PIAGGIO

WORKSHOP MANUAL

633104

Liberty 50 4tempi

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

WORKSHOP MANUAL
Liberty 50 4tempi

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

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

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

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

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

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

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

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INDEX OF TOPICS

Rules

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

Safety rules

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

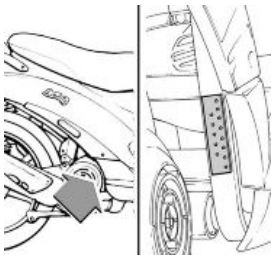
Maintenance rules

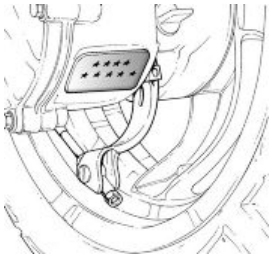
- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. The non original or non-compliant spare parts may damage the vehicle.
- Use only the appropriate tools designed for this vehicle.
- Always use new gaskets, sealing rings and split pins upon refitting.
- After removal, 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.
- Use only equipment with metric sizes for removal, service and reassembly operations. Metric bolts, nuts and screws are not interchangeable with coupling members using English measurements. Using unsuitable coupling members and tools may damage the vehicle.
- When carrying out maintenance operations on the vehicle that involve the electrical system, make sure the electrical connections have been made properly, particularly the ground and battery connections.

Vehicle identification

FRAME/ENGINE PREFIX

Specification	Desc./Quantity
Frame prefix	ZAPC42200÷1001
Engine prefix	C422M÷1001





Dimensions and mass

WEIGHT AND DIMENSIONS

Specification	Desc./Quantity
Kerb weight	88 Kg
Width	735 mm
Length	1.960 mm
Wheel base	1.330 mm
Saddle height	775 mm

Engine

ENGINE

Specification	Desc./Quantity
Engine type	Single cylinder 4-stroke Piaggio Hi-PER4
Bore x stroke	39 X 41.8 mm
Engine capacity	49.93 cm³
Compression ratio	11.5 :1
Timing system	single overhead camshaft, driven by a chain to the left side.
Depression carburettor	KEIHN CVK 18
CO adjustment	3.2% ± 0.5
Engine idle	1900 ÷ 2000 rpm.
Air filter	Sponge, soaked in a mixture (50% SELENIA Air Filter Oil and 50% unleaded petrol).
Starting system	electric starter/kick starter
Lubrication	Engine lubrication with lobe pump (inside the crankcase) controlled by chain and double filter: mesh and centrifugal.
Fuel system	Gravity feed, with unleaded petrol (with a minimum octane rating of 95) with carburettor.
Maximum power (to crankshaft)	2.5 Kw (3.4CV) at 6500 rpm.
Cooling system	forced coolant circulation system
Valve clearance	intake: 0.10 mm discharge: 0.15 mm

Transmission

TRANSMISSION

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

Capacities

CAPACITIES

Specification	Desc./Quantity
Rear hub oil	Quantity: approx. 85 cc
Engine oil	Capacity: approx. 850 cm^3
Fuel tank capacity	6 litres (of which 1 l is reserve)

Electrical system

ELECTRICAL COMPONENTS

Specification	Desc./Quantity
Ignition type	Capacitive discharge electronic ignition, with incorporated HV coil
Ignition advance variable, with microprocessor (before T.D.C.)	8° at 1000 + 2000 rpm - 21° at 4000 + 7000 rpm
Recommended spark plug	NGK CR 9EB - CHAMPION RG 4HC
Alternative spark plug	DENSO U24ESR-NB
Battery	12V-9Ah
Main fuse	10 A
Generator	single-phase alternating current

Frame and suspensions

FRAME AND SUSPENSION

Specification	Desc./Quantity
Chassis type	Welded tubular steel chassis with stamped sheet reinforcements
Front suspension	mechanical telescopic steering tube
Front suspension stroke	66,8 mm
Trail	100 mm
Rear suspension	Single hydraulic double-acting shock absorber, helical coaxial spring. Chassis to engine support with swinging arm.
Rear suspension bump position	70 mm

Brakes

BRAKE

Specification	Desc./Quantity
Front brake	Ø 220 mm disc brake with hydraulic linkage (r.h. brake lever).
Rear brake	drum brake (Ø 140 mm) with mechanical linkage.(l.h. brake lever).

Wheels and tyres

WHEELS AND TYRES

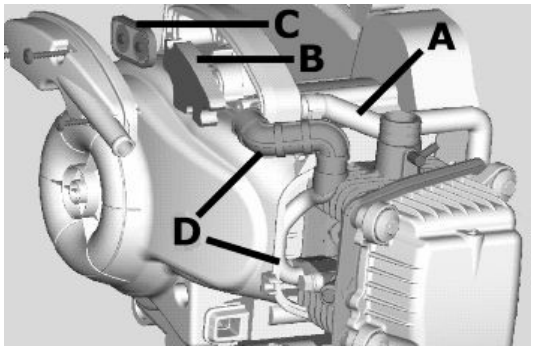
Specification	Desc./Quantity
Front tyre	Tubeless 90/80-16"
Front wheel rim	Die-cast aluminium alloy, 2.15 x16"
Rear tyre	Tubeless 110/80-14"
Rear wheel rim	Die-cast aluminium alloy, 2.75 x14"
Front tyre pressure	2 bar
Rear tyre pressure	2.2 bar
Rear tyre pressure (rider and luggage)	2.5 bar

N.B.

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

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

50cc Version

Kehin

KEHIN CARBURETTOR

Specification	Desc./Quantity
Type	CVK 18
Throttle valve diameter:	Ø 18,5
Choke diameter	Ø 17
Stamping on body	17ND
Maximum nozzle:	75
Maximum air nozzle (on the body):	Ø1.1
Tapered pin stamping	NACA
Gas valve spring	70 ÷ 99 gr
Minimum nozzle:	35
Minimum air thrust (on body)	Ø1.4
Initial minimum mixture screw opening	2 3/8
Starter jet	48
Starter air nozzle (on the body):	Ø 1.5
Stroke of starter pin:	11 mm

Tightening Torques

ENGINE

Name	Torque in Nm
Ignition spark plug	10 to 15 Nm
Head cover screws	8 ÷ 10
Head-cylinder stud bolt nuts	6 to 7 + 90° + 90° *
Screws fixing head and cylinder to crankcase	8 to 10
Chain tensioner pad screw	5 to 7 Nm
Timing chain tensioner screws	8 ÷ 10 Nm
Timing chain tensioner central screw	5 to 6
Camshaft pulley screw	12 to 14
Rocking lever axle and camshaft bearing screw	3 to 4 Nm
Valve clearance adjustment lock nuts	7 to 9 Nm
Engine oil pre-filter cover:	25 to 28 Nm
Engine oil drainage cap	25 to 28
Alternator flywheel nut	40 ÷ 44 Nm
Stator screws	3 to 4
Pick-up screws	3 to 4
Oil pump bulkhead screw	4 to 5
Timing chain/oil pump compartment cover screws	4 to 5 Nm
Oil decantation labyrinth sheet screws	7 to 8
Oil pump crown screw	8 to 10
Screws fixing oil pump to the crankcase	5 to 6
Oil pump coupling screws	7 to 9 Nm
Oil sump screws	8 to 10 Nm
Inlet manifold screw	7 to 9
Carburettor/manifold clamp screw	1.2 ÷ 1.5 Nm
Screws fixing cables to starter motor	1.5 to 2.5
Starter screws	11 to 13
Transmission cover screws	11 to 13 Nm
Start-up lever screw	11 ÷ 13
Crankcase cooling cover screw	2 to 2.5
Nut locking clutch unit on pulley	55 to 60 Nm
Crankshaft pulley nut	18 to 20 + 90° Nm
Driven pulley shaft nut	40 ÷ 44 Nm
Hub oil drainage screw	3 to 5 Nm
Rear hub cap screws	24 to 26 Nm
Wheel axle nut	115 to 125
Crankcase half union screw	8 to 10

In order to ensure an adequate locking torque, lubricate the nuts before fitting them.
** When fitting the new stud bolts, nut tightening involves 3 turns of 90° each after the first locking at 6 ÷ 7 Nm, consequently: 6 ÷ 7 Nm + 90° + 90° + 90° at crossed passages.*

STEERING ASSEMBLY

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

FRAME ASSEMBLY

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

FRONT SUSPENSION

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

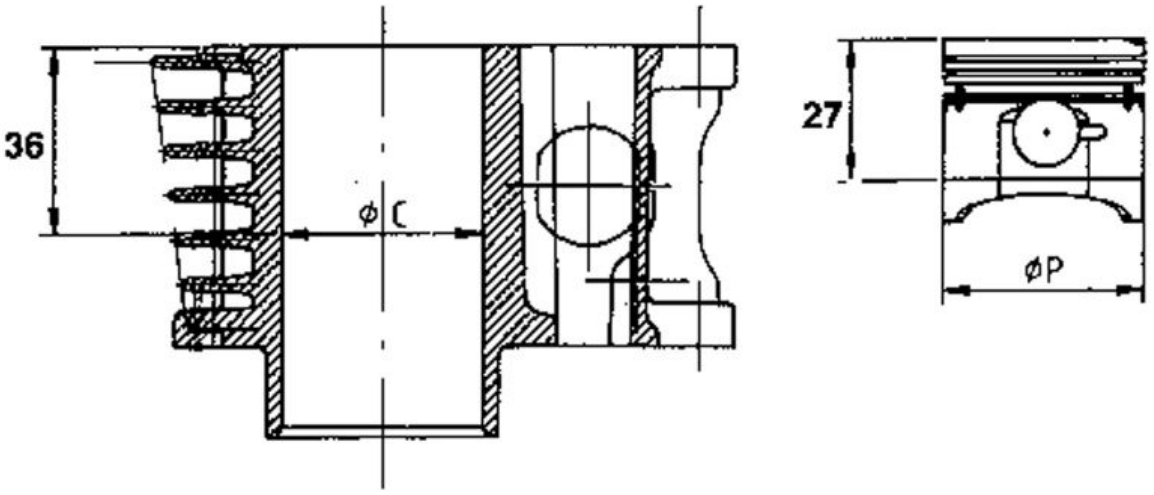
FRONT BRAKE

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

Overhaul data

Assembly clearances

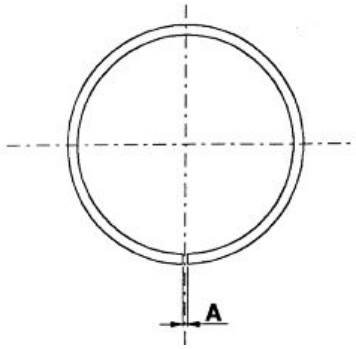
Cylinder - piston assy.



COUPLING BETWEEN PISTON AND CYLINDER

Name	Initials	Cylinder	Piston	Play on fitting
Cylinder (with asso/right way piston)	A	38.993 to 39.000	38.954 to 38.961	0.032 to 0.046
Cylinder (with shiram piston)	A	38.993 to 39.000	38.949 to 38.956	0.037 to 0.051
Cylinder (with asso/right way piston)	B	39.000 to 39.007	38.961 to 38.968	0.032 to 0.046
Cylinder (with shiram piston)	B	39.000 to 39.007	38.956 to 38.966	0.037 to 0.051
Asso/right way piston (with asso/right way cylinder)	C	39.007 to 39.014	38.968 to 38.975	0.032 to 0.046
Asso/right way piston (with shiram cylinder)	C	39.007 to 39.014	38.963 to 38.970	0.037 to 0.051
Shiram piston (with asso/right way cylinder)	D	39.014 to 39.021	38.975 to 38.982	0.032 to 0.046
Shiram piston (with shiram cylinder)	D	39.014 to 39.021	38.970 to 38.977	0.037 to 0.051
Cylinder 1st oversize	A1	39.193 to 39.200	39.154 to 39.161	0.032 to 0.046
Cylinder 1st oversize	B1	39.200 to 39.207	39.161 to 39.168	0.032 to 0.046
Piston 1st oversize	C1	39.207 to 39.214	39.168 to 39.175	0.032 to 0.046
Piston 1st oversize	D1	39.214 to 39.221	39.175 to 39.182	0.032 to 0.046
Cylinder 2nd oversize	A2	39.393 to 39.400	39.354 to 39.361	0.032 to 0.046
Cylinder 2nd oversize	B2	39.400 to 39.407	39.361 to 39.368	0.032 to 0.046
Piston 2nd oversize	C2	39.407 to 39.414	39.368 to 39.375	0.032 to 0.046
Piston 2nd oversize	D2	39.414 to 39.421	39.375 to 39.382	0.032 to 0.046
Cylinder 3rd oversize	A3	39.593 to 39.600	39.554 to 39.561	0.032 to 0.046
Cylinder 3rd oversize	B3	39.600 to 39.607	39.561 to 39.568	0.032 to 0.046
Piston 3rd oversize	C3	39.607 to 39.614	39.568 to 39.575	0.032 to 0.046
Piston 3rd oversize	D3	39.614 to 39.621	39.575 to 39.582	0.032 to 0.046

Piston rings

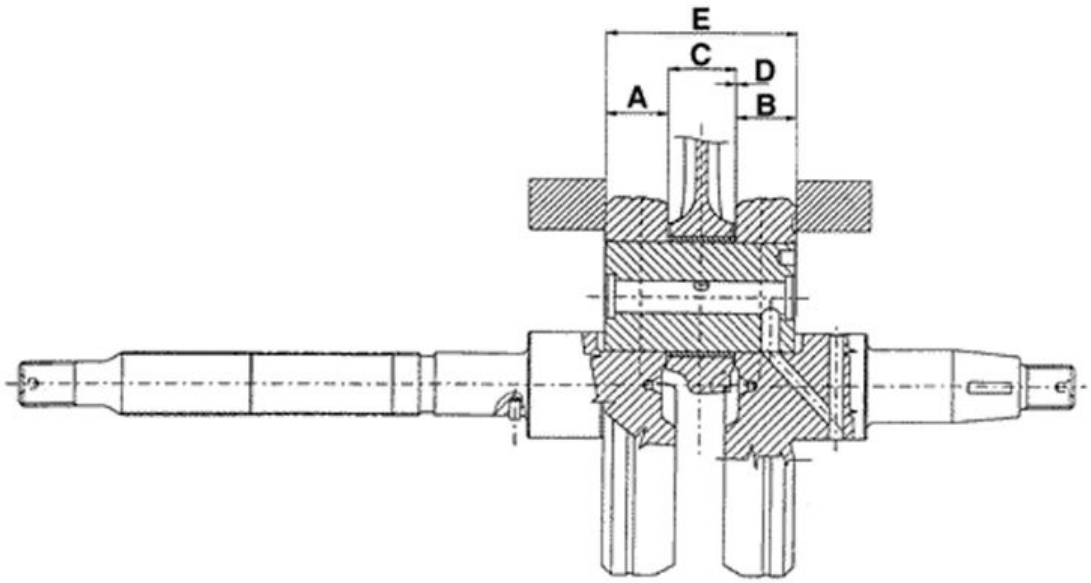


SEALING RINGS

Name	Description	Dimensions	Initials	Quantity
1st Compression ring		39 x 1	A	0.08 to 0.20
2nd Compression ring		39 x 1	A	0.05 to 0.20
Oil scraper ring		39 x 2	A	0.20 to 0.70
1st Compression ring 1st Oversize		39.2 x 1	A	0.08 to 0.20
2nd Compression ring 1st Oversize		39.2 x 1	A	0.05 to 0.20
Oil scraper ring 1st Oversize		39.2 x 2	A	0.20 to 0.70
1st Compression ring 2nd Oversize		39.4 x 1	A	0.08 to 0.20
2nd Compression ring 2nd Oversize		39.4 x 1	A	0.05 to 0.20

Name	Description	Dimensions	Initials	Quantity
Oil scraper ring 2nd Oversize		39.4 x 2	A	0.20 to 0.70
1st Compression ring 3rd Oversize		39.6 x 1	A	0.08 to 0.20
2nd Compression ring 3rd Oversize		39.6 x 1	A	0.05 to 0.20
Oil scraper ring 3rd Oversize		39.6 x 2	A	0.20 to 0.70

Crankcase - crankshaft - connecting rod



END PLAY BETWEEN DRIVING SHAFT 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	
Spacer tool		45.00 / Fits and clearances D = 0.15 to 0.30	E	

Slot packing system

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.

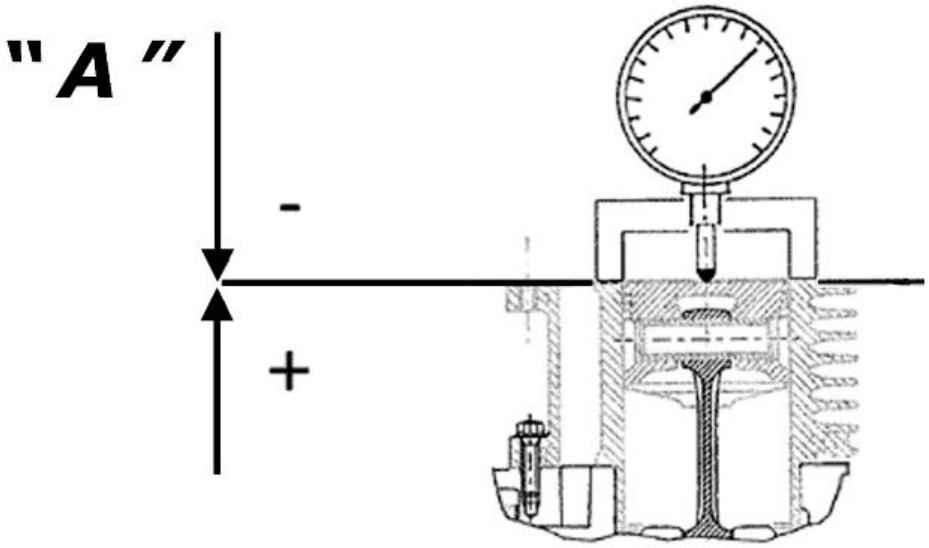
Characteristic

Shimming system for keeping the compression ratio

CR: 11.1 to 12.9

PISTON PROTRUSION CHECK

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



Products

TABLE OF RECOMMENDED PRODUCTS

Product	Description	Specifications
AGIP GEAR SAE 80W-90	Lubricant for gearboxes and transmissions.	API GL-4
eni i-Ride PG 5W-40	Synthetic based lubricant for high-performance four-stroke engines.	JASO MA, MA2 - API SL - ACEA A3
AGIP FILTER OIL	Special product for the treatment of foam filters.	-
AGIP GP 330	Water repellent springy calcium spray grease.	R.I.D./A.D.R. 2 10°b) 2 R.I.Na. 2.42 - I.A.T.A. 2 - I.M.D.G. class 2 UN 1950 Pag. 9022 EM 25-89
eni i-Ride PG 5W-40	Synthetic based lubricant for high-performance four-stroke engines.	JASO MA, MA2 - API SL - ACEA A3
AGIP BRAKE 4	Brake fluid.	Synthetic fluid SAE J 1703 -FMVSS 116 - DOT 3/4 - ISO 4925 - CUNA NC 956 DOT 4
MONTBLANC MOLYBDENUM GREASE	Grease for driven pulley shaft adjusting ring and movable driven pulley housing	Grease with molybdenum disulphide
AGIP GREASE PV2	Ivory smooth-textured, slightly-stringy anhydrous calcium-base grease.	TL 9150 066, symbol NATO G 460
AGIP GREASE SM 2	Gray black smooth-textured lithium grease, containing molybdenum disulphide.	-

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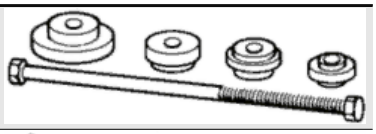
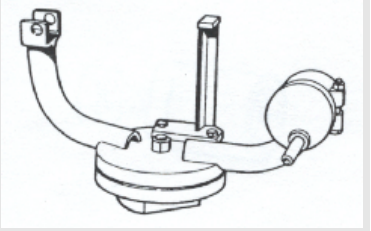
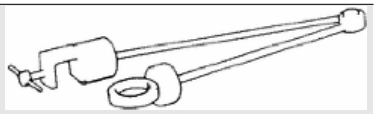
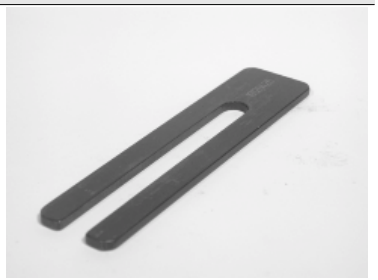
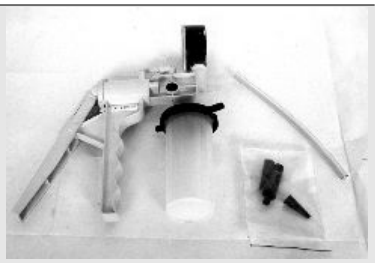
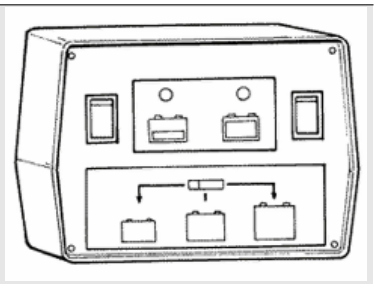
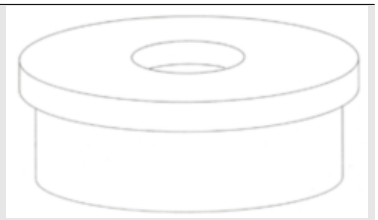
TOOLS

Stores code	Description	
001330Y	Tool for fitting steering seats	
001467Y008	Pliers to extract 17 mm ø bearings	
001467Y009	Bell for OD 42-mm bearings	
004499Y	Camshaft bearing extractor	
005095Y	Engine support	
008119Y009	Tube to assemble shafts and axles	

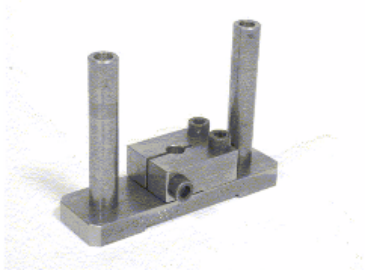
Stores code	Description	
020004Y	Punch for removing steering bearings from headstock	
020055Y	Wrench for steering tube ring nut	
020150Y	Air heater mounting	
020151Y	Air heater	
020162Y	Flywheel extractor	
020171Y	Punch for Ø 17 mm roller bearing	

Stores code	Description	
020265Y	Bearing fitting base	
020288Y	Fork to assemble piston on cylinder	
020291Y	Valve fitting/ removal tool	
020306Y	Punch for assembling valve seal rings	
020329Y	Mity-Vac vacuum-operated pump	
020330Y	Stroboscopic light to check timing	

Stores code	Description	
020331Y	Digital multimeter	
020332Y	Digital rpm indicator	
020333Y	Single battery charger	
020334Y	Multiple battery charger	

Stores code	Description	
020335Y	Magnetic mounting for dial gauge	
020340Y	Flywheel and transmission oil seals fitting punch	
020358Y	37x40-mm Adaptor	
020359Y	42x47-mm Adaptor	
020360Y	52x55-mm Adaptor	
020362Y	12 mm guide	

Stores code	Description	
020363Y	20-mm guide	
020364Y	25-mm guide	
020376Y	Adaptor handle	
020431Y	Valve oil seal extractor	
020432Y	Tool to fit the start-up sector spring	
020439Y	17-mm guide	

Stores code	Description	
020448Y	Pin lock fitting tool	
020449Y	Piston position check support	
020450Y	Camshaft fitting/removal tool	
020452Y	Tube for removing and refitting the driven pulley shaft	
020456Y	Ø 24 mm adaptor	
020565Y	Flywheel lock calliper spanner	

Stores code	Description	
494929Y	Exhaust fumes analyser	

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Maintenance chart

SCHEDULED MAINTENANCE TABLE

__I__: CHECK AND CLEAN, ADJUST, LUBRICATE OR REPLACE IF NECESSARY.
__C__: CLEAN, __R__: REPLACE, __A__: ADJUST, __L__: LUBRICATE
** Replace every 2 years*

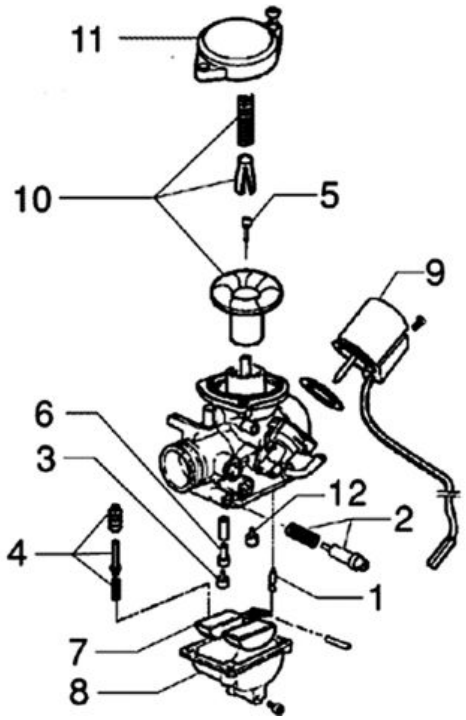
Km x 1000	1	3	6	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60
Safety locks	I				I				I				I				I				I
Spark plug			R		R		R		R		R		R		R		R		R		R
Drive belt			I		R		I		R		I		R		I		R		I		R
Throttle control	A				A				A				A				A				A
Tyre condition and wear					I				I				I				I				I
Air filter					C				C				C				C				C
Oil filter (mesh)			C		C		C		C		C		C		C		C		C		C
Solenoid filter			C		C		C		C		C		C		C		C		C		C
Valve clearance	I				I				I				I				I				I
Electrical system and battery	I		I		I		I		I		I		I		I		I		I		I
Cylinder ventila-tion system									I								I				
Brake levers	L				L				L				L				L				L
Brake oil level (*)	I		I		I		I		I		I		I		I		I		I		I
Hub oil level	R		I		R		I		R		I		R		I		R		I		R
Engine oil	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R	I	R
Brake Pads/Shoes	I		I		I		I		I		I		I		I		I		I		I
Tyre pressure	I		I		I		I		I		I		I		I		I		I		I
Headlight					A				A				A				A				A
Vehicle road test	I		I		I		I		I		I		I		I		I		I		I
Idle speed	A				A				A				A				A				A
Odometer gear					L				L				L				L				L
CVT rollers			I		R		I		R		I		R		I		R		I		R
Suspension					I				I				I				I				I
Steering	A				A				A				A				A				A
Transmission					L				L				L				L				L
Operation time	90'	10'	60'	10'	130'	10'	60'	10'	180'	10'	60'	10'	165'	10'	60'	10'	180'	10'	60'	10'	130'

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 adjustment screw - **3**. Max jet - **4**. Accelerating pump - **5**. Tapered pin - **6**. Jet holder - **7**. Float - 8. Reservoir - **9**. Starter device - **10**. Depression valve - **11**. Cover - **12**. Minimum jet.

Checking the spark advance

The vehicle is provided with a variable spark advance electronic device. Two reference marks for the timing can be found on the flywheel cover as to find out with more precision the reference mark on the fan. To check, use a stroboscopic gun Tecnotest 130/P or similar type. Start the engine and let it run at 1900 revs/min, act on the phase shifter to align the reference mark on the flywheel fan in between the two reference marks on the casing; at the same time, read the spark advance value on the stroboscopic gun display. The value should be 10°.

Repeat the above operation with engine running at 5000-6000 revs/min, spark advance should be 26°.

CAUTION

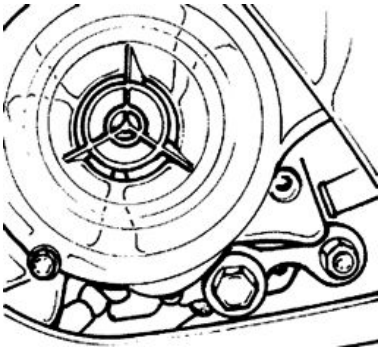
IF THE FLASH INDICATION IS UNSTABLE AND THE RPM INDICATION DOES NOT CORRESPOND TO THE ACTUAL SPEED VARIATION OF THE ENGINE (I.E. HALF VALUES), PROCEED WITH INSERTION OF A RESISTANCE CABLE FROM 10 ÷ 15 KΩ CONNECTED IN SERIES TO THE H.V. CABLE IF READING IRREGULARITIES PERSIST WITH THE SYSTEM SET UP THIS WAY, CHECK THE IGNITION SYSTEM COMPONENTS.

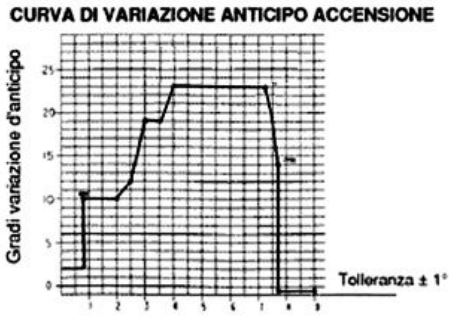
N.B.

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	8200 Rpm
1 spark on 3	8300 Rpm
all sparks are suppressed	8500 Rpm





Spark plug

The central electrode of the above spark plug is treated with silicone oil that acts as an antioxidant agent. If the silicone oil is in excess, crystals tend to form and, by causing hot fire points to preignition phenomena, tend to reduce the spark plug performance. This results in difficulties for vehicles to reach the maximum speed and anomalous noises.

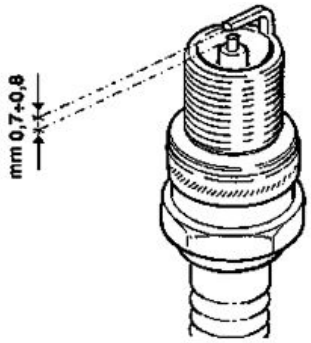
If the above situation should occur, replace the spark plug before performing any other intervention.

Before installing the new spark plug, blow with air to remove the silicone oil in excess.

Direct the jet of compressed air into the round groove between the threaded metal part and the ceramic part of the inner electrode while turning the spark plug to allow removal of the oil in excess.

Disconnect the cap and remove the spark plug.

- Inspect the plug and if the insulator is chipped or damaged, renew it.
- Measure the spark plug gap with a feeler gauge. If necessary adjust the gap by bending the outer electrode.
- Make sure the washer is in good condition.
- Fit the spark plug, screwing it in first by hand and then tighten it to the prescribed torque with a plug spanner.



Characteristic

Electrode gap

0.7 to 0.8 mm

Recommended spark - plug 1

Champion RG 4 HC

Recommended spark - plug

NGK CR9EB

Alternative spark plug

DENSO U24ESR-NB

Locking torques (N*m)

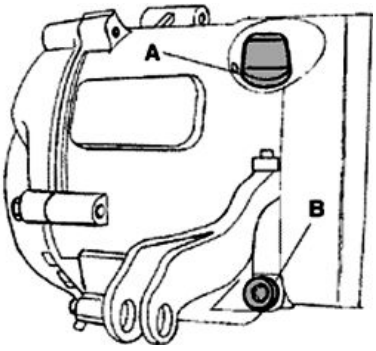
Spark plug 10 to 15 Nm

Hub oil

Check

Rest the vehicle on its centre stand on an even surface.

- Unscrew the oil dipstick "**A**", dry it with a clean cloth and reinsert it, **screwing it in thoroughly**.
- Pull out the dipstick and check that the oil level is above the "middle" notch (dipstick with 3 notches). For dipsticks with 2 notches, the oil level must remain in the lower half of the dipstick.
-Screw up the oil dipstick again and make sure it is locked properly into place.



Recommended products

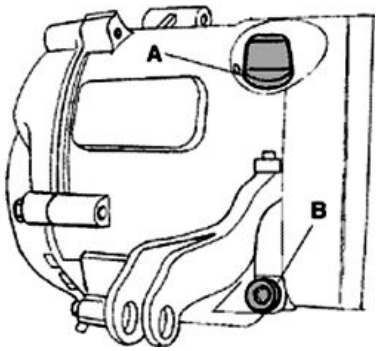
AGIP GEAR SAE 80W-90 Lubricant for gear-boxes and transmissions.

API GL-4

Replacement

Remove the oil filler cap/dipstick "**A**".

- Unscrew the oil drainage plug "**B**" shown in the figure and drain out all the oil.
- Screw the drainage plug back and fill up the hub with the required oil (about 100 cm^3)

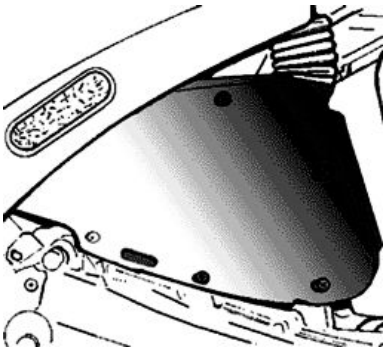


Air filter

- Remove the left-hand lower side band.
- Remove the cleaner cap after unscrewing the 7 fixing screws, and then pull out the filter element.

Cleaning:

- Wash in mild soap and water.
- Dry with a clean cloth without wringing and with compressed air.
- Soak with a 50% fuel-oil mixture with selenia air filter oil.
- Let the filter cartridge drip and then squeeze it between the hands without wringing.
- Refit all components by following the reverse procedure to the removal.



CAUTION

IF THE VEHICLE IS MOSTLY USED ON DUSTY ROADS, THE AIR FILTER NEEDS TO BE CLEANED AT SHORTER INTERVALS THAN INDICATED IN THE SCHEDULED MAINTENANCE TABLE.
DO NOT RUN THE ENGINE WITH THE AIR FILTER DISASSEMBLED OR EXCESS WEAR OF CYLINDER AND PISTON WILL RESULT.

Recommended products

AGIP FILTER OIL Special product for the treatment of foam filters.

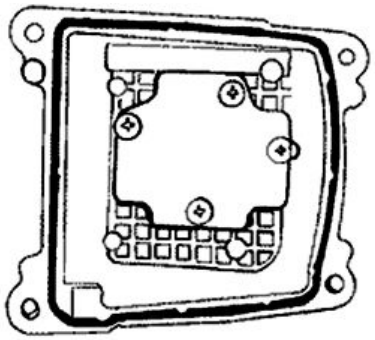
-

Engine oil

-The oil decanting system is a labyrinth type so it does not require servicing.

N.B.

IN THE EVENT OF LONG ROUTES OR LACK OF SERVICING, ADEQUATELY CLEAN THE LABYRINTH BY REMOVING THE FOUR SCREWS AND SHEET METAL COVER.



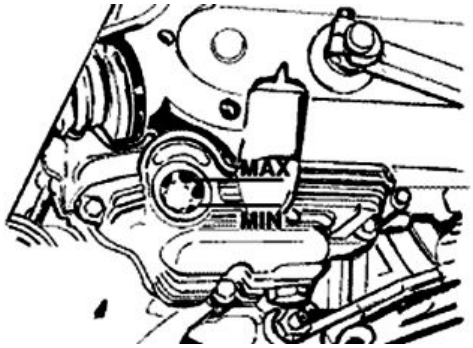
Replacement

Loosen the oil filler plug.

- Unscrew the gauze strainer drain plug on the flywheel side and allow the oil to drain completely.
- Retighten the drain plug and pour in approximately 600-650 cc of oil.
- Start the engine, let it idle for about a minute and then switch it off.
- Wait for at least ten minutes and then top up by adding oil to the «**MAX**» level.

Check

- Put the vehicle on the stand on level ground (cold engine).
- Check that the oil level is between the MIN and MAX marks on the sight.
- The MAX reference mark corresponds to approximately 850 cc of oil in the engine.
- If the oil level is near or below the MIN mark, top up by adding fresh oil, taking care to never exceed the MAX level.



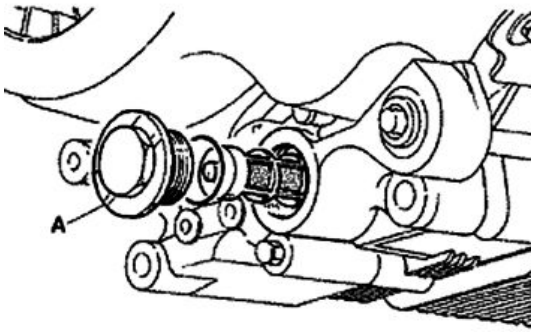
Recommended products

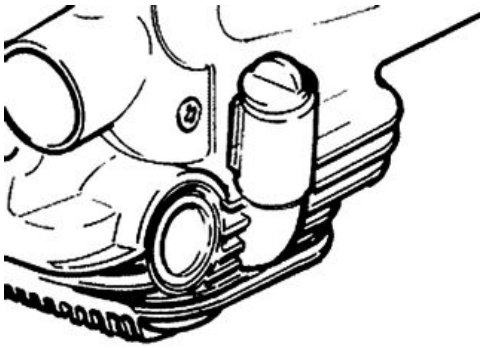
eni i-Ride PG 5W-40 Synthetic based lubricant for high-performance four-stroke engines.

JASO MA, MA2 - API SL - ACEA A3

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.

Run the engine for a couple of minutes and check the oil level when the engine is cold. The level should always be below the MAX mark

N.B.

For the first top-up or when servicing, add 850 cm³ of engine oil; for any other case, add 650 cm³ and top-up, if required.

Recommended products

eni i-Ride PG 5W-40 Synthetic based lubricant for high-performance four-stroke engines.

JASO MA, MA2 - API SL - ACEA A3

Locking torques (N*m)

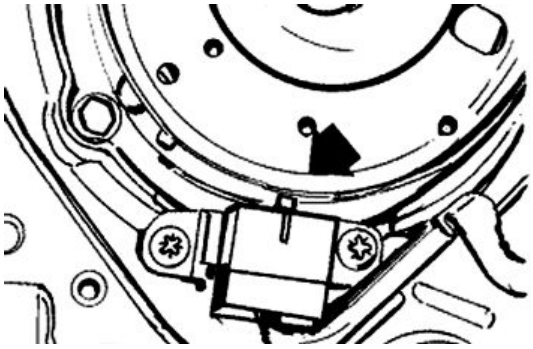
Engine oil pre-filter cover **25 to 28 Nm**

Checking the ignition timing

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

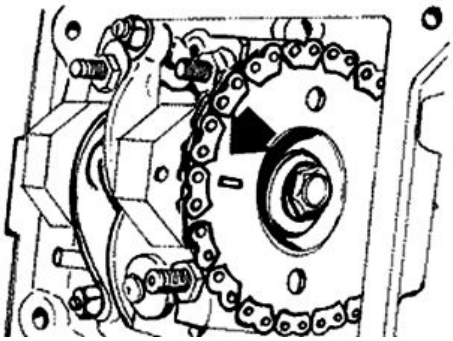
Make sure that the reference point on the camshaft command crown is aligned with the reference point on the head as shown in the second figure.

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.



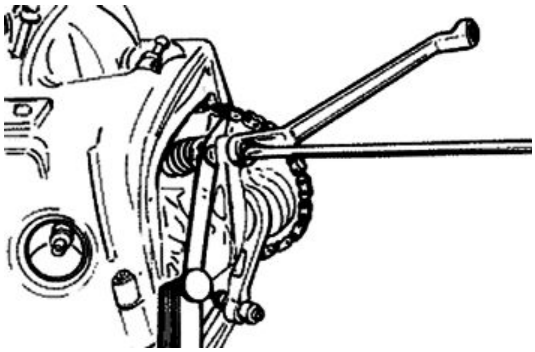
N.B.

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



Checking the valve clearance

- To check the play in the valves collimate the distribution timing point references as described above.
- Use a feeler to make sure the play between the valve and register screw correspond to the indicated values.
- If the values of the valve play for suction and exhaust are different than those shown below, adjust them by loosening the counternut and using a screwdriver on the register screw as shown in the figure.



