MANUALE STAZIONE DI SERVIZIO

XXXXXX IT-XXXXXX EN-XXXXXX FR-XXXXXX DE-XXXXXX ES-XXXXXX PT-XXXXXX OL-XXXXXX EL

Vespa LX 125 - 150 i.e.

MANUALE STAZIONE DI SERVIZIO

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PIAGGIO & C. S.p.A. - After sales
V.le Rinaldo Piaggio, 23 - 56025 PONTEDERA (Pi)

MANUALE STAZIONE DI SERVIZIO
Vespa LX 125 - 150 i.e.

Questo manuale per stazioni di servizio è stato realizzato da Piaggio & C. Spa per essere utilizzato dalle officine dei concessionari e sub-agenzie Piaggio-Gilera. Si presuppone che chi utilizza questa pubblicazione per la manutenzione e la riparazione dei veicoli Piaggio, abbia una conoscenza base dei principi della meccanica e dei procedimenti inerenti la tecnica della riparazione dei veicoli. Le variazioni importanti nelle caratteristiche dei veicoli o nelle specifiche operazioni di riparazione verranno comunicate attraverso aggiornamenti di questo manuale. Non si può comunque realizzare un lavoro completamente soddisfacente se non si dispone degli impianti e delle attrezzature necessarie, ed è per questo che vi invitiamo a consultare le pagine di questo manuale riguardanti l'attrezzatura specifica e il catalogo degli attrezzi specifici.

N.B. Provides key information to make the procedure easier to understand and carry out.

CAUTION Refers to specific procedures to carry out for preventing damages to the vehicle.

WARNING Refers to specific procedures to carry out to prevent injuries to the repairer.

Personal safety Failure to completely observe these instructions will result in serious risk of personal injury.

Safeguarding the environment Sections marked with this symbol indicate the correct use of the vehicle to prevent damaging the environment.

Vehicle intactness The incomplete or non-observance of these regulations leads to the risk of serious damage to the vehicle and sometimes even the invalidity of the guarantee.

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INDEX OF TOPICS

Rules

This section describes general safety rules for any maintenance operations performed on the vehicle.

Safety rules

- If work can only be done on the vehicle with the engine running, make sure that the premises are well-ventilated, using special extractors if necessary; never let the engine run in an enclosed area. Exhaust fumes are toxic.
- The battery electrolyte contains sulphuric acid. Protect your eyes, clothes and skin. Sulphuric acid is highly corrosive; in the event of contact with your eyes or skin, rinse thoroughly with abundant water and seek immediate medical attention.
- The battery produces hydrogen, a gas that can be highly explosive. Do not smoke and avoid sparks or flames near the battery, especially when charging it.
- Fuel is highly flammable and it can be explosive given some conditions. Do not smoke in the working area, and avoid naked flames or sparks.
- Clean the brake pads in a well-ventilated area, directing the jet of compressed air in such a way that you do not breathe in the dust produced by the wear of the friction material. Even though the latter contains no asbestos, inhaling dust is harmful.

Maintenance rules

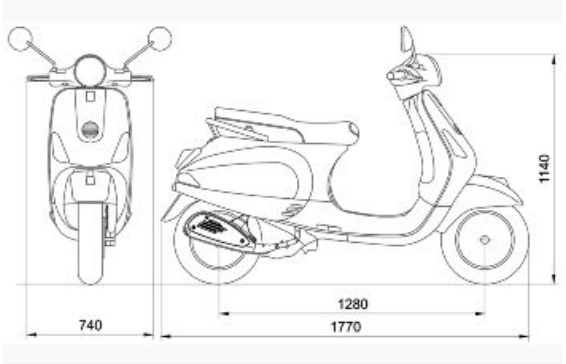
- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. Non-original or non-conforming spare parts may damage the vehicle.
- Use only the appropriate tools designed for this vehicle.
- Always use new gaskets, sealing rings and split pins upon refitting.
- After removal, clean the components using non-flammable or low flash-point solvents. Lubricate all the work surfaces, except tapered couplings, before refitting these parts.
- After refitting, make sure that all the components have been installed correctly and work properly.
- For removal, overhaul and refit operations use only tools with metric measures. Metric bolts, nuts and screws are not interchangeable with coupling members with English measurement. Using unsuitable coupling members and tools may damage the vehicle.
- When carrying out maintenance operations on the vehicle that involve the electrical system, make sure the electric connections have been made properly, particularly the ground and battery connections.

Vehicle identification

VEHICLE IDENTIFICATION

Specification	Desc./Quantity
Chassis prefix (125)	ZAPM4430000 to 100001
Engine prefix (125)	M444Mto 1001
Chassis prefix (150)	ZAPM4440000 to 100001
Engine prefix (150)	M445Mto 1001

Dimensions and mass



WEIGHTS AND DIMENSIONS

Specification	Desc./Quantity
Kerb weight	114 ± 5 kg
Maximum height	1140 mm
Width	740 mm
Wheelbase	1280 mm
Length	1770 mm

Engine

ENGINE

Specification	Desc./Quantity
Engine	Single cylinder 4-stroke
Timing system	Single overhead camshaft (SOHC) with 2 valves
Valve clearance	intake 0.10 outlet 0.15
Bore x stroke (125)	57 x 48.6 mm
Bore/stroke (150)	62.8 x 48.6 mm
Cubic capacity (125)	124 cm³
Cubic capacity (150)	151 cm³
Compression ratio (125/150)	10.6 ± 0.5 to 1
Engine idle speed	1,750 ± 50 rpm
Air filter	sponge, impregnated with mixture (50% petrol and 50% oil)
Fuel system	Electronic injection with electric fuel pump.
Starting system	electric starter motor with freewheel
Lubrication	with lobe pump (inside the crankcase) chain-driven and double filter: mesh and paper
Minimum lubrication pressure (100° C)	0.8 bar
Lubrication pressure	3.5 to 4 bar
Max. power (125)	7.9 kW at 8250 rpm
Max power (150)	7.9 kW at 8000 rpm
Max. torque (125)	9.6 Nm at 6500 rpm
Max torque (150)	11.8 Nm at 6250 rpm
Cooling	Forced air circulation.

Transmission

TRANSMISSION

Specification	Desc./Quantity
Transmission	With automatic expandable pulley variator with torque server, V belt, automatic clutch, gear reduction unit and transmission housing with forced air circulation cooling.
Final reduction gear	Gear reduction unit in oil bath.

Capacities

CAPACITY

Specification	Desc./Quantity
Engine oil	1100 cc (67.13 cu.in)
Rear hub oil	~ 100 cm³
Fuel tank capacity	8.2 litres (2 l of them for reserve)

Electrical system

ELECTRICAL COMPONENTS

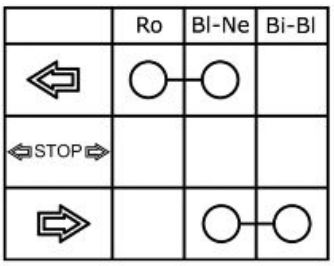
Specification	Desc./Quantity
Spark plug	NGK CR8EB (125) - NGK CR7EB (150)
Battery	12V - 10 Ah Sealed battery
Fuses	1 of 20A - 1 of 15A - 2 of 10A - 2 of 7.5A
Generator	alternating current
Ignition/advance	Electronic with inductive discharge and variable advance

CHECKING REMOTE CONTROLS «A» OPERATING AS CIRCUIT BREAKERS

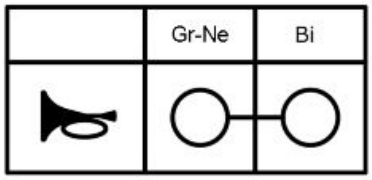
1) Check that, given regular conditions, there is no continuity between terminals 30 and 87.
2) Apply 12V voltage to power terminals 85 and 86 of the remote control.
3) With the remote control powered, check that there is continuity between terminals 30 and 87.
4) If these conditions are not fulfilled, the remote control is damaged and must be replaced.

To check buttons and switches, check that, according to their position, the continuity of contacts is correct as indicated in the following charts.

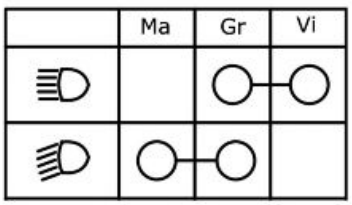
TURN INDICATOR SWITCH



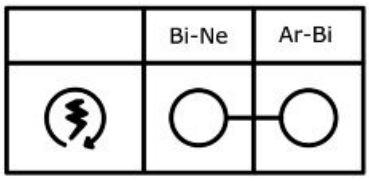
HORN BUTTON



LIGHT SWITCH



STARTER BUTTON



KEY SWITCH

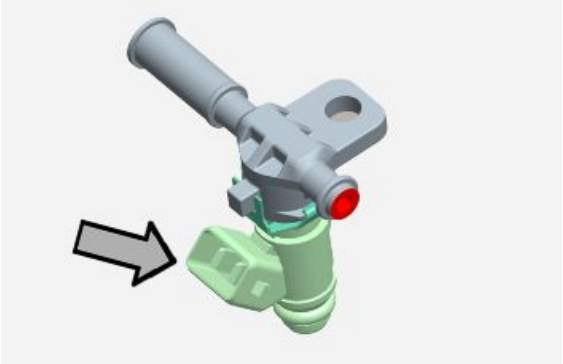
	Ar	Rs-Ne	Gr	Bi-Ne
0 LOCK				
1 OFF				
2 ON	○	○		

FUEL INJECTOR

Type: 3 holes

Conicity of the nozzle: 20°

Resistance at terminals: 13.7 to 15.2 Ohm



FUEL PUMP UNIT

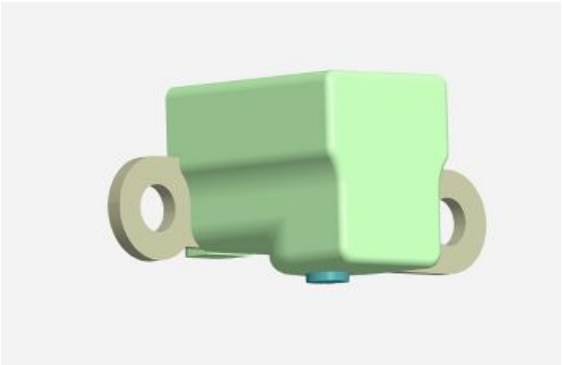
Mechanical type pressure regulator operating at a pressure of 2.5 BAR

Pump winding resistance: ~ 1.5 Ohm

Input current during regular functioning: 1.4 - 1.8 A

ENGINE SPEED SENSOR

Resistance between pins 13 and 15: 100 to 150 Ohm at approx. 20°



ENGINE TEMPERATURE SENSOR

0° = 9440 Ohm

+10° = 5660 Ohm

+20° = 3500 Ohm

+30° = 2265 Ohm

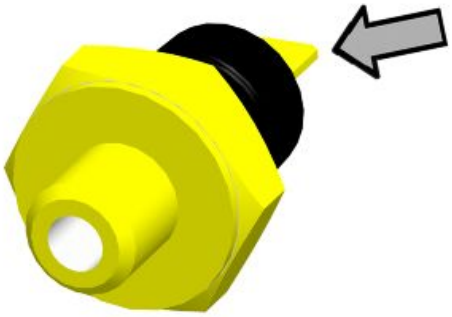
+80° = 357 Ohm

MINIMUM OIL PRESSURE SENSOR

Normally closed switch

Activation threshold: 0.3 - 0.6 bar

With the engine off: continuity between terminal and ground



HV COIL

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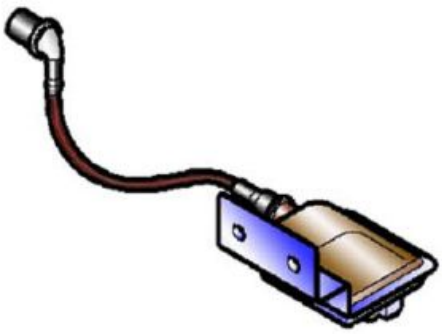
- Resistance of the primary = 0.5 Ohm ± 8%
- Resistance between primary and ground = infinite
- Resistance between primary and HV output = 3.1 KOhm ± 9%
- Presence of battery voltage between pins 22 and 26 of the interface cable harness upon shifting to ON and for 2 sec.

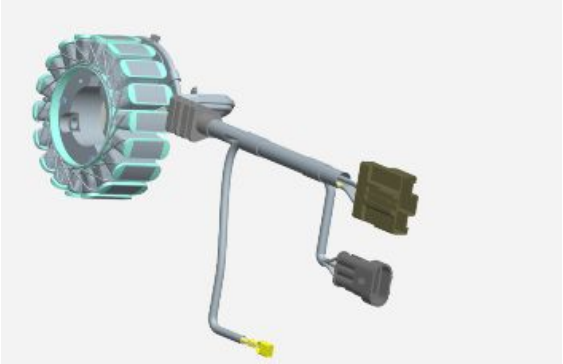


STATOR

Power: 450 W

Resistance between terminals: 0.2 to 1 Ohm

terminal insulation from ground



Frame and suspensions

CHASSIS AND SUSPENSION

Specification	Desc./Quantity
Chassis	Stamped plate body with welded structural reinforcements.
Front suspension	Single arm with helical spring and single double-acting hydraulic shock absorber.
Front suspension travel	70.3 mm
Rear suspension	Double-acting shock absorber, adjustable to four positions at preloading.
Rear suspension travel	83 mm

Brakes

BRAKES

Specification	Desc./Quantity
Front brake	Ø 200-mm disc brake with hydraulic control activated by handlebar right-side lever.
Rear brake	Ø 110-mm drum brake with mechanical control activated by handlebar left-side lever.

Wheels and tyres

WHEELS AND TYRES

Specification	Desc./Quantity
Front wheel rim	Die-cast aluminium alloy, 2.50x11"
Front tyre	Tubeless, 110/70-11" 45L
Rear wheel rim	Die-cast aluminium alloy, 3.00 x 10"
Rear tyre	Tubeless, 120/70-10" 54L

Specification	Desc./Quantity
Front tyre pressure	1.6 bar
Rear tyre pressure	2 bar
Rear wheel pressure (rider and passenger):	2.3 bar

N.B.

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE. REGULATE PRESSURE ACCORDING TO THE WEIGHT OF BOTH RIDER AND ACCESSORIES

Tightening Torques

LUBRICATION

Name	Torque in Nm
Hub oil drainage cap	15 to 17
Minimum oil pressure sensor	12 to 14
Oil filter	4 to 6
Oil pump cover screws	5 to 6
Screws fixing oil pump to the crankcase	5 to 6
Oil pump command sprocket screws	10 to 14
Chain cover screws	4 to 6
Oil sump screws	10 to 14
Minimum oil pressure sensor	12 to 14
Blow-by recovery duct fixing screws	3 - 4
Engine oil drainage plug/ mesh filter	24 to 30

MUFFLER

Name	Torque in Nm
Muffler heat guard fixing screw	4 to 5
Screws fixing exhaust pipe to the crankcase	24 to 27
Lambda probe tightening on exhaust manifold	40 to 50

HEAD AND CYLINDER

Name	Torque in Nm
Ignition spark plug	12 to 14
Head cover screws	11 to 13
Nuts fixing head to cylinder (*)	28 to 30
Head fixing screws (external)	11 to 13
Starter ground screw	7 to 8.5
Flywheel cover screw	1 to 2
Flywheel air duct screw	3 to 4
Pressure reducer counterweight retainer	7 to 8.5
Camshaft sprocket screw	12 to 14
Timing chain tensioner slider screw	10 to 14
Start up counterweight support screw	11 to 15
Tensioner screws	11 to 13
Timing chain tensioner central screw	5 to 6
Camshaft retention plate screw	4 to 6
Nut fixing muffler to cylinder head	16 to 18
Head intake manifold screw	11 to 13

(*) Lubricate the retainer threads before fitting and lock in a crossed sequence and repeat tightening 2 or 3 times.

TRANSMISSION

Name	Torque in Nm
Drive pulley nut	75 to 83
Transmission cover screw	11 to 13
Driven pulley shaft nut	54 to 60
Rear hub cap screw	24 to 27
Clutch unit nut on driven pulley	45 to 50
Hub oil drainage screw	15 to 17

FLYWHEEL

Name	Torque in Nm
Flywheel fan screws	3 to 4
Stator assembly screws (°)	3 to 4
Flywheel nut	52 to 58
Pick-up screw	3 to 4

(°) Apply LOCTITE 242 threadlock

CRANKCASE AND CRANKSHAFT

Name	Torque in Nm
Internal engine crankcase bulkhead (transmission-side half shaft) screws	4 to 6
Oil filter on crankcase fitting	27 to 33
Rear brake cam tightening screw	11 to 13
Engine-crankcase coupling screws	11 to 13
Pre-filter cap	24 to 30
Starter motor fixing screw	11 to 13

STEERING ASSEMBLY

Name	Torque in Nm
Upper steering ring nut	35 to 40
Lower steering ring nut	12 to 14
Handlebar fixing screw	50 to 55

CHASSIS ASSEMBLY

Name	Torque in Nm
Swinging arm - chassis pin	44 to 52
Engine-swinging arm pin	33 to 41
Stand bolt	32 to 40
Swinging arm silent-block containment bolt	33 to 41

FRONT SUSPENSION

Name	Torque in Nm
Shock absorber upper nut	20 to 30
Front wheel axle nut	75 to 90
Shock absorber upper bracket bolts	20 to 25
Wheel screw	20 to 25
Shock absorber lower bolts (°)	20 to 27

(°) Apply LOCTITE 242 threadlock

FRONT BRAKE

Name	Torque in Nm
Brake fluid pump-hose fitting	8 to 12
Brake fluid pipe-calliper fitting	20 to 25
Screw tightening calliper to support	20 to 25
Brake disc screw (°)	5 to 6.5
Oil bleed valve (on the calliper)	10 to 12
Handlebar pump	7 to 10
Brake pump reservoir screw	15 to 20

(°) Apply LOCTITE 242 threadlock

REAR SUSPENSION

Name	Torque in Nm
Rear wheel axle	104 to 126
Shock absorber lower clamping	33 to 41
Shock-absorber/chassis nut	20 to 25

Overhaul data

Assembly clearances

Cylinder - piston assy.

Version 150

COUPLING BETWEEN (ASSO-WERKE) PISTON AND CYLINDER (150)

Name	Initials	Cylinder	Piston	Play on fitting
Coupling	A	62.580 to 62.587	62.533 to 62.540	0.040 to 0.054
Coupling	B	62.587 to 62.594	62.540 to 62.547	0.040 to 0.054
Coupling	C	62.594 to 62.601	62.547 to 62.554	0.040 to 0.054
Coupling	D	62.601 to 62.608	62.554 to 62.561	0.040 to 0.054
Coupling 1st oversize	A1	62.780 to 62.787	62.733 to 62.740	0.040 to 0.054
Coupling 1st oversize	B1	62.787 to 62.794	62.740 to 62.747	0.040 to 0.054
Coupling 1st oversize	C1	62.794 to 62.801	62.747 to 62.754	0.040 to 0.054
Coupling 1st oversize	D1	62.801 to 62.808	62.754 to 62.761	0.040 to 0.054
Coupling 2nd oversize	A2	62.980 to 62.987	62.933 to 62.940	0.040 to 0.054
Coupling 2nd oversize	B2	62.987 to 62.994	62.940 to 62.947	0.040 to 0.054
Coupling 2nd oversize	C2	62.994 to 63.001	62.947 to 62.954	0.040 to 0.054
Coupling 2nd oversize	D2	63.001 to 63.008	62.954 to 62.961	0.040 to 0.054
Coupling 3rd oversize	A3	63.180 to 63.187	63.133 to 63.140	0.040 to 0.054
Coupling 3rd oversize	B3	63.187 to 63.194	63.140 to 63.147	0.040 to 0.054
Coupling 3rd oversize	C3	63.194 to 63.201	63.147 to 63.154	0.040 to 0.054
Coupling 3rd oversize	D3	63.201 to 63.208	63.154 to 63.161	0.040 to 0.054

COUPLING BETWEEN (RIGHT WAY) PISTON AND CYLINDER (150)

Name	Initials	Cylinder	Piston	Play on fitting
Coupling	A	62.580 to 62.587	62.541 to 62.548	0.032 to 0.046
Coupling	B	62.587 to 62.594	62.548 to 62.555	0.032 to 0.046
Coupling	C	62.594 to 62.601	62.555 to 62.562	0.032 to 0.046
Coupling	D	62.601 to 62.608	62.562 to 62.569	0.032 to 0.046

125 version

COUPLING BETWEEN PISTON AND ALUMINIUM CYLINDER WITH CAST IRON LINER (125)

Name	Initials	Cylinder	Piston	Play on fitting
Coupling	A	56.980 to 56.987	56.933 to 56.940	0.040 - 0.054
Coupling	B	56.987 to 56.994	56.940 to 56.947	0.040 - 0.054
Coupling	C	56.994 to 57.001	56.947 to 56.954	0.040 - 0.054
Coupling	D	57.001 to 57.008	56.954 to 56.961	0.040 - 0.054
Coupling 1st oversize	A1	57.180 to 57.187	57.133 to 57.140	0.040 - 0.054
Coupling 1st oversize	B1	57.187 to 57.194	57.140 to 57.147	0.040 - 0.054
Coupling 1st oversize	C1	57.194 to 57.201	57.147 to 57.154	0.040 - 0.054
Coupling 1st oversize	D1	57.201 to 57.208	57.154 to 57.161	0.040 - 0.054
Coupling 2nd oversize	A2	57.380 to 57.387	57.333 to 57.340	0.040 - 0.054
Coupling 2nd oversize	B2	57.387 to 57.394	57.340 to 57.347	0.040 - 0.054
Coupling 2nd oversize	C2	57.394 to 57.401	57.347 to 57.354	0.040 - 0.054
Coupling 2nd oversize	D2	57.401 to 57.408	57.354 to 57.361	0.040 - 0.054
Coupling 3rd oversize	A3	57.580 to 57.587	57.533 to 57.540	0.040 - 0.054
Coupling 3rd oversize	B3	57.587 to 57.594	57.540 to 57.547	0.040 - 0.054
Coupling 3rd oversize	C3	57.594 to 57.601	57.547 to 57.554	0.040 - 0.054
Coupling 3rd oversize	D3	57.601 to 57.608	57.554 to 57.561	0.040 - 0.054

PISTON TO CAST IRON CYLINDER COUPLING (125)

Name	Initials	Cylinder	Piston	Play on fitting
Coupling	M	56.997 to 57.004	56.944 to 56.951	0.046 to 0.060
Coupling	N	57.004 to 57.011	56.951 to 56.958	0.046 to 0.060
Coupling	O	57.011 to 57.018	56.958 to 56.965	0.046 to 0.060
Coupling	P	57.018 to 57.025	56.965 to 56.972	0.046 to 0.060
Coupling 1st oversize	M1	57.197 to 57.204	57.144 to 57.151	0.046 to 0.060
Coupling 1st oversize	N1	57.204 to 57.211	57.151 to 57.158	0.046 to 0.060
Coupling 1st oversize	O1	57.211 to 57.218	57.158 to 57.165	0.046 to 0.060
Coupling 1st oversize	P1	57.218 to 57.225	57.165 to 57.172	0.046 to 0.060
Coupling 2nd oversize	M2	57.397 to 57.404	57.344 to 57.351	0.046 to 0.060
Coupling 2nd oversize	N2	57.404 to 57.411	57.351 to 57.358	0.046 to 0.060
Coupling 2nd oversize	O2	57.411 to 57.418	57.358 to 57.365	0.046 to 0.060
Coupling 2nd oversize	P2	57.418 to 57.425	57.365 to 57.372	0.046 to 0.060
Coupling 3rd oversize	M3	57.597 to 57.604	57.544 to 57.551	0.046 to 0.060
Coupling 3rd oversize	N3	57.604 to 57.611	57.551 to 57.558	0.046 to 0.060
Coupling 3rd oversize	O3	57.611 to 57.618	57.558 to 57.565	0.046 to 0.060
Coupling 3rd oversize	P3	57.618 to 57.625	57.565 to 57.572	0.046 to 0.060

Piston rings

SEALING RINGS (125)

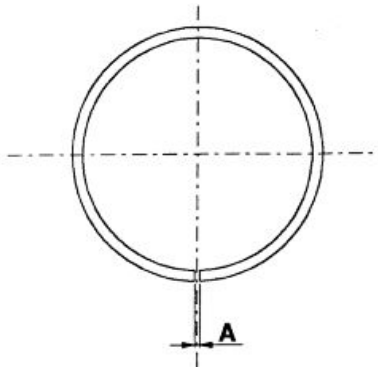
Name	Description	Dimensions	Initials	Quantity
Compression ring		57 x 1	A	0.15 to 0.30
Oil scraper ring		57x1	A	0.10 to 0.30
Oil scraper ring		57x2.5	A	0.10 to 0.35
Compression ring 1st oversize		57.2 x 1	A	0.15 to 0.30
Oil scraper ring 1st oversize		57.2x1	A	0.10 to 0.30
Oil scraper ring 1st oversize		57.2x2.5	A	0.10 to 0.35
Compression ring 2nd oversize		57.4x1	A	0.15 to 0.30
Oil scraper ring 2nd oversize		57.4x1	A	0.10 to 0.30
Oil scraper ring 2nd oversize		57.4x2.5	A	0.10 to 0.35
Compression ring 3rd oversize		57.6x1	A	0.15 to 0.30
Oil scraper ring 3rd oversize		57.6x1	A	0.10 to 0.30
Oil scraper ring 3rd oversize		57.6x2.5	A	0.10 to 0.35

Maximum clearance after use: 1 mm

SEALING RINGS (150)

Name	Description	Dimensions	Initials	Quantity
Compression ring		62.6x1	A	0.15 to 0.30
Oil scraper ring		62.6x1	A	0.20 to 0.40
Oil scraper ring		62.6x2.5	A	0.20 to 0.40
Compression ring 1st oversize		62.8x1	A	0.15 to 0.30
Oil scraper ring 1st oversize		62.8x1	A	0.20 to 0.40
Oil scraper ring 1st oversize		62.8x2.5	A	0.20 to 0.40
Compression ring 2nd oversize		63.0 x 1	A	0.15 to 0.30
Oil scraper ring 2nd oversize		63.0 x 1	A	0.20 to 0.40
Oil scraper ring 2nd oversize		63.0 x 2.5	A	0.20 to 0.40

Name	Description	Dimensions	Initials	Quantity
Compression ring 3rd oversize		63.2 x 1	A	0.15 to 0.30
Oil scraper ring 3rd oversize		63.2 x 1	A	0.20 to 0.40
Oil scraper ring 3rd oversize		63.2 x 2.5	A	0.20 to 0.40



Crankcase - crankshaft - connecting rod

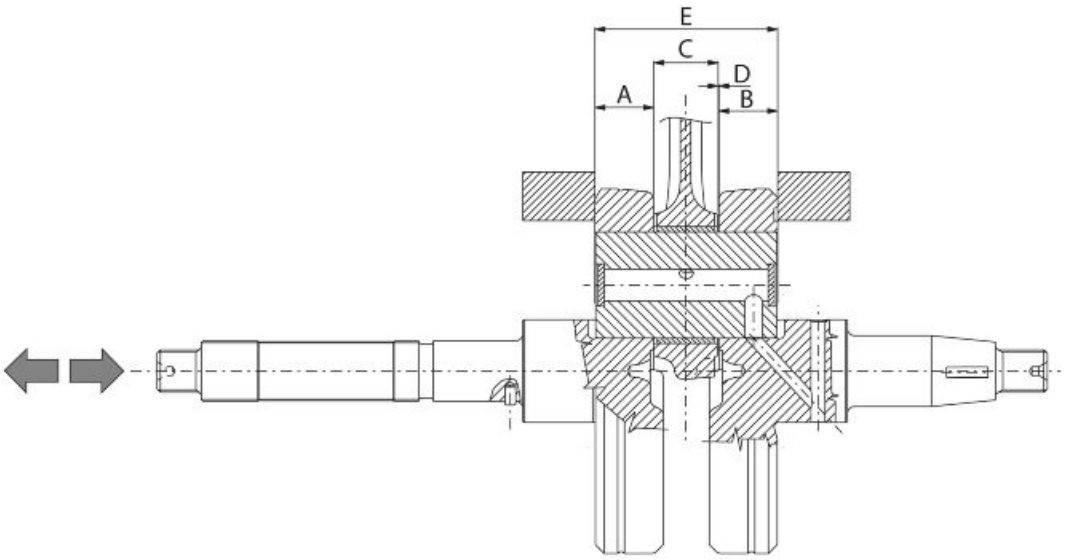
AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CONNECTING ROD

Name	Description	Dimensions	Initials	Quantity
Transmissionside half-shaft		16.6 +0-0.05	A	D = 0.20 to 0.50
Flywheel-side halfshaft		16.6 +0-0.05	B	D = 0.20 to 0.50
Connecting rod with PP		18 -0.10 -0.15	C	0.20 to 0.50
Crank pin width		51.400	E	

AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CRANKSHAFT HALF-BEARINGS

Name	Description	Dimensions	Initials	Quantity
Crankshaft			Category 1	28.998 to 29.004
Crankshaft			Category 2	29.004 to 29.010
Crankcase			Category 1	32.953 to 32.959
Crankcase			Category 2	32.959 to 32.965
Crankshaft half-bearing			Category B - blue	1.973 to 1.976
Crankshaft half-bearing			Category C - yellow	1.976 to 1.979
Crankshaft half-bearing			Category E - green	1.979 to 1.982
Crankshaft category 1 - Crankcase category 1			E - E	
Crankshaft category 1 - Crankcase category 2			C - C	
Crankshaft category 2 - Crankcase category 1			C - C	
Crankshaft category 2 - Crankcase category 2			B - B	

Crankshaft/crankcase axial clearance: 0.15 to 0.40



Slot packing system

- Provisionally fit the piston into the cylinder, without any base gasket.
- Assemble a dial gauge on the specific tool
- Set the dial gauge to zero at a contrast plane with an average preload, for example 5 mm. Keeping the zero setting position, fit the tool on the cylinder and lock it with 2 nuts, as shown in the figure.
- Rotate the crankshaft up to the TDC (the inversion point of the dial gauge rotation)
- Calculate the difference between the two measurements: use the chart below to identify the thickness of the cylinder base gasket to be used for refitting. Correctly identify the cylinder base gasket thickness to keep the correct compression ratio.
- Remove the special tool and the cylinder.

Characteristic

Compression ratio (125/150)

10.6 ± 0.5 to 1

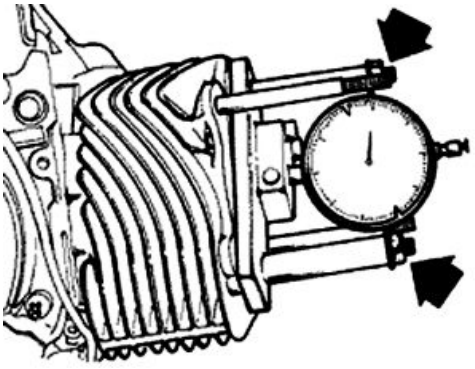
SHIMMING SYSTEM (125)

Specification	Desc./Quantity
Value measured	0 to 0.1
Thickness	0.8 ± 0.05
Value measured	0.1 to 0.3
Thickness	0.6 ± 0.05
Value measured	0.3 - 0.4
Thickness	0.4 ± 0.05

SHIMMING SYSTEM (150)

Specification	Desc./Quantity
Value measured	1 to 1.1
Thickness	0.8 ± 0.05
Value measured	1.1 to 1.3
Thickness	0.6 ± 0.05

Specification	Desc./Quantity
Value measured	1.3 to 1.4
Thickness	0.4 ± 0.05



Products

RECOMMENDED PRODUCTS TABLE

Product	Description	Specifications
AGIP ROTRA 80W-90	Rear hub oil	SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications
AGIP BRAKE 4	Brake fluid	FMVSS DOT 4 Synthetic fluid
AGIP CITY HI TEC 4T	Oil to lubricate flexible transmissions (brakes, throttle control and odometer)	Oil for 4-stroke engines
AGIP FILTER OIL	Oil for air filter sponge	Mineral oil with specific additives for increased adhesiveness
AGIP CITY HI TEC 4T	Engine oil	SAE 5W-40, API SL, ACEA A3, JASO MA Synthetic oil
AGIP GREASE MU3	Grease for odometer transmission gear case	Soap-based lithium grease with NLGI 3; ISO-L-XBCHA3, DIN K3K-20
AGIP GP 330	Grease for brake control levers, throttle, stand	White calcium complex soap-based spray grease with NLGI 2; ISO-L-XBCIB2

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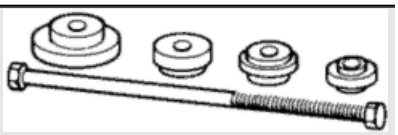
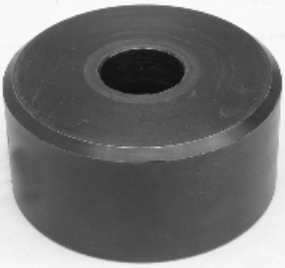
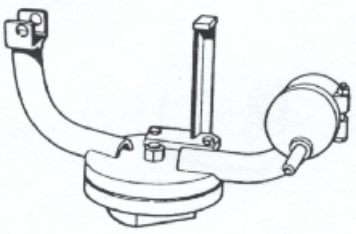
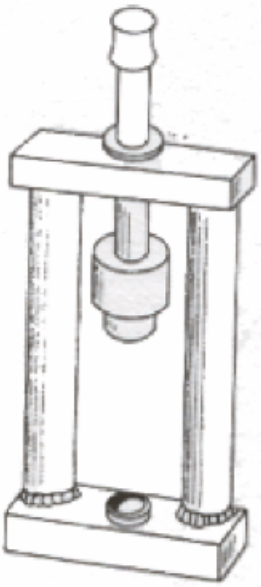
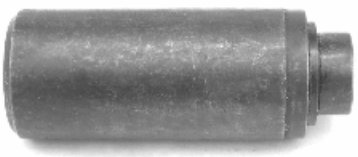
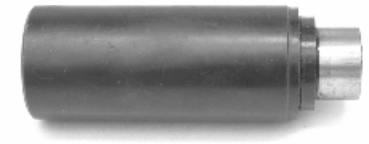
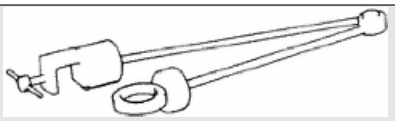
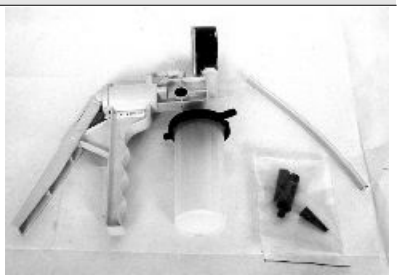
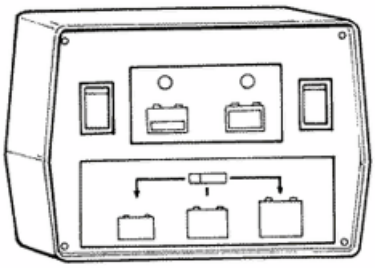
SPECIFIC TOOLS

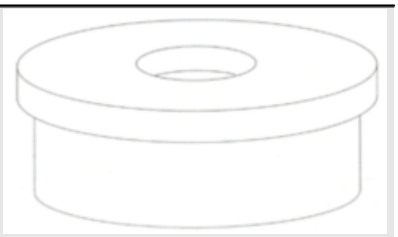
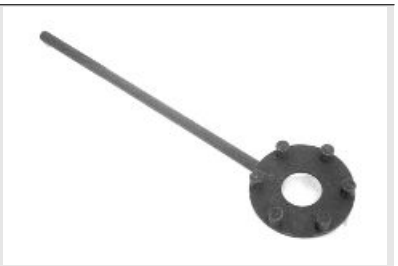
Stores code	Description	
001330Y	Tool for fitting steering seats	
001467Y009	Driver for OD 42-mm bearings	
001467Y013	Pliers to extract ø 15-mm bearings	
001467Y014	Pliers to extract ø 15-mm bearings	
001467Y017	Bell for bearings, OD 39 mm	
002465Y	Pliers for circlips	
005095Y	Engine support	

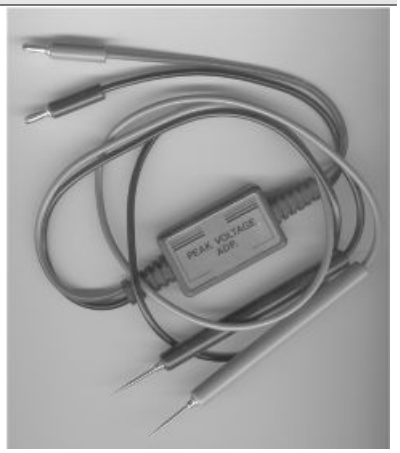
Stores code	Description	
006029Y	Punch for fitting fifth wheel seat on steering tube	
008564Y	Flywheel extractor	
020004Y	Punch for removing fifth wheels from headstock	
020021Y	Front suspension service tool	
020036Y	Punch	
020037Y	Punch	

Stores code	Description	
020038Y	Punch	
020055Y	Wrench for steering tube ring nut	
020074Y	Support base for checking crankshaft alignment	
020150Y	Air heater mounting	
020151Y	Air heater	
020193Y	Oil pressure check gauge	
020262Y	Crankcase splitting plate	

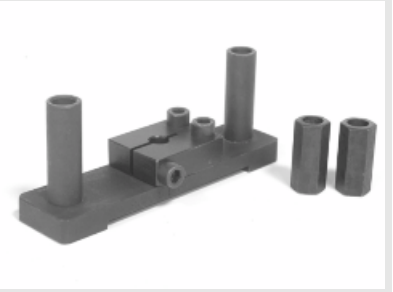
Stores code	Description	
020263Y	Driven pulley assembly sheath	
020306Y	Punch for assembling valve seal rings	
020325Y	Pliers for brake-shoe springs	
020329Y	Mity-Vac vacuum-operated pump	
020330Y	Stroboscopic light to check timing	
020331Y	Digital multimeter	

Stores code	Description	
020332Y	Digital rpm indicator	
020333Y	Single battery charger	
020334Y	Multiple battery charger	
020335Y	Magnetic mounting for dial gauge	
020357Y	32x35-mm Adaptor	
020359Y	42x47-mm Adaptor	

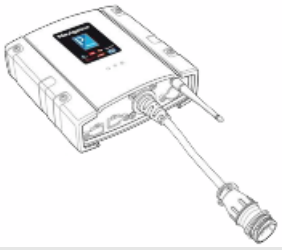
Stores code	Description	
020360Y	52x55-mm Adaptor	
020363Y	20-mm guide	
020364Y	25-mm guide	
020365Y	22 mm guide	
020368Y	driving pulley lock wrench	

Stores code	Description	
020375Y	28 x 30 mm adaptor	
020376Y	Adaptor handle	
020382Y	Tool to extract valve cotters	
020382Y011	adapter for valve removal tool	
020409Y	Multimeter adaptor - Peak voltage detection	
020412Y	15-mm guide	

Stores code	Description	
020414Y	28-mm guide	
020423Y	Driven pulley lock wrench	
020424Y	Driven pulley roller casing fitting punch	
020425Y	Punch for flywheel-side oil seal	
020426Y	Piston fitting fork	
020456Y	Ø 24 mm adaptor	
020427Y	Piston assembly band	

Stores code	Description	
020428Y	Piston position check mounting	
020430Y	Pin lock fitting tool	
020431Y	Valve oil seal extractor	
020434Y	Oil pressure check fitting	
020441Y	26 x 28 mm adaptor	

Stores code	Description	
020439Y	17-mm guide	
020444Y	Tool for fitting/ removing the driven pulley clutch	
020469Y	Reprogramming kit for vehicle diagnostic tester	
020480Y	Petrol pressure check set	
020481Y	Control unit interface wiring	

Stores code	Description	
020565Y	Flywheel lock calliper spanner	
020622Y	Transmission-side oil guard punch	
020680Y	Diagnosis Tool	
020641Y	EFI Technology software upgrade	

INDEX OF TOPICS

Maintenance chart

MAINTENANCE TABLE

***I**: INSPECT AND CLEAN, ADJUST, LUBRICATE OR REPLACE, IF NECESSARY*
***C**: CLEAN, **R**: REPLACE, **A**: ADJUST, **L**: LUBRICATE*
** Check level every 3,000 km*
*** Replace every 2 years*

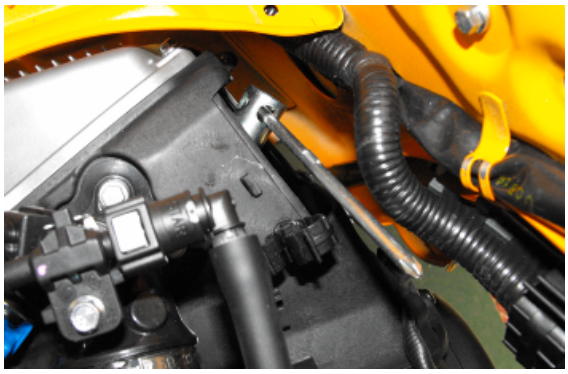
Km x 1,000	1	6	12	18	24	30	36	42	48	54	60
Safety locks	I		I		I		I		I		I
Spark plug		I	R	I	R	I	R	I	R	I	R
Centre stand		L	L	L	L	L	L	L	L	L	L
Driving belt		I	R	I	R	I	R	I	R	I	R
Throttle control	A		A		A		A		A		A
Air filter		C	C	C	C	C	C	C	C	C	C
Oil filter		R	R	R	R	R	R	R	R	R	R
Mesh oil filter	C	C	C	C	C	C	C	C	C	C	C
Valve clearance		A		A			A			A	
Electrical system and battery	I	I	I	I	I	I	I	I	I	I	I
Cylinder ventilation system					C				C		
Brake control levers	L		L		L		L		L		L
Brake fluid **	I	I	I	I	I	I	I	I	I	I	I
Engine oil *	R	R	R	R	R	R	R	R	R	R	R
Hub oil	R	I	I	I	R	I	I	I	R	I	I
Headlight aiming adjustment			A		A		A		A		A
Brake pads	I	I	I	I	I	I	I	I	I	I	I
Sliding blocks / variable speed rollers		I	R	I	R	I	R	I	R	I	R
Tyre pressure and wear	I	I	I	I	I	I	I	I	I	I	I
Vehicle test ride	I	I	I	I	I	I	I	I	I	I	I
Odometer gear			L		L		L		L		L
Suspension			I		I		I		I		I
Steering	A		A		A		A		A		A
Transmissions			L		L		L		L		L
Operation time	80'	150'	160'	150'	175'	95'	270'	95'	175'	150'	160'

Spark plug

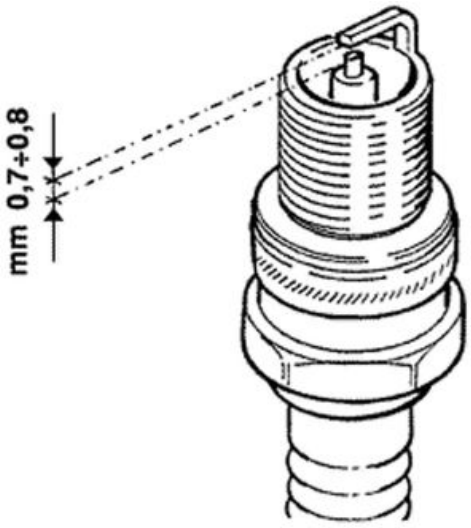
- Position the vehicle on the stand
- Open the saddle and remove the helmet compartment.
- Remove the spark plug external inspection door by undoing the indicated screw

- Disconnect spark plug HV cable hood and, acting on the engine compartment, release the cable from the retaining bracket.
- Slide the internal cover upwards.

- Unscrew the spark plug using the wrench supplied.



- Check the conditions of the spark plug, make sure the insulation is intact, that the electrodes are not excessively worn or sooty, the conditions of the washer, and measure the distance between the electrodes using the appropriate feeler gauge.
-Adjust the distance, if necessary, by bending the side electrode very carefully. In case of anomaly (as described before), replace the spark plug with another of the recommended type.



- Fit the spark plug with the correct inclination and manually screw it all the way down, then use the special spanner to tighten it.
- Refit the cover.
- Place the cap fully over the spark plug, and tie down the cable to the bracket.
- Carry out refit operations.

CAUTION

THE SPARK PLUG MUST BE REMOVED WHEN THE MOTOR IS COLD.THE SPARK PLUG MUST BE REPLACED EVERY 20,000 KM. THE USE OF NON CONFORMING ELECTRONIC IGNITION CONTROL UNITS OR SPARK PLUGS OTHER THAN THOSE PRESCRIBED CAN SERIOUSLY DAMAGE THE ENGINE.

Characteristic

Electrode gap

0.7 to 0.8 mm

Spark plug

NGK CR8EB (125) - NGK CR7EB (150)

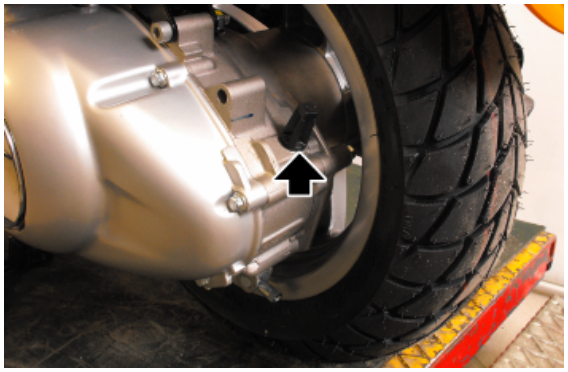
Locking torques (N*m)

Spark plug 12 to 14

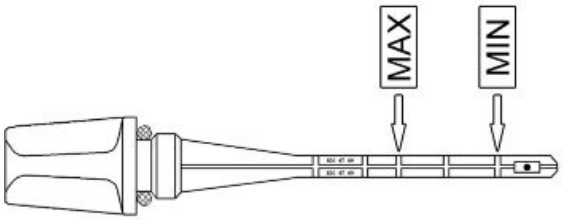
Hub oil

Check

- Park the vehicle on flat ground and rest it on the centre stand.
- Unscrew the oil dipstick/cover, dry it with a cloth and reinsert it **screwing it in thoroughly.**

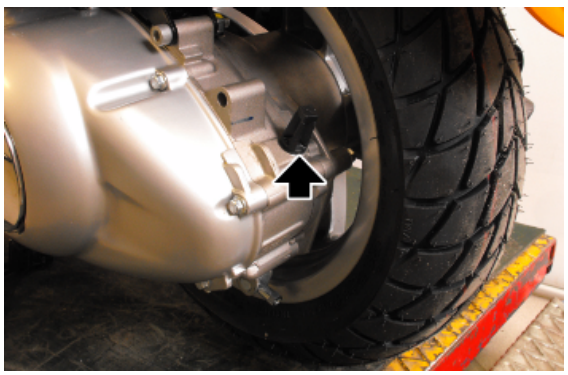


- Remove the dipstick/cover and check that the oil level is between MIN and MAX.
- If the level is below the MIN value, restore the proper amount of oil in the hub.
- Screw the oil dipstick back and check it is locked.

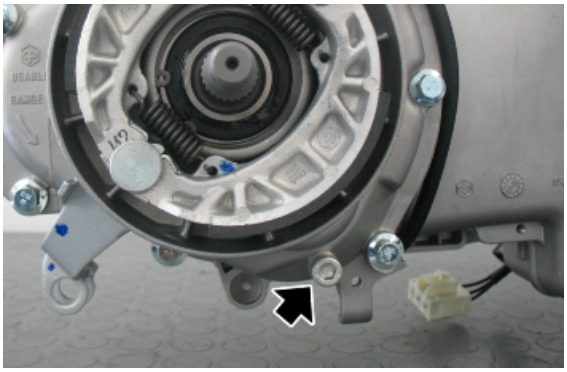


Replacement

- Remove the oil dipstick/cover.



- Remove the rear wheel.
- Unscrew the oil drainage plug and drain out all the oil.



- Screw in the drainage cap again and fill the hub with the prescribed oil.

Recommended products

AGIP ROTRA 80W-90 rear hub oil

SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications

Characteristic

Rear hub oil

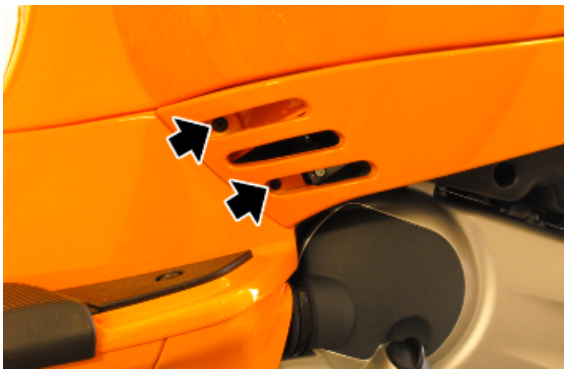
Capacity ~ 100cc

Locking torques (N*m)

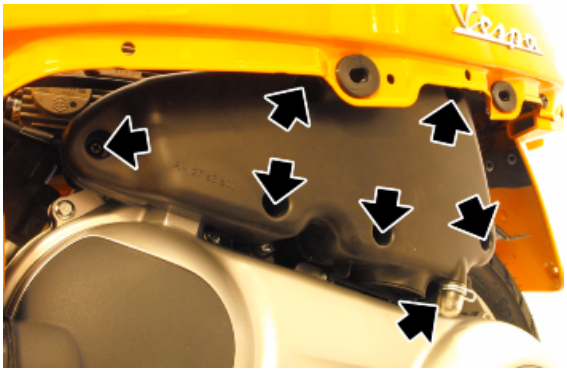
Hub oil drainage screw 15 to 17 Nm

Air filter

Proceed as follows:
- Undo the indicated fixing screws.
- Remove the left side fairing.



- Remove the helmet compartment.
- Undo the six screws and remove the air-box cover.
- Remove the filtering element and clean it with water and shampoo; then dry it with a clean cloth and short blasts of compressed air. Finally, immerse it in a mixture of 50% oil of the recommended type and 50% petrol. Then gently squeeze the



filter element between your hands, allow it to drip and then refit it. Possible oil or water deposits can be eliminated by removing the rubber lower cap.

CAUTION

IF THE VEHICLE IS USED ON DUSTY ROADS, IT IS NECESSARY TO SERVICE THE AIR FILTER MORE OFTEN TO AVOID DAMAGING THE ENGINE.

Recommended products

AGIP FILTER OIL Oil for air filter sponge

Mineral oil with specific additives for increased adhesiveness

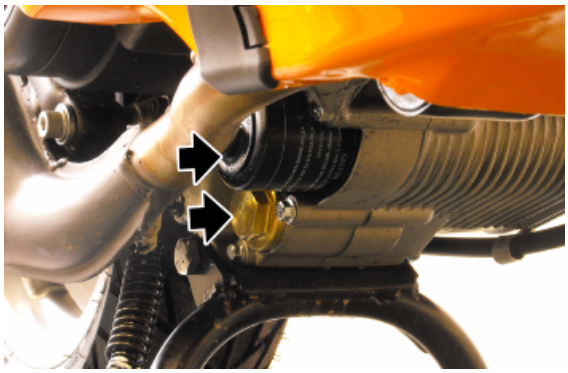
Engine oil

In 4T engines, the engine oil is used to lubricate the distribution elements, the bench bearings and the thermal group. **An insufficient quantity of oil can cause serious damage to the engine.**
In all 4T engines, the deterioration of the oil characteristics, or a certain consumption should be considered normal, especially if during the run-in period. Consumption levels in particular can be influenced by the conditions of use (e.g.: oil consumption increases when driving at "full throttle".

Replacement

Change oil and replace filter as indicated in the scheduled maintenance table. The engine must be emptied by draining off the oil through the drainage plug of the mesh pre-filter, flywheel side; furthermore to facilitate oil drainage, loosen or remove the cap/dipstick. Once all the oil has drained through the drainage hole, unscrew the oil cartridge filter and remove it.
Make sure the pre-filter and drainage plug O-rings are in good conditions.
Lubricate them and refit the mesh filter and the oil drainage plug, screwing them up to the prescribed torque.
Refit the new cartridge filter being careful to lubricate the O-ring before fitting it.
Change the engine oil.

Since a certain quantity of oil still remains in the circuit, oil must be filled from oil dipstick/cover. Then start up the vehicle, leave it running for a few minutes and switch it off: after five minutes check the level and if necessary top up without exceeding the **MAX** level. The cartridge filter must be replaced every time the oil is changed. Use new oil of the recommended type for topping up and changing purposes.



N.B.

THE ENGINE MUST BE HOT WHEN THE OIL IS CHANGED.

Recommended products

AGIP CITY HI TEC 4T Engine oil

SAE 5W-40 Synthetic oil that exceed the requirements of API SL, ACEA A3, JASO MA specifications

Check

This operation must be carried out with the engine cold and following the procedure below:

- Place the vehicle on its centre stand and on flat ground.
- Undo cap/dipstick, dry it off with a clean cloth and reinsert it, **screwing down completely**.
- Remove the cap/dipstick again and check that the level is between the MIN and MAX reference marks; top up if necessary.

The MAX level mark indicates a quantity of around 1100 cc of oil in the engine. If the check is carried out after the vehicle has been used, and therefore with a hot engine, the level will be lower; in order to carry out a correct check it is necessary to wait at least 10 minutes after the engine has been stopped, so as to get the correct level.

Oil top-up

The oil should be topped up after having checked the level and in any case by adding oil **without ever exceeding the MAX. level**.

Restoration of the level from **MIN** to **MAX** requires approximately **200 cc**.

Engine oil filter

The cartridge filter must be replaced every time the oil is changed. Use new oil of the recommended type for topping up and changing purposes.
Make sure the pre-filter and drainage plug O-rings are in good conditions. Lubricate them and refit the mesh filter and the oil drainage plug, screwing them up to the prescribed torque. Refit the new cartridge filter being careful to lubricate the O-ring before fitting it. Change the engine oil.

Recommended products

AGIP CITY HI TEC 4T Engine oil

SAE 5W-40 Synthetic oil that exceed the requirements of API SL, ACEA A3, JASO MA specifications

Oil pressure warning light

The vehicle is equipped with a warning light on the instrument panel that lights up when the key is turned to the «**ON**» position. However, this light should switch off once the engine has been started.

If the light turns on during braking, at idling speed or while turning a corner, it is necessary to check the oil level and the lubrication system.

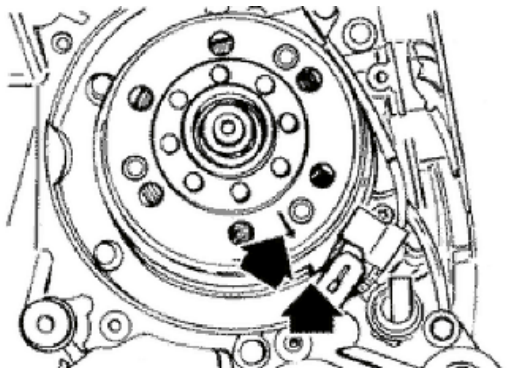
Checking the ignition timing

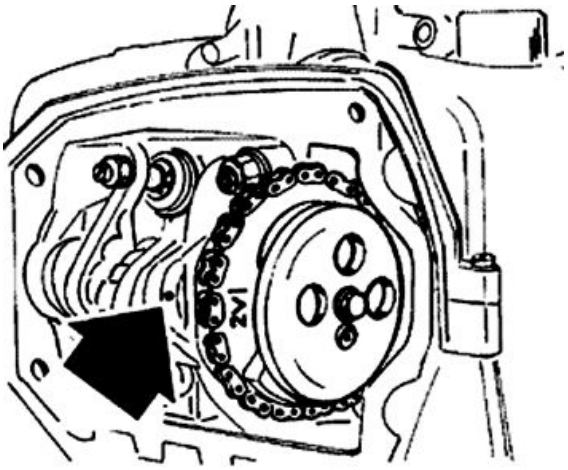
-Remove the flywheel fan.

-Rotate the flywheel until the reference (arrow) matches the crankcase operation end as shown in the figure (TDC). Make sure that the 2V reference point on the camshaft control pulley is aligned with the reference point on the head as shown in the second figure. If the reference mark is opposite the indicator on the head, make the crankshaft turn once more.

-The TDC reference mark is repeated also between the flywheel cooling fan and the flywheel cover.

To use this reference mark, remove the spark plug and turn the engine in the opposite direction to the normal direction of rotation using a compass spanner applied to the camshaft drive sprocket housing.





N.B.

TIME THE TIMING SYSTEM UNIT IF IT IS NOT IN PHASE.

Checking the valve clearance

-To check valve clearance, centre the reference marks of the timing system.

- Use a feeler gauge to check that the clearance between the valve and the register corresponds with the indicated values. When the valve clearance values, intake and exhaust respectively, are different from the ones indicated below, adjust them by loosening the lock nut and operate on the set screw with a screwdriver.

Characteristic

Valve clearance

Intake: 0.10 mm (when cold)

Exhaust: 0.15 mm (when cold)

Braking system

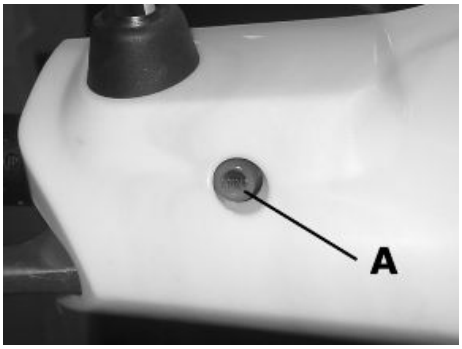
Level check

Proceed as follows:

- Rest the vehicle on its centre stand with the handlebars perfectly horizontal;

- Check the level of liquid with the related warning light «**A**».

A certain lowering of the level is caused by wear on the brake pads.

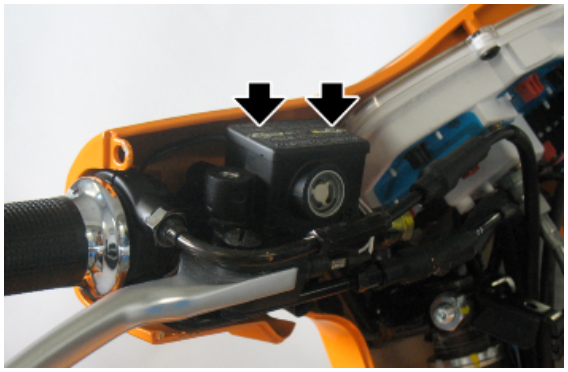


Top-up

Proceed as follows:

- Remove the front handlebar cover.

- Remove the reservoir cap by loosening the two screws, remove the gasket and top-up using only the fluid specified without exceeding the maximum level.



CAUTION

ONLY USE DOT 4-CLASSIFIED BRAKE FLUID.

CAUTION

AVOID CONTACT OF THE BRAKE FLUID WITH YOUR EYES, SKIN, AND CLOTHING. IN CASE OF ACCIDENTAL CONTACT, WASH WITH WATER.

CAUTION

BRAKING CIRCUIT FLUID IS HIGHLY CORROSIVE; MAKE SURE THAT IT DOES NOT COME INTO CONTACT WITH THE PAINTWORK.

CAUTION

BRAKE FLUID IS HYGROSCOPIC; THAT IS, IT ABSORBS MOISTURE FROM THE SURROUNDING AIR. IF THE CONTENT OF MOISTURE IN THE BRAKE FLUID EXCEEDS A CERTAIN VALUE, BRAKING WILL BE INEFFICIENT.
NEVER USE BRAKE FLUID FROM OPEN OR PARTIALLY USED CONTAINERS.
UNDER NORMAL CLIMATIC CONDITIONS, REPLACE FLUID AS INDICATED IN THE SCHEDULED MAINTENANCE TABLE.

N.B.

SEE THE BRAKING SYSTEM CHAPTER WITH REGARD TO THE CHANGING OF BRAKE FLUID AND THE BLEEDING OF AIR FROM THE CIRCUITS.

Recommended products

AGIP BRAKE 4 Brake fluid

FMVSS DOT 4 Synthetic fluid

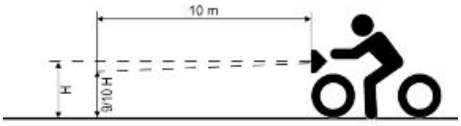
Locking torques (N*m)

Brake pump reservoir screws 15 ÷ 20

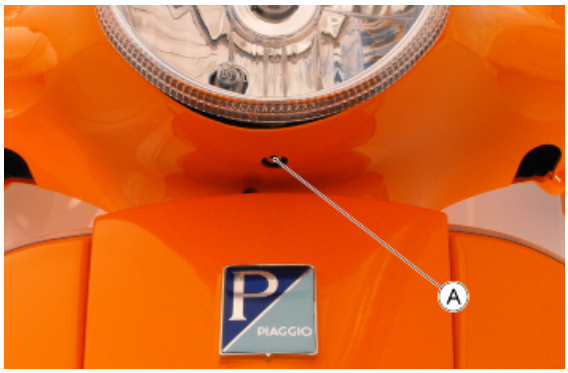
Headlight adjustment

Proceed as follows:

1. Place the vehicle, in running order and with the tyres inflated to the prescribed pressure, on a flat surface 10-m away from a white screen situated in a shaded area, making sure that the longitudinal axis of the scooter is perpendicular to the screen;



2. Turn on the headlight and check that the borderline of the projected light beam on the screen is not higher than 9/10 or lower than 7/10 of the distance from the ground to the centre of vehicle headlamp;



3. If otherwise, adjust the right headlight with screw «**A**».

N.B.

THE ABOVE PROCEDURE COMPLIES WITH THE EUROPEAN STANDARDS REGARDING MAXIMUM AND MINIMUM HEIGHT OF LIGHT BEAMS. REFER TO THE STATUTORY REGULATIONS IN FORCE IN EVERY COUNTRY WHERE THE VEHICLE IS USED.

INDEX OF TOPICS

Engine

Poor performance

POOR PERFORMANCE

Possible Cause	Operation
Air filter blocked or dirty.	Remove the sponge, wash with water and car shampoo, then soak it in a mixture of 50% petrol and 50% specific oil. Press with your hand without squeezing, allow it to drip dry and refit.
Excessive driving belt wear	Check it and replace, if necessary
Lack of compression: parts, cylinder and valves worn	Replace the worn parts
Oil level exceeds maximum	Check for causes and fill to reach the correct level
Excess of scales in the combustion chamber	Descale the cylinder, the piston, the head and the valves
Incorrect timing or worn timing system elements	Time the system again or replace the worn parts
Muffler obstructed	Replace
Inefficient automatic transmission	Check the rollers and the pulley movement, replace the damaged parts and lubricate the movable guide of the driven pulley with grease.
Wrong valve adjustment	Adjust the valve clearance properly
Overheated valves	Remove the head and the valves, grind or replace the valves
Valve seat distorted	Replace the head unit
Worn cylinder, Worn or broken piston rings	Replace the piston cylinder assembly or just the piston rings

Starting difficulties

START-UP PROBLEMS

Possible Cause	Operation
Flat battery	Check the state of the battery. If it shows signs of sulphation, replace it and bring the new battery into service by charging it for not more than ten hours at a current of 1/10 of the capacity of the battery itself.
Faulty spark plug	Replace the spark plug
Incorrect valve sealing or valve adjustment	Inspect the head and/or restore the correct clearance
Starter motor and start-up system fault	Check starter motor.
Altered fuel characteristics	Drain off the fuel no longer up to standard; then, refill
Air filter obstructed or dirty.	Remove the sponge, wash with water and car shampoo, then soak it in a mixture of 50% petrol and 50% specific oil. Press with your hand without squeezing, allow it to drip dry and refit.
Fuel pump fault	Check the pump.

Excessive oil consumption/Exhaust smoke

EXCESSIVE CONSUMPTION

Possible Cause	Operation
Wrong valve adjustment	Adjust the valve clearance properly
Overheated valves	Remove the head and the valves, grind or replace the valves
Misshapen/worn valve seats	Replace the head unit
Worn cylinder, Worn or broken piston rings	Replace the piston cylinder assembly or piston rings
Worn or broken piston rings or piston rings that have not been fitted properly	Replace the piston cylinder unit or just the piston rings
Oil leaks from the couplings or from the gaskets	Check and replace the gaskets or restore the coupling seal
Worn valve oil seal	Replace the valve oil seal
Worn valve guides	Check and replace the head unit if required

Insufficient lubrication pressure

LOW LUBRICATION PRESSURE

Possible Cause	Operation
By-Pass remains open	Check the By-Pass and replace if required. Carefully clean the By-Pass area.
Oil pump with excessive clearance	Perform the dimensional checks on the oil pump components
Oil filter too dirty	Replace the cartridge filter
Oil level too low	Restore the level adding the recommended oil type

Transmission and brakes

Clutch grabbing or performing inadequately

IRREGULAR CLUTCH PERFORMANCE OR SLIPPAGE

Possible Cause	Operation
Slippage or irregular functioning	Check that there is no grease on the masses. Check that the faying surface between the clutch masses and the clutch bell is mainly in the middle and with equivalent specifications on the three masses. Check that the clutch bell is not scored or worn abnormally

Insufficient braking

INEFFICIENT OR NOISY BRAKING

Possible Cause	Operation
Worn brake pads or shoes	Replace the brake pads or shoes and check for brake disk or drum wear conditions.
Front brake disk loose or deformed	Check the brake disc screws are locked; use a dial gauge and a wheel mounted on the vehicle to measure the axial deviation of the disc.
Air bubbles inside the hydraulic braking system	Carefully bleed the hydraulic braking system, (there must be no flexible movement of the brake lever).
Fluid leakage in hydraulic braking system	Failing elastic fittings, plunger or brake pump seals, replace
Excessive backlash in the rear brake control cable	Adjust the backlash with the appropriate adjuster located on the back part of the crankcase.

Brakes overheating

BRAKE OVERHEAT

Possible Cause	Operation
Rubber gaskets swollen or stuck	Replace gaskets.
Compensation holes on the pump clogged	Clean carefully and blast with compressed air
Brake disc slack or distorted	Check the brake disc screws are locked; use a dial gauge and a wheel mounted on the vehicle to measure the axial deviation of the disc.
Defective piston sliding	Check calliper and replace any damaged part.

Electrical system

Battery

BATTERY

Possible Cause	Operation
Battery	The battery is the electrical device in the system that requires the most frequent inspections and thorough maintenance. If the vehicle is not used for some time (1 month or more) the battery needs to be recharged periodically. The battery runs down completely in the course of 5 to 6 months. If the battery is fitted on a motorcycle, be careful not to invert the connections, keeping in mind that the black ground wire is connected to the negative terminal while the red wire is connected to the terminal marked+. Follow the instructions in the ELECTRICAL SYSTEM chapter for the recharging of the batteries.

Steering and suspensions

Heavy steering

STEERING HARDENING

Possible Cause	Operation
Steering hardening	Check the tightening of the top and bottom ring nuts. If irregularities continue in turning the steering even after making the above adjustments, check the seats in which the ball bearings rotate: replace them if they are recessed or if the balls are flattened.

Excessive steering play

EXCESSIVE STEERING CLEARANCE

Possible Cause	Operation
Excessive steering clearance	Check the tightening of the top ring nut. If irregularities continue in turning the steering even after making the above adjustments, check the seats in which the ball bearings rotate: replace if they are recessed.

Noisy suspension

NOISY SUSPENSION

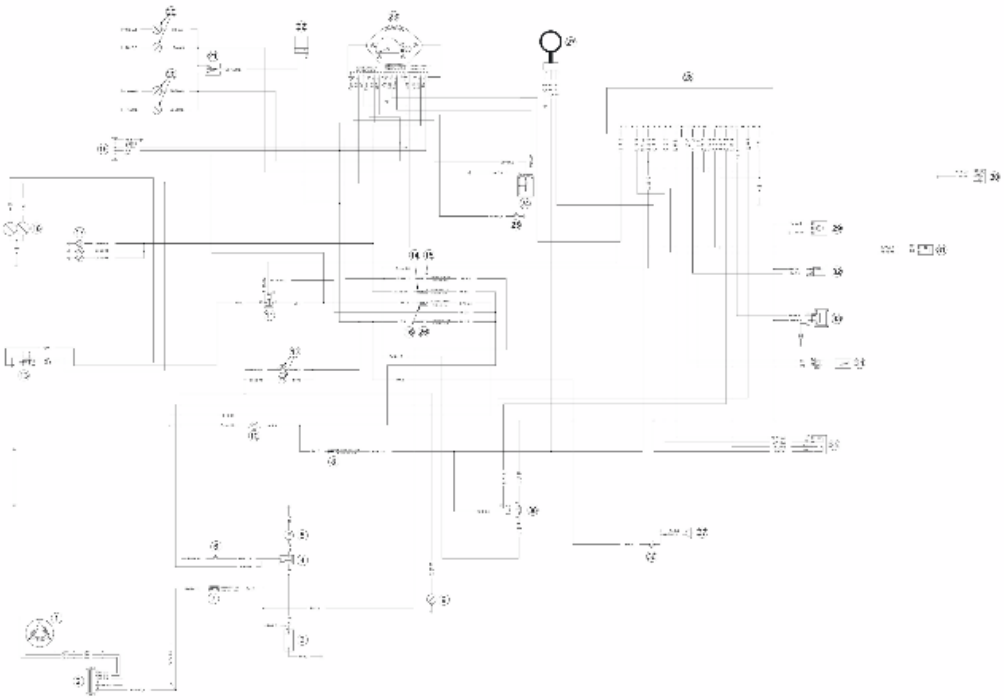
Possible Cause	Operation
Noisy suspension	If the front suspension is noisy, check: that the front shock absorber works properly and the ball bearings are good condition. Finally, check the locking torque of the wheel axle nut, the brake calliper and the disc. Check that the swinging arm connecting the engine to the chassis and the rear shock absorber work properly.

Suspension oil leakage

OIL LEAKAGE FROM SUSPENSION

Possible Cause	Operation
Faulty or broken seals	Replace the shock absorber Check the condition of wear of the steering covers and the adjustments.

INDEX OF TOPICS



Key:

1. Magneto flywheel

2. Voltage regulator

3. 12V-10Ah Battery

4. Start-up remote control switch

5. Starter motor

6. Starter button

7. Fuse No. 1 - 20A

8. Fuse No. 2 - 7.5A

9. Stop light bulb

10. Key switch contacts

11. Headlight remote control

12. Stop buttons

13. Light switch

14. Fuse No. 5 - 7.5A

15. Fuse No. 6 - 7.5A

16. Fuse No. 4 - 10A

17. Front and rear daylight running lights and license plate light

18. Headlight with twin-filament bulb

19. Pre-installation for anti-theft device

20. Turn indicator bulbs

21. Turn indicator switch

22. Turn indicator control device

23. Instrument panel

24. Fuel level transmitter

25. Oil pressure sensor

26. Fuse No. 3 - 10A

27. Immobilizer aerial

28. Injection electronic control unit

29. Fuel system pump

30. Diagnostics socket

31. Engine temperature sensor

32. Fuel injector

33. HV coil

34. Engine speed sensor

35. Lambda probe

36. Horn button

37. Horn

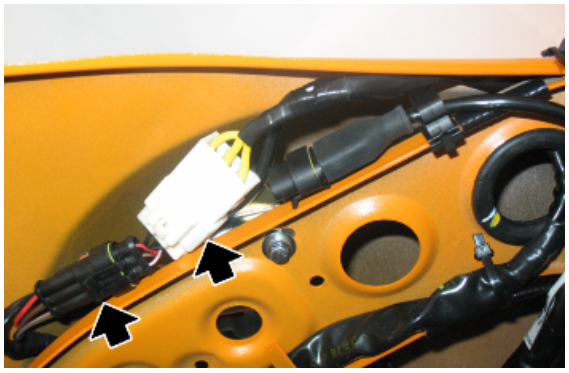
38. Injection load remote control

KEY

Or: Orange **Az:** Sky Blue **Bi:** White **Bl:** Blue **Gi:** Yellow **Gr:** Grey **Ma:** Brown **Ne:** Black **Ro:** Pink **Rs:** Red **Ve:** Green **Vi:** Purple

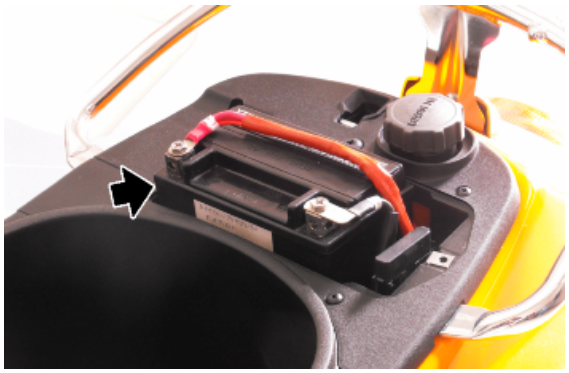
Components arrangement

1. Magneto flywheel - Remove the flywheel cover, as described in the «Engine» chapter, to reach it. To get access to the connectors, remove the helmet compartment.

