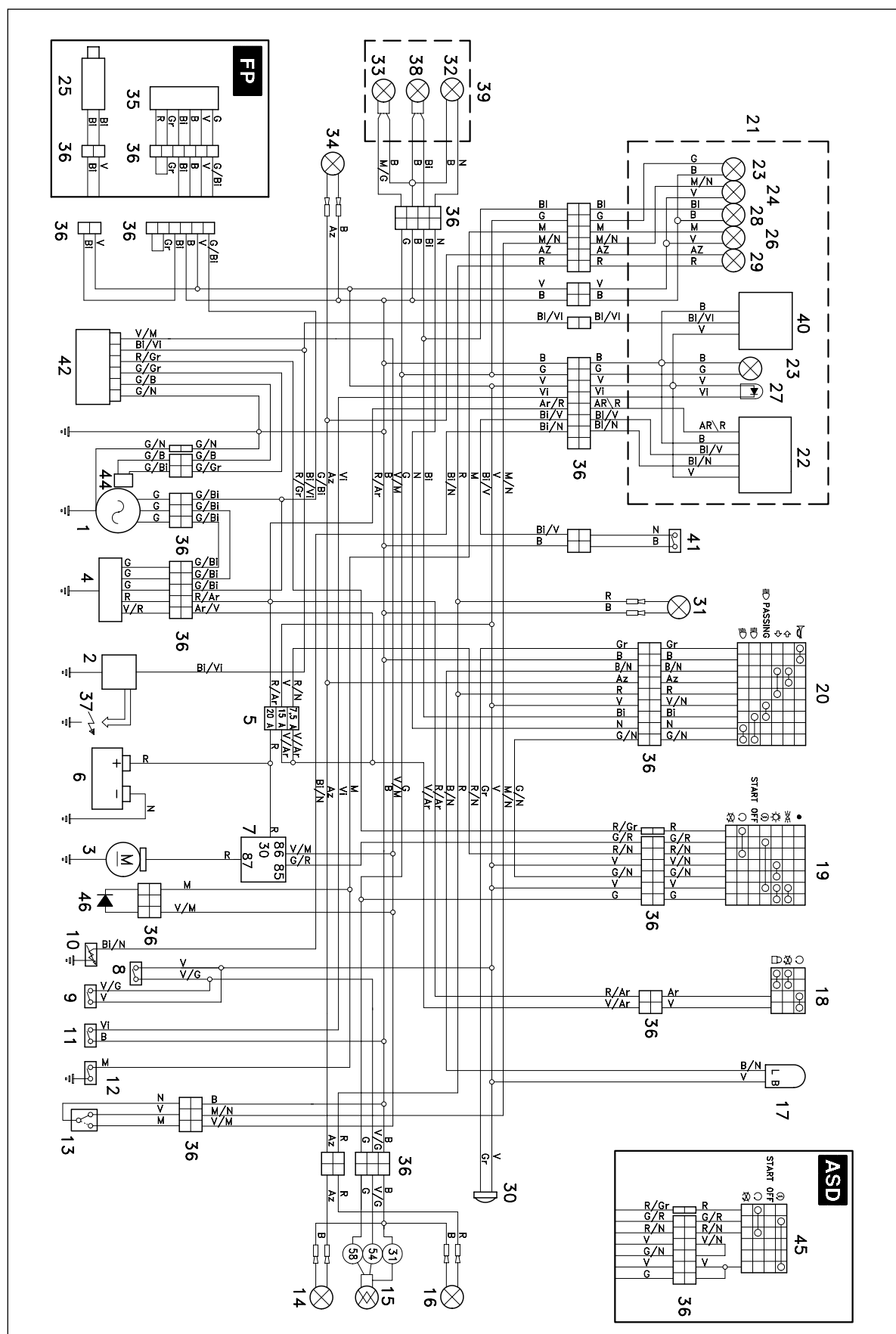
- Working from the rear left end of the front fairing, turn the adjuster screw using a short Phillips screwdriver:

TURN IN (clockwise) to raise the beam.

TURN OUT (anti-clockwise) to lower the beam.



