PIAGGIO

SERVICE STATION MANUAL

• X9 500 cc

Piaggio & C. S.p.A.

Pontedera
After Sales Service
Dis. 594523 - 04/01

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SERVICE STATION MANUAL X9 500 cc

This manual has been designed by Piaggio for use in authorized dealers' and subdealers' workshops.
It is assumed that those who use this publication for maintaining and repairing Piaggio vehicles are familiar with the principles of mechanics and with vehicle repairing procedures and techniques. Any significant changes to the characteristics of the vehicles or to specific repairing procedures will be covered in updates of this manual.
Since satisfactory results cannot be obtained without the necessary equipment and tooling, we recommend referring to the pages of this manual concerning the specific equipment required and to the catalogue of specific tools.

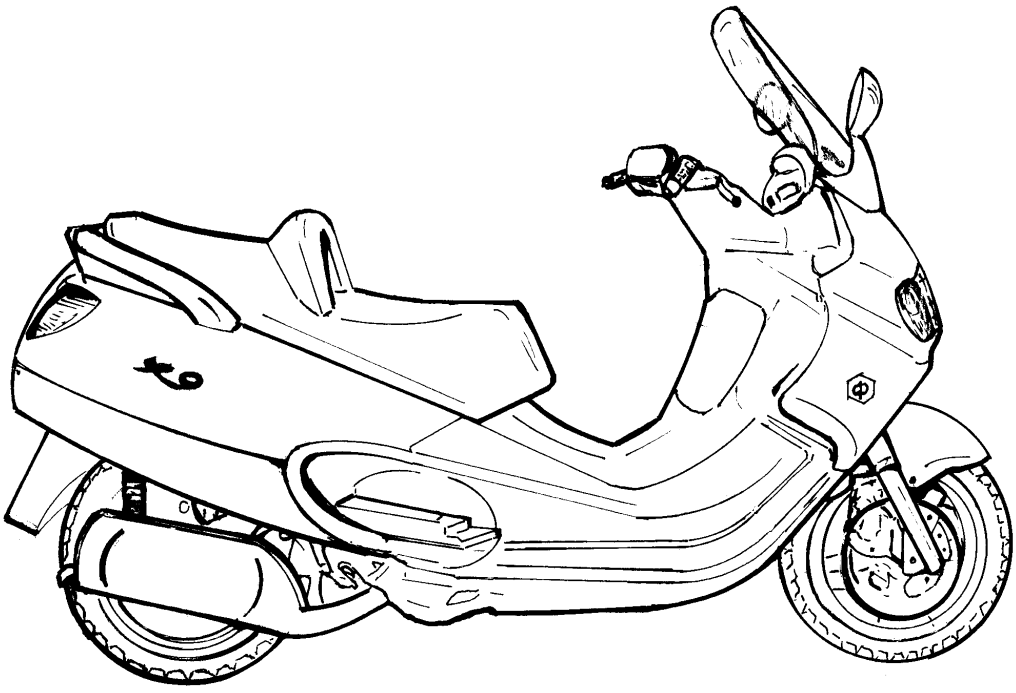
Pieces of particularly important information are identified as follows:

Note: Provides important information intended to simplify and clarify a procedure.

Warning - Denotes specific procedures to be used to avoid damaging the vehicle.

Caution - Identifies specific procedures to be followed to avoid injury to repairing personnel.

NOTE - For any intervention to the engine, refer to the “Service Station Manual” for 500 cc Engines.



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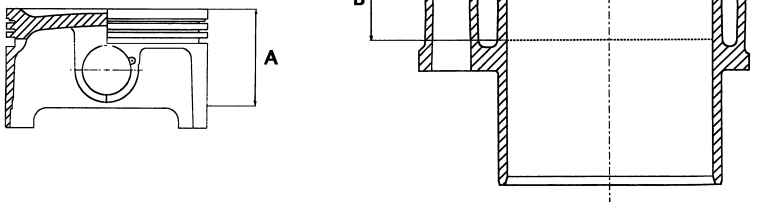
Assembly plays



(Values in mm)

DIAMETER MEASURING HEIGHT	A	43.2
	B	43

01_004

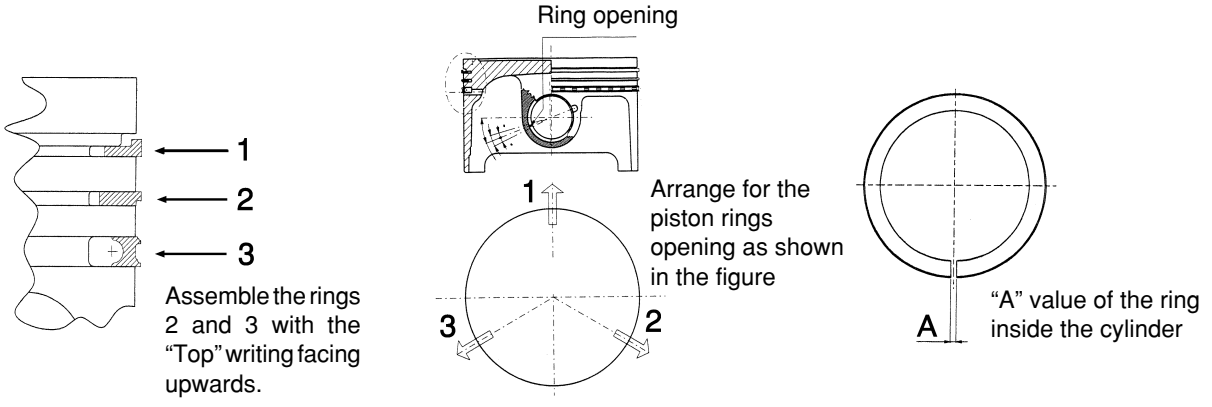
Mating between piston and cylinder

(Values in mm)

PART	DIMENSIONS	MATING CLASSES			ASSEMBLY CLEARANCE
		CODE	CYLINDER	PISTON	
Cylinder Ø C	$92^{-0.010}_{+0.018}$	A	91.990 - 91.997	91.947 - 91.954	0.036 - 0.050
		B	91.997 - 92.004	91.954 - 91.961	
Piston Ø P	$91.961^{+0.014}_{-0.014}$	C	92.004 - 92.011	91.961 - 91.968	
		D	92.011 - 92.018	91.968 - 91.975	

The piston must be fitted so that the arrow faces the exhaust side. The piston rings must be fitted so that the marks face upwards.

Piston rings

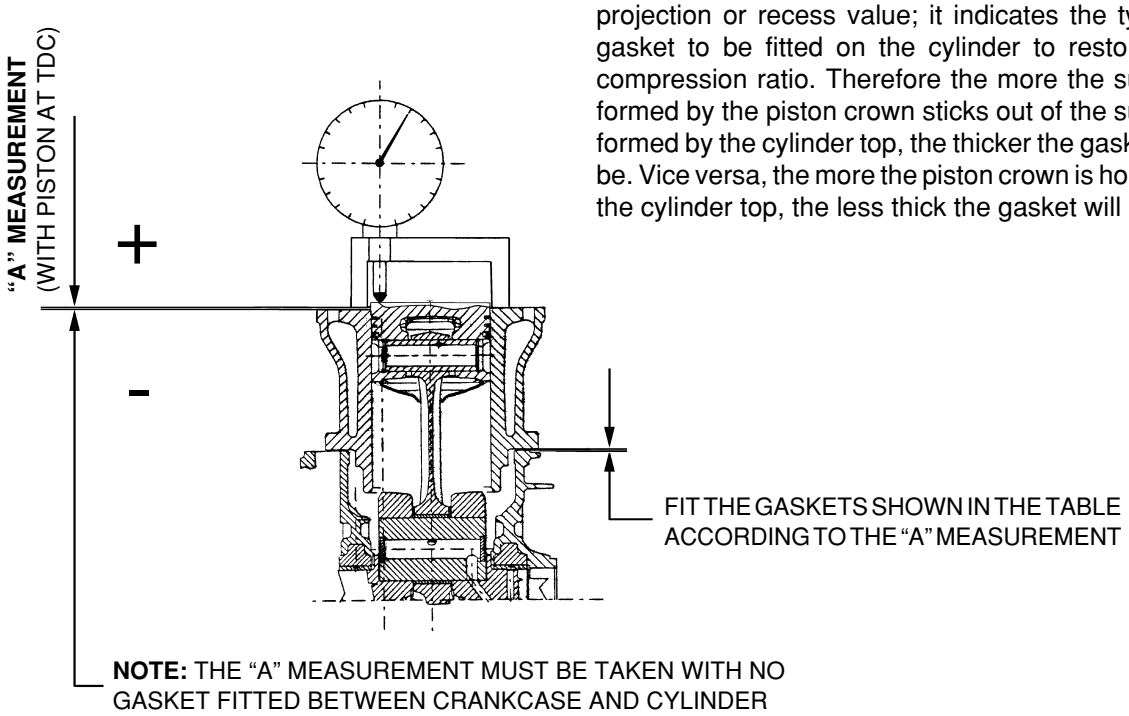


01_005

(Values in mm)

PART	DIMENSIONS	CLEARANCE CODE	SEAT CLEARANCE	CLEARANCE AFTER USE
1st Compression ring	92 x 1.5	A	0.15 - 0.35	0.5
2nd Compression ring	92 x 1.25	A	0.25 - 0.50	0.65
Scraper ring	92 x 2.5	A	0.25 - 0.50	0.65

SHIMMING METHOD FOR LIMITING THE COMPRESSION RATIO: CR = 10.5 : 1

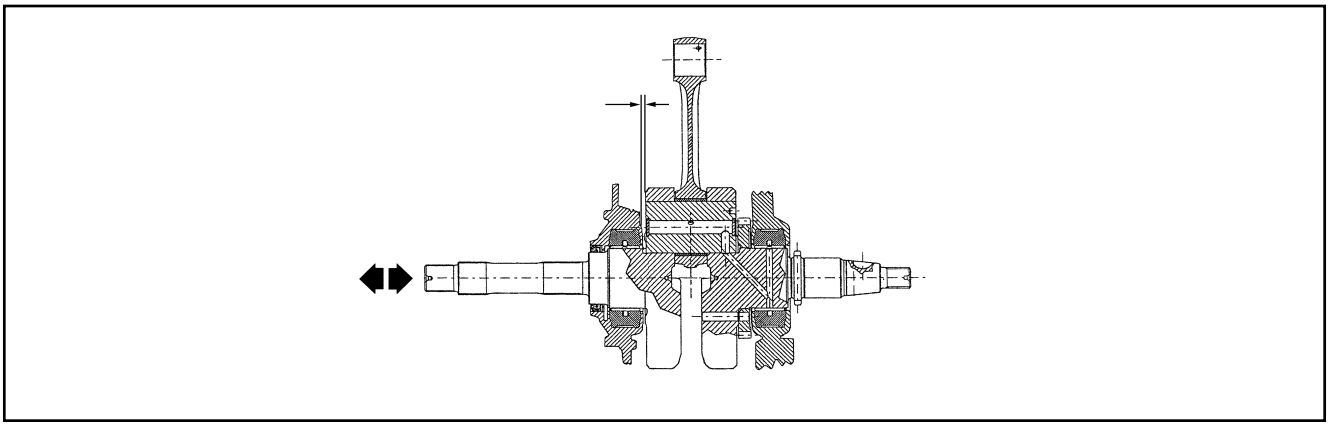


N.B.: The "**A**" measurement is referred to the piston projection or recess value; it indicates the type of gasket to be fitted on the cylinder to restore the compression ratio. Therefore the more the surface formed by the piston crown sticks out of the surface formed by the cylinder top, the thicker the gasket will be. Vice versa, the more the piston crown is hollow to the cylinder top, the less thick the gasket will be.

01_006

"A" MEASUREMENT	THICKNESS OF BASE GASKET
- 0.185 - - 0.10	0.4 ± 0.05
- 0.10 - + 0.10	0.6 ± 0.05
+ 0.10 - + 0.185	0.8 ± 0.05

Crankshaft/crankcase axial clearance 0.1 - 0.5 mm (cold engine)



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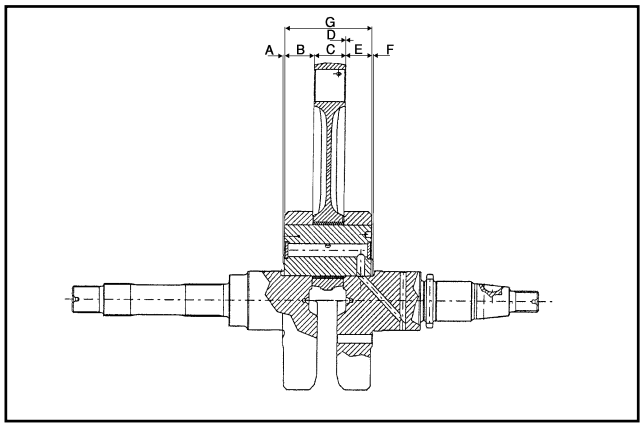
Crankshaft/connecting rod axial clearance



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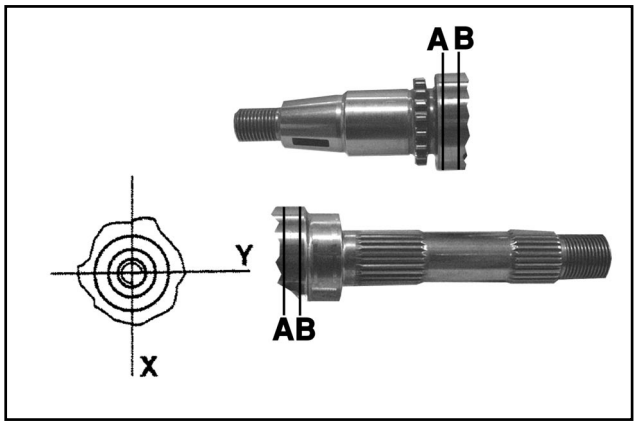
PART	DIMENSIONS	CLEARANCE
Web, transmission side	A =0.8 $^{\pm 0.025}$	D = 0.20 - 0.40
Shaft section, transmission side	B =19.6 $^{+0.05}_{0}$	
Connecting rod	C =22 $^{-0.10}_{-0.15}$	
Shaft section, flywheel side	E =19.6 $^{+0.05}_{0}$	
Web, flywheel side	F =13 $^{\pm 0.025}$	
Crankshaft assembly	G =63.5 $^{+0.1}_{-0.05}$	

Crankshaft alignment and diameters

- Measure the housings on both axes x and y.

	Standard diameter
Class 1	40.010 - 40.016
Class 2	40.016 - 40.022



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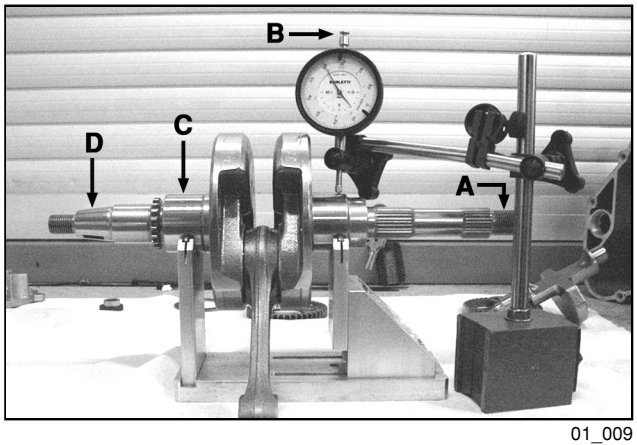
Max. allowable runout:

A = 0.15 mm
B = 0.01 mm
C = 0.010 mm
D = 0.10 mm



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Specific tools for Piaggio X9 500 cc 4-stroke 4-valve

RECOMMENDED TOOLS	
TOOL NAME	**PART NO.**
Circlip pliers	002465Y
Steering thrust ring removing drift	020004Y
Crankshaft aligning tool	020074Y
Support for “METABO HG 1500/2” air heater	020150Y
“METABO HG 1500/2” air heater	020151Y
Mityvac-type vacuum pump	020329Y
Stroboscopic gun for two- and four-stroke engines	020330Y
Digital multimeter	020331Y
Single battery charger	020333Y
Multiple battery charger	020334Y
Magnetic stand and dial gauge	020335Y
Engine support connection	020482Y
Engine mount base	020527Y
Engine mount revolving base	020604Y11

= New tools

NECESSARY TOOLS	
TOOL NAME	**PART NO.**
STEERING SEAT FITTING TOOL, to be fitted with parts 9 - Lower bearing adaptor, 10 - Upper bearing adaptor	001330Y
Bell Ø 80 mm	001467Y002
20 mm pliers	001467Y006
Bell Ø 63 mm	001467Y007
18 mm pliers	001467Y008
Bell Ø 45 mm	001467Y017
Bell Ø 60 mm	001467Y031
15 mm pliers	001467Y034
Hub bearing extraction bell	001467Y035
Steering tube ring spanner	020055Y
Oil pressure gauge	020193Y
Valve seal rings assembly tool	020306Y
37x40 mm adaptor	020358Y
42x47 mm adaptor	020359Y
52x55 mm adaptor	020360Y
20 mm guide (Driven pulley bearings)	020363Y
25 mm guide (Driven pulley bearings)	020364Y
Ø 28x30 mm adaptor	020375Y
Adapter sleeve	020376Y
Bushing (valve removing tool)	020382Y012
15 mm guide	020412Y
Valve oil seal extractor	020431Y
Oil pressure gauge unio	020434Y
17 mm guide (countershaft bearings)	020439Y
Driven half pulley spring compressor	020444Y
46-55 mm spanner	020444Y009
Ø 24 mm adaptor	020456Y
Steering tube lower bearing extractor	020458Y
Drift for fitting bearing on steering tube	020459Y
Injection tester kit	020460Y
Flywheel extractor	020467Y
Piston fitting band	020468Y
Injection tester reprogramming kit	020469Y
Piston pin retainer fitting tool	020470Y
Countershaft timing peg	020471Y
Flywheel retaining tool	020472Y
Clutch bell housing retaining tool	020473Y
Drive pulley stop spanner	020474Y
Piston position comparator support	020475Y
Pillar kit	020476Y
Ø 37 mm adaptor	020477Y
Driven pulley needle roller drift	020478Y
Countershaft stop spanner	020479Y
Fuel pressure measuring kit	020480Y
Control unit interface wiring harness	020481Y
30 mm guide	020483Y
Piston stop fork	020512Y
Compass wrench (valve lifter bell stop)	020565Y
Exhaust gas analyser	494929

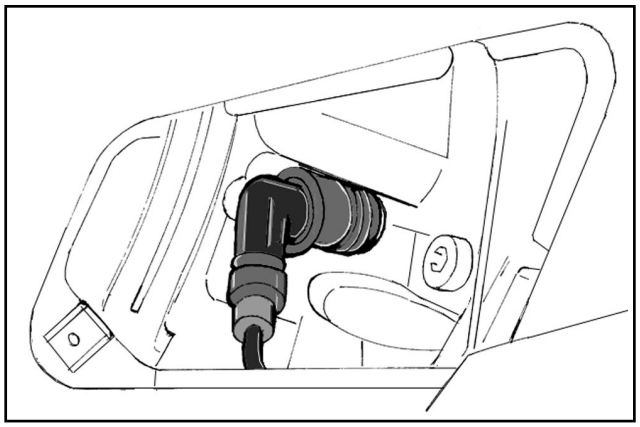
Spark plug

Check and replacement

Warning - Remove the spark plug when the engine is cold. Replace the spark plug every 12,000 km. The use of unsuitable ignition control units and spark plugs other than those specified can seriously damage the engine.

Recommended spark plug: CHAMPION RG 6 YC
NGK CR 7 EKB

- Put the vehicle on the central stand.
- Open the door on the left side of the vehicle by levering in the recess in the lower part of the door after removing the screw.
- Disconnect the spark plug HV cable cap.
- Unscrew the spark plug with the spanner provided.
- Check the spark plug to see if the insulator is cracked, the electrodes are worn out or excessively sooty. Also check the condition of the seal washer and measure the spark gap with a suitable thickness gauge.
  Spark gap: 0,7 - 0,8 mm
- If necessary adjust the spark gap by carefully bending the side electrode.
  If the spark plug has any of the defects mentioned above, replace it with a plug of the recommended type.
- Insert the plug into the hole with the proper inclination, screw it in fully by hand and then tighten it with the specially designed spanner.
  Tightening torque: 10 N·m (1 Kg·m)
- Push the spark plug cap all the way down onto the spark plug and then proceed to the reassembly.



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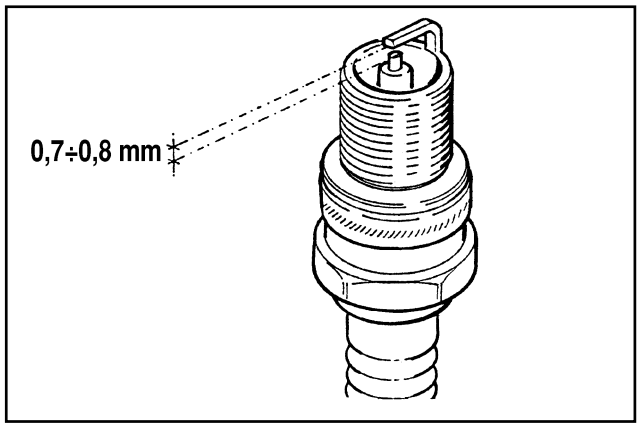
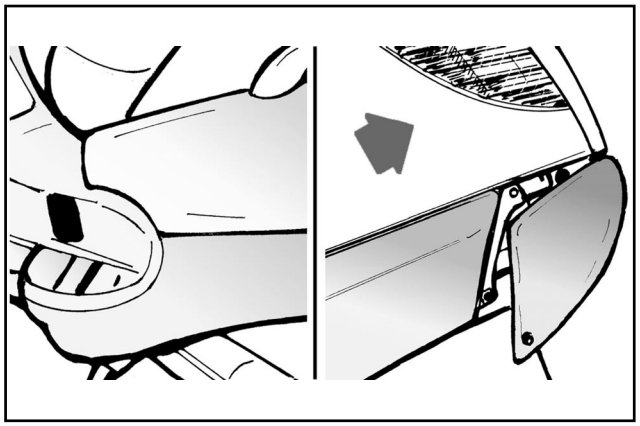


03_002

Air filter

- Remove the left-hand lower side panel as described in Chapter 8-Bodywork.
- Remove the cleaner cap after loosening the eight fixing screws, including one screw of the knob type.
- Pull out the filter element.
- Replace the air filter with a new one.

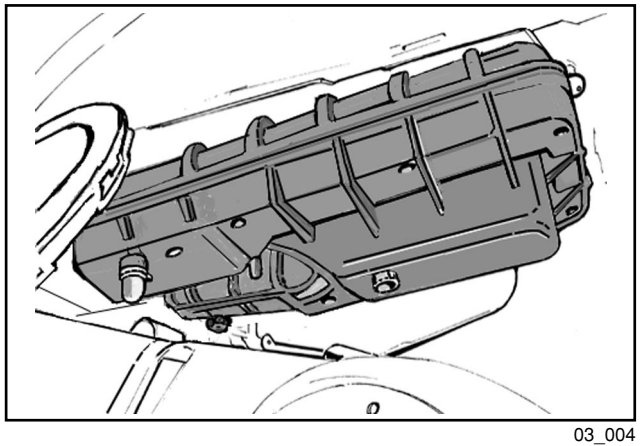
Note: Check and if necessary blow the air filter every 6,000 km. Direct the air jet from the inside to the outside of the filter (i.e. in the opposite direction to the air flow during normal engine operation).



03_003

Warning - If the vehicle is mostly used on dusty roads, the air filter needs to be cleaned and replaced at shorter intervals than indicated in the Maintenance Schedule.

Warning - Do not run the engine if the air filter is not in place as this would result in excessive wear of the cylinder and piston as well as in damage to the throttle body.



03_004

Engine oil level

In four-stroke engines oil is used to lubricate the valve gear components, the crankshaft bearings and the power plant. **A lack of engine oil can cause serious damage to the engine**.
In all four-stroke engines, oil deterioration and consumption are, to some extent, normal, especially during running-in. Consumption partly depends on the riding style (for example, constantly riding at full throttle increases oil consumption).

Checking the oil level

Perform this operation when the engine cold, as described below:
1) Put the vehicle on its central stand on a flat surface.
2) Unscrew dipstick «**A**», dry it with a clean cloth and **refit by screwing it completely**.
3) Remove the dipstick again and check that the oil level is between the MAX and MIN marks on the dipstick; top up if necessary.

The MAX level mark indicates an amount of about 1700 cc of engine oil.
The level will be lower if checked after using the vehicle (i.e. when the engine is hot). To obtain a correct indication of the oil level, wait for at least 10 minutes after switching off the engine.

Topping up

If the oil level is too low, top up by adding fresh oil **without exceeding the MAX level**.

Approximately 400 cc of oil are needed to restore the level between the **MIN** and **MAX** marks.

Oil pressure warning light

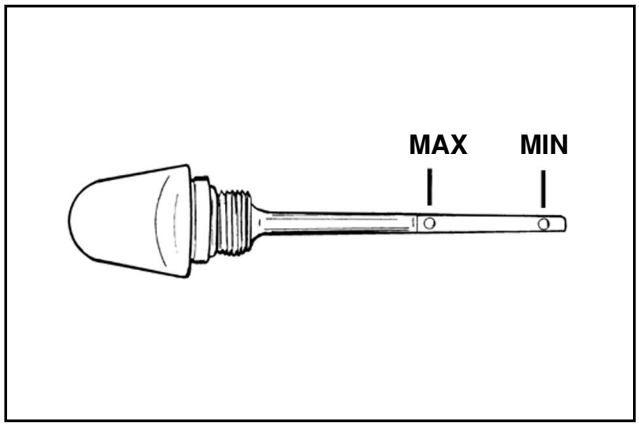
A warning light on the instrument panel comes on when the ignition key is turned to the "**ON**" position. The light must go out after the engine has started.
Should the warning light come on while braking, idling or cornering, check the oil level and the lubrication system as soon as possible.

Renewing the oil and the filter

The oil and the filter must be renewed every 6,000 km. Drain all the oil from the engine by removing gauze strainer drain plug «**B**» on the transmission side. To facilitate the outflow, also remove cap/dipstick «**A**». Once the oil has drained completely through the drain hole, unscrew oil filter cartridge «**C**» and remove it as described below.

Since a certain amount of oil remains in the circuit, the replenishment must be made by adding approximately 1,500 cc of fresh oil through cap «**A**». Subsequently start the engine, let it idle for a few minutes and then switch it off. After about 5 minutes, check the level and if necessary top up **without exceeding the MAX level**. The filter cartridge must be replaced every time the oil is changed. For top-ups and renewals use fresh oil of the **Selenia HI Scooter 4 Tech** type.

Note: Renew the oil when the engine is hot.



