

**Tornado
Tre Novecento**
LIMITED EDITION

**WORKSHOP
MANUAL**



Benelli





Introduction

SYMBOLS

The symbols listed below are all present inside the manual and serve to show those parts which need to be given special attention.



WARNING - indicates a grave danger for the safety of people and/or the integrity of the vehicle.



OILING - Indicates the type of oil to use.



TIGHTENING - Indicates the correct tightness value to carry out.



SPECIFIC VALUE - indicates the specific value using precision instruments.



SPECIFIC INSTRUMENTS - indicates the specific instruments to use.



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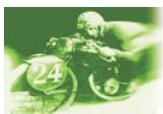
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General Information

1 GENERAL INFORMATION

1.1 VEHICLE IDENTIFICATION

The identification data are:

- 1) Frame number silk-screened on Titanium plate.
- 2) Frame number [on steering casing].
- 3) Engine number on upper base.
- 4) Homologation data [on frame].

1.2 IMPORTANT INFORMATION

• REMOVAL AND DISMANTLING

1. Before carrying out dismantling operations, remove eventual dirt, mud, dust and foreign bodies.
2. Use appropriate instruments and cleaning products exclusively. Refer to the "SPECIAL INSTRUMENTS" paragraph.
3. During dismantling, avoid separating the coupled components, including cylinders, pistons, gears and other parts that have become "coupled" during normal wear. The coupled components must always be re-used or changed without separating them.
4. During dismantling, clean all the components and place them in a bowl, following the order of dismantling.
This will make the re-mounting operation easier and allow a correct installation of all the components.
5. Keep all the components away from any source of heat.

• SPARE PARTS

Use original Benelli spare parts exclusively.

Use oils and greases recommended by Benelli to oil the components.

Other products might appear similar in look and function but are inferior in quality.





- **WASHERS, O-RINGS AND OIL SEAL**

1. During the revision of the engine, change all the washers, O-rings and seals. The surfaces of the washers and O-rings, and the lips of the oil seals must be cleaned.
2. Oil all the coupled components and the ball-bearings and grease the lips of the seals, when remounting.

- **ELASTIC SAFETY WASHERS/PLATES AND SAFETY PINS**

After removing, change all the elastic safety washers and safety pins. After tightening the bolts or nuts, bend the tongues of the safety washers/plates and the ends of the safety pins on a flat surface of bolts or nuts.

- **BALL-BEARINGS AND OIL SEALS**



WARNING:

Do not rotate the compressed air ball-bearings as this might damage their surfaces.

1. Install the ball-bearings and the oil seals so that the Producer brand or data are visible. At the moment of installing the oil seal, oil the lip with a slight layer of grease. The ball-bearings rotate freely if oiled in an appropriate way.

1.3 SPECIAL INSTRUMENTS



WARNING:

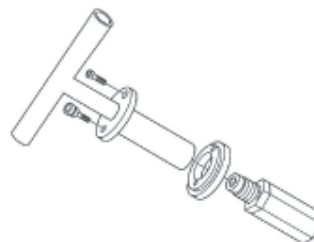
To avoid errors in ordering the special instruments, refer exclusively to the inherent code.

For correct maintenance and a perfect set-up use the BENELLI special instruments, avoiding damage as a result of inadequate or technically improvised instruments.

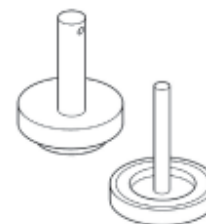


1.3.1 SPECIAL ENGINE INSTRUMENTS

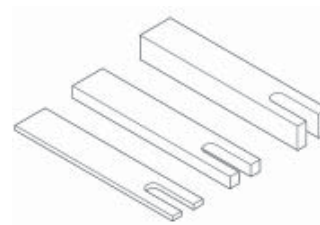
1. *R180197015000*
GONIOMETER PLUG FOR
DISTRIBUTION[*]



2. *R180197017000*
INSTRUMENT FOR MOUNTING
CLUTCH OIL SEAL CASING [*]



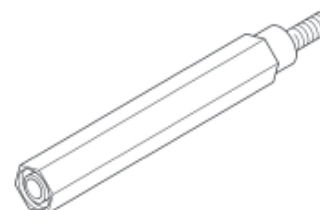
3. *R180197018000*
CYLINDER MOUNTING SPACERS
[*]



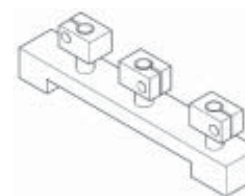
4. *R180197019000*
SMALL CYLINDER COLUMN
FIXING SPAN



5. *R180197020000*
FALSE SPARKING-PLUG



6. *R180197021000*
PISTON THREAD MEASURER





7. R180197022000
P.M.S. MEASURER



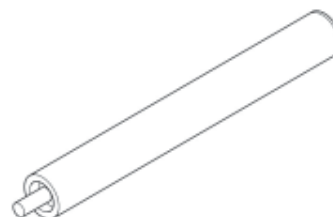
8. R180197023000
CLUTCH COVER OIL SEAL PAD [*]



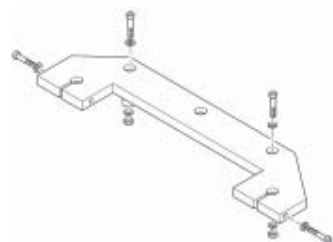
9. R180197024000
OIL SEAL PINION PAD [*]



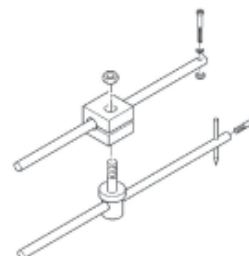
10. R180197025000
OIL SEAL VALVE PAD [*]



11. R180197026000
**INSTRUMENT FOR CHECKING
VALVE LIFT**



12. R180197027000
GONIOMETER INDICATOR





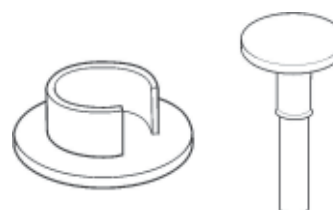
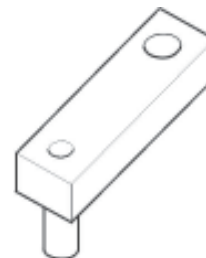
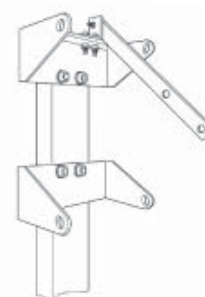
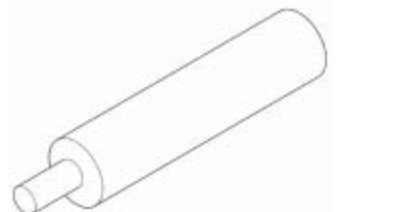
13. R180197028000
CLUTCH OIL SEAL PAD ON
FLANGE [*]

14. R180197029000
ENGINE SUPPORT

15. R180197030000
INSTRUMENT FOR CHECKING
ENGINE SHAFT
AXIAL PLAY

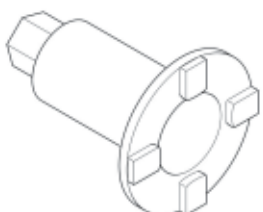
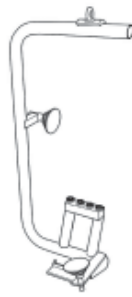
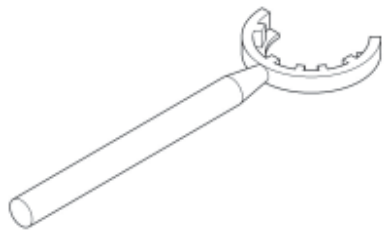
16. R180197036000
ENGINE MANAGEMENT
DIAGNOSTIC
INSTRUMENT [*]

17. R180100143000
RAPID RELEASE PETROL TUBE
KIT [*]





1.3.1 SPECIAL FRAME INSTRUMENTS

1. <i>R180197033000</i> 20 ALLEN WRENCH [*]	
2. <i>R180197031000</i> STEERING RING-NUT CLAMPS [*]	
3. <i>R180197034000</i> ENGINE DISMANTLING INSTRUMENT[*]	
4. <i>R180197032000</i> ENGINE SHOULDER ADJUSTMENT CLAMPS [*]	

(*) Compulsory instruments



Specifications

2 SPECIFICATIONS

2.1 GENERAL SPECIFICATIONS

DIMENSIONS	STANDARD	LIMITS
Engine length	2040 mm	—
Engine width	780 mm	—
Maximum height	1160 mm	—
Wheelbase	1419 mm	—
Minimum light	100 mm	—
Saddle height	840 mm	—
Weight with oil and full tank	215 kg	—
Weight without oil and full tank	190 kg	—
Maximum load with pilot and load	345 kg	—

2.2 TECHNICAL CHARACTERISTICS: ENGINE

ENGINE	
Type	Three four-stroke cylinders in line
Bore	88 mm
Stroke	49.2 mm
Total displacement	898 cm ³
Compression ratio	11±05:1
Max. power at shaft [95/1/EC]	100 kw / 136 cv at 11500 rpm reduced for foreign countries: 72 kw / 98 cv
Minimum rotation at full speed	1350 rpm
Maximum at full speed	11800 rpm
Distribution	At 4 valves per 00HC cylinder
Valves	Suction valve diameter: 33 mm Exhaust valve: 29 mm
Distribution diagram [observed data with 1 mm play]	Suction valve opening before P.M.S.: 21° Suction valve opening after P.M.I.: 57° Exhaust valve opening before P.M.I.: 36° Exhaust valve opening before P.M.S.: 26°



Valve lift [observation data with play of 0 mm]	Suction: 9.2 mm Exhaust: 8.75 mm
	The functioning play of the tappets with the engine cool must be: Suction: 0.25-0.30 mm Exhaust: 0.30-0.35 mm
Transmission	Multiple disks dry friction: commanded by a cable activated by a lever on the left side of the handlebar. Transmission between engine and primary shaft of the gear-box by straight-toothed gears. Mechanisms of selecting the gears with drum and forks. An articulated lever commands the rotation of the drum. 6 gear gearbox.
	Primary ratio: 44/79 [1:1.795]
	Ratio pinion/crown: 15/41 [1:2.563]
Total ratios:	First gear: 14/39 Second gear: 18/35 Third gear: 21/32 Fourth gear: 223/30 Fifth gear: 24/28 Sixth gear: 25/27

OILING/COOLING	
Oiling	Humid housing with trochoidal circulation pump, opening pressure of the oil circuit valve, 6.5 bar.
Engine oil quantity	With filter: 3.5 l Without filter: 3.0 l
Cooling	Closed circuit pressurised liquid with radiator, thermostat and water-oil heat exchanger. A centrifugal pump commanded by gears on the primary gearbox shaft circulates the liquid and an expansion tank recovers the thermal expansion of the cooling liquid.
Radiator capacity	2.55 l



2.3 FRAME CHARACTERISTICS

FRAME	STANDARD	LIMITS
Type	Mixed steel-aluminium frame and structure	
Angle of incidence	23.50°	—
Forward stroke	94.5 mm	—

FRONT WHEEL	STANDARD	LIMITS
Type	Cast	—
Rim	Dimensions: 17 x MT3.50 Material: aluminium	
Wheel span	120 mm	—

REAR WHEEL	STANDARD	LIMITS
Type	Cast	—
Rim	Dimensions: 17 x MT3.50 Material: aluminium	
Wheel span	120 mm	—

FRONT TIRE	STANDARD	LIMITS
Type	Tubeless	—
Dimensions	120/70 ZR17 (58W)	—
Model	D207F RR (DUNLOP)	—
Tire pressure cold	250 kPa (2.5 kg/cm, 2.5 bar)	
Maximum pneumatic pressure	250 kPa (2.5 kg/cm ² 2.5 bar)	—
Minimum depth tread	—	1.6 mm



REAR TIRE	STANDARD	LIMITS
Type	Tubeless	—
Dimensions	180/55 ZR17 (73W)	—
Model	D207F RR (DUNLOP)	—
Tire pressure cold	250 kPa (2.5 kg/cm, 2.5 bar)	—
Maximum tire pressure	250 kPa (2.5 kg/cm, 2.5 bar)	—
Min. depth tread	—	2.0 mm

FRONT BRAKES	STANDARD	LIMITS
Type	Double disk	—
Brake liquid advised	DOT 4	—
Brake disks Diameter x thickness: Min. thickness: Max. deformation:	320 x 4.5 mm — —	— 4.0 mm 0.1 mm
Thickness brake pads	4.5 mm	0.5 mm
Internal cylinder pump diameter	15 mm	—
Internal cylinder clamps diameter	34 mm	—

REAR BRAKES	STANDARD	LIMITS
Type	Single disk	—
Brake liquid advised	DOT 4	—
Brake disks Diameter x thickness: Min. thickness: Max. deformation:	240 x 5 mm — —	— 4.5 mm 0.1 mm
Thickness brake pads	4.3 mm	0.5 mm
Internal cylinder pump diameter	12 mm	—
Internal cylinder clamps diameter	32 mm	—



FRONT SUSPENSION	STANDARD	LIMITS
Type	Telescopic fork with upturned stems	—
Type of front fork	Helical spring/damper oil	—
Front fork stroke	120 mm	—
Spring Spring rate (K1): Spring stroke (K1):	7.35 N/mm (0.75 kgf/mm) 0 ~ 120 mm	— —
Oil advised	R&T 43	—
Adjustment positions in extension (*)	Road: 20 kicks Track: 18 kicks	— —
Adjustment positions in compression (*)	Road: 25 kicks Track: 10 kicks	— —

BAC K SUSPENSION	STANDARD	LIMITS
Type	Oscillating fork	—
Type of rear fork	Helical spring/damper gas-oil	—
Rear fork stroke	62 mm	—
Spring Spring rate (K1): Spring stroke (K1):	7.5 N/mm (0.75 kgf/mm) 62 mm	— —
Optional spring available	no	—
Gas/air pressure preload spring	1200 kPat (12 kgf/cm2)	—
Adjustment preload spring positions	14 mm	—
Adjustment positions in extension (*)	Road: 14 kicks Track: 9 kicks	— —
Adjustment positions in compression(*)	Road: 22 kicks Track: 10 kicks	— —

(*) *Unscrew from completely closed (screwed).*



OSCILLATING ARM	STANDARD	LIMITS
Free play (at the end of the arm)		
Radial	—	1 mm
Axial	—	1 mm

TRANSMISSION CHAIN	STANDARD	LIMITS
Model:	50ZVM (DAIDO)	—
Connection quantities	114	—
Play of the chain	40 ~ 50 mm	—
Max. section of ten connections	150.1 mm	—

2.4 ELECTRICAL CONNECTIONS

COMPONENTS	STANDARD
Plant tension	12V
Cooling liquid temperature sensor Model: Resistance:	16 TT (SAGEM) 2500 Ω at 20°C / 322.5 Ω at 80°C
Engine control system	SAGEM MC 1000
Relay group Safety relay Dazzle/anti-dazzle light: Ignition relay:	CM1 (NAIS) 12V h.o. 01RA001 (SAGEM) h.o.
Injector type:	U9122-357 (SAGEM)
Pick-up type:	O1VR001 (SAGEM)
Engine stepper model: Type:	028M001 (SAGEM) bi-phase
Ignition coils Model: Primary coil resistance: Secondary coil resistance: Primary coil inductance: Secondary coil inductance: Max. admissible current value:	02IG001 (SAGEM) 0.6 Ω 10 K Ω 2.5 mH (1 kHz 0.3V) 23.5 mH (1 kHz) 7.6 A
Throttle valve sensor Standard resistance:	1.2 k Ω $\pm$ 20%



COMPONENTS	STANDARD
Loading system Type: Model: Nominal exit:	AC magnet 5-101211-502-1 (DENSO) 13.5V / 48A at 5000 rpm
Tension adjustment (in the alternator) Type: Voltage adjustment:	Semiconductor, FIELD CONTROL 14.5 ± 0.3V (at 5000 rpm, 10A and 25°C)
Rectifier Battery	in the alternator YT 12B-4 / 12V 10Ah
Electrical start system Model: Power:	5-128-330 (DENSO) 0.7 kw
Starter relay Model: Amperage: Coil resistance:	MS5F - 421 (JIDECO) 100A 4.4 Ω at 20°C
Horn Model: Max. amperage:	AB1242/262 O.S.C. 1.5A
Direction indicator relay: Model: Type: Flashing frequency: Wattage:	70.016.70.001.4 Full-transistor 60 ~ 120 rpm (10W+10W+2W) x2
Oil level switch (model)	285520-10 (BITRON)
Fuel pump Model: Max. amperage: Level sensor: Min. resistance: Max. resistance:	BITRON 5A max. at 13.5V in the fuel pump 285 Ω (tank empty) 21 Ω (tank full)
Stand switch (model)	CE75A (ASAHI DENSO)
Radiator fan (model)	VA46-A101-46 S (SPAL)
Neutral switch (model)	11720.3 (F.M.D.I.)
Commutator switch (model)	23-038/1 (EUROSWITCH)
Air temperature sensor Model: Resistance:	ISTT (SAGEM) 23.75 Ω at 20°C 19.48 Ω at 25°C 16.07 Ω at 30°C

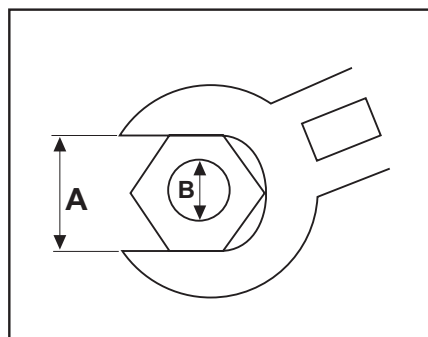


2.5 BOLT TORQUE

2.5.1 GENERAL BOLT TORQUE

The bolt torques are inserted in the chapters of the manual together with the relative special instructions, if necessary.

If not otherwise specified, the bolts are considered with greased thread, created at environmental temperature.



A	B	BOLT TORQUES	
		Nm	kgf·m
10 mm	6 mm	10	1.0
12 mm	8 mm	22	2.2
14 mm	10 mm	45	4.5
17 mm	12 mm	80	8.0
19 mm	14 mm	130	13.0
22 mm	16 mm	200	20.0



2.5.2 BOLT TORQUE FRAME

DESCRIPTION	THREAD	NOMINAL TORQUE (Nm)	INSTRUCTIONS DETAILS
ENGINE GROUP:			
ENGINE ON BACK FUSION PLATE RIGHTHAND FRAME WITH LEFTHAND NUT	M12x1.25	40	GREASE
ENGINE SUPPORT ROD ON ENGINE HEAD	M10x1.25	40	GREASE
RIGHTHAND ENGINE ON LOWER CROSSBAR LOWER ENGINE CRANKPIN THROUGH FRAME WITH NUT	M12x1.25	40	GREASE
LOWER CRANKPIN HEAD TORQUE ENGINE ON LOWER FRAME CROSSBAR	M6	8	
ENGINE HEAD ON RIGHTHAND FRAMEWORK WITH NUT	M12x1.25	40	GREASE
RIGHTHAND ENGINE FIXING SCREW HEAD TORQUE ON FRAMEWORK	M6	10	
RIGHTHAND ENGINE HEAD ON LEFTHAND FRAMEWORK WITH NUT	M12x1.25	40	GREASE

FRAME GROUP:			
STEERING FERRULES TORQUE ON LOWER AND UPPER SADDLE POSTS	M8	25	
ENGINE FRONT SUPPORT ROD ON STEERING SADDLE POST WITH NUT	M10	1.25	GREASE
FORK DAMPER SUPPORT ON CROSSBAR	M16x1.5	50	GREASE
REAR FORK FERRULES TORQUE ON THE SADDLE POSTS	M8	10	
LEFT COWLING MOUNT UNDER HEADLIGHT ON FRONT ENGINE SUPPORT ROD	M6	10	
RIGHT COWLING MOUNT UNDER HEADLIGHT ON FRONT ENGINE SUPPORT ROD	M6	10	
FIXING STEERING WHEEL BLOCK ON FRAME	M6	Screw the screw initially to Nm and trim it with 15 Nm torque to end montage line	



SADDLE PILLAR GROUP:			
SADDLE PILLAR ON FRAMEWORK	M8	25	GREASE
SADDLE PILLAR ON FRAME BACK PLATE WITH SPECIAL NUT	M8	25	GREASE

HANDLEBAR GROUP COMMANDS:			
LEFT AND RIGHT SEMI-HANDLEBARS ON FORK STEM	M10	45	GREASE
LEFT AND RIGHT SAFETY DOWELS	M6	7	
LEFT AND RIGHT SEMI-HANDLEBARS SAFETY SCREWS	M5	6	
FRONT OIL BRAKE TANK SUPPORT ROD ON FRONT BRAKE PUMP	M5	10	
FRONT OIL BRAKE TANK ON SUPPORT ROD	M5	5	
CLUTCH LEVER ON LEFT SEMI-HANDLEBAR	M6	5	

PEDAL GROUP COMMANDS:			
PILOT FOOTBOARD ON FRAME SUPPORTS	M8	22	LOCTITE 243
GEAR TORQUE COMMAND ON SHAFT	M6	10	
DRIVING GEAR ROD ON GEAR COMMAND WITH NUT	M6	10	
DRIVING GEAR ROD ON GEAR PEDAL WITH NUT	M6	10	
FORK LEVER ON LEFT AND RIGHT FOOTREST SUPPORTS	M8	22	LOCTITE 243
LOWER SPRING CRANKPIN ON RIGHT FOOTREST SUPPORT	M5	6	LOCTITE 243
UPPER SPRING CRANKPIN ON RIGHT FOOTREST SUPPORT	M5	6	LOCTITE 243
BRAKE PUMP ROD GROUP ON BRAKE PEDAL WITH NUT	M6	10	



REAR FORK GROUP:			
REAR FORK CRANKPIN SCREW ON REAR FORK CRANKPIN	M18X1.5	65	GREASE
CHAIN PAD ON REAR FORK	M6	8	
FERRULES FOR ASSEMBLY STAND ON REAR FORK	M8	25	

FRONT SUSPENSION GROUP:			
FERRULE STEMS ON STEERING BASE	M6	10	GREASE
FERRULE STEMS ON STEERING HEAD	M8	22	GREASE
FERRULE HUBS ON FRONT WHEEL CRANKPIN	M8	30	GREASE
FRONT MUDGUARD SUPPORTS ON FORKS	M5	6	
BRAKE CLAMP SUPPORTS ON FORKS	M10X1.25	50 LOCTITE	243
STRAP TORQUE STEERING DAMPER ON DAMPER BODY	M6	10	
STEERING DAMPER ON STEERING HEAD	M6	10	
STEERING DAMPER ON FRAME	M6	10	

REAR SUSPENSION GROUP:			
DAMPER ON FORK WITH NUT (UPPER MOUNT)	M10x1.25	35	GREASE
DAMPER ON ROCKER ARM WITH NUT (LOWER MOUNT)	M10x1.5	35	GREASE
REAR SUPENSION RODS ON REAR FORK WITH NUT	M10x1	35	GREASE
ROCKER ARM ON FRAME	M10	45	LOCTITE 243

FRONT WHEEL GROUP:			
FRONT WHEEL CRANKPIN SCREW	M18x1.5	60	GREASE
FRONT BRAKE DISKS ON WHEEL	M8	25	LOCTITE 243



REAR WHEELGROUP:			
REAR WHEEL CRANKPIN NUT	M24x1.5	80	GREASE
CROWN ON FLEXIBLE COUPLING FLANGE	M10x1.25	45	GREASE
REAR BRAKE DISK ON WHEEL	M8	25	LOCTITE 243
SPEED SENSOR ON CLIP SUPPORT	M6	6	

LATERAL ASSEMBLY STAND GROUP:			
HANGER SUPPORT PLATE ON FRAME	M10	35	
HANGER CRANKPIN ON FRAME	M10x1.25	35	
SPRING HOOK ON HANGER	M6	10	

ELECTRIC PLANT GROUP:			
IIINERTIAL SWITCH ON FILTER BOX	M6	1.5	
AIR SENSOR ON FILTER BOX	M10x1.25	8	

COOLING PLANT GROUP:			
LATERAL RADIATOR BOX ON SADDLE PILLAR	M6	3	
UPPER FRONT RADIATOR BOX RADIATOR ON SADDLE PILLAR	M6	10	
RADIATOR BOX COVER ON BASE	Autofil.4 Autofil. 4.8	1 1	
RADIATOR BOX FASTENINGS THREADS	M6	4	LOCTITE 243
UPPER COVER RADIATOR BOX FASTENINGS	Autofil. 4	1	
LOWER COVER RADIATOR BOX FASTENNGS	Autofil. 4	1	
EXPANSION TANK ON FRAME	M6	3	
FANS ON SUPPORT	M6	3	
FANS SUPPORT ON RADIATOR BOX	Autofil. 4	1	



FRONT BRAKING PLANT GROUP:			
FRONT BRAKE PUMP ON RIGHT SEMI-HANDLEBAR	M6	10	FIRST TORQUE BOLT ARROW SIDE
FRONT BRAKE CLIPS ON RELATIVE SUPPORTS	M10x1.25	50	GREASE
HYDRAULIC CONNECTIONS ON FRONT BRAKE PUMP AND CLIPS	M10X1	15	RESTORE BOLT TORQUE TWICE AFTER HAVING LOOSENED

REAR BRAKING PLANT GROUP:			
REAR BRAKE PUMP ON RIGHT FOOTBOARD SUPPORT WITH NUT	M6	10	GREASE
REAR BRAKE CLIP ON SUPPORT	M8	22	GREASE
HYDRAULIC CONNECTION ON REAR BRAKE CLIP	M10X1	15	RESTORE BOLT TORQUE TWICE AFTER HAVING LOOSENED
HYDROSTOP ON REAR BRAKE PUMP	M10X1	15	RESTORE BOLT TORQUE TWICE AFTER HAVING LOOSENED
REAR BRAKE OIL TANK ON RADIATOR BOX WITH WELL NUT	M5	4	

EXHAUST PLANT GROUP:			
EXHAUST COLLECTORS ON ENGINE HEAD	M8	13	METAFLUX
SILENCER SUPPORT ON SADDLE PILLAR	M8	25	LOCTITE 243
SILENCER ON SUPPORT	M10	45	LOCTITE 243
RIGHT "3 IN 1" TUBE SUPPORT PLATE ON FRAME	M6	10	
FIXING "3 IN 1" ON SUPPORT PLATE	M10X1.25	45	

SUPPLY PLANT GROUP:			
COVER ON FILTER BOX	M5	3	
FILTER BOX ON STEERING SADDLE POST	M6	10	
AIR CONDUIT BOX ON FILTER BOX	M5	5	



PETROL PUMP ON TANK	M5	3	
PETROL TUBE ON THROTTLE BODY	M12X1.5	25	
DISTRIBUTOR ON PLATE	M5	4	
GAS CABLES FIXING PLATE ON THROTTLE BODY	M6	10	

FRONT AND BACK BODYWORK GROUP:

USE STANDARD TIGHTENING TORQUE WITH M6 THREAD FOR BODYWORK: 8Nm±20%



2.5.3 BOLT TORQUE ENGINE

DESCRIPTION	THREAD	NOMINAL BOLT TORQUE (Nm)	SPECIAL INSTRUCTIONS
ENGINE CRANKCASE GROUP:			
CRANKCASE TEF FIXING SCREW	M6x1x35	9.8	
CRANKCASE TEF FIXING SCREW	M6x1x45	9.8	
CRANKCASE TEF FIXING SCREW	M6x1x60	9.8	
CRANKCASE TEF FIXING SCREW	M6x1x75	9.8	
CRANKCASE TEF FIXING SCREW	M6x1x120	9.8	
CRANKCASE TEF FIXING SCREW	M8x1.25x40	9.8+24.5	
CRANKCASE TEF FIXING SCREW	M8x1.25x100	36.26	
CRANKCASE BANKS TCEI FIXING SCREW	M8x1.25x100	36.26	
OIL CONDUIT CLOSURE CONICAL DOWEL	M6x1x6	BY HAND	LOCTITE 243
BALL-BEARING AND CRANKPIN TEF FIXING SCREW	M6x1x16	9.8	LOCTITE 243
SMALL PLATES AND TUBE TSP FIXING SCREW	M6x1x16	9.8	
CYLINDRICAL TEI DIN908 CAP	M16x1.5	24.5	LOCTITE 243
CYLINDRICAL TEI DIN906 CAP	M10x1	BY HAND	LOCTITE 243
OIL DIAPHRAGM	M8x1.25x10	24.5	LOCTITE 243
NEUTRAL POSITION SENSOR	M8x1	9.8	LOCTITE 243
MIN. OIL PRESSURE SENSOR	M10x1	24.5	LOCTITE 243
OIL LOAD CLUTCH SUMP CAP	M24x1.5	BY HAND	
CLUTCH SUMP PHASE CAP	M40x1	BY STRIKING	
TEF CLUTCH SUMP CAP SCREW	M6x1x16	9.8	
TEF CLUTCH SCREW	M6x1x20	9.8	
TEF SUMP SCREW	M6x1x30	9.8	
CLUTCH SUMP CYLINDER HEAD UPRIGHT STEM SCREW	M6x1x25	9.8	
CLUTCH SUMP CYLINDER HEAD UPRIGHT STEM SCREW	M6x1x30	9.8	
TEF SUMP BLOW-BY SCREW	M6x1x25	9.8	
TCEI COUNTERSHAFT SUMP SCREW	M6x1x16	9.8	
TCEI COUNTERSHAFT SUMP SCREW	M6x1x25	9.8	
OIL EXHAUST SUMP CAP	M18x1.5	21	
TEI SUMP FILTER FIXING SCREW	M6x1x16	9.8	
TEI SUMP FIXING SCREW	M6x1x30	9.8	



PRISONNER SCREW HEAD	M10x1	BY STRIKING	OIL THREAD
VENT HEAD CONNECTION	M18x1	14.7	LOCTITE 270
TCEI CRANKCASE FIXING SCREW	M6x1X120	12.75	
DOWEL	M8x10	14.7	LOCTITE 270
ENGINE GROUP/OILING:			
TEF OIL PUMP FIXING SCREW	M6x1x20	8.3	LOCTITE 243
OVERPRESSURE VALVE	M12x1.5	24.5	LOCTITE 243
LARGE EXCHANGER FIXING SCREW	M20x1.5	29.4+58.8	LOCTITE 243
OIL TUBE HEAD BORED SCREW	M10x1	15.68	LOCTITE 270
OIL HEAD NIPPLE TUBE	M10x1	32.34	
FILTER	M20x1.5	BY STRIKING	GREASE
ENGINE GROUP/CRANK MECHANISM:			
PHONIC WHEEL FIXING NUT	M8x1	24.5	LOCTITE 270
ROD SCREW	M9x1	14.7-24.5-73	MOLYCOTE GREASE
ENGINE GROUP/CYLINDER-PISTON-HEAD:			
PRISONNER SCREW	M8x25	24.5	LOCTITE 270
CONICAL TEI DOWEL DIN906	M6x1x6	BY HAND	LOCTITE 243
CONICAL CAP DIN906	M14x1,5	BY HAND	LOCTITE 243
TCB CAP FIXING SCREW	M6x1x35	13	
TCB CAP FIXING SCREW	M6x1x45	13	
HEAD FIXING NUT	M10x1	44.1-49	MOLYCOTE GREASE
TCEI TIGHTENER FIXING SCREW	M6x1x25	9.8	
TEF CYLINDER CAP SCREW	M6x1x10	9.8	LOCTITE 243
TEF CYLINDER FIXING SCREW	M6x1x30	9.8	
ENGINE GROUP/DISTRIBUTION:			
TEF DISTR. ENTRY FIXING SCREW	M6x1x25	14.7	LOCTITE 270
TEF UPPER PAD SUPPORT FIXING SCREW .	M6x1x25	9.8	
DISTR. SUMP COIL FIXING SCREW	M6x1	9.8	
DISTR. SUMP SCREW	M6x1	9.8	
MOBILE PAD PIN	-	11.76	OIL THREAD
ENGINE GROUP/CLUTCH:			
TCEI ALTERN./PUMP ENTRY FIXING SCREW	M6x1x16	16.5	LOCTITE 243



SPECIAL CLUTCH CUP FIXING SCREW	M8x1x16	24.5	
LOW CLUTCH ROD HEXAGONAL FIXING NUT	M8x1.25	15.68	
TEF CLUTCH SPRING FIXING SCREW	M6x1x25	9.8	
CLUTCH HEXAGONAL FIXING NUT	M20x1	49	LOCTITE 243
TEF CYLINDER LEVER FIXING SCREW	M6x1x20	9.8	LOCTITE 243
TCB CYLINDER FIXING SCREW	M6x1x20	9.8	LOCTITE 243
ENGINE GROUP/GEARS:			
HEXAGONAL NUT	M24x1.5	137.2	STRIKE WASHER AGAIN
ENGINE GROUP/ GEAR COMMAND:			
TSP PLATE FIXING SCREW	M6x1x14	9.8	LOCTITE 243
TCEI FORK PINS FIXING SCREW	M6x1x14	9.8	LOCTITE 243
TCEI FORK PINS FIXING SCREW	M6x1x14	9.8	LOCTITE 243
SELLET DRUM FIXING SCREW	M6x1	9.8	LOCTITE 243
TEF GEAR COMMAND SUMP FIXING SCREW	M6x1x14	9.8	
TEF GEAR COMMAND SUMP FIXING SCREW	M6x1x25	9.8	
TEF CHAIN COVER SUMP FIXING SCREW	M6x1x25	9.8	
TCEI "B" GEAR FLANGE FIXING SCREW	M8x1.25x60	19.6	
TCEI "B" GEAR FLANGE FIXING SCREW	M8x1.25x25	19.6	
ENGINE GROUP/COOLING:			
PUMP ROTOR BLIND FIXING NUT	M6x1	8.3	LOCTITE 243
TCEI "B" PUMP COVER FIXING SCREW	M6x1x20	9.8	
TEF PURGE SCREW	M6x1x10	9.8	LOCTITE 243
TEF CRANK FIXING SCREW	M6x1x16	9.8	
TEF PUMP BODY FIXING SCREW	M6x1x35	9.8	LOCTITE 243
TEF COLLECTOR FIXING SCREW	M6x1x20	9.8	
TEF THERMOSTAT CAP FIXING SCREW	M6x1x20	9.8	
TEF SMALL COVER FIXING SCREW	M6x1x16	9.8	
ENGINE GROUP/IGNITION:			
SPARKING-PLUG	-	BY HAND	
COIL ROD FIXING NUT	-	BY HAND	
ENGINE GROUP/ELECTRICAL PLANT:			
TEF ELECT. ENGINE FIXING SCREW .	M6x1x25	9.8	LOCTITE 243
TEF ALTERNATOR FIXING SCREW	M8x1.25x65	26.46	LOCTITE 243



TCEI PHONIC WHEEL SENSOR SCREW	M6x1x12	8.3	LOCTITE 243
ENGINE GROUP/ SUPPLY:			
TCEI THROTTLE BODY FIXING SCREW	M6x1x25	9.8	
ENGINE GROUP: SUPPLY:			
TSPEI FREE WHEEL RING FIXING SCREW	M6x1x20	16.5	LOCTITE 270
ENGINE HEXAG. FLEXIBLE COUPLING SCREW	M8x1,25x25	24.5	LOCTITE 270
LOW HEXAG. FLEXIBLE COUPLING NUT	M10x1.25	29.4-49	SELF-BRAKING
TEF INGR. SATELLITE SCREW	M6x16	9.8	LOCTITE 243

2.6 POINTS TO OIL



ENGINE OIL

- Ball-bearings
- Piston surface
- Piston segments
- Piston pin
- Shafts, nuts and screws
- Oil pump rotors
- Distribution bowl surfaces



LOCTITE®



sustitute the element



Clean and degrease the surfaces



MOLYBDENUM BISULFIDE OIL

- Suction and discharge valve stems



LITHIUM SOAP GREASE

- Sealing ring lips



TEFLON® SYNTOFロン® PASTE

- Engine shaft pins
- Eccentric shaft pins
- Eccentric shaft u-bolts



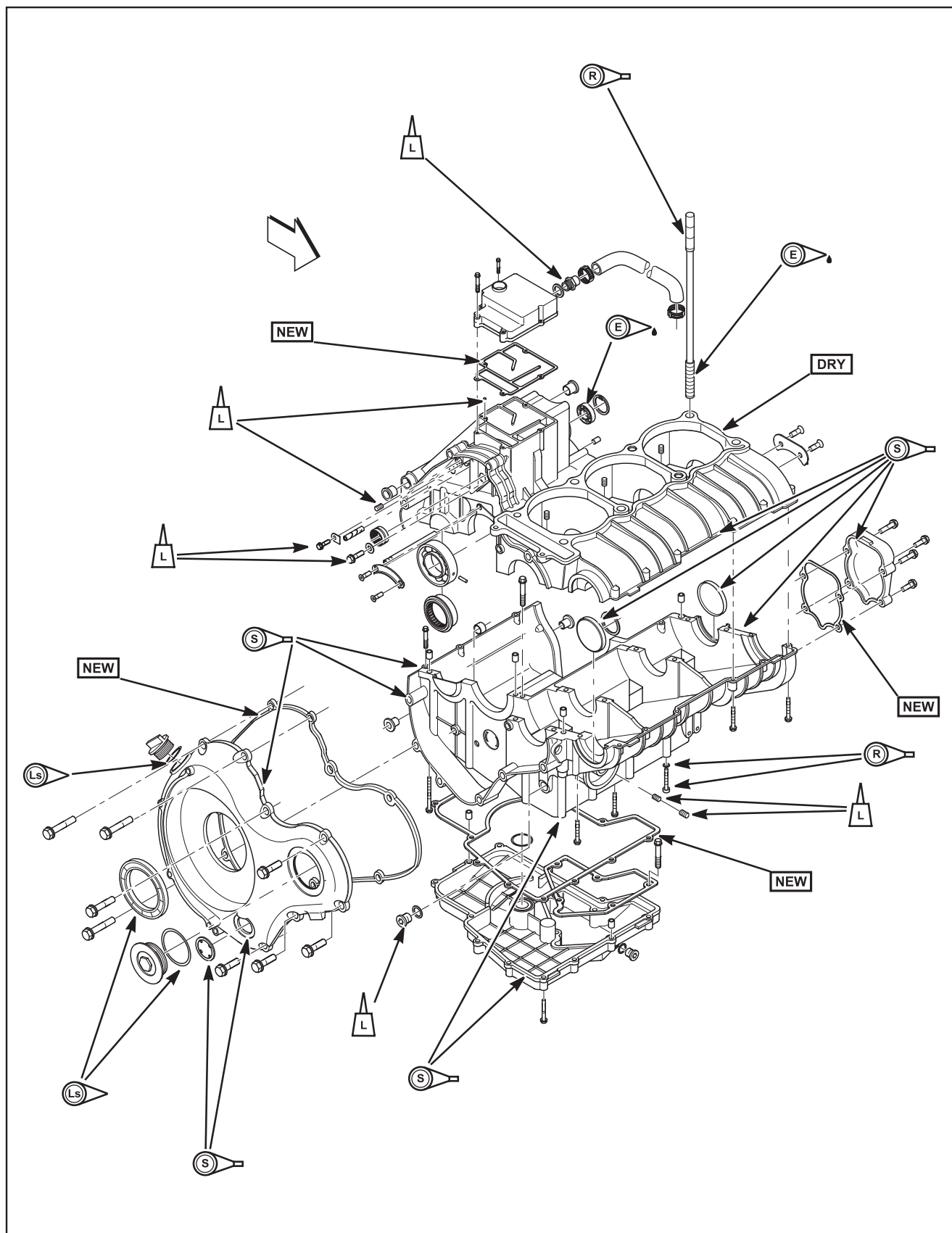
MOLYCOTE® COPPER GREASE

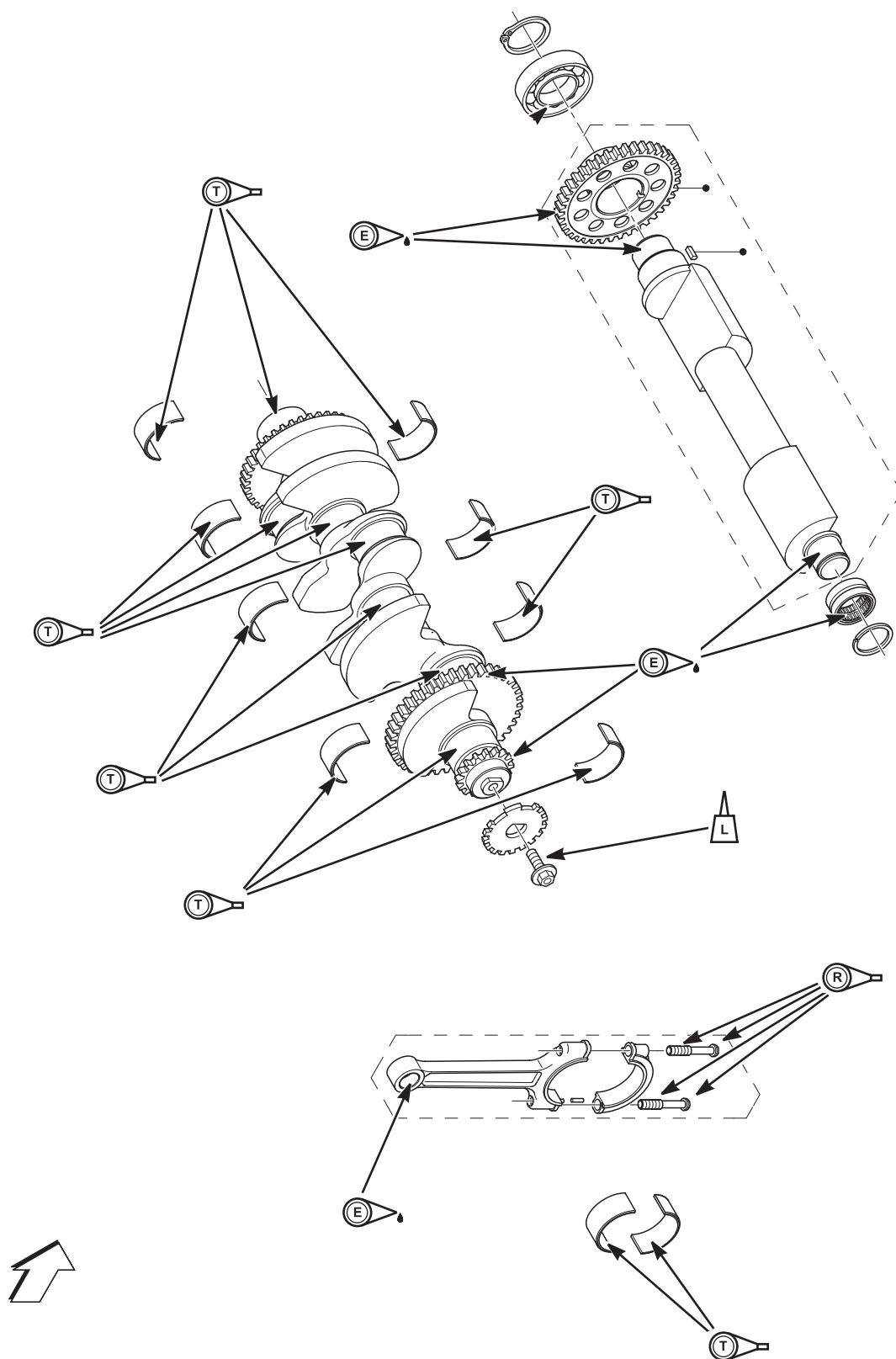
- Engine shaft fixing screws
- Gear flange
- Prisonner head fixing nuts

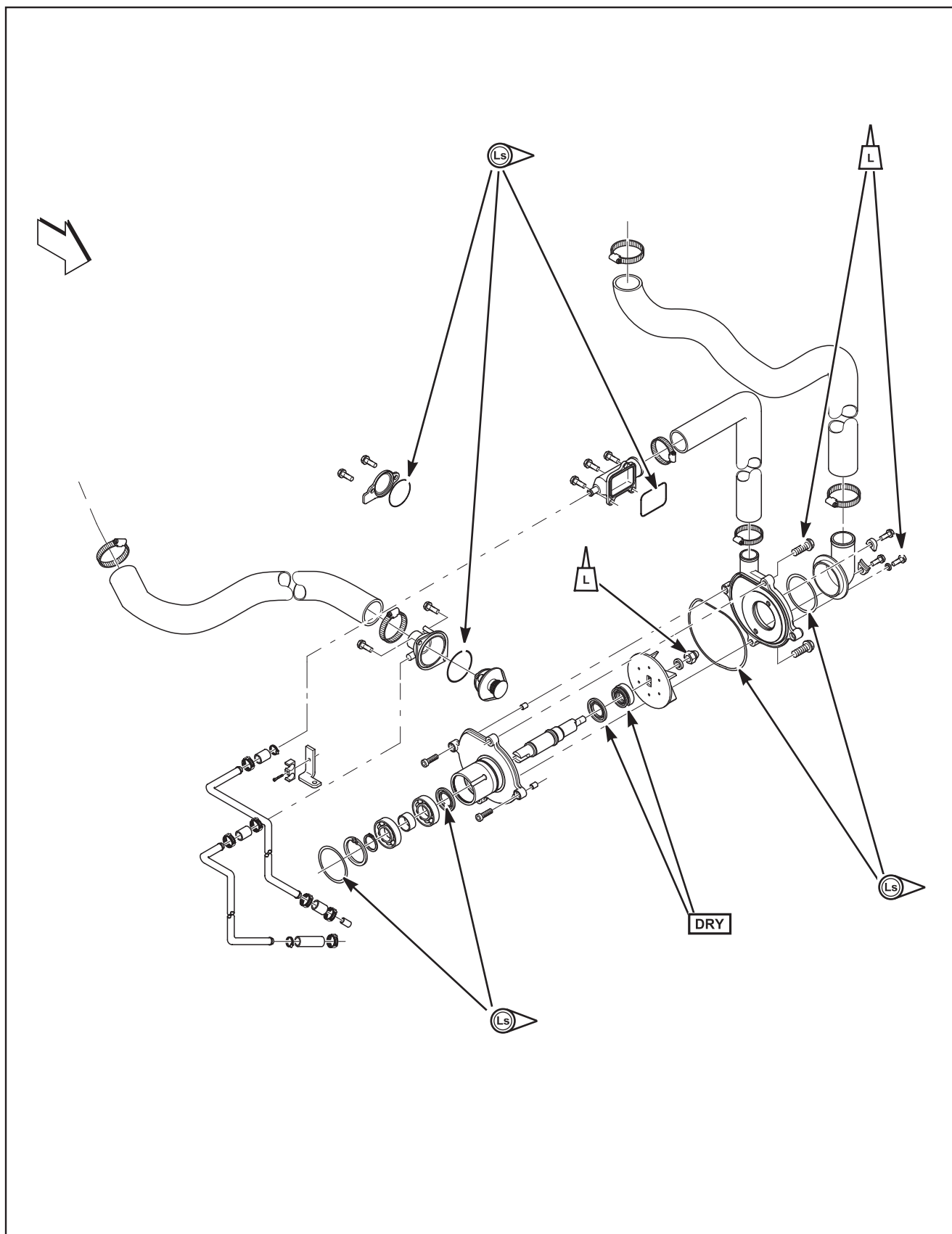


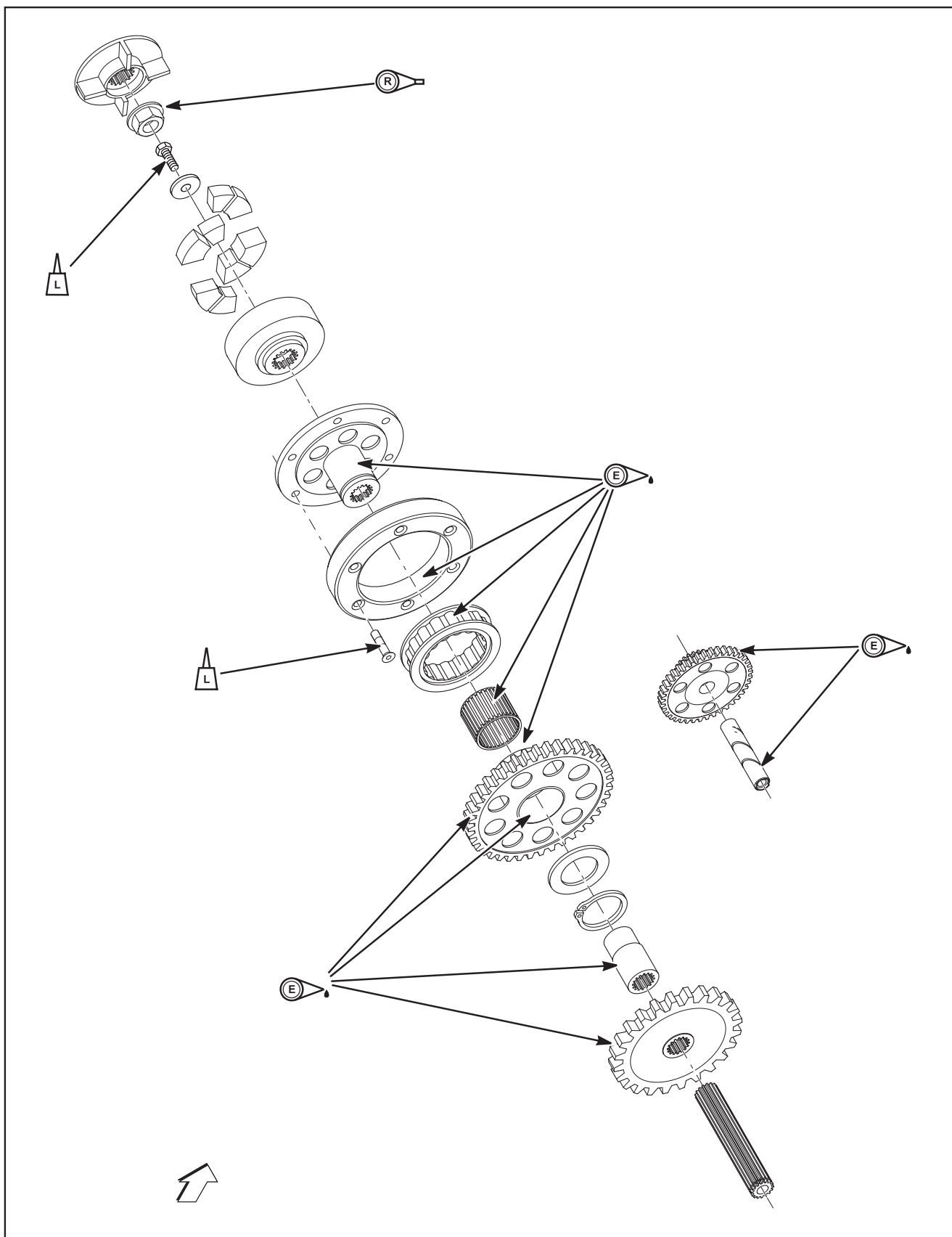
THREE BOND 1215 SEALING PASTE

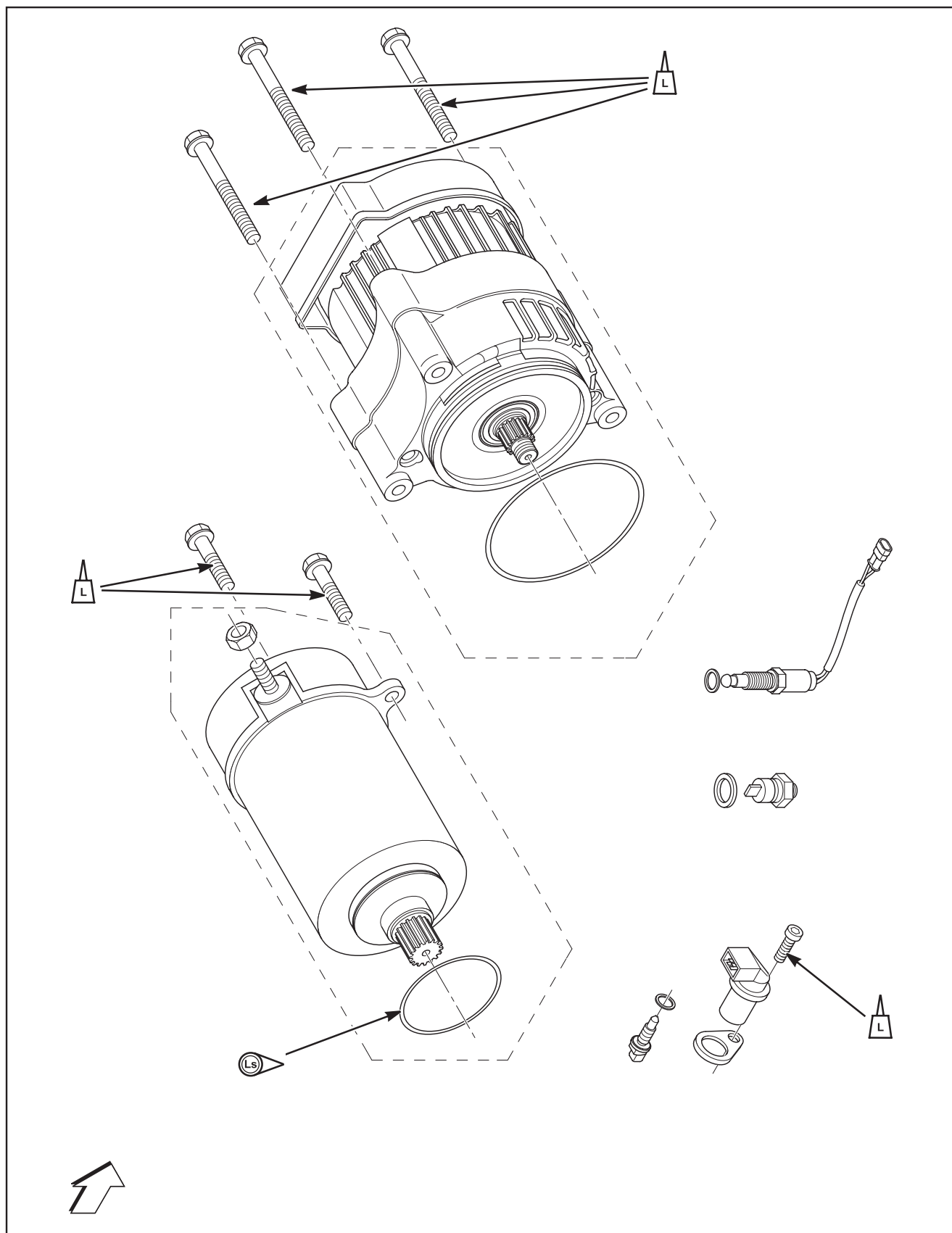
- Casing coupling surfaces
- Casing-cover-gear coupling surfaces
- Casing-oil sump surfaces
- Casing-cover-countershaft surfaces
- Water chamber caps

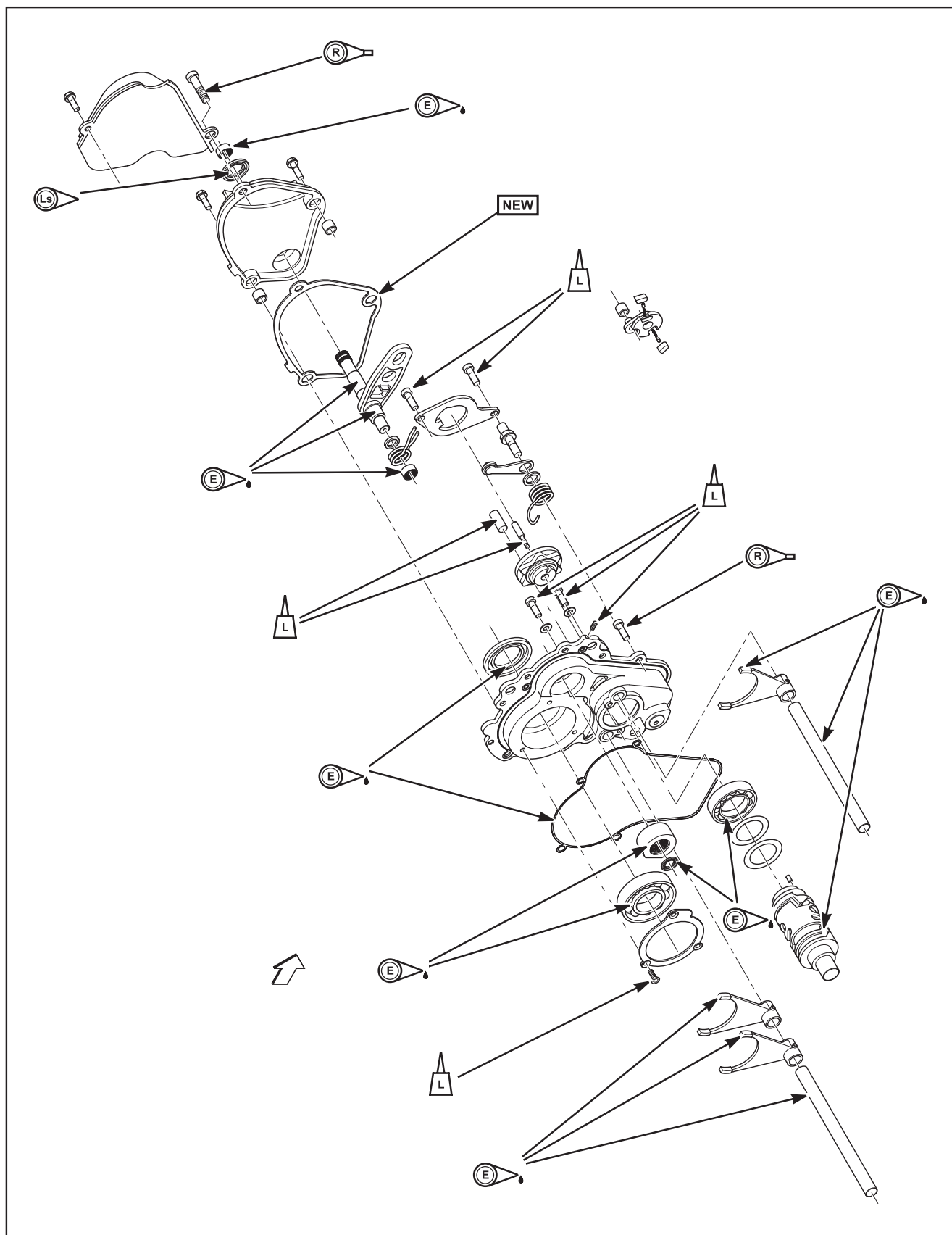


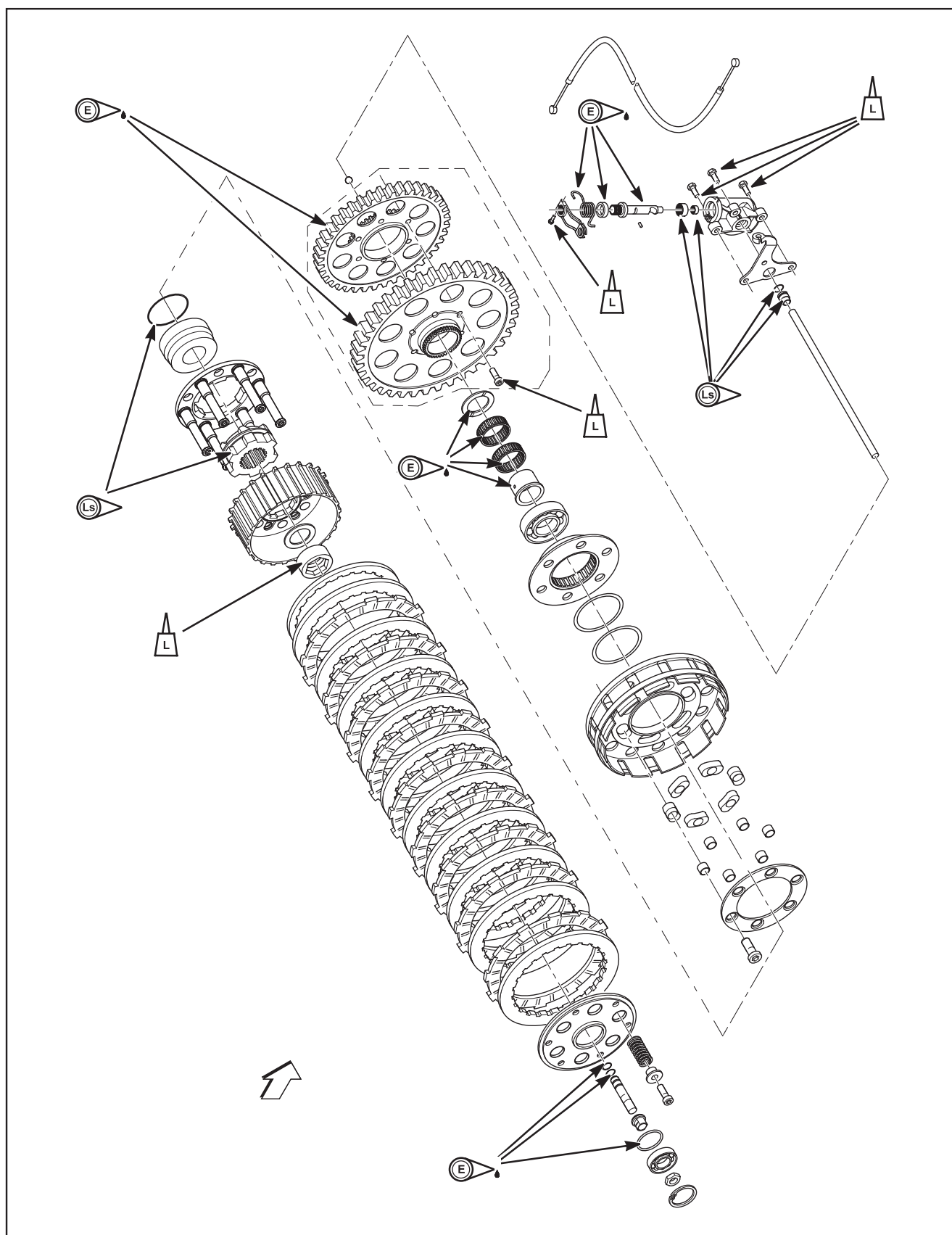


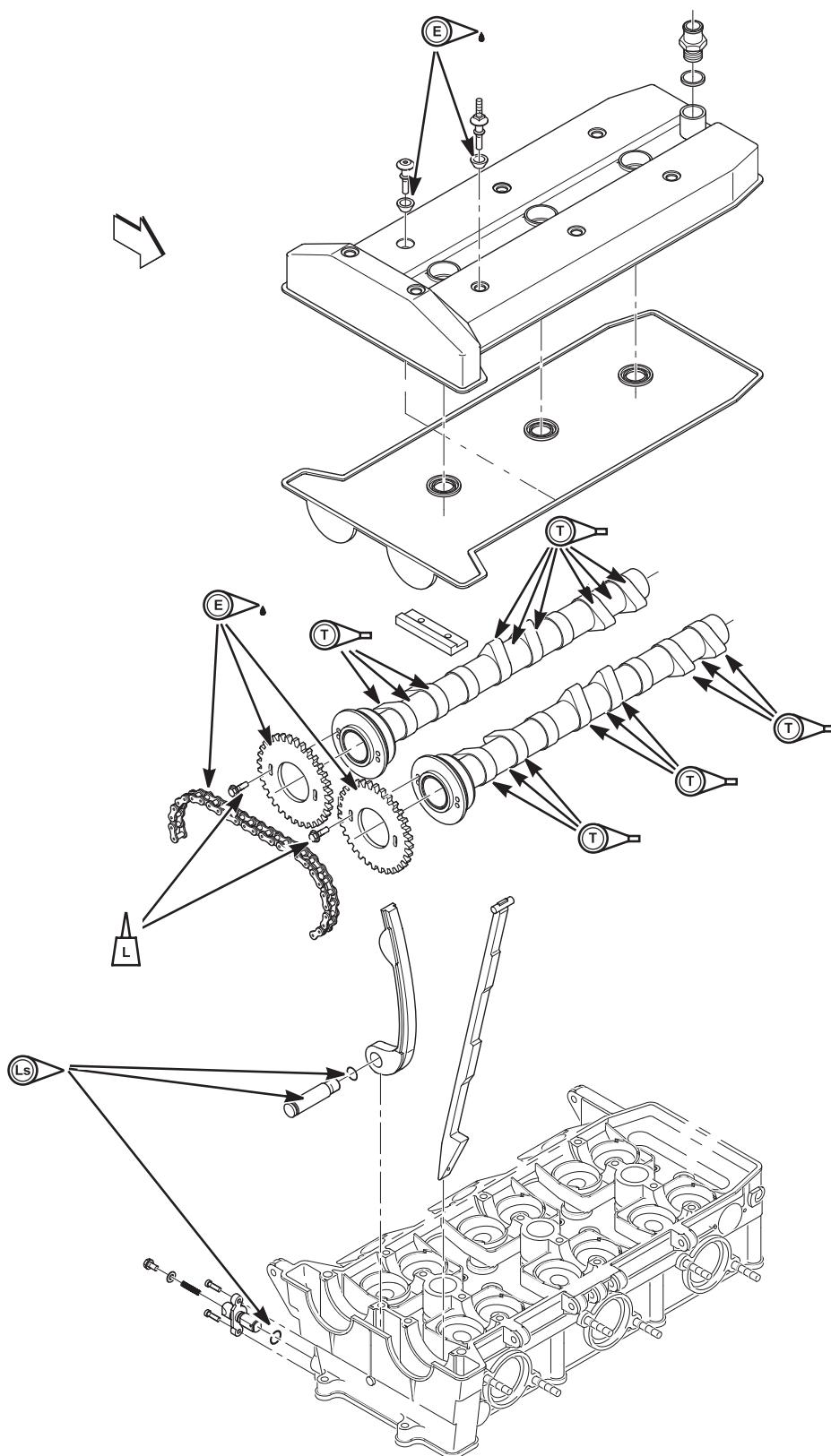


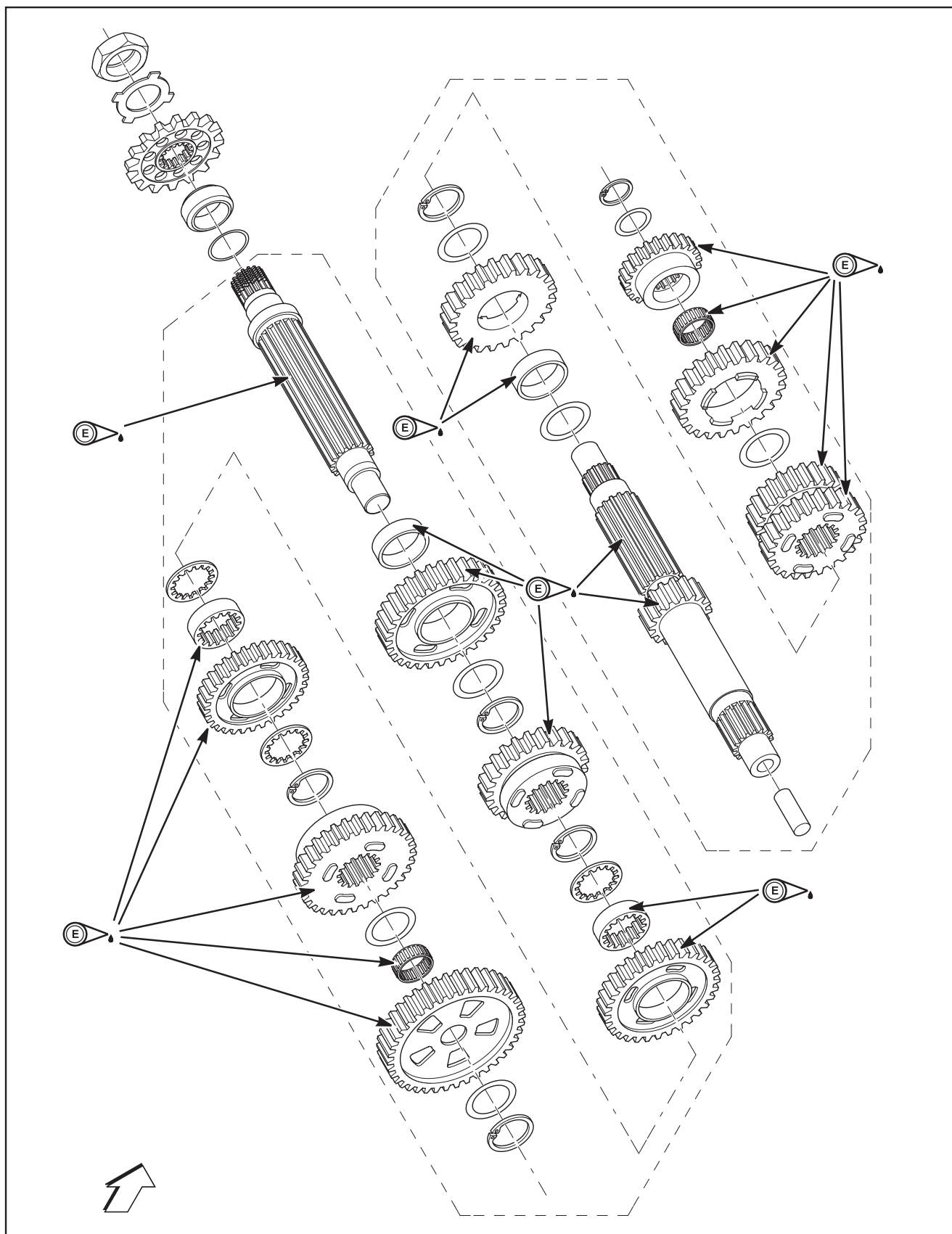
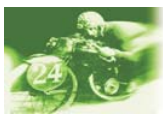


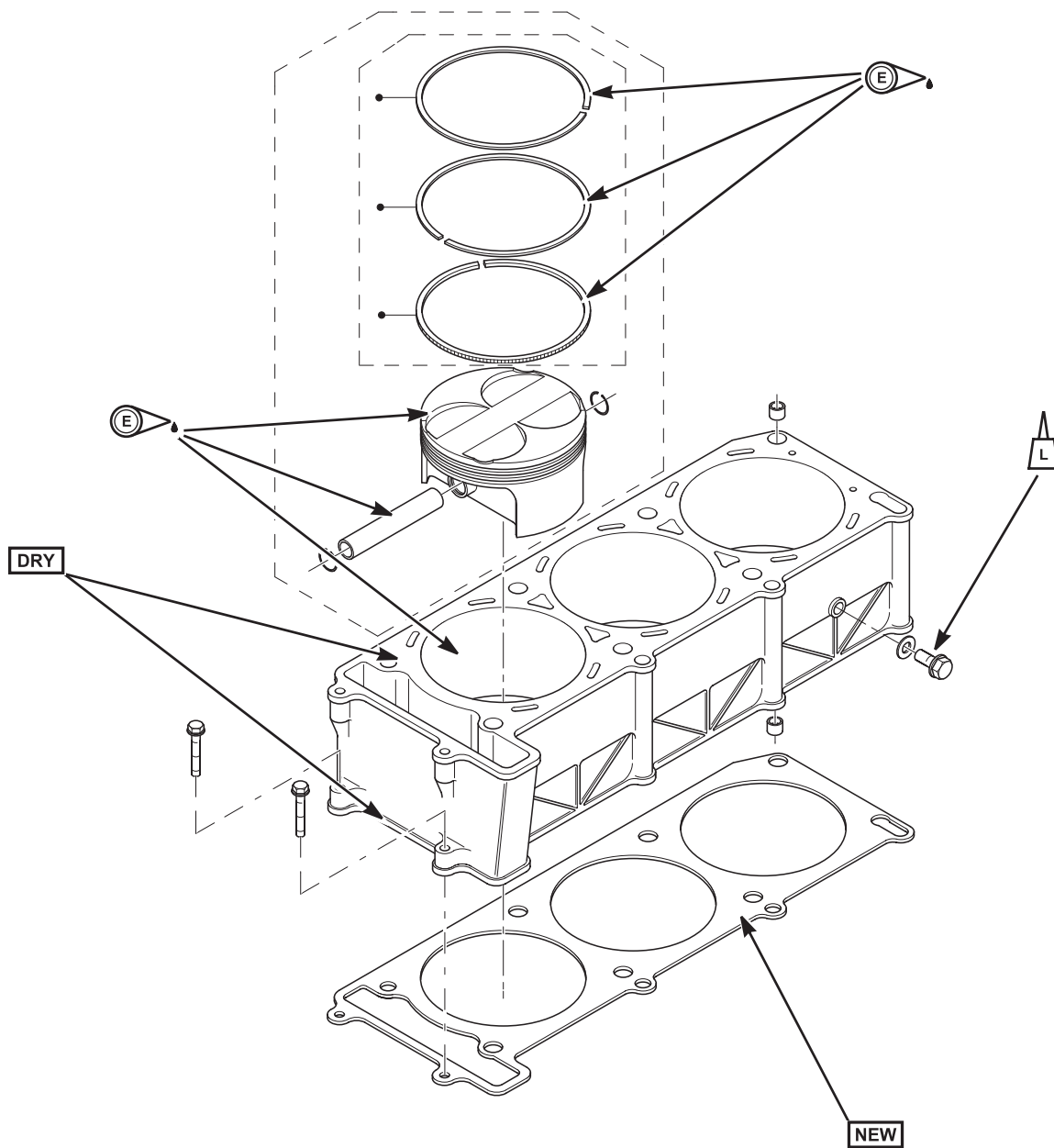


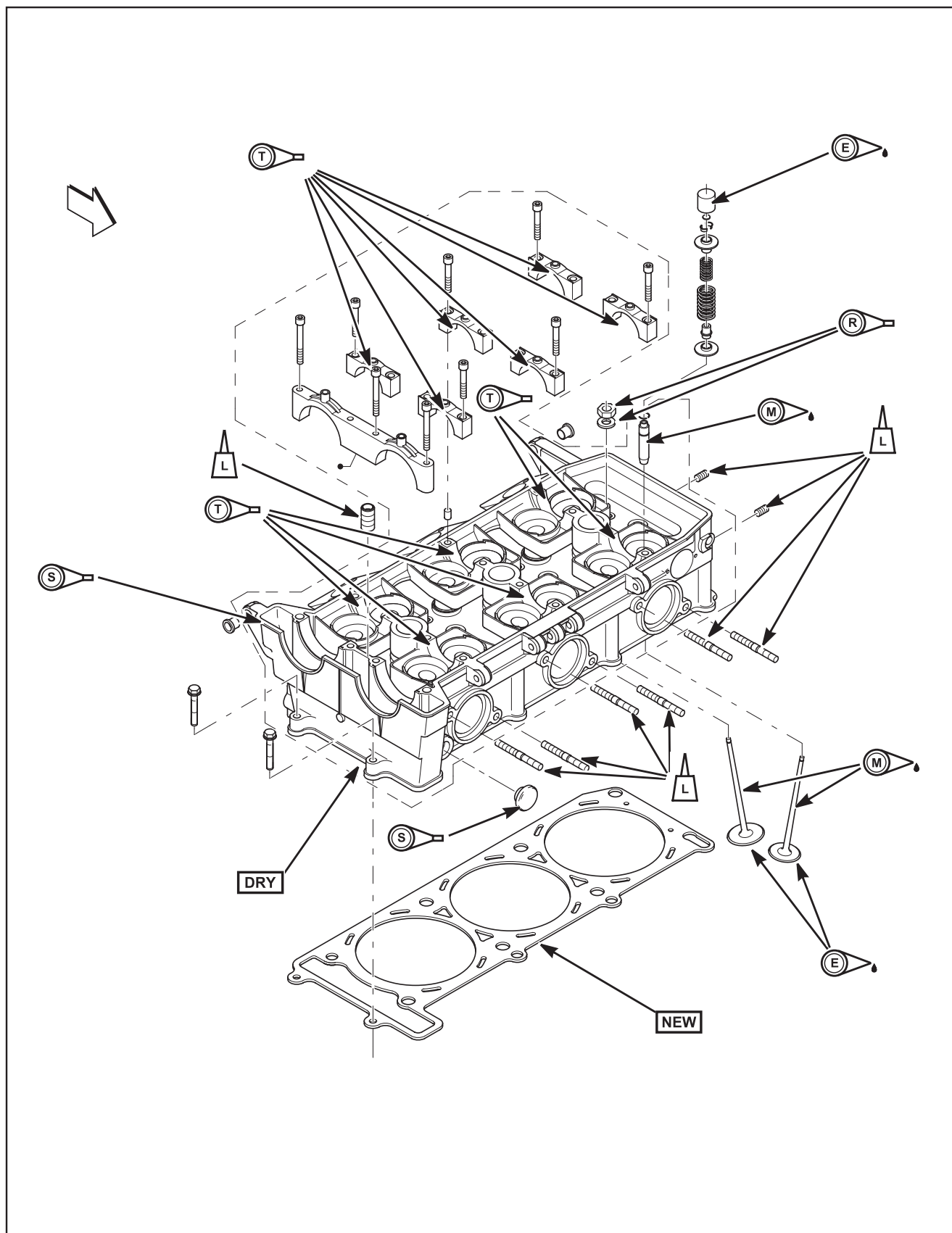
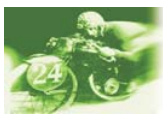


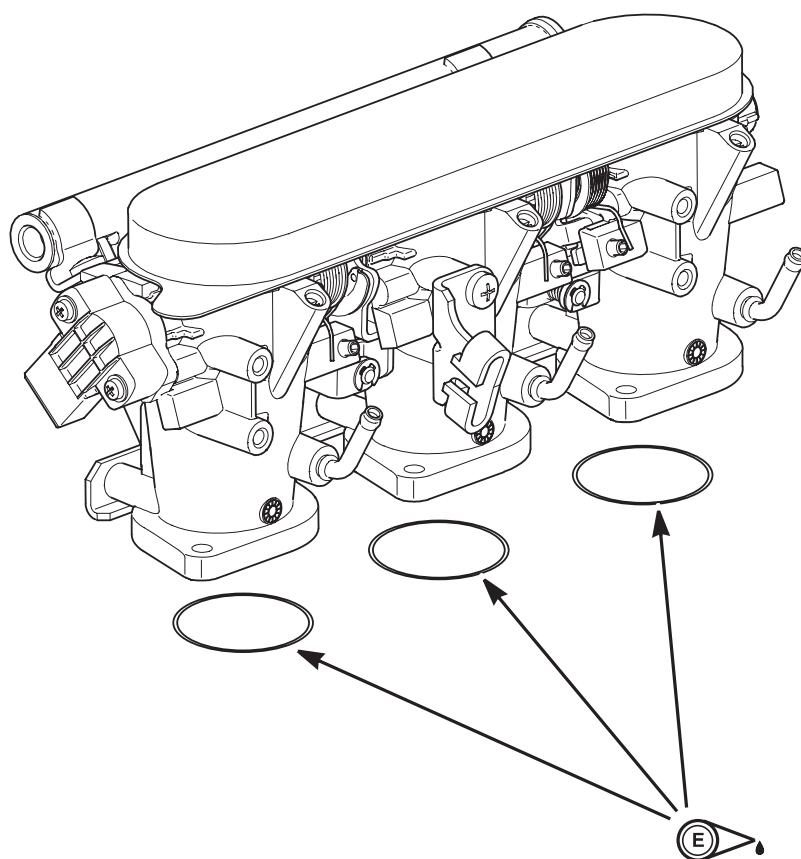


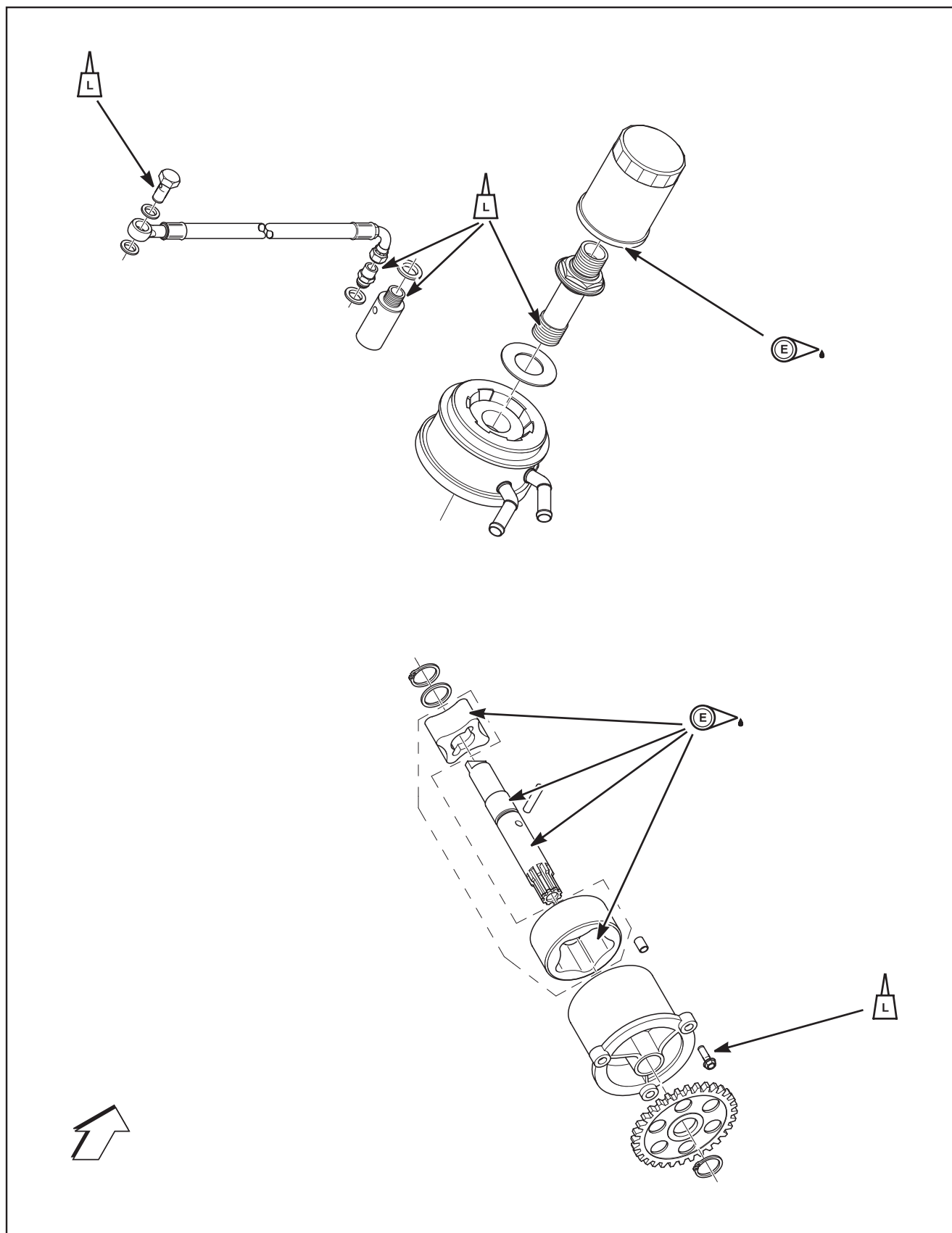




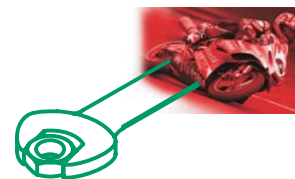












Periodical Checks

3 PERIODICAL CHECKS AND ADJUSTMENTS

3.1 INTRODUCTION

This chapter includes information about checks and adjustments for better maintenance of the bike's performance.

MAINTENANCE FREQUENCY					
COMPONENT	OPERATION	0 km (0 mi) before delivery	1000 km (625 mi) running-in 1st Service	6000 km (3750 mi) 2nd Service	11000 km (6875 mi) 3rd Service
Engine oil	Level check		Before every use of the vehicle		
	Change		R	R	R
		Every year in any case			
Engine oil filter	Change		R	R	R
		At every change of engine oil in any case			
Cooling liquid	Check/Restore level		i	i	i
	Change	Every 2 years			
Cooling plant	Check losses		i	i	i
Electrofans	Check functioning		i	i	i
Valves	Check/Adjust			i	i
Distribution chain	Check			i	i
	Change	Every 25000 km (15000 mi)			
Distribution mobile pad	Check/Change			i	i
	Change	Ogni 25000 km (15000 mi)			
		At every change of the distribution chain in any case			
Distribution chain stretcher	Check/Change				i
Sparkign-plugs	Check/Change		i	i	i
	Change				R

CODE:

i = inspection and adjustment , cleaning, oiling or change according to need.

R = change

T = tighten



COMPONENT	OPERATION	MAINTENANCE FREQUENCY			
		0 km (0 mi) before delivery	1000 km (625 mi) running-in 1st Service	6000 km (3750 mi) 2nd Service	11000 km (6875 mi) 3rd Service
Petrol filter	Check/Change				R
Throttle body	Check/Change		i	i	i
Air filter	Check/Change		i	i	i
Pinion/Stop washer	Check/Change		i	i	i
	Change	At every change of the transmission chain in any case			
Transmission chain	Check/Adjust		i	i	i
	Oiling	Clean and oil every 1000 km (625 mi)			
Crown	Check/Adjust		i	i	i
	Change	At every change of the transmission chain in any case			
Rear fork pads chain	Check/Change		i	i	i
Frame plate pads chain	Check/Change		i	i	i
Oil circulating tubes	Check defects and losses		i	i	i
	Change	Every 3 years in any case			
Brake liquid	Control level		i	i	i
	Change	Every 25000 km (15000 mi)			
		Every 2 years in any case			
Gear command	Check		i	i	i
Brakes/Clutch	Check functioning		i	i	i
Brake pads	Check/Change		i	i	i
Accelerator command	Check functioning	i	i	i	i
	Check/Adjust play	i	i	i	i

CODE:

i = inspection and adjustment , cleaning, oiling or change according to need.

R = change

T = tighten



COMPONENTS	OPERATION	MAINTENANCE FREQUENCY			
		0 km (0 mi) before delivery	1000 km (625 mi) running-in 1st Service	6000 km (3750 mi) 2nd Service	11000 km (6875 mi) 3rd Service
Transmissions and flexible commands	Check/Adjust	i	i	i	i
Steering crown saddle post	Check/Adjust		i	i	i
Steering saddle post ball-bearings	Check/Adjust		i	i	i
	Oil	Every 20000 km (12000 mi)			
Tires	Check pressure	i	i	i	i
	Check wear			i	i
Rear/front wheel ball-bearings	Control			i	i
	Change	Every 50000 km (30000 mi)			
Lateral assembly stand	Check functioning	i	i	i	i
" " " switch	Check functioning	i	i	i	i
Large fork ball-bearings	Change	Every 35000 km (21000 mi)			
	Oil/Check		i	i	i
Rear damper	Check/Adjust		i	i	i
Front fork oil	Change	Ogni 20000 km (12000 mi)			
Battery connections	Check/Clean		i	i	i
Electrical plant	Check functioning	i	i	i	i
Instrumentation	Check functioning	i	i	i	i
Vision Lights/Signals	Check functioning	i	i	i	i
Horn	Check functioning	i	i	i	i
Front headlight	Check functioning	i	i	i	i
	Adjust	At every variation in the state of the vehicle			
Ignition switch	Check functioning	i	i	i	i

CODE:

i = inspection and adjustment , cleaning, oiling or change according to need.

R = change

T = tighten



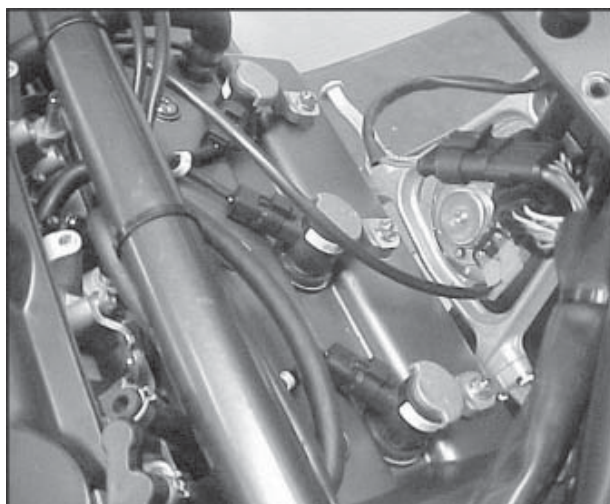
COMPONENTS	OPERATION	MAINTENANCE FREQUENCY			
		0 km (0 mi) before delivery	1000 km (625 mi) running-in 1st Service	6000 km (3750 mi) 2nd Service	11000 km (6875 mi) 3rd Service
Locks	Check/ Functioning	i	i	i	i
Screws and nuts	Check/Tighten	i	T	T	T
Tube clamp straps	Check/Tighten	i	i	i	i
General oiling		i	i	i	i
General test		i	i	i	i

CODE:

i = inspection and adjustment , cleaning, oiling or change according to need.

R = change

T = tighten



3.2 CHECK SPARKING-PLUGS



WARNING:

Changing and checking the sparking-plugs must be carried out with the engine cold.

Remove the internal instrument board fastenings (see "DISMANTLE INSTRUMENT BOARD FASTENINGS").

Remove the small cap (see "DISMANTLE SMALL CAP").

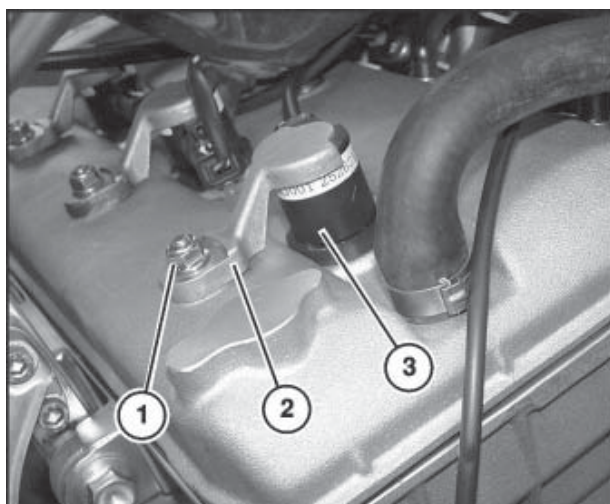
Remove the lower cowl (see "DISMANTLE LOWER COWLING").

Remove the left and right upper cowl (see "DISMANTLE LEFT AND RIGHT UPPER COWLING").

Remove the tank (see "DISMANTLE TANK").

Remove the air box conduits (see "DISMANTLE AIR BOX").

Remove the air box (see "DISMANTLE AIR BOX").



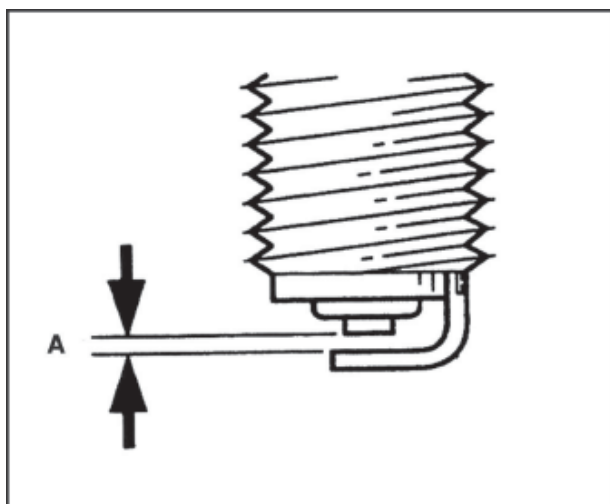
WARNING:

Clean the dirt around the sparking-plugs before removing them.

Loosen and remove the nut (1).

Remove the coil support rod (2) and the coil (3).

Remove the sparking-plugs beneath.



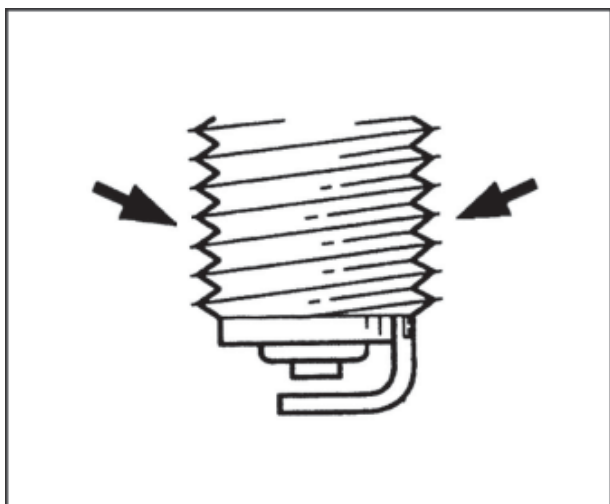
Sight check the state of the sparking-plugs and if necessary change them.

Check the distance (A) with a feeler and check that it corresponds to the specific value.



SPECIFIC VALUE

DISTANCE (A) = 0.7 - 0.8 mm



Oil the sparking-plug threading, position it in its proper seat and tighten it.



12 N·m 1.2 Kg-m

Use the reverse procedure to dismantling.



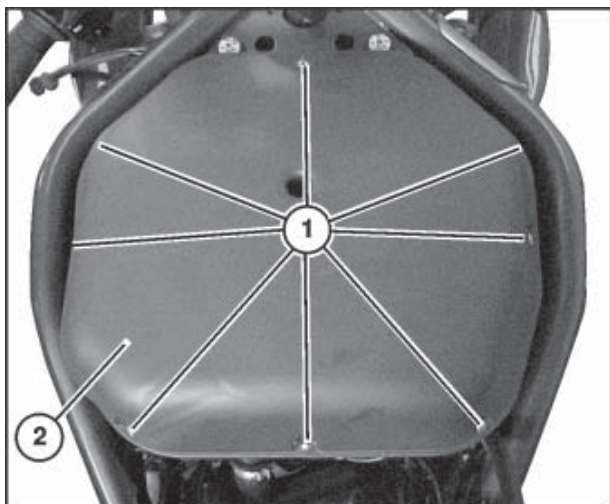
3.3 CLEAN AIR BOX



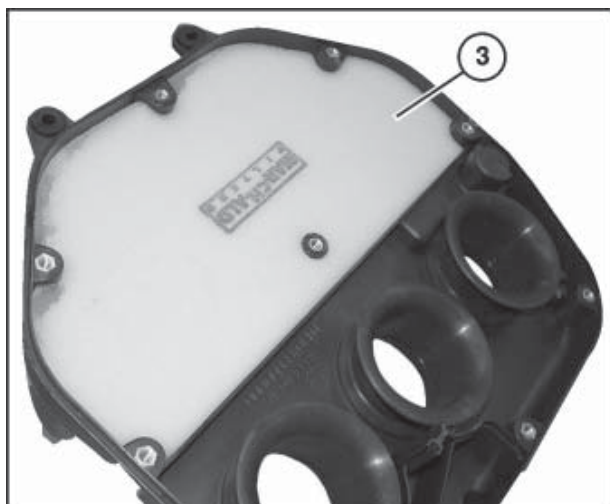
WARNING:

To avoid the risk of fire or explosion do not use petrol or inflammable solvents in cleaning the filtering element inside the filter box.

Remove the tank (see "DISMANTLE TANK").



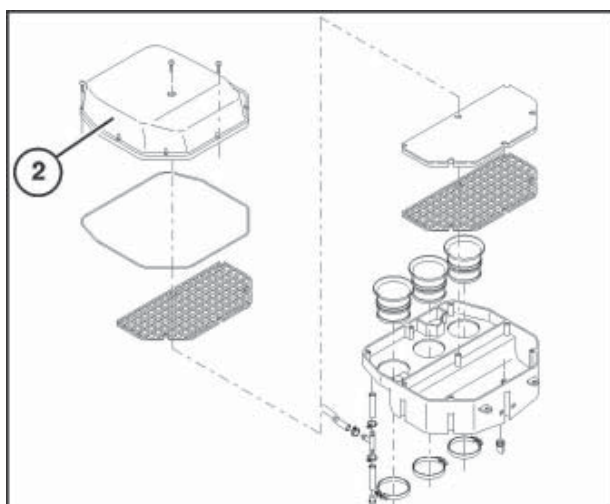
Loosen and remove the eight screws (1) around the air box and the central screw.
Remove the air box cover (2).



Remove the filtering element (3) situated inside the filter box. Wash the filtering element with solvents specific for this use and leave it to dry in the open air. Apply a specific oil to the entire surface of the filtering element.

NOTE:

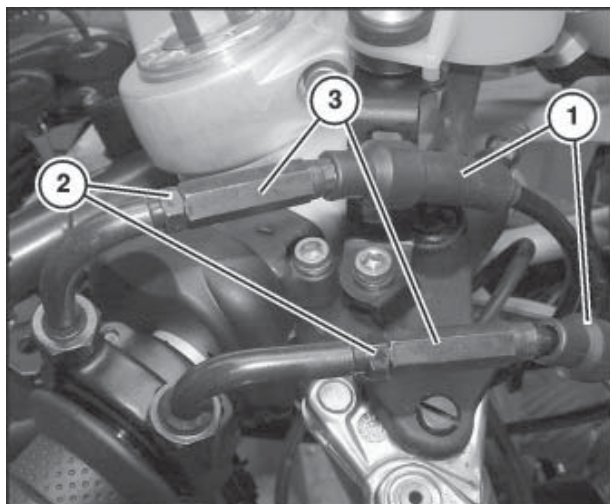
Check that the filtering element is always positioned with its side of major density turned upwards.



WARNING:

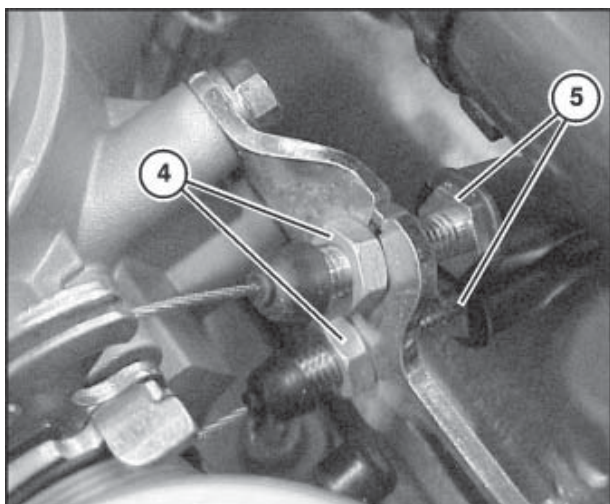
Before re-inserting the filtering element into the air box, eliminate the excess of oil by squeezing the element that must not drip.

Re-position the filtering element.
Position the air box cover (2) and fix it with the nine screws.
Mount the tank (see "MOUNT TANK").



3.4 GAS COMMAND PLAY

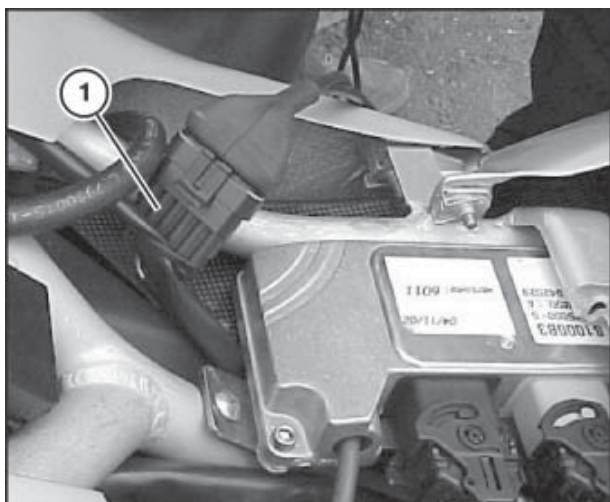
Remove the internal instrumentation fastenings (see "DISMANTLE INTERNAL INSTRUMENTATION FASTENINGS").
Remove the small cap (see "DISMANTLE SMALL CAP").
Remove the lower cowling (see "DISMANTLE LOWER COWLING").
Remove the left and right upper cowling (see "DISMANTLE LEFT AND RIGHT UPPER COWLING").
Remove the tank (see "DISMANTLE TANK").
Remove the air box conduits (see "DISMANTLE AIR BOX").
Remove the air box (see "DISMANTLE AIR BOX").
The first adjustment is made during the installation of the gas command cables.
Move the two rubber protections (1).
Loosen the counter-nut (2).
Carry the adjusters to the bottom of the stroke (3).



Adjust the play on the nuts (4) and counter-nuts (5).
Adjust the play using the adjusters, turning them clockwise or anti-clockwise.
Clockwise the play diminishes.
Anti-clockwise the play increases.
The value of the gas command play must come within the specific value.



SPECIFIC VALUE
GAS COMMAND PLAY = 0.5 mm



3.5 ADJUSTMENT CO



SPECIFIC INSTRUMENTS
Engine management diagnostic instruments:
R180197036000



WARNING:
The Axone connection must be carried out with the key on "OFF".

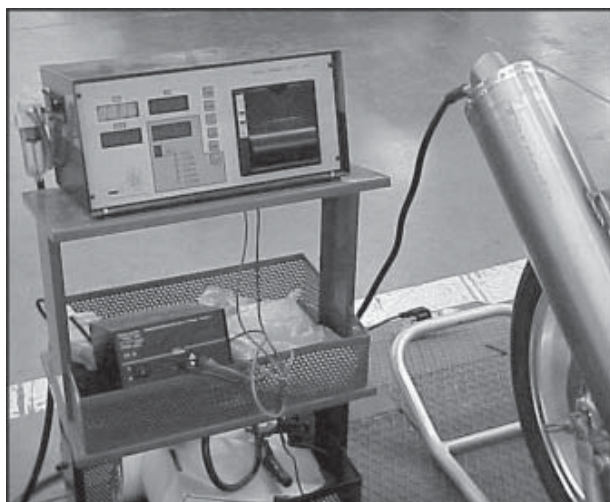
Remove the saddle, connect the Axone to the diagnostic socket (1) under the saddle.



Turn the key to "ON".
Check that the arrest bike switch on the right command is on "RUN".
Check that the vehicle is not in any gear.
Select the options until the indication: engine key "ON".
Position the ignition key on "ON", choose the desired menu.
Start the bike engine.



Select the engineering Parameters icon on Axone, then that on the Stepper position and start.



Bring the engine water temperature to 90°. Connect a CO instrument tester to the exhaust plant. The operation of adjusting the CO at minimum is recursive and must take into consideration contemporaneously variations in the Stepper position and the strength of the mixture. The position of the Stepper must maintain a value between 30 and 40 pitches. If this value does not correspond, select the Adatt icon with Axone. Bring the Stepper to within the mentioned values with the Adjustment icon (Hammer and Screwdriver) on the Stepper Manual. and bring the Stepper to within the previously mentioned values.



Varying these two parameters using Axone (Carb. Adjustment at minimum), try to obtain a CO reading on the tester of about 1.5 (lower values make irregularities at the minimum possible while larger values, normally up to 3.0 - 3.5, improve the performance, increasing the polluting gases however.).



3.6 ADJUSTMENT THROTTLE HOUSING

To be able to accede to the throttle body the following components need to be dismantled.

Dismantle the mirrors (see "DISMANTLE MIRRORS").

Dismantle the internal instrumentation fastenings (see "DISMANTLE INTERNAL FASTENINGS").

Dismantle small cap (see "DISMANTLE SMALL CAP").

Dismantle lower semi-cowling (see "DISMANTLE SEMI-COWLING").

Dismantle upper cowling (see "DISMANTLE COWLING").

Dismantle cowling under headlight (see "DISMANTLE UNDER HEADLIGHT").

Dismantle wheel housing (see "DISMANTLE WHEEL HOUSING").

Remove gearbox (see "DISMANTLE GEARBOX").

Unscrew the gearbox fixing screw without disconnecting it to allow being able to remove the petrol tank.

Remove the petrol tank (see "DISMANTLE TANK").

Remove the petrol tank in such a way as not to prevent access to the throttle body but such as to guarantee supply to the engine.

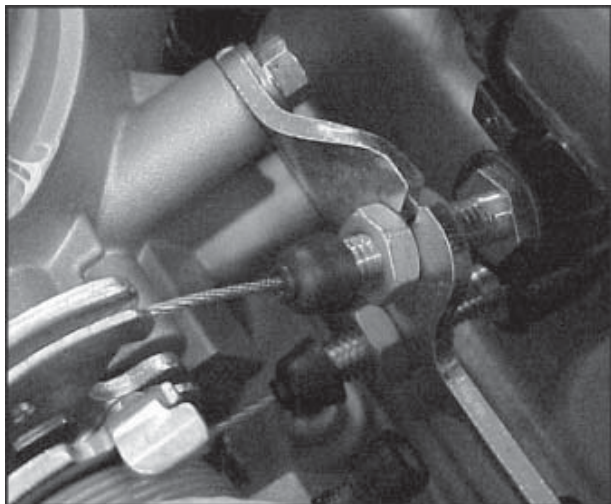
Dismantle air box conduits (see "DISMANTLE CONDUITS").

Remove the rear tail piece (see "DISMANTLE TAIL PIECE").

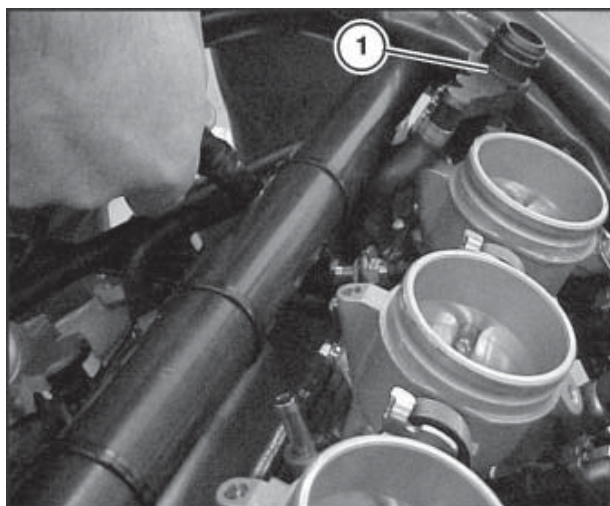
Remove the large rear lead, unhooking it and taking it back a little to allow dismantling the radiator box conduits.

Dismantle the radiator box conduits (see "DISMANTLE RADIATOR BOX").

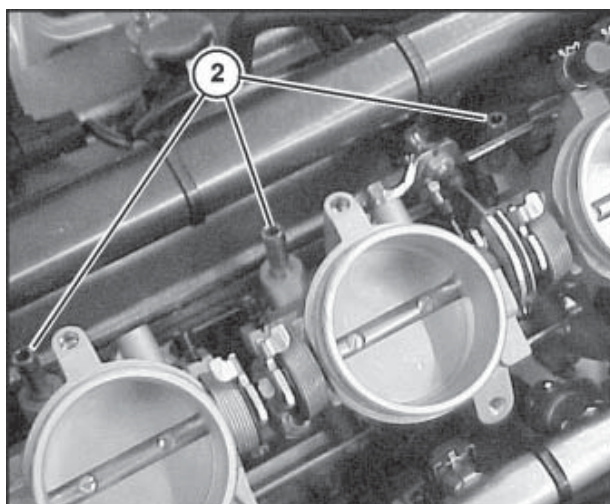
Dismantle airbox (see "DISMANTLE AIR BOX").



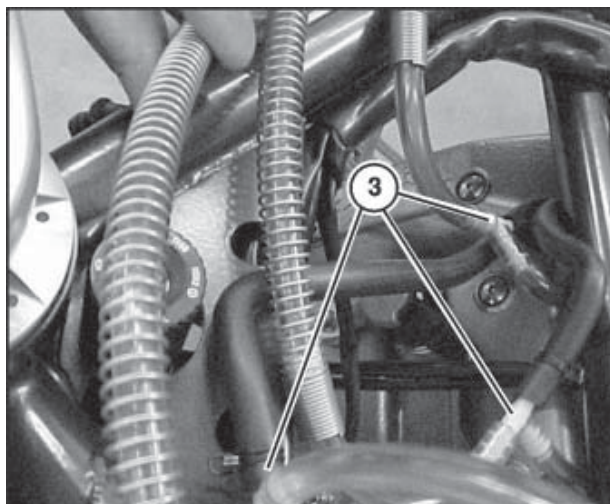
Check that the gas cables are mounted correctly and have the correct amount of play (see "GAS COMMAND PLAY").



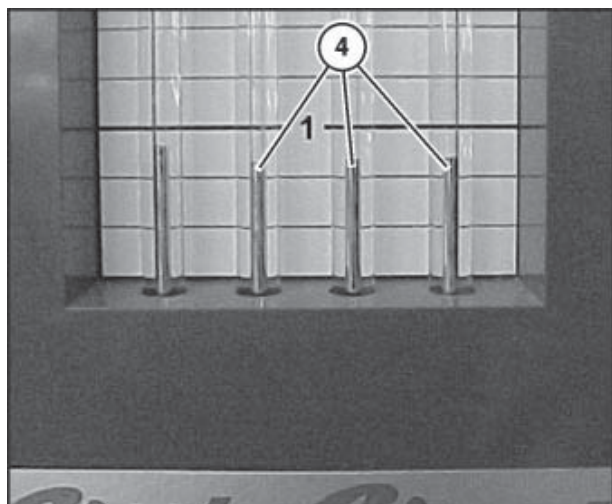
Disconnect the three tubes that connect the throttle body to the Stepper (1).



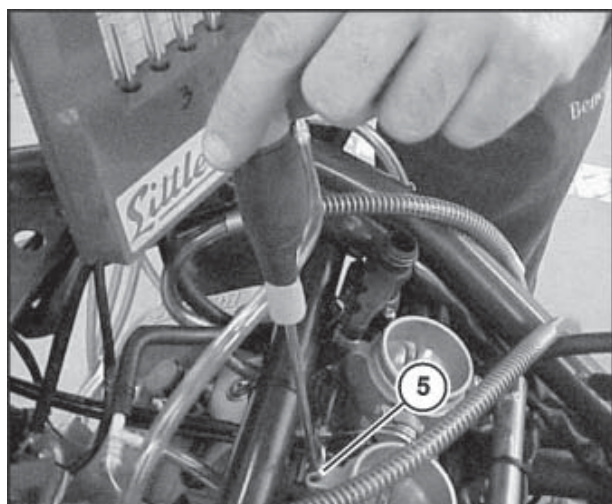
Disconnect the three lips (2) that connect the throttle body.



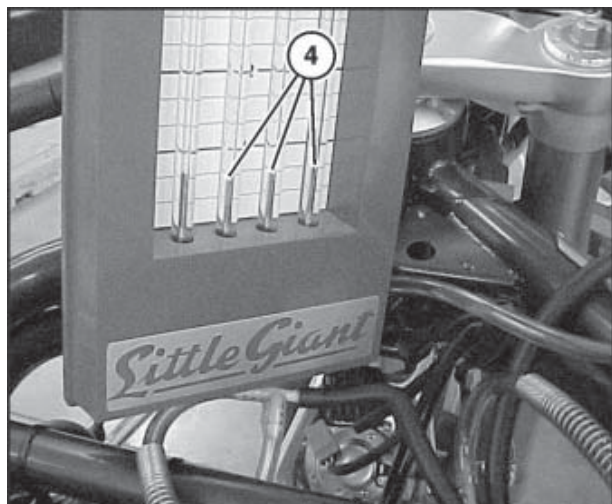
Connect, using the three T switches (3), the minimum air conduits of the throttle body to a mercury columned Vacuum meter.



Start the engine, check that the mercury columns (4), with the engine at minimum, are aligned and then proceed to balancing.



Tighten the upper by-pass screws (5) closing the passages completely.



Work on the by-pass screws, loosening them until the columns are equal.



3.7 CHECK STEPPER

Remove the internal instrument board fastenings (see "DISMANTLE INTERNAL INSTRUMENT BOARD FASTENINGS").

Remove the small cap (see "DISMANTLE SMALL CAP").

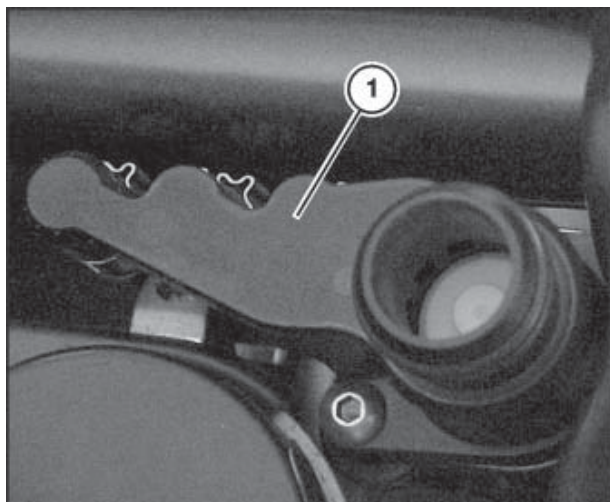
Remove the lower cowling (see "DISMANTLE LOWER COWLING").

Remove the upper left and right cowling (see "DISMANTLE LEFT AND RIGHT COWLING").

Remove the tank (see "DISMANTLE TANK").

Remove the air box conduits (see "DISMANTLE AIR BOX").

Remove the air box (see "DISMANTLE AIR BOX").



WARNING:

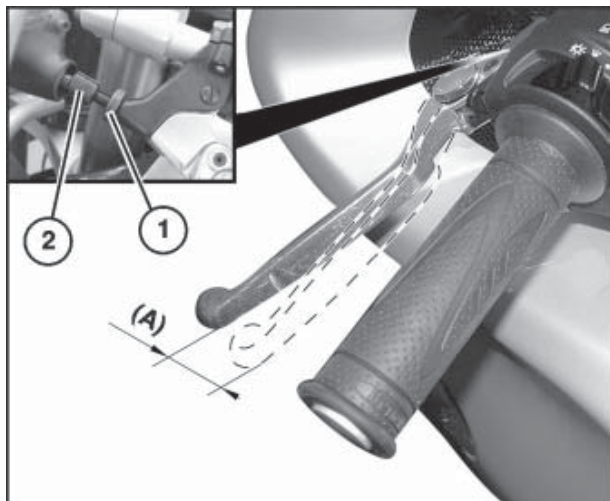
Use the specified Axone instruments for adjusting.