8.16.1. WIRING DIAGRAM



Key:

1. Generator
2. Ignition coil
3. Starter motor
4. Voltage regulator
5. Fuses
6. Battery
7. Starter relay
8. Front brake light switch
9. Rear brake light switch
10. Coolant thermistor
11. Mixer oil reserve sensor
12. Neutral light switch
13. Side stand switch
14. Rear left direction indicator
15. Tail light
16. Rear right direction indicator
17. Flasher
18. Ignition switch
19. Right light dip switch
20. Left light dip switch
21. Complete instrument panel
22. Multi-function display
23. Instrument panel lights
24. Side stand down light
25. Solenoid
26. Neutral light
27. Mixer oil low light (LED)
28. High beam pilot light
29. Indicator repeater light
30. Warning horn
31. Front right direction indicator
32. Low beam lamp
33. Front parking light
34. Front left direction indicator
35. RAVE control unit
36. Multiple connectors
37. Spark plug
38. High beam lamp
39. Headlight
40. Electronic rev counter
41. LAP button
42. CDI unit
43. Pick-up
44. Right light dip switch
45. Diode

WIRE COLOUR CODES

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

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TROUBLESHOOTING INFORMATION

9

SUMMARY

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9.1. TROUBLESHOOTING INFORMATION

9.1.1. ENGINE

Trouble	Symptom and possible causes	Remedy
Engine does not start or is difficult to start	Low compression	
	Cylinder or piston rings exceedingly worn.	Replace.
	Piston ring sticking in its groove.	Repair or replace.
	Crankcase, cylinder or cylinder head gasket leaking.	Repair or replace.
	Loose spark plug.	Tighten
	Piston broken, cracked or damaged.	Replace..
	Crankshaft seal worn.	Replace.
	No spark	
	Foul spark plug.	Replace.
	Wet spark plug..	Clean and dry
	Defective coil.	Replace.
	High-tension cable interrupted or shorted.	Replace.
	Ignition system fault.	Repair or replace.
	Carburetor is receiving no fuel	
	Breather hole in filler cap clogged.	Clean.
	Fuel cock clogged or defective.	Clean or replace.
	Carburetor needle valve defective.	Replace.
	Fuel tube obstructed.	Clean.
	Foul spark plug..	Clean
	Ignition system fault.	Repair or replace.
	Fuel tube obstructed.	Replace.
	Carburetor jets obstructed.	Clean.

Engine is burning oil	Oil pump out of adjustment.	Adjust.
	Crankshaft seal damaged or worn.	Replace.
Loss of engine power	Piston rings or cylinder worn.	Replace.
	Incorrect air gap between spark plug electrodes or ignition system faulty.	Adjust or replace.
	Carburetor jets obstructed.	Clean.
	Incorrect fuel level in carburetor float chamber.	Adjust.
	Air cleaner clogged.	Clean.
	Air leaking past the intake duct.	Tighten or replace.
	Engine is receiving too much oil.	Adjust the oil pump.
Engine overheats	Too much carbon build-up on piston crown.	Clean.
	Engine is receiving insufficient oil.	Adjust the oil pump..
	Oil pump faulty or oilways obstructed.	Replace or clean.
	Fuel level in carburetor float chamber too low.	Adjust.
	Air leaking into intake duct.	Tighten or replace.
	Engine oil used does not meet specification.	Use specified oil..
	Cooling system faulty.	Read radiator section.

9.1.2. CARBURETOR

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

9.1.3. RADIATOR

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

9.1.4. ELECTRICAL SYSTEM

Trouble	Symptom and possible causes	Remedy
Spark plugs develop exceeding carbon build-up too quickly	Carburetion too rich.	Adjust carburetor.
	Idling speed set too high.	Adjust carburetor.
	Fuel does not meet specification.	Change fuel.
	Air cleaner dirty.	Clean.
	Spark plug heat rating too low.	Replace with a higher rating spark plug.
Spark plugs become foul too quickly	Piston rings worn.	Replace.
	Piston or cylinder worn.	Replace.
Spark plug electrodes overheated or burnt out	Spark plug heat rating too high.	Replace with lower rating spark plug.
	Engine overheats.	Adjust.
	Spark plug loose.	Tighten.
	Carburetion too lean.	Adjust carburetor.
Alternator does not charge battery	Connection terminals interrupted, shorted or loose.	Repair, replace or tighten.
	Generator coil shorted, discharging to earth or interrupted.	Replace.
	Regulator/rectifier shorted or faulty.	Replace.
Generator is undercharging the battery	Terminals have a tendency to short-circuiting, becoming interrupted or working themselves loose.	Repair or tighten.
	Generator stator coil discharging to earth or interrupted.	Replace.
	Regulator/rectifier faulty.	Replace.
	Faulty battery.	Replace.
Generator is overcharging the battery	Short circuit inside battery.	Replace the battery.
	Regulator/rectifier damaged or faulty.	Replace.
	Erratic regulator/rectifier ground.	Clean and tighten the ground terminals.
Charge unsteady	Terminal insulator worn due to vibration is causing transient short circuits.	Repair or replace.
	Short circuits inside generator.	Replace.
	Regulator/rectifier faulty.	Replace.

