



V1100

BREVA

workshopmanual



INTRODUCTION

0

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0.1. INTRODUCTION

0.1.1. FOREWORD

This manual provides the information required for normal servicing.

This publication is intended for use by **Moto Guzzi** 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; you are therefore invited to take special care to avoid damage to motorcycle components or injury to persons. **Moto Guzzi s.p.a.** undertakes to constantly improve the design of its products and the relevant literature to ensure that the customer is satisfied with the product. The main technical modifications and changes in repair procedures are communicated to all **Moto Guzzi** dealers and agencies worldwide. Such modifications will be included in subsequent editions of the manual. Should you require assistance or clarifications regarding inspection and repair procedures, please contact the **Moto Guzzi** SERVICE DEPT., which will be pleased to help, as well as providing you with updates and technical modifications regarding the vehicle.

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For further details, see REFERENCE MANUALS.

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0.1.2. REFERENCE MANUALS

PARTS CATALOGUES

guzzi part# (description)							
GU077_00	I	F	D	NL	E	UK	USA

OWNER'S MANUALS

guzzi part# (description)							
05.90.00.30	I	F	D	NL	E	UK	
05.90.00.31	USA						

CHASSIS WORKSHOP MANUAL

aprilia part# (description)							
8140856				I			
8140857				F			
8140858				D			
8140859				E			
8140860				UK			
8140861				USA			
8CM0077	I	F	D	E	UK		
8CM0078				USA			

0.1.3. ABBREVIATIONS/SYMBOLS/CONVENTIONS

#	= number
<	= less than
>	= greater than
≤	= less than or equal to
≥	= greater than or equal to
~	= approximately
∞	= infinity
°C	= degrees Celsius (centigrade)
°F	= degrees Fahrenheit
±	= plus or minus
A.C.	= alternating current
A	= Ampere
Ah	= Ampere per hour
API	= American Petroleum Institute
AT	= high voltage
AV/DC	= Anti-Vibration Double Countershaft
bar	= pressure measurement (1 bar = 100 kPa)
D.C.	= direct current
cc	= cubic centimeters
CO	= carbon monoxide
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	= kilogram meter (1 kgm = 10 Nm)
km	= kilometers
km/h	= kilometers per hour
kΩ	= kilo Ohm
kPa	= kiloPascal (1 kPa = 0.01 bar)
KS	= clutch side (from the German "Kupplungsseite")
kW	= kilowatt
l	= liters
LAP	= racetrack lap
LED	= Light Emitting Diode
LEFT SIDE	= left-hand side
m/s	= meters 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 meter (1 Nm = 0.1 kgm)
Ω	= ohm
PICK-UP	= pick-up
BDC	= Bottom Dead Centre
TDC	= Top Dead Centre
PPC	= Pneumatic Power Clutch
RIGHT SIDE	= right-hand side
SAE	= Society of Automotive Engineers
SAS	= Secondary Air System
TEST	= diagnostic check
T.B.E.I.	= crown-head Allen screw

T.C.E.I.	= cheese-head Allen screw
T.E.	= hexagonal head
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. STRUCTURE OF THE MANUAL

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 summary of sections.
- Unless expressly specified otherwise, assemblies are reassembled by reversing the assembly 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:

-  optional
 catalytic version
 - all versions
 MP national certification
 SF European certification (EURO 1 limits)

VERSION:

 Italy	 Greece	 Malaysia
 United Kingdom	 Holland	 Chile
 Austria	 Switzerland	 Croatia
 Portugal	 Denmark	 Australia
 Finland	 Japan	 United States of America
 Belgium	 Singapore	 Brazil
 Germany	 Slovenia	 South Africa
 France	 Israel	 New Zealand
 Spain	 South Korea	 Canada

1.1.2. SAFETY WARNINGS

The symbols and warnings used throughout this manual have the following meanings:



Safety warning. When you find this symbol on the vehicle or in the manual, be careful of the potential risk of personal injury. Disregarding the instructions identified by this symbol may compromise the safety of the user, the motorcycle and third parties.

**DANGER**

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

**WARNING**

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

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

1.2. GENERAL RULES

1.2.1. BASIC SAFETY RULES

CARBON MONOXIDE

When an operation must be performed with the engine running, position the motorcycle outdoors in a well-ventilated area.

Never run the engine in an enclosed place.

Use an exhaust emission extraction system when working indoors.



DANGER

Exhaust gases contain carbon monoxide, a poisonous gas which, if inhaled, may cause loss of consciousness or even death.

FUEL



DANGER

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

Refueling and maintenance operations should be carried out in a well-ventilated area, with the engine off.

Do not smoke when refueling or in the proximity of sources of fuel vapors. Avoid contact with bare flames, sources of sparks and any other source which may ignite fuel or lead to explosion.

DO NOT DISPOSE OF FUEL IN THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

HOT COMPONENT PARTS

The engine and exhaust component parts become hot when the engine is running and will stay hot for some time after the engine has been stopped.

Wear insulating gloves before handling these components or allow for the engine and the exhaust system to cool down before proceeding.

USED GEARBOX AND FORK FLUIDS



DANGER

Wear latex gloves when servicing.

Prolonged or repeated contact with gear fluid may cause severe skin damage.

Wash your hands thoroughly after handling.

Dispose of it through the nearest waste oil reclamation firm or through the supplier.

Wear latex gloves when servicing.

DO NOT DISPOSE OF FLUID IN THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

BRAKE FLUID



WARNING

Brake fluid can damage plastic, rubber or painted parts. When servicing the brake system, protect all such parts with a clean cloth.

Always wear safety glasses when servicing the brake system.

Brake fluid is highly irritant. Avoid contact with the eyes.

In case of contact with the eyes, rinse abundantly with cool, clean water and immediately seek medical attention.

KEEP AWAY FROM CHILDREN.

HYDROGEN GAS AND BATTERY ELECTROLYTE

**DANGER**

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

Wear close-fitting gloves and protective clothing when handling this fluid.

If any battery fluid gets on your skin, rinse the affected area with abundant fresh water.

Take special care to protect the eyes; even a very small amount of battery fluid can cause blindness. If battery fluid comes in contact with the eyes, flush with abundant water for fifteen minutes and contact an eye specialist immediately.

If battery fluid is swallowed accidentally, drink abundant water or milk. Seek medical attention immediately and keep drinking milk of magnesia or vegetable oil in the meantime.

The battery gives off explosive gases. Keep the battery well away from any sources of ignition, such as flames, sparks, or any heat sources; do not smoke near the battery.

Make sure the area is well ventilated when servicing or refilling the battery.

KEEP AWAY FROM CHILDREN.

Battery fluid is corrosive.

Avoid spillage. Take special care not to spill battery fluid on plastic parts.

Make sure that the electrolyte fluid you are using is the suitable type for your battery.

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 mechanical parts or other vehicle components in your mouth when you have both hands busy. None of the motorcycle components are edible. Some components are harmful to the human body or toxic.

Unless expressly indicated otherwise, for the reassembly of the units repeat the disassembly operations in reverse order. Where a procedure is cross-referred to relevant sections in the manual, proceed sensibly to avoid disturbing any parts unless strictly necessary. Do not use polishing pastes on matt paints.

Never use fuel instead of solvent to clean the motorcycle.

Do not clean rubber or plastic parts or the seat with alcohol, gasoline or solvents. Use only water and mild soap.

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.

For further warnings, see DANGEROUS ELEMENTS.

BEFORE REMOVING 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 loosen and/or tighten nuts and bolts. Always use a suitable wrench.
- Mark the positions of all connections (hoses, wiring, etc.) 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 during running as a result of normal wear and tear and should never be mixed up with other similar parts when refitting.
- Certain components are matched-pair parts and should always be replaced as a set.
- Keep away from heat sources.

REASSEMBLING THE COMPONENTS

**DANGER**

Never reuse a circlip or snap ring. These parts must always be replaced once they have been removed.

When fitting a new circlip or snap ring, open the ends just enough to allow fitting to the shaft.

Make a rule to check that a newly fitted circlip or snap ring is fully housed in its groove.

Never use compressed air to clean bearings.

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

- Use ORIGINAL **Moto Guzzi** 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 the specified torque has been achieved.
- 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 ride the motorcycle in a private estate area or in a safe area away from traffic.
- Clean all mating surfaces, oil seal edges and gaskets before assembly. Apply a thin layer 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

Disconnect electrical connectors as follows: failure to follow these instructions can seriously damage the connectors and the wiring.

Press the special safety hooks, where fitted.

**WARNING**

Never separate two connectors by pulling on the wiring.

- Grasp both connectors and pull them in two opposite directions until they become separated.
- Remove dirt, rust, moisture, etc., from inside the connectors with compressed air.
- Make sure that the wires are securely crimped to the terminals inside each connector.

NOTE A connector will fit properly only in the matching connector and when inserted in the correct fitting position.

- Reconnect the two connectors. Make sure they are correctly coupled (if fitted with hooks, it should click audibly into place).

TIGHTENING TORQUES**DANGER**

Always remember that the tightening torques of all wheel, brake, wheel shaft and other suspension parts are essential to ensuring safe operation of the motorcycle and must be set to the indicated values. Make sure that these values are always within the specified limits.

Regularly check the tightening torques on all fastenings, and always use a torque wrench when fitting them.

Failure to observe these instructions can result in parts loosening or coming away, thus jamming a wheel or creating other problems which would affect the handling of the motorcycle, potentially resulting in serious injury or death.

1.3. DANGEROUS ELEMENTS

1.3.1. WARNINGS

FUEL

**DANGER**

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

Refueling and maintenance operations should be carried out in a well-ventilated area, with the engine off.

Do not smoke when refueling or in the proximity of sources of fuel vapors. 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, as 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 with heat and when left under direct sunlight.

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

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

DO NOT DISPOSE OF FUEL IN THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

Use only premium grade unleaded gasoline with a minimum octane rating of 95 RON and 85 MON.

LUBRICANTS

**DANGER**

Correct lubrication is essential to the safety of the motorcycle.

Failure to maintain the lubricant level or the use of incorrect, old or dirty lubricant can cause the engine or transmission to seize, resulting in accident, serious injury or death.

Prolonged or repeated contact with gear fluid may cause severe skin damage.

Wash your hands thoroughly after handling.

Do not dispose oil in the environment.

For disposal, contact the nearest waste oil reclamation firm or the supplier.

**WARNING**

Avoid spillage when filling the vehicle with oil. Immediately clean up any spilt oil, which can damage painted parts.

Oil on the tires can make them very slippery and dangerous to use.

In case of oil leaks, do not use the motorcycle. Identify the cause of the leak and repair it.

ENGINE OIL

**DANGER**

Prolonged or repeated contact with engine oil may cause severe skin damage.

Wash your hands thoroughly after handling.

Do not dispose oil in the environment.

For disposal, contact the nearest waste oil reclamation firm or the supplier.

Wear latex gloves when servicing.

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: SAE 20 W. Choose suitable viscosity grades according to the desired set-up (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.

BRAKE FLUID

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

**DANGER**

Do not drive the vehicle if the brakes are worn or not operating correctly. The brakes are the vehicle's most important safety component and using the vehicle with the brakes in less than perfect operating condition comprises a high probability of traffic accident, which can result in serious injury or death. The brakes are significantly less effective on a wet road surface.

**DANGER**

If the road surface is wet, maintain a double braking distance, as both the brakes and the grip of the tires are significantly less effective in such conditions.

Water on brakes, whether due to a recent wash or picked up from a wet road surface, puddles or drains, can result in significantly reduced brake efficiency.

Failure to observe these instructions can result in serious accidents, with the risk of serious personal injury or death.

The brakes are essential to your safety. Do not drive the vehicle if the brakes are not in perfect operating condition.

Always check the brakes before riding the motorcycle.

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 the eyes, contact an eye specialist or seek medical attention.

DO NOT DISPOSE OF BRAKE FLUID IN THE ENVIRONMENT.

KEEP AWAY FROM CHILDREN.

Avoid spillage. Brake fluid can damage plastic or painted parts.

**DANGER**

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

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

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

Make sure that the brake discs and brake linings have not come in contact with oil or grease. This is particularly important after servicing or inspections.

Make sure the brake lines are not twisted or worn.

Avoid accidental entry of water or dust into the circuit.

Wear latex gloves when servicing the hydraulic circuit.

DISC BRAKES**DANGER**

The brakes are the vehicle's most important safety component.

To ensure your personal safety, they must be in perfect working order and should be checked before every ride.

Dirty pads must be replaced. Dirty or oily discs must be cleaned with a high-quality degreasing product.

If the vehicle is often used on wet road surfaces or on dusty or rough tracks, or in case of use in competition, reduce the service intervals by half.

Check brake pads for wear.

When the brake pads are worn, the fluid level lowers to compensate for the wear.

The front brake fluid reservoir is on the RH side of the handlebar, next to the front brake lever.

The rear brake fluid reservoir is located under the RH side fairing.

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

TIRES

**WARNING**

An over inflated tire results in a hard, uncomfortable and less secure ride.

Over inflation also affects grip, especially on curves and wet surfaces.

An under inflated tire (insufficient pressure) can slip on the wheel rim, resulting in loss of control.

Under inflation also affects grip and handling, as well as braking efficiency.

Tire 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.

New tires may be covered with a thin layer of protective coating which is slippery. Drive carefully for the first few kilometers (miles).

Never use any kind of rubber treatment product on the tires.

In particular, do not allow the tire to come in contact with liquid fuel, which rapidly deteriorates the tire rubber.

In case of contact with oil or fuel, do not clean but replace the tire.

**DANGER**

Some of the factory-assembled tires on this vehicle are equipped with wear indicators.

There are various types of wear indicators.

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

Check the wear visually and have the tires replaced when they are worn.

If a tire deflates during a ride, do not attempt to continue the trip.

Avoid sudden braking or steering maneuvers, and do not decelerate rapidly.

Slowly decelerate and move to the edge of the road braking with the engine until you come to a standstill.

Failure to observe these instructions can result in serious accidents, with the risk of serious personal injury or death.

Never use tube tires on tubeless tire rims, or vice versa.

1.4. RUNNING-IN

1.4.1. RUNNING-IN

Proper engine running in is essential to preserving engine life and performance over time. Twisty roads and gradients are ideal to break in engine, suspension and brakes effectively. Varying speed frequently is also recommended.

This will vary the amount of stress placed on vehicle components continuously, allowing engine parts to cool down when less stressed.

While it is important to put a certain amount of stress to engine components during the running-in period, it is equally important to spare the engine at this stage in the vehicle's life.



WARNING

Top acceleration performance is only obtained after covering the first 2000 km (1243 mi).

Follow these recommendations:

- Do not open the throttle completely when the engine is running at low speed, both during and after the running-in period.
- Until you have covered the first 100 km (62 mi), use the brakes gently and avoid harsh, prolonged braking. This will help the brake pads bed in properly against the brake disc.
- During the first 1000 km (621 mi), never exceed 5000 rpm (see table).



WARNING

After covering the first 1000 km (621 mi), perform the checks listed in the "After running-in" column, see REGULAR SERVICE INTERVALS CHART to avoid personal injury to yourself or third persons, or vehicle damage.

- After the first 1000 km (621 mi) and until covering 2000 km (1243 mi), drive more briskly, varying speed and using maximum acceleration for just a few seconds, in order to ensure better component coupling; never exceed 6000 rpm (see table).
- After the first 2000 km (1243 mi) you may run the engine harder, however, without exceeding the maximum rpm allowed (7600 rpm).

Recommended maximum rpm	
Mileage km (mi)	rpm
0-1000 (621)	5000
1000-2000 (621-1243)	6000
Over 2000 (1243)	7600

1.5. POSITION OF THE SERIAL NUMBERS

1.5.1. POSITION OF THE SERIAL NUMBERS

These numbers are necessary for vehicle registration.

IMPORTANT: Altering the vehicle's identification numbers is punishable by law with heavy fines and penalties. Altering the frame number voids the warranty.

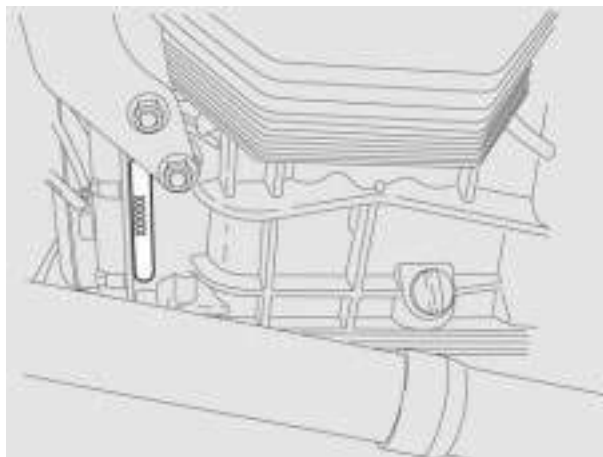
FRAME NUMBER

The frame number (Vehicle Identification Number) is stamped on the right-hand side of the headstock.



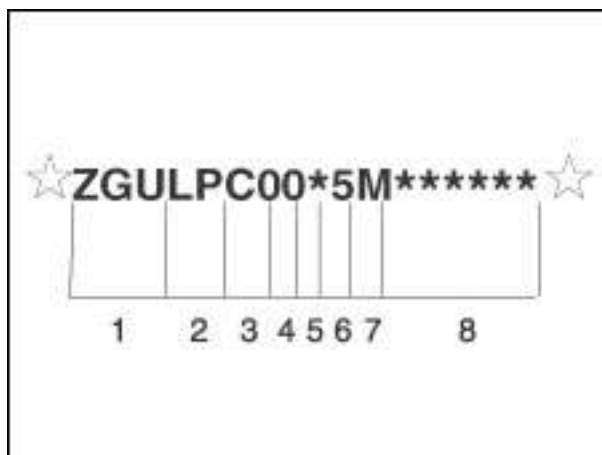
ENGINE NUMBER

The engine number is stamped on the right-hand side of the engine next to the oil level plug.



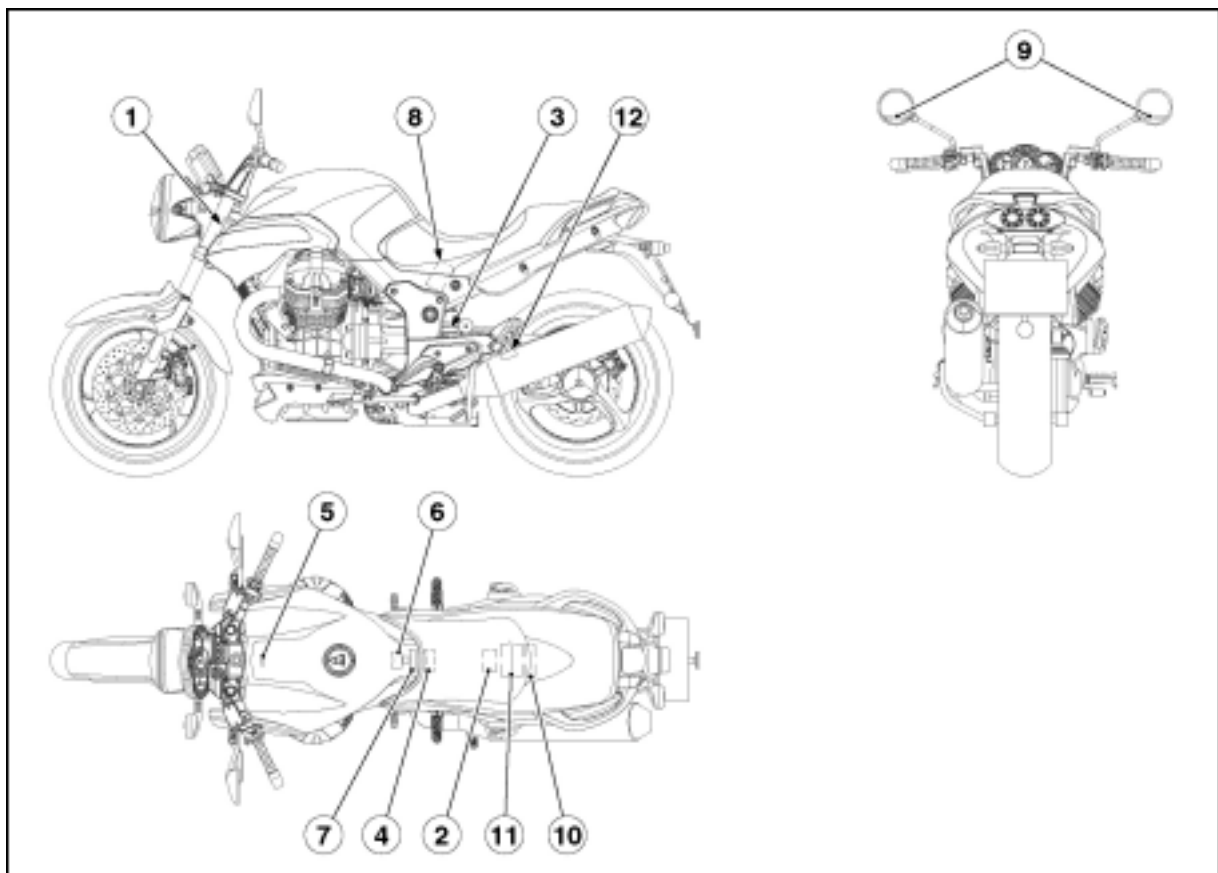
DIGIT MEANING

1. Manufacturer's identification alphanumeric code
2. Vehicle type
3. Model
4. Country for which the vehicle is intended
5. # = Check digit number
6. Model year
7. Designation of assembling factory (M = Mandello)
8. Sequential serial number



1.6. USA VERSION

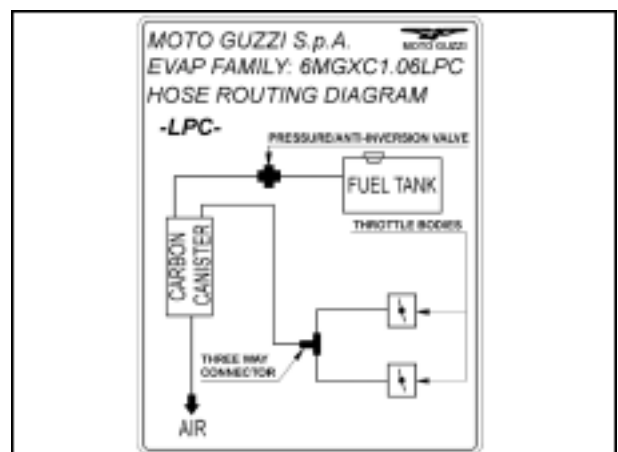
1.6.1. POSITION OF THE ADHESIVE WARNING LABELS



1

MFD BY Moto Guzzi S.p.A. Italy THIS VEHICLE CONFORMS TO ALL APPLICABLE U.S. FEDERAL MOTOR VEHICLE SAFETY STANDARDS IN EFFECT ON THE DATE OF MANUFACTURE SHOWN ABOVE	GVWR 478 KG (1054 LB) GAWR F. 178 KG (393 LB) WITH 120/70 ZR17 (80W) TIRE AND E17 x 3.50 DOT RIM AT 250 KPA (36 PSI) COLD GAWR R. 380 KG (841 LB) WITH 180/60 ZR17 (73W) TIRE AND E17 x 5.50 DOT RIM AT 250 KPA (41 PSI) COLD
VIN: _____	
TYPE: MOTORCYCLE	

2



3

⚠ WARNING!

