



SERVICE STATION MANUAL

**664662 IT-664663 EN-664664 FR-664665 DE-664666
ES-664667 PT-664668 OL-664669 EL**



Vespa GTS 125



SERVICE STATION MANUAL

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PIAGGIO & C. S.p.A. - After-Sales

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SERVICE STATION MANUAL

Vespa GTS 125

This service station manual has been drawn up by Piaggio & C. Spa to be used by the workshops of Piaggio-Gilera dealers. It is assumed that the user of this manual for maintaining and repairing Piaggio vehicles has a basic knowledge of mechanical principles and vehicle repair technique procedures. Any significant changes to vehicle characteristics or to specific repair operations will be communicated by updates to this manual. Nevertheless, no mounting work can be satisfactory if the necessary equipment and tools are unavailable. It is therefore advisable to read the sections of this manual concerning special tools, along with the special tool catalogue.

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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CHARACTERISTICS

CHAR

This section describes the general specifications of the vehicle.

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 open 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.
-

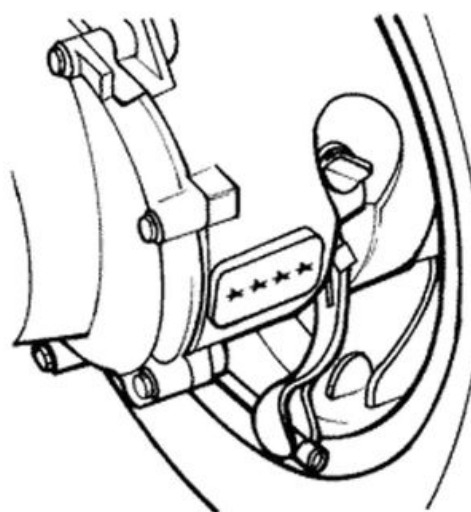
Maintenance rules

- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. Non-original or non-conforming spares 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 solvent. Lubricate all the work surfaces except the tapered couplings before refitting.
 - 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 scooter.
 - 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

Chassis prefix: ZAPM313000000 ÷ 1001

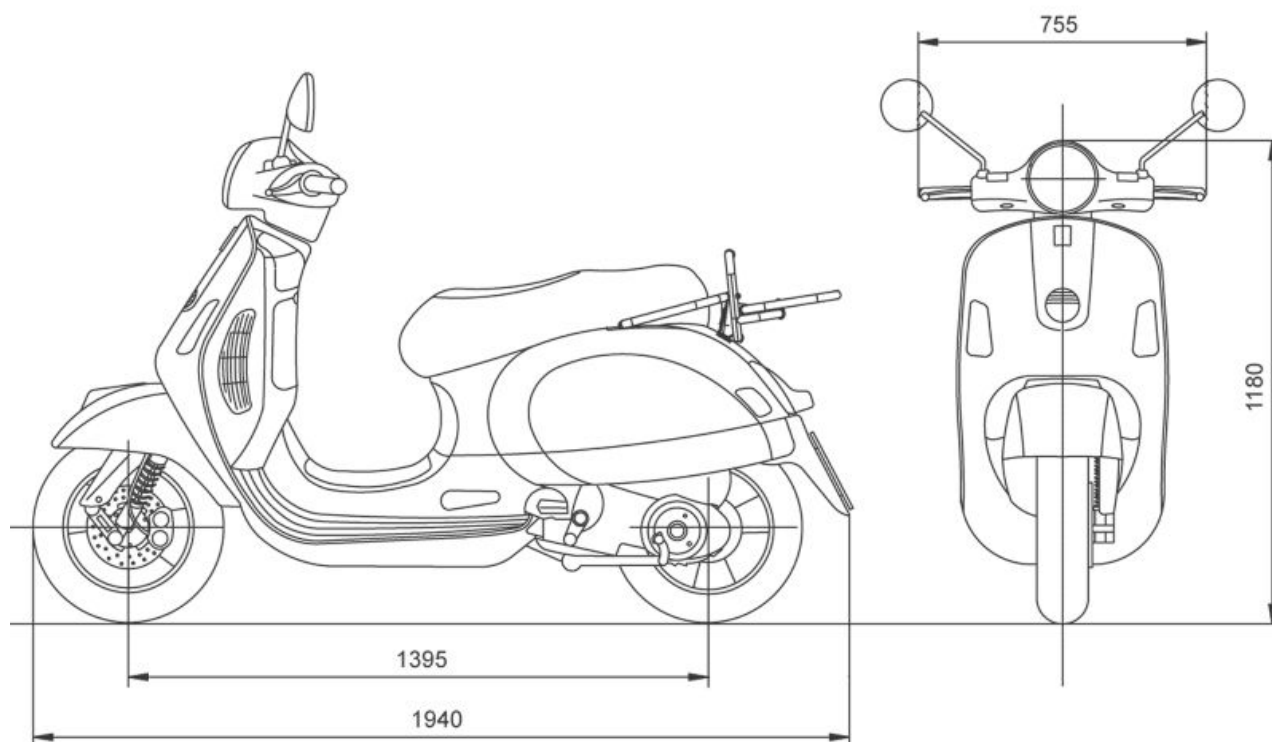
Engine prefix: M315M1001



Dimensions and mass

WEIGHTS AND DIMENSIONS

Specification	Desc./Quantity
Total kerb weight	145 ± 5 kg
Width (to hand grips)	755 mm
Length	1940 mm
Wheelbase	1395 mm
Height	1180 mm
Saddle height	800 mm



Engine

ENGINE

Specification	Desc./Quantity
Type	Single-cylinder, 4-stroke
Cubic capacity	124 cm ³
Bore x stroke	57.0 x 48.6 mm
Compression ratio	12 ± 0.5: 1
Engine idle speed	1650 ± 100 rpm
Timing system	4 valves, single overhead camshaft, chain-driven.
Valve clearance	Inlet: 0.10 mm Outlet: 0.15 mm
MAX. power	10.5 kW at 9,500 rpm
MAX torque	12 Nm at 8,000 rpm
Lubrication	Engine lubrication with lobe pump (inside crank-case) controlled by a chain with double filter: mesh and paper.
Lubrication pressure	3 ÷ 4 bar
Minimum lubrication pressure (90° C)	0.6 ÷ 1.2 bar
Fuel supply	KEIHIN CVEK 30 carburettor and electrical fuel pump.
Cooling	Forced coolant circulation system.
Fuel	Unleaded petrol (95 RON)

Transmission

TRANSMISSION

Specification	Desc./Quantity
Transmission	Automatic expandable pulley variator with torque server, V belt, dry self-ventilating automatic centrifugal clutch and transmission housing with forced air circulation.
Final reduction	Gear reduction unit in oil bath.

Capacities

CAPACITY

Specification	Desc./Quantity
Engine oil	1.10 l
Transmission oil	150 cm ³
Cooling system fluid	~ 2 l
Fuel tank (reserve)	~ 10 l (2 l)

Electrical system

ELECTRICAL SYSTEM

Specification	Desc./Quantity
Start-up	Electric
Ignition	Capacitive discharge ignition, with variable advance and separate HV coil.
Ignition advance	10° at 2.000 rpm - 29° at 6.750 rpm
Spark plug	CHAMPION RG4HC
Alternative spark plug	NGK CR8EB
Battery	Sealed, 12 V / 10 Ah

Frame and suspensions

FRAME AND SUSPENSIONS

Specification	Desc./Quantity
Chassis	Tubular and sheet steel.
FRONT SUSPENSION	Single arm with helicoidal spring and single double-acting hydraulic shock absorber.
Front suspension travel	- mm
Rear suspension	Two double-acting shock absorbers, adjustable to 4 positions at preloading.
Rear suspension travel	- mm

Brakes

BRAKES

Specification	Desc./Quantity
Front brake	Ø 220 disc brake with hydraulic control activated by handlebar right lever.
Rear brake	Ø 200 mm disc brake with hydraulic control activated by handlebar left lever.

Wheels and tyres

WHEELS AND TYRES

Specification	Desc./Quantity
Wheel rim type	Light alloy rims.
Front rim	12" x 3.00
Rear rim	12" x 3.00
Front tyre	120/70 - 12" 51P Tubeless
Rear tyre	130/70 - 12" 62P Tubeless
Front tyre pressure (with passenger)	1.8 bar (-)
Rear tyre pressure (with passenger)	2.2 bar (-)

N.B.

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

Carburettor

125cc Version

Kehin

CARBURETTOR KEIHIN

Specification	Desc./Quantity
Depression carburettor	CVEK-30
Body stamping	CVEK
CUT-OFF device	Not present
Max. jet	108
Minimum jet	38
Max. air jet	70
Minimum air jet	130
Throttle valve spring	100 ÷ 160 g
Minimum mixture set screw initial opening	1 ± ½
Tapered pin	NDYB
Diffuser nozzle	Ø 5.0
Starter air jet	Ø 1.5
Starter jet	42
Starter device resistance	~ 20 Ω
Venturi diffuser	Ø 29 (47x30.9)
Throttle valve	Ø 30.5

N.B.

* THE IDENTIFICATION LETTER MAY VARY WITH EACH CARBURETTOR UPDATE.

Tightening Torques

STEERING ASSEMBLY

Name	Torque in Nm
Upper steering ring nut	30 ÷ 40
Lower steering ring nut	8 ÷ 10
Handlebar fixing screw	45 ÷ 50 (The two screws must be tightened to the prescribed torque after having done so with the rear wheel axle nut. Safety locks: see «Pre-delivery Operations»)
Fixing screws for handlebar control assembly U-bolts	7 ÷ 10

FRAME ASSEMBLY

Name	Torque in Nm
Engine-swinging arm bolt	64 - 72
swinging arm bolt - body shell	76 ÷ 83
Engine and vehicle side swinging arm junction bolt	33 ÷ 41
Bolt of the Silent block support plate	42 ÷ 52
Centre stand bolt	25 - 30
Side stand fixing bolt	40 ÷ 45

FRONT SUSPENSION

Name	Torque in Nm
Screw fixing the shock absorber to the shock absorber - calliper attachment plate	20 ÷ 27
Wheel axle nut	75 ÷ 90
Wheel screw	20 ÷ 25
Screw fixing rear mudguard to steering	5 ÷ 6.5

FRONT BRAKE

Name	Torque in Nm
Brake fluid pump - hose fitting	20 ÷ 25
Brake fluid hose-calliper fitting	20 ÷ 25
Screw fixing calliper to the shock absorber - calliper plate attachment	20 ÷ 25
Disc tightening screw	6 (Apply LOCTITE 242 threadlock, medium strength)
Oil bleed screw	12 - 16
Pad fastening pin	19.6 ÷ 24.5
Brake pump reservoir screws	15 ÷ 20

REAR SUSPENSION

Name	Torque in Nm
Retainer for left shock absorber to crankcase support plate	20 ÷ 25
Shock absorber upper fitting	20 ÷ 25
Shock absorber lower fitting	33 ÷ 41
Rear wheel shaft	104 ÷ 126
Screw fixing wheel to hub	20 ÷ 25

Name	Torque in Nm
Screws for muffler - shock absorber support arm on engine	20 ÷ 25 (The two screws must be tightened to the prescribed torque after having done so with the rear wheel axle nut. Safety locks: see «Pre-delivery Operations»)

REAR BRAKE

Name	Torque in Nm
Brake fluid pump - hose fitting	20 ÷ 25
Brake fluid pipe-calliper fitting	20 ÷ 25
Rear disc tightening bolt	11 ÷ 13
Oil bleed screw	12 ÷ 16
Calliper to engine tightening screw	20 ÷ 25
Brake pump reservoir screws	15 ÷ 20
Calliper coupling screws	30 ÷ 33

MUFFLER

Name	Torque in Nm
Muffler heat guard clamping screw	5 - 6
Exhaust fumes inlet screw	13 ÷ 15
Screw for fixing muffler to the support arm	20 ÷ 25

LUBRICATION

Name	Torque in Nm
Hub oil drainage plug	15 ÷ 17
Oil filter on crankcase fitting	27 ÷ 33
Engine oil drainage plug/mesh filter	24 ÷ 30
Oil filter	8 ÷ 10
Oil pump cover screws	7 ÷ 9
Screws fixing oil pump to the crankcase	5 - 6
Oil pump control crown screw	10 ÷ 14
Oil pump cover plate screws	4 ÷ 6
Oil sump screws	10 ÷ 14
Minimum oil pressure sensor	12 ÷ 14

CYLINDER HEAD

Name	Torque in Nm
Spark plug	12 ÷ 14
Head cover screws	6 ÷ 7
Nuts for head fastening to the cylinder	7 ± 1 + 180° (2x90°) (Fasten nuts in two crossed passes) (Before fitting the nuts, lubricate them with engine oil.)
Head fixing side screws	11 ÷ 13
Starter ground screw	7 ÷ 8.5
M5 side screw locking washers on camshaft	7 ÷ 8.5
Tappet set screw lock nut	6 ÷ 8
Inlet manifold screws	11 ÷ 13
Timing chain tensioner slider screw	10 ÷ 14
M6 central screw locking washers on camshaft	11 ÷ 15
Timing chain tensioner support screw	11 ÷ 13
Timing chain tensioner central screw	5 - 6
Camshaft retention plate screw	4 ÷ 6

TRANSMISSION

Name	Torque in Nm
Belt support roller screw	11 ÷ 13
Clutch assembly nut on driven pulley	55 ÷ 60
Drive pulley nut	75 ÷ 83
Transmission cover screws	11 ÷ 13
Driven pulley shaft nut	54 ÷ 60
Rear hub cap screws	24 ÷ 27

FLYWHEEL

Name	Torque in Nm
Flywheel cover fixing screws	5 - 6
Stator assembly screws	3 - 4 (Apply LOCTITE 242 medium-strength threadlock)
Flywheel nut	52 ÷ 58
Pick-Up clamping screws	3 ÷ 4

CRANKCASE AND CRANKSHAFT

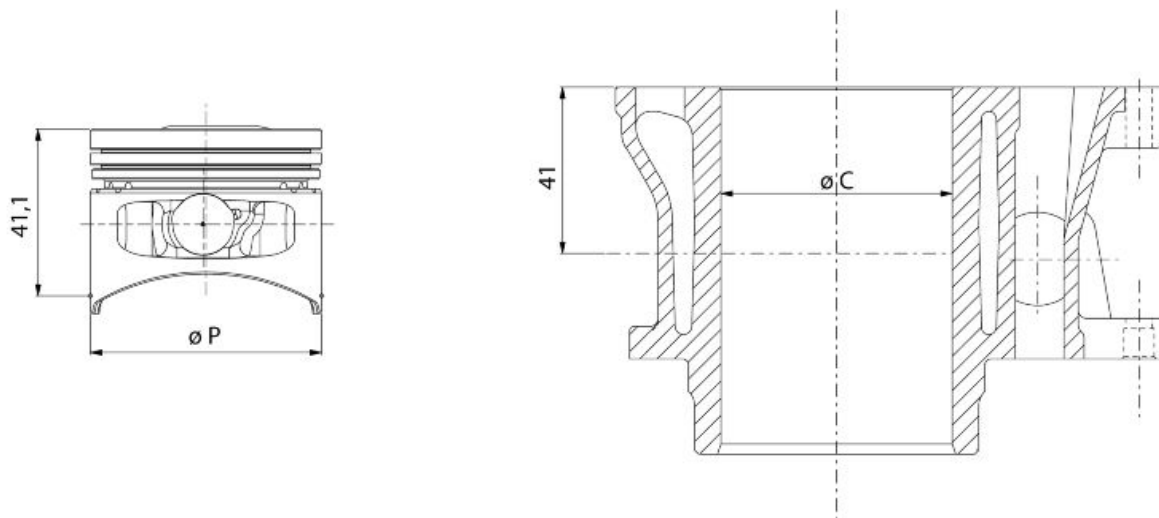
Name	Torque in Nm
Internal engine crankcase bulkhead (transmission-side half shaft) screws	4 ÷ 6
Engine-crankcase coupling screws	11 ÷ 13
Starter motor screws	11 ÷ 13
Crankcase timing cover screws	3.5 - 4.5 (Apply LOCTITE 242 medium-strength threadlock)

COOLING

Name	Torque in Nm
Water pump rotor cover	3 ÷ 4
Screws of the water pump rotor driving link	3 ÷ 4
Thermostat cover screws	3 ÷ 4

Overhaul data**Assembly clearances**

Cylinder - piston assy.

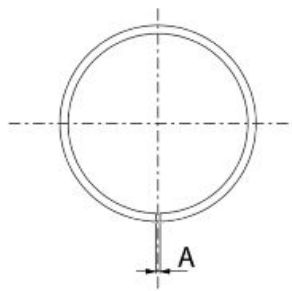


COUPLING CATEGORIES

Name	Initials	Cylinder	Piston	Play on fitting
Cylinder	A	56.997 ÷ 57.004	56.945 ÷ 56.952	0.045 - 0.059
Cylinder	B	57.004 ÷ 57.011	56.952 ÷ 56.959	0.045 - 0.059
Piston	C	57.011 ÷ 57.018	56.959 ÷ 56.966	0.045 - 0.059
Piston	D	57.018 ÷ 57.025	56.966 ÷ 56.973	0.045 - 0.059
Cylinder 1st Over-size	A1	57.197 ÷ 57.204	57.145 ÷ 57.152	0.045 - 0.059
Cylinder 1st Over-size	B 1	57.204 ÷ 57.211	57.152 ÷ 57.159	0.045 - 0.059
Piston 1st Over-size	C 1	57.211 ÷ 57.218	57.159 ÷ 57.166	0.045 - 0.059
Piston 1st Over-size	D 1	57.218 ÷ 57.225	57.166 ÷ 57.173	0.045 - 0.059
Cylinder 2nd Over-size	A2	57.397 ÷ 57.404	57.345 ÷ 57.352	0.045 - 0.059
Cylinder 2nd Over-size	B 2	57.404 ÷ 57.411	57.352 ÷ 57.359	0.045 - 0.059
Piston 2nd Over-size	C 2	57.411 ÷ 57.418	57.359 ÷ 57.366	0.045 - 0.059
Piston 2nd Over-size	D 2	57.418 ÷ 57.425	57.366 ÷ 57.373	0.045 - 0.059
Cylinder 3rd Over-size	A 3	57.597 ÷ 57.604	57.545 ÷ 57.552	0.045 - 0.059
Cylinder 3rd Over-size	B 3	57.604 ÷ 57.611	57.552 ÷ 57.559	0.045 - 0.059
Piston 3rd Over-size	C 3	57.611 ÷ 57.618	57.559 ÷ 57.566	0.045 - 0.059

Name	Initials	Cylinder	Piston	Play on fitting
Piston 3rd Over-size	D 3	57.618 ÷ 57.625	57.566 ÷ 57.573	0.045 - 0.059

Piston rings



ENGINE SEALING RINGS

Name	Description	Dimensions	Initials	Quantity
Compression ring		57 x 1	A	0.15 ÷ 0.30
Oil scraper ring		57 x 1	A	0.10 ÷ 0.30
Oil scraper ring		57 x 2.5	A	0.15 ÷ 0.35

ENGINE SEALING RINGS (1ST OVERSIZE)

Name	Description	Dimensions	Initials	Quantity
Compression ring 1st oversize		57.2 x 1	A	0.15 ÷ 0.30
Oil scraper ring 1st Oversize		57.2 x 1	A	0.10 ÷ 0.30
Oil scraper ring 1st Oversize		57.2 x 2.5	A	0.15 ÷ 0.35

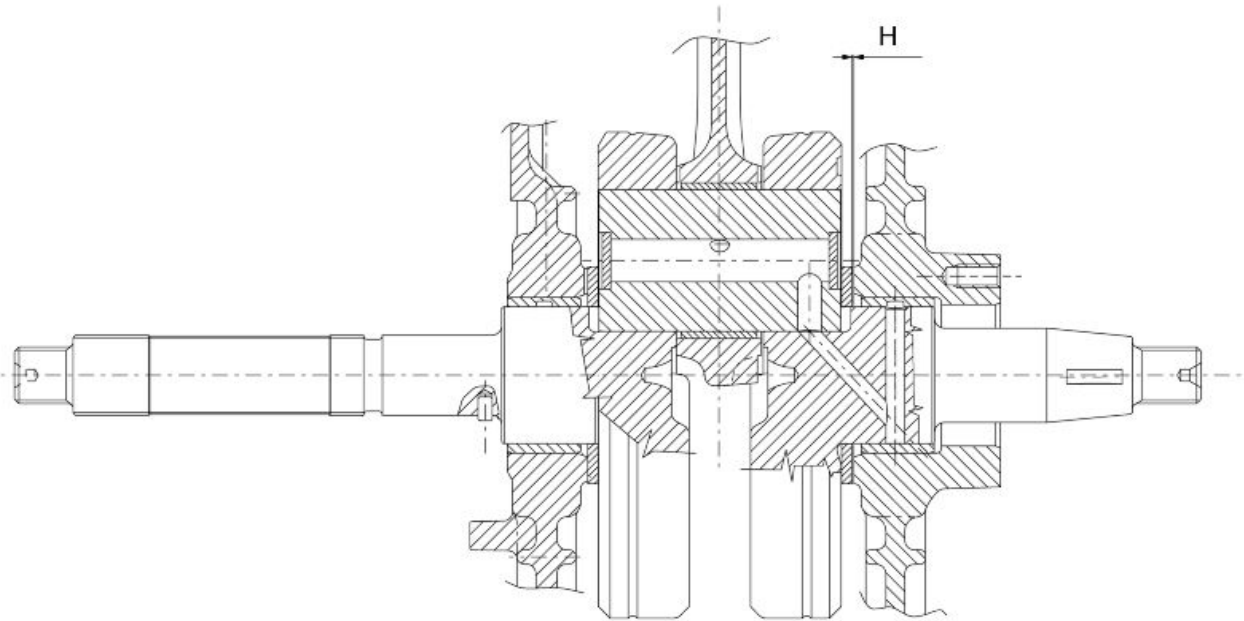
ENGINE SEALING RINGS (2ND OVERSIZE)

Name	Description	Dimensions	Initials	Quantity
Compression ring 2nd Oversize		57.4 x 1	A	0.15 ÷ 0.30
Oil scraper ring 2nd Oversize		57.4 x 1	A	0.10 ÷ 0.30
Oil scraper ring 2nd Oversize		57.4 x 2.5	A	0.15 ÷ 0.35

ENGINE SEALING RINGS (3RD OVERSIZE)

Name	Description	Dimensions	Initials	Quantity
Compression ring 3rd Oversize		57.6 x 1	A	0.15 ÷ 0.30
Oil scraper ring 3rd Oversize		57.6 x 1	A	
Oil scraper ring 3rd Oversize		57.6 x 2.5	A	0.15 ÷ 0.35

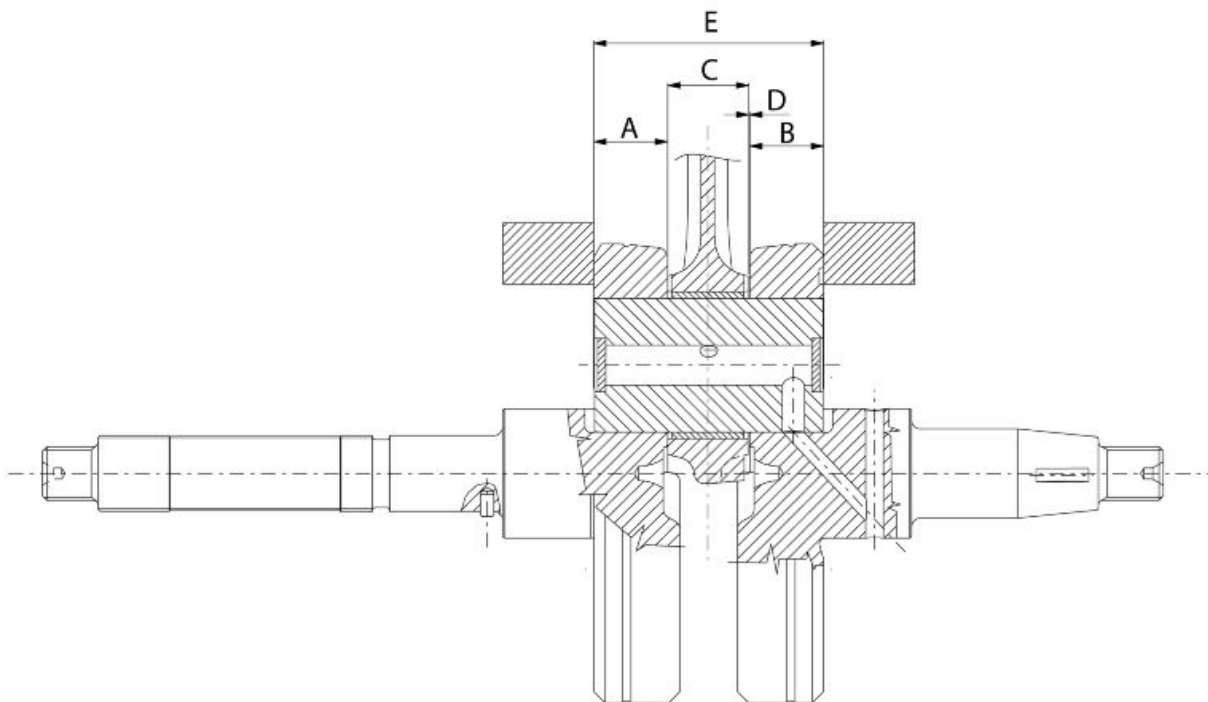
Crankcase - crankshaft - connecting rod



Fitting clearances

Crankshaft/crankcase axial clearance (H):

0.15 ÷ 0.40 mm (when cold)



CRANKSHAFT/ CRANKCASE AXIAL CLEARANCE

Name	Description	Dimensions	Initials	Quantity
Half-shaft, transmission side		16.6 +0-0.05	A	D = 0.20 - 0.50
Flywheel-side half-shaft		16.6 +0-0.05	B	D = 0.20 - 0.50
Connecting rod		18 -0.10 -0.15	C	D = 0.20 - 0.50
Spacer tool		51.4 +0.05	E	D = 0.20 - 0.50

CRANKSHAFT HALF-BEARINGS

Name	Description	Dimensions	Initials	Quantity
Crankshaft half-bearing			Category B - blue	1.973 ÷ 1.976
Crankshaft half-bearing			Category C - yellow	1.976 ÷ 1.979
Crankshaft half-bearing			Category E - green	1.979 ÷ 1.982

CRANKCASE - CRANKSHAFT COUPLINGS

Name	Description	Dimensions	Initials	Quantity
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

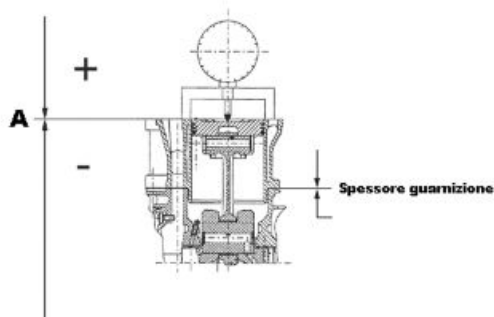
Name	Description	Dimensions	Initials	Quantity
Crankshaft			Category 1	28.998 ÷ 29.004
Crankshaft			Category 2	29.004 ÷ 29.010
Crankcase			Category 1	32.959 ÷ 32.965
Crankcase			Category 2	32.953 ÷ 32.959

Slot packing system

Characteristic

Compression ratio

12 ± 0.5: 1



Measurement "A" to be taken is a value of piston protrusion. It indicates by how much the plane formed by the piston crown protrudes from the plane formed by the upper part of the cylinder. The further the piston protrudes from the cylinder, the bigger the base gasket to be used (to recover the compression ratio) and vice versa.

N.B.

DISTANCE "A" MUST BE MEASURED WITHOUT ANY GASKET FITTED BETWEEN CRANKCASE AND CYLINDER

SHIMMING

Name	Measure A	Thickness
Shimming	2.2 ÷ 2.4	0.4 ± 0.05
Shimming	2.4 ÷ 2.6	0.6 ± 0.05

Products

RECOMMENDED PRODUCTS TABLE

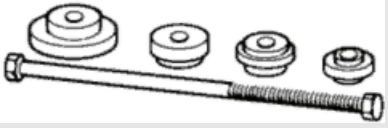

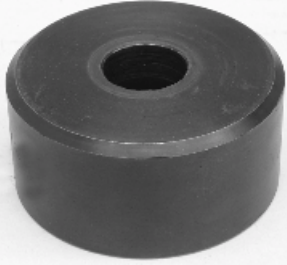

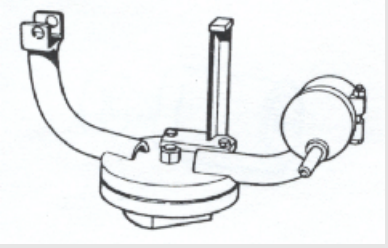

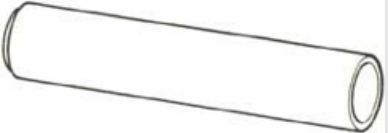
Product	Description	Specifications
AGIP ROTRA 80W-90	Rear hub oil	SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications
AGIP CITY HI TEC 4T	Oil to lubricate flexible transmissions (throttle control)	Oil for 4-stroke engines
AGIP FILTER OIL	Oil for air filter sponge	Mineral oil with specific additives for increased adhesiveness
AGIP GP 330	Calcium complex soap-based grease with NLGI 2; ISO-L-XBCIB2	Grease (brake control levers, throttle grip)
AGIP CITY HI TEC 4T	Engine oil	SAE 5W-40, API SL, ACEA A3, JASO MA Synthetic oil
AGIP BRAKE 4	Brake fluid	FMVSS DOT4 Synthetic fluid
SPECIAL AGIP PERMANENT fluid	coolant	Monoethylene glycol-based anti-freeze fluid, CUNA NC 956-16

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TOOLING


TOOL

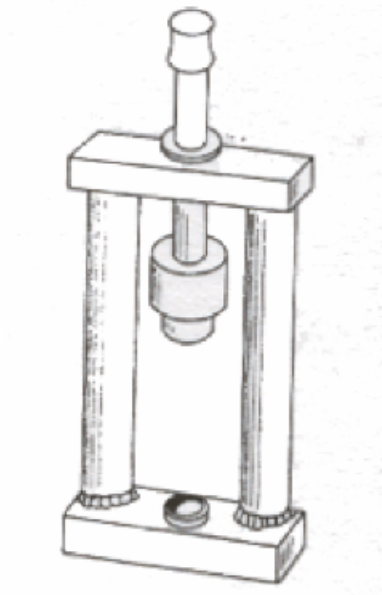
APPROPRIATE TOOLS

Stores code	Description	
001330Y	Tool for fitting steering seats	
001467Y009	Driver for OD 42 mm bearings	
001467Y017	Bell for bearings, outside Ø 39 mm	
001467Y014	Pliers to extract ø 15-mm bearings	
005095Y	Engine support	
002465Y	Pliers for circlips	
006029Y	Punch for fitting fifth wheel seat on steering tube	

Stores code	Description
008564Y	Flywheel extractor



020004Y	Punch for removing fifth wheels from headstock	
---------	--	---

020021Y	Front suspension service tool	
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020036Y	Punch	
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020037Y	Punch	
---------	-------	---

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

Stores code	Description	
020263Y	Sheath for driven pulley fitting	
020287Y	Clamp to assemble piston on cylinder	
020306Y	Punch for assembling valve seal rings	
020319Y	Immobilizer check tester	
020329Y	MityVac vacuum-operated pump	
020330Y	Stroboscopic light for timing control	

Stores code
020331Y

Description
Digital multimeter



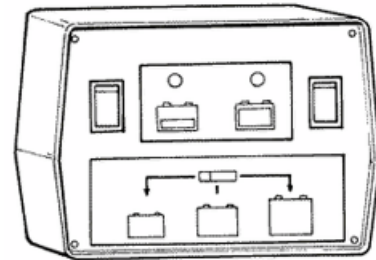
020332Y

Digital rev counter



020333Y

Single battery charger










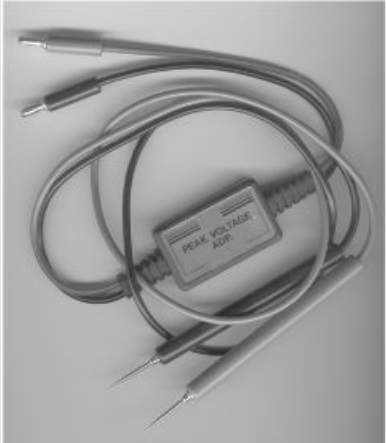



020334Y




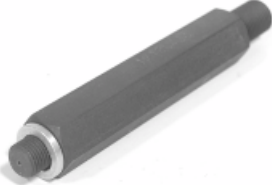
Multiple battery charger









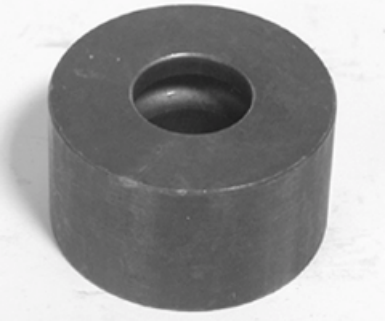



Stores code	Description	
020335Y	Magnetic support for dial gauge	
020357Y	32 x 35 mm adaptor	
020359Y	42x47-mm adaptor	
020360Y	Adaptor 52 x 55 mm	
020363Y	20 mm guide	
020364Y	25-mm guide	

Stores code	Description	
020365Y	22 mm guide	
020368Y	driving pulley lock wrench	
020375Y	Adaptor 28 x 30 mm	
020376Y	Adaptor handle	
020382Y	Valve cotters equipped with part 012 removal tool	
020382Y011	adapter for valve removal tool	

Stores code	Description	
020393Y	Piston fitting band	
020409Y	Multimeter adaptor - Peak voltage detection	
020412Y	15 mm guide	
020414Y	28-mm guide	
020423Y	driven pulley lock wrench	

Stores code	Description	
020424Y	Driven pulley roller casing fitting punch	
020425Y	Punch for flywheel-side oil seal	
020426Y	Piston fitting fork	
020430Y	Pin lock fitting tool	
020431Y	Valve oil seal extractor	
020434Y	Oil pressure control fitting	

Stores code	Description	
020439Y	17 mm guide	
020440Y	Water pump service tool	
020441Y	26 x 28 mm adaptor	
020442Y	Pulley lock wrench	
020444Y	Tool for fitting/ removing the driven pulley clutch	

Stores code	Description	
020455Y	10-mm guide	
020456Y	Ø 24 mm adaptor	
020477Y	Adaptor 37 mm	
020483Y	30 mm guide	
020489Y	Hub cover support stud bolt set	
020565Y	Flywheel lock calliper spanner	

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MAINTENANCE

MAIN

Maintenance chart
EVERY 2 YEARS**Action**

Coolant - change
Brake fluid - change
Secondary air filter (external / internal) - Clean

AFTER 1000 KM

80'

Action

Engine oil - replacement
Hub oil - change
Engine oil - change
Idle speed (*) - adjustment
Throttle lever - adjustment
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Safety locks - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

(*) See instructions in «Idle speed adjustment» section

EVERY 3,000 KM

10'

Action

Engine oil - level check/ top-up

AFTER 6000 KM**Action**

Engine oil - replacement
Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean
Engine oil - change
valve clearance - check
Variable speed rollers - check or replacement
Driving belt - check
Coolant level - check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

AFTER 12,000 KM; 60,000 KM

130'

Action

Engine oil - replacement
Hub oil level - check
Air filter - clean
Engine oil - change
Spark plug - replacement
Idle speed (*) - adjustment
Throttle lever - adjustment
Driven pulley roller casing - Greasing
Driving belt - replacement
Sliding blocks / variable speed rollers - check
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check
Vehicle and brake test - road test

(*) See instructions in the «Idle speed adjustment» section

AT 18000 KM AND AT 54000 KM

100'

Action

Engine oil - replacement
Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean
Engine oil - change
Variable speed rollers - check or replacement
Driving belt - check
Coolant level - check
Radiator - external cleaning/ check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

AT 24000 KM AND AT 48000 KM

Action

Engine oil - replacement
Hub oil - change
Air filter - clean
Engine oil - change
Spark plug - replacement
valve clearance - check
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement

Action

Driving belt - replacement
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Driven pulley roller casing - Greasing
Tyre pressure and wear - check
Vehicle and brake test - road test

(*) See instructions in «Idle speed adjustment» section

AT 30000 KM, AT 42000 KM AND AT 66000 KM**Action**

Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean
Variable speed rollers - check or replacement
Driving belt - check
Coolant level - check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test
Engine oil - replacement
Oil filter -Replacement

AFTER 36000 KM**Action**

Engine oil - replacement
Hub oil level - check
Air filter - clean
Engine oil - change
Spark plug - replacement
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
Driving belt - replacement
Coolant level - check
Radiator - external cleaning/ check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid hoses - replacement
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check

Action

Electrical system and battery - check

Headlight - adjustment

Driven pulley roller casing - Greasing

Tyre pressure and wear - check

Vehicle and brake test - road test

(*) See instructions in «Idle speed adjustment» section

AFTER 72000 KM**Action**

Engine oil - replacement

Hub oil - change

Spark plug / electrode gap - check / replacement

Air filter - clean

Engine oil - change

valve clearance - check

Idle speed (*) - adjustment

Throttle lever - adjustment

Variable speed rollers - check or replacement

Driving belt - replacement

Coolant level - check

Radiator - external cleaning/ check

Steering - adjustment

Brake control levers - greasing

Brake pads - check condition and wear

Brake fluid hoses - replacement

Brake fluid level - check

Transmission elements - lubrication

Safety locks - check

Suspensions - check

Electrical system and battery - check

Headlight - adjustment

Driven pulley roller casing - Greasing

Tyre pressure and wear - check

Vehicle and brake test - road test

(*) See instructions in «Idle speed adjustment» section

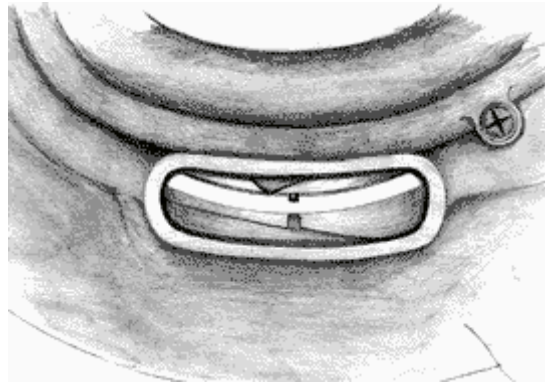
Carburettor

- Disassemble the carburettor in its parts, wash all of them with solvent, dry all body grooves with compressed air to ensure adequate cleaning.
- Check carefully that the parts are in good condition.
- The throttle valve should move freely in the chamber. Replace it in case of excessive clearance due to wear.
- If there are wear marks in the chamber causing inadequate tightness or a free valve slide (even if it is new), replace the carburettor.
- It is advisable to replace the gaskets at every refit

WARNING**PETROL IS HIGHLY EXPLOSIVE ALWAYS REPLACE THE GASKETS TO AVOID PETROL LEAKS**

Checking the spark advance

- To check ignition advance, use the stroboscopic light with induction pincers connected to the spark plug power wire.
- Connect the induction pincers being careful to respect the proper polarity (the arrow stamped on the pincers must be pointing at the spark plug).
- Place the light selector in central position (1 spark = 1 crankshaft revolution as in 2 T engines).
- Start the engine and check that the light works properly and the rpm indicator can read also the high rpm (e.g. 8000 rpm).
- If flash unsteadiness or revolution reading error is detected (e.g. half values), increase the resistive load on the spark plug power line (10 ÷ 15 K Ω in series to AT cable).
- Remove the plastic cover from the slot on the flywheel cover.
- Operating on the flash corrector displacement of the bulb, make the reference on the flywheel cover coincide with level on the water pump drive. Read the advance degrees indicated by the stroboscopic light.
- Check that the advance degrees corresponds with the rotation rpm as indicated in the table.
- If there are anomalies, check the Pick-Up and the control unit power supply (positive-negative), replace the control unit if necessary.
- The brand new control unit prevents that the engine rotation exceeds 2000 rpm.
- The programmed control unit allows the engine to rotate within the prescribed limits.



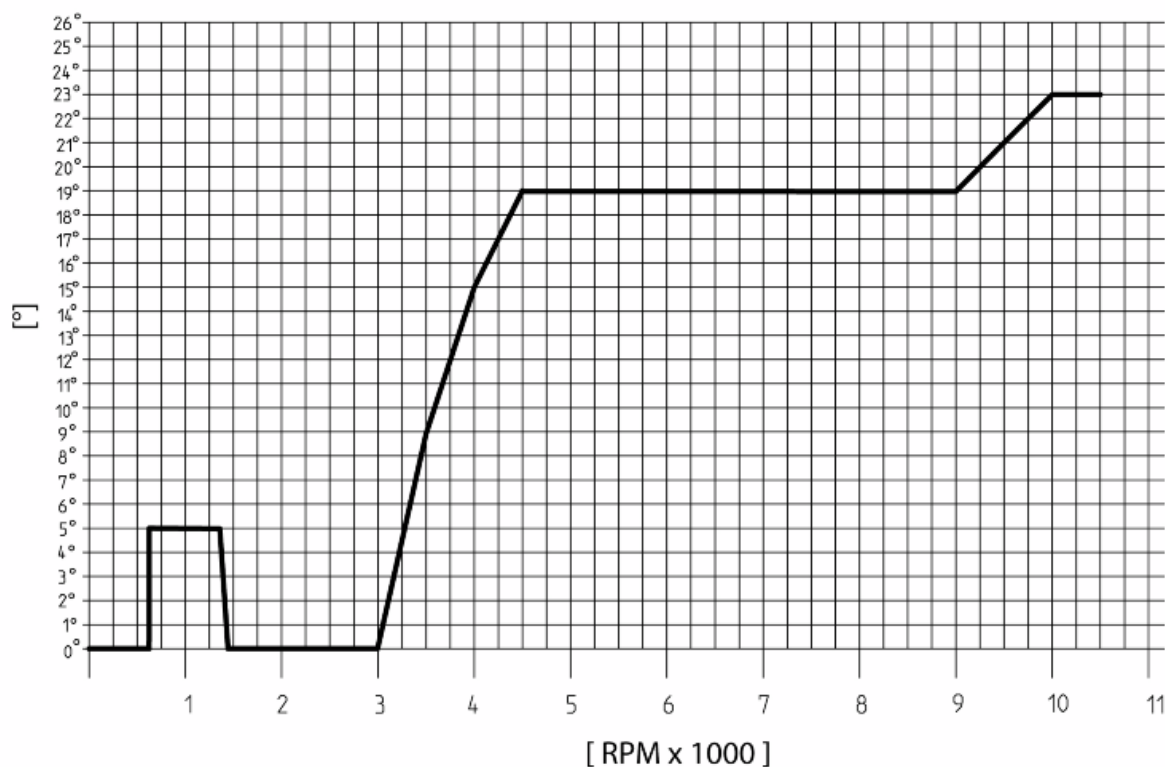
Characteristic Ignition advance

10° at 2.000 rpm - 29° at 6.750 rpm

Spark advance variation

IGNITION ADVANCE VARIATION

Specification	Desc./Quantity
Operation threshold	First threshold : 10700 ±50 Second threshold : 11000 ±50
Reactivation threshold	First threshold : 10600±50 Second threshold : 10900±50
Spark elimination	First threshold : 1 spark on 7 Second threshold : 2 sparks on 3



Spark plug

- Rest the scooter on its stand
- Open the saddle and take out the helmet compartment
- Disconnect spark plug HV wire hood;
- 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 grimy, 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.
- Insert the cap onto the spark plug and proceed with the reassembly operations.

CAUTION

THE SPARK PLUG MUST BE REMOVED WHEN THE MOTOR IS COLD. THE SPARK PLUG MUST BE REPLACED EVERY 12,000 KM. THE USE OF NON CONFORMING IGNITION CONTROL UNITS OR SPARK PLUGS OTHER THAN THOSE PRESCRIBED CAN SERIOUSLY DAMAGE THE ENGINE.

Characteristic**Spark plug**

Champion RG 4 HC

Alternative spark plug

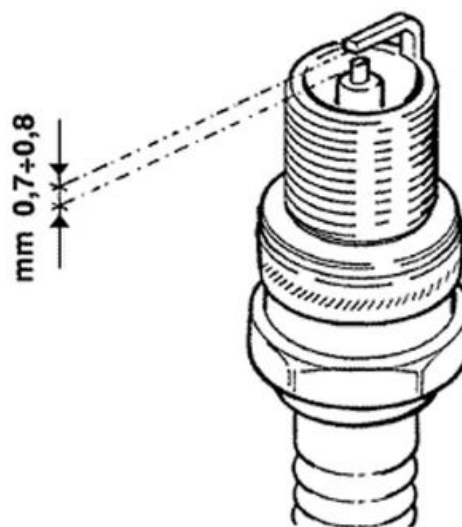
NGK CR8EB

Electrode gap

0.7-0.8 mm

Locking torques (N*m)

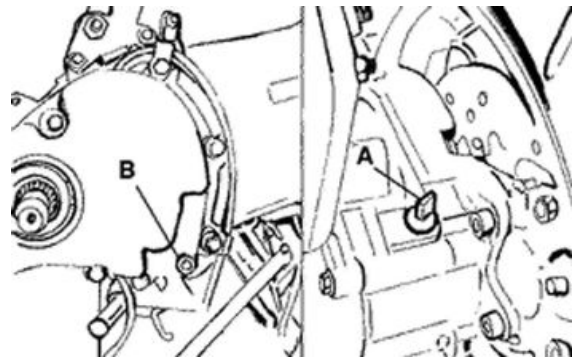
Spark plug 12 ÷ 14



Hub oil

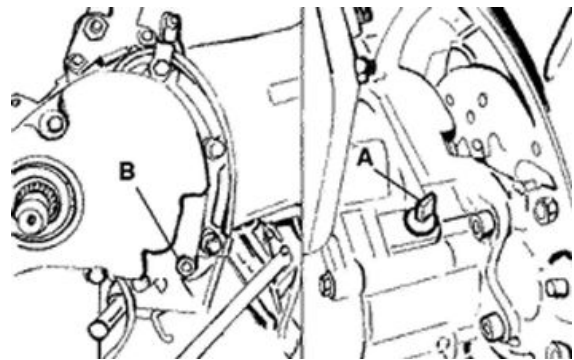
Check

- Stand the vehicle on its centre stand on flat ground;
- Remove the oil dipstick "A", dry it with a clean cloth and put it back into its hole **tightening it completely**;
- Take out the dipstick checking that the oil level reaches the dipstick lower notch; if the level is under the MAX. mark, it needs to be filled with the right amount of hub oil.
- Screw up the oil dipstick again and make sure it is locked properly into place.



Replacement

- Remove the oil cap «A».
- Unscrew the oil drainage cap "B" 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 ~ 150 cm³

Locking torques (N*m)

Hub oil drainage screw 15 ÷ 17 Nm

Air filter

Proceed as follows:

1. unscrew the fixing screw «A».
2. unscrew the nut «B» under the body.
3. remove the left side fairing.
4. remove the helmet compartment;
5. unscrew the fixing screws «C» that can be reached once the helmet compartment has been removed;
6. Unscrew the screws «D» and remove the air filter 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. Oil or water deposits in the filter housing can be cleaned off by removing the two rubber caps «E».

CAUTION

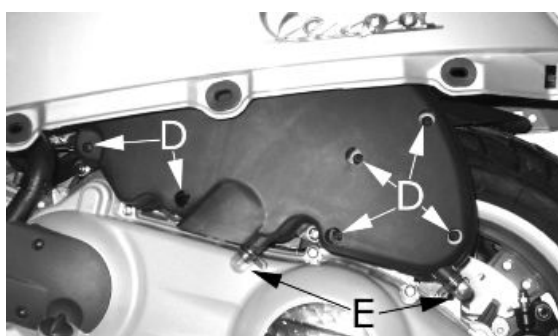
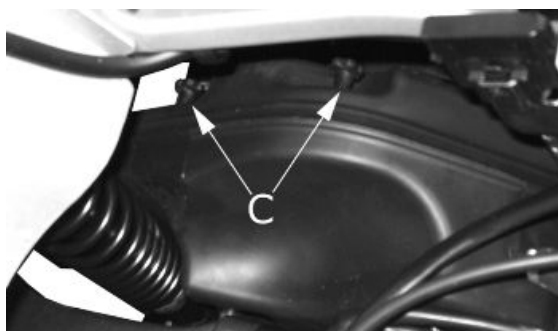
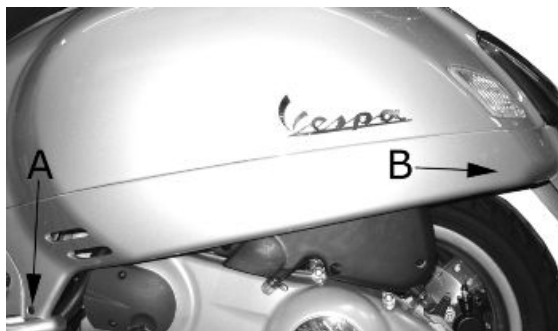


IF THE VEHICLE IS USED ON DUSTY ROADS IT IS NECESSARY TO CARRY OUT MAINTENANCE CONTROLS OF THE AIR FILTER TO AVOID DAMAGING THE ENGINE.

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

Replace oil and filter as indicated in the scheduled maintenance table. The engine must be drained by running off the oil from drainage cap "B" of the flywheel side mesh pre-filter; furthermore to facilitate oil drainage, loosen the cap/dipstick "A". Once all the oil has drained through the drainage hole, unscrew the oil cartridge filter "C" and remove it. Make sure the pre-filter and discharge tap O-rings are in good condition.

Lubricate them and refit the mesh filter and oil drainage plug, screwing them up to the specified 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 cap "A". Then start up the scooter, 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.

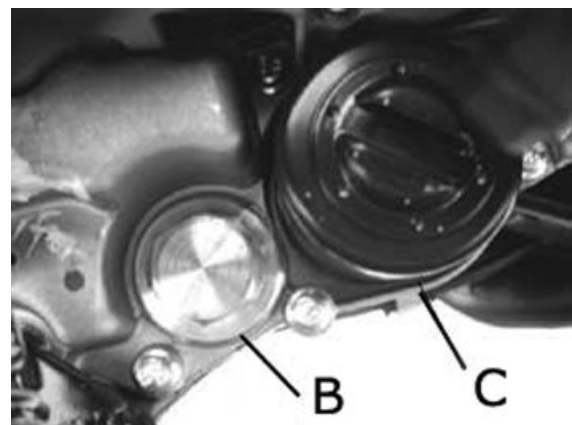
THE ENGINE MUST BE HOT WHEN THE OIL IS CHANGED.

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

Characteristic



Engine oil top-up600 ÷ 650 cc

Check

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

1. Place the vehicle on its centre stand and on flat ground.
2. Undo cap/dipstick "A", dry it off with a clean cloth and replace it, **screwing down completely**.
3. Remove the cap/dipstick again and check that the level is between the min and max. 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 line 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**.

The restoration level between the **MIN** and **MAX** levels implies a quantity of oil of **approx. 400 cc**.

**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 4 fixing screws and move away from the engine the flywheel cover equipped with a water pump and cooling manifolds.

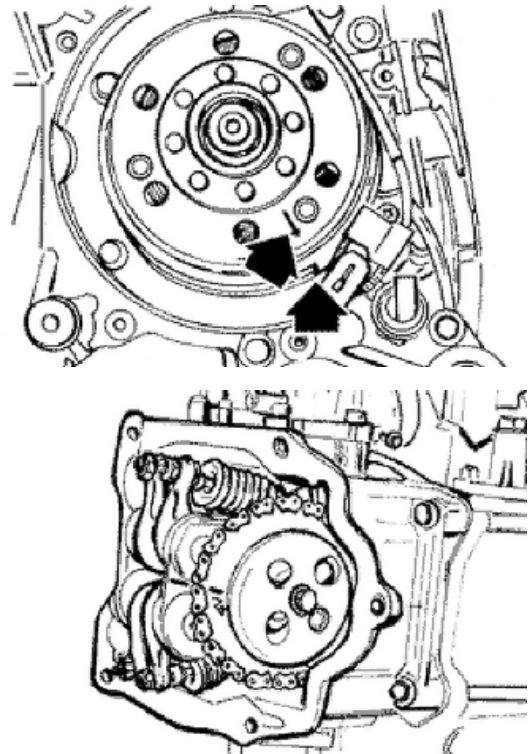
-Rotate the flywheel until the reference matches the crankcase operation end as shown in the figure (TDC). Make sure that the 4V reference point on the camshaft command pulley is aligned with the reference point on the head as shown in the second figure. If the reference mark is opposite the indicator 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 sense opposite to the normal direction using a calliper spanner applied to the camshaft command pulley casing.

N.B.

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



Cooling system

Introduction of the engine coolant.

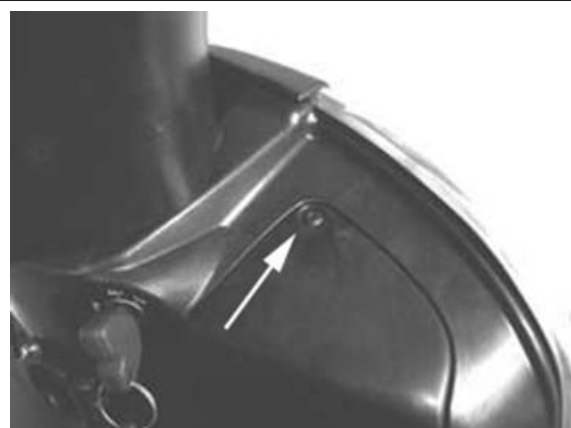
Check coolant level when the engine is cold as indicated in the scheduled maintenance table for kilometres covered, following the steps below:

Place the scooter on its centre stand and on flat ground.

- Undo the screw shown in the figure and remove the expansion tank cap on RHS.

- Top up if the fluid level is near or below the MIN level edge. The liquid level must always be between the MIN and MAX level.

-The coolant consists of an ethylene glycol and corrosion inhibitor based 50% de-ionised water-antifreeze solution mix.



CAUTION

DO NOT EXCEED THE MAX. LEVEL WHEN FILLING SO AS TO AVOID THE COOLANT ESCAPING FROM THE EXPANSION TANK WHEN THE vehicle IS IN USE.

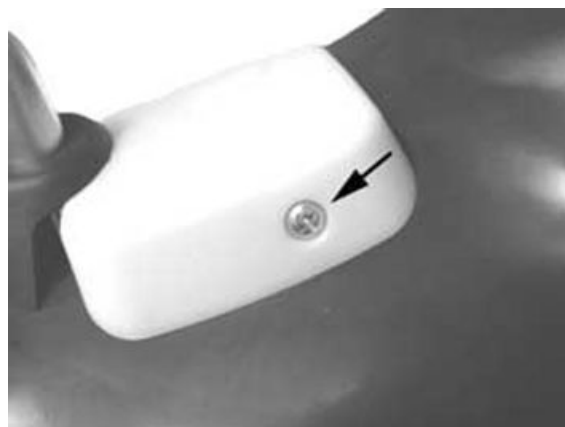


Braking system

Level check

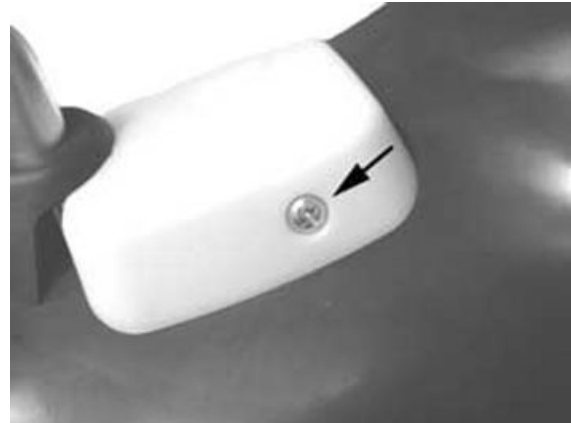
The brake fluid tanks for the front and rear brakes are located on the pumps under the handlebar cover. Proceed as follows:

- Remove the brake pump cover
- Rest the vehicle on its centre stand with the handlebars perfectly horizontal;
- Check the fluid level through the sight glass as shown in the figure. A certain lowering of the level is caused by wear on the pads.