Characteristic

Inlet (with cold engine)

0.10 mm

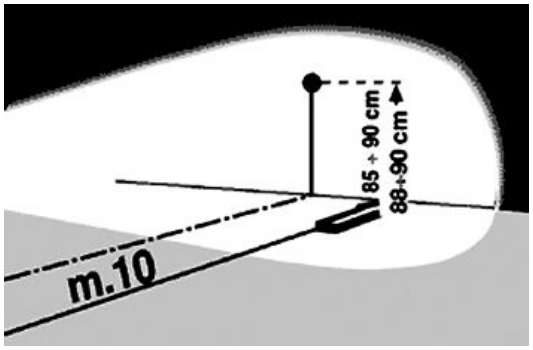
Outlet (with cold engine)

0.15 mm

Headlight adjustment

Set the unladen vehicle on level, even ground at a distance of 10 m from a flat wall or screen that is sufficiently darkened to be able to see the beam (see figure).

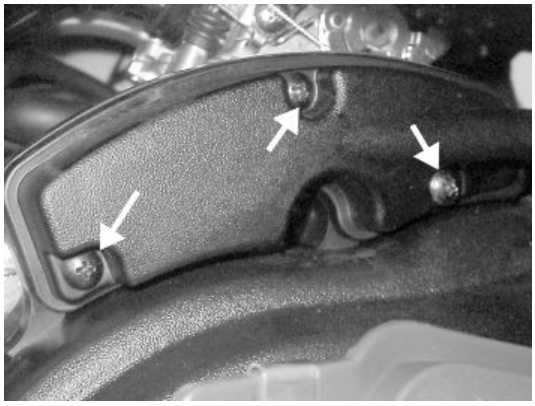
Make sure that the vehicle axis is at right angles to the screen. Mark the screen with a horizontal line 88 ÷ 90 cm from the ground. Start the engine, securing the throttle twistgrip independently so that you don't rock the vehicle. Switch on the head-

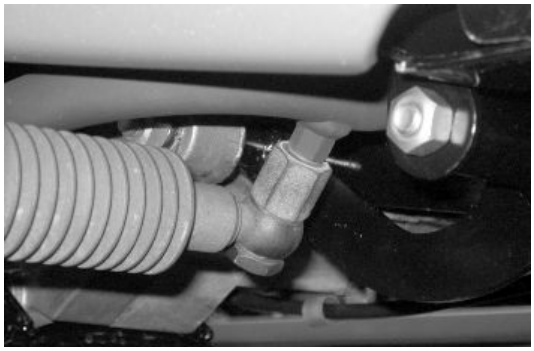


light dipped beam and position it so that the boundary between the brightly illuminated area and the surrounding area is no higher than the line you have drawn.
To access the adjustment screw remove the cover on the legshield rear fairing at the height of the bag clip. Adjust by turning the Phillips screw. Before adjusting the headlight angle, make sure the tyres are inflated to the specified pressures.

CO check

The check may be necessary in the event of irregularities in the engine performances, or when adjusting the engine idle speed.
- The test must be carried out only after having carefully cleaned all carburettor components with the air filter clean and the spark plug in good conditions.
1) Warm up the engine by riding the vehicle for about 5-10 minutes, as this is the time required for the choke device to disengage.
2) Shut down the engine only for the time required to carry out operations 3) and 4).
3) Remove the RH side fairing and the SAS box cover by loosening the 3 screws shown in the figure. Interpose a plastic sheet between the secondary air one-way valve and its housing on the cover. Ensure the valve gasket seals properly. Refit the SAS box cover.
4) Fit the special tool for the collection of exhaust gases as shown in the picture. Pay attention in ensuring the seal between the exhaust pipe and the collection tube. Insert the gas analyser and the exhaust tube.
5) Insert the multimetre thermometer inside the sump, through the oil filler hole.





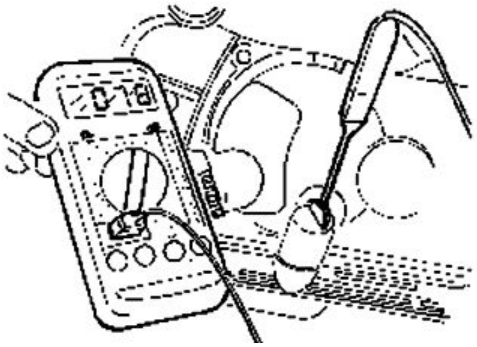
6) Start up the engine and, before adjusting the idle speed, ensure the oil temperature is between 70 and 80 °C.

7) Wait for a few minutes to let the temperature stabilise.

8) **Without ever activating the throttle** and through the idle screw, bring the engine speed to 1,950 ± 50 rpm.

9) Adjust the flow screw so to obtain a "CO" reading of 3.2 % ± 0.5 %.

10) **Slowly** twist the throttle handgrip, bringing the engine up to a speed of 4,000 rpm and then release it; check the idle speed is the same as before, otherwise repeat the operations starting from point (3).



Specific tooling

020332Y Digital rpm indicator

494929Y Exhaust fumes analyser

020331Y Digital multimeter

Checking the end compression pressure

- With the engine cold remove the sparkplug cap.
- Remove the sparkplug.
- Fit a compression testing pressure gauge in the sparkplug seat with a sparkplug fitting and tighten it.
- Run the motor using the starter and with the carburetor fully open, until the reading on the pressure gauge is stable.
- If the pressure is normal, remove the device and disassemble in the opposite order.
- If the pressure readings are below those indicated, check the engine rpm used for the test, if it is low check the starter system, if the number of rpm is perfect or slightly above make sure the correct seal has been chosen for the cylinder base and check the seals of the thermal part (elastic bands - valves etc. head cylinder cap and distribution.

N.B.

IF YOU HAVE A HARD TIME INSERTING THE PRESSURE GAUGE FITTING, DISCONNECT THE ENGINE - SWING ARM CONNECTION PIN AND PULL BACK THE ENGINE AS REQUIRED TO INSERT THE FITTING.

Characteristic

sparkplug fitting

10 mm

Compression end pressure: Engine rpm

13 ÷ 15 bar ~ 630 rpm (starting speed).

Locking torques (N*m)

Ignition spark plug 10 to 15 Nm

INDEX OF TOPICS

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

For each failure, a list of the possible causes and pertaining operations is given.

Engine

Poor performance

POOR PERFORMANCE

Possible Cause	Operation
The carburettor is dirty; vacuum operated cock failure	Remove, 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
Obstructed muffler	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
Drive 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
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 housing
Air filter housing not sealed	Correctly refit the filter housing and replace it if it is damaged
Purifier-carburettor fitting damaged	Replace

Starting difficulties

STARTING PROBLEMS

Possible Cause	Operation
Altered fuel characteristics	Drain off the fuel no longer up to standard; then, refill
Rpm too low at start-up or engine and start-up system damaged	Check the starter motor and the system.
Incorrect valve sealing or valve adjustment	Inspect the head and/or restore the correct clearance
Engine flooded	Try starting-up with the throttle fully open. If the engine fails to start, remove the spark plug, dry it and before refitting, make the engine turn so as to expel the fuel excess taking care to connect the cap to the spark plug, and this in turn to the ground. If the fuel tank is empty, refuel and start up.

Possible Cause	Operation
Automatic starter failure	Check: mechanical movement, electric connection and fuel supply, replace if required.
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.
Faulty spark plug or incorrect ignition advance	Replace the spark plug or check the ignition circuit components
The carburettor is dirty; vacuum operated cock failure	Remove, wash with solvent and dry with compressed air or replace
Flat battery	Check the charge of the battery, if there are any sulphur marks, replace and use the new battery following the instructions shown in the chapter
Intake coupling cracked or clamps incorrectly tightened	Replace the intake coupling and check the clamps are tightened
Defective floating valve	Check the proper sliding of the float and the functioning of the valve
Carburettor nozzles clogged	Dismantle, wash with solvent and dry with compressed air

Excessive oil consumption/Exhaust smoke

EXCESSIVE OIL CONSUMPTION / EXHAUST SMOKE

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

Insufficient lubrication pressure

LOW LUBRICATION PRESSURE

Possible Cause	Operation
By-Pass remains open	Check the By-Pass and replace if required. Carefully clean the By-Pass area.
Oil pump with excessive clearance	Perform the dimensional checks on the oil pump components
Oil filter too dirty	Replace the cartridge filter
Oil level too low	Restore the level using the recommended oil type (Selenia HI Scooter 4 Tech)

Engine tends to cut-off at full throttle

ENGINE TENDS TO CUT OUT AT FULL THROTTLE

Possible Cause	Operation
DEFECTIVE CIRCUIT OF FEEDING	Check and possibly replace the automatic vacuum tap, check the vacuum intake and the conduit seal
Incorrect float level	Restore the level in the tank by bending on the float the thrusting reed of the petrol inlet rod so as to have the float parallel to the tank level with the carburettor inverted.
Water in the carburettor	Empty the tank through the appropriate bleed nipple.
Maximum nozzle dirty - lean mixture	Wash the nozzle with solvent and dry with compressed air

Engine tends to cut-off at idle

ENGINE TENDS TO CUT-OFF AT IDLE

Possible Cause	Operation
Incorrect timing	Time the system and check the timing system components

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

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
Inefficient Starter	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

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 housing is not scored or worn in an anomalous way

Insufficient braking

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

Electrical system

Battery

BATTERY

Possible Cause	Operation
Battery	This is the device in the system that requires the most frequent attention and the most thorough maintenance. If the vehicle is not used for some time (1 month or more) the battery needs to be recharged periodically. The battery runs down completely in the course of 3 months. If the battery is fitted on a motorcycle, be careful not to invert the connections, keeping in mind that the black ground wire is connected to the negative terminal while the red wire is connected to the terminal marked+.

Turn signal lights malfunction

TURN INDICATOR NOT WORKING

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

Steering and suspensions

Rear wheel

REAR WHEEL ROTATES WITH ENGINE AT IDLE

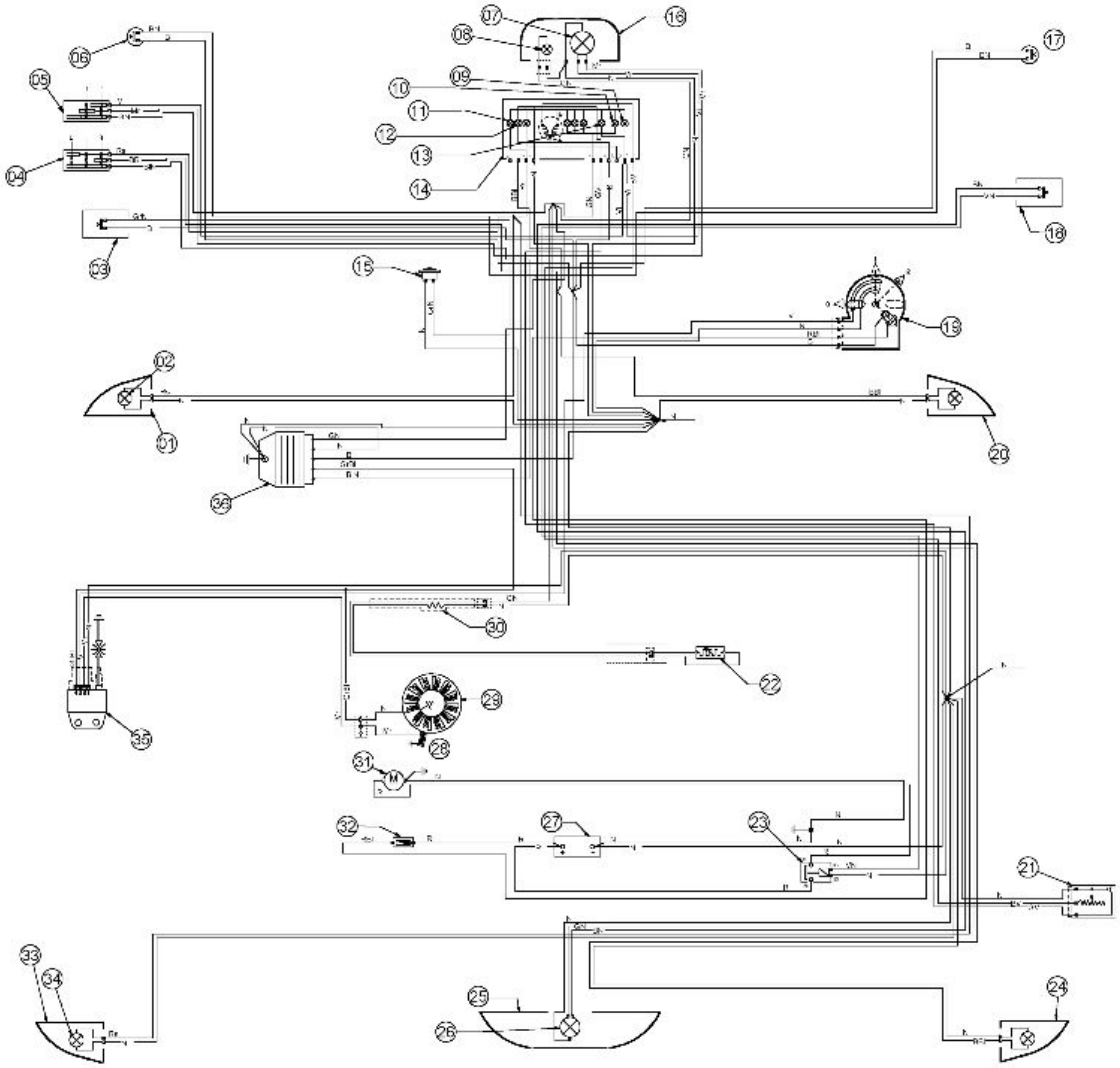
Possible Cause	Operation
Idling rpm too high	Adjust the engine idle speed and the CO%, if necessary.
Clutch fault	Check the springs / clutch masses

Controls

STEERING CONTROLS AND SUSPENSIONS

Possible Cause	Operation
Torque not conforming	Check the tightening of the top and bottom ring nuts. If irregularities continue in turning the steering even after making the above adjustments, check the seats in which the ball bearings rotate: replace them if they are recessed or if the balls are flattened.
Steering hardening	Check the tightening of the top and bottom ring nuts. If irregularities continue in turning the steering even after making the above adjustments, check the seats in which the ball bearings rotate: if they are recessed or if the balls are squashed, replace them.
Faults in the suspension system	If the front suspension is noisy, check: the efficiency of the front shock absorber; the condition of the ball bearings and relevant lock-nuts, the limit switch rubber buffers; and the movement bushings. In conclusion, check the tightening torque of the wheel hub, the brake calliper, the shock absorber disc in the attachment to the hub and the steering tube.
Faulty or broken seals	Replace the shock absorber Check the condition of wear of the steering covers and the adjustments.

INDEX OF TOPICS



Legend:

1. Left front turn indicator 2 bulbs

2. 2 amber bulbs for indicators

3. Horn button

4. Turn signal selector.

5. High/low beam selector

6. Rear brake stop button

7. Bulb

8. Bulb for front position light

9. Turn signal indicator lights (Right)

10. Instrument bulbs

11. Turn signal indicator lights (Left)

12. Fuel warning light

13. Main beam indicator light

14. Speedometer with indicators and level indicator instrument with 7 bulbs and 2 bulbs

15. Horn

16. Headlight

17. Front brake stop button

18. Start button

19. Keyswitch

20. Front right indicator

21. Fuel warning light transmitter

22. Automatic choke

23. Starter motor contactor

24. Rear right indicator

25. Complete taillight

26. Rear position and stop light bulb

27. Battery

28. Pick-up

29. Magneto

30. Complete resistance

31. Starter motor

32. Fuse holder with 10A fuse

33. Rear left indicator

34. 2 amber bulbs for indicator

35. Electronic ignition

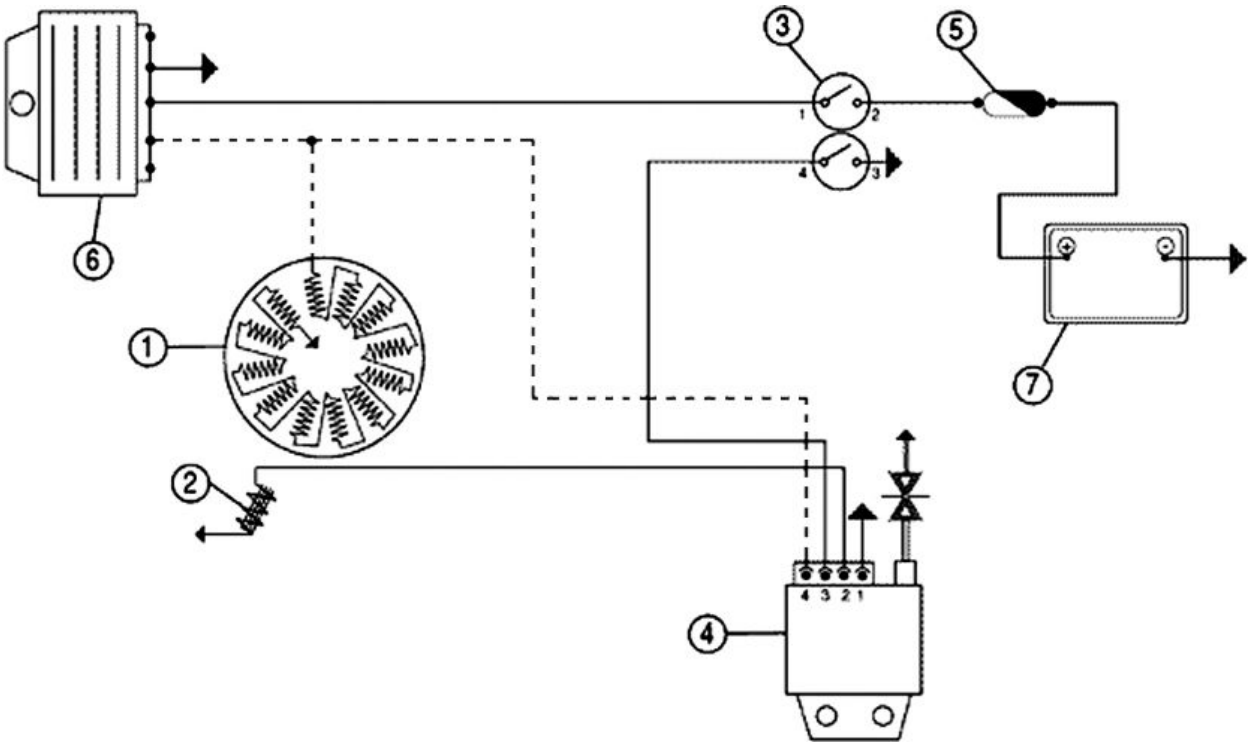
36. Voltage regulator

Wire color coding:

B = White Mr = Brown N = Black GN =Yellow-Black Rs = Pink R = Red Vi = Purple BN = White-Black BBl = White-Blue GV = Yellow-Green GrBl = Gray-Blue RBl = Red-Blue BV = White-Green BlN = Blue-Black GrN = Gray-Black VN = Green-Black

Conceptual diagrams

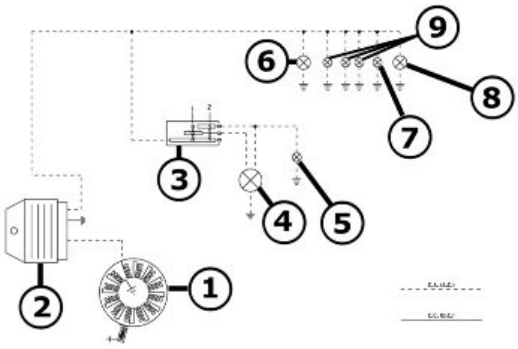
Ignition



IGNITION

	Specification	Desc./Quantity
1	Magneto flywheel	
2	Pick - up	
3	Key switch contacts	
4	Electronic ignition device	
5	Fuse	10 A
6	Voltage regulator	
7	Battery	12V-9Ah

Headlights and automatic starter section

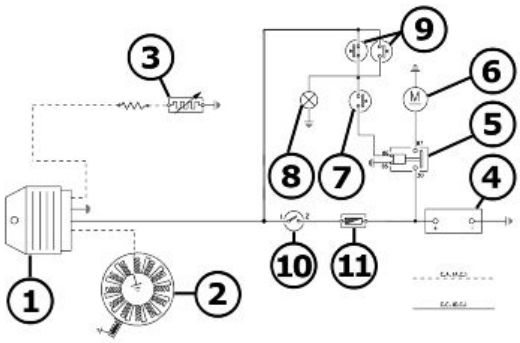


LIGHTS

	Specification	Desc./Quantity
1	Magneto flywheel	
2	Voltage regulator	

	Specification	Desc./Quantity
3	Light switch	
4	Headlight bulb	12V-35/35W
5	High-beam warning light	12V - 1.2W
6	Rear light bulb	12V - 5W
7	Headlight warning light	12V - 1.2W
8	Front position light filament	12V - 5W
9	N°3 instrument lighting bulbs	12V - 1.2W

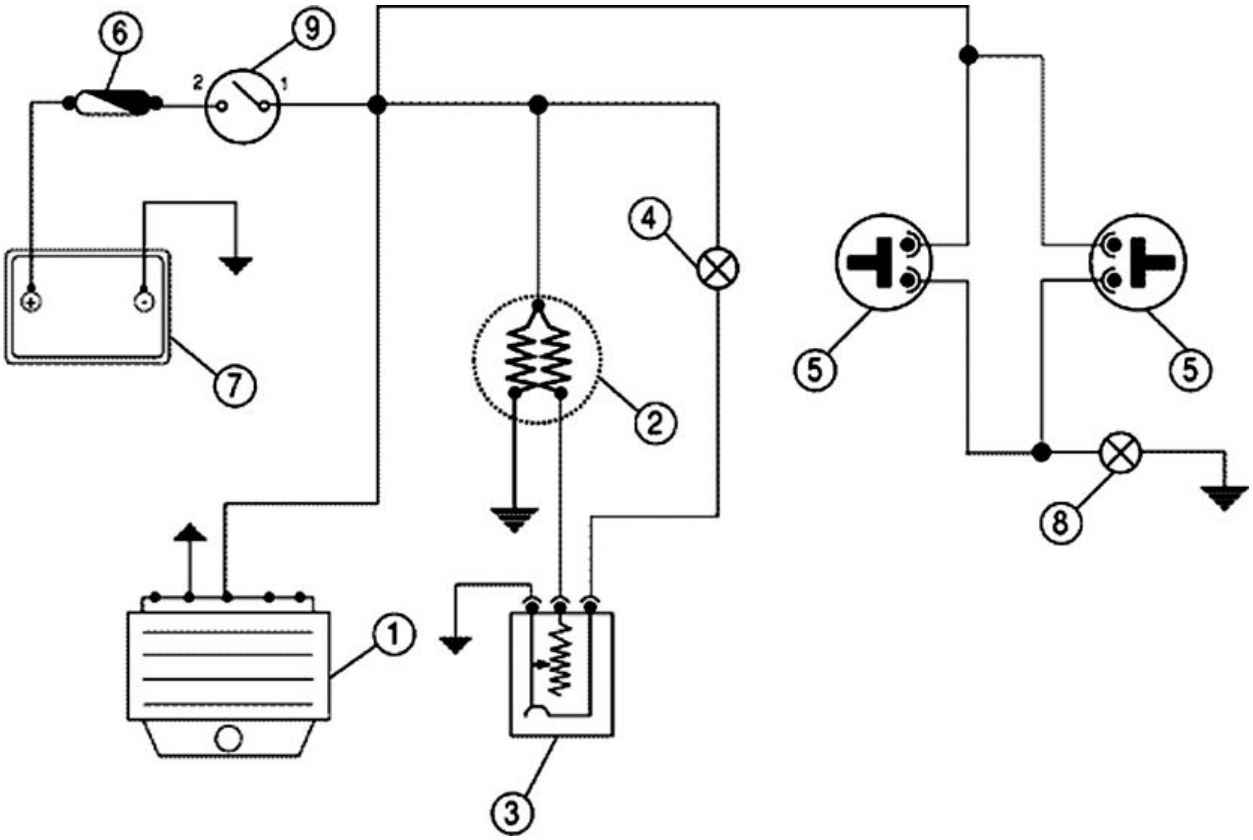
Battery recharge and starting



BATTERY RECHARGE AND STARTING SECTION

	Specification	Desc./Quantity
1	Voltage regulator	
2	Magneto flywheel	
3	Automatic starter	
4	Battery	12V-9Ah
5	Remote starter switch	
6	Starter motor	
7	Start up button	
8	Brake light filament	12V-21W
9	Front and rear brake light button	
10	Key switch	
11	Main fuse	10A

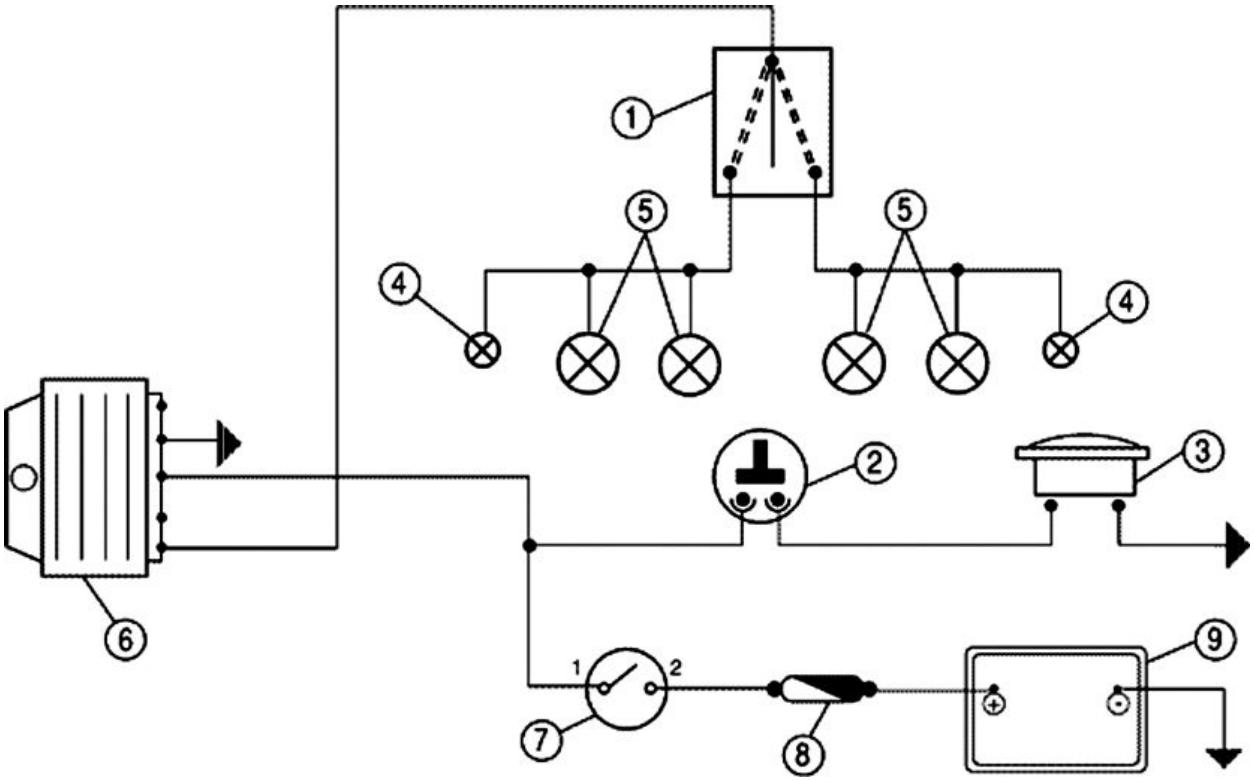
Level indicators and enable signals section



START PERMISSIVE BUTTONS AND LEVEL INDICATORS

	Specification	Desc./Quantity
1	Voltage regulator	
2	Fuel gauge	
3	Fuel level sender	
4	Low fuel warning light	12V - 1.2W
5	Front and rear brake light button	
6	Fuse	10 A
7	Battery	12V-9Ah
8	Brake light filament	12V-21W
9	Key switch contacts	

Turn signal lights

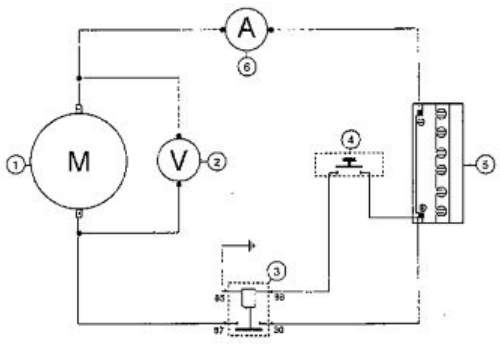


TURN INDICATORS AND HORN

	Specification	Desc./Quantity
1	Indicators switch	
2	Horn button	
3	Horn	
4	Two (2) turn signal warning light bulbs	12V - 2W
5	4 Turn indicator bulbs	12V-10W
6	Voltage regulator	
7	Key switch contacts	
8	Fuse	10 A
9	Battery	12V-9Ah

Checks and inspections

1)-No-load test: the starter motor, under no-load, must draw a maximum of 10 Amp with a supply voltage of ≥12V and must rotate at ≥15,000 rpm.
2)-Load test: braking the starter motor so that it draws 47 Amp, and with a supply voltage of ≥ 10V, a torque of ≥ 0.2 N·m must be obtained, at 10,000 rpm minimum
3)-Pick-up test: with the rotor locked and a supply voltage of < 7V, the current drawn must not be



higher than 130 Amp and the torque must not be lower than 0.55 N·m.

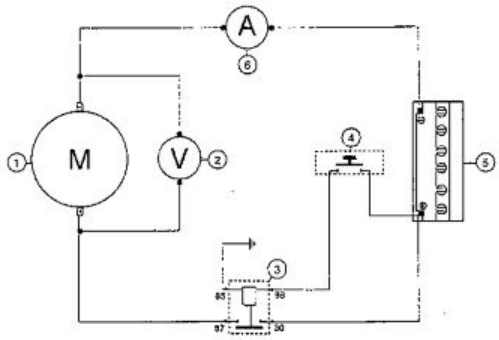
N.B.

THESE VALUES MUST BE MEASURED WITH A CHARGED BATTERY AND AFTER THE STARTER HAS BEEN ROTATING FOR 30" UNDER CONDITIONS OF POINT 1

ELECTRIC MOTOR

	Specification	Desc./Quantity
1	Starter motor	
2	Voltmeter	
3	Start-up solenoid	
4	Battery	12V-3.6Ah
5	Starter button	
6	Ammeter	

1) No-load test: the starter motor, when unloaded, must absorb no more than 10A with a supply voltage ≥ 12V and must rotate at ≥ 15,000 rpm.
2) Load test: when the starter motor is so braked that it absorbs 47A with supply voltage ≥ 10V, torque of ≥ 0.2 N•m must be obtained at 10,000 rpm.
3) Static torque test: when the rotor is locked and the supply voltage is <7V, the absorbed current must not exceed 130A and the torque must be at least 0.55 N•m



specifications

- Nominal voltage 12V.
- Nominal power 0.25 kW.
-Left turn seen from the pinion side.
-Connection to the engine with pinion and toothed sprocket on the crankshaft, transmission side.
- Control with switch.
- Battery used for the test: 12V-3.6Ah.

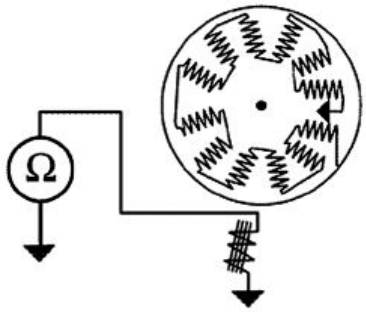
N.B.

THESE VALUES MUST BE MEASURED WITH A CHARGED BATTERY AND AFTER THE STARTER HAS BEEN ROTATING FOR 30" UNDER CONDITIONS OF POINT 1

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.

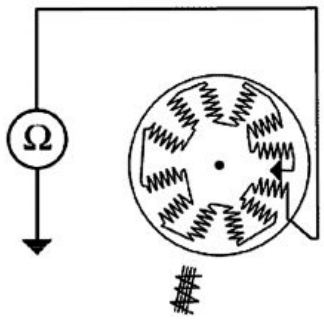


If the failure persists, check the generator and the stator components as follows:

After visually checking the electrical connections, use a specific tester to measurement the stator winding and the pickup (see table).

If any failure is found after checking the loading coil and the pick-up, **replace the stator and the damaged parts.**

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



Specific tooling

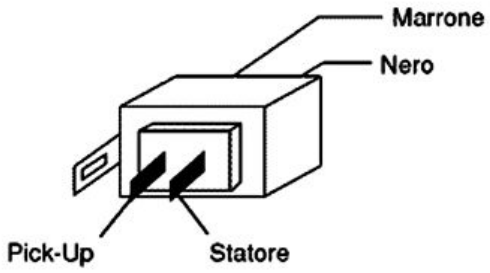
020331Y Digital multimeter

PICK-UP CHECK

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

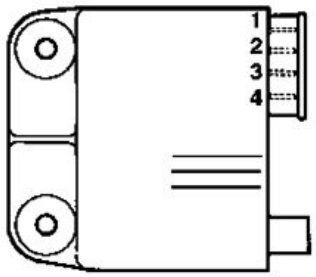
STATOR WINDING CHECK

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



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.

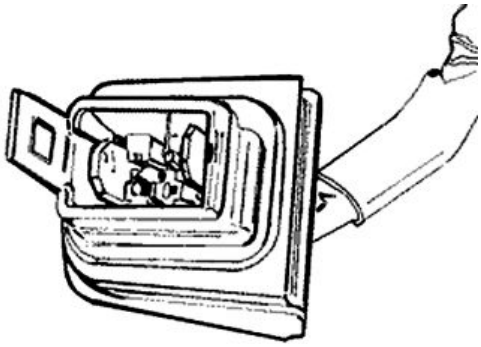


Stator check

- 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

~ 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:

1) Bulbs burned out (regulator in short circuit).

2) Malfunction of the lighting system and the electric starter (regulator interrupted).

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).

1) BULBS BURNT

Replace the regulator because it is certainly inefficient.

2) LIGHTS AND STARTER NOT WORKING

Access the voltage regulator by removing the plastic cover on the legshield; start the engine and keep it running 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 probe 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.

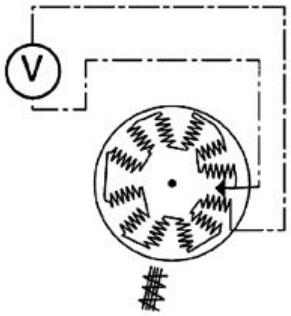
As a last check, the voltage supplied by the stator can be measured:

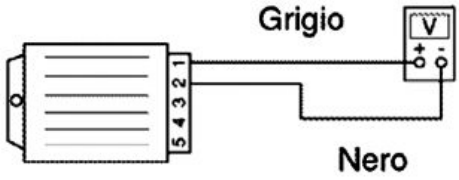
- Disconnect the regulator connector and place a tester between the Grey-Blue cable (4) and the earth in order to detect alternating voltages (see figure).
- Voltage supplied at 2,000 rpm must be about 25 ÷ 35V.

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

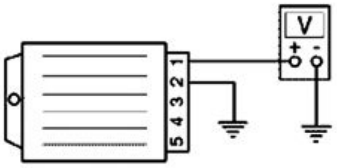
N.B.

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).

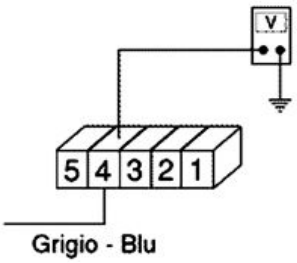




~ 12V a 1900÷2000 giri/min.



~ 12V a 1900÷2000 giri/min.



~ 25÷35V a 1900÷2000 giri/min.

3) BATTERY NOT RECHARGING

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 ignition switch is not damaged and causing a short circuit to earth (thus excluding the possibility that the regulator is damaged); if the protection fuse blows only after the ignition 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 earth.

Now measure the resistance between contact 3 (White) and contact 2 (Black) of the voltage regulator (with connector disconnected);

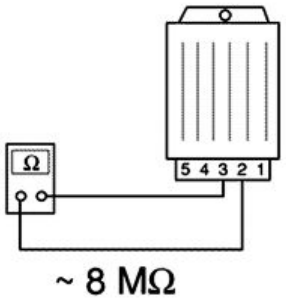
If the value measured is far from that indicated, replace the regulator because it is in short circuit.

b) Battery fails to recharge (regulator interrupted).

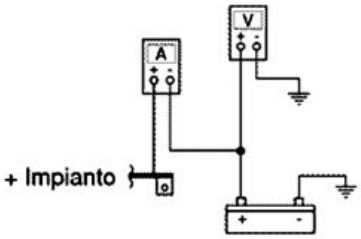
To check if there is any failure in the voltage regulator recharge section, first connect 2 testers to the battery (one to detect voltage and the other to detect current) as indicated in the second figure and follow the procedure below:

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 ÷ 2A with the vehicle lights off.



~ 8 MΩ



~ 2000 giri/min 1,3V/1,5÷2A
> 4000 giri/min 14÷14,5V > 4A

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's lights and stop light are switched on and the horn is powered, current values ≥ 5A and a voltage of 14 -14.5V (regulator threshold voltage) can be measured.

If values other than those above are detected, replace the regulator; contrariwise, check the cable harness and the connections.

Electric characteristic

Voltage regulator resistance

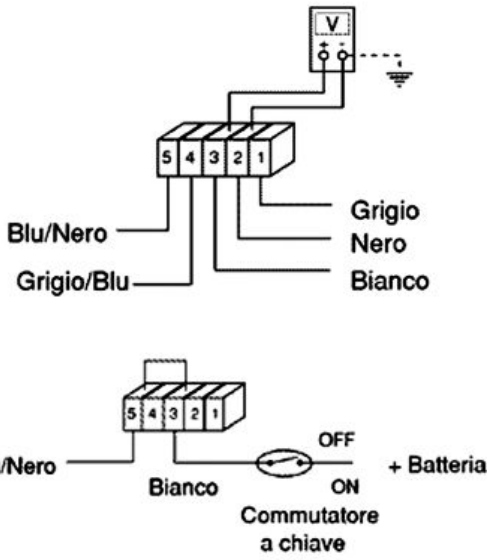
~ 8 MΩ

4) TURN INDICATORS NOT WORKING

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

- Disconnect the regulator connection and insert the multimeter probes 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 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 that the wiring is not damaged and the 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

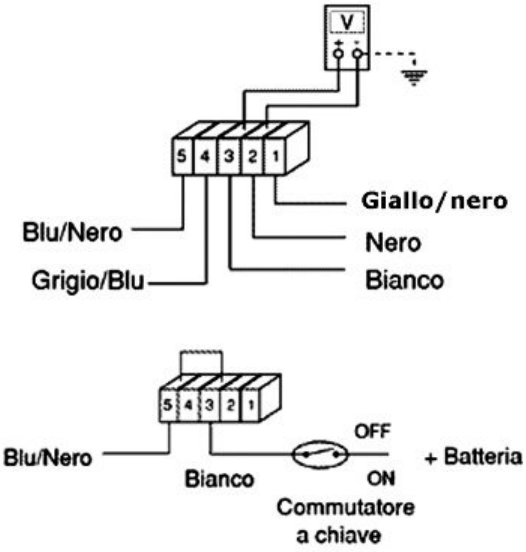
Turn signals system check

4) TURN INDICATORS NOT WORKING

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

- Disconnect the regulator connection and insert the multimeter probes 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 the turn indicator switch left and right to see when the lights are steadily on (as they are powered directly from the battery).

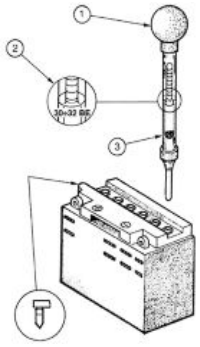
If even after this operation the turn indicators fail to turn on, check that the wiring is not damaged and the switch works properly. If these last two tests have a positive result, replace the regulator because it is certainly not functioning properly.



Specific tooling

020331Y Digital multimeter

Sealed battery



INSTRUCTIONS FOR REFRESHING THE STOCK CHARGE OF AN OPEN CIRCUIT

1) Voltage check up

Before installing the battery on the vehicle, check the open circuit voltage with a standard 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÷14.70V

-Initial charge voltage equal to 0.3÷0.5 for 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. GIVEN THESE CONDITIONS IT IS HOWEVER ESSENTIAL NOT TO EXCEED 8 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

WARNING

- Battery electrolyte is toxic and it may cause serious burns. It contains sulphuric acid. Avoid contact with eyes, skin and clothing. In case of contact with eyes or skin, flush abundantly with water for about 15 minutes and seek immediate medical attention.
In the event of accidental ingestion of the fluid, immediately drink large quantities of water or milk. Follow with milk of magnesia, beaten egg or vegetable oil. Seek immediate medical attention
Batteries produce explosive gases; keep clear of free flames, sparks or cigarettes; ventilate the area when recharging the battery indoors.
Always protect your eyes when working close to batteries.
Keep out of the reach of children.