- CONTAINS HIGH PRESSURE NITROGEN GAS.
- SEE WORKSHOP MANUAL FOR DISPOSAL AND ADJUSTING UNIT.
- DO NOT OPEN. DO NOT INCINERATE, INCINERATION, PUNCTURE OR DISASSEMBLY MAY CAUSE THIS UNIT TO EXPLODE.

4

⚠ WARNING!

Do not use any tire other than those recommended and approved by Moto Guzzi. Maintain proper tire inflation. Do not use any tire with less than 1/8" (3mm) tread remaining. Do not repair any tire, nor use a repaired tire. Do not ride your motorcycle overloaded or with an unbalanced load. Failure to follow these warnings can lead to an accident and serious injuries or death. See owner's manual.

-LPC- 

	Tires pressure kpa - (psi)		Tires size	Front tire	
	Front tire	Rear tire		Metzeler Michelin Dunlop	120/75-ZR17 (58W)
	250 (36)	280 (41)		Rear tire	
	250 (36)	280 (41)		Metzeler Michelin Dunlop	180/55-ZR17 (73W)
	250 (36)	280 (41)			

5

⚠ WARNING!

DO NOT ALLOW KEY CHAIN AND ANY OTHER ITEM TO FALL BETWEEN THE STEERING HEAD AND THE BODY OF MOTORCYCLE. THIS CAN CAUSE LOSS OF CONTROL.

6

⚠ WARNING!

- Wear a helmet, eye protection, and bright protective clothing.
- Don't ride after consuming alcohol or other drugs.
- Slow down on slippery surface, unfamiliar terrain or when visibility is reduced.
- Read owner's manual carefully
- Failure to follow these warnings can lead to an accident and serious injuries or death.
- **USE UNLEADED FUEL MINIMUM OCTANE RATING (R + M) / 2 METHOD 90.**
- See owner's manual for the correct running in and maintenance of the vehicle.

7

⚠ WARNING!

Never install accessories or replacement parts not approved by Aprilia as original equipment. This can degrade the handling and safety of your motorcycle, and can cause an upset with subsequent accident and serious injury or even death. The stability and safety of any motorcycle is adversely affected by the addition of any load carrying accessory. See owner's manual.

8

⚠ WARNING!

Contains sulfuric acid which can cause severe injuries. Avoid contact with skin, eyes or clothing. Antidote: EXTERNAL - Flush with water. INTERNAL - Drink large quantities of water or milk. Follow with milk of magnesia, beaten egg or veg. oil. Call physician immediately. Eyes: Flush with water for 15 minutes and get prompt medical attention.

KEEP OUT OF REACH OF CHILDREN.

Batteries produce explosive gases. Keep sparks, flames, cigarettes away. Charge only in well-ventilated space. Always wear protective goggles when working around batteries. Always connect the battery vent tube. Failure to heed this warning will cause corrosion of the electrical system.

9

OBJECTS IN MIRROR ARE CLOSER THAN THEY APPEAR.

10

MOTORCYCLE NOISE EMISSION CONTROL INFORMATION

THIS 2006 GUZLPC1064 MOTORCYCLE, ZGU1000

MEETS EPA NOISE EMISSION REQUIREMENTS OF 80 dBA

AT 4125 c.f.s. r.p.m. BY FEDERAL TEST PROCEDURE.

MODIFICATIONS WHICH CAUSE THIS MOTORCYCLE TO EXCEED

FEDERAL NOISE STANDARDS ARE PROHIBITED BY FEDERAL LAW.

SEE OWNER'S MANUAL.

-LPC-



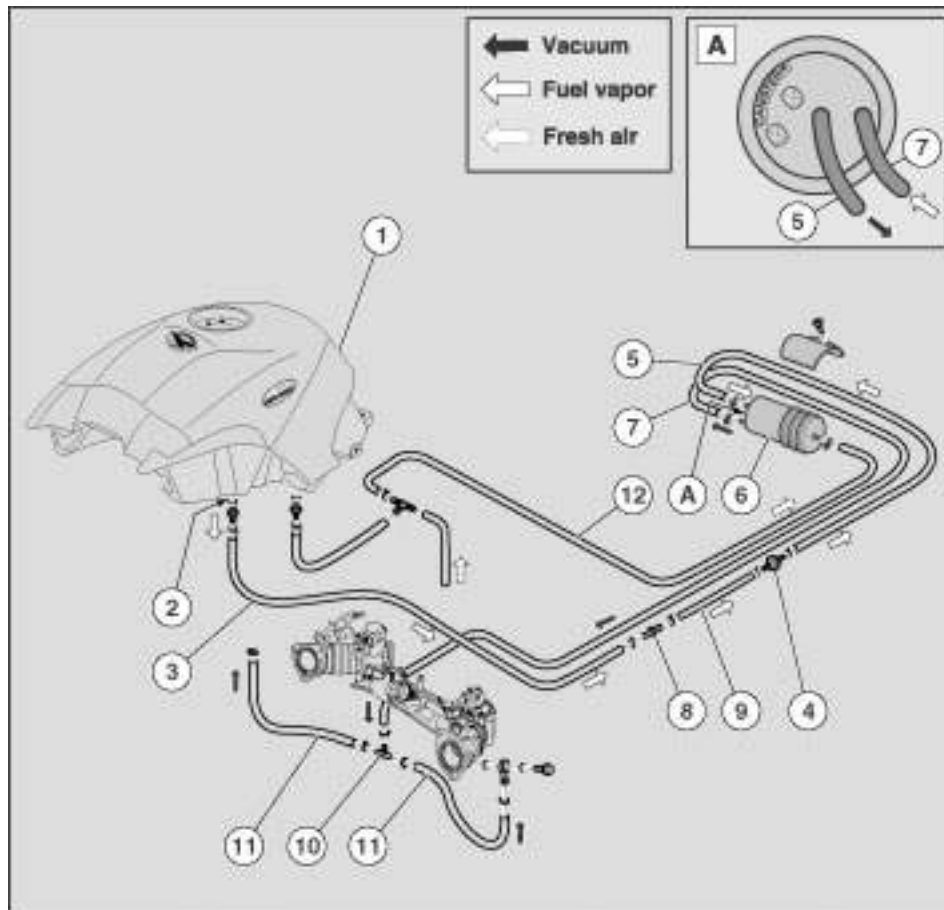
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12

Muffler stamping.

1.6.2. CALIFORNIA EVAPORATIVE EMISSION SYSTEM



The system consists of:

1. Fuel tank
2. Fuel tank breather line
3. Breather line
4. 1-way ventilation valve
5. Breather line (to carbon canister)
6. Carbon canister
7. Drain line
8. Fitting
9. Breather line
10. Tee
11. Drain line
12. Fresh air line

PERIODIC MAINTENANCE

2

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2.1. TECHNICAL INFORMATION

2.1.1. TECHNICAL DATA

DIMENSIONS	
Length	2195 mm (86.4 in.)
Width	870 mm (34.2 in.)
Maximum height	1125 mm (44.3 in.)
Seat height	800 mm (31.5 in.)
Minimum ground clearance	185 mm (7.3 in.)
Wheelbase	1495 mm (58.8 in.)
Weight in running order	248 kg (547 lb)
ENGINE	
Type	twin-cylinder, 90° V transversal, 4-stroke engine
Number of cylinders	two
Cylinder arrangement	V, 90°
Total displacement	1064 cm ³ (65 in ³)
Bore/stroke	92 x 80 mm (3.6 x 3.1 in.)
Compression ratio	9.6 : 1
Starting	electric
Engine idling speed	1100 ± 100 rpm
Clutch	single plate, dry clutch with cush drive damper
Lubricating system	System under pressure, adjustment by valves and vane pump
Air filter	cartridge, dry
Cooling system	air cooled
CAPACITIES	
Fuel (including reserve)	23 liters (6.1 gal)
Fuel reserve	4 liters (1.06 gal)
Engine oil	Engine oil and oil filter change 3900 cm ³ (238 in ³)
Gearbox fluid	500 cm ³ (30.5 in ³)
Transmission fluid	380 cm ³ (23.2 in ³)
Front fork fluid	400 ± 2.5 cm ³ (24.4 ± 0.15 in ³) (per leg)
Seat	2
Vehicle maximum load	230 kg (507 lb) (rider + passenger + luggage)
TIMING SYSTEM	
Timing diagram:	2 valves, with rods and rocker arms
Values with inspection clearance between rocker arms and valve	intake 0.10 mm (0.0039 in.) exhaust 0.15 mm (0.0059 in.)
TRANSMISSION SYSTEM	
- Primary drive	gear, ratio: 26/35 = 1:1.3461
- Gearbox	Mechanic, with 6 speeds, controlled by a pedal on engine left side
- Overall gear ratios:	
1st gear	17/38 = 1:2.2353
2nd gear	20/34 = 1:1.7
3rd gear	23/31 = 1:1.3478
4th gear	26/29 = 1:1.1154
5th gear	31/30 = 1:0.9677
- Final drive	with cardan joint
- Ratio	12/44 = 1:3.6667
FUEL SYSTEM	
Type	Electronic injection (Weber – Marelli) with stepper motor
Choke	Ø 36 mm (1.417 in.)
Fuel	Premium grade unleaded fuel, minimum octane rating 95 (RON) and 85 (MON).
FRAME	
Type	with double split cradle in steel tubes with high yield point
Trail	120 mm (4.72 in.)
Rake	25° 30'

SUSPENSIONS	
Front	hydraulic telescopic fork Ø 45 mm (1.77 in.).
Front travel	120 mm (4.72 in.)
Rear	single-sided with progressive leverage, monoshock adjustable in rebound and with ergonomic knob for spring preload adjustment.
Wheel travel	110 mm (4.33 in.)
BRAKES	
Front	twin floating disc in stainless steel Ø 320 mm (12.6 in), caliper with 4 separated opposed pistons
Rear	Stainless steel disc Ø 282 mm (11.1 in)
WHEELS	
Type	with 3 hollow spokes chill-cast in aluminum alloy
Front wheel rim	3.50" x 17"
Rear wheel rim	5.50" x 17"
TIRES	
Type	BRIDGESTONE BATLAX or, as an alternative, IRELLI SPORT DAEMON
- front	size: 120/70 – ZR 17" 58 W
	inflating pressure: 250 Kpa (36.3 PSI)
	inflating pressure with passenger: 250 Kpa (36.3 PSI)
- rear	size: 180/55 – ZR 17" 73 W
	inflating pressure: 280 Kpa (40.6 PSI)
	inflating pressure with passenger: 280 Kpa (40.6 PSI)
SPARK PLUGS	
Internal (long life)	NGK PMR8B
External	NGK BPR6ES
Electrode gap	0.6 – 0.7 mm (0.024 – 0.028 in.)
ELECTRIC SYSTEM	
Battery	12 V – 18 Ampere/hour
Generator (with permanent magnet)	12 V – 550 W
Main fuses	30 A
Auxiliary fuses	3 A – 15 A – 20 A
BULBS	
Parking light	12 V – 5 W
Low beam	12 V - 55 W - H7
High beam	12 V - 65 W - H9
Turn indicators	12V – 10 W (orange lamp)
Rear parking lights/stoptlights	LED
Instrument lights	LED
License plate light	12 V – 5 W
WARNING LIGHTS	
Turn indicators	LED
ABS	LED
Gear in neutral	LED
Alarm	LED
Side stand down	LED
Fuel reserve	LED
High beam	LED
Antitheft	LED
Gear shift indicator	LED

2.1.2. SCHEDULED MAINTENANCE CHART

OPERATIONS TO BE CARRIED OUT BY THE **Moto Guzzi** Authorized dealer (CAN BE CARRIED OUT BY THE USER AS WELL).

1 = check and clean, adjust, lubricate or change, if necessary;

2 = clean;

3 = replace;

4 = adjust.

NOTE Carry out the maintenance operations more frequently if you use the vehicle in rainy and dusty areas, on uneven ground, or for racing.

(*) = Change every 5000 Km (3125 mi), if used for racing

(**) = Check every two weeks or at indicated intervals.

Component	After running-in [1000 km (621 mi)]	Every 10000 km (6250 mi) or 12 months	Every 20000 km (12500 mi) or 24 months
External plugs (*)	-	3	-
Engine oil filter (*)	3	3	-
Fork	1	-	1
Headlight beam direction - operation	-	1	-
Light system	1	1	-
Safety switches	1	1	-
Brake fluid	-	1	-
Engine oil	3	3	-
Tires	1	1	-
Tire pressure (**)	4	4	-
Idling rpm	4	4	-
Battery terminal tightening	1	-	-
Head bolt tightening	4	-	-
Engine oil pressure warning light	at every starting: 1		
Brake pad wear	1	before every trip and every 2000 Km (1250 mi): 1	
Emptying the oil drain hose from filter box end	Every 5000 km (3125 mi):2		

OPERATIONS TO BE CARRIED OUT BY THE **Moto Guzzi** Authorized dealer.

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

NOTE Carry out the maintenance operations more frequently if you use the vehicle in rainy and dusty areas, on uneven ground, or for racing.

(*) = Change every 5000 Km (3125 mi), if used for racing

(**) = Check every two weeks or at indicated intervals.

Component	After running-in [1000 km (621 mi)]	Every 10000 km (6250 mi) or 12 months	Every 20000 km (12500 mi) or 24 months
Gearbox fluid	3	3	-
Idle mixture (CO)	-	1	-
Transmission and control cables	1	1	-
Steering bearings and steering play	1	1	-
Wheel bearings	-	1	-
Brake discs	1	1	-
Air filter	-	1	3
Vehicle general operation	1	1	-
Brake systems	1	1	-
Brake fluid	-	-	3
Front fork fluid	after the first 10000 km (6250 mi) and then every 20000 km (12500 mi): 3.		
Fork oil seals	after the first 30000 km (18750 mi) and then every 20000 km (12500 mi): 3.		
Brake pads	every 2000 Km (1250 mi): 1 - if worn: 3		
Adjusting valve clearance	4	4	-
Wheels / Tires	1	1	-
Tightening nuts and bolts	1	1	-
Tightening battery terminals	1	-	-
Cylinder synchronization	1	1	-
Suspensions and trim	1	-	1
Final transmission fluid	3	3	-
Fuel hoses	-	1	Every four years: 3
Brake lines	-	1	Every four years: 3
Clutch wear (*)	-	1	-
Internal spark plugs	-	-	4
Generator belt	every 20000 Km (12500 mi): 4, every 50000 Km (31250 mi): 3		
Tightening head stud bolts	4	-	-
Exhaust pipe flange bolts	1	-	-

2.1.3. LUBRICANT TABLE

LUBRICANT	PRODUCT
Engine oil	RECOMMENDED:  RACING 4T 5 W 40 As an alternative to recommended oils, top brand oils meeting or exceeding CCMC G-4 A.P.I. SG specifications can be used.
Transmission fluid	RECOMMENDED:  TRUCK GEAR 80 W 90
Gearbox fluid	RECOMMENDED:  ROTRA MP/S 85 W 90
Front fork fluid	RECOMMENDED:  F.A. 5W or  F.A. 20W, as an alternative  FORK 5W or  FORK 20W.
Bearings and other lubrication points	RECOMMENDED:  BIMOL GREASE 481,  AUTOGREASE MP or  GREASE SM2. As an alternative to recommended grease, use top brand roller bearing grease that will resist a temperature range of -30°C to +140°C (-22°F to +284°F), with dripping point 150°C to 230°C (302°F to 446°F), high corrosion protection, good resistance to water and oxidization.
Battery terminals	Use neutral grease or Vaseline.
Brake fluid	RECOMMENDED:  Autofluid FR. DOT 4 (brake system is also compatible with DOT 5 fluid) or  BRAKE 5.1 DOT 4 (brake system is also compatible with DOT 5 fluid). As an alternative to the recommended product, top brand brake fluid meeting or exceeding SAE J1703, NHTSA 116 DOT 4, ISO 4925 specifications for synthetic brake fluid can be used. NOTE Use new brake fluid only. Do not mix different makes or types of oil without having checked base compatibility.

2.1.4. TIGHTENING TORQUE SETTINGS

DESCRIPTION	QUANTITY	SCREW / NUT	TIGHTENING TORQUE (Nm)	NOTE
FRAME				
ECU + coil plate fasteners	2+4	M6x20	10	-
ECU fasteners	2	M6x35	10	-
Fasteners for tank rubber blocks to frame	2	M8x12	25	-
Gearbox-to-frame fastening	1+1	M12	80	-
Coil fastener	8	M4x25	2	-
Engine fastener	2	M12x50	80	-
Left and right footrest plate upper fastener to frame	4	M8x30	20	-
Right footrest lower fastener to frame	2	M8x40	30	-
Left footrest lower fastener to frame	2	M8x55	30	-
Right/left protection cover fastener	4	M5x9	6	-
Plate ring-to-plate-fastener	6	M5x10	6	-
Grab handle-to-frame fastening	2	M8x25	25	-
Cover-to-grab handle fastening	2	M8x12	25	-
FOOTRESTS AND LEVERS				
Footrest rubber element fastening	8	M6x12	10	-
Linkage fastener (nut)	2	M6	10	-
Brake/gear shift lever peg fastening	1+1	M6x16	10	-
Preselector/gear shift lever fastening	1+1	M6x20	10	-
Spring hook peg	1	M5	4	Loctite 243
SIDE STAND				
Stand plate fastener onto engine	2	M12x35	80	-
Side stand fastening pin	1	M10x1.25	10	-
Switch screw	1	M6x20	10	Loctite 243
Lock nut	1	M10x1.25	30	-
CENTRE STAND				
Stand-to-plates screw	2	M10x35	50	-
Screw securing hose ring to plates	1	M6x16	10	-
SWINGARM				
Swingarm clamp-to-bushing fastening	2	6x25	10	-
Swingarm-to-bevel gear fastening	4	M10x35	50	-
Linkage-to-bevel gear fastening	1	M10x50	50	-
Linkage to frame fastener	1	M10x50	50	-
Swingarm shaft-to-swingarm fastener	1	M12x1.25	60	-
Preload bushing to swingarm shaft fastener	1	M25x1.5	10	-

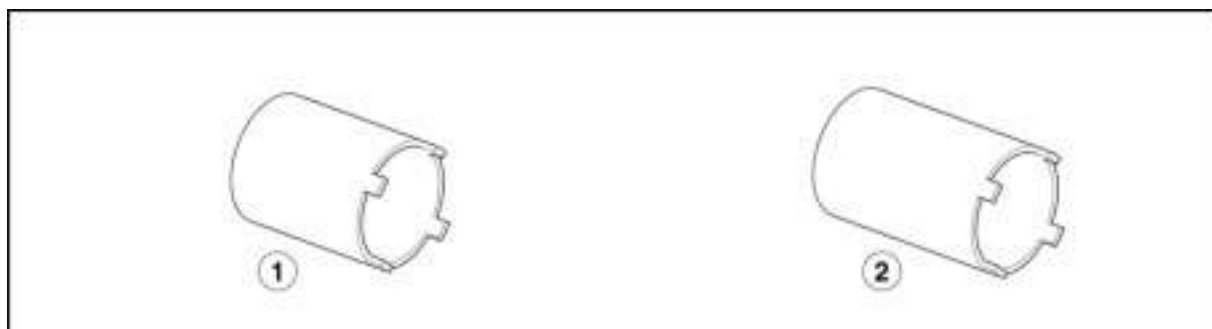
DESCRIPTION	QUANTITY	SCREW / NUT	TIGHTENING TORQUE (Nm)	NOTE
FRONT SUSPENSION				
Speed sensor fastener	1	M6x16	10	-
Hose plate to bottom yoke fastener	2	M5x16	6	-
Fork leg to bottom/top yoke screw	6	M8x25	25	-
Steering tube ring nut	1	M35x1	40	-
Steering stem locking ring nut	1	M35x1	manual + 90 degrees	-
Top yoke retaining cap	1	M29x1	100	-
Fork hubs plugs	2+2	M6	10	-
REAR SUSPENSION				
Shock absorber				
Shock absorber to frame fastener 8.8	1	M10x80	50	-
Connecting rods				
Twin con-rod/shock absorber fastener 10.9	1	M10x47	40	-
Single con-rod/twin con-rod fastener 10.9	1	M10x95	50	-
Single con-rod to frame fastener 8.8	1	M10x85	50	-
Twin con-rod/swingarm fastener 10.9	1	M10x82	50	-
AIR BOX				
Air box cover/air box bracket	5+2	SWP5x20	3	-
Blow by tank-to-air box cover fastener	2	SWP5x14	3	-
Pressure sensor fastener	2	SWP 2.9x12	2	-
EXHAUST				
Exhaust pipe to engine fastener	4	M8x1.25	25	-
Exhaust pipe to collector box fastener (clamp)	2	M6	10	-
Collector box to plate fastener	2	M10	25	-
Collector box to silencer fastener (clamp)	1	M6	10	-
Oxygen sensor fastener	1	M18x1.5	38	-
Silencer-to support fastener (screw + nut)	1	M8	25	-
FRONT WHEEL				
Wheel shaft nut	1	M25x1.5	80	-
REAR WHEEL				
Disc fastener	6	M8x20	30	Loctite 243
Rear wheel fastener 10.9	4	M12x65	110	-