Top-up

- Position the vehicle on a flat surface and on the centre stand
- Remove the brake pump cover as indicated in the photo



- Check the brake fluid level through the sight glass on the pump as shown in the photograph
- If the level is below the minimum, fill using the two screws shown in the figure



- Remove the gasket and fill with DOT 4 until the spyglass is completely covered

For refitting purposes carry out the operations in the reverse order from the removal operation and respect the tightening torque of the tank cover screws.

CAUTION

MAKE SURE THE BRAKE FLUID DOES NOT GET INTO YOUR EYES OR ON YOUR SKIN OR CLOTHES. IF THIS HAPPENS ACCIDENTALLY, WASH WITH WATER.

CAUTION



THE BRAKING CIRCUIT FLUID IS HIGHLY CORROSIVE. THEREFORE, WHEN TOPPING IT UP, AVOID LETTING IT COME INTO CONTACT WITH THE PAINTED PARTS OF THE VEHICLE. THE BRAKING CIRCUIT FLUID IS HYGROSCOPIC, WHICH MEANS THAT IT ABSORBS MOISTURE FROM THE SURROUNDING AIR. IF MOISTURE CONTAINED IN THE BRAKE FLUID EXCEEDS A CERTAIN



VALUE, THIS WILL RESULT IN INEFFICIENT BRAKING.

CAUTION

NEVER USE BRAKE FLUID COMING FROM OPEN OR PARTIALLY USED CONTAINERS. UNDER NORMAL WEATHER CONDITIONS, BRAKE FLUID MUST BE CHANGED AS INDICATED IN THE SCHEDULED MAINTENANCE TABLE.

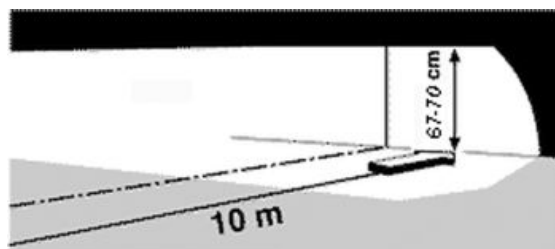
Locking torques (N*m)

Brake pump reservoir screws $15 \div 20$



Headlight adjustment

- Position the unloaded vehicle, in running conditions and with the tyres inflated to the prescribed pressure, onto a flat surface 10 m away from a white screen in a half-lit room, and make sure the vehicle longitudinal axis is perpendicular to the screen.
- Draw a horizontal line on the screen at a height of $67 \div 70$ cm from the ground.
- Remove the front radiator grille working on the screw indicated in the photograph
- Switch on the low-beam headlight and check that the horizontal borderline between the projected light beam and the dark area is not higher than the horizontal line drawn on the screen. To remove the headlight, act on the screw indicated in the figure.



SAS filters inspection and cleaning

the SAS for leader engines 125 cm³ - 200 cm³ Euro 2 operates in a similar manner to the SAS for 2T engines.

The differences are the following:

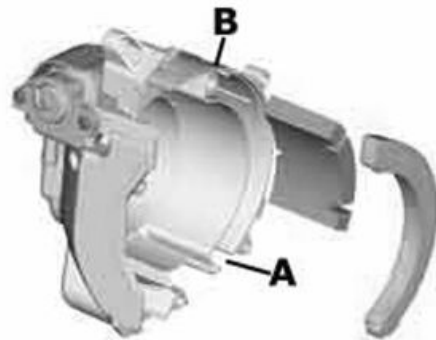
instead of entering through the muffler as for 2T engine, the secondary air enters directly in the discharge pipe on the head.

The 2T reed valve has a diaphragm. The unit, indicated by an arrow in the figure, has a cut-off connected to the depression intake on the inlet manifold that cuts the air inlet in deceleration, to avoid explosions in the muffler.



System description:

Air is drawn through the opening "A", goes through the first filter and is channelled through the opening "B"

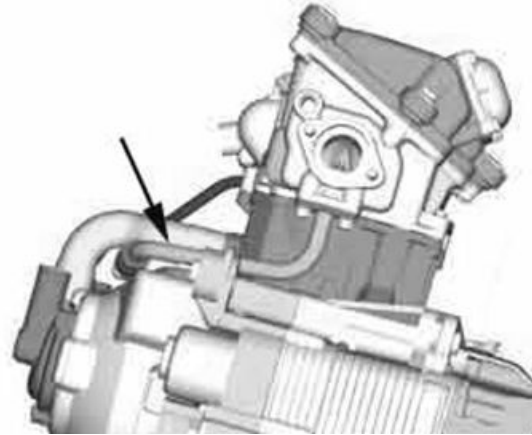


Air gets to the second filter "B" through the opening indicated in the figure.

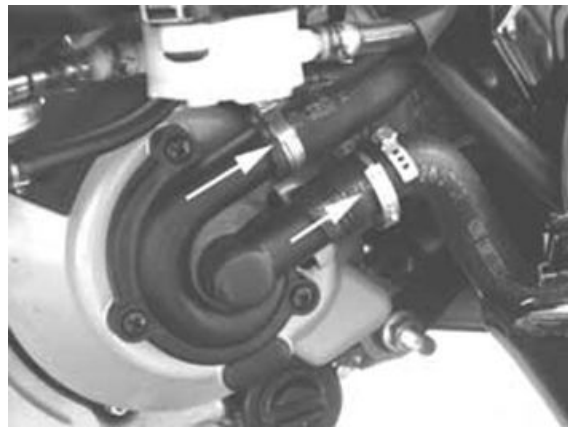
Now, the filtered air enters the diaphragm device, and then is channelled to the head.



The air passes through a rigid pipe connected to the head and reaches a discharge joint in order to supply oxygen to the unburned gases before the catalytic converter, thus favouring an improved re-action of the catalytic converter.



- Remove the muffler.
- Remove the right-hand side fairing
- Remove the coolant inlet and outlet couplings from the pump cover. Then, drain the system



- Remove the upper clamp of the SAS valve connection coupling to the drainage as indicated in the photograph



-
- Remove the 2 fixing screws, the gasket and the pipe connecting the SAS valve to the head. Then remove the pipe.



-
- Release the electrical cable from the flywheel cover clamp as indicated in the photograph



-
- Disconnect the depression pipe from the SAS valve



- Remove the pump support bracket and fuel filter.
- Remove the flywheel cover together with the SAS valve acting on the 4 hexagonal-head screws as indicated in the photograph



- Remove the SAS valve two fixing screws and remove the SAS valve together with the O-ring from the support



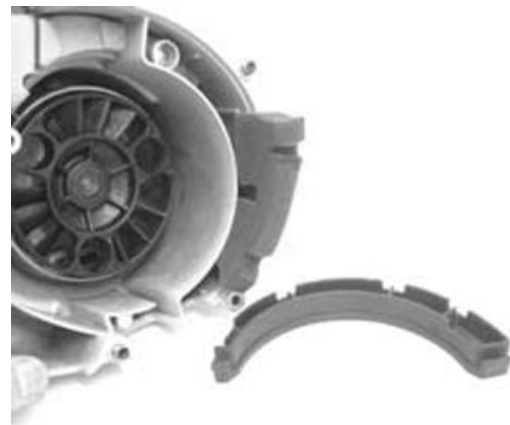
- Remove the plastic support together with the gasket



- Check that the SAS valve plastic support is not dented or distorted
- Check that the gasket is in good conditions
- Carefully clean the inside and outside filters. Replace them if damaged or abnormally distorted.
- Make sure the coupling connecting the secondary air to the head is not dented, overheated or distorted. If there is, replace it.
- Check that the metal pipe does not have any dents

CAUTION

INADEQUATE TIGHTNESS BETWEEN THE SAS VALVE AND ITS SUPPORT INCREASES NOISE IN THE SAS SYSTEM.



To refit, follow the removal procedure in reverse order being careful to respect the direction of the rubber coupling connecting the SAS valve and the discharge system

INDEX OF TOPICS

TROUBLESHOOTING

TROUBL

This section makes it possible to find what solutions to apply when troubleshooting.

For each breakdown, a list of the possible causes and respective interventions is given.

Engine

Poor performance

POOR PERFORMANCE

Possible Cause	Operation
The carburettor is dirty; fuel pump or vacuum valve damaged	Remove, wash with solvent and dry with compressed air or replace
Incorrect timing or worn timing system elements	Time the system again or replace the worn parts
Muffler obstructed	Replace
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.
Automatic starter failure	Check: mechanical movement, electric connection and power supply, replace if required.
Oil level exceeds maximum	Check for causes and fill to reach the correct level
Lack of compression parts, cylinder and valves wear	Replace the worn parts
Transmission belt worn	Replace
Inefficient automatic transmission	Check the rollers and the pulley movement, replace the damaged parts and lubricate the driven pulley moveable guide with Montblanc Molybdenum Grease
Clutch slipping	Check the clutch system and/or the bell and replace if necessary
Carburettor nozzles clogged	Dismantle, wash with solvent and dry with compressed air

Rear wheel spins at idle

REAR WHEEL ROTATES WITH ENGINE AT IDLE

Possible Cause	Operation
Idling rpm too high	Adjust the engine idle speed
Clutch fault	Check the springs / clutch masses
Intake coupling cracked or clamps incorrectly tightened	Replace the intake coupling and check the clamps are tightened

Starting difficulties

DIFFICULTY STARTING UP

Possible Cause	Operation
Altered fuel characteristics	Drain off the fuel no longer up to standard; then, refill
Rpm too low at start-up or engine and start-up system damaged	Check the starter motor, the system and the torque limiter

Possible Cause	Operation
Incorrect valve sealing or valve adjustment - Engine flooded.	Inspect the head and/or restore the correct clearance Try starting-up with the throttle fully open. If the engine fails to start, remove the spark plug, dry it and before refitting, make the motor turn so as to expel the fuel excess taking care to connect the cap to the spark plug, and this in turn to the ground. If the fuel tank is empty, refuel and start up.
Automatic starter failure	Check: mechanical movement, electric connection and fuel supply, replace if required.
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.
Faulty spark plug or incorrect ignition advance	Replace the spark plug or check the ignition circuit components
The carburettor is dirty; fuel pump or vacuum valve damaged	Remove, wash with solvent and dry with compressed air or replace
Battery flat	Check the charge of the battery, if there are any sulphur marks, replace and use the new battery following the instructions shown in the chapter
Intake coupling cracked or clamps incorrectly tightened	Replace the intake coupling and check the clamps are tightened
Defective floating valve	Check the proper sliding of the float and the functioning of the valve
Carburettor nozzles clogged	Dismantle, wash with solvent and dry with compressed air

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 assembly
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 guard	Replace the valve oil guard
Worn valve guides	Check and replace the head unit if required

Insufficient lubrication pressure

POOR LUBRICATION PRESSURE

Possible Cause	Operation
By-Pass remains open	Check the By-Pass and replace if required. Carefully clean the By-Pass area.

Possible Cause	Operation
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

Engine tends to cut-off at full throttle

THE MOTOR TENDS TO STOP AT MAXIMUM THROTTLE

Possible Cause	Operation
Level in tank too low	Restore the level in the tank by bending on the float the thrusting reed of the petrol inlet rod so as to have the float parallel to the tank level with the carburettor inverted.
Tank breather hole obstructed	Restore the proper tank aeration
Fuel supply pipes choked or clogged	Restore the adequate fuel supply
Maximum nozzle dirty - lean mixture	Wash the nozzle with solvent and dry with compressed air
Water in the carburettor	Empty the tank through the appropriate bleed nipple.
Incorrect float level	Restore the level in the tank by bending on the float the thrusting reed of the petrol inlet rod so as to have the float parallel to the tank level with the carburettor inverted.
Faulty fuel supply	Check or replace the fuel pump, and check the vacuum intake and the pipe sealing

Engine tends to cut-off at idle

THE ENGINE TENDS TO STOP AT IDLE SPEED

Possible Cause	Operation
Air calibrated holes in carburettor blocked	Dismantle, wash with solvent and dry with compressed air
Defective floating valve	Check the proper sliding of the float and the functioning of the valve
Level in chamber too high	Restore the level of the float chamber bending on the float the thrusting reed of the petrol inlet pin so as to have the float parallel to the float chamber level, with the carburettor inverted.
The starter remains on	Check the electric connection, fuel supply and mechanical movement. Replace if required.
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.
Incorrect timing	Time the system and check the timing system components
Cut off device failure	Check that the following parts work properly: valve; diaphragm; spring; and that the air calibration elements are clean; check if the sponge filter is clean too
Incorrect idle adjustment	Adjust using the rpm indicator

Possible Cause	Operation
Pressure too low at the end of compression	Check the thermal group seals and replace worn components
Faulty spark plug or incorrect ignition advance	Replace the spark plug or check the ignition circuit components
The starter remains on	Check: electric wiring, circuit not interrupted, mechanical movement and power supply; replace if necessary
Minimum nozzle dirty	Wash the nozzle with solvent and dry with compressed air

High fuel consumption

HIGH FUEL CONSUMPTION

Possible Cause	Operation
Loose nozzles	Check the maximum and minimum nozzles are adequately fixed in their fittings
Fuel pump failure	Check the low-pressure duct sealing
Inefficient Starter	Check: electric wiring, circuit continuity, mechanical sliding and power supply
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.
Incorrect float level	Restore the level in the tank by bending on the float the thrusting reed of the petrol inlet rod so as to have the float parallel to the tank level with the carburettor inverted.

Transmission and brakes

Clutch grabbing or performing inadequately

IRREGULAR CLUTCH PERFORMANCE OR SLIPPAGE

Possible Cause	Operation
Faulty clutch	Check that there is no grease on the masses. Check that the clutch mass contact surface with the casing is mainly in the centre with equivalent characteristics on the three masses. Check that the clutch casing is not scored or worn in an anomalous way

Insufficient braking

INEFFICIENT BRAKING SYSTEM

Possible Cause	Operation
Inefficient braking system	Check the pad wear (1.5 min). Check that the brake discs are not worn, scored or warped. Check the correct level of fluid in the pumps and replace brake fluid if necessary. Check there is no air in

Possible Cause	Operation
Fluid leakage in hydraulic braking system	the circuits; if necessary, bleed the air. Check that the front brake calliper moves in axis with the disc. Failing elastic fittings, plunger or brake pump seals, replace
Brake disc slack or distorted	Check the brake disc screws are locked; measure the axial shift of the disc with a dial gauge and with wheel mounted on the scooter.

Brakes overheating

BRAKES OVERHEATING

Possible Cause	Operation
Defective sliding of pistons	Check calliper and replace any damaged part.
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 shift of the disc.
Clogged compensation holes on the pump Swollen or glued rubber gaskets	Clean carefully and blast with compressed air Replace gaskets.

Electrical system

Battery

BATTERY

Possible Cause	Operation
Battery	This is the device in the system that requires the most frequent attention and the most thorough maintenance. If the vehicle is not used for some time (1 month or more) the battery needs to be re-charged periodically. The battery runs down completely in the course of 3 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+.

Turn signal lights malfunction

TURN INDICATOR NOT WORKING

Possible Cause	Operation
Electronic ignition device failure	With the key switch set to "ON" jump the contacts 1 (Blue - Black) and 5 (Red/Blue) on the control unit connector. If by operating the turn indicator control the lights are not steadily on, replace the control unit; otherwise, check the cable harness and the switch.

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: if they are recessed or if the balls are squashed, replace them.

Excessive steering play

EXCESSIVE STEERING CLEARANCE

Possible Cause	Operation
Torque not conforming	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: if they are recessed or if the balls are squashed, replace them.

Noisy suspension

NOISY SUSPENSION

Possible Cause	Operation
Malfunctions in the suspension system	If the front suspension is noisy, check: the efficiency of the front shock absorbers; the condition of the ball bearings and relevant lock-nuts, the limit switch rubber buffers and the movement bushings. In conclusion, check the tightening torque of the wheel hub, the brake calliper, the shock absorber disk in the attachment to the hub and the steering tube.

Suspension oil leakage

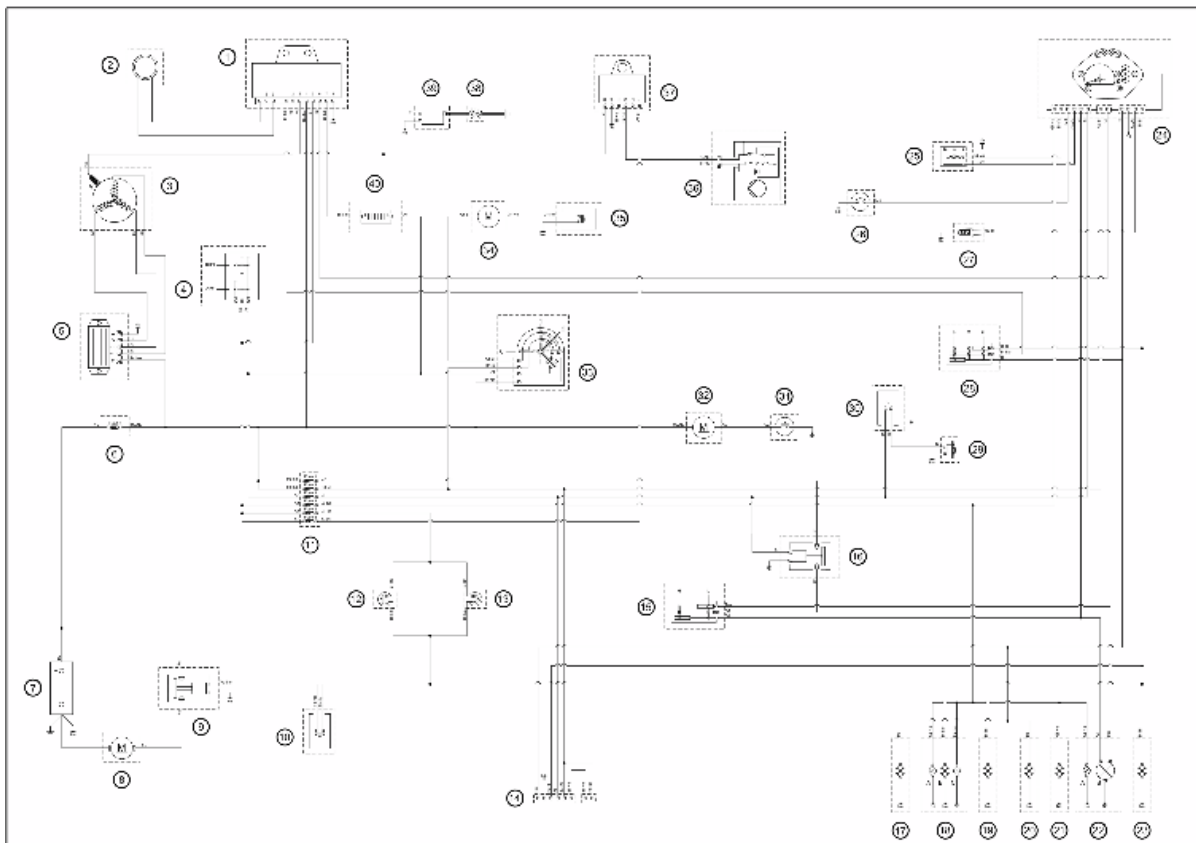
OIL LEAKAGE FROM SUSPENSION

Possible Cause	Operation
Seal fault or breakage	Replace the shock absorber Check the condition of wear of the steering covers and the adjustments.

INDEX OF TOPICS

ELECTRICAL SYSTEM

ELE SYS



KEY

- 1. Electronic ignition device
- 2. Immobilizer aerial
- 3. Magneto flywheel - Pick-up
- 4. Engine stop switch
- 5. Voltage regulator
- 6. Main fuse
- 7. Battery
- 8. Starter motor
- 9. Start-up remote control switch
- 10. Starter button
- 11. Fuses
- 12. Stop button on rear brake
- 13. Stop button on front brake
- 14. Wiring for antitheft device
- 15. Light switch
- 16. Light remote control
- 17. Rear left turn indicator
- 18. Rear light
- A. Tail light bulb

- B. Stop light bulb
- C. License plate bulb
- 19.** Rear right turn indicator
- 20.** Front left turn indicator
- 21.** Front position light
- 22.** Front light
- A. Tail light bulb
- B. Headlight bulb
- 23.** Front right turn indicator
- 24.** Instrument panel
- 25.** Fuel level transmitter
- 26.** Engine oil pressure sensor
- 27.** Thermistor
- 28.** Turn indicator switch
- 29.** Horn
- 30.** Horn button
- 31.** Thermostwitch
- 32.** Electric fan
- 33.** Key switch
- 34.** Saddle opening actuator
- 35.** Saddle opening button
- 36.** Fuel pump
- 37.** Fuel electric pump control device
- 38.** Spark plug
- 39.** HV coil
- 40.** Automatic starter

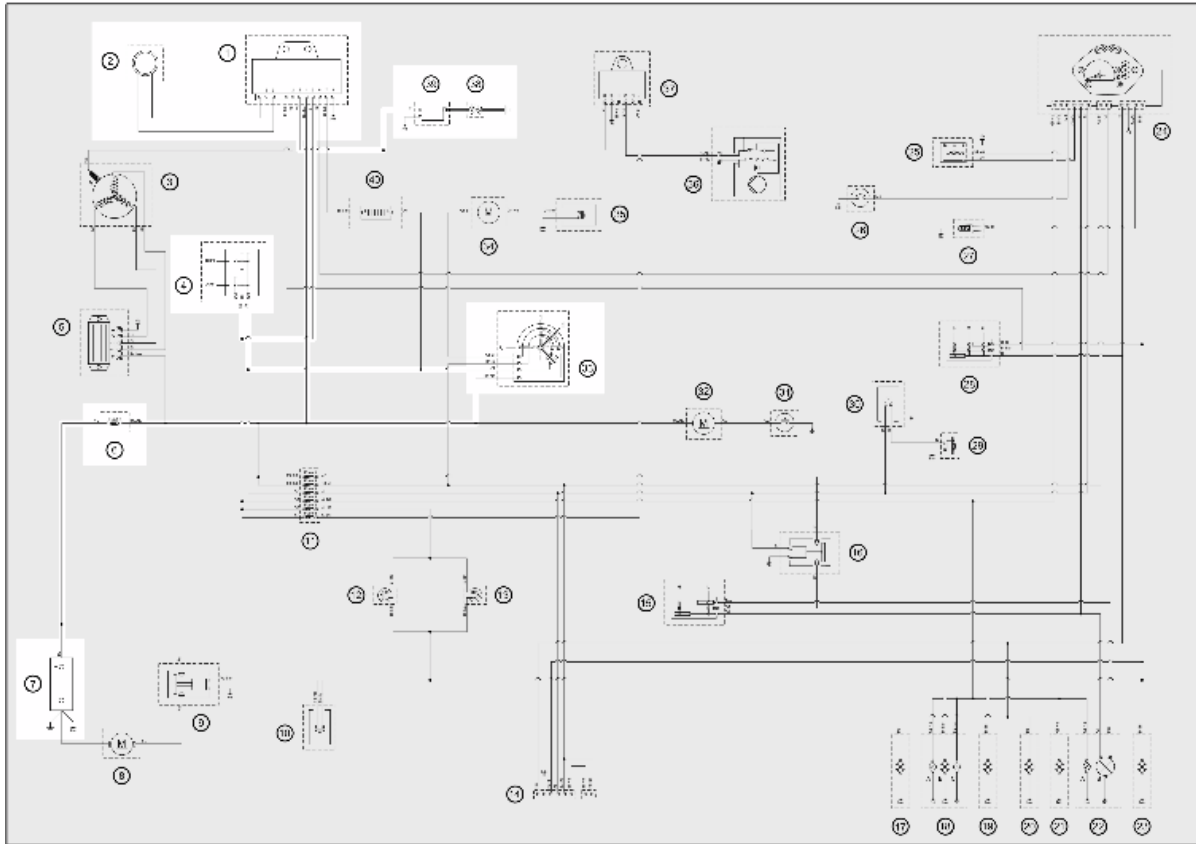
Key

Ar: Orange **Az:** Sky blue **Bi:** White **Bl:** Blue **Gi:** Yellow **Gr:** Grey

Ma: Brown **Ne:** Black **Ro:** Pink **Rs:** Red **Ve:** Green **Vi:** Purple

Conceptual diagrams

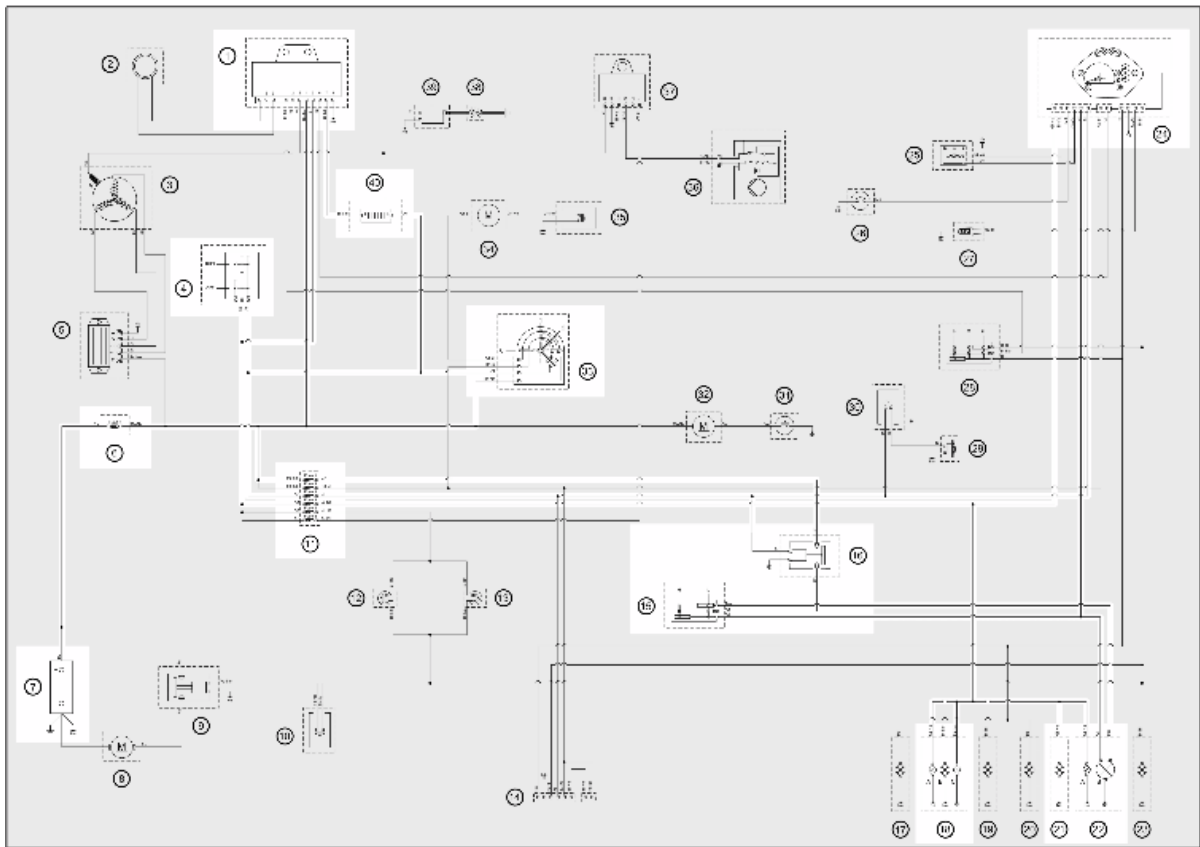
Ignition



KEY

- 1. Electronic ignition device
- 2. Immobilizer aerial
- 4. Engine stop switch
- 6. Main fuse
- 7. Battery
- 33. Key switch
- 38. Spark plug
- 39. HV coil

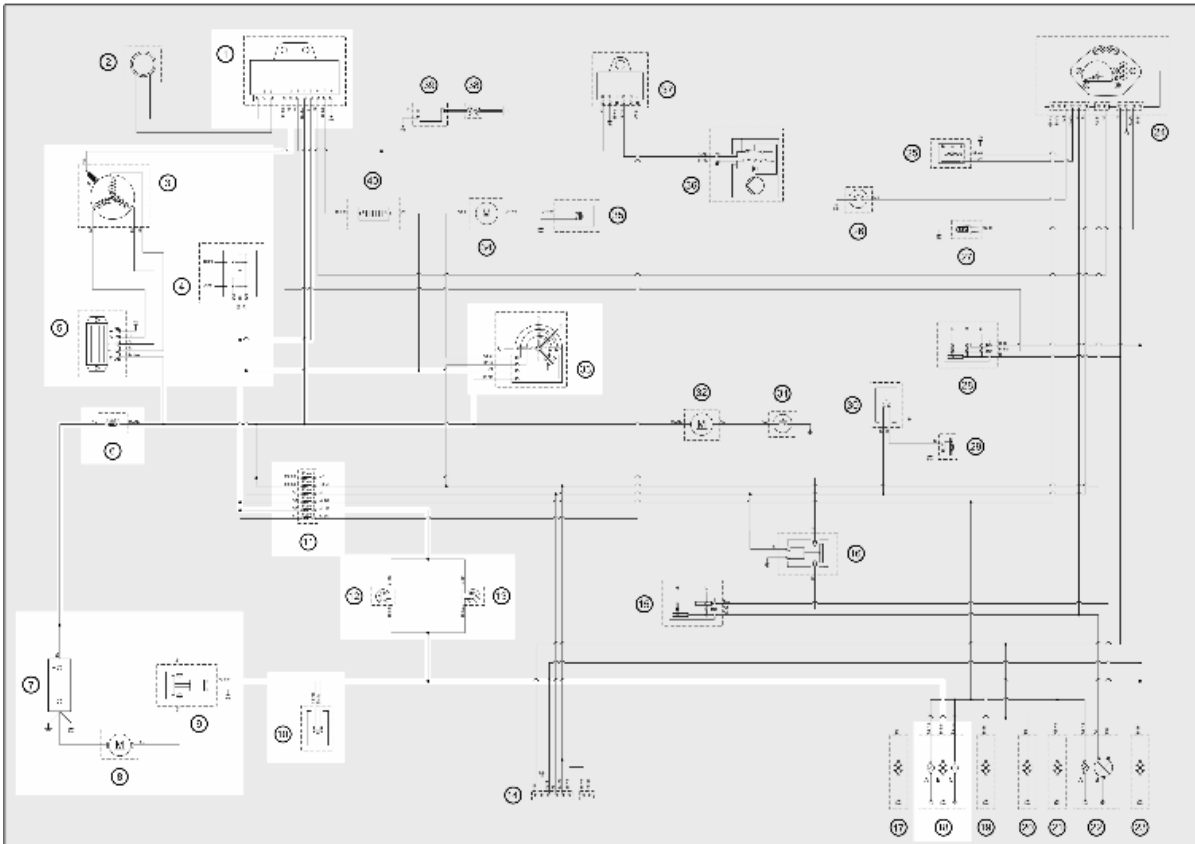
Headlights and automatic starter section



KEY

- 1. Electronic ignition device
- 4. Engine stop switch
- 6. Main fuse
- 7. Battery
- 11. Fuses
- 15. Light switch
- 16. Light remote control
- 18. Rear light
- A. Tail light bulb
- C. License plate bulb
- 21. Front position light
- 22. Front light
- A. Tail light bulb
- B. Headlight bulb
- 24. Instrument panel
- 33. Key switch
- 40. Automatic starter

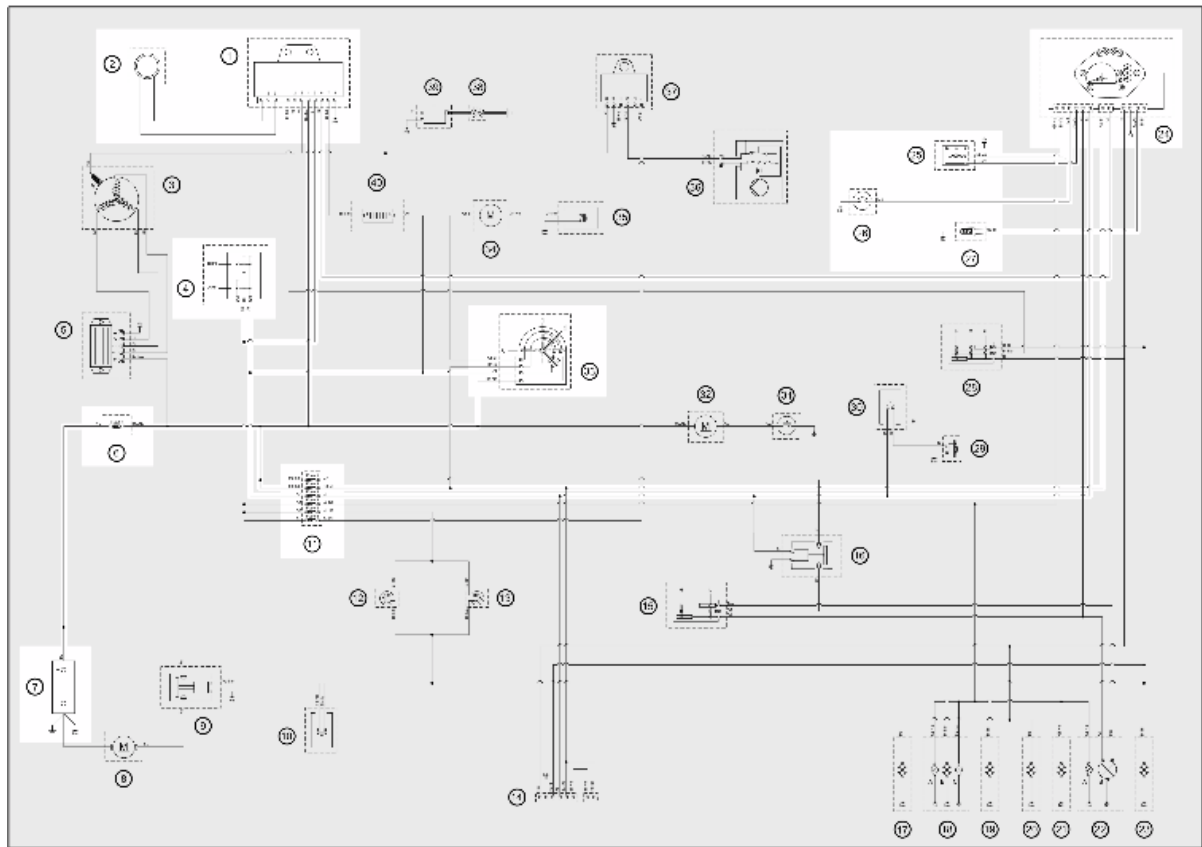
Battery recharge and starting



KEY

- 1. Electronic ignition device
- 3. Magneto flywheel - Pick-up
- 4. Engine stop switch
- 5. Voltage regulator
- 6. Main fuse
- 7. Battery
- 8. Starter motor
- 9. Start-up remote control switch
- 10. Starter button
- 11. Fuses
- 12. Stop button on rear brake
- 13. Stop button on front brake
- 18. Rear light
- B. Stop light bulb
- 33. Key switch

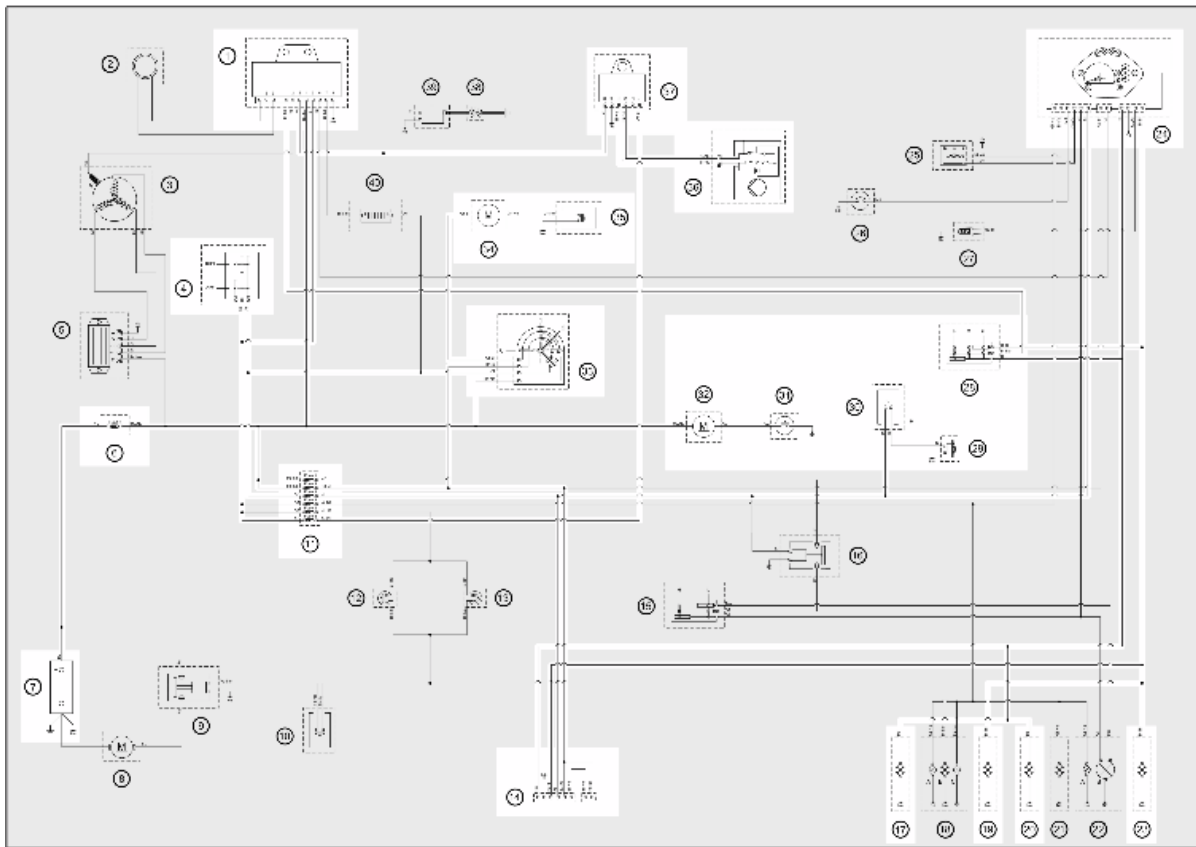
Level indicators and enable signals section



KEY

- 1. Electronic ignition device
- 2. Immobilizer aerial
- 4. Engine stop switch
- 6. Main fuse
- 7. Battery
- 11. Fuses
- 24. Instrument panel
- 25. Fuel level transmitter
- 26. Engine oil pressure sensor
- 27. Thermistor
- 33. Key switch

Devices and accessories



KEY

- 1. Electronic ignition device
- 4. Engine stop switch
- 6. Main fuse
- 7. Battery
- 11. Fuses
- 14. Wiring for antitheft device
- 17. Rear left turn indicator
- 19. Rear right turn indicator
- 20. Front left turn indicator
- 23. Front right turn indicator
- 24. Instrument panel
- 28. Turn indicator switch
- 29. Horn
- 30. Horn button
- 31. Thermoswitch
- 32. Electric fan
- 33. Key switch

- 34. Saddle opening actuator
- 35. Saddle opening button
- 36. Fuel pump
- 37. Fuel electric pump control device

Checks and inspections

This section is devoted to the checks on the electrical system components.

Immobiliser

The electric ignition system is fed with direct current and is protected by an antitheft immobilizer integrated to the control unit.

The ignition system consists of:

- 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 ignition switch is turned to the "OFF" position, or the emergency stop switch is turned to the "OFF" position. It remains activated for 48 hours in order not to affect the battery charge.

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

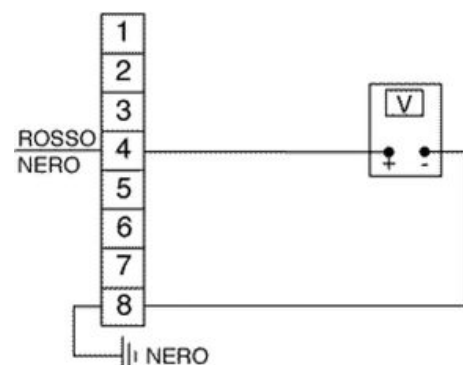
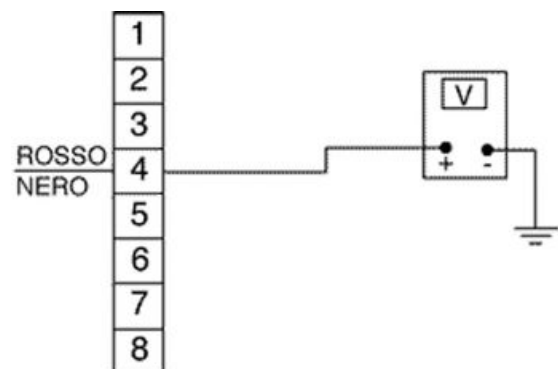
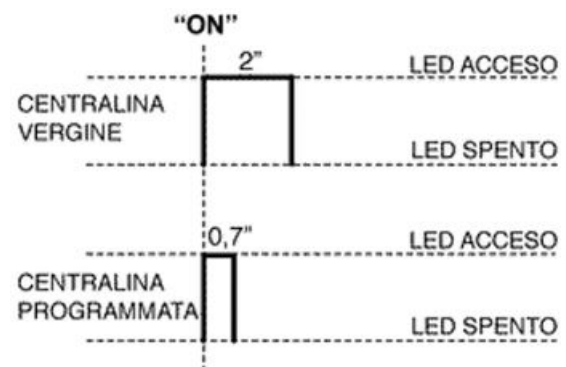
The duration of the flash depends on the electronic control unit program (see figure).

In case the LED turns off and remains so even when switching over to "ON", check if:

- The battery is charged
- The 15A main fuse (No. 7) is in working order

If the deterring LED remains off, check the control unit power supply as follows:

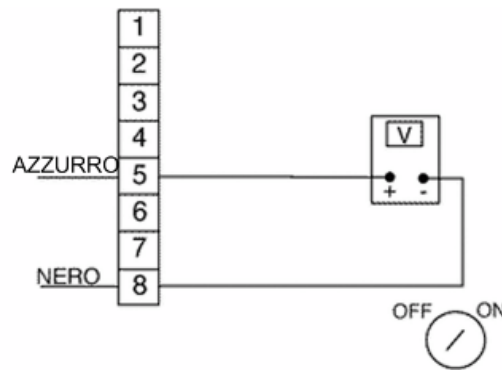
- Disconnect the control unit connector and check if:



- There is battery voltage between terminal No. 4 (Red/Black) and the ground lead.
- There is battery voltage between the terminal No. 4 (Red/Black) and the terminal No. 8 (Negative) as shown in the figure.
- There is battery voltage between terminals No. 5 and No. 8 with the key switch set to "ON", and the emergency cut-off switch set to "RUN".

If no faults are found, replace the control unit; otherwise check the wiring and the following components:

- Emergency cut-off switch
- Key switch contacts



Virgin circuit

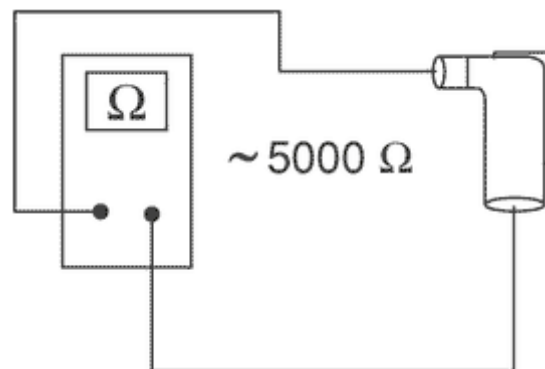
If the ignition system has not been programmed, the engine can be started but it will run limited to 2000 rpm. When trying to accelerate, some evident loss of power may be felt.

To program the system, besides setting the emergency cut-off switch to "RUN", use the (Red) MASTER and (Black) SERVICE keys as follows:

- Insert the MASTER key, turn it to "ON" and keep it in that position for 2 seconds (limit values: 1 ÷ 3 seconds).
- Alternately insert all the available Black keys setting each of them to "ON" for 2 seconds.
- 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 3 (Black) service keys can be programmed at one time.

Sequence and times must be strictly observed or it will be necessary to repeat the procedure from the start. Once the control unit has been programmed, the control unit is inseparably matched with the MASTER key transponder.



This matching allows programming further service keys in case of loss, replacement, etc. Each new time new data is programmed the previously stored one is deleted. If a service key should become un-coded, 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

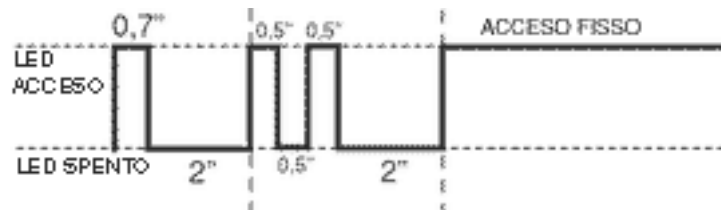
~ 5000 Ω .

Diagnostic codes

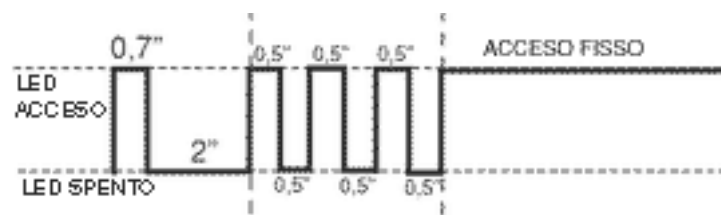
The flash indicating the switching to "ON" can be followed by a phase of programmed failure warnings. That is, the led is off for 2 seconds, and then diagnosis codes are transmitted with 0.5-second flashes. After the failure code indication, a steadily on LED signals that ignition is disabled; see the table:

2-FLASH CODE - Example with programmed control unit, no transponder and/or malfunctioning aerial.

Ignition disabled-Vehicle immobilised



3-FLASH CODE - Example with programmed control unit, aerial working properly and unknown transponder code. **Ignition disabled-Vehicle immobilised**



Diagnostic code - 2 flashes

Diagnosis code: 2-flashes

When the 2-flash code is detected, carry out the following checks:

- Check if the failure continues after changing key (MASTER key included). If the failure persists with any key, disconnect the aerial connector from the control unit and check the aerial continuity with the 020331Y multimeter.

If non-conforming values are measured, replace the aerial.

If no failures are found in the aerial, replace the control unit.

CAUTION

BEFORE PROGRAMMING THE NEW ELECTRONIC CONTROL UNIT CHECK THAT NO FAILURE CODE IS INDICATED. THIS IS TO AVOID SPOILING A NEW CONTROL UNIT UNNECESSARILY.

Electric characteristic**immobilizer aerial**

~ 7 ÷ 9 Ohm

Diagnostic code - 3 flashes

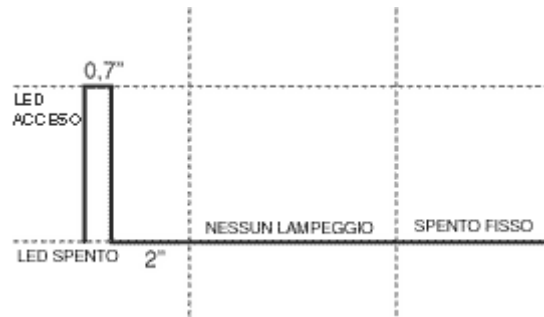
If the 3-flash code is detected, check if the failure occurs when the MASTER key is inserted into the key switch.

- If the failure disappears when the MASTER key is used, proceed to encode the service keys (Black).

- If the failure persists, it means that the MASTER key and the control unit are not linked; in this case, replace the control unit and then encode the keys. The immobilizer system is efficient when, after switching over to "ON", only a 0.7-second flash is detected (see diagram).

In this case, the engine can be started.

Example with programmed control unit, transponder, programmed key and aerial working properly.

The ignition is enabled (regular use conditions)**Ignition circuit**

Once the immobilizer system is enabled, the HV coil and the signals from the Pick-Up will produce a spark in the spark plug.

The battery provides the basic power supply. The system is adjusted so that the start-up system immediately detects an eventual battery voltage drop, but this is practically irrelevant for the ignition system.

The Pick-Up is connected to the control unit by a single cable; then, for the ground circuit, the control unit is connected to the Pick-Up by the chassis and the engine ground lead.

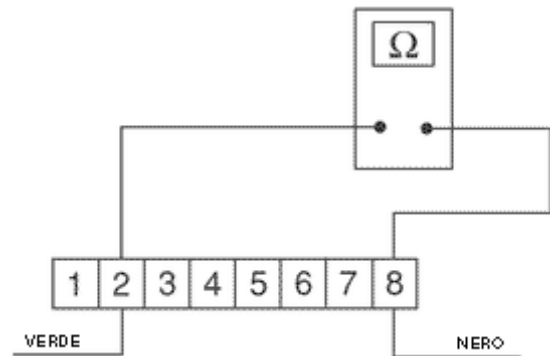
To avoid disturbances in the ignition system during start-up, it is very important that the engine-chassis ground connection bonding is efficient.

No spark plug

Once the lack of power to the spark plug has been detected and the LED indicates it can be ignited, follow this procedure:

- Pick-Up check.

Disconnect the control unit connector and check that the cable between terminal No. 2 (Green) and terminal No. 8 (Black) is not interrupted. Check the Pick-Up and its power line:



Electric characteristic

Pick-up resistance value

Pick-up resistance value: $105 \div 124$ Ohm

If a break in the circuit is found, check again the flywheel and the engine ground connectors (see engine manual). If non-conforming values are measured, replace the Pick-Up; otherwise, repair the cable harness.

In case conforming values are measured, try replacing the control unit (without programming) and make sure the failure has been solved by checking sparks are produced in the spark plug; only then program the control unit.

- HV coil primary check

Disconnect the control unit connector and check that the cable between terminal No. 3 and terminal No. 8 is not interrupted (see figure).

If non-conforming values are measured, check again the HV coil primary directly on the positive and negative terminals.

If non-conforming values are measured, repair the cables or replace the HV coil.

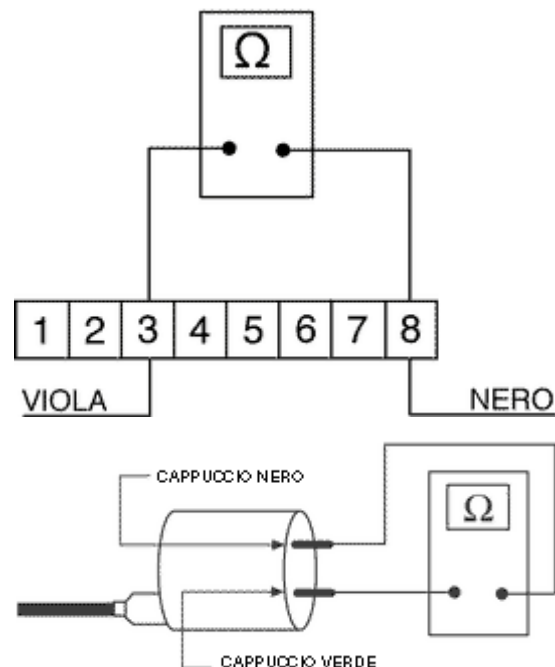
N.B.

THE MULTIMETER MUST BE SELECTED TO DETECT CONTINUOUS VOLTAGE.

Electric characteristic

Resistance value:

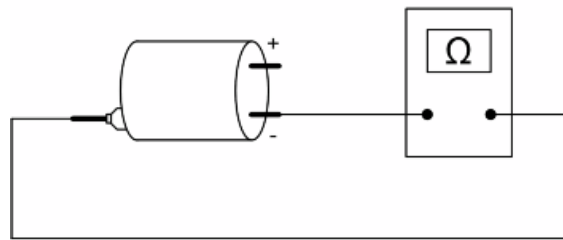
$0.4 \div 0.5$ Ohm



- HV coil secondary check

Disconnect the spark plug cap from the HV cable and measure the resistance between the HV cable terminal and the HV coil negative terminal (see figure).

If non-conforming values are measured, replace the HV coil. To carry out a more complete diagnosis, check the peak voltage with the multimeter adaptor.

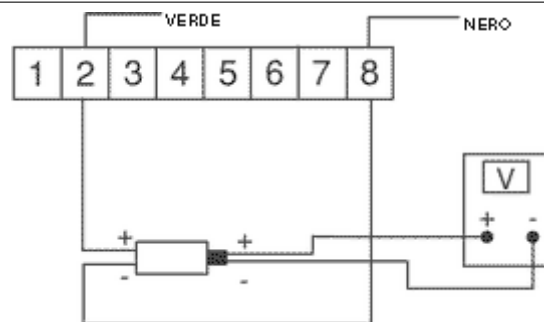
**Specific tooling****020409Y Multimeter adaptor - Peak voltage detection****Electric characteristic****Resistance value:**

~ 3000 ± 300 Ohm

- Pick-Up

Disconnect the control unit connector and connect the positive wire to connector No. 2 and the negative wire to connector No. 8 (see figure).

Use the start-up system to run the engine and measure the voltage produced by the Pick-Up. Replace Pick-Up if non-conforming values are measured.

**N.B.**

THE MULTIMETER MUST BE SELECTED TO DETECT CONTINUOUS VOLTAGE.

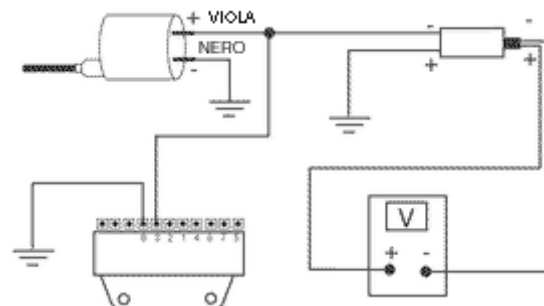
Electric characteristic**Resistance value:**

> 2 Volt

- HV coil

With the control unit and HV coil connected, measure the voltage of the coil primary during the start-up test with the voltage peak adaptor and connecting the positive terminal to the ground one and the negative to the coil positive connector.

If non-conforming values are measured, replace the control unit.

**N.B.**

THE PLASTIC CAP OF THE POSITIVE TERMINAL ON THE HV COIL PRIMARY IS BLACK AND THE NEGATIVE TERMINAL ONE IS GREEN.

Electric characteristic

Resistance value:

> 100 Volt

Battery recharge circuit

The recharge system is provided with a three phase alternator with permanent flywheel.

The alternator is directly connected to the voltage regulator.

In turn, the latter is directly connected to earth and to the battery positive passing through the 15A safety fuse.

This system therefore requires no connection to the key switch.

The three- phase generator provides good recharge power and at low revs a good compromise is achieved between generated power and idle stability.

For this reason, it is very important that the idle speed is adjusted as prescribed.

Specific tooling

020333Y Single battery charger

020334Y Multiple battery charger

Stator check

- With a tester, check the circuit between connections 5-3 and 5-1 is not interrupted.

- Check the earth isolation on the three phases of stators 5-earth, 3-earth, 1-earth.

Stage indicative resistance: 0.7 - 0.9 Ω

Minimum oil pressure switch check

- With a tester, check the circuit between connections 4 and ground (with engine off) is not interrupted.

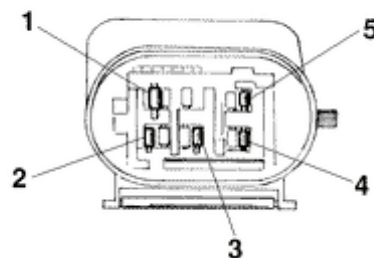
Pick-Up check

- Check that there is a resistance of about 105 \div 124 Ω at 20° C between connection 2 and ground.

- In case of values different from the ones stated, replace the defective parts.

N.B.

VALUES ARE STATED AT AMBIENT TEMPERATURE. A CHECK WITH THE STATOR AT OP-



ERATING TEMPERATURE MAY RESULT IN VALUES HIGHER THAN THOSE STATED.

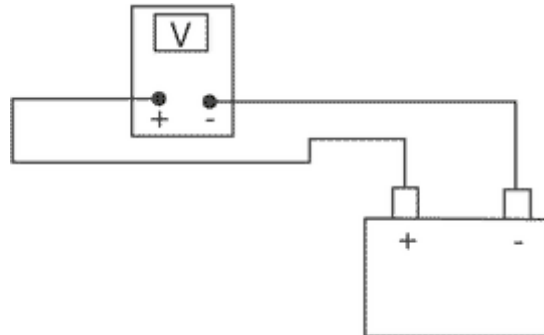
Voltage regulator check

With a perfectly charged battery and lights off, measure voltage at the battery poles with a high running engine.