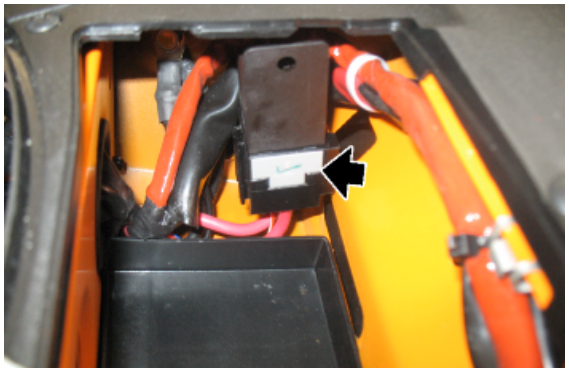


2. Voltage regulator - Remove the front central cover to reach it.

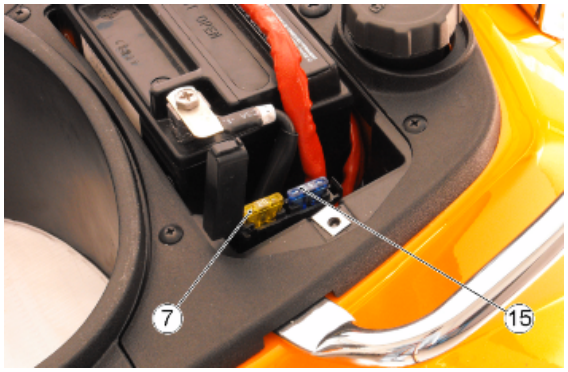
3. Battery - Lift the saddle and remove the cover to reach them.

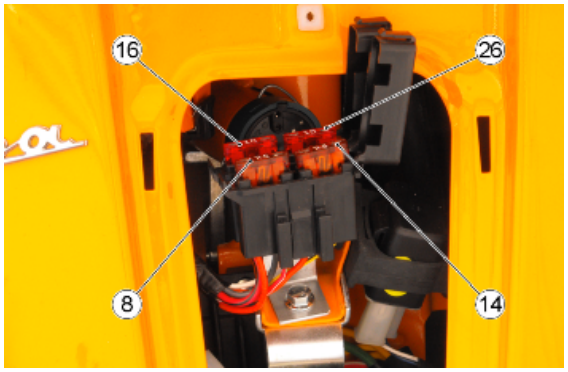


4. Start-up remote control - Remove the battery to reach it.



7 - 8 - 14 - 15 - 16 -26. Fuses - Remove the battery cover and/or the front central cover to reach them.

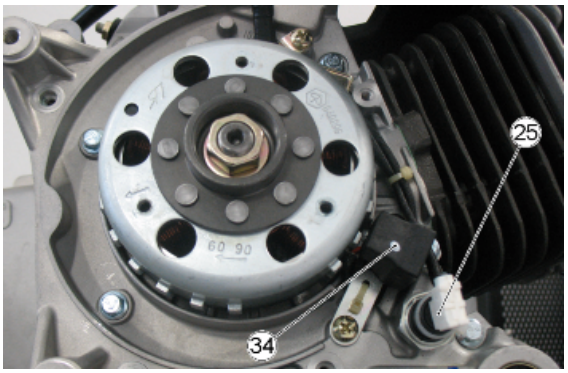




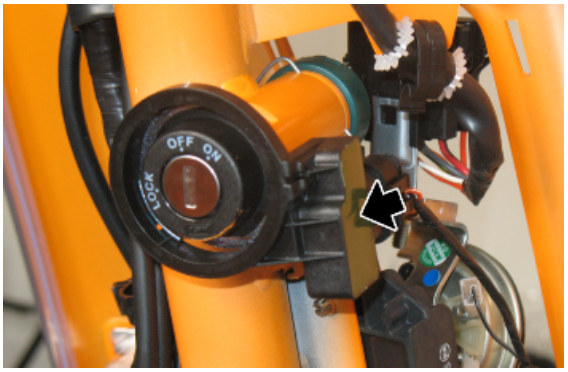
11 - 38. Remote controls - Remove the front central cover to reach it.

29 - 24. Pump and fuel lever transmitter - They are fitted on the tank, remove the fuel tank to reach them.

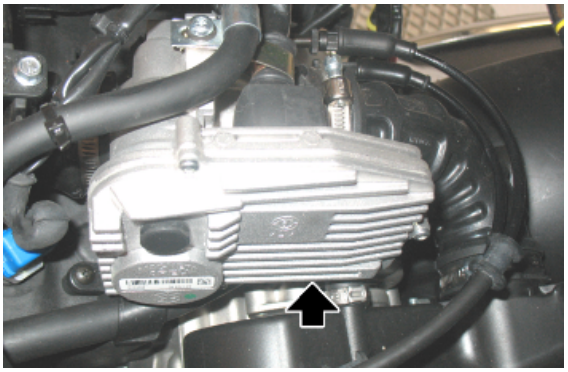
25 - 34. Oil pressure sensor - engine speed sensor - To reach it, remove the fan cover cap, as described in ENGINE chapter.



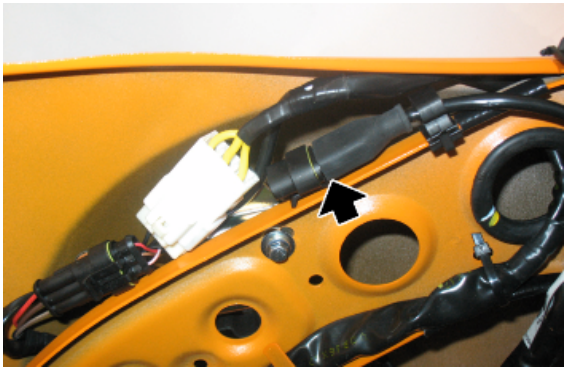
27. Immobilizer aerial- Remove the shield back plate to reach it.



28. Injection ECU - Remove the helmet compartment to reach it.

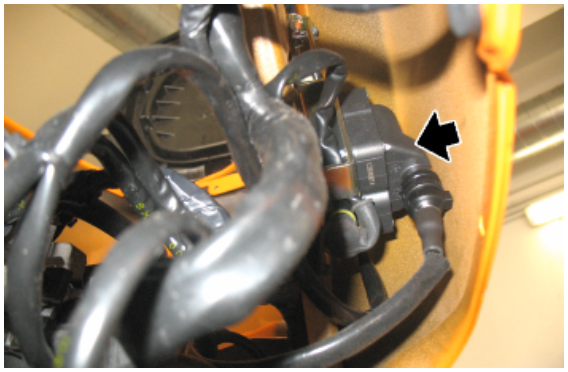


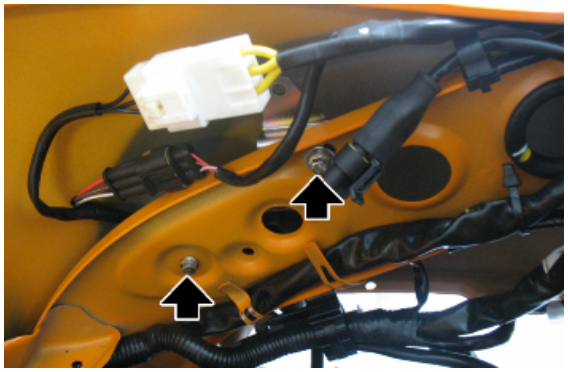
30. Diagnosis connector - Remove the helmet compartment to reach it.



31 - 32. Engine temperature sensor - fuel injector - Remove the helmet compartment to reach it.

33. H.V. coil - Remove the helmet compartment and undo the two screws indicated to reach it.

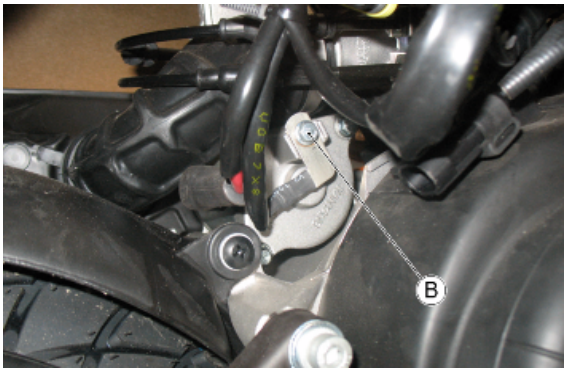




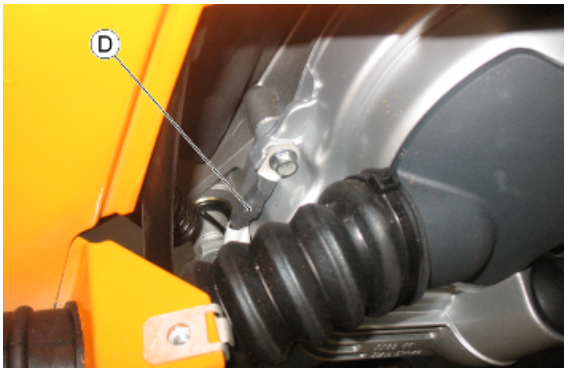
Ground points

On the vehicle there is a chassis ground point, marked with letter **"A"**, on the right side of the battery compartment.

There is another ground point **"B"** on the starter motor.

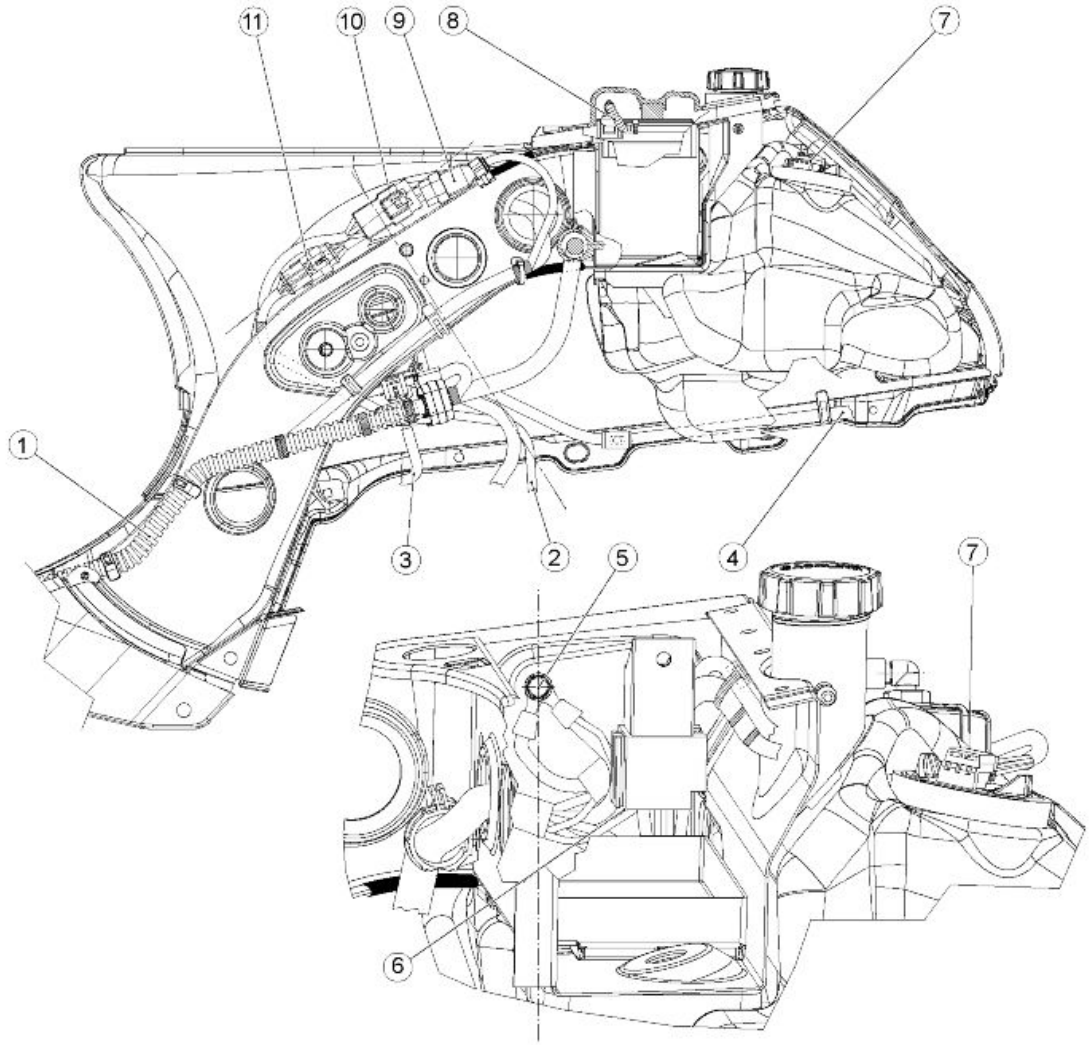


On the left side of the chassis, under the footrest, there is the chassis-engine ground lead **"C"**.

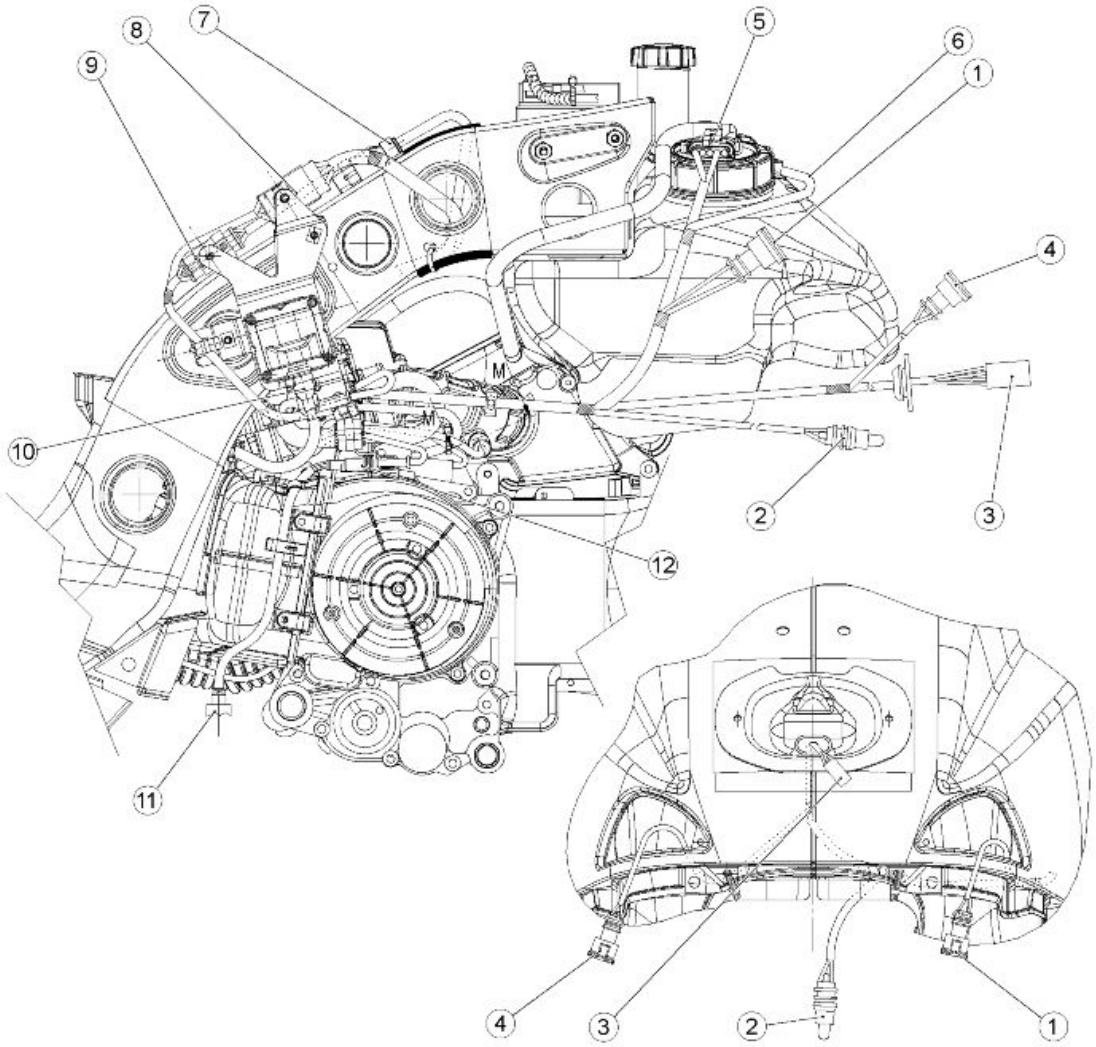


Electrical system installation

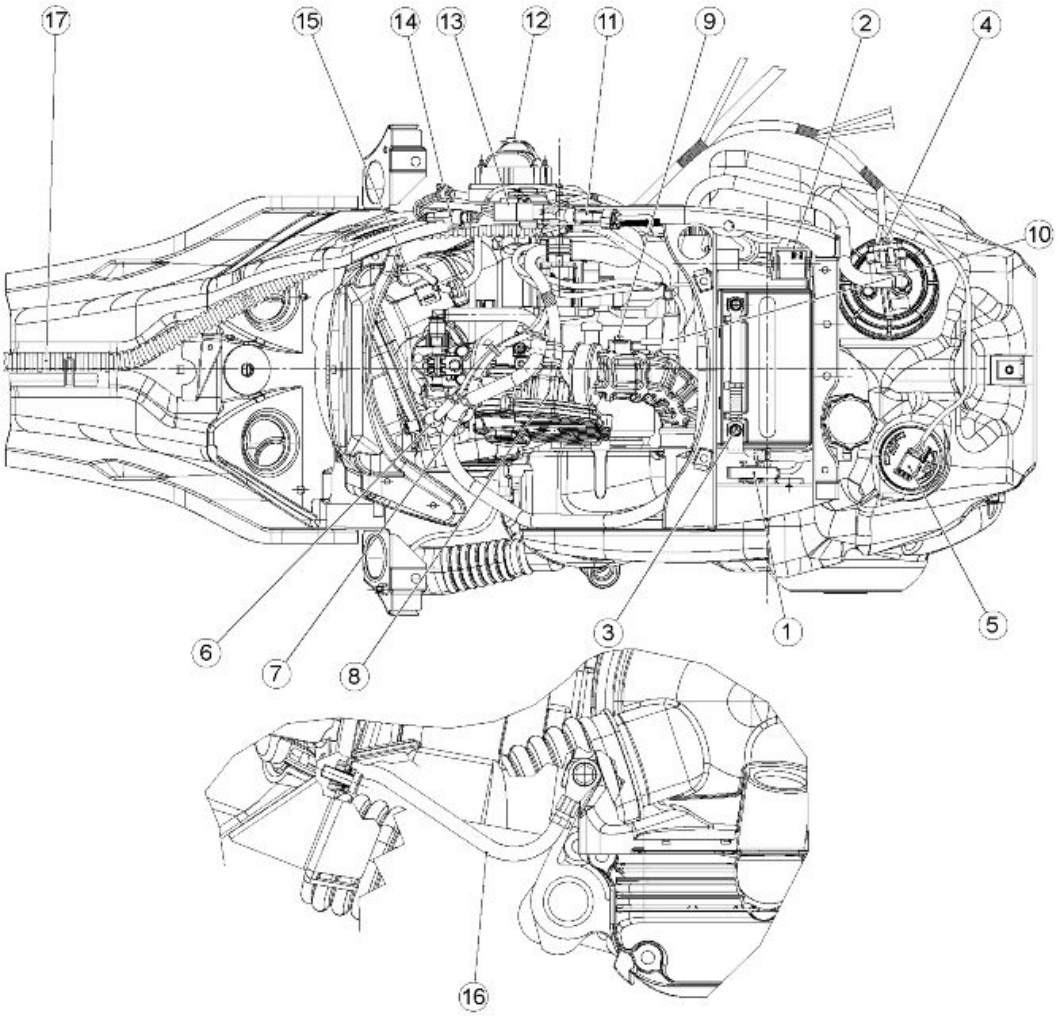
Back side



1. To the front part
2. To the magneto flywheel
3. To HV coil
4. To the rear lighting devices
5. Chassis ground
6. Start-up remote control switch
7. Fuel level transmitter
8. Battery
9. Diagnostic socket
10. Generator connector
11. Pick-up connector



1. Rear right turn indicator
2. License plate light
3. To rear light
4. Rear left turn indicator
5. Fuel pump
6. To the fuel level transmitter
7. Diagnostic socket
8. Generator connector
9. Pick-up connector
10. HV coil
11. Lambda sensor
12. Lambda probe connector



1. Fuse box
2. Start-up remote control switch
3. Battery
4. Fuel pump
5. Fuel level transmitter
6. Injector
7. Engine temperature sensor
8. Injection ECU
9. Start-up motor ground
10. Start-up motor positive terminal
11. Diagnostic socket
12. HV coil
13. Generator connector
14. Pick-up connector

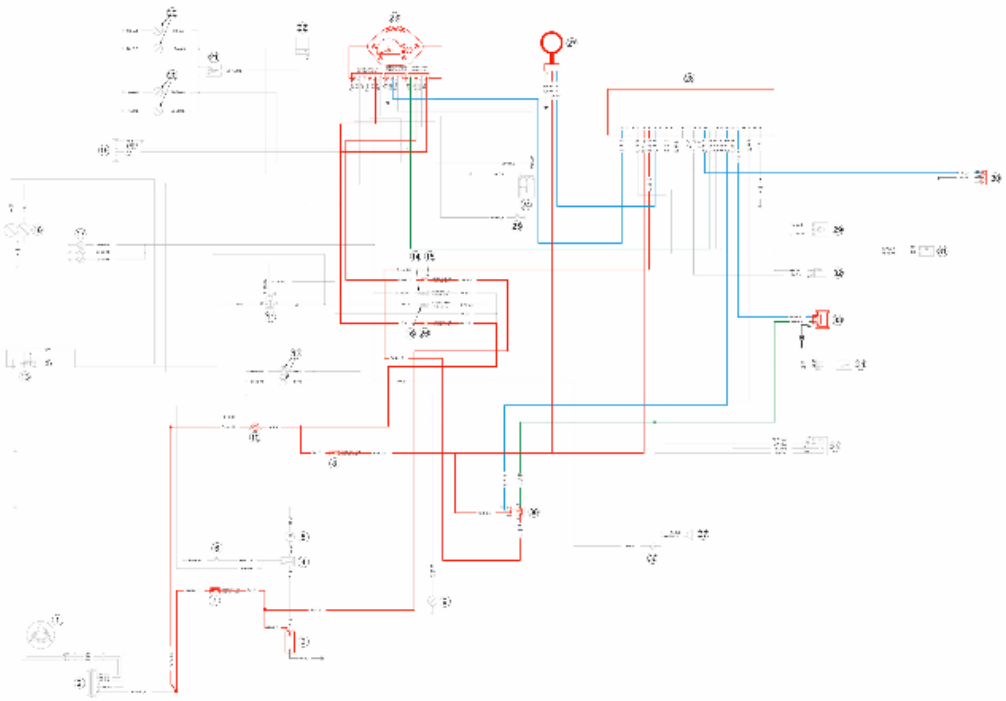
15.To the spark plug

16.chassis - engine ground lead

17.To the front part

Conceptual diagrams

Ignition



3. 12V-10Ah Battery

7. 20A Fuse

8. 7.5A Fuse

10. Key switch contacts

15. Fuse 15A

23. Instrument panel

26. Fuse 10A

27. Immobilizer aerial

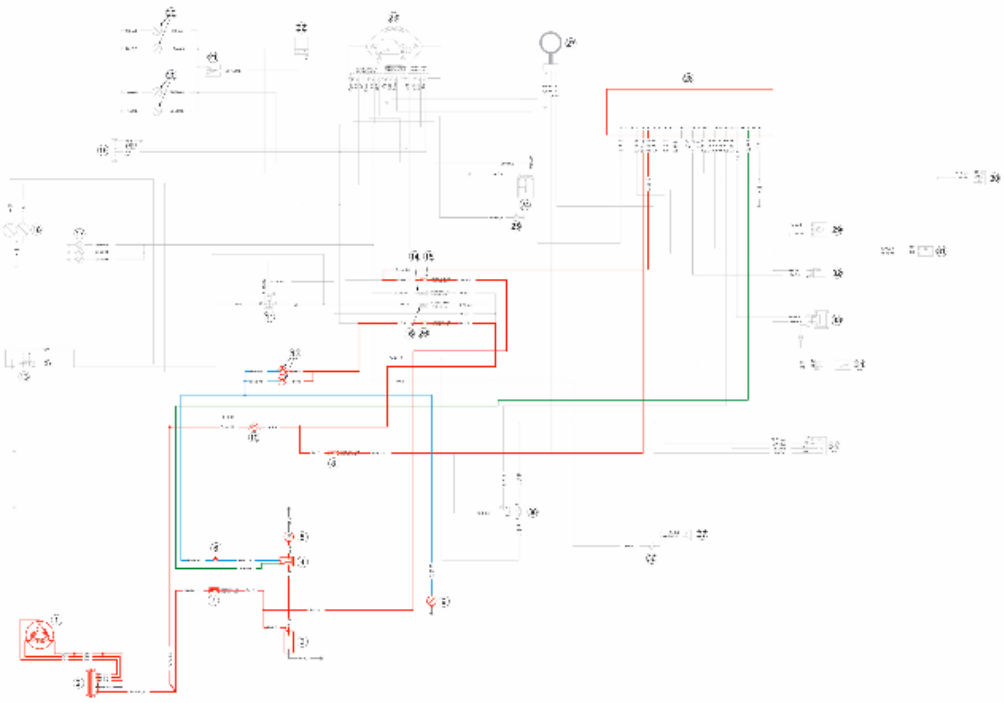
28. Injection ECU

30. Diagnosis socket

33. HV coil

38. Injection load remote control

Battery recharge and starting



1. Magneto flywheel

2. Voltage regulator

3. 12V-10Ah Battery

4. Start-up remote control switch

5. Starter motor

6. Starter button

7. 20A Fuse

8. 7.5A Fuse

9. Stop light bulb

10. Key switch contacts

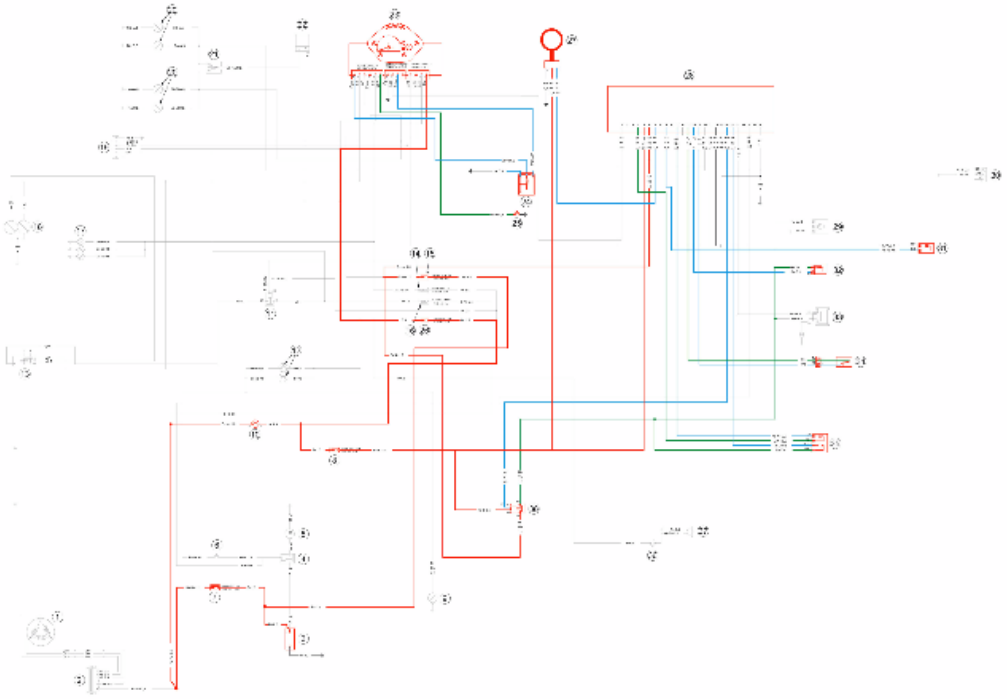
12. Stop buttons

15. Fuse 15A

26. Fuse 10A

28. Injection electronic control unit

Level indicators and enable signals section



3. 12V-10Ah Battery

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8. 7.5A Fuse

10. Key switch contacts

15. Fuse 15A

23. Instrument panel

24. Fuel level transmitter

25. Oil pressure sensor

26. Fuse 10A

27. Immobilizer aerial

28. Injection electronic control unit

31. Engine temperature sensor

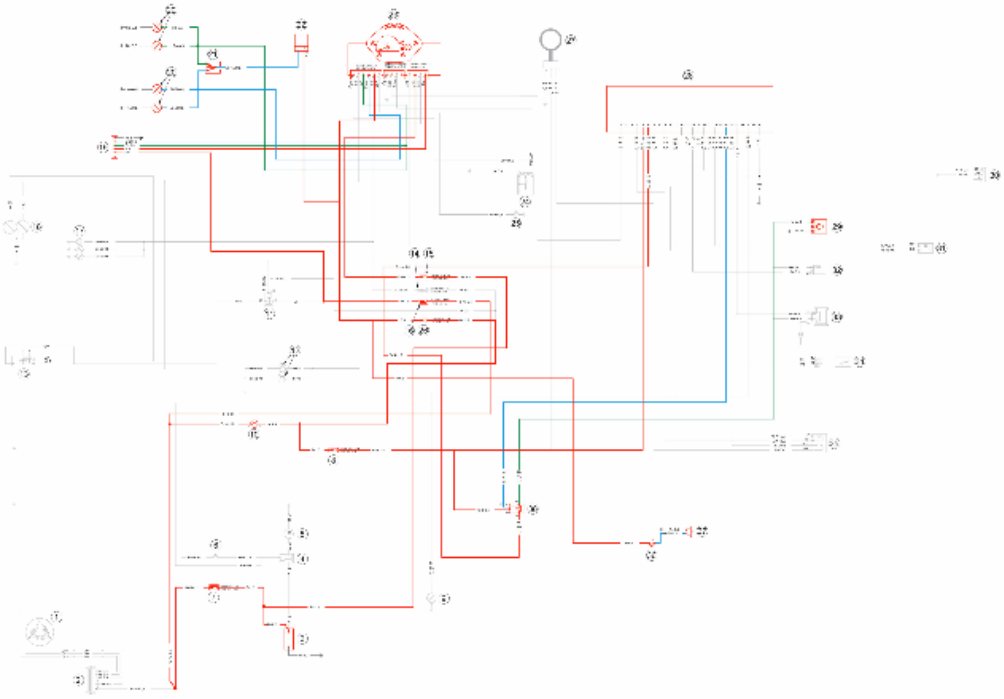
32. Fuel injector

34. Engine speed sensor

35. Lambda probe

38. Injection load remote control

Devices and accessories



3. 12V-10Ah Battery

7. 20A Fuse

8. 7.5A Fuse

10. Key switch contacts

15. Fuse 15A

16. Fuse 10A

19. Pre-installation for anti-theft device

20. Turn indicators bulb

21. Turn indicator switch

22. Turn indicators control device

23. Instrument panel

26. Fuse 10A

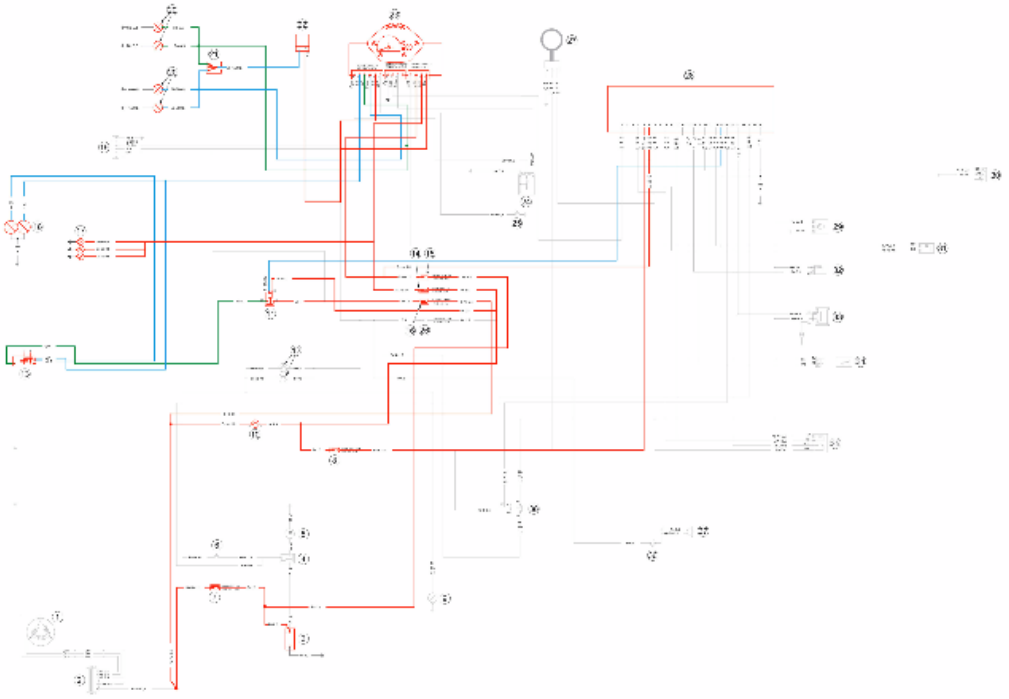
28. Injection electronic control unit

29. Fuel pump

37. Horn

38. Injection load remote control

Lights and turn indicators



3. 12V-10Ah Battery

7. 20A Fuse

8. 7.5A Fuse

10. Key switch contacts

11. Headlight remote control

13. Light switch

14. Fuse 7.5A

15. Fuse 15A

16. Fuse 10A

17. Front and rear daylight running lights and license plate light

18. Headlight with twin-filament bulb

20. Turn indicators bulb

21. Turn indicator switch

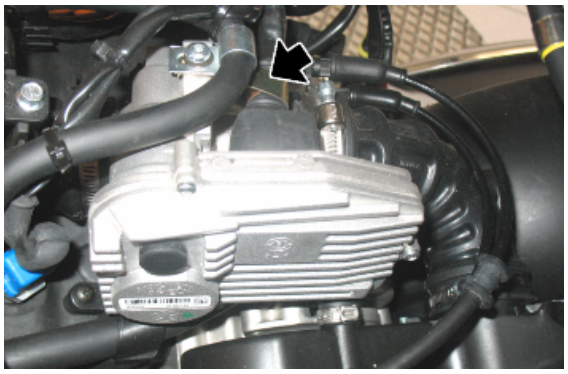
22. Turn indicators control device

23. Instrument panel

28. Injection electronic control unit

Checks and inspections

Immobiliser



The electronic ignition system is controlled by the control unit with the integrated Immobilizer system. The immobilizer is an anti-theft system that allows the vehicle to be operated only when it is started with coded keys recognised by the control unit. The code is integrated in a transponder in the key block. This allows the driver clear operation without having to do anything other than just turning the key. The Immobilizer system consists of the following components:

- Control unit
- Immobilizer aerial
- master and service keys with built-in transponder
- HV coil
- diagnosis LED

The diagnosis led also works as a blinking light to deter theft. This function is activated every time the key switch is turned to "OFF" and it remains active 48 hours so as not to damage the battery charging process.

When the key switch is turned to "ON", it interrupts the function of the immobiliser lamp and a start enable lamp comes "ON".

The duration of the flash depends on the programming of the electronic control unit

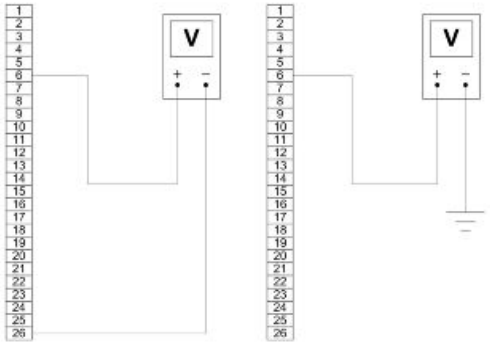
If the LED is off regardless of the position of the ignition-key switch and/or the instrument panel is not initiated, check if:

- there is battery voltage
- that fuse 1 and fuse 6 are in good conditions.
- there is power to the control unit as specified below:

Remove the connector mounting bracket shown in the photograph and disconnect the connector from the control unit. Check the following conditions:

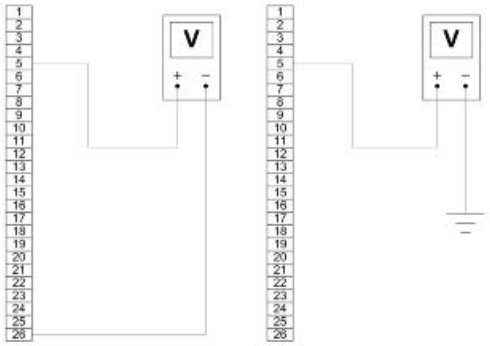
With the key switch set to OFF:

• there is battery voltage between terminals 6-26 and terminal 6-chassis ground (fixed power supply). If there is no voltage check that fuse 3 and its cable are in working order.

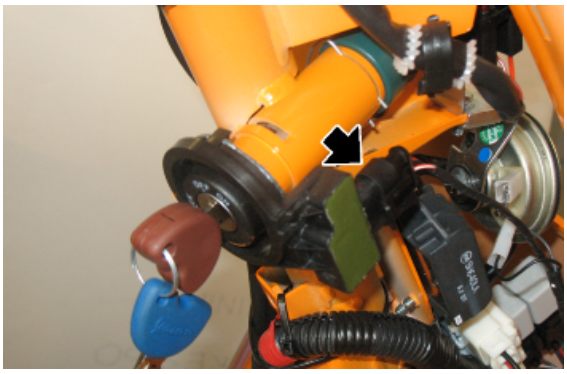


With the key switch set to ON:

• there is battery voltage between terminals 5-26 and terminal 5-chassis ground (fixed power supply). If there is no voltage, check the key switch contacts, that fuse 2 and its cable are in working order.

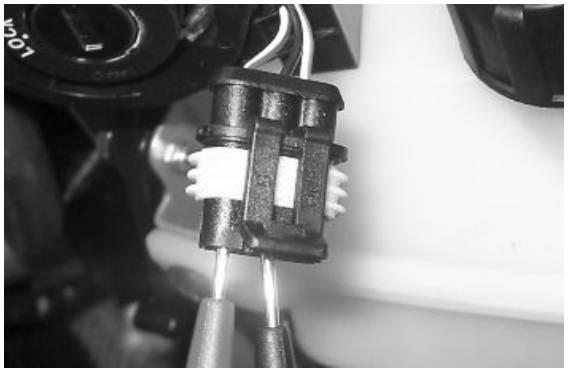


After removing the shield back plate, remove the electrical connection from the aerial as shown in the picture.



Remove the protective base from the connector.

With the ignition key switch at ON check there is battery voltage between the Red-White and Black cables

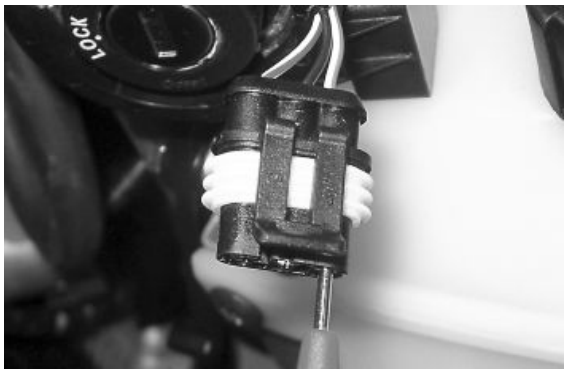


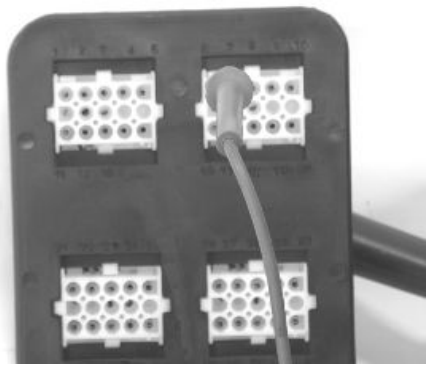
With MIU connector disconnected, check the continuity between the Orange-White cable and pin 7 of the interface wiring.

Specific tooling

020481Y Control unit interface wiring

020331Y Digital multimeter

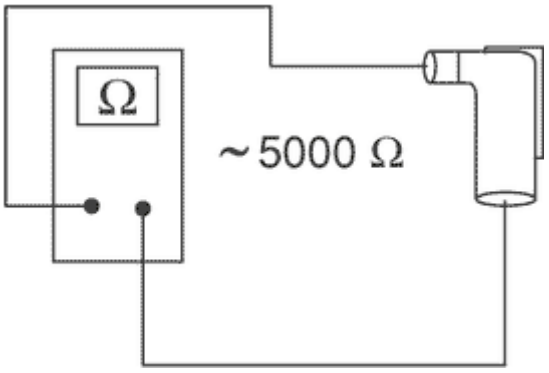




Virgin circuit

When the ignition system is not encrypted, any key will start the engine but limited to 2000 rpm. The keys can only be recognised if the control unit has been programmed properly.

The data storage procedure for a previously unprogrammed control unit provides for the recognition of the red key (master key) as the first key to be stored to memory: this becomes particularly important because it is the only key that enables the control unit to be wiped clean and reprogrammed for the memorisation of the service keys.



The master and service keys must be used to code the system as follows:
- Insert the Master key, turn it to «ON» and keep this position for two seconds (limit values 1 to 3 seconds).
- Insert the blue key and set to «ON» for 2 seconds.
- If you have copies of the key, repeat the operation with each key.
- Insert the MASTER key again and turn it to «ON» for 2 seconds.

The maximum time to change keys is 10 seconds.
A maximum of 7 service keys (blue) can be programmed at one time.
It is essential to adhere to the times and the procedure. If you do not, start again from the beginning.
Once the system has been programmed, master key transponder, decoder and control unit are strictly matched.
With this link established, it is now possible to encode new service keys, in the event of losses, replacements, etc.
Each new programming deletes the previous one so, in order to add or eliminate keys, you must repeat the procedure using all the keys you intend to keep using.
If a service key becomes uncoded, the efficiency of the high voltage circuit shielding must be thoroughly inspected: In any case it is advisable to use resistive spark plugs.

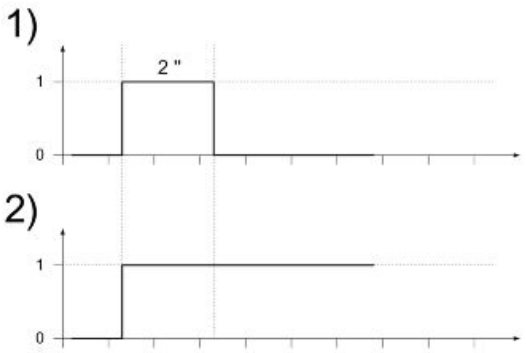
Characteristic

Shielded cap resistance

~ 5000 Ω.

Diagnostic codes

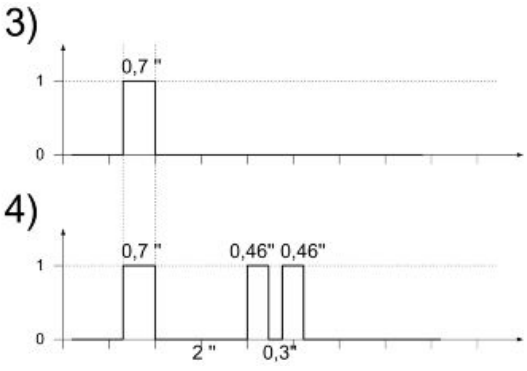
The Immobilizer system is tested each time the key switch is turned from «OFF» to «ON». During this diagnosis phase a number of control unit statuses can be identified and various light codes displayed. Regardless of the code transmitted, if at the end of the diagnosis the LED remains off permanently, the ignition is enabled. If, however, the LED remains on permanently, it means the ignition is inhibited:



1. Previously unused control unit - key inserted: a single 2 second flash is displayed, after which the LED remains off permanently. The keys can be stored to memory, the vehicle can be started but with a limitation imposed on the number of revs.

2. Previously unused control unit - transponder absent or cannot be used: The LED is permanently ON; in this condition, no operations are possible, including starting of the vehicle.

3. **Programmed control unit - the service key in (normal condition of use)**: a single 0.7-second flash is displayed, after which the LED remains off steadily. The engine can be started.



4. **Programmed control unit - Master key in**: a 0.7 sec. flash is displayed followed by the LED remaining off for 2 sec. and then by short 0.46 sec. flashes the same number of times as there are keys stored in the memory including the Master key. When the diagnosis has been completed, the LED remains permanently OFF. The engine can be started.

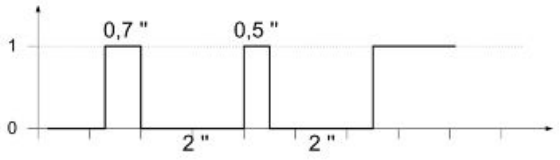
5. Programmed control unit - fault detected: a light code is displayed according to the fault detected, after which the LED remains on steadily. The engine cannot be started. The codes that can be transmitted are:

- 1-flash code
- 2-flash code

- 3 flash code

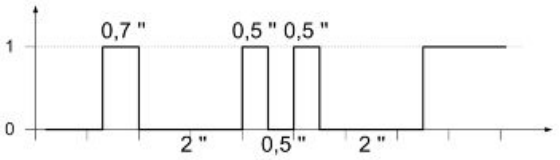
Diagnostic code - 1 flash

A one-flash code indicates a system where the serial line is not present or is not detected. Check the Immobilizer aerial wiring and change it if necessary.



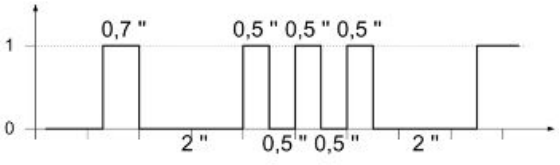
Diagnostic code - 2 flashes

A two-flash code shows a system where the control unit does not show the transponder signal. This might depend on the inefficiency of the immobiliser aerial or the transponder.
Turn the switch to ON using several keys: if the code is repeated even with the Master key, check the aerial wiring and change it if necessary. If this is not the case, replace the defective key and/or reprogram the control unit. Replace the control unit if the problem continues.



Diagnostic code - 3 flashes

A three-flash code indicates a system where the control unit does not recognise the key. Turn the switch to ON using several keys: if the error code is repeated even with the Master key, replace the control unit. If this is not the case, reprogram the decoder.



Battery recharge circuit

The recharge circuit is provided with a three-phase generator with permanent magneto flywheel.
The generator is directly connected to the voltage regulator.

This, in its turn, is connected directly to the ground and the battery's positive terminal passing through the 20A protective fuse.
The three-phase generator provides good recharge power and at low revs, a good compromise is achieved between generated power and idle stability.

Stator check

Checking the stator windings

WARNING

THIS CHECK-UP CAN BE MADE WITH THE STATOR PROPERLY INSTALLED.

1) Lift the saddle and remove the helmet compartment.

2) Disconnect the connector between stator and regulator with the three yellow cables as shown in the picture.

3) Measure the resistance between each of the yellow terminals and the other two.

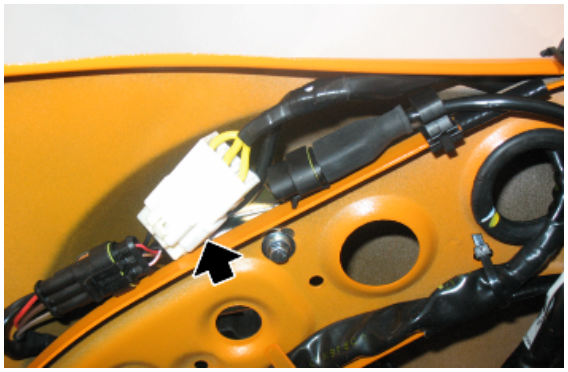
Electric characteristic

Resistance:

0.2 - 1 Ω

4) Check that there is insulation between the each yellow cable and the ground.

5) If values are incorrect, replace the stator.



Recharge system voltage check

Look for any leakage

1) Access the battery by removing the specific cover.

2) Check that the battery does not show signs of losing fluid before checking the output voltage.

3) Turn the ignition key to position OFF, connect the terminals of the tester between the negative pole (-) of the battery and the black cable and only then disconnect the black cable from the negative pole (-) of the battery.

4) With the ignition key always at OFF, the reading indicated by the ammeter must be ≤ 0.5 mA.

Charging current check

WARNING

BEFORE CARRYING OUT THE CHECK, MAKE SURE THAT THE BATTERY IS IN GOOD WORKING ORDER.

1) Park the vehicle on its centre stand

2) With the battery correctly connected to the circuit, place the multimeter leads between the battery terminals..

3) Start the engine, ensure that the lights are all out, increase the engine speed and at the same time measure the voltage.

Electric characteristic

Voltage ranging between 14.0 and 15.0V at 5000 rpm.

Maximum current output check.

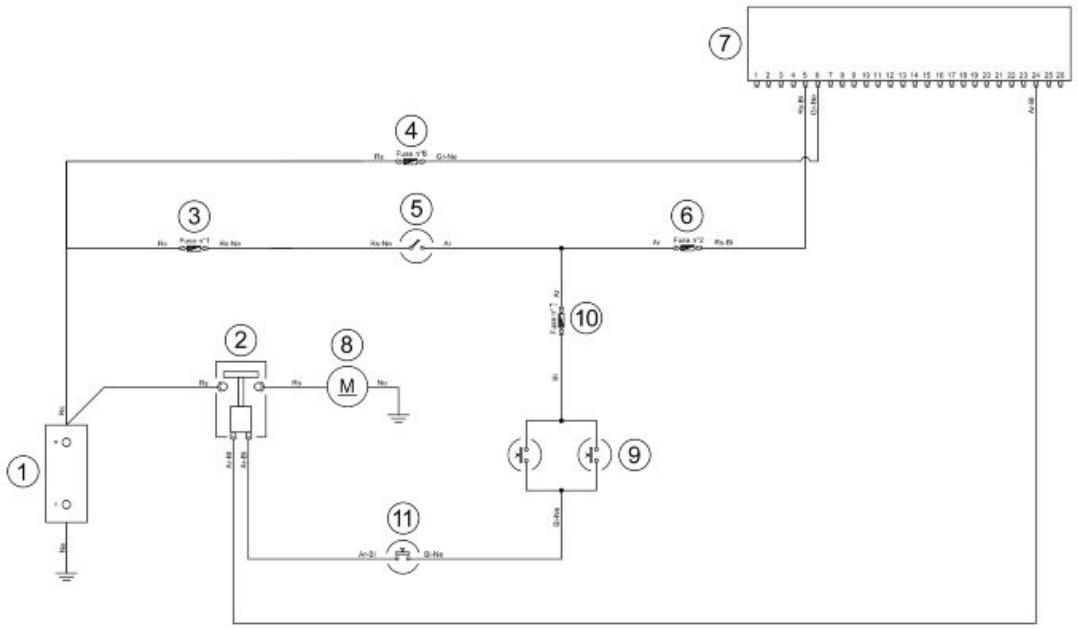
- With engine off and panel set to "ON" turn on the lights and let the battery voltage set to 12V.
- Connect ammeter pliers to the 2 recharge positive poles in output from the regulator.
- Keep the lights on and start the engine, bring it to normal speed and read the values on the ammeter.

With an efficient battery a value must be detected: > 20A

VOLTAGE REGULATOR/RECTIFIER

Specification	Desc./Quantity
Type	Non-adjustable three-phase transistor
Voltage	14 to 15V at 5000 rpm with lights off

Starter motor



KEY

1. Battery

2. Start-up remote control switch

3. Fuse No. 1

4. Fuse No. 6

5. Key switch contacts

6. Fuse No. 2

7. Electronic control unit

8. Starter motor

9. Stop buttons

10. Fuse No. 3

11. Starter button

WARNING

ALL CONTINUITY TESTS MUST BE CARRIED OUT WITH THE CORRESPONDING CONNECTORS DISCONNECTED.

1) Check fuses No. 1, 2, 3 and 6.

2) Check key switch contacts.

3) Check the contacts of the stop buttons and the starter button.

4) With the key switch set to «**ON**», the brake pulled and the starter button pressed, check if there is voltage between the Orange-White cable of the start-up remote control switch and the ground connection. If there is not, check the cable harnesses.

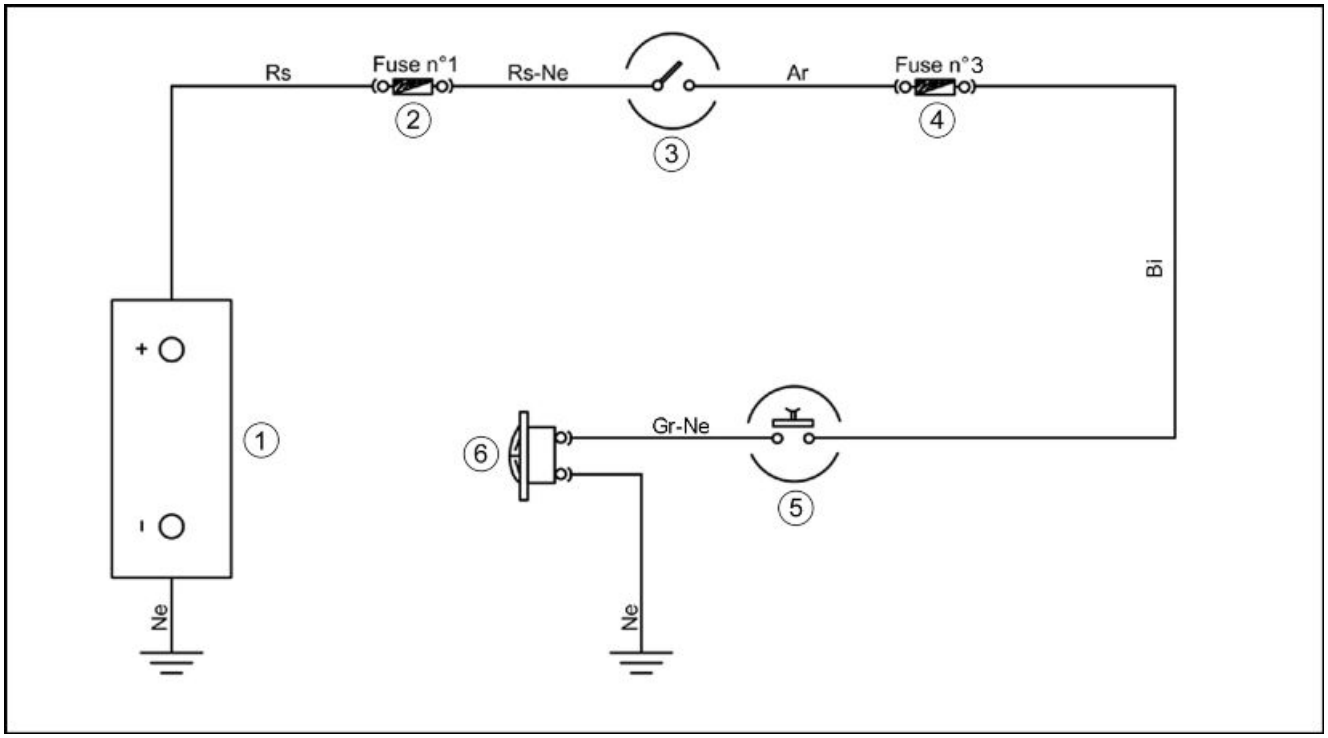
5) Check the start-up remote control switch.

6) Check that the Red cable between the battery and the start-up remote control switch is not interrupted. Also check continuity between the latter and the starter motor.

7) Check the starter motor ground connection.

8) Check that the Orange-Blue cable between the start-up remote control switch and the control unit (pin 24) is not interrupted.

Horn control



KEY

1. Battery

2. Fuse No. 1

3. Key switch contacts

4. Fuse No. 3

5. Horn button

6. Horn

WARNING

ALL CONTINUITY TESTS MUST BE CARRIED OUT WITH THE CORRESPONDING CONNECTORS DISCONNECTED.

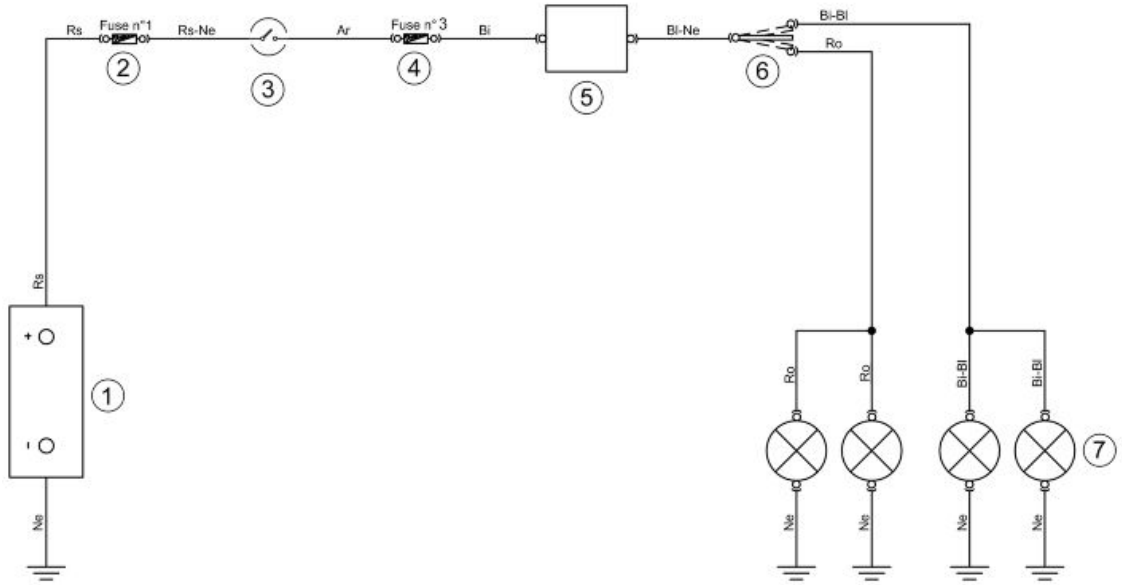
1) Check fuses No. 1 and 3.

2) Check the key switch and horn button contacts.

3) With the key switch set to «**ON**» and the horn button pressed, check if there is voltage between the Grey-Black cable of the horn device and the ground connection. If there is not, check the cable harnesses.

4) Check the horn device ground connection.

Turn signals system check



KEY

1. Battery

2. Fuse No. 1

3. Key switch contacts

4. Fuse No. 3

5. Turn indicator control device

6. Turn indicator switch

7. Turn indicator bulbs (12V - 10W)

WARNING

ALL CONTINUITY TESTS MUST BE CARRIED OUT WITH THE CORRESPONDING CONNECTORS DISCONNECTED.

1) Check that bulbs operate properly.

2) Check fuses No. 1 and 3.

3) Check key switch contacts.

4) With the key switch set to «**ON**», check if there is voltage between the Blue-Black cable of the turn indicators switch and the ground connection. If there is not, check the cable harnesses and the connections of the turn indicator control device.

5) Check the turn indicator switch contacts.

6) With the turn indicator switch pressed to the right, check if there is voltage between the White-Blue cable of the switch and the ground connection. If there is not, check the cable harnesses.

7) With the turn indicator switch pressed to the left, check if there is voltage between the Pink cable of the switch and the ground connection. If there is not, check the cable harnesses.

8) Check that the cable harnesses of the bulbs and their ground connection are not interrupted.

level indicators

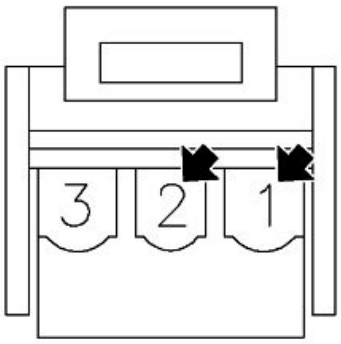
WARNING

ALL CONTINUITY TESTS MUST BE CARRIED OUT WITH THE CORRESPONDING CONNECTORS DISCONNECTED.

If faults are detected:

1) With a multimeter, check resistance values between the White-Green cable and the Black cable of the fuel level transmitter under different conditions.

2) If the transmitter operates correctly but the indication on the instrument panel is not exact, check that the cable harnesses between them are not interrupted.



Electric characteristic

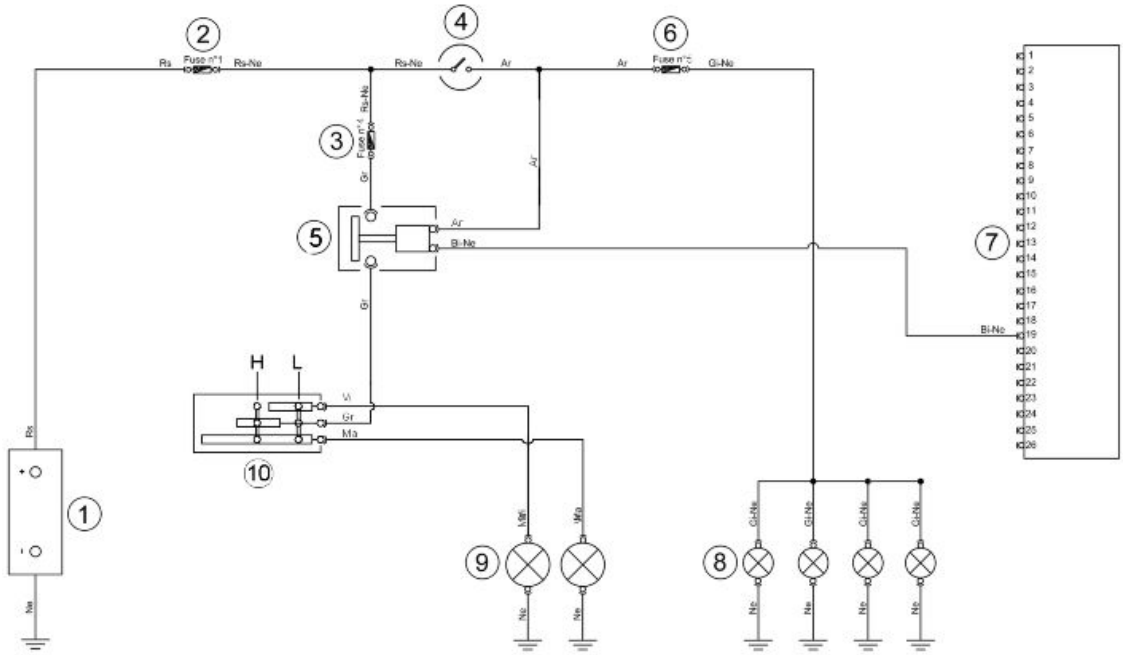
Resistance value when the tank is full

<= 7 Ω

Resistance value when the tank is empty

90 +13/-3 Ω

Lights list



KEY

1. Battery

2. Fuse No. 1

3. Fuse No. 4

4. Key switch contacts

5. Headlight remote control

6. Fuse No. 5

7. Electronic control unit

8. Daylight running lights, license plate lamp (12V - 5W) and dashboard lighting bulb (12V - 1.2W)

9. Low-/high-beam twin filament bulb (12V - 55/60W)

10. Light switch

WARNING

ALL CONTINUITY TESTS MUST BE CARRIED OUT WITH THE CORRESPONDING CONNECTORS DISCONNECTED.

LINE FOR DAYLIGHT RUNNING LIGHTS, LICENSE PLATE LIGHT AND DASHBOARD LIGHTING BULB

1) Check that bulbs operate properly.

2) Check fuses No. 1 and 5.

3) Check key switch contacts.

4) Check if there is voltage between the Yellow-Black cable of fuse No. 5 and the ground. If not, check cable harnesses.

5) Check that the cable harnesses of the bulbs and their ground connection are not interrupted.

HIGH-BEAM /LOW-BEAM LIGHTS LINE

1) Check that bulbs operate properly.

2) Check fuses No. 1 and 4.

3) Check key switch contacts.

4) Check if there is voltage between the Grey cable (30) of the headlight remote control and the ground connection. If there is not, check cable harnesses.

5) With the key switch set to «**ON**» and the engine running, check if there is voltage between the Grey cable (87) of the headlight remote control and the ground connection. If there is not, check cable harnesses.

6) Check that the White-Black cable connecting the headlight remote control switch and the control unit (pin 19) is not interrupted.

7) Check the headlight remote control switch.

8) Check that the continuity between the Grey cable of the light switch and the headlight remote control is not interrupted.

9) Check the light switch contacts.

10) Check that the cable harnesses of the bulbs and their ground connection are not interrupted.

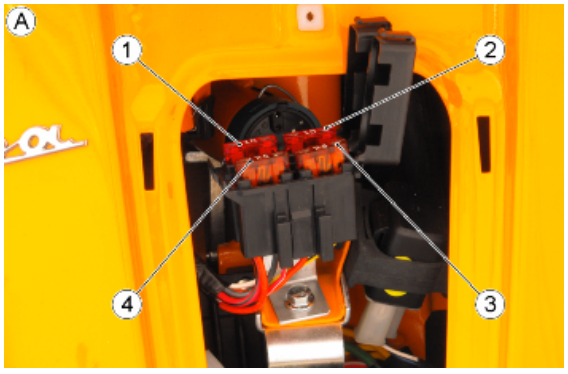
Fuses

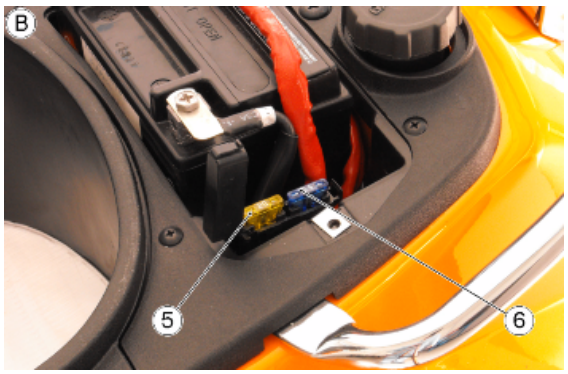
The electrical system is equipped with:

1. four protection fuses «**A**» that can be reached by removing the shield front cover.

2. two fuses «**B**», located in the battery compartment.

The chart shows the position and specifications of the fuses in the vehicle.





CAUTION

BEFORE REPLACING A BLOWN FUSE, FIND AND SOLVE THE FAILURE THAT CAUSED IT TO BLOW. NEVER TRY TO REPLACE THE FUSE WITH ANY OTHER MATERIAL (E.G., A PIECE OF ELECTRIC WIRE).

CAUTION

MODIFICATIONS OR REPAIRS TO THE ELECTRICAL SYSTEM, PERFORMED INCORRECTLY OR WITHOUT STRICT ATTENTION TO THE TECHNICAL SPECIFICATIONS OF THE SYSTEM CAN CAUSE MALFUNCTIONING AND RISK OF FIRE.

FUSES

	Specification	Desc./Quantity
1	Fuses No. 4 - Current rating: 10 A	**Protected circuits:** Battery-powered, lights remote control and antitheft-device pre-installation.
2	Fuses No. 3 - Current rating: 10 A	**Protected circuits:** Live accessories, instrument panel, horn, stop buttons and start-up remote control.
3	Fuses No. 5 - Current rating: 7.5A	**Protected circuits:** Live, daylight running lights and dashboard lighting.
4	Fuse No. 2 - Current rating: 7.5A	**Protected circuits:** Live, coil, injection load remote control, immobilizer aerial and MIU.
5	Fuses No. 1 - Current rating: 20A	**Protected circuits:** Vehicle main fuse.
6	Fuse No. 6 - Current rating: 15A	**Protected circuits:** Battery-powered injection loads, injection ECU and immobilizer LED.

Dashboard

A = Digital clock

B = Odometer

C = Speedometer

D = Engine control warning light

E = Engine oil pressure warning light

F = Turn indicators

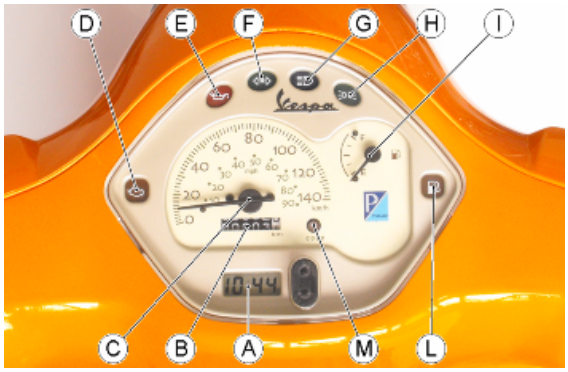
G = High-beam warning light

H = Headlight warning light

I = Fuel gauge

L = Low fuel warning light

M = Immobilizer LED



Sealed battery

If the vehicle is provided with a sealed battery, the only maintenance required is checking its charge and recharging, when necessary.

These operations should be carried out before delivering the vehicle, and on a six-month basis while the vehicle is stored in open circuit.

Besides, upon pre-delivery it is therefore necessary to check the battery charge and recharge it, if required, before storing the vehicle and, afterwards, every six months.

INSTRUCTIONS FOR THE RENEWAL RECHARGE AFTER OPEN-CIRCUIT STORAGE

1) Voltage check up

Before installing the battery on the vehicle, check the open circuit voltage with a standard tester.

- If voltage exceeds 12.60 V, the battery can be installed without any renewal recharge.
- If voltage is below 12.60 V, a renewal recharge is required as explained in 2).

2) Constant voltage battery charge mode

- Constant voltage charge equal to 14.40 to 14.70V
- Initial charge voltage equal to 0.3 to 0.5 for Nominal capacity

- Charge time:

10 to 12 h recommended

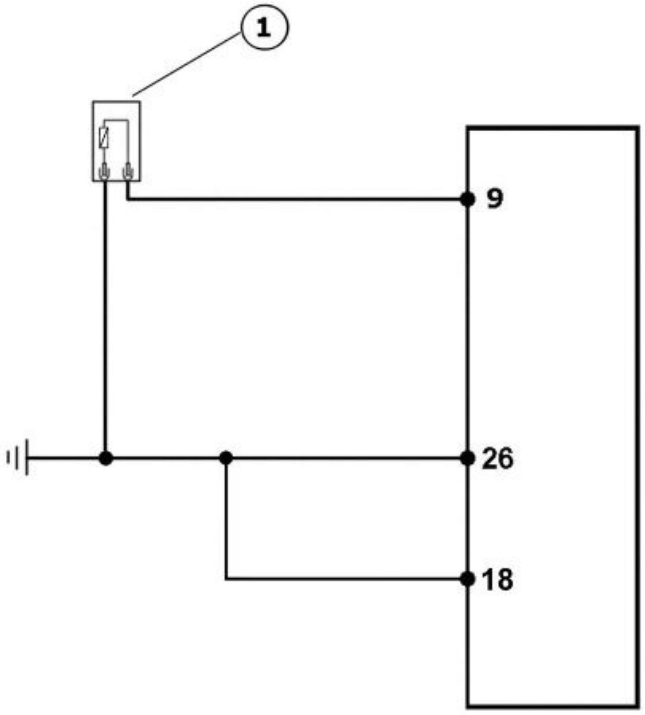
Minimum 6 h

Maximum 24 h

3) Constant current battery charge mode

- Charge current equal to 1/10 of the battery rated capacity
- Charge time: Maximum 5 h

Sensore di temperatura



Key:

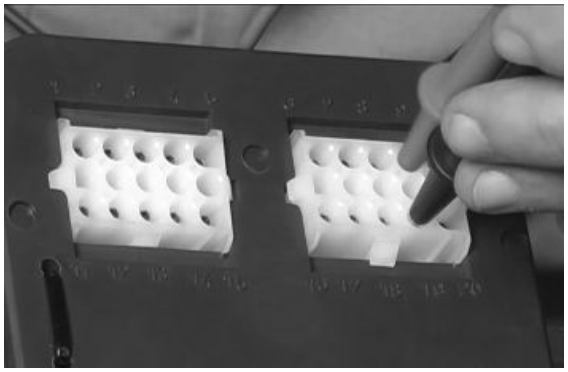
1. Engine temperature sensor

With the connector control unit side disconnected and the coolant temperature sensor connector connected, check the resistance between pins 9 and 26 in relation to the engine temperature.

