



WORKSHOP MANUAL

633120



Liberty 125 - 200 4tempi



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WORKSHOP MANUAL

Liberty 125 - 200 4tempi

This workshop manual has been drawn up by Piaggio & C. Spa to be used by the workshops of Piaggio-Gilera dealers. This manual is addressed to Piaggio service mechanics who are supposed to have a basic knowledge of mechanics principles and of vehicle fixing techniques and procedures. Any important changes made to the vehicles or to specific fixing operations will be promptly reported by updates to this manual. Nevertheless, no fixing work can be satisfactory if the necessary equipment and tools are unavailable. It is therefore advisable to read the sections of this manual relating to specific tools, along with the specific 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

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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 solvents. Lubricate all the work surfaces, except tapered couplings, before refitting these parts.
 - After refitting, make sure that all the components have been installed correctly and work properly.
 - For removal, overhaul and refit operations use only tools with metric measures. Metric bolts, nuts and screws are not interchangeable with coupling members with English measurement. Using unsuitable coupling members and tools may damage the vehicle.
 - When carrying out maintenance operations on the vehicle that involve the electrical system, make sure the electric connections have been made properly, particularly the ground and battery connections.
-

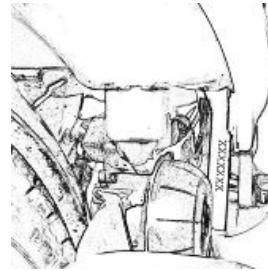
Vehicle identification

VEHICLE IDENTIFICATION (125)

Specification	Desc./Quantity
Chassis prefix (125)	ZAPM38100 ÷ 1001
Engine prefix (125)	M381M ÷ 1001

VEHICLE IDENTIFICATION (200)

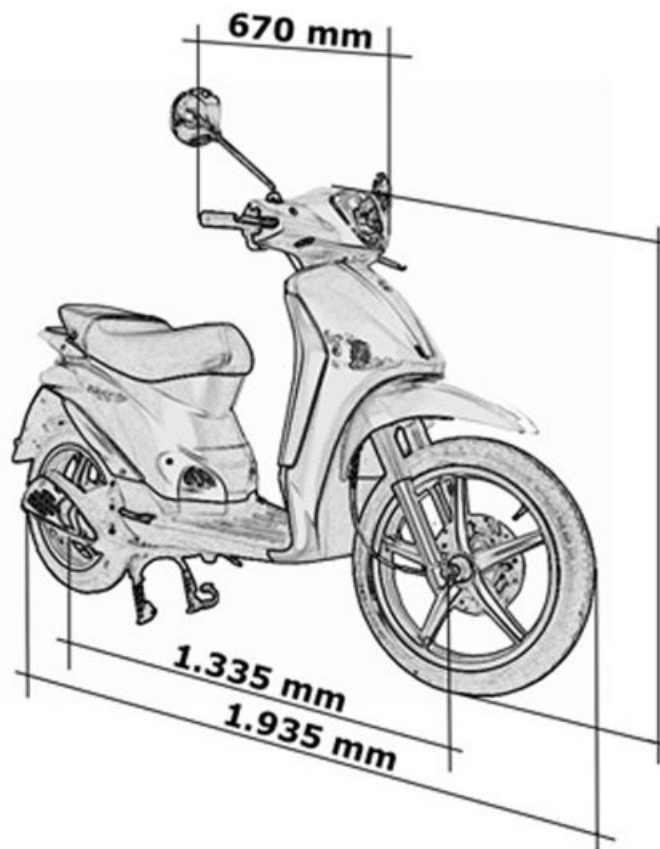
Specification	Desc./Quantity
Chassis prefix (200)	ZAPM38400 ÷ 1001
Engine prefix(200)	M384M ÷ 1001



Dimensions and mass

WEIGHT AND DIMENSIONS

Specification	Desc./Quantity
Dry weight	99 kg
Width	735 mm
Length	1935 mm
Wheelbase	1335 mm
Saddle height	775 mm



Engine

ENGINE

Specification	Desc./Quantity
Engine	Single-cylinder, 4-stroke Piaggio LEADER
Timing system	Single overhead camshaft (SOHC) with 2 valves
Valve clearance	intake 0.10 outlet 0.15
Bore x stroke (125)	57 x 48.6 mm
Bore x stroke (200)	72 x 48.6 mm
Cubic capacity (125)	124 cm ³
Cubic capacity (200)	197 cm ³
Compression ratio (125)	10.6 : 1
Compression ratio (200)	9,5:1
Carburettor	KEIHIN CVEK26
Engine idle speed	approx. 1.600 ÷ 1.800 rpm
Start-up	Electric
Maximum power to crankshaft (125)	10.5 CV at 8000 rpm
Maximum power to crankshaft (200)	12.5 CV at 6500 rpm
Cooling	Forced air circulation.

Transmission

TRANSMISSION

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

Capacities

CAPACITIES

Specification	Desc./Quantity
Engine oil	61 in ³ (1,000 cm ³)
Rear hub oil	~ 200 cm ³
Fuel tank capacity (125)	~ 6 litres (of which 1.5 litres is reserve)
Fuel tank (200 cc.)	~ 9 litres (including 1,5 litre reserve)

Electrical system

ELECTRICAL COMPONENTS

Specification	Desc./Quantity
Start-up	Electric
Spark plug (125)	Champion RG6YC- NGK CR7EB
Spark plug	Champion RG6YC

Frame and suspensions

FRAME AND SUSPENSIONS

Specification	Desc./Quantity
Chassis	Steel tube chassis
Front suspension	Ø 32 Hydraulic telescopic fork - travel: 76 mm
Rear suspension	Hydraulic single shock absorber and spring adjustable to 4 positions at preloading; travel: 85.5 mm.

Brakes

BRAKES

Specification	Desc./Quantity
Front brake	Ø 220 mm disc with calliper with counteracting pistons.
Rear brake	Drum brake, Ø 140 mm

Wheels and tyres

WHEELS AND TYRES

Specification	Desc./Quantity
Front wheel rim	Die-cast aluminium alloy, 2.15 x16"
Rear wheel rim	Die-cast aluminium alloy, 2.75 x14"
Front tyre (125)	Tubeless 90/80 - 16
Rear tyre (125)	Tubeless 110/80-14"
Front tyre (200)	Tubeless 100/80-16"
Rear tyre (200)	Tubeless 120/70 - 14"

Specification	Desc./Quantity
Front tyre pressure	2 bar
Rear tyre pressure	2.2 bar
Rear tyre pressure (rider and luggage)	2.5 bar

Secondary air

In order to reduce polluting emissions, the vehicle is furnished with a catalytic converter in the muffler.

To favour the catalytic process, an extra amount of oxygen is added via a secondary air system (SAS).

This system allows more oxygen to be added to the unburned gases before they reach the converter, thus improving the action of the catalytic converter.

The air enters the exhaust duct from the head, and is purified by a black filter.

The system is fitted with a control valve that disables operation while decelerating to avoid unwanted noise.

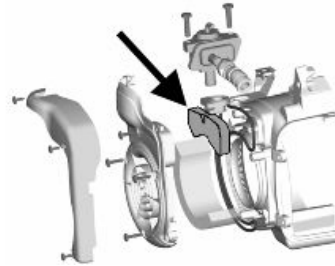
To ensure the best functioning of the SAS system, every 12,000 km the scooter should be taken to an **Authorised Piaggio Service Centre** to have the filter cleaned (Scheduled maintenance operations section).

The filter sponge should be cleaned with water and mild soap, then it should be dried with a cloth and slight blows of compressed air.

CAUTION



CONTACT AN AUTHORISED PIAGGIO SERVICE CENTRE TO CARRY OUT THESE OPERATIONS.



Carburettor

125cc Version

Kehin

CARBURETTOR SETTING

Specification	Desc./Quantity
Type	CVEK26
Throttle valve diameter	Ø 26.5
Diffuser diameter	Ø 26.4
Setting stamping	262A
Maximum jet	82
Maximum air jet (on the body)	85
Tapered pin stamping	NELA
Throttle valve spring	130 ÷ 180 gr.
Minimum jet	35
Idle air jet (on the body)	150
Idle mixture adjustment screw initial opening	1 ¾
Starter jet	42
Starter air jet (on the body)	Ø 1.5
Starter pin travel	10 mm (at 24°)
Starter resistance	20 Ohm (at 24°)

200cc Version

Kehin

CARBURETTOR SETTING

Specification	Desc./Quantity
Type	CVEK26
Throttle valve diameter	Ø 26.5
Diffuser diameter	Ø 26.4
Setting stamping	265A
Maximum jet	82
Maximum air jet (on the body)	85
Tapered pin stamping	NELA
Throttle valve spring	130 ÷ 180 gr.
Minimum jet	35
Idle air jet (on the body)	150
Idle mixture adjustment screw initial opening	1 ¾
Starter jet	42
Starter air jet (on the body)	Ø 1.5
Starter pin travel	10 mm (at 24°)
Starter resistance	20 Ohm (at 24°)

Tightening Torques

MOTORE

Name	Torque in Nm
Ignition spark plug	10 ÷ 15 Nm
Head cover screws	8 ÷ 10
Head-cylinder stud bolt nuts	6 ÷ 7 + 90° + 90° *
Screws fixing head and cylinder to crankcase	8 ÷ 10
Chain tensioner pad screw	5 ÷ 7 Nm
Timing chain tensioner screws	8 ÷ 10 Nm
Timing chain tensioner central screw	5 - 6
Camshaft pulley screw	12 ÷ 14
Rocking lever axle and camshaft bearing screw	3 ÷ 4 Nm
Valve clearance adjustment lock nuts	7 ÷ 9 Nm
Engine oil pre-filter cover:	25 ÷ 28 Nm
Engine oil drainage cap	25 ÷ 28

Name	Torque in Nm
Alternator flywheel nut	40 ÷ 44 Nm
Stator screws	3 ÷ 4
Pick-up screws	3 ÷ 4
Oil pump bulkhead screw	4 ÷ 5
Timing chain/oil pump compartment cover screws	4 ÷ 5 Nm
Oil decantation labyrinth sheet screws	7 ÷ 8
Oil pump crown screw	8 ÷ 10
Screws fixing oil pump to crankcase	5 ÷ 6
Oil pump coupling screws	7 ÷ 9 Nm
Oil sump screws	8 ÷ 10 Nm
Inlet manifold screw	7 ÷ 9
Carburettor/manifold clamp screw	1.2 ÷ 1.5 Nm
Screws fixing cables to starter motor	1.5 ÷ 2.5
Starter motor screws	11 ÷ 13
Transmission cover screws	11 ÷ 13 Nm
Crankcase cooling cover screw	2 ÷ 2.5
Nut locking clutch unit on pulley	55 ÷ 60 Nm
Crankshaft pulley nut	18 to 20 + 90° Nm
Driven pulley shaft nut	40 ÷ 44 Nm
Hub oil drainage screw	3 ÷ 5 Nm
Rear hub cap screws	24 ÷ 26 Nm
Wheel axle nut	115 ÷ 125
Crankcase half union screw	8 ÷ 10

Per assicurare una corretta coppia di bloccaggio lubrificare i dadi prima del montaggio.

* Montando dei nuovi prigionieri, l'operazione di serraggio dei dadi comprende l'effettuazione di 3 rotazioni di 90° dopo il primo bloccaggio a 6÷7 Nm, pertanto: 6÷7 Nm + 90° + 90° + 90° a passaggi incrociati.

STEERING ASSEMBLY

Name	Torque in Nm
Upper steering ring nut	35 ÷ 40
Steering lower ring nut	12 ÷ 14
handlebar fixing screw	45 ÷ 55

FRAME ASSEMBLY

Name	Torque in Nm
Engine-swinging arm bolt	33 ÷ 41
Frame-swinging arm bolt	64 - 72
Shock absorber - chassis nut	20 ÷ 25
Shock absorber/engine pin	33 - 41 N.m
Rear wheel axle	104 ÷ 126
Stand bolt	20 ÷ 25
Front mudguard fixing screw	4 ÷ 6

FRONT SUSPENSION

Name	Torque in Nm
Fork bottom screw	20 ÷ 25
Front wheel axle	45 ÷ 50
Odometer drive screw	6 ÷ 7

FRONT BRAKE

Name	Torque in Nm
Brake fluid pump-hose fitting	20 ÷ 25
Brake fluid pipe-calliper fitting	20 ÷ 22
Calliper tightening screw	20 ÷ 25
Disc tightening screw (Apply LOCTITE 243 medium-strength threadlocker)	8 ÷ 12 Nm
Oil bleeding valve	8 ÷ 12

Overhaul data

Assembly clearances

Cylinder - piston assy.

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

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

PISTON TO CAST IRON CYLINDER COUPLING (125)

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

COUPLING BETWEEN PISTON AND CYLINDER (200)

Name	Initials	Cylinder	Piston	Play on fitting
[p]	A	71.990 ÷ 71.997	71.953 ÷ 71.960	0.030 - 0.044
[p]	B	71.997 ÷ 72.004	71.960 ÷ 71.967	0.030 - 0.044
[p]	C	72.004 ÷ 72.011	71.967 ÷ 71.974	0.030 - 0.044
[p]	D	72.011 ÷ 72.018	71.974 ÷ 71.981	0.030 - 0.044

Piston rings

SEALING RINGS (125)

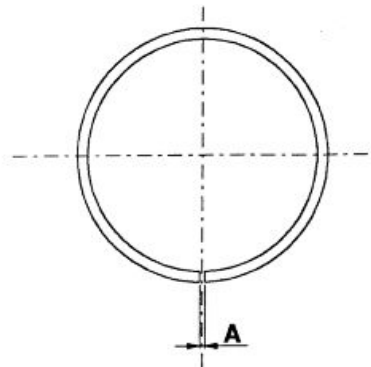
Name	Description	Dimensions	Initials	Quantity
Compression ring		57 x 1	A	0.15 ÷ 0.30
Oil scraper ring		57x1	A	0.10 ÷ 0.30
Oil scraper ring		57x2.5	A	0.10 ÷ 0.35
Compression ring 1st oversize		57.2 x 1	A	0.15 ÷ 0.30

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

Maximum clearance after use: 1 mm

SEALING RINGS (200)

Name	Description	Dimensions	Initials	Quantity
Compression ring		72x1.5	A	0.15 ÷ 0.30
Oil scraper ring		72x1	A	0.20 ÷ 0.40
Oil scraper ring		72x2.5	A	0.20 ÷ 0.40



Crankcase - crankshaft - connecting rod

AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CONNECTING ROD (125)

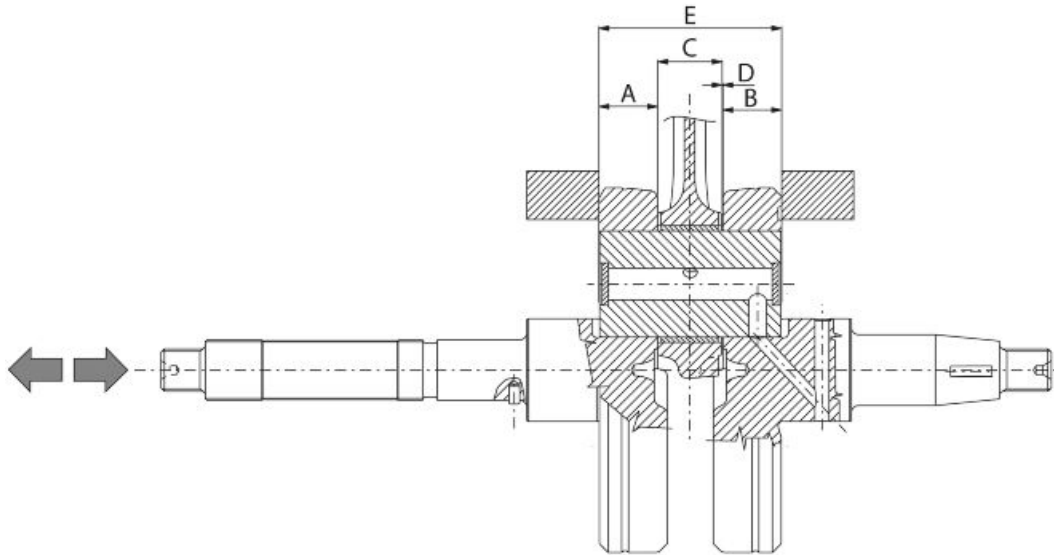
Name	Description	Dimensions	Initials	Quantity
Half-shaft, transmission side		16,6 +0-0,05	A	D = 0.20 ÷ 0.50
Flywheel-side half shaft		16,6 +0-0,05	B	D = 0.20 ÷ 0.50
Connecting rod with PP		18 -0.10 -0.15	C	0.20 ÷ 0.50
Crank pin width		51.400	E	

AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CRANKSHAFT HALF-BEARINGS (125)

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

Name	Description	Dimensions	Initials	Quantity
Crankshaft category 2 - Crankcase category 1			C - C	
Crankshaft category 2 - Crankcase category 2			B - B	

Crankshaft/crankcase axial clearance: 0.15 ÷ 0.40



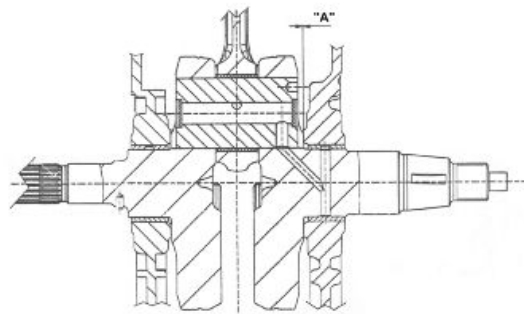
AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CONNECTING ROD (200)

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 with PP		18 -0.10 -0.15	C	0.20 ÷ 0.50
Crank pin width			E	51.4 +0.050

AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CRANKSHAFT HALF-BEARINGS (200)

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

Crankshaft/crankcase axial clearance: 0.15 ÷ 0.43



Products

TABLE OF RECOMMENDED PRODUCTS

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 (brakes, throttle control and odometer)	Oil for 4-stroke engines
AGIP FILTER OIL	Oil for air filter sponge	Mineral oil with specific additives for increased adhesiveness
AGIP GP 330	Grease (brake control levers, throttle grip)	Calcium complex soap-based grease with NLGI 2; ISO-L-XBCIB2
AGIP CITY HI TEC 4T	Engine oil	SAE 5W-40, API SL, ACEA A3, JASO MA Synthetic oil
AGIP GREASE MU3	Grease for odometer transmission gear case	Soap-based lithium grease with NLGI 3; ISO-L-XBCHA3, DIN K3K-20

INDEX OF TOPICS

TOOLING

TOOL

TOOLS

Stores code	Description	
001330Y	Tool for fitting steering seats	


001467Y009	Driver for OD 42-mm bearings	
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001467Y013	Pliers to extract ø 15-mm bearings	
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002465Y	Pliers for circlips	
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005095Y	Engine support	
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008564Y	Flywheel extractor	
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Stores code	Description	
020004Y	Punch for removing fifth wheels from headstock	
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	

Stores code	Description	
020262Y	Crankcase splitting strip	 A black metal plate with a central vertical rod and a smaller rod extending upwards from the top of the plate.
020263Y	Driven pulley assembly sheath	 A black cylindrical component with a flange at the top and bottom.
020287Y	Clamp to assemble piston on cylinder	 A black flexible band with a hook at one end and a latch at the other.
020306Y	Punch for assembling valve sealing rings	 A black cylindrical tool with a tapered end and a small hole at the tip.
020329Y	MityVac vacuum-operated pump	 A white vacuum pump with various hoses and connectors attached.
020330Y	Stroboscopic light to check timing	 A handheld stroboscopic light with a black handle and a white body, connected to a power cord.

Stores code

Description

020331Y

Digital multimeter



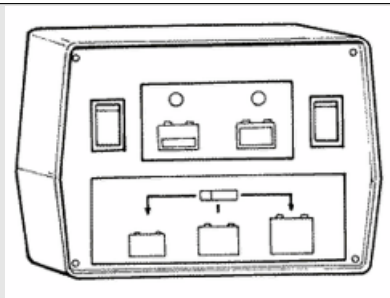
020332Y

Digital rev counter



020333Y



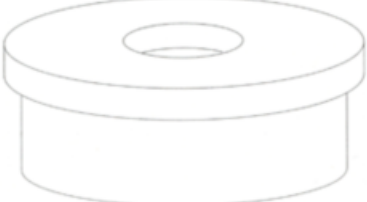


Single battery charger





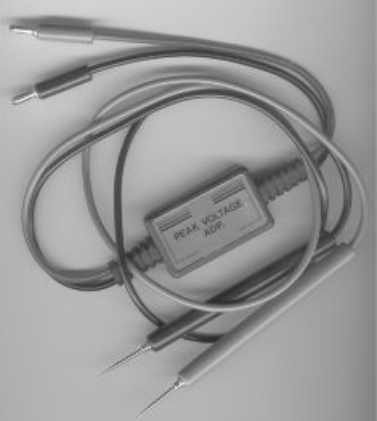


020334Y


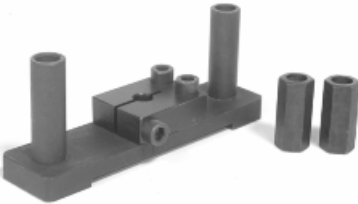


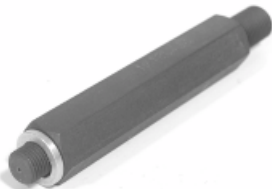

Multiple battery charger




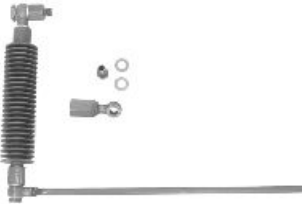


Stores code	Description	
020335Y	Magnetic support for dial gauge	
020357Y	32x35-mm Adaptor	
020359Y	42x47-mm Adaptor	
020360Y	52x55-mm Adaptor	
020363Y	20 mm guide	
020364Y	25-mm guide	

Stores code	Description	
020368Y	driving pulley lock wrench	
020375Y	Adaptor 28 x 30 mm	
020376Y	Adaptor handle	
020382Y011	adapter for valve removal tool	
020409Y	Multimeter adaptor - Peak voltage detection	

Stores code	Description	
020412Y	15 mm guide	
020414Y	28-mm guide	
020423Y	Driven pulley lock wrench	
020424Y	Driven pulley roller casing fitting punch	
020425Y	Punch for flywheel-side oil seal	
020426Y	Piston fitting fork	

Stores code	Description	
020427Y	Piston fitting band	
020428Y	Piston position check support	
020430Y	Pin lock fitting tool	
020431Y	Valve oil seal extractor	
020434Y	Oil pressure control fitting	
020444Y	Tool for fitting/ removing the driven pulley clutch	

Stores code	Description	
020565Y	Flywheel lock calliper spanner	
020622Y	Transmission-side oil guard punch	
494929Y	Exhaust fumes analyser	
020625Y	Kit for sampling gas from the exhaust manifold	

INDEX OF TOPICS

MAINTENANCE

MAIN

Maintenance chart

EVERY 2 YEARS

Action

Brake fluid - change

EVERY 3000 KM

Action

Engine oil - level check/ top-up

AFTER 1000 KM

80'

Action

- Engine oil - replacement
- Hub oil - change
- Oil filter (net filter) - clean
- 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 the «Idle speed adjustment» section

AFTER 6000 KM, 18000 KM, 54000 KM

150'

Action

- Engine oil - replacement
- Hub oil level - check
- Spark plug electrode gap - check
- Air filter - clean
- Engine oil - change
- Oil filter (net filter) - clean
- Valve clearance - adjustment
- Variable speed rollers/pads - check
- Driving belt - checking
- Brake pads - check condition and wear
- Brake fluid level - check
- Electrical system and battery - check
- Centre stand - lubrication
- Tyre pressure and wear - check
- Vehicle and brake test - road test

AFTER 12000 KM, 60000 KM

160'

Action

- Engine oil - replacement
- Hub oil level - check
- Air filter - clean
- Engine oil - change
- Oil filter (net filter) - clean
- Spark plug - replacement
- Idle speed (*) - adjustment
- Throttle lever - adjustment
- Pads and variator rollers - replacement

Action

Driving belt - replacement
Odometer gear - greasing
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
Centre stand - lubrication
Secondary air filter - cleaning
Tyre pressure and wear - check
Vehicle and brake test - road test

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

AFTER 24000 KM, 48000 KM

175'

Action

Engine oil - replacement
Hub oil - change
Air filter - clean
Engine oil - change
Oil filter (net filter) - clean
Spark plug - replacement
Idle speed (*) - adjustment
Throttle lever - adjustment
Pads and variator rollers - replacement
Driving belt - replacement
Cylinder ventilation system - cleaning
Odometer gear - greasing
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
Secondary air filter - cleaning
Centre stand - lubrication
Vehicle and brake test - road test

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

AFTER 30000 KM, 42000 KM, 66000 KM

95'

Action

Engine oil - replacement
Hub oil level - check
Spark plug electrode gap - check
Air filter - clean
Engine oil - change
Oil filter (net filter) - clean
Slide pads and variator rollers - check
Driving belt - checking
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Centre stand - lubrication
Tyre pressure and wear - check
Vehicle and brake test - road test

AFTER 36000 KM

270'

Action

Engine oil - replacement
Hub oil - change
Spark plug - replacement
Air filter - clean
Engine oil - change
Oil filter (net filter) - clean
Valve clearance - adjustment
Idle speed (*) - adjustment
Throttle lever - adjustment
Pads and variator rollers - replacement
Driving belt - replacement
Odometer gear - greasing
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Flexible brake tubes - replacement
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Secondary air filter - cleaning
Centre stand - lubrication
Tyre pressure and wear - check
Vehicle and brake test - road test

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

AFTER 72,000 KM

270'

Action

Engine oil - replacement
Hub oil - change
Spark plug - replacement
Air filter - clean
Engine oil - change
Oil filter (net filter) - clean
Valve clearance - adjustment
Idle speed (*) - adjustment
Throttle lever - adjustment
Pads and variator rollers - replacement
Driving belt - replacement
Odometer gear - greasing
Steering - adjustment
Cylinder ventilation system - check
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Flexible brake tubes - replacement
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Secondary air filter - cleaning
Centre stand - lubrication
Tyre pressure and wear - check
Vehicle and brake test - road test

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

CO check

- Remove the exhaust gases outlet cap on the exhaust pipe
- Using the supplied washer, install the exhaust gases collection kit fitting onto the pipe, as shown in the figure.



- Correctly orientate the components as shown in the picture
- Shut the gas outlet on the tool
- Start the engine and let it warm up
- Shut the engine down



- Disconnect the SAS check valve vacuum hose shown in the figure.
- Seal the connection using a conical a cap.



- Connect the Mitivac vacuum pump to the SAS control valve.
- Start the vacuum pump up to a pressure of -0.6 ÷ -0.8 bar so to close the valve and cut off the SAS system.
- Remove the exhaust gas collection kit cap and connect the analyzer adequately pre-heated.
- Check the analyser output and the engine rpm.
- Adjust the CO concentration.



N.B.

CHECK THAT THE RESULT IS OBTAINED WITH THE VALVE GAS IN CLOSED POSITION.

N.B.

ALSO CHECK THE CARBURETION ADJUSTMENT IS OBTAINED WITH THE FLOW SCREW OPEN BETWEEN 2 AND 4 TURNS.

N.B.

OTHERWISE, CHECK THE FUEL LEVEL ADJUSTMENT IN THE TANK AND THE FUEL CIRCUIT.

N.B.

IN CASE OF UNSTABLE CO, CHECK THAT THE CARBURETTOR IS CLEAN AND THAT THE FUEL SUPPLY SYSTEM AND THE DEPRESSION SEALS WORK ADEQUATELY

N.B.

IN CASE OF 1000 PPM UNBURNED HYDROCARBONS (HC) >, CHECK THE IGNITION SYSTEM, THE TIMING SYSTEM, THE VALVE CLEARANCE AND THE EXHAUST VALVE TIGHTNESS.

Specific tooling

020329Y MityVac vacuum-operated pump

020332Y Digital rev counter

494929Y Exhaust fumes analyser

020625Y Kit for sampling gas from the exhaust manifold

Characteristic

CO Check

3.8±0.7 to 1650±50 RPM

INDEX OF TOPICS

TROUBLESHOOTING

TROUBL

Engine

Poor performance

POOR PERFORMANCE

Possible Cause	Operation
Air filter blocked or dirty.	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% of specific oil (Selenia Air Filter Oil), then hand dry without squeezing, allow to drip dry and then reassemble.
Fuel nozzles or cock clogged or dirty	Dismantle, wash with solvent and dry with compressed air
Dirty or faulty vacuum-operated cock	Check the filter on the cock, remove the petrol and wash the tank, if necessary. Replace the cock as a last resource.
Failing automatic starter on the carburettor	Check the electrical wiring and mechanical movement, replace if necessary.
Excessive driving belt wear	Check it and replace, if necessary
Lack of compression: parts, cylinder and valves worn	Replace the worn parts
Oil level exceeds maximum	Check for causes and fill to reach the correct level
Excess of encrustations in the combustion chamber	Descale the cylinder, the piston, the head and the valves
Incorrect timing or worn timing system elements	Time the system again or replace the worn parts
Muffler obstructed	Replace
Inefficient automatic transmission	Check the rollers and the pulley movement, replace the damaged parts and lubricate the driven pulley moveable guide with Montblanc Molybdenum Grease
Wrong valve adjustment	Adjust the valve clearance properly
Overheated valves	Remove the head and the valves, grind or replace the valves
Valve seat distorted	Replace the head assembly
Worn cylinder, Worn or broken piston rings	Replace the piston cylinder assembly or just the piston rings

Rear wheel spins at idle

REAR WHEEL ROTATES WITH ENGINE AT IDLE

Possible Cause	Operation
Idling rpms too high	Adjust the engine idle speed and the CO%, if necessary.
Clutch fault	Check the springs / clutch masses

Starting difficulties

DIFFICULTY STARTING UP

Possible Cause	Operation
Battery flat	Check the state of the battery. If it shows signs of sulphation replace it and bring the new battery into service charging it for eight hours at a current of 1/10 of the capacity of the battery itself
Faulty spark plug or incorrect ignition advance - Engine flooded.	Replace the spark plug or check the ignition circuit components 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.
Incorrect valve sealing or valve adjustment	Inspect the head and/or restore the correct clearance
Rpm too low at start-up or engine and start-up system damaged	Check the starter motor and the kick-starter unit
Altered fuel characteristics	Drain off the fuel no longer up to standard; then, refill
Vacuum operated cock failure	Check that fuel is adequately supplied through the pipe by applying a vacuum to the suction pipe

Possible Cause	Operation
Failing automatic starter on the carburettor	Check the electrical wiring and mechanical movement, replace if necessary.
Start-up enabling buttons failure	Check continuity using an Ohm meter, with the switch pressed; replace if necessary
Carburettor nozzles clogged or dirty	Dismantle, wash with solvent and dry with compressed air
Air filter obstructed or dirty.	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% of specific oil (Selenia Air Filter Oil), then hand dry without squeezing, allow to drip dry and then reassemble.

Excessive oil consumption/Exhaust smoke

EXCESSIVE OIL CONSUMPTION/SMOKEY EXHAUST

Possible Cause	Operation
Worn valve guides	Check and replace the head unit if required
Worn valve oil guard	Replace the valve oil guard
Oil leaks from the couplings or from the gaskets	Check and replace the gaskets or restore the coupling seal
Worn or broken piston rings or piston rings that have not been fitted properly	Replace the piston cylinder unit or just the piston rings

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.
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 using the recommended oil type (Selenia HI Scooter 4 Tech)

Engine tends to cut-off at full throttle

THE MOTOR TENDS TO STOP AT MAXIMUM THROTTLE

Possible Cause	Operation
Maximum jet clogged	Remove the carburettor, wash with solvent and dry with compressed air
Water or condensate in the carburettor tank	Remove the tank, wash with solvent and dry with compressed air
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.

Engine tends to cut-off at idle

THE ENGINE TENDS TO STOP AT IDLE SPEED

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

High fuel consumption

EXCESSIVE FUEL CONSUMPTION

Possible Cause	Operation
Air filter blocked or dirty. Starter inefficient	Clean according to the procedure Check: electric wiring, circuit continuity, mechanical sliding and power supply
Loose nozzles	Check the maximum and minimum nozzles are adequately fixed in their fittings
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
Slippage or irregular functioning	Check that there is no grease on the masses. Check that the faying surface between the clutch masses and the clutch bell is mainly in the middle and with equivalent specifications on the three masses. Check that the clutch bell is not scored or worn abnormally Never run the engine without the clutch bell

Insufficient braking

INEFFICIENT OR NOISY BRAKING

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

Brakes overheating

BRAKES OVERHEATING

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

Electrical system

Battery

BATTERY

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

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

Noisy suspension

NOISY SUSPENSION

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

Suspension oil leakage

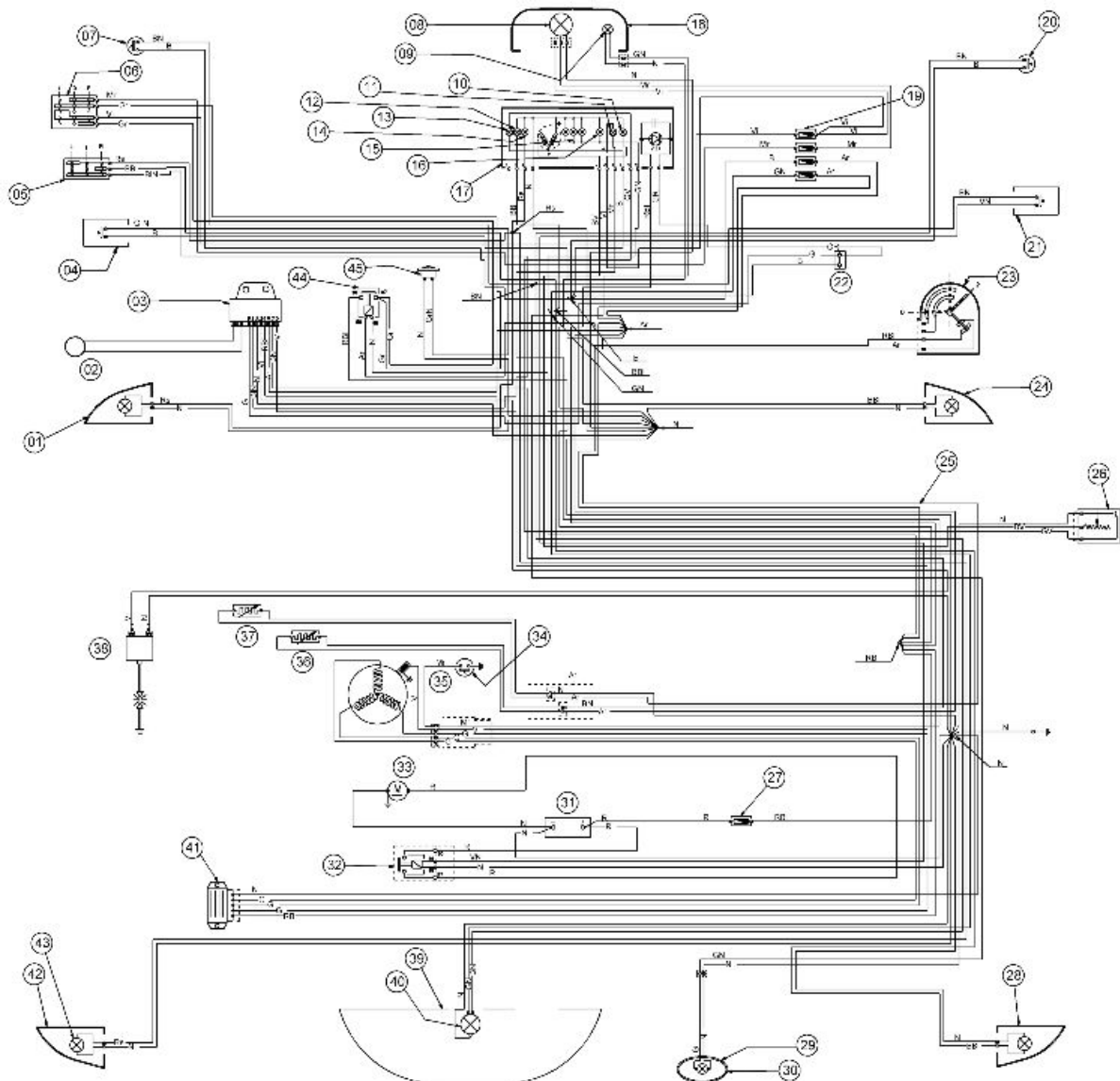
OIL LEAKAGE FROM SUSPENSION

Possible Cause	Operation
Oil leakage from suspension	Replace the rear shock absorber or the front fork cartridge.

INDEX OF TOPICS

ELECTRICAL SYSTEM

ELE SYS



Legend:

1. Front LHS turn signal lights (2 bulbs for each lamp)
2. Immobiliser antenna
3. Electronic ignition device with integrated turn signal and choke controller.
4. Horn button
5. Turn signal switch
6. Light switch
7. Stop light switch on rear brake
8. Dual-setting light bulb 12V - 55/60W
9. Headlamp light bulb
10. High beam warning light
11. Low oil pressure warning light
12. Turn signal warning light (RHS)

13. Low fuel warning light
14. Turn signal warning light (LHS)
15. Dashboard light bulbs
16. Headlamp warning light
17. Odometer with warning lights and level gauges (7 and 2 light bulbs respectively)
18. Headlight
19. Two fuse holders with four fuses (7.5 A)
20. Front brake stop light switch
21. Starter button
22. Immobiliser diagnostic port
23. Key-switch
24. Front RHS turn signal light
25. Cable harness
26. Fuel level sender
27. Fuse holder assembly
28. Rear RHS turn signal light
29. License plate light bulb
30. License plate lamp
31. Battery
32. Starter relay
33. Starter motor
34. Low oil pressure sensor
35. Pick-up
36. Automatic choke device
37. Carburettor heater
38. H.T. coil
39. Taillight assembly
40. Stop and taillight bulb
41. Voltage regulator
42. Rear LHS turn signal light
43. Two amber bulbs for turn signal
44. Relay
45. Horn

Wires colour coding:

B = White

Bl = Blue

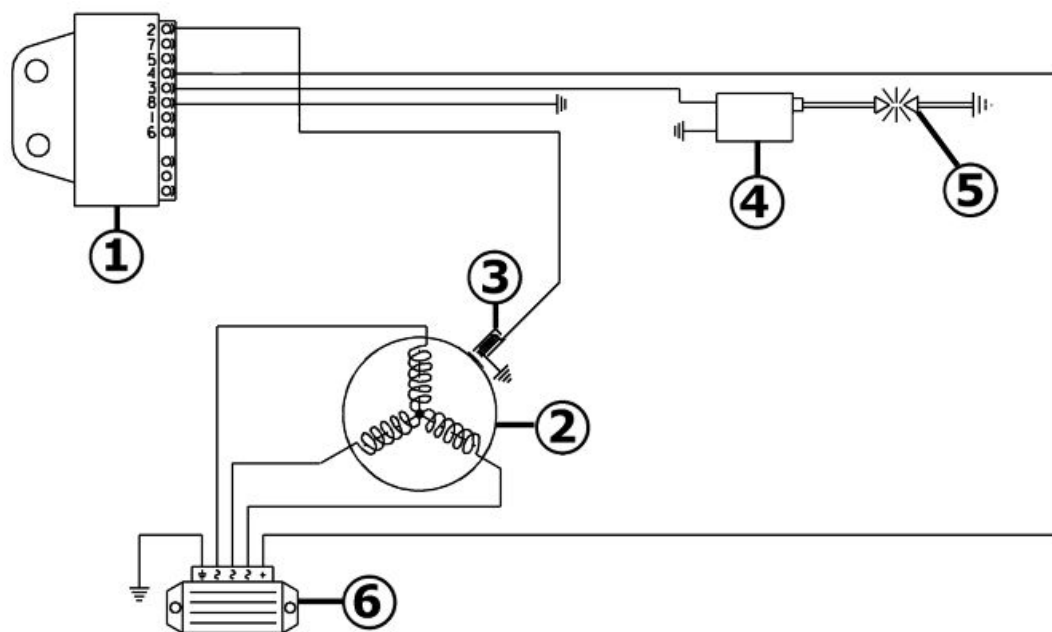
G = Yellow

Mr = Brown

- N = Black
- BV = White-Green
- GN = Yellow-Black
- Gr = Grey
- Rs = Pink
- R = Red
- Vi = Purple
- V = Green
- VN = Green-Black
- BN = White-Black
- BBI = White-Blue
- GV = Yellow-Green
- Ar = Orange
- Az = Light Blue
- GrBI = Grey-Blue
- GrN = Grey-Black
- RBI = Red-Blue
- GR = Yellow-Red
- BIN = Blue-Black

Conceptual diagrams

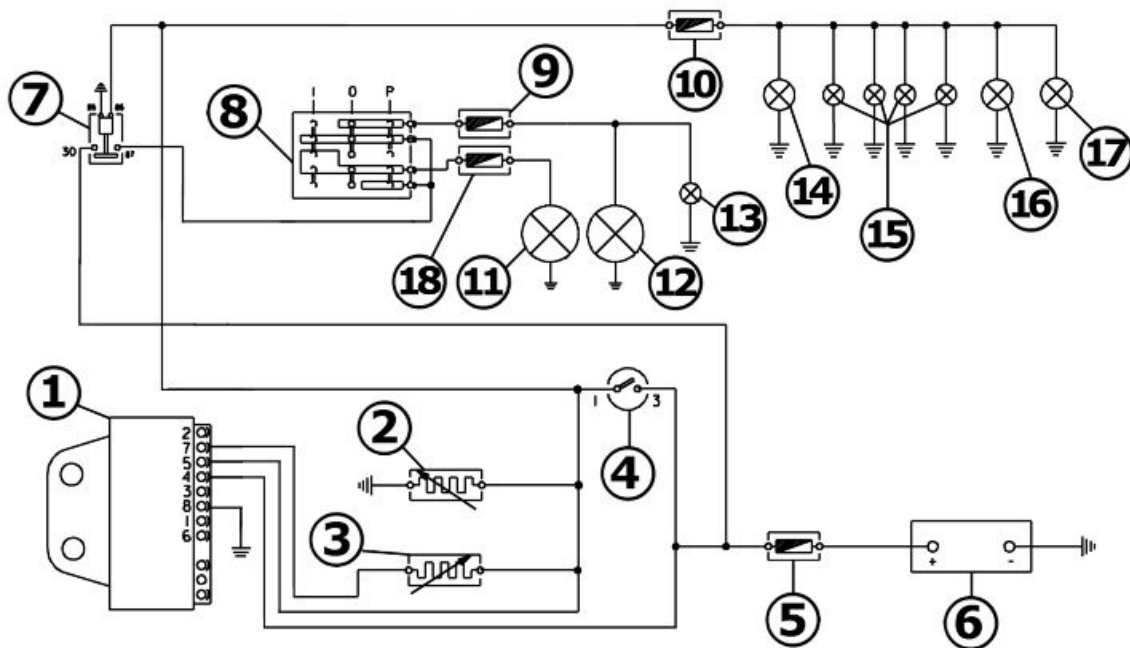
Ignition



IGNITION

Specification	Desc./Quantity
1	electronic control unit
2	Magneto flywheel
3	Pick - up
4	HV coil
5	Spark plug
6	Voltage regulator

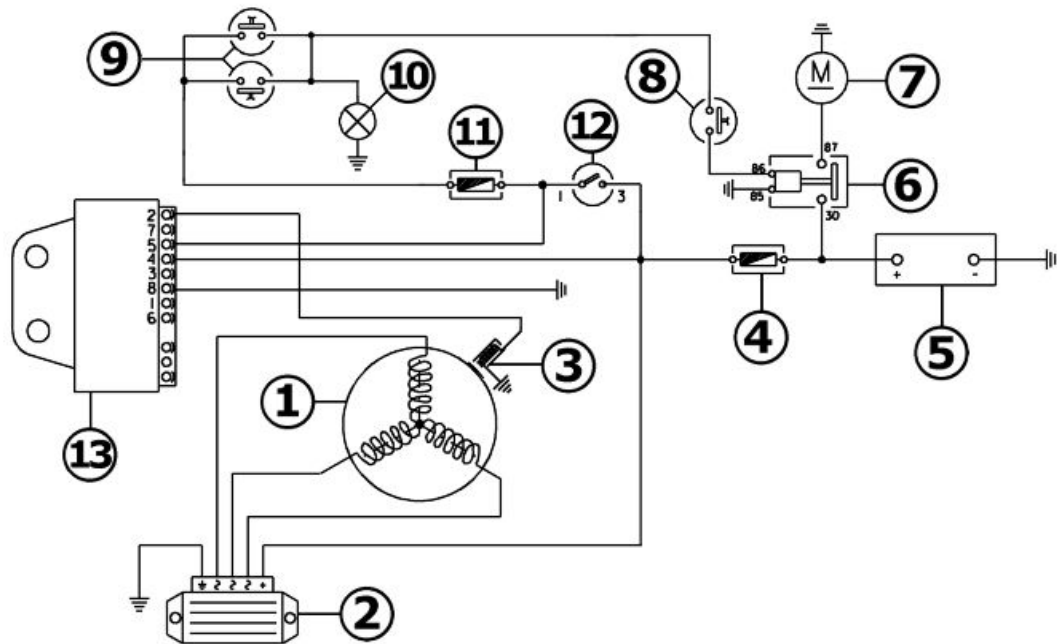
Headlights and automatic starter section



HEADLIGHTS AND AUTOMATIC STARTER SECTION

Specification	Desc./Quantity	
1	electronic control unit	
2	Carburettor heater	
3	Automatic starter	
4	Key switch	
5	Main fusible	15A
6	Battery (125)	12V - 9Ah
7	Battery (200)	12V - 12Ah
8	Headlamp relay	
9	Light switch	
10	High-beam fuse	7,5A
11	Low-beam and dashboard lights fuse	7,5A
12	Low-beam light bulb	12V - 55W
13	High-beam light bulb	12V-55W
14	High-beam lamp warning light	12V - 1.2W
15	Front side-light bulb	12V - 5W
16	Four dashboards illuminating bulbs	12V - 1,2W
17	Taillight bulb	12V - 5W
18	License plate bulb	12V - 5W
19	Low-beam fuse	7,5A

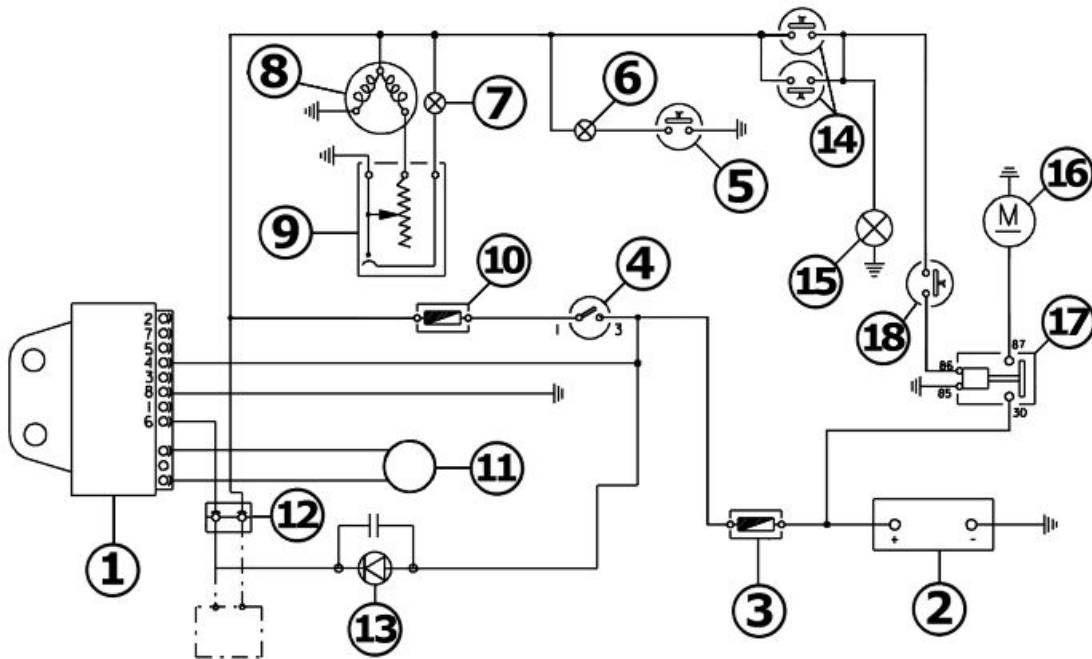
Battery recharge and starting



BATTERY RECHARGE AND START-UP SECTION

	Specification	Desc./Quantity
1	Magneto flywheel	
2	Voltage regulator	
3	Pick - up	
4	Main fusible	15A
5	Battery (125)	12V - 9Ah
6	Battery (200)	12V - 12Ah
7	Starter relay	
8	Starter motor	
9	Start up button	
10	Front and rear brake light button	
11	Brake light filament	12V-21W
12	Fuse	7.5 A
13	Key switch	
14	electronic control unit	

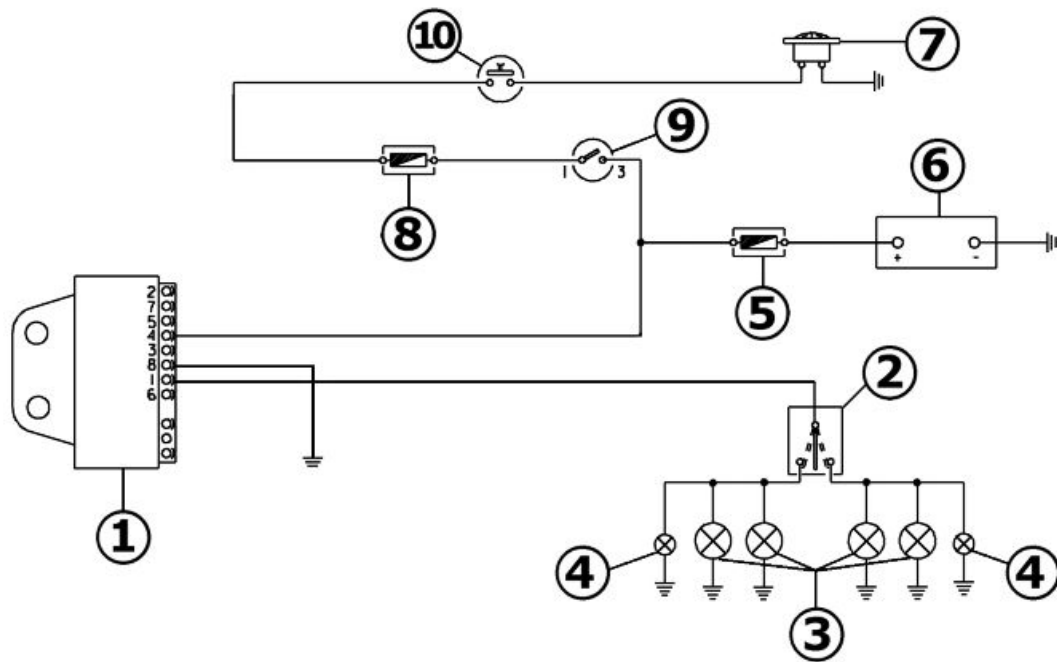
Level indicators and enable signals section



START PERMISSIVE BUTTONS AND LEVEL INDICATORS

	Specification	Desc./Quantity
1	electronic control unit	
2	Battery (200)	12V - 12Ah
3	Battery (125)	12V - 9Ah
4	Main fusible	15A
5	Key switch	
6	Engine oil pressure sensor	
7	Low oil pressure warning light	12V - 1,2W
8	Low fuel warning light	12V - 1.2W
9	Fuel gauge	
10	Fuel level sender	
11	Fuse	7.5 A
12	Immobilizer aerial	
13	Low engine oil pressure sensor	
14	Immobiliser LED	
15	Front and rear brake light button	
16	Taillight bulb	12V - 5W
17	Starter motor	
18	Starter relay	
19	Start up button	

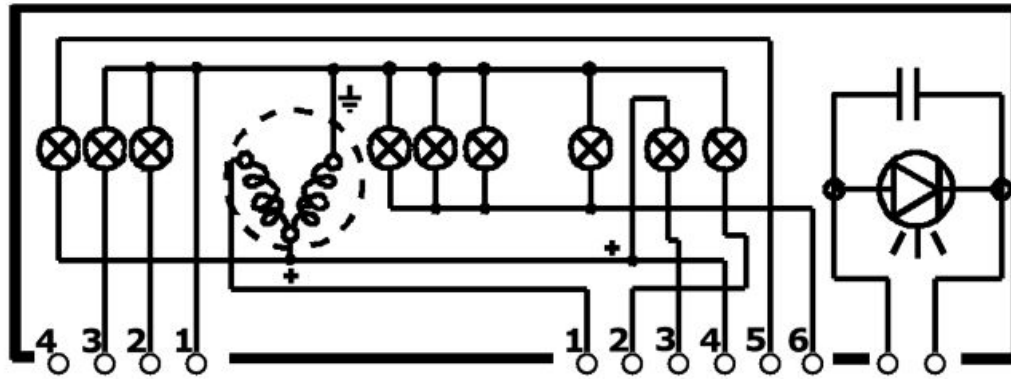
Turn signal lights



TURN INDICATORS AND HORN

	Specification	Desc./Quantity
1	electronic control unit	
2	Indicators switch	
3	4 Turn indicator bulbs	12V-10W
4	Turn signal warning light bulbs	12V - 2W
5	Main fusible	15A
6	Battery (125)	12V - 9Ah
7	Battery (200)	12V - 12Ah
8	Horn	
9	Fuse	7.5 A
10	Key switch	
11	Horn button	

Instruments and warning lights control board



4-PIN CONNECTOR

	Specification	Desc./Quantity
1	Ground lead (-)	
2	Left turn indicator	
3	Right turn indicator	
4	Contact not connected	

6-PIN CONNECTOR

	Specification	Desc./Quantity
1	Fuel gauge	
2	High-beam warning light	
3	Engine oil warning light	
4	Fuse	7.5 A
5	Low fuel warning light	12V - 1.2W
6	Instrument panel lighting and headlamp warning light	

Checks and inspections

Immobiliser

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

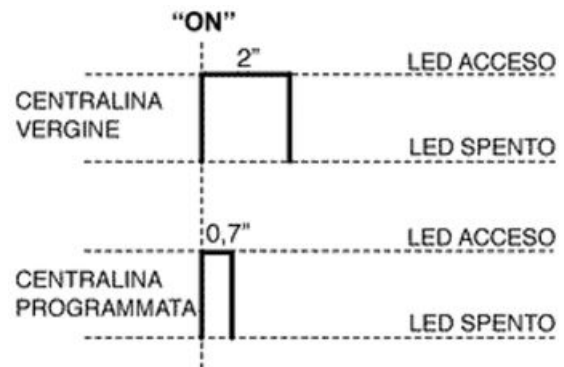
The ignition system consists of:

- electronic control unit
- immobilizer aerial
- master and service keys with built-in transponder
- H.V. coil
- diagnosis LED

The diagnosis LED also works as a blinking light to deter theft. This function is activated every time the key switch is set to «OFF», when the side stand is lowered or the engine emergency cut-off switch is set to «OFF». It remains activated for 48 hours in order not to affect the battery charge.