Remove the stepper from the lower part of the air box (1).
Sight check that the stepper is not broken, otherwise change it.

Sight check that there are no obstructions inside the stepper.
If necessary, clean the stepper.

Insert the stepper as in the figure.

Mount the air box (see "MOUNT AIR BOX").



3.8 ADJUSTMENT CLUTCH LEVER PLAY

Move the adjustment cover cap.

Unscrew the crown (1) and restore the clutch lever play by turning the adjuster (2) clockwise or anti-clockwise.

Clockwise the play diminishes.

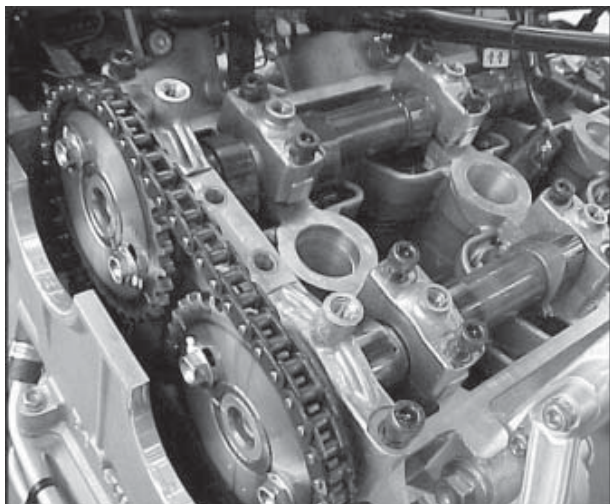
Anti-clockwise the play increases.

The value of the clutch lever (A) must enter within the specific value.



SPECIFIC VALUE

CLUTCU LEVER PLAY (A) = 5 mm



3.9 ADJUSTMENT VALVE PLAY

Remove the internal instrument board fastenings (see "DISMANTLE INTERNAL INSTRUMENT BOARD FASTENINGS").

Remove the small cap (see "DISMANTLE SMALL CAP").

Remove the lower cowling (see "DISMANTLE LOWER COWLING").

Remove the upper left and right cowling (see "DISMANTLE LEFT AND RIGHT COWLING").

Remove the tank (see "DISMANTLE TANK").

Remove the air box conduits (see "DISMANTLE AIR BOX").

Remove the air box (see "DISMANTLE AIR BOX").

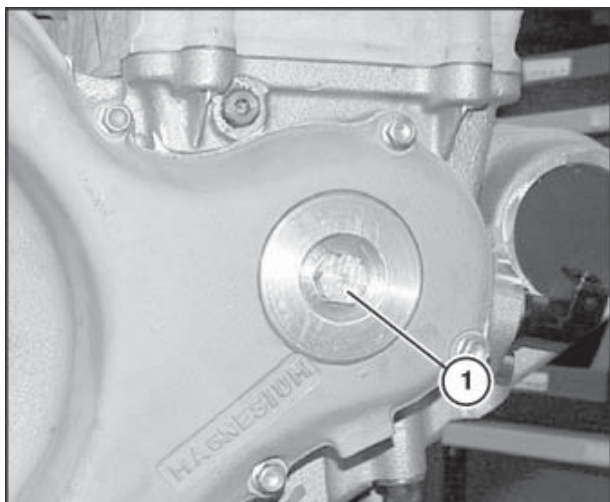
Remove the under headlight fastening (see "DISMANTLE UNDER HEADLIGHT FASTENING").

Remove the wheel housing (see "DISMANTLE WHEEL HOUSING").

Remove the coils.

Remove the sparking-plugs.

Remove the head cover (see "DISMANTLE HEAD COVER").



Remove the phonic wheel inspection cap (1).

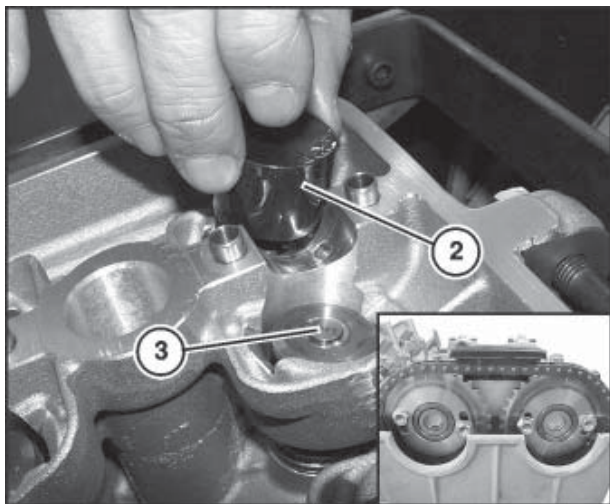
Make the engine turn over with the phonic wheel retaining screw and in the meantime measure the valve play between the cams and the small bowls with the feeler. If adjustment is necessary, operate as follows:



SPECIFIC VALUE

Suction = 0.25 ± 0.30 mm

Exhaust = 0.30 ± 0.35 mm

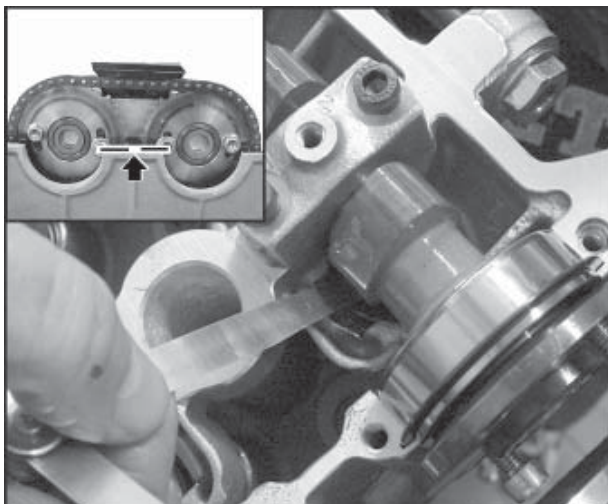


OPERATION PROCEDURE:

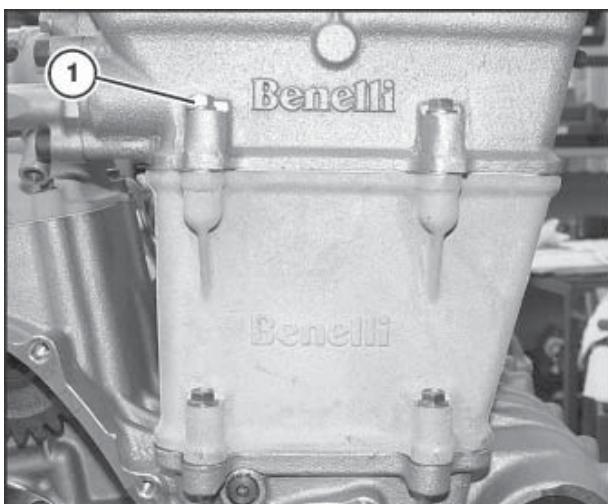
Align the sprockets of the distribution chain with the signs facing inwards. In this position the valves are all in the exhaust position. Dismantle the chain stretcher (see procedure).

Dismantle the cams one at a time, raising the chain.

Raise the small bowls (2) and change the pads (3) to adjust.



Remount the cams with the signs aligned, remount the chain, put the engine back into phase and check the distribution with the reference signs.

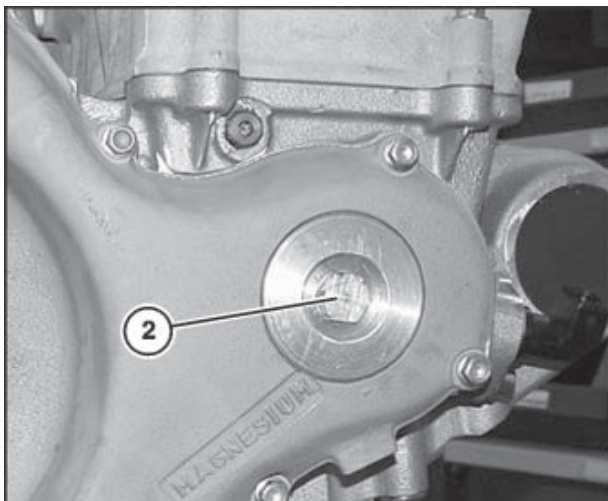


3.10 ENGINE DISTRIBUTION

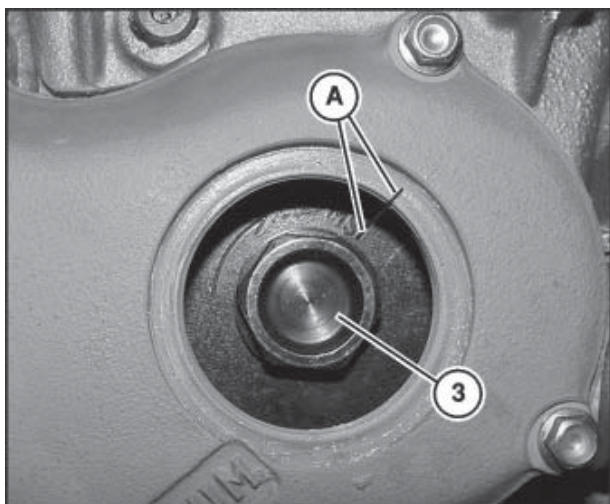


WARNING:
Specific instruments are needed to set up the distribution: goniometer drive, upper dead centre Measurer and equipment for checking valve lifter.

Remove the head cover. (see "DISMANTLE HEAD COVER"), Remove the goniometer indicator fixing screw (1).



Remove the phonic wheel cover (2).

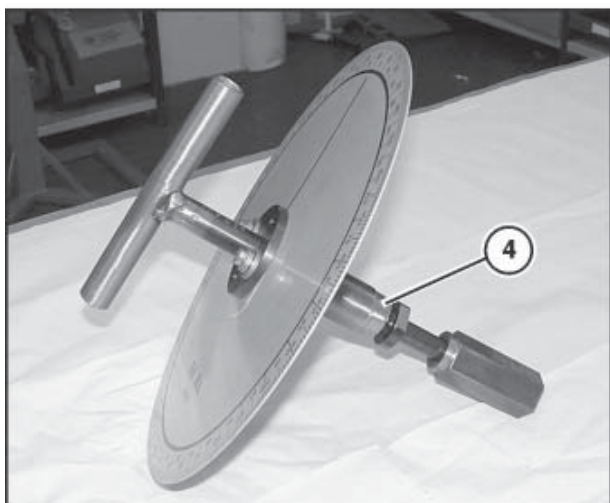


Carry the first piston to the upper dead centre, turning the screw (3) clockwise as indicated on it and align the two reference signs (A).



WARNING:

When mounting the goniometer indicator, check the presence of about 5 mm of space to avoid contact between the indicator and the goniometer.

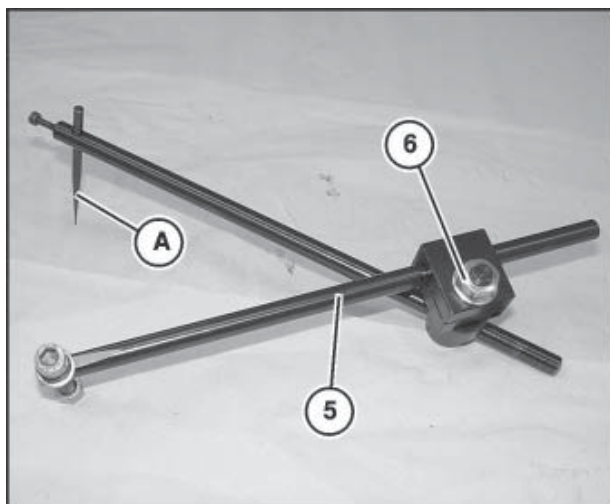


Position the goniometer drive (4) in the place of the phonic wheel screw (3).



SPECIFIC EQUIPMENT:

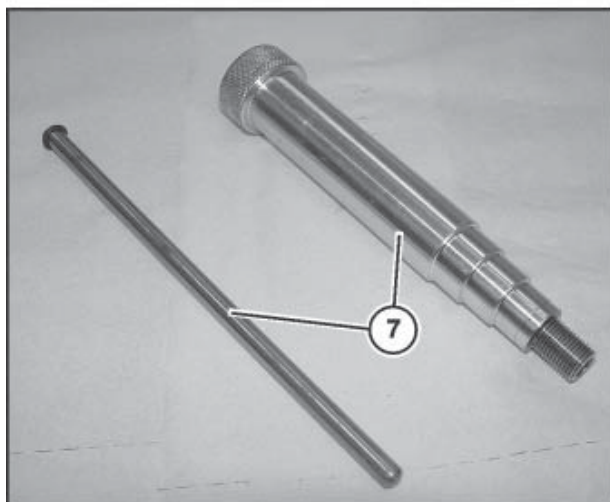
Goniometer drive (4):
R180197015000



Position the goniometer indicator (5), using the nut (6) to adjust the indicator (A).



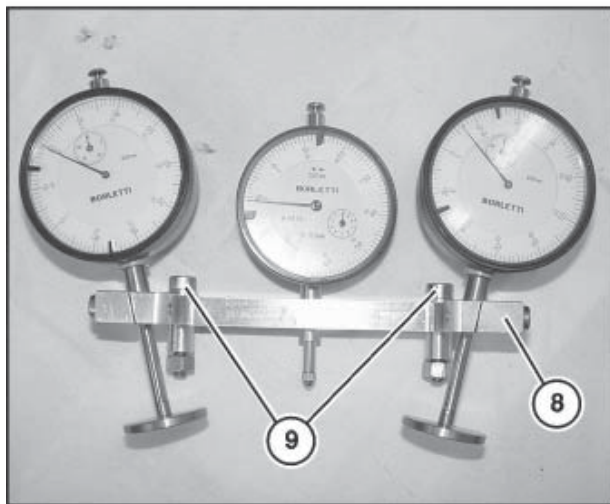
SPECIFIC EQUIPMENT:
Goniometer indicator (5):
R180197027000



Position the upper dead centre measurer (7) in the place of the first piston sparking-plug.



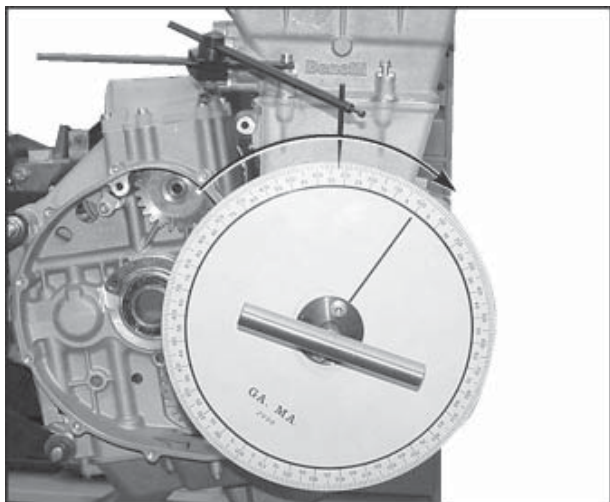
SPECIFIC EQUIPMENT
U.p.c. Measurer (7):
R180197022000



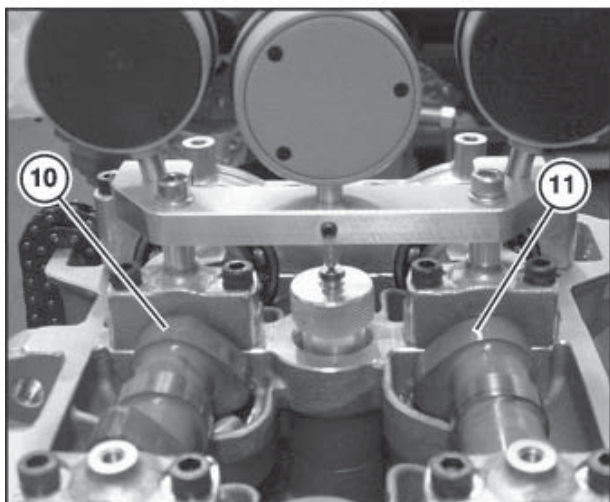
Position the equipment for checking the valve lifter (8) on the two suction and exhaust bridges at the height of the first piston, tightening it with the two screws (9).



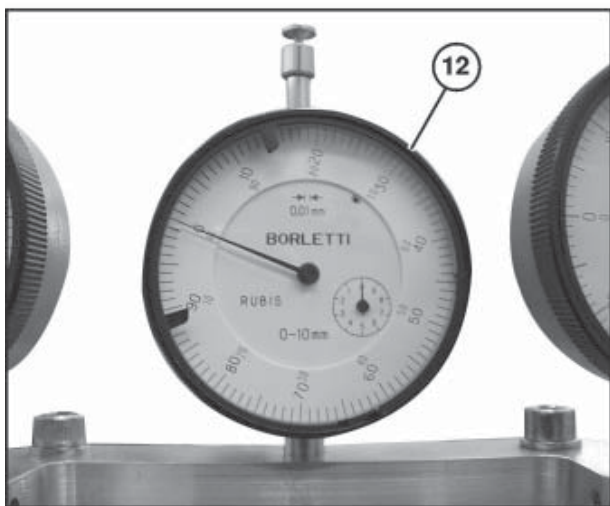
SPECIFIC EQUIPMENT
Equipment for checking lifter.
valves: R180197026000



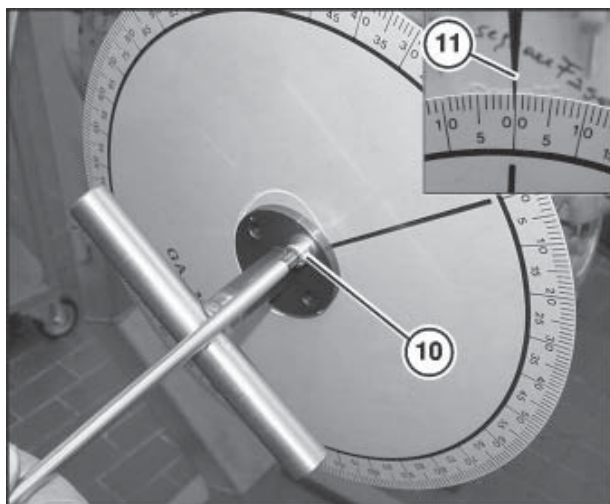
Turn the goniometer drive clockwise until finding the upper dead centre.



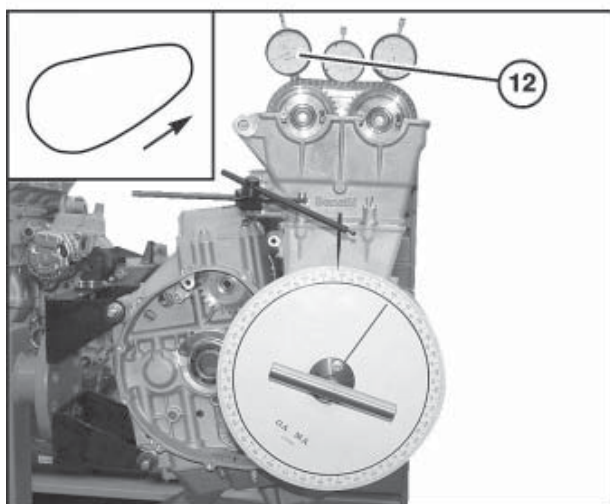
The olives of the two eccentric shafts on the first piston should be turned towards each other.



Once the u.d.c. (upper dead centre) is found, position the crown (12) at zero on the central test indicator.



Loosen the two screws (10) and turn the goniometer until the indicator (1) coincides with zero and tighten the screws again.



Turn the test indicator crown (12) until it coincides with zero.

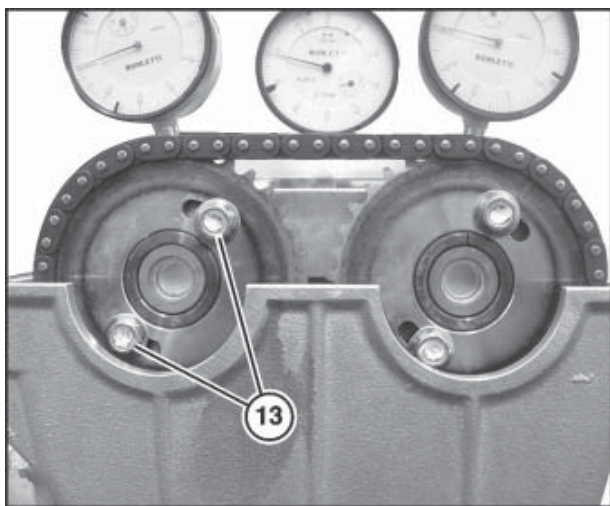


Turn the goniometer drive from the upper dead centre clockwise until it reaches 1 mm on the test indicator (12). Check that the specific value is indicated on the goniometer.



SPECIFIC VALUE

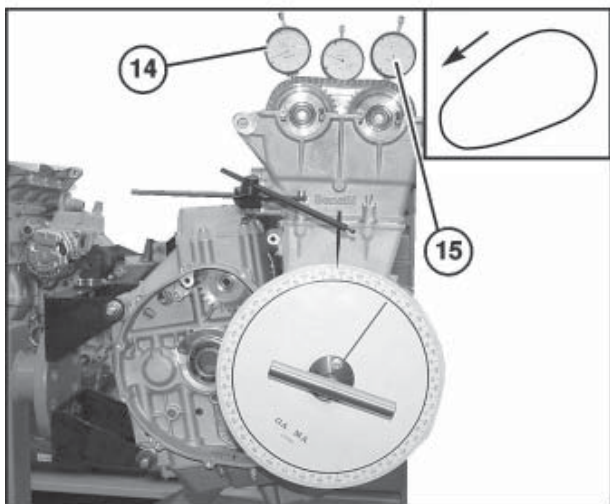
Suction opening = 21° before the UDC



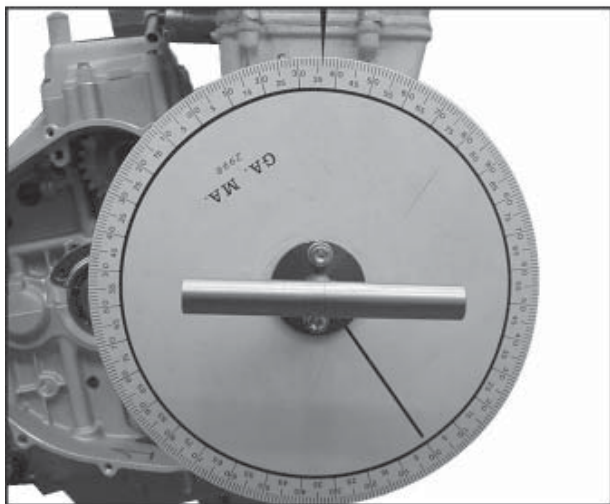
If the value does not correspond to the specific value, turn the goniometer twice and carry it to 21° before the UDC.
Loosen the two screws (13).
Load 1mm again on the test indicator (12).
Lock the two worm screws with Loctite after having degreased them one at a time.



13 N·m 1.3 Kg-m



Position the olive of the exhaust shaft on the first piston, as in the figure.
Turn the test indicator crown (14) to zero.

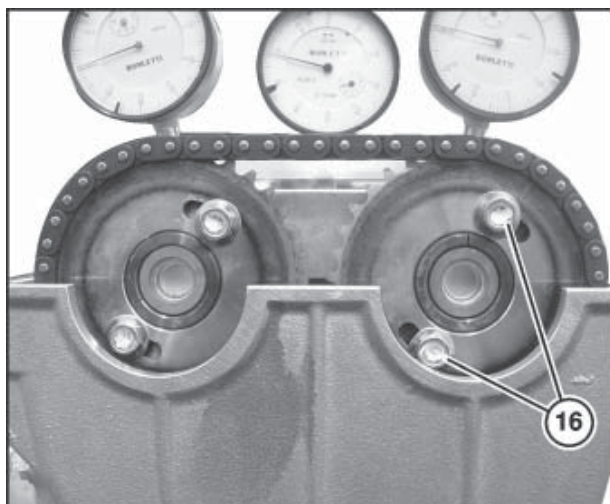


Load 1 mm, referring to the test indicators (15).
Check that the value expressed by the indicator corresponds to the specific value.



SPECIFIC VALUE

Exhaust opening = 36° before the lower dead centre.



If the value found does not coincide with the specific value, tun the goniometer twice and bring it to 36° before the lower dead centre.

Loosen the tow screws (16).

Load 1 mm again.

Tighten the two screws (16) with Loctite after having degreased them one at a time.



13 N·m 1.3 Kg-m

3.11 CHECK ENGINE OIL LEVEL



WARNING:

Do not mix chemical additives in the oil nor use types of oil different to that in the oils and liquids table. Make sure that foreign bodies do not penetrate into the casing during filling.



WARNING:

New or used engine oil can be dangerous. Swallowing new or used engine oil can be harmful to people and domestic animals. In the case of swallowing engine oil, call a doctor immediately and, in order to avoid sucking the product into the lungs, do not provoke vomiting. It has been noted that continuous contact with engine oil provokes skin cancer in cavies.

Brief contacts with engine oil can irritate the skin.

- *Keep new or used engine oil away from children and domestic animals.*
- *Wear long-sleeved clothing and gloves impermeable to water every time filling engine oil is carried out.*
- *Wash with soap and water if engine oil has been in contact with the skin.*
- *Recycle or dispose of used engine oil correctly.*



WARNING:

Danger: Do not start the engine if the oil is below the MIN. reference.

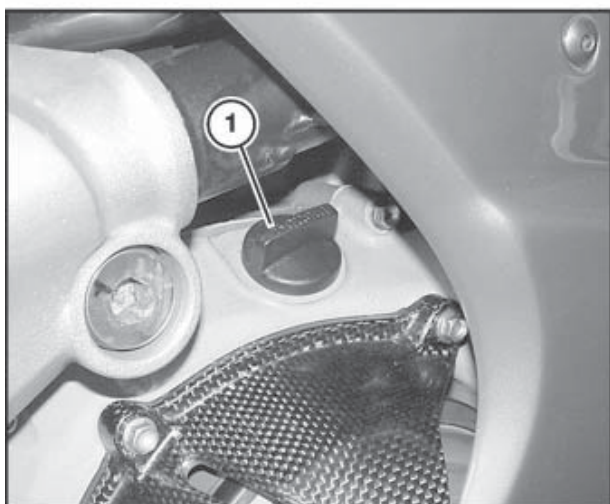
Carry out the check cold with the engine off.

If carried out while warm, the engine must be off for at least ten minutes.

This check is carried out placing the motorbike on a horizontal surface and in an upright position (vertical position).

The level must be between the MAX and MIN references on the casing.

In the case where the level of the oil is below the MIN reference, refill.



To restore the level, undo the oil cap (1) with the engine off and pour a quantity of oil of the type advised until reaching half way up the spyhole, between the MAX and MIN references. Screw on the cap (1) again.

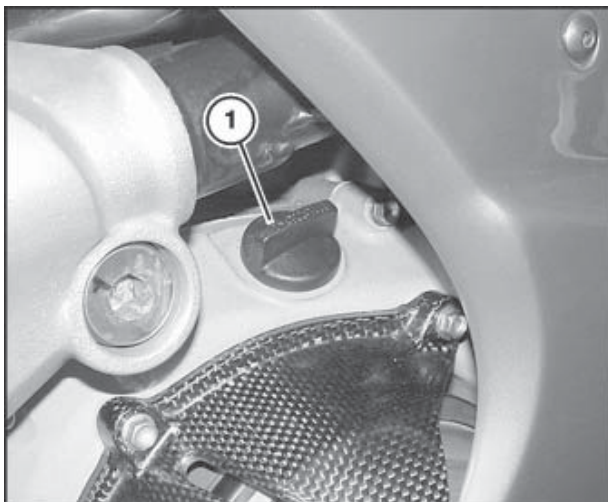


3.12 CHANGE ENGINE OIL AND FILTER

Remove the lower semi-cowling (see "DISMANTLE LOWER SEMI-COWLING").

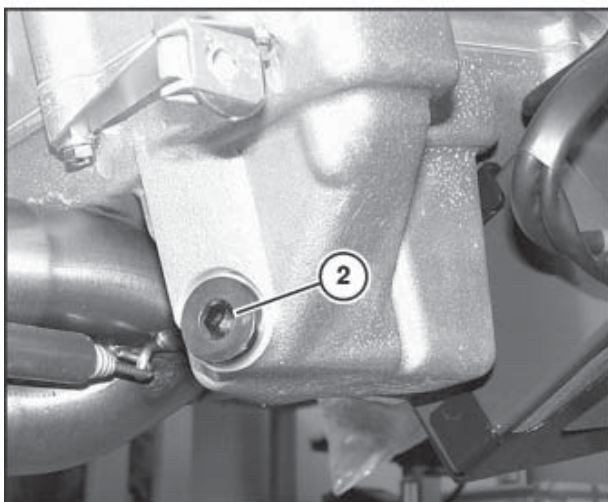
Let the engine turn for a couple of minutes, then turn it off.

Place an adequate container under the engine to catch the oil used.

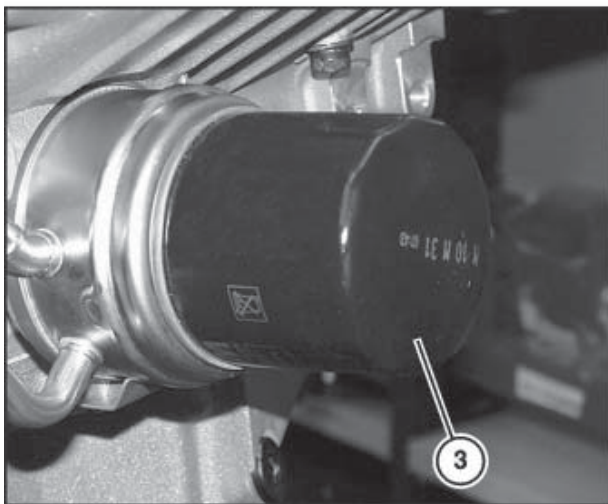


WARNING:
*Used oils are harmful to the environment.
Dispose of the used oils according to the regulations
in vigour.*

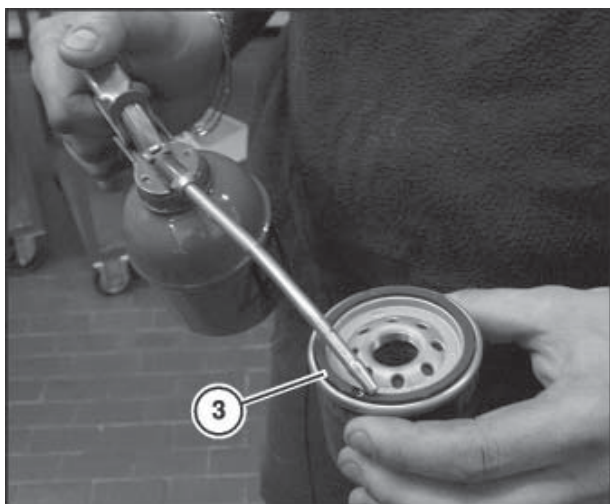
Remove the oil loading cap (1).



Remove the oil discharge cap (2).
Let all the used oil empty away.



Change the oil filter (3).

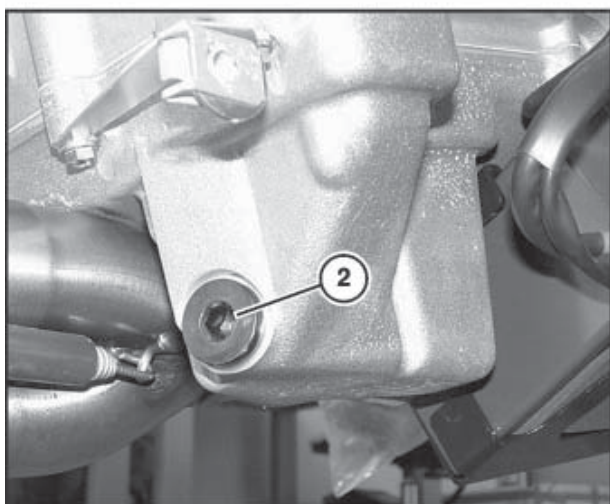


WARNING:

To re-mount the oil filters (3), oil the surfaces of their contacts.

NOTA:

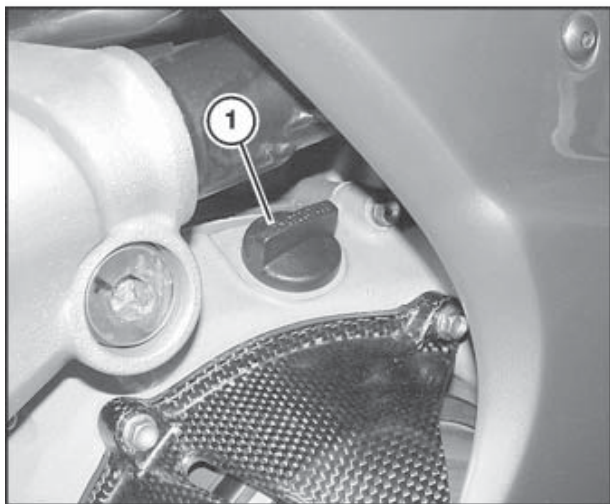
It is essential to use original Benelli filter oil Code: R180107101000.



Re-position the oil exhaust cap (2) and tighten it.



22 N·m 2,2 Kg-m



Engine oil quantity:

- without substitution of oil filter: about 3.1 litres
- with substitution of oil filter: about 3.5 litres

Always check that the level in the spyhole is midway between the Max and Min references.

Restore the level of the engine oil and close the oil loading cap (1) again.

Re-mount the lower semi-cowling (see "MOUNT THE LOWER SEMI-COWLING").

Re-check the level according to the procedure.



3.13 CHECK COOLING LIQUID LEVEL



WARNING:

Filling the cooling liquid must always be carried out with the engine cold. Never try to remove the radiator cap when the engine is hot to avoid the risk of burns.



WARNING:

In determined conditions the ethylene glycol contained in the cooling liquid is inflammable and its flame is invisible. Avoid contact between the cooling liquid and hot elements, the consequent combustion of the ethylene glycol may expose to the risk of burns.



WARNING:

The cooling liquid of the engine is harmful if swallowed and enters into contact with the eyes or the skin.

Keep the cooling liquid far from children and domestic animals.

In the case of swallowing cooling liquid, call a doctor immediately and, in order to avoid sucking the product into the lungs, do not provoke vomiting.

In the case of contact of the engine cooling liquid with the eyes or the skin, immediately rinse with water.



WARNING:

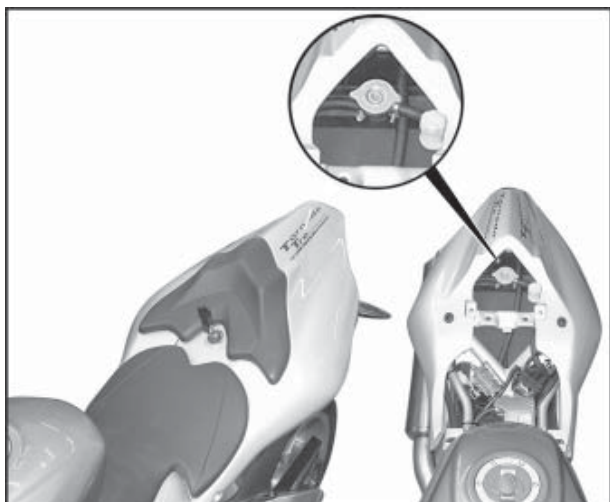
Do not use the motorcycle if the level of the cooling liquid is below the MIN reference.

Carry out the check cold with the engine off.

This check is carried out placing the motorbike on a horizontal surface and in an upright position (vertical position).

The level must be between the MAX and MIN references.

In the case where the level of the oil is below the MIN reference, refill.



WARNING:

Sprays of refrigerant can damage painted surfaces. Be careful not to spill the fluid when filling the cooling plant.

Wipe any eventually spilt refrigerant with a clean cloth immediately.

Remove the saddle to get to the cap

Remove the cap and fill using the cooling fluid advised in the oils and liquids table.

After restoring the level, re-mount the cap and the saddle accurately.



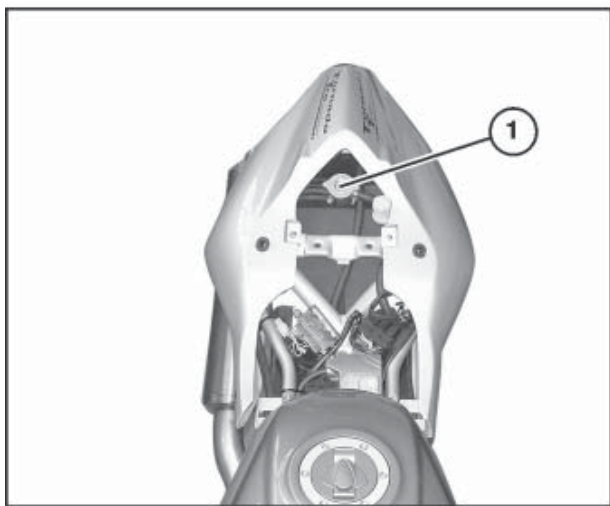
3.14 CHANGE REFRIGERANT LIQUID

NOTE:

Carry out the following operations with the engine cold and the bike on the lateral assembly stand.

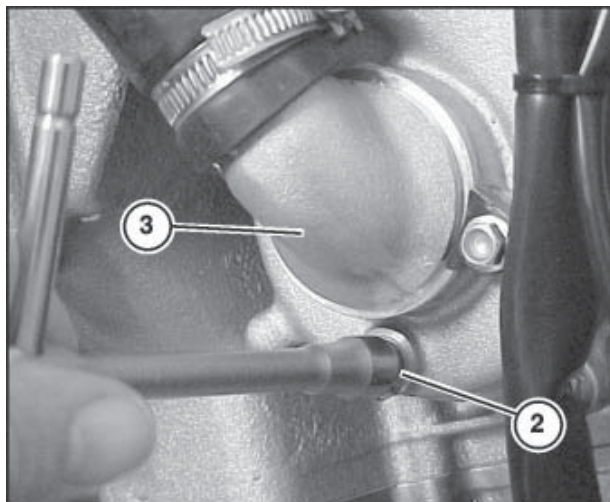
Remove the saddle, see ("REMOVE SADDLE").

Remove the lower left semi-cowling, see ("DISMANTLE LOWER SEMI-COWLING").



Remove the radiator cap (1).

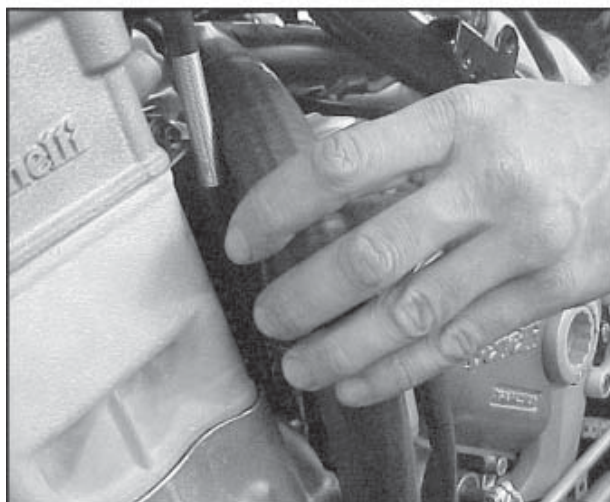
Place a recipient with a capacity superior to 4 litres next to the bike.



Remove the liquid discharge screw (2) on the pump (3) and recover the washer.

NOTE:

Let the cooling liquid empty away completely.



NOTE:

To facilitate the complete emptying of the cooling liquid contained in the cylinder blocks, lean the bike on both sides and press contemporaneously on the entry and exit rubber tubes of the radiator.

Wait for the cooling liquid to empty itself completely.

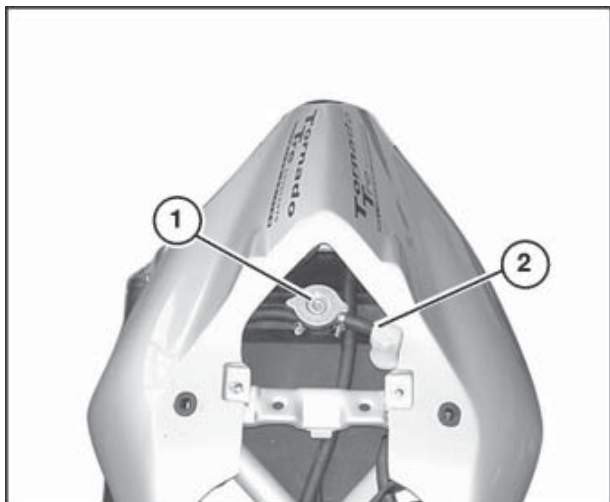


WARNING:

In re-mountng always substitute the copper washers of the discharge screws with new washers and tighten.



TIGHTEN LIQUID DISCHARGE SCREWS
8 N·m 0.8 Kg·m



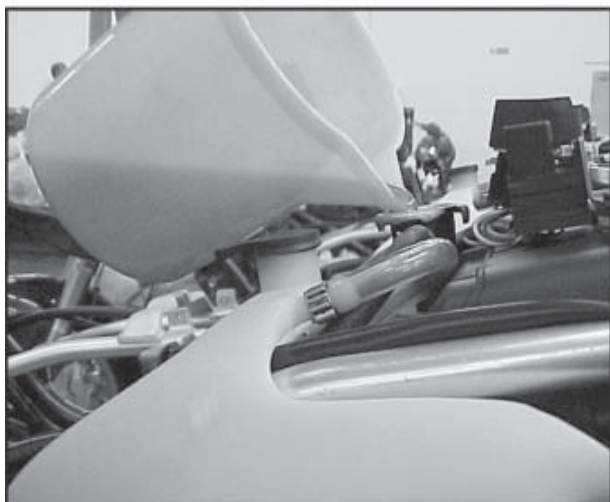
3.15 FILL COOLING PLANT

NOTE:

Carry out the following operations with the engine cold and the bike on the lateral assembly stand.

Remove the radiator cap (1).

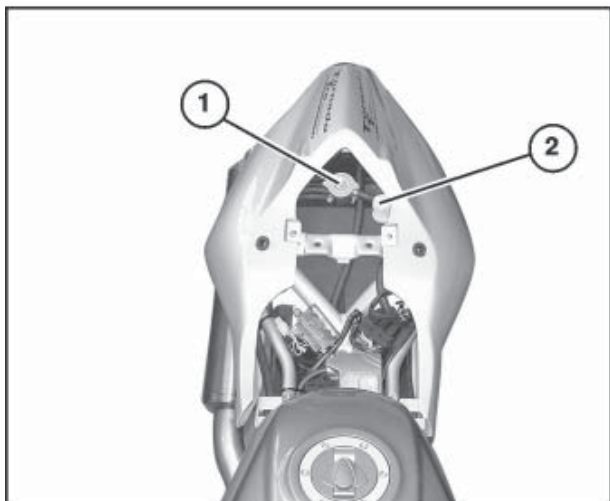
Remove the expansion tank cap (2).



Fill the circuit with about 3 litres of refrigerant liquid through the radiator cap (1).

NOTE:

Help by pressing on the rubber tubes of the radiator to eliminate eventual air-locks.



Fill with about 100 cc of refrigerant liquid through the expansion tank cap (2).

Remount the radiator cap (2).

Remount the expansion tank cap (2).

Start the engine and bring it to working temperature, until the fans start.

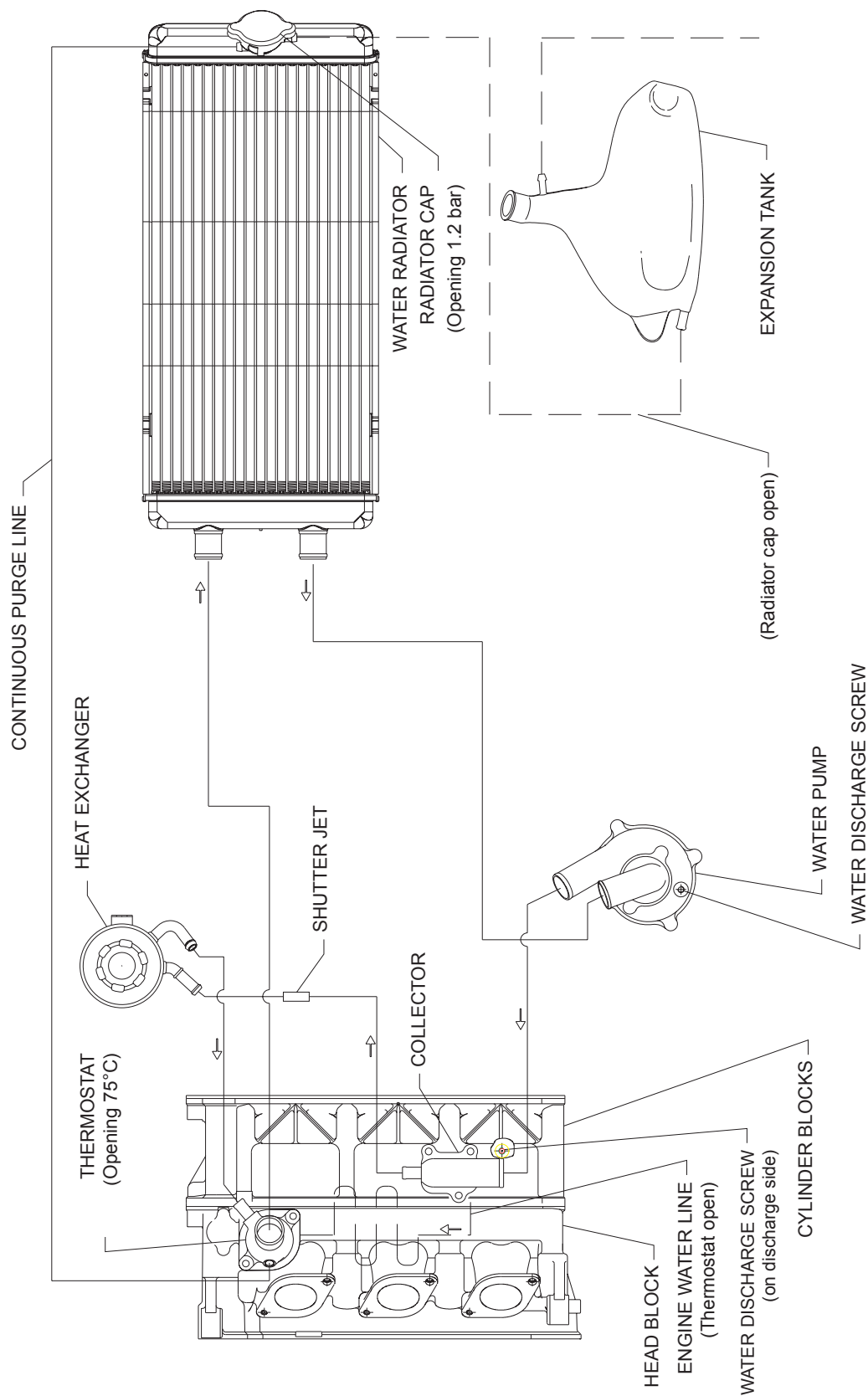
Let it cool and check the level of the refrigerant liquid.

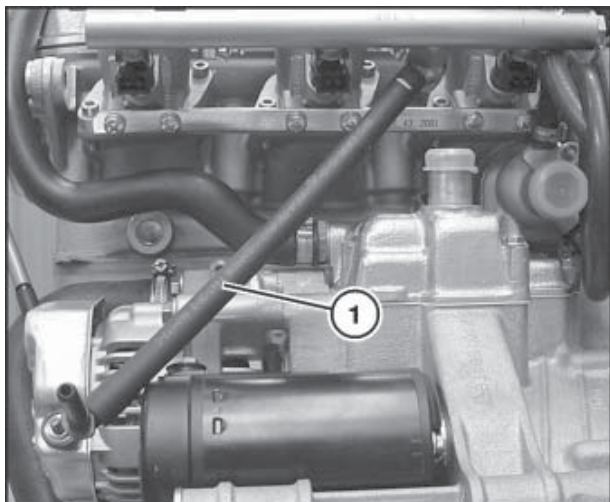
If necessary, refill.

Mount the saddle.



COOLING PLANT DIAGRAM





3.16 CHECK FUEL TUBES

Remove the tank (see "DISMANTLE TANK").



SPECIFIC EQUIPMENT

Petrol tube rapid release kit:
R180100143000

Sight check the state of the fuel tube (1).
If the tube is damaged or excessively worn, change it.
Mount the tank in the reverse way to dismantling.

NOTE:

The petrol tube must be changed every 16000 Km.

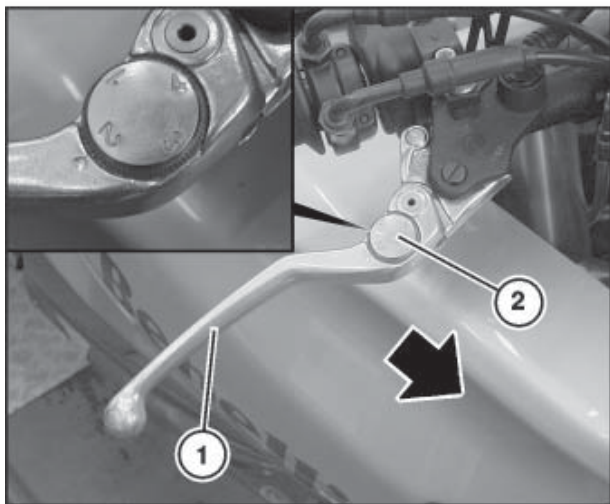


3.17 CHECK EXHAUST PLANT

Remove the lower semi-cowling (see "DISMANTLE LOWER SEMI-COWLING").

Remove the exhaust plant (see "DISMANTLE EXHAUST PLANT").

Check the state of the components of the exhaust plant.
If some element is excessively worn or damaged, change it.
Mount the exhaust plant (see "MOUNT EXHAUST PLANT").



3.18 ADJUSTMENT FRONT BRAKE LEVER



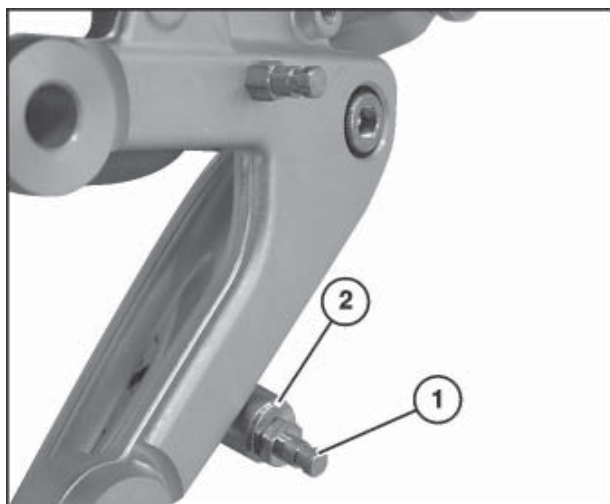
WARNING:

Danger: never carry out adjustment with the engine running.

Push lever (1) forward to neutralize the thrust of the spring and, contemporaneously, adjust its position by turning the crown (2) clockwise or anti-clockwise, adjusting the lever in one of the four possible positions.

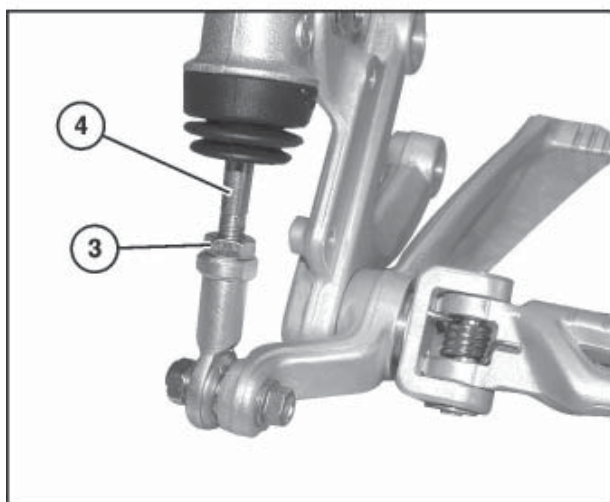
Position 1: furthest from the handlebar.

Position 4: nearest the handlebar.



3.19 ADJUSTMENT REAR BRAKE PEDAL

Loosen the screw (1) and adjust the cam (2) at will.



Loosen the nut (3).
Adjust the play of the rear brake command, working on the threaded pin (4).
The play increases by tightening.
The play diminishes by loosening.



3.20 CHECK BRAKE LIQUID



WARNING:

An insufficient quantity of brake liquid may allow the penetration of air into the brake plant, reducing the efficiency of braking with a consequent increase in the risk of accidents.

The presence of air in the hydraulic plant can be felt in the case in which, pressing the brake pedal, there is a sensation of excessive pliability. In the case of the presence of air in the hydraulic plant, carry out a purge.



WARNING:

Brake liquid is harmful or mortal if swallowed and harmful if it comes into contact with the skin or the eyes.

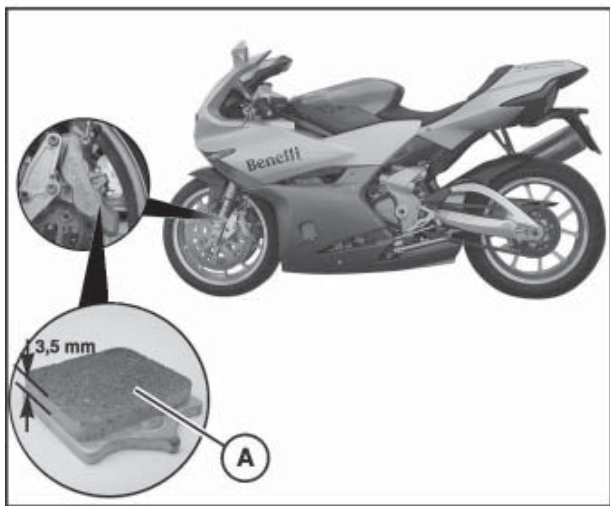
Keep the brake liquid away from children and domestic animals. In the case of swallowing the brake liquid call a doctor immediately and, in order to avoid sucking the liquid into the lungs, do not provoke vomiting. In the case of contact of the brake liquid with the eyes or the skin, rinse immediately with water.



Wear on the brake pads causes a normal fall in the level of the fluid.

In any case, the level must be between the MAX and MIN references.

If this level falls below the MIN reference, a check must be made of the braking plant.

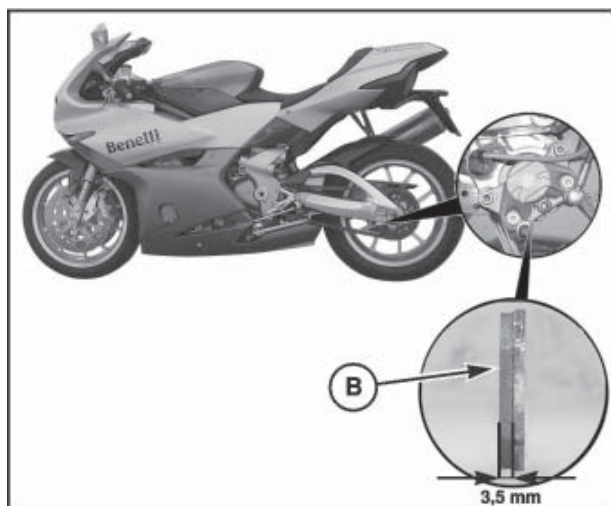


3.21 CHECK FRONT AND REAR BRAKE PADS

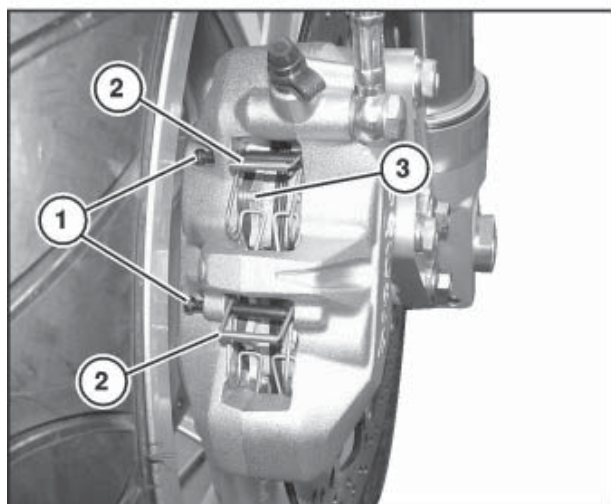
The front brake pads have to be changed when the pad-disk contact surfaces are coplanar with the thickness (A) present on the body of the pad itself.

Apart from a visible check, a particular noise is noticeable during braking due to the rubbing of the thicknesses on the disk.

The minimum thickness reached by the pad, when the conditions listed for changing it are reached, is 3.5 mm.



The rear brake pads have to be changed when the pad-disk contact surfaces are coplanar with the liner (B) present at the end of the steel casing of the pad.
Apart from a sight check, a particular noise is noticeable during braking due to the rubbing of the liners on the disk.
The minimum thickness reached by the pad, when the conditions listed for its substitution are reached, is 3.5 mm.



3.21.1 CHANGE FRONT BRAKE PADS



WARNING:

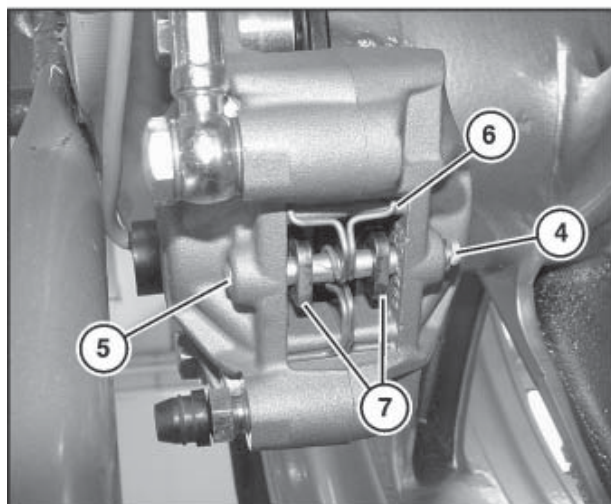
After changing the brake pads, work on the brake command with long but not intense braking for about a hundred Km.



WARNING:

Always change the two pairs of pads together.

Undo the two pins (1) and remove the two springs (2).
Change the two pairs of pads (3).
Re-position the springs (2) and the pins (1).
Do the same for the other front clamp.



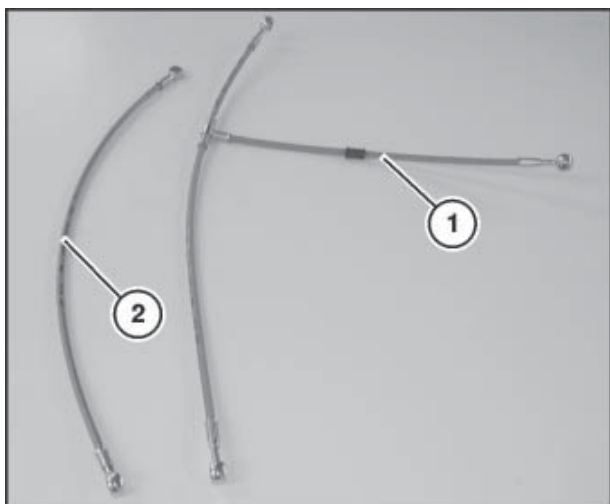
3.21.2 CHANGE REAR BRAKE PADS

Remove the safety ring (4), undo the pin (5) on the opposite side and remove the spring (6).
Change the two pads (7).
Re-position spring (6), pin (5) and secure with ring (4).



WARNING:

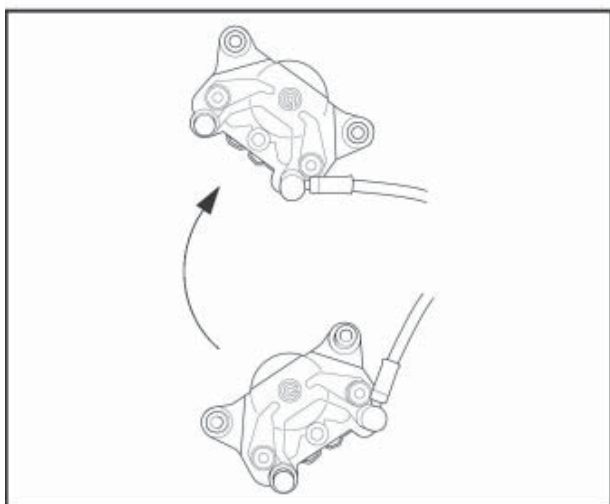
After changing the brake pads, work on the brake command with long but not intense braking for about a hundred Km.



3.22 CHECK BRAKING PLANT TUBES

Sight check the state of the front (1) and rear (2) braking plant tubes.

If the tubing is broken, excessively worn or losing liquid, change it.



3.23 PURGE FRONT/REAR BRAKING PLANT

3.23.1 PURGE REAR BRAKING PLANT



WARNING:

Fill with the brake liquid using only the type of liquid advised in the oils and liquids table of this manual. Eventual mixing of fluids of a different type might cause a dangerous chemical reaction and a diminishing of braking efficiency, with a consequent increase in the risk of accidents.



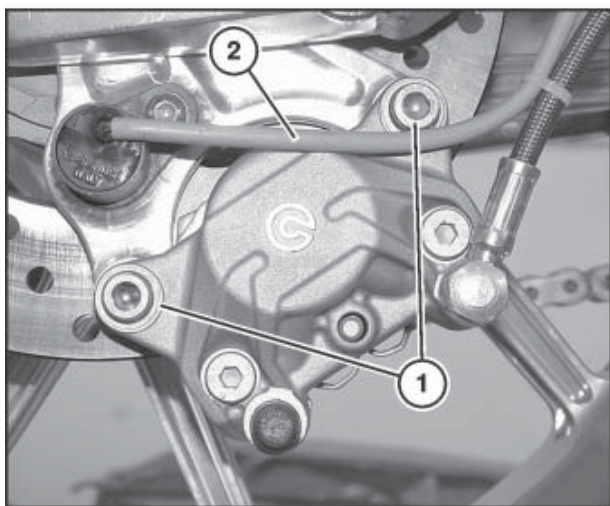
WARNING:

Work with maximum care on dismantling the clamps at the km-counter cable (2).



WARNING:

To carry out the purge of the rear plant, the brake clamps of the relative support have to be dismantled and the plant tubing kept as vertical as possible.



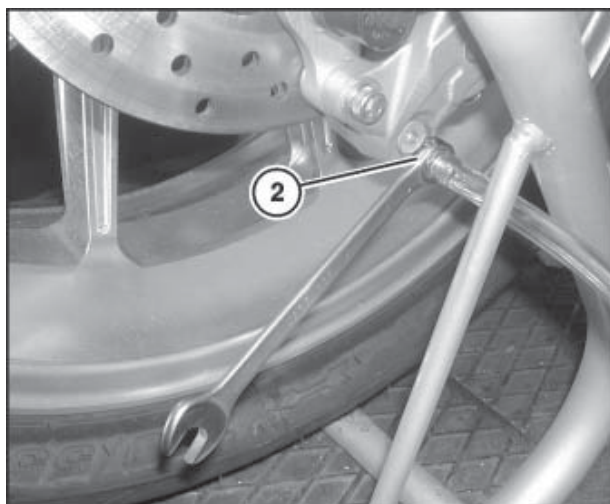
Bring the clamps to a higher position by rotating them and raising them as in the drawing.



WARNING:

During the purge of the braking plant maintain the level of the tanks between the MIN and MAX levels.

Remove the two rear brake clamps fixing screws (1).



Connect a possibly transparent tube of a suitable size to the purge screw (2), position the other end of the tube in a suitable recipient and place a liner similar to the disk between the brake pads.

Open the tap of the rear plant oil tank .



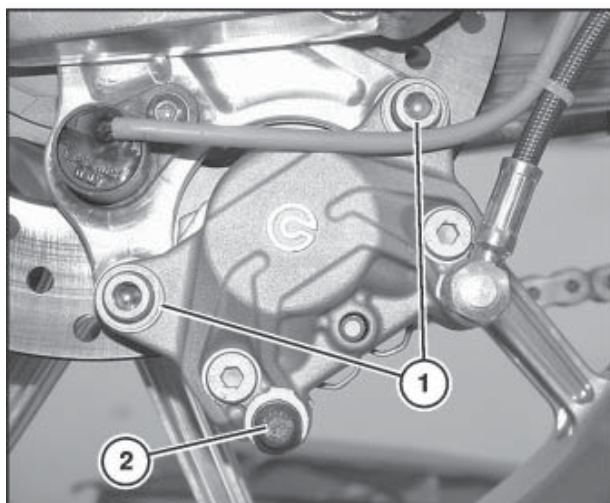
Operate and release the lever (3) repeatedly and in rapid succession.

Press fully and open the purge screw (2).

Repeat the procedure until all the air bubbles have been completely removed.

Check the oil level in the tank during the operation.

Restore if necessary.



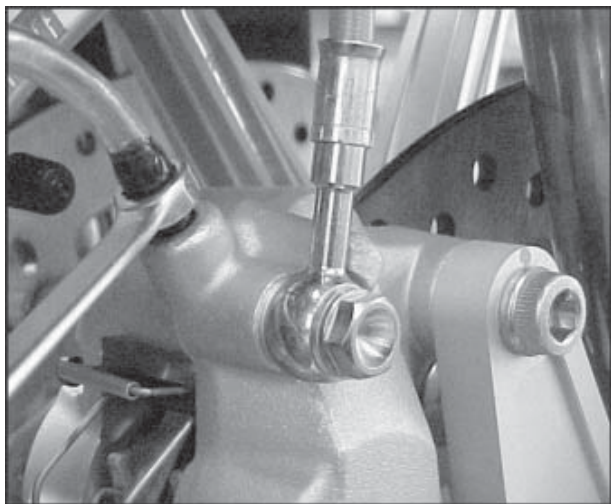
Close the purge screw (2).

Close the rear tank plant after having checked the oil level.

Mount the brake clamp and tighten the two fixing screws (1).



25 N·m 2.5 Kg-m

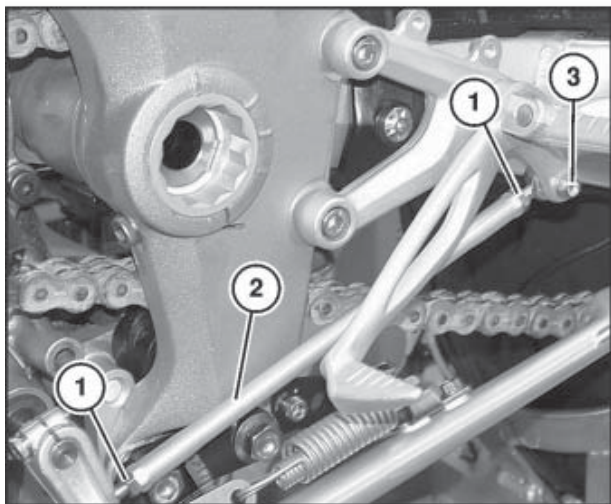


3.23.2 FRONT BRAKING PLANT PURGE

Procede in the same way as for the rear plant without, however, having to remove the clamps.
Purge the right as well as the left clamp.



Procede in the same way as for the brake purge clamps also on the front brake pump.



3.24 ADJUSTMENT GEAR COMMAND PEDAL

Remove the fixing screws (3) of the gear pedal rod.
Loosen the two nuts (1).
Adjust the angle of the gear command pedal by working on the rod (2).
Rotating it clockwise, the pedal will bend lower and vice versa if rotated anti-clockwise.



3.25 CHAIN ADJUSTMENT

To carry out the following operations, position the motorcycle on the supplied rear assembly stand horizontally and with the gears in neutral.



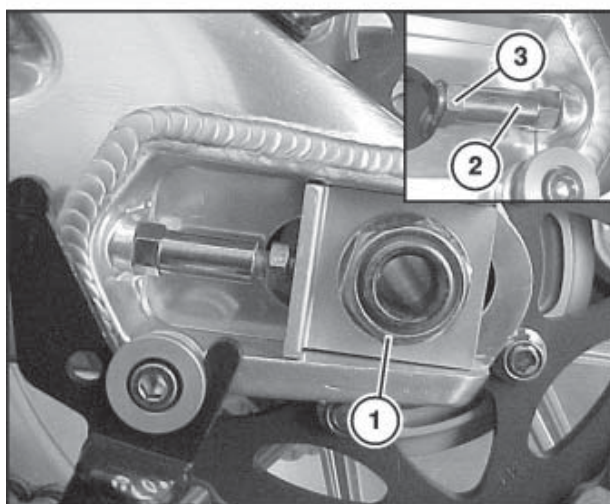
WARNING:
Using the motorcycle with the chain in a bad condition or badly adjusted may cause accidents.



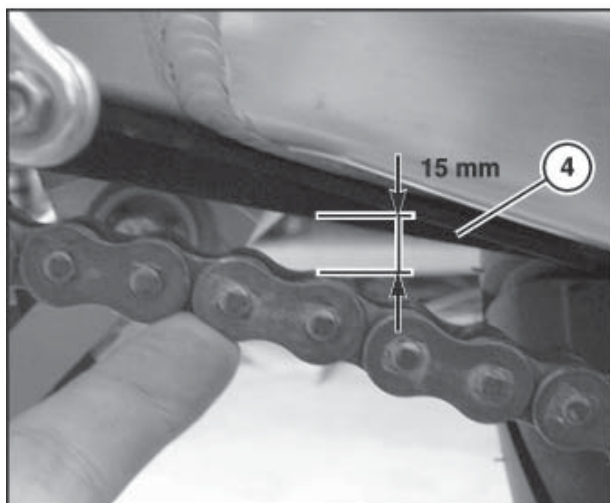
WARNING:
If the chain shows flattened or scuffed links, a correct oiling of the chain according to the instructions in this chapter needs to be carried out.



WARNING:
If damage or excessive wear of the chain or relative sprocket wheels is noted, change them. Every time the chain is changed, the relative sprocket wheels must also be changed.



Loosen the nut (1) and the locknut (2).
Adjust the chain, loosening the screw (3) to measure and fixing it with the counter nut (2).
Check the correctness of the adjustment with a caliper and repeat the operation on the other side.



Keeping the chain in tension upwards, the axis of its lower section must be at a distance of 15 mm from the lower chain guard (4).
Carry out the check at several places on the chain, rotating the rear wheel manually. If the check is successful, tighten the nut (1). The play must remain constant while the wheel turns. If the chain is loose only at certain places this means that some links are flattened or scuffed.
In this case change the chain.



85 N·m 8.5 Kg-m



3.26 OILING THE CHAIN



WARNING:

The chain is the O-ring type: to prevent damage do not clean it with jets of steam or water at high pressure nor use petrol or the detergent solvents on the market. Cleaning the chain must be carried out exclusively with kerosene.



WARNING:

Do not soil the rims with petrol or solvents while cleaning the chain.



WARNING:

Kerosene can be dangerous. Kerosene is inflammable. Contact with kerosene can be harmful to children and domestic animals. Keep open flames and objects at high temperature far from the kerosene. Keep children and domestic animals far from the kerosene. Correctly dispose of the used kerosene.



WARNING:

Only use the advised oil or an equivalent one.



The chain must be correctly oiled to guarantee maximum efficiency.



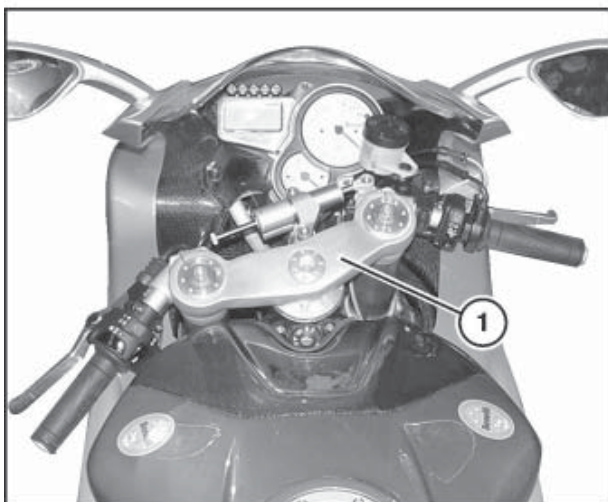
Preliminary cleaning: before oiling is necessary to dissolve deposits of dirt on the chain using kerosene. These deposits must eventually be removed with a clean cloth and/or jets of water.

Oiling: apply a slight and uniform strata of oil along the entire length of the chain, taking care not to reach the surrounding parts and in particular the tires.

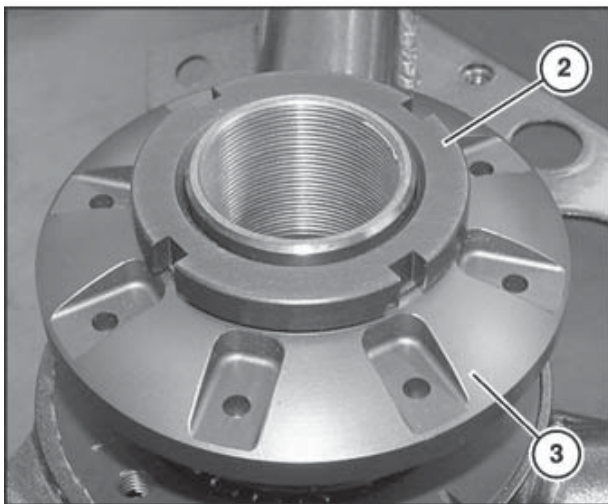


3.27 CHECK AND ADJUSTMENT STEERING BALL-BEARINGS

Check that the steering ball-bearings have no play.
If necessary procede as follows.



Remove the upper steering plate (1) (see "DISMANTLE FRONT FORK").



WARNING:
Never exceed the bolt torque to avoid steering malfunction.

Loosen the counter ring-nut (2) and tighten the ring-nut (3) using the specific instrument.



SPECIFIC EQUIPMENT
Steering ring-nut clamp:
R180197031000



16 N·m 1.6 Kg-m

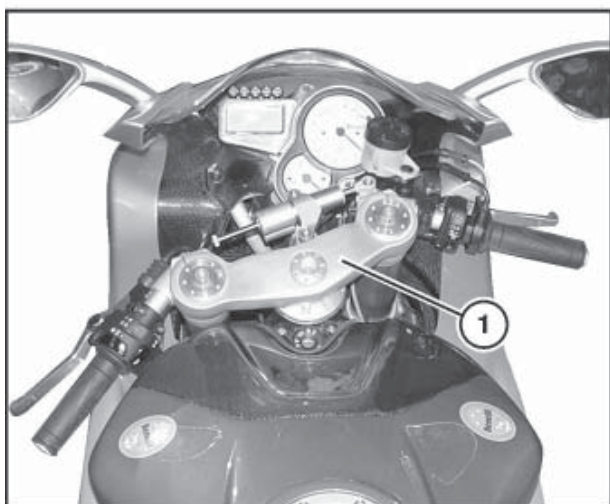
Tighten the counter ring-nut (2).



MANUAL + 90°



Check the absence of play.
If necessary, repeat the previous operations.



Mount the upper steering plate (1) (see "MOUNT FRONT FORK")
Check the free rotation of the steering.

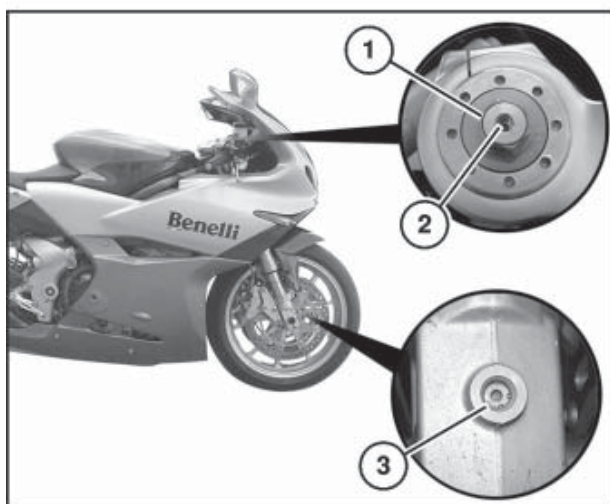


3.28 CHECK FORK

Keeping the front brake on, check the state of the fork as shown in the figure.
Sight check the state of the splashguards.



If the fork needs maintenance, refer directly to the supplier listed in the "SPECIFICATIONS" chapter.



3.29 FORK ADJUSTMENT

Three adjustments are possible on the front fork:

- Preload spring adjustment (1)
- Braking in extension adjustment (2)
- Braking in compression adjustment (3)

REAR SUSPENSION

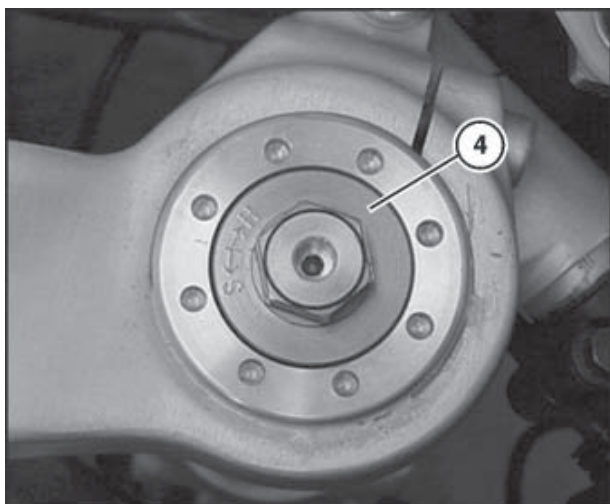
	Standard Set-up
Preload spring	4 spins (4 mm)
Braking in extension	14 kicks
Braking in compression	22 kicks

	Track
Preload spring	4 spins (4 mm)
Braking in extension	9 kicks
Braking in compression	10 kicks

NOTE:

Adjusting the preload is carried out starting from "all open" (in direction-).

Adjusting in compression and extensions starts instead from "all closed" (in direction+).



WARNING:

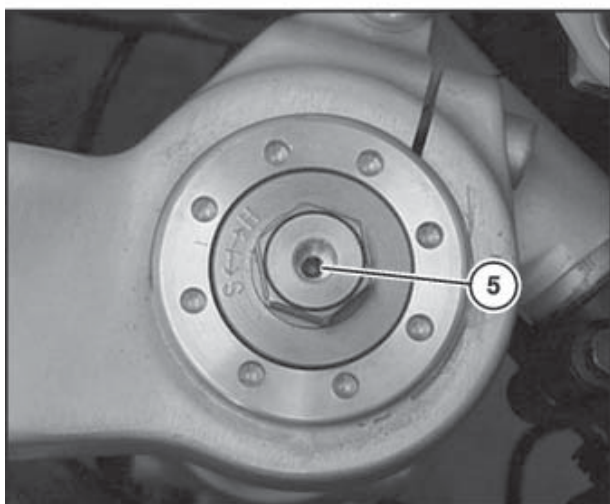
It is essential that both stems of the fork are adjusted to the same position.



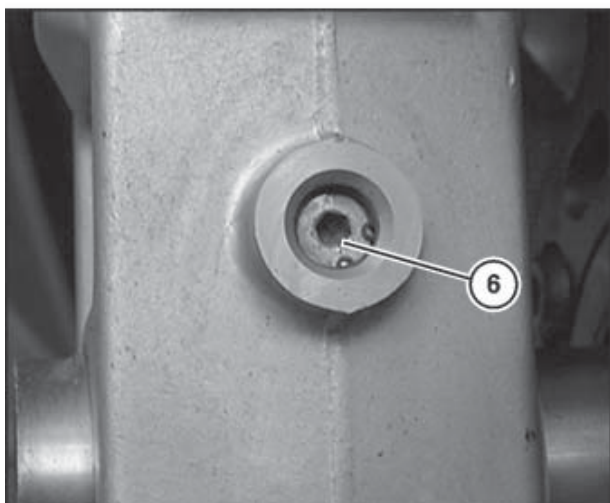
Adjusting the preload spring is carried out counting the spins that are made clockwise or anti-clockwise with the adjuster (4).

The preload will be rigid clockwise.

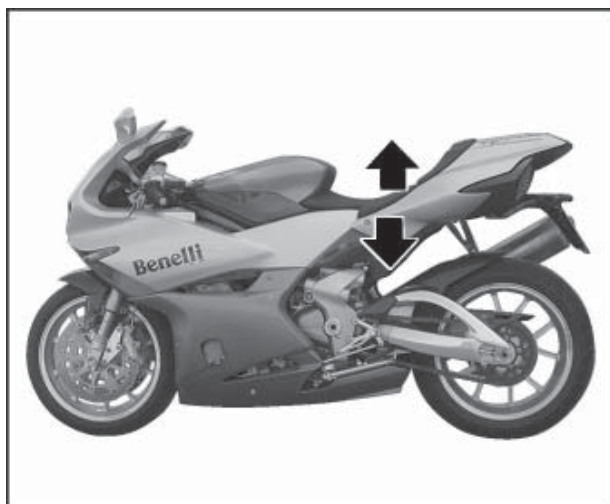
The preload will be slack anti-clockwise.



Adjusting the hydraulic braking device in extension is carried out in sudden steps. Rotate the regulator (5) clockwise to increase the braking action, or anti-clockwise to diminish it.

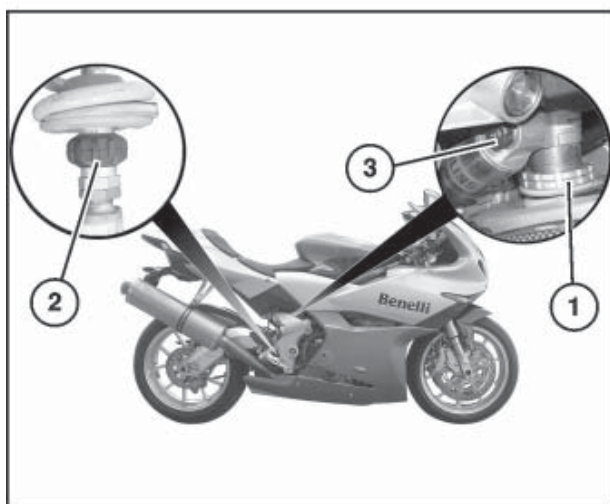


Adjusting the hydraulic braking device in compression is carried out in sudden steps. Rotate the adjuster (6) clockwise to increase the braking action, or anti-clockwise to diminish it.



3.30 CHECK DAMPER

Check the state of the rear damper as shown in the figure.
If the rear damper needs maintenance, refer directly to the supplier listed in the "SPECIFICATIONS" chapter.



3.31 ADJUSTMENT DAMPER

Three adjustments are possible on the rear damper :

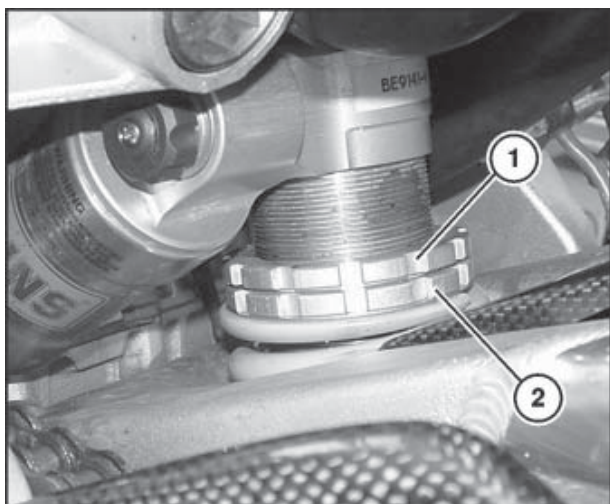
- Preload spring adjustment (1)
- Braking in extension adjustment (2)
- Braking in compression adjustment (3)

REAR SUSPENSION

	Standard set-up
Spring length	146 mm
Brake in extension	9 steps
Brake in compression	14 steps

NOTE:

The adjustment of the preload is carried out starting from the length of the damper equal to 146 mm. Adjustment in compression and extension starts from "all closed" (in direction +).



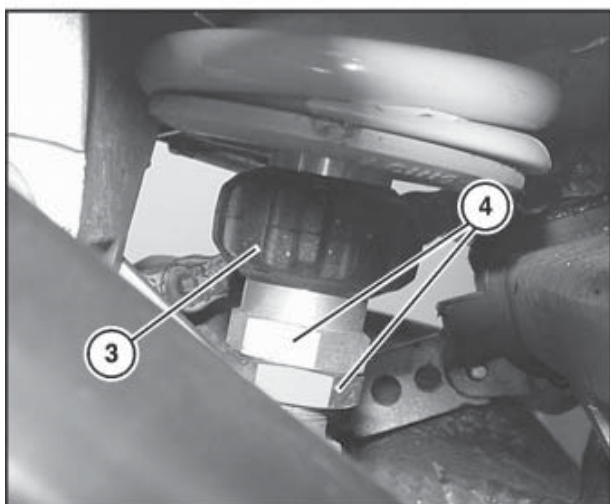
Adjustment of the preload spring is carried out using the two ring-nuts (1) and (2) in the figure.

Loosen ring-nut (1) and adjust the preload with ring-nut (2).

Clockwise, the preload will be more rigid.

Anti-clockwise, the preload will be slacker.

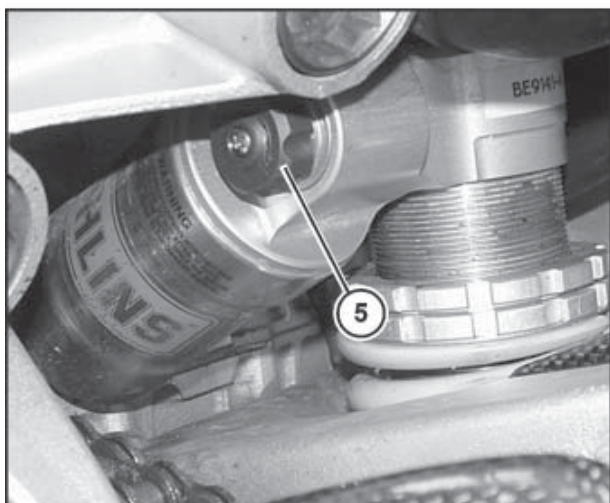
Once the preload is adjusted, tighten the ring-nut (1).



Adjusting the hydraulic braking device in compensation is carried out in sudden steps.

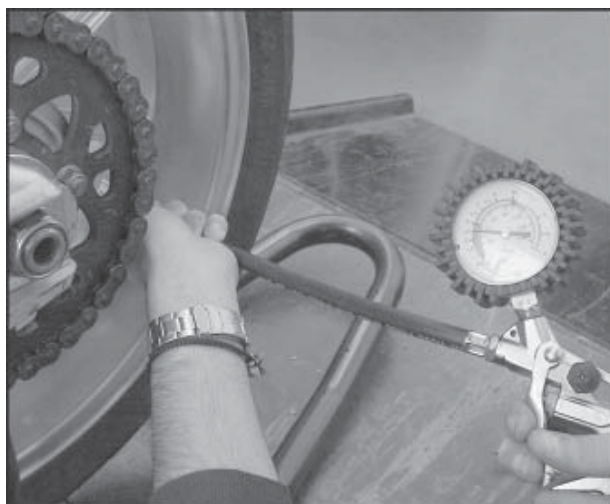
Rotate the adjuster (3) clockwise to increase the braking action, or anti-clockwise to diminish it.

If you want to lengthen or shorten the wheelbase, remove the damper from the small connecting rod, loosen the two locknuts (4), rotate the anchorage support clockwise to shorten, anti-clockwise to lengthen.



Adjusting the hydraulic brake device in compression is carried out in sudden steps.

Rotate the adjuster (5) clockwise to increase the braking action or anti-clockwise to diminish it.



3.32 CHECK TIRE PRESSURE



WARNING:

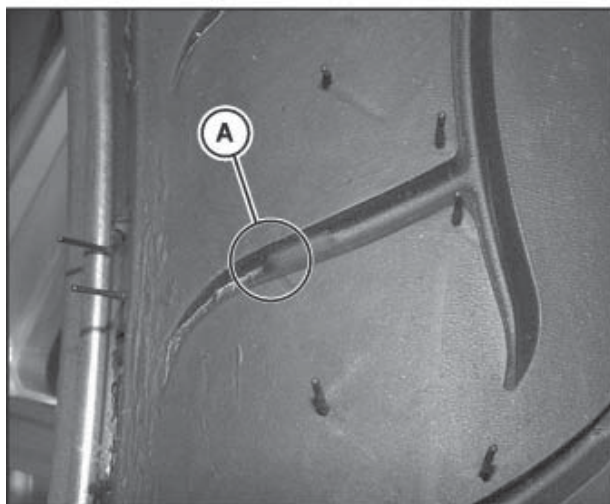
Incorrect inflation of the tires causes serious danger in using the bike. Insufficient pressure can cause the tire to slip on the rim or its detachment, with consequent deflation of the tire and loss of control of the vehicle.

Check the pressure of the tires with a manometer.

	Pressure	
Front tire	250 kPa	2.5 bar
Rear tire	250 kPa	2.5 bar

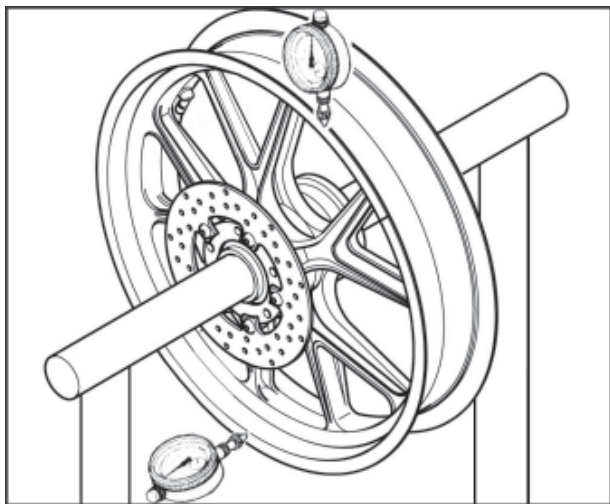
NOTE:

In the case of long continuous driving, increase the value of nominal pressure by 0.2 bar.



Check the wear on the tires.

When the tread is at the same level as in (A), change the tire.

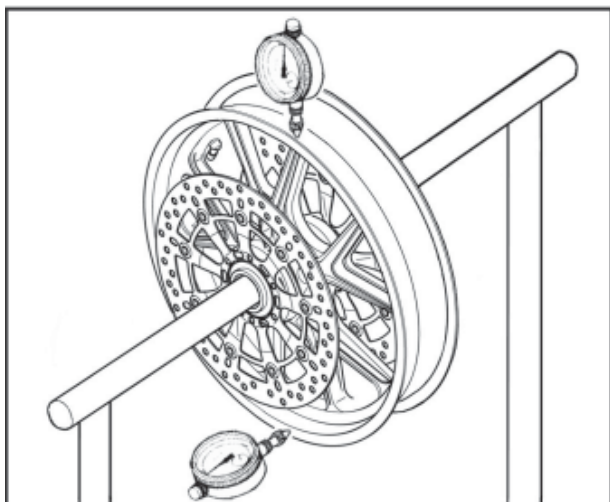


3.33 CHECK WHEELS

Check the radial and axial on the rear rim as in the figure.
The value must enter within the specific value.



SPECIFIC VALUE
Axial veer = 0.3 mm



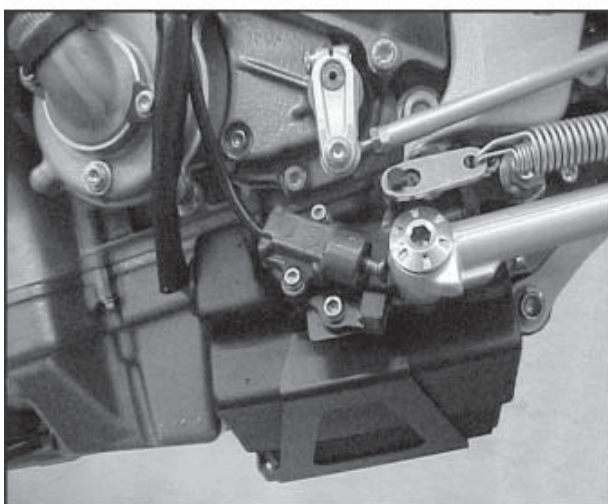
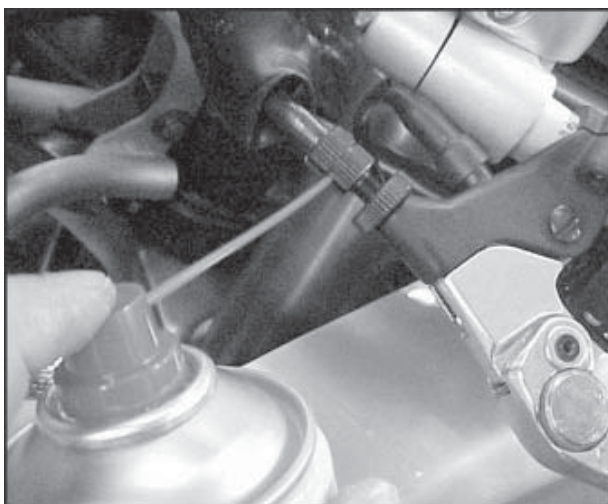
Work on the front wheel as on the back wheel.



SPECIFIC VALUE
Axial veer = 0.05 mm



Excessive veering and eccentricity are generally caused by wear of the ball-bearings
Change the ball-bearings. If the problem persists, change the rim of the wheel.



3.34 CHECK AND OIL CLUTCH CABLE



Check the free run of the cable in its sheath. If necessary, oil it with the advised oil.

If the cable sheath is damaged, change both the cable and sheath together.



WARNING:

If the external body of the battery is damaged, sulphuric acid, a poisonous and extremely corrosive substance, may leak out.

Avoid any contact with the skin, the eyes and clothing and always protect the eyes when working near the battery.

In case of contact, carry out FIRST AID as follows:

- **EXTERNAL CONTACT:** Rinse with a lot of water.
- **INTERNAL CONTACT:** Drink great quantities of water or milk and immediately call a doctor.
- **EYES:** Rinse with water for 15 minutes and immediately see a doctor. Moreover, leakage of sulphuric acid leads to the formation of hydrogen that can provoke an explosion in the presence of a spark or a flame.

3.35 ELECTRICAL PLANT

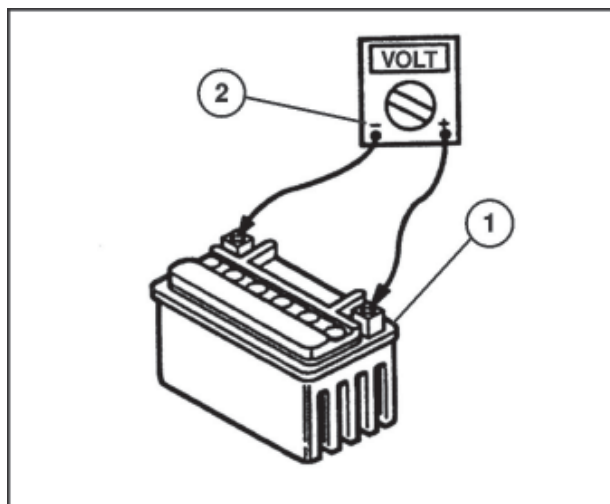
3.35.1 CHECK BATTERY

This motorcycle is equipped with a sealed battery installed under the lower left cowl.

This element does not require maintenance and therefore the liquid does not need checking nor does distilled water need to be added.

If the battery seems to be exhausted (causing electrical problems or difficulty in starting), recharge it.





Check the state of charge of the battery (1) with a tester (2) functioning as a voltmeter.
If necessary recharge the battery.



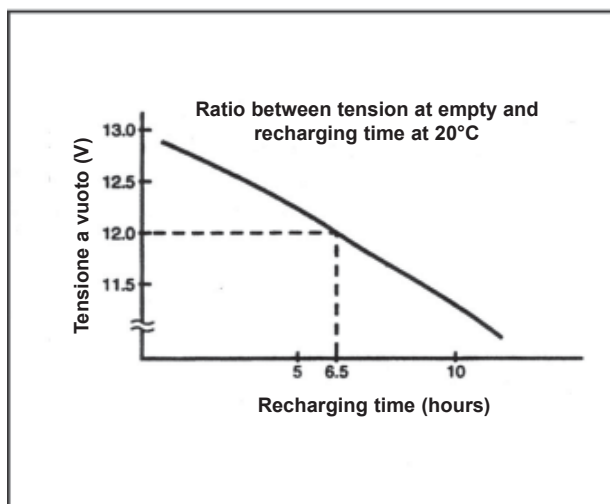
SPECIFIC VALUE

Battery charge = 12.5V



WARNING:

These values vary according to the temperature, the condition of the battery plates and the level of the electrolyte.



Connect a digital voltmeter to the battery terminals.

Positive tester probe > positive battery terminal.
Negative tester probe > negative battery terminal.

NOTE:

It is possible to check the state of the MF battery recharging by measuring the tension at empty (i.e. the tension present with the positive terminal disconnected).

It is not necessary to recharge when the tension at empty is equal to or superior to 12.8V.

Check the recharging of the battery as illustrated in the diagram and the following example.

Example:

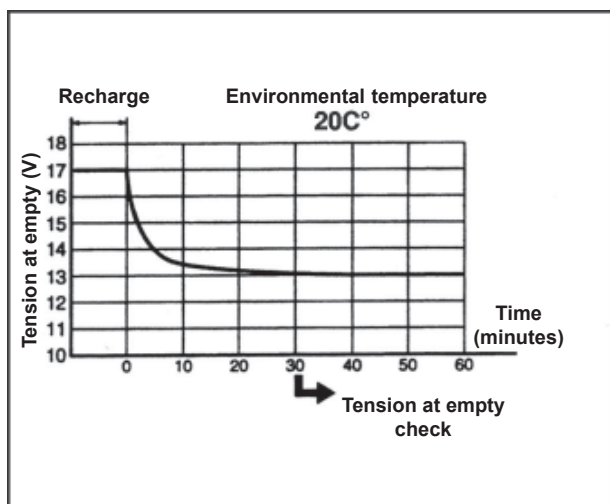
Tension at empty = 12.0 V

Recharging time = 6.5 ore

Recharging the battery = 20 ~ 30%

NOTE:

Do not recharge the battery rapidly.



WARNING:

Pay attention never to remove the sealing fastenings of the MF battery.

Avoid the use of a nominal high potential battery charge because this forces the high amperage tension too quickly inside the battery, causing the battery to overheat with consequent damage to the plates.

If it is not possible to adjust the charging tension, make sure not to charge the battery excessively.

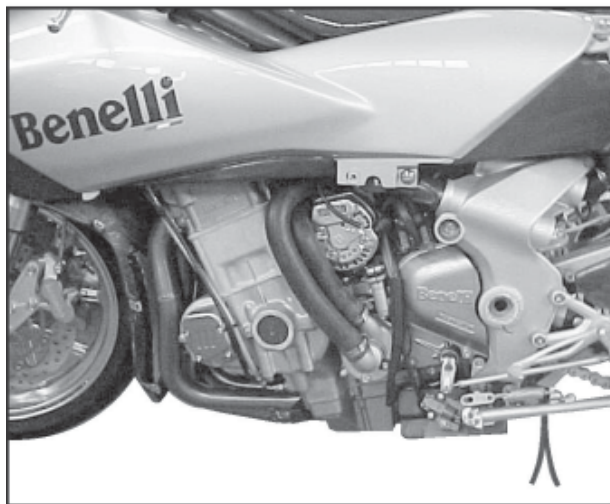
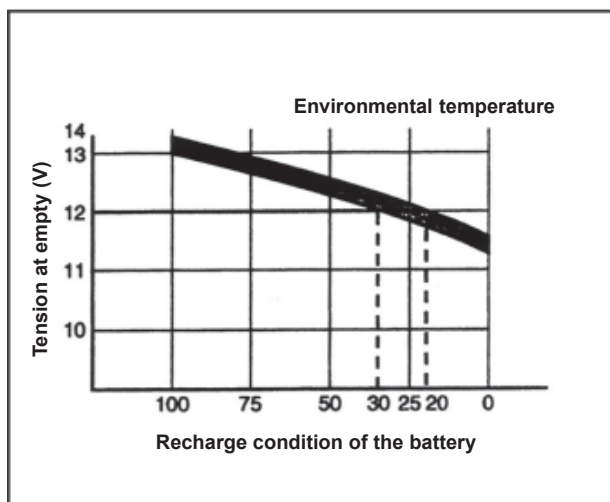
Remove the battery from the vehicle before charging.

To reduce the risk of sparks, do not insert the battery charger plug with the cables still connected to the battery. Before removing the clips of the battery charger cables from the battery terminals make sure that the battery charger is off.

Make sure that the clips are well connected to the battery terminals and are not short circuited. A corroded clip can provoke overheating at the contact point and a clip left behind can cause sparking.

If the battery heats up during recharging, disconnect the battery charger and let the battery cool down before continuing.

This is necessary to avoid the battery exploding. As illustrated in the figure, the tension at empty of the MF battery stabilises after about 30 minutes from completing the recharge. We therefore advise waiting 30 minutes before measuring the tension at empty.



3.35.2 BATTERY RECHARGING SYSTEM

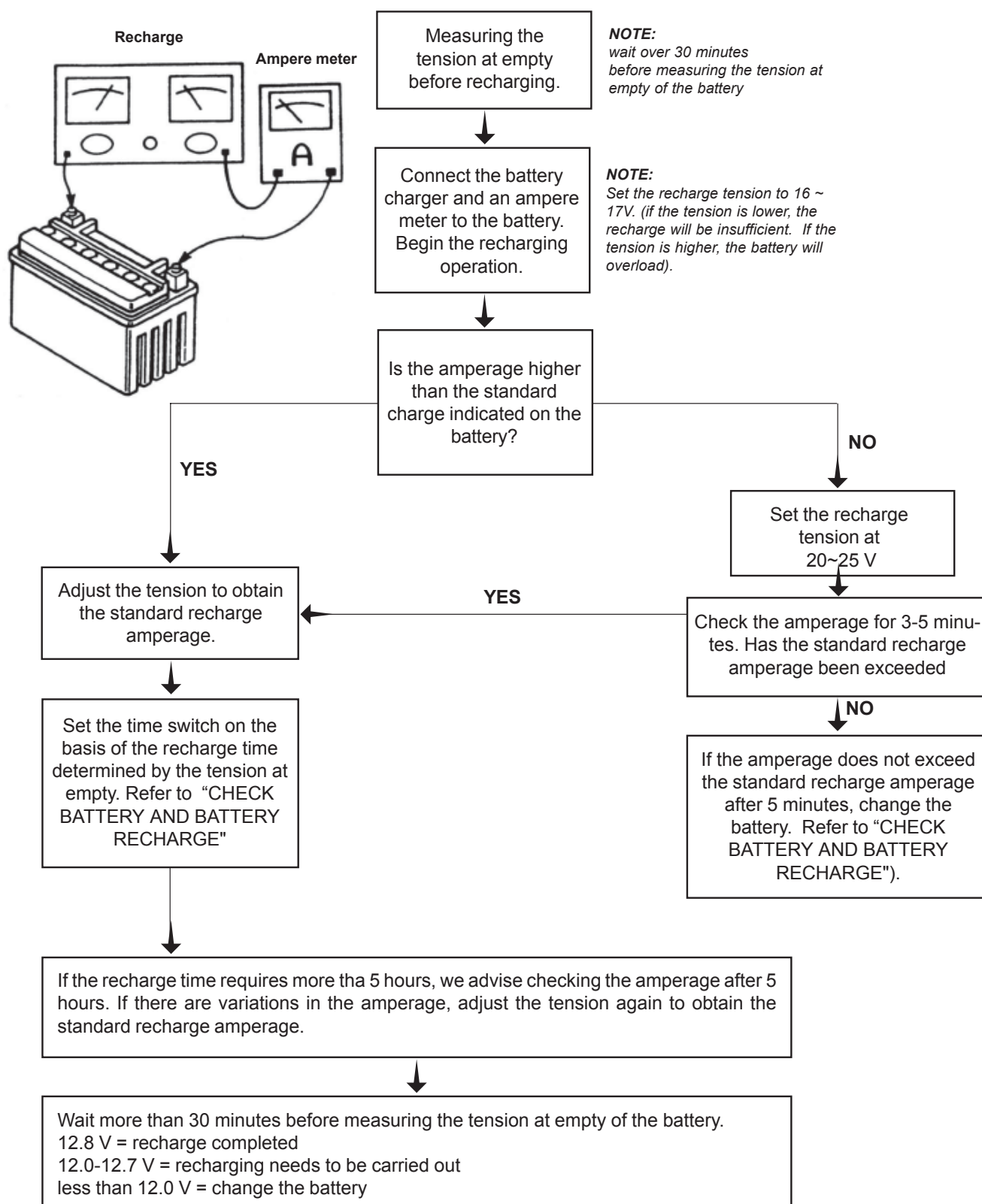
REMOVE THE LOWER LEFT SEMI-COWLING (SEE "DISMANTLE LOWER SEMI-COWLING").

Disconnect the battery.

Remove the battery from the support.

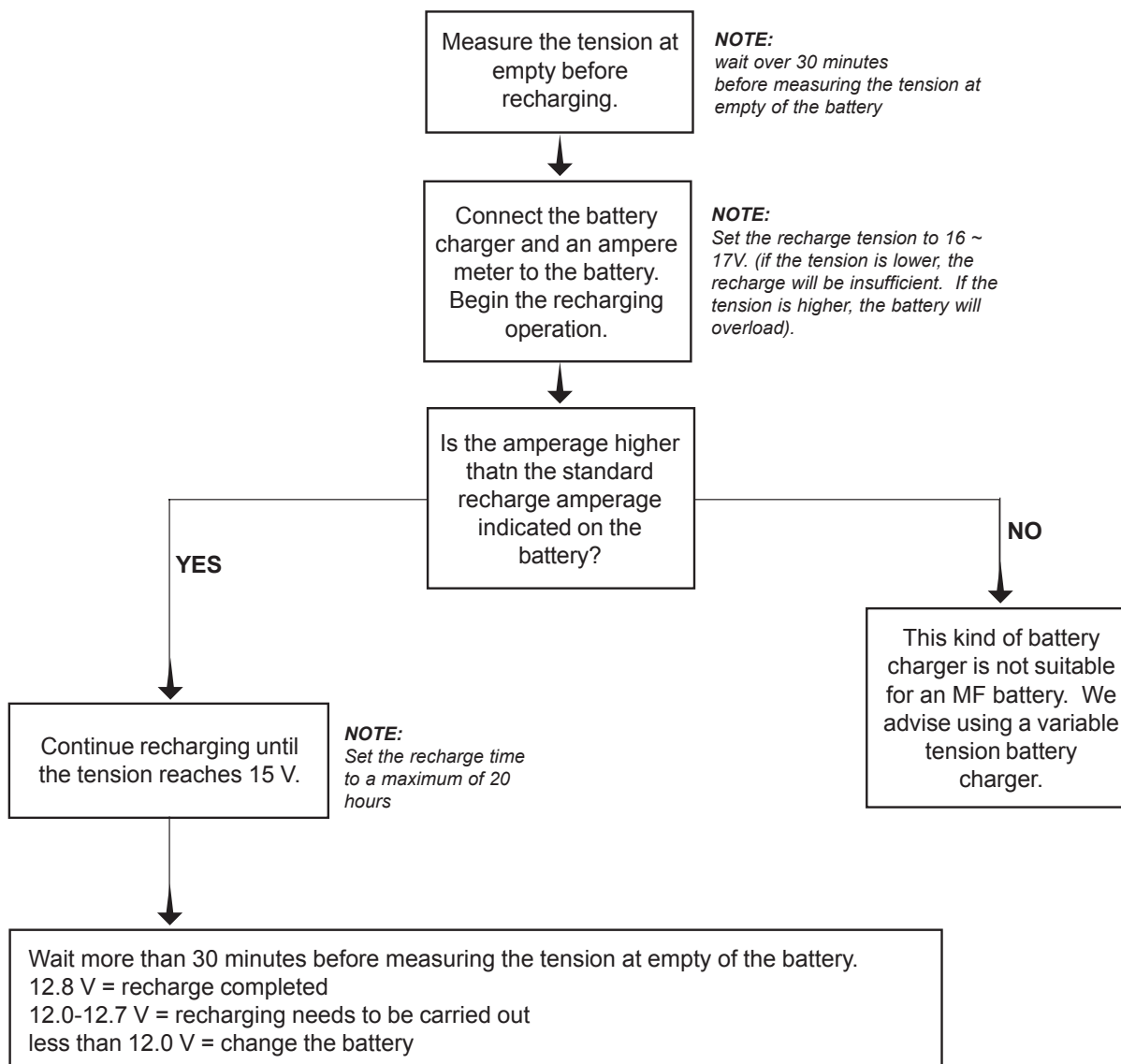


RECHARGING WITH A VARIABLE TENSION BATTERY CHARGER

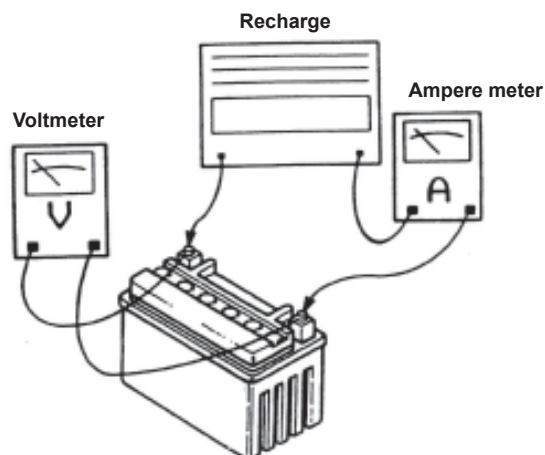


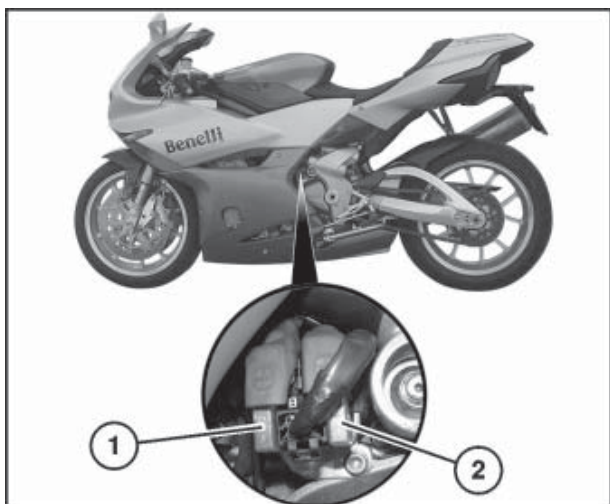


RECHARGING WITH A CONTINUOUS TENSION BATTERY CHARGER



WARNING:
continuous amperage battery chargers are not suitable for MF batteries





3.36 CHANGING FUSES

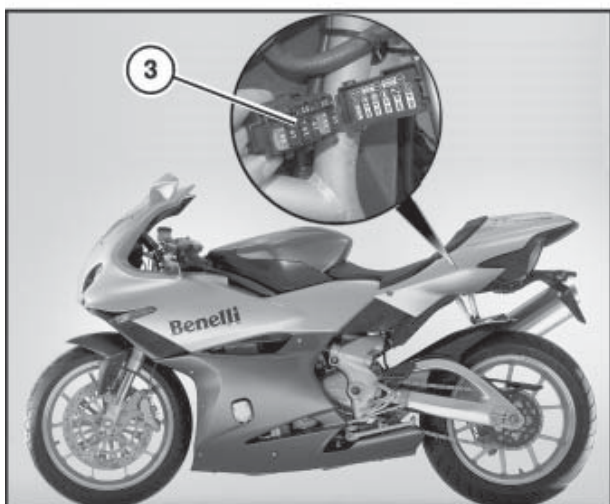
The reload fuse (1) is on the left side of the engine in the position indicated.

The spare fuse (2) is beside it.



WARNING:

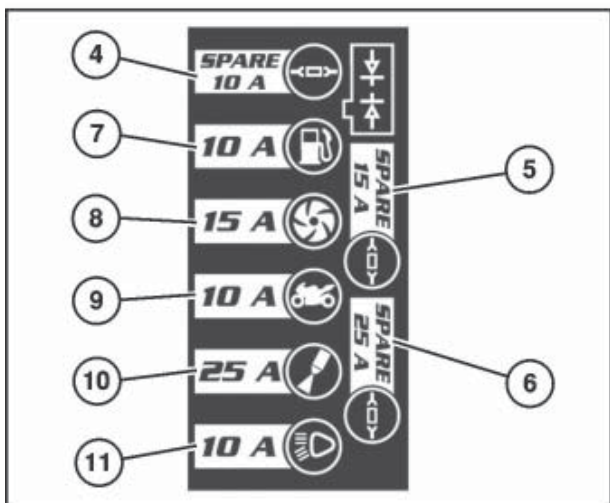
Never use a fuse with a setting different to that specified to avoid damaging the electrical plant of the motorcycle with a consequent danger of fire.



The service fuses (3) are under the saddle, remove it to reach them. Open the cover, change the burned-out fuses and remount the cover.

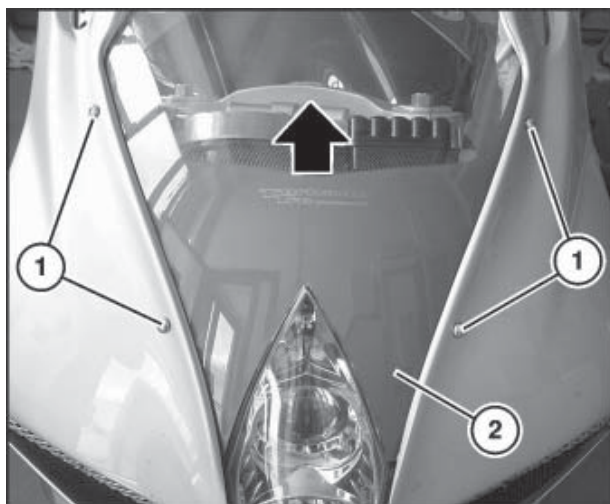
NOTE:

Consult the information in the key to identify the function of the fuses.