The voltage should not exceed 15.2 Volt.

In case higher voltages are detected, replace the regulator.

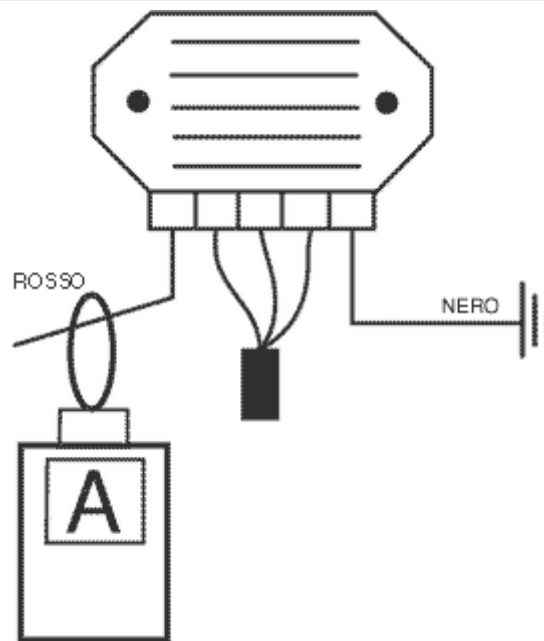
In case of voltage values lower than 14 Volt, check the stator and the corresponding cable harness.



Recharge system voltage check

Connect an ammeter induction clamp to the voltage regulator positive terminal, measure the battery voltage and turning on the vehicles lights with engine off, wait for the voltage to set at about 12 V. Start the engine and measure the current generated by the system with lights on and a high running engine.

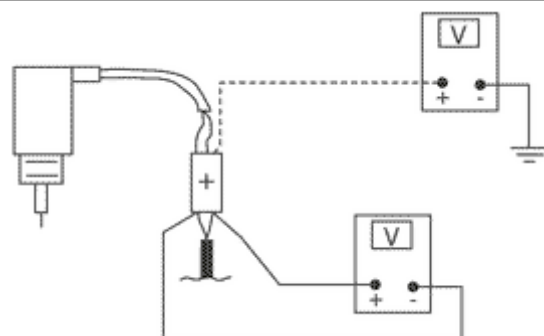
In case the generated current value is lower than 10A, repeat the test using a new regulator and/ stator alternatively.



Choke Inspection

Refer to the engine section to check the resistance and operating conditions of the component. As regards voltage supply, keep the connector connected to the system and check that the two terminals receive battery voltage when the engine is on (see figure).

If no voltage is detected, connect the multimeter negative probe to the ground lead and the positive

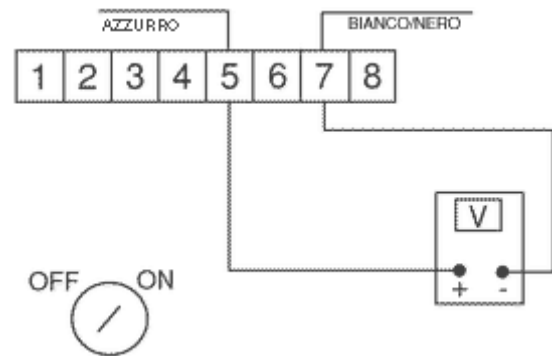


probe to the automatic starter Orange cable; with the key switch set to "ON" check whether there is battery voltage; if there is no voltage, check the wiring connections to the key switch and that the 15A fuse (No. 7) works properly.

If there is voltage, check again the ignition control unit connector.

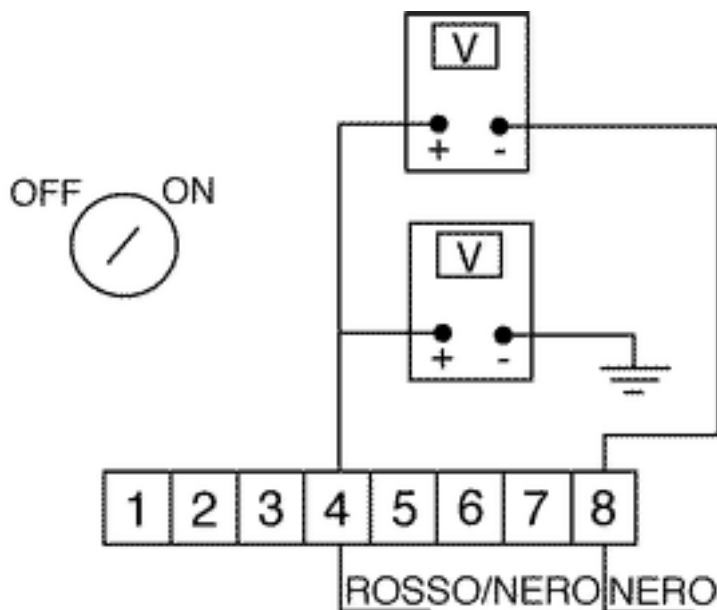
After disconnecting the starter, start up the engine and keep it at idle speed; then check whether there is voltage connecting the multimeter with the positive probe to terminal No. 5 (Blue), and the negative one to terminal No. 7 (White/Black) (see figure).

If there is no voltage, replace the control unit after making sure that the fuses are not blown; otherwise, check the cable harness between the starter and the control unit and, as a last resource, replace the starter.



Turn signals system check

- If the turn indicators do not work, proceed as follows:
- Disconnect the control unit connector and check that there is battery voltage between terminal No.4 (Red/Black) and the ground lead.
- Check that the same happens between terminal No. 4 and terminal No. 8 (Black).
- Repeat the check between terminal No. 5 (Sky blue) and terminal No. 8 (Black) with the key switch set to "ON" and the emergency switch set to "RUN".



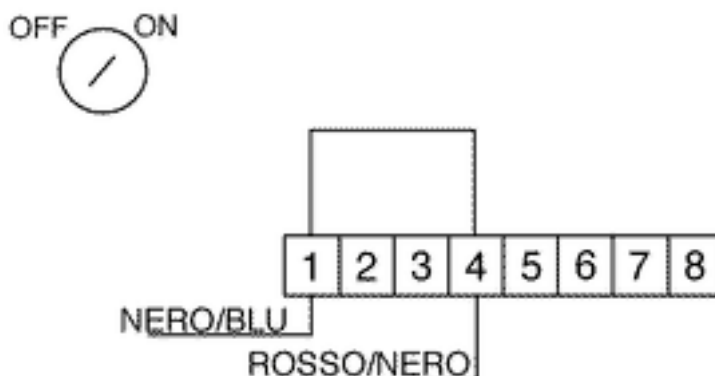
If no voltage is detected, check the cable harness, the connections and make sure the 15A main fuse is in good conditions; otherwise, proceed as follows:

- Jump terminals No.1 (Black/Blue) and No. 4 (Red/Black) (see figure), and set the turn indicator switch alternately to the left and to the right and check that the lights turn on.

If they do, replace the control unit because it is faulty.

If they do not turn on, check the control unit-turn indicator switch connection cable harness; then, repeat the test.

If the cable harness is in good conditions and the turn indicators still do not turn on, replace the turn indicator switch because it is faulty.



Fuses

The electrical system is equipped with:

1. six protection fuses «A» located in the glove compartment to the left
2. one 15A fuse «B» located under the helmet compartment under the saddle hinge latch.

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

CAUTION

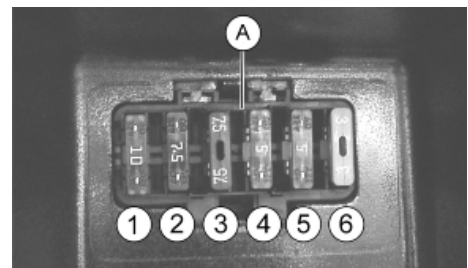
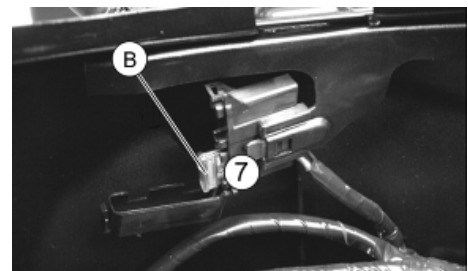


BEFORE REPLACING THE BLOWN FUSE, FIND AND SOLVE THE FAILURE THAT CAUSED IT TO BLOW. NEVER TRY TO REPLACE THE FUSE WITH ANY OTHER MATERIAL (E.G., A PIECE OF ELECTRIC WIRE).

CAUTION



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



FUSES

	Specification	Desc./Quantity
1	Fuse 1	Current rating: 10 A Protected circuits: High-/low-beam headlight bulb, high-beam warning light.
2	Fuse 2	Current rating: 7.5 A Protected circuits: Saddle-opening actuator, immobilizer LED, anti-theft device pre-installation, key switch
3	Fuse 3	Current rating: 7.5 A Protected circuits: Horn, antitheft device pre-installation, oil pressure sensor, oil pressure warning light, water temperature gauge, thermis-

	Specification	Desc./Quantity
		tor, fuel gauge, low fuel warning light, fuel level transmitter.
4	Fuse 4	Current rating: 5 A Protected circuits: Instrument panel lighting bulbs and warning lights, tail lights, license plate light.
5	Fuse 5	Current rating: 5 A Protected circuits: Stop light, starter motor.
6	Fuse 6	Current rating: 3 A Protected circuits: Electric pump control device, fuel electric pump
7	Fuse 7	Current rating: 15A Protected circuits: General

Dashboard

- A = Digital clock with calendar
- B = Cooling liquid temperature gauge
- C = Right turn indicator warning light
- D = Fuel gauge
- E = Headlight warning light
- F = High-beam warning light
- G = Low oil pressure warning light
- H = Low fuel warning light
- I = Speedometer
- L = Odometer
- M = Left turn indicator warning light
- N = Antitheft device LED (immobilizer)

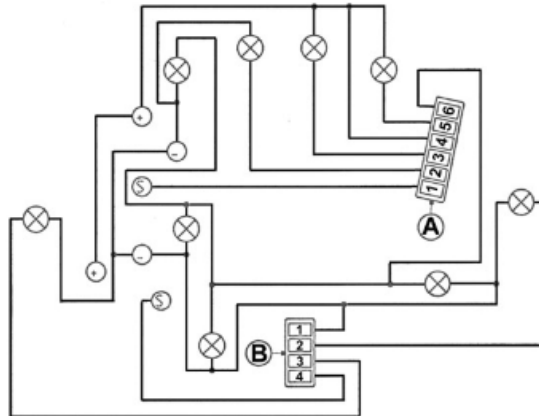


A

	Specification	Desc./Quantity
1	Fuel gauge signal	
2	High-beam warning light	
3	Oil warning light	
4	Fuel supply (+)	
5	Low fuel warning light	
6	Lighting	

B

	Specification	Desc./Quantity
1	Ground lead	
2	Left turn indicator	
3	Right turn indicator	
4	Temperature signal	

**Dry-charge battery****Battery cleaning**

The battery should always be kept clean, especially on its top side, and the terminals should be coated with Vaseline.

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.

CAUTION

DRINKING WATER CONTAINS MINERALS THAT CAN BE EXTREMELY HARMFUL TO THE BATTERY: USE DISTILLED WATER ONLY.

CAUTION

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

Battery recharge

Normal bench charging must be carried out using the special (single or multiple) battery charger, setting the battery charge selector to the type of battery that needs recharging (i.e., at a current equal to 1/10 of the battery rated capacity). Connections to the power supply source must be implemented by connecting corresponding poles (+ to + and - to -).

WARNING

BEFORE RECHARGING THE BATTERY, REMOVE THE CAPS OF EACH CELL. KEEP THE BATTERY AWAY FROM NAKED FLAMES OR SPARKS WHILE IT IS CHARGED. FIRST DETACH THE NEGATIVE LEAD BEFORE REMOVING THE BATTERY FROM THE VEHICLE.

Specific tooling

020333Y Single battery charger

020334Y Multiple battery charger

Charging status check

After topping-up the electrolyte level, check the density using special densimeter

When the battery is charged, you should detect a density of 30 to 32 Bé corresponding to a specific weight of 1.26 to 1.28 at a temperature of no lower than 15° C.

A density reading of less than 20° Bé indicates that the battery is completely flat and it must therefore be recharged.

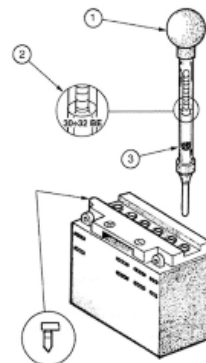
If the scooter is not used for a given time (1 month or more) it will be necessary to periodically recharge the battery.

The battery runs down completely in the course of three months. If it is necessary to refit the battery in the vehicle, be careful not to reverse the connections, remembering that the ground wire (**black**) marked (-) must be connected to the **-negative** clamp while the other two red wires marked (+) must be connected to the clamp marked with the **+positive** sign.

Checking the electrolyte level

The electrolyte level must be checked frequently and must reach the upper level. Only use distilled water, to restore this level. If it is necessary to add water too frequently, check the vehicle's electrical system: the battery works overcharged and is subject to quick wear.

- Remove the short closed tube and the caps, then pour sulphuric acid into the cells using the type specified for batteries with a specific gravity of 1.26, corresponding to 30 Bé at a minimum temperature of 15°C until the upper level is reached.
- Allow to stand for at least 2 hours, then top up the level with sulphuric acid.
- Within the following 24 hours, recharge with the specific (single) or (multiple) battery charger at an intensity approx. to 1/10 of the battery rated capacity and until the acid density is approximately 1.27, corresponding to 31° Bé, and these values are stabilised.
- After charging, level the acid (**adding distilled water**). Close and clean carefully.
- Once the above operations have been performed, install the battery in the vehicle ensuring that it is wired up properly.



Specific tooling

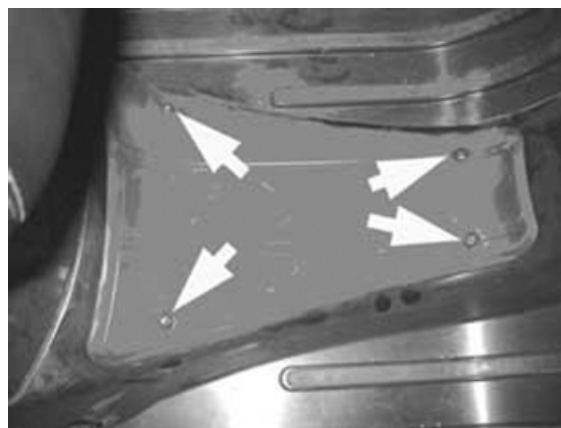
020333Y Single battery charger

020334Y Multiple battery charger

- 1 Hold the vertical tube
- 2 Look at the level
- 3 The float must be freed

Battery installation

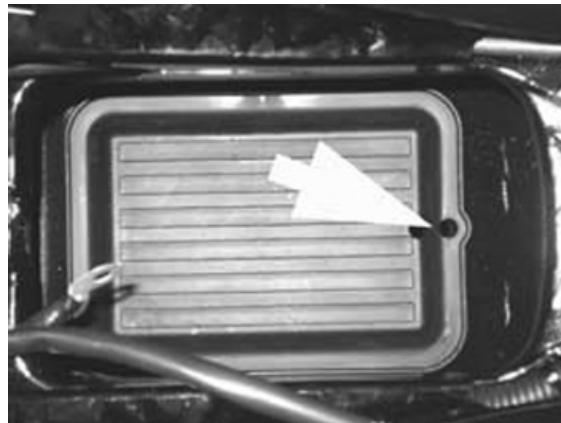
- Remove the battery cover after undoing the 4 screws shown in the photograph.



- Remove the strap fastening the battery



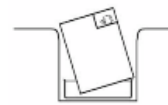
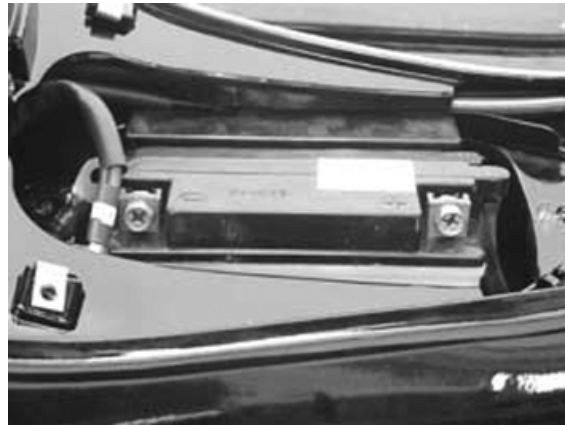
- Insert the battery breather pipe through the hole shown in the photograph.



- Fit the battery as shown in the photograph.

N.B.

IN ORDER TO FIT THE CABLES ON THE BATTERY TERMINALS CORRECTLY, REST THE LOWER END OF THE TERMINAL SIDE OF THE BATTERY ON THE EDGE OF THE BATTERY WELL.



- Using the screwdriver, tighten up the battery terminal cables as far as they will go, placing the special Grover washer between the screw head and the cable terminal.

N.B.

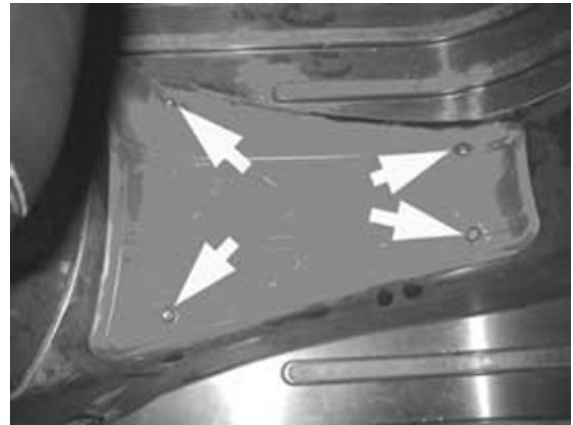
DO NOT USE WRENCHES TO TIGHTEN UP THE SCREWS FOR FIXING THE TERMINALS TO THE BATTERY TERMINALS



- Mount permanently the battery in the battery chamber
- Refit the strap fastening the battery



- Refit the battery cover



INDEX OF TOPICS

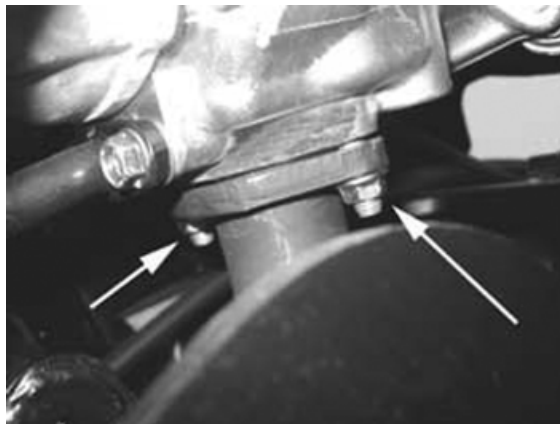
ENGINE FROM VEHICLE

ENG VE

This section describes the operations to carry out when removing the engine from the vehicle.

Exhaust assy. Removal

- Undo the two exhaust manifold fixings on the head.



- Undo the three screws fixing the muffler to the support arm.
Remove the full muffler unit.



Removal of the engine from the vehicle

-Carry out the removal operations but in reverse order and respect the locking torques indicated in the Characteristics Chapter.

Check that there is a small clearance when the valve is in abutment against the set screw.

-Check the engine oil level and if necessary top it up with the recommended type.

- Top-up the cooling circuit.

- Check the functioning of the accelerator and the electrical devices.

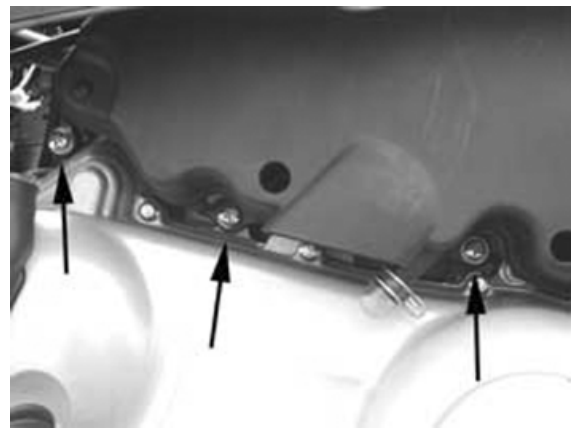
CAUTION

PAY PARTICULAR ATTENTION TO POSITIONING THE THROTTLE COMMAND TRANSMISSION PROPERLY.

- Disconnect the battery
 - Remove the helmet compartment
 - Remove the side fairings
- Remove the full muffler assembly.
- Remove the air cleaner housing acting on the 3 screws indicated in the picture, by removing the clamp from the blow-by pipe and disconnecting the bellow connection to the carburettor acting on the clamp as indicated in the photograph

CAUTION

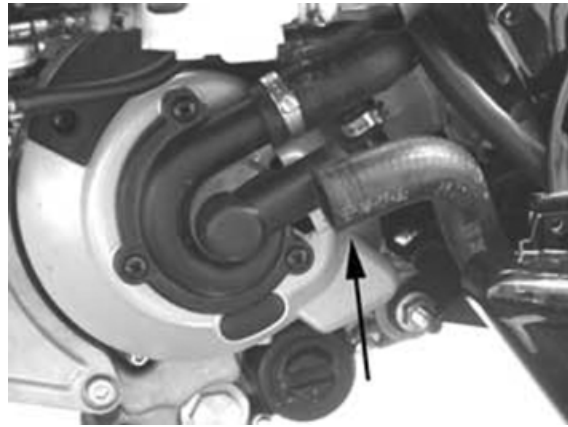
THIS OPERATION MUST BE CARRIED OUT WHEN THE ENGINE IS COLD.



- Remove the air intake manifold on the transmission housing acting on the two screws indicated in the photograph and remove the plastic clip



- Remove the coolant inlet pipe to the pump as indicated in the photograph.



- Remove the fuel valve vacuum intake pipe from "T" joint indicated in the photograph

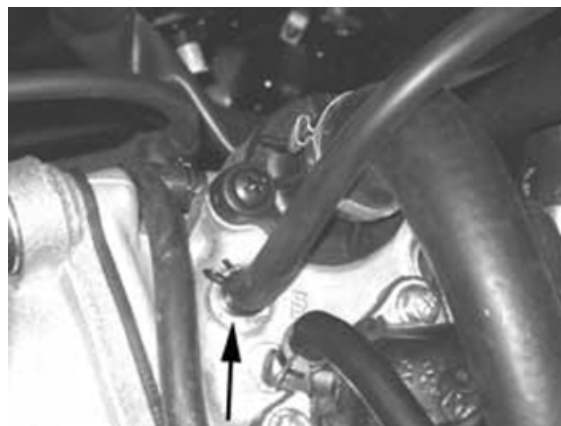


- Remove the fuel supply pipe from the carburettor

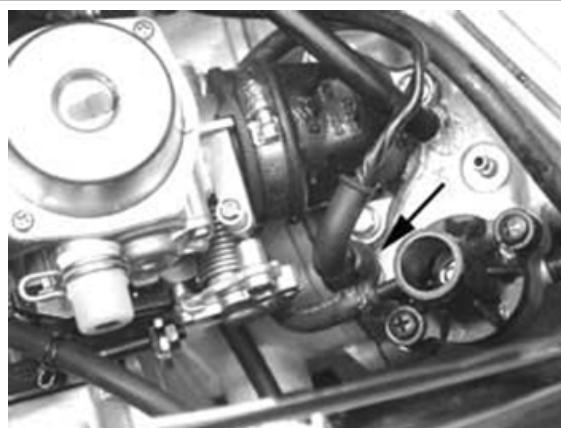


- Remove the coolant outlet pipe from the engine and the bleed pipe indicated in the photograph

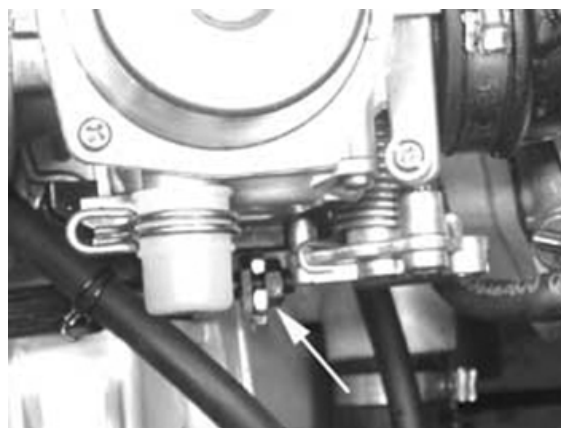




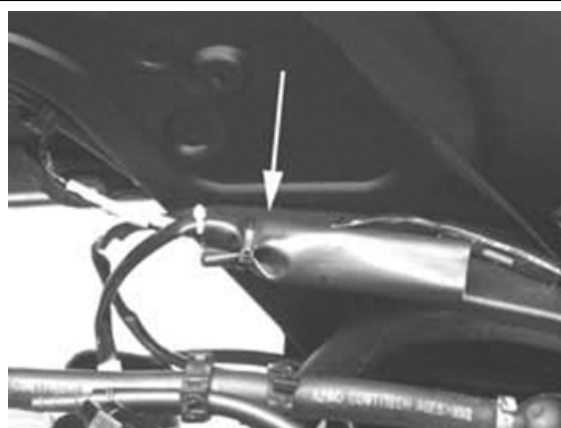
- Remove the spark plug cap
- Remove the coolant temperature sensor connector indicated in the photo



- Remove the throttle control cable from the carburetor acting on the nut shown in the photo

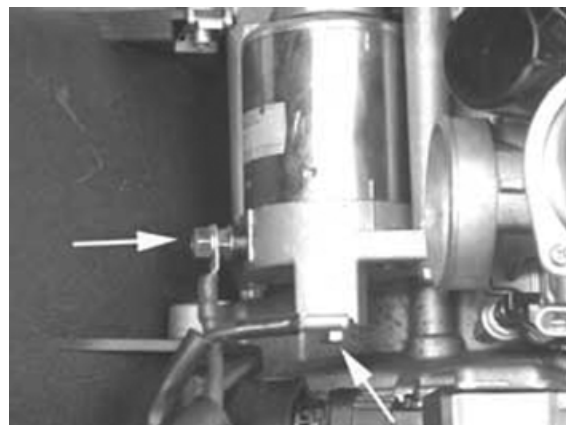


- Remove the automatic starter connector from the system located inside the protection sheath shown in the photo

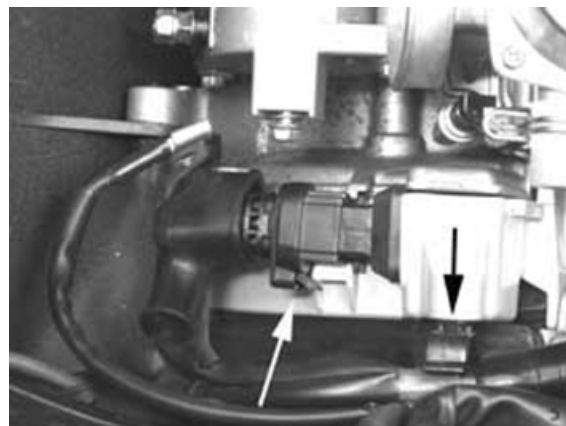




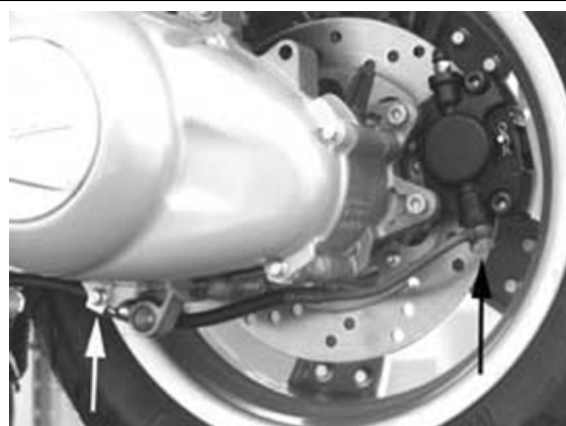
- Remove the positive and negative wires from the starter motor as shown in the photograph



- Remove the connector from the flywheel wiring shown in the photograph.
 - Remove the cable from the retainer clamp on the flywheel cover



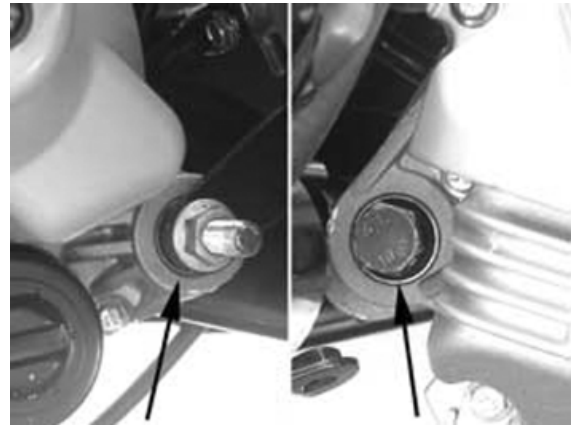
- Remove the rear shock absorbers.
 - Remove the hydraulic piping from the rear caliper by undoing the screw indicated in the photograph. Then remove the retainers fixing the piping to the engine crankcase, indicated in the photograph.





- Use a jack to support the vehicle properly. Remove the engine-swinging arm fixing pin by acting on the nut and the head of the pin indicated in the photograph

- The engine is now free.



INDEX OF TOPICS

ENGINE

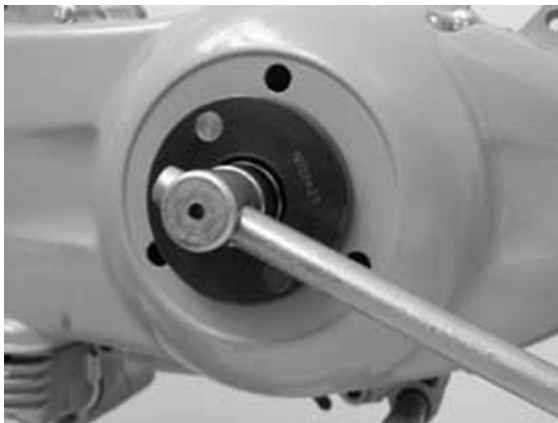
ENG

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 plastic cover first, by inserting a screwdriver in the slotted holes. Using the clutch bell lock wrench shown in the figure, remove the driven pulley shaft locking nut and washer.



Specific tooling

020423Y driven pulley lock wrench

- Remove the cap/dipstick from the engine oil filling hole.

- Remove the ten screws.

- Remove the transmission cover.

If this operation is carried out directly on the vehicle, remove the cooling air supply coupling of the transmission housing.



Air duct

- Remove the 4 screws and the housing.



- To remove the intake throat on the transmission cover, just remove the 2 fixing screws indicated in the figure.



Removing the driven pulley shaft bearing

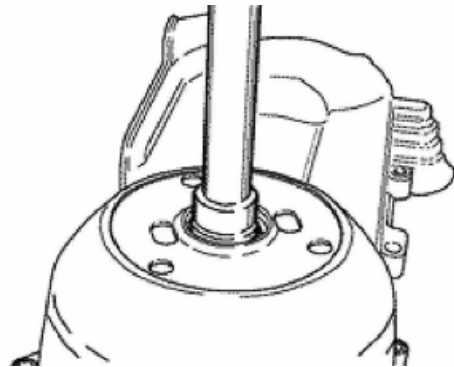
- Remove the clip from the inside of the cover.
- Remove the bearing from the crankcase by means of:

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020412Y 15 mm guide



Refitting the driven pulley shaft bearing

- Slightly heat the crankcase from the inside so as not to damage the painted surface.
- Insert the bearing in its seat.
- Refit the seeger ring.

CAUTION

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

N.B.

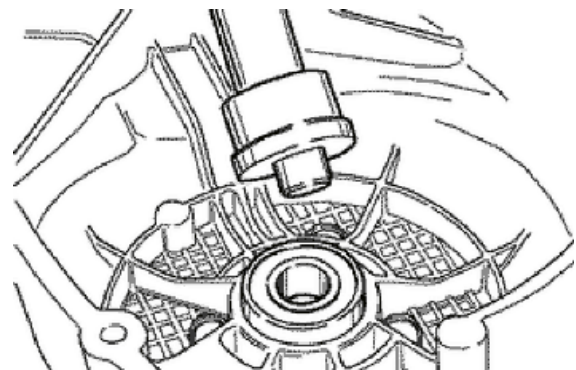
ALWAYS REPLACE THE BEARING WITH A NEW ONE UPON REFITTING.

Specific tooling

020376Y Adaptor handle

020357Y 32 x 35 mm adaptor

020412Y 15 mm guide

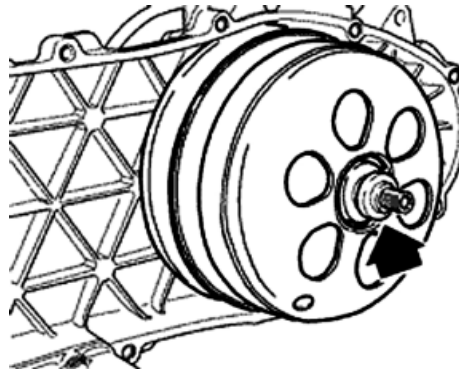


Removing the driven pulley

- 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.

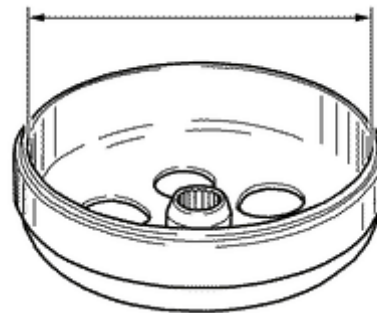
Characteristic

Max. value clutch bell

Max. value: \varnothing 134.5 mm

Clutch bell standard value

Standard value: \varnothing 134 - 134.2 mm



Checking the bell working surface eccentricity

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



- Using a feeler pin 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 support for dial gauge



Characteristic

clutch bell inspection: Limit eccentricity.

Admissible limit eccentricity: 0.15 mm

Removing the clutch**Removing the clutch**

Fit the driven pulley spring compressor specific tool with medium length pins screwed in position **F** from the tool internal side.

- Insert the adapter ring 8 in the pins.
- Assemble the driven pulley assembly on the tool introducing the rivets heads in the adapter ring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to loosen/tighten the clutch nut.
- Use the special 46x55 wrench component n°9 to remove the nut fixing the clutch in place.
- Separate the driven pulley components (Clutch, fan and spring with plastic fitting).

CAUTION

THE TOOL MUST BE FIRMLY FIXED IN THE CLAMP AND THE CENTRAL SCREW MUST BE BROUGHT INTO CONTACT WITH THE TOOL. EXCESSIVE TORQUE CAN CAUSE THE SPECIFIC TOOL TO BUCKLE.

Specific tooling

020444Y009 46x55 Wrench

020444Y010 adapter ring

**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 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 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 DIFFICULTY.

N.B.

BE CAREFUL NOT TO PUSH THE SCREW DRIVERS IN TOO FAR TO AVOID DAMAGE THAT COULD ENDANGER THE O-RING SEAL.

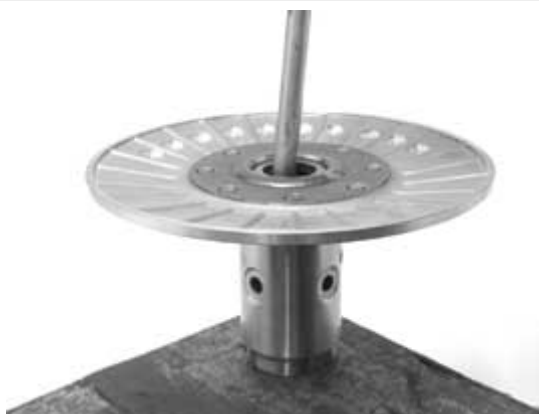


- Remove the four torque server pins and pull the pulley halves apart.



Removing the driven half-pulley bearing

- Check there are no signs of wear and/or noisiness; - Replace with a new one if there are.
- Remove the retaining ring using two flat blade screwdrivers.
- Support the pulley bushing adequately from the threaded side using a wooden surface.
- Using a hammer and pin, knock the ball bearing out as shown in the figure.



- Support the pulley properly using the bell as shown in the figure.

Specific tooling**001467Y035 Belle for OD 47-mm bearings**

- Remove the roller bearing using the modular punch.

Specific tooling**020376Y Adaptor handle****020456Y Ø 24 mm adaptor****020363Y 20 mm guide****Inspecting the driven fixed half-pulley**

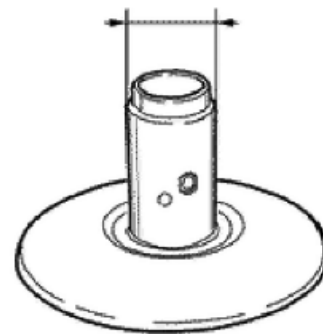
- Measure the outer diameter of the pulley bushing.
- Check the contact surface with the belt to make sure there are no flaws.

Characteristic**Half-pulley standard diameter**

Standard diameter: Ø 40.985 mm

Half-pulley minimum diameter

Minimum admissible diameter Ø 40.96 mm

**Inspecting the driven sliding half-pulley**

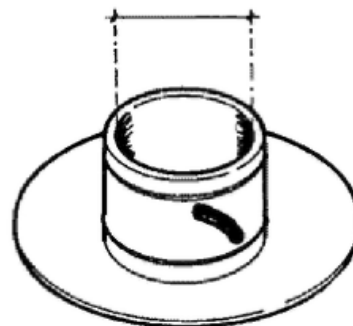
- Remove the two internal grommets and the two O-rings.
- Measure the movable half-pulley bushing inside diameter.

Characteristic**Movable driven half-pulley max. diameter**

Max. diameter admitted: Ø 41.08 mm

Movable driven half-pulley standard diameter

Standard diameter: Ø 41.000 ÷ 41.035 mm



Refitting the driven half-pulley bearing

- Support the pulley bushing adequately from the threaded side using a wooden surface.
- Fit a new roller sleeve as in the figure.
- For the fitting of the new ball bearing, follow the example in the figure using a modular punch.

Fit the retention ring

WARNING

N.B.

FIT THE BALL BEARING WITH THE VISIBLE SHIELD

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020424Y Driven pulley roller casing fitting punch

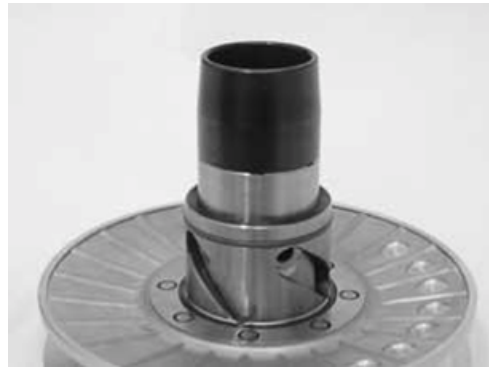


Refitting the driven pulley

- Insert the new oil guards and O-rings on the movable half-pulley.
- Lightly grease the O-rings (A) shown in the figure.



- Fit the half-pulley over the bushing using the appropriate tool
- Check that the pins are not worn and proceed to refitting them in their slots.
- Refit the torque server closure collar.



Using a curved-spout grease gun, lubricate the driven pulley assembly with approximately 6 g of grease. Apply the grease through one of the holes in the bushing until it comes out through the hole on the opposite side. This operation is necessary to avoid the presence of grease beyond the O-rings.



N.B.

THE TORQUE SERVER CAN BE GREASED WHETHER WITH BEARINGS FITTED OR WHEN THEY ARE BEING REPLACED; UNDERTAKING THE OPERATION WHEN THE BEARINGS ARE BEING SERVICED MIGHT BE EASIER.

Specific tooling

020263Y Sheath for driven pulley fitting

Recommended products

AGIP GREASE SM 2 Grease for the tone wheel revolving ring

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

Inspecting the clutch spring

- Measure the length of the movable driven half-pulley spring while it is unloaded.

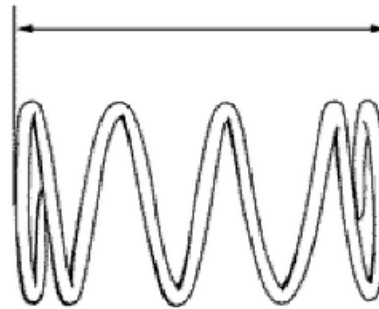
Characteristic

Standard length

106 mm

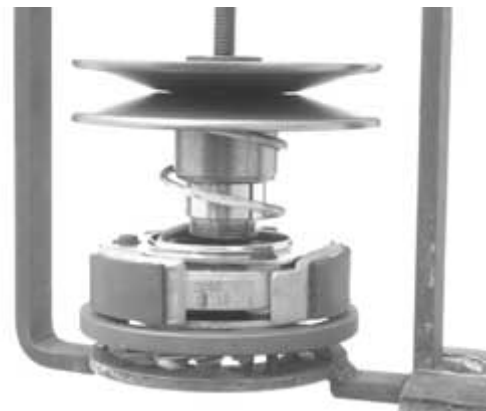
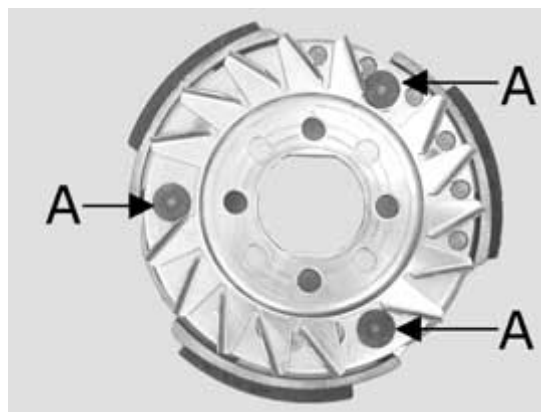
acceptable limit after use:

101 mm



Refitting the clutch

- Support the driven pulley spring compressor appropriate tool with the control screw in vertical axis.
- Arrange the tool with the medium length pins screwed in position «F» on the inside.
- Insert the adapter ring 8 in the pins.
- Preassemble the cooling fan to the clutch in such a way that the keying facets are aligned and the 3 pin heads (A) of the mass axis can be seen in full.
- 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 lock nut and tighten it to the specified torque using the specific 46x55 spanner.



- 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 until it reaches the pulleys maximum opening and place the belt on the minimum rolling diameter.
- Remove the driven pulley /belt assembly from the tool.



N.B.

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

N.B.

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

N.B.

AN EXCESSIVE QUANTITY CAN DAMAGE THE CLUTCH OPERATION.

Specific tooling

020444Y011 adapter ring

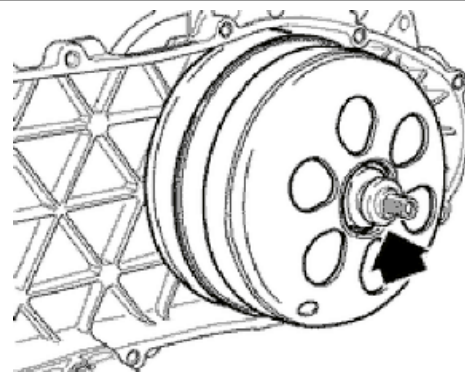
020444Y009 46x55 Wrench

Locking torques (N*m)

Clutch unit nut on driven pulley 55 ÷ 60

Refitting the driven pulley

- Reassemble the clutch bell and spacer.



Drive-belt

- Check that the driving belt is not damaged.
- Check the width of the belt.

Characteristic

125 4T driving belt - minimum width:

21.5 mm

125 4T driving belt - standard width:

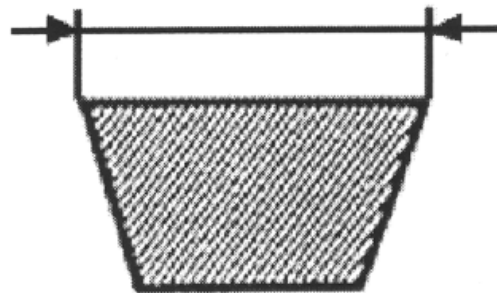
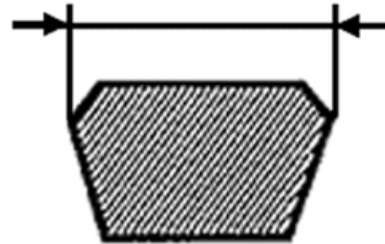
22.5 ± 0.2 mm

250 4T Transmission belt/minimum width

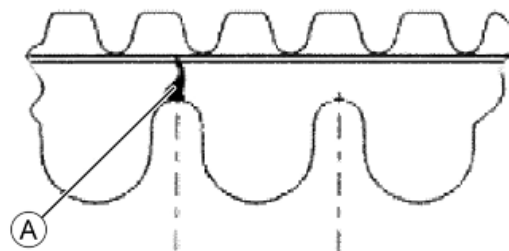
19.5 mm

250 4T Transmission belt/standard width

21.3 ± 0.2 mm



During the wear checks foreseen in the scheduled maintenance services at 6,000 km, 18,000 km, etc., check that the rim bottom of the tothing does not show signs of incisions or cracking (see figure): The rim bottom of the tooth must not have incisions or cracking; if it does, change the belt.



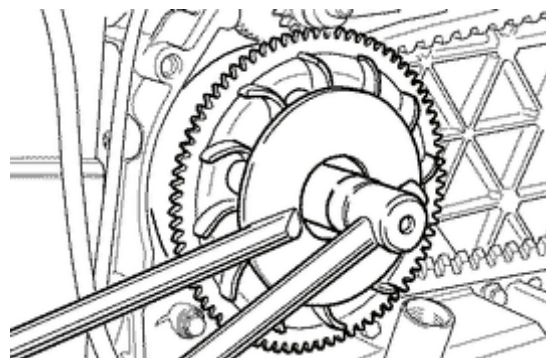
Removing the driving pulley

- With the appropriate tool, remove the nut with the built-in Belleville washer, the drive common to the kick-starter version, and the steel washer.
- Remove the fixed driving half-pulley.
- Remove the steel washer separating from the bushing.

Appropriate tools:

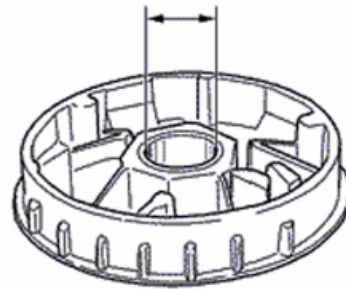
Specific tooling

020368Y driving pulley lock wrench



Inspecting the rollers case

- Check that the internal bushing shown in the figure is not abnormally worn and measure inner diameter A.
- Measure outer diameter B of the pulley sliding bushing shown in the figure.
- Check that the rollers are not damaged or worn.
- Check the guide shoes for the variator back-plate are not worn.
- Check the wear of the roller housings and of the belt contact surfaces on both pulley halves.
- Check that stationary driving pulley does not show signs of abnormal wear on the grooved edge and on the surface in contact with the belt.
- Check that the O-ring is not pushed out of shape.



CAUTION

DO NOT LUBRICATE OR CLEAN SINTERED BUSHINGS

Characteristic

Movable driving half-pulley bushing: Standard Diameter

26.000 - 26.021 mm

Movable driving half-pulley bushing: Maximum allowable diameter

Ø 26.12 mm

Sliding bushing: Standard Diameter

Ø 25.959 ÷ 25.98 mm

Sliding bushing: Minimum admissible diameter

Ø 25.95 mm

Roller: Standard Diameter

Ø 18.9 ÷ 19.1 mm

Roller: Minimum diameter permitted

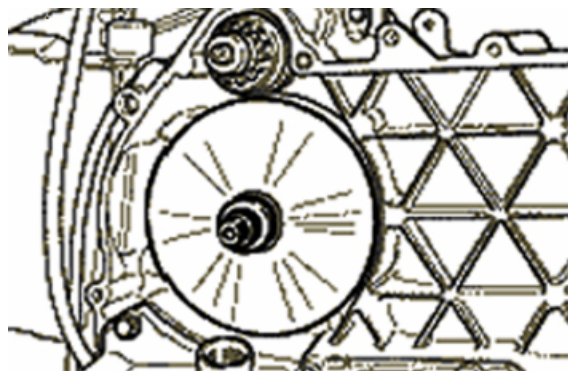
Ø 18.5 mm



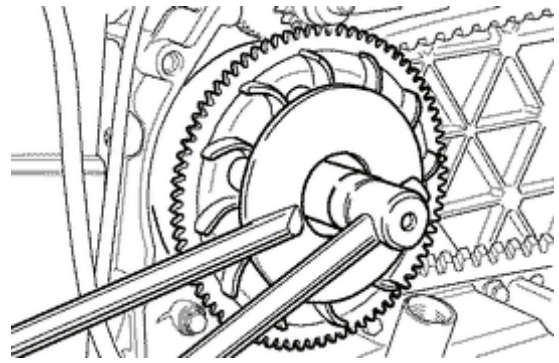


Refitting the driving pulley

- Preassemble the movable half-pulley with the roller contrast plate by putting the rollers in their housings with the larger support surface touching the pulley according to the direction of rotation.
- Check that the roller contact plate does not have flaws and is not damaged on the grooved edge.
- Mount the complete bushing unit on the driving shaft.
- Fit the driven pulley/Clutch/belt unit on the engine.



- Correctly refit the previously removed Bendix back to its position.
- Reassemble the parts of the unit (internal lining, fixed half-pulley, external lining, drive and nut), spread Loctite 243 Quick Set threadlock on the thread and tighten the nut to the prescribed torque.
- Avoid the half-pulley rotation with the appropriate stop key tool..
- Rotate the engine manually until the belt is slightly taut.

**CAUTION**

IT IS EXTREMELY IMPORTANT THAT THE BELT IS PERFECTLY FREE WHEN THE FIXED DRIVING HALF-PULLEY IS ASSEMBLED. THIS IS TO AVOID CARRYING OUT A WRONG TIGHTENING OF THE DRIVING HALF-PULLEY.

Specific tooling

020368Y driving pulley lock wrench

Locking torques (N*m)

Drive pulley nut 75 ÷ 83

Refitting the transmission cover

- Check the presence of the 2 centring dowels and the correct installation of the sealing gasket for the oil sump on the transmission cover.
- Replace the cover tightening the 10 screws at 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.
- Replace the plastic cover.

**Specific tooling**

020423Y driven pulley lock wrench

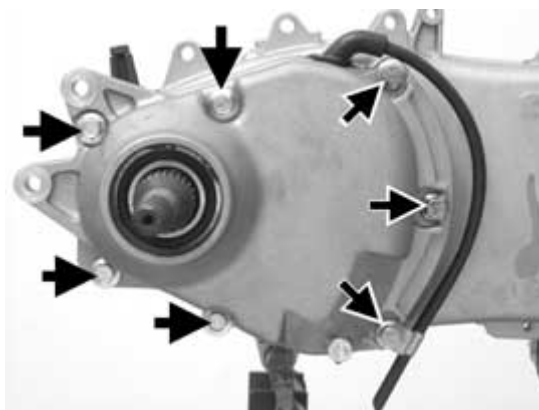
Locking torques (N*m)

Transmission cover screws 11 ÷ 13 Driven pulley shaft nut 54 ÷ 60

End gear

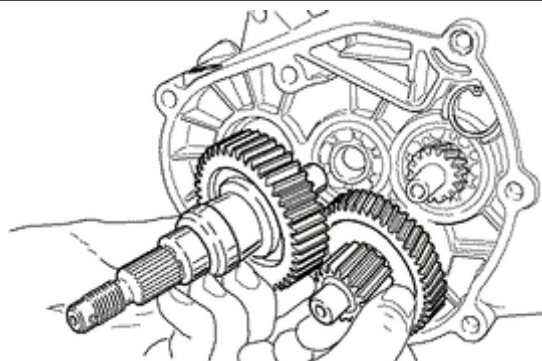
Removing the hub cover

- Empty the rear hub through the oil drainage plug.
- Remove the 7 flanged screws indicated in the figure.
- Remove the hub cover and its gasket.



Removing the wheel axle

- Remove the wheel axis complete with gear.
- Remove the intermediate gear.



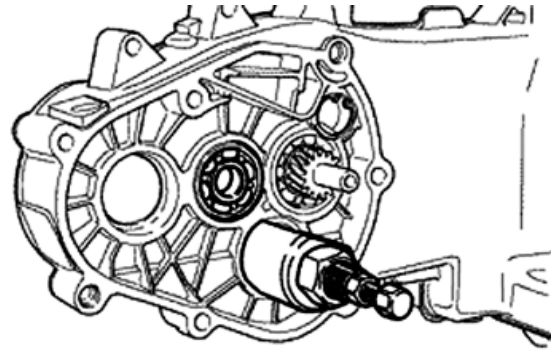
Removing the hub bearings

- 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

001467Y013 Pliers to extract \varnothing 15-mm bearings





Removing the wheel axle bearings

Hold up the hub cover and take out the bearing.

Specific tooling

020376Y Adaptor handle

020477Y Adaptor 37 mm

020483Y 30 mm guide



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

Specific tooling

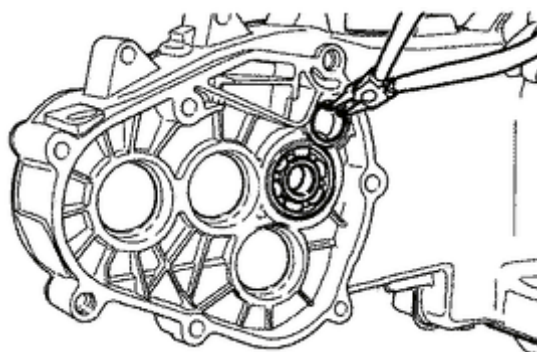
020359Y 42x47-mm adaptor



Removing the driven pulley shaft bearing

When removing the driven pulley shaft, the corresponding bearing and oil seal, remove the transmission cover and the clutch group as explained above.

- Extract the driven pulley shaft from its bearing.
- Remove the oil guard 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 Adaptor 28 x 30 mm

020363Y 20 mm guide



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 bearing bearings.
 - In case of anomalies, replace the damaged components.
-

Refitting the wheel axle bearing

Support the hub cover on a wooden surface.

- Heat the cover crankcase with special heat gun.
- Fit the wheel shaft bearing with a modular punch as shown in the figure.

Specific tooling

020150Y Air heater support

020151Y Air heater

020376Y Adaptor handle

020360Y Adaptor 52 x 55 mm

020483Y 30 mm guide

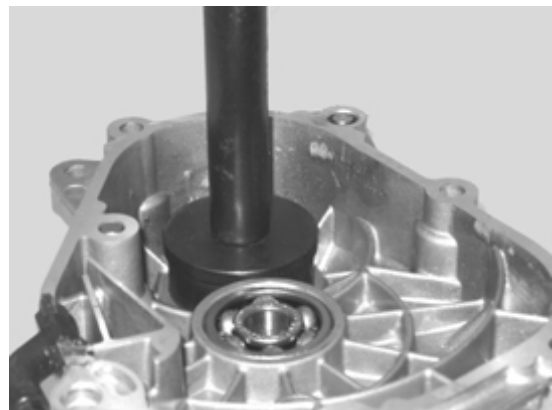


Assemble the seeger ring.



-
- Fit the oil guard with seal lip towards the inside of the hub and place it flush with the internal surface by means of the appropriate tool used from the 52 mm side.

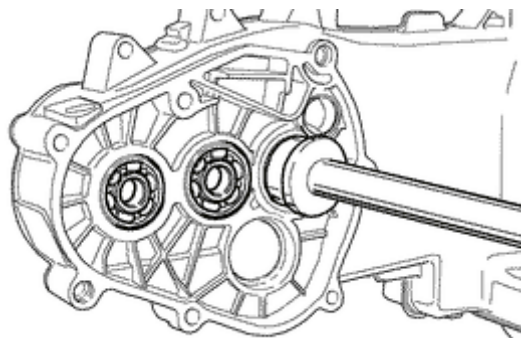
The 52 mm side of the adaptor must be turned towards the bearing.



Refitting the hub cover bearings

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

- The three 15 mm bearings must be fitted using the appropriate tools.
- The 42-mm side of the adaptor must be turned towards the bearing.



Specific tooling

020150Y Air heater support

020151Y Air heater

020376Y Adaptor handle

020359Y 42x47-mm adaptor

020412Y 15 mm guide



N.B.

TO FIT THE BEARING ON THE COVER, SUPPORT THE COVER WITH THE STUD BOLT SET.

- Refit the driven pulley shaft bearing with a modular punch as shown in the figure.