When the ignition switch is turned to «ON», the deterring blinker function is deactivated. Subsequently, a flash confirms the switching to «ON».

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

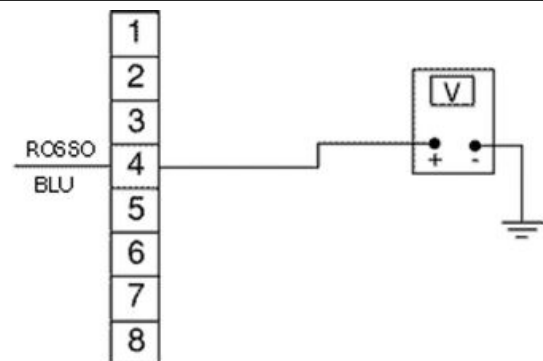


Whenever the LED is off and remains so, even when switching it to «ON», it is necessary to check if:

- the battery is charged
- 15A main fuse is working correctly.

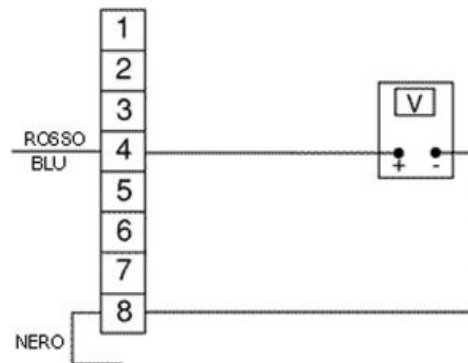
Connect the immobilizer tester to the diagnosis socket (see ET4 125 manual) located behind the front left fuse box flap.

If the serial LED remains off, check the electronic control unit supply as follows:

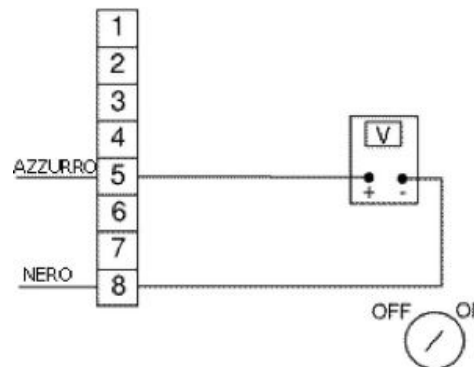


Detach the connector from the ECU and check the following:

- Presence of battery potential difference between terminal 4 (Red/Blue) and earth
- Presence of battery potential difference between terminals 4 (Red/Blue) and 8 (black), as shown in the figure.



- Presence of battery potential difference between terminals 5 and 8 with the key-switch onto «ON».
- If no anomalies are found, replace the electronic control unit.



Virgin circuit

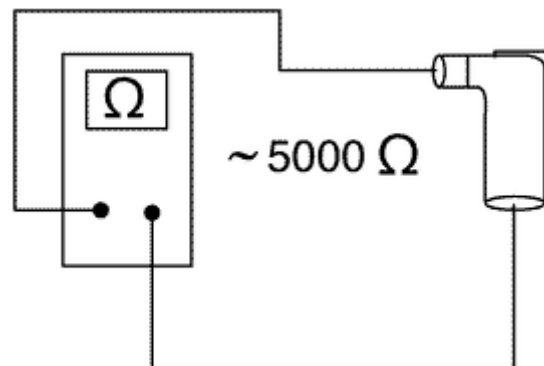
If the ignition system has not been programmed, the engine can be started but it will run limited to 2000 rpm. When trying to accelerate, some evident loss of power may be felt.

Program the system with the MASTER (Brown) and SERVICE (Blue) 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).
- Alternatively insert all the available black keys and turn each one 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 7 service keys (blue) 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 setting is lost, it is essential to carefully check the efficiency of the high voltage system:

Shielded cap resistance ~ 5000 Ω .

In any case, it is advisable to use resistive spark plugs as shown in the figure.

Diagnostic codes

The flash indicating the switching to "ON" (0.7-sec flash) 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-sec flashes.

After the failure code indication, a steadily on LED signals that ignition is disabled; see the table:

2-FLASH CODE

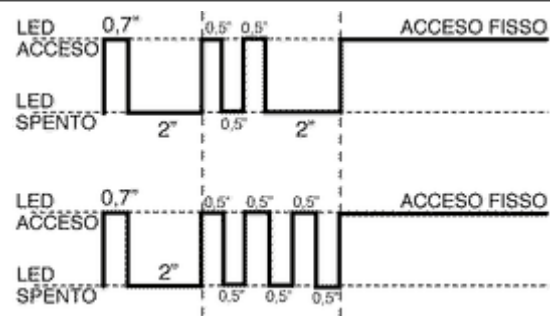
Example with programmed electronic control unit, no transponder and/or aerial malfunction

Ignition disabled-Vehicle immobilised

3-FLASH CODE

Example with programmed electronic control unit, aerial working properly and unknown transponder code.

Ignition disabled-Vehicle immobilised



Diagnostic code - 2 flashes

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

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

If it does not work, replace the aerial.

If no faults are found, 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.

Specific tooling

020331Y Digital multimeter

Electric characteristic

Resistance value

~ 7 ÷ 9 Ohm

Diagnostic code - 3 flashes

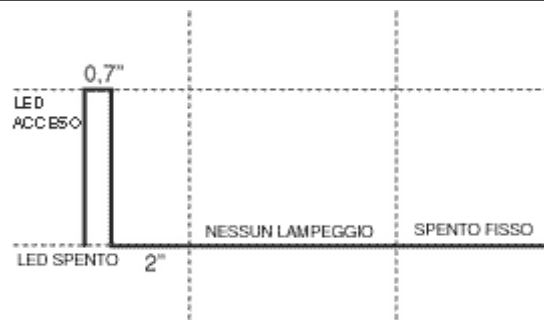
If the 3-flash code is detected, check if the failure occurs when the MASTER key is inserted into the key switch.

- If the failure disappears when the MASTER key is used, proceed with coding a new service key (Blue).
- 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-sec flash is detected (see diagram).

In this case, the engine can be started.

Example with programmed control unit, transponder, programmed key and working aerial. **The ignition is enabled (regular use conditions)**



Ignition circuit

All the control operations of the system that entail disconnecting cables (to check connections and the devices making up the ignition circuit) **must be done with the engine off**: if this is not done, the controls might be irretrievably damaged.

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

The Pick-Up is connected to the control unit by a single cable; therefore, 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

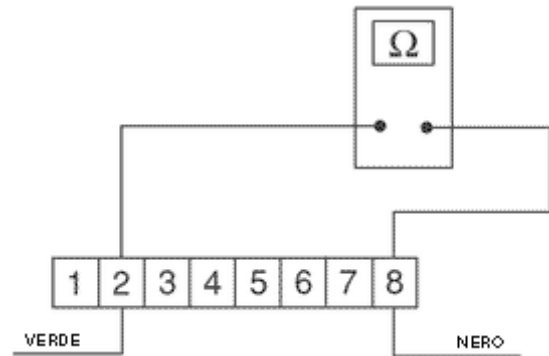
When noticing no spark plug proceed as follows:

- Pick-Up inspection.

Detach the ECU connector and check for continuity between terminals 2 (Green) and 8 (Black).

The inspection must include the pick-up and its power cable.

If an open circuit is found, repeat the inspection between the flywheel connector and earth. If unacceptable values are found, proceed by replacing the pick-up, otherwise repair the cable.



Electric characteristic

Pick-up resistance value

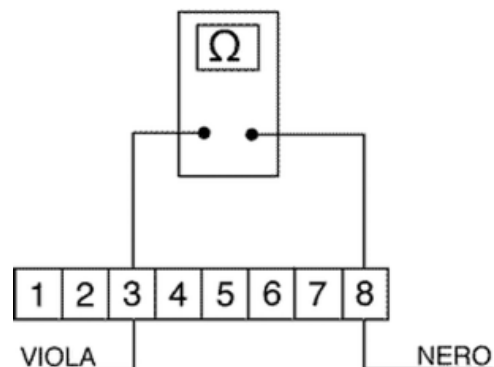
Pick-up resistance value: 105 ÷ 124 Ohm

- H.T. coil primary circuit inspection

Detach the connector from the ECU and check for continuity between terminals 3 (purple) and 8 (black) (see figure).

If unacceptable values are found, repeat the inspection directly from the positive and negative terminals of the H.T. coil primary circuit.

If the values are within the prescribed limit, proceed by repairing the wiring or reattaching all wirings, otherwise replace the H.T. coil.



Electric characteristic

High voltage coil primary resistance value

High voltage coil primary resistance value: 0.4 ÷ 0.5 Ohm

- HV coil secondary check

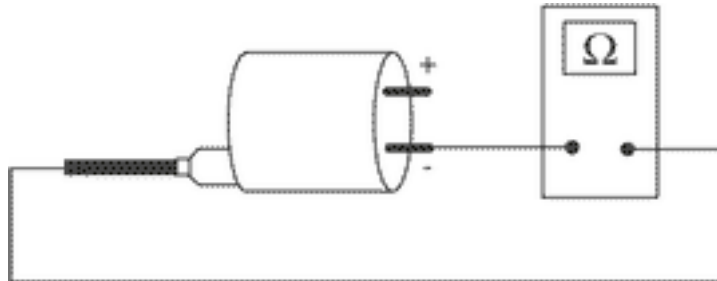
Disconnect the spark plug cap from the HV cable and measure the resistance between the HV cable terminal and the HV coil negative terminal (see figure).

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****High voltage coil secondary resistance value**

High voltage coil secondary resistance value: $\sim 3000 \pm 300$ Ohm

**- Pick-Up**

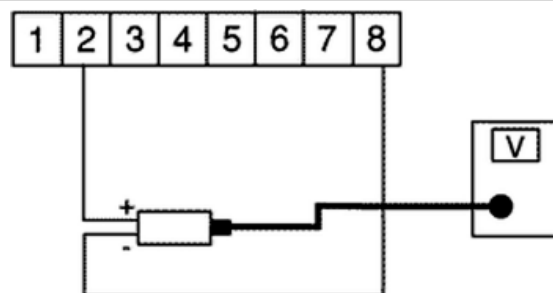
Detach the ECU connector and connect the positive terminal to connector no. 2 and the negative terminal to connector no. 8 (see figure).

Crank the engine using the starter motor and check the tension produced by the pick-up.

If unacceptable values are found, replace the Pick-Up.

N.B.

THE MULTIMETER MUST BE SELECTED TO DETECT CONTINUOUS VOLTAGE.

**Electric characteristic****Pick-Up voltage value**

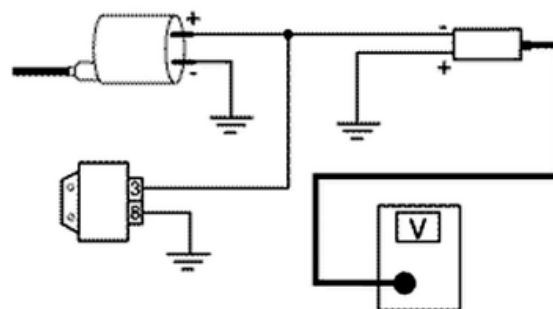
Pick-Up voltage value: > 2 Volt

- H.V. coil

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

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

THE POSITIVE TERMINAL OF THE HV COIL PRIMARY IS BLACK.

**Electric characteristic****High voltage coil voltage value**

High voltage coil voltage 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

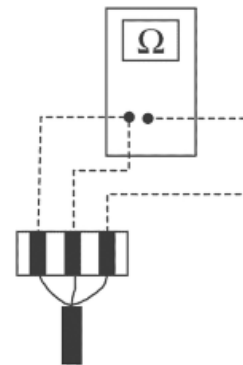
Stator check

Disconnect the connector from the voltage regulator and check there is continuity between any yellow cable and the other two cables.

Electric characteristic

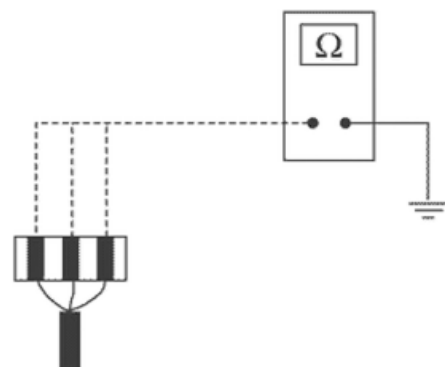
Ohm value:

0.7 ÷ 0.9 Ohm



Also check that all yellow cables are insulated from the ground connection.

If non-conforming values are detected, repeat the checks directly to the stator. In case of further repetitions of incorrect values replace the stator or repair the wiring.



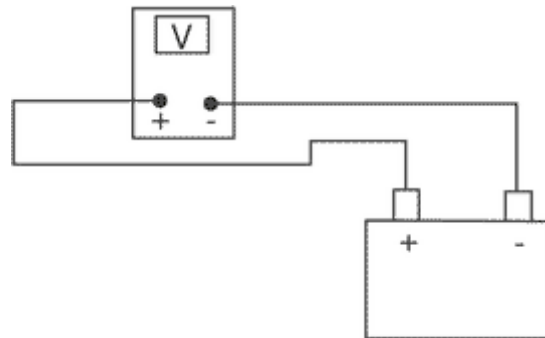
Voltage regulator check

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.

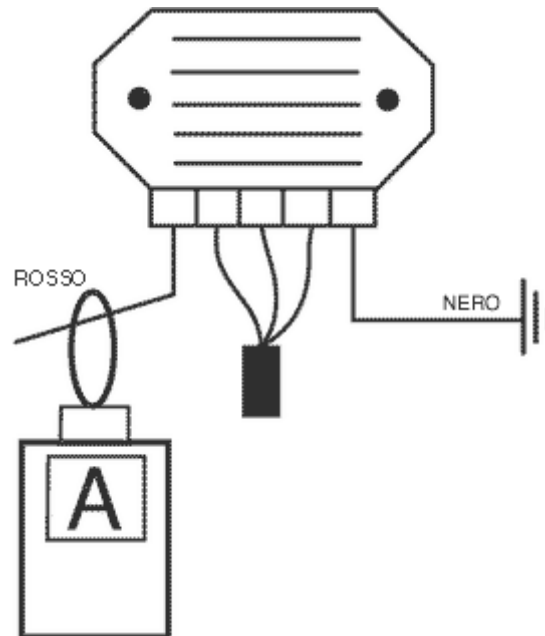
In case of voltage values lower than 14 Volt, check the stator and the corresponding cable harness.



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.

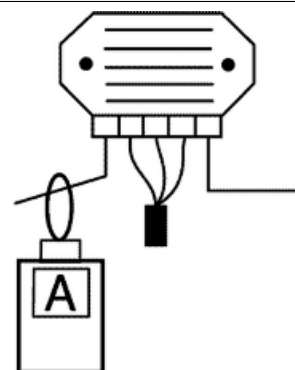
In case the generated current value is lower than 8A, repeat the test using a new regulator and/stator alternatively.



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).

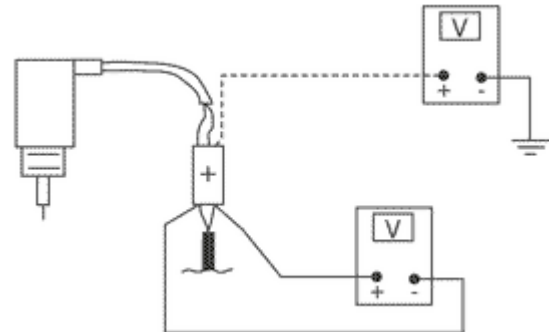
If no voltage is detected, connect the multimeter negative terminal to the ground lead and the positive terminal to the automatic starter orange cable;



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.

If battery potential is found, repeat the inspection from the connector to the ECU.

After detaching the choke device, start the engine and, while at idle, check for tension connecting the positive terminal of the multimeter to terminal 5 (Orange) and the negative to terminal 7 (White/Black) (see figure).



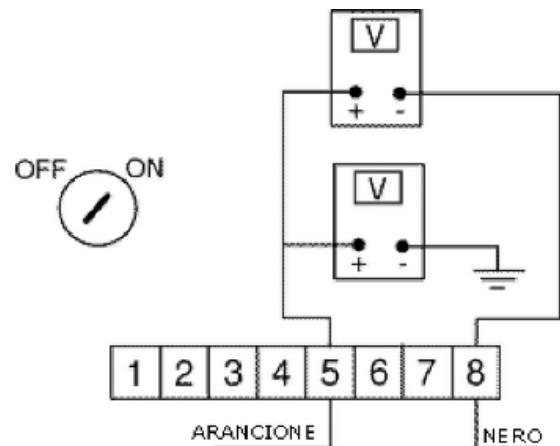
If no tension is found, replace the ECU; otherwise check the wiring between the choke device and the ECU.

Turn signals system check

- If the turn signal lights are faulty, proceed as follows:

- Detach the ECU connector and check for battery tension between terminal 5 (Orange) and earth, with the key-switch onto «ON».

- Check the same is present between terminals 5 (Orange) and 8 (Black).

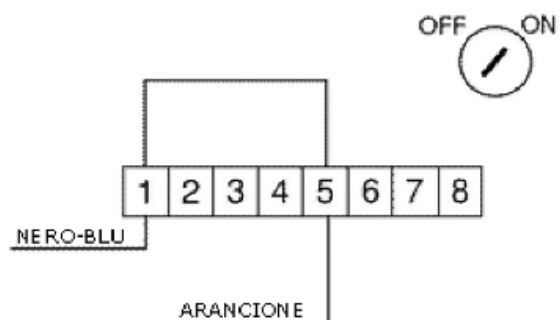


If no tension is measured, check the wiring, otherwise proceed as follows:

- Jumper terminals 1 (Black/Blue) and 5 (Orange), see figure, and alternately operate the turn signal switch towards left and right with the key-switch on to «ON» and check the bulbs go off.

If this happens, replace the ECU, as faulty.

If this does not happen, check the wiring between the ECU and the turn signal switch, hence repeat the test.



Sealed battery

If the vehicle is provided with a sealed battery, the only maintenance required is the check of its charge and recharging, if necessary.

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

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

INSTRUCTIONS FOR THE RENEWAL RECHARGE AFTER OPEN-CIRCUIT STORAGE

1) Voltage check up

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

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

2) Constant voltage battery charge mode

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

- Charge time:

10 to 12 h recommended

Minimum 6 h

Maximum 24 h

3) Constant current battery charge mode

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

Dry-charge battery

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, flush abundantly with water for about 15 minutes and seek immediate medical attention.

In the event of accidental ingestion of the fluid, immediately drink large quantities of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Seek immediate medical attention

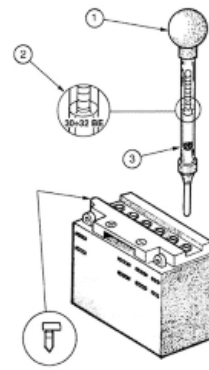
Batteries produce explosive gases; keep clear of free flames, sparks or cigarettes; ventilate the area when recharging the battery indoors.

Always protect your eyes when working close to batteries.

Keep out of the reach of children.

Commissioning dry-charged batteries :

- 1) - 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 Be at a minimum temperature of 15°C until the upper level is reached.
- 2) - Leave to rest for at least 2 hours; then, restore the level with sulphuric acid.
- 3) - Within the following 24 hours, recharge using the specific battery charger (single) or (multiple) at a density of about 1/10 of the battery nominal capacity until fully charged; check that the acid density is about 27, corresponding to 31 Be, and that these values are stabilised.
- 4) - Once the charge is over, level the acid (by adding **distilled water**). Close and clean carefully.
- 5) Once the above operations have been performed, install the battery on the vehicle ensuring that it is wired up properly.



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

WARNING

- ONCE THE BATTERY HAS BEEN INSTALLED IN THE VEHICLE IT IS NECESSARY TO REPLACE THE SHORT TUBE (WITH CLOSED END) NEAR THE + POSITIVE TERMINAL WITH THE CORRESPONDING LONG TUBE (WITH OPEN END), THAT YOU FIND FITTED TO THE VEHICLE, TO ENSURE THAT THE GASES THAT FORM CAN ESCAPE PROPERLY.

Specific tooling

020333Y Single battery charger

020334Y Multiple battery charger

Battery maintenance

The battery is an electrical device which requires careful monitoring and careful maintenance. The maintenance rules are:

1) Electrolyte level check

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 electrical system: the battery works overcharged and is subject to quick wear.

2) Load status check

After restoring the electrolyte level, check its density using an appropriate densitometer (see the figure). 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.

3) Recharging the battery

Remove the battery from the vehicle removing the negative clamp first.

Regular bench charging must be carried out with the specific battery charger, (single) or (multiple), setting the battery charger selector to the type of battery to be recharged. Connections to the power supply source must be implemented by connecting the corresponding poles (+ to+ and - to -).

4) Battery cleaning

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

WARNING

BEFORE RECHARGING THE BATTERY, REMOVE THE PLUGS OF EACH CELL. KEEP SPARKS AND NAKED FLAMES AWAY FROM THE BATTERY WHILE RECHARGING.

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.

CAUTION

ORDINARY AND DRINKING WATER CONTAINS MINERAL SALTS THAT ARE HARMFUL FOR THE BATTERY. FOR THIS REASON, YOU MUST ONLY USE DISTILLED WATER.

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.

Specific tooling

020333Y Single battery charger

020334Y Multiple battery charger

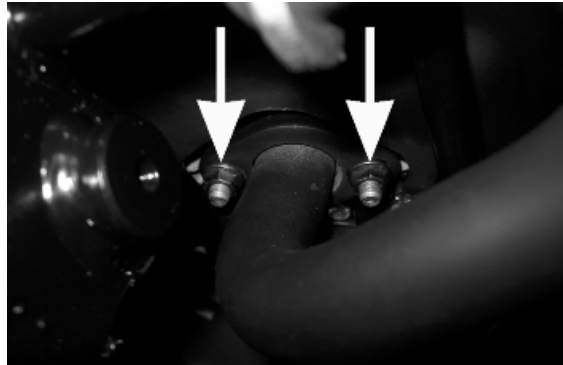
INDEX OF TOPICS

ENGINE FROM VEHICLE

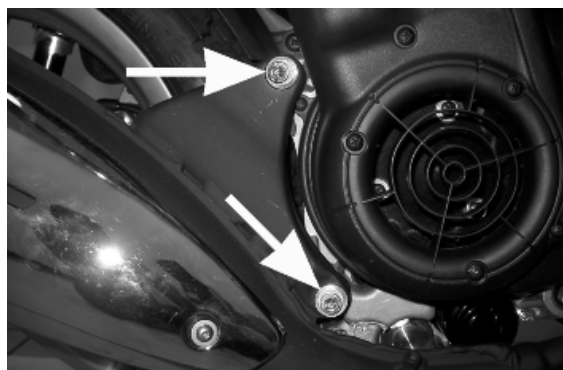
ENG VE

Exhaust assy. Removal

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

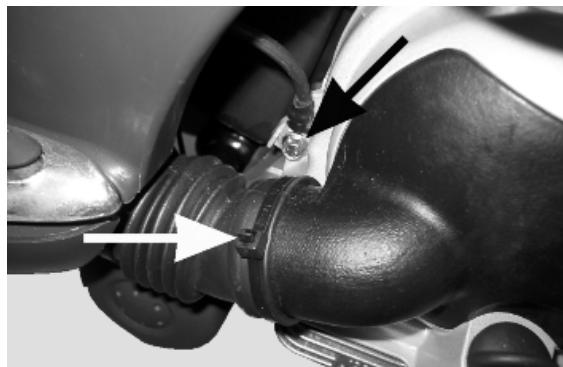


- Undo the 2 screws fixing the muffler to the housing; then remove the whole muffler paying attention to the interference between its supporting bracket and the cooling cover.

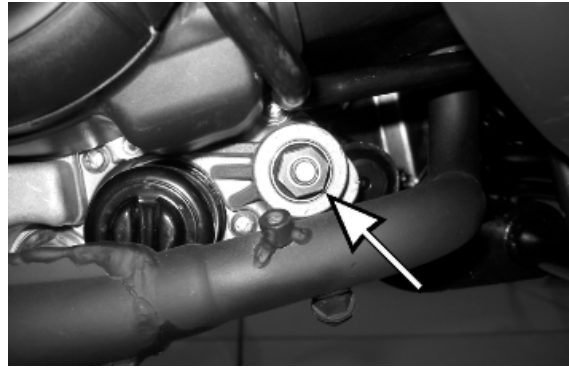


Removal of the engine from the vehicle

- Remove the spark plug access cover.
- Remove the helmet compartment.
- Remove the entire muffler assembly.
- Disconnect the spark plug cap.
- Remove the 3 screws on the transmission cover fixing the rear brake transmission.
- Cut the fixing clamp and disconnect the transmission air pipe. Disconnect the engine ground lead after having unscrewed the specific screw on the cover.



- Detach the electrical connections from starter motor, choke device, carburettor heater and flywheel magneto.
- Detach the throttle cable and the fuel hose from the carburettor.
- Detach the vacuum tube from the fuel tap on the intake manifold.
- Remove the rear shock absorber by loosening the top and bottom fixings.
- Loosen the engine-swingarm fixing nut from the right hand side of the vehicle and then remove the bolt from the left.



WARNING

BE VERY CAREFUL WHEN HANDLING FUEL.

CAUTION

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

See also

[Helmet bay](#)

[Exhaust assy. Removal](#)

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

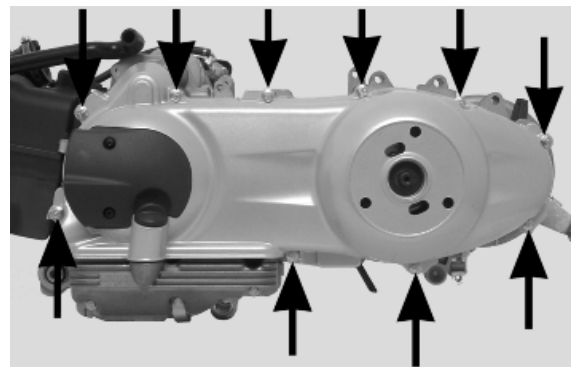
- To remove the transmission cover it is necessary to remove the rear plastic cover first by inserting a screwdriver in the corresponding slotted holes.

Using the clutch bell lock wrench, remove the driven pulley axle locking nut and recover the washer.

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

- Remove the 10 screws and the earth cable fastened under one of them.

- Remove the transmission cover. If this operation is performed directly on the vehicle, it is necessary to remove the cooling air coupling and the three air filter housing retainers.



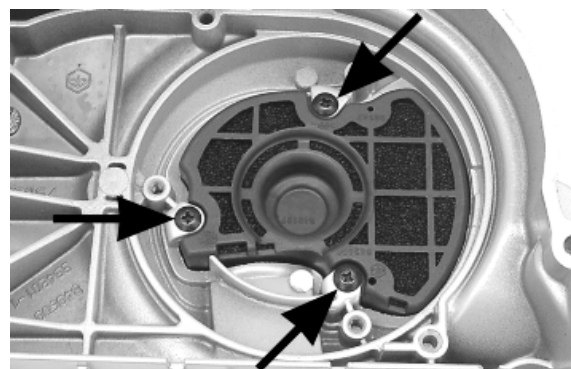
Specific tooling

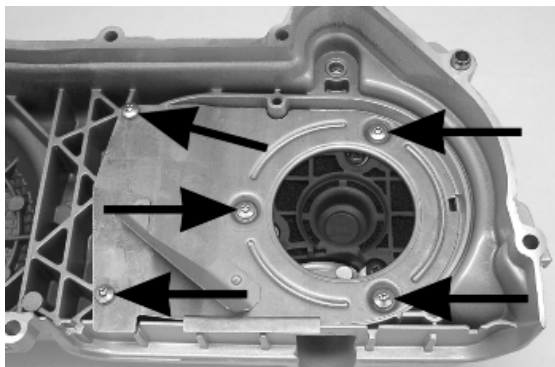
020423Y Driven pulley lock wrench

Air duct

- Unscrew the Torx screws fixing the air manifold bulkhead and remove the bulkhead.

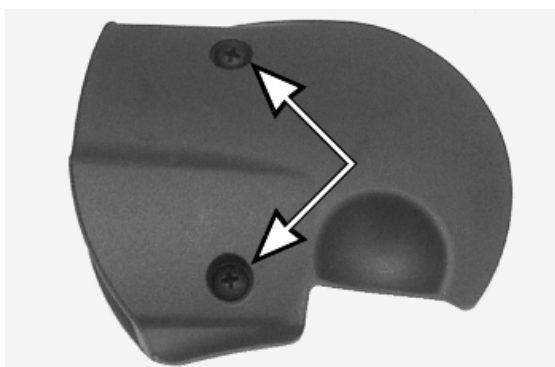
- Remove the 3 screws, then take out the manifold as well as the filter.





Air duct filter

- Unscrew the 2 fixing screws and slide off the filter.
- Clean with water and mild soap.



Removing the driven pulley shaft bearing

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

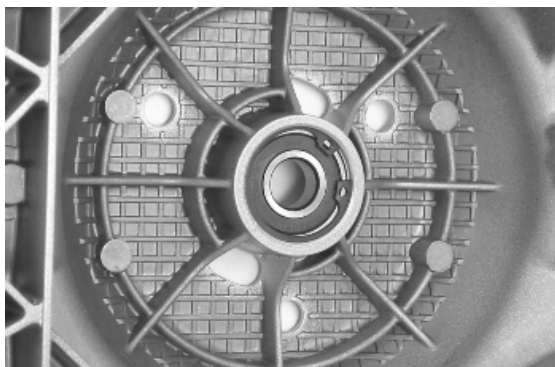
CAUTION

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

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm



Refitting the driven pulley shaft bearing

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

N.B.

ALWAYS REPLACE THE BEARING WITH A NEW ONE UPON REFITTING.

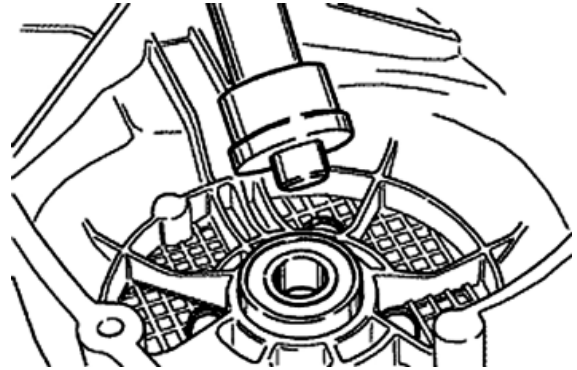
Specific tooling

020151Y Air heater

020376Y Adaptor handle

020357Y 32x35-mm Adaptor

020412Y 15 mm guide

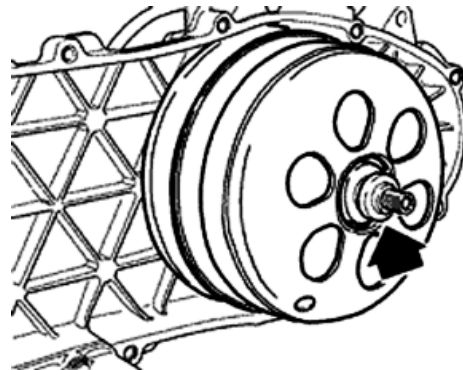


Removing the driven pulley

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

N.B.

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



Inspecting the clutch drum

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

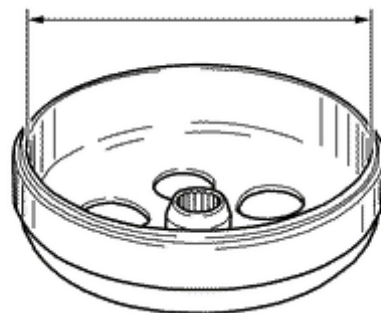
Characteristic

Max. value clutch bell

Max. value: \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 (inside diameter: 15 and 17 mm).
- Lock with the original spacer and nut.
- Place the bell/shaft unit on the support to check the crankshaft alignment.



- Using a feeler 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

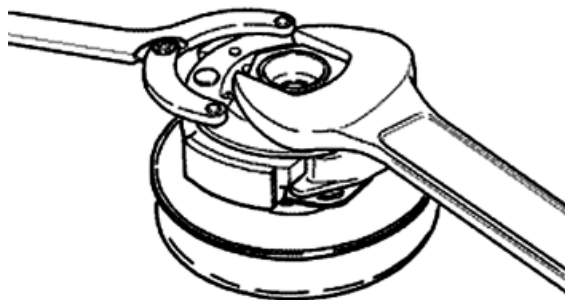
- By means of a calliper spanner, block the clutch assembly rotation.
- With a 46 mm spanner remove the clutch lock nut.
- Remove the clutch and the spring.

CAUTION

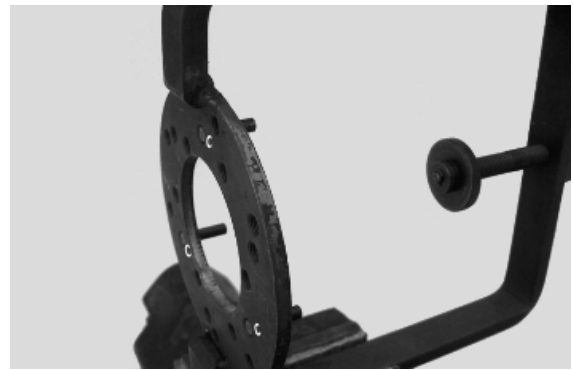
UPON REMOVING THE CLUTCH ASSEMBLY LOCK NUT, PAY ATTENTION TO KEEP THE ASSEMBLY IN ITS SEAT SO THAT IT DOES NOT COME OUT DUE TO THE SPRING THRUST

Specific tooling

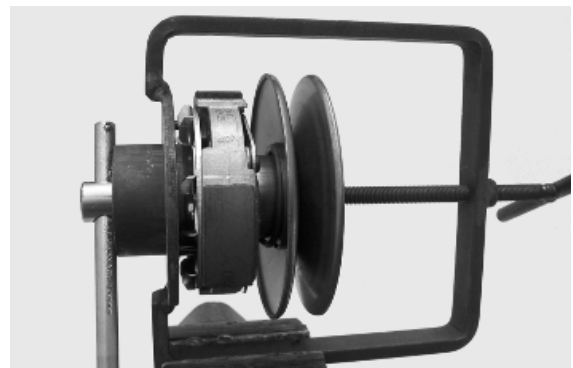
020565Y Flywheel lock calliper spanner



- Prepare the locking tool for the driven pulley with the pins half-screwed in the tool set to «C».



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



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

CAUTION

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

Specific tooling

020444Y Tool for fitting/ removing the driven pulley clutch

020444Y009 wrench 46 x 55

Inspecting the clutch

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

N.B.

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

CAUTION

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



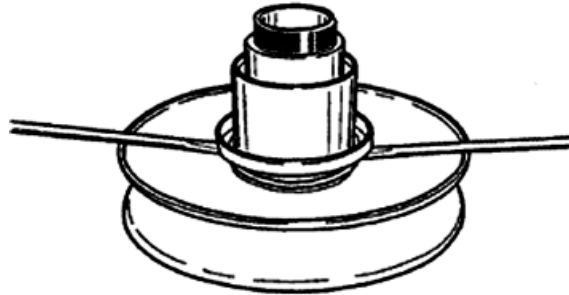
Characteristic

Check minimum thickness

1 mm

Pin retaining collar

- Remove the collar with the aid of 2 screwdrivers.
- Remove the 3 guide pins and the movable half-pulley.



Removing the driven half-pulley bearing

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

N.B.

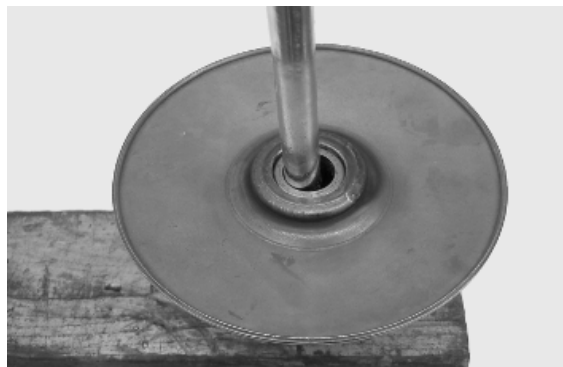
REST THE HALF-PULLEY ON A WOOD SURFACE TO AVOID DAMAGING THE THREADED RINGLET OF THE DRIVEN PULLEY UPON REMOVING IT.

Specific tooling

020375Y Adaptor 28 x 30 mm

020376Y Adaptor handle

020439Y 17 mm guide



Inspecting the driven fixed half-pulley

- Measure the external diameter of the pulley bushing.

Characteristic**Minimum diameter permitted**

Ø 40.96 mm

Standard diameter

Ø 40.965 mm



Inspecting the driven sliding half-pulley

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

Characteristic**Minimum admissible diameter**

Ø 41.08 mm

Standard diameter

Ø 41.035 mm



Refitting the driven half-pulley bearing

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

N.B.

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

Specific tooling

020424Y Driven pulley roller casing fitting punch



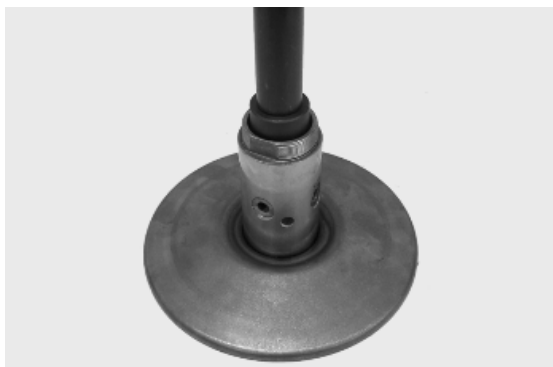
- To assemble the new ball bearing insert it completely down in its housing with the specific punch and finally assemble the Seeger ring.

Specific tooling

020375Y Adaptor 28 x 30 mm

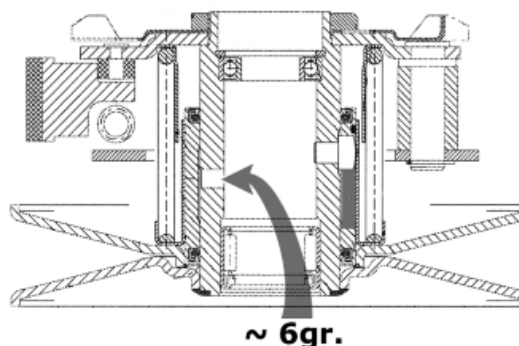
020376Y Adaptor handle

020439Y 17 mm guide



Refitting the driven pulley

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



Specific tooling

020263Y Driven pulley assembly sheath

Recommended products

AGIP GREASE SM 2 Grease for the tone wheel revolving ring

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

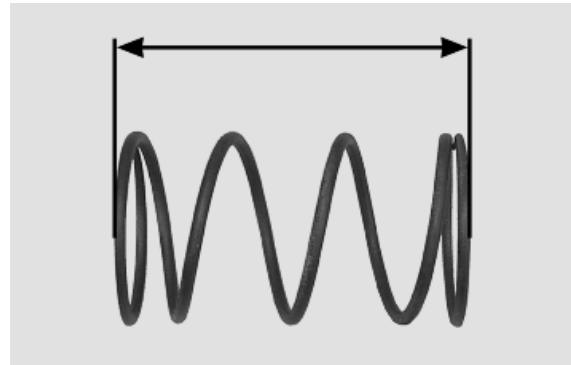
Inspecting the clutch spring

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

Characteristic

Standard length:

106 mm



Refitting the clutch

Version 200

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

N.B.

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

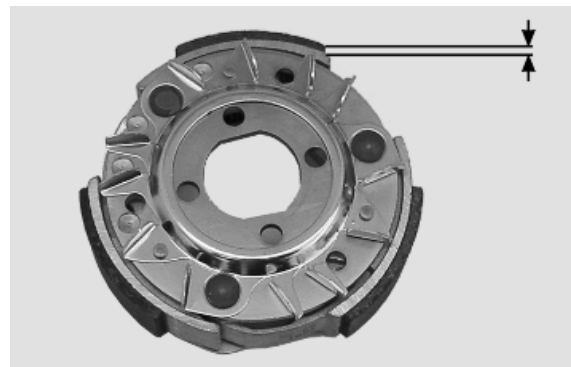
CAUTION

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

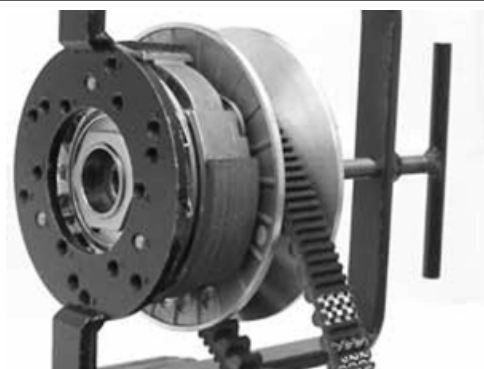
Characteristic

Minimum thickness permitted:

1 mm



- Support the driven pulley spring compressor appropriate tool with the control screw in vertical axis.
- Arrange the tool with the medium length pins screwed in position "C" on the inside.
- Introduce the adapter ring 11 with the chamfering facing upwards.
- Insert the clutch on the adapter ring.
- Lubricate the end of the spring that abuts against the servo-system closing collar.
- Insert the spring with its plastic holder in contact with the clutch.



- Insert the driving belt into the pulley unit according to their direction of rotation.
- Insert the pulley unit with the belt into the tool.
- Slightly preload the spring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Place the tool in the clamp with the control screw on the horizontal axis.
- Fully preload the spring.
- Apply the clutch fixing nut and tighten it to the prescribed torque using the special 46x55 wrench.
- Loosen the tool clamp and insert the belt according to its direction of rotation.
- Lock the driven pulley again using the specific tool.
- Preload the clutch return spring with a traction/rotation combined action and place the belt in the smaller diameter rolling position.
- Remove the driven pulley /belt unit from the tool.

N.B.

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

N.B.

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

Specific tooling

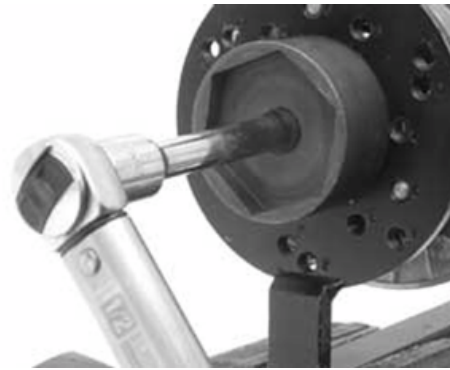
020444Y Tool for fitting/ removing the driven pulley clutch

020444Y011 adapter ring

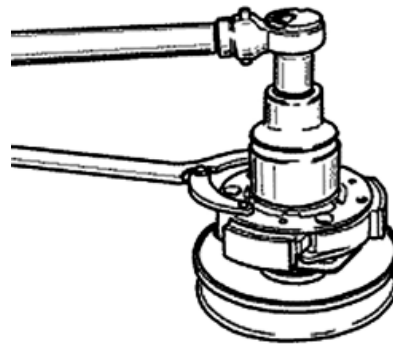
020444Y009 wrench 46 x 55

Locking torques (N*m)

Nut locking clutch unit on pulley 55 ÷ 60 Nm



- Refit the clutch assembly following the fitting operation but in reverse order and using the calliper spanner. Lock the nut to the specified torque.