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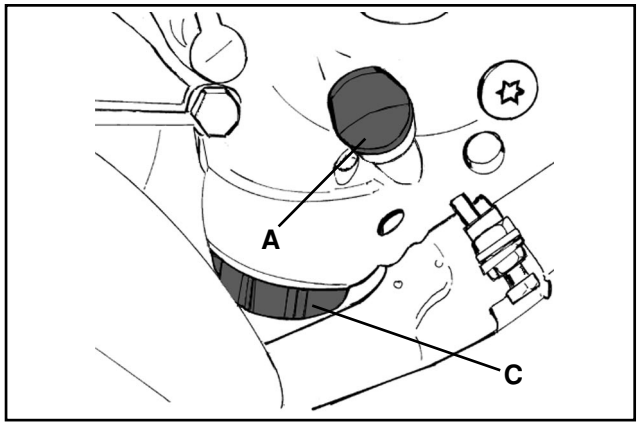

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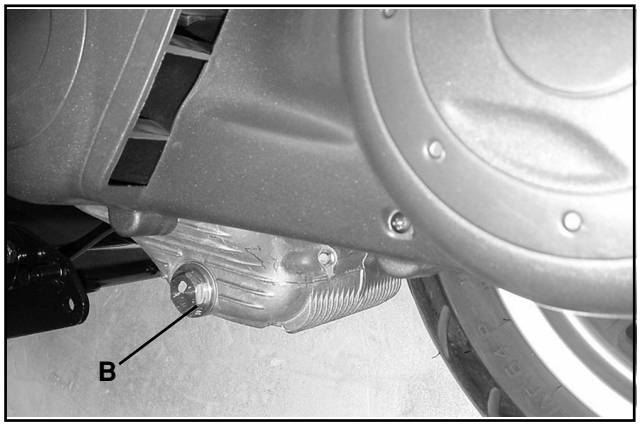


03_007

Replacing the filter

Warning - Do not dispose of the oil in the environment. Carry out the disposal of the oil, the gasket and the filter in accordance with the law.

Caution - To avoid burns, take care not to touch hot engine parts.

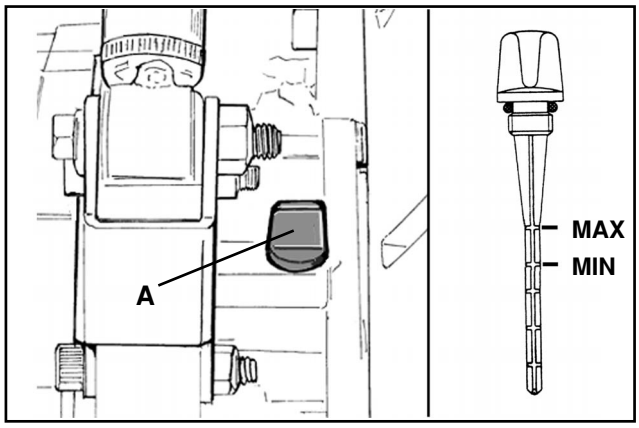
- Remove the silencer.
- Remove filler plug «**A**».
- Remove and clean the drain plug gauze strainer with compressed air.
- Using a strap wrench for filters, remove cartridge filter «**C**».
- Ensure that the O-rings on the prefilter and the drain plug are in good condition.
- Lubricate the O-rings and then refit the gauze strainer and the oil drain plug. Tighten the drain plug with the prescribed torque.
- Fit a new cartridge filter after lubricating the O-ring. Turn in until the gasket makes contact and then tighten it with the prescribed torque.
- Reinstall the silencer.
- Add engine oil as previously described.

Tightening torque:
Tappo scarico olio motore Engine oil drain plug: 24 - 30 N·m
Oil filter: 12 - 16 N·m

Oil type: Selenia HI Scooter 4 Tech

Checking the hub oil level

- Put the vehicle on the central stand on level ground.
- Unscrew oil dipstick «**A**», wipe it with a clean cloth, reinsert it and **then screw it in fully**.
- Pull out the dipstick again and check that the oil level is between the MIN and MAX marks (see figure); if the level is below the MIN mark, top up with oil.
- Reinsert the dipstick and screw it tight.

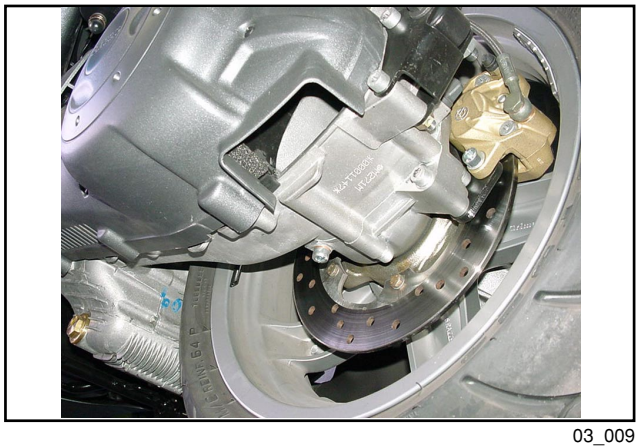


03_008

Renewing the hub oil

- Remove oil filler plug «**A**».
- Unscrew oil drain plug «**B**» and drain all the oil.
- Retighten the oil drain plug and then fill the hub with fresh oil.

Recommended oil: TUTELA ZC 90
Hub oil capacity: ~ 250 cc



03_009

Engine cooling

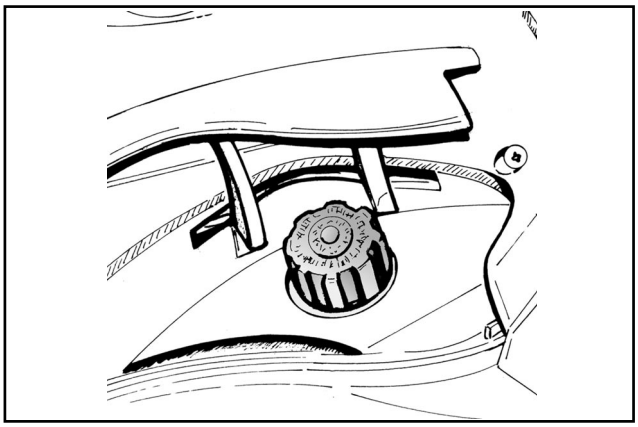
Adding coolant and bleeding air from the system

The level of the fluid must be checked every 6,000 km when the engine is cold.

Follow these steps:

- Put the vehicle on the central stand on level ground.
- Remove the expansion tank cap and top up if the coolant is below or near the MIN level in the expansion tank. The level of the fluid should always be between the MIN and MAX marks.
- To have an indication of the coolant level, refer to the groove in the plastic strip that can be seen through the coolant filler hole. The upper and lower parts of the groove correspond to the MAX and MIN levels respectively.
- The coolant consists of a 50 percent mixture of demineralized water and antifreeze solution with a base of ethylene glycol and corrosion inhibitors.
  Total coolant capacity: ~ 1,8 lt
- To check the presence of air in the circuit follow the procedure described in Chapter 11-Cooling, in the manual of Engine 500 cc.
- Switch off the engine and allow it to cool down. After a few minutes, remove the expansion tank cap and check the level of the fluid.
- If necessary, top up by pouring fresh coolant into the expansion tank up to the correct level.

Warning - To prevent the coolant from leaking out of the expansion tank during use, be sure to never exceed the MAX level when refilling.



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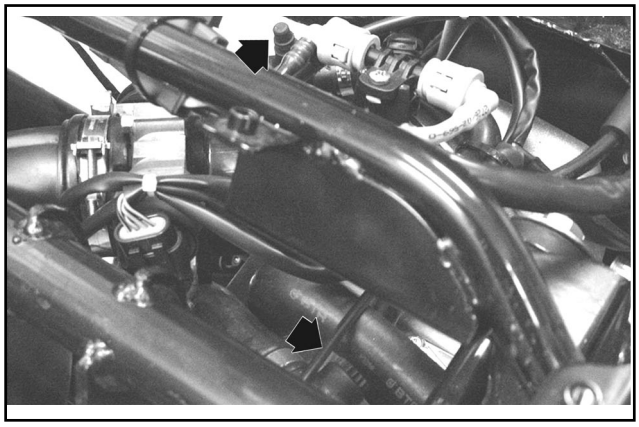


03_011

Water pump

If the water pump becomes noisy or liquid leaks through the pump drain hole, check the water pump as described in Chapter 5-Flywheel cover of the manuale Engine 500 cc. Perform the following preliminary operations:

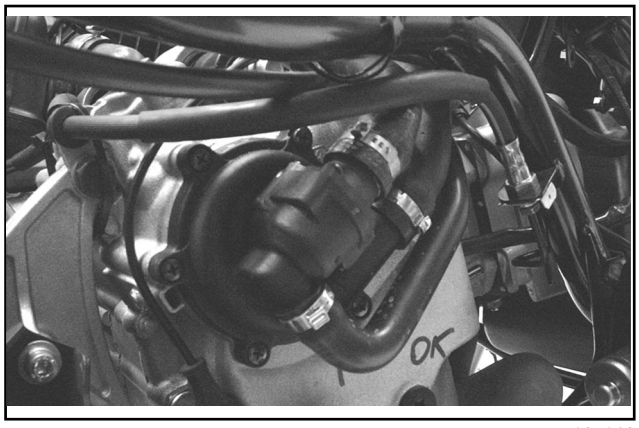
- Put the vehicle on the central stand on level ground.
- Remove the lower right-hand side panel and the right-hand footboard as described in Chapter 8-Bodywork.
- Remove the silencer to gain access to the flywheel cover as described in Chapter 5-Engine;
- Remove the sleeves from the water pump cover and the filler cap from the expansion tank and empty the cooling circuit.

Warning - Perform the operation when the engine is cold.

- Remove the water pump cover shown in the figure after loosening the six fixing screws.
- Cooling circuit capacity: ~ 1,8 lt.

- As described in the manual Engine 500cc, partially drain the system and overhaul the pump.
- After solving the problem and refitting all components, fill and bleed the cooling circuit again.

N.B.: Change the coolant as described in Chapter 11-Cooling of the Manual Engine 500 cc



03_013

Adjusting the play of the valves - Checking the valve gear timing

To adjust the play of the valves and to check the valve gear timing as described in Chapter 7-Thermal Unit and Timing system of the Engine manual, follow these preliminary steps:

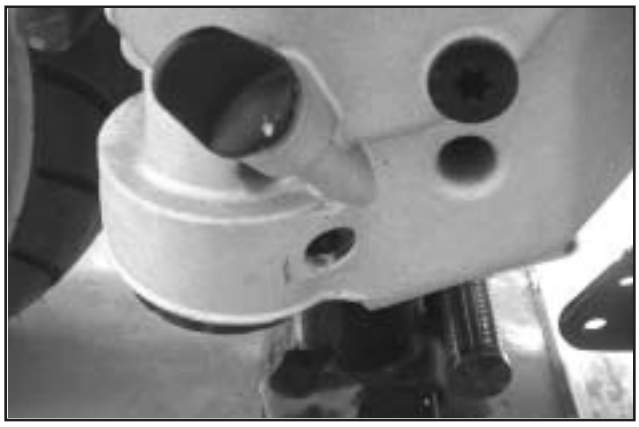
- Put the vehicle on the central stand;
- Remove the relevant body sections to gain access to the pivot fixing the engine to the swingarm (refer to Chapter 8-Bodywork);
- Support the bottom of the engine, e.g. with a jack;
- Remove the engine from the frame as described in Chapter 5-Engine;
- Shift the engine backwards to make room for the removal of the cylinder head cover (until the swingarm cross member touches the starter motor).
- After adjusting the play of the valves, refit the components by following the reverse procedure to the removal.

Warning - Do not lower the engine too much to prevent it from touching the stop push button of the electrohydraulic stand.

Note: The checking areas are shown in the two figures at the right.

Play of valves:

Intake	0.15 mm cold engine
Exhaust	0.15 mm cold engine



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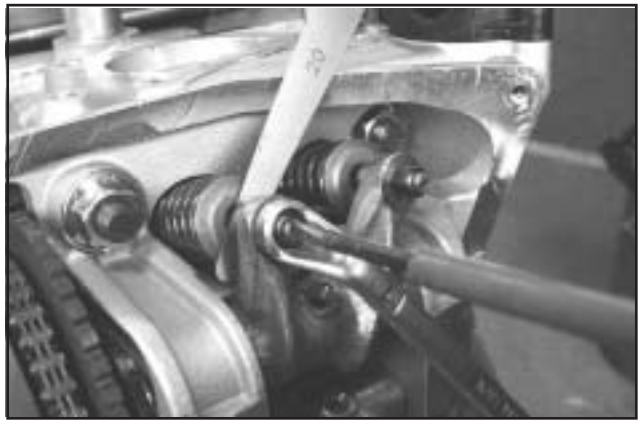


03_012_4

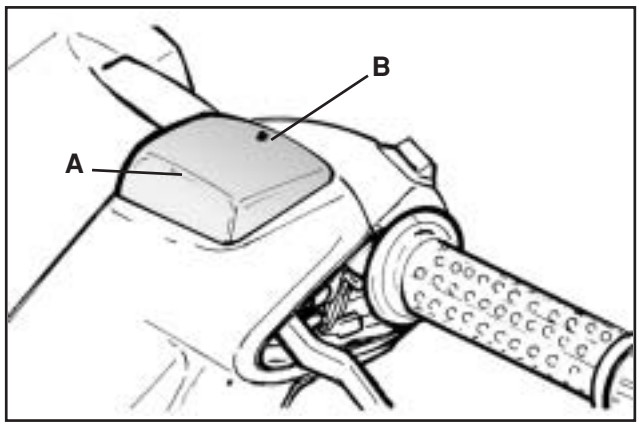
Checking the level

To gain access to the front and rear brake fluid reservoirs, remove the covers on the handlebar cover.

Follow these steps:

- Put the vehicle on the central stand and turn the handlebar to the central position.
- Remove cap «**A**» after loosening fixing screw «**B**».
- Check the level of the fluid through the sight.

A certain decrease in the level of the fluid occurs as a result of pad wear.



03_012_1

Restoring the brake fluid level

Warning - Only use brake fluid classified as DOT 4.

Brake fluid type: TUTELA TOP 4

Use the following procedure:

Remove the «**A**», covers and the tank cap by unscrewing the two screws, remove the gasket and restore the brake fluid level with liquid of the recommended type, without exceeding the max. level.

03_012_2

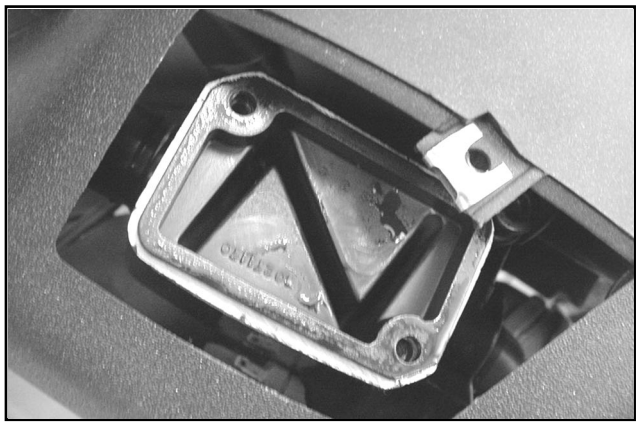
Warning - Keep the brake fluid away from the skin, the eyes and clothing. In case of contact, rinse generously with water.

Warning - The brake fluid is highly corrosive. Take care not to spill it on the paintwork.

Warning - The brake fluid is hygroscopic, i.e. it absorbs humidity from the air. If the humidity contained in the fluid exceeds a given concentration, the braking action becomes insufficient.
Never draw the fluid from open or partly empty containers.

Under normal climatic conditions the fluid should be renewed every 20,000 km, or in any case every two years.

N.B.: Change the brake fluid and bleed the system as described in Chapter 7-Braking system.

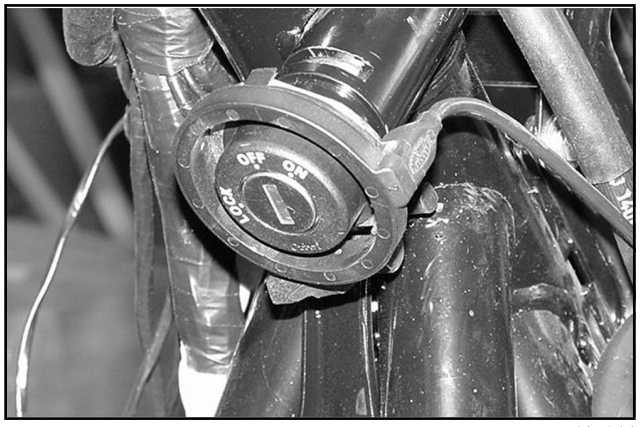


03_012_3

Steering lock

Disassembly with lock turned to "OFF"

- Remove the rear shield as described in Chapter 8-Bodywork.
- Remove the immobilizer aerial shown in the figure.

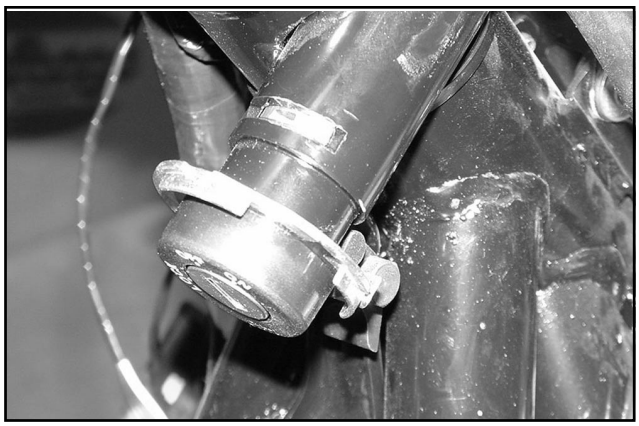


03_014

- Disconnect the wiring.
- Pull out the retaining spring shown in the figure and remove the ignition switch.

03_015

- Push the bolt lightly and extract the retainer from the milled part shown in the figure.
- Extract the bolt assembly from the lock body.
- To refit, follow the reverse procedure.

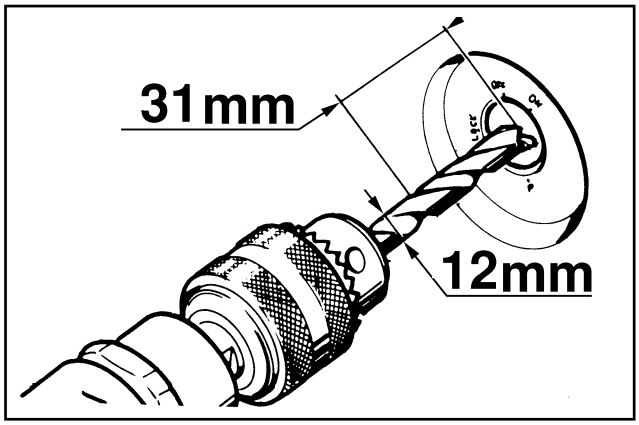


03_016

Removal with lock in LOCK position

The bolt retaining spring is not accessible in the LOCK position. It is then necessary to drill the bolt as show in the figure to eject it.

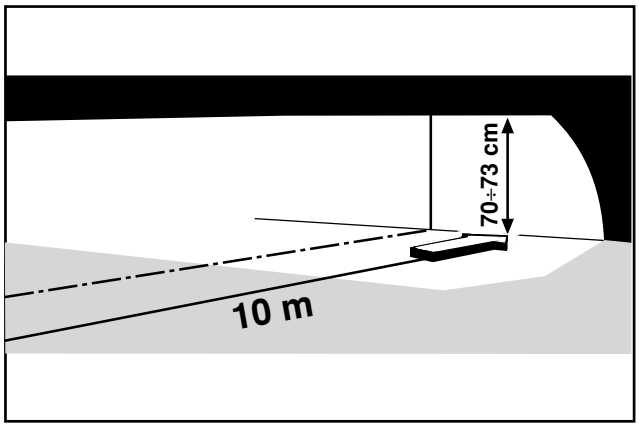
Note: To refit the bolt from this position, first disengage the steering lock by putting the lock body (inner and outer part) in the OFF position.
Proceed as described in the previous paragraph.



03_017

Adjusting the headlight

- Place the unloaded vehicle on a level surface, 10 metres from a half-lit white screen, with the tyres inflated to the prescribed pressure. Ensure that the axis of the vehicle is perpendicular to the screen.
- Draw a horizontal line on the screen 70-73 cm above the ground.
- Switch on the headlight, turn on the low beam and check that the horizontal line that divides the dark area from the lighted area is not above the line previously drawn on the screen. To shift the headlight, use the specially designed screw in the front shield (see figure).



03_018

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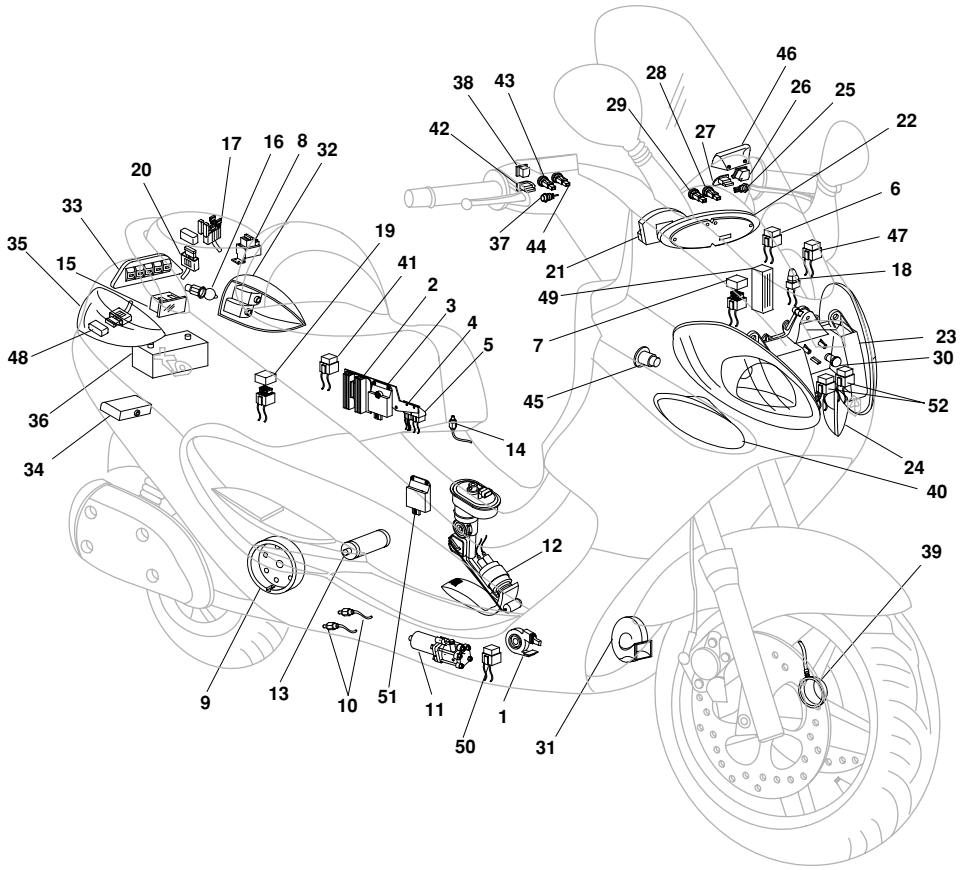
ELECTRICAL EQUIPMENT



1	SIDESTAND SWITCH	27	TURN INDICATOR SWITCH
2	VOLTAGE REGULATOR	28	HORN BUTTON
3	STAND CONTROL UNIT	29	HAZARD WARNING LIGHT BUTTON
4	ELECTRONIC CONTROL UNIT RELAY SWITCH	30	RESET BUTTON
5	ENGINE STOP RELAY SWITCH	31	TRUMPET HORN
6	SERVICES ELECTROMAGNETIC SWITCH	32	LH REAR LIGHT WITH 5W PARKING LIGHT BULB AND 10W TURN INDICATOR BULB
7	FUSE BOX (3 X 7.5A, 1 X 15A)		
8	NO. 2 SOLENOID STARTERS	33	REAR BRAKE LIGHT, 5 X 2.3W BULB
9	375W FLYWHEEL MAGNETO		
10	2 X STAND BUTTON	34	NUMBER-PLATE LIGHT 12V-5W
11	STAND PUMP MOTOR	35	RH REAR LIGHT WITH 5W PARKING LIGHT BULB AND 10W TURN INDICATOR BULB
12	PUMP ASSEMBLY WITH LEVEL INDICATOR		
13	STARTER MOTOR	36	12V-14Ah BATTERY
14	HELMET COMPARTMENT LAMP BUTTON	37	FRONT BRAKE LIGHT BUTTON
15	HELMET COMPARTMENT LAMP	38	ENGINE STOP SWITCH
16	12V SOCKET	39	WHEEL REVOLUTION SENSOR
17	2 X REAR FUSE BOX FOR CONTROL UNIT (1 X 3A, 1 X 5A, 1 X 10A, 1 X 3A)	40	RH FRONT TURN INDICATOR, 10W BULB
		41	MAIN RELAY SWITCH
18	DIODE BOX (2 X 6 A AND 2 A DIODE)	42	LIGHTS SELECTOR SWITCH
19	FUSE BOX (2 X 7.5A, 1 X 15A AND 5A)	43	START BUTTON
20	FUSE BOX WITH STRIP FOR STAND PUMP ELECTROMAGNETIC SWITCH (NO. 1 OF 70A)	44	STAND BUTTON
		45	IGNITION SWITCH
21	DIGITAL INSTRUMENT SET (11 WARNING LIGHTS AND LEDS)	46	RADIO DISPLAY
22	ANALOG INSTRUMENT SET (5 LAMPS)	47	ELECTRIC FAN RELAY SWITCH
23	HEADLIGHT, 2 X PARKING LIGHT BULB, HIGH/LOW BEAM 55/55W BULB	48	30A FUSE WITH SOLENOID STARTER
		49	RADIO CONROL UNIT/INTERCOM/SPEAKERPHONE
24	LH FRONT TURN INDICATOR WITH 10W BULB	50	No. 2 PUMP ELECTROMAGNETIC SWITCHES
25	REAR BRAKE LIGHT BUTTON	51	RELAY SIGNALER GLUED
26	LIGHTS SWITCH WITH HEADLIGHT FLASH	52	No. 2 HEADLIGHT ELECTROMAGNETIC SWITCHES

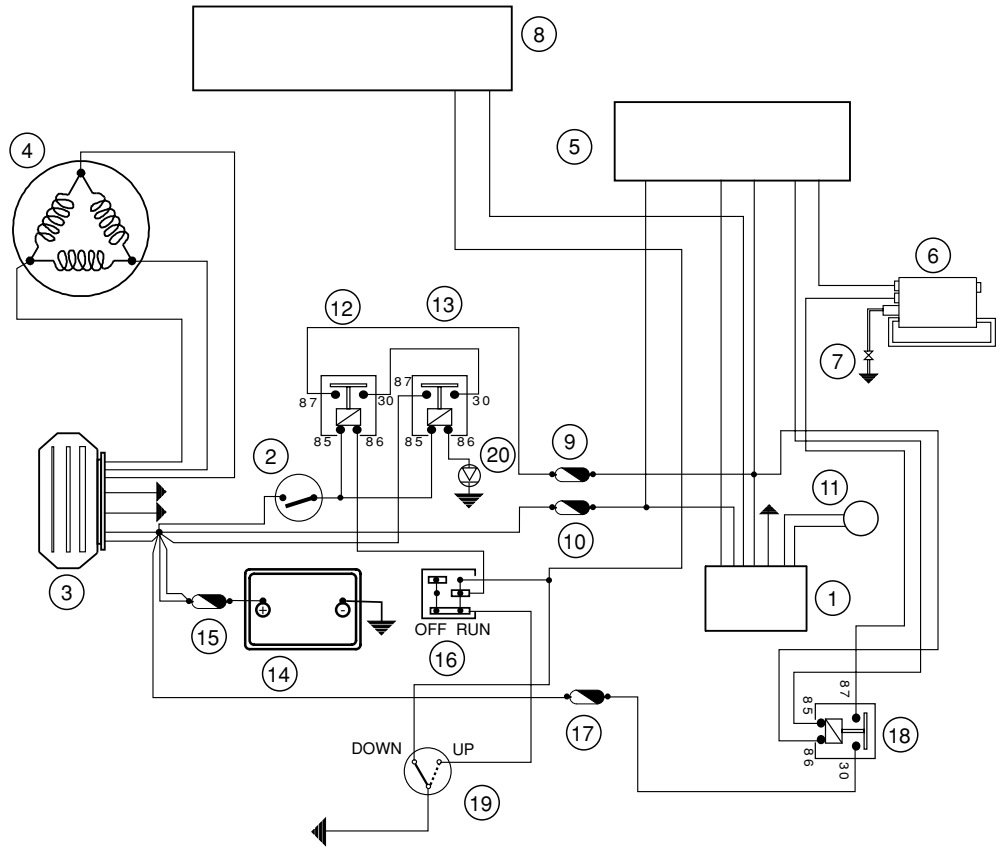
Electrical equipment devices

1. Digital instrument panel (11 LED indicators).
2. Analog instrument panel (5 bulbs).
3. Headlight (2 parking light bulbs, 55/55W low/high beam bulbs).
4. LH front turn indicators (10W bulb).
5. Rear brake light button.
6. Lights selector switch with headlight flash.
7. Turn indicator switch.
8. Horn button.
9. Hazard warning light button.
10. Reset button.
11. Trumpet horn.
12. Sidestand switch.
13. Voltage regulator.
14. Stand control unit.
15. Engine stop relay switch.
16. Electronic control unit relay switch.
17. Stand pump relay switches.
18. LH rear light (5W parking light bulb, 10W turn indicator bulb).
19. Rear brake light (5 x 2.3W bulbs).
20. Number-plate light with bulb.
21. RH rear light (5W parking light bulb, 10W turn indicator bulb).
22. 12V-14Ah battery.
23. Fuse box (3 x 7.5A fuse, 1 x 15A fuse).
24. Starting relay switch.
25. Flywheel magneto (375W).
26. Engine oil pressure sensor.
27. Coolant temperature sensor.
28. Engine rpm sensor.
29. Air temperature sensor.
30. Idle speed adjusting motor.
31. Throttle potentiometer.
32. Petrol injector.
33. 2 stand switches.
34. Stand pump motor.
35. Injection electronic control unit.
36. Decoder.
37. Front brake light button.
38. Engine stop switch.
39. Wheel revolution sensor.
40. RH front turn indicator (10W bulb).
41. Relay switch.
42. Lights switch.
43. Start button.
44. Stand button.
45. Immobilizer aerial.
46. Ignition switch.
47. Electric fan.
48. Electric fan relay switch.
49. Main relay switch.
50. HV coil.
51. Fuel gauge with pump.
52. Starter motor.
53. Helmet compartment lamp button.
54. Helmet compartment lamp.
55. 12V socket.
56. 2 rear fuse boxes for control unit (1 x 3A fuse, 1 x 5A fuse, 1 x 10A fuse, 1 x 3A fuse).
57. Radio display.
58. Relay switch.
59. Outside temperature sensor.
60. Diode box (2 x 6A/2A diodes).
61. Fuse box (2 x 7.5A fuse, 1 x 15A fuse, 1 x 5A fuse).
62. Fuse box with base for stand pump (1 x 70A fuse).
63. Intercom/radio control unit.
64. Intercom connectors.
65. Relay signaler glued.

