



SERVICE STATION MANUAL

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MSS ZIP 100 4T



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

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SERVICE STATION MANUAL

MSS ZIP 100 4T

This service station manual has been drawn up by Piaggio & C. Spa to be used by the workshops of Piaggio-Gilera dealers. It is assumed that the user of this manual for maintaining and repairing Piaggio vehicles has a basic knowledge of mechanical principles and vehicle repair technique procedures. Any significant changes to vehicle characteristics or to specific repair operations will be communicated by updates to this manual. Nevertheless, completely satisfactory work cannot be carried out without the necessary equipment and tools. It is therefore advisable to read the sections of this manual relating to appropriate tools, along with the appropriate 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 naked flames or sparks.
 - Clean the brake pads in a well-ventilated area, directing the jet of compressed air in such a way that you do not breathe in the dust produced by the wear of the friction material. Even though the latter contains no asbestos, inhaling dust is harmful.
-

Maintenance rules

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

Vehicle identification

VEHICLE IDENTIFICATION

Specification	Desc./Quantity
Engine prefix	M252M ÷ 1001
Chassis prefix	LEMM25200 ÷ 1001



Dimensions and mass

WEIGHTS AND DIMENSIONS

Specification	Desc./Quantity
Total and dry weight	89 ± 3 kg
Width	680 mm
Length	1700 mm
Wheelbase	1200 mm
Height	1060 mm

Engine

ENGINE

Specification	Desc./Quantity
Type	single-cylinder, four-stroke
Bore	50 mm
Stroke	49 mm
Cubic capacity	96.21 cc
Compression ratio	10.5 ÷ 11.5 : 1
Timing system	single overhead camshaft, two valves, driven by a chain to the left side.
Depression carburettor	KEIHIN CVK
CO adjustment	3.2% ± 0.5
Engine idle speed (100 cc)	~ 1500 ± 150 rpm
Air filter	sponge impregnated with a mixture 50% oil (Selenia Air Filter Oil) and 50% unleaded petrol.
Starting system	electric starter/kick-starter
Lubrication	engine lubrication with lobe pump (inside the crankcase), chain-driven, and double filter: mesh and centrifugal.
Fuel supply	Gravity feed, with unleaded petrol (with a minimum octane rating of 95) with carburettor.
Max power (to the crankshaft)	4.2 kW (5.7 CV) at 6750 rpm
Maximum torque (to the crankshaft)	6.92 Nm 6000 rpm.
Cooling system	with forced air.
Valve clearance (cold engine)	intake 0.10 mm discharge 0.15 mm

Transmission

TRANSMISSIONS

Specification	Desc./Quantity
TRANSMISSION	With automatic expandable pulley variator, torque server, V-belt, automatic clutch, gear reduction unit.

Capacities

CAPACITY

Specification	Desc./Quantity
Main and supplementary fuel tank (including ~ 1.2 l reserve) (100 cc)	~ 7 l
Rear hub (100 cc)	approx. 80 cm ³
Engine oil	approx. 850 cm ³ (recommended oil: SELENIA HI SCOOTER 4 Tech)

Electrical system

ELECTRICAL COMPONENTS

Specification	Desc./Quantity
Type of ignition	Capacitive discharge type electronic ignition, with incorporated high voltage coil
Variable ignition advance by microprocessor (before TDC)	15° at 1500 rpm. 22° at 5000 ÷ 6000 rpm.
spark plug	Champion RG 4 HC CHAMPION RG 4 PHP NGK CR9EB
Fuse (100 cc)	10 A
Generator	single-phase alternating current

Frame and suspensions

FRAME

Specification	Desc./Quantity
Type of chassis	Welded tubular steel chassis with stamped sheet reinforcements.
Front suspension	Mechanical telescopic fork with 30-mm stems.
Front suspension stroke	77 mm
Rear suspension travel	70 mm
Front brake	Disc brake (220 mm in diameter) with hydraulic control (lever on the right side of the handlebar).
Rear brake	Drum brake (140 mm in diameter) with expanding shoes, mechanically operated
Front tyre size	100/80-10"
Rear tyre size	120/70-10"
Tyre pressure (100 cc)	Front wheel: 1.3 bar Rear wheel: 1.6 ÷ 1.8 bar
Rims	made of light alloy: 2.50x10" (front) 3.00x10" (rear)

N.B.

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

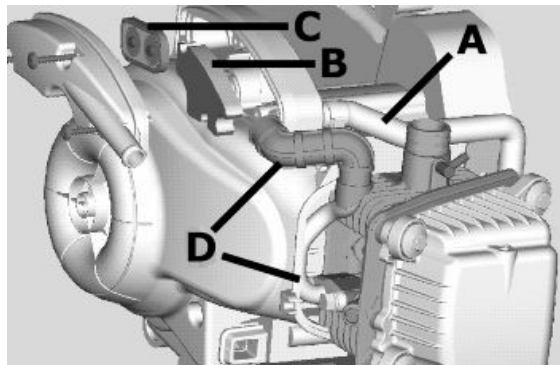
Brakes

BRAKES

Specification	Desc./Quantity
Front brake	Disc brake (Ø 175 mm) with hydraulic control (lever on the handlebar right end).
Rear brake	Ø 110 mm drum brake with mechanically controlled expansion shoes (lever on the handlebar left end)

Secondary air

- The SAS (Secondary air housing) operating principle for 50 4T engines is similar to that for 50 2T engines; the only difference lies in how air is sucked in the external and the external side of the transmission compartment.
- Air is taken in along tube «A» (to the cylinder side) and, after been cleaned through the filter «B», gets into the reed valve «C» to be directed towards the head through a flexible pipe and then a rigid one «D» flanged to the head. In this way, the air reaches the discharge pipe to increase the amount of oxygen in the unburned gases before the catalytic converter, thus helping a better reaction of this device.



Carburettor

KEHIN CARBURETTOR

Specification	Desc./Quantity
Code	CVK 20
Throttle valve diameter	Ø 20.5 mm
Diffuser diameter	Ø 19 mm
Body stamping	ADA
Maximum jet	75
Tapered pin stamping	4REEG
Minimum jet	35
Starter nozzle	45
Type	vacuum
Starter nozzle code	6ZC
Notches from the top	the rod has no notches
Gasoline inlet hole	Ø 1.6 mm
Starter piston protrusion	11 mm at 24°C

50cc Version

Tightening Torques

STEERING ASSEMBLY

Name	Torque in Nm
Upper steering ring nut	35 ÷ 40
Lower steering ring nut	12 ÷ 14
Handlebar clamping screw	20 - 25 Nm

FRAME ASSEMBLY

Name	Torque in Nm
Engine-swinging arm bolt	33 ÷ 41
Frame-swinging arm bolt	64 - 72
Bolt fixing shock absorber to the chassis	20 ÷ 25 Nm
Bolt fixing shock absorber to the engine	33 ÷ 41
Rear wheel axle	104 ÷ 126
Stand bolt	25 ÷ 30 Nm
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
Oil bleeding valve	8 ÷ 12
Disc tightening screw (°)	5 ÷ 6.5

N.B.

IN ORDER TO ENSURE AN ADEQUATE LOCKING TORQUE, LUBRICATE THE NUTS BEFORE ASSEMBLING THEM.

ENGINE ASSEMBLY

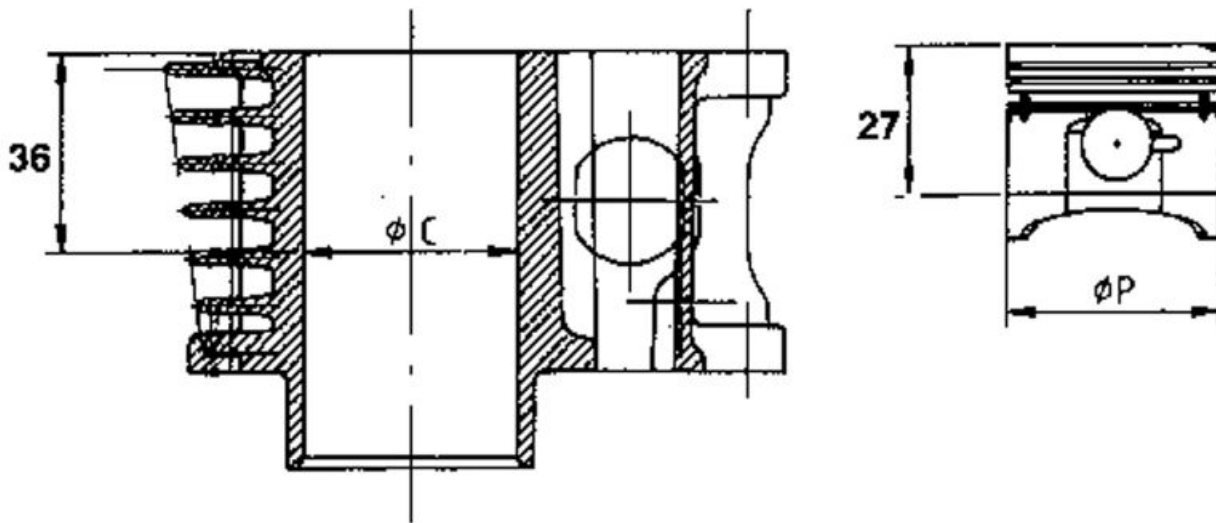
Name	Torque in Nm
Ignition spark plug	10 ÷ 15 Nm
Head cover screws	8 ÷ 10
Head-cylinder stud bolt nuts	6 ÷ 7 + 90° + 90° *
Screws fixing head and cylinder to crankcase	8 ÷ 10
Chain tensioner pad screw	5 ÷ 7
Timing chain tensioner screws	8 ÷ 10 Nm
Timing chain tensioner central screw	5 ÷ 6
Camshaft pulley 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
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
Oil decantation labyrinth sheet screws	7 ÷ 8
Oil pump crown screw	8 ÷ 10
Screws fixing oil pump to the crankcase	5 ÷ 6
Oil pump coupling screws	7 ÷ 9 Nm

Name	Torque in Nm
Oil sump screws	8 ÷ 10
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 screws	11 ÷ 13
Transmission cover screws	11 ÷ 13 Nm
Start-up lever screw	11 ÷ 13
Rear brake lever screw	11 ÷ 13
Crankcase cooling cover screw	2 ÷ 2.5
Nut locking clutch unit on pulley	55 ÷ 60 Nm
Crankshaft pulley nut	18 ÷ 20 + 90° ± 10°
Driven pulley shaft nut	40 ÷ 44 Nm
Hub oil drainage screw	3 ÷ 5 Nm
Rear hub cap screws	24 ÷ 26 Nm
Crankcase half union screw	8 ÷ 10

Overhaul data

Assembly clearances

Cylinder - piston assy.

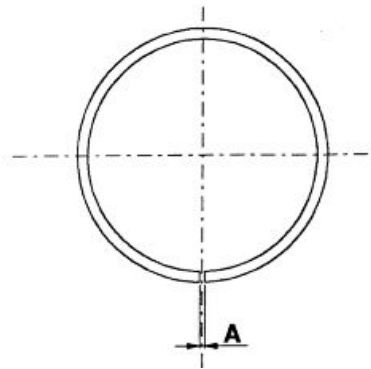


COUPLING BETWEEN PISTON AND CYLINDER

Name	Initials	Cylinder	Piston	Play on fitting
Cylinder Ø C 50 +0.021-0.007	A	49.993 ÷ 50.000	49.948 ÷ 49.955	0.038 ÷ 0.052
Cylinder Ø C 50 +0.021-0.007	B	50.000 ÷ 50.007	49.955 ÷ 49.962	0.038 ÷ 0.052
Piston Ø P 49.962 ±0.014	C	50.007 ÷ 50.014	49.962 ÷ 49.969	0.038 ÷ 0.052
Piston Ø P 49.962 ±0.014	D	50.014 ÷ 50.021	49.969 ÷ 49.976	0.038 ÷ 0.052
Cylinder 1st Oversize Ø C 50.2+0.021-0.007	A1	50.193 ÷ 50.200	50.148 ÷ 50.155	0.038 ÷ 0.052
Cylinder 1st Oversize Ø C 50.2+0.021-0.007	B1	50.200 ÷ 50.207	50.155 ÷ 50.162	0.038 ÷ 0.052
Piston 1st Oversize Ø P 50.162±0.014	C1	50.207 ÷ 50.214	50.162 ÷ 50.169	0.038 ÷ 0.052

Name	Initials	Cylinder	Piston	Play on fitting
Piston 1st Oversize Ø P 50.162±0.014	D1	50.214 ÷ 50.221	50.169 ÷ 50.176	0.038 ÷ 0.052
Cylinder 2nd Oversize Ø C 50.4+0.021-0.007	A2	50.393 ÷ 50.400	50.348 ÷ 50.355	0.038 ÷ 0.052
Cylinder 2nd Oversize Ø C 50.4+0.021-0.007	B2	50.400 ÷ 50.407	50.355 ÷ 50.362	0.038 ÷ 0.052
Piston 2nd Oversize Ø P 50.362±0.014	C2	50.407 ÷ 50.414	50.362 ÷ 50.369	0.038 ÷ 0.052
Piston 2nd Oversize Ø P 50.362±0.014	D2	50.414 ÷ 50.421	50.369 ÷ 50.376	0.038 ÷ 0.052
Cylinder 3rd Oversize Ø C 50.6+0.021-0.007	A3	50.593 ÷ 50.600	50.548 ÷ 50.555	0.038 ÷ 0.052
Cylinder 3rd Oversize Ø C 50.6+0.021-0.007	B3	50.600 ÷ 50.607	50.555 ÷ 50.562	0.038 ÷ 0.052
Piston 3rd Oversize Ø P 50.562±0.014	C3	50.607 ÷ 50.614	50.562 ÷ 50.569	0.038 ÷ 0.052
Piston 3rd Oversize Ø P 50.562±0.014	D3	50.614 ÷ 50.621	50.569 ÷ 50.576	0.038 ÷ 0.052

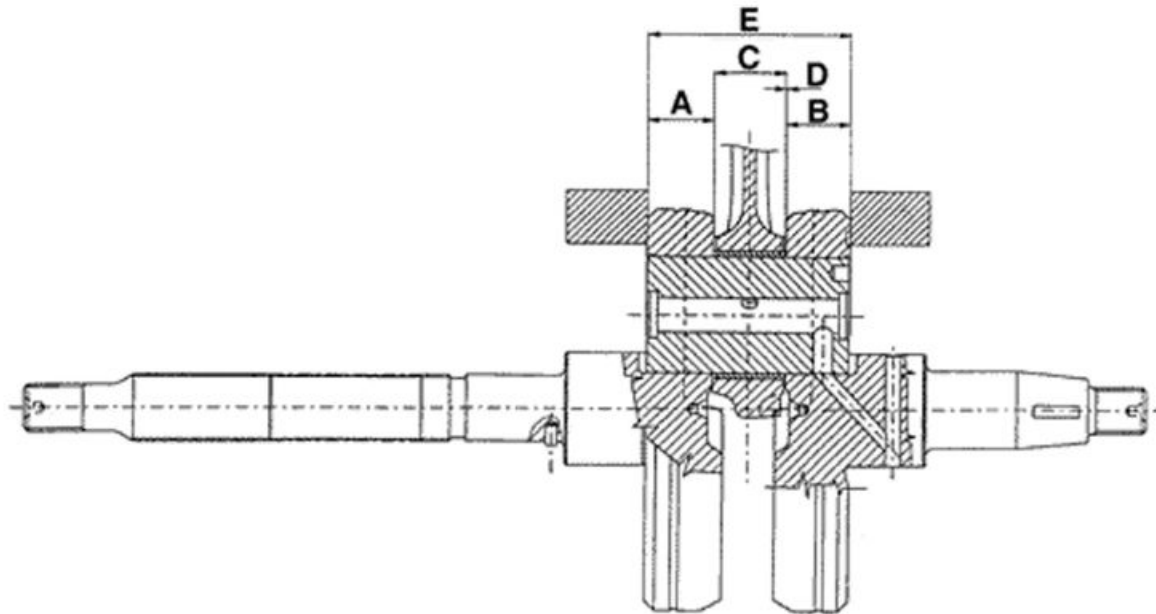
Piston rings



SEALING RINGS

Name	Description	Dimensions	Initials	Quantity
1st Compression ring		50 x 1	A	0.10 ÷ 0.25 (0.40)
2nd Compression ring		50 x 1	A	0.10 ÷ 0.25 (0.35)
Scraper ring		50 x 2	A	0.20 ÷ 0.70 (0.80)
1st Compression ring	1st Oversize	50.2 x 1	A	0.10 ÷ 0.25 (0.40)
2nd Compression ring	1st Oversize	50.2 x 1	A	0.10 ÷ 0.25 (0.35)
Scraper ring	1st Oversize	50.2 x 2	A	0.20 ÷ 0.70 (0.80)
1st Compression ring	2nd Oversize	50.4 x 1	A	0.10 ÷ 0.25 (0.40)
2nd Compression ring	2nd Oversize	50.4 x 1	A	0.10 ÷ 0.25 (0.35)
Scraper ring	2nd Oversize	50.4 x 2	A	0.20 ÷ 0.70 (0.80)
1st Compression ring	3rd Oversize	50.6 x 1	A	0.10 ÷ 0.25 (0.40)
2nd Compression ring	3rd Oversize	50.6 x 1	A	0.10 ÷ 0.25 (0.35)
Scraper ring	3rd Oversize	50.6 x 2	A	0.20 ÷ 0.70 (0.80)

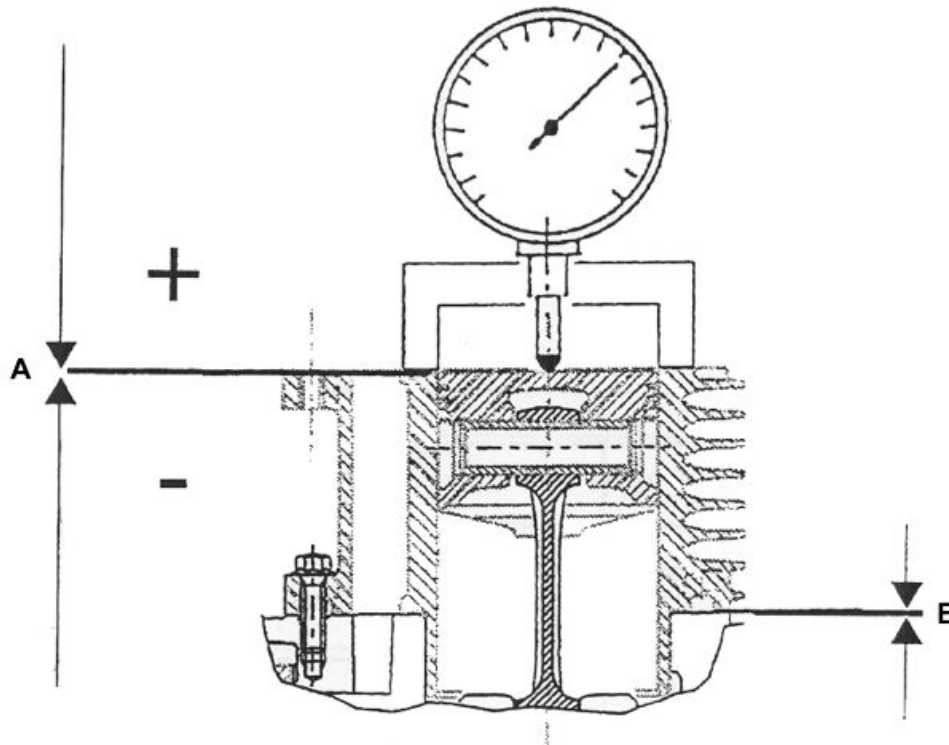
Crankcase - crankshaft - connecting rod



AXIAL CLEARANCE BETWEEN CRANKSHAFT AND CONNECTING ROD

Name	Description	Dimensions	Initials	Quantity
Half-shaft, transmission side		14 +0 -0.005	A	
Flywheel-side half-shaft		16 +0 -0.005	B	
Connecting rod		14.8 +0.05 -0	C	
Built-up camshaft		45.00 / Fits and clearances D = 0.15 ÷ 0.30	E	

Slot packing system



THE VALUE OF MEASUREMENT «A» TO BE TAKEN CAN REFER TO EITHER THE PROTRUSION OR RE-ENTRY OF THE PISTON. VALUES «A» INDICATED BY «-» CORRESPOND TO RE-ENTRY AND THOSE INDICATED BY «+» CORRESPOND TO PROTRUSION. THEREFORE, THE MORE THE PISTON PROTRUDES BEYOND THE PLANE FORMED AT THE CYLINDER UPPER END, THE THICKER THE GASKET TO BE USED AT THE CYLINDER BASE «B» SHOULD BE.

Characteristic

Shimming system to control the compression ratio

CR: 10.5 ÷ 11.5 : 1

CYLINDER HEIGHT

54.95 ± 0.05

HEAD GASKET THICKNESS (steel)

0.3 ± 0.05

BASE GASKET THICKNESS

Specification	Desc./Quantity
Size measured «A» -0.25 ÷ -0.05	0.4
Size measured «A» -0.05 ÷ -0.15	0.5

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

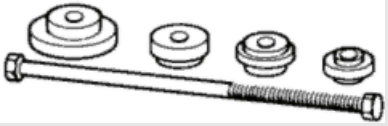


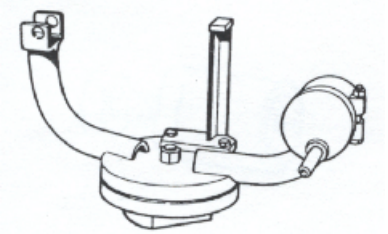


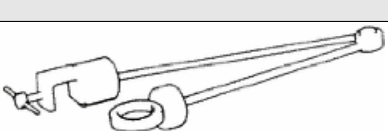
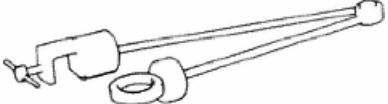
Product	Description	Specifications
AGIP FILTER OIL	Oil for air filter sponge	Mineral oil with specific additives for increased adhesiveness
AGIP GP 330	Grease (brake control levers, throttle grip)	Calcium complex soap-based grease with NLGI 2; ISO-L-XBCIB2
AGIP CITY HI TEC 4T	Engine oil	SAE 5W-40, API SL, ACEA A3, JASO MA Synthetic oil
AGIP BRAKE 4	Brake fluid	FMVSS DOT 4 Synthetic fluid
MONTBLANC MOLYBDENUM GREASE	Grease for driven pulley shaft adjusting ring and movable driven pulley housing	Grease with Molybdenum disulphide
AGIP GREASE PV2	Grease for steering bearings, bolt seatings for swinging arms and faying surface of driven pulley spring (only pulley side)	Soap-based lithium and zinc oxide grease containing NLGI 2; ISO-L-XBCIB2

INDEX OF TOPICS

TOOLING

TOOL

RECOMMENDED TOOLS

Stores code	Description	
001330Y	Tool for fitting steering seats	
001467Y008	Pliers to extract 17 mm ø bearings	
001467Y029	Bell for bearings, O.D. 38 mm	
005095Y	Engine support	
008119Y009	Tube to assemble shafts and axles	
020004Y	Punch for removing fifth wheels from headstock	
020074Y	Tool to align crankshaft	
020150Y	Air heater support	

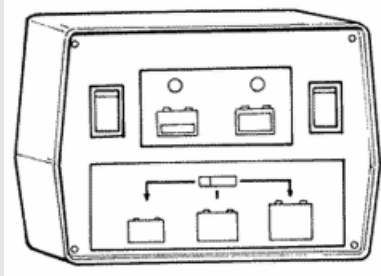
Stores code	Description	
020151Y	Air heater	
020392Y	Fork to assemble piston and cylinder	
020329Y	Mity-Vac vacuum-operated pump	
020330Y	Stroboscopic light to check timing	
020331Y	Digital multimeter	

Stores code	Description
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020332Y	Digital rpm indicator
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020333Y	Single battery charger
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020334Y	Multiple battery charger
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020335Y	Magnetic support for dial gauge
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494929Y	Exhaust fumes analyser
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BASIC TOOLS

Stores code	Description	
004499Y	Bearing extractor. Fitted with: 1 Bell, 2 Sleeve, 3 Screw, 6 Ring, 27 Half rings, 34 Half rings	


020055Y Wrench for steering tube ring nut



020162Y	Flywheel extractor	
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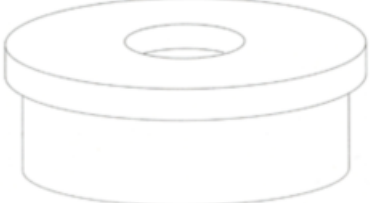




020171Y Punch for driven pulley roller bearing








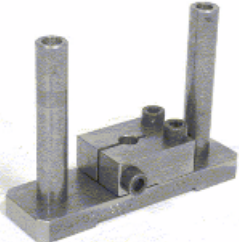





020265Y	Bearing fitting base	
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020306Y Punch for assembling valve seal rings



Stores code	Description	
020340Y	Flywheel and transmission oil seals fitting punch	
020358Y	37x40-mm Adaptor	
020359Y	42 x 47 mm Adaptor - For main bearings and wheel axle	
020360Y	52x55-mm Adaptor	
020362Y	12 mm guide	
020363Y	20-mm guide	
020364Y	25-mm guide	
020376Y	Adaptor handle	

Stores code	Description	
020382Y	Valve fitting/ removal tool	
020382Y011	adapter for valve removal tool	
020431Y	Valve oil seal extractor	
020432Y	Tool to fit the start-up sector spring	
020439Y	17-mm guide	
020444Y	Tool for fitting/ removing the driven pulley clutch	

Stores code	Description	
020449Y	Piston position check support	
020450Y	Camshaft fitting/removal tool	
020451Y	Driving pulley lock wrench	
020452Y	Tube for removing and refitting the driven pulley shaft	
020456Y	Ø 24 mm adaptor	
020565Y	Flywheel lock calliper spanner	
020498Y	Pin lock fitting tool	

INDEX OF TOPICS

MAINTENANCE

MAIN

Maintenance chart

AFTER 1000 KM

Action

Engine oil - level check/ top-up
Hub oil level - replacement
Valve clearance - Check
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 - check
Vehicle and brake test - road test

AT 6000; AT 18,000; AT 30,000; AT 42,000; AT 54,000; AT 66,000 KM

Action

Engine oil - change
Hub oil level - check
Oil filter - Replacement
Variable speed rollers - check or replacement
Driving belt - Check
Brake pads - check condition and wear
Brake fluid level - check
Electrical System and Battery - Check
Tyre condition and wear - Check
Tyre pressure - check
Vehicle and brake test - road test

AT 12000; AT 36,000; AT 60,000 KM

Action

Engine oil - change
Hub oil level - check
Spark plug - replacement
Oil filter - Replacement
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
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 check
Tyre condition and wear - Check
Tyre pressure - check
Vehicle and brake test - road test

AT 24000 AND AT 48000 KM

Action

Engine oil - change
Hub oil level - replacement
Spark plug - replacement
Oil filter - Replacement

Action

Valve clearance - Check
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
Driving Belt - replacement
Cylinder ventilation system - check
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 check
Tyre condition and wear - Check
Tyre pressure - check
Vehicle and brake test - road test

AFTER 72000 KM

Action

Engine oil - change
Hub oil level - replacement
Spark plug - replacement
Oil filter - Replacement
Valve clearance - Check
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
Driving Belt - replacement
Cylinder ventilation system - check
Odometer gear - greasing
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid hoses - replacement
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - Check
Electrical System and Battery - Check
Headlight - adjustment check
Tyre condition and wear - Check
Tyre pressure - check
Vehicle and brake test - road test

EVERY 3000 KM

Action

Air filter - cleaning
Engine oil - Check level /Top-up

EVERY 24 MONTHS

Action

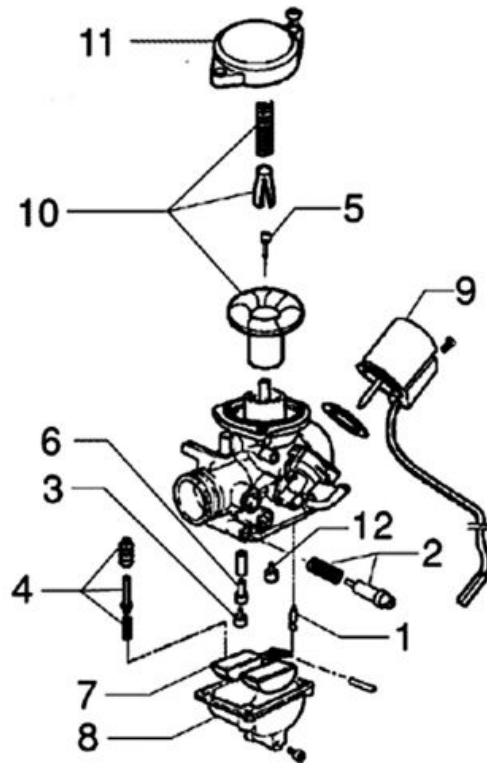
Brake fluid - change

Carburettor

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

WARNING

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



1. Needle valve - 2. Idle speed adjustment screw - 3. Max jet - 4. Accelerating pump - 5. Tapered pin - 6. Jet holder - 7. Float - 8. Chamber - 9. Starter device - 10. Vacuum valve - 11. Cover - 12. Minimum jet.

Specifications

Brand and Code: KEIHIN CVK 20

Adjustment code: AD8A

Type: vacuum

Diffuser diameter \varnothing 20.5 mm

Max. jet: 75

Min. jet: 35

Starter nozzle: 45

Starter nozzle code: 6ZC

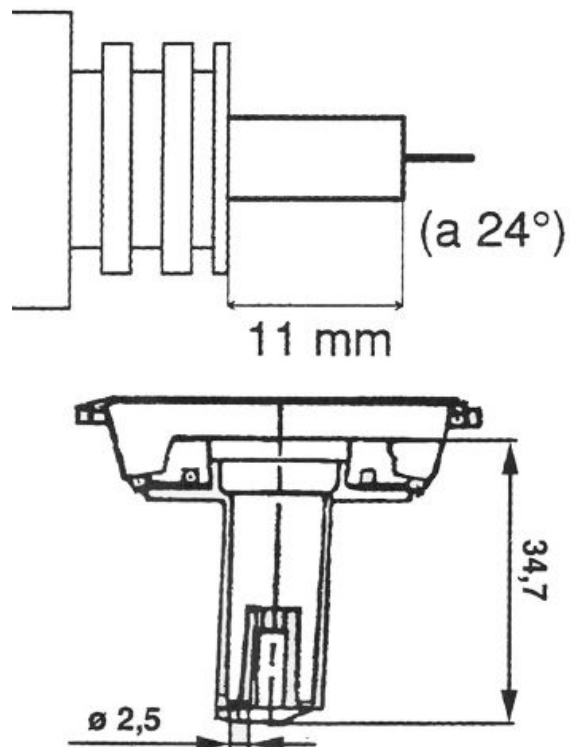
Diffuser: \varnothing 2.1 mm

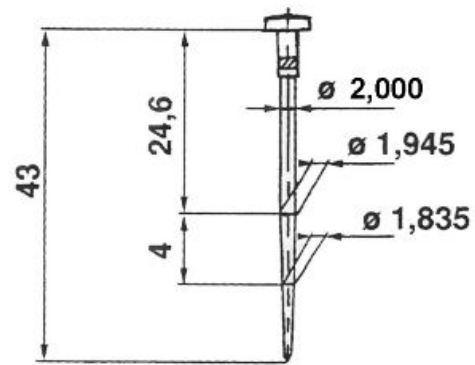
Tapered pin Type: 4 REEG

Notches from the top: the rod has no notches

Gasoline inlet hole: \varnothing 1.6 mm

Starter piston protrusion: 11 mm at 24°C





Checking the spark advance

The vehicle is fitted with a variable advance electronic device. There are two timing references on the flywheel cover in order to ensure a better precision when detecting the reference on the fan. Use a Tecnotest 130/P stroboscopic gun or a similar device to check. Start the engine and rev it to 1800 rpm (engine idle speed), operate the phase shifter and align the reference on the flywheel fan in between the two references done on the cover; at the same time read the advance value shown in the stroboscopic gun display; the value must be 10° . Repeat the operation with the engine at $5000 \div 6000$ rpm; the advance read must be 17° .

CAUTION

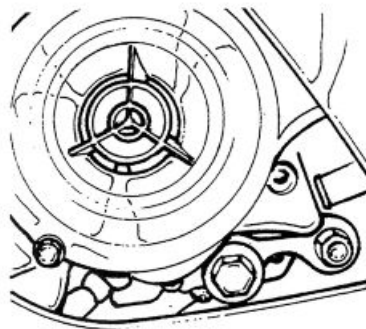
SHOULD THE FLASH INDICATIONS BE UNSTABLE AND THE RPM INDICATION DOES NOT CORRESPOND WITH THE TRUE ENGINE SPEED VARIATION (FOR EXAMPLE, VALUES SHOWN ARE HALVED), INSTALL A $10 \div 15$ K Ω RESISTIVE CABLE CONNECTED IN SERIES TO AN HV CABLE. IF THE IRREGULAR READING CONTINUES AFTER THIS OPERATION, CHECK THE COMPONENTS OF THE IGNITION SYSTEM.

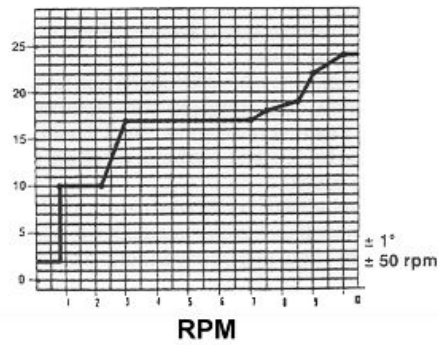
N.B.

WHEN THE INDUCTION CLAMP READS THE SIGNAL CORRECTLY, A READING CAN BE CARRIED OUT AT OVER 6000 RPM.

REVOLUTION LIMITER

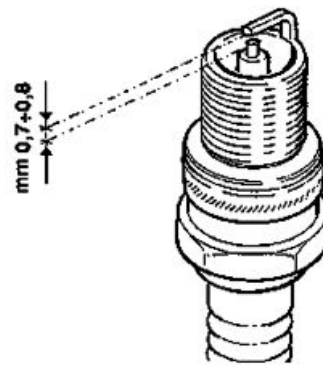
Specification	Desc./Quantity
1 spark on 7	10300 Rpm
1 spark on 3	10400 Rpm
all sparks are suppressed	10500 Rpm





Spark plug

- Disconnect and remove the spark plug pipe.
- Remove the spark plug; if necessary, use the spanner supplied with the vehicle.
- Examine it carefully and replace it if the insulator is chipped or cracked.
- Measure the electrode gap with a thickness gauge and, if necessary, adjust the gap by carefully bending the outer electrode.
- Make sure the sealing washer is in good condition.
- Assemble the spark plug, screw it manually and lock it to the prescribed torque with a spark plug spanner.



Characteristic

Electrode gap

0.7 ÷ 0.8 mm

Recommended spark plug:

Champion RG 4 HC

CHAMPION RG 4 PHP

NGK CR9EB

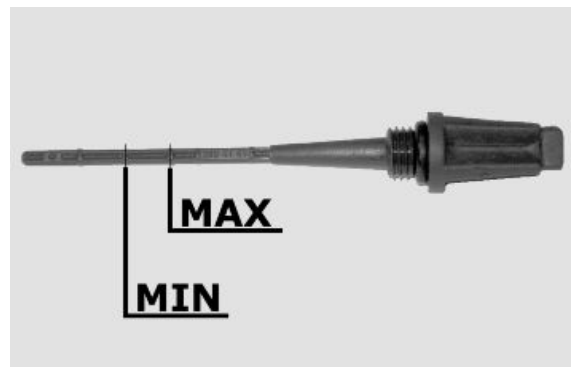
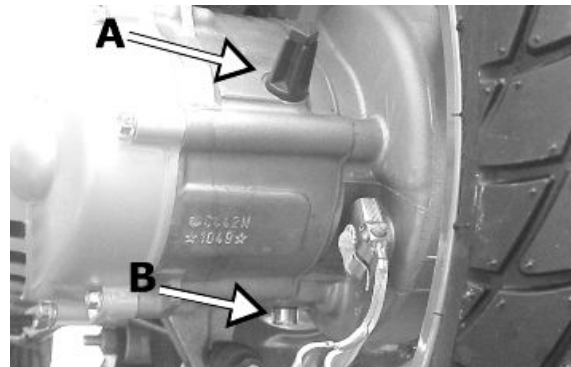
Locking torques (N*m)

Spark plug 10 ÷ 15 Nm

Hub oil

Check

- Park the scooter on level ground and rest it on the centre stand.
- Unscrew the dipstick «A», dry it with a clean rag and then reinsert it, **screwing it tightly into place.**
- Take out the dipstick checking oil level is between the second and third notch from the bottom (MAX and MIN shown in figure).
- If the level is under the MIN notch, refill the hub with the right amount of oil.
- Screw up the oil dipstick again and make sure it is locked properly into place.



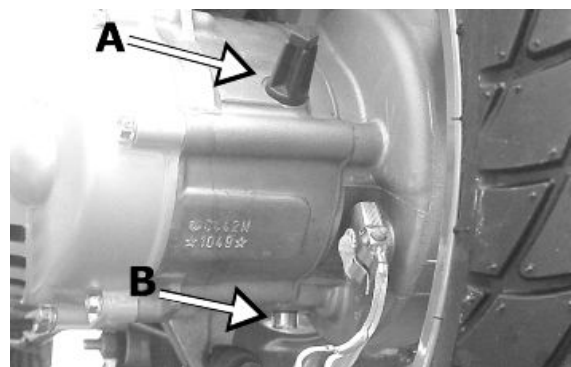
Recommended products

AGIP ROTRA 80W-90 Rear hub oil

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

Replacement

- Remove the oil filling cap/dipstick «A»
- Unscrew the oil drainage cap «B» shown in the figure and drain out all the oil.
- Screw the drainage cap back and fill up the hub with the required oil (about 80 cc)

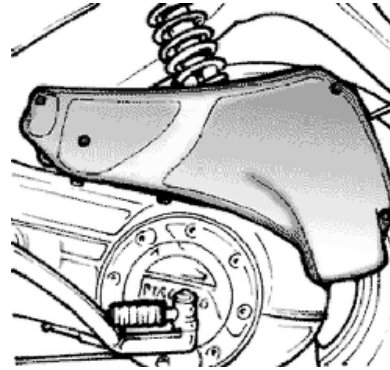


Air filter

Remove the air cleaner cap after undoing the 6 fixing screws, then extract the filter.

Cleaning:

- Wash with water and soap.
- Dry with a clean cloth without wringing.
- Soak with a mixture of 50% petrol and 50% SELENIA AIR FILTER OIL.
- Drip dry the filter and then squeeze it between the hands without wringing.



N.B.

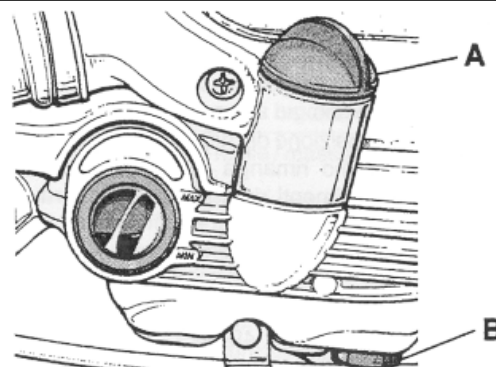
NEVER RUN THE ENGINE WITHOUT THE AIR FILTER, THIS WOULD RESULT IN AN EXCESSIVE WEAR OF THE PISTON AND CYLINDER.

Engine oil

Engine oil is used in 4T engines to lubricate the distribution elements, the bench bearings and the thermal group. **An insufficient quantity of oil can cause serious damage to the engine.** In all 4T engines, a loss of efficiency in oil performance and a certain level of consumption should be considered normal. Consumption is specially affected by use conditions (e.g.: oil consumption increases when driving at "full throttle". The replacement frequencies provided for by the maintenance programme are defined, depending on the total contents of oil in the engine and average consumption measured following standardised methods. **In order to avoid problems, it is advisable to control oil level every time the vehicle is used.**

Replacement

Replace oil and clean the mesh filter every 6,000 km. The engine must be drained by running off the oil from drainage cap «B» with hot engine. To facilitate oil drainage, loosen the cap «C» and take out the mesh filter. After cleaning and refitting the mesh filter, tighten cap «C», refill with about 650 cc oil through cap «A». Then start up the scooter, leave it running for a few minutes and switch it off: 5 minutes later check oil level and, if necessary, add oil without exceeding the MAX level. Only use new oil of the recommend type for oil top-ups and change.



CAUTION

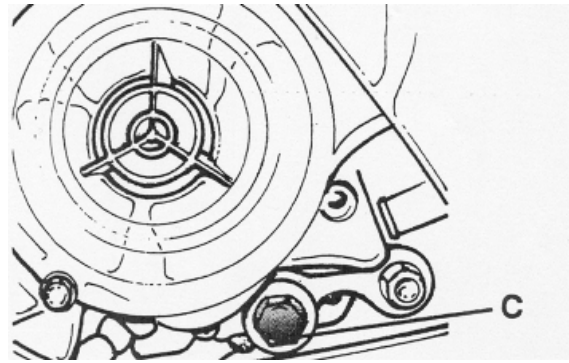
USING THE ENGINE WITH INSUFFICIENT LUBRICATION OR WITH THE WRONG LUBRICANTS MAY INCREASE WEAR AND TEAR ON THE MOVING PARTS AND MAY RESULT IN SERIOUS DAMAGE.

WARNING

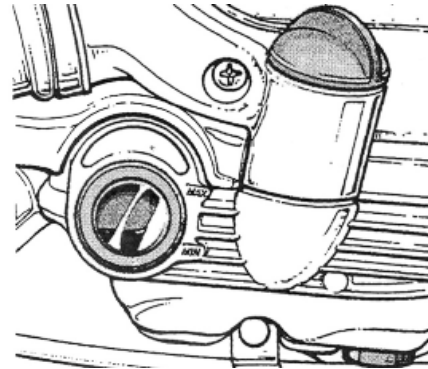
USED OIL CONTAINS ENVIRONMENTALLY HARMFUL SUBSTANCES

Recommended products**AGIP CITY HI TEC 4T Engine oil**

SAE 5W-40, API SL, ACEA A3, JASO MA Synthetic oil

**Check**

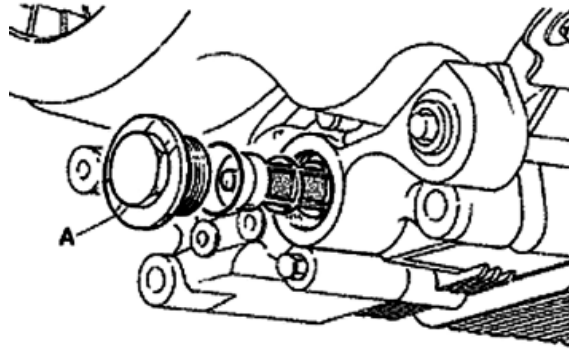
Every time the scooter is used, a visual check should be made on the engine oil level when the engine is cold. The oil level should be somewhere between the MAX and MIN oil marks; during the oil check, the vehicle must be resting on its centre stand on an even, horizontal surface. The MAX level mark indicates a quantity of around 850 cc of oil in the engine. If the check is carried out after the vehicle has been used, and therefore with a hot engine, the level line will be lower; in order to carry out a correct check it is necessary to wait at least 10 minutes after the engine has been stopped, so as to get the correct level.

**Oil top-up**

Always check oil level before a top-up and add oil **without exceeding the MAX level**. After every 3000 km check level and, if necessary, refill with engine oil.

Engine oil filter

- Change oil when the engine is hot.
- Place a container under the oil sump and remove the oil drainage cap.
- After draining the oil, clean the mesh filter with a specific solvent and then blow it with compressed air.
- The filter can be reached after removing cap "A" (see figure).
- After this operation, refit the filter and screw the oil cap at the prescribed torque using a new O-Ring
- Refill the engine with oil through the oil filling hole located in the oil sump.
- Engine oil capacity: ~ 850 cc.
- Lock the cap manually.

**N.B.**

MAKE THE ENGINE TURN FOR A COUPLE OF MINUTES AND THEN CONTROL OIL LEVEL WHEN THE ENGINE IS COLD. THE LEVEL SHOULD ALWAYS BE BELOW THE MAX. NOTCH.

N.B.

IF IT IS THE 1ST TIME IT IS FILLED OR CHECKED, ADD 850 CC OF ENGINE OIL. IN ANY OTHER CIRCUMSTANCE OR FOR TOP-UPS, ADD 650 CC.

Recommended products

AGIP CITY HI TEC 4T Engine oil

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

Locking torques (N*m)

Engine oil pre-filter cover 25 ÷ 28 Nm

Checking the ignition timing

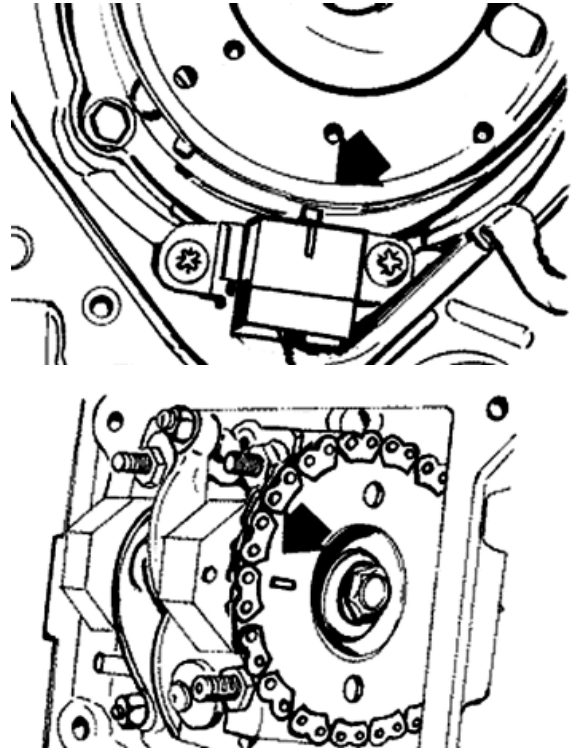
- Turn the flywheel clockwise until its 2nd notch coincides with the Pick-up reference mark as shown in the figure.