1)- Remove the short closed tube and the caps, then pour sulphuric acid into the cells using the type specified for batteries, with a specific gravity of 1.26, corresponding to 30° Bé, at a minimum temperature of 15°C until the upper level is reached.

2) - Leave to rest for at least 2 hours; then, restore the level with sulphuric acid.

3)- Within the following 24 hours, recharge with the specific battery charger (single) or (multiple) at a density of about 1/10 of the battery nominal capacity and until the acid density is about 1.27, corresponding to 31º Bé, and these values are stabilised.

4) - Once the charge is over, level the acid (by adding **distilled water**). Close and clean carefully.

5)- Once the above operations have been performed, install the battery 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.

Specific tooling

020333Y Single battery charger

020334Y Multiple battery charger

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 works overcharged and is subject to quick wear.

2)Load status check

After restoring the electrolyte level, check its density using an appropriate densitometer (see the figure). When the battery is charged, you should detect a density of 30 to 32 Bé corresponding to a specific weight of 1.26 to 1.28 at a temperature of no lower than 15° C.

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

After charging the battery, check each element electrolyte level and density. If the scooter is not used for a given time (1 month or more) it will be necessary to periodically recharge the battery.

The battery runs down completely in the course of three months.

If it is necessary to refit the battery in the vehicle, be careful not to reverse the connections, remembering that the earth wire (**black**) marked (-) must be connected to the **- negative** terminal while the other two **red** wires marked (+) must be connected to the terminal marked with the + **positive** sign.

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

4) Cleaning the battery

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

WARNING

- Before recharging the battery, remove the plugs of each cell. Keep the battery away from naked flames or sparks when charging.
Remove the battery from the vehicle disconnecting the negative terminal first.

CAUTION

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

CAUTION

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

CAUTION

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

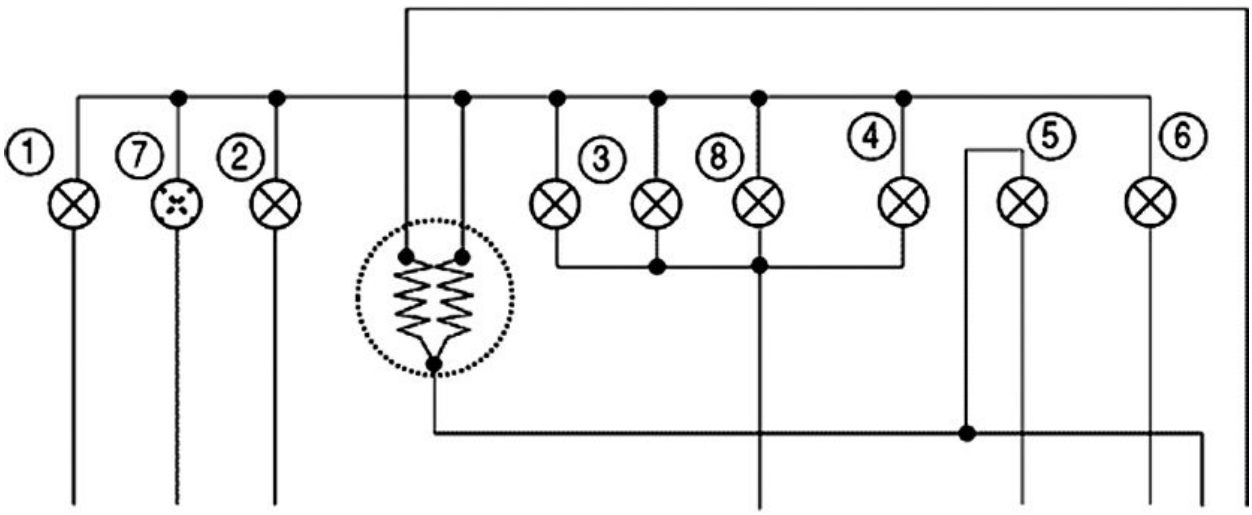
Specific tooling

020333Y Single battery charger

020334Y Multiple battery charger

Connectors

Dashboard



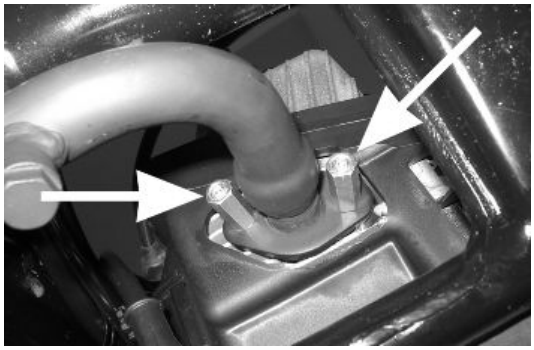
INSTRUMENT PANEL

	Specification	Desc./Quantity
1	Left turn indicator warning light	12V - 2W
2	High-beam warning light	12V - 1.2W
3	Instrument panel lighting bulbs	12V - 1.2W
4	Headlight warning light	12V - 1.2W
5	Low fuel warning light	12V - 1.2W
6	Right turn indicator warning light	12V - 2W
7	Pre-set warning light	
8	Instrument panel lighting bulb	12V-2W

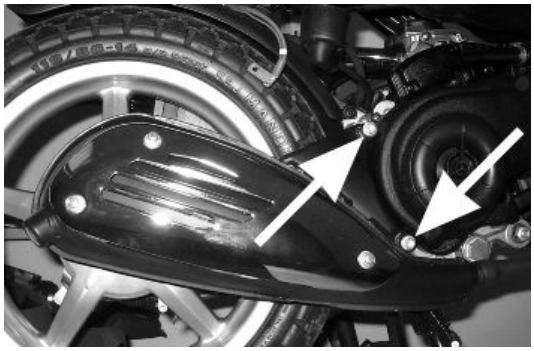
INDEX OF TOPICS

Exhaust assy. Removal

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



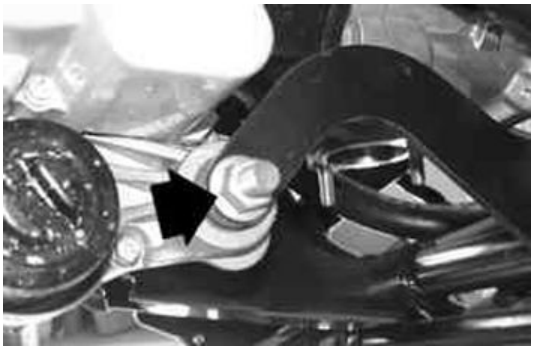
- Undo the 2 screws fixing the silencer to the housing; then remove the whole muffler paying attention to the interference between its supporting bracket and the cooling cover.



Removal of the engine from the vehicle

Removing the engine/connecting arm pivot pin

Remove the nut shown in the figure and then withdraw the pin.



Reassembling engine to frame

Perform the disassembly steps in reverse order. Observe the prescribed tightening torques.

Locking torques (N*m)

Engine swinging arm pin nut 33 to 41 Engine/shock absorber 33÷41N·m

Disassembling engine from frame

-Disconnect the battery.

-Remove the muffler assembly.

- Remove the rear wheel.

- Remove the mechanical transmission of the rear brake.

-Disconnect the electric terminals.

- Remove the throttle grip and mixer transmissions.

- Disconnect the hoses (petrol-oil-vacuum-operated cock control).

WARNING

Handle fuel with care.

CAUTION

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

WARNING

Wear safety goggles when using hitting tools.

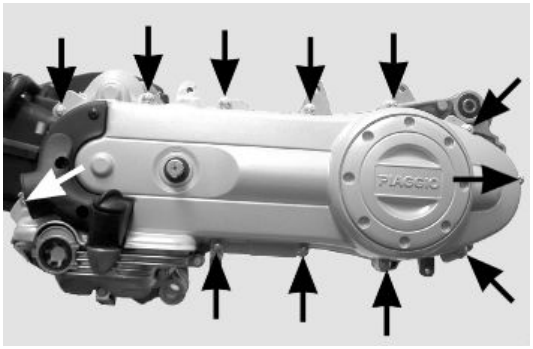
INDEX OF TOPICS

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.

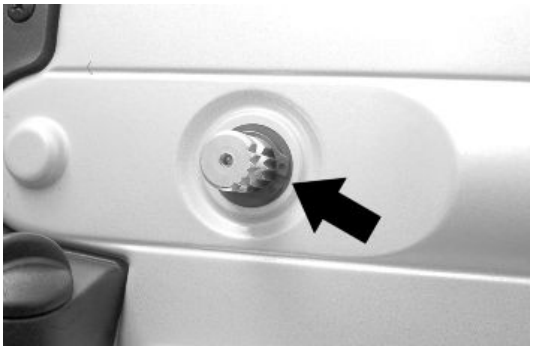
Kickstart

-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.

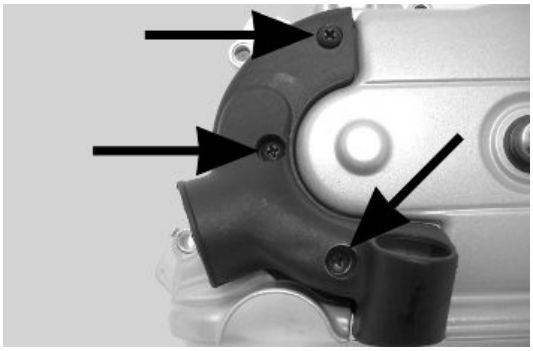


WARNING

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.

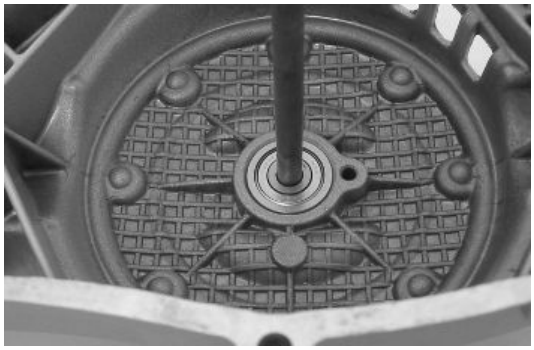


Removing the driven pulley shaft bearing

- 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 housing with the specific tool.
- Remove the nut, the clutch 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 clutch bell inside diameter.

Characteristic

clutch housing diameter/standard value

Ø 107+0.2 +0 mm

clutch housing diameter/max. value allowed after use

Ø 107.5 mm

Eccentricity measured /max.

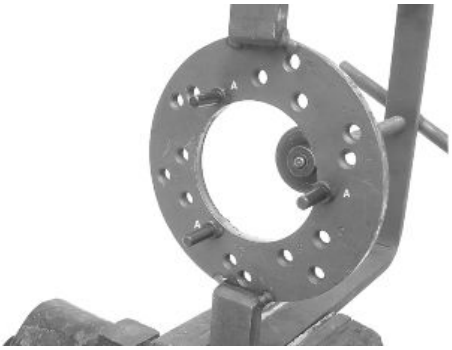
0.20 mm

Removing the clutch

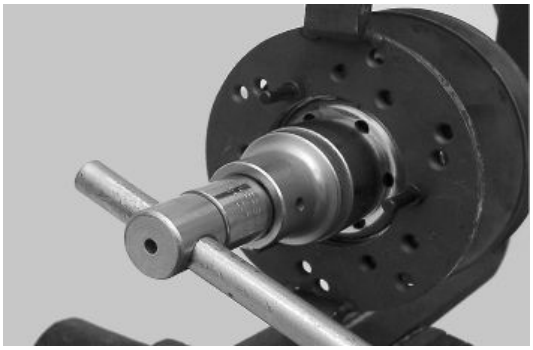
- Equip the tool with long pins screwed into position «**A**» from the outside, insert the entire driven pulley in the tool and have the central screw make contact.

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 SEAL 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 DRIVE BELT

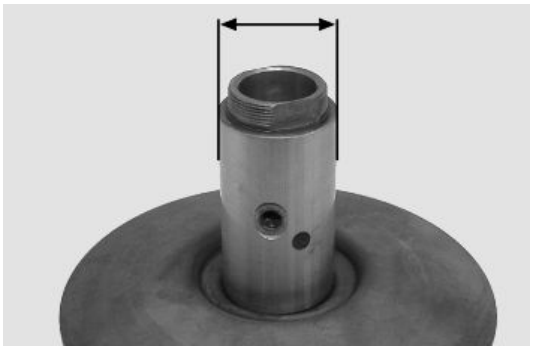
Specific tooling

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 outside diameter of the pulley bushing.



Characteristic

Stationary driven half-pulley/Standard diameter

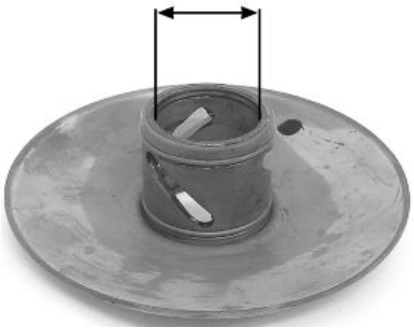
Ø 33.965 to 33.985 mm

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 Gray black smooth-textured lithium grease, containing molybdenum disulphide.

-

- 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 Gray black smooth-textured lithium grease, containing molybdenum disulphide.

-

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

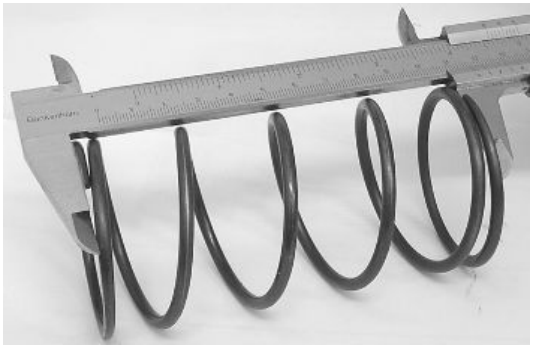
020456Y Ø 24 mm adaptor

020362Y 12 mm guide

020171Y Punch for Ø 17 mm roller bearing

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 shank.

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

CAUTION

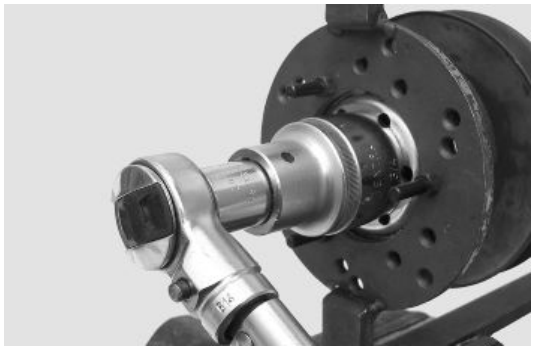
SO AS NOT TO DAMAGE THE CLUTCH NUT USE A SOCKET WRENCH WITH SMALL CHAMFER.

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 to 60 Nm



Refitting the driven pulley

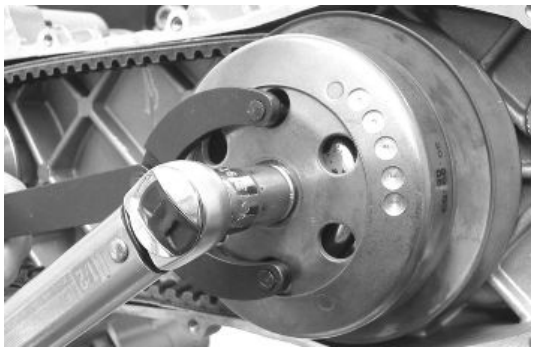
-Refit the driven pulley assembly, the clutch bell and the nut, using the specific tool.

Specific tooling

020565Y Flywheel lock calliper spanner

Locking torques (N*m)

Driven pulley shaft nut 40 to 44 Nm



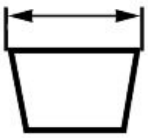
Drive-belt

- Make sure the drive belt is not damaged and does not have cracks in the toothed grooves.
- Check the width of the belt.

Characteristic

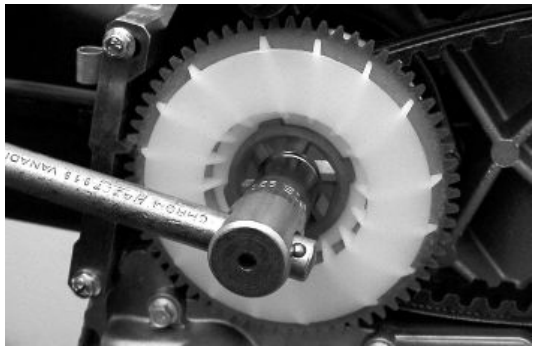
Transmission belt/Minimum width

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.



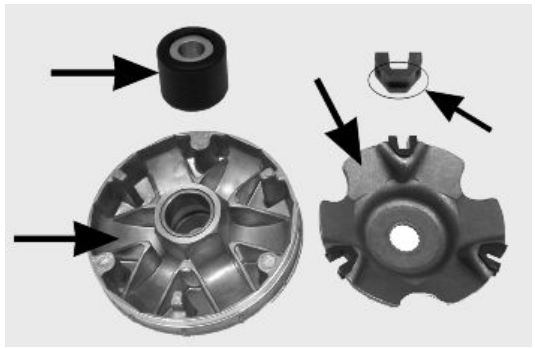
- Remove the belt, washer and remove the mobile half-pulley with its bushing, being careful that the rollers and contrast plate fitted loosely on it do not come off.

Specific tooling

020451Y Starting ring gear lock

Inspecting the rollers case

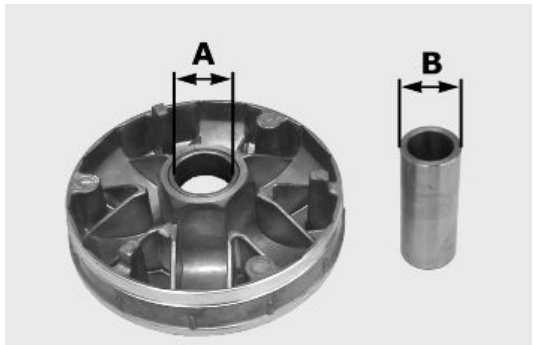
1) Check that the bushing and the sliding rings of the mobile pulley do not show signs of scoring or deformation.
2) Check the roller running tracks on the contact pulley; there must not be signs of wear and check the condition of the contact surface of the belt on the half-pulleys (mobile and stationary).
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 shoes 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:

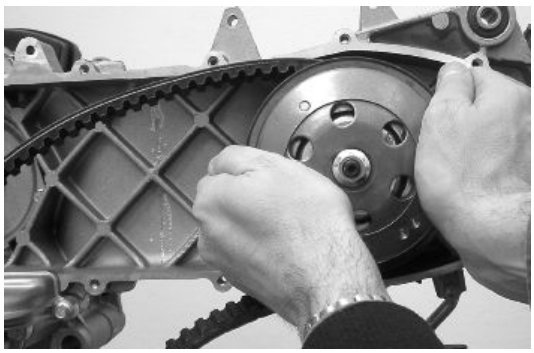
20 -0.020/-0.041mm

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 housing 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.

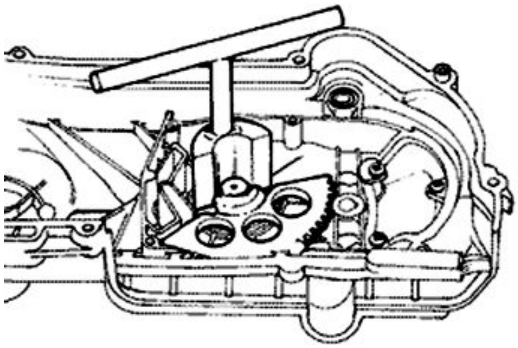
Specific tooling

020451Y Starting ring gear lock

Locking torques (N*m)

Crankshaft pulley nut **18 to 20 + 90° Nm**

Refitting the transmission cover



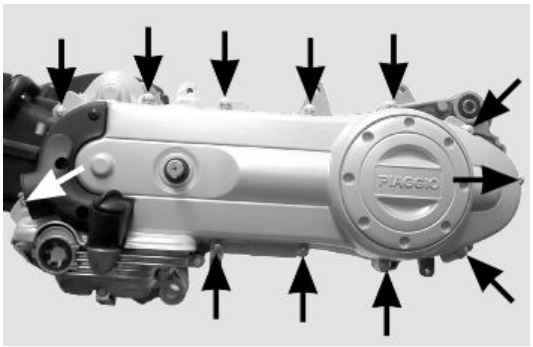
- Check the following for wear: toothed section, toothed section shaft, cover seat bushing, pinion shaft and its seating in the crankcase and the return spring.
- Remove the damaged components.
- Grease the spring.
- Remove the toothed sector and load the spring with an appropriate tool.
- Refit the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

Recommended products

AGIP GREASE MU3 Yellow-brown, lithium-base, medium-fibre multipurpose grease.

ISO L-X-BCHA 3 - DIN 51 825 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.

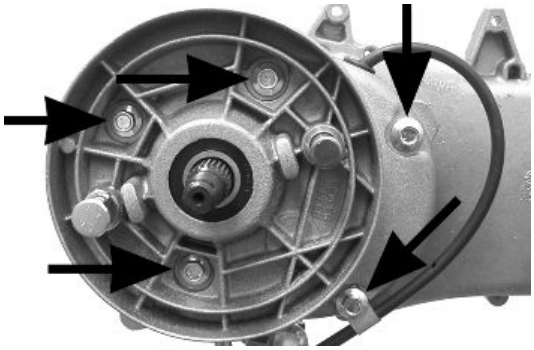
Locking torques (N*m)

Transmission cover screws **11 to 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

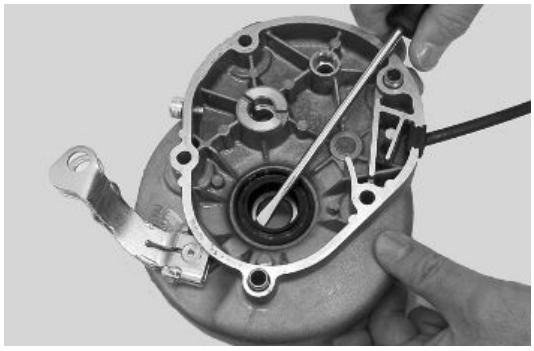
- Remove the oil seal and the seeger ring.
- Fix the hub cover properly to avoid damaging the sealing surface with the housing
- Remove the wheel axle bearing using the specific tool

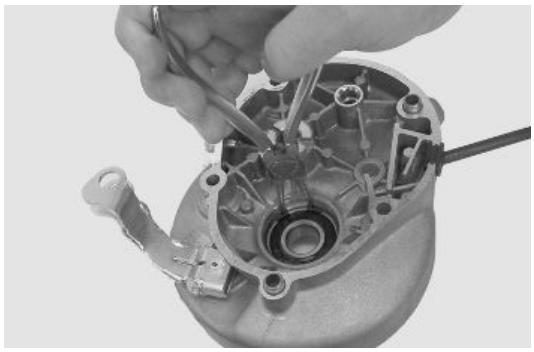
Specific tooling

020363Y 20-mm guide

020376Y Adaptor handle

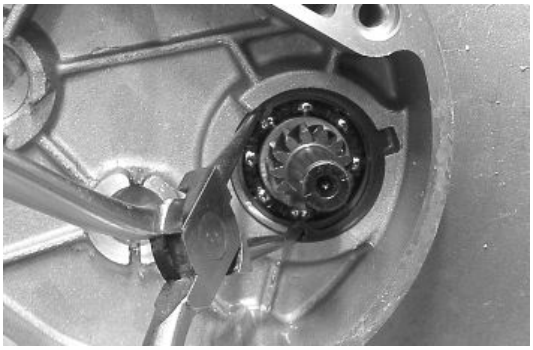
020477Y 37 mm adaptor





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.

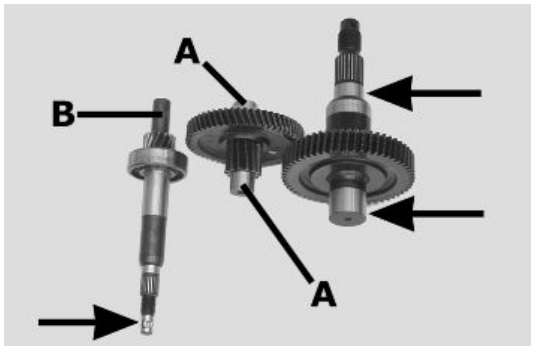
USE THE SPECIFIC TOOL ON THE SIDE WITH THE SMALLER INTERNAL DIAMETER

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.
- If faults are found, 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 seats or in the pulley shaft capacities



Inspecting the hub cover

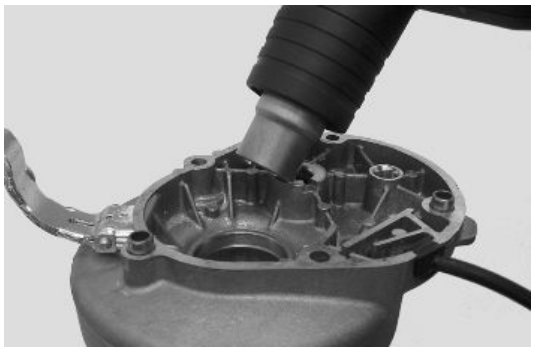
- Check that the fitting surface is not dented or distorted.
- If faults are found, replace the hub cover.

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

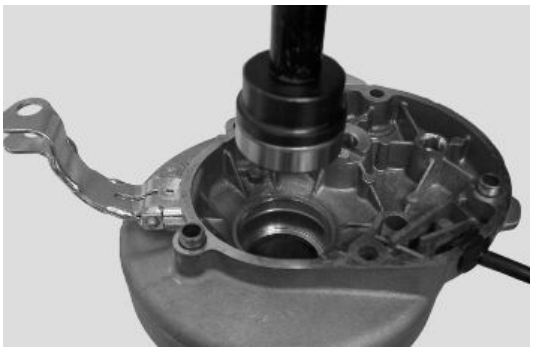
020150Y Air heater mounting

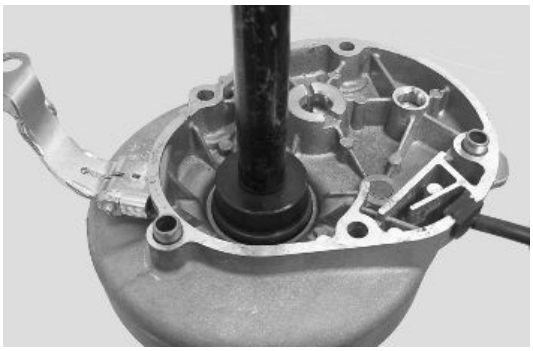
020151Y Air heater

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 ub 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

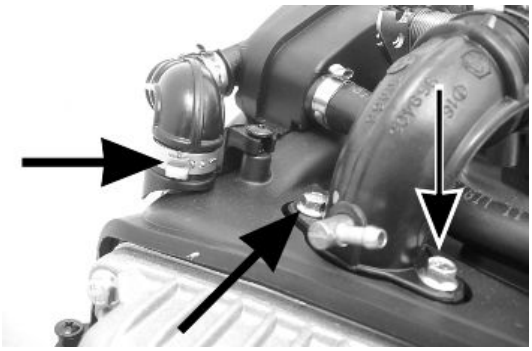
Locking torques (N*m)

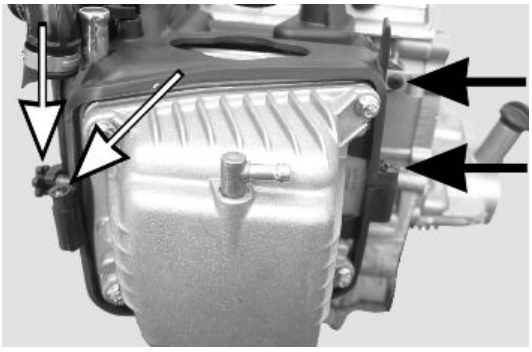
hub cap screws **24 - 26**

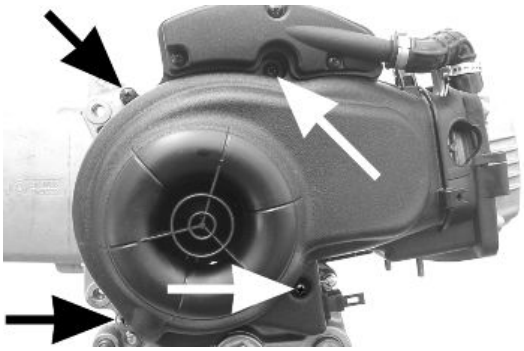
Flywheel cover

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

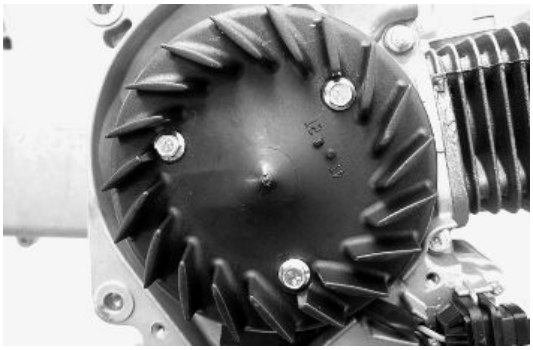
TAKE CARE TO CORRECTLY POSITION THE FLYWHEEL CONNECTOR.

N.B.

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

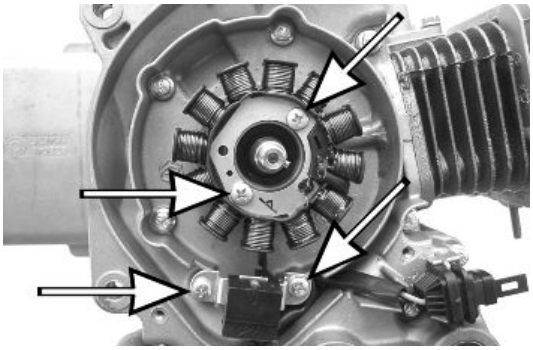
Cooling fan

- 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.

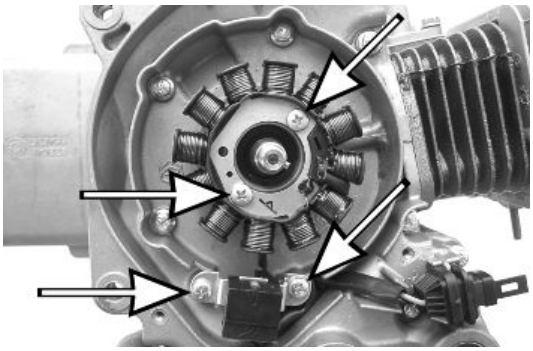


Refitting the stator

- 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.



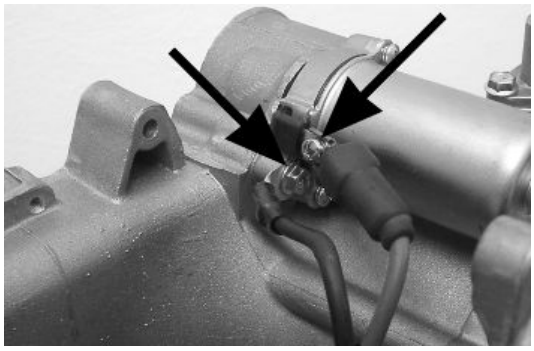
Locking torques (N*m)

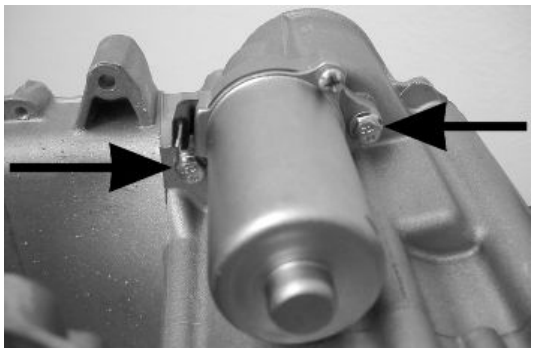
Pick-up screws 3 ÷ 4 Stator screws 3 to 4

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 toothing is level and in good conditions

Intermediate gear

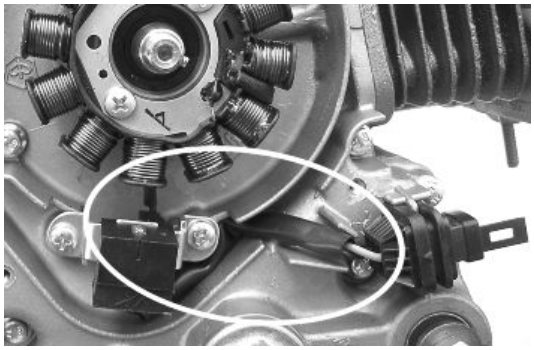
- Check that the keying toothing on the crown and the starter motor are in good conditions.
- Check that the Bendix opens and returns adequately.

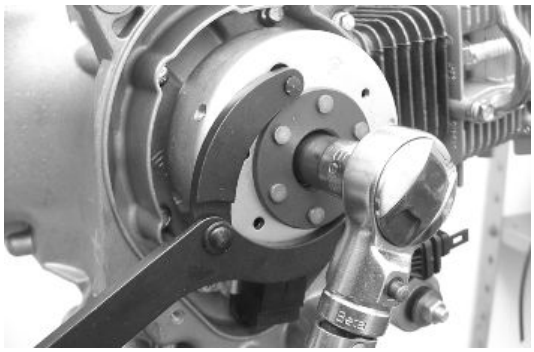
Refitting the flywheel magneto

- 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)

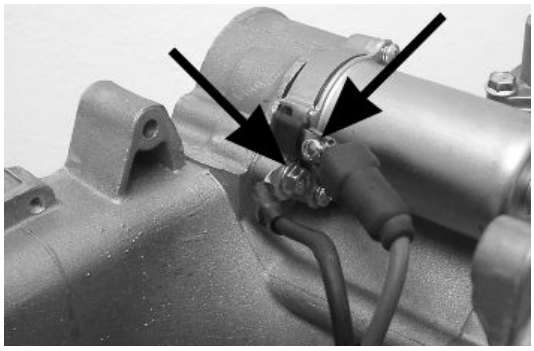
Flywheel nut 52 to 58

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.



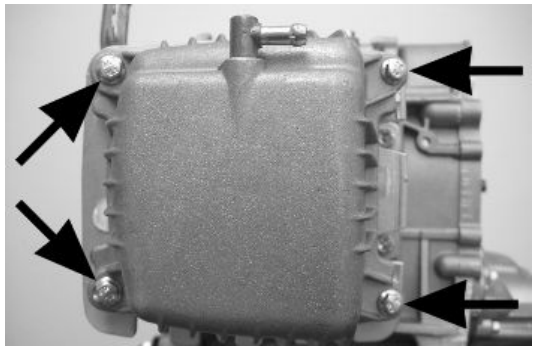
Locking torques (N*m)

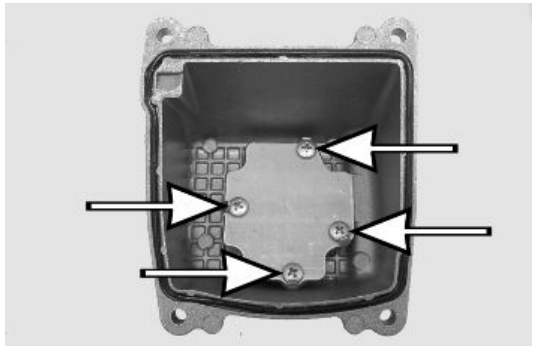
Starter screws 11 to 13

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

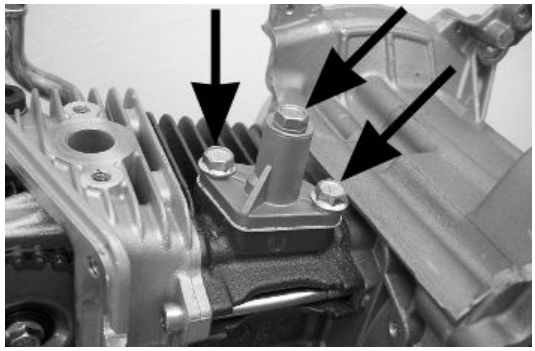
Cooling hood

Removing the timing system drive

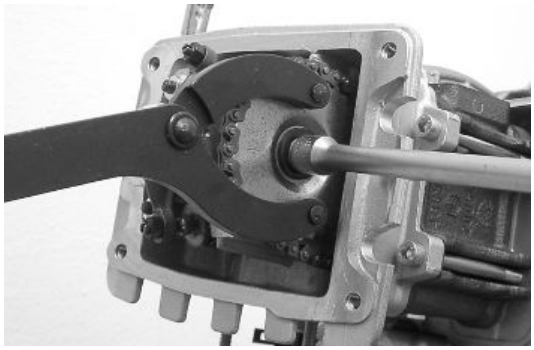
- Temporarily loosen the tensioner central screw and remove it together with the spring.
- Unscrew the 2 retainers indicated in the figure and remove the chain tightener support being careful to recover the sealing gasket.

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.

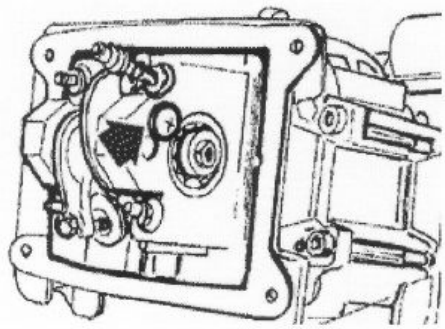
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE DIRECTION OF ROTATION IS MAINTAINED.

See also

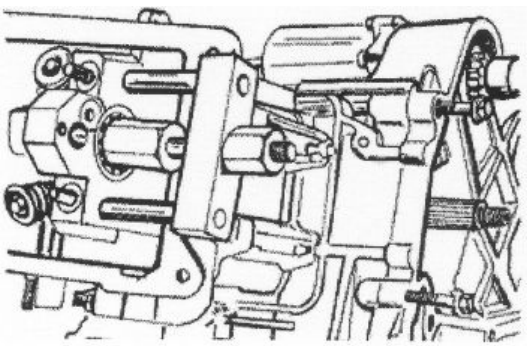
Removing the driving pulley
Removing the rocker-arms cover
Removal

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

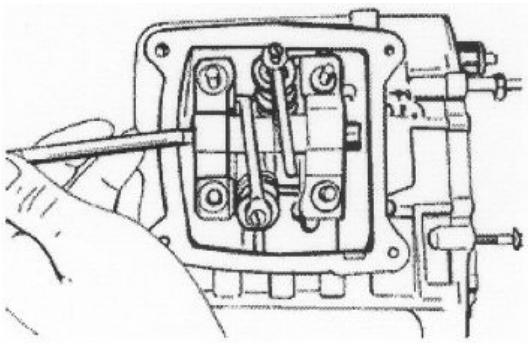
004499Y006 Bearing extractor ring

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.

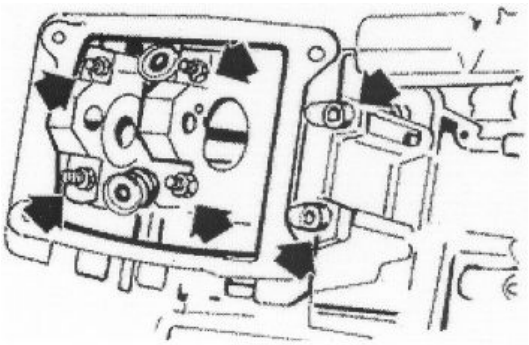


Removing the cylinder head

- 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 alignment dowels and the gasket.

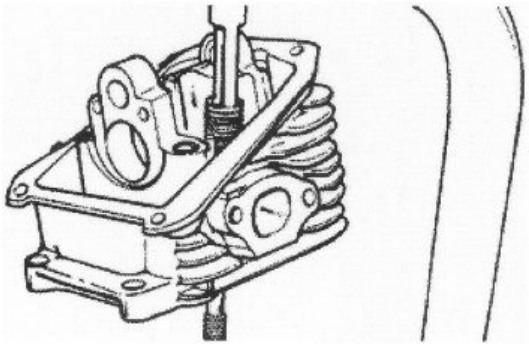
N.B.