CAUTION

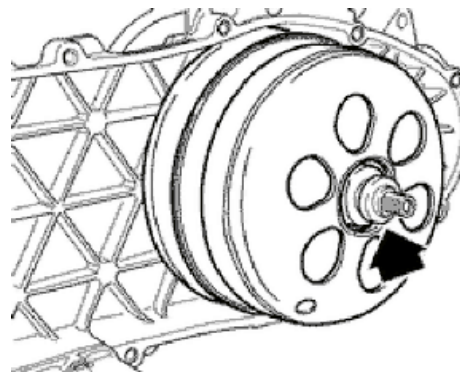
USE A BOX-SPANNER WITH SMALL CHAMFER SO AS NOT TO DAMAGE THE CLUTCH NUT. UPON FITTING THE CLUTCH ASSEMBLY LOCK NUT, PAY ATTENTION TO KEEP THE ASSEMBLY IN ITS SEAT UNTIL SOME NUT THREADS HOLD IT IN PLACE

Locking torques (N*m)

Locking torque 55 ÷ 60 Nm

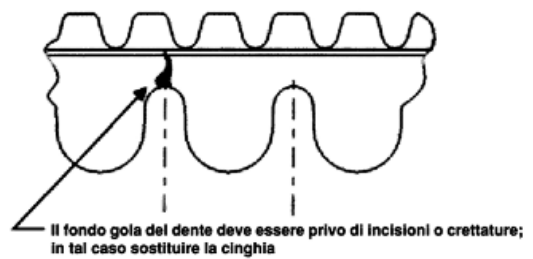
Refitting the driven pulley

- Reassemble the clutch bell and spacer.



Drive-belt

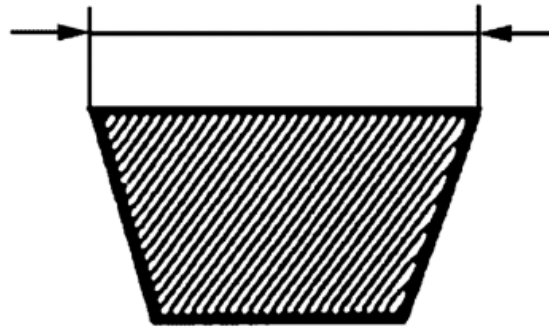
During the wear checks foreseen in the scheduled maintenance services at 6,000 km; 18,000 km; etc., check that the rim bottom of the toothing does not show signs of incisions or cracking (see figure): The rim bottom of the tooth must not have incisions or cracking; if it does, change the belt.



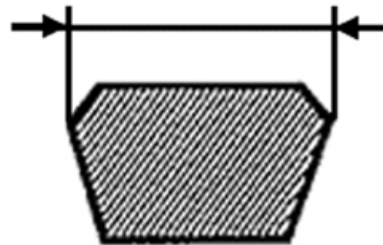
- Check that the driving belt is not damaged.
- Check the width of the belt.

VERSION 125

Specification	Desc./Quantity
Minimum width	21.5 mm
Standard width	22.5 ± 0.2 mm

**VERSION 200**

Specification	Desc./Quantity
Minimum width	21±0.2 mm
Standard width	22±0.2 mm



Removing the driving pulley

Driving pulley removal

- With the appropriate tool placed into the internal slots, remove the nut with the built-in Belleville washer.

Appropriate tools:

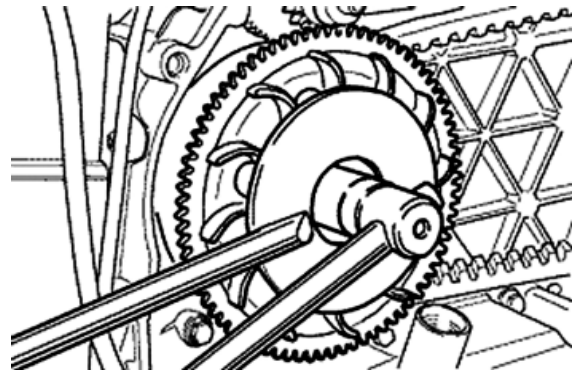
Specific tooling

020442Y Pulley lock wrench

- Remove the entire start-up crown unit with the torque limiter.
- Remove the fixed driving half-pulley together with the O-ring and the steel washer touching the bushing.



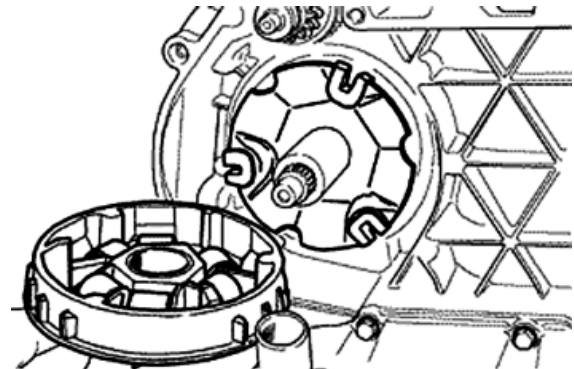
- Lock the driving pulley with the specific tool as shown in the figure.
- Disassemble the central nut and the Belleville washer, remove the drive and the 2 washers.
- Remove the stationary half pulley and the steel washer.



Specific tooling

020368Y driving pulley lock wrench

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



Inspecting the rollers case

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

N.B.

DO NOT LUBRICATE OR CLEAN THE BUSHING.

BUSHING ROLLER CONTAINER

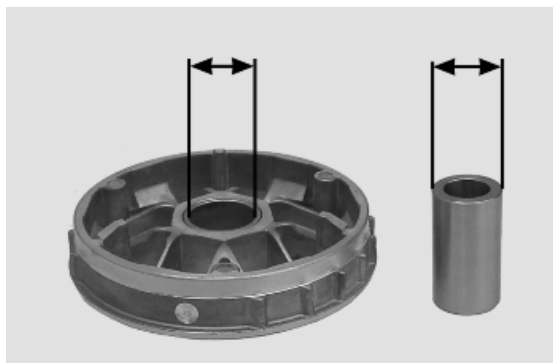
Specification	Desc./Quantity
Maximum allowable diameter	Ø 26.121 mm
Standard diameter	Ø 26+0 +0.021 mm

BUSH SLIDE PULLEY

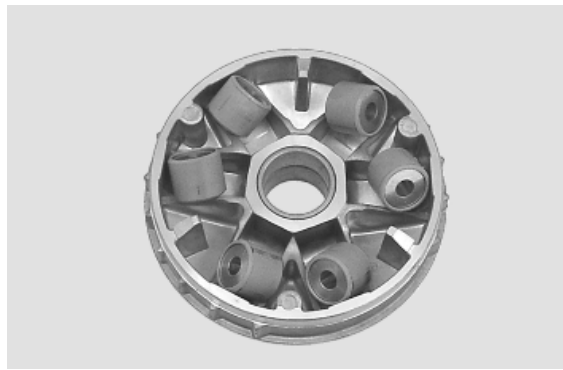
Specification	Desc./Quantity
Minimum diameter permitted	Ø 25.950 mm
Standard diameter	Ø 26-0.020 -0.041 mm

VARIABLE SPEED ROLLERS

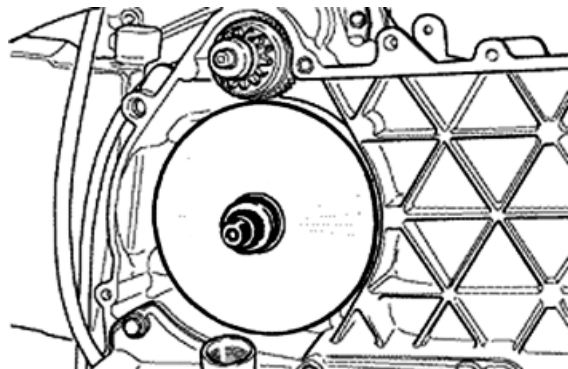
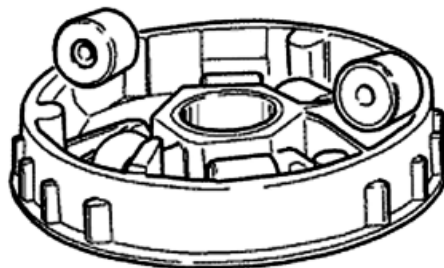
Specification	Desc./Quantity
Minimum diameter permitted	Ø 18.5 mm
Standard diameter	Ø 26±0.1 mm



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



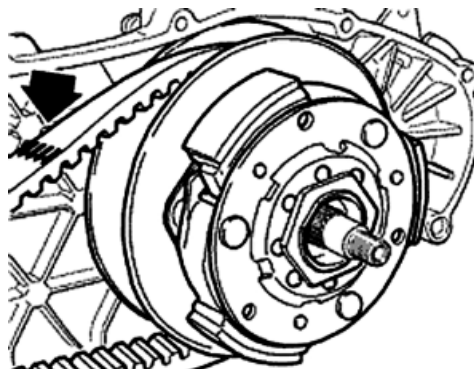
- Pre-assemble the movable half-pulley with the roller contrast plate by placing the rollers as shown in the figure, that is, during insertion, the closed side should be on the left side of the pulley thrust.
- Mount the complete bushing unit on the driving shaft.



- Open the rear pulley and insert the belt observing the correct direction of rotation.

WARNING

IT IS MOST IMPORTANT THAT WHEN FITTING THE FRONT PULLEY UNIT, THE BELT IS FREE INSIDE SO AS TO AVOID A WRONG TIGHTENING OF THE DRIVING HALF-PULLEY.



Refitting the driving pulley

- Correctly reassemble the previously removed Bendix back to its position.
- Fit the steel shim washer in contact with the bushing and the fixed driving pulley together with the O-ring on the outside of the fan blades.
- Fit the entire start-up crown assembly with the torque limiter.
- Fit the torque limiter on the crankshaft so as to guarantee the references on the start-up crown and the fixed driving half-pulley are aligned. In case this is not possible, choose the closest position to the references.
- Failure to do this may affect the cooling fan performance



The lock wrench operates on the start-up crown.

- If the torque limiter is worn, the failure can be detected when locking the nut on the crankshaft.
- The torque limiter cannot be serviced.
- In case of failures, replace the start-up crown and the limiter.



Specific tooling

020442Y Pulley lock wrench

Recommended products

Loctite "Super Rapido" Loctite "Super Rapido" 243

Apply Loctite "Super Rapido" 243 on the threads and screw the nut with washer to the prescribed torque.

Locking torques (N*m)

Drive pulley nut 75 ÷ 83

- Reassemble the parts of the unit (internal lining, fixed half-pulley, external lining, drive and nut), spread threadlock on the thread and screw the nut to the prescribed torque.

- Avoid the half-pulley rotation using a calliper spanner

N.B.

REPLACE THE NUT WITH A NEW ONE AT EVERY REFIT

Specific tooling

020368Y driving pulley lock wrench

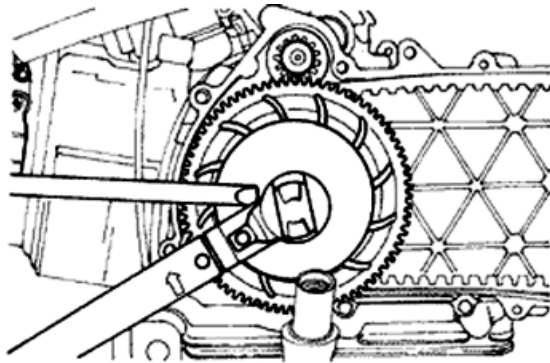
Recommended products

Loctite 243 Medium-strength threadlock

Loctite 243 medium-strength threadlock

Locking torques (N*m)

Locking torque 75 ÷ 83



Refitting the transmission cover

- Check that there are 2 centring dowels and that the sealing gasket for the oil sump on the transmission cover is adequately fitted.

- Replace the cover and tighten the 10 screws to the specified torque.

- Refit the oil loading cap/bar.

- Refit the steel washer and the driven pulley nut.

- Tighten the nut to the prescribed torque using the lock wrench and the torque wrench tools.

- Refit the plastic cover.



Specific tooling

020423Y Driven pulley lock wrench

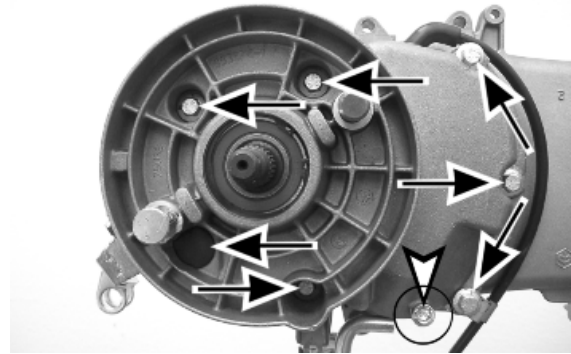
Locking torques (N*m)

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

End gear

Removing the hub cover

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



Removing the wheel axle

Remove the intermediate gear and the complete hub cover.



Removing the hub bearings

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

Specific tooling

001467Y009 Driver for OD 42-mm bearings

001467Y013 Pliers to extract \varnothing 15-mm bearings



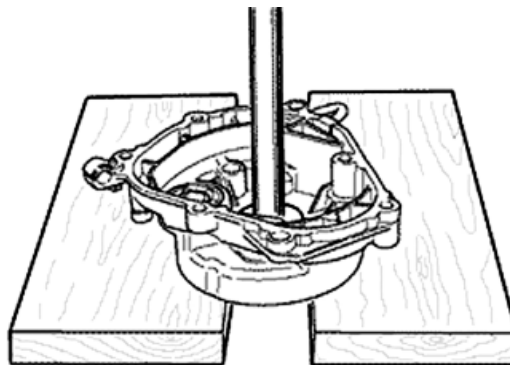
Removing the wheel axle bearings

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

Specific tooling

020376Y Adaptor handle

020364Y 25-mm guide

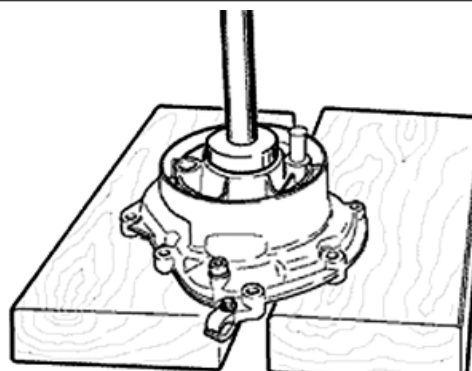


With the appropriate tools, remove the oil seal as shown in the figure.

Specific tooling

020376Y Adaptor handle

020359Y 42x47-mm Adaptor



Removing the driven pulley shaft bearing

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

- Extract the driven pulley shaft from its bearing.
- Remove the oil 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

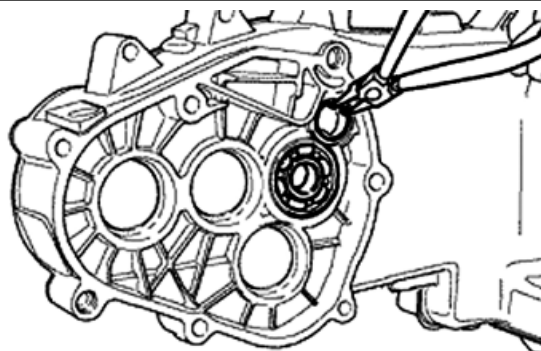
With the sectional punch, remove the driven pulley shaft bearing.

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020363Y 20 mm guide



See also

[Removing the driven pulley](#)

Inspecting the hub shaft

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



Inspecting the hub cover

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

Refitting the driven pulley shaft bearing

- Heat up the parts using the specific heat gun

Specific tooling

020150Y Air heater support

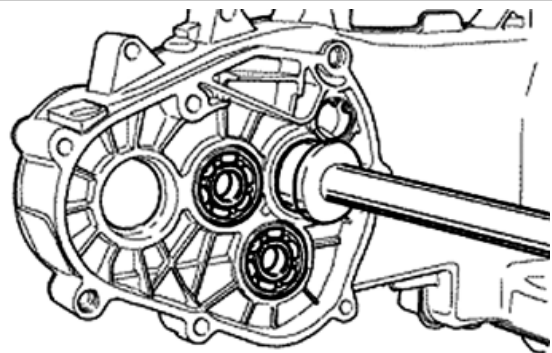
020151Y Air heater

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

Specific tooling

020376Y Adaptor handle

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



Refitting the wheel axle bearing

- Heat up the parts using the specific heat gun

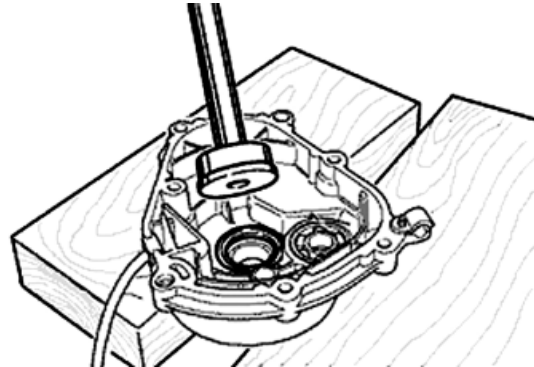
Specific tooling

020151Y Air heater**020150Y Air heater support**

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

Specific tooling**020364Y 25-mm guide****020360Y 52x55-mm Adaptor****020376Y Adaptor handle**

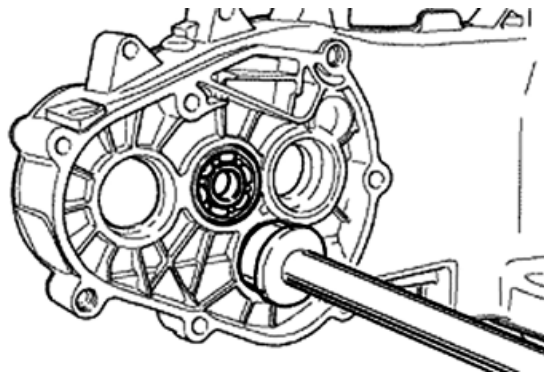
- Assemble the Seeger ring.
- Assemble the oil seal flush with the internal surface as shown in the figure to the hub using the adequate tools and with the seal lip towards the inside of the hub.

**Specific tooling****020376Y Adaptor handle****020360Y 52x55-mm Adaptor****Refitting the hub cover bearings**

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

Specific tooling**020150Y Air heater support****020151Y Air heater**

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



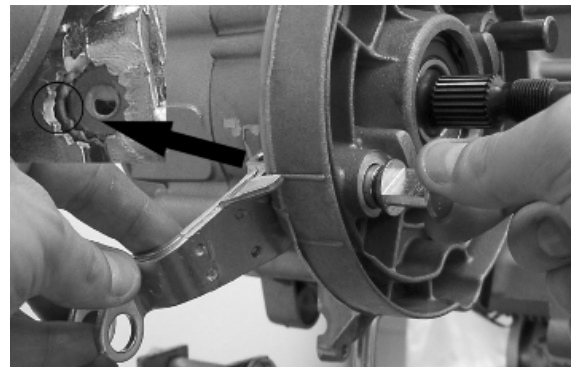
Refitting the hub bearings

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



Refitting the ub cover

- Fit a new gasket together with the centring dowels.
- Fit the gearbox cover, making sure the breather pipe is in the correct position.
- Screw the 7 screws to the specified torque, positioning the support plate of the pipe in the position shown in the figure.
- Remove the control pin of the shoe taking care so as the long tooth coincides with the groove on the control lever.



Locking torques (N*m)

Locking torque 24 ÷ 27

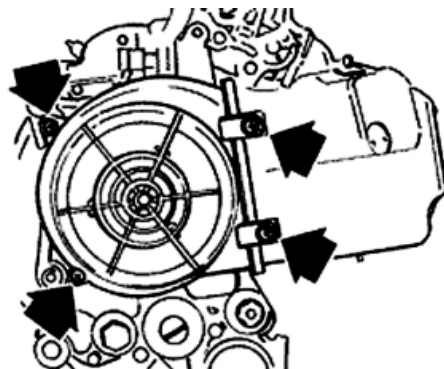
Flywheel cover

Cooling hood

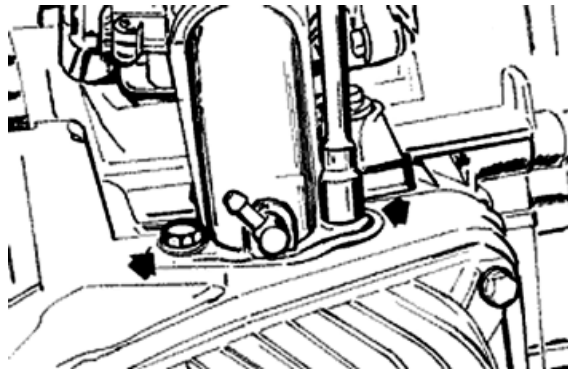
- Remove the housing acting on the 4 retaining screws.

CAUTION

DURING REMOVAL SLIDE THE HOUSING CONNECTOR ON THE HOUSING.



- Loosen the clamp and remove the carburettor from the manifold.
- Remove the complete manifold acting on the 2 retainers as shown in the figure.
- Remove the 2 self threading screws, left and right and the lateral base retaining screw on the crank-case base.
- Take off the housings.
- Remove the gasket seal of the housing on the head.

**N.B.**

IF THE FLYWHEEL HOUSING IS NOT REMOVED, IT IS ALSO NECESSARY TO REMOVE THE TWO KNOB SCREWS.

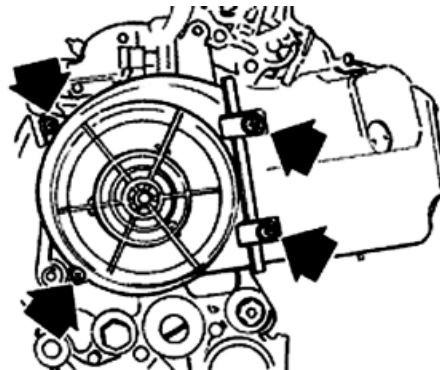
On the vehicles equipped with the engines mentioned if they are losing a full circle at full gas, we suggest to intervene on the vacuum socket inserting on the inlet manifold widening the hole from 0.4 mm to 1.5 mm. Remember that such operation must have performed on a disassembled manifold which must be cleaned afterwards.

Cooling fan

- Refit the parts in reverse order of the removal operation.
- Make sure that there are spacers with the two rear retainers of the housing.
- The long spacers should be in a high position.

CAUTION

TAKE CARE TO CORRECTLY POSITION THE FLYWHEEL CONNECTOR.

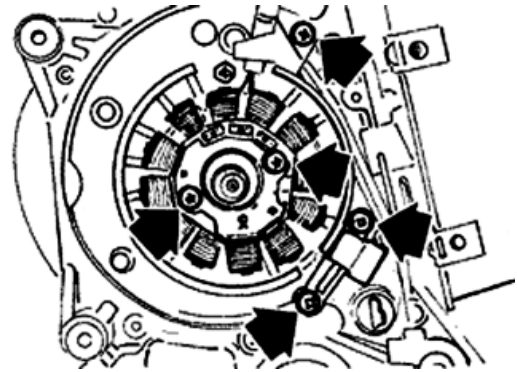


- Remove the cooling fan by acting on the three fixings indicated in the figure.



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

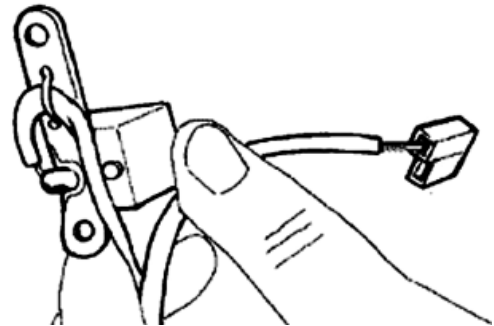
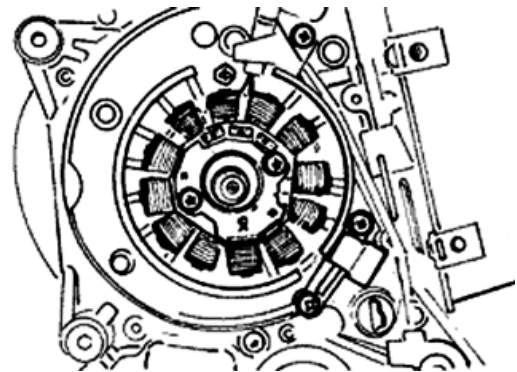
- Refit the stator and flywheel carrying out the removal procedure in reverse, tightening the retainers to the specified torque.
- Place the cable harness as shown in the figure.

N.B.

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

Locking torques (N*m)

Stator screw 3 ÷ 4



Flywheel and starting

Removing the flywheel magneto

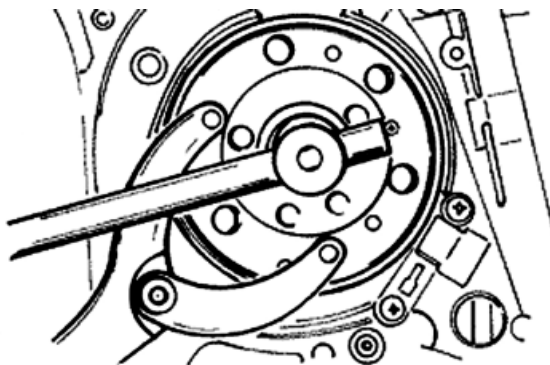
- Lock the rotation of the flywheel using the calliper spanner.
- Remove the nut.

CAUTION

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

Specific tooling

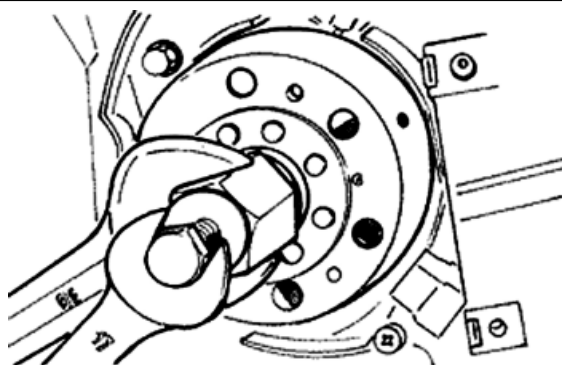
020565Y Flywheel lock calliper spanner



- Extract the flywheel with the extractor.

Specific tooling

008564Y Flywheel extractor



Inspecting the flywheel components

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

Refitting the flywheel magneto

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

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

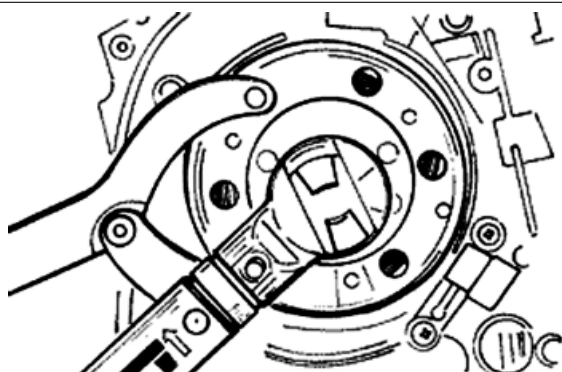
Different values result from deformations visible on the Pick-Up support.

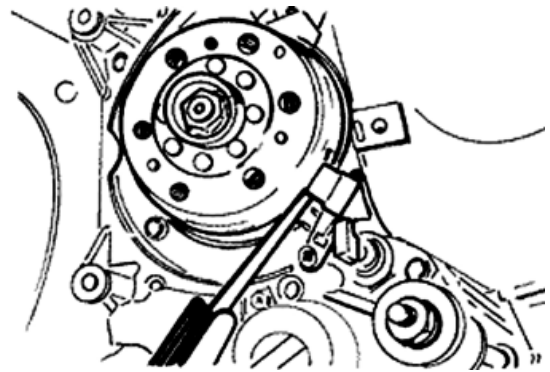
N.B.

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

Locking torques (N*m)

Flywheel nut 52 ÷ 58





Refitting the starter motor

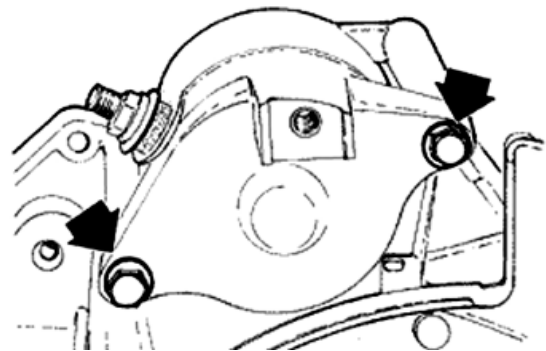
- Fit a new O-ring on the starter and lubricate it.
- Fit the starter on the crankcase, locking the two screws to the prescribed torque.

N.B.

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

Locking torques (N*m)

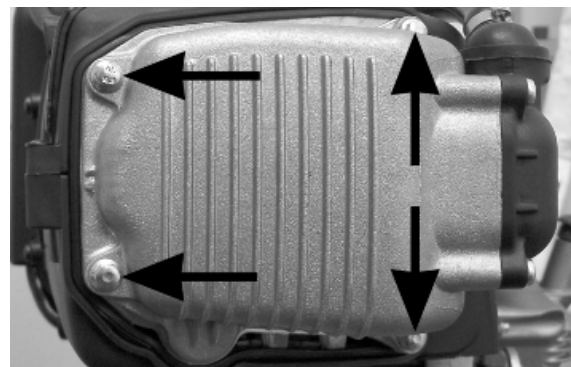
Starter motor screws 11 ÷ 13



Cylinder assy. and timing system

Removing the timing system drive

- Remove the parts listed below first: transmission cover, belt driving pulley, oil pump pulley cover and pinion separator washer.
- Remove the tappet cover.
- Remove the central screw fastener and the automatic valve-lifter retaining cover, as shown in the figure.
- Remove the return spring of the automatic valve lifter assembly and the automatic valve lifter assembly 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 counter-weight shown in the figure.
- Remove the camshaft command pulley and its washer.
- Remove the command sprocket wheel and the timing chain.
- Remove the screws indicated in the figure, the spacer bar and the tensioner pad.

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.

See also

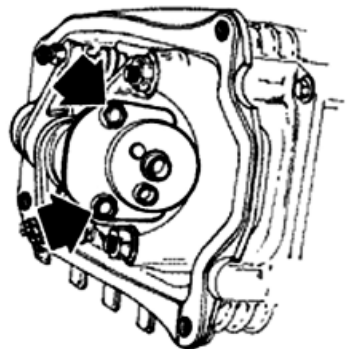
[Removal](#)

Transmission cover

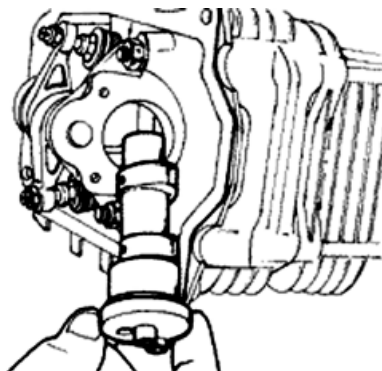
[Removing the driving pulley](#)

Removing the cam shaft

- Remove the two screws and the cam shaft retainer shown in the diagram.



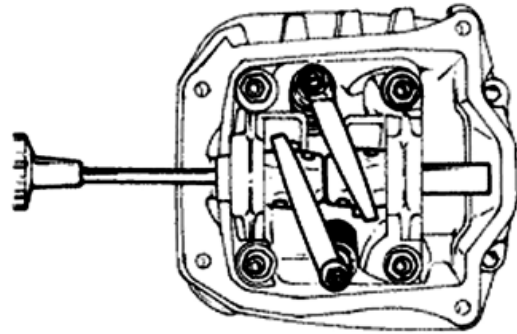
- Remove the cam shaft.



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

N.B.

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

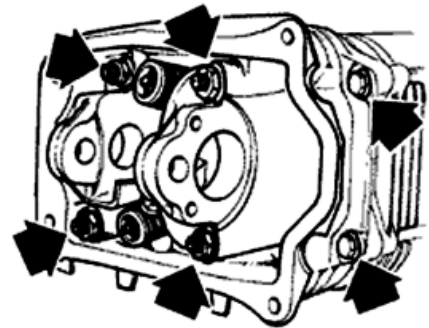


Removing the cylinder head

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

N.B.

IN NEEDED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, ROCKING LEVER PINS AND FIXING BRACKET. THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE DRIVING SHAFT CHAIN TIGHTENER.



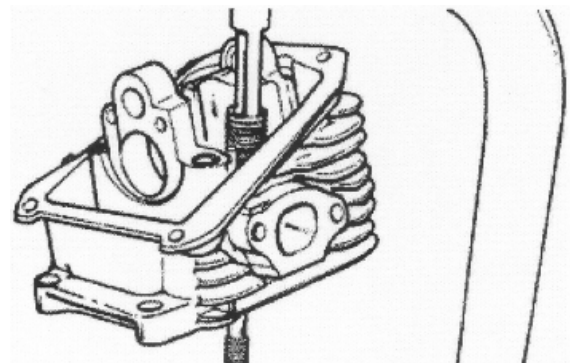
Removing the valves

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

Specific tooling

020382Y Valve cotters equipped with part 012 removal tool

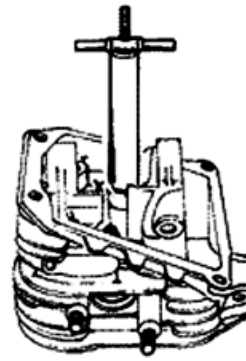
020382Y011 adapter for valve removal tool



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

Specific tooling

020431Y Valve oil seal extractor

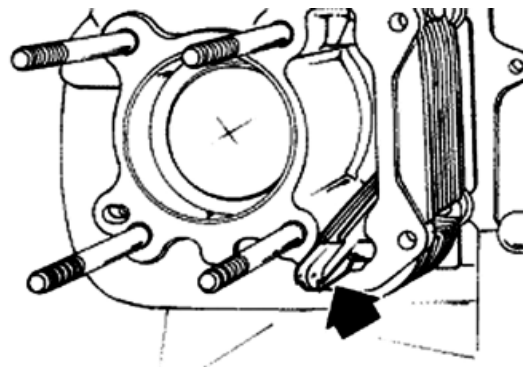


Removing the cylinder - piston assy.

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

CAUTION

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

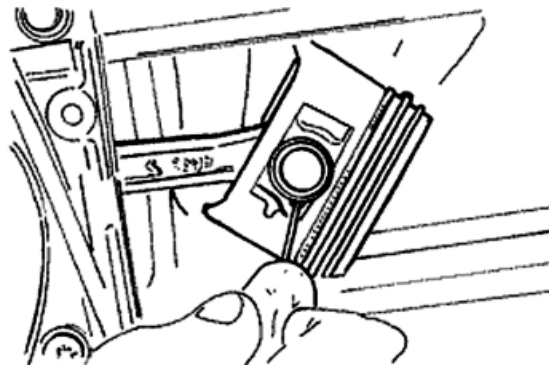


- Remove the two stop rings, the wrist pin and the piston.

- Remove the 3 piston rings from the piston.

N.B.

BE CAREFUL NOT TO DAMAGE THE PISTON RINGS DURING REMOVAL.



Inspecting the small end

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

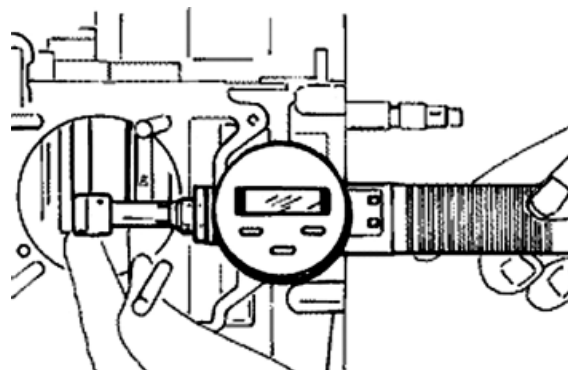
N.B.

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

Characteristic

Rod small end check-up: Maximum diameter

15.030 mm



Rod small end check-up: Standard diameter

15+0.015+0.025 mm

Inspecting the wrist pin

- Check the outer diameter of the gudgeon pin.

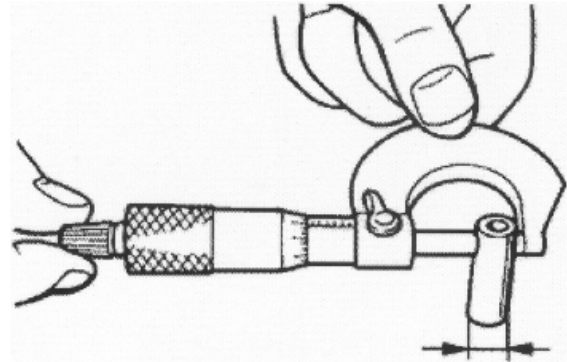
Characteristic

Standard pin diameter

14.996 ÷ 15 mm

Minimum diameter permitted

Ø 14.994 mm



- Calculate the piston pin coupling clearance.

N.B.

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

Characteristic

Piston pin bore - standard diameter

Ø 15+0.001 +0.006

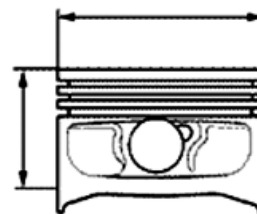


- Measure the outside diameter of the piston, perpendicular to the gudgeon pin axis.

- Measure 36.5 mm from the piston crown's shown in the figure.

N.B.

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

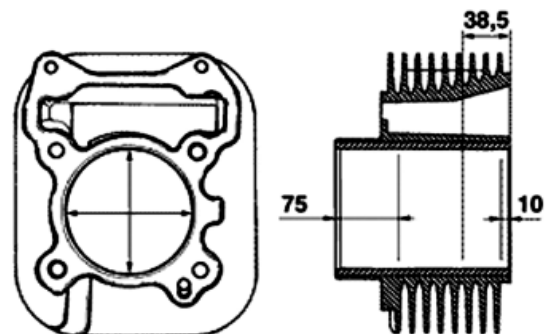


- Using a bore meter, measure the inner cylinder diameter at three different points according to the directions shown in the figure.

- Check that the coupling surface with the head is not worn or misshapen.

- Pistons and cylinders are classified into categories based on their diameter. The coupling is carried out in pairs (A-A, B-B, C-C, D-D).

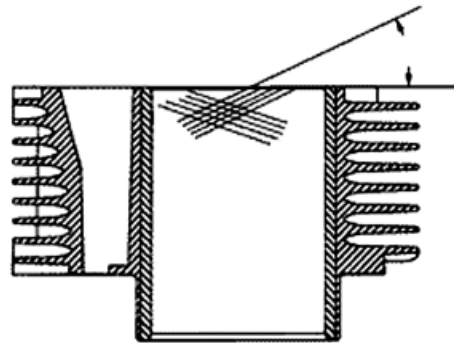
Characteristic



Maximum allowable run-out:

0.05 mm

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



Inspecting the piston

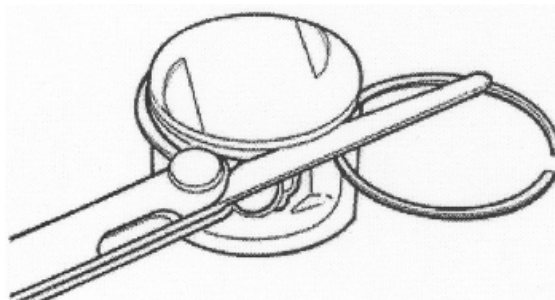
- Carefully clean the seal housings.
- Measure the coupling clearance between the seal rings and the grooves using suitable sensors, as shown in the diagram.
- If the clearance is greater than that indicated in the table, replace the piston.

STANDARD COUPLING CLEARANCE

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

MAXIMUM ADMITTED CLEARANCE AFTER USE

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



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 thickness 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.

SEALING RINGS (125)

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

Maximum clearance after use: 1 mm

MAX. VALUE (125)

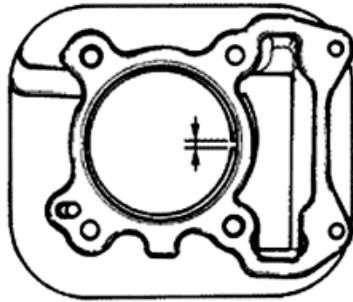
Name	Description	Dimensions	Initials	Quantity
Top piston ring		0,40		
Middle piston ring		0,40		
Oil scraper		0,45		

SEALING RINGS (200)

Name	Description	Dimensions	Initials	Quantity
Compression ring		72x1.5	A	0.15 ÷ 0.30
Oil scraper ring		72x1	A	0.20 ÷ 0.40
Oil scraper ring		72x2.5	A	0.20 ÷ 0.40

MAX. VALUE (200)

Name	Description	Dimensions	Initials	Quantity
Top piston ring		0,40		
Middle piston ring		0,50		
oil scraper		0,50		



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.

Specific tooling

020430Y Pin lock fitting tool



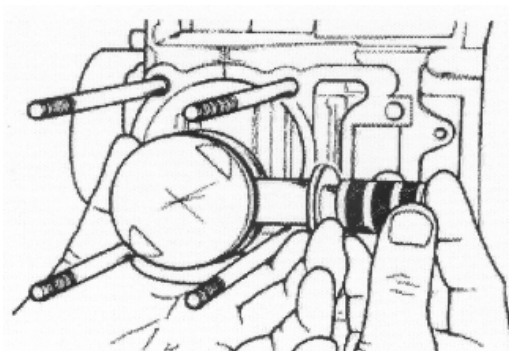
- With the opening in position indicated on the tool, take stop ring in the closed position using the punch.
- Fit the wrist pin stop using the plug as shown in the figure

N.B.

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

CAUTION

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



Choosing the gasket

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

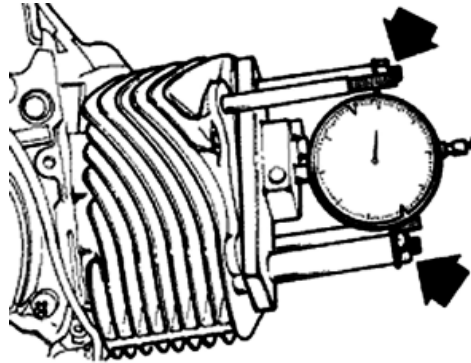
Characteristic

Standard compression ratio

10.6 ± 0.5

CYLINDER BASE GASKET THICKNESS

Specification	Desc./Quantity
Value measured	1 ÷ 1.1
Thickness	0.8 ± 0.05
Value measured	1.1 ÷ 1.3
Thickness	0.6 ± 0.05
Value measured	1.3 ÷ 1.4
Thickness	0.4 ± 0.05

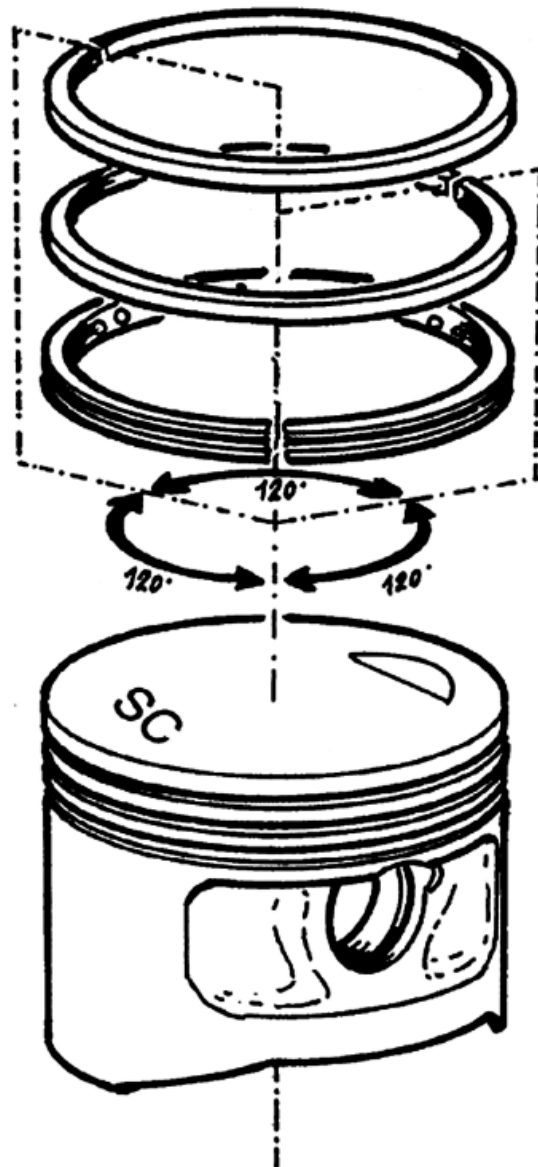


Refitting the piston rings

- Place the oil scraper spring on the piston.
- Refit the oil scraper ring with the join of spring ends on the opposite side from the ring gap and the word 'TOP' towards the crown of the piston. The tapered side of the middle piston ring should always be facing away from the crown of the piston.
- Fit the middle piston ring with the identification letter facing the crown of the piston. In any case, the step must be facing opposite the piston 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.

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



Refitting the cylinder

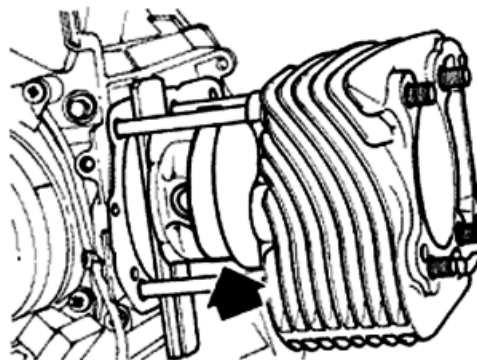
- Insert the cylinder base gasket with the thickness determined above.
- Using the fork support and the piston ring retaining band, refit the cylinder as shown in the figure.

N.B.

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

Specific tooling

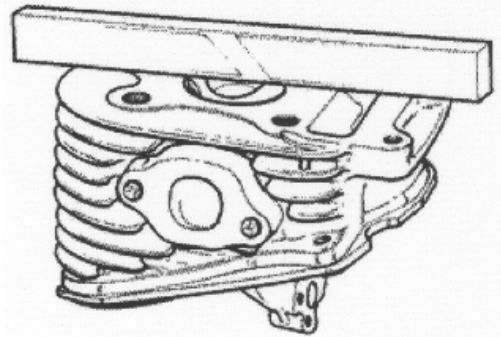
020426Y Piston fitting fork



020427Y Piston fitting band

Inspecting the cylinder head

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



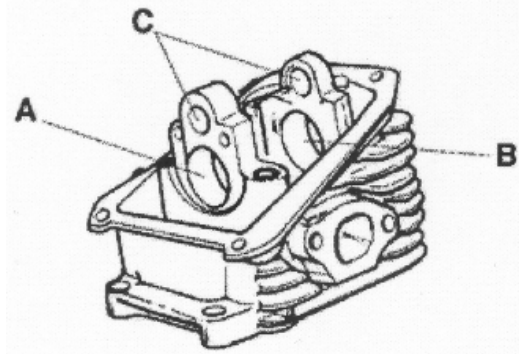
Characteristic

Maximum admitted unevenness: Head check

0.05 mm

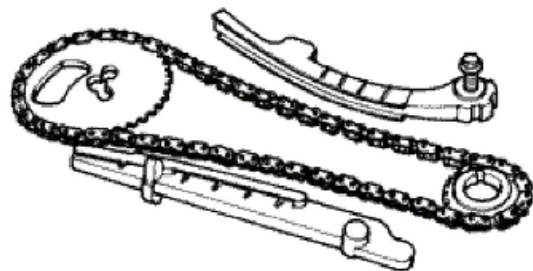
STANDARD DIAMETER

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



Inspecting the timing system components

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



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

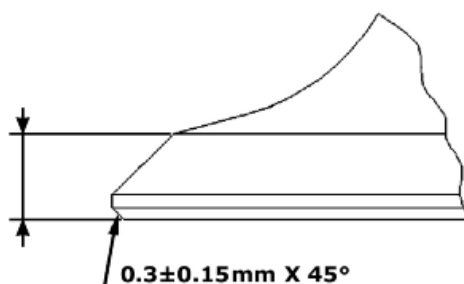


Inspecting the valve sealings

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

VALVE SEAL SURFACE

Specification	Desc./Quantity
Inlet valve - seal surface	2.4 ÷ 2.8 mm
Outlet valve - seal surface	2.2 ÷ 2.6 mm



Inspecting the valve housings

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

Characteristic

Standard drainage guide diameter

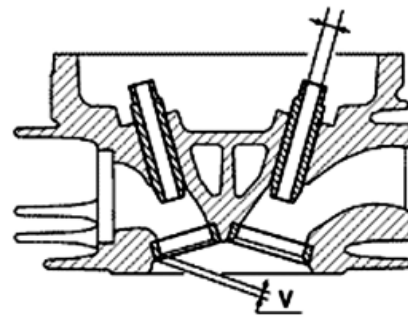
5.012 mm

Standard inlet guide diameter

5.012 mm

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

- Check width of the impression on the valve seat «V»



Characteristic

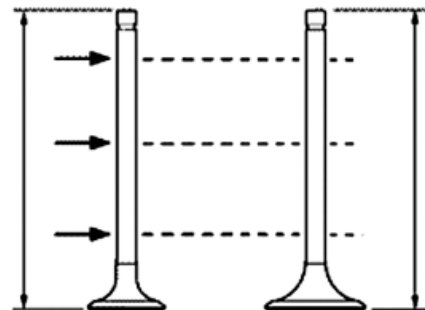
Wear limits:

Max. 1.6 mm.

Inspecting the valves

- Measure the diameter of the valve stems in the three positions indicated in the diagram.

- Calculate the clearance between valve and valve guide.