Make sure that the reference point on the camshaft command crown is aligned with the reference point on the head as shown in the second figure.

If the reference is opposite the indicator on the head, turn the crankshaft once more as the piston must be at the TDC of the bursting phase.

N.B.

TIME THE TIMING SYSTEM UNIT AS DESCRIBED IN CHAPTER 6 IF IT IS NOT IN PHASE



Checking the valve clearance

- Remove the spark plug access cover, undo the 4 fixing screws indicated in the figure and remove the tappet cover.
- To check valve clearance, centre the reference marks of the timing system point as described above.
- Use an adequate thickness gauge to check that the clearance between the valve and the register corresponds with the indicated values.

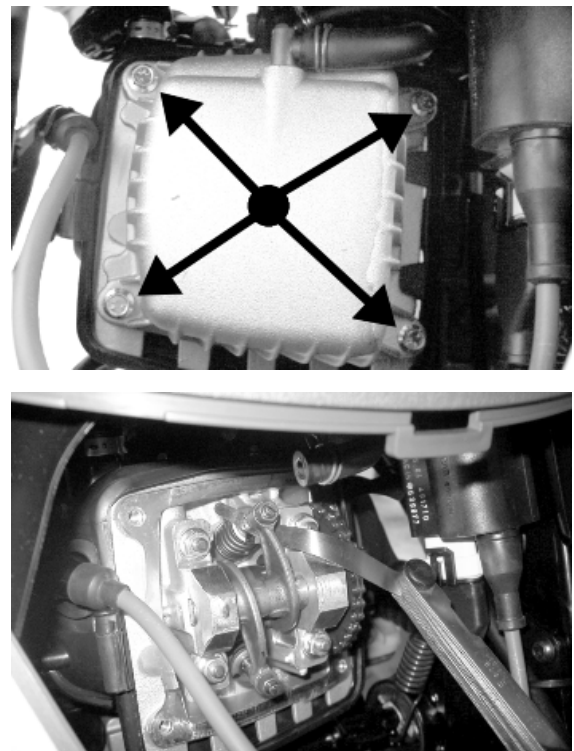
Should the valve clearance values, intake and drainage respectively, be different from the ones indicated below, adjust them by loosening the lock nut and operate on the register with a screwdriver as shown in the figure.

Characteristic

Inlet (with cold engine)

0.10 mm

Outlet (with cold engine)

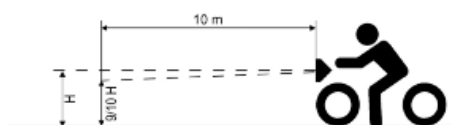
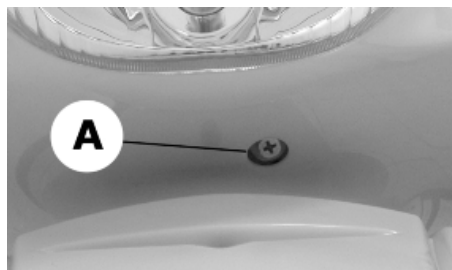


0.15 mm

Headlight adjustment

Proceed as follows:

1. Place the vehicle, in running order and with the tyres inflated to the prescribed pressure, on a flat surface 10-m away from a white screen situated in a shaded area, making sure that the longitudinal axis of the scooter is perpendicular to the screen;
2. Turn on the headlight and check that the borderline of the projected light beam on the screen is not higher than $9/10$ or lower than $7/10$ of the distance from the ground to the centre of vehicle headlamp;
3. If otherwise, adjust the right headlight with screw «A».



N.B.

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

CO check

- CO checking may be necessary when an engine operation failure is detected or during engine idle speed adjustment operations.
 - This test must be carried out after washing all carburettor parts carefully, the air filter must be clean and the ignition spark plug in good conditions.
- 1) warm up the vehicle travelling on the streets at about 50 km/h for ~5 minutes; time enough for the automatic starter to exclude the circuit.
 - 2) Shut off the vehicle only for the time required to carry out steps 3) and 4).
 - 3) Connect a - 50 cm extension pipe to the exhaust fumes intake in the muffler.
 - 4) Make sure the muffler and the pipe are adequately connected and tight. Insert the exhaust fumes analyser probe into the pipe.
 - 5) Connect the tester thermometer to the sump, using a cover with oil expressly prepared for probes.
 - 6) Start the engine and before adjusting the idle speed, make sure that the oil temperature is between $70 \div 80$ °C.
 - 7) Wait until the idle speed stabilises for one minute.
 - 8) **Without operating the accelerator again** and using the flow screw rev the engine at 1500 ± 150 rpm.

9) Adjust the flow screw so that the "CO" value is equal to 3.2 % \pm 0.5 %.

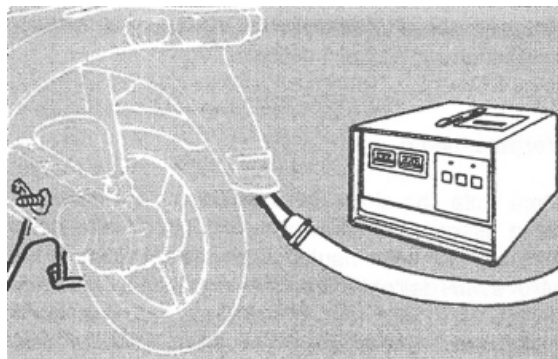
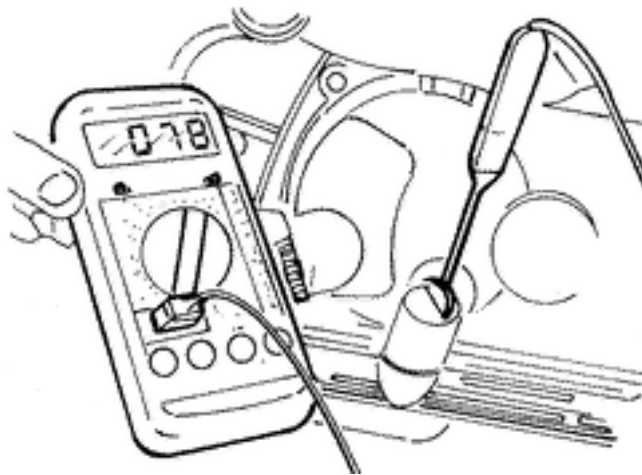
10) **Slowly** operate the throttle accelerating the engine until it reaches 4000 rpm and then set throttle back to close position; check that the idle speed remains at the above set value; if not, repeat the procedure starting from step (3).

Specific tooling

020332Y Digital rpm indicator

494929Y Exhaust fumes analyser

020331Y Digital multimeter



INDEX OF TOPICS

TROUBLESHOOTING

TROUBL

EXCESSIVE FUEL CONSUMPTION

Possible Cause	Operation
Air filter obstructed or dirty.	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% Selenia Air Filter Oil, then allow to drip dry. Wring out water manually without squeezing and reassemble
The starter remains on	Check that the starter runs correctly and it is properly powered
Loose nozzles	Check the maximum and minimum nozzles are adequately fixed in their fittings
Incorrect float level	Restore the correct level in the chamber (the float must be parallel to the upper cover contact plane, that is the throttle valve membrane cover)

FAULTY CLUTCH

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

This section makes it possible to find the solutions to use in troubleshooting.

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

Engine**Poor performance****LOW COMPRESSION**

Possible Cause	Operation
Wrong valve adjustment	Adjust the valve clearance properly
incorrect valve sealing	Remove the head and the valves, grind the seats, descale the valve heads and, if necessary, replace any faulty part.
Valve seat distorted	Replace the head assembly
Worn or broken cylinder or piston rings	Replace the piston cylinder assembly or the piston rings

POOR PERFORMANCE

Possible Cause	Operation
The carburettor is dirty; vacuum operated cock failure	Dismantle, wash with solvent and dry with compressed air or replace
Excess of scales in the combustion chamber	Descale the cylinder, the piston, the head and the valves
Incorrect timing or worn timing system elements	Time the system again or replace the worn parts
Muffler obstructed	Replace
Automatic starter failure	Check: mechanical movement, electric connection and fuel supply, replace if required.
Oil level exceeds maximum	Check for causes and fill to reach the correct level
Lack of compression: parts, cylinder and valves worn	Replace the worn parts
Driving belt worn	Replace
Inefficient automatic transmission	Check the rollers and the pulley movement, replace the damaged parts and lubricate the driven pulley moveable guide with Montblanc Molybdenum Grease
Clutch slipping	Check the clutch system and/or the bell and replace if necessary
Overheated valves	Remove the head and the valves, grind or replace the valves
Wrong valve adjustment	Adjust the valve clearance properly
Valve seat distorted	Replace the head unit

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.
Defective floating valve	Check the proper sliding of the float and the functioning of the valve

Rear wheel spins at idle

REAR WHEEL

Possible Cause	Operation
Idling rpm too high	Check the idling speed and, if necessary, adjust the C.O.
Clutch fault	Check the spring/friction mass and the clutch bell
Air filter housing not sealed	Correctly refit the filter housing and replace it if it is damaged
Purifier-carburettor fitting damaged	Replace

Starting difficulties

DIFFICULTY STARTING UP

Possible Cause	Operation
Defective spark plug or with incorrect electrode gap	Check and if necessary replace the spark plug and the electrode gap
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
- Engine flooded.	Start the vehicle keeping the throttle fully open alternately making the engine run for approx. five seconds and stopping for other five seconds. If however it does not start, remove the spark plug, the engine over with the throttle open being careful to keep the cap in contact with the spark plug and the spark plug grounded but away from its hole. Refit a dry spark plug and start the vehicle.
Vacuum operated cock failure	Check that fuel is adequately supplied through the pipe by applying a vacuum on the suction pipe
Failing automatic starter on the carburettor	Check the electrical wiring and mechanical movement, replace if necessary.
Wrong ignition advance	Check flywheel keying on the crankshaft, replace control unit if necessary
Incorrect valve sealing or valve adjustment	Remove the head and the valves, grind the seats, descale the valve heads and, if necessary, replace any faulty part. check and restore the correct valve clearance.
Start-up rpm too low or starter motor failure	Check starter motor
Altered fuel characteristics	Drain off the fuel no longer up to standard; then, refill
Carburettor nozzles clogged or dirty	Dismantle, wash with solvent and dry with compressed air

Excessive oil consumption/Exhaust smoke

RICH OR GREASY MIX

Possible Cause	Operation
Air calibrated holes in carburettor blocked	Dismantle, wash with solvent and dry with compressed air
Defective floating valve	Check the proper sliding of the float and the functioning of the valve
Level in chamber too high	Restore the correct level in the chamber (the float must be parallel to the upper cover contact plane, that is the throttle valve membrane cover)
The starter remains on	Check that the automatic starter works and moves correctly and it is properly powered.

Possible Cause	Operation
Air filter dirty	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% Selenia Air Filter Oil, then allow to drip dry. Wring out water manually without squeezing and reassemble.

EXCESSIVE OIL CONSUMPTION/SMOKEY EXHAUST

Possible Cause	Operation
Worn or broken cylinder or piston rings	Replace the piston cylinder assembly or the piston rings
Oil leaks from the couplings or from the gaskets	Check and replace the gaskets or restore the coupling seal
Worn valve oil guard	Replace the valve oil guard
Worn valve guides	Check and replace the head unit if required

Insufficient lubrication pressure

POOR OR LEAN MIX

Possible Cause	Operation
Carburettor nozzles clogged	Dismantle, wash with solvent and dry with compressed air
Defective floating valve	Check the proper sliding of the float and the functioning of the valve
Level in chamber too low	Restore the correct level in the chamber (the float must be parallel to the upper cover contact plane, that is the throttle valve membrane cover)
Tank breather hole obstructed	Restore the proper reservoir aeration
Fuel filter on vacuum operated cock blocked	Clean the cock filter
Fuel supply pipes choked or clogged	Restore the adequate fuel supply
Intake joint cracked or with a bad seal	Replace intake joint and check for correct sealing on the head
Air filter housing not sealed	Correctly refit the filter housing and replace it if it is damaged
Purifier-carburettor fitting damaged	Replace

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
Incorrect ignition advance	Use a stroboscopic light to check ignition advance and the fly-wheel correct keying
Water or condensation in the carburettor chamber	Remove the chamber, wash with solvent and dry with compressed air or empty the tank through the appropriate bleed screw
Air filter obstructed or dirty.	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% Selenia Air Filter Oil, then allow to drip dry. Wring out water manually without squeezing and reassemble
Incorrect float level	Check and restore the correct fuel level in the chamber

Engine tends to cut-off at idle

THE ENGINE TENDS TO STOP AT IDLE SPEED

Possible Cause	Operation
Wrong idling adjustment	Correctly adjust the engine idling and check the level of the C.O.
Spark plug defective or faulty	Replace the spark plug with one with the specified degree and check the plug gap
The starter remains activated	Check that the automatic starter works and moves correctly and it is properly powered.
Minimum jet dirty	Remove the carburettor, wash with solvent and dry with compressed air
Electronic ignition circuit failure	Use a stroboscopic light and an rpm indicator to check for correct ignition advance and make sure the flywheel is correctly keyed
Pressure too low at the end of compression	Check the thermal group seals and replace worn components; check and restore the correct valve clearance.
Incorrect timing	Time the system and check the timing system components

Excessive exhaust noise

EXCESSIVE EXHAUST NOISE

Possible Cause	Operation
Depression intake pipe of the secondary air device disconnected or dented	Replace the pipe
Reed valve of the secondary air device does not close correctly and wears out the rubber coupling between the device and the head pipe	Replace the device and the coupling

High fuel consumption

HIGH FUEL CONSUMPTION

Possible Cause	Operation
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.
Loose nozzles	Check the maximum and minimum nozzles are adequately fixed in their fittings
Starter inefficient	Check: electric wiring, circuit continuity, mechanical sliding and power supply
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.

SAS malfunctions

ANOMALIES IN THE SECONDARY AIR DEVICE

Possible Cause	Operation
Depression intake pipe of the secondary air device disconnected or dented	Replace the pipe
Reed valve of the secondary air device does not close correctly and wears out the rubber coupling between the device and the head pipe	Replace the device and the coupling

Transmission and brakes

REAR BRAKE LEVER FAIL TO RETURN

Possible Cause	Operation
Return spring broken	Replace spring.
Shoe control bolt not lubricated	Lubricate with Z2 grease.

Clutch grabbing or performing inadequately

IRREGULAR CLUTCH PERFORMANCE OR SLIPPAGE

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

Insufficient braking

INEFFICIENT OR NOISY BRAKING

Possible Cause	Operation
Brake pads or shoes worn	Replace the brake pads or shoes and check for brake disk or drum wear conditions. If the front calliper is removed to facilitate replacement, remember to replace the copper gaskets located on the tube joint when refitting; failure to do so may result in inadequate tightness; it is necessary to bleed the brakes after this operation.
Air bubbles inside the hydraulic braking system	Carefully bleed the hydraulic braking system, (there must be no flexible movement of the brake lever).
Brake disc or drum deformed	Use a dial gauge to check the levelness of the disk with the wheel correctly fitted and the concentricity of the rear drum; check the brake disc screws are locked
Fluid leakage in hydraulic braking system	Elastic fittings, piston seals or brake pump breakdown, replace
Excessive backlash in the rear brake control cable	Adjust backlash with the appropriate adjuster on the shoe control lever
The brake fluid has lost its properties	Replace the front brake fluid and top up to the correct level in the pump

INSUFFICIENT BRAKING

Possible Cause	Operation
Inefficient braking system	Check the pad wear (1.5 min). Check that the brake discs are not worn, scored or warped. Check the correct level of fluid in the pumps and change brake fluid if necessary. Check there is no air in the circuits; if necessary, bleed the air. Check that the front brake calliper moves in axis with the disc.
Fluid leakage in hydraulic braking system	Failing elastic fittings, plunger or brake pump seals, replace

Brakes overheating

BRAKES OVERHEATING

Possible Cause	Operation
Defective plunger sliding	Check calliper and replace any damaged part.
Brake disc or drum deformed	Use a dial gauge to check the levelness of the disk with the wheel correctly fitted and the concentricity of the rear drum; check the brake disc screws are locked

Electrical system

Battery

BATTERY

Possible Cause	Operation
The battery is the electrical device in the system that requires the most frequent inspections and thorough maintenance.	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 earth wire is connected to the negative terminal while the red wire is connected to the terminal marked +.

Turn signal lights malfunction

ELECTRICAL SYSTEM MALFUNCTION

Possible Cause	Operation
Turn indicators do not turn on	Check turn indicators device and/or wiring as described in the «Electrical system» chapter.

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 3 (White) on the voltage regulator 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

Rear wheel

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

Controls

STEERING AND SUSPENSIONS CONTROLS

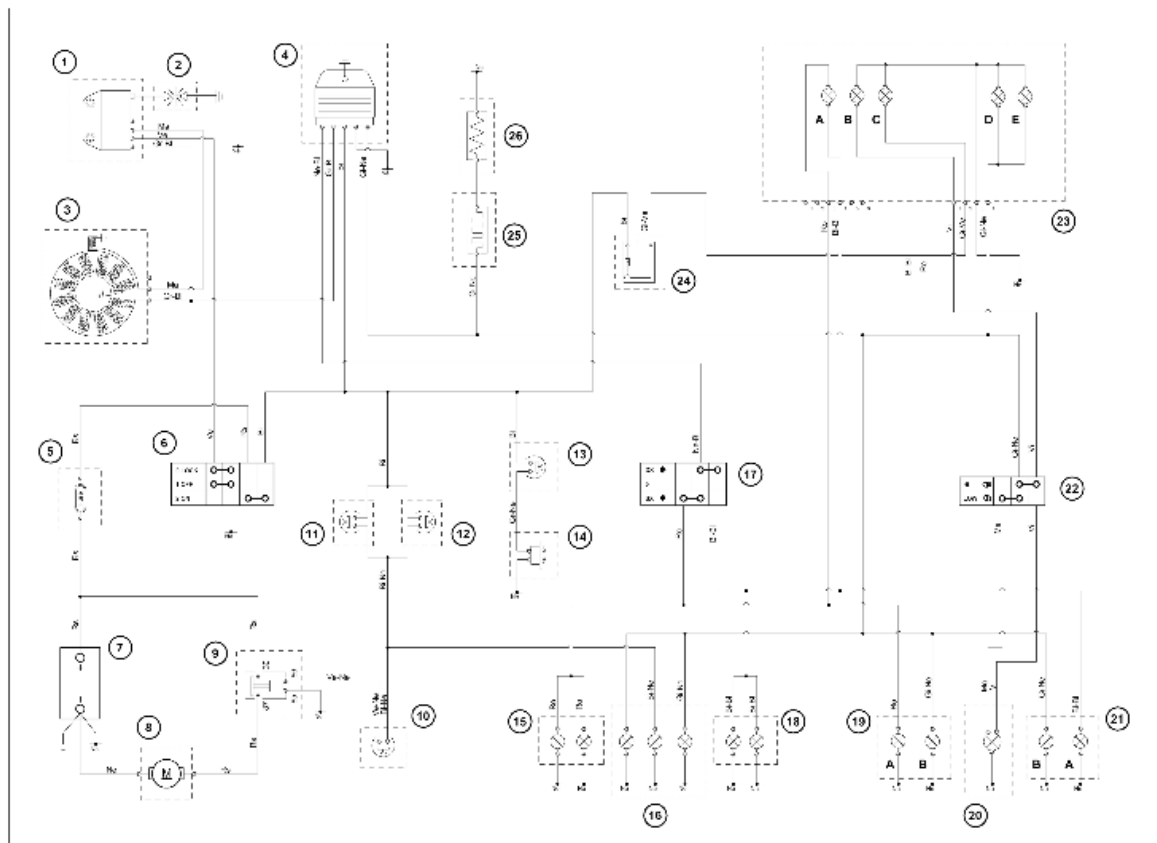
Possible Cause	Operation
Steering hardening	Check the tightening of the top and bottom ring nuts. If irregularities continue in turning the steering even after making the above adjustments, check the seats in which the ball bearings rotate: replace them if they are recessed or if the balls are flattened.

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	If the front suspension is noisy, check: that the front shock absorber works properly and the ball bearings are good condition. In conclusion, check the tightening torque of the wheel hub, the brake calliper, the shock absorber disk in the attachment to the hub and the steering tube. Check that the swinging arm connecting the engine to the chassis and the rear shock absorber work properly
Oil leakage from suspension	Replace the shock absorber

INDEX OF TOPICS

ELECTRICAL SYSTEM

ELE SYS



KEY

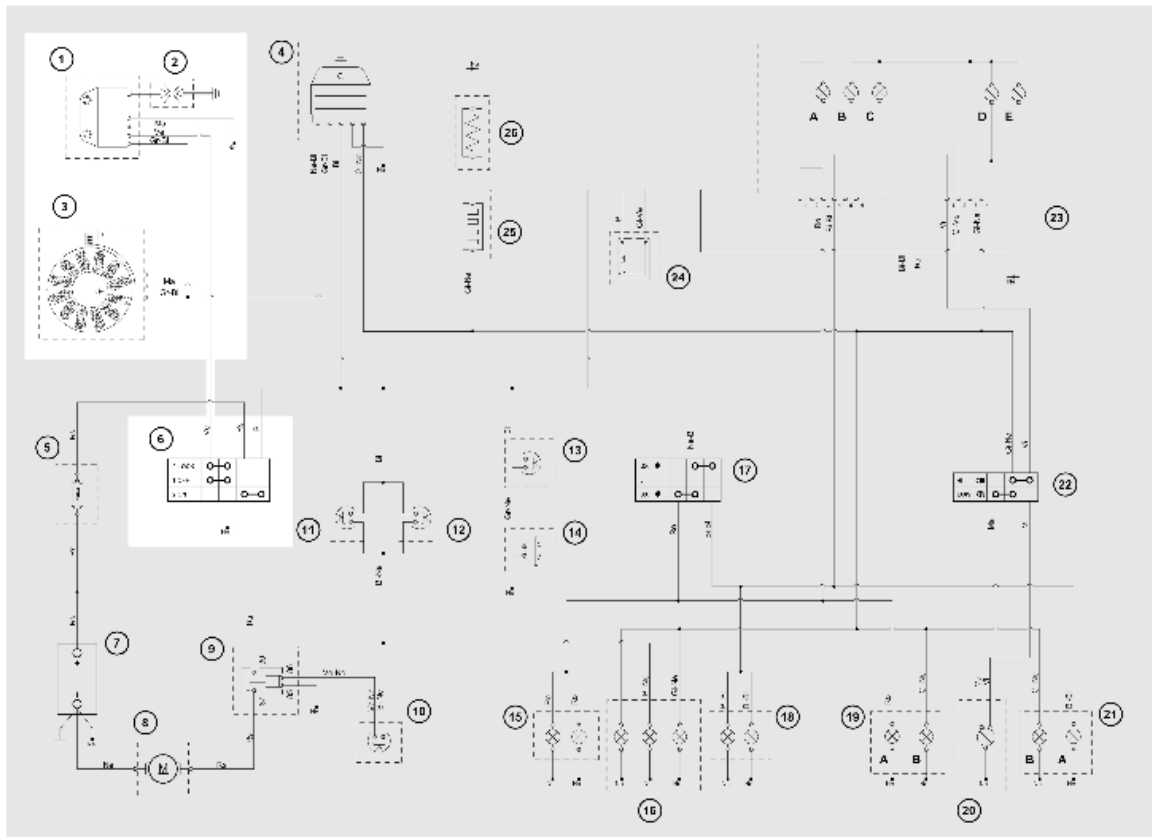
- 1. Electronic ignition device
- 2. Spark plug
- 3. Magneto flywheel
- 4. Voltage regulator
- 5. Main fuse
- 6. Key switch
- 7. Battery
- 8. Starter motor
- 9. Starter remote control
- 10. Starter button
- 11. Rear brake STOP button
- 12. Front brake STOP button
- 13. Horn button
- 14. Horn
- 15. Left rear turn indicator bulbs
- 16. Tail lights/stop light bulbs
- 17. Turn indicator switch
- 18. Right rear turn indicator bulbs
- 19. Left side headlight assembly

- A. Left front turn indicator bulb
- B. Front position light bulb
- 20. Headlight assembly with high-/low-beam bulb
- 21. Right side headlight assembly
- A. Left front turn indicator bulb
- B. Front position light bulb
- 22. Light switch
- 23. Instrument panel
- A. Turn indicator warning light
- B. High-beam warning light
- C. Low fuel warning light
- D. Instrument panel bulb
- E. Instrument panel bulb
- 24. Fuel level warning light control
- 25. Automatic starter
- 26. Resistance

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

Conceptual diagrams

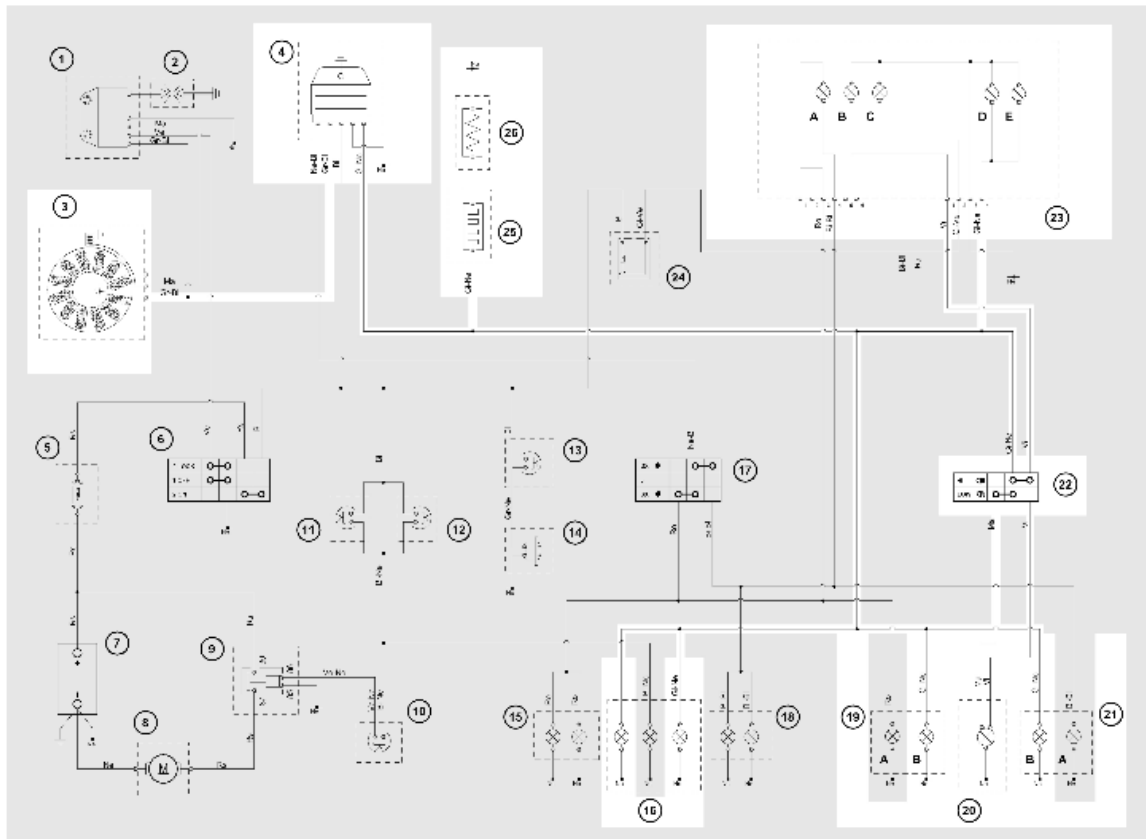
Ignition



KEY

- 1. Electronic ignition device
- 2. Spark plug
- 3. Magneto flywheel
- 6. Key switch

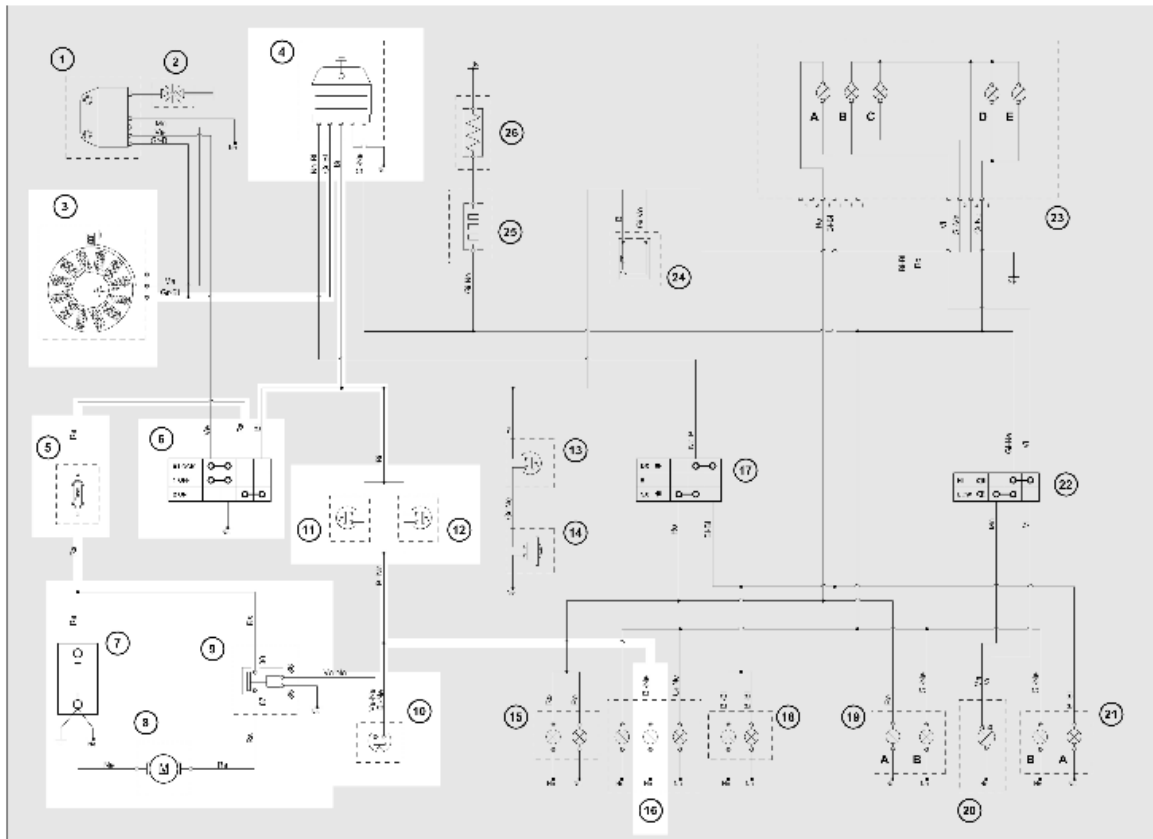
Headlights and automatic starter section



KEY

- 3. Magneto flywheel
- 4. Voltage regulator
- 16. Tail lights/stop light bulbs
- 19. Left side headlight assembly
 - A. Left front turn indicator bulb
 - B. Front tail light bulb
- 20. Headlight assembly with high-/low-beam bulb
- 21. Right side headlight assembly
 - A. Left front turn indicator bulb
 - B. Front position light bulb
- 22. Light switch
- 23. Instrument panel
- 25. Automatic starter
- 26. Resistance

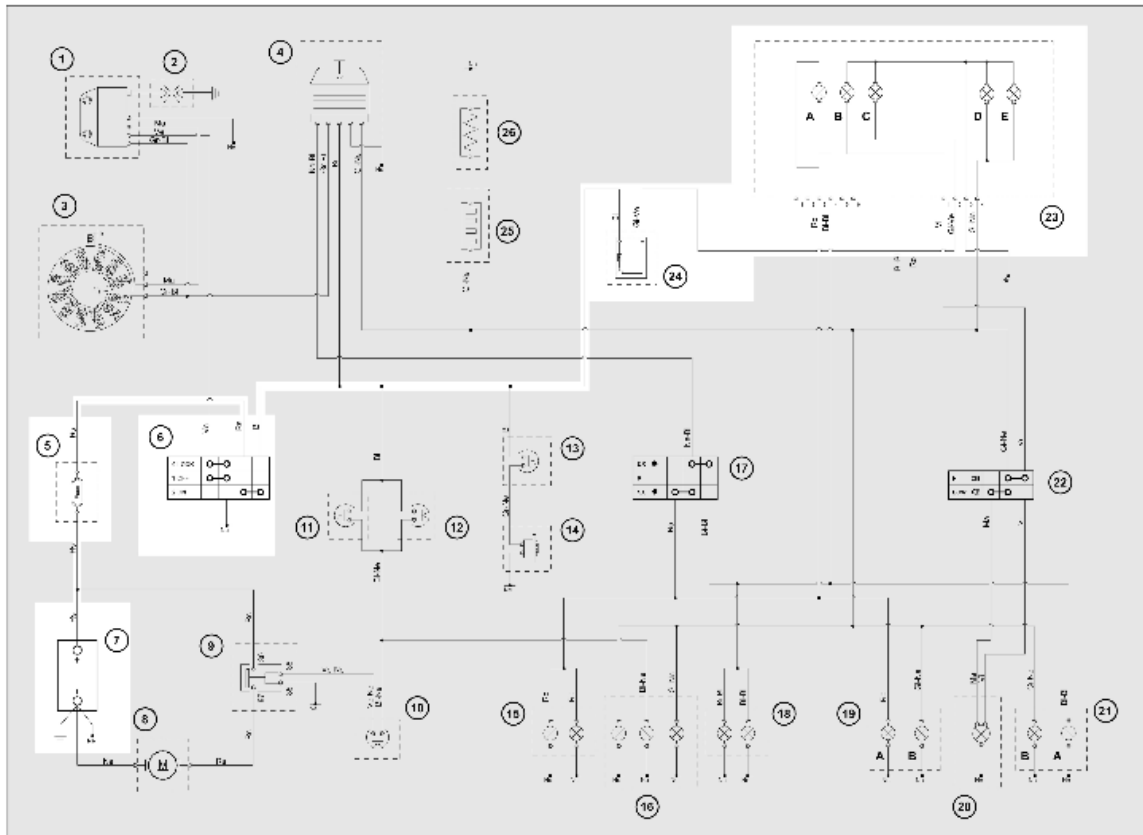
Battery recharge and starting



KEY

- 3. Magneto flywheel
- 4. Voltage regulator
- 5. Main fuse
- 6. Key switch
- 7. Battery
- 8. Starter motor
- 9. Starter remote control
- 10. Starter button
- 11. STOP button on rear brake
- 12. Front brake STOP button
- 16. Tail lights/stop light bulbs

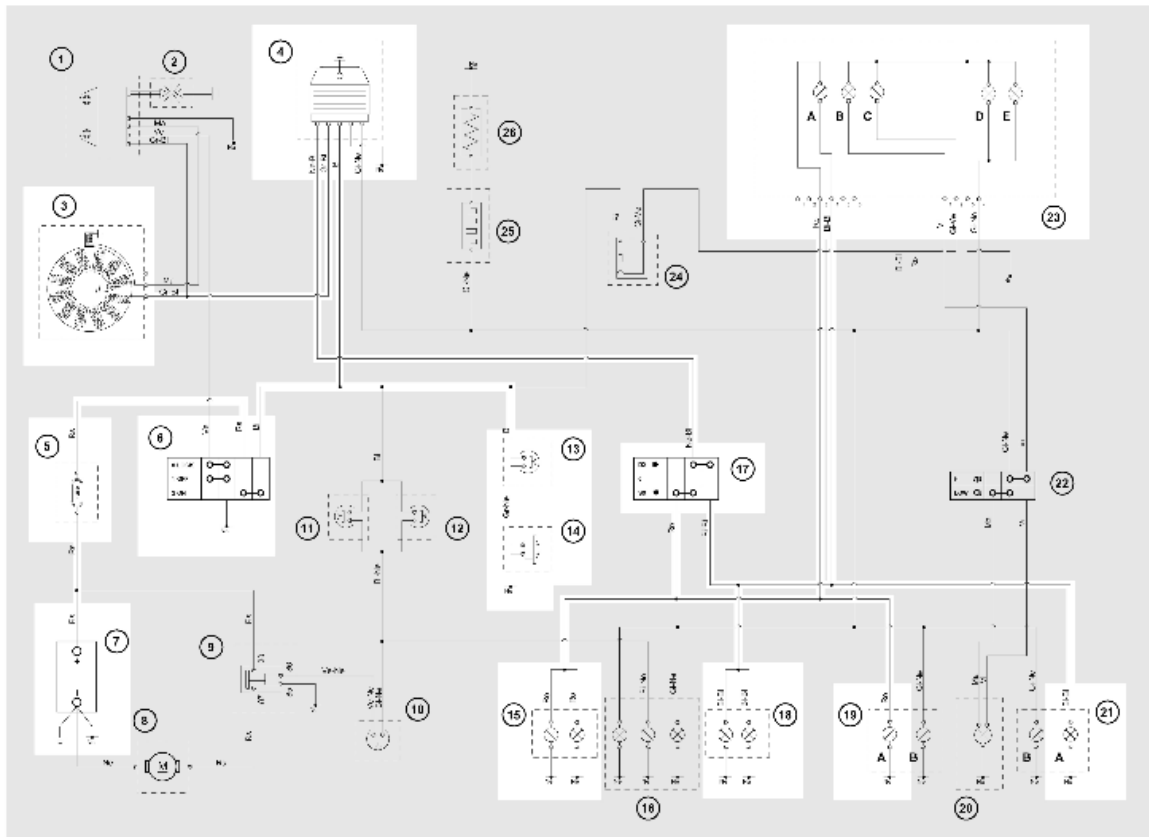
Level indicators and enable signals section



KEY:

- 5. Main fuse
- 6. Key switch
- 7. Battery
- 23. Instrument panel
 - A. Flashing warning light
 - B. High-beam warning light
 - C. Low fuel warning light
 - D. Instrument panel bulb
 - E. Instrument panel bulb
- 24. Fuel level warning light control

Turn signal lights



KEY:

- 3. Magneto flywheel
- 4. Voltage regulator
- 5. Main fuse
- 6. Key switch
- 7. Battery
- 13. Horn button
- 14. Horn
- 15. Left rear turn indicator bulbs
- 17. Turn indicator switch
- 18. Right rear turn indicator bulbs
- 19. Left side headlight assembly
- A. Left front turn indicator bulb
- B. Front tail light bulb
- 21. Right side headlight assembly
- A. Left front turn indicator bulb
- B. Front tail light bulb
- 23. Instrument panel

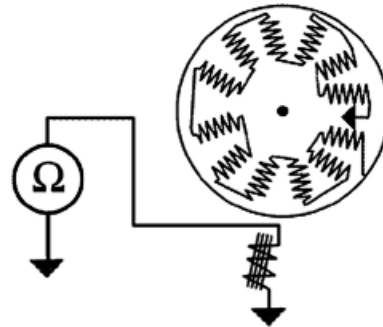
- A. Flashing warning light
- B. High-beam warning light
- C. Low fuel warning light
- D. Instrument panel bulb
- E. Instrument panel bulb

Checks and inspections

In case the cause of ignition failure or malfunction cannot be easily identified at sight, first of all replace the control unit by another one in operating conditions.

Remember that the engine must be off to disconnect and replace the control unit.

If after replacement the vehicle starts properly, the control unit is failing and must be replaced.

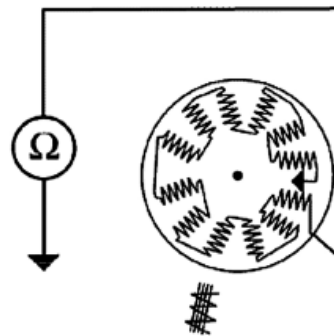


If the failure persists, check the generator and the stator components as follows:

After a sight control of the electrical connections, use a specific tester to measure the stator winding and the pick-up.

If checks on the loading coil, pick-up detect irregularities, **replace the stator and the failing components.**

Disconnect the connector on the flywheel cover and measure the resistance between either contact and the earthing.



Specific tooling

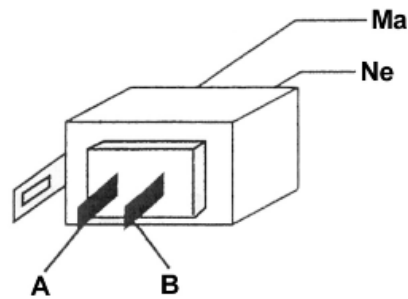
020331Y Digital multimeter

PICK-UP CHECK

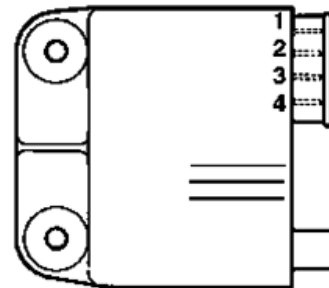
	Specification	Desc./Quantity
1	1) Brown cable and earth	~ 170 Ω

STATOR WINDING CHECK

	Specification	Desc./Quantity
1	1) Black cable and earth	~ 1 Ω

**KEY:****Br**= brown**Bl**= black**A**= Pick-up**B**= Stator**Ignition circuit**

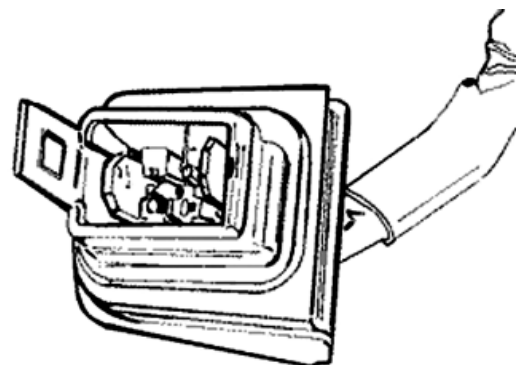
All the control operations of the system that require the disconnection of cables (checks of the connections and the devices making up the ignition circuit) must be done with the engine off: if this is not done, the controls might be irretrievably damaged.

**Stator check**

- Using a tester, check the resistance between the brown-earth and black-earth terminal.

N.B.

VALUES ARE STATED AT AMBIENT TEMPERATURE. A CHECK WITH THE STATOR AT OPERATING TEMPERATURE LEADS TO VALUES HIGHER THAN THOSE STATED.

Electric characteristic**Stator : Brown-earth**approx. 170 Ω (Pick-Up)**Stator : Black-earth**~ 1 Ω (Stator)

Voltage regulator check

A malfunction in the voltage regulator might cause the following problems depending on the type of fault:

Alternating current section

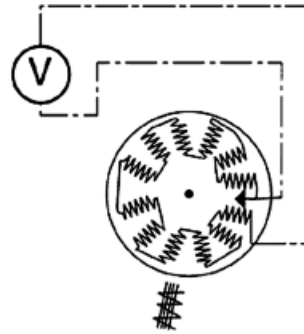
- 1) Bulbs burned out (regulator in short circuit).
- 2) Malfunctioning of the lighting system and the electric starter (regulator interrupted).

Direct current section

- 3) Battery not recharging.
- 4) Turn indicators not working.

The regulator is earthed through the electrical system, so the regulator body does not earth the circuits inside the regulator.

There must be insulation between each regulator terminal and the regulator body (use the tester to check electric resistance).



Measures

1) Bulbs burn out

Replace the regulator because it is certainly inefficient.

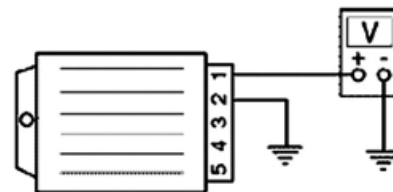
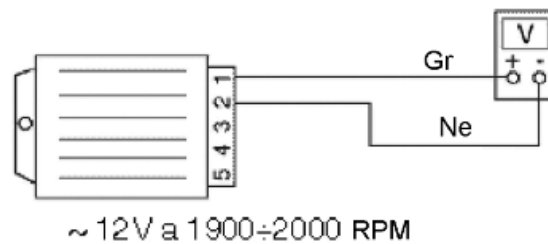
2) Lights and starter not working

Gain access to the voltage regulator, start the engine and keep it at idle speed; keep the vehicle lighting system off.

Connect the tester positive end (select it to detect alternating voltage) to terminal No 1 (grey cable) and the negative end to terminal No 2 (black cable); check there is voltage (see figure).

If there is voltage, check the wiring connecting lights switch and the regulator and make sure the switch works properly.

If no voltage is detected, try connecting the negative end directly to earth; if voltage is detected with this operation, check the earth wiring of the regulator; otherwise, replace the regulator because it is damaged.



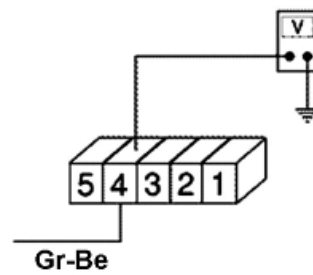
As a last check, the voltage supplied by the stator can be measured:

- Disconnect the regulator connector and place a tester between the Grey-Blue cable (4) and the earth in order to detect alternating voltages (see figure).
- Voltage supplied at 2000 rpm must be about $25 \div 35V$.

If no values are detected with this test, replace the regulator because it is obviously broken.

N.B.