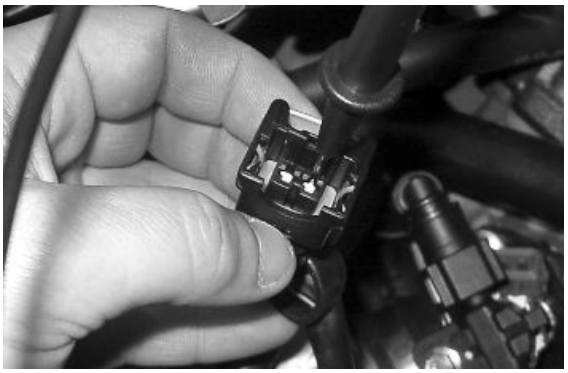
20°C = 3502 ± 237 ohm

80°C = 357 ± 19 ohm

With the connector control unit side disconnected and the engine temperature sensor connector dis-



connected, check the insulation between the two Light Blue-Green and Pink-Yellow cables.



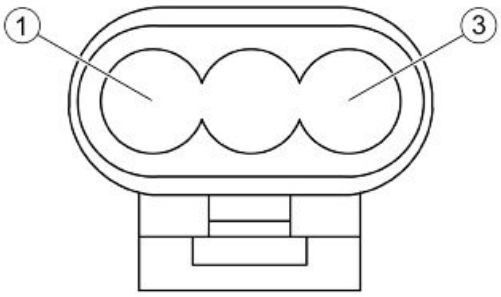
Connectors

DIAGNOSIS CONNECTOR

1. Not connected

2. Ground (Black)

3. Electronic control unit (Purple-White)

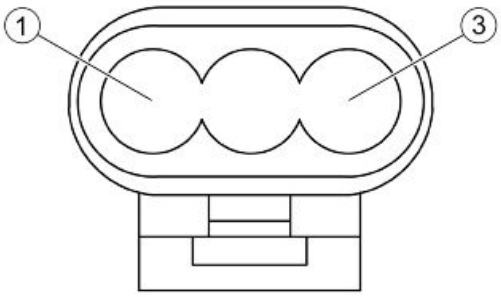


PICK-UP CONNECTOR

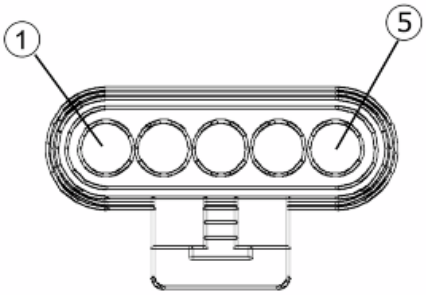
1. Positive from control unit (Red)

2. Negative from control unit (Brown)

3. Not connected



FUEL PUMP CONNECTOR



1. Not connected

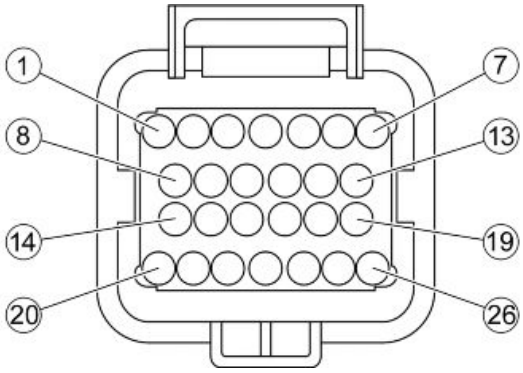
2. Ground (Black)

3. Not connected

4. Not connected

5.Power supply via solenoid (Black-Green)

ELECTRONIC CONTROL UNIT CONNECTOR



1. Injection telltale light (Brown-Black)

2. Not connected

3. Not connected

4. Lambda probe negative terminal (White-Green)

5. Live supply (Red-White)

6. Battery powered (Grey-Black)

7. Immobilizer Aerial (Orange-White)

8. Not connected

9. Engine temperature sensor (Sky blue-Green)

10. Not connected

11. Lambda probe positive (Sky blue-Black)

12. Not connected

13. Engine speed sensor positive (Red)

14. Injector (Red-Yellow)

15. Engine speed sensor negative (Brown)

16. Diagnosis (Purple-White)

17. Immobilizer warning light (Red-Green)

18. To ground (Grey-Green)

19. Low-beam lights automatic ignition (White-Black)

20. Injection load remote control (Black-Purple)

21. Lambda probe (Green - Yellow)

22. HV coil (Pink-Black)

23. Not connected

24. Start-up enabling (Orange-Blue)

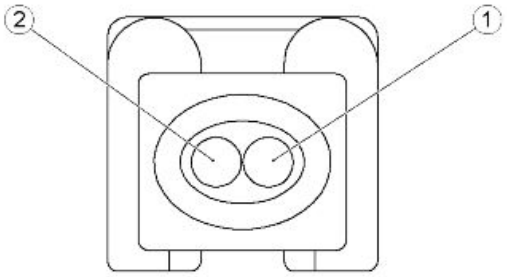
25. Not connected

26. Ground lead (Black)

ENGINE TEMPERATURE SENSOR CONNECTOR

1. Electronic control unit (Sky Blue-Green)

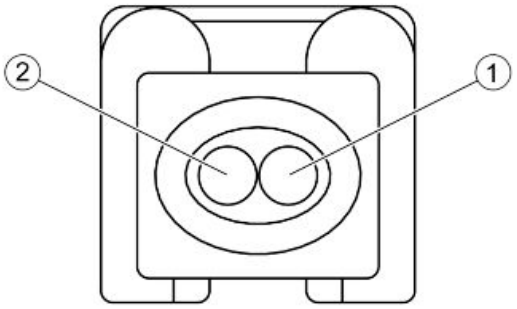
2. Ground (Grey-Green)



INJECTOR CONNECTOR

1. Power via remote control (Black-Green)

2. Electronic control unit (Red-Yellow)



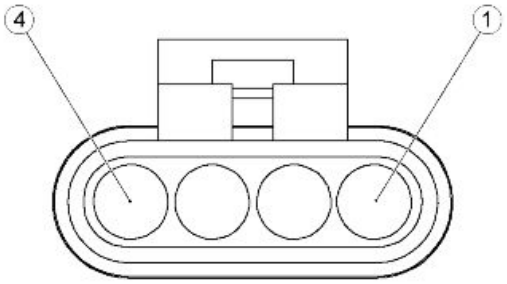
LAMBDA PROBE CONNECTOR

1. Positive from control unit (Sky blue-Black)

2. Negative from control unit (White-Green)

3. Electronic control unit (Green-Yellow)

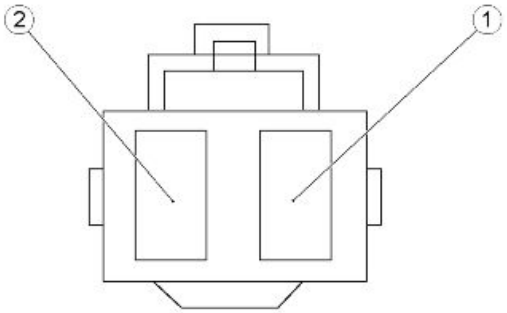
4.Power supply via solenoid (Black-Green)



VOLTAGE REGULATOR CONNECTOR

1. +Battery (Red-Black)

2. Ground (Black)



INSTRUMENT PANEL CONNECTOR «A»

1. Fuel level indicator (White-Green)

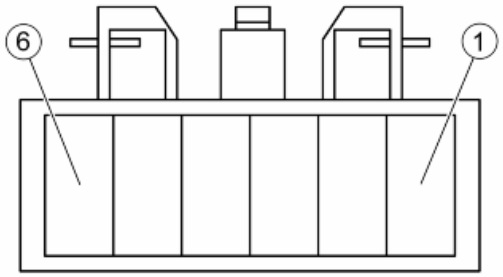
2. High-beam warning light (Purple)

3. Right indicators warning light (Pink)

4. Left indicators warning light (White-Blue)

5. Power permanent supply (White)

6. Oil pressure sensor (Pink-White)

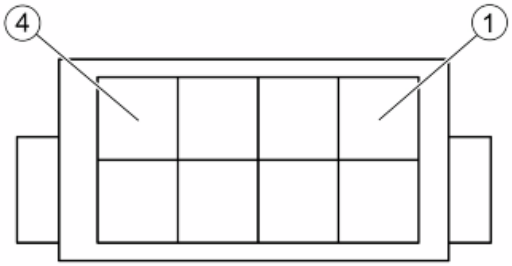


INSTRUMENT PANEL CONNECTOR «B»

1. Ground (Black)

2. Engine control telltale light (Brown-Black)

3. Low fuel warning light (Yellow-Green)



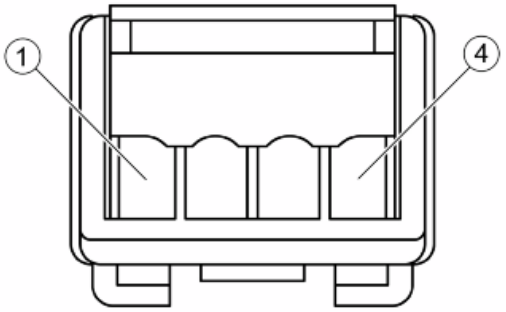
INSTRUMENT PANEL CONNECTOR «C»

1. Immobilizer warning light (Red-Green)

2. Battery powered (Grey-Black)

3. Lighting (Yellow-Black)

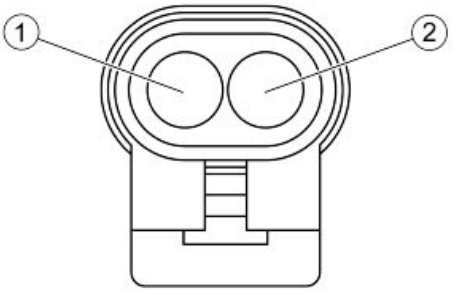
4. Power permanent supply (White)



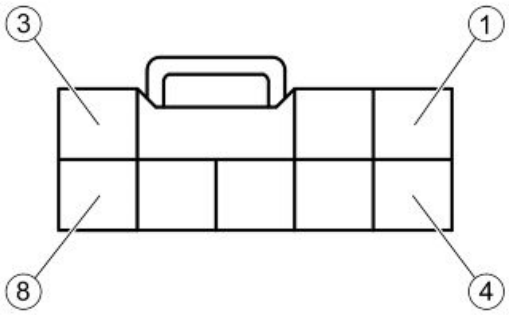
HV COIL CONNECTOR

1. Power via remote control (Black-Green)

2. Electronic control unit (Pink-Black)



ANTI-THEFT DEVICE PRE-INSTALLATION CONNECTOR



1. Ground (Black)

2. Left indicators (White-Blue)

3. Right indicators (Pink)

4. Battery powered (Grey)

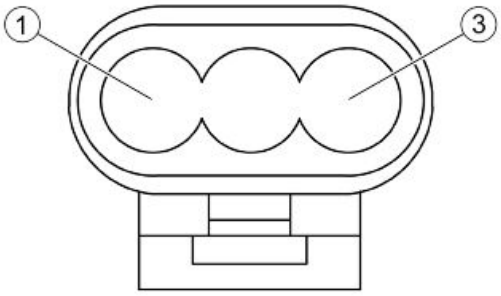
5. Power permanent supply (White)

6. Not connected

7. Not connected

8. Not connected

IMMOBILIZER AERIAL CONNECTOR

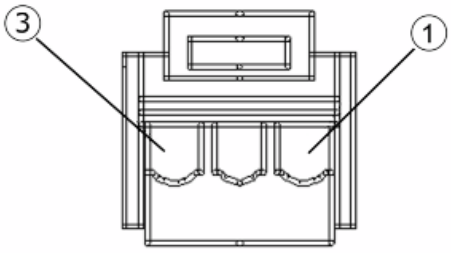


1. Live supply (Red-White)

2. Ground (Black)

3. Electronic control unit (Orange-White)

FUEL LEVEL TRANSMITTER CONNECTOR



1. Fuel level indicator (White-Green)

2. Ground (Black)

3. Low fuel warning light (Yellow-Green)

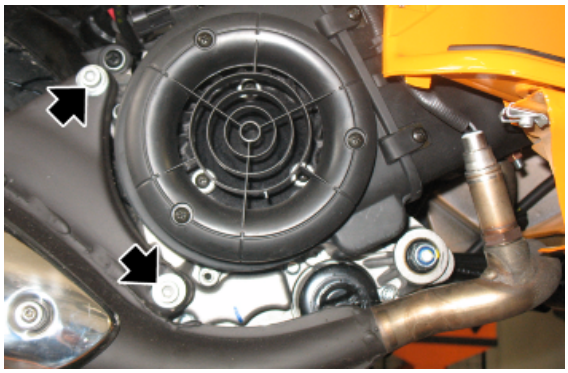
INDEX OF TOPICS

Exhaust assy. Removal

- Remove the 2 fixing nuts from the manifold to the head

- Remove the Lambda probe from its support and disconnect it.
- Release the lambda probe cable from the brackets on the fan cover.

- Loosen the 2 exhaust fixing screws to the crankcase, then remove the whole exhaust.



Remove the lambda probe from the manifold.

CAUTION: SHOULD IT BE NECESSARY TO REMOVE ONLY THE MUFFLER TIP, ALWAYS REPLACE THE GRAPHITE GASKET BETWEEN STUB AND TIP.

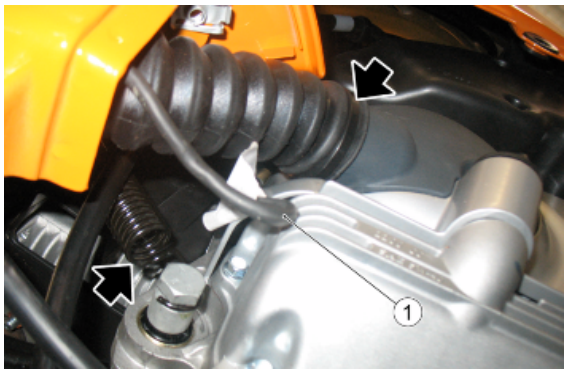
Removal of the engine from the vehicle

CAUTION

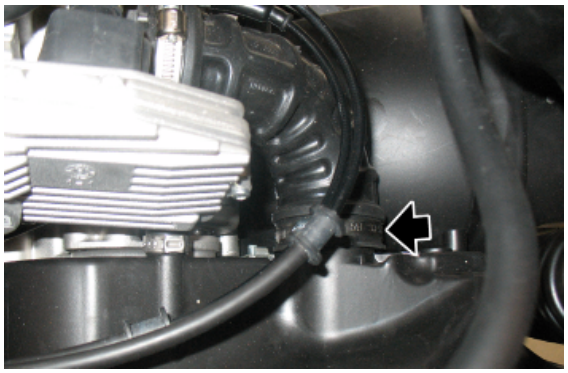
SUPPORT THE VEHICLE ADEQUATELY.

- Disconnect the battery.
- Remove the side fairings and footrest left and right terminals.
- Remove the helmet compartment.
- Remove the full muffler unit.
- Remove the 3 screws of the rear brake transmission retainer brackets indicated in the picture.
- Disconnect the rear brake transmission by unscrewing the adjuster screw.

- Disconnect the belt cooling pipe and the swinging arm retaining spring shown in the picture.
- Disconnect the ground lead (1) from the engine.
- Disconnect the spark plug tube.

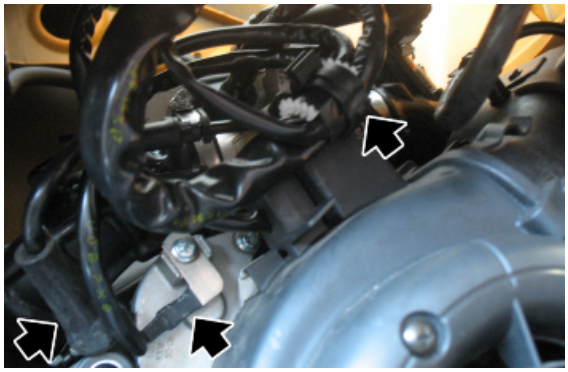


- Loosen the clamp indicated in the picture and disconnect the sleeve connecting the air filter to the throttle body.

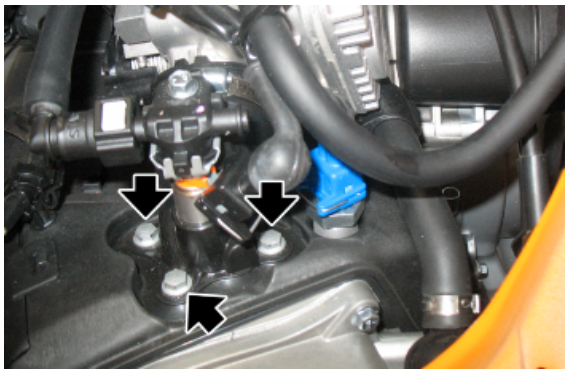


- Disconnect the two connectors of the magneto flywheel cable harness and slide them from the bottom.

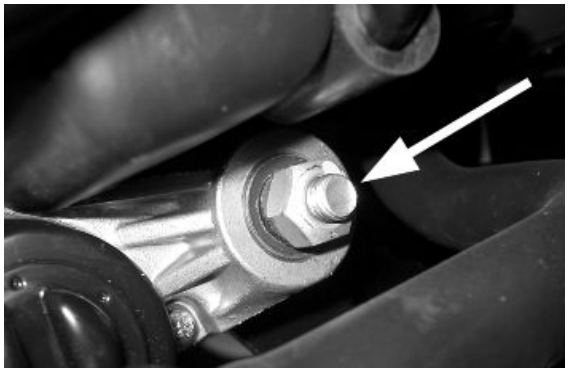
- Remove the ground lead and the positive cable from the starter motor shown in the figure.
- Open the clamp indicated and remove the throttle body cables.

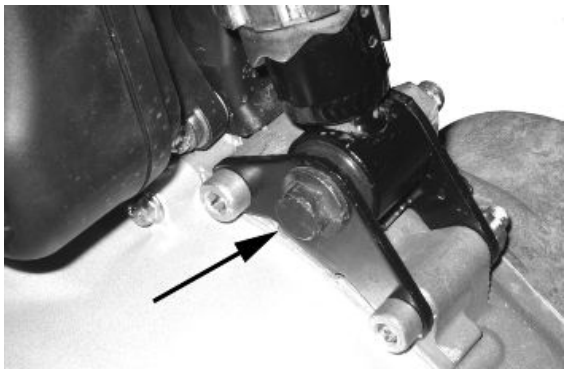


- Undo the three screws, with anti-tampering device, that fasten the intake manifold on the head.
- Detach from the head the manifold with throttle body and commands and collect the gasket.



- Unscrew the engine pin-swinging arm nut on the right-hand side of the vehicle and slide off the pin on the left hand side
- Support the vehicle adequately (with a jack) and remove the shock absorber lower clamping. The engine is now free.





INDEX OF TOPICS

This section describes the operations to be carried out on the engine and the tools to be used.

Automatic transmission

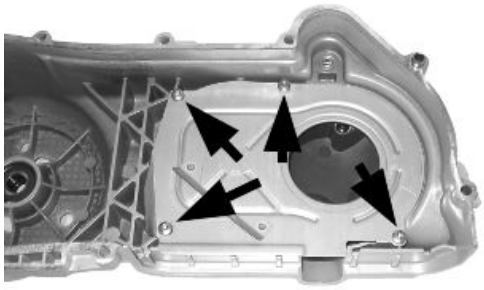
Transmission cover

- To remove the transmission cover it is necessary to remove the rear plastic cover first by inserting a screwdriver in the corresponding slotted holes. Using the clutch bell lock wrench, remove the driven pulley axle locking nut and recover the washer.
- Remove the cap/dipstick from the engine oil filling hole.
- Remove the ten screws.
- Remove the transmission cover. If this operation is performed directly on the vehicle, it is necessary to remove the cooling air sleeve and the three air filter housing retainers.

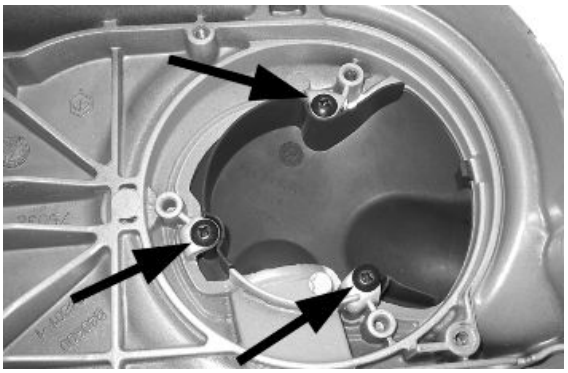
Specific tooling

020423Y Driven pulley lock wrench

Air duct



- Unscrew the Torx screws fixing the air duct bulkhead and remove the bulkhead.
- Remove the 3 screws, then take out the manifold as well as the filter.



Removing the driven pulley shaft bearing

- Remove the clip from the inside of the cover.
- Use the specific tools to remove the bearing from the crankcase.

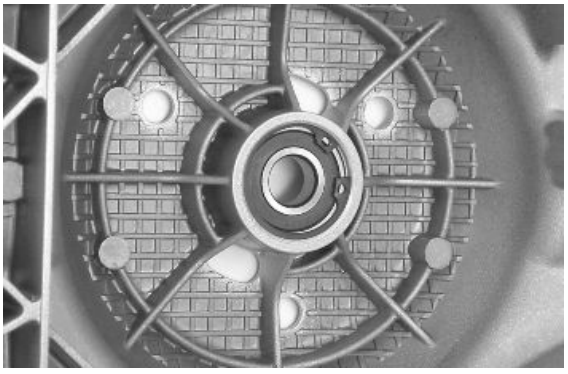
CAUTION

USE AN APPROPRIATE REST SURFACE TO AVOID DAMAGING THE COVER PAINT.

Specific tooling

020376Y Adaptor handle

020375Y 28 x 30 mm adaptor



Refitting the driven pulley shaft bearing

- Heat up the crankcase inside with the hot air gun.
- Insert the bearing in its housing, refit the Seeger ring.

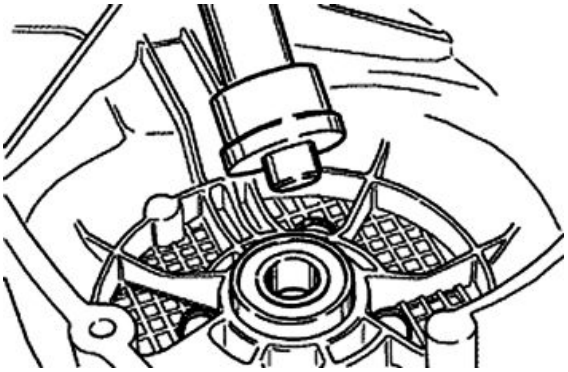
N.B.

ALWAYS REPLACE THE BEARING WITH A NEW ONE UPON REFITTING.

Specific tooling

020151Y Air heater

020376Y Adaptor handle



020357Y 32x35-mm Adaptor

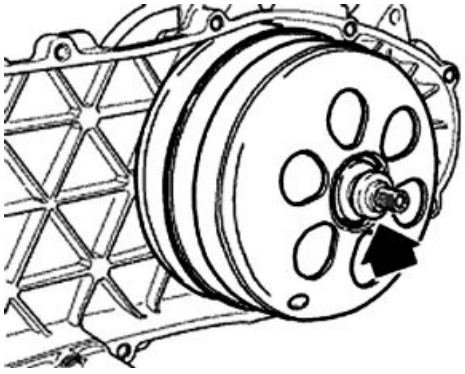
020412Y 15-mm guide

Removing the driven pulley

- Remove the spacer, the clutch bell and the whole driven pulley unit.

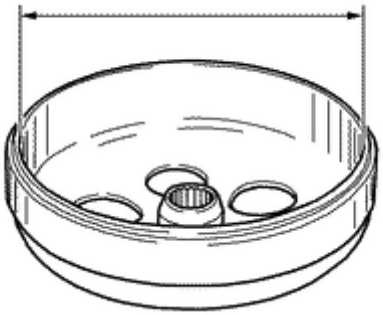
N.B.

THE UNIT CAN ALSO BE REMOVED WITH THE DRIVING PULLEY MOUNTED.



Inspecting the clutch drum

- Check that the clutch bell is not worn or damaged.
- Measure the clutch bell inside diameter.



Characteristic

Max. value clutch bell

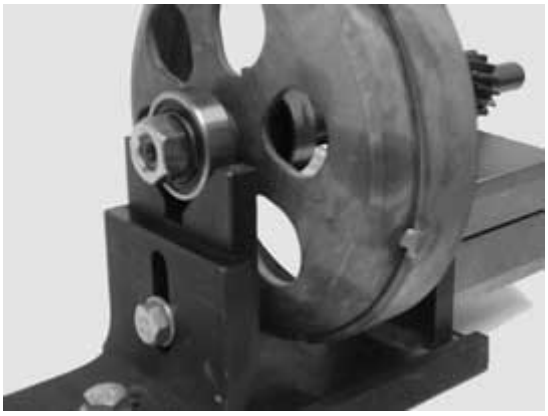
Max. value: Ø 134.5 mm

Clutch bell standard value

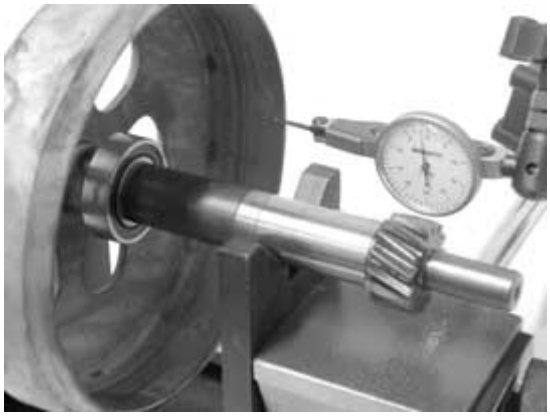
Standard value: Ø 134 - 134.2 mm

Checking the bell working surface eccentricity

- Install the bell on a driven pulley shaft using 2 bearings (inside diameter: 15 and 17 mm).
- Lock with the original spacer and nut.
- Place the bell/shaft unit on the support to check the crankshaft alignment.



- Using a feeler dial gauge and the magnetic base, measure the bell eccentricity.
- Repeat the measurement in 3 positions (Central, internal, external).
- If faults are found, replace the bell.



Specific tooling

020074Y Support base for checking crankshaft alignment

020335Y Magnetic mounting for dial gauge

Characteristic

clutch bell inspection: Limit eccentricity.

Admissible limit eccentricity: 0.15 mm

Removing the clutch

- Prepare the locking tool for the driven pulley with the pins half-screwed in the tool set to «**C**».
- Introduce the adapter ring 11 with the chamfering facing the inside of the tool.

- Fit the driven pulley unit in the tool so as the bolt get into the masses clutch support holes. Afterwards make the support screw make contact with a minimum force.
- Using the specific wrench, inserted 46 mm from the side, remove the clutch central locking nut.

- Separate the driven pulley into its components (clutch with fan and contrast spring with plastic fittings).

CAUTION

THE TOOL MUST BE FIRMLY FIXED IN THE VICE AND THE CENTRAL SCREW MUST NOT BE TIGHTENED WITH EXCESSIVE TORQUE AS THIS MAY DAMAGE THE PULLEY OR DEFORM THE SPECIFIC TOOL.

Specific tooling

020444Y Tool for fitting/ removing the driven pulley clutch

020444Y011 adapter ring

020444Y009 wrench 46 x 55

Inspecting the clutch

- Check the thickness of the clutch mass friction material.
- The masses must not show traces of lubricants; otherwise, check the driven pulley unit seals.

N.B.

UPON RUNNING-IN, THE MASSES MUST EXHIBIT A CENTRAL FAYING SURFACE AND MUST NOT BE DIFFERENT FROM ONE ANOTHER.
VARIOUS CONDITIONS CAN CAUSE THE CLUTCH TO TEAR.

CAUTION

DO NOT OPEN THE MASSES USING TOOLS TO PREVENT A VARIATION IN THE RETURN SPRING LOAD.

Characteristic

Check minimum thickness

1 mm

Pin retaining collar

- Simultaneously turn and pull the collar manually to remove it.

N.B.

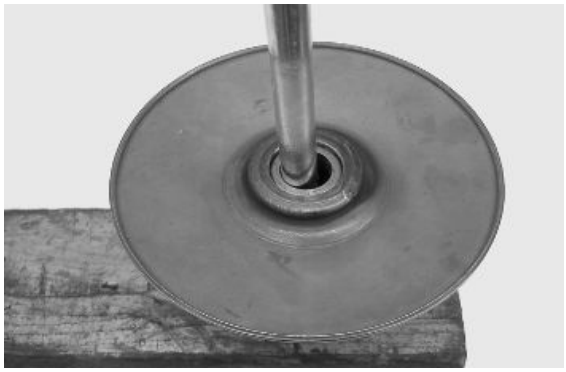
USE TWO SCREWDRIVERS IF YOU HAVE ANY DIFFICULTY.

N.B.

BE CAREFUL NOT TO PUSH THE SCREWDRIVERS IN TOO FAR TO AVOID DAMAGE THAT COULD COMPROMISE THE O-RING SEAL.

Removing the driven half-pulley bearing

- Remove the retainer ring using two flat blade screwdrivers.
- Using a hammer and pin, knock the ball bearing out as shown in the figure.
- Remove the roller bearing using the specific extractor.



N.B.

REST THE HALF-PULLEY ON A WOOD SURFACE TO AVOID DAMAGING THE THREADED RINGLET OF THE DRIVEN PULLEY UPON REMOVING IT.

Specific tooling

020375Y 28 x 30 mm adaptor

020376Y Adaptor handle

020439Y 17-mm guide

Inspecting the driven fixed half-pulley

- Measure the external diameter of the pulley bushing.

Characteristic

Minimum diameter permitted

Ø 40.96 mm

Standard diameter

Ø 40.965 mm

Inspecting the driven sliding half-pulley

- Remove the 2 inner sealing rings and the two O-rings.
- Measure the inside diameter of the mobile half-pulley bushing.

Characteristic

Minimum admissible diameter:

Ø 41.08 mm

Standard diameter

Ø 41.035 mm

Refitting the driven half-pulley bearing

- Assemble a new roller case using the specific punch, fit the bearing with the label facing outward and insert it completely up to the punch on the half-pulley.

N.B.

REST THE HALF-PULLEY ON A WOOD SURFACE TO AVOID DAMAGING THE THREADED RINGLET OF THE DRIVEN PULLEY UPON REMOVING IT.

Specific tooling

020424Y Driven pulley roller casing fitting punch

- To assemble the new ball bearing insert it completely down in its housing with the specific punch and finally assemble the Seeger ring.

Specific tooling

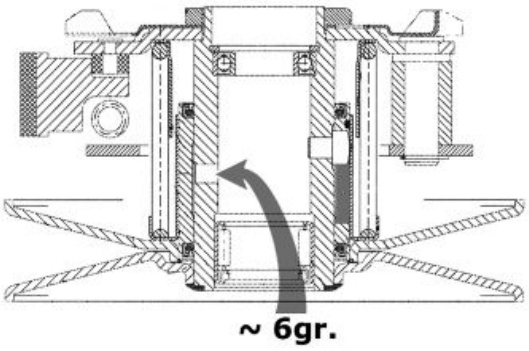
020375Y 28 x 30 mm adaptor

020376Y Adaptor handle

020439Y 17-mm guide

Refitting the driven pulley

- Check that the faying surfaces between the 2 half-pulleys and the belt do not show any signs of wear, scoring and grease.
- Insert the new oil seals and O-rings on the movable half-pulley.
- Assemble the half-pulley on the ringlet with the appropriate protection sheath.
- Make sure the pins and collar are not worn, reassemble the pins and collar.
- Use a greaser with a curved spout to lubricate the driven pulley unit with around 6 g of grease. This operation must be done through one of the holes inside the bushing until grease comes out of the opposite hole. This operation is necessary to avoid the presence of grease beyond the O-rings.



Specific tooling

020263Y Driven pulley assembly sheath

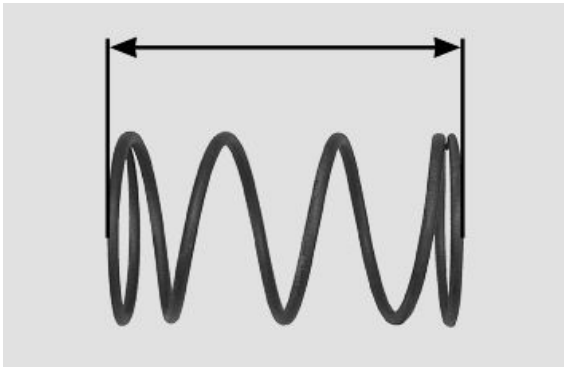
Recommended products

AGIP GREASE SM 2 Grease for the C-ring of the tone wheel

Soap-based lithium grease containing NLGI 2 Molybdenum disulphide; ISO-L-XBCHB2, DIN KF2K-20

Inspecting the clutch spring

- Measure the length of the spring when it is relaxed.



Characteristic

Standard length:

106 mm

Acceptable limit after use

102.5 mm (4.035 in)

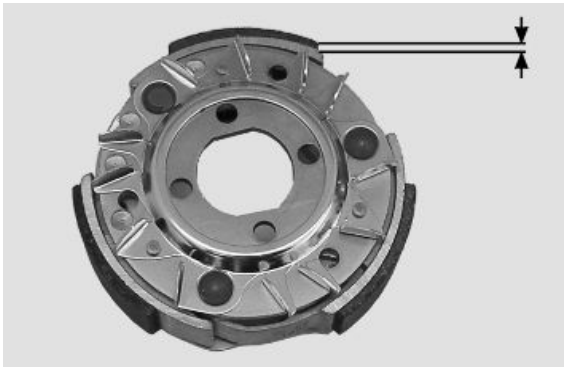
Refitting the clutch

- Check the thickness of the clutch mass friction material.

-The masses must not show traces of lubricants; otherwise, check the driven pulley unit.

N.B.

UPON RUNNING-IN, THE MASSES MUST EXHIBIT A CENTRAL CONTACT SURFACE AND MUST NOT BE DIFFERENT FROM ONE ANOTHER. VARIOUS CONDITIONS CAN CAUSE THE CLUTCH TO TEAR.



CAUTION

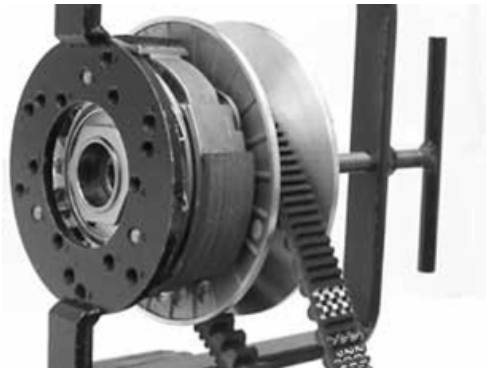
DO NOT OPEN THE MASSES USING TOOLS SO AS TO PREVENT A VARIATION IN THE RETURN SPRING LOAD.

Characteristic

Minimum thickness permitted:

1 mm

- Support the driven pulley spring compressor specific tool with the control screw in vertical axis.
- Arrange the tool with the medium length pins screwed in position "**C**" on the inside.
- Introduce the adapter ring No. 11 with the chamfering facing upwards.
- Insert the clutch on the adapter ring.
- Lubricate the end of the spring that abuts against the servo-system closing collar.
- Insert the spring with its plastic holder in contact with the clutch.
- Insert the driving belt into the pulley unit according to their direction of rotation.
- Insert the pulley unit with the belt into the tool.
- Slightly preload the spring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Place the tool in the clamp with the control screw on the horizontal axis.
- Fully preload the spring.
- Apply the clutch fixing nut and tighten it to the prescribed torque using the special 46x55 wrench.
- Loosen the tool clamp and insert the belt according to its direction of rotation.
- Lock the driven pulley again using the specific tool.
- Preload the clutch return spring with a traction/ rotation combined action and place the belt in the smaller diameter rolling position.
- Remove the driven pulley /belt unit from the tool.



N.B.

DURING THE SPRING PRELOADING PHASE, BE CAREFUL NOT TO DAMAGE THE PLASTIC SPRING STOP AND THE BUSHING THREADING.

N.B.

FOR DESIGN REASONS, THE NUT IS SLIGHTLY ASYMMETRIC; THE FLATTEST SURFACE SHOULD BE MOUNTED IN CONTACT WITH THE CLUTCH.

Specific tooling

020444Y Tool for fitting/ removing the driven pulley clutch

020444Y011 adapter ring

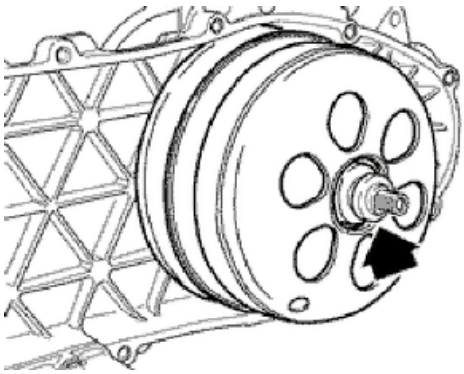
020444Y009 wrench 46 x 55

Locking torques (N*m)

Nut locking clutch unit on pulley **55 to 60 Nm**

Refitting the driven pulley

- Reassemble the clutch bell and spacer.



Drive-belt

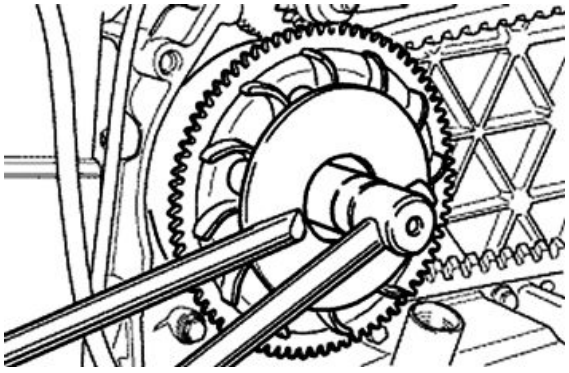
- Make sure the driving belt is not damaged and does not show abnormal wear.
- Replace as indicated in the scheduled maintenance table.

Removing the driving pulley

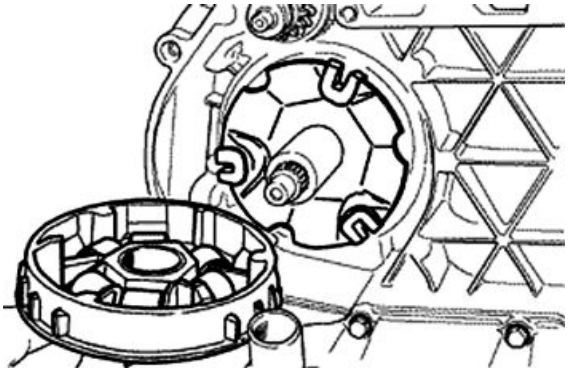
- Lock the driving pulley with the specific tool as shown in the figure. - Disassemble the central nut and the Belleville washer, remove the drive and the 2 washers. - Remove the stationary half pulley and the steel washer.

Specific tooling

020368Y driving pulley lock wrench



- Remove the belt and slide the movable half-pulley with the relevant bush, taking care of the falling free assembled rollers.
- Remove the return rollers plate with the relative guide pads.



Inspecting the rollers case

- Check that the internal bushing is not abnormally worn and measure inner diameter.

N.B.

DO NOT LUBRICATE OR CLEAN THE BUSHING.

BUSHING ROLLER CONTAINER

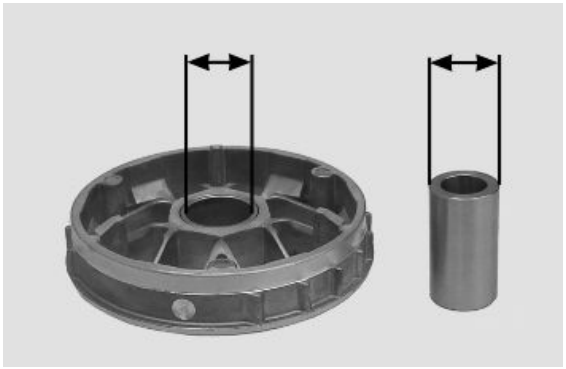
Specification	Desc./Quantity
Maximum allowable diameter	Ø 26.121 mm
Standard diameter	Ø 26+0 +0.021 mm

BUSH SLIDE PULLEY

Specification	Desc./Quantity
Minimum diameter permitted	Ø 25.950 mm
Standard diameter	Ø 26-0.020 -0.041 mm

VARIABLE SPEED ROLLERS

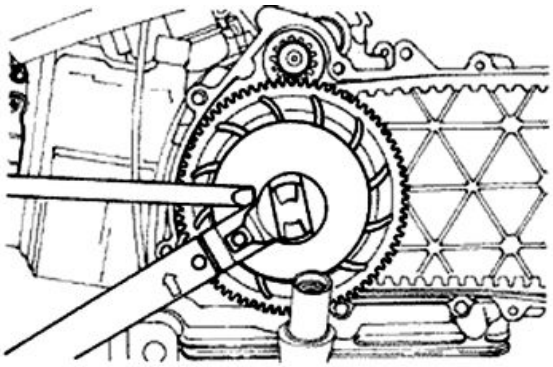
Specification	Desc./Quantity
Minimum diameter permitted	Ø 18.5 mm
Standard diameter	Ø 26±0.1 mm



- Check the guide shoes for the variator back-plate are not worn.
- Check there is no wear in the roller housing, and the surfaces in contact with the belt on either of the pulley halves.

Refitting the driving pulley

- Reassemble the parts of the unit (internal lining, fixed half-pulley, external lining, drive, belleville washer and nut), spread recommended product on the thread and tighten the nut to the prescribed torque.
- Avoid half-pulley rotation using a calliper spanner.



N.B.

REPLACE THE NUT WITH A NEW ONE AT EVERY REFIT

Specific tooling

020368Y driving pulley lock wrench

Recommended products

Loctite 243 Medium strength threadlock

Medium Loctite 243 threadlock

Locking torques (N*m)

Locking torque **75 to 83**

Refitting the transmission cover

- Check that there are 2 centring dowels and that the sealing gasket for the oil sump on the transmission cover is adequately fitted.
- Replace the cover and tighten the 10 screws to the specified torque.
- Refit the oil loading cap/bar.
- Refit the steel washer and the driven pulley nut.
- Tighten the nut to the prescribed torque using the lock wrench and the torque wrench tools.

- Refit the plastic cover.

Specific tooling

020423Y Driven pulley lock wrench

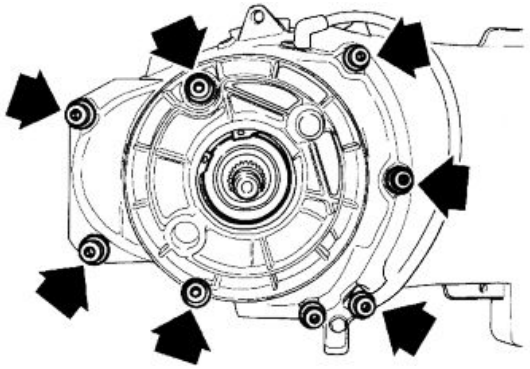
Locking torques (N*m)

Transmission cover screws 11 to 13 **Driven pulley shaft nut** 54 to 60

End gear

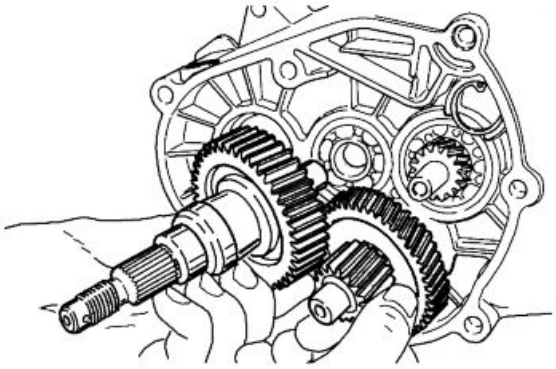
Removing the hub cover

- Empty the rear hub through the oil drainage tap located inside the hub cover
- Remove the brake shoe and relevant spring
- Remove the 7 flanged screws as shown in the figure.
- Remove the rubber cover and the brake pad lever sliding unscrewing the relevant retaining screw to reach the rear of the cover
- Take off the hub cover and relevant gaskets



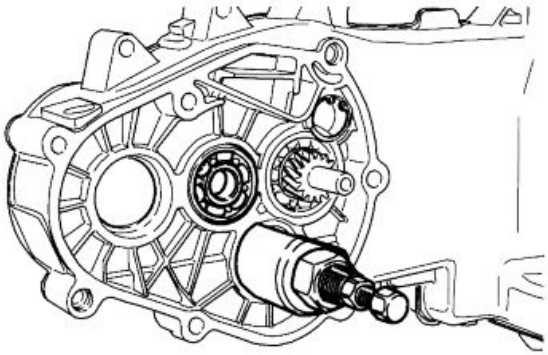
Removing the wheel axle

Remove the intermediate gear and the complete hub cover.



Removing the hub bearings

- Check the state of the bearings being examined (wear, clearance and noisiness). If faults are detected, do the following.
- Use the specific bearing extractor to remove the three 15 mm bearings (2 in the crankcase and 1 in the hub cover).



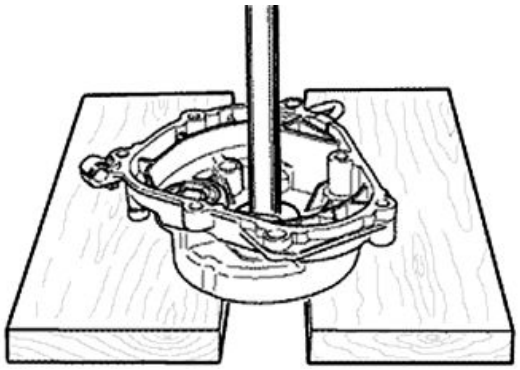
Specific tooling

001467Y009 Driver for OD 42-mm bearings

001467Y013 Pliers to extract ø 15-mm bearings

Removing the wheel axle bearings

- Take out the clip on the outside of the gearbox cover.
- Remove the bearing with the adequate tools adequately supporting the hub cover, as shown in the figure.

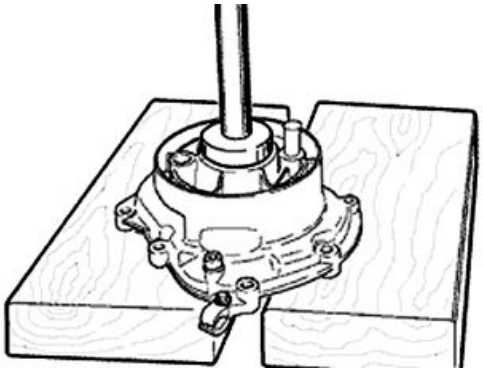


Specific tooling

020376Y Adaptor handle

020364Y 25-mm guide

With the appropriate tools, remove the oil seal as shown in the figure.



Specific tooling

020376Y Adaptor handle

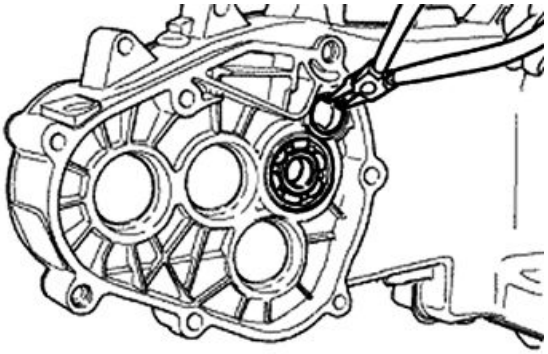
020359Y 42x47-mm Adaptor

Removing the driven pulley shaft bearing

If it is necessary to remove the driven pulley shaft, from the relevant bearing and oil seal, remove driven pulley.

- Extract the driven pulley shaft from its bearing.
- Remove the oil seal using a screwdriver, working from inside the bearing and being careful not to damage the housing, make it come out of the belt transmission side.
- Remove the Seeger ring shown in the figure

With the sectional punch, remove the driven pulley shaft bearing.



Specific tooling

020376Y Adaptor handle

020375Y 28 x 30 mm adaptor

020363Y 20-mm guide

See also

Removing the driven pulley

Inspecting the hub shaft

- Check the three shafts for wear or distortion of the toothed surfaces, the bearing housings, and the oil seal housings.
- In case of anomalies, replace the damaged components.

Inspecting the hub cover

- Check that the fitting surface is not dented or distorted. - Check the capacity of the bearings and the brake camshaft. - If faults are found, replace the hub cover.

Refitting the driven pulley shaft bearing

- Heat up the parts using the specific heat gun

Specific tooling

020150Y Air heater mounting

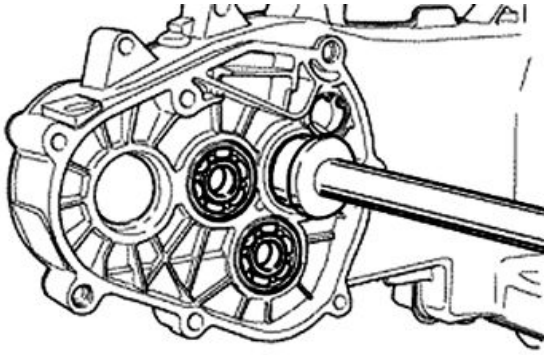
020151Y Air heater

- Reassemble the driven pulley axle bearing positioning it with ball bearing in view from the inside of the hub cover using the adequate tools

Specific tooling

020376Y Adaptor handle

- Refit the Seeger ring with the opening facing the bearing as shown in the figure and fit a new oil seal flush with the crankcase.



Refitting the wheel axle bearing

- Heat up the parts using the specific heat gun

Specific tooling

020151Y Air heater

020150Y Air heater mounting

-The wheel axle bearing on the cover, should be assembled with the specific tools

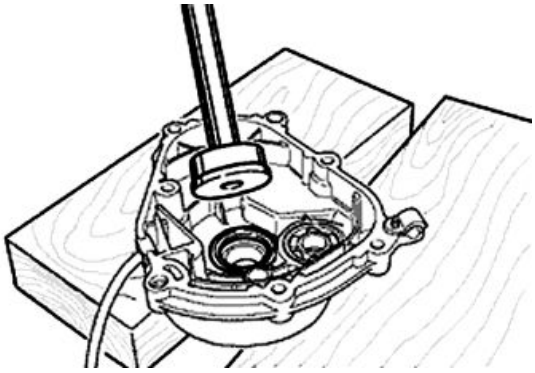
Specific tooling

020364Y 25-mm guide

020360Y 52x55-mm Adaptor

020376Y Adaptor handle

- Assemble the Seeger ring.
- Assemble the oil seal flush with the internal surface as shown in the figure to the hub using the adequate tools and with the seal lip towards the inside of the hub.



Specific tooling

020376Y Adaptor handle

020360Y 52x55-mm Adaptor

Refitting the hub cover bearings

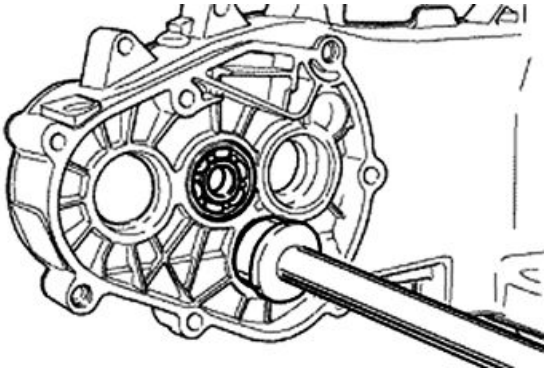
- For the fitting of the hub box bearings the engine crankcase and the cover must be heated with the specific heat gun.

Specific tooling

020150Y Air heater mounting

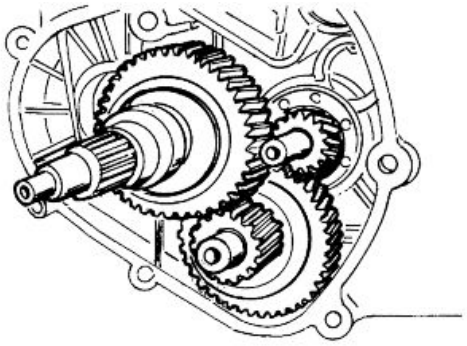
020151Y Air heater

- The three 15 mm bearings must be fitted using the appropriate tools.



Refitting the hub bearings

- Insert the cover prepared in the crankcase taking care of inserting the gear of the pulley shaft on the intermediary gear.

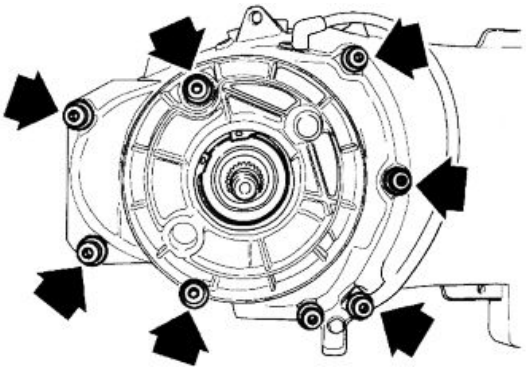


Refitting the ub cover

- Fit a new gasket together with the alignment dowels.
- Fit the gearbox cover, making sure the breather pipe is in the correct position.
- Tighten the 7 screws to the prescribed torque.

Locking torques (N*m)

Locking torque **24 to 27**



Flywheel cover

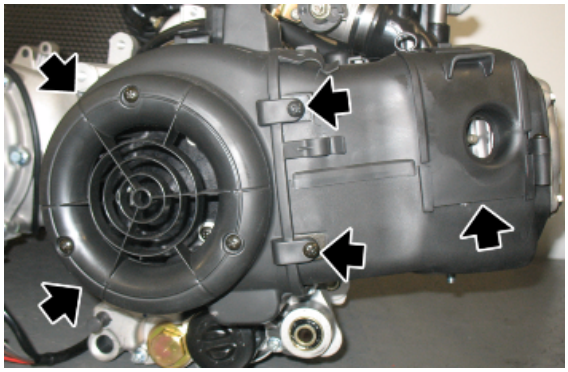
Cooling hood

- Remove the fan cover cap acting on the 4 fixing screws.

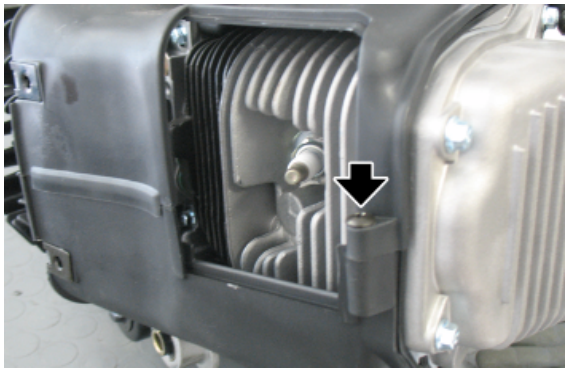
CAUTION

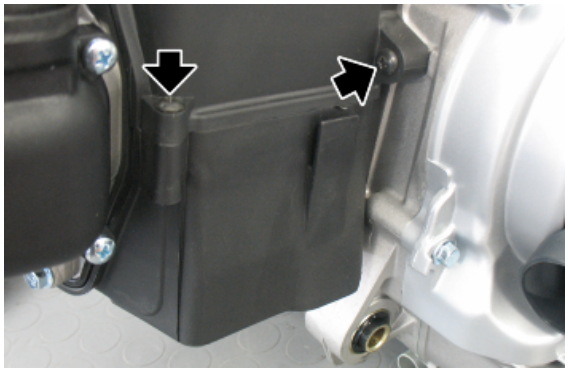
DURING REMOVAL SLIDE THE CABLE GROMMET FROM THE HOUSING ON THE CAP.

- Slide the access flap to the spark plug.



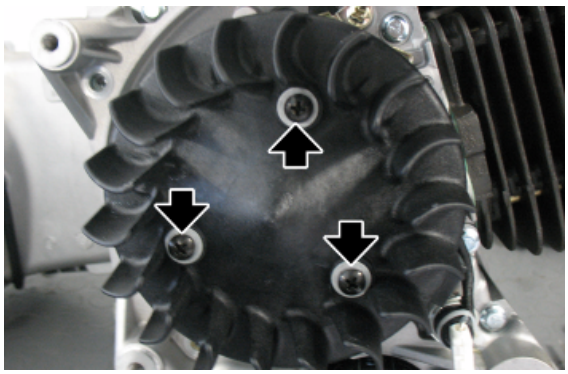
- Remove the two self threading screws, left and right and the lateral left fixing screw on the crank-case base.
- Take off the two caps from the thermal group.
- Remove the gasket seal of the housing on the head.





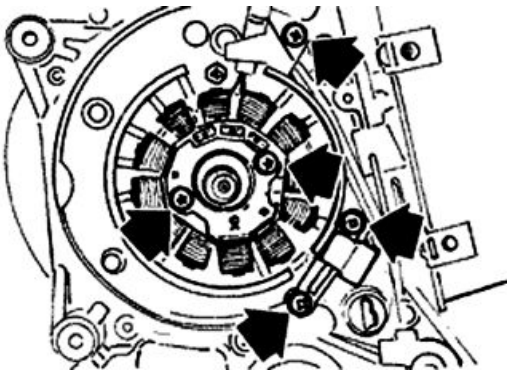
Cooling fan

- Remove the fan cover cap.
- Remove the cooling fan by acting on the three fixings indicated in the figure.



Removing the stator

- Remove the magneto flywheel.
- Remove the electric terminal of the minimum oil pressure switch.
- Remove the two Pick-Up screws and the one for the wiring harness bracket as well as the two stator fixing screws shown in the figure.
- Remove the stator and its wiring.



Refitting the stator

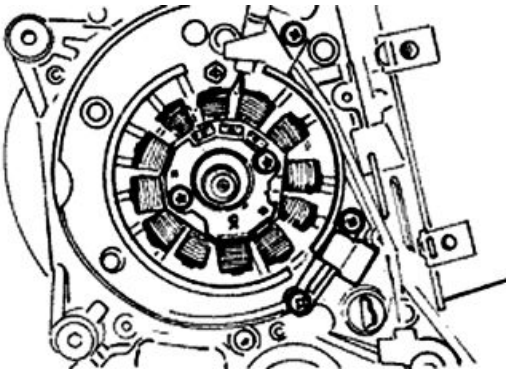
- Refit the stator and flywheel carrying out the removal procedure in reverse, tightening the retainers to the specified torque.
- Place the cable harness as shown in the figure.

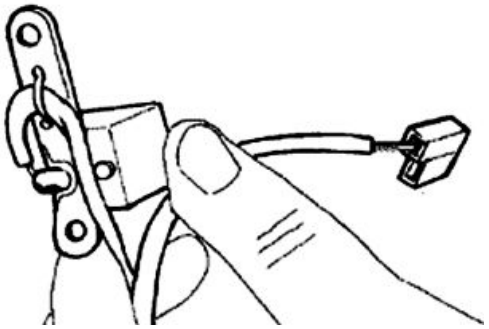
N.B.

THE PICK-UP WIRE SHOULD BE POSITIONED BETWEEN THE UPPER SCREW AND THE REFERENCE PIN AS SHOWN IN THE DETAIL DRAWING.

Locking torques (N*m)

Stator screw **3 to 4**

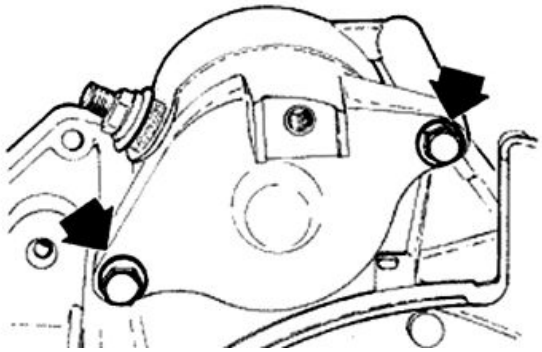




Flywheel and starting

Removing the starter motor

- Remove the two screws indicated in the figure.
- Take the starter motor out of its seat.



Removing the flywheel magneto

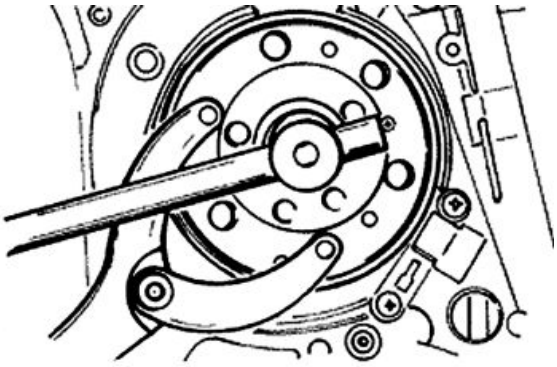
- Lock the rotation of the flywheel using the calliper spanner.
- Remove the nut.

CAUTION

THE USE OF A CALLIPER SPANNER OTHER THAN THE ONE SUPPLIED COULD DAMAGE THE STATOR COILS

Specific tooling

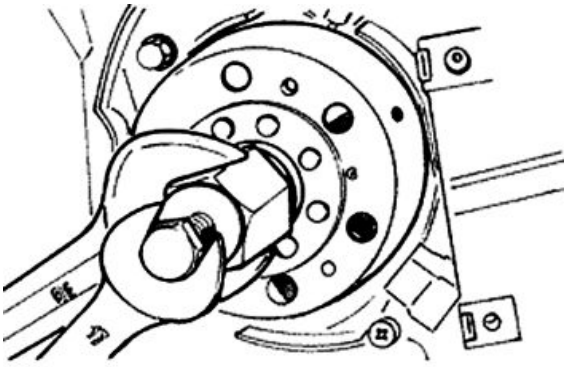
020565Y Flywheel lock calliper spanner



- Extract the flywheel with the extractor.

Specific tooling

008564Y Flywheel extractor



Inspecting the flywheel components

- Check the integrity of the internal plastic parts of the flywheel and the Pick-up control plate.

Refitting the flywheel magneto

- Fit the flywheel being careful to insert the key properly.
- Lock the flywheel nut to the prescribed torque
- Check that the Pick-Up air gap is between 0.34 to 0.76 mm.

The air gap cannot be modified when assembling the Pick-Up.

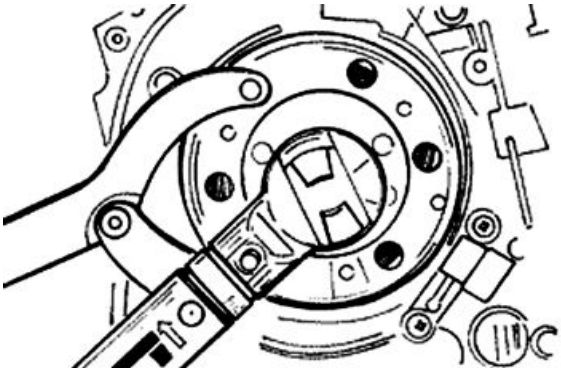
Different values result from deformations visible on the Pick-Up mounting.

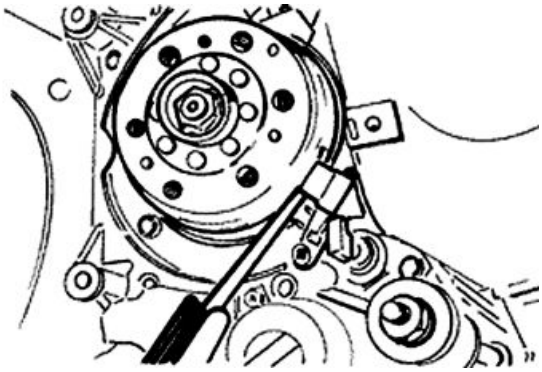
N.B.

A VARIATION IN THE AIR GAP DISTANCE MODIFIES THE IGNITION SYSTEM IDLE SPEED

Locking torques (N*m)

Flywheel nut **52 to 58**





Refitting the starter motor

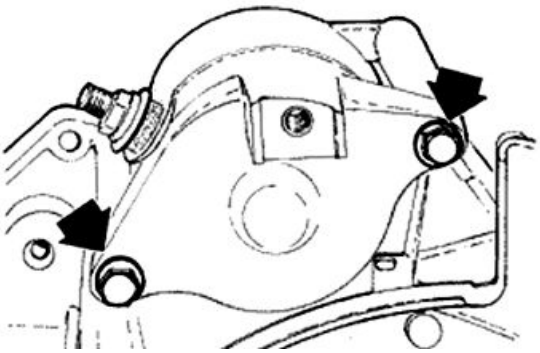
- Fit a new O-ring on the starter and lubricate it.
- Fit the starter on the crankcase and lock the 2 screws to the prescribed torque.

N.B.

REFIT THE REMAINING PARTS AS DESCRIBED IN THE CYLINDER HEAD, TIMING, LUBRICATION, FLYWHEEL AND TRANSMISSION CHAPTERS.

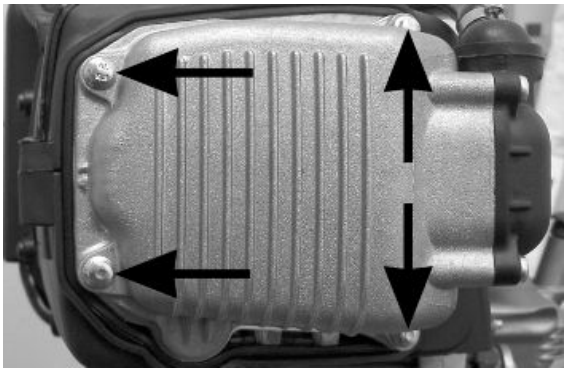
Locking torques (N*m)

Starter screws **11 to 13**



Cylinder assy. and timing system

Removing the timing system drive



- Remove the parts listed below first: transmission cover, belt driving pulley, oil pump pulley cover and pinion separator washer.
- Remove the tappet cover.
- Remove the central screw fastener and the automatic valve-lifter retaining cover, as shown in the figure.
- Remove the return spring of the automatic valve lifter unit and the automatic valve lifter unit and its end of stroke washer.
- Loosen the central screw on the tensioner first.
- Remove the two fixings shown in the figure.
- Remove the tensioner with its gasket.
- Remove the internal hex screw and the counterweight shown in the figure.
- Remove the camshaft command pulley and its washer.
- Remove the command sprocket wheel and the timing chain.
- Remove the screws indicated in the figure, the spacer bar and the tensioner slider.

The chain tensioner slider must be removed from the transmission side. As regards the lower chain guide slider, it may only be removed after the head has been removed.

N.B.

IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

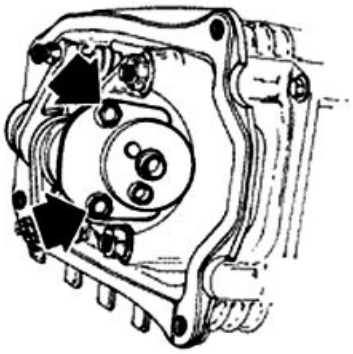
See also

Removing the driving pulley

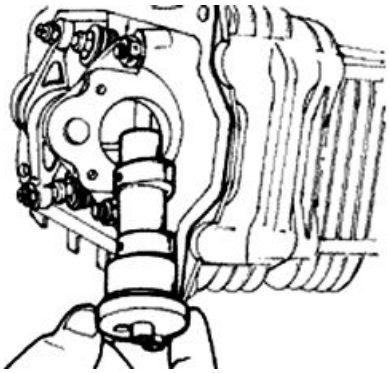
Transmission cover
Removal

Removing the cam shaft

- Remove the 2 screws and the camshaft retainer shown in the diagram.



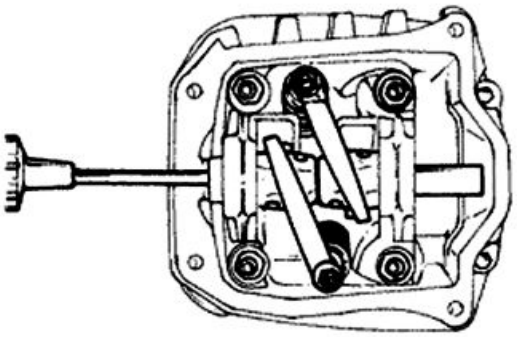
- Remove the cam shaft.



- Remove the pin of the rocking levers from the flywheel side holes.
- Remove the rocking levers and the elastic washer.

N.B.

MARK THE ROCKERS ASSEMBLE POSITION, SO AS TO AVOID THE INVERSION OF INLET WITH THE OUTLET.

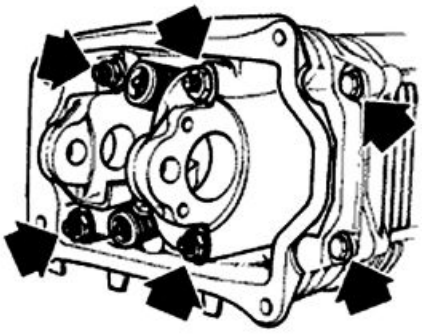


Removing the cylinder head

- Remove the spark plug.
- Remove the 2 side fixings shown in the figure.
- Loosen the 4 head-cylinder fastening nuts in two or three stages and in criss-cross fashion.
- Remove the head, the two centring dowels and the gasket.

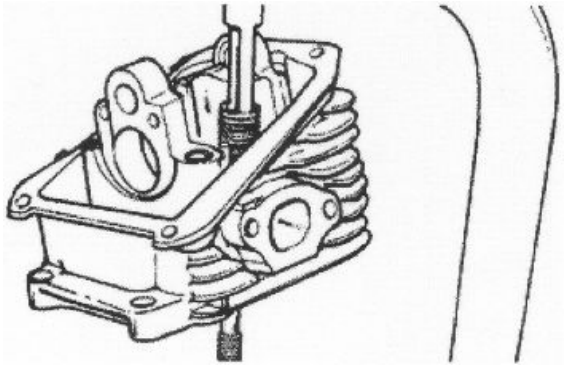
N.B.

IF NEEDED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, ROCKER PINS AND FIXING BRACKET. THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE CRANKSHAFT CHAIN TIGHTENER.



Removing the valves

- Using the specific tool fitted with the element shown in the figure, remove the cotters, the plates and the spring between the valves.

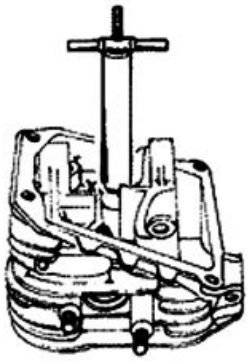


Specific tooling

020382Y Valve cotters equipped with part 012 removal tool

020382Y011 adapter for valve removal tool

- Remove the oil seals with the appropriate tool.
- Remove the lower spring supports.



Specific tooling

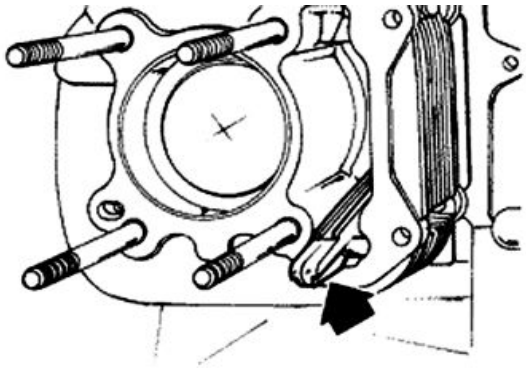
020431Y Valve oil seal extractor

Removing the cylinder - piston assy.

- Remove the chain guide pad.
- Remove the cylinder base gasket.