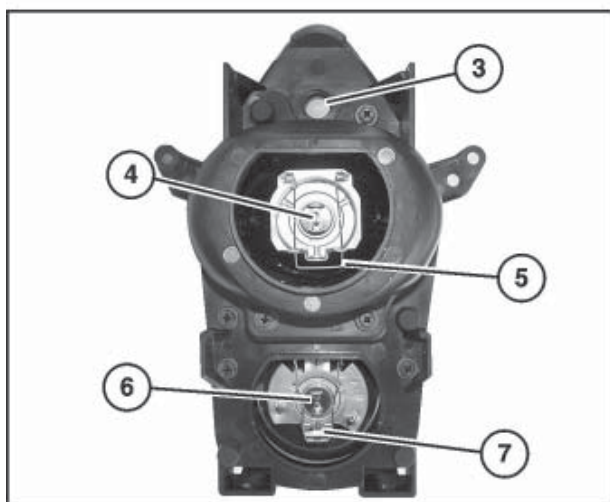
Eight fuses are in the fuse box:

- Reserve fuse 10A (4)
- Reserve fuse 15A (5)
- Reserve fuse 25A (6)
- Oil spyhole reserve fuse 10A (7)
- Cooling fan fuse 15A (8)
- General fuse 10A (9)
- Injector fuse 25A (10)
- Lights fuse 10A (11)

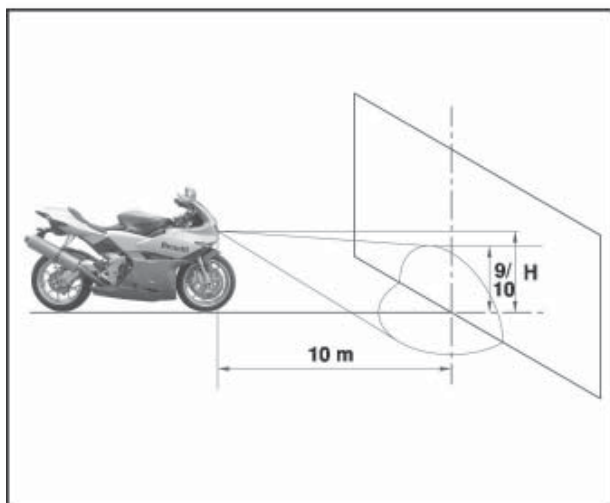


3.37 CHANGING FRONT LIGHTS

Loosen and remove the four fixing screws (1).
Remove the internal instrument board fastenings (see "DISMANTLE INTERNAL INSTRUMENT BOARD FASTENINGS").
Remove left mirror (see "DISMANTLE MIRRORS").
Remove the small cap (2) (see "DISMANTLE SMALL CAP").
Remove the lower left semi-cowling (see ("DISMANTLE LOWER COWLING").
Remove the upper left cowling (see "DISMANTLE LEFT AND RIGHT UPPER COWLINGS").

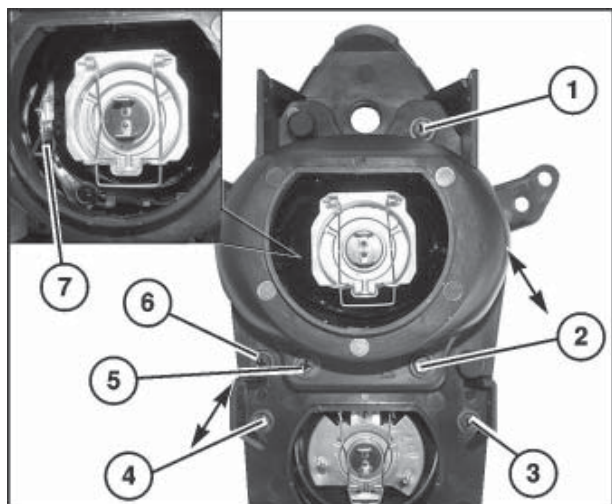


For the position lamp (3), remove the rubber lamp holder and change the lamp.
For the anti-dazzle lamp (4), remove the rubber dust cover, disconnect the cabling and change the lamp (4), freeing it from the spring (5).
Repeat the operation for the anti-dazzle lamp (6), freeing the lamp (6) from the spring (7).



3.38 ADJUSTMENT FRONT HEADLIGHT

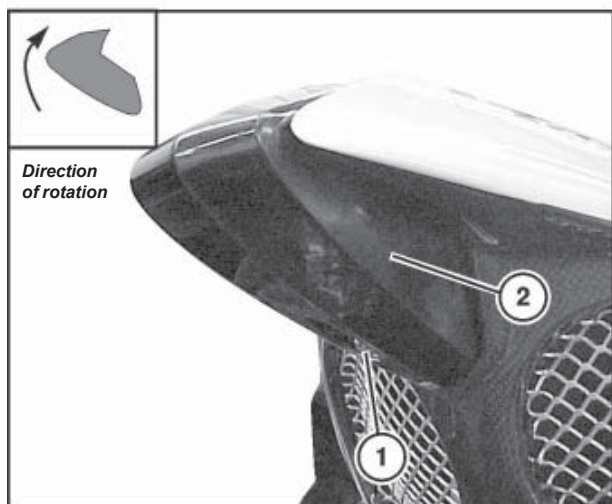
To carry out the correct adjustment of the luminous beam projected by the front headlight, position the vehicle at about 10 metres from a vertical wall on a perfectly flat terrain.
Switch the front headlight on, sit on the vehicle in the driving position and check that the upper limit of the beam projected onto the vertical wall in less than about 1/10 with respect to the horizontal axis of the lights.



Adjusting the front headlight allows carrying out the following adjustments:

- Vertical headlight adjustment (1)
- Oblique anti-dazzle light adjustment (2)
- Horizontal headlight adjustment (3)
- Oblique headlight adjustment (4)
- Horizontal anti-dazzle light adjustment (5)
- Vertical headlight adjustment (6)

Positioning the lever (7) low, the light is set for driving to the right; vice versa, if positioned high it is set for driving to the left.



3.39 CHANGING REAR LIGHTS

3.39.1 CHANGING REAR HEADLIGHT

Loosen and remove the screw (1).

Remove the glass cover (2).

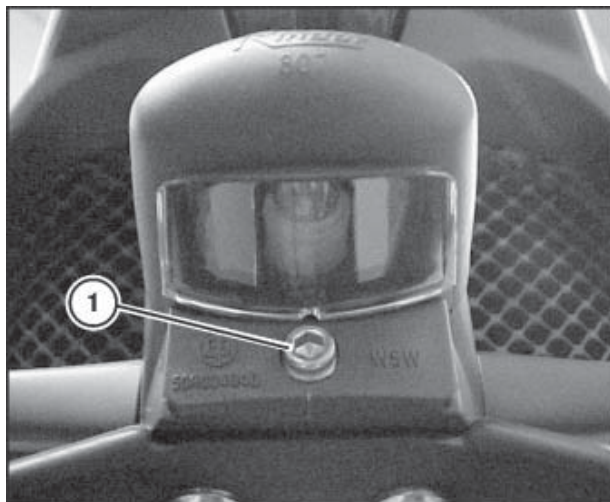
Turn the lens upwards, avoiding breaking the fixing tab.



Change the bulb (3).

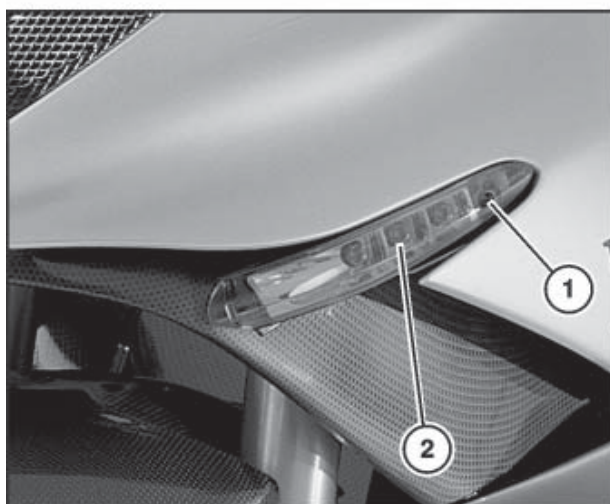
Position the glass cover (2), using the reverse procedure for dismantling.

Tighten the screw (1).



3.39.2 CHANGING LICENCE-PLATE LIGHT

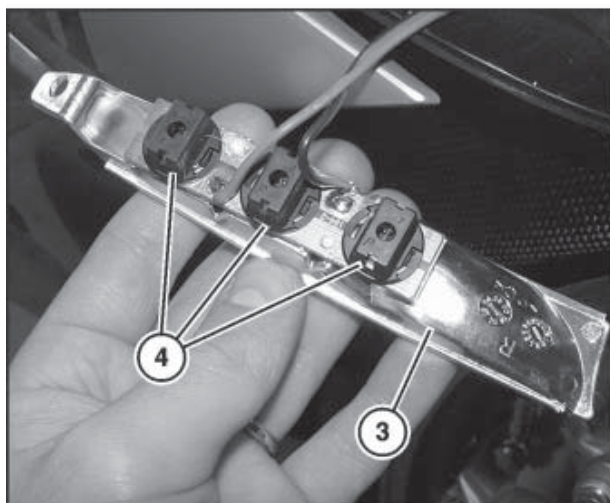
Loosen and remove the screw (1).
 Remove the rubber lamp-holder.
 Change the position lamp.
 Position the rubber lamp-holder and tighten the screw (1).



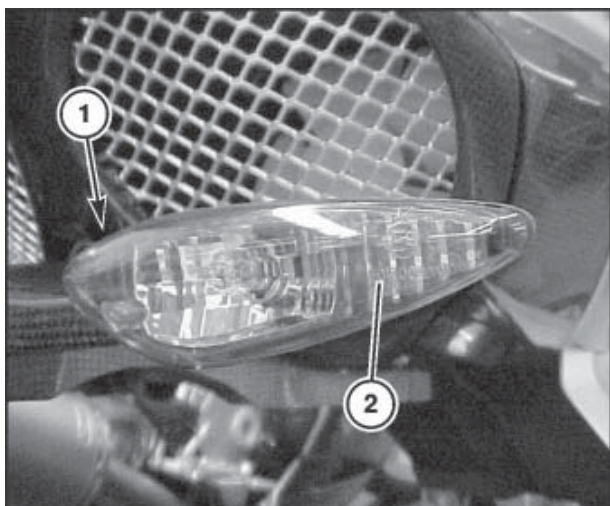
3.39.3 CHANGE FRONT AND REAR ARROWS

3.39.3.1 CHANGE FRONT ARROWS

Loosen and remove screw (1).
 Remove the glass cover (2).

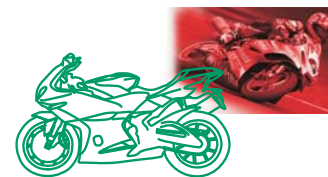


Remove the arrow body (3).
 Change the damaged lamp (4), turning it anti-clockwise.
 Position the arrow body (3) and glass cover and fix with screw (1).
 Operate in the same way with the opposite arrow.



3.39.3.2 CHANGE REAR ARROWS

Loosen and remove the screw (1).
Remove the glass cover (2) and change the bulb.
Position the glass cover (2) and tighten the screw (1).
Operate in the same way with the opposite arrow.



Cowling

4. COWLING

4.1 DISMANTLE COWLING

To remount proceed in the reverse way to dismantling, except for eventual specific notes.

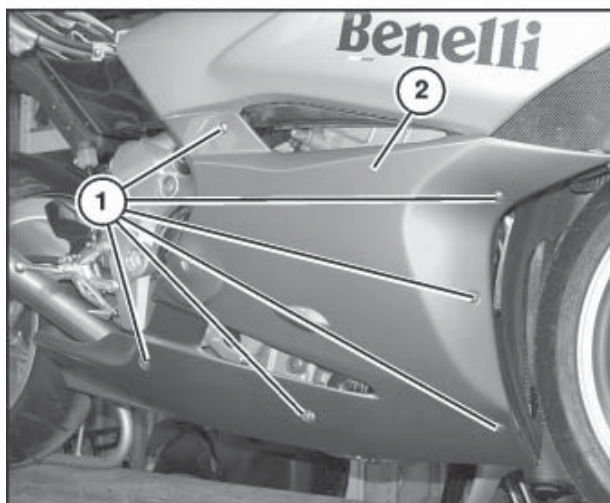
4.2 DISMANTLE LOWER SEMI-COWLING



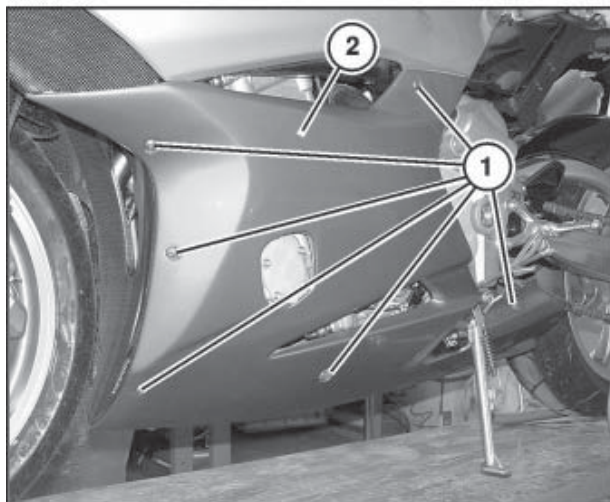
WARNING:
Do not damage the cowling while removing.



WARNING:
Take note of the position of the screws for correct remounting.

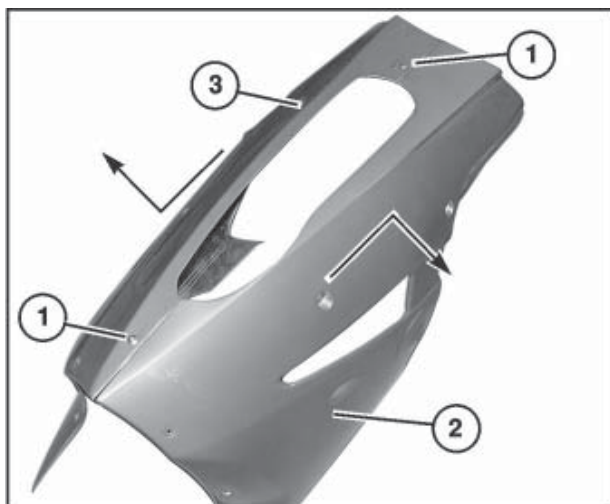


Position the engine on the rear assembly stand.
Unscrew and remove the six screws (1) on the right side of the vehicle.

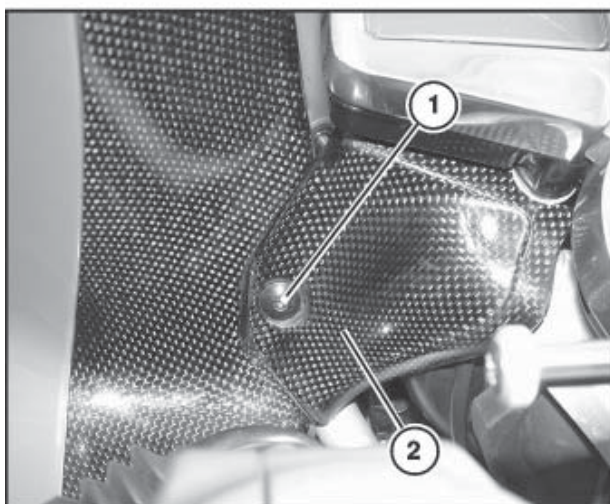


WARNING:
During the following operation support the lower semi-cowlings.

Lower the lateral assembly stand.
Unscrew and remove the six screws (1) on the left side of the vehicle.
Remove the lower semi-cowling (2).



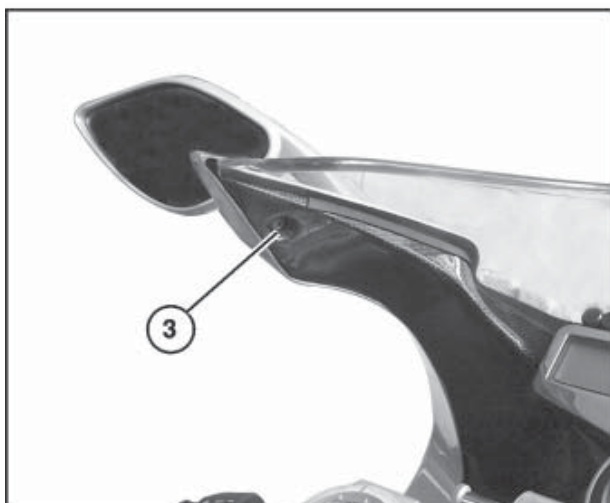
Unscrew and remove the two screws (1).
Separate the right semi-cowling (2) from the left (3) as indicated in the figure.



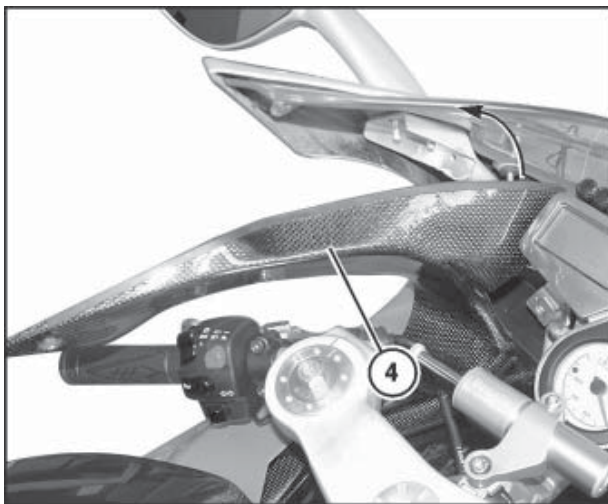
4.3 DISMANTLE UPPER SEMI-COWLING

4.3.1 DISMANTLE LEFT AND RIGHT INTERNAL INSTRUMENT BOARD FASTENINGS

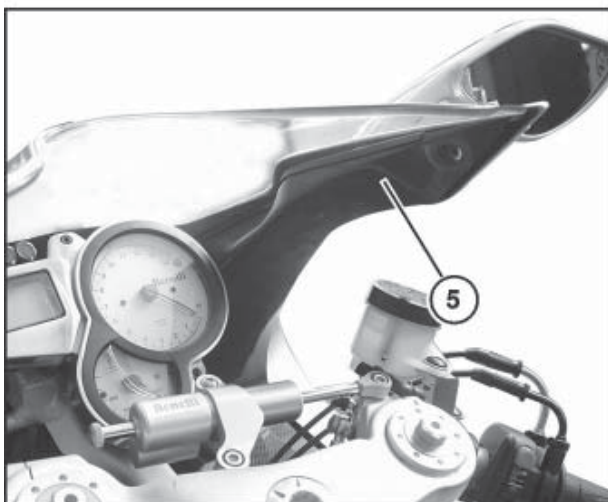
Unscrew and remove the screw (1).
Remove the left instrument board fastenings (2).
Proceed in the same way with the right instrument board fastenings.



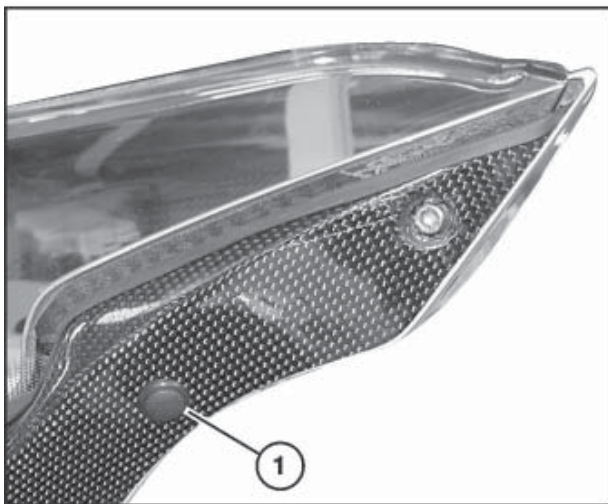
Unscrew and remove the screw (3).



Turn, as shown in the figure, the left internal instrument board fastening (4) and remove it.

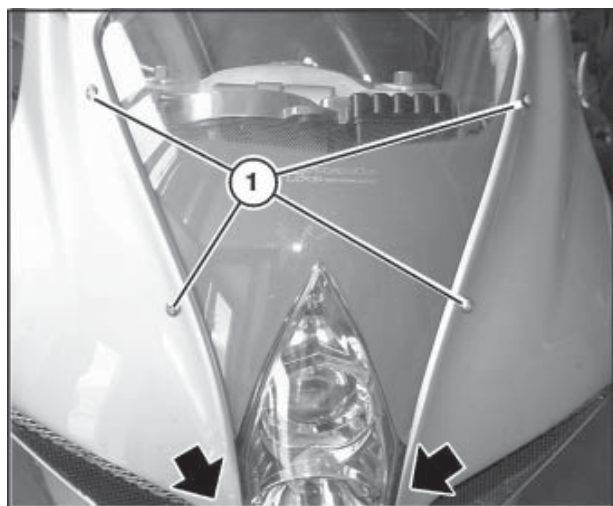


Proceed in the same way with the right internal instrument board fastening (5).



4.4 DISMANTLE LEFT AND RIGHT REARVIEW MIRRORS

Extract the internal rubber cap fastening.
Support the left rearview mirror.
Unscrew the screw (1) and remove the left mirror.
Proceed in the same way with the opposite right mirror.



4.5 DISMANTLE UPPER LEFT AND RIGHT COWLING

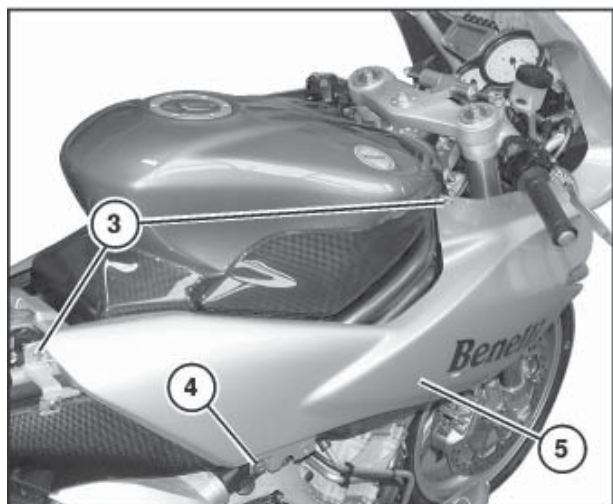


WARNING:
Take note of the position of the screws for correct remounting.

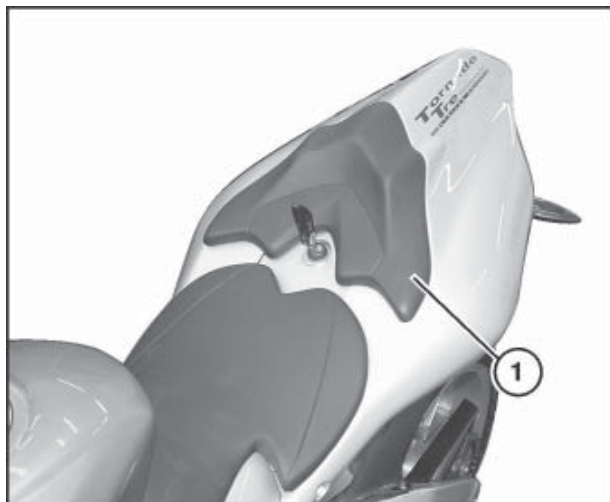
Remove the four screws (1).
There are two high-speed nails in the area indicated by the arrows.



Remove the two high-speed nails (2) under the front headlight to separate the cowlings from the wheel housing.



Loosen and remove the two screws (3) and screw (4).
Remove the upper right side panel (5),
Remove the small cap, working on the remaining two screws (1). Proceed in the same way as this with the upper left side panel.

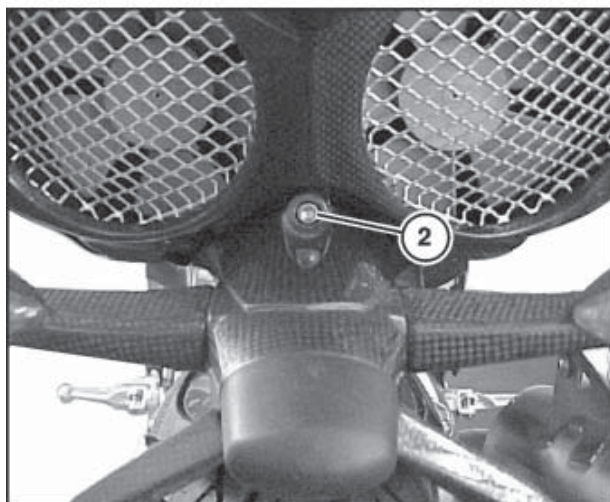


4.6 DISMANTLE TAIL-PIECE

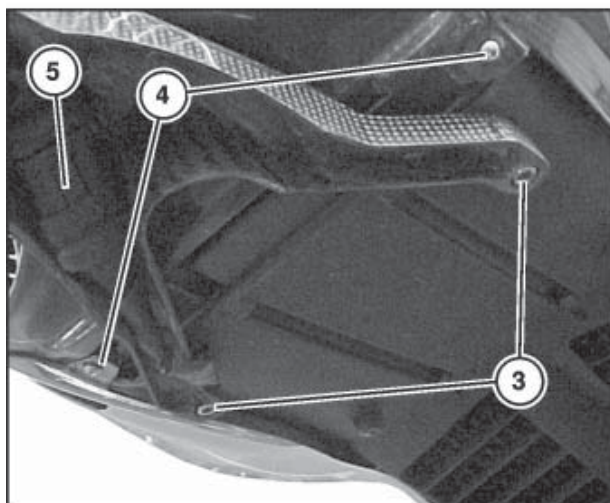


WARNING:
Note the position of the screws for correct remounting.

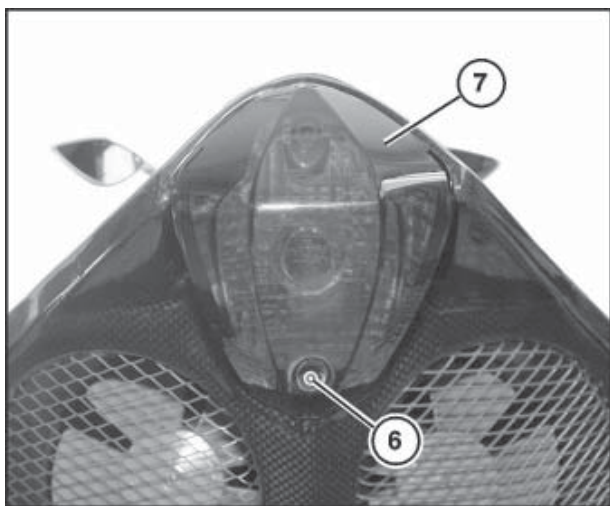
Remove the saddle (1) using the supplied wrench.



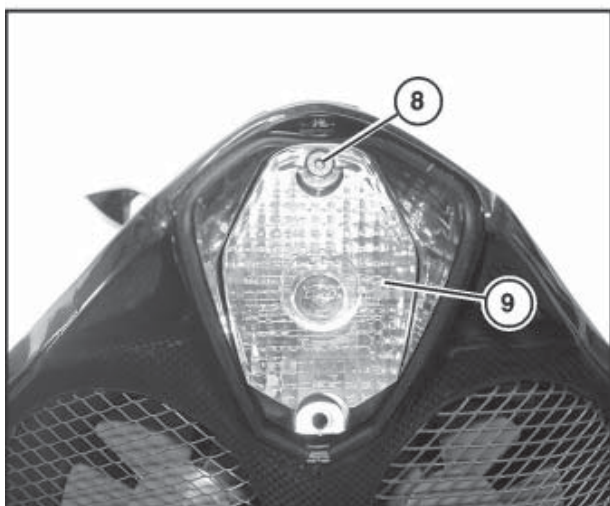
Unscrew and remove the centre fixing screw (2) of the license-plate holder support.



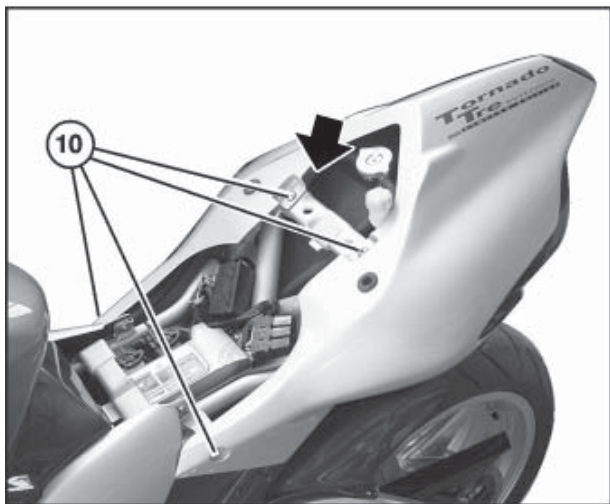
Unscrew and remove the two lower license-plate holder support fixing screws (3).
Remove the license-plate holder.
Unscrew and remove the two lower tail-piece fixing screws (4).
Disconnect the tail-piece connector (5).



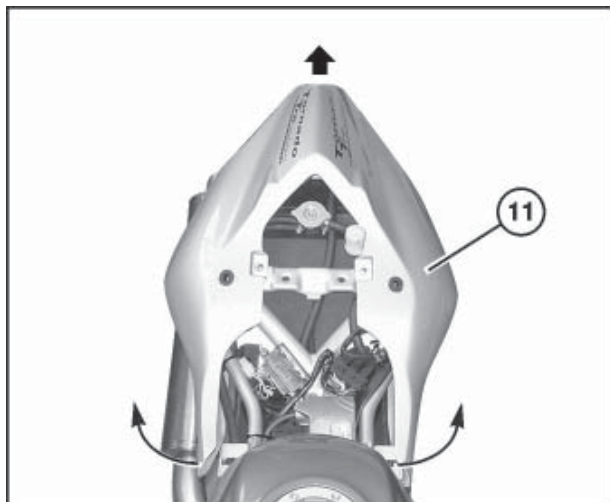
Loosen and remove screw (6), remove the glass cover of the tail-piece(7).



Loosen screw (8) and extract the parabola (9).
Detach the contacts to the tail-piece and remove the parabola (9).



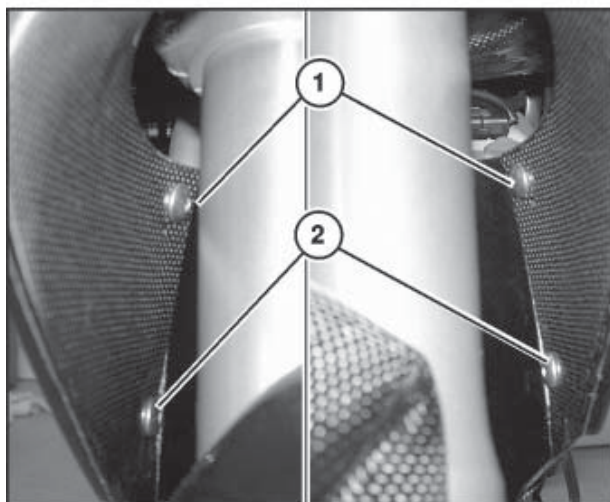
Loosen and remove the four screws (10).



WARNING:

During the following procedure do not force the elasticity of the rear tail-piece more than is necessary.

Remove the rear tail-piece (11), enlarging its front part slightly and passing it towards the rear of the bike as indicated in the figure.



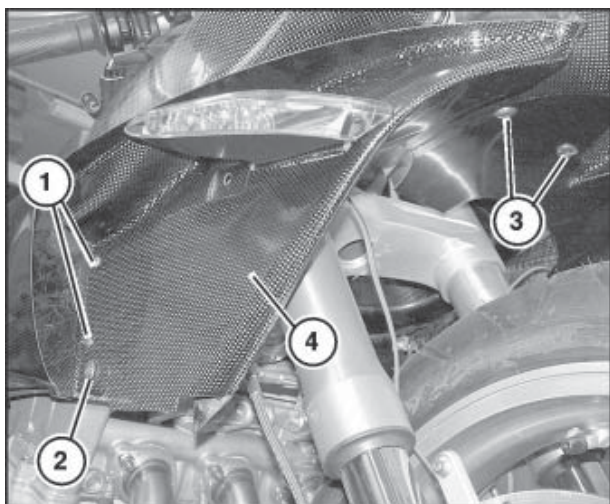
4.7 DISMANTLE WHEEL HOUSING

Remove the lower cowlings (see ("DISMANTLE LEFT AND RIGHT COWLINGS")).

Loosen and remove the two high-speed nails (1).
Loosen and remove the two screws (2).



Remove the wheel housing (3).



4.8 DISMANTLE COWLING BENEATH THE HEADLIGHT



WARNING:

During the following operation support the cowling beneath the headlight.

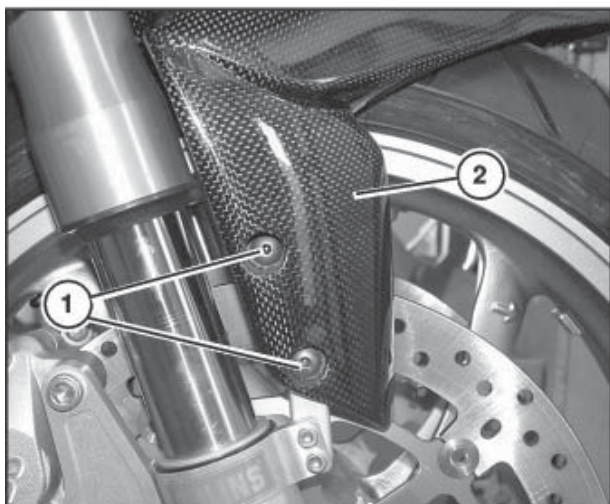
Remove the upper left and right cowlings (ss("DISMANTLE UPPER LEFT AND RIGHT COWLINGS").

Loosen and remove the two screws (1) and screw (2) on both sides.

Loosen and remove the two screws (3).

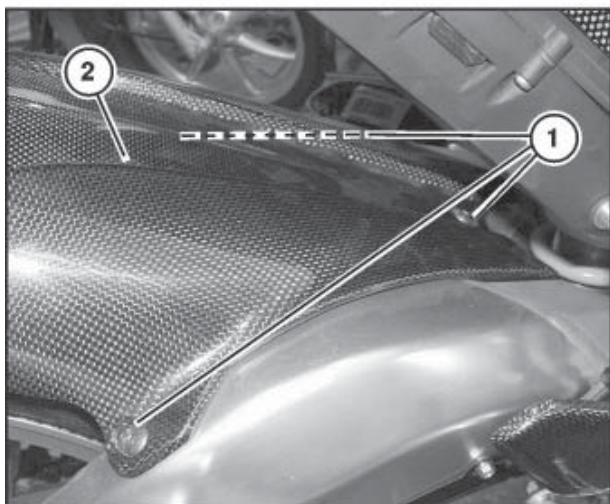
Disconnect the cabling of the direction indicators.

Remove the cowling beneath the headlight (4).



4.9 DISMANTLE FRONT MUDGUARD

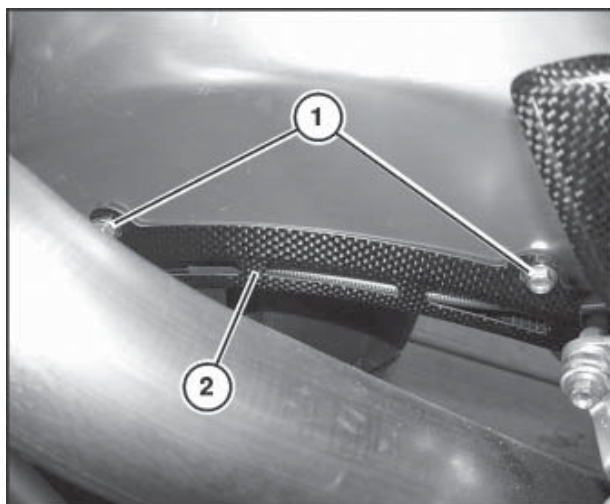
Loosen and remove the two screws (1) on each side and remove the front mudguard (2).



4.10 DISMANTLE REAR MUDGUARD

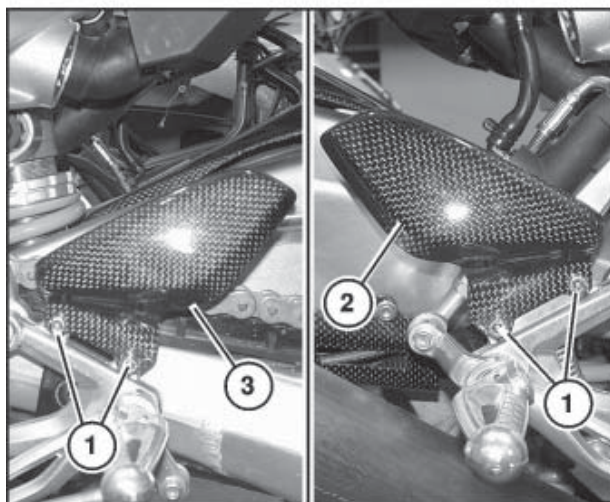
Loosen and remove the three fixing screws (1).

Remove the rear mudguard (2).



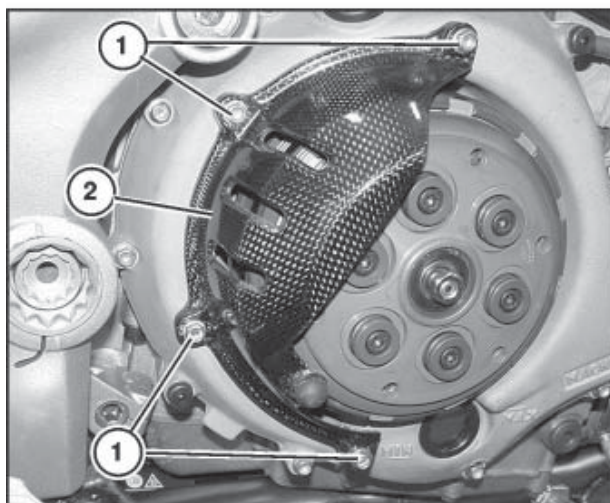
4.11 DISMANTLE CABLE GROMMET COVER

Loosen and remove the two screws (1) and remove the cable grommet cover (2).



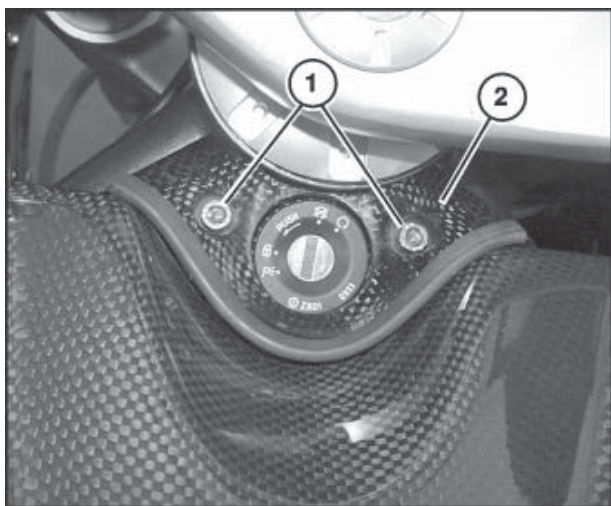
4.12 DISMANTLE RIGHT AND LEFT FOOTRESTS

Loosen and remove the two screws (1) and remove the right footrest (2).
Proceed in the same way with the left footrest (3).



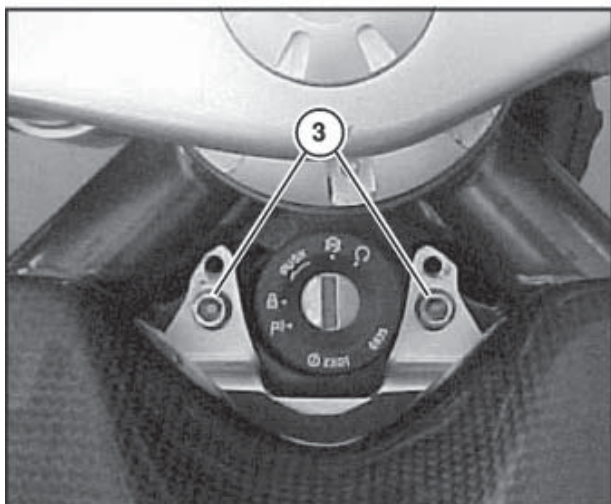
4.13 DISMANTLE HOOD

Remove the lower semi-cowlings (see ("DISMANTLE LOWER SEMI-COWLINGS")).
Loosen and remove the four screws (1) and remove the hood (2).

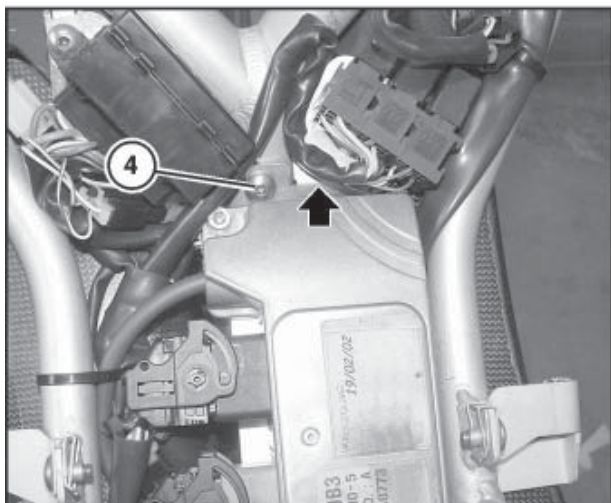


4.14 DISMANTLE TANK

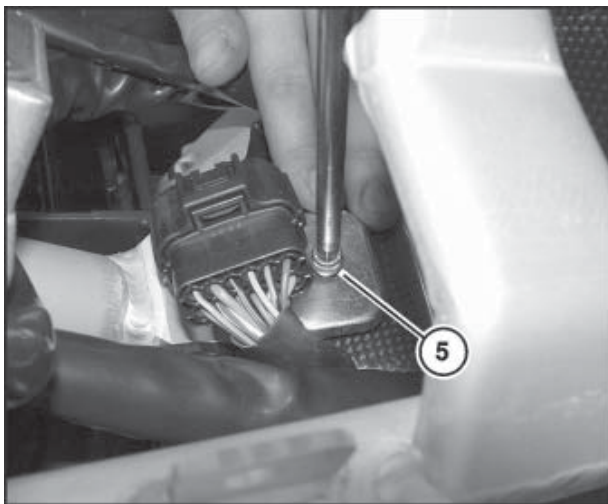
Loosen and remove the two screws (1) and remove the steering block cover (2).



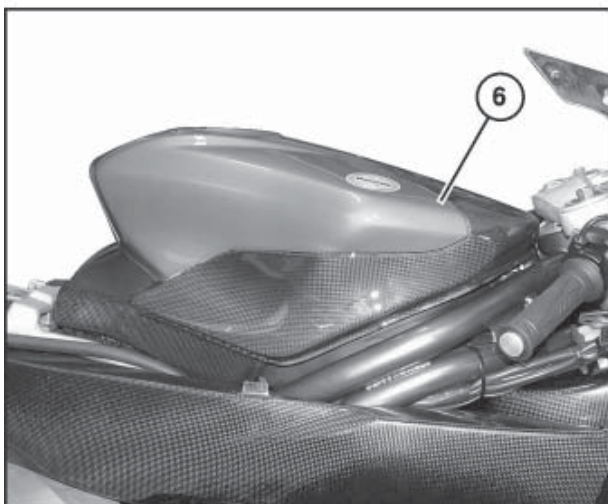
Loosen and remove the two screws (3).



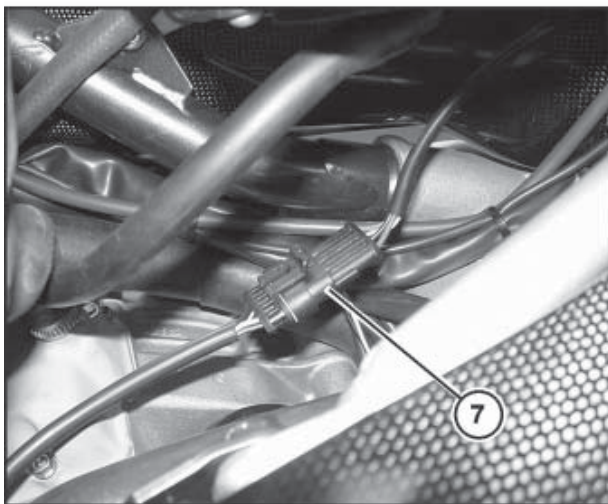
Loosen and remove screw (4) and move the trigger box and the trigger box support as in the figure.



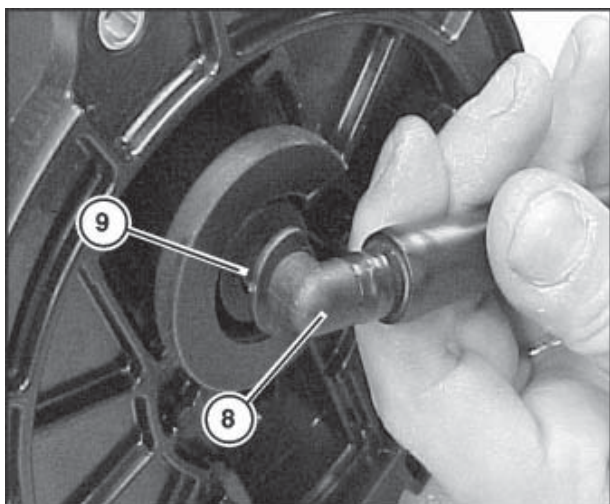
Loosen and remove the screw (5).



Raise the fuel tank (6).



Disconnect the petrol pump cabling (7).

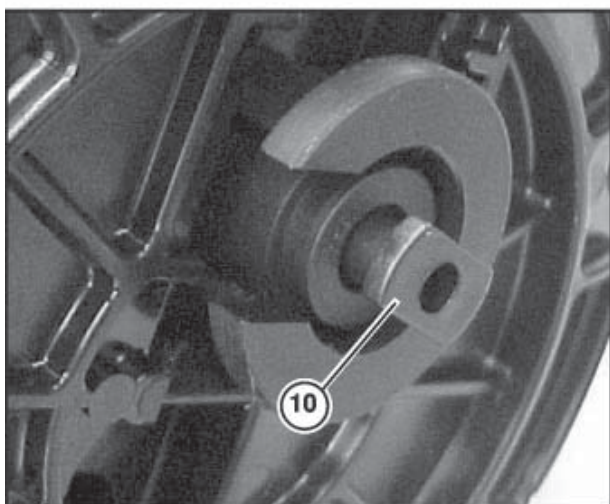


Disconnect the rapid unhooking petrol tube (8) from the pump using the specific equipment.

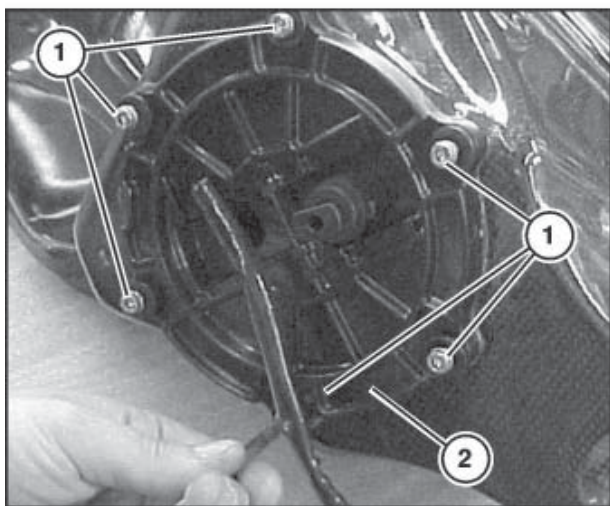


SPECIFIC EQUIPMENT

INSTRUMENT: code R180100143000



Insert the specific pump valve closure cap (10) to avoid oil spilling out.



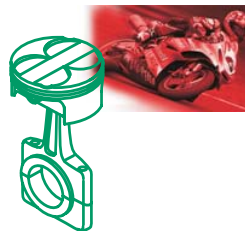
4.15 DISMANTLE TANK FUEL PUMP

Remove the tank from the vehicle (see "DISMANTLE TANK"). Empty the tank, conserving the fuel in a dry place and far from the rays of the sun and open flames.

Loosen and remove the six screws (1) and remove the pump (2). For remounting, proceed in the reverse way to dismantling.

NOTE:

Position the sealing O-ring correctly in the apposite seat during remounting.



Engine

5. ENGINE

5.1 CAMSHAFT

5.1.1 REMOVE CAMSHAFT

To remove the engine from the frame use the specific equipment.



SPECIFIC EQUIPMENT

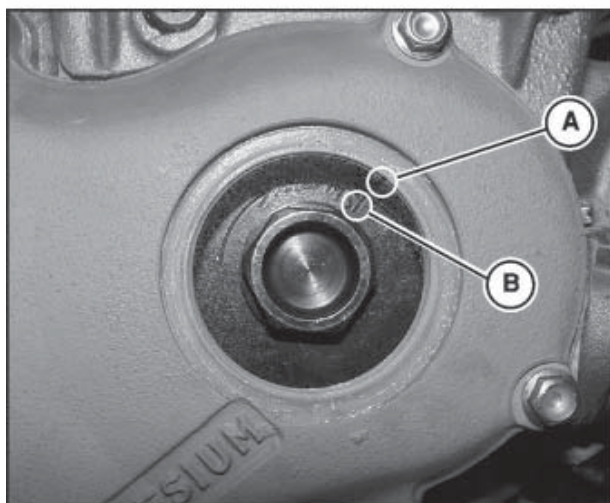
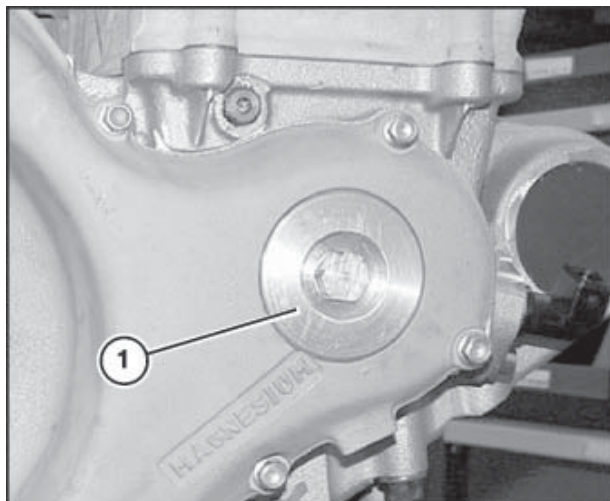
Engine dismantling instrument:
R180197034000

To support the engine use the specific equipment.



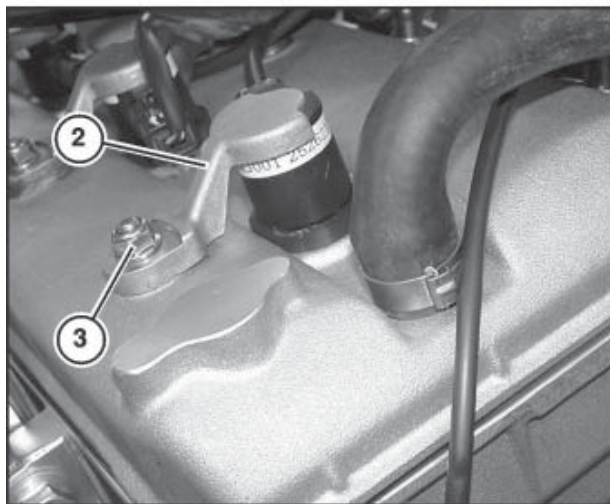
SPECIFIC EQUIPMENT

Engine support:
R180197029000

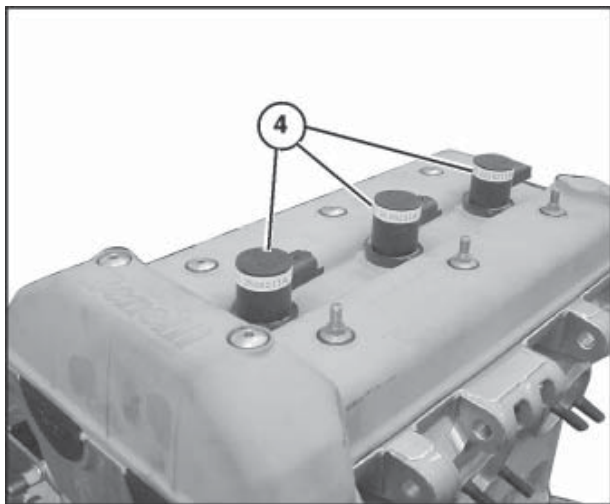


Remove the access cover (1) to the phonic wheel.

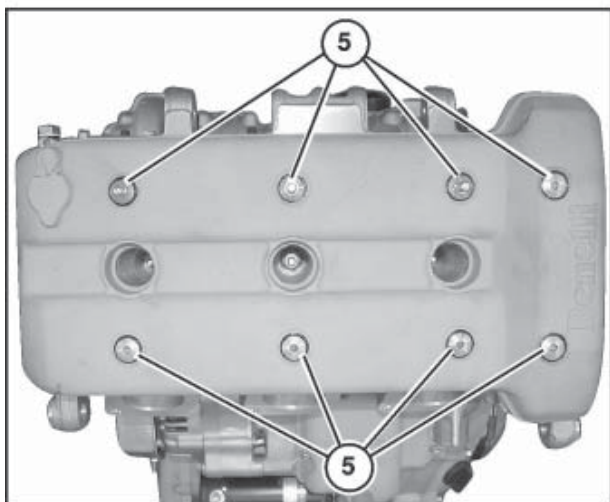
Position the phonic wheel as shown in the figure.
The two signs (A and B) must coincide (PMS).



Remove the three aluminium rods (2) that fix the relative coils,
using the fixing nuts (3).

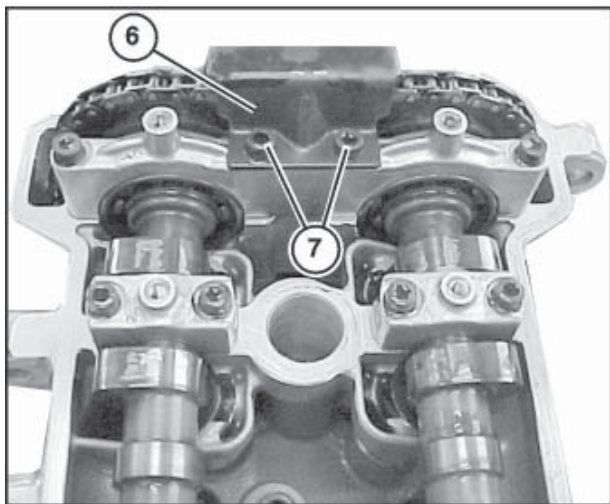


Remove the coils (4) and the sparking-plugs beneath.

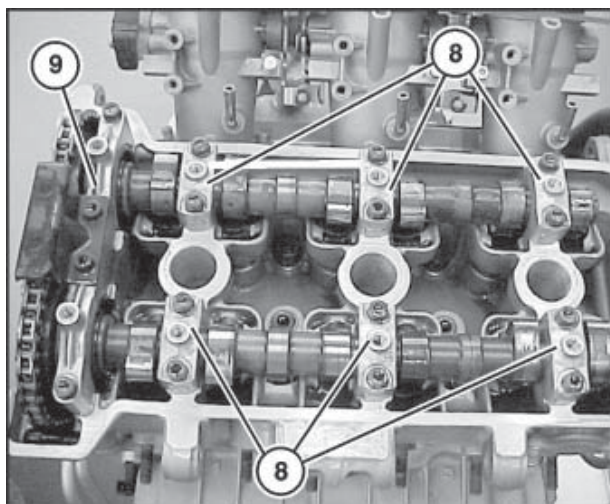


WARNING:
Take note of the position of the screws for correct remounting.

Unscrew the eight head cover fixing screws (5).



Remove the head cover.
Remove the chain pad (6), unscrewing the two fixing screws (7).



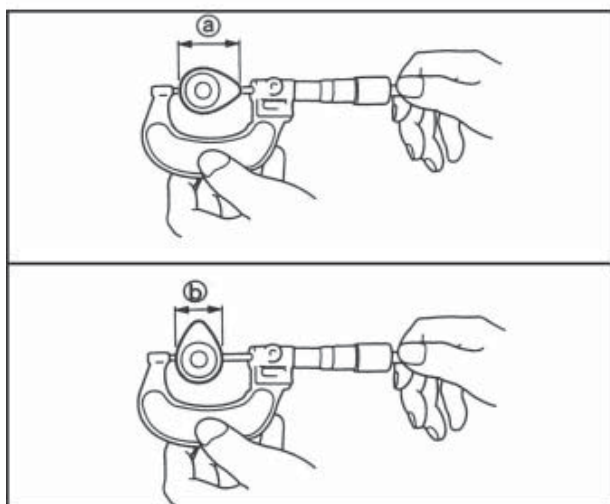
WARNING:
Make sure that the distribution chain does not fall into the casing.

Remove the chain stretcher.



WARNING:
Note the position of the elements for correct remounting.

Unscrew the fixing screws of the large caps (8) and remove them.
Remove the bridge (9), unscrewing the fixing screws.
Remove the camshafts and the chain.



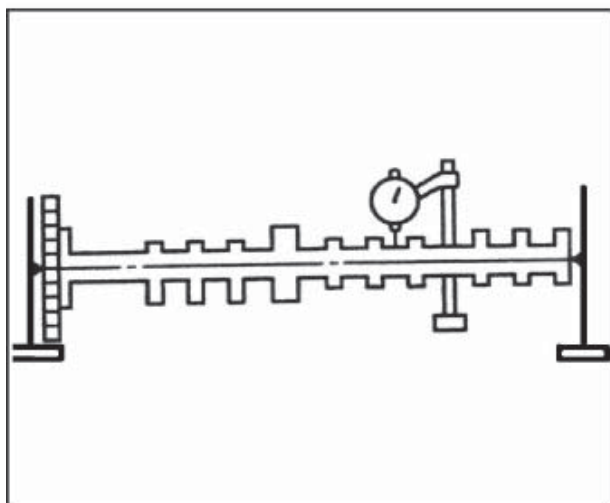
5.1.2 CHECK CAMSHAFT

Check the olives of the camshaft with a micrometer, as indicated in the figure.
If the value does not enter within the specific measure, change the element.



SUCTION SHAFT VALUE LIMIT:
A= 37 mm B= 27.85 mm

EXHAUST SHAFT:
A= 36.6 mm B= 27.85 mm

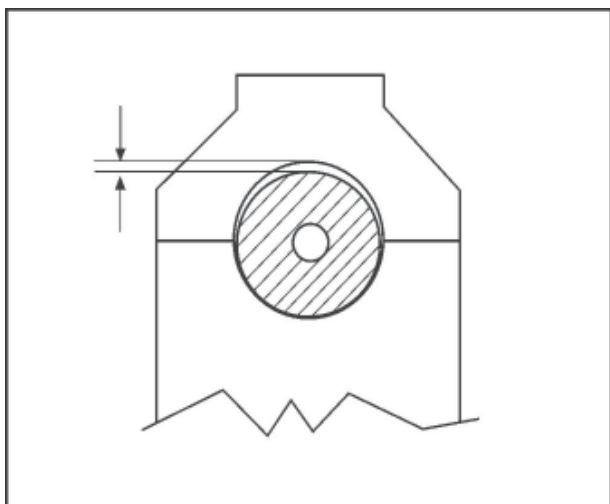


Check the concentricity of the camshaft with a comparator, as shown in the figure.
If the value does not enter within the specific measure, change the element.



SUCTION AND EXHAUST SHAFT DIMENSIONS LIMIT:

MAX. VALUE = 0.03 mm



The maximum play between the distribution camshaft and seat is 0.08 mm.

If the value does enter within the specific value, change the element.



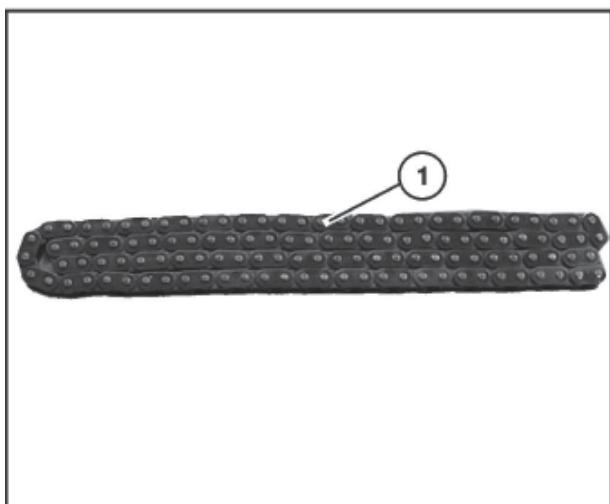
VALUE LIMIT CAMSHAFT AND SEAT

Max. play= 0.08 mm



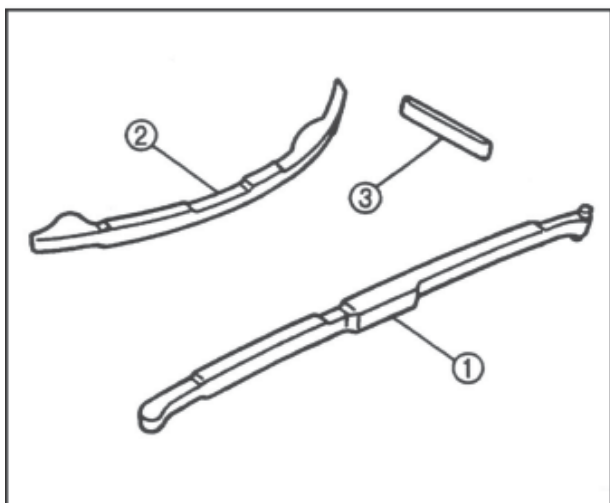
SPECIFIC EQUIPMENT

Instrument for checking engine shaft axle:
R180197030000



5.1.3 CHECK CHAIN, SPROCKET WHEELS AND CAMSHAFT CHAIN GUIDE

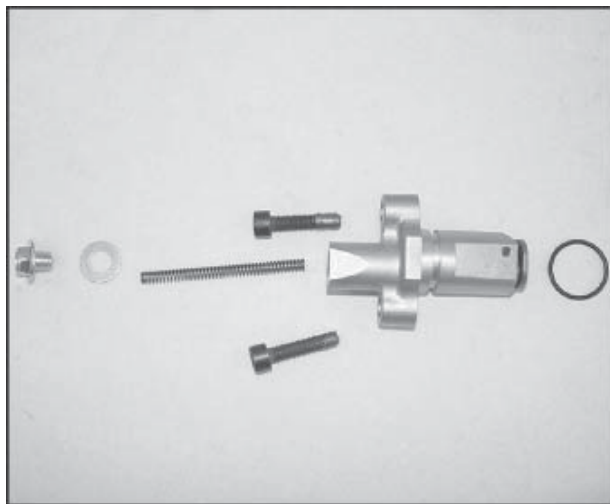
Check the state of wear of the camshaft distribution chain (1).
If the element has blocked links, is excessively worn or has exceeded 25000 Km, change it.



Sight check the distribution chain guides:

- 1 Fixed guide (FRONT PART)
- 2 Mobile guide (REAR PART)
- 3 Upper guide (FIXED ON HEAD)

If one or more elements are worn, change it/them.



5.1.4 CHECK CHAIN STRETCHER

Check the free sliding of the chain stretcher rod.
 Check the state of the chain stretcher spring.
 Check the integrity of the chain stretcher.
 If an element or its components are damaged or ruined, change it/them.

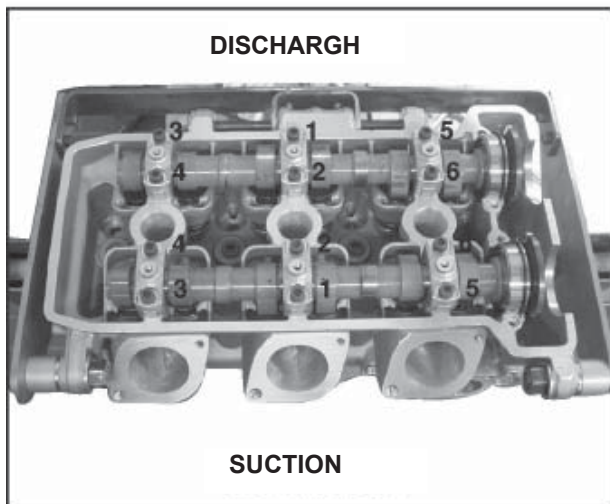


5.1.5 MOUNT CAMSHAFT



WARNING:

To mount the camshafts correctly position the olives on the first cylinder towards the outside on the side of the distribution chain, position the fixed pad and then the mobile pad.



Position the exhaust shaft and transmission chain, position the end shields in the original position (with the writing towards the outside and with the number on the inside of the head) and tighten the fixing screws according to the diagram in the figure.

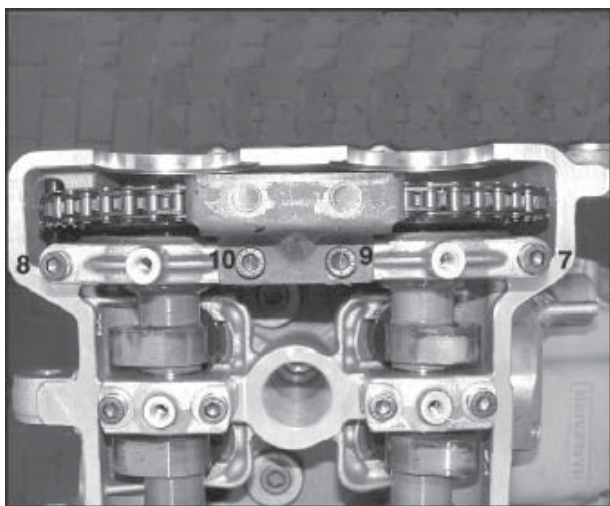


1st phase: 6 N·m; 2nd phase: 13 N·m

Position the suction shaft and the transmission chain, position the end shields in the original position (with the writing towards the outside and with the number on the inside of the head) and tighten the fixing screws according to the diagram in the figure.



1st phase: 6 N·m; 2nd phase: 13 N·m



Position the transmission chain on the toothed wheels of the distribution shafts.

Position the bridge and the upper chain pad and tighten the fixing screws in two phases as in the diagram in the figure.

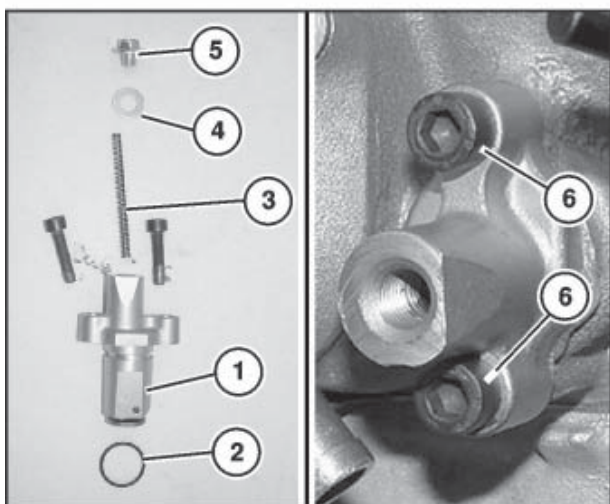


1st phase: 6 N·m; 2nd phase: 13 N·m

NOTE:

Always oil with Teflon SINTOFLOX paste.

Re-position the fixed pad.



Position the body of the chain stretcher (1) complete with O-ring (2) and tighten the two screws (6) as specified in the diagram.



10 N·m 1 Kg-m

Position the rod pushing spring (3) and the washer (4) and tighten everything with a drive screw (5) as in the diagram.

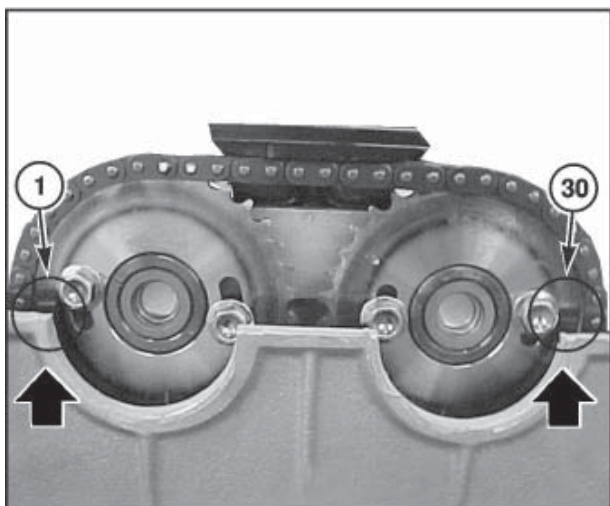


7 ÷ 8 N·m 0,7 ÷ 0,8 Kg-m



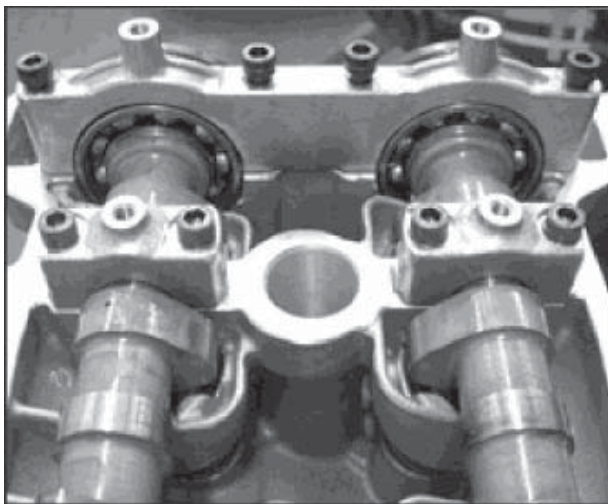
WARNING:

Always check that the chain stretcher is always in position 0 (in exhaust) before mounting it.

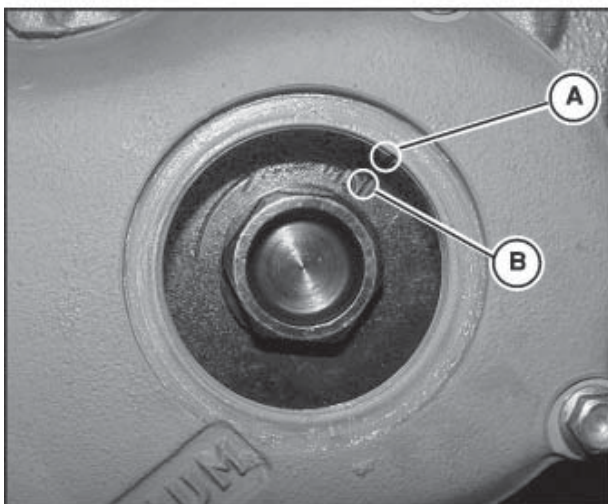


Align the signs on the toothed wheels at the head level as in the figure.

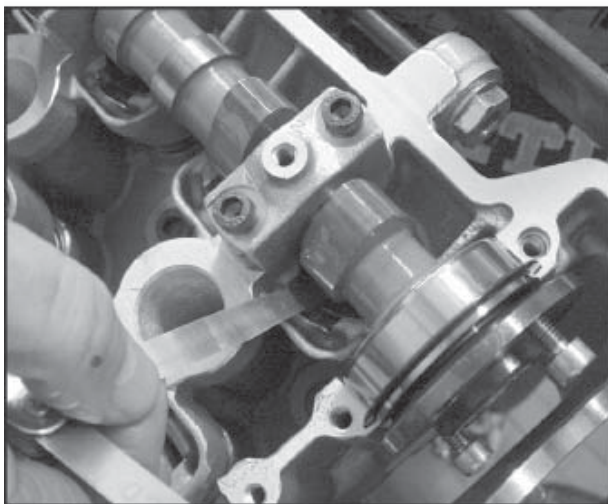
Count n° 30 chain pins from position 1 to position 30 as indicated in the figure.



Check that the position of the cylinder 1 valves are turned towards each other as in the figure.



Check that the position of the phonic wheel is as indicated in the figure ("A" and "B" aligned).

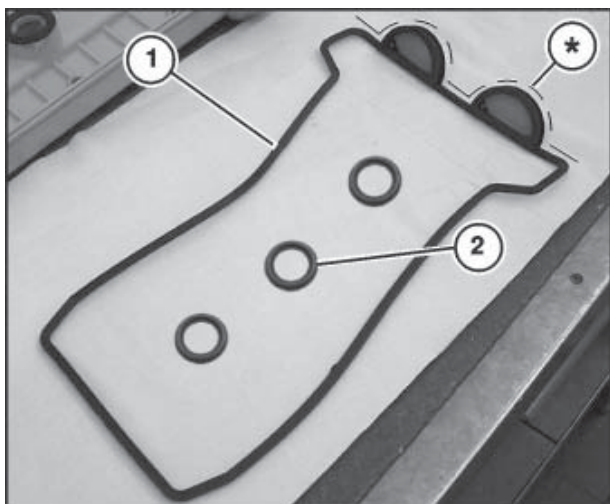


Check the valve play with a feeler.

If the valve play is not within the specific value, adjust the valve play (see "ADJUST VALVE PLAY").
Screw the phonic wheel cover onto the right side of the engine.

SUCTION SHAFT FUNCTIONING PLAY:
0.25 - 0.30

EXHAUST SHAFT FUNCTIONING PLAY:
0.30 - 0.35



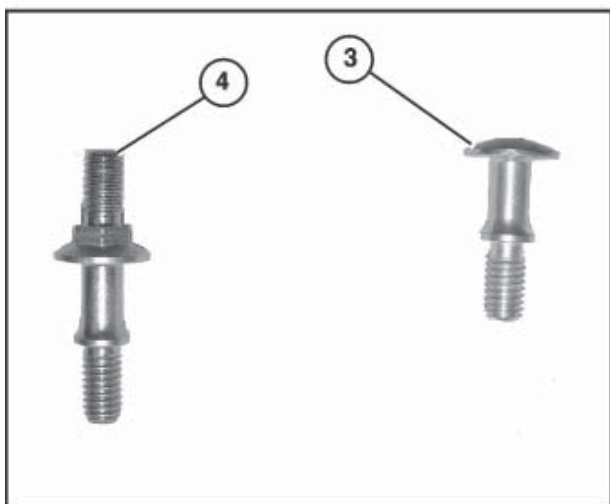
WARNING:
Always use new gaskets.

Position the gaskets of the head cover (1 and 2).

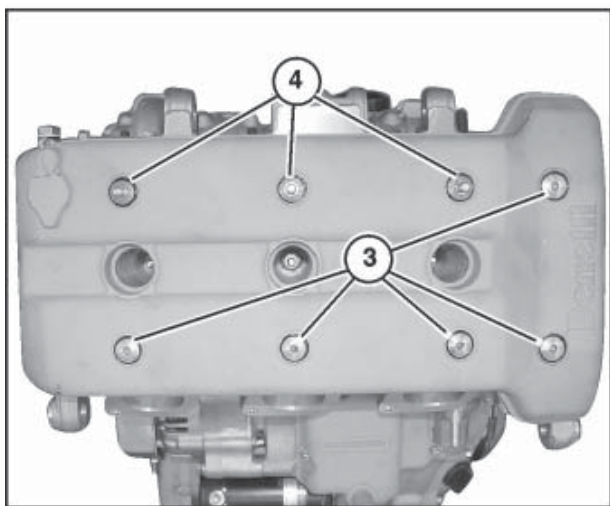


WARNING:
Make sure during mounting that the gaskets (2) do not fall into the head.

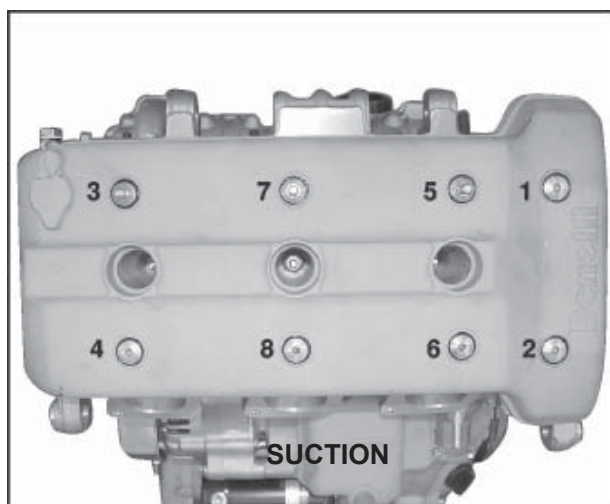
*Apply THREEBOND® paste as in the drawing.



Position the head cover and tighten screws (3) and (4) where indicated in the figure.



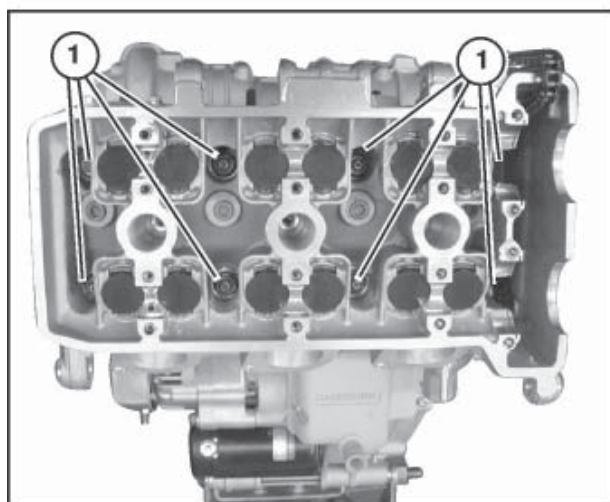
Insert the 8 head fixing screws with suitable rubber washers.



Tighten the head cover fixing screws to the specific worm drive according to the order indicated in the figure, paying attention not to cut or damage the gaskets.



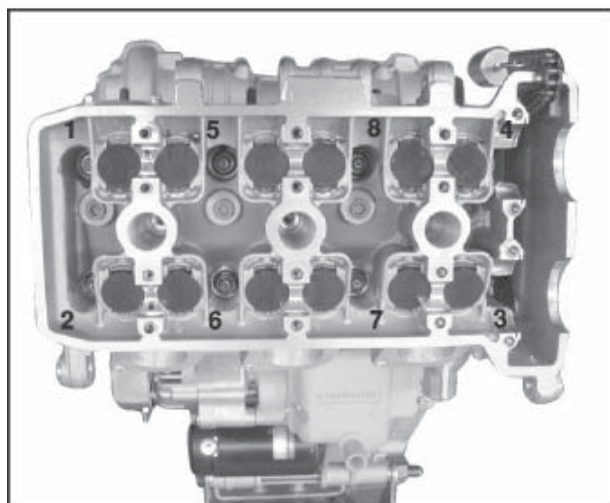
10 N·m 1 Kg-m



5.2 CYLINDER HEAD

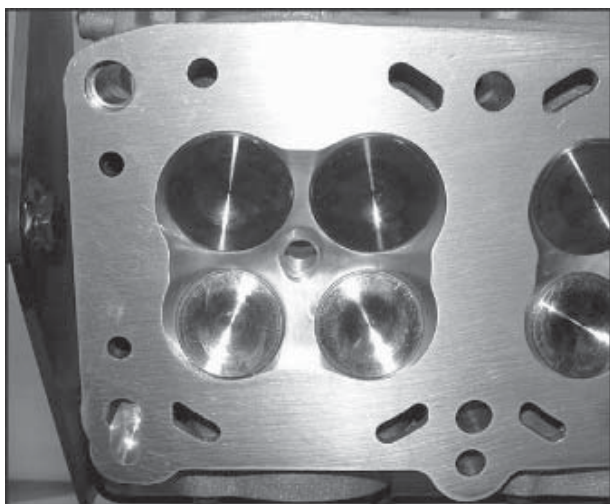
5.2.1 REMOVE CYLINDER

Remove the camshaft (see "REMOVE CAMSHAFT").
Loosen and remove the eight nuts (1) indicated in the figure and the two screws on the right side of the engine (distribution side).



NOTE:

Loosen, for a moment, the fixing screws and nuts according to the sequence indicated in the figure. Then remove the head.



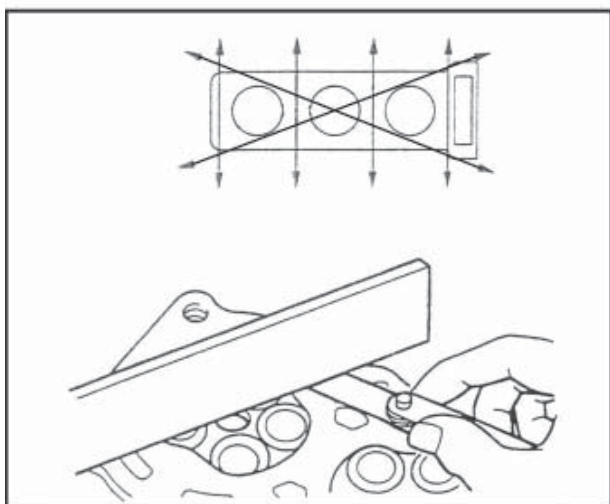
5.2.2 CHECK CYLINDER HEAD



WARNING:

**Do not use a pointed instrument to avoid damaging or scratching:
Sparking-plug hole threading
Valve seat**

Check and eventually eliminate carbon deposits in the combustion chamber with a rounded-off scraper.

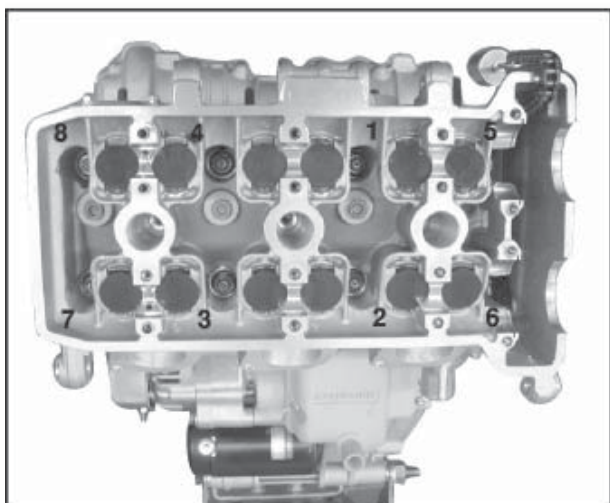


If the surface is damaged or scratched, change the element. Check the distortion of the cylinder head as indicated in the figure. If it is outside the specific value, rectify the head.



**VALUE LIMIT
HEAD DISTORTION**

max. distortion = 0.1 mm



5.2.3 MOUNT CYLINDER HEAD

NOTE:

Always use new gaskets. Clean and degrease the head surface and the cylinders.

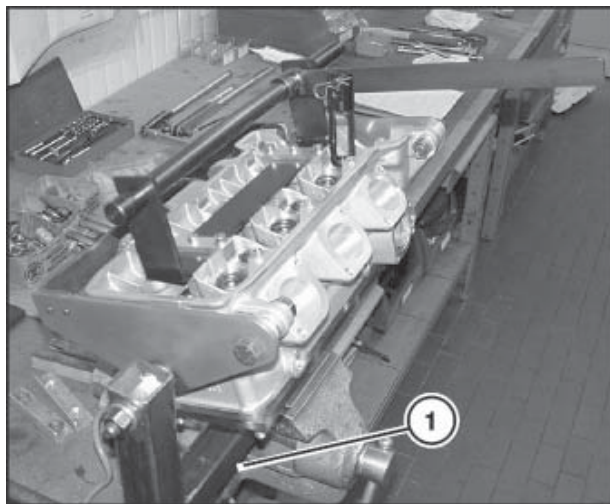
Position the cylinder head. Position the fixing screws and nuts. Tighten to the specified worm drive following the order in the figure in the following phases:



**1st phase: 2.5 Kg-m; 2nd phase: 3.5 Kg-m
3rd phase: 4.5 Kg-m; 4th phase: final tightening with an angle of 50°+50°**

NOTE: Apply grease to the fixing nuts to oil the threading (MOLIKOTE® CU7439 PLUS copper grease).

N.B. This tightening requires a worm drive angle wrench.

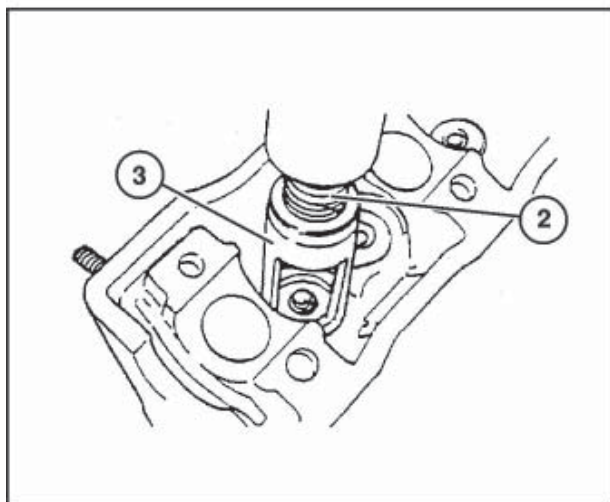


5.3 VALVES AND VALVE SPRINGS

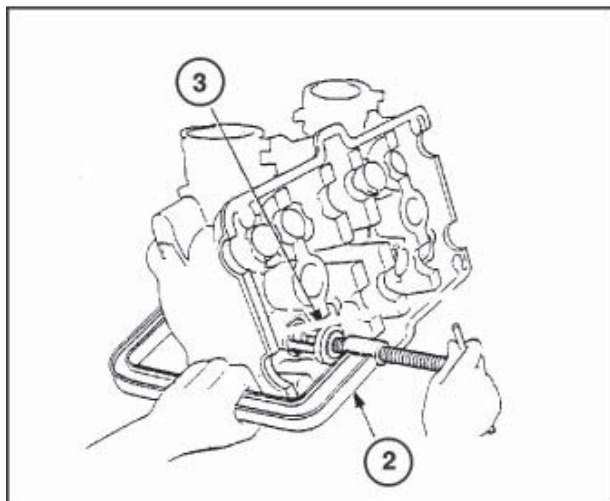
5.3.1 REMOVE VALVES

Remove the cylinder head (see ("REMOVE CYLINDER HEAD").

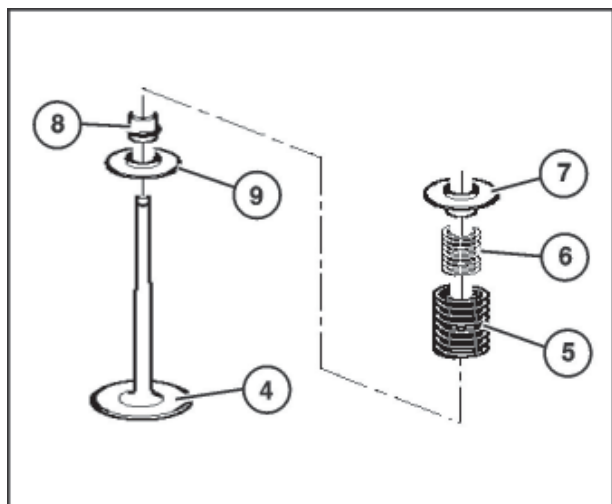
Position the head on a support (1) slightly inclined so that the valve to be removed is perpendicular to the surface.



To remove the valve use the apposite instrument (3) with the correct mount (3), compressing the valve and undo the two lock cones.



Loosen the clamp and remove the valve and its components as in the photo.

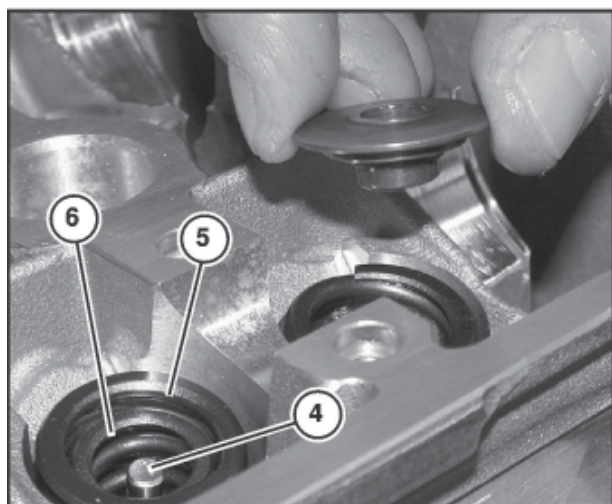


The following procedure is applied to the valves (4), the springs (5) and relative components (7, 8 and 9).

NOTE:

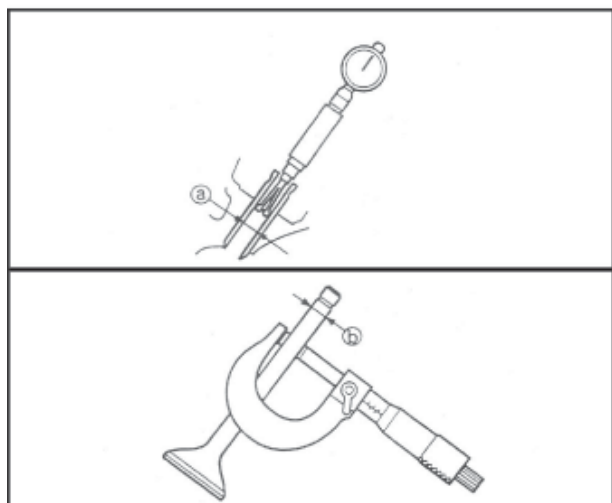
Make sure that valve (4) has a perfect seal by pouring petrol into the conduits and making sure that there are no losses through the valves. Make sure that the valves are perfectly sealed.

Remove the small bowls taking note of the position on each valve and coupling them to their pads.



Free the pusher spring plate using the specified instrument to remove the two lock cones.

Remove the external spring (5), the internal spring (6), valve (4), the valve seal ring and the lower cup.



5.3.2 CHECK VALVES AND VALVE GUIDES

The following procedure must be carried out on all valves and relative valve guides.

Check that values (A) and (B) are within the tolerance of the specific values.

If values (A) and (B) are not within the value limits, change the elements.



SUCTION DIMENSION LIMITS

A max. = 5.05 mm

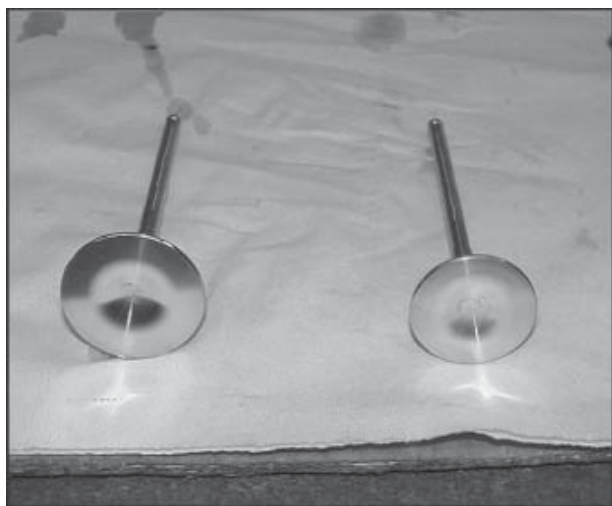
B min. = 4.965 mm



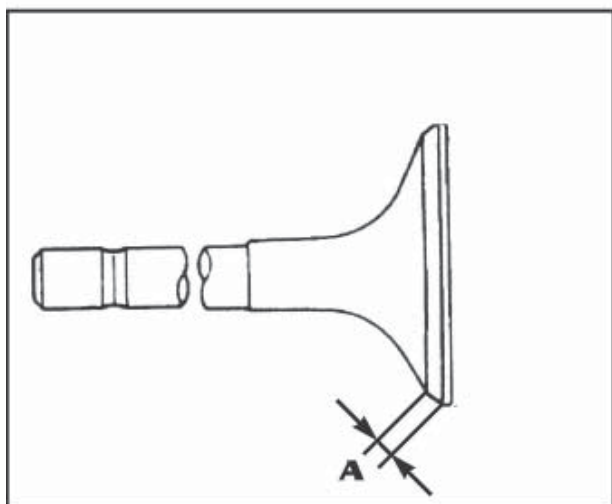
EXHAUST DIMENSION LIMITS

A max. = 5.05 mm

B min. = 4.955 mm



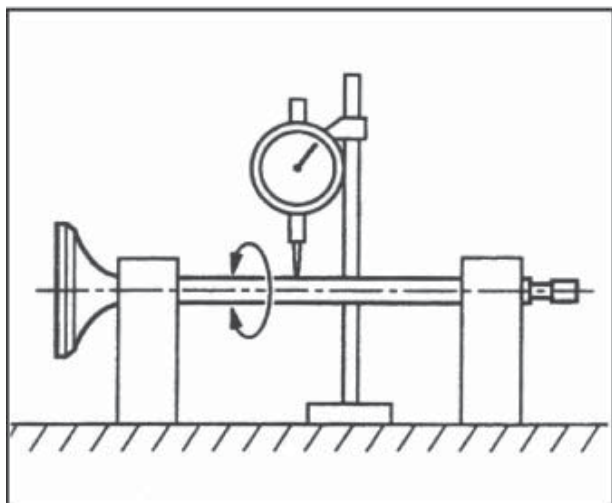
Check the state of the surfaces of the valves.
Eliminate eventual carbon deposits.
If the surface is excessively ruined, change the element.



Check thickness (A) indicated in the figure.



VALVE THICKNESS VALUE LIMIT
A = 0.9 ÷ 1.1 mm



Check the concentricity of the valve stem.
If the concentricity value does not enter within the margin,
change the element.

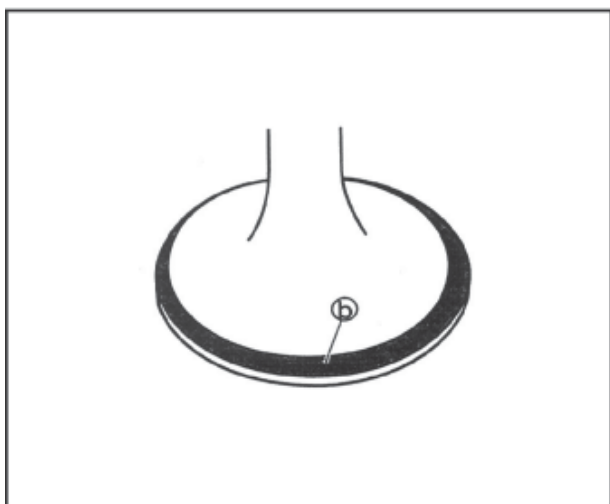
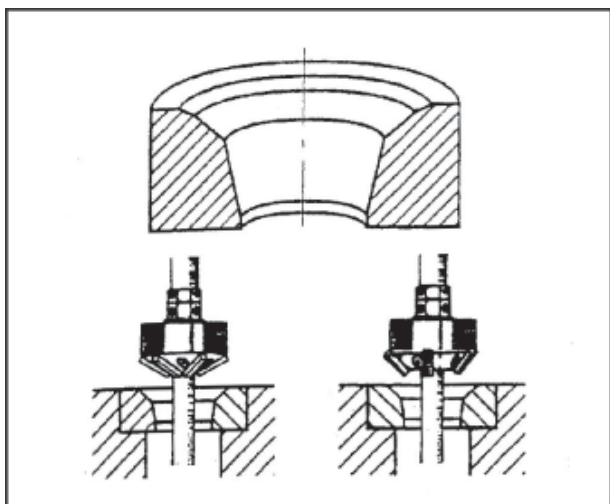


VALVE CONCENTRICITY VALUE LIMIT
0.01 mm



5.3.3 CHECK VALVE SEATS

The following procedure must be applied to all the valve seats.
Eliminate eventual carbon deposits.



Apply the (Dykem) Workshop (b) tincture of bluing onto the face of the valve.
Install the valve in the cylinder head.
Press the valve through the valve guide and on the valve seat to leave a clear trace.

NOTE:

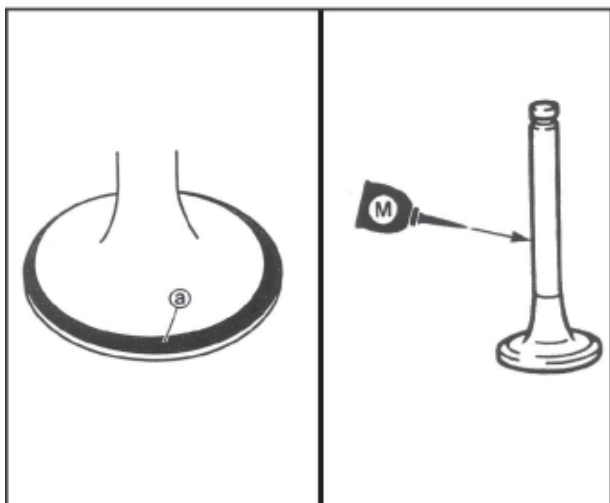
It will be necessary to remove the bluing at the point at which the seat and the face of the valve touch.

NOTE:

If the trace is not partial or not uniform, carry out a smoothing operation on the face and the seat of the valve.

Smooth:

- the face of the valve
- the seat of the valve



NOTE:

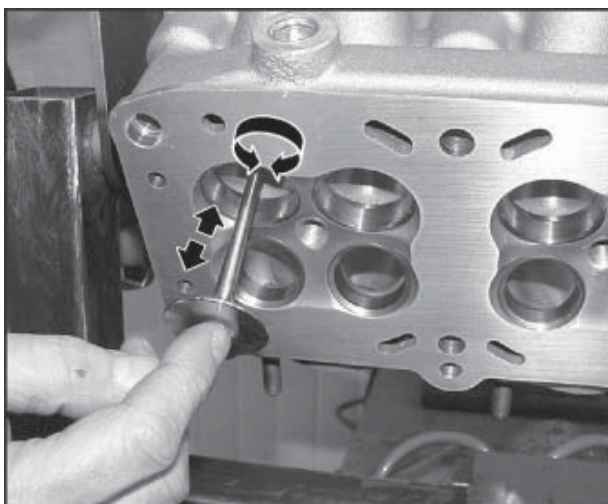
After having changed the cylinder head or the valve and the relative guide, it will be necessary to smooth the seat and face of the valve.

Apply a coarse grained paste (a) for smoothing on the face of the valve.



WARNING:

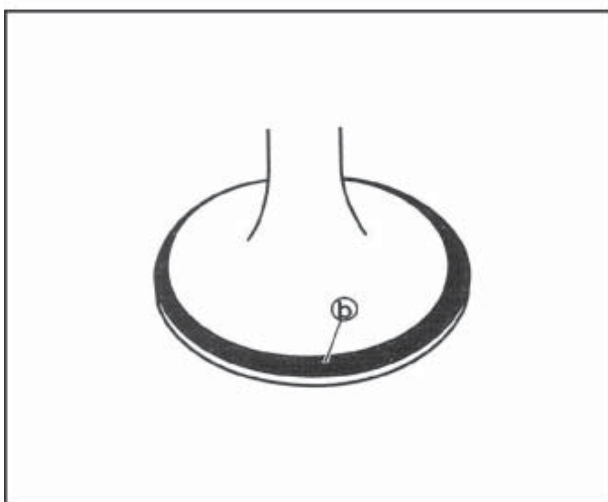
Do not allow the smoothing paste to enter into the space between the stem of the valve and the guide.



Apply disulfide of molybdenum to the stem of the valve.
Insert the valve into the cylinder head.
Rotate the valve until its face and seat shine uniformly, then remove the smoothing paste.

NOTE:

To obtain optimum smoothing results, strike the seat of the valve lightly while turning it forwards and backwards in your hands.

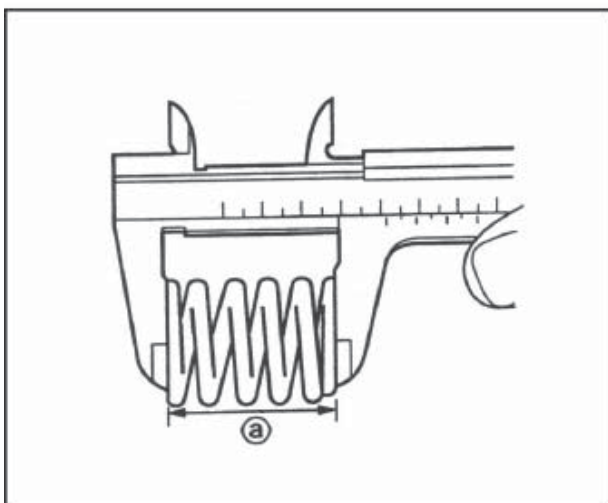


Apply a fine grained paste to the face of the valve and repeat the above operations.
Completely eliminate the smoothing paste from the face and the seat of the valve at the end of each operation.
Apply the (Dykem) Workshop (b) tinture of bluing to the face of the valve.
Install the valve in the cylinder head.
Press the valve through the valve guide and on the valve seat to leave a clear trace.

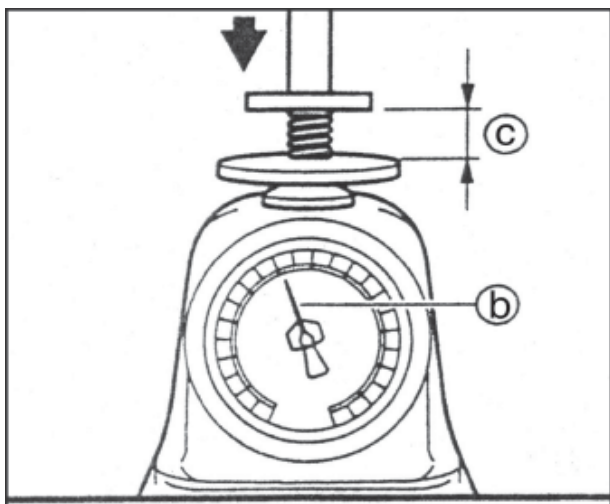
5.3.4 CHECK THE VALVE SPRING

The following procedure is valid for all the valve springs.

Measure the length (a) of the free valve.
If the value does not enter within the envisaged limits, change the spring.



Free valve spring length
External valve spring: 38.5 mm
Tolerance limit: 37.8 mm
Internal valve spring: 34.8 mm
Tolerance limit: 34.0 mm



Bring the spring to a value length (c) and check the value of the load:



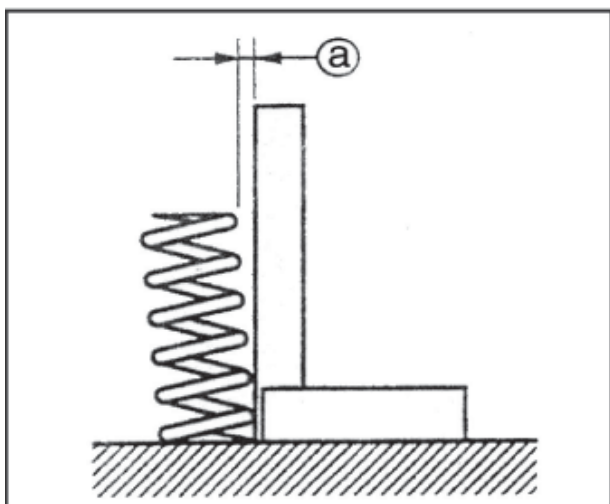
VALUE LIMIT

External spring length: 23.2 mm

Load value limit: 537 N

Internal spring length: 21.2 mm

Load value limit: 298 N



Check the inclination (a) of the valve spring as illustrated in the figure.

If (a) does not enter within the specific value, change it.



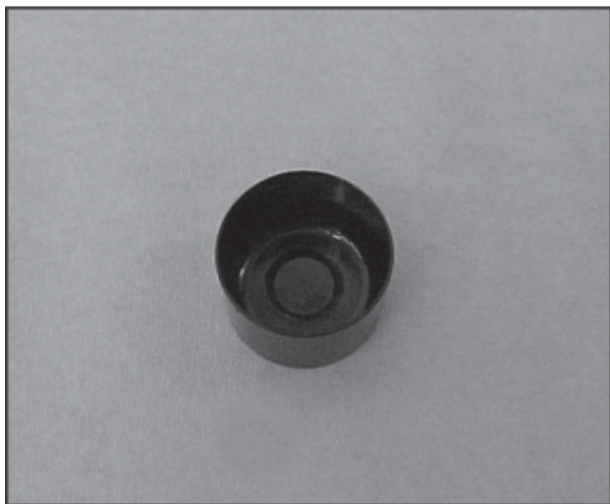
VALUE LIMIT

INCLINATION SUCTION SPRING A = 2 mm



VALUE LIMIT

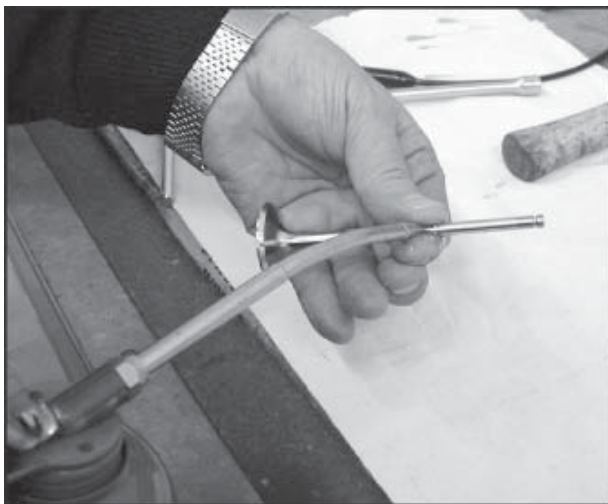
INCLINATION EXHAUST SPRING A = 2 mm



5.3.5 CHECK BUCKET-TYPE TAPPET

The following procedure must be applied to all the bucket-type tappets.

Check that the buckets are not broken or scratched, if so change them.



5.3.6 MOUNT VALVES

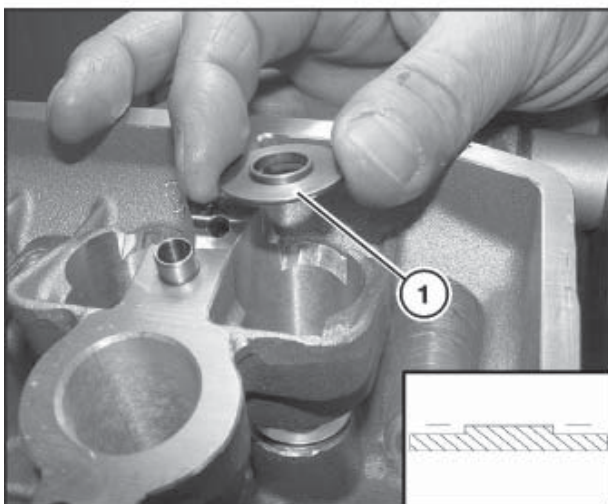
The following procedure must be applied to all the valves and relative components.

Oil the valve stem with the recommended oil.



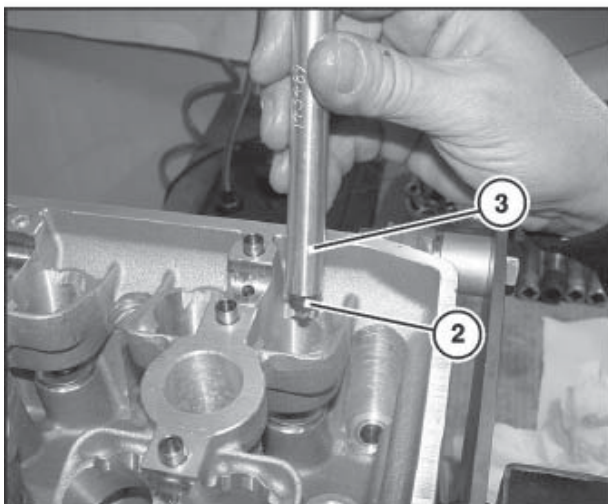
RECOMMENDED OIL

Disulfide of molybdenum oil



Mount the lower small cup (1).

Check the thickness of the small cup. If the thickness is 1.5 mm add a clearance adjustment of 0.6 mm.



WARNING:

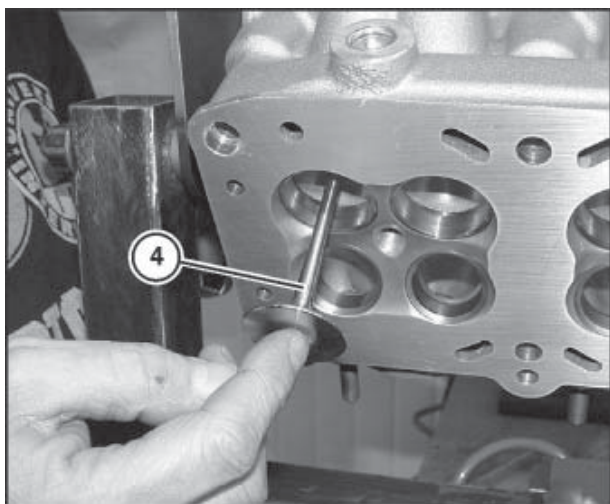
Always use new gaskets and oil seals.

Mount the valve holder hood (2) with the apposite pad (3).



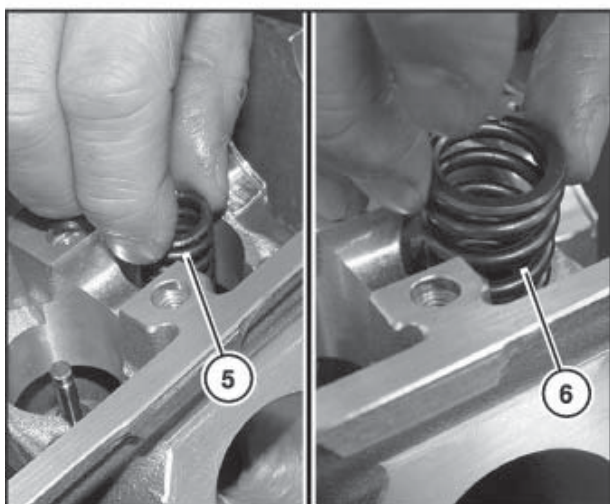
SPECIFIC EQUIPMENT

INSTRUMENT (3): R180197025000

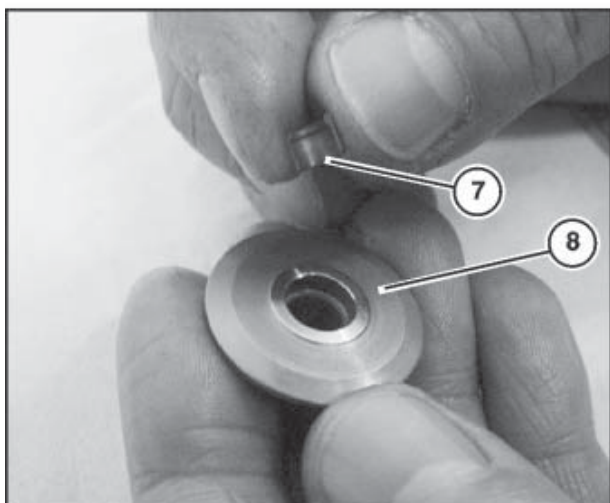


WARNING:
The suction valves are larger than the exhaust valves.

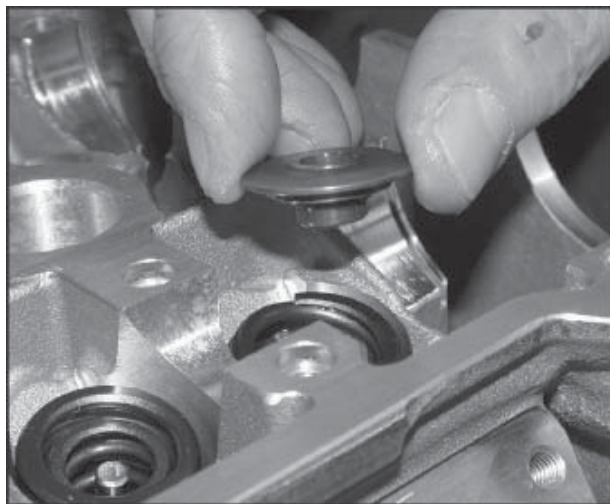
Insert the valves (4).



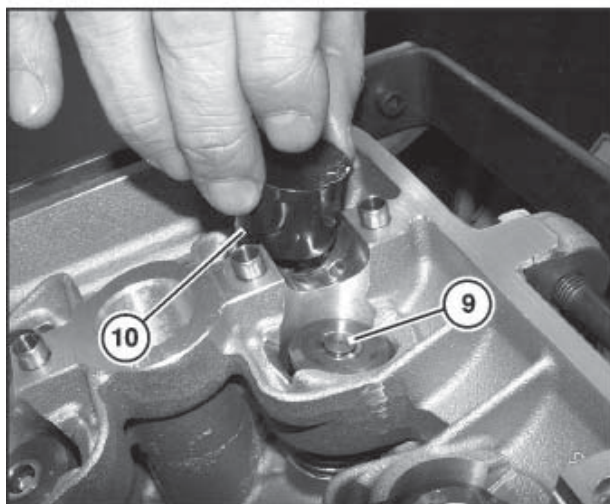
Position the internal (5) and external (6) springs as shown in the figure.



Insert the two lock cones (7) into the upper small cup (8).



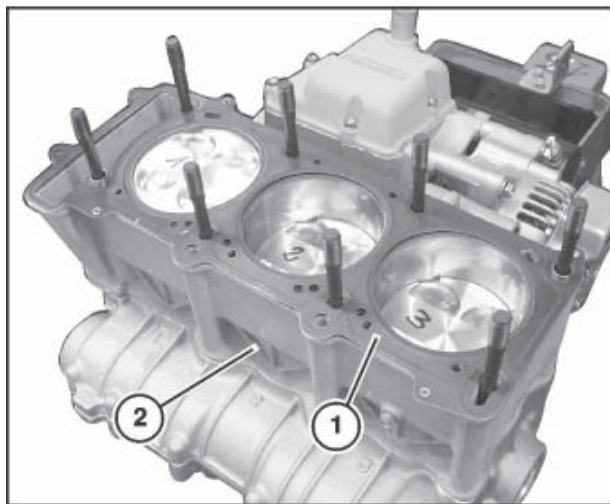
Position the small cup as shown in the figure.
Ensure the fixing of the valve using the specific instrument.



Position the calibrated pads (9) and the bucket-type tappets (10).