DESCRIPTION	QUANTITY	SCREW / NUT	TIGHTENING TORQUE (Nm)	NOTE
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BRAKE SYSTEMS				
Front system				
Right and left front brake caliper fastener	2+2	M10x28	40	-
Rear system				
Rear brake caliper fastener	2	M10x30	50	-
Rear brake lever pivot	1	M8	15	Loctite 243
Rear brake fluid reservoir fastener	1	SWP5x20	3	-
Rear brake fluid tank support-to-plate fastener	1	M6x16	10	-
Rear brake rod lock nut	1	M6	manual	-
Brake lever spring to plate fastener	1	M5x12	6	-
Brake master cylinder fastener	2	M6x20	10	Loctite 243
HANDLEBAR AND CONTROLS				
Handlebar to steering plate fastener	3+3	M8x25	25	-
Handlebar tubes to handlebar fastener	2	M8x30	25	Loctite 243
Counterweight fastener	2	M6x60	10	-
Clutch line fastener	2	M10x1	20	-
ELECTRIC SYSTEM				
Horn fastener	1	M8	15	-
Speed sensor to front fork fastener	1	M6x16	12	-
INSTRUMENT PANEL AND LIGHTS				
Instrument panel mount to headlight mount fastener	4	M6x12	10	-
Instrument panel mount to fork top yoke fastener	1	M8x16	25	-
Instrument panel fastener	3	SWP5x14	3	-
Headlight mount to fork bottom yoke fastener	2	M8x35	25	Loctite 243
Headlight + turn indicators fastener	2+4	M6x20	10	-
Tail light to grab handle fastener	4	M5x16	4	-
FUEL TANK				
Fuel pump flange				
Tank breather fitting	2	M6	6	-
Pump mount to tank fastener	6	M5x16	4	-
Fuel tank				
Union-to-tank fastener	4	M5x16	4	-
Fuel pump flange-to-tank fastener	1	M8x45	25	-

DESCRIPTION	QUANTITY	SCREW / NUT	TIGHTENING TORQUE (Nm)	NOTE
FRAME / FAIRINGS				
Front				
Air scoop to tank fastener	11	M5x9	4	-
Lug-to-engine fastening	4	M8x25	25	-
Right to left lug fastener	3	M5x9	4	-
Front mudguard fastener	4	M5x12	4	-
Rear				
Tail guard + side body panels fastener	12	M5x9	4	-
Tail guard-to-grab handle fastening	2	M5x15	4	-
Net hooks-to-frame fastener	4	M8x50	25	-
Cat's eye-to-support fastener	1	M5	4	-
Cat's eye support-to- license plate holder fastener	2	M5x12	4	-
ABS support-to-splash guard fastener	3	SWP5x20	3	-
Number plate light-to-license plate holder fastener	2	M5	4	-
ACCESSORIES				
Ignition switch fastener – tear screw	1	M8x28	-	until it breaks
Ignition switch fastener	1	M8x30	25	-

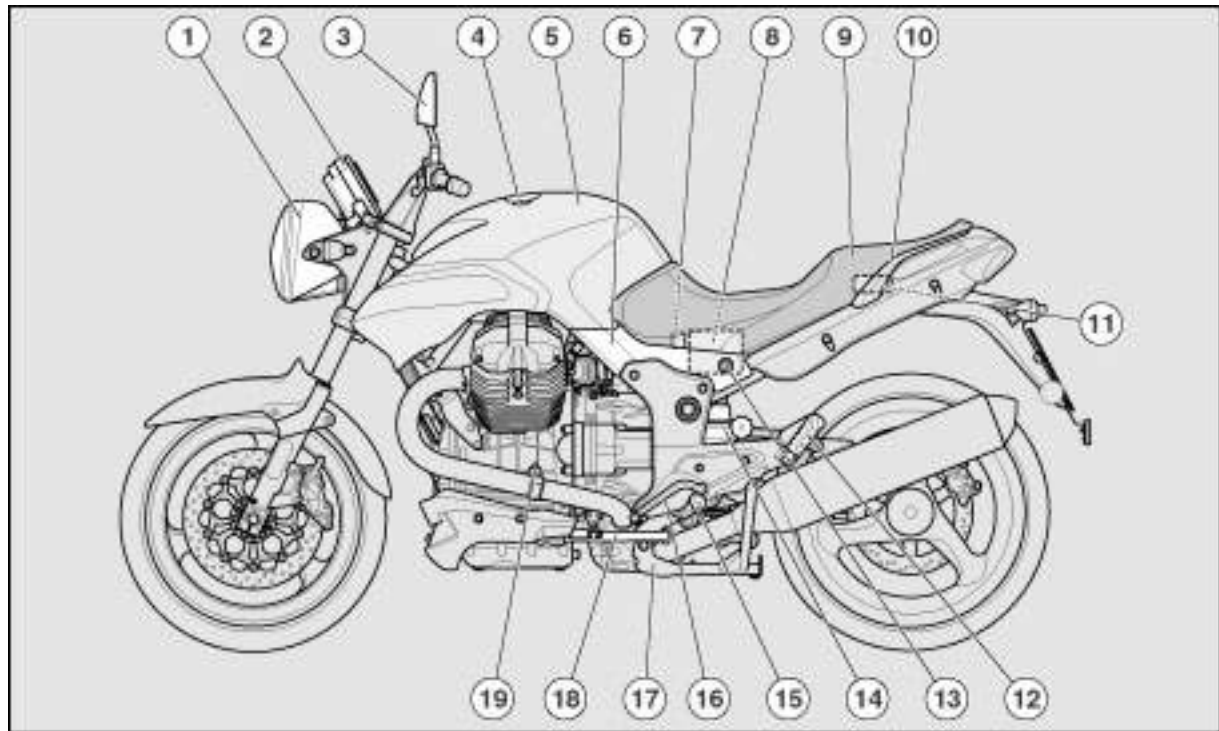
2.1.5. SPECIAL TOOLS



Pos.	Guzzi part# (tool description and function)
1	05.91.26.30 (tool for tightening ring nut on swingarm shaft)
2	AP8140190 (tool for steering tightening)

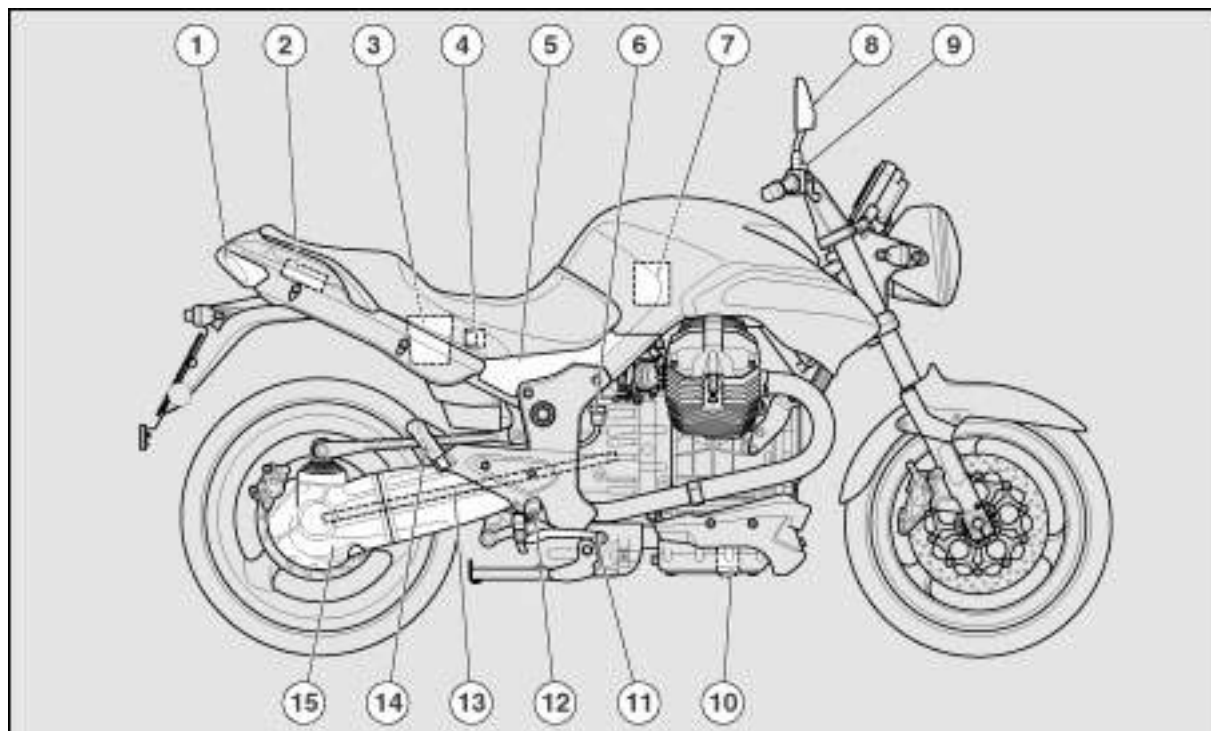
2.1.6. ARRANGEMENT OF THE MAIN ELEMENTS

LEFT SIDE

**Key:**

- 1) Headlight
- 2) Instrument panel
- 3) Left rear-view mirror
- 4) Fuel tank filler plug
- 5) Fuel tank
- 6) Left side body panel
- 7) Main fuse carrier (30A)
- 8) Battery
- 9) Rider/Passenger seat
- 10) Passenger grab handle
- 11) Tool kit compartment
- 12) Left passenger footpeg
- 13) Seat latch
- 14) Rear shock absorber
- 15) Rider left footrest
- 16) Gearbox control lever
- 17) Center stand
- 18) Side stand
- 19) Engine oil level dipstick

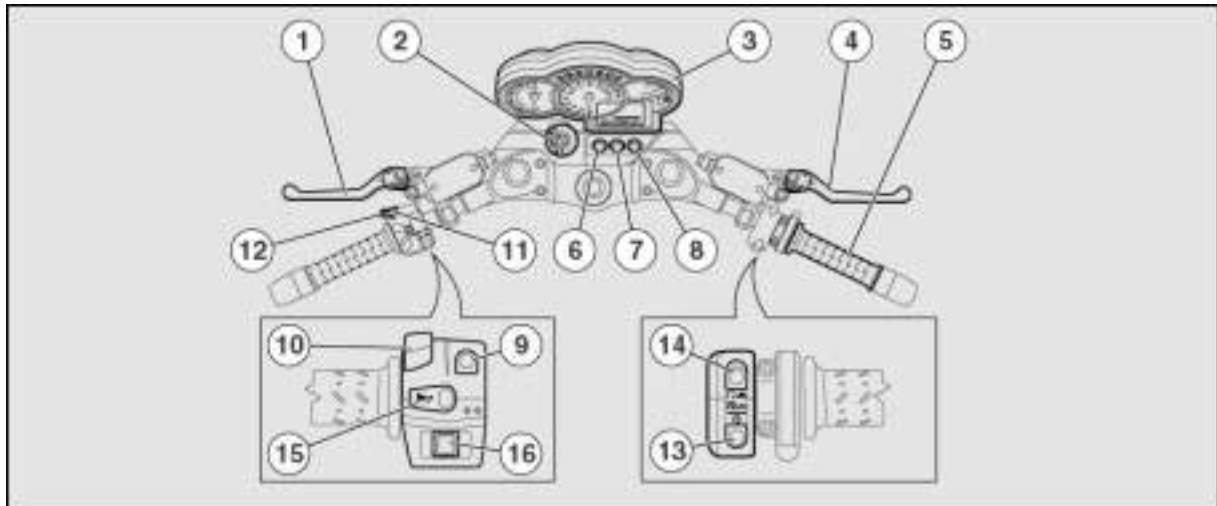
RIGHT SIDE



Key:

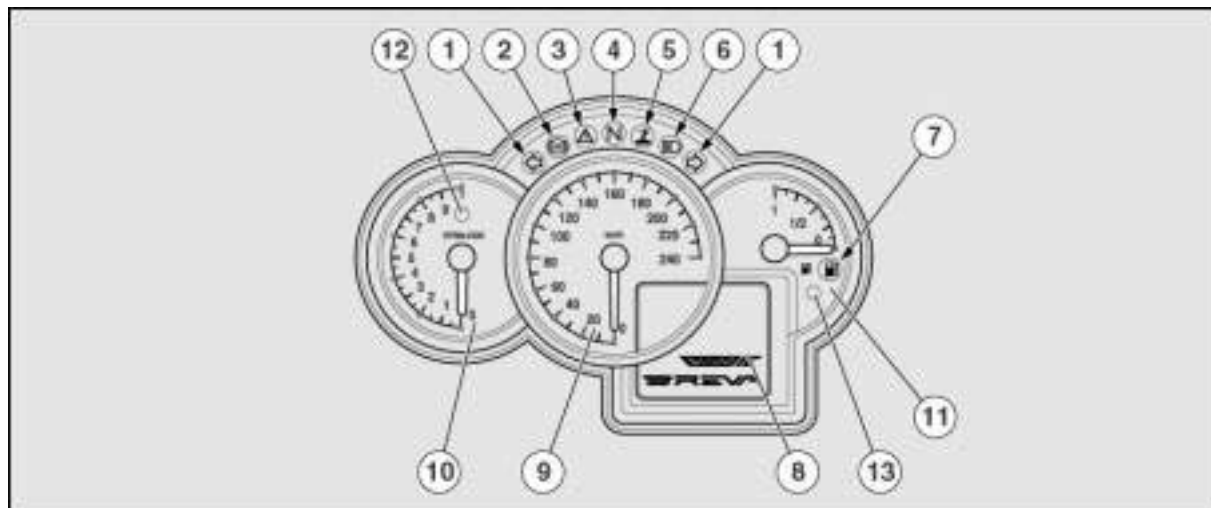
- 1) Rear stop switch
- 2) Glove compartment
- 3) Compartment
- 4) Auxiliary fuse carrier
- 5) Right side body panel
- 6) Rear brake fluid reservoir
- 7) Air filter
- 8) Right rear-view mirror
- 9) Front brake fluid reservoir
- 10) Engine oil filter
- 11) Rear brake lever
- 12) Rider right footrest
- 13) Transmission with cardan shaft
- 14) Right passenger footpeg
- 15) Single-sided swingarm

2.1.7. LOCATION OF INSTRUMENTS/CONTROLS

**Key:**

- 1) Clutch control lever
- 2) Ignition switch/steering lock (🔑-🔒-P)
- 3) Instruments and indicators
- 4) Front brake lever
- 5) Throttle grip
- 6) ABS enabling/disabling push-button (only for vehicles fitted with ABS)
- 7) Hazard emergency indicator push-button
- 8) Handgrip heating enabling/disabling push-button (OPT)
- 9) Light dimmer switch (🔆 - 📺)
- 10) Display function selector
- 11) High beam flasher button (📺)
- 12) SET button
- 13) Starter button (🔌)
- 14) Engine stop button (🔌 - 📺)
- 15) Horn button (🔊)
- 16) Turn indicator switch (📺)

INSTRUMENTS AND INDICATORS



Key:

- 1) Green direction indicator warning light (↔)
- 2) Amber ABS warning light (ABS) (Anti-lock Braking System)
- 3) Red alarm warning light
- 4) Green neutral warning light (N)
- 5) Amber side stand down warning light (I)
- 6) Blue high beam warning light (H)
- 7) Amber fuel reserve warning light (F)
- 8) Multifunction digital display (clock, ambient temperature, odometer, trip info, lap timer, alarm display, service warning)
- 9) Speedometer
- 10) Rev counter
- 11) Fuel level indicator
- 12) Red antitheft warning light
- 13) Red gear shift indicator warning light

2.2. MAINTENANCE OPERATIONS

2.2.1. CHANGING ENGINE OIL AND OIL FILTER

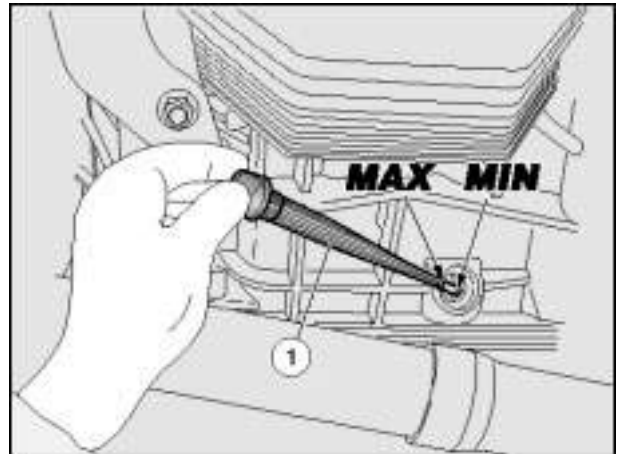
CHECKING AND TOPPING UP

**WARNING**

Check the engine oil level when the engine is hot.

NOTE Letting the engine idle with the vehicle at standstill is not the correct procedure to warm the engine and engine oil up to operating temperature for an oil check. Oil is best checked after taking a short ride; 15 km (10 mi) will be enough.

- Stop the engine.
- Keep the vehicle upright with both wheels on the ground.
- Unscrew and remove the dipstick (1).



- Check the oil level using the dipstick (1).
- Level is correct when it is near the **MAX** mark.

MAX = maximum level

MIN = minimum level.

If necessary, top up the engine oil level as follows:

- Unscrew and remove the dipstick (1).
- Top up with engine oil (see LUBRICANT TABLE) until the level is above the minimum mark **MIN**.

**WARNING**

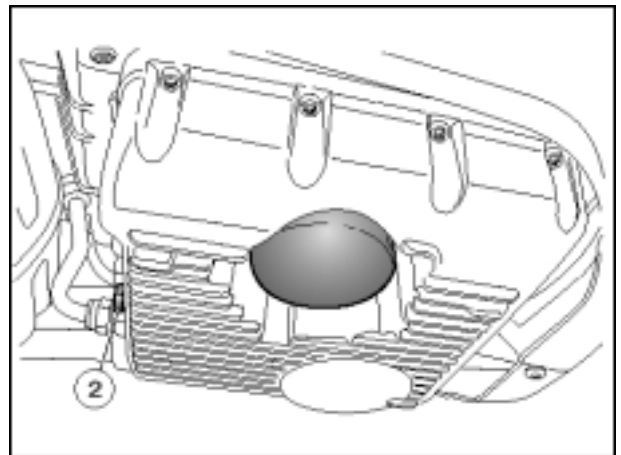
Do not add additives or other substances to the fluid.

If you use a funnel or other tool, make sure it is perfectly clean.

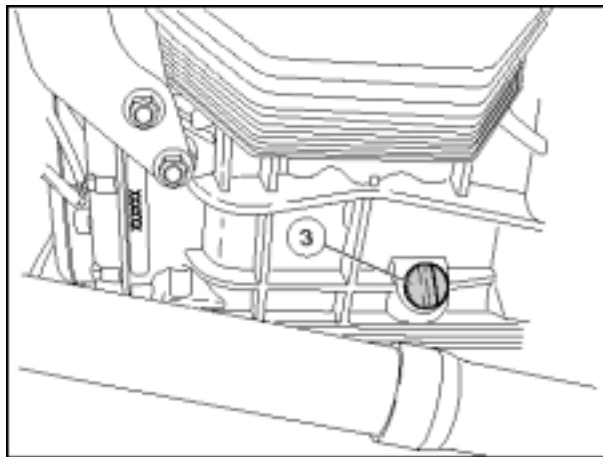
CHANGING ENGINE OIL

NOTE Change oil when it is hot, as it will be more fluid and will drain off more easily.

- Place a container holding more than 4000 cm³ under the drain plug (2).
- Unscrew and remove the drain plug (2).



- Unscrew and remove the filler plug (3).
- Drain the oil into the container and let all the oil drip out for several minutes.
- Check the sealing washers of the drain plug (2) and replace if worn.
- Clean off any metal debris sticking to the drain plug (2) magnet.
- Refit the drain plug (2) and tighten.
- Fill with fresh engine oil, see (LUBRICANT TABLE) until the level is above the minimum mark **MIN**.

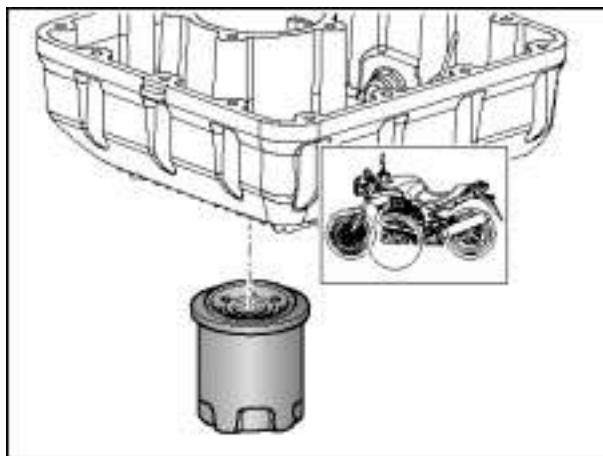


CHANGING THE ENGINE OIL FILTER

- Unscrew the engine oil filter from its housing to remove it.

NOTE Do not use filters that have already been used.

- Smear some oil on the new oil filter seal.
- Fit and screw the new oil filter in its housing.



2.2.2. GEARBOX OIL

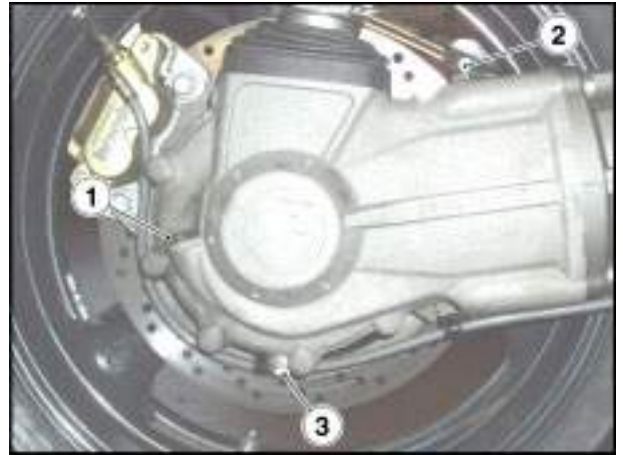
CHECKING AND TOPPING UP

- Keep the vehicle upright with both wheels on the ground.
- Unscrew and remove the level plug (1).
- The correct level is just below the hole of the level plug (1).
- Top up if oil is below specified level, see 2.1.3 (LUBRICANT TABLE), until reaching the level plug hole (1).

**WARNING**

Do not add additives or other substances to the fluid.

If you use a funnel or other tool, make sure it is perfectly clean.



CHANGE

**WARNING**

Change oil when the unit is hot, as oil will be more fluid and will drain off more easily.

NOTE Letting the engine idle with the vehicle at standstill is not the correct procedure to warm engine and engine oil up to operating temperature for an oil check. Oil is best checked after taking a short ride; 15 Km (10 mi) will be enough.

- Place a container holding more than 400 cm³ (25 in³) under the drain plug (3).
- Unscrew and remove the drain plug (3).
- Unscrew and remove the breather plug (2).
- Drain the oil into the container and let all the oil drip out for several minutes.
- Check the sealing washer of the drain plug (3) and replace it if worn.
- Clean off any metal debris sticking to the drain plug (3) magnet.
- Refit the drain plug (3) and tighten.
- Fill with fresh oil, see 2.1.3 (LUBRICANT TABLE) through the oil filler hole (1) until the level reaches the hole of the level plug (1).