CAUTION

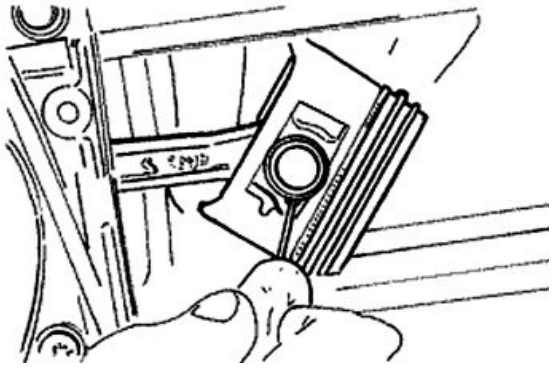
TO AVOID DAMAGING THE PISTON, SUPPORT IT WHILE REMOVING THE CYLINDER.



- Remove the two retainer rings, the wrist pin and the piston.
- Remove the 3 piston rings from the piston.

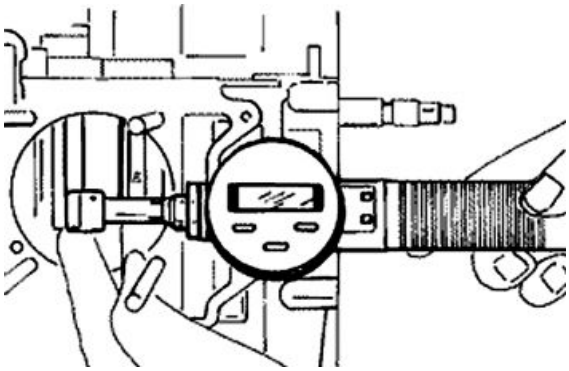
N.B.

BE CAREFUL NOT TO DAMAGE THE PISTON RINGS DURING REMOVAL.



Inspecting the small end

- Measure the internal diameter of the connecting rod small end using an internal micrometer.



N.B.

IF THE DIAMETER OF THE CONNECTING ROD SMALL END EXCEEDS THE MAXIMUM DIAMETER ALLOWED, SHOWS SIGNS OF WEAR OR OVERHEATING REPLACE THE CRANKSHAFT AS DESCRIBED IN THE "CRANKCASE AND CRANKSHAFT" CHAPTER".

Characteristic

Connecting rod small end check-up: Maximum diameter

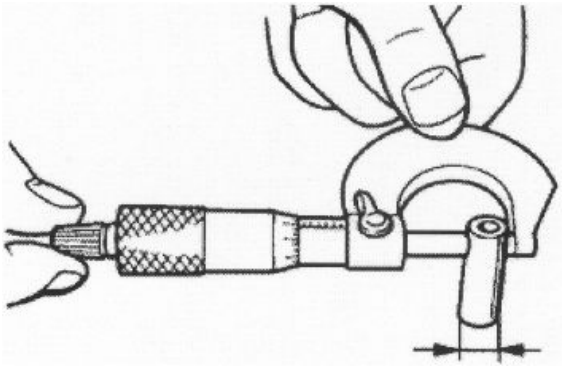
15.030 mm

Connecting rod small end check-up: Standard diameter

15+0.015+0.025 mm

Inspecting the wrist pin

- Check the outer diameter of the gudgeon pin.



Characteristic

Standard pin diameter

14.996 to 15 mm

Minimum diameter permitted

Ø 14.994 mm

- Calculate the piston pin coupling clearance.

N.B.

THE PIN HOUSINGS HAVE 2 LUBRICATION CHANNELS. FOR THIS REASON MEASUREMENT OF THE DIAMETER MUST BE CARRIED OUT ACCORDING TO THE AXIS OF THE PISTON.

Characteristic

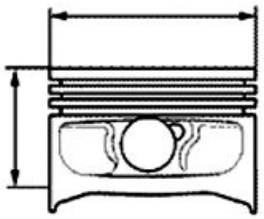
Piston pin bore - standard diameter

Ø 15+0.001 +0.006

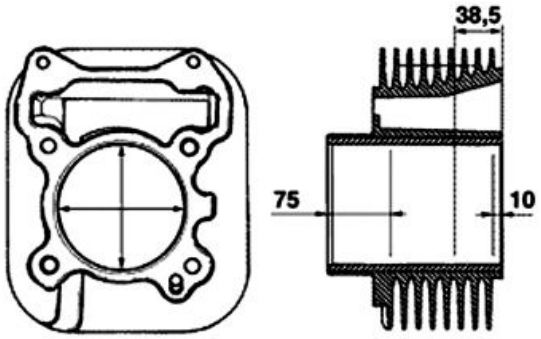
- Measure the outside diameter of the piston, perpendicular to the gudgeon pin axis.
- Measure 36.5 mm from the piston crown's shown in the figure.

N.B.

THE PIN HOUSINGS HAVE 2 LUBRICATION CHANNELS. FOR THIS REASON MEASUREMENT OF THE DIAMETER MUST BE CARRIED OUT ACCORDING TO THE AXIS OF THE PISTON.



- Using a bore meter, measure the inner cylinder diameter at three different points according to the directions shown in the figure.
- Check that the coupling surface with the head is not worn or misshapen.
- Pistons and cylinders are classified into categories based on their diameter. The coupling is carried out in pairs (A-A, B-B, C-C, D-D).

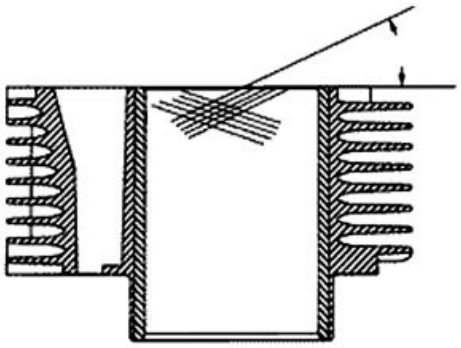


Characteristic

Maximum allowable run-out:

0.05 mm

- The cylinder rectifying operation should be carried out with a surfacing that respects the original angle.
- The cylinder surface roughness should be 0.9 micron.
- This is indispensable for a good seating of the sealing rings, which in turn minimises oil consumption and guarantees optimum performance.
- The pistons are oversized due to cylinder rectification and are subdivided into three categories 1st, 2nd, 3rd with 0.2-0.4-0.6 mm oversize. They are also classified into 4 categories A-A, B-B, C-C, D-D.



Inspecting the piston

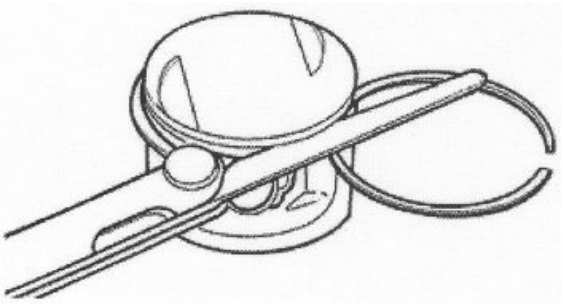
- Carefully clean the sealing ring housings.
- Measure the coupling clearance between the sealing rings and the piston grooves using suitable sensors, as shown in the diagram.
- If the clearance is greater than that indicated in the table, replace the piston.

STANDARD COUPLING CLEARANCE

Name	Description	Dimensions	Initials	Quantity
Top piston ring		0.025 to 0.070		
Middle piston ring		0.015 to 0.060		
oil scraper		0.015 to 0.060		

MAXIMUM ADMITTED CLEARANCE AFTER USE

Name	Description	Dimensions	Initials	Quantity
Top piston ring		0.080 mm		
Middle piston ring		0.070 mm		
oil scraper		0.070 mm		



Removing the piston

- Install piston and wrist pin onto the connecting rod, aligning the piston arrow the arrow facing towards the exhaust.
- Fit the pin retainer ring onto the appropriate tool.

Specific tooling

020430Y Pin lock fitting tool

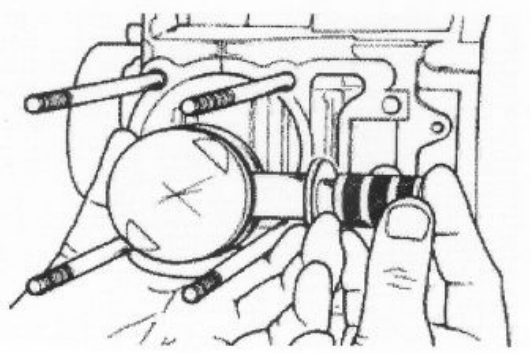
- With the opening in position indicated on the tool, take retainer ring in the closed position using the punch.
- Fit the wrist pin snap ring using the plug as shown in the figure

N.B.

THE TOOL FOR INSTALLING THE RETAINER RINGS MUST BE USED MANUALLY.

CAUTION

USING A HAMMER TO POSITION THE RINGS CAN DAMAGE THE LOCKING HOUSING.

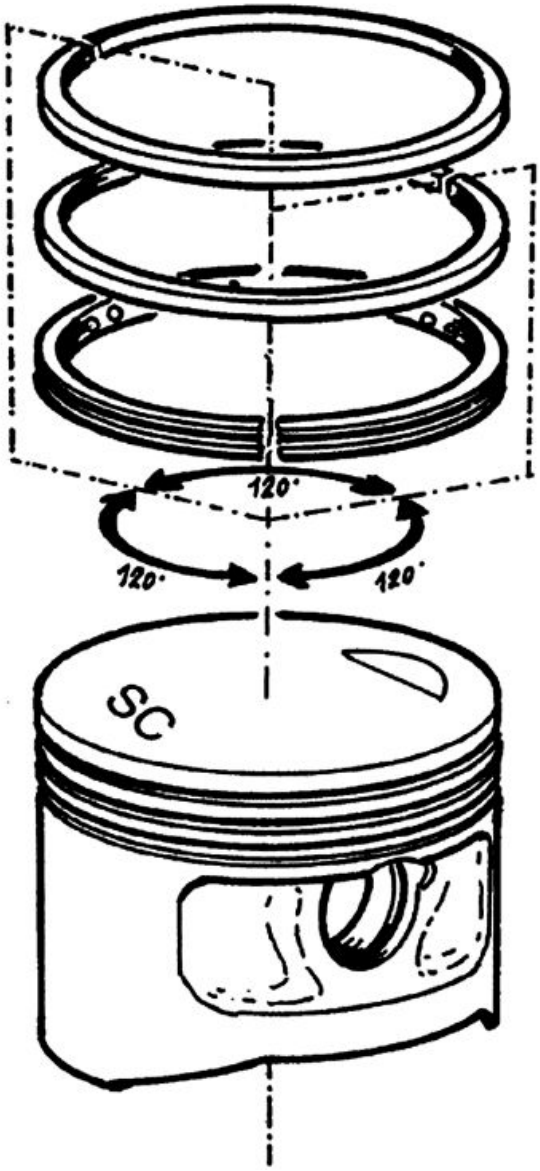


Refitting the piston rings

- Place the oil scraper spring on the piston.
- Refit the oil scraper ring with the join of spring ends on the opposite side from the ring gap and the word 'TOP' towards the crown of the piston. The tapered side of the middle piston ring should always be facing away from the crown of the piston.
- Fit the middle piston ring with the identification letter facing the crown of the piston. In any case, the step must be facing opposite the piston crown.
- Fit the top piston ring with the word 'top' or the reference mark facing the crown of the piston.
- Offset the piston ring gaps on the three rings by 120° to each other as shown in the figure.
- Lubricate the components with engine oil.

N.B.

SO AS TO OBTAIN THE BEST CONFIGURATION THE 2 SEALING RINGS ARE MADE WITH A CONTACT CONICAL CYLINDER SECTION.

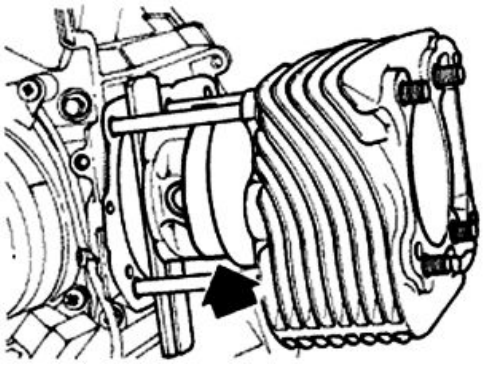


Refitting the cylinder

- Insert the cylinder base gasket with the thickness determined above.
- Using the fork support and the piston ring retaining band, refit the cylinder as shown in the figure.

N.B.

BEFORE FITTING THE CYLINDER, CAREFULLY BLOW OUT THE LUBRICATION DUCT AND OIL THE CYLINDER BARREL.



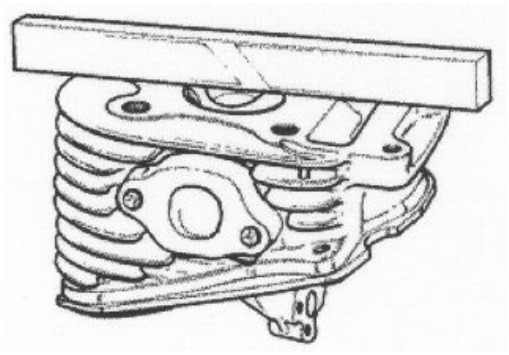
Specific tooling

020426Y Piston fitting fork

020427Y Piston assembly band

Inspecting the cylinder head

- Using a trued bar check that the cylinder head surface is not worn or distorted.
- Check that the camshaft and rocking lever pin bearings show no signs of wear.
- Check that the cylinder head cover surface, the intake manifold and the exhaust manifold are not worn.



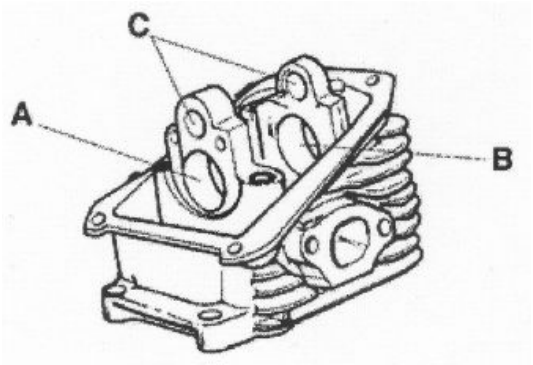
Characteristic

Maximum admitted unevenness: Head check

0.05 mm

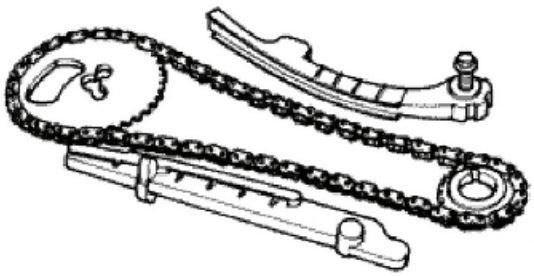
STANDARD DIAMETER

Specification	Desc./Quantity
Standard diameter	A Ø 32.5 to 32.525
Standard diameter	B Ø 20 to 20.021
Standard diameter	C Ø 12 to 12.018

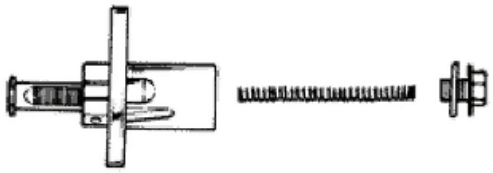


Inspecting the timing system components

- Check that the guide slider and the tensioner slider are not worn out.
- Ensure that the camshaft drive pulley, the chain assembly and the sprocket wheel are not worn.
- If sings of wear are found, replace the parts. if the chain, pinion or pulley are worn, replace the whole assembly.



- Remove the central screw and the tensioner spring. Check that the one-way mechanism is not worn.
- Check the condition of the tensioner spring.
- If examples of wear are found, replace the whole unit.

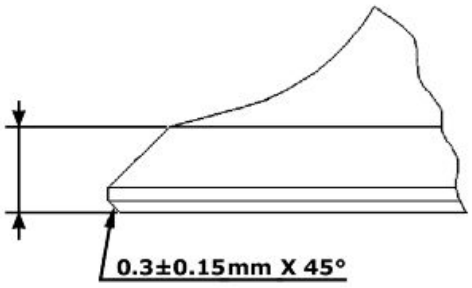


Inspecting the valve sealings

- Measure the width of the sealing surface on the valve seats.

VALVE SEAL SURFACE

Specification	Desc./Quantity
Intake valve - seal surface	2.4 to 2.8 mm
Exhaust valve - seal surface	2.2 to 2.6 mm



Inspecting the valve housings

- Remove any carbon formation from the valve guides.
- Measure the inside diameter of each valve guide.
- Take the measurement at three different heights in the rocker arm push direction.

Characteristic

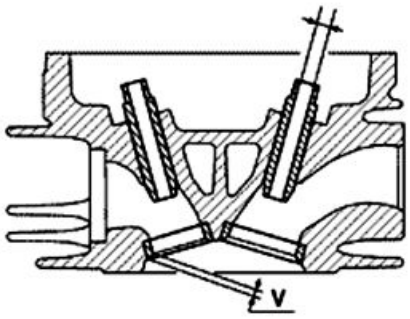
Standard drainage guide diameter

5.012 mm

Standard inlet guide diameter

5.012 mm

- If the width of the impression on the valve seat or the diameter of the valve guide exceed the specified limits, replace the cylinder head.
- Check width of the impression on the valve seat «**V**»



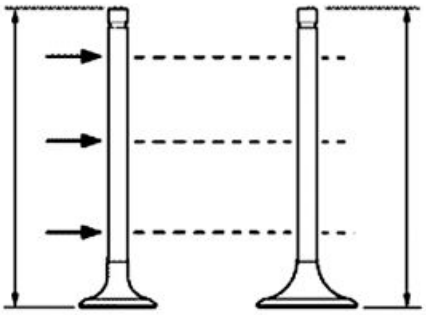
Characteristic

Wear limits:

Max. 1.6 mm.

Inspecting the valves

- Measure the diameter of the valve stems in the three positions indicated in the diagram.
- Calculate the clearance between valve and valve guide.



Characteristic

Minimum diameter admitted - Inlet:

4.96 mm

Minimum diameter admitted - Outlet:

4.95 mm

Standard clearance - Inlet:

0.013 to 0.040 mm

Standard clearance - Outlet:

0.025 to 0.052 mm

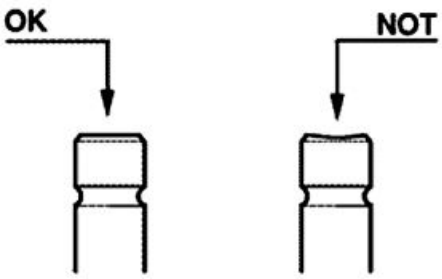
Maximum clearance admitted- Inlet:

0.062 mm

Maximum clearance admitted - Outlet:

0.072 mm

- Check that there are no signs of wear on the contact surface with the articulated register terminal.
- If the sealing surface on the valves is wider than the specified limit, damaged in one or more points or curved, replace the valve with a new one.



Characteristic

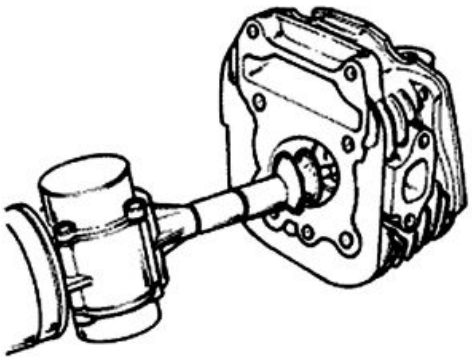
Standard valve length - Inlet:

80.6 mm

Valve standard length: Exhaust

79.6 mm

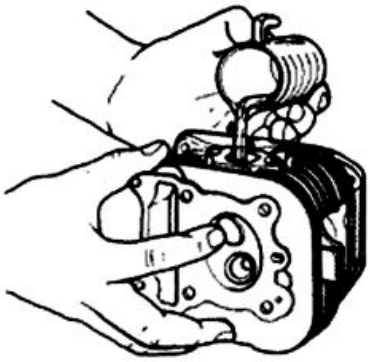
- If the checks above give no failures, you can use the same valves. For best sealing results, it is advisable to grind the valves. Grind the valves gently with a fine-grained lapping compound. During grinding, keep the cylinder head in a horizontal position. This will prevent the lapping compound residues from penetrating between the valve stem/guide coupling.



CAUTION

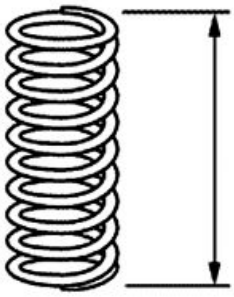
TO AVOID SCORING THE FAYING SURFACE, DO NOT KEEP ROTATING THE VALVE WHEN NO LAPPING COMPOUND IS LEFT. CAREFULLY WASH THE CYLINDER HEAD AND THE VALVES WITH A SUITABLE PRODUCT FOR THE TYPE OF LAPPING COMPOUND BEING USED.

- Insert the valves into the cylinder head.
- Test the 2 valves alternatively.
- The test is carried out by filling the manifold with petrol and checking that the head does not ooze through the valves when these are just pressed with the fingers.



Inspecting the springs and half-cones

- Check that the upper spring caps and the cotter halves show no signs of abnormal wear.
- Check the unloaded springs length.



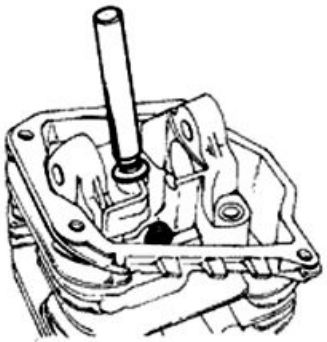
Characteristic

Valve spring length

33.9 to 34.4 mm

Refitting the valves

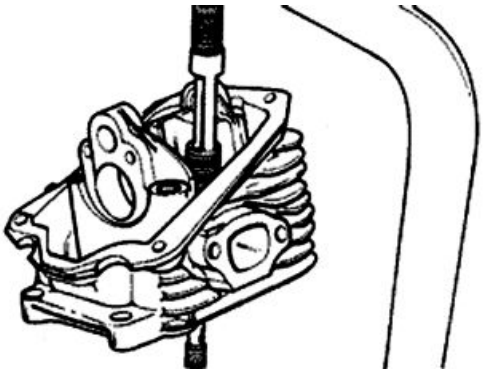
- Lubricate the valve guides with engine oil.
- Place the lower caps of the valve spring on the head.
- Use the punch to fit the 2 sealing rings one at a time.



Specific tooling

020306Y Punch for assembling valve seal rings

- Fit the valves, the springs and the spring retaining caps. Using the appropriate tool with adapter 11, compress the springs and insert the cotters in their seats.



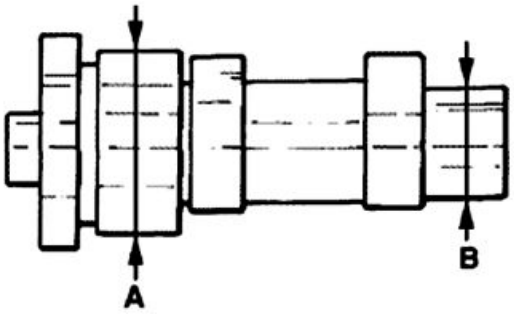
Specific tooling

020382Y Valve cotters equipped with part 012 removal tool

020382Y011 adapter for valve removal tool

Inspecting the cam shaft

- Inspect the cam shaft for signs of abnormal wear on the cams.



Characteristic

Standard diameter Bearing A

Ø: 32.5 mm -0.025 -0.050 mm

Standard diameter Bearing B

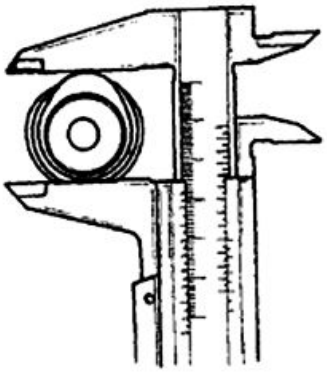
20 -0.020 -0.041 mm

Minimum admitted diameter bearing A

Ø: 32.440 mm

Minimum admitted diameter bearing B

Ø: 19.950 mm



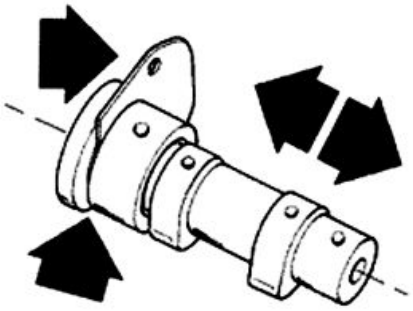
Inlet cam height

27.512 mm

Outlet cam height

27.212 mm

- Check there is no wear on the cam shaft retaining plate and its associated groove on the cam shaft.
- If any of the above dimensions are outside the specified limits, or there are signs of excessive wear, replace the defective components with new ones.

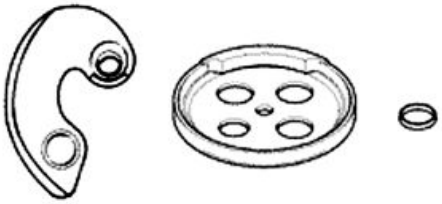


Characteristic

Maximum axial clearance admitted

0.42 mm

- Check there are no signs of wear on the automatic valve-lifter cam, or the end-of stroke roller, or the rubber buffer on the automatic valve-lifter retaining cover.
- Check that the valve lifting spring has not yielded.
- Replace any defective or worn components.

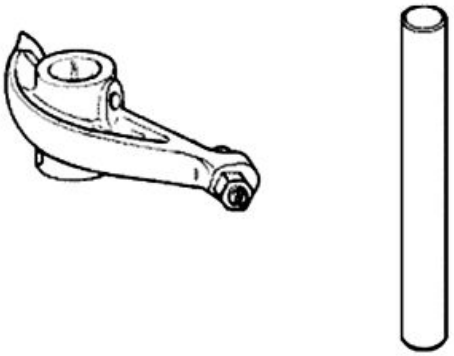


- Check there are no signs of scoring or wear on the rocking lever bolt.

Check there are no signs of wear on the pad from contact with the cam and on the jointed adjustment plate.

- Measure the internal diameter of each rocking lever.

-Check that the elastic washer dedicated to the axle clearance of the rocking levers is not worn. - In case of anomalies, replace the damaged components.



Characteristic

Minimum diameter permitted

Ø 11.970 mm

Maximum diameter admitted

Ø 12.030 mm

Refitting the head and timing system components

- Fit the timing chain guide slider.
- Insert the head and cylinder alignment dowels, fit the head gasket and the head on the cylinder.

-Screw the nuts and lock them in a crossed sequence and in 2 or 3 stages to the specific torque.

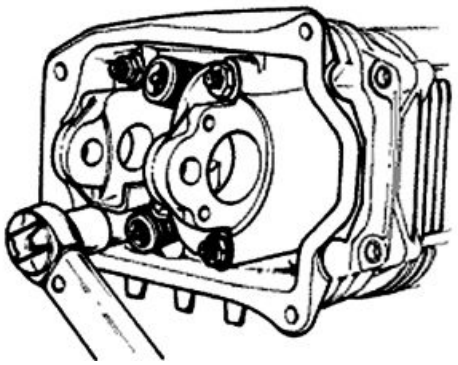
Locking torques (N*m)

Locking torque 28 to 30

- Fit the two screws on the outside of the timing chain side and tighten them to the specified torque.

N.B.

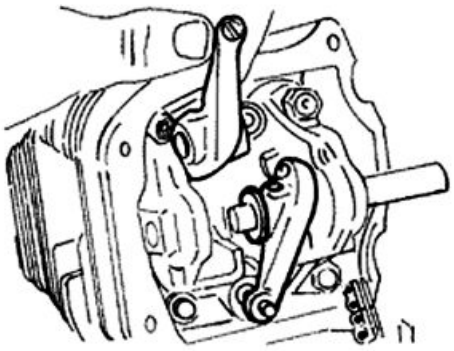
BEFORE INSTALLING THE HEAD, MAKE SURE THAT THE LUBRICATION CHANNEL IS CLEAN USING A COMPRESSED AIR JET.



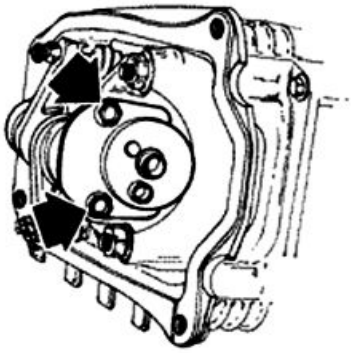
Locking torques (N*m)

Locking torque 11 to 13

- Fit the timing chain sprocket wheel on the crankshaft, with the chamfer facing the insertion side.
- Loop the timing chain around the sprocket on the crankshaft.
- Fit the tensioner pad by the cylinder head.
- Fit the spacer and the screw fastener.
- Fit the pin, the outlet rocking lever, the spring washer and the inlet rocking lever.
- Lubricate the 2 rocking levers through the holes at the top.
- Lubricate the 2 bearings and insert the camshaft in the cylinder head with the cams opposing the rocking levers.



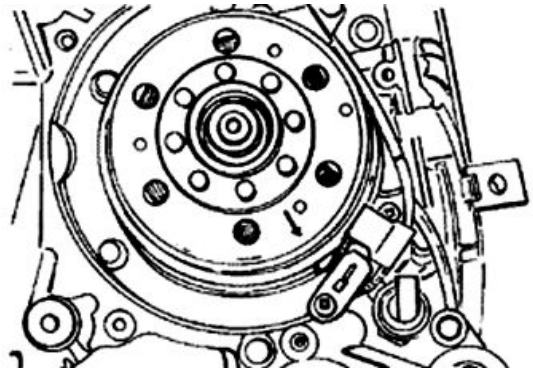
- Insert the retention plate and tighten the two screws shown in the figure to the prescribed torque.

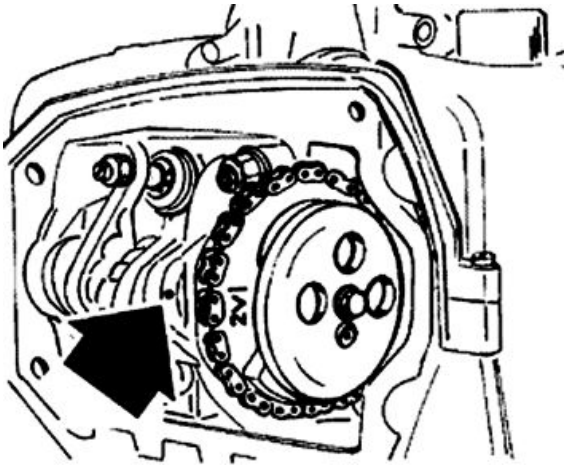


Locking torques (N*m)

Locking torque 4 to 6

- Refit the spacer on the cam shaft.
- Rotate the engine so that the piston is at top dead centre, using the reference marks on the flywheel and the crankcase.
- While doing so, fit the chain onto the control camshaft pulley and keep the reference 2V in correspondence with the reference mark on the head.
- Fit the pulley onto the camshaft.
- Assemble the counterweight with the corresponding fixing screw and tighten to the specified torque.





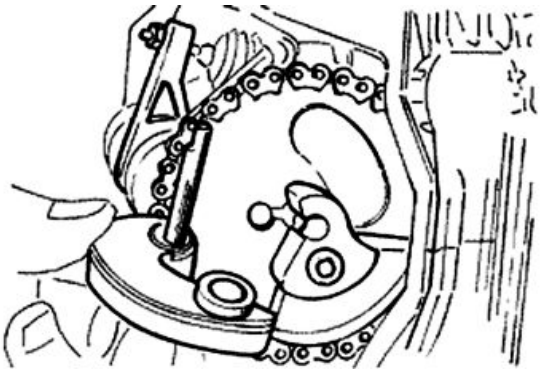
Locking torques (N*m)

Locking torque **7 to 8.5**

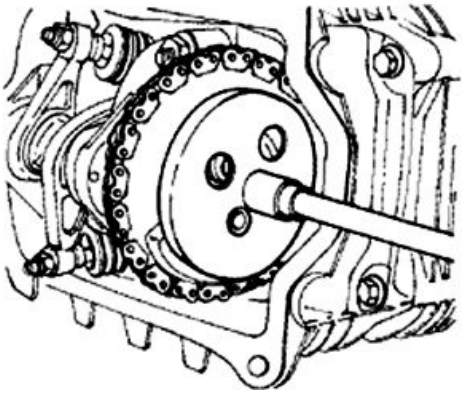
-Fit the end-stop ring on the automatic valve-lifter cam and fit the automatic valve-lifter cam to the cam shaft.
- Fit the automatic valve-lifter return spring.
- During this operation the spring must be loaded approximately 180°.

N.B.

GREASE THE END STOP RING TO PREVENT IT COMING OUT AND FALLING INTO THE ENGINE.



- Fit the automatic valve-lifter retaining dish, using the counterweight screw fastener as a reference.
- Tighten the clamping screw to the prescribed torque.



Locking torques (N*m)

Locking torque **12 to 14**

- Set the tensioner cursor in the rest position.
- Fit the chain tensioner on the cylinder, using a new gasket, and tight the two screws to the prescribed torque.

Locking torques (N*m)

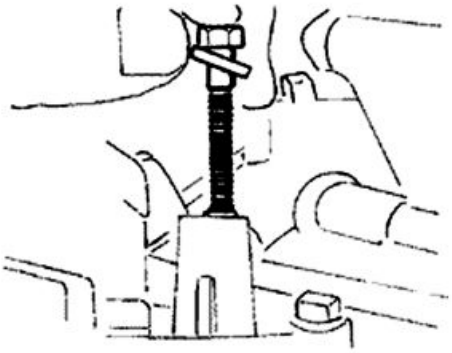
Locking torque 11 to 13

- Insert the chain tensioning screw, together with the spring and washer, tightening it to the prescribed torque.

Locking torques (N*m)

Locking torque 5 to 6

- Adjust the valve clearance.
- Fit the spark plug



Characteristic

Spark plug (125cc)

NGK CR8EB

Spark plug (150cc)

NGK CR7EB

Electric characteristic

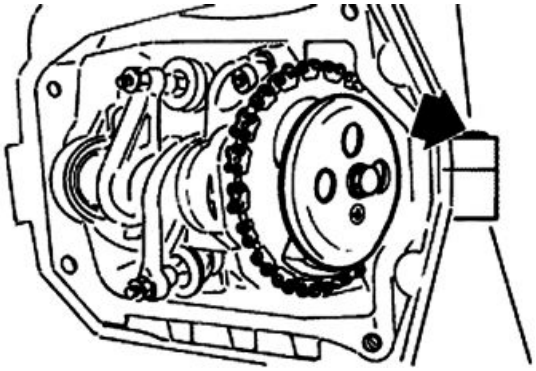
Electrode gap

0.7 to 0.8 mm

Locking torques (N*m)

Locking torque 12 to 14

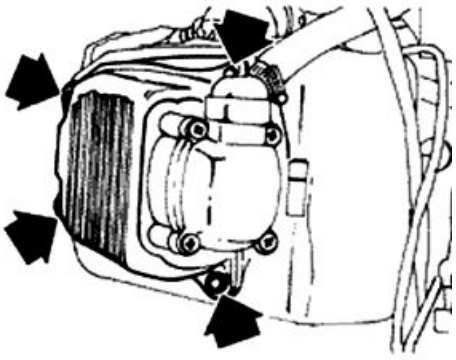
- Assemble the casing sealing gasket on the head. On the fitting direction, use the supplements on the timing side as reference.
- Assemble the screw fixing the housing to the crankcase to the specified torque and the 2 self-threading screws joining the half-shells.
- Take care that the gasket is well inserted in its housing during the assembly stage.
- Place the spark plug access cap.



Locking torques (N*m)

Locking torque 3 to 4

- Refit the cylinder head cover, tightening the 4 clamping screws to the prescribed torque.
- Refit the fan and the housing.
- Reassemble the oil pump control, the chain compartment cover, the by-pass and the oil sump as described in the lubrication chapter.



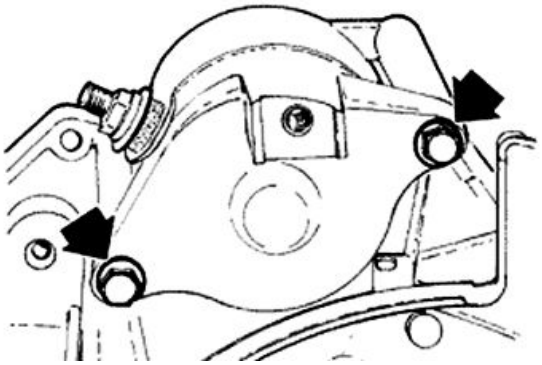
- Reassemble the driving pulley, the belt and the transmission cover as described in the transmission chapter.

Locking torques (N*m)

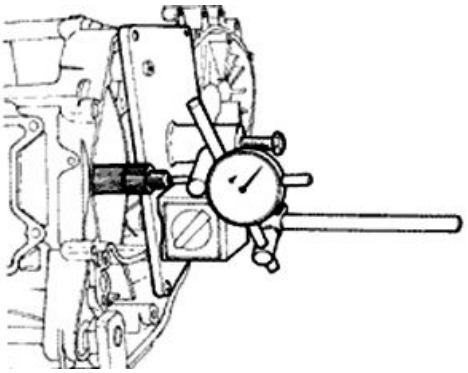
Locking torque 11 to 13

Crankcase - crankshaft

- Precautionary remove the following units: transmission cover, driving pulley, driven pulley and belt, rear hub cover, gears, bearings and oil seals as described in the transmission chapter.
- Remove the oil sump, the by-pass, the chain compartment cover and the oil pump as in the lubrication chapter.
- Remove the flywheel cover, the fan, the flywheel and the stator as described in the magneto flywheel chapter.
- Remove the oil filter and the oil pressure bulb.
- Remove the cylinder-piston-head unit as described in the cylinder head timing system chapter.
- Remove the 2 retainers indicated in the figure and the starter motor.



- Before opening the crankcase, it is advisable to check the axial clearance of the crankshaft. To do this, use a plate and a support with specific tool dial gauge.



Specific tooling

020262Y Crankcase splitting plate

020335Y Magnetic mounting for dial gauge

Characteristic

Standard clearance

0.15 to 0.40 mm

Splitting the crankcase halves

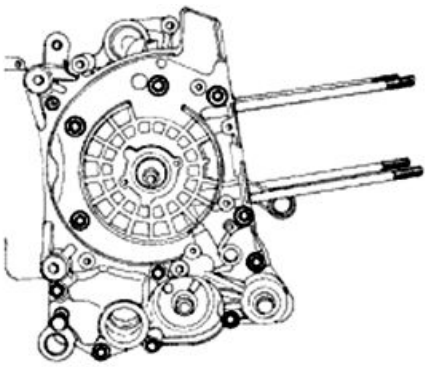
Remove the 11 coupling screws to the crankcase.

- Separate the crankcase while keeping the crankshaft in one of the two halves of the crankcase.

Remove the crankshaft.

CAUTION

IF YOU FAIL TO DO THIS, THE CRANKSHAFT MIGHT ACCIDENTALLY FALL.

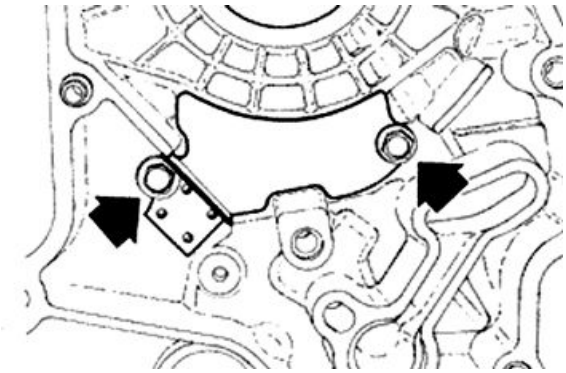


- Remove the coupling gasket of the crankcase halves.

- Remove the two screws and the internal cover shown in the diagram.

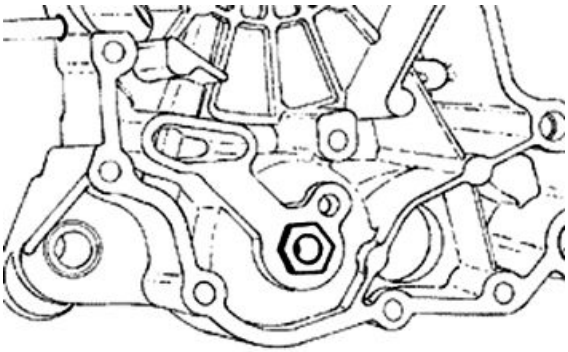
CAUTION

WHILE OPENING THE CRANKCASES AND REMOVING THE CRANKSHAFT, CHECK THAT THE THREADED SHAFT ENDS DO NOT INTERFERE WITH THE MAIN BUSHINGS. FAILURE TO OBSERVE THIS PRECAUTION CAN DAMAGE THE MAIN BUSHINGS.



- Remove the oil seal on the flywheel side.

- Remove the oil filter fitting shown in the diagram

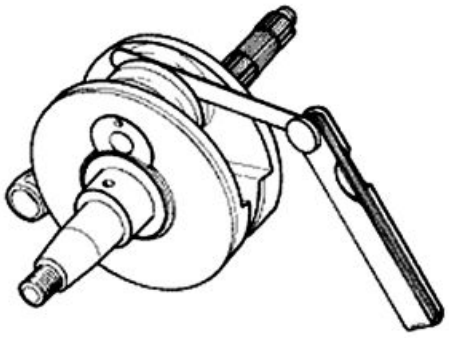


- Check the axial clearance on the connecting rod.

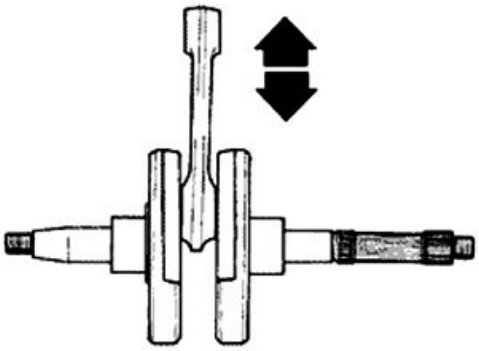
Characteristic

Standard clearance

0.20 to 0.50 mm



- Check the radial clearance on the connecting rod.
-Check the surfaces that limit the axial free-play are not scored and measure the width of the crankshaft between these surfaces, as shown in the diagram.



CAUTION

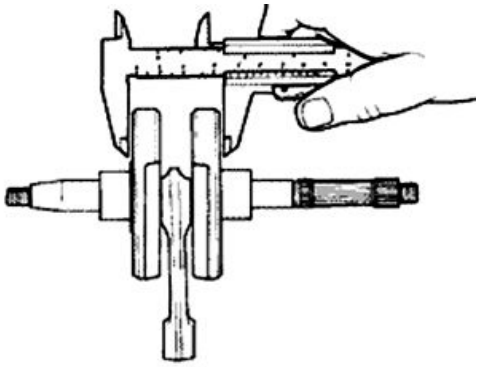
BE CAREFUL NOT TO LET THE MEASUREMENT BE AFFECTED BY THE UNIONS WITH THE CRANKSHAFT ENDS.

Characteristic

Standard clearance

0.036 to 0.054 mm

- If the axial clearance between crankshaft and crankcase is exceeding and the crankshaft does not have any defect, the problem must be due to either excessive wear or wrong machining on the crankcase.



CAUTION

THE CRANKSHAFT CAN BE REUSED WHEN THE WIDTH IS WITHIN THE STANDARD VALUES AND THE SURFACES SHOW NO SIGNS OF SCORING.

Characteristic

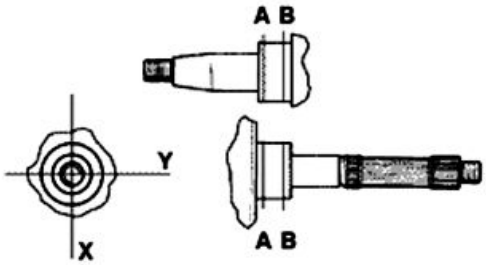
Distance between the shoulders

55.67 to 55.85 mm

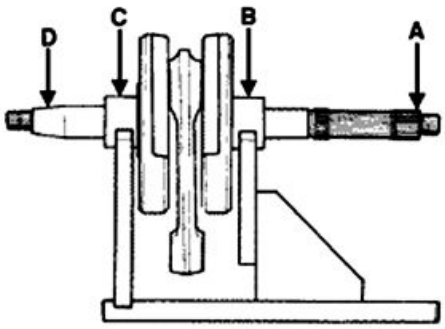
- Check the diameters of both the bearings of the crankshaft in accordance with the axes and surfaces shown in the figure. The half-shafts are classified in two categories Cat. 1 and Cat. 2 as shown the chart below.

STANDARD DIAMETER

Specification	Desc./Quantity
Category 1	28.998 to 29.004
Category 2	28.004 to 29.010



Inspecting the crankshaft alignment



To install the crankshaft on the support and to measure the misalignment in the 4 points indicated in figure.

- Check that the crankshaft cone, the tab seat, the oil seal capacity, the toothed gear and the threaded tangs are in good working order.
- In case of failures, replace the crankshaft.

The big end bushings cannot be replaced. For the same reason, the connecting rod may not be replaced and, when cleaning the crankshaft, be very careful that no impurities get in through the shaft's lubrication holes.

In order to prevent damaging the connecting rod bushings, do not attempt cleaning the lubrication duct with compressed air.

- Make sure that the 2 caps on the crankpin are properly fitted.
- A wrong installation of a cap can seriously affect the bushing lubrication pressure.

N.B.

THE MAIN BEARINGS ARE NOT GRINDABLE

Specific tooling

020074Y Support base for checking crankshaft alignment

Characteristic

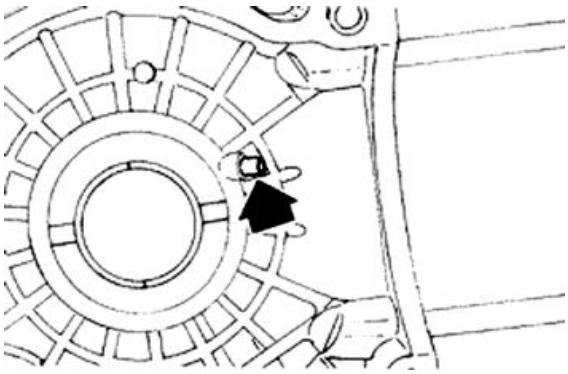
Off-line maximum admitted

A = 0.15 mm

B = 0.01 mm
C = 0.01 mm
D = 0.10 mm

Inspecting the crankcase halves

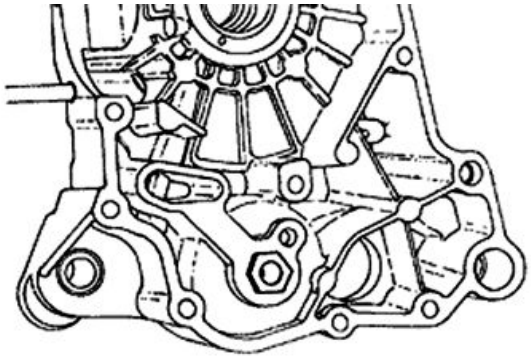
- Before proceeding to check the crankcase halves, thoroughly clean all surfaces and oil ducts.
- On the transmission side crankcase half, take particular care cleaning the housing and oil ducts for the following components: the oil pump, the oil by-pass valve, the main bushings and the cooling jet on the transmission side (see diagram).
- Take particular care, also, that there are no signs wear in the oil by-pass valve housing (see Chapter Lubrication), as this could prevent a good seal in the piston, which regulates the oil pressure.



N.B.

THE JET IS FED THROUGH THE MAIN BUSHINGS. PROPER OPERATION OF THIS COMPONENT IMPROVES PISTON CROWN COOLING. CLOGGING HAS EFFECTS THAT ARE DIFFICULT TO DETECT (PISTON TEMPERATURE INCREASE). FAILURE OR LEAKS CAN CAUSE A CONSIDERABLE DROP IN THE LUBRICATION PRESSURE FOR MAIN BUSHINGS AND CONNECTING ROD.

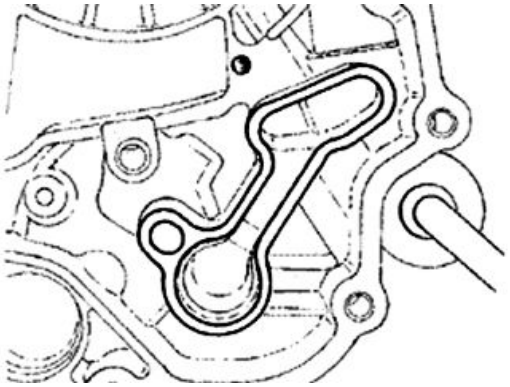
- On the flywheel side crankcase half, take particular care cleaning the oil ducts for the main bushings, the oil duct for the jet that lubricates the cylinder head and the oil drainage duct at the flywheel side oil seal.



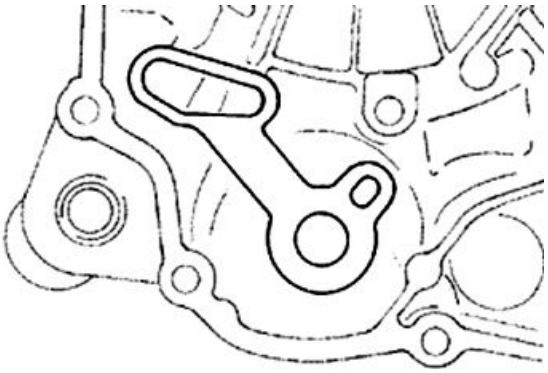
N.B.

THE HEAD LUBRICATION CHANNEL IS PROVIDED WITH A SHUTTER JET; THIS GIVES A "LOW PRESSURE" HEAD LUBRICATION; THIS CHOICE WAS MADE TO REDUCE THE OIL TEMPERATURE IN THE SUMP. THE JET CLOGGING IMPAIRS THE HEAD LUBRICATION AND THE TIMING MECHANISMS. A JET FAILURE CAUSES A DECREASE OF THE MAIN BUSHING AND CONNECTING ROD LUBRICATION PRESSURE.

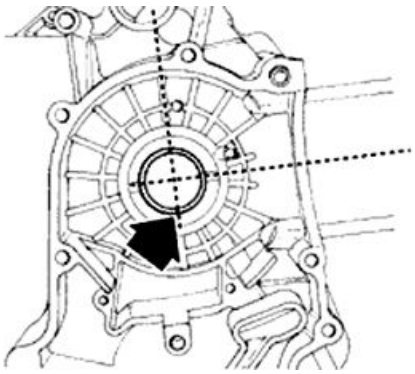
- Inspect the mating surfaces on the crankcase halves for scratches or deformation, taking particular with the surfaces that mate with the cylinder and the mating surfaces between the crankcase halves.
- Defects in the crankcase coupling gasket or the surfaces indicated in the figure can cause a drop in the oil pressure and affect the lubricating pressure for the main bushings and the connecting rod.



- Check the main bearing seats that limit axial clearance in the crankshaft show no signs of wear. The dimension between these seats is measured by way of the procedure described previously for measuring the crankshaft axial clearance and dimensions.



Inspecting the crankshaft plain bearings



- To obtain a good bushing lubrication it is necessary to have both an optimal lubricating pressure (4 bar) and a good oil flow rate; the bushings must be correctly positioned so as not to obstruct the oil supply channels.
- The main bushings are comprised of two half-bearings, one with holes and channels for lubrication whereas the other is solid.
- The solid half-bearing is intended to stand the thrusts caused by combustion, and for this reason it is arranged opposed the cylinder.
- To prevent shutters in the oil feeding channels, the matching surface of the two half-bearings must be perfectly orthogonal to the cylinder axis, as shown in the figure.
- The oil feeding channel section is also affected by the bushings driving depth compared with the crankshaft axial clearance of the limiting surface.

N.B.

TO KEEP THIS POSITION OF THE BUSHINGS ON THE CRANKCASE, FITTING IS FORCED ON STEEL RINGS INSERTED IN THE CASTING OF BOTH CRANKCASE HALVES.

Characteristic

Standard driving depth

1.35 to 1.6

- Check the inside diameter of the main bushings in the three directions indicated in the diagram.
- Repeat the measurements for the other bushing half. see diagram.
- The standard bushing diameter after driving is variable on the basis of a coupling selection.

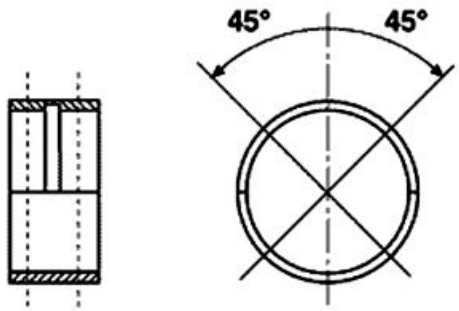
- The bushing housings in the crankcase are classified into 2 categories - Cat. 1 and Cat. 2 - just like those for the crankshaft.
- The main bushings are subdivided into 3 thickness categories; see the table below:

N.B.

DO NOT TAKE THE MEASUREMENT ON THE TWO HALF-SHELL COUPLING SURFACE SINCE THE ENDS ARE RELIEVED TO ALLOW BENDING DURING THE DRIVING OPERATION.

MAIN BEARINGS

Specification	Desc./Quantity
B	Blue
C	Yellow
E	Green

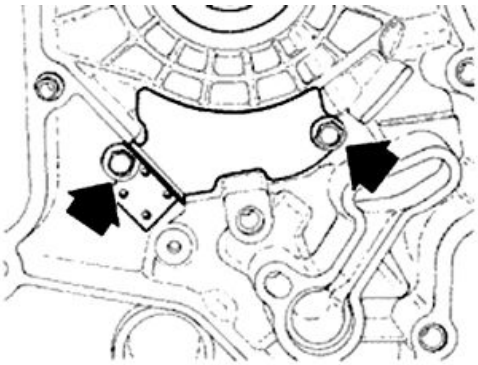


Refitting the crankcase halves

- Fit the internal bulkhead by locking the two screws to the prescribed torque.

Locking torques (N*m)

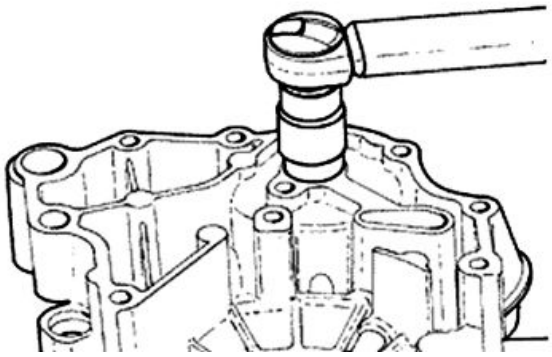
Locking torque **4 to 6**



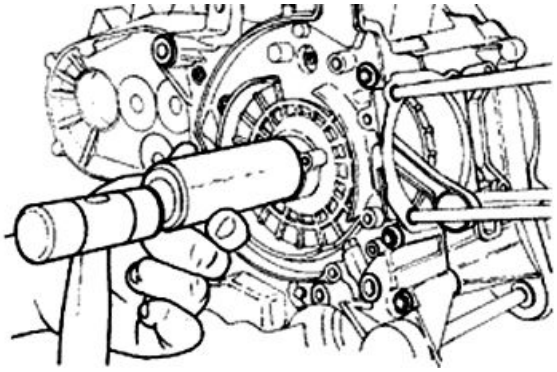
- Fit the oil filter joint and tighten it to the prescribed torque.
- Place a new gasket on one of the crankcase halves, preferably on the transmission side, together with the alignment dowels.

Locking torques (N*m)

Locking torque **27 to 33**



- Lubricate the main bushings and insert the crankshaft in the transmission side crankcase half.
- Reassemble both crankcase halves.
- Fit the 11 screws and tighten them to the prescribed torque.



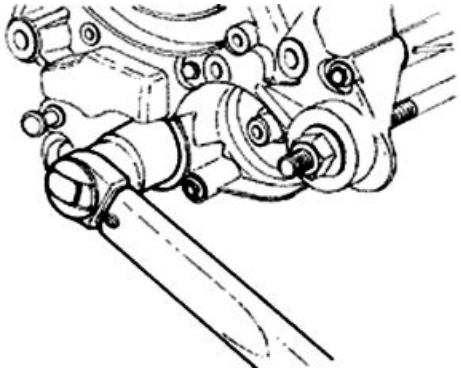
N.B.

WHEN FITTING THE HALF CASING AND THE CRANKSHAFT, TAKE CARE NO TO DAMAGE THE SHAFT THREADED TANGS.

Locking torques (N*m)

Locking torque **11 to 13**

- Lubricate the flywheel oil seal.
- Use the appropriate tool to assemble the oil seal.
- Fit a new O-ring on the pre-filter and lubricate it.
- Insert the pre-filter on the engine with its corresponding cover to the specific torque.



N.B.

REMOVE ANY EXCESS FROM THE CRANKCASE COUPLING GASKET ON THE CYLINDER PLANE, TO ENSURE BETTER SEALING PERFORMANCE.

N.B.

FAILURE TO USE THE SPECIFIC TOOL CAN RESULT IN AN INCORRECT DEPTH POSITION AND AS A CONSEQUENCE IN INADEQUATE OIL SEALING.

Specific tooling

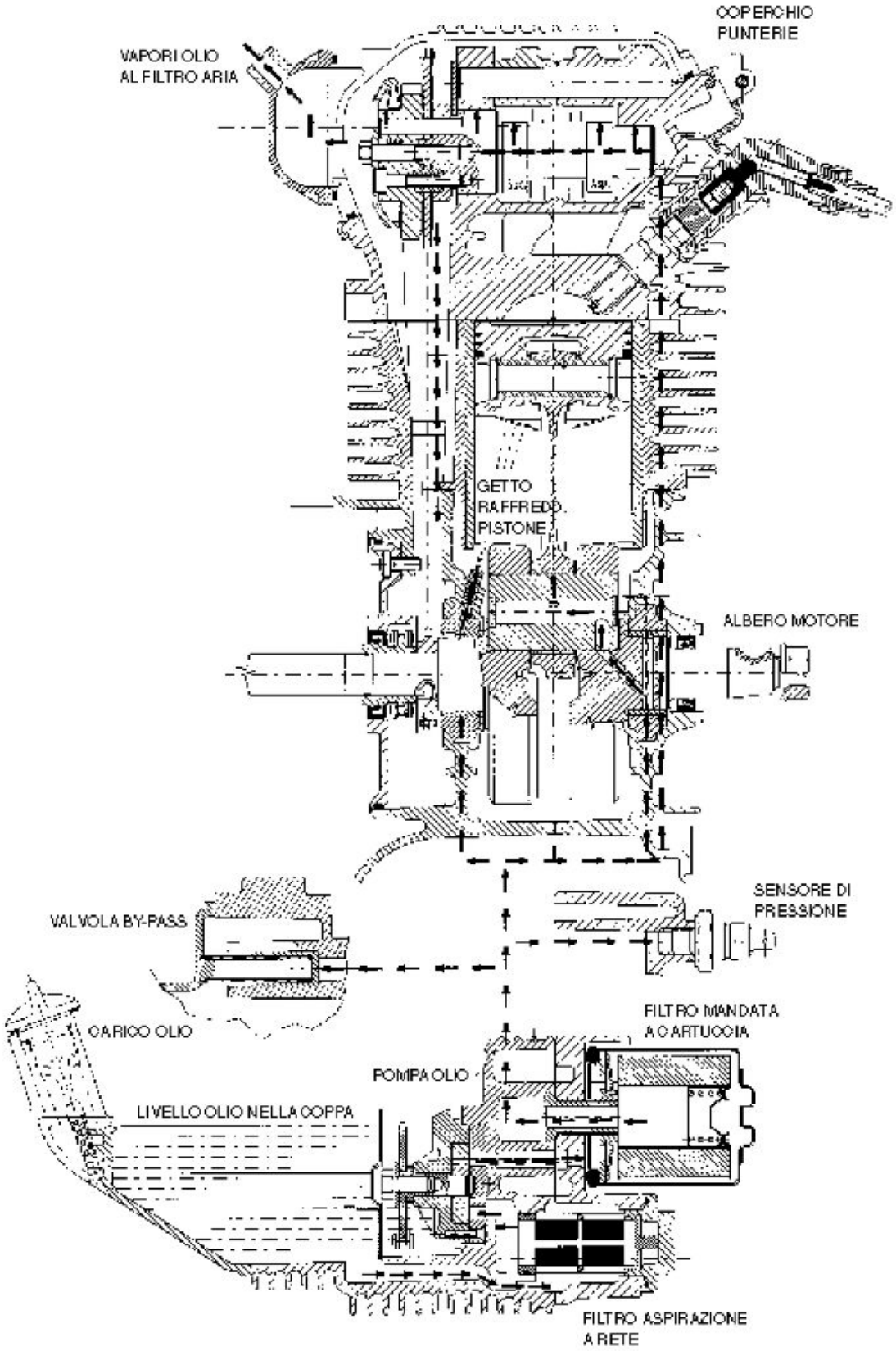
020425Y Punch for flywheel-side oil seal

Locking torques (N*m)

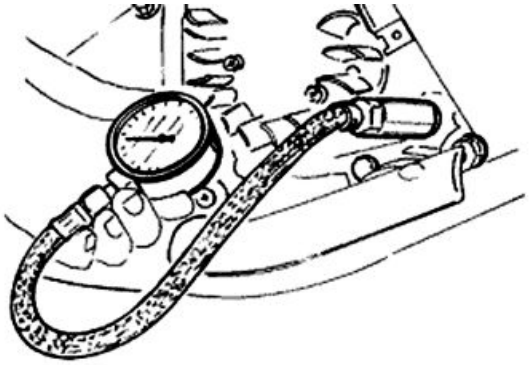
Locking torque **24 to 30**

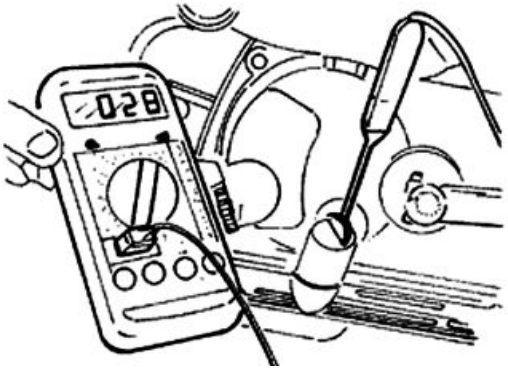
Lubrication

Conceptual diagrams



Oil pressure check





- After removing the cover protections as described in the "Flywheel" chapter, disconnect the electrical connexion of the minimum oil pressure switch and then remove the switch.
- With the engine idling at 1650 rpm and the oil temperature at ~90°C, check that the oil pressure is between 0.5 to 1.2 atm.
- With the engine idling at 6000 rpm and the oil temperature at ~90°C, check that the oil pressure is between 3.2 to 4.2 atm.
- Remove the appropriate tools once the measurement is complete, refit the oil pressure switch and washer, tightening it to the prescribed torque and fit the fan cover.
- If the oil pressure is not within the specified limits, in the following order, check: the oil filter, the oil by-pass valve, the oil pump and the crankshaft seals.

N.B.

THE CHECK MUST BE CARRIED OUT WITH OIL AT THE CORRECT LEVEL AND WITH AN OIL FILTER IN PROPER CONDITION.

Specific tooling

020193Y Oil pressure check gauge

Characteristic

Minimum pressure admitted

3.2 atm.

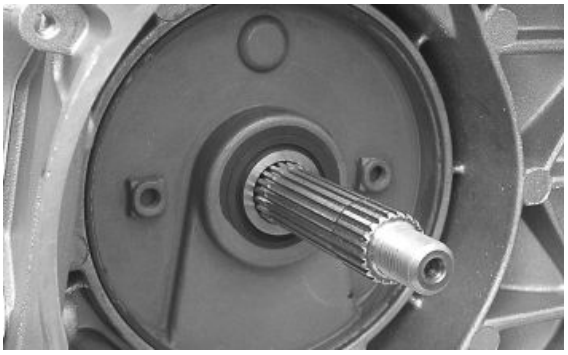
Locking torques (N*m)

Locking torque 12 to 14 (also valid for the control connector).

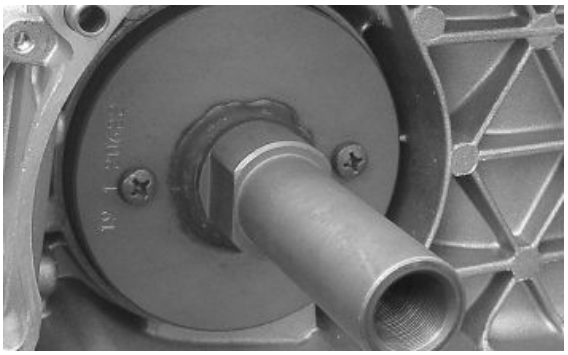
Crankshaft oil seals

Removal

- Remove the transmission cover and the complete drive pulley beforehand



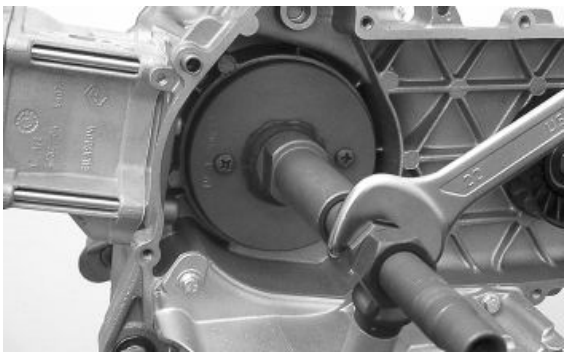
- Install the base of the appropriate tool on the oil seal using the screws provided.



- Screw the threaded bar onto the base of the tool and extract the oil seal.

Specific tooling

020622Y Transmission-side oil guard punch



Refitting

- Prepare the new oil seal, lubricating the sealing lip. Warning: do not lubricate the surface for keying onto the engine crankcase.

CAUTION

DO NOT LUBRICATE THE KEYING SURFACE ONTO THE ENGINE CRANKCASE.

- Preassemble the oil seal with the appropriate tool, positioning the screws
- Place the sheath over the crankshaft

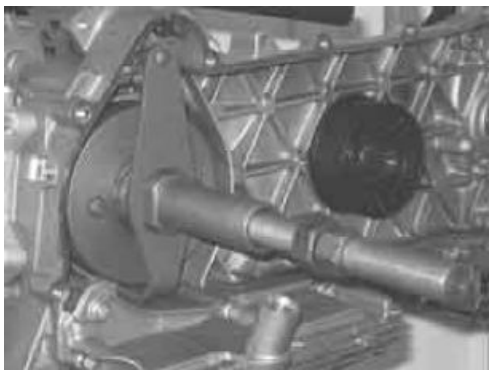
- Insert the tool with the oil seal on the crankshaft until it comes into contact with the crankcase

CAUTION

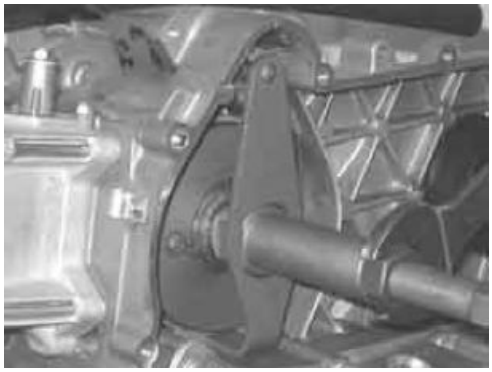
ORIENT THE OIL SEAL BY POSITIONING THE CHAIN HOUSING CHANNEL FACING DOWNWARDS. WHEN THE POSITION IS REACHED, DO NOT RETRACT THE OIL SEAL. FAILURE TO COMPLY WITH THIS RULE CAN CAUSE A WRONG POSITIONING OF THE OIL SEAL SHEATH.

- Orientate the oil seal by inserting the bracket which is part of the specific tool.

- Tighten the threaded bar onto the crankshaft as far as it will go.



- Use the nut to move the base of the tool until you can see end of the oil seal driving stroke



- Remove all of the tool components following the procedure in reverse order

CAUTION

FAILURE TO COMPLY WITH THIS ASSEMBLY PROCEDURE CAN SERIOUSLY DAMAGE THE ENGINE DUE TO THE WRONG TENSIONING OF THE OIL PUMP CONTROL CHAIN.

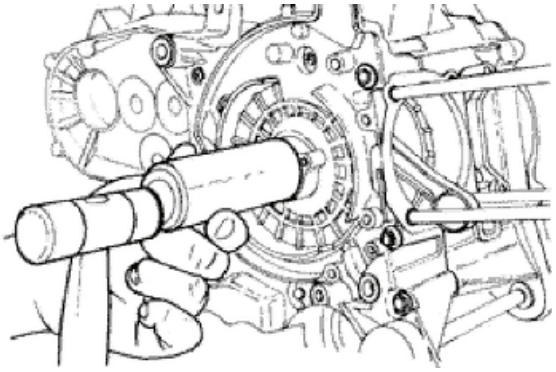
Assemble a new oil seal on the flywheel side using the specific tool as shown in the photograph

N.B.

FAILURE TO USE THE SPECIFIC TOOL CAN RESULT IN AN INCORRECT DEPTH POSITION AND AS A CONSEQUENCE IN INADEQUATE OIL SEALING.

Specific tooling

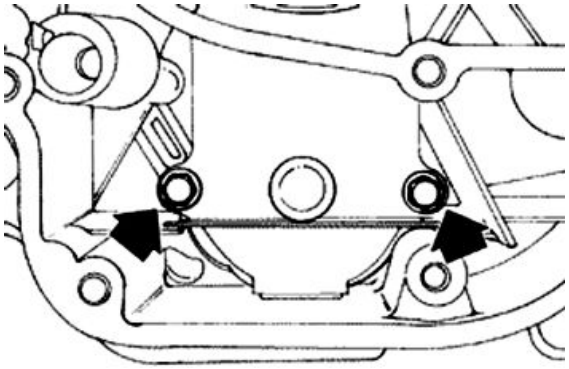
020425Y Punch for flywheel-side oil seal



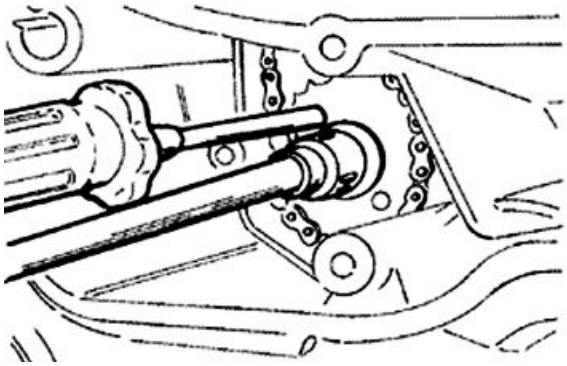
Oil pump

Removal

- Remove the cover of the pump control pulley using the two retainers, as shown in the figure.
- Block the rotation of the oil pump control pulley using a screwdriver inserted through one of its two holes.

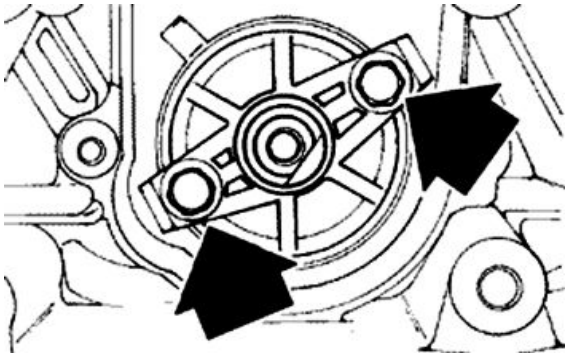


- Remove the central screw with Belleville washer, as shown in the diagram.
- Remove the chain with the pulley.
- Remove the crankshaft control pinion.



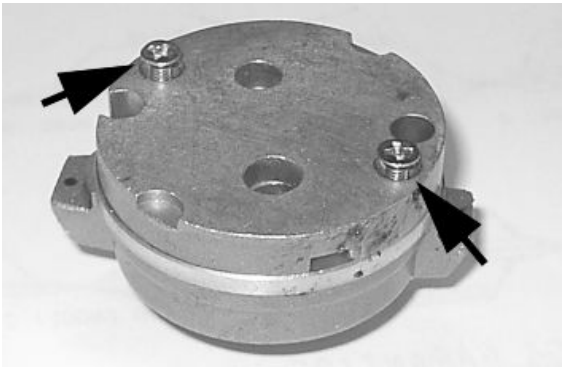
- Remove the oil pump acting on the 2 retainers as shown in the figure.
- Remove the oil pump seal.

IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.



Inspection

- Remove the two screws and the oil pump cover.
- Remove the clip retaining the innermost rotor.
- Remove and wash the rotors thoroughly with petrol and compressed air.
- Reassemble the rotors in the pump body, keeping the two reference marks visible Replace the retainer ring.

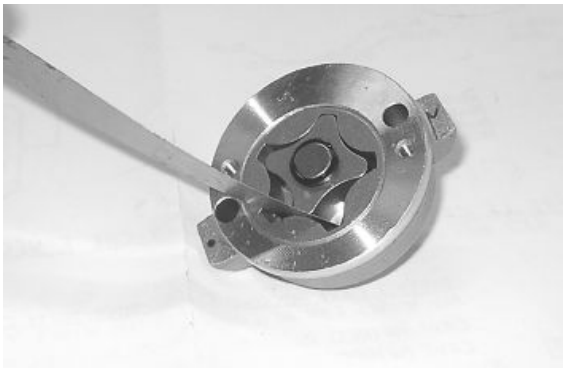


- Using a feeler gauge, check the distance between the rotors in the position shown in the figure.

Characteristic

Maximum clearance admitted

0.12 mm



Measure the distance between the outer rotor and the pump body; see figure.

Characteristic

Admissible limit clearance:

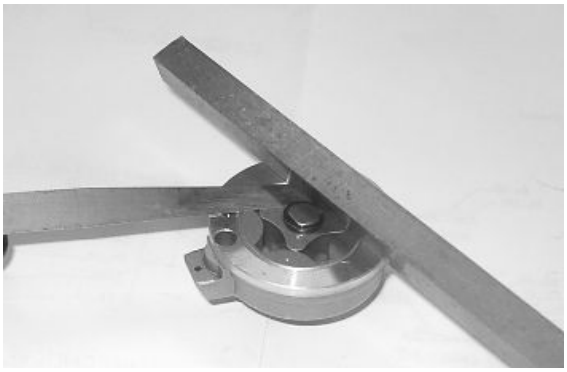
0.20 mm

Check the axial clearance of the rotors with a trued bar as reference, as shown in the figure.

Characteristic

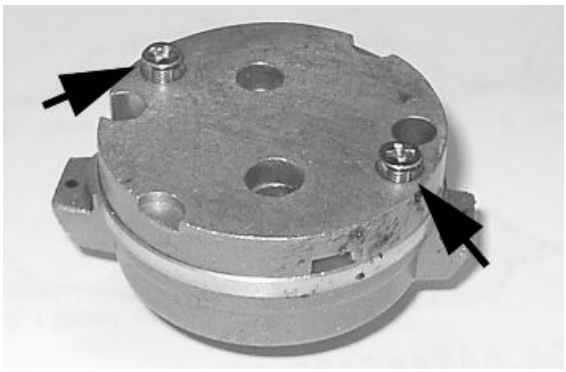
Limit values admitted:

0.09 mm



Refitting

- Check there are no signs of wear on the oil pump shaft or body.
- Check there are no signs of scoring or wear on the oil pump cover.
- If you detect non-conforming measurements or scoring, replace the faulty parts or the assembly.
- Fit the pulley to the pump, the central screw to the specified torque and the belleville washer.
-Fit the oil pump cover, by tightening the two screws to the prescribed torque.



N.B.

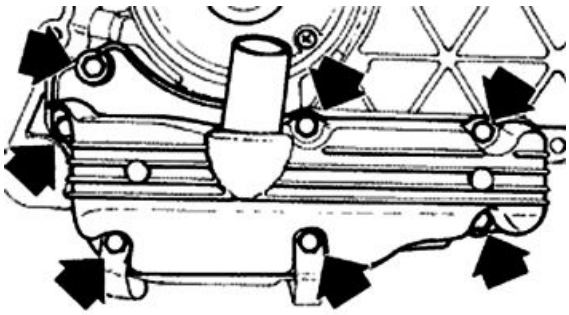
FIT THE BELLEVILLE WASHER SO THAT ITS OUTER (CURVED) RIM TOUCHES THE PULLEY.

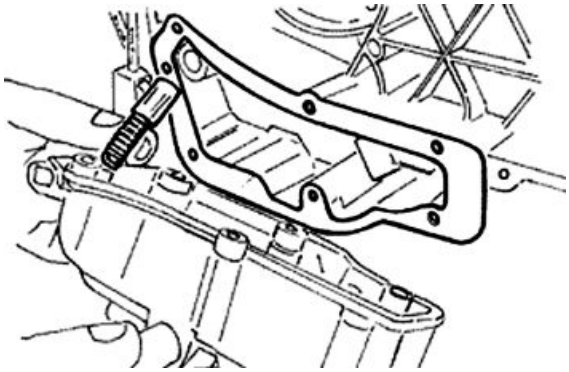
Locking torques (N*m)

Central screw **12 to 14 Nm** **Cover screws** **0.7 to 0.9 Nm**

Removing the oil sump

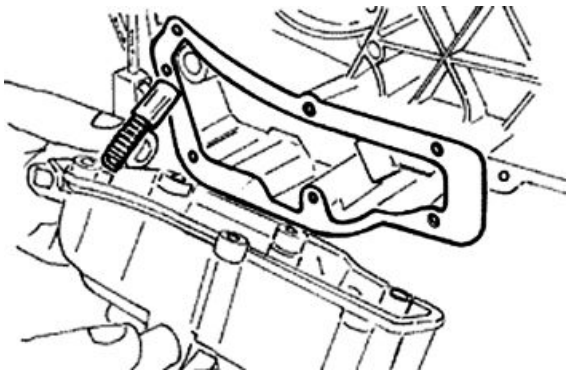
- Remove the oil filler plug, the transmission cover, the complete drive pulley assembly with belt and the sprocket wheel, as described in the Transmission chapter.
- Drain the oil from the sump as described above.
- Remove the 7 screws indicated in the figure and the 2 rear brake transmission fixing brackets.
- Remove the spring, the by-pass piston and the gasket shown in the second image.





Inspecting the by-pass valve

- Check the unloaded spring length.
- Check that the small piston is not scored.
- Ensure that it slides freely on the crankcase and that it guarantees a good seal.
- If not, eliminate any impurities or replace defective parts.

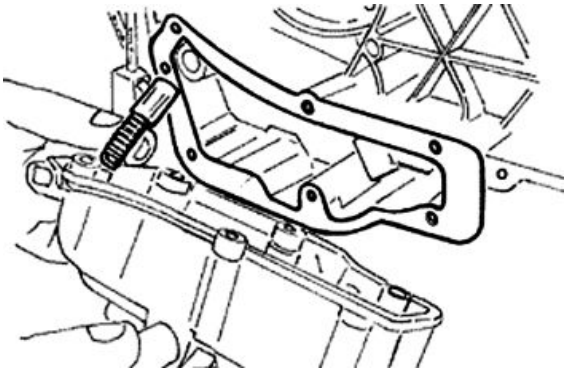


Characteristic

By-pass check up: Standard length

54.2 mm

Refitting the oil sump



- Refit the by-pass piston in its housing.
- Insert the pressure-regulating spring.
- Fit a new sump seal.
- Refit the sump, taking care to locate the spring in the appropriate recess machined into the inside of the sump.
- Refit the rear brake transmission mounting brackets and the screws in the reverse order from which they were removed.
- Tighten the screws to the prescribed torque.
- Refit the driving pulley assembly, the drive belt, the sprocket wheel and the transmission cover, as described in the "Transmissions" chapter.
- **When testing the lubrication system, refer to the "Crankcase and Crankshaft" chapter, regarding lubrication of the crankshaft and connecting rod**

Locking torques (N*m)

Locking torque **11 to 13**

INDEX OF TOPICS

COMPONENT TRANSPOSITION

	Specification	Desc./Quantity
1	Instrument panel	
2	Throttle body and electronic injection control unit (MIU)	
3	Diagnostics socket connector	
4	Fuel pump	
5	Engine temperature sensor	
6	Fuel injector	
7	HV coil	
8	Engine speed sensor	
9	Lambda probe	
10	Injection load remote control	
11	Battery	12V10Ah

MIU injection system

This vehicle is fitted with an integrated injection and ignition system.

Injection is indirect in the manifold through an electro-injector.

The injection and ignition are timed on the four-stroke cycle by means of a tone wheel keyed on to the crankshaft (24-2 teeth) and pick-up sensor.

Combustion and ignition are managed on the basis of engine revs and throttle valve opening. Further corrections are made according to the following parameters:

- Engine temperature
- Intake air temperature
- Lambda probe

The system implements an idle feeding correction with cold engine through a Stepper motor on a by-pass circuit of the throttle valve. The control unit manages the Stepper motor and the injector opening time, thereby ensuring the idle steadiness and the proper combustion.

In all conditions of use, mixture preparation is managed by modifying the injector opening time.

The fuel supply pressure is kept constant based on the ambient pressure.

The **fuel system circuit** consists of:

- Fuel pump
- Fuel filter
- Injector
- Pressure regulator

The pump, the filter and the regulator are placed inside the fuel tank on a single support.

The injector is connected by a pipe with fast-release fittings. The pressure regulator is located at the beginning of the circuit.

The fuel pump is controlled by the MIU control unit; this ensures the scooter safety

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The **ignition circuit** consists of:

- HV coil
- HV cable
- Shielded cap
- MIU control unit
- Spark plug

The MIU control unit manages ignition with the best advance ensuring four-stroke timing (ignition only in the compression phase) at the same time.

The MIU injection-ignition system controls engine functions by means of a pre-set program.

Should any input signals fail, an acceptable working order of the engine is ensured to allow the user to reach a service station.

Of course, this cannot happen when the rpm-timing signal is missing, or when the failure involves the control circuits:

- Fuel pump
- HV coil
- Injector

The control unit is provided with a self-diagnosis system connected to an indicator light in the instrument panel.

Failures are detected and restored by the diagnostic tester.

In any case, when the fault is no longer present, the data storage is automatically cleared after 16 cycles of use (cold start, running at regular engine temperature, stop).

The diagnostic tester is also required to adjust the idle mixture.

Specific tooling

020680Y Diagnosis Tool

The MIU control unit has a decoder for the anti-theft immobilizer system.

The MIU control unit is connected to a diagnostic LED on the instrument panel, that also carries out the deterrent flashing functions.

Precautions

Troubleshooting hints

1 A MIU failure is more likely to be due to the connections than to the components.

Before troubleshooting the MIU system, carry out the following checks:

A: Electrical power supply

a. Battery voltage

b. Blown fuse

c. Remote controls

d. Connectors

B: Chassis ground

C: Fuel system

a. Broken fuel pump

b. Dirty fuel filter

D: Ignition system

a. Faulty spark plug

b. Broken coil

c. Broken shielded cap

E: Intake circuit

a. Dirty air filter

b. Dirty by-pass circuit

c. Faulty Stepper motor

F: Other

a. Incorrect timing

b. Wrong idle mixture

c.Incorrect reset of the throttle valve position sensor

2 MIU system faults may be caused by loose connectors. Make sure that all connections have been correctly made.

Check the connections as follows:

A check that the terminals are not bent.

B check that the connectors have been properly connected.

C check whether the malfunction can be fixed by shaking the connector slightly.

3 Check the entire system before replacing the MIUIf the fault is fixed by replacing the MIU control unit, install the original control unit again and check if the fault occurs again.

4 When troubleshooting use a multimeter with an internal resistance over 10 Ohm /V. Instruments that are not suitable might damage the MIU control unit. Instruments must be used with definitions over 0.1V and 0.5 W , the precision must be greater than 2%.

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1. Before fixing any part of the injection system, check to see if there are any registered faults. Do not disconnect the battery before checking for faults.

2. The fuel feed system is pressurised at 250 kPa (2.5 BAR). Before disconnecting the fast-release fitting of the power supply pipe, check that there are no naked flames. Do not smoke. Act with caution to prevent spraying in the eyes.

3. When fixing electric components, operate with the battery connected only when actually required.

4. When functional checks are performed, check that the battery voltage is over 12V.

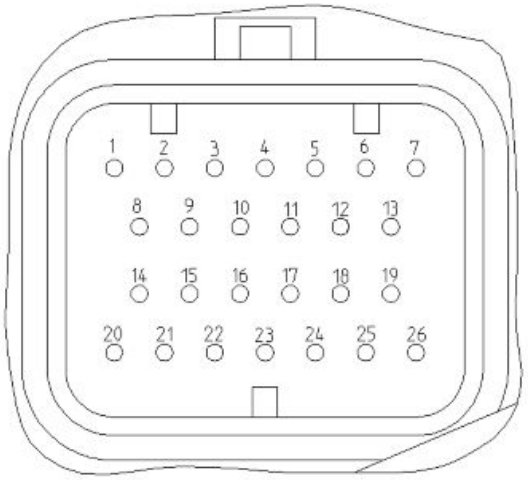
5. Before trying to start the vehicle, check to make sure there is at least two litres of fuel in the tank. Failure to respect this norm will damage the fuel pump.

6. If the vehicle is expected to remain unused for a long time, refill the tank up to a little over half the level. This will ensure the pump will be covered by fuel.

7. When washing the vehicle, be careful with the electric components and wiring.
8. When an ignition problem is detected, start the checks from the battery and the injection system connections.
9. Before disconnecting the MIU ECU connector, perform the following steps in the order shown:
- Set the switch to «OFF»
- Disconnect the battery

Failure to respect this norm may damage the control unit.
10. Do not invert the poles when fitting the battery.
11. To avoid causing any damage, disconnect and reconnect the MIU system connectors only if required. Before reconnecting, check that the connectors are dry.
12. When carrying out electric inspections, do not force the tester probes into the connectors. Do not take measurements not specifically foreseen by the manual.
13. At the end of every check performed with the diagnostic tester, remember to protect the system connector with its cap. Failure to observe this precaution may damage the MIU control unit.
14. Before reconnecting the quick couplers of the power supply system, check that the terminals are perfectly clean.

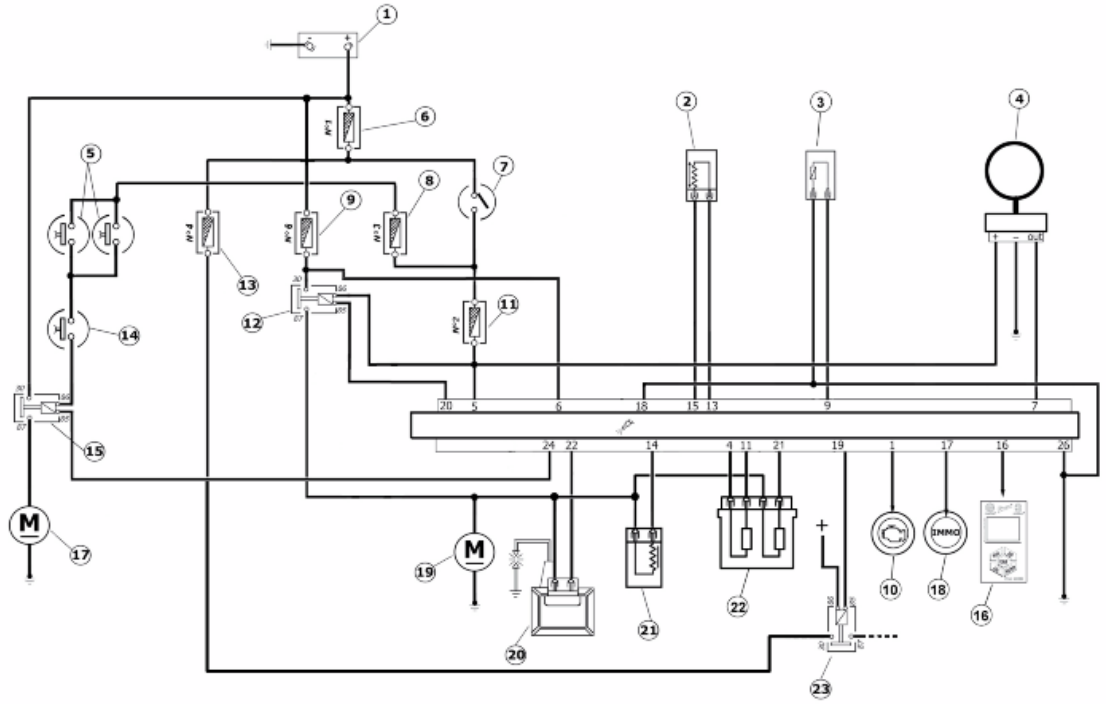
Terminals setup



1. Injection warning light
2. incomplete
3. incomplete
4. **(-)** lambda probe
5. **(+)** live battery
6. **(+)** battery
7. Immobilizer aerial
8. incomplete

9. Engine temperature sensor
10. incomplete
11. **(+)** lambda probe
12. Engine stop switch
13. **(+)** engine speed sensor
14. **(-)** fuel injector
15. **(-)** engine speed sensor
16. Diagnostics output
17. Immobilizer LED
18. Pin short-circuited with pin 26
19. **(-)** low-beam automatic ignition
20. **(-)** injection load remote control
21. Lambda probe
22. **(-)** HV coil
23. incomplete
24. Start up enabling
25. incomplete
26. Ground lead

EMS circuit diagram



1. 12V - 10Ah Battery

2. Speed sensor
3. Engine temperature sensor
4. Immobilizer aerial
5. Stop buttons
6. Fuse No. 1; 20A
7. Key switch contacts
8. Fuse No. 3; 10A
9. Fuse No. 6; 15A
10. Engine control telltale light
11. Fuse No. 2; 7.5A
12. Injection load remote controls
13. Fuse No. 4; 10A
14. Starter button
15. Start-up remote control switch
16. Diagnostics socket output
17. Starter motor
18. "IMMOBILIZER" led
19. Fuel pump
20. HV coil
21. Injector
22. Lambda probe
23. Headlight remote control

Troubleshooting procedure

Engine does not start

ENGINE DOES NOT START IF ONLY PULLED

Possible Cause	Operation
Immobiliser enabling signal	System not encoded System not efficient, repair according to the indications of the self-diagnosis
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor
Fuel system	Fuel in the tank Fuel pump activation Fuel pressure (low) Injector capacity (low)
Power to the spark plug	Shielded spark plug cap HV coil (secondary insulation)
Parameter reliability	Engine temperature Distribution timing - injection ignition Intake air temperature
End of compression pressure	End of compression pressure

Starting difficulties

ENGINE START-UP PROBLEMS

Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor Air temperature Engine temperature
Start-up speed	Starter motor and remote control Battery Ground connections
End of compression pressure	End of compression pressure
Power to the spark plug	Spark plug Shielded cap HV coil Speed-timing sensor Ignition advance
Fuel system	Fuel pressure (low) Injector capacity (low) Injector sealing (poor)
Correctness of the parameters	Engine temperature Stepper throttle valve position intake air temperature (steps and actual opening) Throttle valve cleaning, air filter efficiency

Engine stops at idle

ENGINE DOES NOT IDLE/ IDLING IS UNSTABLE/ IDLING TOO LOW

Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor Air temperature Engine temperature
Ignition efficiency	Spark plug Ignition timing
Correctness of the parameters	Throttle valve position sensor Stepper Engine temperature sensor Intake air temperature sensor
Intake system cleaning	Air filter Diffuser and throttle valve Stepper
Intake system sealing (infiltrations)	Intake manifold - head Throttle body - manifold Air cleaner joint Filter box
Fuel system (low pressure)	Fuel pump Pressure regulator Fuel filter Injector capacity

Engine does not rev down

ENGINE DOES NOT RETURN TO IDLING SPEED/IDLING SPEED TOO HIGH

Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay

Possible Cause	Operation
	HV coil Injector Revolution timing sensor Air temperature Engine temperature
Ignition efficiency	Ignition timing
Correctness of the parameters	Throttle valve position sensor Stepper Engine temperature sensor Intake air temperature sensor
Intake system sealing (infiltrations)	Intake manifold - head Throttle body - manifold Air cleaner joint Filter box
Fuel system (low pressure)	Fuel pump Pressure regulator Fuel filter Injector capacity

Exhaust backfires in deceleration

EXHAUST BACKFIRES WHEN DECELERATING

Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor Air temperature Engine temperature Lambda probe
Correctness of the parameters	Throttle valve position sensor Stepper Engine temperature sensor Intake air temperature sensor
Intake system sealing (infiltrations)	Intake manifold - head Throttle body - manifold Air cleaner joint Filter box
Fuel system (low pressure)	Fuel pump Pressure regulator Fuel filter Injector capacity
Exhaust system sealing (infiltrations)	Manifold - head Manifold - muffler Muffler welding

Engine revs irregularly

ENGINE IRREGULAR PERFORMANCE WITH VALVE SLIGHTLY OPEN

Possible Cause	Operation
Intake system cleaning	Air filter Diffuser and throttle valve Stepper
Intake system sealing	Air cleaner joint Filter box
Ignition system	Spark plug wear check
Parameter reliability	Throttle valve position signal Engine temperature signal Intake air temperature indicator Ignition advance
TPS reset successful	TPS reset successful
Presence of faults detected by the self diagnosis	Pump relay HV coil

Possible Cause	Operation
	Injector Revolution timing sensor Air temperature Engine temperature Lambda probe

Poor performance at full throttle

POOR ENGINE PERFORMANCE AT FULL POWER/ ENGINE IRREGULAR PERFORMANCE ON PICKUP

Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor Air temperature Engine temperature Lambda probe
Spark plug power supply	Spark plug Shielded cap HV cable HV coil
Intake system	Air filter Filter box (sealing) Air cleaner joint (sealing)
Parameter reliability	Throttle valve position signal Engine temperature signal Intake air temperature indicator Ignition advance
Fuel system	Fuel level in the tank Fuel pressure Fuel filter Injector capacity

Engine knocking

PRESENCE OF KNOCKING (COMBUSTION SHOCKS)

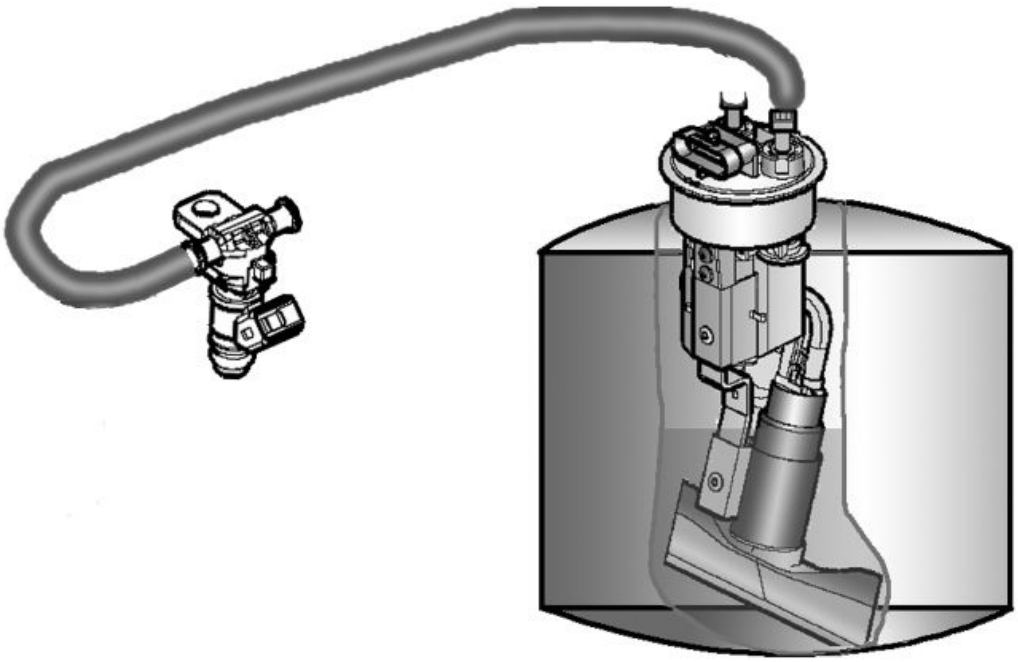
Possible Cause	Operation
Presence of faults detected by the self diagnosis	Pump relay HV coil Injector Revolution timing sensor Air temperature Engine temperature Lambda probe
Ignition efficiency	Spark plug
Parameter reliability	Throttle valve position signal Engine temperature signal Intake air temperature indicator Ignition advance
Intake system sealing	Air cleaner joint Filter box
TPS reset successful	TPS reset successful
Fuel system	Fuel pressure Fuel filter Injector capacity Fuel quality
Selection of the cylinder base gasket thickness	Selection of the cylinder base gasket thickness

Fuel supply system

The fuel system circuit includes the electric pump, the filter, the pressure regulator, the electro-injector and the fuel delivery pipes.

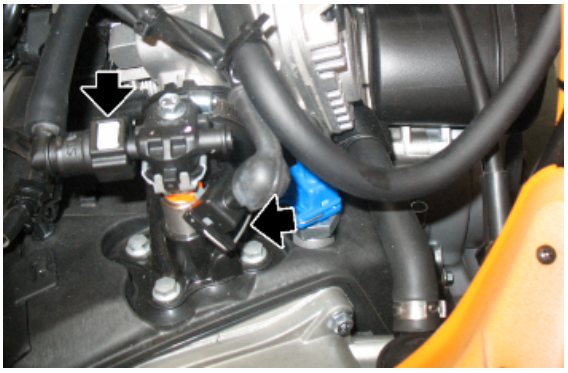
The electrical pump is located in the tank from which the fuel is pumped and sent to the injector through the filter.

The pressure is controlled by the pressure regulator situated in the pump assembly in the tank.



Removing the injector

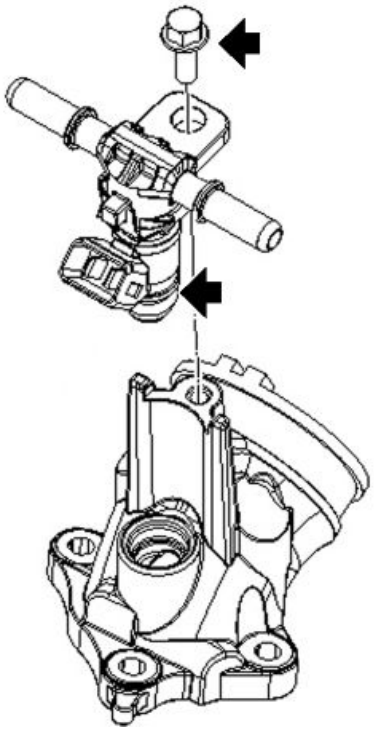
- Remove the helmet compartment.
- Remove the connector from the injector.
- Remove the quick release of the petrol delivery pipes.



- Undo the fixing screws and slide the injector from the manifold being careful not to damage the sealing OR gasket.

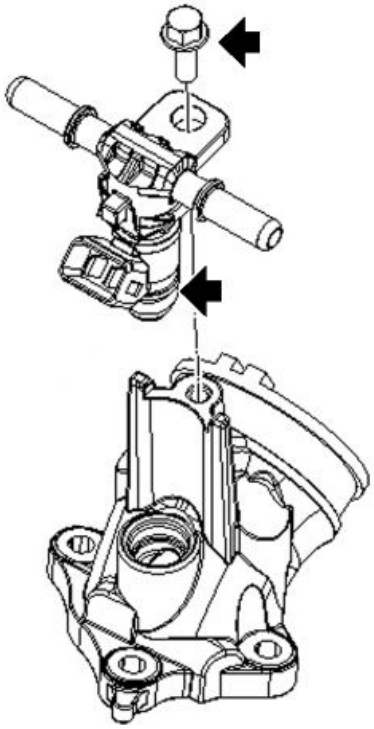
CAUTION

DO NOT DISASSEMBLE THE INJECTOR COMPONENTS.



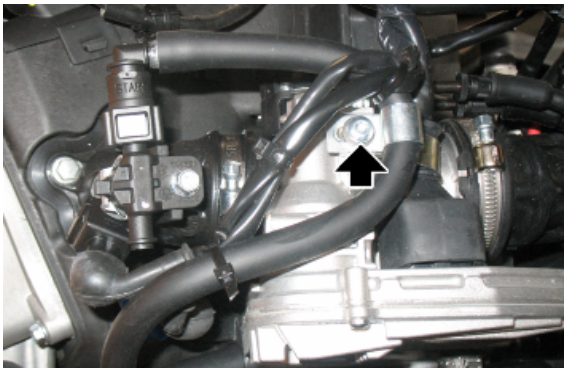
Refitting the injector

For refitting, perform the removal operations in reverse order and lubricate the sealing OR gasket with grease for internal application before fitting the injector on the manifold.

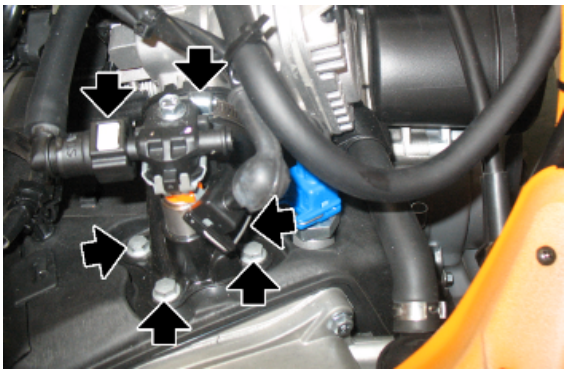


Removing the butterfly valve

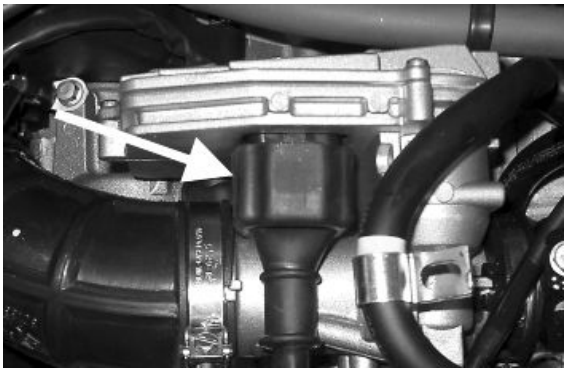
- Remove the helmet compartment.
- Remove the fuel piping clamping screw indicated in the figure.



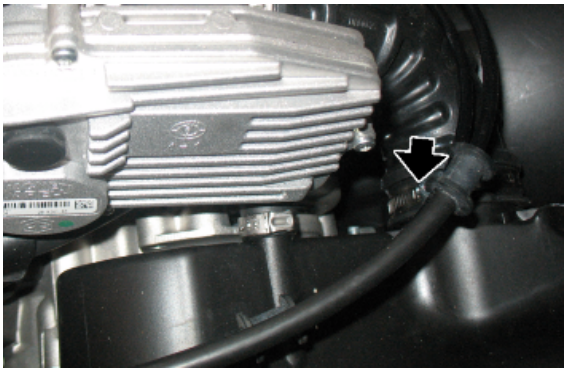
- Remove the fast-release fitting from the injector.
- Remove the injector connector.
- Remove the three screws with anti-tampering device fixing the manifold to the head and the clip fixing the throttle body to the manifold.



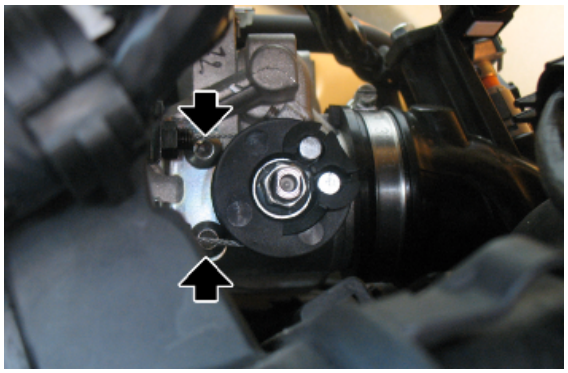
Remove the MIU ECU connector.



- Remove the fastening clamp of the air cleaner joint to the air filter body.

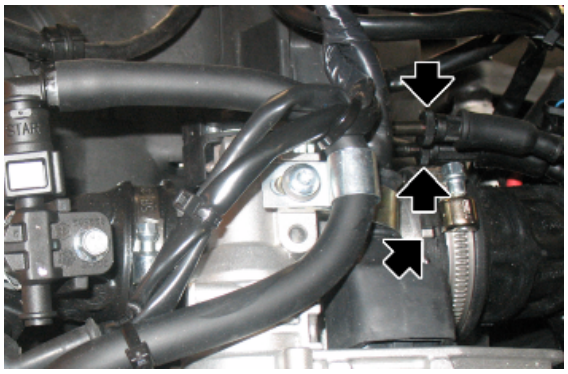


- Remove the mounting bracket of the throttle control cables undoing the two fixing screws.
- Release the cable ends of the throttle body pulley.
- Remove the throttle body with air cleaner joint, manifold and injector.

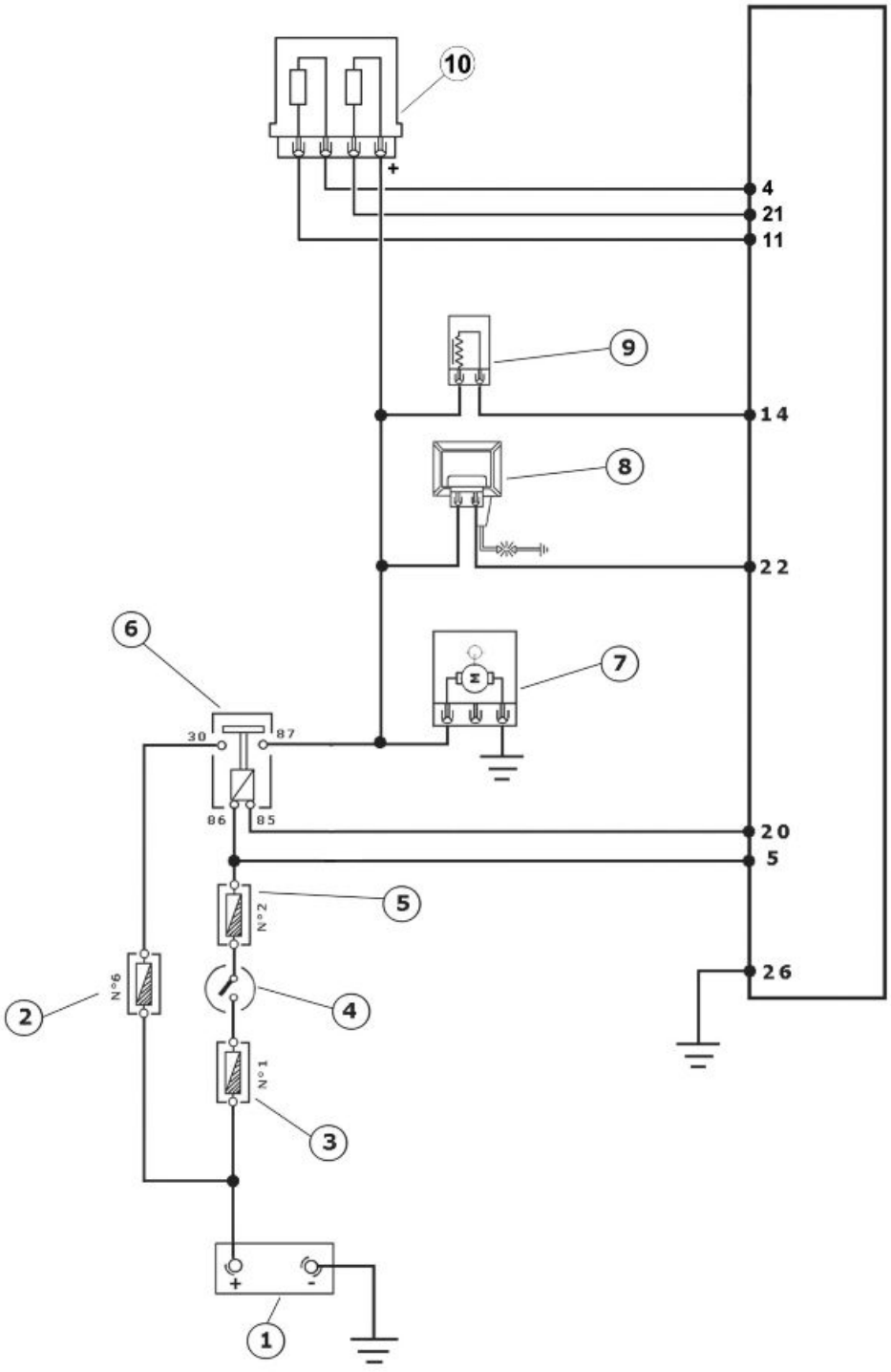


Refitting the butterfly valve

For refitting, perform the steps in the reverse direction to disassembly taking care to orientate the air cleaner joint by inserting it in the reference tooth on the throttle body as shown in the picture.
- To adjust the throttle control cables, act on the specific adjuster screws.



Pump supply circuit



1. 12V - 10Ah Battery
2. Fuse No. 6; 15A
3. Fuse No. 1; 20A
4. Key switch contacts
5. 7.5A fuse No. 2

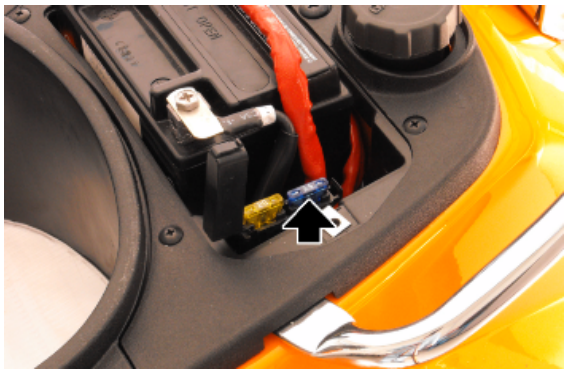
6. Injection load remote control
7. Fuel pump
8. HV coil
9. Fuel injector
10. Lambda probe

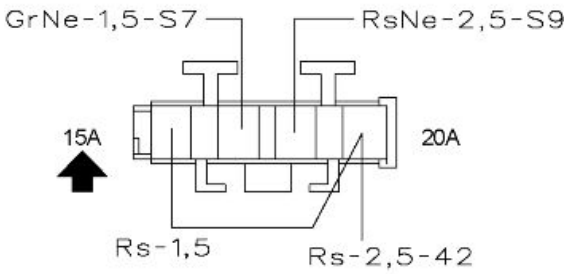
When switched to "ON", the fuel pump starts to rotate for two seconds and then stops. When the engine starts up, in the presence of rpm timing signal the pump is continuously supplied.

ELECTRICAL DATA

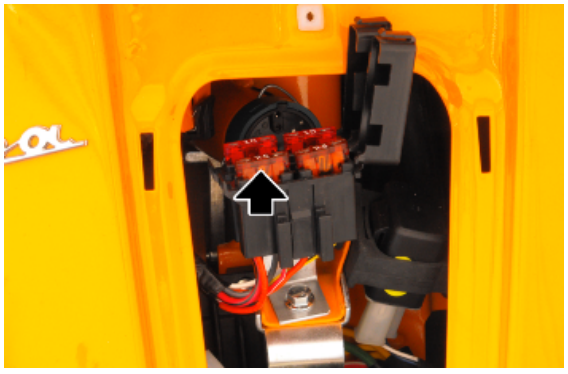
- Pump winding resistance ~ 1.5 Ohm
- Input current during normal functioning 1.4 to 1.8 A
- input current to the closed hydraulic circuit ~ 2 A (to be checked with specific tool for fuel pressure)

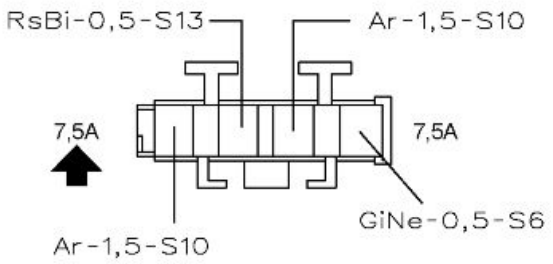
Check efficiency of the fuse No. 6 of 15A injection loads, next to the battery.



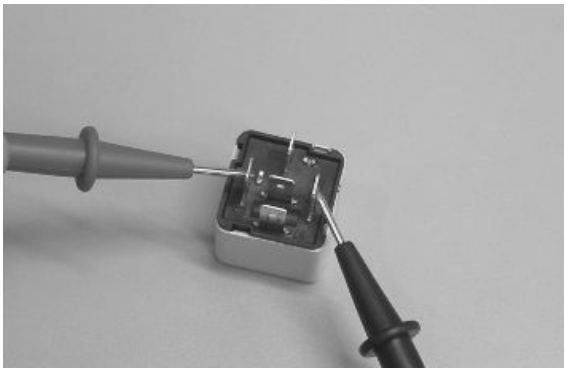


Check efficiency of fuse No. 2 of 7.5A, a 7,5A live control unit power supply, after removing the central cover of the shield.

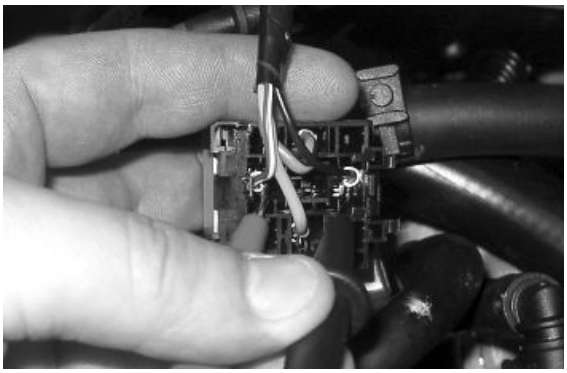




Check efficiency of the injection load remote control, that can be reached by removing the central cover of the shield: check the resistance of the energising coil between pins 86 and 85: 40 to 80 Ohm Apply a voltage of 12V to pins 86 and 85; make sure that there is continuity between pins 30 and 87 of the remote control.

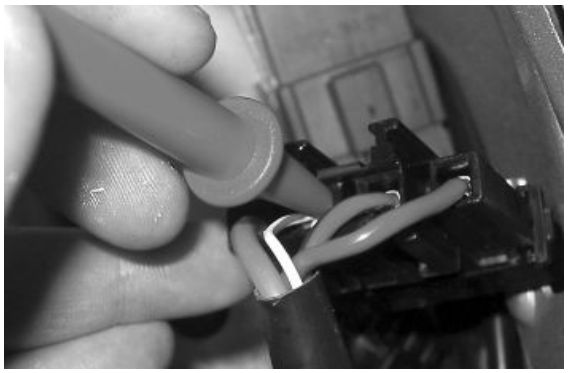


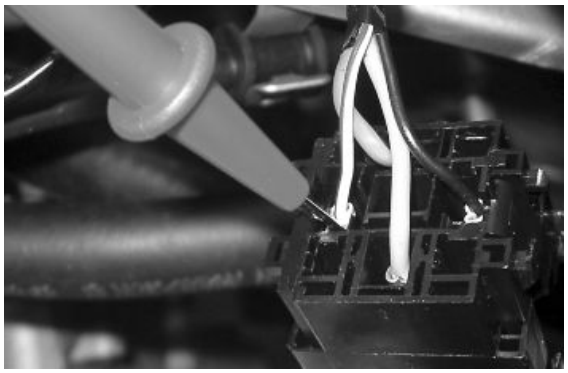
Check the power supply line of the injection load remote control energising coil: after switching to "ON", make sure there is battery voltage, for 2 seconds, between the Red-White cable and Black-Purple cable of the remote control base. If there is not, check the continuity of the Red-White cable between the fuse box and the remote control base and of the Black-Purple cable between the pin 20 of the control unit and the remote control base.

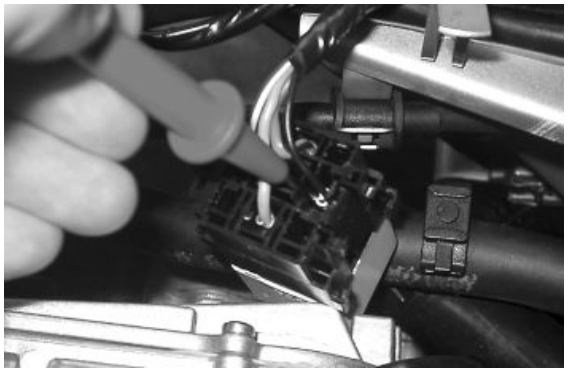


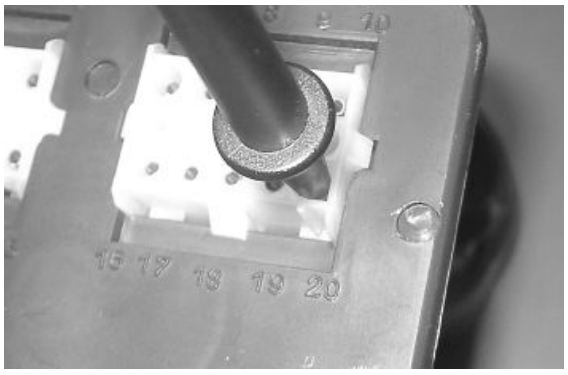
N.B.

CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (REMOTE CONTROLS, CONTROL UNIT, FUSES ETC.).





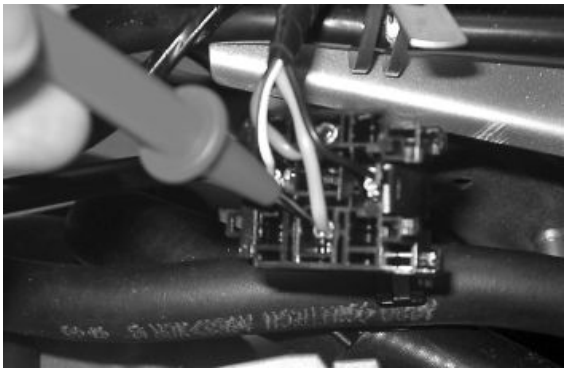


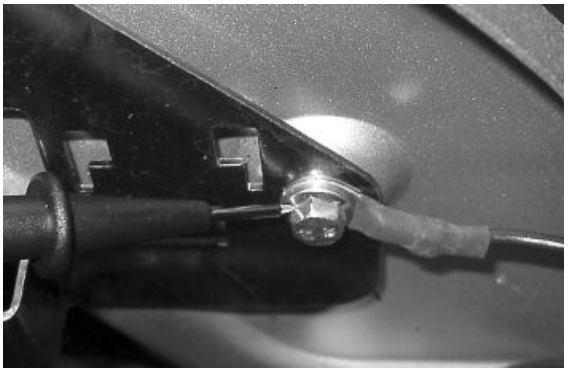

15 17 18 19 20

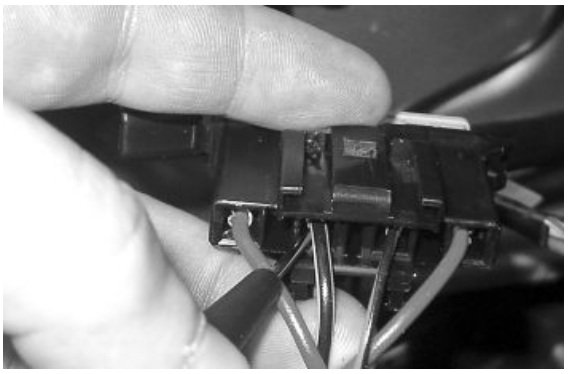
Check the presence of fixed voltage between the grey/black cable of the remote control base and ground. If there is not, check the continuity of the Grey/Black cable between the fuse box (No. 6, 15 A) and the remote control base.

N.B.

CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (REMOTE CONTROLS, CONTROL UNIT, FUSES ETC.).



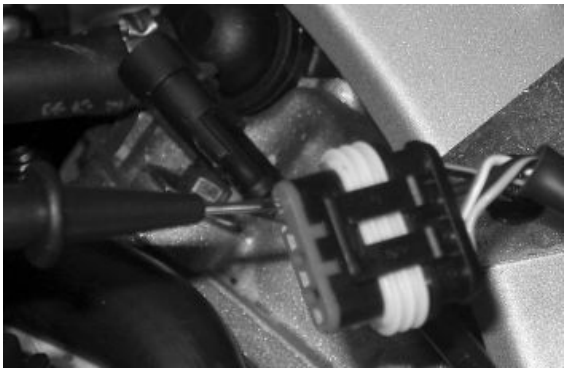




pump circuit 6

Check, on switching to "ON", that there is battery voltage, for about two seconds, to the Black-Green cable of the pump connector and ground with pump connector disconnected. Otherwise, check the continuity of the Black-Green cable between the pump connector and the remote control base. Check the efficiency of the ground line of the fuel pump by measuring the continuity between the pump connector black cable, system side, and the ground.

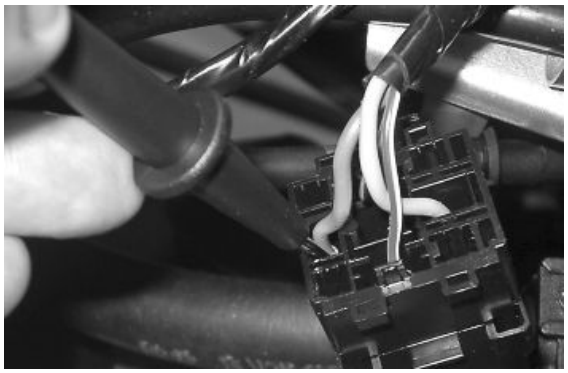
If, when switching to "ON", the pump continues to turn after two seconds of activation, check, with the control unit disconnected and the injection load re-



mote control disconnected, that the Black-Purple cable (pin 20 on the interface wiring) is insulated from the ground.

Specific tooling

020331Y Digital multimeter



Circuit leak test

Install the specific tool for checking the fuel pressure, with the pipe fitted with the gauge.

Check during regular operation by placing the appropriate tool between the pump and the injector. With the battery voltage > 12 V check that the fuel pressure is 2.5 BAR and that the input current is 1.4 to 1.8 A.

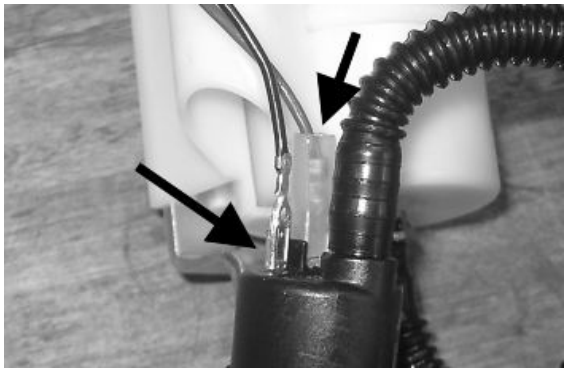
With the battery voltage > 12 V, check the pump flow rate by disconnecting from the injector the pipe equipped with the pressure gauge of the appropriate tool. Make a graded burette available with a flow rate of approximately 1 L. Rotate the pump using the active diagnosis of the palm top computer. Using a pair of long flat needle-nose pliers, choke the fuel pipe making the pressure stabilise at approx. 2.5 bar. Check that within 15 seconds the pump has a flow rate of approx. 110 cm^3.

Specific tooling

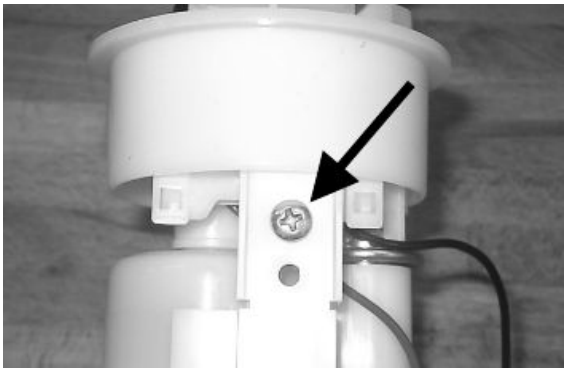
020480Y Petrol pressure check set

Fuel filter check

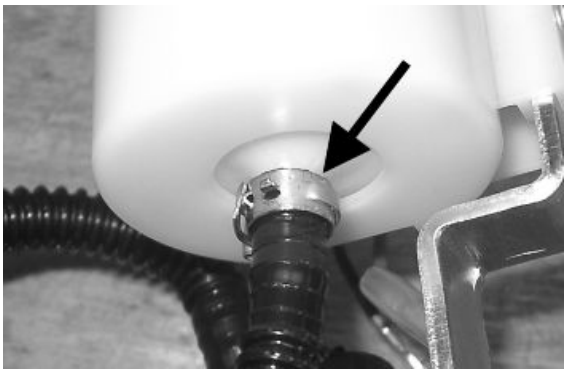
After removing from the tank, disconnect the electric pump terminals.



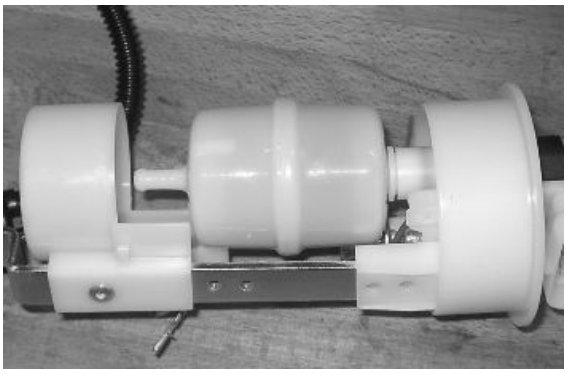
Remove the screw shown in the picture



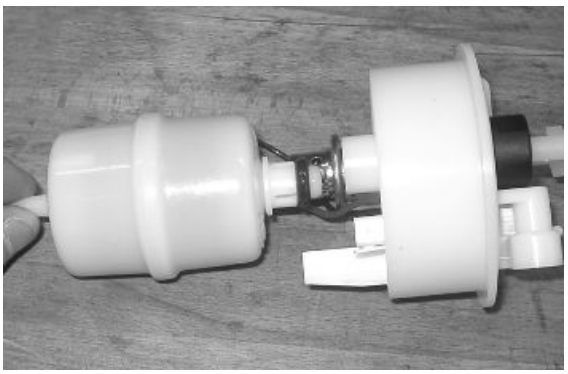
Remove the clip fixing the piping to the filter shown in the picture



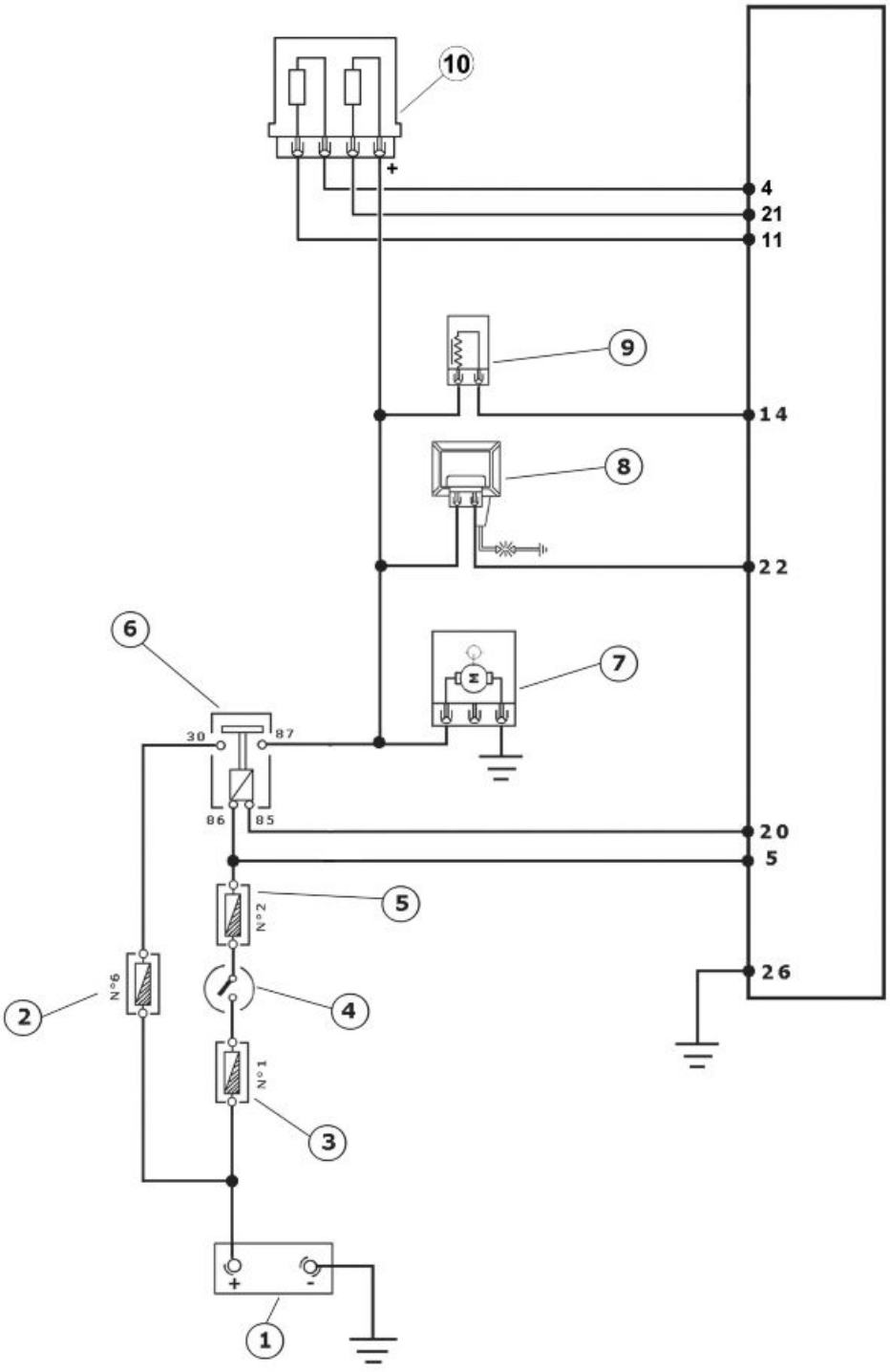
Separate the lower part of the pump mounting as shown in the picture.



Remove the filter from the pump mounting



Inspecting the injector circuit

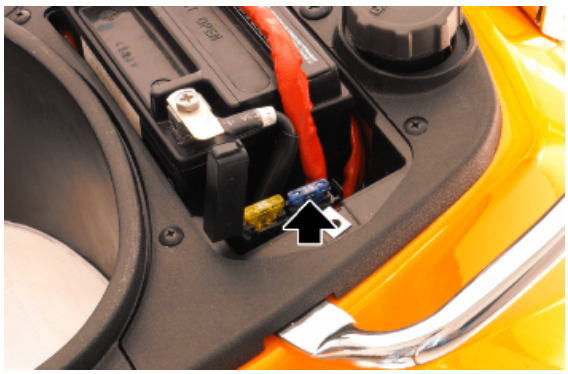


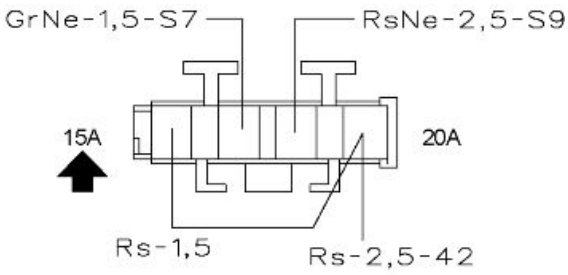
1. 12V - 10Ah Battery
2. Fuse No. 6; 15A
3. Fuse No. 1; 20A
4. Key switch contacts
5. 7.5A fuse No. 2

6. Injection load remote control
7. Fuel pump
8. HV coil
9. Fuel injector
10. Lambda probe

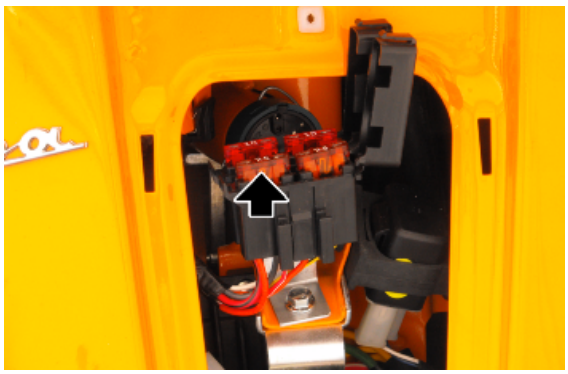
Check the resistance at the injector ends: 14.5 ± 5% Ohm

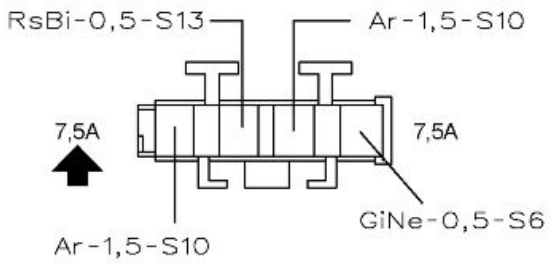
Check efficiency of the fuse No. 6 of 15A injection loads, next to the battery.



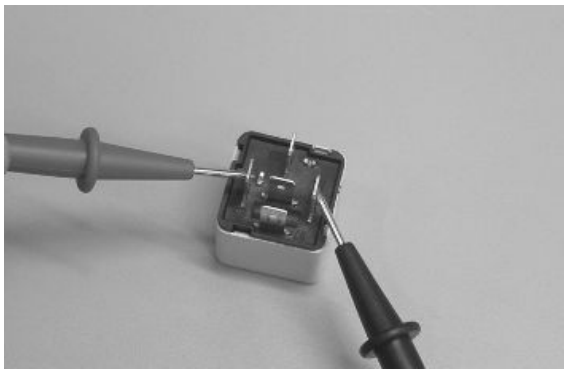


Check efficiency of fuse No. 2 of 7.5A, a 7,5A live control unit power supply, after removing the central cover of the shield.

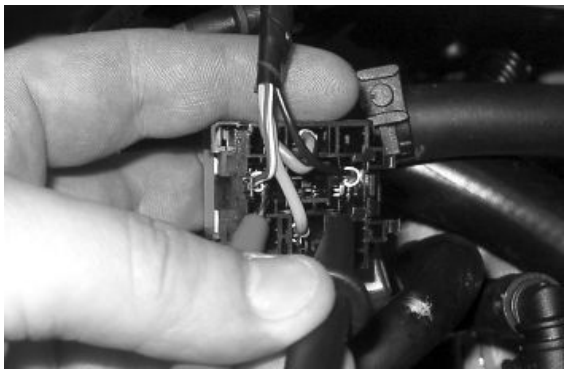




Check efficiency of the injection load remote control, that can be reached by removing the central cover of the shield: check the resistance of the energising coil between pins 86 and 85: 40 to 80 Ohm Apply a voltage of 12V to pins 86 and 85; make sure that there is continuity between pins 30 and 87 of the remote control.

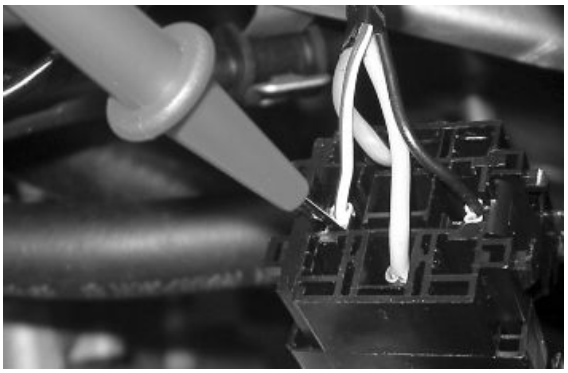


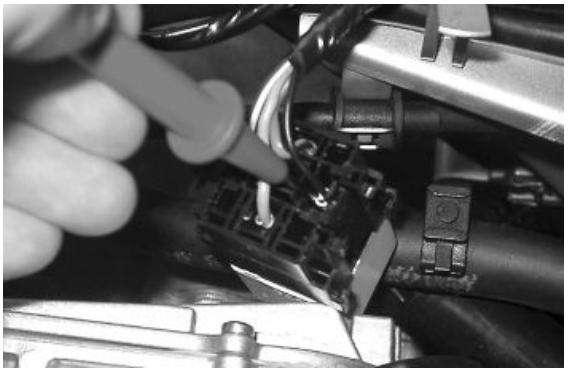
Check the power supply line of the injection load remote control energising coil: after switching to "ON", make sure there is battery voltage, for 2 seconds, between the Red-White cable and Black-Purple cable of the remote control base. If there is not, check the continuity of the Red-White cable between the fuse box and the remote control base and of the Black-Purple cable between the pin 20 of the control unit and the remote control base.

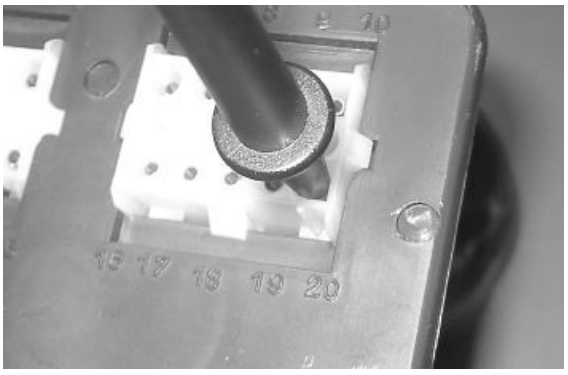


N.B.

CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (REMOTE CONTROLS, CONTROL UNIT, FUSES ETC.).



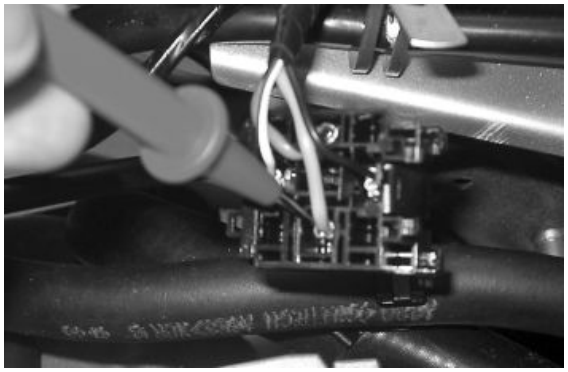


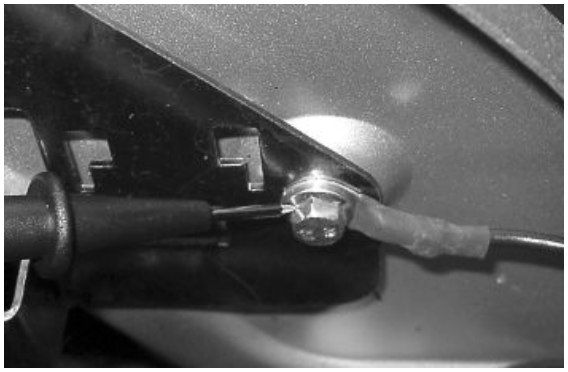

16 17 18 19 20

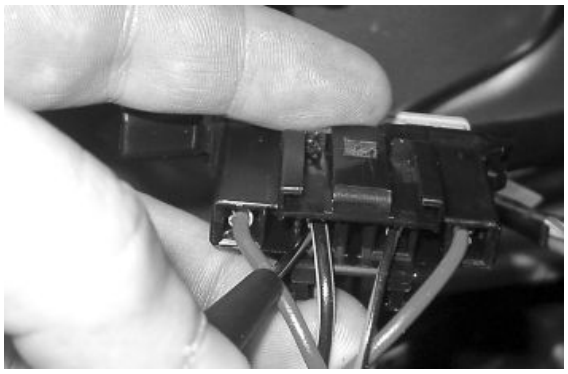
Check the presence of fixed voltage between the grey/black cable of the remote control base and ground. If there is not, check the continuity of the Grey/Black cable between the fuse box (No. 6, 15 A) and the remote control base.

N.B.

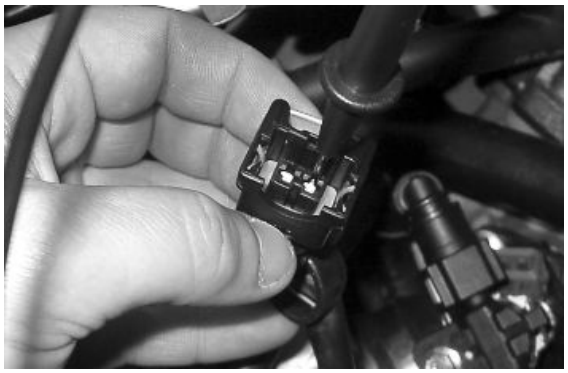
CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (REMOTE CONTROLS, CONTROL UNIT, FUSES ETC.).





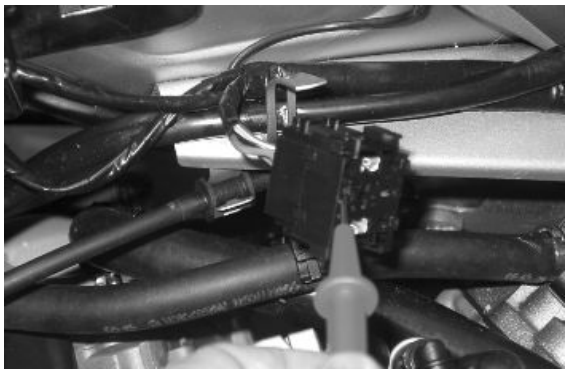


With the control unit and the injector disconnected, check the continuity of the Red-Yellow cable between pin 14 of the interface wiring and the injector connector



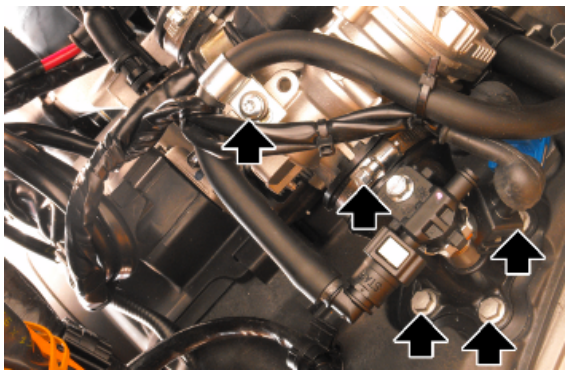
Switch to «ON» and check if there is voltage, with injector disconnected and control unit connected, between the Black-Green cable of the injector connector and the ground lead

With injector disconnected and the injector load remote control disconnected, check the continuity of the Black-Green cable between the injector connector and remote control base.



Inspecting the injector hydraulics

To carry out the injector check, remove the intake manifold by removing the three screws, with anti-tampering device, fixing the head and loosening the clamp connecting the throttle body to the manifold.
Release the injector fuel delivery pipe from the bracket on the throttle body.



Install the appropriate tool for checking fuel pressure and position the manifold over a container graduated by at least 100 cm³. Connect the injector with the cable making up part of the supply for the injection tester. Connect the clamps of the cable to an auxiliary battery. Activate the fuel pump with the active diagnosis. Check that, within fifteen seconds, approximately 40 cm³ of fuel is dispensed with an adjustment pressure of approximately 2.5 BAR.

Specific tooling

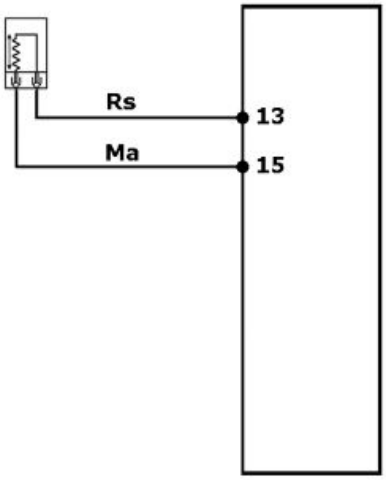
020480Y Petrol pressure check set

Proceed with the injector seal test.

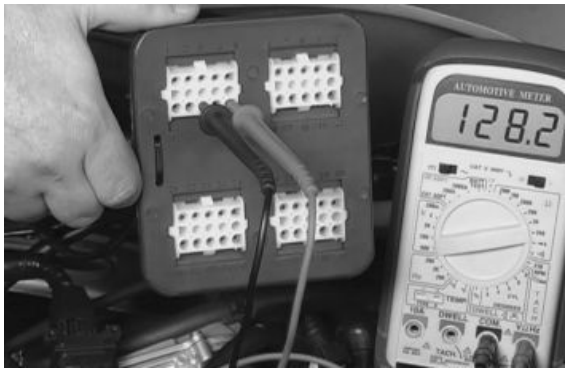
Dry the injector outlet with a blast of compressed air. Activate the fuel pump. Wait for one minute, making sure there are no leaks coming from the injector. Slight oozing is normal.