NOTE:

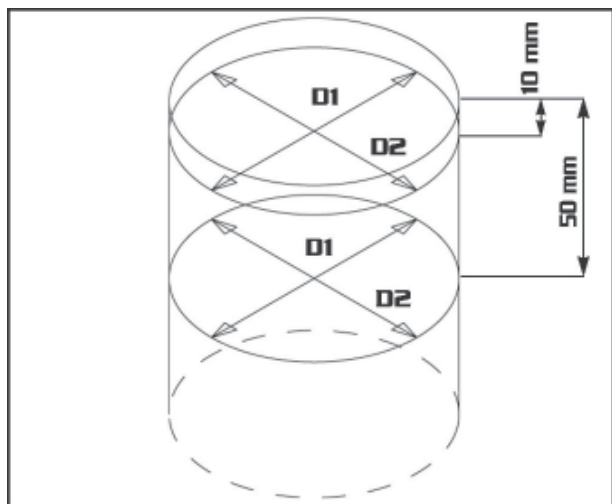
- Check that the buckets turn easily by rotating them with a finger.
- Make sure that the individual valve lifters and the valve guide are re-mounted in the original position.



5.4 CYLINDER

5.4.1 DISMANTLE CYLINDER BODY

Remove the cylinder head (see "REMOVE CYLINDER HEAD").
Remove the gasket of the head (2), the cylinder body (2) and the base of the cylinders gasket beneath.



5.4.2 CHECK CYLINDER

Check that the walls do not present signs of seizure with the pistons.

Check the ovalisation of the cylinders as indicated in the figure.

CLASS	D1	D2
A	ø 88,00-88,01	ø 88,011-88,021
B	ø 88,00-88,017	ø 88,011-88,028

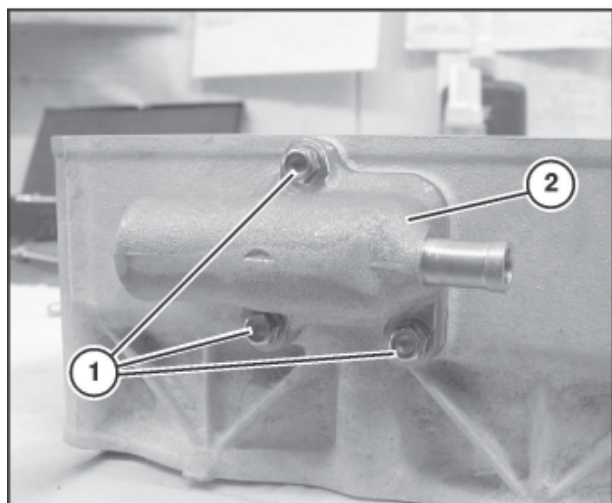


WARNING:

In the case of changing the cylinder block also change the pistons and the elastic straps, if necessary.

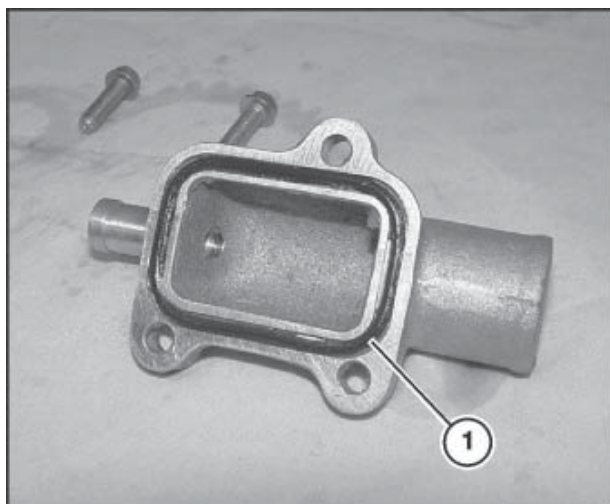
The cylinder is distinguished by a letter that indicates the class it belongs to. The cylinder-piston coupling must be carried out among the same classes that they belong to.

The letters are on the external front part (exhaust side) of the cylinder.



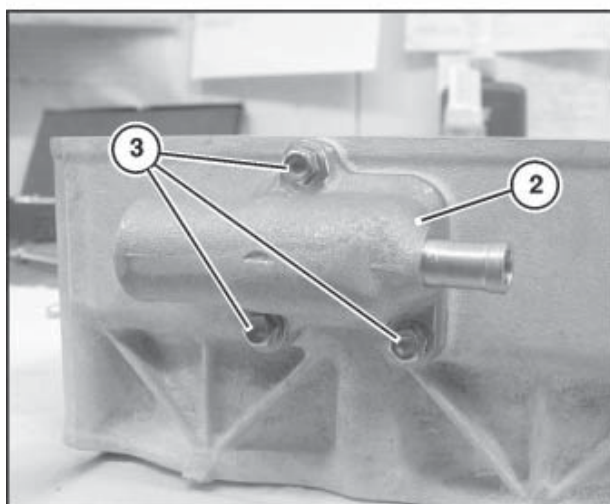
5.4.3 DISMANTLE WATER COLLECTOR

Unscrew and remove the three screws (1) and remove the collector (2).



5.4.4 CHECK WATER COLLECTOR

Check eventual breaks on the collector and if necessary change the piece.



5.4.5 MOUNT WATER COLLECTOR

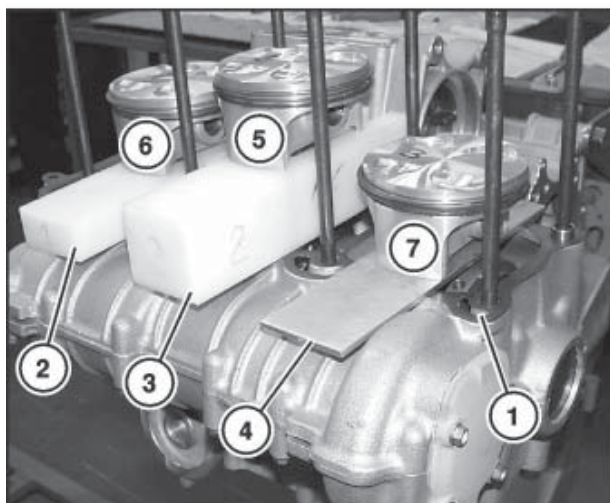


WARNING:
Always use new gaskets.

Position the gasket (1) and the collector (2) and tighten the screws (3).



10 N·m 1 Kg-m



5.4.6 MOUNT CYLINDERS

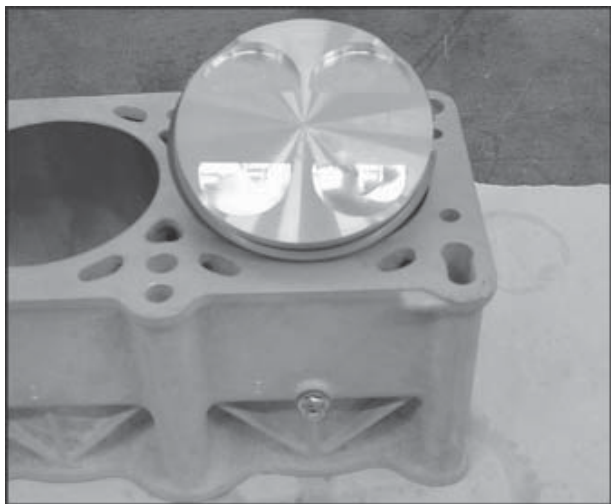


WARNING:
Always use new gaskets.

Position the gasket (1) and the liners (2) and (4), as shown in the figure and check the correct position of the centering dowels. Position the cylinder pistons (5), (6) and (7) enter them in order.



SPECIFIC EQUIPMENT
CYLINDER MOUNTING LINERS:
R180197018000



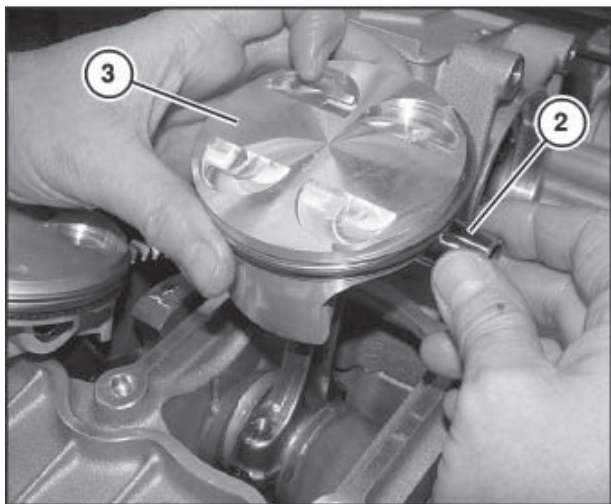
5.5 PISTON

5.5.1 DISMANTLE PISTON

Remove the cylinder (see "DISMANTLE CYLINDER BODY").



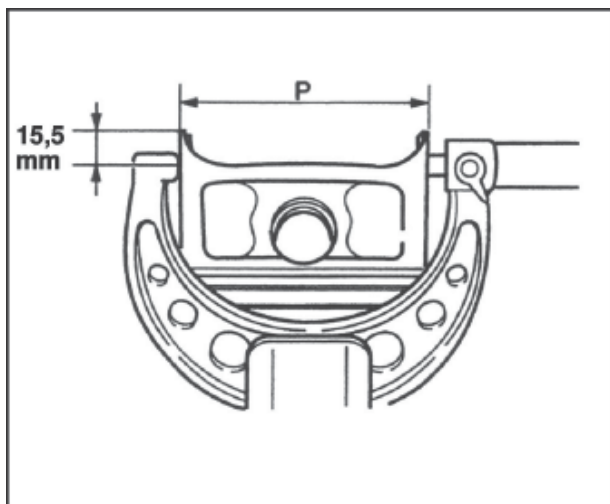
The following procedure must be applied to all the pistons.
Remove the elastic ring (1).



WARNING:

Do not use a hammer to remove the pins (2).

Remove pin (2) and remove piston (3).



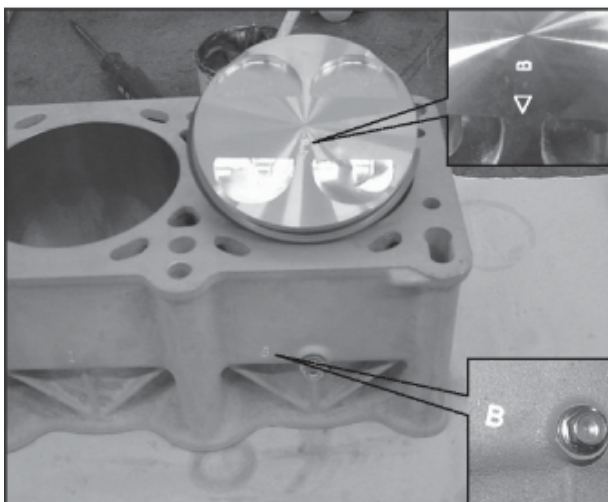
5.5.2 CHECK PISTON

The following procedure must also be applied to all the other pistons.

Check eventual breaks on the piston.

Use a micrometer, as shown in the figure, to check that the value (P) enters within the specific value.

CLASS	P
A	$\varnothing 87.950 \div 87.960$
B	$\varnothing 87.961 \div 87.971$



WARNING:

In the case of changing one or more pistons:

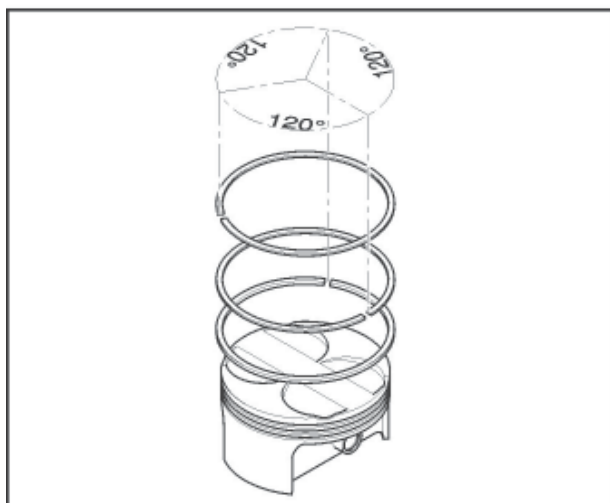
The piston is distinguished by a letter that indicates the class it belongs to.

The cylinder-piston coupling must be carried out among the same classes that they belong to.

NOTE:

The maximum play of the piston is of 0.1 mm.

Change the piston if necessary.

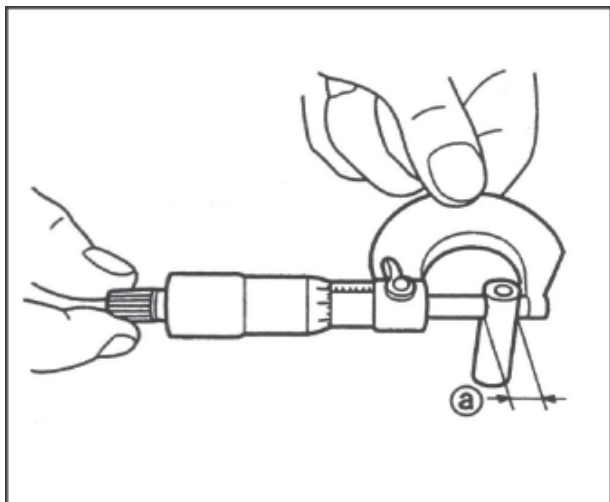


5.5.3 CHECK SEGMENTS

The following procedure must be applied to all the segments. Check the absence of scuffing and traces of shrinkage on every segment.

Check that the edge of the section is well defined and free in the housings.

Whenever wear in the segments is found, change the pistons as well.



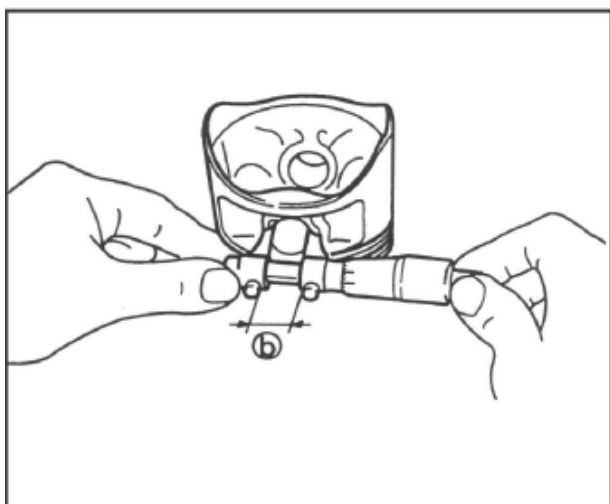
5.5.4 CHECK PISTON PIN

The following procedure must be applied to all the piston pins. Check that value (a) enters within the specific value.



NOMINAL VALUE

a = 18.995 ÷ 19.000 mm



Check the value of (b).

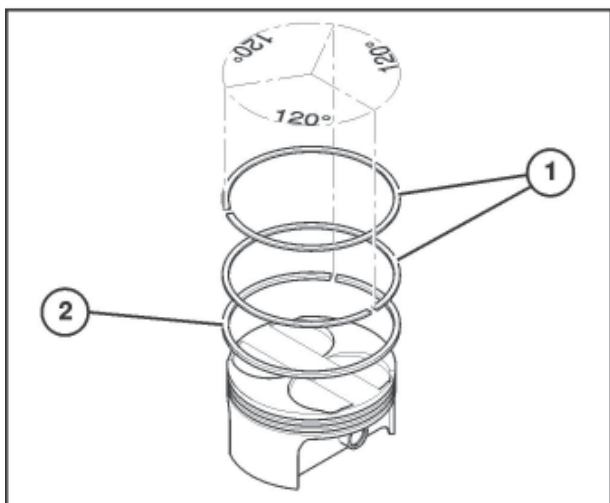


NOMINAL VALUE

b = 19.002 ÷ 19.008 mm

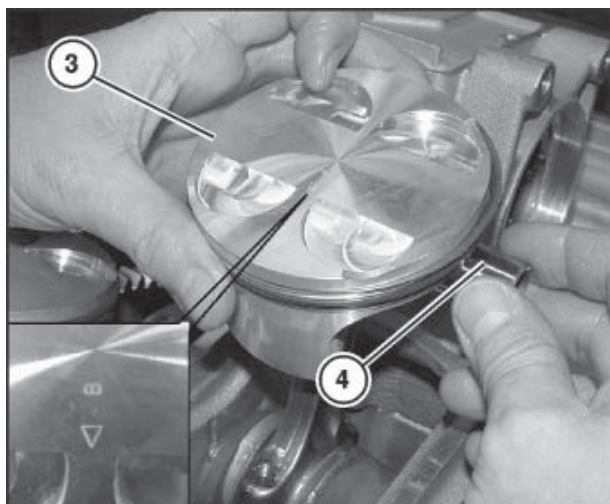
NOTE:

If the play between the piston pin and the piston is greater than 0.03 mm, change the piston.



5.5.5 MOUNT PISTON

Position the two segments (1) and the scraper ring (2) on the piston, positioning the opening at 120° from each other.

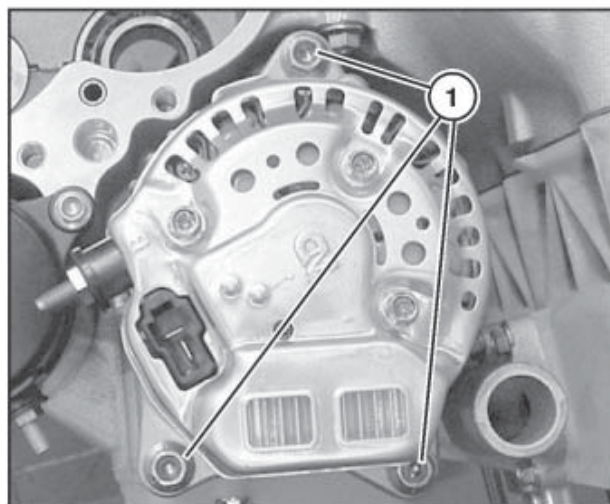


Position the piston (3), as shown in the figure, with the arrow on the piston pointing towards the exhaust.
Insert the pin (4).



WARNING:
Always use new elastic rings for mounting the pistons.

Position the two elastic rings (5), one for each side.



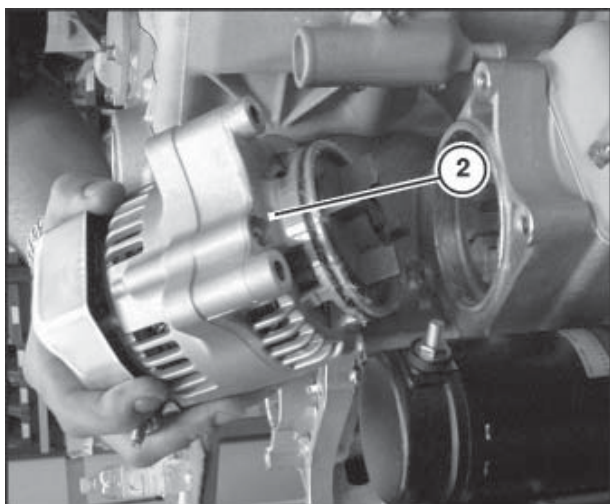
5.6 GENERATOR

5.6.1 REMOVAL GENERATOR

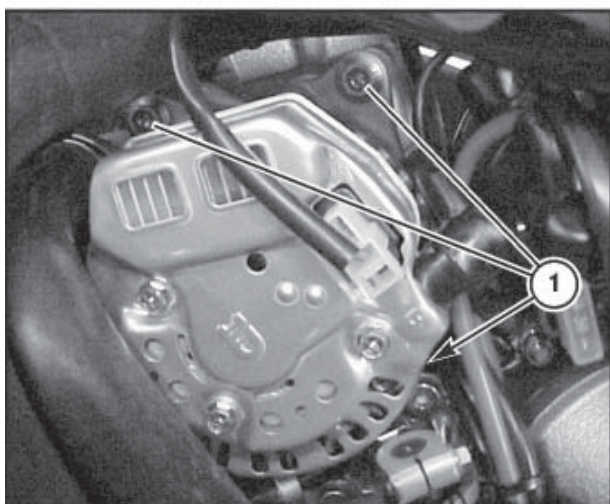


WARNING:
Support the generator during the mounting phase.

Remove the electrical connections.
Loosen and remove the three screws (1).



Remove the generator (2).
Check the state of the flexible couplings of the tires.
If they are worn or damaged, change them.



5.6.2 MOUNT GENERATOR

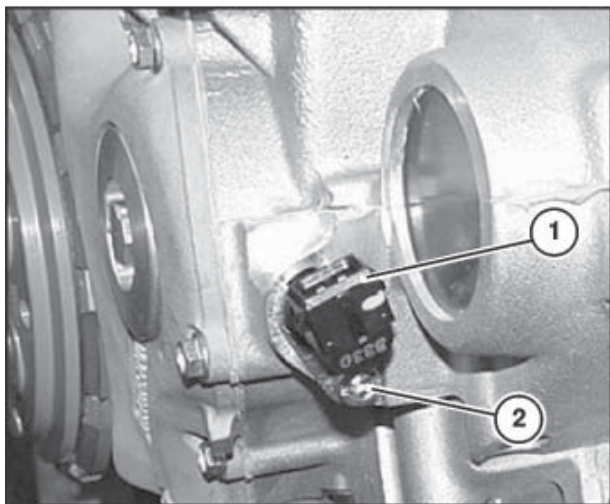
To mount the generator, grease the O-ring and work in the reverse way to dismantling, tightening screws (1) to the specific worm drive after having applied LOCTITE®.

NOTE:

To ease mounting the generator, position the engine, if possible, horizontally.



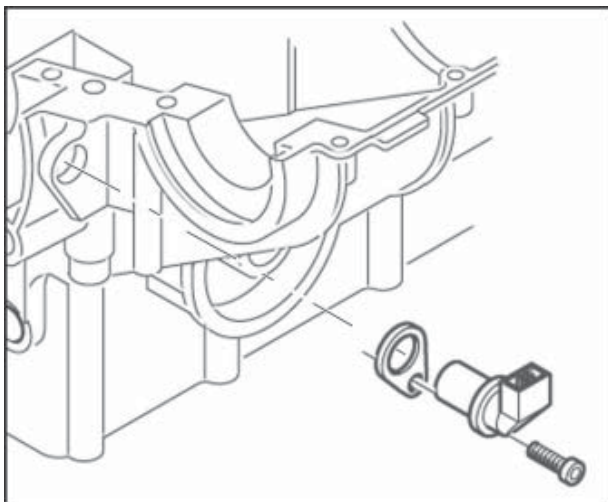
27 N·m 2.7 Kg·m + LOCTITE 243®



5.7 PHASE SENSOR AND PHONIC WHEEL

5.7.1 REMOVE PHASE SENSOR

Remove the phase sensor (1) by unscrewing the fixing screw (2).

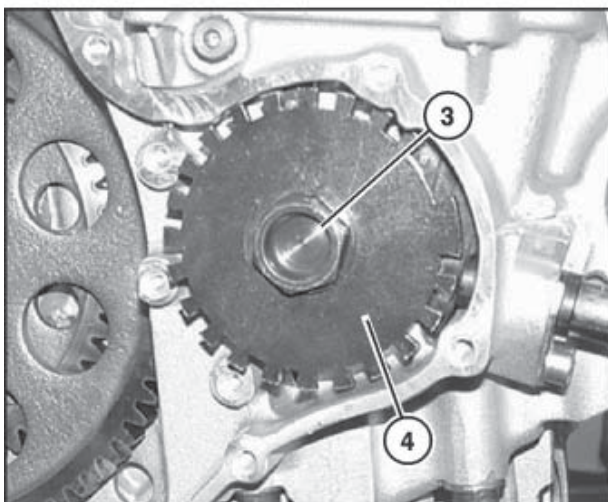


5.7.2 MOUNT PHASE SENSOR

Position the sensor in its housing and fix with screw (2), and tighten.

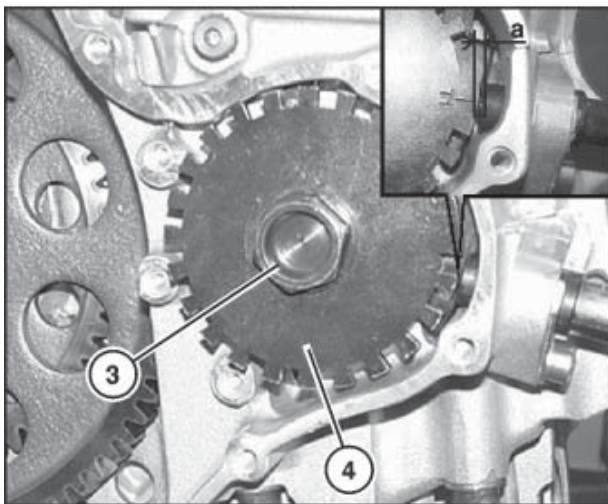


10 N·m 1 Kg-m + LOCTITE 243®



5.7.3 REMOVE PHONIC WHEEL

Remove the clutch cover (see "REMOVE CLUTCH COVER"). Unscrew and remove screw (3) and remove the phonic wheel (4).



5.7.4 MOUNT PHONIC WHEEL



WARNING:
During the phonic wheel mounting phase, position it with the writing towards the outside of the engine.

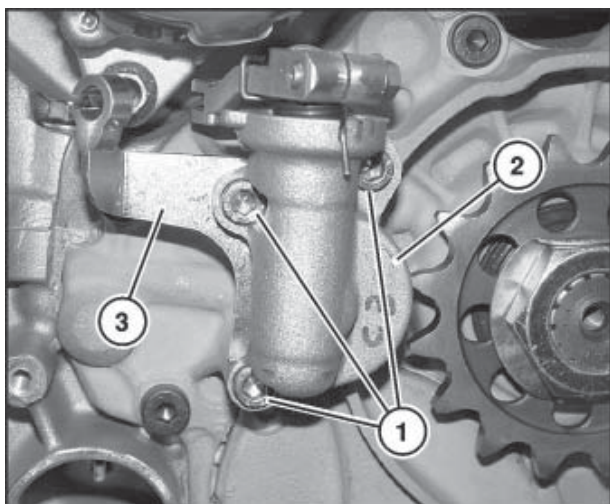
Position the phonic wheel (4) and tighten the fixing screw to the specified worm drive.
Check the liner (a) between the phonic wheel and the phase sensor.



VALUE LIMIT
a = from 0.8 to 1.0 mm



24,5 N·m 2.5 Kg-m + LOCTITE 270®

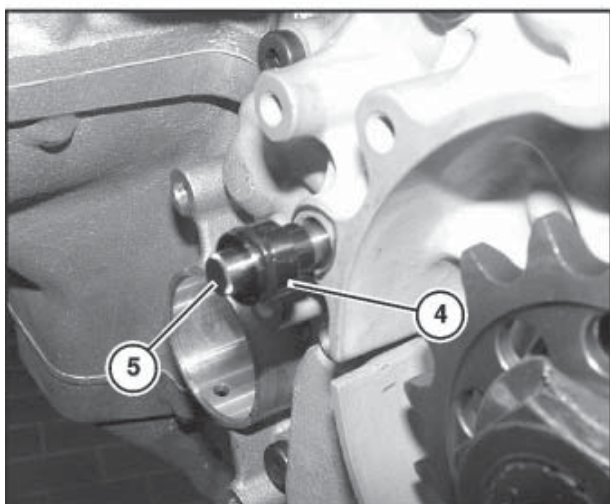


5.8 CLUTCH

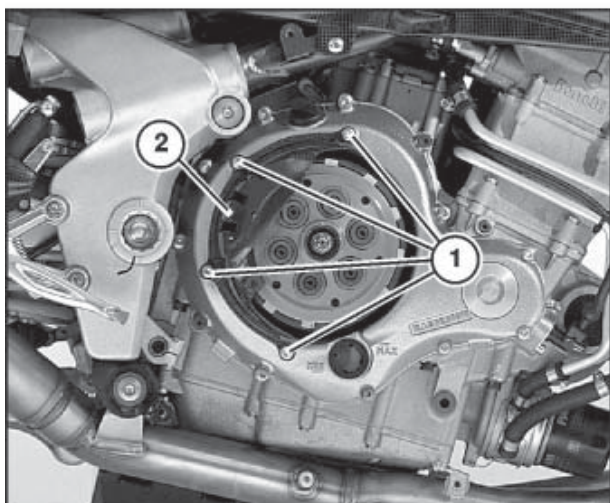
5.8.1 DISMANTLE CLUTCH COMMAND

Remove the clutch command cable and unscrew the three screws (1).

Remove the clutch body command and the cable support plate (3).

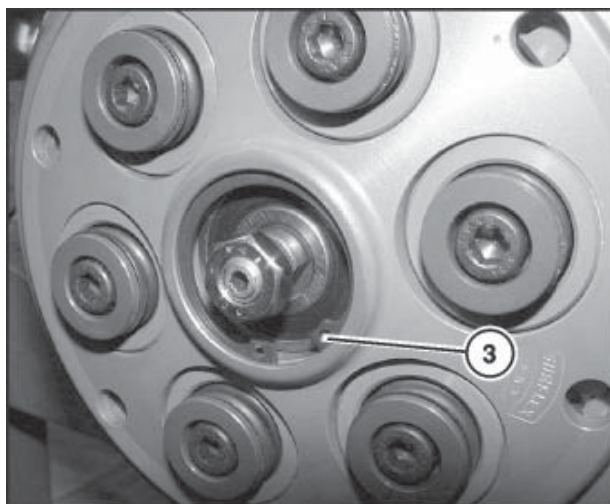


Remove the ferrule (4) and the clutch command rod (5).

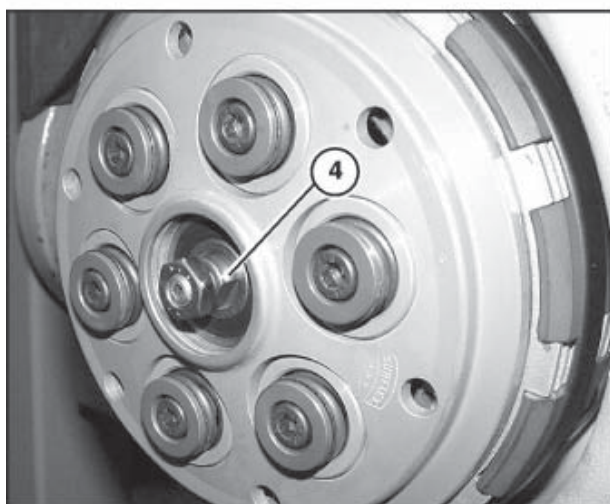


5.8.2 REMOVE THE CLUTCH

Remove the four screws (1) and the clutch hood (2).

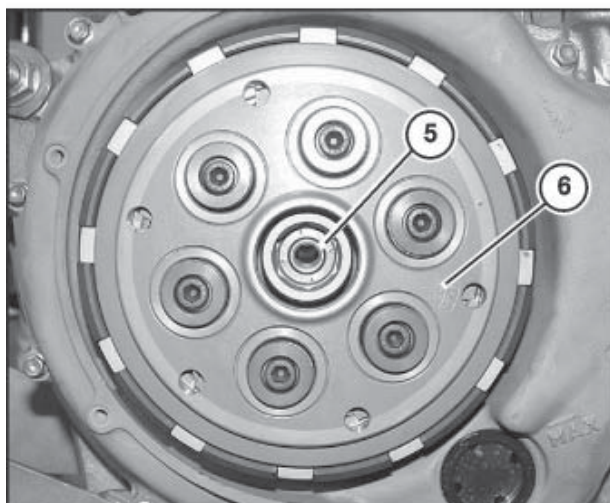


Remove the circlip (3).

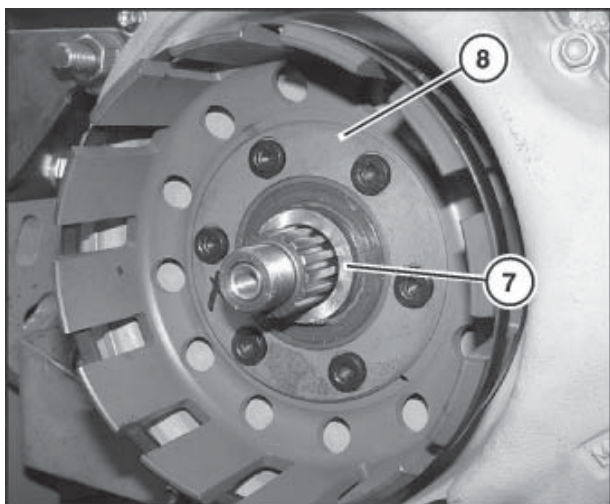


WARNING:
Do not allow the ball to come out during the following dismantling operation.

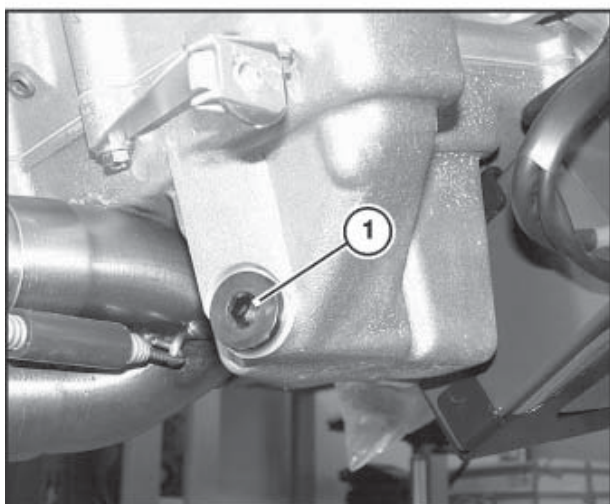
Remove the ball-bearing group, the pin and the nut (4).



Unscrew and remove the clutch fixing nut (5). Remove the clutch group (6).



Remove the spacer (7), the O-ring beneath and the cover (8).

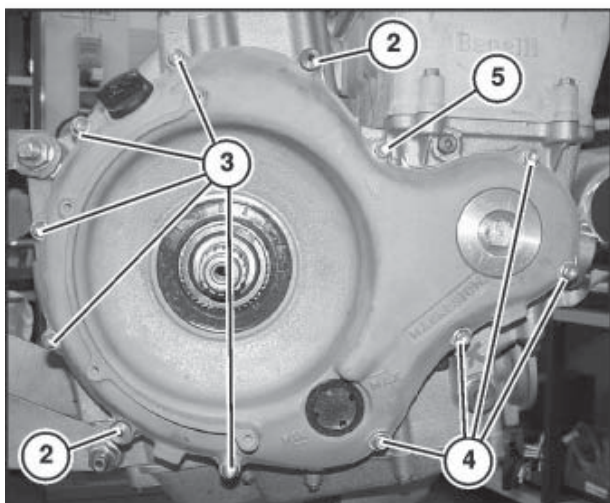


5.8.3 REMOVE CLUTCH COVER

Place a container under the oil sump to allow the oil to empty.
Remove the discharge screw cap.

NOTE:

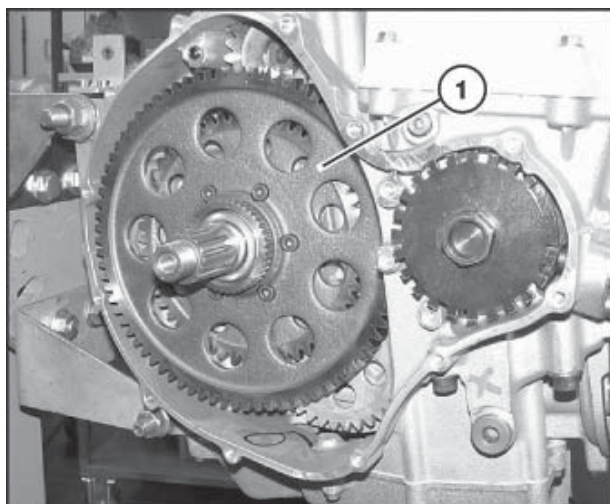
Be careful not to lose the sealing washer beneath.



WARNING:

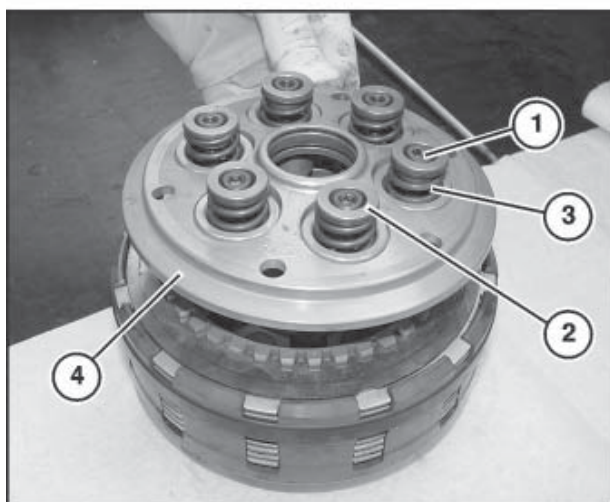
Note the position of the screws for correct re-mounting.

Remove the clutch (see "DISMANTLE CLUTCH GROUP").
First remove the centering screws (2), then screws (3), (4) and (5).



5.8.4 REMOVE PRIMARY TRANSMISSION

Remove the clutch cover (see "REMOVE CLUTCH GROUP").
Remove the primary group (1), the two roller-cages and the spacer beneath.



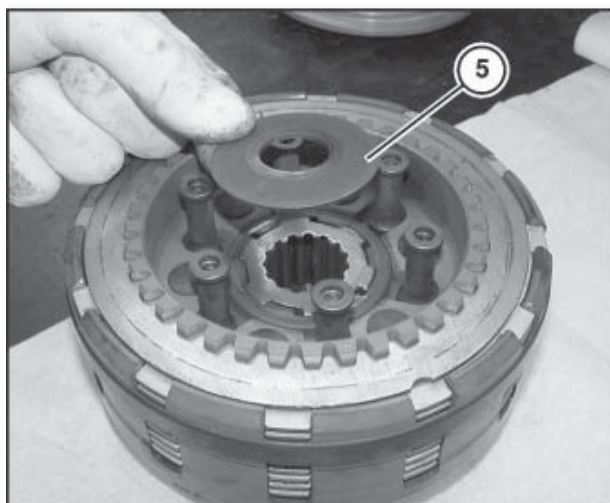
5.8.5 DISMANTLE CLUTCH GROUP



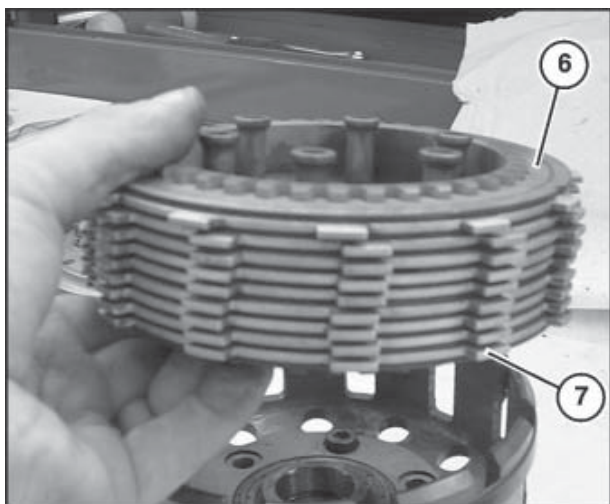
WARNING:

Take note, while dismantling the clutch, of the position of the elements for correct re-mounting.

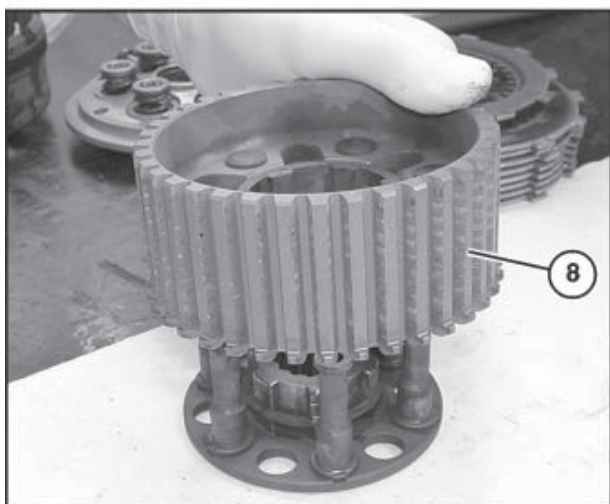
Remove the clutch (see "DISMANTLE CLUTCH GROUP").
Remove the screws (1), then the small cups (2) and the springs (3).
Remove the disk-pusher plate (4).



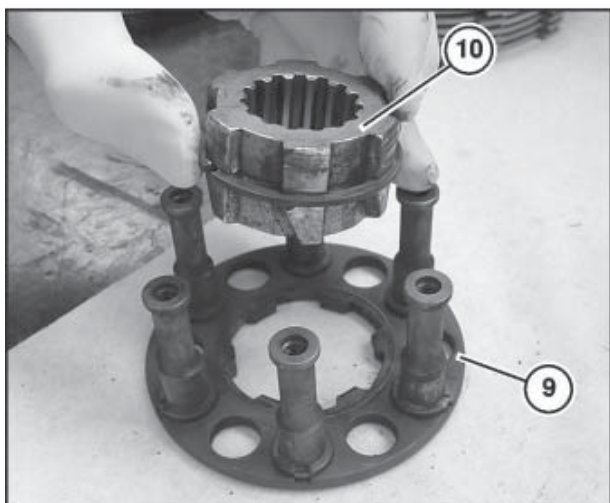
Remove the Belleville spring (5).



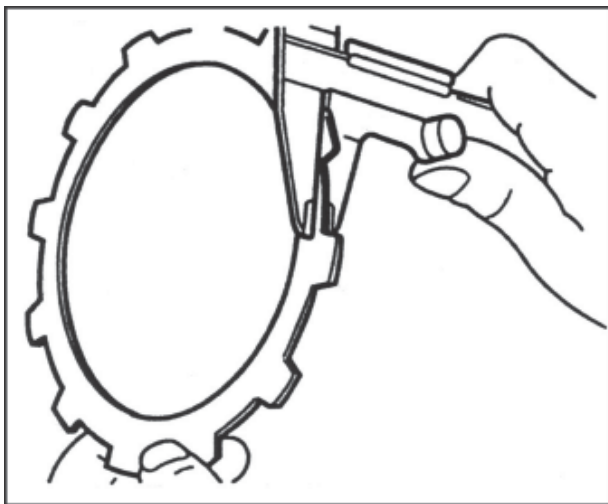
Remove the eight external disks (6), the nine internal disks (7) and the load modulation spring beneath.



Remove the drag hub (8).



Separate the coupling (9) from the sliding flange (10).



5.8.6 CHECK EXTERNAL EQUIPPED DISK

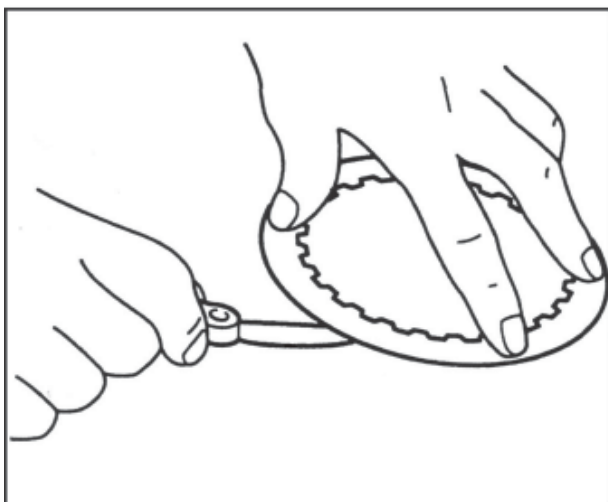
The following operations must be carried out on all the external equipped disks.

Check the external equipped disk liner.

If it does not enter within the specific value, change the entire set of disks.



VALUE LIMIT
DISK LINER = 2.6 mm



5.8.7 CHECK INTERNAL DISK

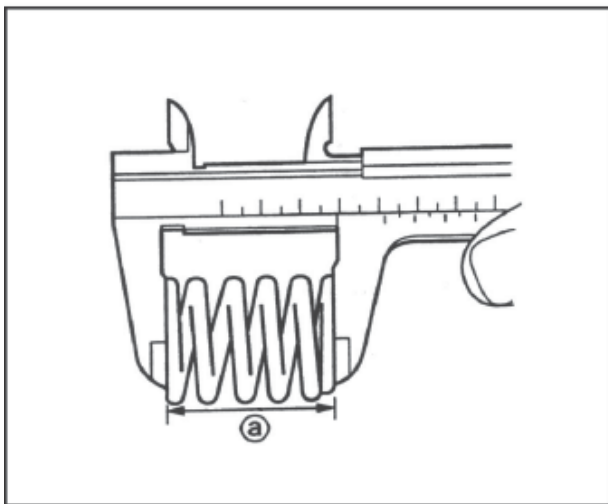
The following operations must be carried out on all the internal disks.

Check the distortion of the disk, as shown in the figure.

If the disk is broken or does not enter within the specific value, change the entire set of disks.



VALUE LIMIT
MAX. DISTORTION = 0.1 mm



5.8.8 CHECK CLUTCH SPRINGS

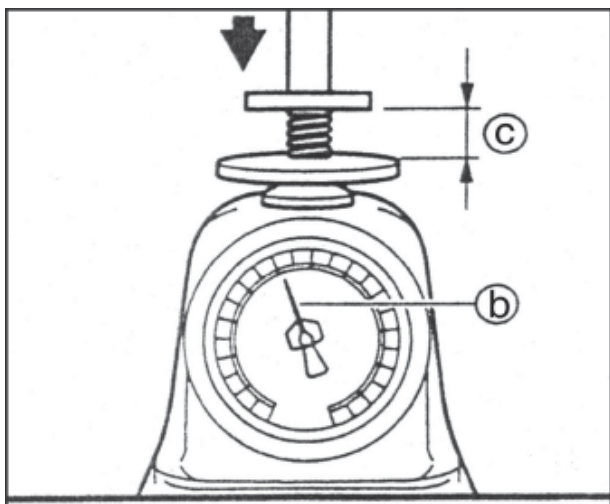
The following operations must be carried out on all the clutch springs.

Measure the lengths (a) of the free spring.

If the value does not enter within the envisaged value, change the entire set of springs.



VALUE LIMIT
CLUTCH SPRING
a = 34.8 mm



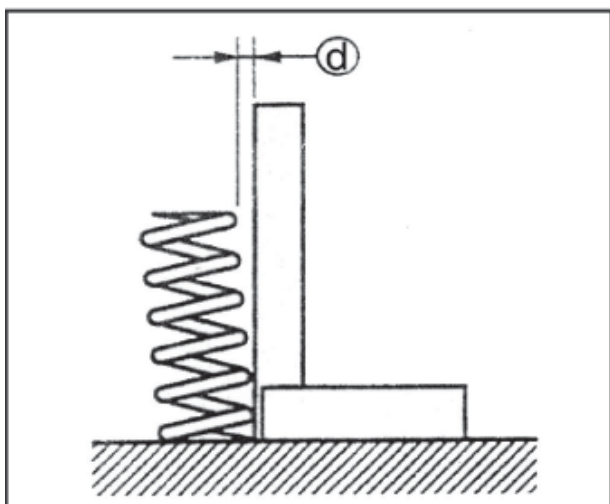
Bring the spring to a value length (c) and check the value of the load.



VALUE LIMIT
CLUTCH SPRING LENGTH
c = 22 mm



LOAD VALUE LIMIT
180 N

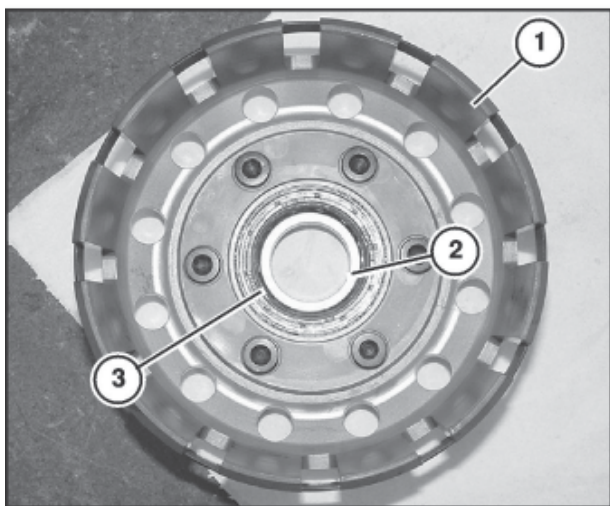


Check the incline (d) of the clutch spring as illustrated in the figure.

If (d) does not enter within the specific value, change the entire set of springs.



VALUE LIMIT
CLUTCH SPRING INCLINE
d = 2 mm



5.8.9 CHECK CLUTCH COVER

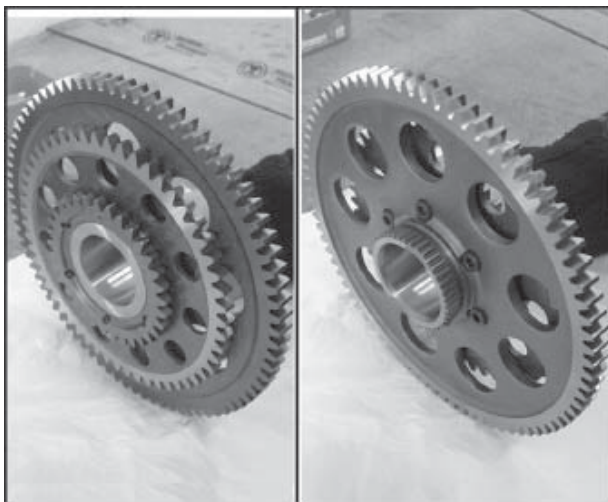
Check that the cover (1) is not broken, otherwise change it. Check the free movement of the ball-bearing (2), otherwise change it.

Check the state of the oil seal (3) and if necessary change it. Check the wear on the small tires and flexible couplings.

To change the oil seal (3), use the specified equipment.

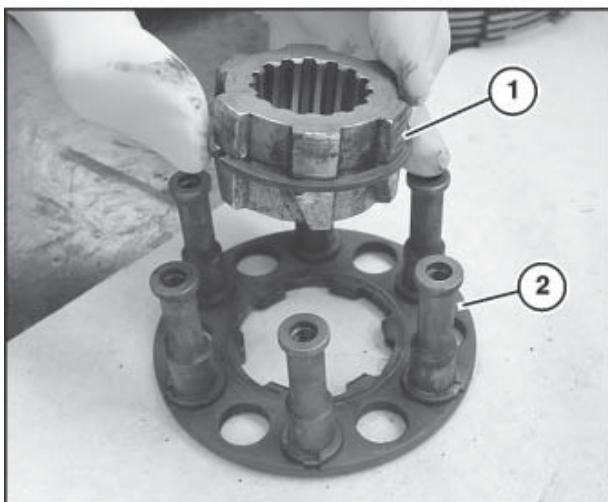


SPECIFIC EQUIPMENT
Oil seal pad:
R180197023000



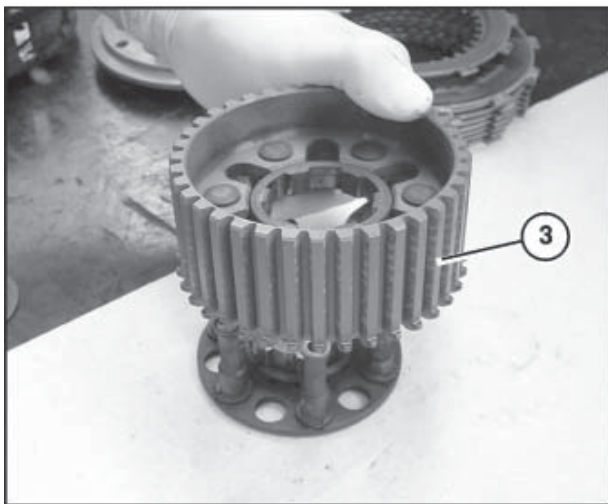
5.8.10 CHECK PRIMARY ASSEMBLY

Check that the components of the primary assembly are not excessively worn, rough or broken.
If necessary, change the component or components or the entire primary assembly.

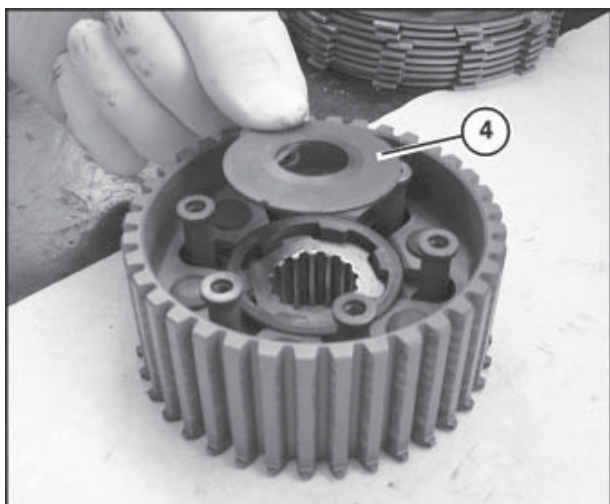


5.8.11 MOUNT CLUTCH GROUP

Position the coupling (1) in the sliding flange (2) as indicated in the figure.

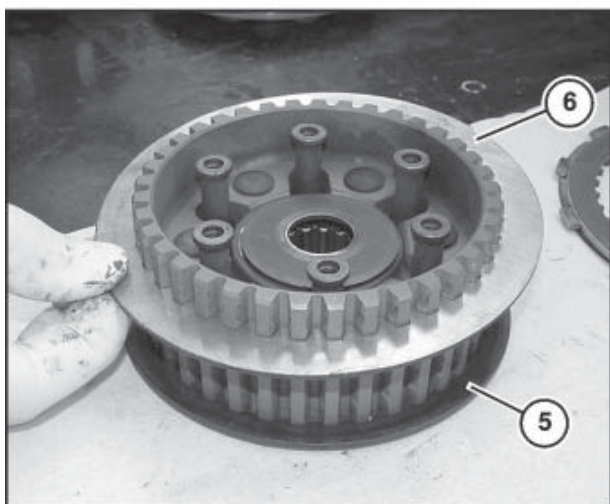


Insert the drag hub (3) as in the figure.



WARNING:
During the following phase, position the Belleville spring (4) with the convex face turned upwards.

Position the Belleville spring (4).

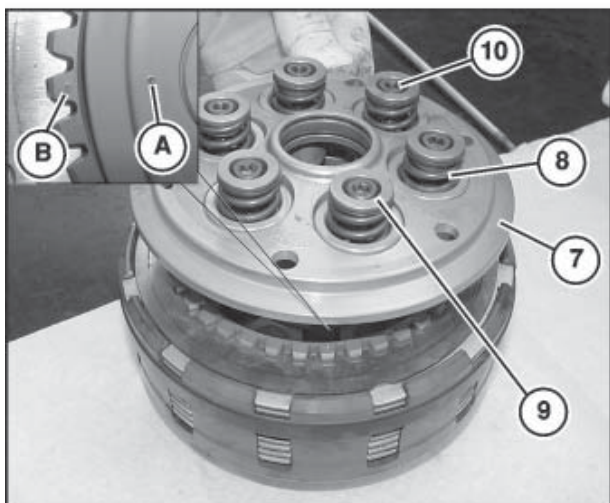


WARNING:
During the following phase position the Belleville spring (5) with the concave face turned upwards.



WARNING:
During the following phase make sure to insert the internal disk with the bigger liner (2 mm) first with respect to the others (1.6 mm).

Position the Belleville spring (5) and alternate an internal disk (6) and an external disk.

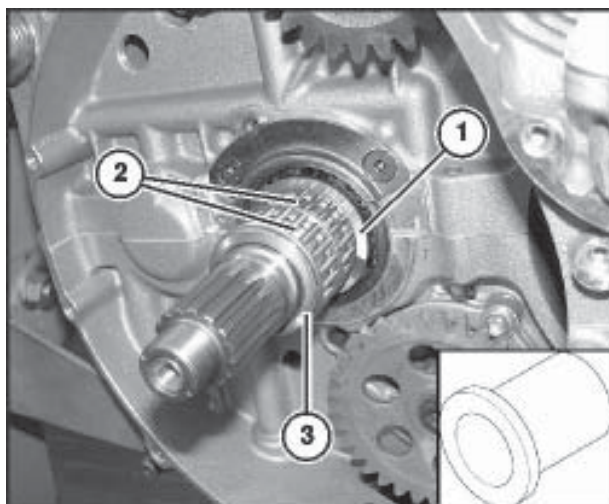


WARNING:
During the following phase make sure to position the disk pusher (7) so as to make it coincide with the two points (A) and (B).

Position the disk pusher (7), the springs (8) and the small cups, and tighten (10).



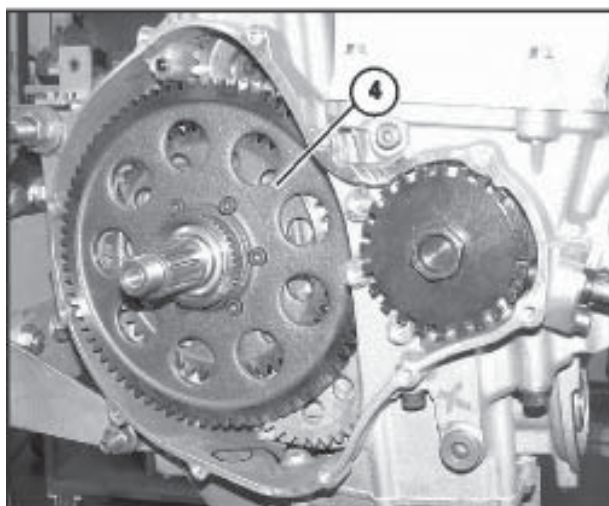
12 N·m 1.2 Kg-m



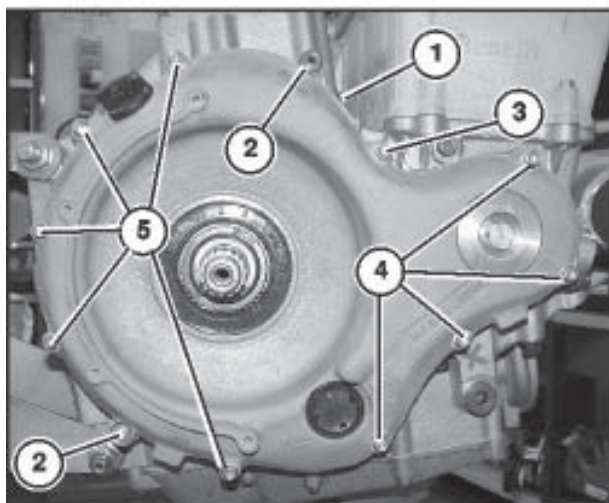
5.8.12 MOUNT PRIMARY ASSEMBLY

Position the spacer (1) making sure that the two oil passages are turned outwards.

Position the two roller cages (2) and the spacer (3).



Position the primary assembly (4).

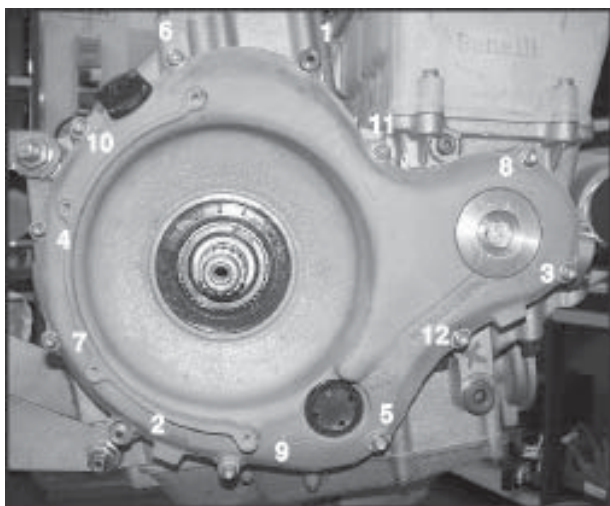


5.8.13 MOUNT CLUTCH COVER



WARNING:
Always use new gaskets.

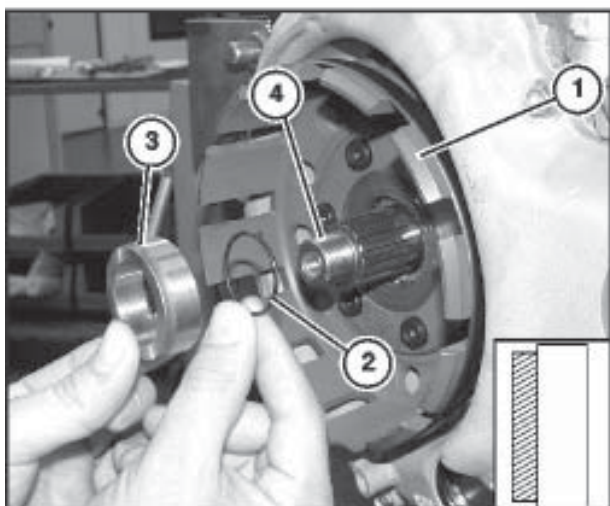
Put "THREEBOND 1215" sealing paste onto the casing surface and onto the clutch cover (1). Then position the gasket and the clutch cover (1) and tighten with the centering screws (2) and then with screws (3), (4) and (5).



Tighten the screws according to the order indicated in the figure.



10 N·m 1 Kg-m



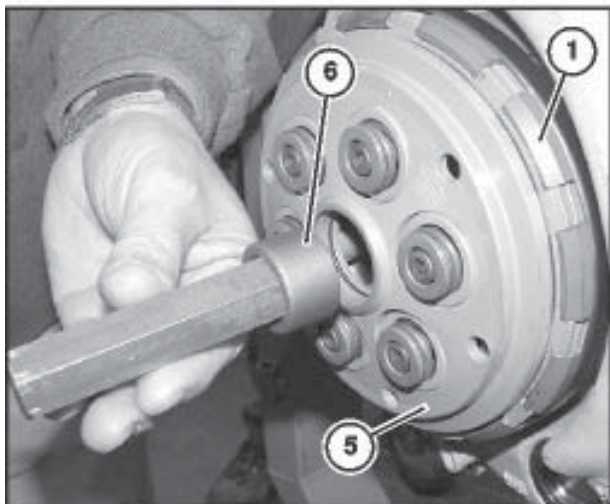
5.8.14 MOUNT CLUTCH



WARNING:

The spacer should be inserted with its smaller diameter facing outwards.

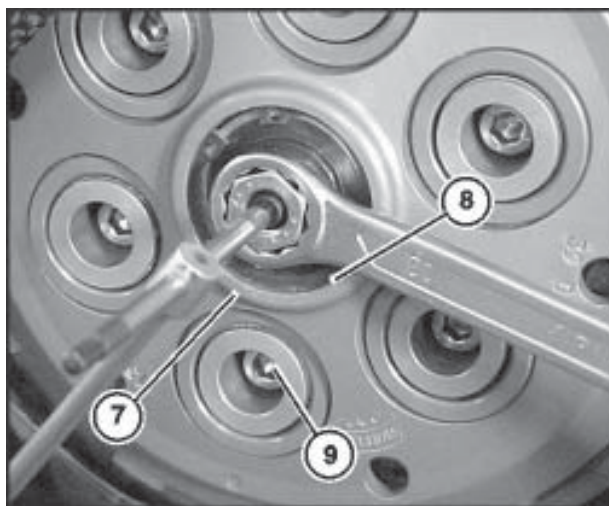
Position the clutch cover (1), the O-ring (2) and the spacer (3) on the primary shaft (4).



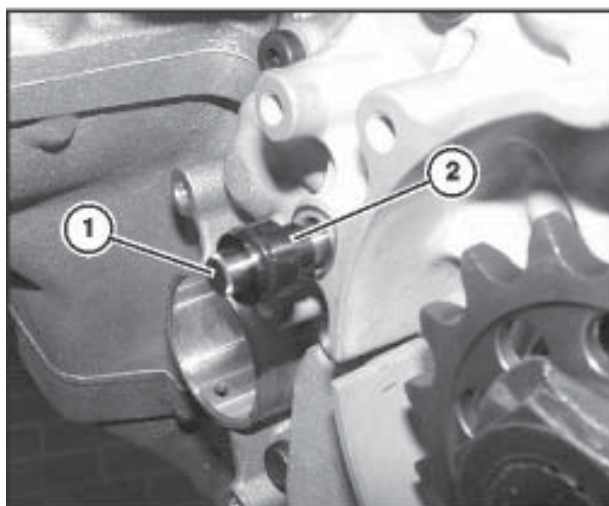
Position the clutch plate (5) in the cover (1) and fix with nut (6), and tighten.



50 N·m 5.0 Kg-m + LOCTITE 243®

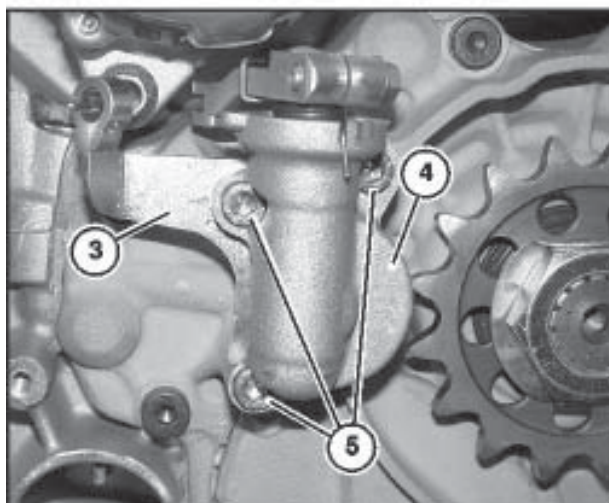


Position the ball in the primary shaft.
Position the disk pusher pin (7) complete with ball-bearing (8).
Fix with elastic ring (9).



5.8.15 MOUNT CLUTCH COMMAND

Insert the clutch command rod (1).
Insert the ferrule (2).

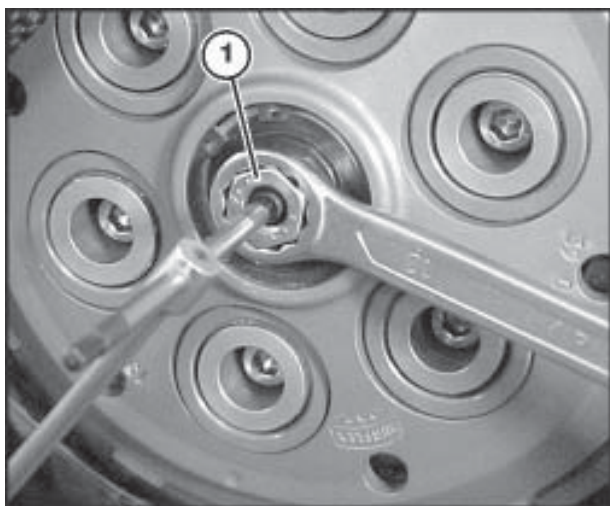


Position the cable support rod (3) and the clutch command body (4).
Fix the clutch command with the three screws (5) and tighten.

Insert the clutch command cable.



10 N·m 1 Kg-m + LOCTITE 243®



5.8.16 ADJUSTMENT PHASE

Unscrew the locknut (1). Use an Allen wrench to make the disk pusher touch the clutch lever pin.

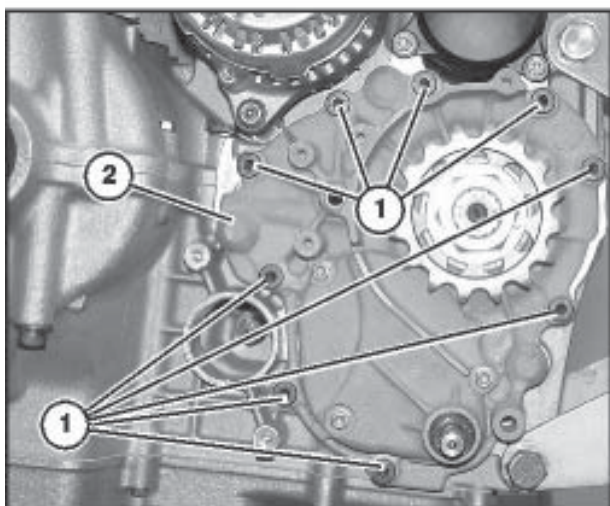
Then unscrew 1/4 of a turn (check that there is a minimum of play in the clutch lever).

At this point block the nut (1), and check, tapping slightly on the disk pusher pin with a rubber hammer, whether play remains between the elastic ring and the ball-bearing.

Use the same procedure for substituting the clutch with a new one, unscrewing the disk pusher pin, in this case, however, 1/2 a turn.



15 N·m 1.5 Kg-m



5.9 GEARS

5.9.1 REMOVE GEARS

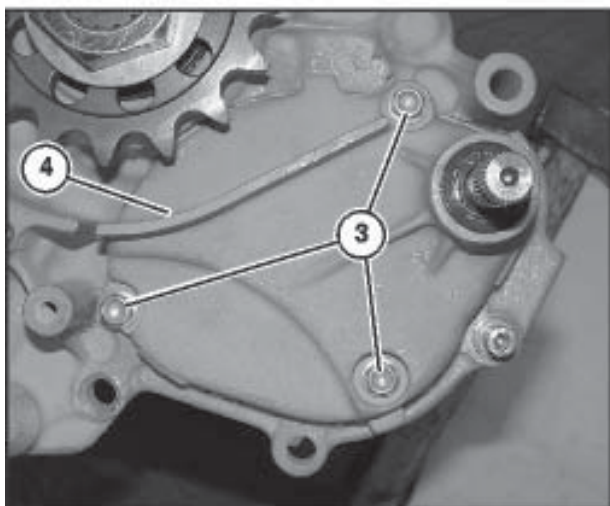
Remove the primary assembly (see "REMOVE PRIMARY TRANSMISSION").



WARNING:

Before removing the gears, remove the neutral sensor at the back of the engine.

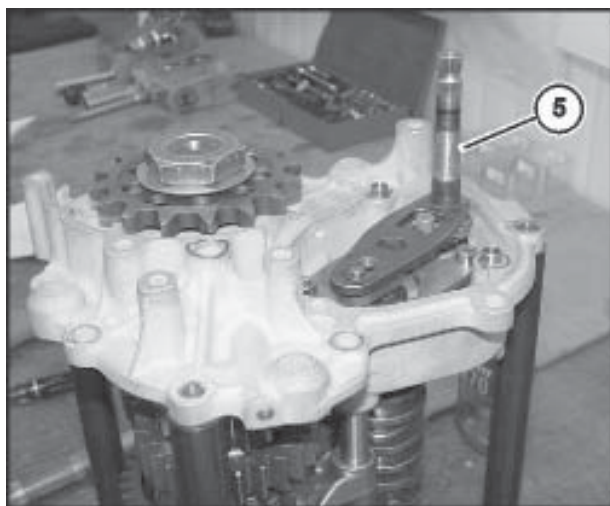
Loosen and remove the nine fixing screws (1) and remove the gears (2).



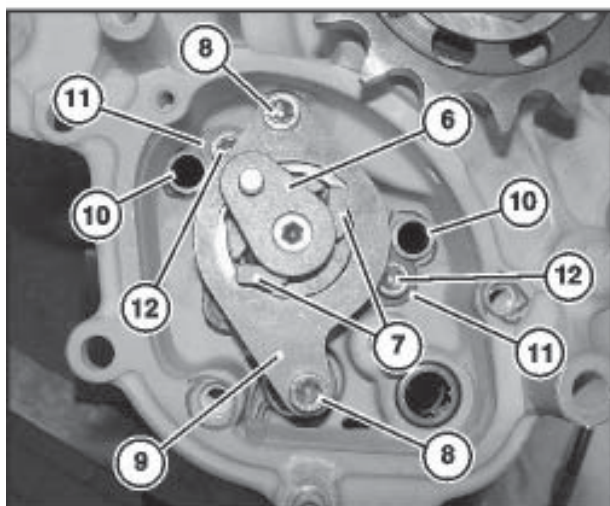
5.9.2 DISMANTLE GEARS

Position the gears on a support.

Loosen and remove the three screws (3) and remove the gear command cover (4).



Remove the shaft command selector (5).



WARNING:

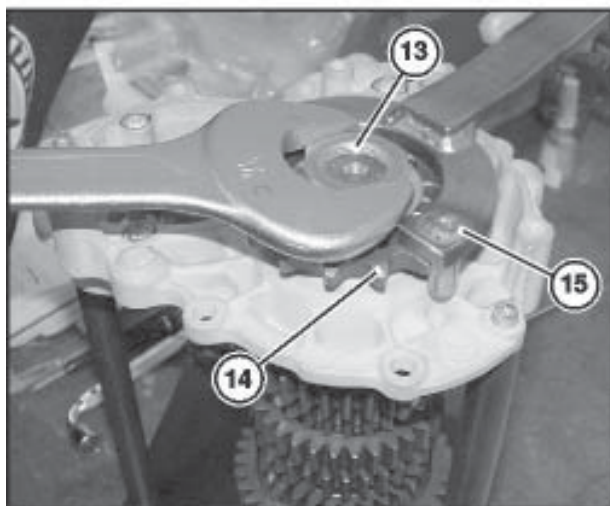
While removing pin (6), resist the reaction of the spring placed under the pawls (7).



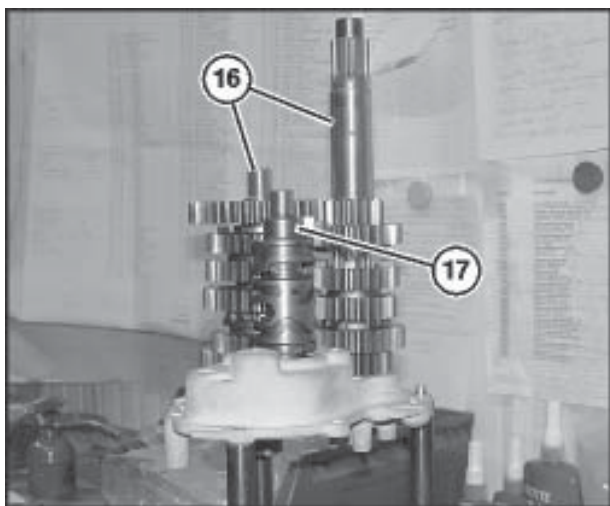
WARNING:

Take note of the position of the forks before removing them for correct re-mounting.

Remove the pin (6).
Loosen and remove the two screws (8).
Remove the stop plate (9).
Free and remove the two fork pins (10) from the washers (11), working on the screws (12).
Remove the forks.



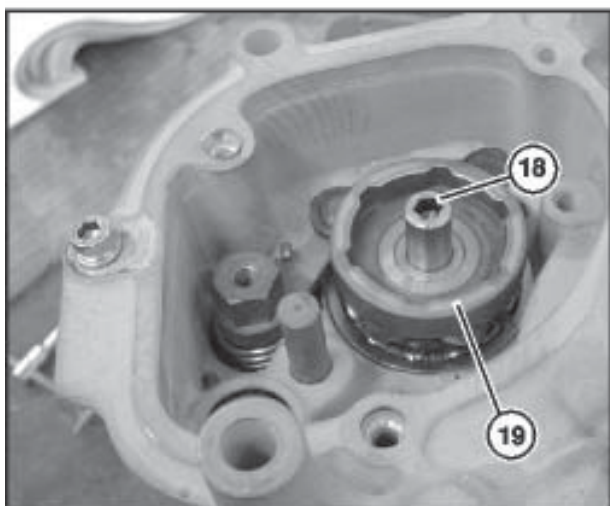
Remove the nut (13) holding the pinion firm with the instrument (15).
Remove the safety washer, the pinion and the spacer.



WARNING:

The toothed wheels of the gear are free.

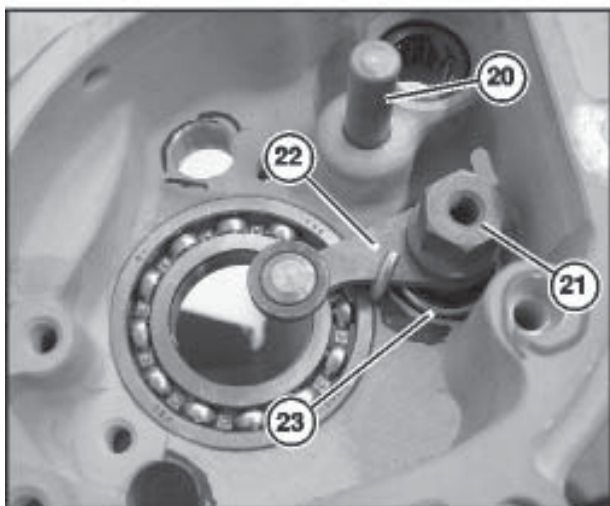
Rotate the gears on the support (the external side below).
Remove the two shafts contemporaneously.



WARNING:

During the dismantling of the drum fixing pin, support the positive valve gear (17) (see previous figure) to avoid it falling.

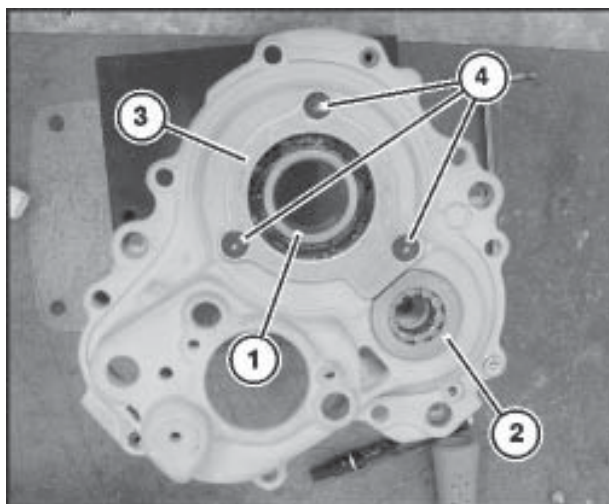
Rotate the gear flange (external side above).
Unscrew and remove the drum fixing pin (18),
Remove the positive valve gear (17) (see previous figure) and the gear selector drum (19).



WARNING:

Make sure that the peg (20) is well inserted into its seat.

Unscrew and remove the threaded pin (21) and the gear fixing assembly (22), the washer beneath and the gear fixing spring (23).

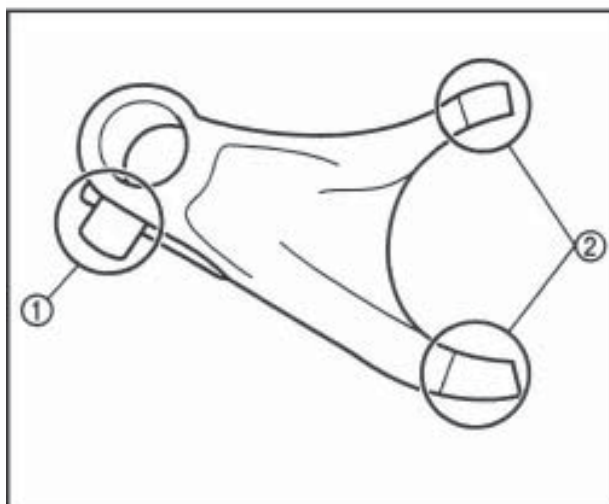


5.9.3 CHECK GEAR FLANGE BALL-BEARINGS

Check the free rotation of the ball-bearings (1) and (2).
If necessary, change them.

NOTE:

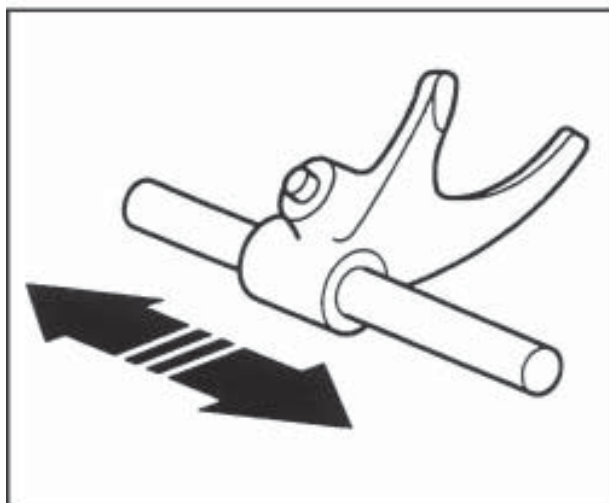
It is necessary to remove plate (3), working on screws (4), to change the ball-bearings (1) and (2).



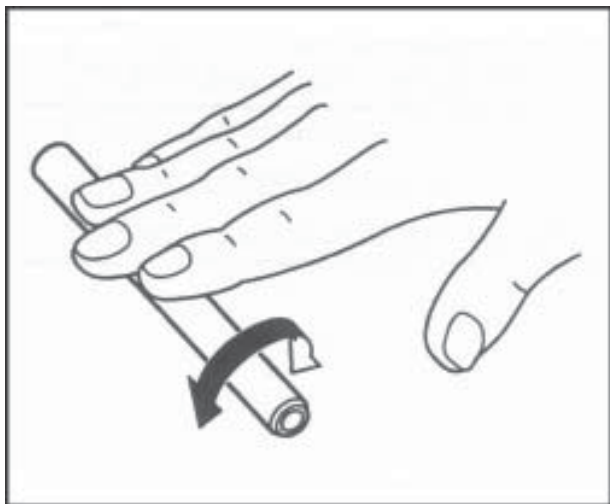
5.9.4 CHECK FORK GEAR AND SLIDE RODS

The following procedure must be carried out on all the fork gears.

Check the state of elements (1) and (2) shown in the figure and if necessary, change them.



Check the free movement of the fork on the slide rod.



WARNING:

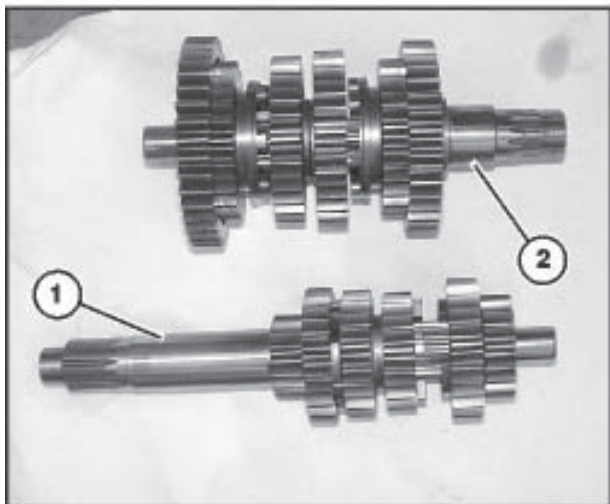
Do not attempt to straighten the rod.

Check the presence of curvature on the slide rod.
If necessary, change the element.



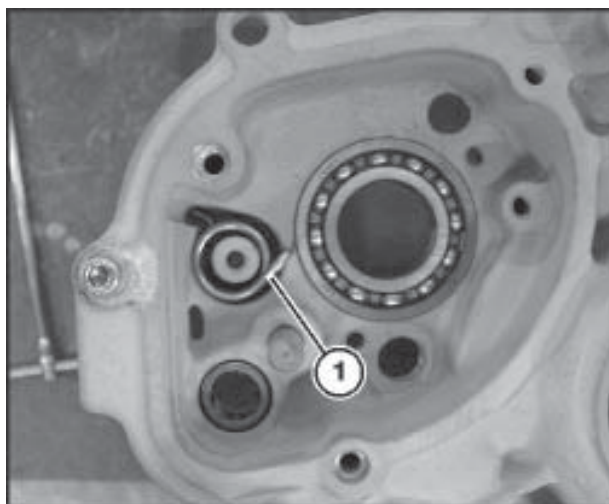
5.9.5 CHECK POSITIVE GEAR SHAFT VALVE

Check the state of the positive gear shaft valve guide.
If necessary, change it.



5.9.6 CHECK PRIMARY AND SECONDARY SHAFT

Check wear and eventual breaks on the primary shaft (1) and the secondary shaft (2) and their components.
If necessary, change the component, the components or the entire shaft.



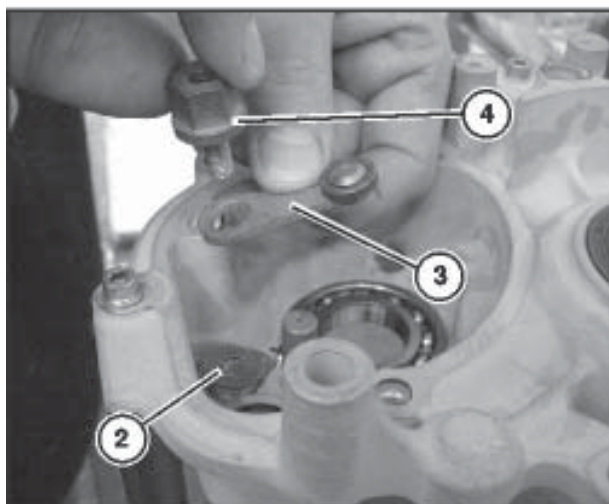
5.9.7 ASSEMBLE GEAR



WARNING:
Always use new gaskets and oil seals.

Position the gear flange on the apposite support (external side above).

Position the gear fixing spring (i) in the appropriate hole.

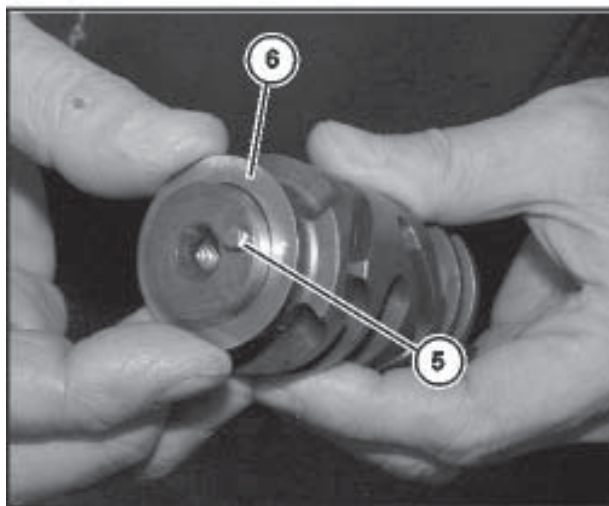


Position the washer (2) and the gear fixing spring (3) and fix with the threaded pin (4).

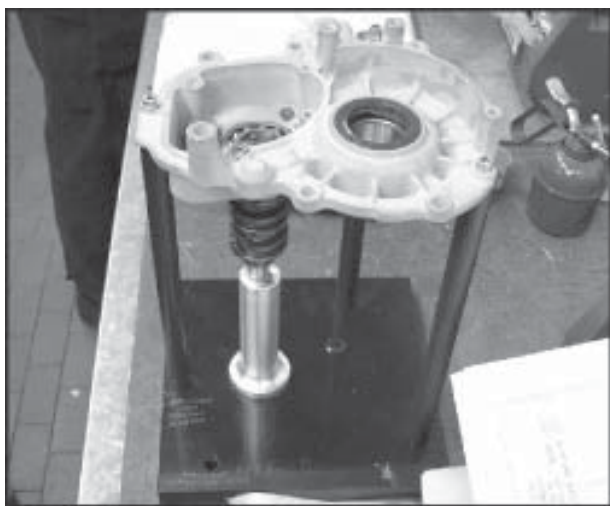
Tighten.



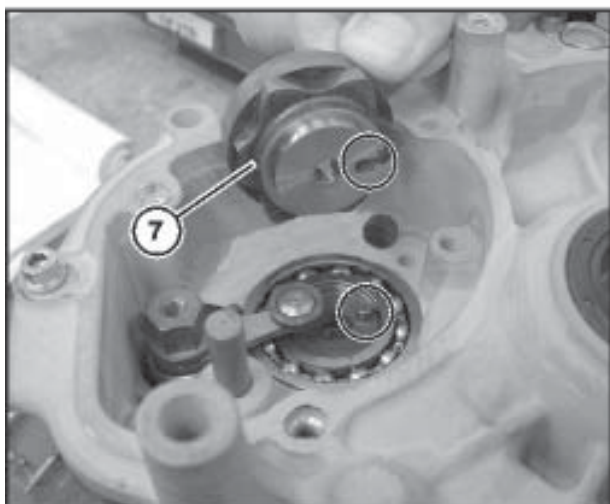
10 N·m 1 Kg-m



Position pin (5) onto the positive valve gear shaft with the appropriate instrument and the two liners (6) (of 0.2 mm each).

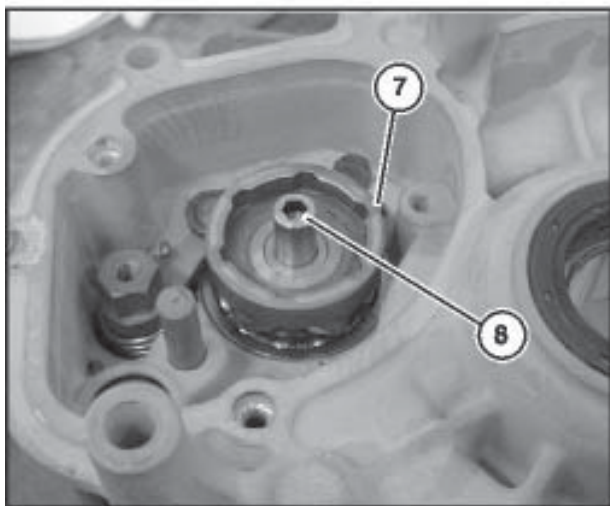


Position the positive valve gear shaft as in the figure, supporting it with a suitable support.



NOTE:

Check, while mounting the gear selector drum, that the two elements shown coincide.



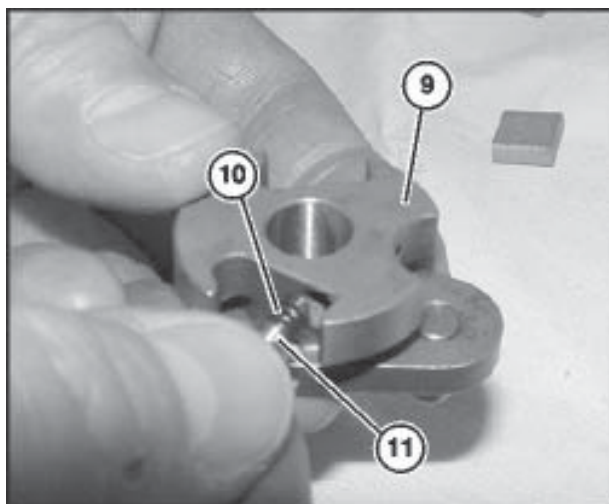
Fix the drum (7) with the threaded pin (8) and tighten.

NOTE:

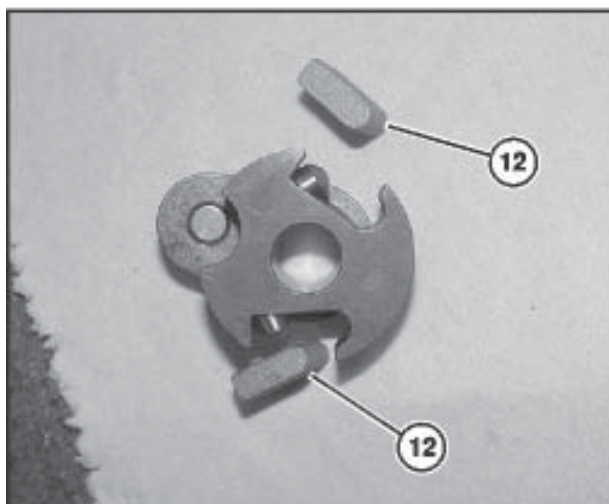
Once pin (8) is tightened it is possible to remove the support previously positioned under the positive valve gear shaft.



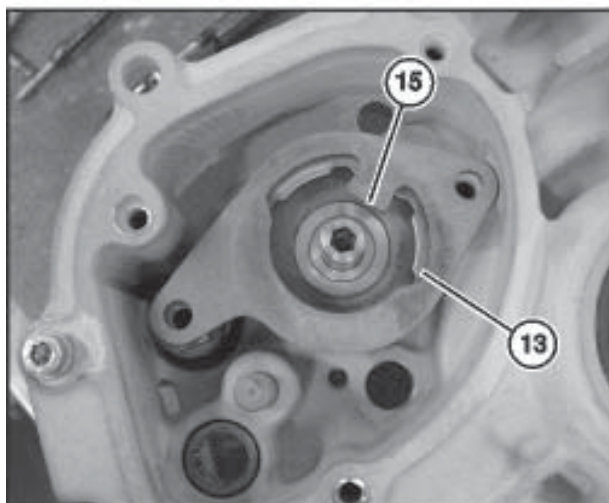
10 N·m 1 Kg-m + LOCTITE 243®



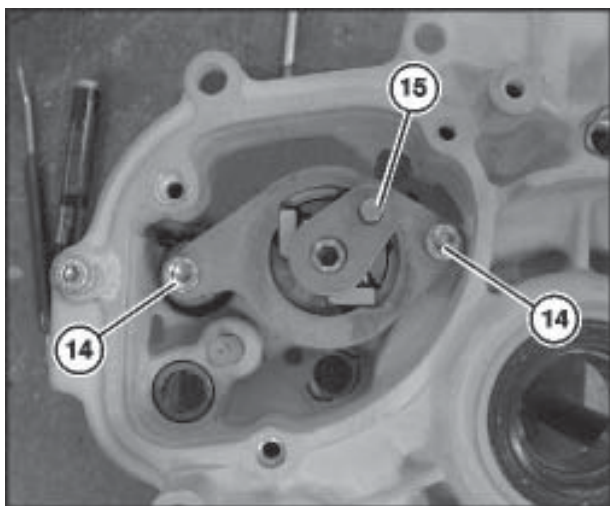
Mount springs (10) and push rods (11) onto the flange (9).



Position the pawls (12).



Position the stop plate (13).
Position the pre-mounted pin complete with sprocket wheel and pawl (15).



Fix the plate with the two screws (14) and tighten (+ LOCTITE 243).
Position the pre-mounted pin (15).



10 N·m 1 Kg-m + LOCTITE 243®



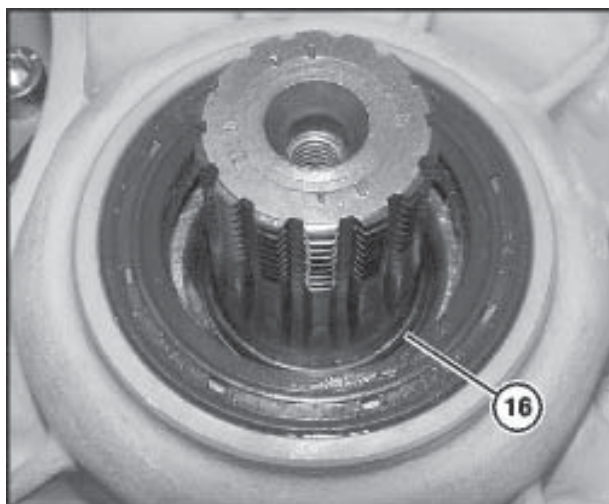
Rotate the flange on the support (internal side above).
Couple the primary and secondary shafts
Position them as shown in the figure.



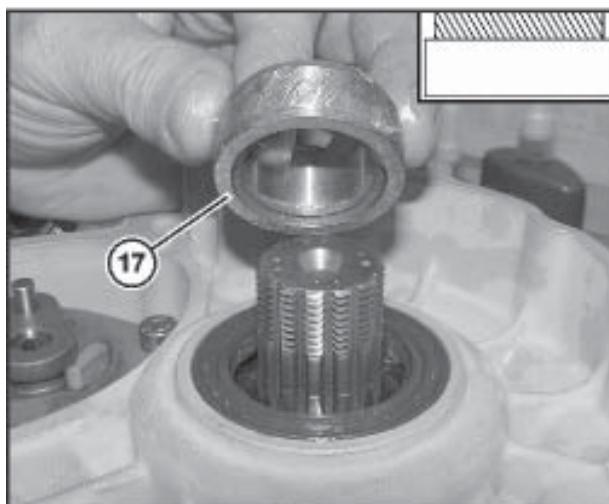
Rotate the flange (external side above).



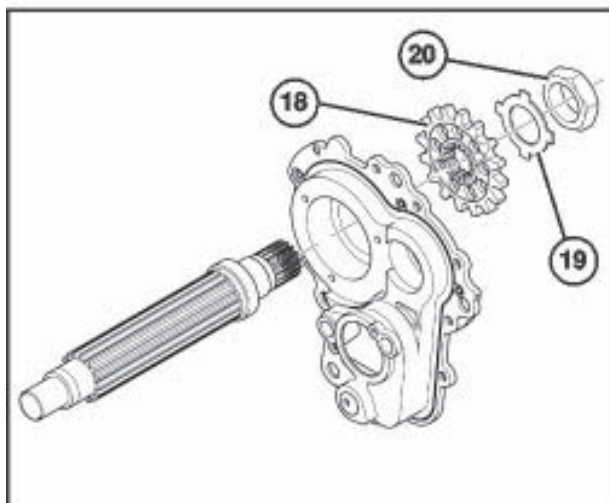
WARNING:
Support the primary and secondary shafts because they are loose.



Position the O-Ring (16) on the secondary shaft.



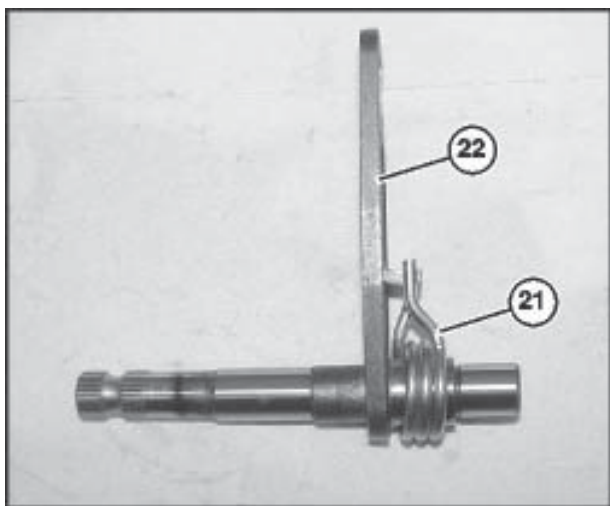
Position the spacer (17) with its minor dimension outwards.



Position the pinion (18), the safety washer (19) and the nut (20).
Tighten the nut.



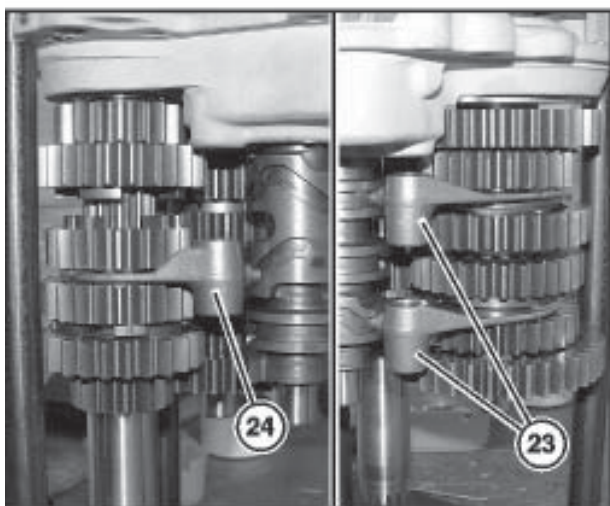
140 N·m 14 Kg-m



WARNING:

Do not force the spring (21) too much while mounting the command shaft (22).

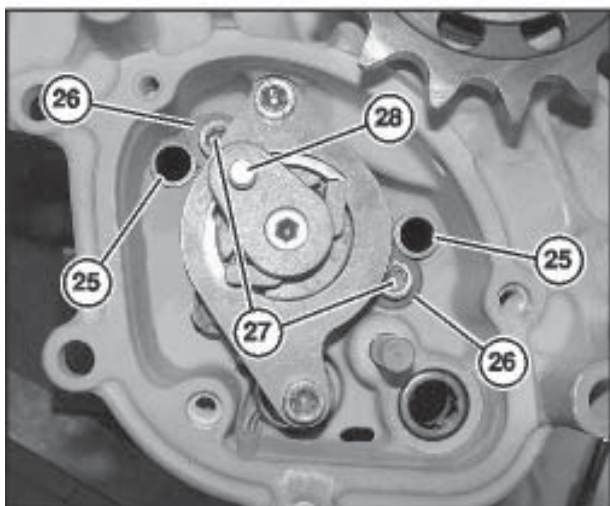
Mount the spring (21) on the command shaft selector (22), as indicated in the figure.



Position the two forks (23) on the secondary shaft and fork (24) on the primary shaft.

NOTE:

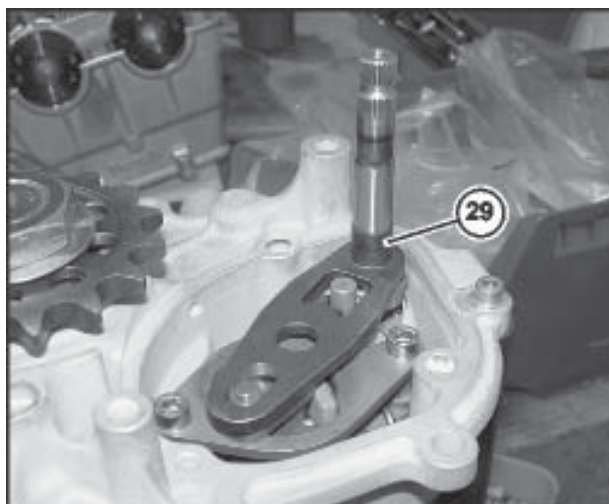
Forks (23) are greater in diameter than fork (24).



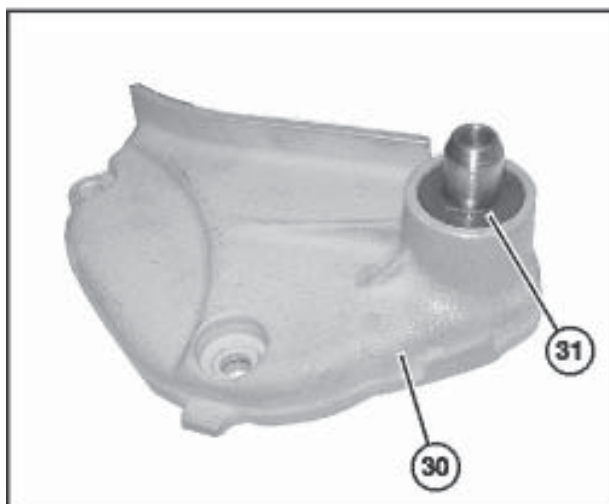
Insert the two slide rods (25).
Insert the two washers (26) into the hole of the rod and fix them with screws (27) and tighten.
Position the ferrule onto the sprocket wheel pin (28).



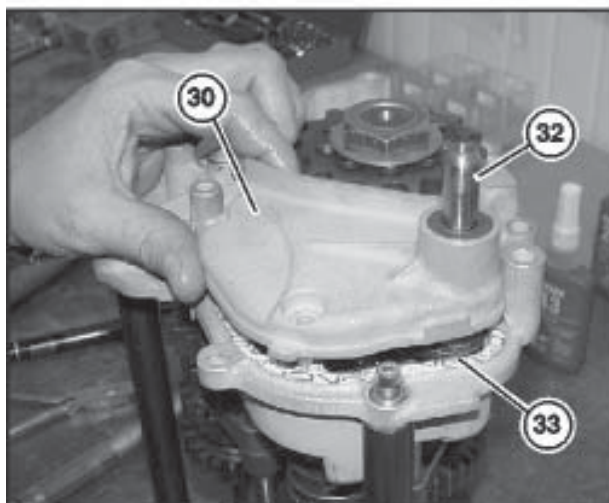
10 N·m 1 Kg-m + LOCTITE 243®



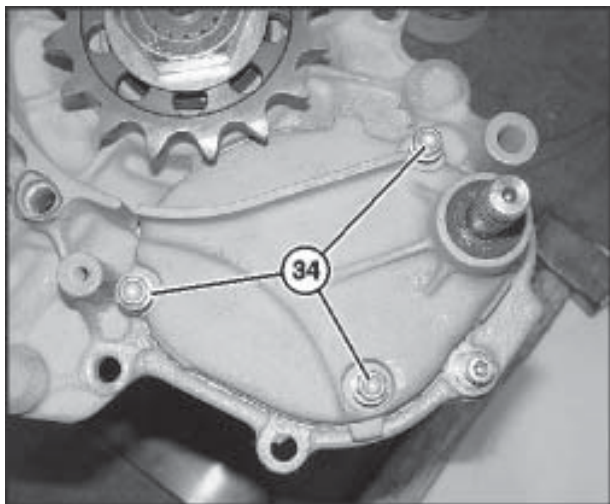
Position the command shaft selector (29), already pre-mounted, as shown in the figure.



Insert the oil seal (31) onto the gear command cover with the appropriate instrument.



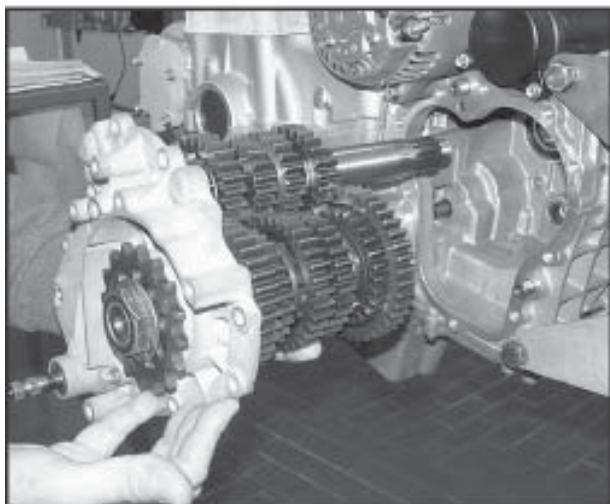
Insert the two centering dowels and the specific instrument (32).
Mount the gasket (33).
Mount the cover (30) and push it down until the instrument (32) has completely emerged.



Insert the fixing screws (34) and tighten.



10 N·m 1 Kg-m

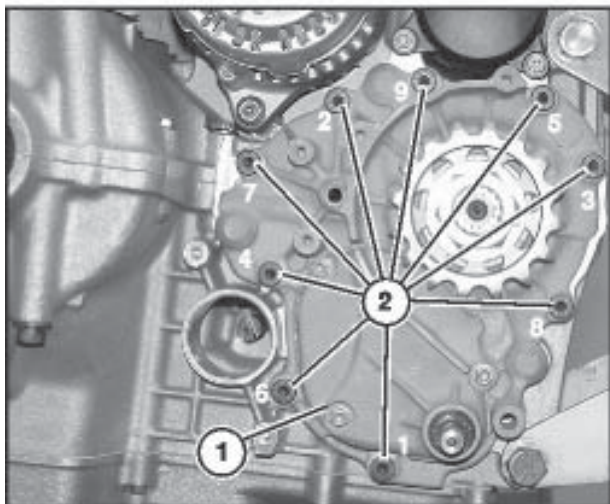


5.9.8 MOUNT GEARS



WARNING:

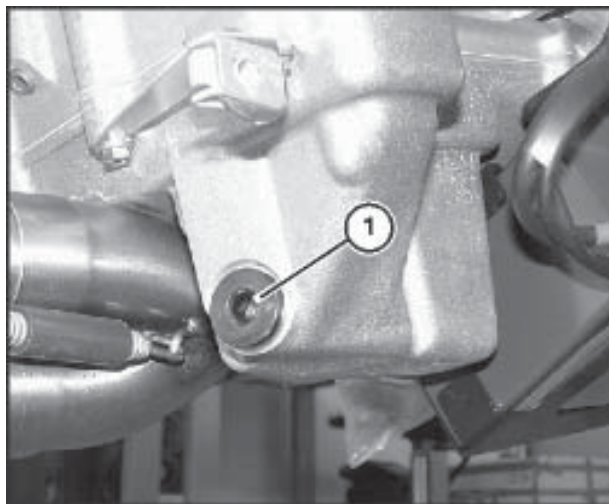
While mounting the gears make sure that they are in fourth gear to avoid breaking the neutral sensor. Otherwise, remove the neutral sensor before re-mounting the gears.



Insert the sealing O-Ring and the gears (1) and tighten the screws (2), according to the order indicated.



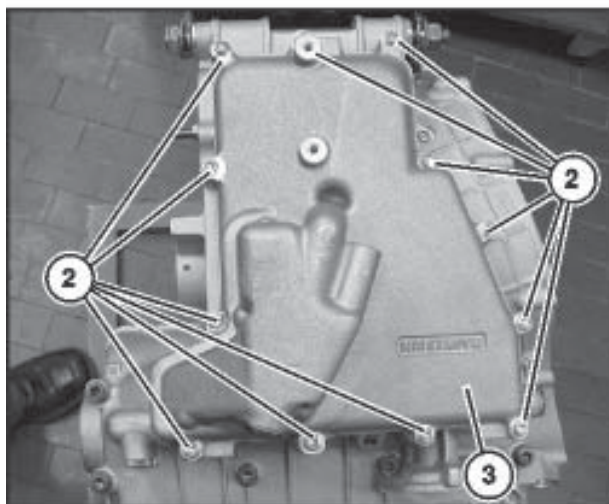
20 N·m 2,0 Kg-m



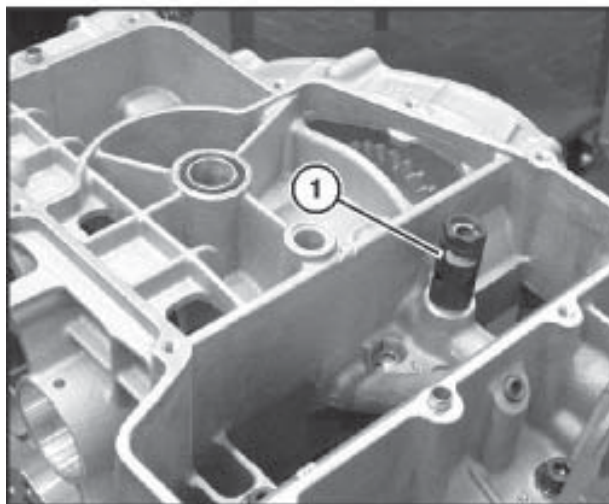
5.10 OIL SUMP AND OIL PUMP

5.10.1 DISMANTLE OIL SUMP

Unscrew and remove the oil discharge cap (1) and the copper gasket beneath.

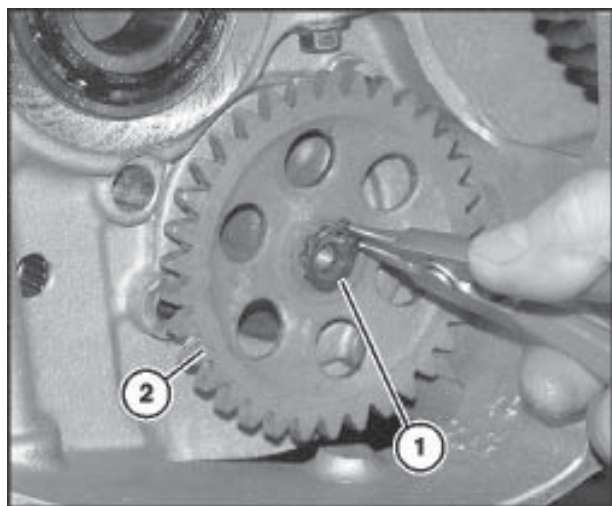


Unscrew and remove the twelve screws (2) and remove the oil sump (3).



5.10.2 DISMANTLE OVERPRESSURE OIL VALVE

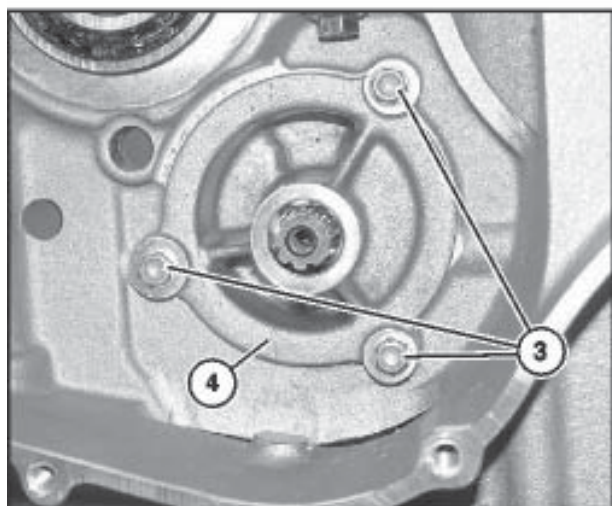
Remove the oil sump (see "DISMANTLE OIL SUMP").
Remove the overpressure oil valve (1).



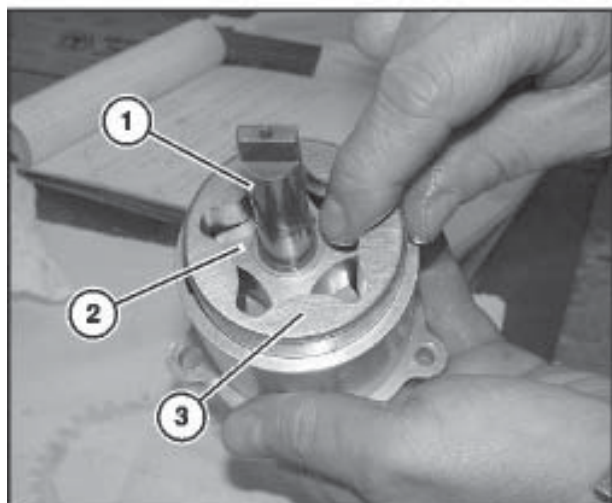
5.10.3 REMOV OIL PUMP

Remove the primary assembly (see "REMOVE PRIMARY ASSEMBLY").

