WORKSHOP MANUAL

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Vespa LX 50

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PIAGGIO & C. S.p.A. - After Sales Service
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WORKSHOP MANUAL
Vespa LX 50

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.

INDEX OF TOPICS

INDEX OF TOPICS

Rules

This section describes general safety rules for any interventions to be performed on the vehicle.

Safety rules

- Should it be necessary to keep the engine running while servicing, make sure that the area or room is well ventilated, and use special exhaust fans, if required. Never let the engine running in closed rooms. In fact, exhaust gases are toxic.
- The battery electrolyte contains sulphuric acid. Protect your eyes, cloths and skin. Sulphuric acid is highly corrosive; in the event of contact with your eyes or clothes, rinse thoroughly with water and consult a doctor immediately.
- The battery produces hydrogen, a gas that can be highly explosive. Do not smoke and avoid sparks and flames when close to the battery, especially during recharge.
- Fuel is highly flammable, and in some conditions it can be explosive. Do not smoke in the working area, and avoid free flames or sparks.
- Clean the brake pads in a well ventilated environment, directing the compressed air jet so as to not intake the dust produced by the wear of the friction material. Even though the latter contains no asbestos, dust inhalation is harmful.

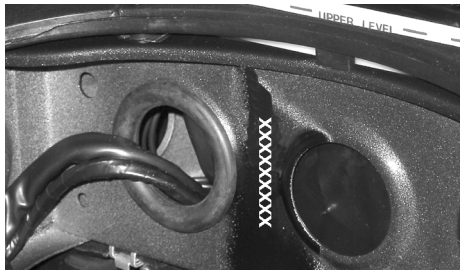
Safety rules

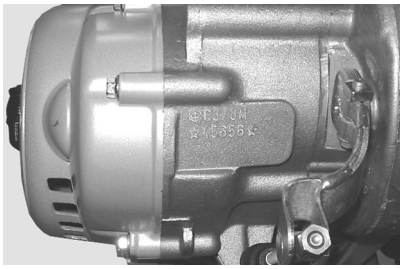
- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. Non-original or non-conforming spares may damage the vehicle.
- Use only the specific tools designed for this vehicle.
- Always use new gaskets, sealing rings and split pins upon reassembly.
- After removal, clean the components using non-flammable or low fire-point solvent. Lubricate all working surfaces before reassembly, except for conical couplings.
- After reassembly, check that all components have been installed properly and that they are in good working order.
- For removal, overhaul and reassembly operations use only tools provided with metric measures. Metric bolts, nuts and screws are not interchangeable with coupling members with English measurement. Using improper coupling members and tools may impair the vehicle.
- Should any interventions to the vehicle electric system be required, check that the electrical connections - especially earth and battery connections - have been implemented properly.

Vehicle identification

VEHICLE IDENTIFICATION

Specification	Desc./Quantity
Chassis prefix	ZAPC38101 ÷ 1001
Engine prefix	C381M ÷ 1001

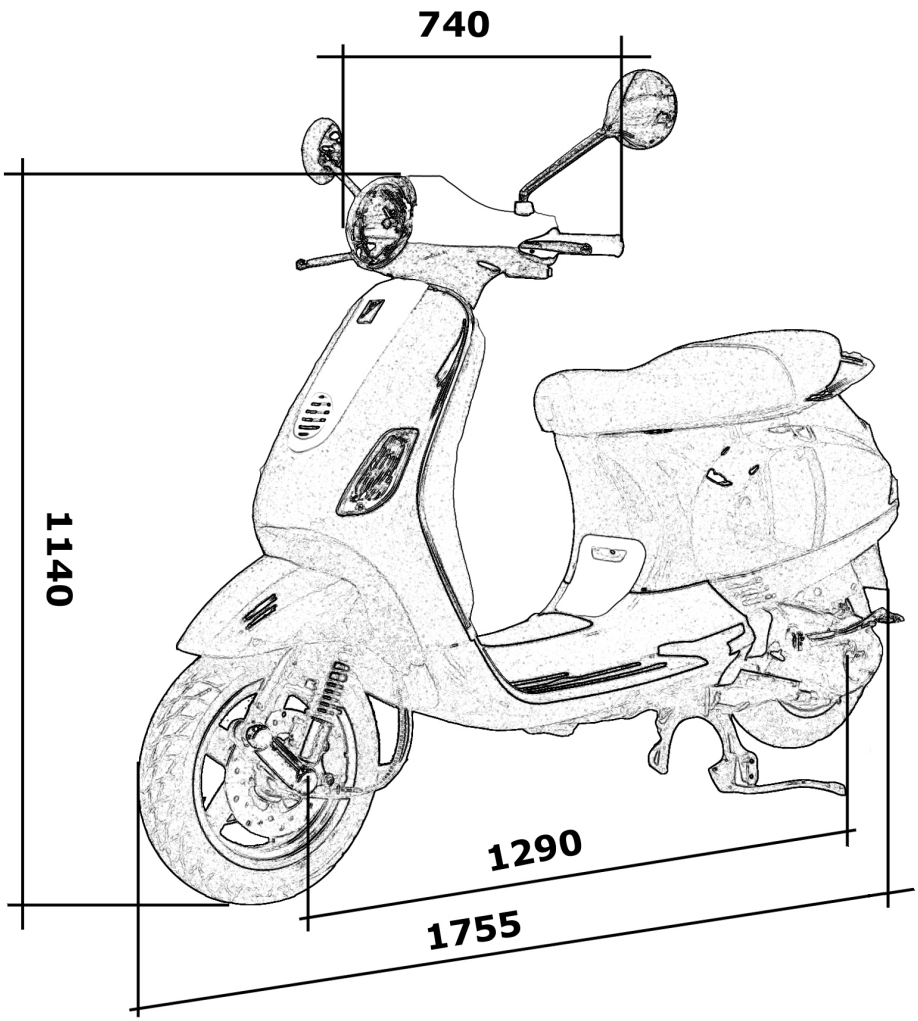




Dimensions and mass

WEIGHT AND DIMENSIONS

Specification	Desc./Quantity
Dry weight	96±4 Kg
Maximum height	1140 mm.
Wheel base	1290 mm.
Length	1755 mm
Width	740 mm



Engine

ENGINE

Specification	Desc./Quantity
Engine type	Piaggio Hi-PER2, 2-stroke, single-cylinder
Bore x stroke	40 x 39,3 mm
Displacement	49,40 cm³
Compression ratio	10,3 :1
Carburettor	DELLORTO PHVA 17,5
CO adjustment	3,5% ± 0,5
Engine idle	1800 ÷ 2000 g/min.
Air filter	Sponge, impregnated with mixture (50% Selenia Air Filter Oil and 50% lead-free fuel).

Specification	Desc./Quantity
Starter system	starter motor/kick-start.
Lubrication	Guaranteed by oil from fuel-oil mixture and varied with engine speed and throttle opening through a pump driven by the crankshaft via toothed belt.
Fuel system	Gravity, unleaded petrol (minimum octane number 95), through carburettor.
Cooling system	forced air

Transmission

TRASMISSIONS

Specification	Desc./Quantity
Transmission	Expanding pulley type automatic speed variator with vee belt, automatic clutch and gear final drive.

Capacities

CAPACITY

Specification	Desc./Quantity
Rear hub oil Quantity	**Amount:** ~ 85 cc
Oil mixer tank	In plastic, of capacity ~ 1.2 lt.
Fuel tank	~ 8,5 lt (including 2 litre reserve)

Electrical system

ELECTRICAL COMPONENTS

Specification	Desc./Quantity
Ignition type	capacitive discharge electronic ignition with incorporated high-voltage coil.
Ignition advance variable, with microprocessor (before T.D.C.)	Fixed 17° ± 1
Reccomended spark plug	CHAMPION RGN2C
Battery	12V-4Ah
Main fuse	7,5 A
Generator	In alternate current with three-second output

Frame and suspensions

FRAME AND SUSPENSION

Specification	Desc./Quantity
Type	Structural frame in pressed sheet steel.
Front suspension	Single-arm with swinging hub pivoting on steering tube. Double-acting hydraulic shock absorber with coaxial spring.
Front suspension stroke	70 mm
Trail (unloaded/loaded suspension)	71/68 mm
Rear suspension	Single double-acting hydraulic shock absorber with coaxial spiral spring. Engine-frame mount by swinging arm.
Rear suspension travel:	83,5 mm

Brakes

BRAKES

Specification	Desc./Quantity
Front brake	Ø 200 mm disc (hydraulically controlled via a lever on RHS of handlebars) with fixed calliper.
Rear brake	Ø110 mm drum

Wheels and tyres

WHEELS AND TYRES

Specification	Desc./Quantity
Front tyre dimensions	110/70"-11"
Rear tyre dimension	120/70-10"
Front tyre inflation pressure:	1,6 bar
Rear tyre inflation pressure:	2 bar
Light alloy rims (front)	2,50" x 11"
Lightweight alloy wheels (rear)	3,00 x 10"

N.B.

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

Secondary air

In order to clean the sponge filters of the second-

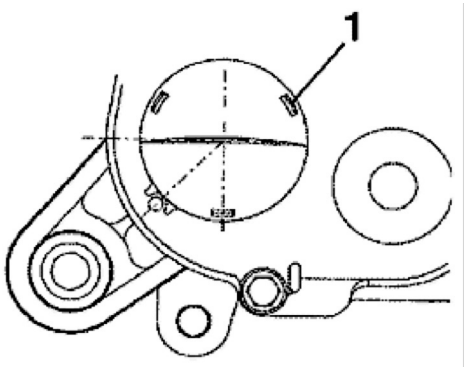
ary air system, please proceed as follows:

1) Remove the plastic cap (**1**) from the transmis-

sion cover by inserting a small screwdriver through one of the three slits and pressing against the retaining spline, to release it.

2) Wash the polyurethane sponge filter with soap and water, then dry it with compressed air and relocate it in its housing. Refit the intake cover minding the angle reference.

3) Loosen the two screws (**2**) fixing the SAS aluminium cover in order to reach the polyurethane sponge located inside the box; clean the sponge as indicated in 2) and refit each component, after having in the meantime ensured that the steel plate is not deformed or unable to guarantee a perfect sealing when shut; replace if necessary.



N.B.

WHEN REFITTING THE VALVE COMPONENTS, ENSURE TO CORRECTLY PLACE THE STEEL LATH IN THE HOUSING MACHINED ON THE PLASTIC AND ALUMINIUM COVERS.

CAUTION

DURING THE OPERATION 3) ALWAYS CHECK THE LEAK TIGHTNESS OF THE TWO RUBBER SLEEVES (3) LOCATED AT THE END OF THE SECONDARY AIR DUCT; REPLACE IF NECESSARY; USE NEW ZIP TIES.

Carburettor

50cc Version

Dell'Orto

DELLORTO CARBURETTOR

Specification	Desc./Quantity
Type	PHVA 17,5 RD
Choke diameter	Ø 17,5
Adjustments reference number	8423
Maximum thrust:	53

Specification	Desc./Quantity
Maximum air thrust (on body):	Ø1,5
Tapered pin stamping:	A22
Needle position (notches from top):	1
Jet mixer:	209 HA
Minimum thrust:	32
Minimum air thrust (on body):	Free
Initial minimum mixture screw opening:	1 1/2
Starter jet	50
Starter air thrust (on body)	Ø 1,5
Starter pin stroke	11 mm
Choke maximum cone	Ø 1,5

Tightening Torques

FRONT BRAKE

Name	Torque in Nm
Pump-tube oil connection	8 ÷ 12
Tube-caliper oil connection	20 ÷ 25
Screw fixing the caliper to the support	20 ÷ 25
Brake disc screw	5 ÷ 6,5
Oil bleeder valve (on caliper)	10 ÷ 12
Handlebar to pump	7 ÷ 10

FRONT SUSPENSION

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

STEERING

Name	Torque in Nm
Steering upper ring nut	35 ÷ 40
Steering lower ring nut	8 ÷ 10
Handlebar fastening screw	50 ÷ 55

ENGINE ASSEMBLY

Name	Torque in Nm
Clutch drum nut (**)	40÷44 N·m
Clutch securing ring-nut	55÷60 N·m
Drive pulley/crankshaft lock-nut (**)	40÷44 N·m
Starter lever screw	12÷13 N·m
Flywheel nut (**)	40÷44 N·m
Flywheel fan screws	3 ÷4 N.m
Half-crankcase coupling screw	12÷13 N·m
Exhaust/crankcase fixing bolts	22÷24 N·m
Air-box/crankcase fixing screw	4÷5 N·m
Cylinder head nuts	10÷11 N·m
Starter motor screws	12÷13 N·m
Spark plug	25÷30 N·m
Hub oil drain cap	3÷5 N·m
Hub oil dipstick	Manual
Rear hub cover screws	12÷13 N·m
Transmission cover screws	12÷13 N·m
Intake manifold screws	8÷9 N·m
Flywheel volute fixing screws	1÷2 N·m
Cylinder shroud fixing screws	3,5÷5 N·m
Stator fixing screw	3÷4 N·m
Pick-up fixing screw	4÷5 N·m
Mixer fixing screw	3÷4 N·m
Brake lever-engine screw	12÷13 N·m

FRAME ASSEMBLY

Name	Torque in Nm
Engine swing-arm bolt*	33 ÷ 41
Frame - swing arm bolt	44 ÷ 52
Shock-absorber/frame nut (*)	20 ÷25 N·m
Frame - swing arm plate	33 ÷ 41
Shock-absorber/engine bolt (*)	33÷41 N·m
Rear wheel spindle nut	137 ÷ 152
Side-stand fixing screw	12÷20 N·m
Side-stand mounting bracket fixing screw	15÷20 N·m

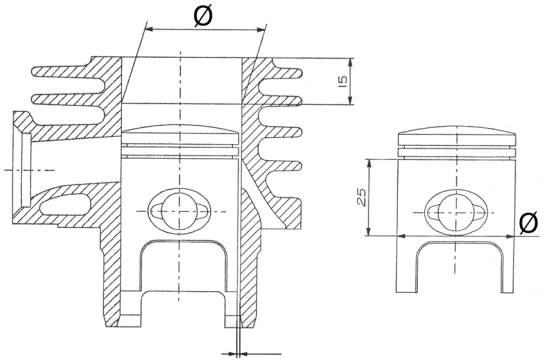
Overhaul data

Assembly clearances

Cylinder - piston assy.

CONNECTION PISTON AND CYLINDER

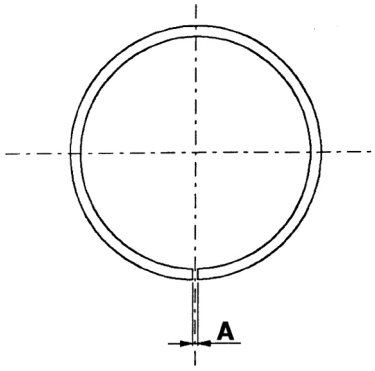
Name	Play	Initials	Cylinder	Piston	Play on fitting
Standard fitting		M	40,005 - 40,012	39,943 - 39,95	0,055 - 0,069
Standard fitting		N	40,012 - 40,019	39,95 - 39,957	0,055 - 0,069
Standard fitting		O	40,019 - 40,026	39,957 - 39,964	0,055 - 0,069
Standard fitting		P	40,026 - 40,033	39,964 - 39,971	0,055 - 0,069
1st oversize fitting		M1	40,205 - 40,212	40,143 - 40,15	0,055 - 0,069
1st oversize fitting		N1	40,212 - 40,219	40,15 - 40,157	0,055 - 0,069
1st oversize fitting		O1	40,219 - 40,226	40,157 - 40,164	0,055 - 0,069
1st oversize fitting.		P1	40,226 - 40,233	40,164 - 40,171	0,055 - 0,069
2nd oversize fitting		M2	40,405 - 40,412	40,343 - 40,35	0,055 - 0,069
2nd oversize fitting		N2	40,412 - 40,419	40,35 - 40,357	0,055 - 0,069
2nd oversize fitting		O2	40,419 - 40,426	40,357 - 40,364	0,055 - 0,069
2nd oversize fitting		P2	40,426 - 40,433	40,364 - 40,371	0,055 - 0,069



Piston rings

UPRATING TABLE

Name	Description	Dimensions	Initials	Quantity
Compression lining		40	A	0,10 ÷ 0,25
Compression lining 1° greater		40,2	A	0,10 ÷ 0,25
Compression lining 2° greater		40,4	A	0,10 ÷ 0,25

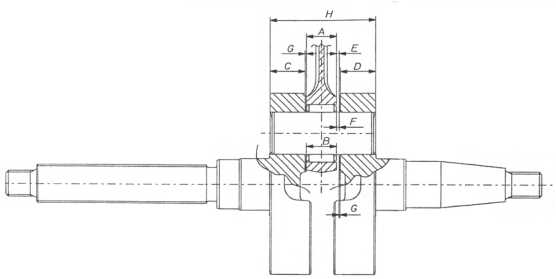


Crankcase - crankshaft - connecting rod

END PLAY BETWEEN CRANKCASE, CRANKSHAFT, AND CONNECTING ROD

Name	Description	Dimensions	Initials	Quantity
Connecting rod		11,750-0,05	A	Play E = 0,25 ÷ 0,50
Packing washer		0,5 ± 0,03	G	Play E = 0,25 ÷ 0,50 - Play F 0,20 ÷0,75
Half shaft trans-mission side		13,75+0,040	C	Play E = 0,25 ÷ 0,50 - Play F 0,20 ÷0,75
Half shaft flywheel side		13,75+0,040	D	Play E = 0,25 ÷ 0,50 - Play F 0,20

Name	Description	Dimensions	Initials	Quantity
				÷0,75
Spacing between shoulders		40,64	H	Play E = 0,25 ÷ 0,50 - Play F 0,20 ÷0,75
Cage		11,80-0,35	B	F = 0,20 ÷ 0,75



Slot packing system

For this engine type, only one thickness value is available for the base gasket.

Products

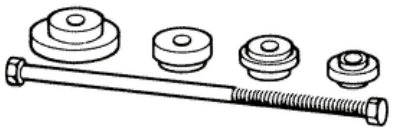
TABLE OF RECOMMENDED PRODUCTS

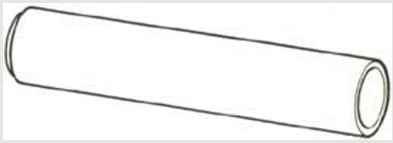
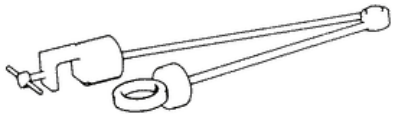
Product	Description	Specifications
TUTELA MATRYX MOTO RIDER	Oil for rear hub	Oil synthetic multidegree SAE 75W/85 API GL4
SELENIA HI Scooter 2 Tech	Oil for flexible transmission lubrication (acceleration control, mixer and km counter)	Oil for two-stroke motors
SELENIA Air Filter Oil	Oil for air filter sponge	Mineral oil with specific additive for ingreasing the ISO VG 150
SELENIA HI Scooter 2 Tech	Mixer Oil	Synthetic oil that passes API TC ++ specifications
TUTELA TOP 4	Brake fluid	Synthetic fluid SAE J1703, NHTSA 116 DOT 4, ISO 4925
MONTBLANC MOLYBDENUM GREASE	Grease for driven pulley shaft compensating ring and mobile driven pulley sliding seat	Molybdenum bisulphide grease
TUTELA ZETA 2	Grease for steering, seats of pin and swing arm	Lithium soap and zinc oxide grease NLG12
TUTELA MRM2	Grease for driven pulley bushing and mobile driven pulley seat	Bisulphide soap grease with Molybdenum NLGI2

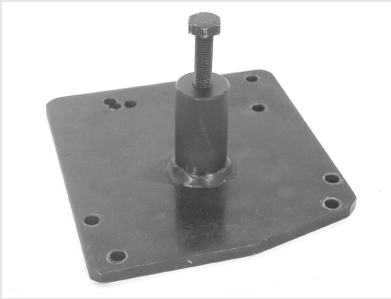
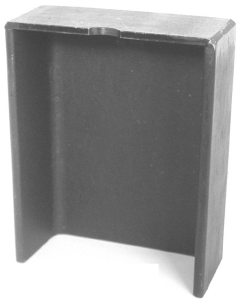
Product	Description	Specifications
TUTELA TP1	Grease for brake control lever, gas, stand	NLGI 1-2 calcium soap based white spray grease

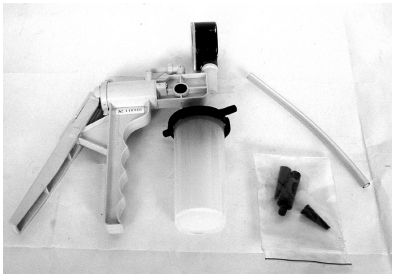
INDEX OF TOPICS

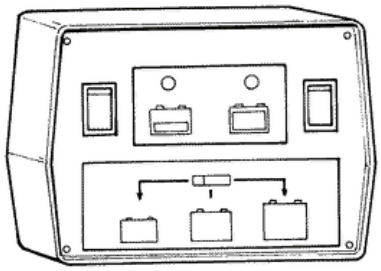
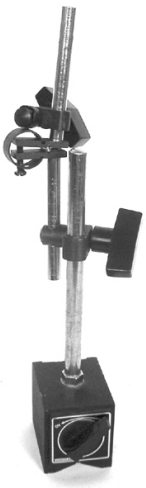
ATTREZZATURA

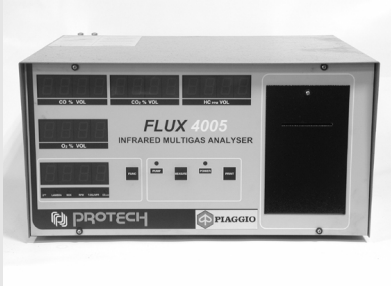
Stores code	Description	
001330Y	Steering seat installer, to be fitted with parts: 001330Y009-For lower seat, 001330Y013-For upper seat	
001467Y006	20-mm pliers	
001467Y009	Bell for bearings external Ø 50 mm	
001467Y013	15-mm pliers	
001467Y014	15 mm pliers	
001467Y017	Bell for bearings external Ø 39 mm	

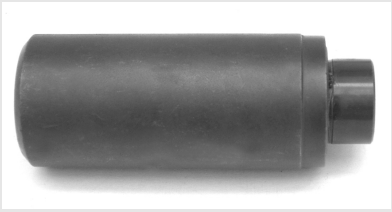
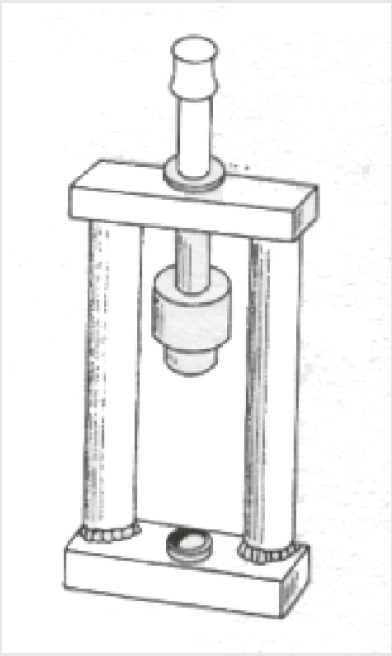
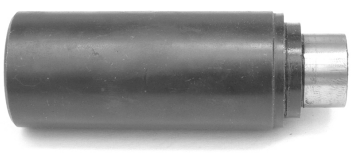
Stores code	Description	
002465Y	Pliers for snap rings	
006029y	Drift for fitting thrust ring seats on steering tube	
020004Y	Drift for removing thrust rings from steering head tube	
020055Y	Steering tube ring nut spanner	
020150Y	Support for air heater "METABO HG 1500/2"	
020151Y	Air heater "METABO HG 1500/2"	

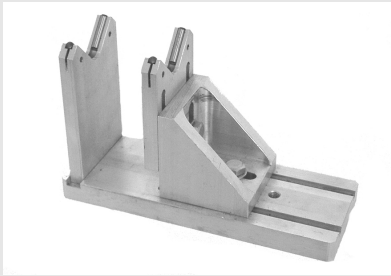
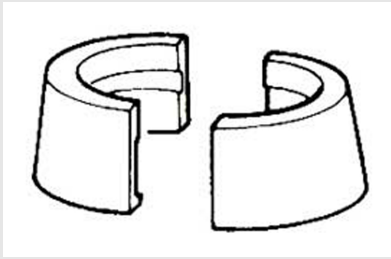
Stores code	Description	
020162y	Flywheel extractor	
020163y	Crankcase splitting plate	
020166y	Piston rings fixing tool	
020261Y	Kick-starter spring assembler	
020265y	Bearing fitting stand	

Stores code	Description	
020325y	Pliers for brake-shoe springs	
020329Y	Pump MITYVAC	
020330Y	Timing light for two- and four-stroke engines	
020331Y	Digital multimeter	
020332Y	Digital rpm counter	

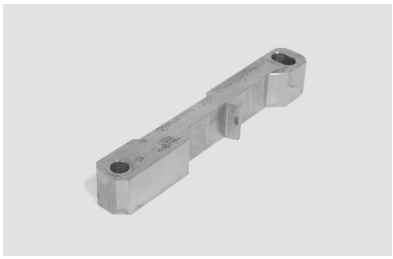
Stores code	Description	
020333Y	Single battery charger	
020334Y	Multiple battery charger	
020335Y	Magnetic stand and comparator	
020350y	Electric system diagnostic device	
020359Y	42 x 47 mm hub bearing fitting adaptor	

Stores code	Description	
020376Y	Handle for punches	
020412Y	15 mm guide	
020456Y	Ø 24 mm adaptor	
020565Y	Compass flywheel stop spanner	
494929	Exhaust gas analyser	

Stores code	Description	
001467y029	Drum (Driven pulley bearings)	
020037y	Drift	
020036y	Drift	
020021y	Front suspension overhaul kit	
020038y	Drift	

Stores code	Description	
020074Y	Crankshaft aligning tool	
004499y001	Bearing extractor fitted with parts	
004499y006	Bearing extractor fitted with parts	
004499y002	Bearing extractor fitted with parts	
004499y007	Half rings	

Stores code	Description	
020171Y	Drift for driven pulley roller bearings	
020340Y	Punch for fitting oil guard magneto and transmission	
020360Y	52 x 55 mm adaptor	
020358y	37 x40 adaptor	
020362y	12 mm guide	
020363Y	20mm guide	

Stores code	Description	
020365y	22 mm guide	
020439Y	17 mm guide	
020441y	26 x 28 mm adapter	
020452y	Driven pulley shaft fitting/re-moving tube	
020451y	Drive pulley stop spanner	

Stores code	Description	
020444Y	Driven half pulley spring compressor tool	

INDEX OF TOPICS

Maintenance chart

EVERY 2 YEARS

Action
Brake fluid - Change

AT 1000 KM OR 4 MONTHS

50'

Action
Hub Oil - Replacement
Oil mixer/throttle linkage - Adjust
Speedometer cable - Grease
Steering - Adjust
Brake levers - Grease
Brake fluid level - Check
Nuts, bolts and fasteners - Check
Electrical system and battery - Check
Tires-inflation and wear - Check
Vehicle and brake test - Road test

AT 5000 KM OR 12 MONTHS, 25000 KM, 35000 KM AND 55000 KM

40'

Action
Hub oil level - Check
Spark plug/Electrode gap - Change
Air filter - cleaning
Oil mixer/throttle linkage - Adjust
Brake levers - Grease
Brake pads - Check condition + wear
Brake fluid level - Check
Electrical system and battery - Check
Tires-inflation and wear - Check
Vehicle and brake test - Road test

AT 10000 KM OR 24 MONTHS AND 50000 KM

95'

Action
Hub Oil - Replacement

Action
Spark plug/spark gap - replacement
Air filter - cleaning
Idle speed/Fuel (*) - Adjust
Oil mixer/throttle linkage - Adjust
Variator rollers - Change
Speedometer cable - Grease
Transmission Belt - Check
Steering - Adjust
Brake levers - Grease
Brake pads - Check condition + wear
Brake fluid level - Check
Transmissions - Lubricate
Nuts, bolts and fasteners - Check
Suspensions - Check
Electrical system and battery - Check
Headlight - Adjust
Tires-inflation and wear - Check
Vehicle and brake test - Road test

(*) See CO regulation in the «Adjusting the engine idle» section

AT 15000 KM AND 45000 KM

65'

Action
Hub oil level - Check
Spark plug/spark gap - replacement
Air Filter - Cleaning
Oil mixer/throttle linkage - Adjust
Transmission Belt - Replacemen
Brake levers - Grease
Brake pads - Check condition + wear
Brake fluid level - Check
Electrical system and battery - Check
Tires-inflation and wear - Check
SAS box (sponge) (**) - Clean
Vehicle and brake test - Road test

(**) See rules in the «Secondary Air System» section

AT 20000 KM AND 40000 KM

110'

Action
Hub Oil - Replacement
Spark plug/Electrode gap - Change
Air filter - cleaning
Idle speed/Fuel (*) - Adjust
Cylinder cooling system - Check/Clean
Oil mixer/throttle linkage - Adjust
Transmission Belt - Check
Variator rollers - Change
Fule-oil mixer belt - Change
Speedometer cable - Grease
Steering - Adjust
Brake levers - Grease
Brake pads - Check condition + wear
Brake fluid level - Check
Transmissions - Lubricate
Nuts, bolts and fasteners - Check
Suspensions - Check
Electrical system and battery - Check
Headlight - Adjust
Tires-inflation and wear - Check
Vehicle and brake test - Road test

(*) See CO regulation in the «Adjusting the engine idle» section

AT 30000 KM

130'

Action
Hub Oil - Replacement
Spark plug/spark gap - replacement
Air filter - cleaning
Idle speed/Fuel (*) - Adjust
Oil mixer/throttle linkage - Adjust
Transmission Belt - Replacemen

Action
Variator rollers - Change
Speedometer cable - Grease
Steering - Adjust
Brake levers - Grease
Brake pads - Check condition + wear
Braking circuit hose - Replacement
Brake fluid level - Check
Transmissions - Lubricate
Nuts, bolts and fasteners - Check
Suspensions - Check
Electrical system and battery - Check
Headlight - Adjust
Tires-inflation and wear - Check
SAS box (sponge) (**) - Clean
Vehicle and brake test - Road test

(*) See CO regulation in the «Adjusting the engine idle» section (**) See rules in the «Secondary Air System» section

AT 60000 KM

150'

Action
Hub Oil - Replacement
Spark plug/spark gap - replacement
Air filter - cleaning
Idle speed/Fuel (*) - Adjust
Cylinder cooling system - Check/Clean
Oil mixer/throttle linkage - Adjust
Transmission Belt - Replacemen
Variator rollers - Change
Fule-oil mixer belt - Change
Speedometer cable - Grease
Steering - Adjust
Brake levers - Grease
Brake pads - Check condition + wear
Braking circuit hose - Replacement
Brake fluid level - Check

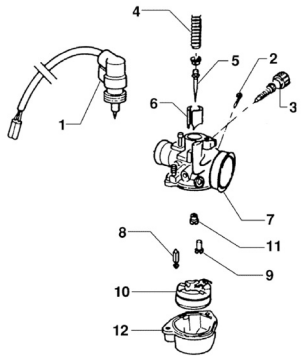
Action
Transmissions - Lubricate
Nuts, bolts and fasteners - Check
Suspensions - Check
Electrical system and battery - Check
Headlight - Adjust
Tires-inflation and wear - Check
SAS box (sponge) (**) - Clean
Vehicle and brake test - Road test

(*) See CO regulation in the «Adjusting the engine idle» section (**) See rules in the «Secondary Air System» section

Carburettor

Disassemble all carburettor components, accurately wash them in solvent, then dry them with compressed air. To ensure thorough cleaning, pay special attention to the passages in the carburettor body.