TO MEASURE THE ABOVE VOLTAGE USE AN ANALOGUE TESTER THAT CAN MEASURE ALTERNATING VOLTAGES AND KEEP THE ENGINE AT IDLE TO HAVE AN ALTERNATING VOLTAGE OF A FREQUENCY AS CLOSE AS POSSIBLE TO 50HZ SO AS TO DETECT THE EFFICIENT VOLTAGE VALUE SUPPLIED BY THE REGULATOR (ABOUT 12V).



~ 25÷35V a 1900÷2000 RPM

Recharge system voltage check

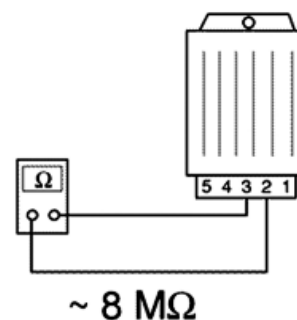
3) Battery fails to recharge

a failure in the direct current section of the voltage regulator may cause the following problems depending on the type of fault:

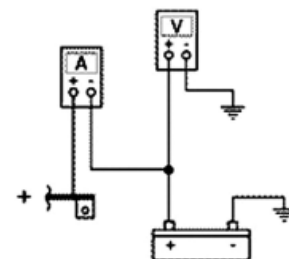
- a) Protection fuse blows due to overvoltage (regulator in short circuit) and consequently the battery fails to recharge.**
- b) Battery fails to recharge (regulator interrupted).**

Measures

a) Protection fuse blows (regulator in short circuit).
Check that the wiring connecting the protection fuse and the key switch is not damaged and causing a short circuit to the earth (thus excluding the possibility that the regulator is damaged); if the protection fuse blows only after the key switch is set to "ON" and with the regulator connector disconnected, check that the upstream wiring and devices of the key switch are not in short circuit to the earth. Now measure the resistance between contact 3 (White) and contact 2 (Black) of the volt-



~ 8 MΩ



~ 2000 RPM 13V/1,5÷2A
> 4000 RPM 14÷14,5V > 4A

age regulator (with connector disconnected); the measurement must be $\sim 8 \text{ M}/\Omega$. If the value measured is far from that indicated, replace the regulator because it is in short circuit.

b) Battery fails to recharge (regulator interrupted).

To check if there is any failure in the voltage regulator recharge section, first connect 2 testers to the battery (one to detect voltage and the other to detect current) as indicated in the second figure and follow the procedure below:

Start the engine (temporarily connect the red cable to the battery positive terminal in order to avoid damaging the device that measures current).

Check there is at least 13V (charged battery) and a recharge current of $1.5 \div 2 \text{ A}$ with the vehicle lights off.

As the engine rpm increases, so do the current and the recharge voltage; with rpm over 4000 there must be a recharge current of about 4.5A; when the vehicle lights and the stop light are switched on and the horn is powered, current values below or equal to 5A and a voltage value of $14 \div 14.5 \text{ V}$ (regulator threshold voltage) can be registered. If values other than those above are detected, replace the regulator; contrariwise, check the cable harness and the connections.

Starter motor

Test to be carried out to check the electrical starter motor

1) Check the battery charging conditions.

2) - Check the remote control and the system. The check can be carried out by replacing a 12V-35W bulb of the starter.

- If the bulb turns on, replace the starter motor.

- If the bulb does not turn on, check the system and the remote control.

Starter motor

Specifications:

- Nominal voltage 12V.

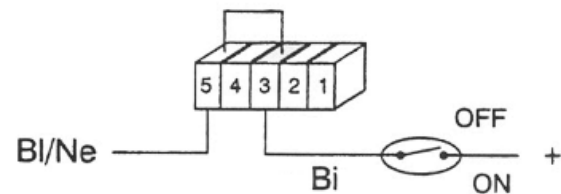
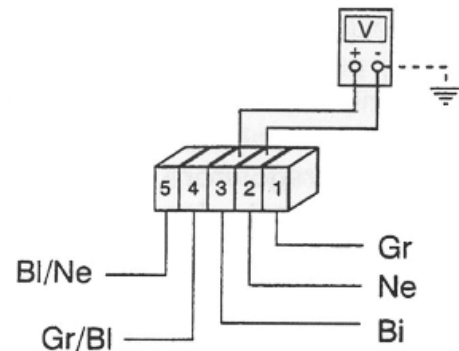
- Nominal power 0.25 kW.
- Leftward rotation seen from the pinion side.
- Connection to the engine by means of pinion and crown gear on the crankshaft, transmission side.
- Control with switch.
- Battery used for the test: 12V-7Ah.

Turn signals system check

4) Turn indicators not working

If the turn indicators do not work, do the following:

- Disconnect the regulator connection and insert the tester end between the white cable (3) and the black one (2).
- Turn the key switch to ON and check that the battery is getting voltage. If no voltage is detected, repeat the test now between the white cable and the earth; if there is no voltage even after this operation, check the wiring and the contacts of the key switch and the battery. If voltage in the battery is detected (black cable), check the regulator earth wiring.
- If the above tests have positive results, jump the contacts 5 (blue/black) and 3 (white) on the connector, set the key switch to ON and turn the turn indicator switch left and right to see when the lights are steadily on (as they are powered directly from the battery). If even after this operation the turn indicators fail to turn on, check the wiring is not damaged and switch works properly; if these last two tests have a positive result, replace the regulator because it is certainly not functioning properly.

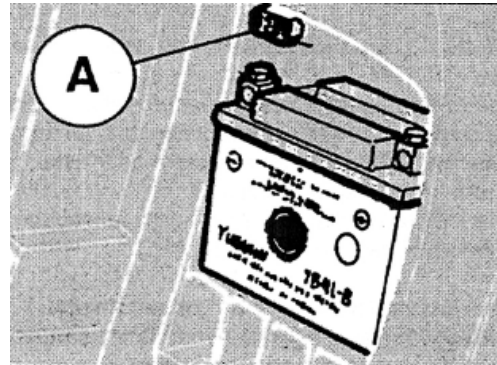


Specific tooling

020331Y Digital multimeter

Fuses

The electrical system is protected by a 10 A fuse «A» located to the left of the battery support. The ignition system, the automatic starter, front headlight and the tail light are not fuse-protected. Before replacing a blown fuse, find and solve the problem that caused it to blow. Do not substitute the fuse with any alternative form of conductor



BATTERIES CONTAIN VERY ENVIRONMENTAL DANGEROUS SUBSTANCES. FOR BATTERY REPLACEMENT, CONTACT AN AUTHORISED PIAGGIO-GILERA SERVICE CENTRE, AS THEY ARE EQUIPPED FOR THE DISPOSAL IN AN ENVIRONMENTALLY FRIENDLY AND LEGAL WAY.

Sealed battery

Using the sealed battery for the first time

If the vehicle is provided with an airtight battery, the only maintenance required is the check of its charge and recharging, if needed.

These operations should be carried out before delivering the scooter, 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 scooter and afterwards every six months.

Instructions for the renewal recharge after open-circuit storage

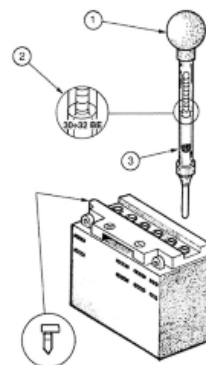
1) Voltage check

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

- If the voltage exceeds 12.60 V, the battery may 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 equal to 14.40 to 14.70V
- Initial charge voltage equal to 0.3 to 0.5 x nominal capacity
- Duration of the charge: 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 nominal capacity of the battery

-Duration of the charge: 5 h

WARNING

-WHEN THE BATTERY IS REALLY FLAT (WELL BELOW 12.6V) IT MIGHT BE THAT 5 HOURS OF RECHARGING ARE NOT ENOUGH TO ACHIEVE OPTIMAL PERFORMANCE. IN THESE CONDITIONS IT IS HOWEVER ESSENTIAL NOT TO EXCEED EIGHT HOURS OF CONTINUOUS RECHARGING SO AS NOT TO DAMAGE THE BATTERY ITSELF.

1 Hold the vertical tube

2 Look at the level

3 The float must be freed

Dry-charge battery

Battery maintenance

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

1) Check the level of the electrolyte

The electrolyte level must be checked frequently and must reach the upper level. Only use distilled water, to restore this level. If it is necessary to add water too frequently, check the vehicle's electrical system: the battery that is working in overloaded mode gets ruined quickly.

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÷32 Bé corresponding to a specific weight of 1.26÷1.28 at a temperature not lower than 15°C. If the density has fallen below 20 Bé, the battery is completely flat and therefore it is necessary to recharge it. After charging the battery, check each element electrolyte level and density. 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 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

The normal bench charging must be carried out with the specific battery charger 020333Y (single) or 020334 (multiple), placing the battery charger selector on the type of battery to be recharged. The connections to the power supply must be made by connecting to the corresponding poles (+ with+ and -with -).

WARNING

BEFORE RECHARGING THE BATTERY, REMOVE THE CAPS OF EACH CELL.

**KEEP THE BATTERY AWAY FROM NAKED FLAMES OR SPARKS WHILE IT IS CHARGED.
FIRST DETACH THE NEGATIVE LEAD BEFORE REMOVING THE BATTERY FROM THE VEHICLE.**

4) Cleaning the battery

You are advised to keep the battery clean, especially in the upper part, and to protect the terminals with Vaseline.

CAUTION

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

CAUTION

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 LEVEL OF ELECTROLYTE BEFORE IT IS FIRST USED SHORTENS THE LIFE OF THE BATTERY.

Use of dry-cell batteries :

- 1) Having removed the short, closed tube and removed the caps, put into the elements sulphuric acid of the type for specific weight 1.26 accumulators corresponding to 30 Bé at a temperature of no less than 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 with the specific battery charger 020333Y (single) or 020334Y (multiple) at a density of about 1/10 of the battery nominal capacity and until the acid density is about 1.27, corresponding to 31Bé, and these values are stabilised.
- 4) Once the charge is over, level the acid (by adding **distilled water**). Replace the caps and clean carefully.
- 5) Once the above operations have been performed, install the battery in the vehicle ensuring the connections between the wiring and the battery terminals are correct.

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.

WARNING

THE BATTERY ELECTROLYTE IS POISONOUS AS IT MAY CAUSE SERIOUS BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH THE EYES, THE SKIN AND CLOTHING. IF COMING INTO CONTACT WITH EYES OR SKIN, WASH ABUNDANTLY WITH WATER FOR APPROX. 15 MIN. AND SEEK IMMEDIATE MEDICAL ATTENTION.

IN THE EVENT OF ACCIDENTAL INGESTION OF THE LIQUID, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR MILK, MAGNESIUM MILK, BATTERED EGG OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.

THE BATTERIES PRODUCE EXPLOSIVE GAS; KEEP CLEAR OF NAKED FLAMES, SPARKS OR CIGARETTES; VENTILATE THE AREA WHEN RECHARGING INDOORS.

ALWAYS WEAR EYE PROTECTION WHEN WORKING IN THE PROXIMITY OF BATTERIES. KEEP OUT OF REACH OF CHILDREN

INDEX OF TOPICS

ENGINE FROM VEHICLE

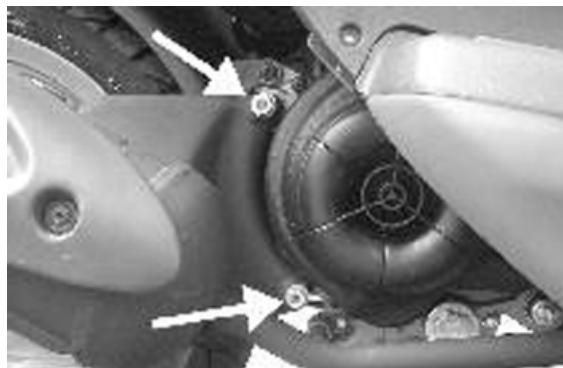
ENG VE

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

Removing the engine from the chassis

- Disconnect the battery.
- Remove the muffler assembly.
- Remove the rear wheel.
- Remove the rear brake mechanical transmission.
- Disconnect the electric terminals.
- Remove the throttle grip transmission.
- Disconnect the tubing (petrol-vacuum operated cock control).
- Disconnect the swinging arm on the engine side
- Disconnect the rear shock absorber lower clamping

WARNING

Be very careful when handling fuel.

CAUTION

When installing the battery, first attach the positive cable and then the negative cable.

WARNING

Wear safety goggles when using hitting tools.

INDEX OF TOPICS

ENGINE

ENG

Automatic transmission

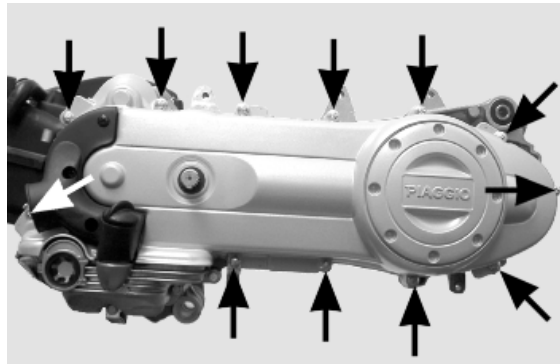
Transmission cover

- Remove the 12 fixing screws.
- Remove the oil filling cap and then slide out the cover.

If this operation is carried out directly on the vehicle, it is necessary to remove the transmission cooling coupling and the air filter housing retainers.

N.B.

USE A MALLET ON THE APPROPRIATE COUPLINGS TO REMOVE THE COVER.



Kickstart

- To remove the start up pinion push the starter lever to facilitate extracting the pinion.
- Remove the kick-start screw and lever.
- Remove the Seeger ring and the washer indicated in the figure.
- Pull out the toothed sector.

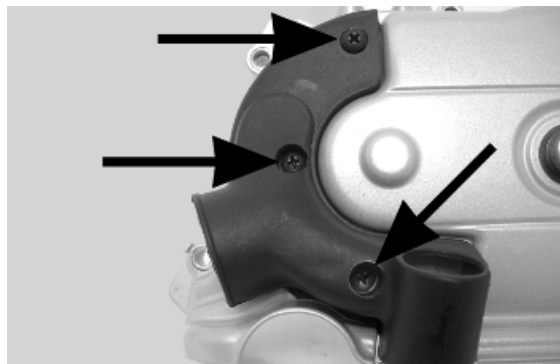
WARNING

THE SECTOR KEEPS THE SPRING SET, BE CAREFUL SO AS NOT TO CAUSE ANY ACCIDENTS



Air duct

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

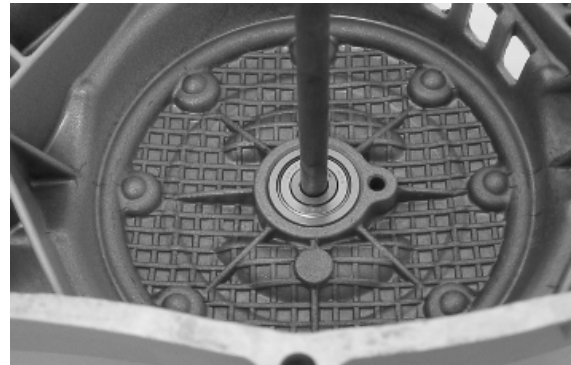


Removing the driven pulley shaft bearing

- Slightly heat the crankshaft from the inside side to avoid damaging the coated surface and use the driven pulley shaft or a pin of the same diameter to remove the bearing.

N.B.

IN CASE OF DIFFICULTY A STANDARD 8MM-INSIDE DIAMETER EXTRACTOR CAN BE USED.



Refitting the driven pulley shaft bearing

Refit the bearing with the aid of a bushing with the same diameter as the external plate of the bearing after slightly heating the crankcase from the inside.

N.B.

WHEN REFITTING, ALWAYS REPLACE THE BEARING WITH A NEW ONE.

CAUTION

WHEN REMOVING/REFITTING THE BEARING, TAKE CARE NOT TO DAMAGE THE COVER PAINTED SURFACE.

Removing the driven pulley

- Lock the clutch bell housing with the specific tool.
- Remove the nut, the clutch bell housing and the whole of the driven pulley assembly.

N.B.

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

Specific tooling

020565Y Flywheel lock calliper spanner



Inspecting the clutch drum

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

Characteristic

Clutch bell diameter/standard value

Ø 107+0.2 +0 mm

Clutch bell diameter/max. value allowed after use

Ø 107.5 mm

Eccentricity measured /max.

0.20 mm

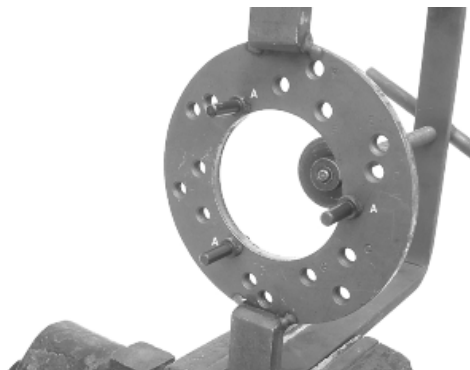


Removing the clutch

- Equip the tool with long pins screwed into position «A» from the outside, insert the entire driven pulley in the tool and have the central screw make contact.

CAUTION

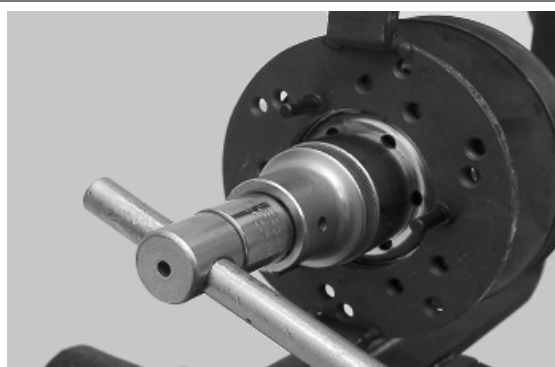
THE TOOL WILL BE DEFORMED IF THE CENTRAL SCREW IS TIGHTENED UP TOO FAR.



- Using a 34 mm socket wrench remove the clutch locking nut.
- Loosen the central screw by undoing spring of the driven pulley unit
- Separate the components.

Specific tooling

020444Y Tool for fitting/ removing the driven pulley clutch



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.

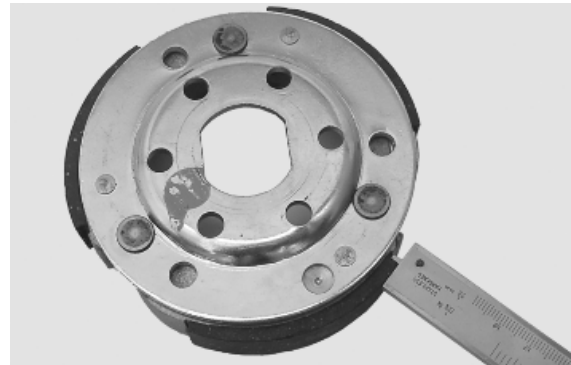
CAUTION

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 three guide pins and the mobile half pulley.



Removing the driven half-pulley bearing

- Remove the roller bearing with the special extractor inserted from the bottom of the fixed half-pulley.

CAUTION

POSITION THE HOLDING EDGE OF THE EXTRACTION PLIERS BETWEEN THE END OF THE BEARING AND THE BUILT IN SEALING RING.

Specific tooling

001467Y029 Bell for bearings, O.D. 38 mm



- Remove the ball bearing retention snap ring.
- Expel the ball bearing from the side of the clutch housing by means of the special tool.

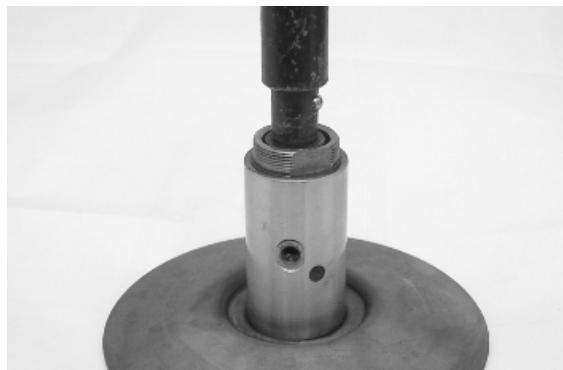
N.B.

PROPERLY SUPPORT THE HALF-PULLEY SO AS NOT TO DEFORM THE SLIDING SURFACE OF THE DRIVING BELT

Specific tooling

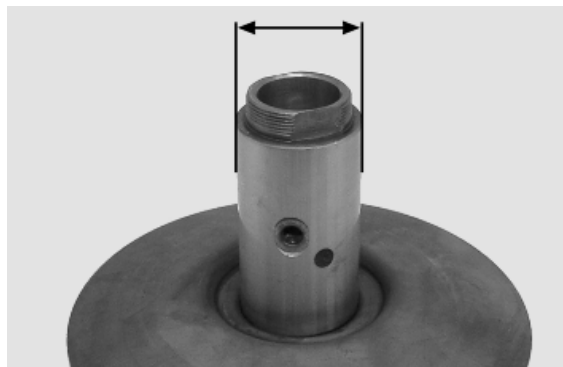
020376Y Adaptor handle

020363Y 20-mm guide



Inspecting the driven fixed half-pulley

- Check that there are no signs of wear on the work surface of the belt. If there are, replace the half-pulley..
- Make sure the bearings do not show signs of unusual wear.
- Measure the external diameter of the pulley bushing.



Characteristic

Stationary driven half-pulley/Standard diameter

Ø 33.965 to 33.985 mm

Stationary driven half-pulley / Minimum diameter admitted after use

Ø 33.96 mm

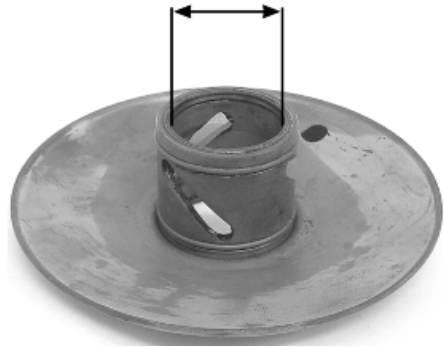
Inspecting the driven sliding half-pulley

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

Characteristic

Mobile driven half-pulley/ Maximum diameter allowed

Ø 34.08 mm



- Check the belt contact surfaces.
- Insert the new oil seal and O-rings on the mobile half-pulley.
- Fitting the half-pulley on the bushing.

Recommended products

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

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



- Make sure the pins and collar are not worn, reassemble the pins and collar.
- Use a greaser with a curved spout to lubricate the driven pulley unit with around 6 g of grease. This operation must be done through one of the holes inside the bushing until grease comes out of the opposite hole. This procedure is necessary to prevent the presence of grease beyond the O-ring.

Recommended products

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

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

Refitting the driven half-pulley bearing

- Fit a new ball bearing with the specific tool.
- Fit the ball bearing retention snap ring.
- Fit the new roller bearing with the wording visible from the outside.

CAUTION

PROPERLY SUPPORT THE HALF-PULLEY TO PREVENT DAMAGE TO THE THREADED END WHILE THE BEARINGS ARE BEING FITTED.

Specific tooling

020376Y Adaptor handle



020456Y Ø 24 mm adaptor

020362Y 12 mm guide

020171Y Punch for Ø 17 mm roller case

Inspecting the clutch spring

- Check that the contrast spring of the driven pulley does not show signs of deformation
- Measure the free length of the spring

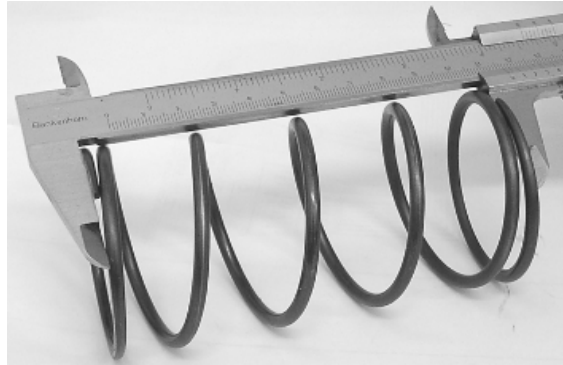
Characteristic

Standard length

118 mm

Minimum length allowed after use

XXXX



- 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

Refitting the clutch

- Preassemble the driven pulley group with spring, sheath and clutch.
- Position the spring with the sheath
- Insert the components in the tool and preload the spring being careful not to damage the plastic sheath and the end of the threaded bar.



- Reassemble the nut securing the clutch and tighten to the prescribed torque.

CAUTION

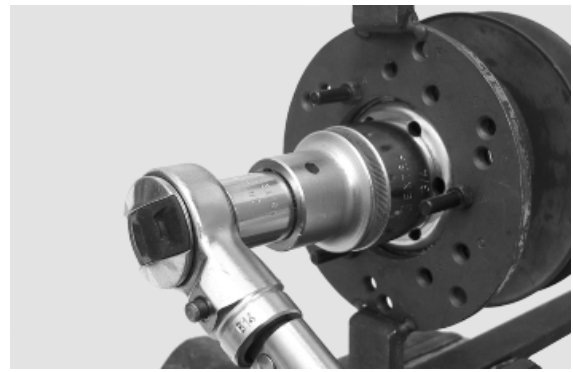
SO AS NOT TO DAMAGE THE CLUTCH NUT USE A SOCKET WRENCH WITH SMALL CHAMFER.

CAUTION

POSITION THE NON-CHAMFERED SURFACES OF THE NUT IN CONTACT WITH THE CLUTCH

Locking torques (N*m)

Nut locking clutch unit on pulley 55 ÷ 60 Nm



Refitting the driven pulley

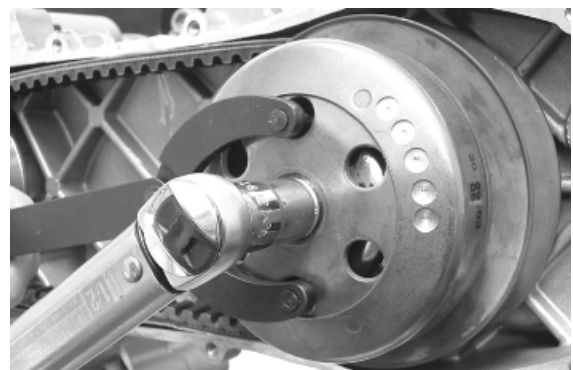
- Refit the driven pulley assembly, the clutch bell and the nut, using the specific tool.

Specific tooling

020565Y Flywheel lock calliper spanner

Locking torques (N*m)

Driven pulley shaft nut 40 to 44 Nm



Drive-belt

- Make sure the driving belt is not damaged and does not have cracks in the toothed grooves.

- Check the width of the belt.



Characteristic

Transmission belt/Minimum width

17.5 mm



Removing the driving pulley

- Lock the driving pulley using the appropriate tool.
- Remove the central nut with the related washer, then remove the drive and the plastic fan.
- Remove the stationary half-pulley.



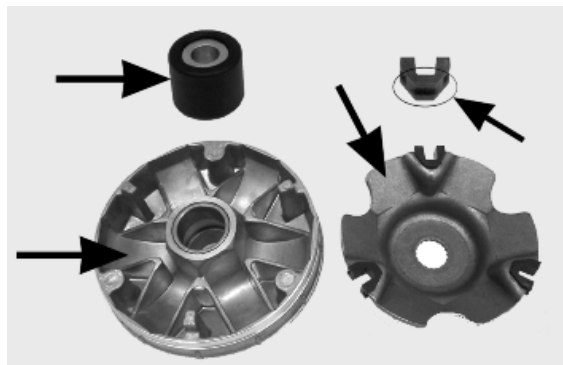
- Remove the belt, washer and remove the mobile half-pulley with its bushing, being careful that the rollers and contrast plate fitted loosely on it do not come off.

Specific tooling

020451Y Starting ring gear lock

Inspecting the rollers case

- 1) Check that the bushing and the sliding rings of the mobile pulley do not show signs of scoring or deformation.
- 2) Check the roller running tracks on the contact pulley; there must not be signs of wear and check the condition of the contact surface of the belt on the half-pulleys (mobile and stationary).
- 3) Check that the rollers do not show signs of marked facetting on the sliding surface and that the metallic insert does not come out of the plastic shell borders.
- 4) Check the integrity of the sliding blocks of the contact plate.



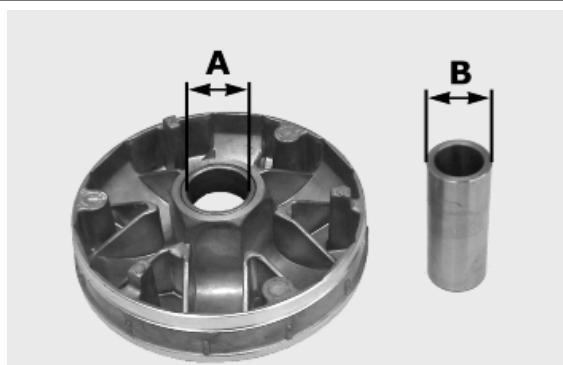
- Check that the internal bushing shown in the figure is not abnormally worn and measure inside diameter «A».
- Measure outside diameter «B» of the pulley sliding bushing shown in the figure.

CAUTION

DO NOT LUBRICATE OR CLEAN THE BUSHING.

Characteristic

Driving pulley / Maximum diameter:



20.12 mm

Driving pulley/ Standard diameter:

20.021 mm

Driving pulley bushing/ Diameter maximum:

XXX mm

Driving pulley bushing/ Standard diameter:

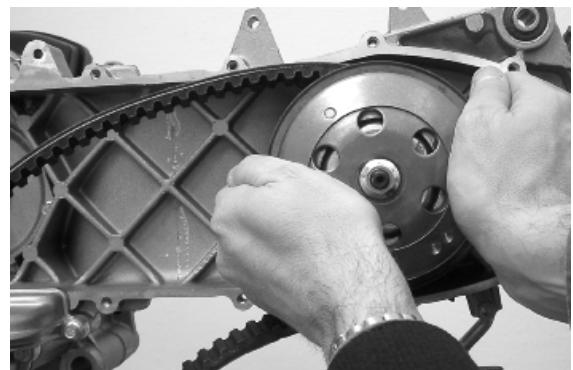
20 -0.020/-0.041 mm

Refitting the driving pulley

- Manually move the movable driven half-pulley away by pulling it towards the clutch unit and insert the belt observing the direction of rotation of the first fitting.

N.B.

IT IS GOOD PRACTICE ALWAYS TO FIT THE BELT SO THAT THE WORDS CAN BE READ IN CASE IT DOES NOT SHOW A FITTING SIDE.



- Refit the components of the assembly (roller container assembly with bushing, limiting washer, stationary half-pulley, cooling fan belt with drive, washer and nut).

- With the specific tool, tighten the lock nut to 20 Nm and then perform a final 90° locking in order to prevent the rotation of the driving pulley.

N.B.

REPLACE THE NUT WITH A NEW ONE AT EVERY REFIT
CAUTION

UPON FITTING THE DRIVING PULLEY UNIT IT IS OF UTMOST IMPORTANCE THAT THE BELT IS FREE INSIDE IN ORDER TO AVOID WRONG TIGHTENING AND CONSEQUENTLY DAMAGING THE CRANKSHAFT KNURLING.



Specific tooling

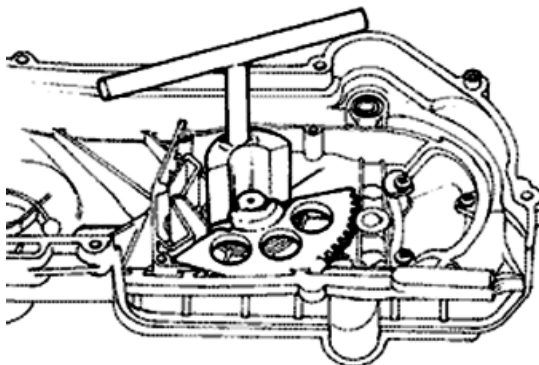
020451Y Starting ring gear lock

Locking torques (N*m)

Crankshaft pulley nut 18 to 20 + 90° Nm

Refitting the transmission cover

- Check the following for wear: toothed section, toothed section shaft, cover seat bushing, pinion shaft and its seating in the crankcase and the return spring.
- Remove the damaged components.
- Grease the spring.
- Remove the toothed sector and load the spring with an appropriate tool.
- Refit the washer, the Seeger and the Kick-start lever.



Recommended products

AGIP GREASE MU3 Grease for odometer transmission gear case

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

- Insert the pinion in its seating by pushing the starter lever.
- Fit the intake throat and tighten the 3 screws.

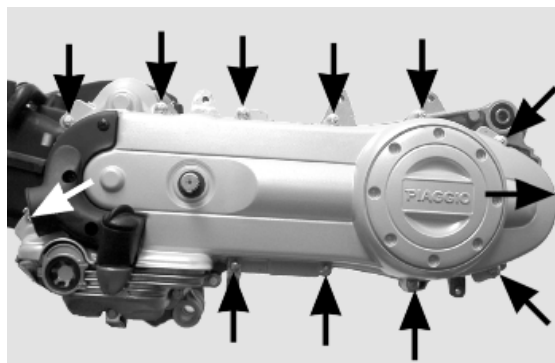
-Make sure the oil sump presents centring dowels and sealing gaskets.

- Replace the cover tightening the 12 screws to the prescribed torque.

-Refit the oil filling cap.

Locking torques (N*m)

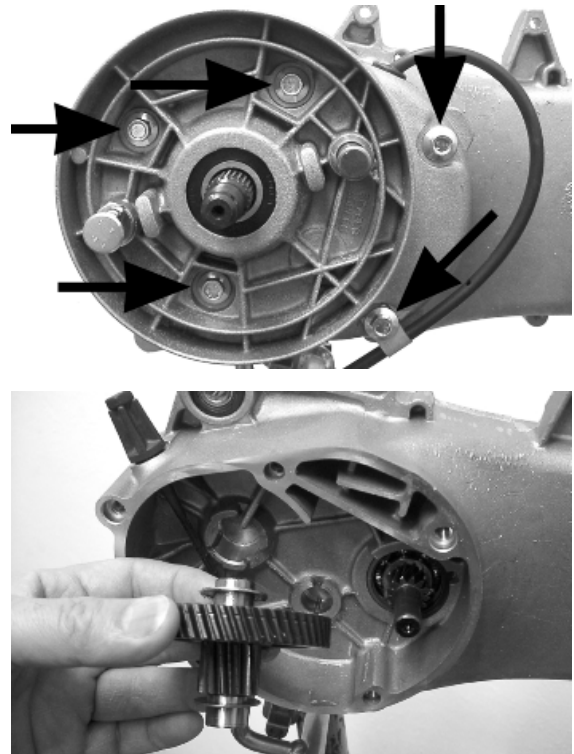
Transmission cover screws 11 ÷ 13 Nm



End gear

Removing the hub cover

- Drain the rear hub oil
- Remove driven pulley
- Remove the rear brake shoes
- Remove the 5 screws fixing the cover to the crankcase
- Remove the cover with the wheel axle and pull it out
- Remove the intermediate gear with the appropriate shim washers



Removing the wheel axle bearings

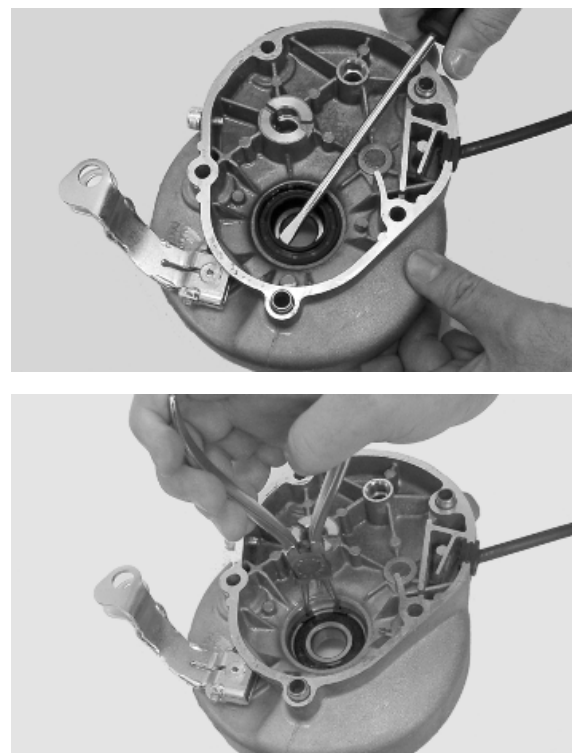
- Remove the oil seal and the seeger ring.
- Fix the hub cover properly to avoid damaging the sealing surface with the housing
- Remove the wheel axle bearing using the specific tool

Specific tooling

020363Y 20-mm guide

020376Y Adaptor handle

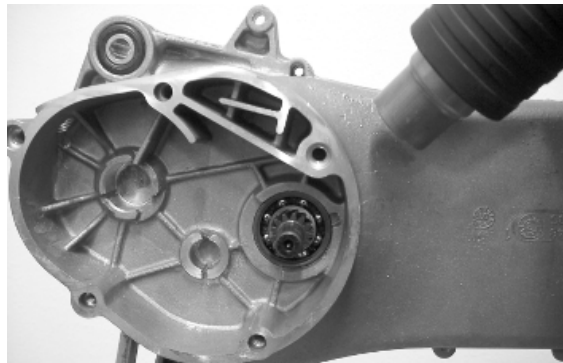
020477Y 37 mm adaptor





Removing the driven pulley shaft bearing

- Remove the seeger ring
- Heat the engine crankcase but do not direct the hot air towards the bearing
- Extract the driven pulley shaft together with the bearing with a few mallet blows



- Remove the bearing off the driven pulley shaft using the specific tool and a press

N.B.

USE THE SPECIFIC TOOL ON THE SIDE WITH THE SMALLER INTERNAL DIAMETER

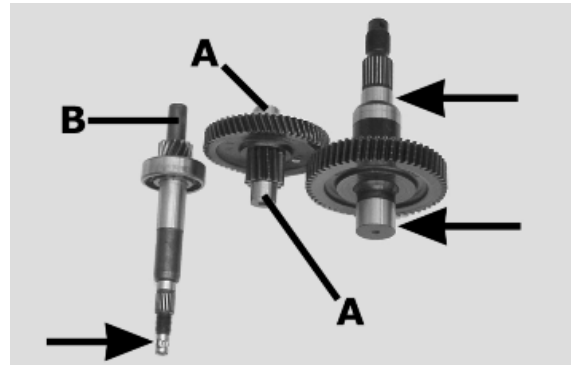
Specific tooling

020452Y Tube for removing and refitting the driven pulley shaft



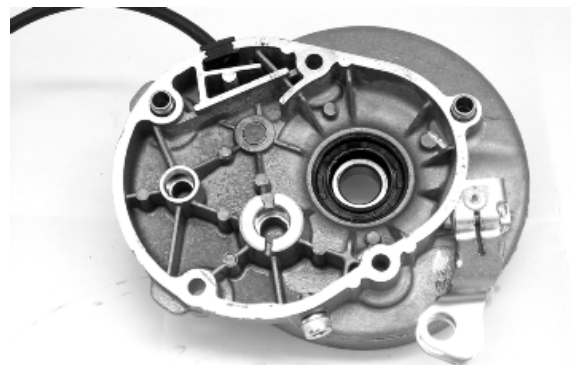
Inspecting the hub shaft

- 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.
- Check capacity (A) of the transmission gear (wear, deformations, etc.)
- Check the pulley shaft seating: Superficial wear (B) may indicate irregularities in the crankcase seatings or in the pulley shaft capacities



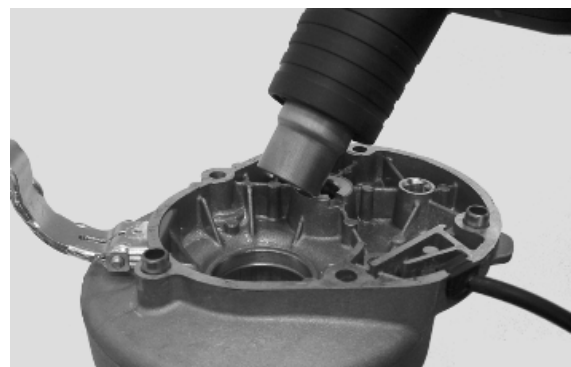
Inspecting the hub cover

- Check that the fitting surface is not dented or distorted.
- If faults are found, replace the hub cover.



Refitting the wheel axle bearing

- Support the hub cover on a wooden surface
- Heat up the hub cover using the thermal gun.
- Preassemble the bearing on the specific punch using grease and then insert the bearing in its seating
- Refit the seeger ring and the oil seal using the 42 x 47 mm adaptor



N.B.

POSITION THE OIL SEAL WITH THE SEALING LIP FACING THE HUB INTERNAL SIDE

Specific tooling

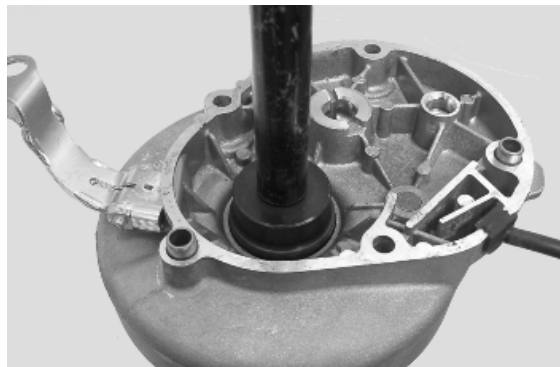
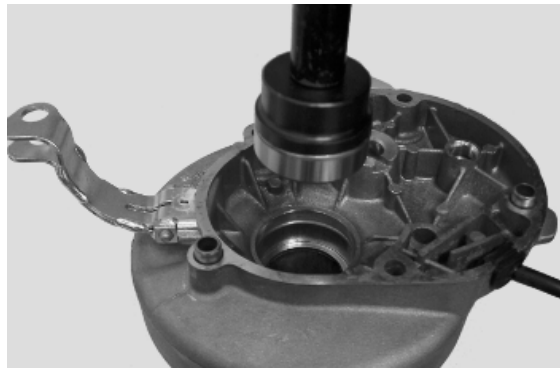
020150Y Air heater support

020151Y Air heater

020376Y Adaptor handle

020363Y 20-mm guide

020359Y 42x47-mm Adaptor



Refitting the hub bearings

- Remove the wheel axle on the cover and pay attention not to damage the sealing lip of the oil seal
- Apply a thin layer of grease on the two shim washers of the intermediate gear and fit one on the cap so that it does not interfere with the wheel axle gear when placing the transmission shaft



Refitting the hub cover

- Apply product recommended for surfaces on the hub cap and refit cap on the crankcase
- Fit the 5 screws and tighten them to the specified torque.

N.B.

CLEAN THE CONTACT SURFACES OF THE HUB COVER AND THE HALF CRANKCASE OF RESIDUE FROM PREVIOUS GASKETS BEFORE APPLYING A NEW ONE.

Recommended products

Loctite 510 Liquid sealant



Gasket

Locking torques (N*m)

hub cap screws 24 - 26

Flywheel cover

Cooling hood

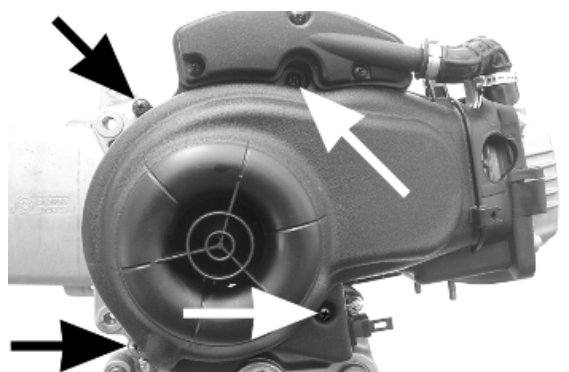
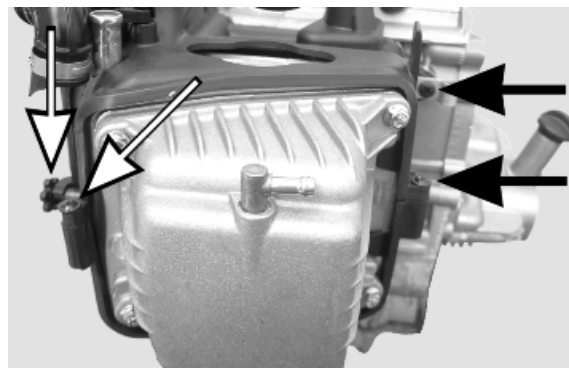
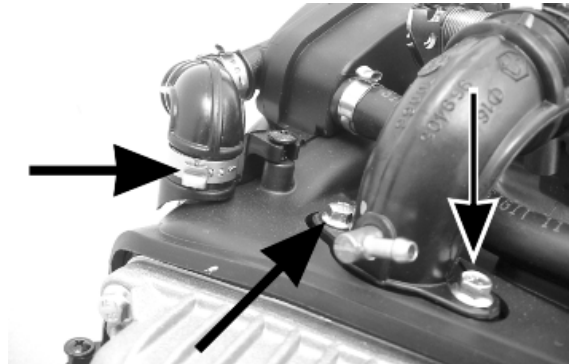
- Remove the manifold and the carburettor undoing the 2 fixing screws on the head
- Remove the fastening clamp of the secondary air pipe and disconnect it
- Remove the 4 front coupling screws (1 of them is a knob) and the side fixing screw at the crankcase base.
- Remove the 4 side screws
- Extract the 3 covers - Remove the cover sealing gaskets on the head
- For refitting, repeat the removal steps but in reverse order

CAUTION

TAKE CARE TO CORRECTLY POSITION THE FLYWHEEL CONNECTOR.

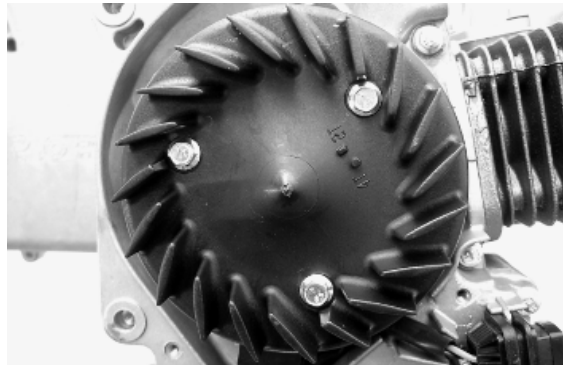
N.B.