Remove the safety ring (1) and the toothed wheel (2)

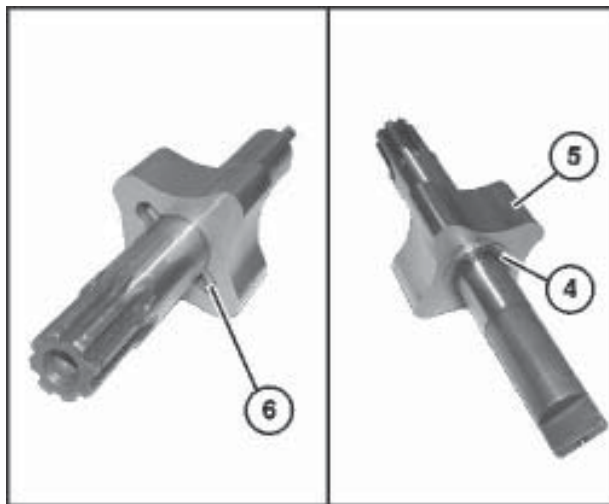


Unscrew and remove the three screws (3) and extract the oil pump (4).

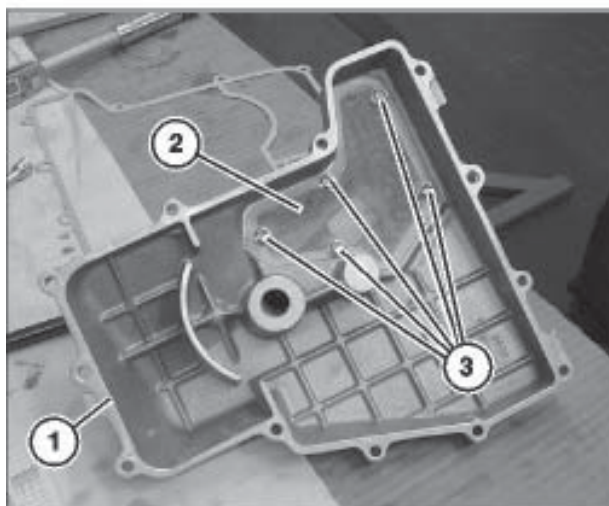


5.10.4 DISMANTLE OIL PUMP

Remove the oil pump shaft (1) complete with internal rotor (2).
Remove the external rotor.

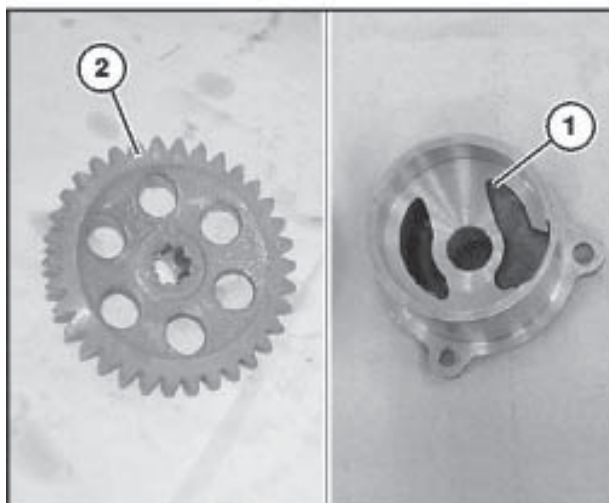


If necessary, remove the safety ring (4) and the internal rotor (5).
Take off the pin (6).



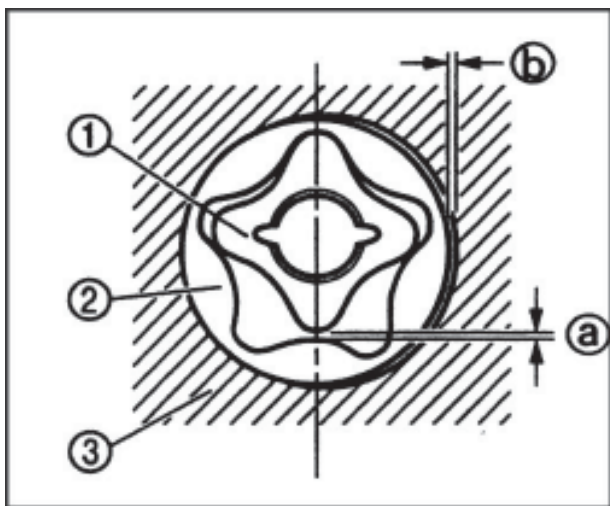
5.10.5 CHECK OIL SUMP

Check for breaks on the oil sump, eventually changing it.
Check the presence of foreign bodies on the suction filter (2), eventually cleaning it.
Check the state of the filter (2). If damaged, substitute the piece working on screws (3).



5.10.6 CHECK OIL PUMP

Check that the pump body (1) and the toothed wheel (2) are not damaged or excessively worn.
If necessary, change the element or elements.

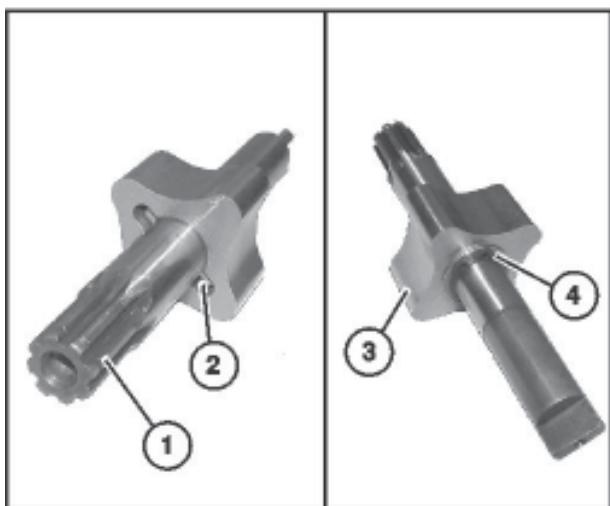


The internal and external rotors should not be serrated. Check that the measurements (a) and (b) enter within the specific value, otherwise change the oil pump.

- 1: Internal rotor
- 2: External rotor
- 3: Pump body

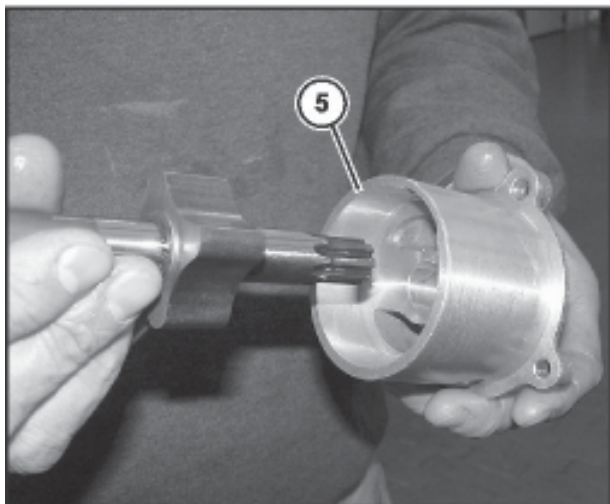


VALUE LIMIT
a = 0.25 mm max.
b = 0.2 mm max.

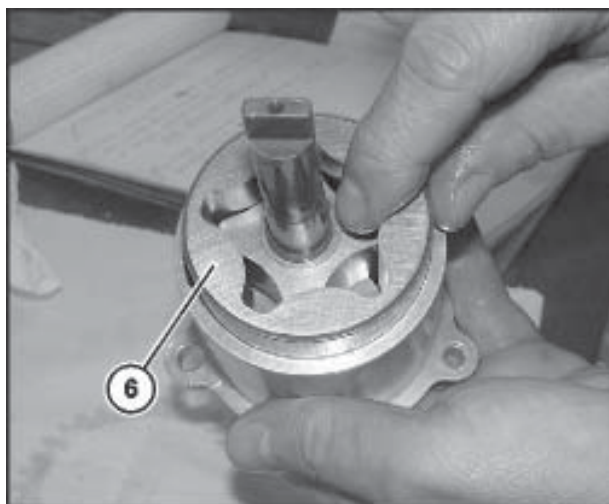


5.10.7 ASSEMBLE OIL PUMP

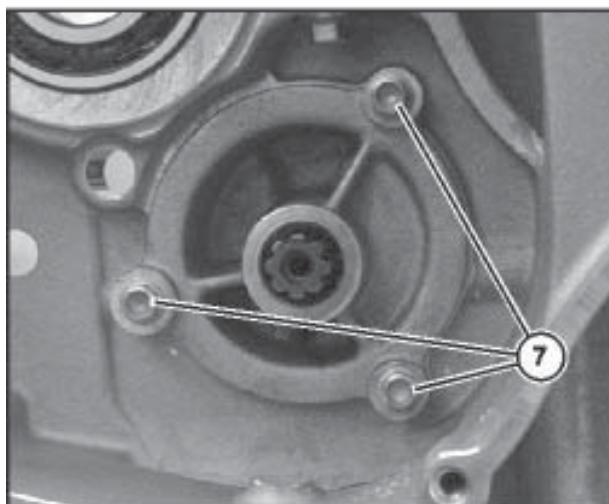
Position the pin (2) in the shaft (1).
 Insert the internal rotor (3) and the 1 mm liner clearance and block with the safety ring (4).



Position the shaft inside the body (5) as indicated in the figure.



Insert the external rotor (6) as in the figure.
Oil the two rotors abundantly.

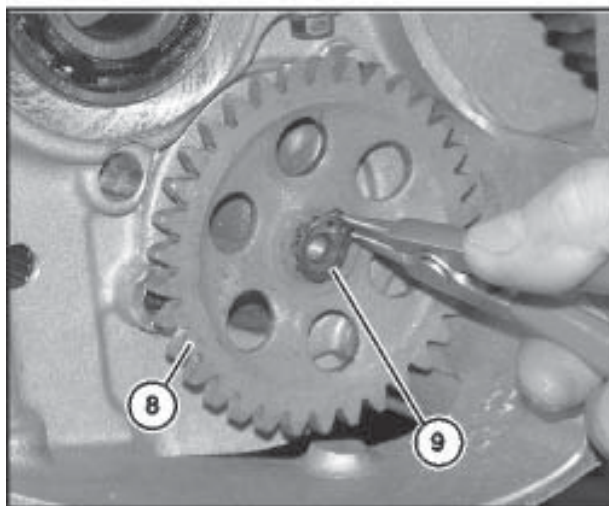


5.10.8 MOUNT OIL PUMP

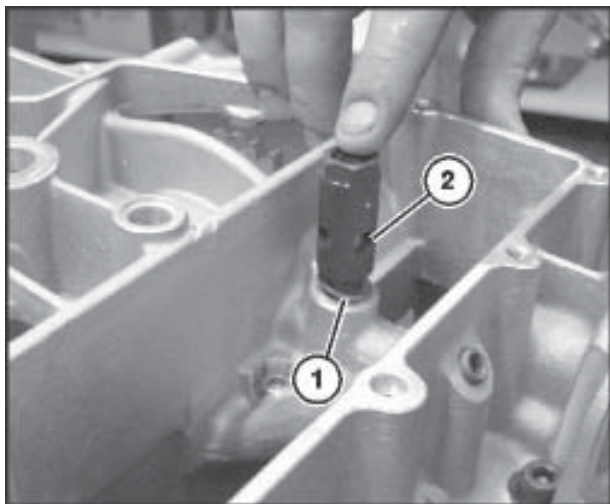
Insert the oil pump from the right with the specific instrument until it touches, as in the figure.
Insert the centering dowel.
Fix with the three screws (7) and tighten.



8,5 N·m 0.85 Kg-m + LOCTITE 243®



Insert the toothed wheel (8) and fix with the elastic ring (9).

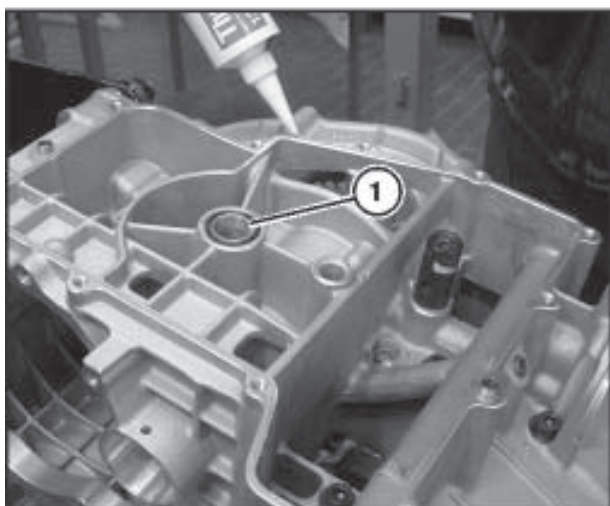


5.10.9 MOUNT OVERPRESSURE VALVE

Position the overpressure valve (1) and valve (2).
Tighten.



25 N·m 2.5 Kg-m + LOCTITE 243®

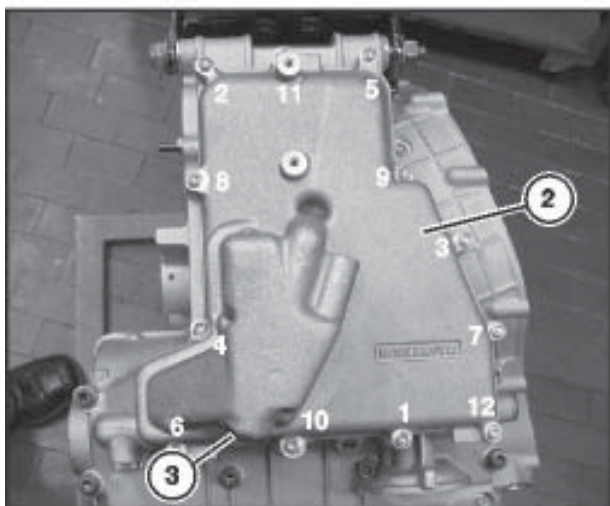


5.10.10 MOUNT OIL SUMP



WARNING:
Always use new gaskets.

Apply THREEBOND 1215 sealing paste to the casing surface
and oil sump.
Position the O-Ring (1) on the casing.
Position the two centering dowels on the base.



Position the sump (2) and tighten the discharge cap (3).

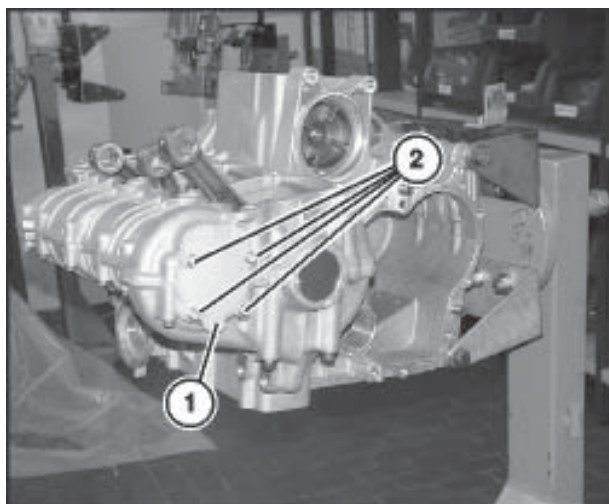


22 N·m 2.2 Kg-m

Tighten according to the order indicated in the figure.



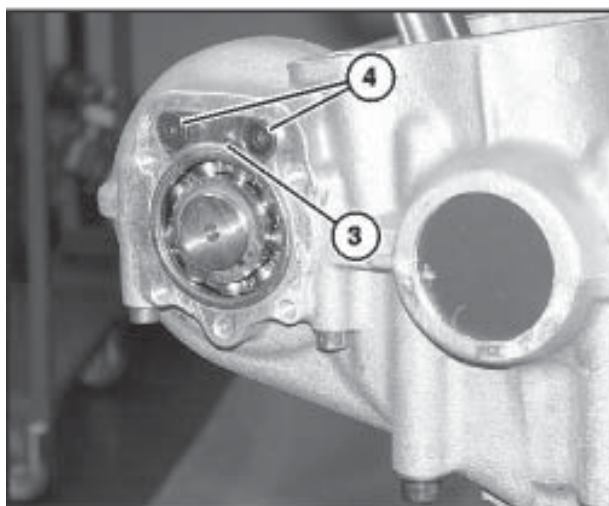
10 N·m 1 Kg-m



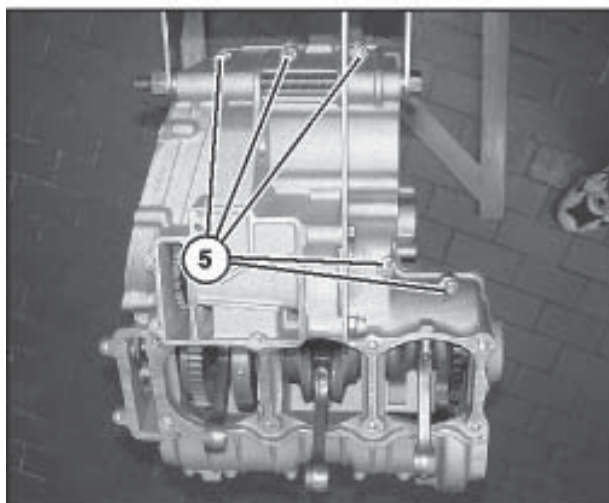
5.11 CASING

5.11.1 DISMANTLE CASING

Remove the head.
Remove the pistons (see "DISMANTLE PISTONS").
Remove the oil sump (see "DISMANTLE OIL SUMP").
Remove the oil pump (see "DISMANTLE OIL PUMP").
Remove the water pump (see "DISMANTLE WATER PUMP").
Remove the gears (see "ADJUSTMENT PHASE").
Remove the exchanger (see "WATER OIL EXCHANGER").
Remove the counter-shaft cover (1), unscrewing the four screws(2).

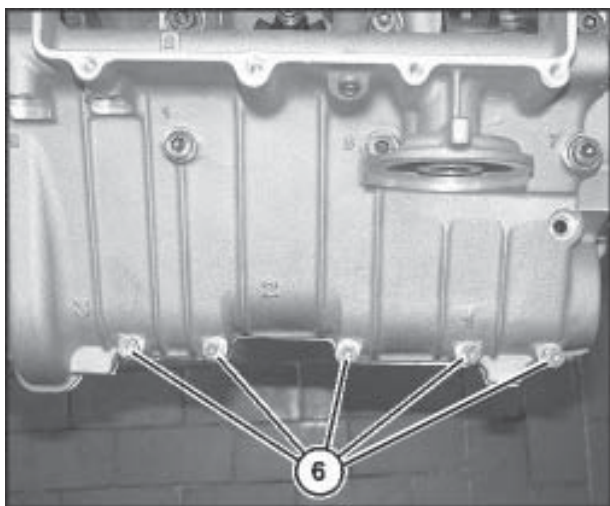


Remove the stop plate (3), unscrewing the two screws ((4).

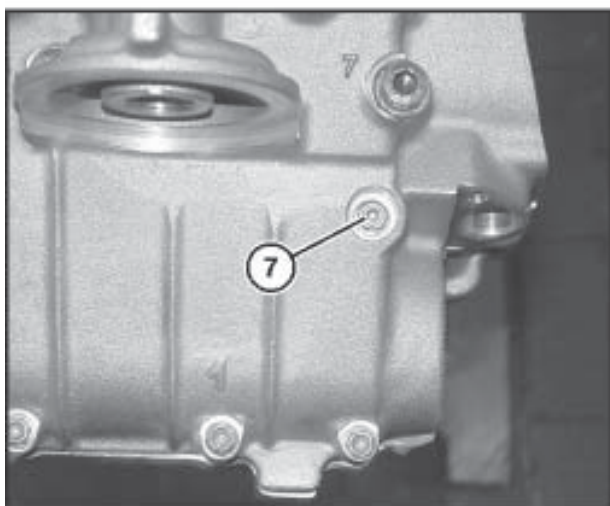


WARNING:
Note the position of the screws for correct re-mounting.

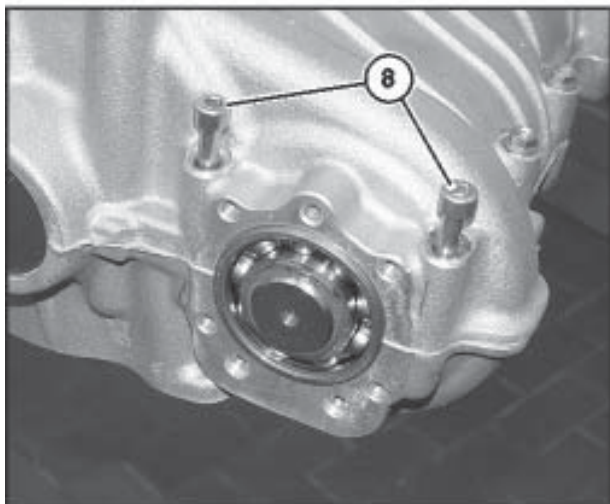
Remove the five screws (5) indicated in the figure (upper part of the engine).



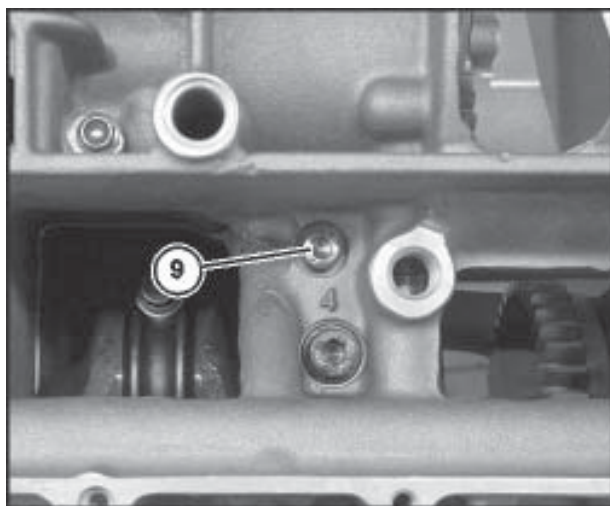
Remove the five screws (6).



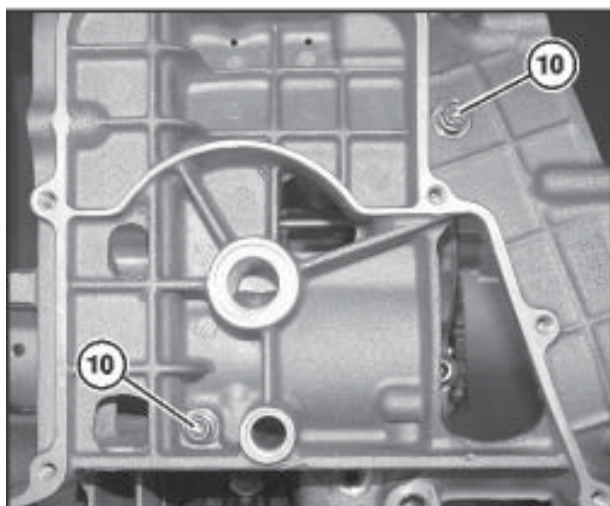
Remove screw (7).



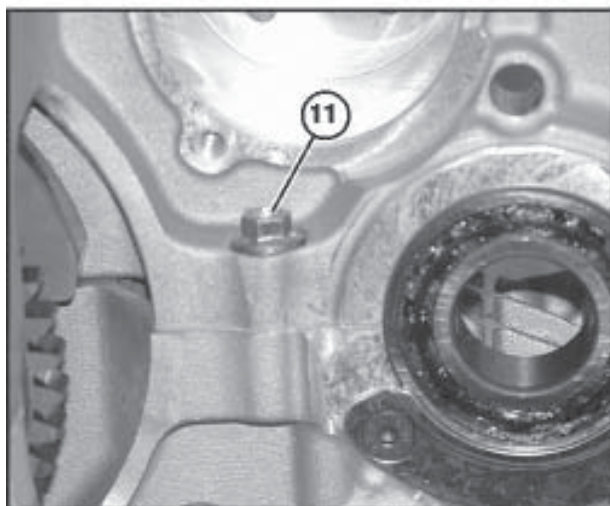
Remove the two screws (8).



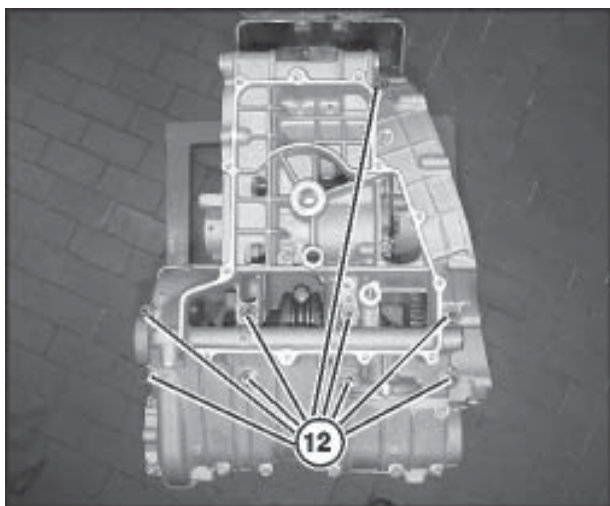
Remove screw (9).



Remove the two screws (10).

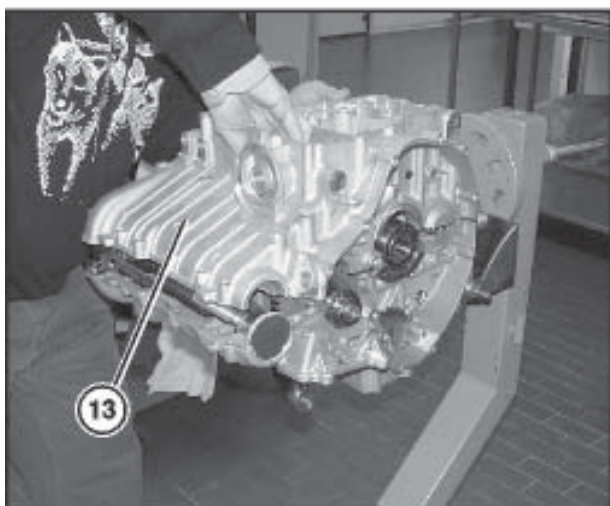


Loosen and remove screw (11).

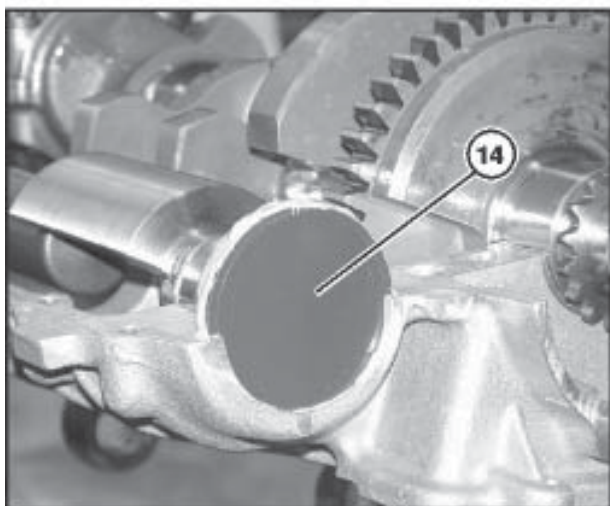


WARNING:
Take note of the position of the screws for correct re-mounting.

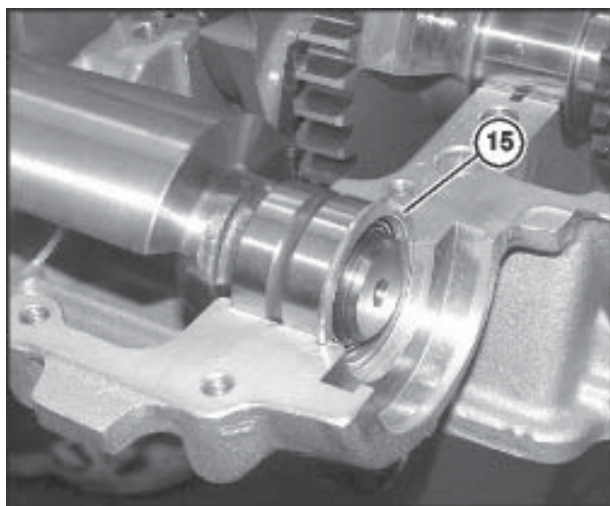
Remove the nine screws (12) indicated in the figure (lower part of the engine).



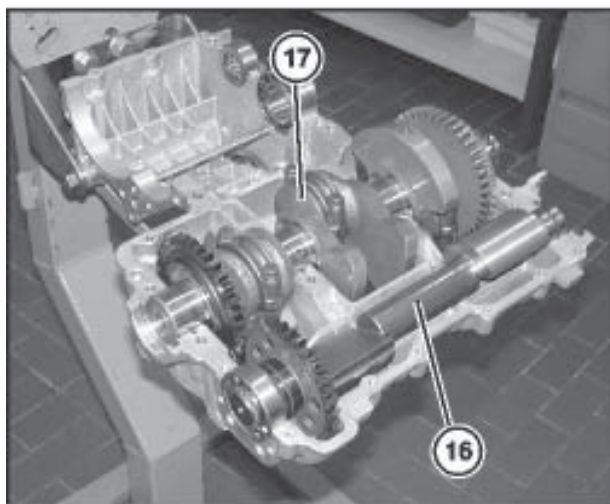
Remove the lower base (13).



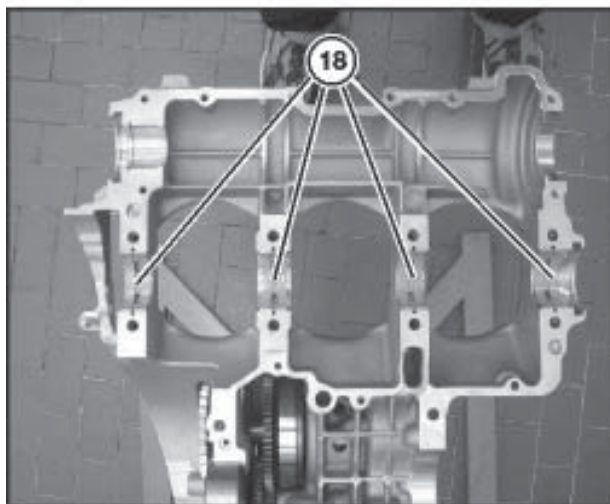
Remove the large plastic lock nut (14).



Remove the ring (15).

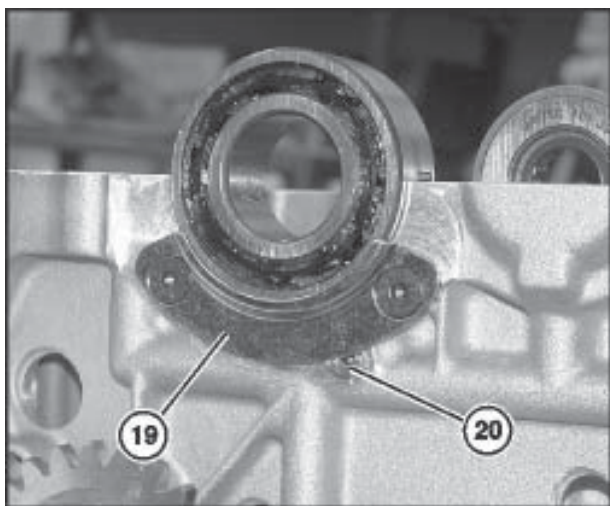


Remove the balancing counter-shaft (16).
Remove the engine shaft (17).

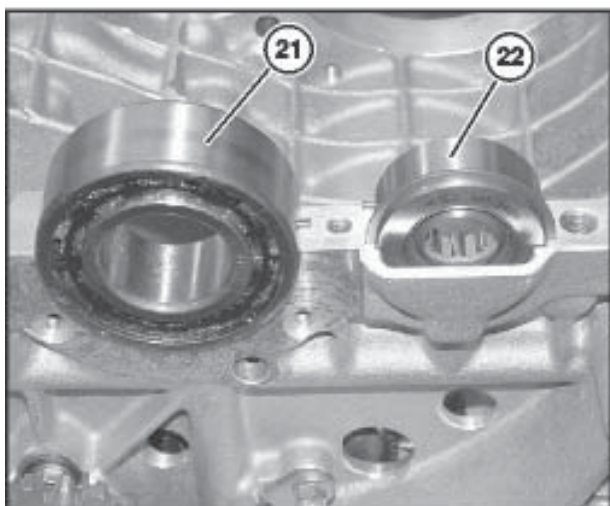


WARNING:
Take note of the position of the bronze bearings for correct re-mounting.

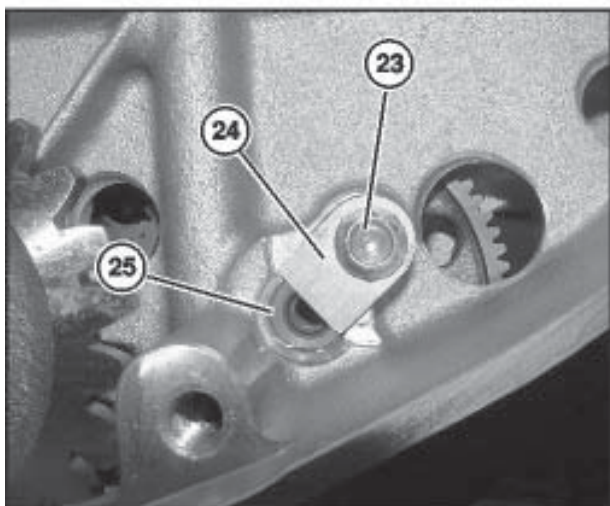
Remove the four semi-bronze bearings (18).



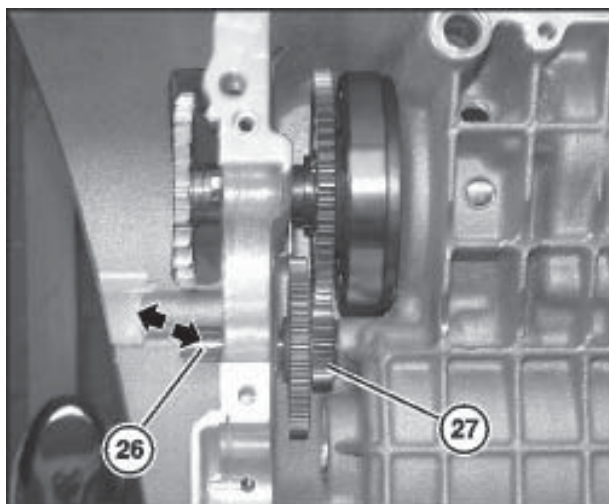
Remove the drainage tube stop plate (19.)
Remove the drainage tube (20).



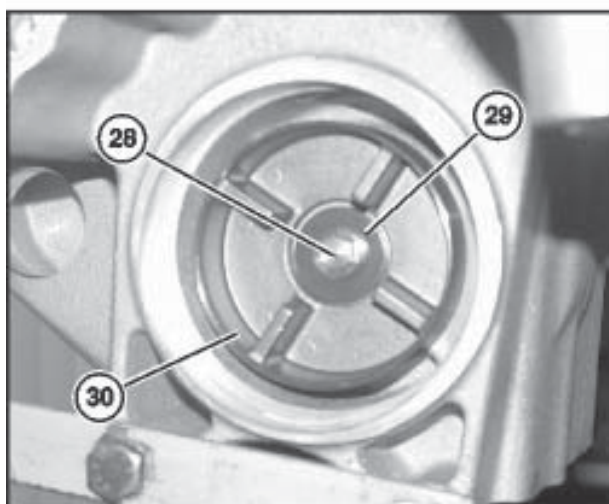
Remove the ball-bearings (21) and (22).



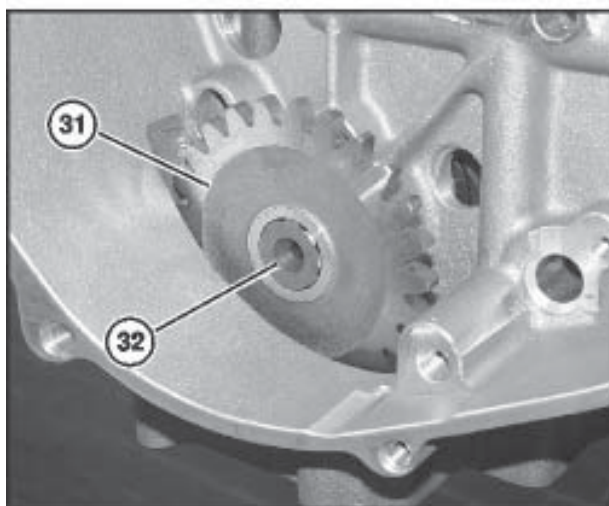
Remove screw (23) and plate (24), freeing the pin (25).



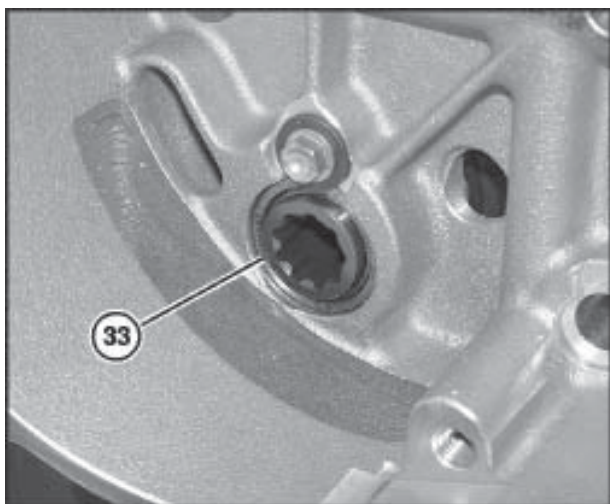
Support the satellite gear (27) and take off the pin (26) as shown in the figure.



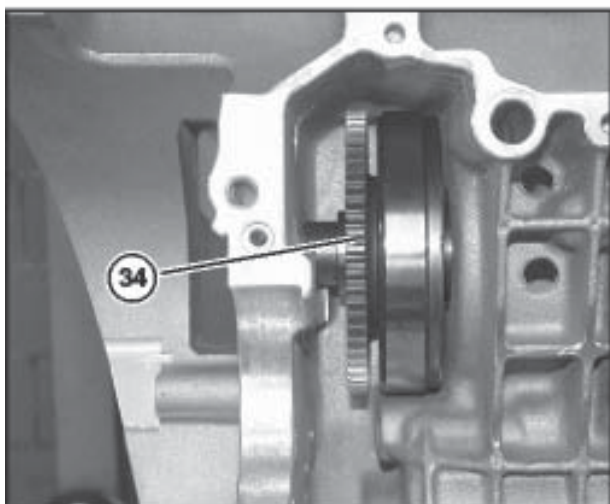
Unscrew and remove screw (28), washer (29) and the female flexible coupling (30).



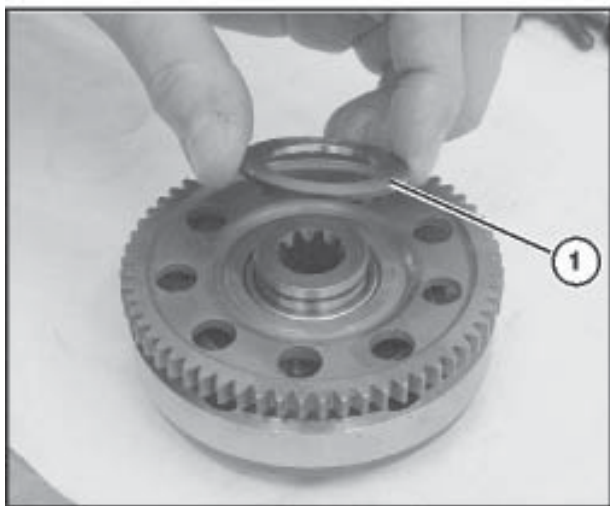
Support the toothed wheel (31) and remove pin (32).
Remove the toothed wheel (31).



Remove the spacer (33).

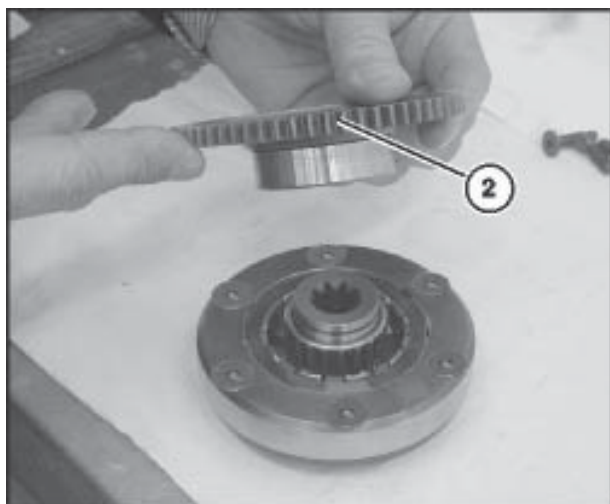


Remove the free wheel (34).

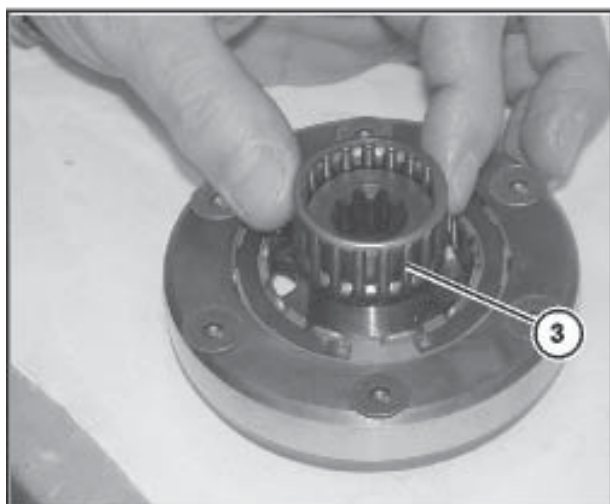


5.11.2 DISMANTLE FREE WHEEL

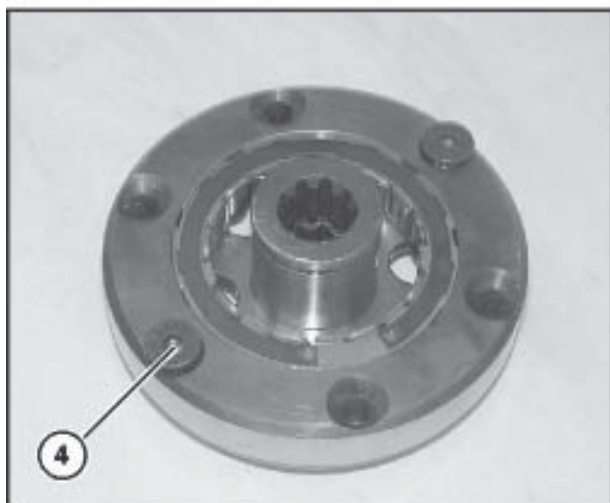
Remove the elastic safety ring.
Remove the washer (1).



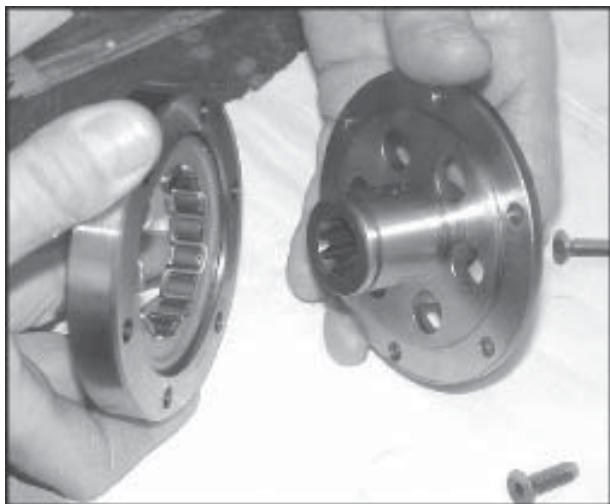
Remove the toothed wheel (2).



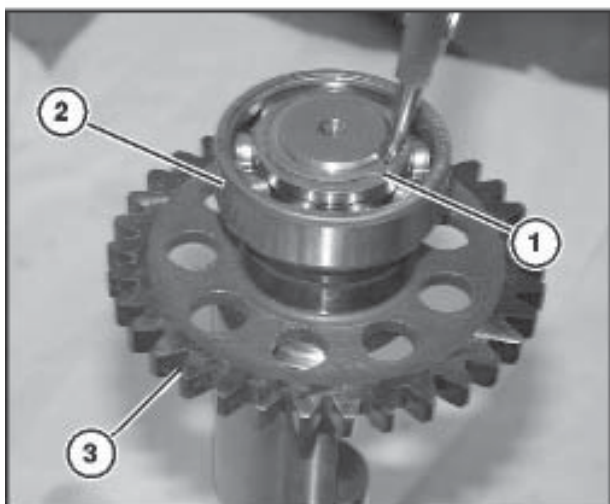
Remove the roller cage (3).



Remove the screws (4).



Dismantle the free wheel.

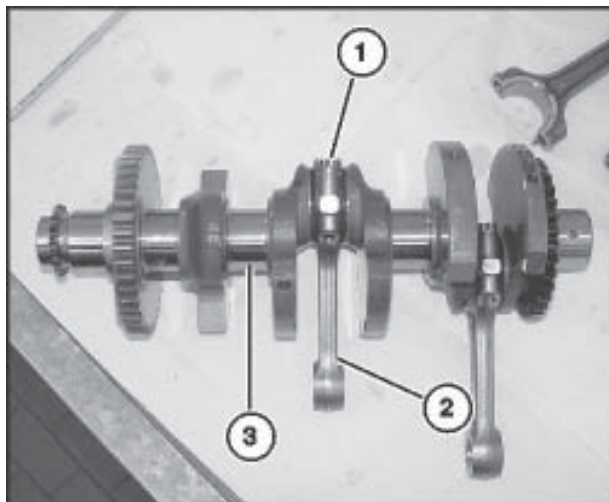


5.11.3 DISMANTLE BALANCING COUNTER SHAFT

Remove the circlip (1).
Remove the ball-bearing (2) and the toothed wheel (3).



Remove the ball-bearing (4).



5.11.4 DISMANTLE ENGINE SHAFT



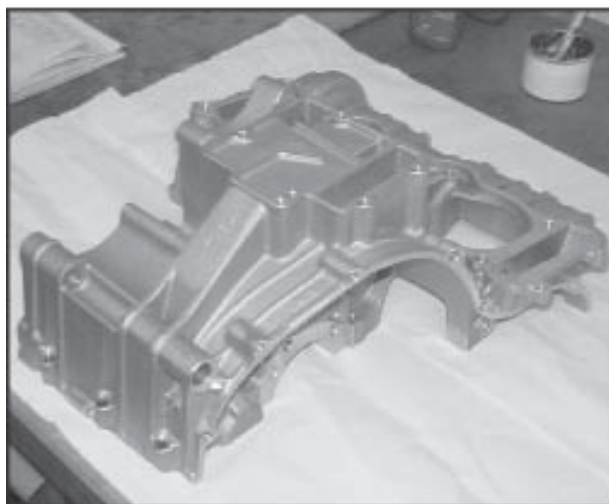
WARNING:

Take note of the position of the elements for correct re-mounting.

The following procedure must be applied to all the connecting rods mounted on the engine shaft.

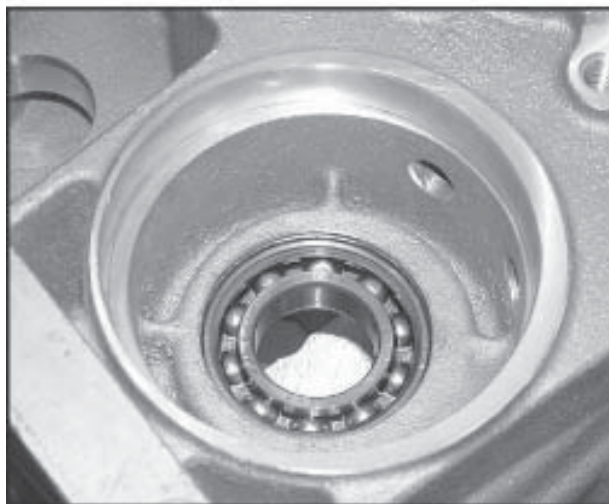
Unscrew and remove screws (1).

Remove the connecting rod (2) from the engine shaft (3).

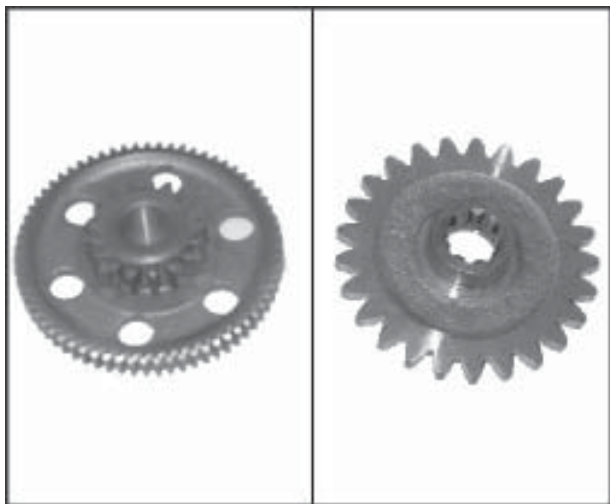


5.11.5 CHECK CASING

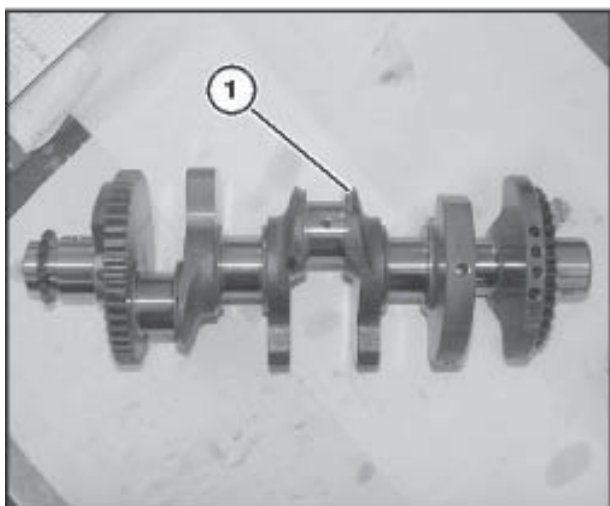
Check the presence of any breaks on the upper and lower casing, eventually changing the casings, always coupled.



Check the free rotation of the ball-bearings, changing them if necessary.

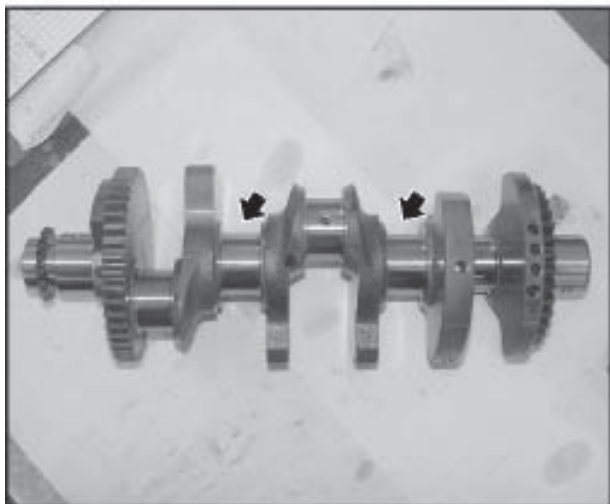


Check that the toothed wheels are not broken or excessively worn.
Change them if necessary.



5.11.6 CHECK ENGINE SHAFT AND CONNECTING ROD

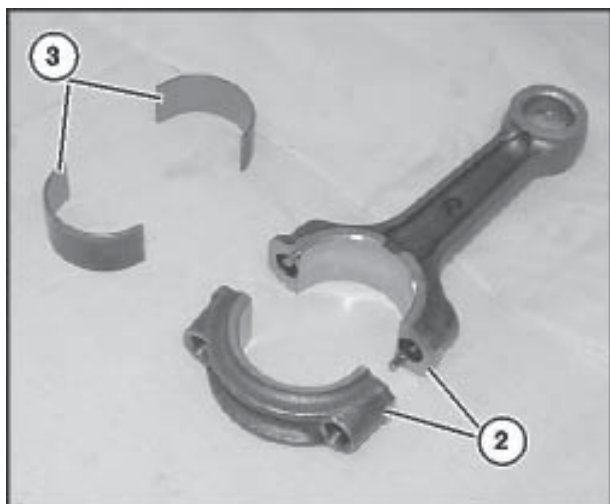
Check eventual breaks or excessive wear on the whole engine shaft (1).
Change the piece if necessary.



Check the eccentricity of the engine shaft at the points indicated in the figure.
If the eccentricity does not enter within the specific value, change the piece.



VALUE LIMIT
ECCENTRICITY = 0.030 mm



Check eventual breaks or excessive play on the connecting rod (2) and on the two semi-bronze bearings.

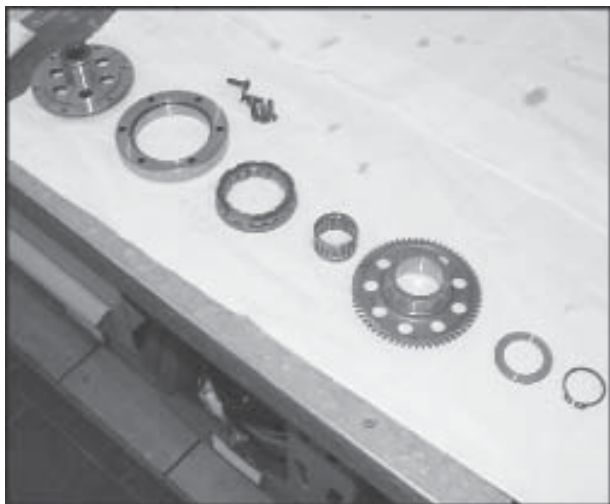


5.11.7 CHECK BALANCING COUNTER SHAFT

Check the eventual presence of breaks on the balancing counter shaft.

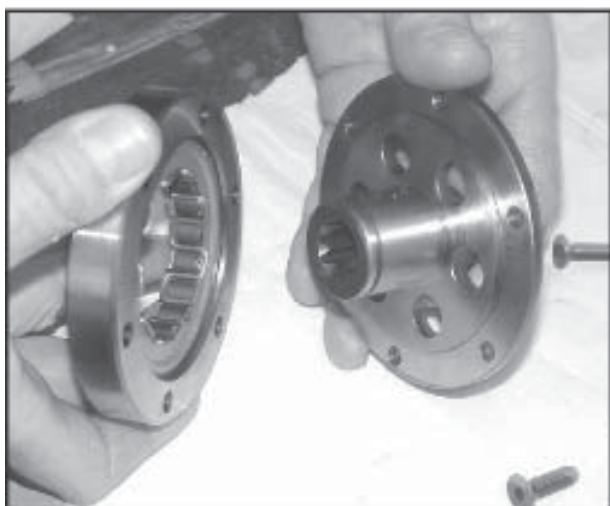


Check the free rotation of the ball-bearings.
Check eventual breaks or excessive wear on the toothed wheel.
If necessary, change the elements or the entire balancing counter shaft.



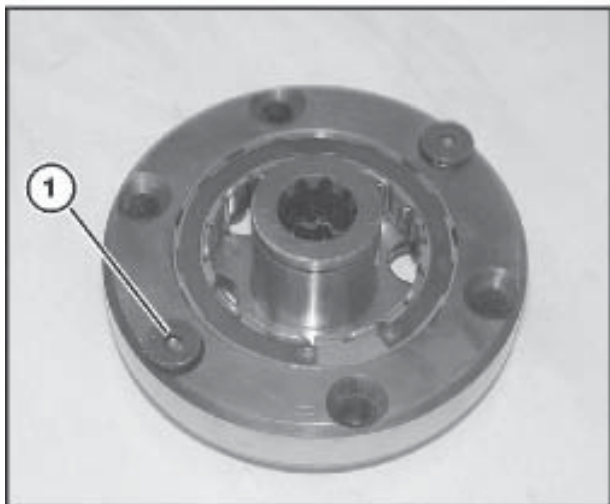
5.11.8 CHECK FREE WHEEL

Check eventual breaks, wear and slippage on the free wheel.
Change the element if necessary.



5.11.9 ASSEMBLE FREE WHEEL

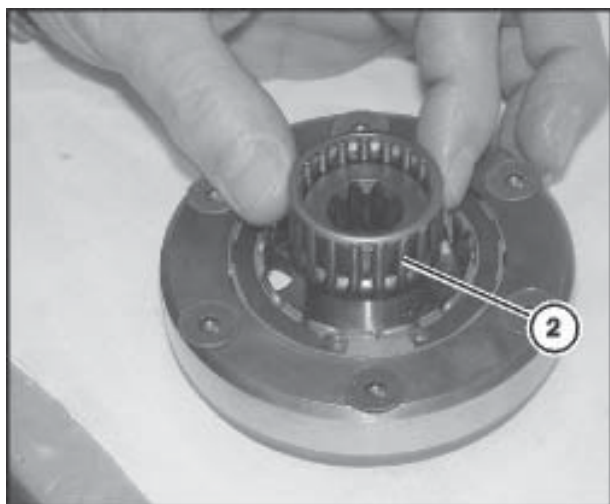
Assemble the two elements as shown in the figure.



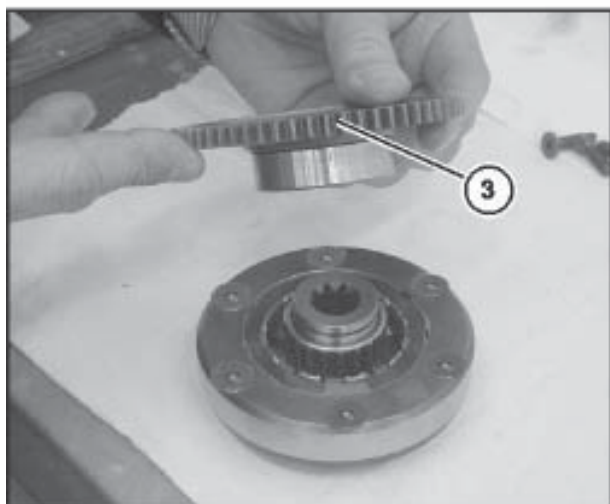
Tighten screws (1).



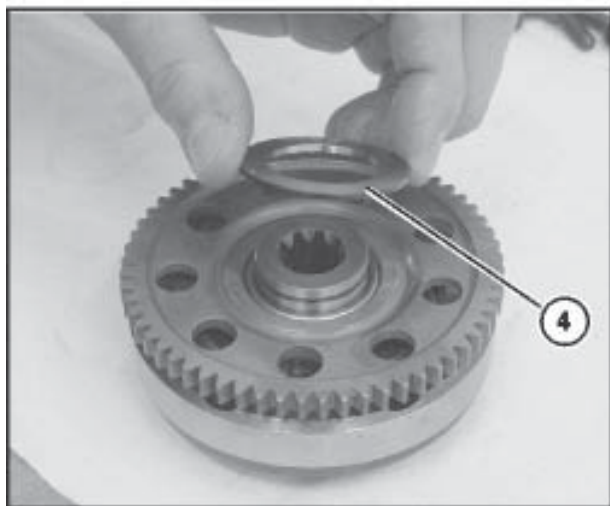
17 N·m 1.7 Kg-m + LOCTITE 270®



Position the roller cages (2).



Position the toothed wheel (3).



Position the washer (4) and fix with the circlip.



CONNECTING ROD BRONZE BEARINGS SELECTION TABLE		
TYPE	COLOUR	Ø CONNECTING ROD HEAD
A	Red	40.395/40.401
B	Blue	40.401/40.407
C	Yellow	40.407/40.413

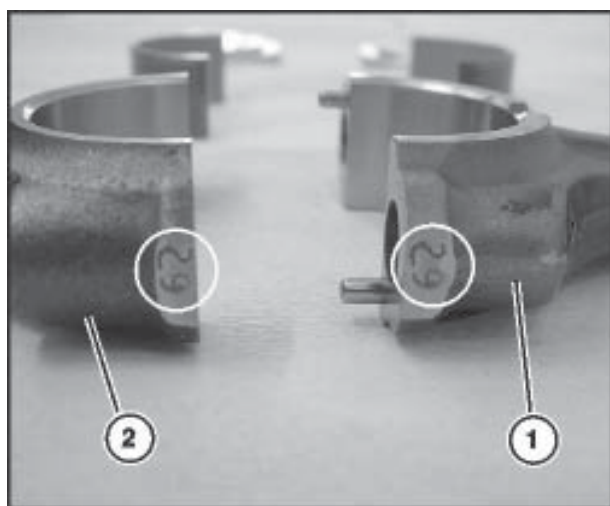
CONNECTING ROD SELECTION TABLE		
TYPE	COLOUR	WEIGHT (g)
K1	Black	408/412
K2	Green	412/416
K3	White	416/420

5.11.10 MOUNT ENGINE SHAFT



WARNING:

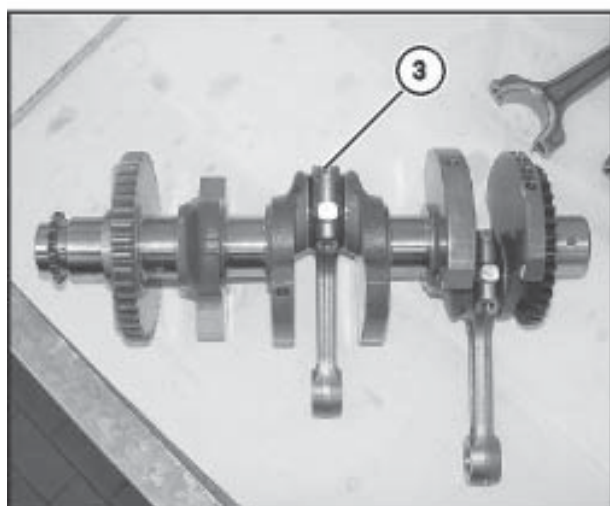
Various semi-bronze bearings liners exist distinguished by different colours (see table).



WARNING:

The two writings shown in the figure must coincide to couple the connection rod container (1) to the large cap (2).

Couple the connecting rod on the engine shaft so that the referent writing for the coupling is turned towards the front of the engine.



WARNING:

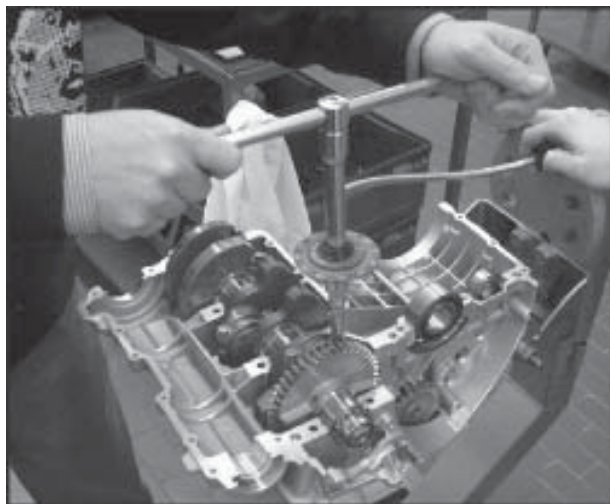
Always change the connecting rod screws after each dismantling.

Oil the thread and the diameter under the flanging of the fixing screws (3) with the recommended oil. Tighten the fixing screws (3) slightly.



RECOMMENDED OIL

MOLIKOTE® CU7439 PLUS copper grease.



Position the engine shaft on the upper semi-casing. Tighten screws (3) in three phases.



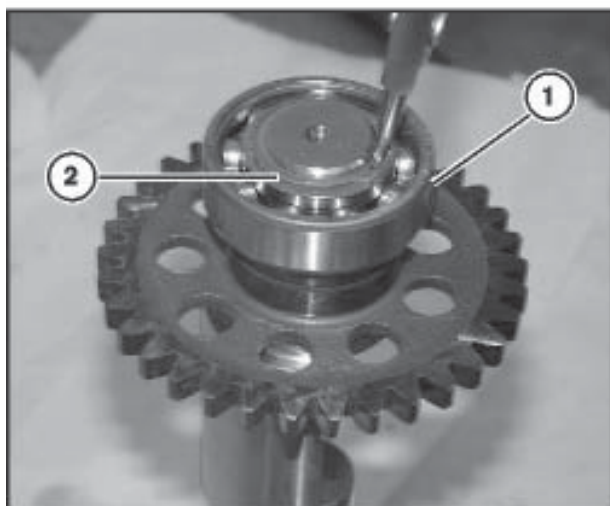
1st 15 N·m 1.5 Kg-m



2nd 25 N·m 2.5 Kg-m

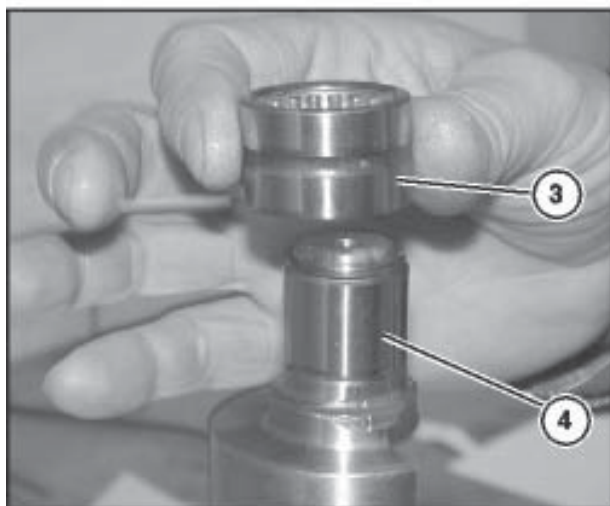


3rd + 50°

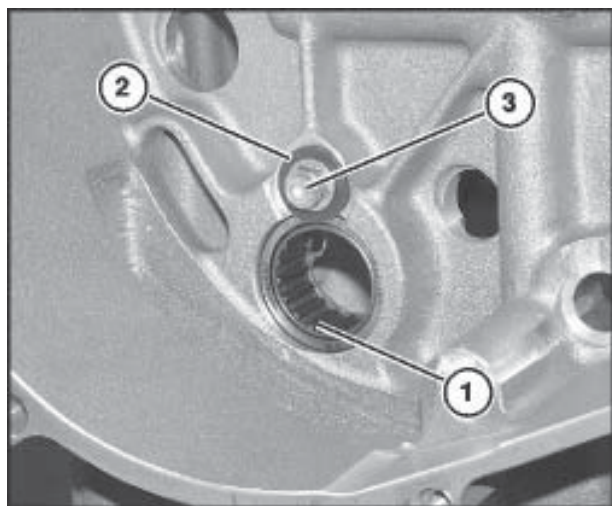


5.11.11 MOUNTAGGIO BALANCING COUNTER SHAFT

Position the ball-bearing (1) and fix with the circlip (2).



Position the roller ball-bearing (3) on the counter shaft (4).

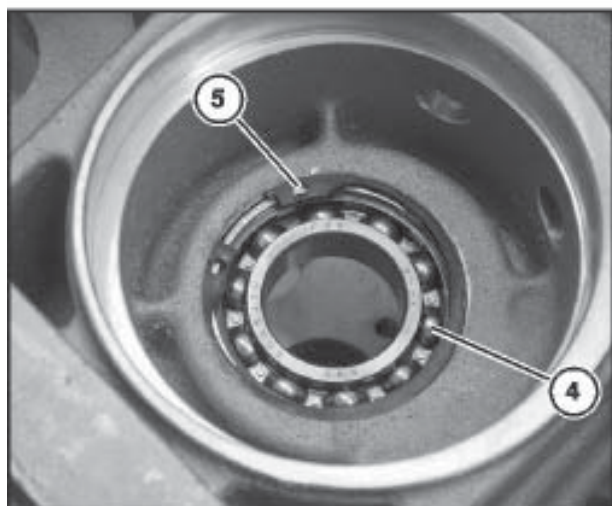


5.11.12 MOUNT CASING

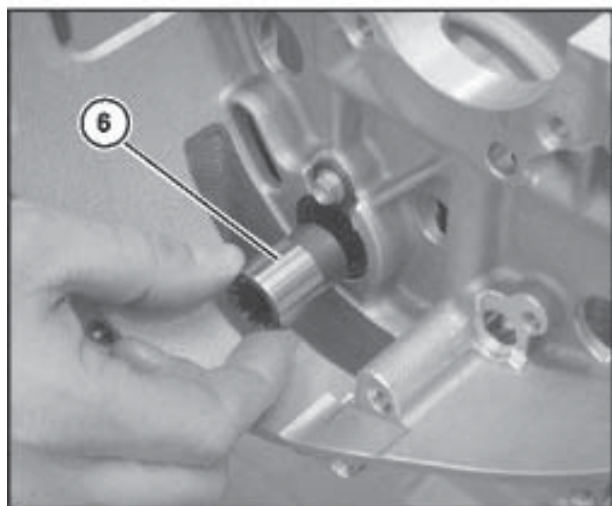
Position the roller cage (1), block it with washer (2) and fix with screw (3) tightly.



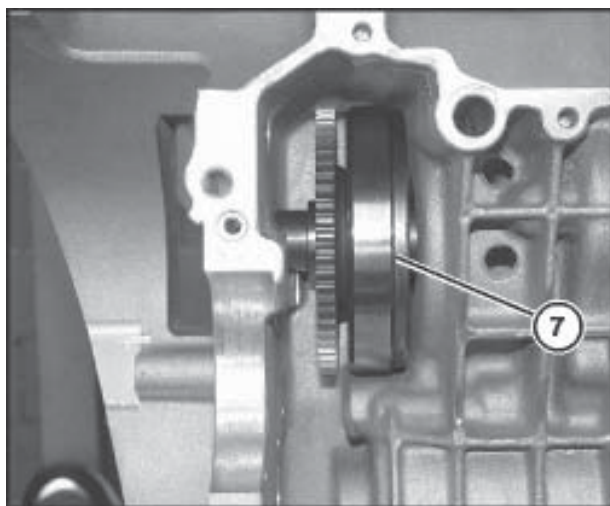
10 N·m 1 Kg-m + LOCTITE 243®



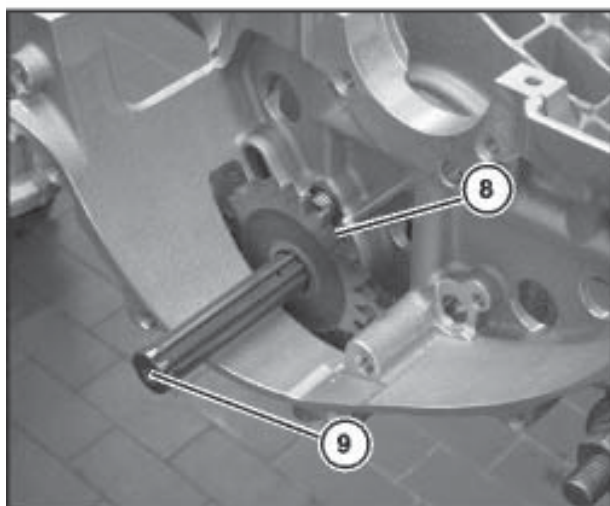
Position the ball-bearing (4) with the apposite pad and fix with the circlip (5).



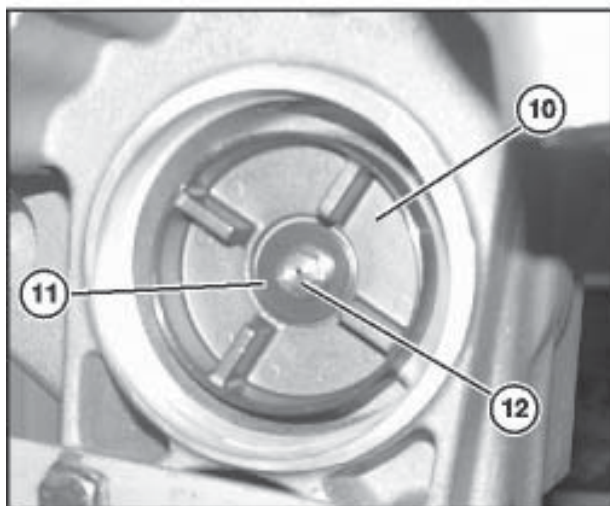
Position the liner (6) as indicated in the figure.



Position the free wheel (7) as shown in the figure.



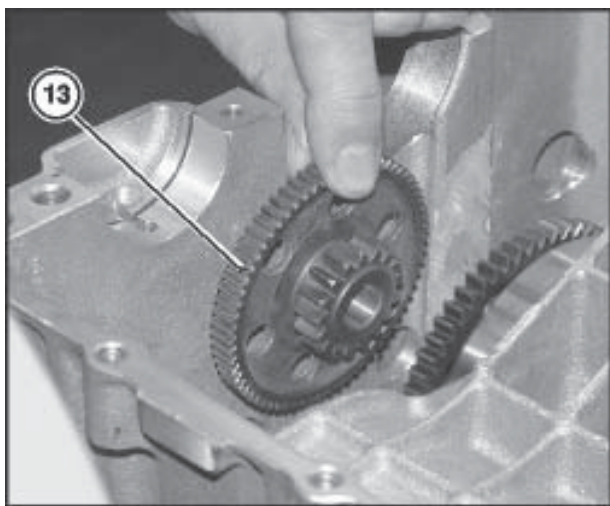
Position the toothed wheel (8) and insert pin (9) until touching, in the direction in the figure..



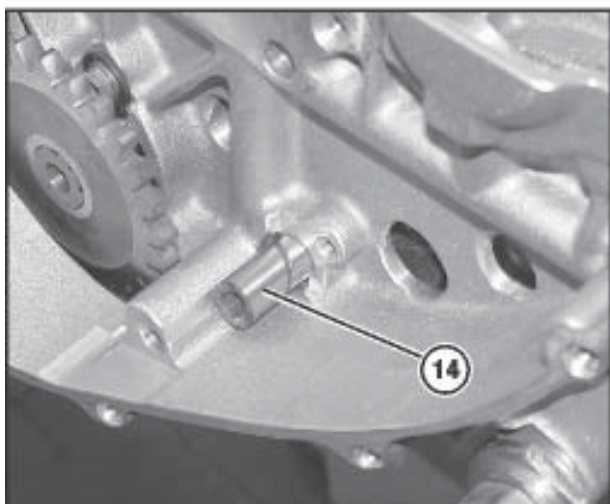
Position the washer (11) in the female flexible coupling housing and fix with screw (12) tightly.



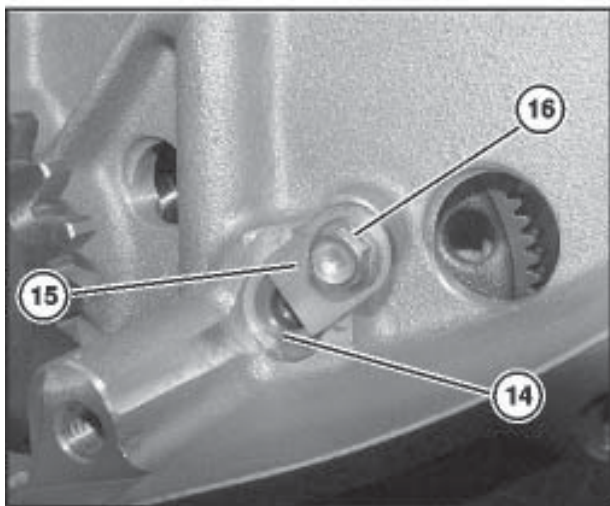
25 N·m 2.5 Kg-m + LOCTITE 270®



Position the toothed wheel (13) as shown in the figure.



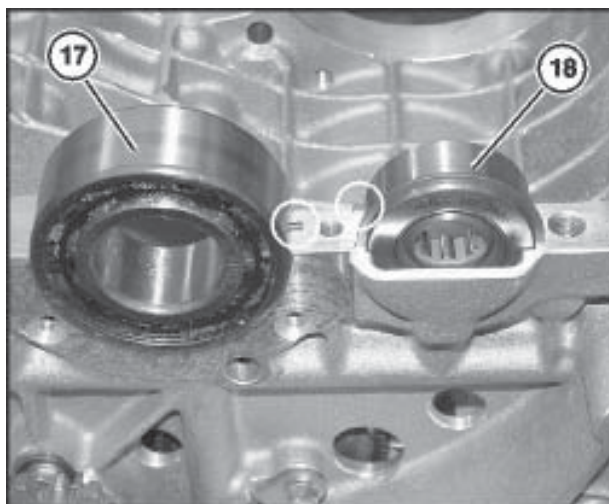
Position pin (14) until touching, as indicated in the figure.



Position plate (15) and fix with screw (16) tightly.

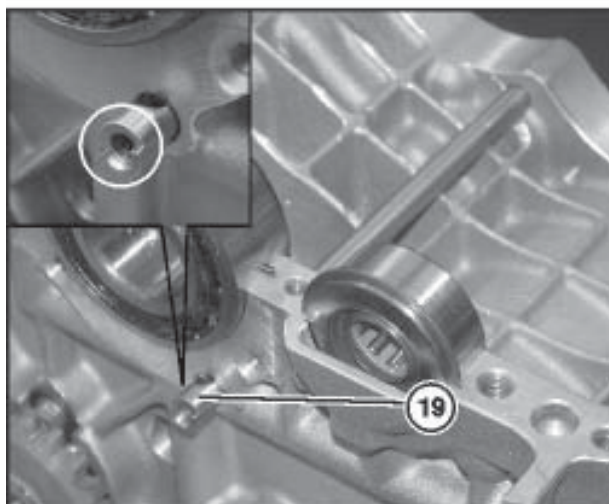


10 N·m 1 Kg-m + LOCTITE 243®



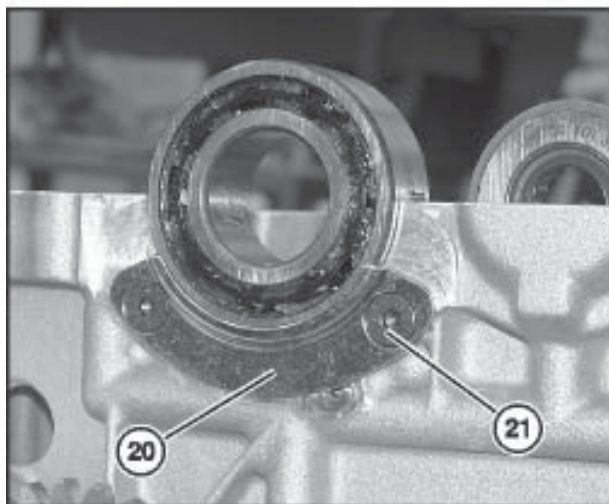
WARNING:
Position the two elements shown, as in the figure.

Position ball-bearings (17) and (18).



WARNING:
Position element (19) as shown in the figure.

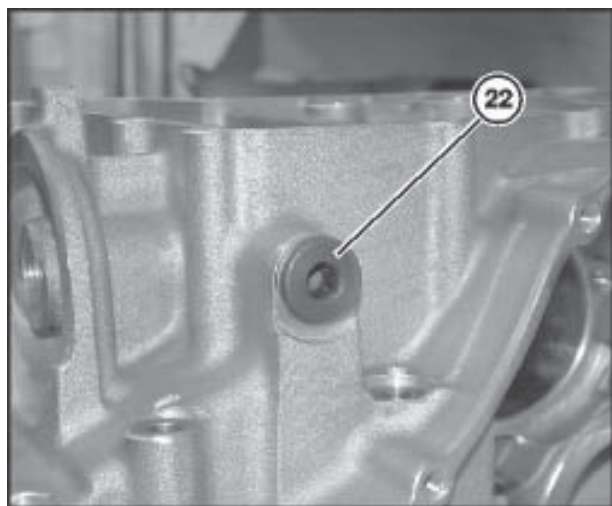
Position the drainage tube until touching (19).



Position the tube retaining plate and ball-bearing (20) and fix with screws (21) tightly.



10 N·m 1 Kg·m



Position and tighten the copper washer and the cap (22).

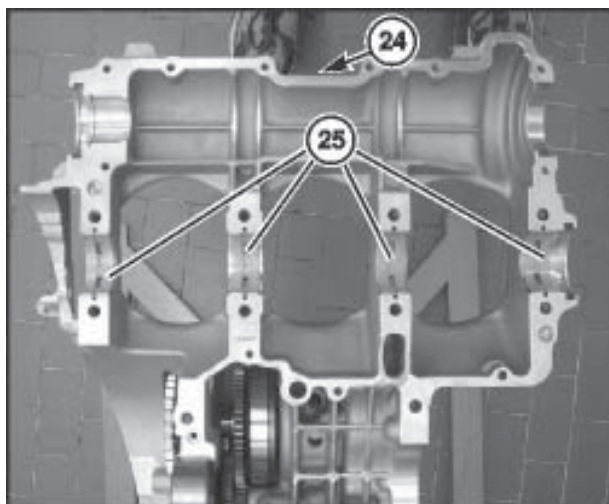


WARNING:
A type of semi-bronze bearing exists:

Various liners of this semi-bronze bearing exist distinguished by different colours (see table).

BENCH SEMI-BALL-BEARING		
STD	COLOUR	SELECTION
A	Red	1.918 - 1.922
B	Blue	1.922 - 1.926
C	Yellow	1.926 - 1.930
Ø seat std A red		41.830 - 41.836
Ø seat std B blue		41.836 - 41.843
Ø seat std C yellow		41.843 - 41.849
Ø single std shaft		37.960 - 37.970

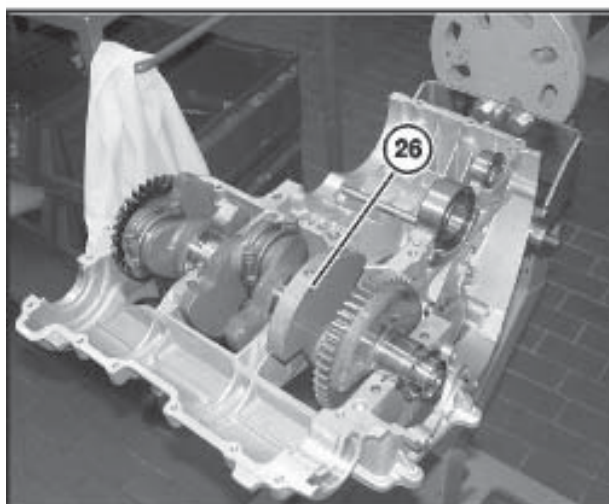
CONNECTING ROD SEMI-BALL-BEARING		
STD	COLOUR	SELECTION
A	Red	1.660 - 1.684
B	Blue	1.684 - 1.688
C	Yellow	1.688 - 1.692
Ø seat std A red		40.395 - 40.401
Ø seat std B blue		40.401 - 40.407
Ø seat std C yellow		40.407 - 40.413
Ø single std shaft		36.976 - 36.986



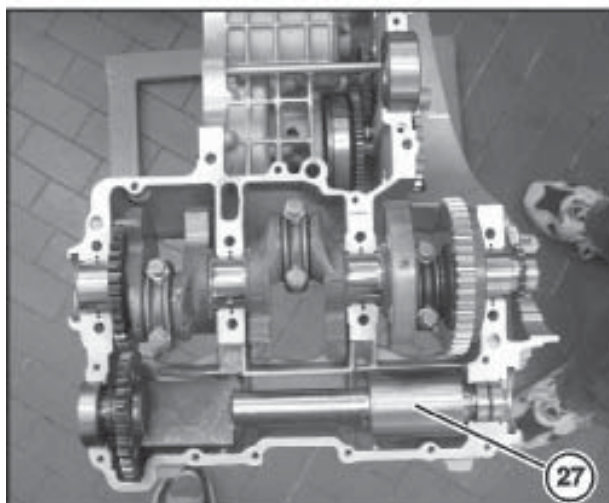
WARNING:
The reading of the letters must always be carried out starting from the transmission chain side.

Position the four semi-bronze bearings (25) each slotted with the correct colour associated with its letter stamped on the outside of the casing (24), centering them with the tooth in the cable.

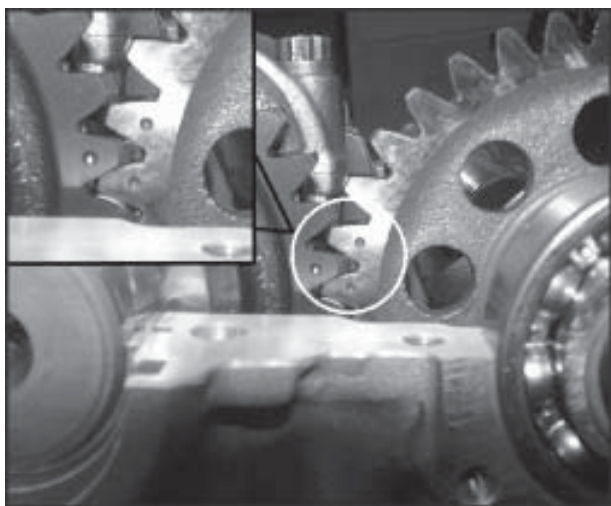
LETTER	COLOUR
A	Red
B	Blue
C	Yellow



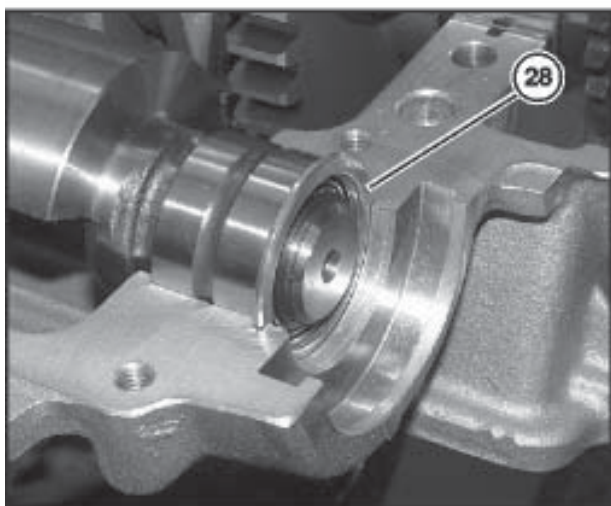
Position the engine shaft (26) as in the figure.



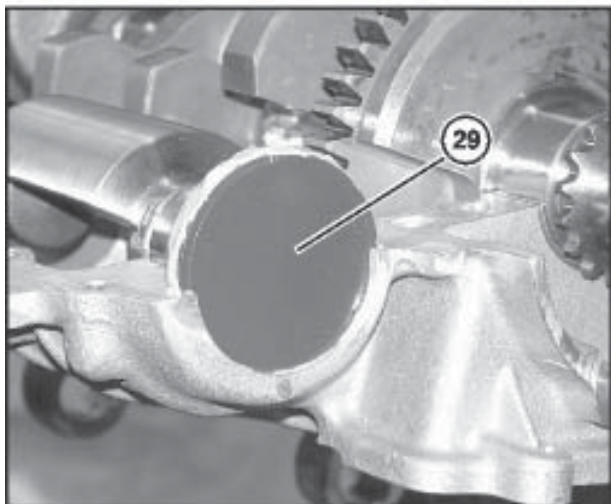
Position the balancing counter shaft (27).



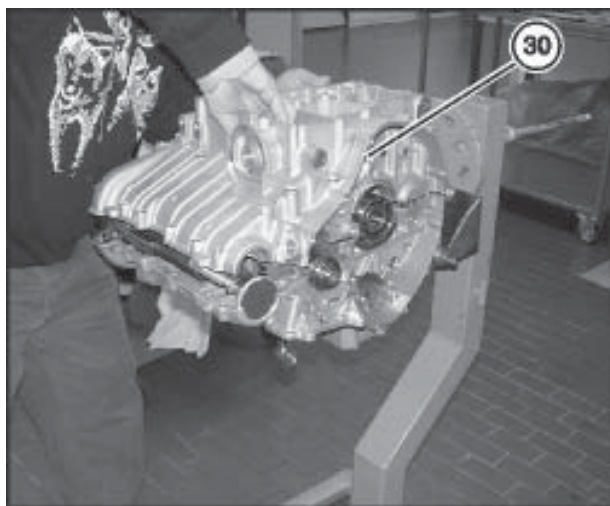
Make sure that the toothed wheels of the balancing counter shaft and the engine shaft are as shown in the figure.



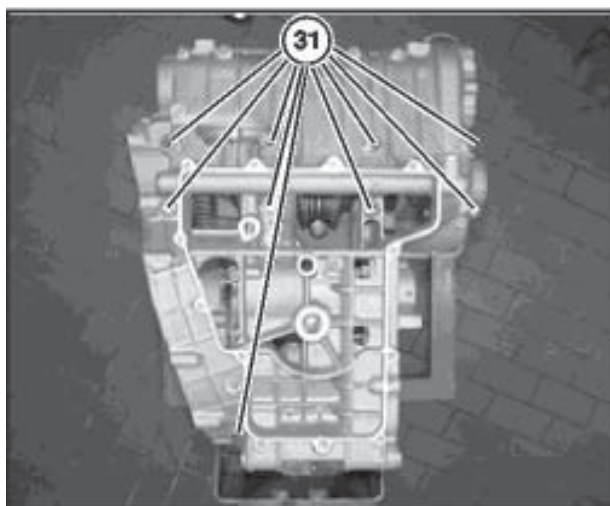
Position ring (28).



Position the large cap (29), one per side, in the apposite seats. Put THREEBOND 1215 on the contact surfaces of the two casings.



Position the lower casing (30) on the upper.



WARNING:
Follow the mounting phases correctly.

Position screws (31) and tighten in three phases, according to the order stamped on the casing.



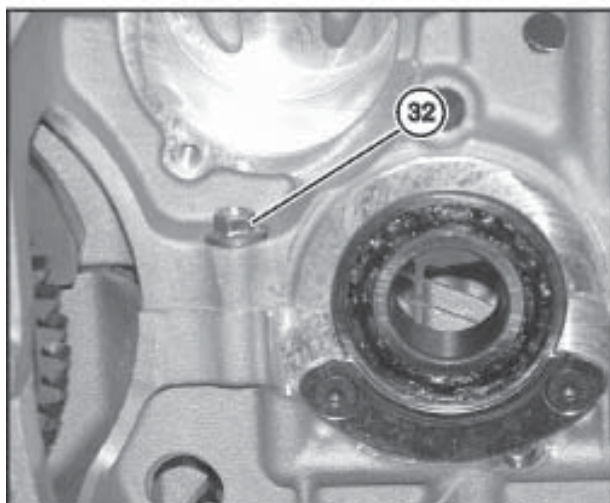
1st 10 N·m 1 Kg-m



2nd 20 N·m 2 Kg-m



3rd 37 N·m 3.7 Kg-m



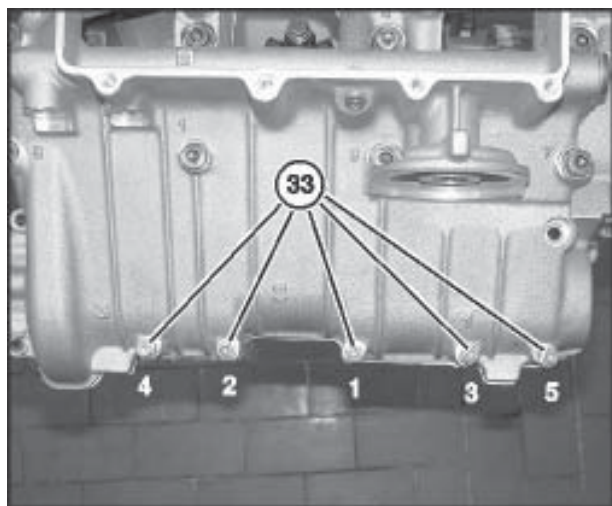
Tighten screws (32) in two phases.



1st 10 N·m 1 Kg-m



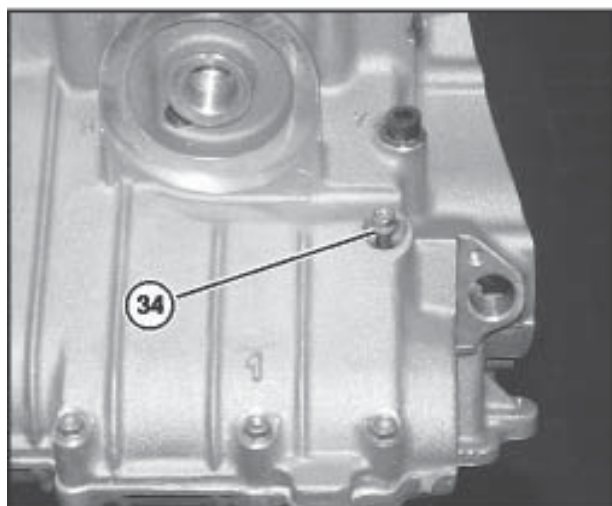
2nd 25 N·m 2.5 Kg-m



Tighten screws (33) according to the order in the figure.



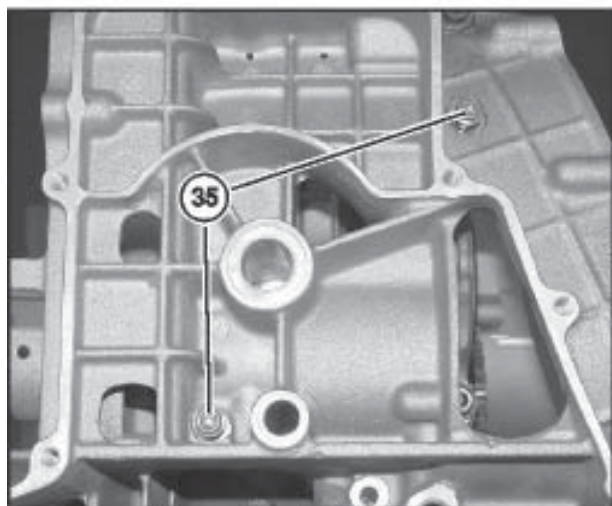
10 N·m 1 Kg-m



Tighten screw (34).



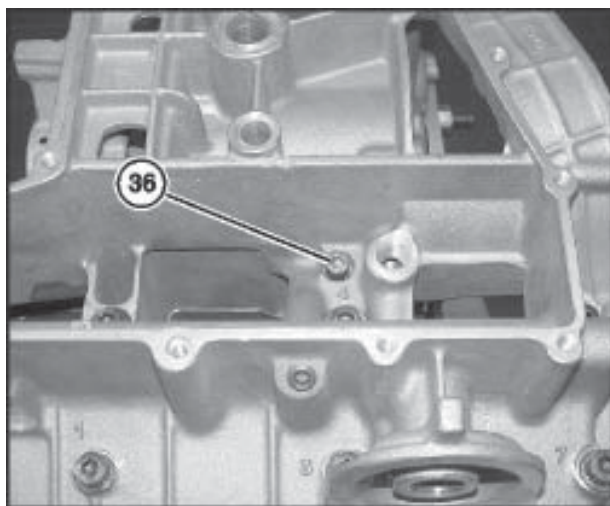
10 N·m 1 Kg-m



Tighten the two screws (35).



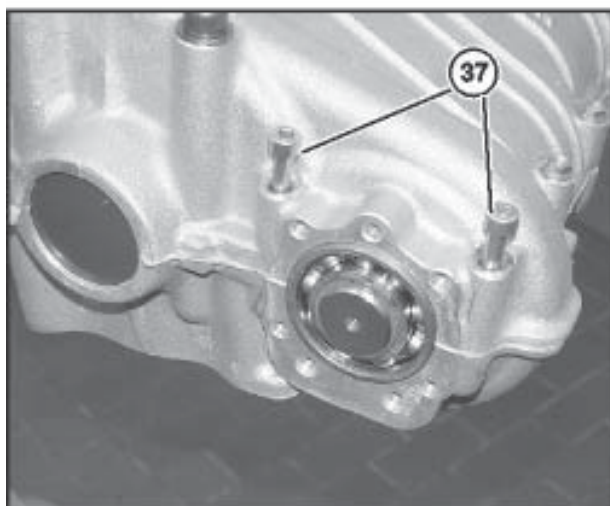
10 N·m 1 Kg-m



Tighten screw (36).



10 N·m 1 Kg-m



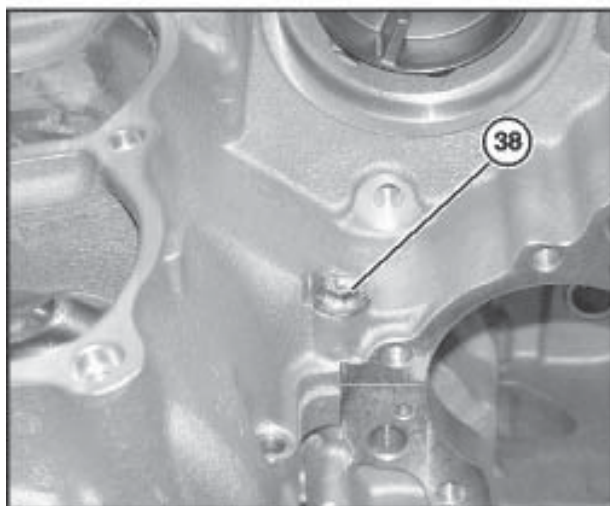
Tighten the two screws (37) in two phases.



1st 10 N·m 1 Kg-m



2nd 25 N·m 2.5 Kg-m



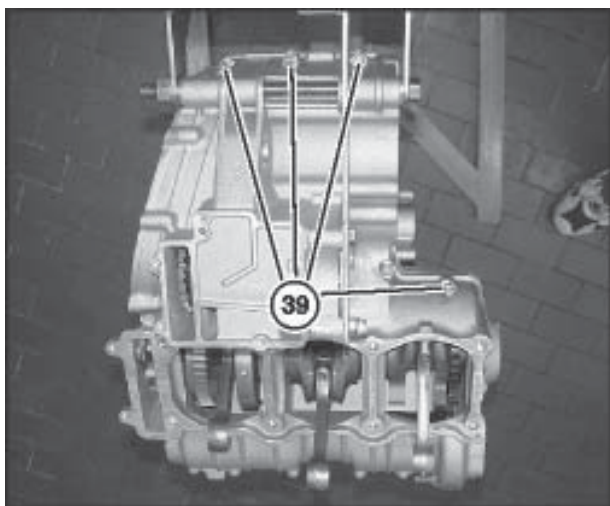
Tighten screw (38) in two phases.



1° 10 N·m 1 Kg-m



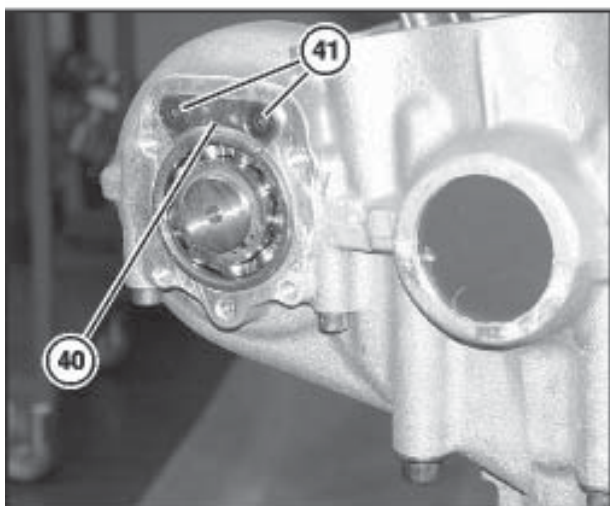
2° 25 N·m 2.5 Kg-m



Tighten the four screws (39).



1° 10 N·m 1 Kg-m



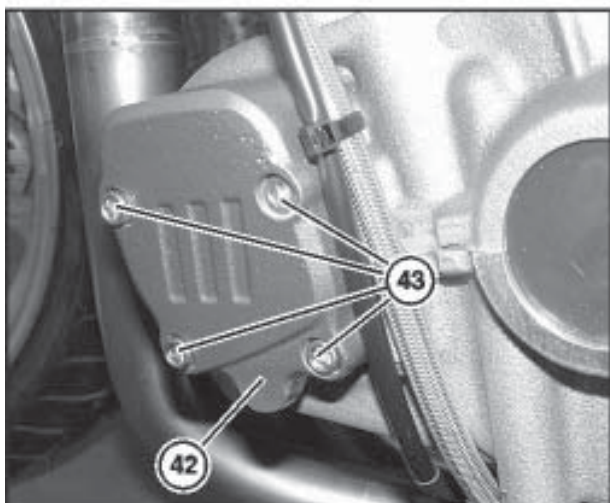
Position balancing counter shaft ball-bearing stop plate (40) and fix with the two screws (41) tightly.



10 N·m 1 Kg-m



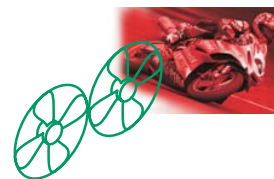
WARNING:
Always use new gaskets.



Apply THREEBOND 1215 sealing paste on the surfaces of the casing and the cover.
Position the gasket and the counter shaft cover (42).
Tighten the screws (43).

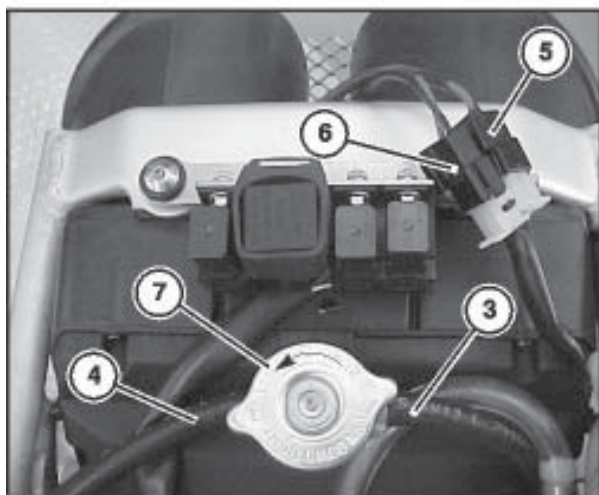
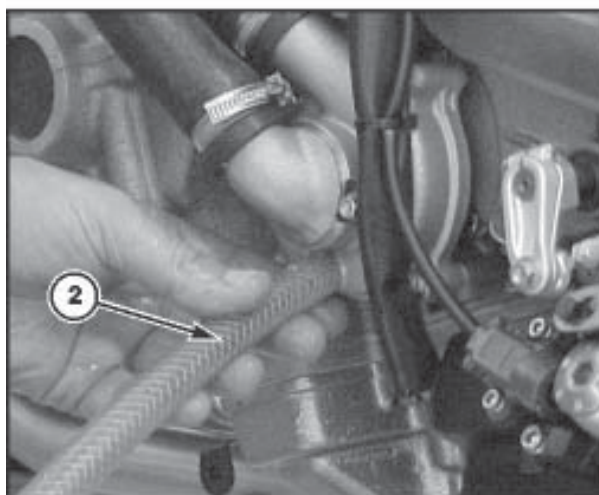
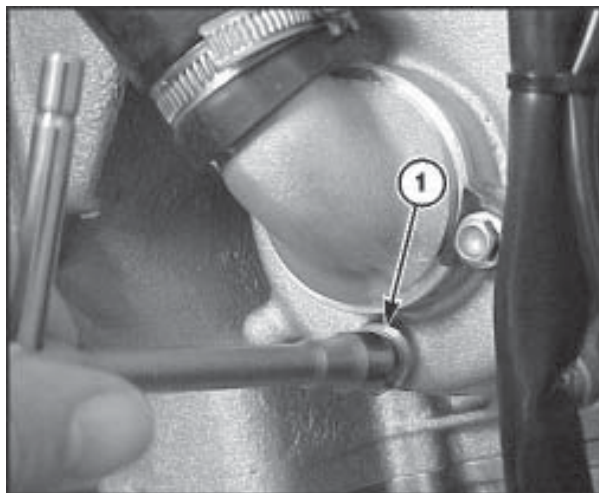


10 N·m 1 Kg-m



Cooling Plant

6 COOLING PLANT



6.1 RADIATOR

6.1.1 DISMANTLE RADIATOR

Remove rearview mirrors (see "DISMANTLE REARVIEW MIRRORS").

Remove the small cap (see "DISMANTLE SMALL CAP").

Remove the internal instrument board fastenings (see "DISMANTLE INTERNAL INSTRUMENT BOARD FASTENINGS").

Remove the lower semi-cowling (see "DISMANTLE LOWER COWLING").

Remove the upper semi-cowling (see "DISMANTLE UPPER COWLING").

Remove the tailpiece (see "DISMANTLE TAILPIECE").

Remove the air box conduits (see "DISMANTLE AIR BOX").

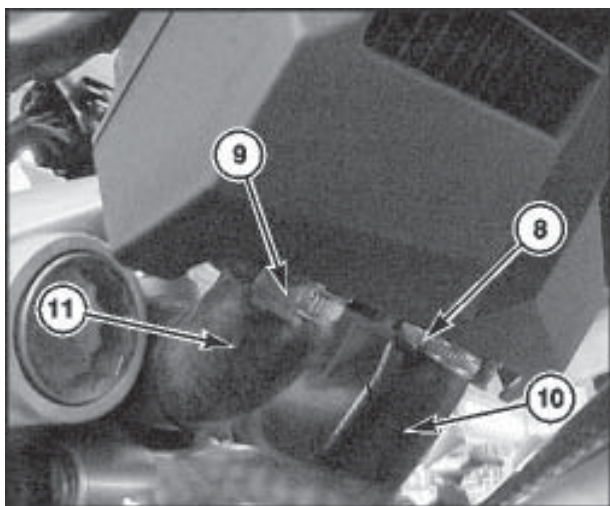
Remove the radiator conduits (see "DISMANTLE RADIATOR").

Unscrew the screw on the water pump (1) to purge the radiator liquid (2) (positioning a recipient to collect the liquid).

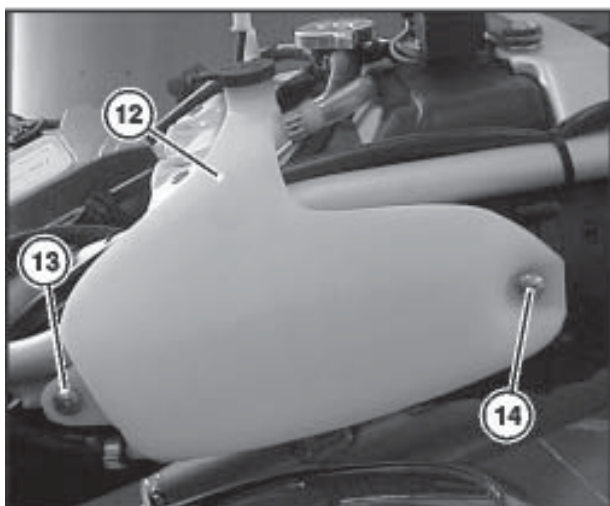
Disconnect the radiator cap purge tubes (3) and (4).

Disconnect the two fan connectors (5) and (6).

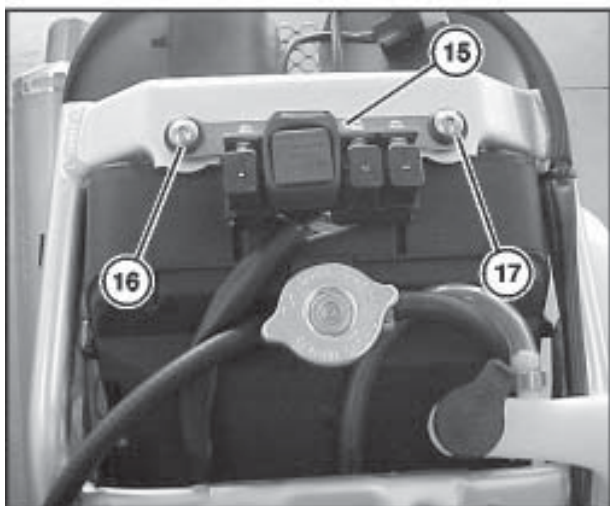
Unscrew the radiator cap (7).



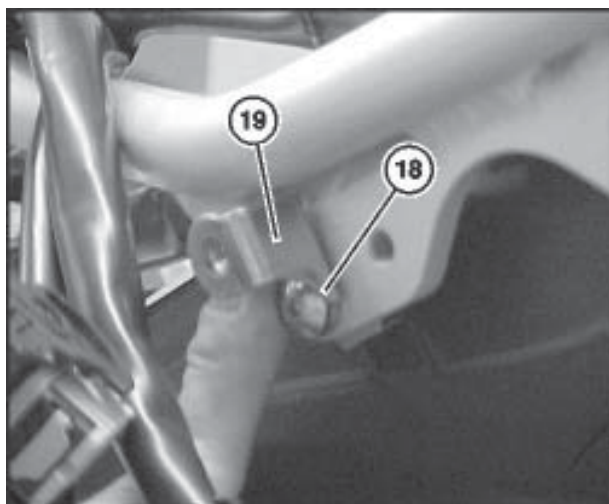
Unscrew the two small bands (8) and (9) of the send and return radiator tubes (10) and (11).



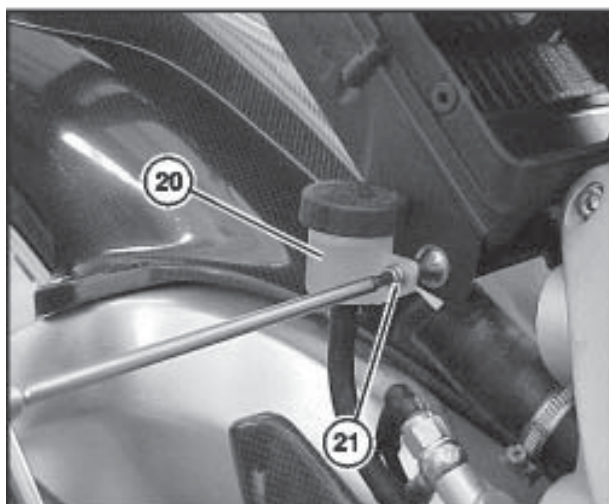
Remove the expansion tank, unscrewing the two fixing screws (13) and (14).



Remove the relay support rod (15), unscrewing the two fixing screws (16) and (17).



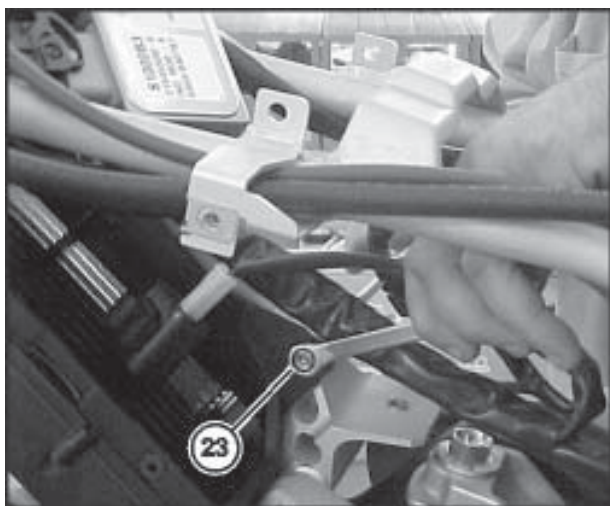
Remove the fixing screw of the expansion tank support plate (19) and the radiator box.



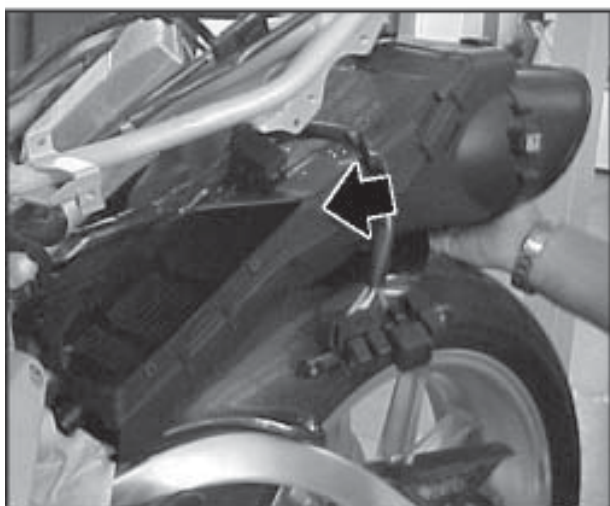
Remove the rear brake oil tank (20) unscrewing screw (21), taking care not to upset it.



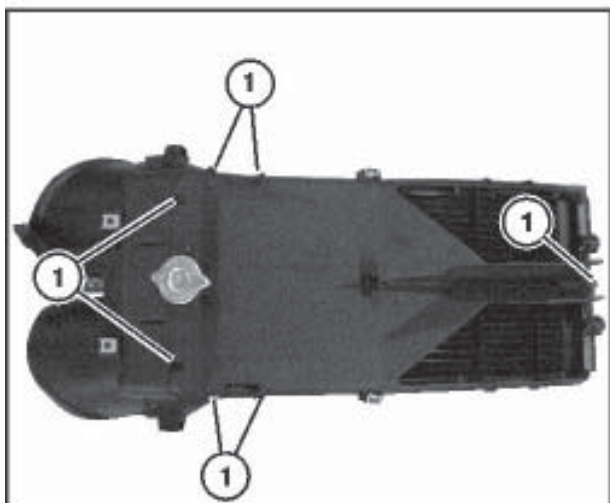
Remove the radiator box fixing screw (22) (right side).



Remove the central radiator box fixing screw (23).

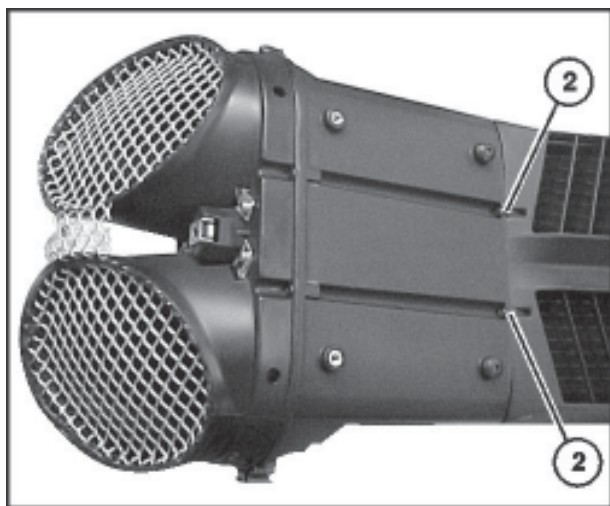


Press lightly on the radiator box in the engine forward direction to unhook it.
Take the radiator box off.