- Carefully check the condition of all components.
- The **throttle** must slide freely in the chamber, if the play is excessive because or wear, replace the throttle.
- Replace the carburettor if the chamber shows signs of wear as to prejudice the valve's regular seal or free sliding (though it is new).
- When reassembling the carburettor, it is a good rule to replace the gaskets.



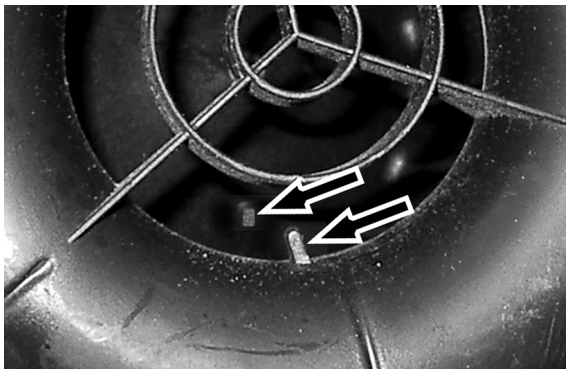
WARNING

PETROL IS HIGHLY EXPLOSIVE. ALWAYS FIT NEW SEALS AND GASKETS TO PREVENT LEAKAGE.

1. Automatic choke device - **2**. Idle air adjusting screw - **3**. Idle adjusting screw - **4**. Throttle valve spring - **5**. Conical needle - **6**. Throttle valve - **7**. Carburettor body - **8**. Needle - **9**. Idle jet - **10**. Float - **11**. Main jet - **12**. Float bowl.

Checking the spark advance

- The check must be carried out at over 4,000 rpm with a strobe light. The spark advance must be 17° before the T.D.C.
- This value is correct when the reference mark shown on the flywheel cover is aligned with that machined on the cooling fan and the phase-shifter on the strobe light is set onto 17°.



N.B.

IN THE EVENT OF IRREGULAR OPERATION, PERFORM THE CHECKS LISTED IN THE ELECTRICAL CIRCUIT CHAPTER.

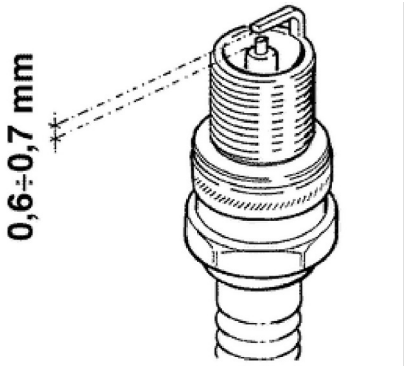
CAUTION

BEFORE PERFORMING THE ABOVE MENTIONED INSPECTIONS, CHECK THE FLYWHEEL IS CORRECTLY KEYED ONTO THE CRANKSHAFT

Specific tooling

020330Y Timing light for two- and four-stroke engines

Spark plug



-Rest the vehicle on its centre-stand;
-Remove the central flap, shown in the figure, by loosening the two fixing screws;
-Detach the H.T. cable cap from the spark plug;
-Remove the spark plug using the supplied box spanner;
-Examine the spark plug conditions, the insulator integrity, and measure the spark gap using a suitable feeler gauge;
-Proceed by adjusting the spark gap by carefully bending the outer electrode.
If defective, replace the spark plug with new of the prescribed model;
- Insert the spark plug in with the correct inclination, screwing it in by hand, hence tighten it using

the supplied box

-spanner at the prescribed torque; -Reattach the spark plug cap; -Refit the central flap.

CAUTION

THE SPARK PLUG REMOVAL MUST BE CARRIED OUT WITH THE ENGINE COLD. THE SPARK PLUG MUST BE REPLACED EVERY 5,000 KM. THE USE OF NON APPROVED ELECTRONIC IGNITION DEVICES OR SPARK PLUGS OTHER THAN THE PRESCRIBED MODEL MAY SERIOUSLY DAMAGE THE ENGINE.

Characteristic

Reccomended spark plug

CHAMPION RGN2C

Electric characteristic

Electrode gap

0,6 ÷ 0,7 mm.

Locking torques (N*m)

Spark plung 25 - 30 Nm

Hub oil

Check

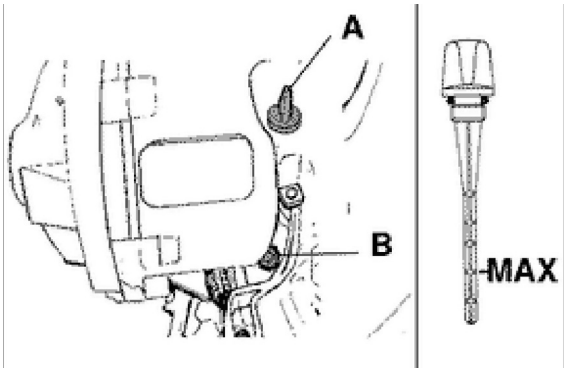
To check the correct oil level, proceed as follows:

1) Place the vehicle on the stand on level ground.

2) Unscrew oil dipstick «**A**», wipe it with a clean rag, reinsert it and screw it in fully.

3) Pull out the dipstick and check that the oil level is in the middle (two-notch dipstick) or reaches the middle notch (three-notch dipstick).

4) Reinsert the dipstick and screw it in fully.



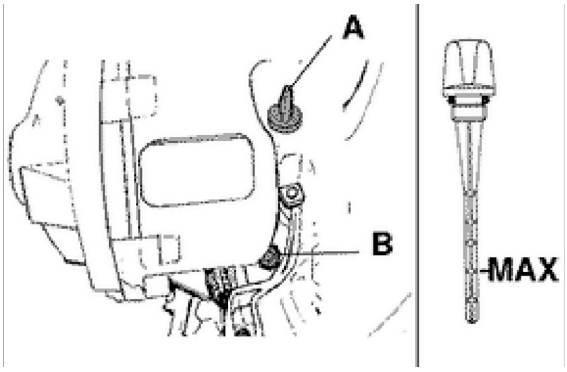
Recommended products

TUTELA ZC 90 Rear hub oil

SAE 80W/90 Oil that passes API GL3 specifications

Replacement

- Remove the oil filler cap, «**A**».
- Loosen the oil draining cap, «**B**» and let all oil out of the hub.
- Refit the draining cap and refil the hub with fresh oil (approx. 85 cc.)



Air filter

- Remove the cleaner plug by unloosing the 6 fixing screws. Remove the filtering element.

Cleaning:

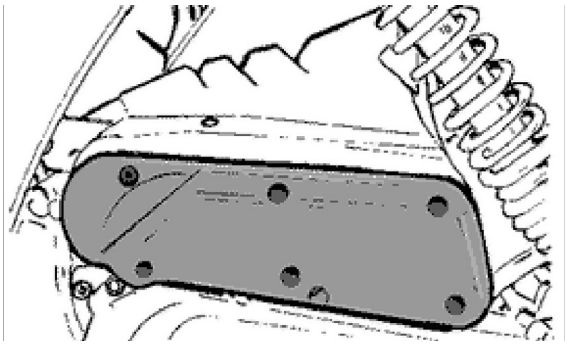
-Wash with water and neutral soap.

-Dry with a clean cloth and small jets of compressed air.

-Soak with a 50% fuel/oil mixture.

-Let the filtering element drain and then squeeze it with your hands without crushing it.

-Let it dry and refit it. Mineral oil with special additives to increase its adhesiveness ISO VG 150



CAUTION

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

Recommended products

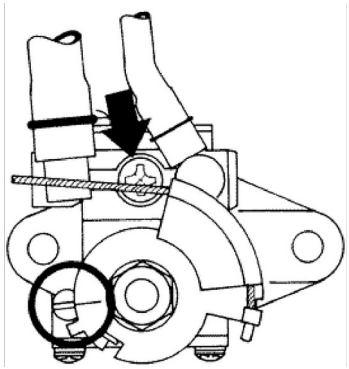
Selenia Air Filter Oil Air filter sponge oil

Mineral oil with specific additives to increase adhesion ISO VG 150

Checking the ignition timing

-Adjust the control cables:

Mixer cable: see "Mixer timing" procedure, below.
Throttle cable: adjust the screw on the carburettor so that there is no play on the sheath.
Splitter control cable: adjust the screw on the throttle grip on the handlebar so that there is no play on the twist grip.
All cables must be adjusted so that there is no play on their sheaths.



Mixer timing

- Adjust via the transmission screw on the crankcase, with the throttle cable released, the reference machined on the rotating plate which must be aligned to that shown on the mixer body as indicated in the figure. While performing this operation the engine must be fed with a 2% oil-fuel mixture (at least 0.5 litres if the tank is empty).

CAUTION

WHEN RUNNING OUT OF OIL OR REMOVING THE OIL TANK, FOLLOW THE MIXER BLEEDING OPERATIONS AS FOLLOWS: REFILL THE OIL TANK, WITH THE MIXER FITTED ONTO THE ENGINE, AND THE ENGINE NOT RUNNING, DETACH THE MIXER TUBE FROM THE CARBURETTOR AND LOOSEN THE BLEED SCREW (SEE ARROW IN FIGURE) UNTIL OIL STARTS FLOWING OUTWARDS. RECONNECT THE INLET TUBE TO THE CARBURETTOR, FIXING IT WITH THE APPROPRIATE METALLIC CLAMP.

Recommended products

SELENIA HI Scooter 2 Tech Mixer Oil

Synthetic oil that passes API TC ++ specifications

Braking system

Level check

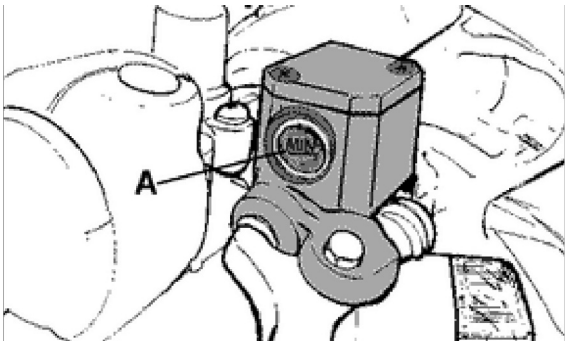
Proceed as follows:

- Rest the vehicle onto its centre-stand and align

the handlebars;

- Check the liquid level through the inspection hole «**A**».

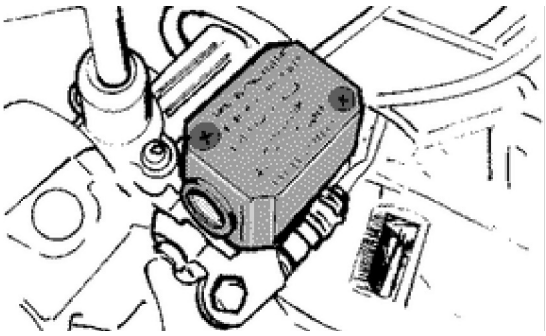
A certain decrease in the liquid level is due to the wear of the pads.



Top-up

Use the following procedure:

Loosen the two screws, remove the reservoir cap, remove the gasket and top up only with the prescribed fluid without exceeding the maximum level.



CAUTION

USE ONLY DOT 4 BRAKE FLUID.

CAUTION

KEEP THE BRAKE FLUID AWAY FROM THE SKIN, THE EYES AND CLOTHING. IN CASE OF CONTACT, RINSE GENEROUSLY WITH WATER.

CAUTION

THE BRAKE FLUID IS HIGHLY CORROSIVE. TAKE CARE NOT TO SPILL IT ON THE PAINTWORK.

CAUTION

THE BRAKE FLUID IS HYGROSCOPIC, I.E. IT ABSORBS HUMIDITY FROM THE AIR. IF THE HUMIDITY CONTAINED IN THE FLUID EXCEEDS A GIVEN CONCENTRATION, THE BRAKING ACTION BECOMES INSUFFICIENT. NEVER DRAW THE FLUID FROM OPEN OR PARTLY EMPTY CONTAINERS.
UNDER NORMAL CLIMATIC CONDITIONS THE FLUID SHOULD BE RENEWED EVERY 20,000 KM, OR IN ANY CASE EVERY TWO YEARS.

N.B.

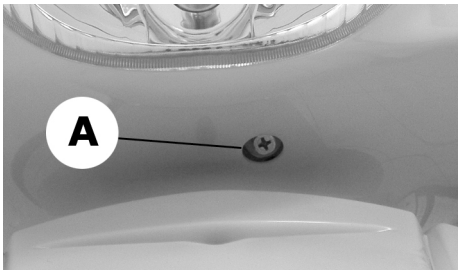
CHANGE THE BRAKE FLUID AND BLEED THE SYSTEM AS DESCRIBED IN CHAPTER BRAKING SYSTEM

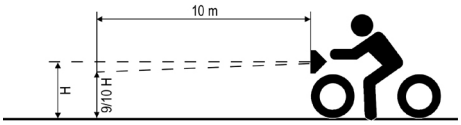
Recommended products

TUTELA TOP 4 Brake fluid

Synthetic fluid SAE J1703, NHTSA 116 DOT 4, ISO 4925

Headlight adjustment





Proceed as follows:

1. Place the vehicle, in riding order and with the tyres inflated to the prescribed pressure, on flat ground, 10 m away from a half-lit white screen. Ensure the vehicle axis is perpendicular to the screen;

2. Turn the headlight on and check the projection of the light beam is between 7/10 and 9/10 of the distance measured from the ground to the centre of the headlight;

3. Adjust the headlight as necessary, via screw «**A**».

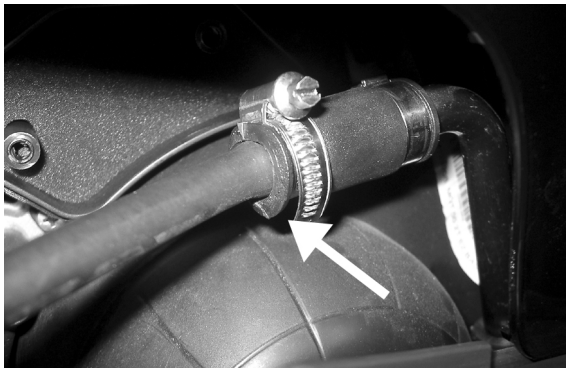
WARNING

THE PROCEDURE DESCRIBED ABOVE COMPLIES WITH THE "EURONORM" CONCERNING THE MAX. AND MIN. HEIGHT OF THE LIGHT BEAM OF A ROAD VEHICLE. PLEASE CHECK WITH THE LOCAL AUTHORITIES FOR WHAT REQUIREMENTS MUST BE FULFILLED IN EVERY SINGLE COUNTRY WHERE THE VEHICLE IS TO BE USED.

CO check

- Remove the RHS fairing
- Remove the air-box cover and its aluminium manifold, by removing the clamp shown in the figure

Attach the exhaust gas collection tube to the secondary air rubber manifold. Such joint must be sealed in order to guarantee accurate CO readings.



- Start the engine, adjust the idle speed to 1,700 ± 100 rpm and check the CO value is equal 3.5 ± 1%
- If the parameters found do not agree with the above figures, act upon the idle adjusting screw. Otherwise, check the automatic choke device

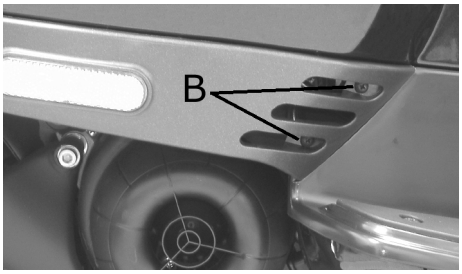
Specific tooling

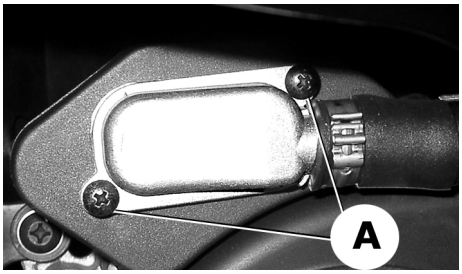
020320Y Exhaust gases analyser

020332Y Digital rpm counter

SAS filters inspection and cleaning

Remove the right panel using the 2 screws "**B**" shown in the figure.
Remove the two screws "**A**" from the aluminium SAS cover. Release the metal tube from the rubber housing on the cover without extracting the tube from the cover/sleeve. Then remove the tab and plastic cover, extract the sponge and wash it in water and soap. Dry it with compressed air before refitting it, making sure to correctly fit the tab in the housing on the two plastic and aluminium covers. Replace the O-Ring which seals the box, housed in the cover, every time you disassemble the filter.





INDEX OF TOPICS

This section is for finding solutions to solve problems.

A list of possible causes is provided for each problem and related operations.

Engine

Poor performance

POOR PERFORMANCE

Possible Cause	Operation
Carburettor jets or fuel cock clogged or dirty	Remove, wash in solvent and dry with compressed air
Excessive carbon deposits on cylinder ports and in combustion chamber	Decoke
Poor compression: worn compression rings or cylinder	Check parts and replace if necessary
Silencer clogged by excessive carbon deposits	Replace silencer and check carburation and mixer timing
Air filter clogged or dirty	Clean
Choke failure (it remains inserted)	Check mechanical sliding, circuit continuity, power supply, and electrical connections
Clutch slippage	Check and if necessary replace the centrifugal weights and/or clutch housing
Defective sliding of movable pulleys	Check parts and replace if necessary. Lubricate the driven pulley with Montblanc-Molibdenum Grease (drg. 498345).
Worn driving belt	Replace
Carburettor jets clogged or dirty	Remove, wash in solvent and dry with compressed air
Fuel filter on vacuum cock obstructed	Replace cock filter
Worn rollers; presence of oil; dirt	Check presence of the plug with filter on the transmission cover; clean the speed variator; replace worn rollers

Rear wheel spins at idle

REAR WHEEL

Possible Cause	Operation
Idle speed set too high	Adjust slow running speed and C.O, if necessary.
Faulty clutch	Check springs/weight of friction and clutch housing pan
Air filter box not sealed	Refit filter box. Replace if it is damaged

Starting difficulties

STARTING DIFFICULTIES

Possible Cause	Operation
Carburettor jets clogged or dirty	Remove, wash in solvent and dry with compressed air
Fuel cock failure	Check that the fuel comes through the feed pipe when the engine is started, with the throttle closed; if not, replace the vacuum cock
Choke failure	Check: electrical connections, circuit continuity, mechanical sliding and power supply
Spark plug faulty or electrodes gap incorrect	Check spark plug and electrodes gap. Replace if necessary
Battery is down	Check the battery charge condition. If the battery shows signs of sulfation, replace it. Before installing the new battery, charge it for eight hours with a current corresponding to 1/10 of the capacity of the battery
Engine flooding	Open the throttle wide and try to start the engine. If the engine does not start, remove the spark plug, run the engine with throttle open making sure the cap is connected to the spark plug and the spark plug is earthed, far from the hole. Fit a dry spark plug and start the engine.
Wrong fuel specifications	Drain the fuel and then refuel
Spark plug defective	Brush clean and restore the correct gap between electrodes, or replace with a plug of recommended type. Remember that many engine problems are attributable to the use of an unsuitable spark plug
Intake manifold cracked or clips not tightened	Renew intake manifold and check sealing on head
Cleaner-carburettor union damaged	Replace

Excessive oil consumption/Exhaust smoke

EXCESSIVE OIL CONSUMPTION/SMOKE FROM EXHAUST

Possible Cause	Operation
Excessive carbon deposits on cylinder ports and in combustion chamber	Decoke

Engine tends to cut-off at full throttle

ENGINE STOPS AT FULL THROTTLE

Possible Cause	Operation
Maximum jet dirty - lean carburetion	Wash with solvent and dry with compressed air
Fuel cock failure	Check that the fuel comes through the feed pipe when the engine is started, with the throttle closed; if not, replace the vacuum cock
Water in the carburettor	Empty the basin by the special drain
Float valve faulty	Check float sliding and needle valve operation
Float valve defective	Check float and needle sliding
Fuel vent pipe clogged	Restore the proper tank aeration

Engine tends to cut-off at idle

ENGINE STOPS AT IDLE

Possible Cause	Operation
Idle nozzle dirty	Wash with solvent and dry with compressed air
The choke stays open	Check: electrical connections, circuit continuity, mechanical sliding and power supply
The reed valve does not close	Check / replace the reed pack
Slow running incorrectly tuned up	Tune up slow running and check C.O. level
Spark plug faulty	Replace spark plug with an equivalent part having the prescribed heat grade. Check electrodes gap

High fuel consumption

EXCESSIVE CONSUMPTION

Possible Cause	Operation
Air filter clogged or dirty	Clean
Inefficient starter	Check: electric connections, circuit continuity, mechanical sliding, and presence of power

Excessive exhaust noise

INCREASED EXHAUST NOISE

Possible Cause	Operation
Secondary air metal pipeline is worn	Check pipelline sealing on crankcase and box, check presence and correct assembly of plug with filter on transmission cover.
Secondary air circuit components faulty	Check components and tubing. Check correct assembly. Replace components if damaged

SAS malfunctions

LOOSENESS OF RUBBER UNION OF SECONDARY AIR TUBE TO SILENCER

Possible Cause	Operation
Secondary air reed blocking	Replace
Secondary air filter clogged	Clean filter and box
Secondary air union to silencer clogged	Decoke the union taking care not to let the carbon deposits fall inside the silencer

Transmission and brakes

Clutch grabbing or performing inadequately

CLUTCH DEFECTIVE

Possible Cause	Operation
Jerky or irregular operation	Check that the weights shift and return smoothly. Check that there is no grease on the weights. Check that the contact surface of the clutch weights with the housing is at the centre,and that the 3 weights have the same specifications. Check that the clutch housing is not scored or does not show anomalous signs of wear. Never run the engine without the clutch housing. Check that the plug with filter on the transmission cover is there

Insufficient braking

BRAKING SYSTEM FAILURE

Possible Cause	Operation
Insufficient braking force	The rear brake (drum brake) is adjusted by setting the relative registers (on the wheel), remembering that the wheels must turn freely when the brake levers are fully released. The braking action should start when brake levers are pulled at 1/3 of their travel. Check wear of brake pads. If there are problems that cannot be overcome simply by normal adjustment of the control linkages, proceed to inspect the pads and front brake disc, the shoes and the rear drum. If surfaces are excessively worn or scored, replace the affected parts as necessary
Air bubbles in the braking hydraulic system	Carefully bleed the hydraulic system (spring ac-

Possible Cause	Operation
	tion of the brake lever should not be felt)
Fluid leakage	Spring connections, piston gaskets or brake pump failure. Replace
Worn fluid	Change the front brake fluid and restore correct level in the pump
Cables not sliding properly in sheaths	Lubricate or replace
Noisy brake	Check pads and/or shoes wear

Brakes overheating

BRAKES OVERHEATING

Possible Cause	Operation
Defective piston sliding	Check the caliper and replace any damaged parts
Brake disc or drum deformed	Check by means of a dial gauge the disc levelness with the wheel correctly mounted, or concentricity of the rear drum

Electrical system

Battery

BATTERY

Possible Cause	Operation
Battery	This one component of the system needs checking more frequently and servicing more carefully than any other. If the vehicle is to stand idle for any length of time (one month or longer), the battery will need recharging periodically. The battery discharges completely over a period of around 5 - 6 months. When fitting the battery to the vehicle, take care not to switch the connections: the black earth lead is connected to the negative terminal and the red lead to the positive terminal marked +. To charge the battery, follow the instructions described in Chapter ELECTRICAL EQUIPMENT.

Steering and suspensions

Heavy steering

STEERING STIFF

Possible Cause	Operation
Unacceptable tightening	Check the tightening torque of the upper and lower collar. If the steering fails to turn smoothly even when correctly tightened, inspect the bearing races and replace if they show signs of uneven wear

Excessive steering play

EXCESSIVE STEERING PLAY

Possible Cause	Operation
Excessive steering play	Check the tightening torque of the upper and lower collar. If the steering fails to turn smoothly even when correctly tightened, inspect the bearing races and replace if they show signs of uneven wear

Noisy suspension

NOISY SUSPENSION

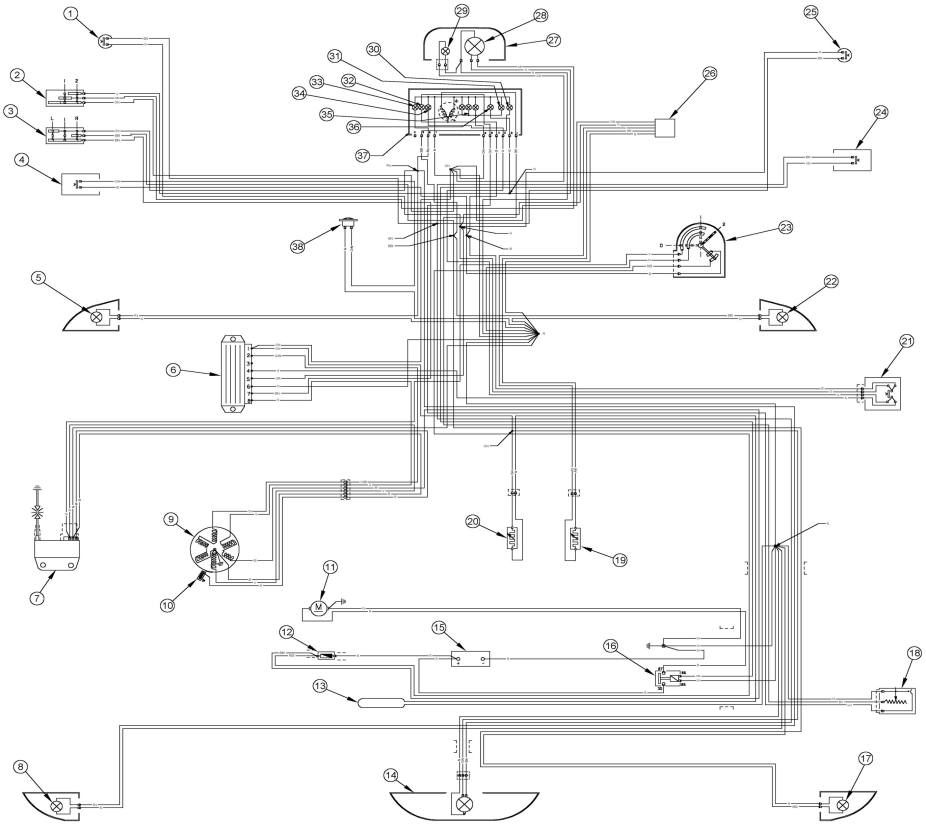
Possible Cause	Operation
Noisy suspension	If the front suspension is noisy, check: efficiency of front suspension; condition of the ball bearings and relative locking nuts; rubber stroke end bumbers; sliding bushes

Suspension oil leakage

OIL LEAKING FROM SUSPENSION

Possible Cause	Operation
Oil leaking from suspension	Check pumping elements and condition of sleeves and sealing rings. Replace if damaged.