N.B.

IF THE BEARING HAS AN ASYMMETRICAL BALL RETAINER, PLACE IT SO THAT THE BALLS ARE VISIBLE FROM THE HUB INNER SIDE.

Specific tooling

020376Y Adaptor handle

020359Y 42x47-mm adaptor

020363Y 20 mm guide

N.B.

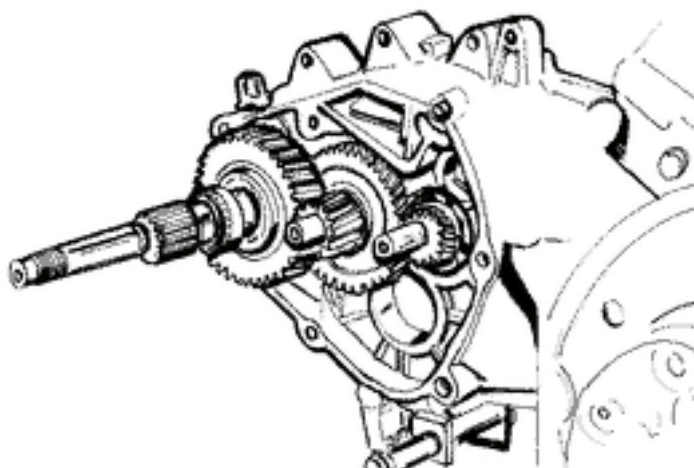
WHEN FITTING THE BEARINGS ON THE ENGINE CRANKCASE, SUPPORT THE CRANKCASE PREFERABLY ON A SURFACE TO ALLOW THE BEARINGS TO BE DRIVEN VERTICALLY.

- Refit the seeger ring with the opening facing the bearing and fit a new oil guard flush with the crankcase from the pulley side.



Refitting the hub bearings

- Install the three shafts in the engine crankcase as shown in the figure.



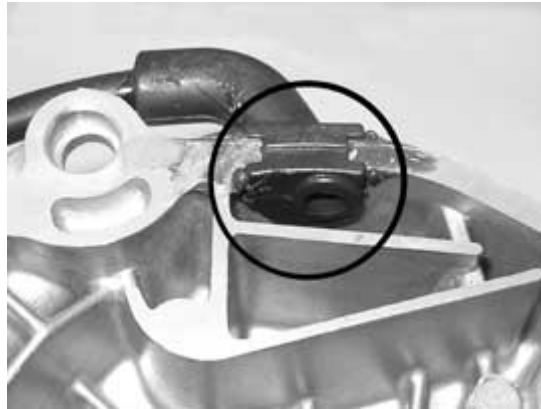
Refitting the ub cover

- Fit a new gasket together with the centring dowels.
- Seal the gasket of the breather pipe using black silicone sealant.
- Fit the gearbox cover, making sure the breather pipe is in the correct position.
- Place the 3 shortest screws, identifiable by their different colour, as shown in the figure.
- Fasten the breather pipe support bracket with the lower short screw.
- Assemble the remaining 4 screws and tighten the 7 screws to the prescribed torque.

Locking torques (N*m)

Rear hub cover screws 24 ÷ 27

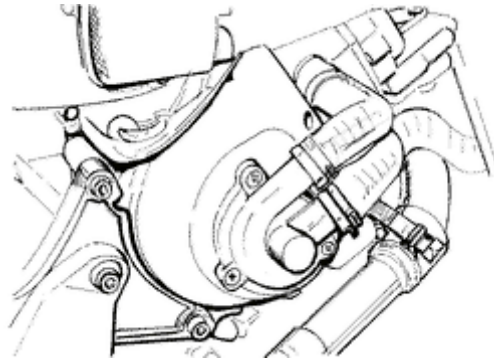




Flywheel cover

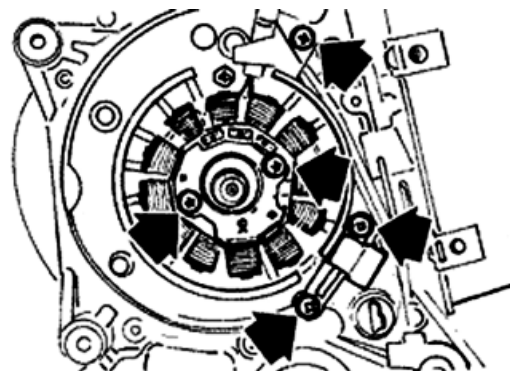
Removing the hub cover

- Remove the two clamps, the two couplings and empty the cooling system.
- Remove the 4 retainers and the flywheel cover



Removing the stator

- 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

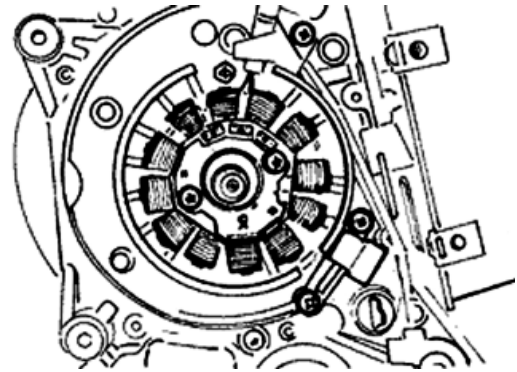
- Refit the stator and flywheel carrying out the removal procedure in reverse, tightening the retainers to the prescribed torque.
- Place the cable harness as shown in the figure.
- Stator screws and Pick-Up

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 assembly screws (°) 3 ÷ 4



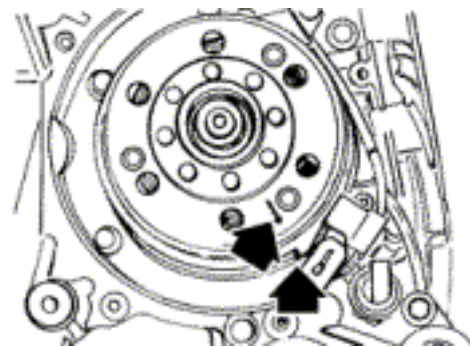
Refitting the flywheel cover

- Place the flywheel with the top dead centre mark aligned with the crankcase.
- Place the flywheel cover by aligning the reference marks of the drive and the crankcase cover.
- Reassemble the cover on the engine, placing the three connectors in the drive for the water pump.
- Carry out the steps in the reverse order from the dismantling procedure.



CAUTION

TAKE CARE TO CORRECTLY POSITION THE FLYWHEEL CONNECTOR. MAKE SURE THE CENTRING DOWELS ARE PRESENT.



Flywheel and starting

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

Removing the flywheel magneto

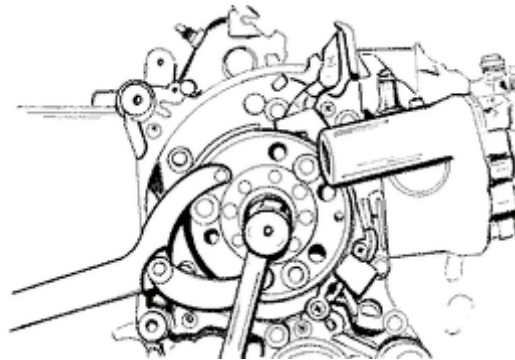
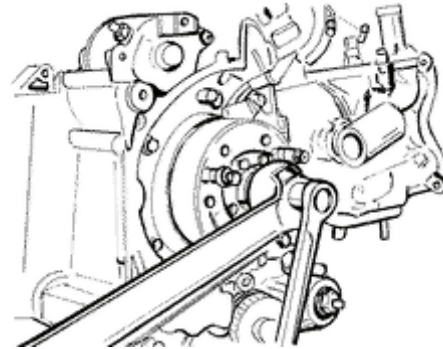
- Lock the rotation of the Flywheel with the calliper spanner tool.
- Remove the nut.
- Take out the flywheel.

CAUTION

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

N.B.

THE FLYWHEEL OF THE 200 CM³ MODELS FEATURES ENHANCED INERTIAL MASS.



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 ÷ 0.76 mm.

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

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

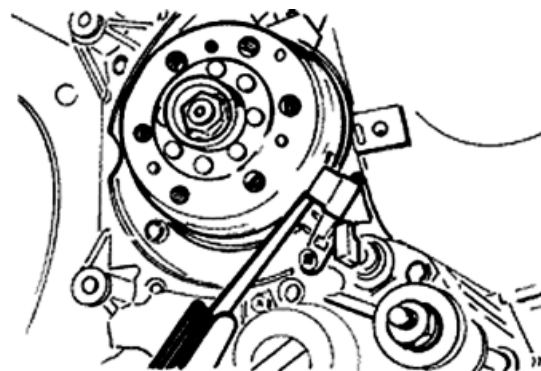
N.B.

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

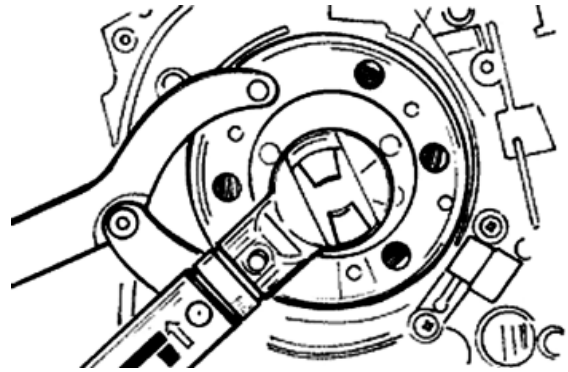
Specific tooling

020565Y Flywheel lock calliper spanner

Locking torques (N*m)



Flywheel nut 54 ÷ 60

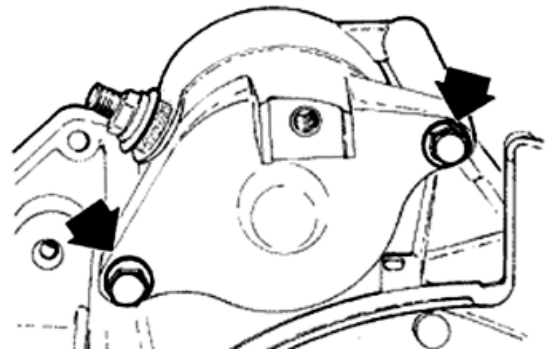


Refitting the starter motor

- Fit a new O-ring on the starter motor and lubricate it.
- Fit the starter on the crankcase, locking the two screws to the prescribed torque.

Locking torques (N*m)

Starter motor screws 11 ÷ 13



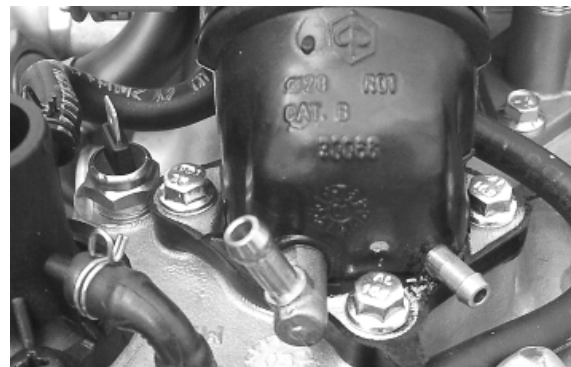
Cylinder assy. and timing system

Removing the intake manifold

- Remove the flywheel cover completely as described in the flywheel cover section.
- Loosen the 3 screws and remove the intake manifold.

N.B.

SCREWS AGAINST ACCIDENTAL OPERATION ARE PROVIDED.



Removing the rocker-arms cover

- Remove the 5 screws indicated in the figure



Removing the timing system drive

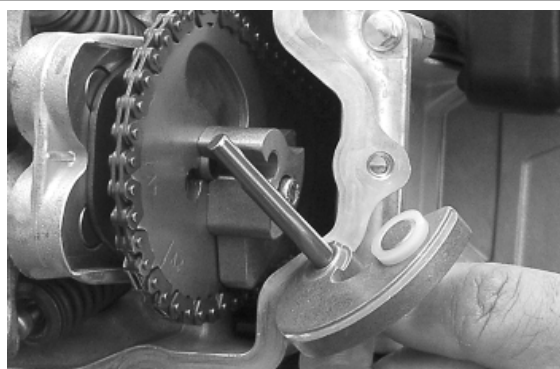
- Remove the parts listed below first: transmission cover, drive pulley with belt, oil sump with spring and by-pass piston, oil pump pulley cover, O-ring on the crankshaft and the sprocket wheel separation washer.

- Remove the tappet cover.

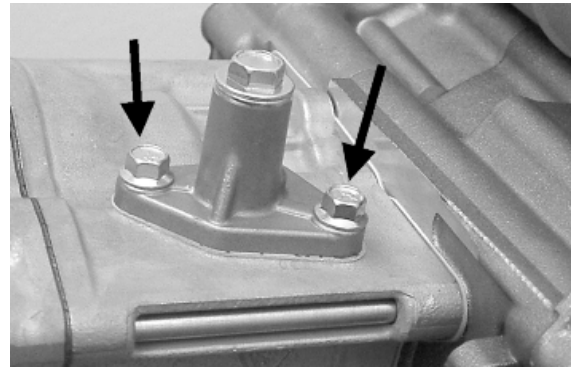
- Remove the central screw fastener and the automatic valve-lifter retaining cover, as shown in the figure.



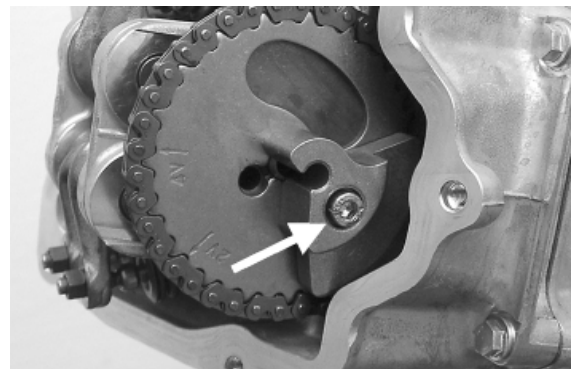
- Remove the return spring of the automatic valve lifter unit and the automatic valve lifter unit and its end of stroke washer.



- 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.



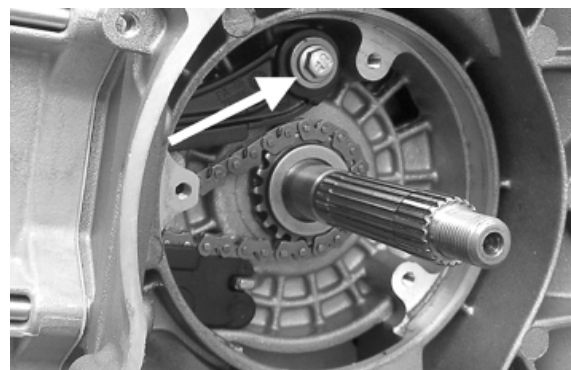
- Remove the camshaft control pulley with its washer.



- 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 tensioning pad must be removed from the transmission side. As regards the lower chain guide pad, it may only be removed after the head has been removed.



N.B.

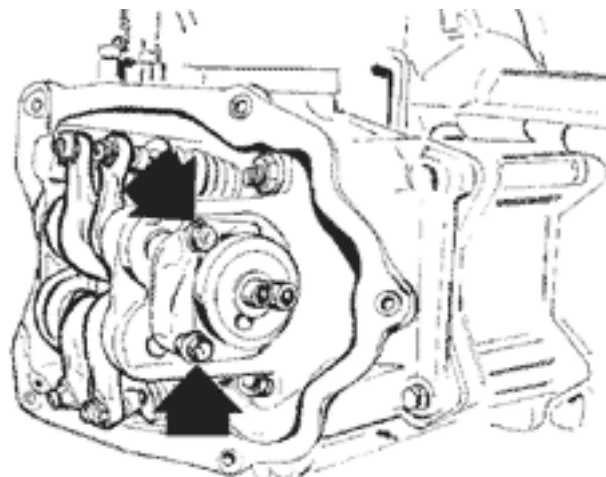
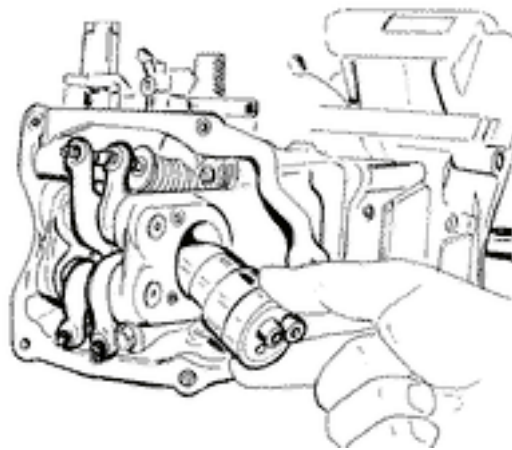
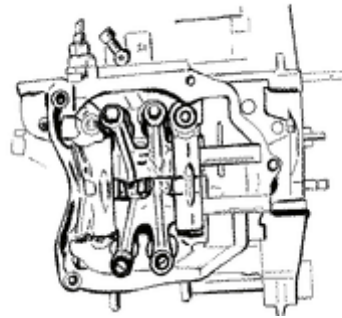
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

Removing the cam shaft

- Remove the two screws and the cam shaft retainer shown in the diagram.
- Remove the cam shaft.
- Remove the pins and the rocker arms from the flywheel side holes.

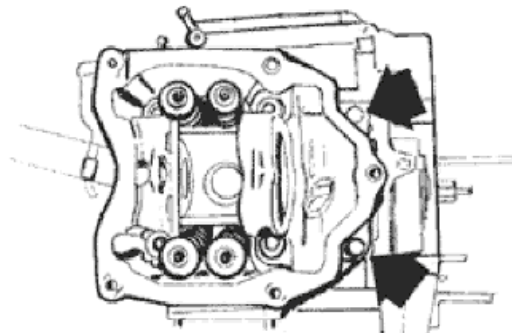
N.B.

IN CASE OF NEED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, PINS, ROCKING LEVERS AND FIXING BRACKET. THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE DRIVING SHAFT CHAIN TIGHTENER.



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.

IN CASE OF NEED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, PINS, ROCKING LEVERS AND FIXING BRACKET. THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE DRIVING SHAFT CHAIN TIGHTENER.

Removing the valves

- Using the appropriate tool fitted with an adapter, remove the cotters, caps, springs and valves.
- Remove the oil guards with the appropriate tool.
- Remove the lower spring supports.

CAUTION

REPLACE THE VALVES IN SUCH A WAY AS TO RECOGNISE THEIR ORIGINAL POSITION ON THE HEAD.

Specific tooling

020382Y011 adapter for valve removal tool

020382Y Valve cotters equipped with part 012 removal tool

020306Y Punch for assembling valve seal rings



Removing the cylinder - piston assy.

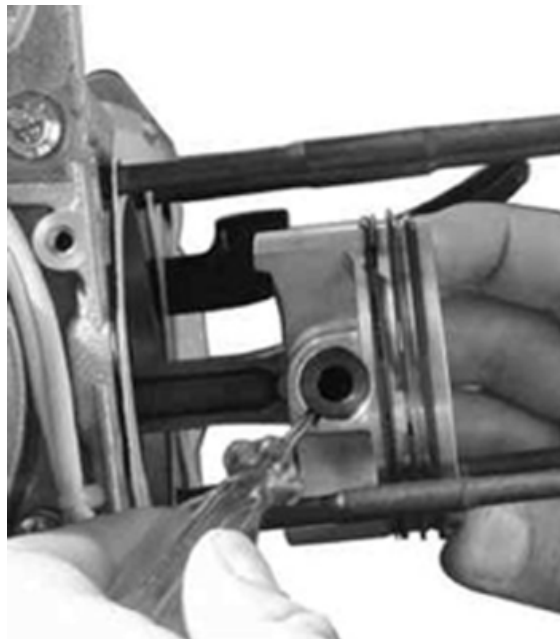
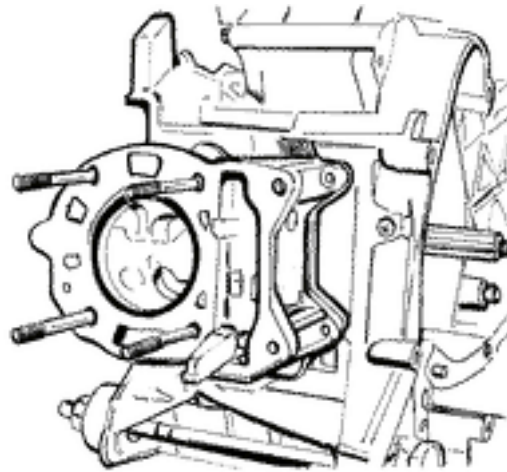
- Remove the chain guide pad.
- Pull out the cylinder.
- Remove the cylinder base gasket.
- Remove the two stop rings, the wrist pin and the piston.
- Remove the piston seals.

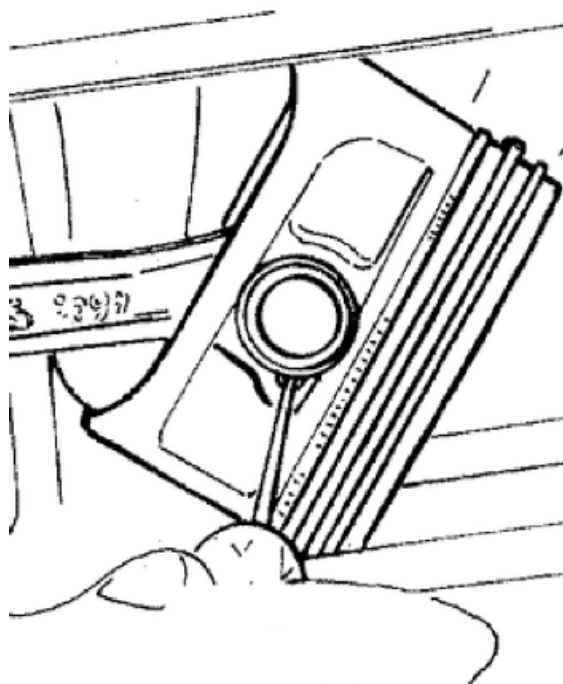
CAUTION

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

N.B.

BE CAREFUL NOT TO DAMAGE THE SEALING RINGS DURING REMOVAL.





Inspecting the small end

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

N.B.

REPLACE THE CRANKSHAFT IF THE DIAMETER OF THE ROD SMALL END EXCEEDS THE STANDARD DIAMETER OR IT SHOWS SIGNS OF WEAR OR OVERHEATING.

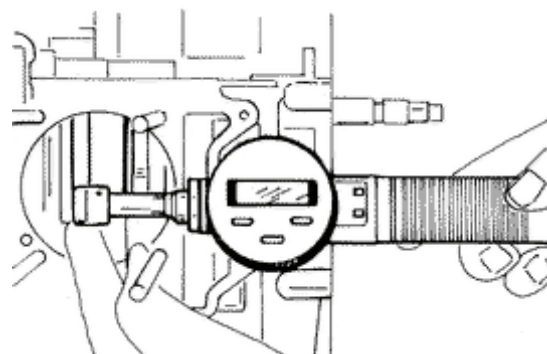
Characteristic

Checking the connecting rod small end: Maximum diameter

15.030 mm

Checking the connecting rod small end: Standard diameter

15 +0.015+0.025 mm



Inspecting the wrist pin

- Measure the outer diameter of the gudgeon pin.
- Calculate the coupling clearance between pin and connecting rod end.
- Measure the capacity diameter on the piston.
- Calculate the piston pin coupling clearance.
- Measure the outside diameter of the piston, perpendicular to the gudgeon pin axis.
- Carry out the measurement as shown in the figure.

41.1 mm (from the crown)

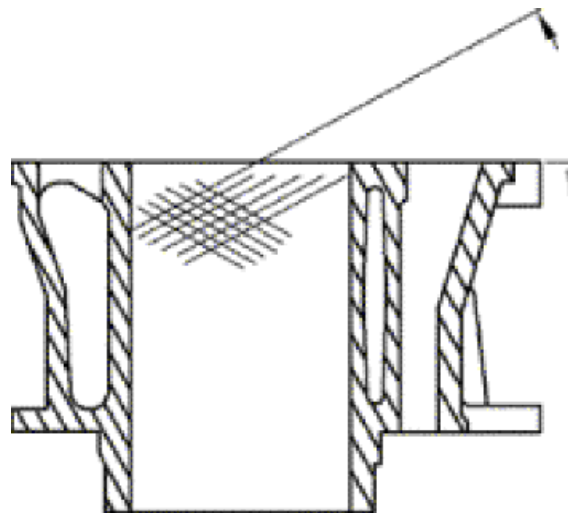
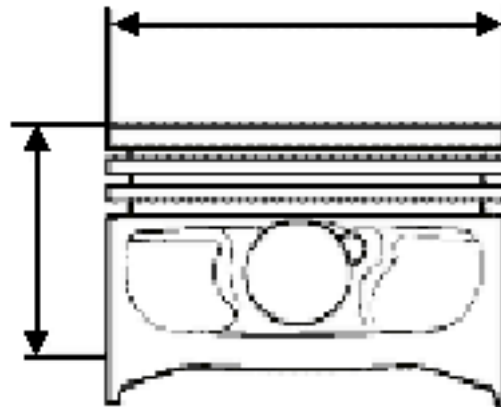
- Using a bore meter, measure the inner cylinder diameter at three different points according to the directions shown in the figure.
- Check that the head matching surface exhibits no deformations or wear.

Maximum admissible displacement: 0.05 mm

- 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).
- 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.

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

Pin diameter Standard diameter

56.997 ÷ 57.025

piston diameter

56.945 ÷ 56.973 mm

Pin diameter: Standard clearance

0.015 ÷ 0.029 mm

Pin diameter Standard diameter

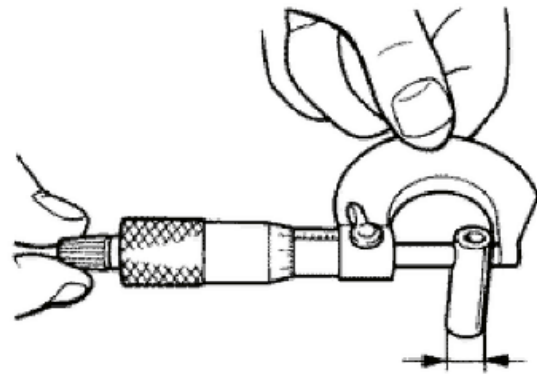
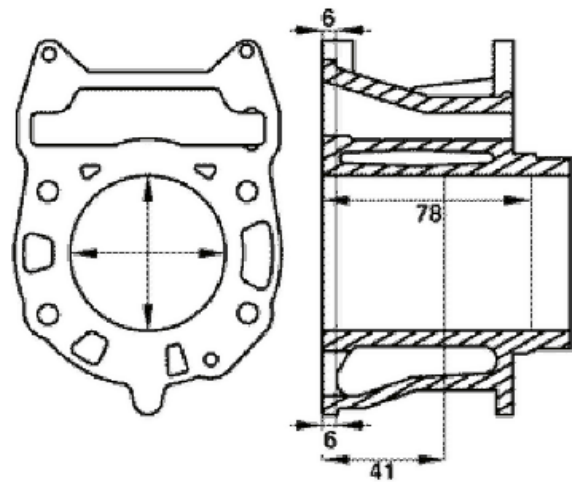
14.996 - 15.000 mm

Wrist pin seat on the piston: Standard diameter

15.001 ÷ 15.006 mm

**Diameter of the wrist pin seat on the piston:
Standard clearance**

0.001 ÷ 0.010 mm



Inspecting the piston

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



Inspecting the piston rings

- Alternately insert the three sealing rings into the cylinder, in the area where it retains its original diameter. Using the piston, insert the rings perpendicularly to the cylinder axis.
- Measure the opening (see figure) of the sealing rings using a feeler gauge.
- If any measurements are greater than specified, replace the piston rings.

N.B.

BEFORE REPLACING ONLY THE PISTON RINGS, ENSURE THAT THE CLEARANCE BETWEEN THE PISTON RINGS AND THE PISTON RING GROOVES, AND BETWEEN THE PISTON AND THE CYLINDER, IS AS SPECIFIED. IN ANY CASE, NEW PISTON RINGS USED IN COMBINATION WITH A USED CYLINDER MAY HAVE DIFFERENT BEDDING CONDITIONS THAN THE STANDARD.



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 stop ring onto the appropriate tool.
- With opening in the position indicated on the tool

S = left

D = right

- Place the wrist pin stop ring into position using a punch
- Fit the wrist pin stop using the plug as shown in the figure

CAUTION

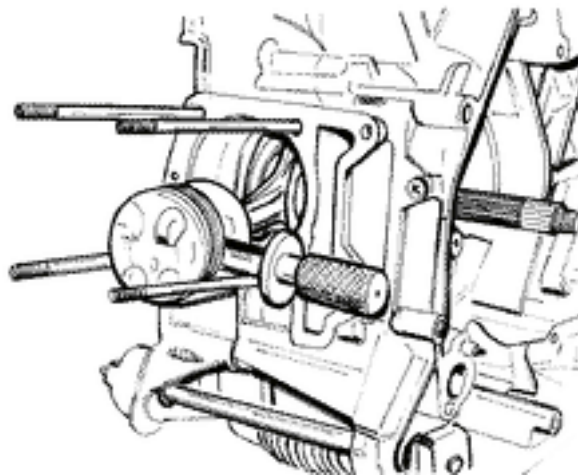
USING A HAMMER MIGHT DAMAGE THE STOPS' HOUSING.

N.B.

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

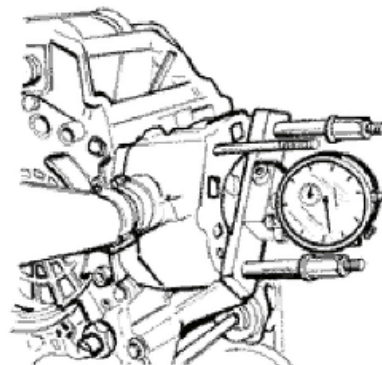
Specific tooling

020430Y Pin lock fitting tool



Choosing the gasket

- Provisionally fit the piston into the cylinder, without any base gasket.
- Assemble a dial gauge on the specific tool Support to check piston position 020428Y
- Set the dial gauge to zero placing the tool on a contrasting surface. Keeping the zero position, assemble the tool on the cylinder and lock it with 2 supplied nuts as shown in the figure.



- Rotate the crankshaft until TDC (the inverted point of the dial gauge rotation)
- Position the dial gauge on the piston as shown in the figure and measure how much the piston protrudes.
- By means of the table shown in the specifications chapter identify the cylinder base gasket thickness to be used for refitting. Correctly identify the cylinder base gasket thickness to keep the correct compression ratio.
- Remove the specific tool and the cylinder.

N.B.

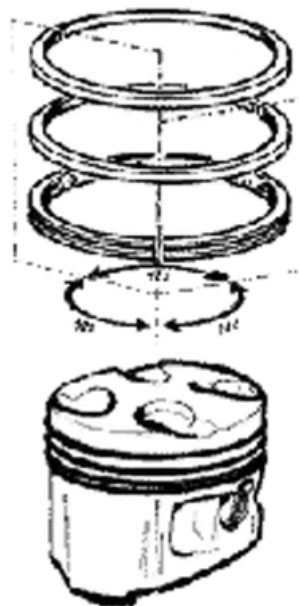
MEASURE PISTON PROTRUSION.

See also

[Slot packing system](#)

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 chamfered side of the oil scraper ring should always be facing the piston crown.
- 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 top.
- 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.

THE TWO PISTON RINGS ARE MADE WITH A TAPERED CYLINDRICAL CONTACT CROSS-SECTION. THIS IS TO ACHIEVE A BETTER BEDDING.



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

020393Y Piston fitting band

020287Y Clamp to assemble piston on cylinder



Inspecting the cylinder head

- Using a trued bar and feeler gauge check that the cylinder head surface is not worn or distorted.
Maximum allowable run-out: 0.05 mm
- Check that the camshaft and the rocker pin capacities exhibit no wear.
- Check that the cylinder head cover surface, the intake manifold and the exhaust manifold are not worn.



Characteristic

bearing «A»

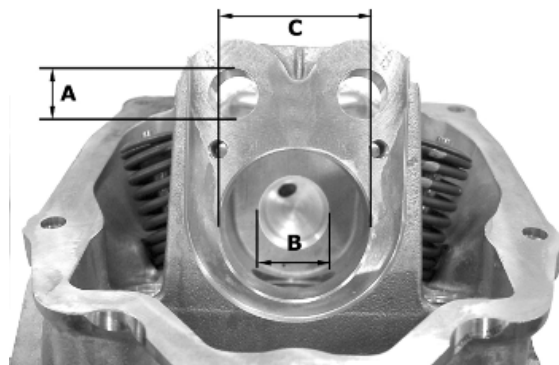
Ø 12.000 - 12.018 mm

bearing «B»

Ø 20.000 ÷ 20.021 mm

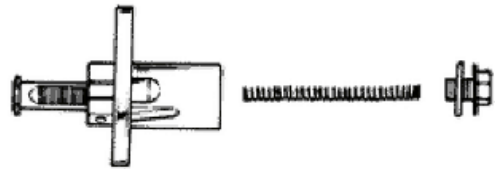
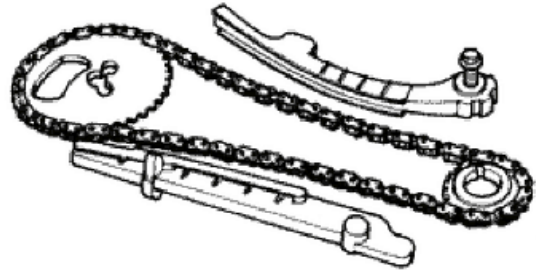
bearing «C»

Ø 37.000 - 37.025 mm



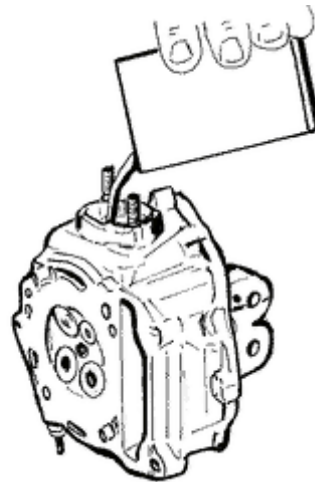
Inspecting the timing system components

- Check that the guide shoe and the tensioner shoe are not worn out.
- Ensure that the camshaft control pulley chain assembly and the sprocket wheel are not worn.
- If you encounter wear, replace the parts or, if the chain, sprocket wheel and pulley are worn replace the whole assembly.
- Remove the centre screw with the washer 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 assembly.



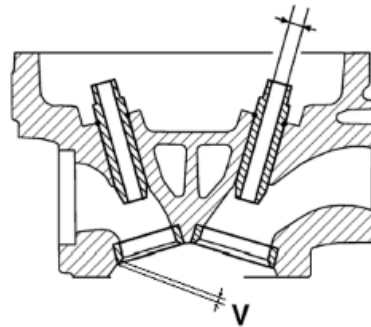
Inspecting the valve sealings

- Insert the valves into the cylinder head.
- Alternatively check the intake and exhaust valves.
- 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 valve housings

- Check the width of the imprint on the valve seat «V» wear limit max. 1.6 mm.
- 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.
- 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.



Characteristic

Valve seat wear Intake guide

limit accepted: 5.022

Valve seat wear Exhaust guide

Standard diameter: 5.000 ÷ 5.012 mm

Valve seat wear Exhaust guide

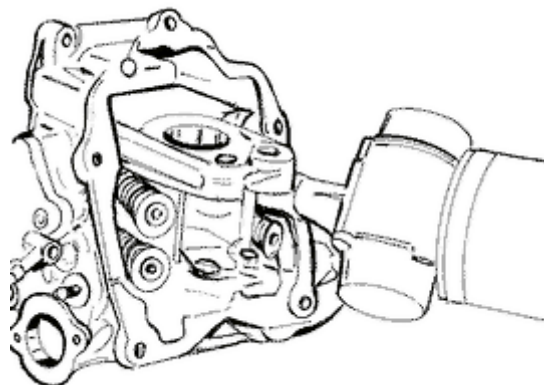
Accepted limit 5.022

Valve seat wear Exhaust guide

Standard diameter: 5.000 ÷ 5.012 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.
- Check that there are no signs of wear on the surface of contact with the articulated register terminal.
- 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 the grinding, keep the cylinder head with the valve axes in a horizontal position. This will prevent the lapping compound residues from penetrating between the valve stem and the guide (see figure).



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.

N.B.

DO NOT CHANGE THE POSITIONS THE VALVES ARE FITTED IN

Characteristic**Valve check standard length**

Outlet: 94.4 mm

Valve check standard length

Inlet: 94.6 mm

Valve check Maximum admissible clearance

Outlet: 0.072 mm

Valve check Maximum admissible clearance

Inlet: 0.062 mm

Valve check standard clearance

Outlet: 0.025 ÷ 0.052 mm

Valve check standard clearance

Inlet: 0.013 ÷ 0.040 mm

Valve check Minimum admissible diameter

Outlet: 4.95 mm

Valve check Minimum admissible diameter

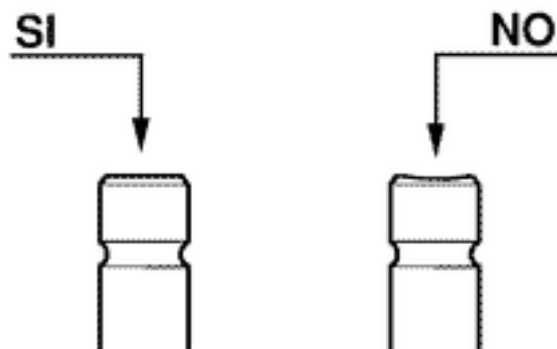
Inlet: 4.96 mm

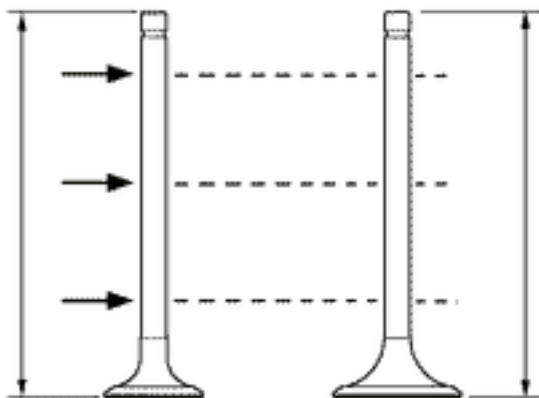
Valve check Standard diameter:

Inlet: 4.972 ÷ 4.987 mm

Valve check Standard diameter:

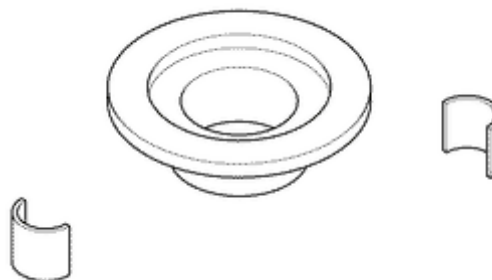
Outlet: 4.96 ÷ 4.975 mm





Inspecting the springs and half-cones

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



Refitting the valves

- Lubricate the valve guides with engine oil.
- Place the valve spring supports on the head.
- Using the special punch, fit the four valve seals.
- Fit the valves, the springs and the caps. Using the appropriate tool with adapter, compress the springs and insert the cotters in their seats.

N.B.

DO NOT CHANGE THE VALVE FITTING POSITION. FIT THE VALVE SPRINGS WITH THE REFERENCE COLOUR ON COTTER SIDE (TURNS WITH GREATER PITCH).

Specific tooling

020306Y Punch for assembling valve seal rings

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.
- Check the cam height.
- 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.
- 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 the rocker pins do not show signs of wear or scoring.
- Measure the internal diameter of each rocker arm.

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

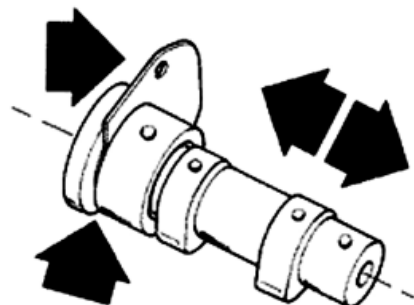
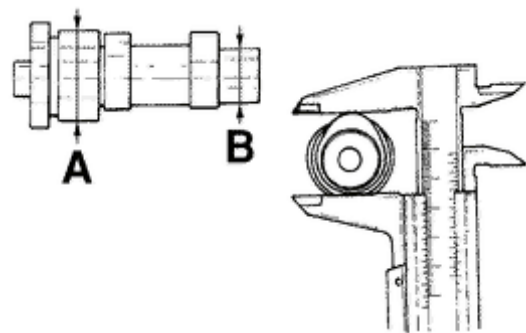
Characteristic

Internal rocker arm diameter: Standard diameter

Diameter 12.000 - 12.011 mm

Rocker arm pin diameter: Standard diameter

Diameter 11.977 - 11.985 mm



Cam shaft check: Maximum admissible axial clearance

0.42 mm

Cam shaft check: Standard axial clearance:

0.11 - 0.41 mm

Cam shaft check: Standard height

Outlet: 29.209 mm

Cam shaft check: Standard height

Inlet: 30.285 mm

Cam shaft check: Minimum admissible diameter

Bearing B diameter: 19.950 mm

Cam shaft check: Minimum admissible diameter

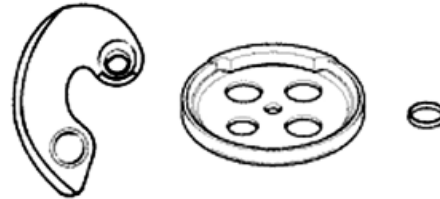
Bearing A Ø: 36.94 mm

Cam shaft check: Standard diameter

Bearing B diameter: 19.959 ÷ 19.98 mm

Cam shaft check: Standard diameter

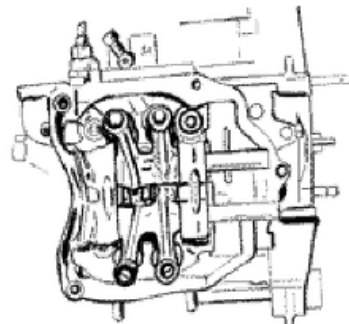
Bearing A Ø: 36.95 ÷ 36.975 mm



Refitting the head and timing system components

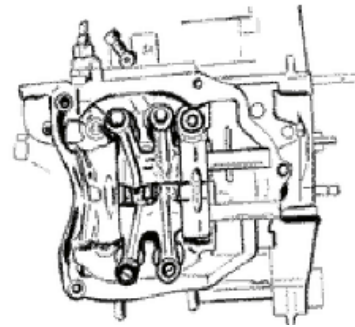
Assemble the lower timing chain sprocket wheel on the crankshaft, with the chamfer facing the insertion side.

- Loop the timing chain around the sprocket on the crankshaft.
- Fit the chain tensioner slider from the cylinder head side.
- Fit the spacer and the screw fastener.
- Tighten the screws to the prescribed torque.

**Locking torques (N*m)****Slider screw 10 ÷ 14 Nm**

Fit the pins and rocking levers.

- Lubricate the two rocking levers through the holes at the top.
- Lubricate the 2 bearings and insert the cam shaft in the cylinder head with the cams corresponding to the rockers.
- Insert the retention plate and tighten the two screws shown in the figure to the prescribed torque.



Locking torques (N*m)

Plate screws 4 ÷ 6 Nm

Insert 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.
- Holding this position insert the chain on the camshaft control pulley.
- Insert the pulley on the cam shaft while keeping the reference **4V** in correspondence with the reference mark on the head.
- Assemble the counterweight with the corresponding fixing screw and tighten to the prescribed torque.



Locking torques (N*m)

Counterweight screw 7 ÷ 8.5

Fit the end-of stroke ring on the valve-lifting mass and fit the automatic valve-lifting cam to the camshaft.

N.B.

LUBRICATE WITH GREASE THE END-OF-STROKE RING IN ORDER TO AVOID ACCIDENTAL LEAKS THAT MAY FALL INTO THE ENGINE. ASSEMBLE THE AUTOMATIC VALVE-LIFTER RETURN SPRING. DURING THIS OPERATION THE SPRING MUST BE LOADED AT APPROXIMATELY 180°.

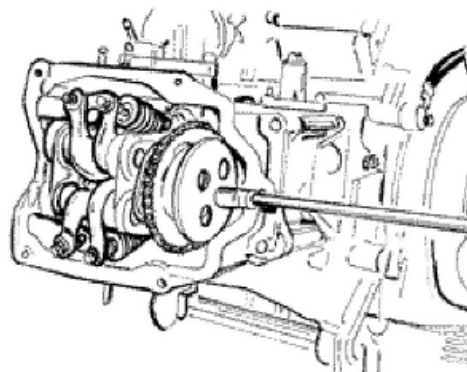


Assemble the limiting bell using the counterweight fixing screw as a reference.

- Tighten the clamping screw to the prescribed torque.

Locking torques (N*m)

Limiting bell screw 11 ÷ 15 Nm



Set the tensioner cursor to the rest position.

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

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



Locking torques (N*m)

Tensioner screws 11 ÷ 13 Tensioner cover 5 ÷ 6 Nm

Adjust valve clearance

- Fit the spark plug.

Electrode distance 0.8 mm

Locking torques (N*m)

Spark plug 12 ÷ 14

Refit the cylinder head cover, tightening the 5 screws to the prescribed torque. Make sure the gasket is positioned properly.

Remove the flywheel cover completely as already described in the flywheel chapter.

- 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)

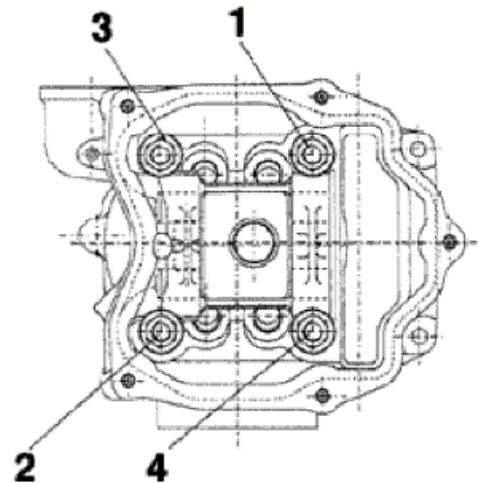
Tappet cover screws 6 - 7 Nm

TIMING SYSTEM COMPONENTS ASSEMBLY

Name	Torque in Nm
Tappet cover screws	6 - 7 Nm
Spark plug	12 ÷ 14
Tensioner cover	5 ÷ 6 Nm
Tensioner screws	11 ÷ 13
Limiting bell screw	11 ÷ 15 Nm

Name	Torque in Nm
Counterweight screw	7 ÷ 8.5
Plate screws	4 ÷ 6 Nm
Slider screw	10 ÷ 14 Nm

- Fit the timing chain guide pad.
- Insert the centring dowel between the cylinder head to the cylinder, fit the cylinder head gasket and the cylinder head.
- Lubricate the stud bolt threading.
- Tighten up the nuts to a pre-torque of 7 ± 1 N·m
- Rotate by a 180° angle (2 rotations of 90° each)
- To carry out the operations described above, follow the tightening sequence in the figure.
- Fit the two screws on the outside of the timing chain side and tighten them to the prescribed torque.

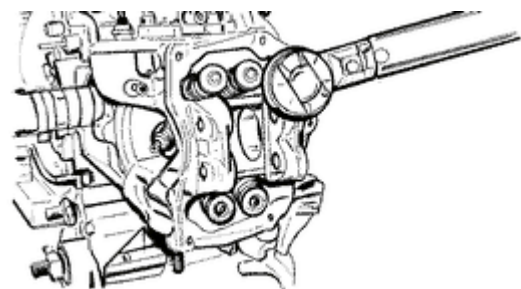


N.B.

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

Locking torques (N*m)

Timing chain tensioner support screw 11 ÷ 13

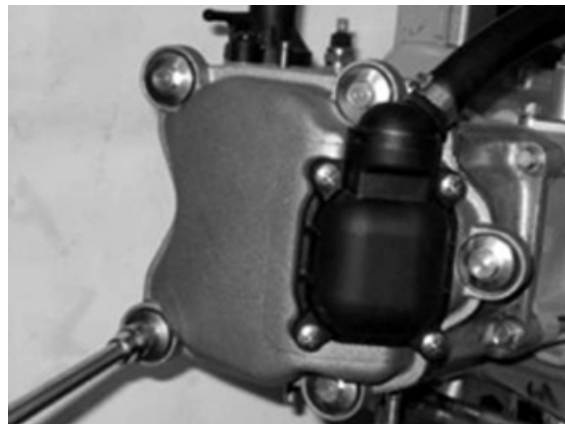


Refitting the rocker-arms cover

- Refit the cylinder head cover, tightening the 5 clamping screws to the prescribed torque.
- Make sure the gasket is positioned properly.

Locking torques (N*m)

Tappet cover screws 6 - 7 Nm

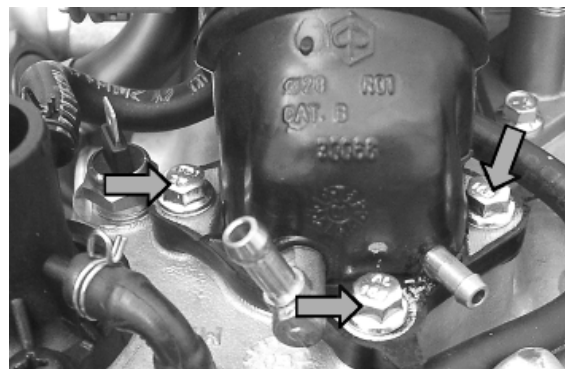


Refitting the intake manifold

Fit the intake manifold and do up the three screws.

N.B.

USE COMMERCIALY AVAILABLE INSERTS AND INSERT HOLDERS FOR THE SPECIAL SCREWS FOR 125 CM³ MODELS.



Crankcase - crankshaft

Splitting the crankcase halves

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 together with the water pump, the flywheel and the stator as described in the **magneto flywheel** chapter.

- Remove the oil filter and the oil pressure switch.

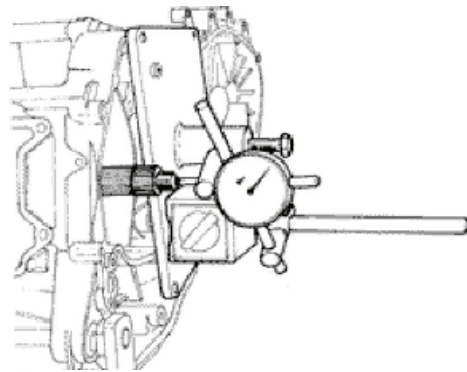
- Remove the cylinder/piston/head unit as described in the **cylinder head timing system** chapter.

- Remove the two retainers indicated in the figure and the starter motor.

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

Higher clearances are signs of wear on the supporting surfaces of the crankshaft casing.

Standard clearance: 0.15 ÷ 0.40 mm



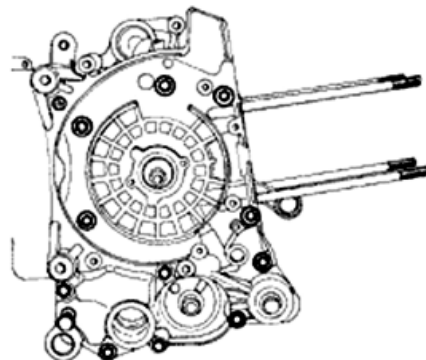
Remove the 11 coupling screws to the crankcase.

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

Remove the crankshaft.

CAUTION

KEEP THE CRANKSHAFT IN ONE OF THE TWO HALVES OF THE CRANKCASE WHEN SEPARATING IT. IF YOU FAIL TO DO THIS, THE CRANKSHAFT MIGHT ACCIDENTALLY FALL.

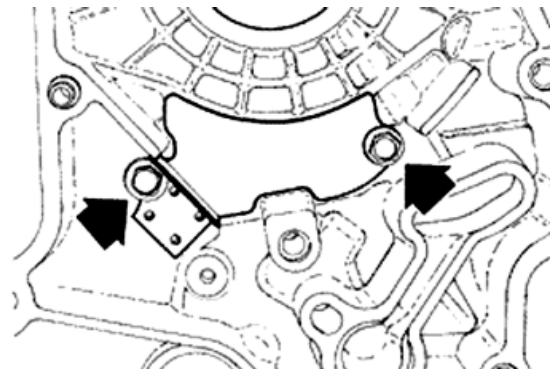


- Remove the coupling gasket of the crankcase halves.

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

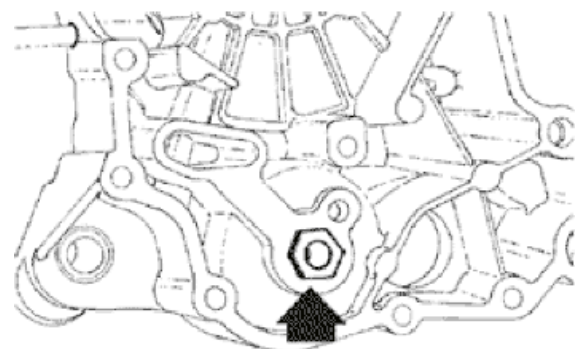
CAUTION

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



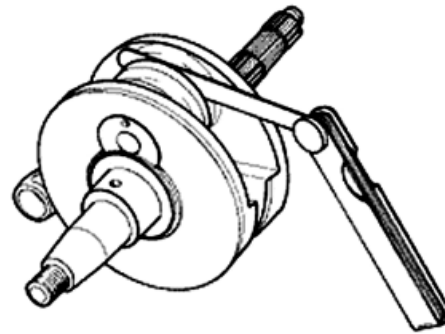
- Remove the oil guard on the flywheel side.

- Remove the oil filter fitting shown in the diagram



Fitting clearance

Connecting rod axial clearance 0.20 - 0.50



Check the radial clearance on the connecting rod.

Standard clearance: 0.036 ÷ 0.054 mm

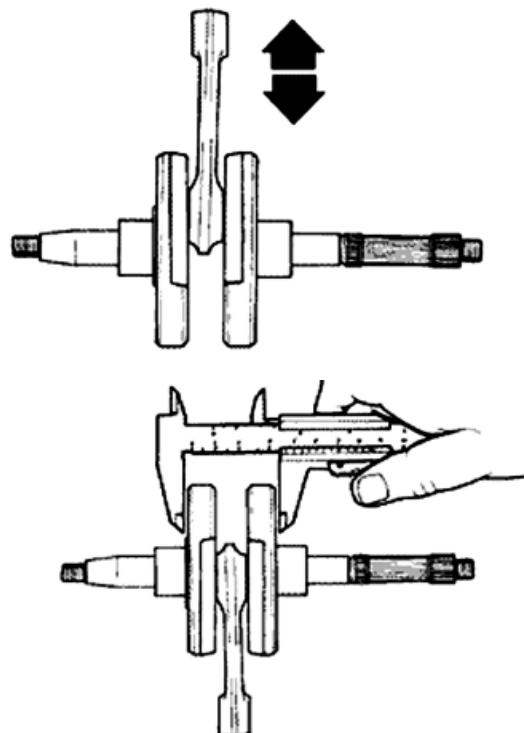
-Check the surfaces that limit the axial free-play are not scored and measure the width of the crankshaft between these surfaces, as shown in the diagram.

Standard dimensions:

55.75 ÷ 55.90 mm

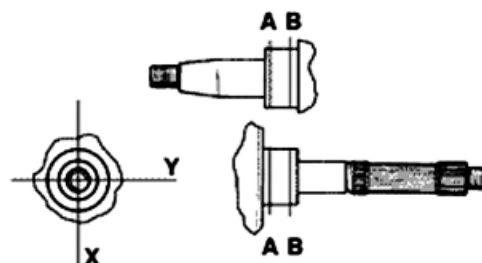
N.B.

WHEN MEASURING THE WIDTH OF THE CRANKSHAFT, MAKE SURE THAT THE MEASUREMENTS ARE NOT MODIFIED BY THE RADIUS OF FITTINGS WITH THE CRANKSHAFT BEARINGS.



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

Check the diameters of both bearings of the crankshaft according to 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.



Characteristic

Standard diameter - Category 2

29.004 ÷ 29.010

Standard diameter - Category 1

28.994 ÷ 29.000

The crankshaft can be reused when the width is within the standard values and the surfaces show no signs of scoring.