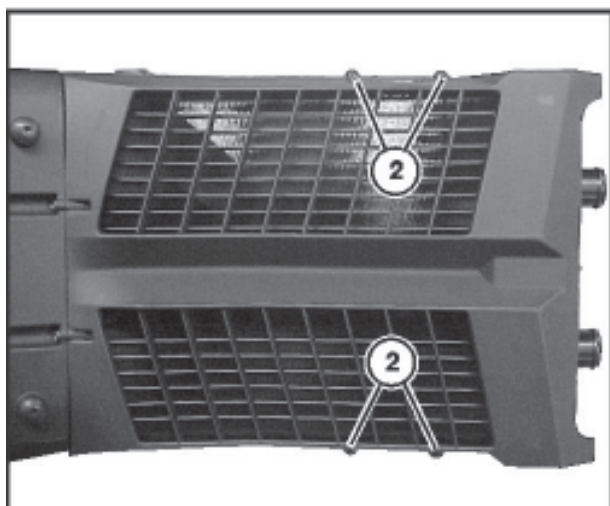


6.1.2 DISMANTLE RADIATOR BOX

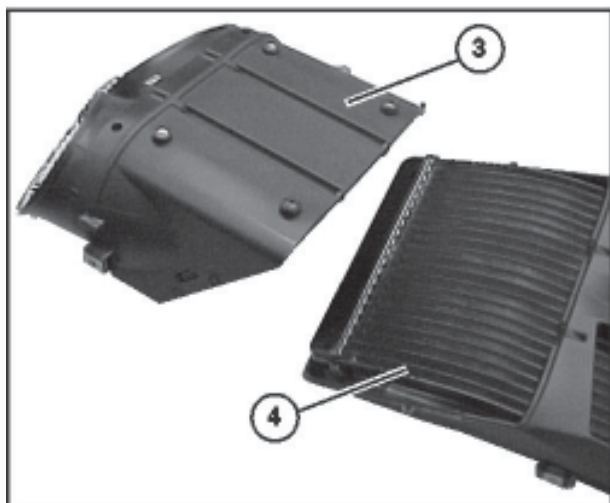
Position the radiator box on a surface with the cap upwards.
Unscrew the seven screws (1).



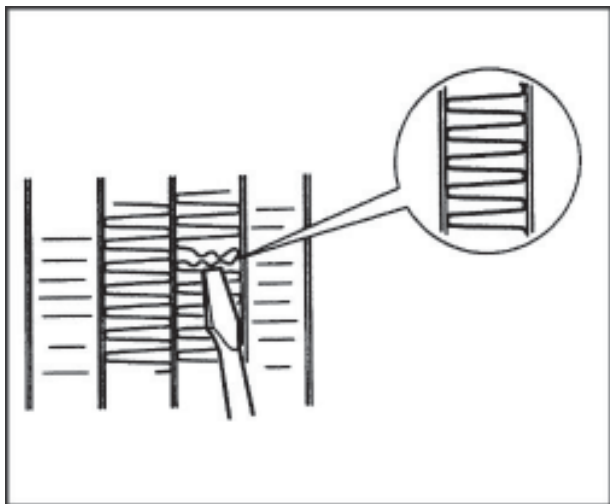
Rotate the radiator box and unscrew the screws (2).



Unscrew the last four screws (2).

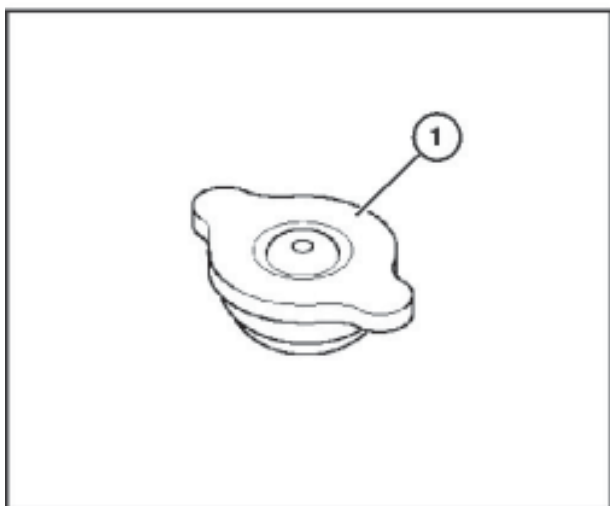


Unhook the fan body (3) and extract the radiator (4).

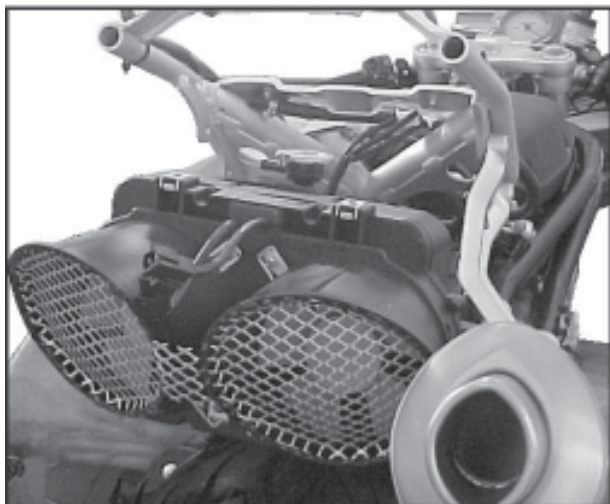


6.1.3 CHECK RADIATOR

Check the state of the radiator fins.
Repair or change the radiator if necessary.
Check the state of the radiator entry and exit tubes.
Change the elements if necessary.

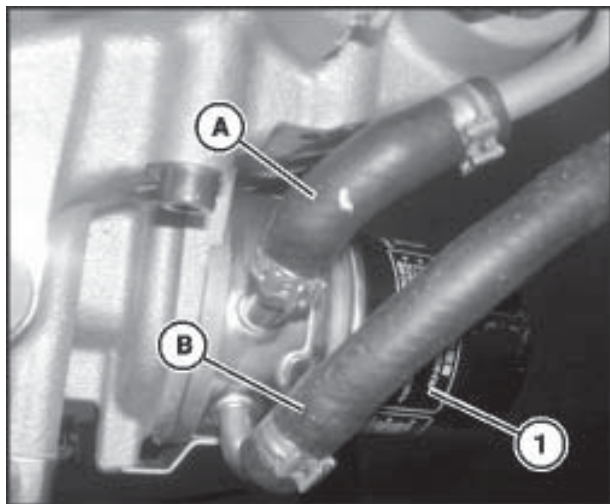


Check the radiator tap seal (1), checking that it is not damaged.



6.1.4 MOUNT RADIATOR

Reverse the operations described in the dismantling procedure.
Pour the refrigerant liquid into the the cooling plant (see "CHANGE REFRIGERANT LIQUID").



6.2 WATER OIL EXCHANGER

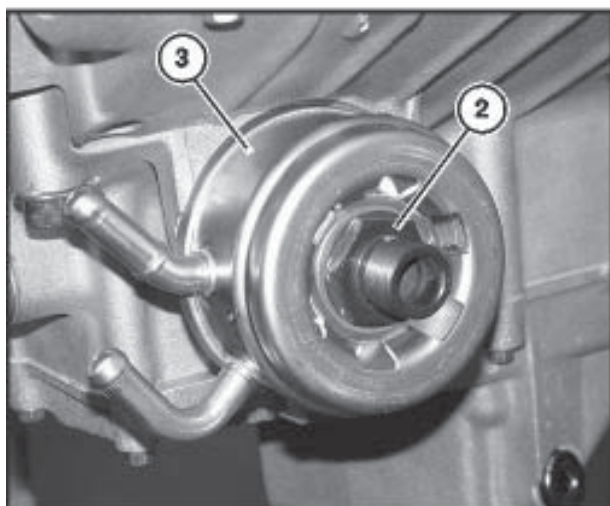
Remove the semi-cowling (see "DISMANTLE SEMI-COWLING").

Remove the wheel housing (see "DISMANTLE WHEEL HOUSING").

Remove the exhaust plant. Discharge the liquid refrigerant circuit (see "CHANGE LIQUID REFRIGERANT").

Remove the engine oil filter (1) (see "REMOVE OIL FILTER").

Disconnect the entry and exit connectors (A) and (B).



NOTE:

Take care not to lose the clearance.

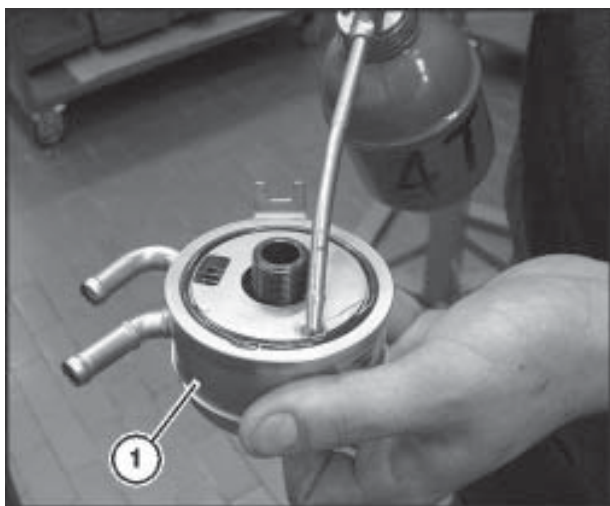
Loosen and remove screw (2) and remove the exchanger (3).



Check that the exchanger is not damaged, otherwise change the element.

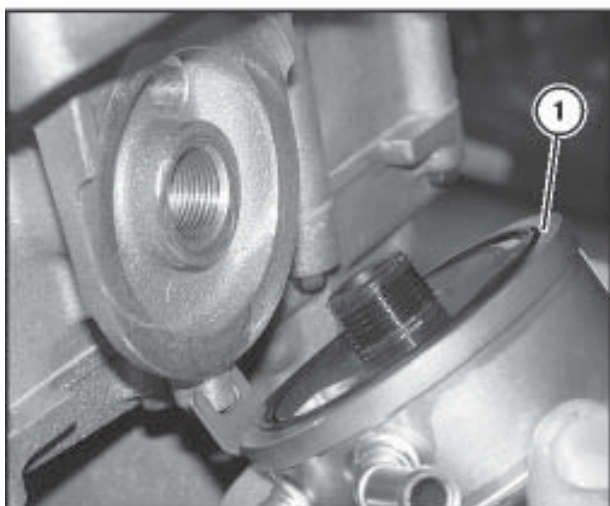
Check that there are no breaks in the entry and exit tubes.

Change the damaged element if necessary.

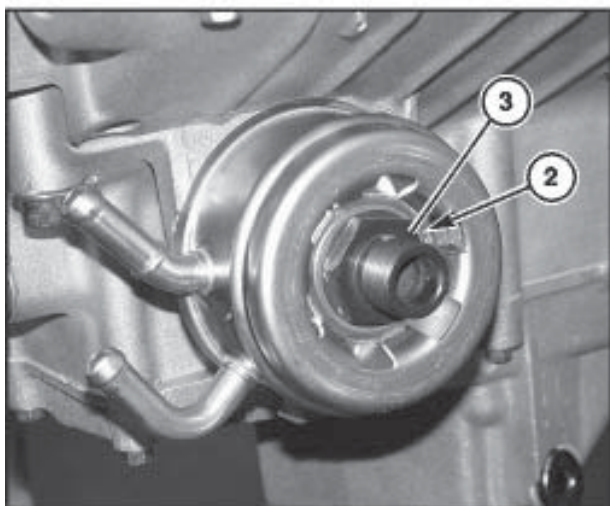


6.2.1 MOUNT EXCHANGER

Oil the O-Ring on the exchanger (1).



Position the exchanger (1) as in the figure.



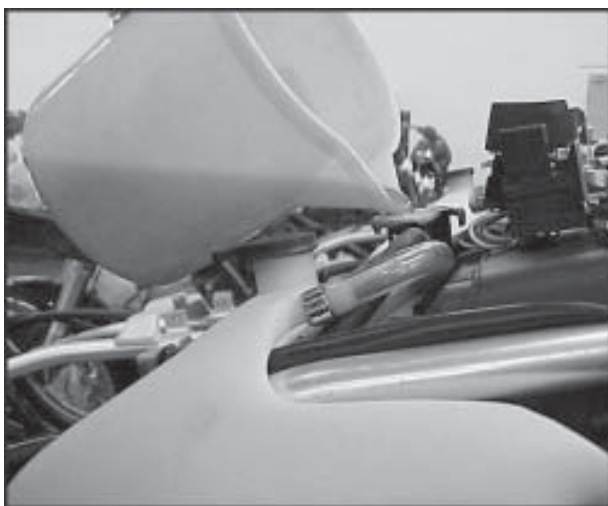
WARNING:
Always re-mount the clearance element.

Insert the clearance element (2) before the connector to screw (3).

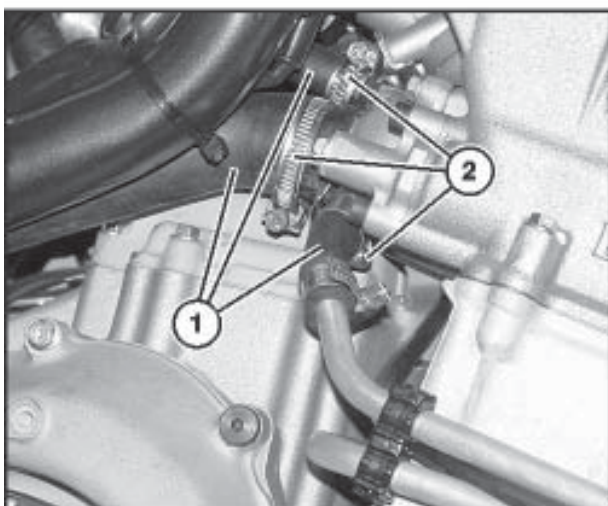
Tighten screw (3) in two phases.



1st phase: 30 N·m 3 Kg-m
2nd phase: 60 N·m 6 Kg-m
Use LOCTITE 243®



Reintroduce the liquid advised into the cooling circuit (see "CHANGE REFRIGERANT LIQUID").
Remount the oil filter(see "CHANGE OIL FILTER").
Reintroduce the lacking oil into the engine.
Remount the exhaust plant.
Remount the wheel housing.
Remount the semi-cowling.



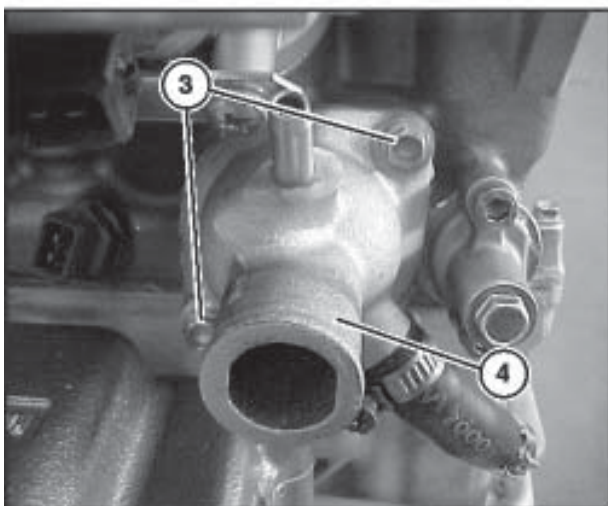
6.3 THERMOSTAT

6.3.1 DISMANTLE THERMOSTAT

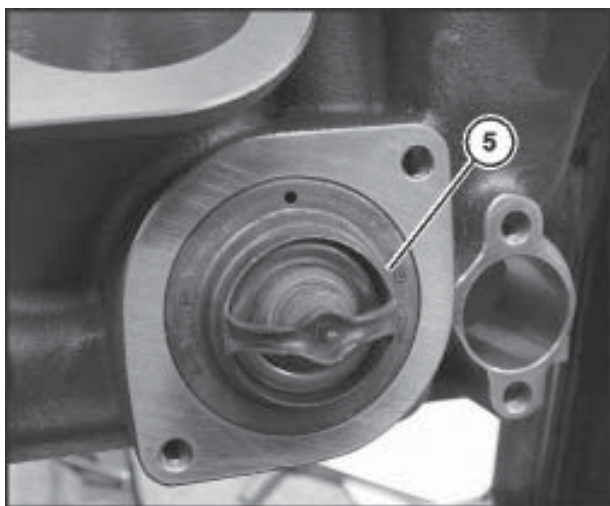


WARNING:
Always use new gaskets and oil seals.

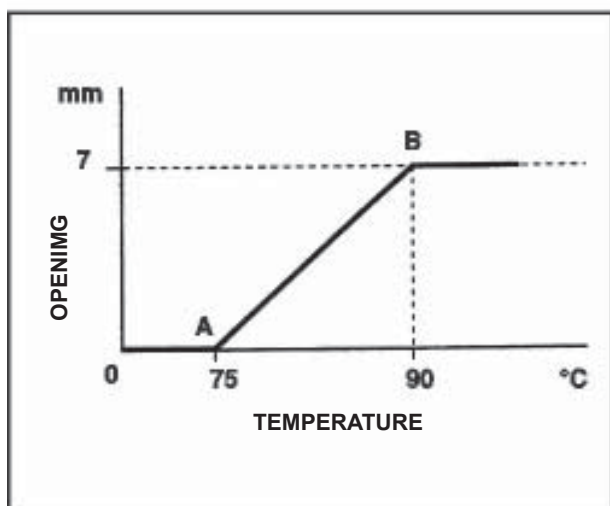
Remove the refrigerant liquid from the cooling circuit (see "CHANGE REFRIGERANT LIQUID").
Remove the tubes (1), loosening the bands (2).



Loosen and remove the two screws (3) and remove the thermostat cover (4).

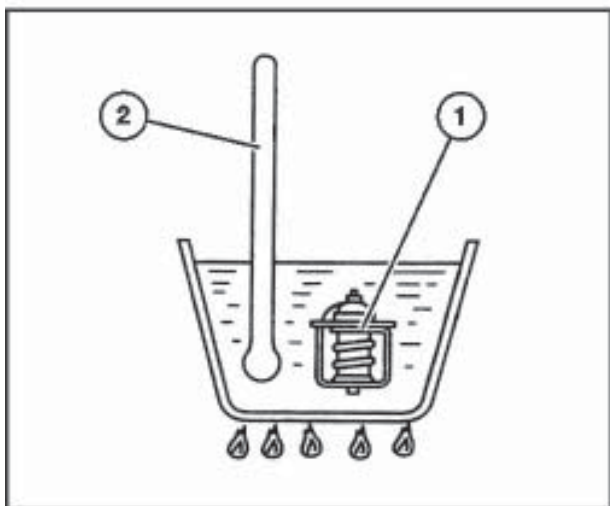


Remove the thermostat (5).



6.3.2 CHECK THERMOSTAT

The thermostat begins to open at 75°C and reaches the maximum opening of 7 mm at 90°C, as shown in the diagram in the figure.

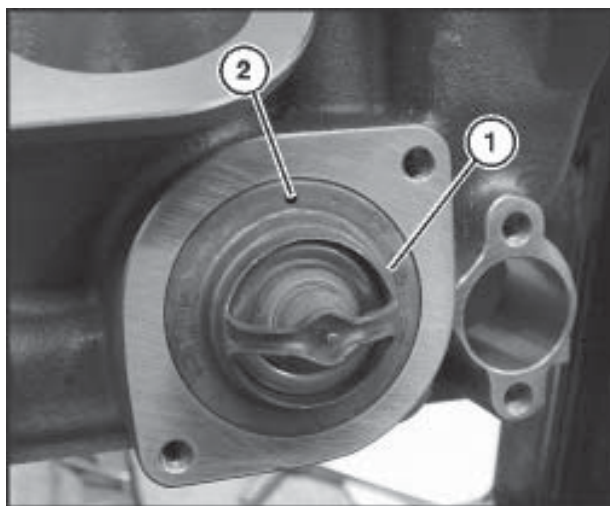


Check the above conditions by immersing the thermostat (1) in a container with water.

Slowly heat the water and check the temperature with a thermometer (2).

Change the thermostat if necessary.

Check that the thermostat cover and the tubes connected to it are not broken, otherwise change the damaged element.



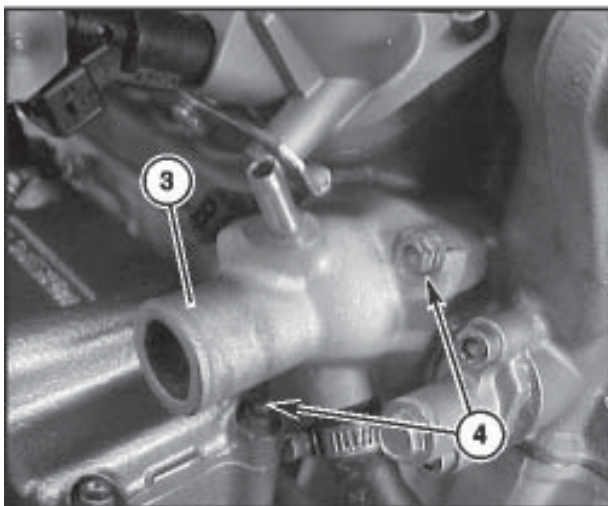
6.3.3 MOUNT THERMOSTAT



WARNING:

The thermostat must be mounted with the by-pass hole (2) turned upwards, as in the figure.

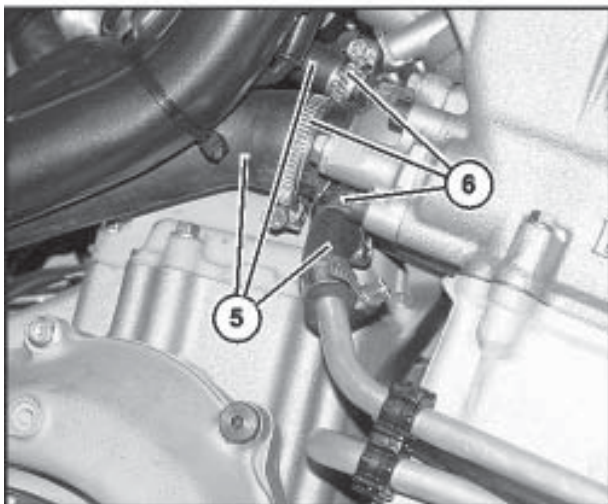
Position the thermostat (1) as indicated in the figure.



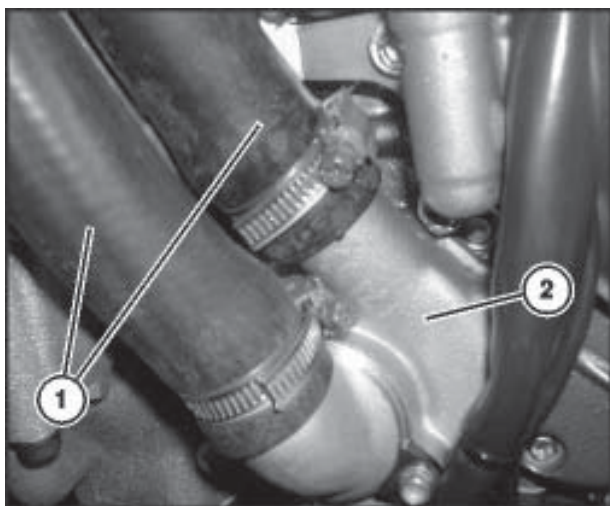
Position the thermostat cover (3) and tighten with the two screws (4) il coperchio termostato (3) e fissare con le due viti (4).



10 N·m 1 Kg-m



Position the tubes (5) and tighten with the bands (6).
Reinsert the refrigerant liquid into the cooling circuit (see "CHANGE REFRIGERANT LIQUID"),

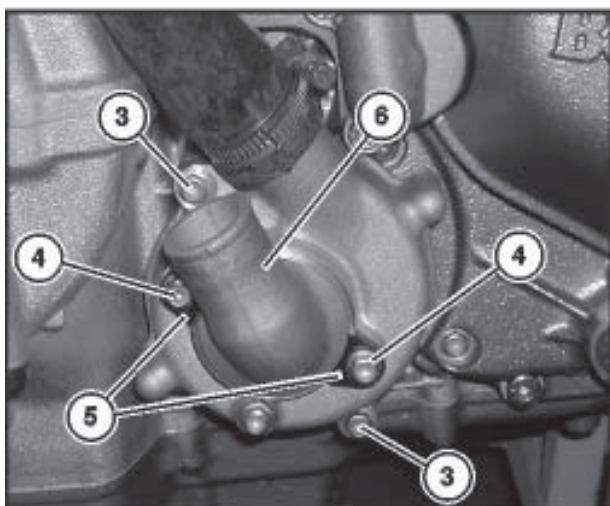


6.4 WATER PUMP

6.4.1 REMOVE WATER PUMP

Remove the refrigerant liquid from the cooling circuit ("CHANGE REFRIGERANT LIQUID").

Remove the two entry and exit tubes (1) in the pump (2).

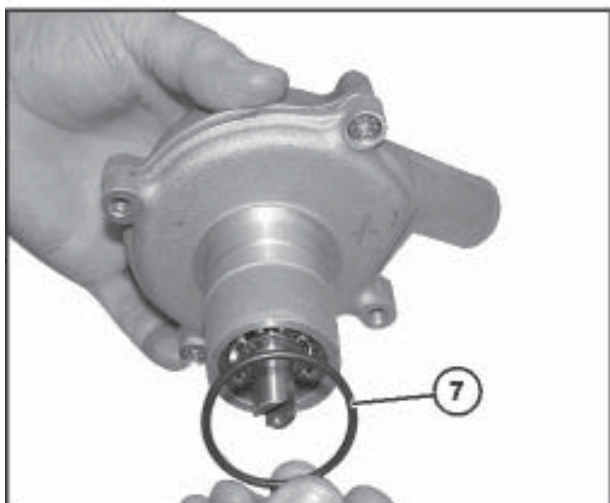


6.4.2 DISMANTLE WATER PUMP

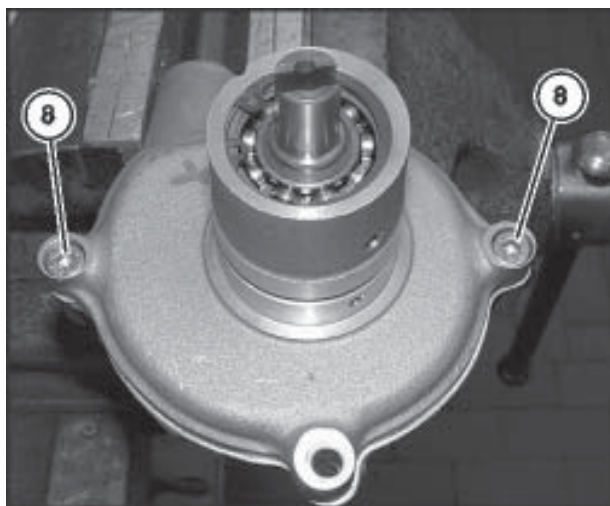
Loosen and remove the two screws (4) and the small plates (5).

Remove the entry elbow (6).

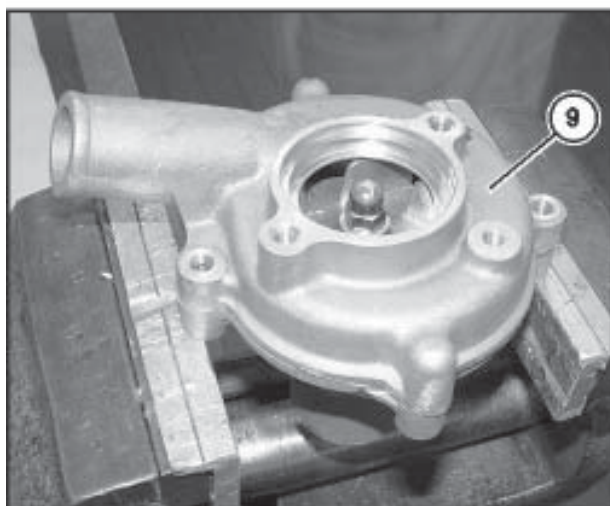
Loosen and remove the two screws (3) and remove the water pump.



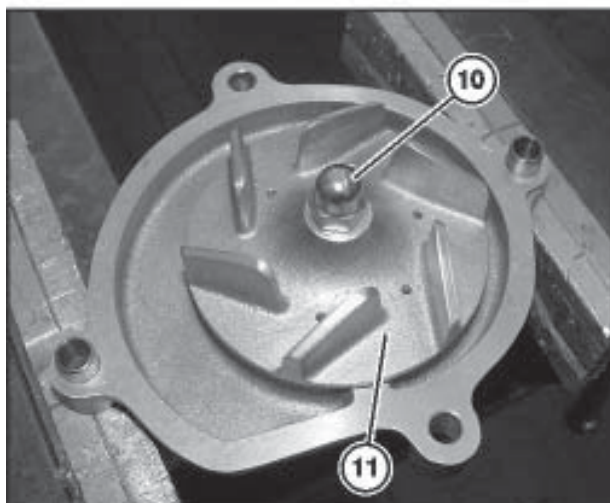
Remove the O-Ring (7).



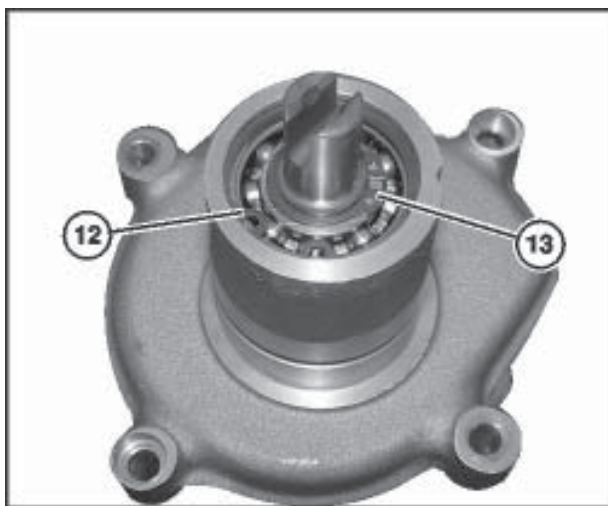
Loosen and remove the two screws (8).



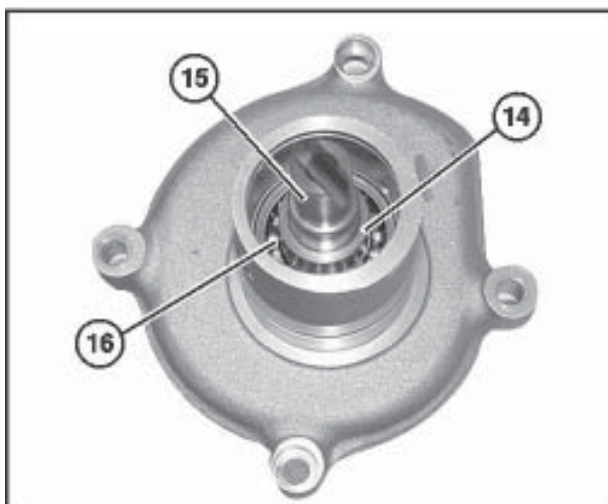
Remove the cover (9).



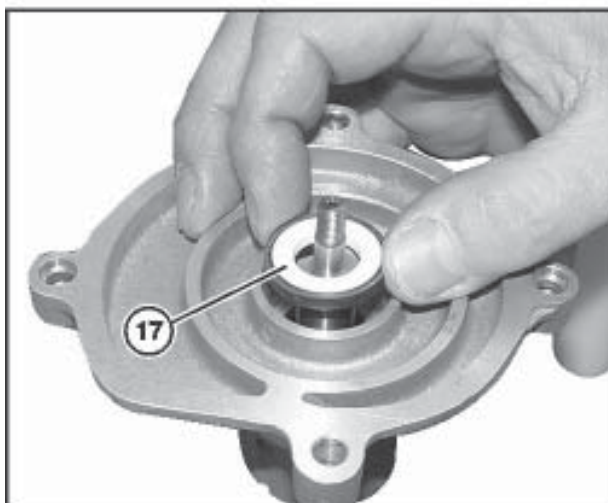
Loosen and remove the nut (10) and remove the rotor (11).



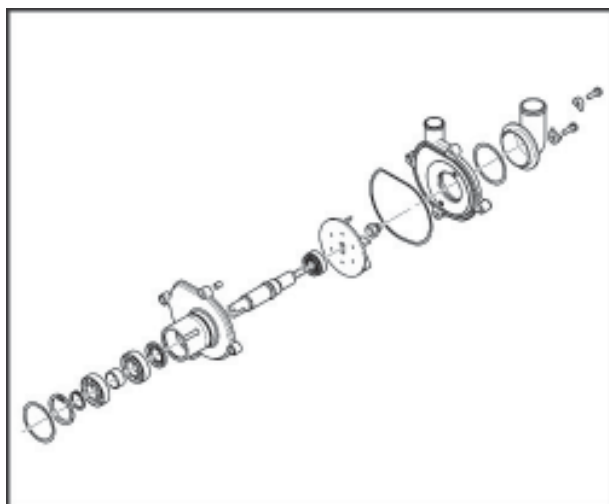
Remove the external circlip (12), the internal circlip (13) and the ball-bearing beneath.



Remove the liner (14), the shaft (15), the ball-bearing (16) and the oil seal beneath.

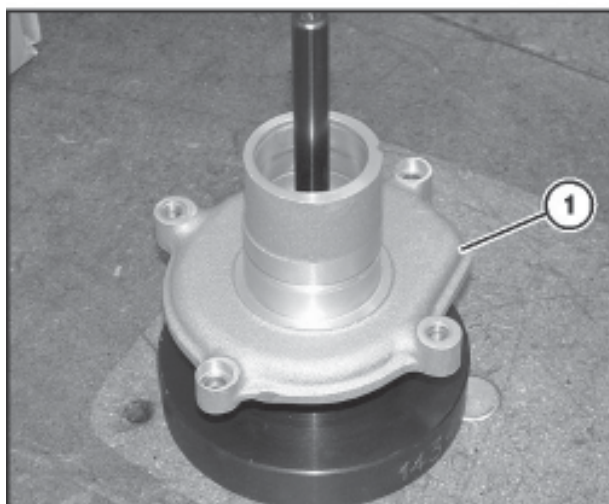


Remove the mechanical seal (17).



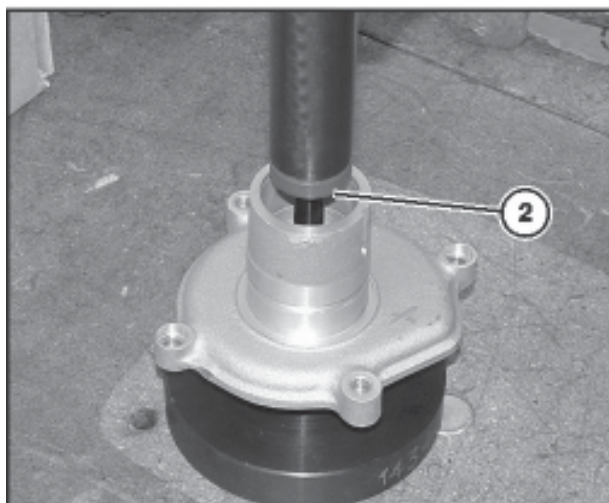
6.4.3 CHECK WATER PUMP

Check the state of wear of the various components of the pump.
Check that the various elements are not broken.
Change worn or damaged elements if necessary.



6.4.4 ASSEMBLE WATER PUMP

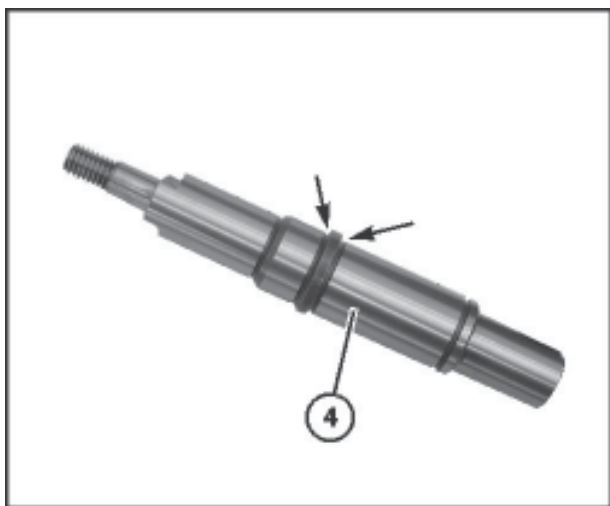
Position the pump body (1) on a support.



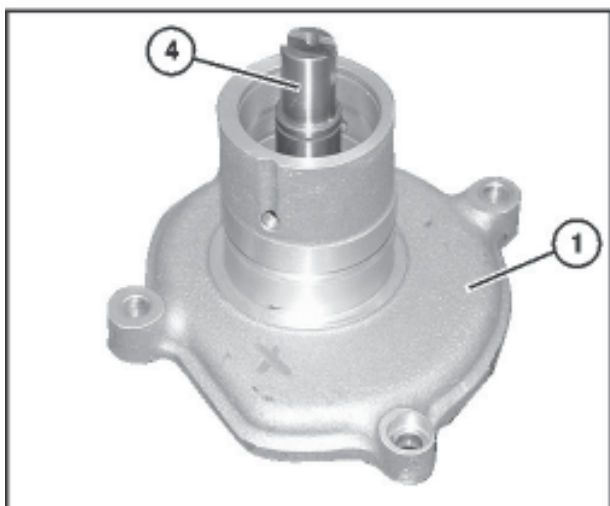
WARNING:

The oil seal must be inserted downwards with the lip closed.

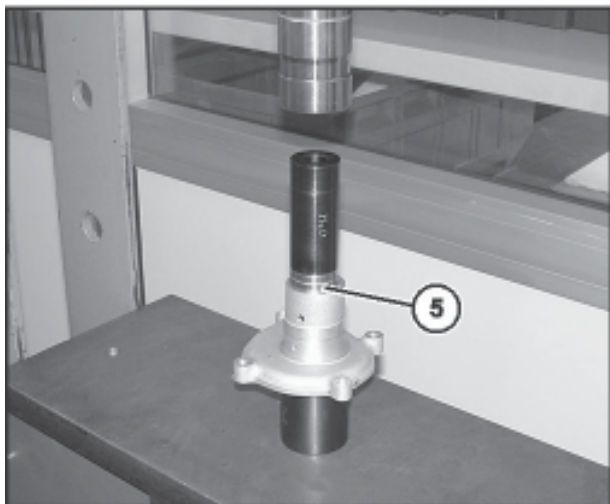
Position the oil seal until it touches (2).



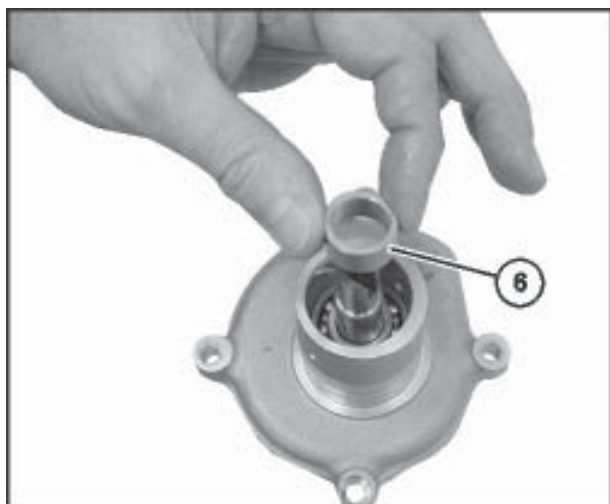
Grease the shaft (4) at the points indicated in the figure.



Position the shaft (4) inside the pump body (1).



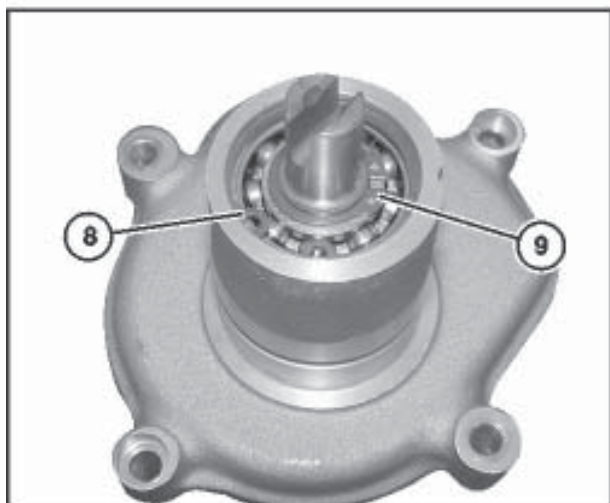
Position the first ball-bearing (5), using a press to make it touch.



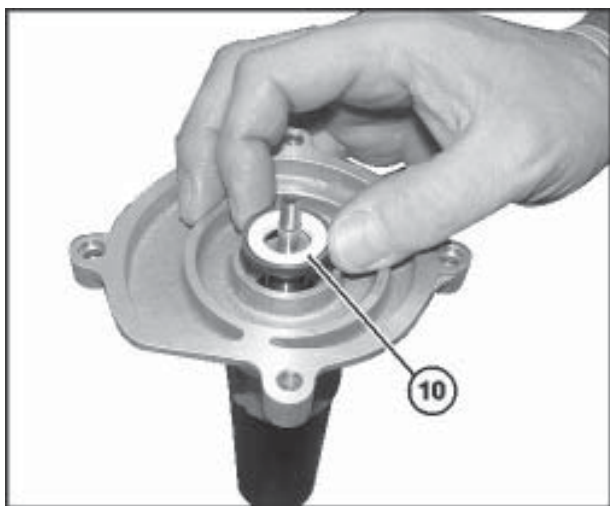
Position the liner (6).



Position the second ball-bearing (7), using a press to make it touch.

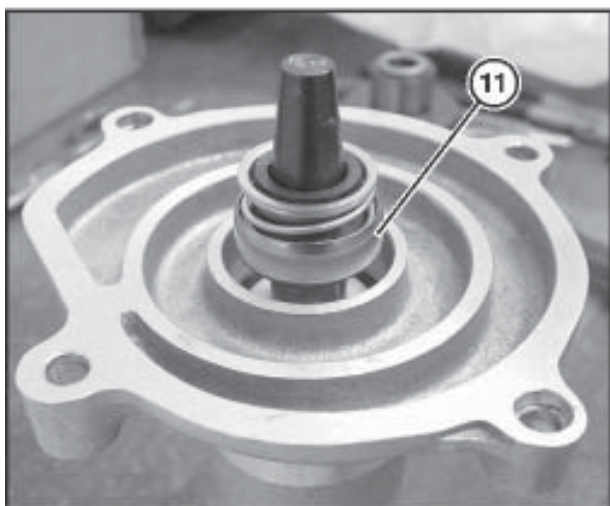


Fix the ball-bearings with the external (8) and internal (9) circlips.

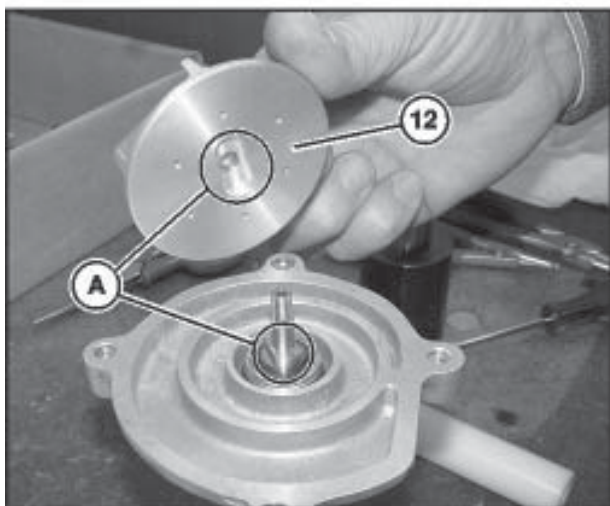


WARNING:
While mounting the counterface and the mechanical seal make sure that they are clean and bear no traces of grease.

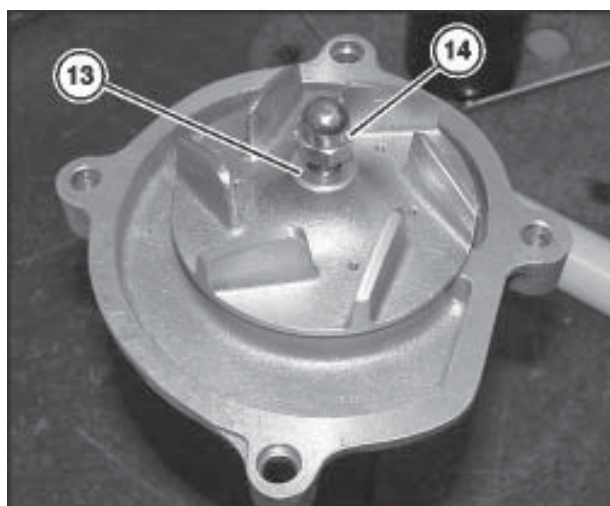
Position the counterface as in the figure (10).



Position the mechanical seal (11) until it touches as shown in the figure.



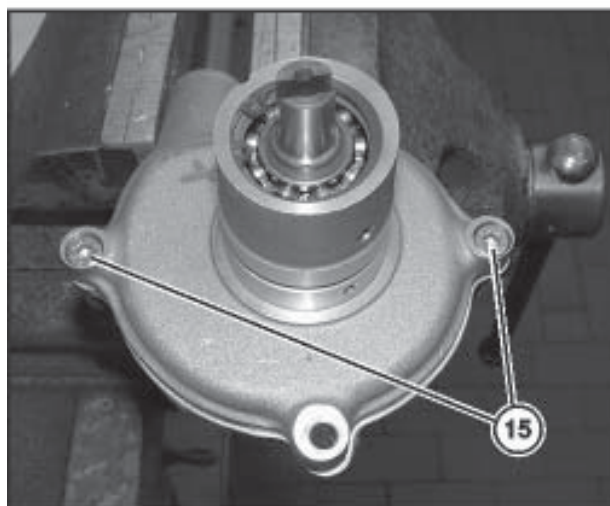
Position the rotor (12) making it meets clutch (A).



Position the sealing washer (13) and fix it tight with the nut (14).



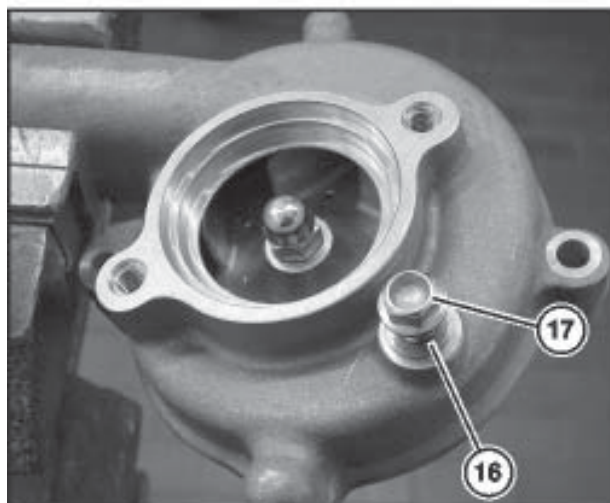
8 N·m 0.8 Kg-m
Always use LOCTITE 243®



Position the cover and lock it tight with the two screws (15).



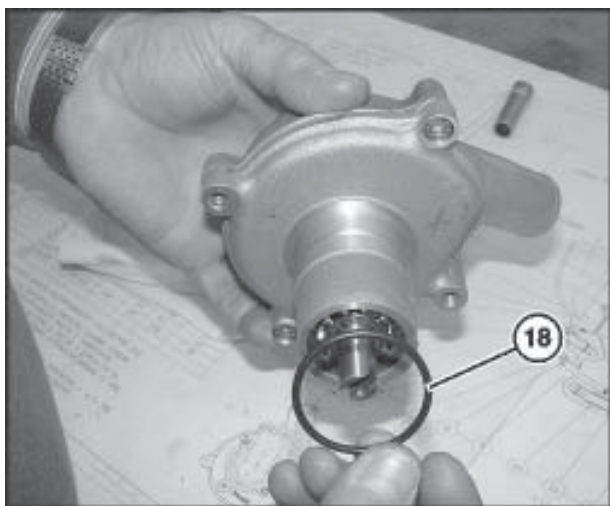
10 N·m 1 Kg-m



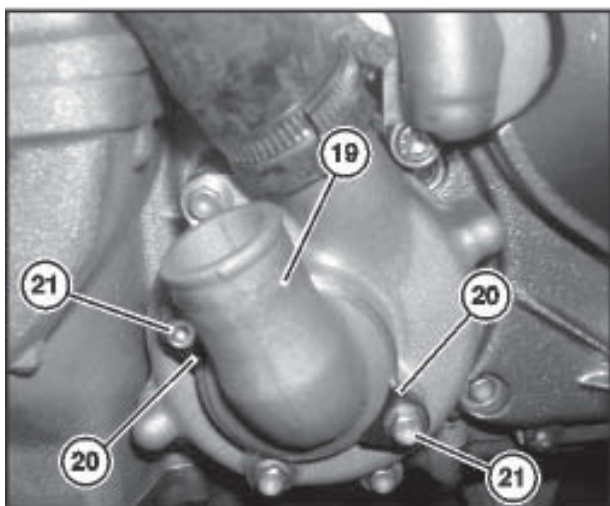
Position the sealing washer (16) and tightly screw the purge screw (17) up.



10 N·m 1 Kg-m
Always use LOCTITE 243®



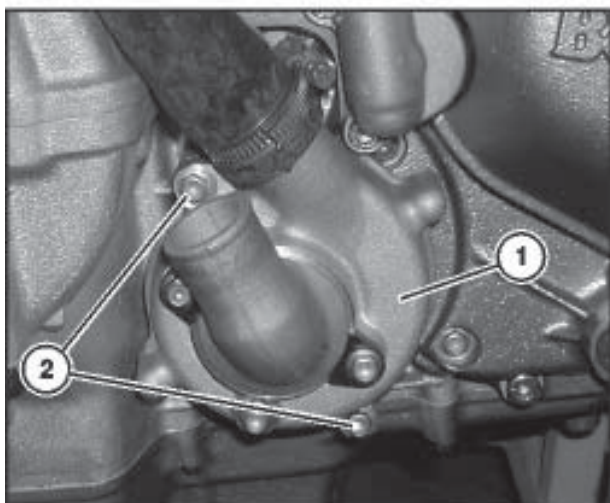
Position the O-Ring (18) on the pump body.



Position the entry elbow (19) and fix with the two small plates (20) and the two screws (21) tightly.



10 N·m 1 Kg-m

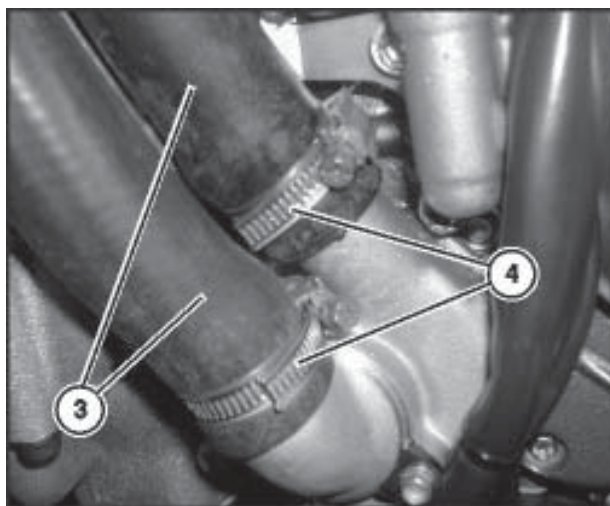


6.4.5 MOUNT WATER PUMP

Position the pump (1) as in the figure and screw the two screws (2) up tightly.



10 N·m 1 Kg-m
Always use LOCTITE 243®



Reposition the entry and exit tubes (3) of the pump, tightening the two bands (4).



Restore the level of the liquid in the circuit (see "CHANGE COOLING LIQUID").





Frame

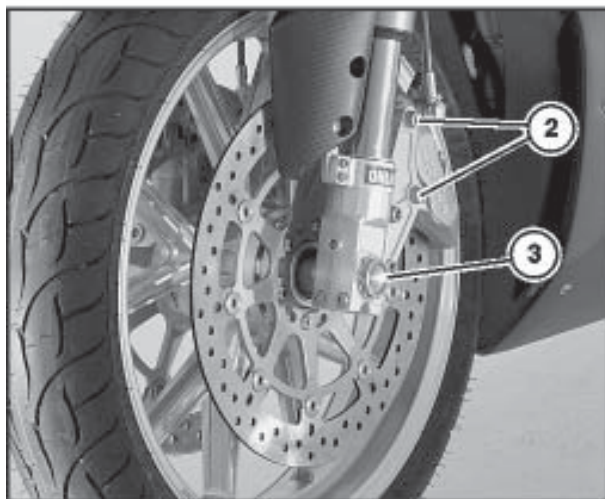
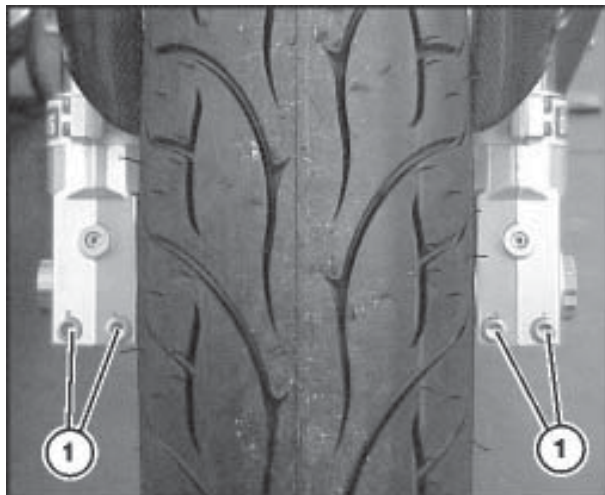
7 FRAME

7.1 FRONT WHEEL AND BRAKE DISKS

7.1.1 REMOVE FRONT WHEEL

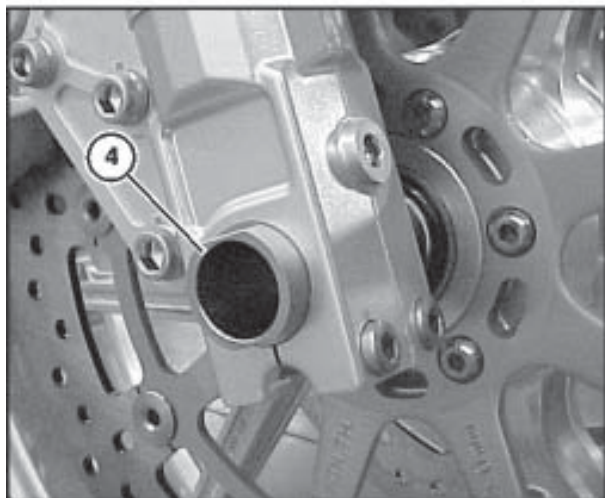
Prepare a support suitable to sustain the bike without the front wheel.

Loosen the four fork clamp screws (1).



Loosen and remove the brake clamp fixing screws (2) on both sides.

Loosen and remove the wheel pin screw (3).



WARNING:

Note the position of the elements for correct re-mounting.

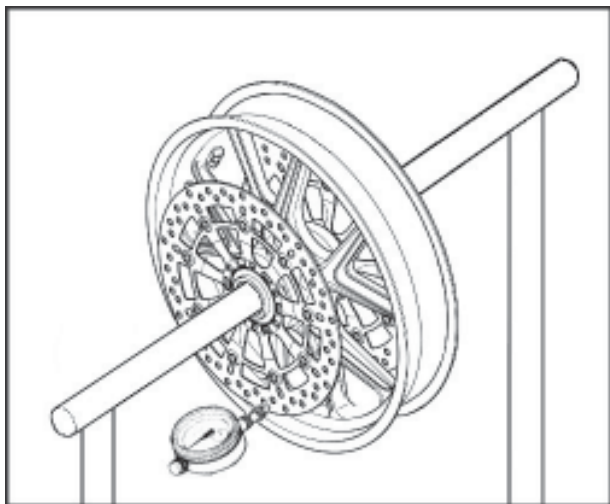


WARNING:

During the following operation, prevent the left spacer falling.

Remove the pin (4).

Remove the front wheel. .



7.1.2 CHECK FRONT BRAKE DISKS



WARNING:

The following procedures must also be applied to the opposite disk.

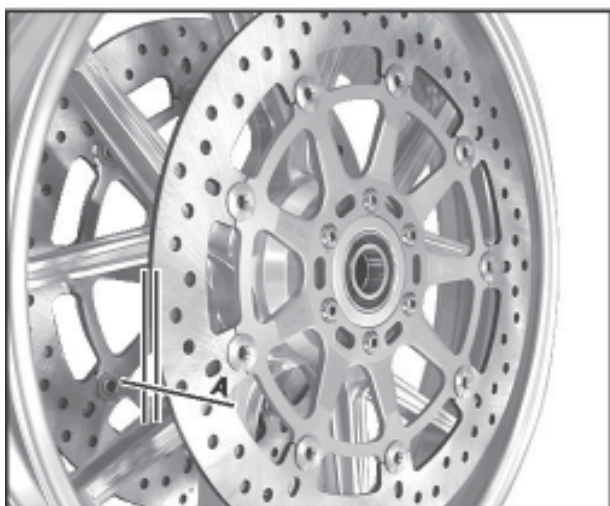


WARNING:

The following procedures must be applied with the disk mounted on the wheel.

Check the lateral displacement of the brake disk with a comparator.

The lateral displacement must enter within the specific value. If the value of the displacement does not enter within the specific value, change the piece.



SPECIFIC VALUE

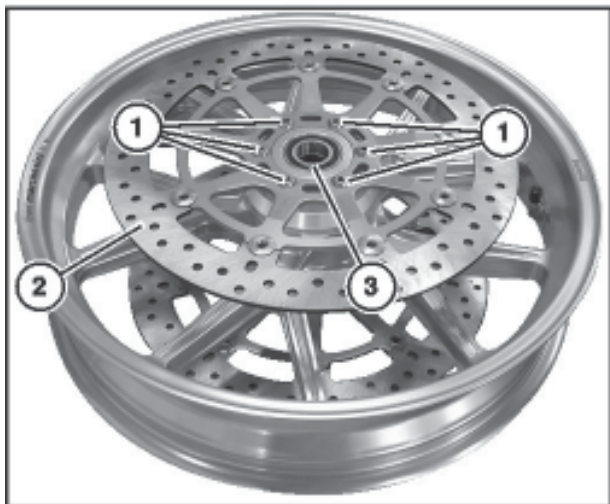
Lateral displacement = 0.3 mm

Check the state of wear of the disk with a gauge. If the value of the liner (A) does not enter within the specific value, change the piece.



SPECIFIC VALUE

A = 4.5 mm



7.1.3 DISMANTLE FRONT WHEEL



WARNING:

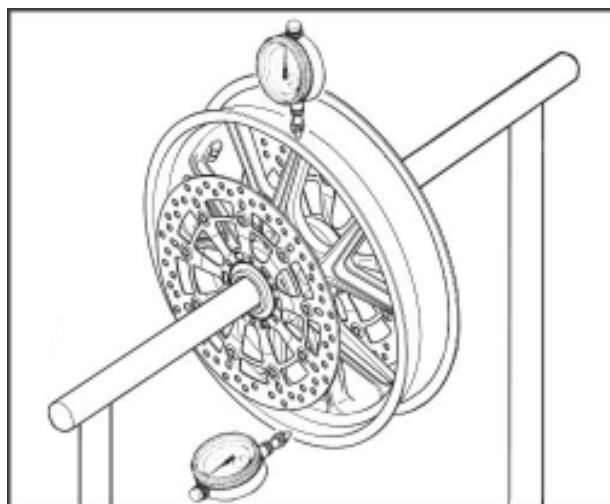
During the following procedure, prevent the internal spacer falling if dismantling the ball-bearings is envisaged.

Remove the six disk (2) fixing screws (1).

Remove the disk (2) and the ball-bearing (3).

The operation of removing the ball-bearings is to be carried out exclusively if requested by the maintenance plan or if the ball-bearing could be the source of malfunctioning. Once removed the ball-bearings must be changed.

Repeat the operations on the opposite side of the wheel as well.



7.1.4 CHECK FRONT WHEEL



WARNING:

Change the brake disk fixing screws. The ball-bearings must be changed if removed.

Carry out the radial and axial check on the front rim (see "CHECK WHEEL"), using a comparator.

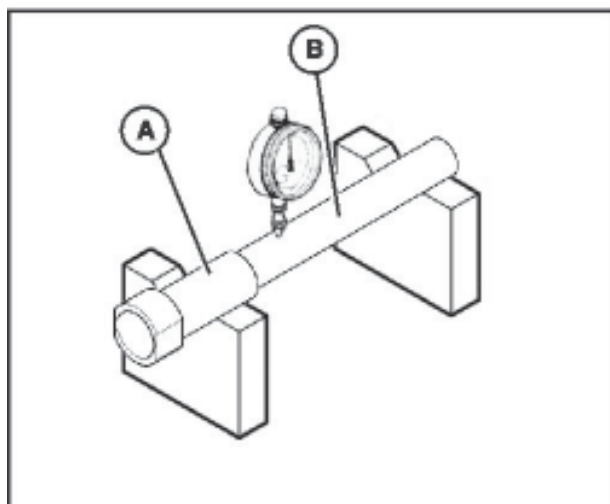
If the value of displacement does not enter within the specific value, change the piece.

Check the cylindricity of the front wheel pin.



SPECIFIC VALUE

A = 0.05 mm



WARNING:

Do not try to straighten a bent pin.

Check the lateral displacement of the two cylindrical zones (A) and (B) with respect to one another with a comparator.

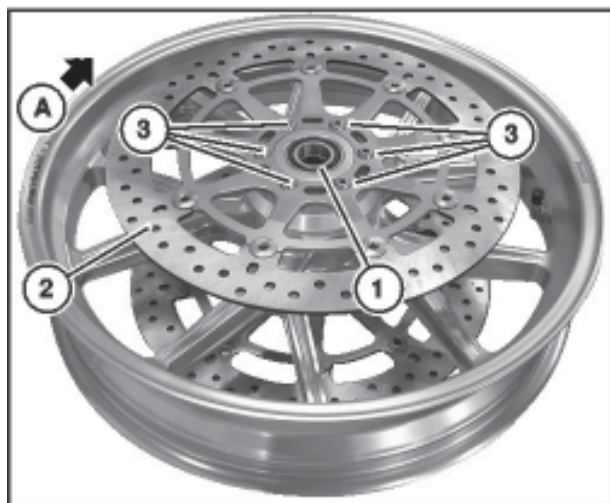
The lateral displacement (cylindricity error) must enter within the specific value.

If the lateral displacement value does not enter within the specific value, change the piece.



SPECIFIC VALUE

0.05 mm



7.1.5 MOUNT FRONT WHEEL



WARNING:

Before mounting the ball-bearings, identify correctly the right and left sides of the wheel, based upon the direction of rotation.

Place the left side ball-bearing (1) first until it touches.

Insert the internal spacer from the right side and place the right ball-bearing until it touches this spacer.

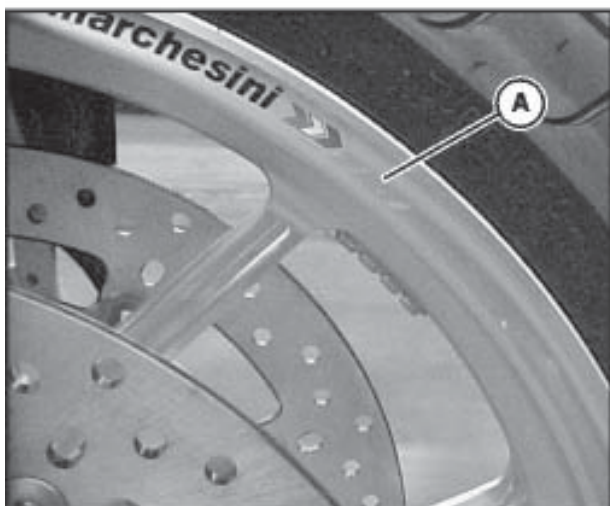
Position the two brake disks (2) and the fixing screws (3).



Tighten the disk fixing screws in the order indicated in the figure.
Do the same for the opposite disk.



22 N·m 2.2 Kg-m Grease thread



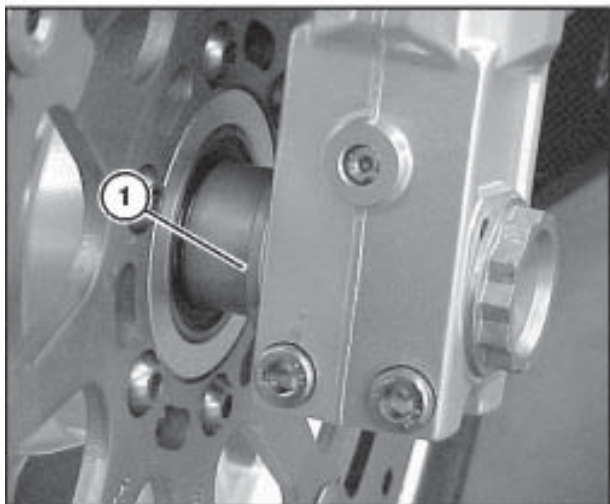
7.1.6 INSTALL FRONT WHEEL



WARNING:
After each operation on the bike it is advisable to balance it.



WARNING:
While installing the wheel pay attention to the direction of mounting.



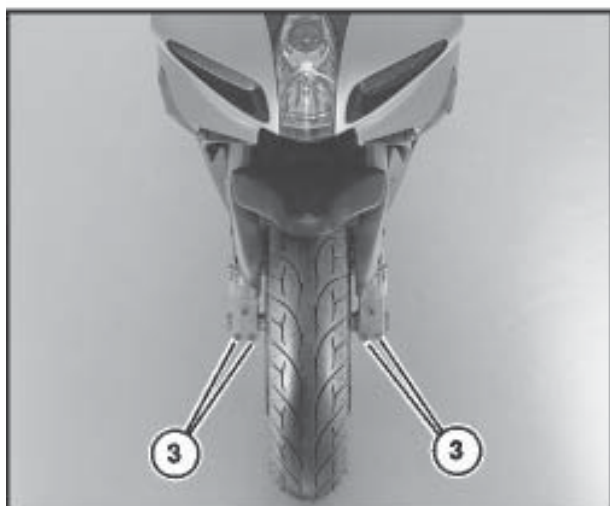
Position the front wheel and the left co-axial spacer (1) in their respective housing holes on the fork and insert the wheel pin from the right.



Tighten screw (2).



60 N·m 6 Kg-m Grease thread



Tighten the four screws (3) of the fork clamps. Mount the brake clamps.



**30 N·m 3 Kg-m Grease the thread
Clamp screws**



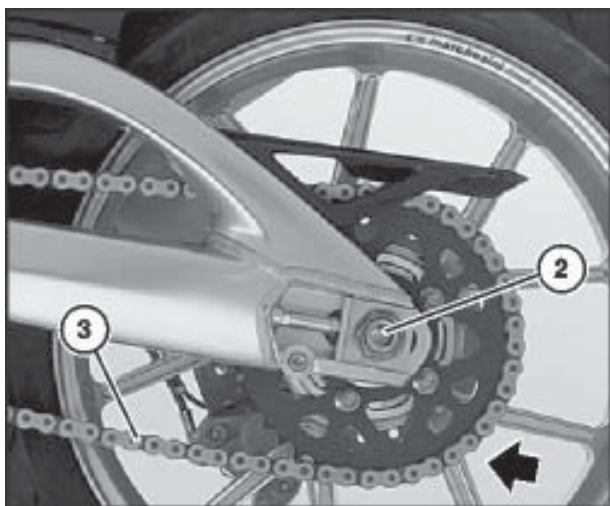
**50 N·m 5 Kg-m Grease the thread
Brake clamp screws.**



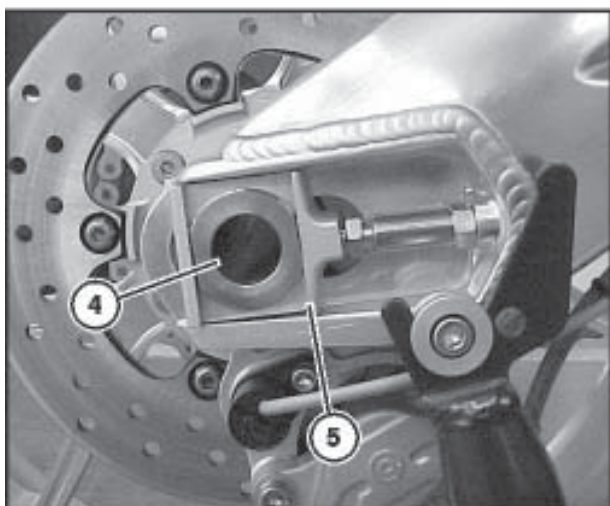
7.2 REAR WHEEL, BRAKE DISK AND CROWN

7.2.1 REMOVE REAR WHEEL

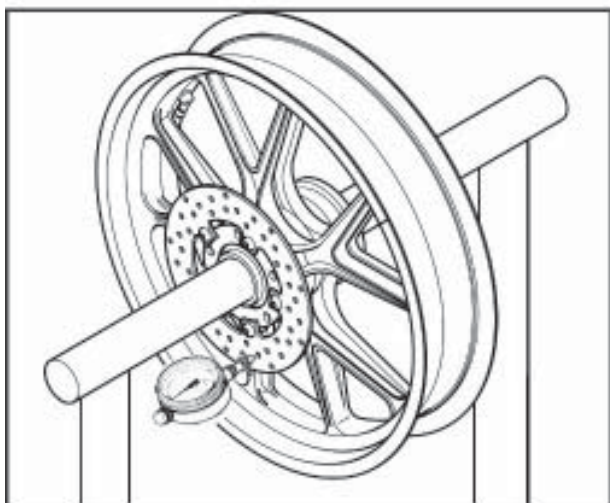
Position the bike on the supplied rear assembly stand (1).



Loosen and remove nut (2).
Undo the pin and push the wheel forward.
Disengage the chain (3) from the crown.



Remove nut (4) and the chain stretcher plate (5).
Remove the wheel.



7.2.2 CHECK REAR BRAKE DISK



WARNING:

The following procedure must be carried out with the disk mounted on the wheel.

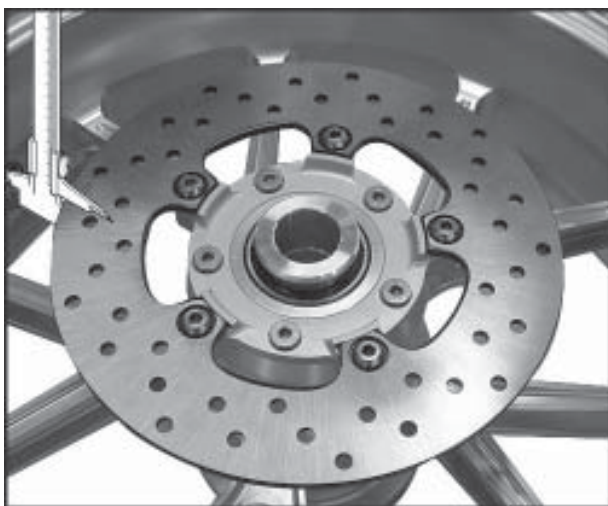
Check the lateral displacement of the brake disk with a comparator.

The lateral displacement must enter within the specific value.
If the value of the displacement does not enter within the specific value, change the piece.



SPECIFIC VALUE

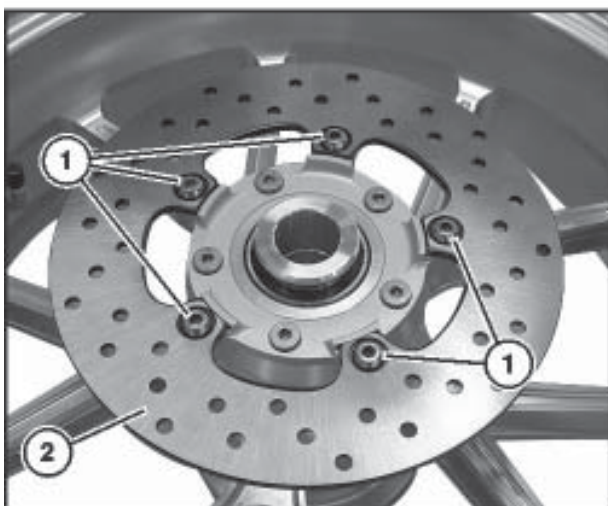
Lateral displacement = 0.3 mm



Check the state of wear of the disk with a gauge. If the value of the liner (A) does not enter within the specific value, change the piece.

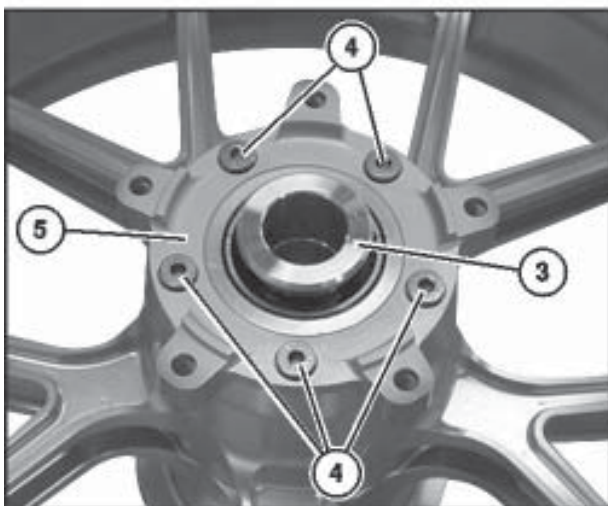


SPECIFIC VALUE
A = 4.5 mm

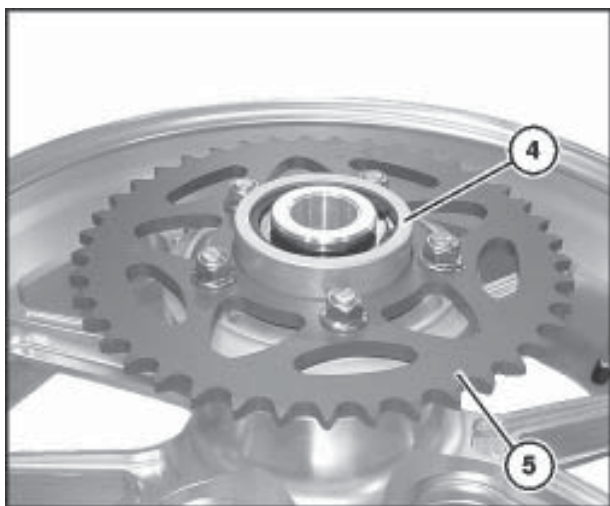


7.2.3 DISMANTLE REAR WHEEL

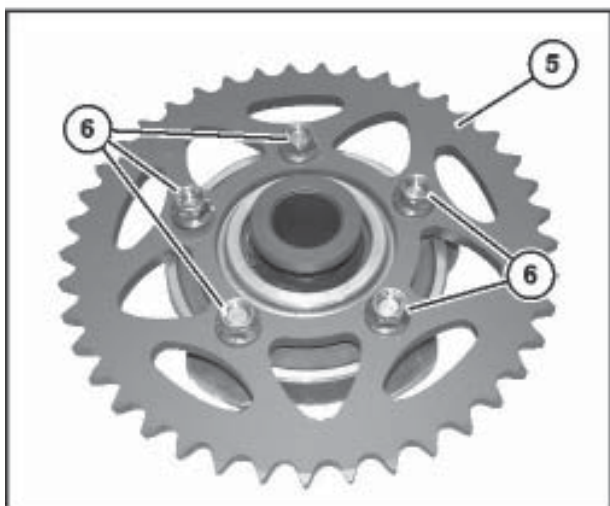
Loosen and remove the five brake disk fixing screws (1).
Remove the brake disk (2).
Change the brake disk fixing screws.



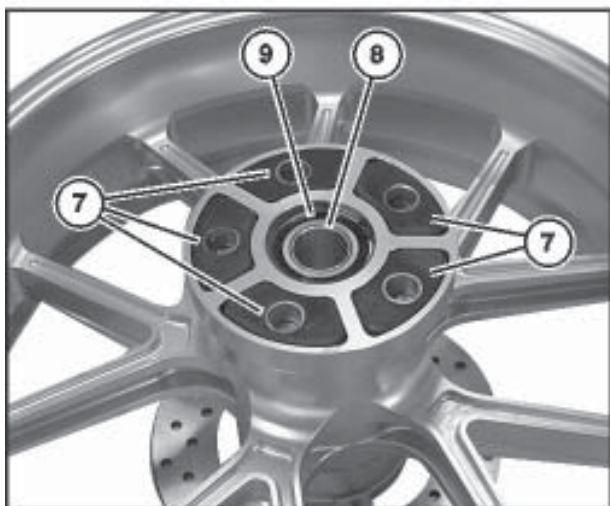
Remove the right spacer (3), extracting it from the wheel.
Loosen and remove the five disk holder flange fixing screws (4).
Remove the disk holder flange (5).
Change the disk holder flange fixing screws (4) at every dismantling.



Remove the flange (4) complete with crown (5), extracting it from the wheel.

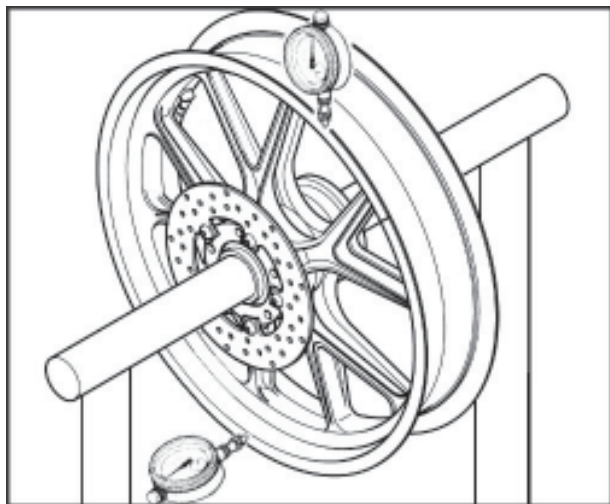


Loosen and remove the five nuts (6) and remove the crown (5) from the flange.



WARNING:
During the following operation prevent the internal spacer falling if dismantling the ball-bearings is envisaged.

Remove the five flexible couplings (7).
Remove the circlip (9).
Extract the ball-bearings (8) on both sides.
This operation is to be carried out exclusively if required by the maintenance plan or if the ball-bearing could be the source of malfunctioning.
Once dismantled, the ball-bearings must be changed.



7.2.4 CHECK REAR WHEEL



WARNING:
Change the fixing screws on the brake disk. If the ball-bearings are dismantled, they must be changed.

Carry out the radial and axial check on the rear rim (see CHECK WHEEL"), using a comparator.

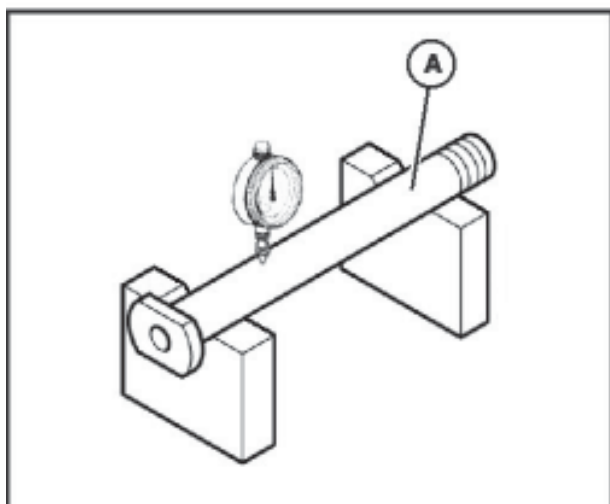
If the value of displacement does not enter within the specific value, change the piece.

Check the cylindricity of the rear wheel pin.



SPECIFIC VALUE

A = 0.05 mm



WARNING:
Do not try to straighten a bent pin.

Check the lateral displacement of the cylinder zone (A) with a comparator.

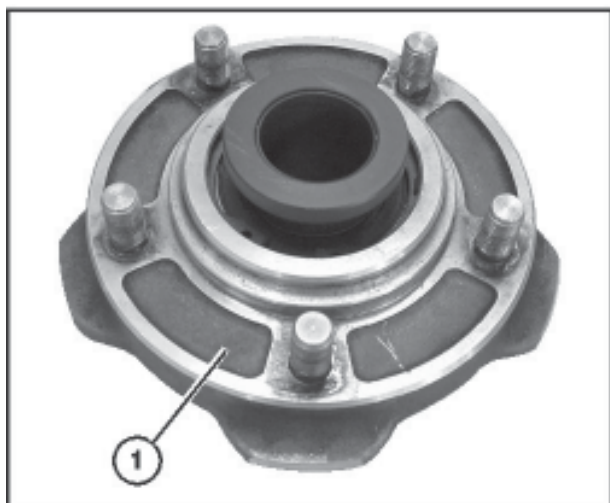
This lateral displacement (cylindricity error) must enter within the specific value.

If the value of the displacement does not enter within the specific value, change the piece.



SPECIFIC VALUE

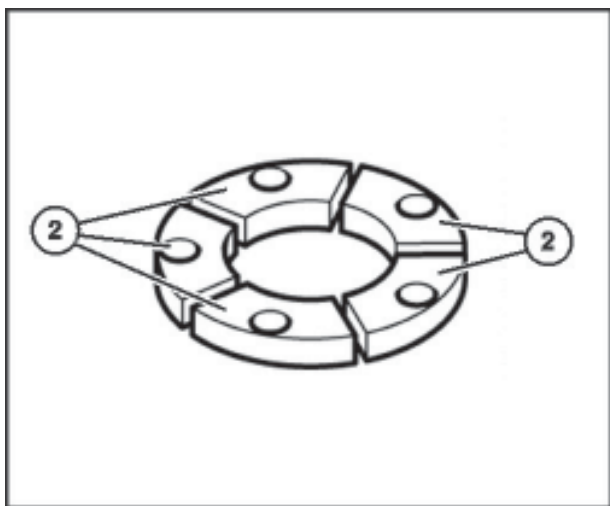
A = 0.05 mm



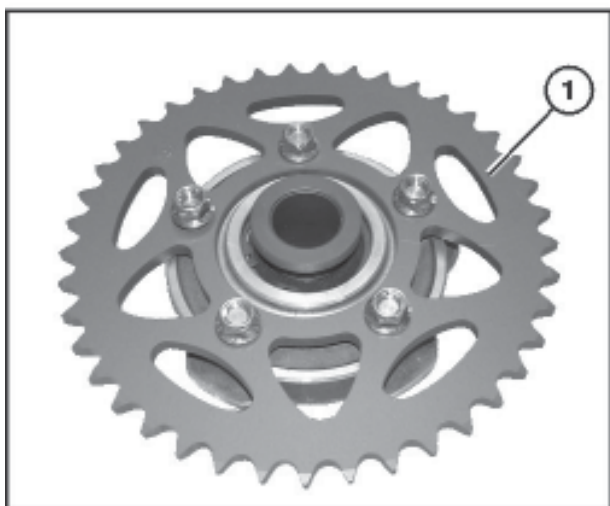
7.2.5 CHECK HUB

Check that the flange (1) is not broken.

If necessary, change it.

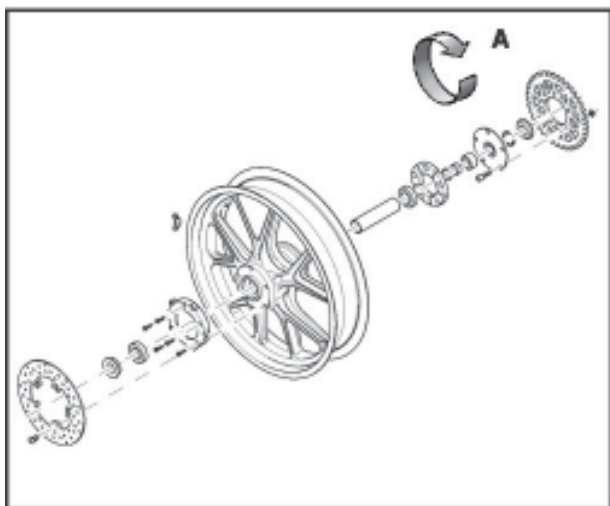


Check that the flexible couplings (2) are not broken.
If necessary, change them.



7.2.6 CHECK CROWN

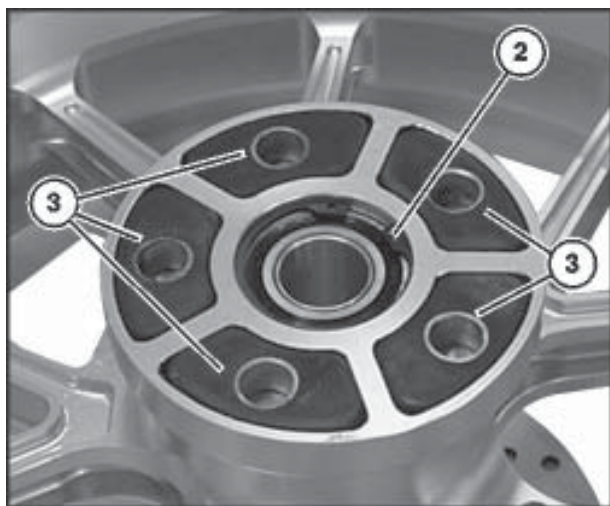
Sight check that the crown (1) is not broken and that the teeth are not excessively worn.
Change the crown, the pinion and the chain if necessary.



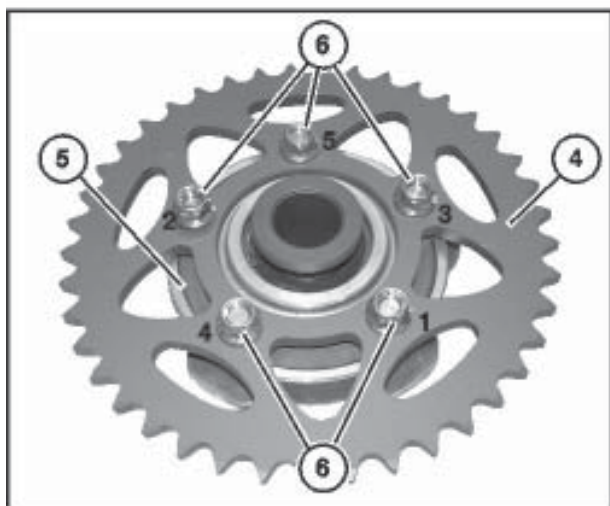
7.2.7 MOUNT REAR WHEEL



WARNING:
Identify correctly the left and right of the wheel based on the sense of rotation before mounting the ball-bearings.



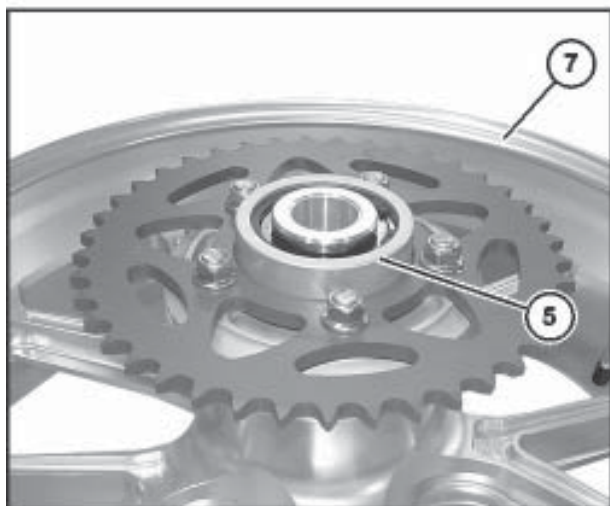
Push the left side ball-bearing in first until it touches and fix it with the circlip (2).
Insert the internal spacer from the right side and push the right side ball-bearing in until it touches.
Position the five flexible couplings in the correct seats (3).



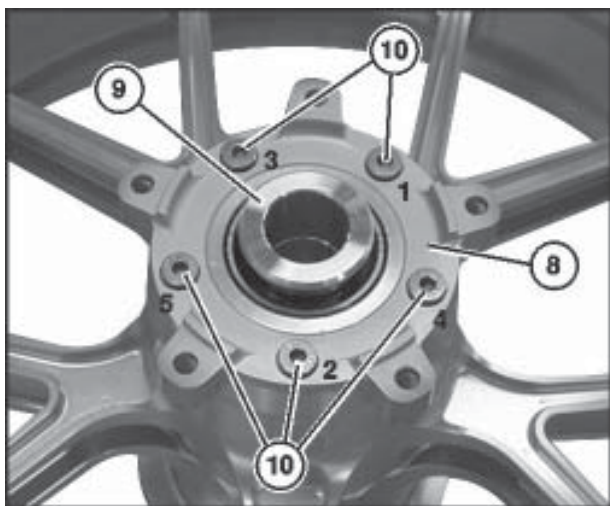
Position the crown (4) on the flange (5) and fix it with the nuts (6) tightening then according to the order indicated.



45 N·m 4.5 Kg-m Grease thread



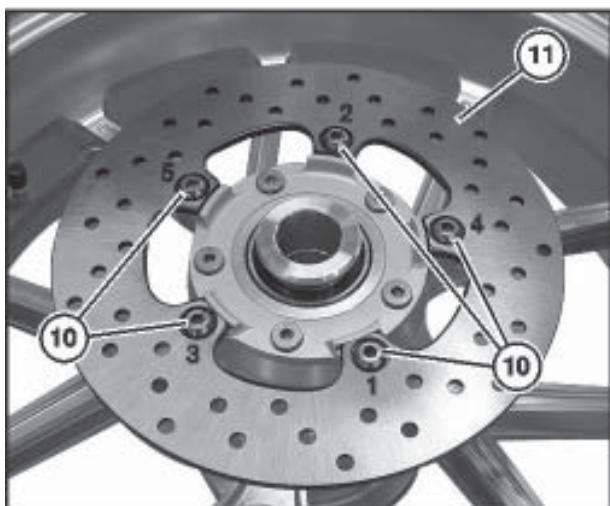
Position the flange (5) on the wheel (7).



Position the disk holder flange (8) on the wheel and tighten the five screws (10) according to the order in the figure. Insert the right spacer (9) in the ball-bearing.



22 N·m 2.2 Kg-m with LOCTITE 243



Positiona the disk (11) and tighten the five screws (10) according to the order in the figure.

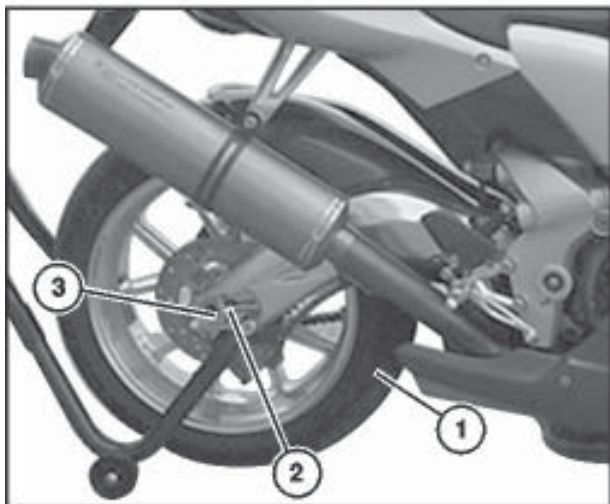


22 N·m 2.2 Kg-m Grease thread

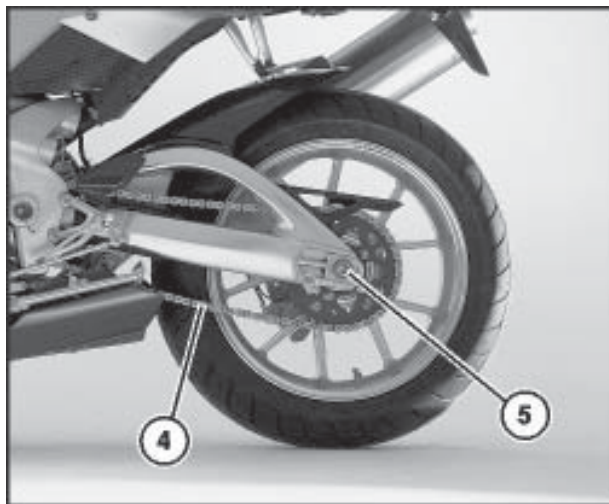
7.2.8 INSTALL REAR WHEEL



WARNING:
It is advisable to balance the wheel after every operation on the wheel.



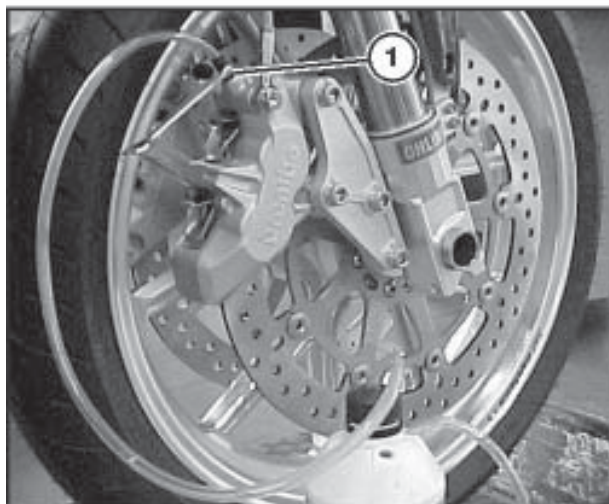
Position the wheel (1).
Position the right chain stretcher plate (2) and insert the pin (3) from the right, with the head on the right side.



Position the chain (4).
Position the nut (5) without tightening it.
Adjust the chain (see "ADJUST CHAIN").
Tighten the nut (5).



80 N·m 8 Kg·m Grease thread



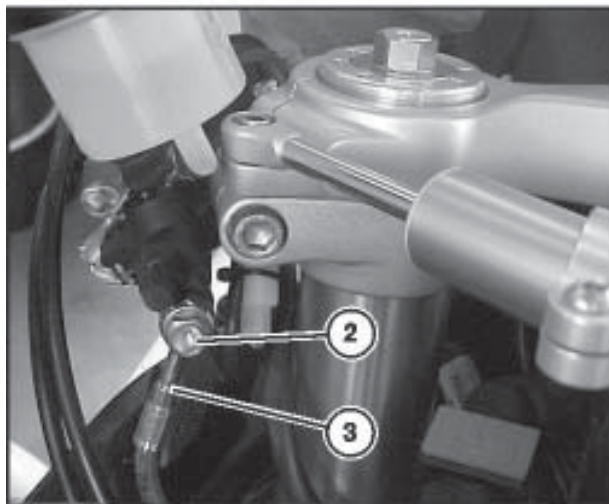
7.3 FRONT AND REAR BRAKES

7.3.1 REMOVE FRONT BRAKE PUMP

The oil in the braking plant needs to be emptied before proceeding to remove the pump. Position the end of a tube of suitable diameter at the purge screw (1) of a front brake clamp and the other end in a suitable recipient.
Open the purge screw (1) and empty the braking liquid. Do the same thing with the opposite clamp.

NOTE:

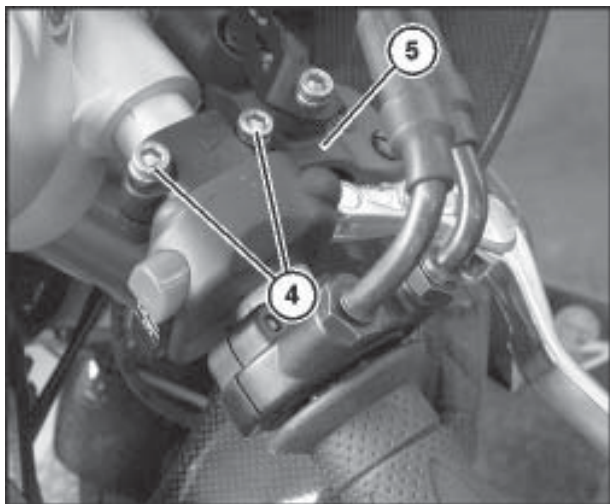
To help empty the liquid, open the liquid tank cap and work on the front brake lever repeatedly.



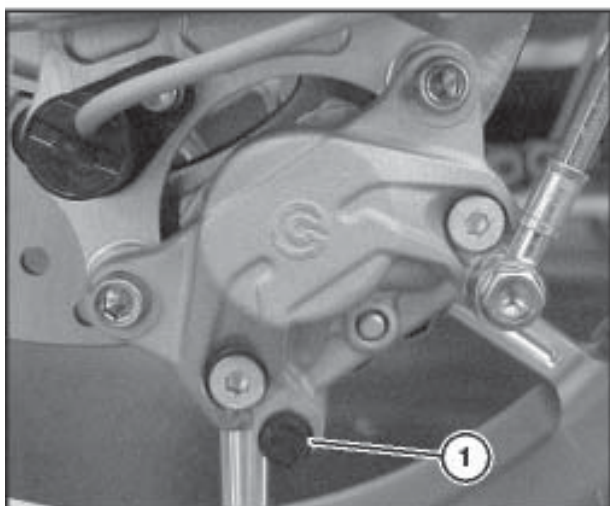
WARNING:

Place a rag under the connector because of the probable leakage of braking liquid.

Remove the screw (2) and the connector (3).



Loosen and remove the two screws (4).
Remove the complete brake pump (5).

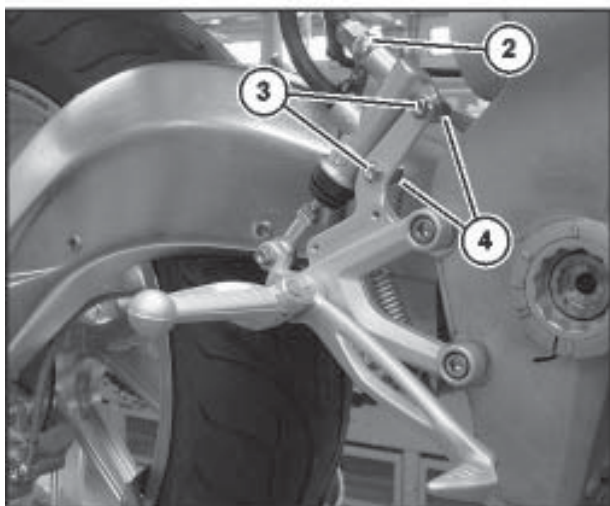


7.3.2 REMOVE REAR BRAKE PUMP

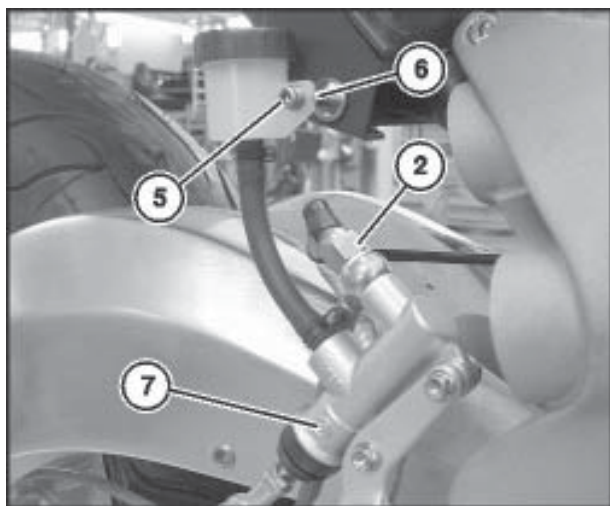
Remove the rear brake pump from the clamp support and position it under the brake pump.
Position the end of a tube of suitable diameter at the purge screw (1) and the other end in a suitable recipient.
Open the purge screw (1) and empty the braking liquid. Do the same thing with the opposite clamp.

NOTE:

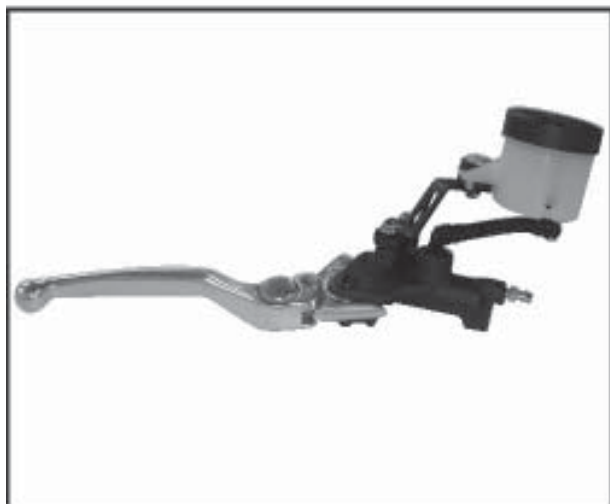
To help empty the liquid, open the liquid tank cap and work on the rear brake lever repeatedly.



Dismantle the footrest (see "DISMANTLE FOOTREST").
First loosen the idrostop (2), making sure not to twist the wires of the relative cabling excessively.
Loosen and remove the two screws (3) and the relative nuts (4).



Loosen and remove screw (5) and the ferrule (6).
Rotate the pump (7) keeping the idrostop (2) steady until the latter is completely unscrewed. Remove the idrostop.
Remove the entire tank pump.

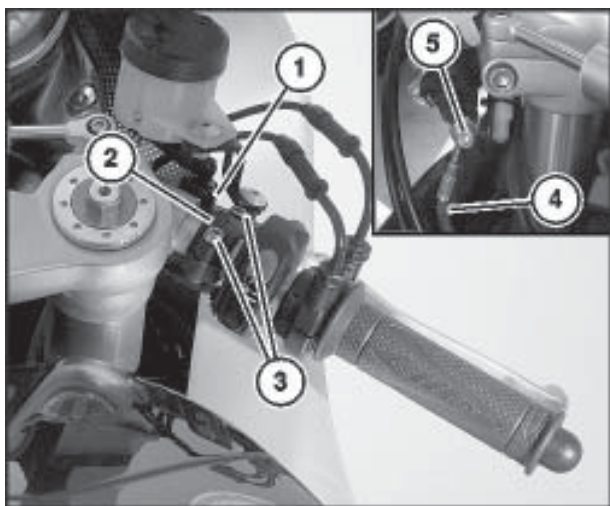


7.3.3 CHECK FRONT AND REAR BRAKE PUMP

Check that the front and rear brake pumps are not damaged.
If necessary, change the damaged pump.



Check that the front and rear brake pumps are not obstructed.
If necessary, eliminate the obstruction with a jet of compressed air.



7.3.4 INSTALL FRONT BRAKE PUMP



WARNING:
First tighten the arrow side screw.



WARNING:
Always change the braking plant sealing gaskets.



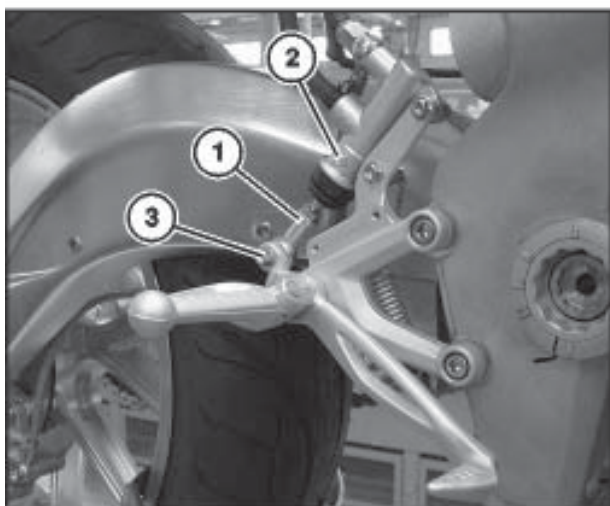
10 N·m 1 Kg-m

Position the front brake pump (1), and the assembly stand (2) and fix tightly with the two screws (3).



15 N·m 1.5 Kg-m

Position the brake (4) and fix it tightly with screw (5) on the connector.

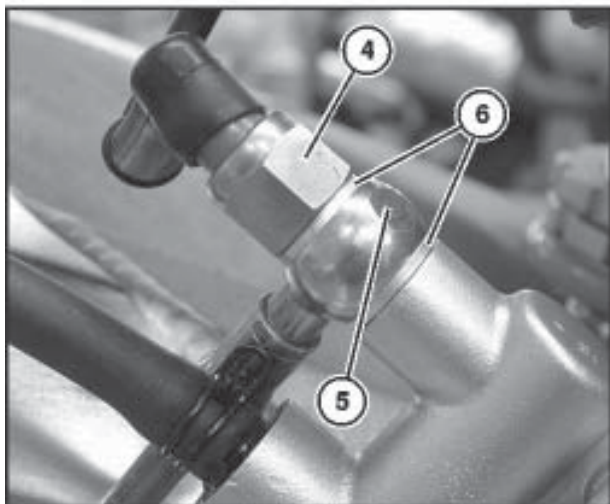


7.3.5 INSTALL REAR BRAKE PUMP

Connect the cap (1) of the brake pedal pump and tighten the screw (3).



10 N·m 1 Kg-m



WARNING:
Always change the braking plant sealing gaskets.

Fix the eye of (5) of the brake tube to the pump using the idrostop and the two gaskets (6).

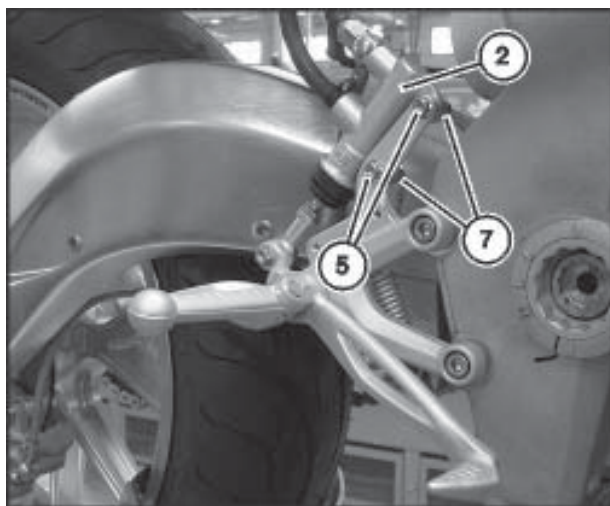
Rotate the pump to tighten the idrostop (4).

Tighten the idrostop keeping the brake tube in the correct angular position.

Fill the circuit with braking liquid and purge the braking plant (see "PURGE BRAKING PLANT").



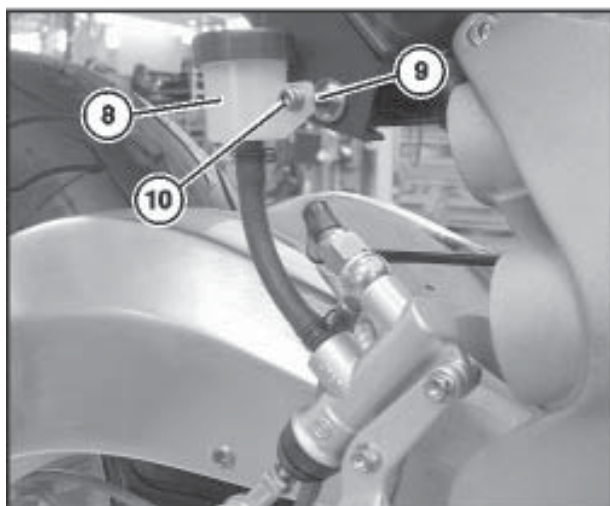
15 N·m 1.5 Kg-m



Position the rear brake pump (2) and fix with the two screws (5) and the relative nuts (7) tightly.



10 N·m 1 Kg-m

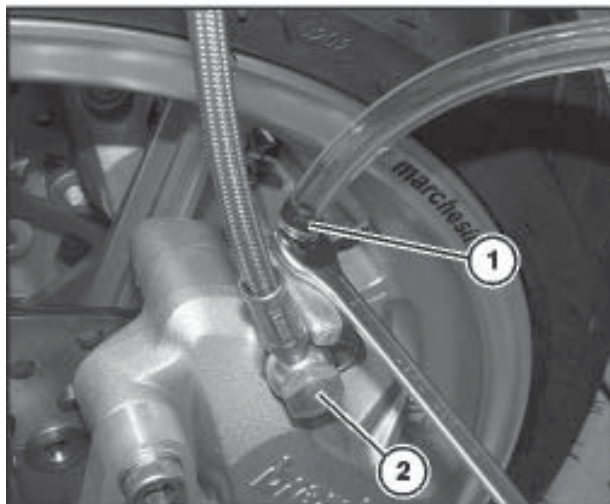


Fix the tank pump (8) and the ferrule (9) with screw (10).
Mount the footrest (see "MOUNT FOOTREST").



4 N·m 0.4 Kg-m

7.3.6 DISMANTLE FRONT BRAKE PLANT TUBES

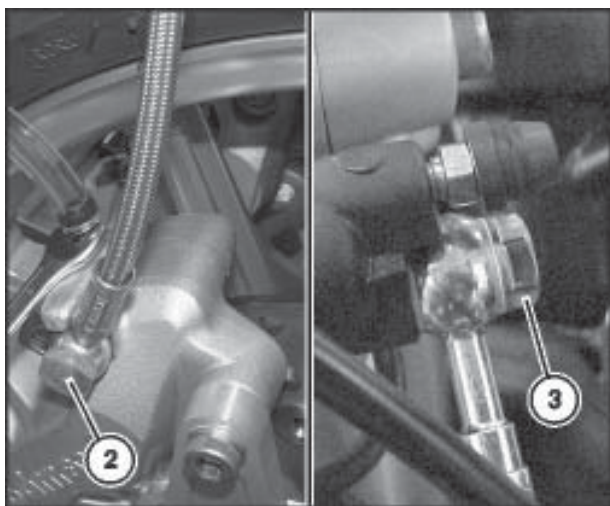


Position the end of a tube of suitable diameter at the purge screw (1) of a brake clamp and the other end in a suitable recipient.

Open the purge screw (1) and empty the braking liquid.

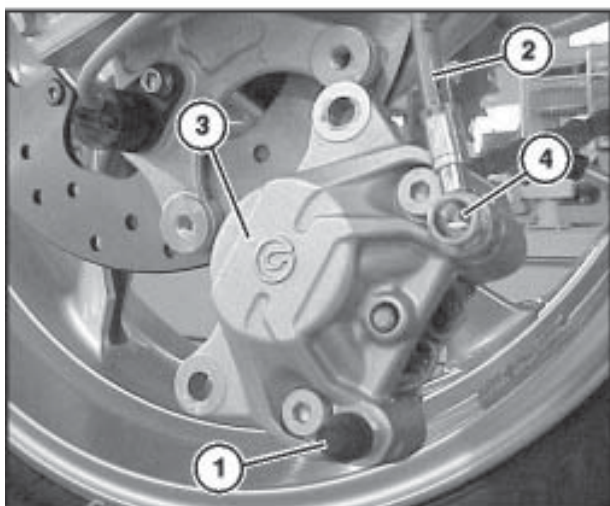
NOTE:

To help empty the liquid, open the liquid tank cap and work on the rear brake lever repeatedly.



WARNING:
Always change the sealing gaskets at every dismantling.

Loosen and remove the connecting screws (2), one fixed to the right brake clamp and the other to the left brake clamp. Loosen and remove connecting screw (3) of the front brake pump. Unhook the brake tube from the eye positioned on the front mudguard. Remove the front brake plant tubing. Be careful with the sealing gasket.

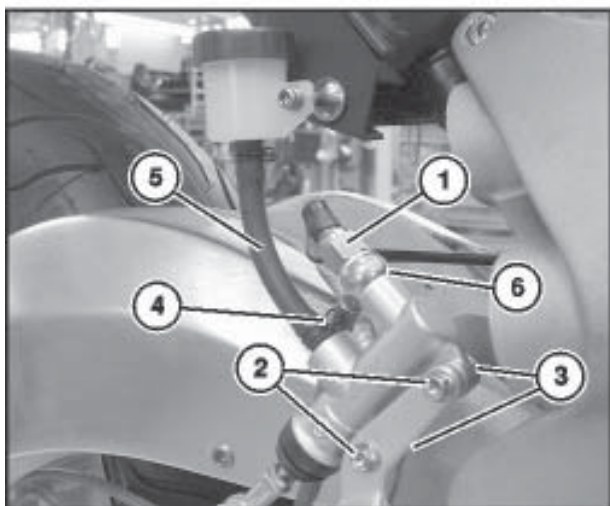


7.3.7 DISMANTLE REAR BRAKE PLANT TUBES

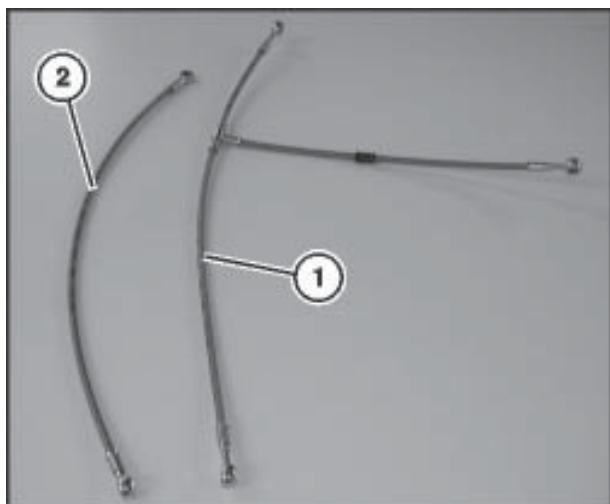
Remove the rear brake clamp from the clamp support and position it under the brake pump. Position the end of a tube of suitable diameter at the purge screw (1) of a brake clamp and the other end in a suitable recipient. Open the purge screw (1) and empty the braking liquid. Remove the brake tube (2) from the clamp (3), unscrewing screw (4).

NOTE:

To help empty the liquid, open the liquid tank cap and work on the rear brake lever repeatedly.

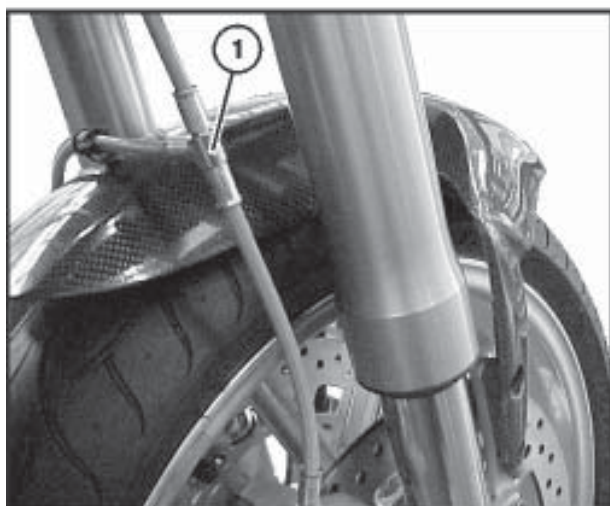


Dismantle the footrest (see "DISMANTLE FOOTREST"). Loosen the idrostop (1) taking care not to twist the cables of the cabling excessively. Loosen and remove the two screws (2) and relative nuts (3). Remove the elastic bands (4) and take the tube (5) of the pump off. Rotate the pump freeing the idrostop and removing the rear brake tube (6).