INDEX OF TOPICS



ELECTRICAL COMPONENTS

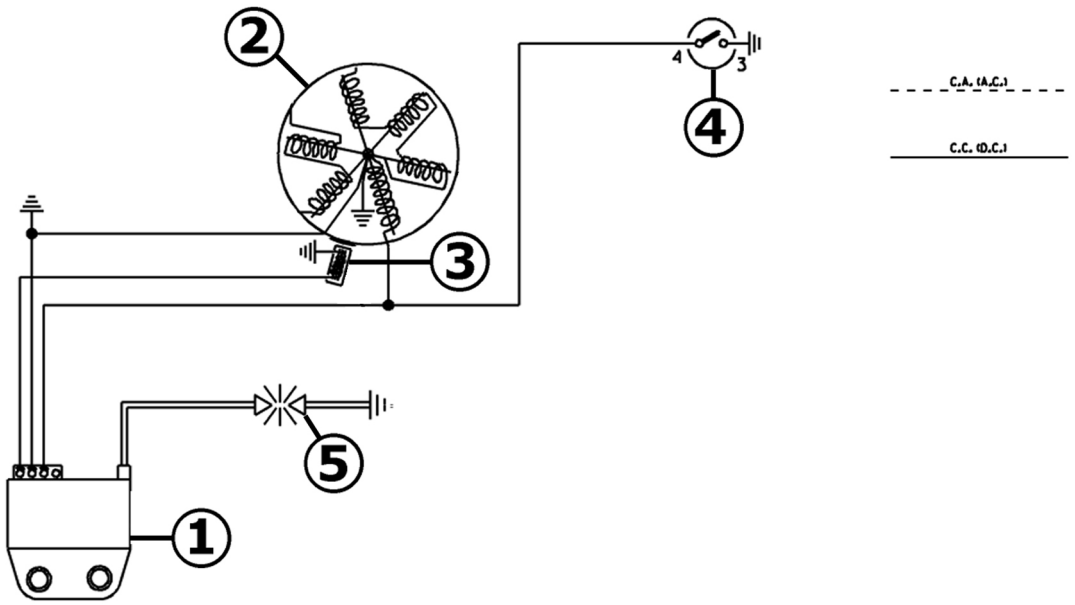
	Specification	Desc./Quantity
1	Rear brake stop button	
2	Light switch	
3	Turn signal switch	
4	Horn button	
5	Front L.H. turn signal light	
6	Voltage regulator	
7	Control device ignition	
8	Rear L.H. turn signal light	
9	Flywheel magneto	
10	Pick - up	
11	Starter motor	
12	Fuse	7.5A
13	Automatic choke diagnostic light	
14	Taillight assembly	
15	Battery	12V - 4Ah
16	Starter relay	
17	Rear R.H. turn signal light	

	Specification	Desc./Quantity
18	Fuel level sender	
19	Heater	
20	Automatic starter	
21	Oil level sender	
22	Front R.H. turn signal light	
23	Ignition key-switch	
24	Starter button	
25	Front brake stop light switch	
26	Heating control device	
27	Headlight assembly	
28	Headlight bulb	12V-35/35W
29	Front side light bulb	12V - 5W
30	RHS turn signal warning light	
31	Headlamp warning light	
32	Low-fuel warning light	
33	Turn signal warning	
34	Oil indicator	
35	Dashboard light bulbs	**Type**: Bayonet **Power**: 12V 1.2W **Quantity**: 3
36	High-beam warning light	12V - 1,2W
37	Speedometer	
38	Horn	

R = Red - B = White - Bl = Blue - N = Black - V = Green - Rs = Pink -Mr = Brown - Gr = Grey - Az = Light Blue G = Yellow Vi = Purple A = Orange

Conceptual diagrams

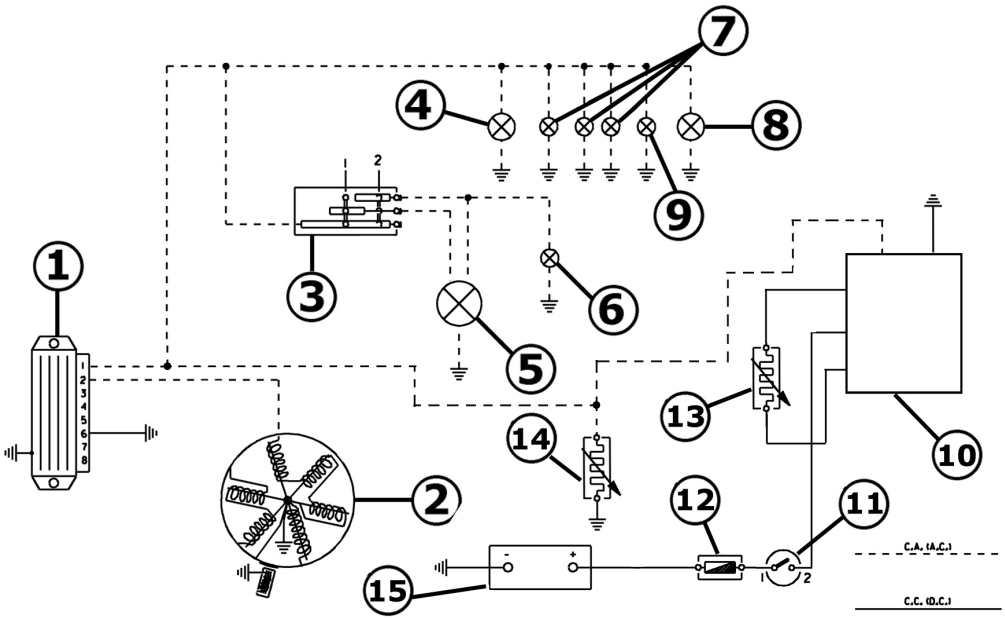
Ignition



IGNITION

	Specification	Desc./Quantity
1	Electronic controller	
2	Magneto flywheel	
3	Pick - up	
4	Key switch	
5	Spark plug	

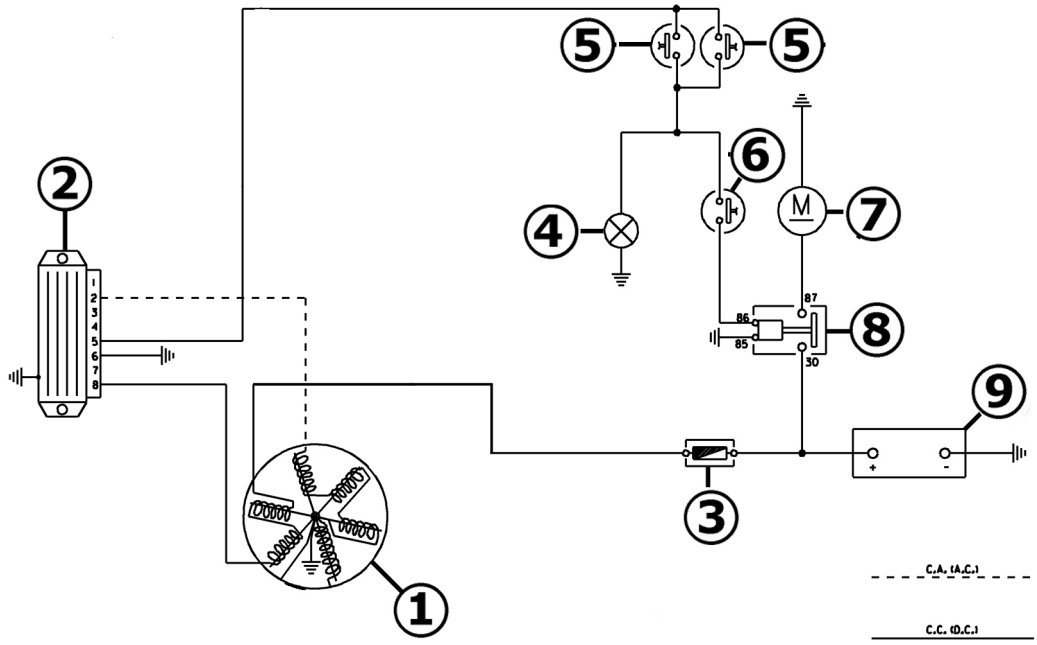
Headlights and automatic starter section



LIGHTS

	Specification	Desc./Quantity
1	Voltage regulator	
2	Magneto flywheel	
3	Light switch	
4	Rear light bulb	12V - 5W
5	Headlight bulb	12V-35/35W
6	High beam warning light bulb	12V-1,2W
7	N°3 instrument lighting bulbs	12V - 1.2W
8	Taillight bulb	12V - 5W
9	Headlight warning light	12V - 1.2W
10	Heating control device	
11	Key switch contacts	
12	Fuse 7,5A	
13	Carburettor heater	
14	Automatic starter	
15	Battery	12V - 4Ah

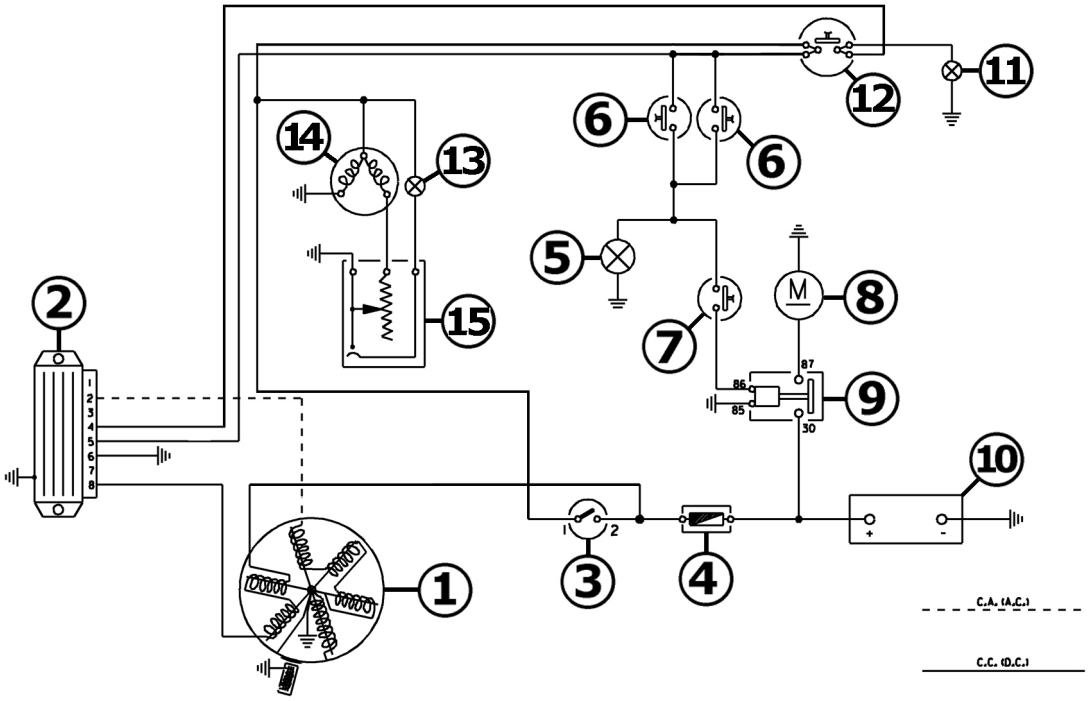
Battery recharge and starting



BATTERY RECHARGE AND STARTING

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

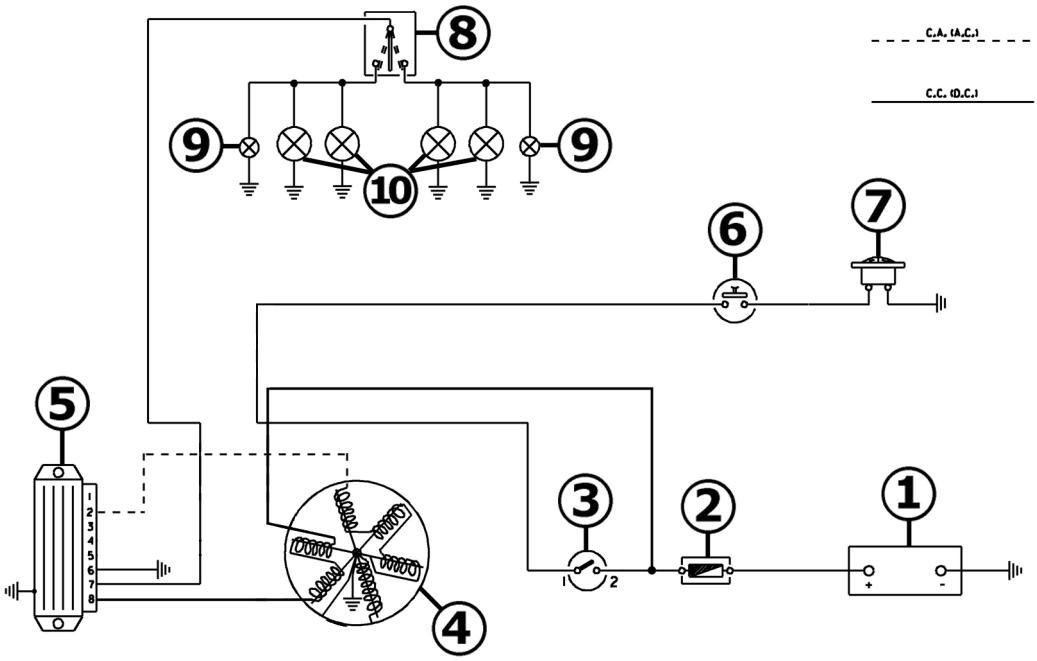
Level indicators and enable signals section



START PERMISSIVE BUTTONS AND LEVEL INDICATORS

	Specification	Desc./Quantity
1	Magneto flywheel	
2	Voltage regulator	
3	Key switch	
4	Main fuse	7,5A
5	Brake light filament	12V - 21W
6	Front and rear brake light button	
7	Start up button	
8	Starter motor	
9	Remote starter switch	
10	Battery	12V - 4Ah
11	Low oil level light	12V - 1.2W
12	Oil level sender	
13	Reserve fuel light	12V-1,2W
14	Fuel Level indicator	
15	Fuel level sender	

Turn signal lights

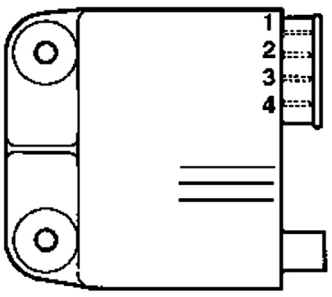


TURN INDICATORS AND HORN

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

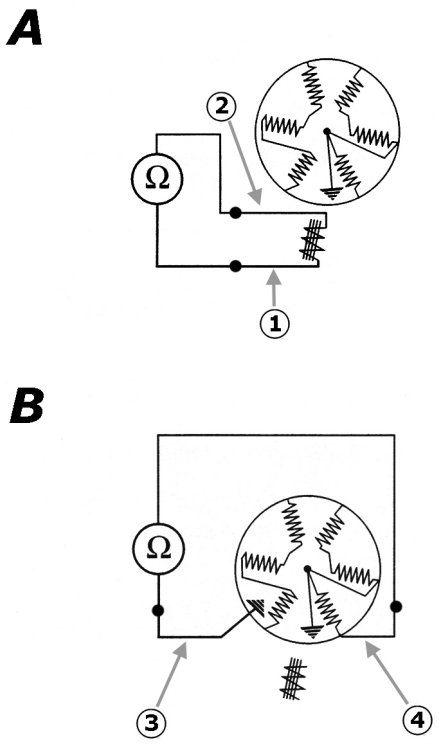
Checks and inspections

All system checks requiring the disconnection of wires (e.g. connections and ignition system device checks) must be carried out with the engine off, or the ECU may be damaged irreparably.



Ignition circuit

1) Check the state of the spark plug (clean it with a metallic brush, remove all incrustations, blow it with compressed air, and replace it if necessary).
2) Without removing the stator, perform the checks described below:
After a visual inspection of the electrical connections, carry out the measurements on the charging coil and pick-up (see table), and check for continuity using the special tester, 020331Y.
If the continuity checks or the inspections on the coil and pick-up are incorrect, proceed by replacing the stator, otherwise replace the ECU.
Remember to detach the ECU wirings when the engine is not running.



Specific tooling

020331Y Digital multimeter

PICK-UP INSPECTION (FIGURE A)

	Specification	Desc./Quantity
1	Red (1) and White (2) wires	90 ÷ 140 ohm

CHARGING COIL INSPECTION (FIGURE B)

	Specification	Desc./Quantity
1	White (3) and Green (4) wires	800 ÷ 1100 ohm

CONTINUITY CHECK

	Specification	Desc./Quantity
1	White wire - Engine	Continuity
2	White wire - Frame	Continuity

Voltage regulator check

Voltage regulator

A fault in the voltage regulator can cause the fol-

lowing problems depending on the type of fault:

1) Blow out of the lighting system bulbs.

2) Failure of the lighting system.

3) Excessive battery charging (blowing of main fuse).

4) Battery recharging failure.

5) Failure of the turn indicators.

6) Failure of the oil and petrol check lamp.

Operations

FAULT 1:

Make sure that at 5000 rpm with the lights on that the regulation voltage is between 13V and 14.5V. Make sure that at 5000 rpm with the lights off the regulation voltage is □ 16V.

If the regulation voltage is greater than >16V replace the regulator.

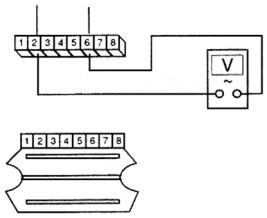
FAULT 2:

a) Make sure the stator is supplying voltage correctly: disconnect the regulator connector and place tester 020331 y between the grey-blue wire (2) and the black wire (6) to measure the alternating voltage and make sure that the voltage supplied at 3000 rpm, is between 25 and 30V (FIG> A). If there are any anomalies, replace the stator.

b) If the tests do not reveal any anomalies, replace the regulator.

c) If replacement of the regulator does not restore correct operation, check the connections of the electrical system.

A

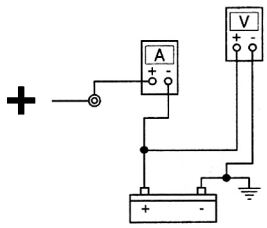


FAULT3

With the engine off and the regulator connector detached, check there are no short-circuits in the system, with reference to earth. Then replace regulator, as definitely faulty, and fuse.

After replacing the regulator, measure the charge voltage and current at the battery terminals (FIG. B). Measured values must be 1.5 ÷ 2 A and 13 V at 3,000 rpm.

B



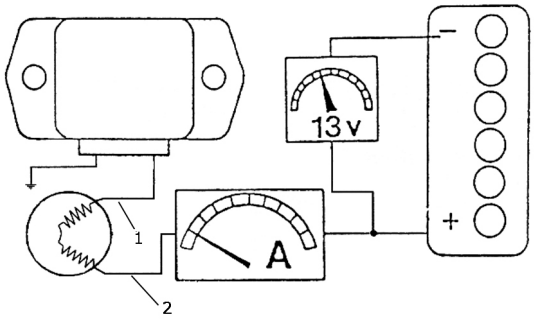
FAULT 4

a) By positioning tester 020331Y between the yellow wire terminal (8) on the regulator and the black wire (6) (FIG. D), check the generator output voltage is within 26 and 30 V at 3,000 rpm (this measurement must be carried out with the battery detached). In the event of anomalies, replace the stator; otherwise proceed to point b).

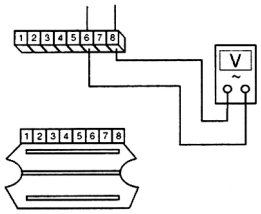
b) Yellow wire (1) attached to the regulator. Insert an ammeter between the stator's blue wire (2) and the battery, and check, using tester 020331Y, that the current output, at 3,000 rpm and with the battery kept between 12 and 13V, is approx. 1.5 - 2 A (FIG. C).

If the values thus obtained are lower than prescribed, proceed by replacing the regulator. Before carrying out inspections on the regulator and its electrical system, it is always advisable to check for continuity between the black wire and earth.

C



D



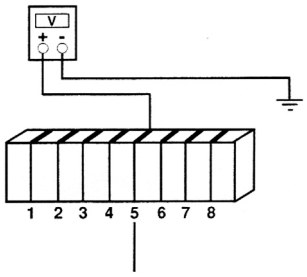
FAULT 5

(FIG. E) In the event that the turn signal lights are not operational, proceed as follows:

- Remove the regulator connector and insert the tester terminals between pin 5 and ground.
- Turn the ignition switch onto ON and check for

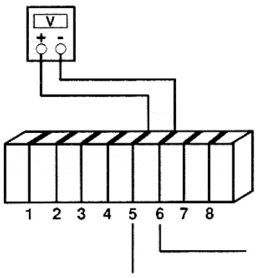
battery voltage. If no voltage is found, check wiring and terminals on key-switch and battery.

E



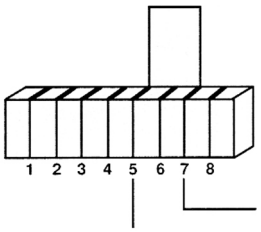
(FIG. F) - Repeat the same operation with the terminals inserted between pins 5 (+) and 6 (-) and check for the presence of battery voltage with the ignition switch onto ON. If unsuccessful, check the ground cable on the regulator.

F



(FIG. G) - If the checks given above are unsuccessful, jump pins 5 and 7 on the connector, turn the key-switch onto ON and turn the turn signal switch alternately from left to right to visualize the continuous operation of the lights (as powered directly by the battery). If the lights do not go on, check the switch and its cable; if these are not damaged or faulty; replace the regulator as definitely faulty.

G



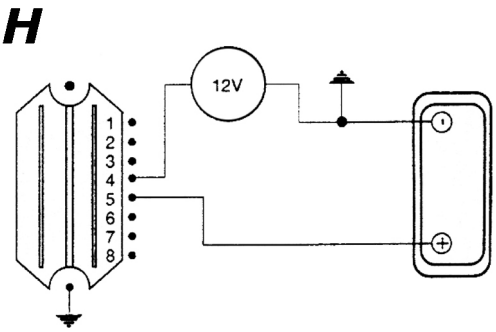
FAULT 6

Low-oil and petrol warning lights failure

(FIG H) - Detach the connector to the voltage regulator, and check the following:

- Apply a tension of 12V to the pin marked with the number 5, check, using the digital tester; there is an equivalent output (12V) from pin 4 for at least 5 seconds.
- If pin no. 4 gives no output voltage, replace the

H



regulator.

- If pin no. 3 gives output voltage, check the sys-

tem and the low-oil warning light.

Specific tooling

020331Y Digital multimeter

Sealed battery

RECHARGING THE BATTERY FOLLOWING OPEN-CIRCUIT STORAGE

1) Checking the voltage

Before installing the battery on the vehicle, measure the open-circuit voltage with an ordinary multi-

meter.

- If the voltage exceeds 12.60 V, the battery can be installed without recharging.

- If the voltage is less than 12.60 V, recharge the battery as described at item 2).

2) Constant-voltage charging method

- Constant voltage: 14.40-14.70 V

- Initial charging current: 0.3-0.5 x rating

- Charging time:

- Recommended 10-12 hrs

Minimum 6 hrs

Maximum 24 hrs

3) Constant-current charging method

- Initial charging current: 1/10 of rating

- Charging time: Maximum 5 hrs

WARNING

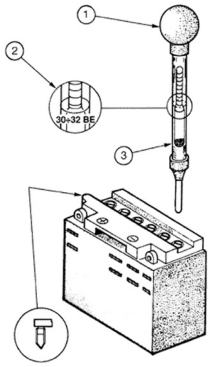
WHEN THE BATTERY IS DEEPLY DISCHARGED (FAR BELOW 12.6V), 5 HOURS' RECHARGING MAY NOT BE ENOUGH TO OBTAIN OPTIMUM PERFORMANCE.
IN THESE CONDITIONS, HOWEVER, TO AVOID DAMAGING THE BATTERY BEYOND REPAIR, IT IS ESSENTIAL NOT TO RECHARGE IT FOR MORE THAN 8 CONSECUTIVE HOURS.

Dry-charge battery

WARNING

BATTERY ELECTROLYTE IS POISONOUS AND CAN CAUSE SERIOUS BURNS AS IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH THE EYES, THE SKIN AND GARMENTS. IN CASE OF CONTACT WITH THE EYES OR SKIN RINSE ABUNDANTLY WITH WATER FOR ABOUT 15 MINUTES AND SEEK IMMEDIATE MEDICAL ASSISTANCE.
IF THE LIQUID IS INGESTED IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR MILK.

SUBSEQUENTLY DRINK MILK OF MAGNESIA, BEATEN EGG OR VEGETABLE OIL. CALL A DOCTOR WITHOUT DELAY.
BATTERIES PRODUCE EXPLOSIVE GASES. KEEP AWAY OPEN FLAMES, SPARKS AND CIGARETTES. WHEN A BATTERY IS CHARGED IN CLOSED PLACES ENSURE ADEQUATE VENTILATION.
ALWAYS PROTECT THE EYES WHEN WORKING IN THE PROXIMITY OF BATTERIES. POSITION THE TUBE BETWEEN THE MUDGUARD AND THE FILTER.
KEEP OUT OF REACH OF CHILDREN.



The battery is the electrical component which requires the most constant care and accurate maintenance. The main maintenance rules are as follows:

1) Checking the electrolyte level

Frequently check that the electrolyte reaches the upper level. To top up, only use distilled water.
If you need to top up the battery too frequently, check the vehicle electrical equipment as the battery is certainly working in overload conditions, which will lead to rapid deterioration.

2) Checking the battery charge

After restoring the electrolyte level, check its density with the special hydrometer (see figure).
When the battery is charged, electrolyte density must be between 30 and 32 Bé, corresponding to specific gravity of 1.26-1.28 at a temperature not lower than 15°C.
If density has fallen below 20° Bé, the battery is completely discharged and needs recharging.
At the end of the charging, check the level and density of the electrolyte in each cell. If the vehicle is not used for some time (1 month or more) the battery must be periodically recharged.
In three months the battery runs down completely.
When reinstalling the battery on the vehicle, take care not to invert the connections. The black (-)

earth wire must be connected to the negative (-) terminal whereas the two red (+) wires must be connected to the positive (+) terminal.
Normal bench charging must be carried out with the specific battery charge (single) or (multiple). Choose the charger setting corresponding to the type of battery to be recharged. Ensure you connect up to the battery with the correct polarity (+ to + and - to -). The plugs must be removed from the battery throughout the charging procedure.

4) Cleaning the battery

Keep the battery clean, especially the top; coat the terminals with Vaseline.

WARNING

BEFORE CHARGING THE BATTERY REMOVE ALL CELL PLUGS. KEEP FREE FLAMES OR SPARKS AWAY FROM THE BATTERY DURING RECHARGE.
WHEN THE BATTERY HAS TO BE REMOVED FROM THE VEHICLE, DISCONNECT THE NEGATIVE TERMINAL FIRST.

CAUTION

NEVER USE FUSES HAVING A GREATER CAPACITY THAN THE ONE RECOMMENDED. THE USE OF A FUSE OF UNSUITABLE CAPACITY MAY RESULT IN SERIOUS DAMAGE TO THE WHOLE VEHICLE OR EVEN CAUSE A FIRE.

CAUTION

NORMAL DRINKING WATER CONTAINS SALTS THAT ARE HARMFUL FOR BATTERIES. USE ONLY DISTILLED WATER.

CAUTION

TO ENSURE MAXIMUM PERFORMANCE THE BATTERY MUST BE CHARGED BEFORE USING THE VEHICLE.
INSUFFICIENT BATTERY CHARGE OR LOW ELECTROLYTE LEVEL WHEN FIRST USED WILL RESULT IN PREMATURE FAILURE OF THE BATTERY.

Specific tooling

020333Y Single battery charger

020334Y Multiple battery charger

1) - Remove the short closed tube and the plugs. Fill the cells to the upper level with battery acid, specific gravity 1.26 corresponding to 30° Bé at 15°C.

2) - Leave the battery to stand for about 2 hours and then top up once again with battery acid.

3) - Within 24 hours, recharge the battery using the specific battery charger 020333Y (single) or 020334Y (multiple). Apply an intensity equivalent to about 1/10 of the battery rating until the acid density is approximately 1.27, corresponding to 31° Bé, and these values stabilize.

4) - When the battery is fully charged, top up with **distilled water**, refit the plugs and clean the battery case.

5) - After completing the above operations, proceed to install the battery on the vehicle, taking care to observe the connections between the wiring and the battery terminals.

WARNING

AFTER INSTALLING THE BATTERY AND IN ORDER TO PROVIDE A VENT FOR THE GASES FORMING INSIDE IT, REPLACE THE SHORT CLOSED TUBE NEXT TO THE POSITIVE (+) TERMINAL WITH THE CORRESPONDING LONG OPEN TUBE WHICH IS PRESENT ON THE VEHICLE. CHECK THAT THE TUBE SLOTS ARE TURNED TO THE BATTERY SIDE

Specific tooling

020333Y Single battery charger

020334Y Multiple battery charger

INDEX OF TOPICS

Removal of the engine from the vehicle

Removing the engine from the frame

- Disconnect the battery.
- Disassemble the complete exhaust unit.
- Remove the rear wheel.
- Disassemble the rear brake linkage.
- Disconnect the electrical terminals.
- Disassemble the throttle and mixer control cables.
- Disconnect the pipelines (fuel - oil - vacuum tap control).

WARNING

HANDLE PETROL WITH THE UTMOST CARE.

CAUTION

WHEN INSTALLING THE BATTERY ALWAYS CONNECT THE POSITIVE LEAD BEFORE THE NEGATIVE LEAD.

WARNING

WEAR PROTECTIVE GOGGLES WHEN USING HAMMERING TOOLS.

INDEX OF TOPICS

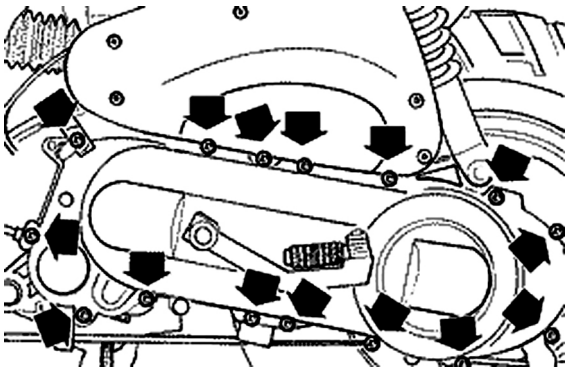
Automatic transmission

Transmission cover

- Loosen the 15 screws and remove the transmission cover with the aid of a mallet.