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 REFITTING.



Removing the valves

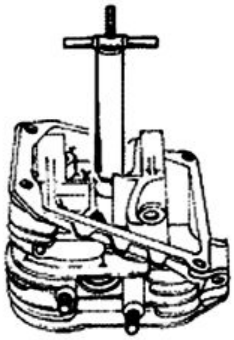
- Using the specific tool fitted with the element shown in the figure, remove the cotters, the caps and the spring between the valves.



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

Specific tooling

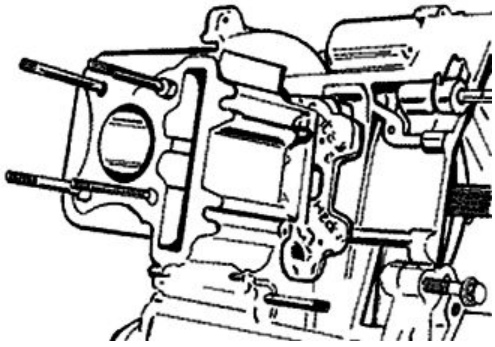
020431Y Valve oil seal extractor



Removing the cylinder - piston assy.

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

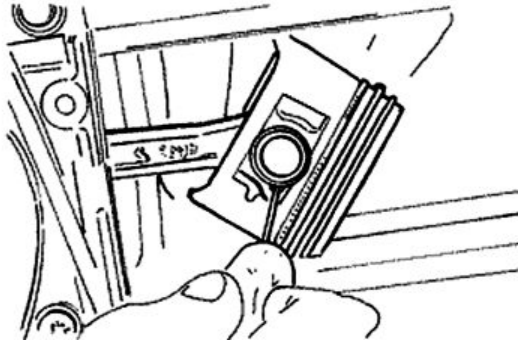
To avoid damaging the piston, keep it fixed while removing the cylinder.



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

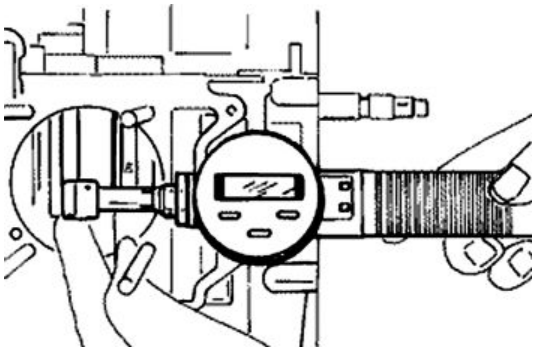
N.B.

BE CAREFUL NOT TO DAMAGE THE PISTON RINGS DURING REMOVAL.



Inspecting the small end

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



N.B.

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

Characteristic

Max. diameter admitted: check the small end

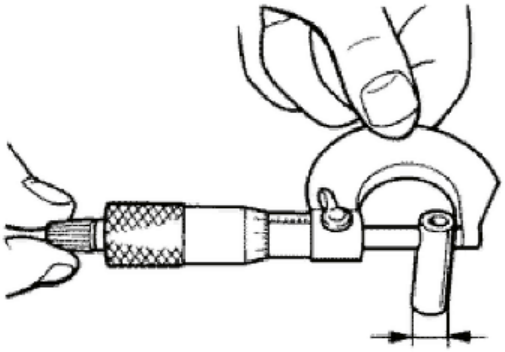
13.030 mm

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

- Calculate the piston pin coupling clearance.

Fitting clearance

Pin coupling clearance 13 +0.010+0.005mm **0.005 to 0.014 mm**

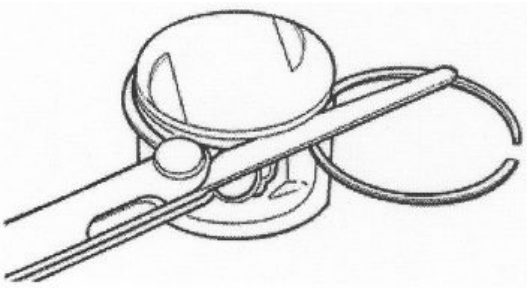
- Measure the outside diameter of the piston, perpendicular to the gudgeon pin axis.
- Carry out the measurement at 27 from the piston crown as shown in the figure.

- 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.

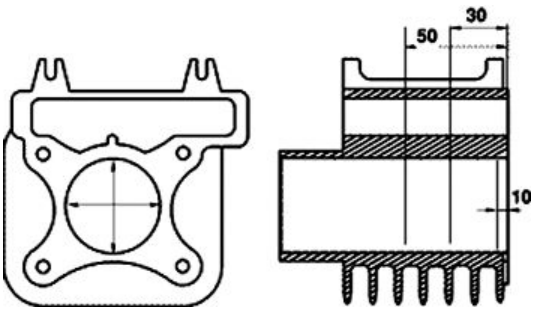
PISTON

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



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).

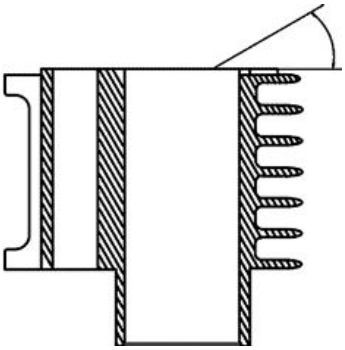


Characteristic

Maximum allowable run-out:

0.001 in 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

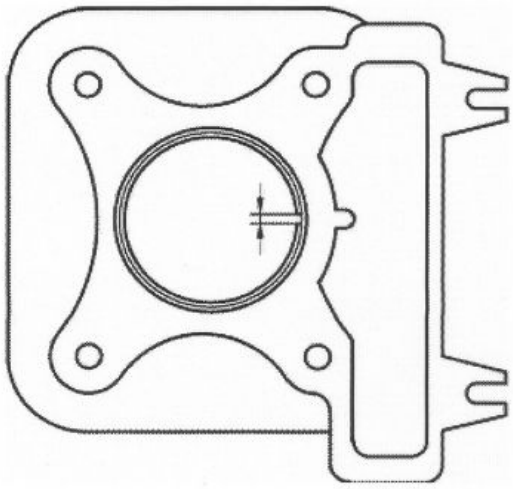
- Alternately insert the three sealing rings into the cylinder, in the area where it retains its original diameter. Using the piston, insert the rings perpendicularly to the cylinder axis.
- Measure the opening, see figure, of the sealing rings using a thickness gauge.
- If any measurements are greater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

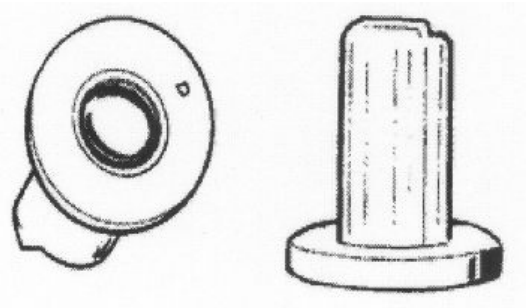


Removing the piston

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

Specific tooling

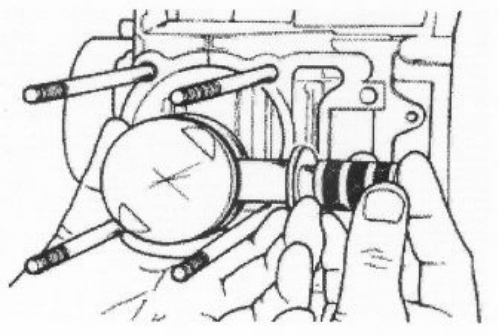
020448Y Pin lock fitting tool



- 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

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

- 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 up to the TDC (the inversion 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 special tool and the cylinder.

Characteristic

Standard compression ratio

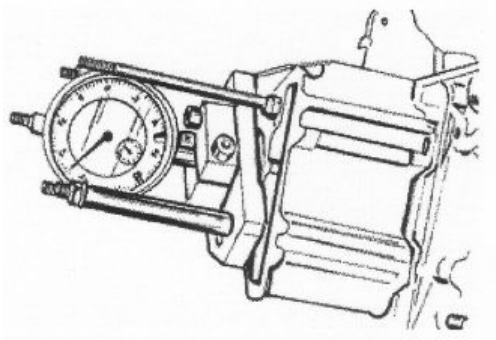
C.R. 11.5 ÷ 12 ÷ 1

CYLINDER BASE GASKET THICKNESS

Specification	Desc./Quantity
Cylinder height	56.45 ± 0.05
Head gasket thickness (fibre)	0.95 ± 0.06
Value measured	0.9 ± 0.05
Base gasket thickness	0.4
Value measured	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
Value measured	0.20 ± 0.05
Base gasket thickness	0.4
Value measured	0.30 ± 0.05
Base gasket thickness	0.5



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.

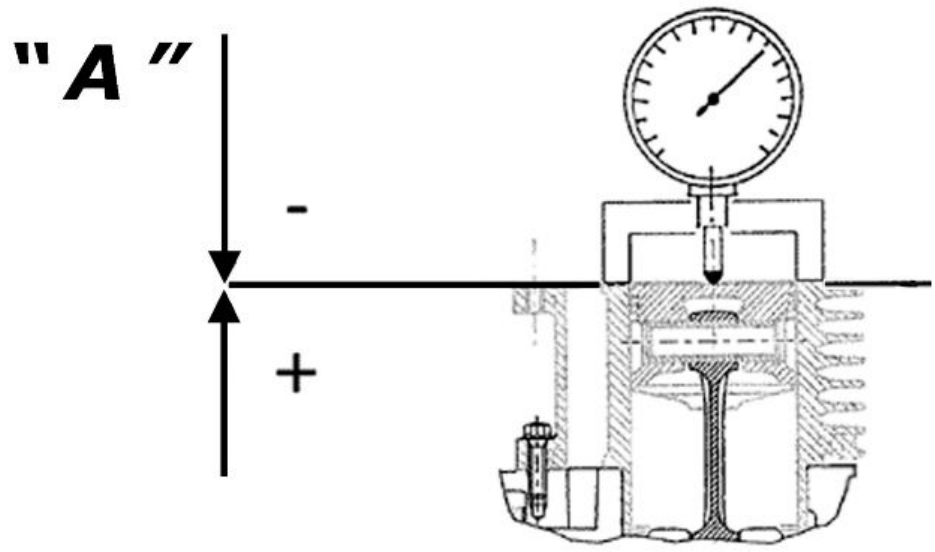
Characteristic

Shimming system for keeping the compression ratio

CR: 11.1 to 12.9

PISTON PROTRUSION CHECK

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

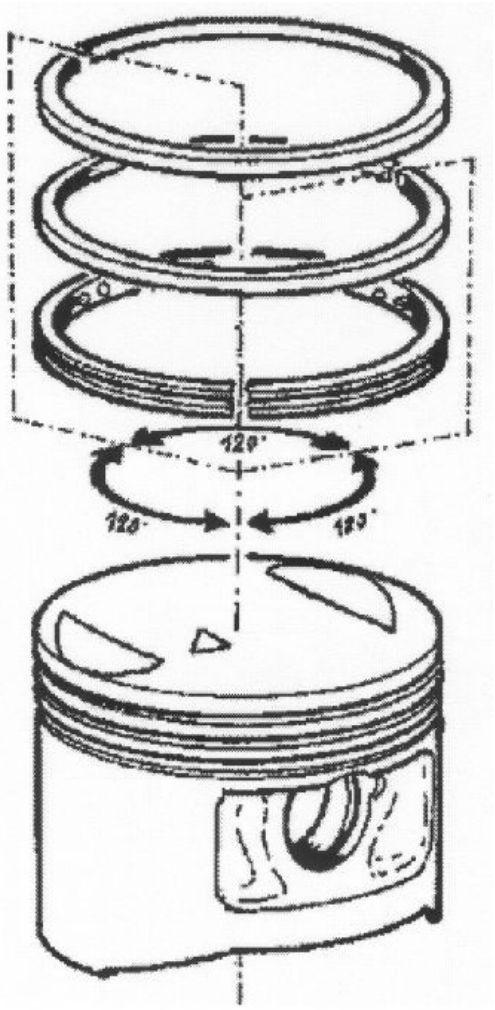


Refitting the piston rings

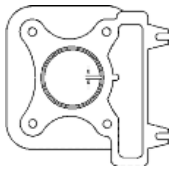
- Fit the oil scraper ring starting from the spring, taking care that the spring ends do not superimpose. Fit the two piston rings so that their gaps and that of the oil scraper ring are never aligned.
- Fit the 2nd sealing ring with the identifying letter «**T**» facing towards the piston crown.
- Fit 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-

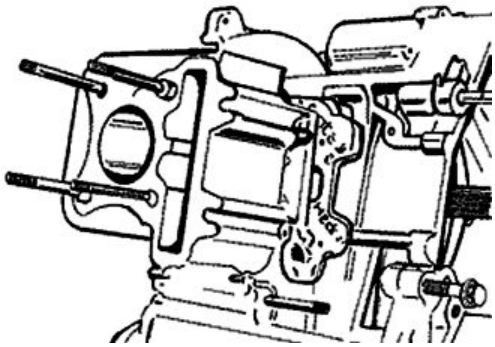
NATION WITH A USED CYLINDER MAY HAVE DIFFERENT BEDDING CONDITIONS THAN THE STANDARD.

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

- Insert the cylinder base gasket with the thickness determined above.
- 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

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.

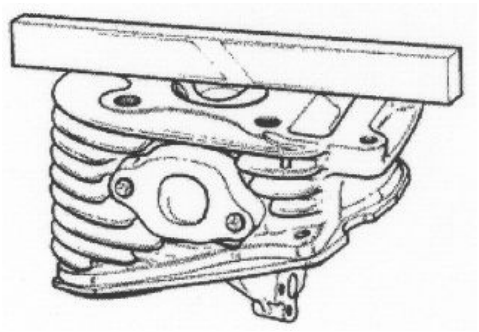
The procedure is different from that indicated in the vehicle manuals:

Head nuts tightening (only for stud bolts replacement) 6÷7 N*m +90° + 90° + 90°

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

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.



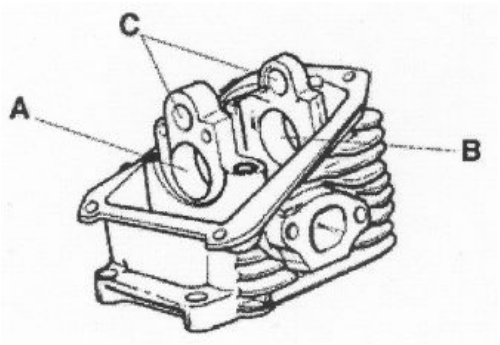
Characteristic

Maximum admitted unevenness: Cylinder head check

0.05 mm

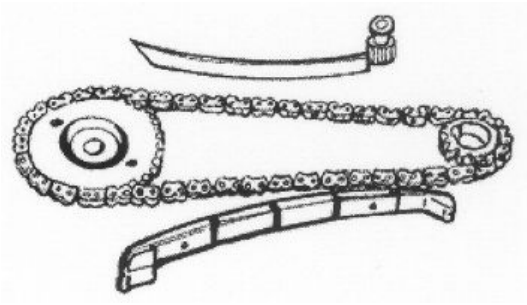
HEAD CHECK

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

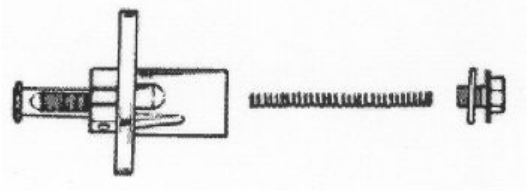


Inspecting the timing system components

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

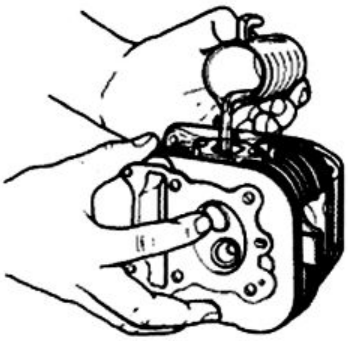


- Remove the central screw and the tensioner spring. Check that the one-way mechanism is not worn.
- Check the condition of the tensioner spring.
- If examples of wear are found, replace the whole unit.

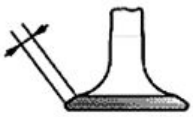


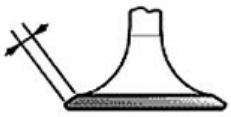
Inspecting the valve sealings

- 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

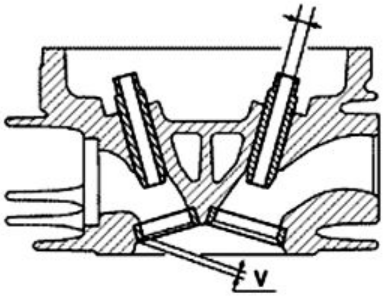
1.5 mm

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**»

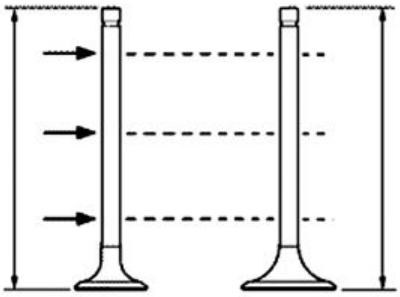
Characteristic

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 valve and valve guide.



Characteristic

Minimum diameter allowed: Intake

4.970 mm

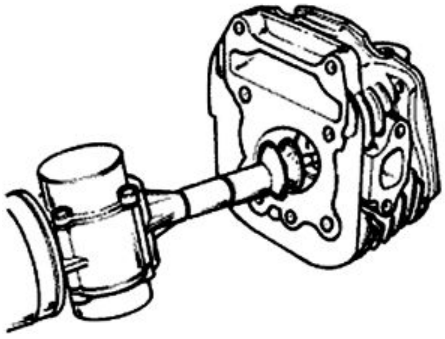
Minimum admissible diameter drainage

4.960 mm

Fitting clearance

Standard clearance: Intake 0.015 to 0.042 mm
Standard clearance: drainage 0.025 to 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: Exhaust

69.2 mm

Fitting clearance

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

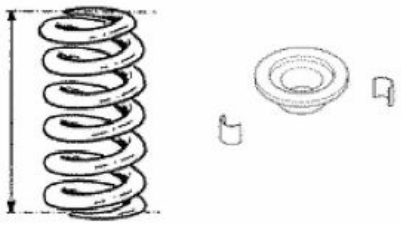
- If no faults are found during the above checks, you can use the same valves. For best sealing results, it is advisable to grind the valves. Grind the valves gently with a fine-grained lapping compound. During grinding, keep the cylinder head in a horizontal position. This will prevent the lapping compound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

CAUTION

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

Inspecting the springs and half-cones

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

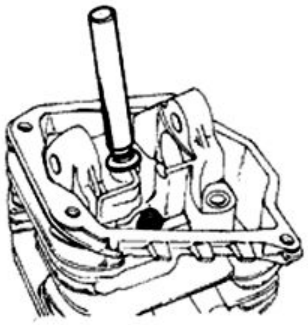


Refitting the valves

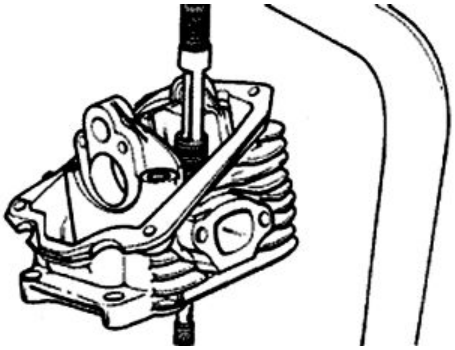
- Lubricate the valve guides with graphite grease.
- Place the lower caps of the valve spring on the head.
- Use the punch to fit the 2 sealing rings one at a time.

Specific tooling

020306Y Punch for assembling valve seal rings



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



Inspecting the cam shaft

- Inspect the camshaft for signs of abnormal wear on the cams.

Characteristic

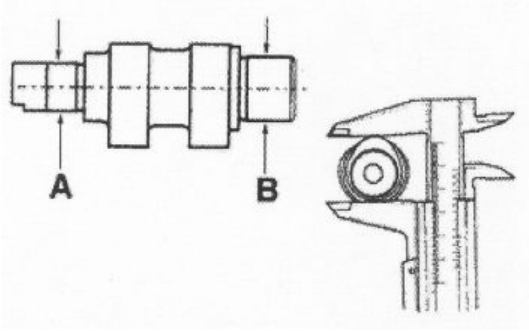
Standard diameter - Bearing A:

Ø 12 +0.002 +0.010

mm **Standard diameter - Bearing B:**

Ø 16-0.015 -0.023 mm

Minimum diameter allowed - Bearing A:

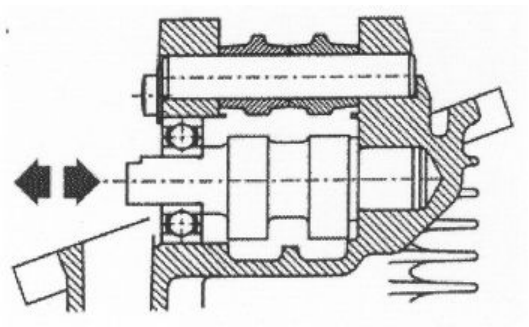


Ø 11.98 mm

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

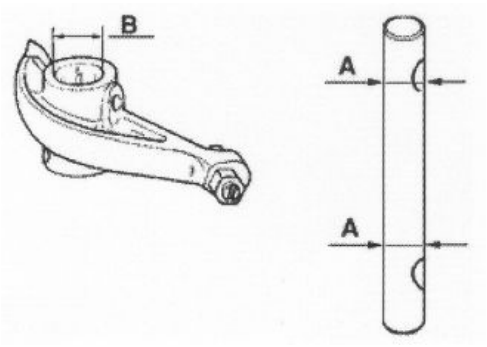
Fitting clearance

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 slider from contact with the cam and on the jointed adjustment plate.

- In case of anomalies, replace the damaged components.



Characteristic

Minimum admissible diameter:

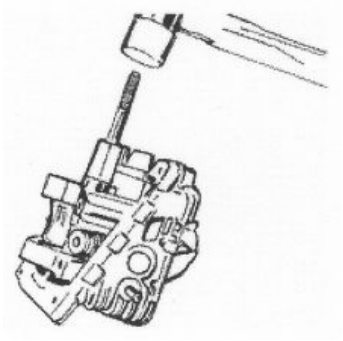
Ø 10.970 mm

Maximum admissible diameter:

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

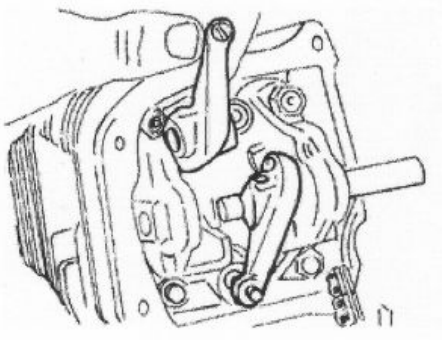
Locking torques (N*m)

Head-cylinder stud bolt nuts: 6 to 7 +135° +90° Nm first fitting, upon refitting tighten again at 6 to 7 90° +90° Nm

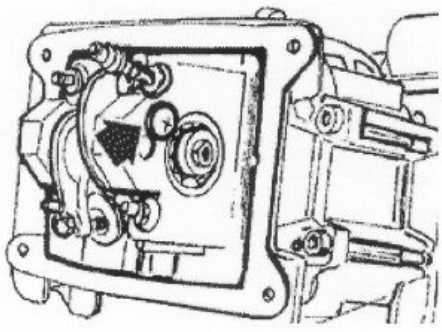
- Loosen the rocking lever registers.
- Fit the pin, the intake rocking lever and the discharge rocking lever.
- Lubricate the 2 rocking levers through the holes.

N.B.

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



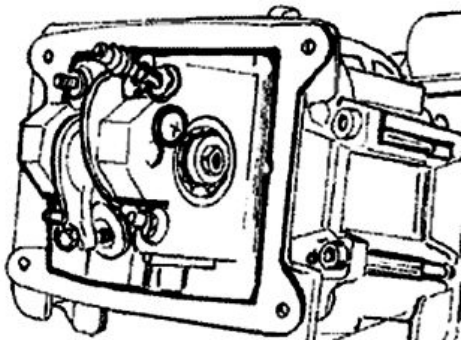
- Screw the limit screw for the pin and the camshaft with the washer indicated in the figure and tighten it to the prescribed torque.



Locking torques (N*m)

Rocking lever axle and camshaft bearing screw 3 to 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.

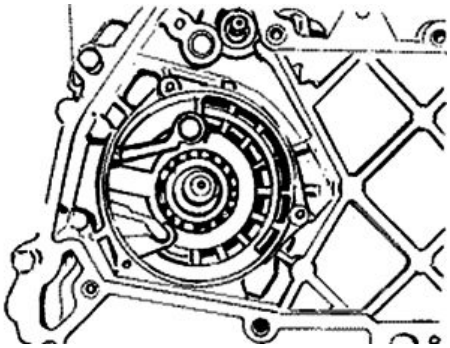
SHOULD THE CRANKCASE OR THE CYLINDER STUD BOLTS BE REPLACED, IT IS NECESSARY TO CARRY OUT AN INITIAL TIGHTENING PLUS OTHER 3 TURNS OF 90° EACH AT 3 CROSSED PASSES

Locking torques (N*m)

Head-cylinder stud bolt nuts: 6 to 7 +135° +90° Nm first fitting, upon refitting tighten again at 6 to 7 90° +90° Nm Head cover screws 8 to 10 Nm

Refitting the timing chain

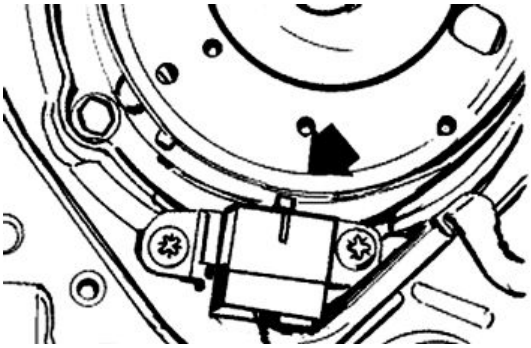
- Insert the timing chain pads in their corresponding seatings, the screw and the spacer as indicated in the figure.
- Tighten to the prescribed torque and check the tensioner pad moves adequately.
- Insert the timing pinion in driving shaft with the chamfered side facing the insertion (towards the main bearing).
- Loop the timing chain around the sprocket on the crankshaft.



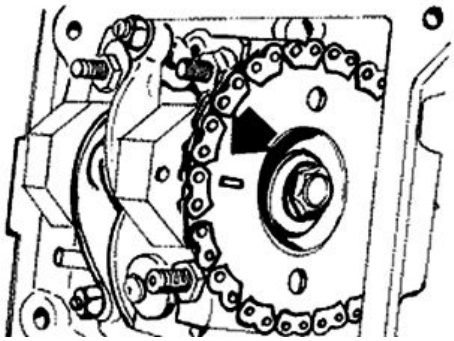
Locking torques (N*m)

Chain tensioner pad screw 5 to 7 Nm

- Refit the spacer on the camshaft.
- 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 to 14 Head cover screw 8 to 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

Alternative spark plug

DENSO U24ESR-NB

Electric characteristic

Electrode gap

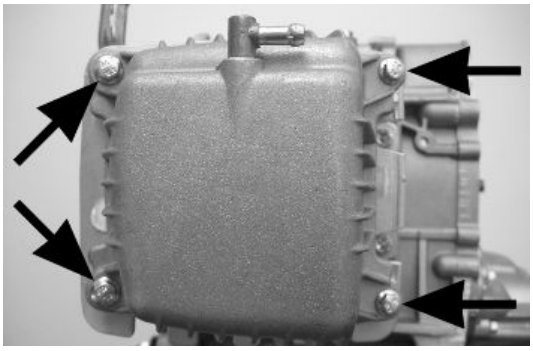
0.7 to 0.8 mm

Locking torques (N*m)

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

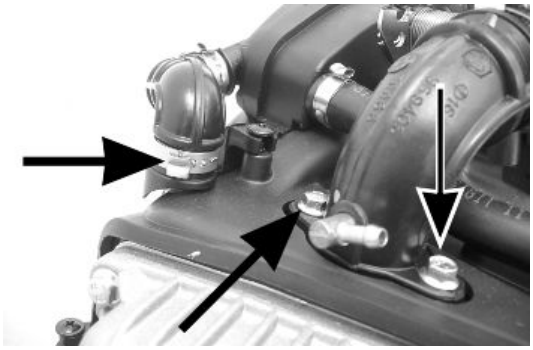
-Fit the cover sealing gaskets on the head.

-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 to 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

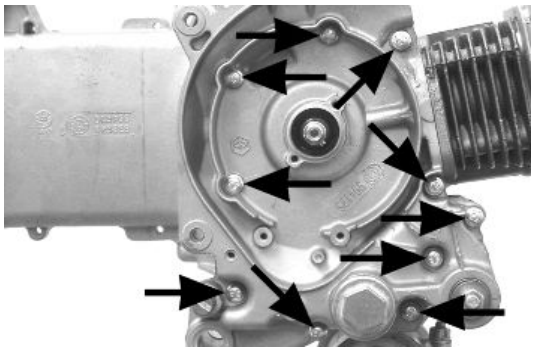
Removing the driving pulley
Removing the driven pulley
Removal
Removing the stator
Removing the cylinder - piston assy.
Removing the starter motor

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

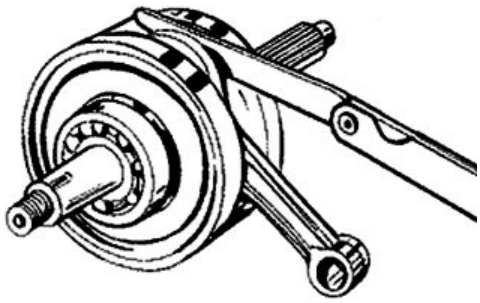
IF YOU FAIL TO DO THIS, THE CRANKSHAFT MIGHT ACCIDENTALLY FALL.

- 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.

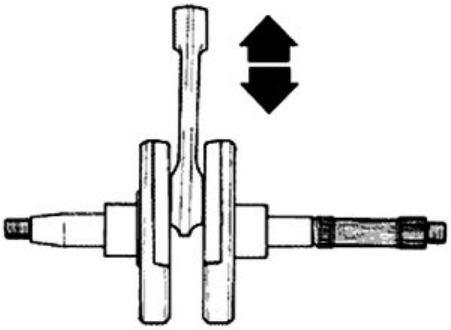
- Check the axial clearance on the connecting rod.



Fitting clearance

Standard connecting rod axial clearance 0.15 to 0.30 mm **Max. connecting rod clearance** 0.5 mm

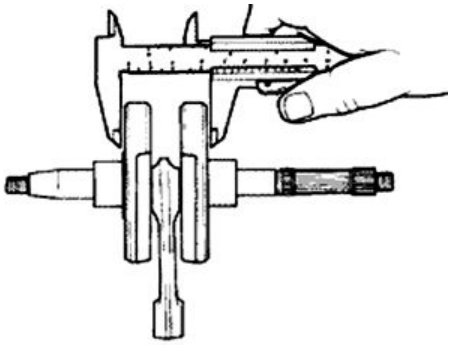
- Check the correct radial clearance of the connecting rod by holding the driving shaft with your hands and, with a dial gauge fitted to the rod small end, measuring the clearance, move the connecting rod vertically as shown in the figure.



Fitting clearance

Connecting rod radial - standard clearance 0.006 to 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.



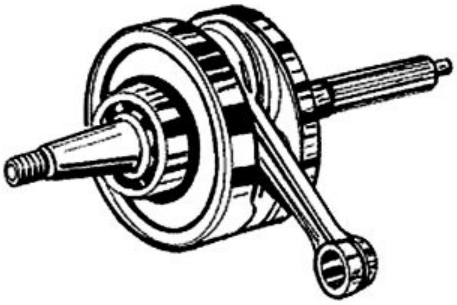
Characteristic

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

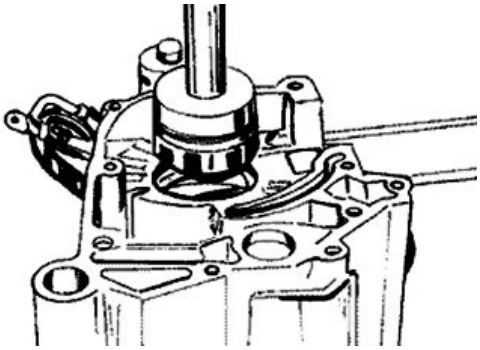
004499Y002 Bearing extractor screw

004499Y006 Bearing extractor ring

004499Y034 Bearing extractor part

Refitting the crankshaft bearings

- 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

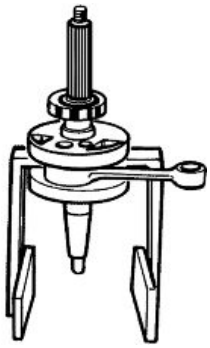
020359Y 42x47-mm Adaptor

020364Y 25-mm guide

020376Y Adaptor handle

020360Y 52x55-mm Adaptor

- 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.

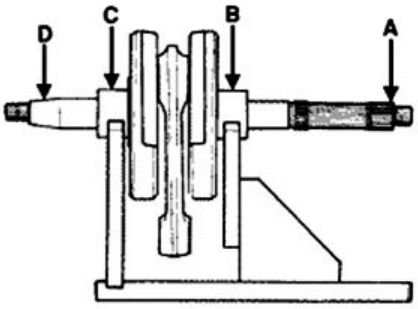
Specific tooling

020265Y Bearing fitting base

008119Y009 Tube to assemble shafts and axles

Inspecting the crankshaft alignment

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

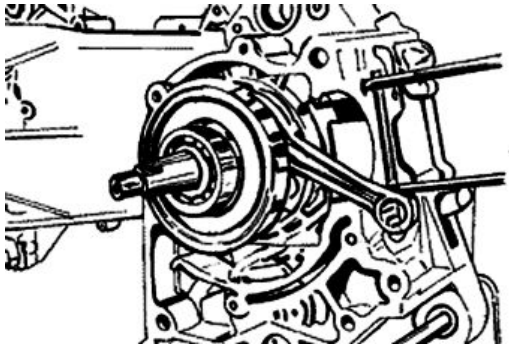
Specific tooling

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.

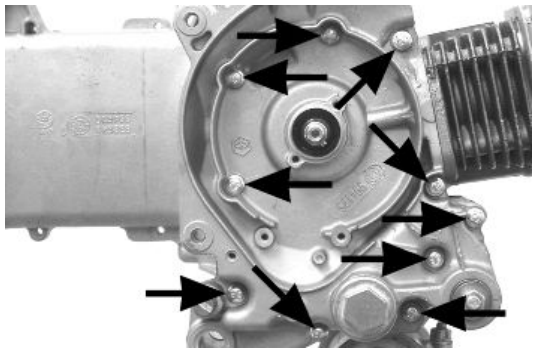
-Insert the crankshaft on the half casing on the transmission side.



- 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 NO TO DAMAGE THE SHAFT THREADED TANGS.

Recommended products

Loctite 510 Liquid sealant

Gasket

Locking torques (N*m)

Half casing joint bolts: **8 to 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)

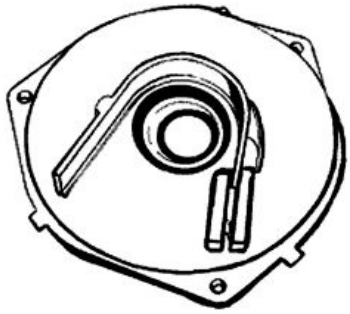
Engine oil pre-filter cover: **25 to 28 Nm**

Lubrication

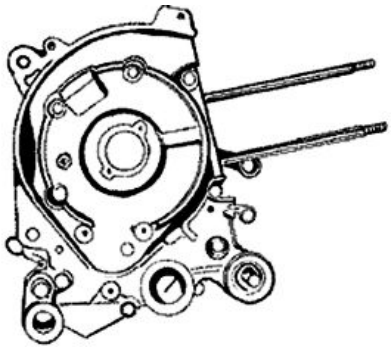
Crankshaft oil seals

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 (Ø 32 mm Max).



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

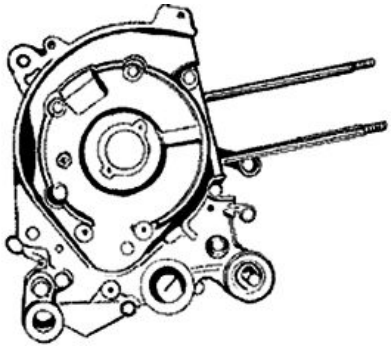


Refitting

- 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.

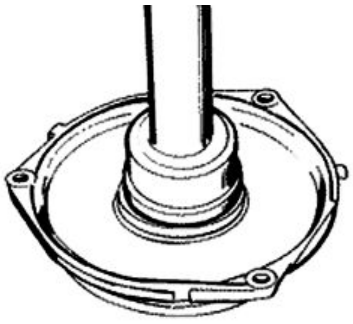
N.B.

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



- 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

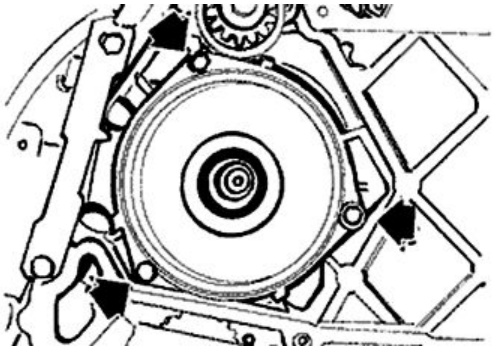
Locking torques (N*m)

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

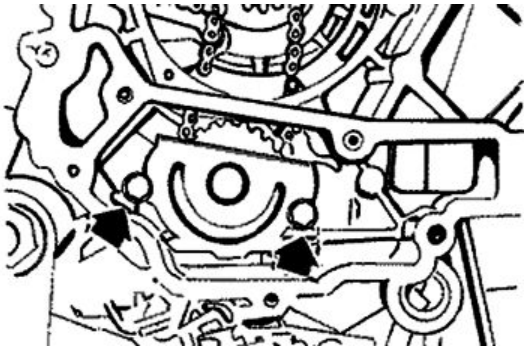
Oil pump

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

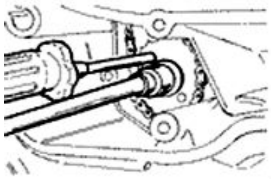


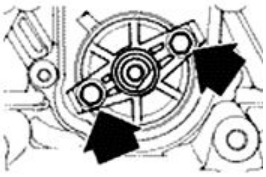
- Undo the 2 clamping screws in the figure and remove the cover over the pump control crown gear.
- Block the rotation of the oil pump control gear with a screwdriver inserted through one of its pump holes.



- 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

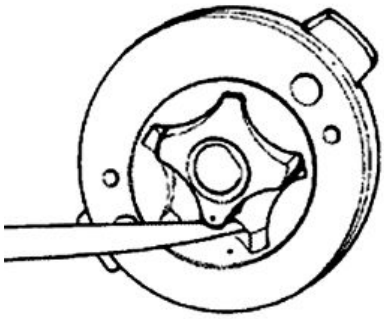
- Remove the two screws and the oil pump cover.
- Remove the clip retaining the innermost rotor.
- Remove and wash the rotors thoroughly with a degreasing solvent and compressed air.
- Reassemble the rotors in the pump body, keeping the two reference marks visible Replace the clip.

- 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

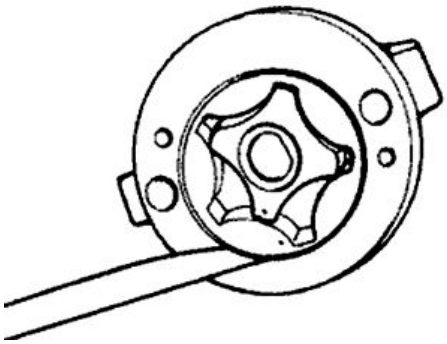


Measure the distance between the outer rotor and the pump body (see figure).