**WARNING**

Do not add additives or other substances to the fluid.

If you use a funnel or other tool, make sure it is perfectly clean.

- Refit and tighten the plugs (1 – 2).

2.2.3. GEARBOX FLUID

CHECKING AND TOPPING UP



WARNING

Check the gearbox oil level when the engine is hot.

NOTE Letting the engine idle with the vehicle at standstill is not the correct procedure to warm engine and engine oil up to operating temperature for an oil check. Oil is best checked after taking a short ride; 15 Km (10 mi) will be enough.

- Stop the engine.
- Keep the vehicle upright with both wheels on the ground.
- Unscrew and remove the inspection plug (1) on the right side of the gearbox.
- The correct level is just below the hole of the inspection plug (1).

If necessary:

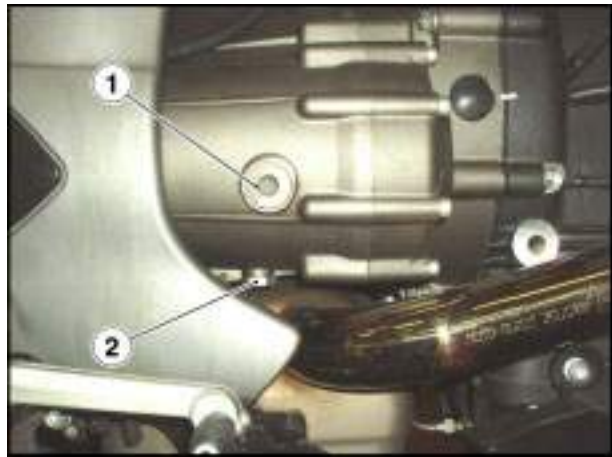
- Top up with oil, see 2.1.3 (LUBRICANT TABLE) until the level reaches the hole of the inspection plug (1).



WARNING

Do not add additives or other substances to the fluid.

If you use a funnel or other tool, make sure it is perfectly clean.



CHANGE

NOTE Change oil when it is hot, as it will be more fluid and will drain off more easily.

- Place a suitable container under the drain plug (2).
- Unscrew and remove the drain plug (2).
- Unscrew and remove the filler plug (1).
- Drain the oil into the container and let all the oil drip out for several minutes.
- Check the sealing washers of the drain plug (2) and replace if worn.
- Clean off any metal debris sticking to the drain plug (2) magnet.
- Refit the drain plug (2) and tighten.
- Fill with fresh oil, see 2.1.3 (LUBRICANT TABLE) until the level reaches the hole of the inspection plug (1).
- Tighten the filler plug (1).



WARNING

Do not add additives or other substances to the fluid.

If you use a funnel or other tool, make sure it is perfectly clean.

2.2.4. CLEANING THE AIR FILTER

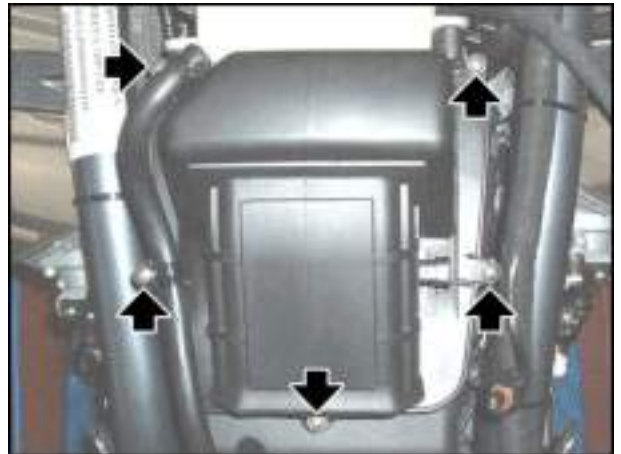
- Remove the fuel tank (see REMOVING THE FUEL TANK).
- Disconnect the connector on the end of the air temperature sensor.



- Slide out the oil breather hose.



- Loosen and remove the five screws.



- Raise the air box cover.
- Remove the sound-deadening panel.
- Remove the air filter.
- Block off the intake duct with a clean cloth to prevent dirt from falling into the intake ducts.

**DANGER**

Do not start the engine when the air filter is not in place. Use compressed air to clean the filter and aim the jet of air inside out.



2.2.5. ADJUSTING THE VALVE CLEARANCE

When the timing system is noisy, check clearance between valves and rocker arms.

NOTE Adjust clearance when the engine is cold, with the piston at top dead centre (TDC) during the compression stroke (valves closed).

- Remove the fuel tank (see REMOVING THE FUEL TANK).
- Loosen and remove the two screws.
- Remove the spark plug protection.
- Disconnect both spark plug caps.



- Loosen and remove the eight screws.
- Remove the head cover.



- Loosen the nut (1);
- Turn the adjuster screw (2) with a screwdriver until setting the following clearances:
 - intake valve 0.10 mm (0.0039 in.)
 - exhaust valve 0.15 mm (0.0059 in.)
- Measure clearance using a suitable feeler gauge (3).

NOTE If clearance is greater than specified, the tappets will be noisy; a clearance lower than specified will prevent the valves from closing fully and causing:

- pressure leaks;
- engine overheating;
- burnished valves, etc.



2.2.6. FRONT BRAKE

BLEEDING

Any air trapped in the hydraulic circuit will act as a cushion and take up most of the pressure applied by the master cylinder; this will impair the operation of the brake calipers and reduce braking efficiency.

A spongy feel of the brake lever and loss of braking mean that there is air in the circuit.



DANGER

This is a dangerous condition that makes the vehicle unsafe to ride; each time the brakes are removed, it is essential to bleed the hydraulic circuit once the brakes have been refitted and the brake system is back to normal operating conditions.

NOTE The following procedure applies to both front brake calipers.

Place the vehicle on level ground before beginning the bleeding procedure.
While bleeding the hydraulic circuit, top up the reservoir with brake fluid as required. Make sure there is always some fluid in the reservoir throughout the process.

- Remove the bleed valve rubber cap.
- Insert one end of a transparent plastic tubing inside the front brake caliper bleed valve and the other end in a container.
- Pump the brake lever quickly. Repeat several times, then keep the lever pulled in.



- Slacken the bleed valve by one quarter of a turn to let the brake fluid drain into the container; this will remove any tension from the lever and help it travel fully home.
- Retighten the bleed valve before the lever is fully squeezed in.
- Repeat this process until the fluid draining into the container is totally clear of air bubbles.

NOTE While bleeding the hydraulic circuit, top up the reservoir with brake fluid as required. Make sure there is always some fluid in the reservoir throughout the process.

- Tighten the bleed valve and remove the tubing.
- Add brake fluid to the reservoir until the fluid has reached the correct level.
- Refit the rubber cap.



CHANGING THE PADS

- Turn the pins and slide out both slit pins.



- Remove both pins.



- Remove the vibration damper.



- Remove one pad at a time.

**WARNING**

Do not operate the brake lever when the pads are not in place or the caliper pistons might come off their housing, thus causing brake fluid leakage.

- Install two new pads. Fit them so the holes match those on the caliper.

**WARNING**

Always change both pads and make sure they are correctly in place inside the caliper.

- Fit the vibration damper.
- Fit both pins.
- Fit both split pins.
- Check the brake fluid level.



2.2.7. REAR BRAKE

BLEEDING

Any air trapped in the hydraulic circuit will act as a cushion and take up most of the pressure applied by the master cylinder; this will impair the operation of the brake calipers and reduce braking efficiency.

A spongy feel of the brake lever and loss of braking mean that there is air in the circuit.



DANGER

This is a dangerous condition that makes the vehicle unsafe to ride; each time the brakes are removed, it is essential to bleed the hydraulic circuit once the brakes have been refitted and the brake system is back to normal operating conditions.

NOTE Place the vehicle on level ground before beginning the bleeding procedure. While bleeding the hydraulic circuit, top up the reservoir with brake fluid as required. Make sure there is always some fluid in the reservoir throughout the process.

- Remove the bleed valve rubber cap.
- Insert one end of a transparent plastic tubing inside the rear brake caliper bleed valve and the other end in a container.
- Pump the rear brake lever quickly. Repeat several times, then keep the lever pulled in.

- Slacken the bleed valve by one quarter of a turn to let the brake fluid drain into the container; this will remove any tension from the lever and help it travel fully home.
- Retighten the bleed valve before the lever is fully squeezed in.
- Repeat this process until the fluid draining into the container is totally clear of air bubbles.

NOTE While bleeding the hydraulic circuit, top up the reservoir with brake fluid as required. Make sure there is always some fluid in the reservoir throughout the process.

- Tighten the bleed valve and remove the tubing.
- Add brake fluid to the reservoir until the fluid has reached correct level.
- Refit the rubber cap.

CHANGING THE PADS

- Loosen and remove the two screws.



- Turn the pin and slide out the split pin.
- Remove the split pin.



- Remove the pin.



- Remove one pad at a time.



WARNING

Do not operate the brake lever when the pads are not in place or the caliper pistons might come off their housing, thus causing brake fluid leakage.

- Install two new pads, fit them so the holes match those on the caliper.



WARNING

Always change both pads and make sure they are correctly in place inside the caliper.

- Fit the pin.
- Fit the split pin.
- Check the brake fluid level.



FUEL SYSTEM

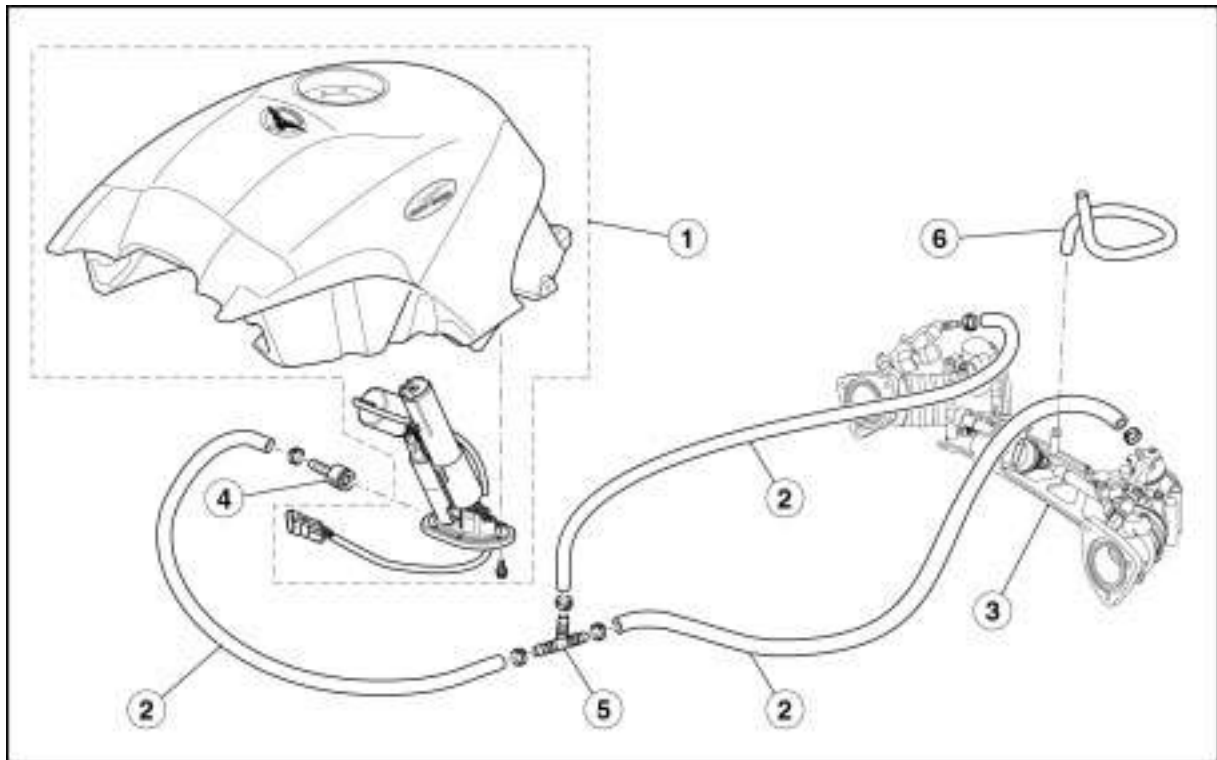
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3.1. FUEL SYSTEM

3.1.1. FUEL SUPPLY SYSTEM DIAGRAM

**Key:**

1. Complete fuel tank
2. Fuel hose
3. Throttle body
4. Fitting
5. Three-way union
6. Hose

3.1.2. REMOVING THE FUEL TANK

- Remove the seat.
- Working on either side, loosen and remove the screw.



- Working on either side, raise and slide out the side panel from the pin to remove it.



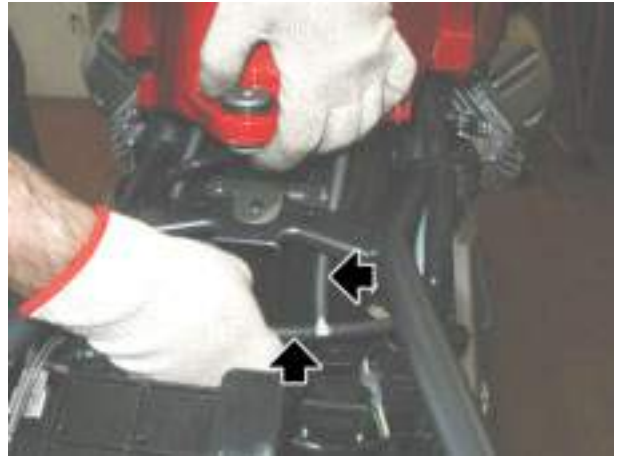
- Working on either side, loosen and remove the two front screws.



- Loosen and remove the rear screw.



- Raise the fuel tank and slide the hoses out of "T" fitting.



- Disconnect the connector.



- Disconnect the fuel hose.



- Slide out the fuel tank from behind to remove it.



3.1.3. REMOVING THE AIR BOX

- Remove the fuel tank, see (REMOVING THE FUEL TANK).
- Disconnect the connector on the end of the air temperature sensor.



- Slide out the oil breather hose.



- Loosen and remove the two oil recovery tank screws.



- Loosen and remove the hose guide screw on the air box.



- Move the oil recovery tank to one side.
- Loosen and remove the two air box front screws.



- Working on either side, loosen the clamp and remove the coupling from the throttle body.

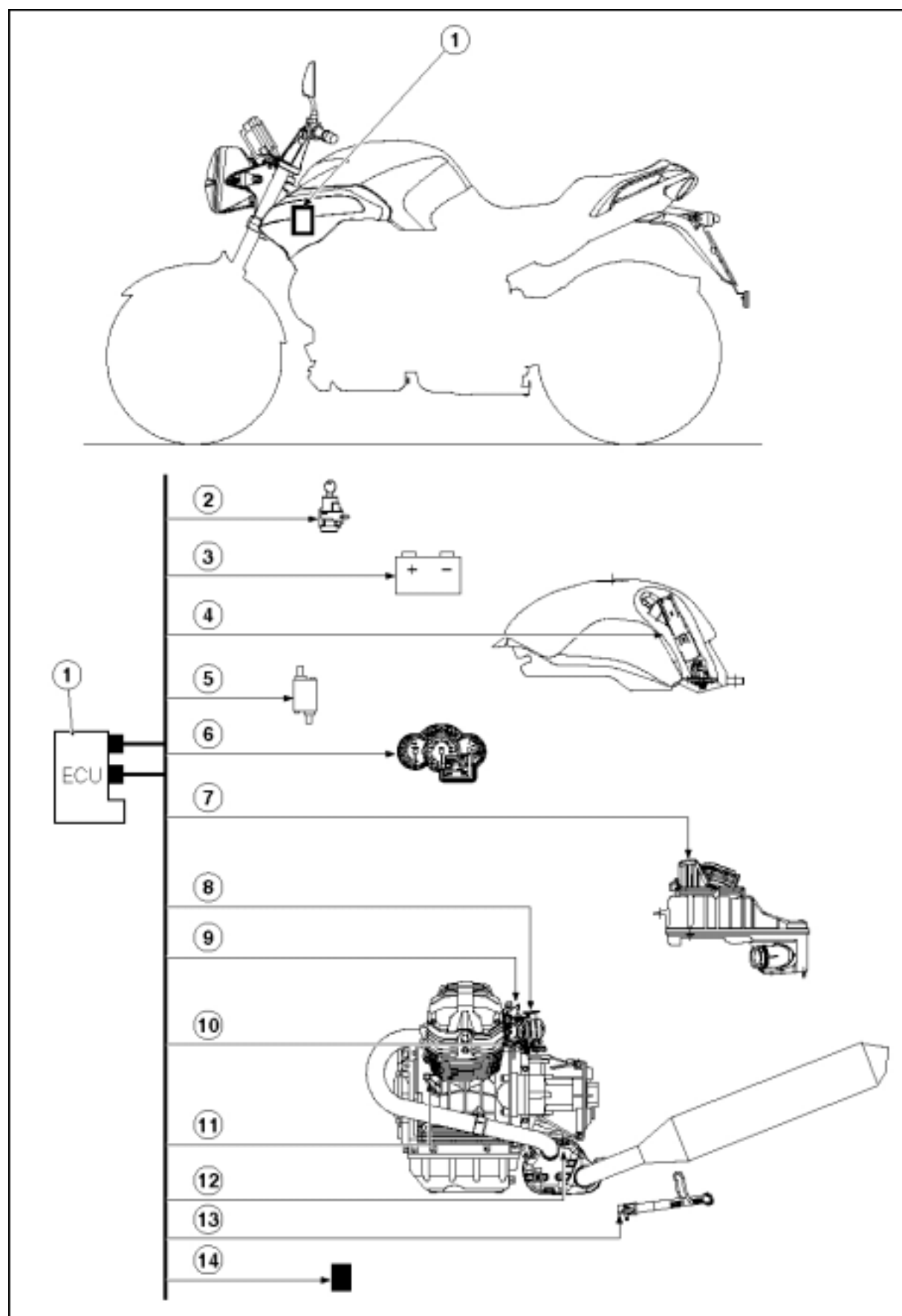


- Raise the air box and remove the fuel vacuum hose.
- Remove the air box.



3.2. INJECTION

3.2.1. INJECTION SYSTEM DIAGRAM



Key:

1. Electronic control unit
2. Ignition switch
3. Battery
4. Fuel pump
5. Coils
6. Instrument panel
7. Air temperature sensor
8. Throttle position sensor
9. Injectors
10. Engine temperature sensor
11. Crankshaft position sensor
12. Oxygen sensor
13. Side stand
14. Bank angle sensor

ENGINE

4

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4.1. REMOVING AND REFITTING THE ENGINE

4.1.1. REMOVING THE ENGINE

- Before removing the engine, first remove the air box, the sump guard and disconnect the battery.
- Remove the swingarm together with the bevel gears.



- Disconnect the spark plug caps.



- Disconnect the injector connectors.



- Disconnect the throttle cables.



- Disconnect the stepper motor connector.



- Disconnect the connector on the end of the engine temperature sensor.



- Disconnect the connector on the end of the throttle position sensor.



- Disconnect the connector on the end of the rpm sensor.



- Disconnect the generator connector.



- Disconnect the connector on the end of the neutral sensor.



- Release and remove the two screws.
- Remove the starter motor protection.



- Loosen and remove the screw.
- Disconnect the ground cables.



- Disconnect the starter motor connectors.



- Disconnect the oxygen sensor connector.



- Prepare a container.
- Release the clutch bleed hose.
- Drain all clutch fluid.



- Loosen and remove the clutch fluid hose screw, set aside the washer.
- Release the clutch hose.



- Disconnect the horn connectors.



- Loosen and remove the radiator top stud bolt.



- Loosen and remove the lower pin nut, set aside the washer.



- Remove the lower pin, set aside the washer.



- Remove the center stand.



- Loosen the clamp.



- Loosen and remove the screws and set aside the washers.



- Remove the exhaust manifolds.



- Remove the catalytic converter.



- Fit the engine support stand.
- Working on either side, loosen and remove the front screw.
- Remove wiring ties.



- Loosen and remove the two oil vapor hose screws.
- Move aside the oil vapor hose.



- Ask for the assistance of another person, loosen and remove the engine top nut, set aside the washer.



- Remove the upper pin, set aside the washer.



- Partially lower the engine.
- Disconnect the connector on the end of the oil pressure sensor.
- Completely lower the engine.



4.1.2. REFITTING THE ENGINE

- Secure the vehicle frame to a lift, lift the engine and set in position.
- During this operation, restore the oil pressure transmitter connection.



- Install the upper pin with washer.



- Fit the washer and tighten the engine top nut to the specified torque.



- Fit the oil vapor hose.
- Tighten the two screws.



- Working on either side, tighten the front screw.



- Refit the catalytic converter.



- Fit the exhaust manifolds.



- Fit the washers and tighten the nuts



- Tighten the clamp.



- Position the center stand.



- Fit the lower pin with washer.



- Fit the washer and tighten the engine bottom nut to the specified torque.



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- Position the oil cooler.
- Tighten the top stud bolt



- Connect the horn connectors.



- Secure the clutch fluid hose using the screw and washers.



- Fit the clutch bleed hose.
- Fill the clutch system with fluid.



- Connect the oxygen sensor connector.



- Fit the starter motor connector.
- Tighten the nut and fit the rubber cap.



- Fit the ground cables.



- Tighten the screw.



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- Fit the starter motor protection.
- Tighten the two screws.



- Connect the connector on the end of the neutral sensor.



- Connect the generator connectors.



- Connect the connector on the end of the rpm sensor.



- Connect the connector on the end of the throttle position sensor.



- Connect the connector on the end of the engine temperature sensor.



- Connect the stepper motor connector.



- Correctly route the throttle cables and adjust play.



- Connect the injector connectors.



- Connect the four spark plug caps.



- Refit the complete swingarm, the reinforcement bar, the connecting rods, the brake caliper and the rear wheel.