N.B.

THE CRANKCASE IS RESTRAINED BY THE TIGHT FITTING BETWEEN THE SHAFT OF THE DRIVEN HALF-PULLEY AND THE BEARING HOUSED ONTO THE CRANKCASE.

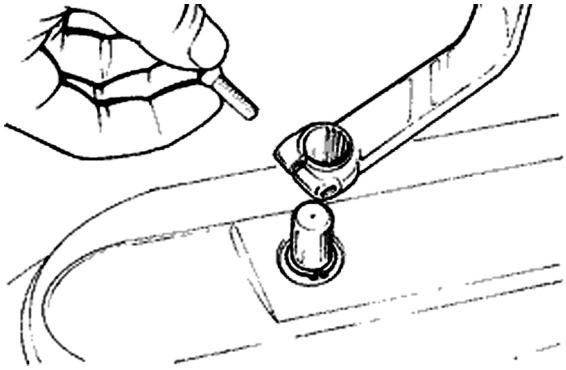


Kickstart

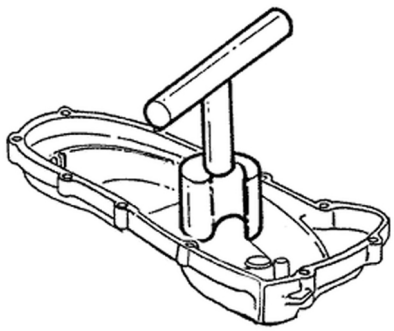
- Remove the screw shown in the figure and detach the kick-start lever.
- When refitting, follow the above operations in the reverse order, tightening the screw to the prescribed torque.

Locking torques (N*m)

Kick-start lever replacement: 12 ÷ 13 N·m



- During the reassembly, apply some of the recommended grease on the bushing, the spring, and the toothed segment.
- To load the spring, use the special tool as shown in the figure.
- Refit the split ring after checking its condition.



Specific tooling

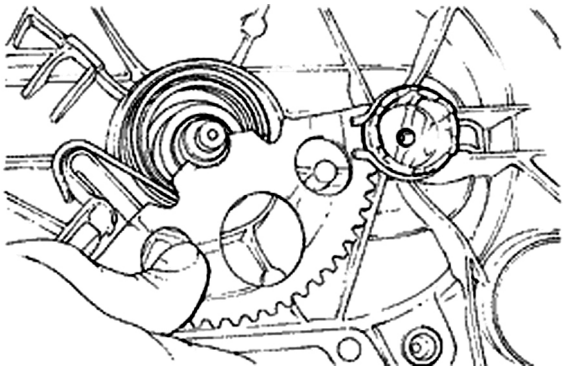
020261Y Kick-starter spring assembler

Recommended products

JOTA 3 FS Speedometer transmission

Lithium soap grease NLGI 33

- Remove the split ring positioned on the external side of the transmission cover.
- Remove the drive gear from its housing, decreasing the tension that the toothed segment applies via the spring; to do so, it is necessary to slightly rotate the toothed segment (see figure).

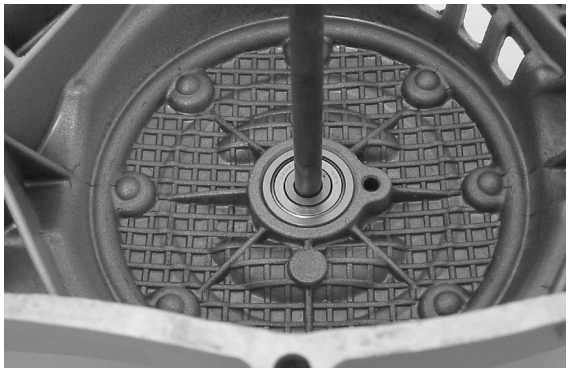


CAUTION

WHEN REMOVING THE GEAR, PAY PARTICULAR ATTENSION TO THE LOADING OF THE SPRING AS THIS MAY BE DANGEROUS FOR THE OPERATOR.

Removing the driven pulley shaft bearing

- Slightly heat the crankcase on the inside to avoid damaging the painted surface. Remove the bearing using the driven pulley shaft or a pin of the same diameter.



N.B.

IF THIS IS DIFFICULT A GENERIC 8 MM EXTRACTOR FOR INNER PARTS CAN BE USED.

Refitting the driven pulley shaft bearing

- After slightly heating the crankcase on the inside, fit the bearing using a bush of the same diameter as the bearing outer race.

N.B.

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

CAUTION

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

Removing the driven pulley

- Lock the clutch bell housing with the specific tool.
- Remove the nut, the clutch bell housing and the

whole of the driven pulley assembly.

N.B.

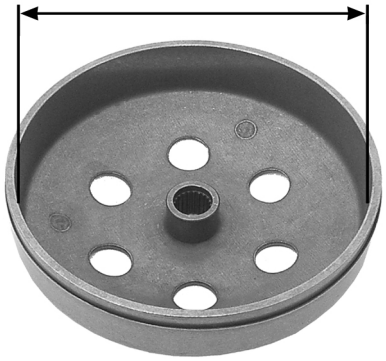
THE ASSEMBLY CAN ALSO BE REMOVED WITH THE DRIVE PULLEY IN PLACE.

Specific tooling

020565Y Compass flywheel stop spanner

Inspecting the clutch drum

- To verify that the bell clutch is not usurata or damaged.
- To measure the inner diameter of the bell clutch.



Characteristic

Clutch bell diameter/standard value

Ø 107+0,2 +0 mm

Clutch bell diameter/max. value allowed after use

Ø 107,5 mm

Found eccentricity /max.

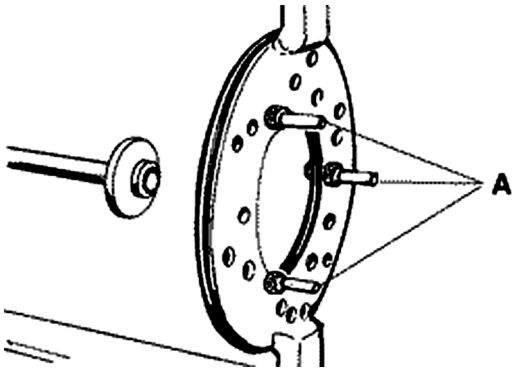
0,20 mm

Removing the clutch

- Fit the tool with the long pins screwed on from the outside in positions «**A**». Insert the driven pulley assembly into the tool and tighten the central screw.

CAUTION

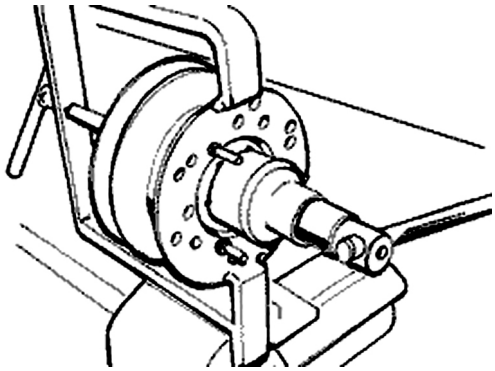
OVERTIGHTENING OF THE CENTRAL SCREW CAUSES THE DISTORTION OF THE TOOL.



- Using a 34 mm socket wrench, remove the clutch locknut.
- Loosen the central screw, unloading the spring

of the driven pulley assembly.

- Separate the components.



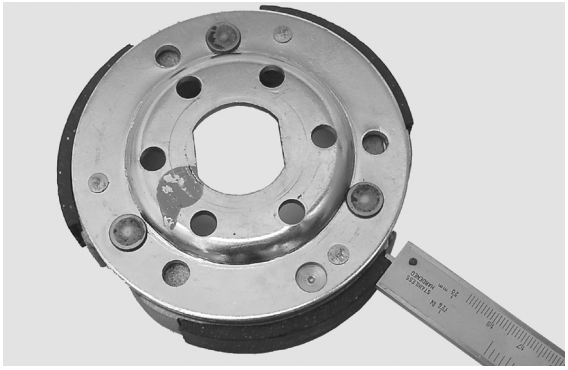
Specific tooling

020444Y Driven half pulley spring compressor tool

Inspecting the clutch

- Check the thickness of the clutch mass friction material.

- The masses must exhibit no traces of lubricants; in that case, check the driven pulley unit seals.



N.B.

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

CAUTION

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

Characteristic

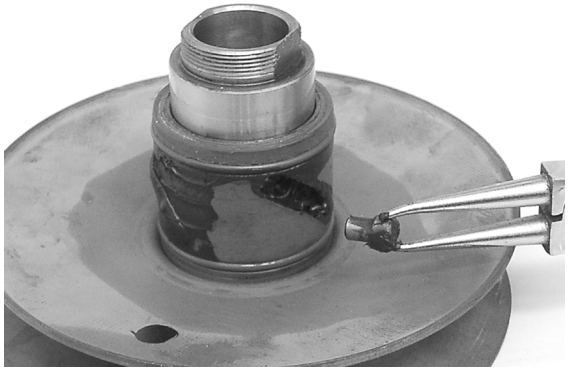
Check . Minimum thickness

1 mm

Pin retaining collar

- Remove the collar with the aid of two screwdrivers.

- Remove the three guide pins and the movable half pulley.



Removing the driven half-pulley bearing

- Remove the roller bearing using the specific extractor inserted from the lower side of the stationary half pulley

CAUTION

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

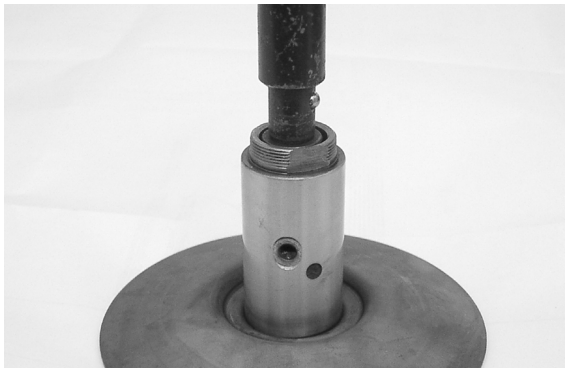
Specific tooling

001467y029 Bell

- Remove the snap ring from the roller bearing.
- Remove the roller bearing from the side of the clutch using the specific device.

N.B.

ADEQUATELY SUPPORT THE HALF PULLEY TO PREVENT THE DRIVE BELT SLIDING SURFACE FROM BEING DISTORTED.



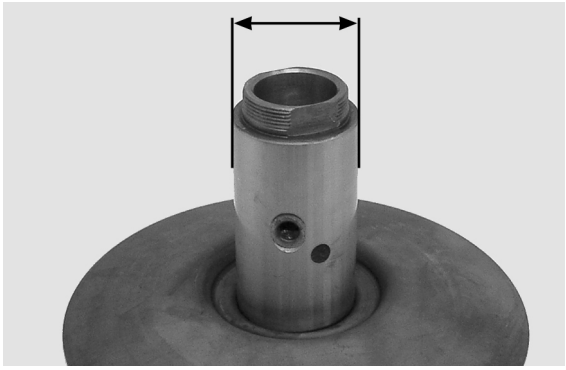
Specific tooling

020376Y Handle for punches

020363Y 20mm guide

Inspecting the driven fixed half-pulley

- Make sure there are no signs of wear on the work surface of the belts, if there are replace the half pulley.
- Make sure the bearing do not show signs of unusual wear.
- Measure the external diameter of the pulley bushing.



Characteristic

Standard diameter

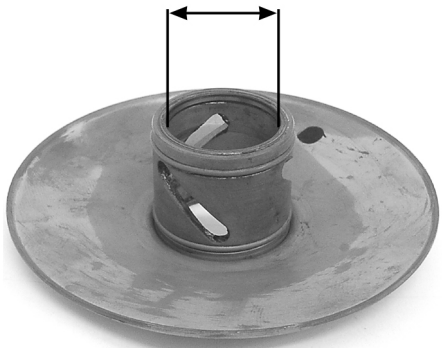
Ø 33,965 ÷ 33,985 mm

Stationary driven half pulley/ Minimum diameter allowed after use

Ø 33,96 mm

Inspecting the driven sliding half-pulley

- Remove the two inner seal rings and the two O-rings.
- Measure the inside diameter of the movable half pulley bushing.



Characteristic

Maximum allowable diameter

Ø 34,08 mm

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

Recommended products

TUTELA MRM 2 Grease for the phonic wheel turning ring

Molybdenum disulphide grease and lithium soap

- 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 gr. of grease, this operation must be carried out through one of the holes inside the bushing until grease comes out of the opposite hole. This operation is necessary to avoid the presence of grease beyond the O-rings.

Recommended products

TUTELA MRM 2 Grease for the phonic wheel turning ring

Molybdenum disulphide grease and lithium soap

Refitting the driven half-pulley bearing

- Fit a new ball bearing with the specific tools.
- Fit the ball bearing circlip.
- Fit the new roller bearing so that the lettering is visible from the outside.

CAUTION

ADEQUATELY SUPPORT THE HALF PULLEY TO AVOID DAMAGING THE THREADED END WHILE FITTING THE BEARINGS.

Specific tooling

020376Y Handle for punches

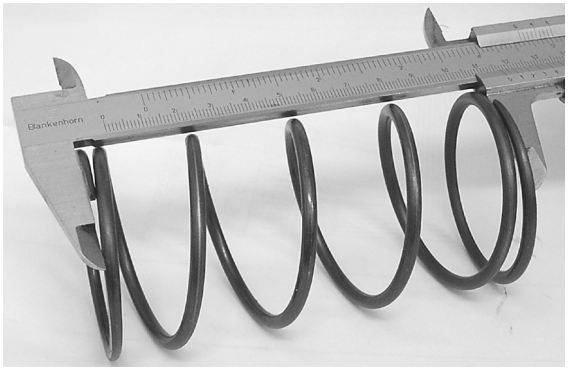
020456Y Ø 24 mm adaptor

020362y 12 mm guide

020171y Roller bearing drift

Inspecting the clutch spring

- Make sure that the driven pulley contrast spring is not deformed.
- Minimum length allowed after use



Characteristic

Standard length

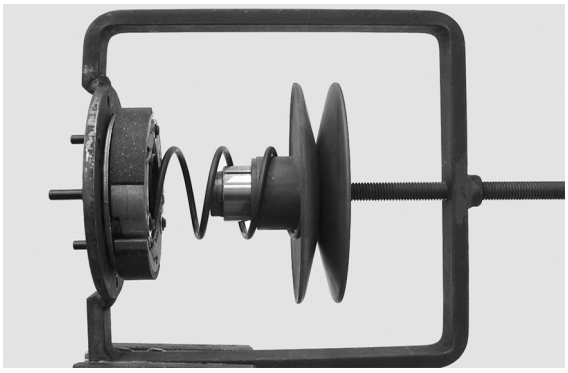
118 mm

Limit after use

XXXX

Refitting the clutch

- Preassemble the driven pulley unit with spring, sheathing and clutch.
- Position the spring with the plastic shielding supporting the clutch
- Insert the parts in the device and preload the spring, being careful not to damage the plastic sheathing and the end of the threaded shank.



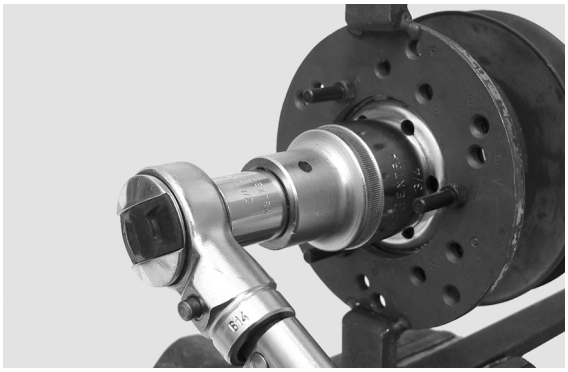
- Reassemble the nut securing the clutch and tighten to the prescribed torque.

CAUTION

TO AVOID DAMAGING THE CLUTCH NUT, USE A SOCKET WRENCH WITH A SMALL BEVEL.

CAUTION

POSITION THE UNBEVELLED SURFACE OF THE NUT IN CONTACT WITH THE CLUTCH.



Locking torques (N*m)

Nut locking clutch assembly on pulley 55 ÷ 60 Nm

Refitting the driven pulley

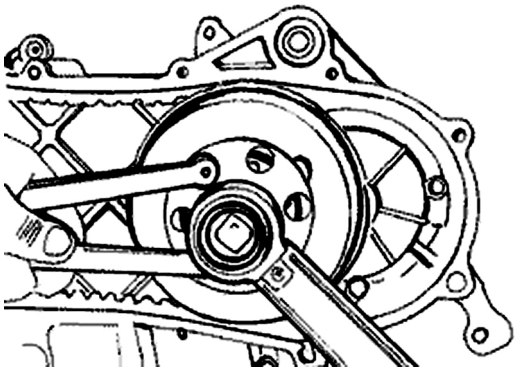
- Fit the driven pulley assembly, the clutch bell housing and the nut using the specific tool.

Specific tooling

020565Y Compass flywheel stop spanner

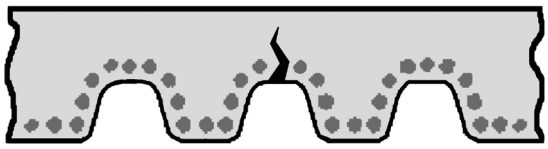
Locking torques (N*m)

Driven pulley shaft nut 40 -÷ 44 Nm



Drive-belt

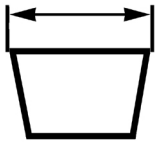
- Make sure the transmission belt is not damaged and does not have cracks in the toothed grooves.
- Check the width of the belt.



Characteristic

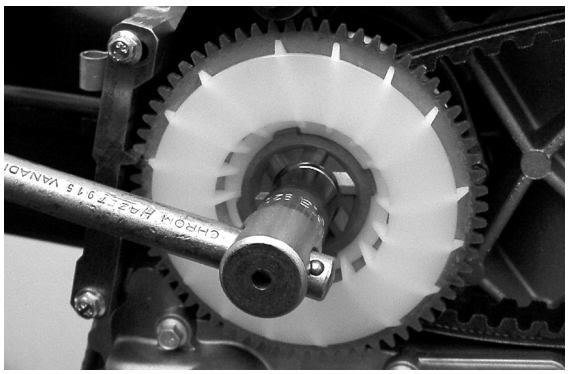
transmission belt/Minimum width

17,5 mm



Removing the driving pulley

- Lock the pulley with the specific tool.
- Remove the central nut with the related washer, then remove the drive and the plastic fan.
- Remove the fixed half pulley.



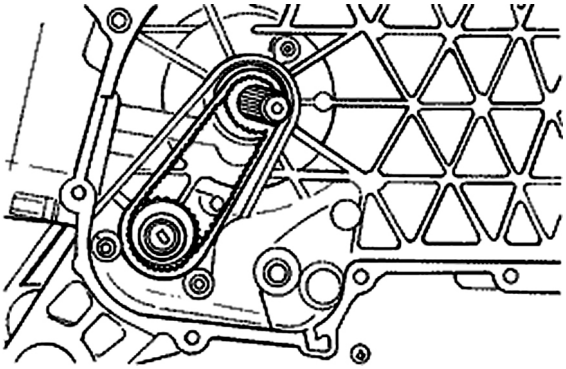
- Remove the belt, washer and remove the mobile half pulley with its bushing, being careful of the rollers and contrast plate fitted loosely on it.

Specific tooling

020451y Drive pulley stop spanner

Mixer gears and belt

- Remove belt and gear



CAUTION

DO NOT TWIST OR BEND THE BELT WHEN REFITTING IT

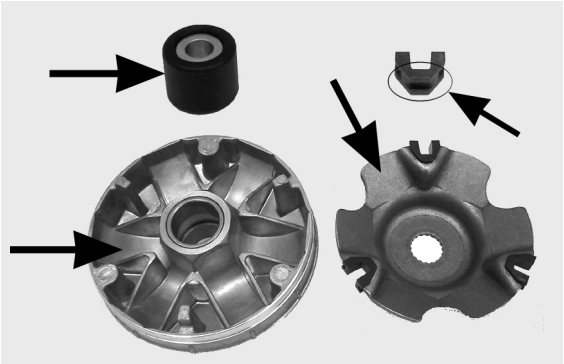
CAUTION

BEFORE REFITTING THE BELT, CAREFULLY LUBRICATE THE PIN AND THE MIXER DRIVE GEAR BUSHING WITH OIL, MAKING SURE THIS IS FREE FROM ANY LOAD.

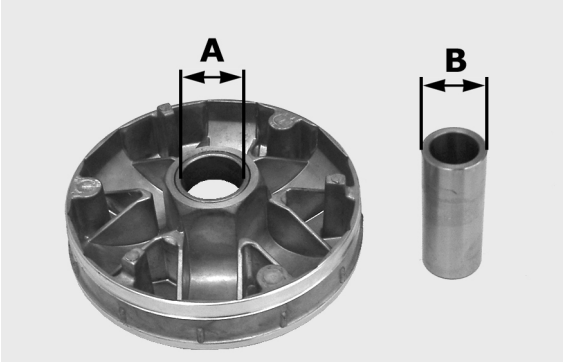
N.B.

REPLACE THE BELT EVERY 20,000 KM.

Inspecting the rollers case



1) Make sure that the bushing and sliding rings on the mobile pulley are not lined or deformed.
2) Check the track where the rollers slide on the contact pulley, there should not be any signs of wear and check the conditions of the belt contact surfaces on the half pulleys (mobile and stationary).
3) Make sure that the rollers do not have marked facing on the sliding surfaces and that the metal insert does not protrude from the edges of the plastic cover.
4) Make sure that the contact plate sliding blocks are intact.



- Check that the internal bronze 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 BRONZE BUSHING.

Characteristic

Maximum allowable diameter:

20,12 mm

Standard diameter:

20,021 mm

Sliding pulley brass/ Diameter maximum:

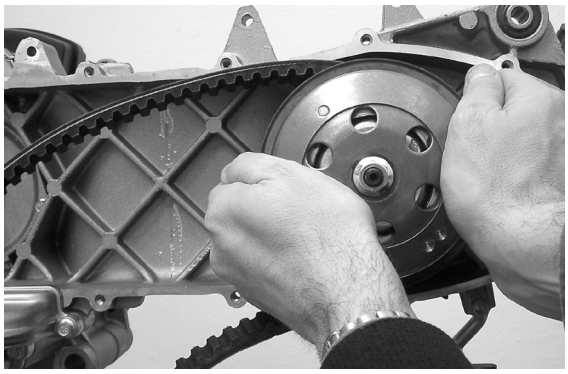
XXX mm

Sliding pulley brass/ Standard diameter:

XXX mm

Refitting the driving pulley

- Manually move the mobile driven pulley by pulling it towards the clutch unit and insert the belt keeping the rotation direction of the first assembly.



N.B.

IT IS ALWAYS A GOOD IDEA TO FIT THE BELT SO THAT THE WORDS ARE LEGIBLE IN CASE THE BELT DOES NOT SHOW AN ASSEMBLY DIRECTION.

- Reassemble the unit parts (roller housing unit with bushing, washer, stationary half pulley, belt cooling fan with intake, washer and nut).
- Tighten the nut to a torque of 20 Nm and then finally tighten 90° with the specific tool preventing rotation of the drive pulley.

N.B.

REPLACE THE NUT WITH A NEW ONE EVERY TIME THE PARTS ARE REASSEMBLED

CAUTION

IT IS VERY IMPORTANT THAT WHEN THE DRIVE PULLEY IS SECURED THAT THE BELT IS FREE INSIDE IT, TO AVOID INCORRECTLY TIGHTENING IT WITH LATER DAMAGE TO THE ENGINE SHAFT MM SCALE.

Specific tooling

020451y Drive pulley stop spanner

Locking torques (N*m)

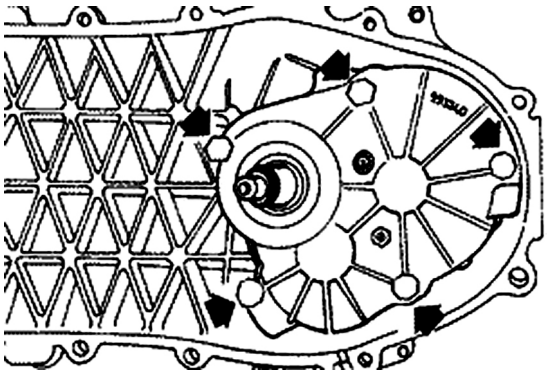
Tightening torque plus angle 18 ÷ 20 + 90°
N.m

On models with max speed limited to 25 km/h, the restriction spacer has a thickness of 5.5 mm.

End gear

Removing the hub cover

- Remove the transmission cover.
- Remove the Driven pulley removal
- Discharge the rear hub oil.
- Remove the 5 screws indicated in the figure.
- Remve the hub cover with pulley shaft.

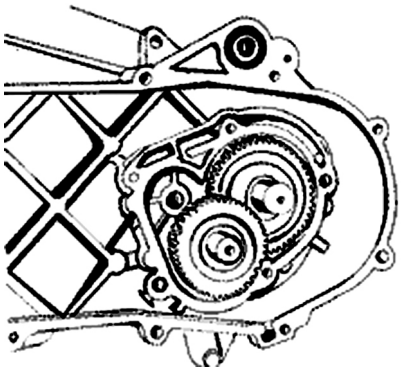


See also

Refitting the clutch

Removing the wheel axle

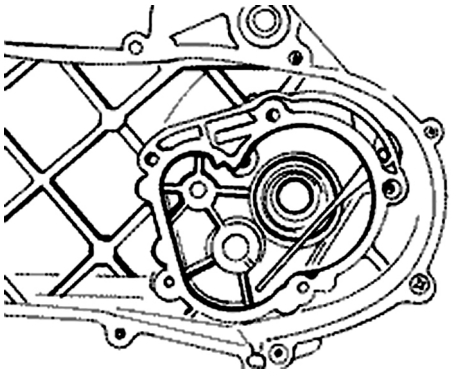
- Remove the idler gear and the wheel spindle with the related gear.
- While removing the idler gear, pay attention to the related shoulders.



Removing the wheel axle bearings

- Remove the oil seal and the seeger ring.
- Remove the bearing by pushing it with the spe-

cially designed drift from the outside towards the inside of the gear compartment.



Specific tooling

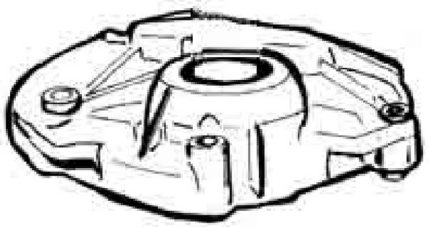
020363Y 20mm guide

020376Y Handle for punches

020358y 37 x40 adaptor

Removing the driven pulley shaft bearing

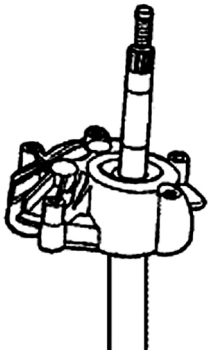
- Remove the seeger ring from inside the cover.
- Remove the oil seal from the outside.
- Remove the two dowel bolts and place the cover on a horizontal surface.
- Position the specific tool on the inner race of the bearing and expel the bearing with the aid of a press.



Specific tooling

020452y Driven pulley shaft fitting/removing tube

- Position the specific tube on the inner race of the bearing and on the pulley shaft teeth side as shown in the figure. Expel the driven pulley shaft with the aid of a press.



Specific tooling

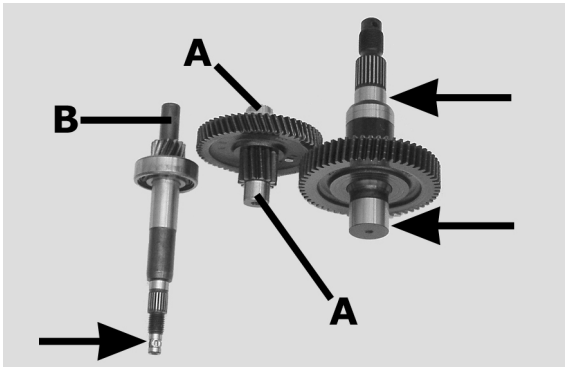
020452y Driven pulley shaft fitting/removing tube

Inspecting the hub shaft

- Make sure the three shafts are not worn or deformed on the toothed surfaces, bearing and oil guard spans.
- If faults are discovered replace the damaged

parts.

- Check the span (A) of the counter gear (wear, lines etc.)
- Check the seat of the pulley shaft: Worn surfaces (B) can indicate irregularity in the seats on the chassis or in the pulley shaft span



Inspecting the hub cover

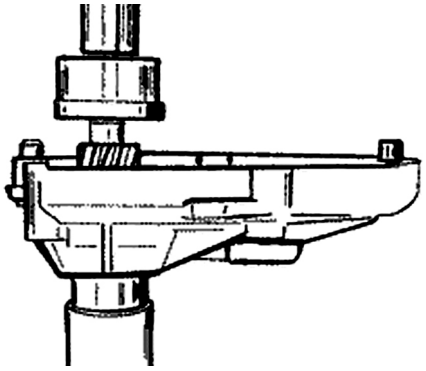
- Make sure the coupling surface is not dented or deformed.
- If faults are discovered replace the hub cover.