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.

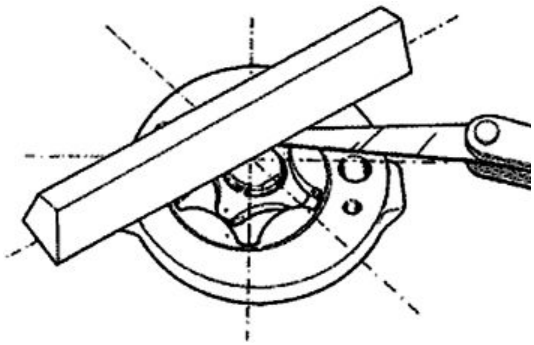
N.B.

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.

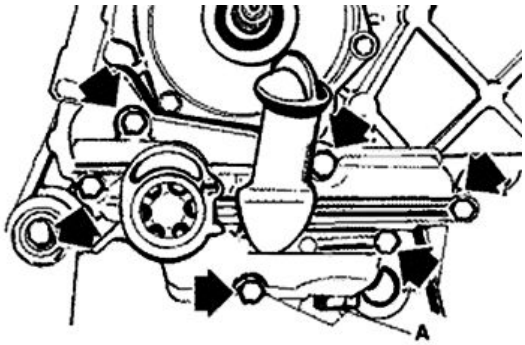
FIT THE CUP WASHER SO THAT ITS OUTER (CURVED) RIM TOUCHES THE PULLEY.

Locking torques (N*m)

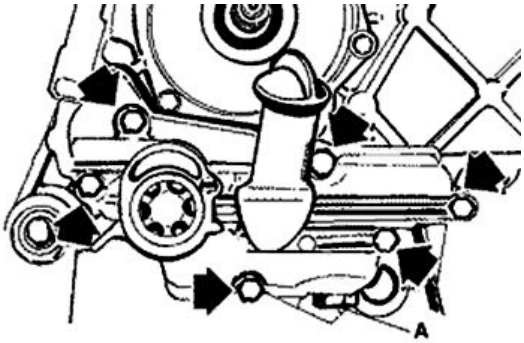
Central screw 12 to 14 Nm **Cover screws** 0.7 to 0.9 Nm **Oil pump screws** 5 ÷ 6

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



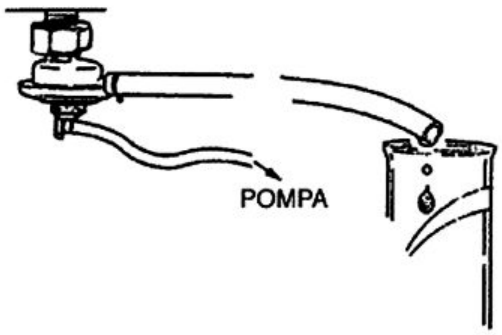
- Clean and grease the faying surfaces.
- Apply LOCTITE 510 on the sump surface and tighten the 6 fixing screws to the specified torque.
- Refit the driving pulley assembly, the belt, the pinion and the transmission cover.

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 to 10 Nm

Fuel supply



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

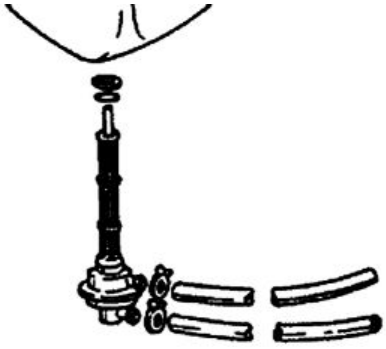
020329Y Mity-Vac vacuum-operated pump

Characteristic

Minimum flow rate

20 cc

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

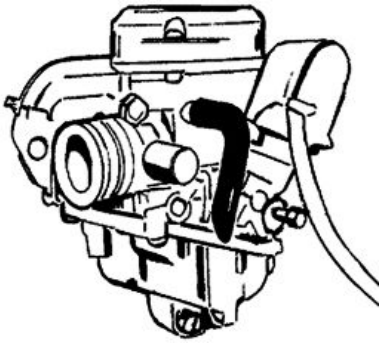


N.B.

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

Removing the carburettor

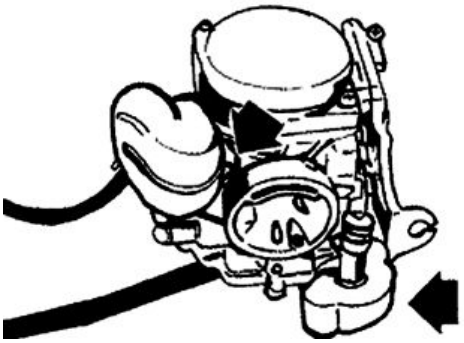
- To detach the carburettor from the engine, remove the two clamps anchoring the carburettor to the inlet manifold and the air intake coupling to the filter.
- Remove the fuel supply pipe.
- Disconnect the starter connection.
- Detach the accelerator cable with the sheath that connects the plate and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



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

CAUTION

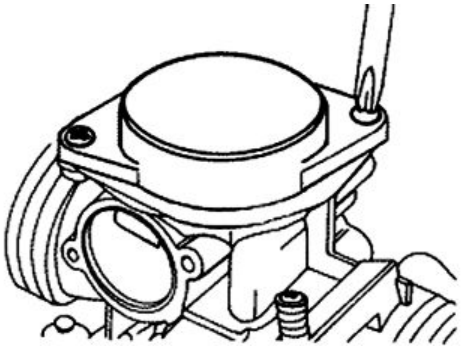
THE CARBURETTOR FEATURES AN ANTI-VIBRATION RUBBER BUFFER FITTED ON THE LOWER SUPPLEMENT OF THE ACCELERATING PUMP BODY. UPON REFITTING THE CARBURETTOR ON THE ENGINE, MAKE SURE THIS BUFFER IS PRESENT SO THAT THE PETROL IN THE TANK DOES NOT EMULSIFY.



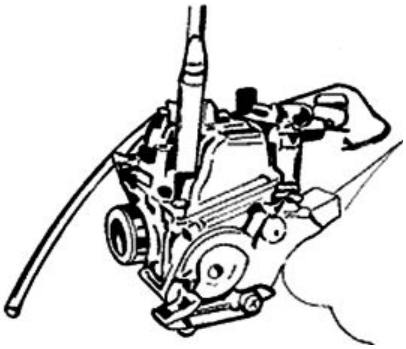
- Remove the 2 fixing screws indicated in the figure, the vacuum chamber cover and the spring.
- Remove the vacuum valve together with the diaphragm; the pin, the spring and its plastic guide.

WARNING

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

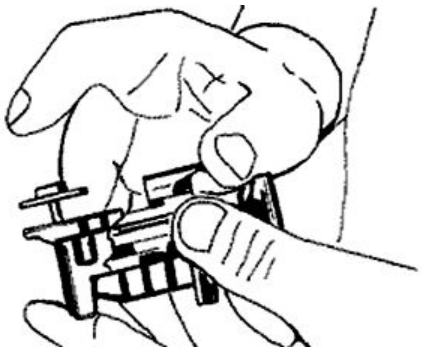


- Remove the 3 fixing screws and the chamber with the gasket.

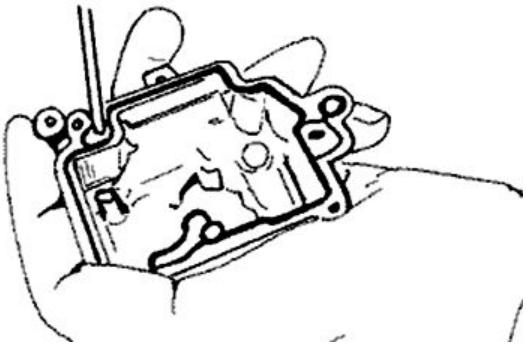


- Remove the chamber components following the procedure below.
- Undo the 2 screws fixing the intake pump diaphragm cover.

- 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.

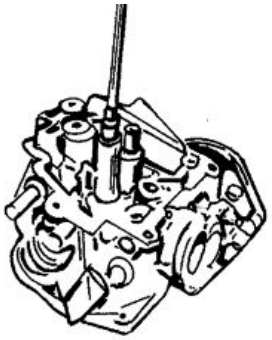


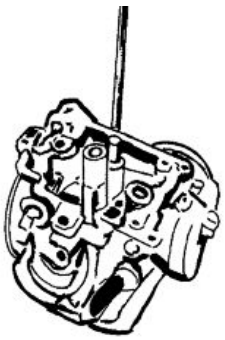
- Remove the screw indicated in the figure fixing the float pin.
- Remove the float and the plunger.

-Remove the maximum nozzle.

-Remove diffuser.

-Remove the minimum nozzle.

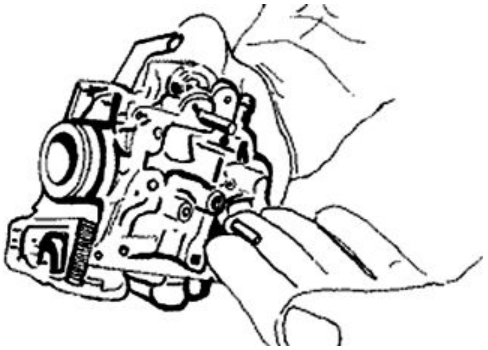




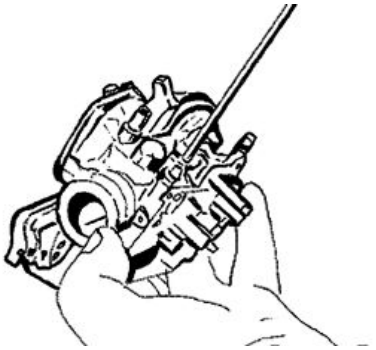
- Remove the sprayer tilting the carburettor body.

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.

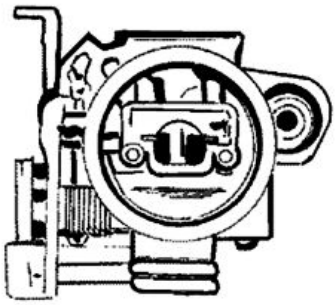


CAUTION

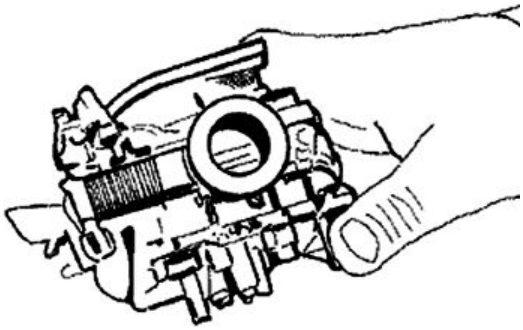
DO NOT ATTEMPT REMOVING PARTS EMBEDDED IN THE CARBURETTOR BODY SUCH AS: FUEL SUPPLY PIPE, PIN SEATING, STARTER NOZZLE, THROTTLE VALVE CONTROL VALVE SHAFT. DO NOT REMOVE THROTTLE-SHAFT CONNECTION SCREWS. THE FIXING SCREWS ARE CAULKED AFTER THE ASSEMBLY AND THEIR REMOVAL DAMAGES THE SHAFT.

Refitting the carburettor

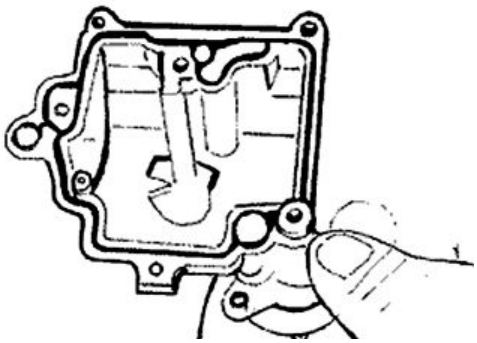
- Before refitting, wash the carburettor body accurately with a degreasing solvent and compressed air.
- Pay special attention to the fuel supply pipe and the plunger seat.



- For the minimum circuit, make sure the following points are properly cleaned: air gauging, exhaust 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.

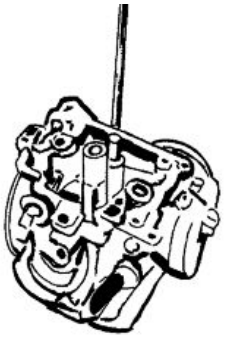


- Check that the carburettor body has the closing ball for the idle circuit pipe.
- Check that the coupling surfaces, the chamber and the diaphragm are not dented.
-Check that the depression valve housing pipe is not scratched.
- Check that the throttle valve and the shaft do not show abnormal wear.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

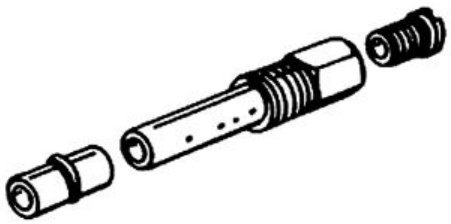
N.B.

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

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



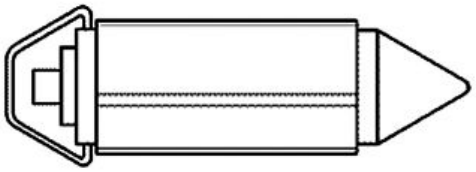
- Accurately wash and blow the components of the maximum circuit, the sprayer, the diffuser and the nozzle.
- Introduce the sprayer in the carburettor body with the bigger cylindrical part directed to the diffuser.
- Fit the diffuser.
-Assemble the maximum nozzle.



- Check that the tapered pin does not show signs of wear on the sealing surfaces of the shock absorber pin and the return clamp.
- Replace the rod if worn out.
- Check that the float is not worn on the pin housing or on the contact plate with the rod and that there are no fuel infiltrations.
- Replace it in case of failures.
- Fit the float together with the pin and rod in its position and lock it with its screw.

N.B.

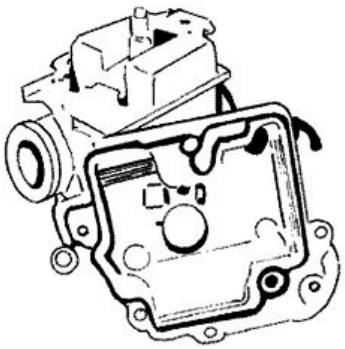
INTRODUCE THE RETURN SPRING ON THE FLOAT PLATE ADEQUATELY



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

WARNING

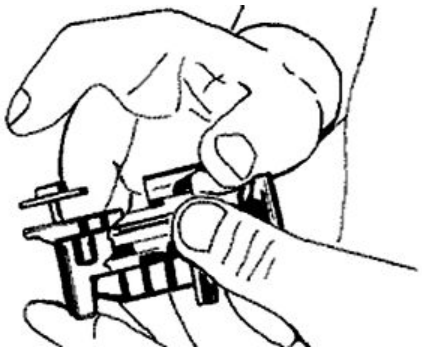
WHEN REFITTING, PAY SPECIAL ATTENTION TO THE COMPONENTS AS THEY ARE SMALL.



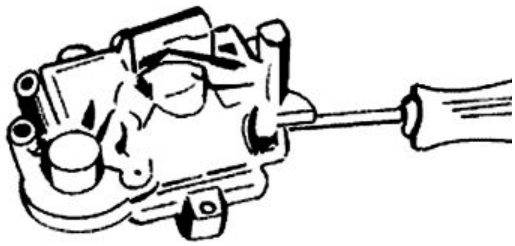
- Check the diaphragm is in good conditions and remove the remaining components of the accelerating pump following these steps:
- Insert the O-Ring in the pipe.
- Insert the diaphragm together with the pin and its spring.

N.B.

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

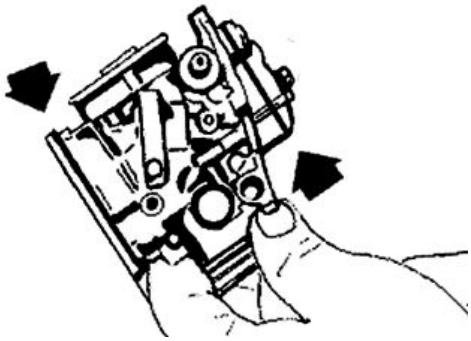


- Fit the accelerating pump diaphragm cover and tighten the 2 fixing screws making sure the spring below is correctly positioned.
- Fit the rubber bellows protecting the pin in the upper part of the accelerating pump.



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.



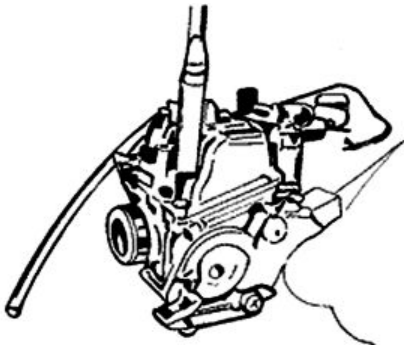
- Blow air in to the tank and then assembly it and its gasket on the carburettor body with the 3 fixing screws.

N.B.

-ALWAYS USE NEW RINGS AND GASKETS FOR REFITTING.

WARNING

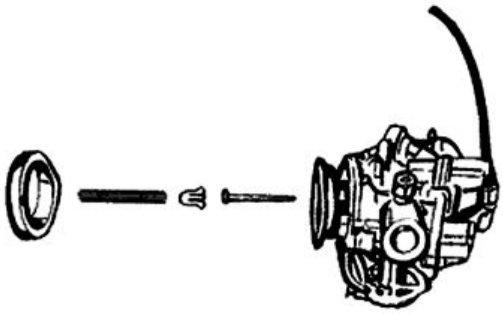
THE SCREW IN THE TANK BOTTOM IS A BLEEDING ONE AND CONSEQUENTLY IT ONLY REQUIRES CLEANING.



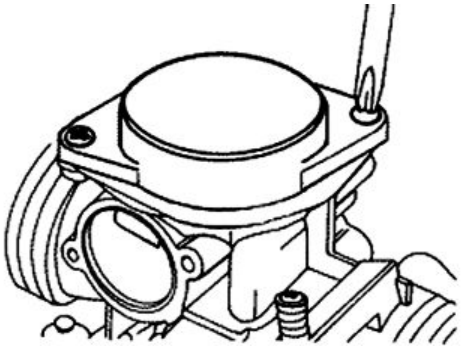
- Insert the diaphragm into the throttle valve.
- Insert the tapered pin together with the plastic support and the contrast spring into the throttle valve.

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.

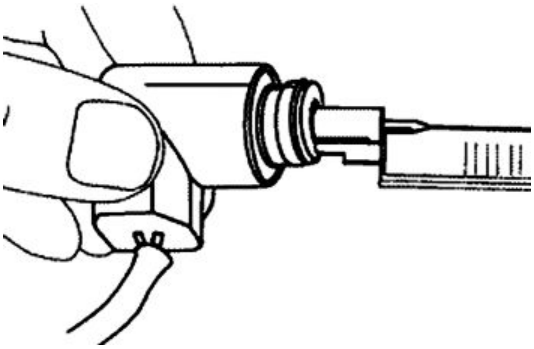


- Fit the vacuum chamber cover with the 2 fixing screws paying special attention to the spring.



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 electric heating.
- Check the starter resistance when adjusted to the ambient temperature.

Characteristic

ambient temperature

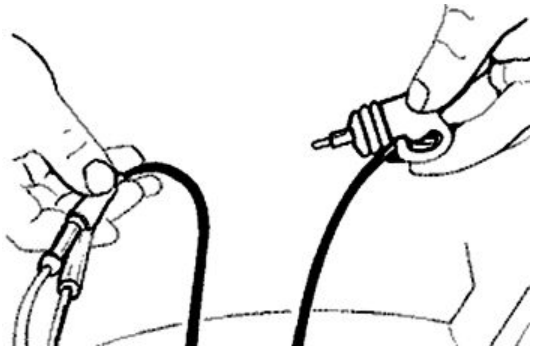
24° C

Electric characteristic

Automatic starter resistance

6 Ω ± 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

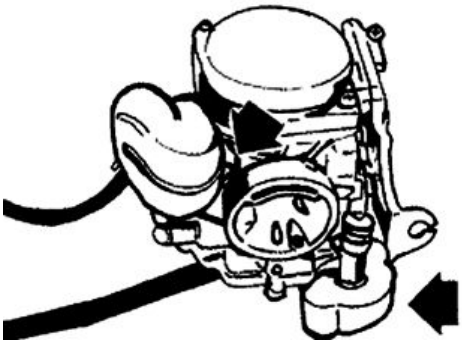
max. protrusion

15 mm

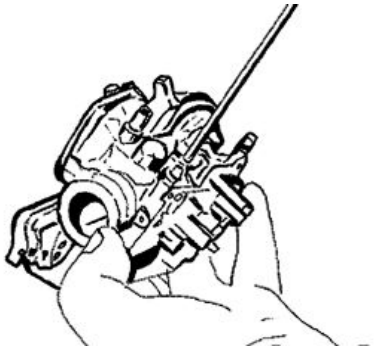
max. time

15 min

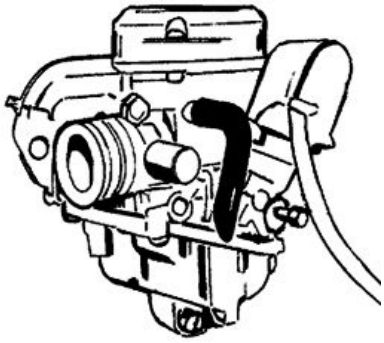
- Fit the starter, the support bracket and the protection with the screw indicated in the figure.



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



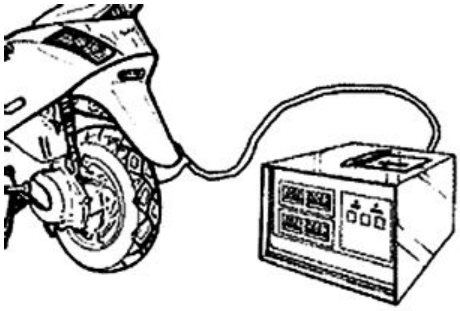
- Refit the carburettor on the engine and connect again the accelerator cable with the sheath and the support plate and the electrical connection of the starter.
- Reconnect the fuel supply pipe and tighten the 2 clamping screw fixing the carburettor to the inlet manifold and the air inlet coupling to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

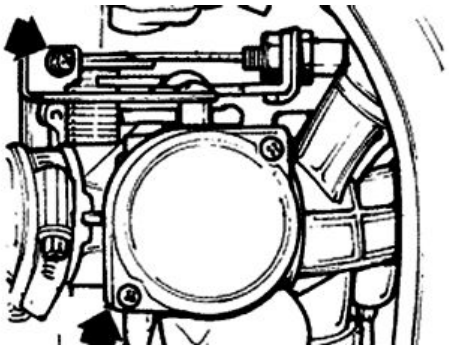
Specific tooling

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

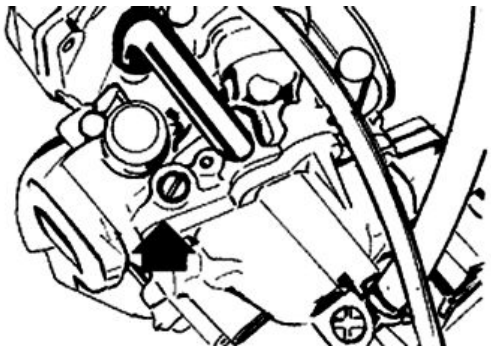
020332Y Digital rpm indicator

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 carburation 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.

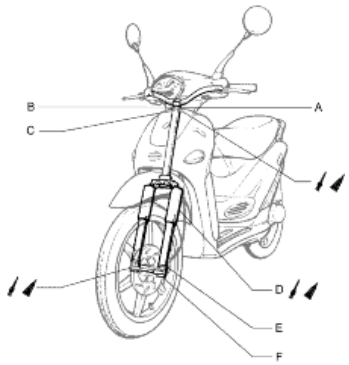
If it is difficult to adjust CO values, check accurately:

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

INDEX OF TOPICS

Front suspension

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



Front

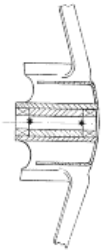
Front wheel hub overhaul

Ball bearings to hub

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

WARNING

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



Handlebar

Removal

Disassembling the handlebar

Remove the handlebar cover before carrying out this operation,.

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

N.B.

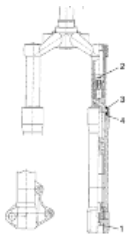
IF THE HANDLEBAR IS BEING REMOVED TO REMOVE THE STEERING, TILT THE HANDLEBAR FORWARD TO AVOIDING DAMAGING THE TRANSMISSIONS.

Front fork

Removal

Overhaul

O-ring renewal and rod disassembly



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

Locking torques (N*m)

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

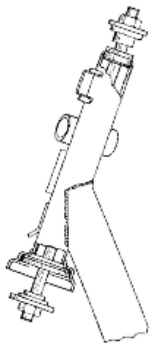
Steering column

Refitting

Lower and upper seating on the chassis

LOWER AND UPPER SEATING ON THE CHASSIS

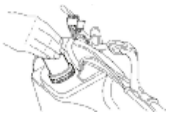
Titolo	Durata/ Valore	Testo Breve (< 4000 car.)	Indirizzo Immagine
Lower and upper seating on the chas-sis			



Steering bearing

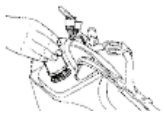
Steering collar

Steering lock ring nut



Steering bearing upper race

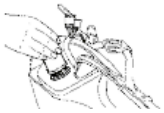
- Lubricate race and balls with **Z2** grease.
- Tighten to the specified torque and then rotate the tool through 80° - 90° in an anticlockwise direction.



Removal

Upper bearing washer and race

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



Lower and upper races from frame

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

N.B.

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

LOWER AND UPPER SEATING FROM THE CHASSIS

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

Rear

Removing the rear wheel

- Use a screwdriver as a lever between the drum and the cover.

-Straighten the cotter pin and remove the cap.

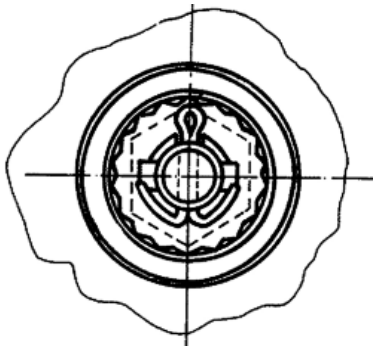
-Remove the wheel acting on the central fixing point.

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)

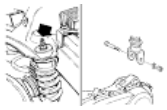
Rear wheel axle 104 to 126

Shock absorbers

Removal

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.



- 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/chassis nut torque 20 to 25 Nm

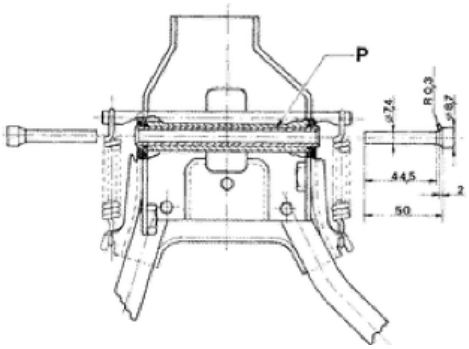
Centre-stand

Assembly and staking of stand pivot pin to bracket

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

N.B.

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



Changing the complete stand

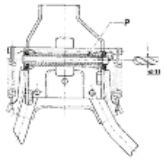
- Work on the screws shown in the figure.
- When refitting, secure to the prescribed torque.

Locking torques (N*m)

Stand screw torque **18.5 to 19 Nm**

Expelling stand pivot pin from bracket

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



INDEX OF TOPICS

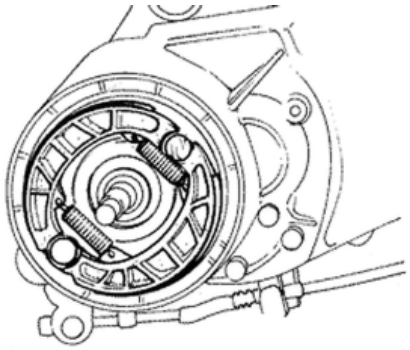
Once the silencer and the wheel have been removed, follow these steps:

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

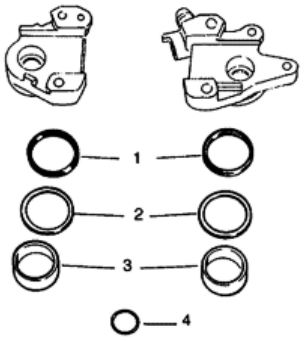
020325Y Pliers for brake-shoe springs

Refitting

Insert the following parts into the calliper half bodies:

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

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



CAUTION

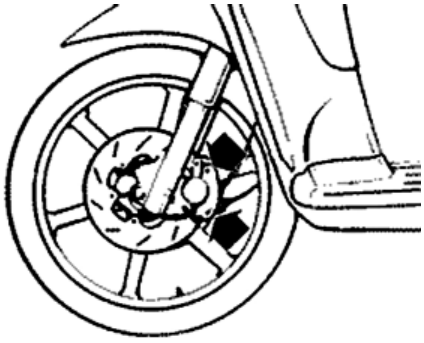
RUBBER PARTS SHOULD NEVER BE LEFT IN ALCOHOL FOR LONGER THAN 20 SECONDS.
AFTER WASHING, THE PIECES MUST BE DRIED WITH A BLAST OF COMPRESSED AIR AND A CLEAN CLOTH.

Locking torques (N*m)

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

Front brake calliper

Removal



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

Locking torques (N*m)

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

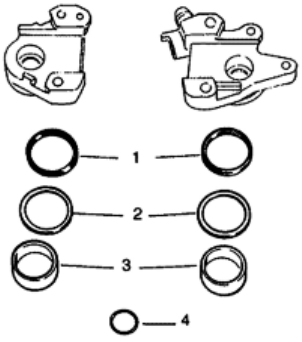
Overhaul

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

CAUTION

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

Refitting



Insert the following parts into the calliper half bodies:
- sealing rings (1-2);
- pistons (3);
- fit O-ring seal (4) in one of the pump bodies.
- Couple the inner and outer bodies by means of the coupling bolts. Fit the pads and bleed air from the system (see previous paragraphs).
- Position the caliper on the disc and fasten it to the support, tightening the bolts.
- Secure the tube connection to the caliper with the required torque.

- Before reassembly, the parts must be perfectly clean and **bear no traces of oil, diesel fuel, grease**, etc.. They must therefore be washed thoroughly in denatured alcohol before proceeding.

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

CAUTION

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

Locking torques (N*m)

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

1 DUST GUARDS

2 SEALING RINGS

3 PLUNGERS

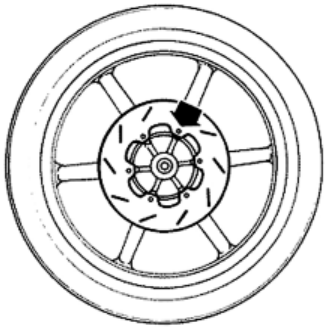
4 O-RING GASKET

Front brake disc

Removal

- Remove the front wheel loosening the axle clamp.

-Remove the six fastenings of the disc.



Refitting

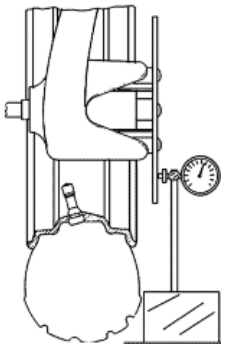
-When refitting, position the disc correctly making sure that it rotates in the right direction.

Locking torques (N*m)

Disc tightening screw 8 to 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, replace the disc and repeat the check.
- If the problem persists, check and replace the wheel rim if necessary.



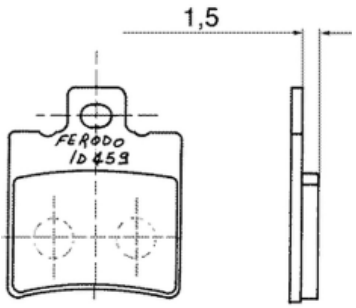
Specific tooling

020335Y Magnetic mounting for dial gauge

Front brake pads

Removal

- To facilitate this operation remove the two calliper fixings. With the calliper detached from its support but still connected to the brake fluid line, remove the plastic cover by prising it with a screwdriver.
- Remove the outside circlip from the brake pad pin, the leaf spring and the pads.
- Renew the pads when friction facing thickness is less than 1.5 mm.



Refitting

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

Fill

Front

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

-Undo the bleed screw.

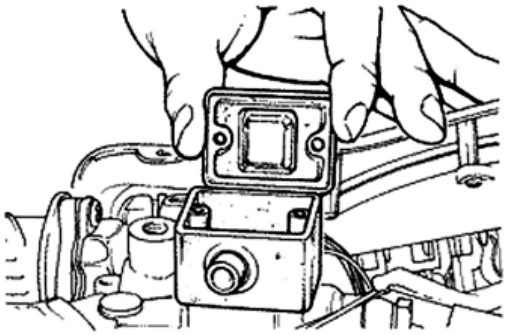
-Apply the tube of the special tool to the bleed screws.

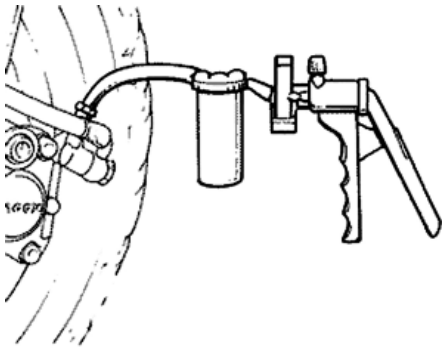
When bleeding it is necessary to fill the oil tank in continuation while working with a MITYVAC pump on the bleed screws until no more air comes out of the system.

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

-Do up the bleed screw.

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





N.B.

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

CAUTION

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

N.B.

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

WARNING

- BRAKING CIRCUIT FLUID IS HYGROSCOPIC. IT ABSORBS HUMIDITY FROM THE SURROUNDING AIR.
IF THE LEVEL OF HUMIDITY IN THE BRAKING FLUID EXCEEDS A GIVEN VALUE, BRAKING EFFICIENCY WILL BE REDUCED.
THEREFORE, ALWAYS USE FLUID FROM SEALED CONTAINERS.
UNDER NORMAL DRIVING AND CLIMATIC CONDITIONS YOU SHOULD CHANGE THIS LIQUID EVERY TWO YEARS.
IF THE BRAKES ARE USED INTENSELY AND/OR IN HARSH CONDITIONS, CHANGE THE FLUID MORE FREQUENTLY.

CAUTION

WHEN CARRYING OUT THE OPERATION, BRAKE FLUID MAY LEAK FROM BETWEEN THE BLEED SCREW AND ITS SEAT ON THE CALLIPER.
CAREFULLY DRY THE CALLIPER AND DEGREASE THE DISC SHOULD THERE BE OIL ON IT.

Specific tooling

020329Y Mity-Vac vacuum-operated pump

Recommended products

AGIP BRAKE 4 Brake fluid.

Synthetic fluid SAE J 1703 -FMVSS 116 - DOT 3/4 - ISO 4925 - CUNA NC 956 DOT 4

Locking torques (N*m)

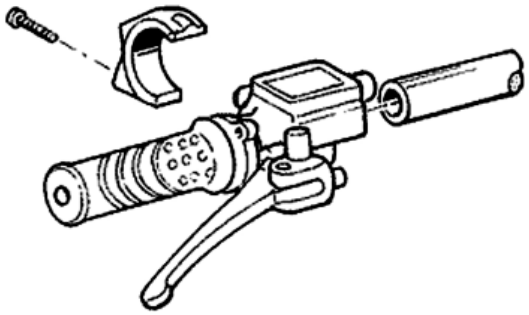
Oil bleed screw 8 - 12

Front brake pump

-After removing the front and rear handlebar covers, act on the two stand fixing points (see the figure).

- Disconnect the tube, collecting the brake oil in a container.

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



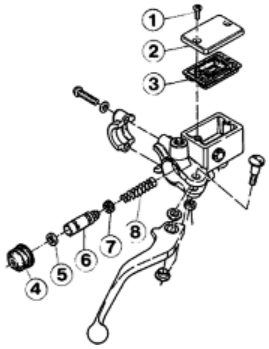
Locking torques (N*m)

Brake fluid pump - hose fitting 20 ÷ 25 Nm

Removal

- Bleed the circuit and drain the brake fluid through the bleeding screw located on the calliper and actuate the brake lever until no more fluid flows out.

-Remove the oil pump from the handlebar; remove the brake lever and then remove the wheel cylinder.



1 - Tank cap screw.

2. Tank cover.

3. Diaphragm.

4. Bellows.

5. Sealing ring.

6. Piston.

7. Gasket.

8 - Spring

CAUTION

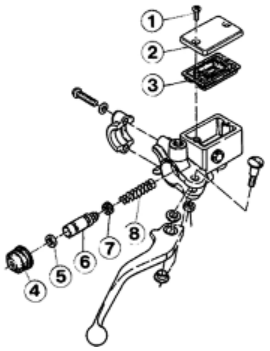
- THE PRESENCE OF BRAKE FLUID ON THE DISC OR BRAKE PADS REDUCES THE BRAKING EFFICIENCY. IN THIS CASE, REPLACE THE PADS AND CLEAN THE DISC WITH A HIGH-QUALITY SOLVENT.
CONTACT WITH BRAKE FLUID WILL DAMAGE PAINTED SURFACES.

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

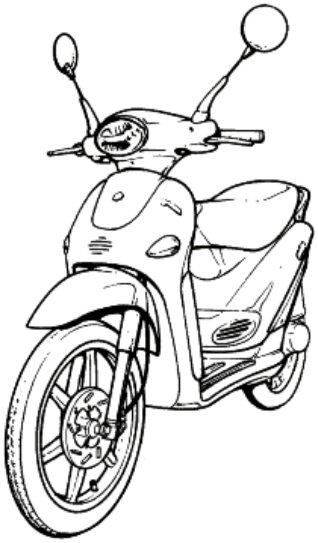
6. Piston.

7. Gasket.

8. Spring.

INDEX OF TOPICS

BODYWORK

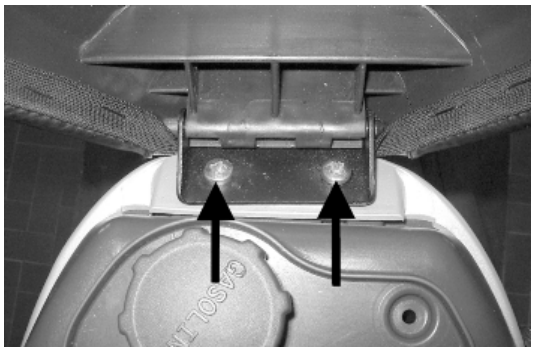


Taking apart approached cover motor

Remove the 2 implantations.

Seat

- Unscrew the 2 fixing screws and remove the saddle

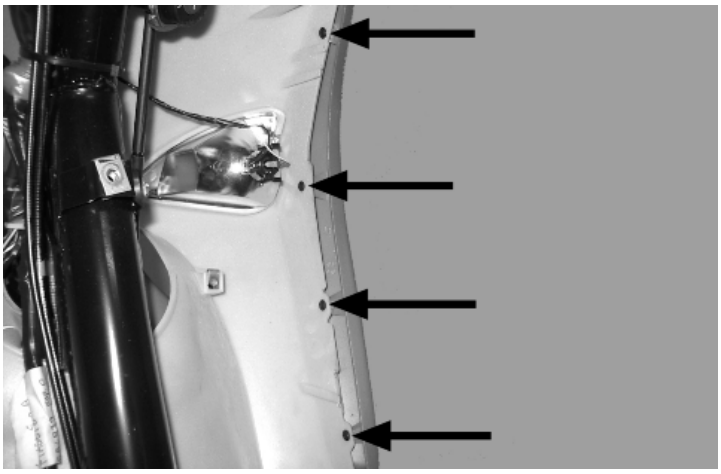


Saddle

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

Side fairings

- Remove the shield back plate
- Undo the 4 fixing screws and remove the bumper band



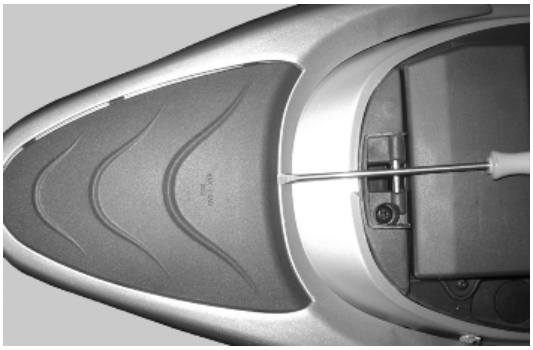
See also

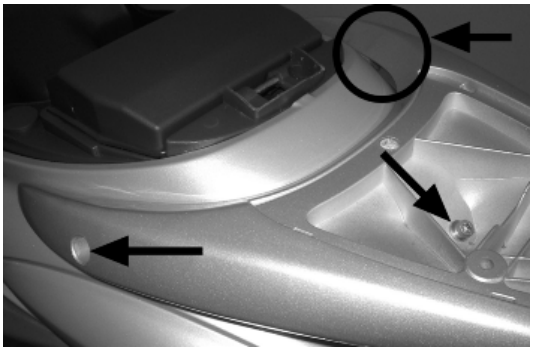
Knee-guard

Rear rack

• Operating from the rear and using a screwdriver, remove the plastic cap of the central screw cover.