Inspecting the crankshaft alignment

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

- Check that the driving shaft 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 connecting rod head 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

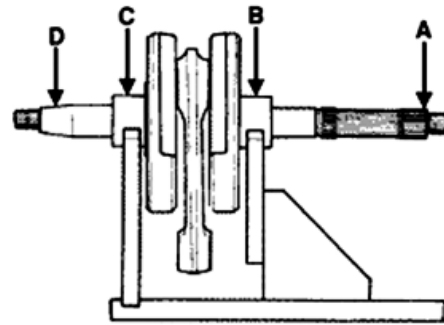
Off-line maximum admitted

A = 0.15 mm

B = 0.01 mm

C = 0.01 mm

D = 0.10 mm



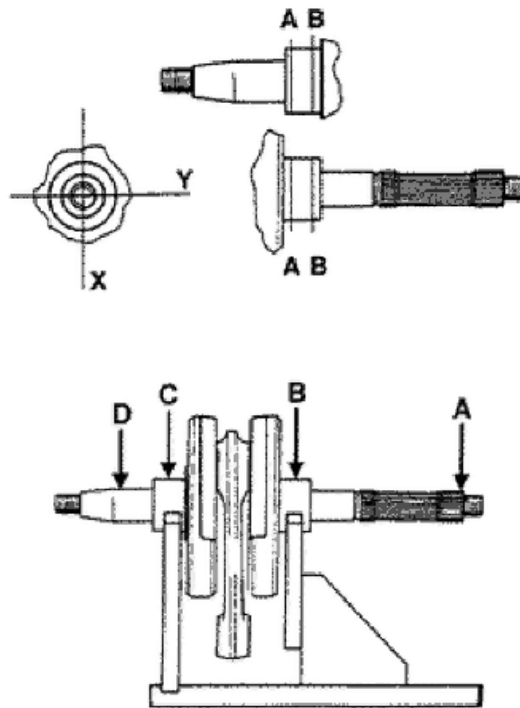
Measure the capacity of both axes X-Y

Specific tooling

020074Y Support base for checking crankshaft alignment

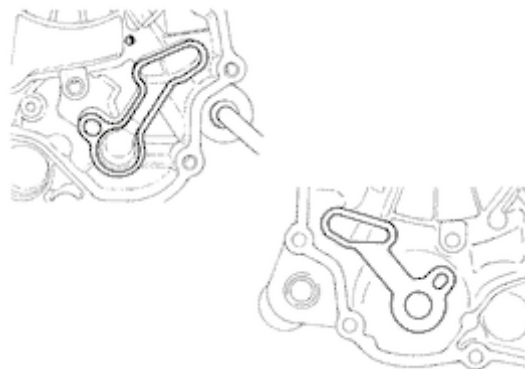
CRANKSHAFT ALIGNMENT

Titolo	Durata/Valore	Testo Breve (< 4000 car.)	Indirizzo Immagine
Crankshaft alignment			



Inspecting the crankcase halves

- Before proceeding to check the crankcase halves, thoroughly clean the all surfaces and oil ducts.
- On the transmission-side crankcase half, take particular care when handling the oil pump compartment and the oil ducts, the by-pass duct, 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 valve, which regulates the oil pressure.
- 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

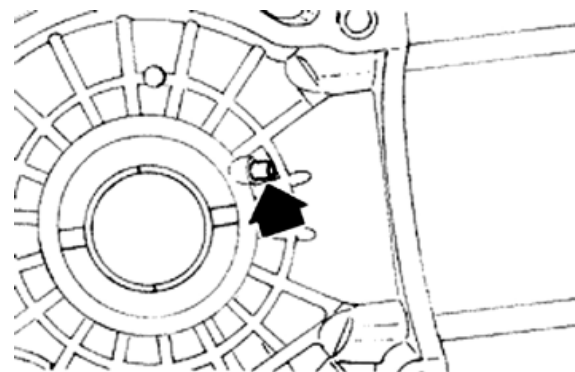
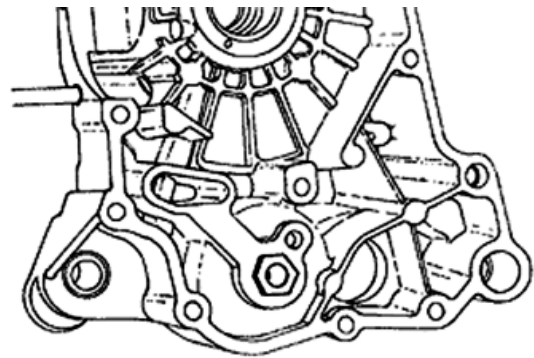


cylinder head and the oil drainage duct at the fly-wheel side oil seal.

- Inspect the coupling surfaces on the crankcase halves for scratches or deformation, taking particular care with the cylinder/crankcase surfaces and the crankcase halves surfaces.

- Defects in the crankcase coupling gasket between the crankcase halves or the mating surfaces shown in the diagram, could cause a drop in the oil pressure lubricating the main bearings and connection 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.



N.B.

THE JET IS FED THROUGH THE MAIN BUSHINGS. PROPER OPERATION OF THIS COMPONENT IMPROVES THE PISTON TOP COOLING. CLOGGING HAS EFFECTS THAT ARE DIFFICULT TO DETECT (PISTON TEMPERATURE INCREASE). FAILURE OR LEAK CAN CONSIDERABLY DECREASE THE MAIN BUSHING AND CONNECTING ROD LUBRICATION PRESSURE.

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.

Inspecting the crankshaft plain bearings

- T

o obtain a good bushing lubrication it is necessary to have both an optimal lubricating pressure (3,2 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 opposite the cylinder.

- To prevent obstructions in the oil feeding channels, the matching surface of the two half-bearings must be perfectly perpendicular 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.

- 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.

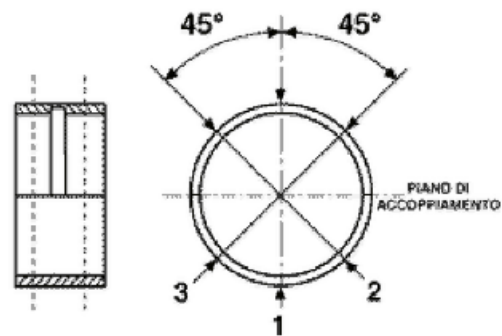
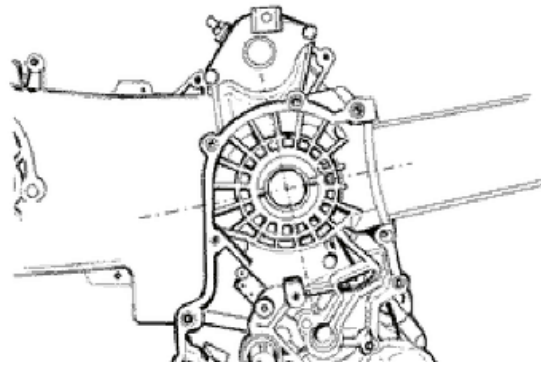
- There are three crankcase versions: with RED main bushings, with BLUE main bushings and with YELLOW main bushings.

- There is only one type of main bushing housing hole in the crankcase

The standard bushing diameter after driving is variable on the basis of a coupling selection.

- The bushing housings in the crankcase are available in two categories, Cat. 1 and Cat. 2, as are the crankshafts.

- The main bushings are available in three thickness categories, identified by colour markings, as shown in the table below.



TYPE		IDENTIFICATION		
A		RED		
B		BLUE		
C		YELLOW		
		Type "A"	Type "B"	Type "C"
		- RED	- BLUE	- YEL-
				LOW
Main half-bearing	1.970 ÷ 1.973	1.9703 ÷ 1.976	1.976 ÷ 1.979	
Bushing category	Crankcase halves category	Internal bushing diameter after fitting	Possible fitting	
A	1	29.025 ÷ 29.040	Original	
B	1	29.019 ÷ 29.034	Original and spare	
	2	29.028 ÷ 29.043		
C	2	29.022 ÷ 29.037	Original	

Match the shaft with two category 1 crank webs with the category 1 crankcase (or cat. 2 with cat. 2) Furthermore a replacement crankcase cannot be matched with a crankshaft with mixed categories. The replacement crankshaft has half-shafts of the same category.

Crankcase halves	Engine half-shaft	Bushing
Cat. 1	Cat. 1	B
Cat. 2	Cat. 2	B
Cat. 1	Cat. 2	A
Cat. 2	Cat. 1	C

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.

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.

N.B.

CRANKCASES FOR REPLACEMENTS ARE SELECTED WITH CRANKCASE HALVES OF THE SAME CATEGORY AND ARE FITTED WITH CATEGORY B BUSHINGS (BLUE)

Characteristic

Standard driving depth

1.35 ÷ 1.6

Diameter of crankcase without bushing

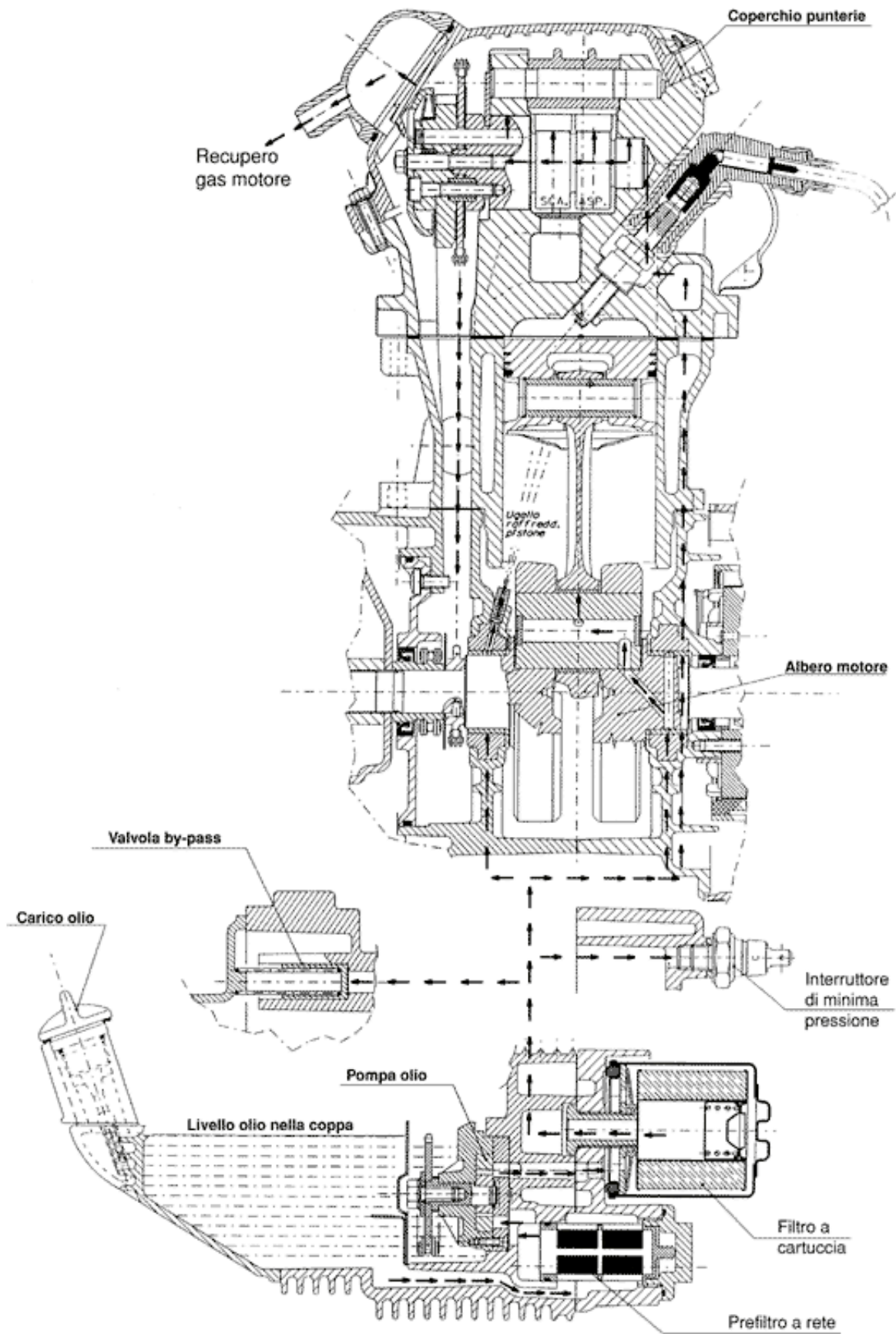
32.953 ÷ 32.963

Refitting the crankcase halves

Lubrication

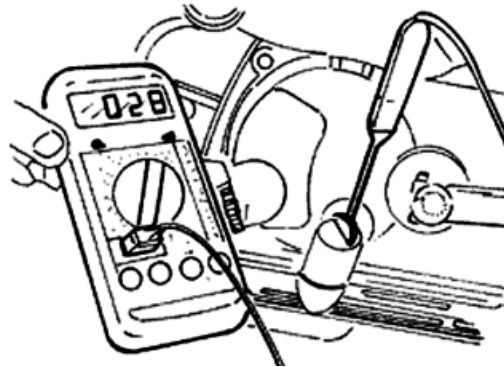
Conceptual diagrams

LUBRICATION CIRCUIT



Oil pressure check

- After removing the flywheel cover as described in the "Flywheel" chapter, remove 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 $\sim 90^{\circ}\text{C}$, check that the oil pressure is between $0.5 \div 1.2$ atm.
- With the engine idling at 6000 rpm and the oil temperature at $\sim 90^{\circ}\text{C}$, check that the oil pressure is between $3.2 \div 4.2$ atm.
- Remove the appropriate tools once the measurement is complete, refit the oil pressure switch and washer, tightening it to the specified torque and fit the fan cover.
- If the oil pressure is outside 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 GOOD CONDITION.

Characteristic

Oil pressure

Minimum pressure admitted at 6000 rpm: 3.2 atm.

Locking torques (N*m)

Minimum oil pressure sensor $12 \div 14$



Crankshaft oil seals

Refitting

- Fit the internal bulkhead by locking the two screws to the prescribed torque.
 - Fit the oil filter fitting and tighten it to the specified torque.
 - Place a new gasket on one of the crankcase halves, preferably on the transmission side, together with the locating dowels.
 - Lubricate the main bushings and insert the crankshaft in the transmission side crankcase half.
 - Reassemble the two crankcase halves.
 - Fit the 11 screws and tighten them to the prescribed torque.
 - Lubricate the flywheel oil seal.
 - Using the appropriate tool, assemble the oil seal.
 - Fit a new O-ring on the pre-filter and lubricate it.
 - Insert the filter on the engine with the relative cap.
- Tighten to the specified torque.

N.B.

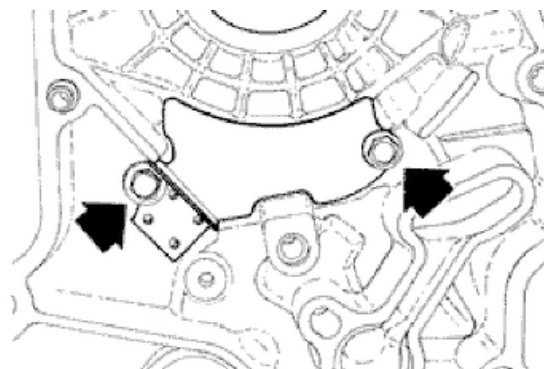
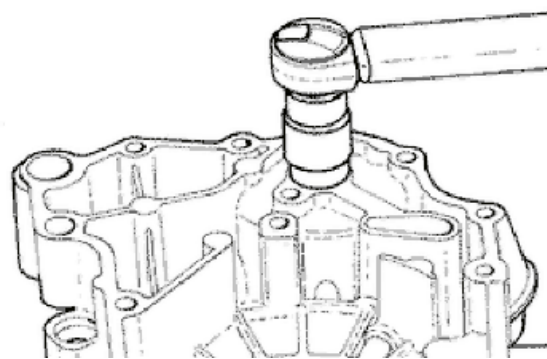
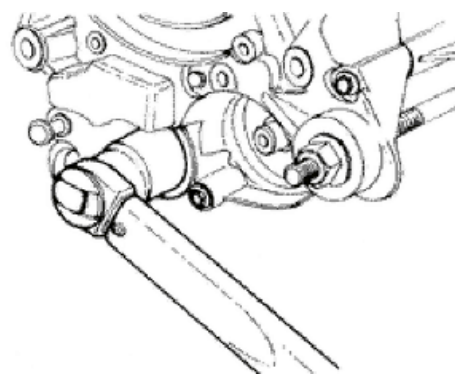
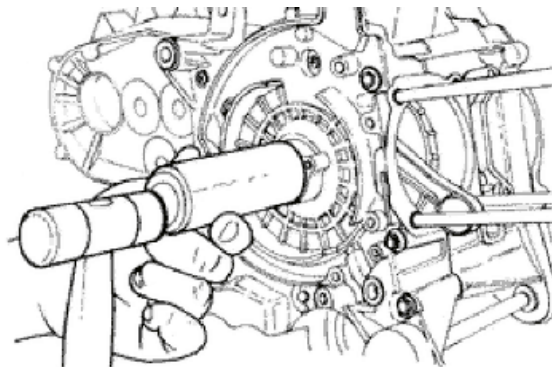
FAILURE TO USE THE SPECIFIC TOOL CAN RESULT IN AN INCORRECT DEPTH POSITION AND AS A CONSEQUENCE IN INADEQUATE OIL SEALING.

Specific tooling

020425Y Punch for flywheel-side oil seal

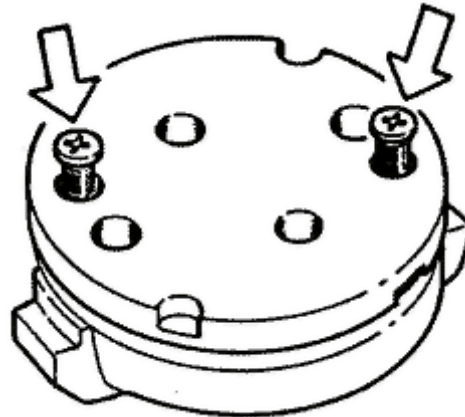
Locking torques (N*m)

Internal engine crankcase bulkhead (transmission-side half shaft) screws 4 ÷ 6
 Oil filter on crankcase fitting 27 ÷ 33
 Engine-crankcase coupling screws 11 ÷ 13
 Engine oil drainage plug/mesh filter 24 ÷ 30



Oil pump

- 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 unit.
- Fit the pump cover in the position that permits the crankcase fixing screws to be aligned.
- Make sure the gasket is positioned properly and refit the pump on the engine crankcase. The pump can only be fitted in one position. - Tighten the screws to the prescribed torque.
- Fit the sprocket wheel with a new O-ring.
- Fit the chain.
- Fit the central screw and the Belleville washer. Tighten to the prescribed torque.
- Fit the oil pump cover by tightening the two screws to the prescribed torque.



N.B.

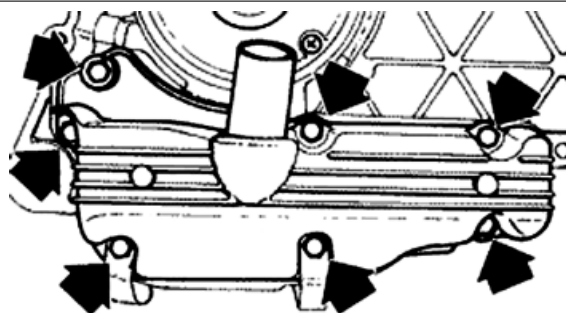
FIT THE BELLEVILLE WASHER SO THAT ITS OUTER RIM TOUCHES THE PULLEY. MAKE SURE THAT THE PUMP TURNS FREELY.

Locking torques (N*m)

**Screws fixing oil pump to the crankcase 5 - 6
Oil pump control crown screw 10 ÷ 14 Oil pump
cover screws 0.7 ÷ 0.9**

Removing the oil sump

- Remove the oil filler plug, the transmission cover, the complete driving pulley assembly with belt and the sprocket wheel, as described in the "Transmission" chapter.
- Drain the oil as described previously.
- Remove the seven screws, shown in the diagram, and the two rear brake fluid pipe fixing brackets.
- Remove the screw, the by-pass piston, the gasket and centring dowels shown in the figure.



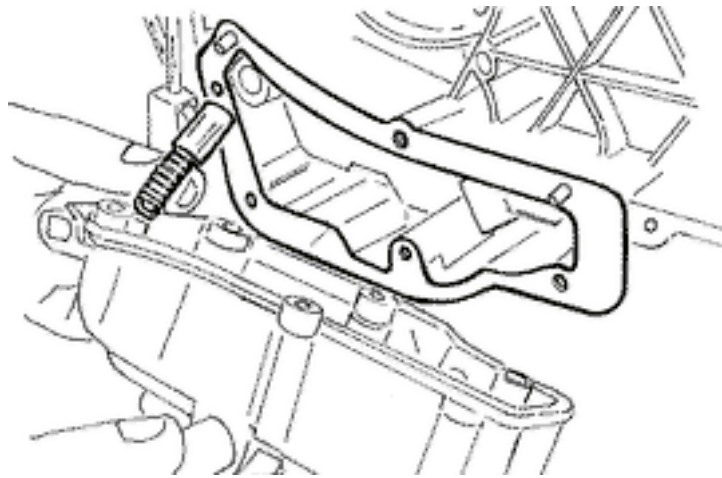
Inspecting the by-pass valve

- 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

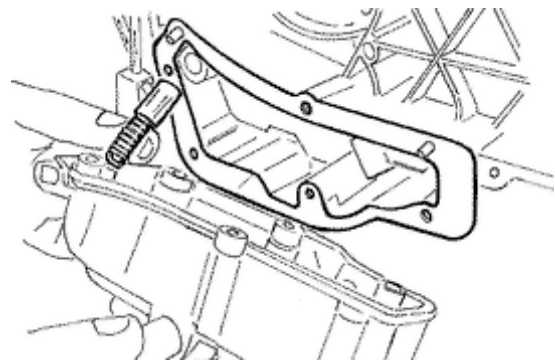
By-pass check up: Standard length

54.2 mm



Refitting the oil sump

- Refit the by-pass valve plunger in its housing.
- Insert the pressure-regulating spring.
- Fit a new sump seal.
- Refit the two centring dowels.
- Refit the sump, taking care to locate the spring in the appropriate recess machined into the inside of the sump.
- Refit the rear brake cable 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 chapter "Crankcase and Crankshaft", regard-**



ing lubrication of the crankshaft and connecting rod

Locking torques (N*m)

Oil sump screws 10 ÷ 14

SAS valve

Inspecting the one-way valve

- Remove the SAS valve.
- Provisionally assemble the rubber coupling of the SAS valve outlet to ensure tightness.
- Connect the MITYVAC vacuum pump to the rubber coupling as shown in the photograph.
- Set the pump to the low-pressure position (VACUUM).
- Operate the pump slowly.
- Check that the one way valve allows the air to pass through causing a slight vibration.
- Switch the pump to pressure mode (PRESSURE).
- Operate the pump slowly and check if there is an increase of pressure. A small leakage is considered to be normal.



If anomalies are detected, replace the pump.

N.B.

A MALFUNCTIONING ONE-WAY VALVE CAN RESULT IN RUBBER COUPLING AND FILTER OVERHEATING

N.B.

ABSENCE OF VIBRATION INDICATES INEFFICIENT SEALING

Specific tooling

020329Y MityVac vacuum-operated pump

Inspecting the cut-off

- Remove the SAS valve.
- Connect the MITYVAC pump in low-pressure mode (VACUUM) to the CUT-OFF valve vacuum intake.
- Apply a vacuum value higher than 0.5 BAR.
- Check that this value is kept all the time.
- If a worn seal is detected, replace it.
- With a "T" bypass and flexible rubber hoses make a parallel connection between the rubber coupling and the vacuum intake of the CUT-OFF valve.
- Connect the bypass to the MITYVAC pump.
- Set the pump set to the low-pressure mode (VACUUM).
- Using a pair of long flat pliers, choke the rubber hose next to the valve.
- Operate the pump until vacuum is higher than 0.5 BAR.
- Release the hose and check how the vacuum reacts. - Under normal functioning conditions the vacuum undergoes a slight fall and then readjusts. There follows a slow and continuous loss of depression up to approximately 0.4 BAR. At this point the valve opens and the depression is suddenly set to zero.

Lack of tightness or the fact that the valve opens at different vacuum values should be regarded as anomalies. In this case, replace it.

N.B.

LACK OF TIGHTNESS IN THE CUT-OFF VALVE RESULTS IN EXHAUST NOISE (EXPLOSIONS IN THE MUFFLER). INCORRECT CUT-OFF VALVE CALIBRATION CAN RESULT IN CATALYTIC CONVERTER MALFUNCTIONING

N.B.

A FAULTY CUT-OFF VALVE DIAPHRAGM, BESIDES JEOPARDISING THE CORRECT OPERATION OF THE CUT-OFF VALVE, ALSO DAMAGES IDLE FUNCTIONING

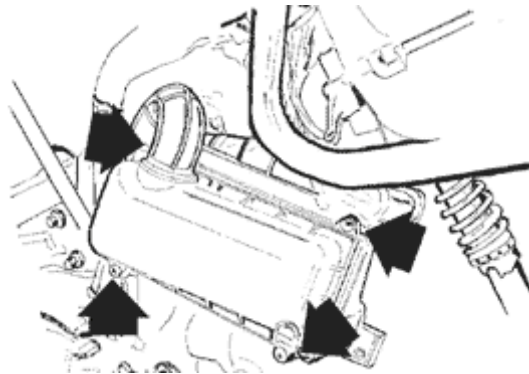
Specific tooling



020329Y MityVac vacuum-operated pump

Fuel supply

- To clean the filtering element proceed as follows: remove the 4 filter cover fixing screws indicated in the figure; remove the cover and take out the paper filtering element, clean with compressed air and refit.
- Make sure the filtering element is in the correct position.
- Check that the air passage sections are not damaged or deformed.
- Check the correct sealing of the coupling between the filter housing and the cover.

**N.B.**

FAILURE TO OBSERVE THESE INSTRUCTIONS MAY RESULT IN WRONG VACUUM INSIDE THE FILTER HOUSING, WHICH IN TURN MAY PRODUCE VARIATIONS IN CARBURETION.

Removing the carburettor

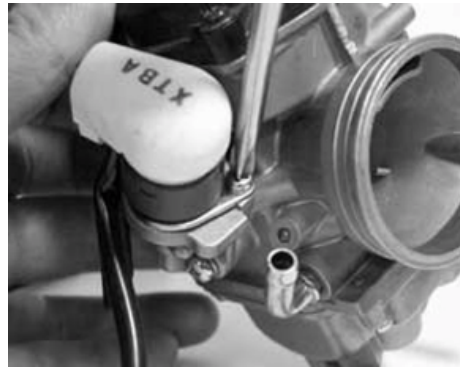
Kehin

- To detach the carburettor from the engine, it is necessary to move the air filter and remove the transmission throttle control, the automatic starter connection, the clamps anchoring the carburettor to the filter housing and to the inlet manifold, the air delivery pipe to the diaphragm, and the intake fitting.
- Take out the carburettor and rotate it so as to remove the screw with the water joint and the pipes.

**N.B.**

THIS LAST OPERATION IS NECESSARY SO AS NO TO EMPTY THE COOLING SYSTEM.

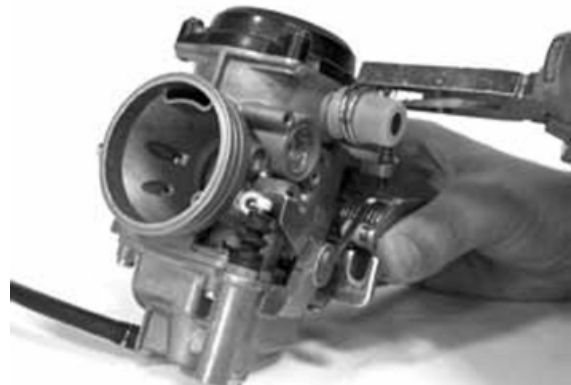
-
- Remove the protection, the bracket and the starter acting on the screw shown in the figure.



-
- Remove the 2 screws and the starter support with the gasket.



-
- Remove the clamp and cover with the airing filter of the diaphragm chamber.



-
- Remove the 4 fixing screws shown in the figure and the vacuum chamber cover.

WARNING

DURING THE REMOVAL OF THE CARBURETOR COVER TAKE SPECIAL CARE NOT TO RELEASE THE SPRING ACCIDENTALLY.

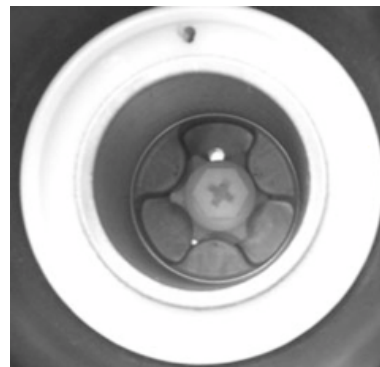




- Remove the vacuum valve together with the diaphragm.



- Unscrew the bayonet joint 1/8 of a turn and remove, take out the spring and vacuum valve needle



- Remove the 4 screws indicated in the figure.



- Remove the chamber with the accelerating pump, its control and gasket.



- Remove the oil pump seal.
- Remove the intake and outlet valves of the intake pump from the tank

N.B.

CAUTION, THE ACCELERATION PUMP VALVES ARE MADE UP OF NOZZLES, SPRING AND BALL.

N.B.

AVOID REMOVING THE PISTON OF THE PUMP AND ITS CONTROL.

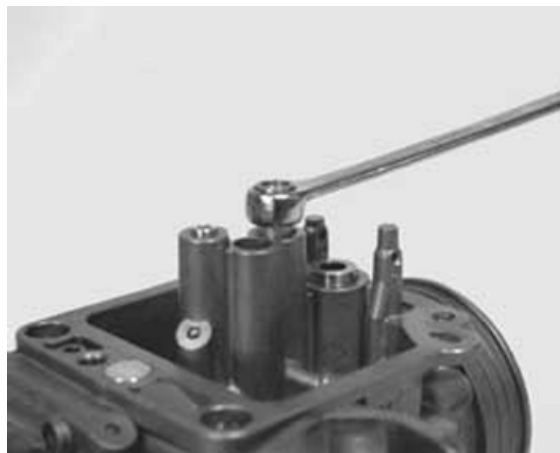


Adequately support the carburettor and using a rod and hammer remove the float pin acting from the throttle control side.

- Remove the float and the plunger.
- Remove the maximum nozzle



-Remove the maximum nozzle.



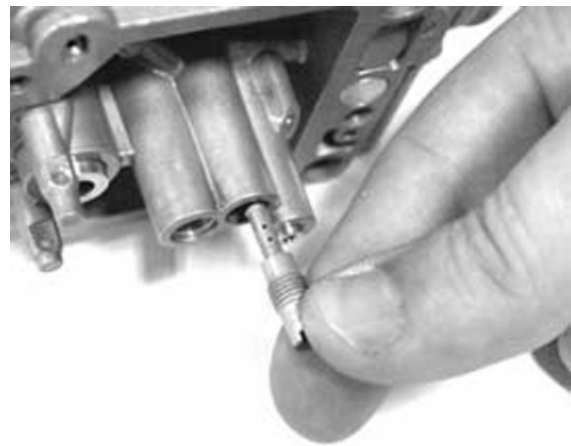
-Remove diffuser.



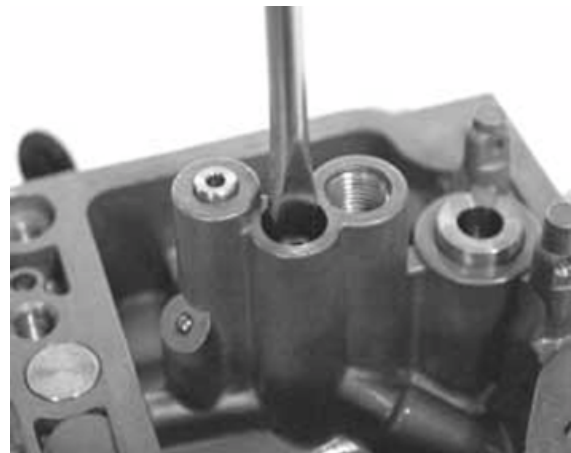
- Remove the sprayer.

N.B.

WHEN CLEANING THE CARBURETTOR BODY REMOVE THE SPRAYER TO AVOID LOSING PARTS. IF THE SPRAYER IS FORCED IN ITS HOUSING DO NOT ATTEMPT TO REMOVE IT AS THIS WILL ONLY DAMAGE IT.



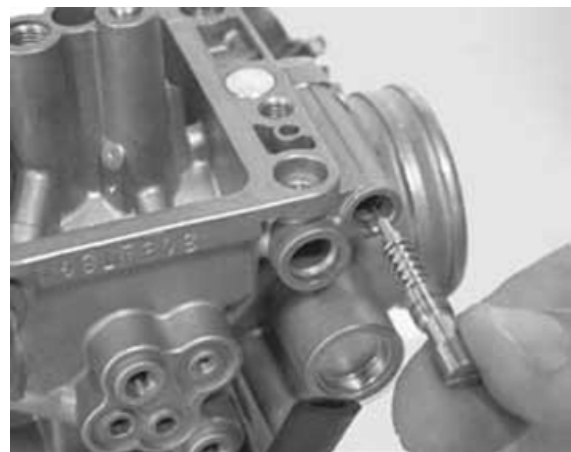
- Remove the minimum nozzle.



- Remove the minimum flow set screw and the spring.

CAUTION

DO NOT ATTEMPT REMOVING PARTS EMBEDDED IN THE CARBURETTOR BODY SUCH AS: FUEL SUPPLY PIPE, PLUNGER HOUSING, STARTER NOZZLE, PIT COVER FOR PROGRESSIONS AND INLET NOZZLE, MINIMUM AND MAXIMUM AIR GAUGE, THROTTLE VALVE CONTROL SHAFT. DO NOT REMOVE THROTTLE-SHAFT CONNECTION SCREWS. THE FIXING SCREWS ARE CAULKED AFTER ASSEMBLY AND THEIR REMOVAL DAMAGES THE SHAFT.



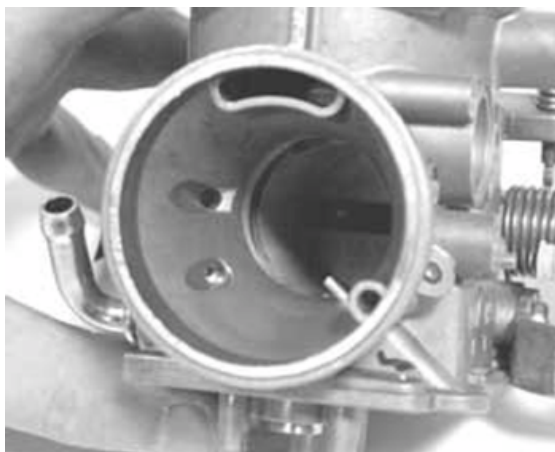
Refitting the carburettor

Kehin

- Before refitting, wash the carburettor body accurately with petrol and compressed air.
- Pay special attention to the fuel supply pipe and the plunger seat.



- For maximum circuit, check the air adjustment is correct as shown in the figure.



- For the minimum circuit, make sure the following points are properly cleaned: air gauging, outlet section controlled by flow screw, progression holes near the throttle valve.



- For the starter circuit, blow the connection pipe properly with the jet. This is necessary because the nozzle support hides other inaccessible internal calibrations.
- Blow the intake nozzle properly.

N.B.

THE ACCELERATION NOZZLE OUTLET IS EXTREMELY SMALL AND IS ORIENTED TO THE THROTTLE VALVE. NOZZLE INCORRECT ORIENTATION RESULTS IN INADEQUATE SPRAYING.

- Check that there are 5 closing ball joints for the operating pipes on the carburettor body.

- Check that the coupling surfaces, the tank and the diaphragm are not dented.
- Check that the depression valve housing pipe is not scratched.
- Check that the throttle valve and the shaft do not show abnormal wear.
- Check that the plunger seat does not show abnormal wear.
- Replace the carburettor in case of irregularities.
- Check that the return spring of the accelerating pump rocking lever is not deformed by over-stretching.

N.B.

TO AVOID DAMAGES, DO NOT INTRODUCE METAL OBJECTS IN THE ADJUSTED SECTIONS.

- Wash and blow the minimum nozzle properly and reassemble it.



- Properly wash and blow the components of the sprayer maximum circuit, the diffuser and the nozzle.
- Introduce the sprayer in the carburettor body with the shortest cylindrical part directed to the diffuser.
- Assemble the diffuser making sure the sprayer is being adequately inserted and lock it.
- Assemble the maximum nozzle.



- Check that the tapered pin does not show signs of wear on the sealing surfaces of the shock absorber pin and the return clamp.
- Replace the rod if worn out.



- Check that the float is not worn on the pin housing or on the contact plate with the plunger and that there are no fuel infiltration.
- Replace it in case of anomalies.

- Introduce the float with the rod on the fuel feeding tube side.

N.B.

INTRODUCE THE RETURN SPRING ON THE FLOAT PLATE ADEQUATELY

- Remove the drainage screw from the tank, wash and blow it properly and make sure the acceleration pump pipes are clean.

- Operate the acceleration pump piston repeatedly and blow with compressed air.

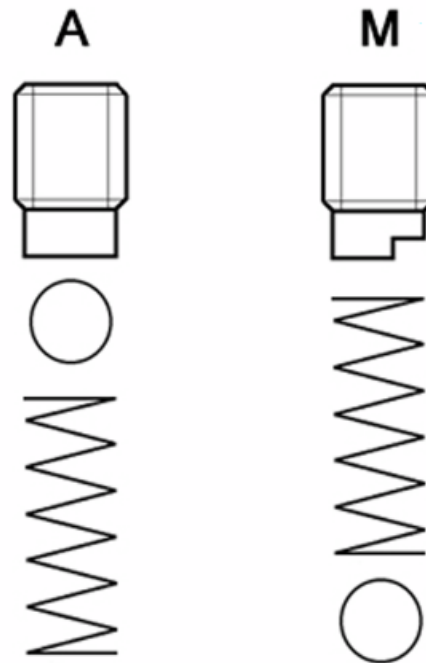
- Reassemble the acceleration pump valves following this order:

INTAKE VALVE (A)

- Spring
- Ball
- Nozzle

IN VALVE (M)

- Ball
- Spring
- Nozzle



N.B.

THE IN VALVE NOZZLE, CORRESPONDING TO THE ACCELERATION PUMP, IS MILLED.

-Check the screw tightness introducing a small amount of fuel in the tank.

- Assemble a new gasket on the tank.

- Assemble the tank on the carburettor body fastening the 4 screws.

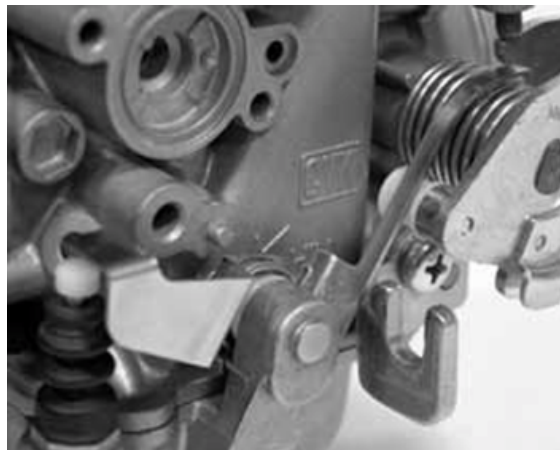
- Check that the control roller is free to rotate in its own seat.

N.B.

MAKE SURE THE TANK GASKET IS CORRECTLY INTRODUCED

N.B.

AVOID DEFORMING THE ACCELERATION PUMP CONTROL ROCKING LEVER.



-
- Wash and blow the flow screw properly.
 - Check that screw is not deformed and/or rusty.
 - Assemble the spring on the screw.
 - Screw the flow screw on the carburettor body.



- The screw final position should be determined by an exhaust fume analysis.
- Adjust the carburettor by turning the screw twice from the close position.

Level check

Kehin

- Place the carburettor inclined as shown in the figure.



- Check that the float reference is parallel to the tank coupling surface
- If different positions are detected, change the plunger control metal plate direction to obtain the position described above.

Inspecting the valve and needle

Kehin

- Check that the tapered pin of the vacuum valve does not show wear.
- Check that the depression valve does not show threads on the external surfaces.
- Check that the vacuum intake hole is not clogged.
- Check that the diaphragm is not damaged or has hardened, otherwise replacement the whole valve.
- Insert the tapered pin into the vacuum valve housing.
- Reassemble the vacuum valve on the carburettor body taking care that the tapered pin is inserted into the sprayer.

N.B.

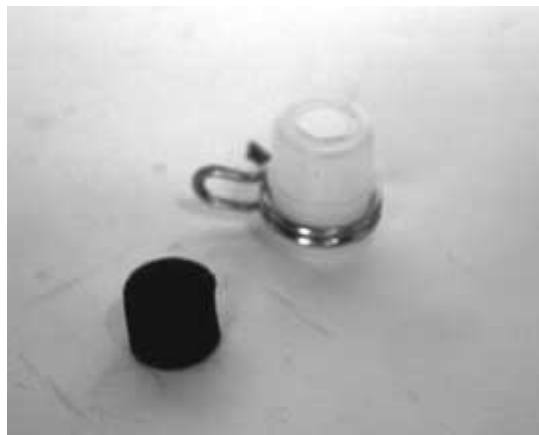
THE VALVE CAN BE INSERTED IN ONLY ONE POSSIBLE POSITION.



- Reassemble the spring with the pin lock.
- Remove the cover of the vacuum chamber being careful to correctly insert the spring in its place on the cover.
- Tighten the screws.



-
- Wash and blow dry the filter sponge of the ambient pressure intake.



-
- Reassemble the filter with its clamp.



-
- Wash and blow dry the starter support.
Assemble a new gasket on the carburettor body and tighten the 2 fixing screws.



Inspecting the automatic choke device

Kehin

- Check that the automatic starter piston is not deformed or rusty.
- Check that the piston slides freely from the seat to the support.
- Check that the piston sealing gasket is not deformed.
- The starter must be more or less functional depending on the ambient temperature.
- Measure the protrusion of the piston as shown in the figure and check its corresponding value.
- Make sure that the starter is adjusted for the ambient temperature.
- The starter should disconnect progressively by means of electrical heating.
- Check the starter resistance when adjusted to the ambient temperature.

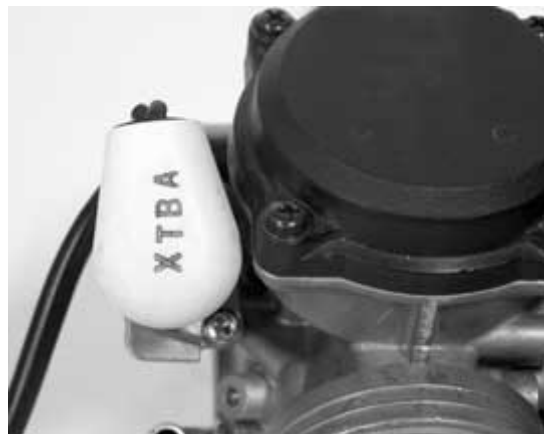
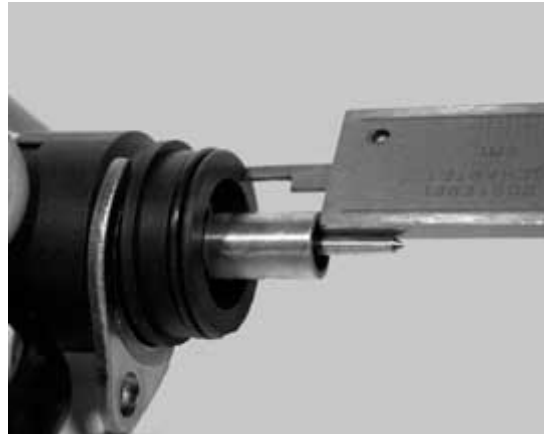
With a 12V battery power the automatic starter and check that the piston protrudes as much as possible.

- The correct warm up time depends on the ambient temperature.
- If protrusion, resistance or timing values are different from the ones prescribed, replace the starter.
- Assemble the starter to the carburettor being careful to position the O-Ring correctly, insert the plate with the machined side contacting the starter, tighten the fixing screws.
- Position the starter as shown in the figure.
- Assemble the protection casing.

N.B.

TO CARRY OUT THIS CHECK PAY SPECIAL ATTENTION NOT TO GENERATE SHORT CIRCUITS USE A CABLE SECTION WITH A TERMINAL SUITABLE TO BE CONNECTED TO THE STARTER.

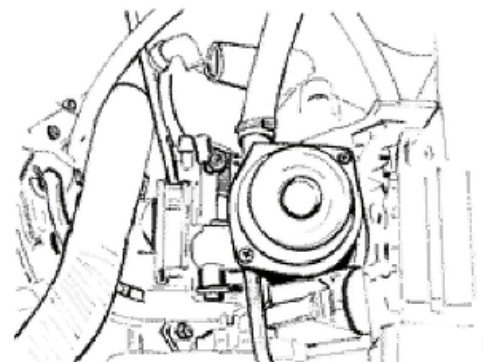
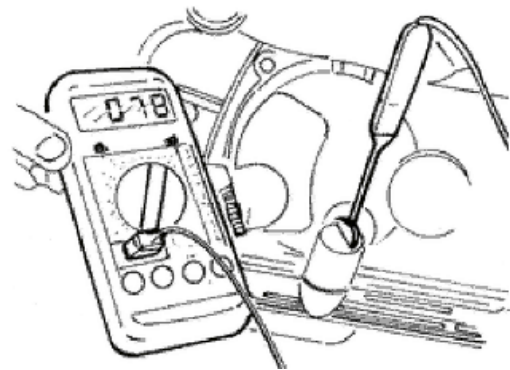
Characteristic Starter pin travel



10

Starter device resistance~ 20 Ω **Adjusting the idle**

- The engine does not require frequent idle speed adjustments, but it is essential to strictly follow certain rules when adjusting the idle speed.
- Before adjusting the carburettor make sure to respect the lubrication requirements, valve clearance, and complying timing, spark plug should be in optimum conditions, air filter clean and sealed, and the exhaust system tight.
- Warm up the engine by running it at least 5 minutes at approximately 50 kph.
- Connect a millimetre thermometer (020331y) on the sump, using a cover with oil expressly prepared for probes.
- Start the engine and before adjusting the idle speed, make sure that the oil temperature is between 70÷80 °C.
- Using the rpm indicator of the analyser or an independent one (020332y), adjust the idle set screw until 1600 ÷ 1700 rpm is obtained.

**N.B.**

THE WASTED SPARK IGNITION SYSTEM OFFERS REMARKABLE POWER. READINGS MAY NOT BE ACCURATE IF INADEQUATE RPM INDICATORS ARE USED. CORRECT COUPLING OF THE RPM INDICATOR WILL BE INDICATED WHEN IT CAN READ RPM OVER 6000 ÷ 8000

INDEX OF TOPICS

SSUSPENSIONS

SUSP

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

Front

Removing the front wheel

- Remove the 5 fixing screws indicated in the photograph.

Locking torques (N*m)

Wheel fixing screw 20 ÷ 25



Front wheel hub overhaul

- Remove the ball bearing seeger ring indicated in the photograph



Extract the ball bearing using the specific tool

Specific tooling

001467Y014 Pliers to extract \varnothing 15-mm bearings

001467Y017 Bell for bearings, outside \varnothing 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 locking seeger ring

Specific tooling

020151Y Air heater

020376Y Adaptor handle

020359Y 42x47-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

Refitting the front wheel

- To refit, carry out the removal operations but in reverse order and comply with the specified locking torque.

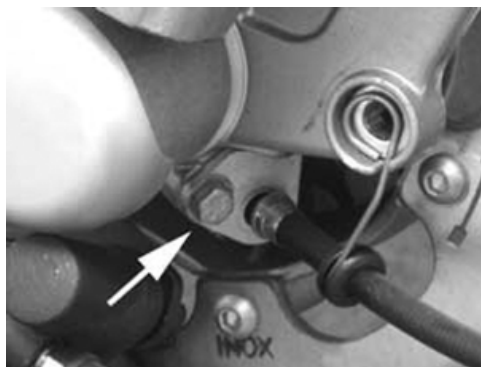
Locking torques (N*m)

Wheel fixing screw 20 ÷ 25

Steering column

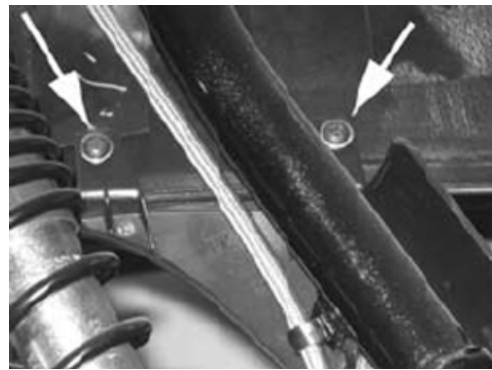
Removal

- Remove the front wheel
- Remove the brake calliper
- Loosen the screw fixing the odometer cable plate and take out the cable.

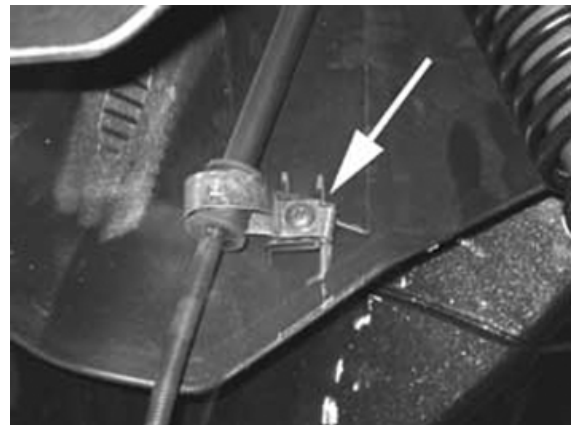


- Remove the suspension arm housing by unscrewing the three screws indicated in the photograph.





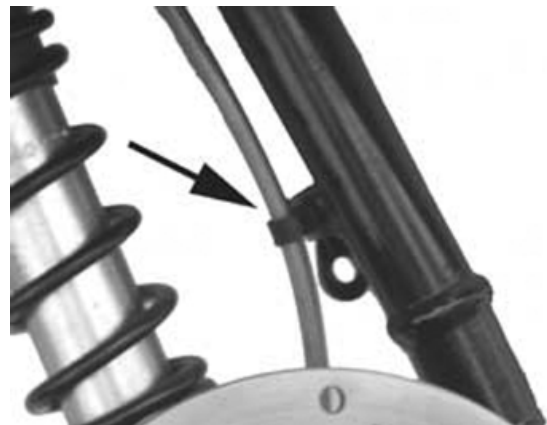
- Remove the retainer fixing the odometer cable to the mudguard indicated in the photograph



- Remove the retainer fixing the brake piping to the front shock absorber upper plate



- Remove the retainer fixing the brake piping to the suspension arm



- Pre-loosen the 3 nuts fixing the mudguard to the suspension



- Remove the rear handlebar cover.
- Remove the screw fixing the handlebar to the steering tube
- Tilt the handlebar towards the shield back plate being careful not to scratch the plastic parts



- Remove the steering tube ring nut cover



- Use a specific tool to remove the counter-ring nut, the spacer washer and the ring nut of the upper disk of the fifth wheel fitting
- Slide off the steering tube and remove permanently the mudguard from the suspension

Specific tooling

020055Y Wrench for steering tube ring nut



To refit, carry out the removal operations but in reverse order; grease the fifth wheel fittings and tighten to the prescribed torques.

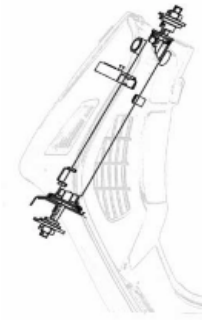
Locking torques (N*m)

Upper ring nut 30 ÷ 40 Nm Lower ring nut 30 ÷ 40 Nm Handlebar to steering tube 45 ÷ 50 Nm

Overhaul

Carry out this operation only if strictly necessary and in any case remove and replace the old part with a new one.

- Remove the steering tube
- Use a special tool remove the upper disk of the fifth wheel fitting seat on the headstock by operating from the lower part of the headstock as indicated in the photograph. Afterwards remove the lower disk of the fifth wheel operating from the upper part



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



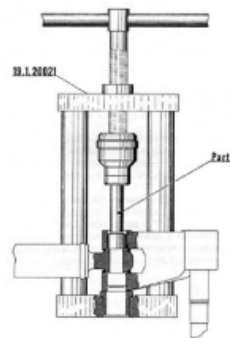
- Use the specific tool to fit the fifth wheel fitting on the headstock as indicated in the figure

Specific tooling

020037Y Punch



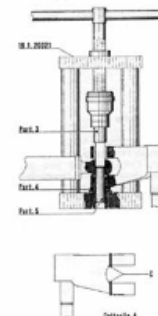
- Remove the steering tube
- Remove the attachment bracket
- Use the specific tool with the part 1 and operate the handgrip until removing temporarily the pin and the Nadella opposite the tool thrusting direction.
- To extract the second Nadella, use the tool with the part 2, instead of part 1, on opposite side to the one indicated in the figure.



Specific tooling

020021Y Front suspension service tool

- Fit the two dust guard rings "C" on the swinging hub as shown in drawing "A".
- Connect the swinging hub to the steering tube with the guiding pin, part 5.
- Use the specific tool fitted with part 3 on the stem and part 4 on the tool base.
- Lubricate the pin with Z2 grease and insert it temporarily on the swinging hub, move the tool handgrip until part 3 is fully inserted on the steering tube.
- Once the pin has been fitted, insert the two spacers part 17 slightly hitting with a mallet (see next figure).



CAUTION

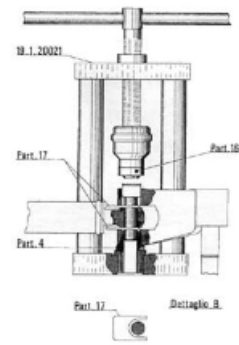
USE NEW ROLLER CASINGS, PIN, SEALING RINGS AND DUST GUARDS FOR REFITTING.

Specific tooling

020021Y Front suspension service tool

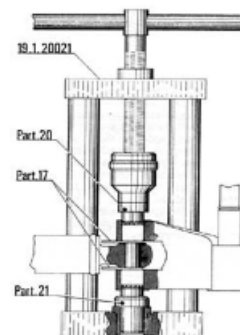
To fit sealing rings, roller casings and wedging washers proceed as follows

- Lubricate the sealing rings with mineral oil and half fill the roller casings with Z2 grease.
- Insert the seal ring on the pin and the roller bushing with wedging washers at the same time.
- Remove the specific tool and then the part 5 (guide) partially ejected in the previous assembly stage; part 4 must be always fitted.
- Replace part 3 with part 16 on the stem.
- Push, from the handgrip, the wedging washer - roller casing - seal ring unit, placing part 16 until it stops on the swinging hub
- Repeat the operation described above using the tool fitted with part 16 and part 22* instead of part 4 on the stem, on the side opposite the one shown in the figure to refit the second wedging washer - roller casing - sealing ring unit.



To position roller casings on the pin (pin end in contact with the internal bottom of the roller casings) proceed as follows:

- Use the tool with part 20 and 21 fitted to the stem as indicated in the figure.
- Push the two roller casings with the handgrip until their bottoms make contact with the pin end.
- Use the specific tool fitted with parts 3 and 4 as indicated for fitting the spin and push with the handgrip until the washer is wedged in the swinging hub.
- Remove the spacers, part 17, fill with grease the area between the steering tube and the swinging hub, and place the dust guard rings in that place.



Carry out this operation only if strictly necessary and in any case remove and replace the old part with a new one.

-
- Remove the steering tube
 - Use a special tool remove the upper disk of the fifth wheel fitting seat on the headstock by operating from the lower part of the headstock as indicated in the photograph. Afterwards remove the lower disk of the fifth wheel operating from the upper part



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

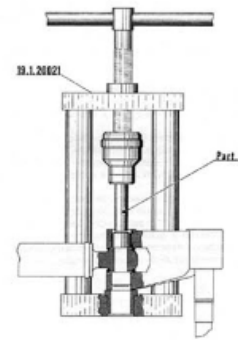
-
- Use the specific tool to fit the fifth wheel fitting on the headstock as indicated in the figure

Specific tooling

020037Y Punch



- Remove the steering tube
- Remove the attachment bracket
- Use the specific tool with the part 1 and operate the handgrip until removing temporarily the pin and the Nadella opposite the tool thrusting direction.
- To extract the second Nadella, use the tool with the part 2, instead of part 1, on opposite side to the one indicated in the figure.