9.1.5. BATTERY

Trouble	Symptom and possible causes	Remedy
Battery runs flat quickly	Charge system faulty.	Check generator, regulator/rectifier, circuit connections and rectify to obtain proper charge
	Battery was overcharged and battery cells lost much of their active material.	Replace battery and repair charge system.
	Exceeding deposit build-up caused by wrong electrolyte leads to short-circuits in the battery.	Replace battery.
	Battery is due for replacement.	Replace battery.
Battery polarity reversal	Battery improperly connected to electrical system.	Replace battery; make sure to connect it properly.
Battery runs flat too fast	Dirt at top end and at the sides of the container.	Clean.
	Battery is due for replacement.	Replace battery.

9.1.6. BRAKES

Trouble	Symptom and possible causes	Remedy
Loss of braking	Brake hydraulic system leaking.	Repair or replace.
	Brake pads worn.	Replace.
	Contact surfaces of brake pads contaminated with oil.	Replace.
	Brake discs worn.	Replace.
	Air in the hydraulic circuit.	Bleed the circuit.
Brakes squeal	Contact surfaces of brake pads vitrified.	Sand brake pad surfaces.
	Brake pads inverted.	Install brake pads correctly.
	Wheel hub bearing damaged.	Replace.
	Front or rear wheel spindle loose.	Tighten to the specified torque.
	Brake pads worn.	Replace.
	Foreign matter suspended in brake fluid.	Change brake fluid.
	Return hole of master cylinder obstructed.	Dismantle and clean brake master cylinder.
Brake lever has exceeding travel	Air in the hydraulic circuit.	Bleed the circuit.
	Brake fluid level low.	Top up to specified level. Bleed the circuit.
	Brake fluid does not meet specification.	Change using specified brake fluid.
Brake fluid leakage	Fittings loose.	Tighten to the specified torque.
	Hoses cracked.	Replace.
	Piston and/or body damaged.	Replace piston and/or body.