ELECTRICAL CABLES COLOUR: B=White - **Bl**=Blue - **G**=Yellow - **Mr**=Brown - **N**=Black - **BV**=White-Green - **GN**=Yellow-Black - **Gr**=Grey - **Rs**=Pink - **R**=Red - **Vi**=Violet - **V**=Green - **VN**=Green-Black - **BN**=White-Black - **BBl**=White-Blue - **GV**=Yellow-Green - **Ar**=Orange - **Az**=Azure - **GrBl**=Grey-Blue - **GrN**=Grey-Black.

Warning - When working on the electrical equipment, take special care to ensure that the leads that link up to the electronic control device are properly connected by observing the polarity and colour coding of the connectors.

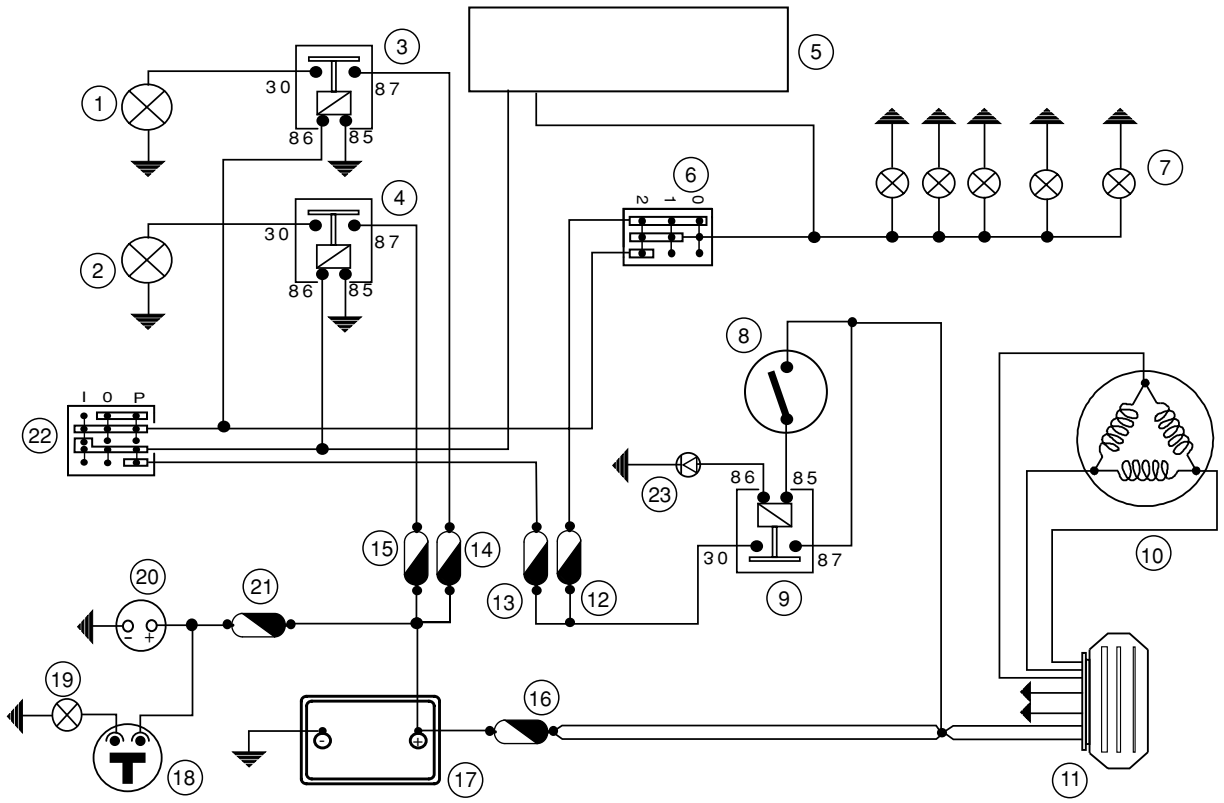
Ignition section



04_002

1	IMMOBILIZER DECODER	11	IMMOBILIZER AERIAL
2	IGNITION SWITCH CONTACTS	12	ENGINE STOP RELAY SWITCH
3	VOLTAGE REGULATOR	13	MAIN RELAY SWITCH
4	FLYWHEEL MAGNETO	14	12V-14Ah BATTERY
5	INJECTION ELECTRONIC POWER UNIT	15	30A FUSE
6	HV COIL	16	ENGINE STOP SWITCH
7	SPARK PLUG	17	10A FUSE
8	DIGITAL INSTRUMENT SET	18	ELECTRONIC POWER UNIT ELECTROMAGNETIC SWITCH
9	5A FUSE	19	SIDE STAND SWITCH
10	3A FUSE	20	2A DIODE

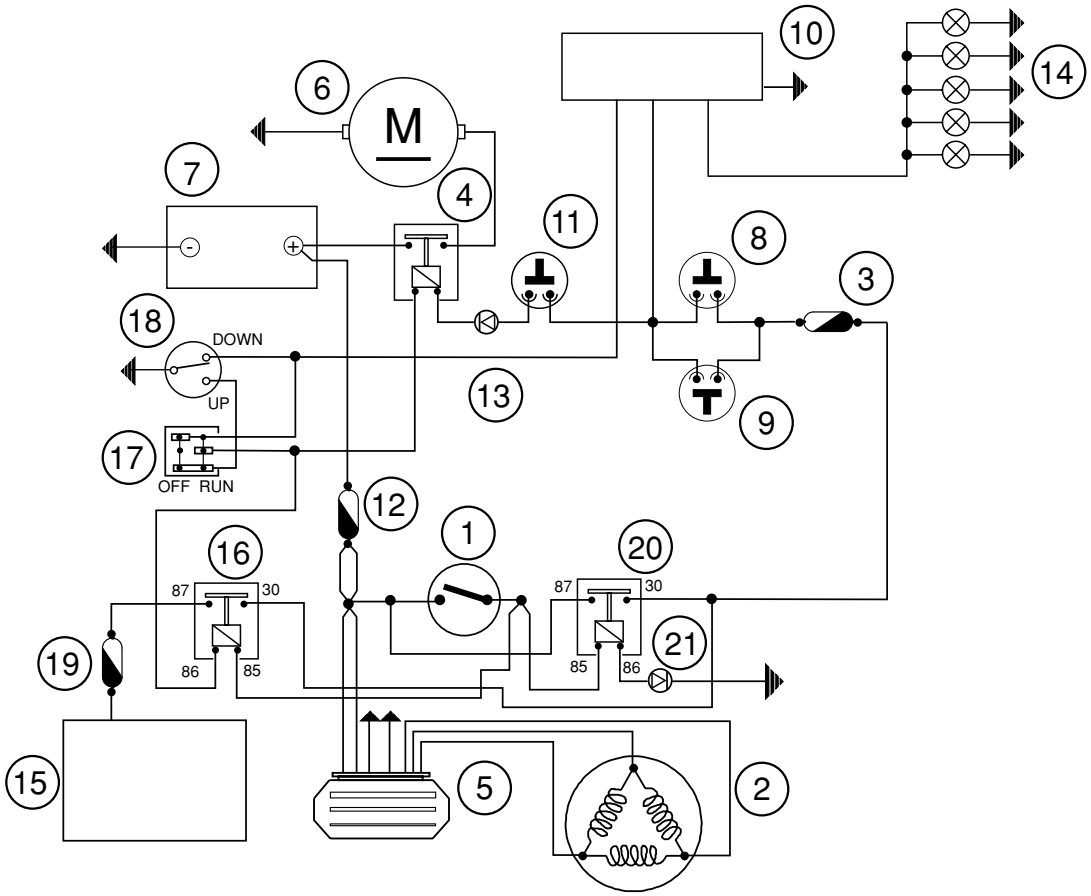
Lights section



04_003

1	12V-55W LOW BEAM BULB	12	7.5 A FUSE
2	12V-55W HIGH BEAM BULB	13	15 A FUSE
3	LOW BEAM RELAY SWITCH	14	7.5 A FUSE
4	HIGH BEAM RELAY SWITCH	15	7.5 A FUSE
5	DIGITAL INSTRUMENT SET	16	30 A FUSE
6	LIGHTS SWITCH	17	12V-14Ah BATTERY
7	2 x 12V-5W FRONT PARKING LIGHT BULB, 2 x 12V-5W REAR PARKING LIGHT BULB, 1 x 12V-5W NUMBER-PLATE LIGHT BULB	18	HELMET COMPARTMENT LAMP BUTTON
		19	12V-5W HELMET COMPARTMENT LAMP BULB
8	IGNITION SWITCH CONTACTS	20	12V-180W SOCKET
9	MAIN RELAY SWITCH	21	15A FUSE
10	FLYWHEEL MAGNETO	22	LIGHTS SELECTOR SWITCH
11	VOLTAGE REGULATOR	23	2A DIODE

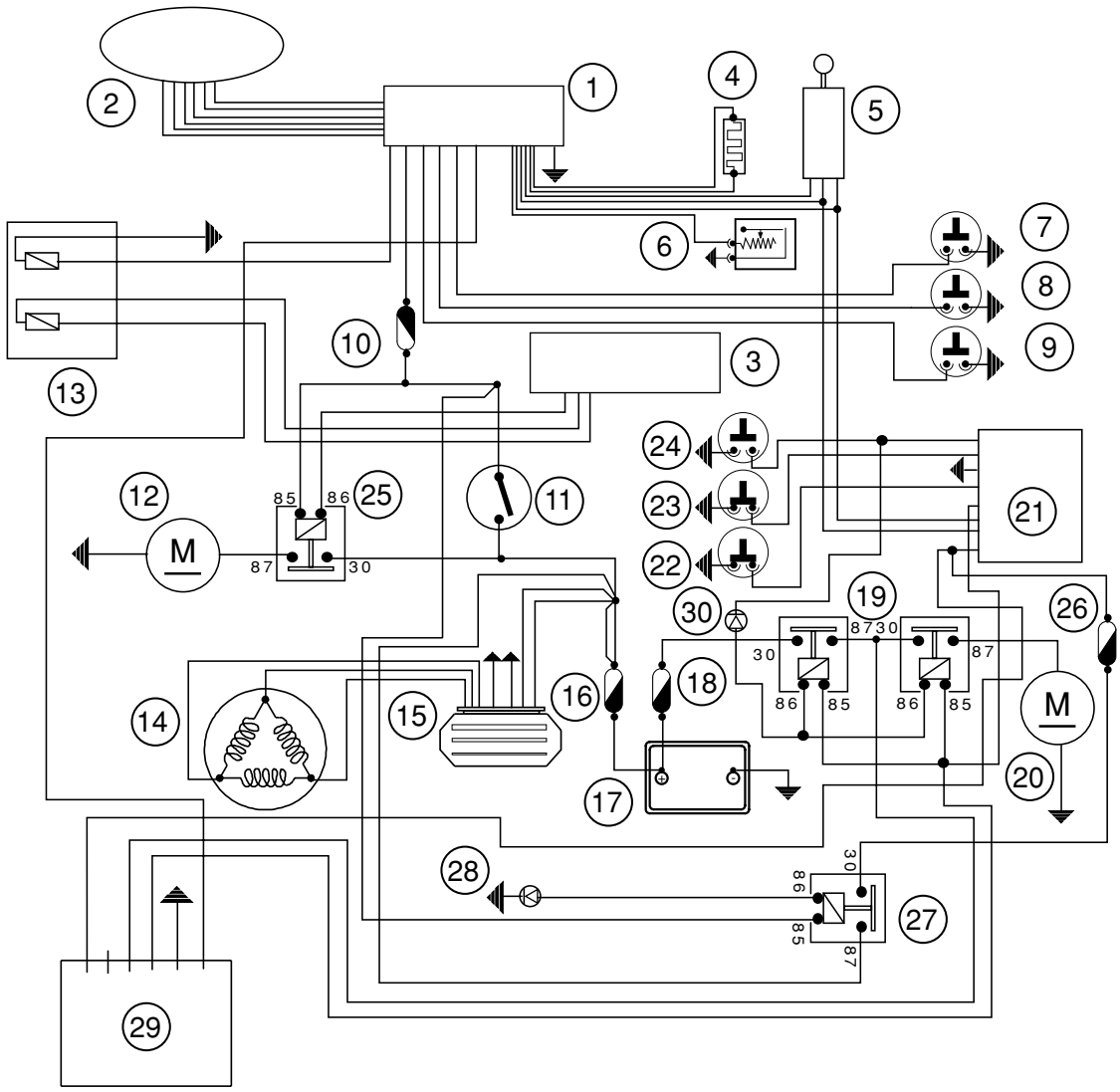
Battery recharge and starter section



04_004

1	IGNITION SWITCH CONTACTS	12	30A FUSE
2	FLYWHEEL MAGNETO	13	6A DIODE
3	7.5A FUSE	14	5 X 12V-2.3W BRAKE LIGHT BULB
4	STARTER RELAY SWITCH	15	INJECTION POWER UNIT
5	VOLTAGE REGULATOR	16	ENGINE STOP RELAY
6	STARTER MOTOR	17	ENGINE STOP SWITCH
7	12V-14Ah BATTERY	18	STAND SWITCH
8	FRONT BRAKE LIGHT BUTTON AND START INHIBITOR SWITCH	19	5A FUSE
9	REAR BRAKE LIGHT BUTTON AND START INHIBITOR SWITCH	20	MAIN RELAY SWITCH
10	DIGITAL INSTRUMENT PANEL	21	2A DIODE
11	START BUTTON		

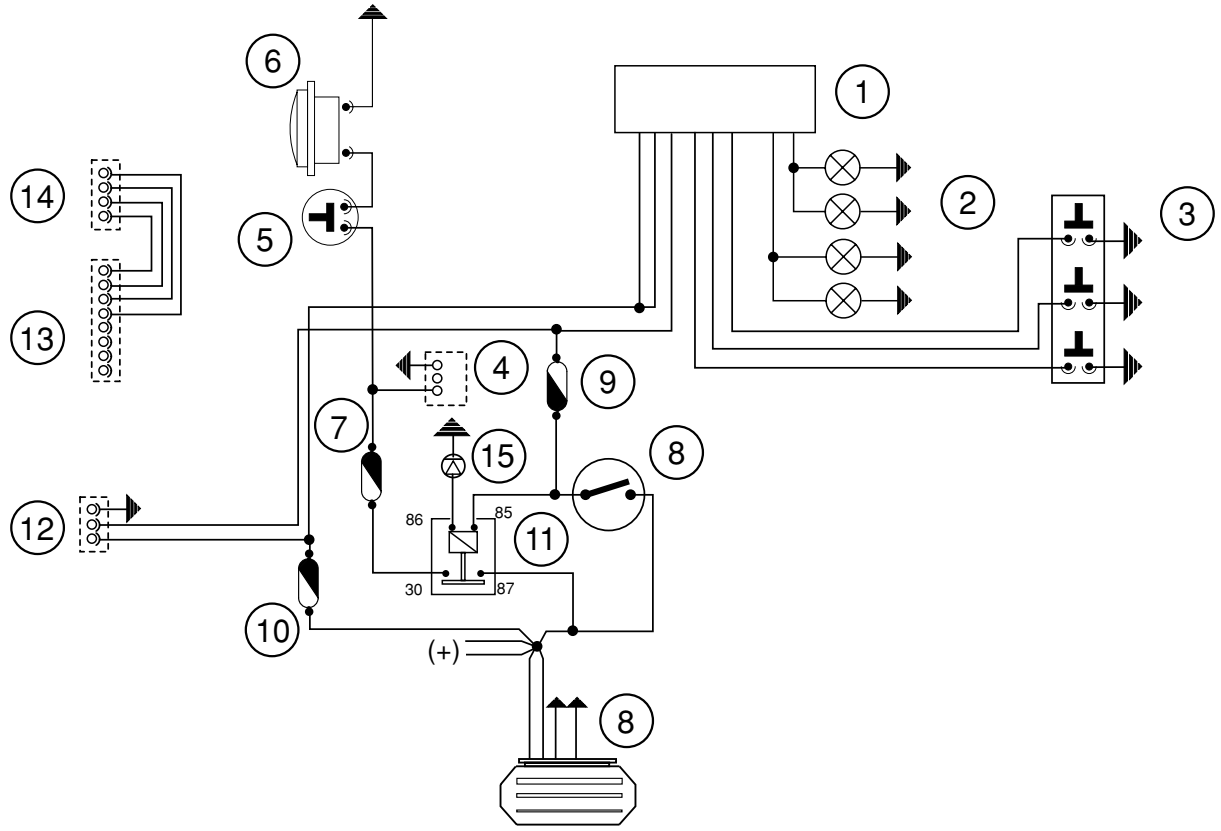
Consent, electrohydraulic central stand device and level indicators section



04_005

1	DIGITAL INSTRUMENT	16	30A FUSE
2	ANALOG INSTRUMENT SET	17	12V-14Ah BATTERY
3	INJECTION ELECTRONIC CONTROL UNIT	18	70A FUSE
4	OUTSIDE TEMPERATURE SENSOR	19	STAND HYDRAULIC PUMP RELAY SWITCHES
5	WHEEL REVOLUTION SENSOR	20	STAND HYDRAULIC PUMP MOTOR
6	FUEL LEVEL THERMISTOR	21	STAND ELECTRONIC CONTROL UNIT
7	OIL PRESSURE SENSOR	22	STAND INHIBITOR SWITCH
8	RESET BUTTON	23	STAND LIMIT SWITCH
9	EMERGENCY BUTTON	24	BUTTON
10	7.5A FUSE	25	ELECTRIC FAN RELAY SWITCH
11	IGNITION SWITCH CONTACTS	26	5A FUSE
12	RADIATOR ELECTRIC FAN MOTOR	27	MAIN ELECTROMAGNETIC SWITCH
13	ENGINE TEMPERATURE SENSOR	28	2A DIODE
14	FLYWHEEL MAGNETO	29	RELAY SIGNALER GLUED
15	VOLTAGE REGULATOR	30	1A DIODE

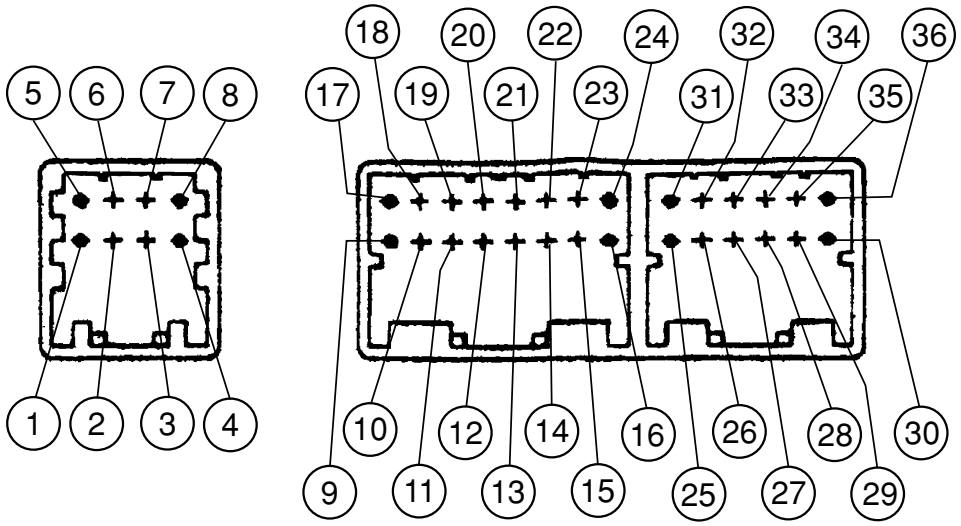
Turn indicators, horn and accessories prewiring section



04_006

1	DIGITAL INSTRUMENT PANEL	9	7.5A FUSE
2	TURN INDICATORS, 2 + 2 X 12V-10W BULB	10	7.5A FUSE
3	TURN INDICATOR SWITCH	11	MAIN RELAY SWITCH
4	ACCESSORIES PREWIRING	12	PRESETTING FOR INTERCOM POWER UNIT INPUT
5	HORN BUTTON		
6	HORN	13	PRESETTING FOR RADIO POWER UNIT SIDE
7	15A FUSE	14	PRESETTING FOR RADIO DISPLAY SIDE
8	GNITION SWITCH CONTACT	15	2A DIODE

Control panel, warning lights, instruments



04_007

1	ANALOG CARD GND	19	MALFUNCTIONING BRAKE LIGHT WARNING LIGHT INPUT
2	BATTERY POSITIVE TERMINAL (+30) FOR ANALOG CARD	20	LH TURN INDICATOR OUTPUT
3	ANALOG CARD SERIAL CLOCK OUTPUT	21	TURN INDICATOR STOP BUTTON INPUT
4	ANTITHEFT DEVICE LED OUTPUT	22	RESET SERVICE BUTTON INPUT
5	ANALOG CARD SERIAL DATE OUTPUT	23	COOLANT TEMPERATURE SENSOR INPUT
6	LIGHTS-ON OUTPUT	24	FUEL LEVEL SENSOR INPUT
7	(NOT CONNECTED)	25	BATTERY POSITIVE TERMINAL (+30)
8	(NOT CONNECTED)	26	SENSOR POWER SUPPLY
9	INJECTION WARNING LIGHT INPUT	27	SPEEDOMETER SENSOR EARTH RETURN
10	RELAY ALARM WARNING LIGHT INPUT GLUED	28	RPM SENSOR INPUT
11	MALFUNCTIONING BRAKE LIGHT OUTPUT	29	BATTERY POSITIVE TERMINAL (+30)
12	RH TURN INDICATOR OUTPUT	30	ANTITHEFT DEVICE LED
13	RH TURN INDICATOR BUTTON INPUT	31	KEY POSITIVE TERMINAL (+15)
14	LH TURN INDICATOR BUTTON INPUT	32	SPEEDOMETER SENSOR INPUT
15	HIGH BEAM WARNING LIGHT INPUT	33	GND
16	AIR TEMPERATURE SENSOR INPUT	34	AIR TEMPERATURE SENSOR EARTH RETURN
17	ENGINE START DISABLED WARNING LIGHT INPUT	35	HAZARD WARNING LIGHT BUTTON INPUT
18	OIL PRESSURE WARNING LIGHT INPUT	36	LIGHTS-ON INPUT

Battery recharge system

The battery recharge system includes a three-phase generator with a permanent-magnet flywheel.

The generator is directly connected to the voltage regulator.

The latter is in turn directly connected to earth and to the battery positive terminal via the 30A fuse.
Therefore, the system is not connected to the ignition switch.

The three-phase generator allows considerable recharging power and a fair compromise between supplied power and slow running stability at low rpm.

Recharging system

Searching for leaks

1) Before measuring the output voltage, ensure that no electrolyte is leaking from the battery.
2) Turn the ignition key to the OFF position and connect the tester terminals between the battery negative pole (-) and the black cable.
3) Detach the black cable from the battery negative pole (-) while keeping the tester terminals connected.
4) With the ignition key still in the OFF position, the ammeter should read ≤ 0,5 mA.

Checking the charging voltage

Warning - Before performing the check, ensure that the battery is in good condition.

1) Put the vehicle on the central stand.
2) With the battery properly connected to the circuit, position the multimeter prods between the battery terminals.
3) Start the engine with all lights out and rev up while measuring the voltage.

VOLTAGE: 14.0-15.0V at 5,000 rpm.

Checking the stator winding

Warning - The check can be performed with the stator in place.

1) Remove the undersaddle compartment door
2) Detach the connector between stator and regulator with the three yellow cables.
3) Measure the resistance between each of the yellow terminals and the other two.
   Resistance: 0.2 - 1 Ω
4) Check that each yellow wire is insulated from earth.
5) If the resistance is not as specified, replace the stator.

Checking the peak current

- With the engine off and swithboard “ON”, turn the vehicle lights on and let the battery tension set to 12V.
- Connect the amperometric pliers to the 2 outlet re-charge positive poles of the regulator.
- With lights on, start the engine and read the value on the pliers with the engine running at high speed.