Refitting the driven pulley shaft bearing

- Using the specific tool under the press, support the inner race of the bearing on the outside of the hub cover. Fit the driven pulley shaft.
- Fit the oil seal so it is flush with the cover.

Specific tooling

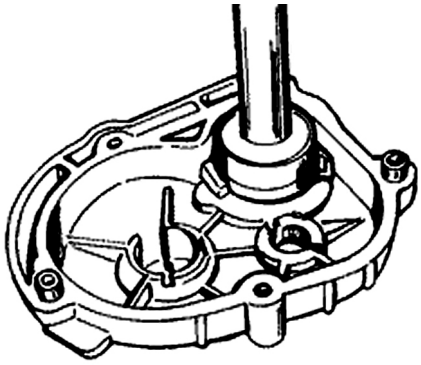
020452y Driven pulley shaft fitting/removing tube



• Heat the hub cover and insert the bearing using the specific punch.
• Fit the elastic ring with the concave part on the bearing side.

N.B.

FIT THE BALL BEARING WITH THE SHIELD FACING THE OIL SEAL.



Specific tooling

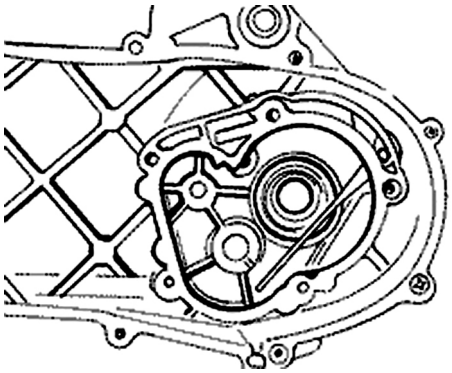
020151Y Air heater "METABO HG 1500/2"

020376Y Handle for punches

020439Y 17 mm guide

020358y 37 x40 adaptor

Refitting the wheel axle bearing



- Heat the crankcase on the clutch side with the thermal gun.
- After lubricating the bearing outer plate, fit the bearing using the specially designed adaptor with the aid of a hammer.
- Fit the seeger ring and the oil ring using the 42x47 adaptor and the handle.

Specific tooling

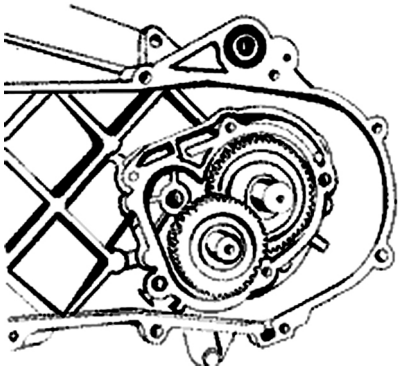
020151Y Air heater "METABO HG 1500/2"

020376Y Handle for punches

020363Y 20mm guide

020359Y 42 x 47 mm hub bearing fitting adaptor

Refitting the ub cover



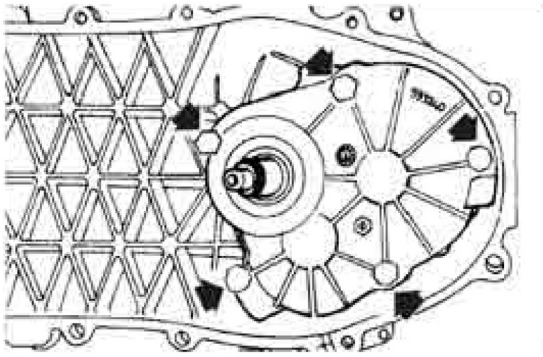
- Refit the wheel axle assembly.
- Refit the intermediate gear paying attention to the two shim washers.
- Apply LOCTITE 510 on the hub cover and refit it with driven pulley shaft.
- Refit the 5 screws and tighten to the prescribed torque.

N.B.

BEFORE FITTING A NEW GASKET, REMOVE ANY RESIDUES OF THE OLD GASKET FROM THE MATING SURFACES OF THE HUB COVER AND THE CRANKCASE HALF.

Locking torques (N*m)

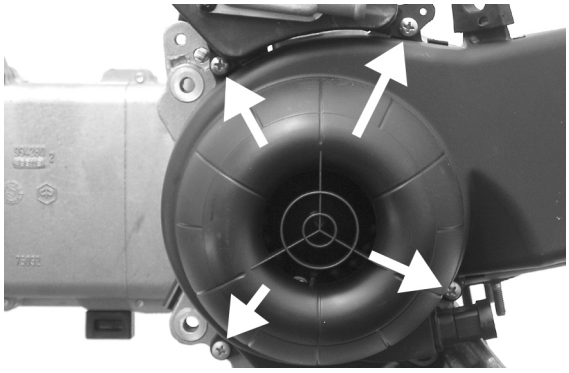
Tightening torque: 11 ÷ 13 N·m



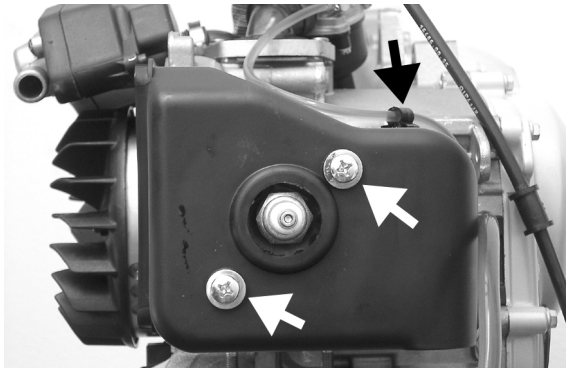
Flywheel cover

Cooling hood

- Remove the 4 fixings shown in the figure
- Remove the fan cover

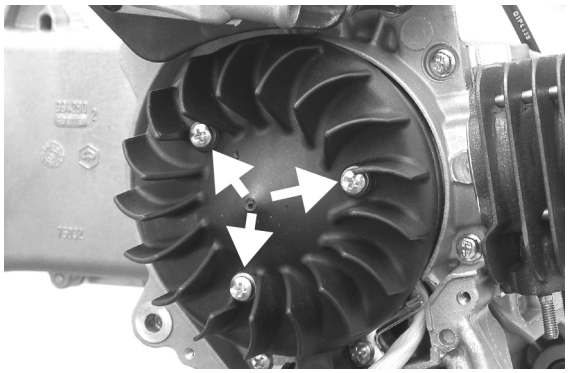


- Remove the oil line retaining zip tie from the cooling hood
- Remove the two screws shown in the picture



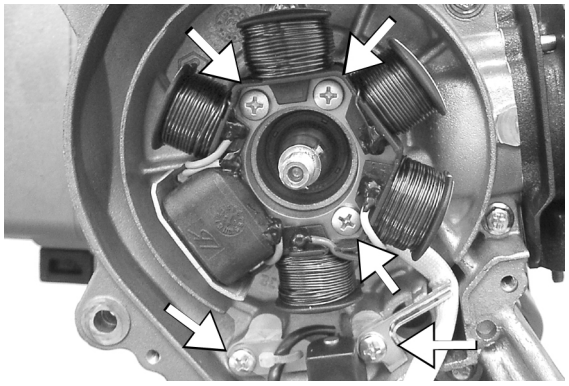
Cooling fan

- Remove the three fastenings shown in the figure.



Removing the stator

- Remove the stator 3 implantations indicated in photo
- Remove the pick-up 2 implantations indicates in photo
- Remove the stator complete with wiring



Refitting the stator

- Fit the stator and the flywheel by following the reverse procedure to the removal. Tighten the fastenings with the prescribed torque.

N.B.

THE PICK-UP WIRE MUST BE POSITIONED SO THAT IT TOUCHES THE CAST TAB ON THE CRANKCASE. THIS WILL PREVENT IT FROM BEING CRUSHED BY THE FAN COVER ASSEMBLY.

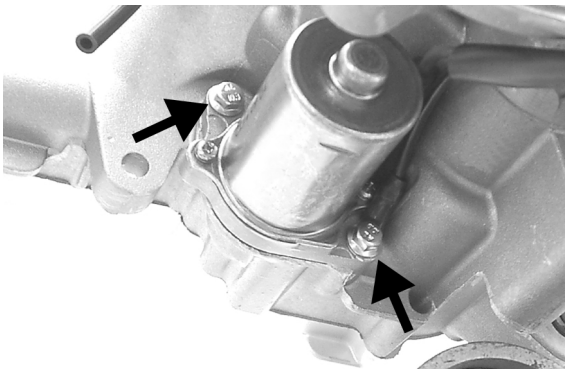
Locking torques (N*m)

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

Flywheel and starting

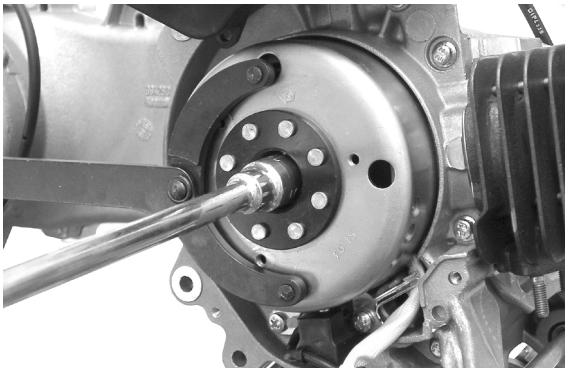
Removing the starter motor

Remove the fixings shown in the picture



Removing the flywheel magneto

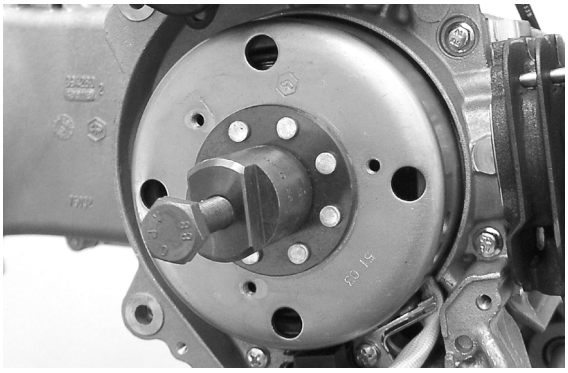
- Lock the flywheel using the compass spanner.
- Remove the nut.



CAUTION

USING A COMPASS SPANNER OTHER THAN THE ONE PROVIDED CAN DAMAGE THE STATOR COILS.

- Extract the flywheel with the specially designed extractor.



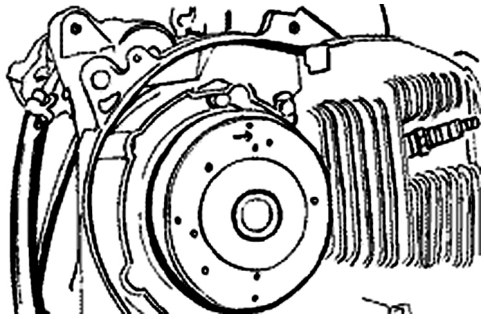
Specific tooling

020565Y Compass flywheel stop spanner

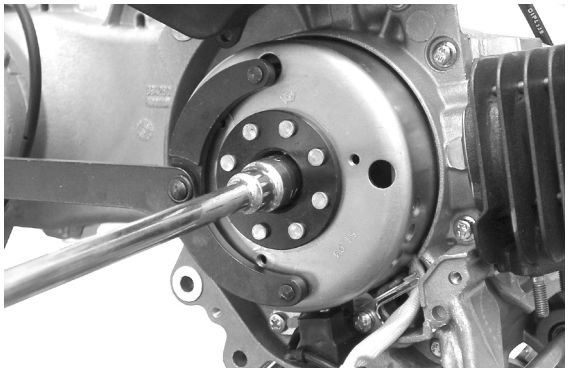
020162y Flywheel extractor

Inspecting the flywheel components

- Check the flywheel for any distortion that might cause rubbing on the stator and the pick-up.



Refitting the flywheel magneto



- Fit the flywheel taking care to properly insert the key.
- Tighten the flywheel locknut with the prescribed torque.
- Check that the pick-up air gap is 0.5 - 0.6 mm

No adjustment of the air gap is necessary when fitting the pick-up.

A different air gap denotes distortion of the pick-up support.

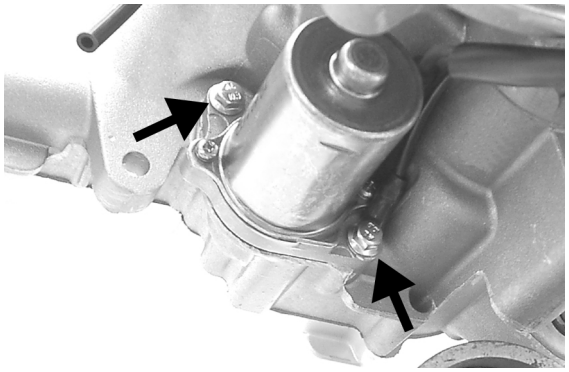
N.B.

A CHANGE IN THE AIR GAP MAY ALTER THE SPARK ADVANCE AND CAUSE KNOCKING, ETC.

Locking torques (N*m)

Flywheel nut 40 ÷ 44 N.m

Refitting the starter motor



- Fit a new O-ring on the starter motor and lubricate it.
- Install the starter motor on the crankcase and tighten the two screws with the prescribed torque.

N.B.

FIT THE REMAINING PARTS AS DESCRIBED IN THE CHAPTERS CYLINDER, CYLINDER HEAD, VALVE GEAR, LUBRICATION, FLYWHEEL AND TRANSMISSION.

Locking torques (N*m)

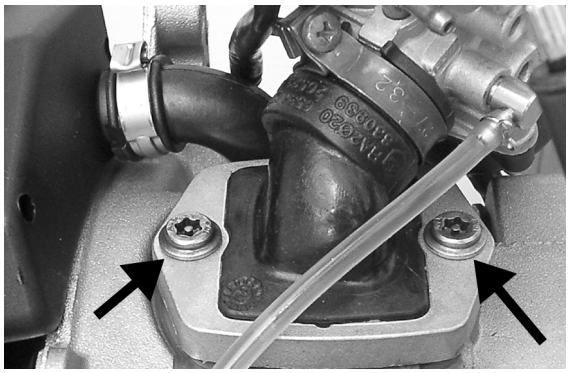
Starter motor screws 11 ÷ 13

Cylinder assy. and timing system

Removing the intake manifold

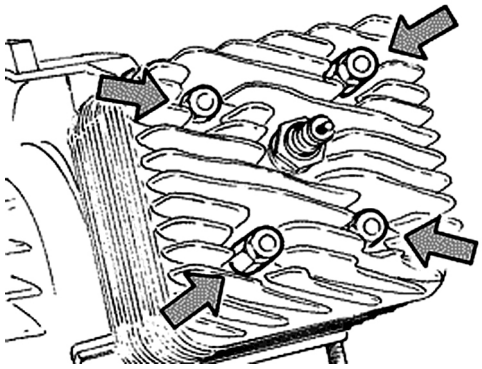
Using the TORX spanner, remove the 2 intake

manifold fixing screws



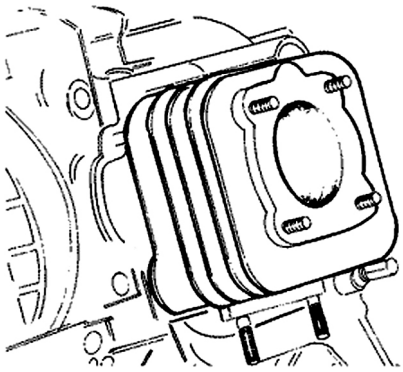
Removing the cylinder head

Remove the four nuts shown in the picture



Removing the cylinder - piston assy.

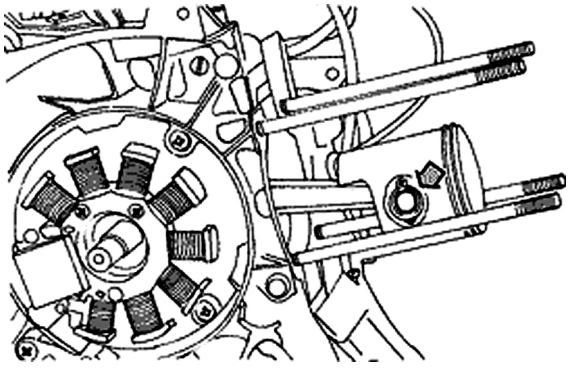
Carefully remove the cylinder



Remove the split rings and the wrist pin

CAUTION

ALWAYS REPLACE THE WRIST PIN SPLIT RINGS WITH NEW ONES

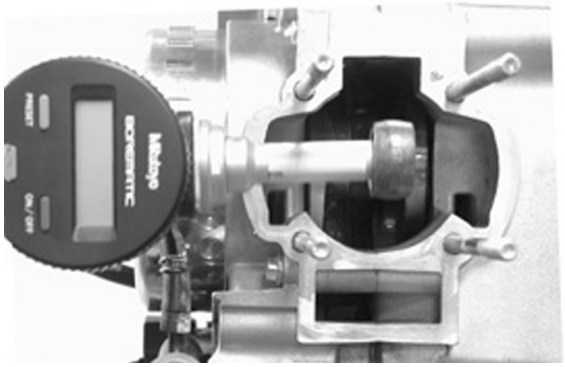


Inspecting the small end

- Using an inside micrometer, measure the small end diameter

N.B.

IF THE SMALL END DIAMETER EXCEEDS THE MAXIMUM ALLOWABLE VALUE, OR IF IT SHOWS SIGNS OF WEAR OR OVERHEATING, PROCEED TO REPLACE THE CRANKSHAFT AS DESCRIBED IN THE CHAPTER "CRANKCASE AND CRANK-SHAFT".



Characteristic

Standard diameter

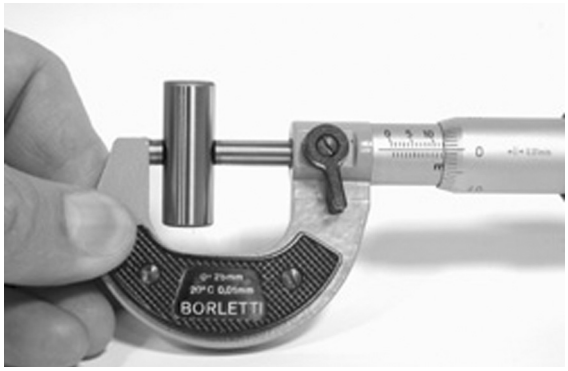
17 +0,011-0,001

Max. allowable diameter

17,060

Inspecting the wrist pin

- Check the wrist pin external diameter using a micrometer



Characteristic

Wrist pin: standard diameter

12 +0,005 +0,001 mm

Inspecting the piston

- Using a suitable instrument measure the piston diameter
- Evaluate the piston-wrist pin fitting clearance

Characteristic

Wrist pin housing: standard diameter

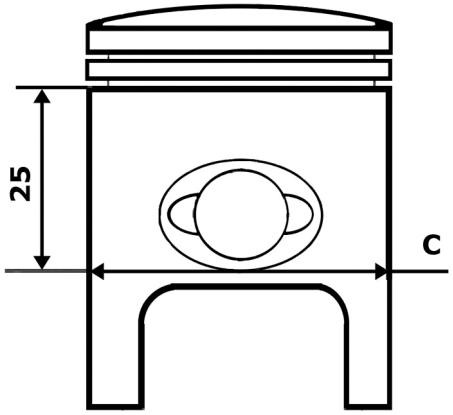
12 +0,007 +0,012

Wrist pin housing: standard tolerance

0,002 ÷ 0,011 mm

- Measure the external diameter of the piston according to a direction orthogonal to the pin axis
- Carry out the measurement at the location shown in the figure

To classify the cylinder-piston mating, check the appropriate table

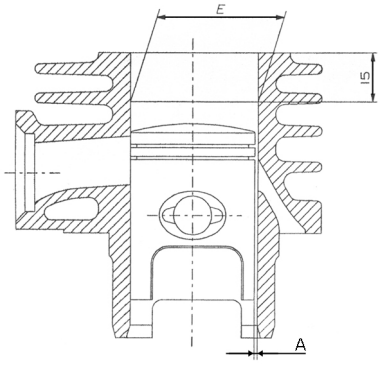


See also

Cylinder - piston assy.

Inspecting the cylinder

- Check the cylinder does not show signs of seizures. If it does proceed by replacing it or performing a grinding operation befitting the available oversize pistons
- Using an appropriate device, measure the internal cylinder diameter in the directions shown in the figure
- Check the mating surface with the head is free from wear or deformations To classify the cylinder-piston mating, check the appropriate table

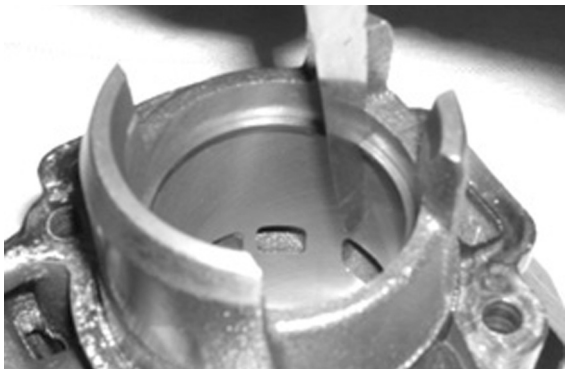


See also

Cylinder - piston assy.

Inspecting the piston rings

- Alternatively insert the two piston rings inside the cylinder
- Insert the piston rings in the direction orthogonal to the cylinder axis, using the piston to push them through.
- Measure the rings gap using a feeler gauge as shown in the picture.
- If the measured values exceed those shown in the table, proceed by replacing the rings.



Removing the piston

- Position the piston ring inside part 1 with its opening coinciding with the arrow shown on the tool.
- Push part 2 through part 1 as far as it will go and hence extract part 2.
- Insert part 3 inside part 1, position the assembly in the piston ring housing and push part 3 home.

N.B.

REFIT THE REMAINING COMPONENTS FOLLOWING THE OPERATIONS FOR THEIR REMOVAL IN THE REVERSE ORDER.

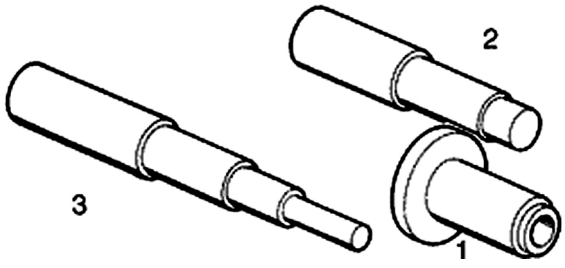
Specific tooling

020166y Piston rings fixing tool

Locking torques (N*m)

Cylinder head lock nuts 10 ÷ 11 N·m

- Use new split rings for the wrist pin.
- Replace the cylinder base gasket with a new one.
- Before proceeding with the reassembly carefully clean all surfaces.
- Lubricate components with two-stroke oil when refitting piston and cylinder.



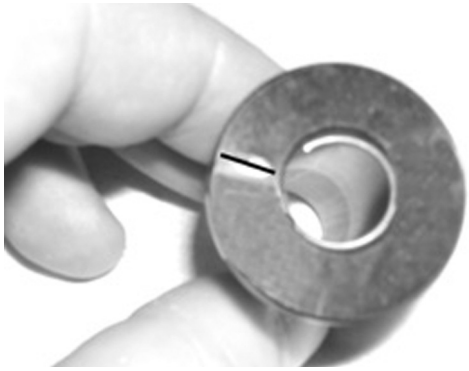
CAUTION

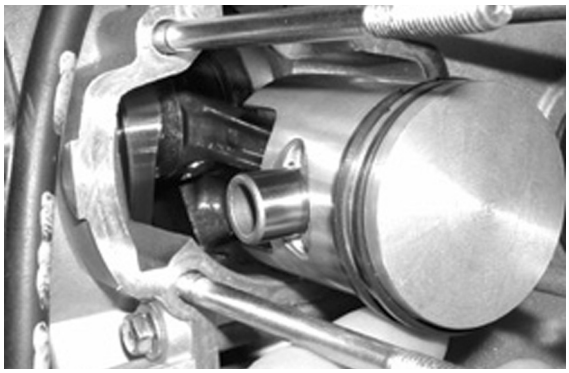
POSITION THE ARROW STAMPED ON THE TOP OF THE PISTON TOWARDS THE EXHAUST PORT. THE WRIST PIN SPLIT RINGS MUST BE POSITIONED ON THE PISTON USING THE SPECIAL TOOL.

Recommended products

Selenia Hi Scooter 2 Tech Oil

Recommended oil

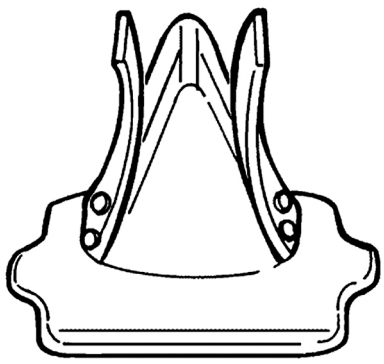




Inspecting the timing system components

CAUTION

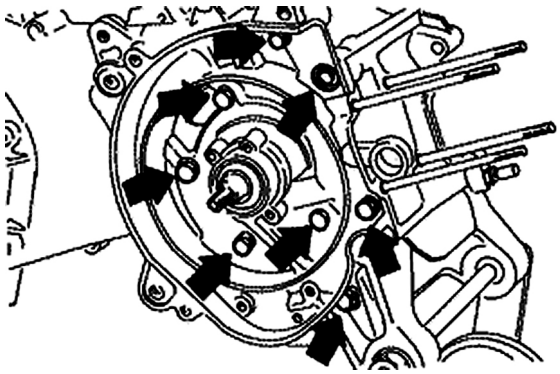
CHECK THE LEAK TIGHTNESS OF THE REED VALVE ASSY.; NO LIGHT BE VISIBLE BETWEEN VALVE AND HOUSING.



Crankcase - crankshaft

Splitting the crankcase halves

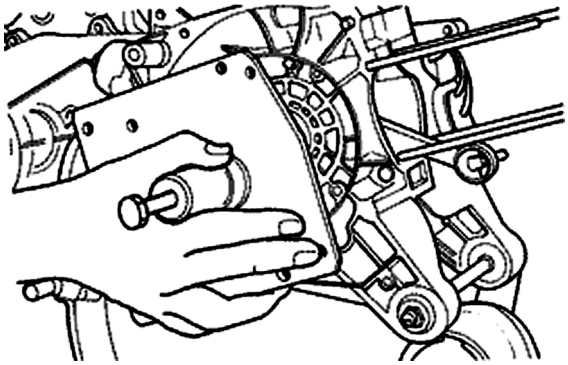
Remove the eight crankcase fasteners.



Install the special plate on the flywheel-side half-crankcase and proceed by splitting the two halves.

Specific tooling

020163y Crankcase splitting plate

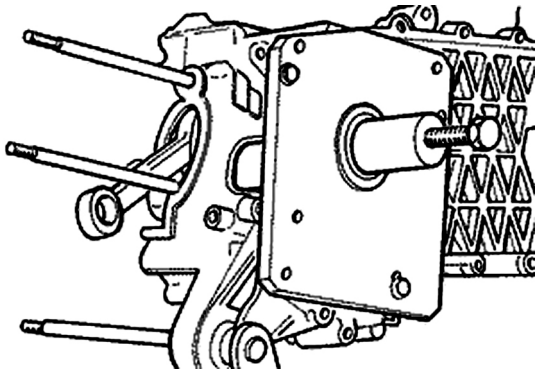


Removing the crankshaft

- Install the special tool onto the transmission-side half-crankcase using four M6 screws of adequate length.
- Remove the crankshaft from the transmission-side half-crankcase.

Specific tooling

020163y Crankcase splitting plate



Removing the crankshaft bearings

The bearings may remain attached either to half-crankcase or crankshaft, indifferently.

- Using the special tool provided, remove only the bearings attached to the engine.

N.B.

THE HALF RINGS MUST BE FITTED ONTO THE BEARINGS WITH THE AID OF A MALLET.

Specific tooling

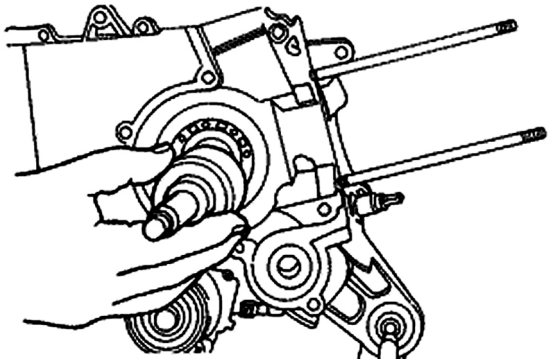
004499y001 Bearing extractor fitted with parts

004499y006 Bearing extractor fitted with parts

004499y002 Bearing extractor fitted with parts

004499y007 Half rings

Using the special tool, remove any bearing which remained on the crankcase.



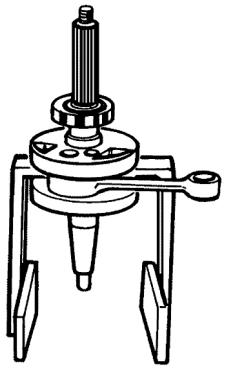
Specific tooling

001467Y007 Bell for bearings external Ø 54 mm

001467Y006 20-mm pliers

Refitting the crankshaft bearings

Heat the bearings in oil at approx. 100°C and fit them onto the crankshaft with the aid, if necessary of tube section acting directly on the internal ring of the bearing.