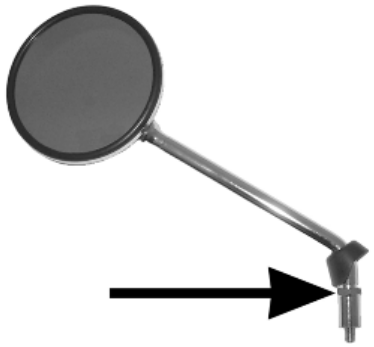
• Remove the central and the 2 side screws.





Driving mirrors

• With the set screw fully tightened, screw the mirror stem on the handlebar until it stops. • Loosen the mirror and set it in the desired position. • Loosen the set screw until the stem is locked.

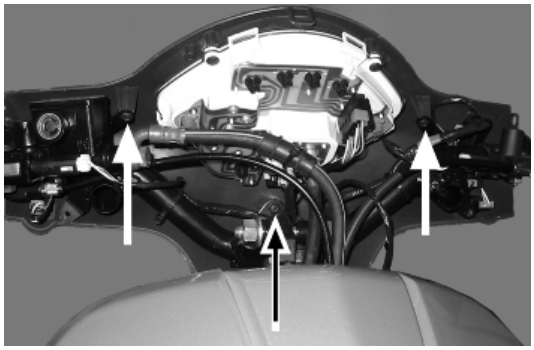


Locking torques (N*m)

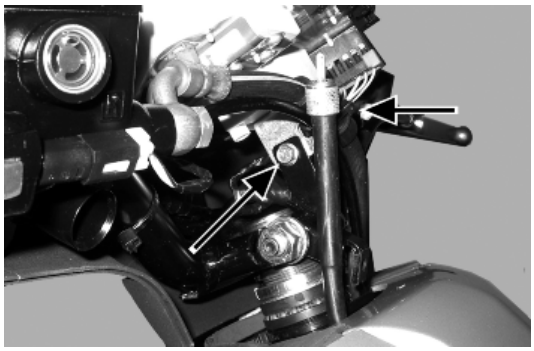
Mirror set screw 24 to 26

Rear handlebar cover

• Remove the front handlebar cover
• Unscrew the odometer transmission joint and slide it off
• Disconnect the instrument panel and electrical controls connections



• Cut the clamp retaining the front brake pipes to the instrument panel
• Remove the screw fixing the instrument panel to the handlebar



See also

Front handlebar cover

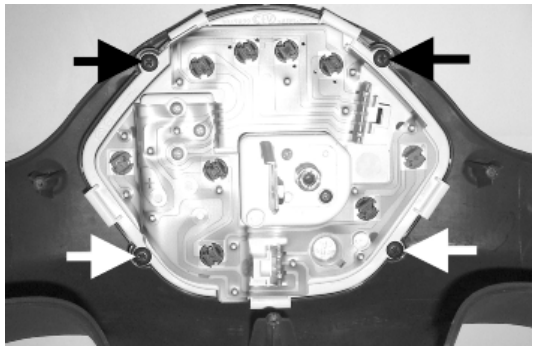
Instrument panel

• Remove the rear handlebar cover

• Unscrew the 4 fixing screws and remove the instrument panel

N.B.

THE WARNING LIGHT BULBS HAVE A BAYONET JOINT ON THE BULB HOLDER; THE LATTER CAN BE REMOVED BY ROTATING IT 30° ANTICLOCKWISE. THE CLOCK IS POWERED BY A BATTERY TYPE



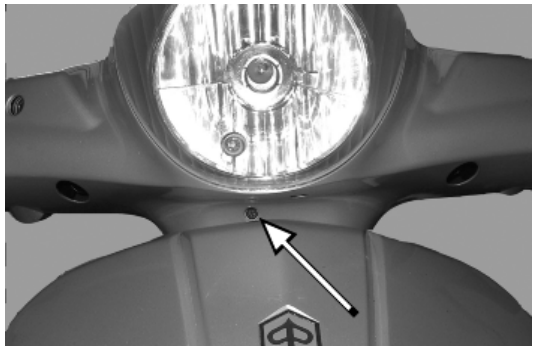
See also

Rear handlebar cover

Front handlebar cover

• Remove the 2 screws in the rear handlebar cover and the screw under the headlamp.

• Pull up and detach the front handlebar cover, disconnect the headlight assembly connections.



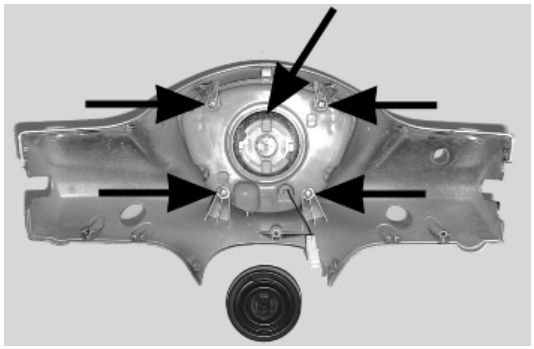
Headlight assy.

• Remove the front handlebar cover.

• Unscrew the 4 fixing screws and remove the headlight assembly.

N.B.

N.B. TO REPLACE THE HIGH/LOWBEAM HEADLIGHT BULB, REMOVE THE RUBBER COVER AND TURN THE SUPPORTING PLATE BY 30° ANTICLOCKWISE. TO REPLACE THE SIDE LIGHT BULB, JUST SLIDE IT OFF THE RUBBER BULB HOLDER.



See also

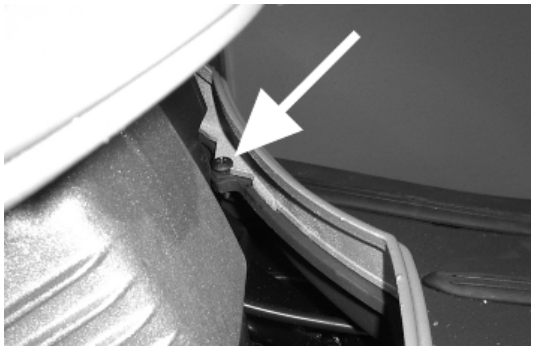
Front handlebar cover

Frame central cover

• Remove the rear luggage rack

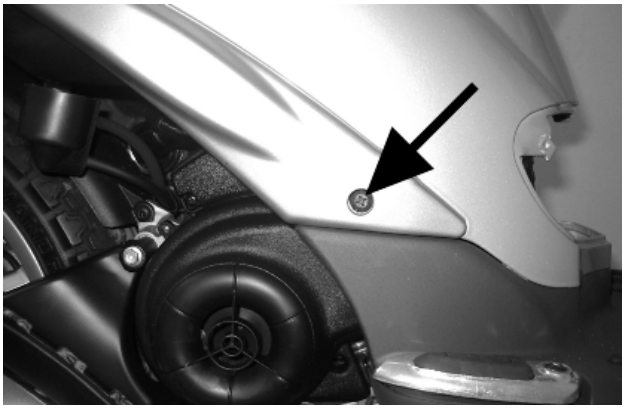
• Remove the saddle

• Remove the spark plug access cover, unscrew the 2 screws joining the helmet compartment clamp with the footrest.



• Unscrew the 2 side screws placed on the bumper rings.

• Remove the cover by holding it from the rear part and disconnect the turn indicator light connections

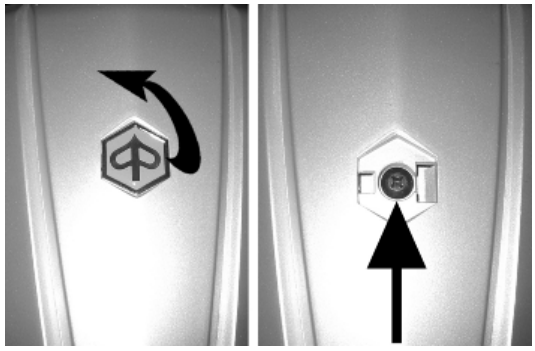


See also

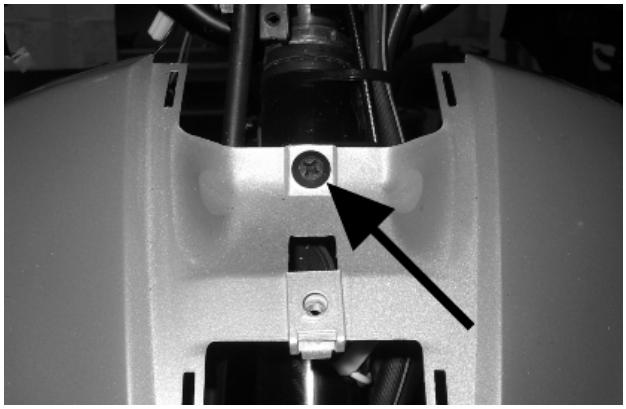
Rear rack
Seat

Legshield

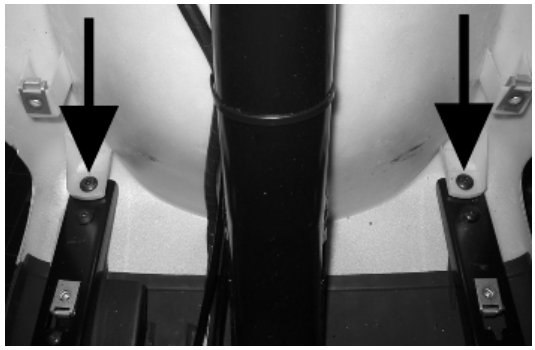
- Remove the shield back plate
- Remove the footrest.
- Remove the front fork.
- Remove the front badge using a blade and operating carefully from the right side.
- Undo the screw underneath and slide the cover upwards.



- Undo the front screw fixing the shield.



- Undo the 2 lower screws and remove the shield once the turn indicator connections have been disconnected.

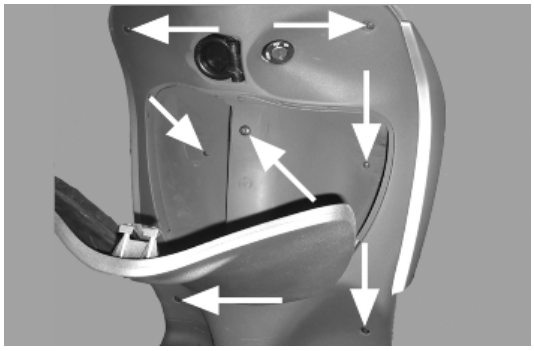


See also

Knee-guard
Footrest
Removal

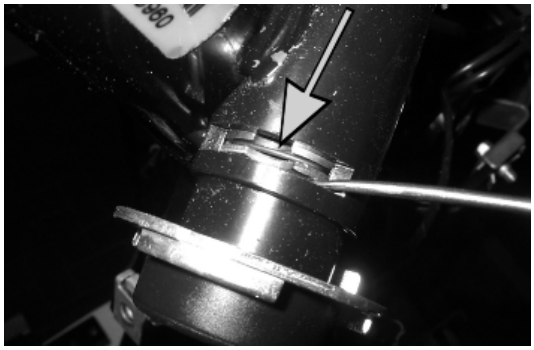
Knee-guard

• Remove the 4 external screws of the leg shield back plate and the 3 screws inside the front box.
• Using the bag hook, pull the leg shield back plate backwards until it slides off the fitting with the leg-shield.



Removing the ignition key-switch when on *off*

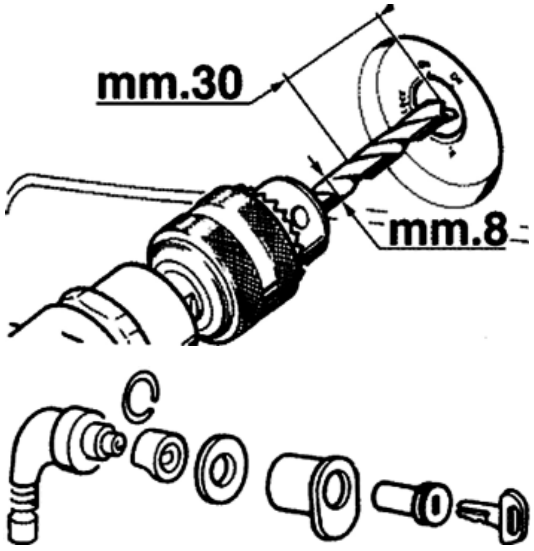
• Remove the leg shield back plate
• Push the lock body until the stop spring does not show grooves.
• Keep the lock body blocked with a screwdriver and remove the spring with a pair of pliers.
• Take out the lock block.



See also
Knee-guard

Removing the ignition key-switch when on *lock*

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

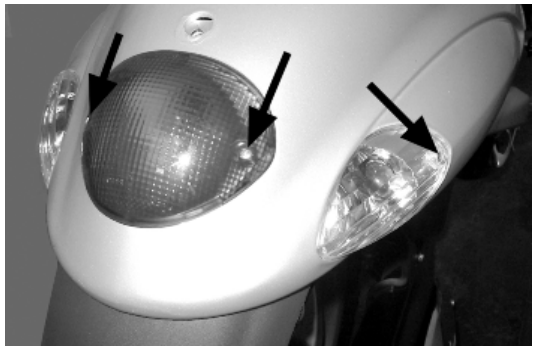


Taillight assy.

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

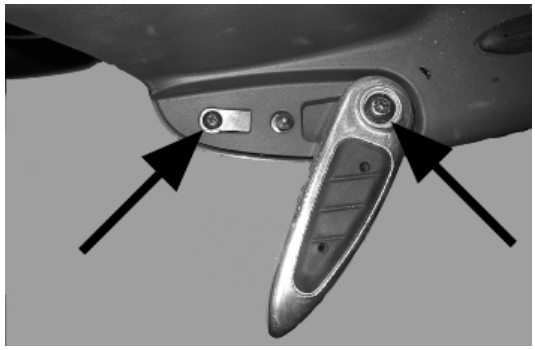
N.B.

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

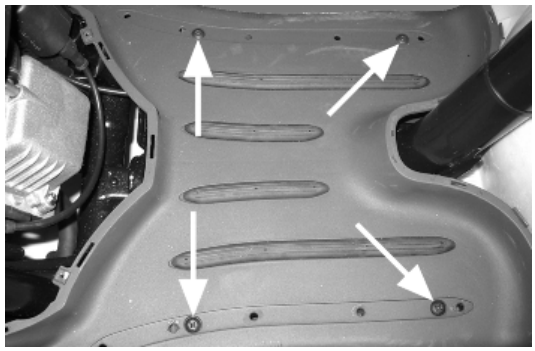


Footrest

• Remove the leg shield back plate
• Remove the central frame cover.
• Remove the passenger footrest by undoing its fixing screw.
• Undo the screw of the footrest lock and remove the tab.



• Remove the 2 outer rubber covers of the footrest fixing screws and undo them.
• Pull the footrest upwards paying attention to the lower hooks.

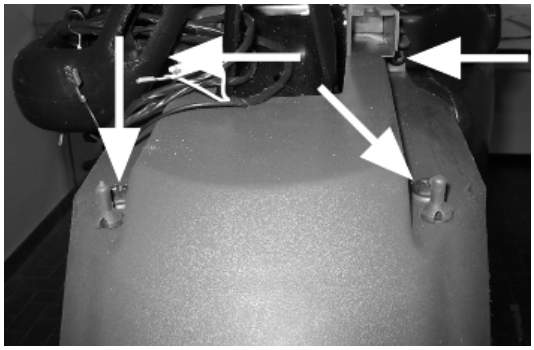


See also

Knee-guard
Frame central cover

License plate holder

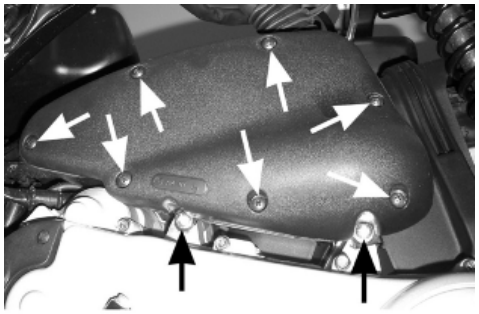
• Remove the saddle compartment cover
• Unscrew the 2 screws securing it to the frame, then remove the license plate housing



See also
Frame central cover

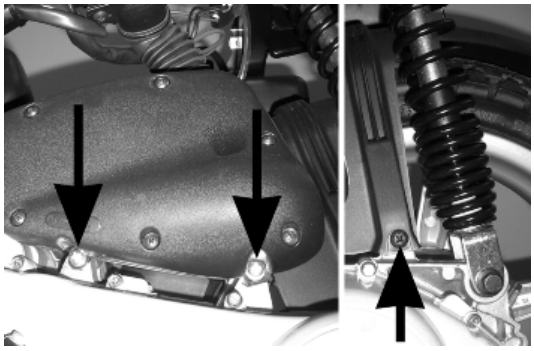
Air filter

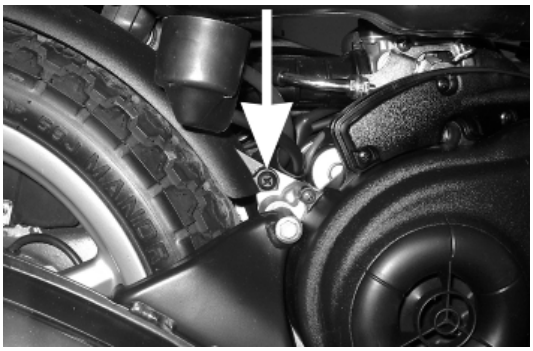
• Unscrew the 7 cover screws and remove the cover to reach the filter sponge.
• To disassemble the filter housing, unscrew the 2 bottom screws and disconnect the manifold connections, the carburettor and the external air intake.



Rear mudguard

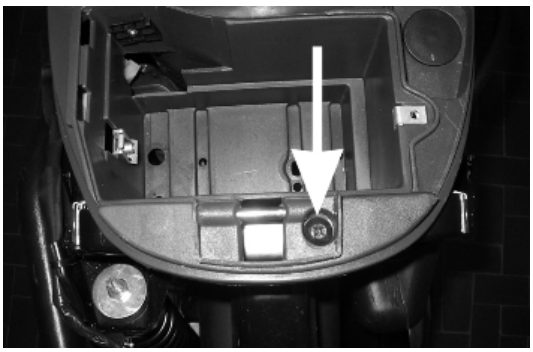
• Remove the 3 retainers on the left side (2 of which also fix the air filter housing).
• Remove the fixing screw on the cooling cap side.
• Remove the mudguard making it come out on the muffler side.





Helmet bay

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

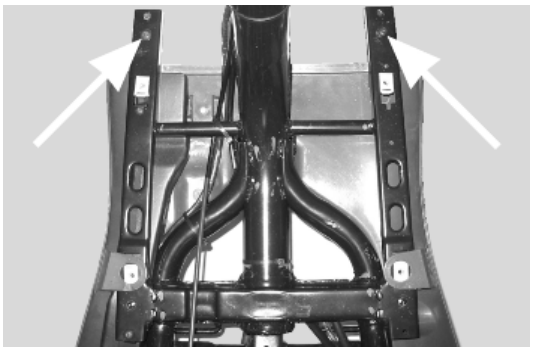


See also

Frame central cover

spoiler

- Remove the footrest.
- Undo the 2 front retainers and then remove the spoiler from the bottom.



See also

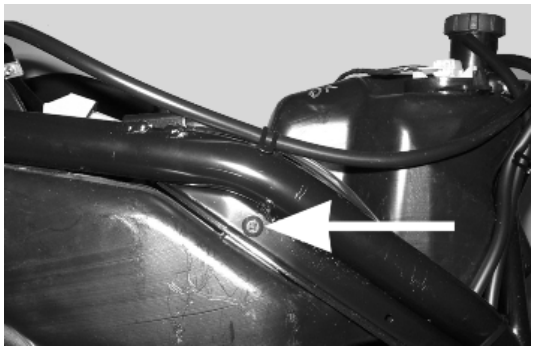
Footrest

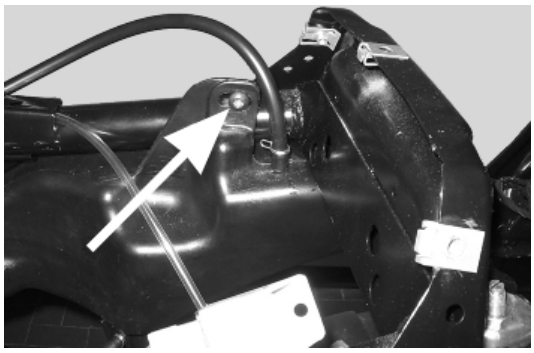
Fuel tank

• Remove the helmet compartment central cover.

• Undo the front and rear screws on the chassis right side.

• Disconnect the breather pipe and remove the float.





See also

Frame central cover

Front mudguard

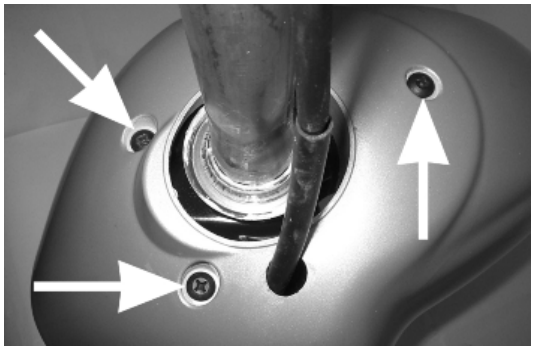
• With the front wheel mounted, remove the fork from the vehicle.

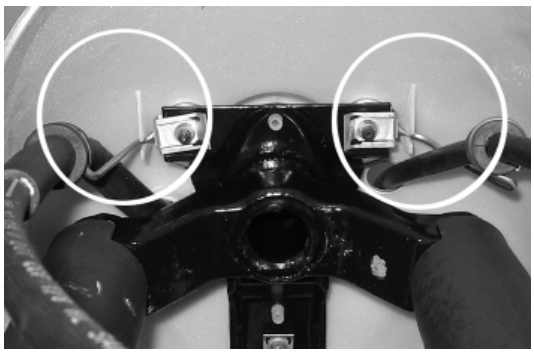
• Unscrew the 3 fixing screws and remove them.

• Slide off the odometer transmission and the brake pipes, and then remove the mudguard.

N.B.

Note: ON REASSEMBLY, TAKE CARE TO CORRECTLY POSITION THE 2 METAL CABLE GROMMETS IN ORDER TO PREVENT ANY RUBBING AGAINST THE WHEEL.





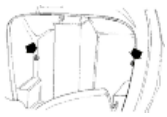
See also

Removal

Top-case

Front

Disassembling the inner shield fairing (glove box assy.)



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

INDEX OF TOPICS

Aesthetic inspection

Appearance check:

- Paintwork
- Fitting of plastics
- Scratches
- Dirt

Tightening torques inspection

Lock check

- Safety fasteners
- Fixing screws

Safety fasteners:

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

Electrical system

Electrical system:

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

CAUTION

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

WARNING

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

CAUTION

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

WARNING

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

CAUTION

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

Levels check

Level check:

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

Road test

Test ride

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

Static test

Static control after the test ride:

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

CAUTION

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

CAUTION

NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES OR TYRES MAY BURST.

Functional inspection

Functional Checks:

Braking system (hydraulic)

- Lever travel

Braking system (mechanical)

- Lever travel

Clutch

- Proper functioning check

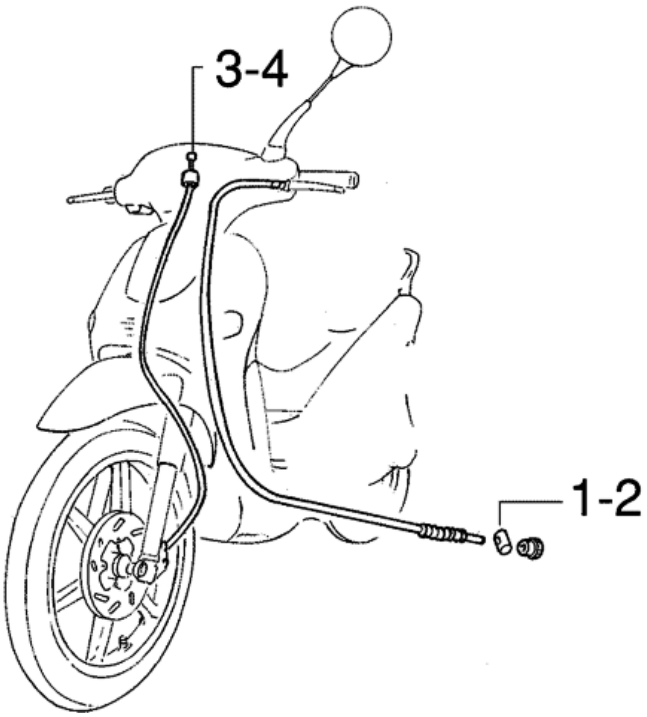
Engine

- Throttle travel check

Others

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

INDEX OF TOPICS

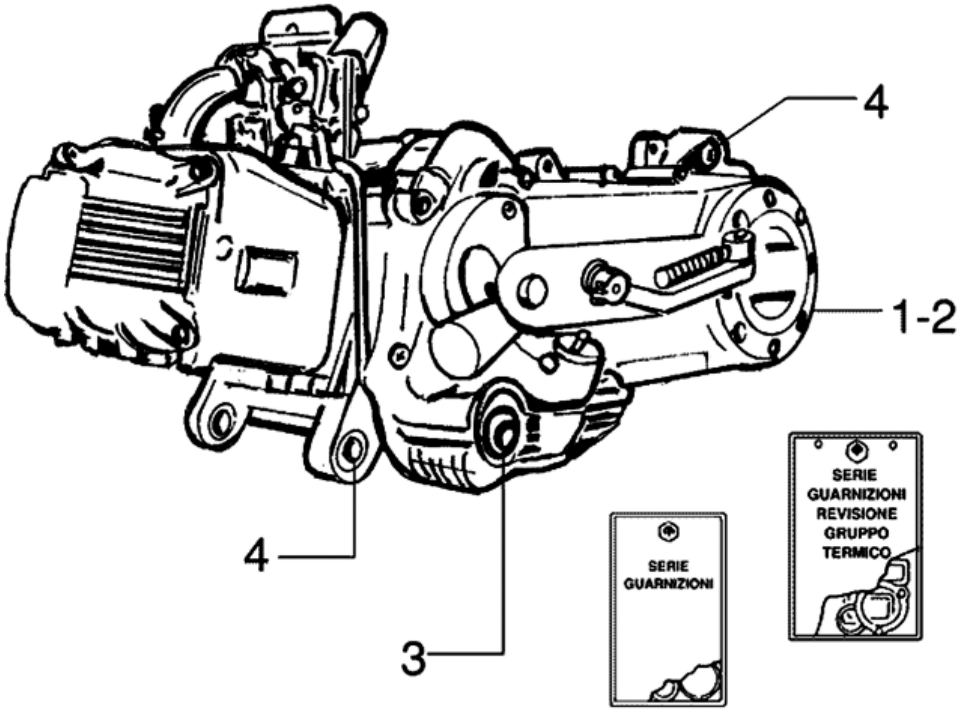


TRANSMISSIONS

	Code	Action	Duration
1	002053	Rear brake transmission complete - Replacement	
2	003060	Rear brake transmission - Adjustment	
3	002051	Odometer transmission assembly - Replacement	
4	002049	Odometer cable - Replacement	

This section is dedicated to the time necessary to carry out repairs.
The description and code for each operation is indicated.

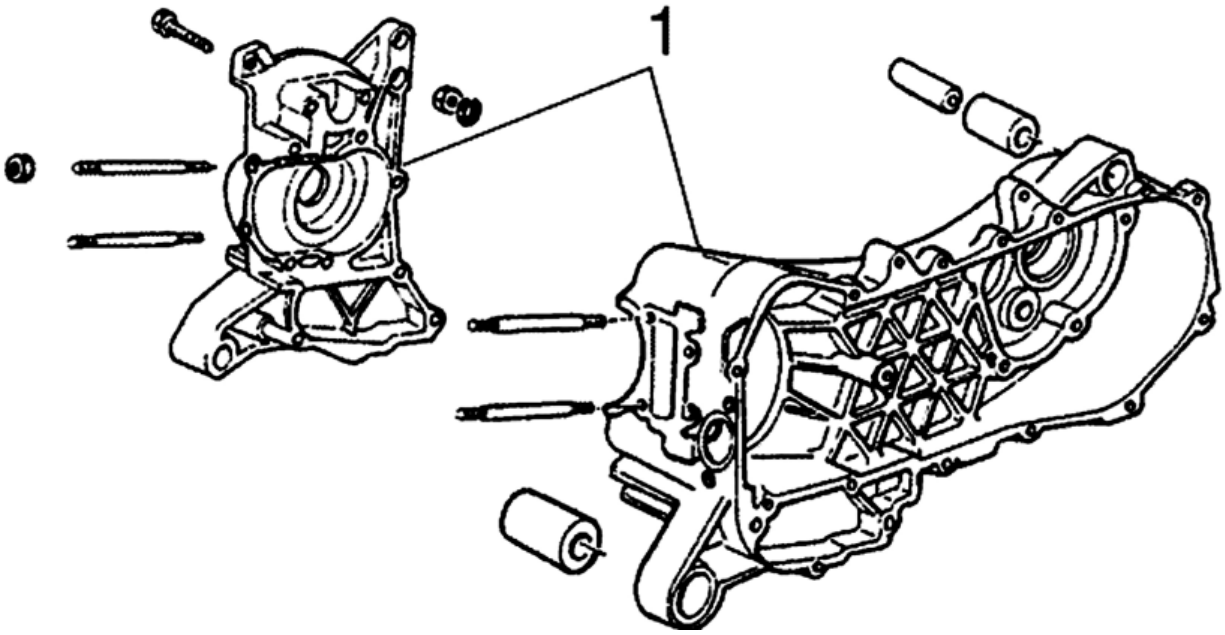
Engine



ENGINE

	Code	Action	Duration
1	001001	Engine from chassis - Removal and refit.	
2	001127	Engine - Complete service	
3	003064	Engine oil - change	
4	003057	Engine fixing - Nuts tightening 4	

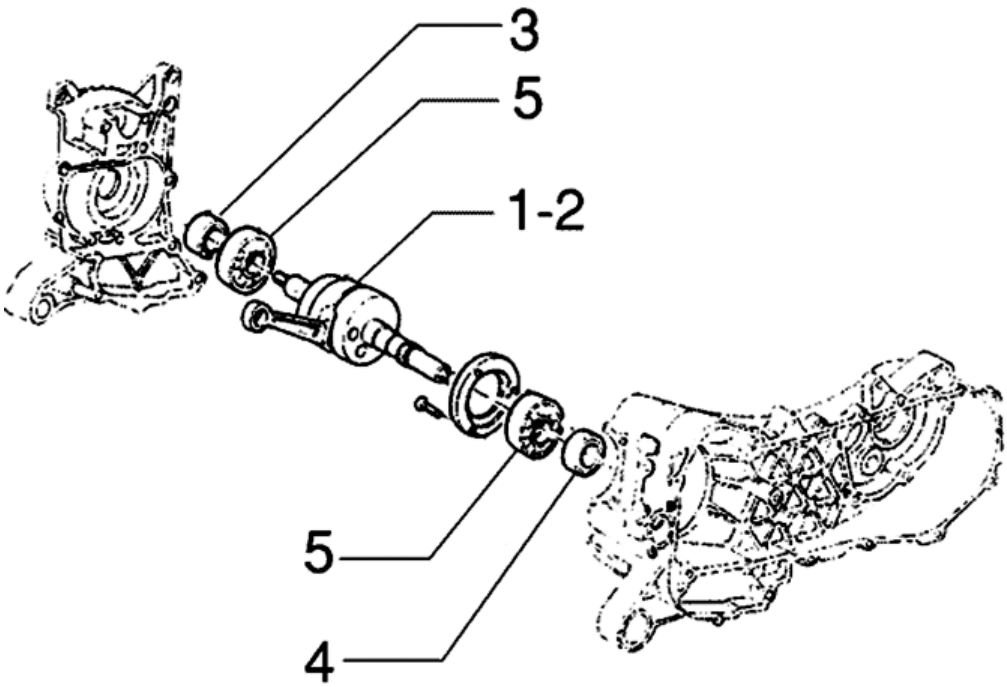
Crankcase



CRANKCASE

	Code	Action	Duration
1	001133	Engine crankcase - Replacement	

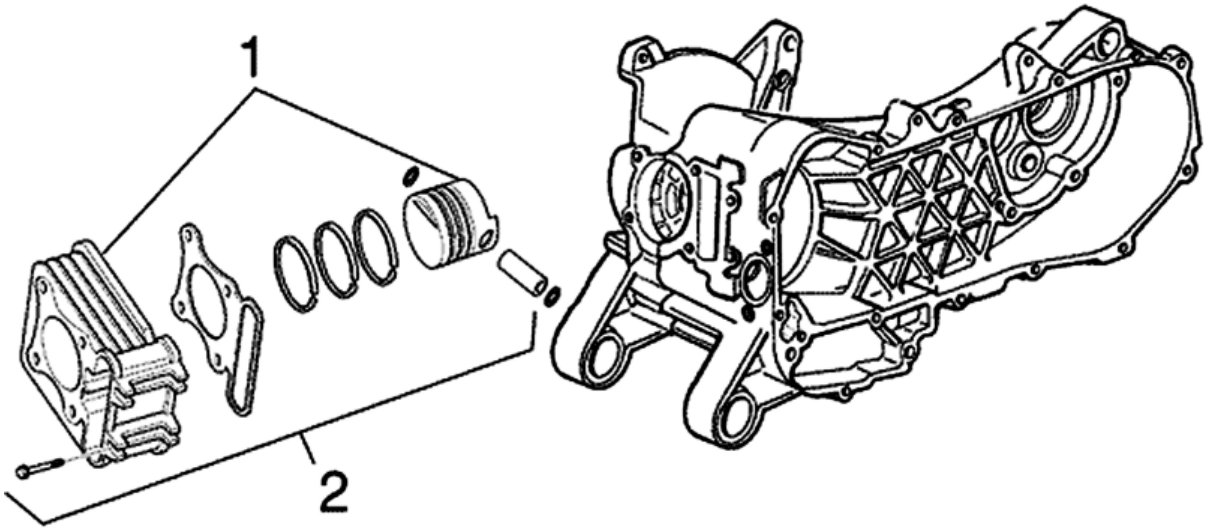
Crankshaft



DRIVING SHAFT

	Code	Action	Duration
1	001117	Crankshaft - Replacement	
2	001101	Engine - Overhaul	
3	001099	Oil seal flywheel side - Replacement	
4	001100	Clutch-side oil seal - Replacement	
5	001118	Main bearings - Replacement	

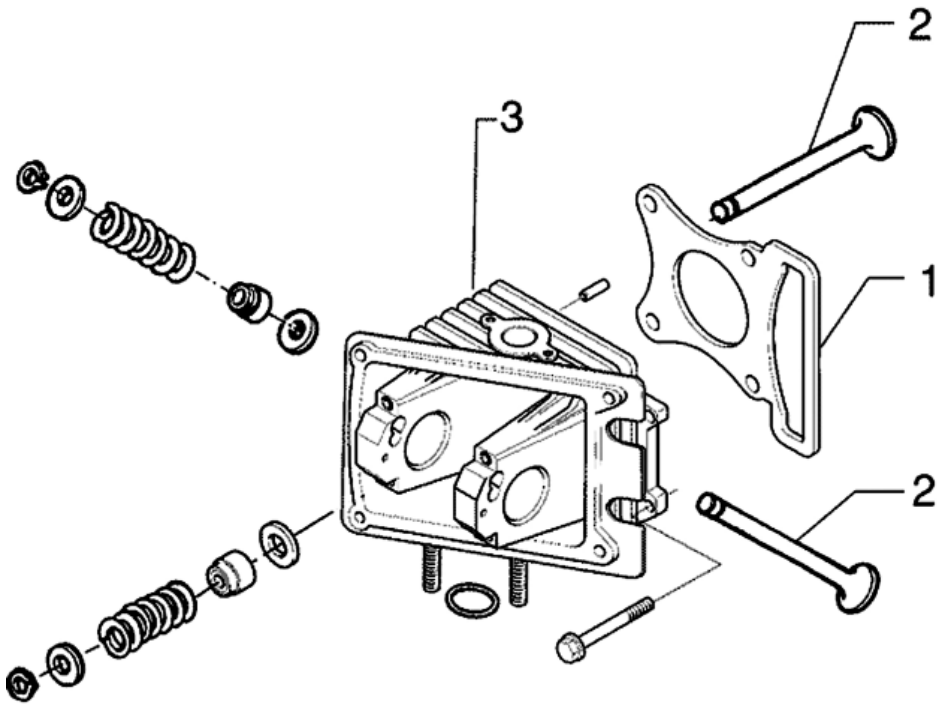
Cylinder assy.



CYLINDER - PISTON

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

Cylinder head assy.



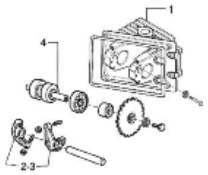
HEAD

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

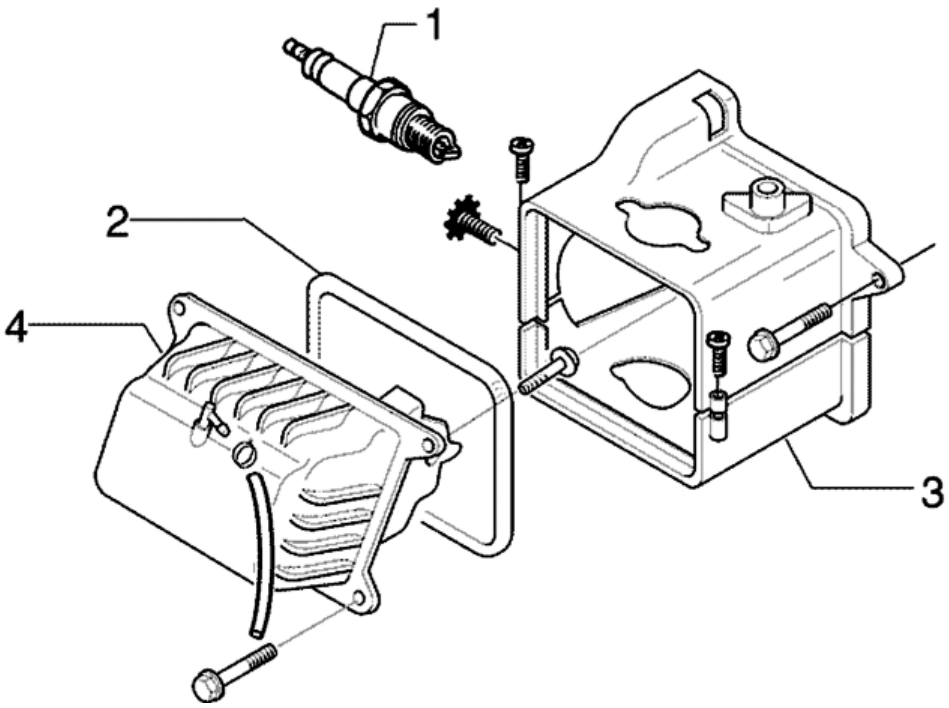
Rocker arms support assy.