Characteristic

Minimum diameter admitted - Inlet:

4.96 mm

Minimum diameter admitted - Outlet:

4.95 mm

Standard clearance - Inlet:

0.013 ÷ 0.040 mm

Standard clearance - Outlet:

0.025 ÷ 0.052 mm

Maximum clearance admitted- Inlet:

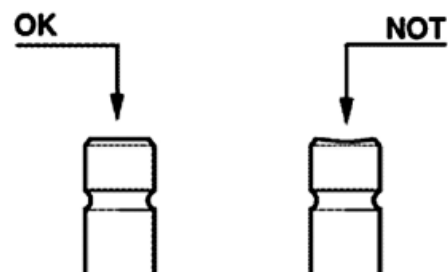
0.062 mm

Maximum clearance admitted - Outlet:

0.072 mm

- Check that there are no signs of wear on the contact surface with the articulated register terminal.

- If the sealing surface on the valves is wider than the specified limit, damaged in one or more points or curved, replace the valve with a new one.



Characteristic

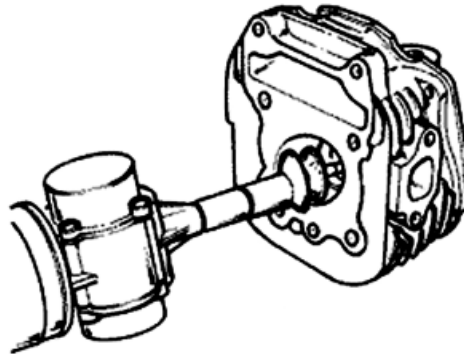
Standard valve length - Inlet:

80.6 mm

Valve standard length: drainage

79.6 mm

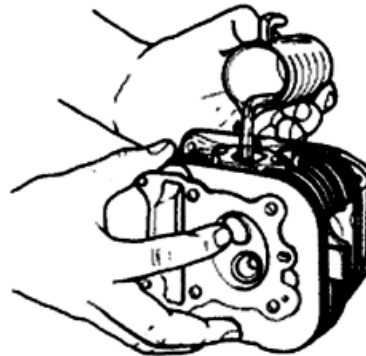
- If the checks above give no failures, you can use the same valves. For best sealing results, it is advisable to grind the valves. Grind the valves gently with a fine-grained lapping compound. During grinding, keep the cylinder head in a horizontal position. This will prevent the lapping compound residues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



CAUTION

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

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



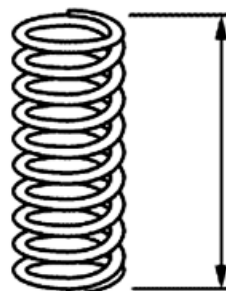
Inspecting the springs and half-cones

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

Characteristic

Valve spring length

33.9 ÷ 34.4 mm

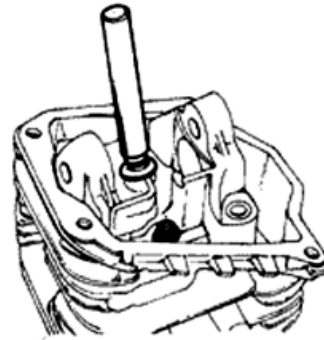


Refitting the valves

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

Specific tooling

020306Y Punch for assembling valve sealing rings

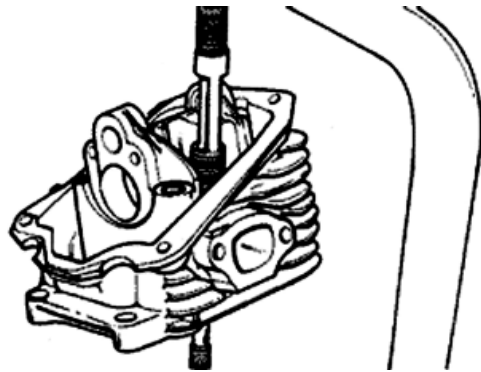


- Fit the valves, the springs and the spring retaining caps. Using the appropriate tool with adapter 11, compress the springs and insert the cotters in their seats.

Specific tooling

020382Y Valve cotters equipped with part 012 removal tool

020382Y011 adapter for valve removal tool



Inspecting the cam shaft

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

Characteristic

Standard diameter Bearing A

Ø: 32.5 mm -0.025 -0.050 mm

Standard diameter Bearing B

20 -0.020 -0.041 mm

Minimum admitted diameter bearing A

Ø: 32.440 mm

Minimum admitted diameter bearing B

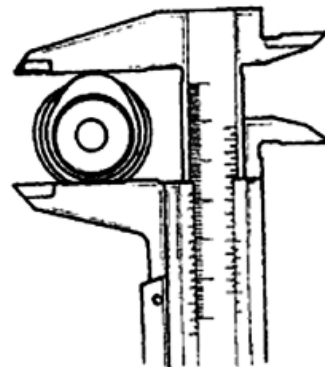
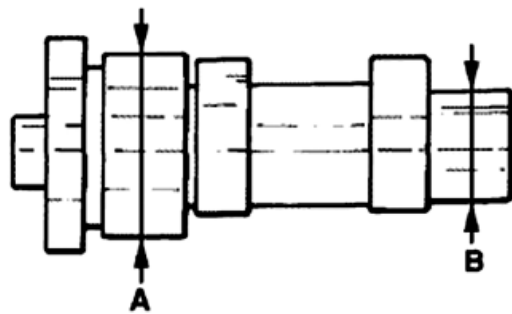
Ø: 19.950 mm

Inlet cam height

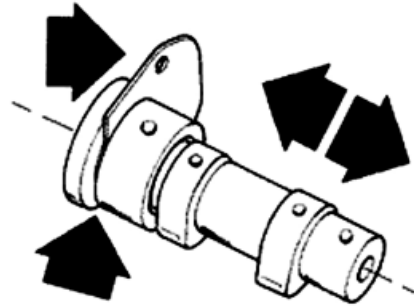
27.512 mm

Outlet cam height

27.212 mm



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

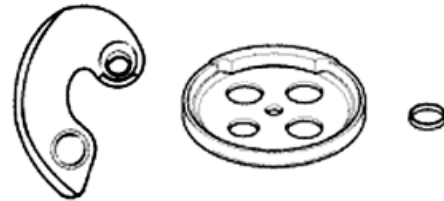


Characteristic

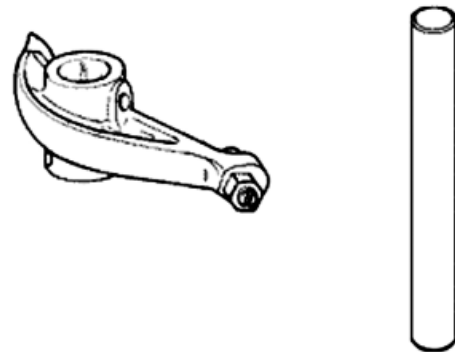
Maximum axial clearance admitted

0.42 mm

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



- Check there are no signs of scoring or wear on the rocking lever bolt.
- Check there are no signs of wear on the pad from contact with the cam and on the jointed adjustment plate.
- Measure the internal diameter of each rocking lever.
 - Check that the elastic washer dedicated to the axle clearance of the rocking levers is not worn.
- In case of anomalies, replace the damaged components.



Characteristic

Minimum diameter permitted

Ø 11.970 mm

Maximum diameter admitted

Ø 12.030 mm

Refitting the head and timing system components

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

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

Locking torques (N*m)

Locking torque 28 ÷ 30

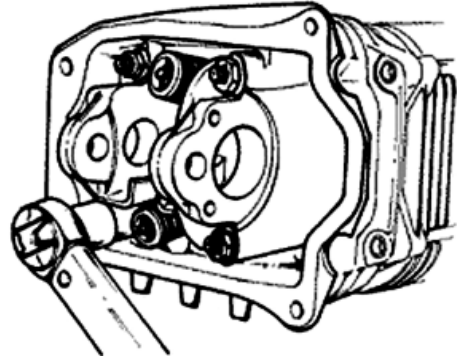
- Fit the two screws on the outside of the timing chain side and tighten them to the specified torque.

N.B.

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

Locking torques (N*m)

Locking torque 11 ÷ 13



- Fit the timing chain sprocket wheel on the crankshaft, with the chamfer facing the insertion side.

- Loop the timing chain around the sprocket on the crankshaft.

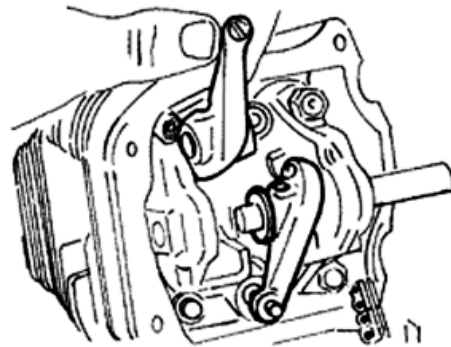
- Fit the tensioner pad by the cylinder head.

- Fit the spacer and the screw fastener.

- Fit the pin, the outlet rocking lever, the spring washer and the inlet rocking lever.

- Lubricate the 2 rocking levers through the holes at the top.

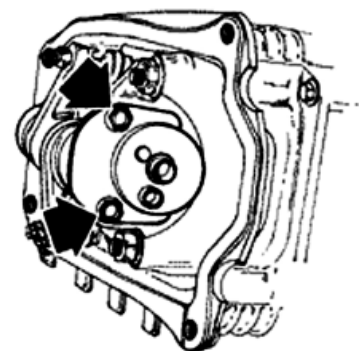
- Lubricate the 2 bearings and insert the camshaft in the cylinder head with the cams opposing the rocking levers.



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

Locking torques (N*m)

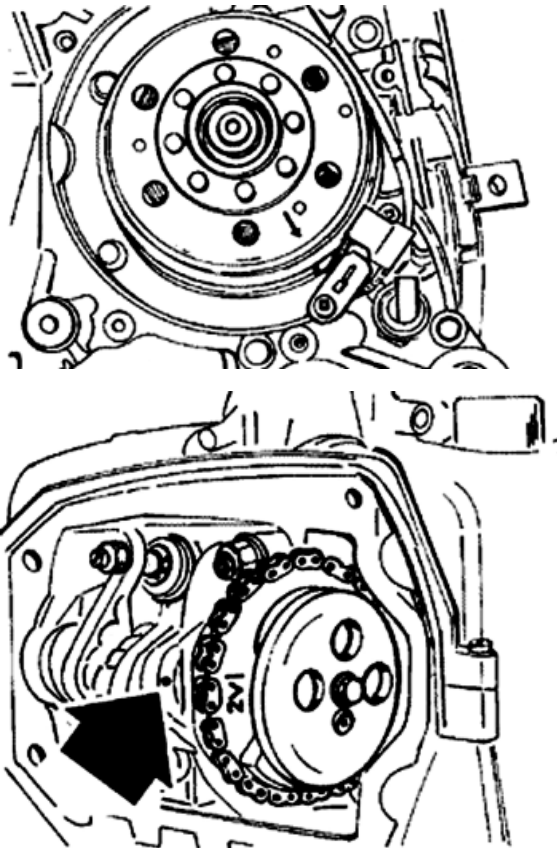
Locking torque 4 ÷ 6



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

Locking torques (N*m)

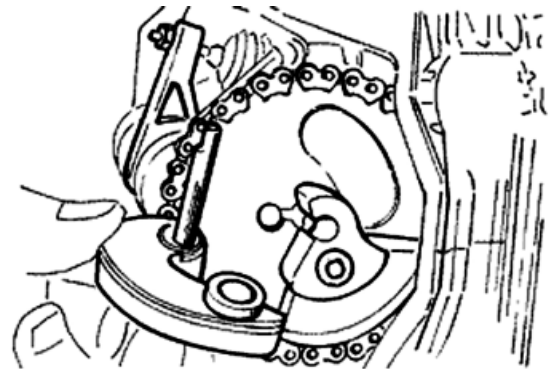
Locking torque 7 ÷ 8.5



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

N.B.

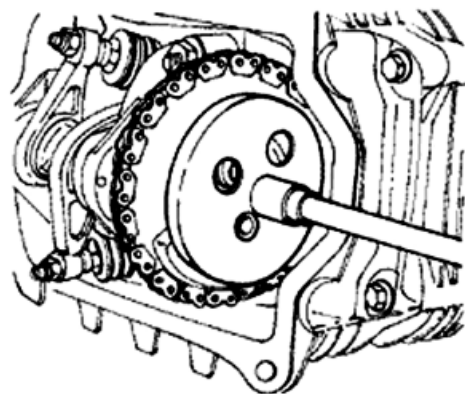
GREASE THE END STOP RING TO PREVENT IT COMING OUT AND FALLING INTO THE ENGINE.



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

Locking torques (N*m)

Locking torque 12 - 14



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

Locking torques (N*m)

Locking torque 11 ÷ 13

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

Locking torques (N*m)

Locking torque 5 - 6

- Adjust the valve clearance.
- Fit the spark plug

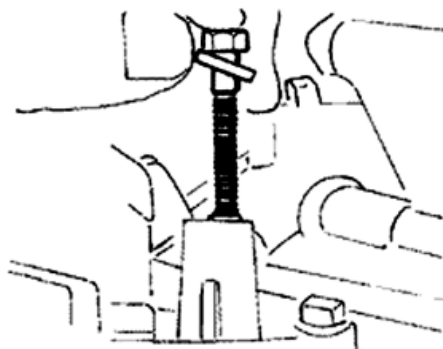
Electric characteristic

Recommended spark plug:

CHAMPION RG4HC

Electrode gap

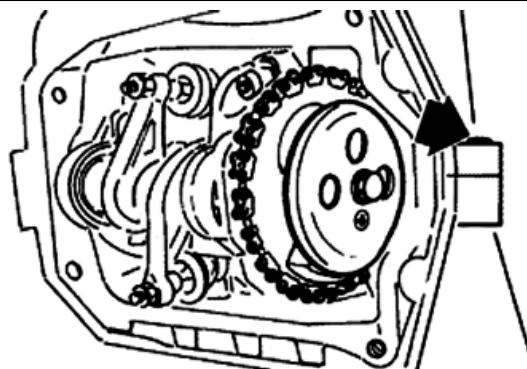
0.8 mm



Locking torques (N*m)

Locking torque 12 - 14

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



Locking torques (N*m)

Locking torque 3 ÷ 4

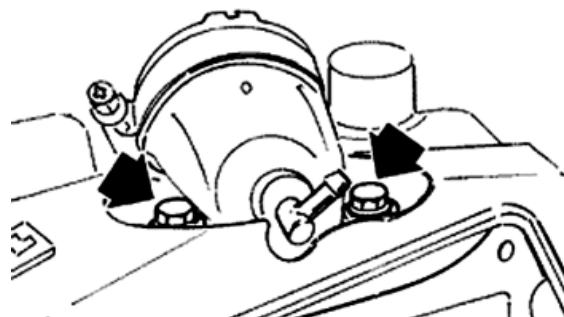
- Fit the inlet manifold and lock the 2 screws to the specified torque.
- Fit the carburettor onto the inlet manifold and lock the clamp

N.B.

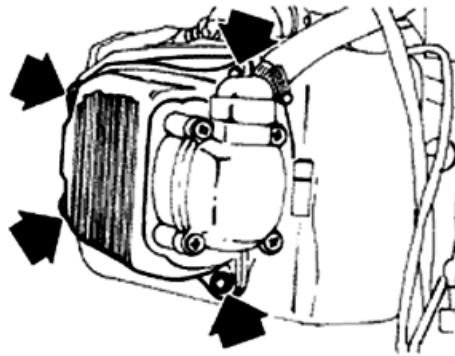
FIT THE CARBURETTOR THROUGH THE SUPPLEMENT ON THE MANIFOLD.

Locking torques (N*m)

Locking torque 11 ÷ 13



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

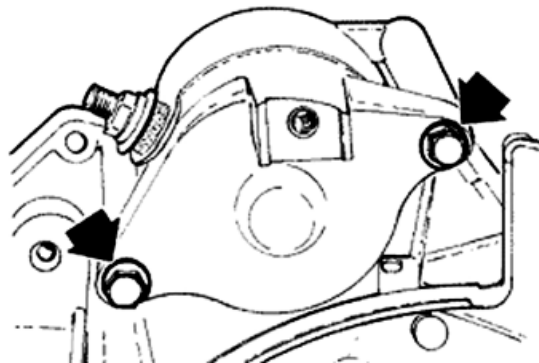


Locking torques (N*m)

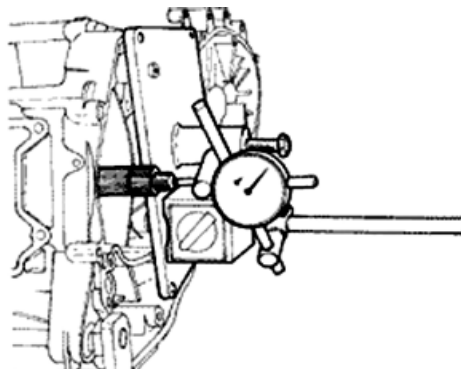
Locking torque 11 ÷ 13

Crankcase - crankshaft

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



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



Specific tooling

020262Y Crankcase splitting strip

020335Y Magnetic support for dial gauge

Characteristic

Standard clearance

0.15 ÷ 0.40 mm

Splitting the crankcase halves

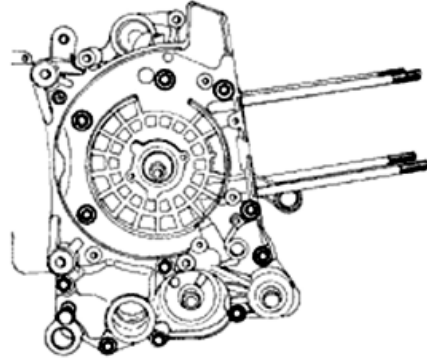
Remove the 11 coupling screws to the crankcase.

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

Remove the crankshaft.

CAUTION

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

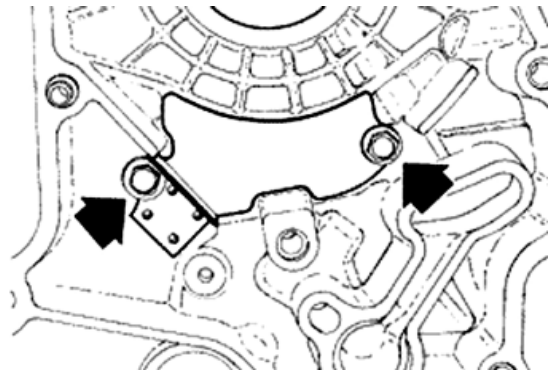


- Remove the coupling gasket of the crankcase halves.

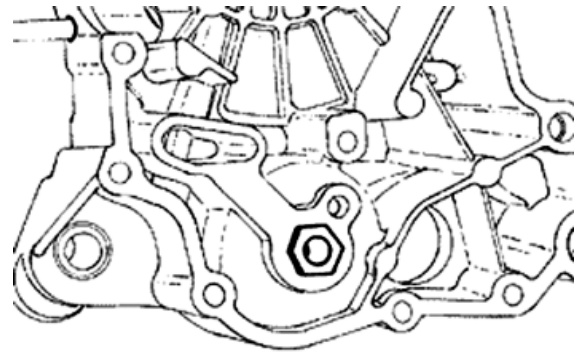
- Remove the two screws and the internal cover shown in the diagram.

CAUTION

WHILE OPENING THE CRANKCASES AND REMOVING THE 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

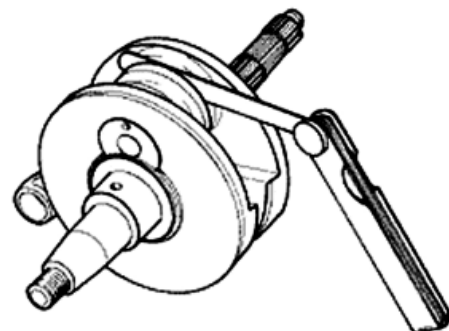


- Check the axial clearance on the connecting rod.

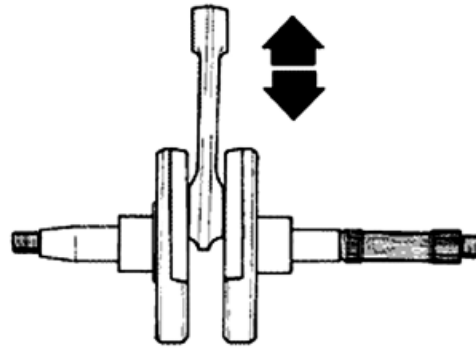
Characteristic

Standard clearance

0.20 ÷ 0.50 mm



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



CAUTION

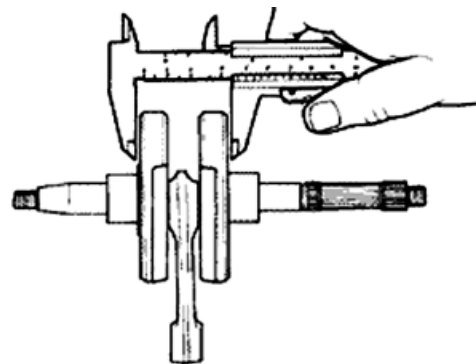
BE CAREFUL NOT TO LET THE MEASUREMENT BE AFFECTED BY THE UNIONS WITH THE CRANKSHAFT ENDS.

Characteristic

Standard clearance

0.036 ÷ 0.054 mm

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



CAUTION

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

Characteristic

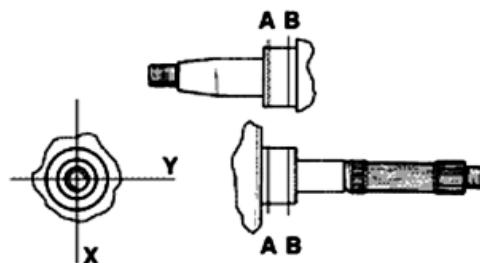
Distance between the shoulders

55.67 ÷ 55.85 mm

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

STANDARD DIAMETER

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



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

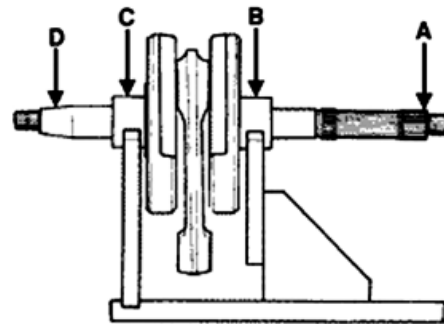
Off-line maximum admitted

A = 0.15 mm

B = 0.01 mm

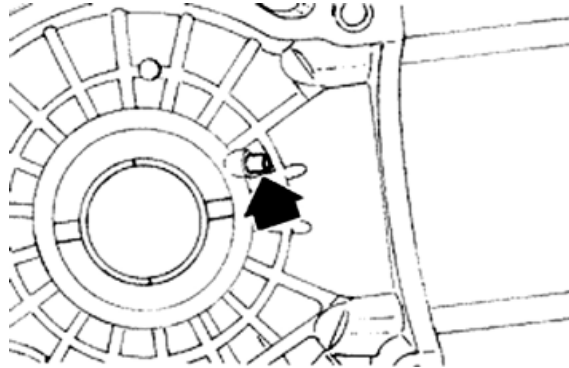
C = 0.01 mm

D = 0.10 mm



Inspecting the crankcase halves

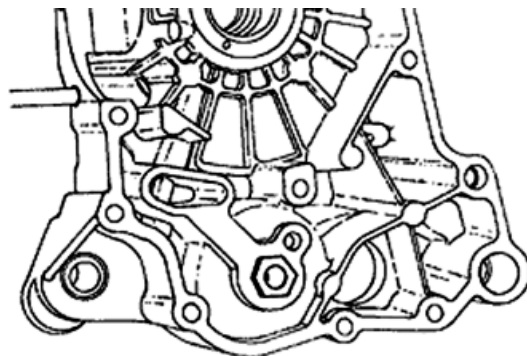
- Before proceeding to check the crankcase halves, thoroughly clean the all surfaces and oil ducts.
- On the transmission side crankcase half, take particular care cleaning the housing and oil ducts for the following components: the oil pump, the oil by-pass valve, the main bushings and the cooling jet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



N.B.

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

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



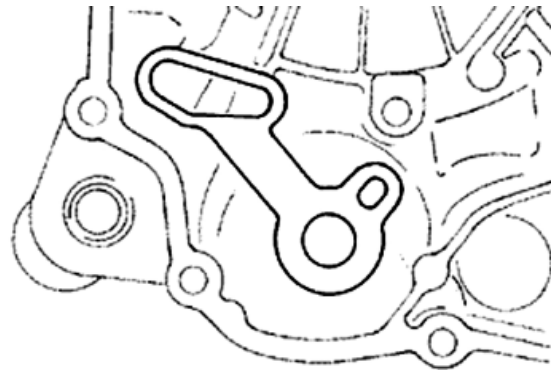
N.B.

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

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



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



Inspecting the crankshaft plain bearings

- To obtain a good bushing lubrication it is necessary to have both an optimal lubricating pressure (4 bar) and a good oil flow rate; the bushings must be correctly positioned so as not to obstruct the oil supply channels.

- The main bushings are comprised of two half-bearings, one containing holes and channels for lubrication and the other solid.

- The solid half-bearing is intended to stand the thrusts caused by combustion, and for this reason it is arranged opposed the cylinder.

- To prevent shutters in the oil feeding channels, the matching surface of the two half-bearings must be perfectly orthogonal to the cylinder axis, as shown in the figure.

- The oil supply channel section is also affected by the bushings driving depth compared with the crankshaft axial clearance of the limiting surface.

N.B.

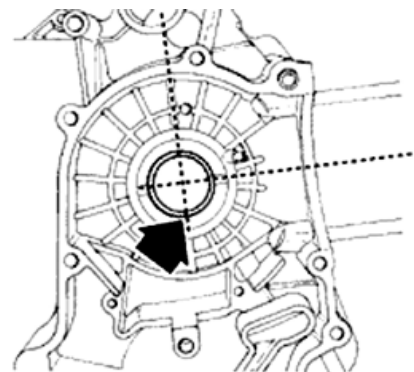
TO KEEP THIS POSITION OF THE BUSHINGS ON THE CRANKCASE, FITTING IS FORCED ON STEEL RINGS INSERTED IN THE CASTING OF BOTH CRANKCASE HALVES.

Characteristic

Standard driving depth

1.35 ÷ 1.6

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



- The bushing housings in the crankcase are classified into 2 categories - Cat. 1 and Cat. 2 - just like those for the crankshaft.

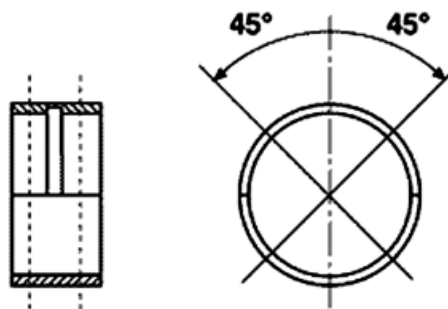
3 - The main bushings are subdivided into 3 thickness categories; see the table below:

N.B.

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

MAIN BEARINGS

Specification	Desc./Quantity
B	Blue
C	Yellow
E	Green

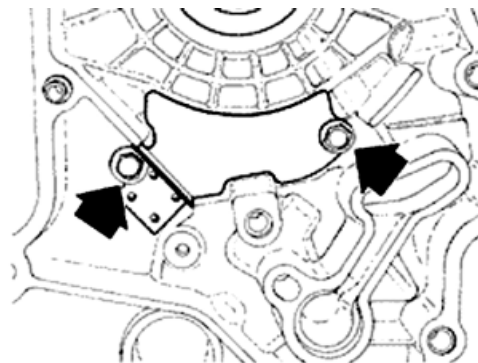


Refitting the crankcase halves

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

Locking torques (N*m)

Locking torque 4 ÷ 6

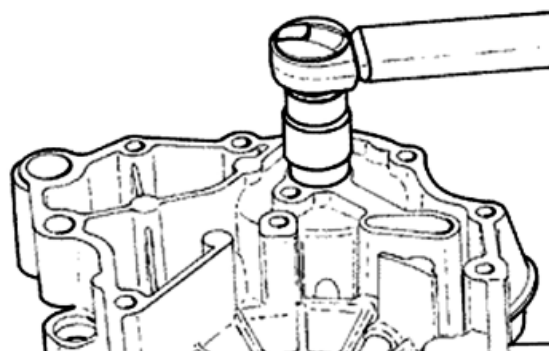


- Fit the oil filter joint and tighten it to the prescribed torque.

- Place a new gasket on one of the crankcase halves, preferably on the transmission side, together with the locating dowels.

Locking torques (N*m)

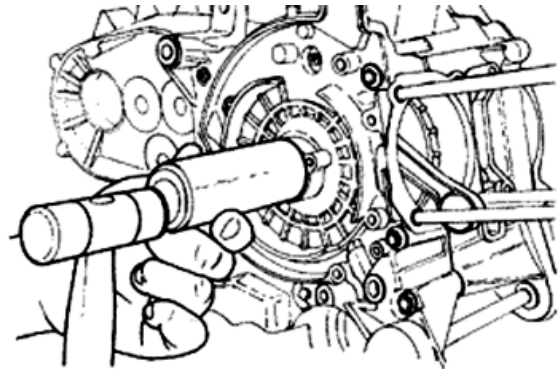
Locking torque 27 ÷ 33



- 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.

N.B.

WHEN FITTING THE HALF CASING AND THE CRANKSHAFT, TAKE CARE NOT TO DAMAGE THE SHAFT THREADED TANGS.



Locking torques (N*m)

Locking torque 11 ÷ 13

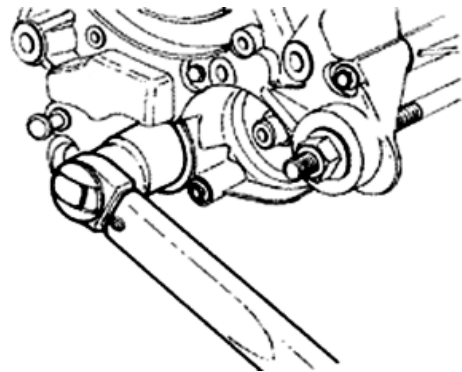
- Lubricate the flywheel oil seal.
- Use the appropriate tool to assemble the oil seal.
- Fit a new O-ring on the pre-filter and lubricate it.
- Insert the pre-filter on the engine with its corresponding cover to the specific torque.

N.B.

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

N.B.

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



Specific tooling

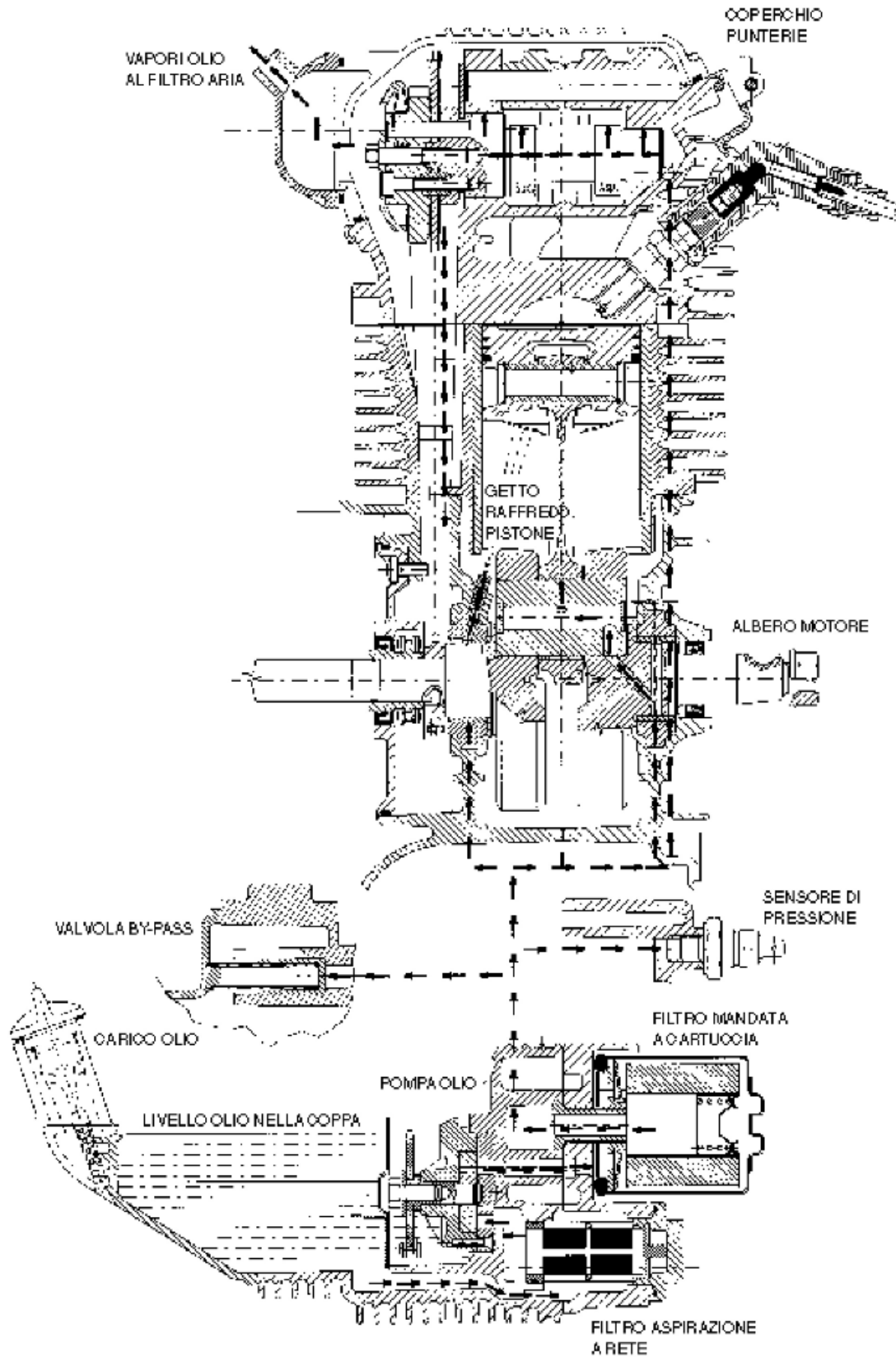
020425Y Punch for flywheel-side oil seal

Locking torques (N*m)

Locking torque 24 ÷ 30

Lubrication

Conceptual diagrams



Oil pressure check

- After removing the cover protections as described in the "Flywheel" chapter, disconnect the electrical connexion of the minimum oil pressure switch and then remove the switch.
- With the engine idling at 1650 rpm and the oil temperature at $\sim 90^{\circ}\text{C}$, 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 prescribed 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.

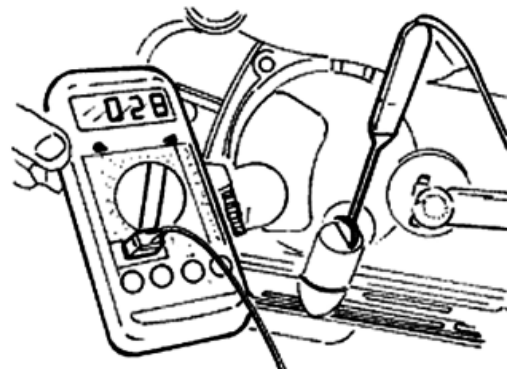
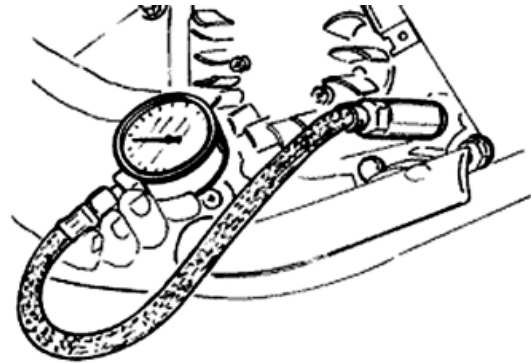
Characteristic

Minimum pressure admitted

3.2 atm.

Locking torques (N*m)

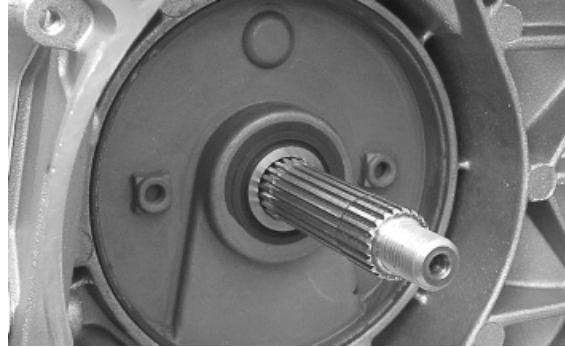
Locking torque $12 \div 14$ (also valid for the control connector).



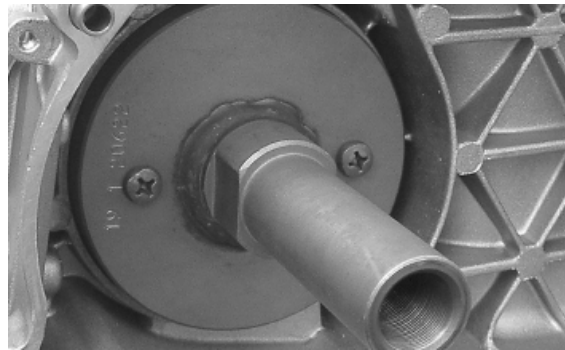
Crankshaft oil seals

Removal

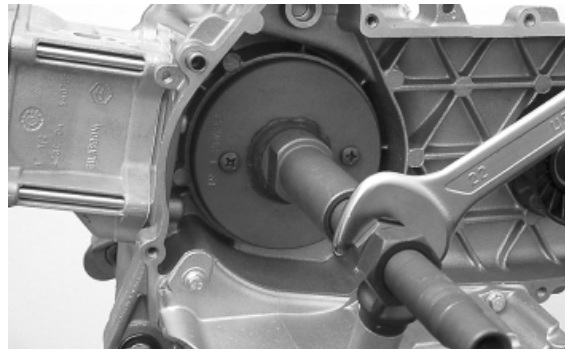
- Remove the transmission cover and the complete drive pulley beforehand



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



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



Specific tooling

020622Y Transmission-side oil guard punch

Refitting

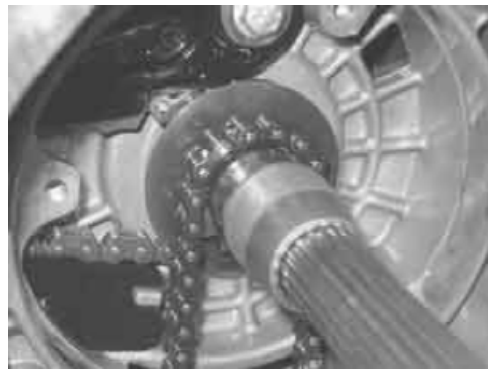
- Prepare the new oil guard, lubricating the sealing lip. Warning: do not lubricate the surface for keying onto the engine crankcase.

CAUTION

DO NOT LUBRICATE THE KEYING SURFACE ONTO THE ENGINE CRANKCASE.



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



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

CAUTION

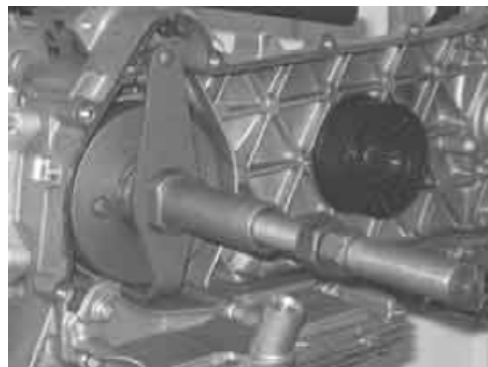
ORIENT THE OIL GUARD BY POSITIONING THE CHAIN HOUSING CHANNEL FACING DOWNWARDS. WHEN THE POSITION IS REACHED, DO NOT RETRACT THE OIL GUARD. FAILURE TO COMPLY WITH THIS RULE CAN CAUSE A WRONG POSITIONING OF THE OIL GUARD SHEATH.



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



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



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



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

CAUTION

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

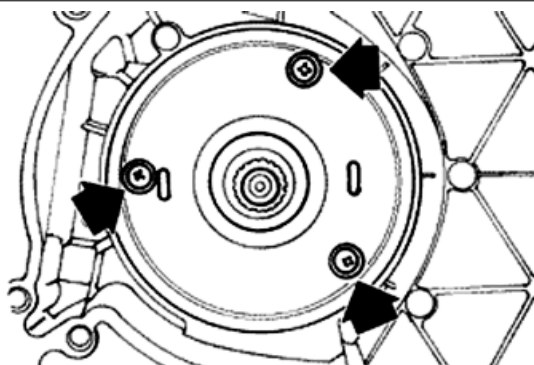
Oil pump

Removal

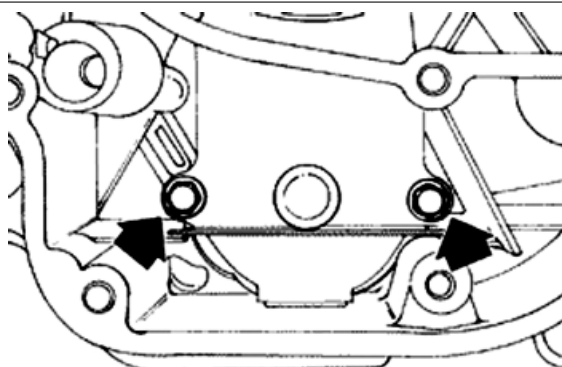
- Remove the chain cover acting on the 3 retaining screws as shown in the figure and the relevant copper washer.
- Extract the cover using the appropriate appendages.

N.B.

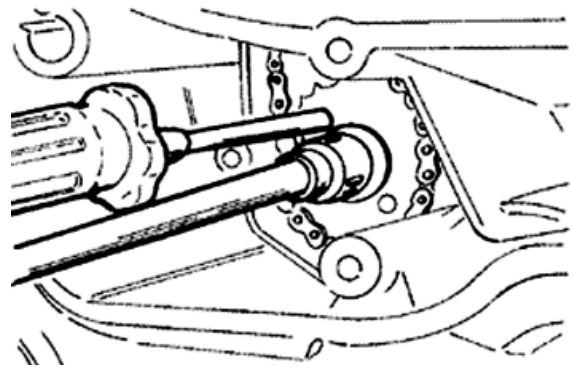
WITH THE AIM OF AVOIDING DAMAGING THE APPENDAGES PRACTICE A RUN PARALLEL TO CRANKSHAFT.



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

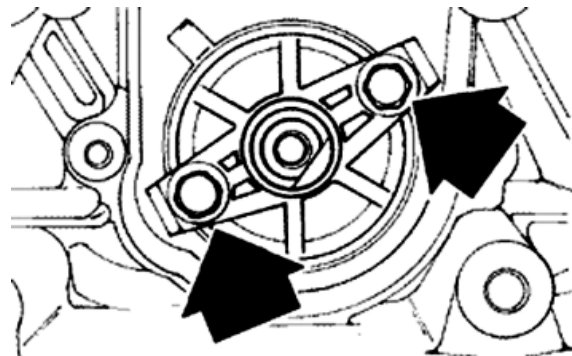


- Remove the central screw with Belleville washer, as shown in the diagram.
- Remove the chain with the pulley.
- Remove the crankshaft control pinion.



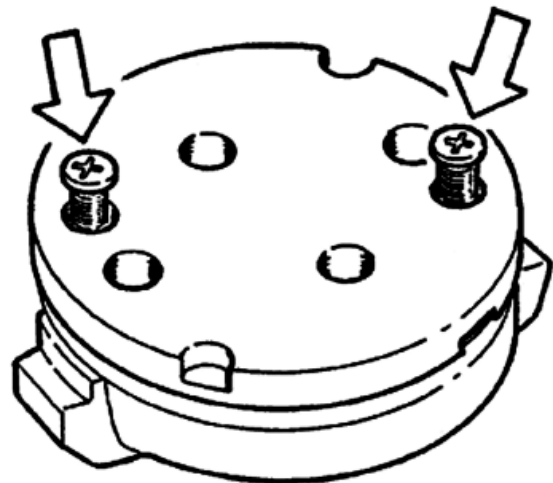
- Remove the oil pump acting on the 2 retainers as shown in the figure.
- Remove the oil pump seal.

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



Inspection

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

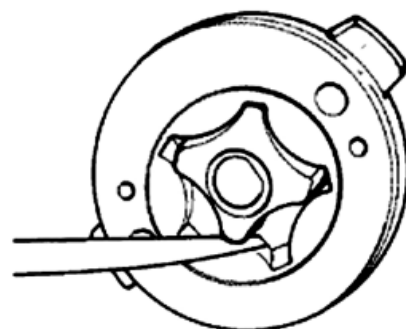


- Using a thickness gauge, check the distance between the rotors in the position shown in the figure.

Characteristic

Maximum clearance admitted

0.12 mm

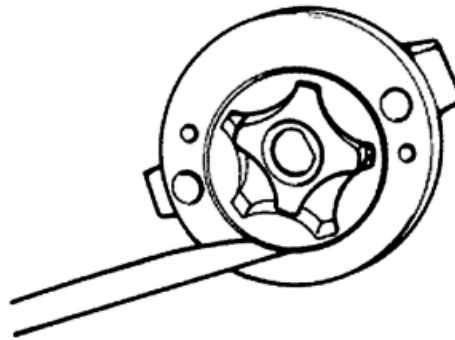


Measure the distance between the outer rotor and the pump body; see figure.

Characteristic

Admissible limit clearance:

0.20 mm

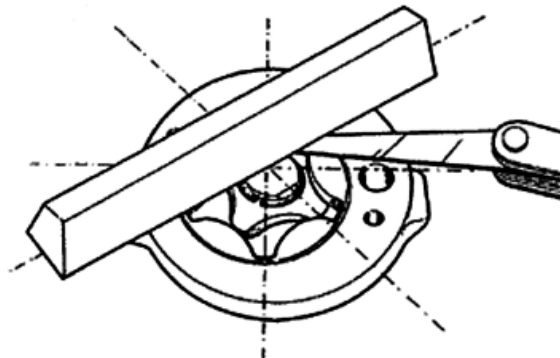


Check the axial clearance of the rotors with a trued bar as reference, as shown in the figure.

Characteristic

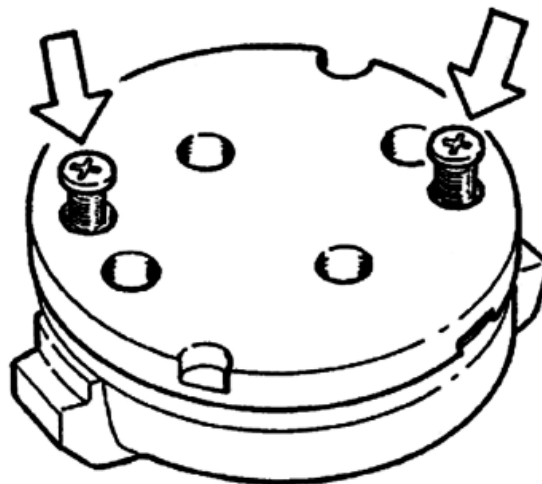
Limit values admitted:

0.09 mm



Refitting

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



N.B.

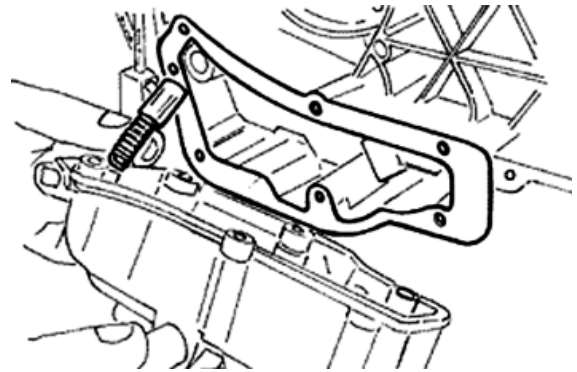
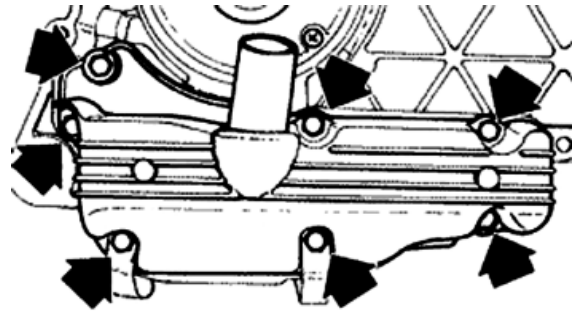
FIT THE BELLEVILLE WASHER SO THAT ITS OUTER (CURVED) RIM TOUCHES THE PULLEY.