4.1.3. TIGHTENING TORQUE SETTINGS

DESCRIPTION	QUANTITY	SCREW / NUT	TIGHTENING TORQUE (Nm)	NOTE
FRAME				
ECU + coil plate fasteners	2+4	M6x20	10	-
ECU fasteners	2	M6x35	10	-
Fasteners for tank rubber blocks to frame	2	M8x12	25	-
Gearbox-to-frame fastening	1+1	M12	80	-
Coil fastener	8	M4x25	2	-
Engine fastener	2	M12x50	80	-
Left and right footrest plate upper fastener to frame	4	M8x30	20	-
Right footrest lower fastener to frame	2	M8x40	30	-
Left footrest lower fastener to frame	2	M8x55	30	-
Right/left protection cover fastener	4	M5x9	6	-
Plate ring-to plate-fastener	6	M5x10	6	-
Grab handle-to-frame fastening	2	M8x25	25	-
Cover-to-grab handle fastening	2	M8x12	25	-

CYCLE PARTS

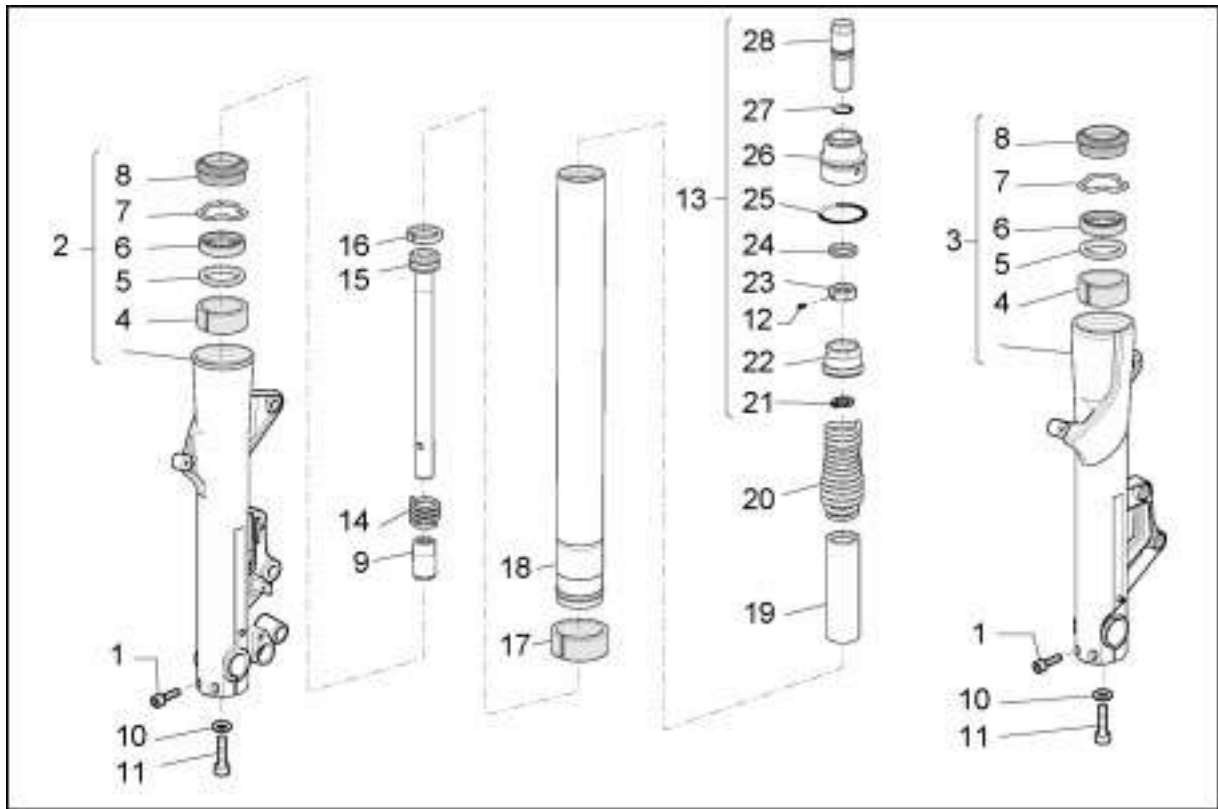
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5.1. FRONT FORK

5.1.1. DIAGRAM



Key:

1. Screw
2. Right sleeve
3. Left sleeve
4. Upper bushing
5. Retainer
6. Seal
7. Snap ring
8. Dust seal
9. Buffer
10. Washer
11. Screw
12. Dowel
13. Complete plug
14. Counter spring
15. Complete damper rod
16. Ring
17. Lower bushing
18. Rod
19. Preload tube
20. Spring
21. Snap ring
22. Bushing
23. Nut
24. Fifth wheel
25. O-ring
26. Plug body
27. O-ring
28. Adjuster

5.1.2. REMOVING THE FORK LEGS

- Loosen the front mudguard screws and remove it.
- Loosen the speed sensor screw, remove the wiring ties.
- Remove the speed sensor.
- Loosen the front caliper screws and remove the calipers.
- Support the vehicle front end.
- Remove the wheel shaft nut.
- Set aside the washer.



- Loosen the wheel shaft pinch bolts.



- Lightly tap with a mallet on the wheel shaft so as to let the holes come out on the opposite side.



- Remove the wheel shaft with a screwdriver inside the shaft holes.



- During this operation, support and remove the wheel.



- Set aside the front wheel spacer on the right side.



- Support the fork and loosen the top and bottom yoke screws.



- Slide out the fork leg.



5.1.3. CHANGING THE FRONT FORK FLUID

NOTE The operations below apply to both fork legs.

Periodically change the fork fluid, see (REGULAR SERVICE INTERVALS CHART).

NOTE During oil drainage and filling operations, the fork leg and its inner parts should be clamped in a vice; be careful not to tighten excessively or damage them; always use aluminum safety protections.

EXHAUST

Drain fluid as follows:

- Remove the fork, see (REMOVING THE FORK LEGS).
- Loosen the complete top cap. The loose plug might pop off due to the spring force.
- Do not damage the O-ring during removal.
- Push the rod inside the sleeve.
- Remove the spring.



- Let oil drain off completely.
- Set aside the preload tube.



NOTE Push the rod inside the sleeve so that oil will flow out more easily.



- Carefully check every part of the leg and make sure nothing is damaged.
- Fill the rod with fluid only if parts are in good condition; replace any damaged or worn parts.

FILLING:

- Tighten the sleeve in a vice.
- Pour oil inside.

Quantity of oil (per leg): $400 \pm 2.5 \text{ cm}^3$ ($24.4 \pm 0.15 \text{ in}^3$).

- Pump the tube, make sure oil has completely filled the damper rod.



- Install the preload tube and the spring.



- Start the plug onto stanchion tube, pay attention not to damage O-ring.



- Tighten cap to the specified torque.



5.1.4. DISASSEMBLING THE FORK LEG

- Drain all oil from the stanchion, see (CHANGING THE FRONT FORK FLUID).
- Tighten the sleeve in a vice.
- Loosen the bottom screw and remove it with its gasket.



- Remove the dust seal, pry with a screwdriver.

**WARNING**

Be careful not to damage the sleeve edge and the dust seal.



- Pull up the dust seal to remove it.



- Remove the snap ring from inside the sleeve using a screwdriver.

**WARNING**

Be careful not to damage the sleeve edge.



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- Slide out the stanchion from the sleeve together with the lower bushing, the seal, the retainer, the top bushing and the complete damper.

NOTE It is possible that some parts stay inside the sleeve while sliding the rod out of the sleeve; in this case it will be necessary to remove them. Pay attention not to damage the sleeve edge and the top bushing seat.



5.1.5. CHECKING THE COMPONENTS**STANCHION**

Inspect the sliding surface for scoring and/or scratching.
Eliminate minor scoring with wet sand paper (grain size 1).
Replace the stanchion if badly scored.
Check for stanchion buckling using a dial gauge.
Replace the stanchion if buckled beyond the service limit.

Buckling limit: 0.2 mm (0.00787 in).

**DANGER**

NEVER attempt to straighten a buckled stanchion as this would weaken the overall structure leading to a dangerous riding condition.

SLIDER

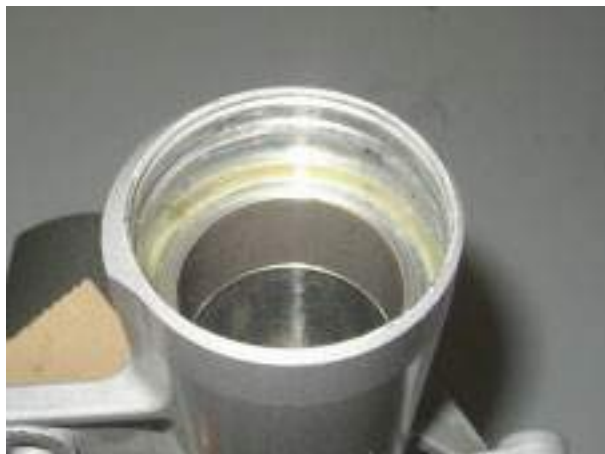
Inspect for damage and/or cracking. Replace if damaged.

SPRING

Check spring condition.

Check the condition of the following parts:

- upper bushing;



- lower bushing;



- damper rod.
- Change any component which is badly worn or damaged.

**WARNING**

Remove from the bushing any possible impurities, pay attention not to damage the surface.



When reassembling, replace the following components with new ones:

- seal;



- dust seal;



- O-ring in the cap.



5.1.6. REASSEMBLING THE FRONT FORK

**WARNING**

All components should be carefully washed and blown dry with compressed air before refitting.

- Overhaul, where necessary.
- Install the damper unit with counter spring and ring in the sleeve.
- Ensure that the top guide bushing is fitted in the sleeve.
- Fit the bottom sliding bushing in its seat in the fork leg.
- Refit the leg in the sleeve, push fully home.
- Screw the bottom screw with gasket and tighten to the specified torque.



- Fit the retainer and the lubricated seal.
- Using a suitable drift, push the seal fully home in the sleeve.



- Insert the snap ring.



- Fit the dust seal.
- Pour some oil inside the leg and make sure it fills up all inner channels of the damper rod.
- Pump the rod. Make sure oil has completely filled the damper rod.
- Install the spring and the preload tube.
- Start the plug onto fork leg. Pay attention not to damage the O-ring.
- Tighten the cap to the specified torque.



5.1.7. INSTALLING THE FORK LEGS

- Install the fork leg.
- Install the wheel shaft so that fork legs are aligned.
- Tighten the screws onto the fork plates to the specified torque.



- Slide out the wheel shaft.
- Position the wheel together with spacer on the right side.
- Install the pin.



- Tighten the clamp screws (nut side) to lock the wheel shaft.



- Fit the washer on the wheel shaft.
- Tighten the wheel shaft securing the nut to the specified torque.
- Work the fork to make sure that the fork legs are aligned.



- Tighten the wheel shaft clamp screws to the specified torque.



- Fit the brake calipers and tighten the screws to the specified torque.

**WARNING**

After installing the brake calipers, pull the front brake lever a few times



- Fit the speed sensor.
- Tighten the speed sensor screw.
- Secure the speed sensor wiring using ties.



- Fit the front mudguard.



5.1.8. TIGHTENING TORQUE SETTINGS

DESCRIPTION	QUANTITY	SCREW / NUT	TIGHTENING TORQUE (Nm)	NOTE
FRONT SUSPENSION				
Speed sensor fastener	1	M6x16	10	-
Hose plate to bottom yoke fastener	2	M5x16	6	-
Fork leg to bottom/top yoke screw	6	M8x25	25	-
Steering tube ring nut	1	M35x1	40	-
Steering stem locking ring nut	1	M35x1	manual + 90 degrees	-
Top yoke retaining cap	1	M29x1	100	-
Fork hubs plugs	2+2	M6	10	-

5.2. ADJUSTING BEARING PLAY

5.2.1. ADJUSTING BEARING PLAY

- Loosen the top bolt on the steering tube.
- Working on both handlebars, remove the bottom screw fastening fork plate.
- Working on both handlebars, remove the two top screws fastening the fork plate.
- Remove both handlebars, leave them attached to the cables.



- Working on either side, remove the screw securing the cover below the instrument panel.



- Raise the instrument panel cover. Pay attention not to force hazard button cables and temperature sensor cables.



- Remove the top screw securing the headlight subframe.



- Working on either side, remove the screw securing the headlight subframe to the bottom yoke.



- Move the headlight subframe forward a few centimeters, together with the headlight and instrument panel.



- Working on either side, remove the screw securing the fork legs to the steering head.



- Slide out the steering head, moving it toward the instrument panel.



- Bend the safety washer onto steering tube.



WARNING
When refitting, replace the safety washer with a new one.



- Loosen the top ring nut.

**WARNING**

When refitting, tighten the top ring nut finger-tight and then slightly force until the ring nut grooves are aligned.



- Remove the safety washer.



NOTE Prepare the suitable special tool (*OPT*):

AP8140190 (tool for steering tightening)

- Set steering bearing preload using the special tool.



5.2.2. TIGHTENING TORQUE SETTINGS

DESCRIPTION	QUANTITY	SCREW / NUT	TIGHTENING TORQUE (Nm)	NOTE
FRONT SUSPENSION				
Speed sensor fastener	1	M6x16	10	-
Hose plate to bottom yoke fastener	2	M5x16	6	-
Fork leg to bottom/top yoke screw	6	M8x25	25	-
Steering tube ring nut	1	M35x1	40	-
Steering stem locking ring nut	1	M35x1	manual + 90 degrees	-
Top yoke retaining cap	1	M29x1	100	-
Fork hubs plugs	2+2	M6	10	-

5.3. FRAME

5.3.1. LEFT FOOTREST PLATE

- To remove the left footrest plate first secure the vehicle front end using the low front stand (**OPT**) and the vehicle rear end using slings and a hoist.
- Remove the left side body panel, see (REMOVING THE FUEL TANK).



- Loosen and remove the two screws.
- Remove the gear shift lever cover.



- Loosen the gear shift lever screw.



- Slide out the gear shift lever, set aside the shim and O-ring.



- Loosen and remove the two upper screws.

**WARNING**

Make sure you place the screws in the correct position: the shortest one is at the rear.



- Loosen and remove the two lower screws, set aside the nuts.



- Move the left footrest plate and release the gear shift transmission.
- Remove the left footrest plate.



5.3.2. RIGHT FOOTREST PLATE

- To remove the right footrest plate, first secure the vehicle front end using the low front stand (**OPT**) and the vehicle rear end using slings and a hoist.
- Remove the right side body panel, see (REMOVING THE FUEL TANK).



- Loosen and remove the two lower screws, set aside the nuts.



- Loosen and remove the two screws.
- Remove the rear brake caliper from the disc.



- Loosen and remove the four screws of the rear brake hose guides.



- Loosen and remove the two upper screws.

**WARNING**

Make sure you place the screws in the correct position: the shortest one is at the rear.



- Disconnect rear brake lever switch connector.



- Remove the right footrest plate.



5.3.3. TIGHTENING TORQUE SETTINGS

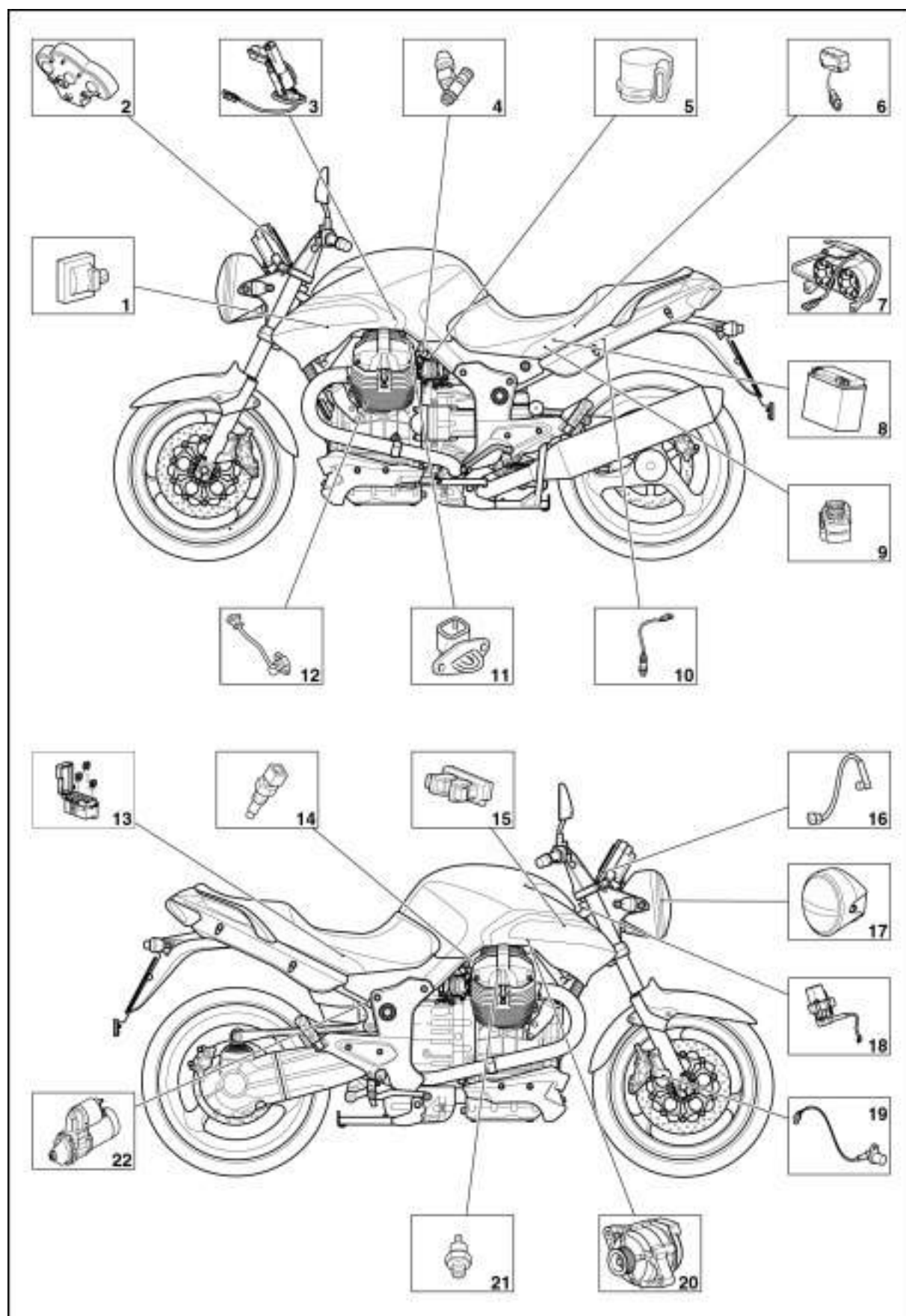
DESCRIPTION	QUANTITY	SCREW / NUT	TIGHTENING TORQUE (Nm)	NOTE
FRAME				
ECU + coil plate fasteners	2+4	M6x20	10	-
ECU fasteners	2	M6x35	10	-
Fasteners for tank rubber blocks to frame	2	M8x12	25	-
Gearbox-to-frame fastening	1+1	M12	80	-
Coil fastener	8	M4x25	2	-
Engine fastener	2	M12x50	80	-
Left and right footrest plate upper fastener to frame	4	M8x30	20	-
Right footrest lower fastener to frame	2	M8x40	30	-
Left footrest lower fastener to frame	2	M8x55	30	-
Right/left protection cover fastener	4	M5x9	6	-
Plate ring-to plate-fastener	6	M5x10	6	-
Grab handle-to-frame fastening	2	M8x25	25	-
Cover-to-grab handle fastening	2	M8x12	25	-

ELECTRICAL SYSTEM

6

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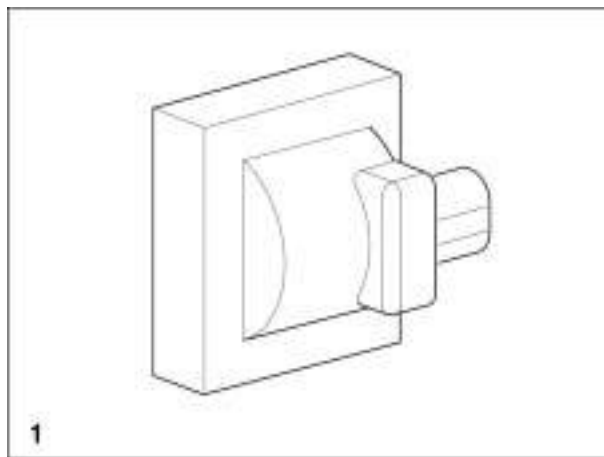
6.1.	ELECTRIC SYSTEM	3
6.1.1.	ELECTRIC COMPONENTS	3
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6.1. ELECTRIC SYSTEM**6.1.1. ELECTRIC COMPONENTS**

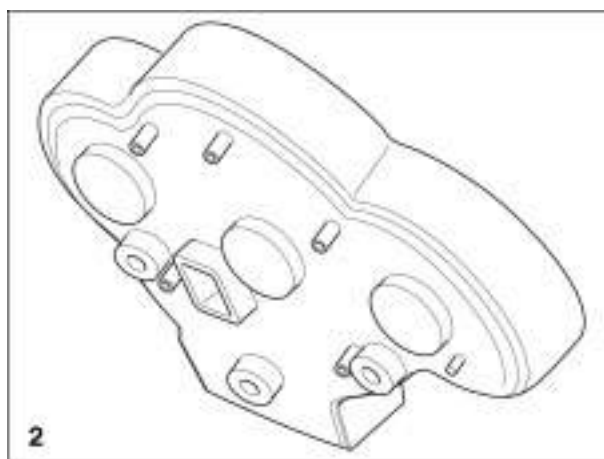
1 Coil

primary resistance: 0.9 – 1.1 Ω (measured across pins 1 and 15)

secondary resistance: 6.5 – 7.2 K Ω .