Specific tooling

020021Y Front suspension service tool

Refitting

To refit, carry out the removal operations but in reverse order; grease the fifth wheel fittings and tighten at the specified locking torques

Locking torques (N*m)

Handlebar to steering tube 45 ÷ 50 Nm Upper steering ring nut 30 ÷ 40 Lower steering ring nut 8 ÷ 10

Front shock absorber

Removal

- Remove the steering tube
- Remove the shock absorber lower clamps
- Remove the shock absorber upper clamps



Refitting

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

Locking torques (N*m)

shock absorber lower clamp 20 - 27 Nm shock absorber upper clamp 20 ÷ 30

Shock-absorber - calliper bracket

- 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 clamp 20 ÷ 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 Adaptor 52 x 55 mm

- 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**

Rear

Removing the rear wheel

- Remove the bracket supporting the rear shock absorber and the muffler;
- Remove the rear wheel by unscrewing the 5 screws indicated in the photograph



Refitting the rear wheel

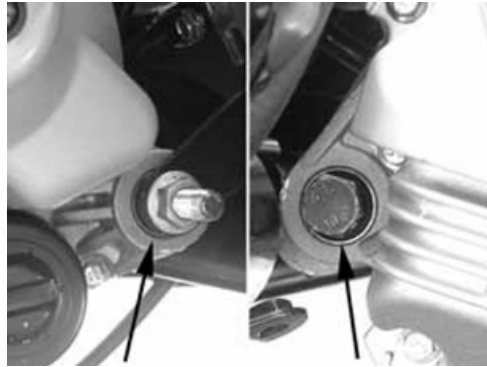
To refit, carry out the removal operations but in reverse order, observing the prescribed torques.

Locking torques (N*m)**Wheel fixing screws: 20 ÷ 25 Nm**

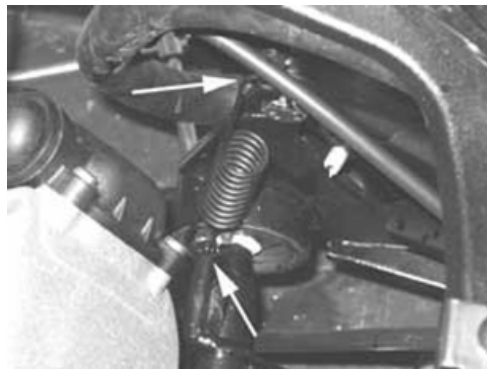
Swing-arm

Removal

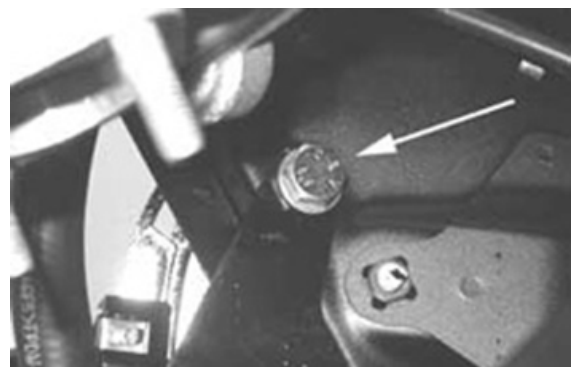
- Place the scooter on its centre stand;
- Remove the engine housing
- Remove the swinging arm/engine fitting shown in the photo
- Move the engine back



- remove the spring anchoring the swinging arm to the frame as shown in the photo



- Remove the two screws fixing the buffer support bracket to the frame



- Remove the left and right caps located under the footrest to reach the pin fixing the swinging arm to the body.
- Remove the pin. Then remove the swinging arm.

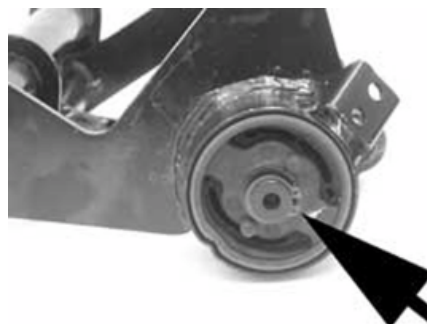


- Check the entire swinging arm assembly.
- Check all the centring bushing components and silent block rubber buffers.
- Replace the work components that cause excessive clearance on the rear suspension.



Overhaul

- Make sure the silent bloc is not broken. If there is, replace it.
- Remove the seeger ring shown in the photograph



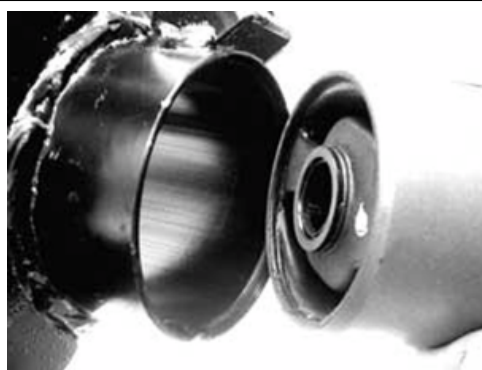
-
- Remove the full silent bloc bracket
 - Undo the silent bloc ring shown in the photograph



-
- Hold the full silent bloc bracket in the clamp
 - Using the appropriate tool, remove the silent bloc from the bracket from the side corresponding to the inside of the vehicle. This is to guarantee the tool is centred properly on the support



-
- Install a new silent bloc, making sure it aligns properly with the reference tooth.
 - Fit the silent blocs, making sure the chamfered part of the silent bloc matches the chamfered part of the bracket



- Using the appropriate tool, fit the silent bloc as shown in the photo



- Check there is no sticking in the movement of the connection of the swinging arm on the engine side to the swinging arm on the frame side.
- Check the axial clearance between the two swinging arms using a feeler gauge



Characteristic

Standard clearance

0.40 ÷ 0.60 mm

Allowable limit after use:

1.5 mm

- To check the clearance on the frame-side arm, mount the retainer using the pin fixing the swinging arm to the frame and two adaptor rings of the appropriate tool 020229Y. Alternatively use two washers with inner diameter for 12-mm pins, min. outer diameter: 30 mm: min. thickness: 4 mm.



- Check there is no sticking in the rotation.
- Check the axial clearance of the swinging arm on the frame side

Characteristic

Standard clearance

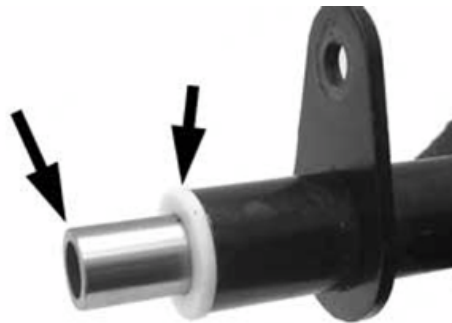
0.40 ÷ 0.60 mm

Allowable limit after use:

1.5 mm



- Separate the swinging arm on the engine side from the vehicle side arm.
- Remove the plastic bushings and the internal spacer shown in the photo.



- Using a suitable pin remove the roller casings as shown in the photographs



- Using an appropriate tool plant new roller casings, being careful to position the bearings with the O-rings facing outwards

Specific tooling

020244Y 15-mm diameter punch

020115Y Ø 18 punch

Characteristic

Length of the swinging arm tube on the engine side:

L 175.3 + 0.3 0

Length of the internal swinging arm spacer on the engine side:

L 183 + 0.3 0

Engine side swinging arm plastic bushing shim:

3.5 ± 0.05 mm

Frame-side swinging arm plastic bushing shim:

3.5 ± 0.05 mm

Length of the internal swinging arm spacer on the frame side:

290 ± 0.1 mm



Length of the swinging arm tube on the frame side:

283 ± 0.1 mm

- Lubricate roller casings and the plastic bushings with grease
- Insert the spacers
- Assemble the two arms with the relative bolt in the position shown in the photograph
- Adjust the bolt as shown in the photograph
- Position the frame side swinging arm with the most protruding part pointing towards the silent block side as shown in the photograph

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

Soap-based lithium and zinc oxide grease containing NLGI 2; ISO-L-XBCIB2 of the swinging arm

Refitting

- To refit, perform the removal operations in reverse.
- Grease the bearings and the rolling parts with the recommended grease.
- Complete the fitting by tightening the nuts on the relative bolts to the proper tightening torque.

Locking torques (N*m)

Engine and vehicle side swinging arm junction bolt 33 ÷ 41 Nm Swinging arm pin - Engine 64 - 72 Body shell - Swinging arm pin 76 ÷ 83 Screw fixing the silent-block support plate to the body 42 ÷ 52

Shock absorbers**Removal**

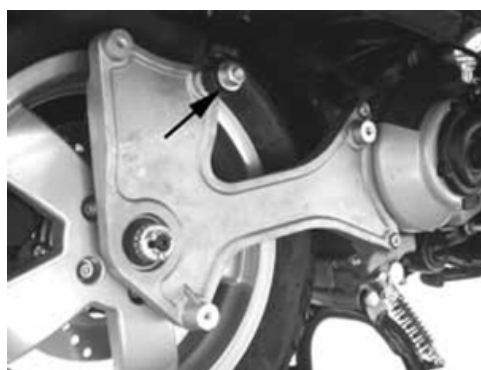
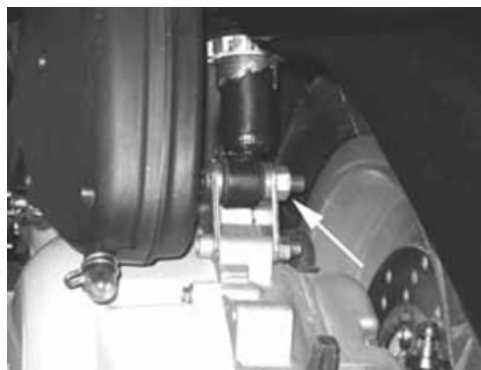
Proceed as follows:

- place the scooter on its centre stand;
- remove the luggage rack
- lift the engine a little with a jack so as to free the two shock absorbers;
- remove the muffler assembly;
- undo the shock absorber spring assembly clamping screw from the support fixed to the engine on



the one side and from that fixed to the muffler on the other;

- undo the two upper nuts (one on each side) fixing the shock absorber spring assembly to the frame and remove the shock absorbers themselves.



Refitting

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

Locking torques (N*m)

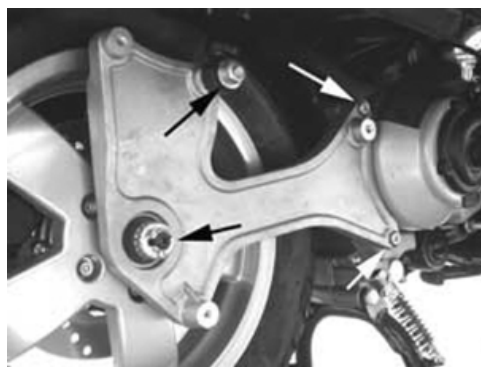
Lower shock absorber clamping screw 33 ÷ 41 Nm Upper shock absorber fixing screws 20 ÷ 25 Nm

Exhaust bracket

Removal

Remove the full muffler assembly.

- Remove the two fixing screws of the bracket to the engine crankcase
- Remove the split pin, the cover and the fixing nut of the rear wheel axle and its spacer
- Remove the shock absorber lower clamp



Refitting

- The refitting procedure is in the reverse order of the removal operation being careful to respect the torques indicated and the spacer assembly layout as shown in the photo.

Locking torques (N*m)

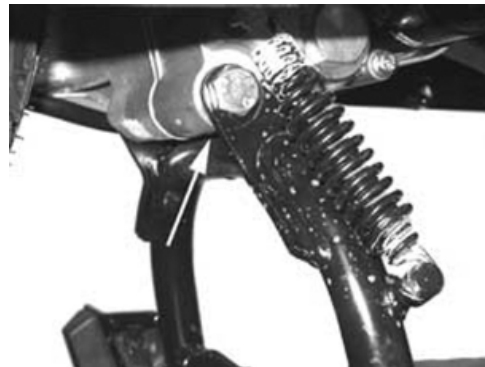
Bracket fixing screws to the engine crankcase: 20 ÷ 25 Nm Shock absorber lower clamp 33 ÷ 41 Wheel axle clamping 104 ÷ 126 Nm

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 bolt from the right side.
- Remove the centre stand.

FITTING

- On refitting tighten the nut to the specified torque.

**Locking torques (N*m)**

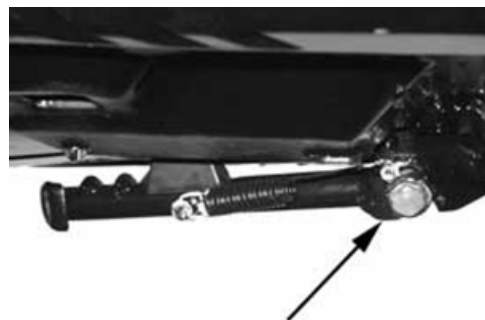
Centre stand fixing bolt 25 ÷ 30 Nm

Side stand**REMOVAL**

- Uncouple the centre stand return spring;
- Remove the screw shown in the photograph

FITTING

To refit, carry out the removal operations in reverse order and comply with the specified torque.

**Locking torques (N*m)**

Side stand fastening bolt 40 - 45 Nm

INDEX OF TOPICS

BRAKING SYSTEM

BRAK SYS

This section è is devoted to the description of the braking system components.

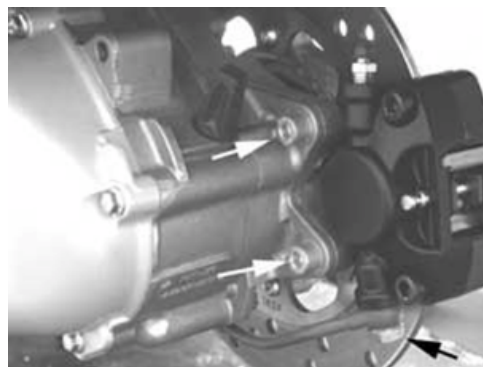
Rear brake calliper

Removal

- Remove the rear wheel.
- Remove the pad retention pin.
- Using a pin partially remove the brake pad retention pin.
- Remove the screws fixing the brake calliper to the crankcase then remove the brake calliper complete with pipe.
- Complete the extraction of the pad retention pin, the spring and the pads.

N.B.

IF IT IS NECESSARY TO REPLACE OR SERVICE THE BRAKE CALLIPER, BEFORE REMOVING THE FITTINGS FIXING THE CALLIPER TO THE SUPPORT BRACKET, FIRST LOOSEN THE OIL HOSE FITTING AFTER HAVING EMP-TIED THE SYSTEM OF THE CIRCUIT BEING EXAMINED.



Overhaul

- Remove the rear brake calliper.
- Suitably hold the brake calliper in a clamp
- Remove the two calliper coupling screws as shown in the photo
- Remove the two pistons from the calliper body with the aid of short blasts of compressed air through the brake fluid holes
- Remove the dust ring and the O-ring of each half calliper.
- Remove the O-rings in the half calliper.

N.B.

WHEN REMOVING THE O-RINGS, BE CAREFUL NOT TO SCRATCH THE HALF CALLIPER SEATS





- Check that the pistons and their seats show no scratches.
- Wash and blow all the components carefully
- Fit the O-rings and new dust guards
- Refit the pistons in their seats being careful to lubricate with brake fluid
- Re-couple the half callipers and lock the two screws at the specified torque



Locking torques (N*m)

Calliper coupling screw 22 ÷ 27



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.

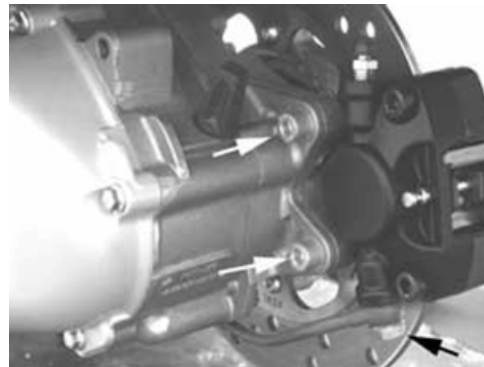
FAILURE TO RESPECT THE PAD POSITIONING REQUIREMENTS WITH RESPECT TO THE DIRECTION OF ROTATION COULD INHIBIT PROPER BRAKE FUNCTION AND QUIETNESS.



-
- Keep the brake pads in contact with the pistons and insert the calliper in the brake disc.
 - Fix the calliper to the crankcase with the two screws with elastic washer at the prescribed torque as shown in the photograph



-
- Fix the brake pipe joint to the calliper and tighten at the prescribed torque
 - Bleed the system and refit the rear wheel

Locking torques (N*m)**Brake calliper support clamping 20 ÷ 25 Nm****Brake pipe connection 20 to 25 N•m**

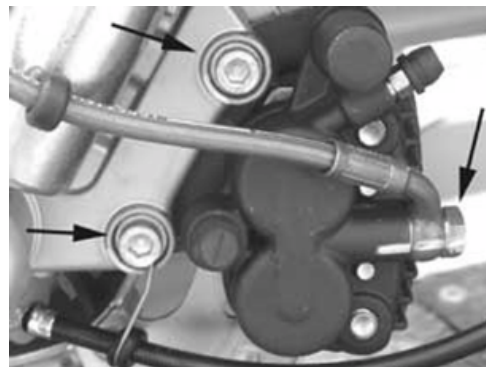
Front brake calliper

Removal

- Remove the front wheel
- Pre-loosen the two fixing pins of the brake pads
- Remove the two front brake calliper devices fastening them to the support as shown in the photograph.

N.B.

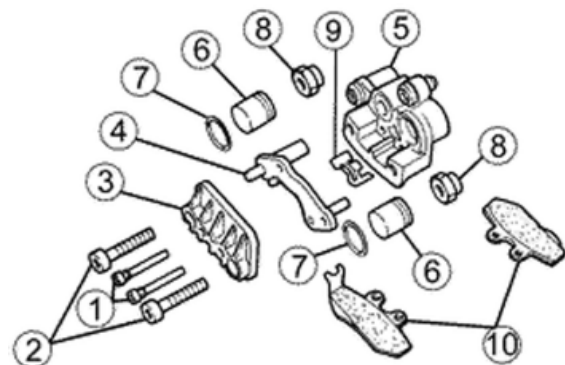
WHEN A PROCEDURE IS PLANNED INCLUDING THE SERVICE OR REPLACEMENT OF THE CALLIPER, FIRST LOOSEN THE FITTING CONNECTING THE PIPE TO THE BRAKE CALLIPER



Overhaul

Proceed as follows:

- 1) remove the two male hexagonal screws (1) and take out the two pads (10);
- 2) remove the two male hexagonal screws (2) and remove the reaction plate (3);
- 3) take out the fixed plate (4) from the guide;
- 4) remove the internal elements from the floating body (5) with the help of short blows of compressed air through the brake fluid pipe in order to facilitate the expulsion of pistons (6).
- 5) Check:
 - that the plates and the body are whole and in good condition;
 - that the cylinder and the floating body of the calliper do not show signs of scratches or erosion, otherwise replace the entire calliper;
 - that the guides of the fixed plate are not scratched or eroded, otherwise replace the entire plate;



- that the brake pad check spring works properly.

CAUTION

ALL THE INTERNAL COMPONENTS MUST BE REPLACED EVERY TIME THE CALLIPER IS SERVICED.

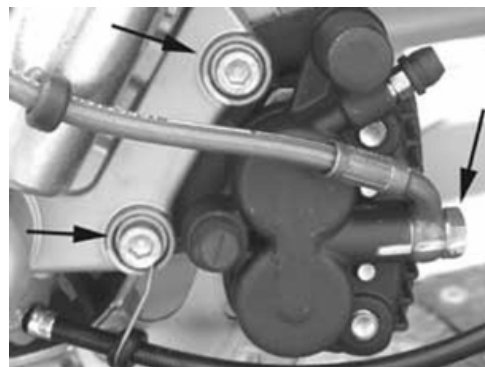
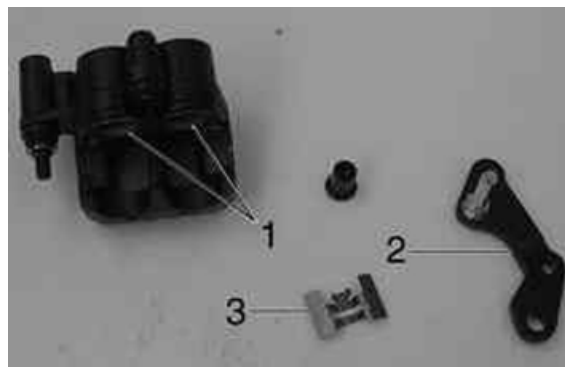
The brake pad check spring

1. pad fixing screws
2. reaction plate fixing screws
3. reaction plate
4. fixed plate
5. floating body
6. piston
7. piston sealing rings
8. guide protection rubbers
9. brake pad check spring
10. pads

Refitting

Insert the following on the front brake body:

- The sealing rings and the pistons (1).
- Refit the plate (2).
- Arrange the pad holding clamp (3).
- Refit the pads and bleed air.
- Place the calliper on the disk and lock it to the support by tightening the bolts at the prescribed torque.
- Lock the pipe joint to the calliper at the prescribed torque.
- Follow the same procedure for the rear brake caliper.

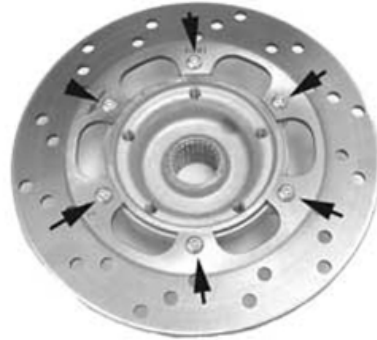
**Locking torques (N*m)**

Screws fixing the front calliper to the support: 20 ÷ 25 Nm
Screw fixing the oil connection to the calliper: 20 ÷ 25 Nm

Rear brake disc

Removal

- Remove the rear brake calliper.
- Remove the brake disc and the hub from the wheel axle
- To remove the brake disc from the hub, hold the unit firmly with a vice and operate on the 5 fixing screws indicated in the photograph



Refitting

- To reassemble the brake disc on the hub, carry out the removal operations in the reverse order arranging the brake disc on the hub on the side opposite the wheel keying
- Follow the direction of rotation shown by the arrow and tighten to the prescribed torque.
- Fit the hub unit
- disc in the wheel axle

Locking torques (N*m)

Disk to the hub 11 ÷ 13 Nm

Disc Inspection

- Remove the rear brake calliper.
- Check the disc thickness with a micrometer

Characteristic

Minimum thickness allowed after use:

3.5 mm

Standard thickness:

4 +0.2-0.2 mm

- Repeat the measurement at no fewer than six points on the disc.
- Check the regular nature of the rotation of the brake disc assembly using the appropriate tool fixed onto the brake calliper as shown in the photo.
- In order to be able to anchor the appropriate tool properly use a metal plate with M8 threaded hole and fix it to one of the two rear brake calliper attachment points.
- Suitably fix the flange to the wheel axle with the original nut and spacer and a Æ 17 mm bearing.

N.B.

SO AS NOT TO GET A DISTORTED READING, CAUSE THE DRIVEN PULLEY SHAFT TO TURN IN ORDER TO ROTATE THE DISC.

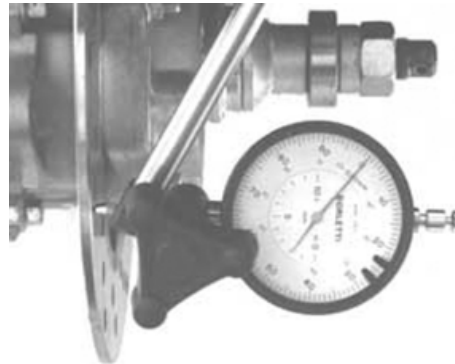
Specific tooling

020335Y Magnetic support for dial gauge

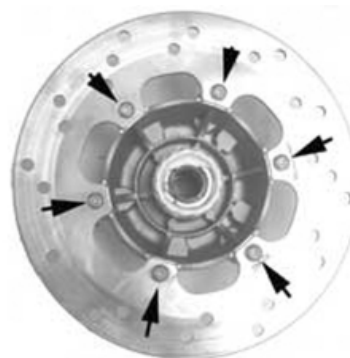
Characteristic**Max. deviation allowed:**

0.1 mm

- If you detect incorrect values, replace the disc. If the anomaly persists, replace the hub.

**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
- Hold the hub and the disc firmly and remove the brake disc undoing the six screws indicated in the photograph



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 six 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 support for dial gauge

Characteristic

Standard thickness:

4 +0.2-0.2 mm

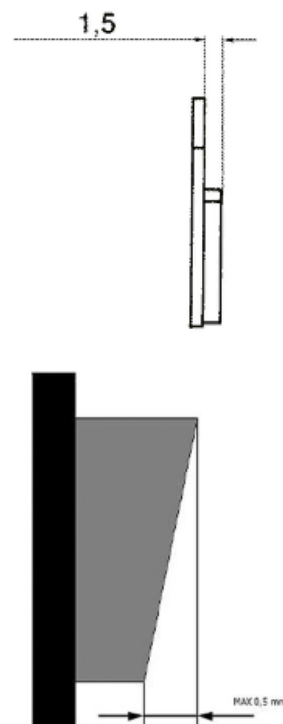
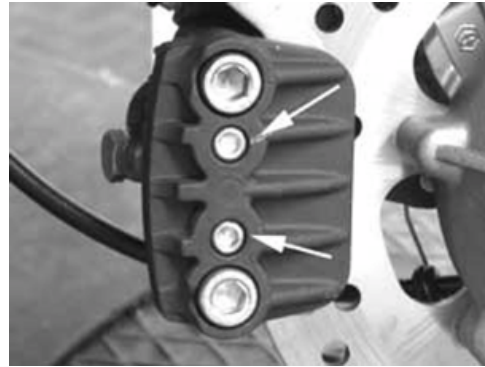
Max. deviation allowed:

0.1 mm

Front brake pads

Removal

- Remove the front wheel
- Pre-loosen the two fixing pins of the brake pads
- Remove the brake calliper
- Remove permanently the two pad fixing screws
- Check that there are no flaws or warping. If there is, replace it.
- 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 pad has not worn evenly. A 0.5 mm thickness difference in the residual friction material is permitted



Refitting

To fit, proceed as follows:

- Insert the two pads in the callipers.

- Screw the two pad lock pins to the correct torque, and apply the recommended product.
- Fit the calliper on its support, tightening the two screws to the prescribed torque.

N.B.

IF IT IS NOT POSSIBLE TO CORRECTLY POSITION THE CALLIPER ON THE DISC DURING FITTING, GENTLY EXPAND THE PADS.

Recommended products

Loctite 243 Medium strength threadlock

Loctite 243 medium-strength threadlock

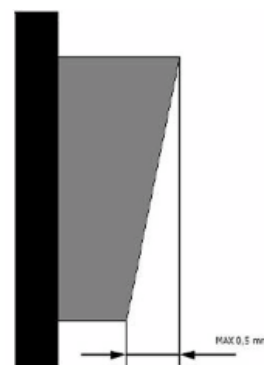
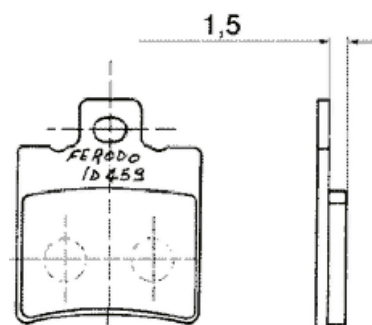
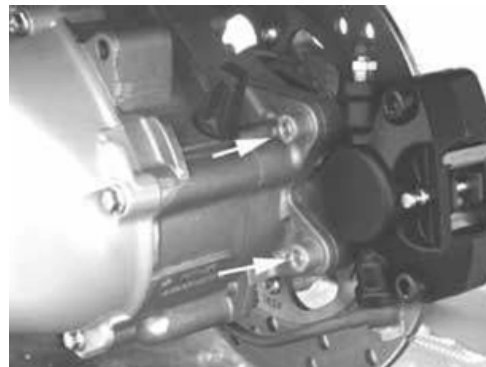
Locking torques (N*m)

Screw tightening calliper to the support 20 ÷ 25 Pad fastening pin 19.6 ÷ 24.5

Rear brake pads

Removal

- Remove the rear brake calliper.
- Remove the brake pad and check there are no faults or warping. If there is, replace it.
- 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 pad has not worn evenly. A 0.5 mm thickness difference in the residual friction material is permitted

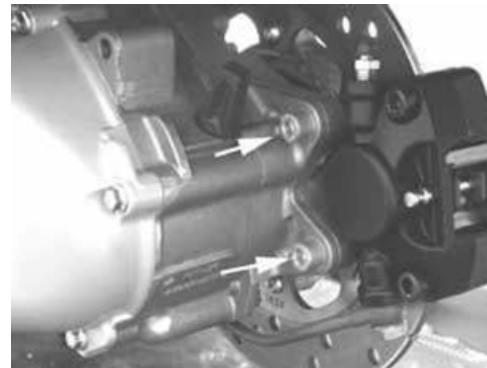


See also[Removal](#)**Refitting**

- 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 clip on the pin
- Fix the rear brake calliper to the bracket and tighten the two screws to the specified torque.

**Locking torques (N*m)**

Rear brake calliper tightening screw 20 ÷ 25 Nm

**Fill****Front**

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



If necessary, bleeding can be done using a special vacuum 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 COMPLY WITH THIS NORM WILL ENDANGER THE PROPER WORKING AND EFFICIENCY OF THE BRAKING SYSTEM

Specific tooling

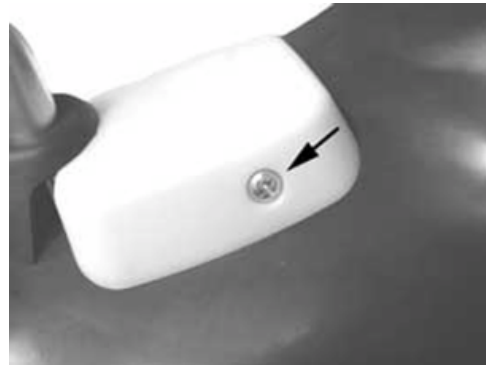
020329Y MityVac vacuum-operated pump

Locking torques (N*m)

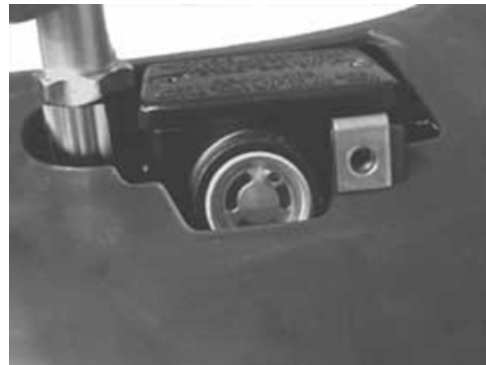
System bleed calliper fitting: 20 ÷ 25 Nm

Brake fluid level check

- Position the vehicle on a flat surface and on the centre stand
- Remove the brake pump cover as indicated in the photo



- Use the appropriate spyglass on the pump to check the level of the brake fluid, as shown in the photograph



- If the level is below the minimum, fill using the two screws shown in the figure
- Remove the gasket and fill with DOT 4 until the spyglass is completely covered

CAUTION

MAKE SURE THE BRAKE FLUID DOES NOT GET INTO YOUR EYES OR ON YOUR SKIN OR CLOTHES. IF THIS HAPPENS ACCIDENTALLY, WASH WITH WATER.

CAUTION



THE BRAKING CIRCUIT FLUID IS HIGHLY CORROSIVE. THEREFORE, WHEN TOPPING IT UP, AVOID LETTING IT COME INTO CONTACT WITH THE PAINTED PARTS OF THE VE-



VEHICLE. THE BRAKING CIRCUIT FLUID IS HYGROSCOPIC, WHICH MEANS THAT IT ABSORBS MOISTURE FROM THE SURROUNDING AIR. IF MOISTURE CONTAINED IN THE BRAKE FLUID EXCEEDS A CERTAIN VALUE, THIS WILL RESULT IN INEFFICIENT BRAKING.

CAUTION

- BRAKING CIRCUIT FLUID IS HYGROSCOPIC. IT ABSORBS HUMIDITY FROM THE SURROUNDING AIR. IF THE LEVEL OF HUMIDITY IN THE BRAKE FLUID EXCEEDS A GIVEN VALUE, BRAKING EFFICIENCY WILL BE REDUCED.

Locking torques (N*m)

Float chamber screws 15 ÷ 20 Nm

Never use brake liquid in open or partially used containers.

Under normal climatic conditions, the fluid must be changed every 20,000 km or anyway every two years.

For refitting purposes carry out the operations in the reverse order from the removal operation and respect the tightening torque of the tank cover screws.



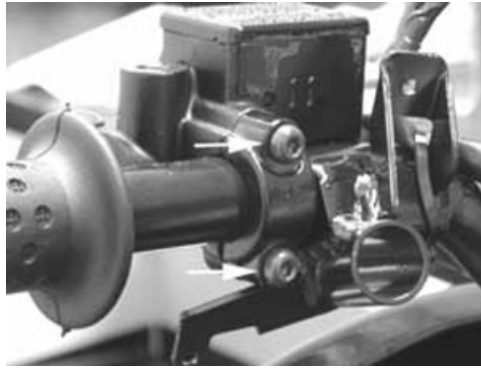
Front brake pump

Removal

- Remove the rear handlebar cover.
- 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 to the stop light switch

BRAKE PUMP TECHNICAL DATA:

Specification	Desc./Quantity
Pump right piston diameter	Ø 12.7
Pump left piston diameter	Ø 11



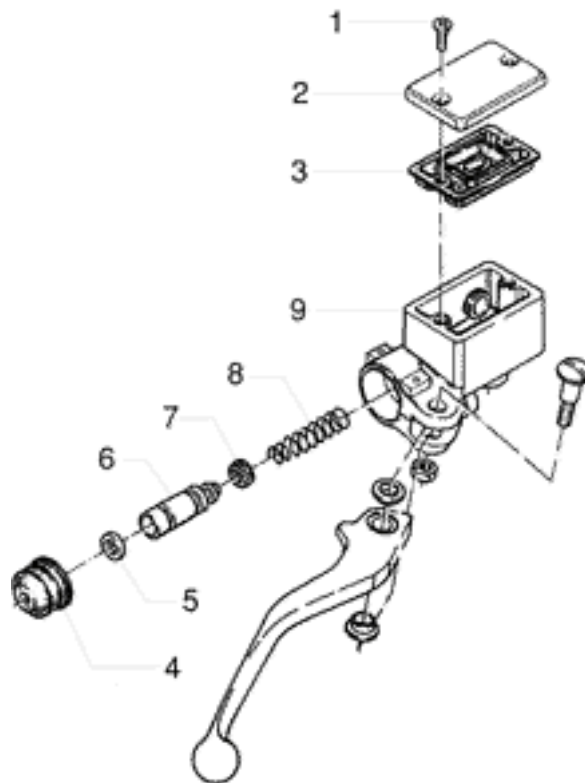
Overhaul

Proceed as follows:

- 1) Remove the brake lever by loosening the retaining screw; open the cover (2) and take out the diaphragm (3);
- 2) remove the cap (4) and take out the internal parts in order;
- 3) Check that:
 - The pump body shows no signs of internal damage or corrosion;
 - The plunger shows no sign of damage or abnormal wear;
 - The plunger return spring is in good condition.

CAUTION

ALL THE SEALS AND GASKETS MUST BE REPLACED EVERY TIME THE PUMP IS SERVICED.



1. Reservoir cap screw
2. Reservoir cap.
3. Diaphragm.
4. Bellows.
5. Sealing ring
6. Piston.
7. Gasket.
8. Spring.
9. Reservoir

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 ÷ 10 Nm

INDEX OF TOPICS

COOLING SYSTEM

COOL SYS

Water pump - overhaul

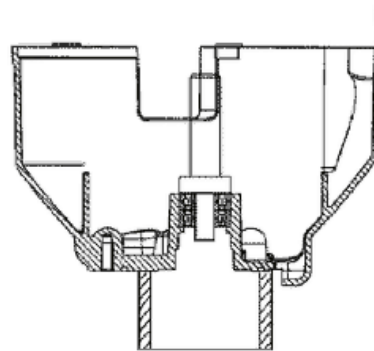
Water pump assembly

With a hot air gun heat the inner side of the flywheel cover.

AVOID OVERHEATING AS THIS MAY ALTER THE PAINTED SURFACE.

Specific tooling

020151Y Air heater



- Place the flywheel cover on the ring base following the same procedure as for removal.
- Place the two bearings on the specific punch.

N.B.

USE A NEW BEARING WHEN REFITTING

- Use grease to keep the bearings on the appropriate tool.
- Use a plastic mallet to insert the bearings on the housing up to the stop.

- Assembly the ceramic ring and the corresponding rubber gasket. The ceramic ring chamfering should always face towards the gasket.

- Lubricate the rubber gasket and insert the unit on the flywheel cover.

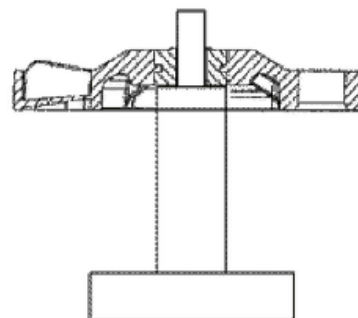
Use the punch of the appropriate tool manually if necessary.

ALWAYS USE NEW CERAMIC RING AND GASKETS. ASSEMBLING THE CERAMIC SEALING RING IN A MANNER OTHER THAN MANUALLY MAY DAMAGE THE RING.

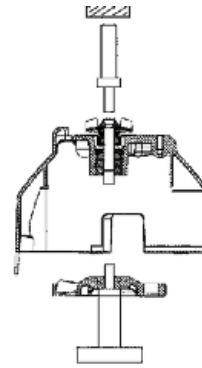
Specific tooling

020440Y Water pump service tool

- Insert the drive on the guide pin of the support base which is part of the appropriate tool. Check that the convex part faces upwards.



- Insert the flywheel cover with bearings on the appropriate tool.
- Insert the shaft together with the mechanical gas-kets on the bearings.
- With the appropriate punch and socket, insert the shaft in the bearings and the drive until the end of stroke of the appropriate tool cannot be seen.



N.B.

CENTRE THE PUNCH CORRECTLY ON THE ROTOR. PUSH THE SHAFT IN AND CHECK THAT THE FLYWHEEL COVER ROTATES SMOOTHLY. FAILURE TO RESPECT THIS PROCEDURE DAMAGES THE DRIVE.

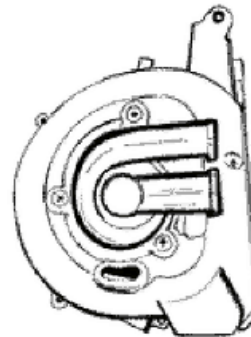
- Reassemble the rotor cover with a new O-Ring.
- Tighten the 3 fixing screws to the torque below:

N.B.

DO NOT LUBRICATE THE O-RING. FAILURE TO RESPECT THIS RULE RESULTS IN RING DISTORTION.

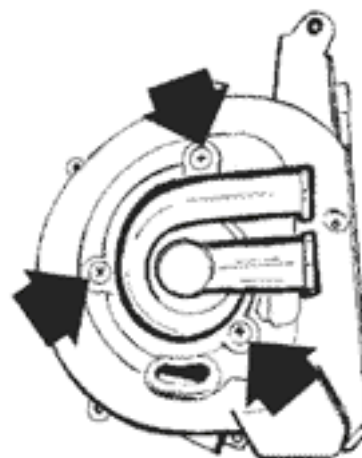
Locking torques (N*m)

Water pump cover screws 3 ÷ 4



Removal

- Check the water pump if noise in the bearings or liquid leaking from the drainage hole inside the cover is detected.
- Remove the flywheel cover together with the water pump from the engine.
- Remove the rotor cover by unscrewing the 3 retainers indicated in the figure.



- Place the flywheel cover on the ring base which is part of the tool

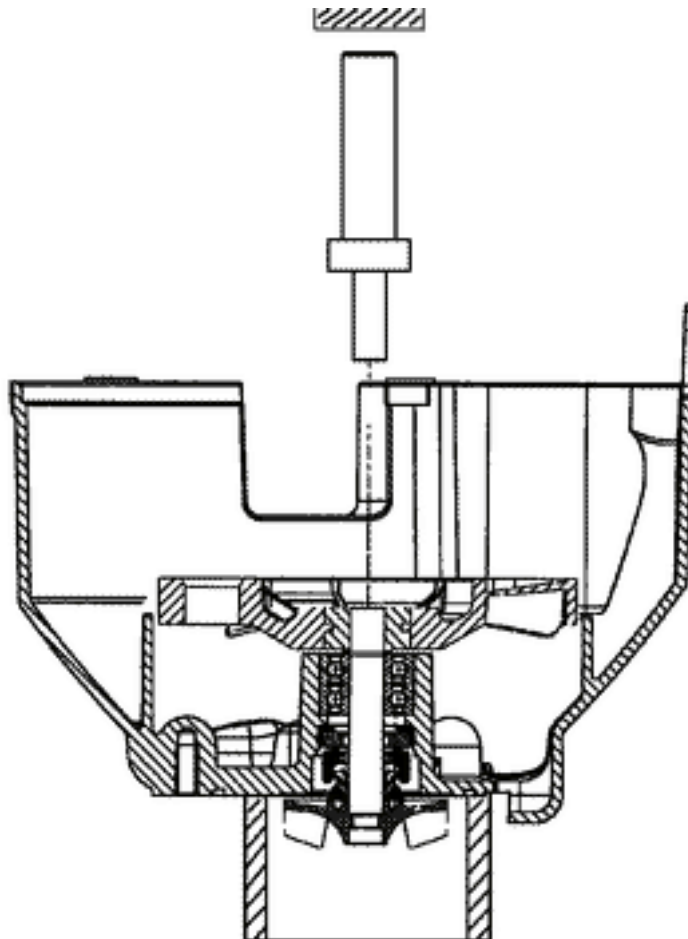
N.B.

TO AVOID DAMAGING THE COVER SURFACE THAT SEALS THE COOLANT, USE THE RING BASE WITH THE ACCURATELY MACHINED SURFACE FACING THE FLYWHEEL COVER.

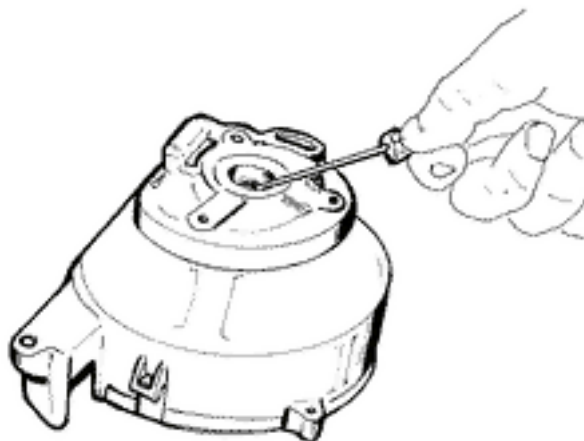
Specific tooling

020440Y Water pump service tool

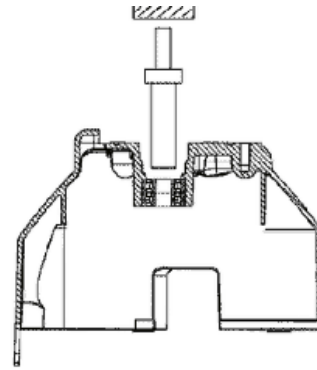
-With an appropriate socket and punch, forming part of the specific tool 020440y, extract the shaft together with the rotor from the drive and the bearings.



- Use a screwdriver to remove the static part of the ceramic seal from the flywheel cover.



-
- Place the flywheel cover below the socket making sure it is perfectly levelled.
 - Use the punch in the inverted position to extract the two ball bearings.



Water pump ceramic seal

Our Leader, Quasar, and Master liquid cooled engines are equipped with water pumps fitted with the ceramic seal in the subject. This component is intended to guarantee the leak tightness of the coolant in relation to the pump shaft. The seal achieved via two special ceramics, a static one and a spinning one, kept in contact by the thrust of a spring, coaxially mounted onto the pump shaft. The efficiency of this system is guaranteed by the accurate machining and cleaning of the components as they are fitted; in any case, ceramic seals are subjected to a running in period. During this period ($1,000 \pm 1,500$ km), there may be small leaks through draining holes, which remain visible on the aluminium crankcase. This phenomenon is particularly visible there where the hole is more exposed (Quasar and Master). In such cases we recommend cleaning the casing in order to be able to check again for leaks after a distance of more than 1500 km. If leaks continue or in the event of real losses, the ceramic seal should be replaced. For these operations, observe the tools and instructions given in the relevant service station manuals.

Note: The ceramic seal may be overhauled according to the following couplings:

- Coupling "A": seal ring no. 485084 with ceramic seal no. 486216
- Coupling "B": seal ring no. 841329 with ceramic seal no. 841330

The couplings above may be selected according to their availability, as they are interchangeable.

Component check

- Check that the rotor does not show abnormal wear or dents;
 - Check that the rotor shaft is not rusty;
 - Check that there is no rust on the bearing seats or the ceramic seal;
 - Check that the drive does not show dents and that it is perfectly integral with the steel hub.
-

Check

- 1) Look to see that the thermostat is not damaged.
- 2) Fill a metal container with approx. 1 litre of water.

Immerse the thermostat, and keep it in the centre of the container.

Immerse the multimeter temperature probe, and keep it close to the thermostat.

Heat up the container using the thermal gun.

Check the temperature when the thermostat starts to open:

Heat up until the thermostat is completely open.

- 3) Replace the thermostat if it is not working properly.

CAUTION

TO EXECUTE THE TEST CORRECTLY, MAKE SURE NEITHER THE THERMOSTAT NOR THE THERMOMETER TOUCHES THE CONTAINER.

Specific tooling

020331Y Digital multimeter

020151Y Air heater

Characteristic

Thermostat check: Opening start temperature

69.5 ÷ 72.5°C



INDEX OF TOPICS

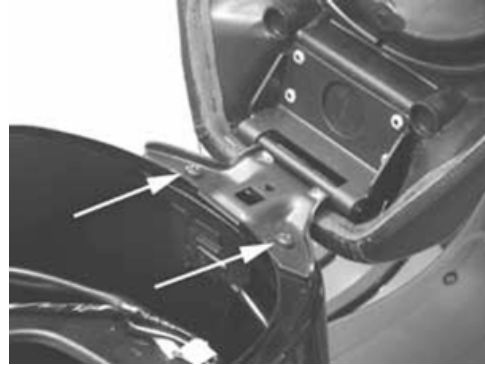
CHASSIS

CHAS

This section è is devoted to the operations that can be carried out on the vehicle's bodywork.

Seat

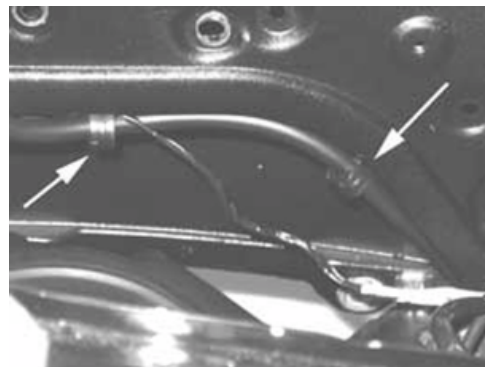
- Remove the helmet compartment
- Remove the two screws shown in the photograph
- Remove the saddle



- Remove the helmet compartment
- Remove the 2 nuts indicated in the photograph



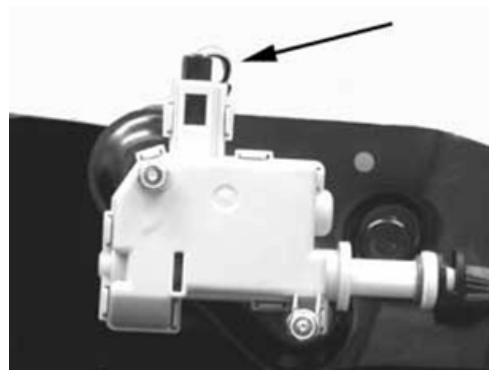
- Free the electric cables form the retaining clamps indicated in the photograph



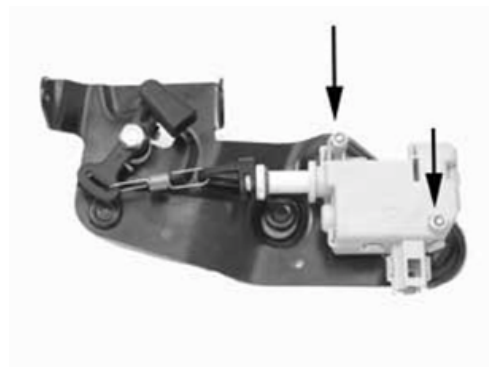
- Remove the saddle opening transmission cable
- Remove the saddle manual opening transmission cable.



- Remove the electric connector from the saddle opening actuator



- Remove the two screws shown in the photograph
- Remove the clip from the transmission
- Remove the actuator from the supporting bracket

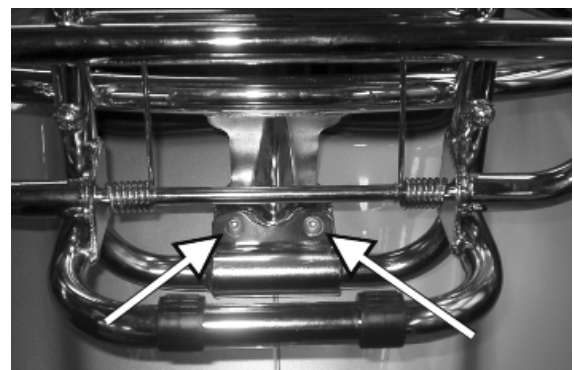


Rear rack

- Remove the helmet compartment
- Remove the 4 screws indicated in the figure

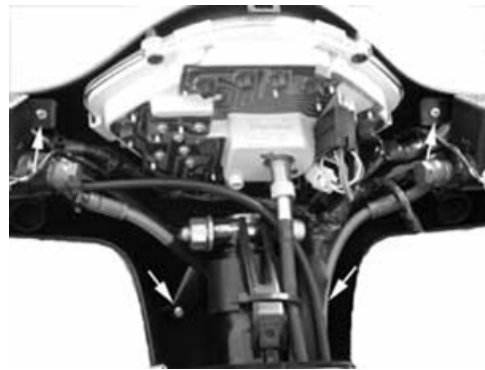


- Remove the two screws, indicated in the figure, that fix the luggage rack to the body



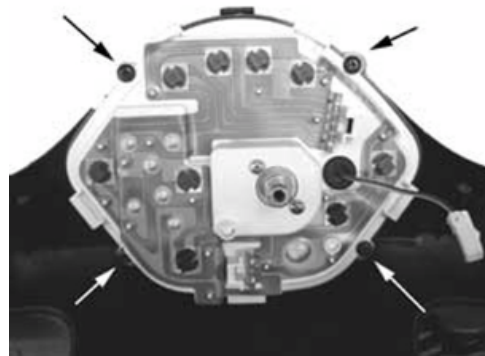
Rear handlebar cover

- Remove the front handlebar cover
- Undo the 4 screws indicated in the photograph
- Disconnect the odometer cable
- After disconnecting the wiring remove the rear handlebar.



Instrument panel

- Remove the rear handlebar cover;
- Remove the four screws indicated in the figure
- Remove the instrument panel.



Front handlebar cover

- Remove the front grille
- Remove the front screw indicated in the figure



- Undo the 2 screws indicated in the figure;
- Remove the front handlebar cover
- Disconnect the front headlamp connectors



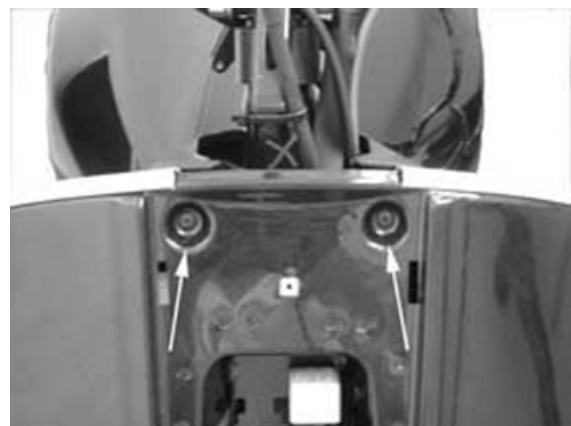
Headlight assy.

- Operate the screw indicated in the figure to remove the front turn indicator

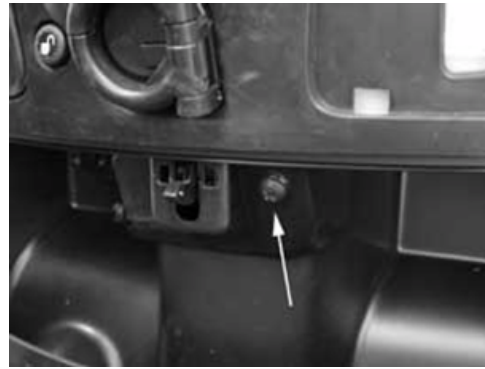


Knee-guard

- Remove the rear handlebar cover.
- Remove the two screws indicated in the photograph and located on the shield under the grille



- Remove the expansion tank cover and then its cap
- Remove the central screw inside the glove-box, indicated in the photograph



- Remove the two screws indicated in the photograph and located below the expansion tank cover and the left cover respectively



- Remove the shield back plate lower screws, to the right and left side of the shield back plate, as indicated in the photograph



- Remove the electric saddle opening switch, the fuse box and the manual saddle opening cable as shown in the photograph



Removing the ignition key-switch when on *off*

- Remove the shield back plate.
- Remove the immobilizer aerial as shown in the figure.



- Detach the electrical wiring.
- Remove the ignition key-switch, by removing the spring retainer shown in the figure.





- Lightly push the master-cylinder and extract the lock from the notch shown in the figure.
- Hence extract the master-cylinder complete with the key-switch.
- For the reassembly proceed in the reverse order.

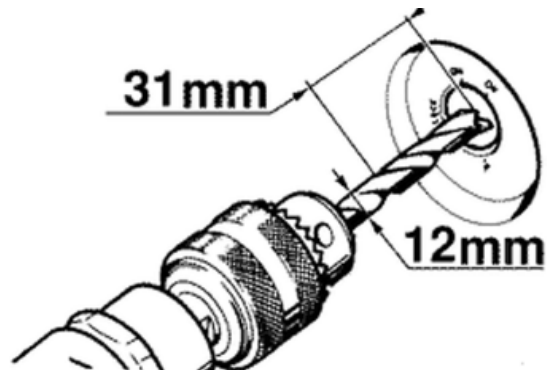


Removing the ignition key-switch when on *lock*

In position "Lock", it is not possible to access the cylinder retaining spring. The spring must then be removed as shown in the figure, allowing the lock spring to be pressed out.

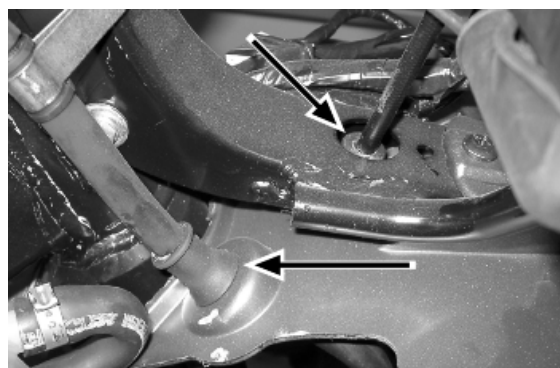
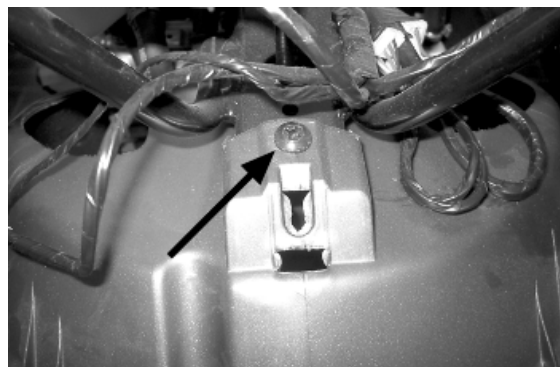
N.B.