Locking torques (N*m)

Central screw 12 ÷ 14 Nm Cover screws 0.7 ÷ 0.9 Nm

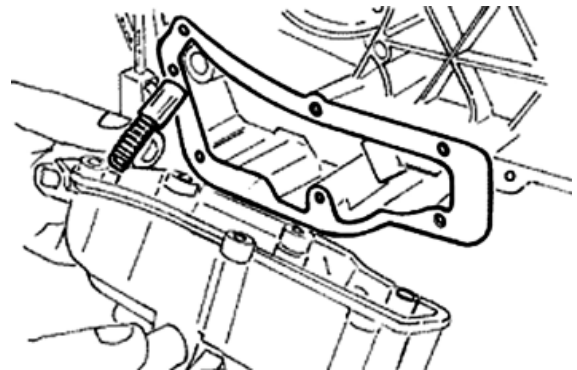
Removing the oil sump

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



Inspecting the by-pass valve

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



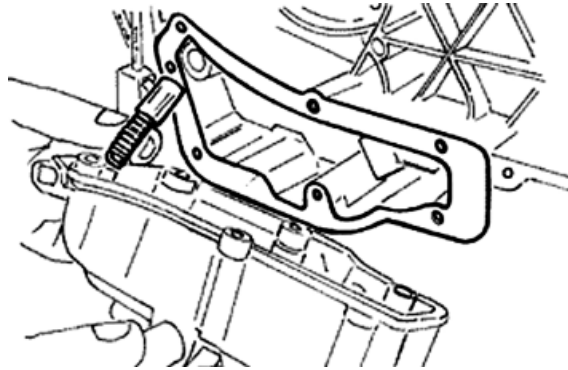
Characteristic

By-pass check up: Standard length

54.2 mm

Refitting the oil sump

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

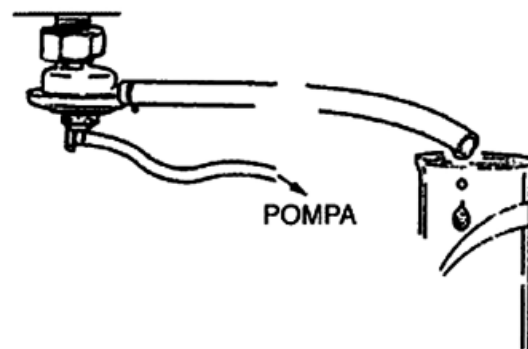


Locking torques (N*m)

Locking torque 11 ÷ 13

Fuel supply

- Disconnect the fuel supply and the suction taking pipe from the carburettor.
- Check that there are no fuel leaks between the two tubes.
- Close the fuel outlet pipe.
- By means of the MITYVAC pump apply 0.1 bar of suction to the tap.
- Make sure that the suction is kept stable and that there are no fuel leaks.
- Reconnect the suction pipe to the manifold.
- Position the fuel pipe with the outlet at the point of the tap.
- Turn the engine by using the starter for five seconds with the carburettor at minimum.
- Take up the fuel by means of a graded burette.



N.B.

THE MEASUREMENT MAY BE FALSIFIED BY THE INCORRECT NUMBER OF REVS OR BY THE WRONG POSITION OF THE TUBE. IN THIS CASE, THE TENDENCY IS TO OBTAIN A REDUCED FUEL FLOW RATE. THE SUCTION OUTLET ON THE MANIFOLD HAS A SECTION INTENTIONALLY REDUCED FOR THE PURPOSE OF ENHANCING THE SUCTION PULSATION AND THEREBY GUARANTEE A CONSTANT TAP FLOW RATE.

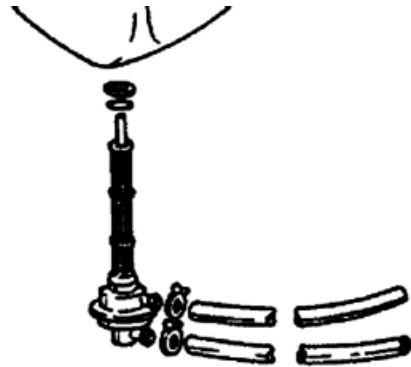
Specific tooling

020329Y MityVac vacuum-operated pump

Characteristic**Minimum flow rate**

20 cc

- Completely empty the fuel tank.
- Remove the petrol delivery pipe and the low-pressure pipe.
- Loosen the clip and remove the cock.
- Clean the tank and the filter of the cock with a specific solvent.
- Refit the cock making sure that there is an O-Ring.
- Turn the cock to the direction it had before it was removed and block the clip.

**N.B.**

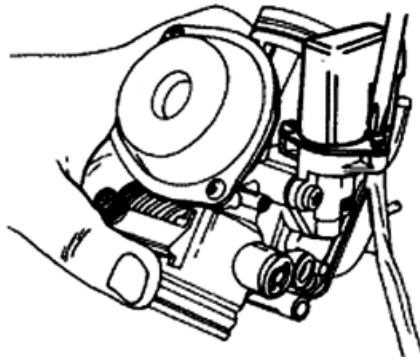
THE FILTER CAN BE UNSCREWED FROM THE COCK TO FACILITATE CLEANING.

Removing the carburettor

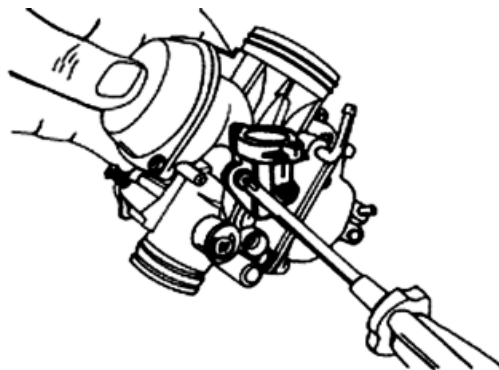
- Follow the steps described in Chapter Cylinder Head and Timing Components.
- Remove the run-off tube and the float bowl breather tube.
- Remove the carburettor heater.



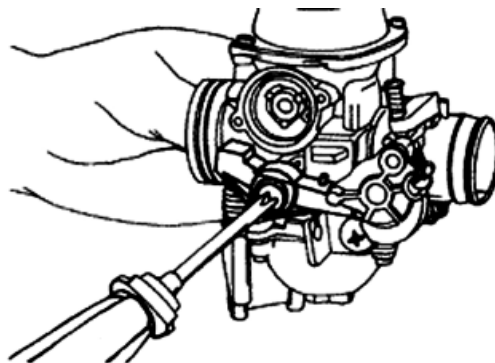
-
- Remove the guard, the bracket and the auto-choke unit.



-
- Remove the two screw fasteners and the auto-choke support, together with the gasket.



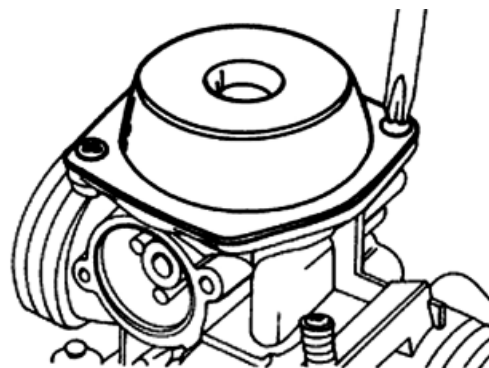
-
- Remove the screw fastener shown in the diagram, the lever and the accelerator pump spring.



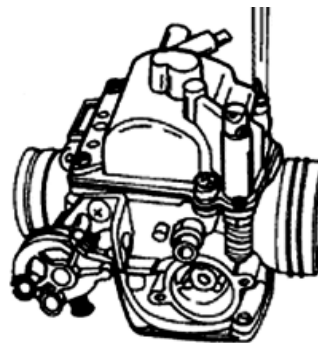
-
- Remove the two screw fasteners shown in the diagram, the venturi cover and the spring.
 - Remove the needle valve together with the diaphragm.

WARNING

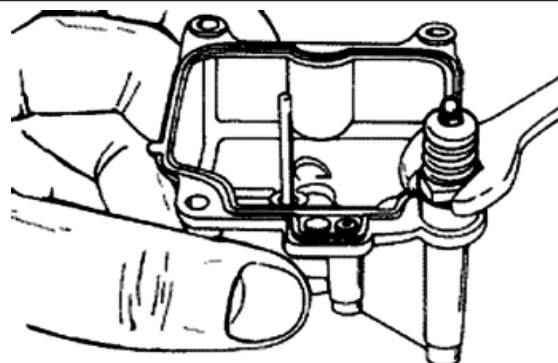
DURING THE REMOVAL OF THE COVER TAKE SPECIAL CARE NOT TO RELEASE THE SPRING ACCIDENTALLY.



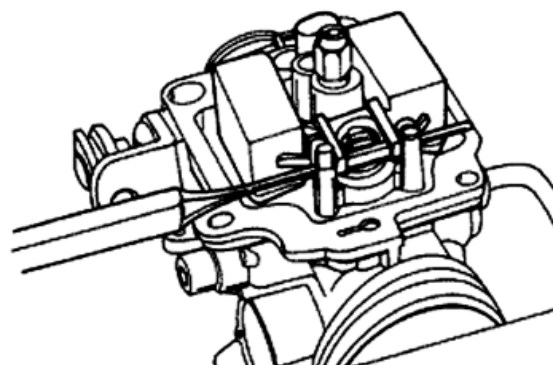
- Remove the four screw fasteners shown in the diagram and the float bowl, together with the gasket.



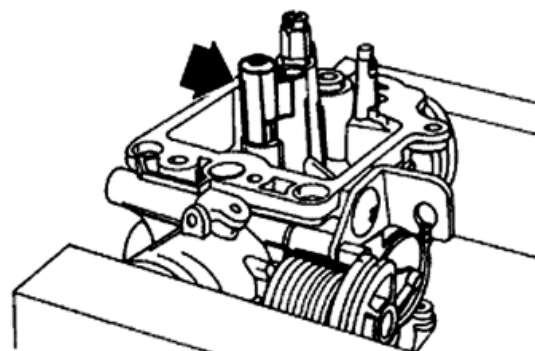
- Remove the accelerator pump piston together with the washer, the boot, the O-ring and the spring, as shown in the diagram.



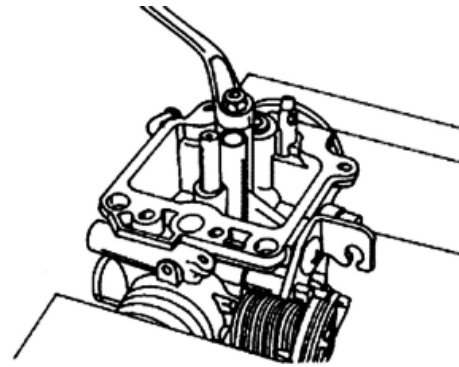
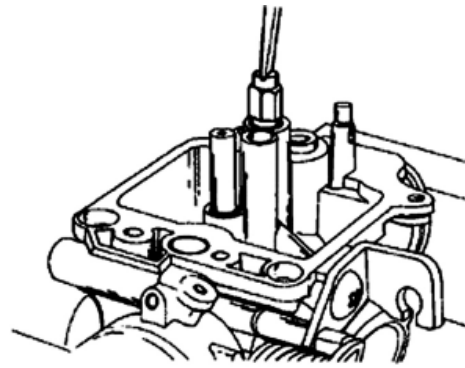
- Support the carburettor well and, using a mallet and narrow drift, remove the float pin from the throttle side.
- Remove the float and the needle.



- Remove the starter jet cap shown in the diagram.



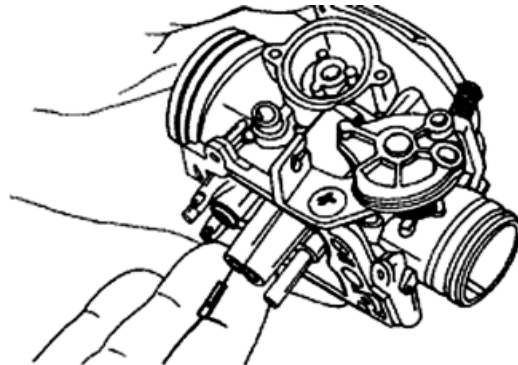
- Remove the maximum nozzle.
- Remove diffuser.



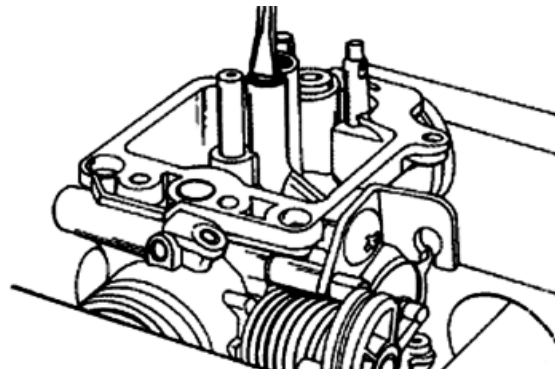
- Remove the sprayer tilting the carburettor body.

N.B.

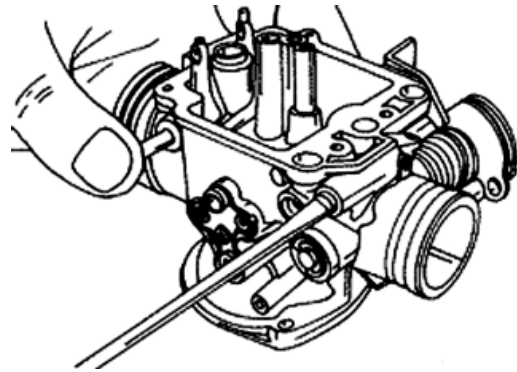
THIS OPERATION IS NECESSARY TO AVOID LOSING SPRAYER PARTS WHEN CLEANING THE CARBURETTOR BODY. IF THE SPRAYER IS FORCED IN ITS HOUSING DO NOT ATTEMPT TO REMOVE IT AS THIS WILL ONLY DAMAGE IT.



- Remove the minimum nozzle.



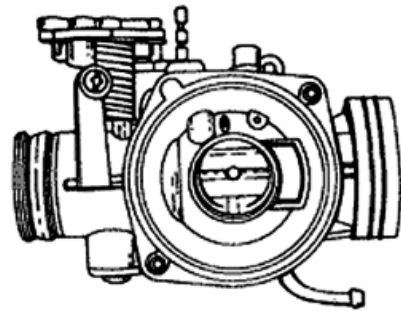
-
- Remove the idle flow screw with the O-ring and the spring.

**CAUTION**

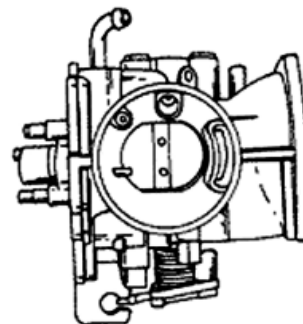
DO NOT ATTEMPT REMOVING PARTS EMBEDDED IN THE CARBURETTOR BODY SUCH AS: FUEL SUPPLY PIPE, PIN SEATING, STARTER NOZZLE, THROTTLE VALVE CONTROL VALVE SHAFT. DO NOT REMOVE THROTTLE-SHAFT CONNECTION SCREWS. THE FIXING SCREWS ARE CAULKED AFTER THE ASSEMBLY AND THEIR REMOVAL DAMAGES THE SHAFT.

Refitting the carburettor

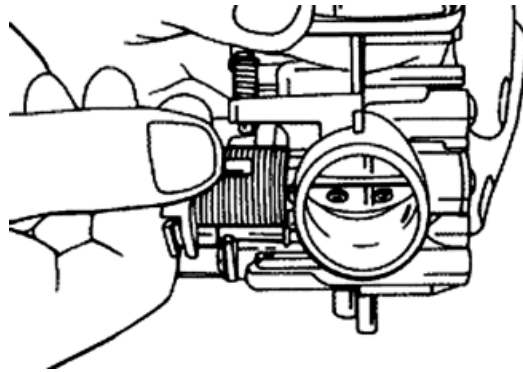
- Before refitting, wash the carburettor body accurately with a degreasing solvent and compressed air.
- Pay special attention to the fuel supply pipe and the plunger seat.



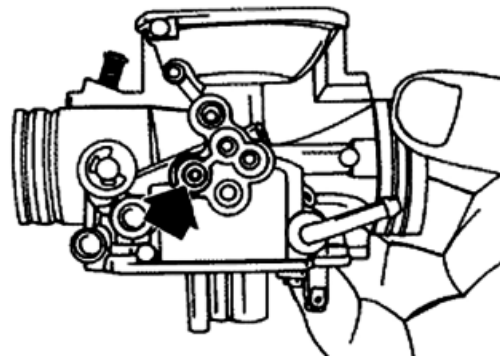
- Clean the main air jet shown in the diagram.



- 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.
- The acceleration nozzle outlet is extremely small and is oriented to the throttle valve.

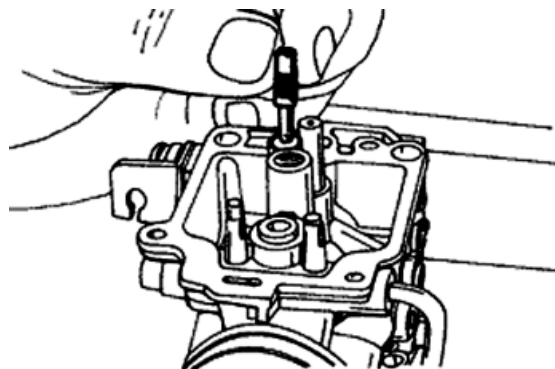


- Check there are 5 ball bearing seals pressed into holes machined in the carburettor body
- Check that the two mating surfaces, between the float bowl and the diaphragm, are unblemished.
- Check the float valve housing channel shows no signs of scoring.
- Check the butterfly valve and control arm.
- Check the valve seat shows no signs of abnormal or excessive wear.
- If any of the above defects are observed, replace the carburettor with a new one.

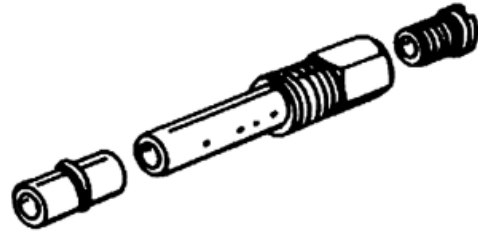
N.B.

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

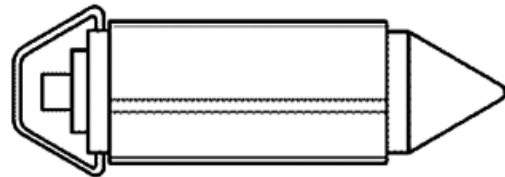
- Wash and blow the minimum nozzle properly and reassemble it.



- Accurately wash and blow the components of the maximum circuit, the sprayer, the diffuser and the nozzle.
- Introduce the sprayer in the carburettor body with the bigger cylindrical part directed to the diffuser.
- Fit the diffuser.
- 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 rod and that there are no fuel infiltrations.
- Replace it in case of anomalies.
- Fit the float together with the pin and rod in its position and lock it with its screw.

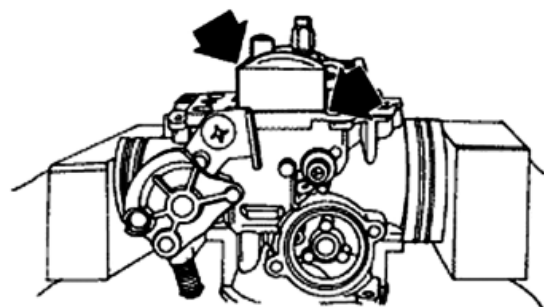


N.B.

INTRODUCE THE RETURN SPRING ON THE FLOAT PLATE ADEQUATELY

Level check

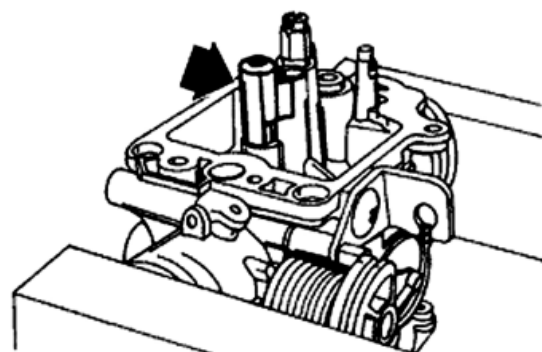
- Holding the carburettor upside-down, check that the float is parallel to the plane of the float bowl.
- If found to be out of alignment, adjust by bending the metal tab that controls the needle, until corrected.
- When making adjustments to the metal tab, ensure it remains parallel to the pin on which the float hinges.



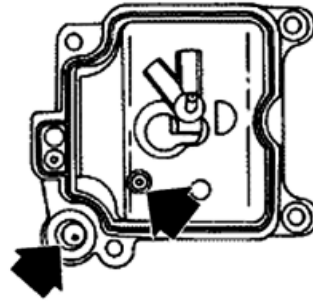
- Thoroughly clean, blow out and re-fit the starter jet cap

N.B.

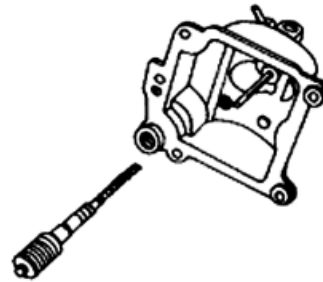
ABSENCE OF THE STARTER JET CAP WILL CAUSE OLD FUEL WILL BE TAKEN FROM THE BOTTOM OF THE FLOAT BOWL AND HENCE POOR STARTING.



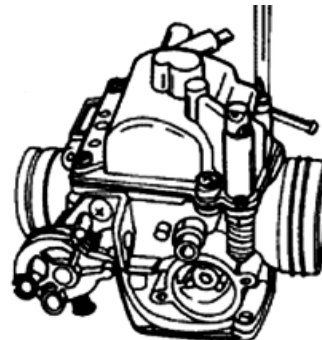
- Remove the float bowl drain screw, thoroughly clean it and blow out the passage.
- The float bowl vent and the accelerator pump contain one-way valves and, as such, should be blown out gently with compressed air from inside the float chamber.



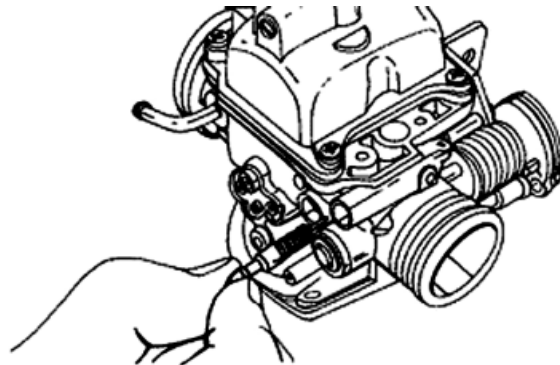
- Check there are no signs of wear either on the accelerator pump piston or the corresponding seat in the float bowl.
- Replace defective components.
- Check the spring on the accelerator pump piston shows no signs of wear.
- Re-fit the accelerator pump piston in the float bowl, using a new O-ring and a new boot.
- Re-fit the float, together with the needle, inserting the pin from the fuel inlet side.



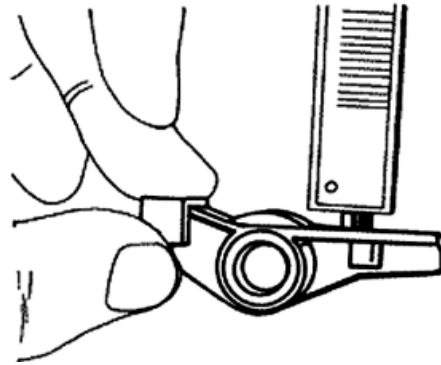
- Check the seal on the screw by introducing a little petrol into the float bowl.
- Assemble a new boot on the float bowl.
- Re-fit the float bowl to the carburettor body, by tightening to the specified tightening torque.



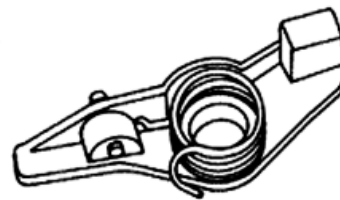
- Thoroughly clean the mixture screw, blow out the passage and re-assemble, using a new O-ring.
- Re-assembly takes the following order: spring, washer and O-ring.
- Screw the mixture screw into the carburettor body.
- The final position of the screw must be set according to analysis of the exhaust gas.
- Prepare the carburettor for setting-up, by opening the mixture screw two full turns from the closed position.



- Check the accelerator pump control arm shows no signs of abnormal or excessive wear.
- Check the clearance of the arm, at the end of its travel, is 3 ± 0.1 mm

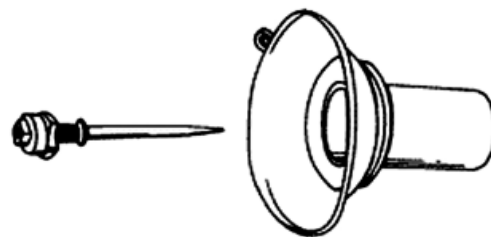


- Check the return spring on the accelerator pump control arm has not been over-extended or deformed.
- Pre-fit the spring to the control arm as shown in the diagram.
- Re-fit the control arm to the carburettor body, whilst holding the butterfly valve open.
- Tighten the control arm screw fastener to the specified tightening torque.
- Once assembled, check the mechanism is working correctly.



Inspecting the valve and needle

- Undo the bayonet fitting by rotating it 1/8th of a turn, remove the fitting and remove the vacuum valve needle and spring.

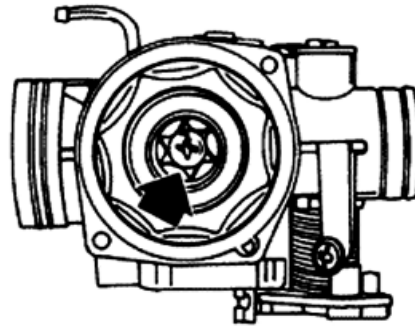


- Check the needle for signs of wear and that the stay is set on the second notch from the top.
- Check there are no signs of scoring on the outside of the valve.
- Check the two fuel supply holes are unobstructed.

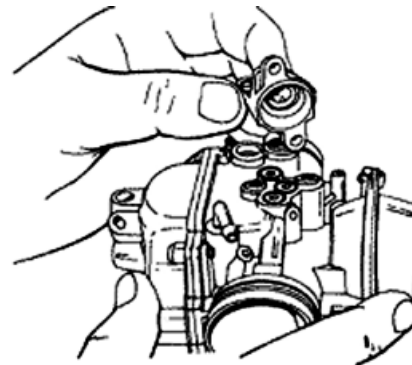


N.B.
THESE TWO HOLES ARE OF DIFFERENT DIAMETERS

- Check the diaphragm has not hardened and is not broken.
- Replace with a new one if necessary.
- Re-fit the needle to the vacuum valve.
- Ensure the spring is correctly positioned, both on the needle and in its seat.
- Push and turn the bayonet fitting 1/8th of a turn, back into position.

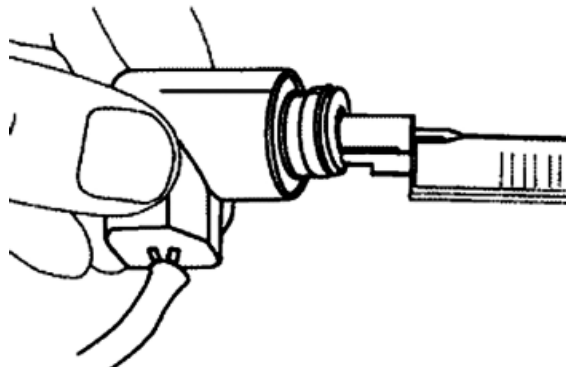


- Re-fit the vacuum petrol valve on the carburettor body, ensuring that the needle is inserted in the atomiser.
- Gradually screw in the vacuum valve to the point where the lobe on the diaphragm locates in its notch; with the valve in such a position, the main vacuum opening should be in line with the axis of the bore of the carburettor, offset towards the butterfly valve side.
- Re-fit the spring on the valve.
- Re-fit the vacuum chamber cover, aligning the reference mark on the cover with the one on the diaphragm.
- Tighten the screw fasteners to the specified tightening torque.
- Take off the auto-choke seat and blow it out.
- Replace the gasket with a new one and tighten the two screw fasteners.



Inspecting the automatic choke device

- Inspect the auto-choke piston for signs of scoring and oxidation.
- Check the auto-choke piston does not stick, but is free to move back and forth in its housing.
- Check the gasket is not deformed.
- The auto-choke piston should be more or less fully retracted at room temperature.
- Measure the distance by which the auto-choke piston projects.



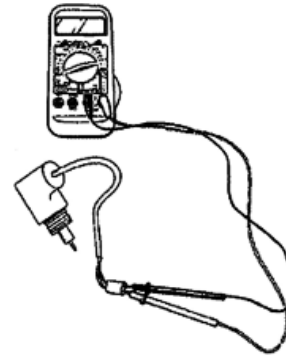
- Ensure the piston is retracted at room temperature.

Characteristic

Piston projection starter automatico Walbro

10 mm ~ 24°C

- The auto-choke piston should gradually extend when power is supplied to its electrical heater terminals.
- Check the resistance across the auto-choke terminals at room temperature.

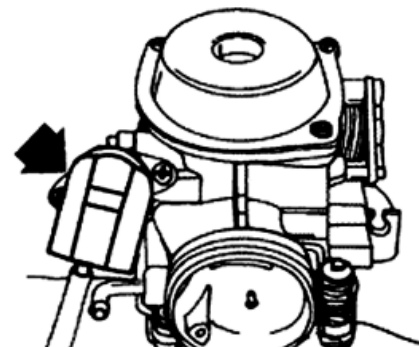


**Electric characteristic
keihin choke device resistor**

30 - 40 Ω

- Connect a battery to power the automatic choke for 5 minutes and check that the piston extends fully.
- The actual time to warm up is dependent on ambient temperature.
- If the automatic choke protrudes, sticks or requires times other than those specified, replace it with a new one.

- Re-fit the auto-choke unit to the carburettor, ensuring the O-ring is correctly located and the knurled side of the clamping plate is facing downwards, then tighten the two screw fasteners.
- The correct auto-choke position is indicated in the diagram.
- Place the protective hood over the auto-choke.



- Check the resistance across the carburettor heater terminals at room temperature.
- If the heater resistance varies significantly from the specified value, replace it with a new one.
- Re-fit the carburettor heater.
- Re-fit the float bowl vent tube and the run-off tube.
- Re-fit the carburettor, following the steps described in Chapter Cylinder Head and Timing Components.

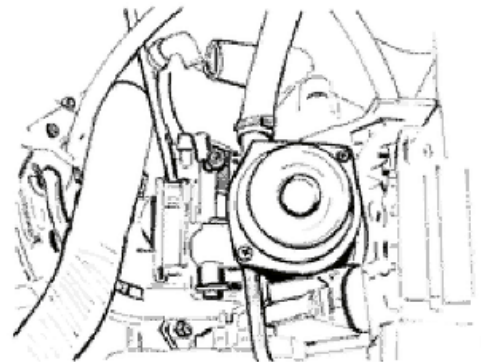
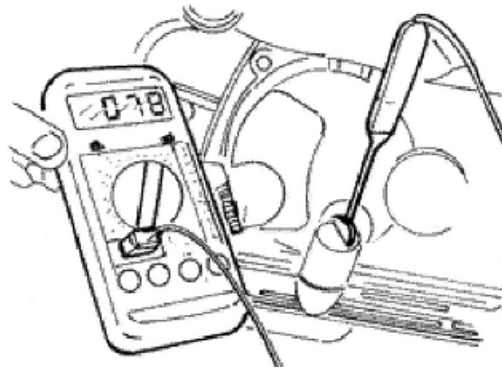


**Electric characteristic
Resistance at room temperature**

~ 15 Ω

Adjusting the idle

- The engine does not need frequent idle adjustments, however it is very important to make any adjustments fully respecting some standards.
- 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 the vehicle to the exhaust fumes analyser inserting the probe into a sealed extension pipe placed at the muffler exit end.
- Connect a millimetre thermometer (020331y) on the sump, using a cover with oil expressly prepared for probes.
- Start the motor and before adjusting the idle speed make sure that the oil temperature is between 70 ÷ 80°C.
- Using the rpm indicator or any other instrument (020332y), adjust the idle screw to obtain 1600 rpm ÷ 1700 rpm
- Adjust the flow screw until the carbon monoxide (CO) percentage is 3.1 ÷ 4.5%, when the screw is loosened the CO value rises (rich mix). Tightening the screw decreases the CO (lean mix).
- If the adjustment of the flow screw causes a rpm increase readjust the revs again and if necessary, the flow screw to reach stable values.
- When the oil temperature, the numbers of revs and the percentage of carbon monoxide are respected the idle carburetion is considered correct. From the analyser we can draw further information:



- carbon dioxide percentages (CO₂), the percentage of carbon dioxide has an inverted course compared to the percentage of (CO), values over 12.5% are considered correct. Non complying values indicate lack of tightness in the exhaust system.

- Unburned hydrocarbons (HC) are measured in parts per million (PPM). The HC value decreases while the rpm increases; with the engine at idle it is normal to detect 200 ÷ 400 PPM, these emission values are deemed normal for an engine with a diagram of distribution for motorcycles. Higher values can cause loss of engine blows as the mixture is too lean (low CO), ignition failure or, incorrect timing or a clogged or unsealed exhaust valve.

- If it were difficult to ???? adjustment CO check accurately:

- That the carburettor is clean
- That the automatic starter is efficient
- Tapered pin housing efficiency
- Tank level adjustments

N.B.

THE EXTENSION TUBE IS INDISPENSABLE SO AS NOT TO SEND POLLUTED EXHAUST FUMES TO THE AMBIENT OXYGEN. IT IS INDISPENSABLE TO USE AN EXHAUST FUMES ANALYSER PREVIOUSLY HEATED AND PREPARED TO GUARANTEE THE RESET OF THE READING OF GASES AND THE CORRECT GAS CAPACITY. FAILURE TO RESPECT THESE REGULATIONS RESULTS IN INACCURATE READINGS.

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

Characteristic

Idle adjustment: Pipe sizes

Ø 40 mm

Idle adjustment: length

500 ÷ 600 mm

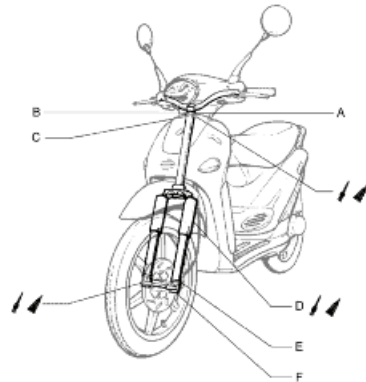
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SSUSPENSIONS

SUSP

Front suspension

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



Front

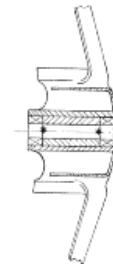
Front wheel hub overhaul

Ball bearings to hub

- Fit the spacer
- Fit the ball bearings and bushes and position the seal rings.

WARNING

PRIOR TO REASSEMBLY, LUBRICATE WITH JOTA 3 F.S. GREASE IN THE AREAS MARKED WITH THE ASTERISK.



Handlebar

Removal

Remove the handlebar cover before carrying out this operation,.

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



N.B.

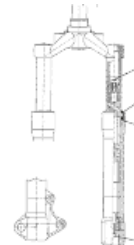
IF THE HANDLEBAR IS BEING REMOVED TO REMOVE THE STEERING, TILT THE HANDLEBAR FORWARD TO AVOIDING DAMAGING THE TRANSMISSIONS.

Front fork

Overhaul

O-ring renewal and rod disassembly

- Remove the wheel axle.
- Remove the lower screw (1).
- Discharge the oil in the suspension.
- Remove the stem.
- Replace the sealing rings (3-4) with new ones.
- Insert the new sealing rings only after lubricating their seatings.
- Refit the stem and the lower screw (1).
- Remove the upper screw (2).
- Add 30 cc \pm 1 "**Fork PG**" oil (SAE 20W oil for forks).
- Refit all components.



Locking torques (N*m)

Upper screw tightening torque 20 to 25 Nm Lower screw tightening torque: 20 to 25 Nm

Steering column

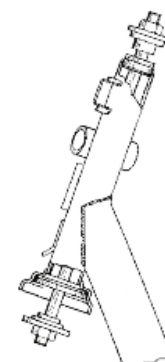
Refitting

Lower and upper bearing races to frame

Lower and upper seating on the chassis

LOWER AND UPPER SEATING ON THE CHASSIS

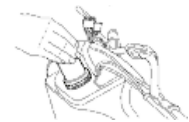
Titolo	Durata/ Valore	Testo Breve (< 4000 car.)	Indirizzo Immagine
Lower and upper seating on the chassis			



Steering bearing

Steering collar

Steering lock ring nut



Steering bearing upper race

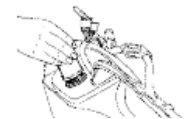
- Lubricate race and balls with **Z2** grease.
- Tighten to the specified torque and then rotate the tool through 80° - 90° in an anticlockwise direction.



Removal

Upper bearing washer and race

After removing the upper seating, tilt the vehicle to a side and take out the steering tube making sure mudflaps have been removed and the calliper disconnected.



Lower and upper races from frame

To remove the bearing seats from the chassis, use the appropriate tool as shown in the figure.

N.B.

To remove the lower seating of the lower bearing just use a screwdriver as a lever between the seating and the shell.



LOWER AND UPPER SEATING FROM THE CHASSIS

Titolo	Durata/Valore	Testo Breve (< 4000 car.)	Indirizzo Immagine
Lower and upper seating from the chassis			

Rear

Removing the rear wheel

- Use a screwdriver as a lever between the drum and the cover.
- Straighten the split pin and remove the cap.
- Remove the wheel acting on the central fixing point.

WARNING

-ALWAYS USE NEW SPLIT PINS FOR REFITTING.



Refitting the rear wheel

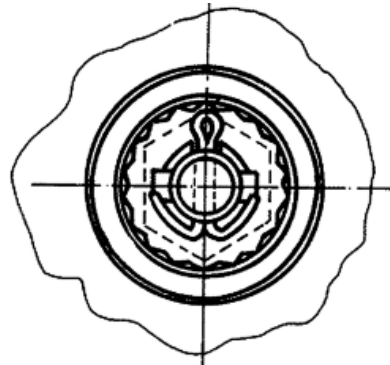
- Refit the parts in the reverse order as for removal, lock the wheel nut to the specified torque.

WARNING

- FOLD THE EDGES OF THE SPLIT PIN AS SHOWN IN ORDER TO AVOID BACKSLASH BETWEEN THE CAP AND THE WHEEL AXLE.

Locking torques (N*m)

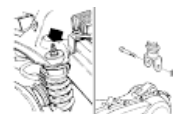
Rear wheel axle 104 ÷ 126



Shock absorbers

Removal

- To replace the shock absorber remove the rear cover and battery access flap to get and remove the shock absorber/ chassis anchoring nut. Then remove the shock absorber/engine anchorage nut.
- When refitting, tighten the shock absorber/chassis anchoring nut and the shock absorber/engine pin to the prescribed torque.



Locking torques (N*m)

Shock absorber/engine pin torque 33 to 41 N-m

Shock absorber/frame nut torque 20 to 25 Nm

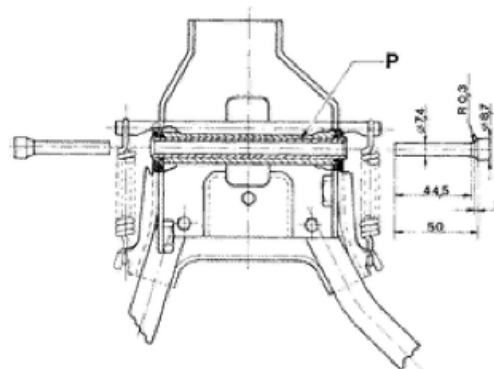
Centre-stand

Assembly and staking of stand pivot pin to bracket

- Caulk the end of the pin «P» between the two punches shown in the figure.
- After caulking it must be possible for the stand to turn freely.

N.B.

UPON REFITTING USE NEW O-RING AND PIN, GREASE THE SPRING ATTACHMENTS AND THE PIN.



Changing the complete stand

- Work on the screws shown in the figure.
- When refitting, secure to the prescribed torque.

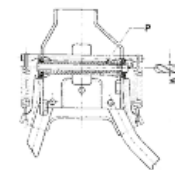


Locking torques (N*m)

Stand screw torque 18.5 to 19 Nm

Expelling stand pivot pin from bracket

- Remove the stand support bracket from the engine.
- Drill a 5 mm hole in the bracket so that the pin «P» can come out.



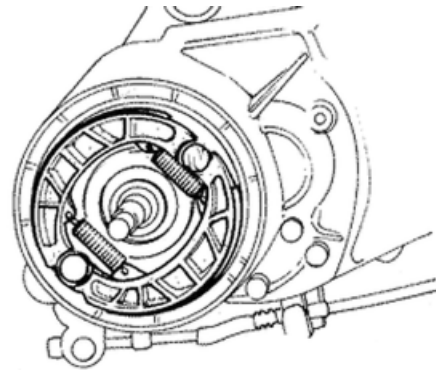
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BRAKING SYSTEM

BRAK SYS

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

1. Remove the shoe spring using the specific spanner.
2. Remove the shoe with the aid of a lever.
3. Refit the new shoes giving a few taps with the mallet.
4. Attach the spring using the specific pliers.



Specific tooling

020325Y Pliers for brake-shoe springs

Rear brake calliper

Refitting

Insert the following parts into the calliper half bodies:

- sealing rings (1-2);
- pistons (3);
- fit O-ring seal (4) in one of the pump bodies.
- Couple the inner and outer bodies by means of the coupling bolts. Fit the pads and bleed air from the system (see previous paragraphs).
- Position the caliper on the disc and fasten it to the support, tightening the bolts.
- Secure the tube connection to the caliper with the required torque.
- Before reassembly, the parts must be perfectly clean and **bear no traces of oil, diesel fuel, grease**, etc.. They must therefore be washed thoroughly in denatured alcohol before proceeding.

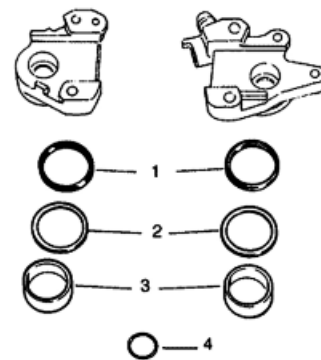
Immerse the seals in brake fluid; the use of protective agent PRF1 is tolerated.

CAUTION

RUBBER PARTS SHOULD NEVER BE LEFT IN ALCOHOL FOR LONGER THAN 20 SECONDS.

AFTER WASHING, THE PIECES MUST BE DRIED WITH A BLAST OF COMPRESSED AIR AND A CLEAN CLOTH.

Locking torques (N*m)

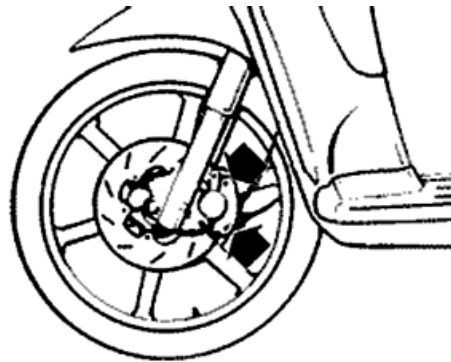


Screw tightening calliper to the support 20 ÷ 25
Calliper to tube connection 8 ÷ 12 Nm

Front brake calliper

Removal

- Detach the oil brake hose from calliper, pouring the fluid inside a container.
- Remove the mountings indicated in the figure.
- When refitting, tighten the nuts to the prescribed torque.
- Bleed the system.



Locking torques (N*m)

Calliper tightening screw 20 ÷ 25 Nm Brake fluid tube calliper 20 ÷ 25

Overhaul

- Remove the calliper assembling bolts and take out the internal bodies and components. If necessary, in order to make it easier to take out the plungers, inject (shorts blasts of) compressed air through the brake fluid pipe.
- Check that the cylinders of the internal and external body of the calliper do not show scratches or signs of erosion; otherwise, replace the entire calliper.

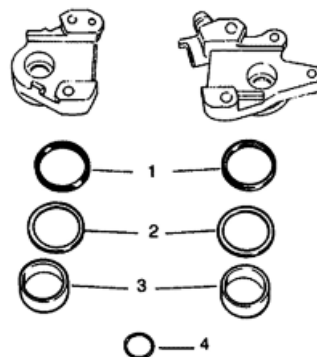
CAUTION

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

Refitting

Insert the following parts into the calliper half bodies:

- sealing rings (1-2);
- pistons (3);
- fit O-ring seal (4) in one of the pump bodies.
- Couple the inner and outer bodies by means of the coupling bolts. Fit the pads and bleed air from the system (see previous paragraphs).
- Position the caliper on the disc and fasten it to the support, tightening the bolts.



- Secure the tube connection to the caliper with the required torque.
- Before reassembly, the parts must be perfectly clean and **bear no traces of oil, diesel fuel, grease**, etc.. They must therefore be washed thoroughly in denatured alcohol before proceeding.
Immerse the seals in brake fluid; the use of protective agent PRF1 is tolerated.

CAUTION

RUBBER PARTS SHOULD NEVER BE LEFT IN ALCOHOL FOR LONGER THAN 20 SECONDS.
AFTER WASHING, THE PIECES MUST BE DRIED WITH A BLAST OF COMPRESSED AIR AND A CLEAN CLOTH.

Locking torques (N*m)

Screw tightening calliper to the support 20 ÷ 25
Calliper to tube connection 8 ÷ 12 Nm

1 DUST GUARDS

2 SEALING RINGS

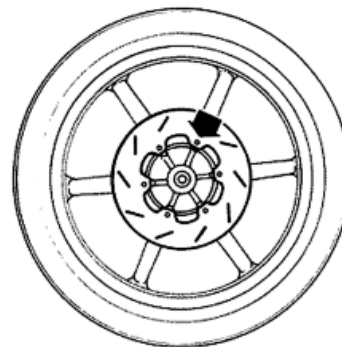
3 PLUNGERS

4 O-RING GASKET

Front brake disc

Removal

- Remove the front wheel loosening the axle clamp.
- Remove the six fastenings of the disc.



Refitting

- When refitting, position the disc correctly making sure that it rotates in the right direction.

Locking torques (N*m)

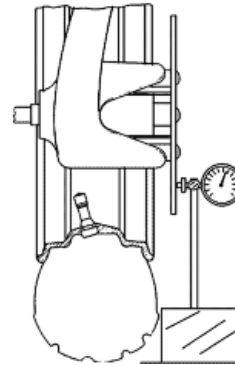
Disc tightening screw 8 - 12

Disc Inspection

- Remove the wheel and check for unevenness of the disc.

Maximum permissible out of true is 0.1 mm. If the value measured is greater, fit a new disc and repeat the check.

- If the problem persists, check and replace the wheel rim if necessary.



Specific tooling

020335Y Magnetic support for dial gauge

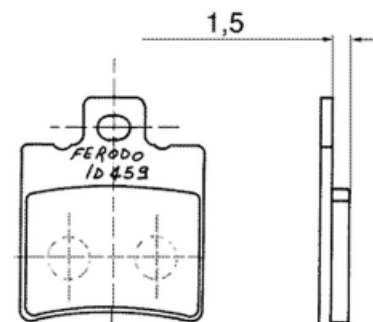
Front brake pads

Removal

- To facilitate this operation remove the two calliper fixings. With the calliper detached from its support but still connected to the brake fluid line, remove the plastic cover by prising it with a screwdriver.

- Remove the outside circlip from the brake pad pin, the leaf spring and the pads.

- Renew the pads when friction facing thickness is less than 1.5 mm.



Refitting

- To reassemble perform the above steps in reverse order. Position the leaf spring with the arrow facing up.

Fill

Front

-Once the bleed valve is closed, fill the system with brake liquid to the maximum level.

-Undo the bleed screw.

-Apply the tube of the special tool to the bleed screws.

When bleeding it is necessary to fill the oil tank in continuation while working with a MITYVAC pump on the bleed screws until no more air comes out of the system.

The operation is finished when just oil comes out of the bleed screws.

-Do up the bleed screw.

-When the operation is over, tighten up the oil bleed screw to the prescribed torque.

N.B.

IF AIR CONTINUES TO COME OUT DURING PURGING, EXAMINE ALL THE FITTINGS:
IF SAID FITTINGS DO NOT SHOW SIGNS OF BEING FAULTY, LOOK FOR THE AIR INPUT AMONG THE VARIOUS SEALS ON THE PUMP AND CALLIPER PISTONS.

CAUTION

- DURING THE OPERATIONS, THE VEHICLE MUST BE ON THE STAND AND LEVEL.

N.B.

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

WARNING

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

THEREFORE, ALWAYS USE FLUID FROM SEALED CONTAINERS.

UNDER NORMAL DRIVING AND CLIMATIC CONDITIONS YOU SHOULD CHANGE THIS LIQUID EVERY TWO YEARS. IF THE BRAKES ARE USED INTENSELY AND/OR IN HARSH CONDITIONS, CHANGE THE FLUID MORE FREQUENTLY.

CAUTION

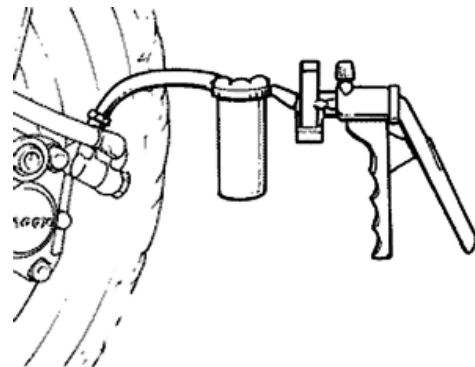
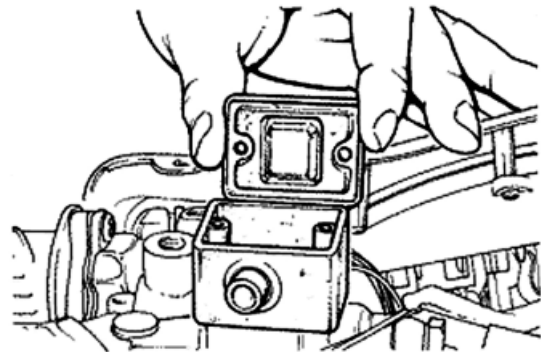
WHEN CARRYING OUT THE OPERATION, BRAKE FLUID MAY LEAK FROM BETWEEN THE BLEED SCREW AND ITS SEAT ON THE CALLIPER.