WHEN REFITTING THE COVER, TAKE CARE NOT TO DAMAGE THE STATOR WIRING.



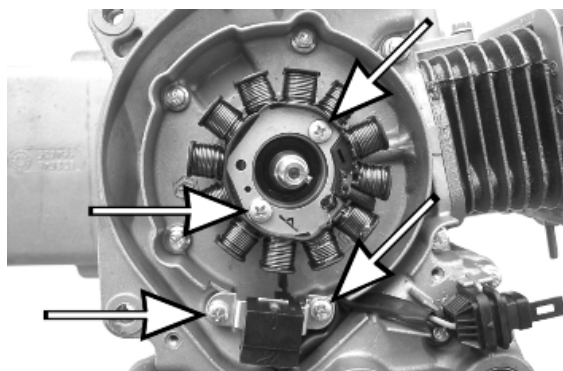
Cooling fan

- Remove the cooling fan by undoing the 3 screws fixing it to the rotor
- When refitting the fan, pay attention that the screw holes in the fan and the rotor coincide, then tighten screws at the specified torque.



Removing the stator

- Remove the 2 Pick-Up screws and the 2 stator fixing screws indicated in the figure.
- Remove the stator and its wiring.



Refitting the stator

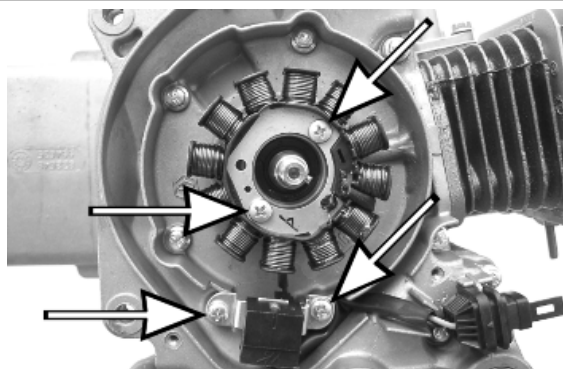
- Refit the stator and flywheel carrying out the removal procedure in reverse, tightening the retainers to the specified torque.

N.B.

THE PICK-UP CABLE MUST BE POSITIONED ADHERING TO THE FUSION TONGUE ON THE CRANKSHAFT IN SUCH A WAY AS TO AVOID BEING CRUSHED BY THE FAN COVER ASSEMBLY.

Locking torques (N*m)

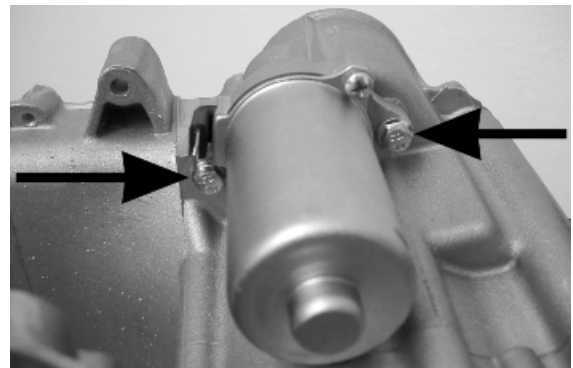
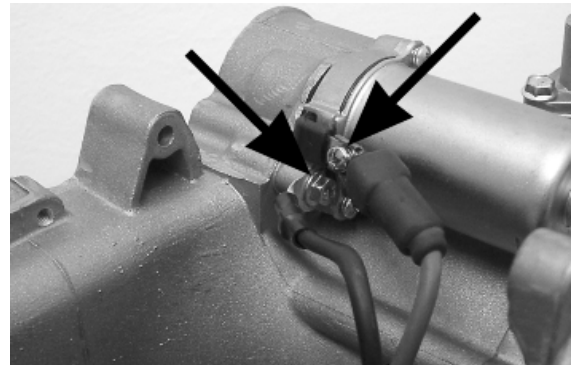
Pick-up screws 3 ÷ 4 Stator screws 3 ÷ 4



Flywheel and starting

Removing the starter motor

- Undo the screw on the power positive contact and disconnect the cable
- Undo the 2 screws fixing the starter motor to the crankcase and recover the power wiring.



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

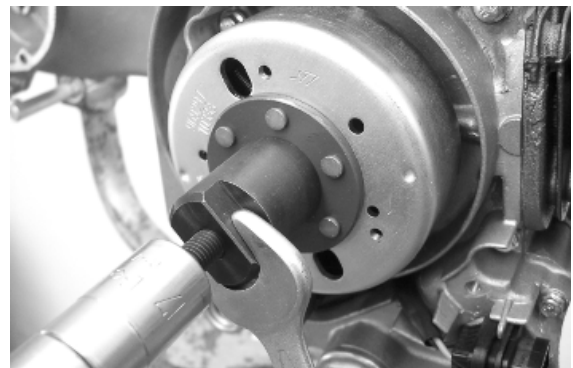


- Extract the flywheel with the extractor.

Specific tooling

020565Y Flywheel lock calliper spanner

020162Y Flywheel extractor



Inspecting the flywheel components

- Check that the flywheel internal magnets are in good conditions.
- Check that the flywheel splines exhibit no loosening.
- Check there are no deformations that may cause rubbing on the stator and the Pick-Up.
- Check that the stator winding, its ferromagnetic support and the pick-up are in good conditions.



Starter gear rim

- Check the tothing is level and in good conditions



Intermediate gear

- Check that the keying tothing on the crown and the starter motor are in good conditions.
- Check that the Bendix opens and returns adequately.



Refitting the flywheel magneto

- Refit the stator and the pick-up being careful to pass the wiring through the appropriate crankcase couplings.
- Refit the flywheel to the crankshaft being careful to respect the keying, then lock rotation with the specific tool and tighten the nut to the prescribed torque.

N.B.

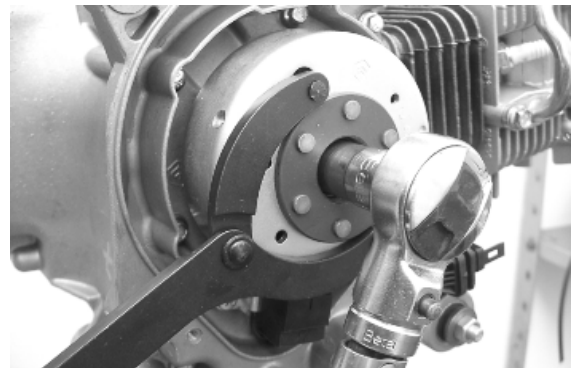
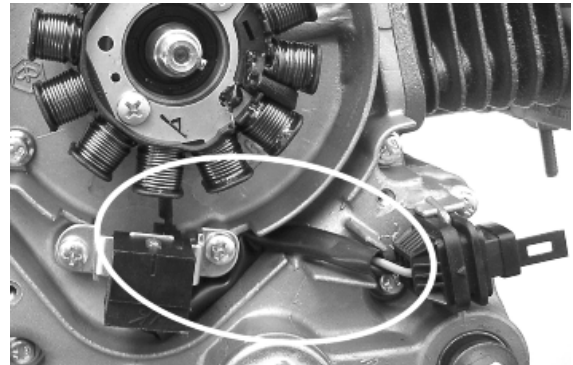
A VARIATION OF THE AIR GAP DISTANCE CAN LEAD TO A VARIATION IN THE IGNITION ADVANCE SUCH AS TO CAUSE PINGING, KNOCKING ETC.

Specific tooling

020565Y Flywheel lock calliper spanner

Locking torques (N*m)

Flywheel nut $52 \div 58$



Refitting the starter motor

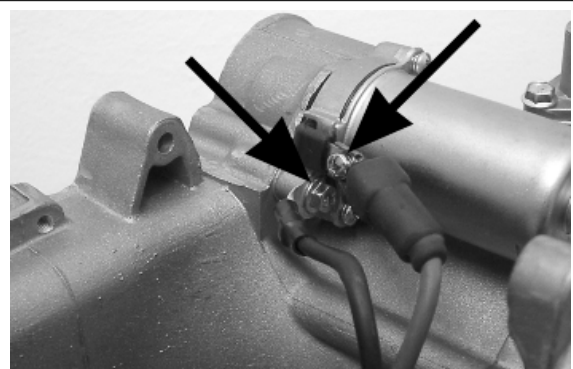
- Install the starter motor in its seating in the crankcase.
- Tighten the screw on the head side but do not lock it, screw the second screw inserting the earth cable (black), then tighten the 2 screws at the prescribed torque.
- Tighten the locking screw of the positive cable (red) on the side contact.

N.B.

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

Locking torques (N*m)

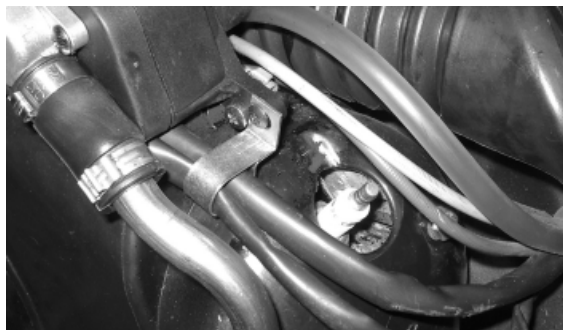
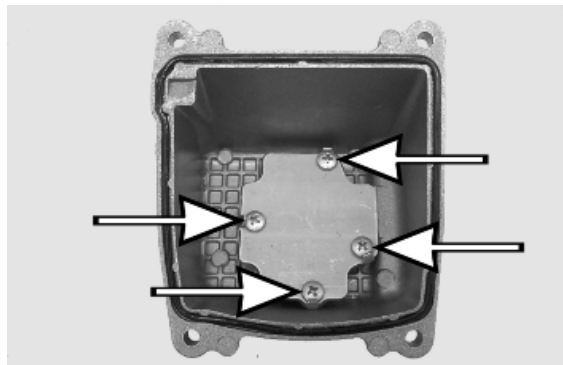
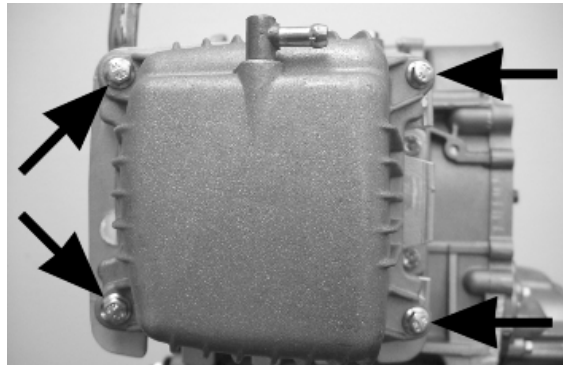
Starter screws $11 \div 13$



Cylinder assy. and timing system

Removing the rocker-arms cover

- Remove the cooling covers
- Remove the 4 retainers of the tappet cover
- Remove the cover and the O-ring
- Remove the 4 screws and then remove the Blow-by cover
- Clean the nozzle labyrinth and the membrane (replace it, if necessary), then remove the cover unit.



See also

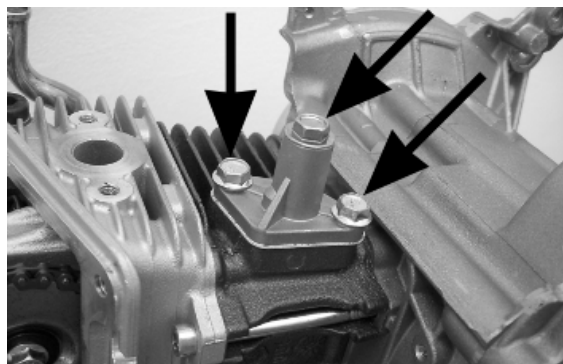
[Cooling hood](#)

Removing the timing system drive

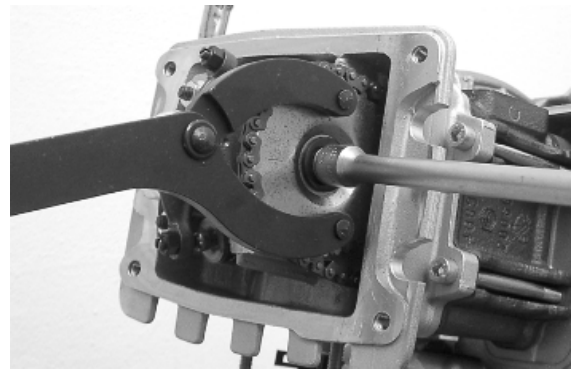
- Temporarily loosen the tensioner central screw and remove it together with the spring.
- Unscrew the 2 retainers indicated in the figure and remove the chain tightener support being careful to recover the sealing gasket.

N.B.

SHOULD THE GASKET NOT BE IN GOOD CONDITIONS, REPLACE IT AFTER CAREFULLY CLEANING THE FAYING SURFACE IN ORDER TO AVOID ENGINE OIL LEAKS



- Remove the driving pulley
- Remove the oil pump chain
- Remove the tappet cover
- Remove the central screw and the belleville washer indicated in the figure and lock the camshaft crown with the specific tool.

**N.B.**

TO FACILITATE REMOVING THE HEAD COMPONENTS, SET THE CRANKSHAFT TO THE TIMING POINT (TDC OF THE COMPRESSION END).

Specific tooling**020565Y Flywheel lock calliper spanner**

- Remove the camshaft control pulley and the washer below.
- Remove the pinion of the crankshaft timing control
- To remove the chain lower guiding pad, remove the head by pulling it upwards

N.B.

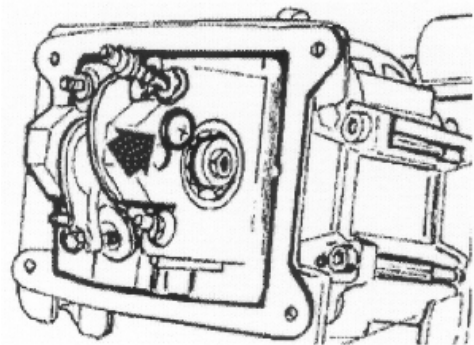
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE DIRECTION OF ROTATION IS MAINTAINED.

See also

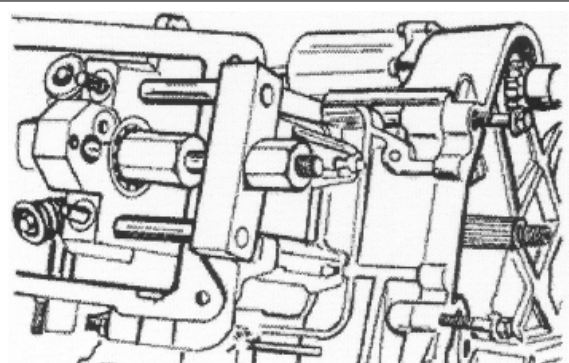
[Removing the rocker-arms cover Removal](#)
[Removing the driving pulley](#)

Removing the cam shaft

- Remove the bearing clamping screw indicated in the figure.



- Remove the entire camshaft with bearing using the specific tool shown in the figure.
- Take out the camshaft bearing with the aid of the specific tool, being careful to mount a screw on the camshaft in order to protect its thread.

**N.B.**

IF A BEARING SEPARATES FROM THE CAMSHAFT, IT IS ESSENTIAL TO FIT A NEW BEAR.

Specific tooling

020450Y Camshaft fitting/removal tool

004499Y Camshaft bearing extractor

004499Y001 Bearing extractor bell

004499Y002 Bearing extractor screw

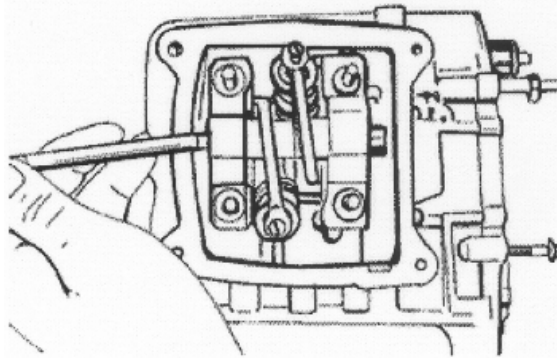
004499Y006 Bearing extractor ring

004499Y027 Bearing extractor part

- Pull out the rocking lever bolt operating on the flywheel hole and remove the rocking levers at the same time.

N.B.

MARK THE ASSEMBLY POSITION OF THE ROCKING LEVERS IN ORDER TO AVOID MISPLACING THE INTAKE AND DISCHARGE ENDS.

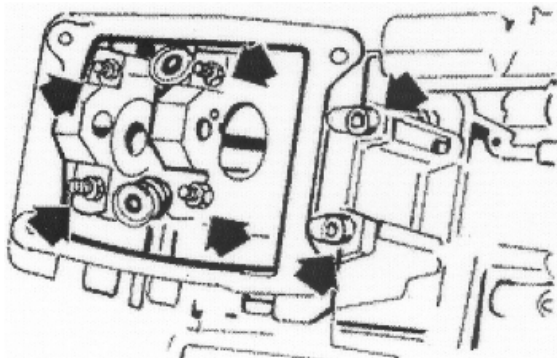


Removing the cylinder head

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

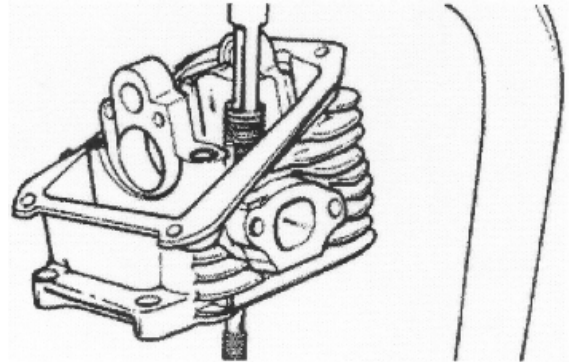
N.B.

IF NEEDED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, PINS AND ROCKING LEVERS WITHOUT REMOVING THE DRIVING PULLEY UNIT. REMEMBER TO HOLD THE TIMING CHAIN WITH A PIECE OF METAL CABLE AND TO ADJUST THE CHAIN TIGHTENER UPON RE-FITTING.



Removing the valves

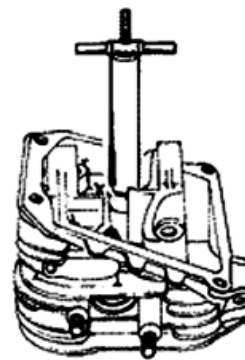
- Using the specific tool fitted with the element shown in the figure, remove the cotters, the plates and the spring between the valves.



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

Specific tooling

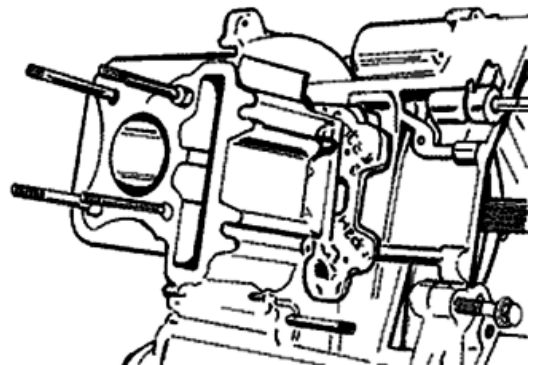
020431Y Valve oil seal extractor



Removing the cylinder - piston assy.

- Remove the cylinder paying attention to the 2 cylinder centring dowels in the housing.
- Remove the cylinder base gasket.

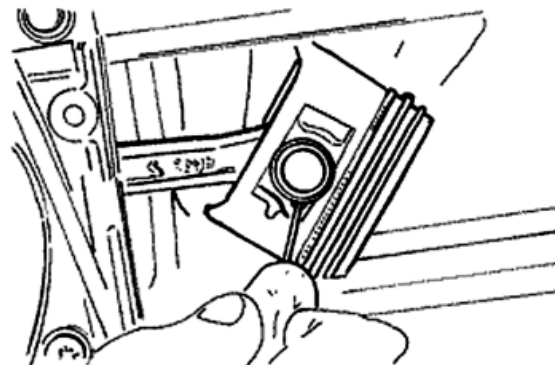
To avoid damaging the piston, keep it fixed while removing the cylinder.



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

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 CRANK-SHAFT" CHAPTER".

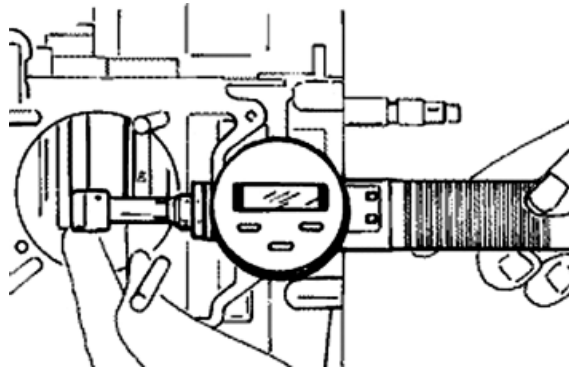
Characteristic

Max. diameter admitted: check the small end

13.030 mm

Standard diameter: check the small end

13 +0.025+0.015mm



Inspecting the wrist pin

- Measure the outer diameter of the gudgeon pin.

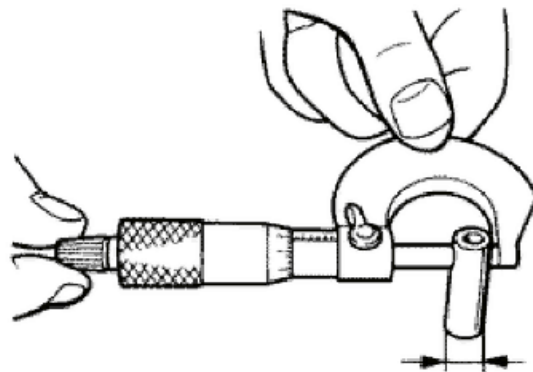
Characteristic

Standard diameter: gudgeon pin

13 -0-0.004mm

Minimum admissible diameter gudgeon pin

12.990 mm

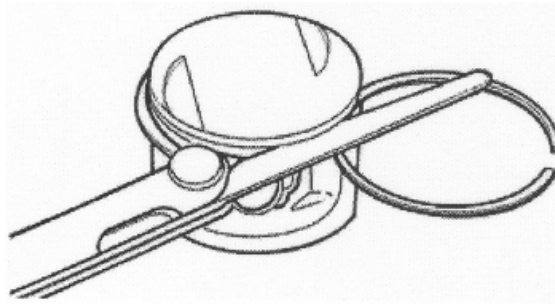


Inspecting the piston

- Carefully clean the sealing rings housings with the aid of an old piston ring.
- Measure the coupling clearance between the sealing rings and the piston grooves using a thickness gauge, as shown in the figure.
- If the clearances detected exceed the limits specified in the table, the piston and the piston rings should be replaced.

PISTON

Name	Description	Dimensions	Initials	Quantity
Top piston ring		0.030 ÷ 0.065 mm		0.080 mm
Middle piston ring		0.020 ÷ 0.055 mm		0.070 mm
oil scraper		0.040 ÷ 0.160 mm		0.20 mm



- Calculate the piston pin coupling clearance.

Fitting clearance

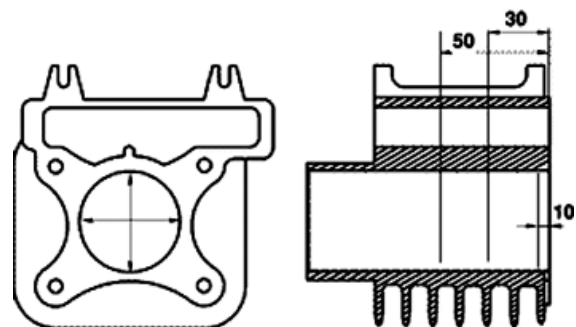
Pin coupling clearance $13 + 0.010 + 0.005 \text{ mm} \div 0.014 \text{ mm}$



- Measure the outside diameter of the piston, perpendicular to the gudgeon pin axis.
- Carry out the measurement at 27 from the piston crown as shown in the figure.

Inspecting the cylinder

- 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).

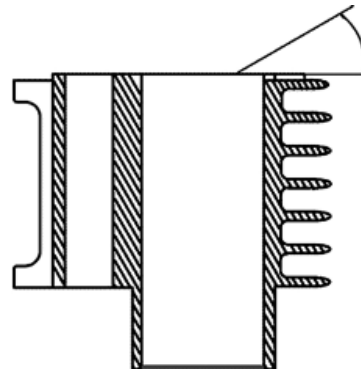


Characteristic

Maximum allowable run-out:

0.05 mm

- The cylinder rectifying operation should be carried out with a surfacing that respects the original angle. at 120° crossed.
- The cylinder surface roughness should be of R.A.= 0.30 ÷ 0.50.
- 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 two categories 1st and 2nd with 0.2-0.4mm oversize. They are also classified into 4 categories A-A, B-B, C-C, D-D.



Inspecting the piston rings

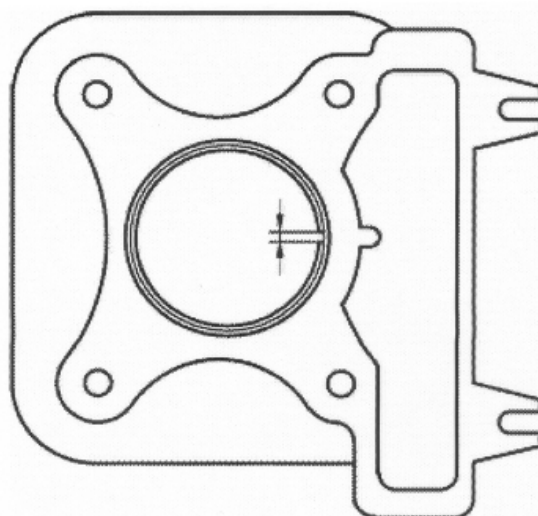
- Alternately insert the three sealing rings into the cylinder, in the area where it retains its original diameter. Using the piston, insert the rings perpendicularly to the cylinder axis.
- Measure the opening, see figure, of the sealing rings using a thickness gauge.
- If any measurements are greater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

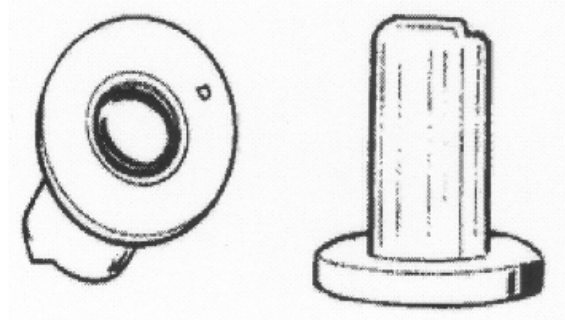
SEALING RINGS

Name	Description	Dimensions	Initials	Quantity
Top piston ring		0.08 ÷ 0.20 mm		0.35 mm
Middle piston ring		0.05 ÷ 0.20 mm		0.30 mm
oil scraper		0.20 ÷ 0.70 mm		0.80 mm



Removing the piston

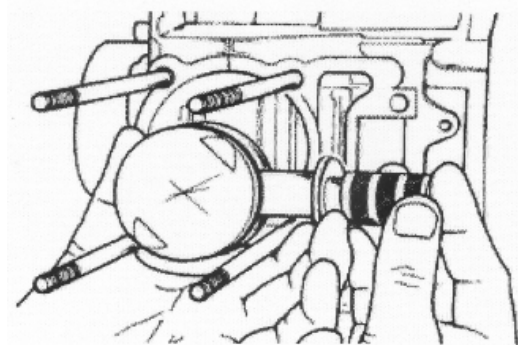
- Install piston and wrist pin onto the connecting rod, aligning the piston arrow the arrow facing towards the exhaust.
- Fit the pin stop ring onto the appropriate tool.



Specific tooling

020448Y Pin lock fitting tool

- With the opening in the position indicated on the tool, set the lock ring into position in the tool with the punch.
- Rest the tool on the piston paying attention that the 90° chamfered side faces upwards as indicated in the figure.
- Fit the gudgeon pin stop using the plug.



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.
- Fit a dial gauge on the specific tool, then rest both on a stop surface.
- Zero set the dial gauge on the stop surface. Keeping the zero position, assemble 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)
- Measure piston protrusion compared with the head plane and determine the gasket thickness to be used according to the table below. By correctly identifying the cylinder base gasket thickness, an adequate compression ratio is maintained.
- Remove the specific tool and the cylinder.

Characteristic

Standard compression ratio

C.R. $11.5 \div 12 \div 1$

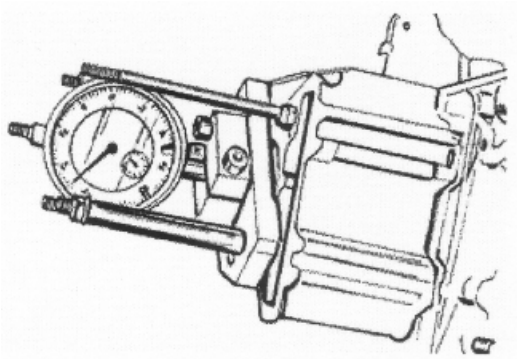
CYLINDER BASE GASKET THICKNESS

Specification	Desc./Quantity
Cylinder height	56.45 ± 0.05
Head gasket thickness (fibre)	0.95 ± 0.06
Measure detected	0.9 ± 0.05
Base gasket thickness	0.4

Specification	Desc./Quantity
Measure detected	1 ± 0.05
Base gasket thickness	0.5

CYLINDER BASE GASKET THICKNESS

Specification	Desc./Quantity
Cylinder height	57.15 ± 0.05
Head gasket thickness (steel)	0.3 ± 0.05
Measure detected	0.20 ± 0.05
Base gasket thickness	0.4
Measure detected	0.30 ± 0.05
Base gasket thickness	0.5



This engine is manufactured with two different head gasket solutions:

- Fibre gasket drw. 969244 0.95 mm thick.
- Steel gasket drw. 969393 0.3 mm thick.

In order to guarantee an adequate compression ratio, the gaskets match cylinders with different heights:

- **Fibre gaskets with cylinder 56.45 mm high**
- **Fibre gaskets with cylinder 57.15 mm high**

In order to carry out the revision both gaskets should be present on the spare parts.

All pin-piston-cylinder units supplied with the spare parts present cylinders 57.15 mm high

N.B.

MEASUREMENT "A" TO BE TAKEN IS A VALUE OF PISTON RE-ENTRY, IT INDICATES BY HOW MUCH THE PLANE FORMED BY THE PISTON CROWN FALLS BELOW THE PLANE FORMED BY THE TOP OF THE CYLINDER. THE FURTHER THE PISTON GETS INSIDE THE CYLINDER, THE THINNER THE HEAD GASKET TO BE APPLIED SHOULD BE (TO RECOVER THE COMPRESSION RATIO) AND VICE VERSA.

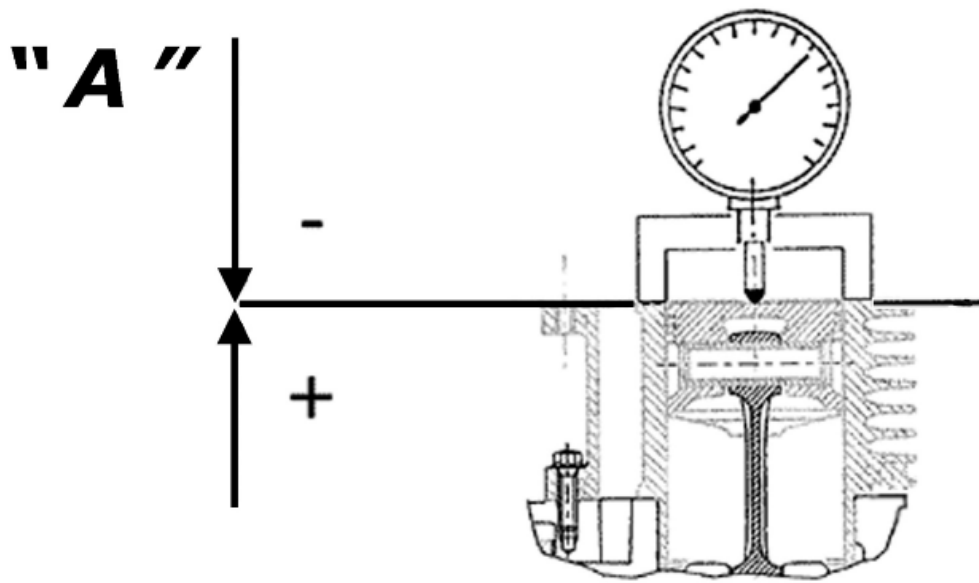
Characteristic

Shimming system to control the compression ratio

CR: 11.1 ÷ 12.9

PISTON PROTRUSION CHECK

Name	Measure A	Thickness
shimming_1	0.05 ÷ 0.25	0.35
shimming_2	0.25 ÷ 0.40	0.25

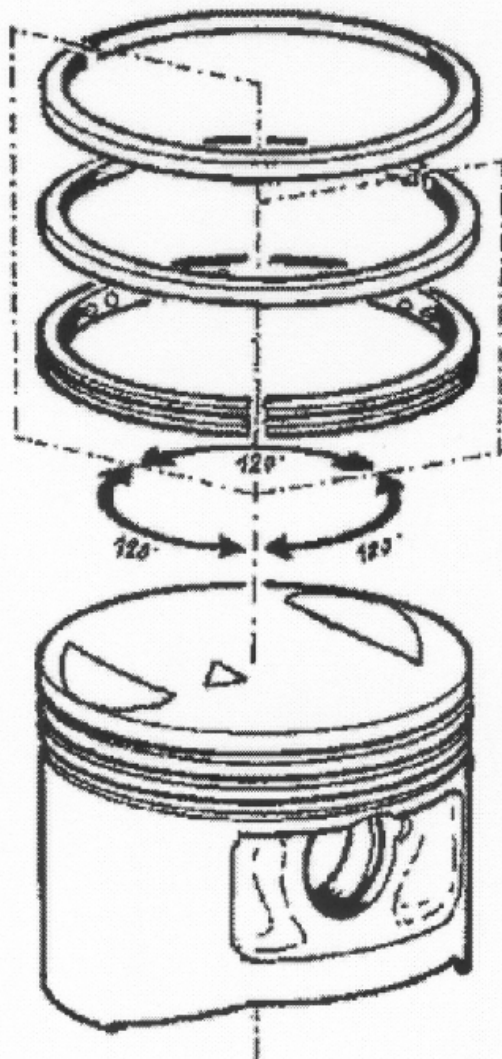


Refitting the piston rings

- Fit the oil scraper ring starting from the spring, taking care that the spring ends do not superimpose. Fit the two piston rings so that their gaps and that of the oil scraper ring are never aligned.
- Fit the 2nd sealing ring with the identifying letter «T» facing towards the piston crown.
- Fit the 1st sealing ring with the reference letter «T» facing towards the piston crown.
- Misalign the lining openings at 120° as shown in the figure.
- Lubricate the components with engine oil.

N.B.

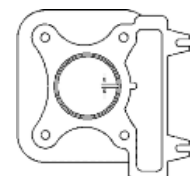
IN ORDER TO OBTAIN A GOOD BEDDING, THE 2 SEALING PISTON RINGS ARE MADE OF CONE SHAPED CONTACT SECTION TO THE CYLINDER. AS A RESULT IT IS IMPORTANT TO RESPECT THE FITTING INSTRUCTION TO ASSEMBLY THE RINGS WITH THE "T" MARK FACING UPWARDS.



- 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 COMBI-



NATION WITH A USED CYLINDER MAY HAVE DIFFERENT BEDDING CONDITIONS THAN THE STANDARD.

SEALING RINGS

Name	Description	Dimensions	Initials	Quantity
Top piston ring		0.08 ÷ 0.20 mm		0.35 mm
Middle piston ring		0.05 ÷ 0.20 mm		0.30 mm
oil scraper		0.20 ÷ 0.70 mm		0.80 mm

Refitting the cylinder

If the four cylinder stud bolts should be replaced in this kind of engine, it is necessary to tighten the head nuts strictly following the procedure below.

The procedure is different from that indicated in the vehicle manuals:

Head nuts tightening (only for stud bolts replacement) $6 \div 7 \text{ N}^* \text{m} + 90^\circ + 90^\circ + 90^\circ$

The 45° rotation reduction of the key is necessary to avoid stud bolt stretching.

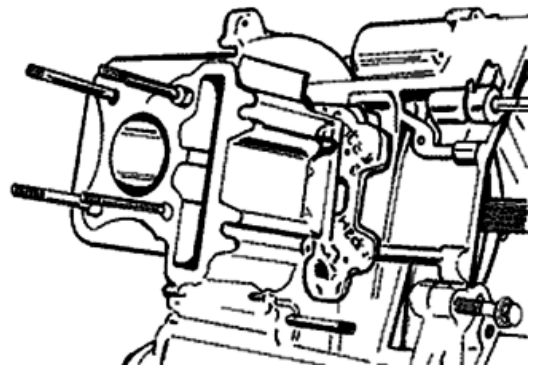
- Fit the base gasket of the chosen thickness, previously determined.
- Fit the cylinder as shown in the figure
- The piston can be kept out of the housing plane using the appropriate tool.

N.B.

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

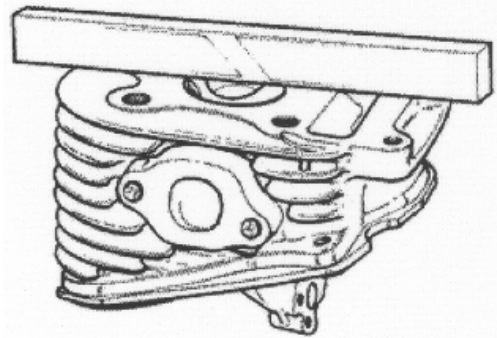
Specific tooling

020288Y Fork to assemble piston on cylinder



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.



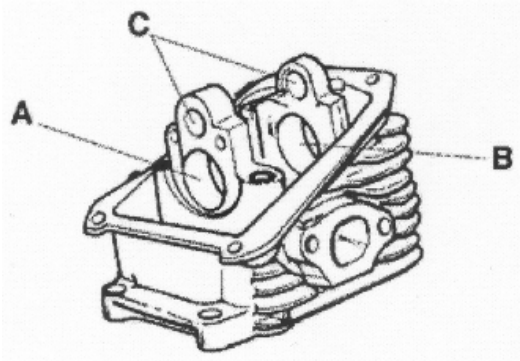
Characteristic

Maximum admitted unevenness: Head check

0.05 mm

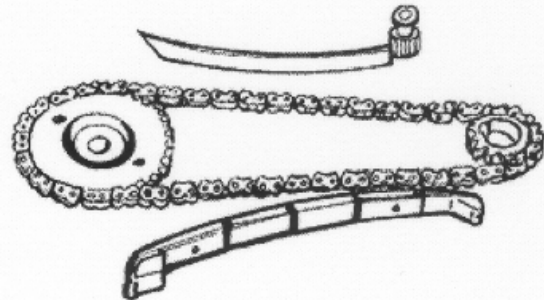
HEAD CHECK

Specification	Desc./Quantity
Standard diameter (mm) A	Ø 32.015 ÷ 32.025 mm
Standard diameter (mm) B	Ø 16.0 ÷ 16.018
Standard diameter (mm) C	Ø 11.0 ÷ 11.018

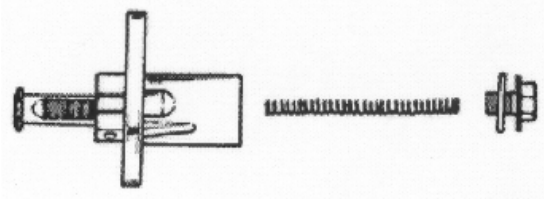


Inspecting the timing system components

- 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 signs of wear are found, replace the parts. If the chain, pinion or pulley are worn, replace the whole assembly.

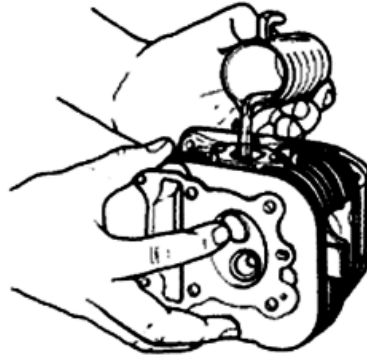


- Remove the central screw and the tensioner spring. Check that the one-way mechanism is not worn.
- Check the condition of the tensioner spring.
- If examples of wear are found, replace the whole assembly.



Inspecting the valve sealings

- 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.



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

Characteristic

Sealing surface width: Intake

1.5 mm

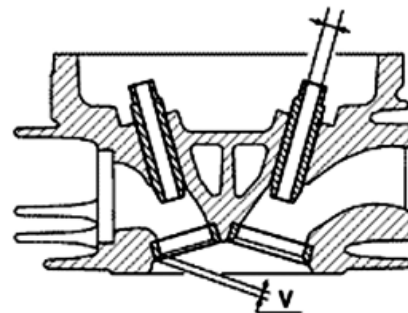
Sealing surface width: Drainage

1.6 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

Discharge guide: Standard diameter

5 +0+0.012mm

Discharge guide: Wear limit

5.022 mm

Intake guide: Standard diameter

5 +0+0.012mm

Intake guide: Wear limit

5.022 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»

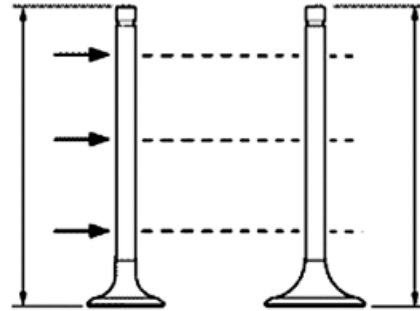
Characteristic

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 the valve and the valve guide.

**Characteristic****Minimum diameter allowed: Intake**

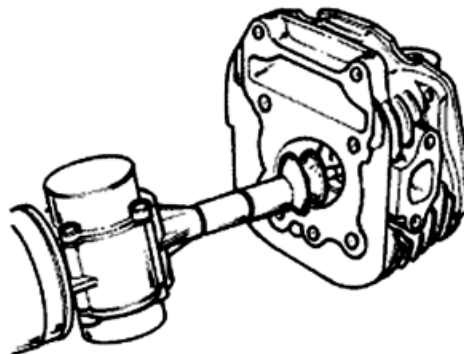
4.970 mm

Minimum admissible diameter drainage

4.960 mm

Fitting clearance**Standard clearance: Intake** 0.015 ÷ 0.042 mm**Standard clearance: drainage** 0.025 ÷ 0.052 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****Valve standard length: Intake**

70.1 mm

Valve standard length: drainage

69.2 mm

Fitting clearance**Max. clearance allowed: Intake** 0.052 mm **Max.****clearance allowed: drainage** 0.062 mm

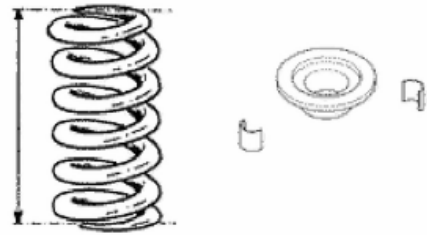
- If the checks above give no failures, you can use the same valves. For best sealing results, it is advisable to grind the valves. Grind the valves gently with a fine-grained lapping compound. During grinding, keep the cylinder head in a horizontal position. This will prevent the lapping compound residues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

Inspecting the springs and half-cones

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



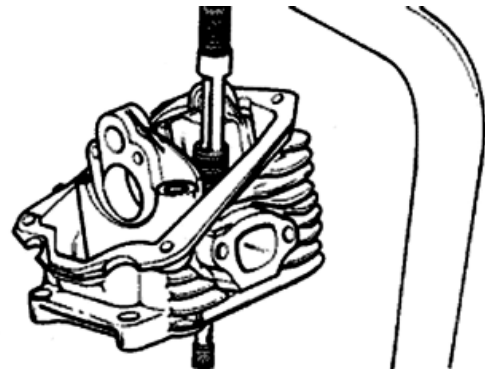
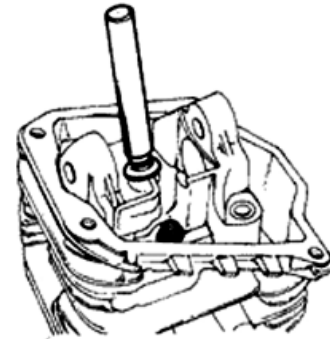
Refitting the valves

- Lubricate the valve guides with graphite grease.
- 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 seal rings

- Fit the valves, the springs and the upper caps.
- Using the appropriate tool, compress the springs and insert the cotters in their seats.



Inspecting the cam shaft

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

Characteristic

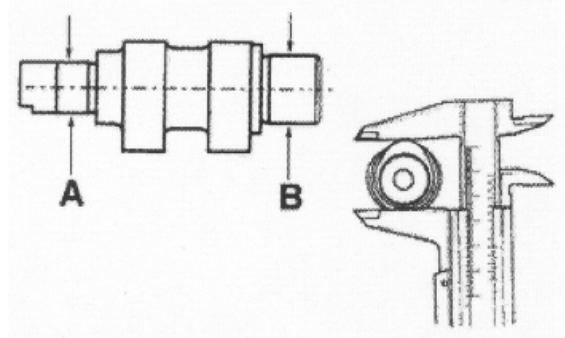
Standard diameter - Bearing A:

$\varnothing 12 +0.002 +0.010$

mm Standard diameter - Bearing B:

$\varnothing 16 -0.015 -0.023$ mm

Minimum diameter allowed - Bearing A:



Ø 11.98 mm

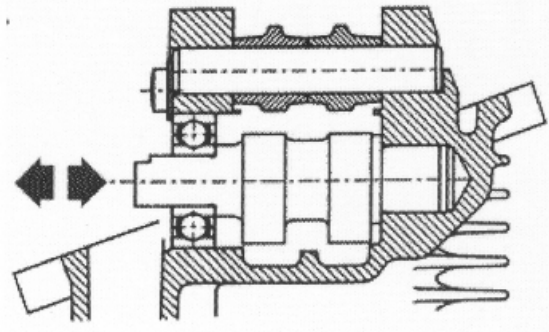
Minimum diameter allowed - Bearing B:

Ø 15.96 mm

- 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.