7.3.8 CHECK FRONT AND REAR BRAKE TUBING

Check that the front (1) and rear (2) tubing is not broken. Change the damaged element if necessary.



7.3.9 MOUNT FRONT BRAKE TUBES PLANT



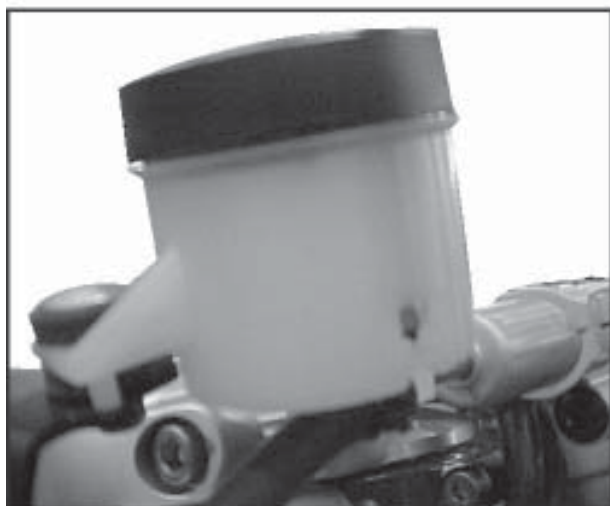
WARNING:
Always change the sealing gaskets at every dismantling.

Position the brake plant tubes with the "T" (1) connector on the right side of the vehicle.

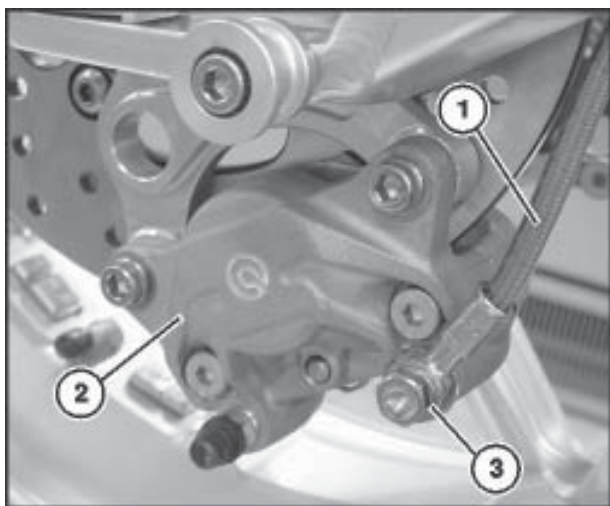
Fix the tubes with the connector screws and the sealing gaskets tightly, two on the clamp and one on the pump.



15 N·m 1.5 Kg-m



Restore the level of the braking liquid and purge the plant (see "PURGE BRAKING PLANT").



7.3.10 MOUNT REAR BRAKE TUBES PLANT



WARNING:
Always change the sealing gaskets at every dismantling.

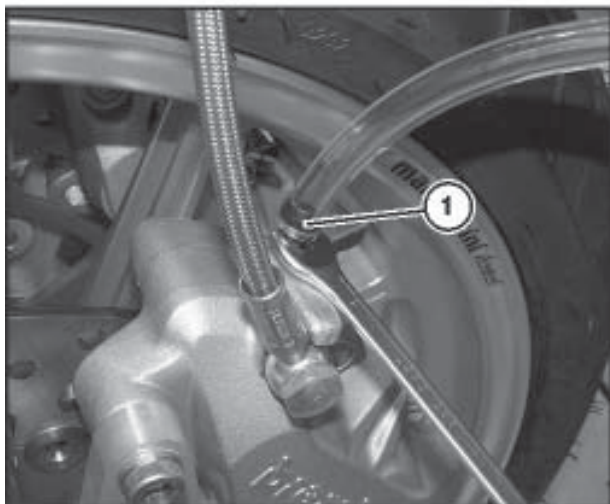
Position tube (1) on the clamp (2) and on the pump.
Position the connector screw (3) and tighten it with the associated sealing gasket.



15 N·m 1.5 Kg-m



Restore the level of the braking liquid and purge the plant (see "PURGE BRAKING PLANT").



7.3.11 DISMANTLE FRONT BRAKE CLAMPS



WARNING:
Always change the sealing gaskets at every dismantling.

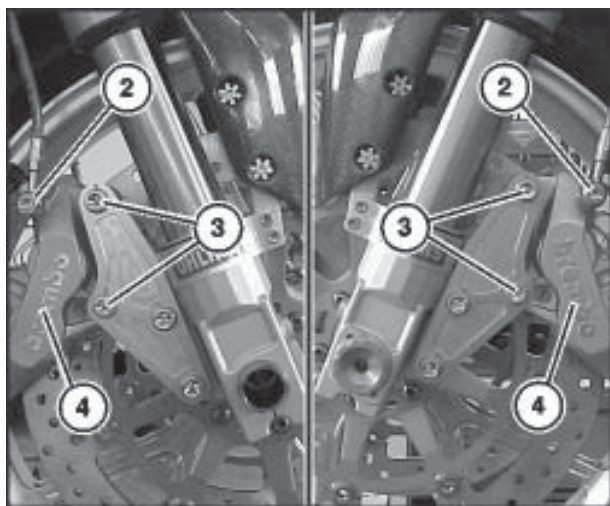
Remove the front brake clamp from the clamp support and position it under the brake pump.

Position the end of a tube of suitable diameter at the purge screw (1) of a brake clamp and the other end in a suitable recipient.

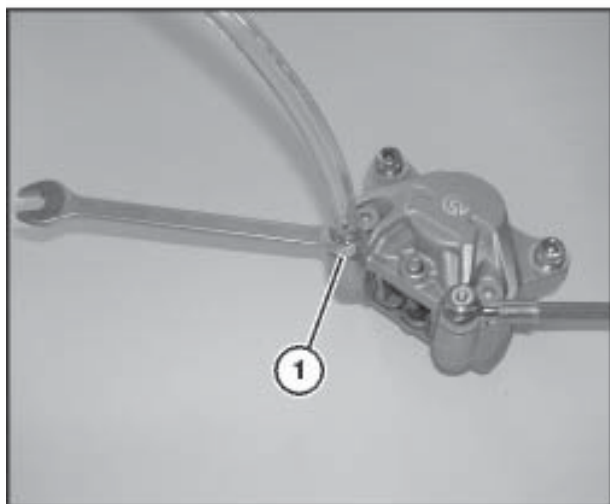
Open the purge screw (1) and empty the braking liquid.

NOTE:

To help empty the liquid, open the liquid tank cap and work on the rear brake lever repeatedly.



Remove the connector screws (2).
Loosen and remove the two brake clamp fixing screws (3).
Remove the brake clamps (4).



7.3.12 DISMANTLE REAR BRAKE CLAMP



WARNING:
Always change the sealing gaskets at every dismantling.

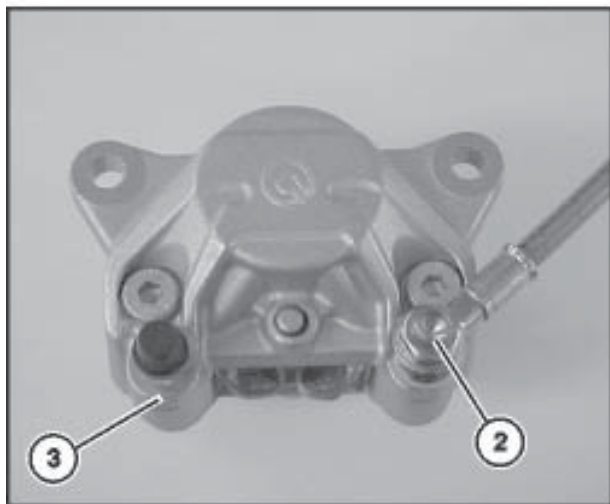
Remove the rear brake clamp from the clamp support unscrewing the two screws and position it under the brake pump.

Position the end of a tube of suitable diameter at the purge screw (1) of a brake clamp and the other end in a suitable recipient.

Open the purge screw (1) and empty the braking liquid.

NOTE:

To help empty the liquid, open the liquid tank cap and work on the rear brake lever repeatedly.



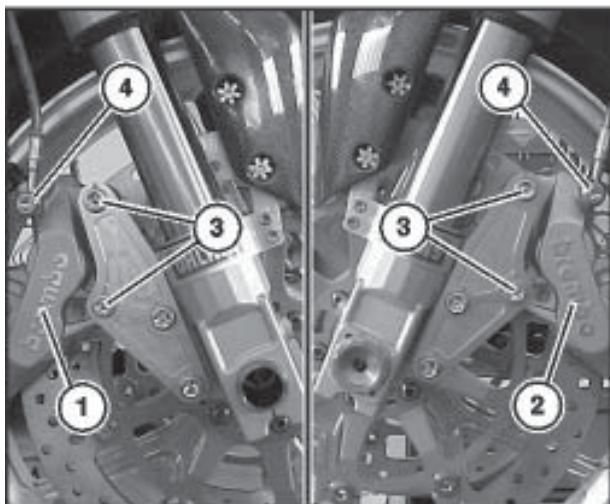
Loosen and remove the connector screw (2) and free the clamp (3) completely.



7.3.13 CHECK BRAKE CLAMP

Check that the front and rear brake clamps are not broken or show losses.

If necessary, change the damaged element.



7.3.14 MOUNT FRONT BRAKE CLAMP

Position the right (1) and left (2) brake clamps.

Tighten screws (3).

Position the brake tubing on the two clamps and on the pump.

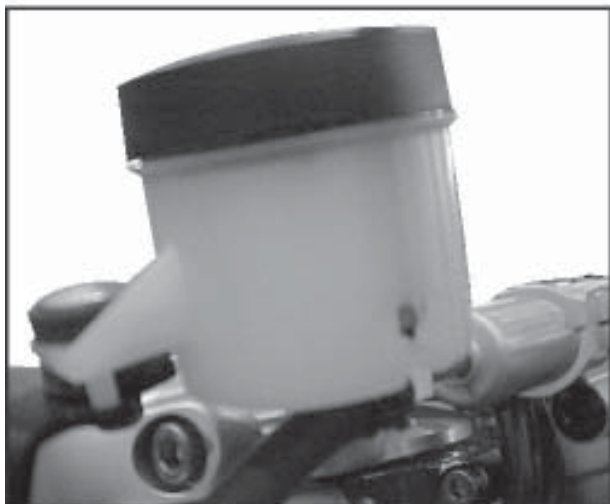


50 N·m 5 Kg-m

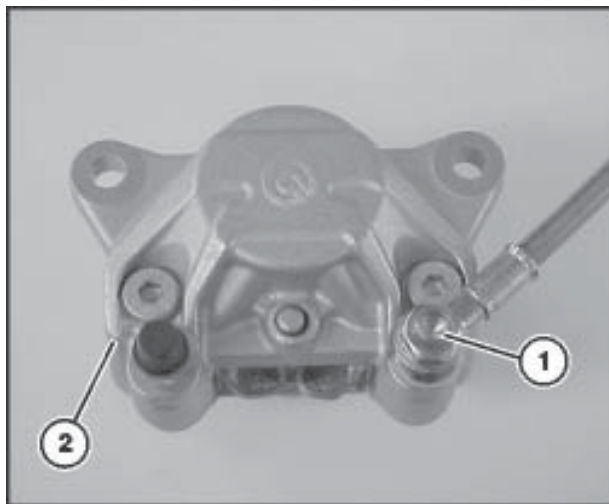
Tighten screws (4).



15 N·m 1.5 Kg-m



Restore the level of the braking liquid and purge the front plant (see "PURGE BRAKING PLANT").



7.3.15 MOUNT REAR BRAKE CLAMP

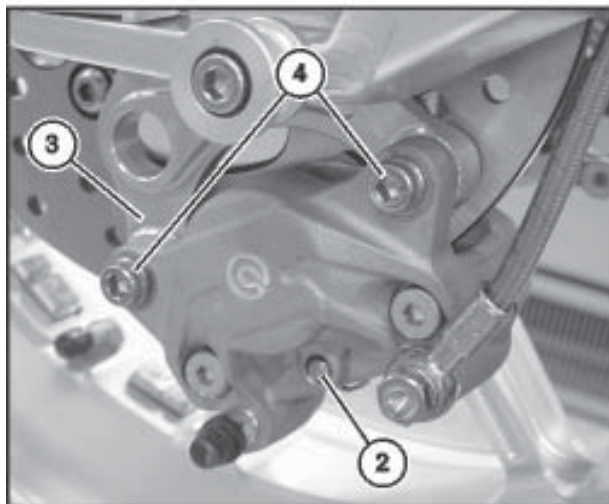
Tighten the connector screw (1) on the clamp (2).



15 N·m 1.5 Kg-m



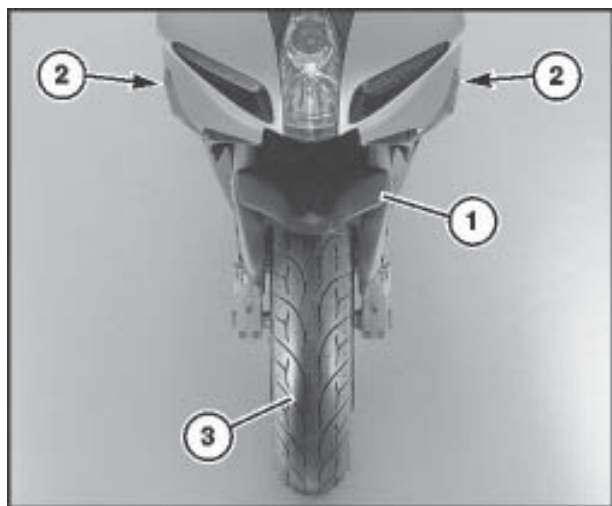
Restore the level of the braking liquid and purge the rear plant (see "PURGE BRAKING PLANT").



Position the clamp (2) on the clamp support (3). Tighten the two screws (4).



22 N·m 2.2 Kg-m



7.4 FORK

7.4.1 REMOVE RIGHT AND LEFT STEM



WARNING:

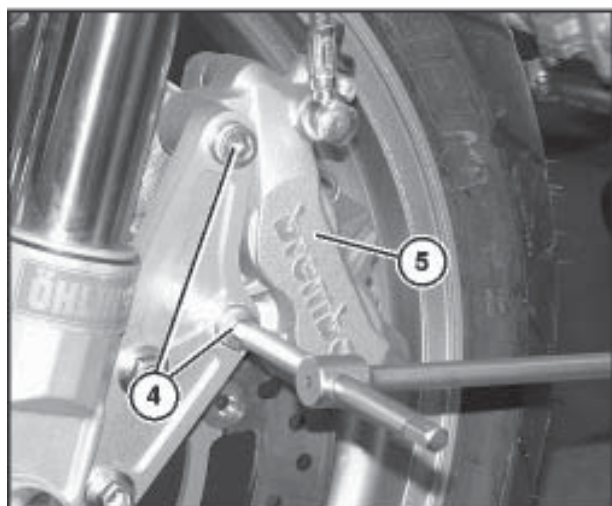
After removing the stem clamps do not leave them hanging up but provide an adequate support.

Remove the front mudguard (1) (see "DISMANTLE FRONT MUDGUARD").

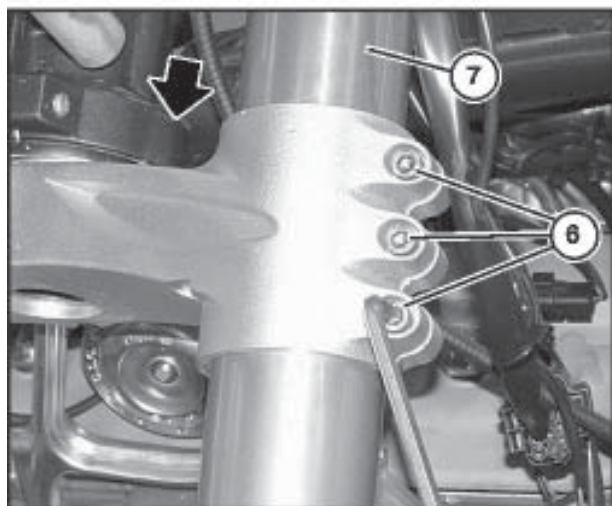
Remove the right and left upper cowlings (2) (see "REMOVE UPPER COWLINGS").

Remove the right and left lower cowlings (see "REMOVE LOWER COWLINGS").

Remove the front wheel (3) (see "REMOVE FRONT WHEEL").



Loosen and remove the two screws (4) and free the clamp (5). Repeat the operation on the opposite clamp as well.



Remove the upper steering plate (see "DISMANTLE STEERING PLATE").



SPECIFIC INSTRUMENTS

Alan wrench 20:
R180197033000

Remove the right semi-handlebar (see "REMOVE RIGHT SEMI-HANDLEBAR").

Remove the left semi-handlebar (see "REMOVE LEFT SEMI-HANDLEBAR").

Loosen the three screws (6).

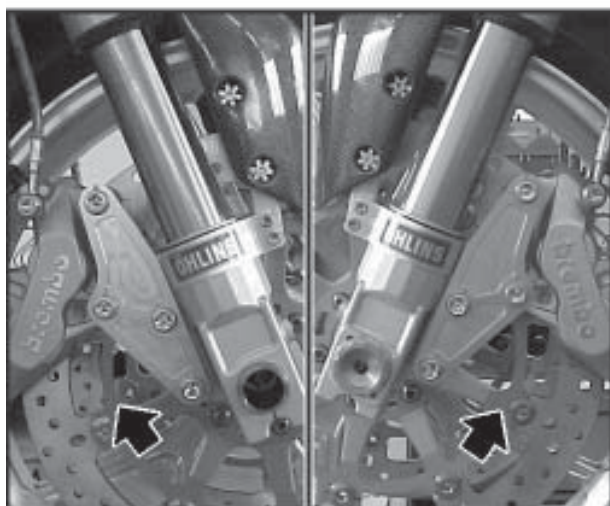
Take the lining (7) off downwards.

Repeat the operation for the opposite lining.



7.4.2 CHECK FORK LEGS

Turn directly to the supplier listed in the "SPECIFICATIONS" chapter with regard to checking the stems and linings.



7.4.3 INSTALL FORK LININGS



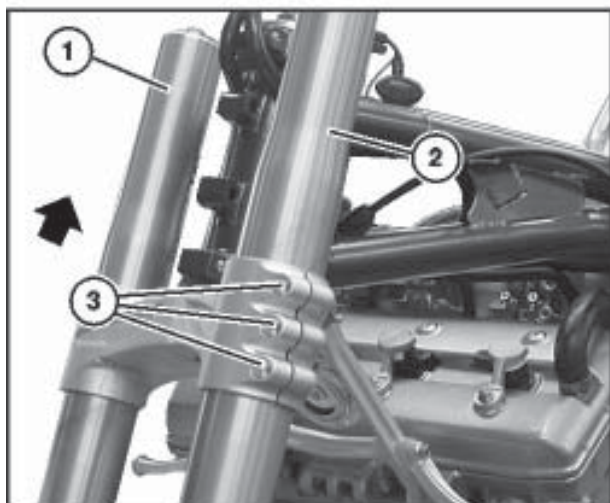
WARNING:

Do not damage the surfaces of the linings.



WARNING:

The stem must be mounted with the brake clamp holder support towards the inside of the vehicle.

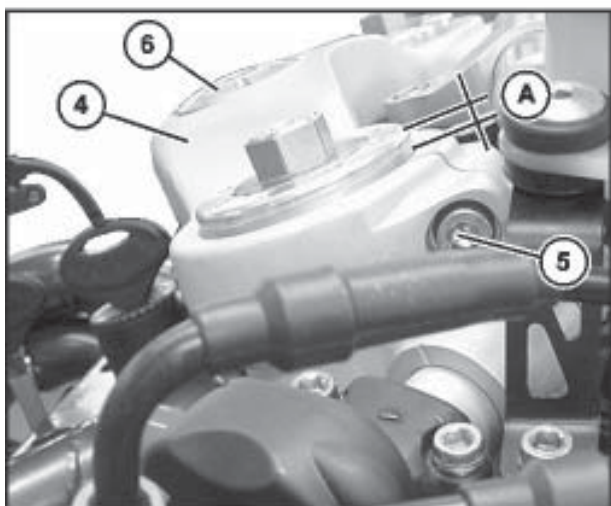


Insert from under the lining, right (1) and left (2), without tightening the screws (3).



Position the right semi-handlebar (see "MOUNT RIGHT SEMI-HANDLEBAR").

Position the left semi-handlebar (see "MOUNT LEFT SEMI-HANDLEBAR").



Position the upper steering plate (4) and adjust the stems according to specific value A.



SPECIFIC VALUE

A = 1 mm

Tighten the screws (5), one for each stem.

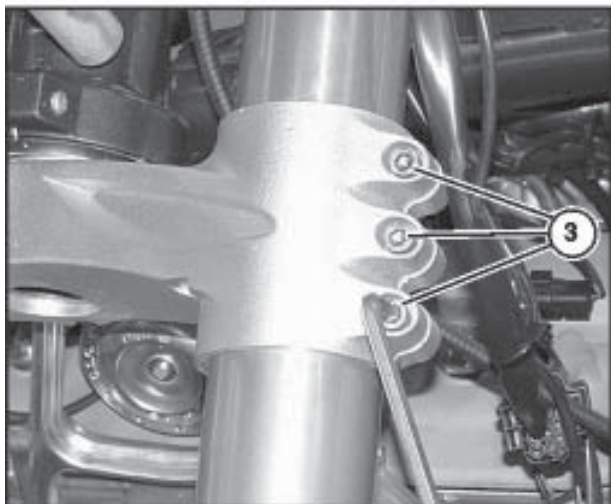


25 N·m 2.5 Kg-m

Tighten the steering plate central screw (6).



60 N·m 6 Kg-m

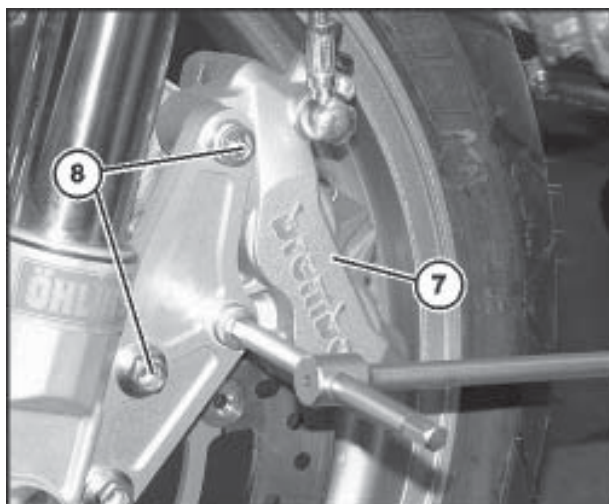


Tighten the six screws (3), three for each stem.

Position the front wheel (see "MOUNT FRONT WHEEL").



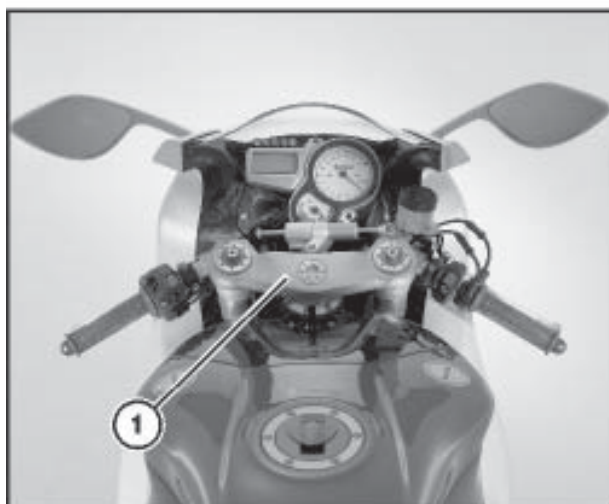
12 N·m 1.2 Kg-m



Position the front brake clamp (7) and tighten the two screws (8).
Do the same with the opposite brake clamp.



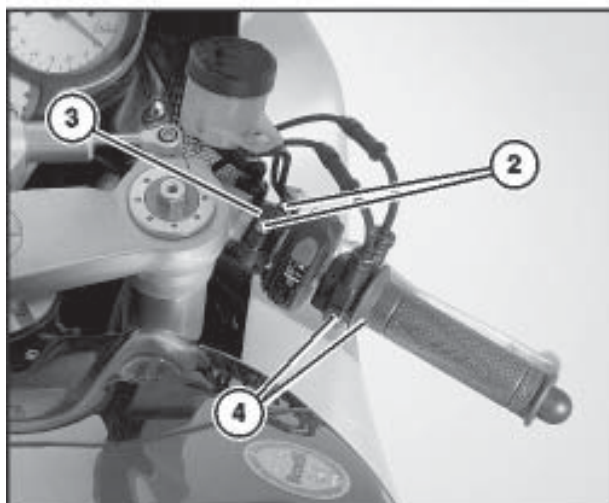
50 N·m 5 Kg-m



7.5 SEMI-HANDLEBARS

7.5.1 REMOVE RIGHT SEMI-HANDLEBAR

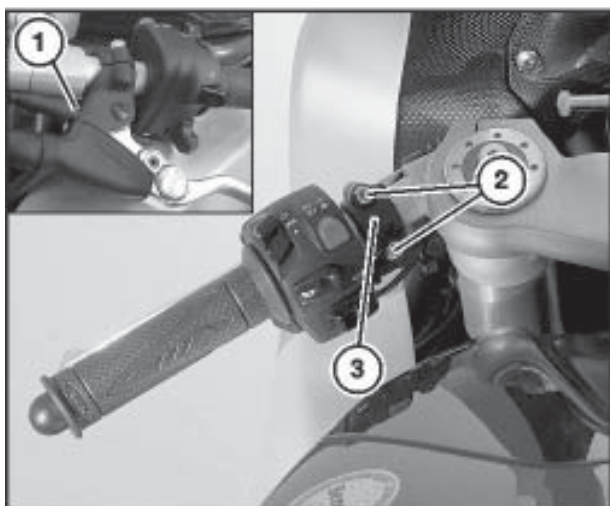
Remove the upper steering plate (see "DISMANTLE STEERING HEAD").



Loosen and remove the two screws (2) and free the front brake pump (3).
Remove the gas command, using the two screws beneath.



Loosen and remove screw (5), disconnect the ignition command cabling and take the right semi-handlebar off, upwards.



7.5.2 REMOVE LEFT SEMI-HANDLEBAR

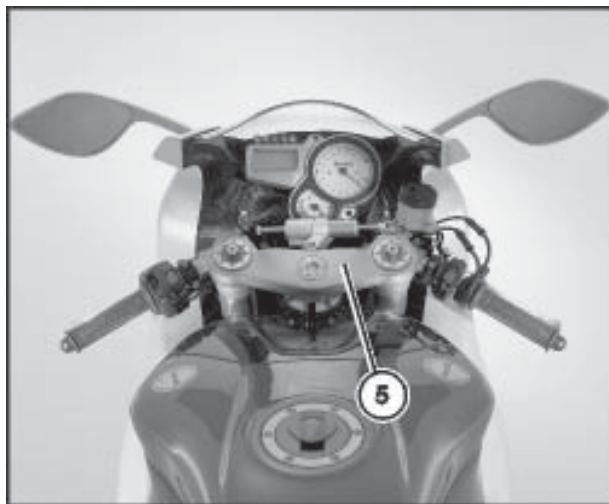
Disconnect the micro clutch connector (1), taking the rubber cap off first.

Loosen and remove the two screws (2) and free the clutch command (3).

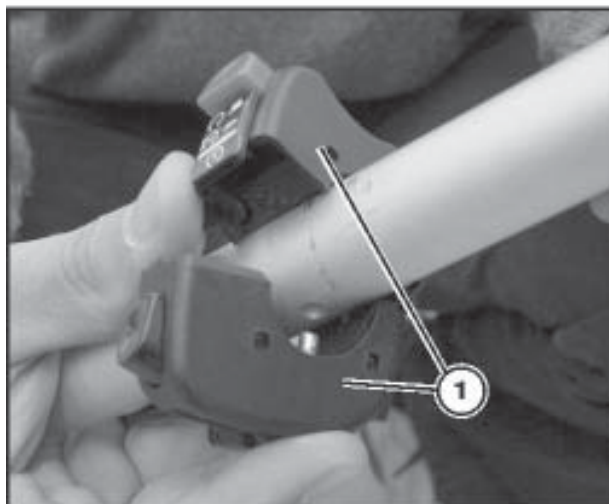
Disconnect the cabling of the left lights command.



Loosen and remove screw (4) and take the left semi-handlebar off, upwards.

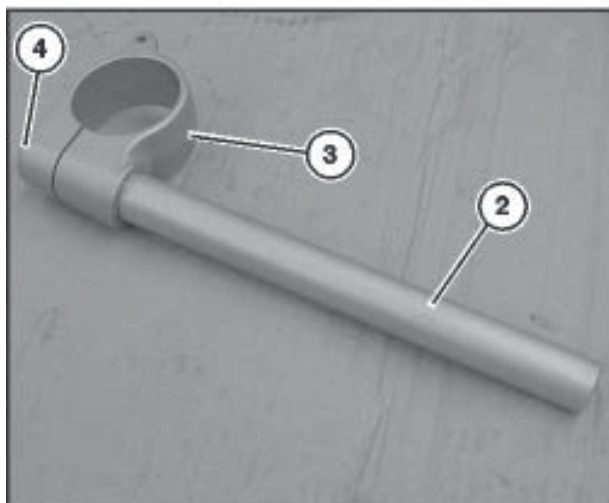


Remove the upper steering plate (5) (see "MOUNT STEERING HEAD").

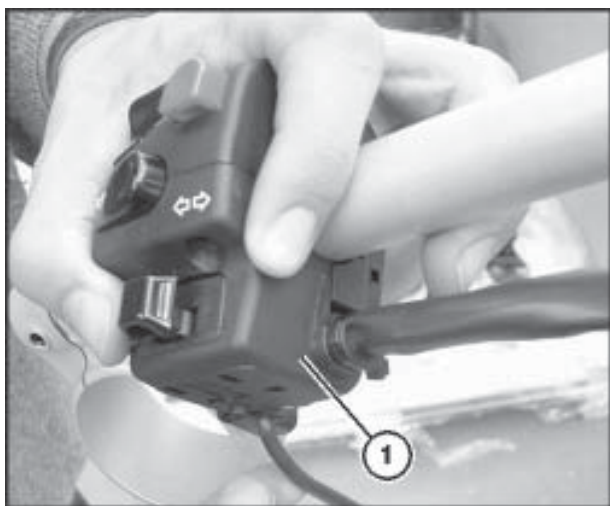


7.5.3 DISMANTLE RIGHT SEMI-HANDLEBAR

Remove the right semi-handlebar (see "REMOVE RIGHT SEMI-HANDLEBAR").
Remove the start command block (1) using the two screws beneath it.



Separate the semi-handlebar rod (2) from the support (3), unscrewing screw (4).

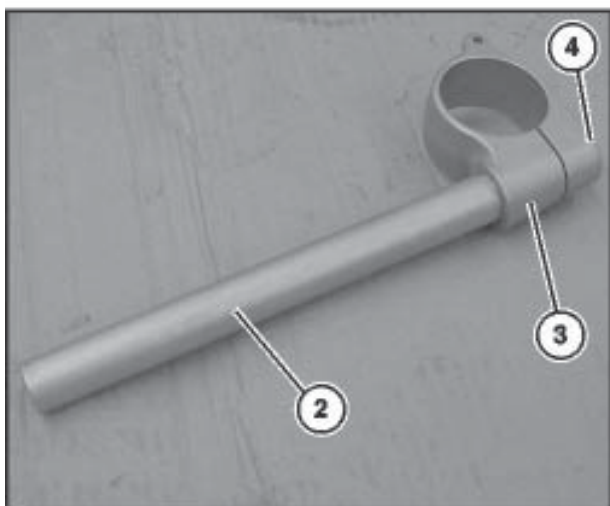


7.5.4 DISMANTLE LEFT SEMI-HANDLEBAR

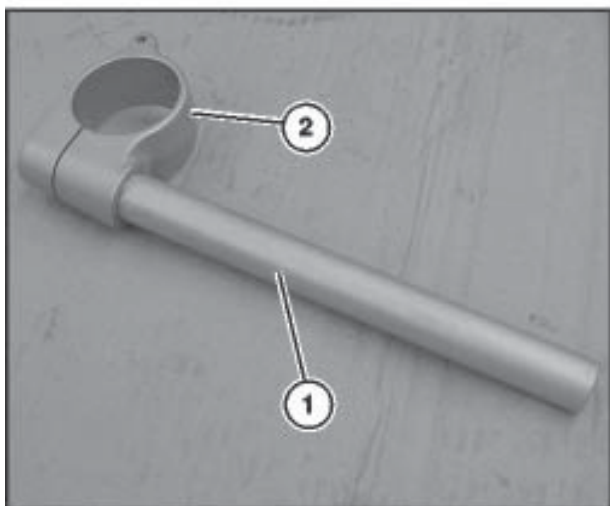
Remove the left semi-handlebar (see "REMOVE LEFT SEMI-HANDLEBAR").

Remove the handle.

Remove the block (1), unscrewing the two fixing screws under it



Separate the semi-handlebar rod (2) from the support (3), unscrewing screw (4).



7.5.5 CHECK RIGHT SEMI-HANDLEBAR

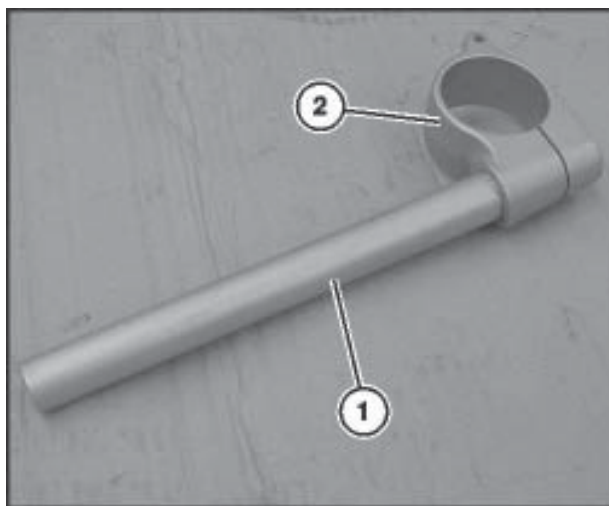


WARNING:

Do not try to straighten the semi-handlebar rod.

Check that the rod (1) and the support (2) are not damaged or bent.

Change the damaged element if necessary.



7.5.6 CHECK LEFT SEMI-HANDLEBAR

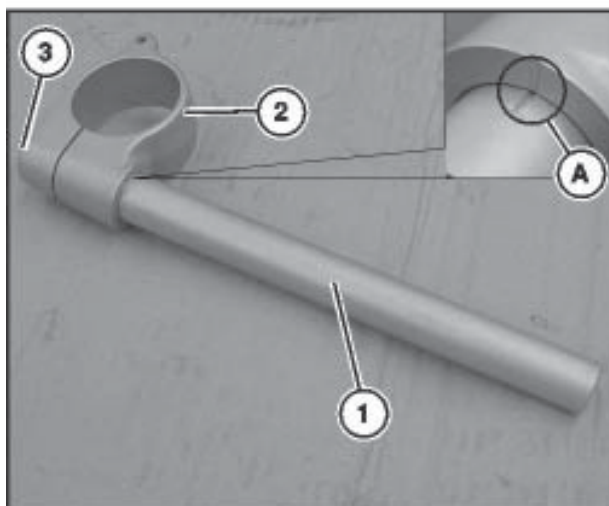


WARNING:

Do not try to straighten the semi-handlebar rod.

Check that the rod (1) and the support (2) are not damaged or bent.

Change the damaged element if necessary.



7.5.7 MOUNT RIGHT SEMI-HANDLEBAR



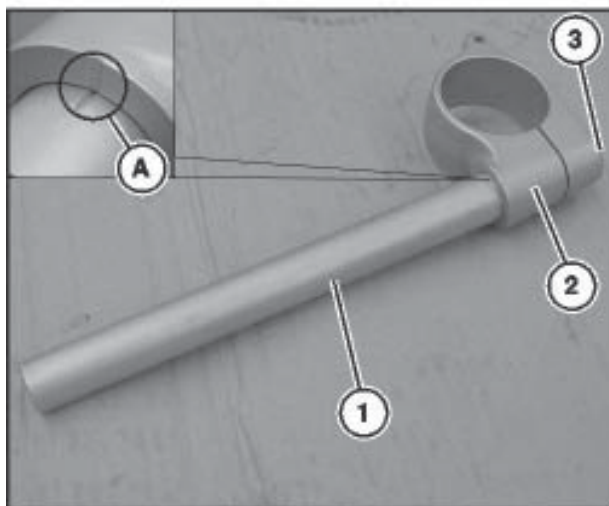
WARNING:

Do not try to straighten the semi-handlebar rod.

WARNING:

During the assembly of the semi-handlebar make the two signs coincide as shown in figure (A).

Assemble the semi-handlebar rod (1) with the support (2).
Fix with screw (3) without tightening it.



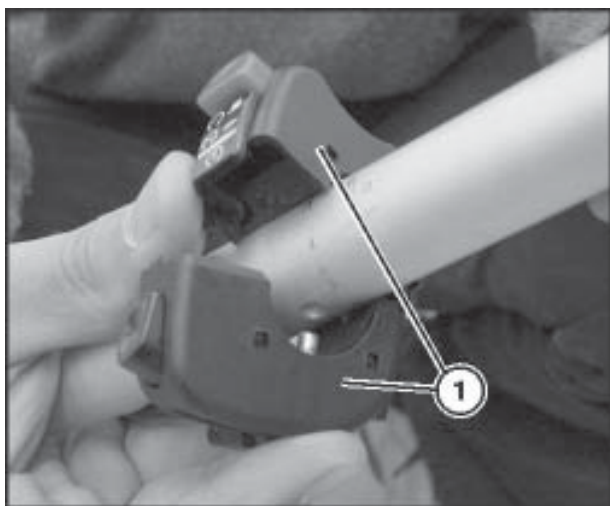
7.5.8 MOUNT LEFT SEMI-HANDLEBAR



WARNING:

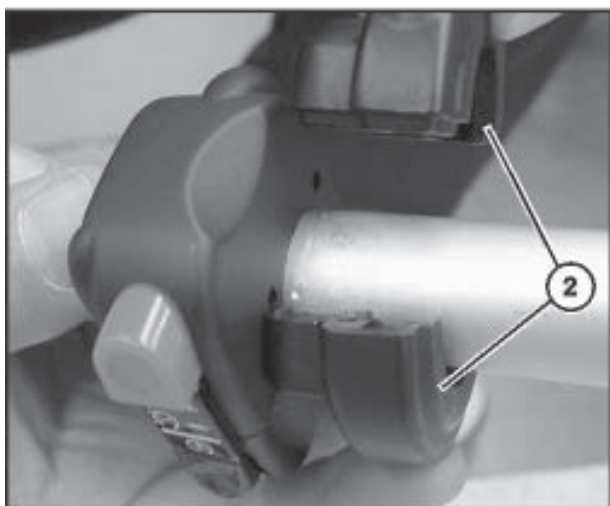
During the assembly of the semi-handlebar make the two signs coincide as shown in figure (A).

Assemble the semi-handlebar rod (1) with the support (2).
Fix with screw (3) without tightening it.

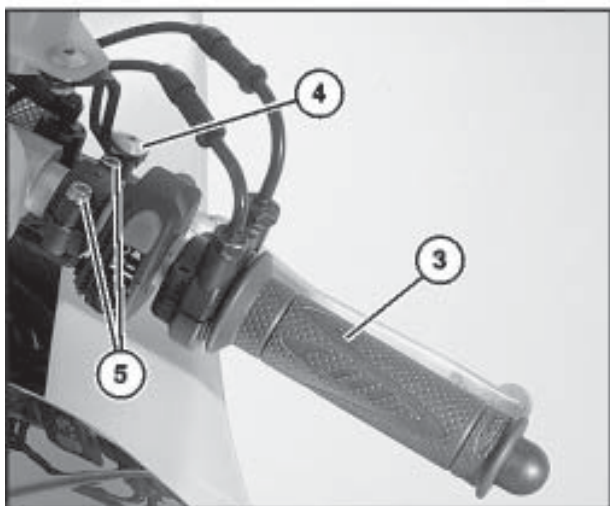


7.5.9 INSTALL RIGHT SEMI-HANDLE

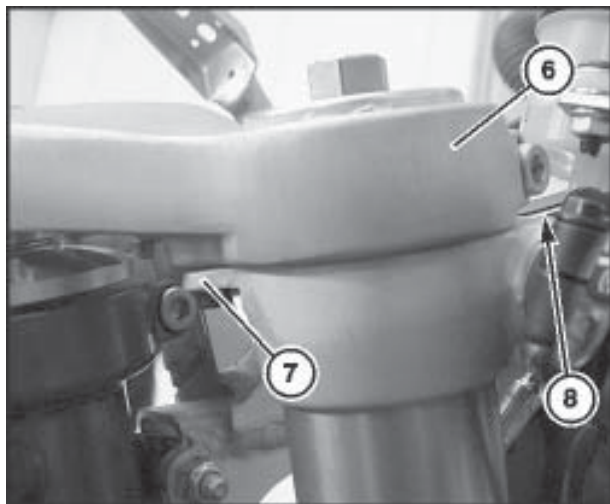
Position the ignition block (1) and tighten the two fixing screws.



Position the gas command (2) and fix with the two fixing screws.



Position the right semi-handlebar (3).
Position the front pump brake (4) and fix it with the two screws (5).
Connect the ignition command connector.



Position the upper plate (6).
Tighten screw (7).

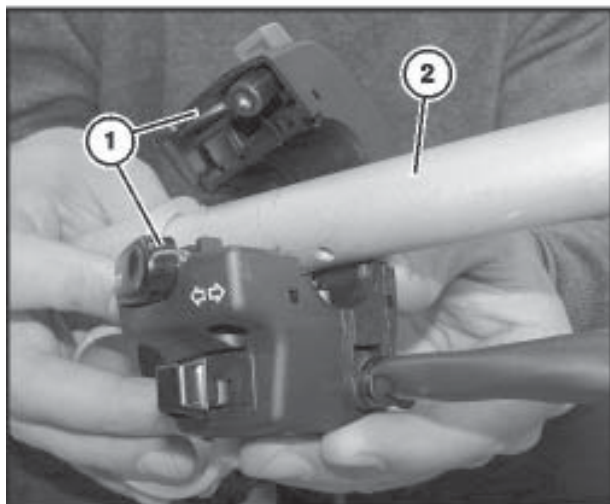


6 N·m 0.6 Kg-m

Tighten the plate-lining assembly screw (8).



30 N·m 3 Kg-m



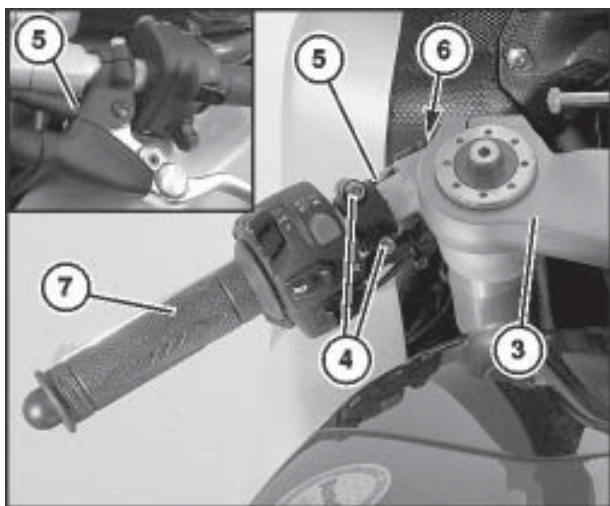
7.5.10 INSTALL LEFT SEMI-HANDLEBAR

Position the lights block (1) on the semi-handlebar (2).



WARNING:
The longest screw must be positioned at the back of the block.

Position the semi-handlebar on the stem.
Insert the steering plate (see mount).



Tighten the safety screw under the upper plate (3).



6 N·m 0.6 Kg-m

Position the clutch command and tighten the two fixing screws (4).



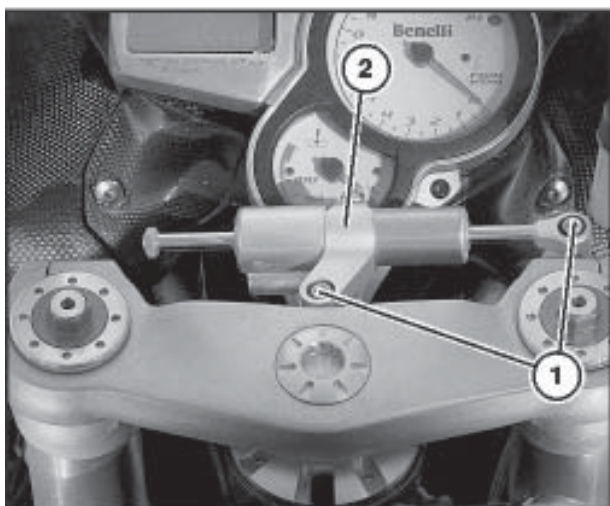
10 N·m 1 Kg-m

Connect the micro clutch connector (5) on the lever. Tighten the semi-handlebar screw (6).



30 N·m 3 Kg-m

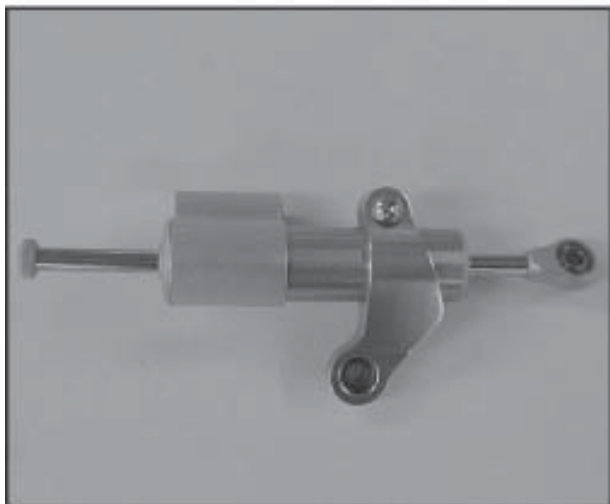
Insert the handle (7).



7.6 STEERING DAMPER

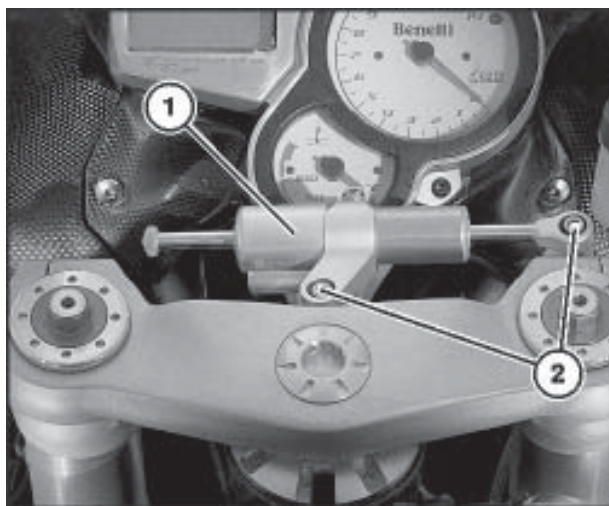
7.6.1 DISMANTLE STEERING DAMPER

Loosen and remove the two fixing screws (1) and remove the steering damper (2).



7.6.2 CHECK STEERING DAMPER

Check that the damper does not show losses or damage. Change the piece if necessary. Do not try to straighten the slide rod.

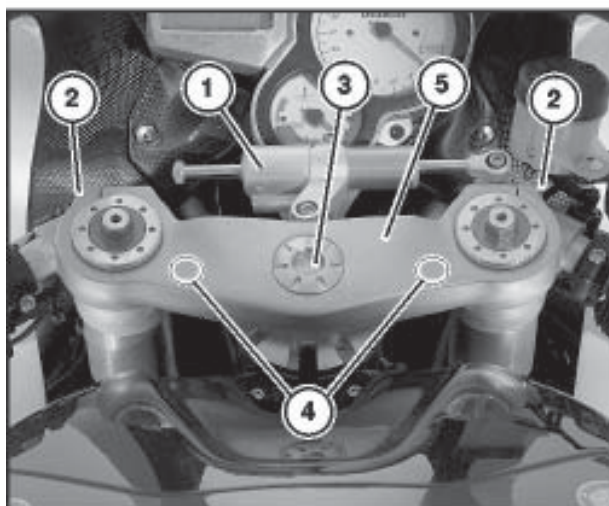


7.6.3 MOUNT STEERING DAMPER

Position the steering damper (1) and tighten the two fixing screws (2).



10 N·m 1 Kg-m



7.7 STEERING HEAD

7.7.1 DISMANTLE LOWER STEERING PLATE

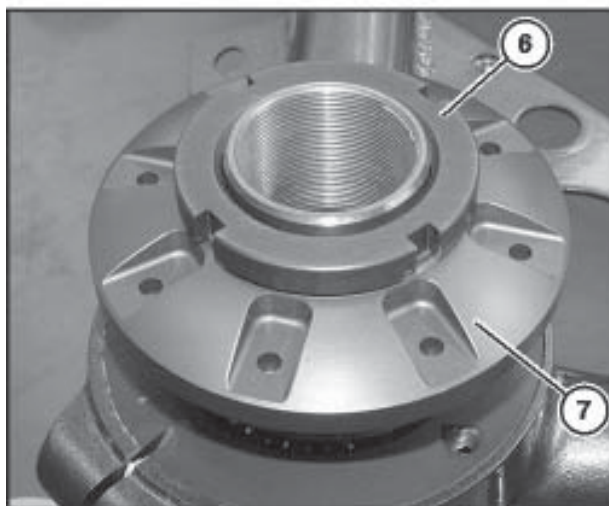
Remove the steering damper (1) (see "DISMANTLE STEERING").

Remove the two semi-handlebar fixing screws (2).

Remove the steering fixing screw (3).

Loosen and remove the safety screw (4) of the two semi-handlebars and remove the upper plate (5).

Remove the fork stems (see "REMOVE FORK STEMS").



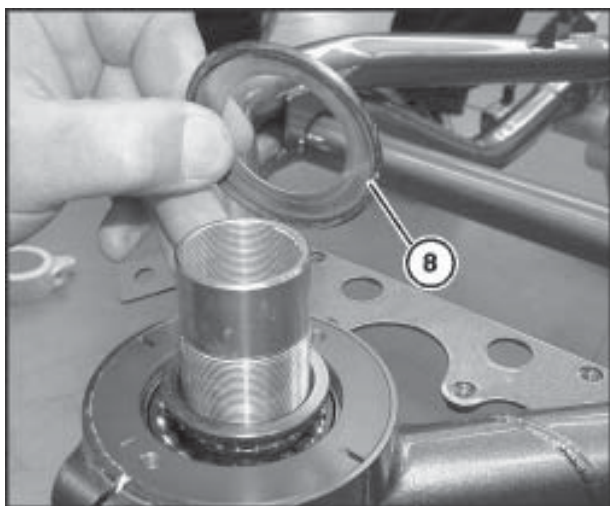
Warning:
Support the lower steering plate during the following operation.

Loosen and remove the counter ring-nut (6).

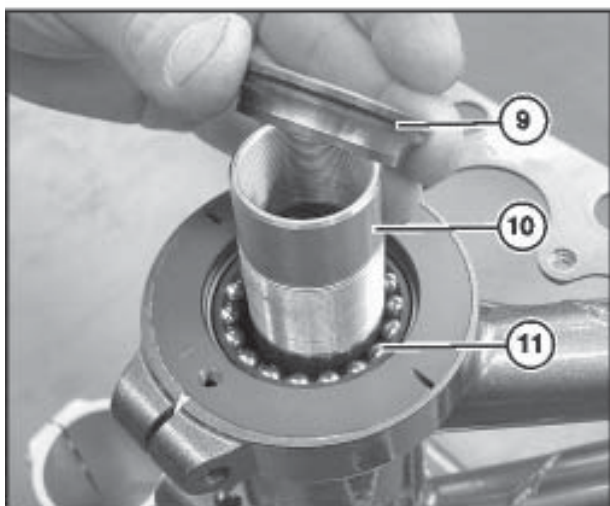
Loosen and remove the ring-nut (7).



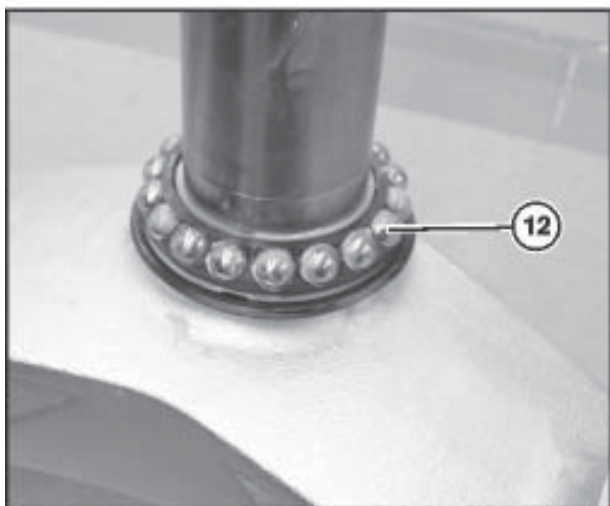
SPECIFIC EQUIPMENT
Steering ring-nut wrench:
R180197031000



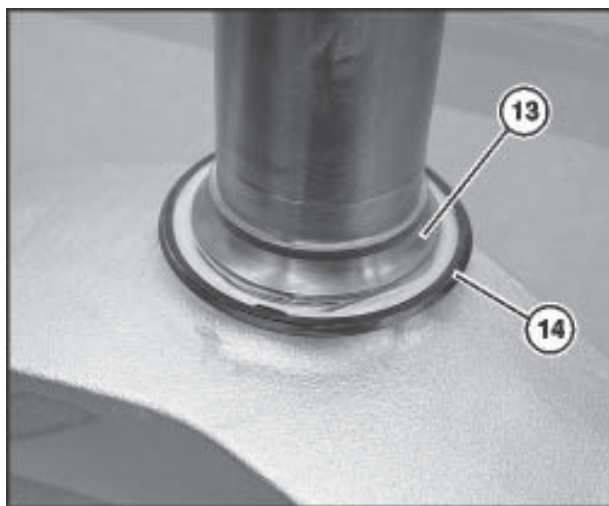
Remove the dust cover (8).



Remove the upper cowling pin (9) and the lower steering plate complete with pin (10).
Remove the ball cage (11) and the upper and lower coupling pins inside the chassis.



Remove the ball cage (12).



Remove the upper coupling pin (13) and the dust cover (14) from the steering plate.

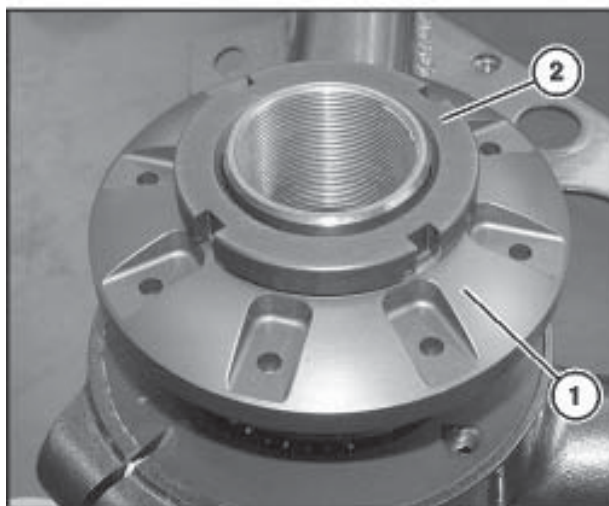


7.7.2 CHECK LOWER STEERING PLATE

Check that none of the components of the steering plate are broken.

Check that the steering roller cages are not excessively worn or broken.

Change the elements damaged or worn if necessary.



7.7.3 MOUNT LOWER STEERING PLATE

Carry out in reverse order to dismantling.
Tighten the ring-nut (1).

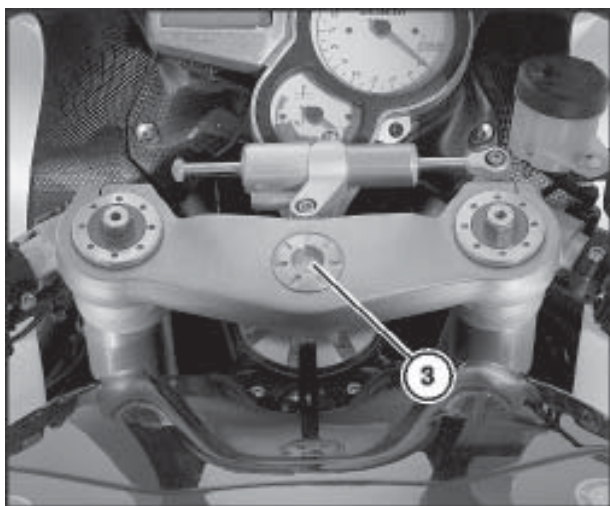


40 N·m 4 Kg-m

Tighten the counter ring-nut (2).



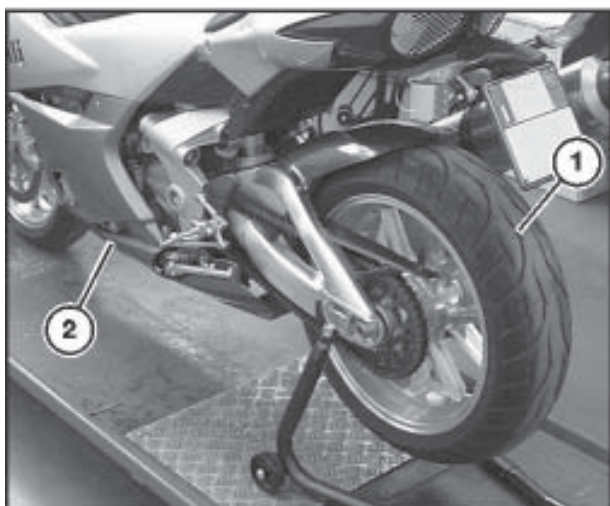
Manual + 90°



Tighten the steering fixing screw (3).



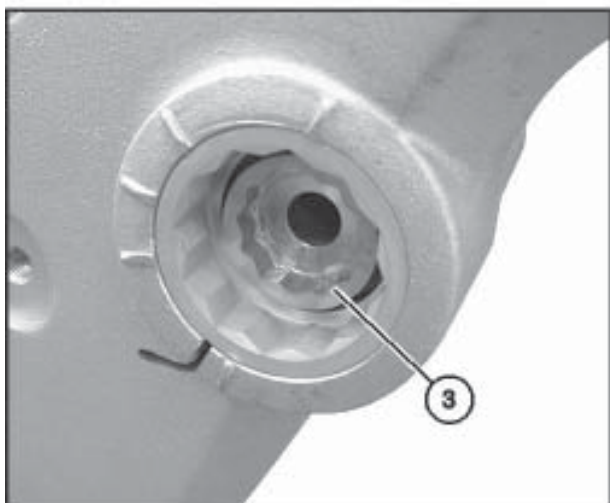
60 N·m 6 Kg-m



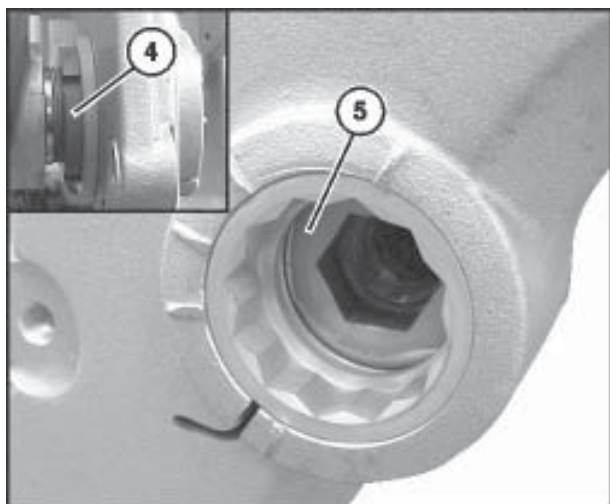
7.8 REAR DAMPER

7.8.1 REMOVE REAR DAMPER

Support the vehicle adequately.
Remove the rear wheel (1) (see "REMOVE REAR WHEEL").
Remove the lower semi-cowling (2) (see "DISMANTLE SEMI-COWLING").



Loosen and remove the right side rear fork fixing pin (3) of the bike.

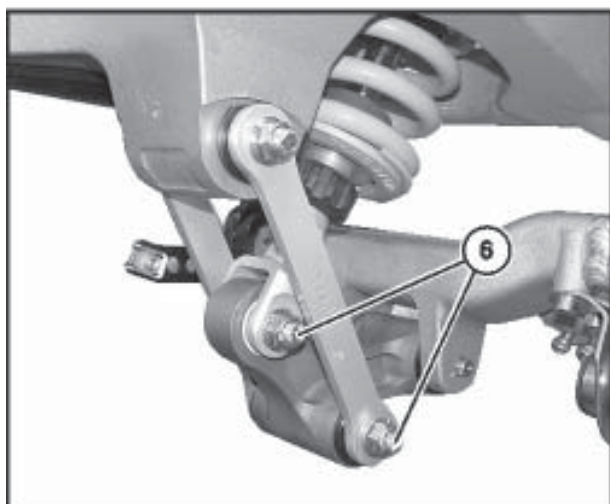


Loosen the reaction ring-nut (4) inside the chassis with the apposite instrument and loosen the adjustor (5).

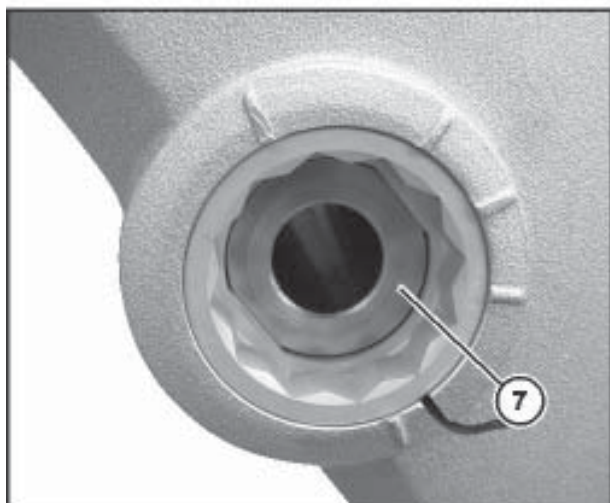


SPECIFIC EQUIPMENT

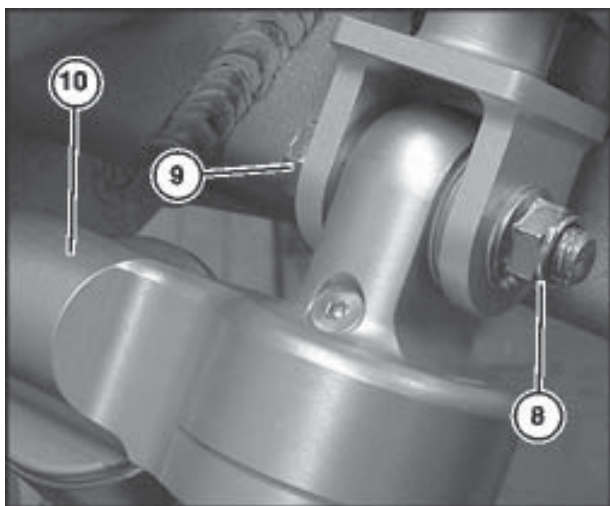
Engine shoulder adjustment wrench:
R180197032000



Loosen and remove nuts (6) and relative screws.



Remove the rear fork pin (7) from the left side and lower the rear fork as far as possible, extracting it from the damper and rotating it downwards.

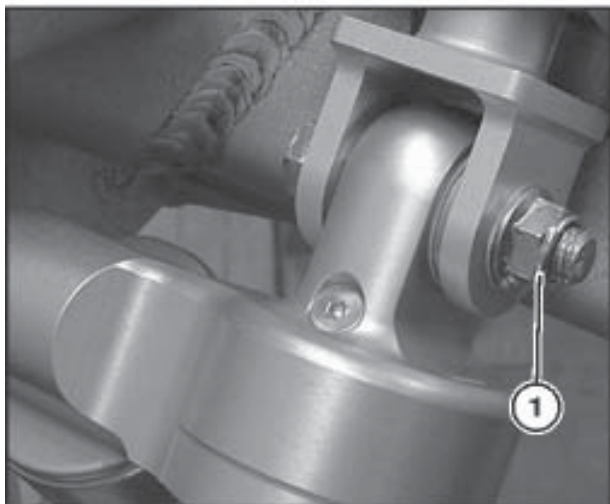


Loosen and remove nut (8) and remove screw (9).
Remove the rear damper (10).



7.8.2 CHECK REAR DAMPER

Apply to the direct supplier listed in the "SPECIFICATIONS" chapter with regard to checking the rear damper.

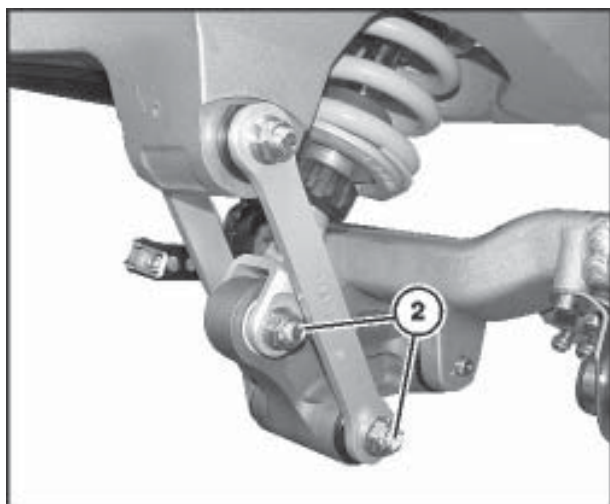


7.8.3 MOUNT REAR DAMPER

Operate in the reverse sense to dismantling.
Tighten the nut (1).



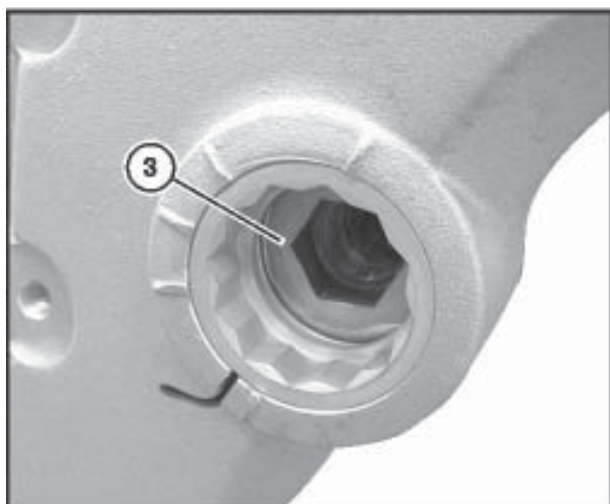
50 N·m 5 Kg-m



Tighten the two nuts (2).



50 N·m 5 Kg-m



Bring the adjuster to touch (3) and tighten it.

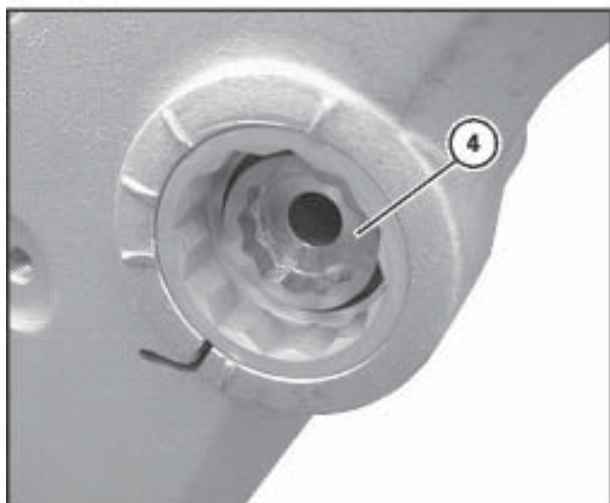


+ 90°

Tighten the ring-nut inside the frame.



40 N·m 4 Kg-m



Insert the pin from the left side.

Tighten the rear fork fixing pin screw (4).

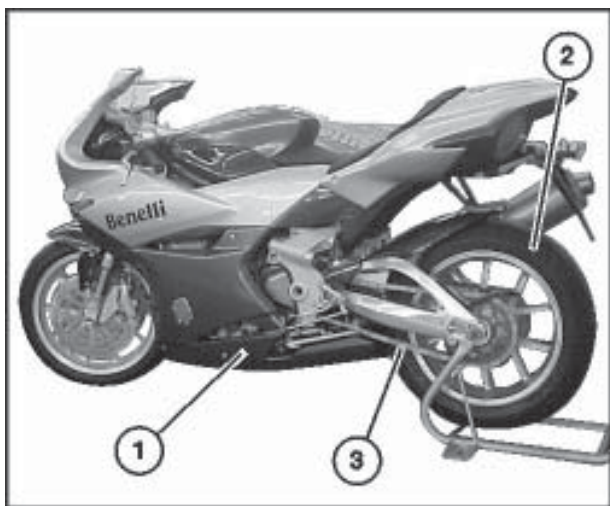
Re-mount the rear wheel (see "MOUNT REAR WHEEL").

Adjust the chain (see "ADJUST CHAIN").

Re-mount the semi-cowling (see "MOUNT SEMI-COWLING").



65 N·m 65 Kg-m



7.9 REAR FORK

7.9.1 REMOVE REAR FORK

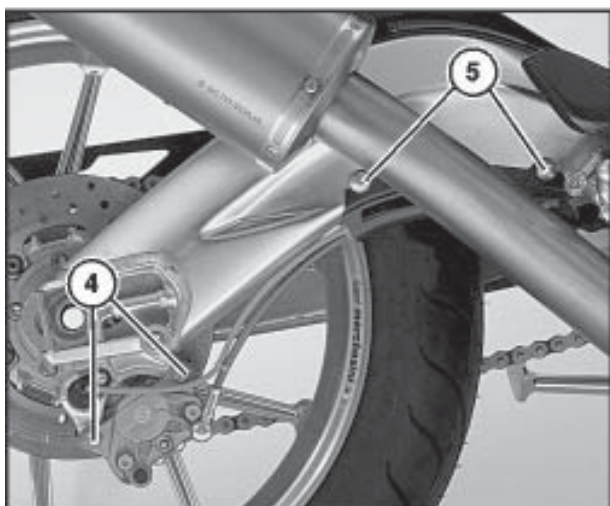
Support the vehicle adequately.

Remove the lower semi-cowling (1) (see "DISMANTLE SEMI-COWLING").

Remove the rear wheel (2) (see "REMOVE REAR WHEEL").

|

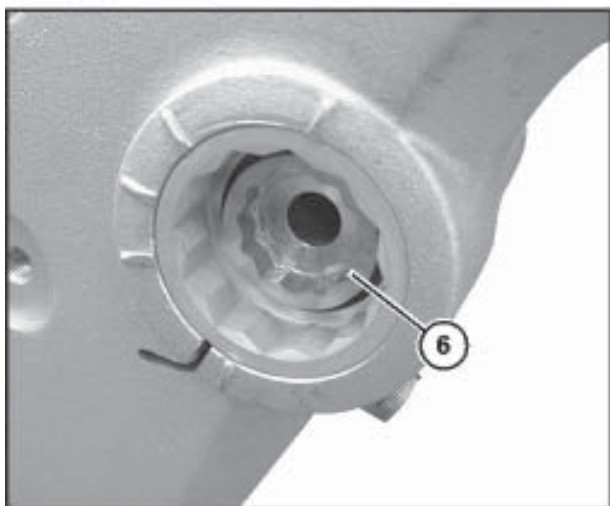
Remove the chain (3) (see "DISMANTLE CHAIN").



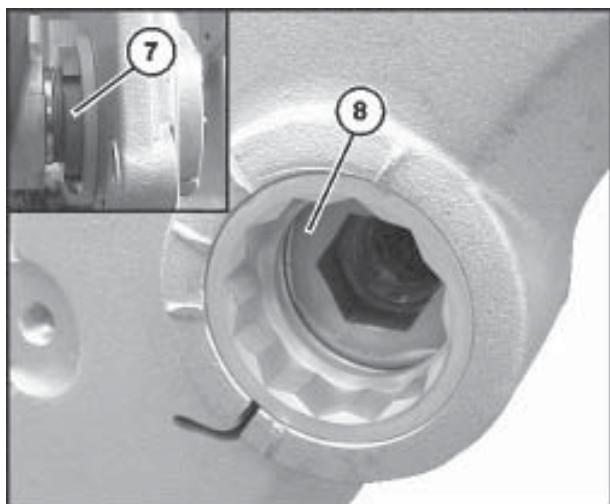
Disconnect the mileage counter cabling connector.

Remove the brake clamp, unscrewing the two fixing screws (4).

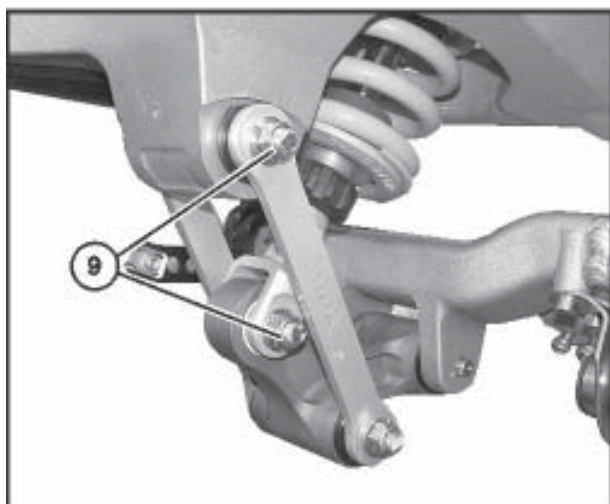
Remove the oil guide tube, unscrewing the two fixing screws (5).



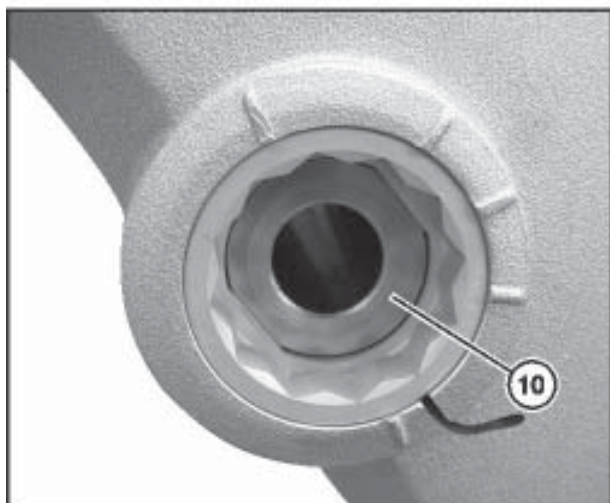
Loosen and remove the large fork pin fixing screw (6).



Loosen the reaction ring-nut (7) inside the chassis and loosen the adjustor (8).



Loosen and remove nuts (9) and relative screws.

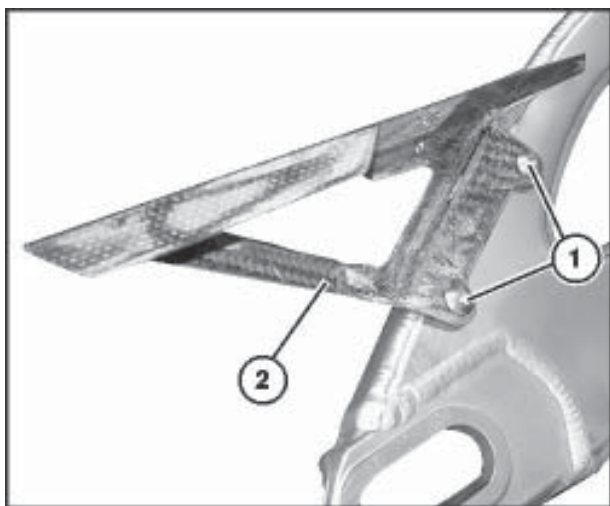


Undo pin (10) and remove the rear fork.

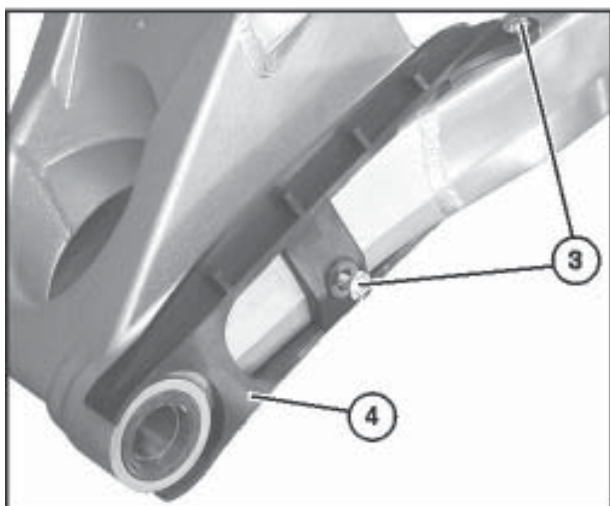


7.9.2 DISMANTLE REAR FORK COMPONENTS

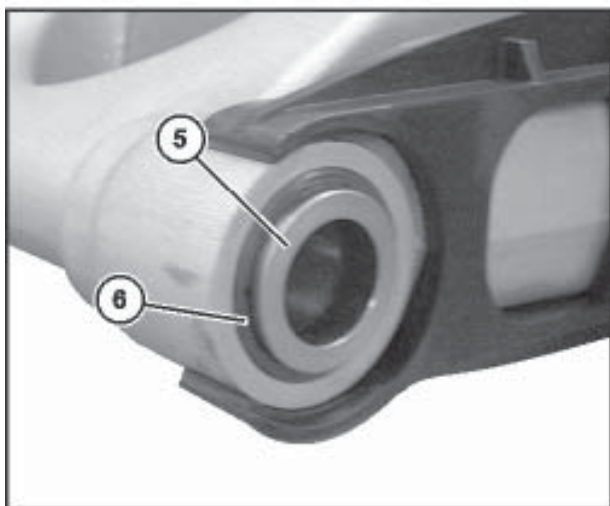
Loosen and remove the two screws
Remove the chain casing (2).

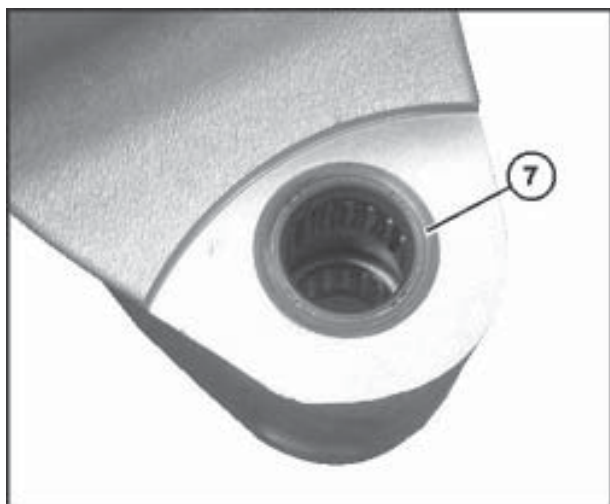


Loosen and remove the two screws (3) and remove the chain pad (4).

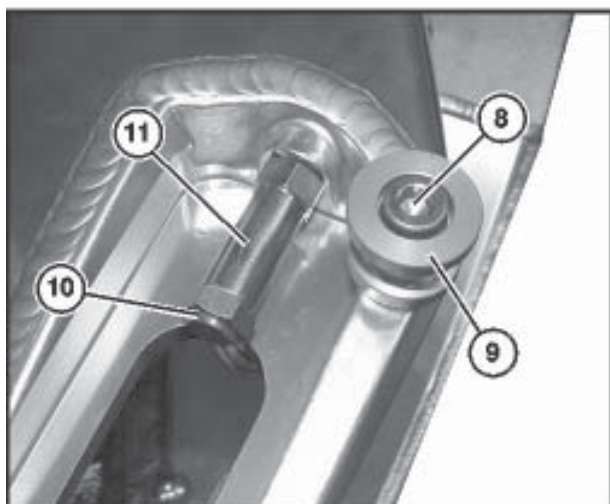


Remove the ferrule (5) and the oil seal (6).
Repeat the operation on the opposite part of the rear fork as well.

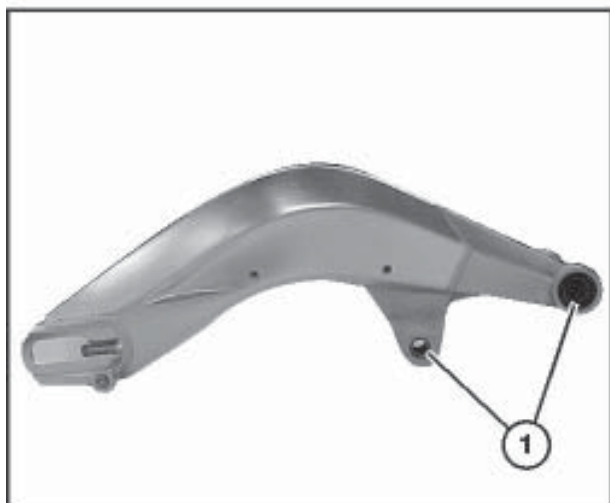




Remove the oil seal (7).
Repeat the operation on the opposite part of the rear fork as well.

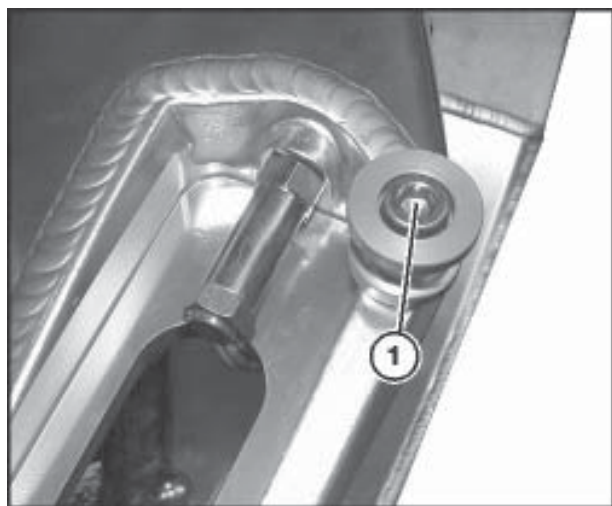


Loosen and remove screw (8) and the assembly stand ferule (9), the chain adjustment screw (10) and the locknut (11).
Repeat the operation on the opposite part of the rear fork as well.



7.9.3 CHECK REAR FORK

Sight check the state of the rear fork, change it if there are breaks.
Check the free rotation of the ball-bearings (1). If necessary, change them.
Check the state of wear of the chain pad. If necessary change it.
Check the state of the chain adjusters. If necessary, change them.



7.9.4 MOUNT REAR FORK



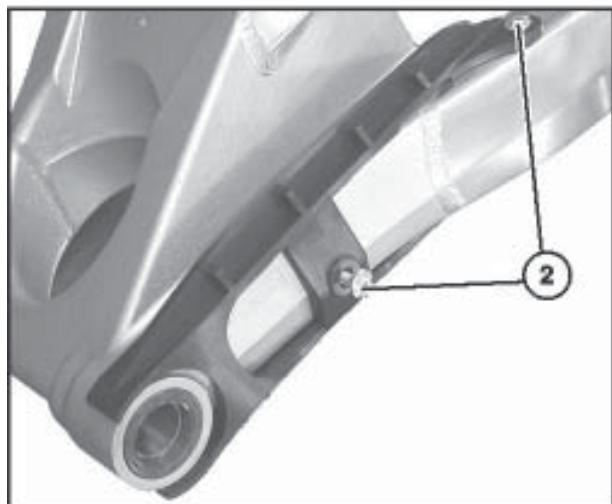
WARNING:
Always use new oil seals.

Proceed in the reverse manner to dismantling.

Tighten the assembly stand support screw (1).



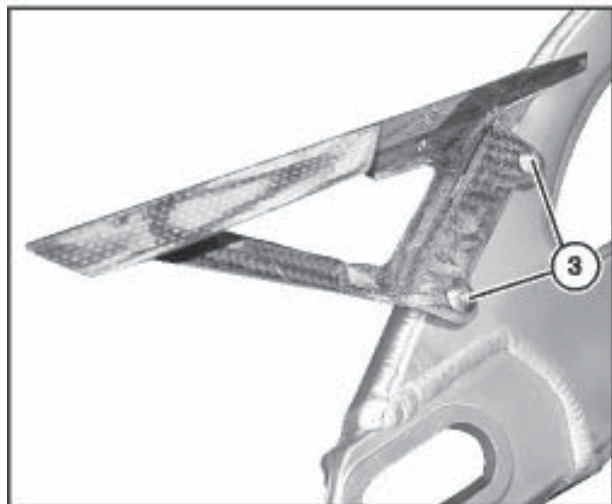
20 N·m 2 Kg-m



Tighten the chain pad screws (2).



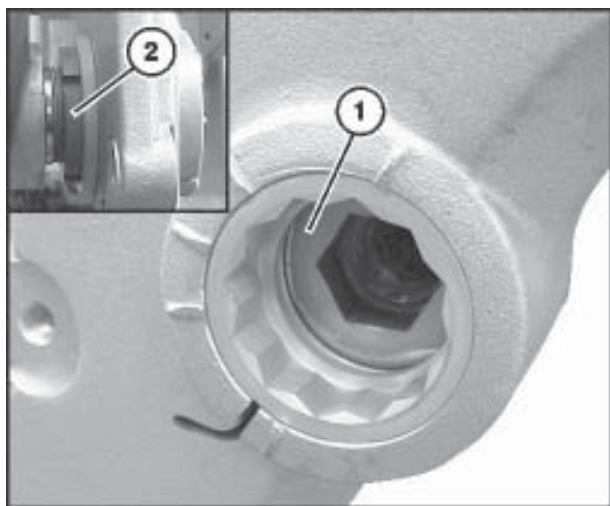
10 N·m 1 Kg-m



Tighten the chain casing screws (3).



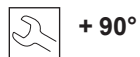
10 N·m 1 Kg-m



7.9.5 INSTALL REAR FORK

Operate in the reverse manner to removal.

Bring the adjuster (1) to touch and tighten.

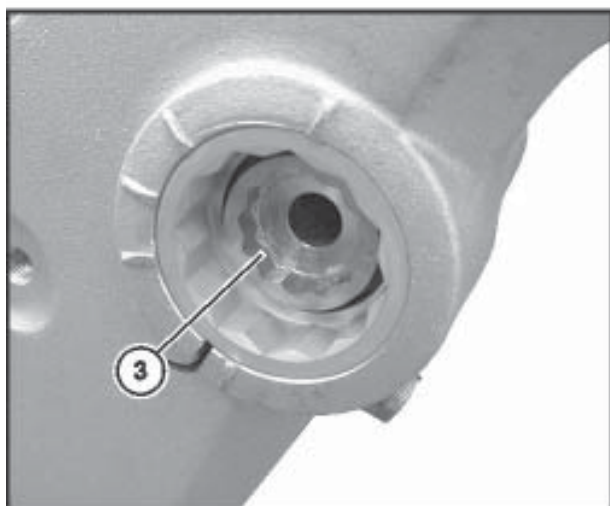


+ 90°

Tighten the ring-nut (2) inside the chassis.



40 N·m 4 Kg-m

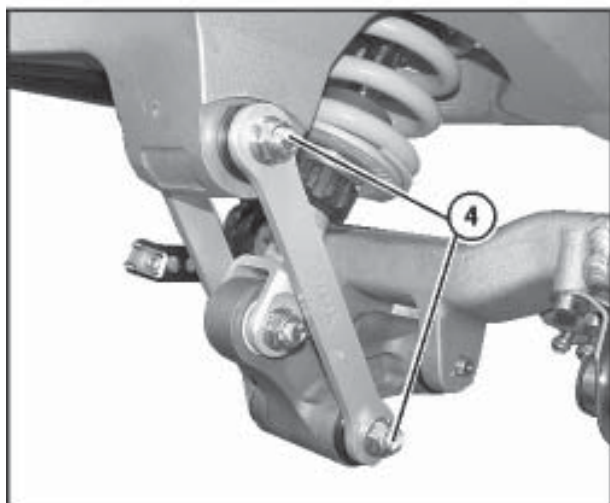


Insert the pin from the left side.

Tighten the rear fork pin fixing screw (3).



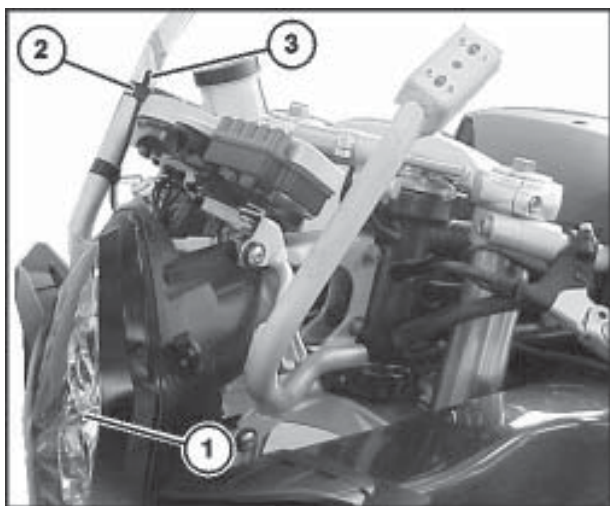
65 N·m 6.5 Kg-m



Tighten the two nuts (4).



50 N·m 5 Kg-m



7.10 FRONT FRAME

7.10.1 REMOVE FRONT FRAME

Remove the internal instrument board fastenings (see "REMOVE INSTRUMENT BOARD").

Remove the cap (see "REMOVE CAP").

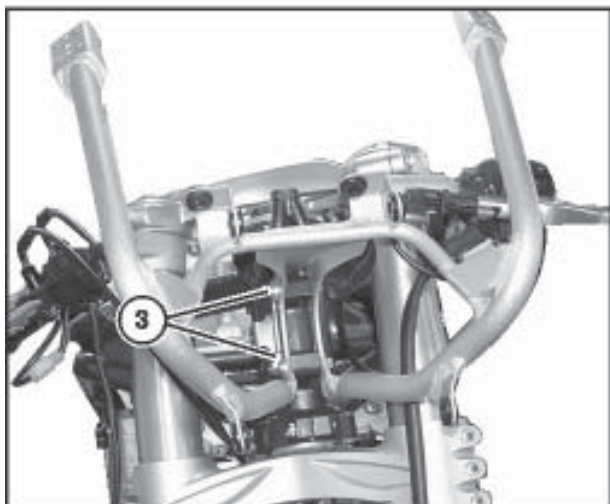
Remove right and left upper cowlings (see "REMOVE UPPER COWLINGS").

Remove the lower cowlings (see "REMOVE LOWER COWLINGS").

Remove the instrument (see "REMOVE INSTRUMENT").

Remove the front headlight (1) (see "REMOVE FRONT HEADLIGHT").

Remove the band (2) and free the external temperature sensor (3).



Loosen and remove the two nuts (3) and relative screws.
Remove the front frame.

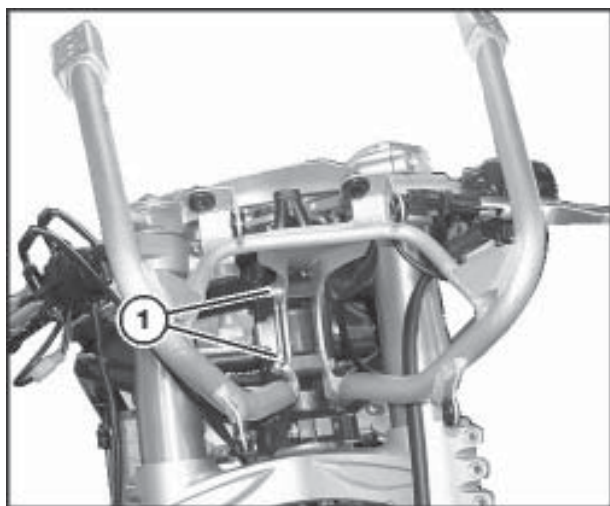


7.10.2 CHECK FRONT FRAME

Sight check the state of the front frame.

Change the piece if necessary.

Do not attempt to straighten.

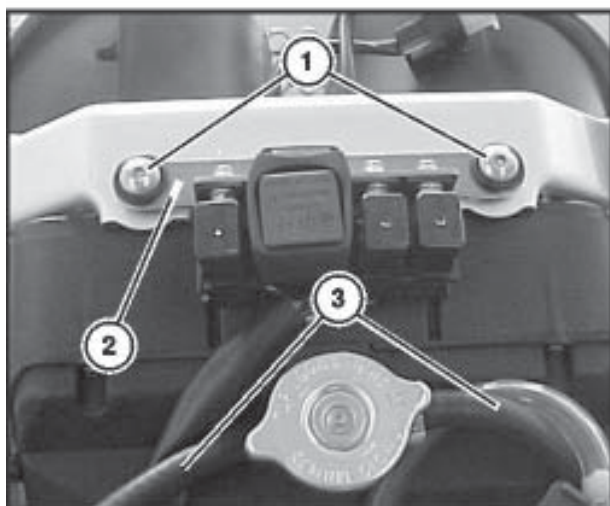


7.10.3 INSTALL FRONT FRAME

Operate in the reverse manner to removal.
Tighten the two fixing nuts (1).



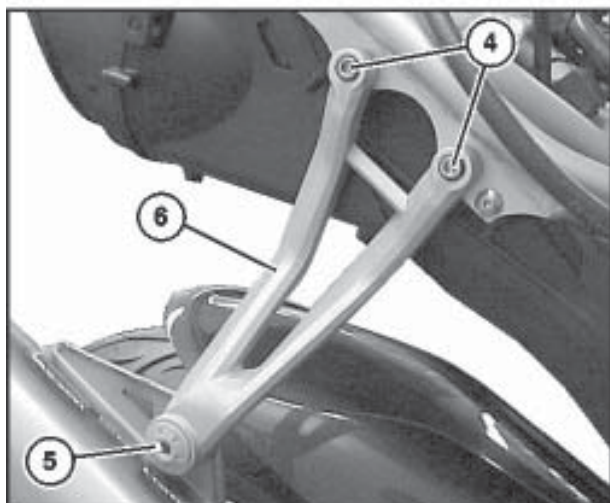
12 N·m 1.2 Kg-m



7.11 REAR FRAME

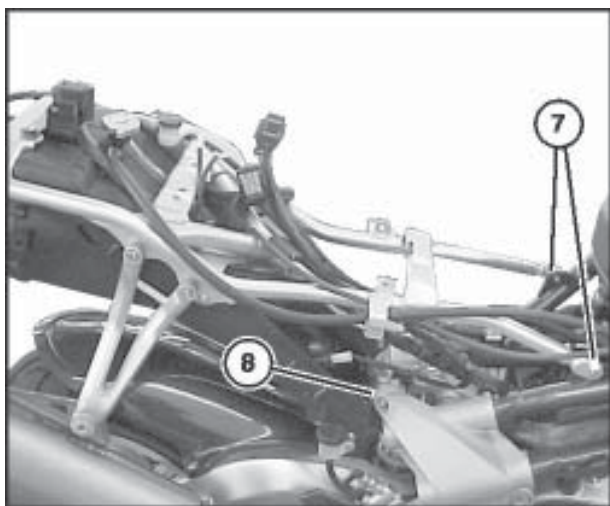
7.11.1 DISMANTLE REAR FRAME

Remove the internal instrument board fastenings (see "REMOVE INSTRUMENT BOARD").
Remove the cap (see "REMOVE CAP").
Remove right and left upper cowlings (see "REMOVE UPPER COWLINGS").
Remove right and left lower cowlings (see "REMOVE LOWER COWLINGS").
Remove the tailpiece (see "REMOVE TAILPIECE").
Remove the radiator box conduits (see "REMOVE RADIATOR BOX").
Loosen and remove the two screws (1) freeing the relay fixing plate (2) and disconnect the two radiator cap tubes (3).



Loosen the five radiator box fixing screws without removing them, leaving them free from the rear frame.

Loosen and remove the two screws (4) and screw (5), extracting the exhaust fixing rod (6).



Loosen and remove the two lateral screws (7).
Loosen and remove the centre screw (8).
Remove the rear frame, freeing it from the electrical plant and the radiator cap tubes.

NOTE:

Always check the passage of the electrical plant and the radiator cap tubes before dismantling.



7.11.2 CHECK REAR FRAME

Sight check the state of the rear frame. If necessary, change the piece. Do not attempt to straighten.



7.11.3 INSTALL REAR FRAME

Tighten the screws (1).

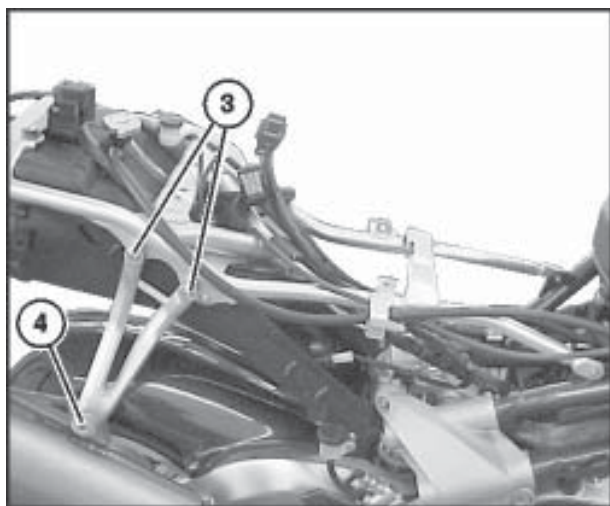


25 N·m 2.5 Kg-m

Tighten screw (2).



25 N·m 2.5 Kg-m



Tighten the two exhaust support rod screws (3).



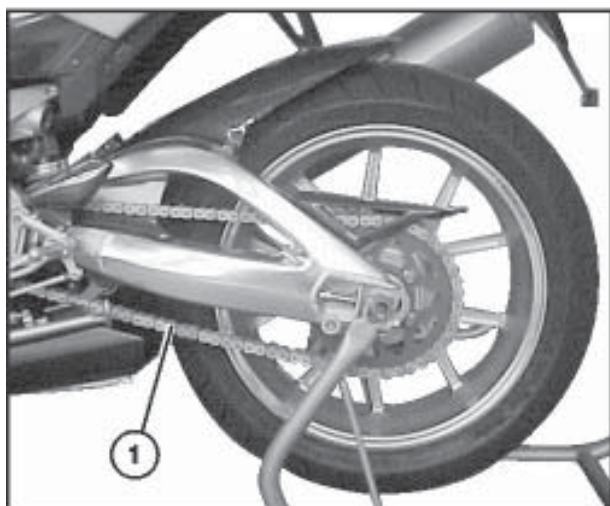
25 N·m 2.5 Kg-m

Tighten the exhaust support screw (4)



25 N·m 2.5 Kg-m

Operate in the reverse manner to remove the remaining elements.



7.12 TRANSMISSION CHAIN

7.12.1 REMOVE TRANSMISSION CHAIN

Remove the transmission chain (1) with a link cutter.

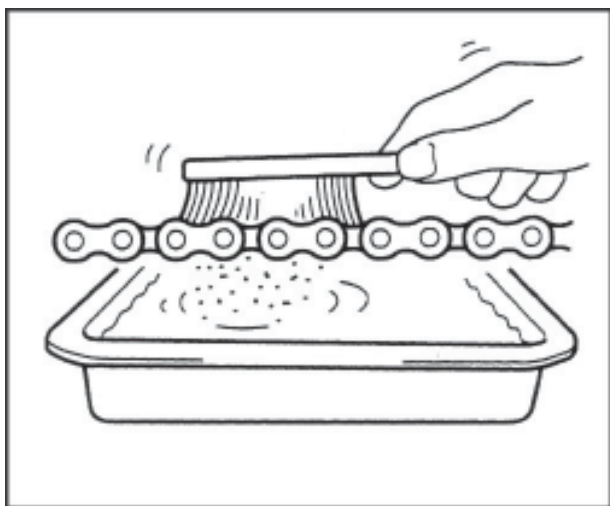


7.12.2 CHECK TRANSMISSION CHAIN

Check that the chain is not excessively worn or excessively loose.

Change the chain if necessary.

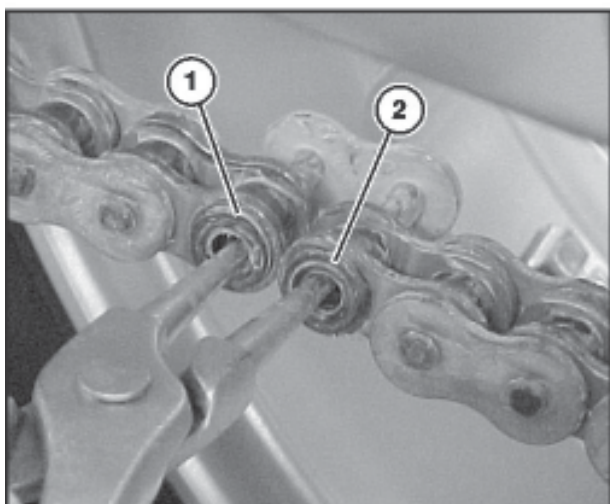
Check that the chain does not have crushed or seized up links.



WARNING:

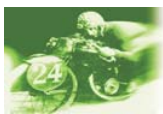
This is a chain with an O-ring. Respect the cleaning phases.

If necessary, dissolve the dirt deposits on the chain using kerosene. These deposits must be later removed with a clean rag or a jet of air. Then oil the chain.



7.12.3 INSTALL TRANSMISSION CHAIN

Position the chain on the crown and on the pinion.
Unite the two ends of the chain (1) and (2) with the specific equipment.
Adjust the chain (see "ADJUST CHAIN").



Injection Plant

8 INJECTION PLANT

8.1 ENGINE MANAGEMENT SYSTEM

8.1.1 DESCRIPTION OF THE SYSTEM

Each model is equipped with an electronic engine management system with a control that includes both the ignition and the distribution of the fuel.

The electronic control module (ECM) receives information from sensors placed around the engine and the cooling and suction systems, and calculates with precision the anticipation of ignition and the fuel needs for all engine states and loads.

Moreover, the system has hardware diagnostic functions that conform to the demands of the USA State of California for on board diagnostics.

These functions ensure that, in the case of faults in the system, the type of fault and the engine data at the moment of fault are stored in the ECM memory.

The stored data can be retrieved by a Benelli dealer using the apposite service equipment supplied to all Benelli dealers (see Axone instruction manual).

In this way, a precise diagnosis of the fault can be carried out and the defect rapidly repaired.

8.1.2 SYSTEM SENSORS

Suction air temperature sensor - placed in the air filter box. Considering that the density of the air (and therefore the quantity of oxygen available for burning the fuel) varies with the temperature, a suction air temperature sensor has been provided.

Variations in the air temperature (and therefore the density of the air) are compensated by adjusting the quantity of fuel injected at a level conforming to clean combustion and low emissions.

Barometric pressure sensor - the barometric pressure sensor is incorporated within the ECM and is connected to the air filter box by a flexible tube. The barometric pressure sensor measures the pressure of the air in the air filter box. The density of the air is calculated for this measurement and, when added to other information to the ECM, the engine load is calculated.

With this information the quantity of fuel for the injector is calibrated, adapting itself to the prevalent conditions.

Engine shaft position sensor (phase sensor) - placed on the right of the engine near the engine shaft. The elbow position of the shaft sensor notes the movement of a toothed wheel fixed to the right end of the engine shaft. The wheel has 21 equidistant teeth and a tripple sized tooth next to a space of triple dimension.

The triple dimension of the tooth and the space acts as a point of reference from which the immediate position of the engine shaft is calculated.

The engine shaft position sensor is used by the ECM to determine the position of the engine shaft in relation to the point at which the fuel is injected and the need to ignite the fuel.

Engine refrigerant liquid temperature sensor - placed on the right of the cylinder head. The information about the temperature of the refrigerant liquid received by the ECM is used to optimise the supply of the temperature of the engine to all and to calculate the supply needs in hot and cold starts.



Throttle body group position sensor - placed at the right end of the small throttle body group shaft. The throttle body group position sensor gives a completely closed position reading and all the other opening angles are calculated taking the completely closed position as basis.

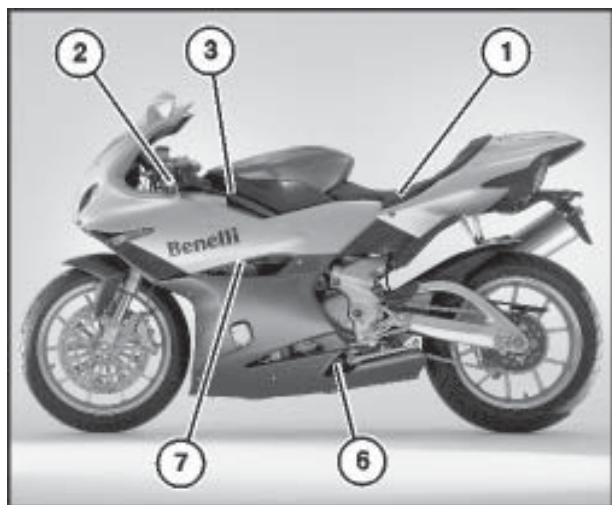
The throttle body group angle is used by the ECM to determine the supply needs of all the throttle body group positions.

Neutral switch - situated in the gear box. The neutral switch indicates when the gears are in neutral. Moreover, the neutral switch sends a signal to a safety device that prevents starting with the assembly stand lowered.

If a gear is engaged with the assembly stand lowered, supply to the ECM is immediately interrupted, causing the engine to stop.

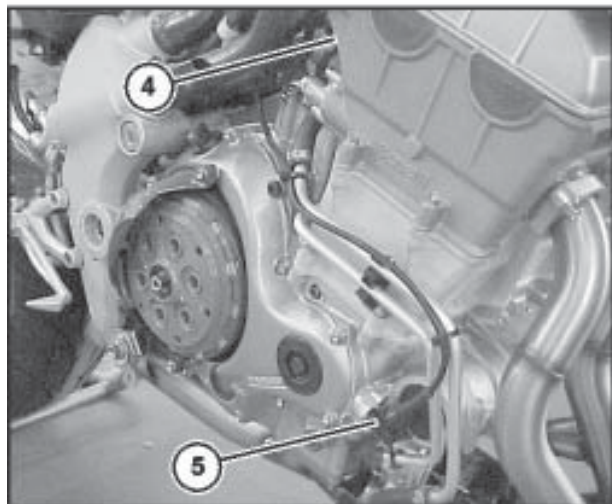
Lateral assembly stand switch - placed at the top of the lateral assembly stand leg. If the lateral assembly stand is lowered, the engine will not turn until the gears are in neutral or the clutch lever, that has a switch, is pulled up to the handle.

Clutch switch - placed on the clutch lever. The engine will not start until the lever is pulled up to the handle.



8.1.3 POSITION OF THE SENSORS

- 1 Barometric pressure sensor. Engine control module (under the saddle)
- 2 Clutch lever (on the clutch lever)
- 3 Suction air temperature sensor (low in the air filter box)
- 4 Cooling liquid temperature sensor (on the cylinder head)
- 5 Position of the engine shaft sensor (on the right side of the engine near the engine shaft)
- 6 Neutral switch (on the left of the gearbox)
Lateral assembly stand switch (on the arm of the lateral assembly stand)
- 7 Position sensor (right end of the throttle body group).



8.2 SYSTEM ACTIVATING DEVICES

In response to signals received from the sensors, the ECM adjusts a series of activating electronic and electromechanical devices. The function and arrangement of the activating devices is illustrated below.

Minimum air control system - Situated inside the air filter box: the system includes a control valve of the passage of air under the throttle of the throttle body and is equipped with a stepper engine.



The system controls the following parameters:

- Minimum functioning.
- Supply of air in the case of the engine missing.
- Correction of the air/fuel relation operating at minimum speeds at heights above sea-level.
- Correction of the air/fuel relation in cold and hot starts. When the stepper is activated it opens the valve more or less to allow a determined flow of air to flow along a series of tubes in the throttle body group.

Injectors - positioned on the throttle body group. The engine is equipped with three quadruple jet injectors. The quantity of the jets is constant, but the amount of time that each injector remains open is variable. The duration of each injection is calculated by the ECM on the basis of the data received from various sensors of the system.

Ignition coils - Placed directly above the head of every sparking-plug. The ECM controls the moment at which the coils are turned on or off. In calculating the turning on time, the ECM allows the sparking-plug sufficient time to produce a spark. The coils are turned off at ignition in the time needed to have correct combustion.

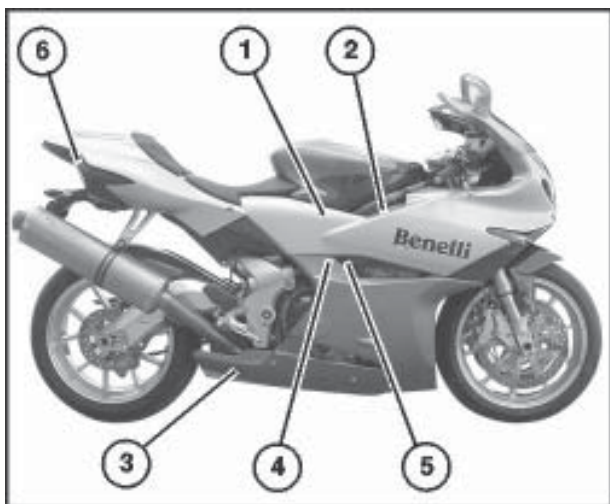
Injection relay - situated near the ECM, below the saddle of the vehicle. When ignition takes place, the main power relay is encouraged to supply a stable voltage to the ECM. When turned off, the ECM maintains the main power relay in such a way as to be able to accomplish the turning off procedure that includes:

- Inserting the data in the ECM memory.
- Supplying data about the position of the stepper engine of the air control valve.
- Activating the cooling fan until the engine is sufficiently cool.

At the moment in which all the turning off procedures are completed, the injection relay turns itself off.

Fuel pump - placed in the fuel tank. The electric pump distributes the fuel in the supply plant using a pressure adjustor at a constant pressure of 3.5 bar. The pump rotates continuously while the engine is functioning and rotates for a brief period when the engine is turned off so that the pressure of 3.5 bar is ensured as soon as the engine is turned on.

Cooling fan - placed behind the radiator. The ECM activates and deactivates the cooling fan in function of a signal received from the refrigerant liquid temperature sensor. When the temperature of the refrigerant liquid reaches a level at which the cooling effect of the natural flow of air is insufficient, the ECM activates the cooling fan. When the temperature of the refrigerant liquid lowers itself sufficiently, the ECM deactivates the cooling fan.



8.2.1 ENGINE SUPPLY PLANT

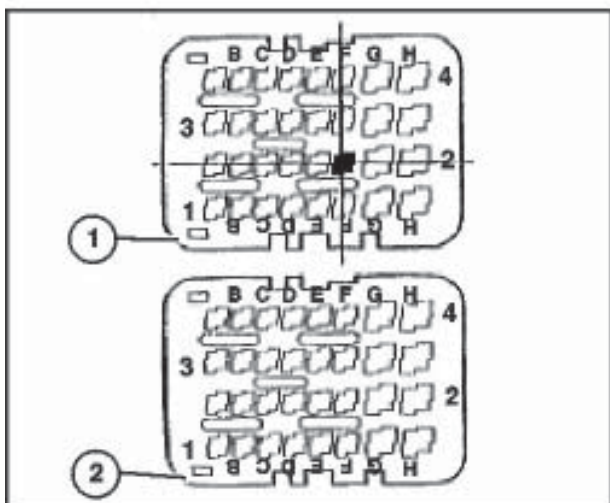
Location of actuators

- 1 Oil pump (on the base of the oil tank)
- 2 Ignition coils (upper part of the cover of the cams)
- 3 Canister breather valve (only USA version)
- 4 Minimum air control system (on the lower part of the air box filter)
- 5 Injectors (behind the throttle bodies)
- 6 Cooling fan (behind the radiator).



8.2.2 IGNITION AND INJECTION DIAGNOSTIC SYSTEM

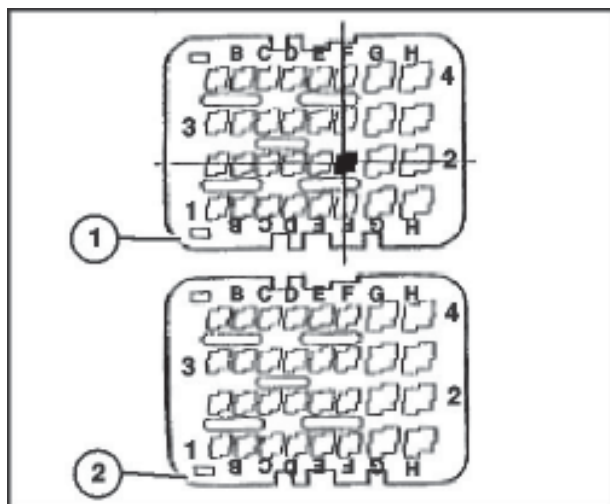
A diagnostic Software exists for the diagnosis of the ignition and injection system for replacements (Cod.R180197036000) able to identify damage present or presenting itself on the bike. This Software is supplied with a manual guide to the use of the programme in order to be able to carry out a check on every single component of the system. The system can also be checked observing the operations described as follows.



8.3 NUMBERING THE ECM CONNECTORS

The diagram on the side shows the sequence of the two ECM connectors. These pin numbers correspond directly to the pin numbers supplied in the diagnostic procedure and the schematic drawings of the cabling used in this manual.

Each connector has 32 pins arranged in four rows numbered 1, 2, 3 and 4 and in eight columns as illustrated below. The first column is denominated A and the eighth column H.