CAREFULLY DRY THE CALLIPER AND DEGREASE THE DISC SHOULD THERE BE OIL ON IT.

Specific tooling

020329Y MityVac vacuum-operated pump

Recommended products



AGIP BRAKE 4 Brake fluid

FMVSS DOT 4 Synthetic fluid

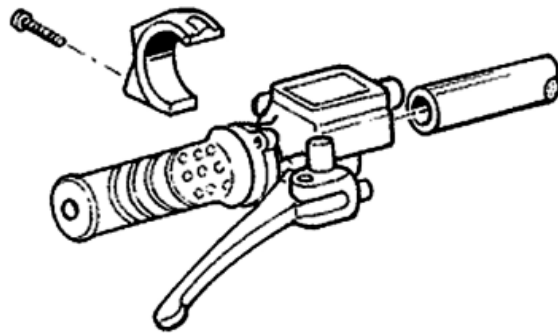
Locking torques (N*m)

Oil bleed screw 8 ÷ 12

Front brake pump

- After removing the front and rear handlebar covers, act on the two stand fixing points (see the figure).
- Disconnect the tube, collecting the brake oil in a container.

- On refitting, perform the operation in reverse.
- Tighten the hydraulic line to the prescribed torque and bleed the system.

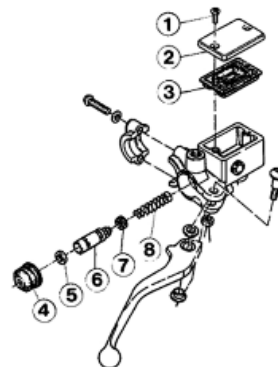
**Locking torques (N*m)**

Brake fluid pump - hose fitting 20 ÷ 25 Nm

Removal

- Bleed the circuit and drain the brake fluid through the bleeding screw located on the calliper and actuate the brake lever until no more fluid flows out.
- Remove the oil pump from the handlebar; remove the brake lever and then remove the wheel cylinder.

- 1 - Tank cap screw.
2. Tank cover.
3. Diaphragm.
4. Bellows.
5. Sealing ring.
6. Piston.
7. Gasket.
- 8 - Spring

**CAUTION**

- THE PRESENCE OF BRAKE FLUID ON THE DISC OR BRAKE PADS REDUCES THE BRAKING EFFICIENCY. IN THIS CASE, REPLACE THE PADS AND CLEAN THE DISC WITH A HIGH-QUALITY SOLVENT. CONTACT WITH BRAKE FLUID WILL DAMAGE PAINTED SURFACES. RUBBER PARTS SHOULD NEVER BE LEFT IN ALCOHOL FOR LONGER THAN 20 SECONDS.

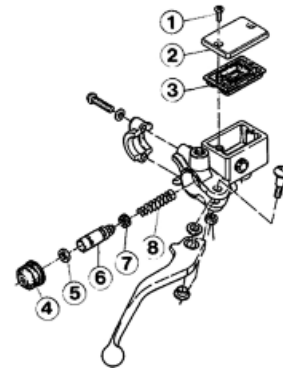
AFTER WASHING, THE PIECES MUST BE DRIED WITH A BLAST OF COMPRESSED AIR AND A CLEAN CLOTH. THE SEALING RINGS MUST BE IMMERSSED IN THE OPERATING LIQUID.

Refitting

Before fitting, the parts must be perfectly clean and free of traces of oil, diesel fuel, grease, etc.. They should be washed thoroughly in denatured alcohol before proceeding.

- Reinstall the individual parts in the reverse order to the removal, paying attention to the correct positioning of the rubber parts in order to ensure leak tightness.

- 1 - Tank cap screw.
2. Tank cover.
3. Diaphragm.
4. Bellows.
5. Sealing ring.
6. Piston.
7. Gasket.
8. Spring.



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CHASSIS

CHAS

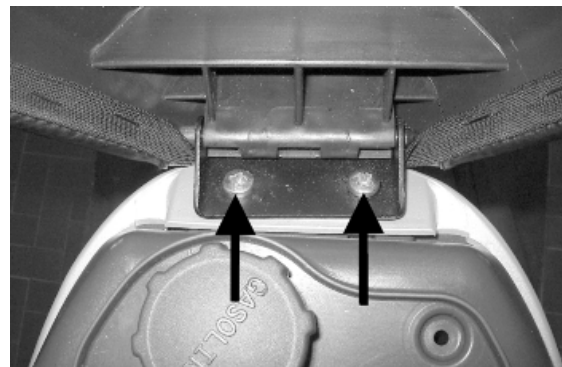
Taking apart approached cover motor

Remove the 2 implantations.



Seat

- Unscrew the 2 fixing screws and remove the saddle

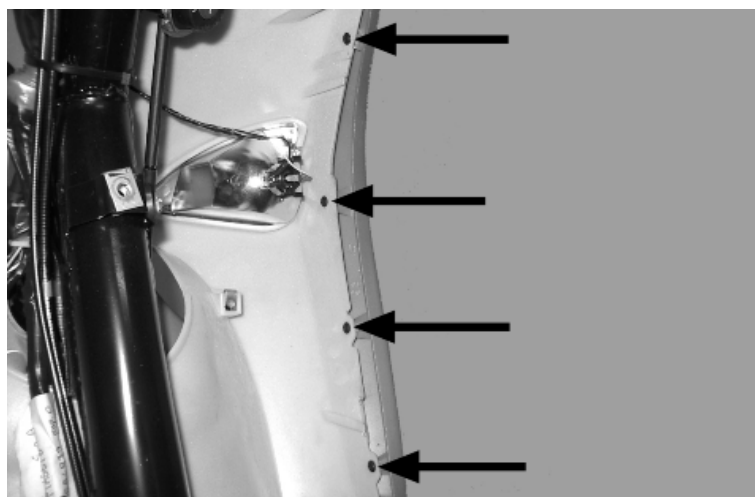


Saddle

After checking the homologation specifications, it was concluded that the strap on the saddle is redundant. Please note that the passenger saddle comes without strap since last May. The design number remains unchanged.

Side fairings

- Remove the countershield
- Unscrew the 4 screws securing it and remove the bumper band

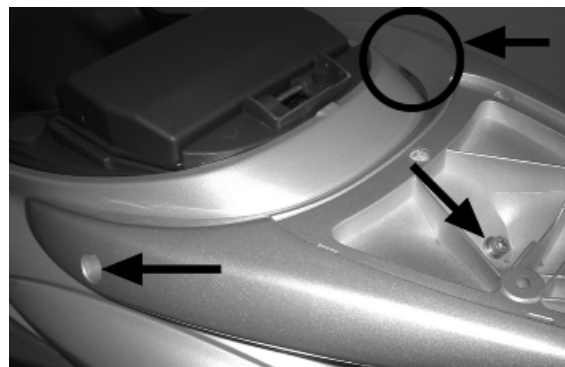
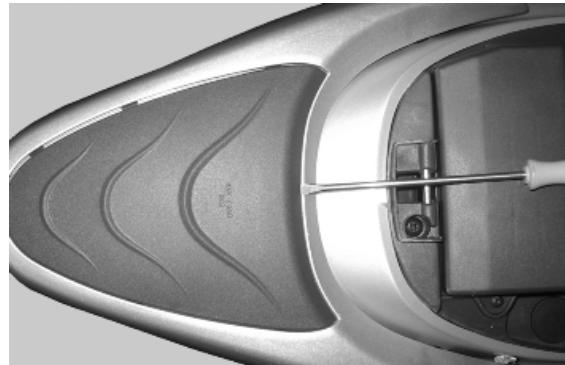


See also

[Knee-guard](#)

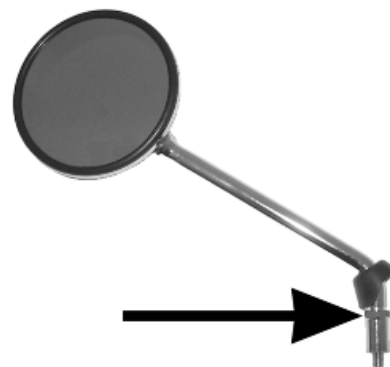
Rear rack

- Operating from the rear and using a screwdriver, remove the plastic cap of the central screw cover.
- Remove the central and the 2 side screws.



Driving mirrors

- With the register screw completely tightened, screw the mirror stem all the way down on the handlebars.
- Loosen the mirror and put it in the desired position.
- Loosen the register screw until the stem is tightened.

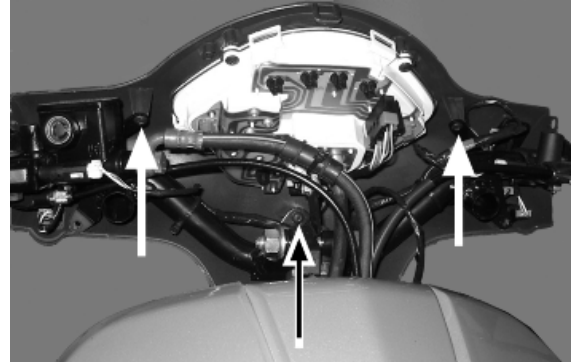


Locking torques (N*m)

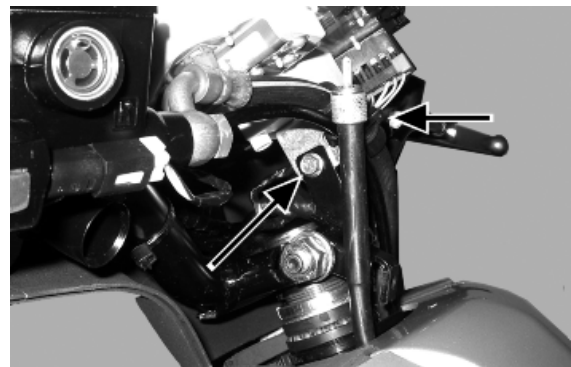
Mirror register screw 24÷26

Rear handlebar cover

- Remove the front handlebar fairing
- Unscrew the speedometer transmission connection and remove it
- Disconnect the instrument unit and electrical control connections



- Cut the band holding the front brake hoses to the instrument unit
- Remove the screw securing the instrument unit to the handlebar



See also

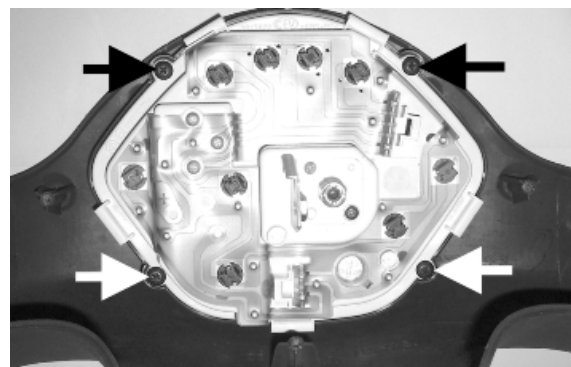
[Front handlebar cover](#)

Instrument panel

- Remove the rear handlebar fairing
- Unscrew the 4 screws securing it and remove the instrument unit

N.B.

THE BULBS HAVE BAYONET COUPLING ON THE LAMP-HOLDER; THE LAMP-HOLDER CAN BE REMOVED BY ROTATING IT 30° ANTI-CLOCKWISE. THE CLOCK RUNS ON A BATTERY

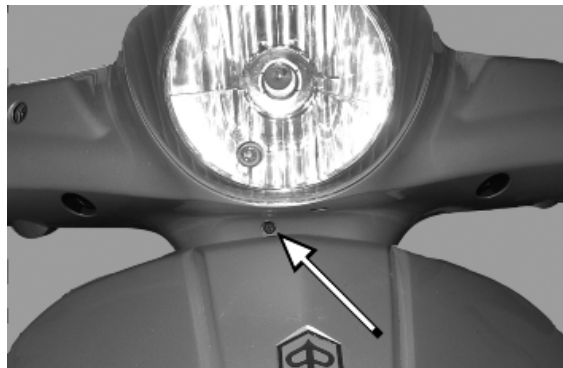


See also

[Rear handlebar cover](#)

Front handlebar cover

- Remove the 2 screws in the rear handlebar cover and the screw under the headlamp.
- Pull up and detach the front handlebar cover, disconnect the headlight assembly connections.

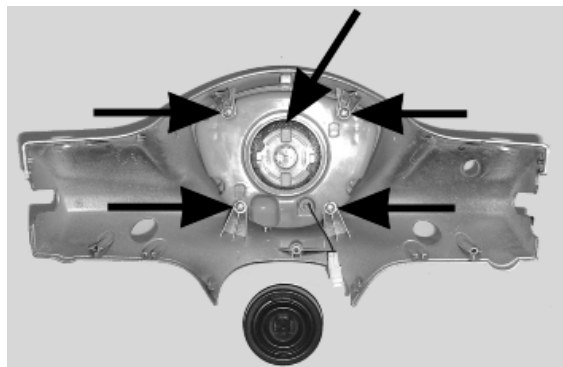


Headlight assy.

- Remove the front handlebar fairing
- Unscrew the 4 screws securing it and remove the headlight

N.B.

TO REPLACE THE HIGH BEAM/DIPPED BEAM BULB THE RUBBER COVER MUST BE REMOVED AND THE SUPPORT PLATE ROTATED 30° ANTI-CLOCKWISE. TO REPLACE THE POSITION LIGHT BULB, JUST REMOVE IT FROM THE RUBBER LAMP-HOLDER.

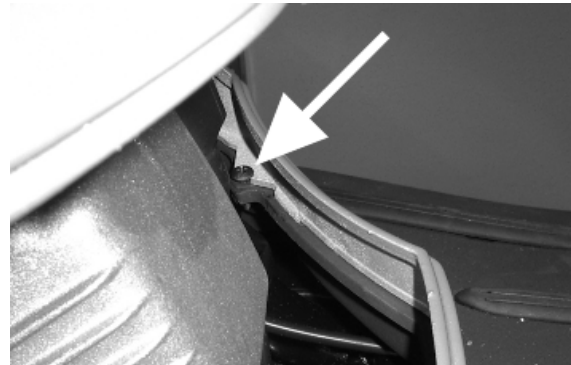


See also

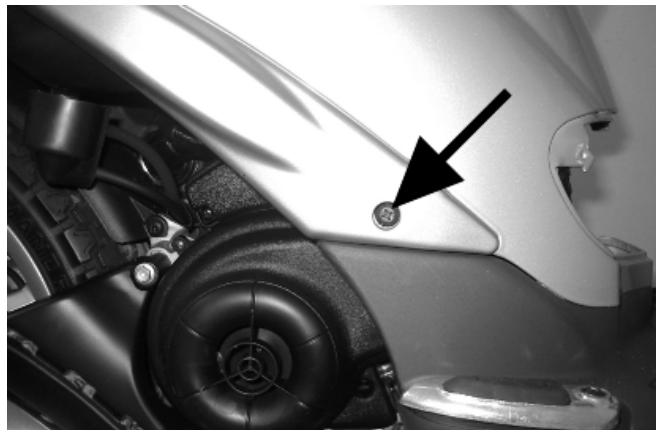
[Front handlebar cover](#)

Frame central cover

- Remove the rear luggage rack
- Remove the saddle
- Remove the spark plug access cover, unscrew the 2 screws joining the helmet compartment clamp with the footrest.



- Unscrew the 2 side screws placed on the bumper rings.
- Remove the cover by holding it from the rear part and disconnect the turn indicator light connections

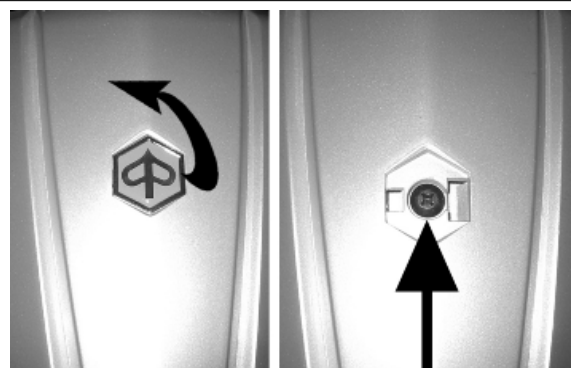


See also

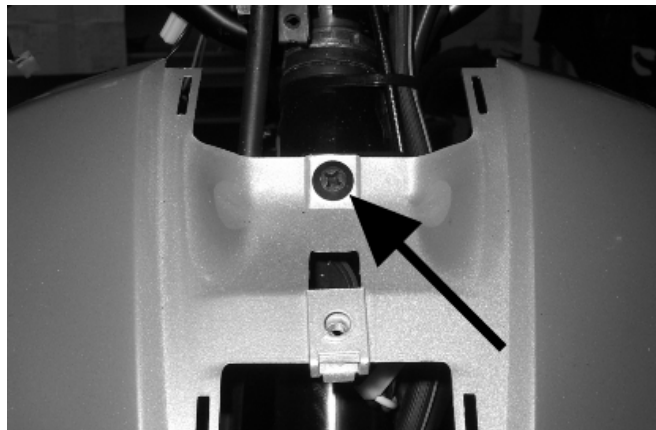
[Rear rack](#)
[Seat](#)

Legshield

- Remove the countershield
- Remove the footrest
- Remove the front steering tube
- Remove the front shield using a blade and working carefully on the right side of it
- Unscrew the screw below and lift off the cover



- Unscrew the front screw securing the shield



- Unscrew the lower 2 screws, then remove the shield after having disconnected the turn signal connections

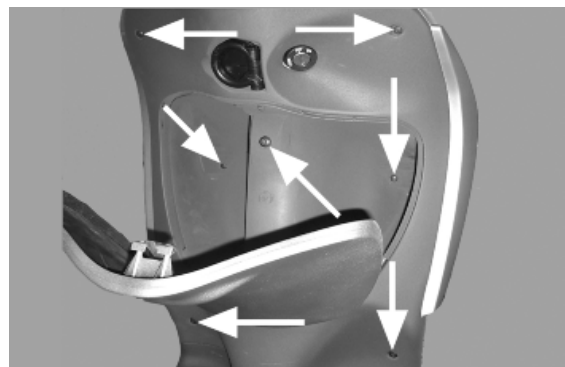


See also

[Knee-guard](#)
[Footrest](#)

Knee-guard

- Remove the 4 external screws of the countershield and the 3 located inside the front glove box
- Use the bag clip to pull the countershield back until releasing it with the front shield



Removing the ignition key-switch when on *off*

- Remove the shield back plate
- Push the lock body until the stop spring does not show grooves.
- Keep the lock body blocked with a screwdriver and remove the spring with a pair of pliers.
- Take out the lock block.



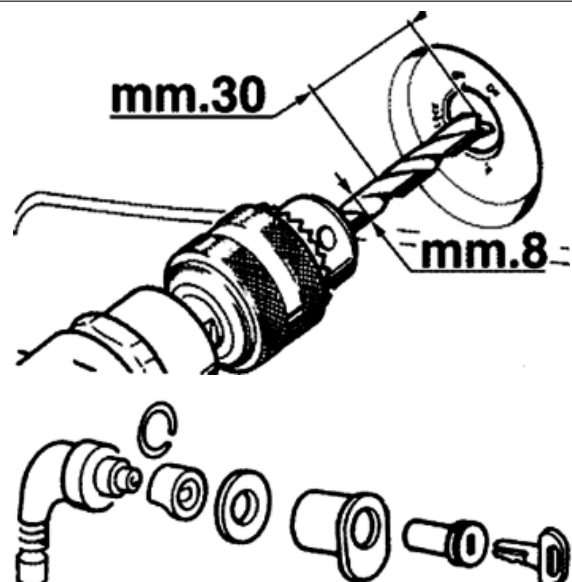
See also

[Knee-guard](#)

Removing the ignition key-switch when on *lock*

Remove the shield.

- Remove the switch of the key switch.
- Make a hole on the block using a drill as shown in the figure.
- Insert the wheel cylinder with the key and with the anchoring tab facing down halfway on the lock body taking care that the insertion phase of the key is oriented matching "ON" (the only position that enables the cylinder to get into the lock body); now turn the key leftwards to "OFF" and at the same time press until the cylinder is completely in.



Taillight assy.

- To remove the taillight and position light or the 2 turn signals, just unscrew the screws located on the related light covers and disconnect the electrical connections.

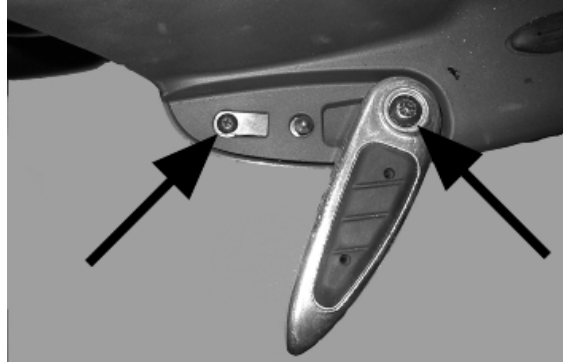
N.B.

REMOVAL OF THE REAR LIGHT BULBS IS ONLY POSSIBLE BY REMOVING THE LIGHT COVERS ROTATING THEM 30° ANTI-CLOCKWISE.

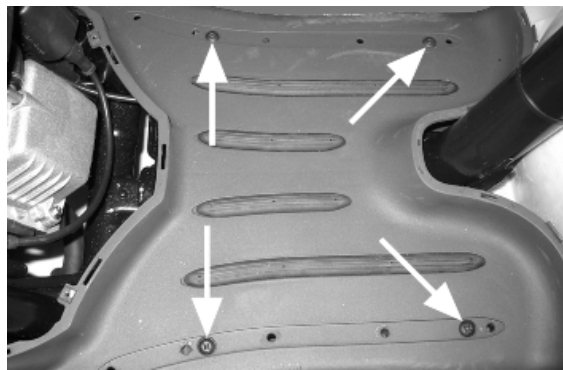


Footrest

- Remove the countershield
- Remove the frame central cover
- Unscrew the screws that secure the passenger footrest and remove it
- Unscrew the footrest stop screw and remove the tab



- Remove the 2 external rubber caps of the screws securing the footrest and unscrew them
- Pull the footrest up being careful of the lower hooks

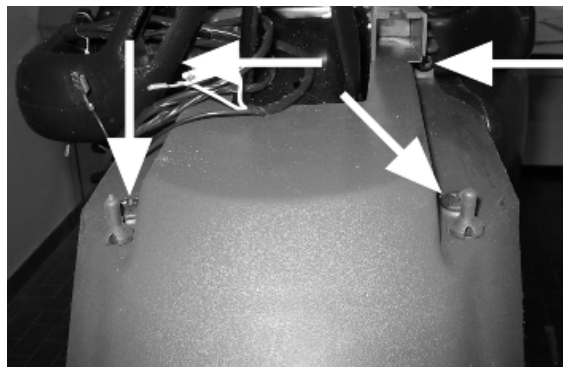


See also

[Knee-guard](#)
[Frame central cover](#)

License plate holder

- Remove the saddle compartment cover
- Unscrew the 2 screws securing it to the frame, then remove the license plate housing

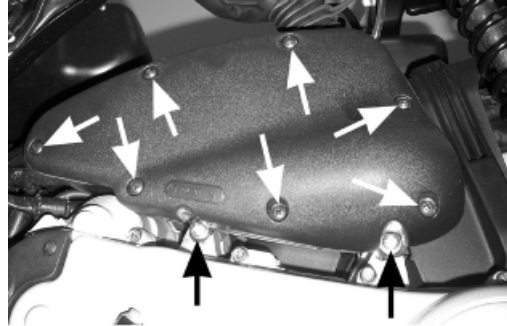


See also

[Frame central cover](#)

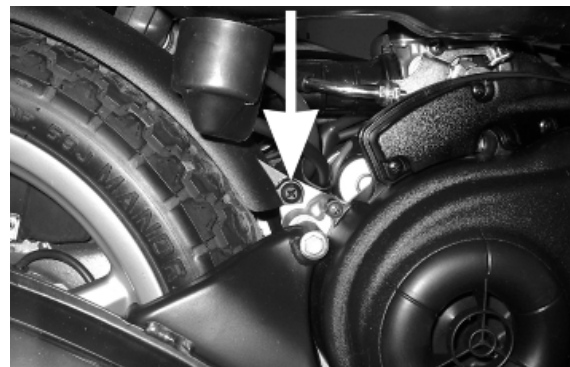
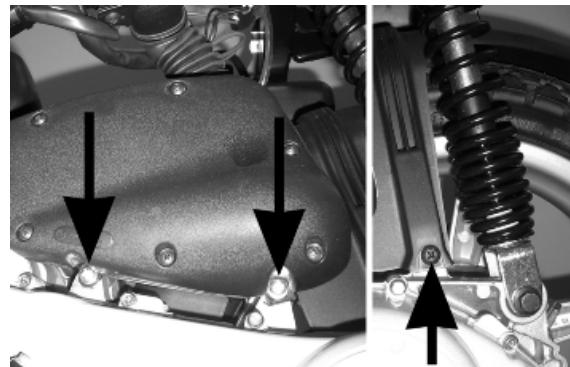
Air filter

- Unscrew the 7 cover screws and remove the cover to reach the filter sponge.
- To disassemble the filter housing, unscrew the 2 bottom screws and disconnect the manifold connections, the carburettor and the external air intake.



Rear mudguard

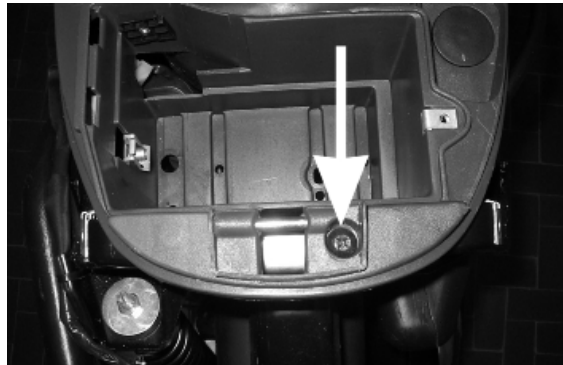
- Remove the 3 screws securing it on the left side (including the 2 screws securing the air filter box)
- Remove the screw on the side of the cooling casing
- Remove the mudguard by taking it off the muffler side.



Please take note that, starting from chassis serial number ZAPM384000005931, a washer drawing 709047 has been added in order to guarantee the rear mudguard correct fixing

Helmet bay

- Remove the helmet compartment central cover.
- Remove the battery and the fuse box.
- Remove the fuel tank cap and the start-up remote control switch.
- Unscrew the rear fixing screw and lift the helmet compartment.

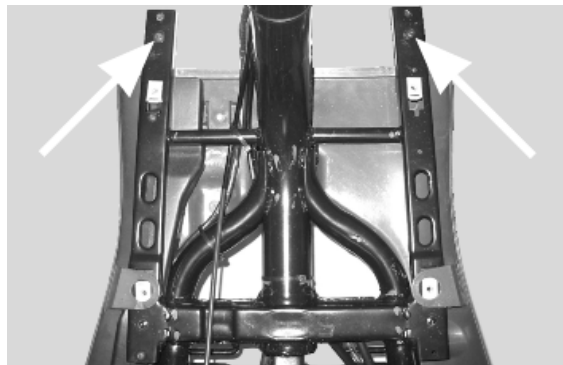


See also

[Frame central cover](#)
[Frame central cover](#)

spoiler

- Remove the footrest
- Unscrew the two front screws securing it and then remove the spoiler from the bottom

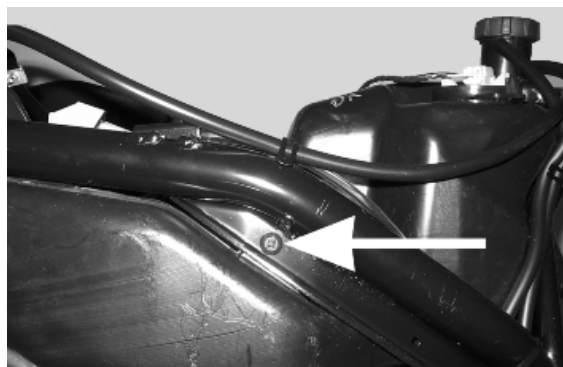


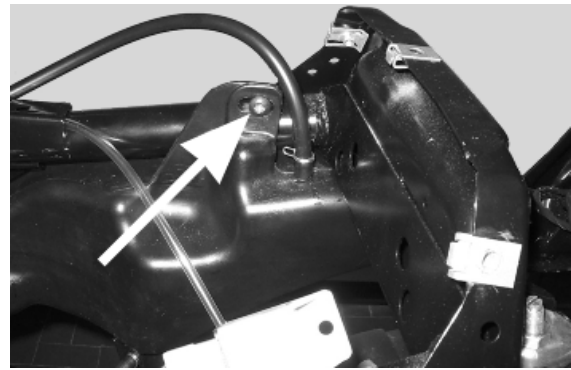
See also

[Footrest](#)

Fuel tank

- Remove the central saddle compartment cover
- Unscrew the front and rear screws on the right side of the frame
- Disconnect the vent tube and disassemble the float



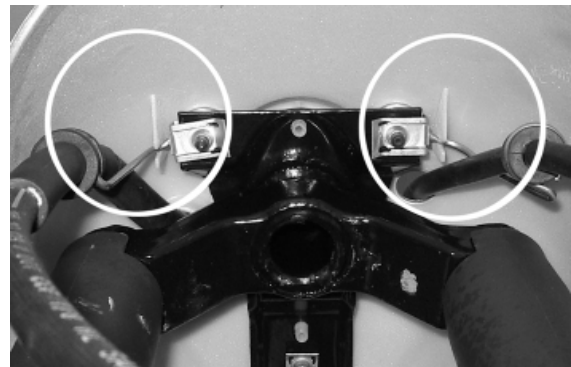
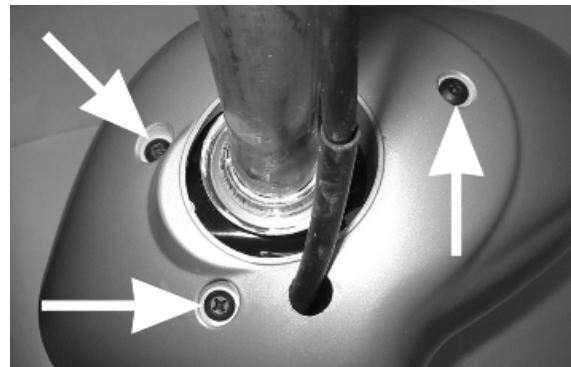
**See also**[Frame central cover](#)

Front mudguard

- Leaving the front wheel assembled, disassemble the steering tube from the vehicle
- Unscrew the 3 screws securing it and remove them
- Remove the speedometer transmission and brake hose, then remove the mudguard

N.B.

WHEN REASSEMBLING BE CAREFUL TO POSITION THE 2 METAL GROMMETS TO AVOID ANY RUBBING AGAINST THE WHEEL.



Top-case

Front**Disassembling the inner shield fairing (glove box ass.y)**

- Remove the two screws from inside the glove box.



- Remove the two screws at the lower part of the inner shield fairing
 - Remove the two screws located behind the front grille.
-

INDEX OF TOPICS

PRE-DELIVERY

PRE DE

Aesthetic inspection

Appearance check:

- Paintwork
 - Fitting plastic parts
 - Scratches
 - Dirt
-

Tightening torques inspection

Lock check

- Safety locks
- clamping screws

Safety locks

Rear shock absorber upper fixing

Rear shock absorber lower fixing

Front wheel axle nut

Wheel hub nut

Frame - swinging arm bolt *

Swinging arm bolt - Engine

Engine arm pin - Frame arm

Handlebar lock nut

Steering lower ring nut

Upper steering ring nut

Electrical system

Electrical system:

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

CAUTION

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

WARNING

BEFORE RECHARGING THE BATTERY, REMOVE THE CAPS OF EACH CELL. KEEP THE BATTERY AWAY FROM NAKED FLAMES OR SPARKS WHILE IT IS CHARGED. REMOVE THE BATTERY FROM THE SCOOTER, DISCONNECTING THE NEGATIVE TERMINAL FIRST.

CAUTION

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

WARNING

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

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 braking system fluid level.
- Rear hub oil level
- Engine coolant 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:

- Starting when warm
- Starter operation
- Minimum hold (turning the handlebar)
- Uniform turning of the steering
- Possible leaks

CAUTION

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

CAUTION

NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES OR TYRES MAY BURST.

Functional inspection

Functional check up:

Braking system (hydraulic)

- Lever travel

Braking system (mechanical)

- Lever travel

Clutch

- Proper functioning check

Engine

- Throttle travel check

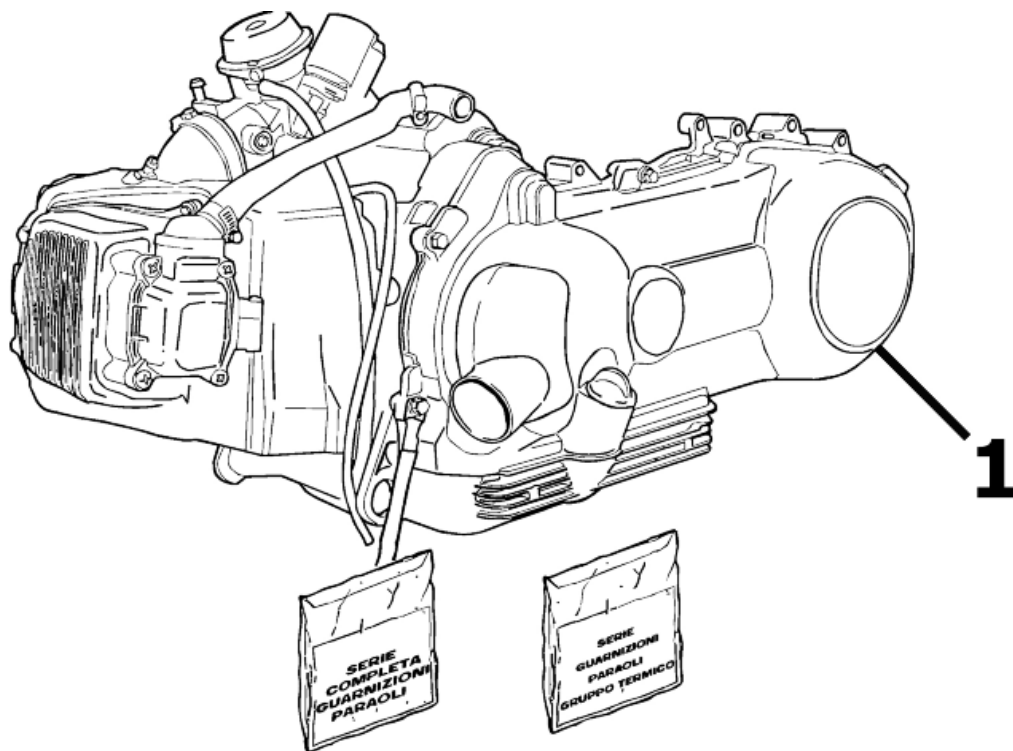
Others

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

INDEX OF TOPICS

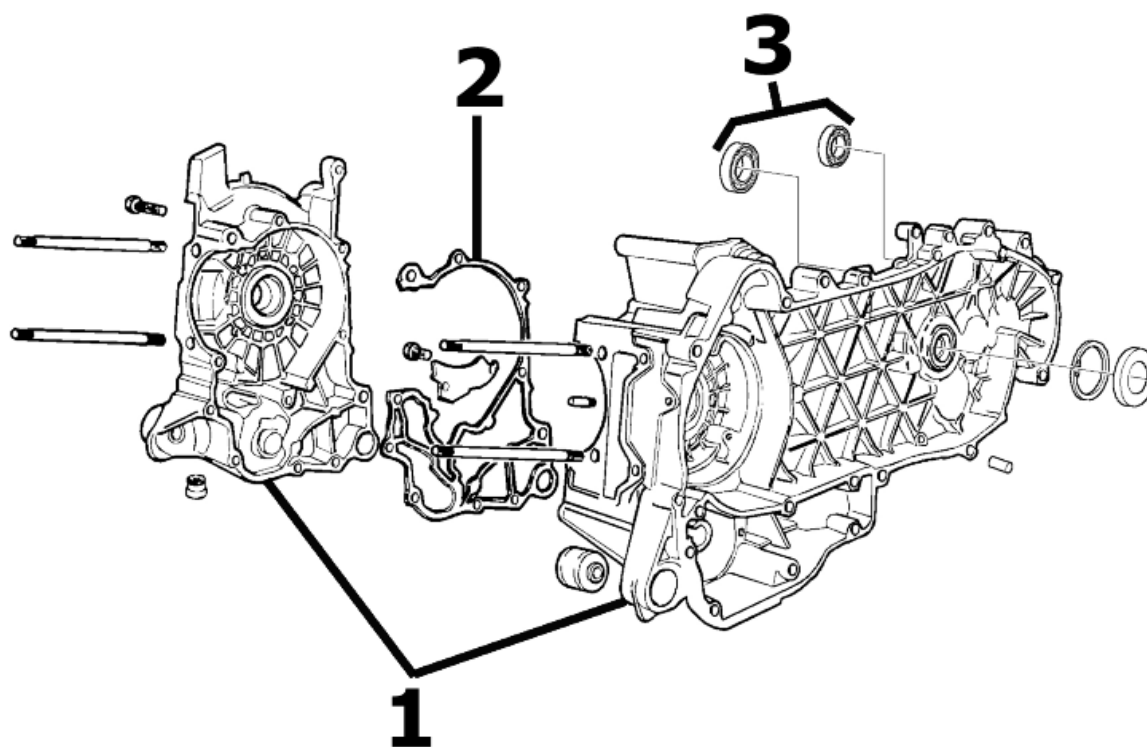
TIME

TIME

Engine**ENGINE**

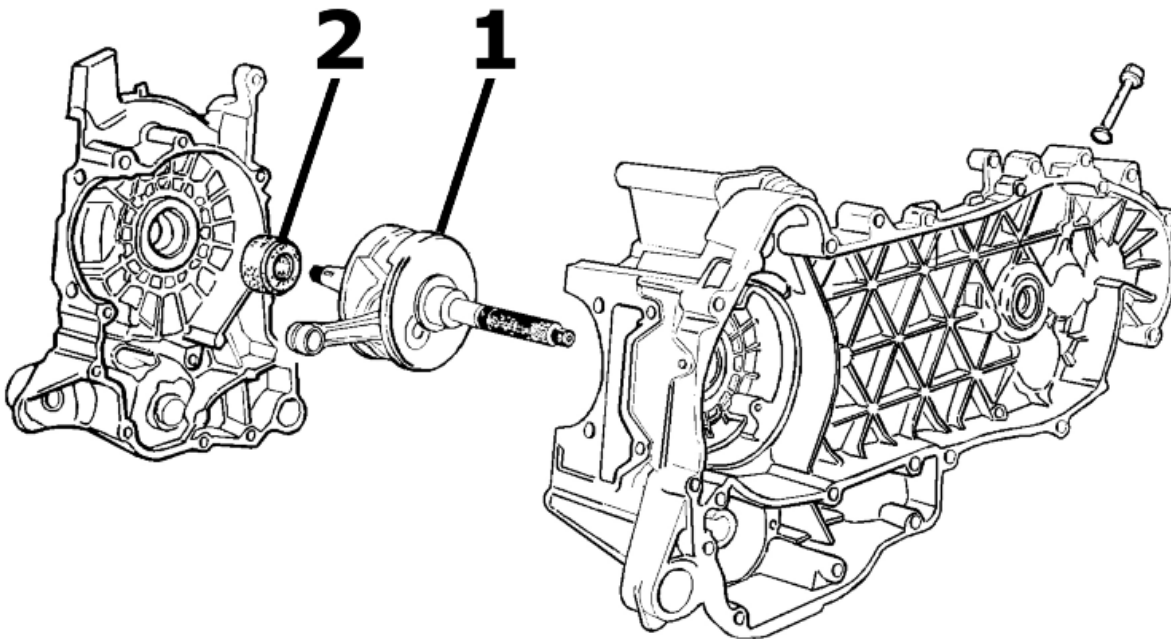
	Code	Action	Duration
1	001001	engine from frame - removal and re-fitting	

Crankcase



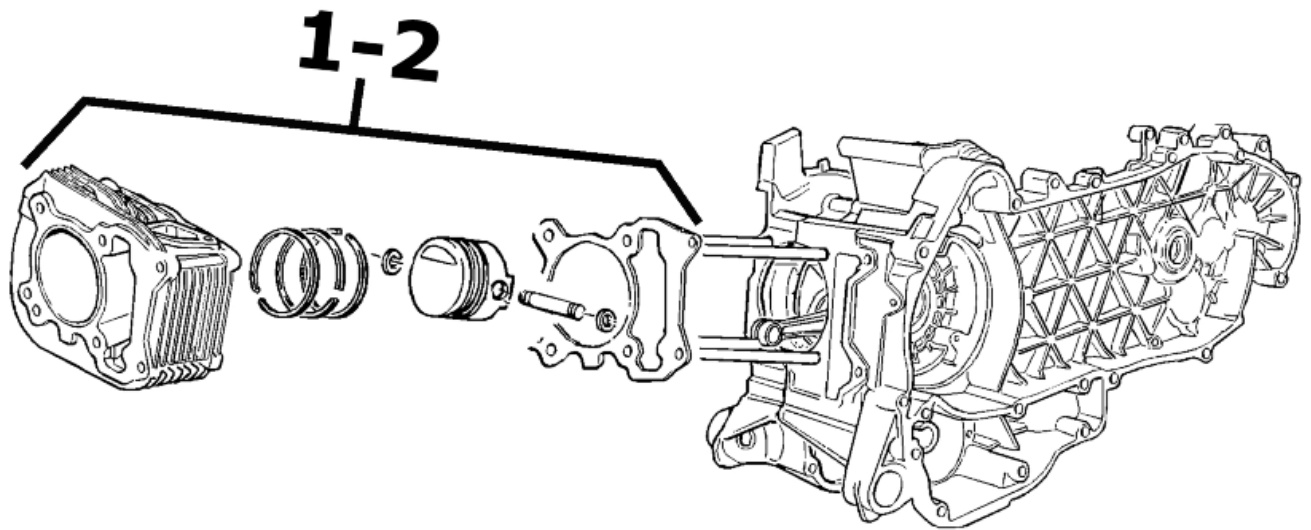
CRANKCASE

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

Crankshaft**DRIVING SHAFT**

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

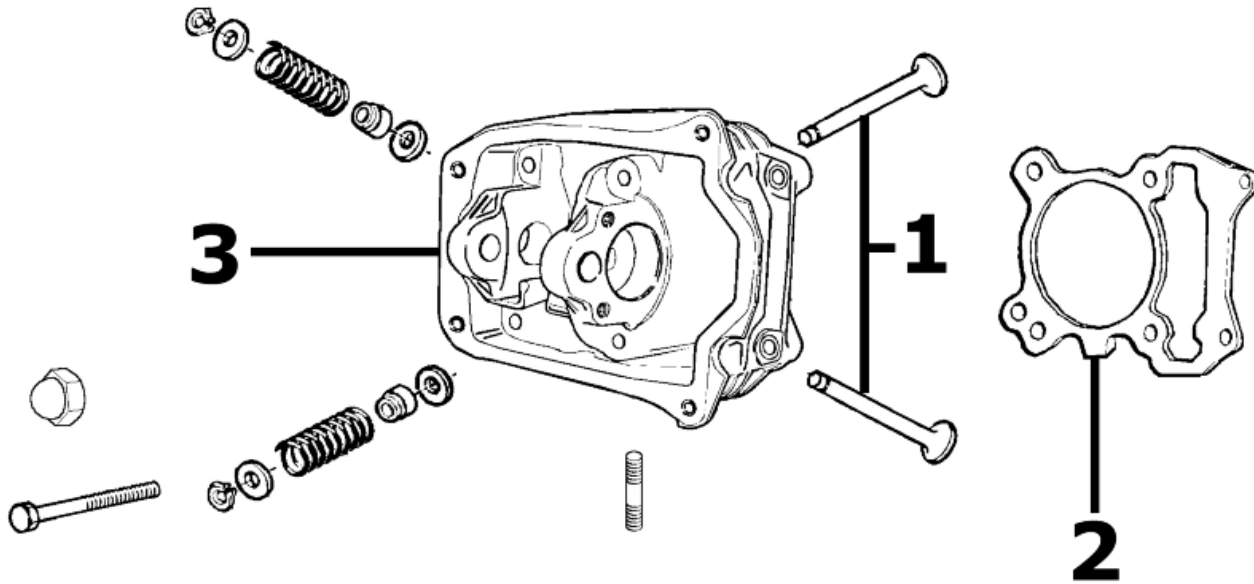
Cylinder assy.



CYLINDER GROUP

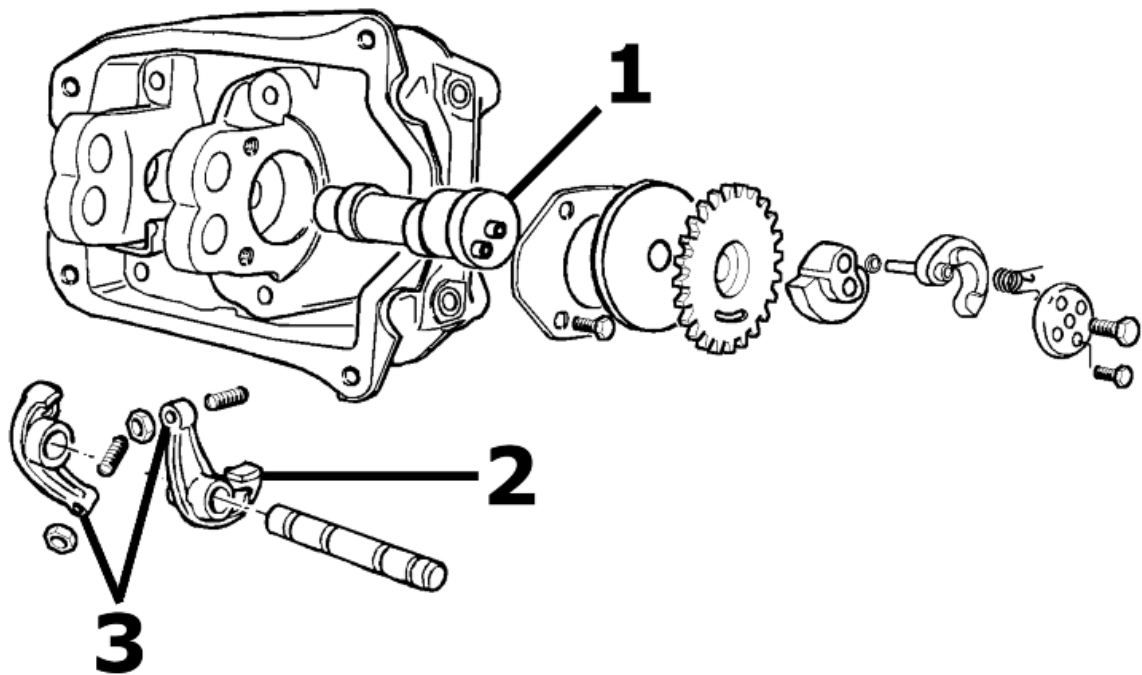
	Code	Action	Duration
1	001002	Cylinder-Piston - Replacement	
2	001107	Cylinder / piston - Inspection / cleaning	

Cylinder head assy.

**HEAD UNIT**

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

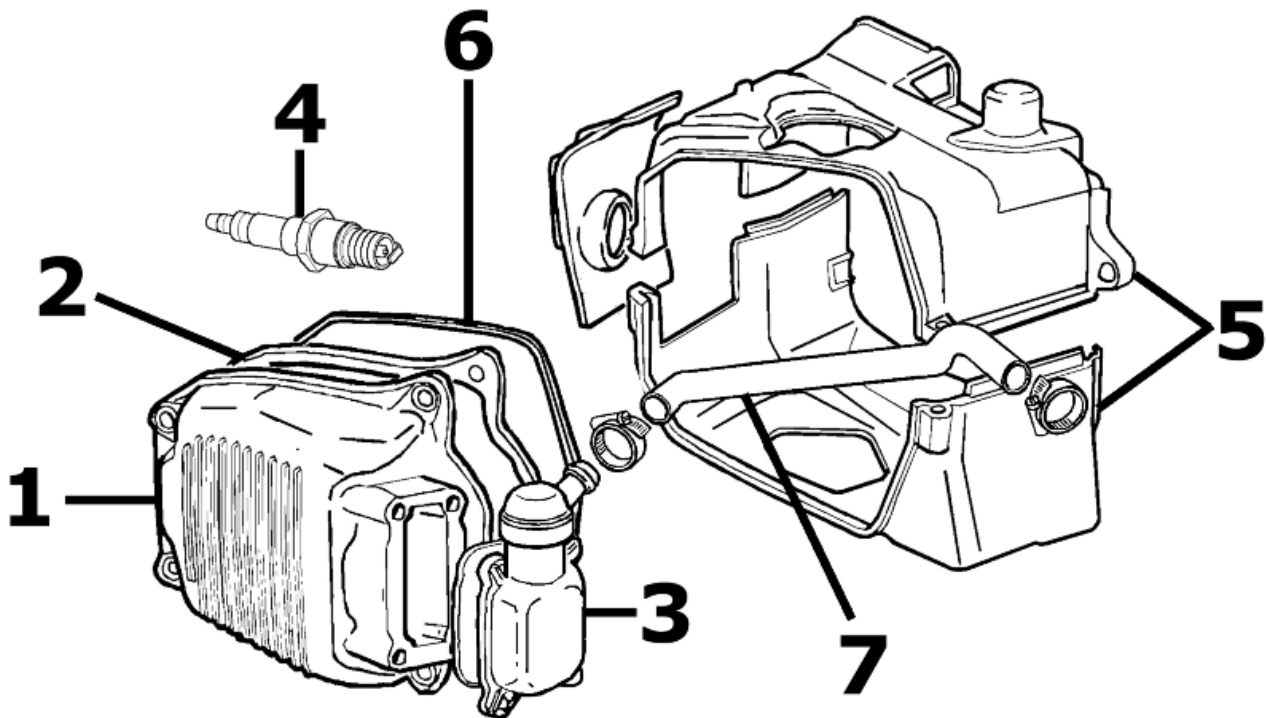
Rocker arms support assy.