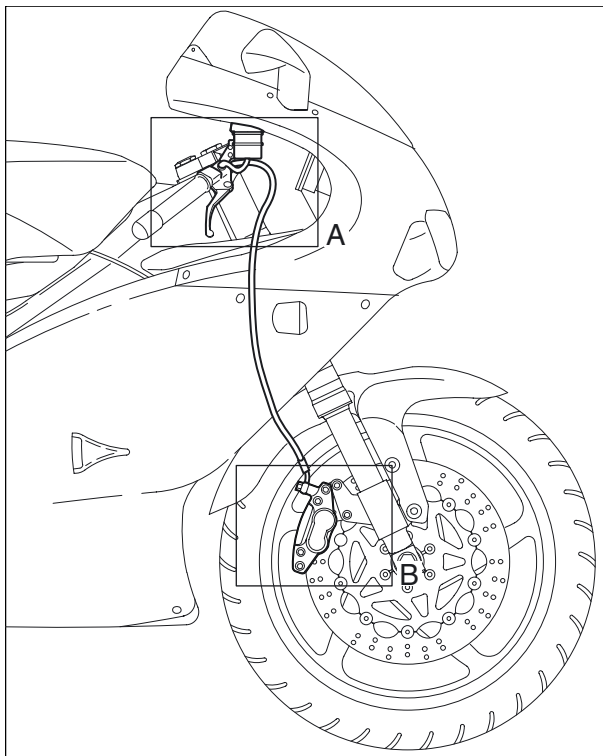
9.1.7. CHASSIS

Trouble	Symptom and possible causes	Remedy
Hard steering	Steering adjusting ring nut overtightened.	Adjust.
	Steering bearing damaged.	Replace.
	Steering stem distorted.	Replace.
	Tyre underinflated.	Adjust.
Handlebars shake	Uneven front fork settings.	Adjust.
	Front fork buckled.	Replace.
	Front wheel rim and/or tyre warped.	Replace.
Front wheel wobbles	Wheel rim warped.	Replace.
	Front wheel hub bearings worn.	Sostituire.
	Tyre defective or does not meet specification.	Replace.
	Wheel spindle nut loose.	Tighten.
	Front fork oil does not meet specification.	Adjust.
Front fork too soft	Springs yielded.	Replace.
	Front fork oil level low.	Top up
Front fork too stiff	Front fork oil does not meet specification (viscosity too high).	Replace.
	Front fork overfilled.	Remove excess oil.
Front fork is noisy	Front fork oil level low.	Top up.
	Suspension nuts loose.	Tighten.
Rear wheel wobbles	Wheel rim warped.	Replace.
	Wheel hub bearings or swinging arm bearings worn.	Replace.
	Tyre defective or does not meet specification.	Replace.
	Swinging arm and shock absorber bearings worn.	Replace.
	Rear suspension bolts or nuts loose.	Tighten.
Rear suspension too soft	Shock absorber spring yielded.	Replace.
	Adjuster incorrectly set.	Adjust.
	Perdita d'olio dall'ammortizzatore.	Sostituire.
Rear suspension too stiff	Adjuster incorrectly set.	Adjust.
	Shock absorber pivot bolt distorted.	Replace.
	Swinging arm distorted.	Replace.
	Swinging arm and shock absorber bearings worn.	Replace.
Rear suspension noisy	Rear suspension bolts or nuts loose.	Tighten.
	Swinging arm and shock absorber bearings worn.	Replace.