N.B.

A BALL BEARING IS FITTED ON BEARING «A»; CONSEQUENTLY, BEARING «B» IS THE MOST IMPORTANT AS IT WORKS DIRECTLY ON THE HEAD ALUMINIUM



Characteristic

Standard height - Intake:

25.935 mm

Standard height - Discharge:

25.935 mm

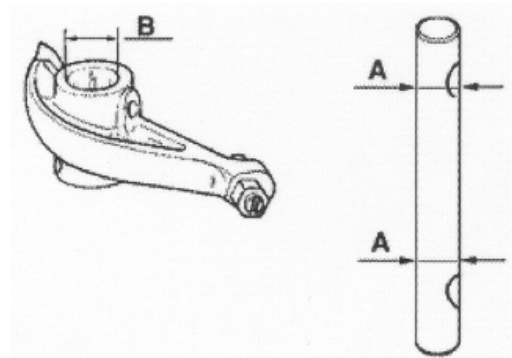
Fitting clearance

Maximum admissible axial clearance: 0.5 mm

- Check there are no signs of scoring or wear on the rocking lever bolt.
- Measure the diameter «A».
- Measure the internal diameter of each rocking lever. level «B».

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

- In case of anomalies, replace the damaged components.



Characteristic

Minimum admissible diameter

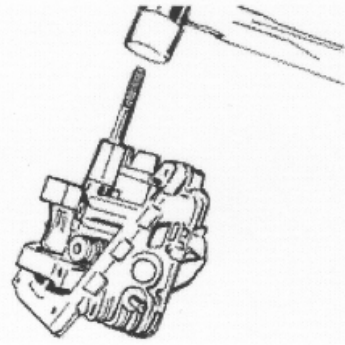
Ø 10.970 mm

Maximum diameter allowed:

Ø 11.030 mm

Refitting the head and timing system components

- Fix the head on a workbench.
- Screw the tool to fit the camshaft fully down on the bearing's inner track.
- Fit the camshaft fully into its seating together with the bearing with the aid of a mallet.
- Remove the tool.
- Fit the head gasket after cleaning the faying surface carefully.
- Insert the head in the cylinder stud bolts and tighten the 4 fixing nuts to the prescribed torque.



Specific tooling

020450Y Camshaft fitting/removal tool

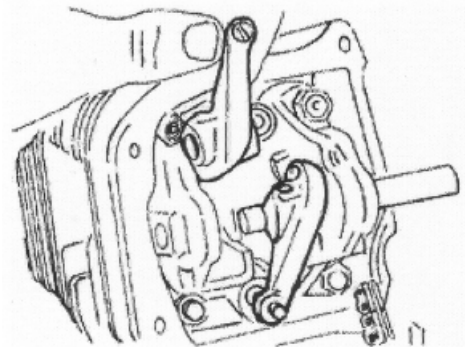
Locking torques (N*m)

Head-cylinder stud bolt nuts: $6 \div 7 +135^\circ +90^\circ$ Nm
 first fitting, upon refitting tighten again at $6 \div 7 90^\circ +90^\circ$ Nm

- Loosen the rocking lever registers.
- Fit the pin, the intake rocking lever and the discharge rocking lever.
- Lubricate the 2 rocking levers through the holes.

N.B.

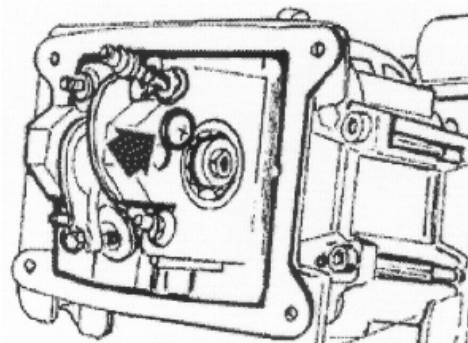
IF A BEARING SEPARATES FROM THE CAMSHAFT, IT IS ESSENTIAL TO FIT A NEW BEARING.



- Screw the limit screw for the pin and the camshaft with the washer indicated in the figure and tighten it to the prescribed torque.

Locking torques (N*m)

Rocking lever axle and camshaft bearing screw $3 \div 4$ Nm



- Finish the head tightening following the procedure below: screw the four head nuts to an initial torque at two crossed passes. Afterwards tighten the nuts with 2 turns of 90° each to be done at two crossed passes.

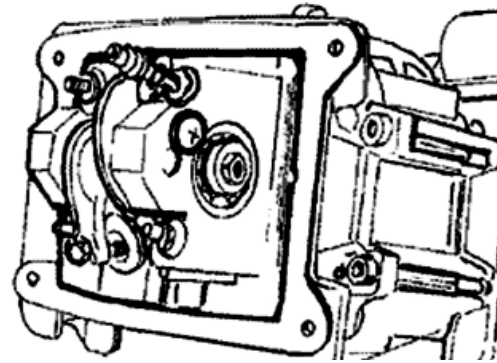
- Finish the tightening of the head to the crankcase with the 2 side screws.

N.B.

SHOULD THE CRANKCASE OR THE CYLINDER STUD BOLTS BE REPLACED, IT IS NECESSARY TO CARRY OUT AN INITIAL TIGHTENING PLUS OTHER 3 TURNS OF 90° EACH AT 3 CROSSED PASSES

Locking torques (N*m)

Head-cylinder stud bolt nuts: $6 \div 7 +135^\circ +90^\circ$ Nm
 first fitting, upon refitting tighten again at $6 \div 7 90^\circ +90^\circ$ Nm
Head cover screws $8 \div 10$ Nm



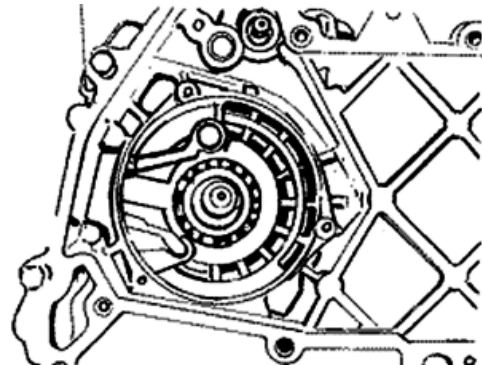
Refitting the timing chain

- Insert the timing chain pads in their corresponding seatings, the screw and the spacer as indicated in the figure.

- Tighten to the prescribed torque and check the tensioner pad moves adequately.

- Insert the timing pinion in driving shaft with the chamfered side facing the insertion (towards the main bearing).

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



Locking torques (N*m)

Chain tensioner pad screw $5 \div 7$ Nm

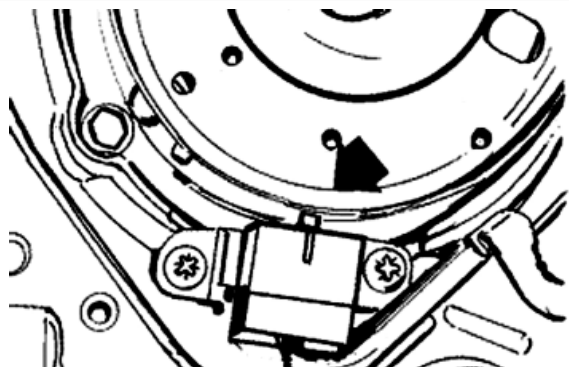
- Refit the spacer on the cam shaft.

- Rotate the engine so that the piston is at top dead centre, using the reference marks on the flywheel and the crankcase.

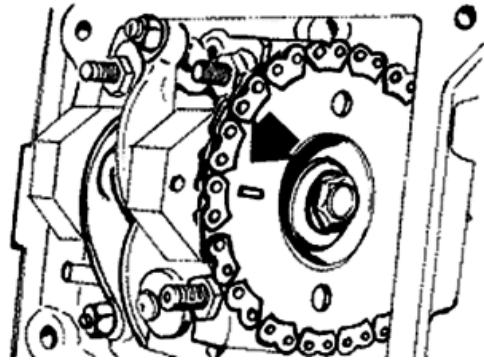
- With this operation, insert the chain on the camshaft control pulley and make the reference notch coincide with the point on the head.

- Fit the pulley onto the camshaft.

- Fit the belleville washer so that the outer rim touches the pulley.



- Bring the screw closer but without reaching its final locking point.



- Push the tensioner pad lightly so as to check the correct timing.
- Use the specific tool to lock the camshaft crown gear and tighten the screw.
- Adjust valve clearance.
- Replace the O-ring on the tappet cover.
- Fit the tappet cover and lock it with the 4 fixing screws indicated in the figure.

Specific tooling

020565Y Flywheel lock calliper spanner

Locking torques (N*m)

Camshaft pulley screw 12 ÷ 14 Head cover screw 8 ÷ 10 Nm

- 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.
- Insert the spring with the central screw and tighten it to the prescribed torque.
- Fit the spark plug.

Characteristic

Recommended spark plug

NGK CR 9EB - CHAMPION RG 4HC

Electric characteristic

Electrode gap

0.7 ÷ 0.8 mm

Locking torques (N*m)

Timing chain tensioner screw 8 ÷ 10 Nm Timing chain tensioner central screw 5 ÷ 6 Ignition spark plug 10 ÷ 15 Nm

Refitting the rocker-arms cover

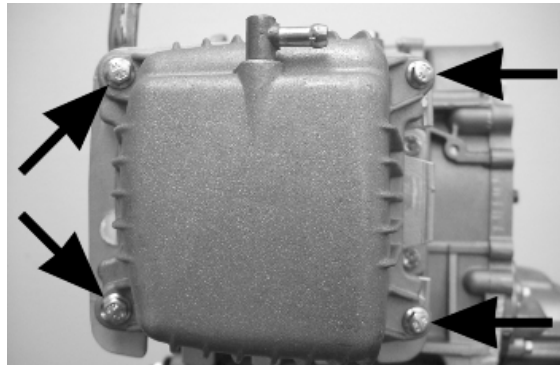
- Carry out the removal procedure but in reverse order and tighten the four fixing screws to the specified torque.

N.B.

FIT A NEW O-RING ON THE TAPPET COVER.

Locking torques (N*m)

Timing chain tensioner screws 8 ÷ 10 Nm



Refitting the intake manifold

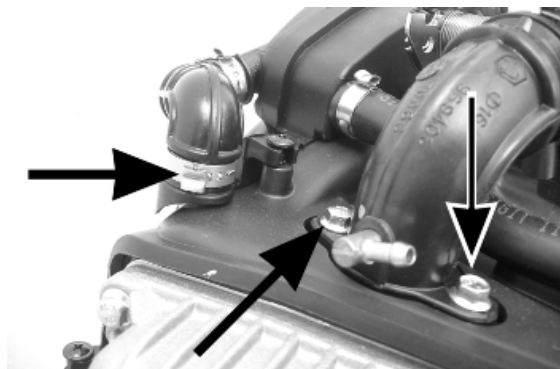
- Fit the cover sealing gaskets on the head.
- Fit the 2 covers.
- Fit the inlet manifold and do up the 2 screws to the specified torque.
- Fit the carburettor on the inlet manifold and lock the clamp.
- Fit the secondary air pipe and fix it with the appropriate clamp.

N.B.

FIT THE CARBURETTOR THROUGH THE SUPPLEMENT ON THE MANIFOLD.

Locking torques (N*m)

Inlet manifold screw 7 ÷ 9 Nm



Crankcase - crankshaft

- First remove the following units:

Driving pulley Driven pulley

Final reduction greasing

Oil pump Flywheel with stator

Cylinder-piston-head unit

Starter motor with cables.

See also

[Removal](#)

[Removing the starter motor](#)

[Removing the driving pulley](#)

[Removing the cylinder - piston assy.](#)

[Removing the driven pulley](#)

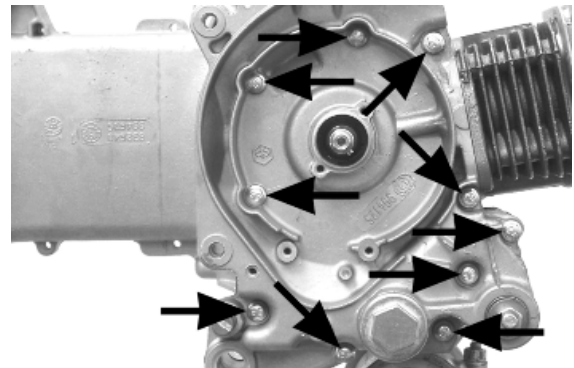
[Removing the stator](#)

Splitting the crankcase halves

- Remove the ten crankshaft coupling screws.
- Separate the crankcase halves keeping the half casing driving shaft engaged on the transmission side.
- Remove the crankshaft.

CAUTION

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



- Remove the oil guard on the flywheel side.

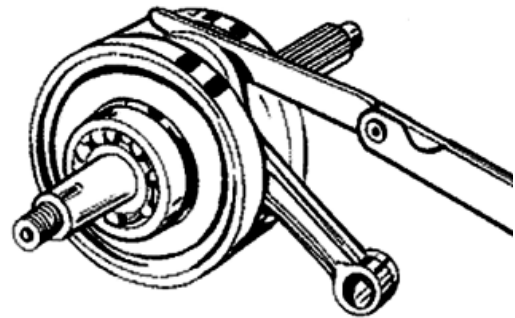
CAUTION

THE CENTRIFUGAL OIL FILTER IS IN THE FLYWHEEL AXLE SHAFT. CONSEQUENTLY, DO NOT WASH WITH SOLVENTS OR BLOW COMPRESSED AIR SO THAT NO IMPURITIES LEAK OUT. A CENTRIFUGAL OIL FILTER'S LIFE IS THE SAME AS THE ENGINE'S AND IS MAINTENANCE FREE.

- Check the axial clearance on the connecting rod.

Fitting clearance

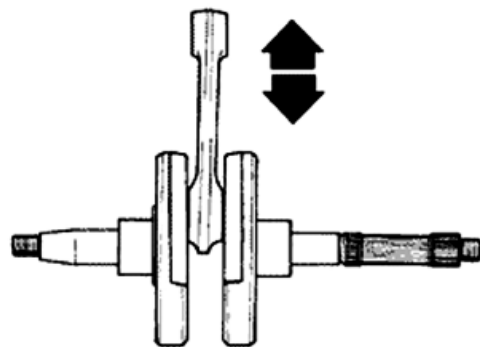
Standard connecting rod axial clearance $0.15 \div 0.30$ mm Max. connecting rod clearance 0.5 mm



- Check the correct radial clearance of the connecting rod by holding the driving shaft with your hands and, with a dial gauge fitted to the rod small end, measuring the clearance, move the connecting rod vertically as shown in the figure.

Fitting clearance

Connecting rod radial - standard clearance $0.006 \div 0.018$ mm Connecting rod max. - radial clearance 0.25 mm

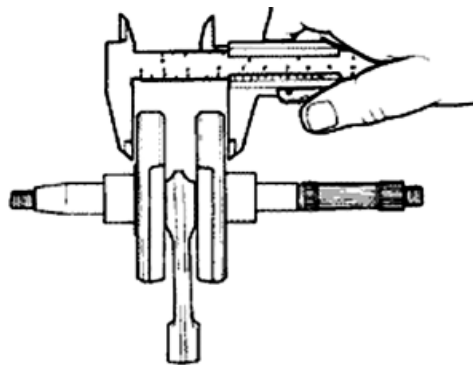


- Check that the half shaft surfaces are not scored and with the aid of a gauge check the driving shaft width as indicated in the figure.

Characteristic

Standard measure

45 mm



Removing the crankshaft bearings

- Remove the flywheel bearing fitted on the driving shaft using the specific tool.

Specific tooling

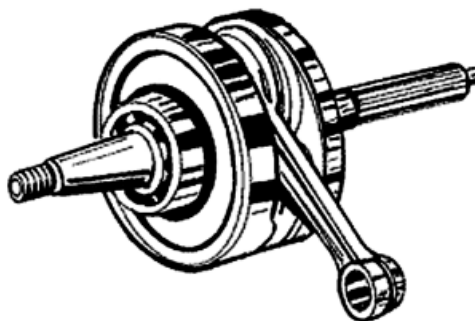
004499Y Camshaft bearing extractor

004499Y001 Bearing extractor bell

004499Y002 Bearing extractor screw

004499Y006 Bearing extractor ring

004499Y034 Bearing extractor part



Refitting the crankshaft bearings

- Heat a new main bearing in an oil bath at 120°.
 - Place the driving shaft on the support base and insert the bearing with the aid of an adequate piece of tube if necessary.

N.B.

USE A NEW BEARING WHEN REFITTING

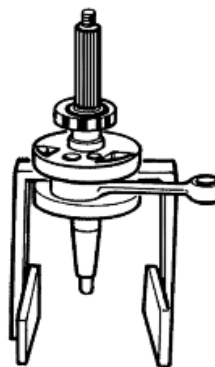
WARNING

THE CENTRIFUGAL OIL FILTER IS IN THE FLYWHEEL AXLE SHAFT. DO NOT WASH WITH SOLVENTS OR BLOW COMPRESSED AIR SO THAT NO IMPURITIES LEAK OUT.

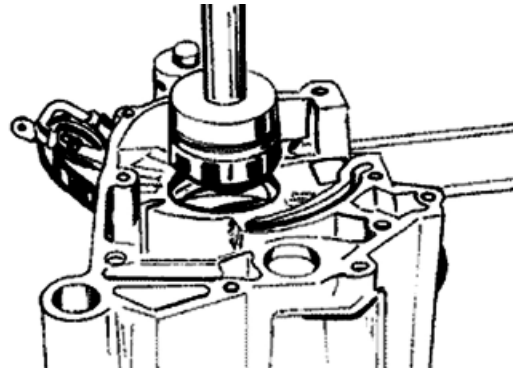
Specific tooling

020265Y Bearing fitting base

008119Y009 Tube to assemble shafts and axles



- Support the crankcase on a surface and place it with the driving shaft axle in a vertical position.
- Warm the crankcase at ~ 120° C with a thermal gun (and support).
- Fit the punch with guide and adaptor, place the bearing on the punch using grease (to keep it from falling).
- Insert the bearing in the crankcase; if needed, use a mallet but do so with extreme care so as not to damage the engine crankcase limit stop.



Specific tooling

020359Y 42x47-mm Adaptor

020364Y 25-mm guide

020376Y Adaptor handle

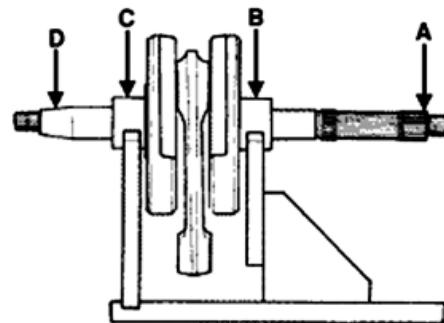
020360Y 52x55-mm Adaptor

Inspecting the crankshaft alignment

- Install the crankshaft on the support and measure the displacement at the 4 points shown in the figure.

N.B.

IF VALUES OTHER THAN THOSE ALLOWED ARE DETECTED, TRY STRAIGHTENING THE CRANKSHAFT BY INSERTING A WOODEN WEDGE BETWEEN THE HALF SHAFTS OR BY CLOSING THEM WITH A VICE AS NEEDED. IF EVEN AFTER THIS OPERATION THE VALUES ARE NOT THOSE ADMITTED, REPLACE THE CRANKSHAFT.



Characteristic

Off-line maximum admitted - A

0.15 mm

Off-line maximum admitted - B

0.02 mm

Off-line maximum admitted - C

0.02 mm

Off-line maximum admitted - D

0.10 mm

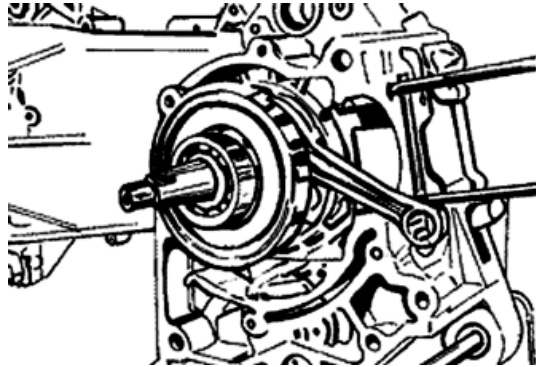
- Check that the driving shaft cone, the tab seat, the oil seal capacity, the toothed gear and the threaded tangs are in good working order.
- In case of failures, replace the crankshaft.

Specific tooling

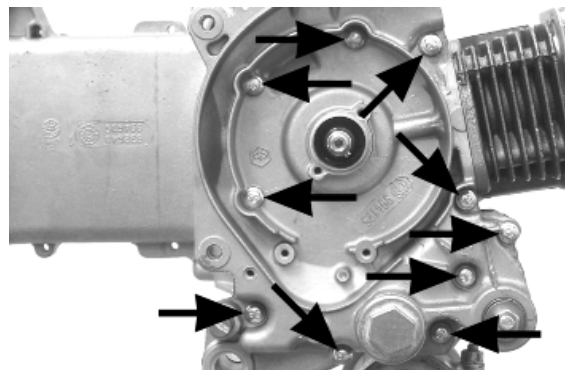
020074Y Support base for checking crankshaft alignment

Refitting the crankcase halves

- Be careful to place the two centring dowels preferably on the flywheel side half casing.
- Insert the crankshaft on the half casing on the transmission side.



- Fit the gasket recommended for surfaces on the half casing on the transmission side after greasing the two faying surfaces carefully.
- Insert the flywheel half casing.
- Fit the 10 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.

Recommended products

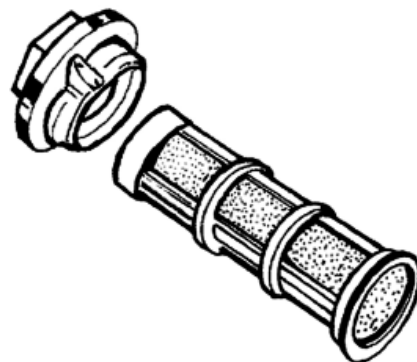
Loctite 510 Liquid sealant

Gasket

Locking torques (N*m)

Half casing joint bolts: $8 \div 10$ Nm

- Fit a new O-Ring on the mesh oil filter and on the filling cap; lubricate the rings.
- Insert the filter on the engine and lock the cap to the prescribed torque.


Locking torques (N*m)

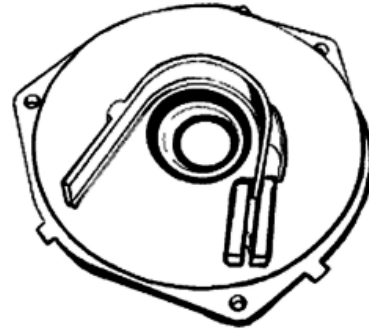
Engine oil pre-filter cover: $25 \div 28$ Nm

Lubrication

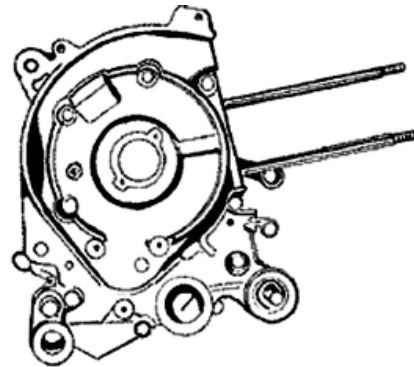
Crankshaft oil seals

Removal

- Check that the chain contrast pad is not worn.
- Otherwise, replace the pad or fit it inverted to make it work on the other side.
- Any operation on the chain cover oil seal should be carried out placing the cover on the workbench on the covering plate side of the oil pump chain.
- Remove the oil seal with a tube section of 30 mm in diameter (\varnothing 32 mm Max).



-
- Extract the flywheel oil seal from the crankcase being careful not to damage or score the crankcase.

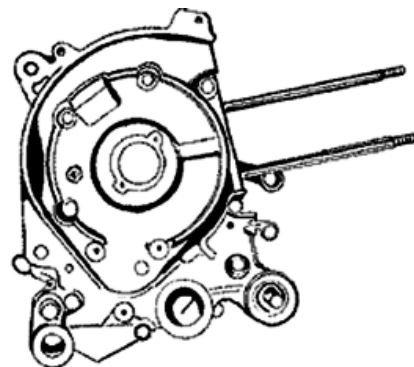


Refitting

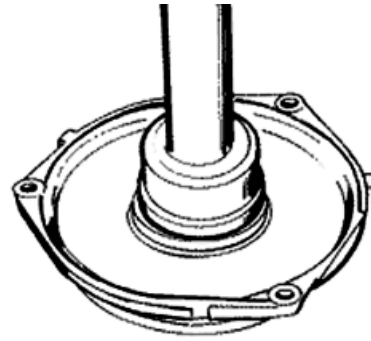
- Apply engine oil on the oil seal and it seating on the crankcase.
- From the outside and using the specific punch, place the oil seal fully down until it reaches the bottom of the seating in the crankcase.

N.B.

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



- Fit a new oil seal on the outer rim with the help of the specific tools below.
- Fit a new O-ring and lubricate it with grease.
- Install the cover on the engine crankcase, insert the three screws and place the cover in its position.
- Tighten the 3 screws to the prescribed torque.



Specific tooling

020376Y Adaptor handle

020358Y 37x40-mm Adaptor

Locking torques (N*m)

Timing chain/oil pump compartment cover screws 4 ÷ 5 Nm

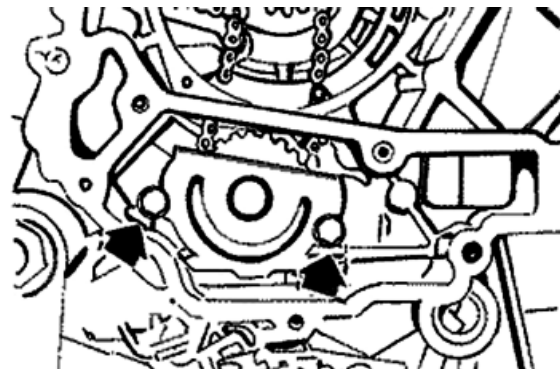
Oil pump

Removal

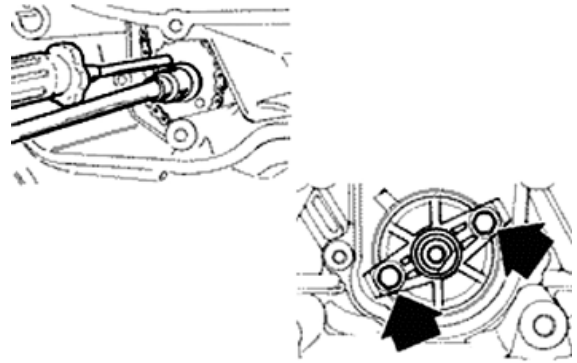
- Remove the chain compartment cover undoing the 3 fixing screws indicated in the figure.
- Take out the cover using the appropriate fusion couplings on the cover with a pair of pliers



- Undo the 2 clamping screws in the figure and remove the cover over the pump control crown gear.
- Block the rotation of the oil pump control gear with a screwdriver inserted through one of its pump holes.



- Remove the central screw and the belleville washer
- Remove the chain with the crown gear.
- Remove the crankshaft control pinion.
- Remove the oil pump by undoing the 2 screws indicated 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 a degreasing solvent and compressed air.
- Reassemble the rotors in the pump body, keeping the two reference marks visible. Replace the clip.

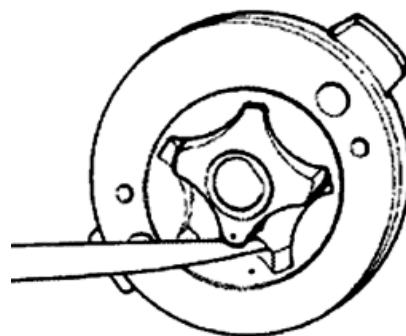


- Measure distance between rotors (inner rotor/ outer rotor) with a thickness gauge in the position shown in the picture.

Characteristic

Admissible maximum clearance 1

0.15 mm

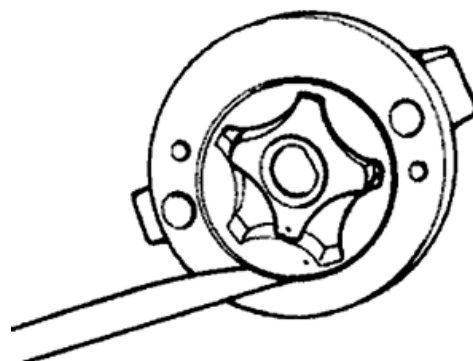


Measure the distance between the outer rotor and the pump body (see figure).

Characteristic

Admissible maximum clearance 2

0.20 mm



- Check the axial clearance of the rotors using a trued bar as reference as shown in the figure.

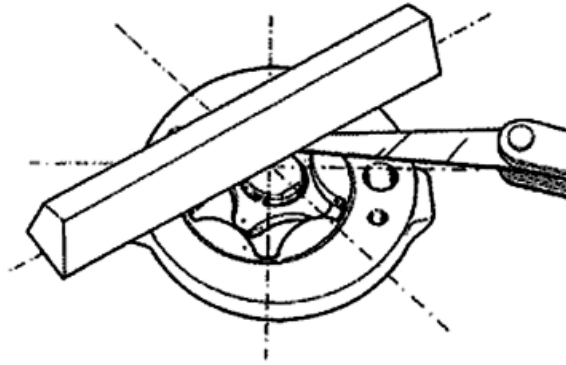
N.B.

MAKE SURE THE TRUED BAR IS POSITIONED PROPERLY ON THE TWO POINTS ON THE PUMP BODY.

Characteristic

Admissible maximum clearance 3

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 cover on the pump being careful to align the holes (2 on the cover and 2 on the pump body) fixing the oil pump on the crankcase.
- Fit the oil pump on the crankcase by tightening the two screws to the prescribed torque.
- Fit the pulley on the pump, the central screw to the specified torque and the belleville washer.
- Check that there is no seizing and/or friction during the pulley rotation.

**N.B.**

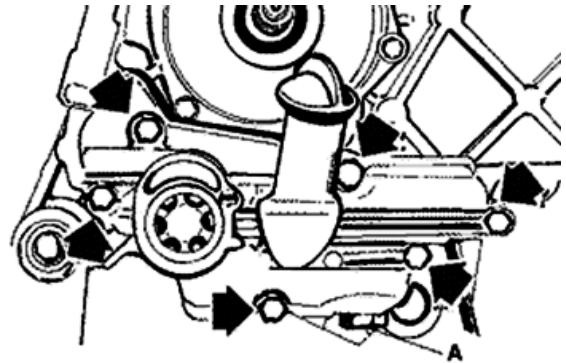
FIT THE BELLEVILLE WASHER SO THAT ITS OUTER (CURVED) RIM TOUCHES THE PULLEY.

Locking torques (N*m)

Central screw 12 ÷ 14 Nm Cover screws 0.7 ÷ 0.9 Nm Oil pump screws 5 ÷ 6

Removing the oil sump

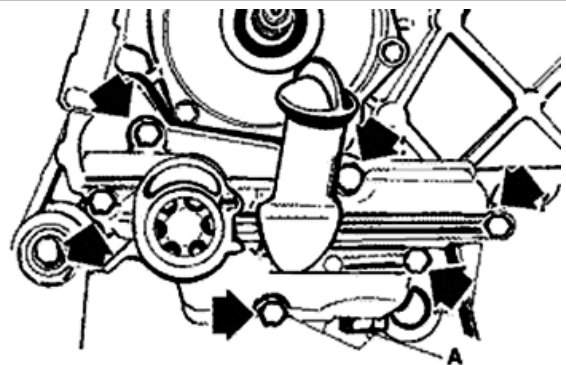
- Remove the oil filling cap, the transmission cover, the complete driving pulley assembly with belt and pinion.
- Unscrew the oil drainage plug «A» shown in the figure and drain out all the oil from the sump.
- Remove the 6 screws indicated in the figure.



Refitting the oil sump

- Clean and grease the faying surfaces.
- Apply LOCTITE 510 on the sump surface and tighten the 6 fixing screws to the specified torque.
- Refit the driving pulley assembly, the belt, the pinion and the transmission cover.

WHEN TESTING THE LUBRICATION SYSTEM, REFER TO THE "CRANKCASE AND CRANKSHAFT" CHAPTER, REGARDING LUBRICATION OF THE CRANKSHAFT AND CONNECTING ROD



Locking torques (N*m)

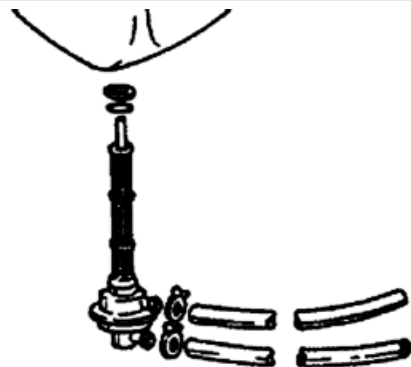
Oil sump screws 8 ÷ 10 Nm

Fuel supply

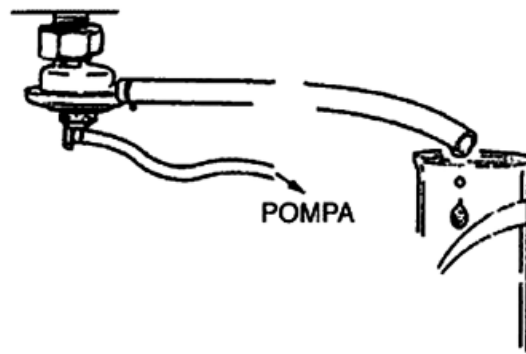
- Completely empty the fuel tank.
- Remove the petrol delivery pipe and the low-pressure pipe.
- Loosen the clip and remove the cock.
- Clean the tank and the filter of the cock with a specific solvent.
- Refit the cock making sure that there is an O-Ring.
- Turn the cock to the direction it had before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

N.B.

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



- 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 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

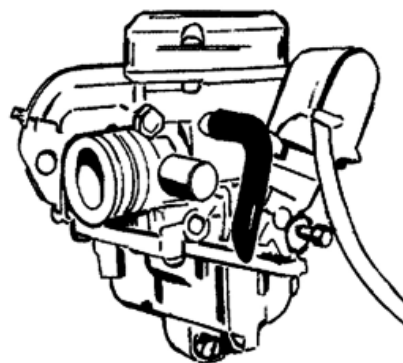
020329Y Mity-Vac vacuum-operated pump

Characteristic**Minimum flow rate**

20 cc

Removing the carburettor

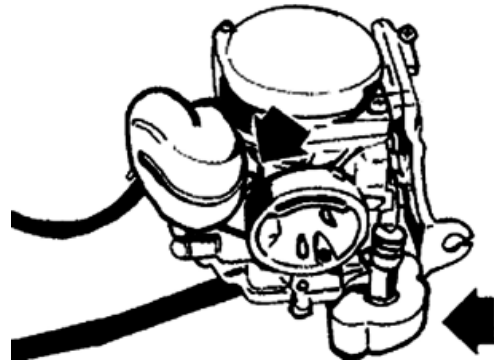
- To detach the carburettor from the engine, remove the two clamps anchoring the carburettor to the inlet manifold and the air intake coupling to the filter.
- Remove the fuel supply pipe.
- Disconnect the starter connection.
- Detach the accelerator cable with the sheath that connects the plate and the support.
- Remove the carburettor.



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

CAUTION

THE CARBURETTOR FEATURES AN ANTI-VIBRATION RUBBER BUFFER FITTED ON THE LOWER SUPPLEMENT OF THE ACCELERATING PUMP BODY. UPON REFITTING THE CARBURETTOR ON THE ENGINE, MAKE SURE THIS BUFFER IS PRESENT SO THAT THE PETROL IN THE TANK DOES NOT EMULSIFY.

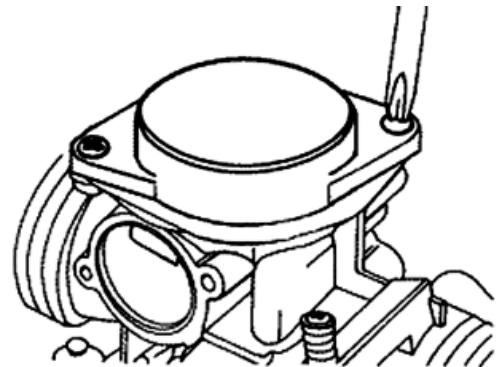


- Remove the 2 fixing screws indicated in the figure, the vacuum chamber cover and the spring.

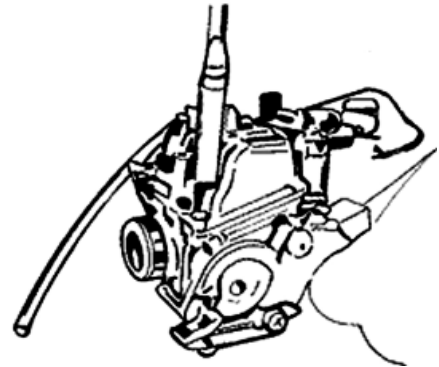
- Remove the vacuum valve together with the diaphragm; the pin, the spring and its plastic guide.

WARNING

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

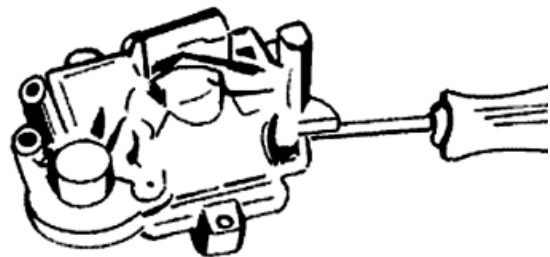


- Remove the 3 fixing screws and the chamber with the gasket.

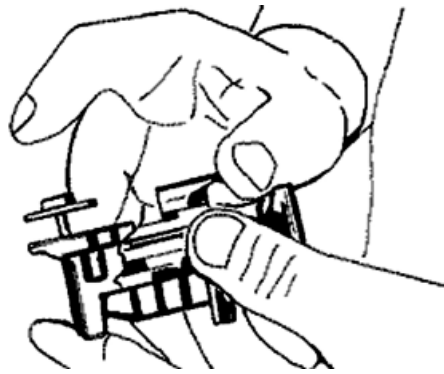


- Remove the chamber components following the procedure below.

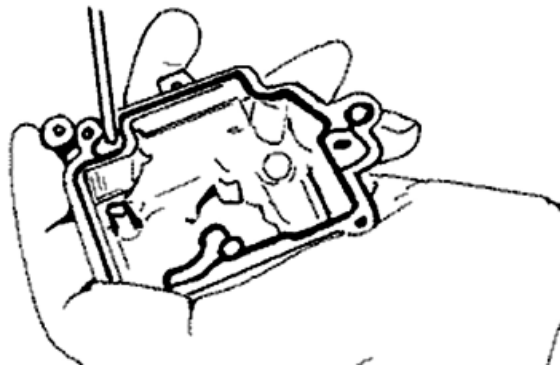
- Undo the 2 screws fixing the intake pump diaphragm cover.



-
- Remove the cover being careful with the spring below, then remove the spring, take out the rubber protection and the diaphragm together with the pipe O-Ring.



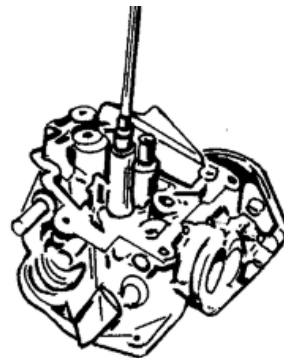
-
- Remove the accelerating pump jet together with the ball spring.

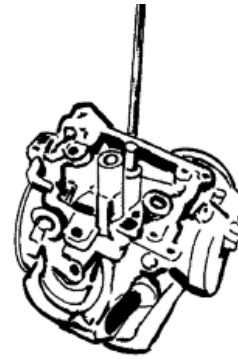


-
- Remove the screw indicated in the figure fixing the float pin.
 - Remove the float and the plunger.



-
- Remove the maximum nozzle.
 - Remove diffuser.
 - Remove the minimum nozzle.

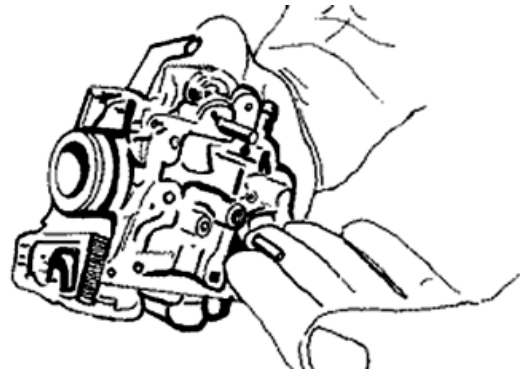




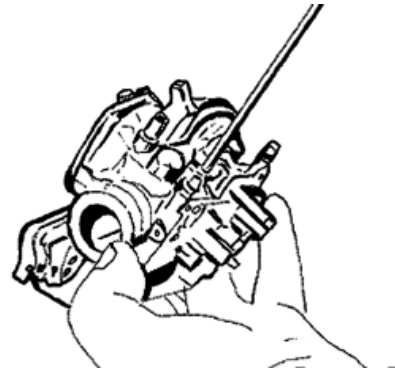
- Remove the sprayer tilting the carburettor body.

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

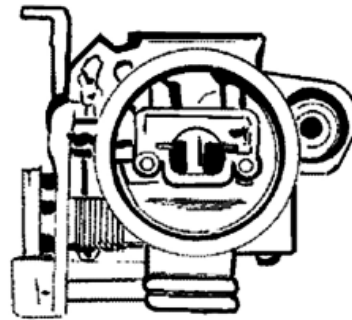


CAUTION

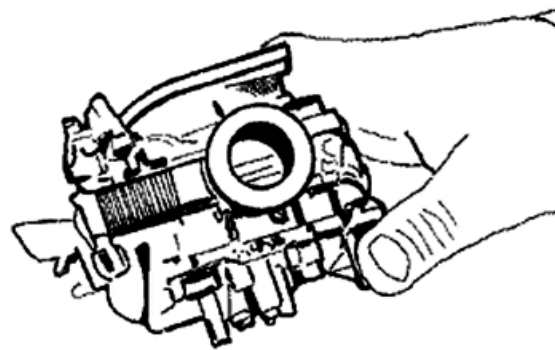
DO NOT ATTEMPT REMOVING PARTS EMBEDDED IN THE CARBURETTOR BODY SUCH AS: FUEL SUPPLY PIPE, PIN SEATING, STARTER NOZZLE, THROTTLE VALVE CONTROL VALVE SHAFT. DO NOT REMOVE THROTTLE-SHAFT CONNECTION SCREWS. THE FIXING SCREWS ARE CAULKED AFTER THE ASSEMBLY AND THEIR REMOVAL DAMAGES THE SHAFT.

Refitting the carburettor

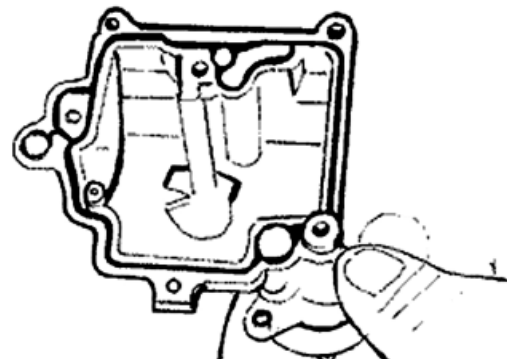
- Before refitting, wash the carburettor body accurately with a degreasing solvent and compressed air.
- Pay special attention to the fuel supply pipe and the plunger seat.



- 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.

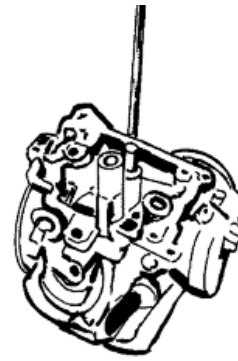


- Check that the carburettor body has the closing ball for the idle circuit pipe.
- Check that the coupling surfaces, the chamber and the diaphragm are not dented.
- Check that the depression valve housing pipe is not scratched.
- Check that the throttle valve and the shaft do not show abnormal wear.
- Check that the plunger seat does not show abnormal wear.
- Replace the carburettor in case of irregularities.

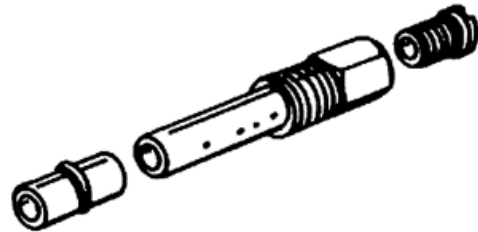
N.B.

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

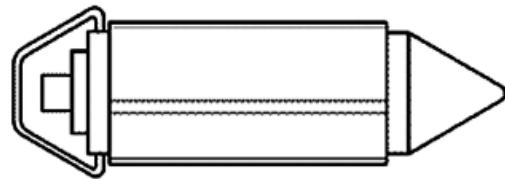
- Wash and blow the minimum nozzle properly and reassemble it.



- 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 cylindric 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.

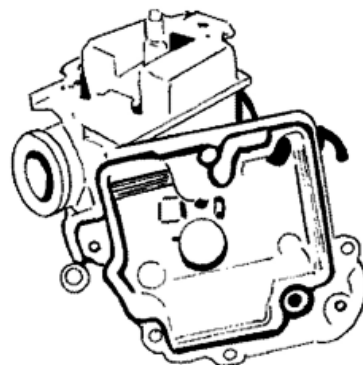
**N.B.**

INTRODUCE THE RETURN SPRING ON THE FLOAT PLATE ADEQUATELY

- Insert the ball in the corresponding accelerating pump.
- Fit the spring.
- Fit the accelerating pump nozzle.