ROCKING LEVER SUPPORT UNIT

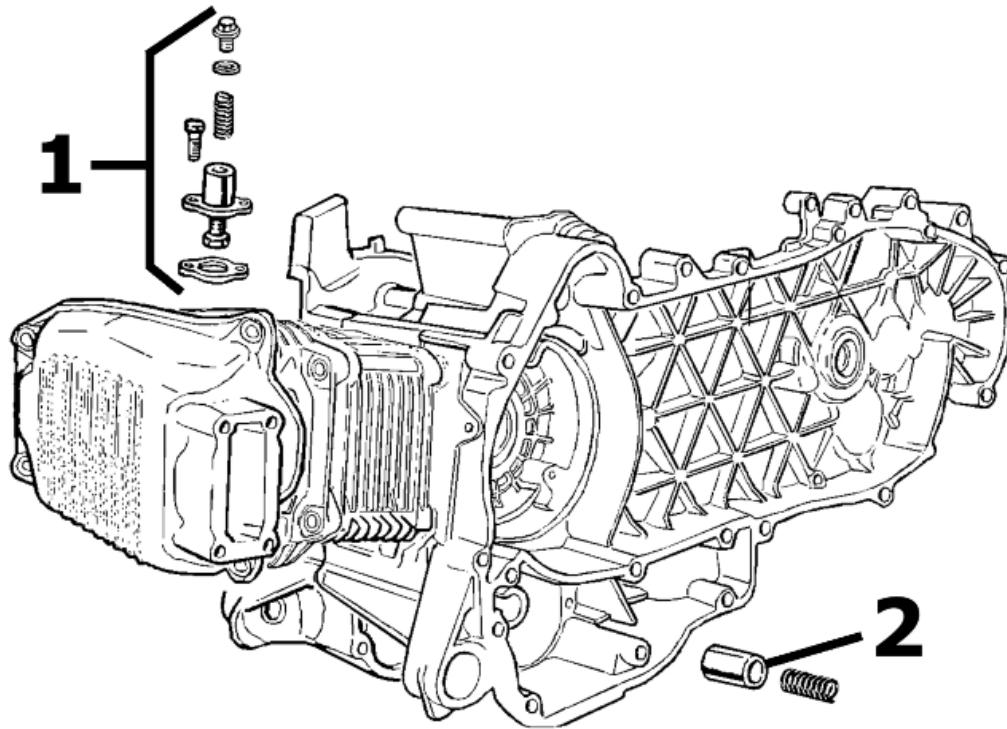
	Code	Action	Duration
1	001044	Camshaft - Replacement	
2	001148	Rocking lever valve - Replacement	
3	001049	Valves - Adjustments	

Cylinder head cover

**HEAD COVER**

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

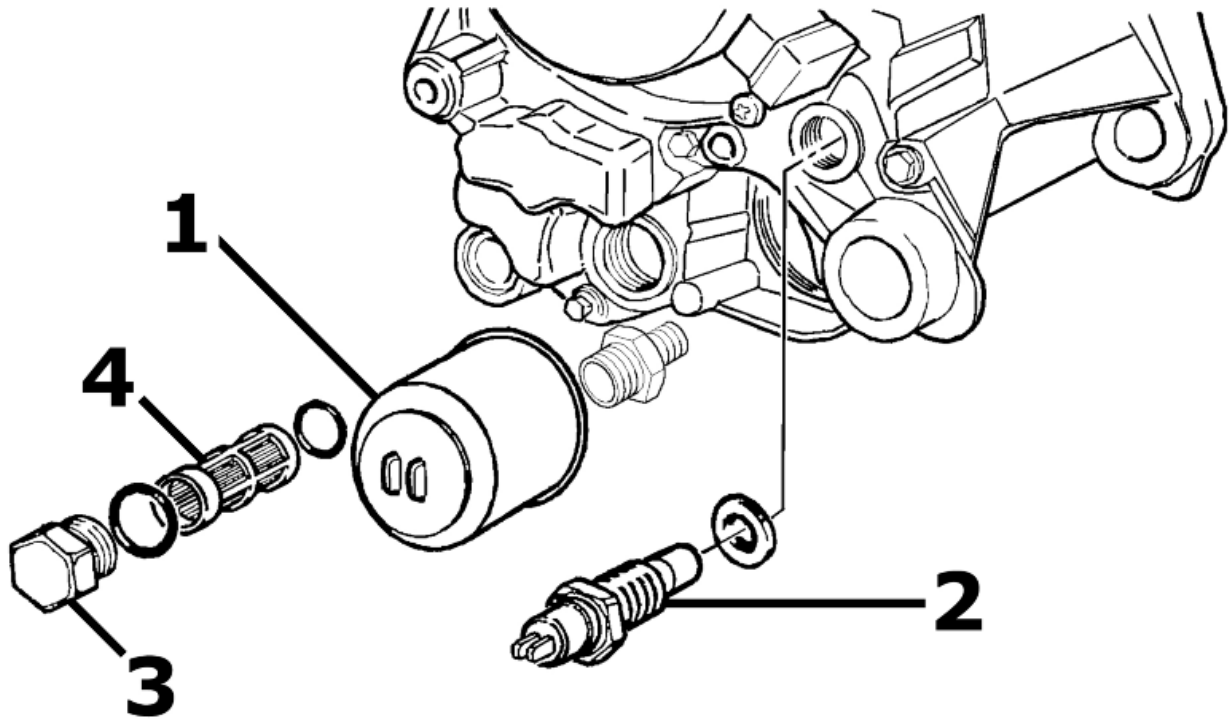
Chain tensioner



CHAIN TIGHTENER

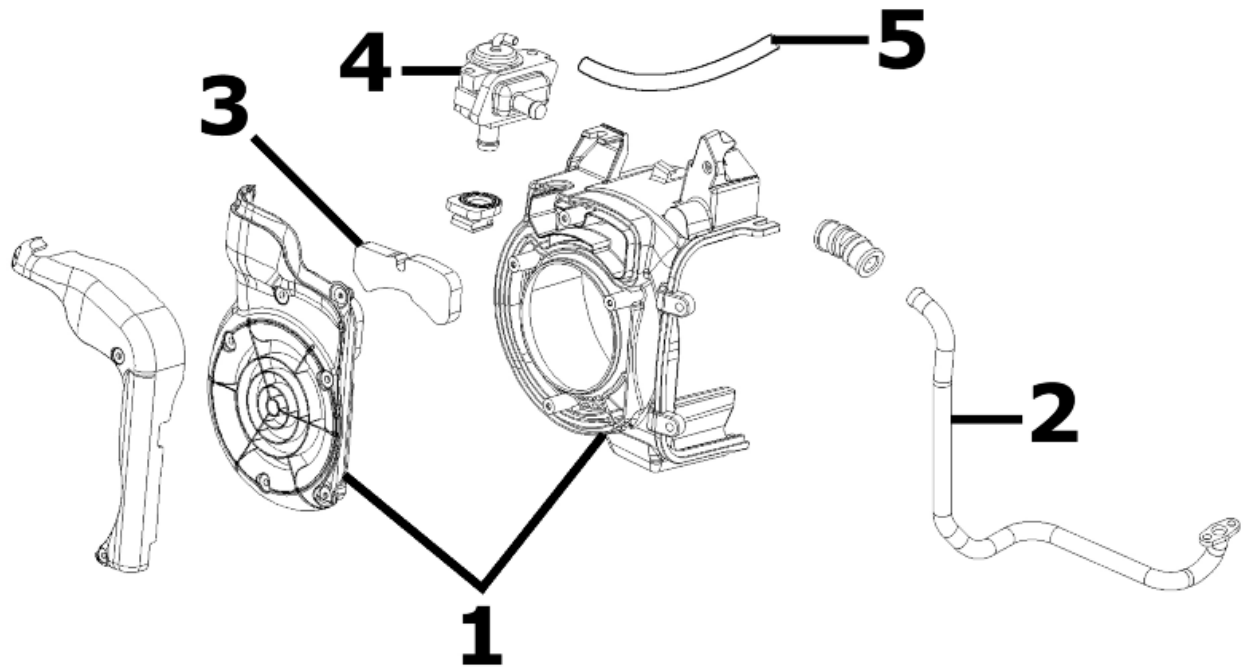
	Code	Action	Duration
1	001129	Chain tensioner - Service and Replacement	
2	001124	By pass lubrication - Replacement	

Oil filter

**OIL FILTER**

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

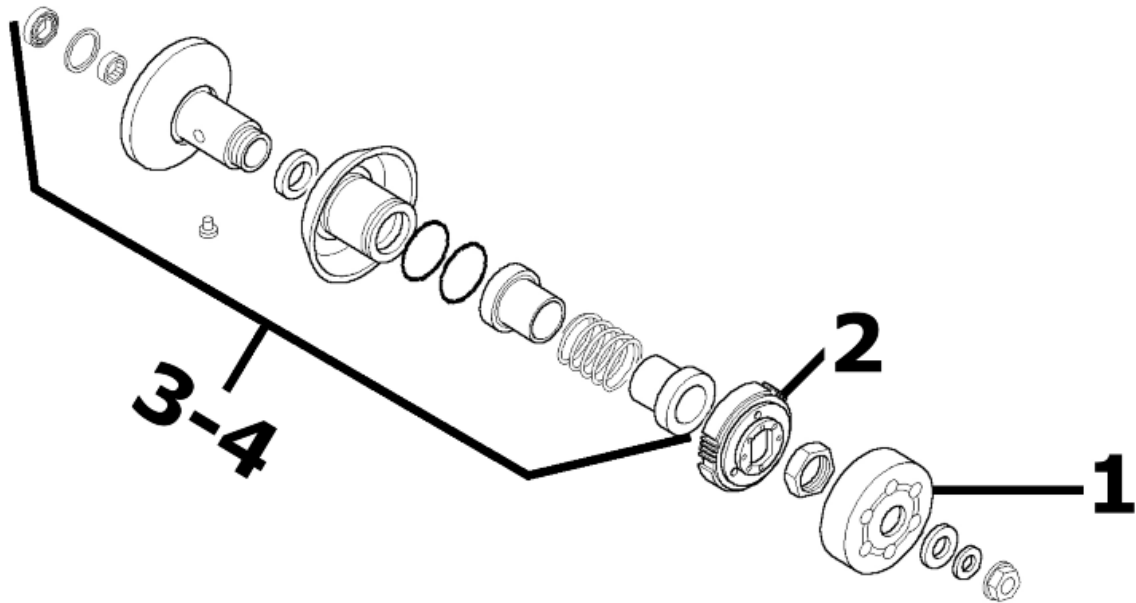
Flywheel cover



FLYWHEEL COVER

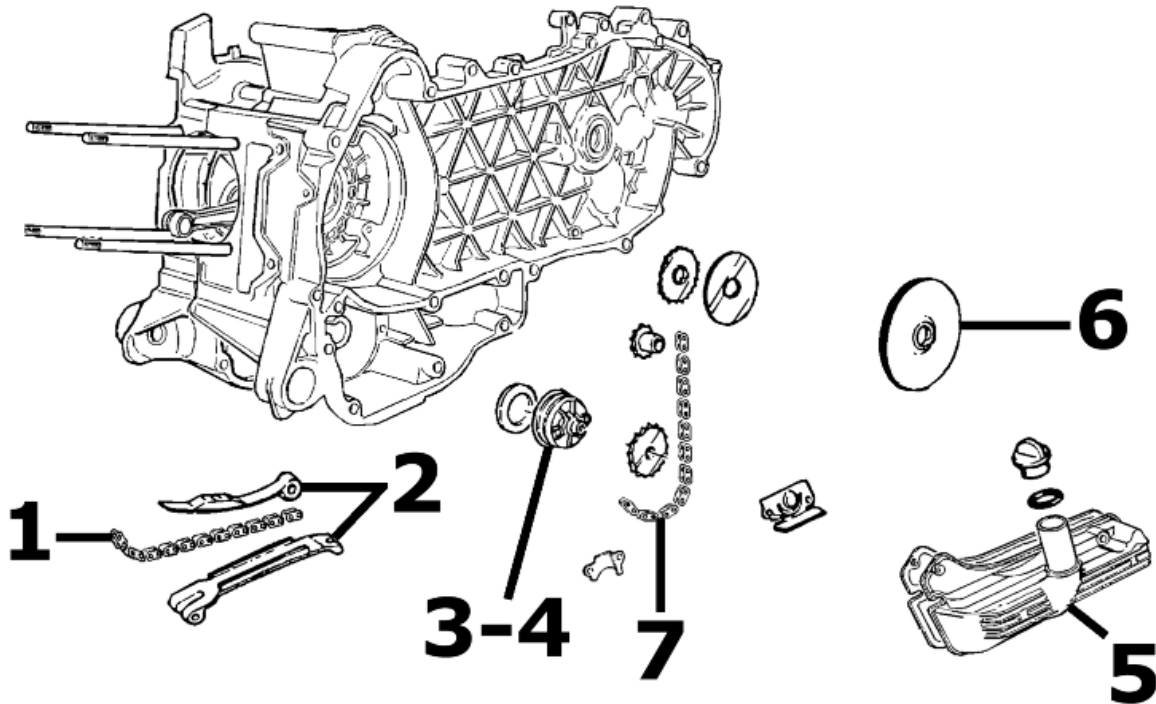
	Code	Action	Duration
1	001087	Flywheel cover - Replacement	
2	001163	Secondary air-exhaust manifold - Replacement	
3	001161	Secondary air filter - Replacement / Cleaning	
4	001174	SAS valve - Replacement	
5	001164	Secondary air-crankcase manifold - Replacement	

Driven pulley

**DRIVEN PULLEY - CLUTCH**

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

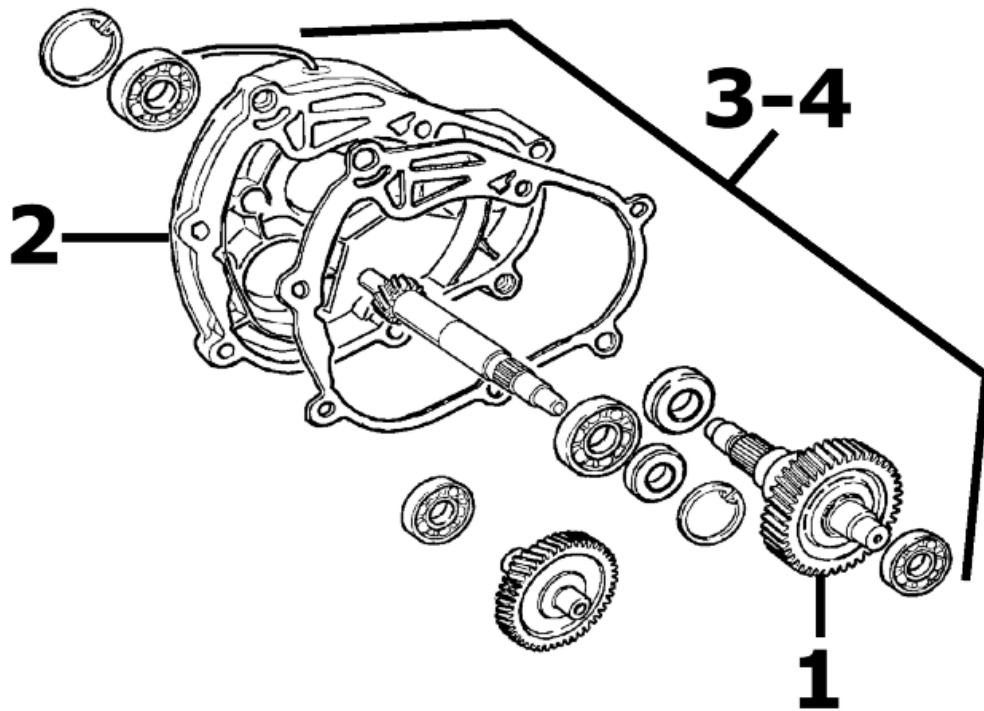
Oil pump



OIL PUMP

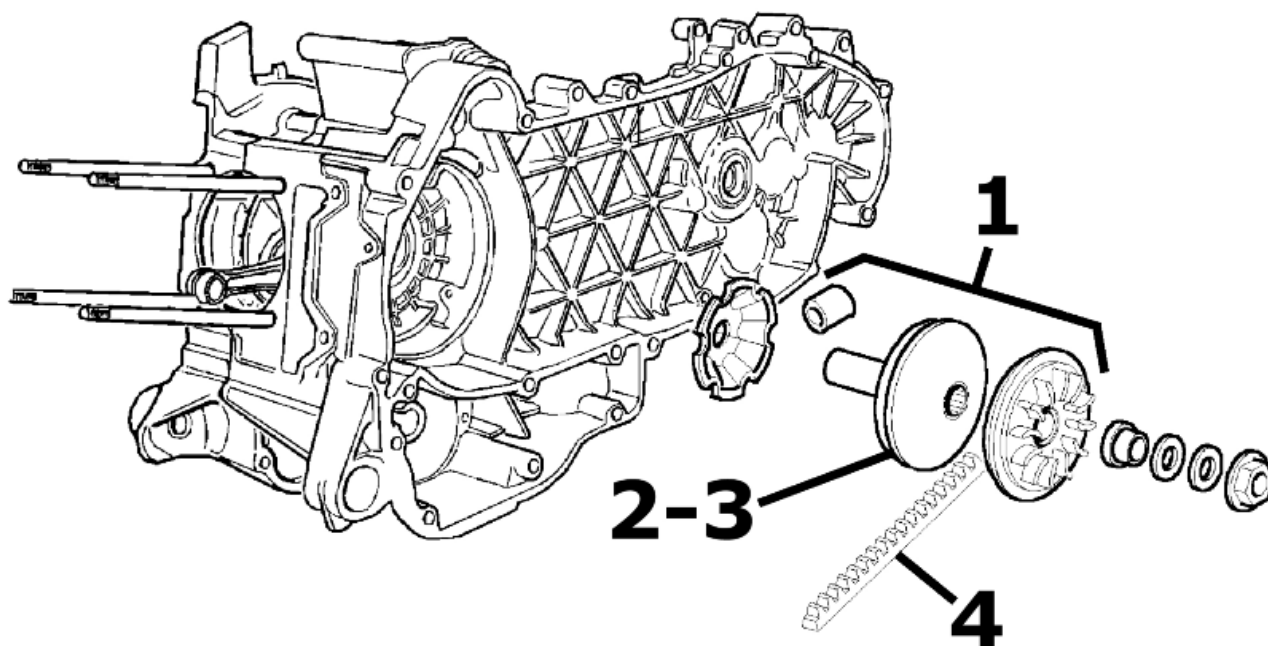
	Code	Action	Duration
1	001051	Belt/Timing chain - Replacement	
2	001125	Chain guide pads - Replacement	
3	001042	Oil pump - Overhaul	
4	001112	Oil pump - Replacement	
5	001130	Oil sump - Replacement	
6	001100	Oil seal clutch side - Replacement	
7	001122	Oil pump chain - Replacement	

Final gear assy.

**FINAL REDUCTION GEAR ASSEMBLY**

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

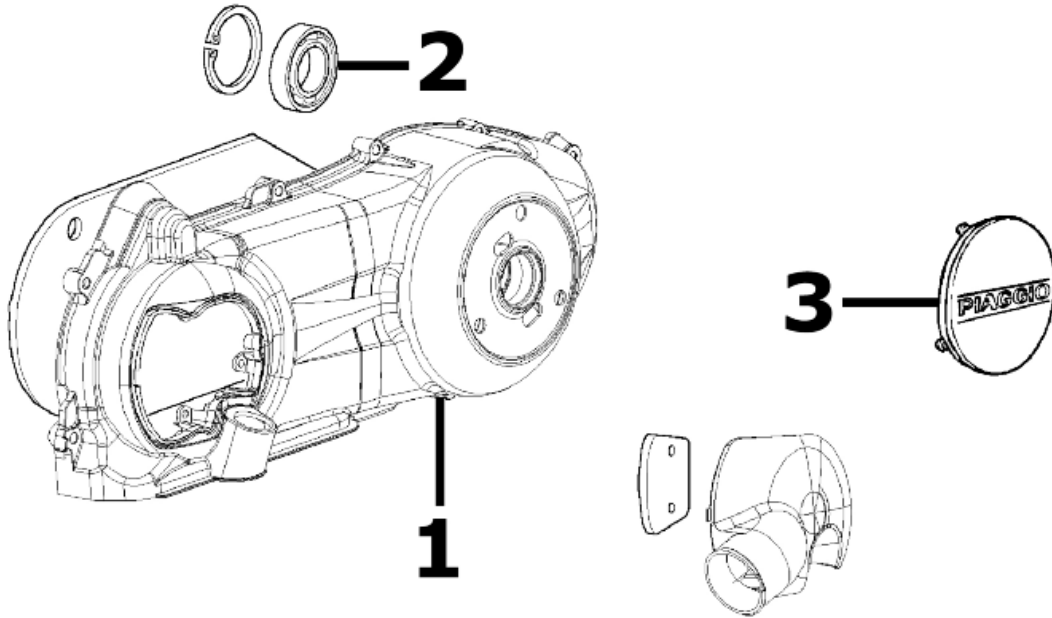
Driving pulley



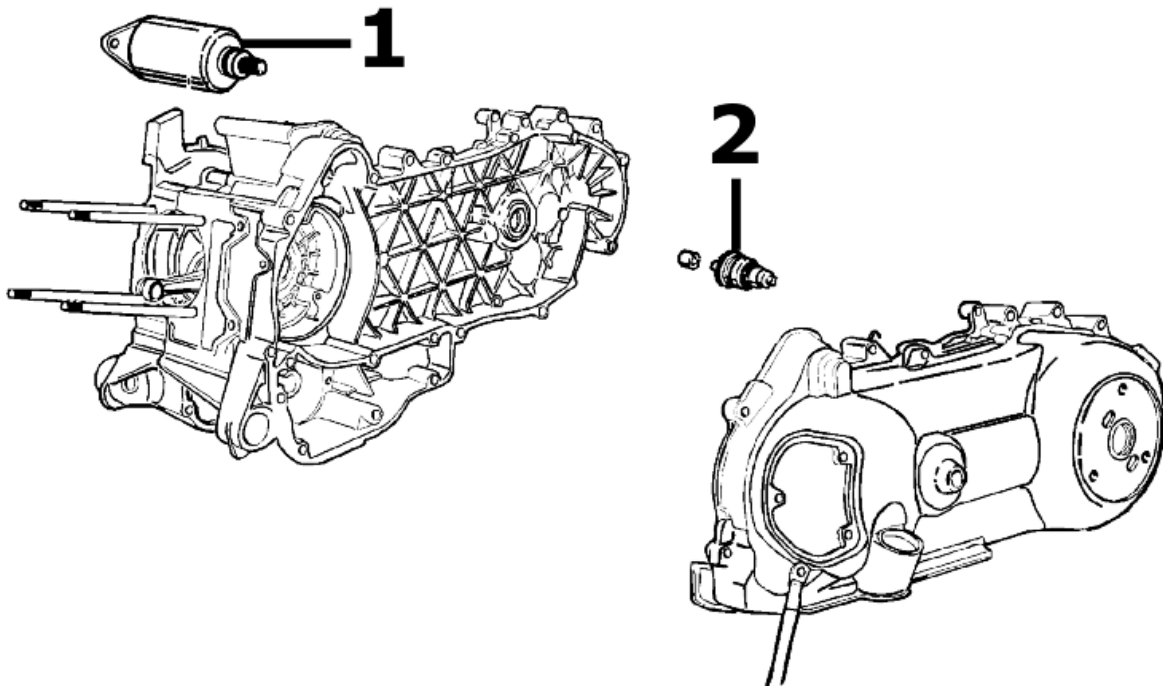
DRIVING PULLEY

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

Transmission cover



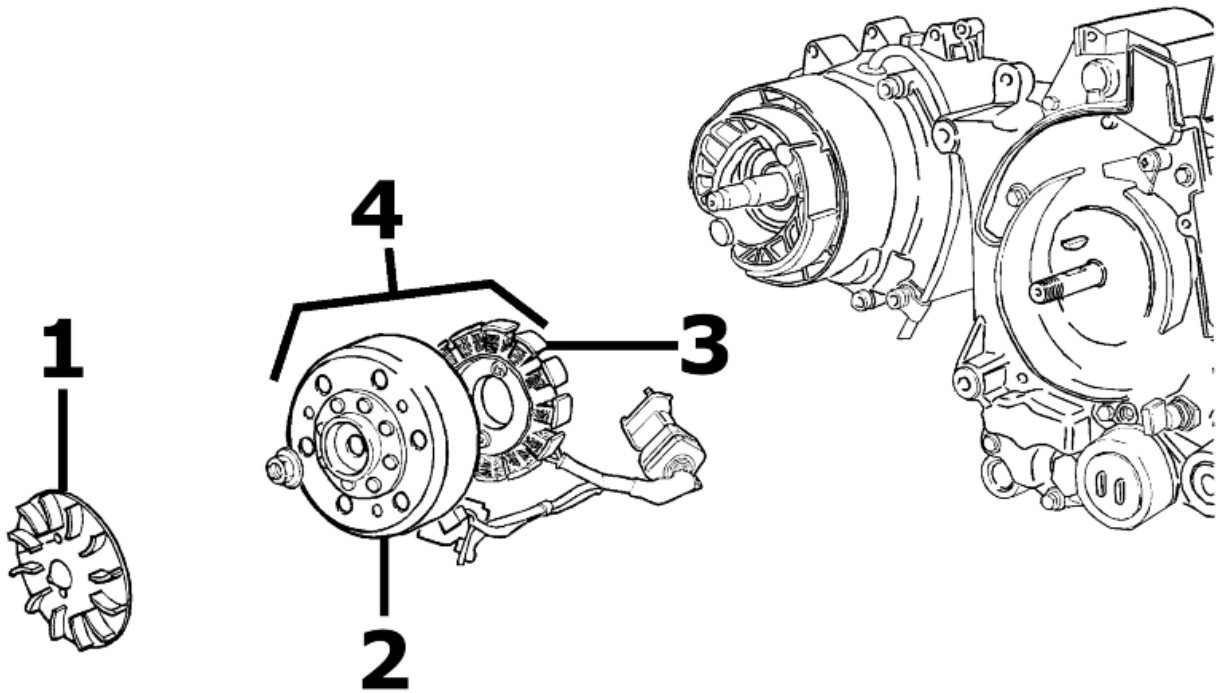
Starter motor



STARTING MOTOR

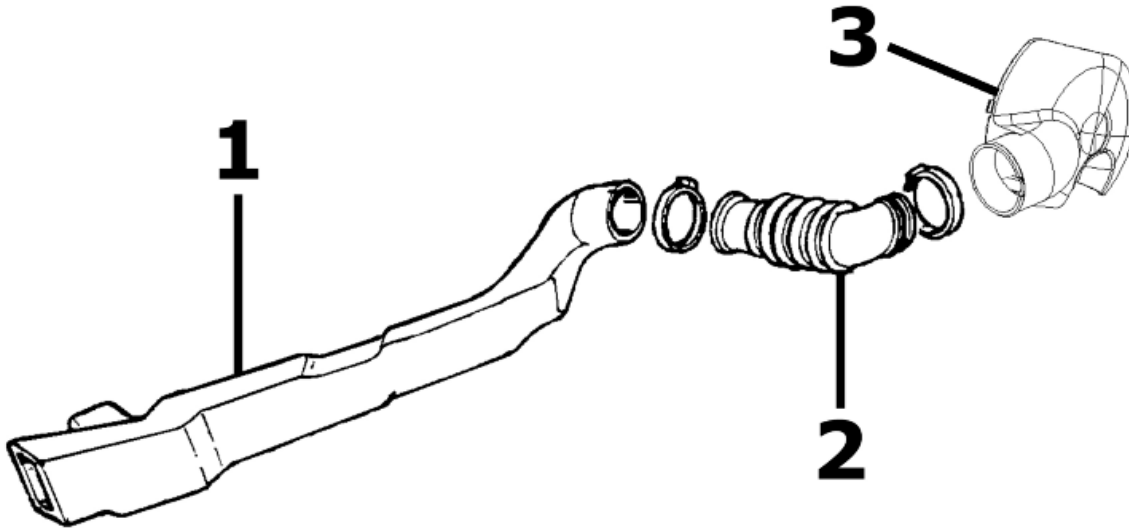
	Code	Action	Duration
1	001020	Starter motor - Replacement	
2	001017	Starter sprocket wheel - Replacement	

Flywheel magneto



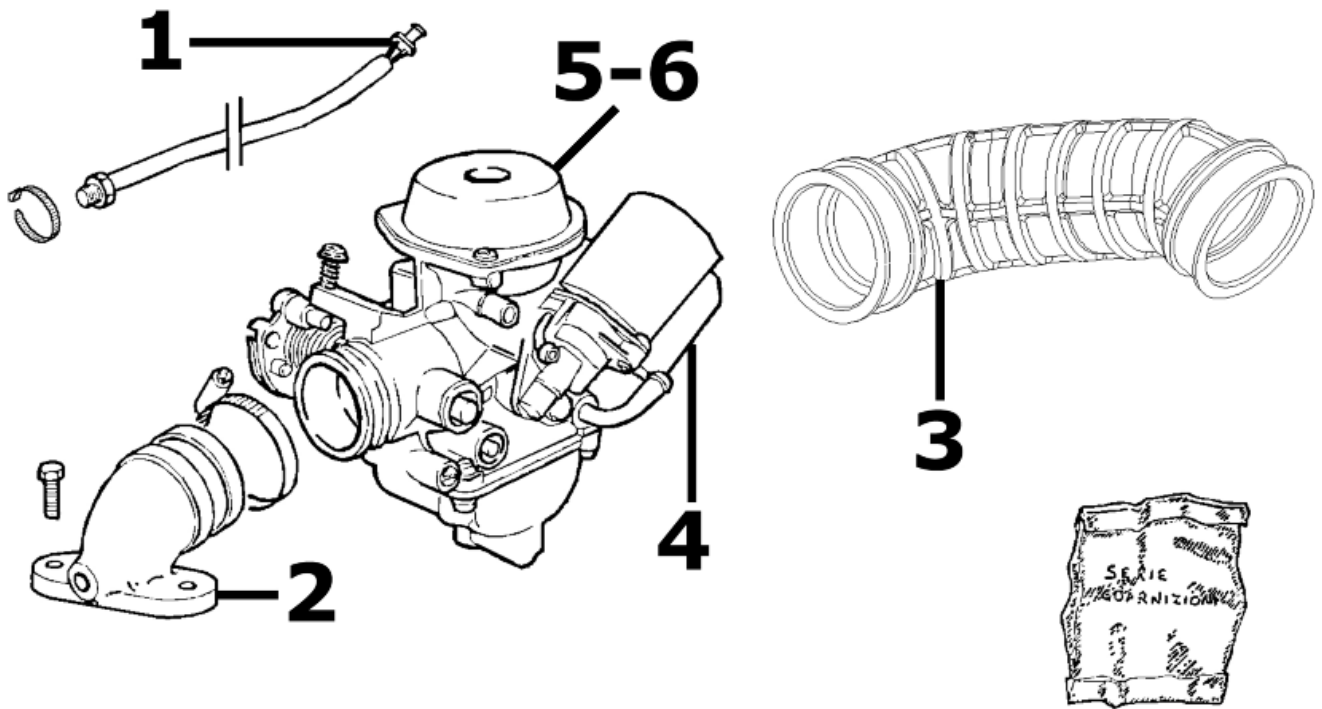
MAGNETO FLYWHEEL

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

Belt cooling duct**BELT COOLING PIPE**

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

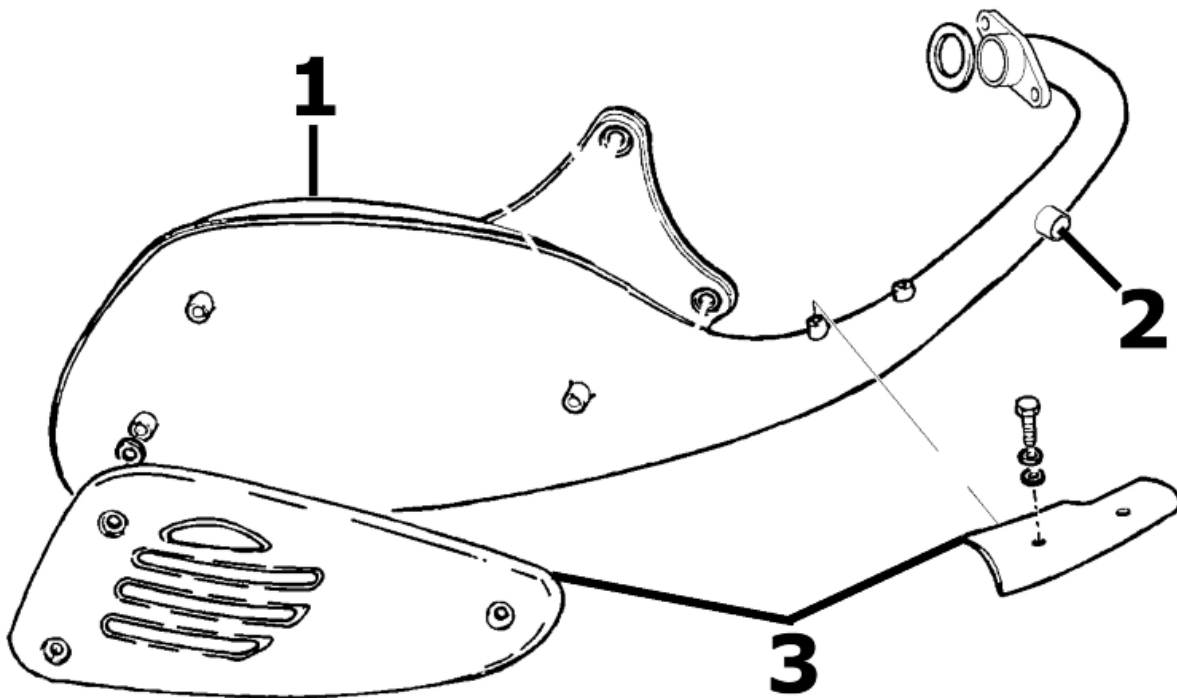
Carburettor



CARBURETTOR

	Code	Action	Duration
1	001082	Carburettor heating resistor - Replacement	
2	001013	Intake hose - Replacement	
3	004122	Carburettor-filter bellow - Replacement	
4	001081	Automatic choke - Replacement	
5	001008	Carburettor - Inspection	
6	001063	Carburettor - Replacement	

Exhaust pipe



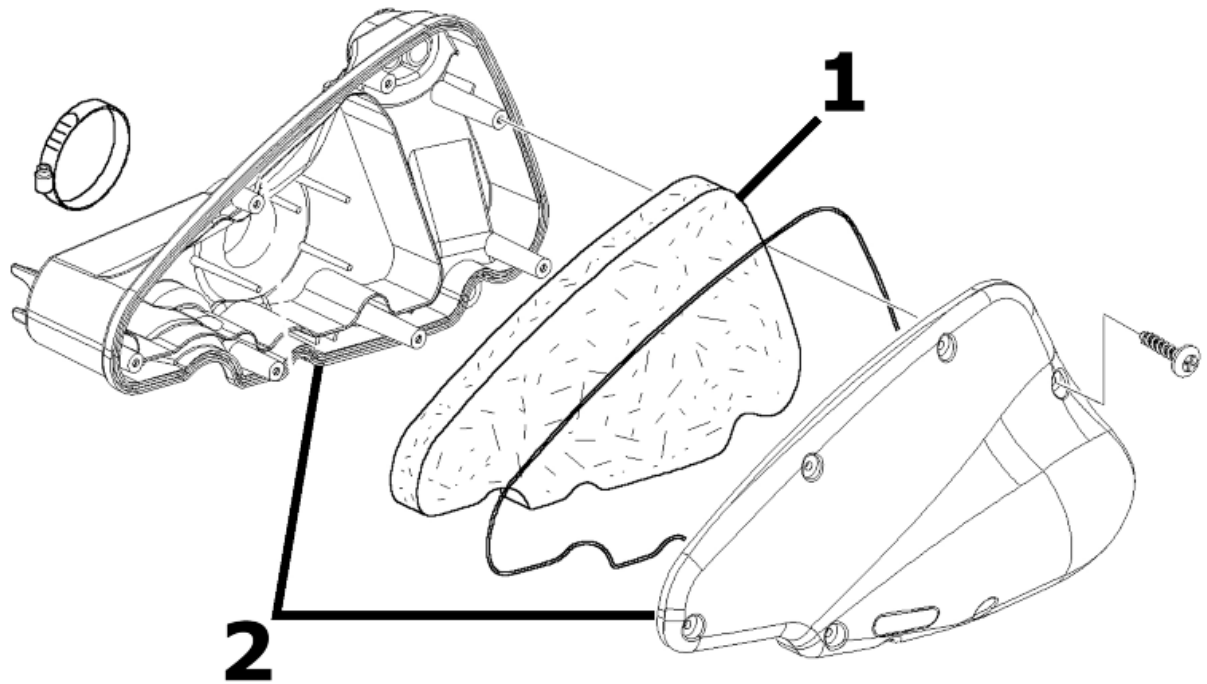
MUFFLER

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

Silencer fixing

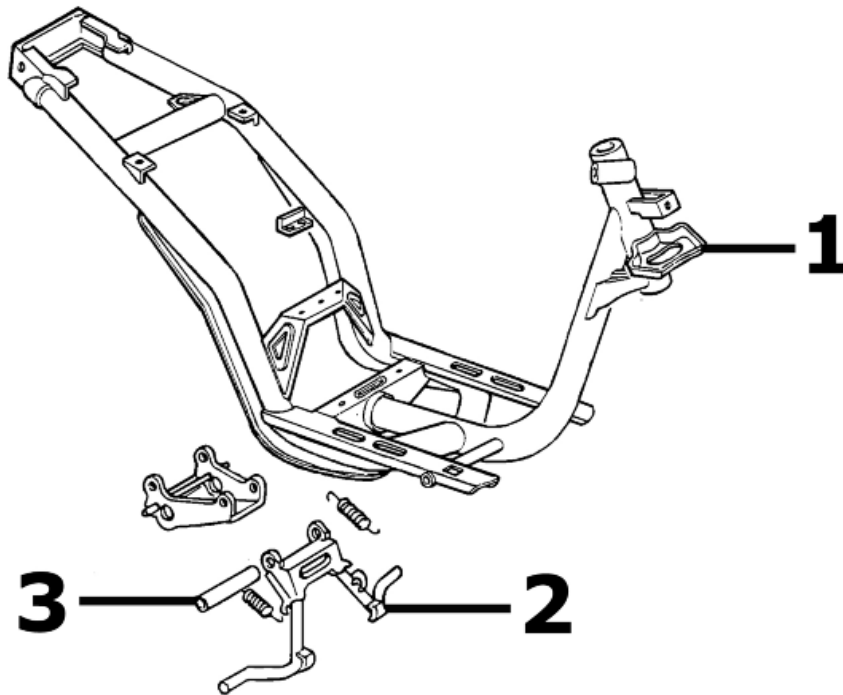
Please take note that, starting from chassis serial number ZAPM381000003971, the two M8 x 50 silencer fixing flanged head screws have been replaced by two M8 x 50 internal hexagonal cylindrical head screws.

Air cleaner



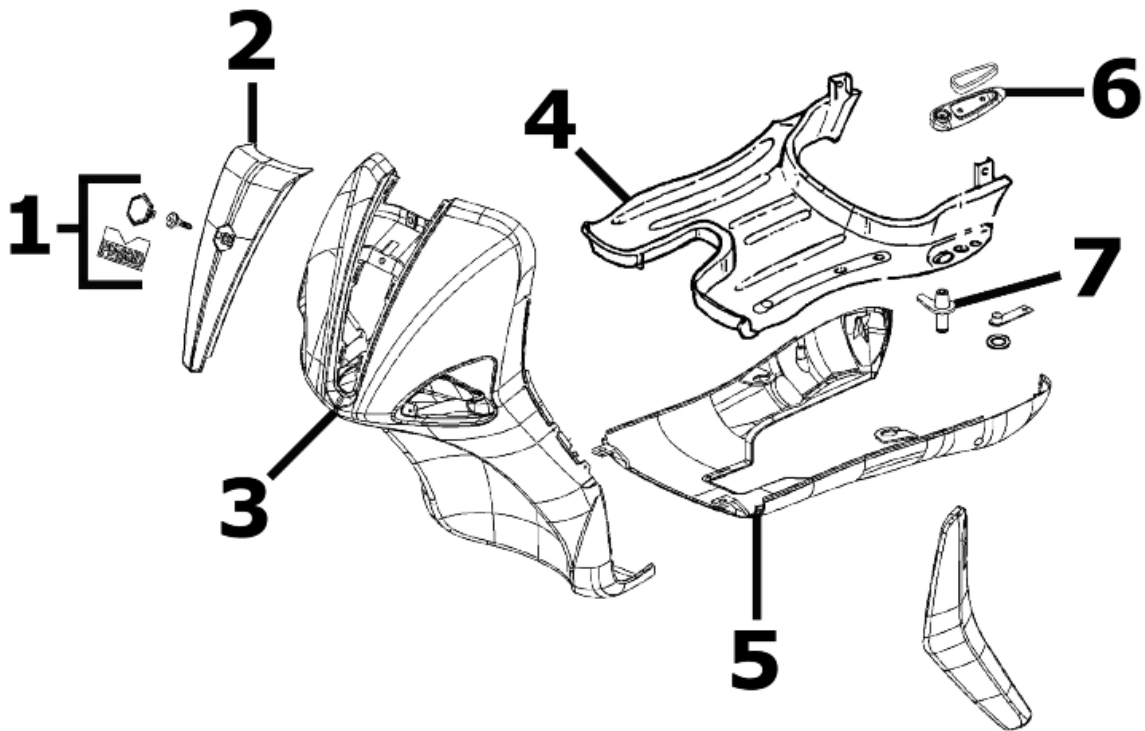
AIR CLEANER

	Code	Action	Duration
1	001014	Air filter - Replacement/Cleaning	
2	001015	Air filter box - Replacement	

Frame**FRAME**

	Code	Action	Duration
1	004001	Chassis - Replacement	
2	004004	Stand - Replacement	
3	001053	Stand bolt - Replacement	

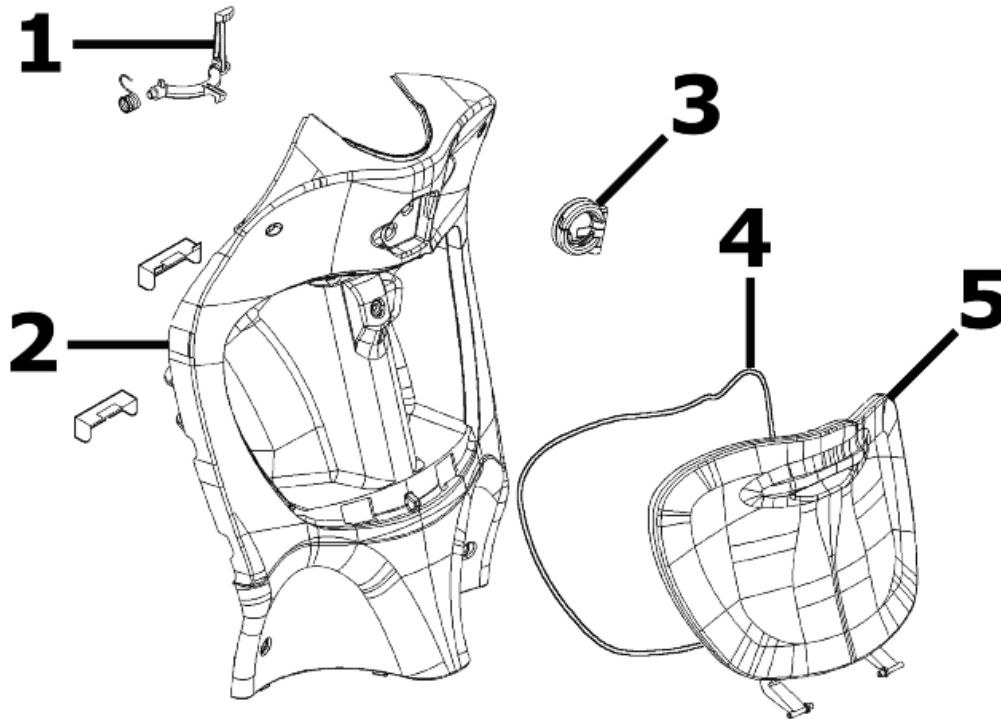
Legshield spoiler



MUFFLER - GLOVE COMPARTMENT

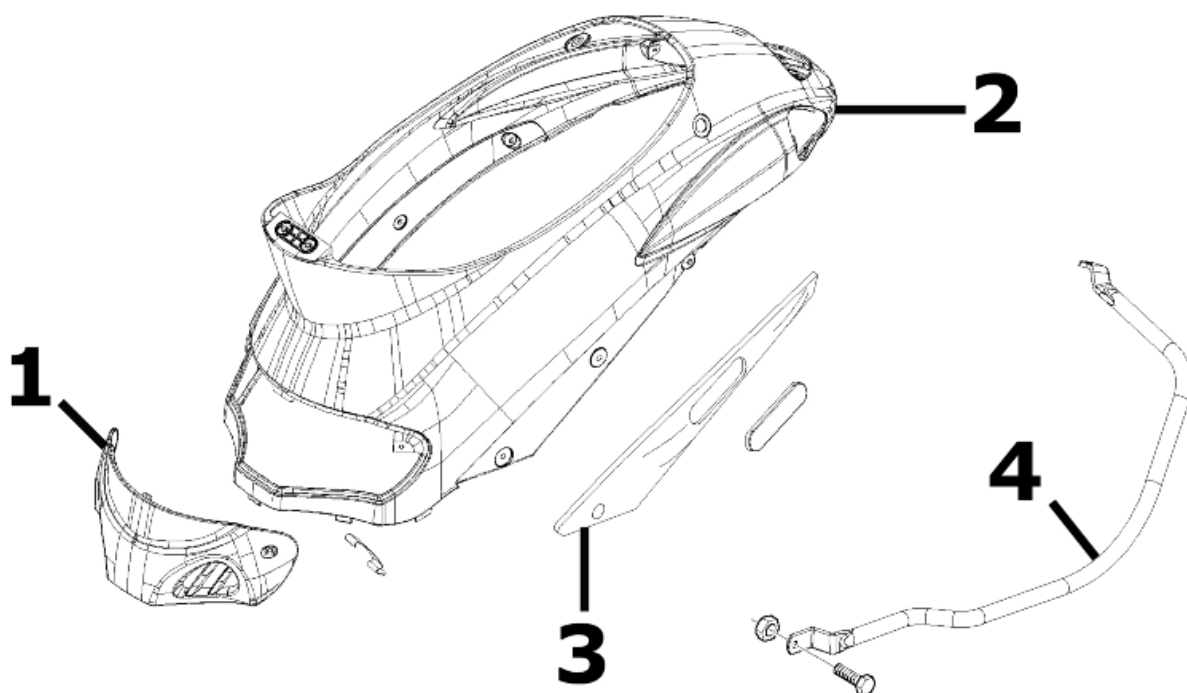
	Code	Action	Duration
1	004159	Plates / Stickers - Replacement	
2	004149	Shield central cover - Replacement	
3	004064	Front shield, front section - Removal and refitting	
4	004079	Rear footrest - Replacement	
5	004053	Spoiler - Replacement	
6	004015	Footrest - Disassembly and reassembly	
7	004143	Footrest support - replace	