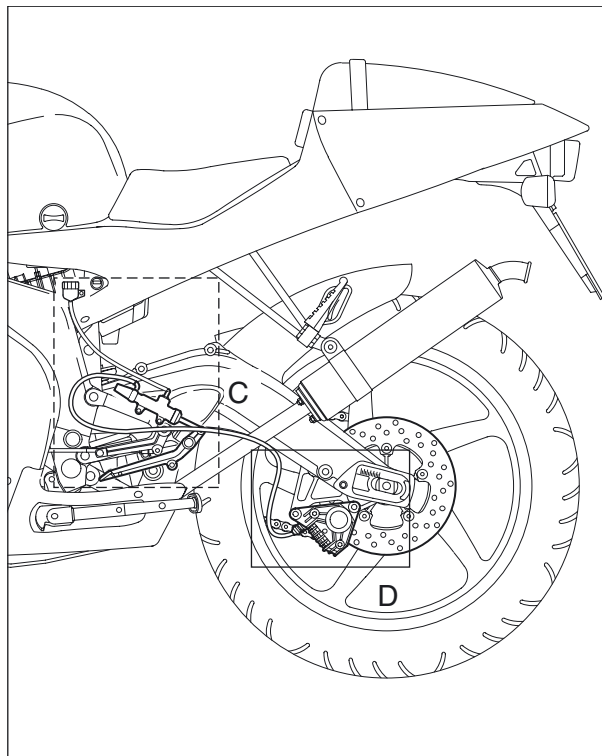
9.2. HOSE ROUTING

9.2.1. ROUTING AND CONNECTIONS OF WIRING, CABLES AND HOSES

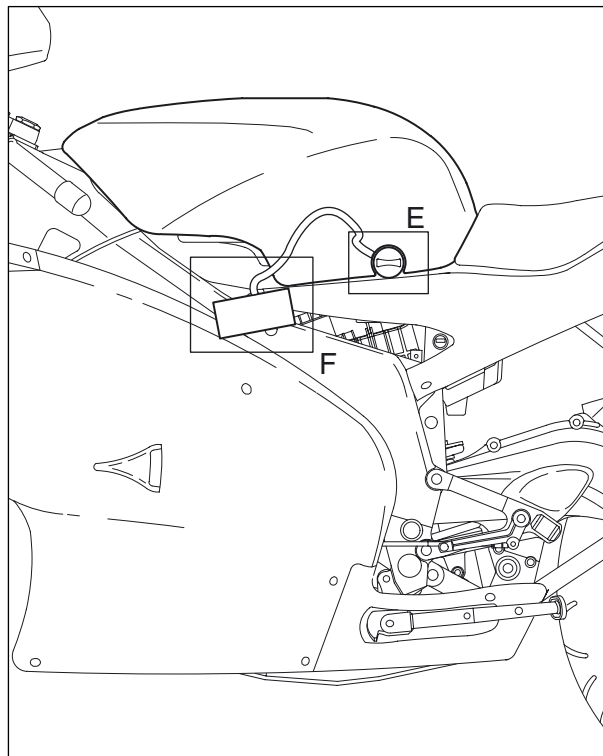
FRONT BRAKE HOSES



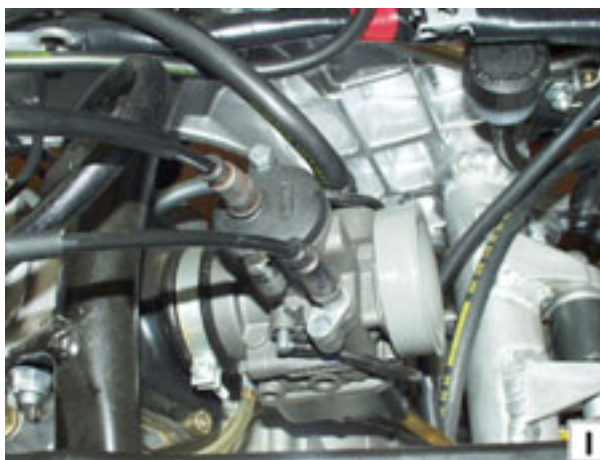
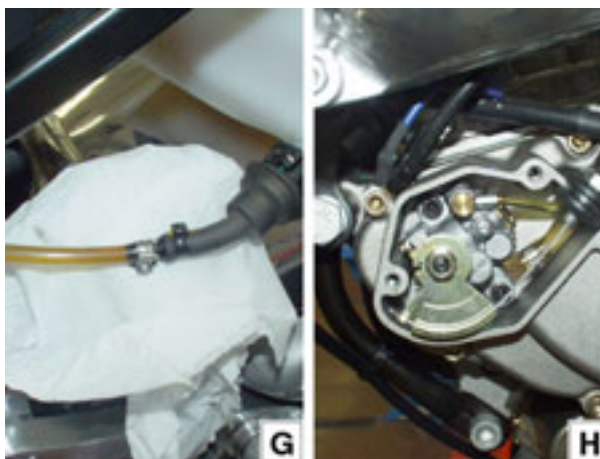
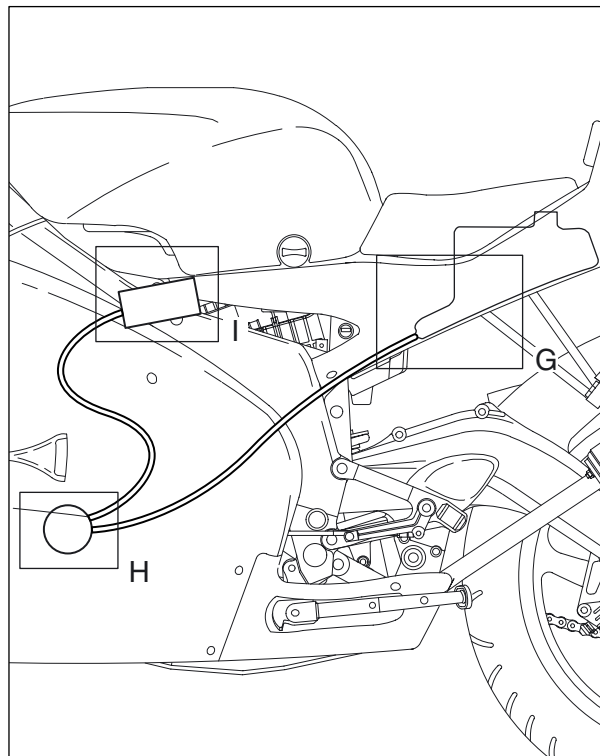
REAR BRAKE HOSES