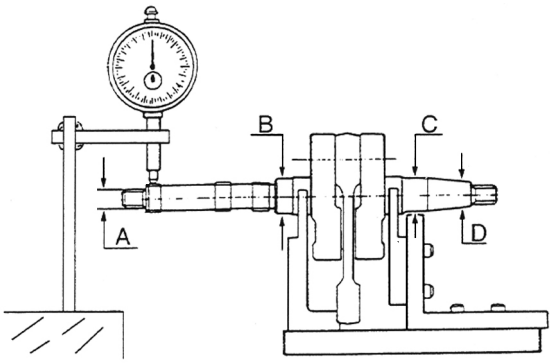
Specific tooling

020265y Bearing fitting stand

Inspecting the crankshaft alignment

Using the appropriate specific tools, check the eccentricities of the surfaces of diameters «**A**»-«**B**»-« **C**» are within 0.03 mm (top reading limit for the dial gauge clock); check also the eccentricity of diameter «**D**», for which a maximum

misalignment of 0.02 mm is allowed. In the event that the eccentricities are not too far off the prescribed values, **straighten** the crankshaft by acting with a wedge in between the counterweights or by using vice (with aluminium mouth guards) according to your needs.



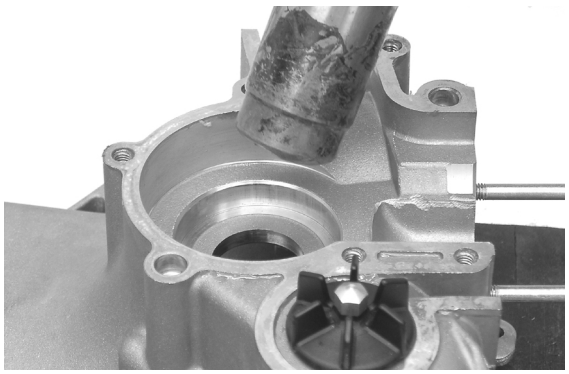
Specific tooling

020335Y Magnetic stand and comparator

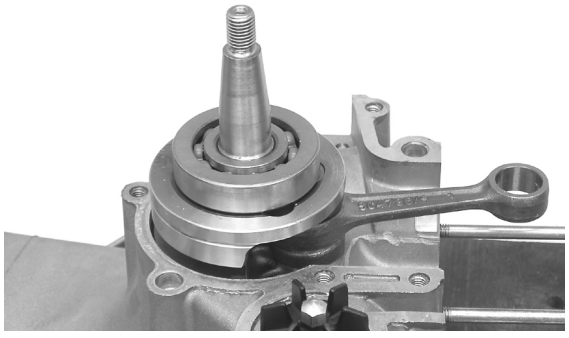
020074Y Crankshaft aligning tool

Refitting the crankshaft

- Rest the transmission-side half-crankcase on two wooden supports.
- Using a heat gun, heat the bearing housing up to approx. 120°.

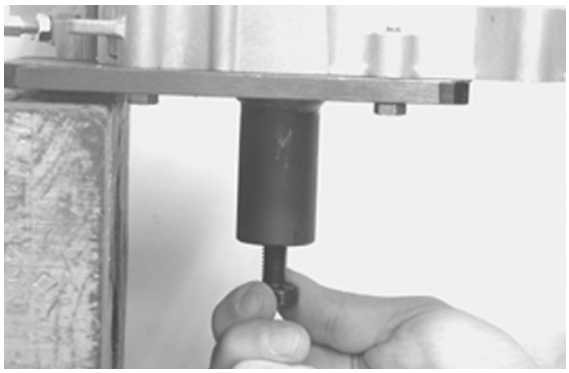


- Insert the crankshaft and push it in as far as the bearing will go.



- Let the half-crankcase temperature settle with that of the crankshaft.
- Reinstall the crankcase splitting plate WITHOUT installing the crankshaft protection.
- During the reassembly process keep the centre thrust screw loose.

- Tighten the four fixing screws and then loosen them with the same angle (e.g. 90°)
- When the temperature has settled manually preload the tool's thrusting screw until the ball bearing play disappears.

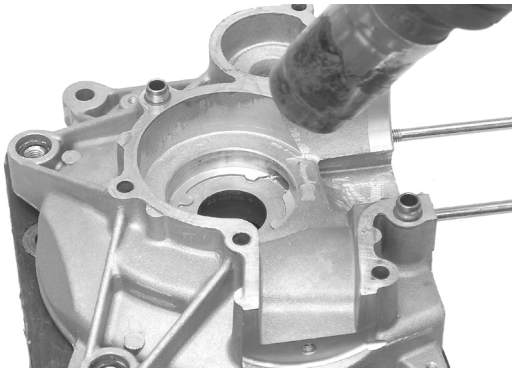


Specific tooling

020163y Crankcase splitting plate

Refitting the crankcase halves

- Prepare the mating plane by applying a thin layer of LOCTITE 510, after cleaning the surface with and adequate solvent (e.g. acetylene trichloride).
- Heat the flywheel-side half-crankcase using a heat gun.

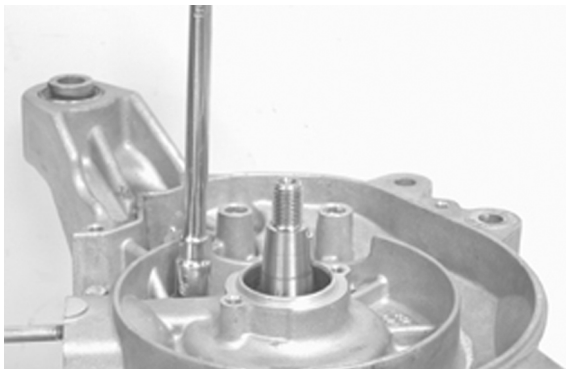


Recommended products

Loctite 510 Packing fluid

Packing

- Keeping the transmission-side half-crankcase in horizontal position, vigorously and accurately insert the flywheel-side half-crankcase.
- Insert at least 3 fixing screws and tighten them quickly.
- Insert the other 5 screws and tighten them at the prescribed torque.

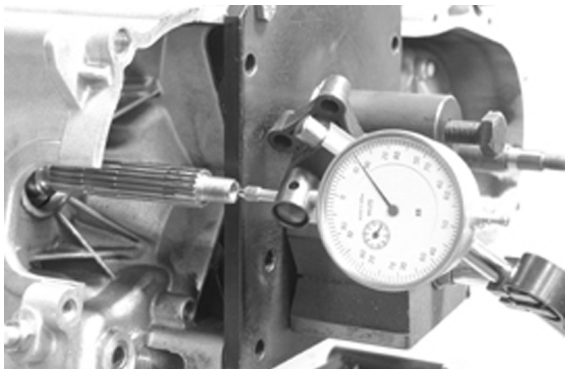


Locking torques (N*m)

Crankcase fixing screws 11 - 13

- Move the crankcase splitting plate backwards as shown in the figure.
- Install the special magnetic mounting with its dial gauge, at the end of the crankshaft.
- Check the crankshaft axial play.

- If the measurements do not match those prescribed, repeat the crankshaft reassembly operation.



Specific tooling

020335Y Magnetic stand and comparator

Characteristic

Axial play with warm crankcase

0,10 ÷ 0,12 mm

Axial play with cold crankcase

0,06 ÷ 0,08 mm

Limit value with cold crankcase

0,02 ÷ 0,03 mm

Lubrication

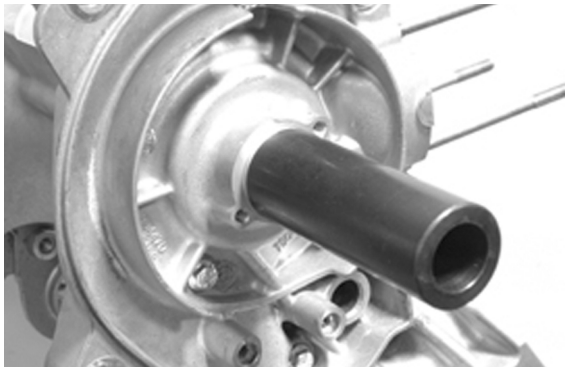
Crankshaft oil seals

Refitting

- Install a new flywheel-side oil seal using the puncher from the special tool.
The flywheel-side oil seal may be recognised for having a smaller diameter.

N.B.

THE SPECIAL TOOL MAY NOT BE USED WHEN THE WOODRUFF KEY IS FITTED



Specific tooling

020340Y Punch for fitting oil guard magneto and transmission

- Install a new transmission-side oil seal using the special tool fitted with adapter ring.
The transmission-side oil seal may be recognised by its larger diameter.

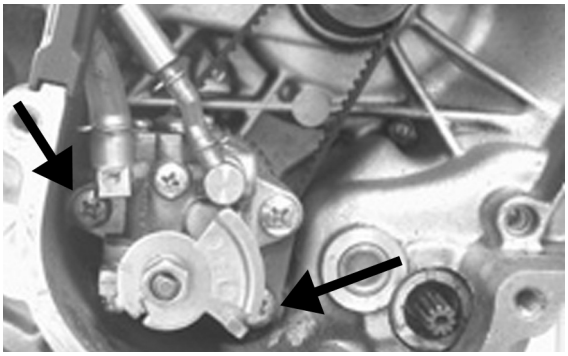
Specific tooling

020340Y Punch for fitting oil guard magneto and transmission

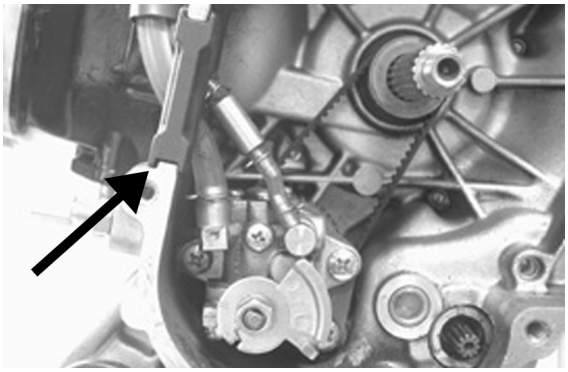
Oil pump

Removal

Remove the two screws shown in the figure



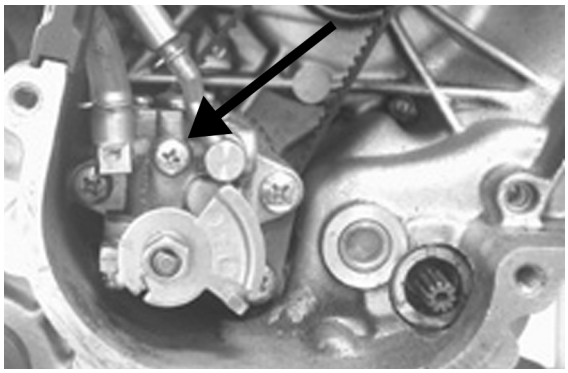
Remove the fairlead from the crankcase, as indicated in the figure.



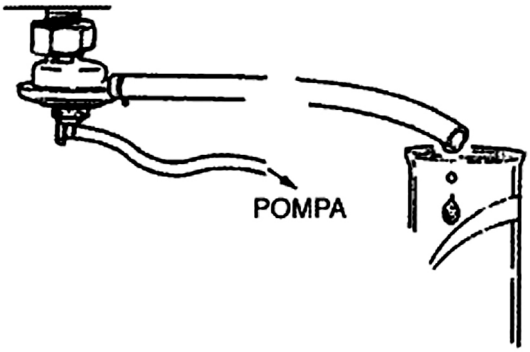
Refitting

For the reassembly follow the removal operations in the reverse order.

After the reassembly, it is recommended to bleed the system by acting upon the screw shown in the picture.



Fuel supply



- Disconnect the fuel feed pipe and the vacuum pipe from the carburettor.
- Ensure that no fuel is leaking from the pipes.
- Close the fuel outlet.
- Using the MITYVAC pump, apply a 0.1 bar vacuum to the cock.
- Ensure that the vacuum does not change, and that no fuel is leaking.
- Reconnect the vacuum pipe to the manifold.
- Position the fuel pipe so that its outlet is on the same level as the cock.
- Make the engine turn by operating the starter motor for five seconds with the carburettor in the idle position.
- Gather the fuel in a graduated burette.

N.B.

THE MEASUREMENT MAY BE ALTERED BY AN UNSUITABLE ENGINE SPEED OR BY INCORRECT POSITIONING OF THE PIPE. IN THAT CASE, A REDUCED FUEL DELIVERY IS GENERALLY OBTAINED. THE VACUUM HOLE ON THE MANIFOLD HAS AN INTENTIONALLY REDUCED CROSS-SECTIONAL AREA IN ORDER TO IMPROVE THE VACUUM PULSES AND ENSURE CONSTANT DELIVERY OF THE COCK.

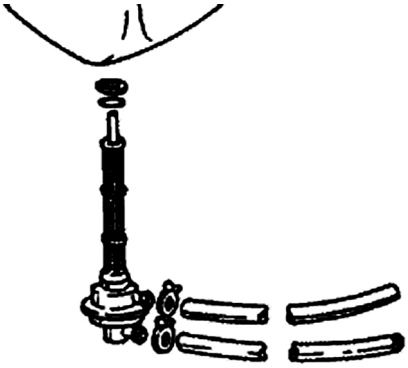
Specific tooling

020329Y Pump MITYVAC

Characteristic

Minimum delivery

20 cc



- Drain the fuel from the tank.
- Remove the fuel delivery pipe and the vacuum pipe.
- Release the clamp and remove the cock.
- Clean the tank and the cock filter with a suitable solvent.
- Refit the cock taking care to verify the presence of the O-ring.
- Turn the cock in the same direction as before the removal and then tighten the clamp.

N.B.

THE FILTER CAN BE SCREWED OFF THE COCK TO FACILITATE THE CLEANING.

INDEX OF TOPICS

This section describes the operations which can be carried out on the suspensions.

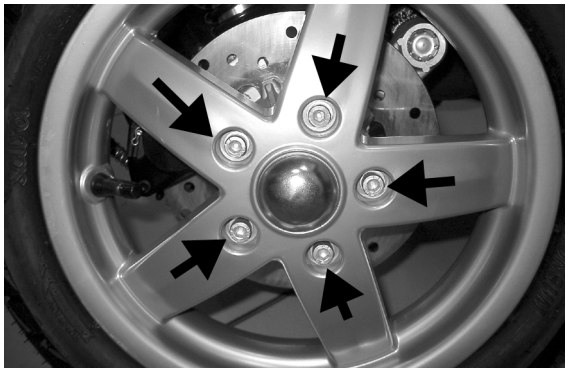
Front

Removing the front wheel

-Remove the five socket-head screws fastening the wheel to the hub.

N.B.

REMOVE THE BRAKE CALLIPER BEFORE REMOVING THE WHEEL HUB.



Front wheel hub overhaul

- Remove the ball bearing lock snap ring shown in the figure

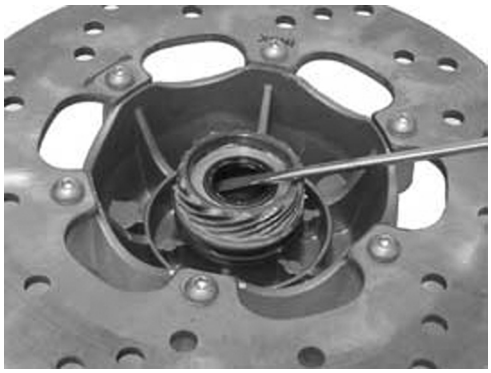
Using the specific tool, remove the ball bearing.

Specific tooling

001467Y014 15 mm pliers

001467Y017 Bell for bearings external Ø 39 mm

- Using a screwdriver, remove the oil guard on the roller bearing side.



Using the specific tool, remove the roller bearing

Specific tooling

020376Y Handle for punches

020456Y Ø 24 mm adapter

020363Y 20mm guide

- Using a thermal gun, warm the roller bearing seat
- Using the specific tool, insert the bearing with the screened side facing outwards and move it to travel end
- Replace the ball bearing lock snap ring

Specific tooling

020151Y Air heater "METABO HG 1500/2"

020376Y Handle for punches

020359Y 42 x 47 mm hub bearing fitting adaptor

020412Y 15 mm guide

- Using the specific tool, insert the roller case and move it to travel end
- Replace the oil guard on the roller bearing side
- Apply grease between ball and roller bearings

Specific tooling

020038y Drift

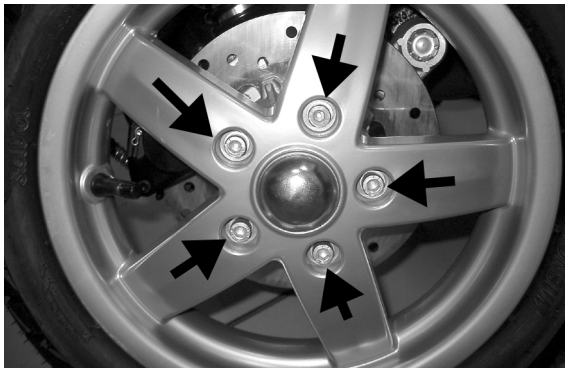
Recommended products

JOTA 3 FS Speedometer transmission

Lithium soap grease NLGI 33

Refitting the front wheel

- Reassembly, tighten the five screws to the prescribed torque.



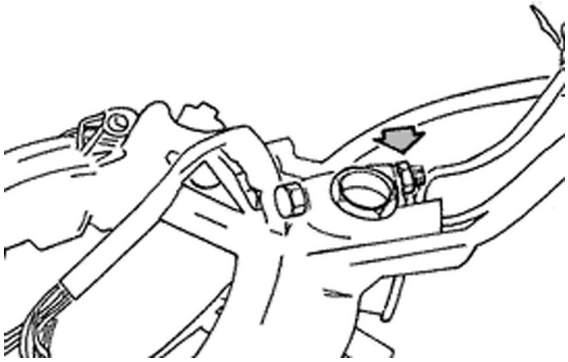
Locking torques (N*m)

Nut tightening torque 20 ÷ 25 N·m

Handlebar

Removal

- Before proceeding, remove the handlebar fairing.
- After detaching flexible transmission cables and disconnecting electrical terminals, loosen the clamp securing the handlebar to the steering tube
- Check all components and replace any damaged or defective parts.



N.B.

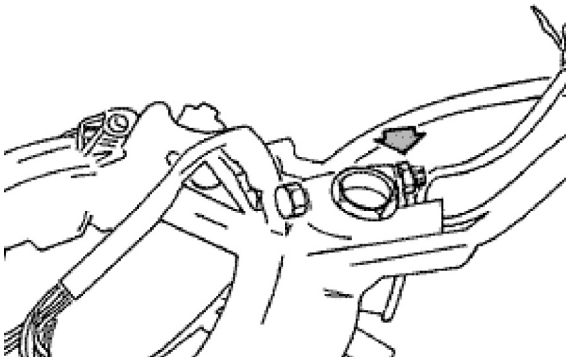
IF YOU ARE REMOVING THE HANDLEBAR ONLY SO THAT YOU CAN THEN REMOVE THE STEERING ASSEMBLY, SIMPLY ALLOW THE HANDLEBAR TO TIP OVER THE FRONT OF THE SCOOTER, TAKING CARE THAT FLEXIBLE TRANSMISSION CABLES ARE NOT DAMAGED.

Refitting

Follow the operations for removal in reverse, observing the prescribed tightening torques.

Locking torques (N*m)

Handlebar fastening screw 50 ÷ 55



Steering column

Removal

After removing the top seat, tilt the vehicle on a side and extract the steering tube with fork.

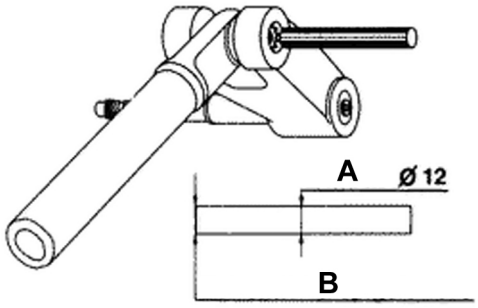
Specific tooling

020055Y Steering tube ring nut spanner

Overhaul

- Overhauling the front suspension serves to renew the parts connecting the steering tube and the trailing link. This operation is only effective if both steering tube and trailing link are in perfect condition.

- Crush the retaining washer and remove it by means of a punch.
- Repeat the operation for the second washer using the punch on the opposite side to the one shown in the figure.

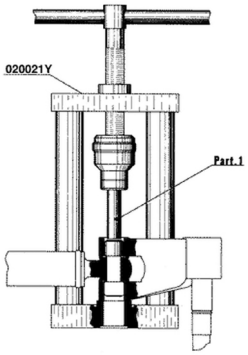


A = Punch Ø12

B = Sharp edge end

- Apply the special tool fitted with part 1* and turn the handle until both the pin and the needle bearing opposing the force exerted by the tool are expelled at the same time.
- To remove the second needle bearing, fit the tool with part 2* working from the side opposite to the one shown in the figure.

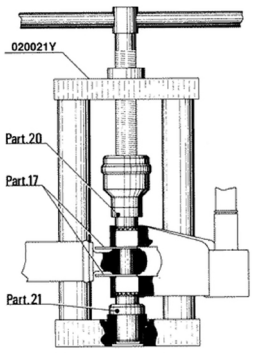
* supplied with the tool



Specific tooling

020021y Front suspension overhaul kit

-Use the special tool equipped with parts 20* and 21* as shown in the figure.
-Turn the handle to force the base of the needle bearings into contact with the end of the pin.

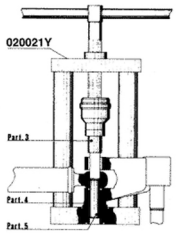


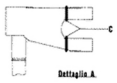
- Fit the two dust seals «**C**» on the trailing link as shown in detail «**A**».
- Connect the trailing link to the steering tube by

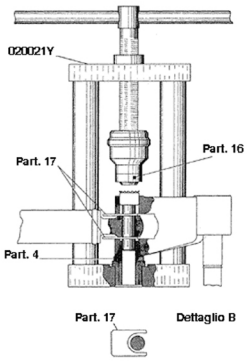
means of guide pin 5*.

- Apply the special tool equipped with part 3* on the shaft and part 4* at the bottom.
- Smear Z2 grease on the pin and insert it into the trailing link and turn the tool handle until part 3 locates against the steering tube.
- After fitting the pin, insert the two spacers, part 17*, by tapping lightly with a mallet (see following figure).

* supplied with the tool







Specific tooling

020021y Front suspension overhaul kit

Recommended products

ZETA 2 Grease for steering wheel bearings and pin seats

Lithium soap and zinc oxide grease NLG12

-Lubricate the oil seals with mineral oil and half-fill the needle bearings with grease.

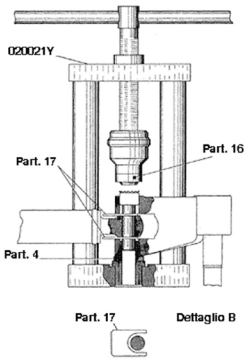
-Fit the oil seal and the needle bearing on the pin, complete with retaining washer.

-Remove the special tool and then remove part 5 (guide) which was partially expelled in the previous assembly step. Leave part 4* mounted on the tool.

-Remove part 3 from the tool and replace it with part 16*.

-Turn the tool handle to insert the retaining washer - needle bearing - seal ring assy. until part 16 comes into contact with the trailing link.

- To fit the second retaining washer - needle bearing - seal ring assy. repeat the above operation with the tool on the opposite side to that shown in the figure, still equipped with part 16 and with part



22* instead of part 4.

* supplied with the tool

Specific tooling

020021y Front suspension overhaul kit

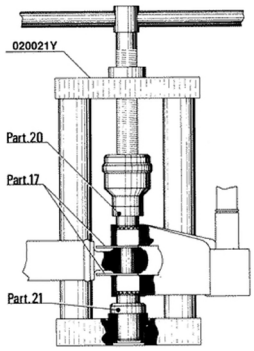
Recommended products

ZETA 2 Grease for steering wheel bearings and pin seats

Lithium soap and zinc oxide grease NLG12

- Use the tool equipped with parts 3 and 4 and turn the tool handle until the washers are wedged into the trailing link.
- Remove spacers, part 17, and pack the clearance between the steering tube and the trailing link with grease. Now slide the dust seals into position.

* Supplied with the tool



N.B.

THE LOWER SEAT ON THE STEERING COLUMN TUBE MUST BE MOUNTED WITH THE HELP OF A CROP END WITH AN APPROPRIATE DIAMETER.

Specific tooling

020021y Front suspension overhaul kit

001330Y Steering seat installer, to be fitted with parts: 001330Y009-For lower seat, 001330Y013-For upper seat

Recommended products

ZETA 2 Grease for steering wheel bearings and pin seats

Lithium soap and zinc oxide grease NLG12

Refitting

When assembling the steering tube apply the re-

commended grease on the steering fifth wheel.

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

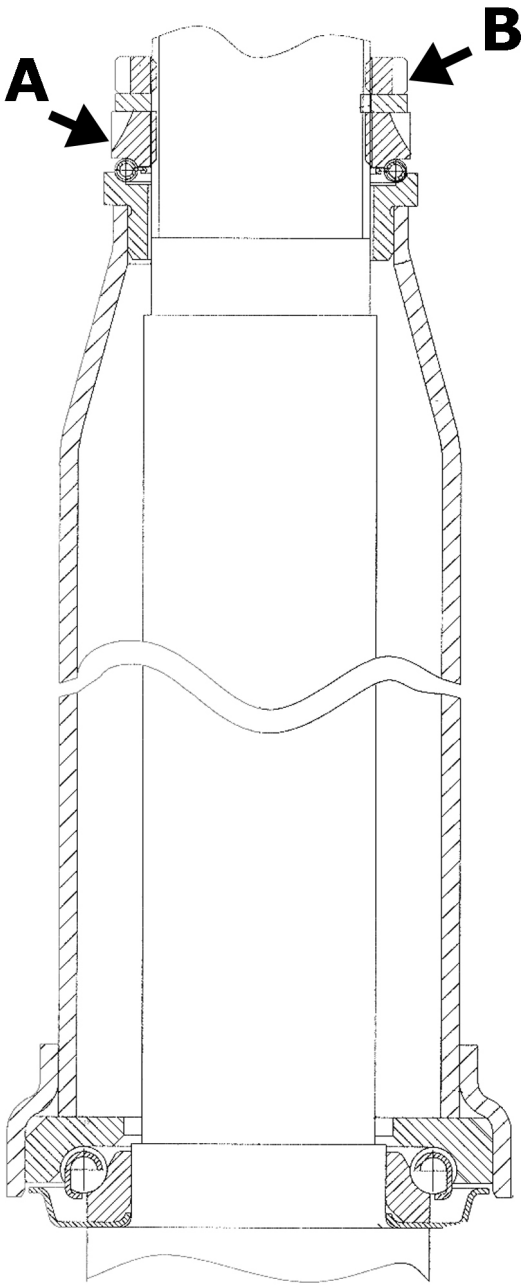
Recommended products

TUTELA ZETA 2 Grease for steering, seats of pin and swing arm

Lithium soap and zinc oxide grease NLG12

Locking torques (N*m)

Steering lower ring nut 8 ÷ 10 Steering upper ring nut 35 ÷ 40



CAUTION

REASSEMBLE WITH NEW ROLLER BEARINGS, PIN, OIL SEALS AND DUST SEALS.

Front shock absorber

Removal

- Remove the steering tube

- Remove the shock absorber bottom fixing screws
- Remove the top shock absorber attachments

Refitting

- For re-assembly, perform the operations for removal in the reverse order according to the tightening torques.

Locking torques (N*m)

Shock absorber top fixing 20 - 27 Nm Shock absorber bottom fixing 20 - 30 Nm

Shock-absorber - calliper bracket

Removal

- Remove the wheel hub with the brake disc
- Remove the front shock absorber bottom fixing screws

- Remove the bracket lock snap ring
- Extract the bracket

- Before replacing the bracket into the wheel axle,

place the o-ring as shown in the figure in order to have a proper positioning of the same after the installation of the bracket.

- Replace the washer and the snap ring
- Replace the screws fixing the shock absorber to the bracket and tighten at the prescribed torque

Locking torques (N*m)

Shock absorber bottom fixing 20 ÷ 27 Nm

Overhaul

- The caliper - shock absorber fixing bracket is provided with two roller bearings spaced from one another as shown in the figure

- Remove the two roller bearings from the bracket using the specific tool from the shock absorber coupling side, as shown in the figure

Specific tooling

020376Y Handle for punches

020441y 26 x 28 mm adapter

020365y 22 mm guide

- Remove the oil guard on the wheel hub side using a screwdriver as shown in the figure

- Suitably support the shock absorber - brake caliper bracket
- Using the specific tool, install a new oil guard and move it to travel end

Specific tooling

020376Y Handle for punches

020360Y 52 x 55 mm adaptor

- Using the specific tool, install a new roller bearing on the shock absorber side and move it to travel end

Specific tooling

020036y Drift

- Suitably support the shock absorber - brake caliper bracket
- Using the specific tool, install a new oil guard and move it to travel end

Specific tooling

020037y Drift

Steering bearing

Removal

- Use the special tool to remove the lower race of the top bearing and the upper race of the bottom bearing from the frame.

N.B.

THE LOWER BEARING RACE CAN BE PRISED OFF BY LEVERING IT WITH A SCREWDRIVER OR SIMILAR.

Specific tooling

020004Y Drift for removing thrust rings from steering head tube

- Using the specific tool, remove the fifth wheel seat and the dust guard on the steering tube as shown in the figure. Proceed by slightly hitting with a mallet.

Specific tooling

020004Y Drift for removing thrust rings from steering head tube

- Using the specific tool, replace the dust guard and the fifth wheel seat on the steering tube to abutment.