**2 Instrument panel**

Pin	Service
1	+ Key
2	Right turn indicator control
3	Oil sensor
4	High beam input
5	-
6	Select 1
7	Select 2
8	Fuel sensor
9	Air temperature sensor
10	-
11	+ Battery
12	Left turn indicator control
13	-
14	Hazard
15	Antitheft LED (if connected)
16	Select 3
17	Sensor ground
18	General ground
19	General ground
20	General ground
21	+ Battery
22	+ Battery
23	Low beam relay actuation
24	-
25	Heated handgrip control
26	CAN L
27	CAN H
28	K-line
29	-
30	Antenna 1
31	-
32	-
33	-
34	Rear right turn indicator actuation
35	Front right turn indicator actuation
36	Rear left turn indicator actuation
37	Front left turn indicator actuation
38	Left heated handgrip actuation
39	Right heated handgrip actuation
40	Antenna 2



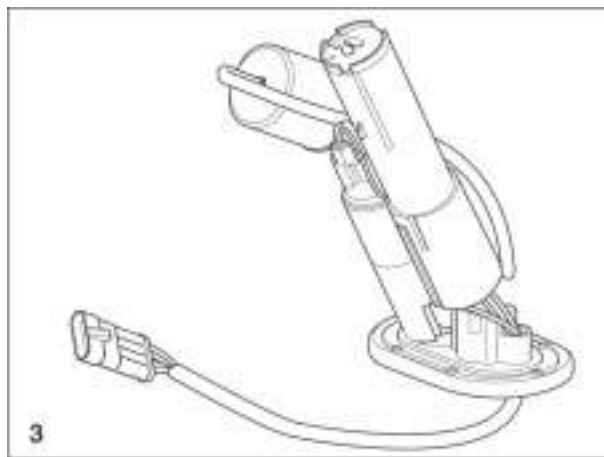
3 FUEL PUMP

Fuel pump:

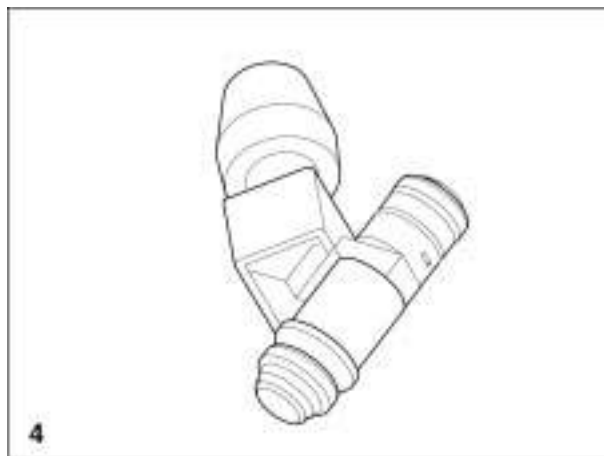
Power input: 3.5 A (to be measured across pins 1 and 2 with 12V)

Fuel sensor

Resistance: 250-300 Ω (to be measured across pins 3 and 4 with fuel level equal to 0 liters)

**4 INJECTOR**

Resistance: $14\Omega \pm 2\Omega$ measured at 20°C (68°F)

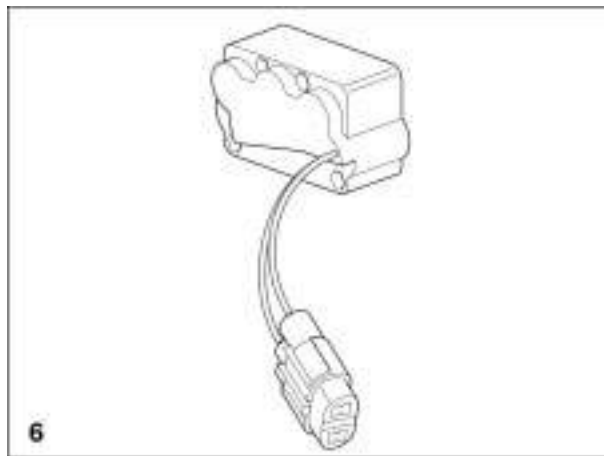
**5 THROTTLE POSITION SENSOR**

output voltage 0.55-4.4 V (variable according to throttle position to be measured across pins C and A)

**6 BANK ANGLE SENSOR**

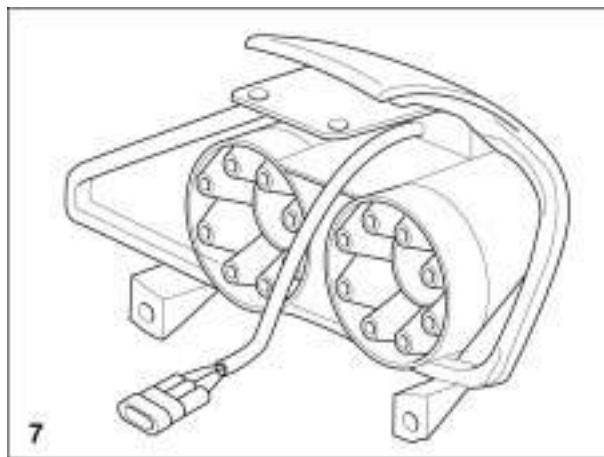
NO contact

Resistance: 0 Ω when turning the sensor by 90° with respect to assembly position.

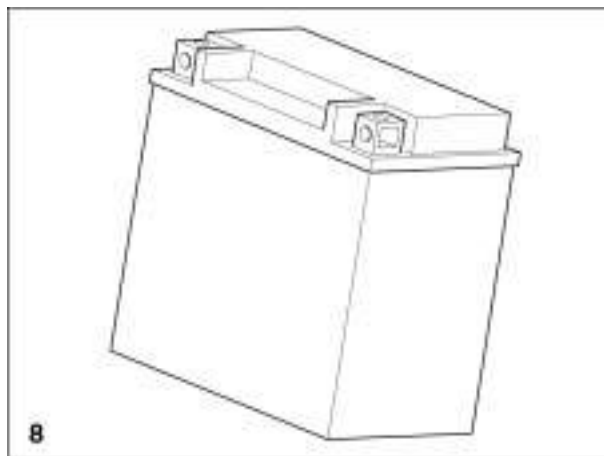


7 TAIL LIGHT

LED

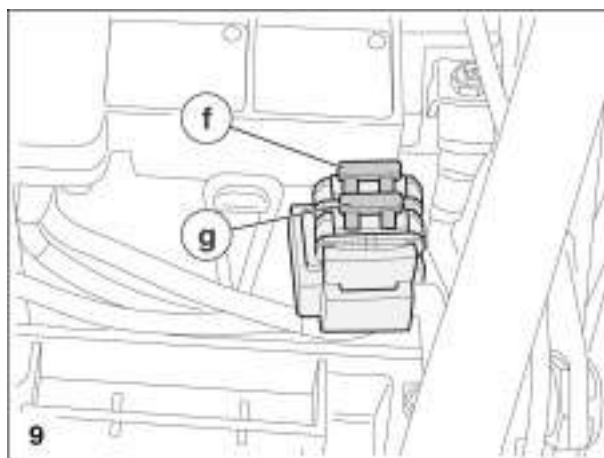
**8 Battery**

12 V – 18 Ampere/hour

**9 MAIN FUSES**

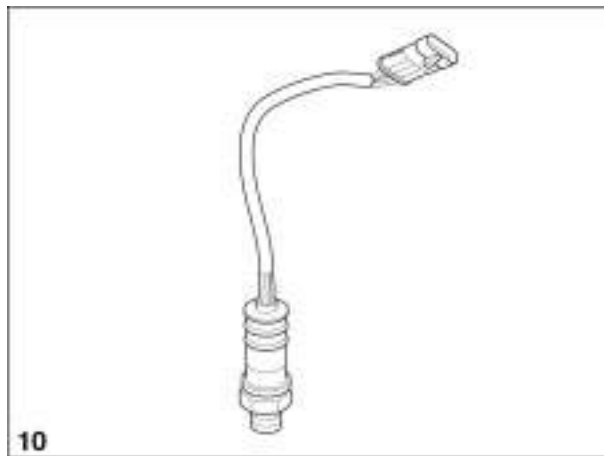
f - From battery to voltage regulator (30 A).

g - From battery to key and auxiliary fuses c - d (30 A).

NOTE There is one spare fuse.**10 OXYGEN SENSOR**

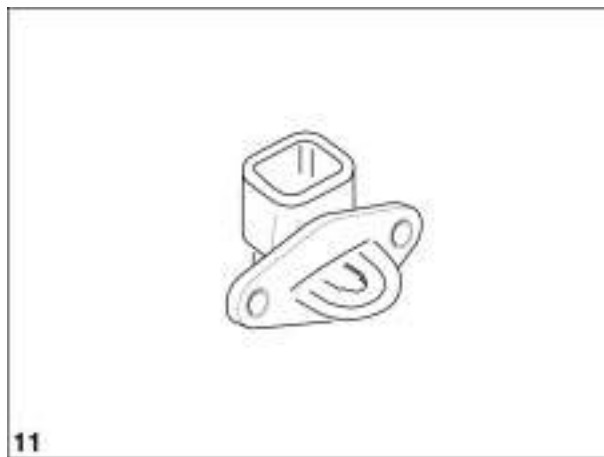
Oxygen sensor with heater.

Sensor voltage between 0 and 0.9 V (to be measured across pins 1 and 2).

Heater resistance 12.8 Ω (to be measured across pins 3 and 4 at 20°C – 68°F).

11 INTAKE AIR TEMPERATURE SENSOR

NTC-type sensor

resistance: 3.7 K Ω (at 20°C – 68°F)**12 ENGINE SPEED SENSOR**

inductive-type sensor, with shielding cable.

Winding resistance: 650 Ω (to be measured across pins 1 and 2).

Output voltage: 0-5 V (to be measured when cranking).

Air gap: 0.5 – 0.7 mm (0.0197 – 0.0276 in).

**13 AUXILIARY FUSES**

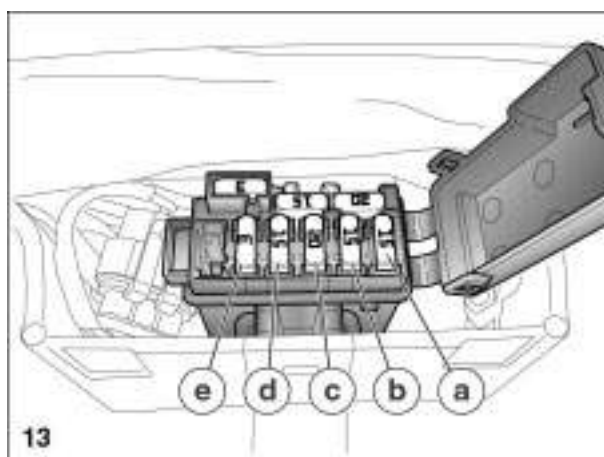
a – Stop, horn, Hazard button illumination, light relay coil (15 A).

b – Parking lights, starter relay coil, passing (15 A).

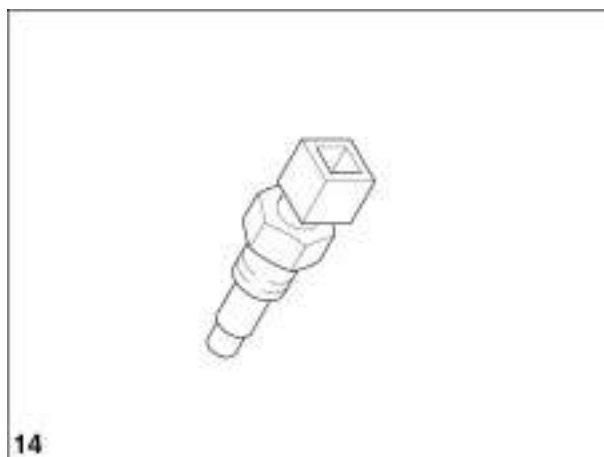
c – Fuel pump, coils, injectors (20 A).

d – Lambda heater, secondary injection relay coil, starter relay coil, speed sensor power supply (15 A).

e – Permanent positive, ECU power supply (3A).

NOTE There are three spare fuses (3, 15, 20 A).**14 HEAD TEMPERATURE SENSOR**

NTC-type sensor

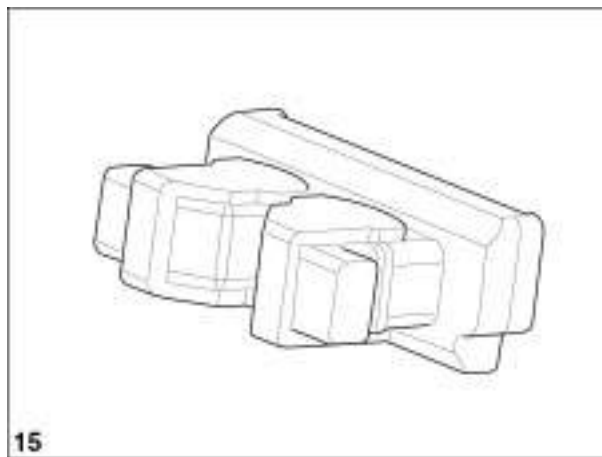
resistance: 3.7 K Ω (at 20°C – 68°F)resistance: 220 Ω (at 100°C – 212°F)

15 ECU

Model: Magneti Marelli IAW 5 AM2

Black connector pinout (engine)

Pin	Service
1	Not used
2	Not used
3	TPS signal
4	Not used
5	Engine temperature signal
6	Not used
7	Not used
8	Not used
9	Stepper motor (+)
10	Right cylinder coil control
11	Not used
12	Not used
13	Not used
14	Air temperature signal
15	Not used
16	Not used
17	Stepper motor (+)
18	Stepper motor (-)
19	Stepper motor (-)
20	Power supply 5V (NTC sensors)
21	Not used
22	Not used
23	Neutral sensor signal
24	Not used
25	Engine speed sensor signal
26	Not used
27	Not used
28	Left cylinder injector control
29	TPS power supply
30	Not used
31	Not used
32	TPS negative
33	Not used
34	Rpm sensor wave trap
35	Engine speed sensor signal
36	Not used
37	Right cylinder injector control
38	Left cylinder coil control

**Grey connector pinout (chassis)**

Pin	Service
1	Starter relay control pin 85
2	Not used
3	Not used
4	Protected power supply from instrument panel
5	Not used
6	Secondary relay control pin 86
7	Immobilizer line
8	Starter relay control pin 85
9	Not used
10	Not used
11	Oxygen sensor negative control
12	Not used
13	Not used
14	Not used
15	Not used
16	K line (diagnosis)
17	Power supply from main relay

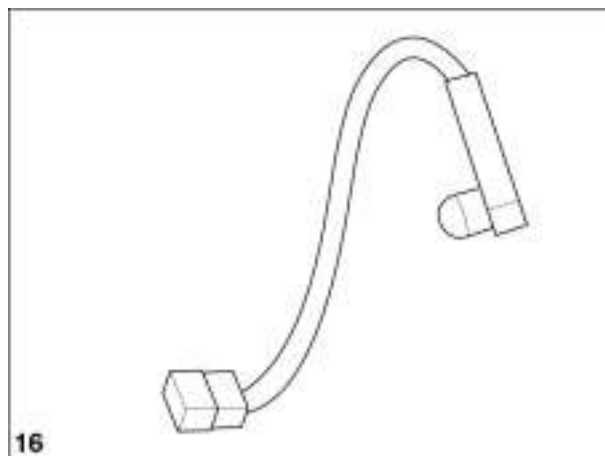
continued

Pin	Service
18	Not used
19	Not used
20	CAN – H line (ECU/instrument panel)
21	Not used
22	Oxygen sensor signal
23	Not used
24	Vehicle speed signal input
25	Not used
26	Not used
27	"Engine stop" signal input
28	Starting signal input
29	CAN – L line (ECU/instrument panel)
30	Not used
31	Not used
32	Oxygen sensor power supply
33	Clutch sensor signal
34	Not used
35	Bank angle sensor signal
36	Not used
37	Not used
38	Side stand sensor signal

16 INSTRUMENT PANEL AIR TEMPERATURE SENSOR

Resistance: 32.5 k Ω (at 0°C – 32°F)

Resistance: 10 k Ω (at 25°C – 77°F)



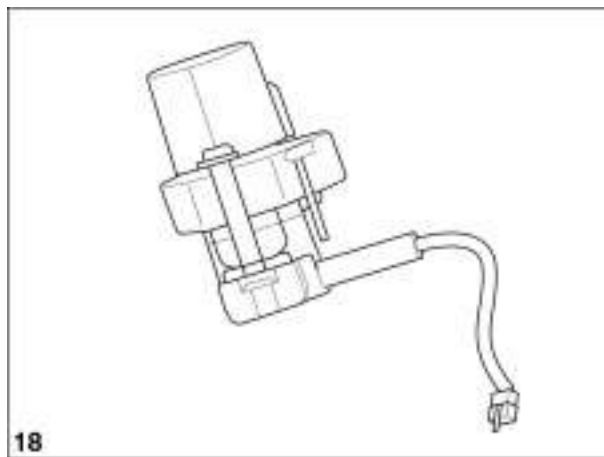
17 Headlight

Parking light: 12V 5W

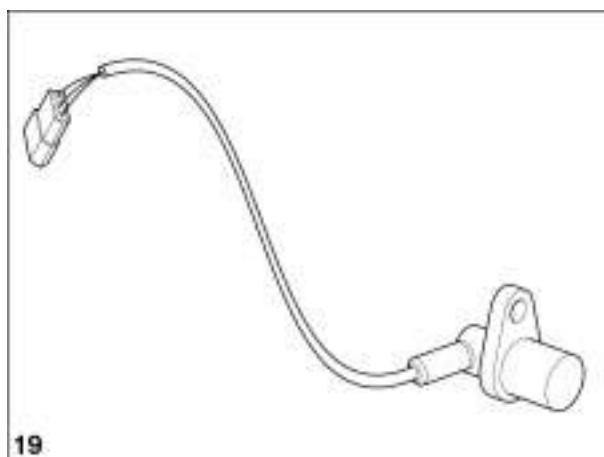
Low beam: 12V 55W H7

High beam: 12V 65W H9

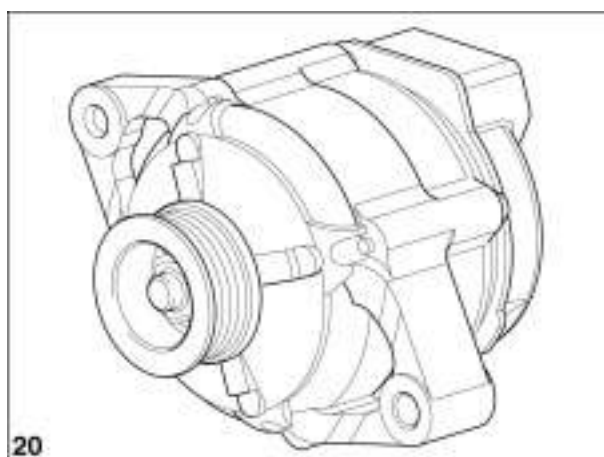


18 IMMOBILIZER ANTENNA**19 SPEED SENSOR**

Active inductive sensor
3-pin connector (Power supply – Signal - Ground)

**20 GENERATOR**

Single-phase generator with regulated voltage
Maximum charge 40A (550W)
Charge voltage 14.2 - 14.8 V (5000 rpm)

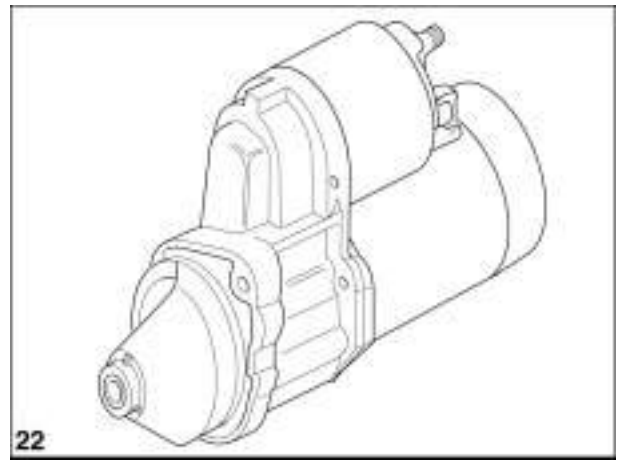
**21 OIL PRESSURE SENSOR**

NO contact

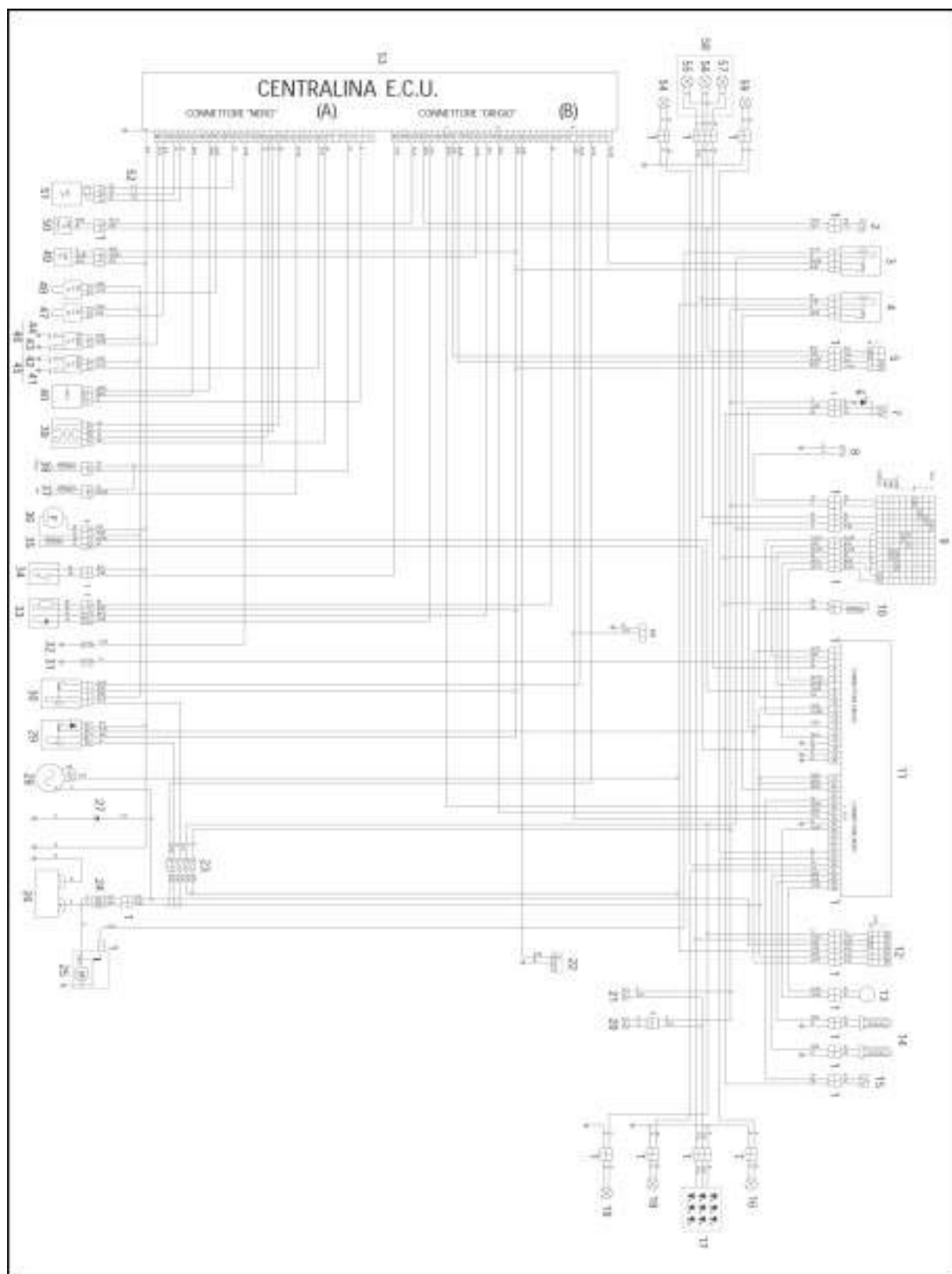


22 STARTER MOTOR

starting input: about 100 A



6.1.2. WIRING DIAGRAM



Key:

1. Multiple connectors
2. Clutch switch
3. Starter relay
4. Light relay
5. Right dimmer switch
6. HAZARD button LED
7. HAZARD button
8. Warning horn
9. Left dimmer switch
10. Instrument panel air temperature thermistor
11. Instrument panel
12. Key-operated switch
13. Immobilizer antenna
14. Heated handgrips
15. Heated handgrip control
16. Rear right turn indicator
17. Tail light (LED)
18. Rear left turn indicator
19. License plate light
20. Rear brake switch
21. Front brake switch
22. Diagnosis connector
23. Auxiliary fuses
24. Main fuses
25. Starter motor
26. Battery
27. Power outlet
28. Generator
29. Injection main relay
30. Injection auxiliary relay
31. Oil pressure sensor
32. Neutral switch
33. Oxygen sensor
34. Side stand switch
35. Fuel reserve sensor
36. Fuel pump
37. Intake air temperature thermistor
38. Head temperature sensor
39. Automatic choke
40. Throttle sensor
41. Right cylinder internal spark plug
42. Right cylinder external spark plug
43. Left cylinder internal spark plug
44. Left cylinder external spark plug
45. Right cylinder twin coil
46. Left cylinder twin coil
47. Right injector
48. Left injector
49. Speed sensor
50. Bank angle sensor
51. Flywheel pick-up
52. Pick-up cable shielding
53. ECU
54. Front left turn indicator
55. Parking light bulb
56. Low beam bulb
57. High beam bulb
58. Headlight
59. Front right turn indicator
60. Instrument panel diagnosis
61. –
62. –
63. –
64. –
65. –

Wire color coding:

Ar	Orange
Az	Light blue
B	Blue
Bi	White
G	Yellow
Gr	Gray
M	Brown
N	Black
R	Red
Ro	Pink
V	Green
Vi	Violet

TRANSMISSION

7

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7.1. SWINGARM

7.1.1. REMOVING THE SWINGARM

- Before removing the swingarm, first remove both footpeg plates and the exhaust silencer.
- Remove the cover.