WARNING

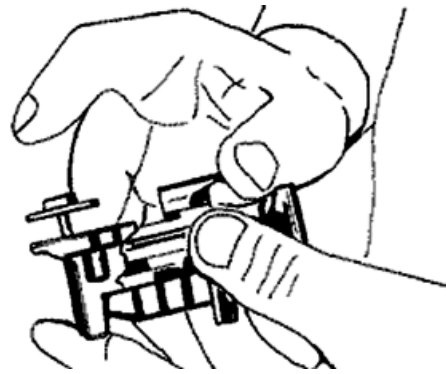
WHEN REFITTING, PAY SPECIAL ATTENTION TO THE COMPONENTS AS THEY ARE SMALL.



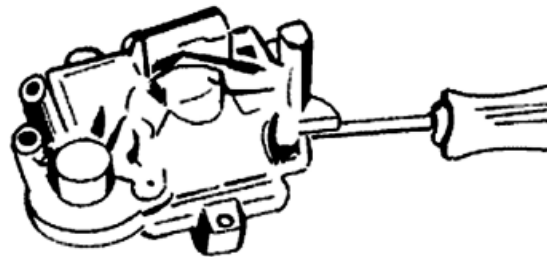
- Check the diaphragm is in good conditions and remove the remaining components of the accelerating pump following these steps:
- Insert the O-Ring in the pipe.
- Insert the diaphragm together with the pin and its spring.

N.B.

REPLACE THE DIAPHRAGM IF THERE ARE SIGNS OF UNDULATIONS, CRACKS OR HARDENING.

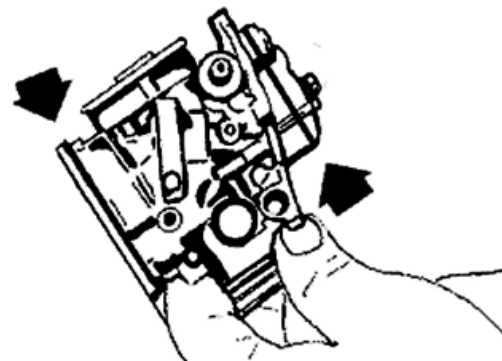


- Fit the accelerating pump diaphragm cover and tighten the 2 fixing screws making sure the spring below is correctly positioned.
- Fit the rubber bellows protecting the pin in the upper part of the accelerating pump.



Level check

- Tilt the carburettor so that the needle valve at the fuel supply is closed and the float weight does not affect it.
- Check that the diaphragm closing line and the float central line are parallel as shown in the figure.



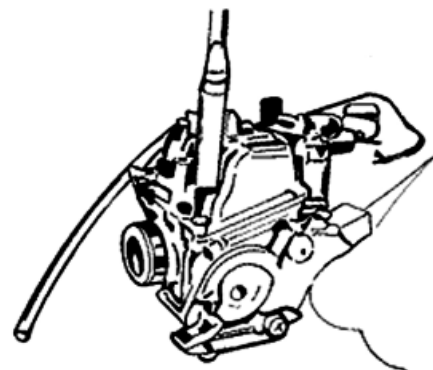
- Blow air in to the tank and then assembly it and its gasket on the carburettor body with the 3 fixing screws.

N.B.

-ALWAYS USE NEW RINGS AND GASKETS FOR REFITTING.

WARNING

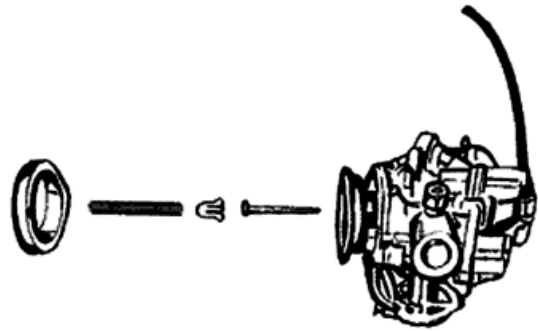
THE SCREW IN THE TANK BOTTOM IS A BLEEDING ONE AND CONSEQUENTLY IT ONLY REQUIRES CLEANING.



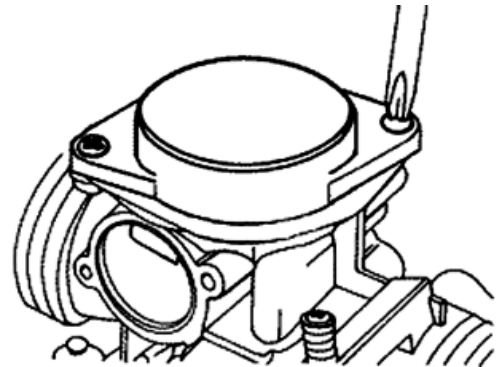
- Insert the diaphragm into the throttle valve.
- Insert the tapered pin together with the plastic support and the contrast spring into the throttle valve.

N.B.

PLACE THE SPRING PLASTIC SUPPORT WITH ITS TEETH FACING THE INNER SIDE OF THE MEMBRANE TO BE ABLE TO FIT THE LOWER END OF THE THROTTLE VALVE SPRING.

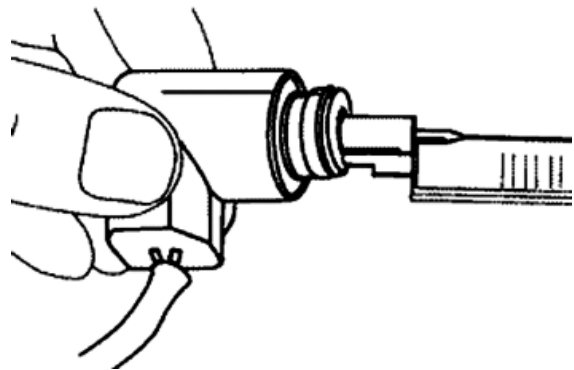


- Fit the vacuum chamber cover with the 2 fixing screws paying special attention to the spring.



Inspecting the automatic choke device

- Check that the automatic starter piston is not deformed or rusty.
- Check that the piston slides freely in its seating.
- Check that the piston sealing O-Ring is not deformed.
- The starter must be more or less functional depending on the ambient temperature.
- Measure the protrusion of the piston as shown in the figure and check its corresponding value.
- Make sure that the starter is adjusted for the ambient temperature.

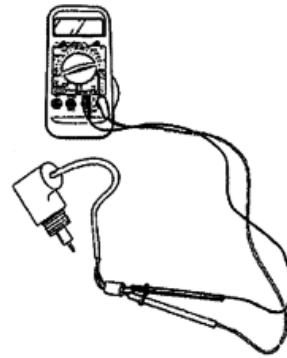
**Characteristic****Protrusion value**

11 mm

ambient temperature

24° C

- The starter should disconnect progressively by means of electrical heating.
- Check the starter resistance when adjusted to the ambient temperature.



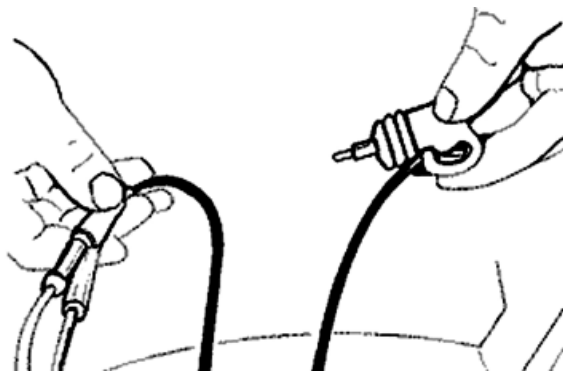
**Characteristic
ambient temperature**

24° C

**Electric characteristic
Automatic starter resistance**

$6 \Omega \pm 5 \%$

- Use battery to power the automatic starter and check that piston protrudes as much as possible.
- The correct warm up time depends on the ambient temperature.
- If protrusion, resistance or timing values are different from the ones prescribed, replace the starter.



**Characteristic
Battery**

12V-9Ah

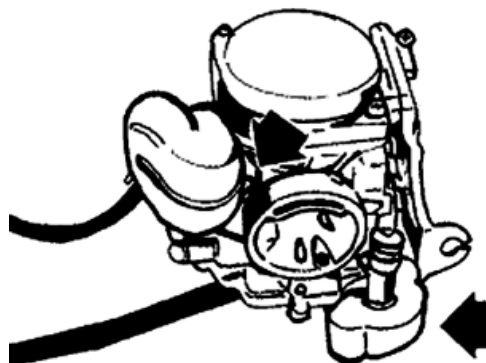
max. protrusion

15 mm

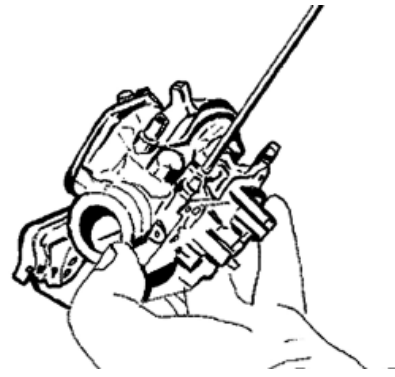
max. time

15 min

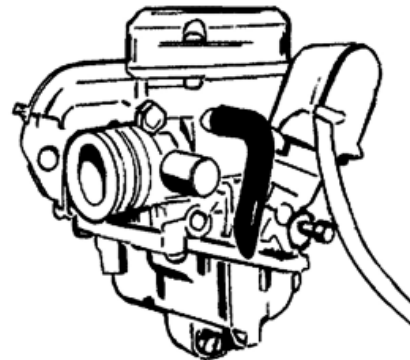
- Fit the starter, the support bracket and the protection with the screw indicated in the figure.



- Insert rubber pipes for chamber ventilation.
- Insert the O-Ring, the washer, the spring and the idle flow screw in their seatings.



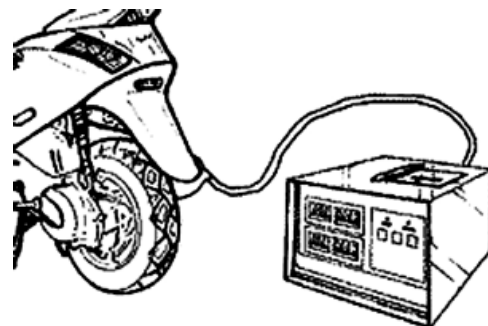
- Refit the carburettor on the engine and connect again the accelerator cable with the sheath and the support plate and the electrical connection of the starter.
- Reconnect the fuel supply pipe and tighten the 2 clamping screw fixing the carburettor to the inlet manifold and the air inlet coupling to the filter.



Adjusting the idle

- The engine does not require frequent idle speed adjustments, but it is essential to strictly follow certain rules when adjusting the idle speed.
- Before adjusting the carburettor make sure to respect requirements on lubrication, 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 10 minutes at a speed as close as possible to the maximum one.
- Connect the vehicle to the exhaust fumes analyser inserting the probe into a sealed extension pipe placed at the muffler exit end.



N.B.

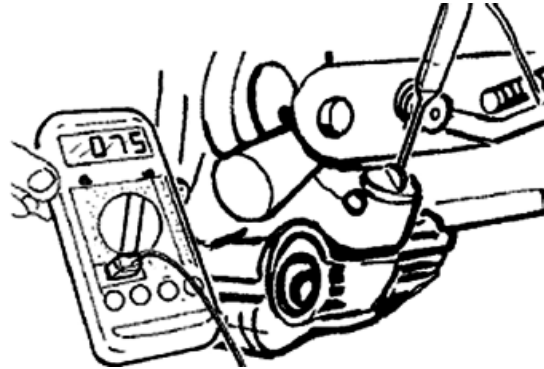
THE EXTENSION TUBE IS INDISPENSABLE SO AS NOT TO SEND POLLUTED EXHAUST FUMES TO THE AMBIENT OXYGEN. IT IS ESSENTIAL TO USE AN EXHAUST FUMES ANALYSER PREVIOUSLY HEATED AND PREPARED TO GUARANTEE THE RESET OF THE READING OF GASES AND THE CORRECT GAS CAPACITY. FAILURE TO RESPECT THESE REGULATIONS RESULTS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

Characteristic

Pipe ideal length

40 ÷ 50 cm

- Connect the tester thermometer to the sump, using a cover with oil expressly prepared for probes.
- Start the engine and before adjusting the idle speed, make sure that the oil temperature is between 70÷80 °C.



Specific tooling

020331Y Digital multimeter

- Using the rpm indicator in the analyser or a separate one, adjust the idle screw.

N.B.

THE WASTED SPARK IGNITION SYSTEM OFFERS REMARKABLE POWER. READINGS MAY NOT BE ACCURATE IF INADEQUATE RPM INDICATORS ARE USED.

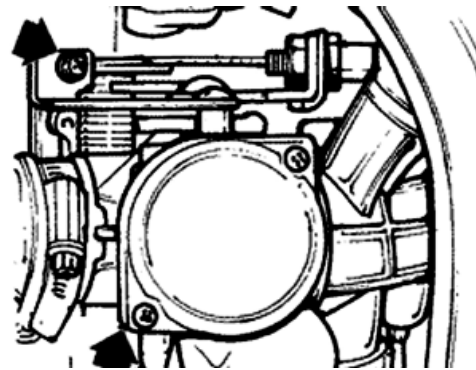
Specific tooling

020332Y Digital rpm indicator

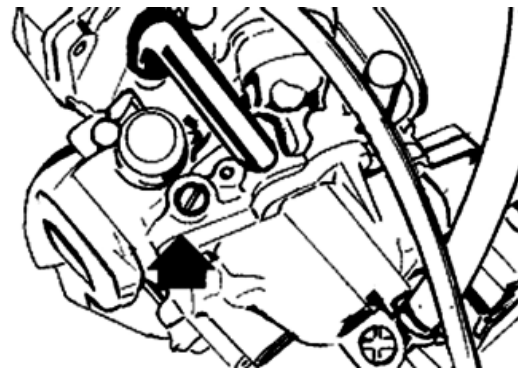
Characteristic

Idle speed

about 1900/2000 rpm



- Adjust the flow screw until a percentage of carbon monoxide (CO) is obtained. 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.



Characteristic

CO adjustment

3,2% ± 0,5

- When the oil temperature, the numbers of revs and the percentage of carbon monoxide are respected the idle carburetion is considered correct.
- Further information can be drawn from the analyser:
 - carbon dioxide percentages (CO₂), the percentage of carbon dioxide has an inverted course compared to the percentage of (CO), values over 13% 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 obtain 200 ÷ 400 PPM, these emission values are deemed normal for an engine with a diagram of timing 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 is difficult to adjust CO values, check accurately:

- That the automatic starter is efficient.
 - That the tapered pin-housing is efficient
 - Tank level adjustments
-

INDEX OF TOPICS

SSUSPENSIONS

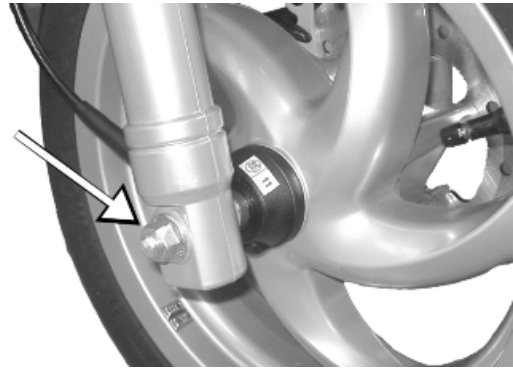
SUSP

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

Front

Removing the front wheel

- Remove the wheel axle lock nut.
- Remove the wheel axle and the wheel.
- Upon removal take care not to damage the sensor that detects movement in the odometer.



Front wheel hub overhaul

Ball bearing on wheel hub

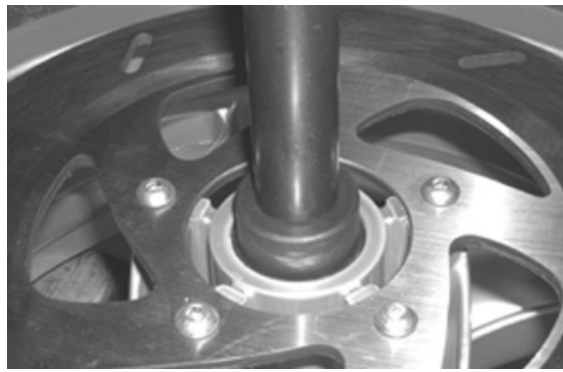
- Remove the front wheel
- Keep the wheel level by means of two wooden wedges
- With the appropriate pliers and tool remove the wheel bearing on the side the rpm indicator detects movement, as shown in the photograph



- Remove the internal spacer
- Use appropriate handle, adaptor and guide and hit with a mallet to extract the bearing and the spacer bushing on the brake disc side; insert handle on the side the rpm indicator detects movement, as shown in the photo



- Check that the bearings do not show flaws or jamming. Otherwise, replace them.
- Check that the internal spacer does not show abnormal wear. Otherwise, replace it.
- With a hot air gun heat the seat of the bearing on the brake calliper side
- With an appropriate tool remove the bearing on the brake disc side
- Insert the spacer bushing on the brake disc side



- With a hot air gun heat the seat of the bearing on the side the rpm indicator detects movement
- Insert the internal spacer with the centring ring facing to the brake disc side, as shown in the photo
- Use an appropriate tool to insert the bearing on the side the rpm indicator detects movement



Specific tooling

001467Y009 Driver for OD 42-mm bearings

001467Y014 Pliers to extract \varnothing 15-mm bearings

020357Y 32x35-mm Adaptor

020376Y Adaptor handle

020412Y 15-mm guide

020456Y \varnothing 24 mm adaptor

Refitting the front wheel

- Follow the same procedure as per removal but in reverse order, tighten to the specified torque, remember to offset the odometer movement sensor by 90° compared with its own seating on the wheel so as to avoid damages.

Locking torques (N*m)

Front wheel axle nut 45 - 50

Handlebar

Removal

Handlebar removal

Remove the handlebar cover before carrying out this operation,.

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



N.B.

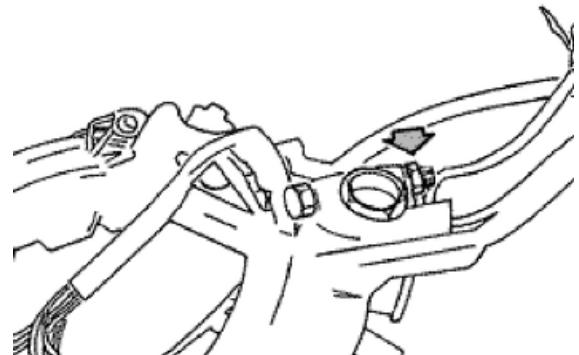
IF THE HANDLEBAR IS BEING REMOVED TO REMOVE THE STEERING, TILT THE HANDLEBAR FORWARD TO AVOIDING DAMAGING THE TRANSMISSIONS.

Refitting

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

Locking torques (N*m)

Handlebar fixing screw 50 ÷ 55

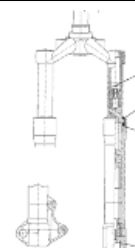


Front fork

Overhaul

Sealing ring replacement and stem removal

- 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

Refitting

When fitting the fork, lubricate with the steering bearing tracks with the recommended grease. Tighten the lower ring nut "A" and the upper ring nut "B" to the specified torque

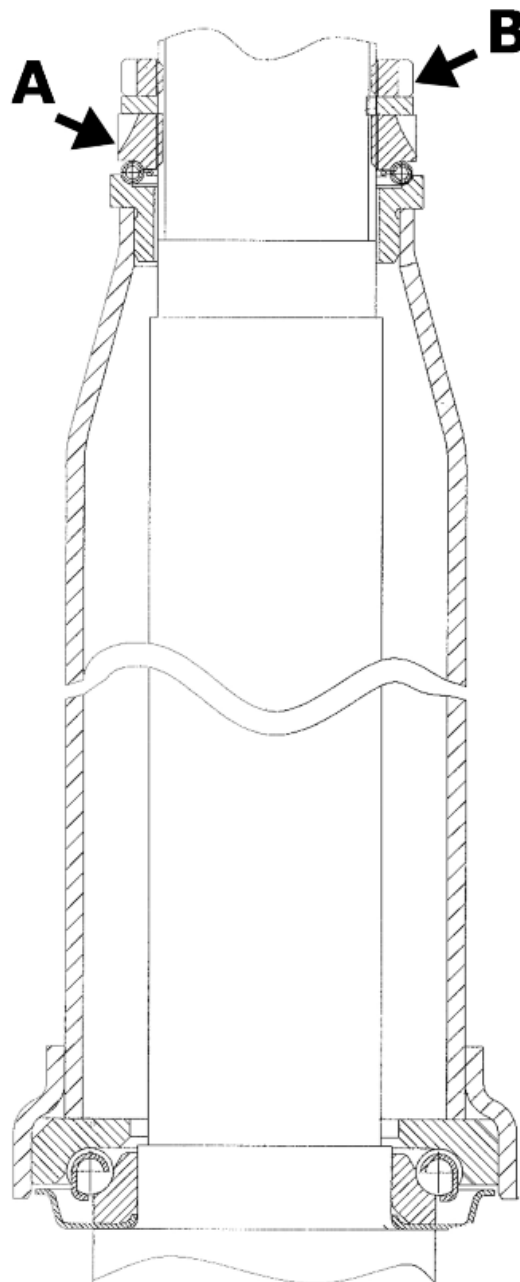
Recommended products

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

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

Locking torques (N*m)

Steering lower ring nut 8 \div 10 Upper steering ring nut 35 \div 40

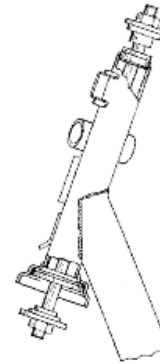


Steering column

Refitting

Lower and upper seating on the chassis

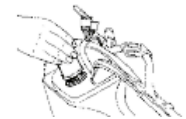
Lower and upper seating on the chassis



Removal

Washer and upper seating of upper bearing

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 seating from the chassis

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			

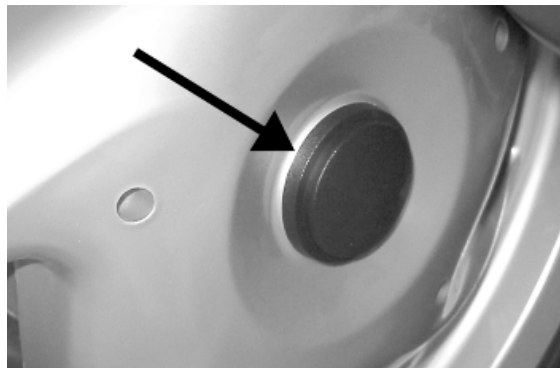
Rear

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

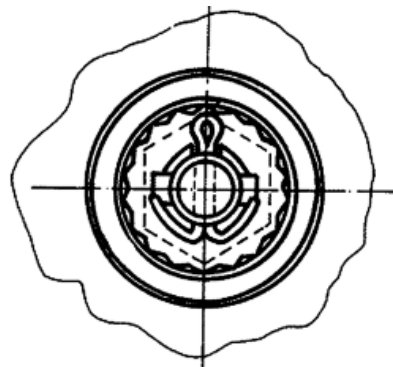
- Refit the parts in the reverse order as for removal, lock the wheel nut to the specified torque.

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

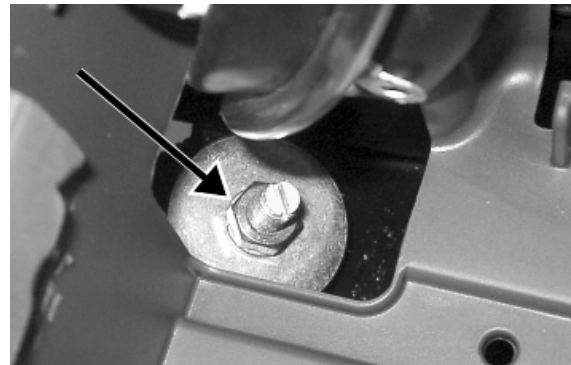
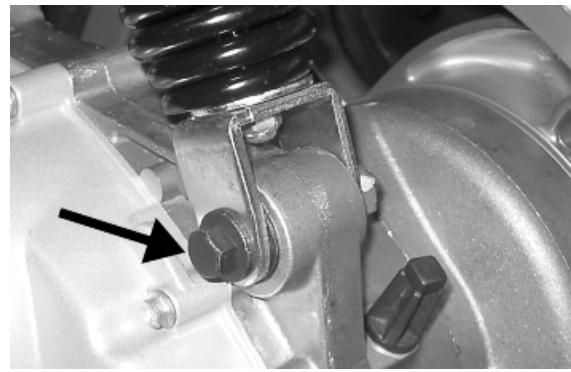


Shock absorbers

Removal

Shock absorber

- 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.



Refitting

- 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

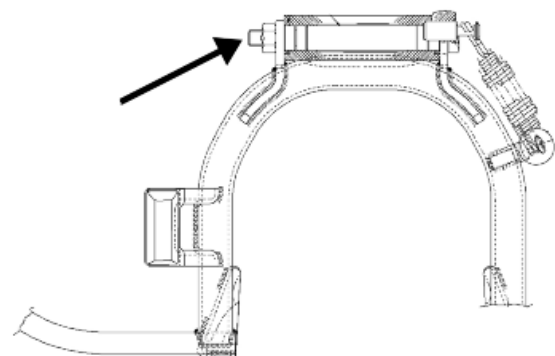
Centre-stand

Replace complete stand

- Undo the screw marked in the figure.
- When refitting, secure to the prescribed torque.

Locking torques (N*m)

Centre stand screw 32 ÷ 40



INDEX OF TOPICS

BRAKING SYSTEM

BRAK SYS

Front brake calliper

Removal

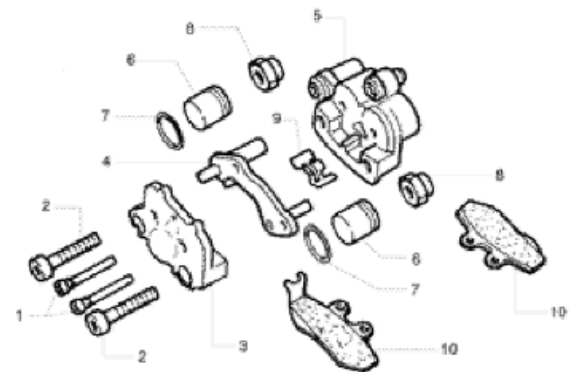
- Inspect the condition of the hoses, packing and joint. In the event of fluid leaks from the calliper, this must be replaced.
- Detach the oil brake pipe from the calliper; pour the fluid inside a container.
- Remove the clamps shown in the figure.



Overhaul

Proceed as follows:

- 1) remove the two male hexagonal screws (1) and take out the two pads (10);
- 2) remove the two male hexagonal screws (2) and remove the reaction plate (3);
- 3) take out the fixed plate (4) from the guide;
- 4) remove the internal elements from the floating body (5) with the help of short blows of compressed air through the brake fluid pipe in order to facilitate the expulsion of pistons (6).



5) Check:

- that the plates and the body are whole and in good condition;
- that the cylinder and the floating body of the calliper do not show signs of scratches or erosion, otherwise replace the entire calliper;
- that the guides of the fixed plate are not scratched or eroded, otherwise replace the entire plate;
- that the brake pad check spring works properly.

Reassembly

- 1) insert the pistons (6) and the sealing rings (7) in the body;

- 2) place the guide rubbers (8) and refit the fixed plate (4);
- 3) assemble the reaction plate (3) tightening the screws (2), insert the brake pad check spring (9) and then the pads, fixing them with the corresponding screws (1);
- 5) place the calliper on the disc and lock it to the strut by tightening the fixing screws;
- 6) fix the pipe joint on the calliper at the prescribed torque.

Functioning

This is a floating type calliper.

It takes advantage of the action and reaction principle to obtain the thrust for both pads.

The body and the reaction plate body work integrally and can move axially with respect of the fixed plate that is integral to the strut.

The pistons, forced by pressure to push the pad to the disk, cause the reaction plate to push in turn the other pad towards the disc.

The brake pad lock spring

1. Pad fixing screws
2. Reaction plate fixing screws
3. Reaction plate
4. Fixed plate
5. Floating body
6. Piston
7. Piston sealing rings
8. Guide protection rubbers
9. Brake pad check spring
10. Pads

CAUTION

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

Locking torques (N*m)

**Calliper tightening screw 24 ÷ 27 Brake fluid
pipe-calliper fitting 19 ÷ 24**

Refitting



- When refitting, tighten the nuts to the prescribed torque.
- Bleed the system.

N.B.

WHILE REFITTING, REPLACE THE COPPER GASKETS ON THEIR FITTINGS.

Locking torques (N*m)

Oil bleed screw 7 ÷ 10 Calliper tightening screw 24 ÷ 27 Brake fluid pipe-calliper fitting 19 ÷ 24

See also

[Front](#)

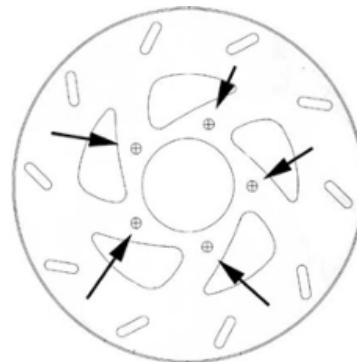
Front brake disc

Removal

- Remove the front wheel undoing the axle clamping.
- Undo the five disc clamps.

Locking torques (N*m)

Disc tightening screw 8 ÷ 10



Refitting

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

Locking torques (N*m)

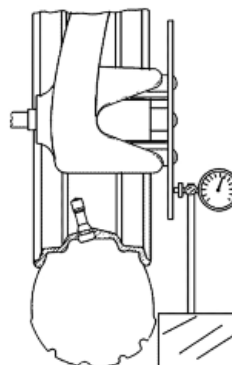
Disc tightening screw 8 - 12

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

Proceed as follows:

- Remove the front calliper.
- Loosen the two pins shown in the figure that lock the two pads.
- Remove the pads, being careful with the pad spring clamp.
- Check the thickness of the pads.



Characteristic

Minimum value

1.5 mm

See also

[Front](#)
brake calliper

Refitting

To fit, proceed as follows:

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

N.B.

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

Recommended products

Loctite 243 Medium strength threadlock

Medium Loctite 243 threadlock

Locking torques (N*m)

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

Fill

Front

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

-Undo the bleed screw.

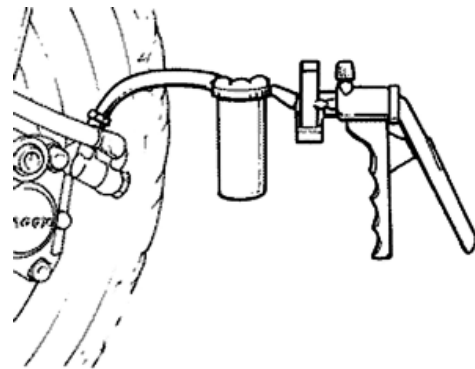
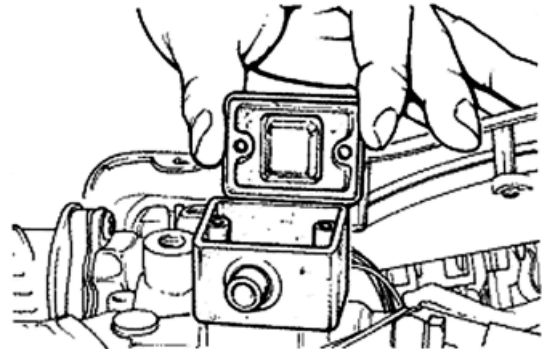
-Apply the tube of the special tool to the bleed screws.

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 Mity-Vac vacuum-operated pump

Recommended products

AGIP BRAKE 4 Brake fluid

FMVSS DOT 4 Synthetic fluid

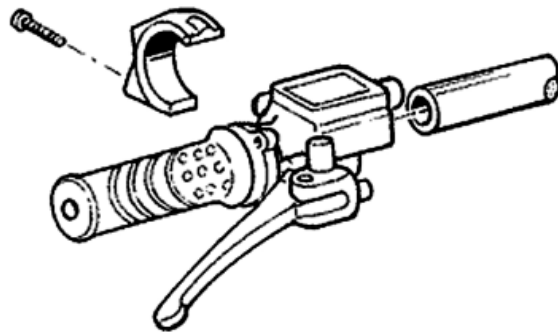
Locking torques (N*m)

Oil bleed screw 7 ± 10

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.



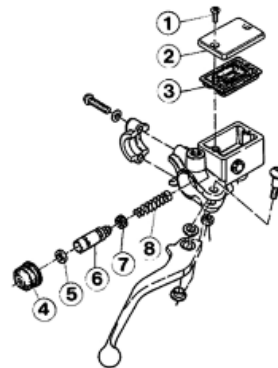
Locking torques (N*m)

Brake fluid pump - hose fitting 16 ± 20 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

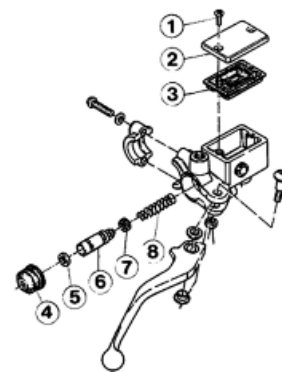
- THE PRESENCE OF BRAKE FLUID ON THE DISC OR BRAKE PADS REDUCES THE BRAKING EFFICIENCY. IN THIS CASE, REPLACE THE PADS AND CLEAN THE DISC WITH A HIGH-QUALITY SOLVENT. CONTACT WITH BRAKE FLUID WILL DAMAGE PAINTED SURFACES.
RUBBER PARTS SHOULD NEVER BE LEFT IN ALCOHOL FOR LONGER THAN 20 SECONDS.
AFTER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

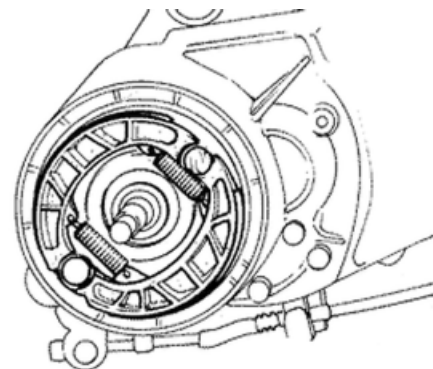
- 1 - Tank cap screw.
2. Tank cover.
3. Diaphragm.
4. Bellows.
5. Sealing ring.
6. Piston.
7. Gasket.
8. Spring.



Rear drum brake

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

INDEX OF TOPICS

CHASSIS

CHAS

Removing the ignition key-switch when on *off*

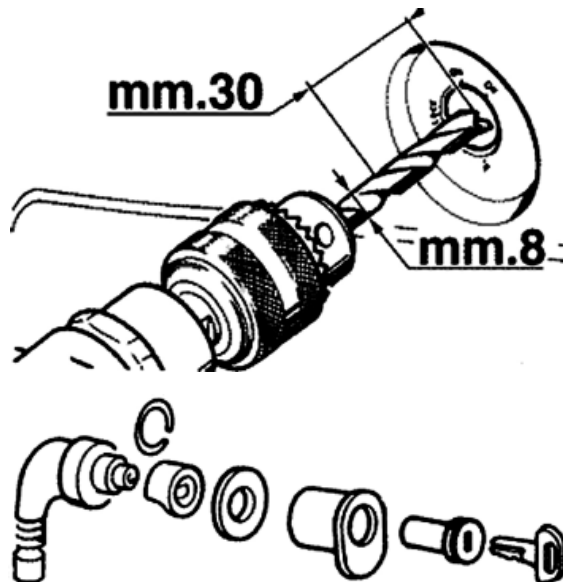
- Remove the shield back plate
- Push the lock body until the stop spring does not show grooves.
- Keep the lock body blocked with a screwdriver and remove the spring with a pair of pliers.
- Take out the lock block.



Removing the ignition key-switch when on *lock*

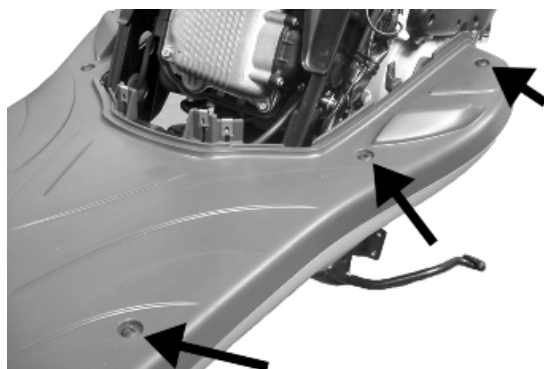
Remove the shield.

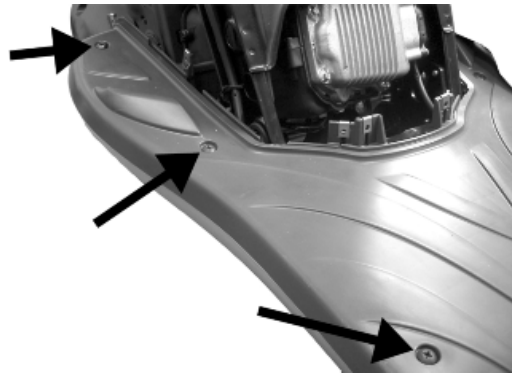
- Remove the switch of the key switch.
- Make a hole on the block using a drill as shown in the figure.
- Insert the wheel cylinder with the key and with the anchoring tab facing down halfway on the lock body taking care that the insertion phase of the key is oriented matching "ON" (the only position 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.



Footrest

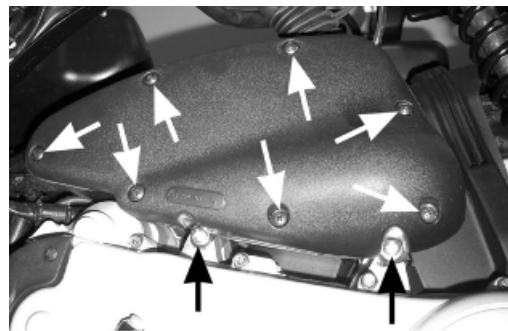
- Remove the side fairings
- Remove the shield back plate
- Remove the 6 screws shown in the photograph



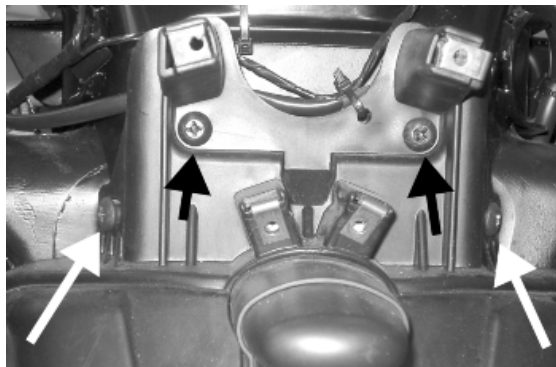


Air filter

- 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.



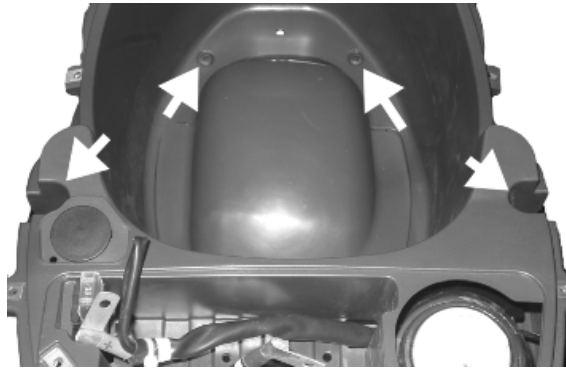
Rear mudguard



- Remove the side fairings
- Remove the 4 screws shown in the photograph

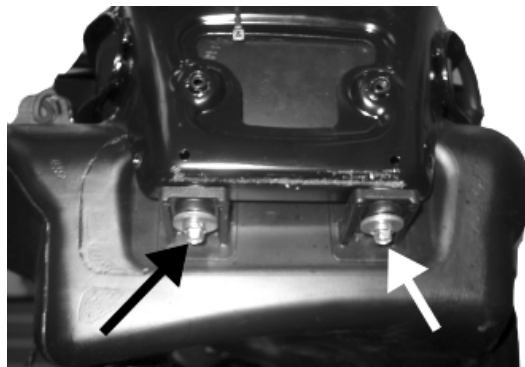
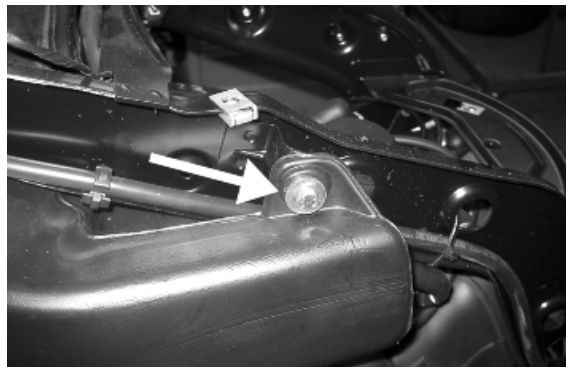
Helmet bay

- Remove the side fairings
- Remove the helmet compartment by undoing the 4 screws indicated in the figure



Fuel tank

- Remove the side fairings
- Remove the rear mudguard
- Remove the crews shown in the photograph
- Remove the shock absorber upper clamping in order to create the necessary space to take out the tank.



INDEX OF TOPICS

PRE-DELIVERY

PRE DE

Aesthetic inspection

Appearance check:

- Paintwork
 - Fitting of plastics
 - 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 lights, low-beam lights, tail and parking lights and their warning lights
 - Adjusting the headlights according to the regulations currently in force
 - Rear light, parking light, stop light
 - Front and rear stop light switches
 - Turn indicators and their warning lights
 - Instrument panel lights
 - Instrument panel: fuel gauge
 - Instrument panel warning lights
 - Horn
 - 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 YOUR EYES, SKIN AND CLOTHING. IN CASE OF CONTACT WITH YOUR EYES OR SKIN, RINSE WITH ABUNDANT WATER FOR ABOUT 15 MINUTES AND SEEK IMMEDIATE MEDICAL ATTENTION.

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

BATTERIES PRODUCE EXPLOSIVE GASES; KEEP THEM AWAY FROM NAKED FLAMES, SPARKS AND CIGARETTES. IF THE BATTERY IS CHARGED IN A CLOSED PLACE, TAKE CARE TO ENSURE ADEQUATE VENTILATION. ALWAYS PROTECT YOUR EYES WHEN WORKING CLOSE TO BATTERIES.

KEEP OUT OF THE REACH OF CHILDREN

CAUTION

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

Levels check

Level check:

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

Road test**Test ride**

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

Static test

Static control after the test ride:

- 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

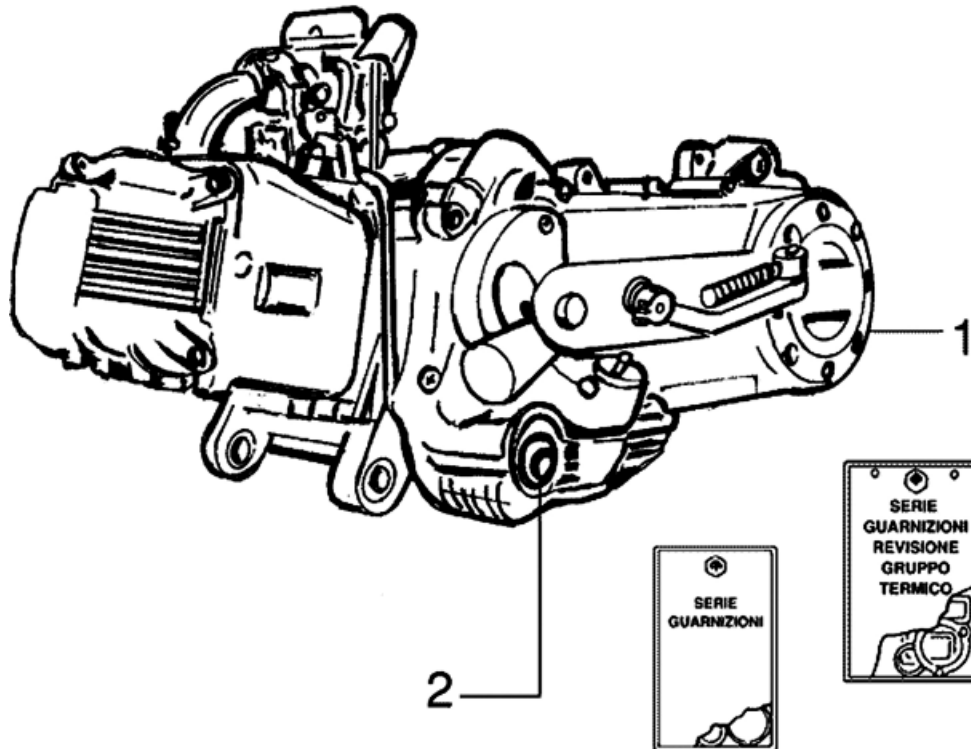
TIME

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

The description and code for each operation is indicated.