CAMSHAFT SUPPORT

	Code	Action	Duration
1	003056	Head/cylinder - Nuts tightening	
2	001049	Valve clearance - Adjustment	
3	001148	Valve rocking levers - Replace-ment	
4	001044	Camshaft - Re-placement	



Cylinder head cover



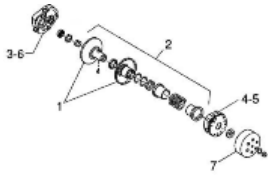
HEAD COVER

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

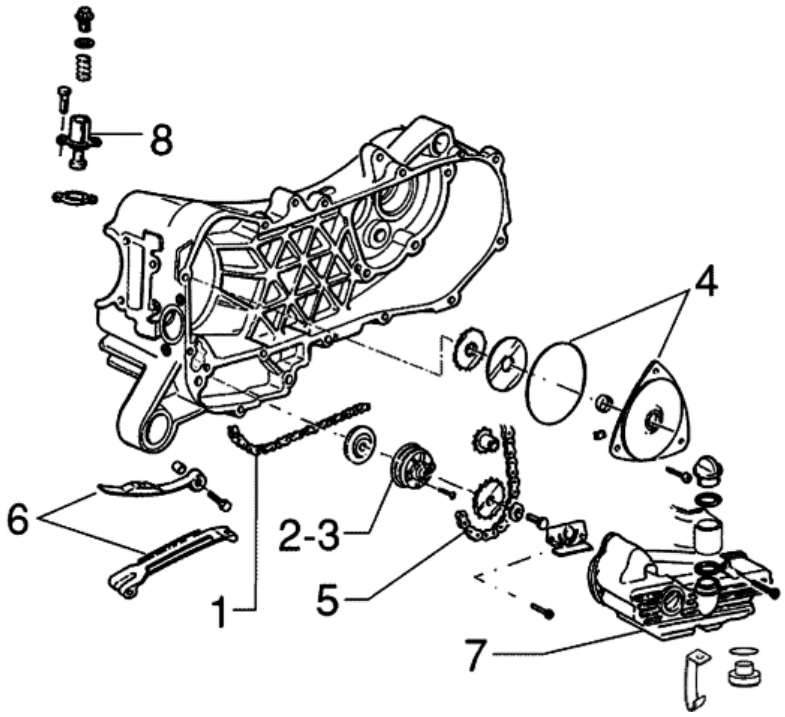
Driven pulley

DRIVEN PULLEY - CLUTCH

	Code	Action	Duration
1	001110	Driven pulley- Replacement	
2	001012	Driven pulley - overhaul	
3	003065	Gear casing oil - Replacement	
4	001022	Clutch - Re- placement	
5	003072	Clutch assembly - Wear check	
6	001156	Reduction gear- ing cover - Re- placement	
7	001155	clutch housing - Replacement	



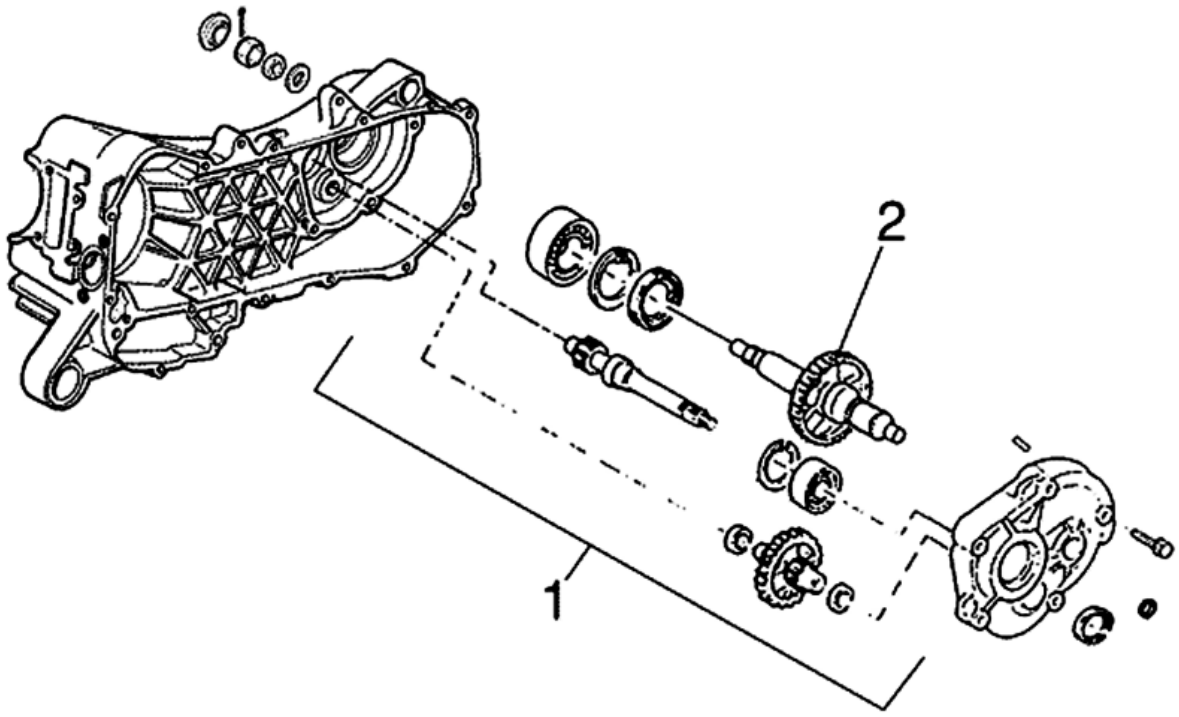
Oil pump



OIL PUMP

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

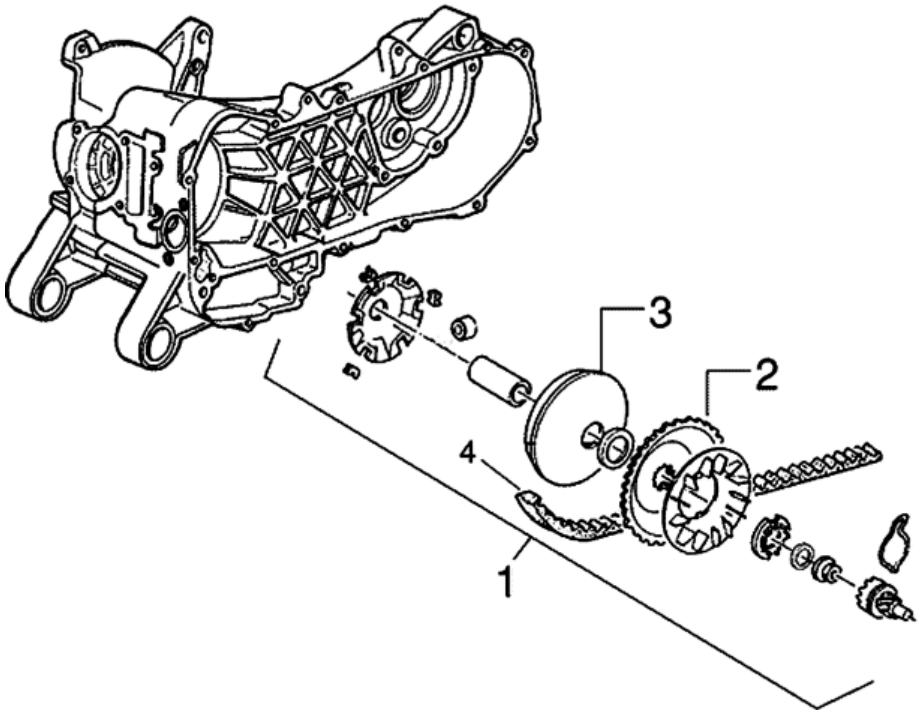
Final gear assy.



REDUCTION GEAR

	Code	Action	Duration
1	001010	Geared reduction unit - Service	
2	004125	Rear wheel axle - Replacement	

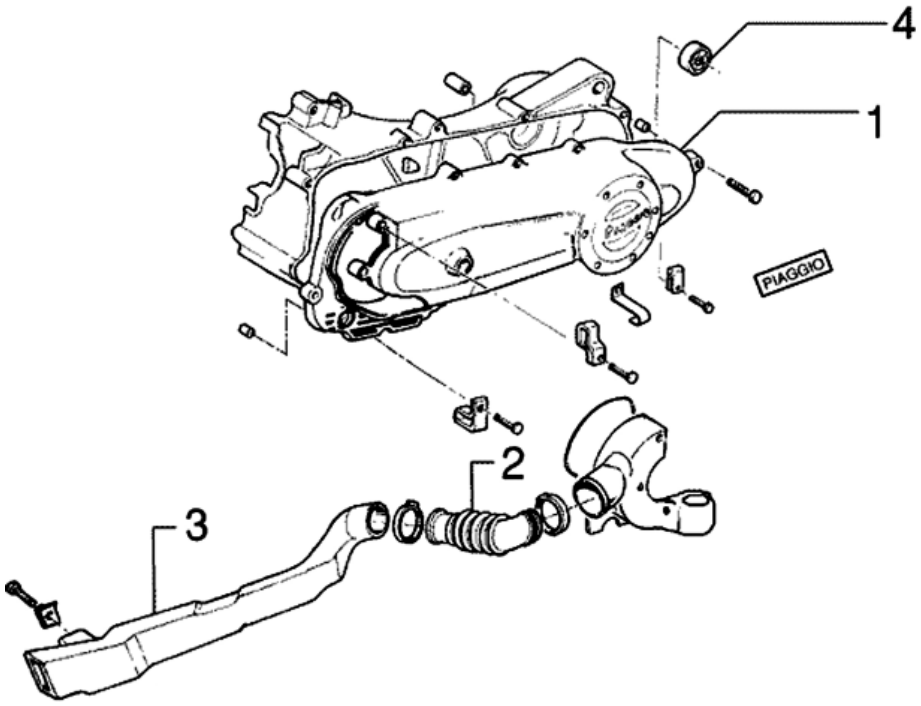
Driving pulley



DRIVING PULLEY

	Code	Action	Duration
1	001006	Driving pulley - Overhaul	
2	001086	Driving half-pulley - Replacement	
3	001066	Driving pulley - Removal and refitting	
4	001011	Drive belt - Replacement	

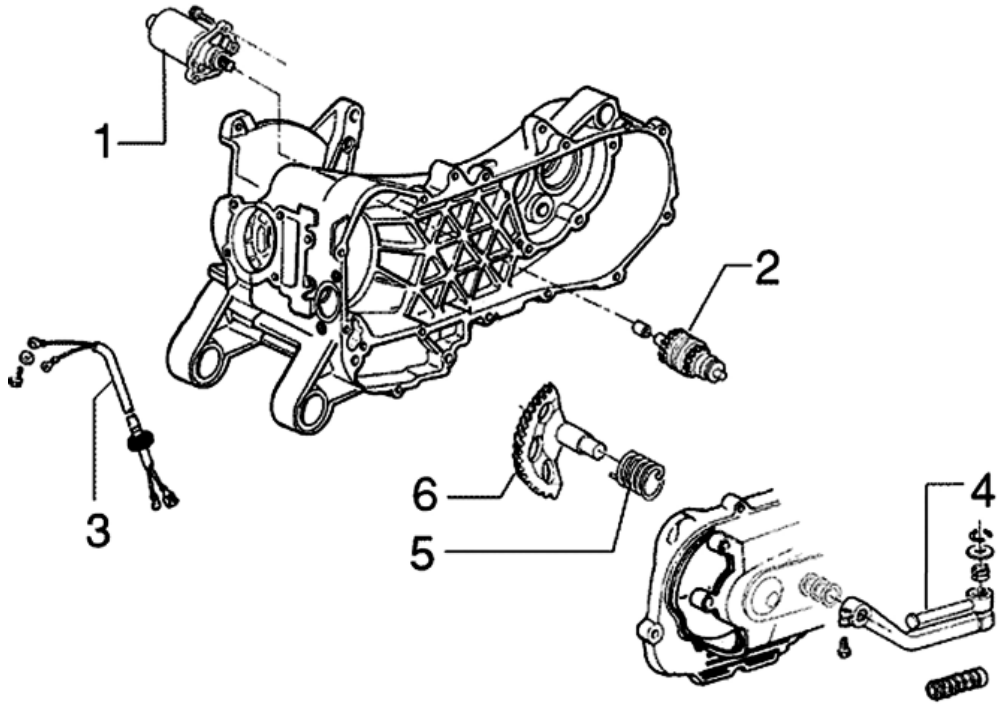
Transmission cover



TRANSMISSION COVER

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

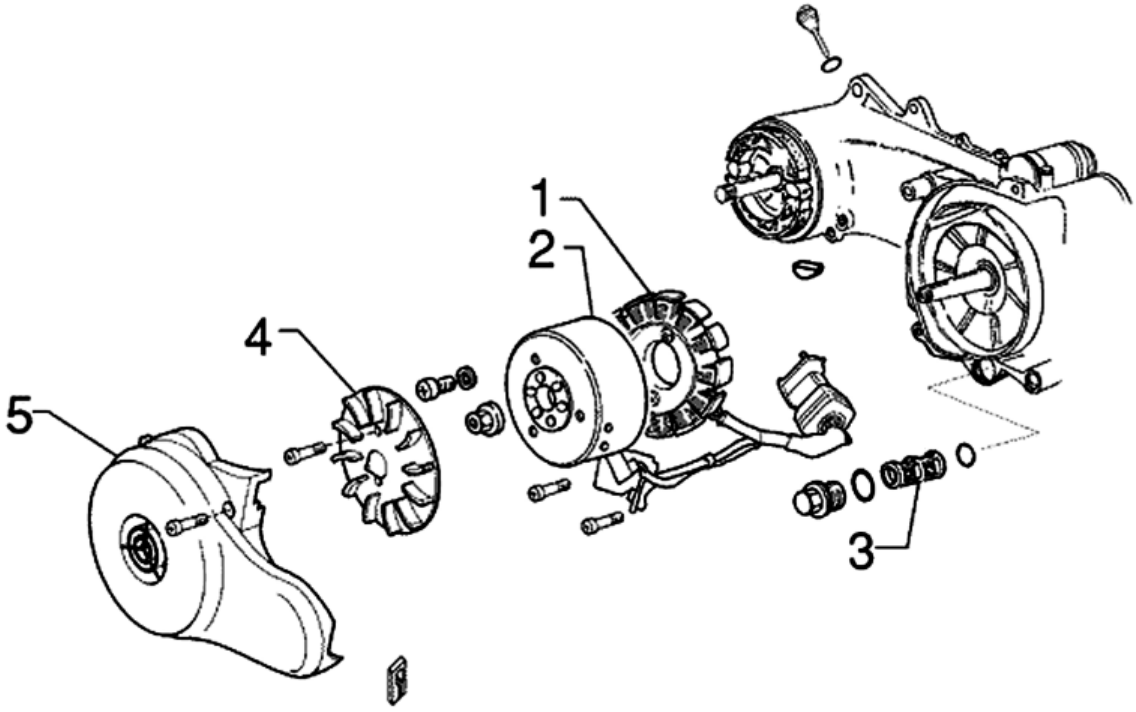
Starter motor



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	

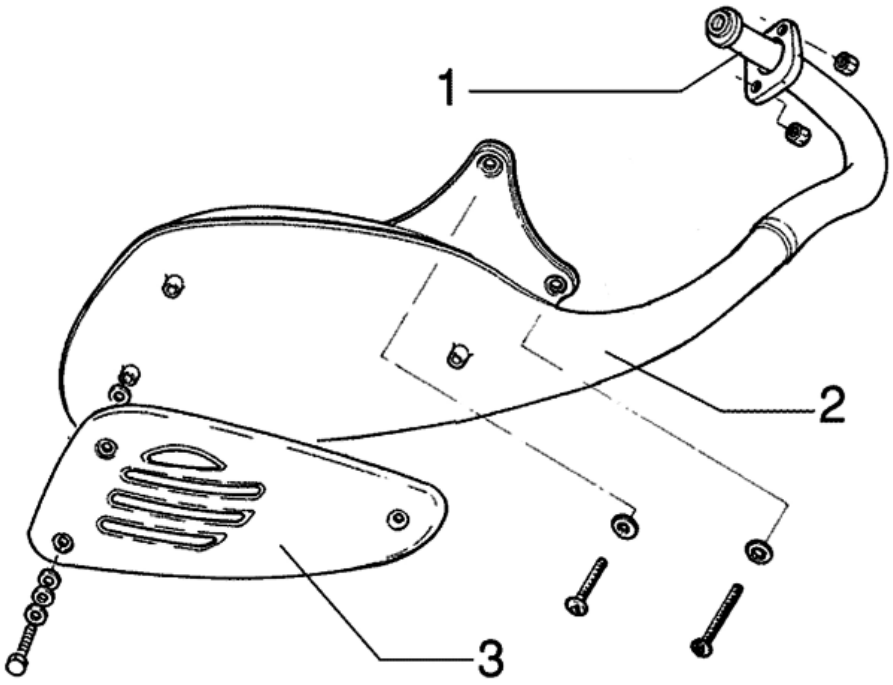
Flywheel magneto



FLYWHEEL FAN

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

Exhaust pipe



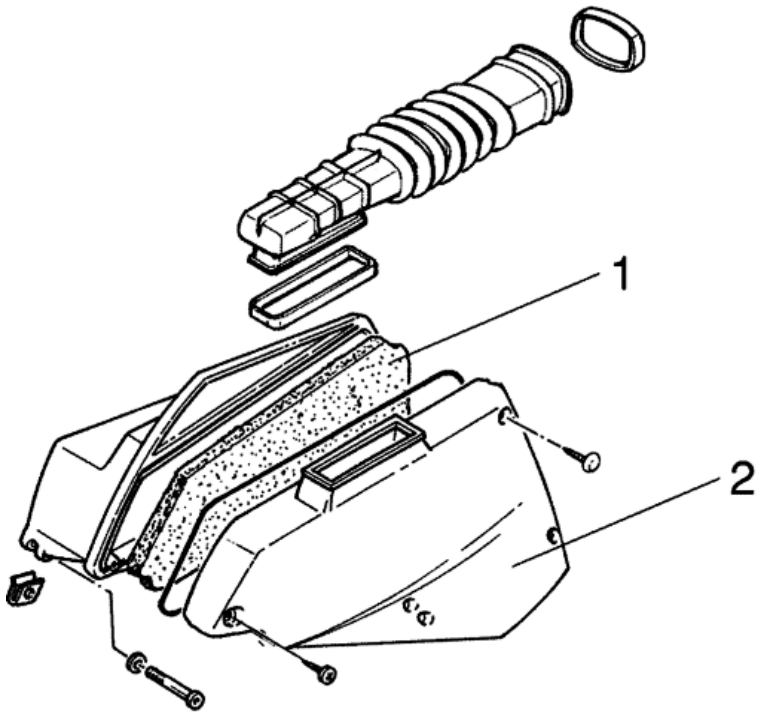
MUFFLER

	Code	Action	Duration
1	001092	Exhaust manifold - Replacement	
2	001009	Silencer - Replacement	
3	001095	Muffler guard - Replacement	

Silencer fixing

Please take note that, starting from chassis serial number ZAPM3810000003971, the two M8 x 50 silencer fixing flaged head screws have been replaced by two M8 x 50 internal hexagonal cylindrical head screws.

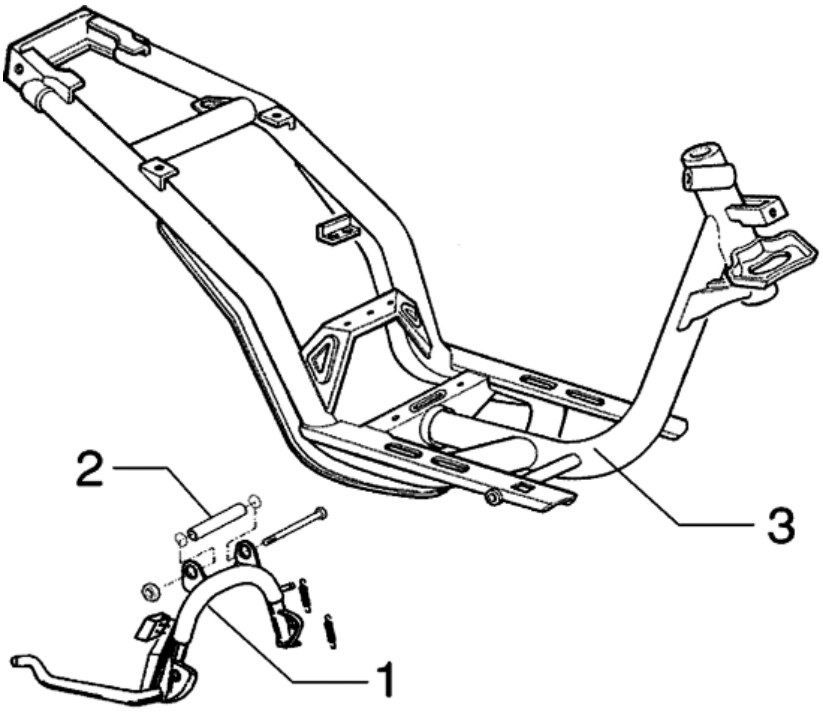
Air cleaner



AIR FILTER

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

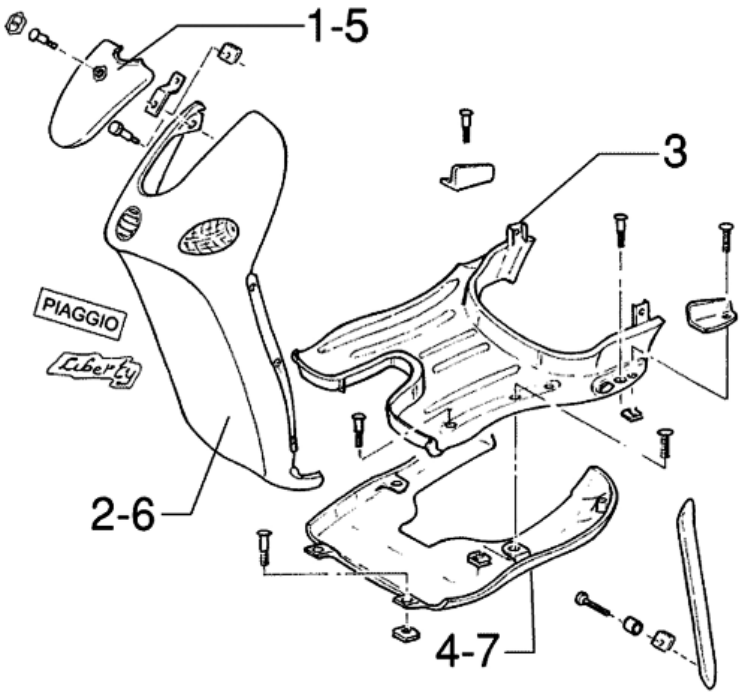
Frame



CHASSIS

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

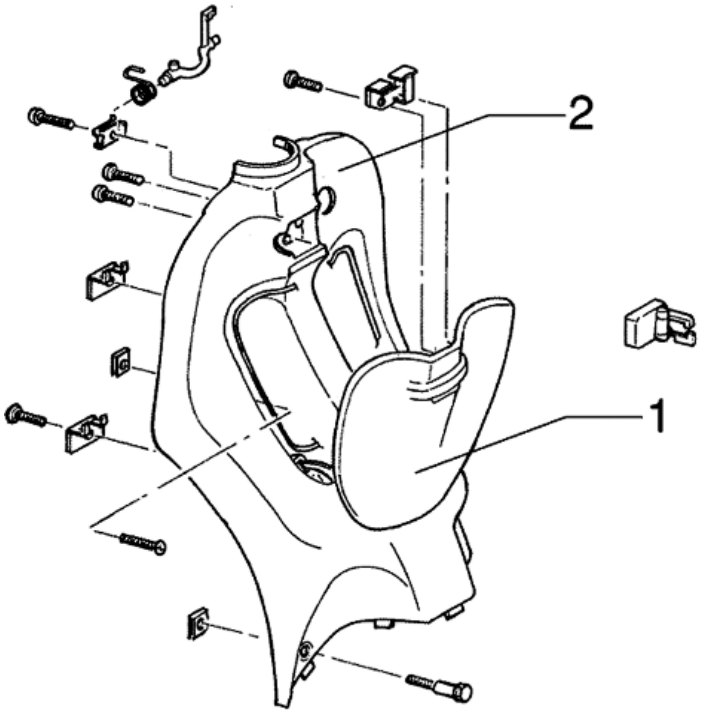
Legshield spoiler



MUFFLER - GLOVE COMPARTMENT

	Code	Action	Duration
1	004024	Co Steering cover - Replacement	
2	004064	Front shield, front section - Removal and refitting	
3	004015	Footrest - Disassembly and reassembly	
4	004053	Spoiler - Replacement	
5	006006	Steering head tube cover - Painting	
6	006012	Front shield, front section - Painting	
7	006027	Spoiler - Painting	

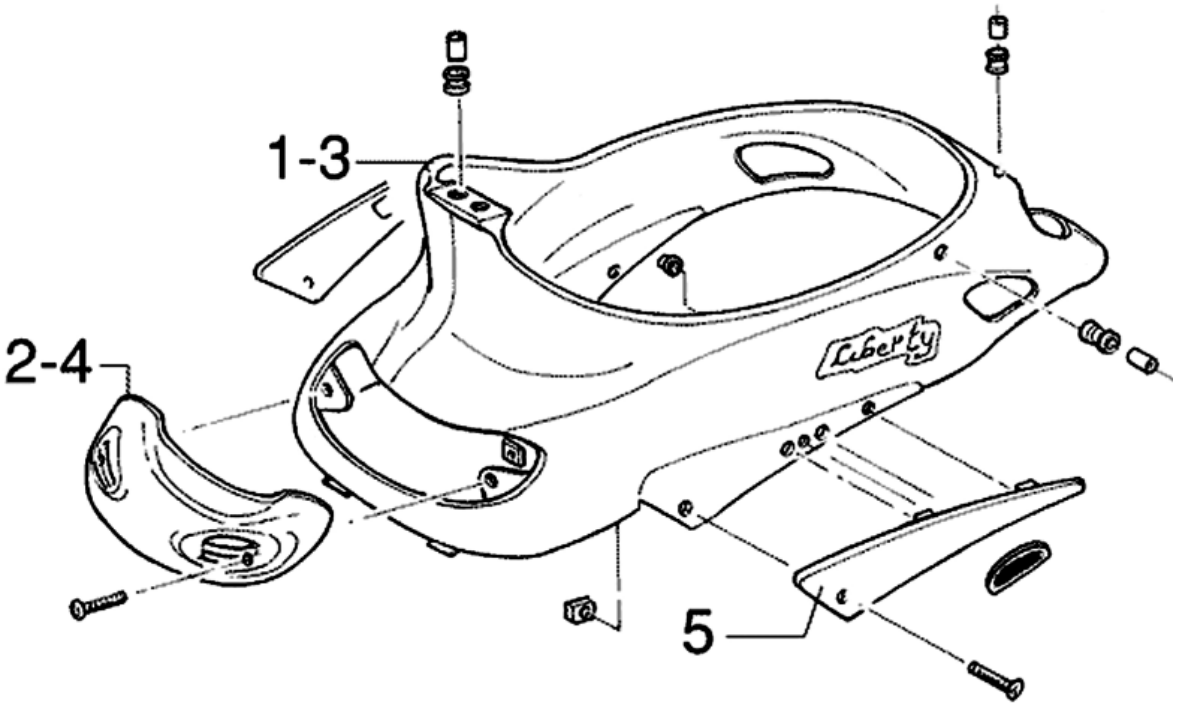
Rear cover



FRONT FOOTBOARD

	Code	Action	Duration
1	004081	Glove comparment door - Replace-ment	
2	004065	Front shield, rear section - Replace-ment	

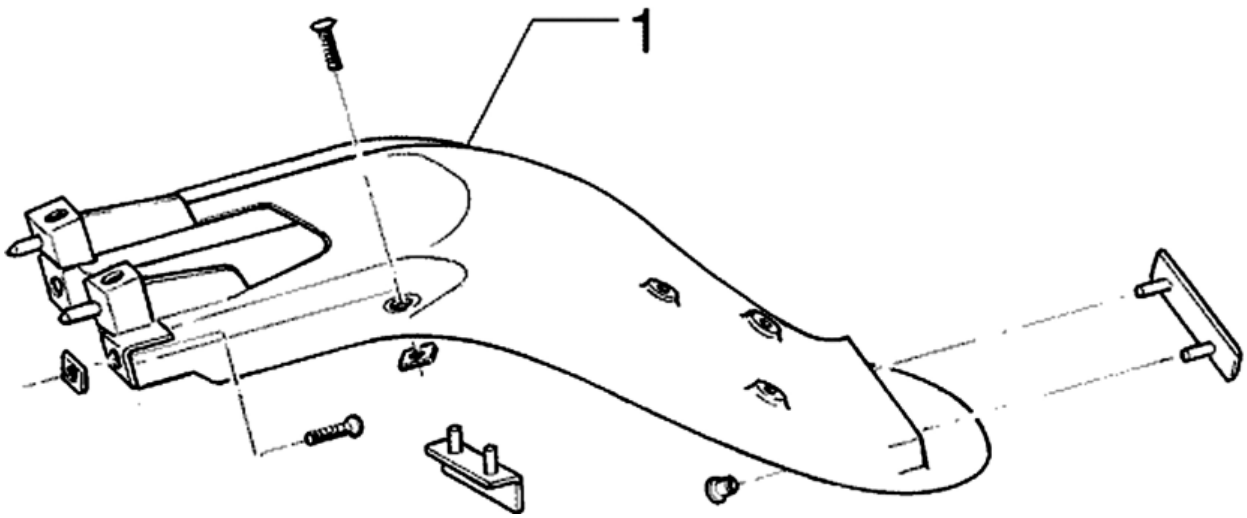
Central cover



CENTRAL COVER

	Code	Action	Duration
1	004106	Undersaddle band - Replacement	
2	004059	Spark plug inspection flap - Replacement	
3	006035	Undersaddle band - Painting	
4	006032	Door - Painting	
5	004085	Fairing (1) - Replacement	

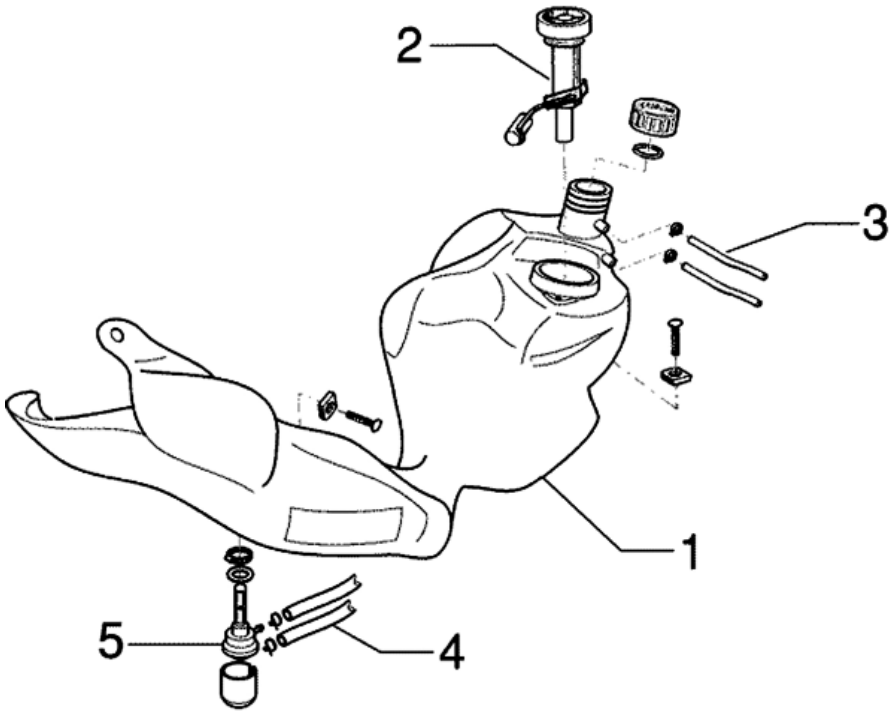
Mudguard



REAR MUDGUARD

	Code	Action	Duration
1	004136	Number-plate holder support - Replacement	

Fuel tank



FUEL TANK

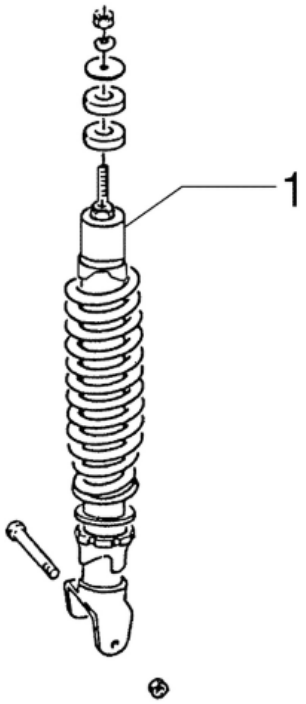
	Code	Action	Duration
1	004005	Fuel tank - Replacement	
2	005010	Tank float - Replacement	
3	004109	Fuel tank breather - Replacement	
4	004112	Cock-carburettor hose - Replacement	
5	004007	Fuel valve - Replacement	

Rear shock-absorber

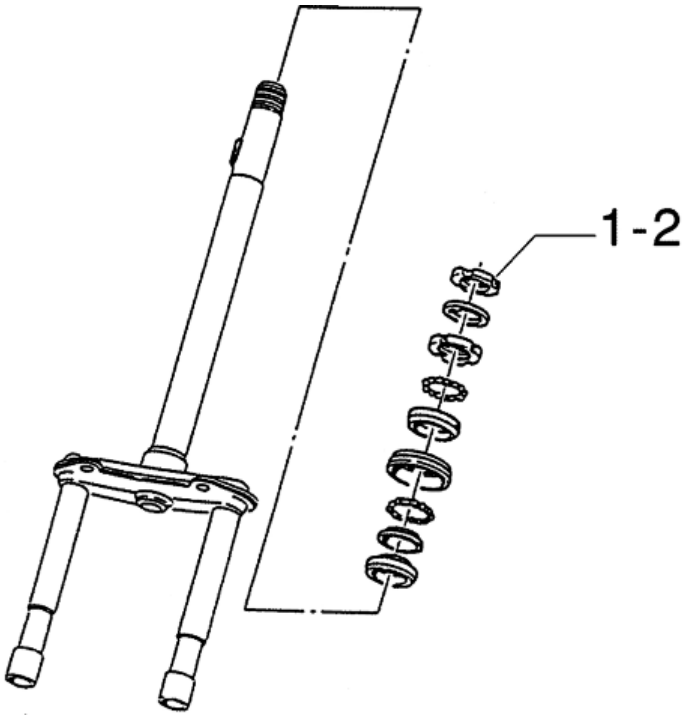
In order to unify the licensed vehicles, starting from frame **C28200 10346**, a new frame **dis. no. 576680** has been introduced instead of the old dis. **no. 576823**. At the same time a new steering tube **dis no. 597419**, a new front hydraulic brake hose **dis no. 597286**, a new front shock absorber dis. **no. 597470** and a new stand dis. **no. 582894** have been introduced.