Value limit = 1 drop per minute

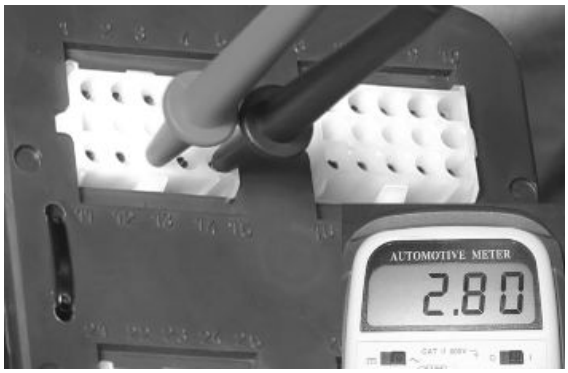
Tachometer



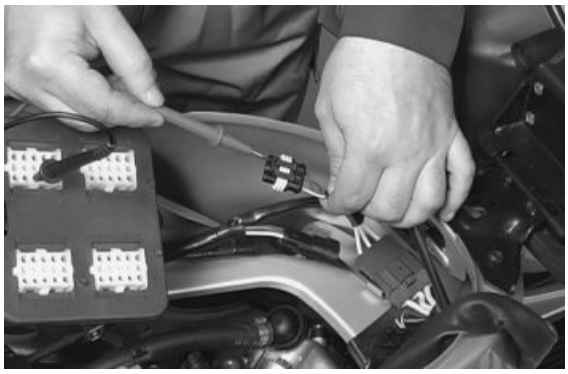
With wiring disconnected from the control unit and connected to the system, check that the sensor resistance between pins 13 - 15 is between 100 and 150 Ohm at an engine temperature of approximately 20°



Disconnect the fuel pipe connector. Start up the engine and wait for it to stop. With the wiring connected to the control unit and system try to start up the engine and check that the voltage between pins 13 and 15 is around 2.8 V



With the interface cable harness disconnected from the control unit, check continuity between pin 13 and the red cable of the engine speed sensor connector and between pin 15 and the brown cable of the engine speed sensor connector

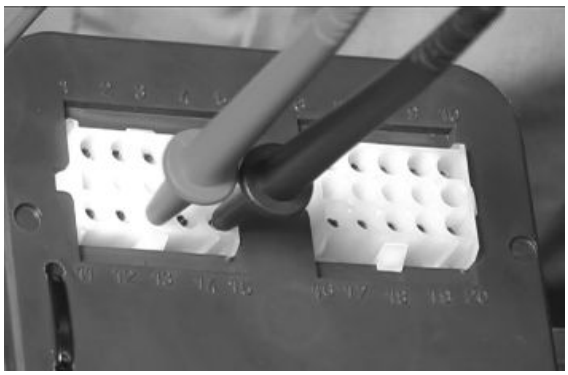


With the interface wiring and rpm sensor connector disconnected from the control unit, check that the Red and Brown cables (pin 13 - 15) are isolated from each other and insulated from the ground.

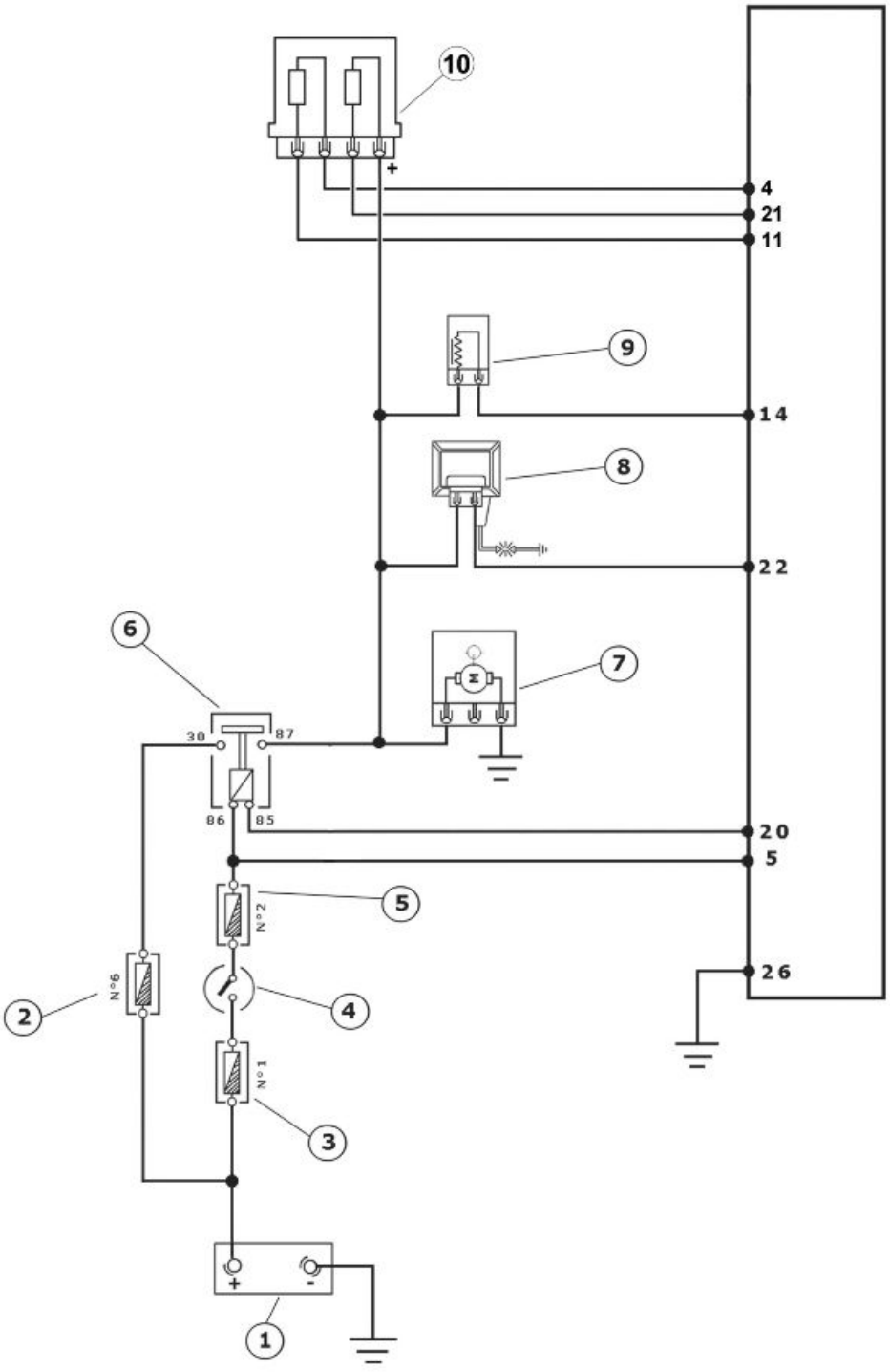
Specific tooling

020481Y Control unit interface wiring

020331Y Digital multimeter



HT coil



1. 12V - 10Ah Battery
2. Fuse No. 6; 15A
3. Fuse No. 1; 20A
4. Key switch contacts
5. 7.5A fuse No. 2

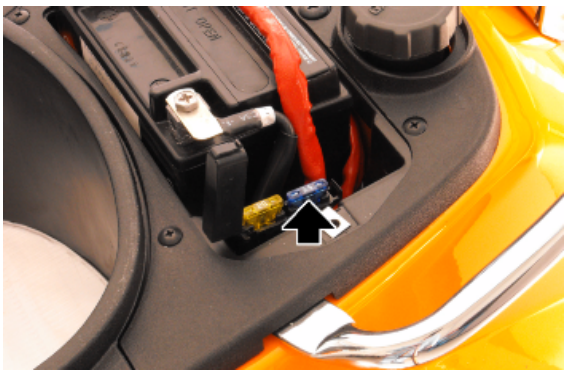
6. Injection load remote control
7. Fuel pump
8. HV coil
9. Fuel injector
10. Lambda probe

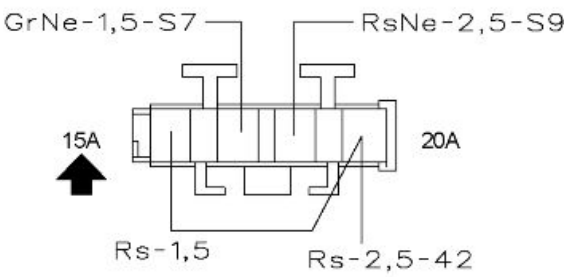
The ignition system is integrated with the injection and it is a high-efficiency inductive type ignition.
The control unit manages two important parameters:
- Ignition advance
This is optimised at the moment in accordance with the engine revs, engine load, temperature and environmental pressure.
With the engine at idle, the ignition advance is optimised to stabilise the speed at 1450 ± 50 rpm.
- Magnetisation time
The coil magnetisation time is controlled by the control unit. The ignition power is increased during the engine start-up phase.
The injection system recognises the 4-stroke cycle and therefore, ignition is only controlled during compression.

Specific tooling

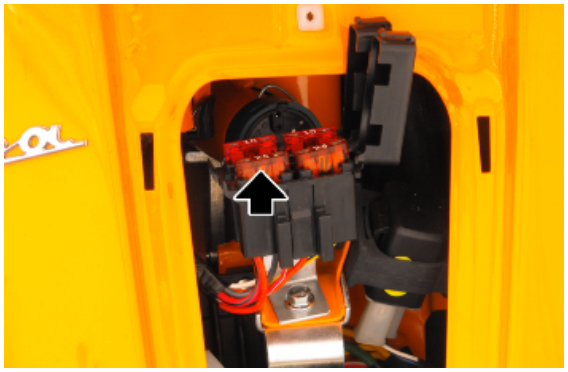
020331Y Digital multimeter

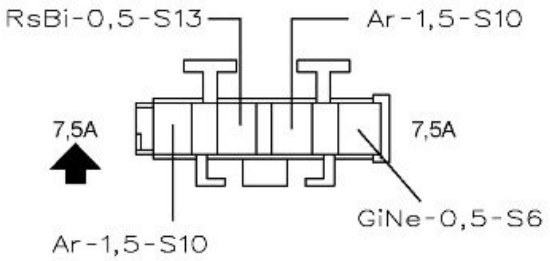
Check efficiency of the fuse No. 6 of 15A injection loads, next to the battery.



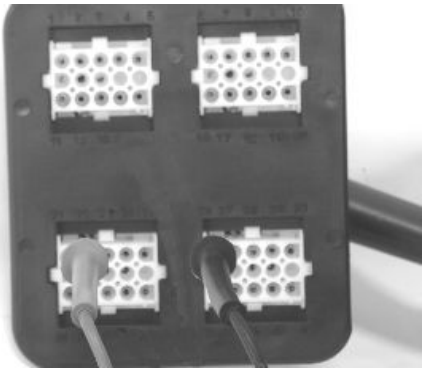


Check efficiency of fuse No. 2 of 7.5A, a 7,5A live control unit power supply, after removing the central cover of the shield.

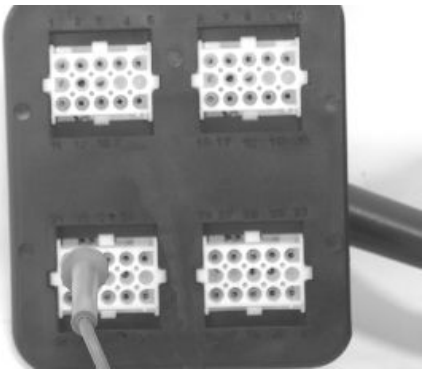


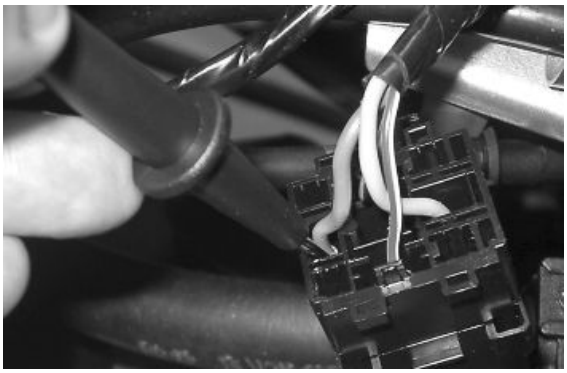


Check there is voltage between pins 22 and 26 of the interface wiring for around two seconds when switching to «**ON**».

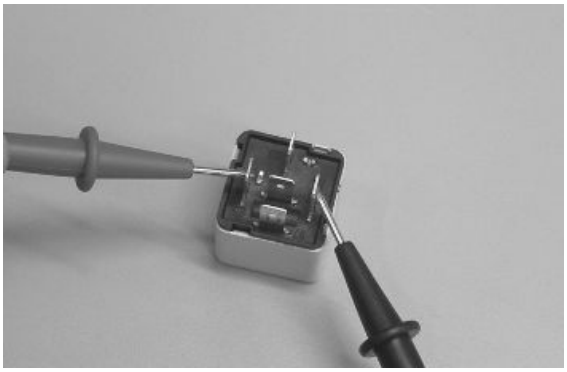


Check the resistance of primary coil between pin 22 of the interface wiring and the Black-Green cable of the injection load remote control base, that can be reached by removing the shield central cover, with the control unit disconnected and the remote control disconnected.
Resistance of the primary = 0.5 ± 8% Ohm

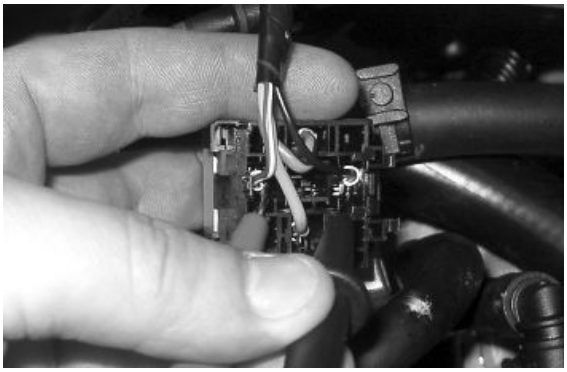




Check the efficiency of the injection load remote control. Check the resistance of the energising coil between pins 86 and 85: 40 to 80 Ohm
Apply a voltage of 12V to pins 86 and 85; make sure that there is continuity between pins 30 and 87 of the remote control.

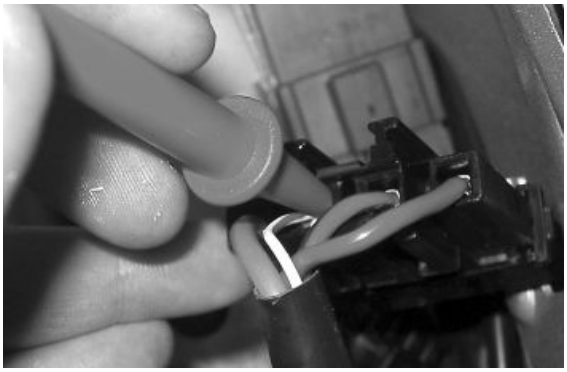


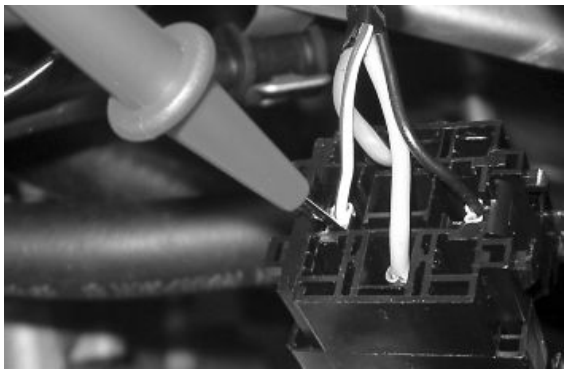
Check the power supply line of the injection load remote control energising coil: after switching to "ON", make sure there is battery voltage, for 2 seconds, between the Red-White cable and Black-Purple cable of the remote control base. If there is not, check the continuity of the Red-White cable between the fuse box and the remote control base and of the Black-Purple cable between the pin 20 of the control unit and the remote control base.

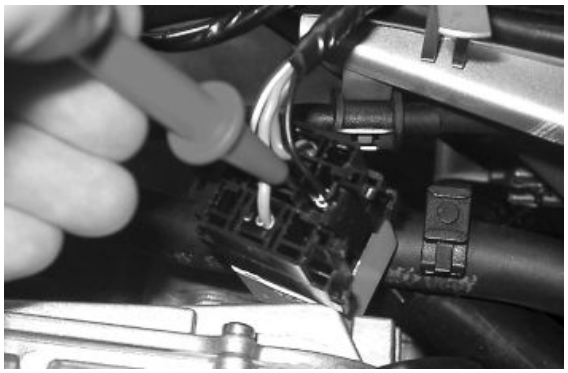


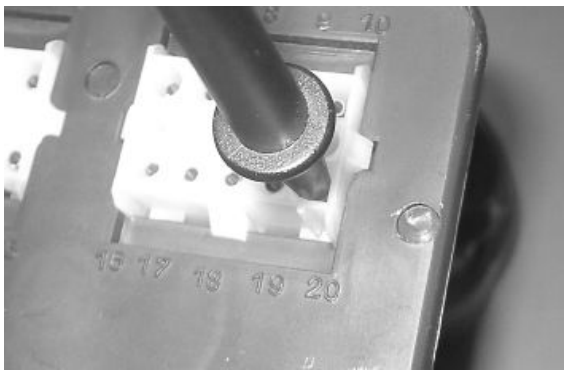
N.B.

CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (REMOTE CONTROLS, CONTROL UNIT, FUSES ETC.).





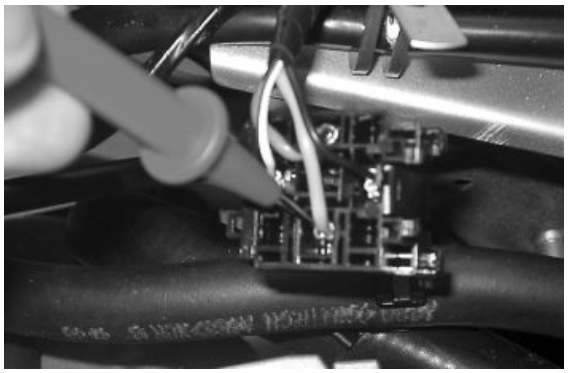


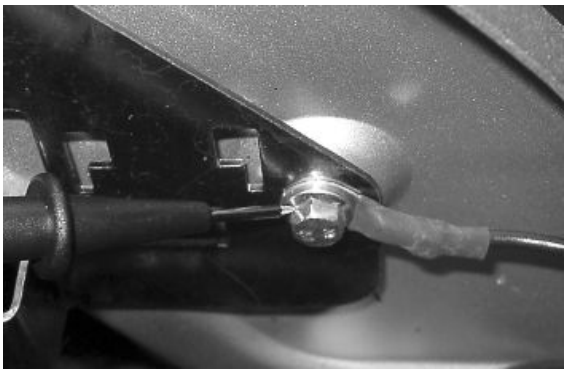


Check the presence of fixed voltage between the grey/black cable of the remote control base and ground. If there is not, check the continuity of the Grey/Black cable between the fuse box (No. 6, 15 A) and the remote control base.

N.B.

CONTINUITY TESTS MUST BE CARRIED OUT WITH THE COMPONENTS DISCONNECTED. (REMOTE CONTROLS, CONTROL UNIT, FUSES ETC.).





Zeroing the throttle

Resetting the throttle valve position signal (TPS reset)

The MIU control unit is supplied with a throttle valve position sensor that is pre-calibrated.

Pre-calibration entails regulating the minimum opening of the throttle valve to obtain a certain flow of air under pre-set reference conditions.

Pre-calibration ensures optimal air flow to control idling.

This regulation must not be tampered with in any way whatsoever.

The injection system will complete the management of the idling through the Stepper motor and the variation of the ignition advance.

The throttle body after the pre-calibration has an opened valve with an angle that can vary depending on the tolerances of the machining of the pipe and the valve itself.

The valve position sensor can also assume various fitting positions. For these reasons the mV of the sensor with the valve at idle can vary from one throttle body to another.

To obtain the optimum fuel mixture, especially at small openings of the throttle valve, it is essential to match the throttle body with the control unit following the procedure known as TPS resetting.

With this operation we inform the control unit, as the starting point, of the mV value corresponding to the pre-calibrated position.

To reset, proceed as follows.

Connect the diagnostic tester.

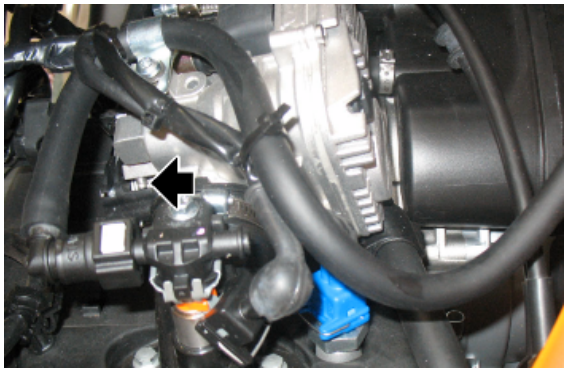
Switch to «**ON**».

Select the functions of the diagnostic tester on «**TPS RESET**».

Specific tooling

020680Y Diagnosis Tool

Make sure that the throttle valve with the control is supporting the stop screw.



Guaranteeing that this position will be kept, send a confirmation for the TPS reset procedure.

Reset should be performed in the following cases:

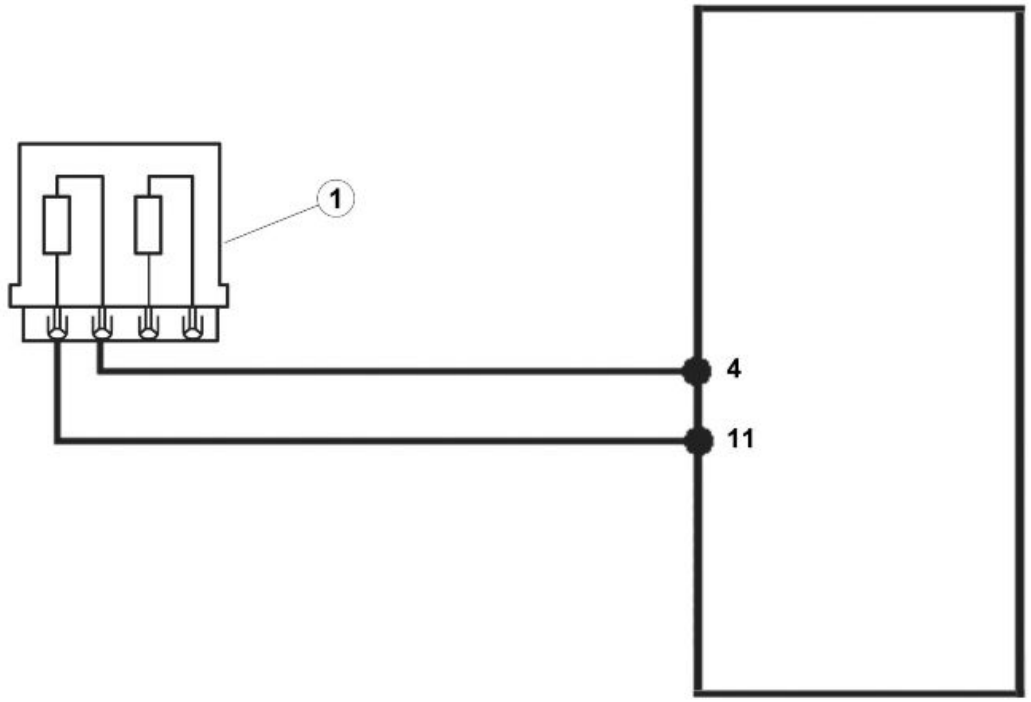
- on first fitting.
- if the injection control unit is replaced.

N.B.

THE TPS RESET PROCEDURE MUST NOT BE CARRIED OUT WITH A USED THROTTLE BODY BECAUSE POSSIBLE VALVE WEAR AND STOP WEAR FOR THE MINIMUM OPENING MAKE THE AIR FLOW DIFFERENTLY FROM THAT OF PRE-CALIBRATION.

Lambda probe

SIGNAL CONTROL



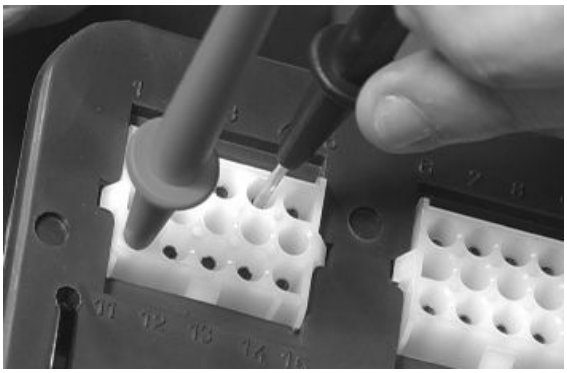
1. Lambda probe

Install the electronic control unit interface wiring.

Start the engine and let it warm up.

Use an analogue multimeter with a direct voltage scale measuring down to 2 V.

Place the tips of the multimeter between pins 4 (-) and 11 (+)

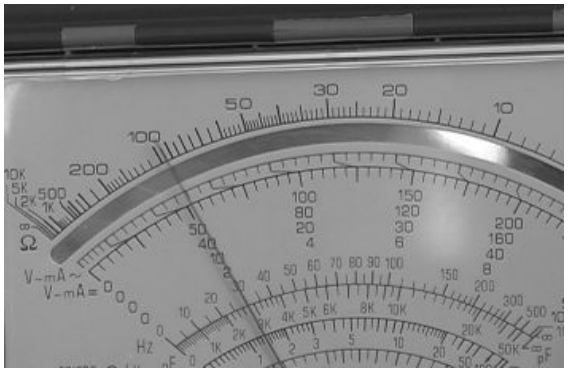


With the engine running at idle speed, check that the voltage oscillates between 0V and 1V

With the throttle valve completely open, the voltage is approx. 1V.

During the closing phase, the voltage is approx. 0V.

If the voltage remains constant, the sensor may be damaged. Remove the sensor and check that there are no oil or carbon deposits inside it..



INDEX OF TOPICS

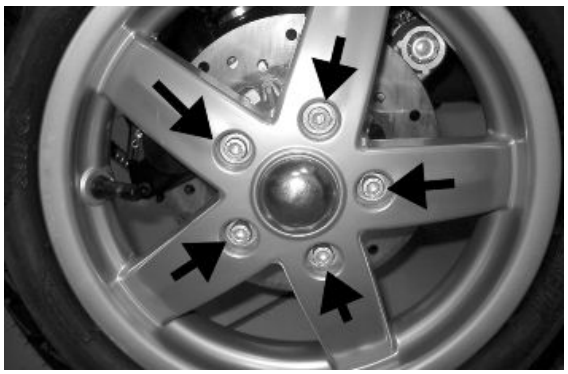
Front suspension

This section is devoted to operations that can be carried out on the suspension.

Front

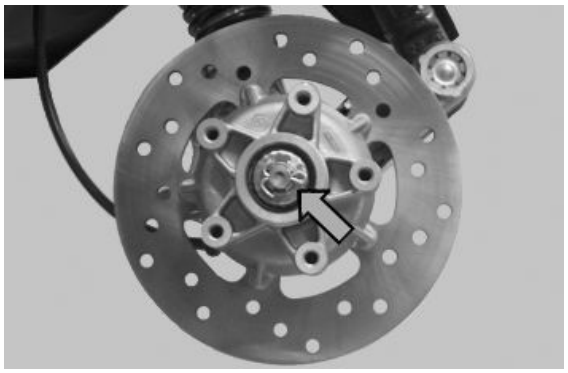
Removing the front wheel

- Support the vehicle adequately.
- Loosen the five screws fixing the wheel to the hub.

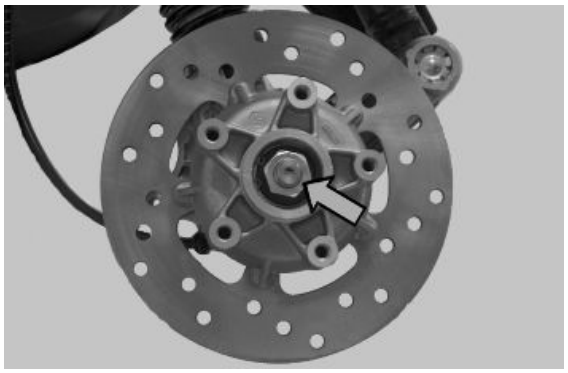


Front wheel hub overhaul

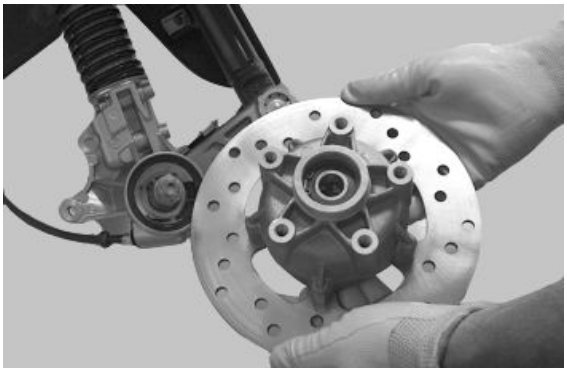
- Support the vehicle adequately.
- Remove the front wheel.
- Remove the front brake calliper.
- Remove the cotter pin and remove the cap.



- Unscrew the nut fixing the front wheel hub.



- Remove the wheel hub.



- Remove the ball bearing check Seeger ring indicated in the picture

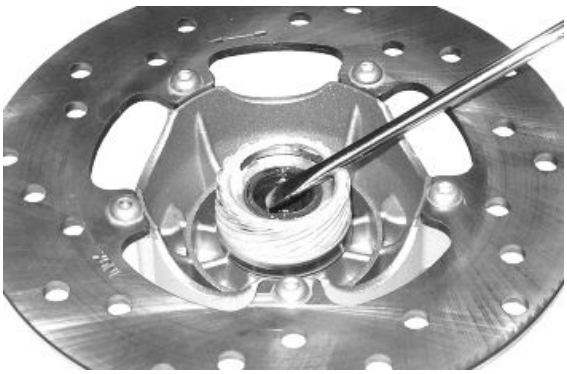
Extract the ball bearing using the specific tool

Specific tooling

001467Y014 Pliers to extract ø 15-mm bearings

001467Y017 Bell for bearings, OD 39 mm

- Remove the oil seal on the roller bearing side using a screwdriver.



- Remove the roller bearing using the specific tool

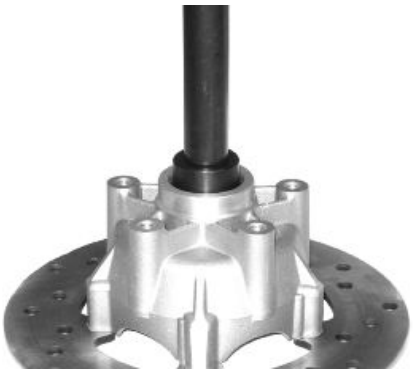
Specific tooling

020376Y Adaptor handle

020456Y Ø 24 mm adaptor

020363Y 20-mm guide

- Heat the roller bearing seat with a heat gun
- Use the specific tool to introduce and push the bearing until it stops, with the shielded side facing out
- Refit the ball bearing check Seeger ring



Specific tooling

020151Y Air heater

020376Y Adaptor handle

020357Y 32x35-mm Adaptor

020412Y 15-mm guide

- Use the specific tool to fit and push the roller casing until it stops
- Refit the oil seal on the roller bearing side
- Lubricate the area between the roller bearing and the ball bearing

Specific tooling

020038Y Punch

Recommended products

AGIP GREASE MU3 Grease for odometer transmission gear case

Soap-based lithium grease with NLGI 3; ISO-L-XBCHA3, DIN K3K-20

- To refit, follow the removal steps but in reverse order; be careful to tighten to the prescribed torque.

Locking torques (N*m)

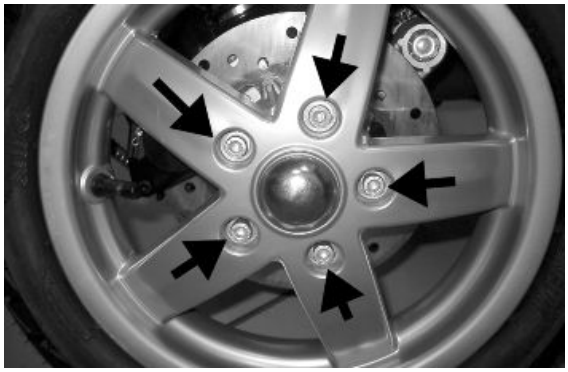
Front wheel axle nut 75 to 90

Refitting the front wheel

- Upon refitting, tighten the five screws to the prescribed torque.

Locking torques (N*m)

Wheel rim screws **20 to 25**



Handlebar

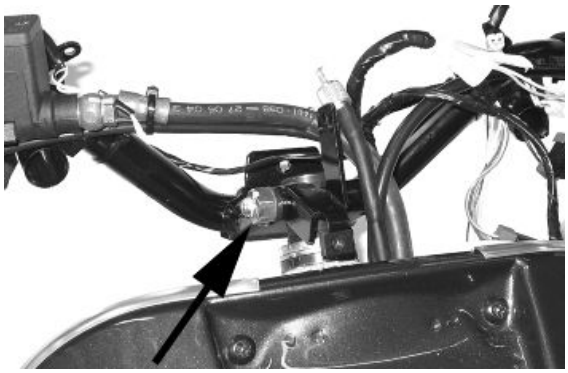
Removal

Remove the handlebar cover before carrying out this operation,.

- After removing the transmissions and disconnecting the electrical terminals, remove the terminal fixing the handlebar to the steering.
- Check all components and replace faulty parts.

N.B.

IF THE HANDLEBAR IS BEING REMOVED TO REMOVE THE STEERING, TILT THE HANDLEBAR FORWARD TO AVOIDING DAMAGING THE TRANSMISSIONS.

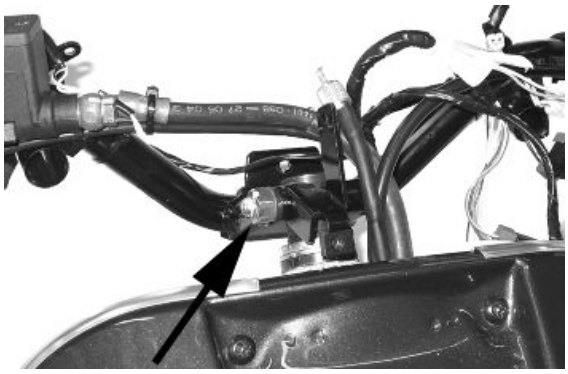


Refitting

Carry out the removal operations but in the reverse order, observing the prescribed tightening torque.

Locking torques (N*m)

Handlebar lock nut **45 to 50**



Steering column

Removal

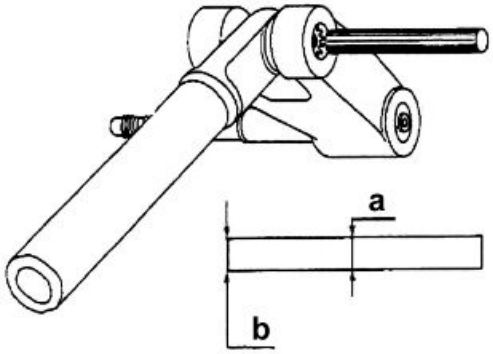
After removing the upper seat, lean the vehicle on one side and extract the steering tube completely from the fork.

Specific tooling

020055Y Wrench for steering tube ring nut

Overhaul

Servicing the front suspension-steering assembly, described below, deals mainly with replacing parts (pin- NADELLA roller bushings - sealing rings unit and dust guard) which connect the steering tube to the front wheel holder swinging hub.



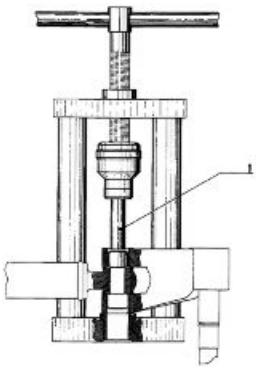
N.B.

BEFORE PROCEEDING WITH THE DESCRIBED SERVICE, CHECK THAT THE STEERING TUBE AND THE WHEEL HOLDER HUB ARE IN EXCELLENT CONDITIONS: ONLY THEN IS THE SERVICE JUSTIFIABLE.
MOREOVER, REMEMBER THE STEERING TUBE SHOULD BE REPLACED WITH A NEW ONE WHEN DEFORMED.

a = Ø 12 Punch

b = Sharp-edged end

Use a suitable punch with the dimensions indicated on the figure; hit with a mallet until the wedging washer is crushed and then extract it with the help of a pointed end.



Repeat the operation for the second washer using the punch on the side opposite to the one shown in the figure.

Use the tool fitted with part 1 as shown in the figure and move the tool handgrip until the pin and the NADELLA are simultaneously ejected in the direction opposite the tool thrusting force.

After removing the pin and the first NADELLA, the swinging hub gets detached from the steering tube.

To remove the second NADELLA, use the tool fitted with part 2 instead of part 1, on the side opposite the one shown in the figure.

N.B.

DURING THE REMOVAL OPERATIONS DESCRIBED ABOVE, THE ROLLER BUSHINGS ARE DESTROYED WHEN THE EXTRACTOR IS USED. UPON REFITTING, IT IS THEREFORE NECESSARY TO USE NEW BUSHINGS AS WELL AS A NEW PIN, NEW SEALING RINGS AND DUST GUARDS.

Specific tooling

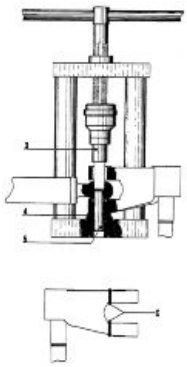
020021Y Front suspension service tool

Connect the swinging hub to the steering tube with the guiding pin.

- Use the tool fitted with part 3 on the stem and part 4.

Lubricate the pin with recommended grease and insert it temporarily on the swinging hub, move the tool handgrip until part 3 is fully inserted on the steering tube.

After fitting the pin, insert the two spacers, slightly hitting them with the mallet.



N.B.

BEFORE PROCEEDING WITH THE DESCRIBED FITTING, PLACE THE TWO DUST GUARD RINGS ON THE SWINGING HUB AS SHOWN IN THE FIGURE.

Specific tooling

020021Y Front suspension service tool

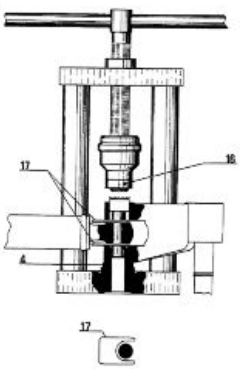
Recommended products

AGIP GREASE SM 2 Grease for odometer transmission gear case

Lithium grease with NLGI 2 molybdenum disulphide; ISO-L-XBCHB2, DIN KF2K-20

Insert the sealing ring on the pin and the roller bushing with its wedging washer at the same time.

- Remove the tool and the part 5 (guide), which has been partially ejected during the previous pin fitting phase, and leave part 4 always fitted.
- Replace part 3 with part 16 (on the stem).
- By moving the tool handgrip, push the wedging washer - roller bushing - seal ring unit, placing part 16 until it stops on the swinging hub.



- Repeat the above operation using the tool with part 16 and part 22, instead of part 4, always fitted to the stem, on the side opposite that indicated in the figure to fit the second wedging washer - roller bushing - sealing ring unit.

WARNING

BEFORE PROCEEDING WITH THE DESCRIBED PRE-FITTING, DIP THE SEALING RINGS IN MINERAL OIL AND THE "NADELLA" ROLLER BUSHINGS (PREVIOUSLY WASHED IN PURE PETROL OR NEUTRAL PETROLEUM TO ELIMINATE THE ANTIRUST PROTECTION), HALF-FILLED WITH GREASE.

Specific tooling

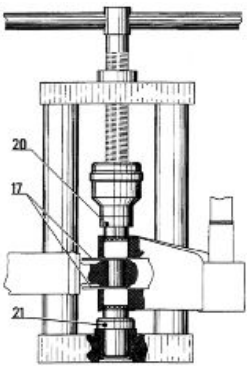
020021Y Front suspension service tool

Recommended products

AGIP GREASE MU3 Grease for odometer transmission gear case

Soap-based lithium grease with NLGI 3; ISO-L-XBCHA3, DIN K3K-20

- Use the tool fitted with part 20 on its stem and part 21 on the tool base as shown in the figure.
- By moving the tool handgrip, push the two NADELLA bushings until their internal bottoms make contact with the pin end.
- Use the tool fitted with parts 3 and 4 to fit the pin, and press moving the tool handgrip, until wedging the washers on the swinging hub.
- Now, remove the two spacers (parts 17 and 16) and, once the space between the NADELLAs - steering tube and swinging hub - has been fully filled with grease, move the dust guard rings until they are placed in that space.
- By wedging the washers as described above, the front suspension unit refitting stage is finished.



Recommended products

AGIP GREASE MU3 Grease for odometer transmission gear case

Soap-based lithium grease with NLGI 3; ISO-L-XBCHA3, DIN K3K-20

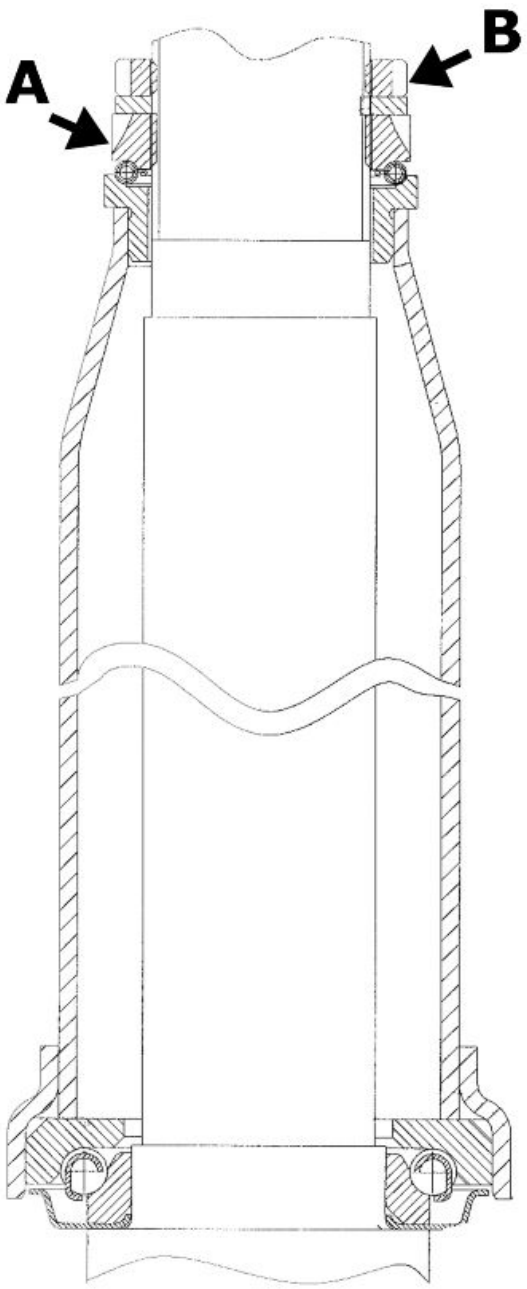
Refitting

CAUTION

USE NEW ROLLER CASINGS, PIN, SEALING RINGS AND DUST GUARDS FOR REFITTING.

When fitting the fork, lubricate with the steering bearing tracks with the recommended grease.

Tighten the lower ring nut **"A"** and the upper ring nut **"B"** to the specified torque



Recommended products

AGIP GREASE PV2 Grease for the steering bearings, pin seats and swinging arm

White anhydrous-calcium based grease to protect roller bearings; temperature range between -20 C and +120 C; NLGI 2; ISO-L-XBCIB2.

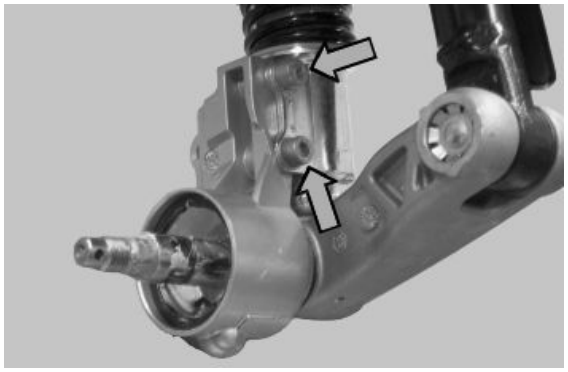
Locking torques (N*m)

Lower steering ring nut 8 to 10 **Upper steering ring nut** 35 to 40

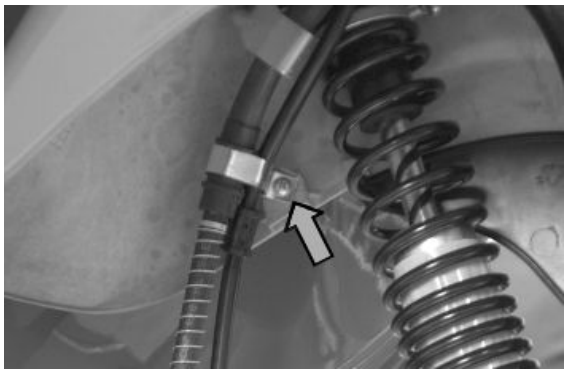
Front shock absorber

Removal

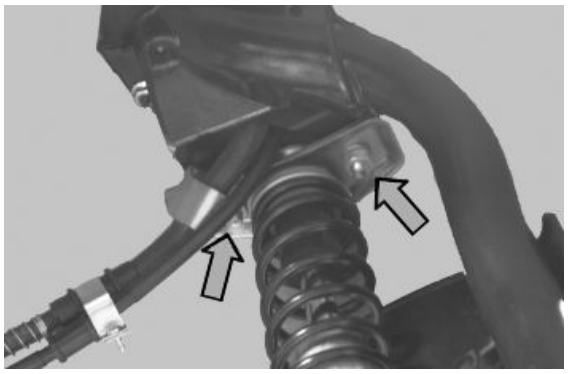
- Support the vehicle adequately.
- Remove the wheel hub.
- Loosen the shock absorber lower clamps and remove the brake calliper shock absorber mounting.



- Loosen the screws fixing the front brake pipe retainer clamp and the odometer cable in order to reach the upper clamps.



- Unscrew the upper fixing nuts.



- Remove the front shock absorber.

Refitting

To refit, carry out the removal operations in reverse order, observing the prescribed tightening torques.

Locking torques (N*m)

shock absorber lower clamping 20 - 27 shock absorber upper clamp 20 to 30

Shock-absorber - calliper bracket

Removal

- Remove the front wheel hub with the brake disc
- Remove the front shock absorber lower clamps

- Remove the bracket locking Seeger ring
- Unscrew the bracket

- Before refitting the bracket in the wheel axle, place the O-ring as shown in the photograph so that it is correctly placed after fitting the bracket.
- Refit the washer and the Seeger ring.
- Refit the lower screws fixing the shock absorber to the bracket and tighten at the prescribed torque

Locking torques (N*m)

Shock absorber lower clamping **20 to 27**

Overhaul

- The bracket for the shock absorber -calliper attachment has two roller bearings separated one from the other as shown in the photograph

- Remove the two roller bearings from the bracket with the specific tool operating on the shock absorber attachment side as shown in the photograph

Specific tooling

020376Y Adaptor handle

020441Y 26 x 28 mm adaptor

020365Y 22 mm guide

- Remove the oil seal on the wheel hub side with the screwdriver as shown in the photograph

- Suitably hold the brake calliper - shock absorber attachment bracket
- Fit a new oil seal and move it until it stops using the specific tool

Specific tooling

020376Y Adaptor handle

020360Y 52x55-mm Adaptor

- Assemble a new roller bearing on the shock absorber side and move it until it stops using the specific tool

Specific tooling

020036Y Punch

- Suitably hold the brake calliper - shock absorber attachment bracket
- Assemble a new roller bearing on the wheel hub side and move it until it stops using the specific tool

Specific tooling

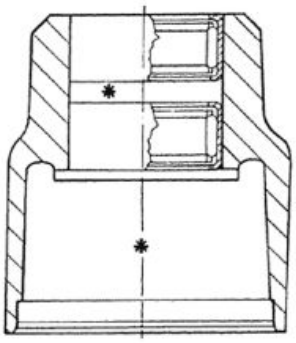
020037Y Punch

Refitting

- Refit the parts in reverse order of the removal operation.

CAUTION

BEFORE CARRYING OUT REFITTING OPERATIONS IN THE AREAS MARKED WITH AN ASTERISK, LUBRICATE THEM WITH THE RECOMMENDED PRODUCT



Specific tooling

020036Y Punch

020037Y Punch

Recommended products

AGIP GREASE PV2 Grease for control levers on the engine

White anhydrous-calcium based grease to protect roller bearings; temperature range between -20 ° C and +120 °C; NLGI 2; ISO-L-XBCIB2

Steering bearing

Removal

- Use the specific tool both to remove the lower seat of the upper bearing and to remove the upper seat of the lower bearing fitted on the chassis.

N.B.

TO REMOVE THE LOWER SEAT OF THE LOWER STEERING BEARING JUST USE A SCREW-DRIVER AS A LEVER BETWEEN THE SEATING AND THE SLEEVE.

Specific tooling

020004Y Punch for removing fifth wheels from headstock

- Remove the fifth wheel fitting and the dust guard on the steering tube as shown in figure, using the specific tool. Proceed giving a few taps with the mallet.

Specific tooling

020004Y Punch for removing fifth wheels from headstock

- Refit the fifth wheel fitting and the dust guard on the steering tube until they stop, using the specific tool.

Specific tooling

006029Y Punch for fitting fifth wheel seat on steering tube

Rear

Removing the rear wheel

- Remove the muffler.
- Remove the cotter pin and remove the cap.

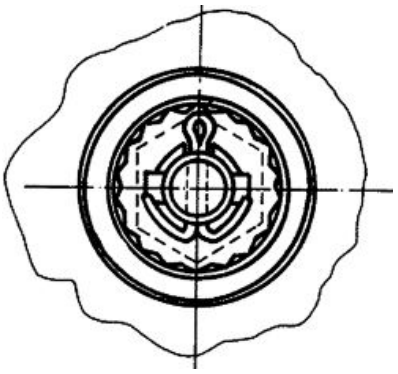
- Unscrew the nut fixing the wheel axle and collect the washer.

Refitting the rear wheel

- To refit, follow the removal steps but in reverse order; be careful to tighten to the prescribed torque.

Locking torques (N*m)

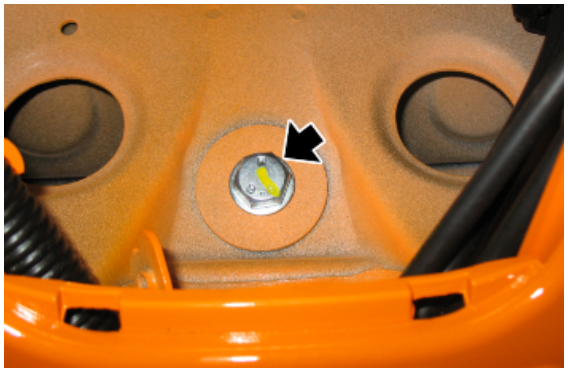
Locking torque **137 to 152 Nm**



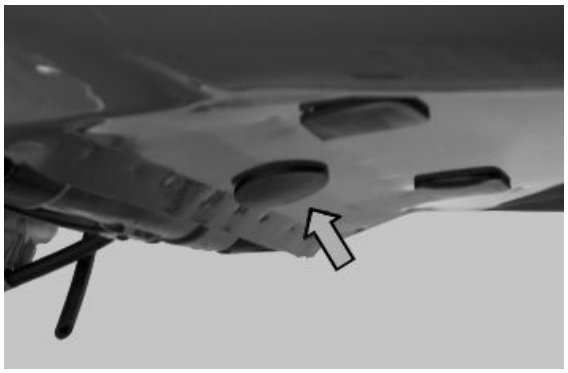
Swing-arm

Removal

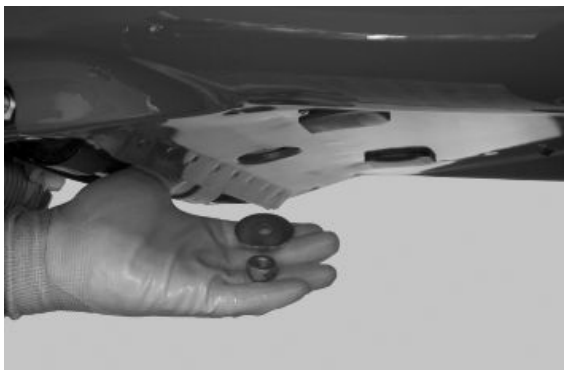
- Support the vehicle adequately.
- Remove the central tunnel inspection door.
- To remove the upper clamp from the chassis, proceed as follows:
- Unscrew the pin and collect the washer.



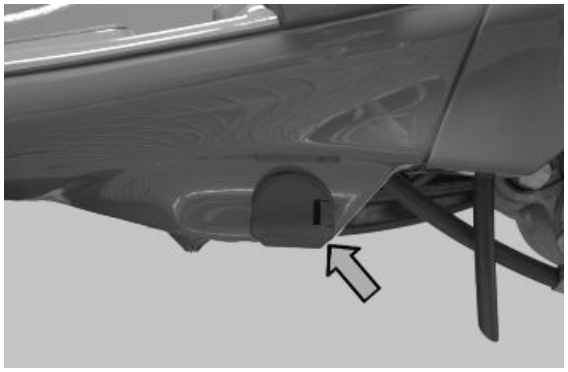
- Remove the cap from the lower part.



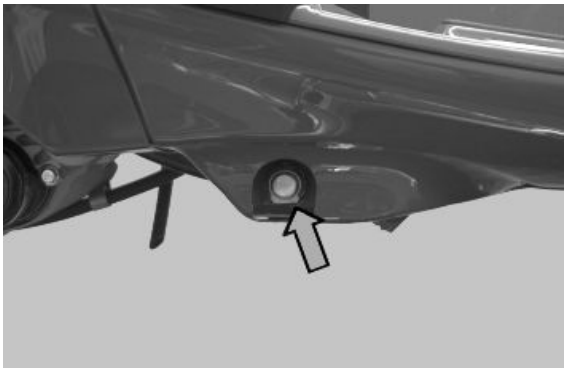
- Collect the lower fixing nut and collect the washer.



- Working on both sides, remove the cover caps.

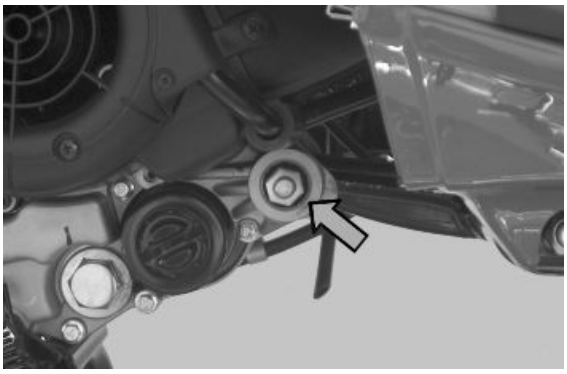


- Working on the right side, unscrew the side fixing nut to the chassis and collect the washer.

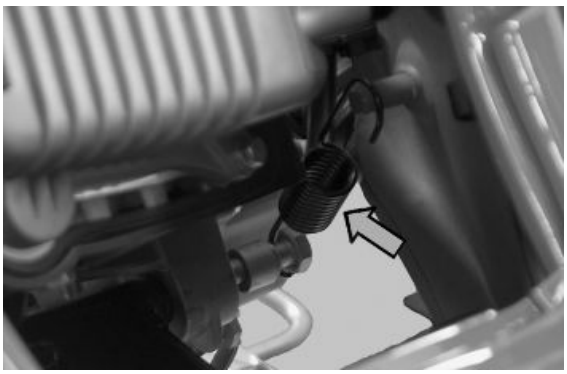


- Working on the left side, remove the pin.

- Remove the spoiler terminal from both sides.
- Working on the right side, unscrew the fixing nut.

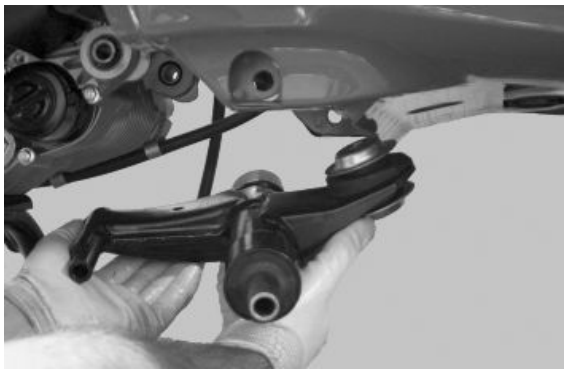


- Working on the left side, release the pin from the spring shown.



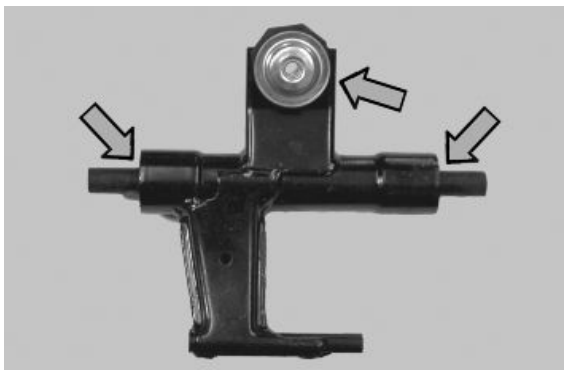
- Remove the fixing pin to the engine and collect the spacer.
- Now the swinging arm is free.

- Remove the swinging arm from the vehicle; first release it from the engine side and then from the chassis side.



Overhaul

- Check that the silent-blocks are in good conditions.
- Otherwise, replace the swinging arm.

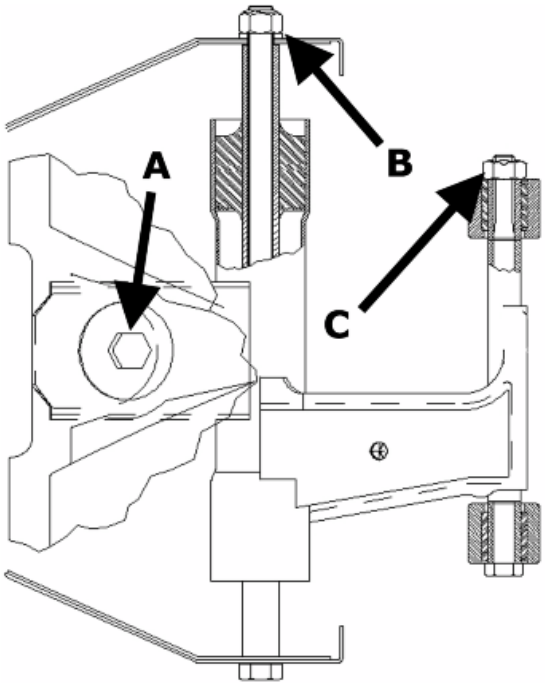


Refitting

- To fit, follow the removal steps but in reverse order; be careful to tighten to the prescribed torques.

Locking torques (N*m)

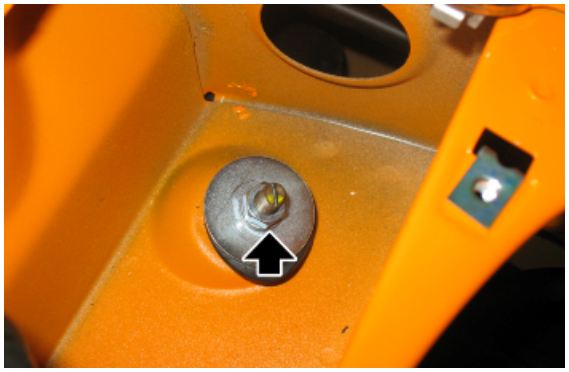
Part A 33 to 41 **Part B** 44 to 52 **Part C** 33 to 41



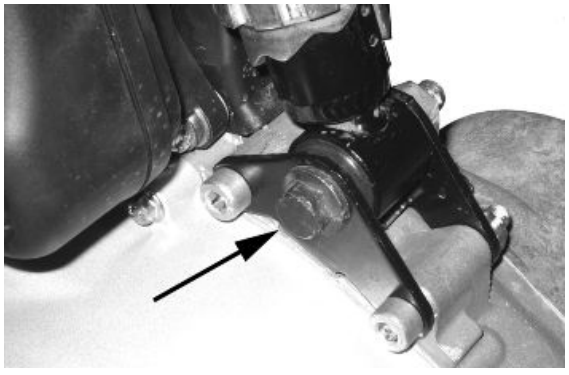
Shock absorbers

Removal

- Adequately support the rear part of the vehicle.
- Remove the battery.
- Undo the indicated upper fixing screw to the chassis.



- Unscrew the lower fixing pin to the transmission crankcase.



Refitting

- To fit, follow the removal steps but in reverse order; be careful to tighten to the prescribed torques.

Locking torques (N*m)

Shock absorber/engine pin torque 33 to 41 N·m Shock absorber/chassis nut torque 20 to 25 Nm

Centre-stand

REMOVAL

- Use a jack to support the vehicle properly.
- Remove the two return springs from the centre stand.
- Undo the nut shown in the figure.
- Remove the pin from the right side.
- Remove the centre stand.

FITTING

- On refitting tighten the nut to the specified torque.

Locking torques (N*m)

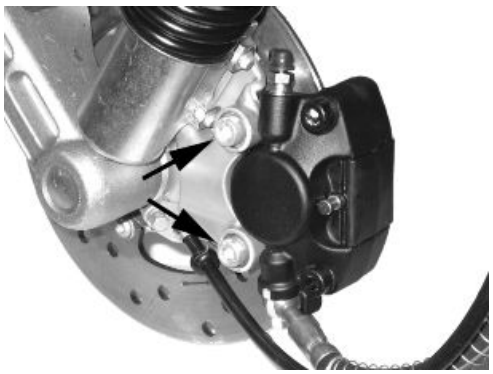
Centre stand screw 32 to 40

INDEX OF TOPICS

Front brake calliper

Removal

- Remove the front wheel.
- Remove the two screws fixing the brake calliper to the mounting bracket, then remove the brake calliper with the pipe from the disc.
- Remove the brake pad retention pin snap ring.
- Remove the brake pad retention pin using a plug.
- Complete the extraction of the protection cover, the springs and the pads.



N.B.

IF BRAKE CALLIPER REPLACEMENT IS NEEDED, BEFORE REMOVING THE CALLIPER CLAMPS TO THE MOUNTING BRACKET, LOOSEN THE OIL JOINT FITTING.

Refitting

- Insert the brake pads in the calliper.
- Insert the pad fixing pin and the retention screw being careful to position the terminals of it pointing towards the bleed screw as shown in the photo.
- Insert the clip on the pad fixing pin

N.B.

FAILURE TO RESPECT THE PAD POSITIONING REQUIREMENTS WITH RESPECT TO THE DIRECTION OF ROTATION COULD COMPROMISE PROPER BRAKE FUNCTIONING AND NOISELESSNESS.

- Keep the brake pads in contact with the pistons and insert the calliper in the brake disc.
- Fix the calliper to the mounting bracket with the two screws with spring washer to the prescribed torque

- If it is disconnected, fasten the brake pipe joint to the calliper and tighten to the prescribed torque
- Purge the circuit and refit the front wheel

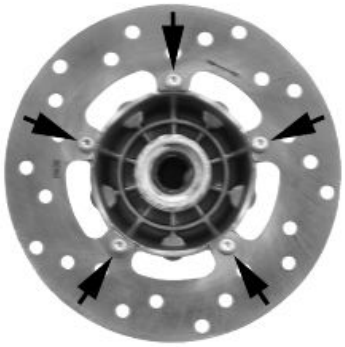
Locking torques (N*m)

Brake calliper mounting clamping 20 to 25 Nm Brake pipe connection 20 to 25 N•m

Front brake disc

Removal

- Remove the front wheel
- Remove the front brake calliper
- Remove the hub and the disc operating on the wheel axle nut
- Adequately support the hub with the disc and operating on the five screws shown in the photograph, remove the brake disc

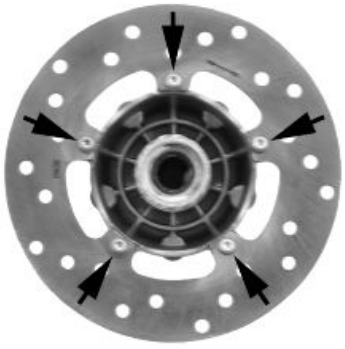


Refitting

- Carry out the operations in the reverse order from the removal being careful to respect the direction of disc rotation shown by the arrow printed on it
- Tighten the 5 screws to the specified torque

Locking torques (N*m)

Brake disc screws: 6 +0.5 -1 Nm



Disc Inspection

- Remove the front wheel
- Use a micrometer to check the disc thickness as shown in the photograph
- Repeat the measurement in at least 6 points on the disk
- Remove the front brake calliper
- In order to secure the appropriate tool adequately use a metal plate with M8 threaded hole and fix it to one of the two front brake calliper attachment points
- Place the dial gauge on the disk outer edge
- Make the wheel hub turn and check the disk deviation

Specific tooling

020335Y Magnetic mounting for dial gauge

Characteristic

Standard thickness:

4 +0.2-0.2 mm

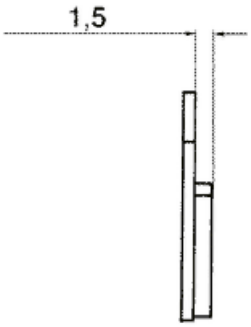
Max. deviation allowed:

0.1 mm

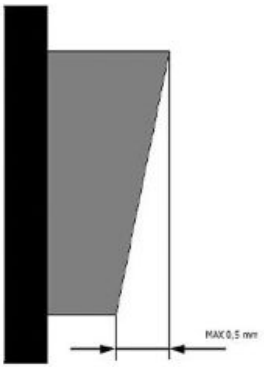
Front brake pads

Removal

- Remove the front wheel
- Remove the brake calliper
- Remove protection cover, the pin and the spring
- Remove the brake pads
- Check that there are no faults or warping. If there are, replace them.
- Check the thickness of the friction material is more than 1.5 mm. If it is not, replace it
- The replacement must be made with greater residual thickness if the brake pad has not worn



evenly. A 0.5 mm thickness difference in the residual friction material is permitted



Refitting

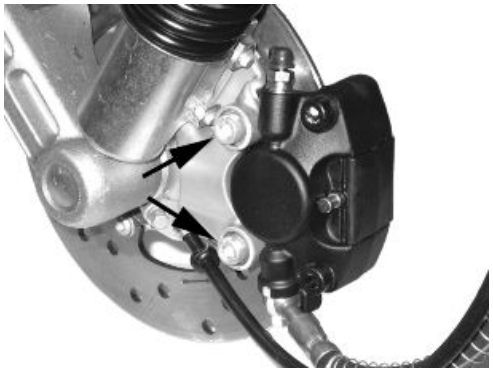
- Insert the brake pads
- Insert the fixing pin being careful to position the clip with the ends towards the bleed screw as in the photo.
- Insert the lock on the bolt and then the protection cover
- Fix the brake calliper to the bracket and tighten the two screws to the specified torque.

CAUTION

BEFORE USING THE BRAKE, OPERATE THE LEVER A FEW TIMES.

Locking torques (N*m)

Rear brake calliper tightening screw **20 to 25 Nm**



Fill

Front

- Remove the rubber cap from the bleed screw.
- Insert a rubber pipe in the bleed screw to permit the brake fluid to be recovered.
- With the right-hand brake lever, load the system and bring it up to the required pressure.
- Keeping the right-hand brake lever pulled, loosen the bleed screw to purge the air. Then tighten the bleed screw
- Release the brake lever
- Repeat the operation until only brake fluid comes out of the rubber pipe.
- Remove the fluid recovery pipe and refit the rubber cap over the bleed screw.
- Top up the brake fluid to the right level in the reservoir.

If necessary, bleeding can be done using a special vacuum pump

N.B.

DURING PURGING FREQUENTLY CHECK THE LEVEL TO PREVENT AIR GETTING INTO THE SYSTEM THROUGH THE PUMP.

N.B.

DURING THE BLEEDING OPERATIONS, MAKE SURE THE BRAKE FLUID DOES NOT COME INTO CONTACT WITH THE BODYWORK SO AS NOT TO DAMAGE IT. FURTHERMORE, DURING THE BLEEDING OPERATIONS REGARDING THE BRAKE CALLIPERS, MAKE SURE THE BRAKE FLUID DOES NOT COME INTO CONTACT WITH THE DISC BRAKES AND WITH THE BRAKE PADS. FAILURE TO OBSERVE THIS PRECAUTION WILL ENDANGER THE PROPER WORKING AND EFFICIENCY OF THE BRAKING SYSTEM

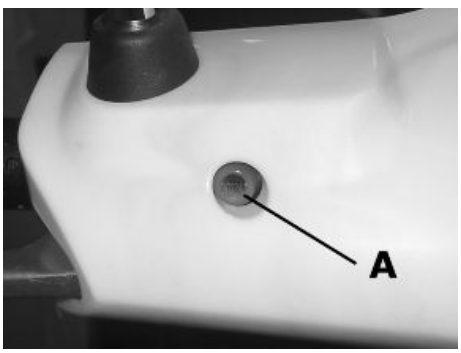
Specific tooling

020329Y Mity-Vac vacuum-operated pump

Locking torques (N*m)

System bleed calliper fitting: 20 to 25 Nm

Brake fluid level check



- Rest the vehicle on its centre stand on flat ground.
- The brake fluid reservoir has a sight glass «**A**» made of transparent material; the quantity of liquid contained in the sight glass indicates the level of fluid in the reservoir.
- When the sight glass «**A**» is full, the level inside the reservoir is above the MIN level; when it is partially full, the level has dropped to the MIN level;

when it is fully empty, the level of fluid in the reservoir is below the MIN level.

N.B.

THE LEVEL TENDS TO DROP AS THE BRAKE PADS GET WORN, A MINIMUM LEVEL SHOULD NOT BE REACHED. IF THE LEVEL IS TOO LOW, CHECK AND FIX THE SYSTEM SEALS, IF REQUIRED. TOP UP THE PUMP RESERVOIR, IF REQUIRED, CONSIDERING THAT THE "MAX." LEVEL MUST ONLY BE OBTAINED WITH NEW PADS.

- Under standard climatic conditions, replace fluid as indicated in the scheduled maintenance table.

Front brake pump

Removal

- Remove the front and rear handlebar covers
- Remove the two screws fixing the brake pump to the handlebar indicated in the photograph
- Remove the oil pipe joint from the pump
- Remove the connector from the stop lights switch

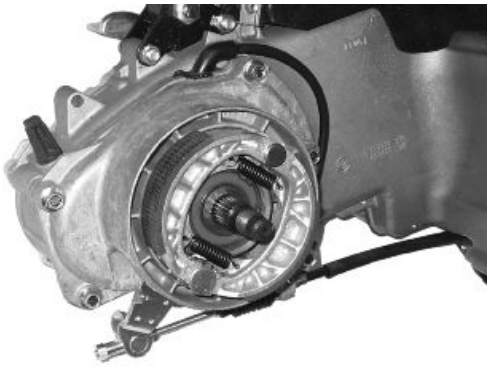
Refitting

To refit, carry out the removal operations but in reverse order, observing the specified torques.

Locking torques (N*m)

Oil pipe joint to the pump: 20 - 25 Brake pump fixing screws to the handle bar: 7 to 10 Nm

Rear drum brake



Once the muffler and the wheel have been removed, follow these steps:

1.Remove the shoe springs using the specific spanner.