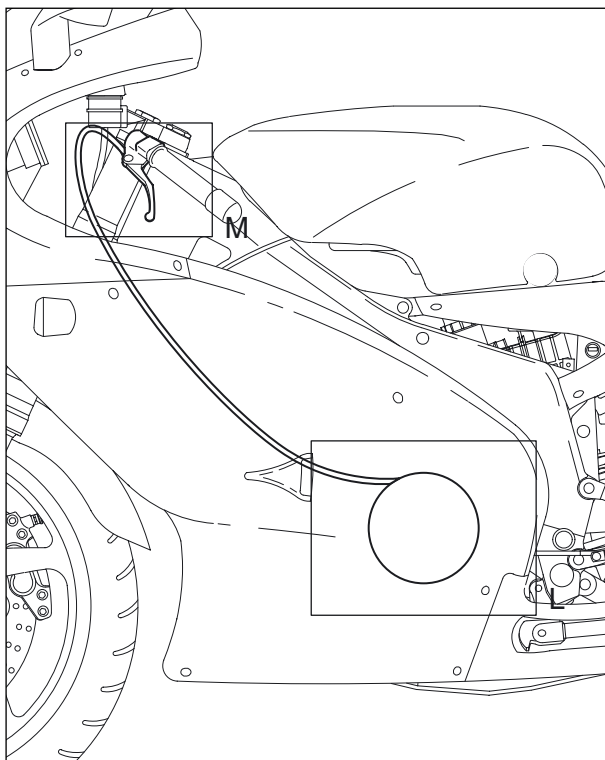
FUEL SYSTEM HOSES



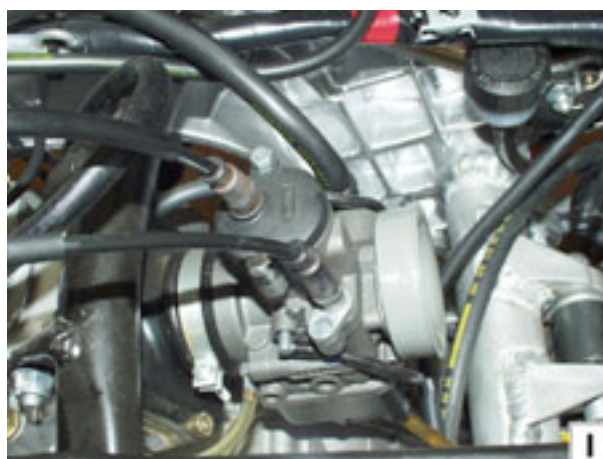
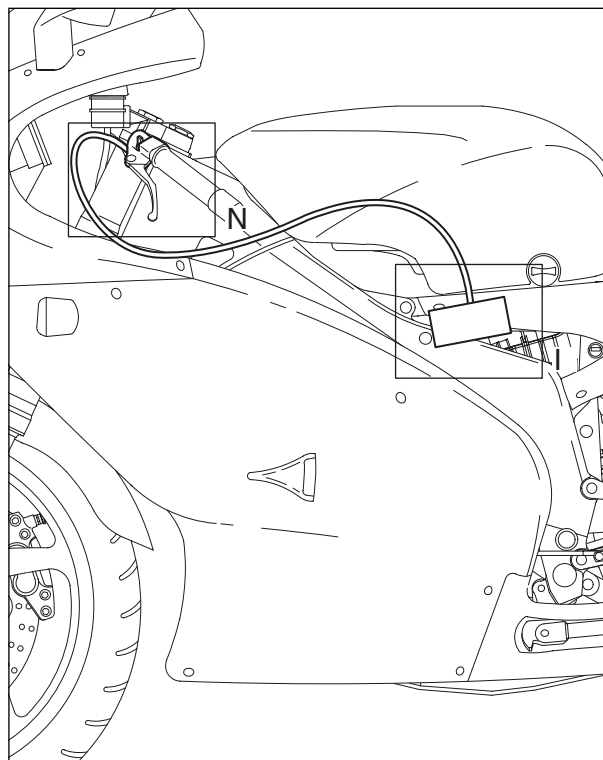
OIL TUBES