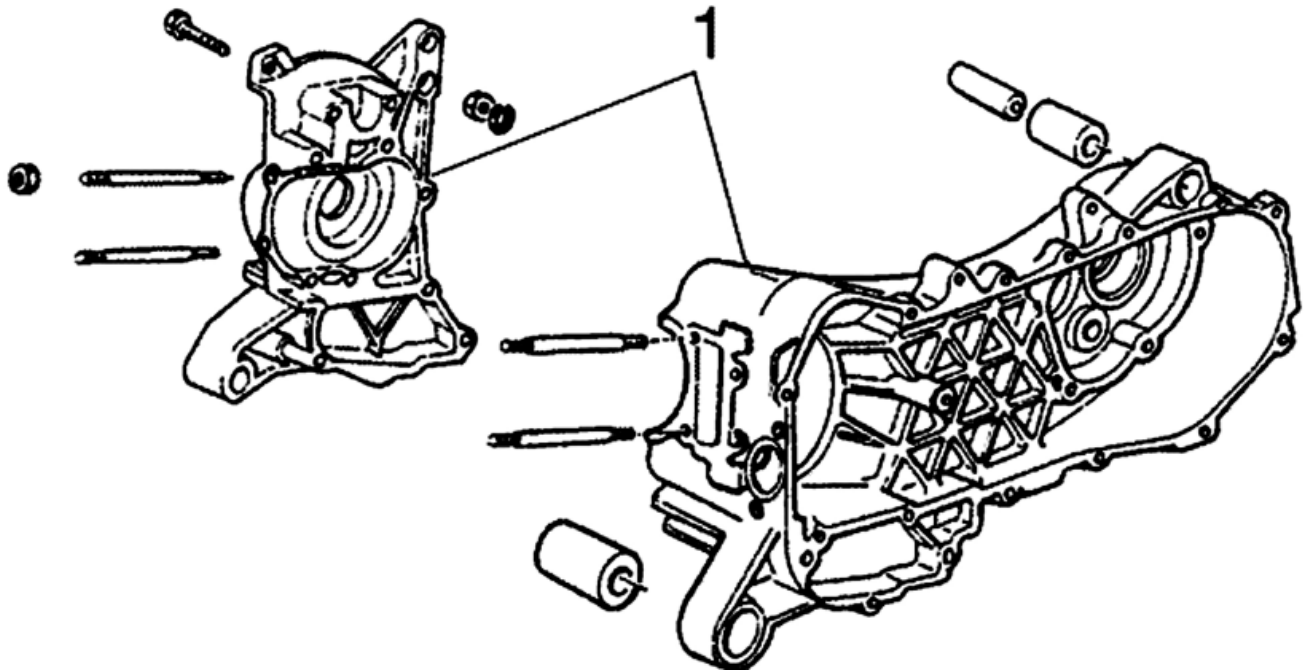
Engine



ENGINE

	Code	Action	Duration
1	001001	Engine from frame - Removal and re-fit.	
2	003064	Engine oil - Change	

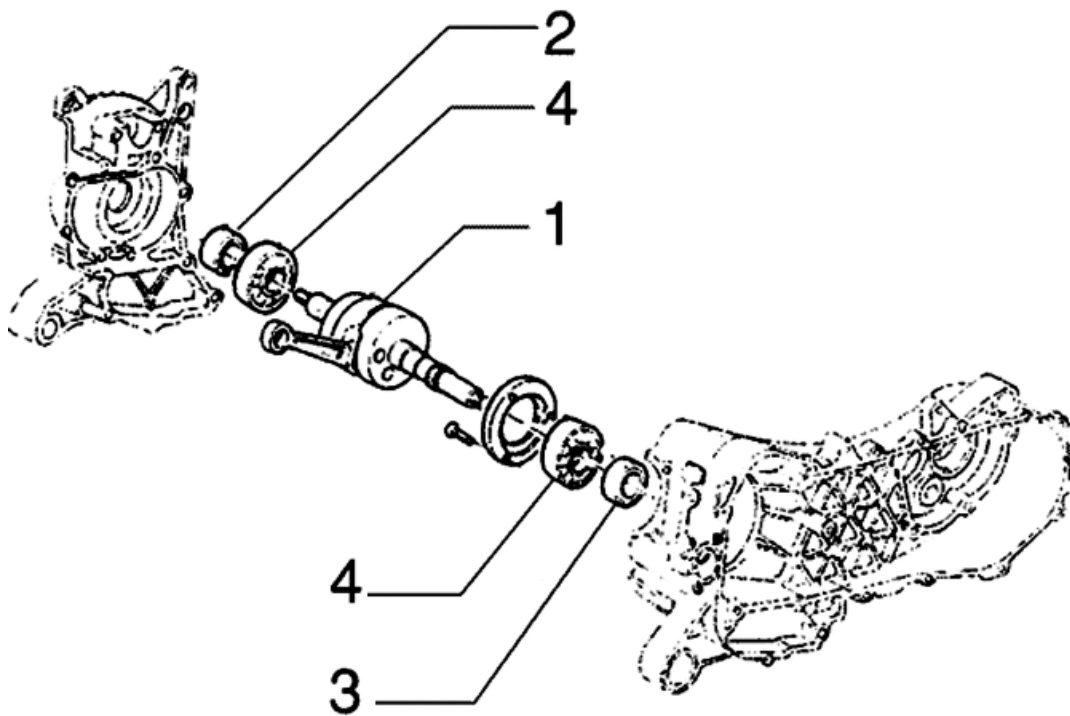
Crankcase



CRANKCASE

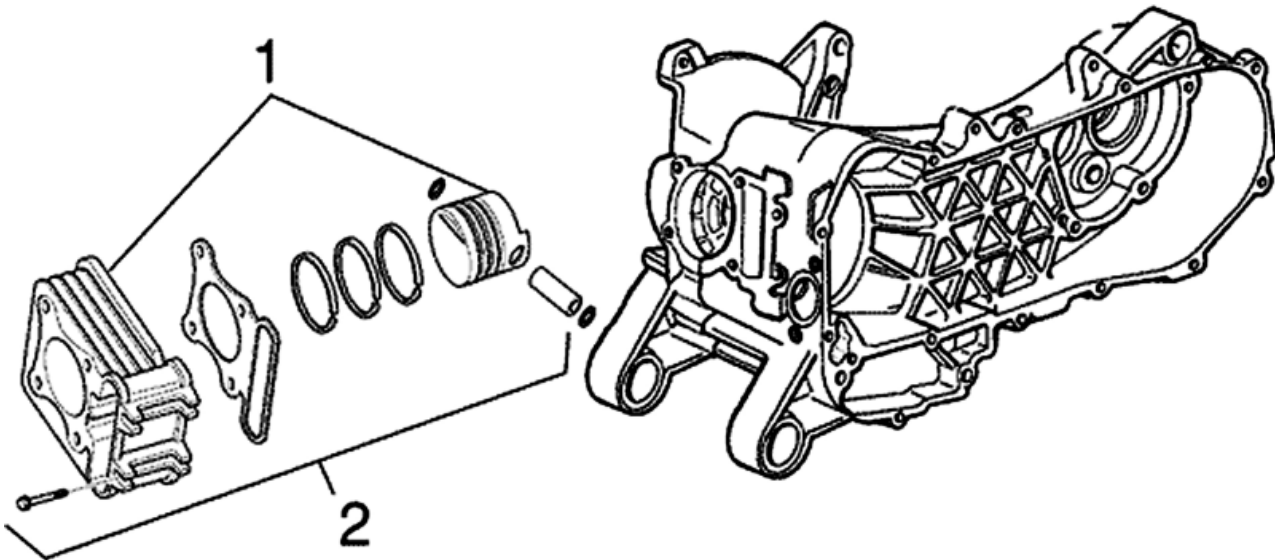
	Code	Action	Duration
1	001133	Engine crankcase - Replacement	

Crankshaft



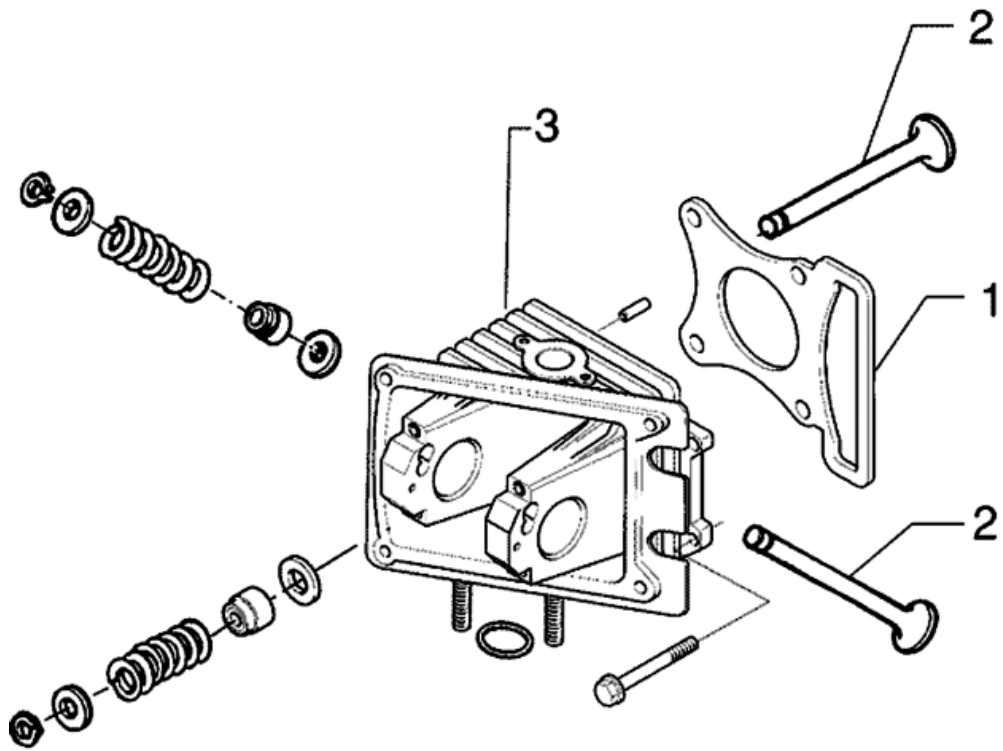
CRANKSHAFT

	Code	Action	Duration
1	001117	Crankshaft - Replacement	
2	001099	Oil seal, flywheel side - Replacement	
3	001100	Oil seal, clutch side - Replacement	
4	001118	Main bearings - Replacement	

Cylinder assy.**CYLINDER- PISTON**

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

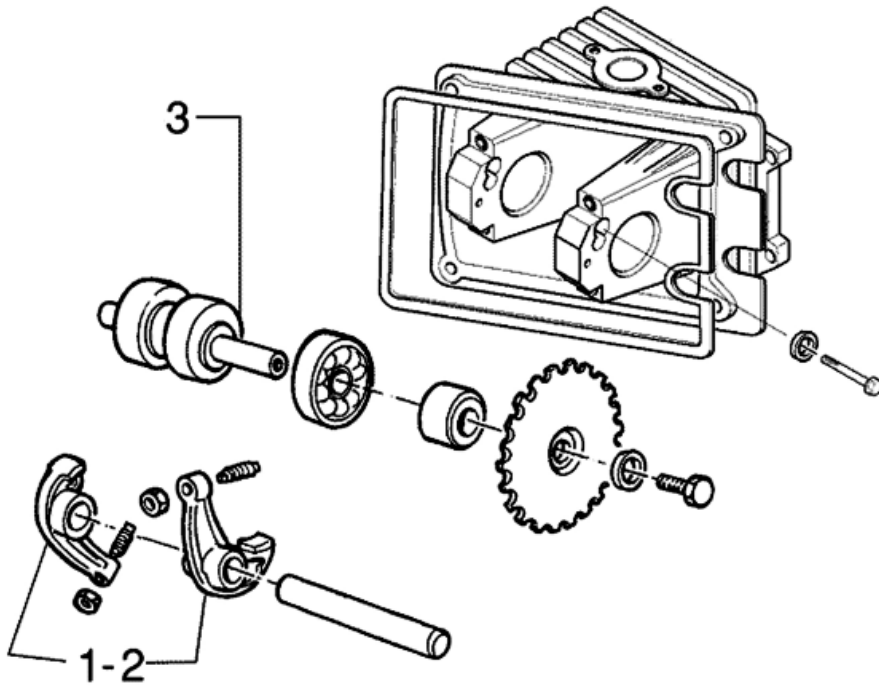
Cylinder head assy.



HEAD

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

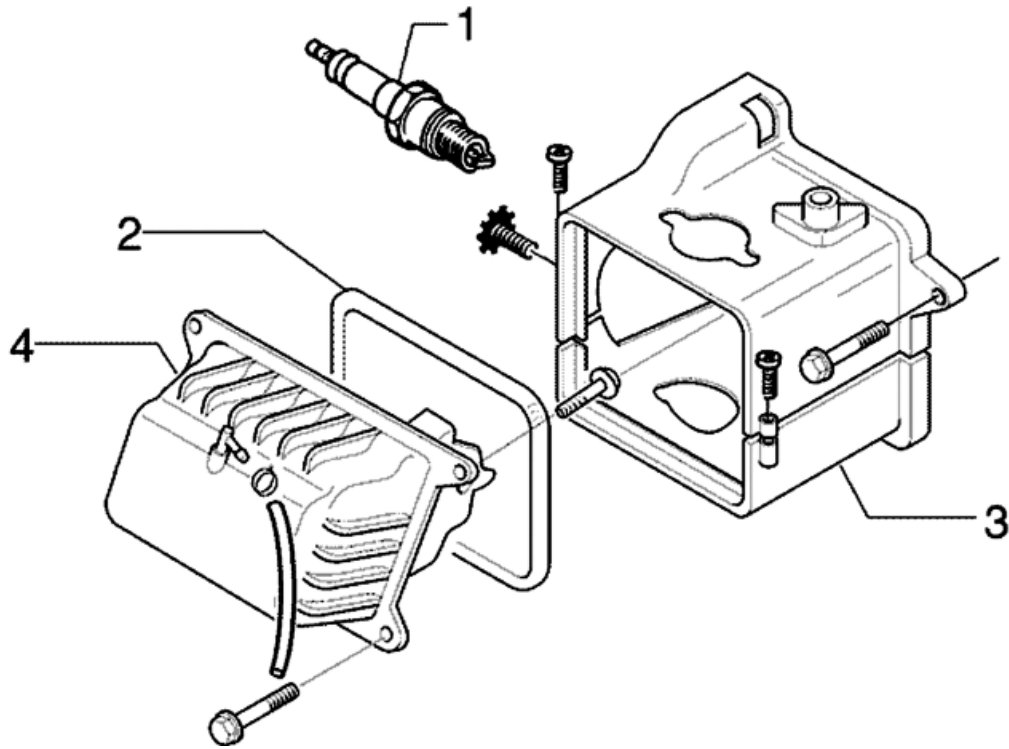
Rocker arms support assy.



CAMSHAFT SUPPORT

	Code	Action	Duration
1	001049	Valve clearance - Adjustment	
2	001148	Valve rocking levers - Replacement	
3	001044	Camshaft - Replacement	

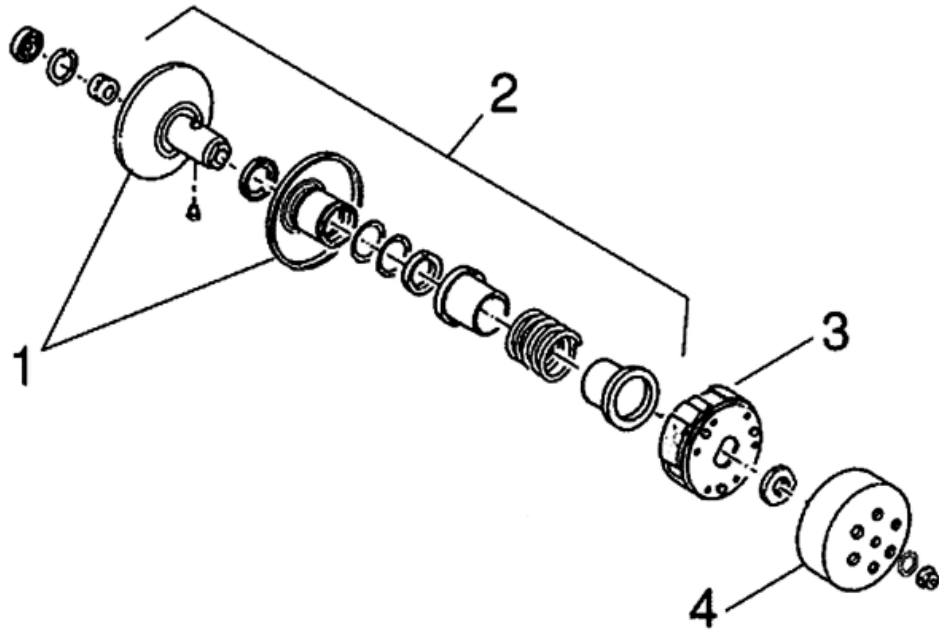
Cylinder head cover



HEAD COVER

	Code	Action	Duration
1	001093	Spark plug - Replacement	
2	001088	Head cover gasket - Replacement	
3	001097	Cooling hood - Replacement	
4	001089	Head cover - Replacement	

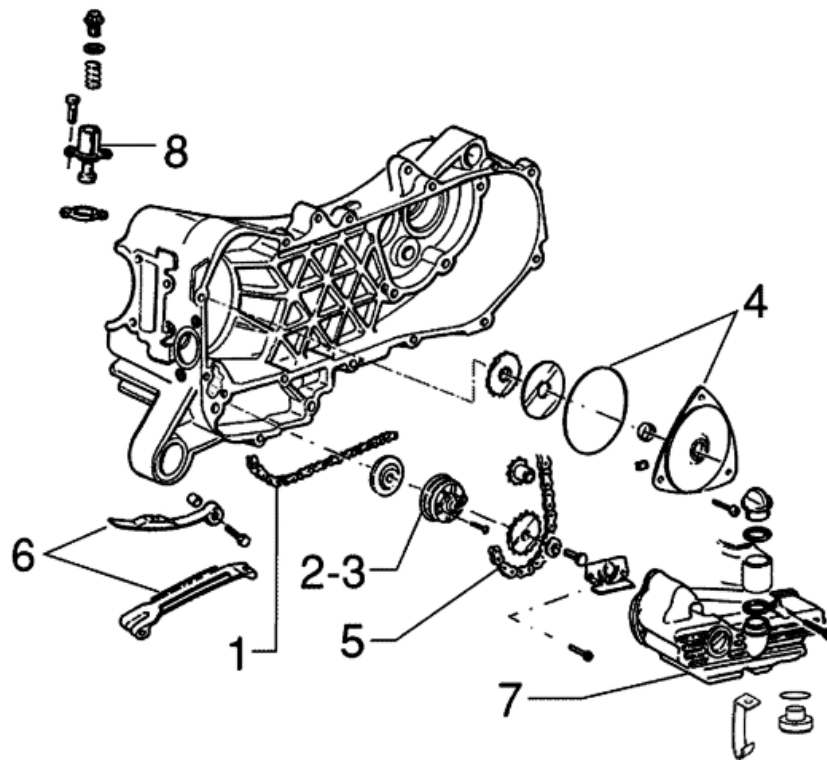
Driven pulley



DRIVEN PULLEY - CLUTCH

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

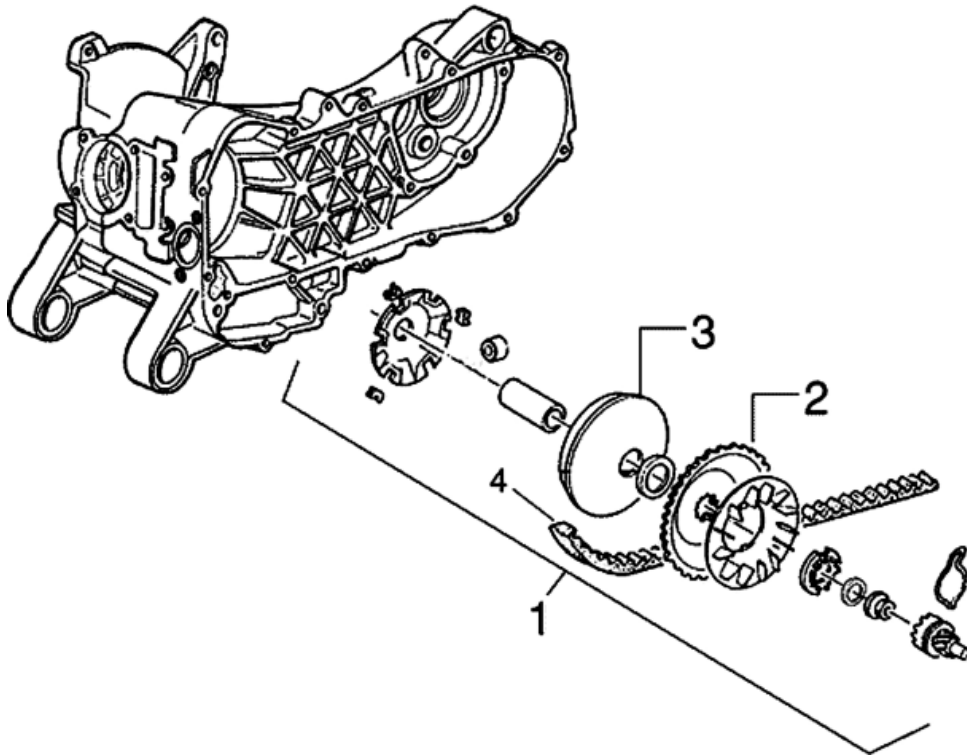
Oil pump



OIL PUMP

	Code	Action	Duration
1	001051	Belt/Timing chain - Change	
2	001112	Oil pump - change	
3	001042	Oil pump - Service	
4	001121	Chain cover oil seal - Replacement	
5	001122	Oil pump chain - Replacement	
6	001125	Chain guide pads - Replacement	
7	001130	Oil sump - Replacement	
8	001129	Chain tightener - Overhaul and replacement	

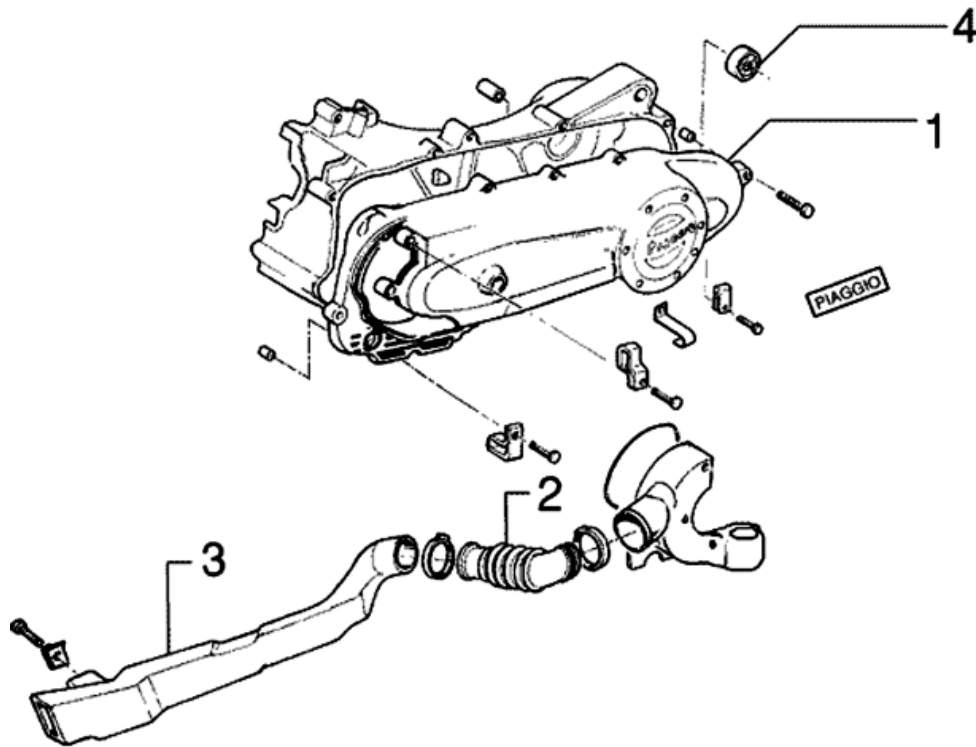
Driving pulley



REAR-VIEW PULLEY

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

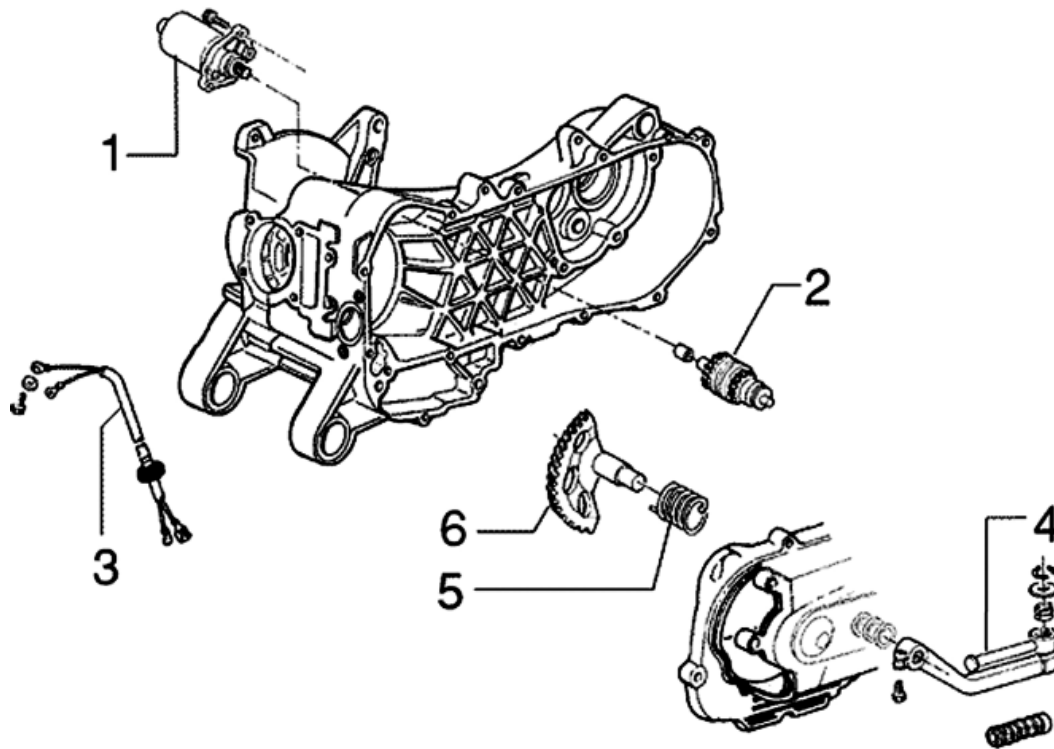
Transmission cover



TRANSMISSION COVER

	Code	Action	Duration
1	001096	Transmission crankcase cover - replace	
2	001132	Transmission air inlet pipe - Replacement	
3	001131	Transmission air intake - Replacement	
4	001135	Transmission cover bearing - Replacement	

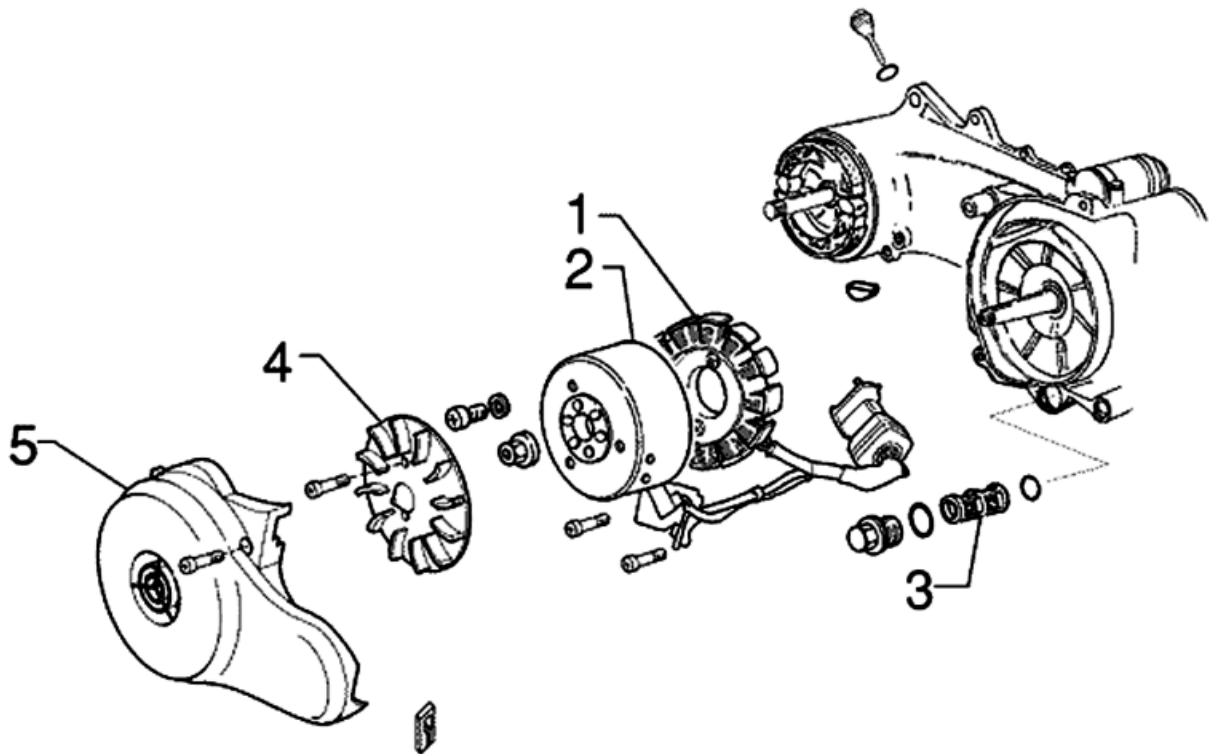
Starter motor



STARTER MOTOR - START UP LEVER

	Code	Action	Duration
1	001020	Starter motor - change	
2	001017	Starter sprocket wheel - replace	
3	005045	Starter motor with cables unit - Re-plac.	
4	001084	Starter lever - Replacement	
5	008008	Starter spring pack - Replacement	
6	001021	Kick starter - Inspection	

Flywheel magneto



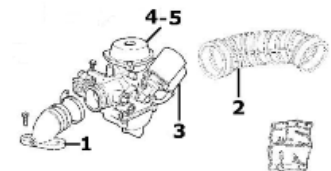
FLYWHEEL FAN

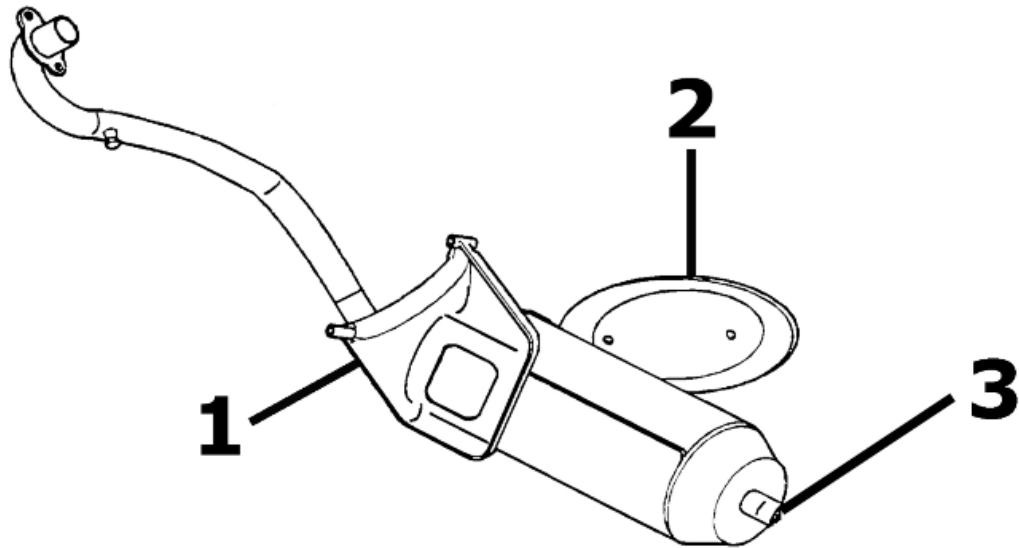
	Code	Action	Duration
1	001067	Stator - Fitting and Refitting	
2	001058	Flywheel - Replacement	
3	001102	Net oil filter - Replacement / Cleaning	
4	001109	Cooling fan - Replacement	
5	001087	Flywheel cover - Replacement	

Carburettor

CARBURETTOR

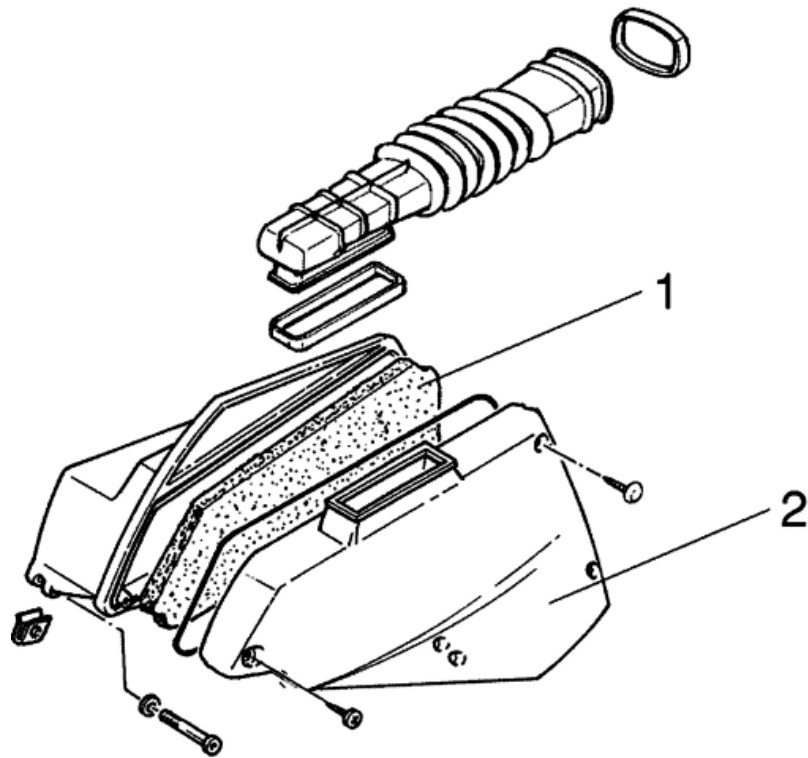
	Code	Action	Duration
1	001013	Intake manifold - change	
2	004122	Air cleaner carburettor fitting - Replacement	
3	001081	Automatic choke - Replacement	
4	001008	Carburettor - Inspection	
5	001063	Carburettor - Replacement	



Exhaust pipe**MUFFLER**

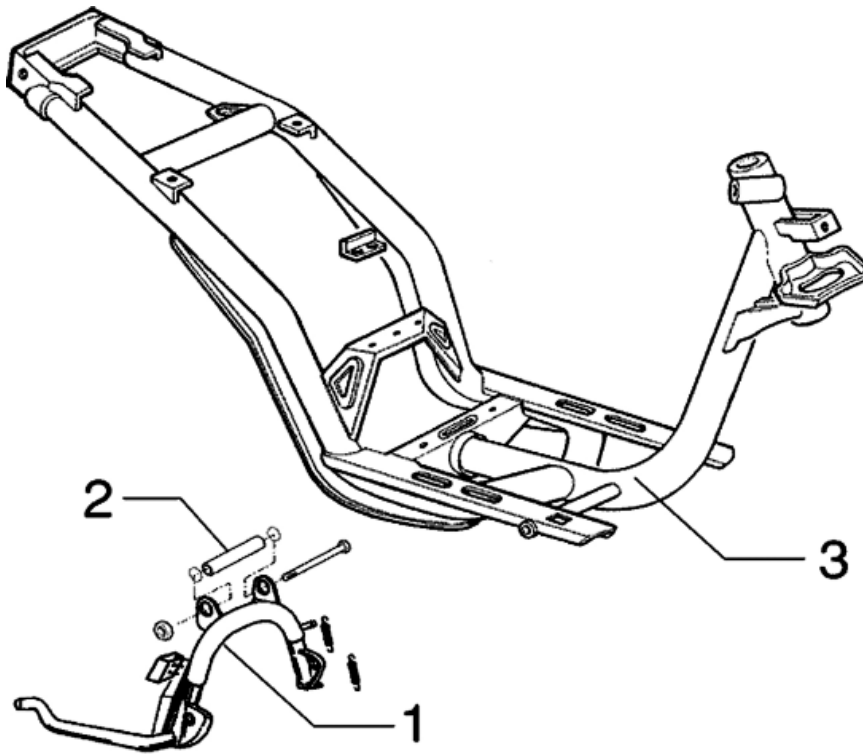
	Code	Action	Duration
1	001009	Muffler - Replacement	
2	001095	Muffler guard - Replacement	
3	001136	Exhaust emissions - Adjustment	

Air cleaner



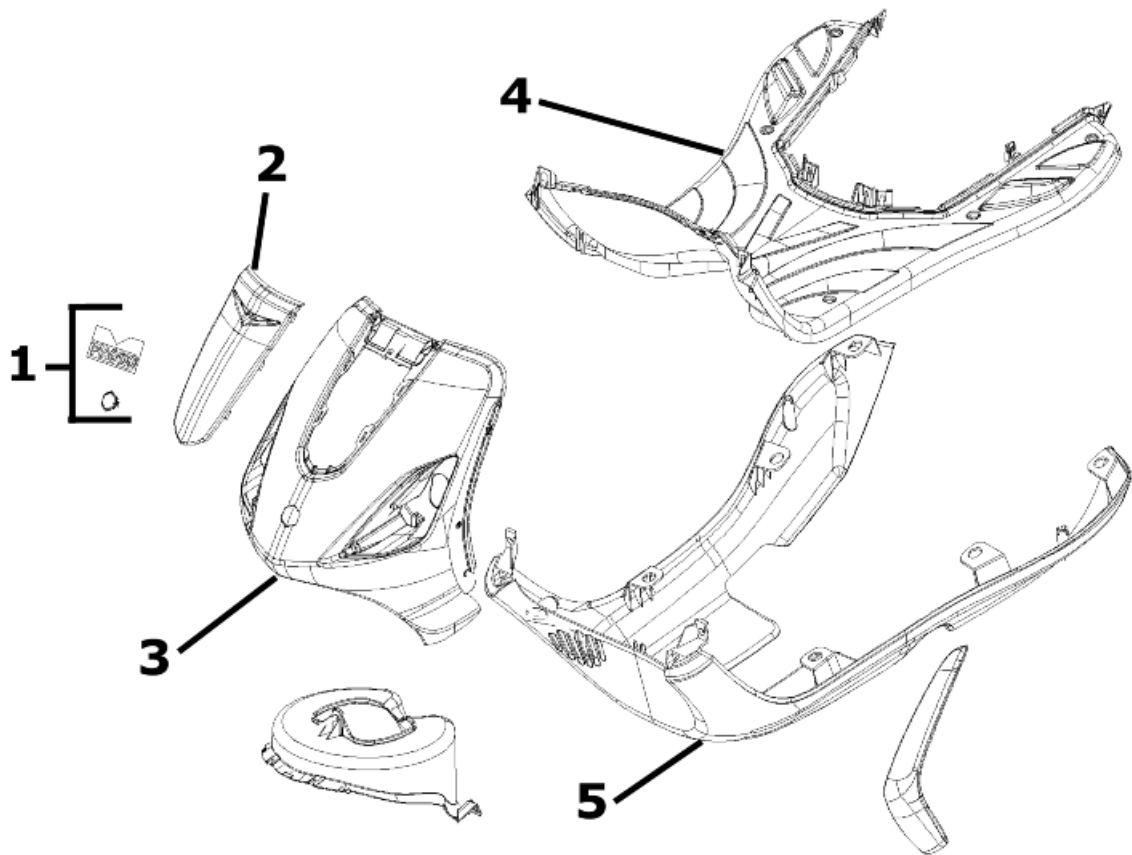
AIR FILTER

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

Frame**FRAME**

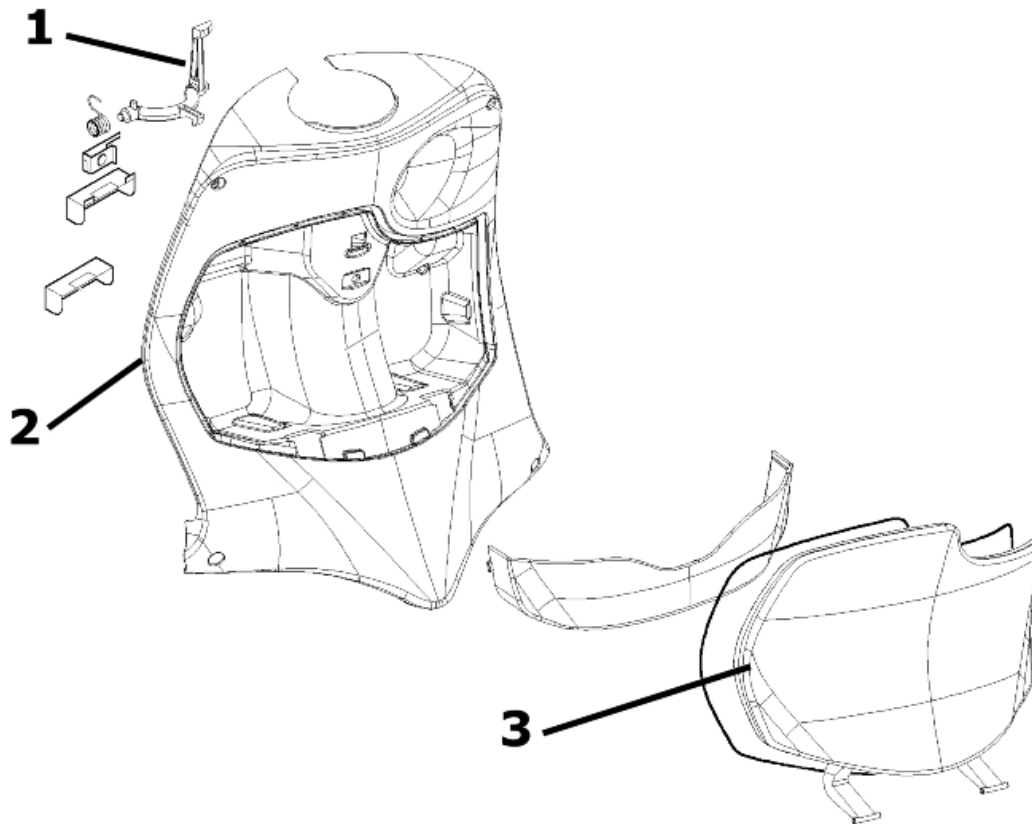
	Code	Action	Duration
1	004004	Stand - Replacement	
2	001053	Stand bolt - Replacement	
3	004001	Frame - replace	

Legshield spoiler

**FRONT SHIELD SPOILER**

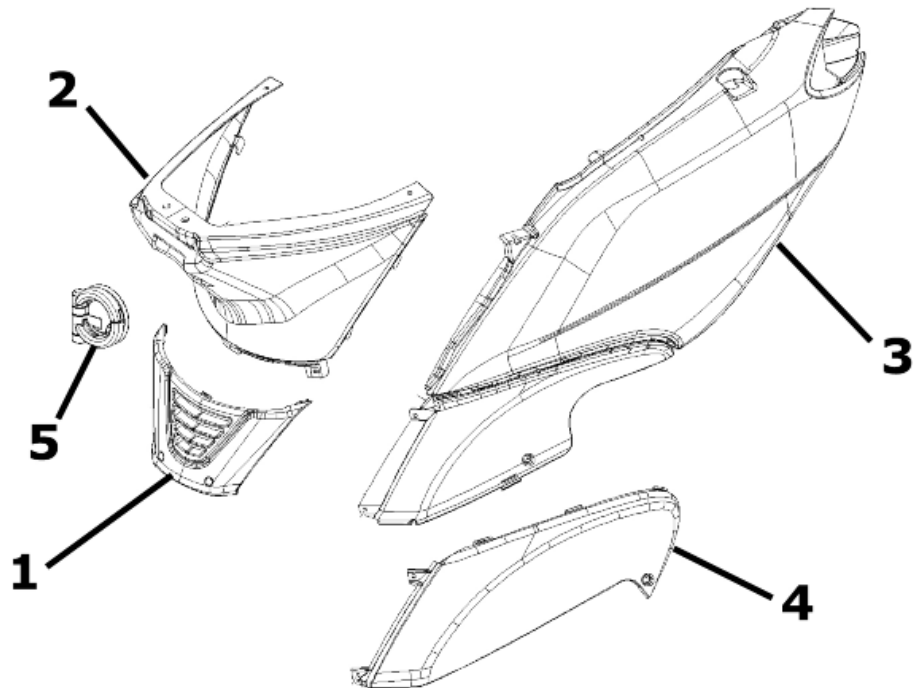
	Code	Action	Duration
1	004159	Plates / Stickers - Replacement	
2	004149	Shield central cover - Replacement	
3	004064	Front shield, front part - Removal and refitting	
4	004015	Footrest - Removal and Refitting	
5	004053	Spoiler - Replacement	

Rear cover

**REAR SHIELD**

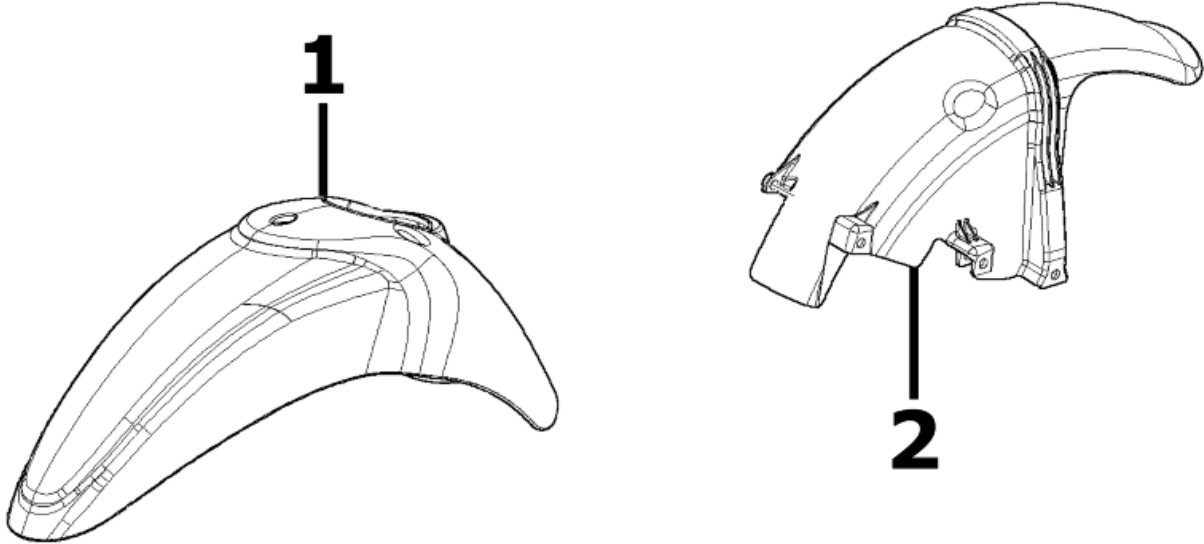
	Code	Action	Duration
1	004174	Trunk levers - Replacement	
2	004065	Legshield, rear part - Removal and refitting	
3	004081	Glove box door - Replacement	