REAR SHOCK ABSORBER

	Code	Action	Duration
1	003007	Rear shock absorber - Disassembly and reassembly	



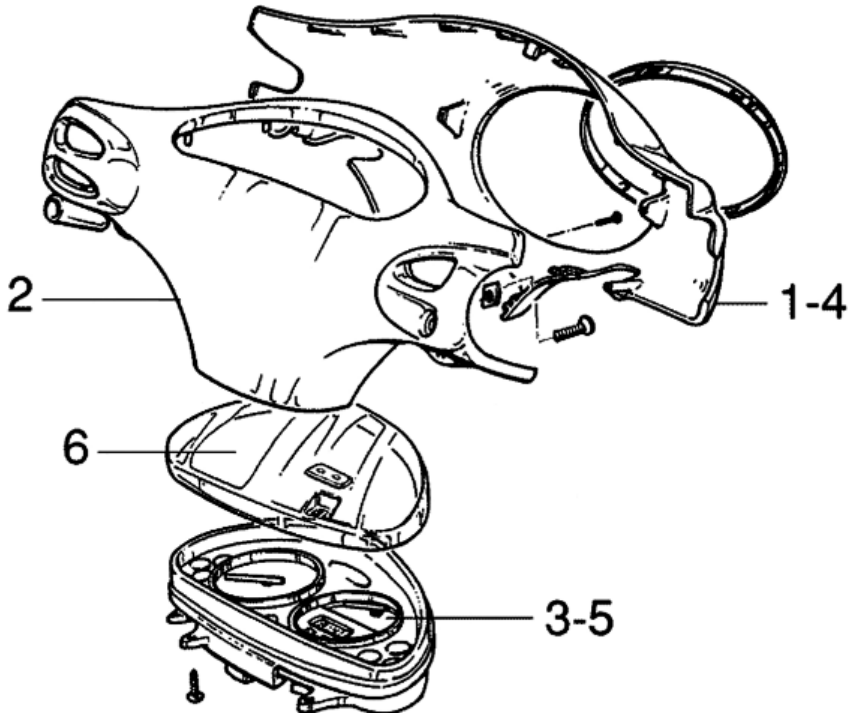
Steering column bearings



STEERING FIFTH WHEELS

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

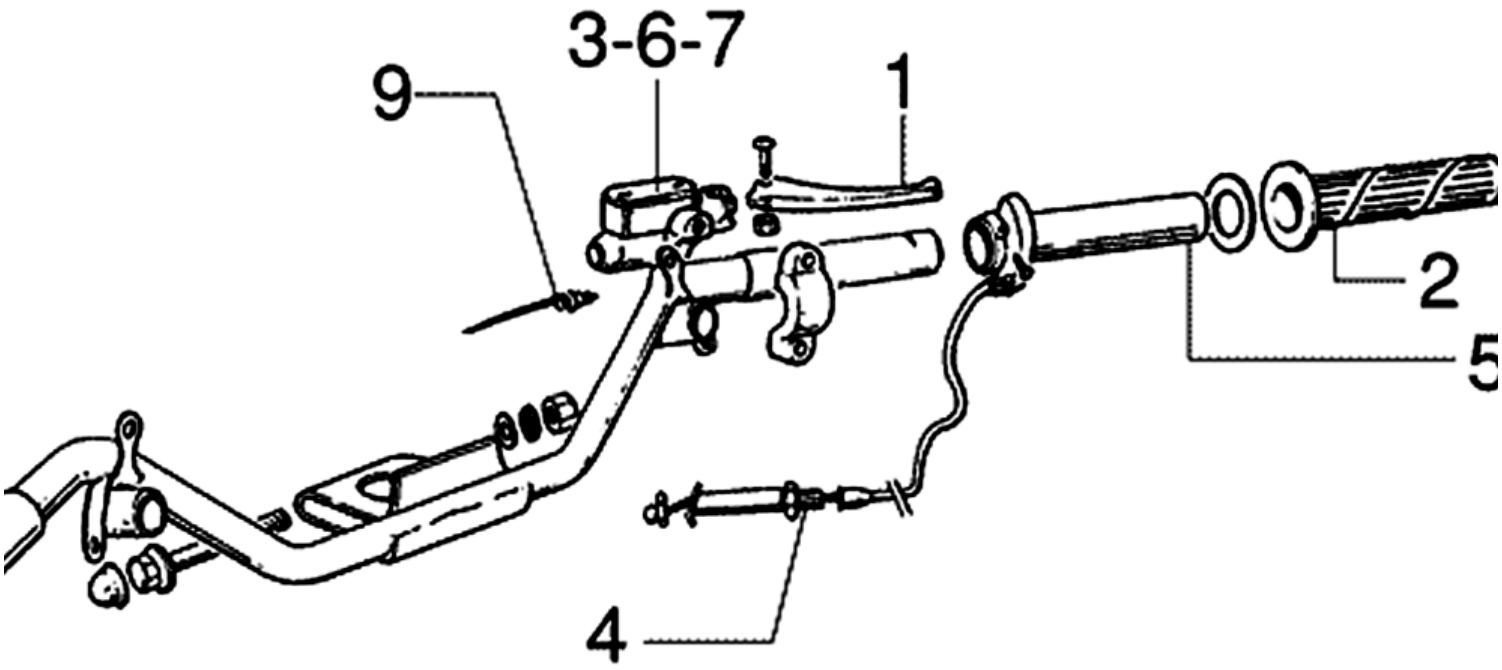
Handlebar covers



ODOMETER - HANDLEBAR COVERS

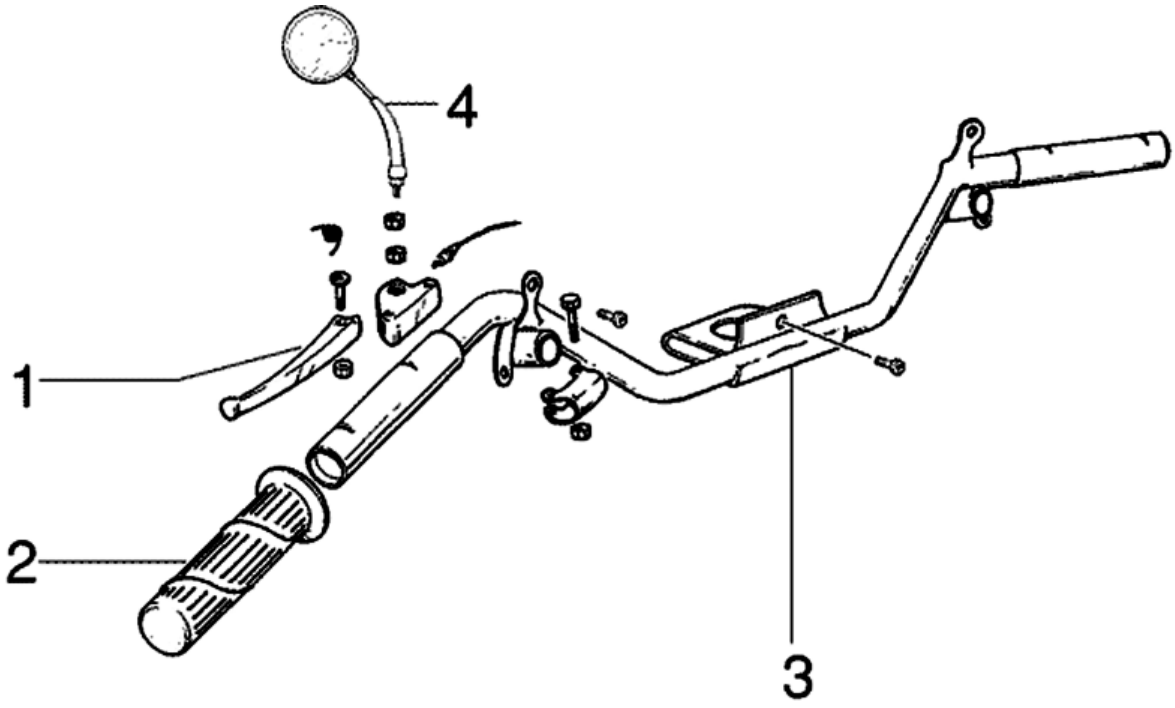
	Code	Action	Duration
1	004018	Handlebar front section - Replacement	
2	004019	Handlebar rear section - Replacement	
3	005014	Odometer - Replacement	
4	006013	Handlebar front part - Painting	
5	005038	Instrument panel warning light bulbs - Replacement	
6	005078	Speedometer glass - Replacement	

Handlebar components



HANDLEBAR COMPONENTS

	Code	Action	Duration
1	002037	Brake or clutch lever - Replacement	
2	002059	Right hand grip - Replacement	
3	003067	Front brake fluid - Renewal	
4	003061	Accelerator transmission - adjust	
5	002060	Complete throttle control - Replacement	
6	002047	Front brake fluid and air bleeding system - Replacement	
7	002024	Front brake pump - Removal and Refitting	
8	002063	Accelerator transmission - Replacement	
9	005017	Stop switch - Replacement	

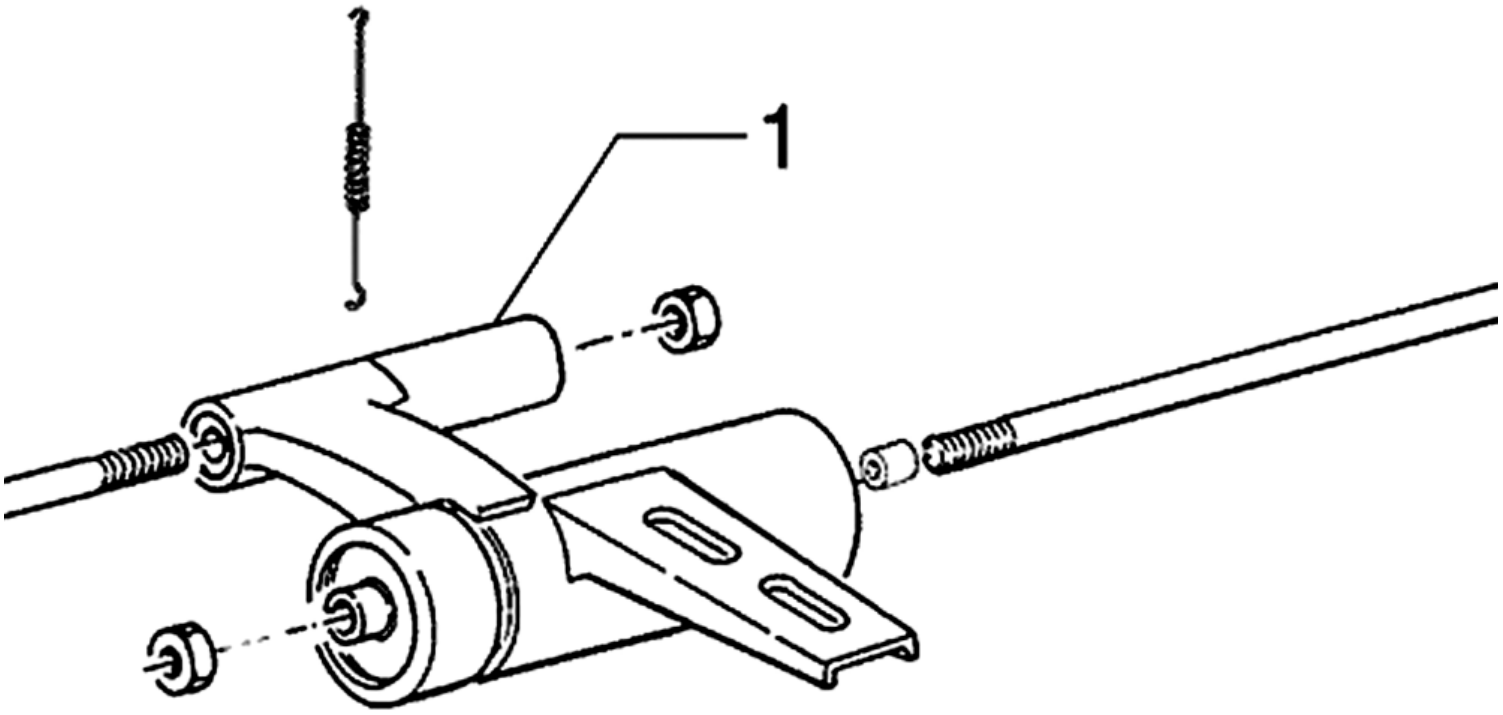


HANDLEBAR COMPONENTS

	Code	Action	Duration
1	002037	Brake or clutch lever - Replacement	
2	002071	Left hand grip - Replacement	
3	003001	Handlebar - Removal and refitting	
4	004066	Driving mirror - Replacement	

Swing-arm

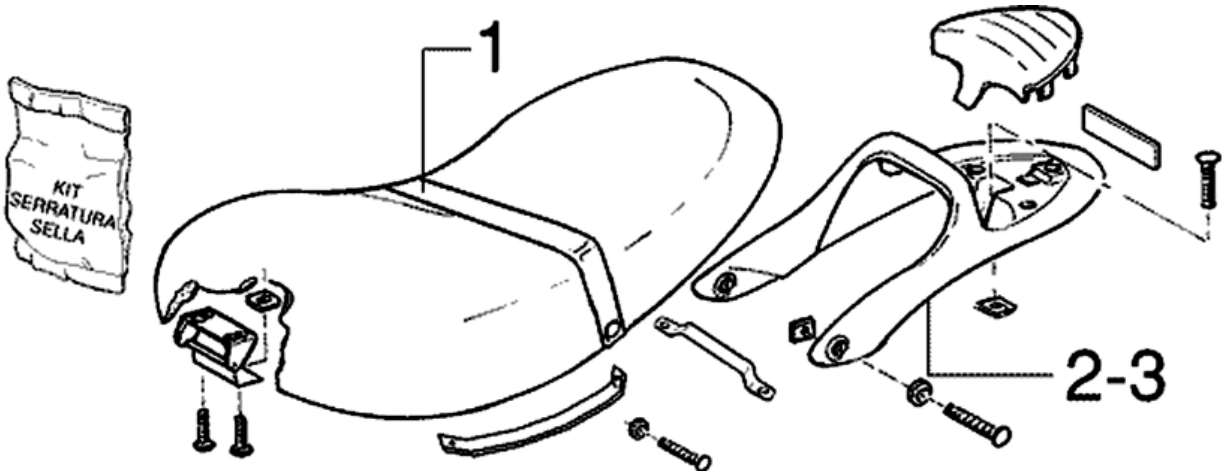
We inform you that, starting from frame **C15000 160199**, a new frame-side swinging arm pin locknut part **no. 231370** has replaced old part no. **232108**. Also, the locknut tightening torque has been increased from **33÷41** Nm to **64÷72** N•m.



SWINGING ARM

	Code	Action	Duration
1	001072	Engine/frame connection swing arm - Replacement	

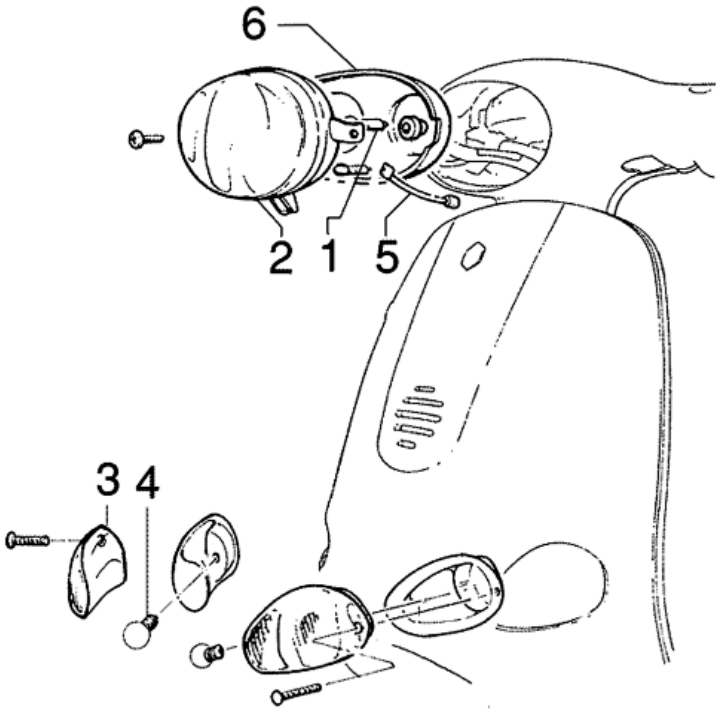
Seat



SADDLE - CARRIER

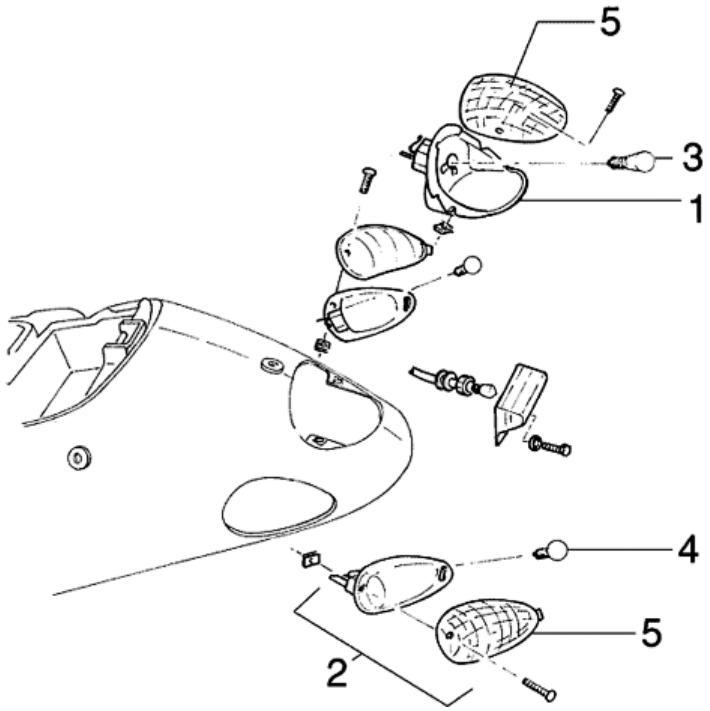
	Code	Action	Duration
1	004003	Saddle - Replacement	
2	004008	Carrier - Replacement	
3	006002	Luggage rack - Painting	

Turn signal lights



LAMP CLUSTER

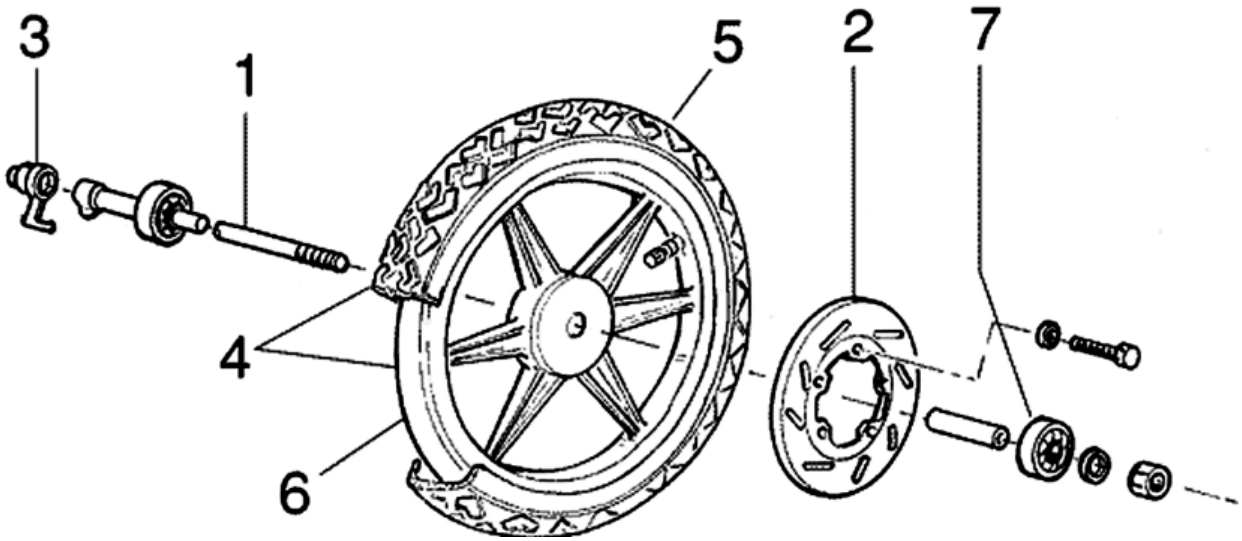
	Code	Action	Duration
1	005008	Headlight bulbs - Replacement	
2	005002	Front headlamp - Replacement	
3	005012	Front turning indicators - Replacement	
4	005067	Front turning indicator bulb - replacement	
5	005044	Front lights cable unit - replace	
6	004020	Headlight frame - Replacement	



REAR RED LAMP

	Code	Action	Duration
1	005005	Taillight - change	
2	005022	Rear turning indicators - Replacement	
3	005066	Rear light bulbs - Replacement	
4	005068	Rear turning indicator bulb - Replacement	
5	005028	Rear optical unit glass - Replacement	

Front wheel



FRONT WHEEL

	Code	Action	Duration
1	003068	Front wheel spindle - Removal and refitting	
2	002041	Brake disc - Replacement	
3	002011	Odometer drive - Replacement	
4	004123	Front wheel - Replacement	
5	003047	Front tyre - Replacement	
6	003037	Front wheel rim - Remov. and Refit.	
7	003040	Front wheel bearings - Replacement	

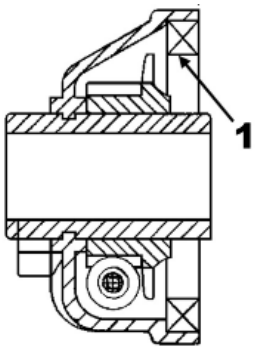
Tone wheel or drive greasing

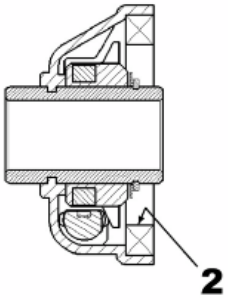
Please take note that the code has been introduced:

900001 - Tone wheel / drive greasing - 15'.

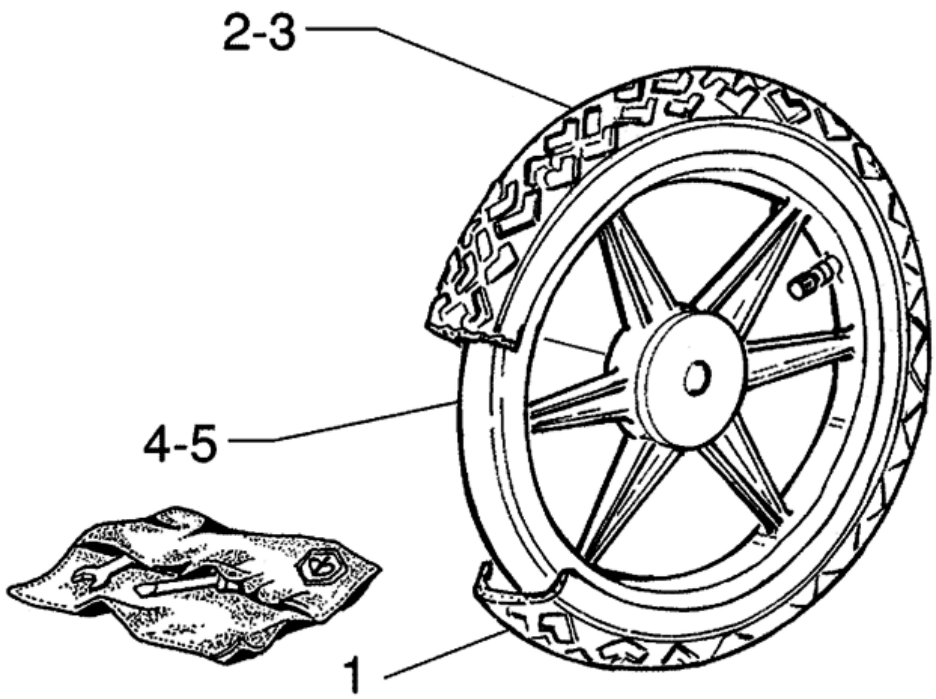
Never mistake the codes 002011 (movement sensor replacement) and 005089 (tone wheel replacement) in the event of noise of the indicated components. The grease recommended is TUTELA MRM 2 (soap-based lithium grease with Molybdenum disulphide).

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





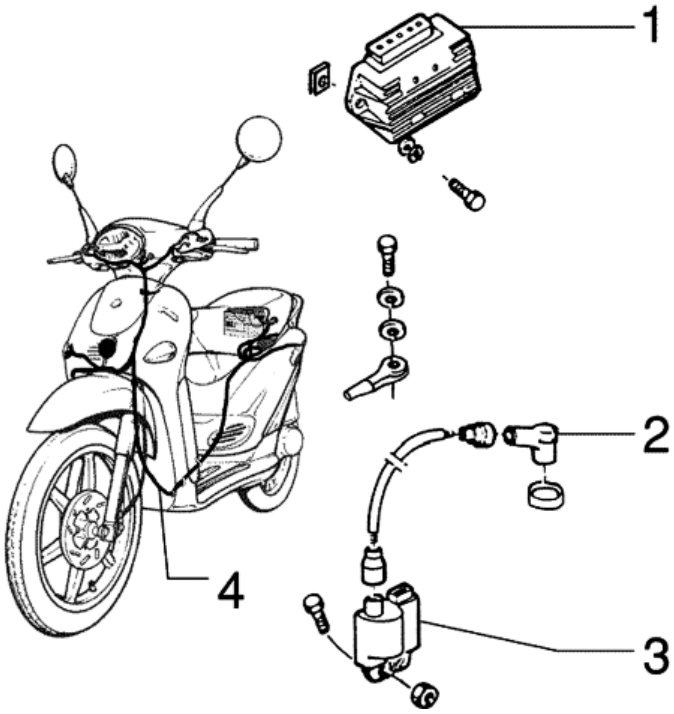
Rear wheel



REAR WHEEL

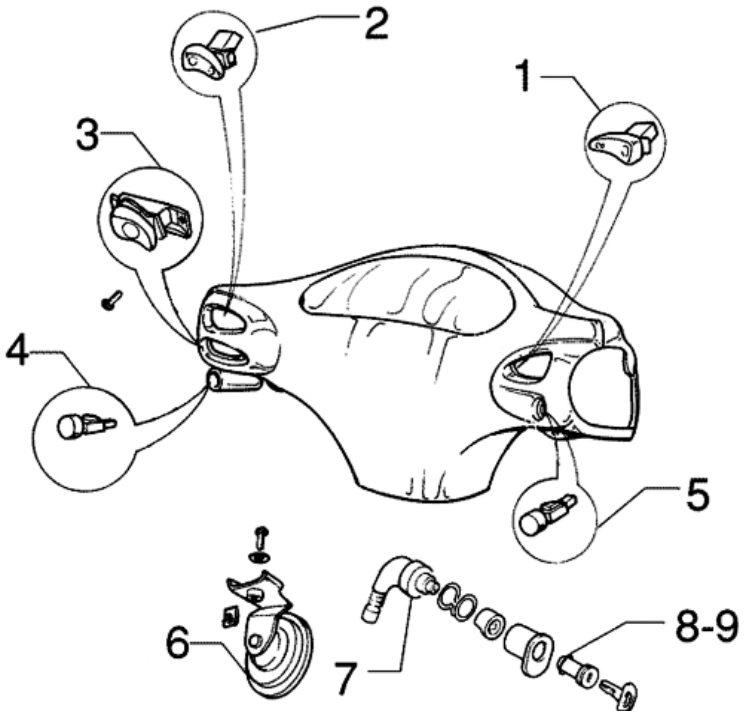
	Code	Action	Duration
1	001016	Rear wheel - Replacement	
2	004126	Rear wheel tyre - Replacement	
3	003063	Tyres pressure - Check	
4	006018	Wheel rim - Paintwork	
5	001071	Front wheel rim - Removal and Re-fitting	

Electric devices



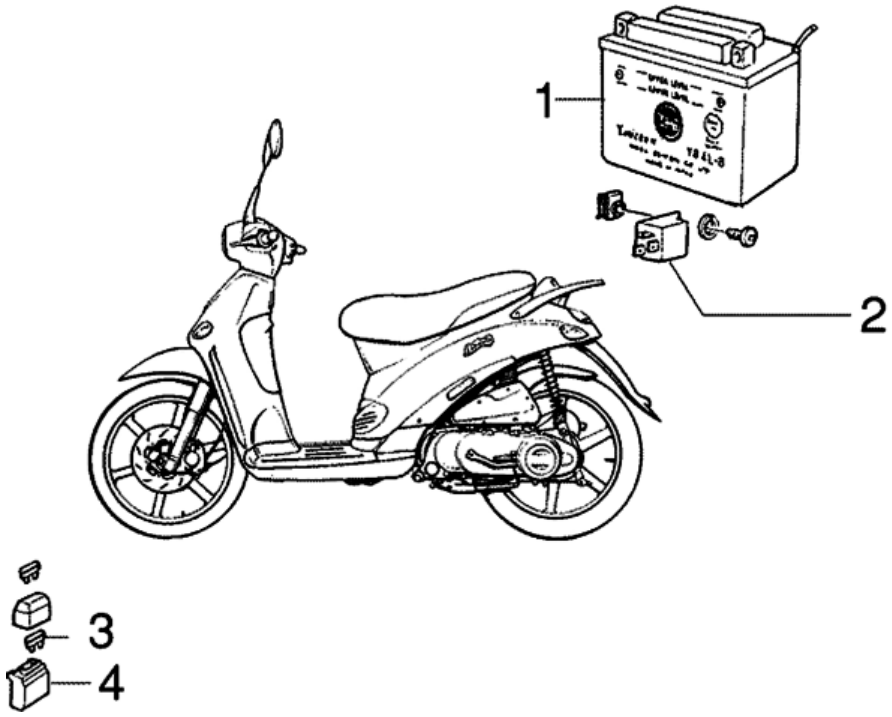
ELECTRICAL DEVICES

	Code	Action	Duration
1	005009	Voltage regulator - Replacement	
2	001094	Spark plug cap - Replacement	
3	001023	CPU - Replacement	
4	005001	Electrical system - Removal and re-fitting	



ELECTRICAL DEVICES

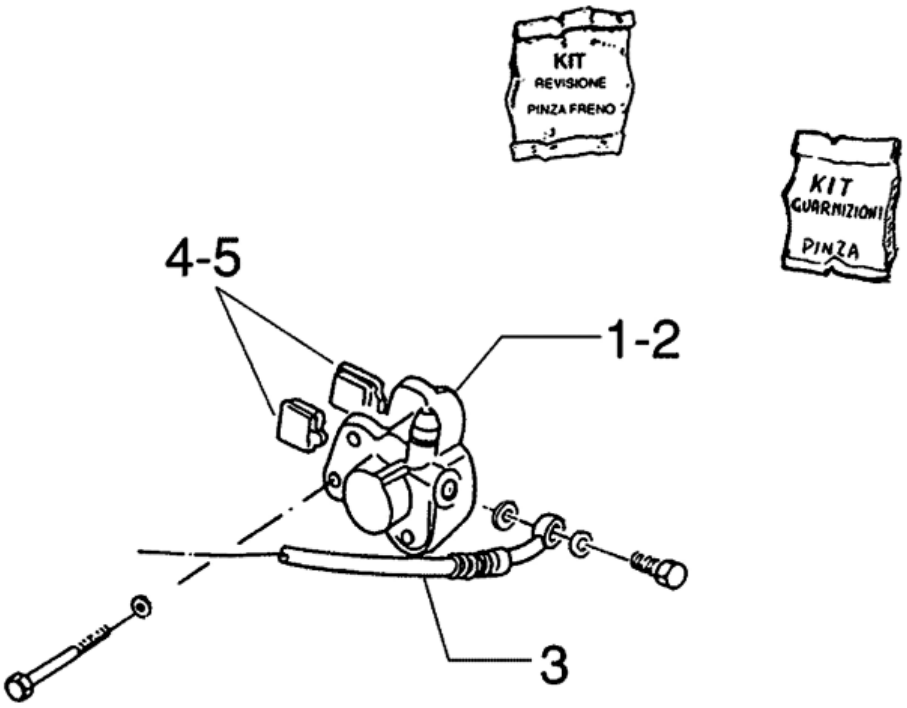
	Code	Action	Duration
1	005006	Light or turning indicator switch - Replacement	
2	005069	Left-hand switch - Replacement	
3	005039	Lights switch - Replacement	
4	005040	Horn button - Replacement	
5	005041	Starting device push button - Replacement	
6	005003	Electric horn - Replacement	
7	005016	Key switch - Replacement	
8	004096	Locks series - Replacement	
9	004010	Antitheft lock - Replacement	



ELECTRICAL DEVICES

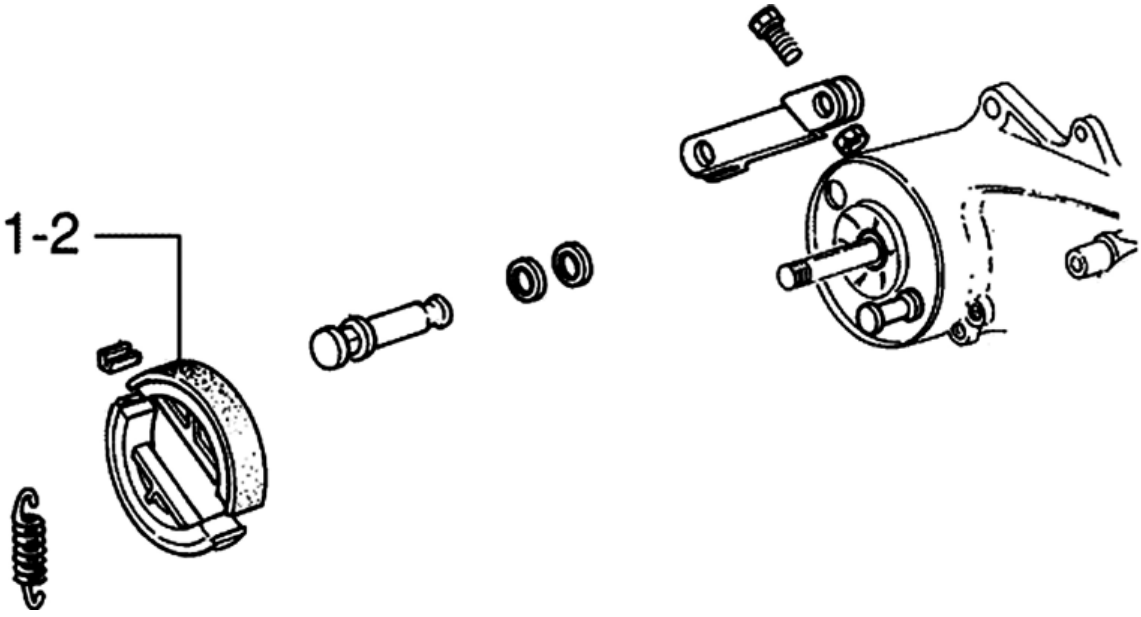
	Code	Action	Duration
1	005007	Battery - change	
2	005011	Start-up solenoid - Replacement	
3	005024	Battery fuse - Replacement	
4	005025	Battery fuse box - Replacement	

Brake callipers



FRONT BRAKE CALIPER

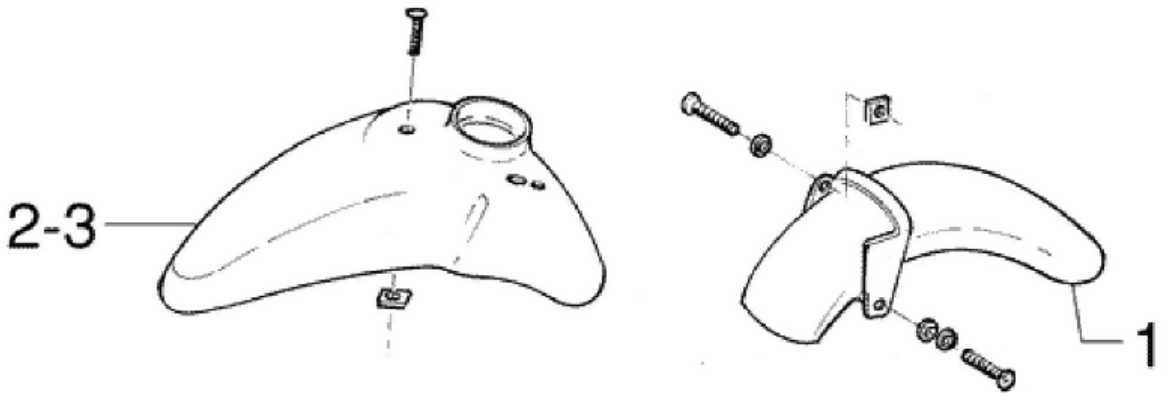
	Code	Action	Duration
1	002039	Front brake caliper - Removal and refitting	
2	002040	Front brake caliper - Overhaul	
3	002021	Front brake hose - Remov. and Refitt.	
4	003070	Front brake pads - Wear check	
5	002007	Front brake pads - Replacement	



BRAKE LEVER

	Code	Action	Duration
1	003071	Rear brake pads/shoes - Check for wear	
2	002002	Rear brake pads/shoes - Wear check	

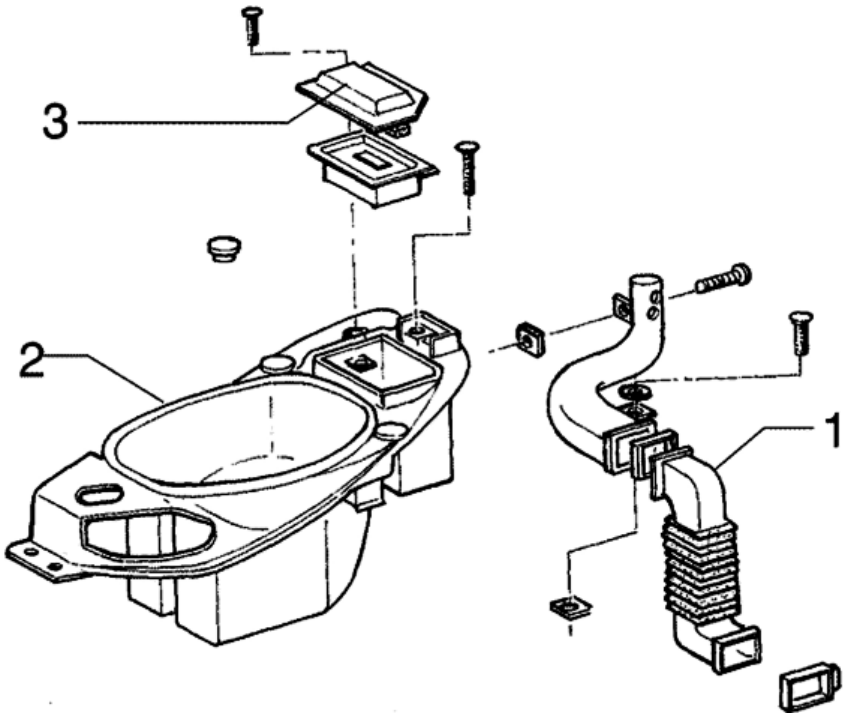
Front mudguard



FRONT AND REAR MUDGUARD

	Code	Action	Duration
1	004009	Rear mudguard - Replacement	
2	004002	Front mudguard - Replacement	
3	006003	Paragraph - Painting	

Helmet bay



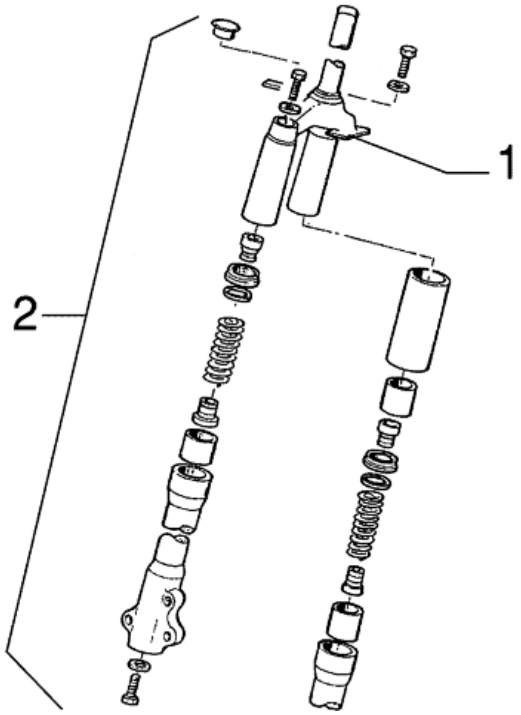
HELMET CARRIER

	Code	Action	Duration
1	001027	Body cleaner connection - Replacement	
2	004016	Helmet compartment - Disassembly and reass.	
3	005046	Battery cover - change	

Front suspension

To unify licensed vehicles starting with frame **C28200 10346**, a new frame **dis. no. 576680** has been introduced instead of the old **dis. no. 576823**.

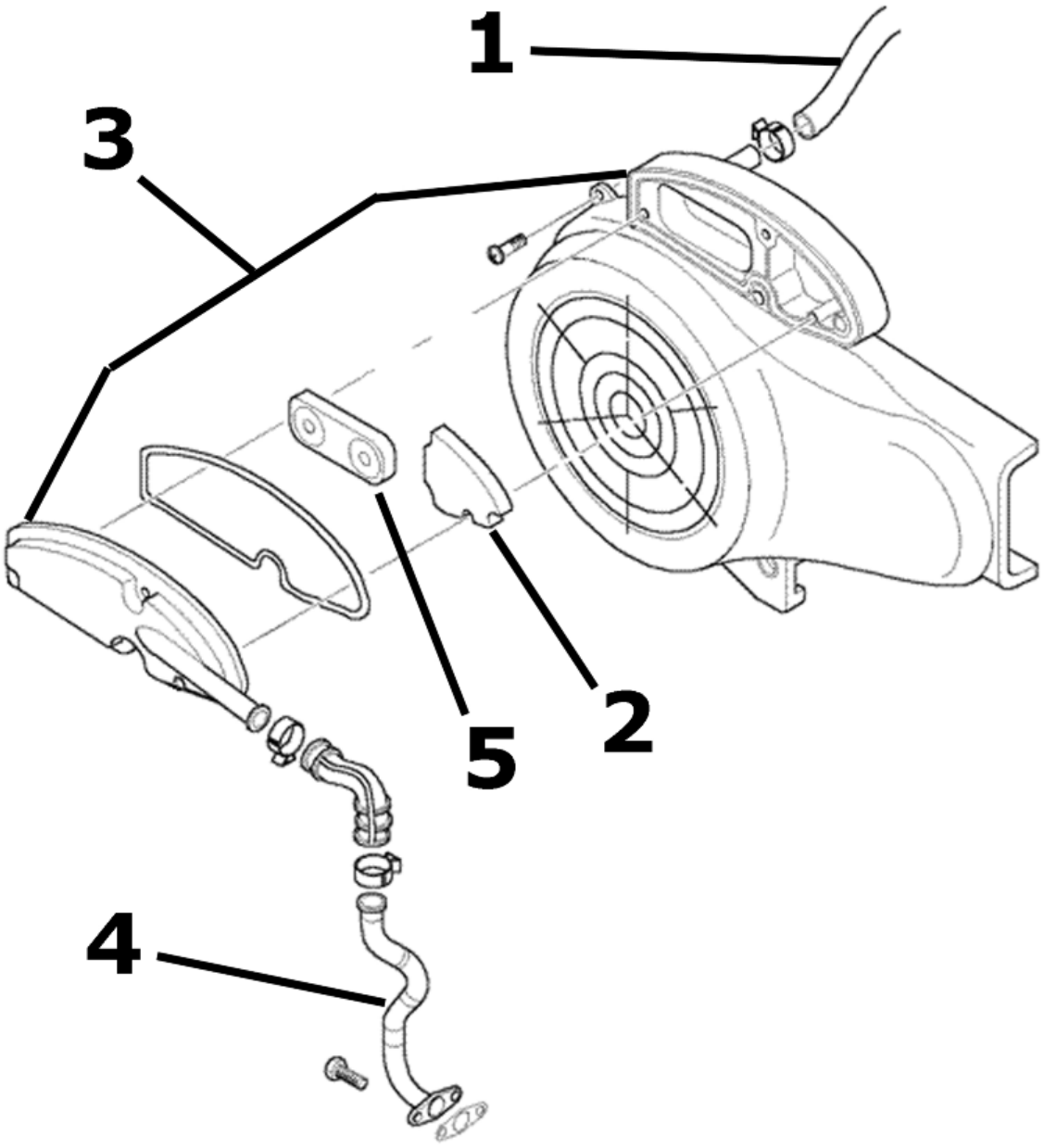
At the same time a new steering tube **dis. no. 597419**, a new front hydraulic brake hose **dis. no. 597286**, a new rear shock absorber **dis. no. 597470** and a new stand **dis. no. 562694** have been introduced.



FRONT SUSPENSION

	Code	Action	Duration
1	003010	Front suspension - Service	
2	003051	Fork assembly - 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	Silencer secondary air connection - Replacement	
5	001165	Secondary air reed - Replacement	

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