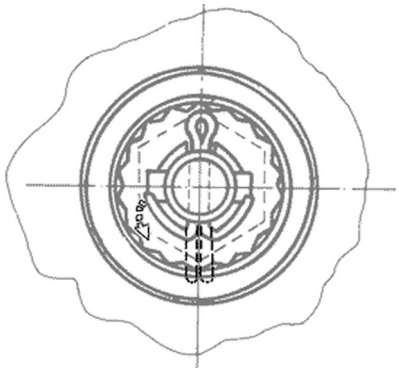
Specific tooling

006029y Drift for fitting thrust ring seats on steering tube

Rear

Removing the rear wheel

- Prise off the hub cap by levering against the brake drum with a screwdriver
- Straighten the split pin and remove the cap.
- Unscrew the wheel spindle nut and remove the wheel.
- On reassembly, tighten the spindle nut to the prescribed torque.



WARNING

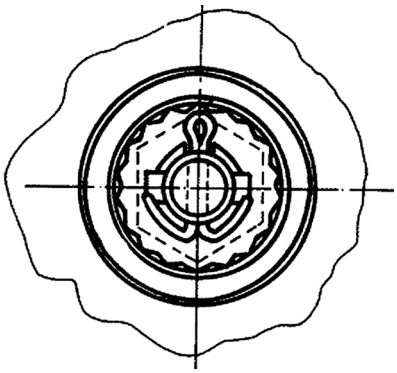
ALWAYS REASSEMBLE WITH NEW SPLIT PINS.

Refitting the rear wheel

- Fit the wheel and tighten the central nut to the

prescribed torque.

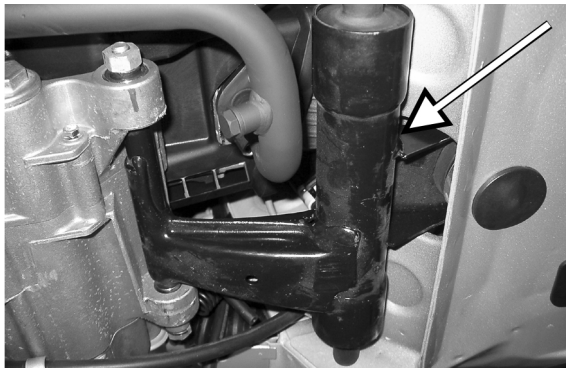
- Fit the nut cap and insert the split pin, peening over the ends as shown in the figure.



Locking torques (N*m)

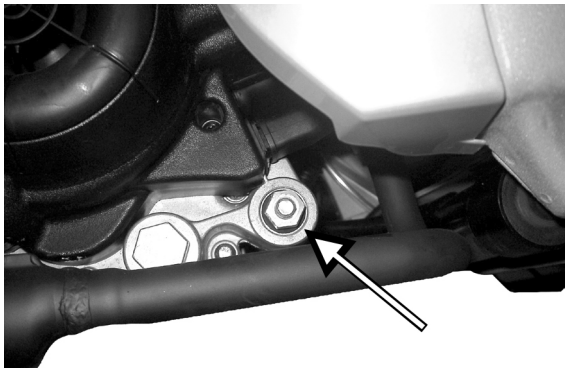
Tightening torque 137 ÷ 152 N·m

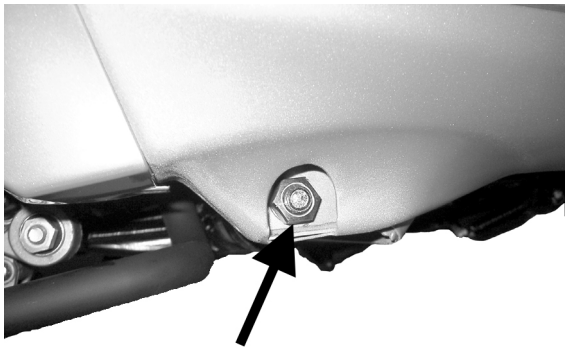
Swing-arm

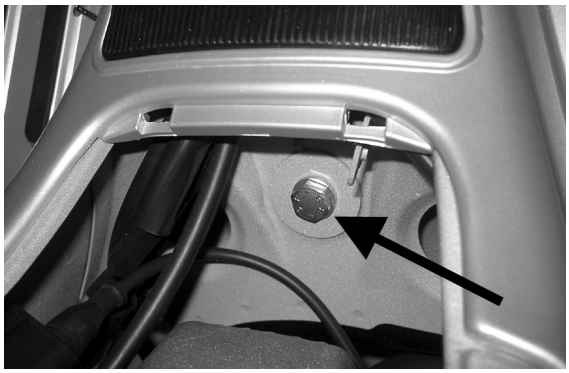


Removal

To remove the swing-arm, loosen the three fixings shown in the picture.





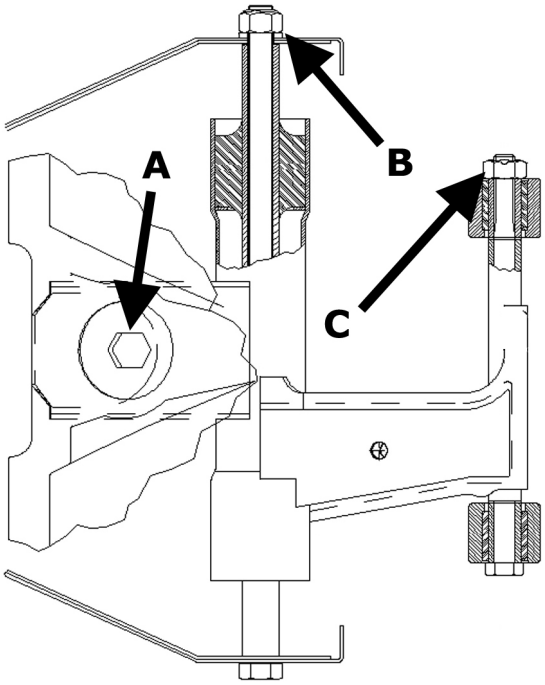


Refitting

Upon refitting, tighten to the prescribed torque

Locking torques (N*m)

Component C 33 ÷ 41 Component B 44 ÷ 52
Component A 33 ÷ 41



Shock absorbers

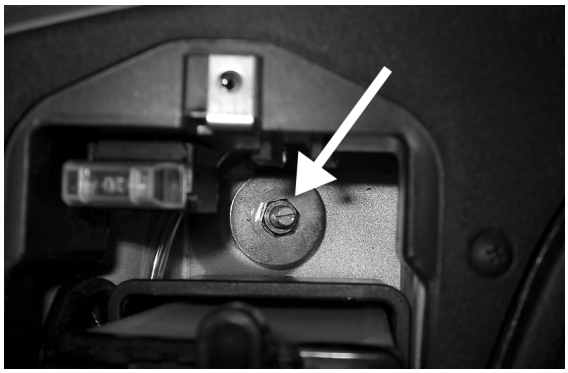
Removal

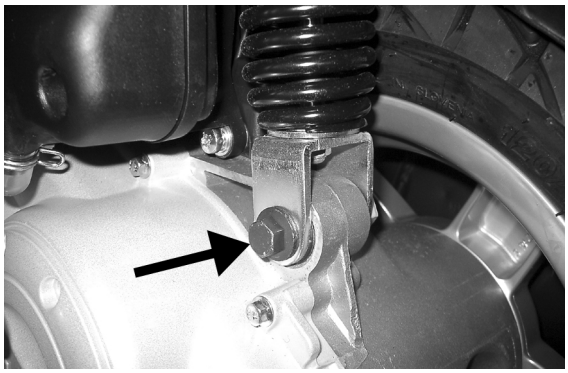
- To replace the shock absorber, it is necessary to remove the the battery access door, in order to gain access to the nut fixing the shock-absorber to the frame. Then, remove the bolt fixing the shock-absorber to the engine.
- Upon refitting, tighten the nut securing the shock-absorber to the frame, and the bolt fixing it

to the engine, to the prescribed torque.

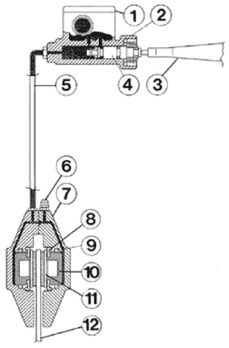
Locking torques (N*m)

Shock absorber/engine pivot pin 33 ÷ 41 N·m
Shock absorber/frame nut 20 ÷ 25 N·m





INDEX OF TOPICS



1 - Reservoir cap

2 - Master cylinder

3 - Brake lever

4 - Master cylinder piston

5 - Flexible brake line

6 - Bleed screw cap

7 - Calliper

8 - Piston seal ring

9 - Plunger seal ring

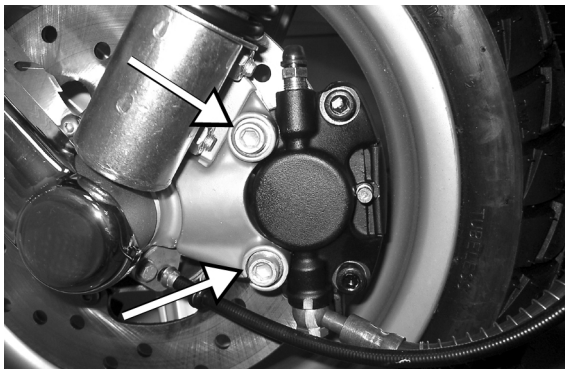
10 - Piston

11 - Brake pad

12 - Brake disc

Front brake calliper

Removal



- Disconnect the brake tube and allow the fluid to flow into a container.
- Remove the screws shown in the figure.
- When reassembling, tighten the nuts to the prescribed torque.
- Bleed air from the brake circuit.

Locking torques (N*m)

Fixing screw 20 ÷ 25 Nm Brake tube union 20 ÷ 22 Nm

Overhaul

- Remove the calliper assembly bolts and take out the internal parts from both bodies. If necessary, use short blasts of compressed air through the brake fluid passage to facilitate expulsion of the pistons.
- Make sure the cylinders of the calliper inner and outer bodies are not scratched or eroded. If they are, renew the entire calliper.

CAUTION

ALL INTERNAL COMPONENTS MUST BE RENEWED AT EACH CALLIPER OVERHAUL.

Insert the following parts into the calliper bodies

-seal rings (1-2)

-pistons (3)

- O-ring (4) (in one of the bodies)

-Join the two bodies by means of the assembly bolts. Fit the pads and air bleed screw (see previous paragraphs).

-Position the calliper on the disc and fasten it to the hanger, tightening the bolts.

-Secure the brake tube union to the calliper and tighten to the prescribed 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 MUST NOT BE LEFT IN ALCOHOL FOR MORE THAN 20 SECONDS. AFTER WASHING, DRY THE PARTS WITH COMPRESSED AIR AND A CLEAN CLOTH

Locking torques (N*m)

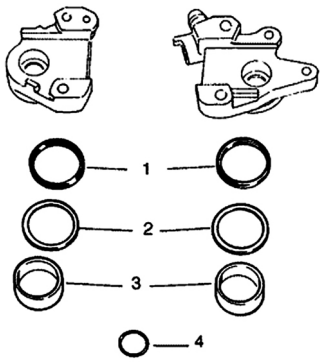
Calliper to hanger: 20 ÷ 25 Calliper to tube union 25 ÷ 30

1 DUST SEALS

2 OIL SEALS

3 PISTONS

4 O-RING



Front brake disc

Removal

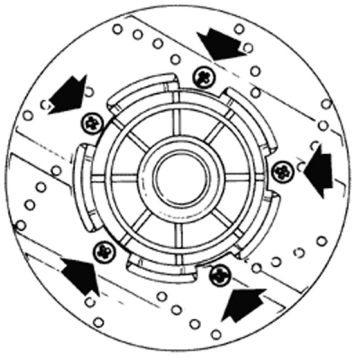
- After replacing the brake disc smear the advised

product the screw threads.

- Tighten to the prescribed torque.

N.B.

THE DISC FACE WITH THE DIRECTION ARROW MUST FACE THE SHOCK ABSORBER



Recommended products

Loctite 242 product description

Apply thread-holding LOCTITE medium type 242

Locking torques (N*m)

Tightening torque 5 ÷ 6,5 N.m

Disc Inspection

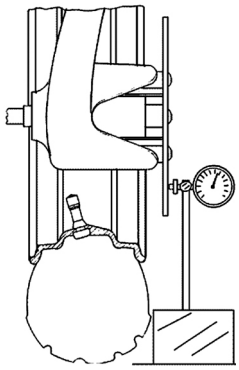
Specific tooling

020335Y Magnetic stand and comparator

Characteristic

-Max. allowable wobble

mm 0,1.



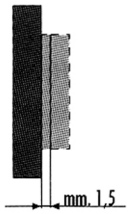
Front brake pads

Removal

-Replace the brake pads when the friction material has come to its wear limit.

-To replace the pads it is necessary:

remove the protection cover, the pin and the leaf spring. Take out the pads and replace them after sending the pistons back in. Fit the parts again by following the same steps in reverse order.

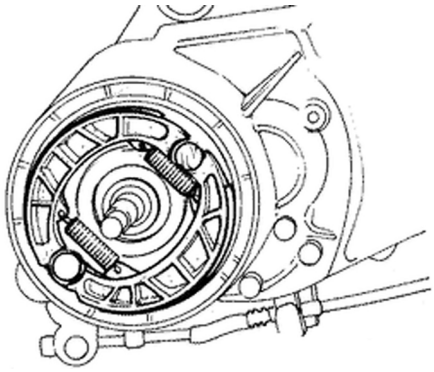


CAUTION

BEFORE USING THE BRAKE, PULL THE LEVER FOR A FEW TIMES.

Front brake pump

Rear drum brake



After removing the muffler and wheel proceed as follows:

1.Remove the shoe spring using the specific pliers.

2.Remove the shoes using a lever.

3.Fit the new shoes using a mallet and hitting lightly.

4.Hook the spring using the specific pliers.

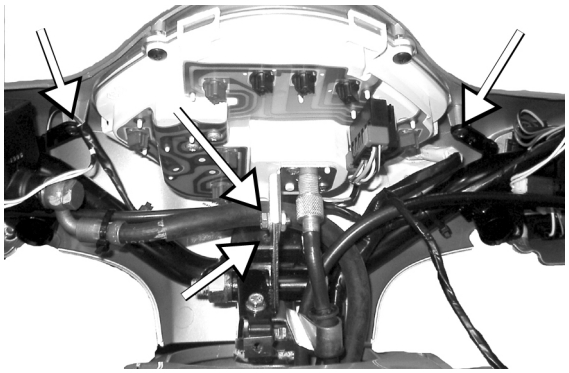
Specific tooling

020325y Pliers for brake-shoe springs

INDEX OF TOPICS

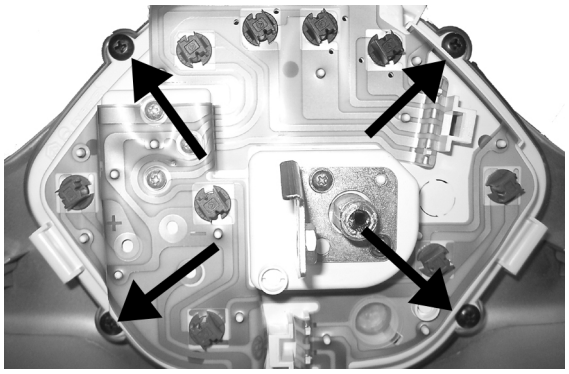
Rear handlebar cover

Remove the handlebar rear fairing after loosening the screws as shown in the figure.



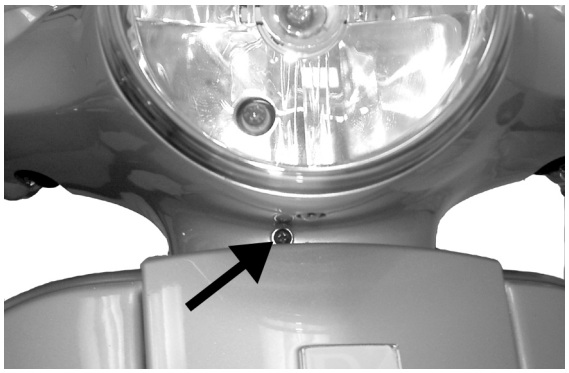
Instrument panel

To replace the instrument panel, loosen the 4 screws shown in the figure.



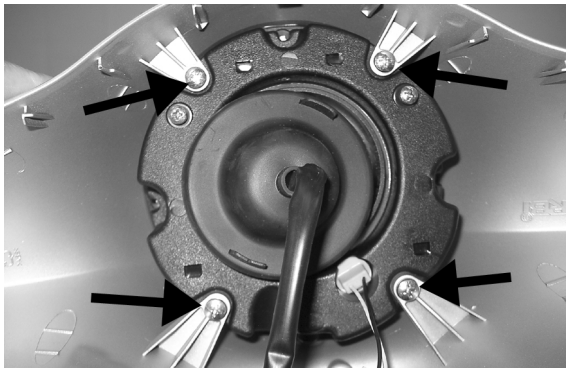
Front handlebar cover

• Remove the 2 screws in the handlebar fairing and the screw under the headlight.
• Pull up to release the handlebar fairing and disconnect the headlight connections



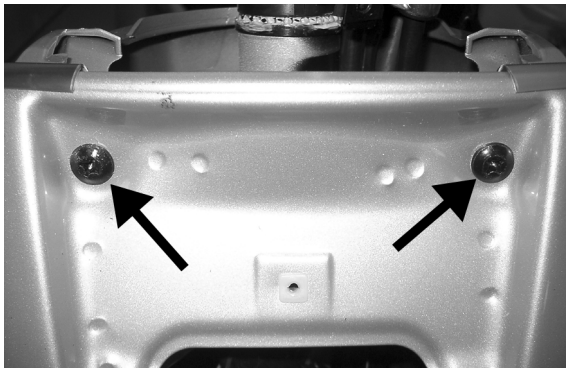
Headlight assy.

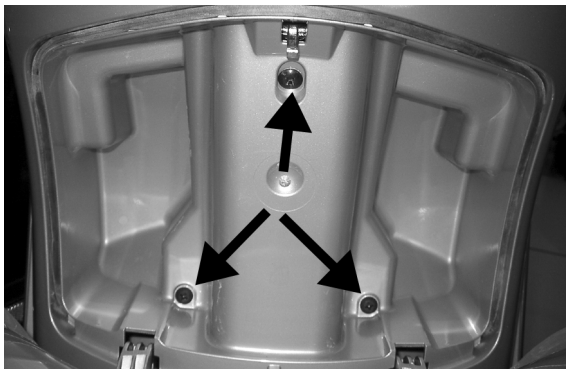
After removing the front handlebar cover, remove the 4 screws shown in the figure and remove the headlight.



Knee-guard

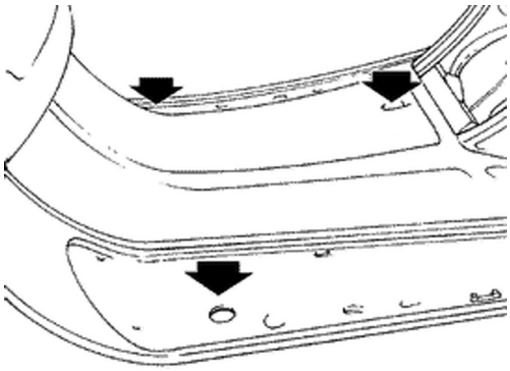
- Loosen the two screws located under the front grille (see figure).
- Open the glove compartment door and remove the three screws located inside (see figure).





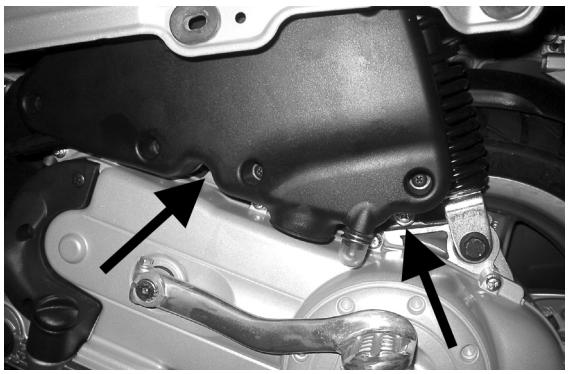
Footrest

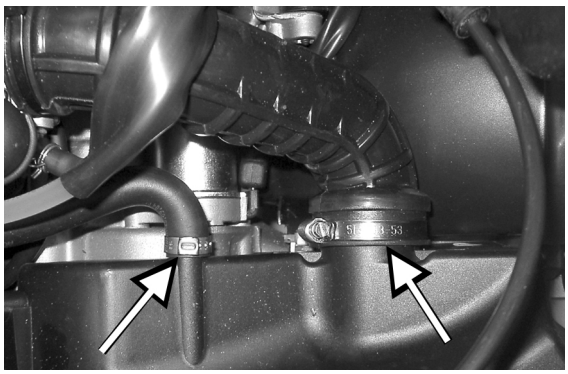
- Loosen the three screws shown in the figure after removing the glove compartment and the side fairings.



Air filter

- Remove the helmet bay.
- After removing the side fairing, loosen the 2 screws shown in the figure and fixing the air-box to the engine.
- Remove the two clamps shown in the figure.

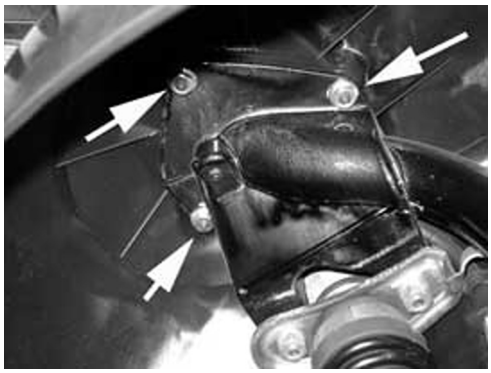




Front mudguard

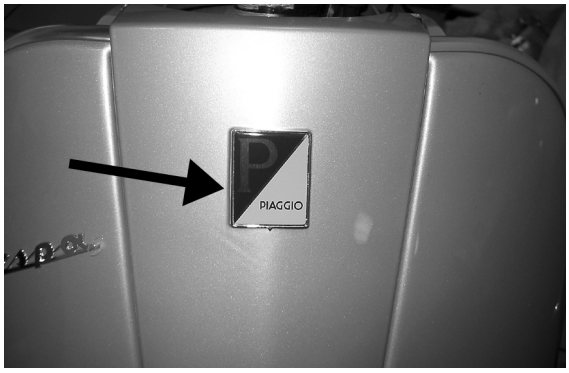
- To remove the front mudguard, remove the steering tube and release the front brake piping from the caliper
- Then, remove the three attachments fixing the mudguard to the steering tube as shown in the

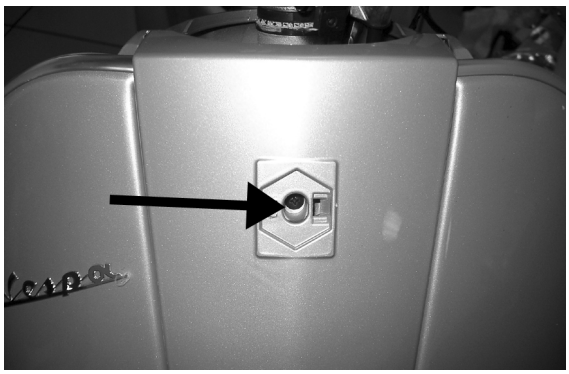
figure



Front central cover

- Remove the «PIAGGIO» logo
- Release the screw shown in the figure
- Remove the radiator grill





INDEX OF TOPICS

Aesthetic inspection

Predelivery checks:

- Paintwork
- Mating of plastics
- Scratches
- Dirt

Tightening torques inspection

Locks Inspection

- Safety locks
- Fixing screws

Safety locks:

Rear shock absorber top tightening
Rear shock absorber bottom tightening
Front wheel axle nut
Wheel hub nut
Oscillating arm pin - Chassis
Oscillating arm pin - Engine
Chassis arm-engine arm pin
Handlebar locking nut
Steering wheel lower ring nut
Steering wheel upper ring nut

Electrical system

Electrical system:

- Main switch
- Headlight: high-beam, low-beam, sidelight, and relevant warning lights
- Headlight adjustment as per statutory regulations
- Taillight, stop light
- Front and rear stop light switches

- Turn signals and relevant warning lights
- Dashboard light
- Gauges: fuel gauge
- Dashboard warning lights
- Horn
- Choke

CAUTION

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

WARNING

BEFORE RECHARGING THE BATTERY, REMOVE THE PLUGS OF EACH ELEMENT.
KEEP SPARKS AND FREE FLAMES AWAY FROM THE BATTERY WHILE RECHARGING.
REMOVE THE BATTERY FROM THE VEHICLE DISCONNECTING THE NEGATIVE TERMINAL FIRST.

CAUTION

WHEN INSTALLING THE BATTERY, FIRST FIX THE POSITIVE CABLE AND THEN THE NEGATIVE CABLE.

WARNING

THE BATTERY ELECTROLYTE IS POISONOUS AND CAUSES SEVERE BURNS AS IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH THE EYES, THE SKIN AND CLOTHING.
IN CASE OF CONTACT WITH THE EYES OR THE SKIN, RINSE GENEROUSLY WITH WATER FOR ABOUT 15 MINUTES AND IMMEDIATELY SEEK MEDICAL ATTENTION.
IN CASE OF INGESTION, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR VEGETABLE OIL. IMMEDIATELY SEEK MEDICAL ATTENTION.
BATTERIES PRODUCE EXPLOSIVE GASES. KEEP THEM AWAY FROM OPEN FLAMES, SPARKS AND CIGARETTES. IF THE BATTERY IS CHARGED IN A CLOSED PLACE, TAKE CARE TO ENSURE ADEQUATE VENTILATION. ALWAYS PROTECT THE EYES WHEN WORKING CLOSE TO BATTERIES.
KEEP OUT OF REACH OF CHILDREN

CAUTION

NEVER USE FUSES HAVING A HIGHER RATING THAN 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

Road test:

- Cold starting
- Operation of instruments
- Operation of throttle control
- Stability during acceleration and braking
- Operation of front and rear brakes
- Operation of front and rear suspensions
- Abnormal noise from vehicle

Static test

Static inspection after test on the road:

- Hot start
- Starter operation
- Idel speed hold (by turning the handlebar)
- Even steering wheel rotation
- Leaks, if any

CAUTION

CHECK THE INFLATING PRESSURES WHEN THE TYRES ARE AT AMBIENT TEMPERATURE.

CAUTION

NOT EXCEED THE RECOMMENDED INFLATING PRESSURES AS THE TYRES MAY BURST.

Functional inspection

Functional Check:

Braking system (hydraulic)

- Lever stroke

Braking system (mechanical)

- Lever stroke

Clutch

- Proper performance check

Engine

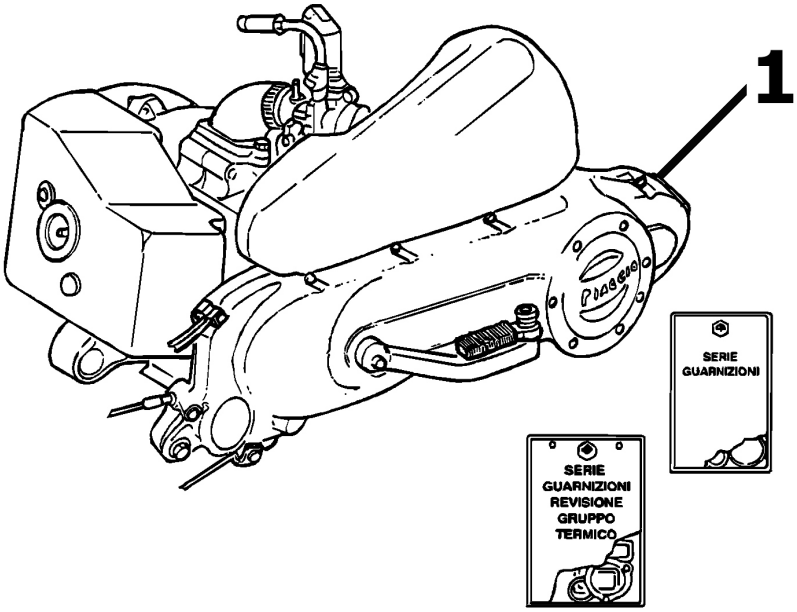
- Gas control stroke check Miscellaneous
- Document check
- Check of chassis no. and engine no.

- Ancillary tools
- Plate assembly
- Check of locks
- Tyre pressure check
- Installation of rear-view mirrors and optional fixtures

INDEX OF TOPICS

This section describes the amount of time it takes for repair operations.
The description, code and amount of time for each operation are indicated.