With efficient battery, the measured value is: > 20A

Voltage regulator/rectifier

Specifications

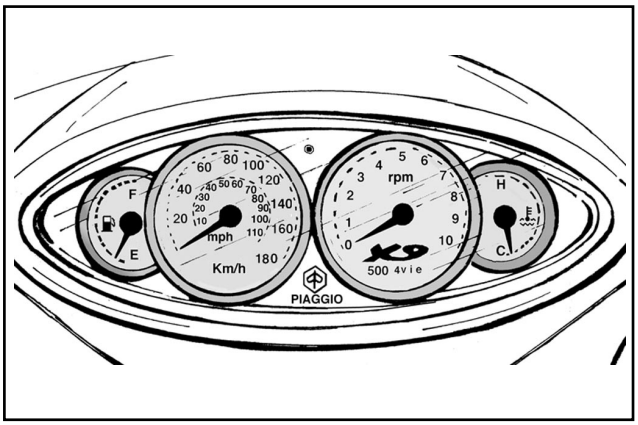
ITEM		STANDARD VALUE
Voltage regulator/rectifier	Type	Transistorized, non-adjustable, three-phase
	Voltage	14 - 15V at 5000 rpm with lights off

Instrument panel

The X9 is equipped with a dual instrument panel consisting of an analog section installed in the front fairing and a digital section mounted on the handlebars.
The analog section includes:

- A dual-scale (km/h-mph) speedometer controlled by the speed sensor by means of the digital section;
- A tachometer controlled by a signal coming from the power unit-injection;
- A fuel gauge controlled by a resistive sensor (in the fuel tank);
- A coolant temperature indicator controlled by a resistive sensor (on the cylinder head).

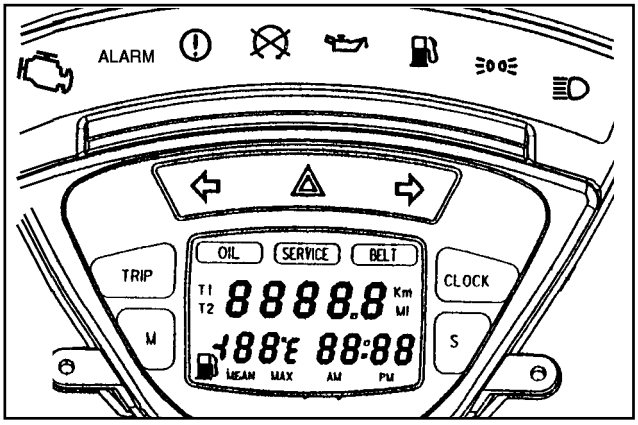
These instruments are of the electrical type, and are operated by step-by-step motors.



04_009

The digital section includes the following indicators:

- Reserve fuel warning light: amber.
- Lights-on and low beam warning light: green.
- High beam warning light: blue.
- Left-hand turn indicator warning light: green.
- Right-hand turn indicator warning light: green.
- Hazard warning lights (four turn indicators): red
- Engine disabled: red.
- Brake light bulb burnt-out warning light: red.
- Oil pressure warning light: red;
- Injection warning light: amber;
- ALARM warning light (electrohydraulic cable): red.



04_010

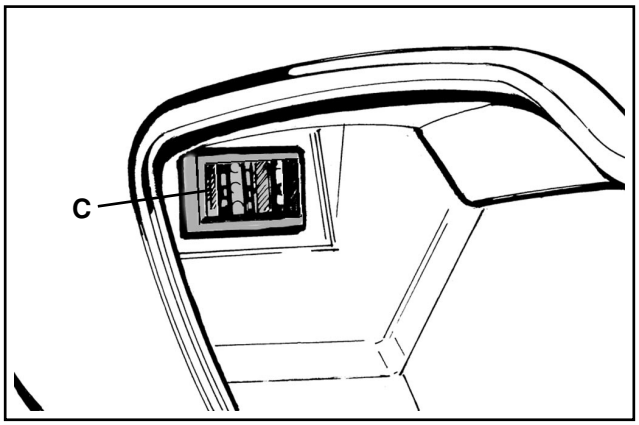
The reserve fuel, turn indicator and hazard warning lights are activated by the electronics of the instrument. For example, the fuel reserve warning light comes on only when the reserve fuel indication from the fuel tank lasts a minimum of 13.5 seconds. This prevents the warning light from blinking when the engine begins to run on reserve fuel.

- The flashing function is built in the electronics of the instrument, which allows the hazard warning lights to work when the ignition switch is in the “OFF” position and the control switch is disabled. The control switch is active only when the instrument panel is on.

For greater riding safety, the “turn indicator control” function is connected to the mileometer. If the turn indicators are inadvertently left on, they are automatically switched off after 1 kilometre.

- The “engine start disabled” warning light is activated by the sidestand switch and the emergency switch on the right side of the handlebar.
- The indication “brake light bulb burnt-out” is activated when at least two of the five bulbs fail to operate.
- The warning light is controlled by a circuit that measures the absorption of the brake light bulb.
- The liquid crystal display shows a 5-digit total mileage count in either kilometres or miles. Naturally, this counter can never be reset. **To select the unit, with key turned to “OFF”, press the “Trip” and “M” buttons at the same time and turn the ignition switch to the “ON” position. If the two buttons are depressed for longer than three seconds, the word “SET” is displayed and then the unit toggles between kilometres and miles.**

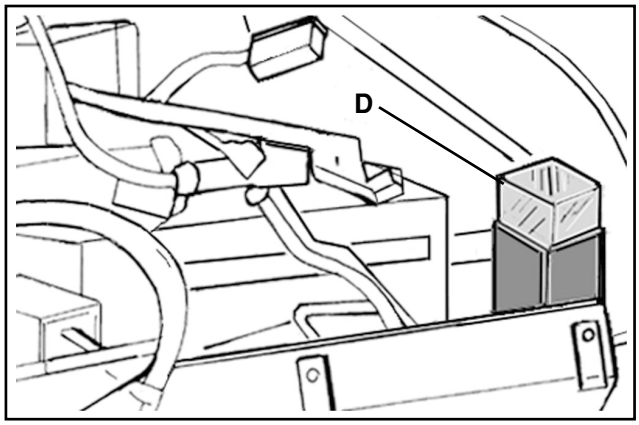
3 Four fuses «**C**» in the glove compartment, on the left side.



04_016

Fuse	Protected circuits
1 x 15 A	Flash, horn, accessories
1 x 7.5 A	Brake light buttons, start button, starter relay switch
1 x 7.5 A	Lights switch, parking lights, number-plate light
1 x 7.5 A	Digital instrument panel, PICS control unit power supply

4 One fuse «**D**» of 30A (main fuse) located next to the battery on the solenoid starter. A spare fuse is also provided underneath.



04_017

4

List of bulbs

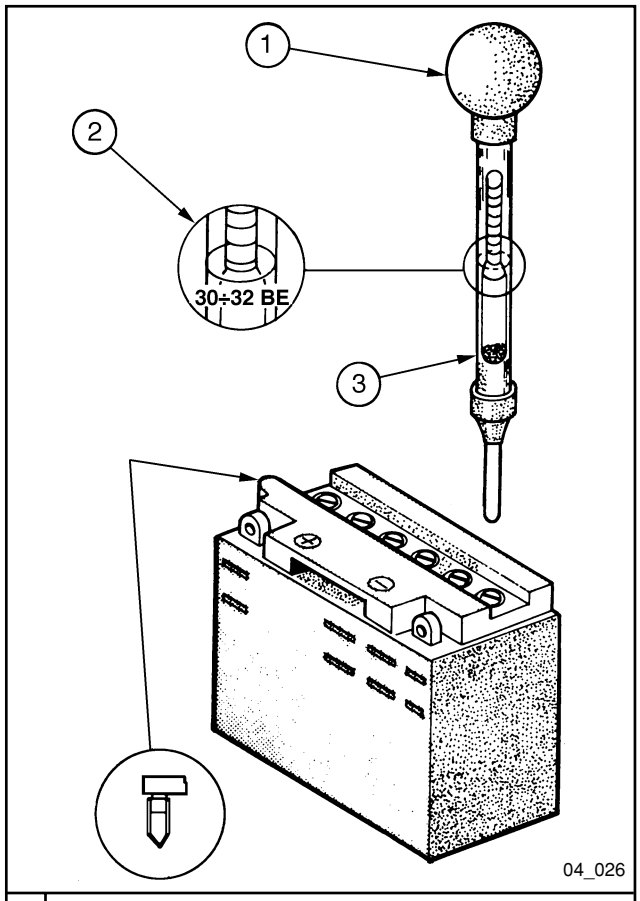
Function	Type	Power
Low beam bulb	halogen	12V-55W
High beam bulb	halogen	12V-55W
Front parking light bulb	all-glass	12V-5W x 2
Front turn indicator bulb	spherical	12V-10W x 2
Rear parking light bulb	spherical	12V-5W x 2
Brake light bulbs	spherical	12V-2.3W x 5
Rear turn indicator bulb	spherical	12V-10W x 2
Instrument panel lighting bulb	all-glass	12V-2W x 5
Glove compartment lamp bulb	cylindrical	12V-5W
Number-plate light bulb	cylindrical	12V-5W

Battery (12V - 14Ah)

Caution - The battery electrolyte causes severe burns as it contains sulphuric acid. Avoid contact with the eyes, the skin and clothing.
In case of contact with the eyes or the skin, rinse generously with water for about 15 minutes and immediately seek medical attention.
In case of ingestion, immediately drink large quantities of water or milk. Subsequently administer milk of magnesia, beaten eggs or vegetable oil. Immediately seek medical attention.
Batteries produce explosive gases. Keep them away from open flames, sparks and cigarettes. If the battery is charged in a closed place, ensure adequate ventilation.
Always protect the eyes when working close to batteries.
Keep out of reach of children.

Installing charged-dry batteries:

1) - Remove the short closed tube and the plugs. Fill the cells to the upper level with accumulator sulphuric acid, specific weight 1.26, corresponding to 30° Bé at a temperature of at least 15°C.
2) - Leave at rest for at least two hours and then restore the level by adding sulphuric acid.
3) - Recharge within 24 hours by means of the specific charger 020333Y (single station) or 020334Y (multiple station) with intensity equal to about 1/10 of the battery rated power, until the acid density reaches the value of about 1,27, corresponding to 31 Bé, and until such values have stabilized.
4) - When the charging is over, level off the acid (by adding **distilled water**), put the plugs back into place and clean thoroughly.
5) - Proceed to install the battery on the vehicle, taking care to observe the connections described at item 3) of the paragraph **Recharging the battery**.

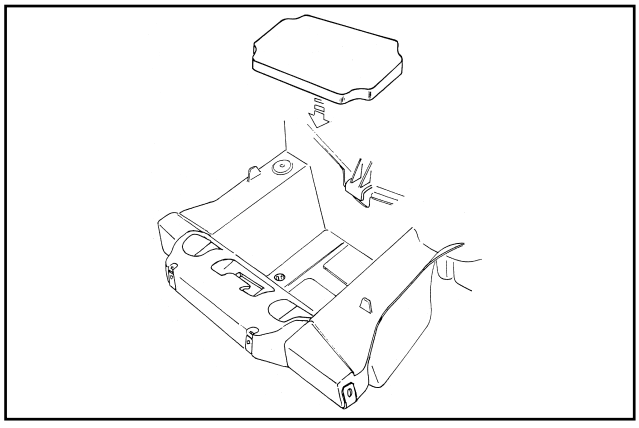


04_026

1	Hold tube upright
2	Check visually
3	Float must be disengaged

Removing and installing the battery

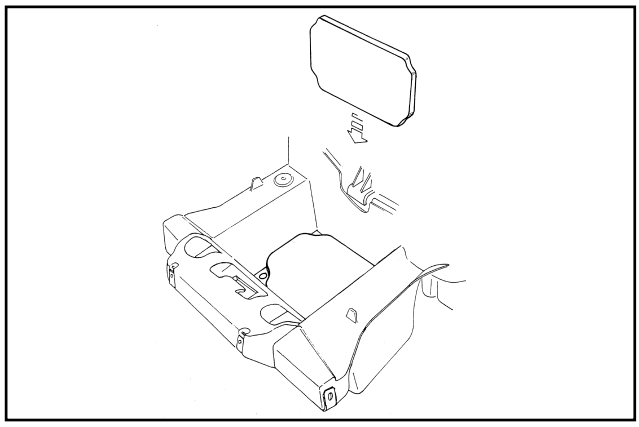
- Lift the saddle;
- Remove the rear optical unit and the covering element;
- Disconnect the battery by detaching the negative (-) cable first and then the positive (+) cable.
- Remove the battery strap and then the battery itself.
- To install the battery, follow these steps:



04_018

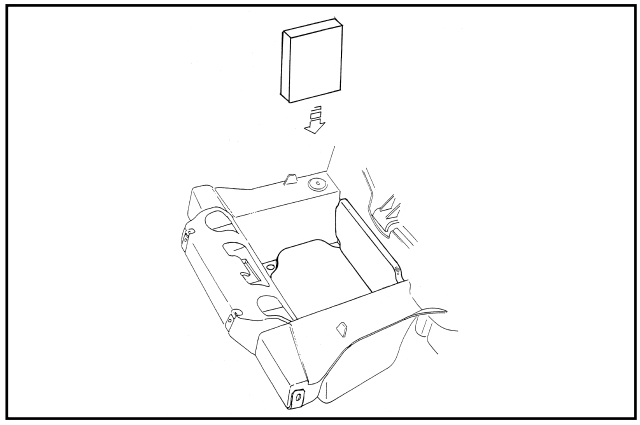
- Fit the lower support shown in the figure on the battery compartment bottom.

- Fit the front element.



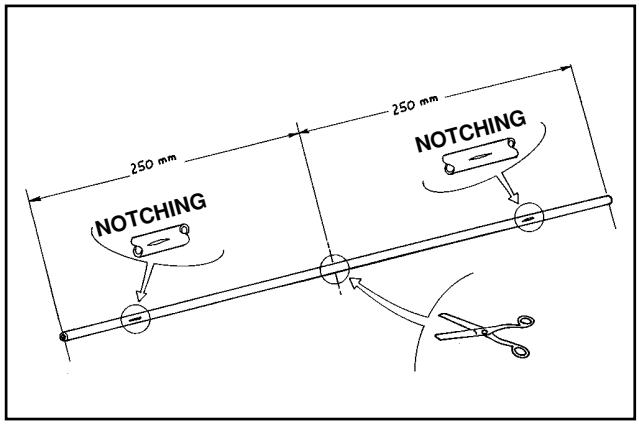
04_019

- At last, fit the left side element.



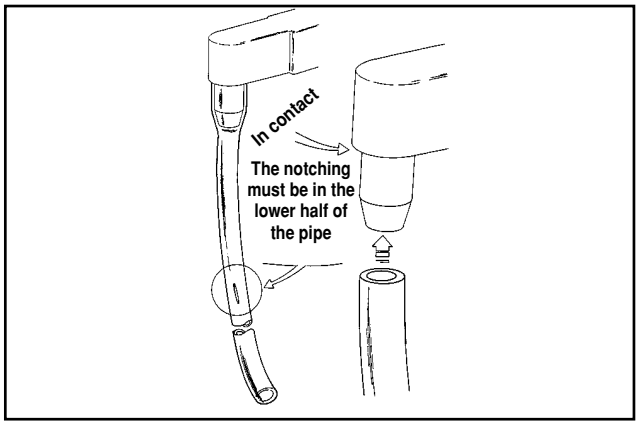
04_020

- Cut the breather pipe supplied as shown in the figure.



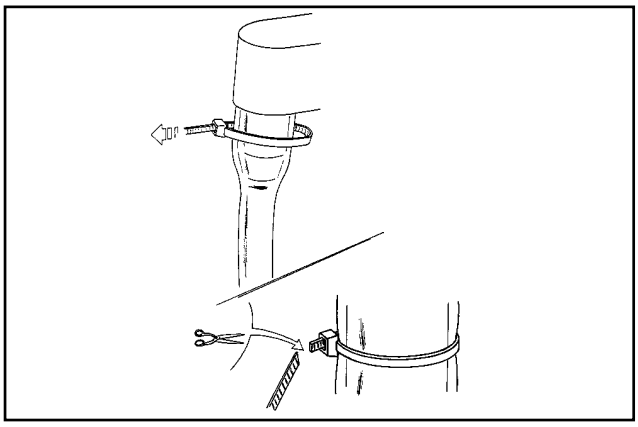
04_021

- Fit the pipe until it contacts the battery and in the direction shown in the figure.



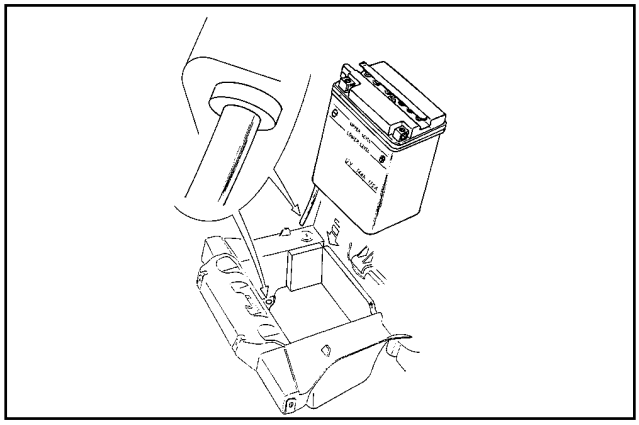
04_022

- Lock the pipe with a tear-clamp and cut the end that sticks out of the clamp.



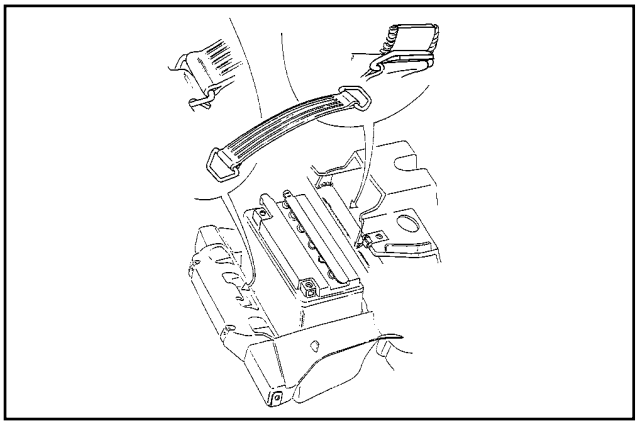
04_023

- Insert the battery in the compartment taking care to fit the breather pipe in the bottom hole.



04_024

- Insert the battery in the compartment taking care to fit the breather pipe in the bottom hole.



04_025

Checking the electrolyte level
Frequently check that the electrolyte reaches the upper level. To top up, only use distilled water.
If you need to top up the battery too frequently, check the vehicle electrical equipment as the battery is certainly working in overload conditions, which will lead to rapid deterioration.

Checking the battery charge
After restoring the electrolyte level, check its density with the special hydrometer (see figure).
When the battery is charged, electrolyte density must be between 30 and 32 Bé, corresponding to specific gravity of 1.26-1.28 at a temperature not lower than 15°C. If density has fallen below 20° Bé, the battery is completely discharged and needs recharging.

If the vehicle is not used for some time (1 month or more) the battery must be periodically recharged. In three months the battery runs down completely.
When refitting the battery take care not to invert the connections: the ground lead **(black)** is to be connected to the **negative (-)** terminal and the other lead **(red)** must be connected to the **positive (+)** terminal.

Battery recharge

Caution - Before charging the battery remove all cell plugs. Keep free flames or sparks away from the battery during recharge. When the battery has to be removed from the vehicle, disconnect the negative terminal first.

Charge the battery using the specific charger 020333Y (single station) or 020334 (multiple station), by putting the charger selector on the type of battery to be recharged (use current at 1/10 of the battery rated power). Connection to the power supply must be made by means of the corresponding poles (+ with + and – with -).

4) Cleaning the battery
Keep the battery clean, especially the top; coat the terminals with Vaseline.

Warning - Never use fuses having a greater capacity than the one recommended. The use of a fuse of unsuitable capacity may result in serious damage to the whole vehicle or even cause a fire.

Warning - Normal drinking water contains salts that are harmful for batteries. Use only distilled water.

Warning - To ensure maximum performance the battery must be charged before using the vehicle. Failure to properly charge the battery before starting the vehicle will cause the battery premature breakdown.

Sealed battery

Putting a sealed battery into service
If the vehicle is equipped with a sealed battery, servicing is limited to checking the charge level and, if necessary, recharging the battery.
These operations must be performed during predelivery, and every six months of open-circuit storage.
Therefore, in addition to checking and, if necessary, charging the battery before delivery, it is necessary to carry out these operations before storing the vehicle, and subsequently every six months.

RECHARGING THE BATTERY FOLLOWING OPEN-CIRCUIT STORAGE

1) Checking the voltage
Before installing the battery on the vehicle, measure the open-circuit voltage with an ordinary multimeter.
- If the voltage exceeds 12.60 V, the battery can be installed without recharging.
- If the voltage is less than 12.60 V, recharge the battery as described at item 2).

2) Constant-voltage charging method
- Constant voltage: 14.40-14.70 V
- Initial charging current: 0.3-0.5 x rating
- Charging time: Recommended 10-12 hrs
  Minimum 6 hrs
  Maximum 24 hrs

3) Constant-current charging method
- Initial charging current: 1/10 of rating
- Charging time: Maximum 5 hrs

Caution - When the battery is deeply discharged (far below 12.6V), 5 hours' recharging may not be enough to obtain optimum performance.
In these conditions, however, to avoid damaging the battery beyond repair, it is essential not to recharge it for more than 8 consecutive hours.

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Engine disassembly from frame

Caution - Perform these operation with the engine cold.

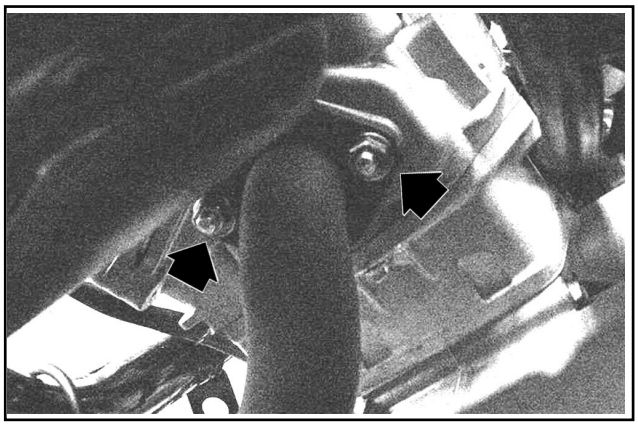
- Disconnect the battery.
- Remove the saddle, and the upper and lower body sides (Chapter 8 - Bodywork)
- Drain the coolant (Chapter 3 - Maintenance)
- Disassemble the muffler assembly and relevant support, as described below.
- Remove the rear wheel (Chapter 6 - Front/Rear Suspension)
- Remove the accelerator control transmissions and mark their position on the throttle body control.
- Disconnect the air filter sleeve and the engine oil values collecting pipe.
- Disconnect the earth cable from the engine.
- Disconnect the electrical devices from the throttle body, head, and starter feed cable.
- Detach the fuel delivery and return pipes to the injector and the coolant system pipes (head outlet and thermostat input)
- Close the injector Tee Joint with rubber plugs to prevent dirt from entering.
- Detach the H.V. cable from the spark plug.
- Detach the generator harness from the vehicle electrical system.

Caution - Take care when handling the petrol.

Warning - When installing the battery, first fix the positive cable and then the negative cable.

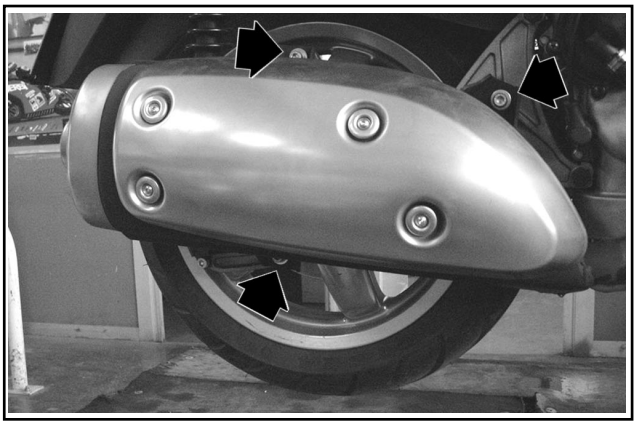
Muffler assembly disassembly

- Unloose the two fixings of the exhaust manifold on the head.



05_001

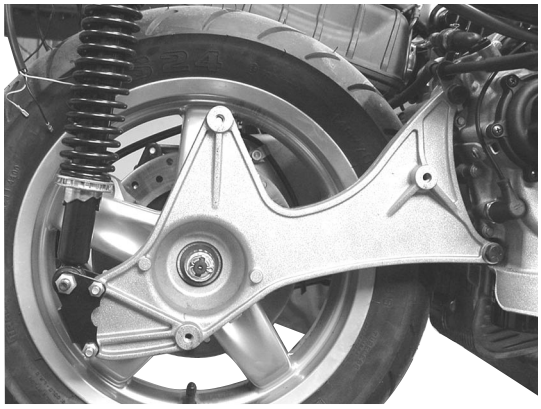
- Unloose the 3 screws fixing the muffler to the supporting arm.
- Remove the muffler assembly.



05_002

Supporting arm disassembly

- Unscrew and remove the r.h. shock absorber to supporting arm lower fixing bolt
- Unloose the arm to engine 2 fixing screws.
- Remove the split pin and unscrew the wheel axle nut; avoid the wheel turning by means of the integral brake.
- Remove the supporting arm.

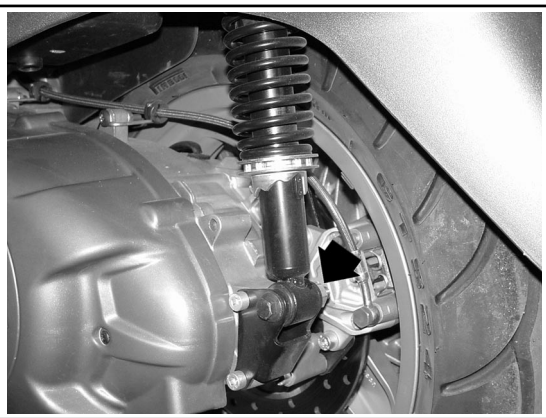


05_003

Disassembly of l.h. shock absorber lower pin

- Remove the bolt shown in the figure.

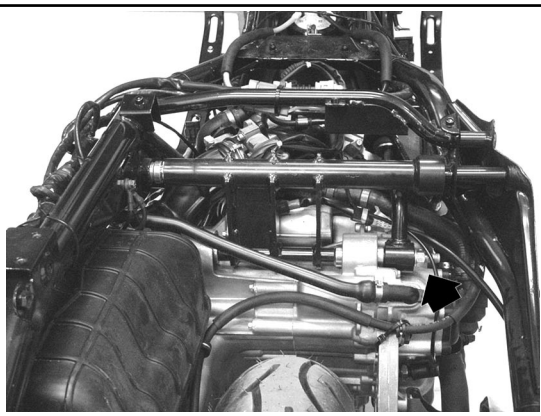
N.B.: To be able to remove the shock absorber support, remove the two nuts on the brake caliper side and the screws.



05_004

Engine pin/swing arm disassembly

- Adequately support the engine.
- Remove the nut shown in the figure.
- Remove the pin.
- Now the engine is free.



05_005

Engine assembly to vehicle

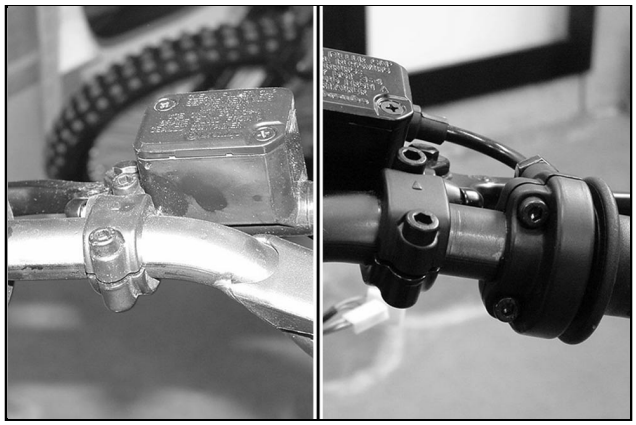
- Perform the assembly in the reverse order observing the tightening torques indicated in Chapter 1.