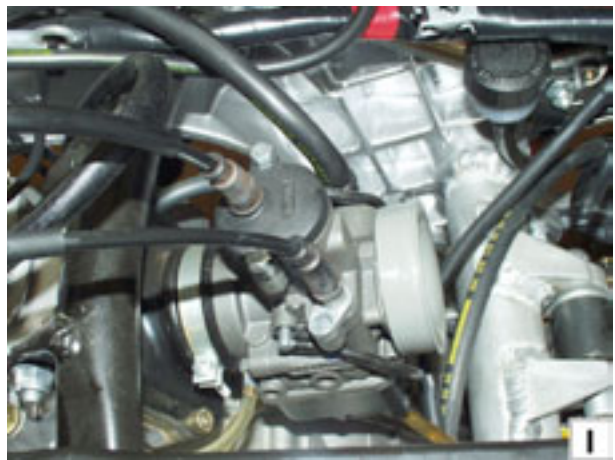
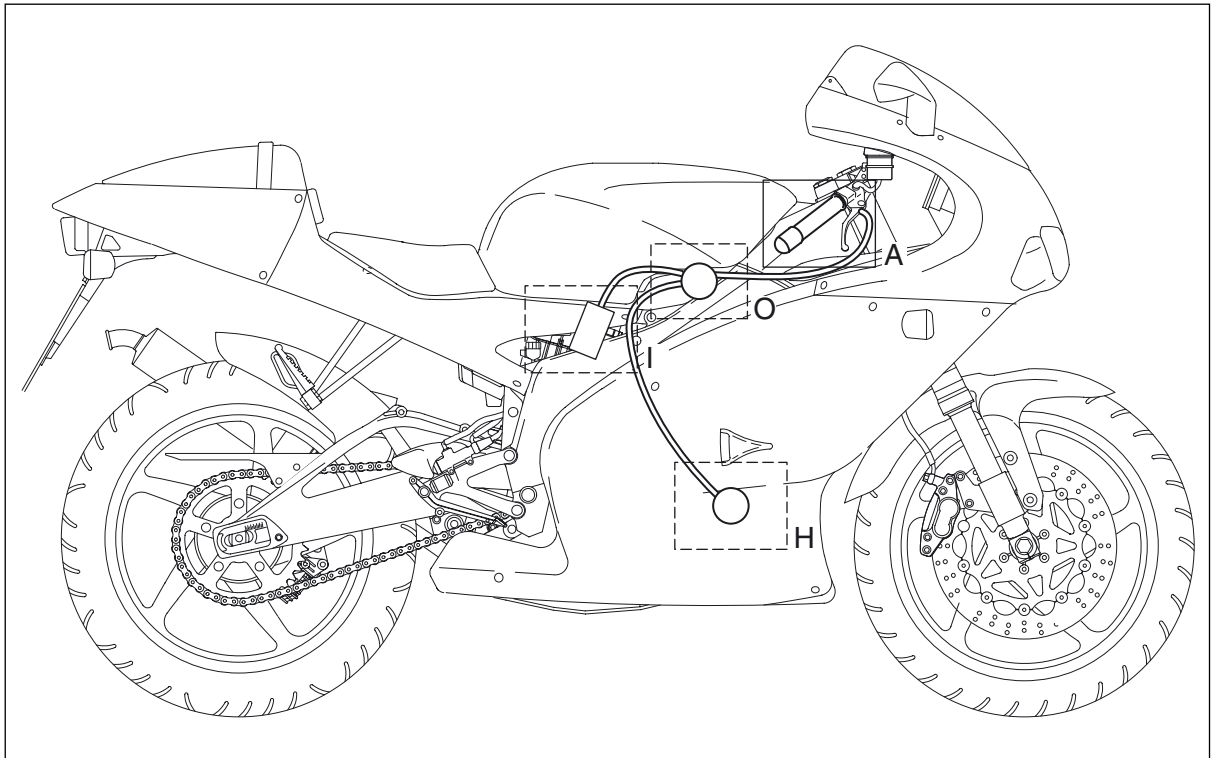
CLUTCH CABLE