FOR REASSEMBLY FROM THIS POSITION, RELEASE THE STEERING WHEEL AND SET THE LOCK BODY (INSIDE AND OUTSIDE PART) TO "OFF". THEN, PROCEED AS DESCRIBED IN PARAGRAPH REMOVAL, LOCK IN OFF POSITION.



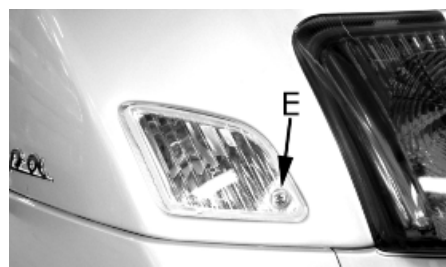
Front wheel housing

- Remove the front fork;
- Unscrew the central stud of the wheel well at the frame;
- Disconnect the brake pipe to the pump and pull it out;;
- Remove the odometer transmission..



Taillight assy.

- Operate the screw indicated in the figure to remove the rear turn indicator



Remove screw «A» to remove the rear headlight assembly.

Access to taillight bulbs, stop light bulb and license plate bulb.

To reassemble, repeat the operation in the reverse order.

N.B.

IF MISTING IS NOTICED ON THE INSIDE OF THE HEADLAMP GLASS, THIS DOES NOT INDICATE A FAULT AND IS RELATED TO THE HUMIDITY AND/OR TO LOW TEMPERATURES. THE PHENOMENON SHOULD QUICKLY DISAPPEAR WHEN THE LIGHT IS SWITCHED ON. THE PRESENCE OF DROPS OF WATER, ON THE OTHER HAND, COULD INDICATE THAT



WATER IS INFILTRATING. CONTACT THE PIAGGIO AFTER-SALES SERVICE NETWORK.

Footrest

- Remove the shield back plate
- Remove the battery compartment cover
- Remove the side fairings
- Remove the central screw located under the battery compartment cover as indicated in the figure



- Remove the passenger footrests undoing the two screws indicated in the figure



- Remove the right and left screws fixing the footrest indicated in the figure



- Remove the right and left lower covers as shown in the figure



- Remove the screws under the non-slip rubber mat of the footrest as indicated in the photograph



Side fairings

- Remove side fairings, right and left, by undoing the 2 screws shown in the figure



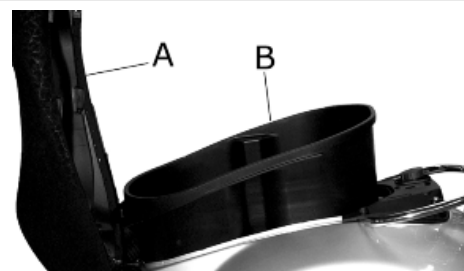
Rear mudguard

- Remove the air filter
- Remove the screw indicated in the photograph
- Remove the mudguard



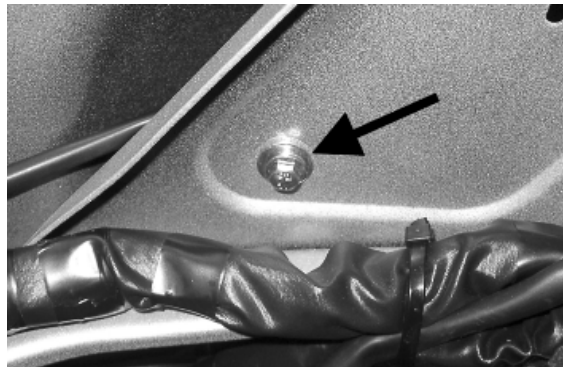
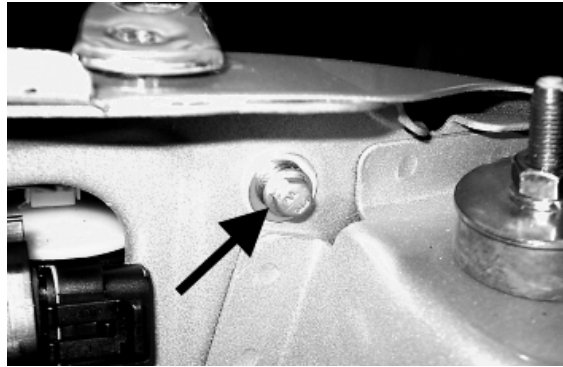
Helmet bay

- Lift the saddle and remove the helmet compartment



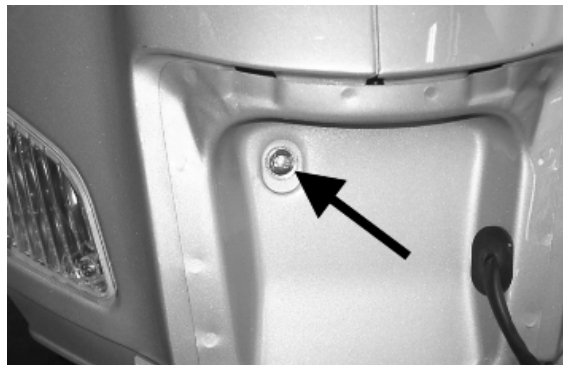
Fuel tank

- Remove the helmet compartment
- Remove the side fairings
- Remove the muffler
- Remove the luggage rack
- Remove the shock absorber upper clamps
- Remove the two screws, indicated in the figure, that fix the tank to the body



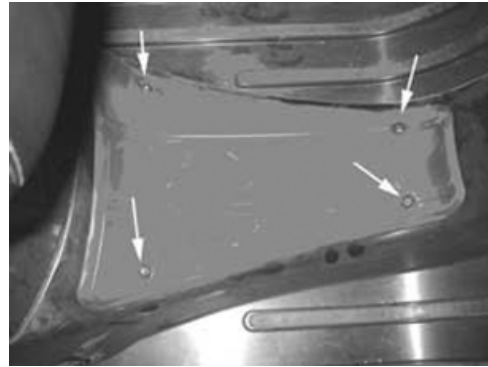
- Remove the screw indicated in the figure that fixes the tank to the body after removing the rear headlight assembly

- Remove the two turn indicators
 - Use a jack to lift the body so that there is enough space between the vehicle rear side and the engine to slide off the tank
- To refit, perform the steps in the reverse direction to disassembly



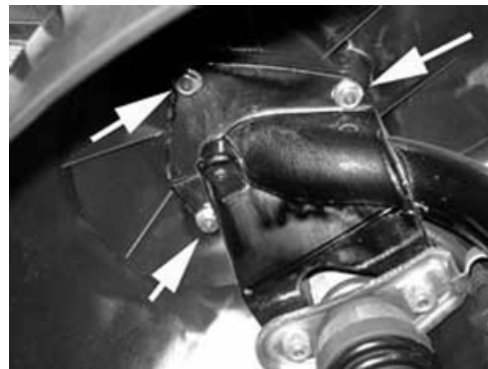
Rear central cover

- Remove the four screws indicated in the figure



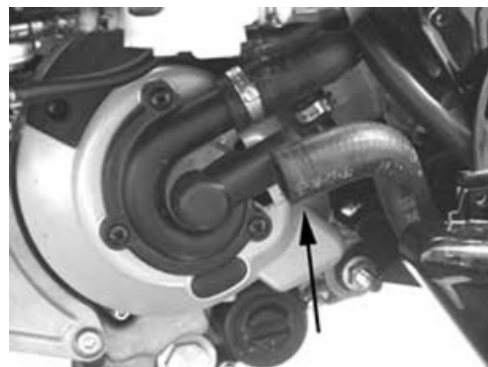
Front mudguard

- 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

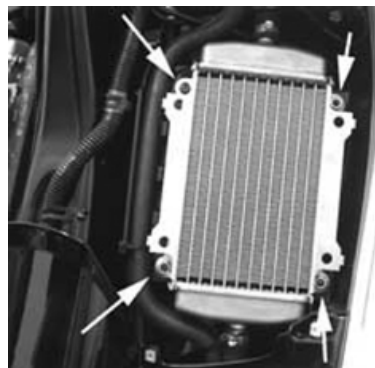


Radiator fan

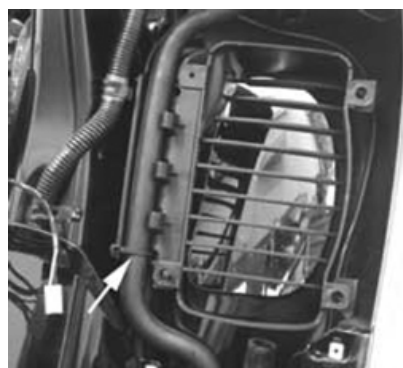
- In order to carry out any operation on the radiator unit, flow out the coolant in the coolant delivery pipe in the pump, indicated in the photograph.



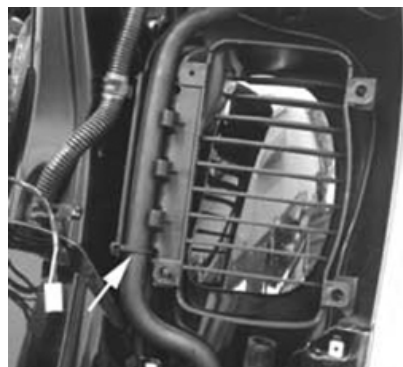
- Remove the shield back plate;
- Remove the coolant feed and return hoses from the right radiator;
- Unscrew the 4 screws fixing the radiator to the body;
- Detach the radiator



- Detach the pipe from the plastic duct by removing the plastic clip shown in the photograph. Then remove the duct.



- The same procedure also applies to the left radiator for which it is necessary to remove the electrical fan first by undoing the 3 screws indicated in the photograph.



To refit, perform the removal operations but in reverse order being careful when positioning the new clips for the fluid hoses and when filling the cooling system.

Front central cover

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



INDEX OF TOPICS

PRE-DELIVERY

PRE DE

Carry out the listed tests before delivering the vehicle.

Warning- be very careful when handling fuel.

Aesthetic inspection

Appearance checks:

- Paintwork
- Fitting of plastics
- Scratches
- Dirt

Tightening torques inspection

- Safety Locks • Cover retaining screws

SAFETY LOCKS

Name	Torque in Nm
Shock absorber upper fixing: rear	20 to 25 N•m
Shock absorber bottom fixing: rear	33 to 41 N•m
Left shock absorber lower support bolts	20 ÷ 25
Front wheel axle nut	75 ÷ 90
Rear wheel axle nut	104 ÷ 126
Rear brake disc bolts	11 ÷ 13
swinging arm bolt - chassis	76 ÷ 83 Nm
Engine swinging arm bolt	64 ÷ 72 Nm
Handlebar clamping bolts	45 ÷ 50 Nm
Upper steering ring nut	30 ÷ 40
Lower steering ring nut	8 ÷ 10

Electrical system

- Main switch
- Lights: high beams, low beams, side/taillights (front and rear) and relevant warning lights
- Regulating the headlights according to the regulations currently in force
- Front and rear stop light buttons and relative light •Turn indicators and relative telltales
- Instrument lighting
- instruments: fuel and temperature indicator
- Instrument panel lights
- Horn
- Electrical start up
- Engine stop by emergency stop switch and side stand
- Electrical saddle opening button

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.

CAUTION

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

WARNING

BATTERY ELECTROLYTE IS TOXIC AND IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH EYES, SKIN AND CLOTHING.

IN CASE OF CONTACT WITH EYES OR SKIN, RINSE WITH ABUNDANT WATER FOR ABOUT 15 MINUTES AND SEEK MEDICAL ATTENTION AT ONCE.

IF IT IS SWALLOWED, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.

THE BATTERIES PRODUCE EXPLOSIVE GAS; 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 THE RECOMMENDED CAPACITY. USING A FUSE OF UNSUITABLE RATING MAY SERIOUSLY DAMAGE THE VEHICLE OR EVEN CAUSE A FIRE.

Levels check

Level check:

- Hydraulic brake system liquid level.
 - Rear hub oil level
 - Engine coolant 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:

- Hot engine restart
 - Starter operation
 - Minimum seal (turning the handlebar)
 - Uniform steering rotation
 - Possible losses
-

- Electrical radiator fan operation

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 check up:

- Hydraulic braking system: lever travel
 - Clutch: proper functioning check
 - Engine: proper general functioning and no abnormal noise check
 - Other: papers check, frame and engine number check, tools and equipment, licence plate fitting, lock check, tyre pressure check, rear-view mirror and any accessory fitting
-

INDEX OF TOPICS

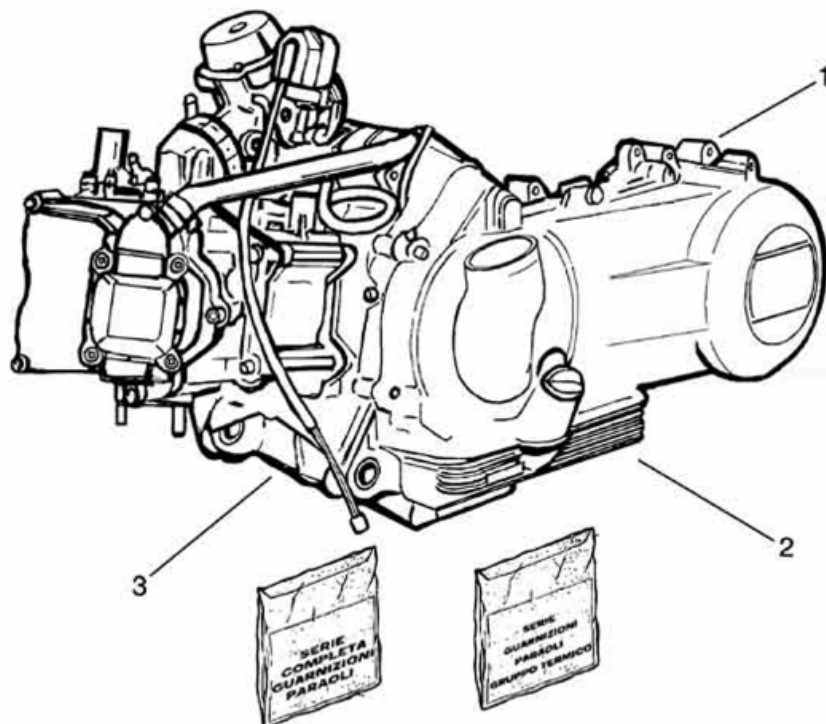
TIME

TIME

This section is devoted to the time necessary to carry out repairs.

For each operation, the description, code and time envisages are specified.

Engine



ENGINE

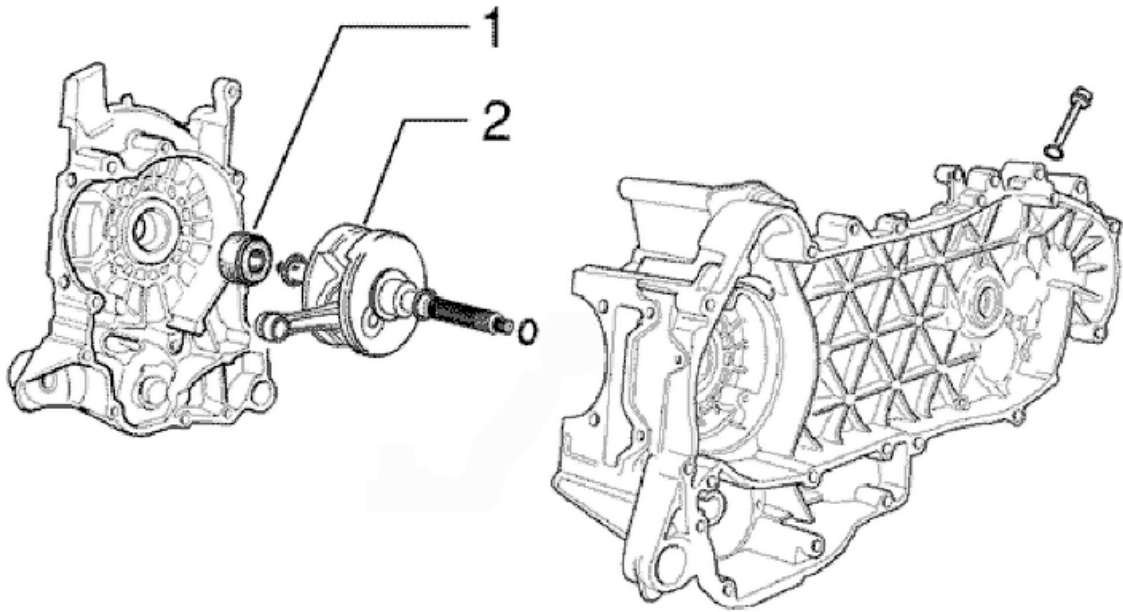
	Code	Action	Duration
1	001001	Engine from frame - Removal and refit.	
2	003064	Engine oil - change	
3	003057	Engine retainer - Tighten nuts	

Crankcase

CRANKCASE

	Code	Action	Duration
1	001153	Crankcase halves gasket - Replacement	
2	001133	Engine crankcase- Replacement	

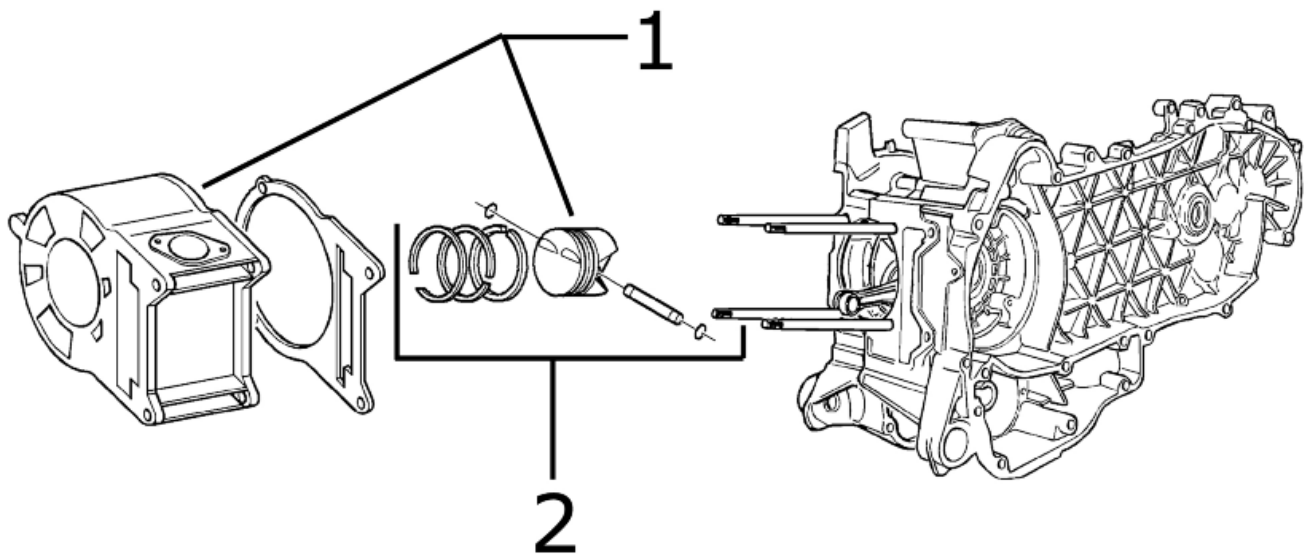
Crankshaft



CRANKSHAFT

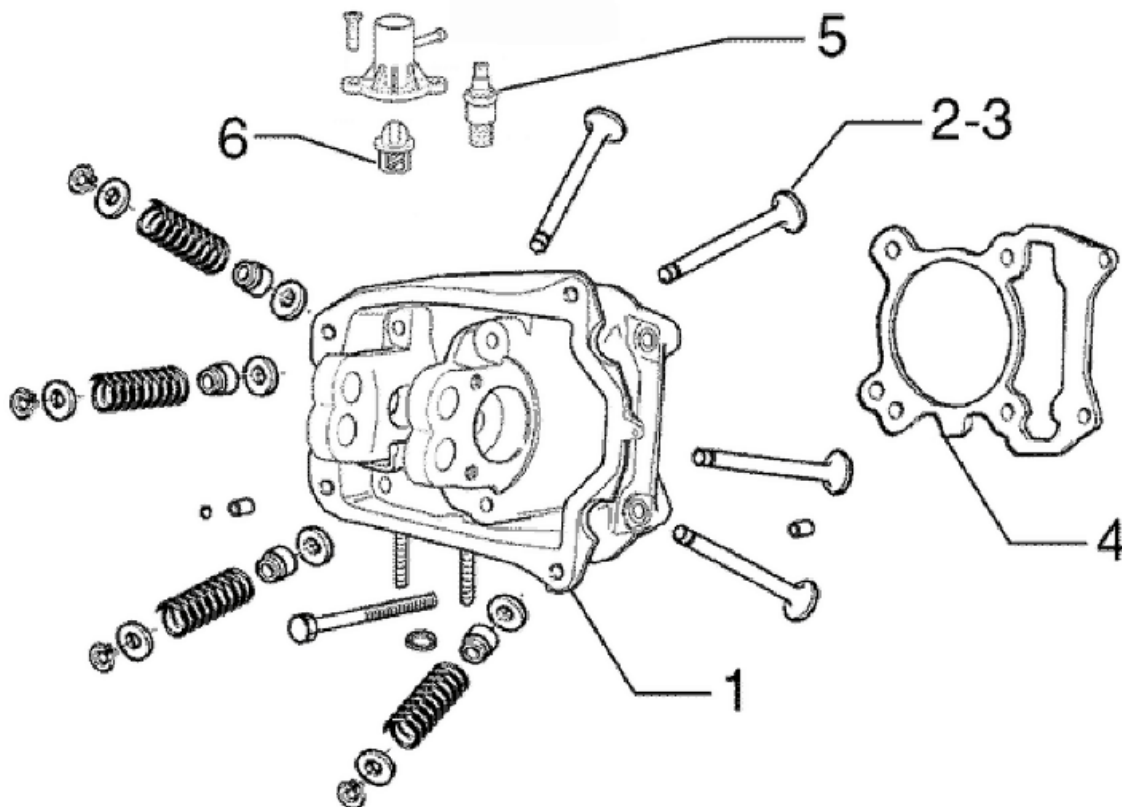
	Code	Action	Duration
1	001099	Oil seal, flywheel side - Replacement	
2	001117	Crankshaft - Replacement	

Cylinder assy.



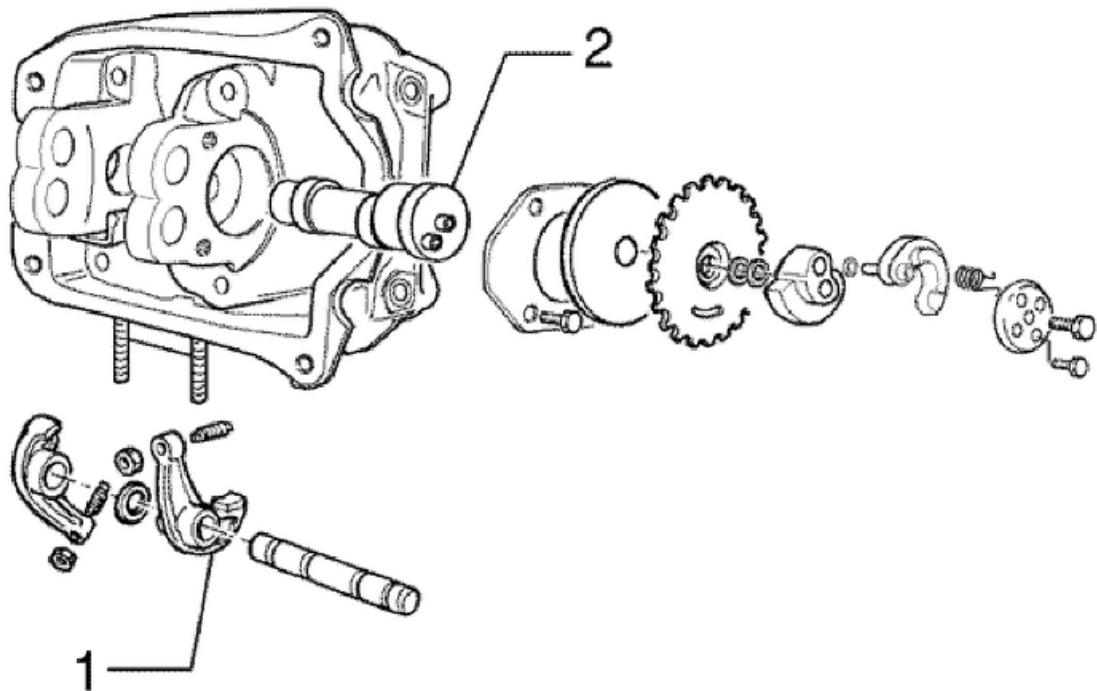
CYLINDER- PISTON

	Code	Action	Duration
1	001002	Cylinder-Piston - Replacement	
2	001154	Pin ring piston unit - Service	

Cylinder head assy.**VALVE HEAD**

	Code	Action	Duration
1	001126	Head - Replacement	
2	001045	Valves - Replacement	
3	001049	Valves - Adjustment	
4	001056	Head gasket - Replacement	
5	001083	Thermistor - Replacement	
6	001057	Thermostat - Replacement	

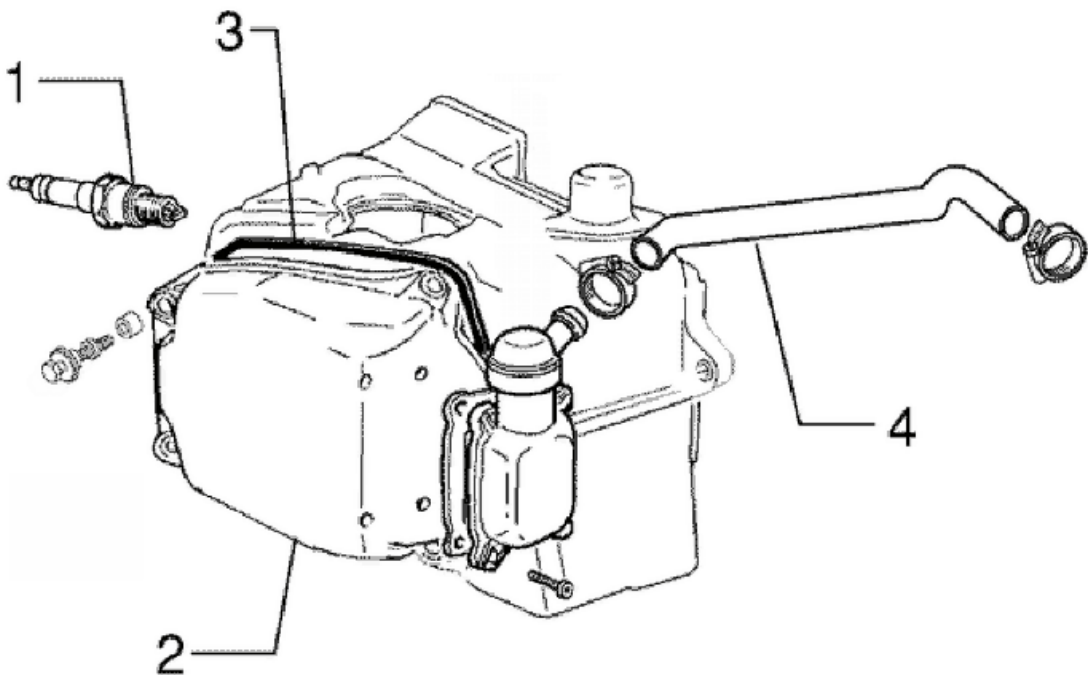
Rocker arms support assy.



CAM SHAFT

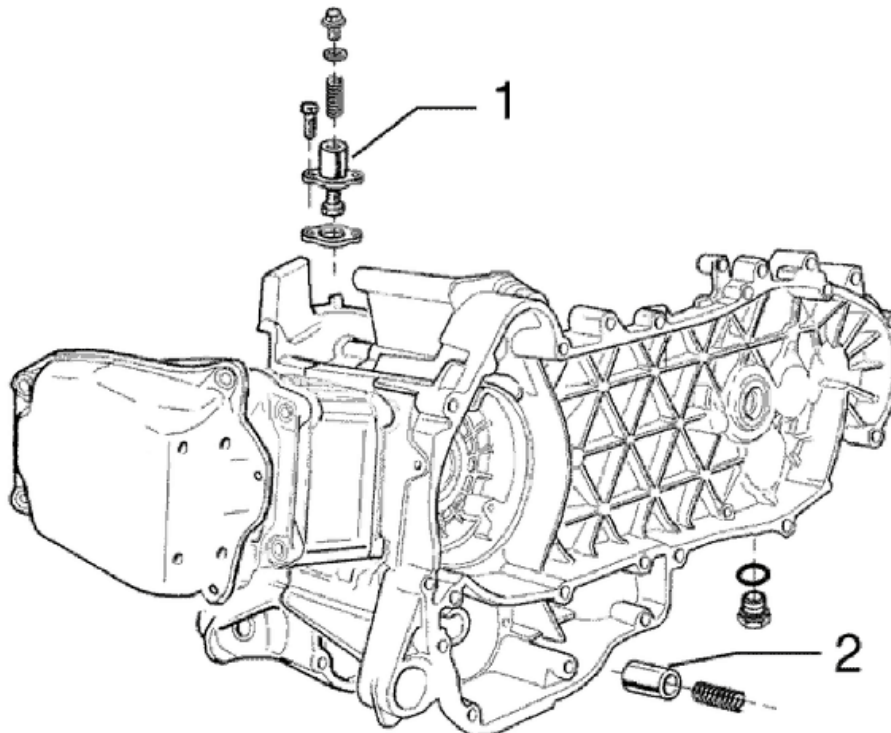
	Code	Action	Duration
1	001148	Rocking lever valve - Replacement	
2	001044	Camshaft - Replacement	

Cylinder head cover



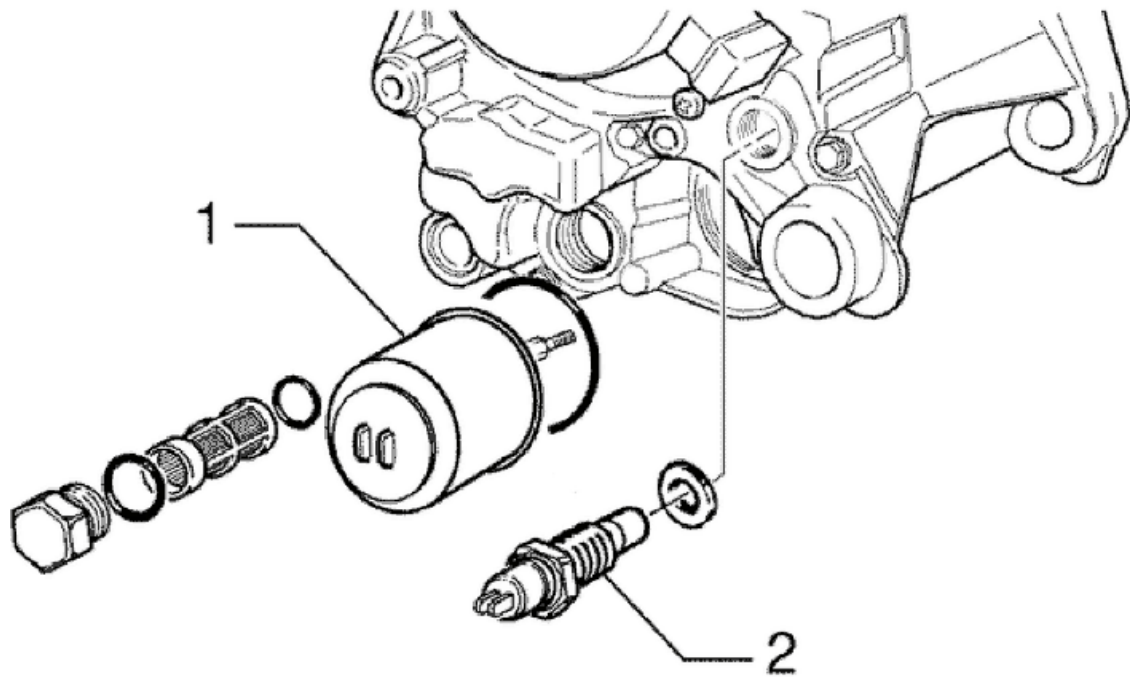
HEAD COVER

	Code	Action	Duration
1	001093	Spark plug - Replacement	
2	001089	Head cover - Replacement	
3	001088	Head cover gasket - Replacement	
4	001074	Oil vapour recovery pipe - Replacement	

Chain tensioner**CHAIN TIGHTENER**

	Code	Action	Duration
1	001129	Chain tightener - Overhaul and replacement	
2	001124	Lubrication by-pass - Replacement	

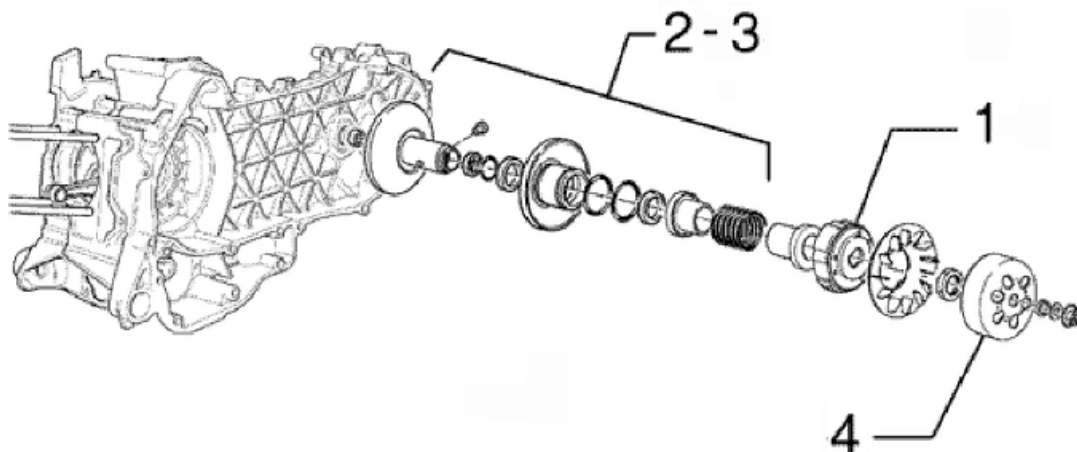
Oil filter



OIL FILTER

	Code	Action	Duration
1	001123	Oil filter -Replacement	
2	001160	Oil pressure sensor - Replacement	

Driven pulley

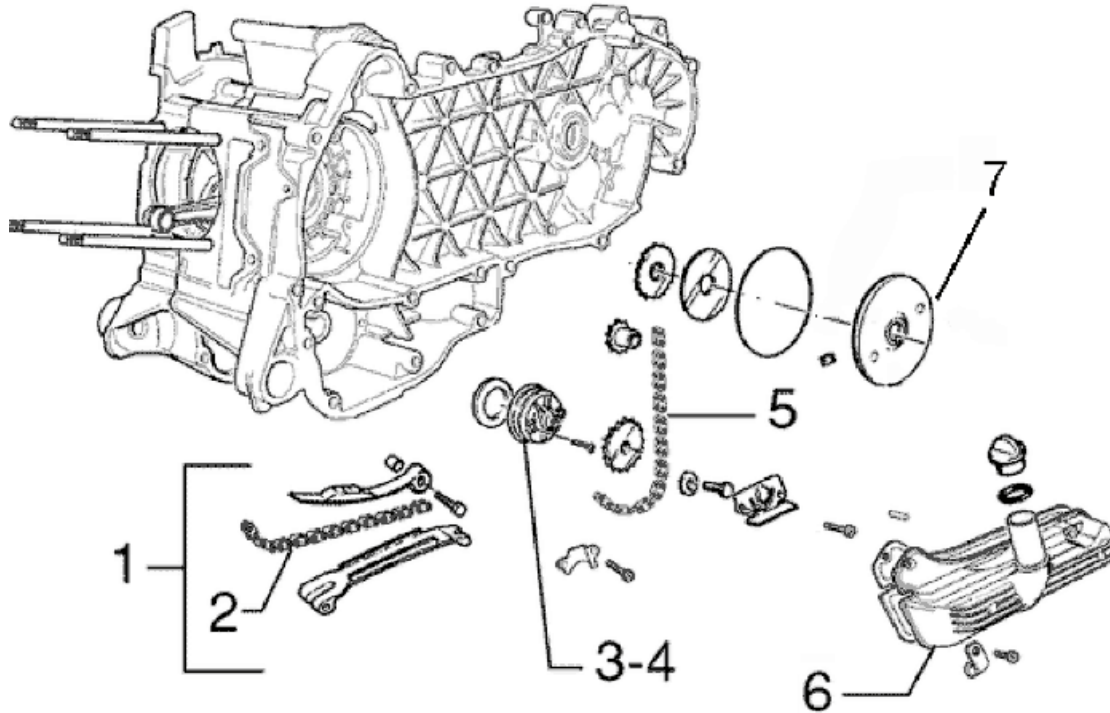


DRIVEN PULLEY

	Code	Action	Duration
1	001022	Clutch - Replacement	
2	001012	Driven pulley - Service	
3	001110	Driven pulley - Replacement	

	Code	Action	Duration
4	001155	Clutch bell - Replacement	

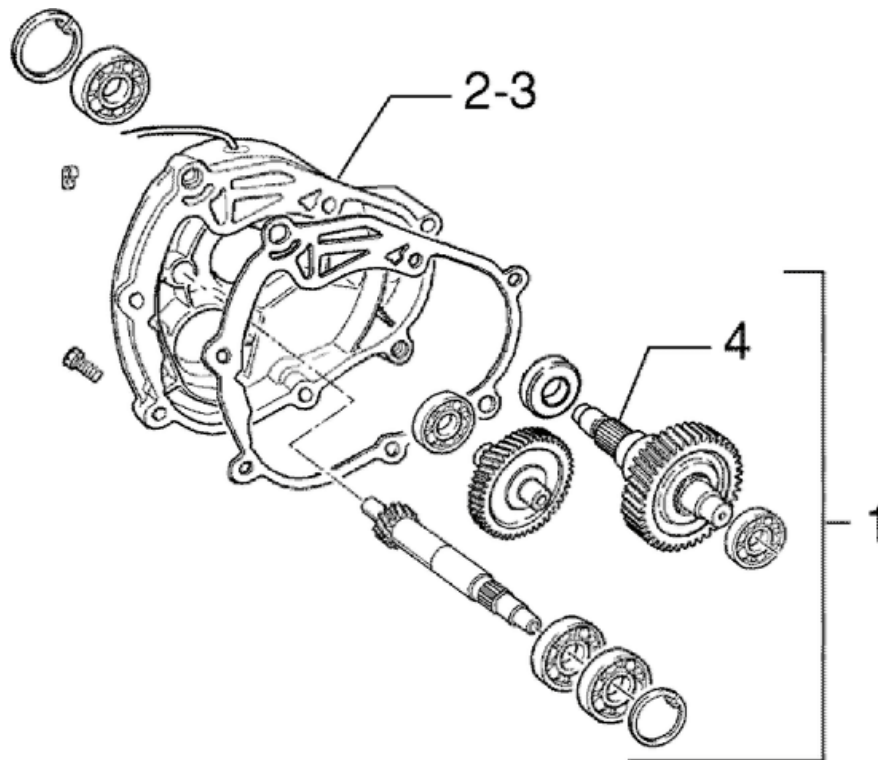
Oil pump



OIL SUMP PUMP

	Code	Action	Duration
1	001125	Chain guide pads - Replacement	
2	001051	Belt/Timing chain - Change	
3	001042	Oil pump - Service	
4	001112	Oil pump - change	
5	001122	Oil pump chain - Replacement	
6	001130	Oil sump - Replacement	
7	001172	Chain cover flap - change	

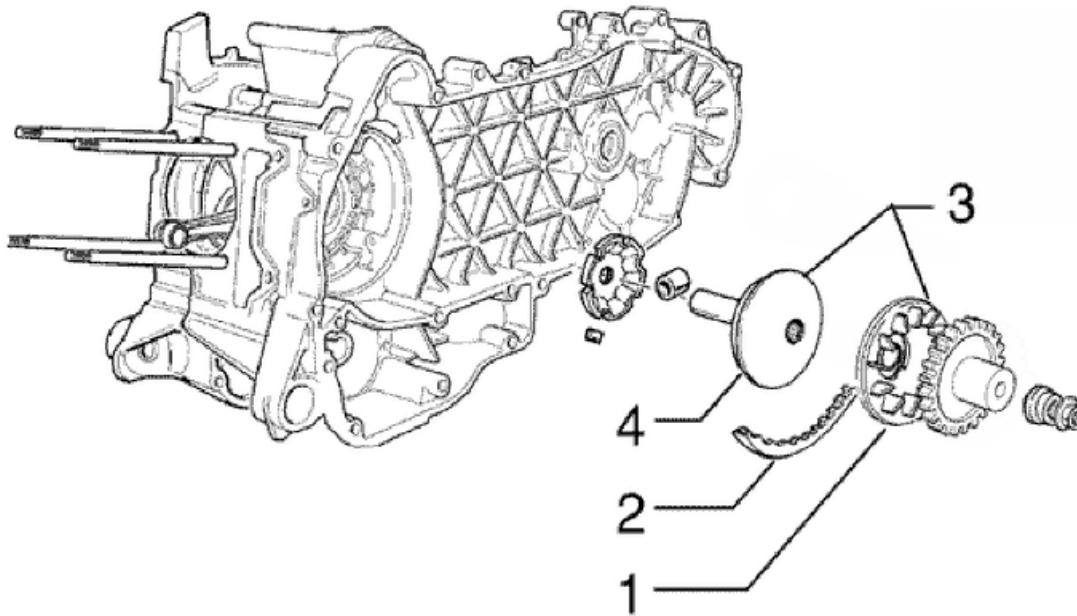
Final gear assy.



FINAL REDUCTION

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

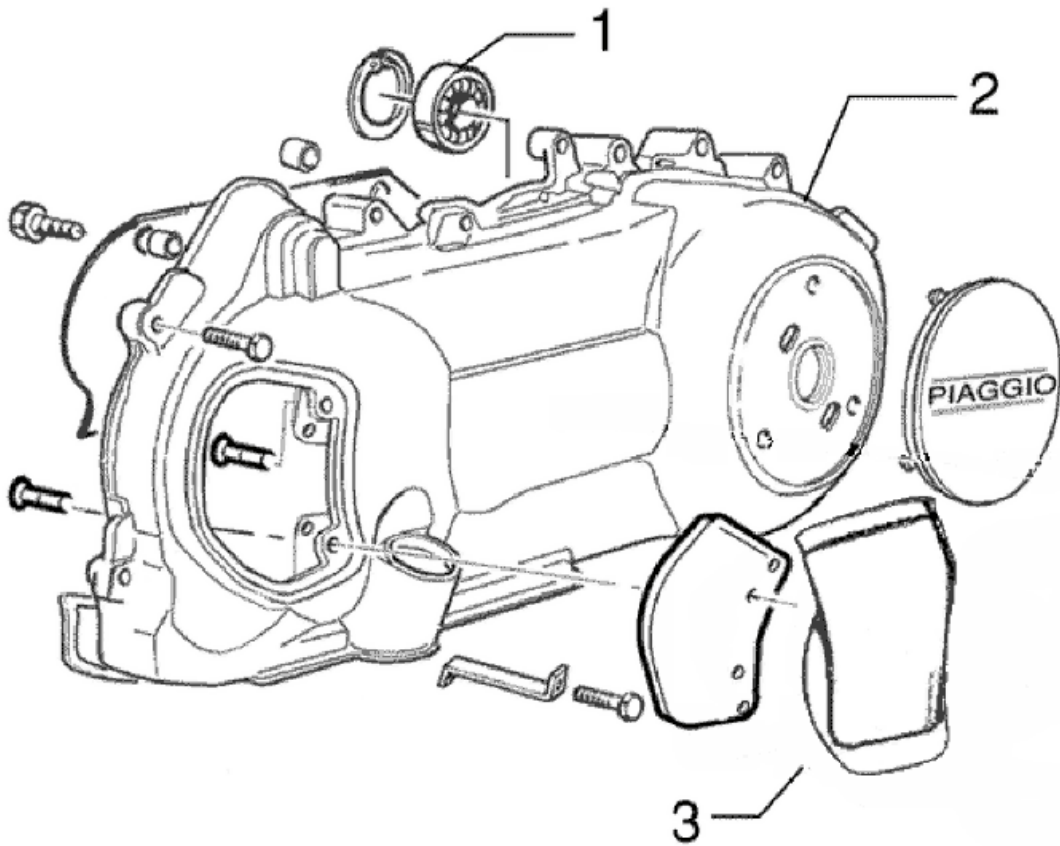
Driving pulley



DRIVING PULLEY

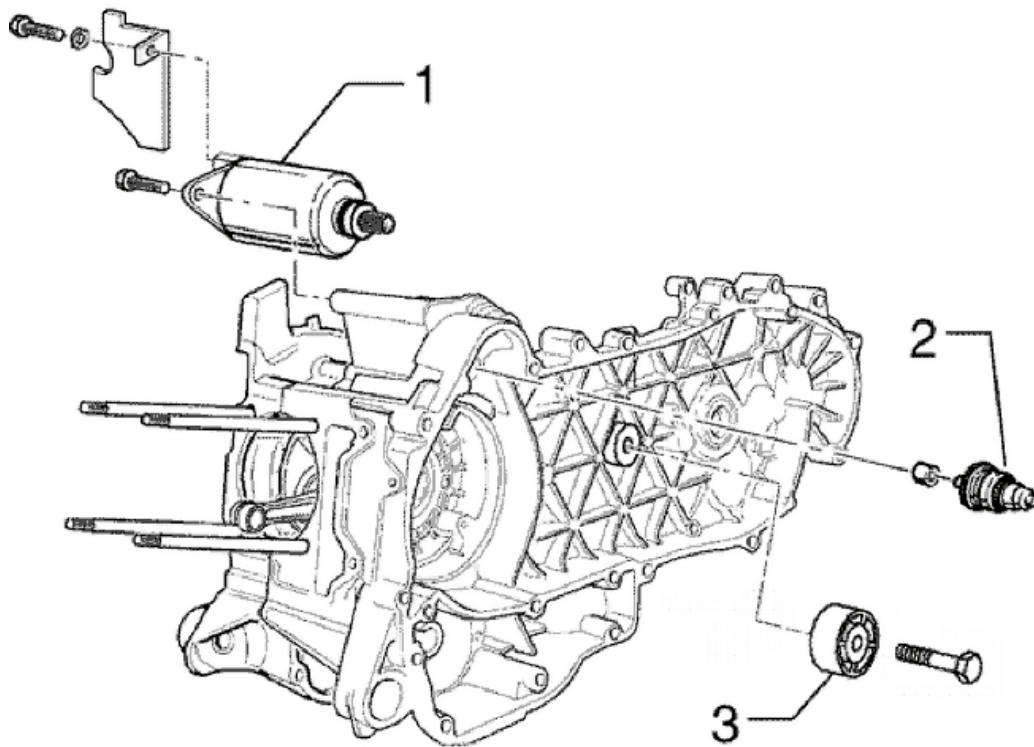
	Code	Action	Duration
1	001086	Driving half-pulley - Replacement	
2	001011	Driving belt - Replacement	
3	001066	Driving pulley - Removal and Refitting	
4	001006	driving pulley - Service	

Transmission cover



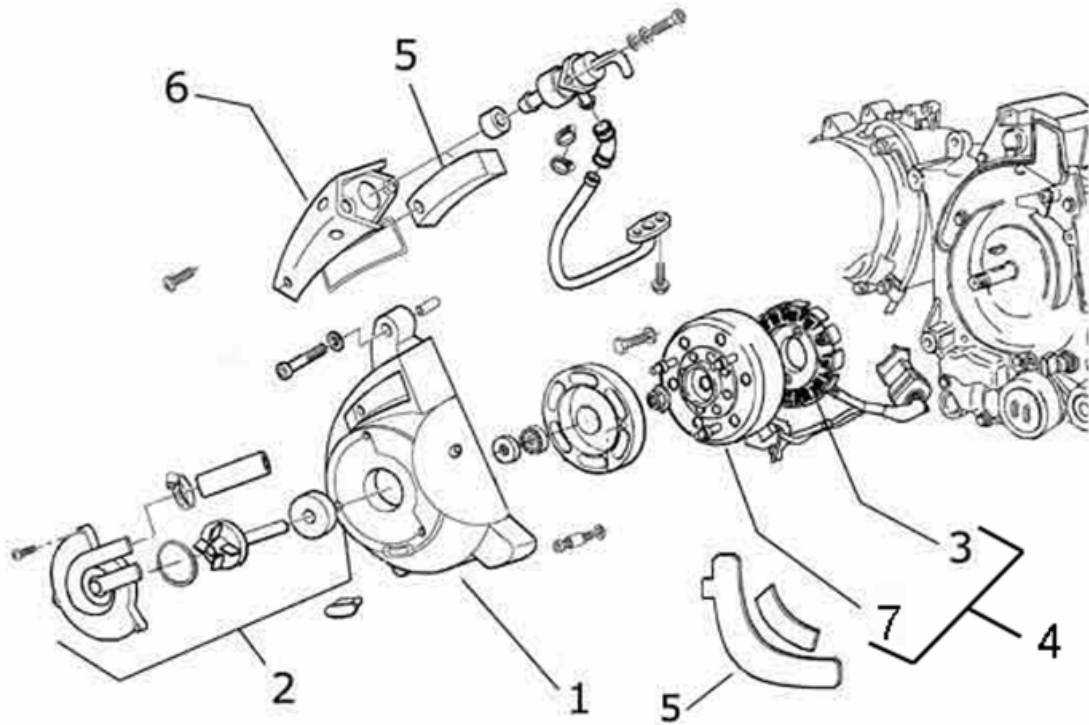
TRANSMISSION COVER

	Code	Action	Duration
1	001135	Transmission cover bearing - Replacement	
2	001096	Transmission crankcase cover - Replacement	
3	001131	Transmission air intake - Replacement	

Starter motor**ELECTRICAL START UP**

	Code	Action	Duration
1	001020	Starter motor - Replacement	
2	001017	Start-up pinion - Replacement	
3	001141	Belt anti-flapping roller - Replacement	

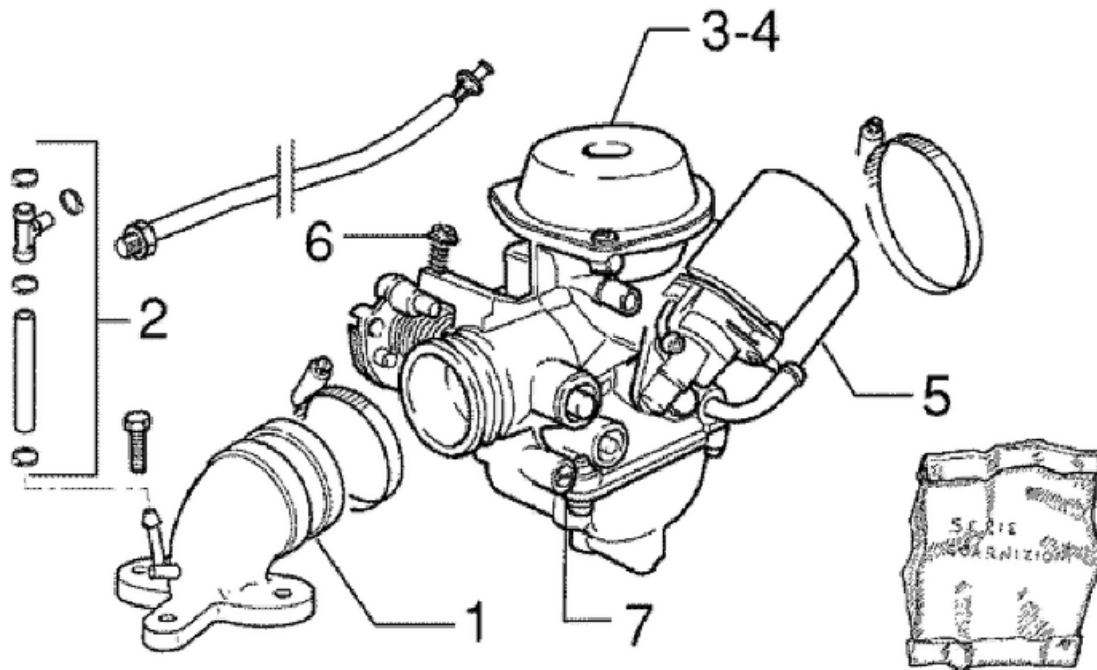
Flywheel magneto



MAGNETO FLYWHEEL

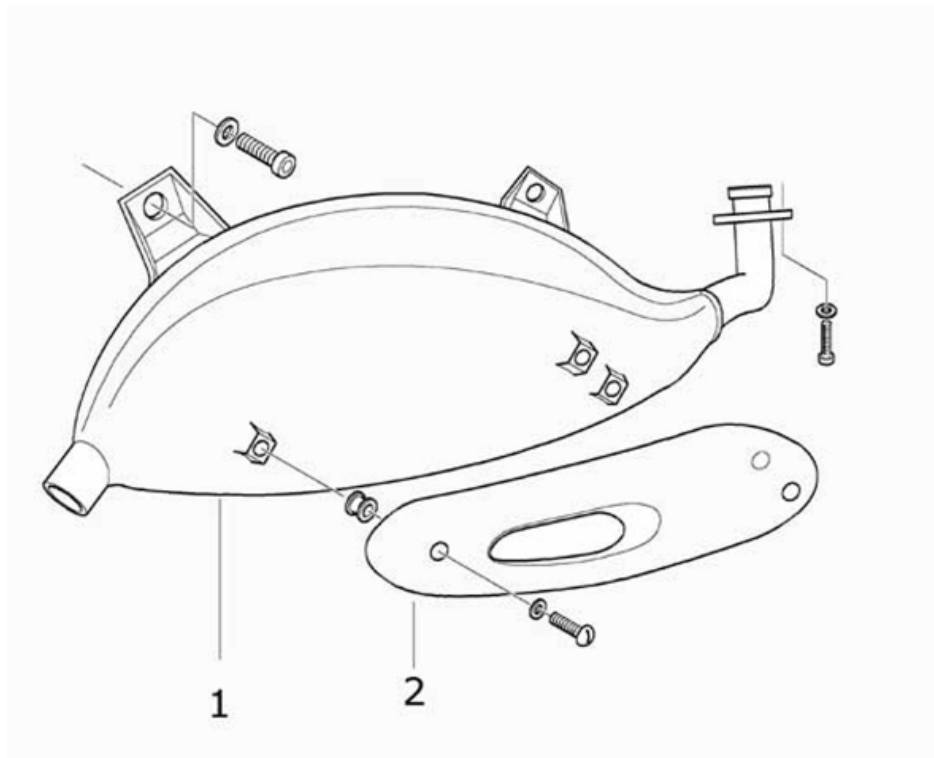
	Code	Action	Duration
1	001087	Flywheel cover - replace	
2	001113	Water pump / Pump rotor - Replacement	
3	001067	Stator - Removal and Refitting	
4	001058	Complete flywheel - Replacement	
5	001161	Secondary air filter - Replacement	
6	001162	Secondary air filter box - Replacement	
7	001173	Rotor - Replacement	

Carburettor

**CARBURETTOR**

	Code	Action	Duration
1	001013	Intake manifold - change	
2	007020	Carburettor heating tubing - replacement	
3	001008	Carburettor - Inspection	
4	001063	Carburettor - Replacement	
5	001081	Automatic choke - Replacement	
6	003058	Carburettor - Adjustment	
7	001136	Exhaust emissions - Adjustment	