Warning - Take care not to invert the position of the two accelerator control transmissions. Check that both show a slight play with the valve in contact with the register.

N.B.: Carefully clean the injector Tee Joint before reassembling the quick-connections. Direct the injector in such a way as to avoid any interferences of the electrical cables with the coolant and fuel pipes.

- Check the engine oil level, top up if necessary with oil of the recommended type.
- Fill the cooling system (Chapter 11-Cooling).
- Check the accelerator and electrical devices function.

Handlebar
Removal
- Begin by removing the radio-interphone and then disconnect the feeder cable.
- Remove the digital panel support and the front and rear sections of the handlebar cover as described in Chapter 8-Bodywork.
- Disengage the handlebar from the components installed on it.
- Remove the two counterpoises after loosening the side screws.
- Remove the pumps after loosening the screws on the clevises shown in the figure.
- Slide the throttle control off the handlebar after loosening the fixing screws.
- Remove the left handgrip.
- Loosen the bolt fastening the handlebar to the steering tube shown in the figure and then remove it. Remove the handlebar and the plastic support.



06_001

Note: If the handlebar is removed to proceed to the removal of the front fork, simply overturn the handlebar onto the front of the vehicle without removing the parts fitted on it. Take care not to damage the flexible transmissions, the pipes or the bodywork.

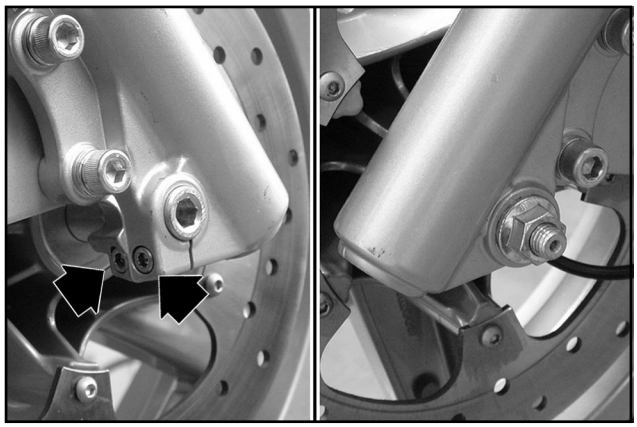
Fitting
Perform the removing procedure in reverse order. To align the handlebar with the steering tube, align the notch on the handlebar with the notch on the sterring tube. Tighten the fasteners with the torques specified in Chapter 1.
Tightening torques:
Handlebar fastening bolt: 43 - 47 N·m

06_002

Removing the front wheel

- Remove the two brake calipers as described in Chapter 7-Braking system.
- Unscrew the axle locknut.
- Disengage the axle by loosening the two screws on the right-hand fork sheath (see figure).
- While supporting the wheel, remove the axle on the right side of the vehicle.

Caution - When removing the wheel, take care not to damage the speed sensor.



06_003

Overhauling the front wheel

Check the bearings for any excessive play or stickiness causing noise and uneven rotation of the wheel.

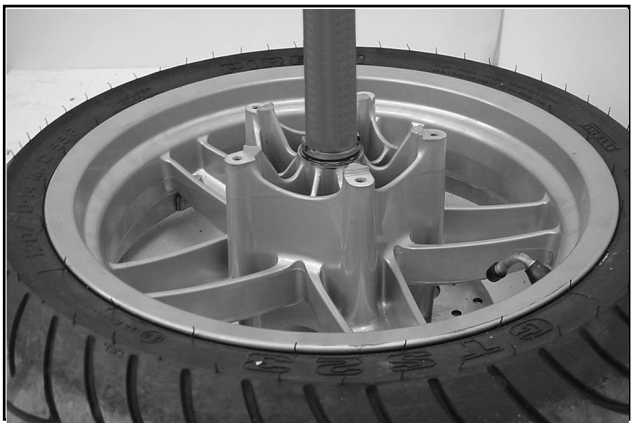
Should the wheel bearings need to be replaced, follow these steps:
- Using a suitable extractor on the inner race, remove the two bearings on the left side of the wheel (speed sensor side).

06_004

- Support the wheel to allow the removal of the internal parts.
- Using a mallet and a drift of suitable diameter, simultaneously drive out the inner spacer, the right-hand bearing and the outer spacer complete with the dust ring on the same side.

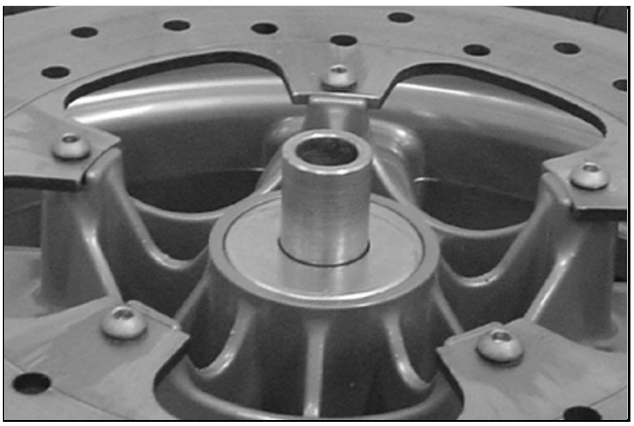
06_005

- Refit the two bearings on the left side of the wheel rim.
- Using a tube of suitable diameter on the outer race of the bearings, push them home into their seats.
- Fit the spacer in the right side of the wheel as shown in the figure.
- Fit the right-hand bearing by following the same procedure as the other bearings.



06_006

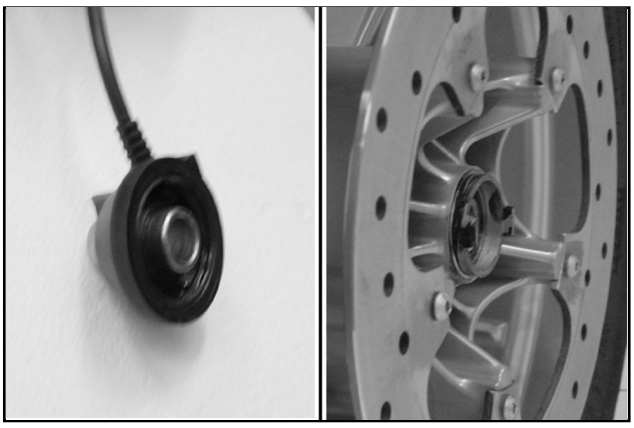
- Refit the two front brake discs as described in Chapter 7-Braking system.
- Fit the outer spacer and the related ring taking care not to compress it excessively against the wheel bearing.



06_007

- Check the condition of the speed sensor seal ring and of the related groove in the wheel rim.
- Insert the pin from the r.h. side by aligning the spacers.
- Take care not to damage the phonic wheel.
- Offset the drives beforehand by about 90°.
- Tighten the wheel axle nut.
- Tighten the two screws of the clamp on the pin housing, on the r.h. sheath.

Tightening torques:
Axle nut: 45 - 50 N·m
Right-hand sheath lower screws: 6 - 7 N·m



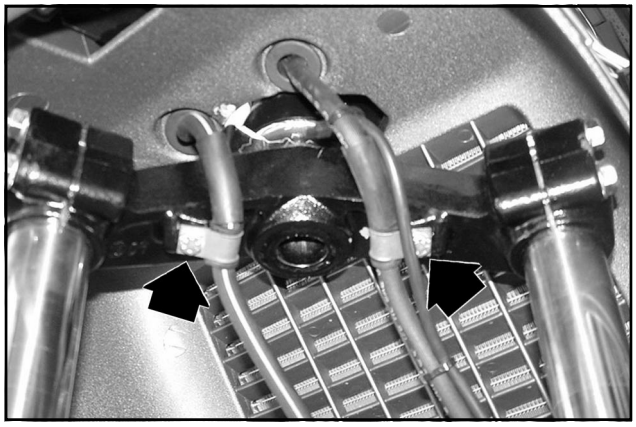
06_008

Removing the front fork

- Remove the mudguard as described in Chapter 8-Bodywork.

- Remove the handlebar and the front wheel as previously described.
- Loosen the two screws fastening the brake line supports (see figure).

Note: It is also possible to remove one of the two fork rods after loosening the two related screws on the fork upper plate.



06_009

- Remove the two rings, the middle washer shown in the figure and the spacer below.

Caution - Adequately support the vehicle so as to allow the steering tube to come out of the head tube.

Warning - Before unscrewing both rings, support the fork assembly so as to prevent it from falling.

- Pull out the fork assembly.

Specific tool:
Steering tube ring spanner: 020055Y

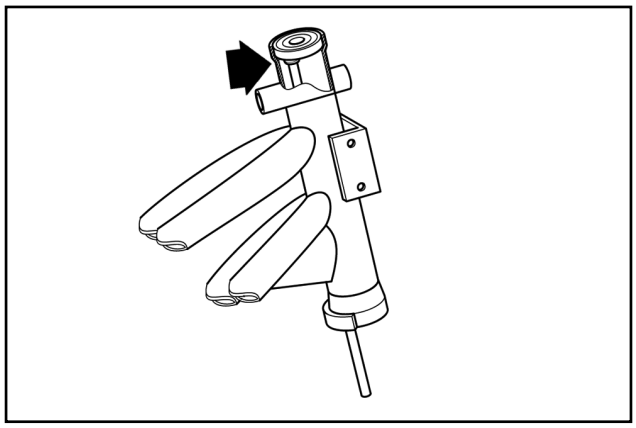
06_010

Replacing the steering bearings

- Using the specially designed tool shown in the figure and a mallet, remove the upper ball bearing.

N.B.:Act at different times between the two points at 180°. Failure to observe this instruction may damage the housing.

Specific tool:
Steering thrust ring removing drift: 020004Y

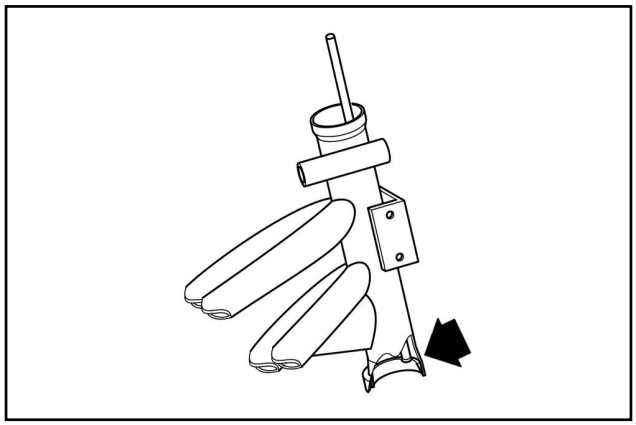


06_011

- Use the same method to extract the seat of the lower roller bearing.

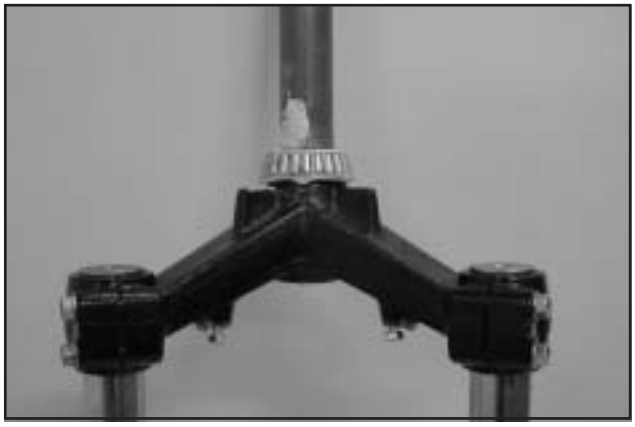
N.B.: Act at different times between the two points at 180°. Failure to observe this instruction may damage the housing.

Specific tool:
Steering thrust ring removing drift: 020004Y



06_012

- Remove the lower roller bearing and the dust cover ring from the fork by means of the specific tool.
- Use the larger half ring pair and the shorter steering tube protection.



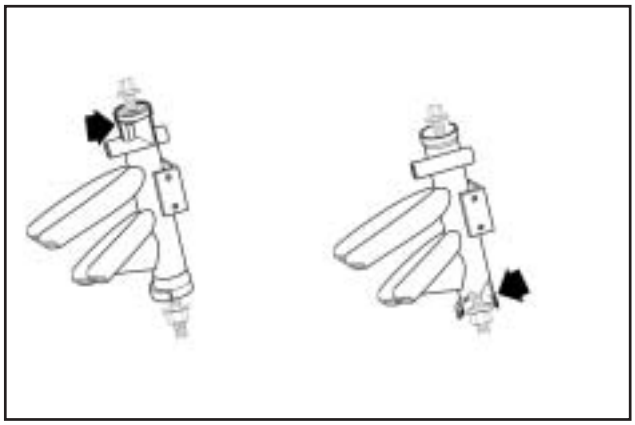
06_013

Specific tool:
Steering tube lower bearing extractor: 020458Y

Fitting the steering bearing
- Check the condition of the bearing races and rollers.
- Fit the upper bearing and the lower bearing housing by inserting the specific tool in the steering sleeve, provided with 2 adapters.
- Fit the dust cover ring and the roller bearing on the steering tube by means of a piece of tube having a suitable diameter, and by resting against the inner race of the roller bearing.

Specific tool:

Steering seats assembly tool:	**001330Y**
Upper bearing adapter:	**001330Y010**
Lower bearing adapater:	**001330Y009**



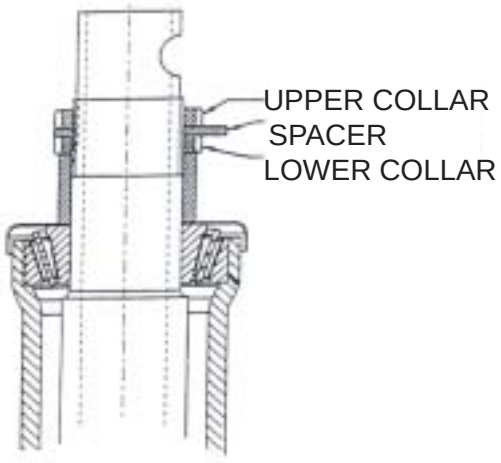
06_014

- Lubricate the steering bearing housing with grease of the TUTELA Z2 type.
- Fit the steering tube into the sleeve.
- Tighten the lower collar with a torque of 20-25 Nm (2-2.5 Kgm) and then loosen it completely.
- Tighten it again with a torque of 10-13 Nm (1-1.3 Kgm), then loosen it by 90 degrees.
- Insert the spacer.
- Lock the upper collar with a torque of 30-36Nm (3-3.6 Kgm).

Specific tool:
Wrench for Steering Tube Collar - 020055Y

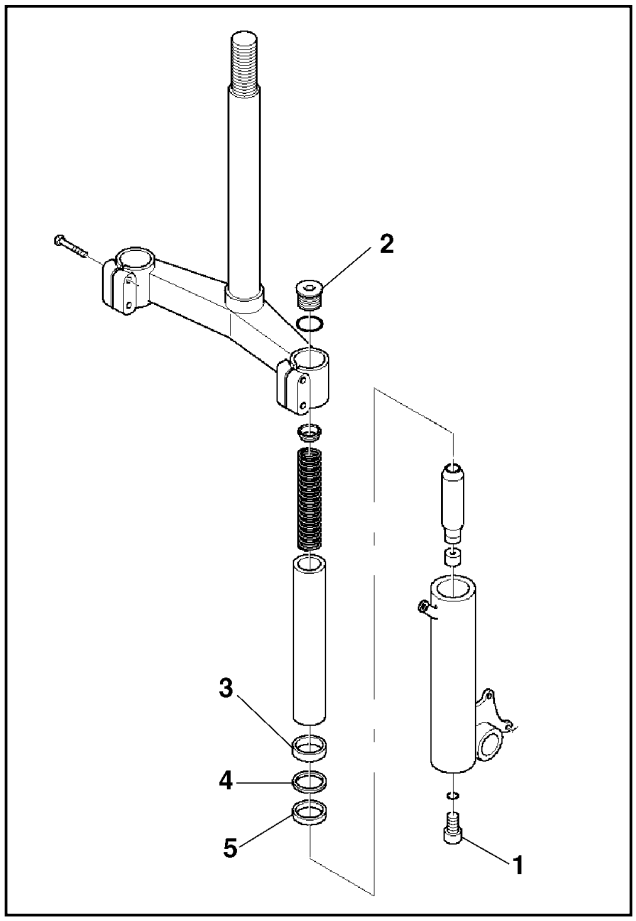
N.B.
This procedure is also valid for the previous versions with upper ball bearing.

06_010



Replacing the seal ring and removing the fork rod

- Remove lower screw (1).
- Drain the oil from the suspension.
- Remove the fork rod.
- Replace seal rings (3), (4) and (5) with new ones.
- Fit the new rings after lubricating their seats.
- Reinsert the fork rod;
- Unscrew plug (2);
- Fit from the top a suitable wrench of 12mm in order to block the pumping element. Refit the lower screw (1).
- Pour in 90 cc of "**Fork PG**" SAE 20W oil;
- Reassemble by following the reverse procedure.

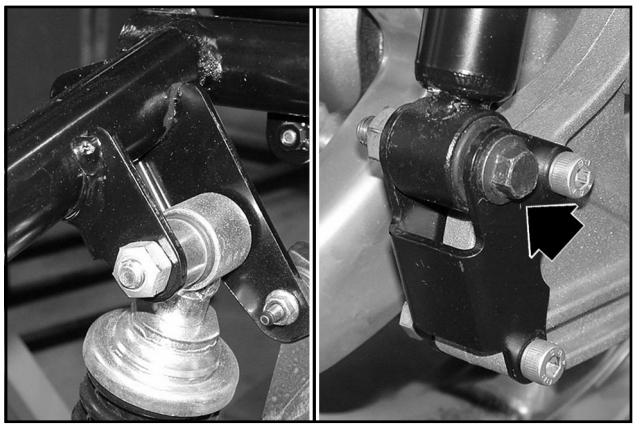


06_015

Rear shock absorbers

Removal

Follow these steps:
- Put the vehicle on the central stand.
- Using a jack, slightly lift the engine so as to free both shock absorbers.
- Remove the silencer.
- Unloose the shock absorber spring assembly fixing screw from the support fixed to the engine, on one side, and from the one fixed to the muffler support, on the other side;
- Unscrew the two upper nuts (one on each side) fixing the shock absorber spring assemblies to the frame and then remove the assemblies themselves.



06_016

Fitting

Perform the removing procedure in reverse order taking care to observe the prescribed tightening torques.

Tightening torques:
Shock absorbers lower fixing screw: 33 - 41 N·m
Shock absorbers upper fixing screw: 33 - 41 N·m

Rear wheel

Removal

- Remove the shock absorber as previously described.
- Remove the silencer and the bracket as described in Chapter 5-Engine.
- Remove the 5 screws fixing the rear wheel to the hub.
- Take down the wheel.

06_017

Fitting

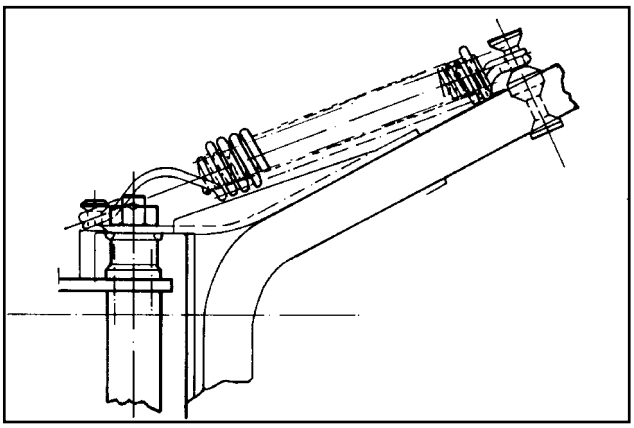
Fit the wheel using the reverse procedure to the removal. Tighten the rear wheel fixing screws and the axle locknut with the prescribed torques.

Tightening torque:
Rear wheel rim screws: 20 - 25 N·m

Central stand (Basic model)

Removal

- Release the springs.
- Unloose the r.h. and l.h. nut.
- Remove the screws.

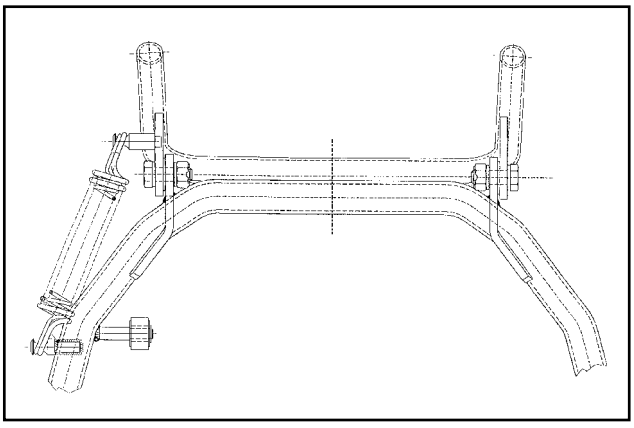


06_018

Fitting

Perform the above procedure in reverse order and then move the seal rings into their seats.

Warning - Lubricate the following parts with TUTELA Z2 grease: spring connection pins, bushes on stand clamps.



06_019

Tightening torques:
Central stand bolt: 25 - 30 N·m

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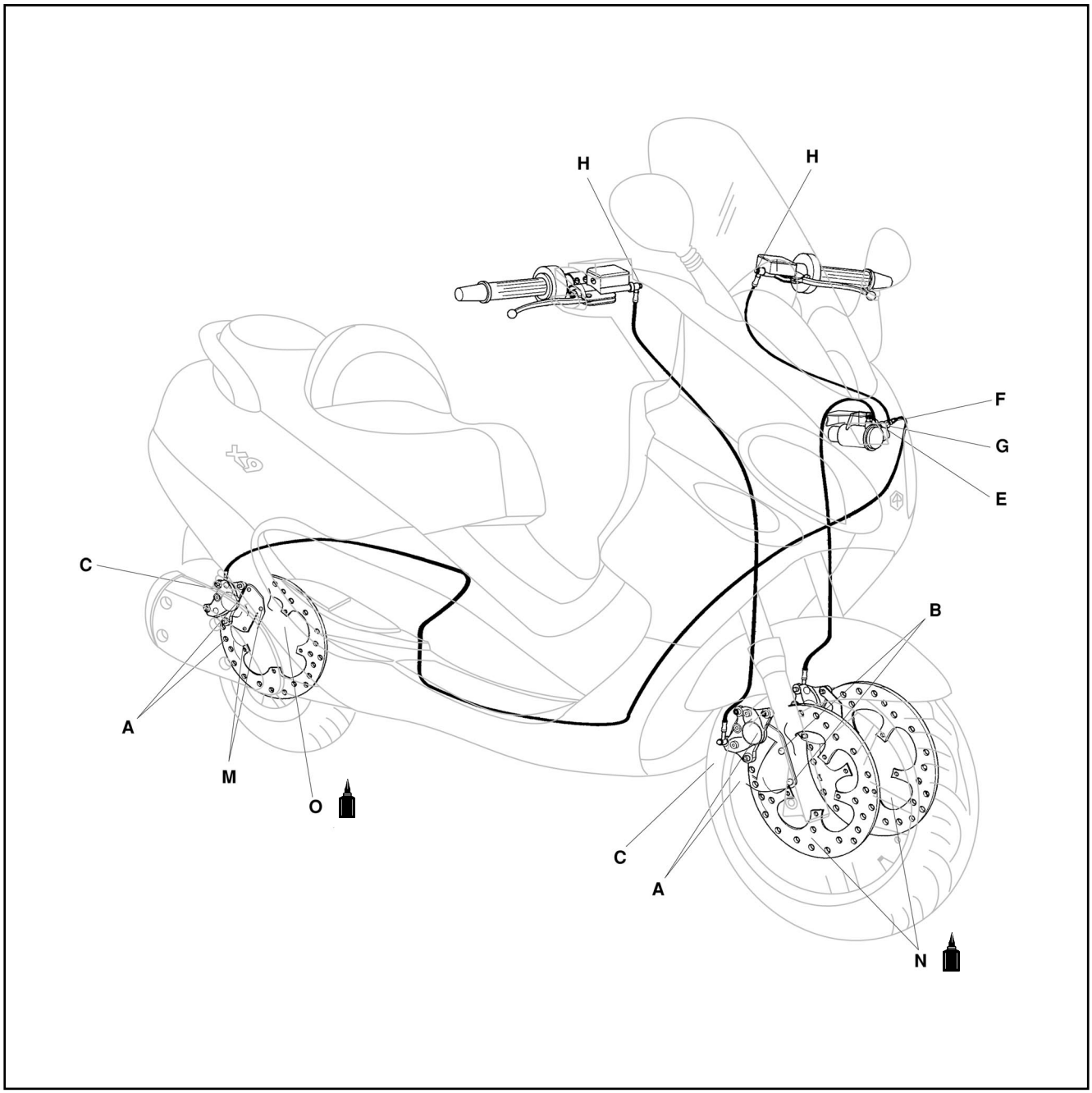


LUBRICATE WITH OIL

APPLY PRODUCT

WARNING - HANDLE WITH CARE

LUBRICATE WITH GREASE

CLEAN CAREFULLY

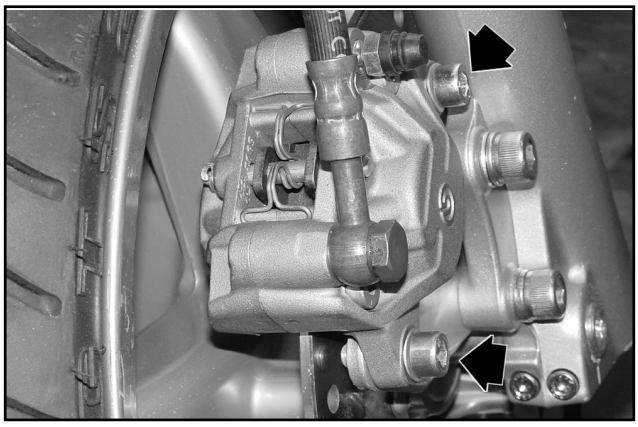
ALWAYS REPLACE

CALLOUT	A	B	C	D	E	F	G	H	I	L	M	N	O			
QUANTITY	6	4	3		1	1	1	2			2	10	5			
TORQUE N·m	20-25	42-62	15-20		20-25	20-25	16-20	16-20			20-25	5-6,5	14-17			

Checking and replacing the brake pads

Removing the front brake pads:
Follow these steps:
- Loosen the two screws shown in the figure and disengage the calipers from their supports.
- Remove the retaining ring and the pin. During the operation pay special attention to the pin retaining spring as it may spring off abruptly.
- Remove the two pads by pulling them downwards.
- Check the thickness of the pads.

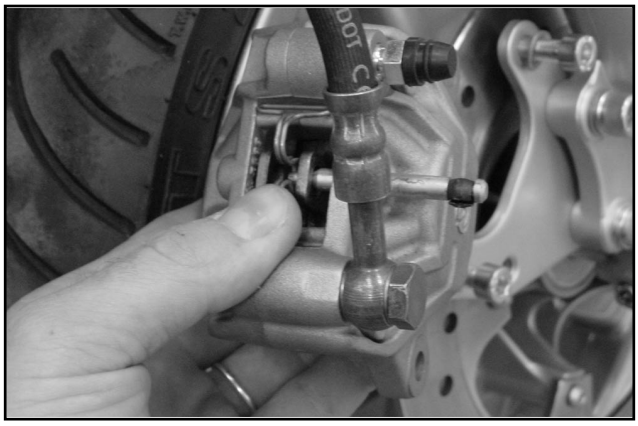
Wear limit: 1.5 mm
- Repeat the operations on the brake caliper on the opposite side.