- Engage the first gear.
- Loosen and remove the four screws, set aside the spacers.



- Loosen and remove the connecting rod nut, set aside the screw.



- Loosen and remove the reinforcement bar nut.
- Remove the screw.
- Secure the reinforcement bar to the frame using a clamp.



- Remove the dust cover clip.



- Loosen the two screws on the swingarm clamp.



- Loosen the ring nut.



Breva V1100

- Request the assistance of a second person, slide out the shaft and remove the swingarm together with the cardan joint.



7.1.2. CHECK

- Check that the cardan joint is in good condition, that the gear teeth engaging in the union grooves and the joint grooves are not damaged or worn. Replace the joint if necessary.
- Check that the rubber bellow is not cut or pierced. Replace if necessary.
- Check that the threadings of swingarm shafts and nuts are in good condition, and not damaged or flat. Replace them if necessary.
- Check that the union grooves are in good condition, and not damaged or worn. Replace if necessary.
- Check that the union outer teeth and inner grooves are not damaged.



7.1.3. REFITTING THE SWINGARM

- Smear some grease all along the swingarm shaft.
- Fit the ring nut to the swingarm shaft and tighten snugly.



- Support the swingarm, fit the cardan joint, match the holes and simultaneously fit the shaft completely with the assistance of a second person.
- Tighten the swingarm shaft.



NOTE Prepare the suitable special tool (OPT):

- **Guzzi** part# 05.91.26.30 (tool for tightening the swingarm shaft ring nut).
- Tighten the ring nut using the suitable box wrench.



- Tighten the two screws on the swingarm clamp.



- Fit the dust cover on gearbox.
- Secure the dust cover using a new clamp.



- Fit the reinforcement bar in its seat.
- Fit the screw.
- Tighten the reinforcement bar nut.



- Fit the connecting rod to the swingarm.
- Fit the screw.
- Tighten the connecting rod nut.



- Fit the rear wheel to the swingarm.
- Tighten the four screws with spacers.
- Fit the cover.



7.1.4. TIGHTENING TORQUE SETTINGS

DESCRIPTION	QUANTITY	SCREW / NUT	TIGHTENING TORQUE (Nm)	NOTE
SWINGARM				
Swingarm clamp-to-bushing fastening	2	6x25	10	-
Swingarm-to-bevel gear fastening	4	M10x35	50	-
Linkage-to-bevel gear fastening	1	M10x50	50	-
Linkage to frame fastener	1	M10x50	50	-
Swingarm shaft-to-swingarm fastener	1	M12x1.25	60	-
Preload bushing to swingarm shaft fastener	1	M25x1.5	10	-

7.2. TRANSMISSION BOX

7.2.1. REMOVAL

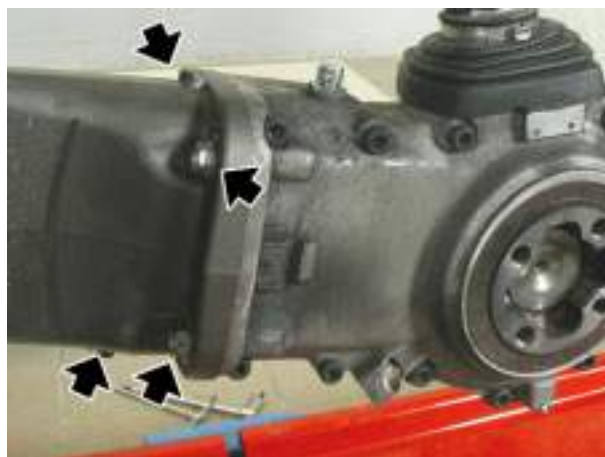
- Before removing the transmission box, first remove the exhaust silencer and the rear wheel.



- Loosen and remove the reinforcement bar nut.
- Remove the screw.
- Secure the reinforcement bar to the frame using a clamp.



- Loosen and remove the four screws.



- Remove the cardan joint and the transmission box.

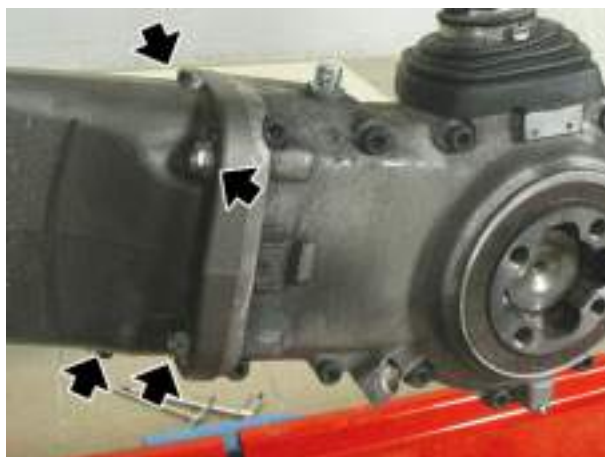


7.2.2. REASSEMBLY

- Fit the transmission box on the swingarm. Make sure that the cardan joint fits correctly.



- Tighten the four screws to the specified torque, following a cross pattern.



- Fit the reinforcement bar in its seat.
- Fit the screw.
- Tighten the reinforcement bar nut.

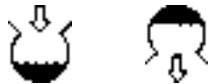
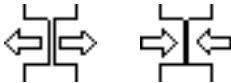


- Fit the rear wheel to the swingarm.
- Tighten the four screws with spacers.
- Fit the cover.

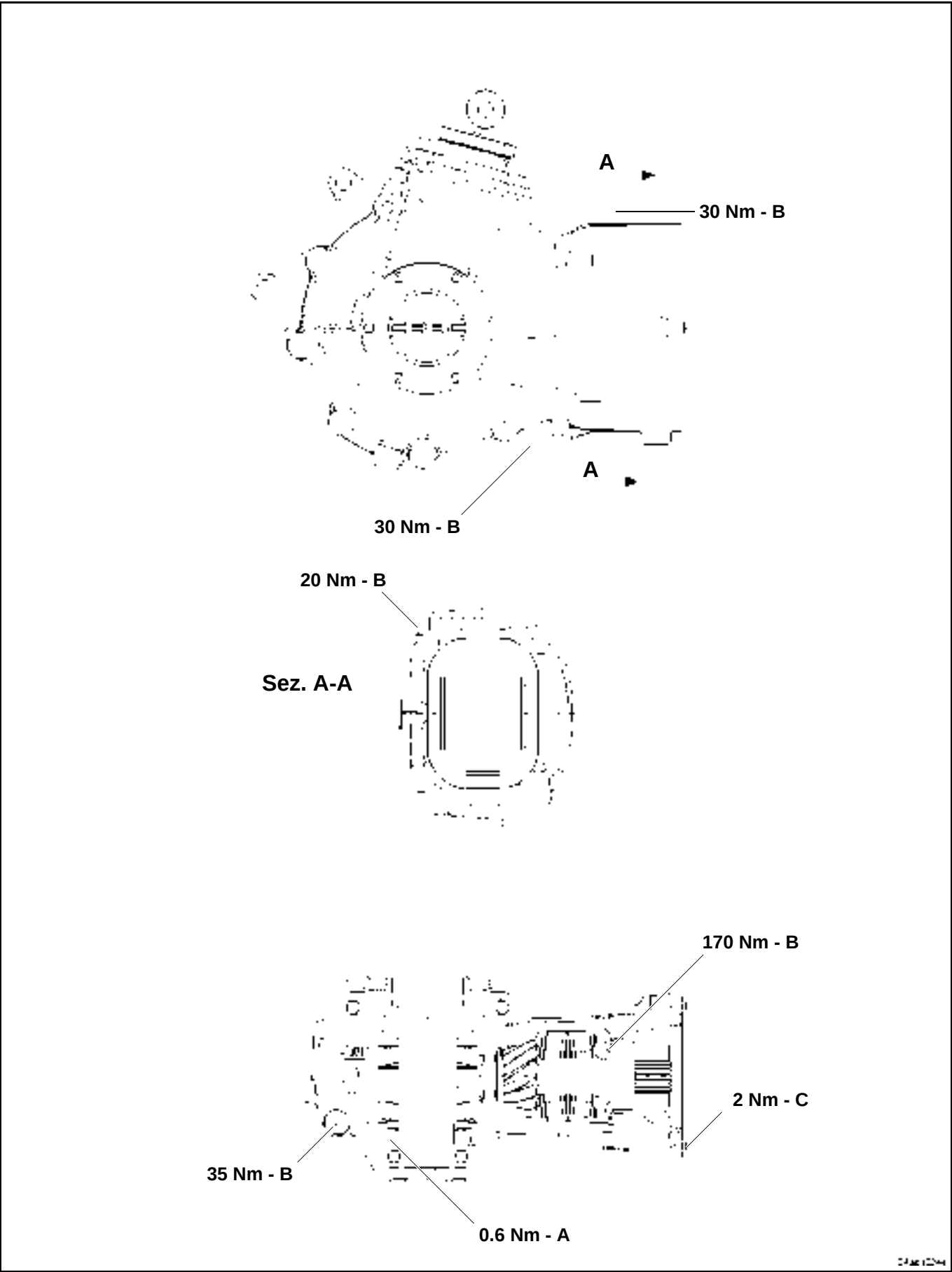


7.2.3 Disassembly

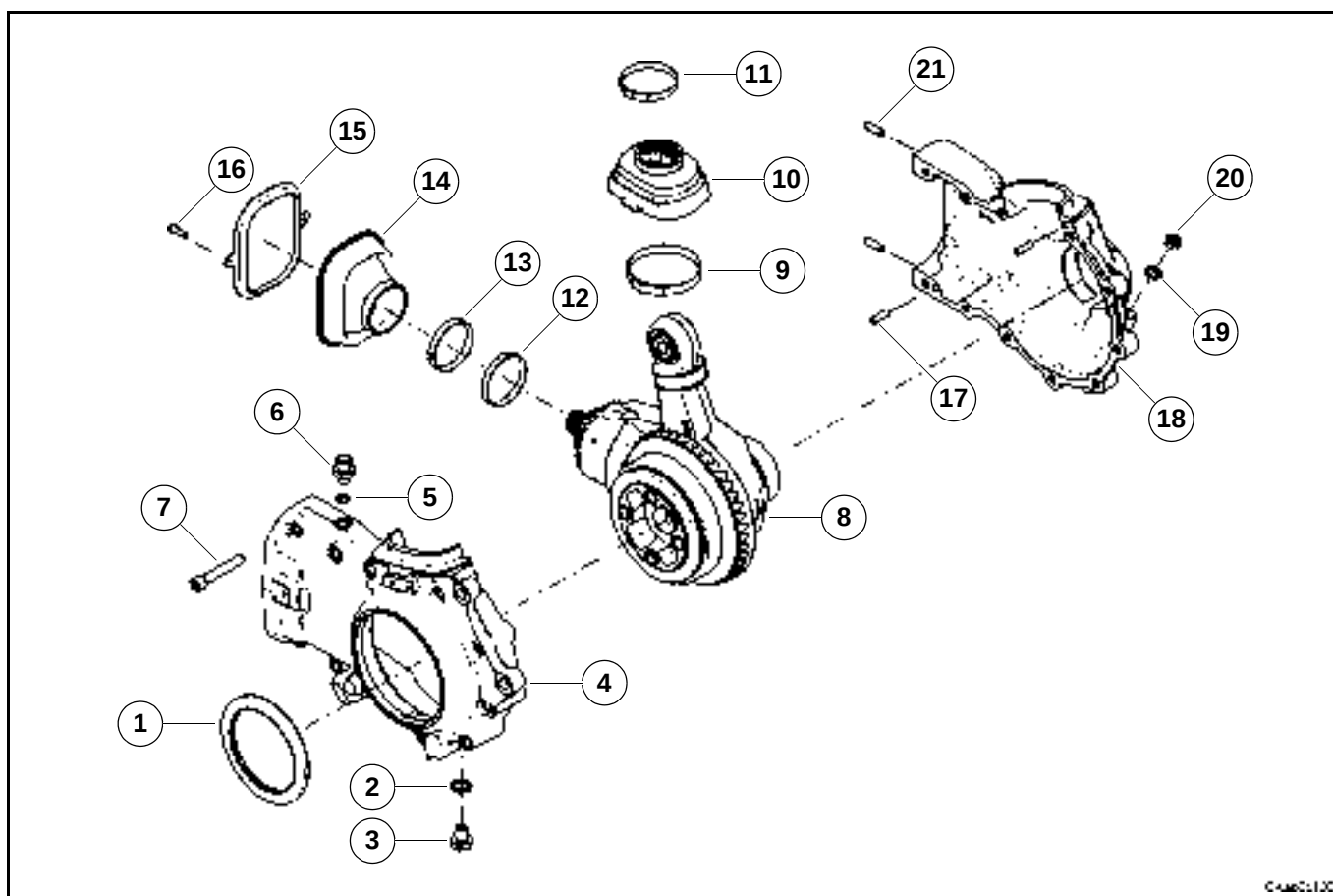
SYMBOLOLOGY

DESCRIPTION	SYMBOLS
WARNING/DANGER	
REMOVE/INSTALL seals-gaskets-filters	
OIL FILLING OR OIL LEVEL/OIL DRAIN	
LUBRICATION/GREASING	
ADJUSTMENTS/MEASUREMENTS tightening torques-preloads-backlash	
SPECIAL TOOLS	
SEALING/LOCKING FLUIDS APPLICATION	
MARKING	
DISASSEMBLY/ASSEMBLY OF BULKY PARTS OR SUBASSEMBLIES	
WARNING: respect assembly orientation	
CLEANING CAREFULLY	
APPLY PRESSURIZED FLUID	

TIGHTENING TORQUES



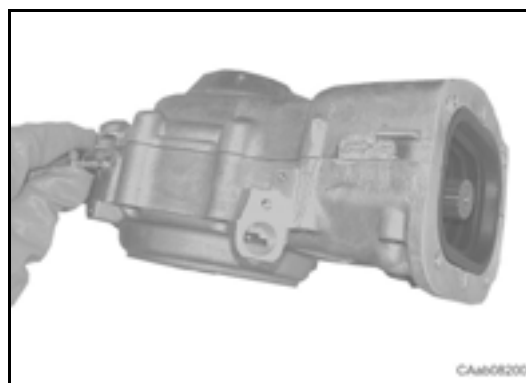
HOUSING GROUP



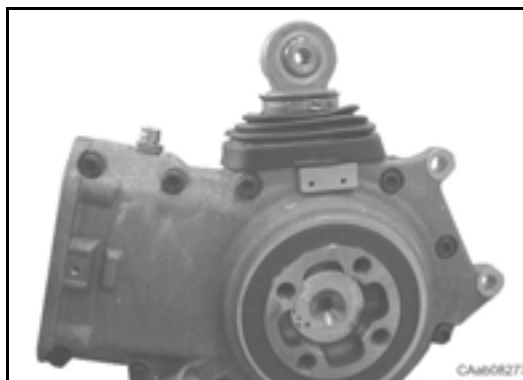
CAMEC 1100

DISASSEMBLY

Remove the plug (20).
Remove the plug (3) to drain the oil.

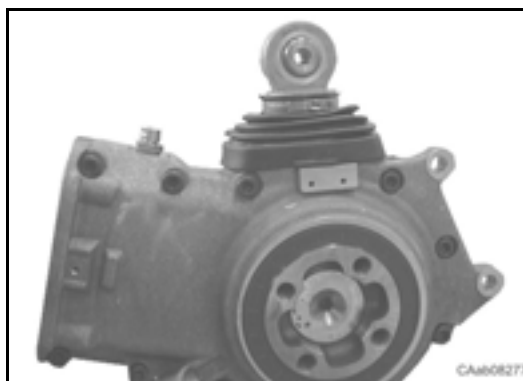


Lift the boot (10).



Remove the clamps (9) and (11).

Remove the boot (14).



Remove the screws (16).

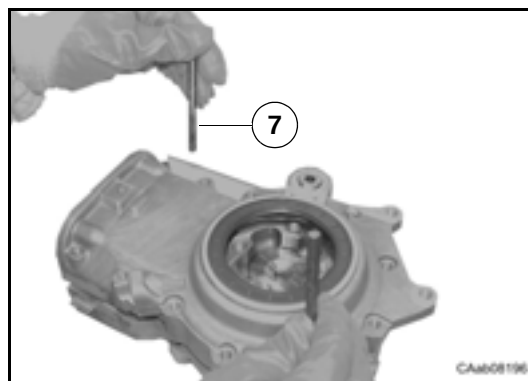


Set aside the ring (15).



Remove the bolts (7).

Remove the housing (4).



Remove the clamp (12).



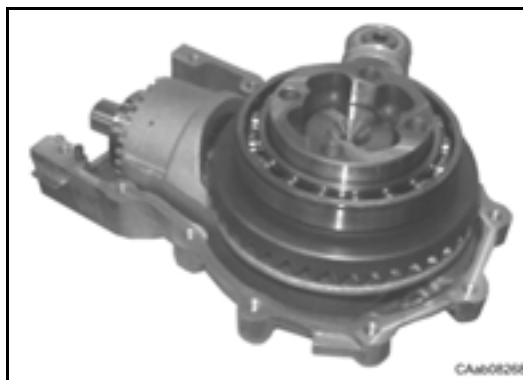
Remove the boot (14).



Set aside the ring (13).



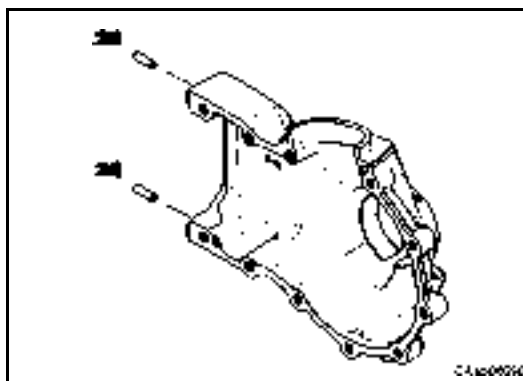
Remove the support group (8).



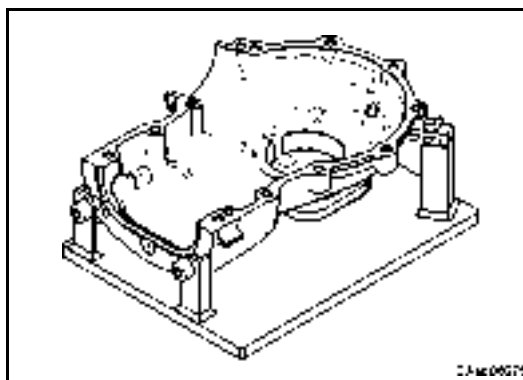
ASSEMBLY



Assemble the dowel pin (21) to the housing (18) with the special tool and a hammer.



Assemble the housing (18) on the special fastening tool.
Clean with care the housings contact surfaces.



Heat the housing (18).



Insert the support group (8) into the housing (18).



Assemble the ring (13) with the boot (14).



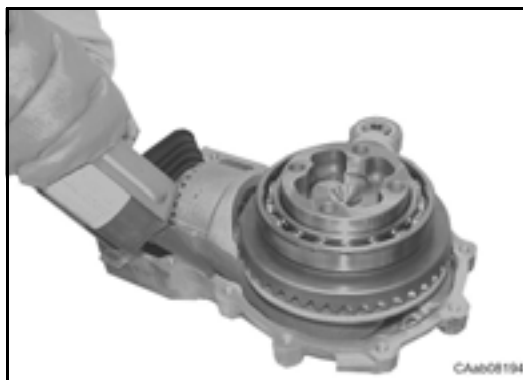
Assemble the boot (14) to the support (8).
Assemble the clamp (12).



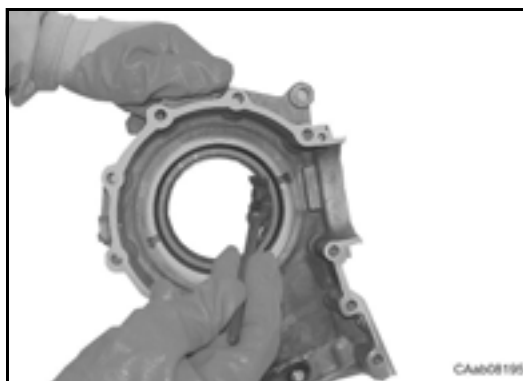
Lock the clamp (12) with suitable pliers.