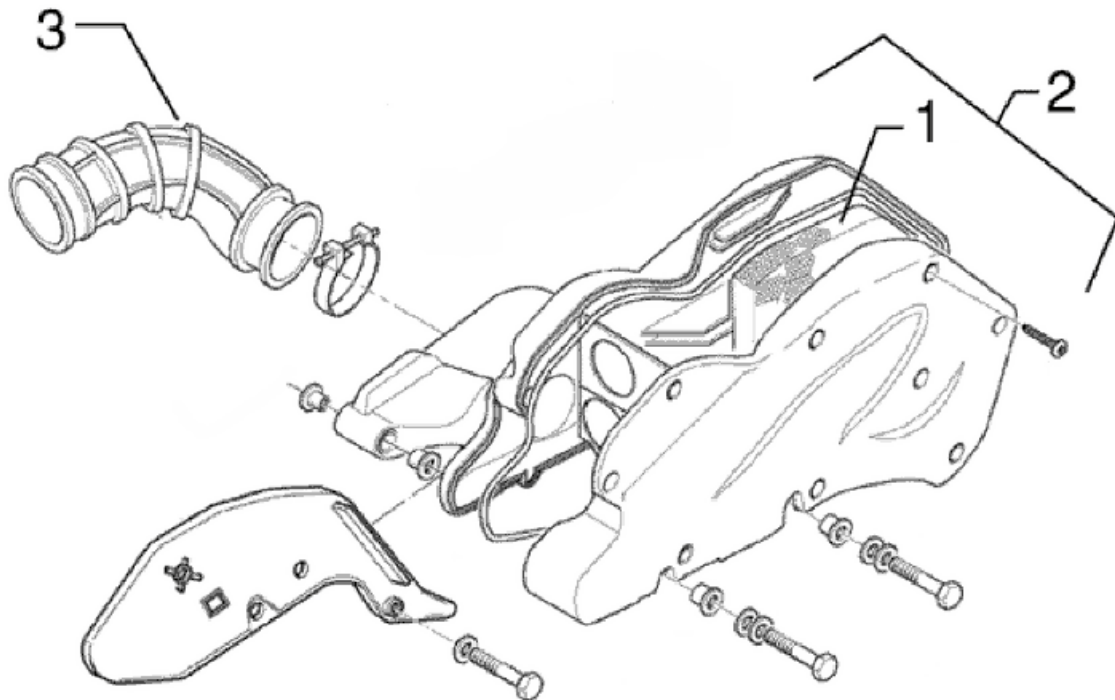
Exhaust pipe



MUFFLER

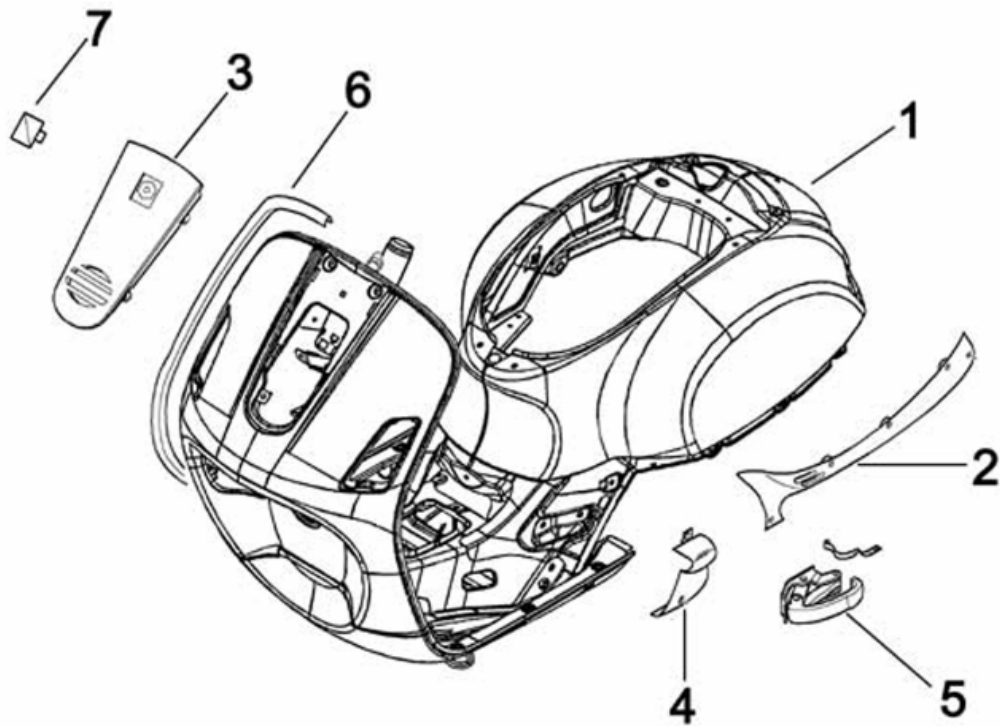
	Code	Action	Duration
1	001009	Muffler - Replacement	
2	001095	Muffler guard - Replacement	

Air cleaner

**AIR CLEANER**

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

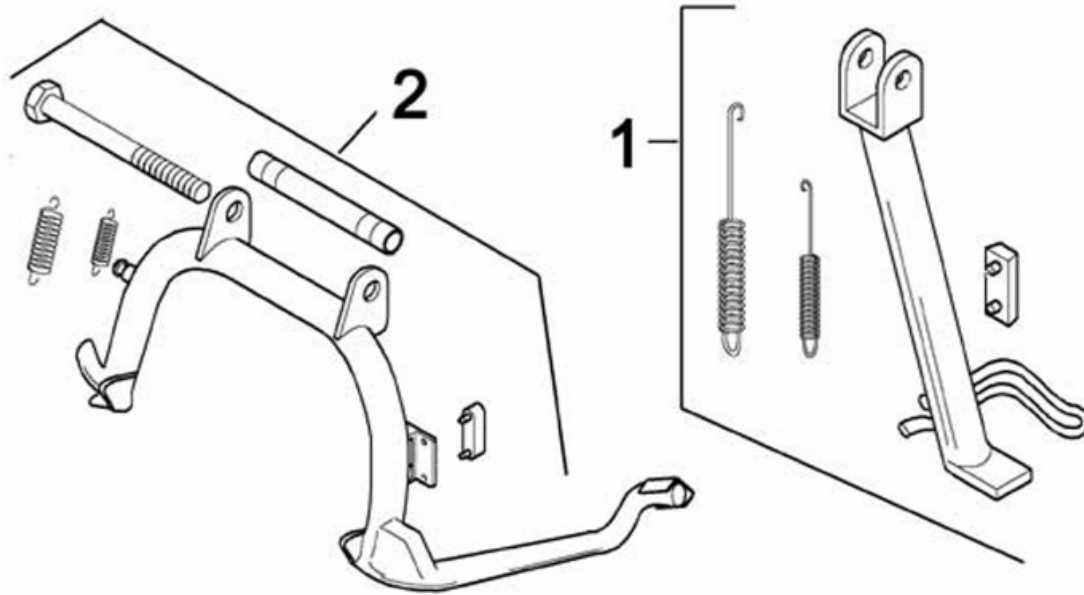
Frame



FRAME

	Code	Action	Duration
1	004001	Chassis - Replacement	
2	004085	Fairing (1) - Replacement	
3	004149	Shield central cover - Replacement	
4	004053	Spoiler - Replacement	
5	004015	Footrest - Removal and Refitting	
6	004023	Shield rim - Replacement	
7	004159	Plates / Stickers - Replacement	

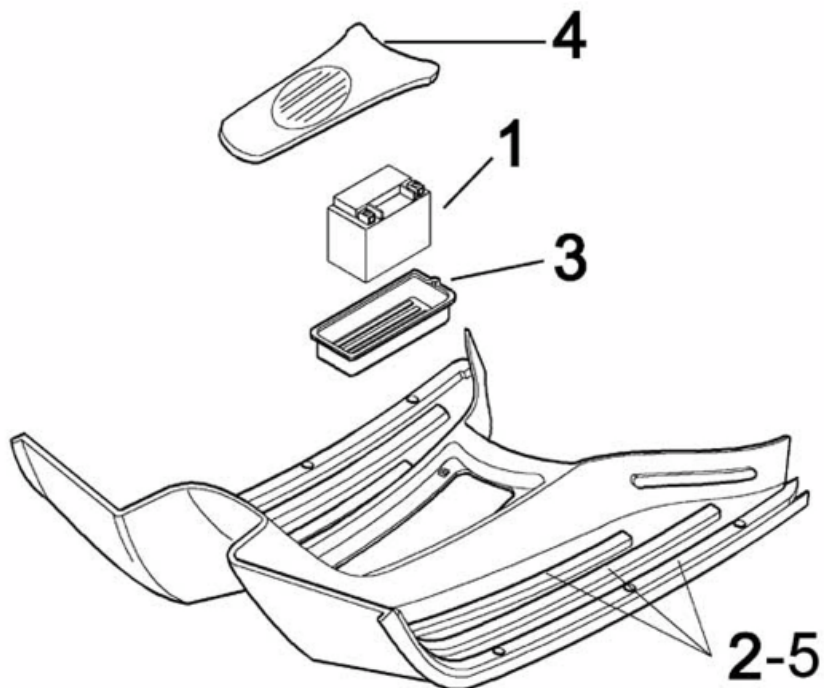
Centre-stand



STAND

	Code	Action	Duration
1	004102	Side stand - Replacement	
2	004004	Stand - Replacement	

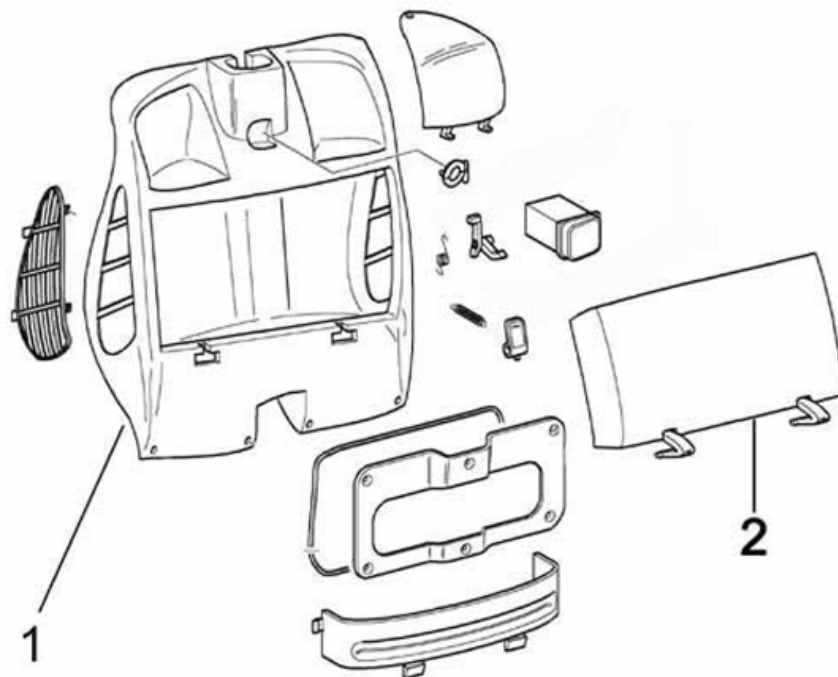
Footrests



MATS AND COVERS

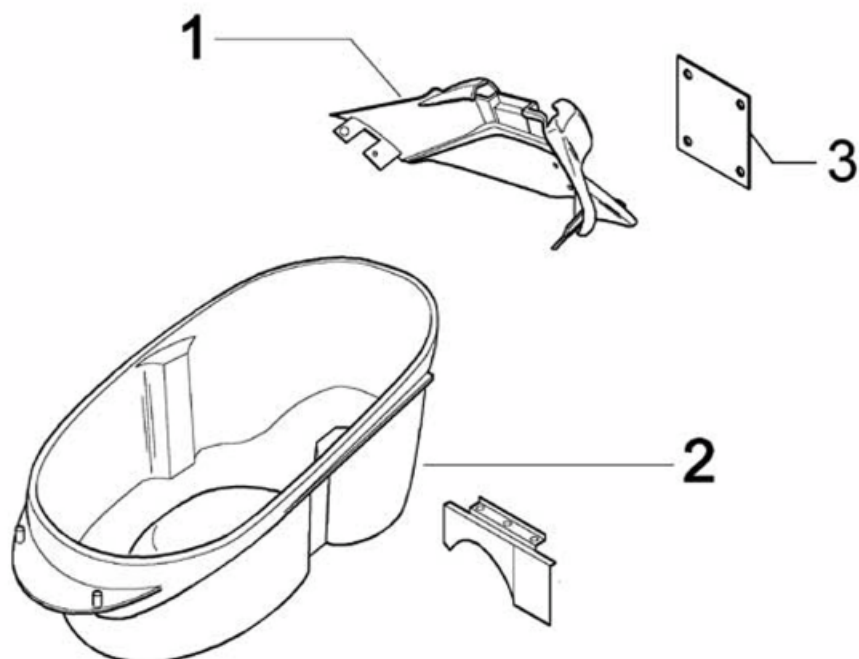
	Code	Action	Duration
1	005007	Battery - Replacement	
2	004079	Footrest - replacement	
3	004071	Battery compartment - re- placement	
4	005046	Battery cover - change	
5	004078	Front/rear footrest rubber - Replacement	

Rear cover



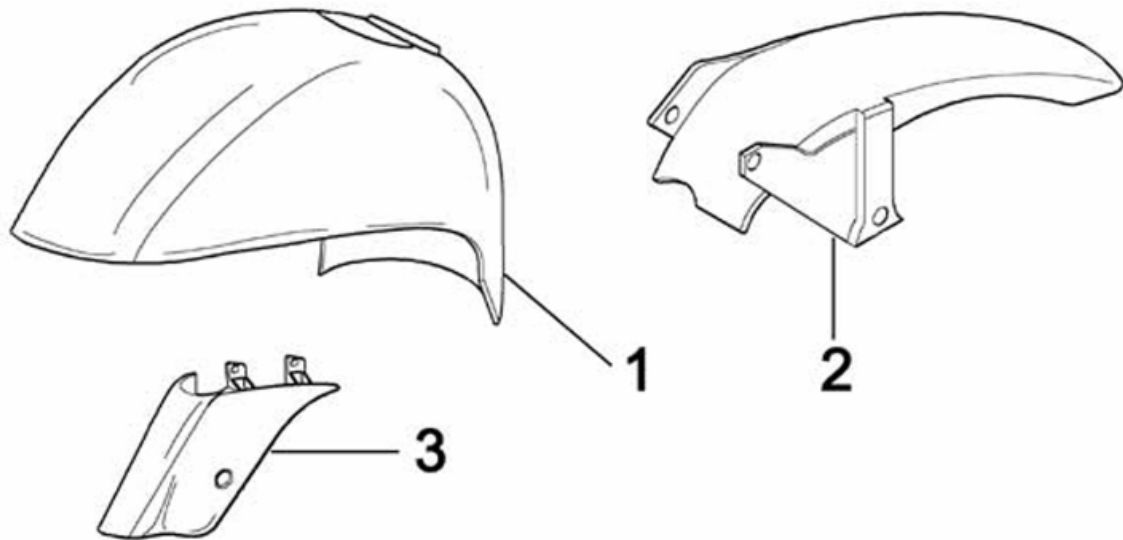
REAR SHIELD

	Code	Action	Duration
1	004083	Glove box - Replacement	
2	004081	Glove box door - Replace- ment	

Underseat compartment**HELMET COMPARTMENT**

	Code	Action	Duration
1	004136	License plate support - Replacement	
2	004016	Helmet compartment - Removal and Refitting	
3	005048	Licence plate holder - Replacement	

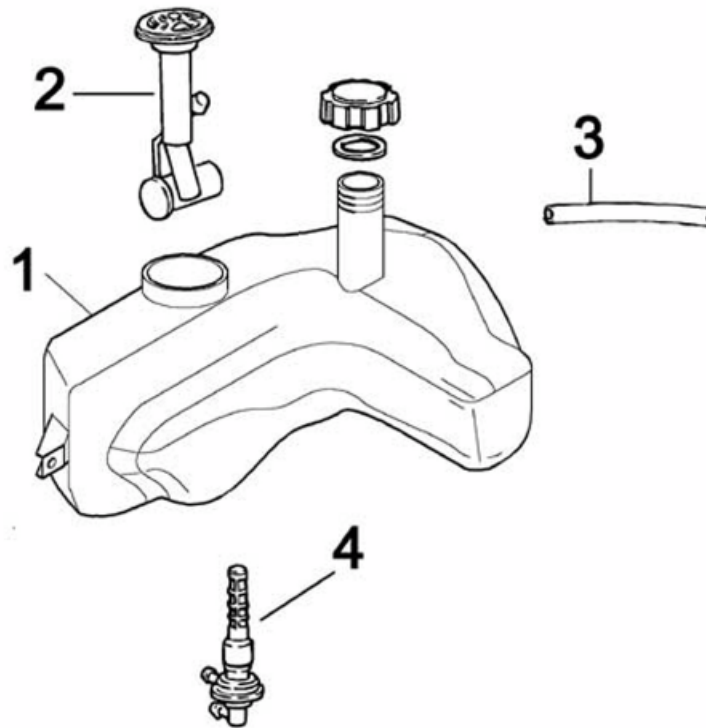
Mudguard



MUDGUARDS

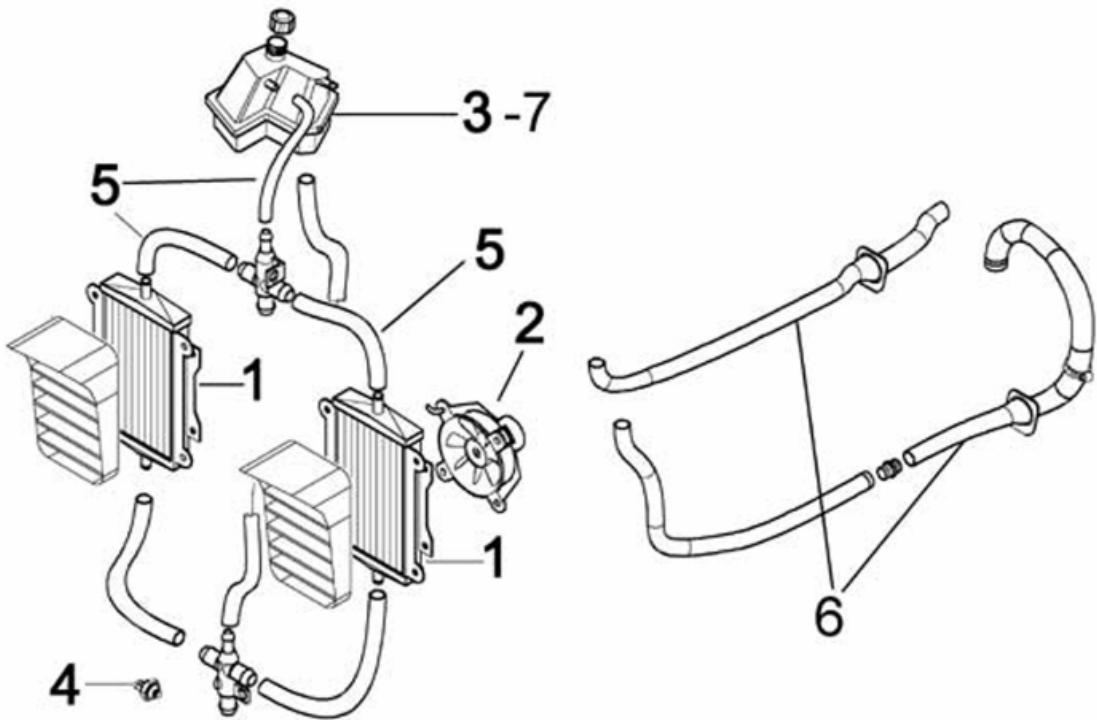
	Code	Action	Duration
1	004002	Front mudguard - Replacement	
2	004009	Rear mudguard - Replacement	
3	003044	Shock absorber cover - Replacement	

Fuel tank

**FUEL TANK**

	Code	Action	Duration
1	004005	Fuel tank - Replacement	
2	005010	Tank float - Replacement	
3	004109	Fuel tank breather - Replacement	
4	004007	Fuel valve - Replacement	

Expansion tank



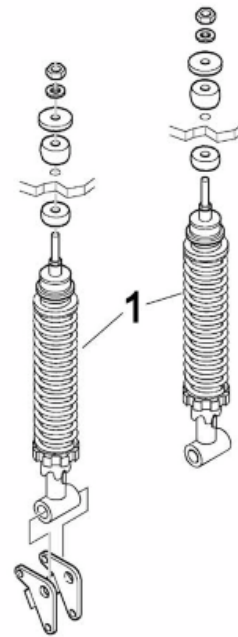
EXPANSION TANK

	Code	Action	Duration
1	007002	Water cooler - Replacement	
2	007016	Fan complete with support - Replacement	
3	007001	Expansion tank - Replacement	
4	007014	Radiator thermal switch - Replacement	
5	007013	Expansion tank / radiator connecting hose - Replacement	
6	007003	Delivery line and coolant return - Replacement	
7	001052	Coolant and air bleed - Replacement	

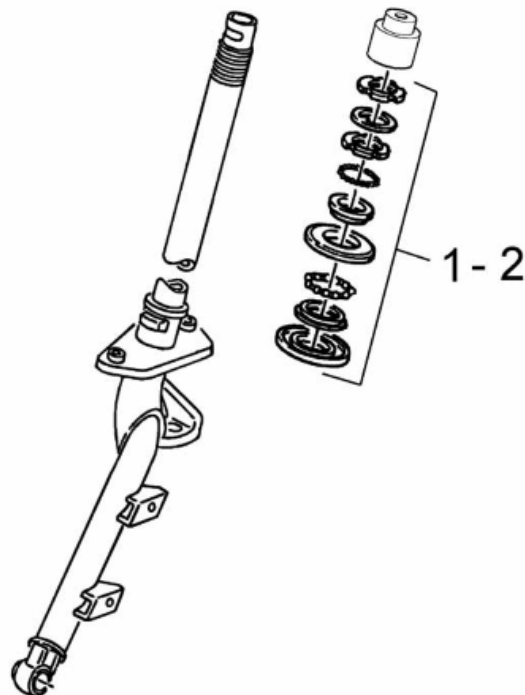
Rear shock-absorber

REAR SHOCK ABSORBER

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



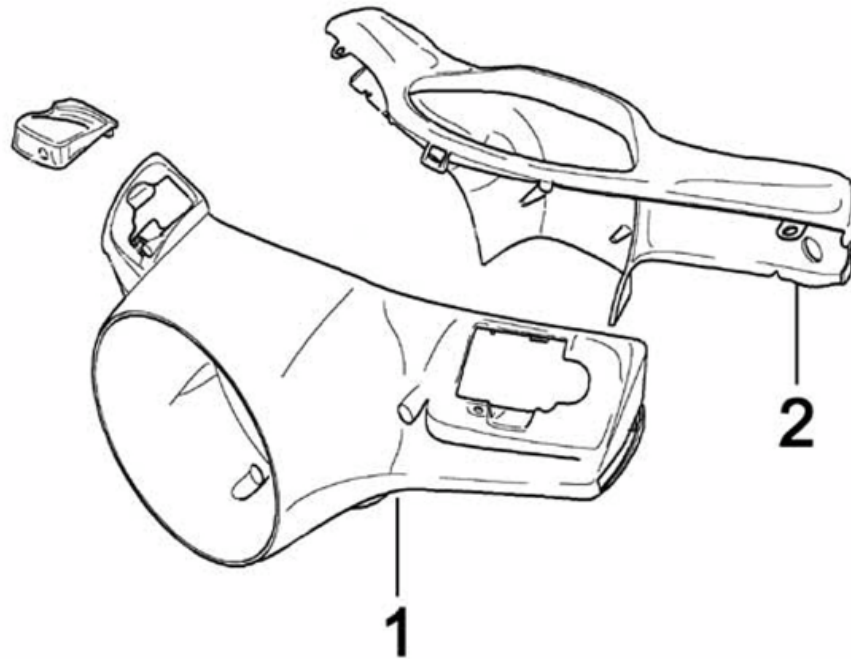
Steering column bearings



STEERING FIFTH WHEELS

	Code	Action	Duration
1	003002	Steering fifth wheel - Replacement	
2	003073	Steering clearance - Adjust	

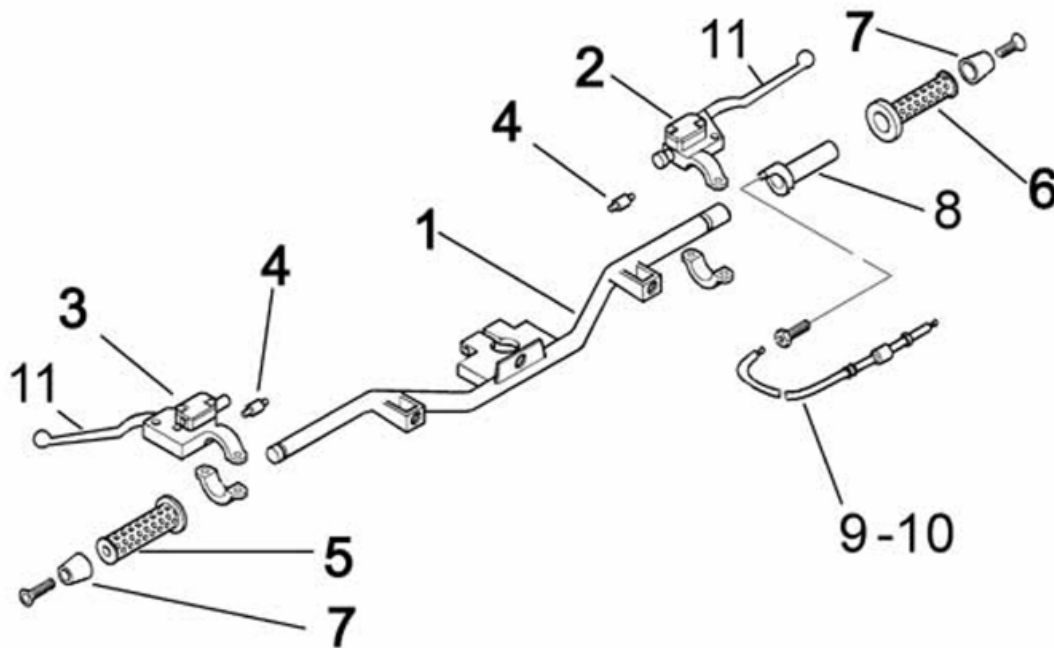
Handlebar covers



HANDLEBAR COVERS

	Code	Action	Duration
1	004018	Front handlebar covers - Replacement	
2	004019	Rear handlebar covers - Replacement	

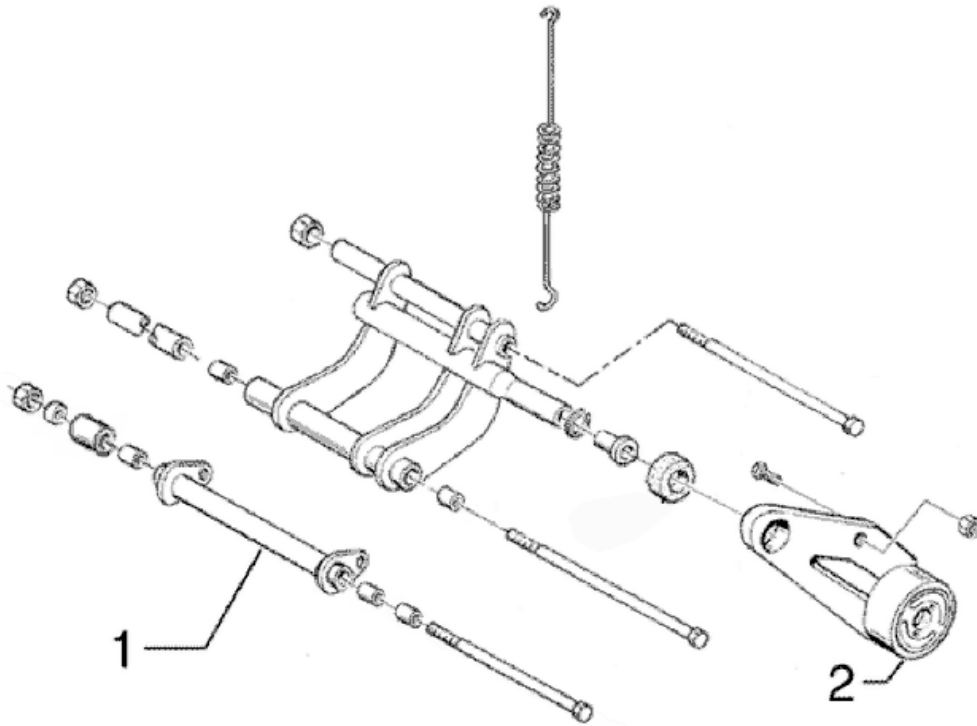
Handlebar components



HANDLEBAR COMPONENTS

	Code	Action	Duration
1	003001	Handlebar - Removal and re-fitting	
2	002067	Rear brake pump - Replacement	
3	002024	Front brake pump - Removal and refitting	
4	005017	Stop switch - Replacement	
5	002059	Right-hand knob - change	
6	002071	Left hand grip - Replacement	
7	003059	Counterweight - Replacement	
8	002060	Throttle grip - Replacement	
9	002063	Throttle control transmission - Replacement	
10	003061	Accelerator transmission - adjust	
11	002037	Brake or clutch lever - Replacement	

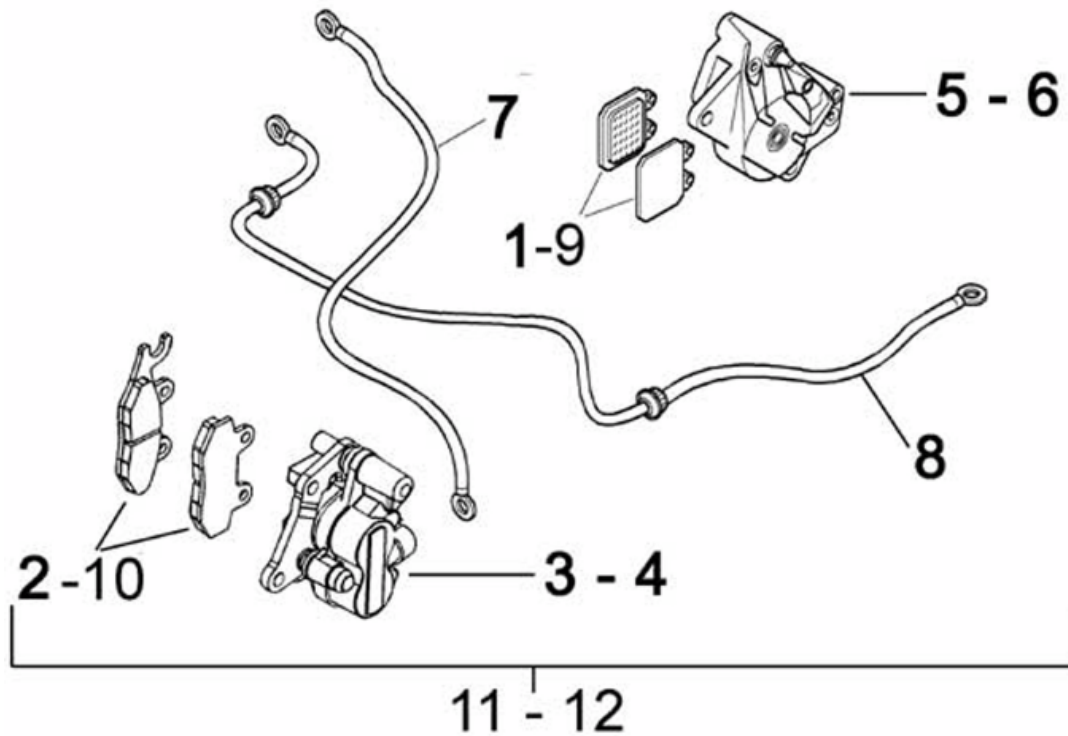
Swing-arm



SWINGING ARM

	Code	Action	Duration
1	001072	Swinging arm - Engine-chassis connection - Replacement	
2	004058	Silent block - Replacement	

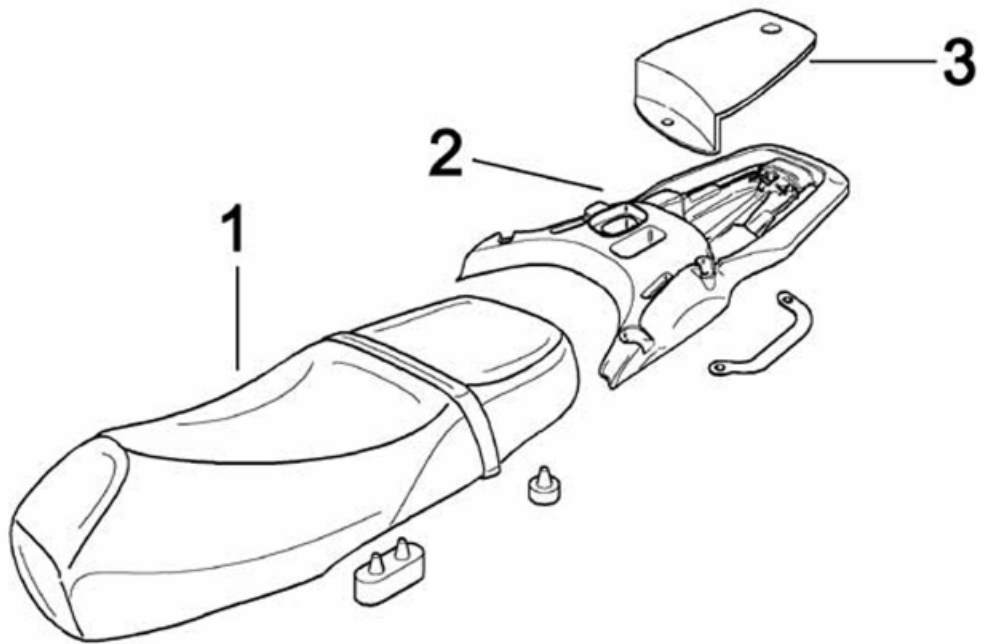
Brake hoses



CALLIPER BRAKE PIPING

	Code	Action	Duration
1	003071	Rear brake pads/shoes - Check wear	
2	003070	Front brake pads / Shoes - Check wear	
3	002040	Front brake calliper - Check	
4	002048	Rear brake calliper - Re- placement	
5	002068	Rear brake calliper - Check	
6	002021	Front brake piping - Replace- ment	
7	002020	Rear brake pipes - Removal and refitting	
8	002007	Front brake pads/shoes - re- moval and installation	
9	002002	Rear brake pad/s shoes - re- moval and refitting	
10	002047	Front brake fluid and air bleeding system - Replace- ment	
11	002080	Rear brake oil bleeding sys- tem - Replacement	

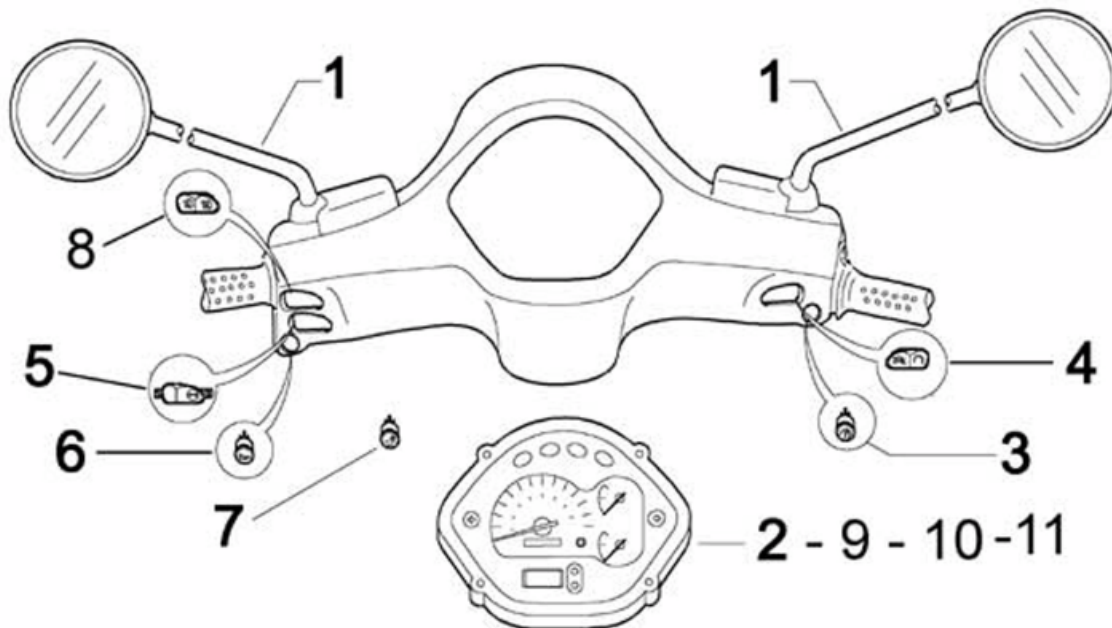
Seat



SADDLE

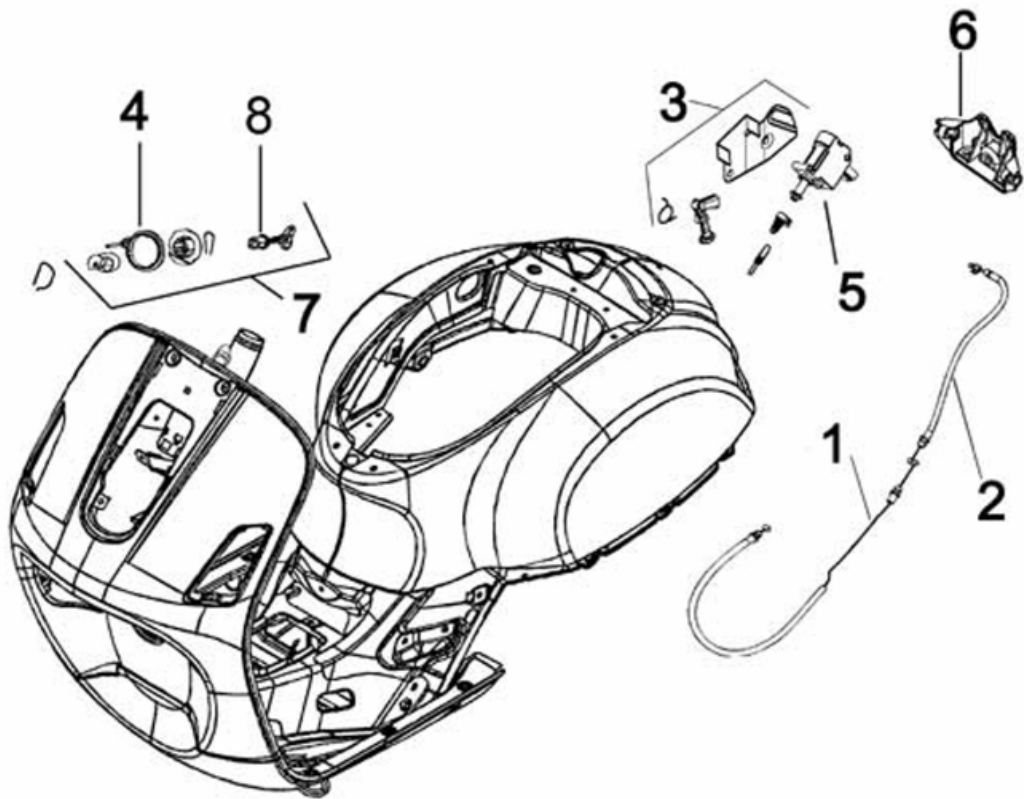
	Code	Action	Duration
1	004136	License plate support - Replacement	
2	004016	Helmet compartment - Removal and Refitting	
3	005048	Licence plate holder - Replacement	

Instrument panel

**INSTRUMENT PANEL**

	Code	Action	Duration
1	004066	Driving mirror - Replacement	
2	005014	Odometer - Replacement	
3	005041	Starter button - Replacement	
4	005077	Emergency stop switch - Replacement	
5	005006	Light switch or turn indicators - Replacement	
6	005040	Horn button - Replacement	
7	005121	Saddle opening button - Replacement	
8	005039	Headlight switch - replace	
9	005078	Odometer glass - Replacement	
10	005038	Instrument panel warning light bulbs - Replacement	
11	005076	Clock / battery - Replacement	

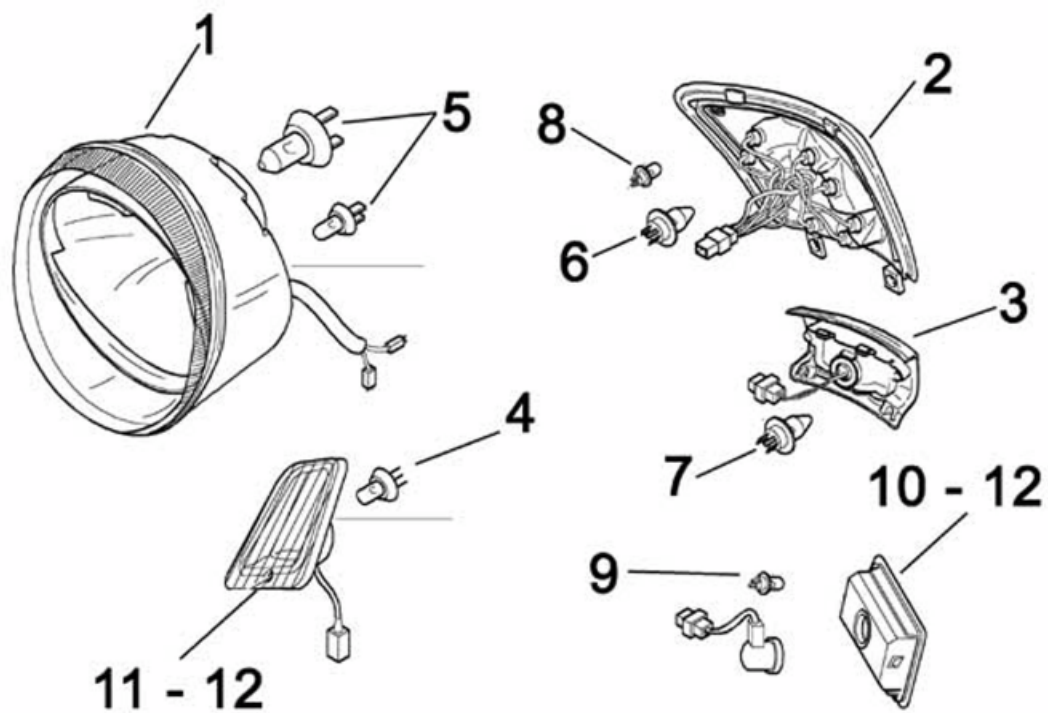
Locks



LOCKS

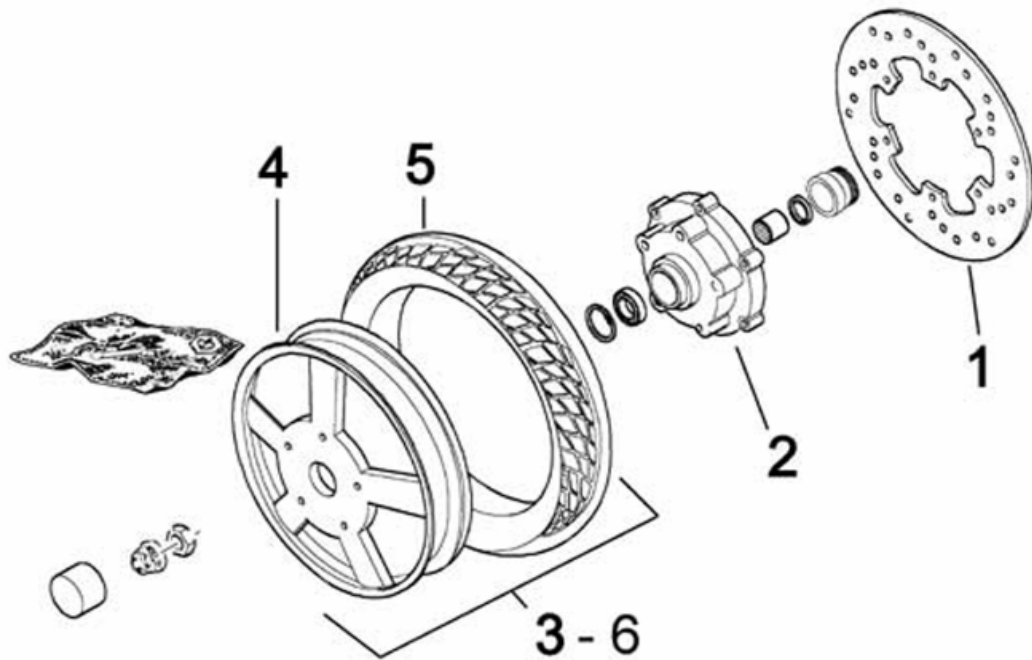
	Code	Action	Duration
1	002083	Saddle opening transmission - Replacement	
2	002092	Transmission splitter/ hook transmission - Replacement	
3	004158	Saddle opening splitter - Replacement	
4	005072	Immobilizer aerial - Replacement	
5	005099	Electric saddle opening device - Replacement	
6	004054	Saddle lock catch - Replacement	
7	004010	Anti-theft lock - Replacement	
8	005016	Key switch - Replacement	

Turn signal lights

**TURN INDICATOR LIGHTS**

	Code	Action	Duration
1	005002	Front headlamp - change	
2	005005	Taillight - Replacement	
3	005032	Transparent licence plate cover - replace	
4	005067	Front turn indicator bulb - Replacement	
5	005008	Front headlamp bulbs - Replacement	
6	005066	Rear light bulbs - Replacement	
7	005031	Licence plate light bulb - Replacement	
8	005090	Stop light bulb - Replacement	
9	005068	Rear turn indicator bulb - Replacement	
10	005022	Rear turn indicators - Replacement	
11	005012	Front turn indicator - Replacement	
12	005091	Turn indicator glass - Replacement	

Front wheel



FRONT WHEEL

	Code	Action	Duration
1	002041	Brake disc - Replacement	
2	003033	Front wheel hub- Replacement	
3	004123	Front wheel - Replacement	
4	003037	Front wheel rim- Replacement	
5	003047	Front tyre - Replacement	
6	003063	Tyre pressure - Check	

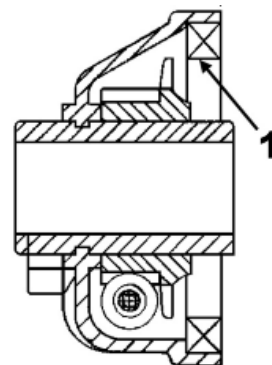
Grease tone wheel or drive

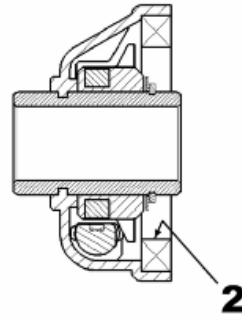
Please take note that the code has been introduced:

900001 - Tone wheel / drive greasing - 15'.

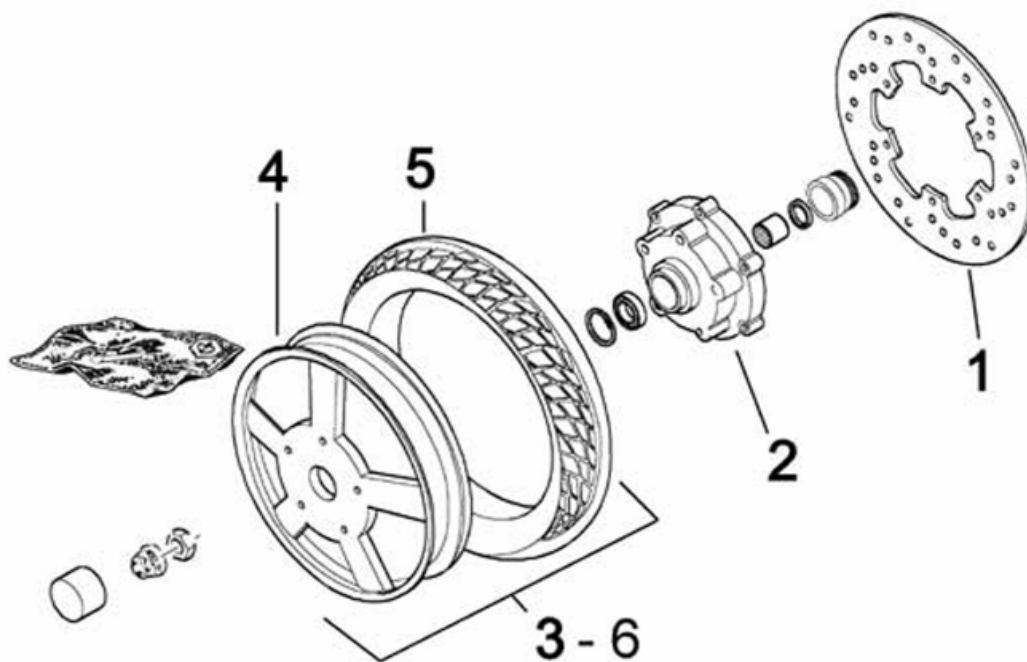
Never mistake the codes 002011 (movement sensor replacement) and 005089 (tone wheel replacement) in the event of noise of the indicated components. The grease recommended is TUTE-LA MRM 2 (soap-based lithium grease with Molybdenum disulphide).

In the following points we indicate with an arrow the area to be greased (1 - Drive, 2 - Tone wheel)





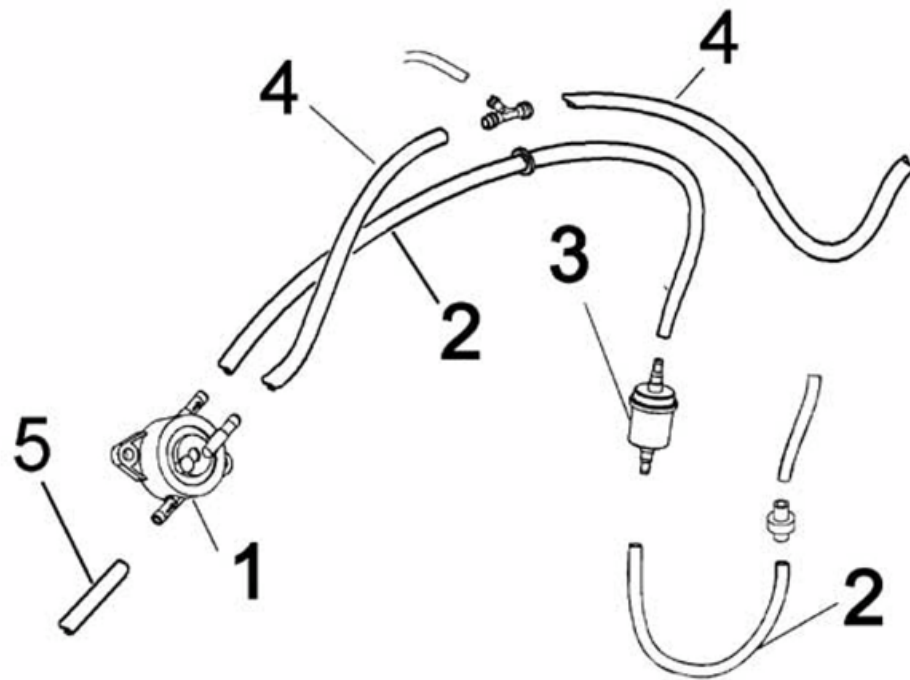
Rear wheel



REAR WHEEL

	Code	Action	Duration
1	001016	Rear wheel - Replacement	
2	004126	Rear wheel tyre - Replacement	
3	001071	Front wheel rim - Removal and refitting	
4	002070	Rear brake disc - Replacement	
5	003077	muffler/rear shock absorber support arm - Service	
6	002028	Rear wheel hub - Replacement	
7	003063	Tyre pressure - Check	

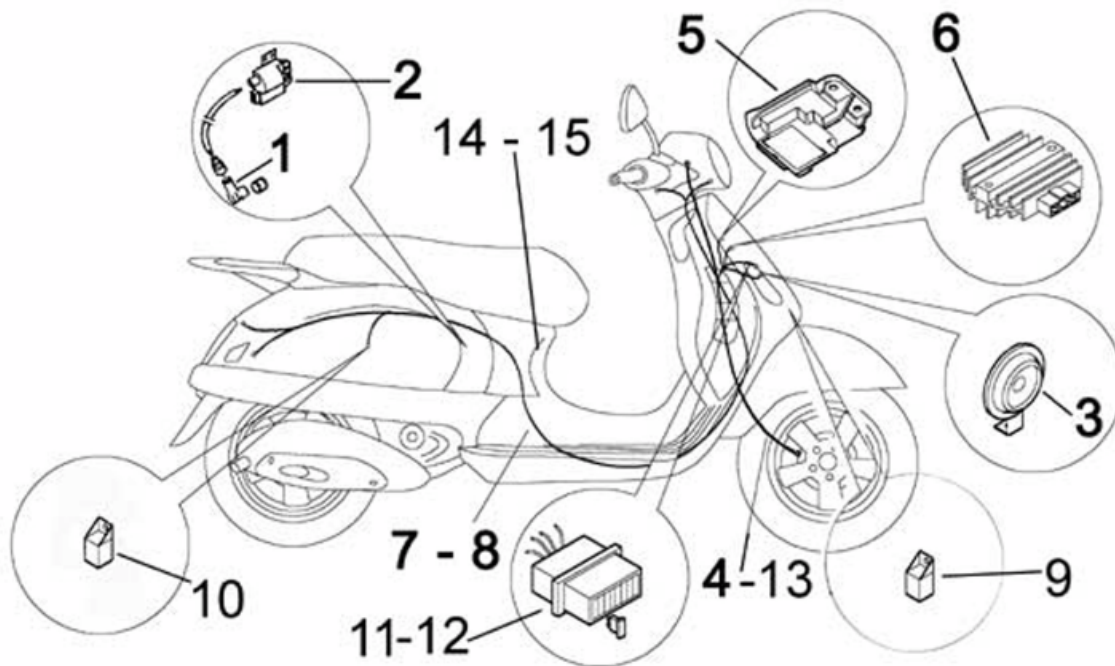
Fuel pump



FUEL PUMP

	Code	Action	Duration
1	004073	Fuel pump - Replacement	
2	004089	Tank / petrol pump pipe - Replacement	
3	004072	Fuel filter - Replacement	
4	004086	Petrol pump depression tube - Replacement	
5	004086	Petrol pump depression tube - Replacement	

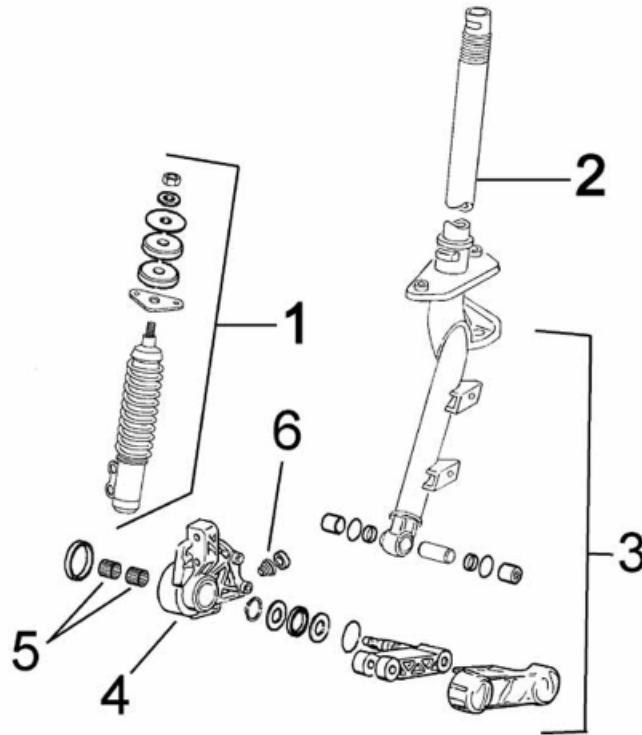
Electric devices



ELECTRIC DEVICES

	Code	Action	Duration
1	001094	Spark plug cap - Replacement	
2	001069	HV coil - replace	
3	005003	Horn - Replacement	
4	002049	Odometer cable - Replacement	
5	001023	Control unit - Replacement	
6	005009	Voltage regulator - replace	
7	005001	Electrical system - Removal and refitting	
8	005114	Electrical system - Service	
9	005035	Headlight remote control - Replacement	
10	005011	Start-up remote control switch - Replacement	
11	005054	Fuse holder - Replacement	
12	005019	Fuse terminal block - Replacement	
13	002051	Odometer transmission assembly - Replacement	
14	005024	Battery fuse - Replacement	
15	002025	Brake piping - Replacement	

Front suspension



FRONT SUSPENSION

	Code	Action	Duration
1	003011	Front shock absorber - Removal and Refitting	
2	003045	Steering tube - Replacement	
3	003010	Front suspension - Service	
4	003035	Shock absorber support and brake calliper - Replacement	
5	003034	Front wheel hub bearing - Replacement	
6	001064	Odometer reel - Replacement	