2. Remove the shoe with the aid of a lever.

3. Refit the new shoes giving a few taps with the mallet.

4. Attach the springs using the specific pliers.

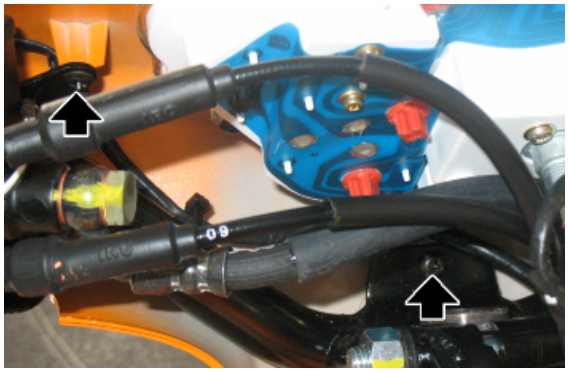
Specific tooling

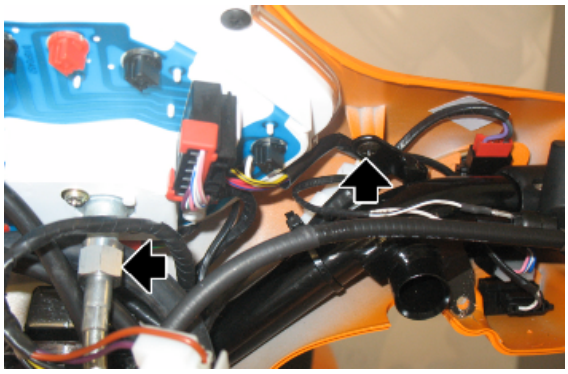
020325Y Pliers for brake-shoe springs

INDEX OF TOPICS

Rear handlebar cover

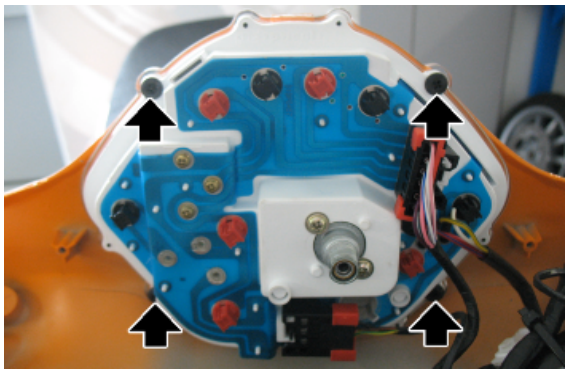
- Remove the front handlebar cover.
- Undo the three screws indicated in figure fixing it to the handlebar, the odometer transmission and the electrical connectors.





Instrument panel

- Remove the rear handlebar cover.
- Undo the four screws indicated fixing the rear handlebar cover.



Front handlebar cover

Proceed as follows:

-Remove the rear-view mirrors.

- Undo the two screws indicated.

- Undo the screw under the headlamp.

- Laterally release the handlebar cover end.

- Disconnect the electrical terminals and remove the front handlebar cover.

Headlight assy.

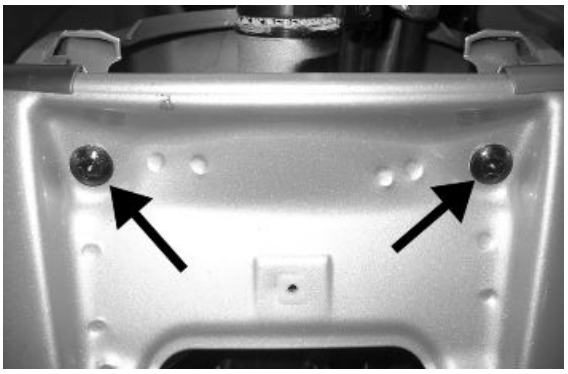
- Remove the front handlebar cover.

- Undo the four screws indicated fixing the front handlebar cover.

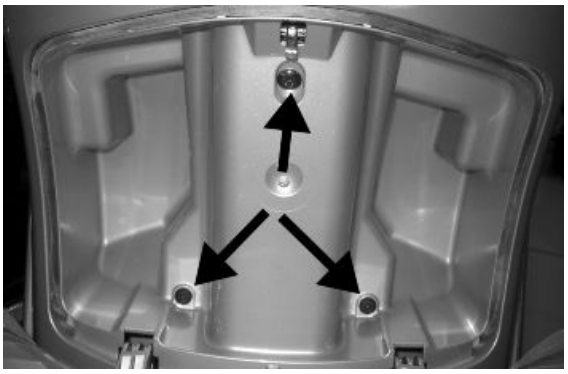
After removing the front handlebar cover, operate the 4 screws shown in the figure and remove the headlight.

Knee-guard

- Unscrew the two screws shown in the figure placed under the front central cover.

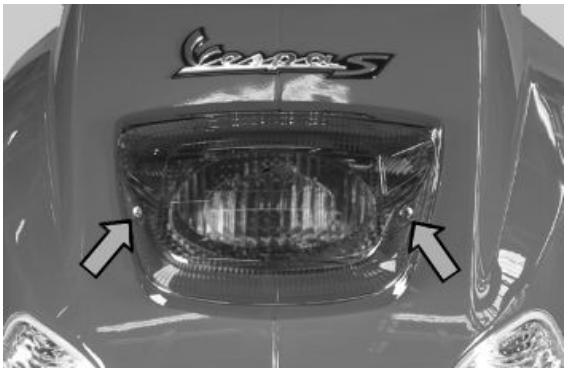


- Remove the 3 screws shown in the figure, placed inside the glove-box; they can be reached opening the glove-box door.
- Remove the shield back plate by pulling it upwards.

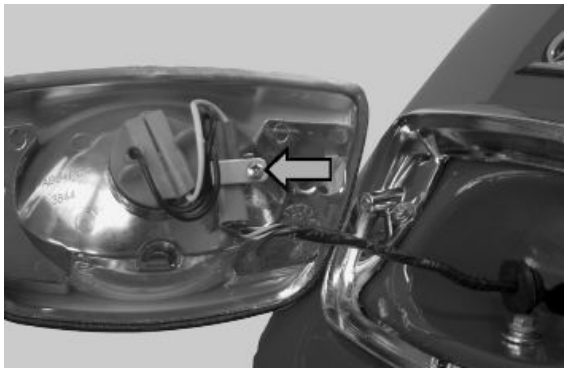


Taillight assy.

- Undo the two fixing screws and remove the rear light unit.



- Undo the screw indicated and disconnect the connector.

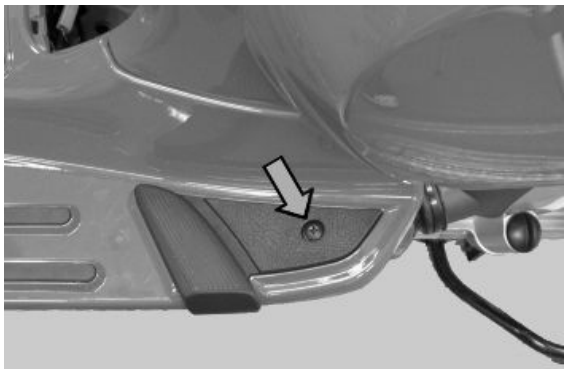


Footrest

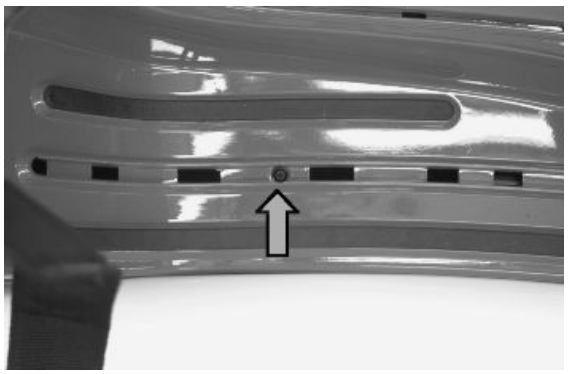
- Remove the shield back plate.
- Remove the side fairings.
- Remove the central tunnel inspection door.

From both sides, unscrew:

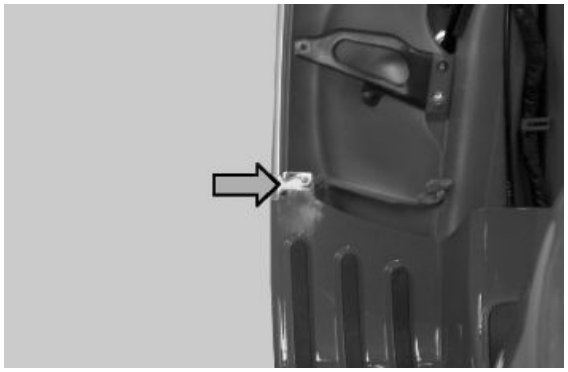
- The fixing screw at the back.



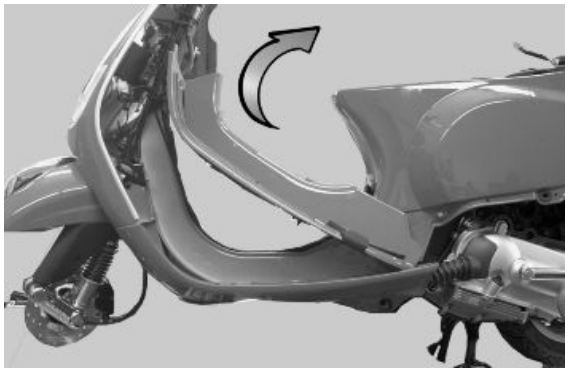
- The fixing screw on the central part.



- The fixing screw at the front.

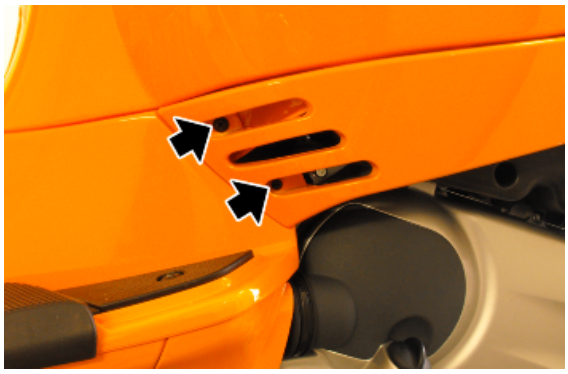


- Remove the footrest.

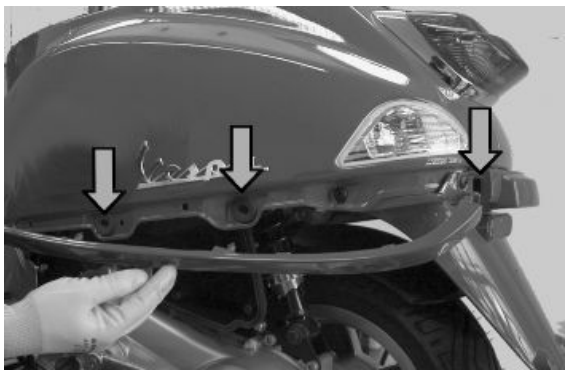


Side fairings

- Undo the upper screw and the smallest lower screw.

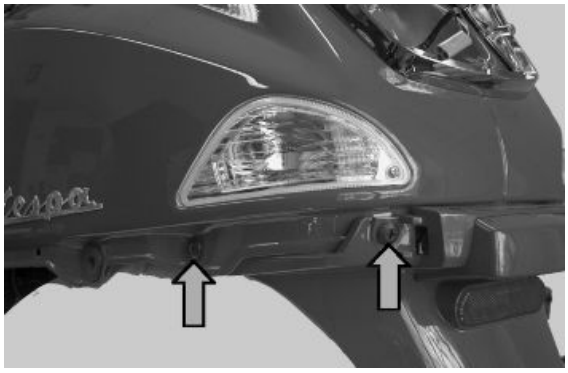


- Detach the seats on the fairing.

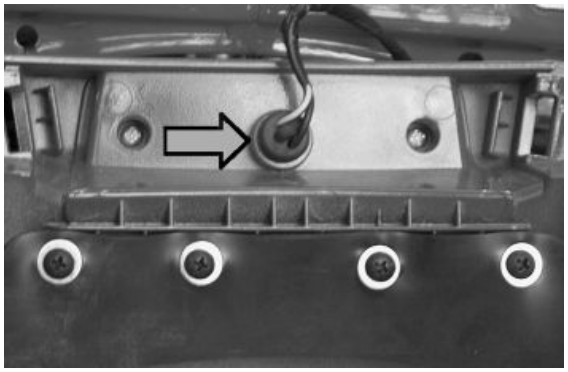


License plate holder

- Remove the side fairings.
- Working on both sides, undo the two screws indicated.

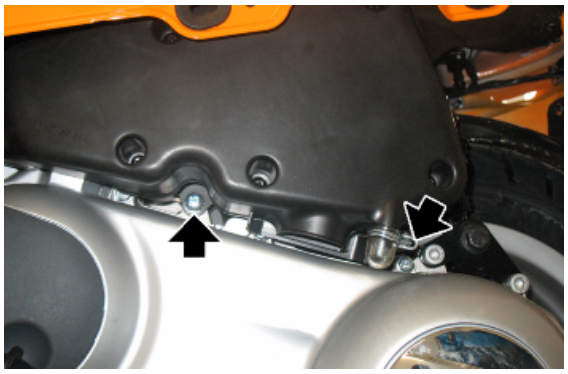


- Remove the license plate light.

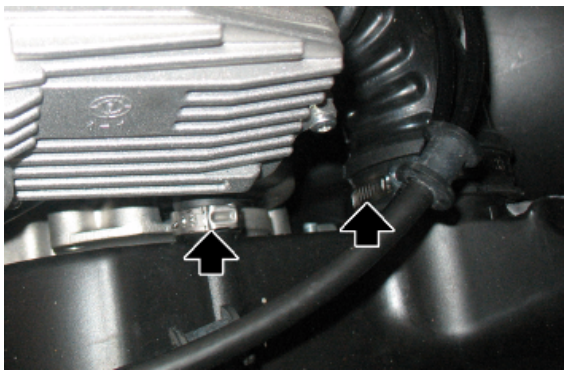


Air filter

- Remove the helmet compartment.
- Remove the side fairings.
- Undo the two indicated clamps to the crankcase.

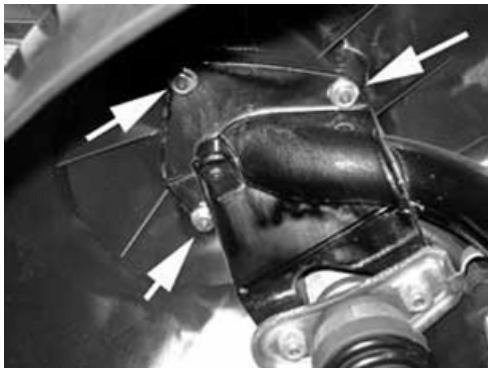


- Undo the two clamps indicated.



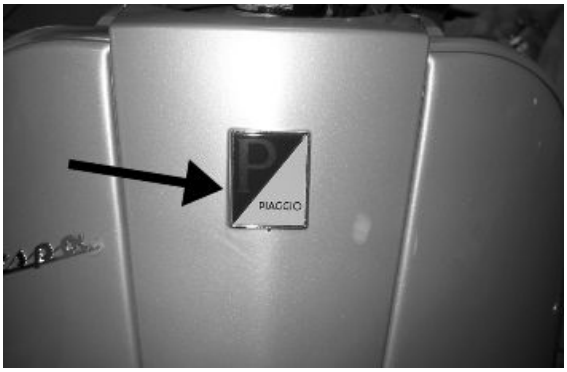
Front mudguard

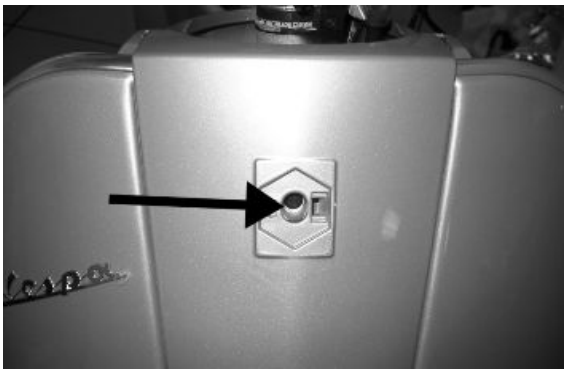
- First remove the steering tube and uncouple the front brake pipes from the calliper in order to remove the front mudguard
- Remove the three mudguard-steering tube clamps indicated in the figure



Front central cover

- Remove the "PIAGGIO" clip-on badge
- Unscrew the screw indicated in the figure
- Remove the grille





INDEX OF TOPICS

Aesthetic inspection

Appearance check:

- Paintwork
- Fitting of plastics
- Scratches
- Dirt

Tightening torques inspection

Lock check

- Safety locks
- Fixing screws

Safety locks

- Rear shock absorber upper retainer
- Rear shock absorber lower clamping
- Front wheel axle nut
- Front wheel screws
- Wheel hub nut
- Front brake calliper fixing screws
- Swinging arm - chassis pin
- Engine-swinging arm pin
- Engine arm pin - Chassis arm
- Handlebar lock nut
- Lower steering ring nut
- Upper steering ring nut

Electrical system

Electrical system:

- Main switch
- Headlamps: high-beam lights, low-beam lights, tail and parking lights and their warning lights
- Adjusting the headlights according to the regulations currently in force
- Rear light, parking light, stop light
- Front and rear stop light switches
- Turn indicators and their warning lights
- Instrument panel lights
- Instrument panel: fuel gauge
- Instrument panel warning lights

- Horn

CAUTION

TO ENSURE MAXIMUM PERFORMANCE, THE BATTERY MUST BE CHARGED BEFORE USE. INADEQUATE CHARGING OF THE BATTERY WITH A LOW LEVEL OF ELECTROLYTE BEFORE IT IS FIRST USED SHORTENS THE LIFE OF THE BATTERY.

WARNING

KEEP SPARKS AND NAKED FLAMES AWAY FROM THE BATTERY WHILE RECHARGING. REMOVE THE BATTERY FROM THE VEHICLE, DISCONNECTING THE NEGATIVE TERMINAL FIRST.

CAUTION

WHEN INSTALLING THE BATTERY, ATTACH THE POSITIVE LEAD FIRST AND THEN THE NEGATIVE ONE.

WARNING

BATTERY ELECTROLYTE IS TOXIC AND IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH YOUR EYES, SKIN AND CLOTHING.
IN CASE OF CONTACT WITH YOUR EYES OR SKIN, RINSE WITH ABUNDANT WATER FOR ABOUT 15 MINUTES AND SEEK IMMEDIATE MEDICAL ATTENTION.
IF IT ACCIDENTALLY SWALLOWED, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.
BATTERIES PRODUCE EXPLOSIVE GASES; KEEP THEM AWAY FROM NAKED FLAMES, SPARKS AND CIGARETTES. IF THE BATTERY IS CHARGED IN A CLOSED PLACE, TAKE CARE TO ENSURE ADEQUATE VENTILATION. ALWAYS PROTECT YOUR EYES WHEN WORKING CLOSE TO BATTERIES.
KEEP OUT OF THE REACH OF CHILDREN

CAUTION

NEVER USE FUSES WITH A CAPACITY HIGHER THAN THAT RECOMMENDED. USING A FUSE OF UNSUITABLE RATING MAY SERIOUSLY DAMAGE THE VEHICLE OR EVEN CAUSE A FIRE.

Levels check

Level check:

- Hydraulic braking system fluid level.
- Rear hub oil level
- Engine oil level

Road test

Test ride

- Cold start
- Instrument operations
- Response to the throttle control
- Stability on acceleration and braking
- Rear and front brake efficiency
- Rear and front suspension efficiency
- Abnormal noise

Static test

Static control after the test ride:

- Restarting when warmed up
- Minimum hold (turning the handlebar)
- Uniform turning of the steering
- Possible leaks

CAUTION

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

CAUTION

NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES OR TYRES MAY BURST.

Functional inspection

Functional Checks:

Braking system (hydraulic)

- Lever travel

Braking system (mechanical)

- Lever travel

Clutch

- Proper functioning check

Engine

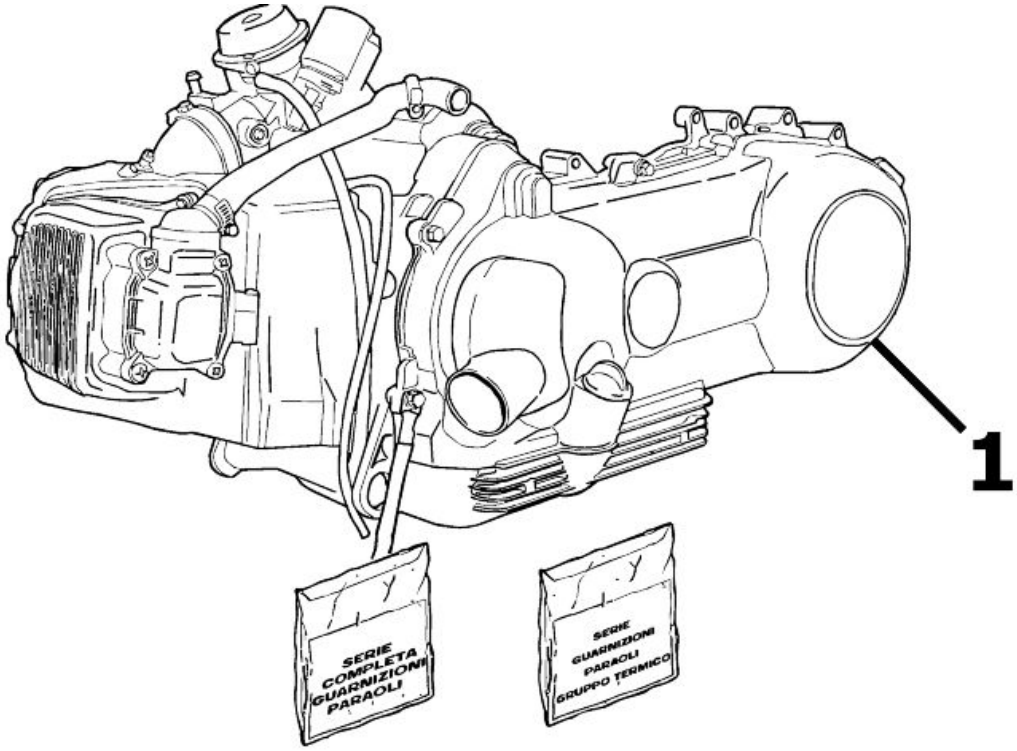
- Proper general functioning and no abnormal noise check

Others

- Check documentation
- Check the chassis and engine numbers
- Tool kit
- License plate fitting
- Check locks
- Check tyre pressures
- Installation of mirrors and any accessories

INDEX OF TOPICS

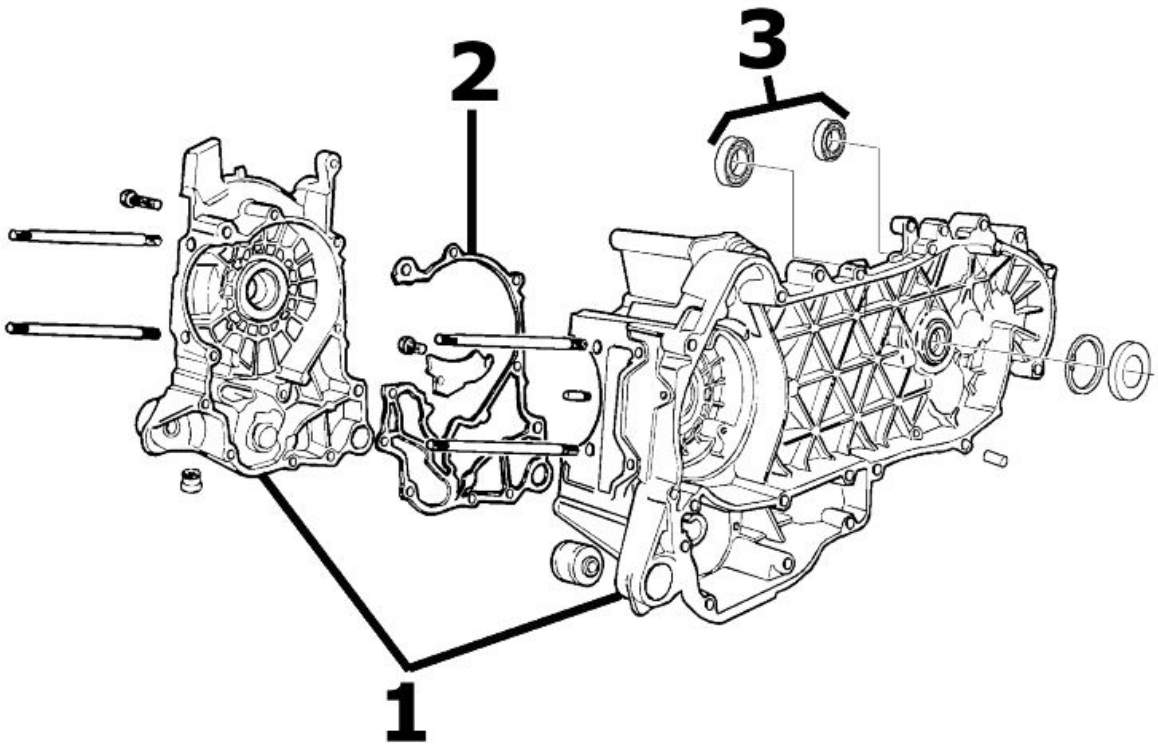
Engine



ENGINE

	Code	Action	Duration
1	001001	Engine from chassis - Removal and refit.	

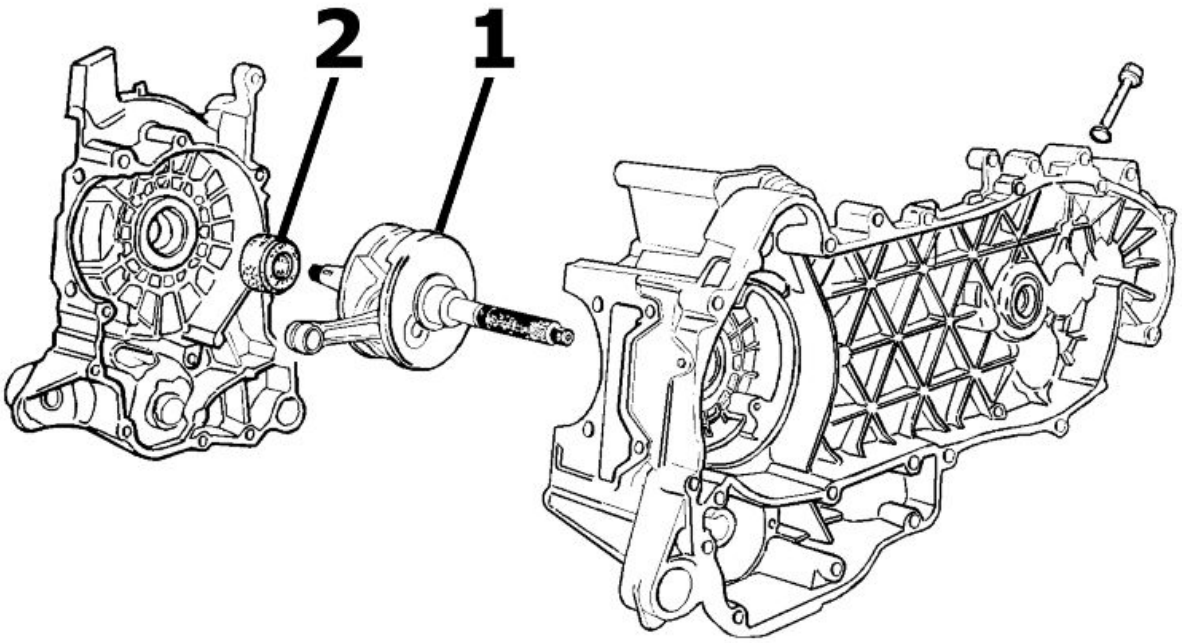
Crankcase



CRANKCASE

	Code	Action	Duration
1	001133	Engine crankcase - Replacement	
2	001153	Crankcase halves gasket - Replacement	
3	002031	Rear wheel hub bearings - Replacement	

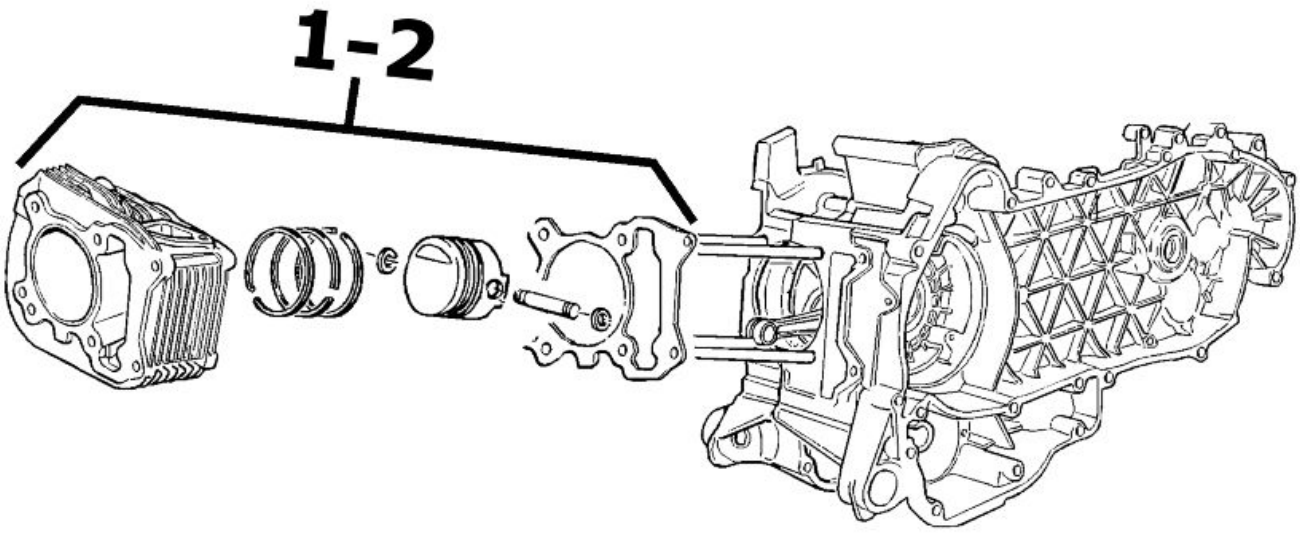
Crankshaft



CRANKSHAFT

	Code	Action	Duration
1	001117	Crankshaft - Replacement	
2	001099	Flywheel-side oil seal - Replacement	

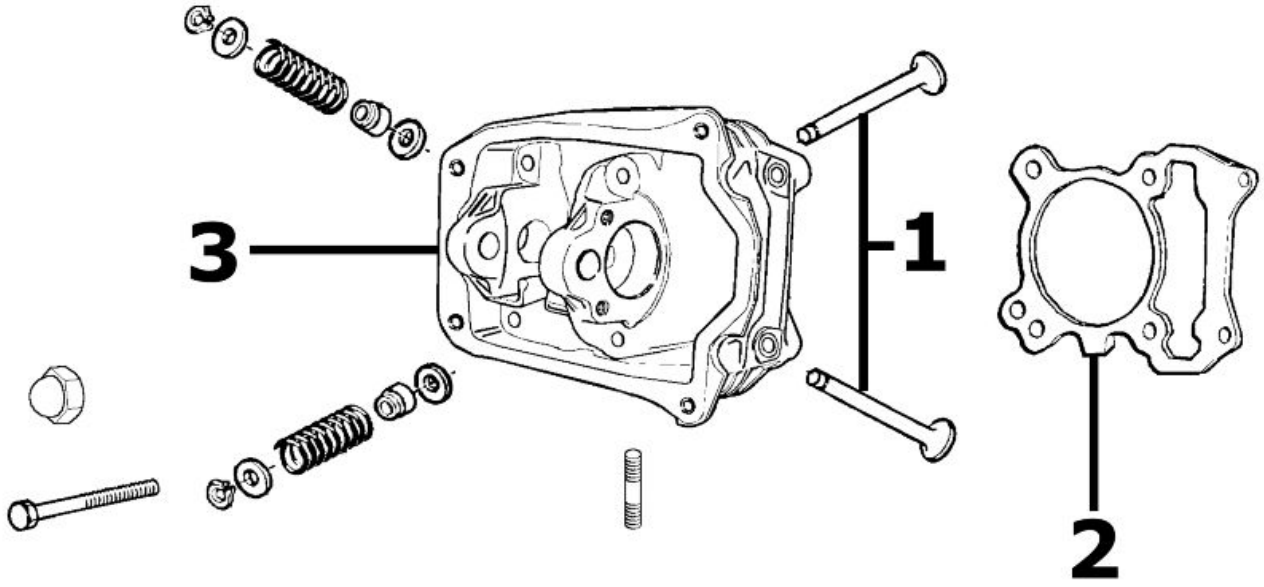
Cylinder assy.



CYLINDER ASSEMBLY

	Code	Action	Duration
1	001002	Cylinder-Piston - Replacement	
2	001107	Cylinder / piston - Inspection / cleaning	

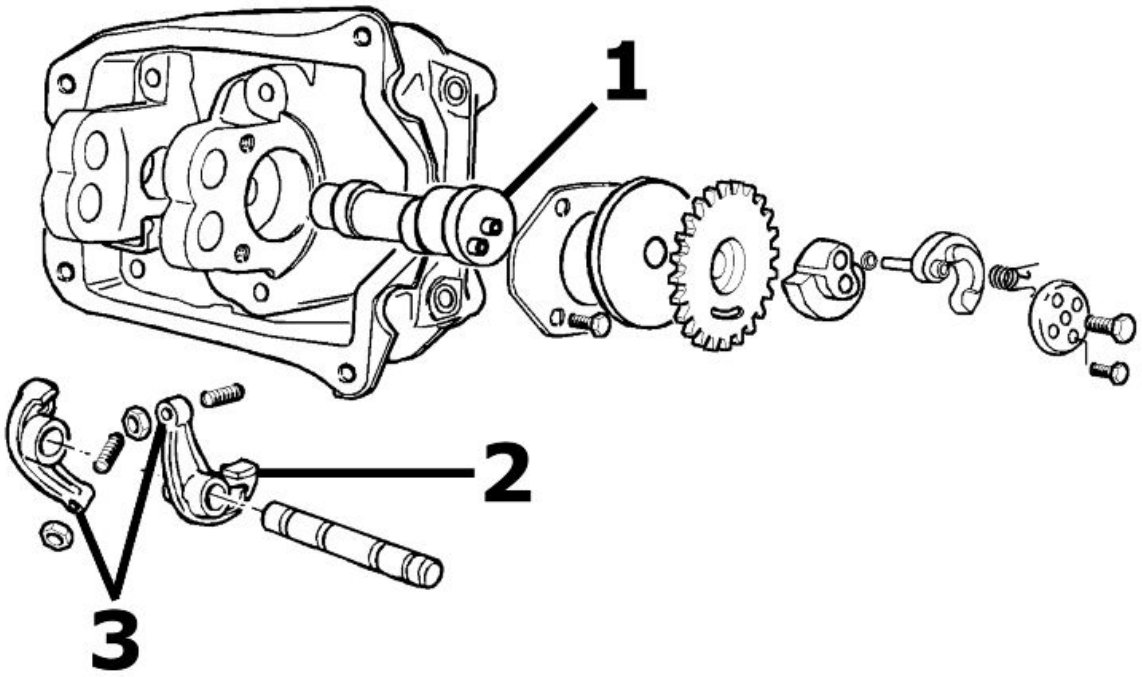
Cylinder head assy.



HEAD ASSEMBLY

	Code	Action	Duration
1	001045	Valves - Replacement	
2	001056	Head gasket - change	
3	001126	Head - Replacement	

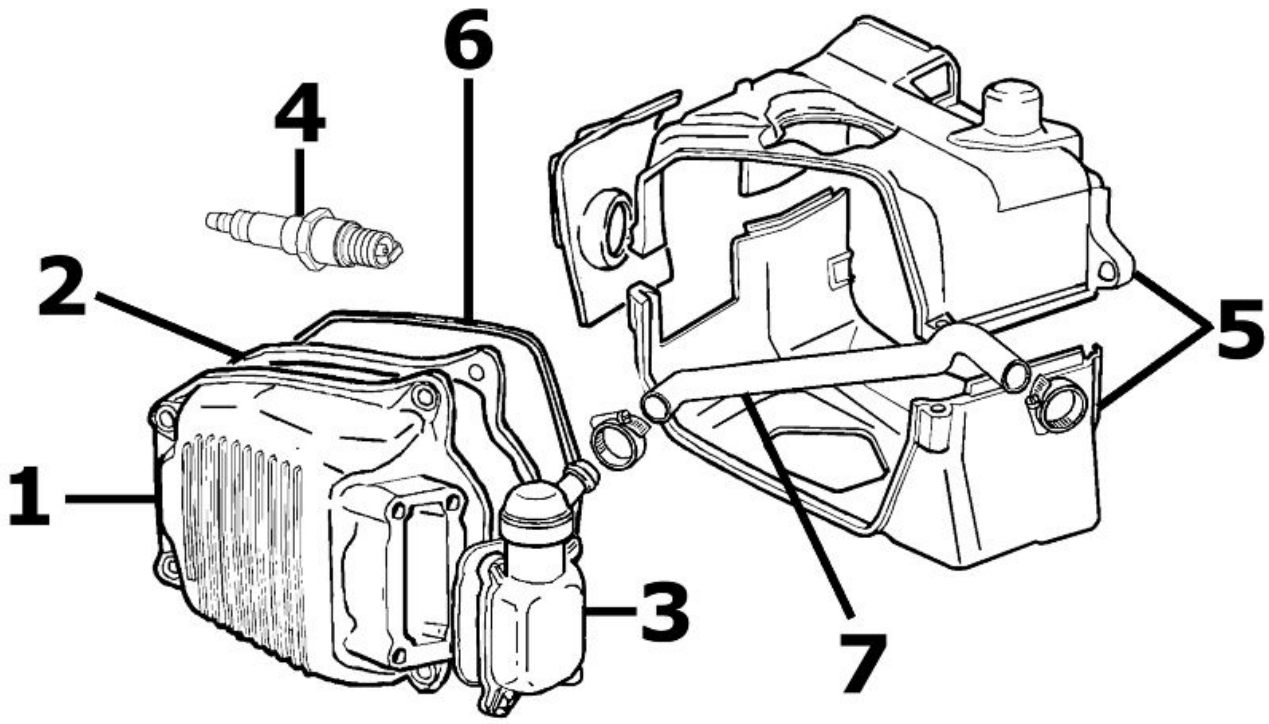
Rocker arms support assy.



ROCKERS MOUNTING UNIT

	Code	Action	Duration
1	001044	Camshaft - Replacement	
2	001148	Rockers valves - Replacement	
3	001049	Valves - adjust	

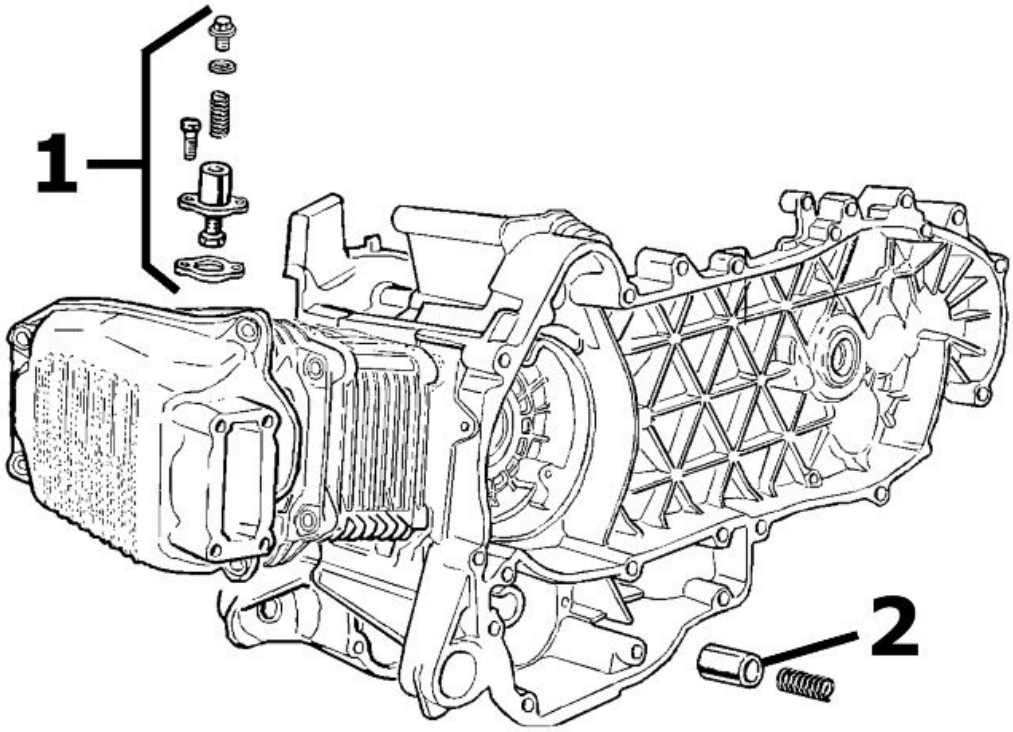
Cylinder head cover



HEAD COVER

	Code	Action	Duration
1	001089	Head cover - Replacement	
2	001088	Head cover gasket - Replacement	
3	001159	Oil vapour recovery tank - Service	
4	001093	Spark plug - Replacement	
5	001097	Cooling hood - Replacement	
6	001091	Head cover sealing ring	
7	001074	Oil vapour recovery pipe - Replacement	

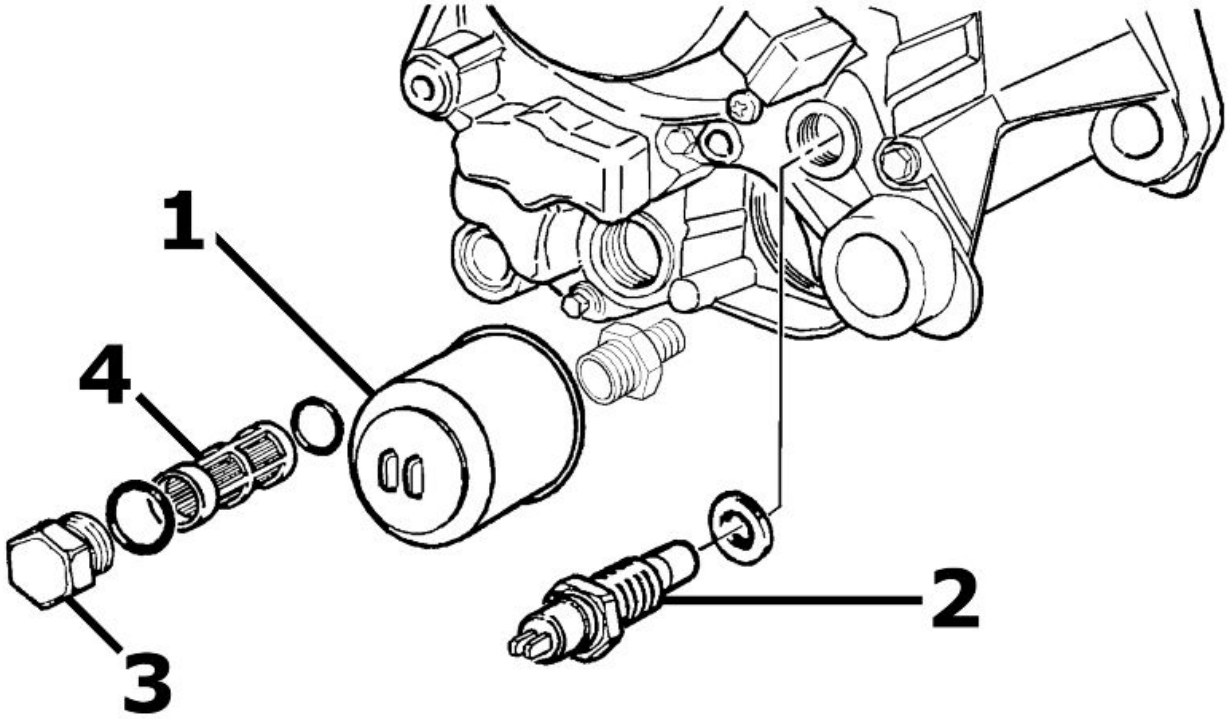
Chain tensioner



CHAIN TIGHTENER

	Code	Action	Duration
1	001129	Chain tensioner - Service and Replacement	
2	001124	By pass lubrication - Replacement	

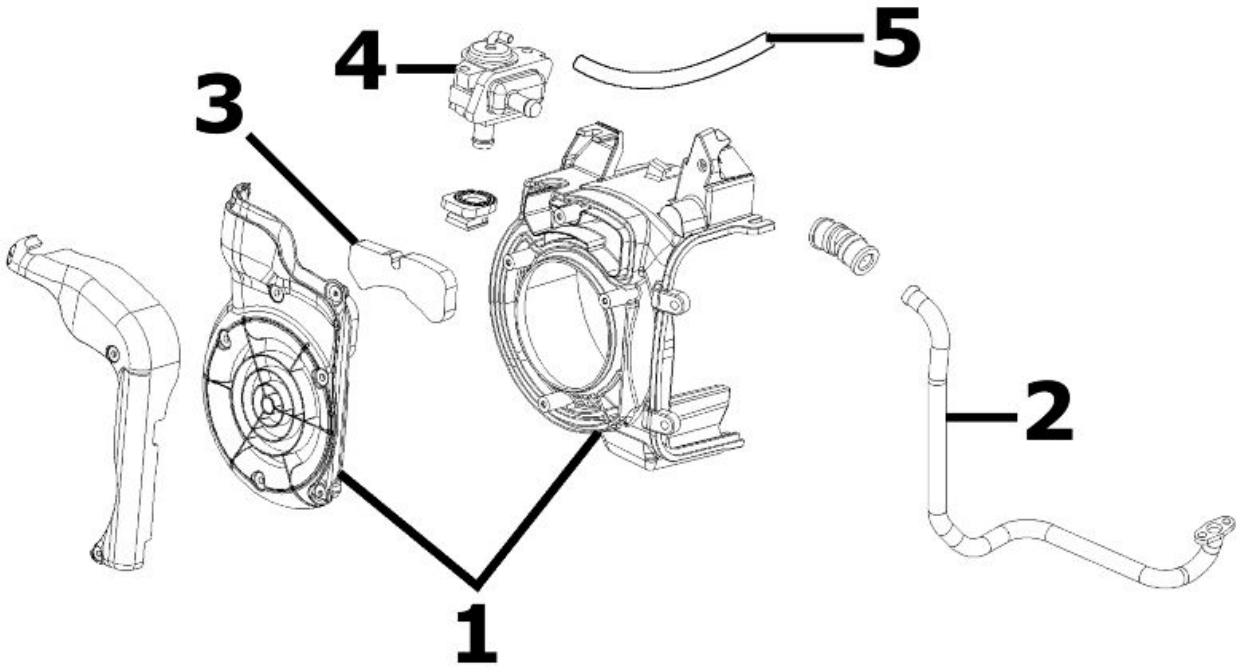
Oil filter



OIL FILTER

	Code	Action	Duration
1	001123	Oil filter -Replacement	
2	001160	Oil pressure sensor - change	
3	003064	Engine oil - change	
4	001102	Net oil filter - change / Cleaning	

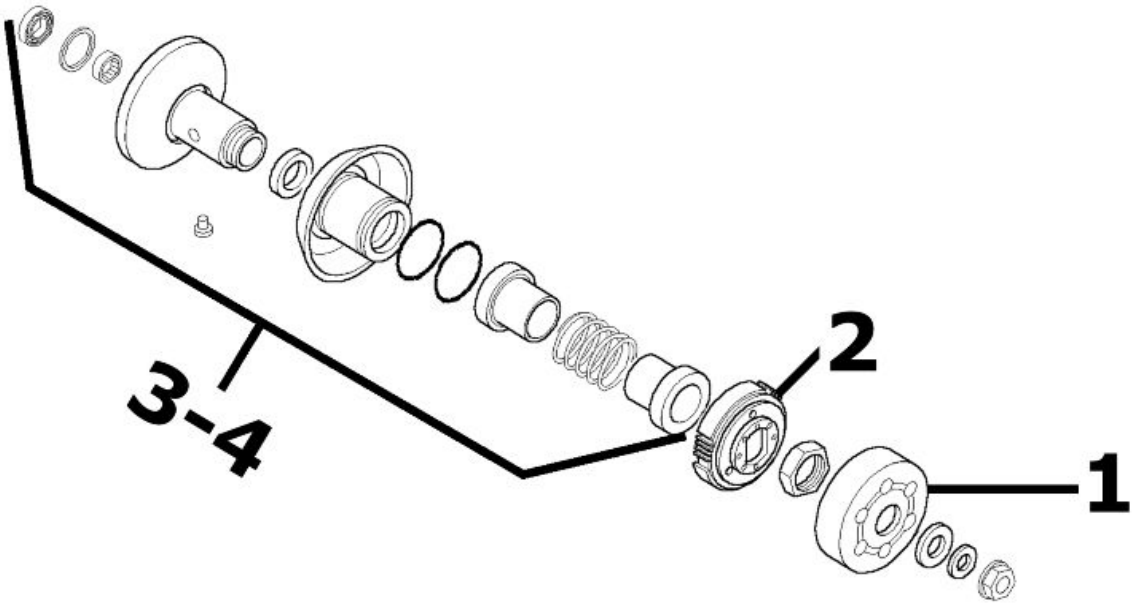
Flywheel cover



FLYWHEEL COVER

	Code	Action	Duration
1	001087	Flywheel cover - Replacement	
2	001163	Muffler secondary air connection - Replacement	
3	001161	Secondary air filter - Replacement / Cleaning	
4	001174	SAS valve - Replacement	
5	001164	Crankcase secondary air connection - Replacement	

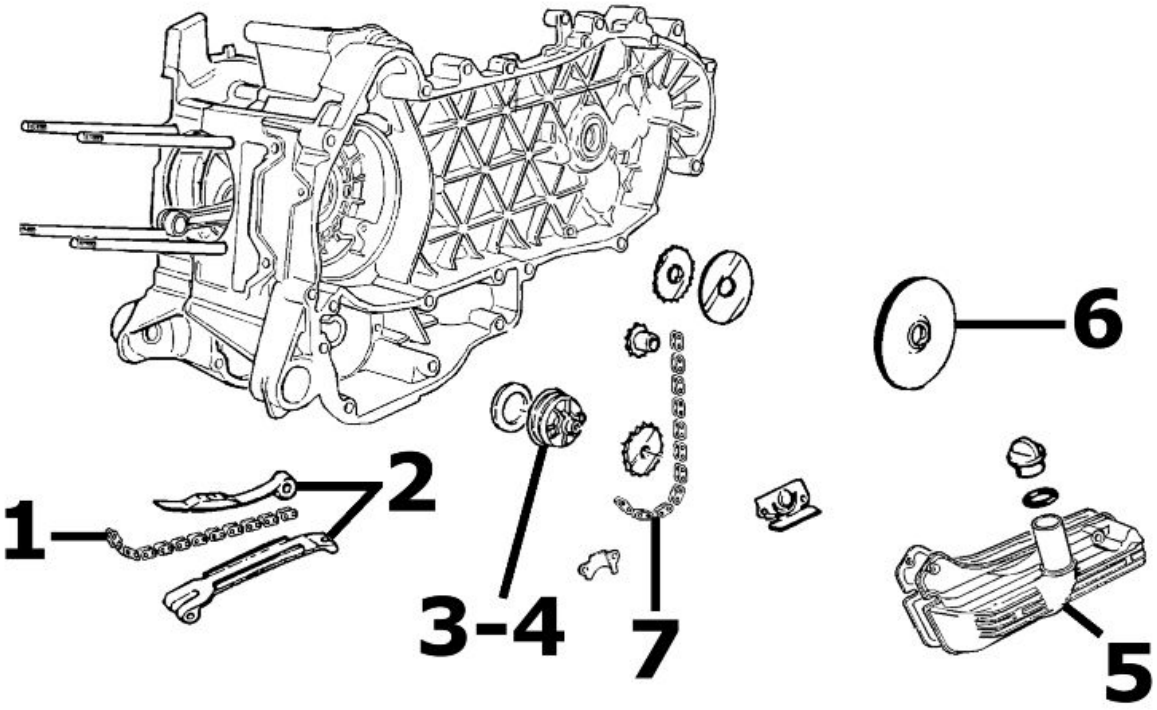
Driven pulley



DRIVEN PULLEY

	Code	Action	Duration
1	001155	Clutch bell - Replacement	
2	001022	Clutch - Replacement	
3	001012	Driven pulley - overhaul	
4	001110	Driven pulley- Replacement	

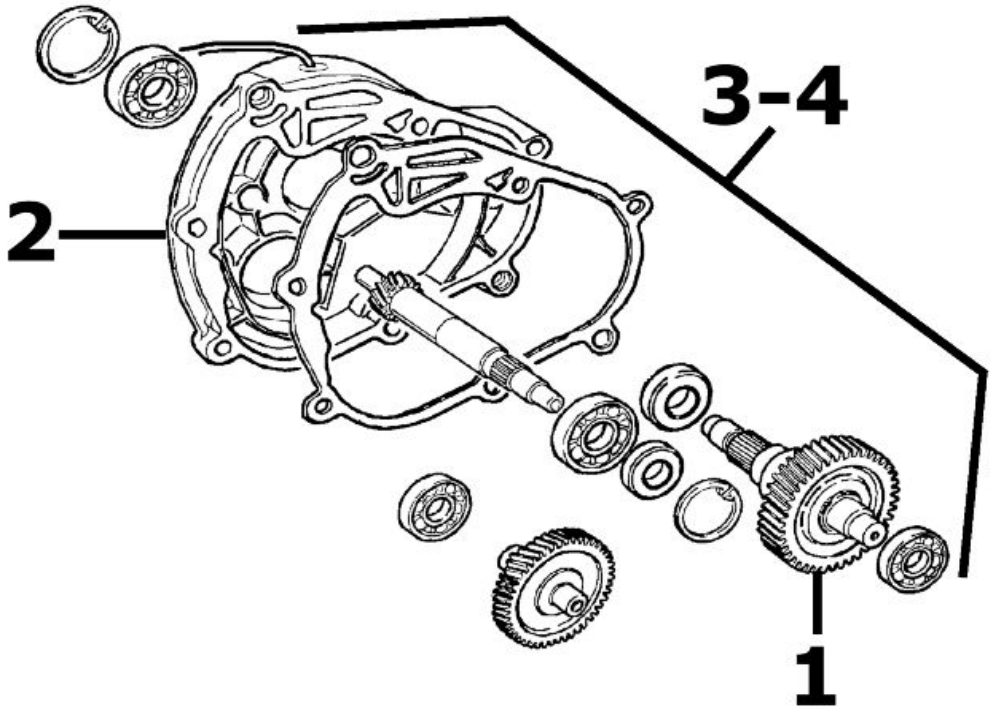
Oil pump



OIL PUMP

	Code	Action	Duration
1	001051	Belt/Timing chain - Change	
2	001125	Chain guide pads - Replacement	
3	001042	Oil pump - overhaul	
4	001112	Oil pump - change	
5	001130	Oil sump - change	
6	001100	Clutch-side oil seal - Replacement	
7	001122	Oil pump chain - Replacement	

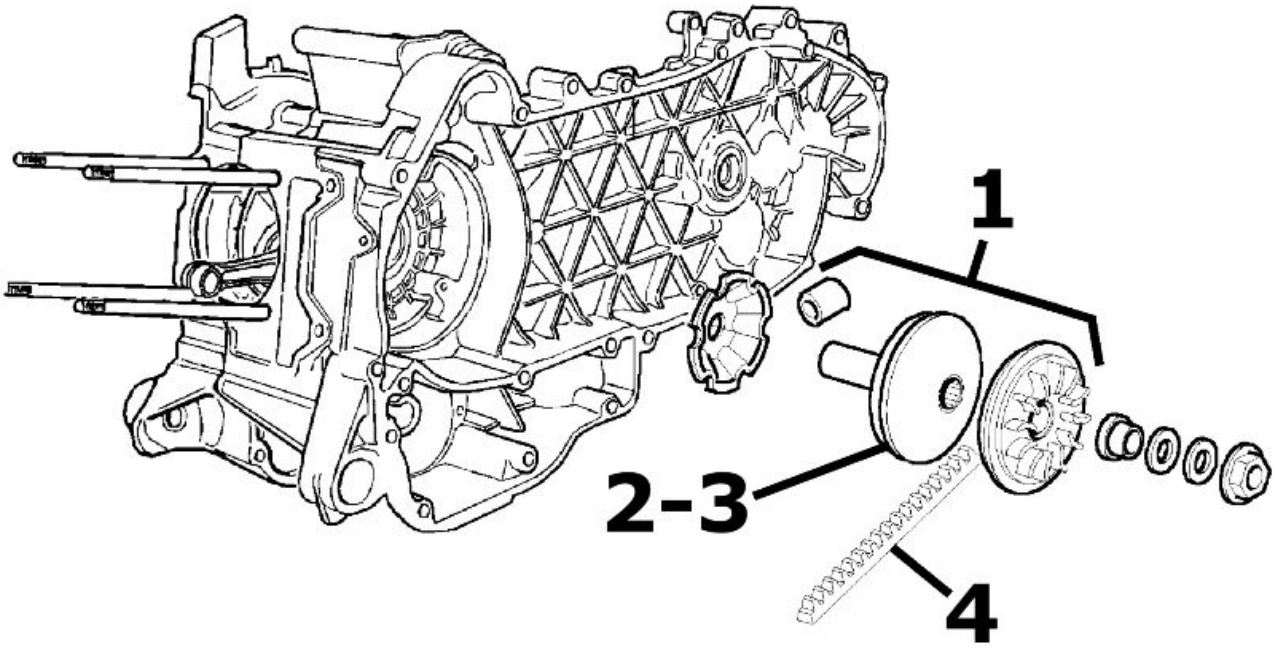
Final gear assy.



FINAL REDUCTION GEAR

	Code	Action	Duration
1	004125	Rear wheel axle - Replacement	
2	001156	Gear reduction unit cover - Replacement	
3	003065	Gear box oil - Replacement	
4	001010	Geared reduction unit - Service	

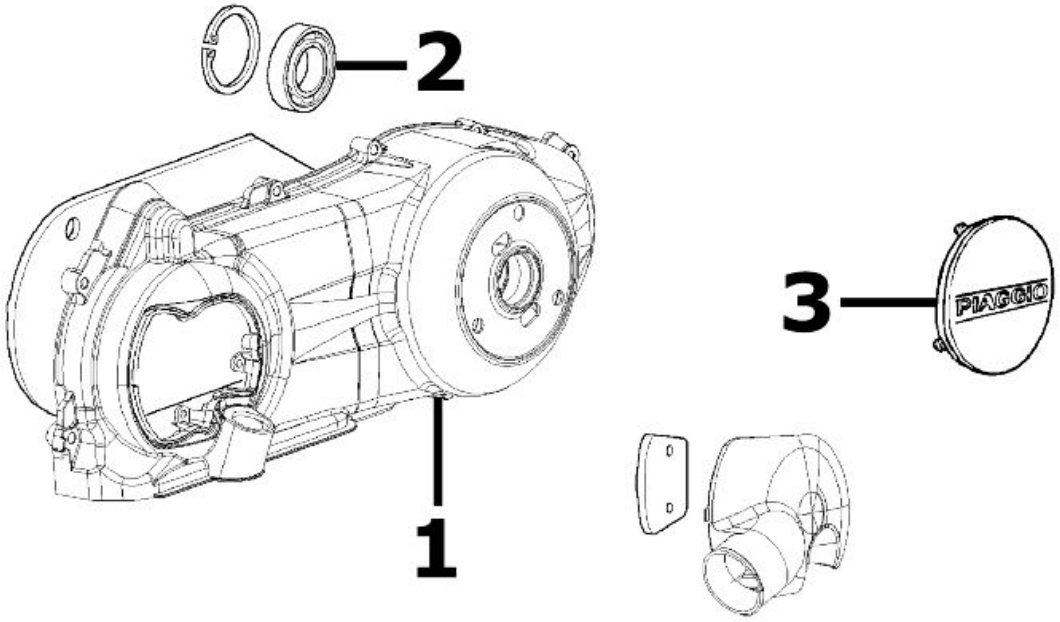
Driving pulley



DRIVING PULLEY

	Code	Action	Duration
1	001066	Driving pulley - Removal and refitting	
2	001086	Driving half-pulley - Replacement	
3	001177	Variator rollers / shoes - Replacement	
4	001011	Driving belt - Replacement	

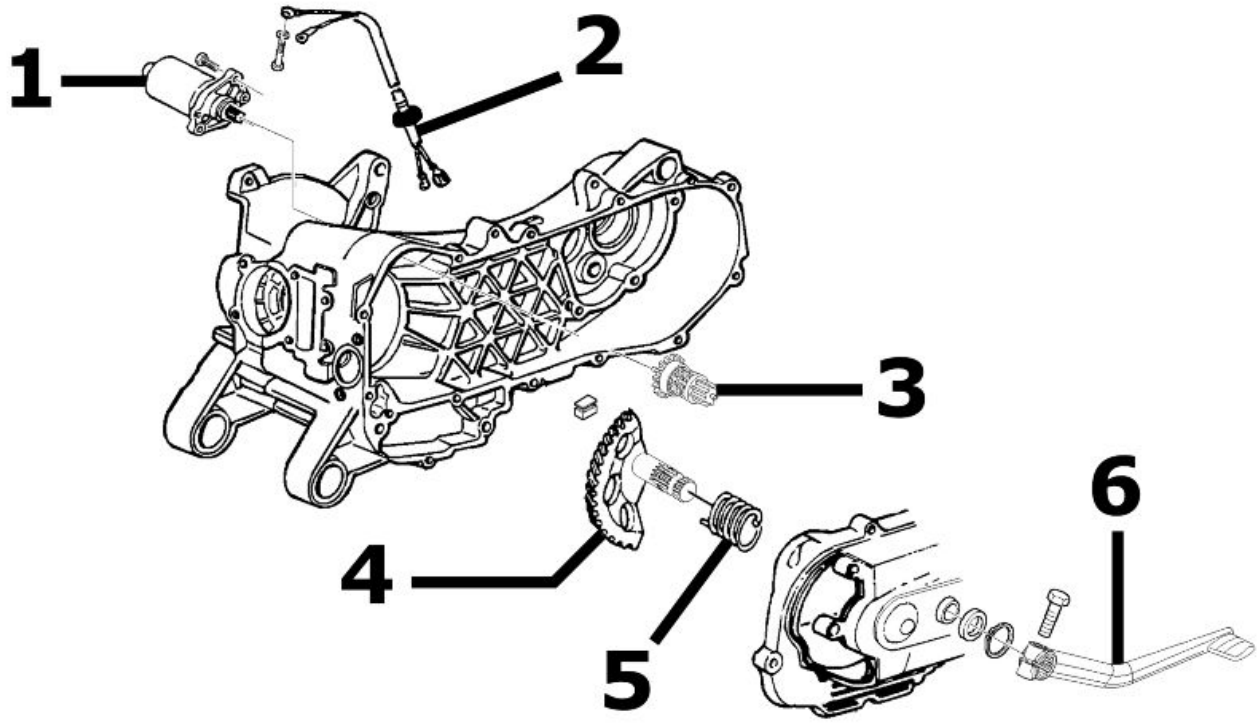
Transmission cover



TRANSMISSION COVER

	Code	Action	Duration
1	001096	Transmission crankcase cover - Replacement	
2	001135	Transmission cover bearing - Replacement	
3	001065	Transmission cover - Removal and Refit	

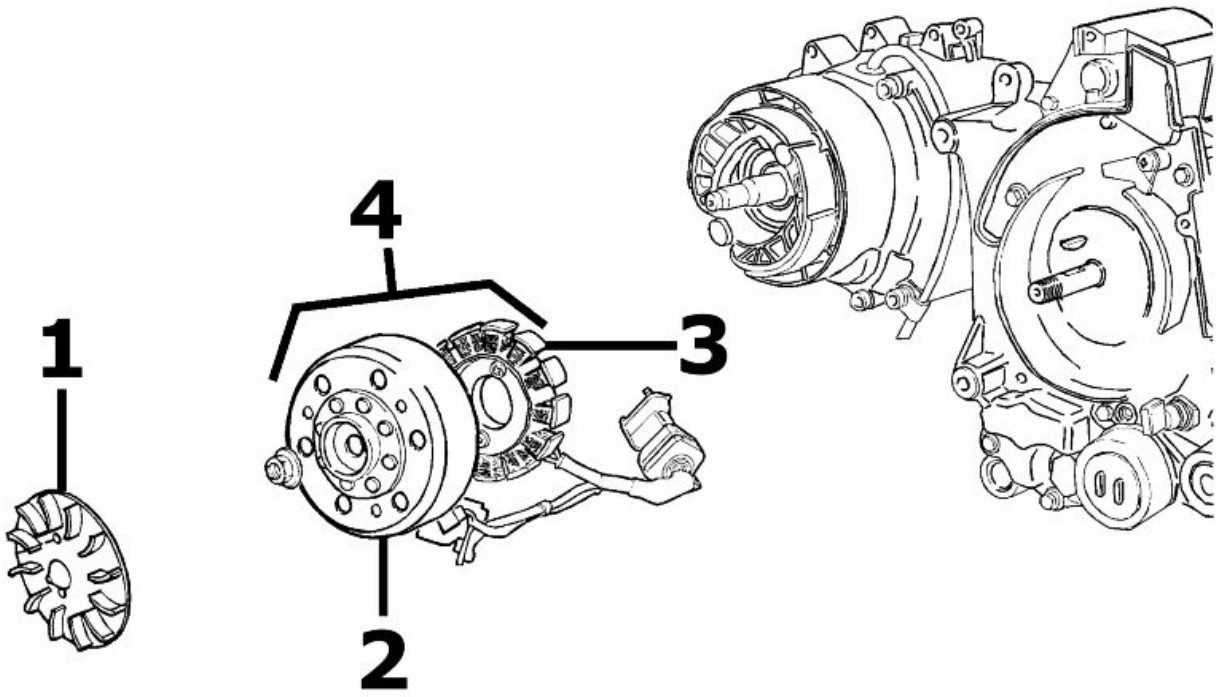
Starter motor



ELECTRICAL START-UP

	Code	Action	Duration
1	001020	Starter motor - Replacement	
2	005045	Starter motor cable harness - Replacement	
3	001017	Start-up pinion - Replacement	
4	001021	Kick starter - Inspection	
5	008008	Starter spring pack - Replacement	
6	001084	Starter lever - Replacement	

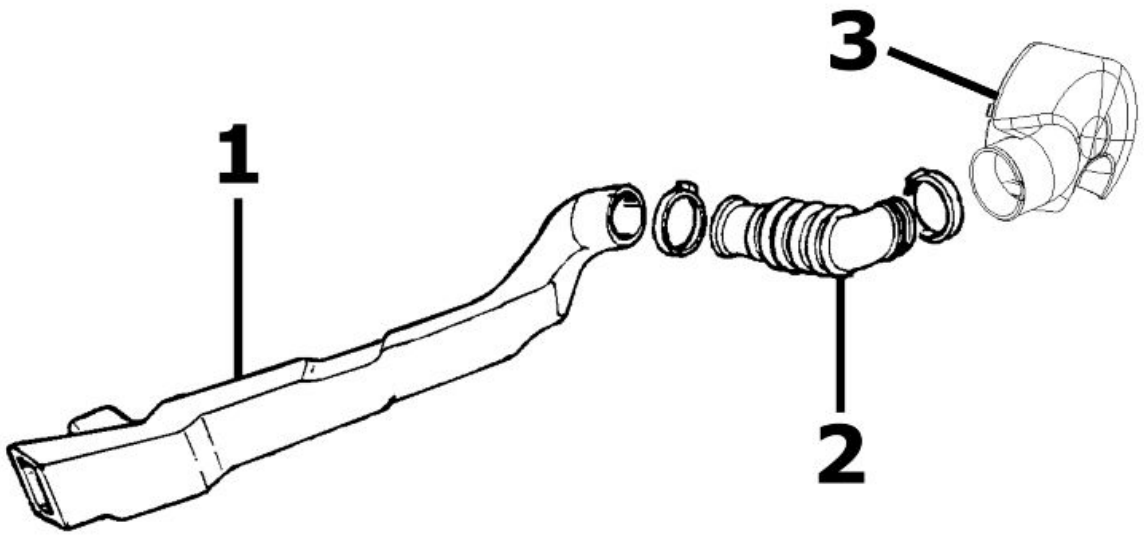
Flywheel magneto



MAGNETO FLYWHEEL

	Code	Action	Duration
1	001109	Cooling fan - Replacement	
2	001173	Rotor - Replacement	
3	001067	Stator - Removal and Refitting	
4	001058	Flywheel - Replacement	

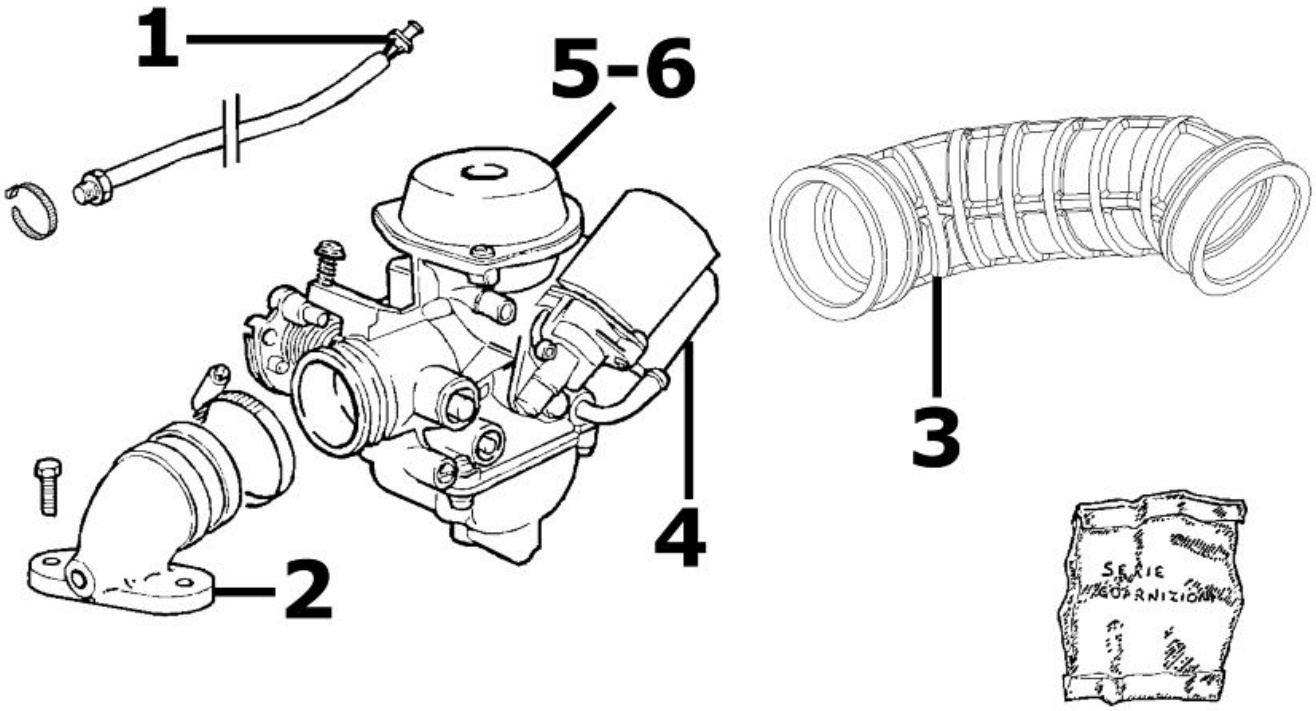
Belt cooling duct



BELT COOLING PIPE

	Code	Action	Duration
1	001170	Air duct - replacement	
2	001132	Transmission air intake pipe - Replacement	
3	001131	Transmission air intake - Replacement	