Rear cover

**REAR COVER**

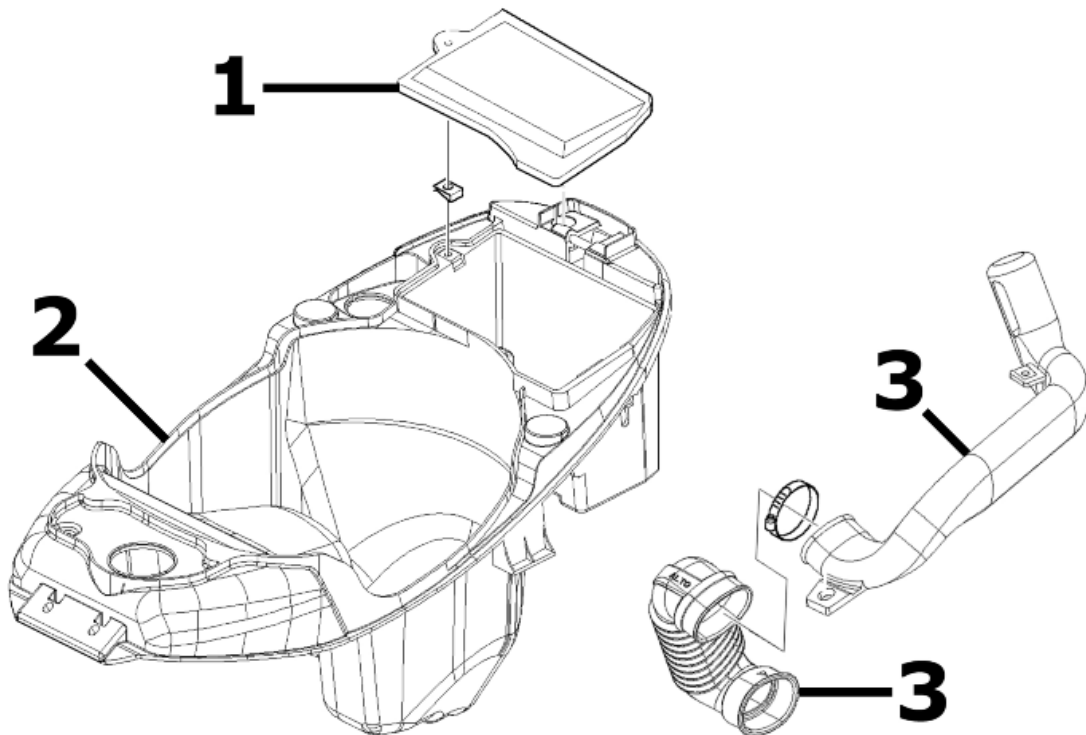
	Code	Action	Duration
1	004174	Glove-box remote opening linkage - Replacement	
2	004065	Knee-guard - Removal and refitting	
3	004131	Rear rack mounting bracket - Replacement	
4	004082	Glove-box packing - Replacement	
5	004081	Glove compartment door - Replacement	

Central cover



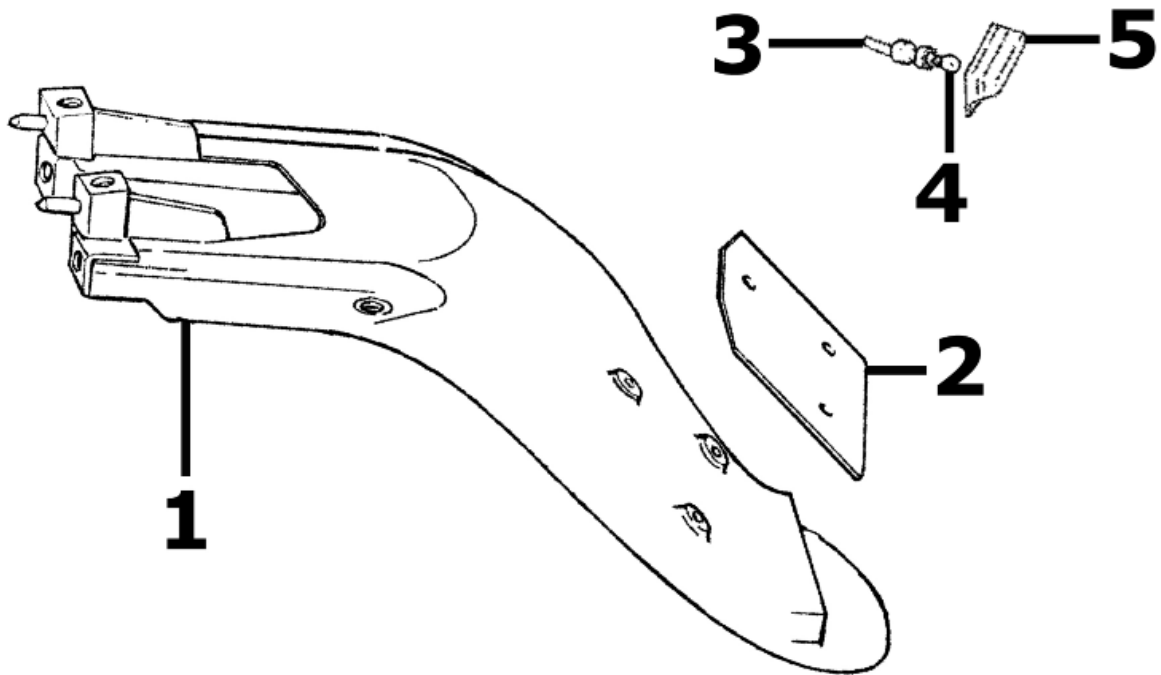
CENTRAL COVER

	Code	Action	Duration
1	004059	Spark plug inspection flap - Replacement	
2	004106	Under-saddle band - Replacement	
3	004085	Fairing (1) - Replacement	
4	004013	Side/rear bumper pipes - Replacement	

Underseat compartment**UNDERSEAT COMPARTMENT**

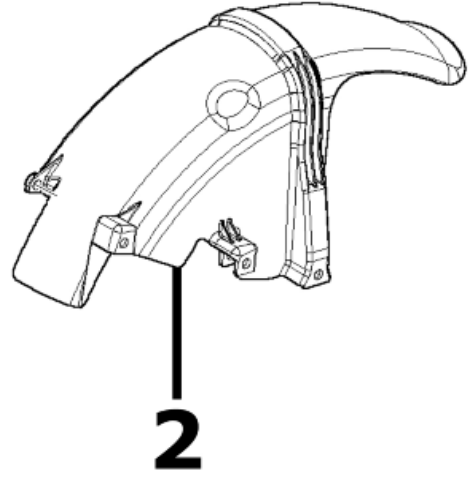
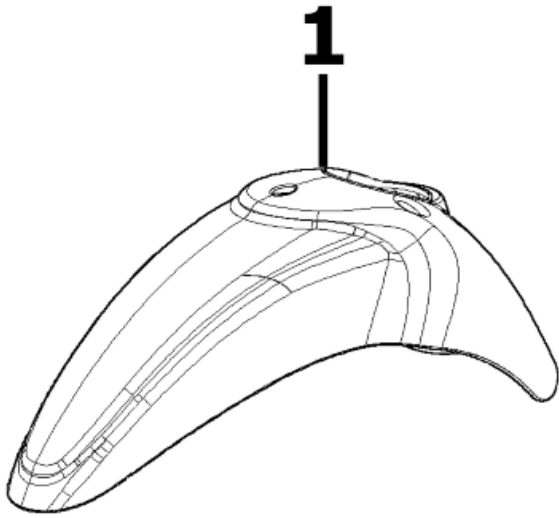
	Code	Action	Duration
1	005046	Battery cover - Replacement	
2	004016	Helmet compartment - Removal and Refitting	
3	001027	Filter bellow - Replacement	

Plate holder



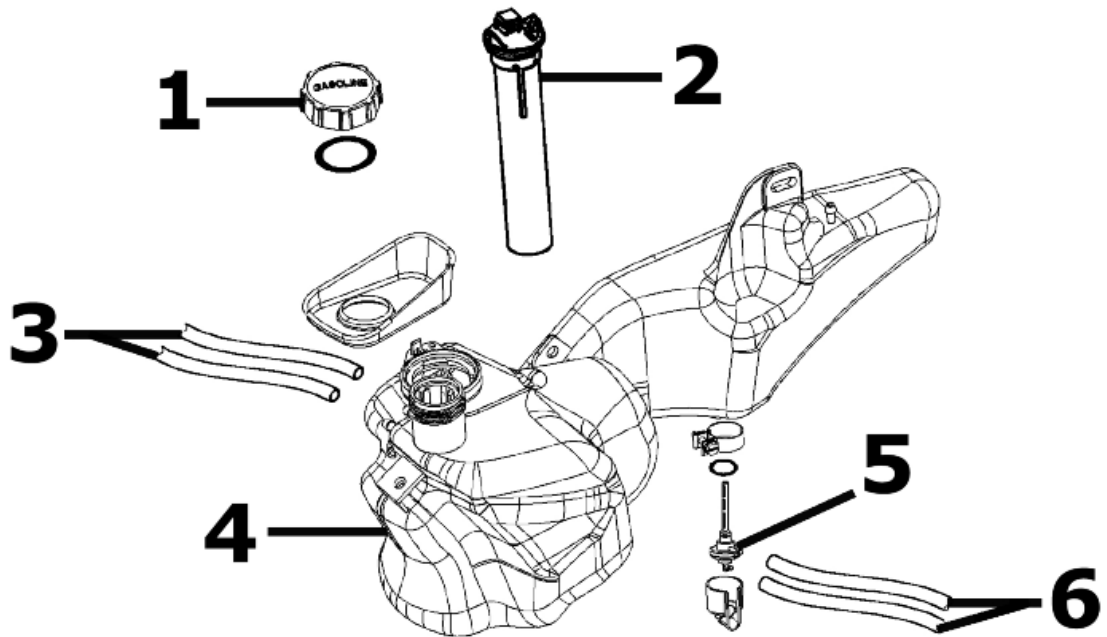
SUPPORT PLATE

	Code	Action	Duration
1	004136	License plate holder support - Replacement	
2	005048	Licence plate holder - Replacement	
3	005131	number plate light support - Replacement	
4	005031	Licence plate light bulb - Replacement	
5	005032	number plate light glass - Replacement	

Mudguard**MUDGUARD**

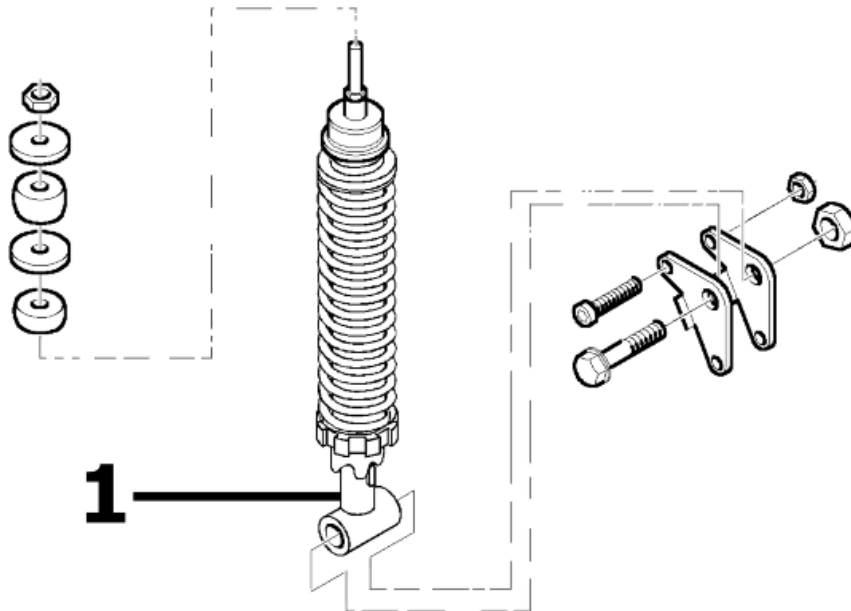
	Code	Action	Duration
1	004002	Front mudguard - Replacement	
2	004009	Rear mudguard - Replacement	

Fuel tank



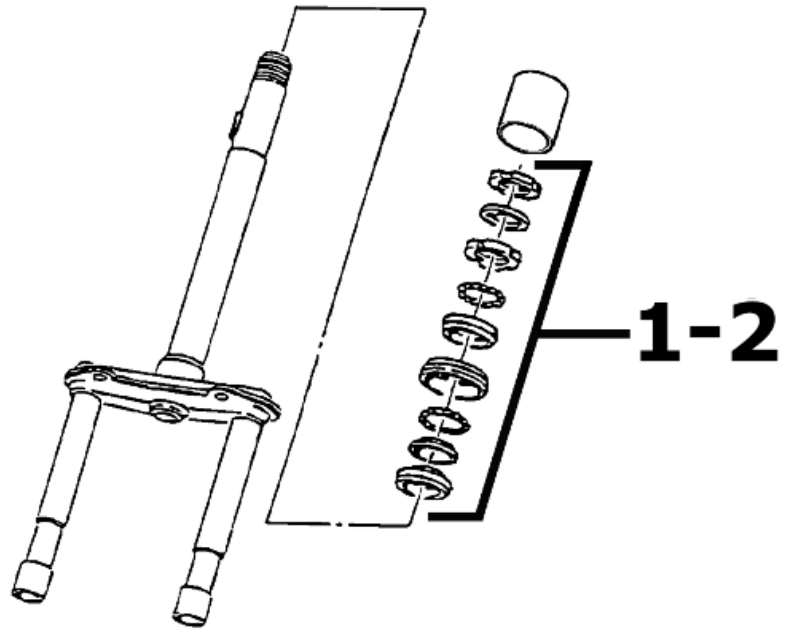
FUEL TANK

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

Rear shock-absorber**REAR SHOCK ABSORBER**

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

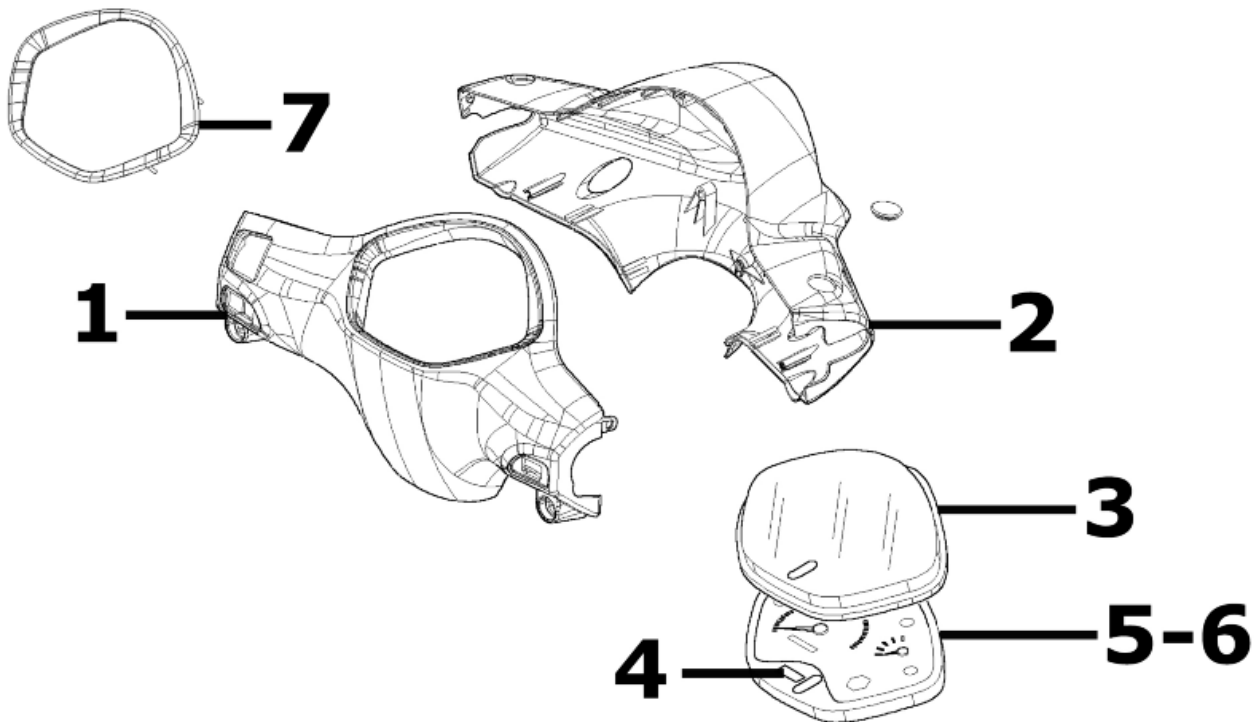
Steering column bearings



STEERING COLUMN BEARINGS

	Code	Action	Duration
1	003002	Steering fifth wheels - Replacement	
2	003073	Steering clearance - Adjustment	

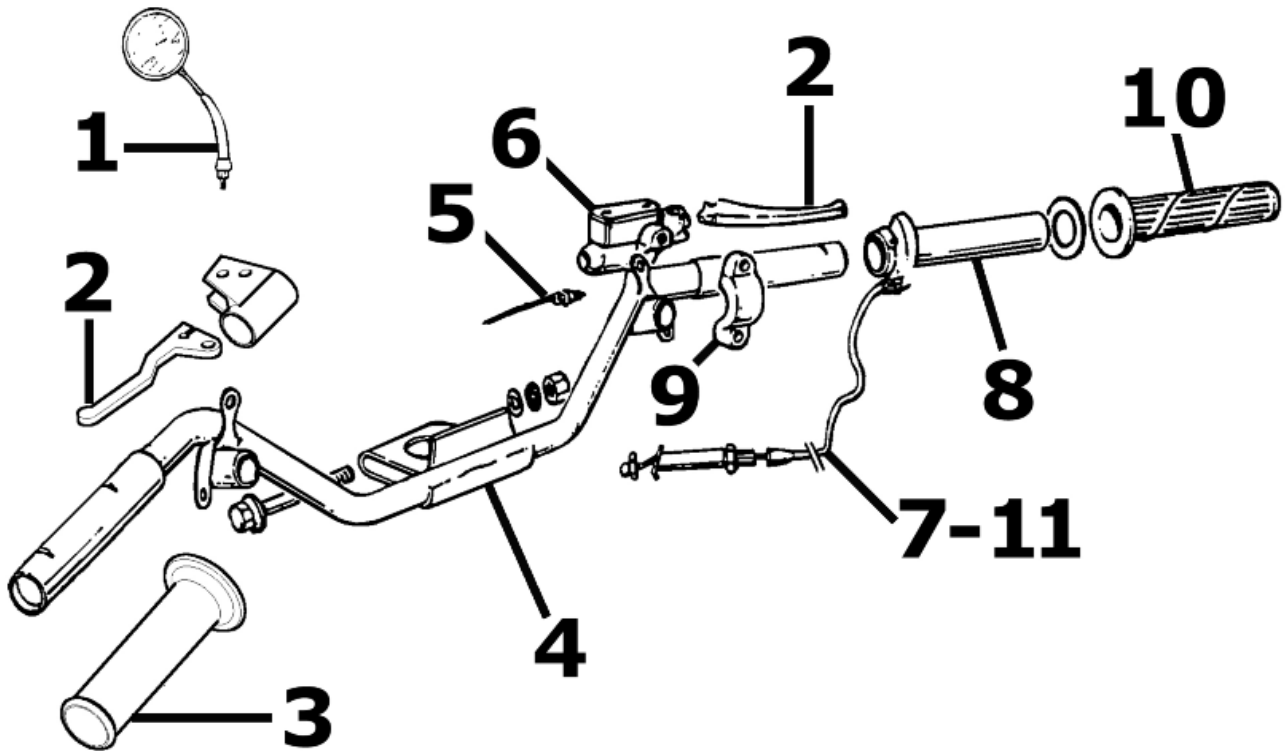
Handlebar covers



HANDLEBAR COVERS

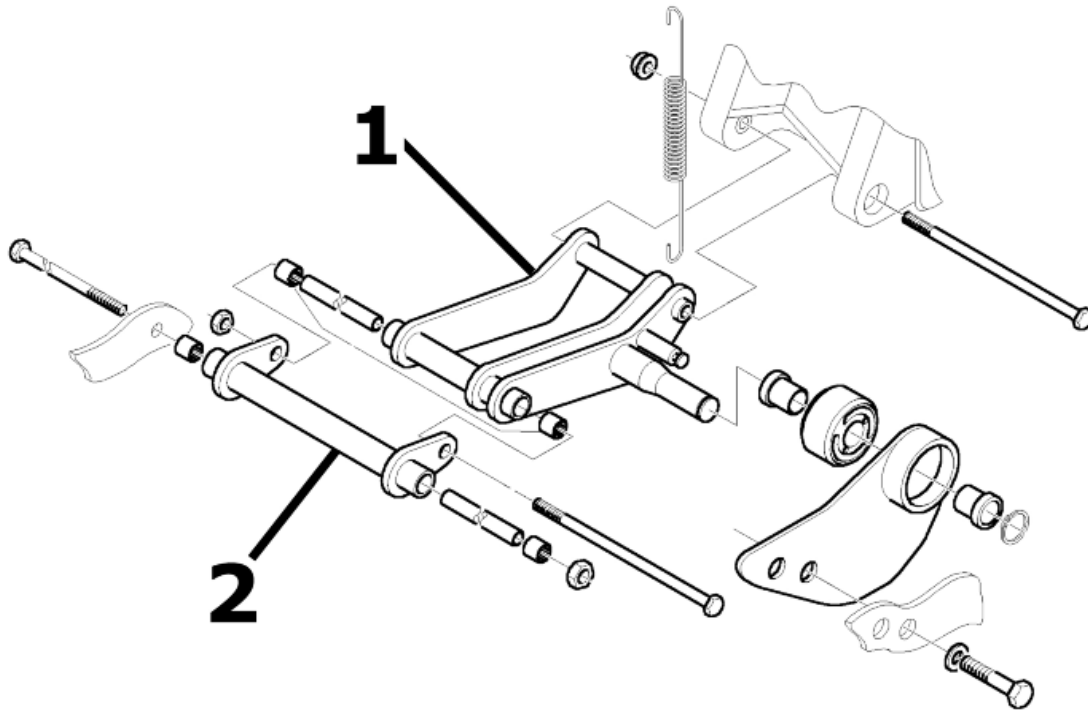
	Code	Action	Duration
1	004019	Handlebar rear section - Replacement	
2	004018	Handlebar front section - Replacement	
3	005078	Odometer glass - Replacement	
4	005076	Clock \ Pile - Replacement	
5	005014	Odometer - Replacement	
6	005038	Instrument panel warning light bulbs - Replacement	
7	004099	Odometer housing - Replacement	

Handlebar components



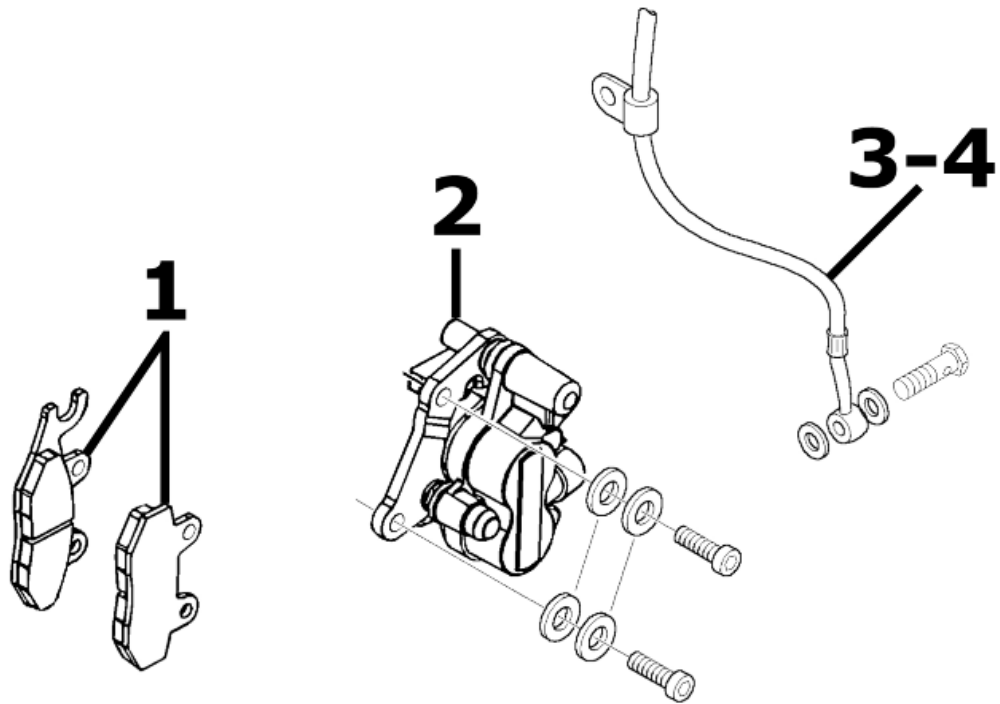
HANDLEBAR COMPONENTS

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

Swing-arm**SWINGING ARM**

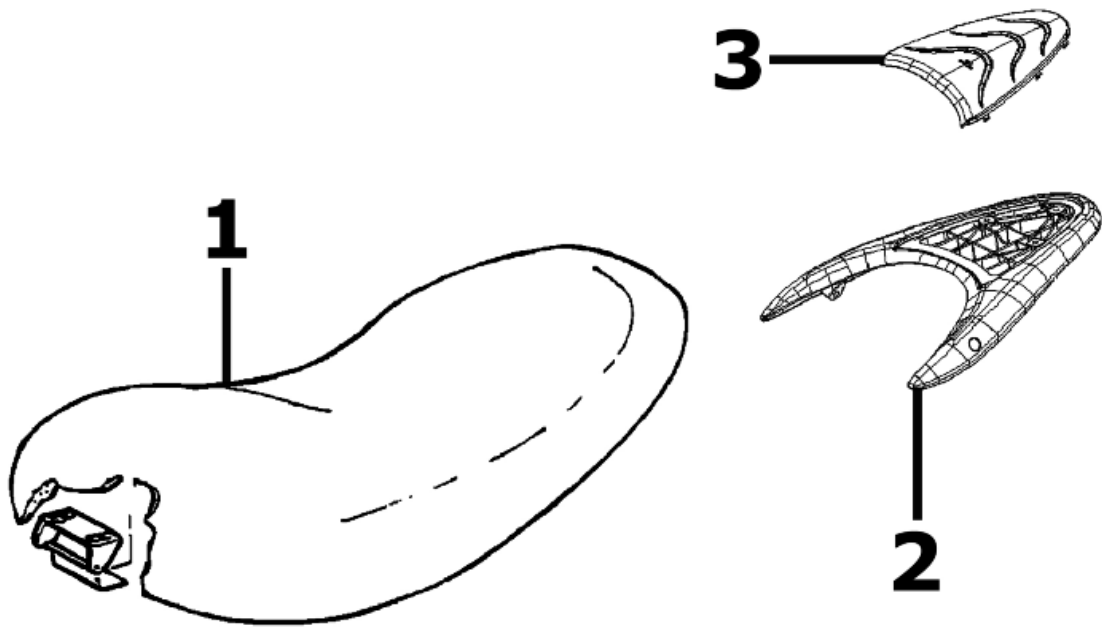
	Code	Action	Duration
1	001072	Engine / frame swinging arm fitting - Replacement	
2	003080	Swinging arm on frame - Replacement	

Brake hoses



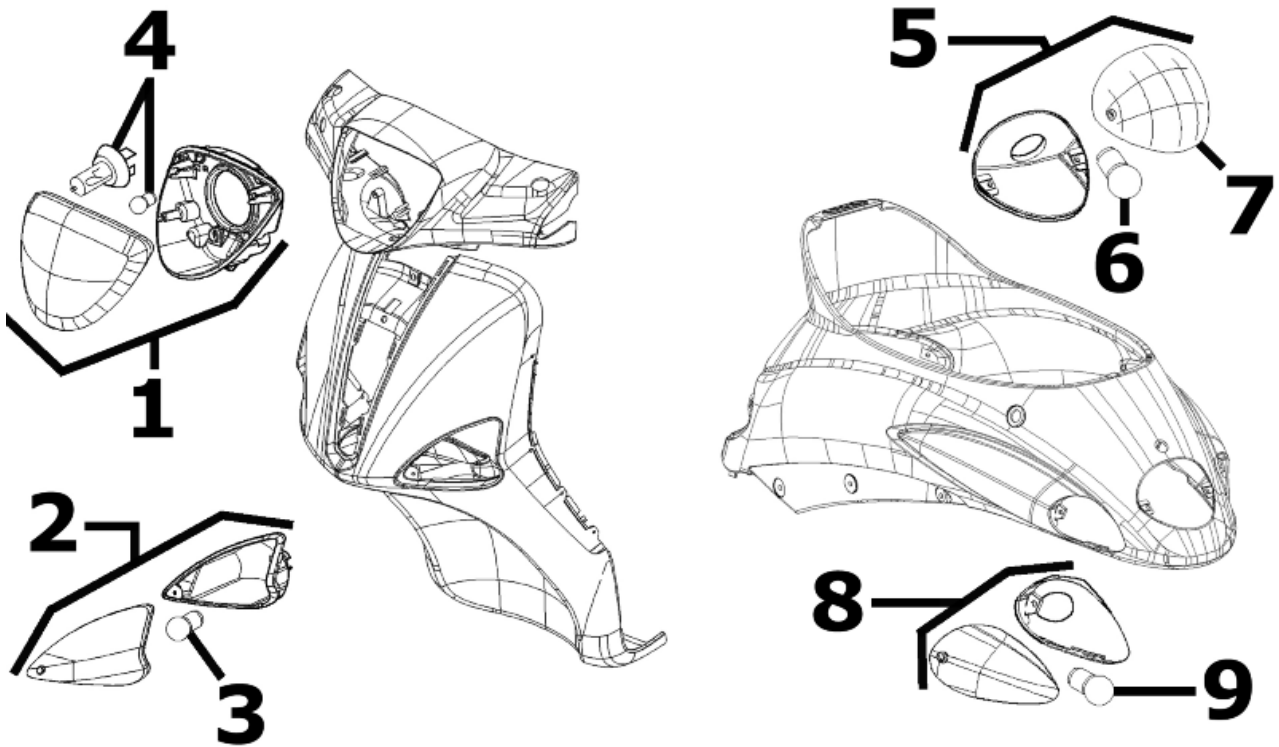
BRAKE HOSES

	Code	Action	Duration
1	002007	Front brake shoes/pads - Remov. and Refitt	
2	002039	Front brake line - Replacement	
3	002021	Front brake hose - Remov. and Refitt.	
4	002047	Front brake fluid and system bleeding plug - Repl.	

Seat**SEAT**

	Code	Action	Duration
1	004003	Saddle - Replacement	
2	004008	Luggage rack - Replacement	
3	004062	Luggage rack cover - Replacement	

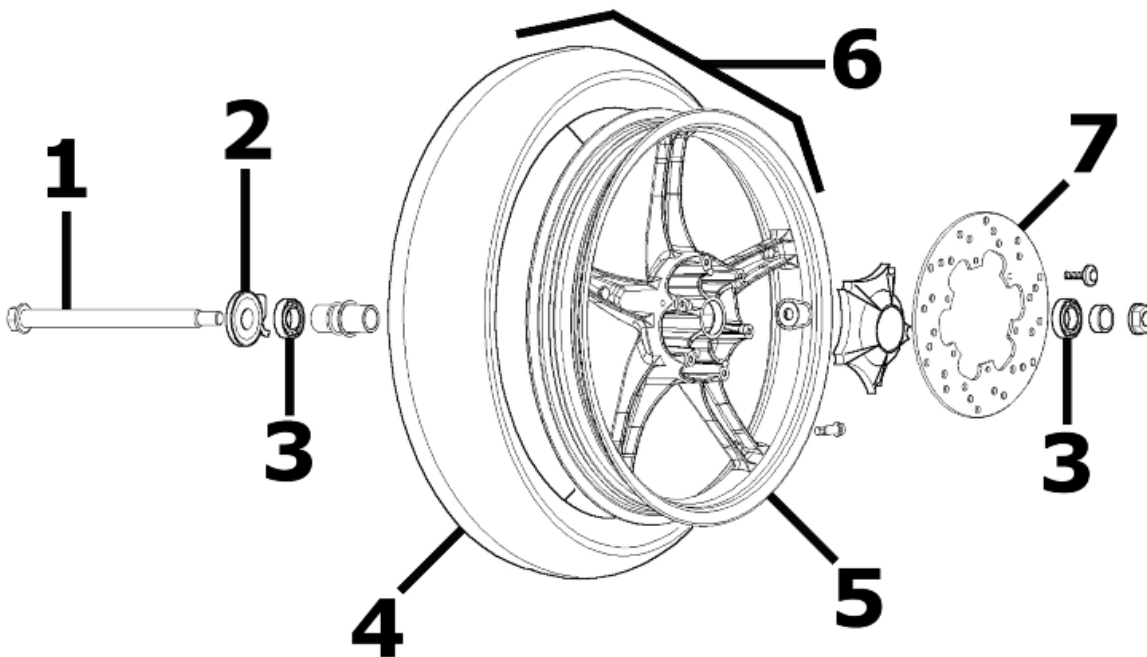
Turn signal lights



TURN SIGNAL LIGHTS

	Code	Action	Duration
1	005002	Front headlamp - change	
2	005012	Front turn indicator - Replacement	
3	005067	Front turn indicator bulb - Replacement	
4	005008	Front headlamp bulbs - Replacement	
5	005005	Taillight - Replacement	
6	005066	Rear light bulbs - Replacement	
7	005028	Rear light assembly glass - Replacement	
8	005022	Rear turning indicators - Replacement	
9	005068	Rear turning indicator bulb - Replacement	

Front wheel



FRONT WHEEL

	Code	Action	Duration
1	003038	Front wheel axle - Replacement	
2	002011	Odometer drive - Replacement	
3	003040	Front wheel bearings - Replacement	
4	003047	Front tyre - Replacement	
5	003037	Front wheel rim - Removal and Re-fitting	
6	004123	Front wheel - Replacement	
7	002041	Brake disc - Replacement	

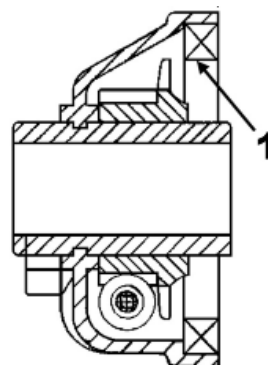
Grease tone wheel or drive

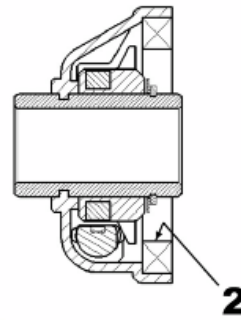
Please take note that the code has been introduced:

900001 - Tone wheel / drive greasing - 15'.

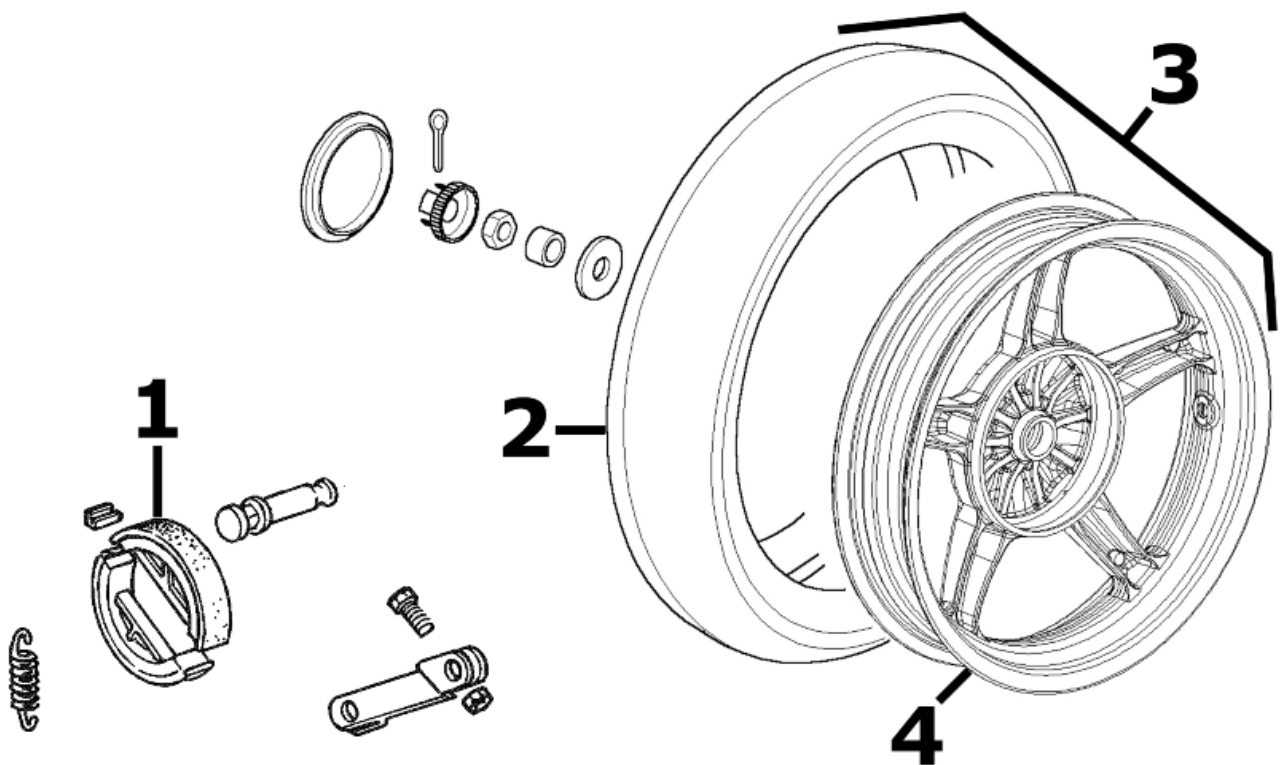
Never mistake the codes 002011 (movement sensor replacement) and 005089 (tone wheel replacement) in the event of noise of the indicated components. The grease recommended is TUTELA MRM 2 (soap-based lithium grease with Molybdenum disulphide).

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





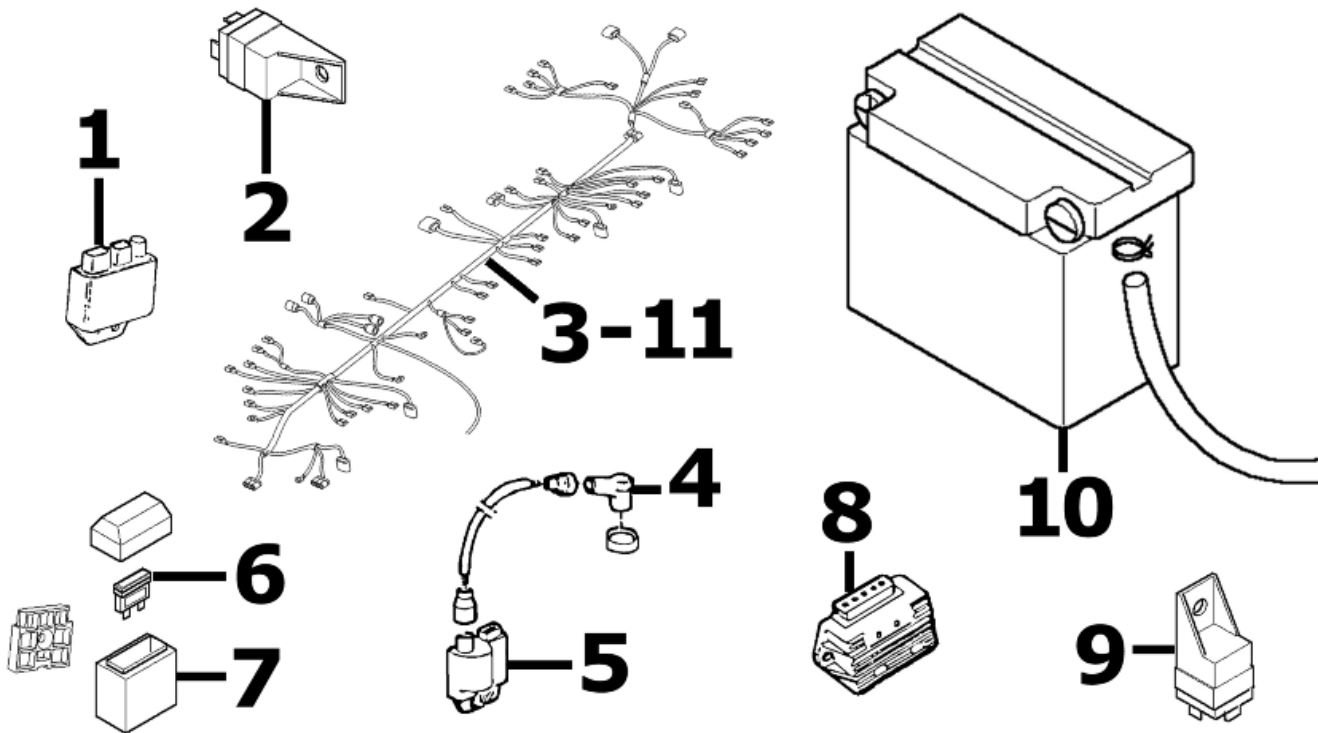
Rear wheel



REAR WHEEL

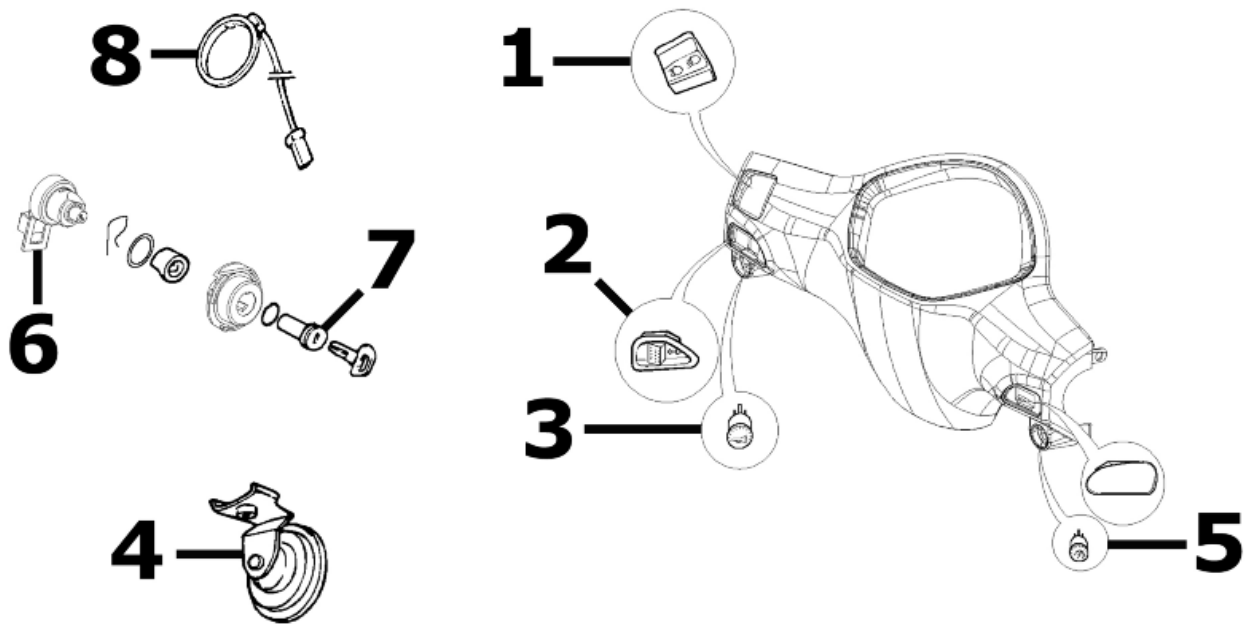
	Code	Action	Duration
1	002002	Rear brake pads/shoes - Repl.	
2	004126	Rear wheel tyre - Replacement	
3	001016	Rear wheel - Replacement	
4	001071	Rear wheel rim - Removal and Refit	

Electric devices

**ELECTRICAL DEVICES**

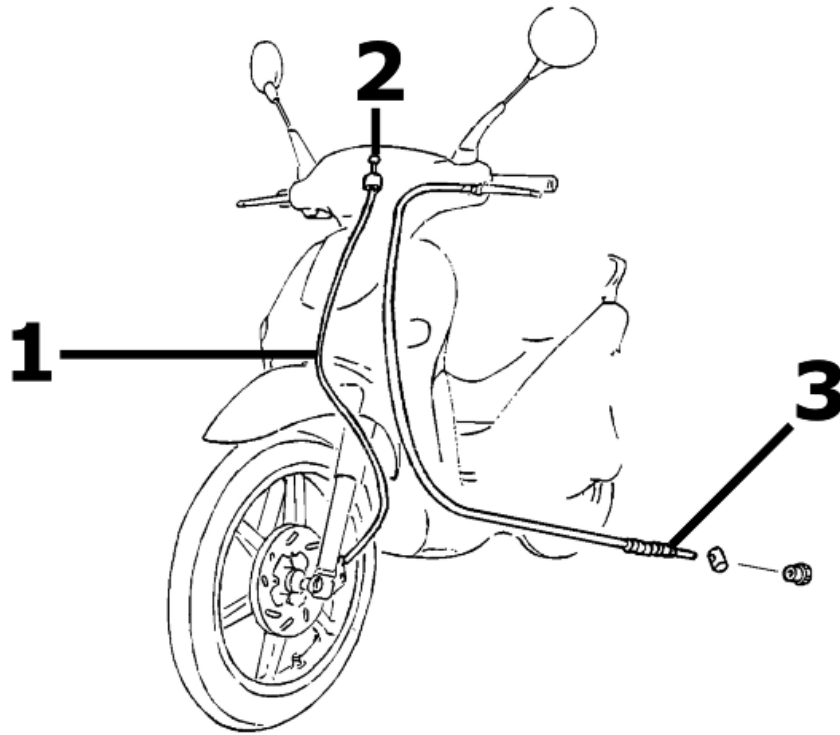
	Code	Action	Duration
1	001023	Control unit - Replacement	
2	005035	Headlight remote control - Replacement	
3	005001	Electric system - Removal and reassembly	
4	001094	Spark plug cap - Replacement	
5	001069	HV coil - replace	
6	005052	Fuse - Replacement	
7	005025	Battery fuse box - Replacement	
8	005009	Voltage regulator - Replacement	
9	005011	Start-up remote control switch - change	
10	005007	Battery - Replacement	
11	005114	Electrical system - Service	

Electronic controls



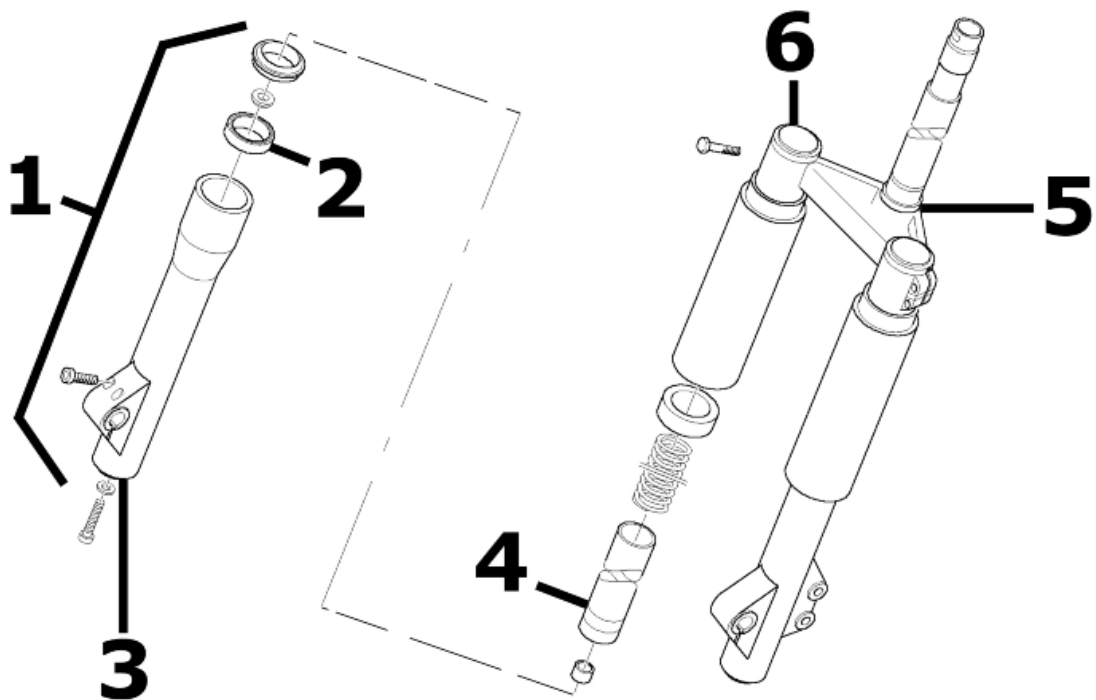
ELECTRIC CONTROLS

	Code	Action	Duration
1	005039	Lights switch - Replacement	
2	005006	Light or turning indicator switch - Replacement	
3	005040	Horn button - Replacement	
4	005003	Horn - Replacement	
5	005041	Starter button - Replacement	
6	005016	Key switch - Replacement	
7	004096	Lock series - Replacement	
8	005072	Immobilizer aerial - Replacement	

Transmissions**TRANSMISSIONS**

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

Front suspension



FRONT SUSPENSION

	Code	Action	Duration
1	003010	Front suspension - Service	
2	003048	Fork oil seal - Replacement	
3	003076	Fork leg - Replacement	
4	003079	Fork stem - Replacement	
5	003051	Complete fork - replace	
6	003069	Front fork oil - Replacement	

A

Air filter: 161

B

Battery: 38, 45, 55, 58

Brake: 145–148, 150, 203

C

Carburettor: 11, 125, 129, 187

F

Fuel: 37, 124, 162, 197

H

Headlight: 156

Horn:

I

Identification: 8

Instrument panel: 155

M

Maintenance: 7, 29

Mirrors: 154

O

Oil filter: 178

S

Shock absorbers: 142

Spark plug: 53

Start-up:

T

Tank: 162, 197

Transmission: 10, 37, 65, 80, 90, 184

Turn indicators:

Tyres: 10