Apply the prescribed sealant to the housing (18).



Assemble a new seal ring (1) using the special tool.
Lubricate the seal ring (1).



Assemble two stud bolts with thread in the threaded holes on the housing (18), as shown in figure.



Assemble the housing (4).
Remove the two dowel pin.

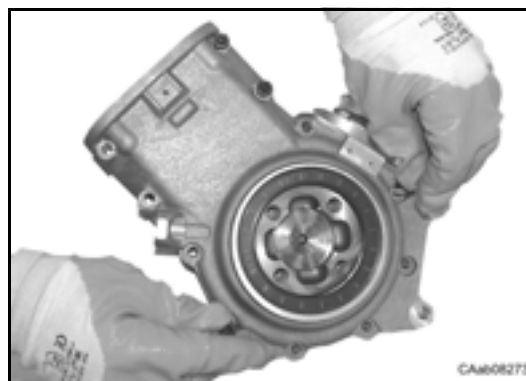




Assemble the fastening screws (7).

Tighten the screws (7) to the prescribed torque.

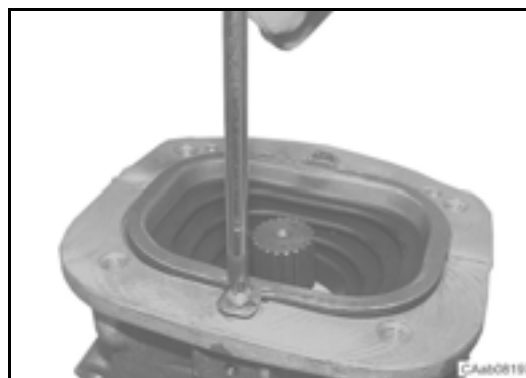
Remove excess sealant.



Assemble the ring (15) to the housing.

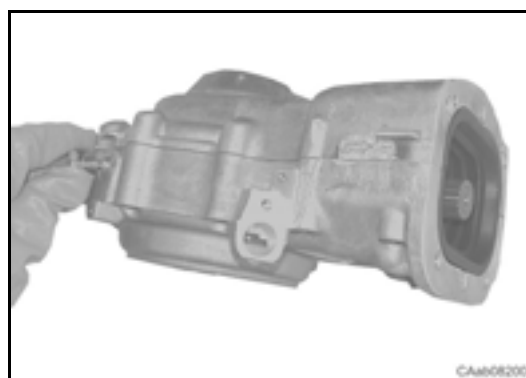


Assemble the fastening screws (16) to the prescribed torque.

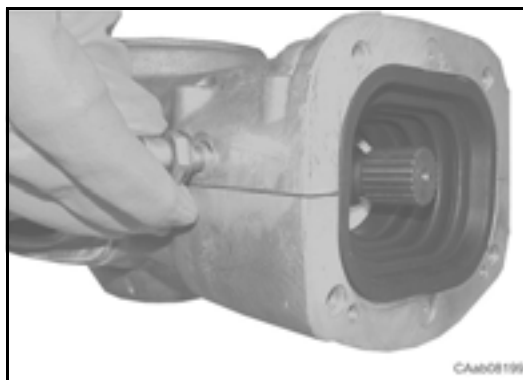


Assemble the plug (3) and the washer (2).

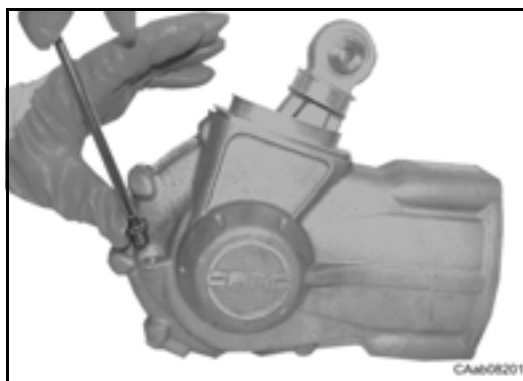
Tighten the plug to the prescribed torque.



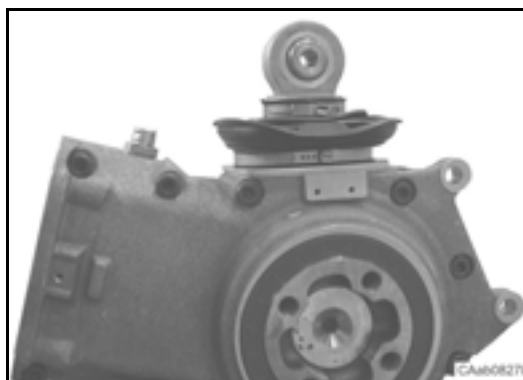
Assemble the breather (6) and the washer (5).
Tighten the breather (6) to the prescribed torque.



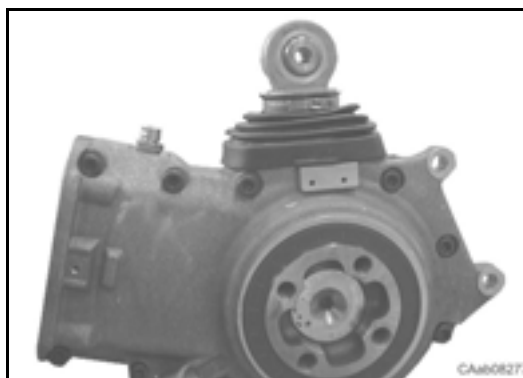
Fill the transmission with the prescribed oil.
Assemble the plug (3) and the washer (2).
Tighten the plug to the prescribed torque.



Assemble the boot (14) with the clamps (9) and (11).



Fit the boot (10) on its seat.



WHEEL SHAFT GROUP

DISASSEMBLY



Remove the bearing **(1)** from the wheel shaft **(3)** with suitable extractor.



Turn the group over.

Remove the bearing **(10)** from the wheel shaft **(3)** with suitable extractor.



ASSEMBLY

Heat the bearings **(1)** and **(10)** at 100°C.



Assemble the bearing **(1)** to the wheel shaft **(3)**.



Turn the group over.

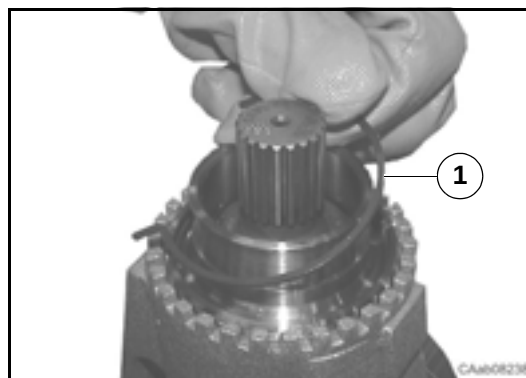
Assemble the bearing **(10)** to the wheel shaft **(3)**.



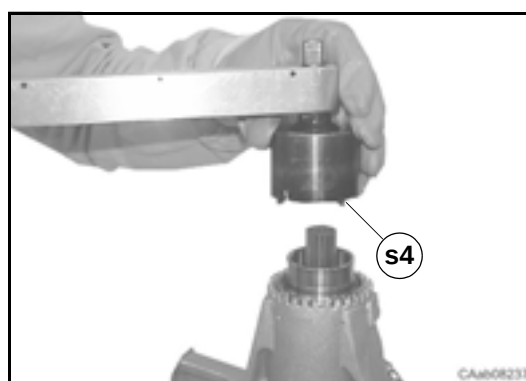
PINION GROUP

DISASSEMBLY

Remove the lock ring (1) from the ring nut (2).

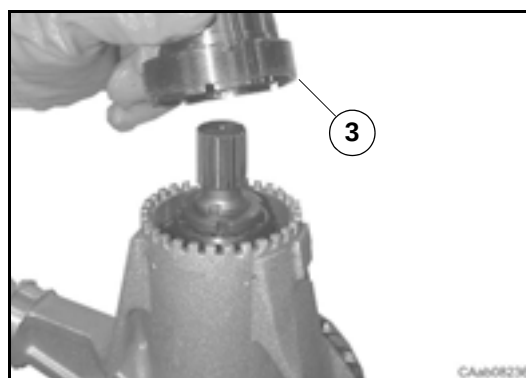


Unscrew the ring nut (2) with the special wrench (s4).

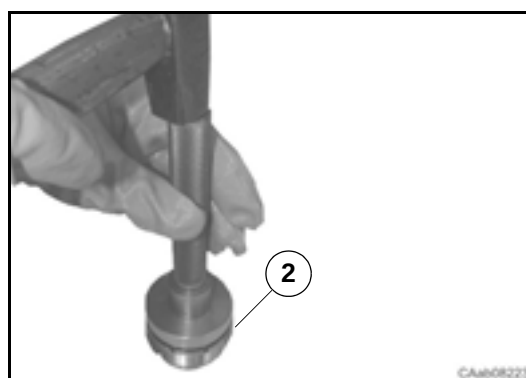


Remove the ring nut (2), then remove the seal ring from the ring nut.

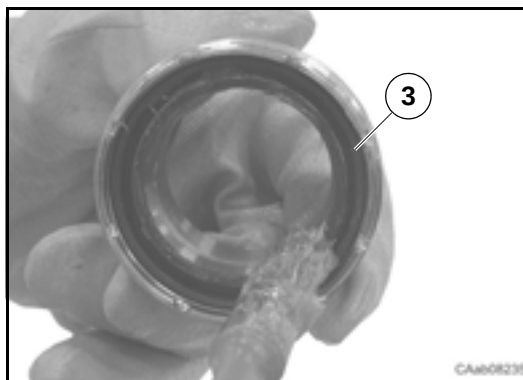
Note: destructive operation for the seal ring.



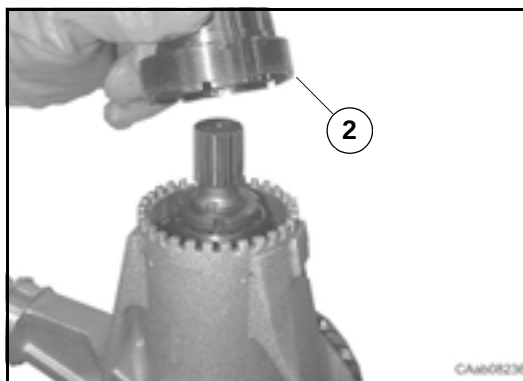
Assemble the seal ring (3) to the ring nut (2) with the special tool and a hammer.



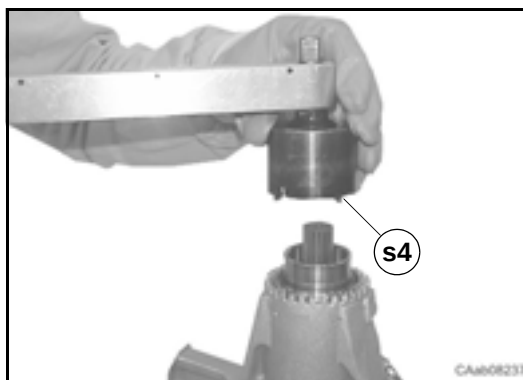
Grease the seal ring (3).



Assemble the ring nut (2).

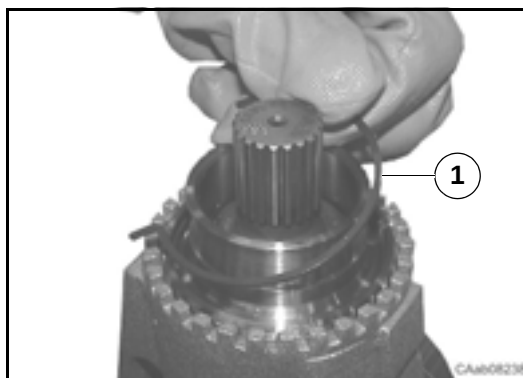


Tighten the ring nut (2) with the special wrench (s4) to the prescribed torque.

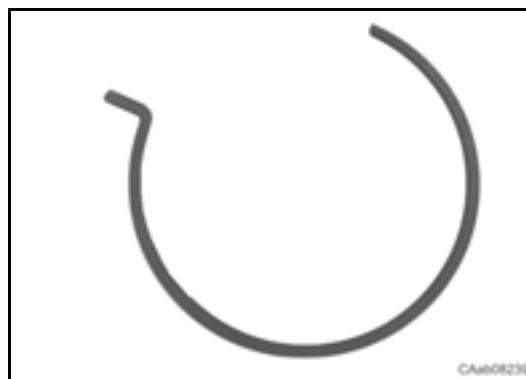


Insert the locking ring (1) into the ring nut (2) in the shown position.

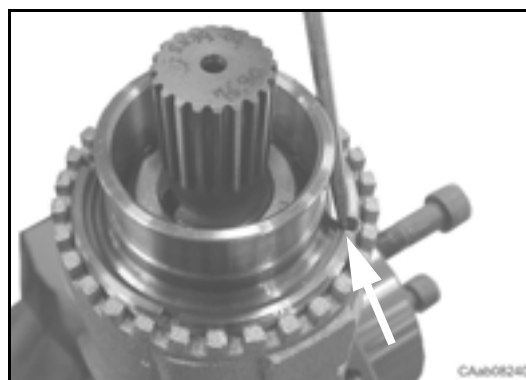
See: next step



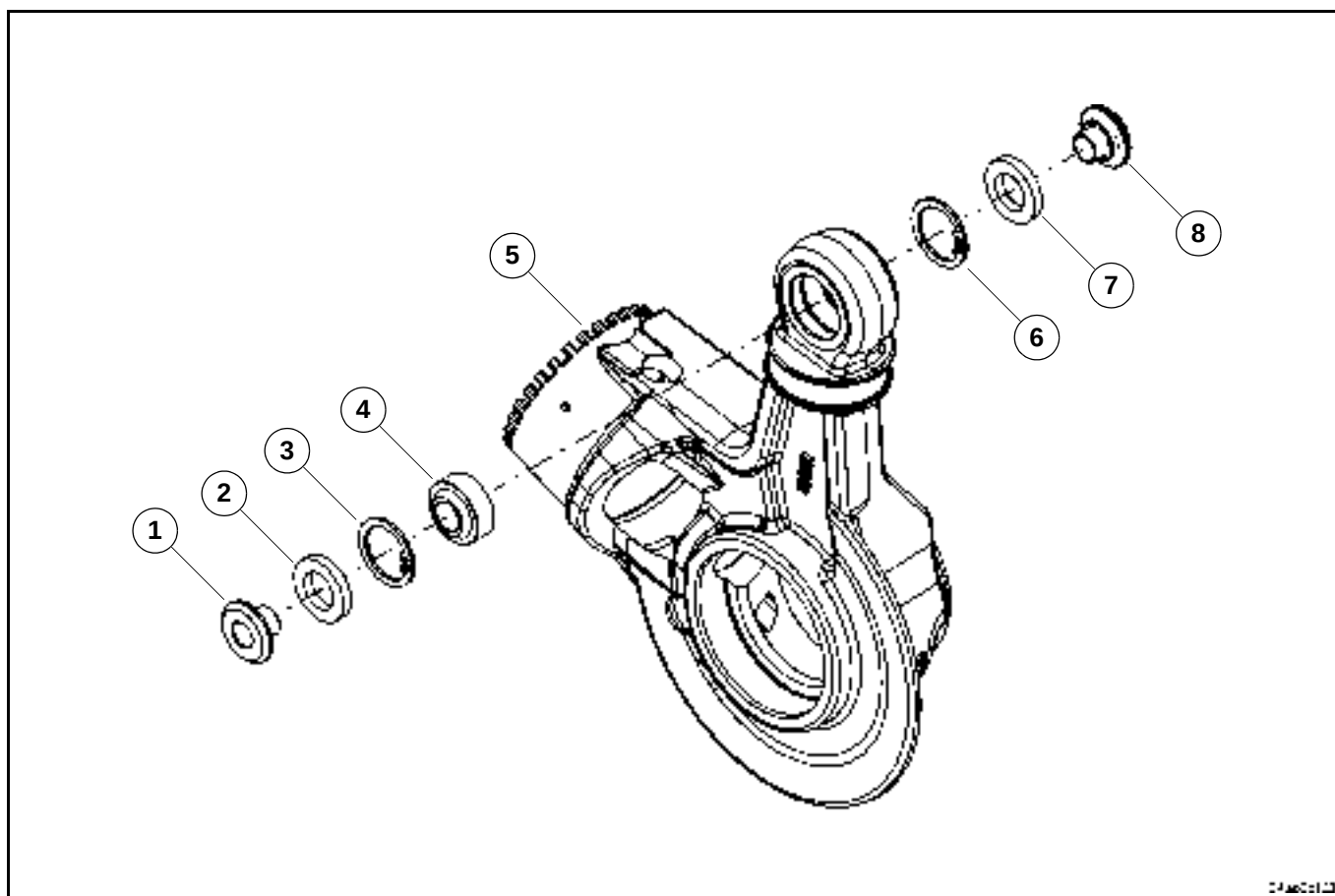
Assembly position of the locking ring (1).



Warning:
the locking ring (1) must be pushed in its seat.



SUPPORT GROUP



DISASSEMBLY

Remove the bushing (1) with a punch.

Overturn the support (5) and remove the other bush (8).

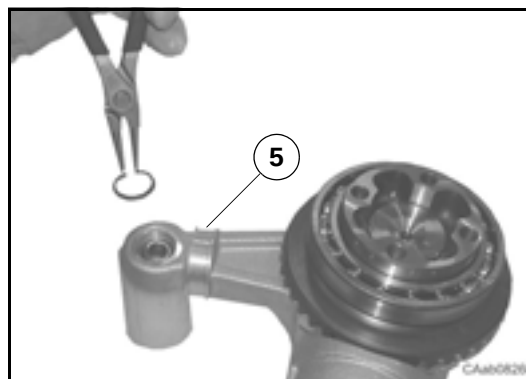




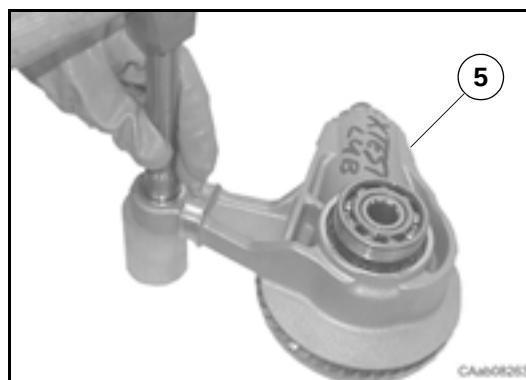
Remove the seal ring (2) and (7) with a screwdriver.

Note: destructive operation for the seal ring.

Remove from the support (5) the lock rings (3) and (6) with suitable pliers.

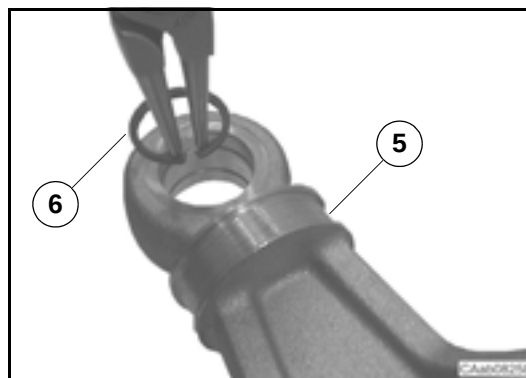


Remove the spherical joint (4) with a suitable pad and a hammer.



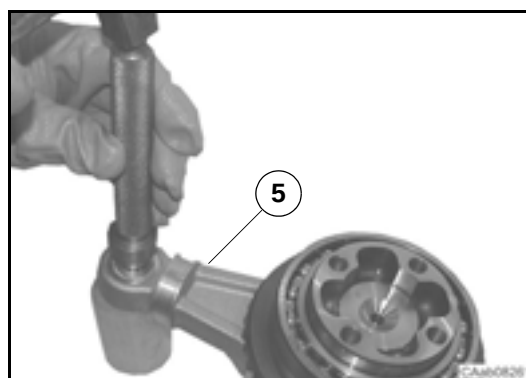
ASSEMBLY

Insert into the support (5) the lock ring (6) with suitable pliers.

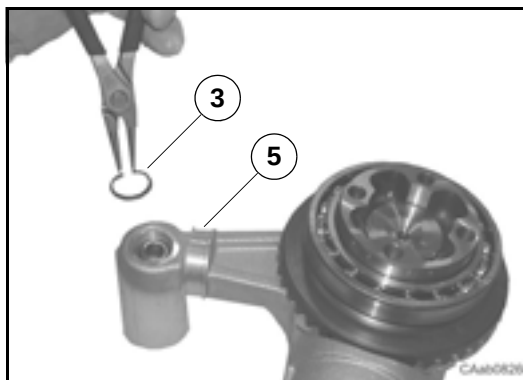


Turn over the support (5).

Assemble the spherical joint (4) with the special tool and a hammer.



Insert into the support (5) the lock ring (3) with suitable pliers.



Assemble the new seal rings (2) and (7) by hand.
Assemble the bushing (1).



Drive in the bushing (1) with a plastic hammer.
Turn over the support (5) and assemble the other bush (8)



TROUBLESHOOTING

This chapter is a descriptive and explanatory guide to common transmission problems. This guide suggests the correct repair procedures to be followed.

Problem	Cause	Action
<i>Oil leakage from the wheel shaft</i>	1. Radial shaft seal incorrectly mounted or damaged 2. Running surface of the wheel shaft seal damaged	1. Replace and mount radial shaft seal correctly 2. Replace wheel shaft
<i>Oil leakage from housing</i>	1. Housing is not sealed 2. Bolts not sealed off or not tightened to specified torque	1. Open and seal off half-housings with sealant 2. Tighten bolts to specified torque
<i>Oil leakage from the oil fill plug or oil drain plug</i>	1. Dirt between sealing ring and housing 2. An old sealing ring was used 3. Plug not tightened to specified torque	1. Clean and tighten to prescribed torque 2. Use new sealing ring 3. Tighten plug to specified torque
<i>Oil leakage between housing and fork</i>	1. Damaged boot 2. Loosen locking clamp or cover 3. Radial seal damaged or incorrectly assembled 4. Damaged running surface of the wheel spacer seal	1. Replace boot 2. Tighten clamp with proper tool 3. Replace and assemble the seal using an appropriate tool 4. Replace the spacer
<i>Oil leakage from outer boot</i>	1. Damaged boot 2. Loosen outer or inner locking clamp	1. Replace boot 2. Lock the clamp using an appropriate tool
<i>Bevel gear group noise</i>	1. Bevel gear incorrectly assembled 2. Damaged gear crown toothing	1. Replace bevel gear
<i>Excessive wheel shaft backlash</i>	1. Wheel shaft ball bearings damaged	1. Replace wheel bearings



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