07_001

To fit the pads, follow these steps:
- Insert the two pads into the caliper.
- Fit the pin retaining spring.
- Press down the spring to allow the insertion of the pin (see figure).
- Insert the pin.
- Fit the retainer.
- Fit the caliper on its support and then tighten the two screws with the prescribed torque.

Tightening torques:
Screws fixing caliper to support: 20 - 25 N·m
N.B.: If during the assembly it is not possible to fit the caliper on the disc, refit the pistons in the caliper carefully.

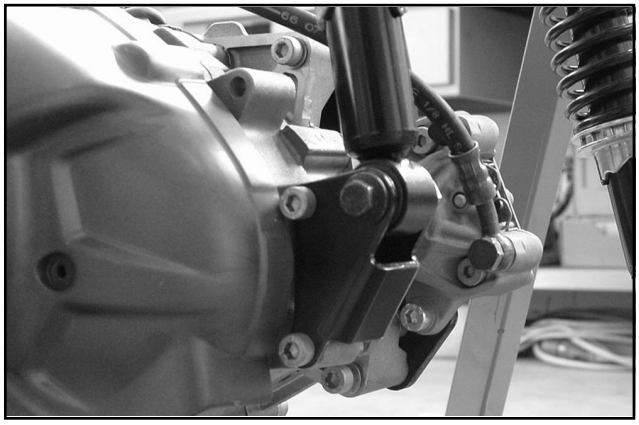


07_002

Removing and replacing the rear brake pads

Follow these steps:

- Remove the left-hand rear shock absorber support with the shock absorber itself and the rear wheel as described in Chapter 6-Front and rear suspensions.
- Unloose the two screws fixing the brake caliper support to the engine.
- Remove the caliper from its support.
- Remove the retaining ring and the pin.
- Remove the two pads by pulling them downwards.
- Check the thickness of the pads.
  Wear limit: 1.5 mm
- If the thickness of the pads is less than the prescribed limit, replace them.
- Refit the parts by following the same procedure used for the front brake pads.
- Tighten the two screws fixing the caliper support to the engine with the prescribed torque.



07_003

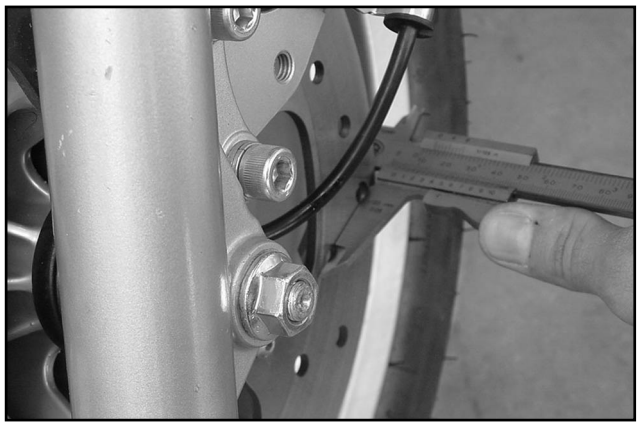
Tightening torques:
Screws fixing caliper to support: 20 - 25 N·m
Screws fixing caliper support to engine: 20 - 25 N·m

Brake discs

Checking disc thickness

It is important to check the brake discs. The discs should always be perfectly clean and free from rust, grease and dirt and shown no deep scoring.

Thickness of front discs when new ..... 4.0 mm
Thickness of rear disc when new ..... 5.0 mm
Wear limit (front discs) ..... 3.5 mm
Wear limit (rear) ..... 4.5 mm

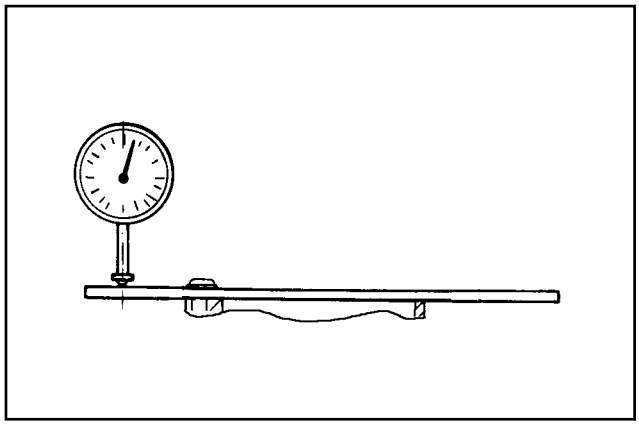


07_004

Checking disc distortion

Take down the wheel and, using suitable equipment, check that the axial runout of the braking surface does not exceed the specified limit.
Max. axial runout: 0.1 mm
If the runout exceeds the specified limit, replace the disc as described below and repeat the measurement.
If the problem persists, check and if necessary replace the wheel hub.

Note: When refitting, thoroughly clean the disc and its seat on the hub.

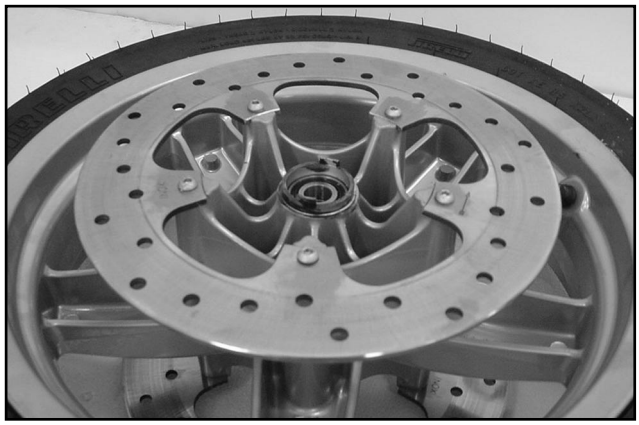


07_005

Replacing the front brake discs

Follow these steps:
- Remove the front wheel as described in Chapter 6- Front and rear suspensions.
- For each disc, loosen the five screws shown.
- Carefully clean the seats on the front wheel hub and the discs.
- When fitting the disc, take care to position it properly by referring to the arrow stamped on it.
- Tighten the screws with the prescribed torque and smear them with LOCTITE Threadlocker medium 242.

Note: The disc side bearing the arrow indicating the direction of rotation must face the outside of the vehicle.
Tightening torques:
Brake disc fixing screws: 5 - 6 N·m



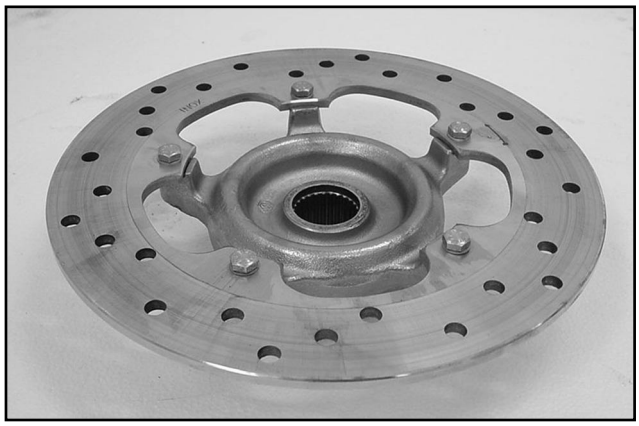
07_006

Replacing the rear brake disc

- Remove the rear wheel as described in Chapter 6- Front and rear suspensions.
- Remove the hub with the brake disc.
- Follow the same procedure used for the front brake discs.

Note: The disc side bearing the arrow indicating the direction of rotation must face the outside of the vehicle.

Tightening torques:
Brake disc fixing screw: 14 - 17 N·m



07_007

General guidelines for servicing the hydraulic braking system

Caution - The brake fluid is corrosive. Always wear protective gloves when working on the hydraulic system. In case of contact with the eyes, rinse generously with water.

The used brake fluid is harmful to the environment. Collect and dispose of used oil according to the regulations in force.

Note: When topping up or renewing the brake fluid, only use DOT4 - NHTSA 116 fluid.
Always ensure that all parts are perfectly clean.
The brake fluid is highly corrosive. Take care not to spill it on painted surfaces.

The brake fluid is hygroscopic, i.e. it absorbs humidity from the air. If the humidity contained in the fluid exceeds a given concentration, the braking action becomes insufficient owing to a reduction in the boiling point of the liquid.

Note: Always take the brake fluid from sealed containers.

Under normal climatic and riding conditions the brake fluid should be renewed every two years. However, if the brakes are subjected to heavy stress the fluid should be renewed at shorter intervals.

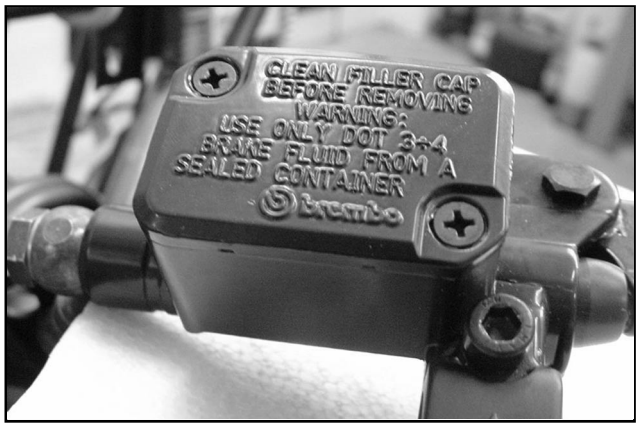
When reassembling, reused parts should be perfectly clean and free from oil, diesel fuel and grease. It is therefore necessary to thoroughly clean them with denatured alcohol. Braking system.

Note: Rubber parts must not be left immersed in alcohol for longer than 20 seconds. After the washing, dry the parts with a compressed air jet and wipe them with a clean cloth.
Seal rings must be immersed in the liquid of use. The use of the PRF1 protective agent is permitted.

Caution - The braking action is decreased if brake fluid is present on the brake discs or pads. Should the discs and the pads become contaminated with brake fluid, replace the pads and clean the disc with a good-quality solvent.

Renewing the brake fluid and bleeding air from the brake circuit
Front brake

Follow these steps:
1) Put the vehicle on the stand on level ground.
2) Remove the brake fluid pump reservoir cap as described in Chapter 8-Bodywork.
3) Remove the two screws shown in the figure and open the front brake fluid reservoir.
4) Using the bleeder screw on the brake caliper, empty the brake circuit through a pipe of suitable diameter.
5) Collect the used fluid in a suitable container.
6) Operate the brake pump until all the fluid has come out.
7) Close the bleeder valve.
8) Fill the circuit reservoir to the maximum level with fluid of the prescribed type.
9) Attach the pipe of the specific tool (Mityvac-type manual pump) to the bleeding connection.
10) While acting on the bleeder with the specific tool, constantly pour fresh fluid into the reservoir so as to avoid sucking in air. Stop pumping as soon as the fluid flows out of the bleeder with no air bubbles.
11) Tighten the bleeder screw with the prescribed torque.



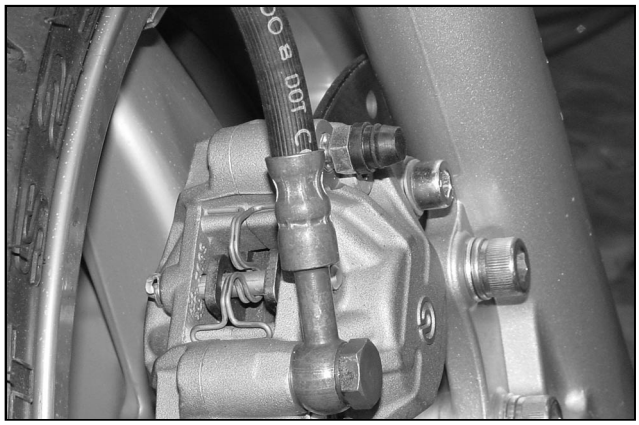
07_008

Tightening torque:
Drain screw: 12 - 16 N·m

Note: If air keeps coming out during the bleeding, check all connections. If these are tight, check the different pump seals and the caliper pistons.

During the operation oil may trickle from the bleeder screw onto the caliper and the disc. In that case, carefully dry the caliper and degrease the disc.

Specific tool:
Vacuum pump MITIVAC type: 020329Y



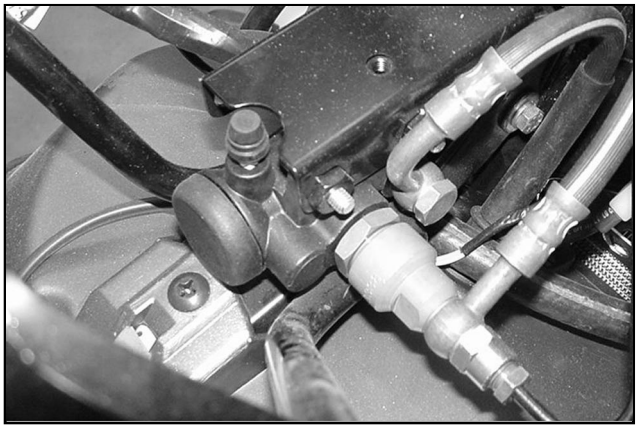
07_009

Combined brake

A control system allows the left brake lever to simultaneously operate the left-hand front caliper and the rear caliper.
To empty the circuit, follow the procedure given for the right-hand front brake, using the bleeder of both brake calipers, front and rear.

To bleed the system, follow these steps:

1) Attach the specific Mityvac tool to the bleeder fitted on the pressure divider valve shown in the figure.
2) Fill the left brake fluid reservoir to the maximum level.
3) Slowly operate the left brake lever while pouring fresh fluid into the reservoir until all the air has come out, thus obtaining the bleeding of the first section of the combined brake line. Tighten the bleeder valve with the prescribed torque.
4) Proceed to bleed each caliper - the front caliper first and then the rear caliper - following the same procedure used for the front brake.



07_010

Specific tool:
Vacuum pump MITIVAC type: 020329Y

Tightening torque:
Oil drain screw: 12 - 16 N·m

Removing the brake calipers

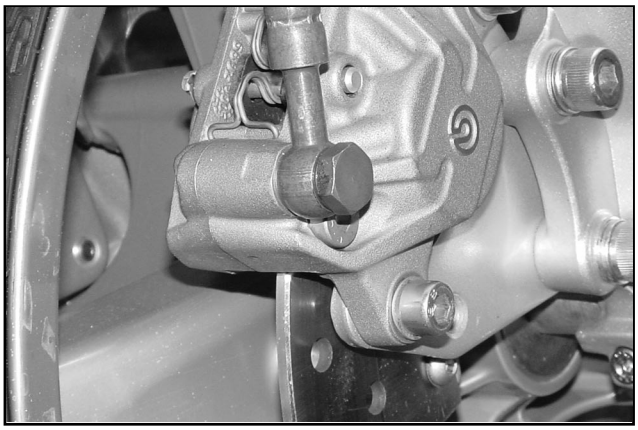
Check the condition of the brake lines, the gaskets and the related connections. Should any fluid leak onto the calipers, replace them by following these steps:

- Empty the circuit as previously described for the brake fluid renewal.
- Remove the caliper pipe connection shown in the figure.
- Collect any fluid residues left in the pipe.
- Remove the two screws fixing the caliper to the support.
- Remove the caliper.
- Remove the brake pads from the caliper as previously described.
- Replace the caliper with a new one and then follow the reverse procedure to the removal.

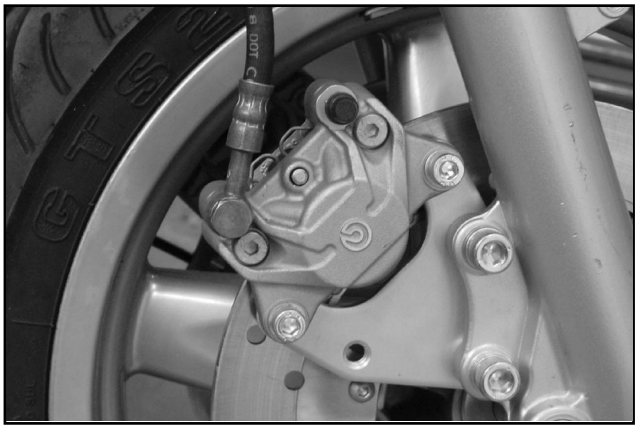
Note: Fit new copper gaskets on the connection.

- Tighten the two fixing screws with the prescribed torque.
- Complete the operation by filling and bleeding the circuit.
- Use the same procedure for the three calipers, the only difference being that the rear brake caliper must be removed from the vehicle together with its support. This is obtained by loosening the two screws shown in the figure after removing the rear wheel as described in Chapter 6-Front and rear suspensions.

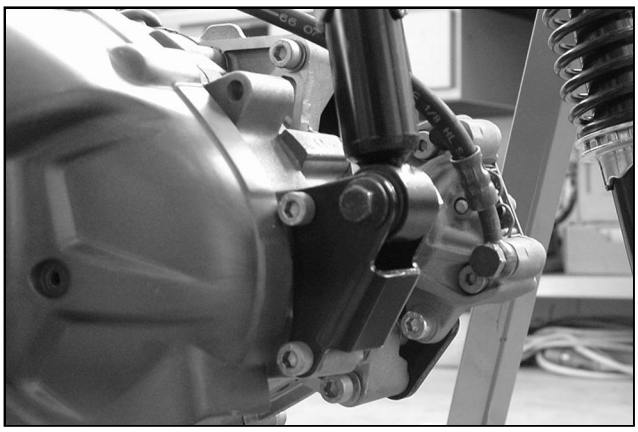
Tightening torque:
Screws fixing caliper to support: 20 - 25 N·m



07_011



07_012

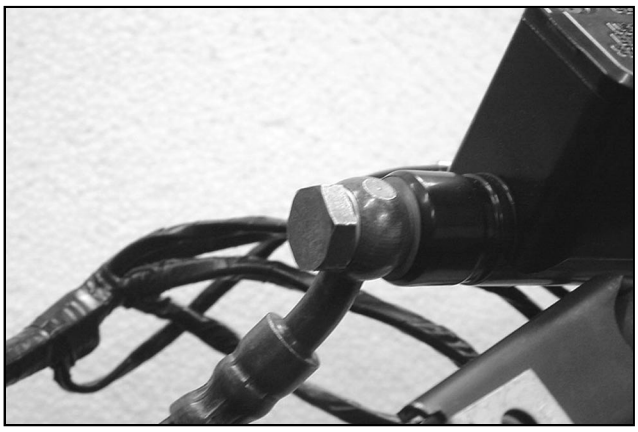


07_013

Removing the brake pumps

To remove and replace the brake pumps, follow these steps:

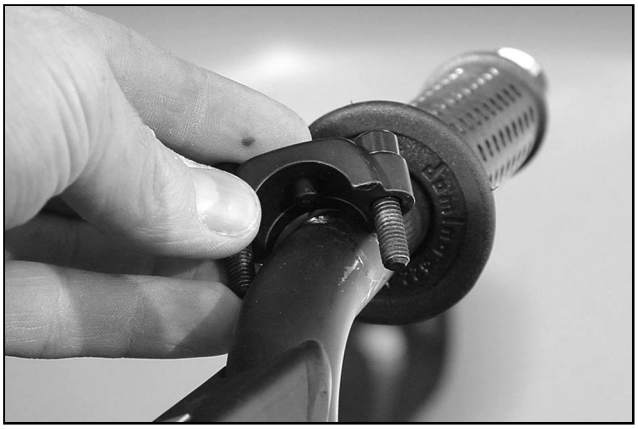
- Empty the related braking circuit as described in the previous paragraphs.
- Remove the connection shown in the figure taking care to prevent any fluid residues from coming out.
- Remove the two screws fastening the clevis to the handlebar.
- Replace the broken pump.
- Reassemble taking care to replace the copper gaskets. Fasten the connection and tighten the two screws fixing the pump to the handlebar.



07_014

Note: Take care to properly insert the specially designed projection on the pump clevis in the related hole in the handlebar (see figure).

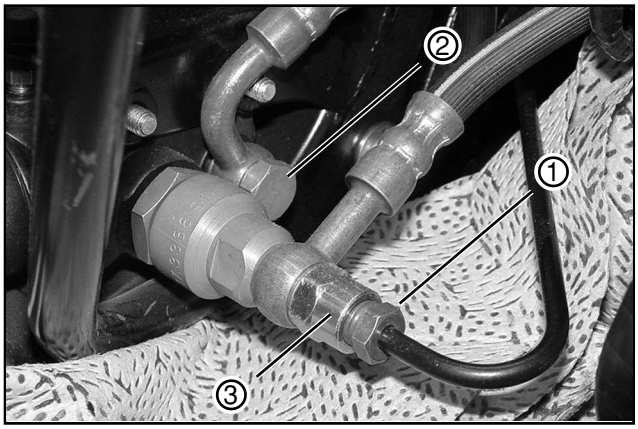
- Complete the overhaul by filling and bleeding the circuit.
- The removing procedure is the same for both brake pumps (see figure).



07_015

Replacing the pressure divider valve
Removal
Should the braking action between the front left and rear calipers by unevenly distributed (e.g. with the same surface and adhesive force on both wheels the rear brake jams while the front brake is not applied or vice versa, or the brakes work in a completely different manner, or the divider valve does not work properly), follow these steps:

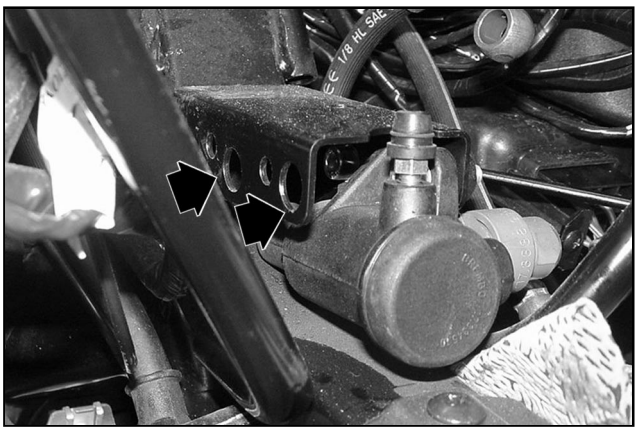
- Empty the combined brake circuit as previously described.
- Remove the front countershield as described in Chapter 8-Bodywork.
- Unscrew rear caliper connection 1 (see figure).



07_016

Note: Place a rag under the divider valve to prevent brake fluid from soiling the brake pads or other components.

- Remove front brake caliper connection 2.
- Remove connection 3, conveying the fluid from the pump to the valve.
- Remove the two cheese-headed socket screws fixing the valve to the frame in the two holes shown in the figure.
- Remove the valve and replace it with a new one.



07_017

Fitting

Follow the reverse procedure to the removal.

Note: Fit new copper gaskets on the connections.

- Tighten the screws fixing the valve to the frame and, above all, the connections on the brake lines with the prescribed torque.
- Fill and bleed the brake circuit as previously described.

Tightening torques:
Oil pump - Integral braking device tube connection: 16 - 20 N·m
Front brake caliper - Integral braking device connection: 20 - 25 N·m
Rear brake caliper - Integral braking device connection: 20 - 25 N·m

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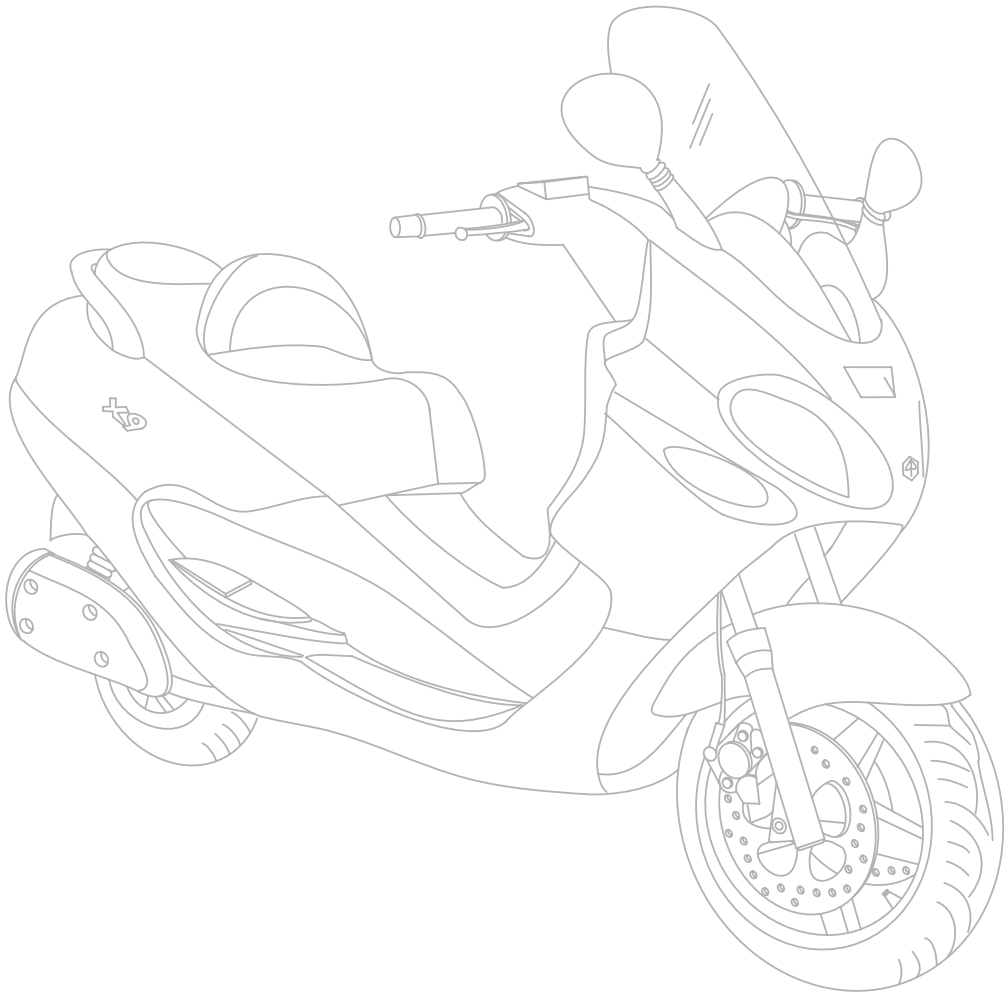


: Perform all operations with great care. Plastics are easily damaged.

: Avoid cleaning painted plastics with solvents containing petrol and its derivatives.

LUBRICATE WITH OIL

APPLY PRODUCT

WARNING - HANDLE WITH CARE

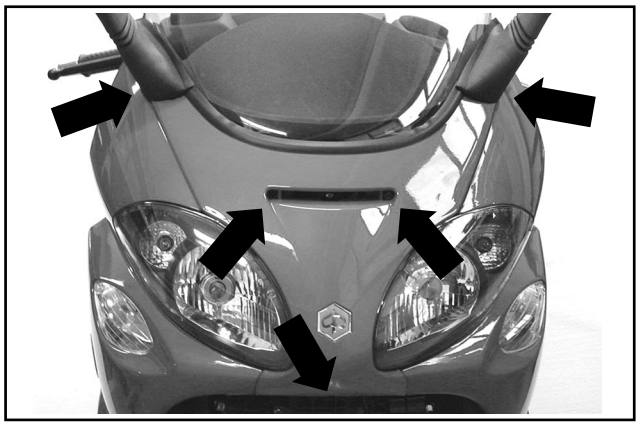
LUBRICATE WITH GREASE

CLEAN CAREFULLY

ALWAYS REPLACE

Front central cover

- Lift the rearview mirror covers.
- Unscrew the five fixing screws shown in the figure.
- Remove the front central cover with the weather strip.