NOTE:

Note that the first column is not marked A because of the restricted space on the face of the connector.

The diagram to the side shows the numbering of the pins as they appear on the connector.

The position of the ECM connectors is described in this manual through the identification of the connector, 1 (black) or 2 (grey), followed by the row number and the column number in which it is situated.

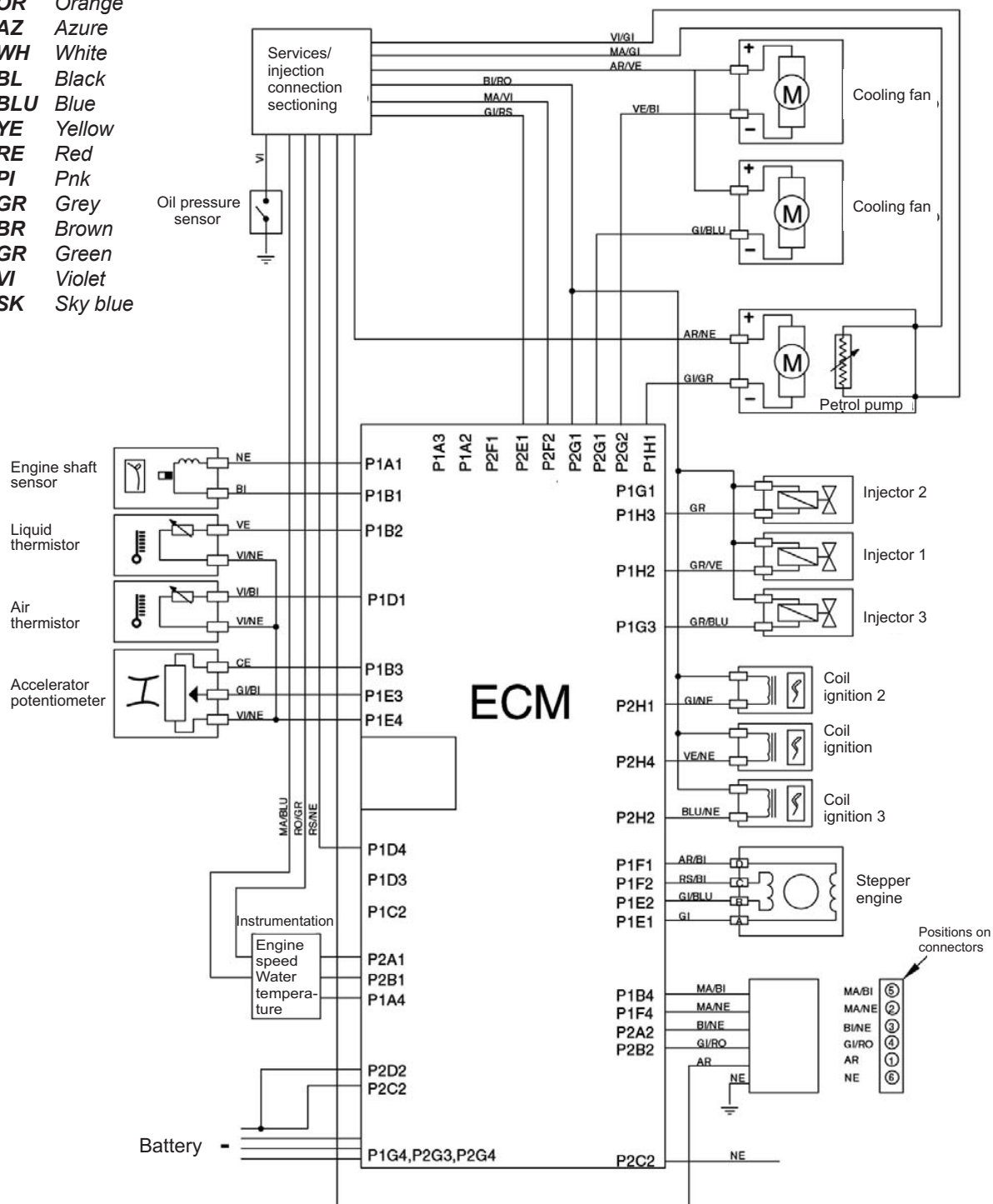
In the example to the side, pin 1/F2 is shown from the intersection of the lines.



8.4 FUEL PUMP CHECKING SYSTEM

Key:

OR Orange
AZ Azure
WH White
BL Black
BLU Blue
YE Yellow
RE Red
PI Pnk
GR Grey
BR Brown
GR Green
VI Violet
SK Sky blue





8.5 SUPPLEMENTARY DIAGNOSIS

The following tables, if used correctly, help to identify a fault in the system once the diagnostic code of the problem has been stored.

PHASE SENSOR (ENGINE SHAFT) – MC 1000 ECM

Fault code	Possible cause	Instruction
P0335	Damage to the phase sensor system (engine shaft) Toothed wheel disengaged/ screen cable damaged	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual) if available. Make sure that the sensor is inserted correctly and the connector fixed well. Check that the distance between the sensor and the phonic wheel is 1 mm. Check that the teeth are not damaged. Check eventual contamination by magnetic debris. Disconnect the ECM and proceed to location test 1.
P1335		Proceed to location test 5.

LOCATION TEST

Test	Result	Instruction
1 - Check the integrity of the terminal and the cable: - ECM 1/A1 pin - ECM 1/B1 pin	OK	Disconnect the sensor, proceed to test 2.
	Fault	Repair the fault, proceed to test 6.
2 - Check the integrity of the cable for short circuiting: - ECM 1/A1 pin at the chassis - ECM 1/B1 pin at the chassis	OK	Proceed to test 3
	Short circuit	Locate and repair fault, proceed to test 6.
3 - Check the continuity of the cable: - ECMPin 1/B pin at pin 1 of the Pick-up connector - ECM Pin 1/A1 pin at pin 2 of the Pick-up connector	OK	Proceed to test 4
	Open circuit	Locate and repair fault, proceed to test 6.



4 - Check the continuity of the cable for short circuiting: - ECM 1/A1 Pin at ECM pin 1/B1	OK	Change the phase sensor (engine shaft). proceed to test 5
	Short circuit	Locate and repair fault, proceed to test 6
5 - Check the continuity of the cable: - Cable shielded at the chassis	OK	Proceed to test 6
	Open circuit	Locate and repair fault in the cables, proceed to test 6.
6 - Re-connect the cabling, cancel the fault code and start the engine to check that the fault has disappeared	OK	Activity carried out – terminate the test
	The fault persists	Contact the Benelli assistance

CHECK AIR AT MINIMUM – MC 1000 ECM

Fault code	Possible cause	Instruction
P0505	Stepper engine/cabling damage	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual) if available. Check and note the data on the sensor of the diagnostic instrument (see Axone instruction manual). Make sure that the sensor is inserted correctly and the connector fixed well. Disconnect the ECM and proceed to location test 1.

LOCATION TEST

Test	Result	Instruction
1 - Check the integrity of the terminal and the cable: - ECM pin 1/E1 - ECM pin 1/E2 - ECM pin 1/F1 - ECM pin1/F2	OK	Proceed to test 2
	Fault	Rectify the fault, proceed to test 6.



2 - Check the resistance value: - ECM pin 1/E1 at ECM pin 1/F1 - ECM pin 1/E2 at ECM pin 1/F2	from 47 to 59 Ω	Disconnect the stepper engine and proceed to test 3
	Open circuit	Proceed to test 4
	Short circuit	Disconnect the stepper engine and proceed to test 5
3 - Check whether the cable is short circuited. - ECM Pin 1/E1 at the chassis - ECM Pin 1/E2 at the chassis - ECM Pin 1/F1 at the chassis - ECM Pin 1/F2 at the chassis	OK	Proceed to test 7
	Short circuit	Locate and repair the fault at the cabling, proceed to test 7
4 - Check the continuity of the cable: - ECM Pin 1/E1 at pin A of the stepper connector - ECM Pin 1/E at pin B of the stepper connector - ECM Pin 1/F2 at pin C of the stepper connector - ECM Pin 1/F1 at pin D of the stepper connector	OK	Proceedere to test 6
	Open circuit	Locate and repair the fault at the cabling, proceed to test 7
5 - Check the continuity of the cable for short circuiting: - ECM Pin 1/E at ECM pin 1/F1 - ECM Pin 1/E2 at ECM pin 1/F2	OK	Proceedere to test 6
	Short circuit	Locate and repair the cable faults, proceed to test 7
6 - Check the resistance of the stepper engine - Between pin A / pin D - Between pin B / pin C	from 47 to 59 Ω	Proceed to test 7
	Fault	Change the stepper engine, proceed to test 7
7 - Re-connect the cabling, cancel the fault code and activate the functional test of the diagnostic equipment (see Axone manual) to view the checking operations of the stepper engine	OK	Activity carried out – terminate the test
	Fault	Contact the Benelli assistance



INJECTORS – MC 1000 ECM

Fault code	Possible cause	Instruction
P0201/02/03	Injection plant damaged– 2/1/3 Failure to ignite indicates open circuit Flooding indicates short circuit	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual) if available. Make sure that the relative injector connectors are correctly inserted. Disconnect the ECM and proceed to location test 1.
P1201/02/03	Open or short circuit – injectors 2/1/3	
P1205/06/07	Short circuit at the battery positive pole (+) - injectors 2/1/3	Disconnect the relative injectors and proceed to location test 5.

LOCATION TEST

Test	Result	Instruction
1- Check the integrity of the terminal and the cable: - ECM 1/G3 pin - ECM 1/H3 pin - ECM 1/H2 pin	Ok	Proceed to test 2
	Fault	Repair the fault, proceed to test 6
2- Check the value of the resistance: - ECM pin 1/H4 at ECM pin 1/H3 (injector 2) - ECM pin 1/H4 at ECM pin 1/H2 (injector 1) - ECM pin 1/H4 at ECM pin 1/G3 (injector 3)	from 15.5 a 16.3	Disconnect the relative injector and proceed to test 3
	Open circuit	Proceed to test 4
	Short circuit	Disconnect the relative injector and proceed to test 5
3- Check whether the cable is short circuited: - ECM Pin 1/H3 at the chassis - ECM Pin 1/H2 at the chassis - ECM Pin 1/G3 at the chassis	Ok	Proceed to test 7
	Short circuit	Locate and repair the cable fault, proceed to test 7
4- Check the continuity of the cable: - ECM Pin 1/H4 at the injection relay - ECM Pin 1/H3 at connector pin 2 (injector 2) - ECM Pin 1/H2 at connector pin 2 (injector 1) - ECM Pin 1/G3 at connector pin 2 (injector 3)	Ok	Proceed to test 6
	Open circuit	Locate and repair the cable fault and proceed to test 7



5 - Check the continuity of the cable for short circuiting: - ECM Pin 1/H4 at ECM pin 1/H3 (injector 1) - ECM Pin 1/H4 at ECM pin 1/H2 (injector 2) - ECM Pin 1/H4 at ECM pin 1/G3 (injector 3)	Ok	Proceed to test 6
	Short circuit	Locate and rectify cable fault, proceed to test 7
6 - Check the resistance of the relative injector: - injector pin 1 to injector pin 2	from 15.5 to 16.3	Proceed to test 7
	Fault	Change the relative injector, proceed to test 7
7 - Reconnect the cabling, cancel the fault code and activate the engine to check the elimination of the fault	Ok	Activity carried out - terminate test
	The fault persists	Contact the Benelli assistance



POSITION SENSOR OF THE THROTTLE BODY GROUP – MC 1000 ECM

Fault Code	Possible cause	Instruction
P0120	Position sensor system of the throttle body group damaged	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual) if available.
P0122	Entrance voltage of the sensor low	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual).
P0123	Entrance voltage of the sensor high	Make sure that the sensor is inserted correctly and the connector fixed well. Disconnect the ECM and proceed to location test 1.

LOCATION TEST

Test	Result	Instruction
1- Check the integrity of the terminal and the cable: - ECM pin 1/B3 - ECM pin 1/E3 - ECM pin 1/E4	OK	Disconnect the sensor and proceed to test 2
	Fault	Rectify the fault, proceed to test 5
2- Check whether the cable is short circuited: - ECM pin 1/E3 to the chassis	OK	Proceed to test 3
	Short circuit	Locate and repair the cable fault, proceed to test 5
3- Check the continuity of the cable: - ECM pin 1/E4 at sensor pin 3 - ECM pin 1/E3 at sensor pin 2 - ECM pin 1/B3 at sensor pin 1	OK	Proceed to test 4
	Open circuit	Locate and repair the cable fault, proceed to test 5
4- Check whether the cable is short circuited: - ECM pin 1/E3 at ECM pin 1/B3 - ECM pin 1/E3 at pin ECM 1/E4	OK	Change the position sensor of the throttle body group, proceed to test 5.
	Short circuit	Locate and repair the cable fault, proceed to test 5
5- Reconnect the cabling, cancel the fault code and activate the engine to check the elimination of the fault.	OK	Activity carried out – terminate the test
	The fault persists	Contact the Benelli assistance



IGNITION COIL – MC 1000 ECM

Fault Code	Possible cause	Instruction
P0351/52/53	Ignition system damaged – ignition coil 2/1/3	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual) if available.
P1351/52/53	Open or short circuit – ignition coil 2/1/3	Make sure that the connector of the relative ignition coil is inserted correctly. Disconnect the ECM and proceed to location test 1.
P1355/56/57	Short circuit at the positive battery pole (+) - ignition coil 2/1/3	Disconnect the relative ignition coil and proceed to location test 5.

LOCATION TEST

Test	Result	Instruction
1 - Check the integrity of the terminal and the cable: - ECM pin 2/H1 - ECM pin 2/H2 - ECM pin 2/H4	OK	Proceed to test 2
	Fault	Repair the fault, proceed to test 7
2 - Check the resistance value: - ECM pin 1/H4 at: - ECM pin 2/H1 (ignition coil 2) - ECM pin 2/H4 (ignition coil 1) - ECM pin 2/H2 (ignition coil 3)	0.8 Ω	Disconnect the relative coil and proceed to test 3
	Open circuit	Proceed to test 4
	Short circuit	Disconnect the relative coil and proceed to test 5
3 - Check the cable for short circuiting: - ECM pin 2/H1 at the chassis - ECM pin 2/H2 at the chassis - ECM pin 2/H4 at the chassis	OK	Proceed to test 7
	Short circuit	Locate and rectify the cable fault, proceed to test 7
4 - Check the continuity of the P1H4 cable with each ignition coil pin 2: Supply pin 8 of the relay block with each ignition coil pin. - ECM pin 2/H1 at pin 1 of ignition coil 2 - ECM pin 2/H4 at pin 1 of ignition coil 1 - ECM pin 2/H2 at pin 1 of ignition coil 3	OK	Proceed to test 6
	Open circuit	Locate and rectify the cable fault, proceed to test 7



5- Check the cable for short circuiting P1H4 with: Supply blocking relay pin 8 to: - ECM pin 2/H1 (ignition coil 2) - ECM pin 2/H4 (ignition coil 1) - ECM pin 2/H2 (ignition coil 3)	OK	Proceed to test 6.
	Short circuit	Locate and repair the cable fault, proceed to test 7
6- Check the resistance of the relative ignition coil: - Pin 1 of the ignition coil at pin 2 of the ignition coil	0.8 Ω	Proceed to test 7
	Fault	Change the relative ignition coil, proceed to test 7
7- Reconnect the cabling, cancel the fault code and activate the engine to check the elimination of the fault	OK	Activity carried out - terminate test
	The fault persists	Contact the Benelli assistance

COOLING LIQUID TEMPERATURE SENSOR – MC 1000 ECM

Fault Code	Possible cause	Instruction
P0115	Cooling liquid temperature system damaged	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual) if available. Check and note the data on the sensor of the diagnostic instrument (see Axone instruction manual). Make sure that the connector is inserted correctly. Disconnect the ECM and proceed to location test 1.
P0117	Open or short circuit at the positive battery pole (+)	
P0118	Short circuit at the chassis	Disconnect the sensor and proceed to location test 6.
P0119	Voltage signal too high.	Proceed to location test 4.



LOCATION TEST

Test	Result	Instruction
1 - Check the integrity of the terminal and the cable: - ECM pin 1/B2 - ECM pin1/E4	OK	Proceed to test 2
	Fault	Repair the fault, proceed to test 7
2 - Check the resistance value: - ECM pin 1/B2 to ECM pin 1/E4 (depending on the temperature, - see below)	OK	Disconnect the temperature sensor and proceed to test 6
	Open circuit	Proceed to test 3
	Short circuit	Disconnect the temperature sensor and proceed to test 4
3 - Check the continuity of the cable: - ECM pin 1/B2 to sensor pin 2 - ECM pin 1/E4 to sensor pin 1	OK	Procedere al test 5
	Open circuit	Locate and rectify the cable fault, proceed to test 7
4 - Check the cabling for short circuiting: - pin 1/B2 al ECM pin 1/E4	OK	Procedere al test 5
	Short circuit	Locate and rectify the cable fault, proceed to test 7
5 - Check the resistance of the sensor: - Sensor pin 1 to sensor pin 2 (depending on the temperature, - see below)	OK	Proceed to test 7
	Fault	Change the temperature sensor, proceed to test 7
6 - Check the cable for short circuiting: - ECM pin 1/B2 to the chassis	OK	Procedere al test 7
	Short circuit	Locate and restore the cable fault, proceed test 7
7 - Reconnect the cabling, cancel the fault code and activate the engine to check the elimination of the fault	OK	Attività svolta – terminare il test
	Fault	Contact the Benelli assistance

Resistance data in typical conditions:
Engine warm:

Environmental temperature	Resistance value
20°C	2.35 a 2.65 KΩ
10°C	3.60 a 4.00 KΩ
0°C	5.60 a 6.25 KΩ



AIR ENTRANCE TEMPERATURE SENSOR – MC 1000 ECM

Fault code	Possible cause	Instruction
P0110	Air entrance temperature system damaged	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual) if available. Check and note the data on the diagnostic instrument sensor (see Axone instruction manual). Make sure that the sensor connector is inserted correctly. Disconnect the ECM and proceed to location test 1
P0113	Open or short circuit at positive battery pole (+)	
P0112	Short circuit at the chassis	Disconnect the sensor and proceed to location test 6.

LOCATION TEST

Test	Result	Instruction
1- Check the integrity of the terminal and the cable: - ECM pin 1/D1 - ECM pin 1/E4	OK	Proceed to test 2
	Fault	Rectify the fault, proceed to test 7
2- Check the resistance value: - ECM pin 1/D1 to ECM pin 1/E4 (depending on the temperature, - see below)	OK	Disconnect the temperature sensor and proceed to test 6
	Open circuit	Proceed to test 3
	Short circuit	Disconnect the temperature sensor, proceed to test 4
3- Check the continuity of the cable: - ECM pin 1/D1 to sensor pin 2 - ECM pin 1/E4 to sensor pin 1	OK	Proceed to test 5
	Open circuit	Locate and rectify cable fault, proceed to test 7
4- Check the cabling for short circuiting: - ECM pin 1/D1 al ECM pin 1/E4	OK	Proceed to test 5
	Short circuit	Locate and rectify cable fault, proceed to test 7



5 - Check the sensor resistance: - Sensor pin 1 to sensor pin 2 (depending on the temperature, - see below)	OK	Proceed to test 7
	Fault	Change the temperature sensor, proceed to test 7
6 - Check the cabling for short circuiting: - EXM pin 1/D1 to the chassis	OK	Procedere al test 7
	Short circuit	Locate and restore the cable fault, proceed to test 7
7 - Reconnect the cabling, cancel the fault code and activate the engine to check the elimination of the fault	OK	Activity carried out - temoinate test
	Fault	Contact Benelli assitance

If the engine is hot, remove the sensor and let it cool down beofre carrying out the test

Resistance data:

Environmental temperature	Resistance value
30°C	1.6 a 1.8 KΩ
25°C	1.9 a 2.2 KΩ
20°C	2.3 a 2.7 KΩ
15°C	2.9 a 3.3 KΩ
10°C	3.5 a 4.0 KΩ
5°C	4-4 a 4.9 KΩ
0°C	5.5 a 6.1 KΩ



FUEL PUMP – MC 1000 ECM

Fault code	Possible cause	Instruction
P0230	Fuel system pump damaged	Check whether the pump starts working when activating ignition. make sure the the pump connector is inserted correctly. Disconnect the ECM and proceed to test 1.
P1231	Open or short circuit to the chassis	
P1232	Short circuit to the positive battery pole (+)	Disconnect the fuel pump and proceed to test 4.

LOCATION TEST

Test	Result	Instruction
1- Check the integrity of the terminal and the cable: - ECM pin 1/H1	OK	Disconnect the fuel pump and proceed to test 2
	Fault	Rectify the fault, proceed to test 5
2- Check the cable for short circuiting: - pin dell'ECM 1/H1 to the chassis	OK	Proceed to test 3
	Short circuit	Locate and rectify the cable fault, proceed to test 5
3- Check the continuity of the cable: - pin 1/H1 to fuel pump pin 2 - fuel pump pin 1 +12 vDC with ignition key on	OK	Procedere al test 4
	Open circuit	Locate and rectify the cable fault, proceed to test 5
4- Check the cable for short circuiting: - ECM pin 1/H1 to ECM pin 2/E1	OK	Procedere al test 5
	Short circuit	Locate and rectify the cable fault, proceed to test 5
5- Reconnect the cabling, cancel the fault code and activate the engine to check the elimination of the fault	OK	Activity carried out – terminate the test
	Fault	Contact the Benelli assistance



VOLTAGE SUPPLY SENSOR – MC 1000 ECM

Fault code	Possible cause	Instruction
P1560	Engine control module/ cabling fault	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual) if available. Disconnect the ECM and proceed to location test 1.

LOCATION TEST

Test	Result	Instruction
1 - Check the integrity of the terminal and the cable: - ECM pin 1/E4 - ECM pin 1/B3	OK	Disconnect the throttle group position sensor and the air pressure sensor, proceed to test 2
	Fault	Rectify the fault, proceed to test 4
2 - Check for short circuiting: - ECM pin 1/B3 to ECM pin 1/E4	OK	Reconnect the ECM, proceed to test 3
	Short circuit	Locate and rectify the cable fault, proceed to test 4
3 - With the key "ON", check the voltage at: - ECM pin 1/B3	from 4.5 to 5.5 v	Proceed to test 4
	Fault	Locate and rectify the cabling fault between the ECM and the sensors, if the cabling is alright, change the ECM. Proceed to test 4
4 - Reconnect the cabling, cancel the fault code and activate the engine to check the elimination of the fault	OK	Activity carried – terminate the test
	Fault	Contact the Benelli assistance



VOLTAGE SUPPLY SENSOR – MC 1000 ECM

Fault code	Possible cause	Instruction
P0560	Engine voltage system damaged	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual) if available. Make sure that the voltage through the battery is acceptable, note the voltage. Disconnect the ECM and proceed to location test 1
P0562	Alternator/battery damaged - low voltage	
P0563	Alternator damaged - high voltage	Make sure that the alternator exit voltage is acceptable, note the voltage.

LOCATION TEST

Test	Result	Instruction
1 - Check the integrity of the terminal and the cable: - ECM pin 2/E1	OK	Proceed to test 2
	Fault	Rectify the fault, proceed to test 3
2 - Check the voltage with the engine running at: - ECM pin dell'2/E1	The same through the battery voltage	Proceed to test 3
	Less than through the battery voltage	Locate and repair the cable fault, proceed to test 3
3 - Reconnect the cabling, cancel the fault code and activate the engine to check the elimination of the fault	OK	Activity carried out – terminate the test
	Fault	Contact the Benelli assistance



**BAD FUNCTIONING OF THE ENGINE DIAGNOSIS WARNING LAMP (MIL) –
MC 1000 ECM**

Fault code	Possible cause	Instruction
P1600	MIL system damaged	Check and make sure that the connector of the warning lamp is inserted well and that the bulb works. Disconnect the ECM and proceed to location test 1.
P1601	Open or short circuit to the chassis	
P1602	Short circuit at the positive battery pole (+)	Disconnect the warning lamp, proceed to test 4.

LOCATION TEST

Test	Result	Instruction
1 - Check the integrity of the terminal and the cable: - ECM pin 1/D4	Ok	Disconnect the warning lamp and proceed to test 2
	Fault	Restore the fault, proceed to test 5
2 - Check the cable for short circuiting: - ECM pin 1/D4 to the frame	Ok	Proceed to test 3
	Short circuit	Locate and rectify the cable fault, proceed to test 5
3 - Check the continuity of the cable: - instrument pin 15 to ECM pin 1/D4	Ok	Proceed to test 4
	Open circuit	Locate and rectify the cable fault, proceed to test 5
4 - Check for short circuiting: - ECM pin 1/D4 to ECM pin 2/E1 - Instrument pin 5 to instrument pin 15	Ok	Proceed to test 5
	Short circuit	Locate and rectify the cable fault, proceed to test 5
5 - Reconnect the cabling, cancel the fault code and activate the engine to check the elimination of the fault	Ok	Activity carried out – terminate the test
	Fault persists	Contact the Benelli assistance



COOLING FAN - MC 1000 ECM

Fault code	Possible cause	Instruction
P1551	Cooling fan system damaged	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual). Make sure that the fan connector is inserted well. Disconnect the ECM and proceed to location test 1.
P1552	Open or short circuit to the chassis	
P1553	Short circuit at the positive battery pole (+)	Disconnect the ECM and proceed to test 4.

LOCATION TEST

Test	Result	Instruction
1 - Check the integrity of the terminal and the cable: - ECM pins 2/G1 & 2/G2	Ok	Disconnect the fan and proceed to test 2
	Fault	Repair the fault, proceed to test 5
2 - Check the cable for short circuiting: - ECM pin 2/G1 to the frame - ECM pin 2/G2 to the frame	Ok	Proceed to test 3
	Short circuit	Locate and repair the cable fault, proceed to test 5
3 - Check the continuity of the cable: - Fan cable V/Bi with ECM pin 2/G2 - Fan cable Gi/B with ECM pin 2/G1	Ok	Proceed to test 4
	Open circuit	Locate and rectify the cable fault, proceed to test 5
4 - Check the cable for short circuiting: - ECM pin 2/G1 & 2/G2 to ECM pin 1/H4	Ok	Proceed to test 5
	Short circuit	Locate and repair the cable fault, proceed to test 5
5 - Reconnect the cabling, cancel the fault code and activate the engine to check the elimination of the fault.	Ok	Activity carried out – terminate the test
	Fault	Contact the Benelli l'assistance



COOLING LIQUID TEMPERATURE INDICATOR – MC 1000 ECM

Fault code	Possible cause	Instruction
P1115	Temperature indicator system damaged	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual) if available. Check and note the sensor data. Make sure that the temperature indicator connection is inserted well. Disconnect the ECM and proceed to the location test.
P1116	Open or short circuit at the frame	
P1117	Short circuit at the positive battery pole (+)	Disconnect the temperature indicator and proceed to test 5.

LOCATION TEST

Test	Result	Instruction
1 - Check the integrity of the terminal and the cable: - ECM pin 2/B1	Ok	Disconnect the temperature indicator and proceed to test 2
	Fault	Repair the fault, proceed to test 5
2 - Check the cable for short circuiting: - ECM pin 2/B1 at the chassis	Ok	Proceed to test 3
	Short circuit	Locate and repair the cable fault, proceed to test 5
3 - Check the continuity of the cable: - instrument pin 14 with ECM pin 2/B1	Ok	Proceed to test 4
	Open circuit	Locate and rectify the cable fault, proceed to test 5
4 - Check the cable for short circuiting: - EC pin 2/B1 to ECM pin 2/E1	Ok	Change the temperature indicator, proceed to test 5
	Short circuit	Locate and repair the cable fault, proceed to test 5
5 - Reconnect the cabling, cancel the fault code and activate the function test of the diagnostic instrument (see Axone instruction manual) to check the operation of the temperature indicator.	Ok	Activity carried – terminate the test
	Fault	Contact the Benelli assistance



REV COUNTER – MC 1000 ECM

Fault code guasto	Possible cause	Instruction
P1385	Rev counter system damaged	Check and note the data on the display of the diagnostic instrument (see Axone instruction manual) if available. Check and note the sensor data. Make sure that the rev counter is inserted well. Disconnect the ECM and proceed to location test 1.
P1386	Open or short circuit to the chassis	
P1387	Short circuit at the positive battery pole (+)	Disconnect the ECM and proceed to test 1.

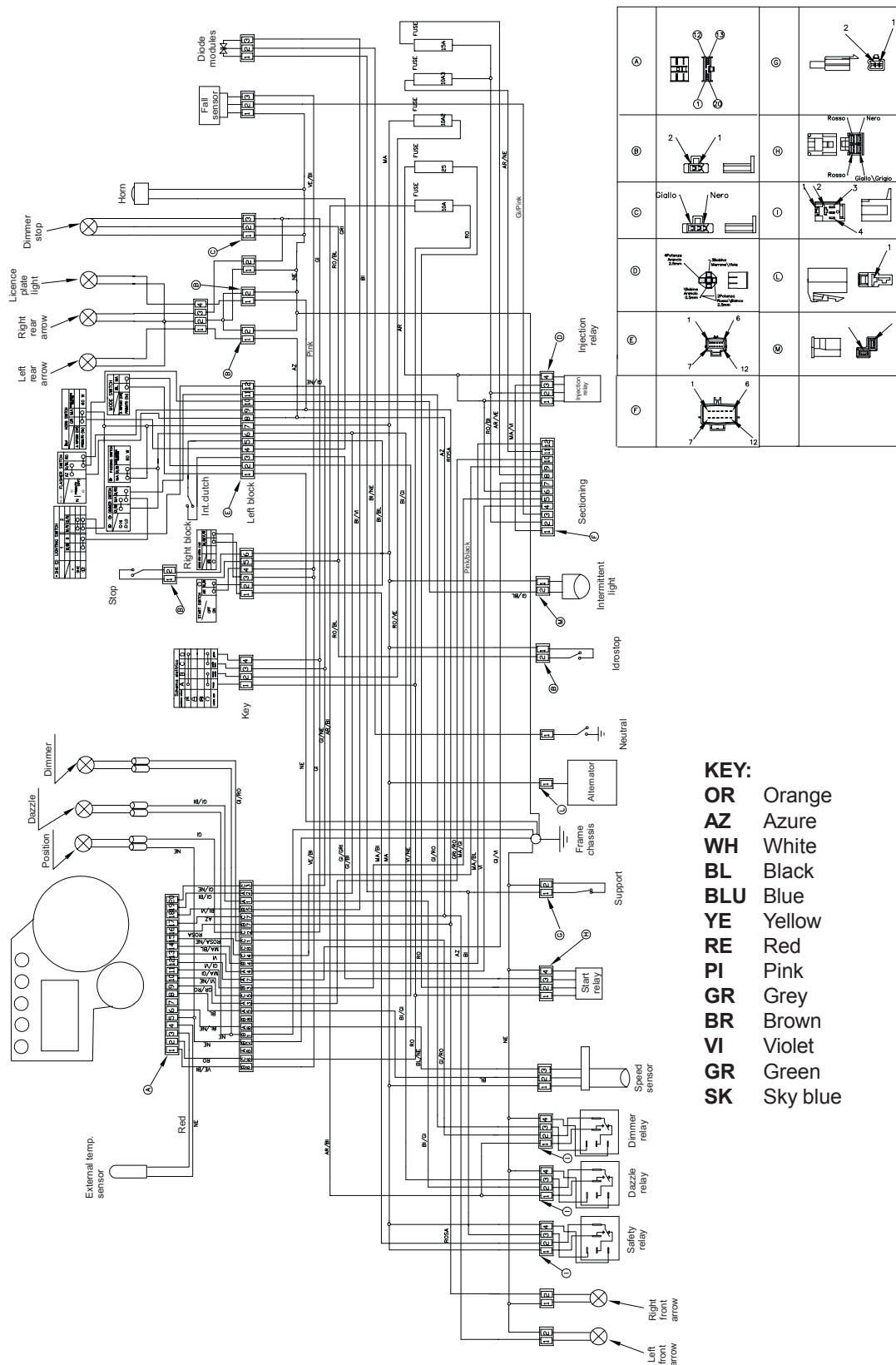
LOCATION TEST

Test	Result	Instruction
1 - Check the integrity of the terminal and the cable: - ECM pin 2/A1	Ok	Disconnect the rev counter and proceed to test 2
	Fault	Repair the fault, proceed to test 6
2 - Check the cable for short circuiting: - ECM pin to the chassis 2/A1	Ok	Proceed to test 3
	Short circuit	Locate and rectify the cable fault, proceed to test 6
3 - Check the resistance of the cable: - ECM pin 2/A1 to EMC pin 2/E1	1.1 a 1.3 Ω	Proceed to test 4
	Fault	Locate and rectify the cable fault, proceed to test 6
4 - Check the continuity of the cable: - instrument pin 9 to ECM pin	Ok	Proceed to test 5
	Short circuit	Locate and rectify the cable fault, proceed to test 6
5 - Check the cable for short circuiting: - ECM pin 2/A1 to ECM pin 2/E1	Ok	Change the rev counter, proceed to test 6
	Short circuit	Locate and rectify the cable fault, proceed to test 6
6 - Reconnect the cabling, cancel the fault code and activate the function test of the diagnostic instrument (see Axone instruction manual) to check the operation of the rev counter.	Ok	Activity carried out – terminate the test
	Fault	Contact the Benelli assistance

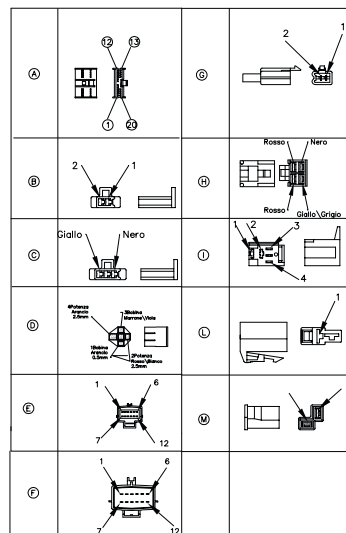


Electrical Plant

9 ELECTRICAL PLANT

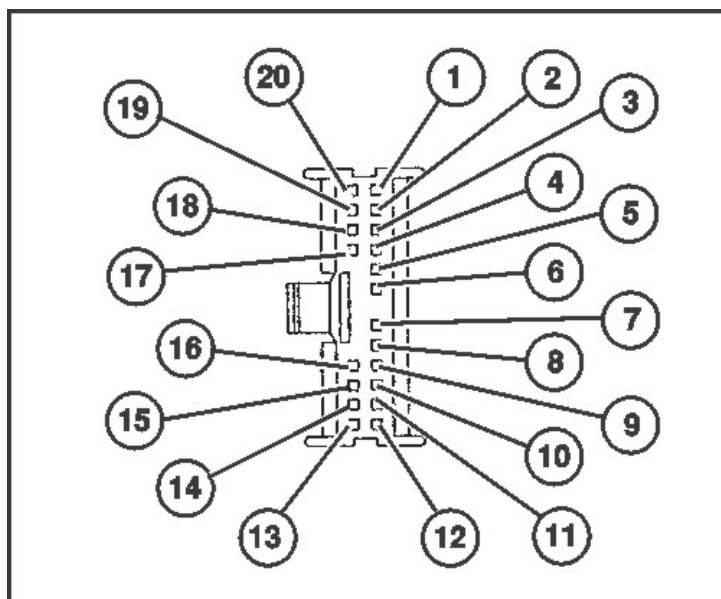


KEY:
OR Orange
AZ Azure
WH White
BL Black
BLU Blue
YE Yellow
RE Red
PI Pink
GR Grey
BR Brown
VI Violet
GR Green
SK Sky blue



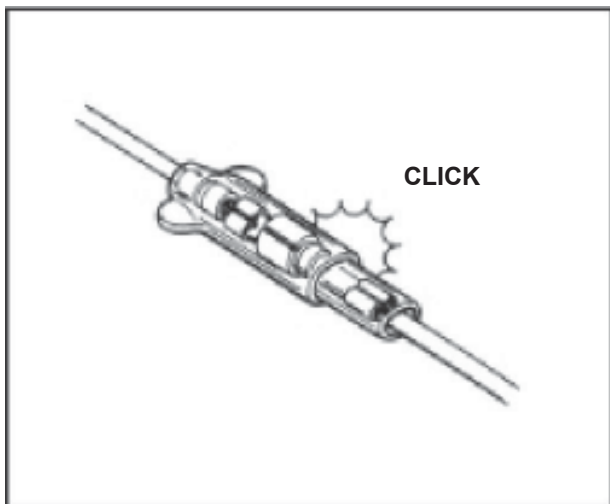


Consult the table below to identify the contacts of the various components:



A	COLOURS
1) Main switch	Green / White
2) Battery	Red
3) Env. temp. sensor	Red
4) GND environmental temperature sensor	Black
5) GND	Black
6) GND speed sensor	Blue / Black
7) Supply speed sensor	N.C.
8) Output speed sensor	Blue
9) Tachymeter	Grey / Violet
10) Set/Reset switch	Violet / Black

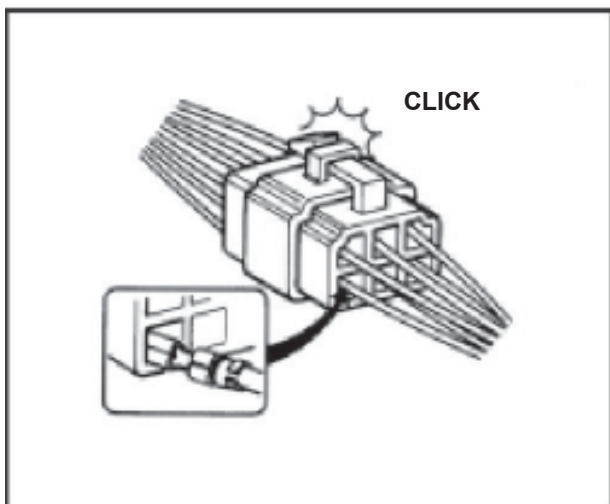
A	COLOURS
11) Level spyhole	Brown/ Yellow
12) GND level spyhole	Yellow/ Violet
13) Oil pressure sensor	Violet
14) Water Temperature	Brown/ Green
15) Injection alarm	Pink/ Black
16) Right flashtlight	Pink
17) Left flashtlight	Azure / Blue
18) Neutral	White/ Violet
19) Headlight	Yellow/ White
20) Illumination measurer	Yellow/ Black



9.1 CONNEC TORS

When connecting a connector make sure to press until hearing a click.

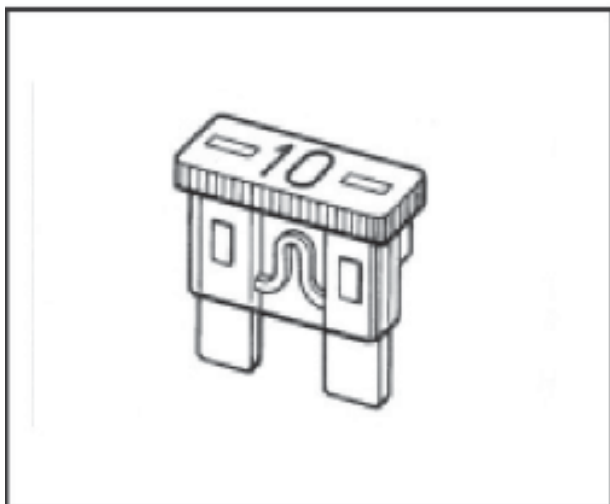
Check whether the connector is corroded or dirty and whether its cover is broken.



With a block type connector make sure to release the block before disconnecting it and to press down completely when connecting.

On disconnecting the connector make sure to hold the body of the connector and not pull the wires.

Check whether the connector terminals are loose or bent. Check whether the terminals are corroded or dirty.

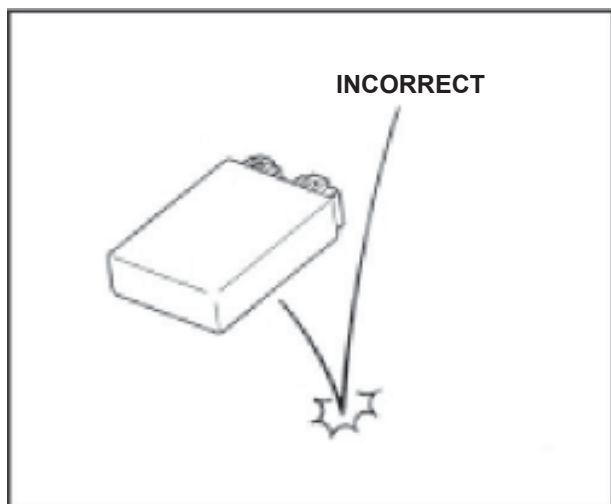


9.2 FUSES

Always investigate the cause of a fuse burning out, repair and then change the fuse.

Do not use a fuse with a capacity different to the original.

Do not use a wire or other substitute for the fuse.



9.3 SEMI-CONDUCTOR PARTS

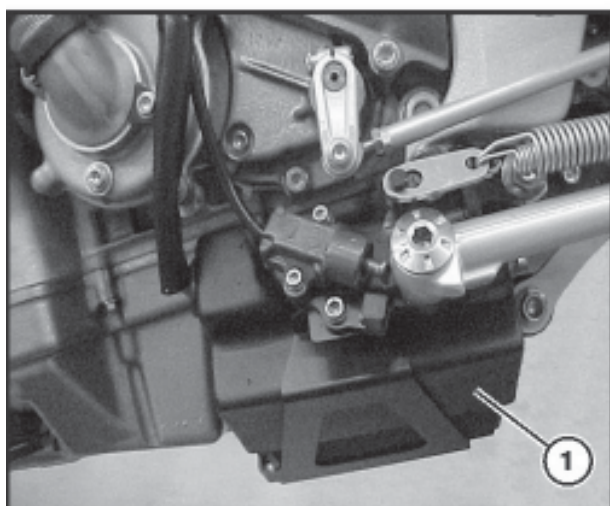


WARNING:

Be careful not to let the parts fall with an incorporated semi-conductor like the ECU.

When controlling such parts follow the checking instructions to the letter.

Failure to respect the correct procedure can cause grave damage.



9.4 BATTERY



WARNING:

Do not use batteries other than those specified.

The battery (1) mounted on this vehicle is the hermetic type. There is no need, therefore, for maintenance.

The batteries advised are the following:

- FIAMM F12-12B
- YUASA YT12B-4



Proceed to reload, following the indications in the battery packaging or as indicated.



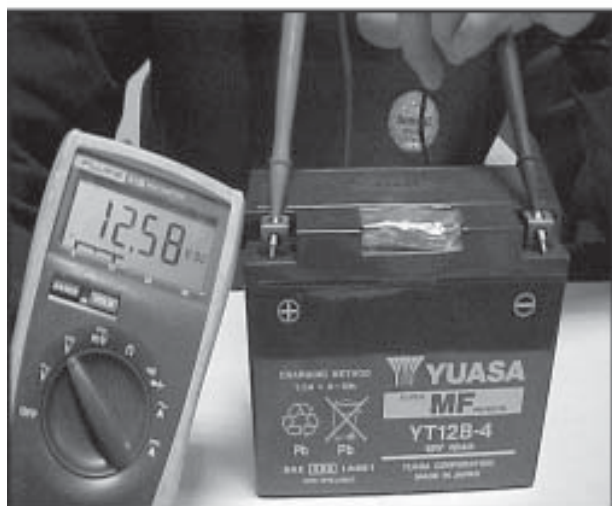
Loading method

It is preferable to use the constant tension method of loading so as not to overload the batteries. Follow this rule:

NORMAL: 1.0A x 5 ~ 10h

SLOW: 0.5A x 8 ~ 16h

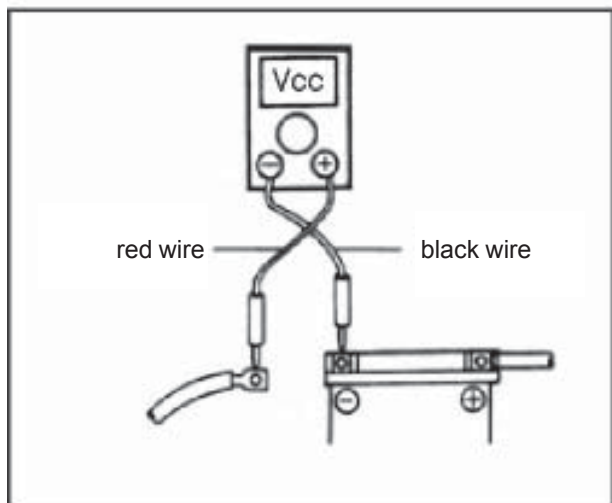
Check the voltage after ~ 30 minutes from loading the voltage at the battery heads.
Voltage >/- Å 12.5 Volt.



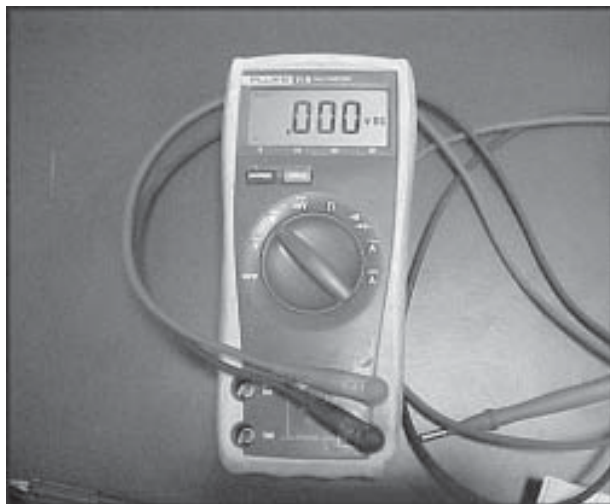
9.4.1 CHECK BATTERY EFFICIENCY

Check battery current losses

Bring the ignition switch to the OFF position.
Disconnect the cables of the negative pole (-) of the battery.



Connect the multimeter between the negative pole (-) and the negative cable (-) of the battery, in function of a continuous current ammeter.



Battery current losses

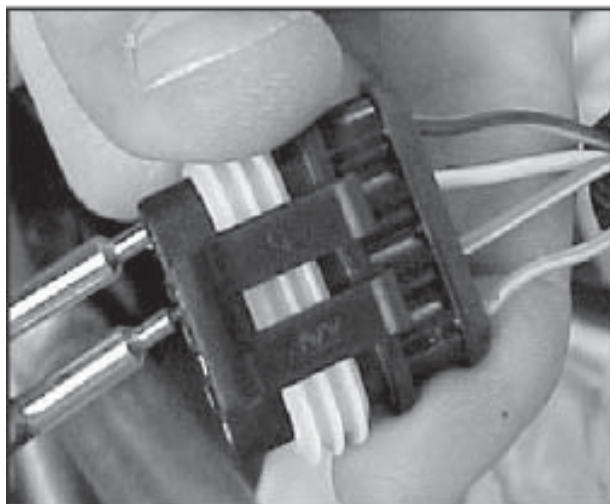


WARNING:

Since current losses in the case of malfunctioning can be high, use a high range of the multimeter first when using the ammeter.

Do not put the ignition switch on "ON" when measuring the current.

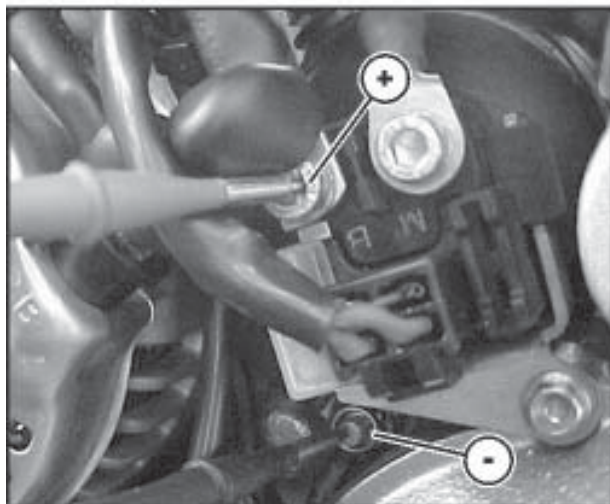
With the switchboard off, the losses of current should be $\approx 2 \sim 2,5$ mA.



In the contrary case, identify the source of this absorption by disconnecting the connectors of every single use supplied directly from the battery (see electricity diagram).

NOTE:

In the case of eventually installing anti-theft devices, disconnect the latter before carrying out the checks.



Check load exit

Dismantle the semi-cowlings to get to the alternator zone. Start the engine and make it spin at 2000 rev/min with the lights switch ON and the selector on the dazzle position. HI.

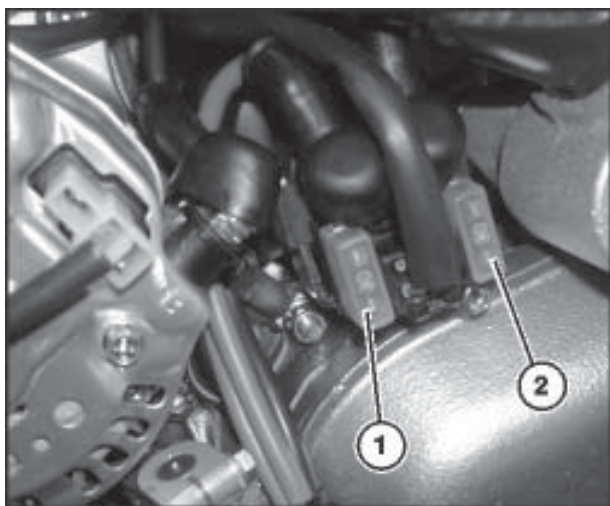
Measure the DC voltage between the positive + and negative - terminals of the battery with a multimeter. If the tester indicates less than 13.0 V or more than 15.0 V, the cause is to be identified in the generator.

NOTE:

When carrying out this test, make sure that the battery is completely charged.

Load exit

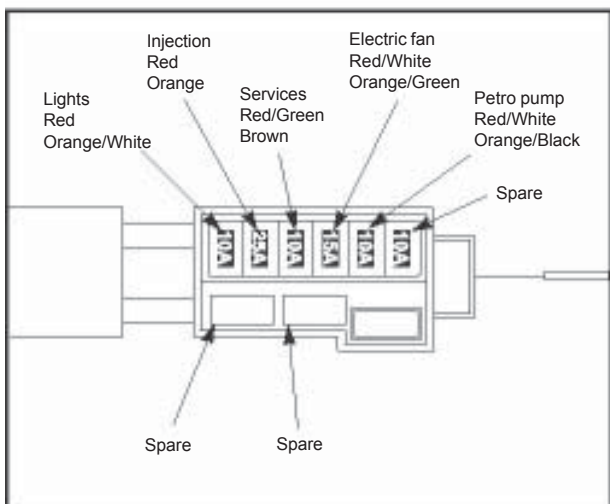
Standard: 13.0 V - 14.5 V at 2000 rev/min



9.5 FUSES

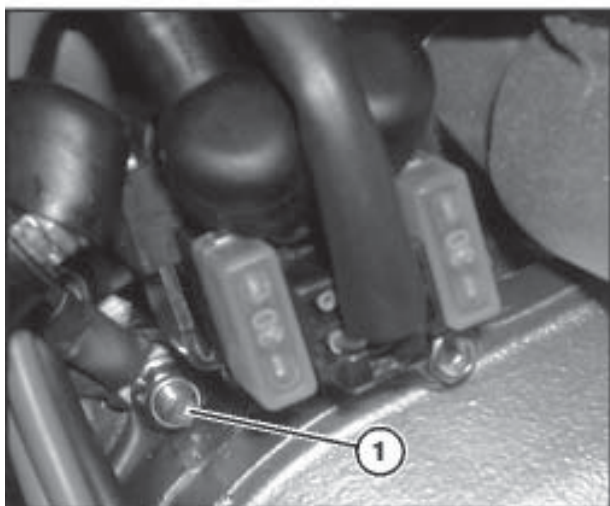
General fuse:

The general fuse (1) is on the left side of the engine. To remove it undo the plastic protective cover. Fuse (2) is the spare.



Service fuses:

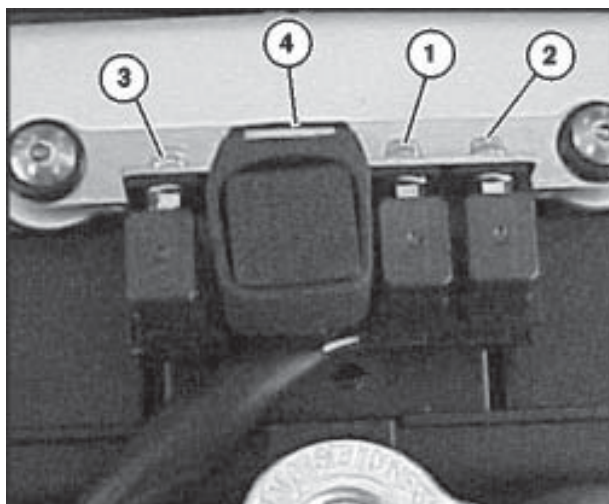
The service fuses box is under the saddle. Open the fusebox cover to identify the position of the burned-out fuse, read the key placed under the cover and consult the electricity diagram.



9.6 RELAYS

9.6.1 RELAY STARTER

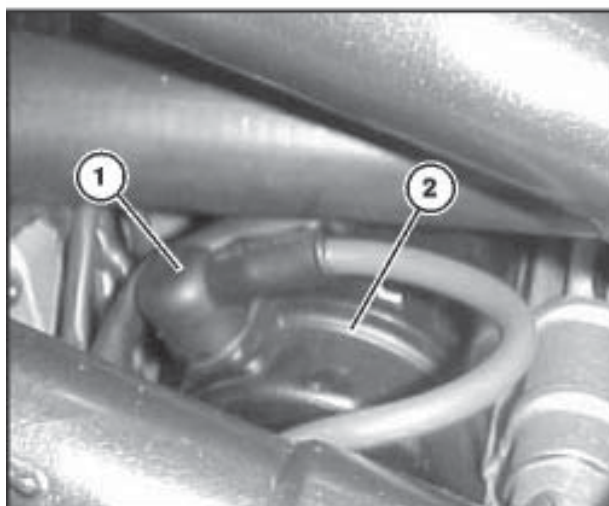
The relay starter (1) is on the left side of the engine, inside the left semi-cowling.



9.6.2 RELAY SERVICES GROUP

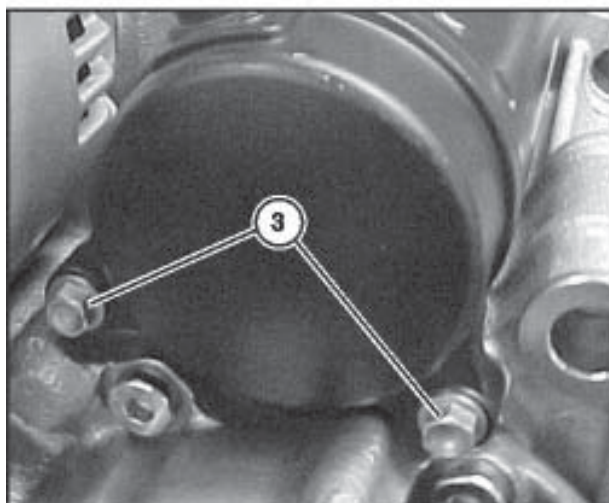
Positioned under the saddle are the:

- 1) dazzle lights relay
- 2) dazzle lights relay
- 3) safety relay
- 4) injection relay.



9.7 ENGINE STARTER

Remove left semi-cowling (see "DISMANTLE COWLING").
Disconnect the supply cables on the battery.
Remove the starter relay (see "DISMANTLE RELAY").



Disconnect the supply cables (1) on the engine starter (2), unscrew the engine starter fixing screws (3) and extract the component.

Check that the engine rotates freely without effort. Otherwise change the piece. Check the state of the O-ring and if damaged change the piece.

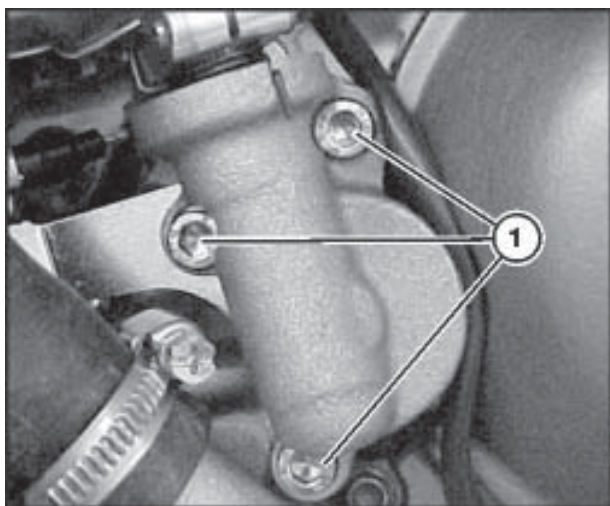
NOTE:

Oil the O-ring during mounting, paying attention not to damage it.

Tighten the screws (2).

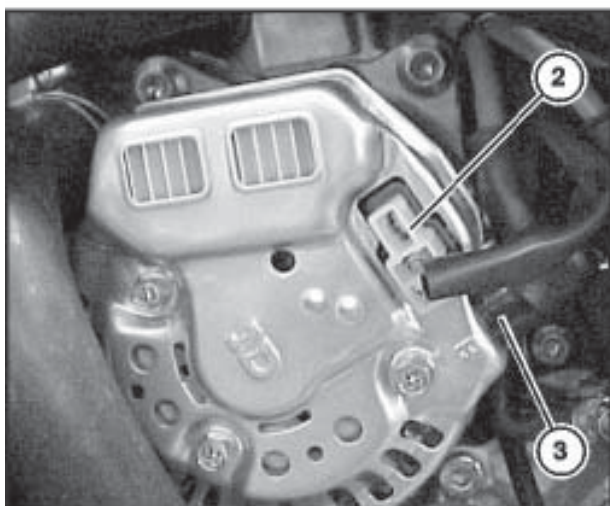


10 N·m 1 Kg-m

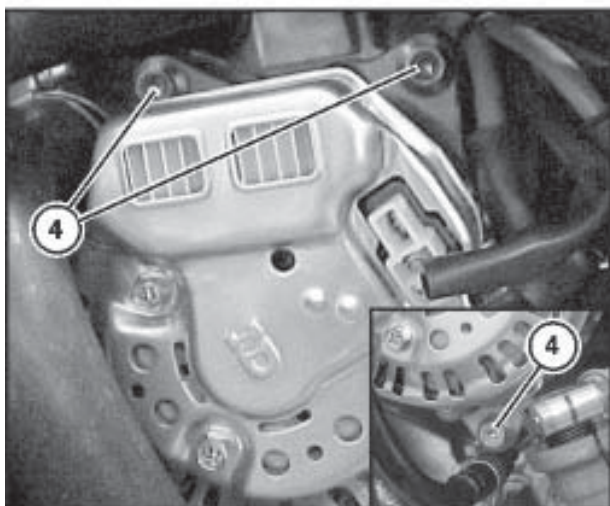


9.8 ALTERNATOR

Unscrew the three clutch command fixing screws (1), unhook the clutch cable and remove the clutch command to allow the removal of the alternator.



Disconnect the battery supply cables.
Disconnect the connector (2), lift the protective cap and unscrew the starter supply fixing nut(3).



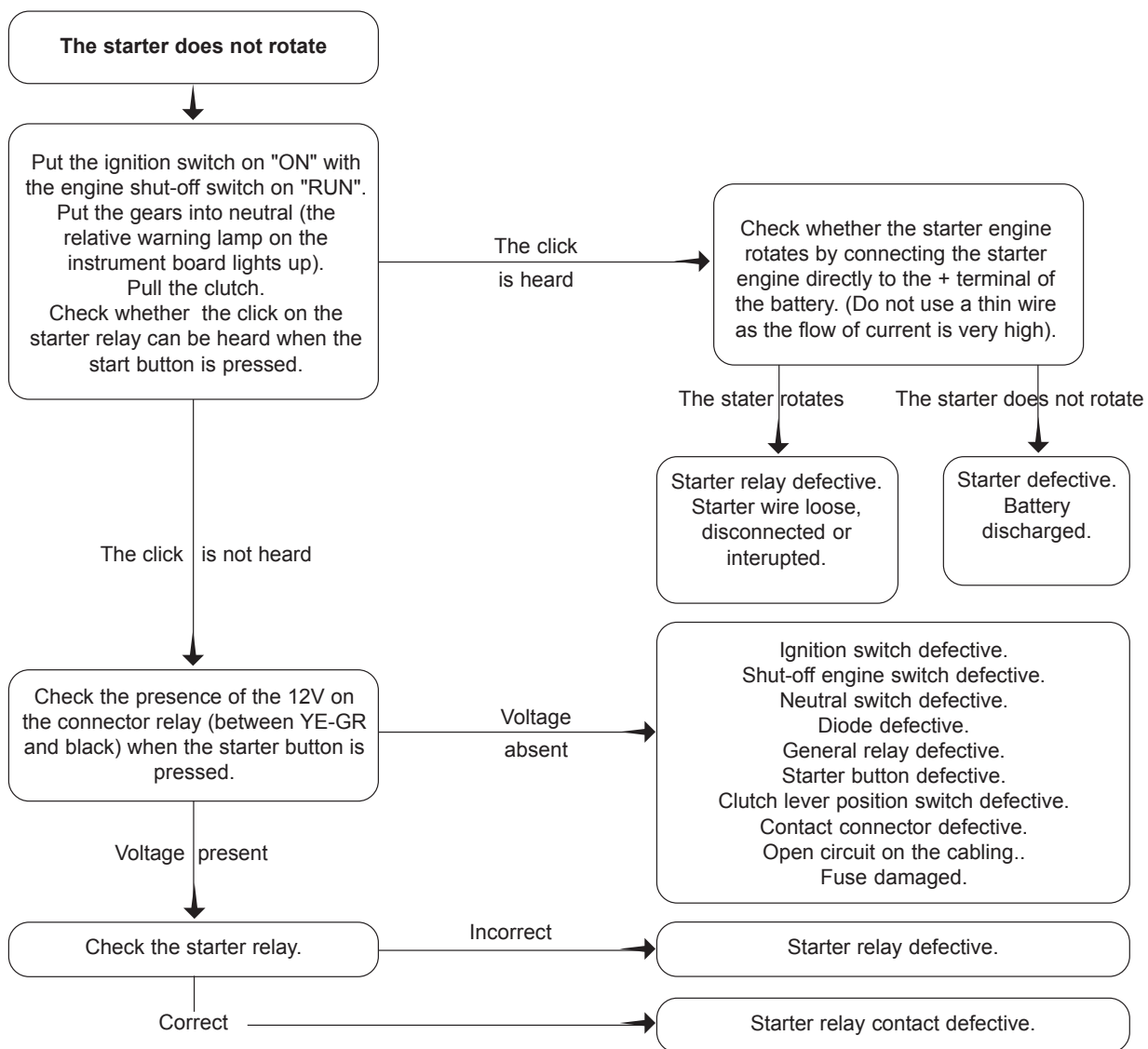
Unscrew the three fixing screws (4) and extract the alternator moving the water pump tube slightly and paying attention not to let the flexible rubber couplings fall.
To re-mount it, use the reverse procedure, oiling the flexible couplings and the O-rings.
Tighten the three screws.



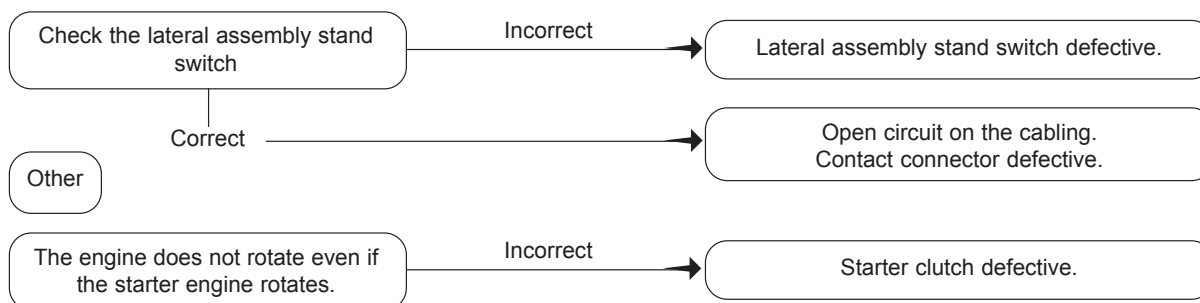
25 N·m 2.5 Kg-m

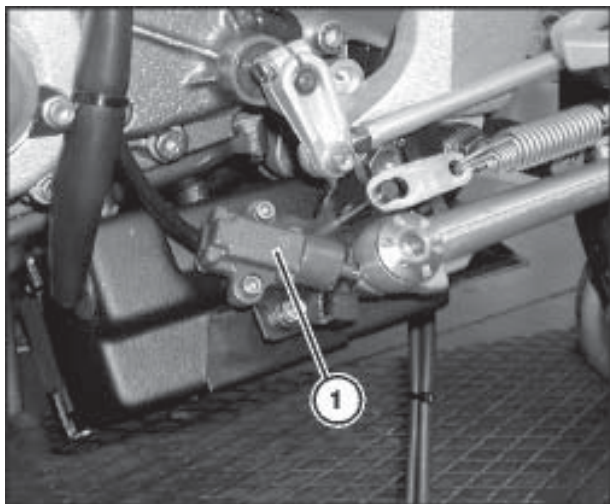


9.9 STARTER DIAGNOSTIC SYSTEM



NOTE: With the assembly stand raised or lowered, the engine starter rotates when the gears are in neutral or when the clutch lever is pulled with a gear inserted.

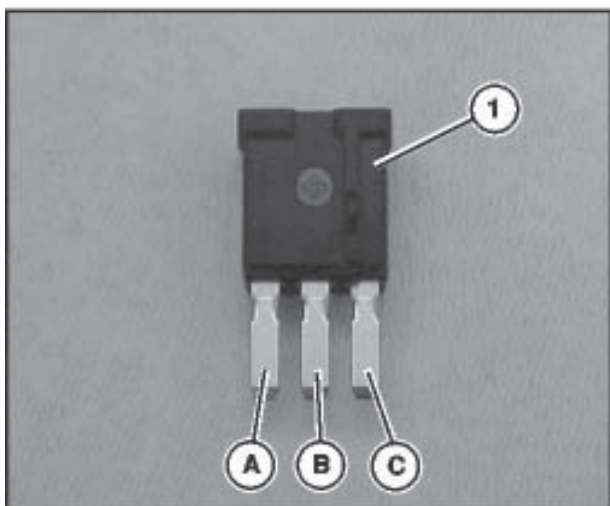




9.10 CHECK SAFETY SYSTEM PARTS

If the safety system does not function properly, check each component.

If anomalies are found, substitute the component (1) with a new one.

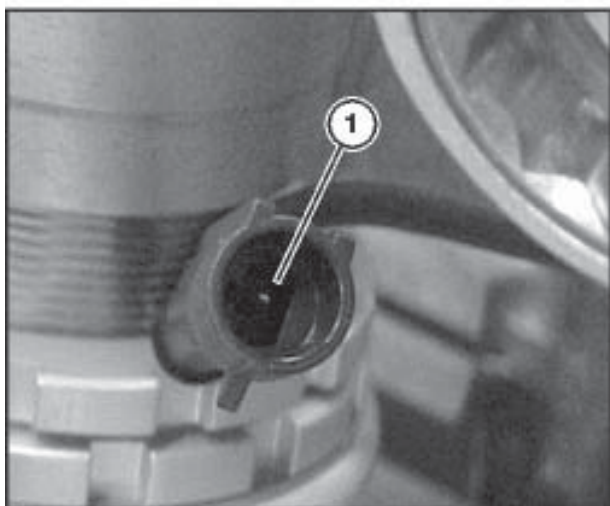


9.11 DIODES

The diodes (1) are under the saddle inside the fuse box. Disconnect the diode module and check what follows:

+Tester prod	+ Tester prod	Resistance
A	B	$\approx \emptyset \Omega$
C	B	$\approx \emptyset \Omega$
B	A	$\infty \Omega$
B	C	$\infty \Omega$

If the above conditions are satisfied the diode module is functioning.

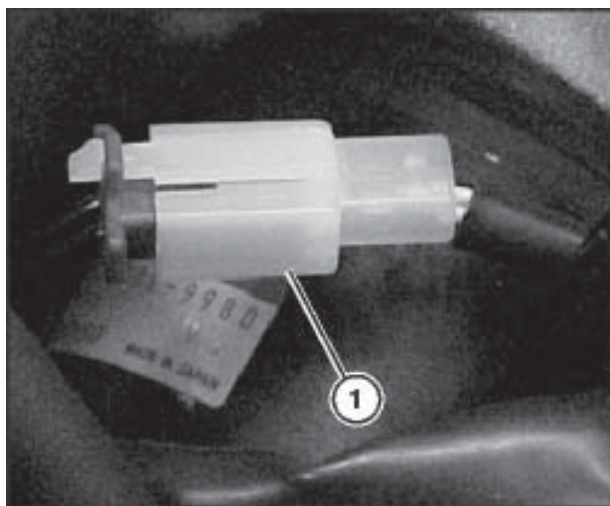


9.12 GEAR POSITION SWITCH

The connector of the neutral switch wire is in the rear zone of the engine. Disconnect the neutral switch wire and check the continuity between the "NEUTRAL" sensor wire and the chassis.

		Engine frame
ON (neutral)	●	●
OFF (neutral excluded)	●	●

In the case in which there is no continuity between the neutral sensor wire and the chassis, change the component.



9.13 LATERAL STAND SWITCH

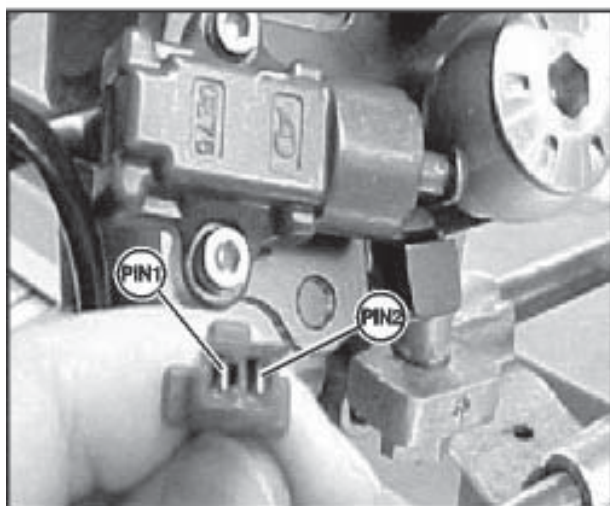
The connector of the lateral stand switch is under the petrol tank.

Remove the petrol tank.

Disconnect the lateral stand switch and measure the continuity as described below.

Check the continuity with a multimeter as indicated in the table.

Stand	PIN 1	PIN 2
Raised	● —	● —
Lowered	●	●



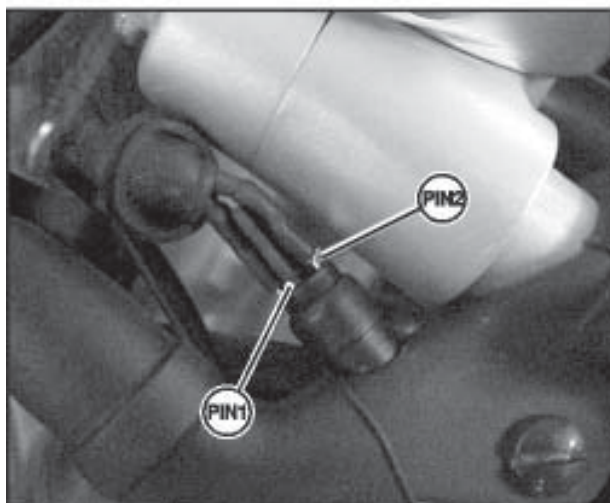
If the above conditions are satisfied, the stand switch is functioning.

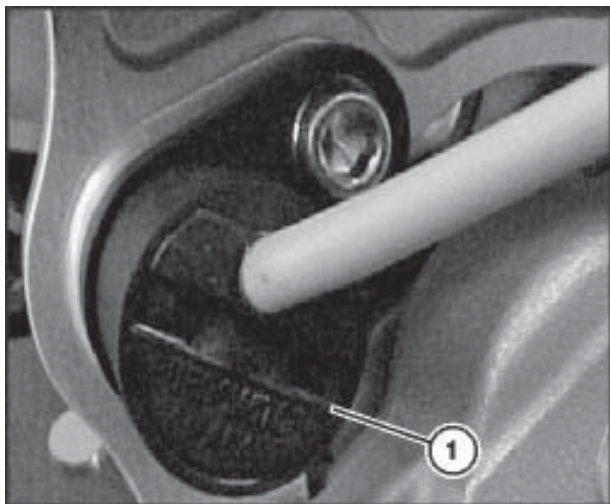
9.14 CLUTCH SWITCH

Disconnect the clutch switch cables.

Use a tester to check the following on the clutch switch pins:

Clutch	PIN 1	PIN 2
Pulled	● —	● —
Released	●	●



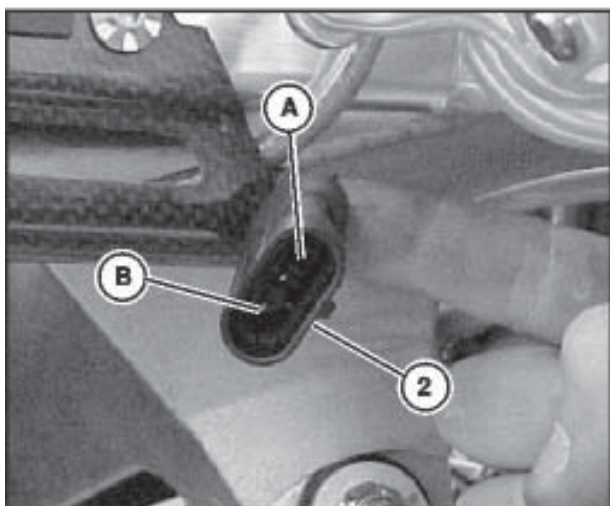


9.15 SPEED SENSOR

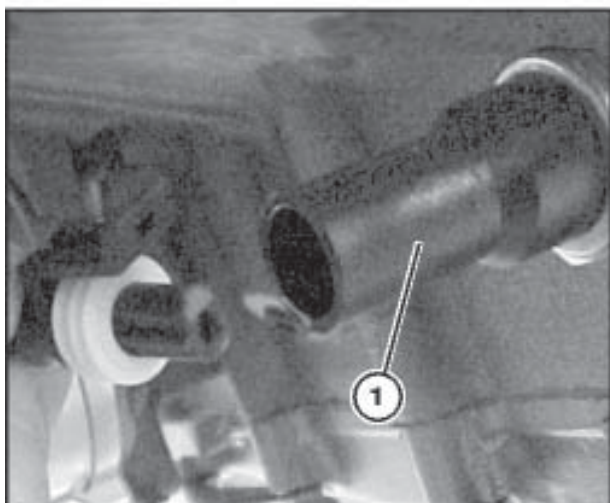
When the speed is not indicated on the instrument board, proceed as follows:

Check the integrity of the fuse.

If the fuse in question is intact, check the speed sensor (1):



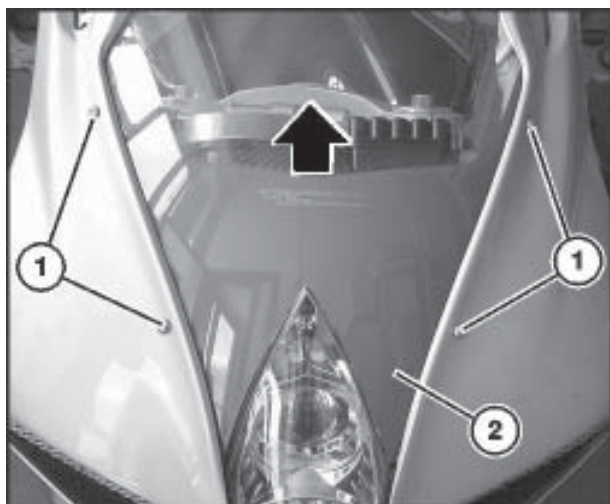
- 1) Remove the vehicle sensor as described in the "ENGINE" chapter.
- 2) Disconnect the connector (2), and check that the connector measures 10K between terminal (A) (brown wire) and (B) (blue wire).



9.16 OIL PRESSURE SENSOR

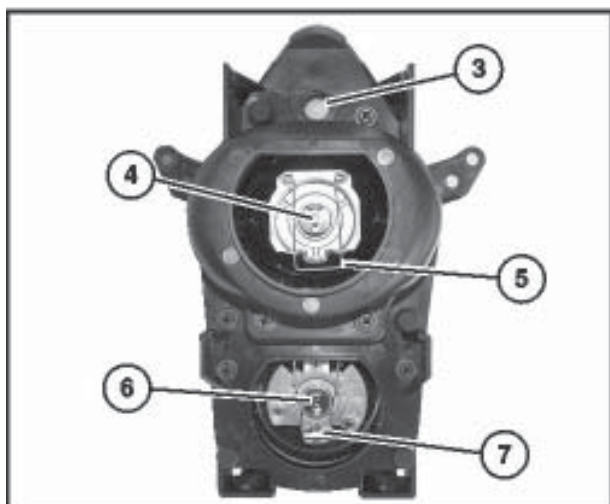
To check the good functioning of this component, the continuity between the contact on the sensor (1) and the chassis of the vehicle must be ascertained with the vehicle not running, as shown in the figure.

On the contrary, with the vehicle running the contact must be interrupted.

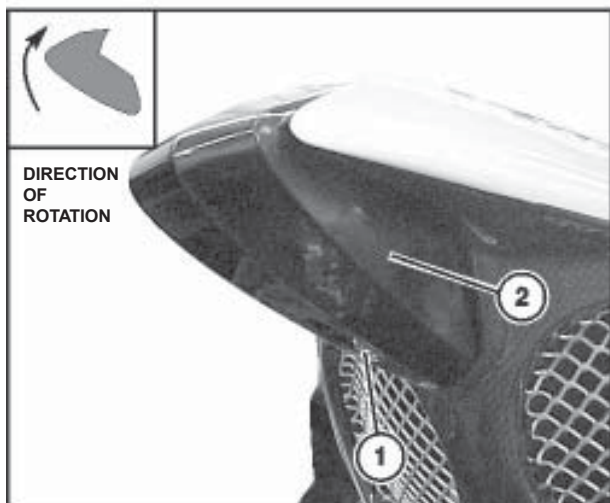


9.17 FRONT LIGHTS

Loosen and remove the four fixing screws (1).
Remove the internal instrument board fastenings (see "DISMANTLE INTERNAL INSTRUMENT BOARD FASTENINGS").
Remove the left mirror (see "DISMANTLE MIRRORS").
Remove the cap (2) (see "DISMANTLE CAP").
Remove the lower left semi-cowling (see "DISMANTLE LOWER COWLING").
Remove the upper left semi-cowling (see "DISMANTLE LEFT AND RIGHT UPPER COWLING").



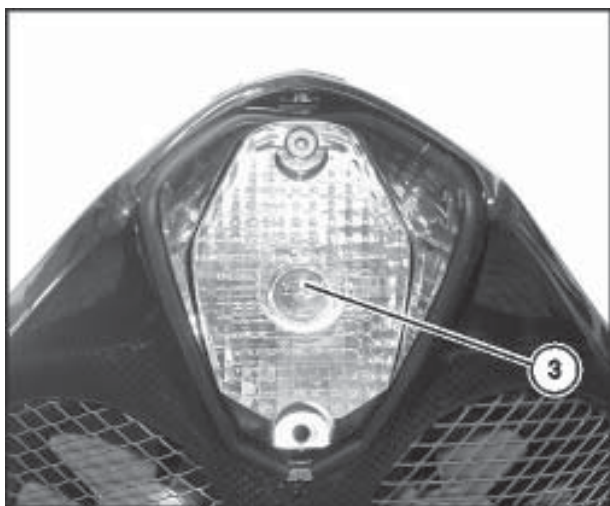
For the position lamp (3), remove the rubber lamp holder and change the lamp.
For the dimmer lamp (4), remove the rubber dust cover, disconnect the cabling and change the lamp (4), freeing it from the spring (5).
For the dazzle light (6), proceed in the same way as for the dimmer, freeing the lamp (6) from the spring (7).



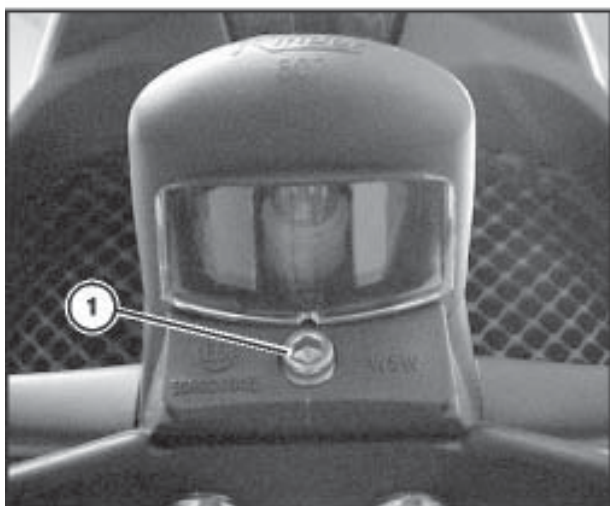
9.18 REAR LIGHTS

9.18.1 REAR HEADLIGHT

Loosen and remove screw (1)..
Remove the glass cover (2).
Rotate the glass cover upwards, avoiding breaking the fixing tab.

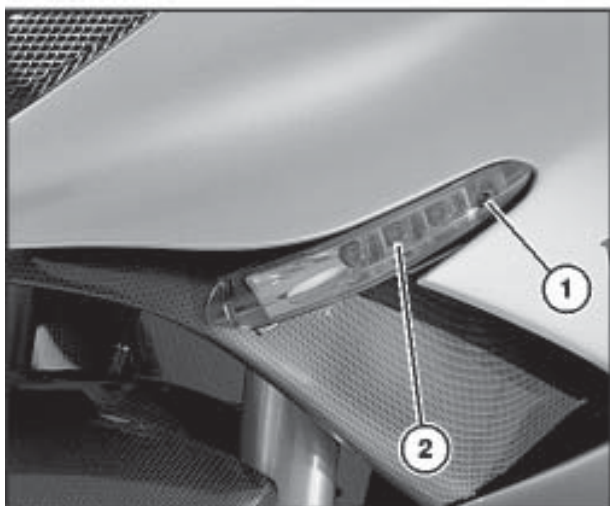


Change the lamp (3).
Position the glass cover (2), reversing the dismantling procedure.
Tighten screw (1).



9.18.2 LICENCE PLATE LIGHT HOLDER

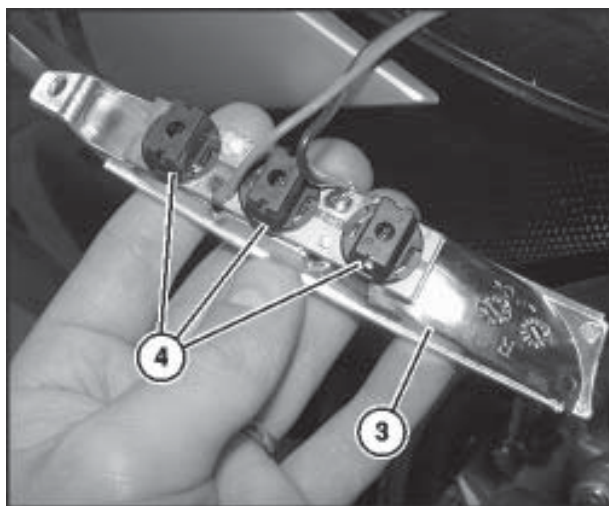
Loosen and remove screw (1).
Remove the rubber lamp holder.
Change the position lamp.
Position the lampholder and tighten screw (1).



9.18.3 FRONT AND REAR ARROWS

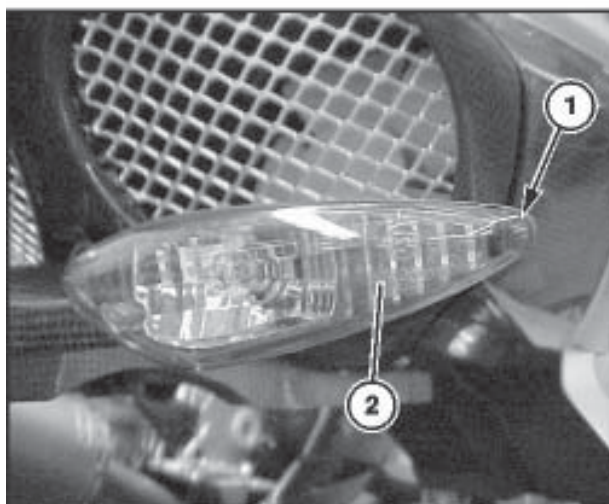
9.18.3.1 FRONT ARROWS

Loosen and remove screw (1).
Remove the glass cover (2).



Remove the arrow body (3).
Change the damaged led, rotating it anti-clockwise.
Position the arrow body (3) and the glass cover (2) and fix with screw (1).

Operate in the same way with the opposite arrow.



9.18.3.2 REAR ARROWS

Loosen and remove screw (1).
Remove the glass cover (2) and change the lamp.
Position the glass cover (2) and tighten screw (1).
Operate in the same way for the opposite arrow.





Diagnostic

10 DIAGNOSTICS

10.1 ELECTRICAL PART

LOADING SYSTEM

Battery warning light lit

Alternator damaged	Change
Alternator connection defective	Check
Battery damaged	Change

GENERAL

No function

30A Fuse	Change
Relay switch burnt	Change
Battery connections oxidised	Deoxidise/Restore

12V SUPPLY SERVICES PLANT

No function enabled

Key switch damaged	Change
Key switch connection defective	Deoxidise/Restore
General relay damaged	Change
General relay connection defective	Deoxidise/Restore

ELECTRICAL STARTER

Starter not functioning

10A engine fuse burnt	Change
10A engine fuse connection defective	Deoxidise/restore
Neutral sensor damaged	Change
Clutch switch damaged	Change
Starter damaged	Change
Starter button damaged	Change
Right electrical connection block	Deoxidise/Restore
Relay starter damaged	Change
Power cable connections defective	Deoxidise/Restore

COOLING PLANT

Electric fan not functioning

Electric fan fuse burnt	Change
Electric fan fuse connection defective	Deoxidise/Restore
ECU defective	Change
H2° bulb	Change
H2° bulb connection defective	Deoxidise/Restore
Electric fan damaged	Deoxidise/Restore

LIGHTS/INDICATORS PLANT

Front/rear position lights not functioning

Lights fuse burnt	Change
Lights fuse connection defective	Deoxidise/Restore
Key switch damaged	Change
Key switch connection defective	Deoxidise/Restore
Lamp burnt	Change
Lamp connections defective	Deoxidise/Restore
Lights switch damaged	Change
Lights switch connection defective	Deoxidise/Restore



Dazzle/dimmer lights not functioning

Light fuses burnt	Change
Light fuses connection defective	Deoxidise/Restore
Lamps burnt	Change
Lamp connections defective	Deoxidise/Restore
Lights switch damaged	Change
Lights switch connection defective	Deoxidise/Restore
Dazzle + dimmer lights relay damaged	Change
Dazzle light and dimmers relay connection defective	Deoxidise/Restore

Rear light stop not functioning

10A fuse burnt	Change
10A fuse connection defective	Deoxidise/Restore
Lamp burnt	Change
Lamp connectiond defective	Deoxidise/Restore
Front brake lever switch damaged	Change
Front brake lever switch connection defective	Deoxidise/Restore
Rear brake lever damaged	Change
Rear brake lever switch connection defective	Deoxidise/Restore

Rear stop light remains lit

Front brake lever blocked	Change/Repair
Rear brake lever switch blocked	Change/Repair

Horn not functioning

10A engine fuse burnt	Change
10A engine fuse connection defective	Deoxidise/Restore
Horn damaged	Change
Switch damaged	Change
Horn connection defective	Deoxidise/Restore
Switch connection defective	Deoxidise/Restore

Direction indicators not functioning

10A engine fuse burnt	Change
10A engine fuse connection defective	Deoxidise/Restore
Intermittent light damaged	Change
Intermittent light connection defective	Deoxidise/Restore
Lamp burnt	Change
Lamp connection defective	Deoxidise/Restore
Direction indicators switch damaged	Change
Indicators switch connection defective	Deoxidise/Restore

Direction indicator remains lit

The lamp of the other indicator, same side is burnt	Change
The other indicator connection is defective	Deoxidise/Restore

INSTRUMENT BOARD PLANT

Instrument board not functioning

10A fuse burnt	Change
10A fuse connection defective	Deoxidise/Restore

The instrument board does not light up

10A fuse burnt	Change
10A fuse connection defective	Deoxidise/Restore
Instrument board damaged	Change
Instrument board connection defective	Deoxidise/Restore



Tachymeter not functioning

Speed sensor damaged
Speed sensor connection defective
10A fuse burnt
10A fuse connection defective
Instrument board damaged
Instrument board connection defective

Change
Deoxidise/Restore
Change
Deoxidise/Restore
Change
Deoxidise/Restore

H2O temperature indicator not functioning

Speed sensor connection defective
10A fuse burnt
10A fuse connection defective
Instrument board damaged
Instrument board connection defective

Deoxidise/Restore
Change
Deoxidise/Restore
Change
Deoxidise/Restore

Oil warning light does not light up

Oil pressure sensor damaged
Oil pressure sensor connection defective
Instrument board damaged
Instrument board connection defective
Warning light burnt

Change
Deoxidise/Restore
Change
Deoxidise/Restore
Change instrument board

Neutral warning light does not light up

Neutral sensor burnt
Neutral sensor connection defective
Warning light burnt

Change
Deoxidise/Restore
Change instrument board

State of battery warning light does not light up

Alternator connection defective
Instrument board damaged
Instrument board connection defective
Warning light burnt

Deoxidise/Restore
Change
Deoxidise/Restore
Change instrument board

Fuel reserve warning light does not light up

Fuel level sensor damaged
Fuel level sensor connection defective
Instrument board damaged
Instrument board connection defective
Warning light burnt

Change
Deoxidise/Restore
Change
Deoxidise/Restore
Change instrument board

Direction indicator warning lights do not light up

Intermittent light damaged
Intermittent light connection defective
Instrument board damaged
Instrument board connection defective
Warning light burnt

Change
Deoxidise/Restore
Change
Deoxidise/Restore
Change instrument board

Position warning lights do not light up

Instrument board damaged
Instrument board connection defective
Warning light burnt

Change
Deoxidise/Restore
Change instrument board



INJECTION

*Air pressure /temperature sensor
signal error*

Sensor damaged
Sensor connection defective

Change
Deoxidise/Restore

*Potentiometer throttle valve
signal error*

Potentiometer damaged
Potentiometer connection defective

Change
Deoxidise/Restore

*Engine temperature sensor
signal error*

Engine temperature sensor damaged
Sensor connection defective

Change
Deoxidise/Restore

FUEL INJECTION PLANT

Injector does not inject fuel

25A fuse burnt
25A fuse connection defective
Injection relay damaged
Injection relay connection defective
Safety relay damaged
Safety relay connection defective
Injector damaged
Injector connection defective
ECU injection damaged
Lateral injection hanger damaged
Pick up engine damaged
Pick up light/phonic wheel not exact
Petrol pump damaged

Change
Deoxidise/Restore
Change
Deoxidise/Restore
Change
Deoxidise/Restore
Change
Deoxidise/Restore
Change
Change
Change
Change
Change

IGNITION PLANT

Sparkling-plug spark absent

Fuse burnt
Fuse connection defective
Ignition remote
Ignition remote connection
power relay defective
Ignition remote power relay damaged
Relay connection defective
Coils damaged
Coil connections
ECU injection damaged
Sparkling-plug damaged
Engine chassis connection defective
Lateral hangere switch damaged
Pick up engine damaged
Pick up/phonic wheel not exact
Neutral sensor damaged

Change
Deoxidise/Restore
Change
Deoxidise/Restore
Change
Deoxidise/Restore
Change
Deoxidise/Restore
Change
Change
Restore
Change
Change
Restore
Change



10.2 FRAME

STEERING

Steering hard

Steering ball-bearings damaged	Change
Steering ball-bearings tightened excessively	Adjust
Steering pin bent	Change
Steering damper braked excessively	Adjust
Steering damper joints damaged	Change
Low tire pressure	Adjust

The engine tends to swerve or not proceed in a direct line

Fork bent	Change
Frame bent	Change
Rear fork bent	Change
Steering damper joints damaged	Change
Steering ball-bearings damaged	Change
Wheel pin bent	Change
Rear wheel ball-bearings damaged	Change

FRONT WHEEL

Front wheel oscillates/vibrates

Wheel rim bent	Change
Wheel not balanced	Balance
Tire defective	Change
Tire not suitable	Change
Wheel ball-bearings damaged	Tighten
Pin fixing screws not tight	Tighten
Pin fixing ring-nut not tight	Tighten

Front wheel rotates with difficulty

Ball-bearings damaged	Change
Wheel pin damaged	Change
Brake pads drag excessively on the disks (see brakes)	Check
Brake disks bent	Change
Wheel ring-nut pin tightened excessively	Loosen

FRONT SUSPENSION

Front suspension too pliable

Fork oil deteriorated	Change
Preload spring insufficient	Adjust
Hydraulic brake in compression insufficient	Adjust
Fork oil level low	Refill
Tire pressure low	Adjust
Fork damaged	Adjust

Front suspension too rigid

Preload spring excessive	Adjust
Hydraulic brake in compression excessive	Adjust
Fork oil level high	Adjust
Tire pressure high	Adjust



REAR WHEEL

Rear wheel oscillates/vibrates

Wheel rim bent	Change
Wheel not balanced	Balance
Tire defective	Change
Tire unsuitable	Change
Wheel ball-bearings damaged	Tighten
Fixing nut not tight	Tighten
Suspension screws not tight	Tighten
Suspension ball-bearings damaged	Change

Rear wheel rotates with difficulty

Ball-bearings damaged	Change
Wheel hub sealing ring out of place	Check
Brake pads drag excessively on disk	Check
Brake disk bent	Change
Transmission chain damaged	Change

REAR SUSPENSION

Rear suspension too pliable

Preload spring insufficient	Adjust
Hydraulic brake in compression insufficient	Adjust
Hydraulic brake in extension insufficient	Adjust
Tire pressure low	Adjust
Damper damaged	Change

Rear suspension too rigid

Preload spring excessive	Adjust
Hydraulic brake in compression insufficient	Adjust
Hydraulic brake in extension insufficient	Adjust
Tire pressure high	Adjust
Rear wheel ball-bearings damaged	Change
Suspension balancer ball-bearings damaged	Change
Damper joints damaged	Change
Suspension joints connecting rod damaged	Repair
Rear wheel pin bent	Change

BRAKES

*Brake lever and pedal too pliable
or "spongy"*

Air bubble in hydraulic circuit	Purge
Losses in the hydraulic circuit	Repair
Clamp seals damaged	Change
Pump seals damaged	Change
Clamp pistons do not run freely	Check
Hydraulic liquid low	Refill
Brake disks distorted	Change

Brake lever and pedal too hard

Brake lever and pedal bent	Change
----------------------------	--------



Braking power insufficient

Disks dirty
Air bubble in hydraulic circuit
Losses in the hydraulic circuit
Clamp seals damaged
Pump seals damaged
Clamp pistons do not run freely
Hydraulic liquid low
Brake disks distorted

Clean
Purge
Repair
Change
Change
Check
Refill
Change

Pads dragging on brake disks

Pad springs damaged
Brake disks distorted
Clamp pistons do not run freely
Hydraulic liquid level too high
Brake pads worn out

Change
Change
Check
Adjust
Change

EXHAUST PLANT

Exhaust noise excessive

Exhaust pipe damaged
Fixing pipe loosened

Change
Tighten

Poor engine performance

Exhaust pipe damaged
Fixing pipe loosened

Change
Tighten

COOLING PLANT

Engine temperature too high

Cooling liquid level too low
Cooling fan defective
Expansion tank cooling liquid cap defective
Electric fan thermoswitch defective
Sensor temperature instrument defective
Thermostat blocked closed
Radiator vanes bend or obstructed
Radiator encrusted
Water pump damaged
Injection/ignition plant defective
Fuel not suitable
Engine cooling circuit defective
Sparkplug thermal grade not suitable
Accumulation of carbon residues in the head/piston

Refill
Change
Change
Change
Change
Change
Repair/clean
Clean
Change
Check
Change
Check
Change
Clean

Engine temperature too low

Thermostat blocked open

Change



10.3 PRELIMINARY OPERATIONS

- Connect the supplied cables to the instrument.
- Switch the instrument on.
- Move with the horizontal or vertical buttons inside the menu.
- Select the item wanted with the "enter" key.
- Follow the indications supplied.

10.4 SELF-DIAGNOSIS

- The self-diagnosis system reads the information dialoging directly with the console (ECU) of the vehicle.
- It reads the functional parameters of all the devices connected to the console.
- It acquires automatically eventual faulty codes.
- It modifies a number of engine management parameters.

Procedure:

1. Carry out the procedure described in "Preliminary operations", selecting "self-diagnosis" and pressing "ENTER".
2. Select "DATABASE" with the horizontal arrows
3. Press "ENTER"
4. From the "SELECT TRADEMARK" menu select "Benelli"
5. Press "ENTER"
6. From the "SELECT MODEL" menu select "Tornado Three"
7. Press "ENTER"
8. From the "MOTORISATION" menu select "898"
9. Press "ENTER"
10. From the "SYSTEM TYPE" menu select "INJECTION"
11. Press "ENTER"
12. The "FRAME CODE" menu is not defined, press "ENTER"
13. From the "PLANT TYPE" menu select "Sagem"
14. Press "ENTER"
15. The "VERSION" menu is not defined, press "ENTER"
16. Follow the instructions seen on the instrument and press "ENTER"
17. At this point the instrument is in communication with the console.

- With the "+" and "-" keys it is possible to scroll the following menus, identified by icons
 1. ENGINEERING PARAMETERS (icon °C mV mS)
 2. PRESENT AND MEMORISED ERRORS (icon generic danger)
 3. FUNCTION OF STATES (icon 0 1)
 4. ACTIVATION FUNCTION (injector icon)
 5. ADJUSTMENTS (screwdriver and hammer icon)

10.5 SET THROTTLE

1. Carry out the procedure described for self-diagnosis
2. Go to ENGINEERING PARAMETERS page (icon C°....)
3. Look for the "correct throttle position" item with the horizontal arrows (if not already present on the display).
4. Press "ENTER" to see the parameter value (this value with the engine off and the panel lit must be equal to 0%)
5. if the value is other than 0%, proceed as follows
6. Go to the ADJUSTMENTS page (icon screwdriver and hammer)
7. Using the vertical arrows position yourself on the "Set throttle" line
8. Press "ENTER" and follow the instructions supplied by the instrument



10.6 ADJUST STEPPER / CO

This operation must be carried out also using an exhaust gases analyser. The process is repetitive, arriving at the CO wanted by repeating the procedure described below.

1. Carry out the procedure described for self-diagnosis.
2. Go to the "ENGINEERING PARAMETERS" page(icon C°....)
3. Look for the "STEPPER POSITION" item with the horizontal arrows (if not already present on the display).
4. Press "ENTER" to see the parameter value (this parameter, with the engine running at minimum and at 85-90°C working temperature, must be around 30-40 steps)
5. Go to the ADJUSTMENTS page (icon screwdriver and hammer)
6. Using the vertical arrows position yourself on the "FUEL ADJUSTMENT AT MINIMUM" line
7. Press "ENTER"
8. Start the engine, keep it at minimum and connect the exhaust gases analyser
9. A percentage value will be seen that is possible to modify with the vertical arrows
10. Increase or diminish this procedure according to whether you want to thin or thicken the fuel
11. Go to the "ENGINEERING PARAMETERS" page(icon C°....)

NOTE: it is important, in order to have a correct reading of the CO, that the position of the stepper is at a value of about 30-40 steps as, acting on the "FUEL ADJUSTMENT AT MINIMUM" value, this parameter is modified automatically (this parameter with the engine running is in continuous correction, and it is very difficult to read a fixed value equal to 30-40 steps. It is therefore sufficient that the fluctuations are around this value).

A way of finding the exact position of the stepper is to step slightly on the accelerator and read the value at the instant in which the engine goes back to the minimum.

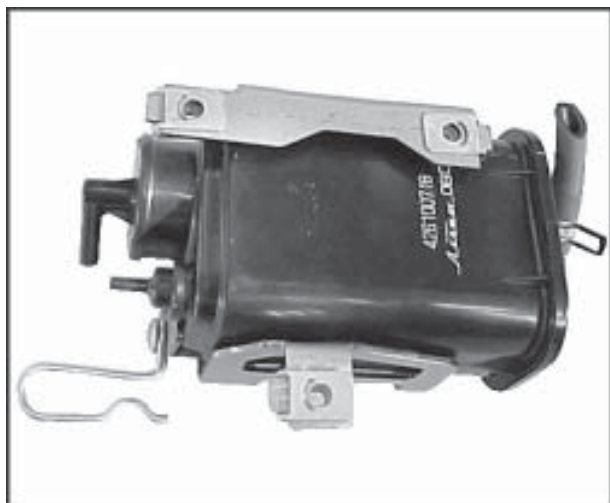
12. Select the "STEPPER POSITION" item
13. In the case of the value being very far off (attention, fluctuations of 4 or 5 steps are normal) it needs to be corrected
14. To correct the stepper position, return to the "ADJUSTMENTS" page (icon screwdriver and hammer)
15. Using the vertical arrows position yourself on the "Stepper manual" line
16. Press "ENTER"
17. From the present reading value, increase or decrease using the vertical arrows according to whether you want to add or remove steps from the stepper position
18. Press "ENTER"
19. Read the CO value of the exhaust gases analyser (it should be equal to (1-1.5)
20. In the case where the CO value is not that desired, repeat the operation from point 5.





U_{sa} V_{ersion}

11 USA VERSION



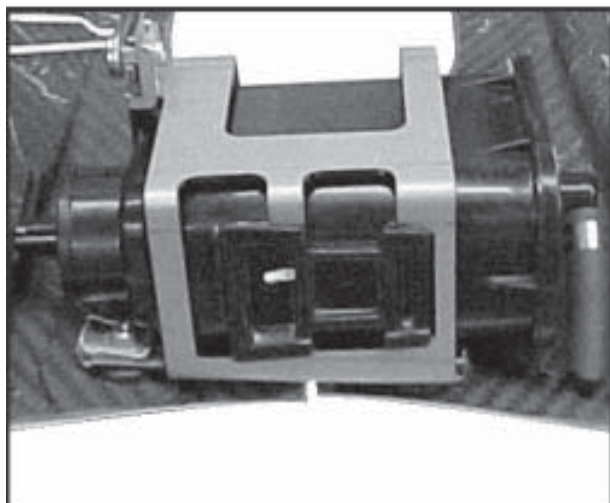
WARNING:

If on any changed component an adhesive recommendations label is applied, this must necessarily be re-integrated.

11.1 E.V.A.P. CANNISTER

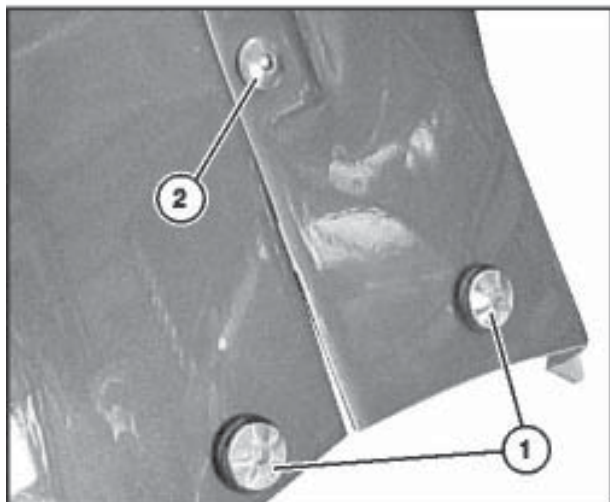
Gas vapours emission control system. Only for the USA (California).

This model conforms to the requirements of fuel evaporation. When the engine is off, gas vapours from the tank are directed into the EVAP cannister where they are absorbed and stored. When the engine is running and the EVAP control valve is open, the gas vapours contained in the Cannister are sent to the engine through the Stepper and burnt.



11.2 CANNISTER POSITION

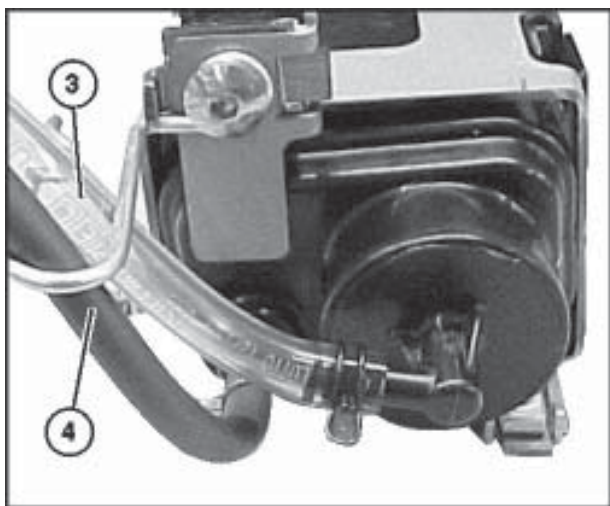
It is severely forbidden to remove it, maintenance is not envisaged. In the case of loss of gas, change the piece. Check every 15000 Km the state of wear of the connection tubes to the Cannister, if damaged change them.



11.3 REMOVE CANNISTER

To remove the cannister dismantle the lower semi-cowlings (see "DISMANTLE SEMI-COWLINGS").

Unscrew the two screws ((1) and screw (1).

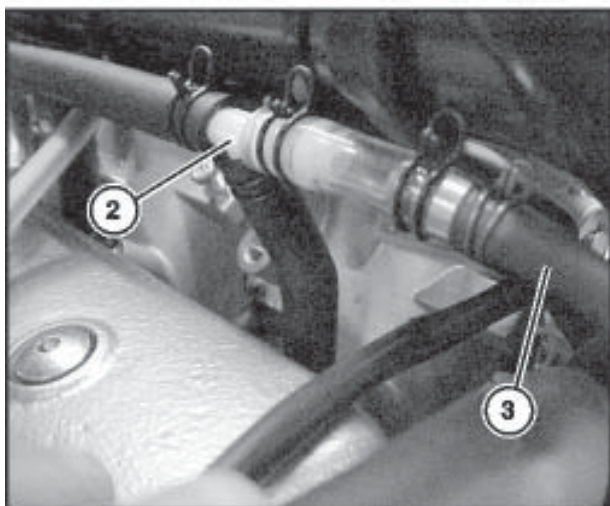


Disconnect the tube (3) connected to the gas tank.
Disconnect the tube (4) connected to the Stepper.

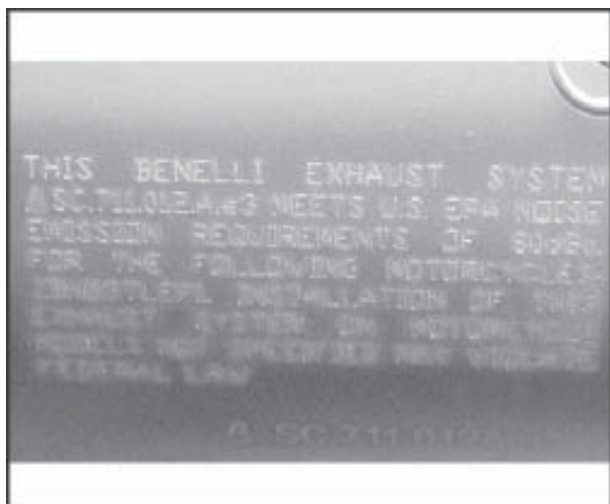


11.4 CANNISTER CONNECTION

Tube (1) connects the gas tank to the Cannister.



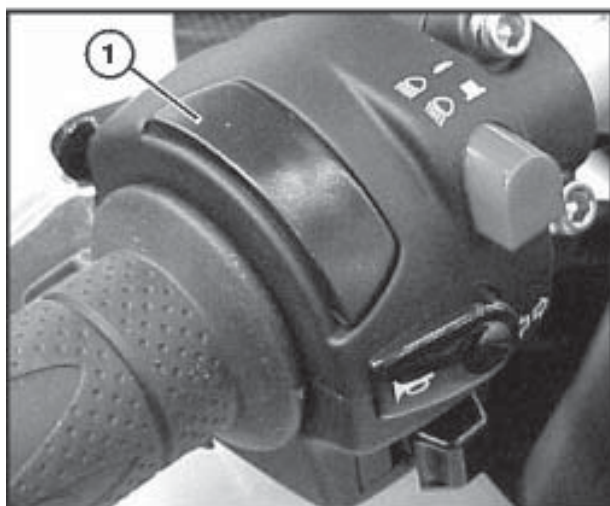
T connector (2) with connection tube (3) between the Cannister
and the Stepper.



11.5 EXHAUST

The exhaust is distinguished by bossing on the lower part of the silencer.

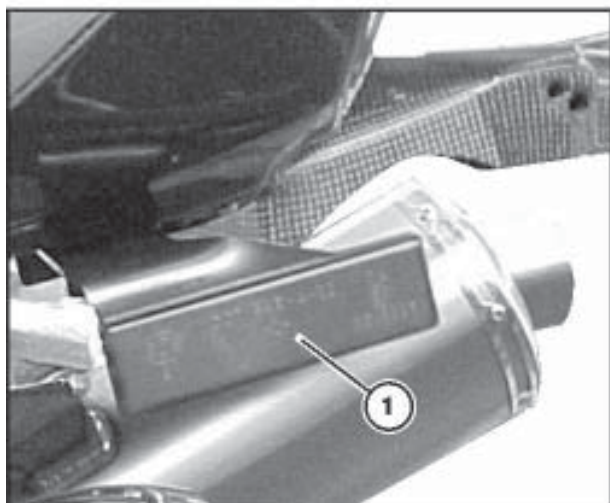
To remove it, use the same procedure as the European version..



11.6 LIGHT COMMANDS

The left light command is not equipped with an ON/OFF switch.

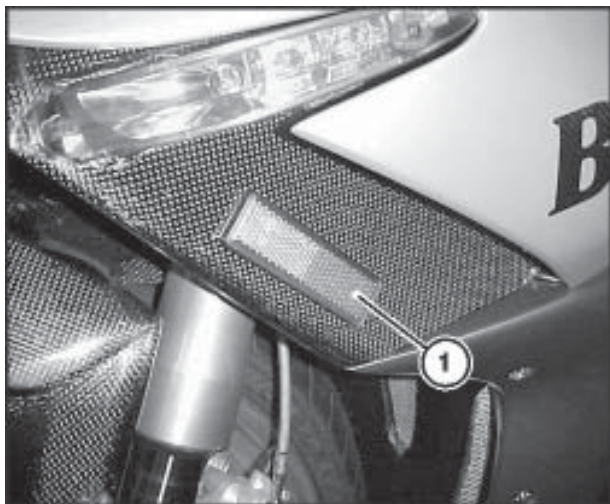
To remove it, use the same procedure as the European version.



11.7 REAR CATADIOPTRICS

Two catadioptrics (1) are positioned at the rear, one to the left and one to the right.

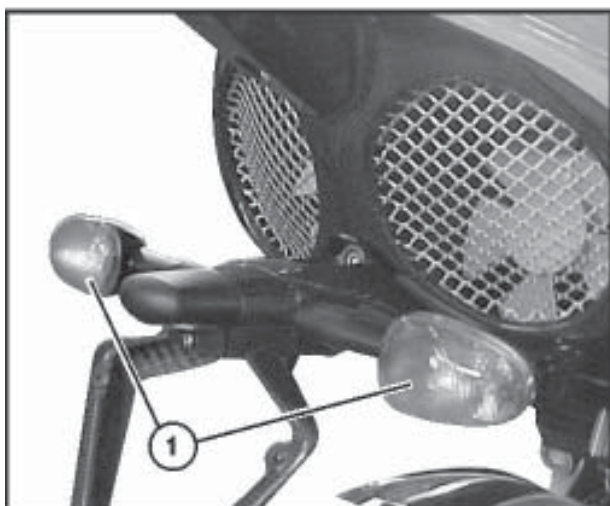
To remove them, dismantle the licence plate holder (see "DISMANTLE LICENCE PLATE HOLDER"), as in the European version.



11.8 FRONT CATADIOPTRICS

Two catadioptrics (1) are positioned at the front, one on the left and one on the right.

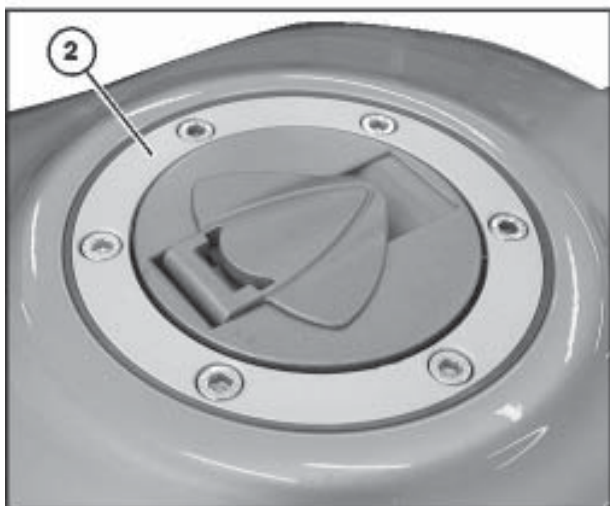
In the case of removal, change the element because it is fixed with double adhesive.



11.9 REAR ARROWS

The rear arrows (1) are not in carbon.

To remove them, use the same procedure as in the European version.



The gas tank (2) is not in carbon.

To remove it, use the same procedure as in the European version.









Benelli

Grafica e Stampa SERIART - Fabriano (AN)