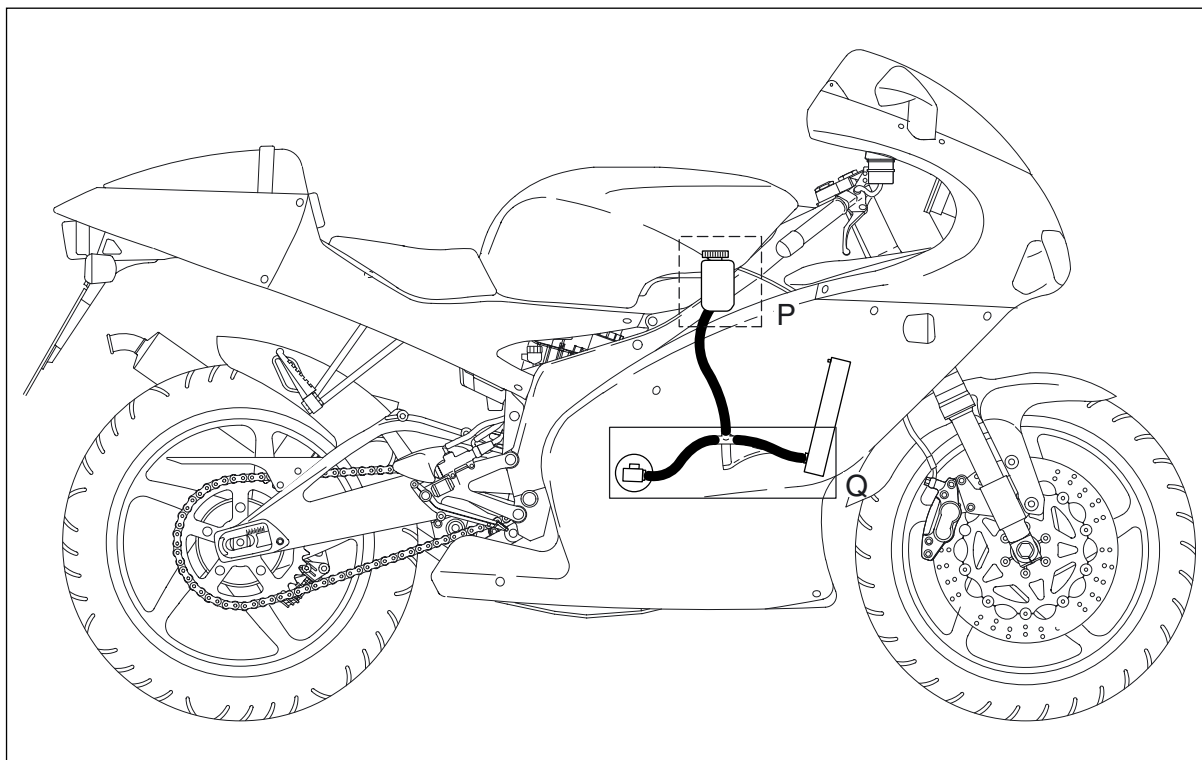
COLD-START CABLE

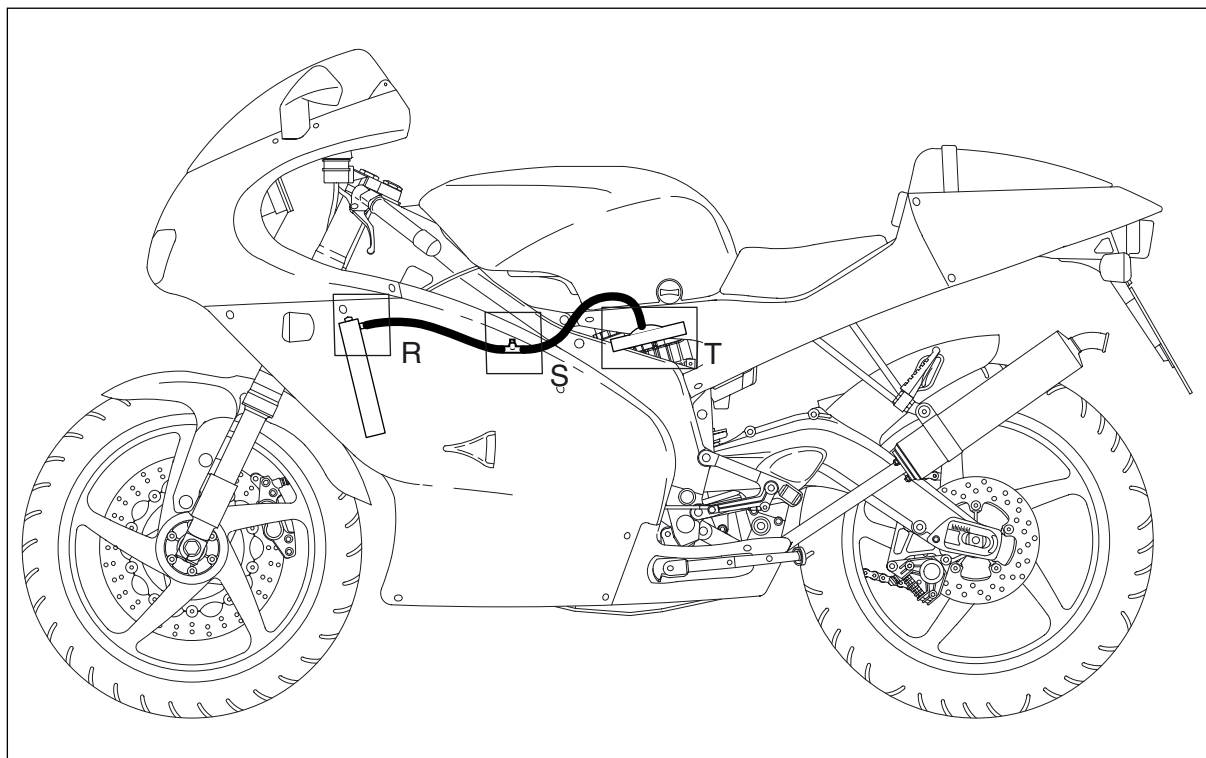


THROTTLE CABLE



COOLING SYSTEM





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Removing gearbox cover

- Unfasten screw (1) for idle speed detent and remove coil.
- Remove retaining screws from gearbox cover.
- Heat gearbox cover to 100 °C at the bearing seats.
- Place sliding sleeve, BMW No. 23 4 632, on the input shaft.
- Press off gearbox cover evenly.
- Remove ball (3) from neutral chain spacers.

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