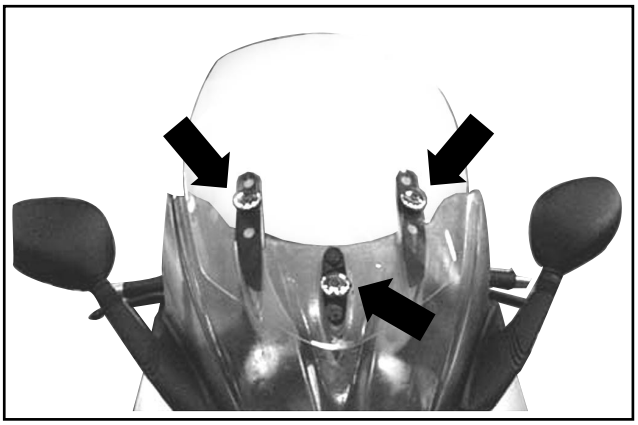


08_001

Lower guard - Windscreen

- Remove the rearview mirrors;
- Unloose the 3 fixing screws shown in the figure and relevant spacers;
- Remove the upper windscreen;
- Unloose the 4 fixing screws with washers, located under the rearview mirrors and under the front central cover;
- Remove the lower guard and relevant weather strip.

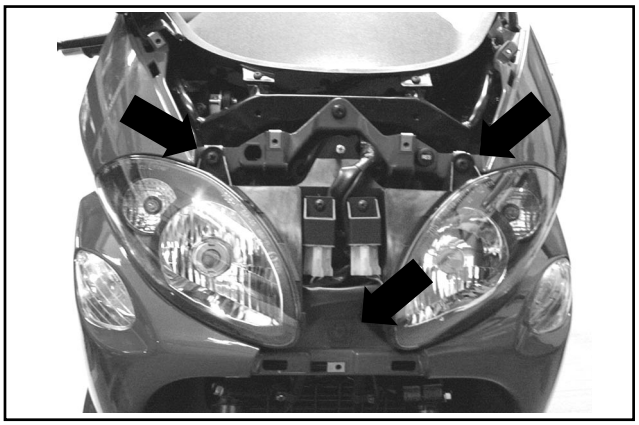
Note: When refitting, take care to properly reinsert the weather strips into their seats.



08_002A

Front lamp cluster

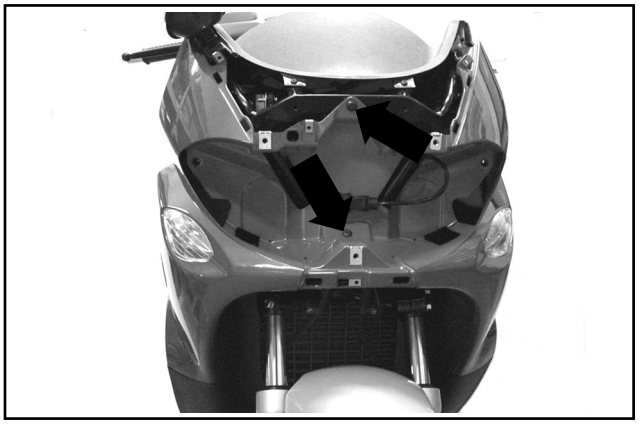
- Remove the three fixing screws.
- Detach the electrical connectors.
- Remove the front lamp cluster by pulling it forward.



08_003

Front shield

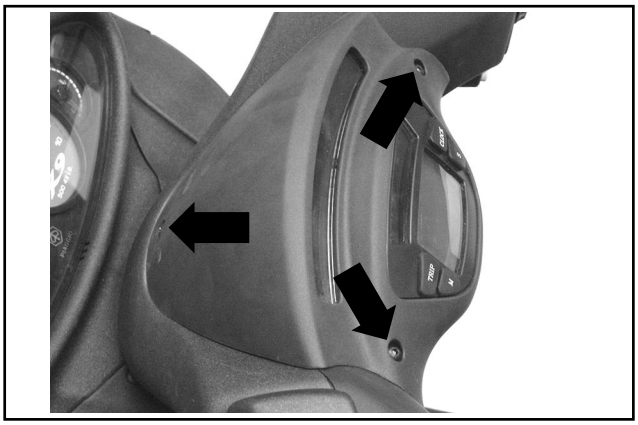
- Remove the two front screws.
- Remove the two screws behind the wheel.
- Unscrew the remaining six fixing screws.
- Detach the electrical connectors.
- Remove the front shield with the turn indicators.



08_004

Digital instrument panel support

- Remove the three fixing screws.
- Detach the electrical connectors.
- Remove the support with the digital instrument panel.
- Pay special attention to the electrical connectors.



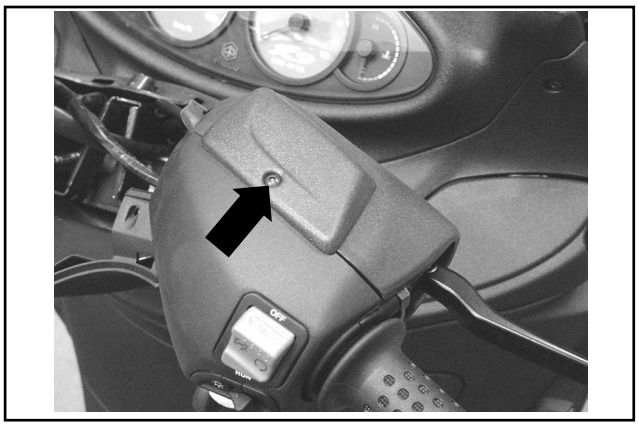
08_005

Front handlebar cover

- Loosen the two screws fixing the radio-interphone unit.
- Detach the electrical connectors.
- Remove the radio-interphone.
- Remove the two handlebar cover lower screws (one on each side).

08_006

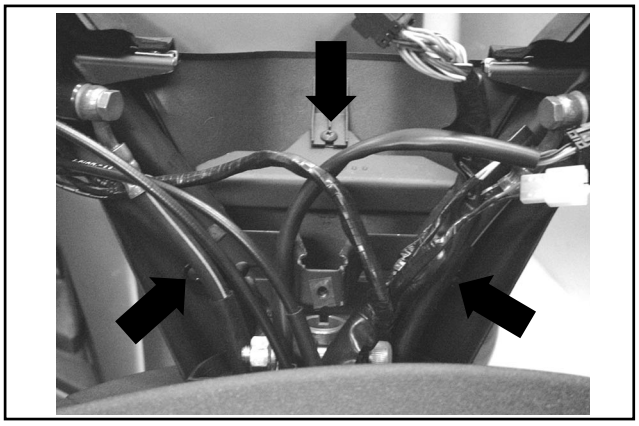
- Remove the brake fluid pump cover on the right side.
- Remove the front handlebar cover.



08_007

Rear handlebar cover

- Remove the three fixing screws.
- Detach the electrical connectors.
- Remove the rear handlebar cover.



08_008

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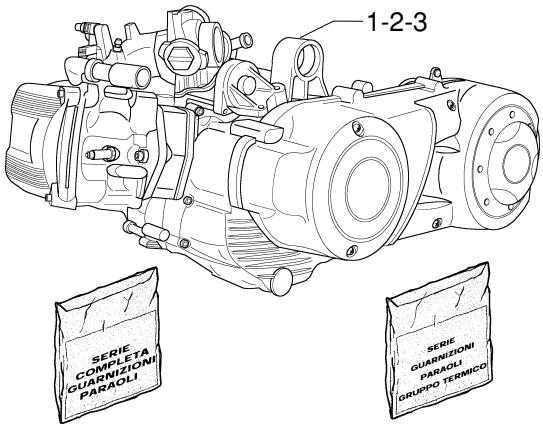
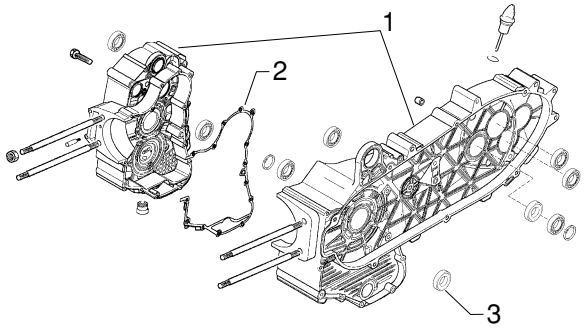
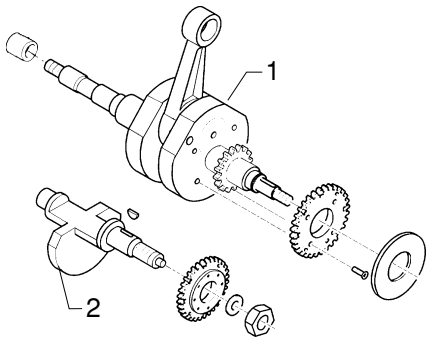
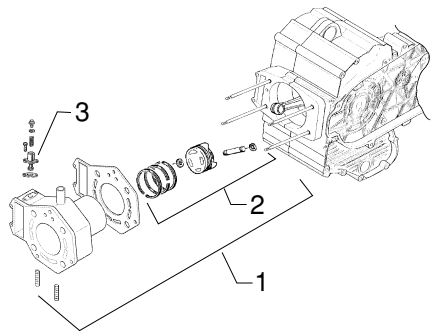
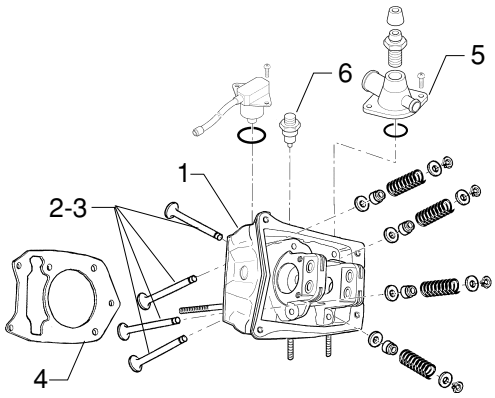
1 ENGINE	Op.	Code	Description	Time
	1	001001	Engine from frame - Removal and reinstallation	160'
	2	001127	Engine - Complete overhaul	450'
	3	003057	Engine anchorage - Tightening of nuts	20'

2 CRANKCASE	Op.	Code	Description	Time
	1	001133	Crankcase - Replacement	410'
	2	001153	Crankcase half gasket - Replacement	280'
	3	001100	Oil seal clutch side - Replacement	60'

3 CRANKSHAFT	Op.	Code	Description	Time
	1	001117	Crankshaft - Replacement	310'
	2	001098	Countershaft - Replacement	290'

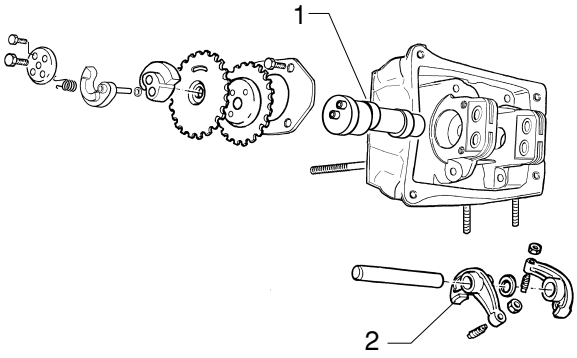
4 CYLINDER - PISTON - PISTON PIN ASSEMBLY	Op.	Code	Description	Time
	1	001002	Cylinder-piston - Replacement	250'
	2	001154	Piston-piston rings-piston pin assembly - Overhaul	240'
	3	001129	Chain stretcher - Overhaul and replacement	45'

5 CYLINDER HEAD



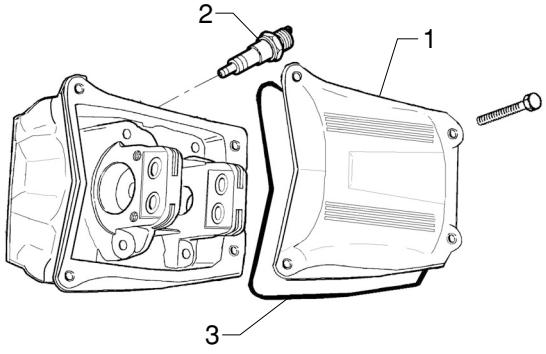
Op.	Code	Description	Time
1	001126	Cylinder head - Replacement	250'
2	001045	Valves - Replacement	240"
3	001049	Valves - Adjustment	75'
4	001056	Cylinder head gasket - Replacement	210'
5	007023	Union tee head outlet - Replacement	95'
6	005081	Temperature sensor - Replacement	80'

6 ROCKER ARM SUPPORT ASSEMBLY



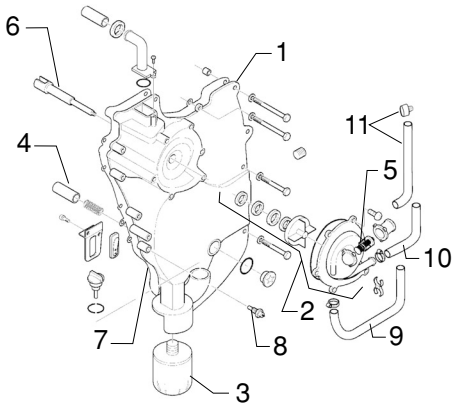
Op.	Code	Description	Time
1	001044	Camshaft - Replacement	90'
2	001148	Valve rocker arms - Replacement	90'

7 CYLINDER HEAD COVER

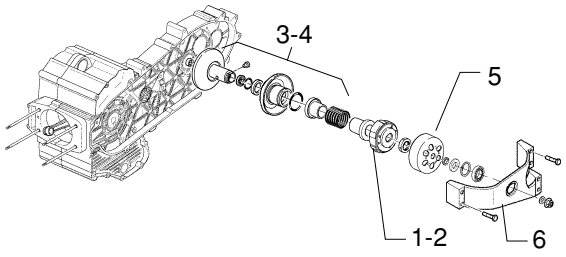


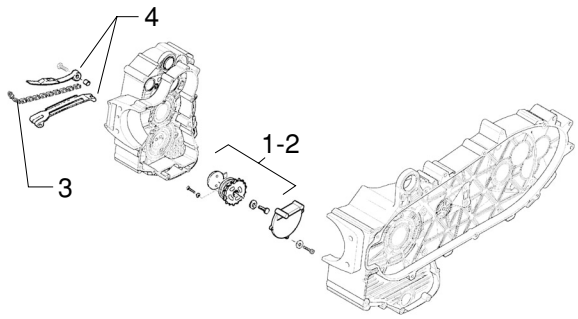
Op.	Code	Description	Time
1	001089	Cylinder head cover - Replacement	70'
2	001093	Spark plug - Replacement	15'
3	001088	Cylinder head cover gasket - Replacement	70'

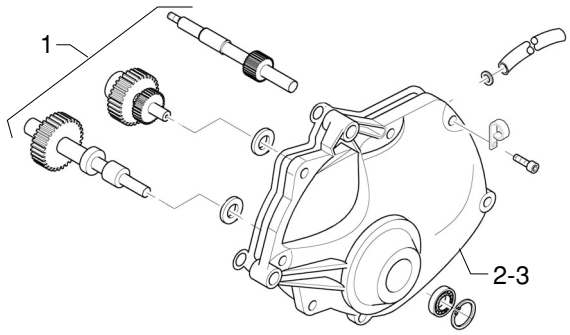
8 FLYWHEEL COVER

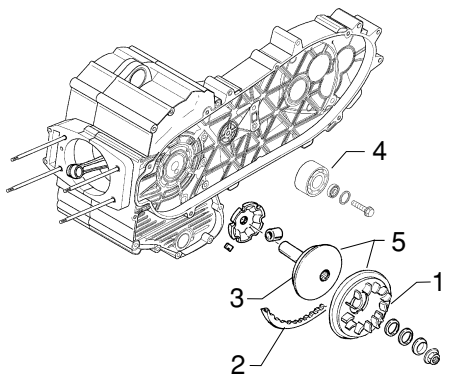


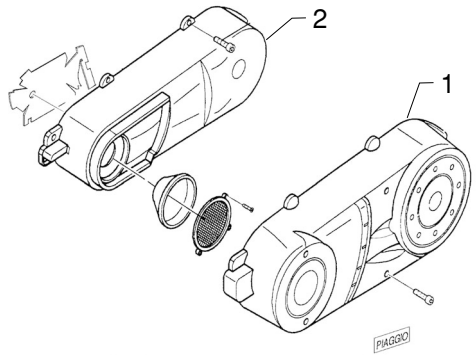
Op.	Code	Description	Time
1	001087	Flywheel cover - Replacement	105'
2	001113	Water pump - Replacement	60'
3	001123	Oil filter - Replacement	15'
4	001124	By-pass - Replacement	100'
5	001057	Thermostat - Replacement	55'
6	001062	Water pump control shaft - Replacement	85'
7	001150	Flywheel cover gasket - Replacement	100'
8	001160	Oil minimum pressure sensor - Replacement	20'
9	007011	By pass sleeve-Thermostat-Drain valve - Replacement	70'
10	007019	Water pump connection pipe-Return pipe - Replacement	70'
11	007012	Drain valve - Coolant outlet pipe - Replacement	70'

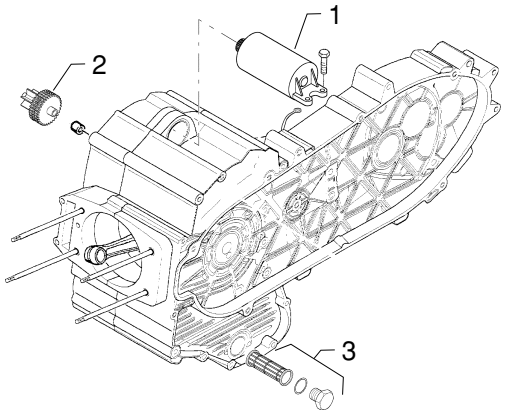
9 DRIVEN PULLEY AND CLUTCH	Op.	Code	Description	Time
	1	001022	Clutch - Replacement	60'
	2	003072	Clutch assembly - Wear check	50'
	3	001012	Driven pulley - Overhaul	75'
	4	001110	Driven pulley - Replacement	60'
	5	001155	Clutch bell housing - Replacement	50'
	6	001167	Driven pulley shaft support - Overhaul / Replacement	60'

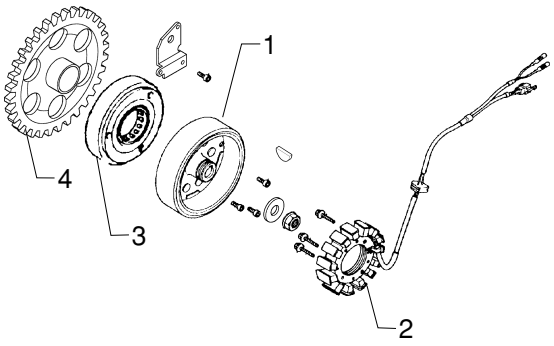
10 OIL PUMP	Op.	Code	Description	Time
	1	001112	Oil pump - Replacement	270'
	2	001042	Oil pump - Overhaul	280'
	3	001051	Timing chain/belt - Replacement	220'
	4	001125	Chain guide shoes - Replacement	225'

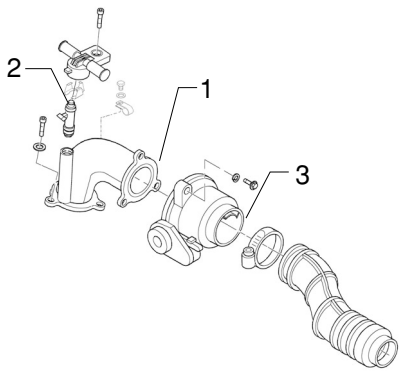
11 REDUCTION GEARING ASSEMBLY	Op.	Code	Description	Time
	1	001010	Reduction gearing - Overhaul	75'
	2	001156	Reduction gearing cover - Replacement	75'
	3	003065	Gear box oil - Renewal	15'

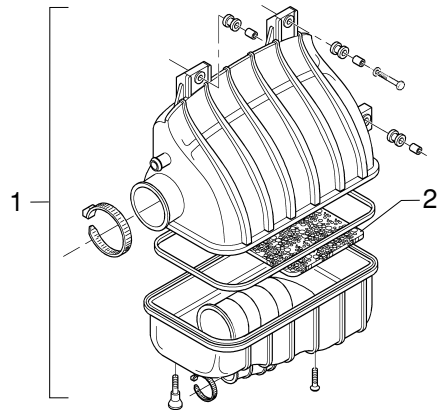
12 DRIVING PULLEY	Op.	Code	Description	Time
	1	001086	Driving half pulley - Replacement	50'
	2	001011	Drive belt - Replacement	65'
	3	001006	Driving pulley - Overhaul	55'
	4	001141	Belt antiflapping roller - Replacement	45'
	5	001066	Driving pulley - Disassembly and reassembly	55'

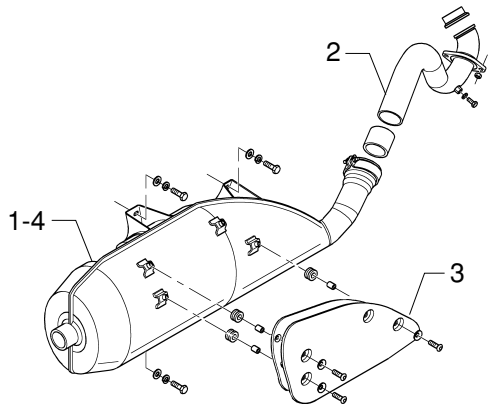
13 TRANSMISSION COVER	Op.	Code	Description	Time
	1	001096	Transmission crankcase cover - Replacement	35'
	2	008002	Mechanical transmission cover - Replacement	30'

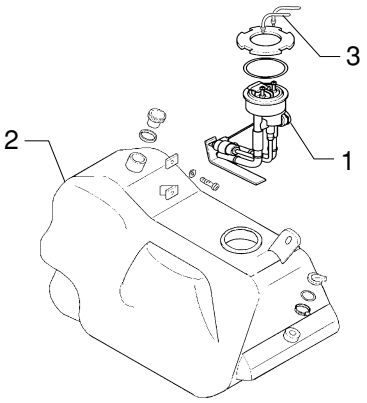
14 STARTER MOTOR	Op.	Code	Description	Time
	1	001020	Starter motor - Replacement	40'
	2	001017	Starter pinion - Replacement	90'
	3	003064	Engine oil - Replacement	20'

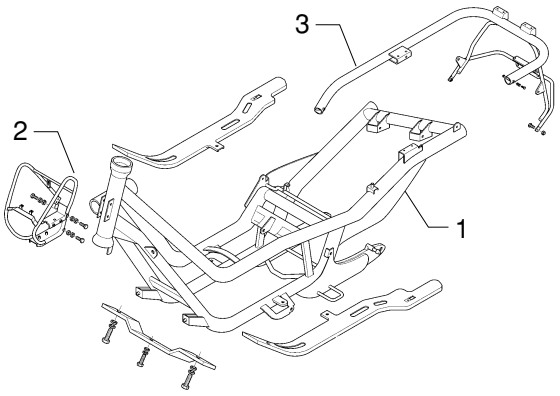
15 FLYWHEEL MAGNETO	Op.	Code	Description	Time
	1	001058	Flywheel - Replacement	100'
	2	001067	Stator - Removal and reinstallation	95'
	3	001104	Starting free wheel - Replacement	100'
	4	001151	Starting driven gear - Replacement	100'

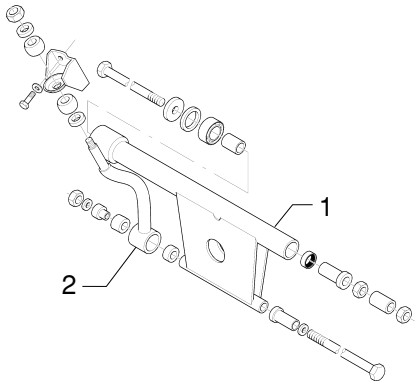
16 THROTTLE BODY	Op.	Code	Description	Time
	1	001013	Intake manifold - Replacement	75'
	2	001047	Injector - Replacement	70'
	3	001166	Throttle body - Replacement	70'

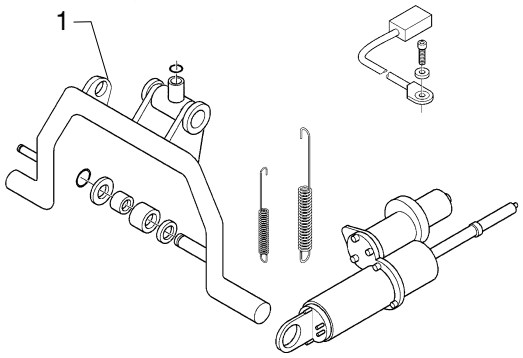
17 AIR CLEANER	Op.	Code	Description	Time
	1	001015	Air filter box - Replacement	40'
	2	001014	Air filter - Replacement/Cleaning	20'

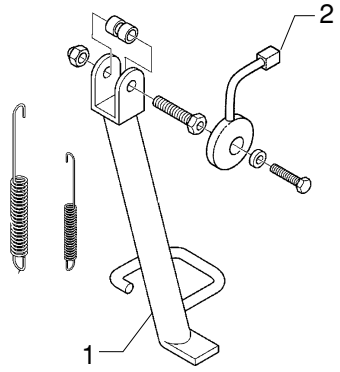
18 SILENCER	Op.	Code	Description	Time
	1	001009	Silencer - Replacement	10'
	2	001092	Exhaust manifold - Replacement	20'
	3	001095	Silencer guard - Replacement	5'
	4	001136	Exhaust emissions - Adjustment	30'

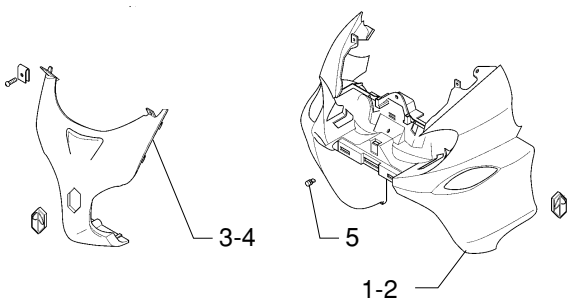
19 TANK	Op.	Code	Description	Time
	1	004073	Fuel pump - Replacement	20'
	2	004005	Fuel tank - Replacement	65'
	3	004137	Fuel pump tube - Replacement	70'

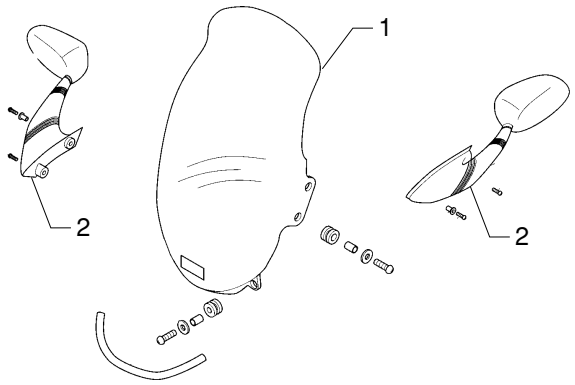
20 FRAME BODY	Op.	Code	Description	Time
	1	004001	Frame - Replacement	480'
	2	004146	Front frame - Replacement	50'
	3	004116	Rear frame - Replacement	45'