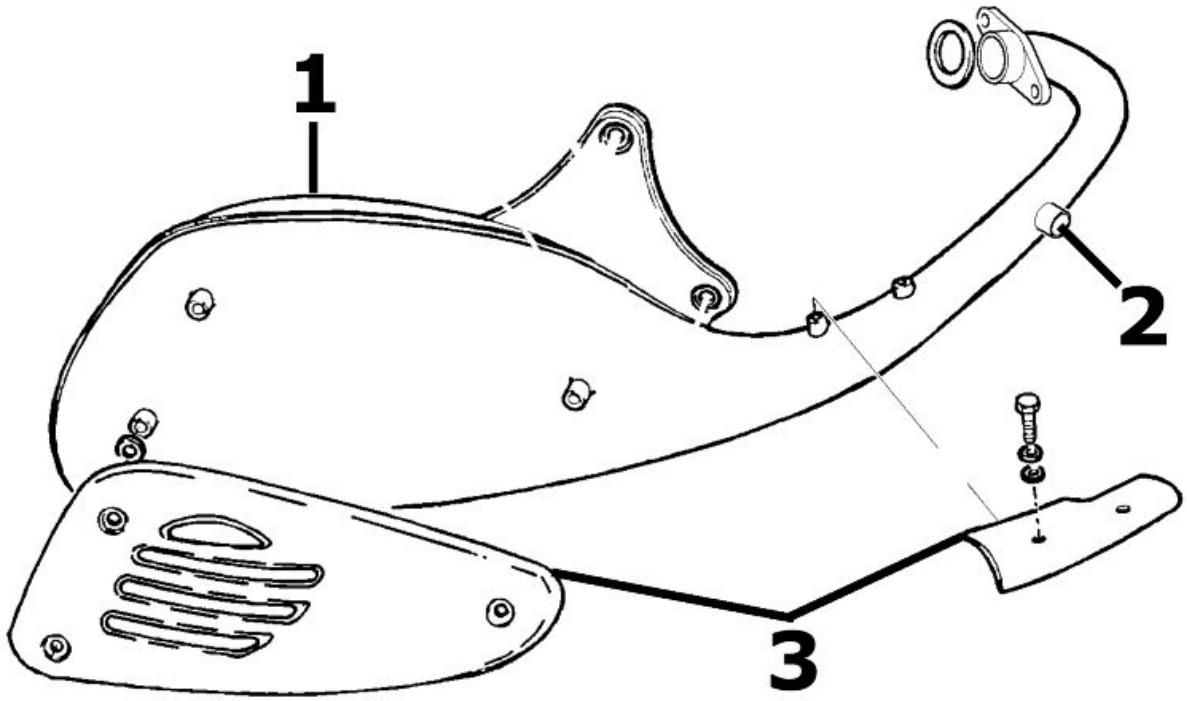
Carburettor



CARBURETTOR

	Code	Action	Duration
1	001082	Carburettor heating resistor - Replacement	
2	001013	Intake manifold - change	
3	004122	Air cleaner carburettor fitting - Replacement	
4	001081	Automatic choke - Replacement	
5	001008	Carburettor - Inspection	
6	001063	Carburettor - Replacement	

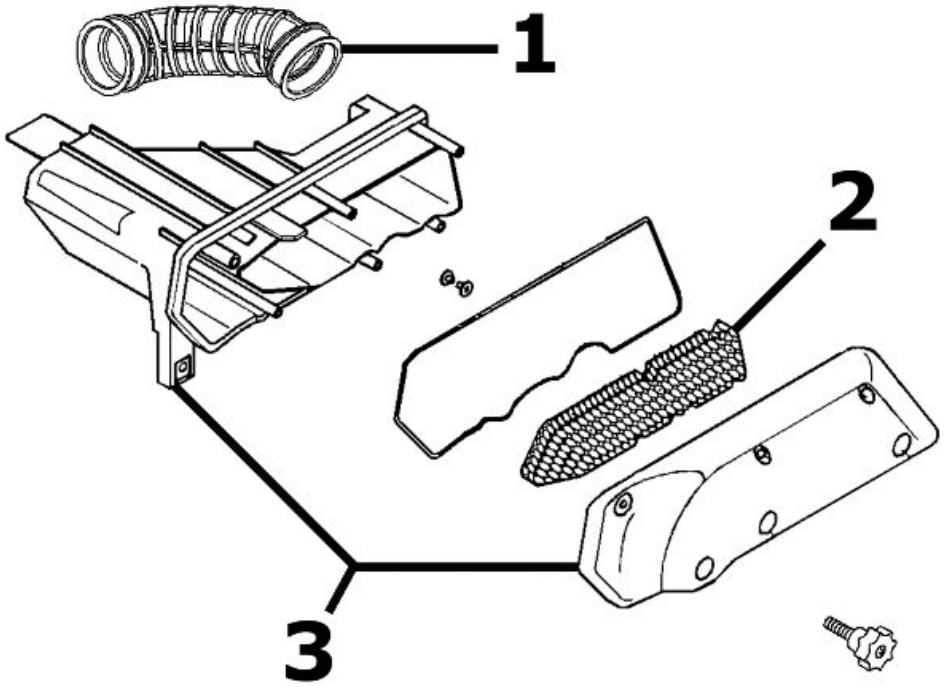
Exhaust pipe



MUFFLER

	Code	Action	Duration
1	001009	Muffler - Replacement	
2	001136	Exhaust emissions - Adjustment	
3	001095	Muffler guard - Replacement	

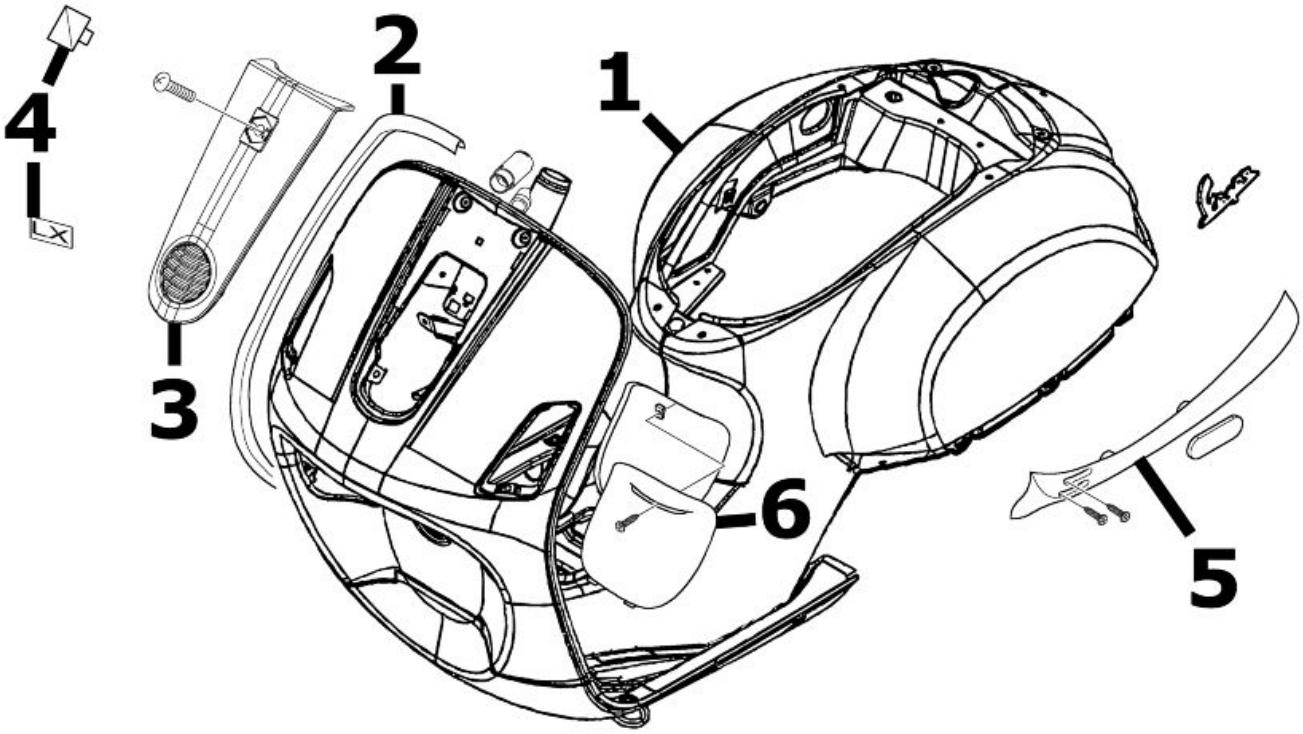
Air cleaner



AIR CLEANER

	Code	Action	Duration
1	004122	Air cleaner carburettor fitting - Replacement	
2	001014	Air filter - Replacement / cleaning	
3	001015	Air filter box - Replacement	

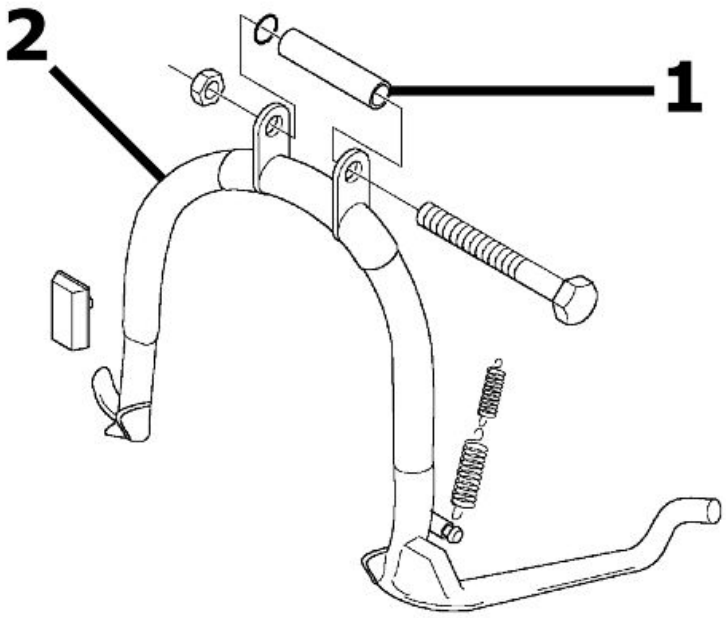
Frame



CHASSIS

	Code	Action	Duration
1	004001	Chassis - Replacement	
2	004023	Shield rim - Replacement	
3	004149	Shield central cover - Replacement	
4	004159	Plates / Stickers - Replacement	
5	004012	Rear side panels - Replacement	
6	004059	Spark plug inspection flap - Replacement	

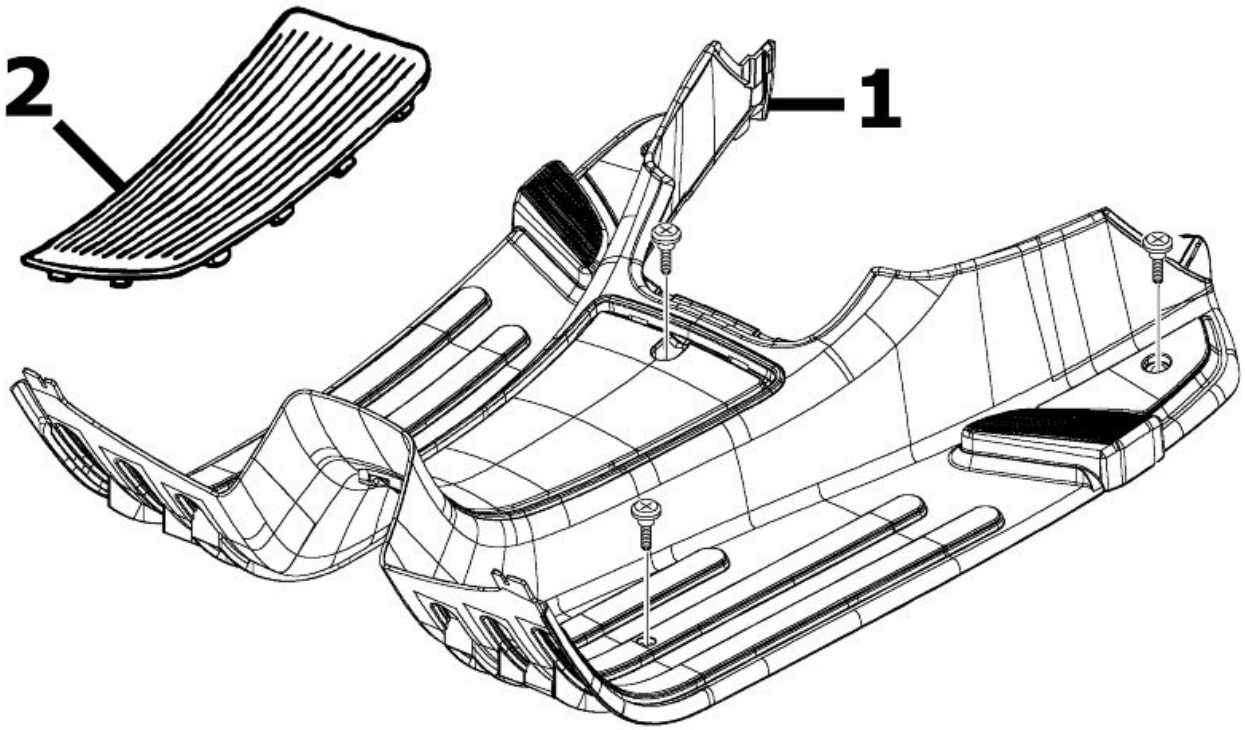
Centre-stand



STAND

	Code	Action	Duration
1	001053	Stand bolt - Replacement	
2	004004	Stand - Replacement	

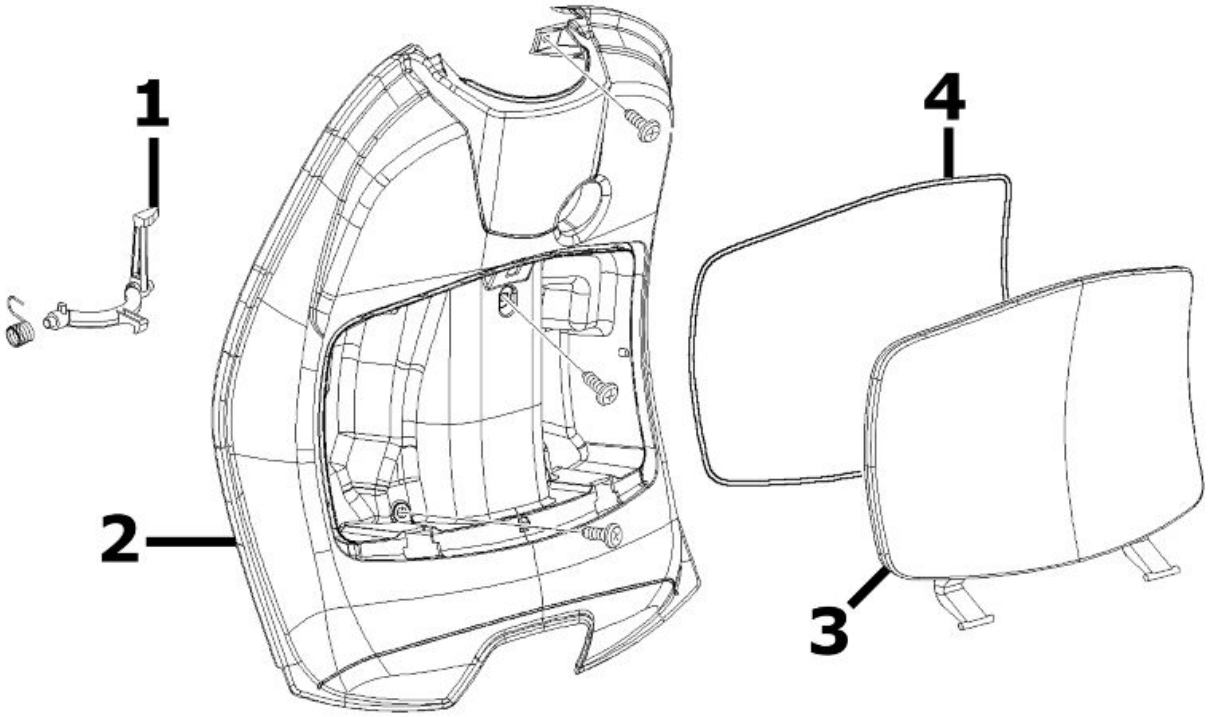
Footrests



FOOTREST

	Code	Action	Duration
1	004178	Footrest - Replacement	
2	004078	Front/rear footrest rubber - Replacement	

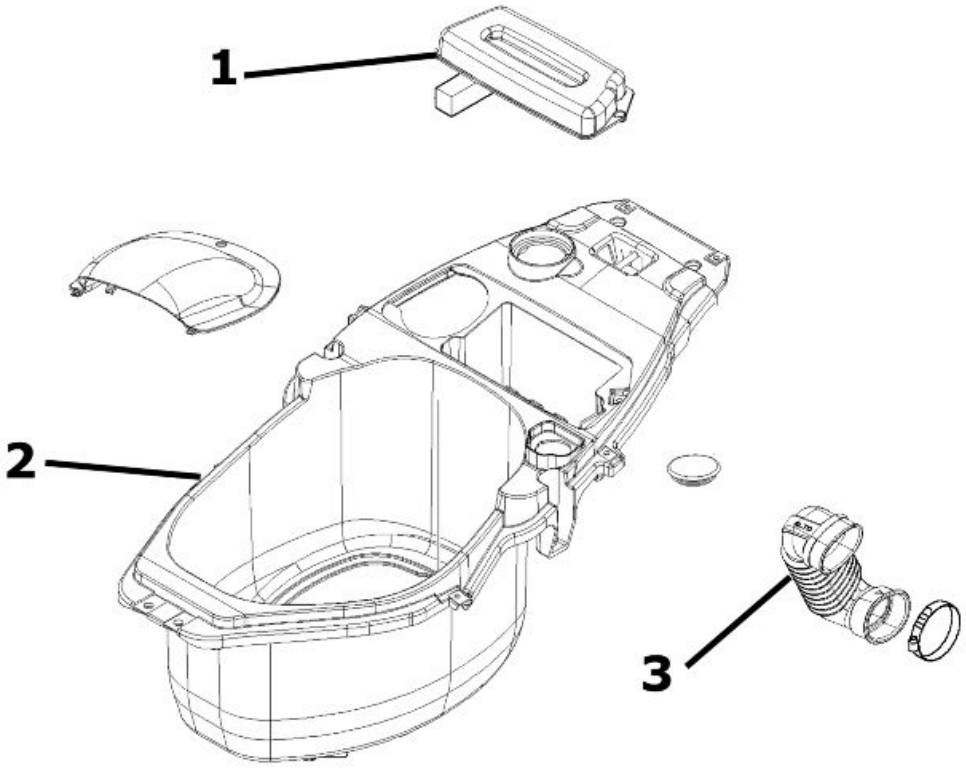
Rear cover



SHIELD BACK PLATE

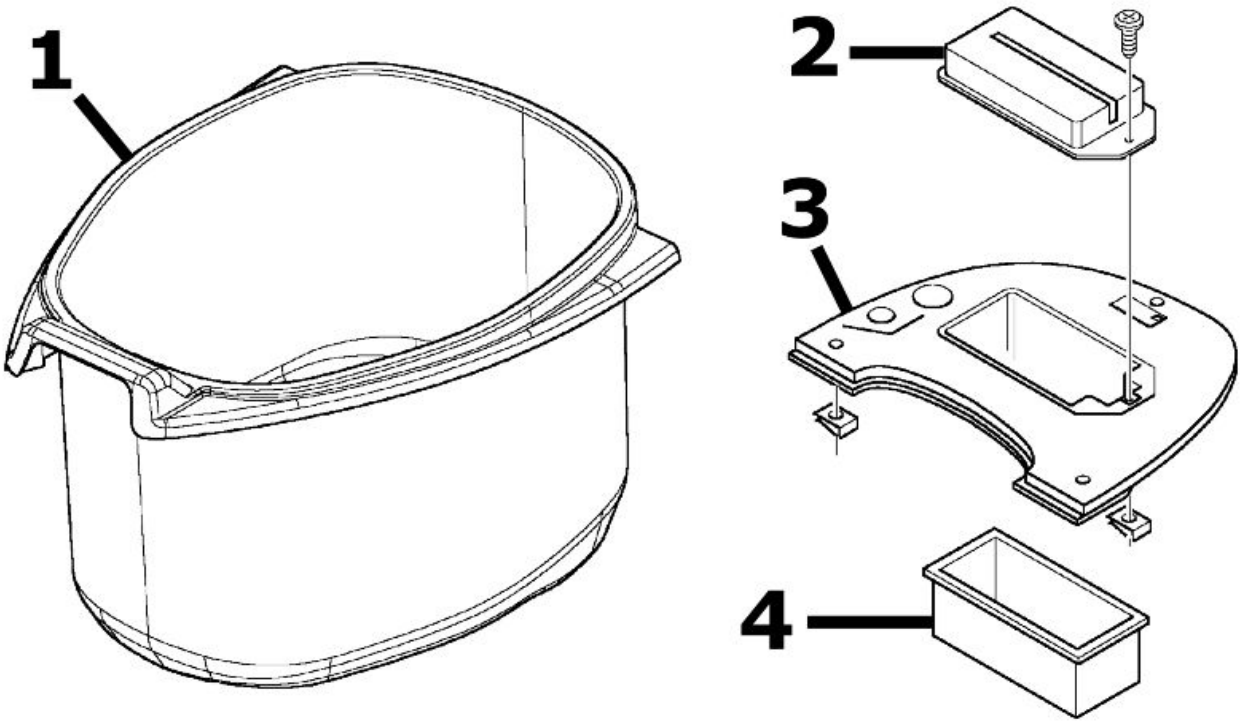
	Code	Action	Duration
1	004174	Trunk levers - Replacement	
2	004065	Legshield, rear part - Removal and refitting	
3	004081	Top box lid - Replacement	
4	004082	Top box gasket - Replacement	

Underseat compartment



HELMET COMPARTMENT

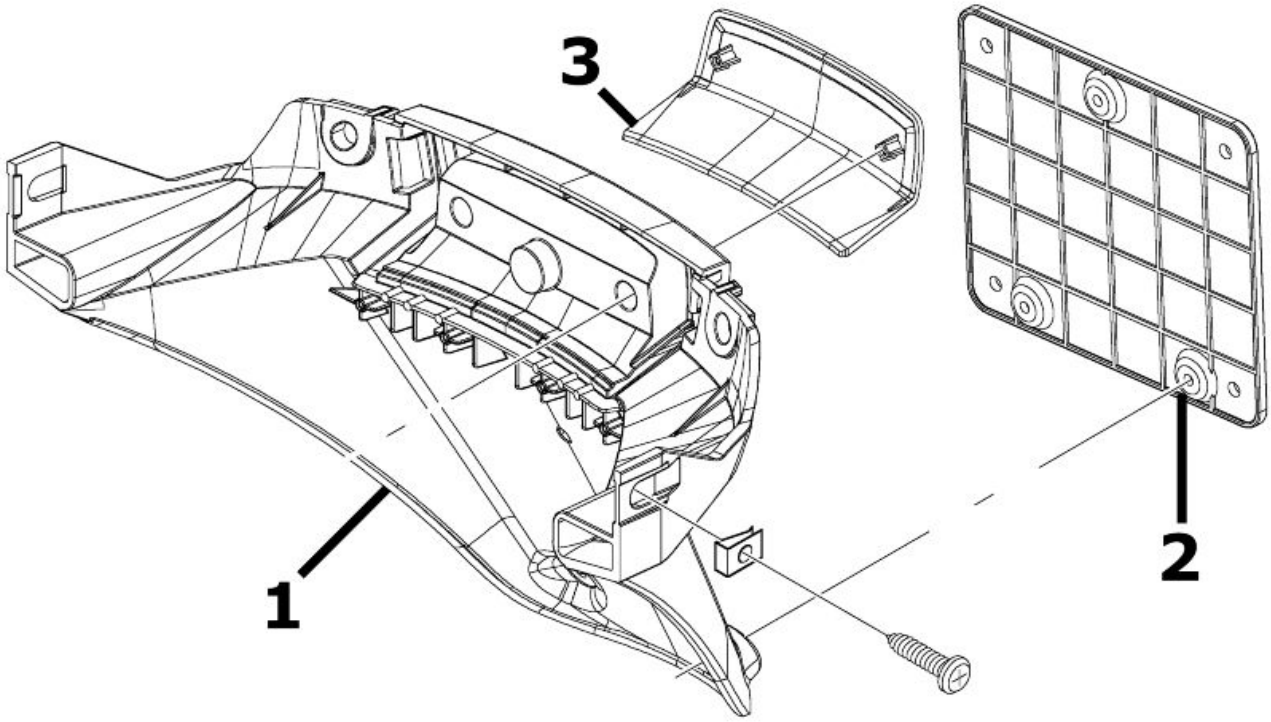
	Code	Action	Duration
1	005046	Battery cover - change	
2	004016	Helmet compartment - Removal and Refitting	
3	001027	Body / air cleaner union - Replacement	



HELMET COMPARTMENT

	Code	Action	Duration
1	004016	Helmet compartment - Replacement	
2	005046	Battery cover - change	
3	004011	Central chassis cover - Replacement	
4	004071	Battery compartment - replacement	

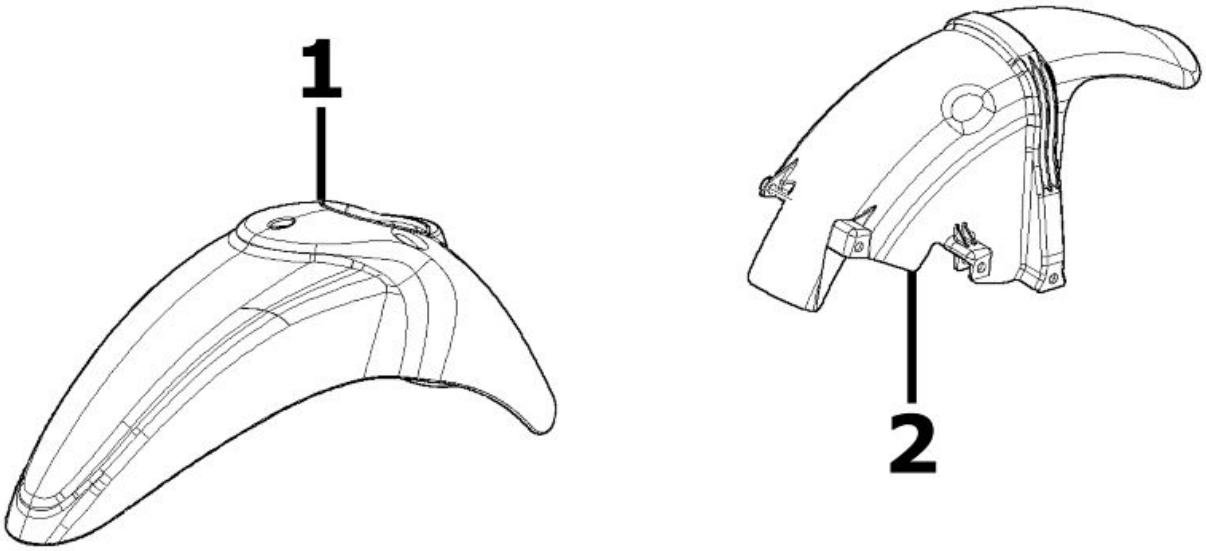
Plate holder



LICENSE PLATE HOLDER

	Code	Action	Duration
1	004136	License plate holder mounting - Replacement	
2	005048	number plate holder - Replacement	
3	005032	number plate light glass - Replacement	

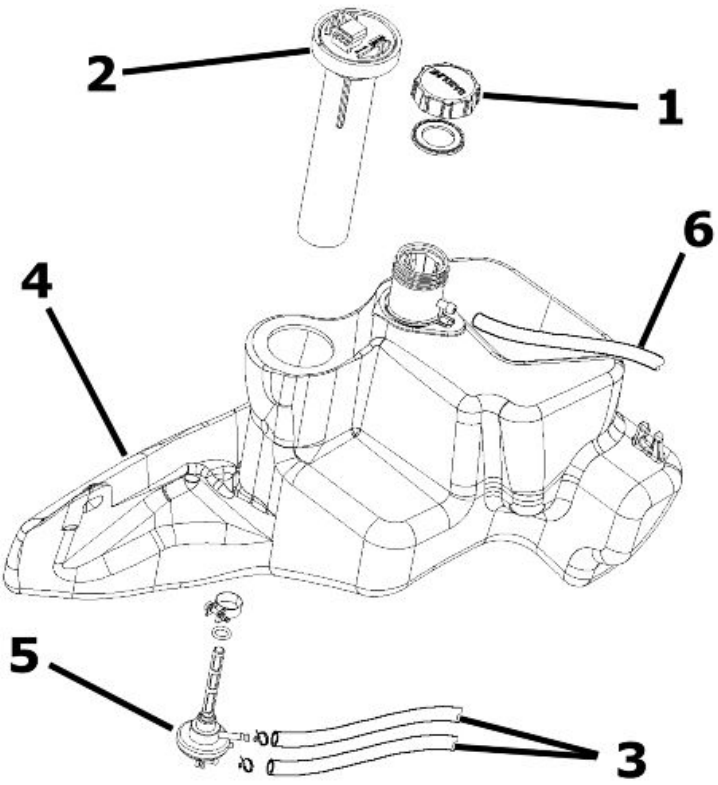
Mudguard



MUDGUARDS

	Code	Action	Duration
1	004002	Front mudguard - change	
2	004009	Rear mudguard - Replacement	

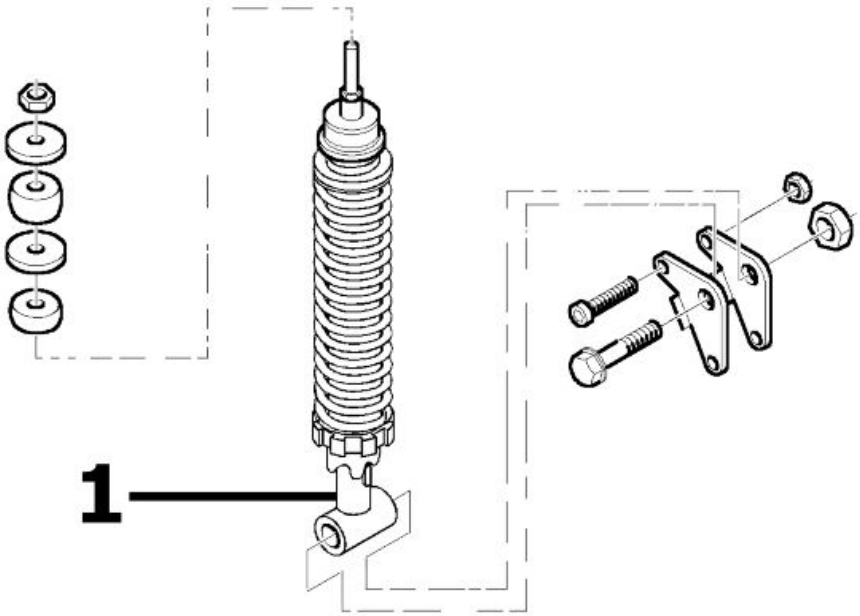
Fuel tank



FUEL TANK

	Code	Action	Duration
1	004168	Fuel tank cap - Replacement	
2	005010	Tank float - Replacement	
3	004112	Cock-carburettor hose - Replacement	
4	004005	Fuel tank - Replacement	
5	004007	Fuel valve - Replacement	
6	004109	Fuel tank breather - change	

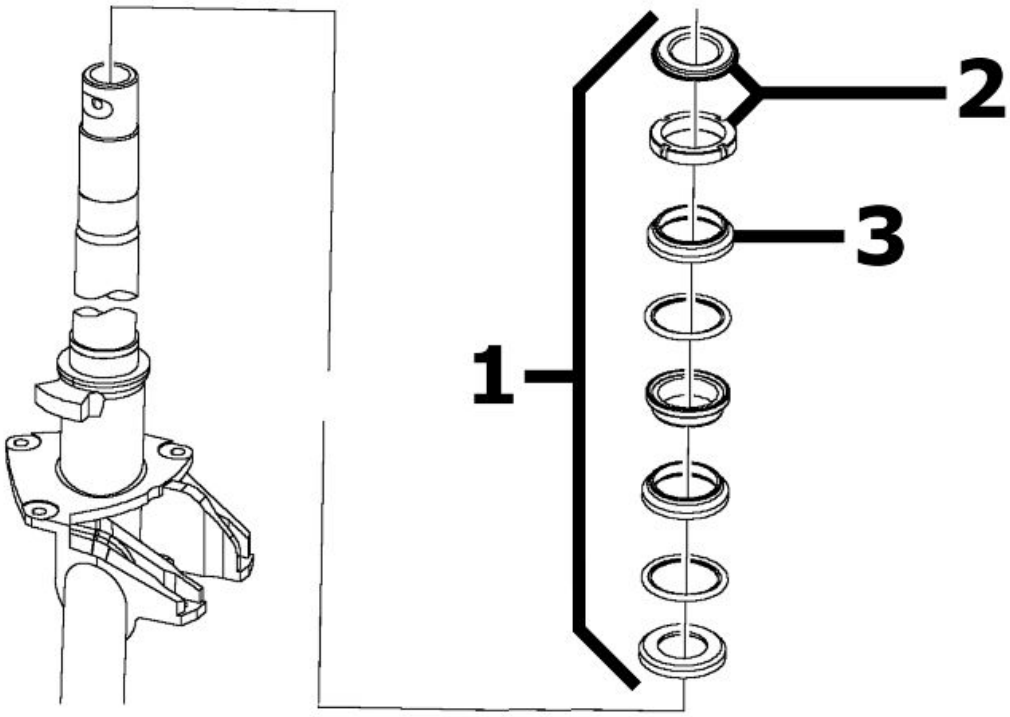
Rear shock-absorber



REAR SHOCK ABSORBER

	Code	Action	Duration
1	003007	Rear shock absorber - Removal and Refitting	

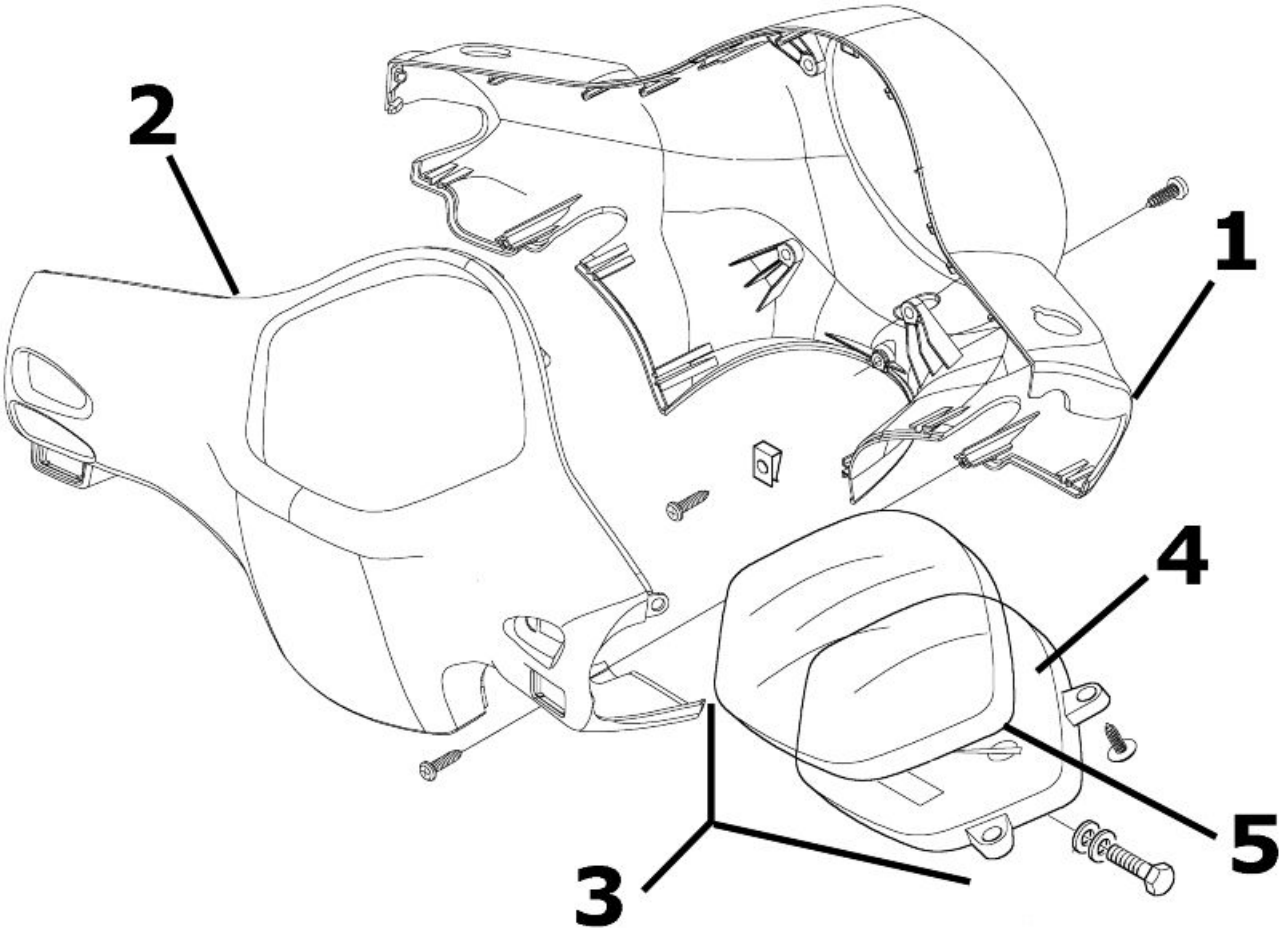
Steering column bearings



STEERING FIFTH WHEELS

	Code	Action	Duration
1	003002	Steering fifth wheels - Replacement	
2	003073	Steering clearance - Adjustment	
3	004119	Bearing / upper steering fifth wheel - Replacement	

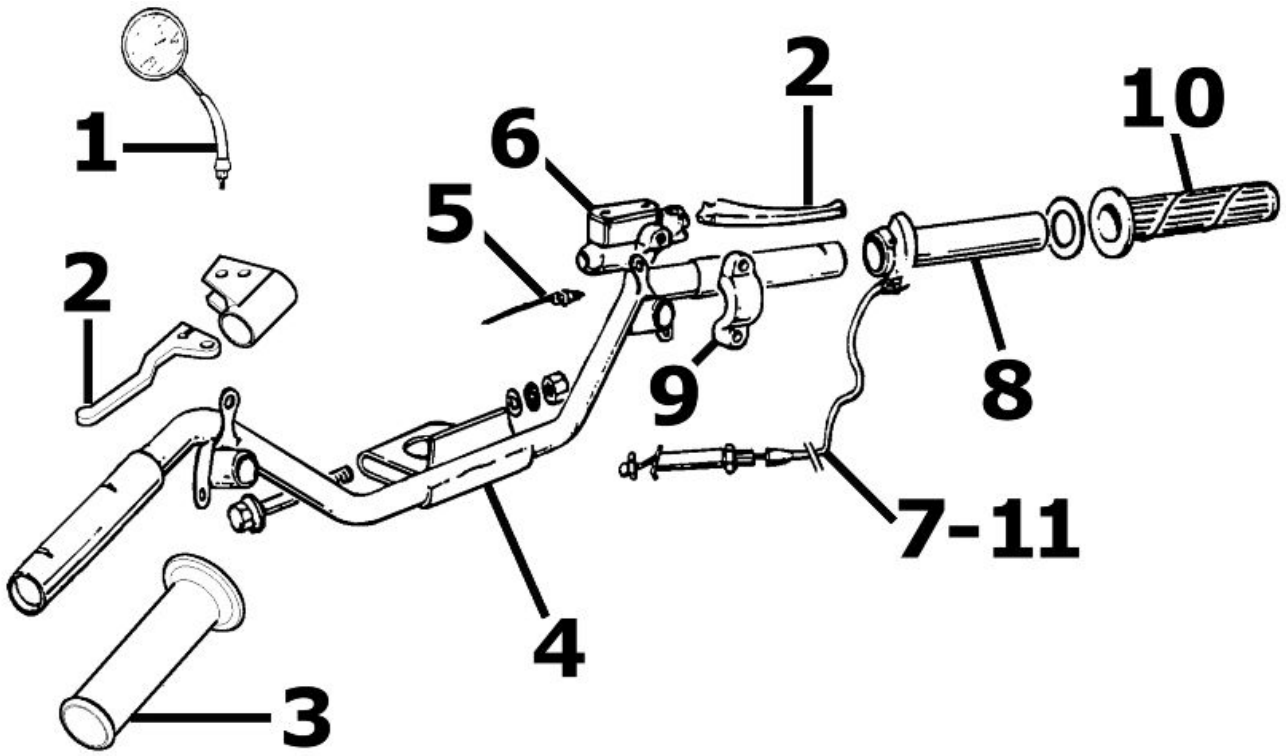
Handlebar covers



ODOMETER - HANDLEBAR COVERS

	Code	Action	Duration
1	004018	Handlebar front section - Replacement	
2	004019	Handlebar rear section - Replacement	
3	005014	Odometer - Replacement	
4	005038	Instrument panel warning light bulbs - Replacement	
5	005078	Odometer glass - Replacement	

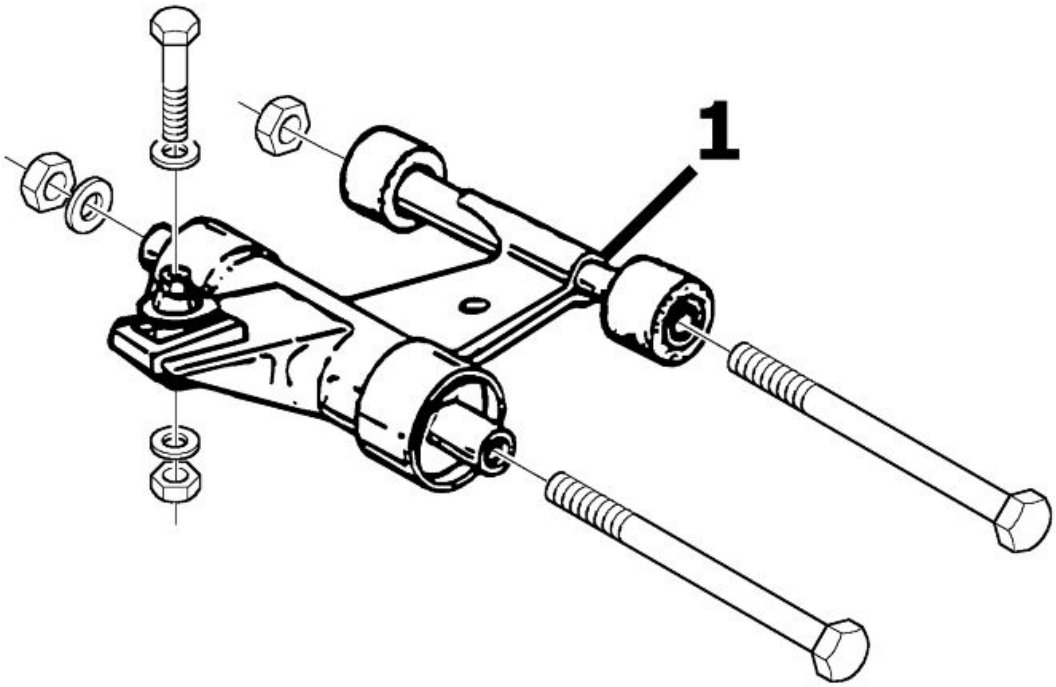
Handlebar components



HANDLEBAR COMPONENTS

	Code	Action	Duration
1	004066	Driving mirror - Replacement	
2	002037	Brake or clutch lever - Replacement	
3	002071	Left hand grip - Replacement	
4	003001	Handlebar - Removal and refitting	
5	005017	Stop switch - Replacement	
6	002024	Front brake pump - Removal and Refitting	
7	003061	Accelerator transmission - adjust	
8	002060	Complete throttle control - Replacement	
9	004162	Mirror mounting and/or brake pump fitting U-bolt - Replacement	
10	002059	Right hand grip - Replacement	
11	002063	Throttle control transmission - Replacement	

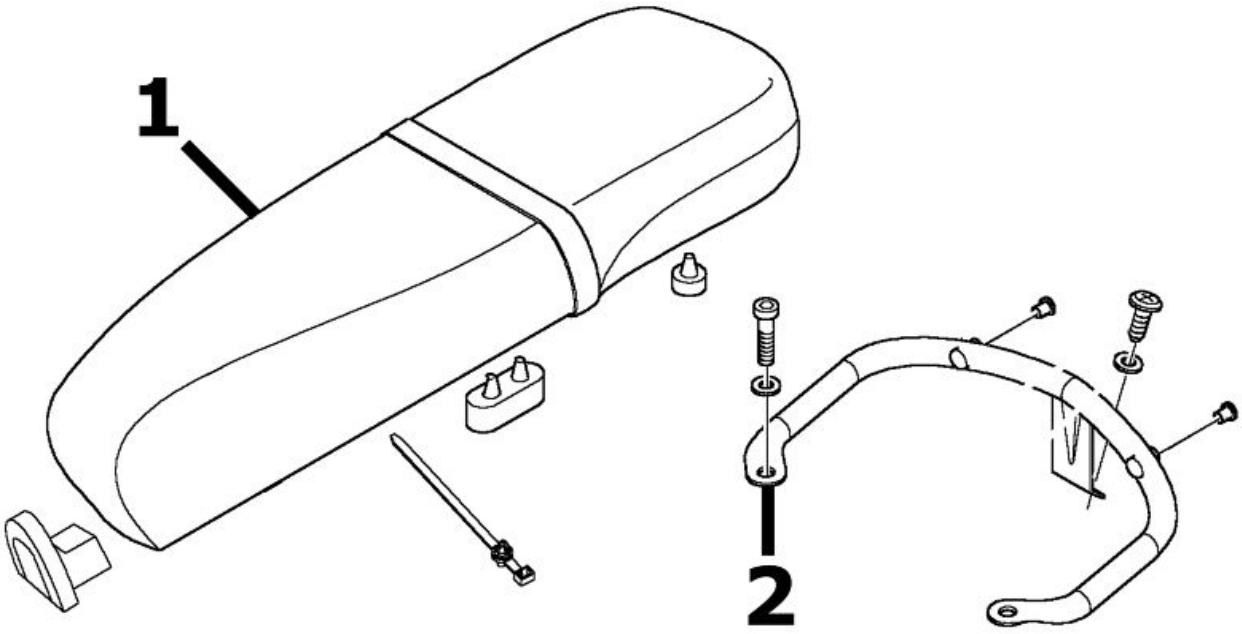
Swing-arm



SWINGING ARM

	Code	Action	Duration
1	001072	Engine-chassis connection swinging arm - Replacement	

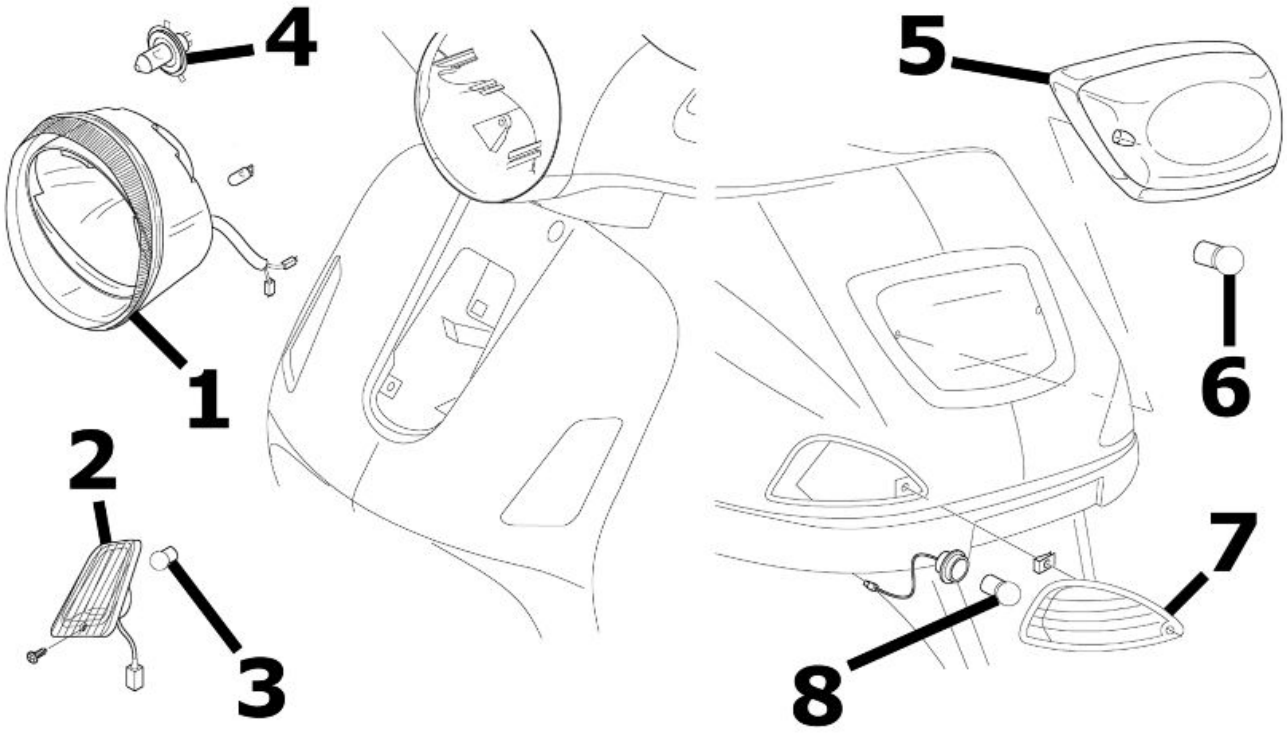
Seat



SADDLE

	Code	Action	Duration
1	004003	Saddle - Replacement	
2	004131	Luggage rack mounting - Replacement	

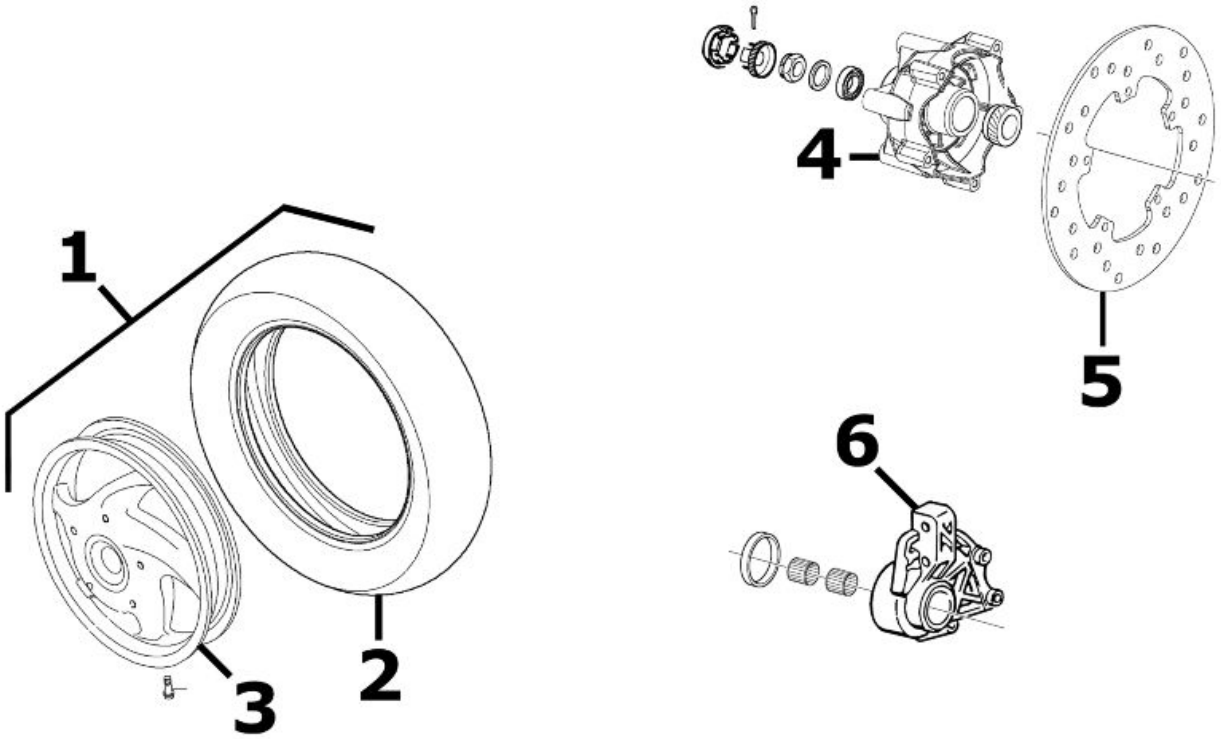
Turn signal lights



INDICATOR LIGHTS

	Code	Action	Duration
1	005002	Front headlamp - Replacement	
2	005012	Front turn indicator - Replacement	
3	005067	Front turn indicator bulb - Replacement	
4	005008	Headlight bulbs - Replacement	
5	005005	Taillight - change	
6	005066	Rear light bulbs - Replacement	
7	005022	Rear turning indicators - Replacement	
8	005068	Rear turning indicator bulb - Replacement	

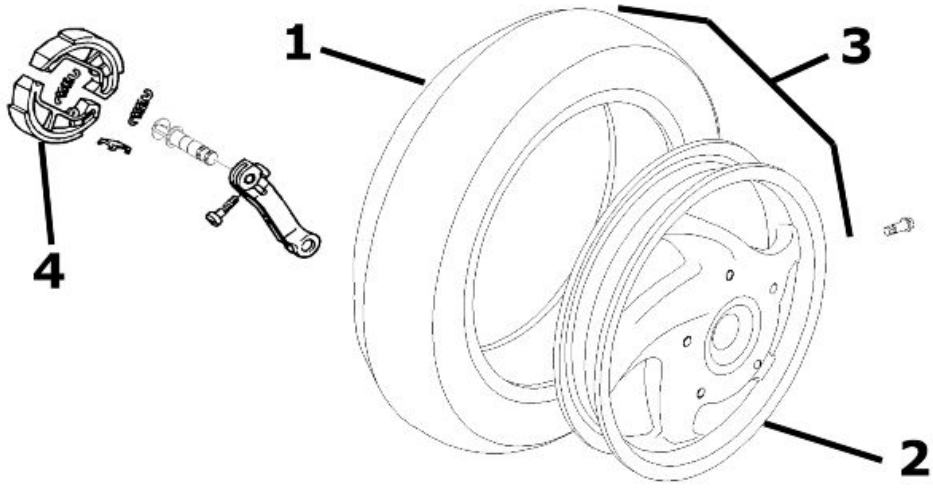
Front wheel



FRONT WHEEL

	Code	Action	Duration
1	004123	Front wheel - Replacement	
2	003047	Front tyre - Replacement	
3	003037	Front wheel rim - Replacement	
4	003033	Front wheel hub- Replacement	
5	002041	Front brake disc - Replacement	
6	003034	Front wheel hub bearing - Replacement	

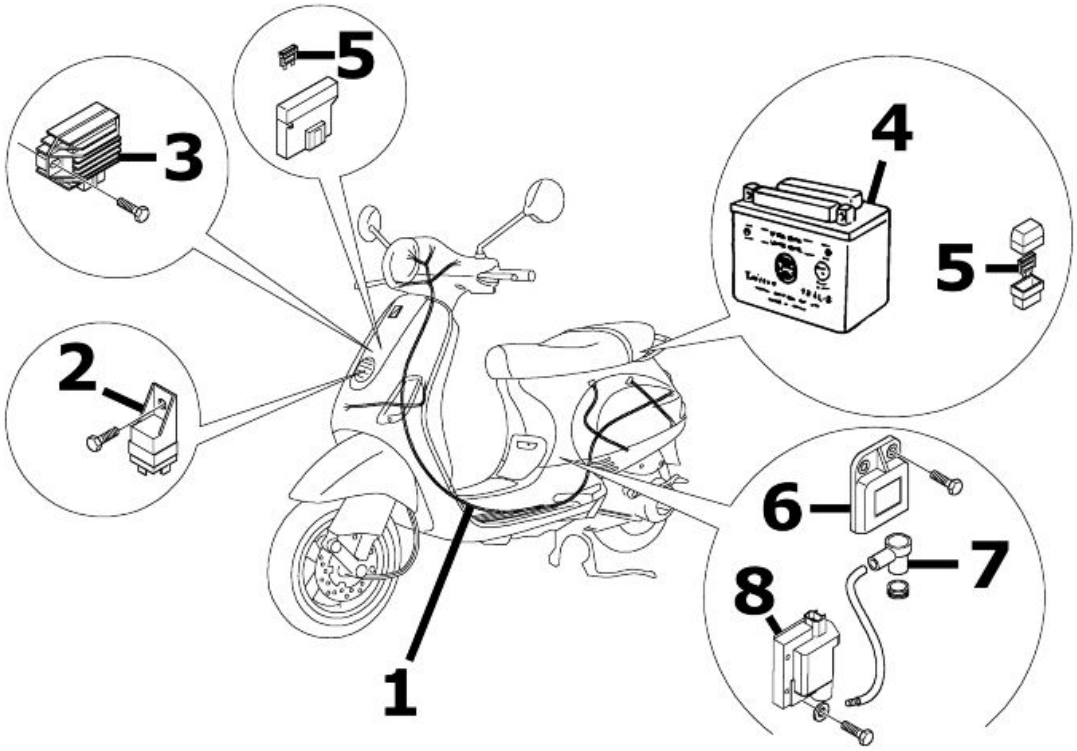
Rear wheel



REAR WHEEL

	Code	Action	Duration
1	004126	Rear wheel tyre - Replacement	
2	001071	Rear wheel rim - Removal and Refitting	
3	001016	Rear wheel - Replacement	
4	002002	Rear brake pads/shoes - Repl.	

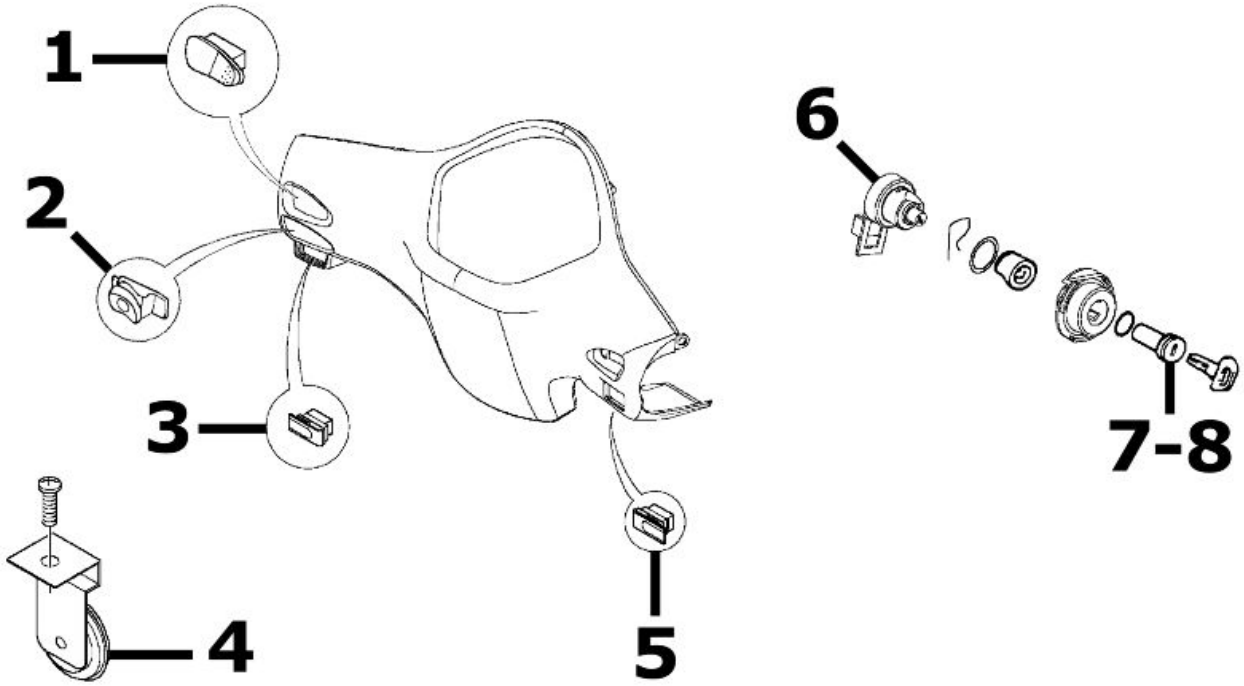
Electric devices



ELECTRICAL COMPONENTS

	Code	Action	Duration
1	005001	Electrical system - Replacement	
2	005011	Start-up remote control switch - Replacement	
3	005009	Voltage regulator - Replacement	
4	005007	Battery - change	
5	005052	Fuse (1) - Replacement	
6	001023	Control unit - Replacement	
7	001094	Spark plug cap - Replacement	
8	001069	HV coil - Replacement	

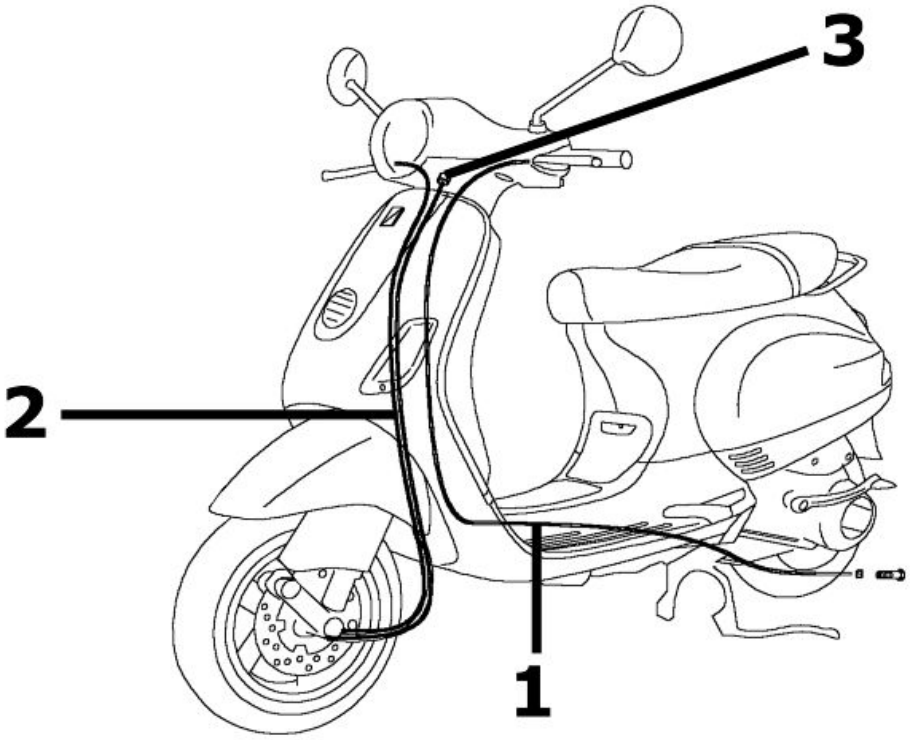
Electronic controls



ELECTRIC CONTROLS

	Code	Action	Duration
1	005039	Lights switch - Replacement	
2	005006	Light or turning indicator switch - Replacement	
3	005040	Horn button - Replacement	
4	005003	Horn - Replacement	
5	005041	Starter button - Replacement	
6	005016	Key switch - Replacement	
7	004096	Lock series - Replacement	
8	004010	Anti-theft lock - Replacement	

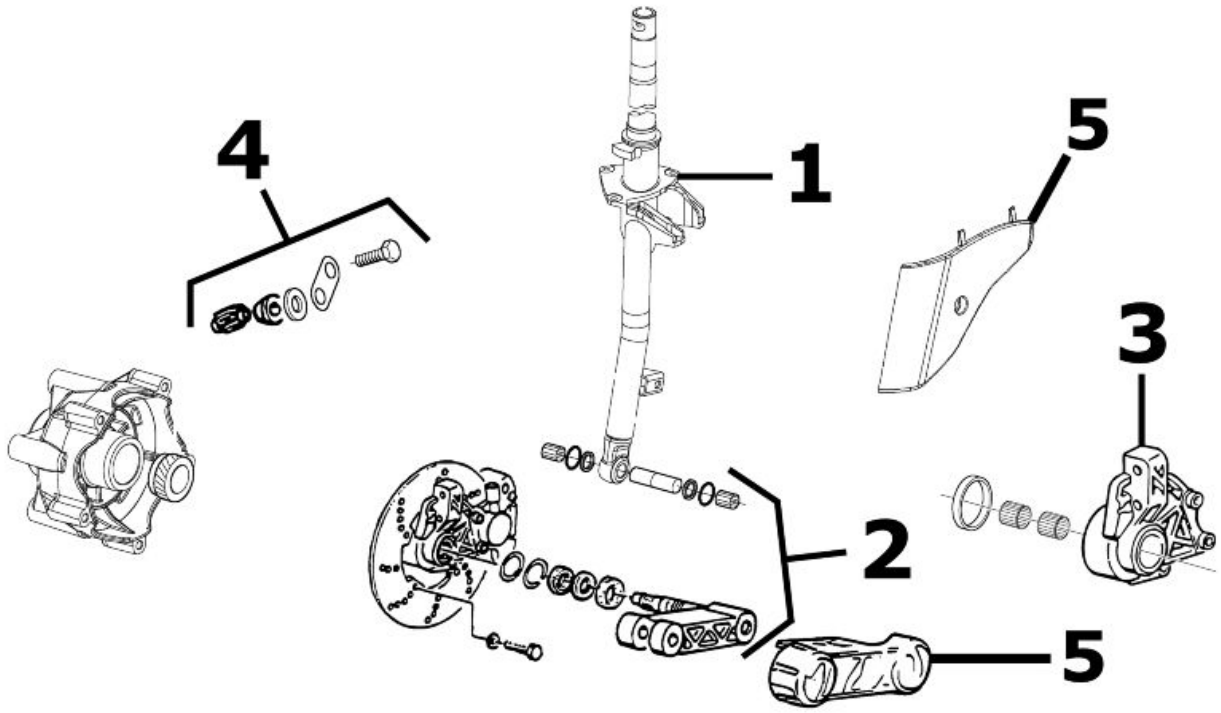
Transmissions



TRANSMISSIONS

	Code	Action	Duration
1	002053	Rear brake transmission complete - Replacement	
2	002051	Odometer transmission assembly - Replacement	
3	002049	Odometer cable - Replacement	

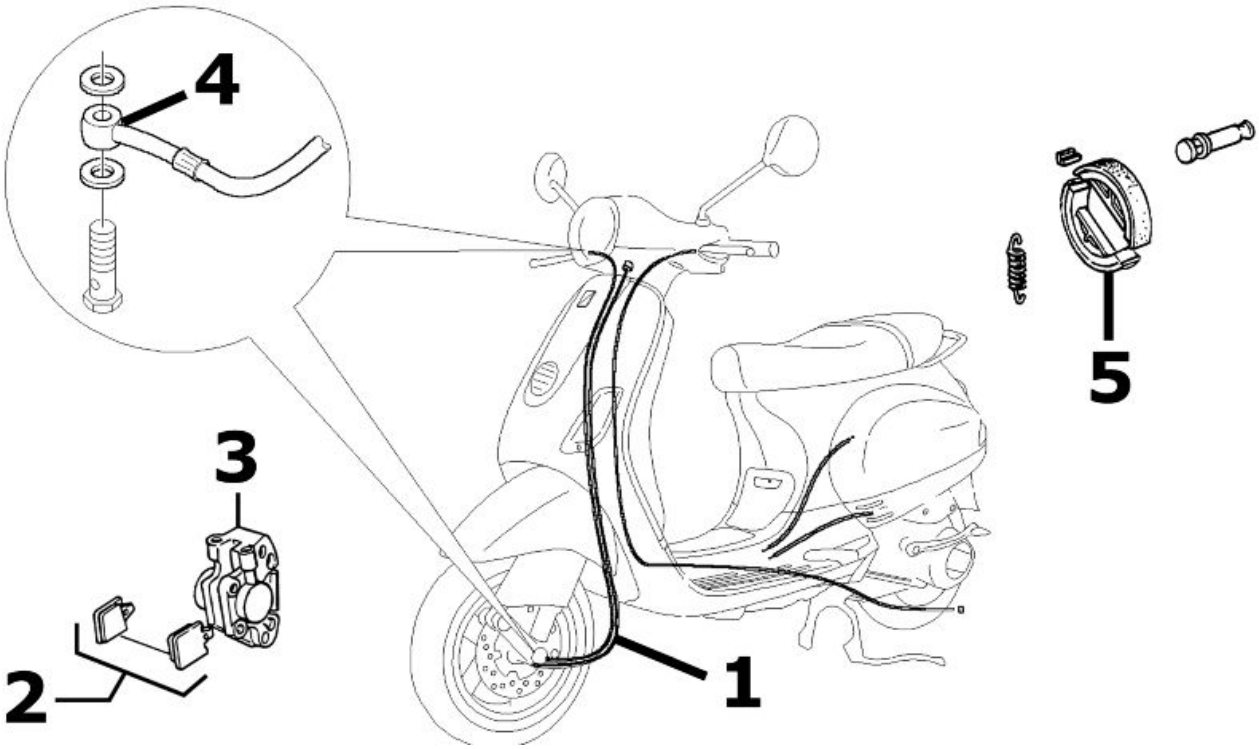
Front suspension



FRONT SUSPENSION

	Code	Action	Duration
1	003045	Steering tube - Replacement	
2	003010	Front suspension - Service	
3	003035	Shock absorber mounting and brake calliper - Replacement	
4	001064	Odometer sprocket - Replacement	
5	003044	Shock absorber cover - Replacement	

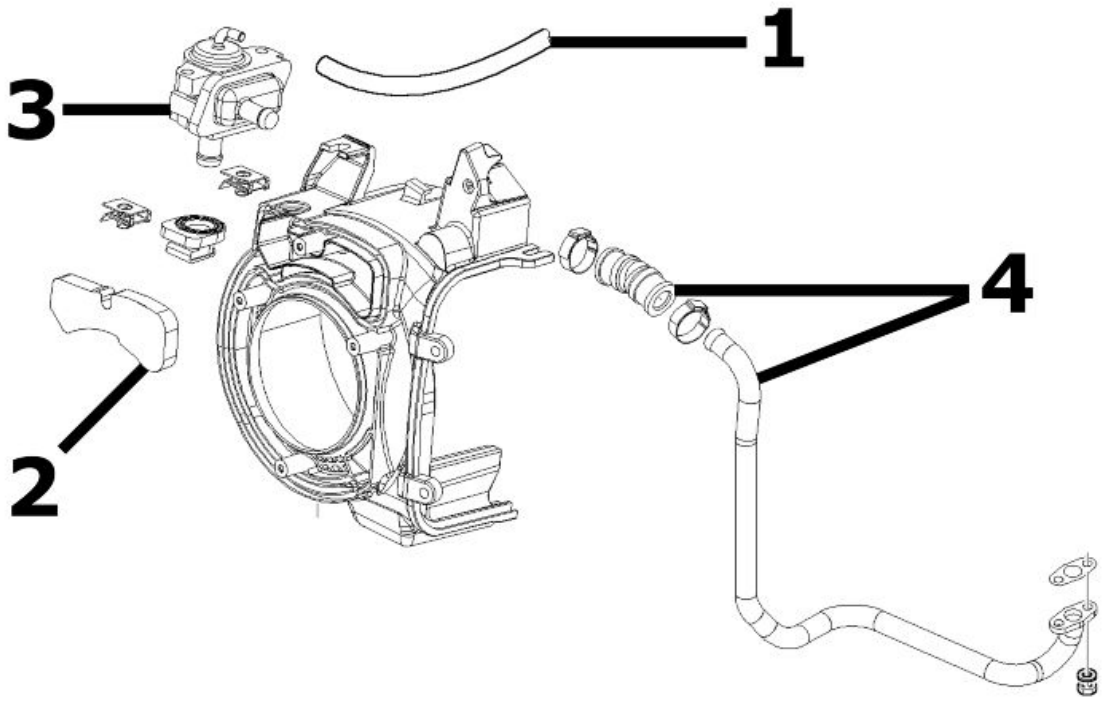
Braking system



BRAKING SYSTEM

	Code	Action	Duration
1	002021	Front brake hose - Remov. and Refitt.	
2	002007	Front brake shoes/pads - Remov. and Refitt	
3	002039	Front brake calliper - Removal and Refitting	
4	002047	Front brake fluid and air bleed system - Replacement	
5	002002	Shoes - Rear brake pads - Replacement	

Secondary air box



SECONDARY AIR SYSTEM

	Code	Action	Duration
1	001164	Crankcase secondary air connection - Replacement	
2	001161	Secondary air filter - Replacement / Cleaning	
3	001174	SAS valve - Replacement	
4	001163	Muffler secondary air connection - Replacement	

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