Central cover



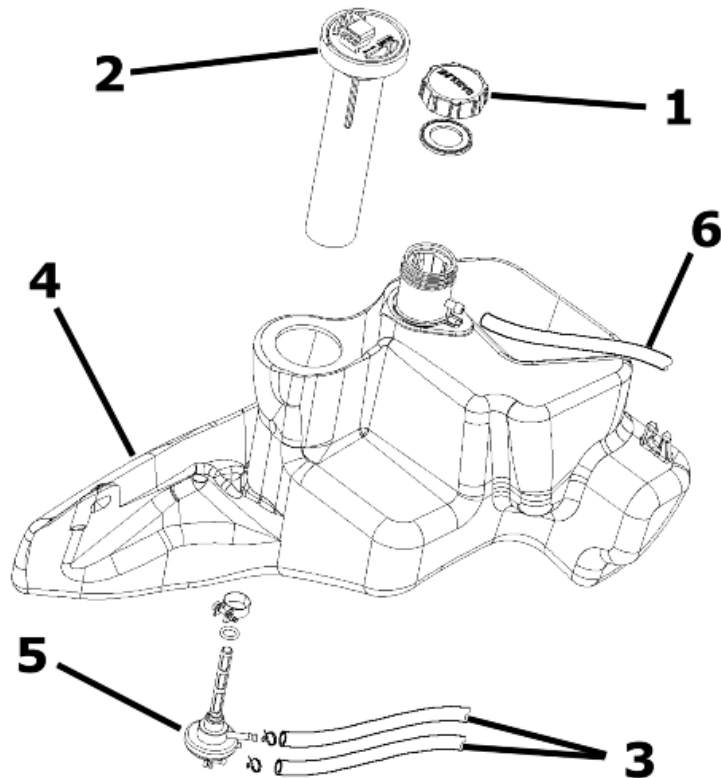
CENTRAL COVER

	Code	Action	Duration
1	004059	Spark plug inspection flap - Replacement	
2	004106	Under-saddle band - Replacement	
3	004085	Fairing (1) - Replacement	
4	004105	Right side clamp - Replacement	
5	004131	Luggage rack support - Replacement	

Mudguard**MUDGUARDS**

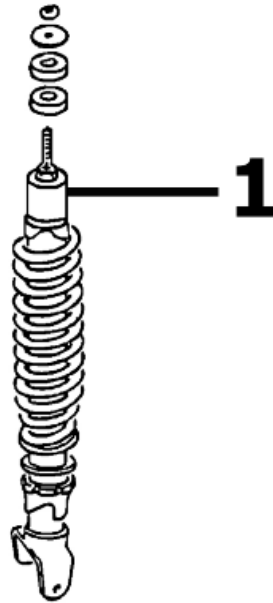
	Code	Action	Duration
1	004002	Front mudguard - Replacement	
2	004009	Rear mudguard - Replacement	

Fuel tank



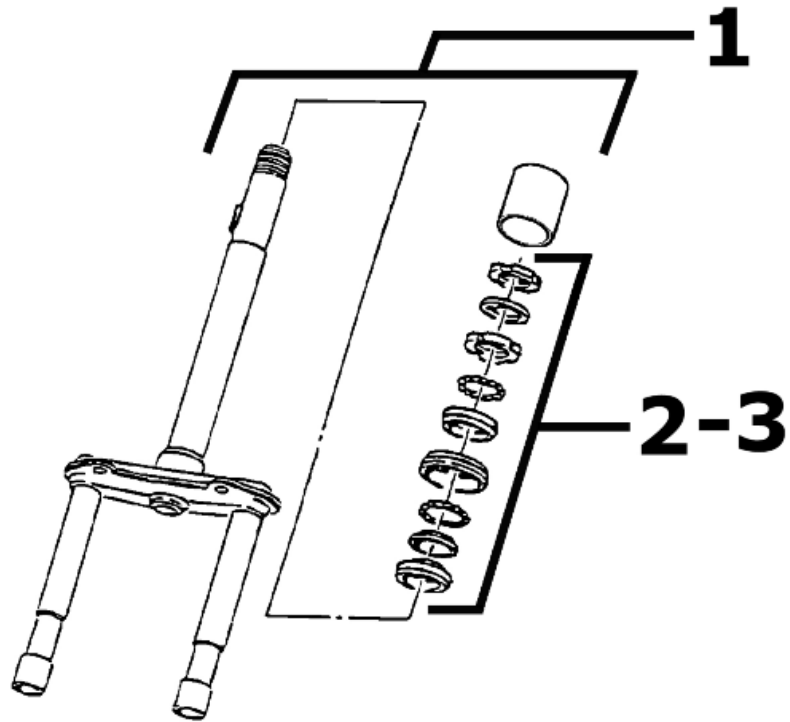
FUEL TANK

	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 - change	

Rear shock-absorber**REAR SHOCK ABSORBER**

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

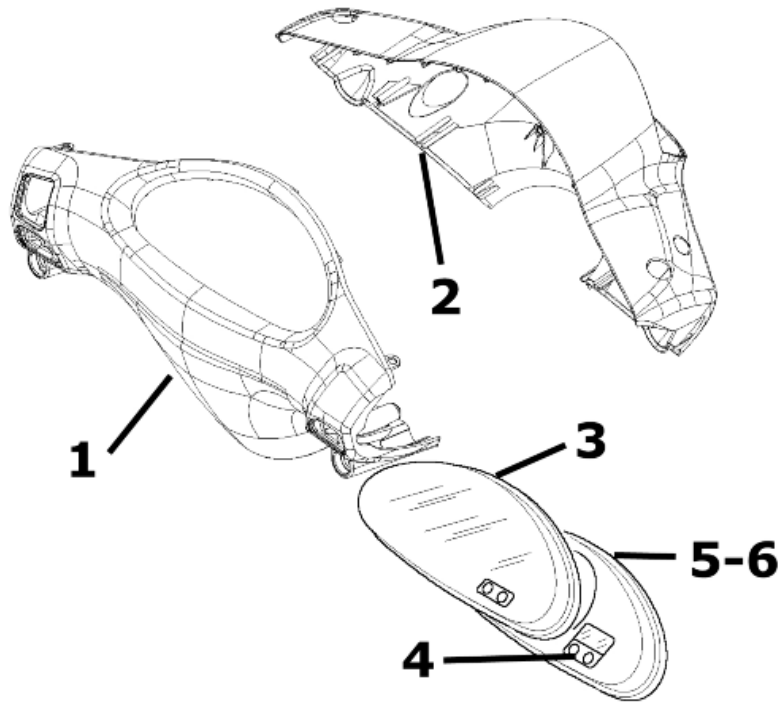
Steering column bearings



STEERING FIFTH WHEELS

	Code	Action	Duration
1	003051	Complete fork - Replacement	
2	003002	Steering fifth wheels - Replacement	
3	003073	Steering clearance - Adjustment	

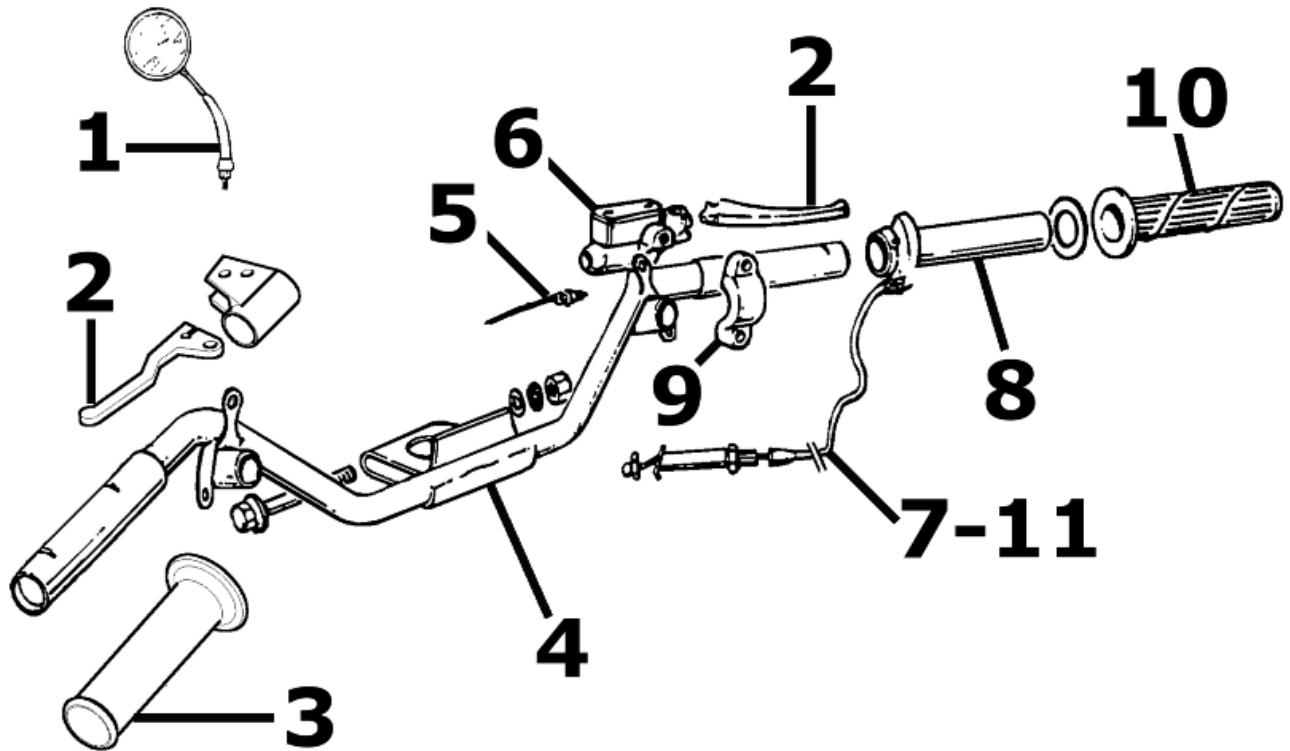
Handlebar covers



HANDLEBAR COVERS

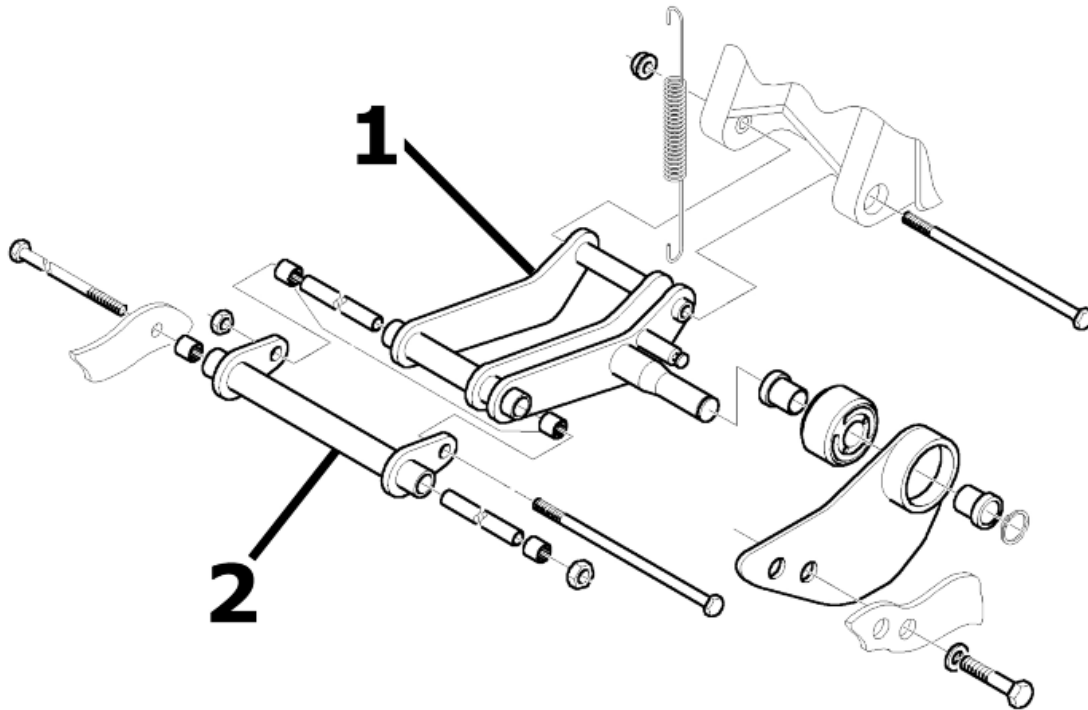
	Code	Action	Duration
1	004019	Handlebar rear section - Replacement	
2	004018	Handlebar front section - Replacement	
3	005078	Odometer glass - Replacement	
4	005076	Clock / Cell - Replacement	
5	005014	Odometer - Replacement	
6	005038	Instrument panel warning light bulbs - Replacement	

Handlebar components



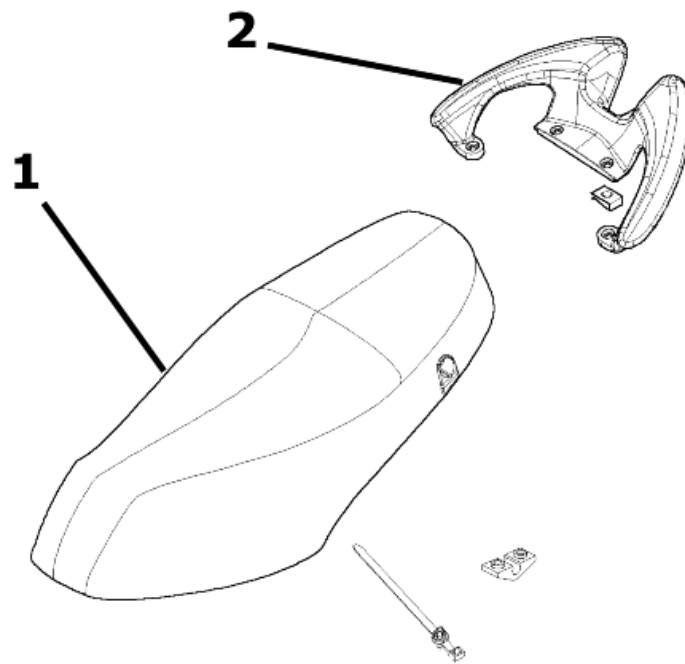
HANDLEBAR COMPONENTS

	Code	Action	Duration
1	004066	Driving mirror - Replacement	
2	002037	Brake or clutch lever - Replacement	
3	002071	Left hand grip - Replacement	
4	003001	Handlebar - Replacement	
5	005017	Stop switch - Replacement	
6	002024	Front brake pump - Removal and Re-fitting	
7	002063	Throttle control transmission - Replacement	
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	003061	Accelerator transmission - adjust	

Swing-arm**SWINGING ARM**

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

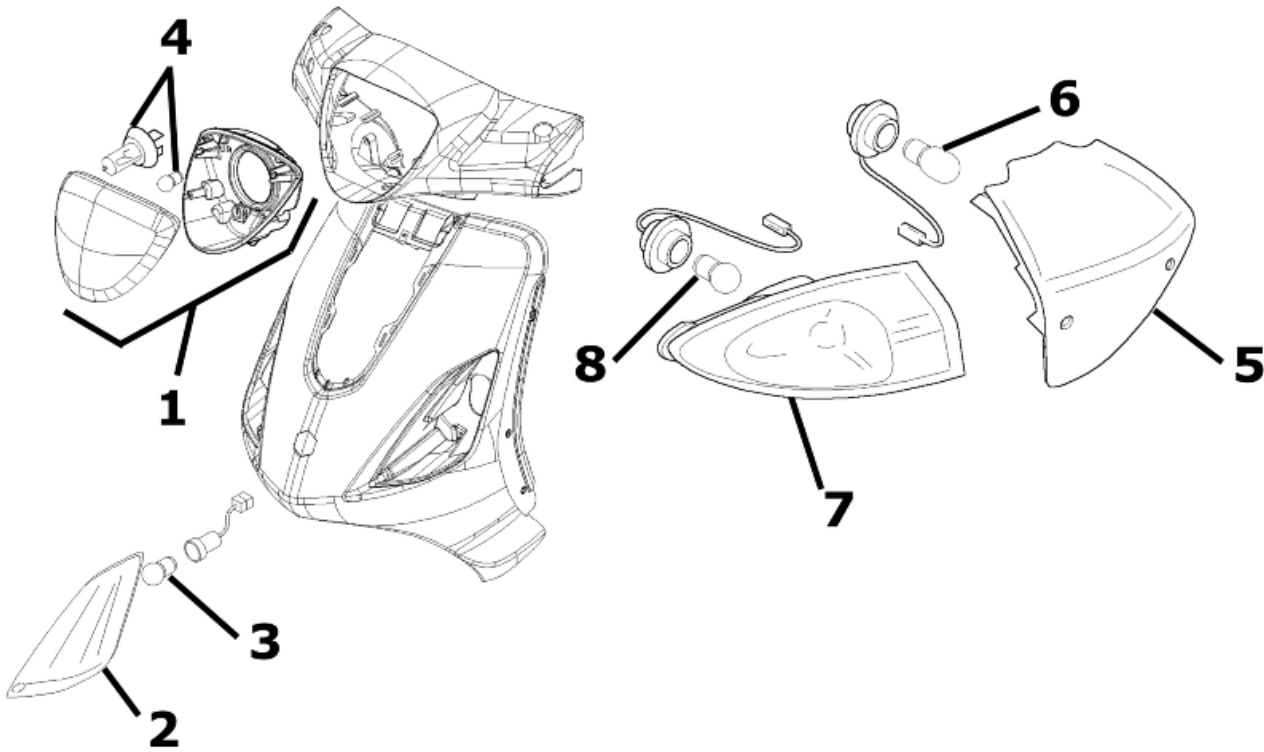
Seat



SADDLE

	Code	Action	Duration
1	004003	Saddle - Replacement	
2	004068	Passenger handgrip - Replacement	

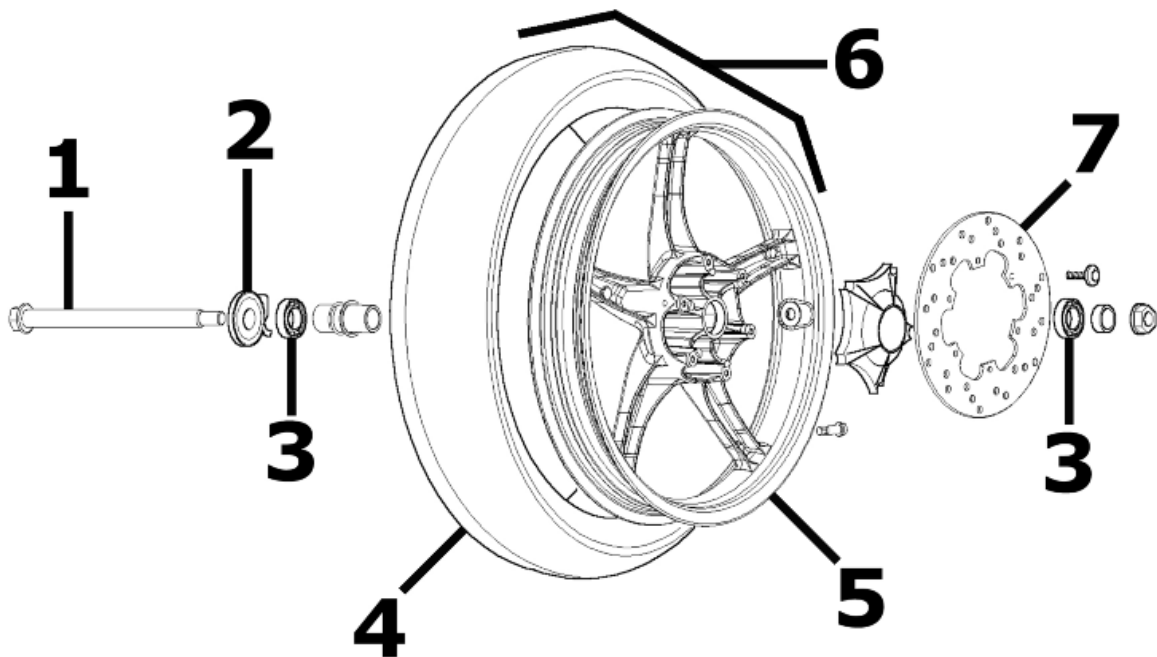
Turn signal lights



TURN INDICATOR LIGHTS

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

Front wheel



FRONT WHEEL

	Code	Action	Duration
1	003038	Front wheel axle - Remov. and refitt.	
2	002011	Odometer movement sensor - Replacement	
3	003040	Front wheel bearings - Replacement	
4	003047	Front tyre - Replacement	
5	003037	Front wheel rim - Removal and Refitting	
6	004123	Front wheel - Replacement	
7	002041	Front brake disc - Replacement	

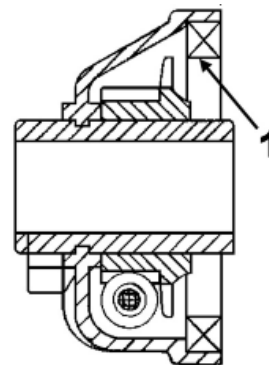
Grease tone wheel or drive

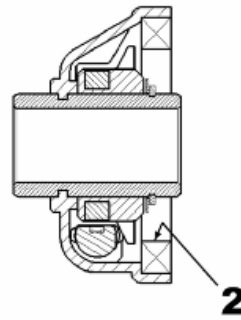
Please take note that the code has been introduced:

900001 - Tone wheel / drive greasing - 15'.

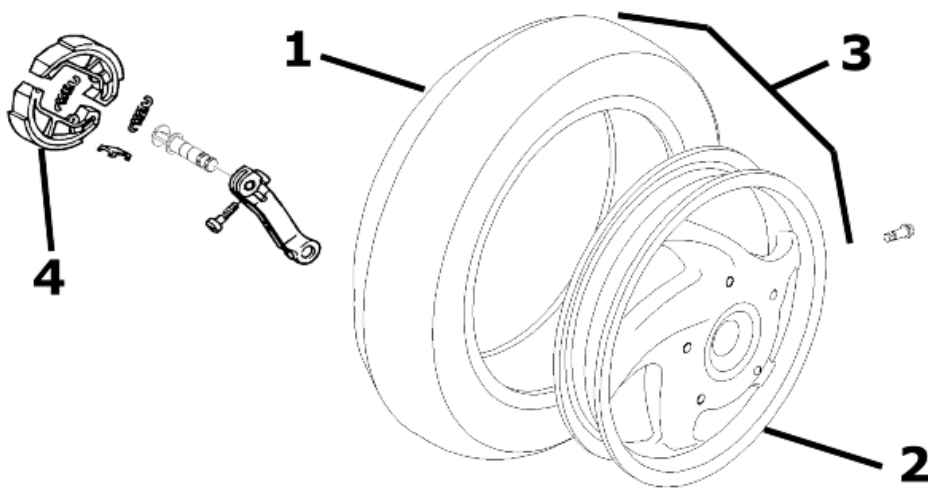
Never mistake the codes 002011 (movement sensor replacement) and 005089 (tone wheel replacement) in the event of noise of the indicated components. The grease recommended is TUTE-LA MRM 2 (soap-based lithium grease with Molybdenum disulphide).

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





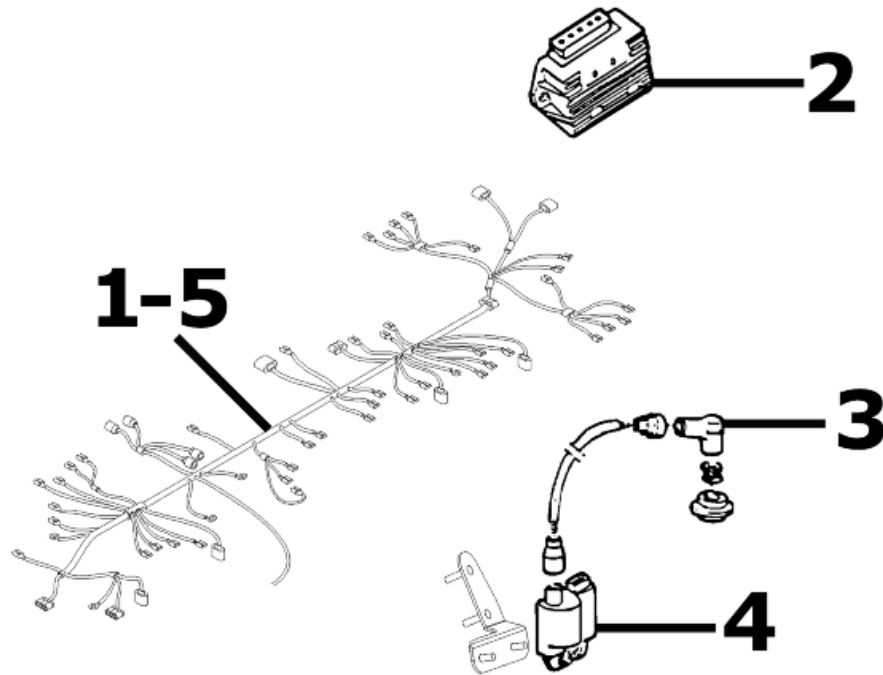
Rear wheel



REAR WHEEL

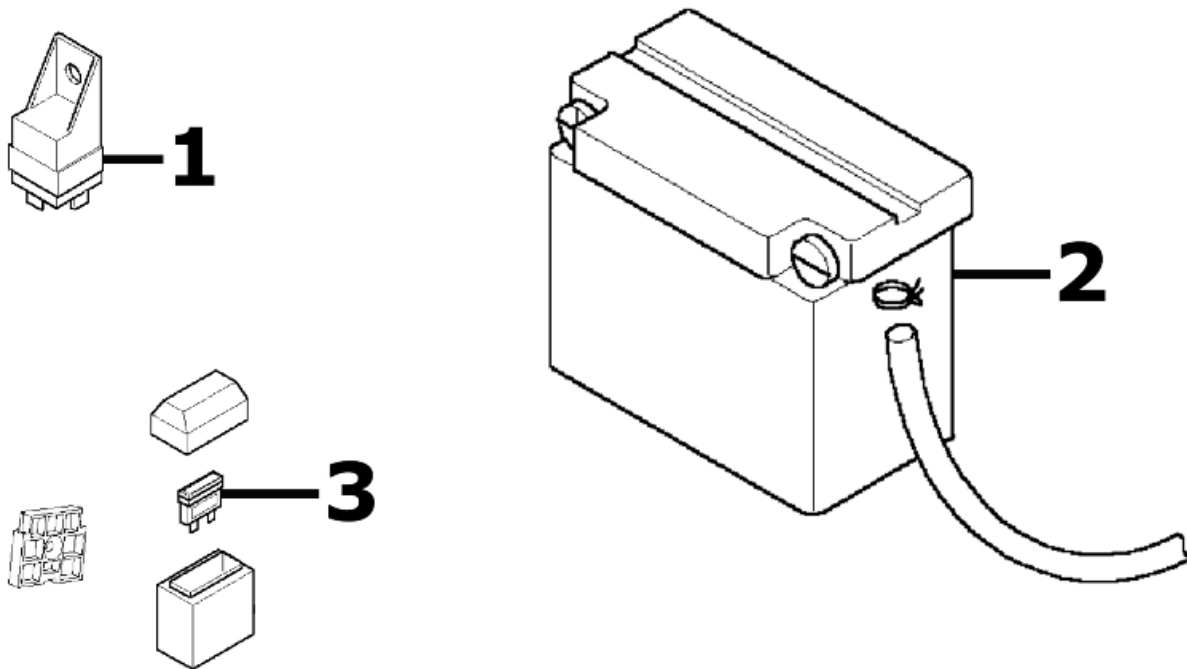
	Code	Action	Duration
1	004126	Rear wheel tyre - Replacement	
2	001071	Rear wheel rim - Removal and Refitting	
3	001016	Rear wheel - Replacement	
4	002002	Rear brake pads/shoes - Repl.	

Electric devices



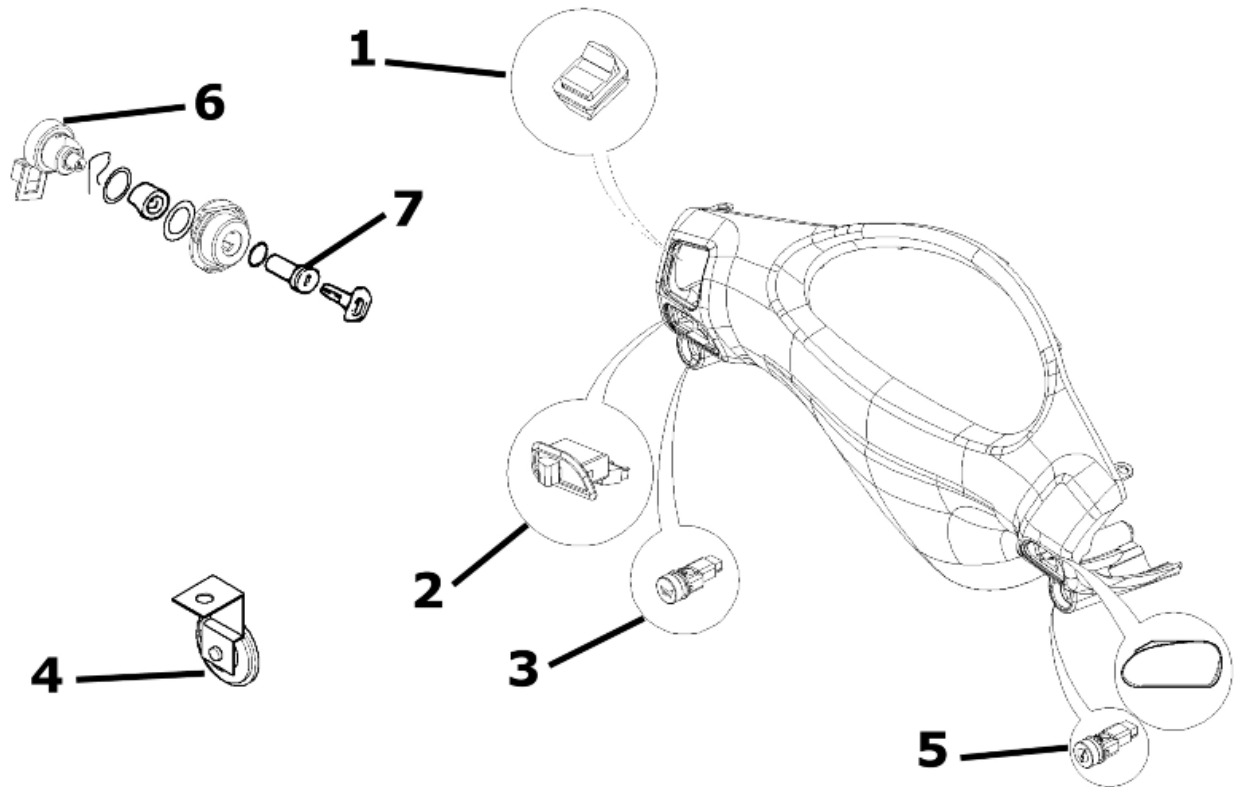
ELECTRICAL DEVICES

	Code	Action	Duration
1	005001	Electrical system - Replacement	
2	005009	Voltage regulator - Replacement	
3	001094	Spark plug cap - Replacement	
4	001023	Control unit - Replacement	
5	005114	Electrical system - Service	

**ELECTRICAL DEVICES**

	Code	Action	Duration
1	005011	Start-up remote control switch - Replacement	
2	005007	Battery - change	
3	005052	Fuse (1) - Replacement	

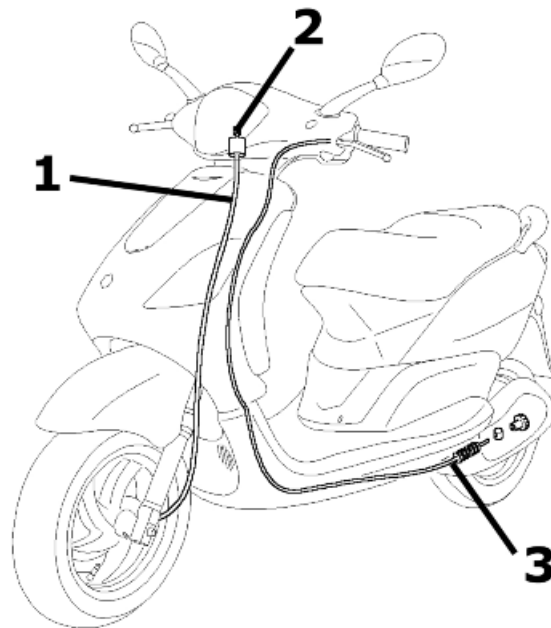
Electronic controls



ELECTRIC CONTROLS

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

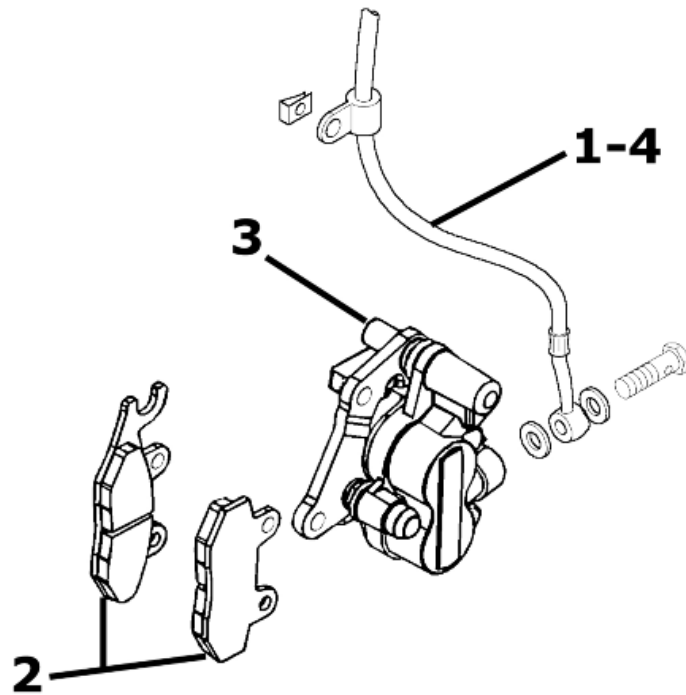
Transmissions



TRANSMISSIONS

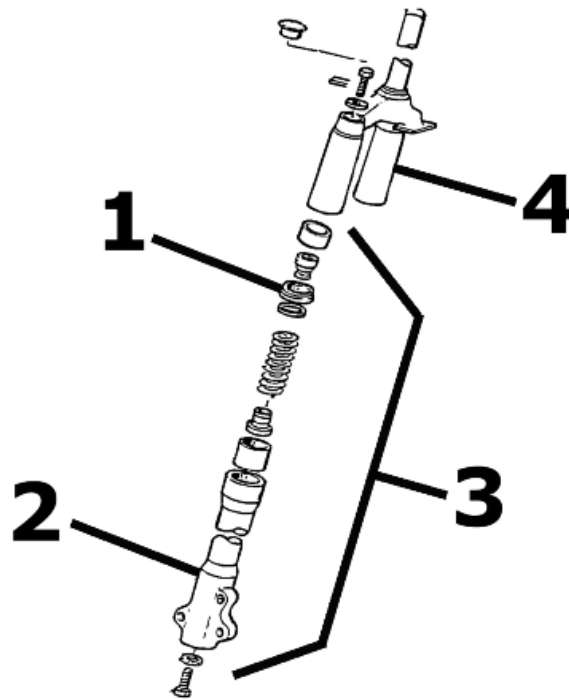
	Code	Action	Duration
1	002051	Odometer transmission assembly - Replacement	
2	002049	Odometer cable - Replacement	
3	002053	Rear brake transmission complete - replacement	

Brake callipers



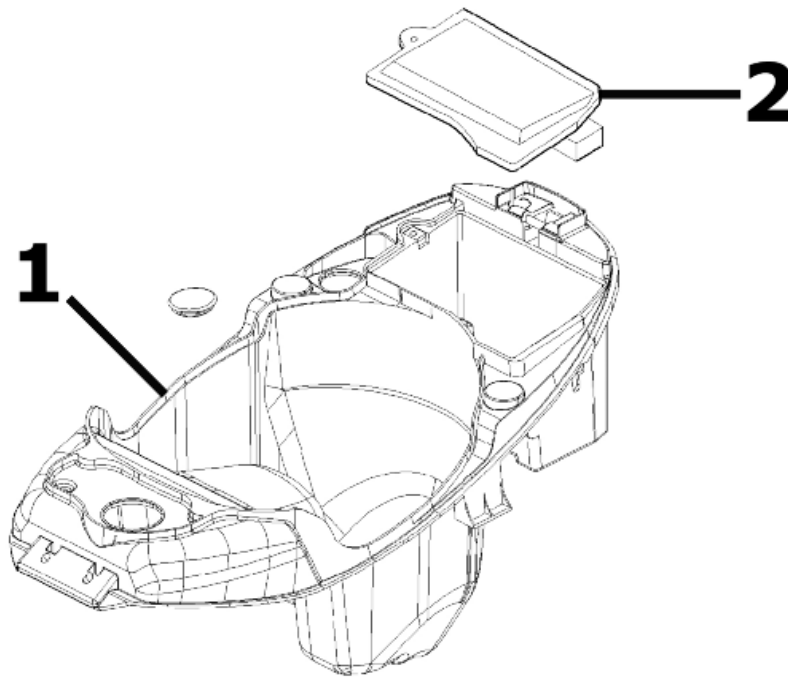
CALLIPER

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

Steering column**STEERING**

	Code	Action	Duration
1	003048	Fork oil seal - Replacement	
2	003076	Fork sheath - Replacement	
3	003079	Fork stem - Replacement	
4	003010	Front suspension - Service	

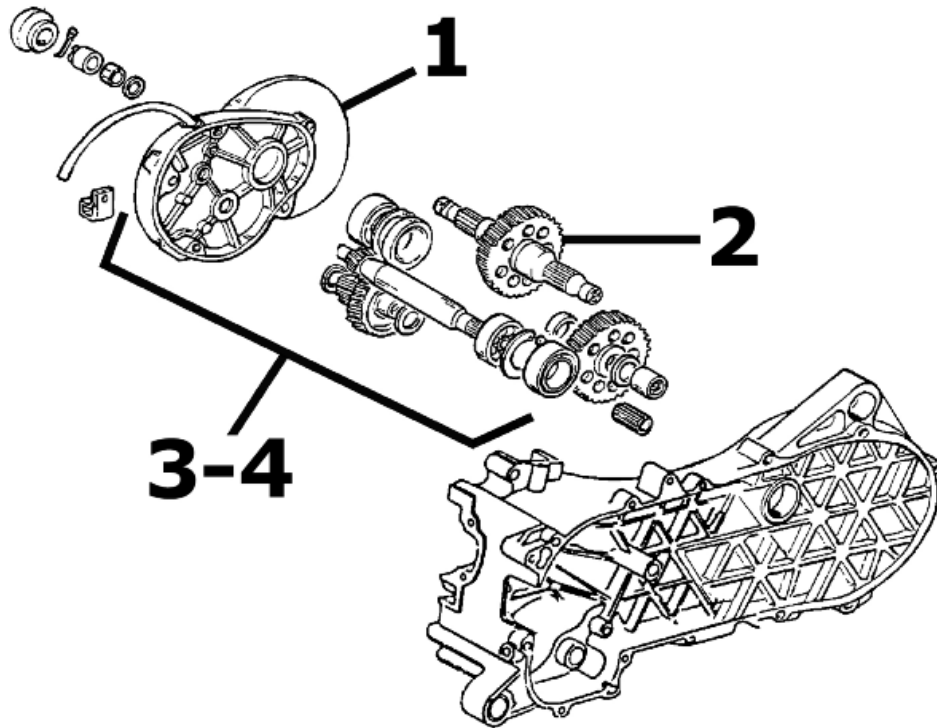
Helmet bay



HELMET COMPARTMENT

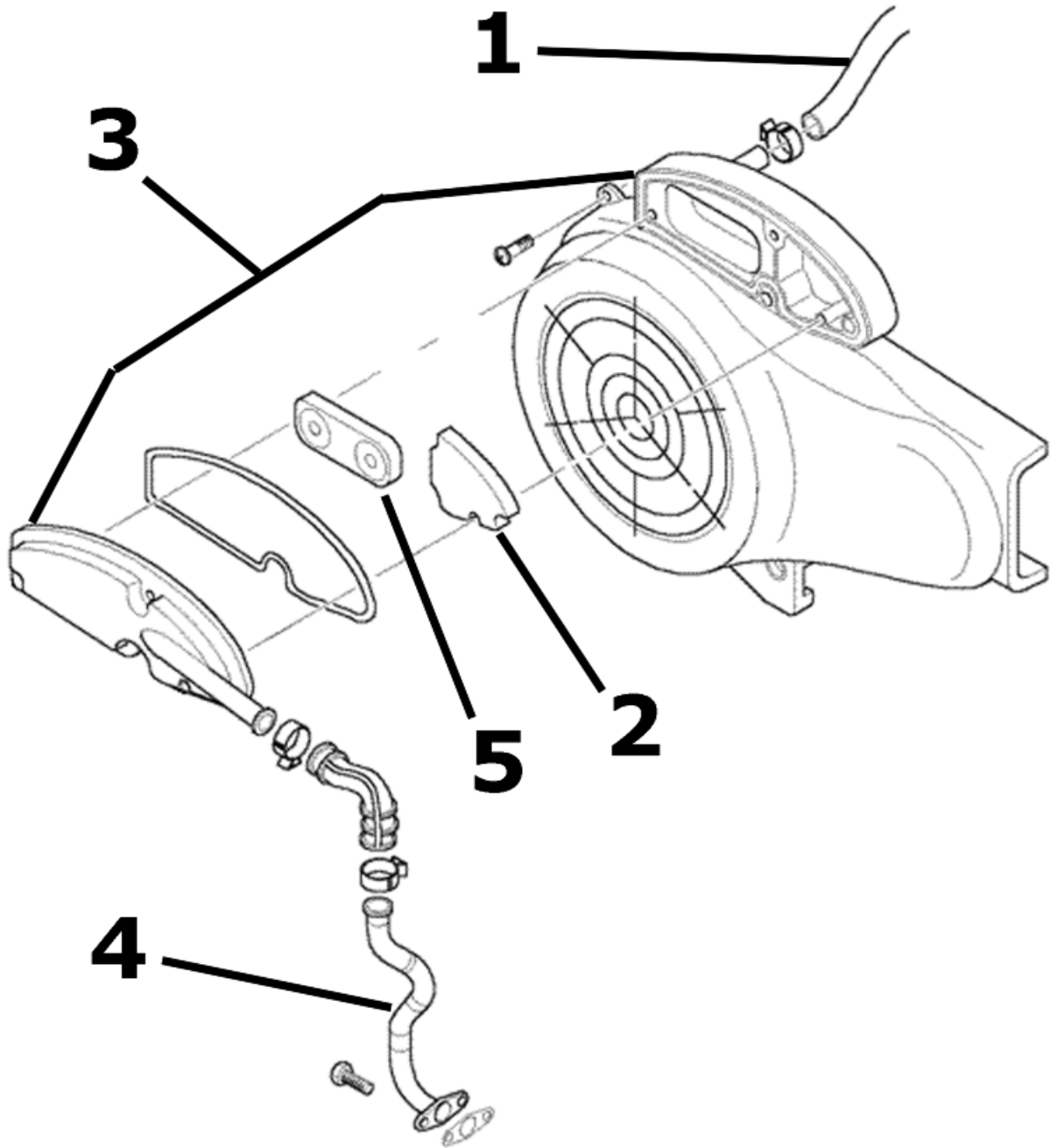
	Code	Action	Duration
1	004016	Helmet compartment - Removal and Refitting	
2	005046	Battery cover - change	

Rear wheel axle

**REAR WHEEL AXLE**

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

Secondary air box



SECONDARY AIR HOUSING

	Code	Action	Duration
1	001164	Crankcase secondary air connection - Replacement	
2	001161	Secondary air filter - Replacement / Cleaning	
3	001162	Secondary air housing - Replacement	
4	001163	Muffer secondary air connection - Replacement	
5	001165	Secondary air reed - Replacement	

A

Air filter: 32, 147

B

Battery: 44, 51, 60, 61

Brake: 137, 139, 140, 142, 143, 187

C

Carburettor: 10, 28, 116, 120, 165

E

Engine oil: 32

F

Fuel: 42, 115, 148, 173

Fuses: 60

H

Headlight: 36

Hub oil: 30

I

Identification: 8

M

Maintenance: 7, 26

O

Oil filter: 34

S

Saddle:

Shock absorbers: 134

Spark plug: 30

T

Tank: 148, 173

Transmission: 9, 43, 66, 76, 163