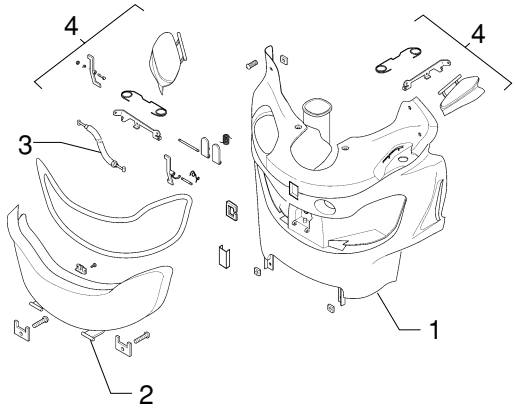
21 SWINGARM	Op.	Code	Description	Time
	1	001072	Engine-frame connection swing arm - Replacement	65'
	2	003082	Damper arm - Replacement	65'

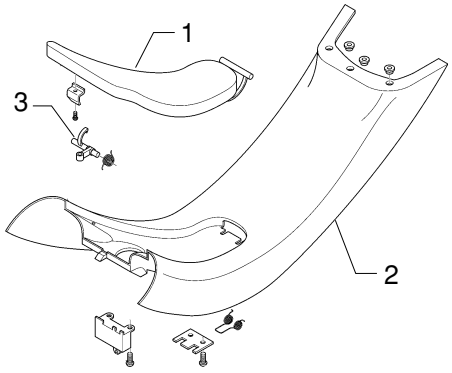
22 CENTRAL STAND/ELECTROHYDRAULIC	Op.	Code	Description	Time
	1	004004	Stand - Replacement	65'

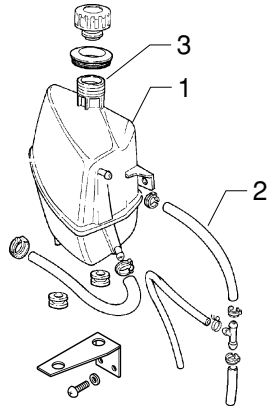
23 SIDESTAND	Op.	Code	Description	Time
	1	004102	Side stand - Replacement	20'
	2	005079	Stand switch - Replacement	40'

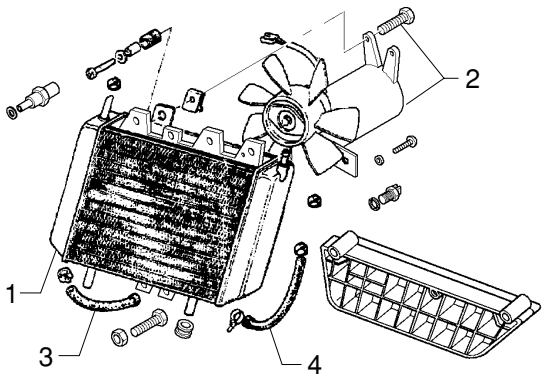
24 FRONT SHIELD	Op.	Code	Description	Time
	1	004064	Front shield, front section - Replacement	35'
	2	006012	Front shield - Painting	30'
	3	004149	Front shield central cover - Replacement	10'
	4	006006	Steering head tube cover - Painting	30'
	5	005085	Reset button - Replacement	10'

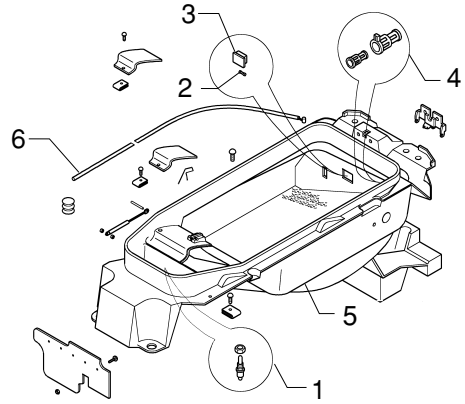
25 WINDSCREEN	Op.	Code	Description	Time
	1	004028	Windscreen glass - Replacement	15'
	2	004066	One rearview mirror - Replacement	10'

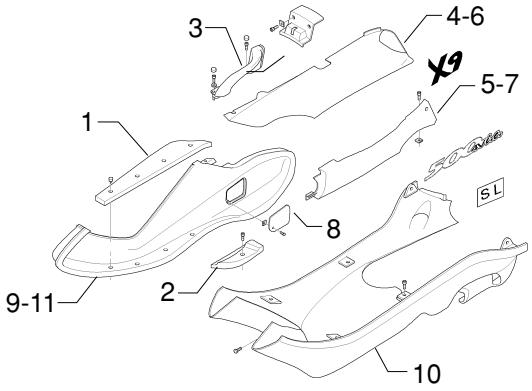
26 REAR SHIELD	Op.	Code	Description	Time
	1	004065	Front shield, rear section - Removal and refitting	50'
	2	004081	Glove compartment door - Replacement	50'
	3	002082	Fuel tank door opening cable - Replacement	50'
	4	004156	Glove compartment door and/or support - Replacement	40'

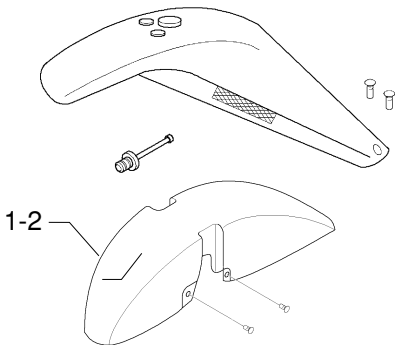
27 FOOTBOARD - FUEL TANK DOOR	Op.	Code	Description	Time
	1	004135	Fuel tank door - Replacement	15'
	2	004011	Frame central cover - Replacement	20'
	3	004157	Fuel tank door catch - Replacement	15'

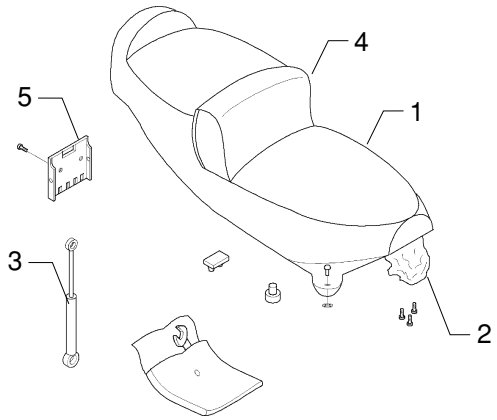
28 EXPANSION TANK	Op.	Code	Description	Time
	1	007001	Expansion tank - Replacement	40'
	2	007013	Expansion tank connection pipe, radiator - Replacement	45'
	3	001052	Coolant renewal and air bleeding - Replacement	60'

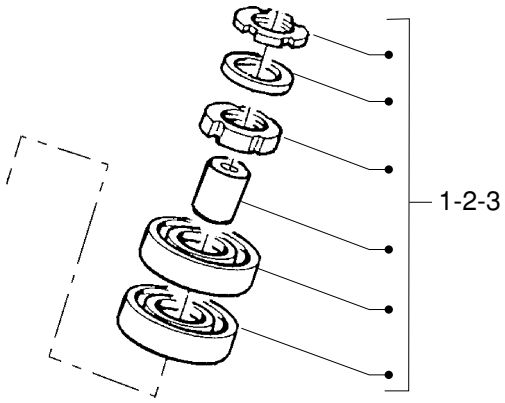
29 RADIATOR	Op.	Code	Description	Time
	1	007002	Radiator - Replacement	110'
	2	007016	Fan complete with support - Replacement	100'
	3	007003	Coolant delivery and return pipe - Replace.	80'
	4	007022	Coolant return pipe - Replacement	60'

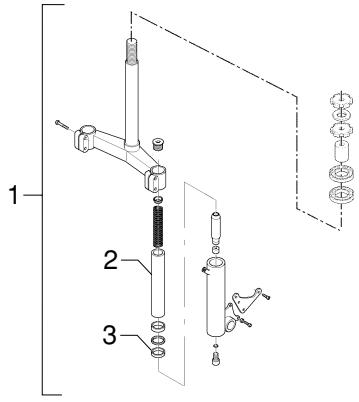
30 UNDERSADDLE COMPARTMENT	Op.	Code	Description	Time
	1	005033	Glove compartment lamp switch - Repl.	50'
	2	005026	Helmet compartment lamp - Replacement	5'
	3	005027	Helmet compartment lamp support - Repl.	5'
	4	004142	Electrical socket - Replacement	5'
	5	004016	Helmet compartment - Removal and refitting	45'
	6	002083	Saddle opening cable - Replacement	70'

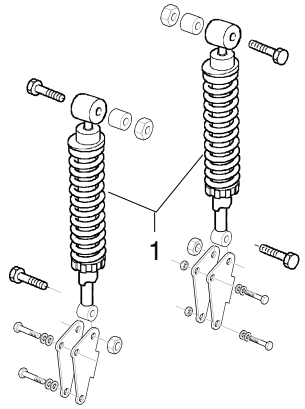
31 MATS AND COVERS	Op.	Code	Description	Time
	1	004075	1 front mat - Replacement	10'
	2	004076	One rear mat - Replacement	40'
	3	004068	One grab handle - Replacement	10'
	4	004012	2 Rear body sides - Removal and refitting	30'
	5	004129	Rear side panel - Replacement	20'
	6	006005	Two side covers - Painting	50'
	7	006008	Rear side fairing - Painting	40'
	8	004059	Spark plug inspection door - Replacementc	5'
	9	004079	Footrest (1) - Replacement	35'
	10	004053	Spoiler - Replacement	50'
	11	004015	Footboards - Replacement	50'

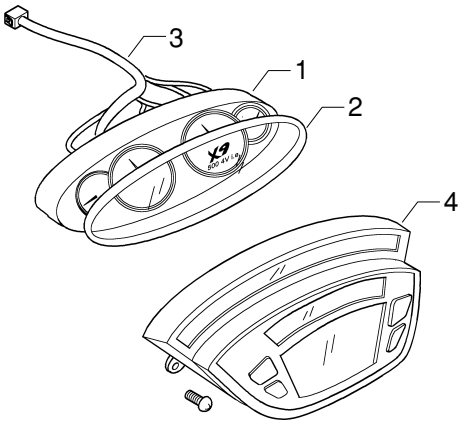
32 FRONT MUDGUARDS	Op.	Code	Description	Time
	1	004002	Front mudguard - Replacement	10'
	2	006003	Front mudguard - Painting	30'

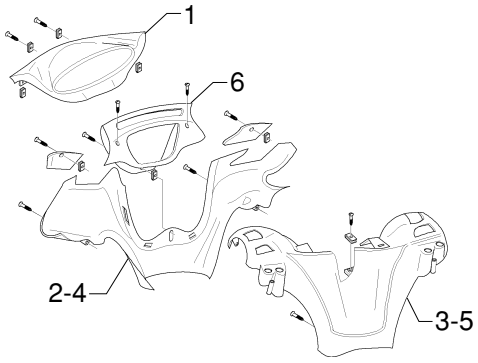
33 SADDLE	Op.	Code	Description	Time
	1	004003	Saddle - Replacement	10'
	2	004144	Bag - Replacement	10'
	3	004150	Saddle damper - Replacement	5'
	4	004067	Rider's backrest - Replacement	10'
	5	004054	Saddle catch - Replacement	10'

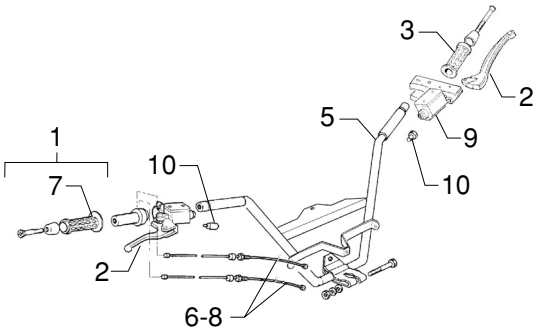
34 STEERING THRUST RINGS	Op.	Code	Description	Time
	1	004119	Steering upper thrust ring/bearing - Replace.	60'
	2	003002	Steering thrust rings - Replacement	80'
	3	003073	Steering play - Adjustment	30'

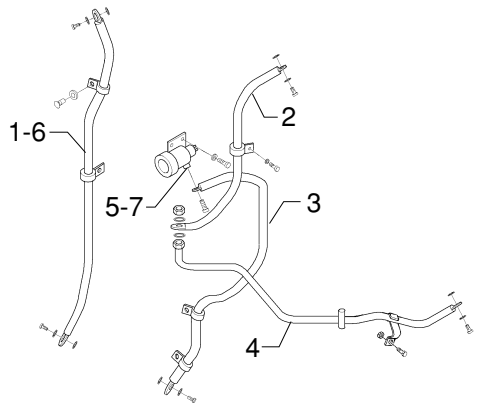
35 FRONT FORK	Op.	Code	Description	Time
	1	003051	Fork assembly - Replacement	60'
	2	003079	Fork rod - Replacement	30'
	3	003048	Fork oil seal - Replacement	40'

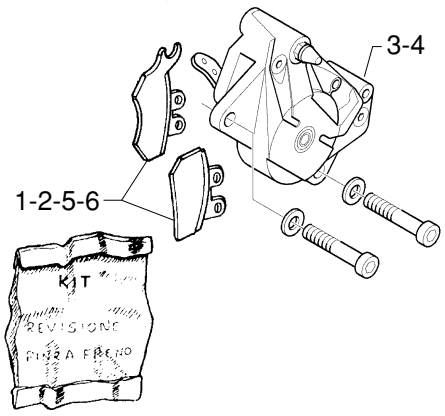
36 REAR SHOCK ABSORBER	Op.	Code	Description	Time
	1	003007	Rear shock absorber - Removal and refitting	20'

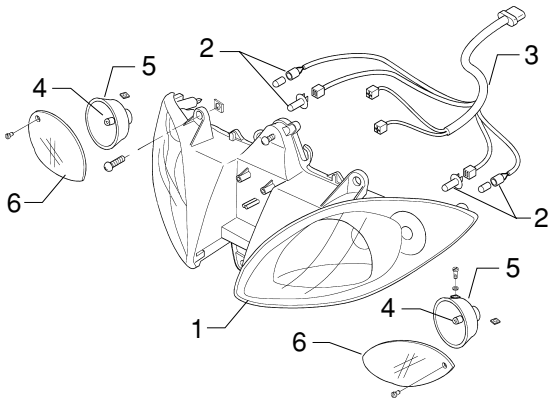
37 INSTRUMENT PANEL	Op.	Code	Description	Time
	1	005014	Speedometer - Replacement	35'
	2	005078	Speedometer glass - Replacement	40'
	3	005082	Instrument panel wiring - Replacement	35'
	4	005083	Trip computer - Replacement	10'

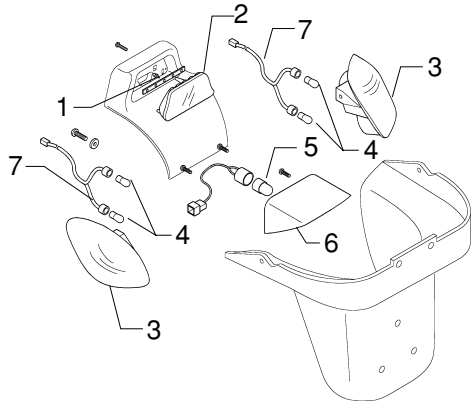
38 HANDLEBAR COVERS	Op.	Code	Description	Time
	1	004151	Instrument panel support - Replacement	30'
	2	004018	Handlebar front section - Replacement	15'
	3	004019	Handlebar rear section - Replacement	20'
	4	006013	Handlebar front section - Painting	30'
	5	006014	Rear handlebar protection - Painting	30'
	6	004152	Trip computer cover - Replacement	10'

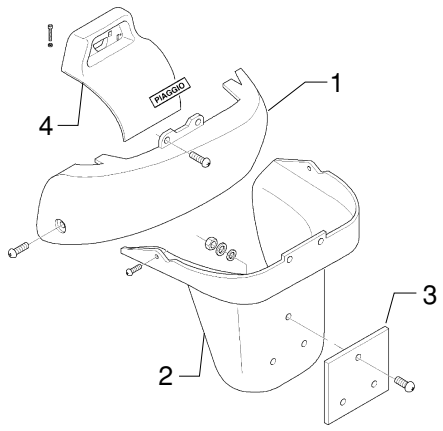
39 HANDLEBAR COMPONENTS	Op.	Code	Description	Time
	1	002060	Throttle control assembly - Replacement	20'
	2	002037	Brake or clutch lever - Removal	20'
	3	002071	Left handgrip - Replacement	10'
	4	002024	Brake pump - Removal and reinstallation	40'
	5	003001	Handlebar - Removal and refitting	40'
	6	002063	Throttle control cable assembly - Replacement	70'
	7	002059	Throttle twist grip - Replacement	10'
	8	003061	Throttle control cable - Adjustment	15'
	9	002088	All-wheel brake pump - Replacement	50'
	10	005017	Stoplight switches - Replacement	20'

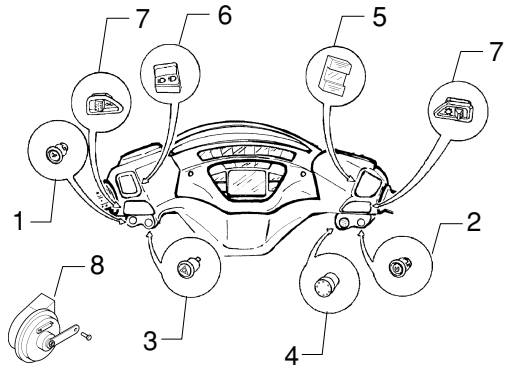
40 BRAKE LINES	Op.	Code	Description	Time
	1	002021	Front brake line - Removal and refitting	65'
	2	002084	All-wheel brake pump tube device - Replacement	60'
	3	002085	Front caliper all-wheel braking device tube - Replacement	60'
	4	002087	All-wheel braking rear rigid tube - Replacement	80'
	5	002090	All-wheel brake fluid - Renewal and system bleeding	40'
	6	002047	Front brake oil and system draining - Replacement	25'
	7	002089	Integral braking device - Replacement	60'

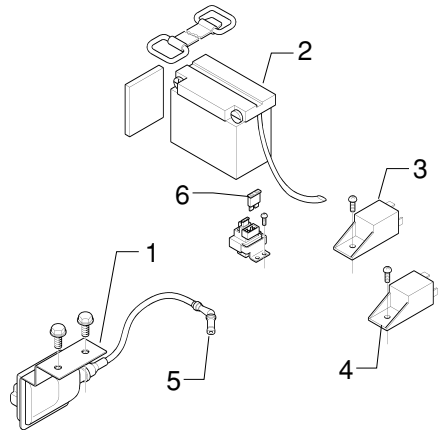
41 BRAKE CALIPER	Op.	Code	Description	Time
	1	002007	Front brake shoes/pads - Replacement	10'
	2	003070	Front brake pads/shoes - Wear check	5'
	3	002039	Brake caliper - Removal and refitting	20'
	4	002048	Front brake caliper - Replacement	45'
	5	002002	Rear brake pads - Replacement	45'
	6	003071	Rear brake pads/hook - Wear check	40'

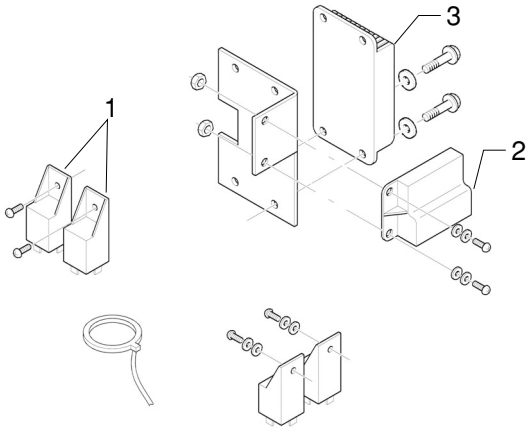
42 HEADLIGHT	Op.	Code	Description	Time
	1	005002	Headlight - Replacement	15'
	2	005008	Headlight bulbs - Wear check	15'
	3	005044	Headlight wiring harness - Replacement	15'
	4	005067	Front turn indicator bulb - Replacement	10'
	5	005012	Front turn indicators - Replacement	30'
	6	005091	Turn indicators glass - Replacement	5'

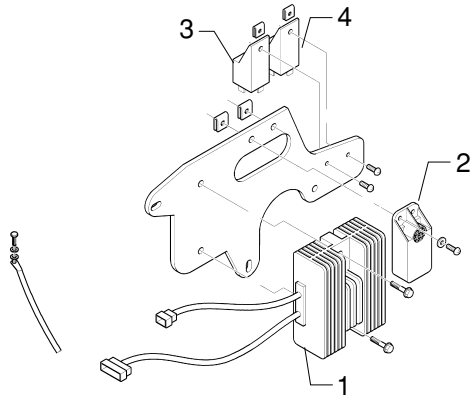
43 REAR LIGHT	Op.	Code	Description	Time
	1	005090	Stoplight bulbs - Replacement	15'
	2	004141	Reflector - Replacement	15'
	3	005005	Rear light - Replacement	15'
	4	005066	Rear light bulbs - Replacement	15'
	5	005031	Number-plate light bulb - Replacement	5'
	6	005032	Number-plate light lens - Replacement	15'
	7	005030	Rear light wiring harness - Replacement	15'

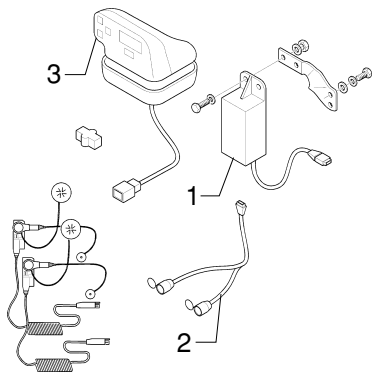
44 REAR COVERS	Op.	Code	Description	Time
	1	004057	Tail lamp lower cover - Replacement	15'
	2	004009	Rear mudguard - Replacement	20'
	3	005048	Number plate holder - Replacement	5'
	4	005046	Battery cover - Replacement	10'

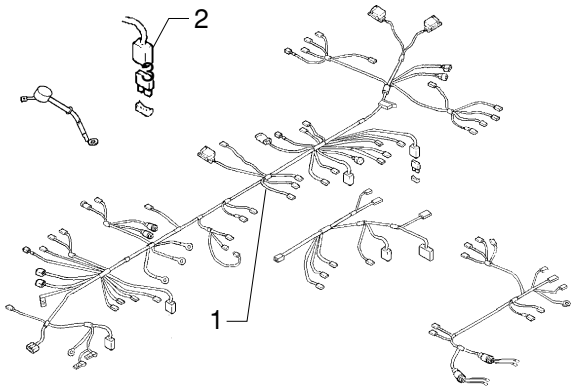
45 ELECTRICAL DEVICES	Op.	Code	Description	Time
	1	005040	Horn button - Replacement	20'
	2	005041	Starting device button - Replacement	20'
	3	005084	Hazard warning light button - Replacement	20'
	4	005095	Electrical stand push button - Replacement	20'
	5	005077	Emergency stop switch - Replacement	10'
	6	005039	Lights selector switch - Replacement	10'
	7	005006	Lights or turn indicator switch - Replacement	10'
	8	005003	Horn - Replacement	50'

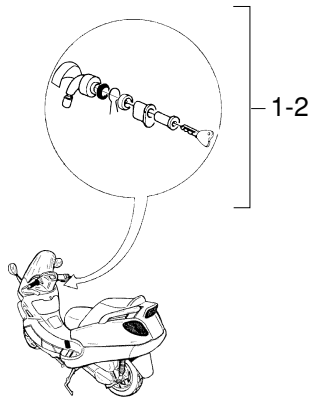
46 BATTERY AND HV COIL	Op.	Code	Description	Time
	1	001069	HV coil - Replacement	35'
	2	005007	Battery - Replacement	20'
	3	005011	Starting relay switch - Replacement	20'
	4	005097	Electrical central stand electromagnetic switch - Replacement	20'
	5	001094	Spark plug cap - Replacement	15'
	6	005024	Battery fuse - Replacement	10'

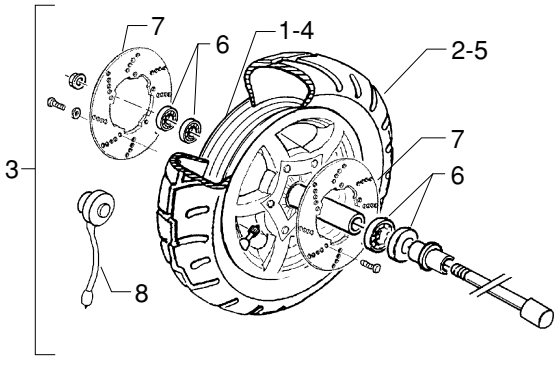
47 FUEL INJECTION CONTROL UNIT	Op.	Code	Description	Time
	1	005035	Headlight relay switch - Replacement	10'
	2	005073	Decoder - Replacement	40'
	3	001023	Electronic control unit - Replacement	40'

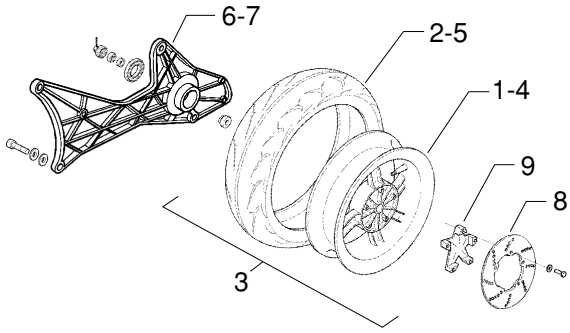
48 VOLTAGE REGULATOR ASSEMBLY	Op.	Code	Description	Time
	1	005009	Voltage regulator - Replacement	30'
	2	005098	Stand control unit - Replacement	25'
	3	005088	Hazard warning light relay switch - Replacement	25'
	4	005096	Injection components electromagnetic switch - Replacement	25'

49 RADIO - INTERCOM	Op.	Code	Description	Time
	1	005092	Radio / intercom control unit - Replacement	45'
	2	005093	Radio / Intercom cables - Replacement	60'
	3	005094	Radio / Intercom display - Replacement	15'

50 WIRING (WIRING HARNESS)	Op.	Code	Description	Time
	1	005001	Electrical equipment - Removal and reinstallation	140'
	2	005025	Battery fuse holder - Replacement	10'

51 LOCKS	Op.	Code	Description	Time
	1	005016	Ignition switch - Replacement	25'
	2	004010	Security lock - Replacement	50'

52 FRONT WHEEL	Op.	Code	Description	Time
	1	003037	Front wheel rim - Removal and refitting	30'
	2	003047	Front tyre - Replacement	20'
	3	004123	Front wheel - Replacement	20'
	4	006018	Wheel rim - Painting	35'
	5	003063	Tyre pressure - Check	5'
	6	003040	Front wheel bearings - Replacement	40'
	7	002041	Front brake disc - Replacement	20'
	8	005089	Speed sensor - Replacement	15'

53 REAR WHEEL	Op.	Code	Description	Time
	1	001071	Rear wheel rim - Removal and refitting	45'
	2	004126	Rear tyre - Replacement	45'
	3	001016	Rear wheel - Replacement	35'
	4	006018	Wheel rim - Painting	35'
	5	003063	Tyre pressure - Check	5'
	6	003014	Rear suspension arm - Replacement	20'
	7	003077	Silencer/rear shock absorber support arm - Overhaul	25'
	8	002070	Rear brake disc - Replacement	40'
	9	002028	Rear wheel hub - Replacement	40'