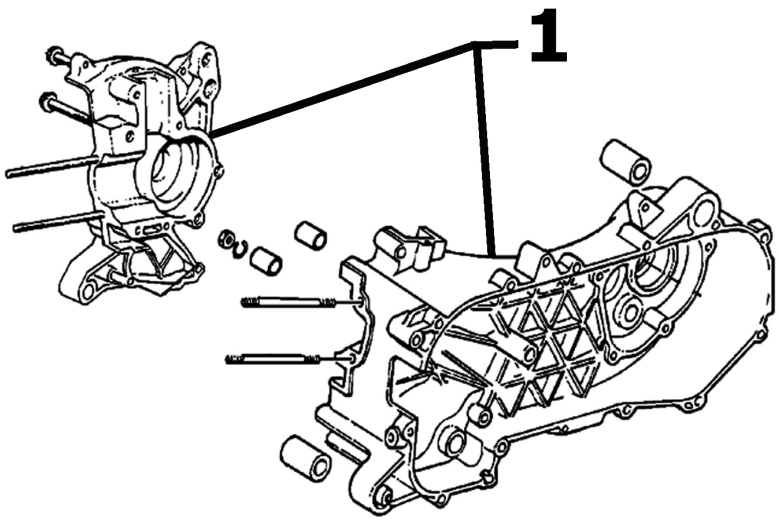
Engine



ENGINE

	Code	Action	Duration
1	001001	Engine to frame - Disassembly and reassembly	

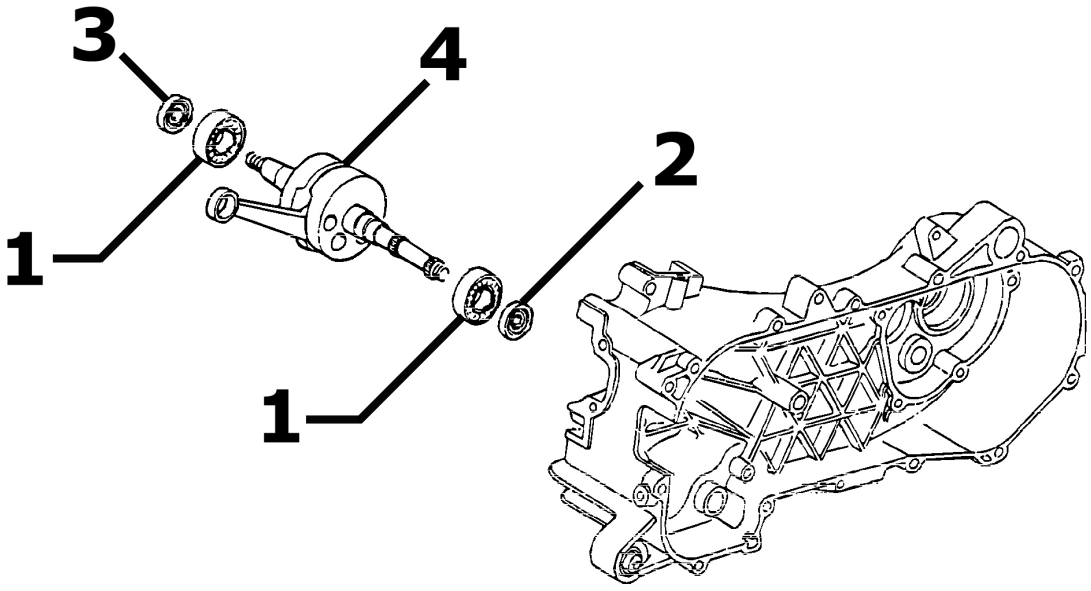
Crankcase



CRANKCASE

	Code	Action	Duration
1	001133	Engine crankcase - Replacement	

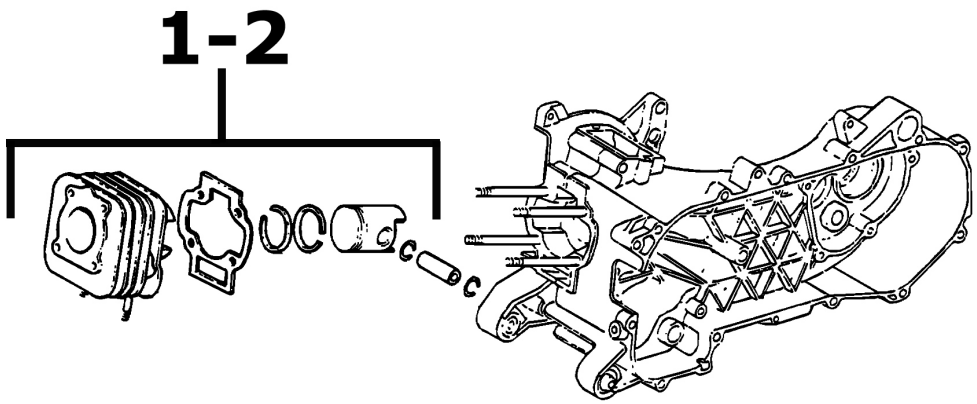
Crankshaft



DRIVING SHAFT

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

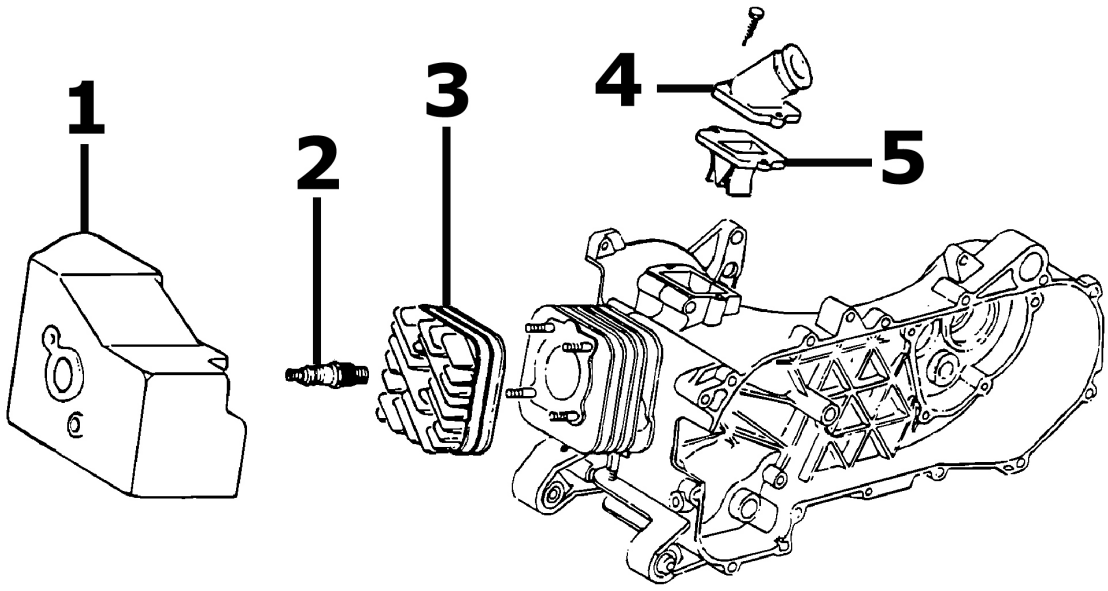
Cylinder assy.



PISTON CYLINDER

	Code	Action	Duration
1	001002	Piston cylinder - Replacement	

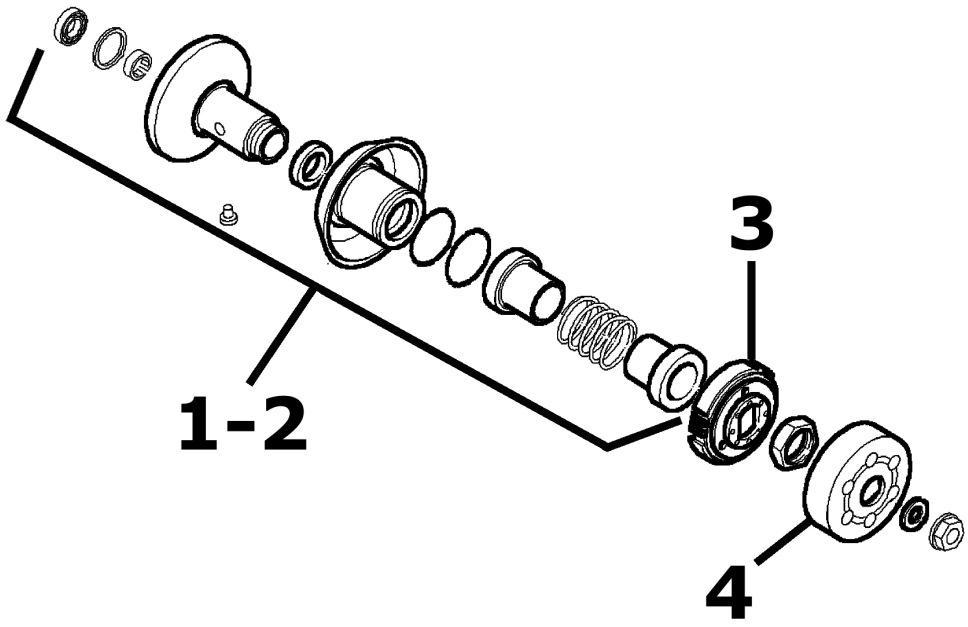
Cylinder head assy.



HEAD

	Code	Action	Duration
1	001097	Cooling hood - Replacement	
2	001093	Spark plug - Replacement	
3	001126	Head - Replacement	
4	001013	Intake manifold - Replacement	
5	001178	Reed valve assembly - Replacement	

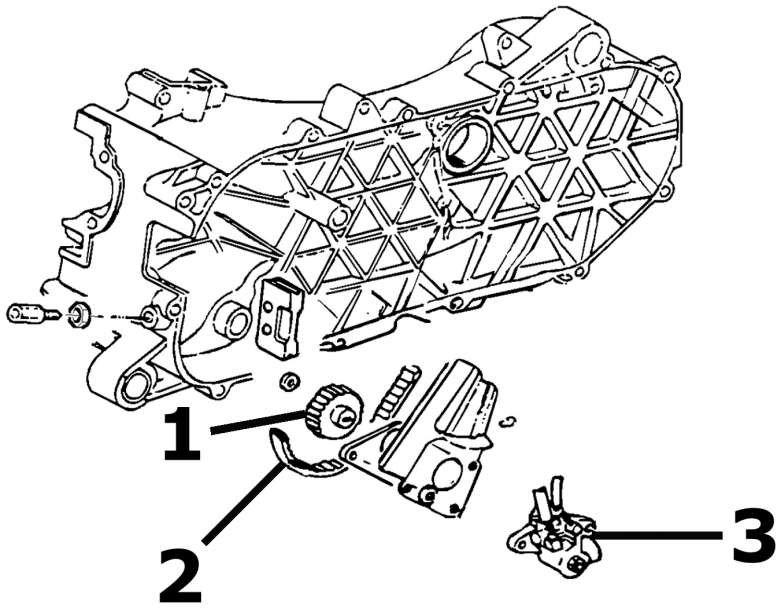
Driven pulley



DRIVEN PULLEY - CLUTCH

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

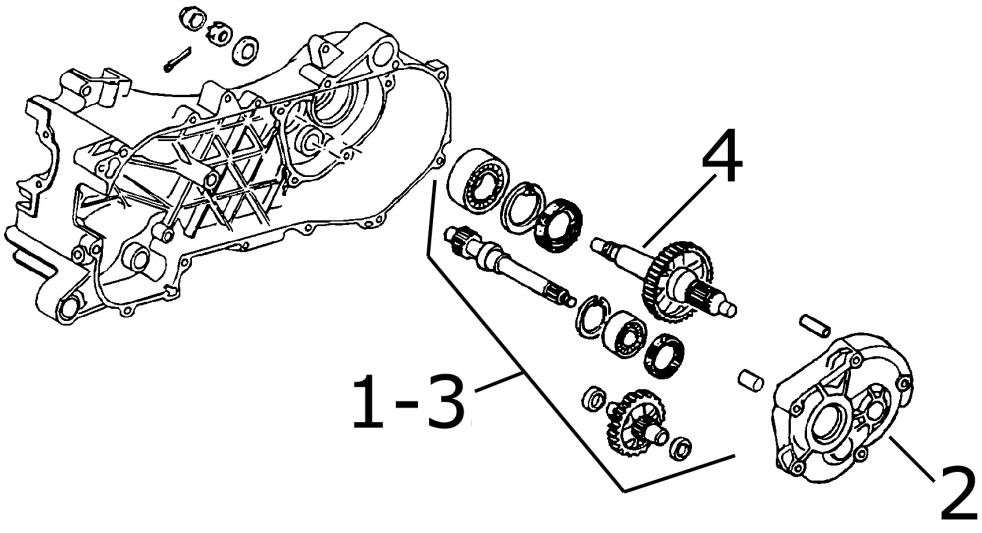
Oil pump



OIL PUMP

	Code	Action	Duration
1	001028	Mixer drive gear - Replacement	
2	001019	Mixer belt - Replacement	
3	001018	Mixer - Replacement	

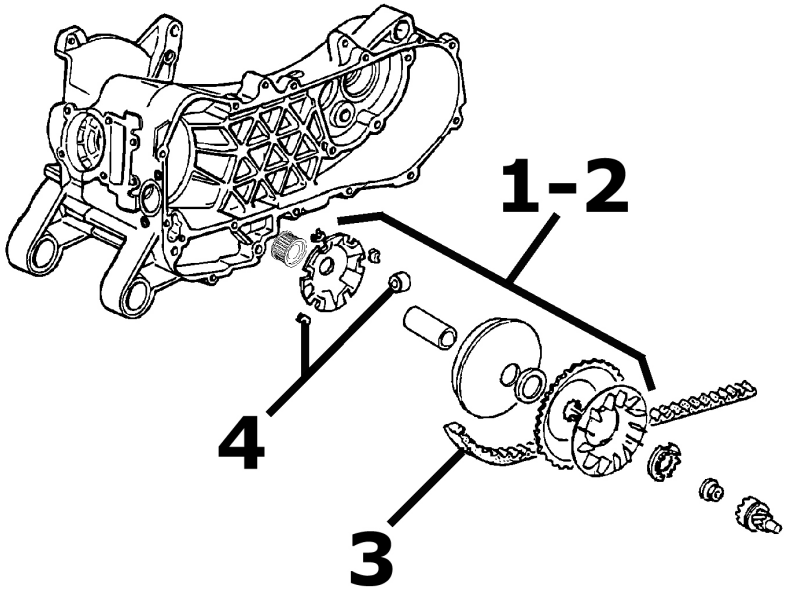
Final gear assy.



FINAL GEAR ASSY

	Code	Action	Duration
1	001010	Reduction gear - Overhaul	
2	001156	Reduction gear cover - Replacement	
3	003065	Gearcase oil - Replacement	
4	004125	Rear wheel axle - Replacement	

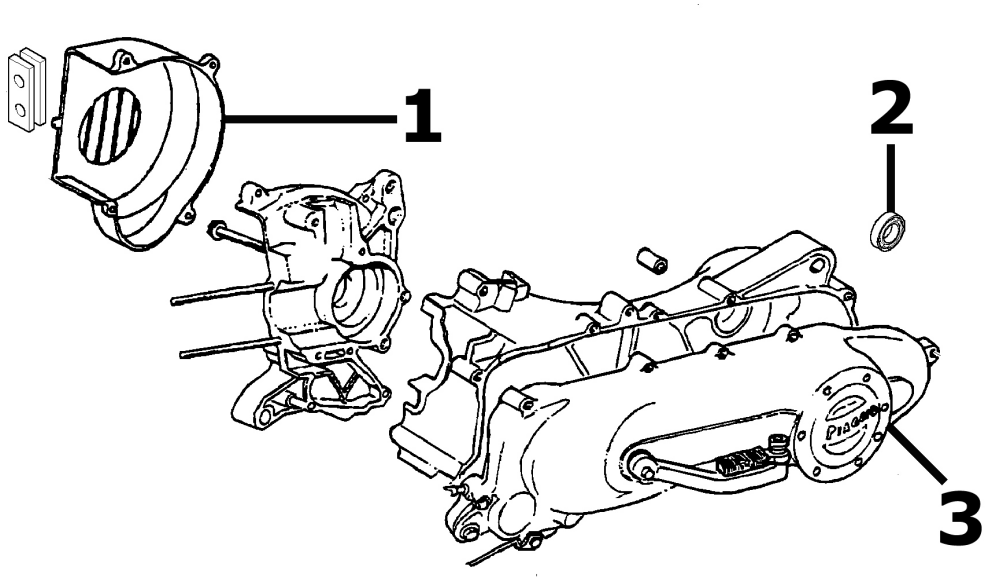
Driving pulley



DRIVING PULLEY

	Code	Action	Duration
1	001066	Driving pulley - Disassembly and reassembly	
2	001086	Driving half pulley - Replacement	
3	001011	Driving belt - Replacement	
4	001177	Rollers / Variator track shoes - Replacement	

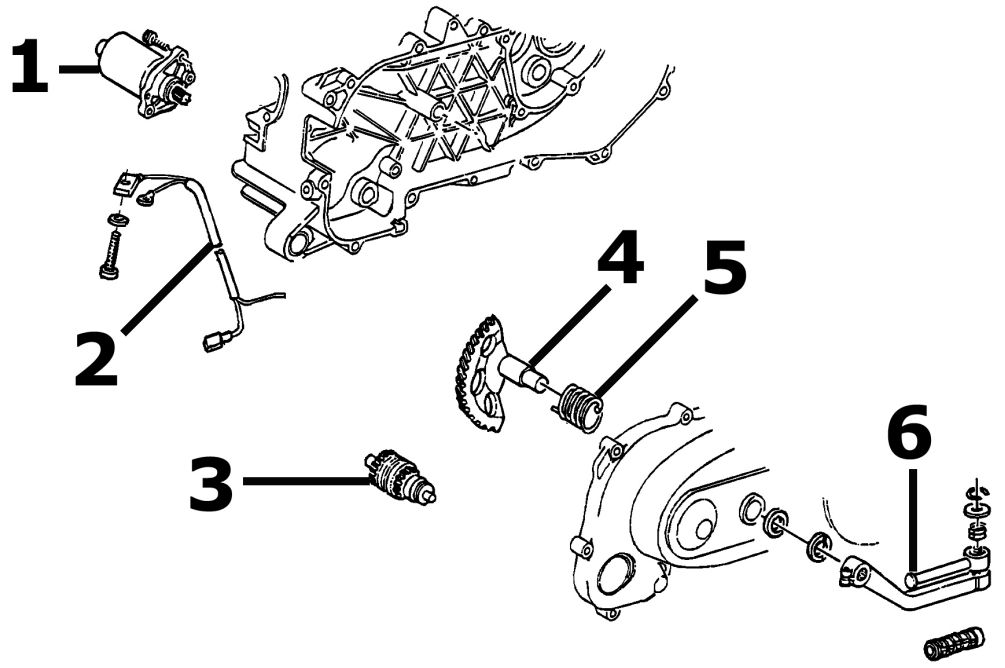
Transmission cover



TRANSMISSION COVER

	Code	Action	Duration
1	001087	Flywheel cover - Replacement	
2	001135	Transmission cover bearing - Replacement	
3	001096	Transmission casing cover - Replacement	

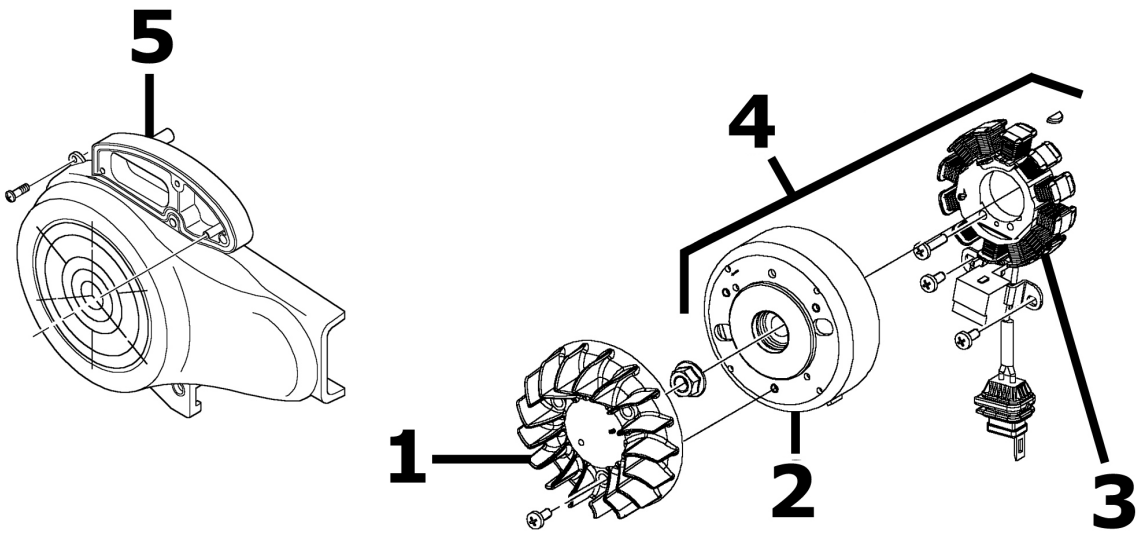
Starter motor



ELECTRIC START

	Code	Action	Duration
1	001020	Starter engine - Replacement	
2	005045	Starting motor cables - Replacement	
3	001017	Starter pinion - Replacement	
4	001021	Kick starter - Overhaul	
5	008008	Starting sector spring - Replacement	
6	001084	Starting lever - Replacement	

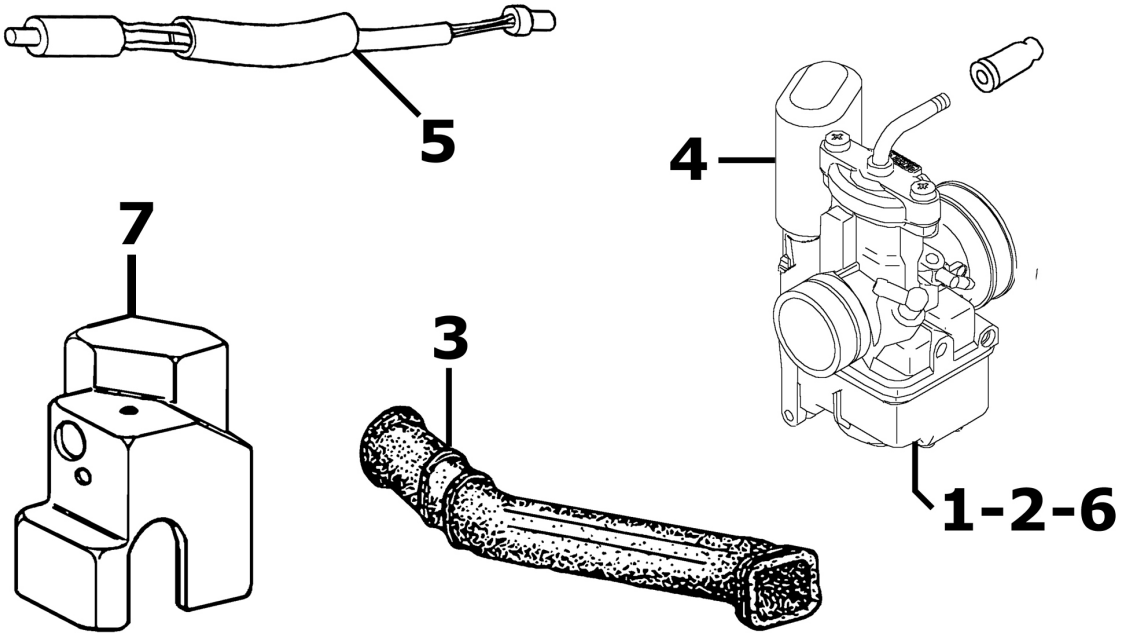
Flywheel magneto



FLYWHEEL MAGNETO

	Code	Action	Duration
1	001109	Cooling fan - Replacement	
2	001173	Rotor - Replacement	
3	001067	Stator - Disassembly and re-assembly	
4	001058	Flywheel - Replacement	
5	001087	Flywheel cover - Replacement	

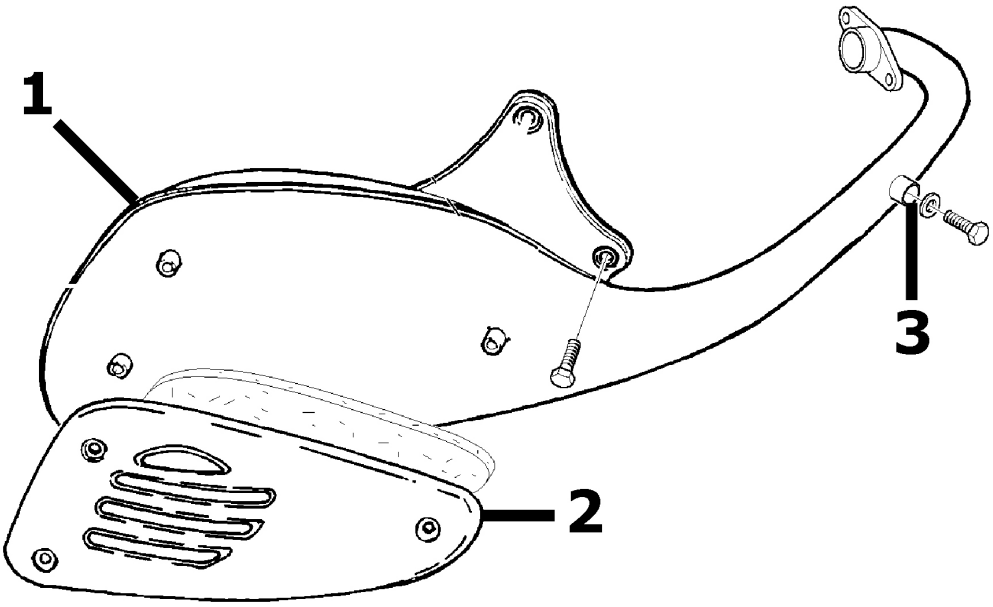
Carburettor



CARBURETTOR

	Code	Action	Duration
1	001008	Carburettor - Overhaul	
2	001063	Carburettor - Replacement	
3	007020	Carburettor heating manifolds - Replacement	
4	001081	Automatic starter device - Replacement	
5	001082	Carburettor heating resistor - Replacement	
6	003058	Carburettor - Adjustment	
7	004177	Heating shroud - Replacement	

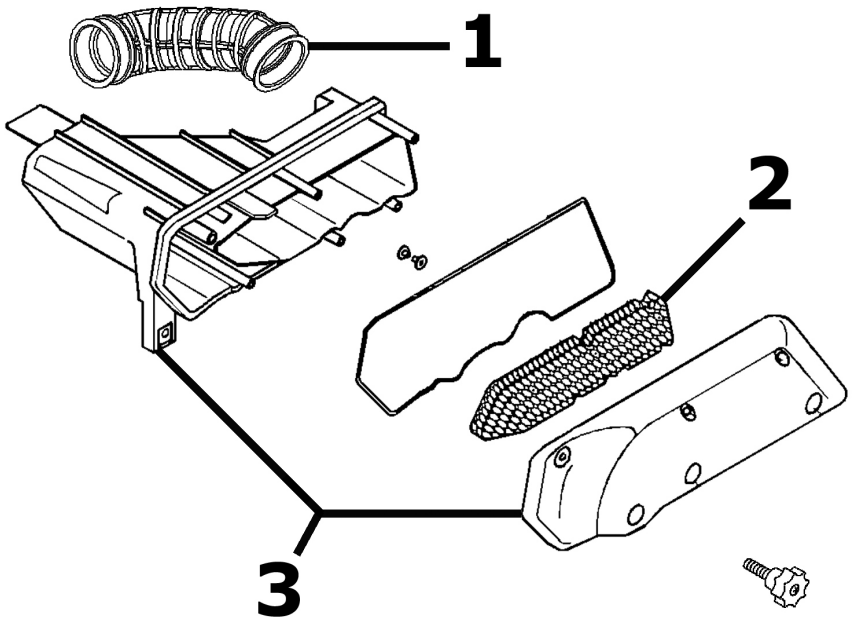
Exhaust pipe



MUFFLER

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

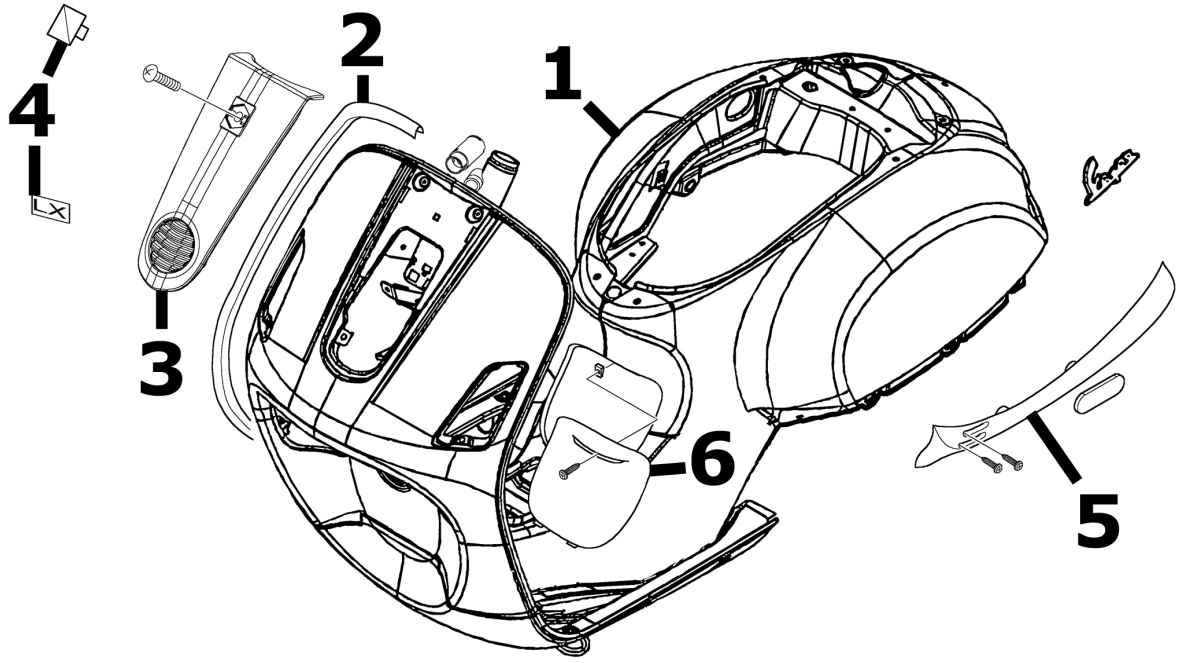
Air cleaner



AIR FILTER

	Code	Action	Duration
1	004122	Carburettor filter manifold - Replacement	
2	001014	Air Filter - Replacement/Clean-ing	
3	001015	Air filter box - Replacement	

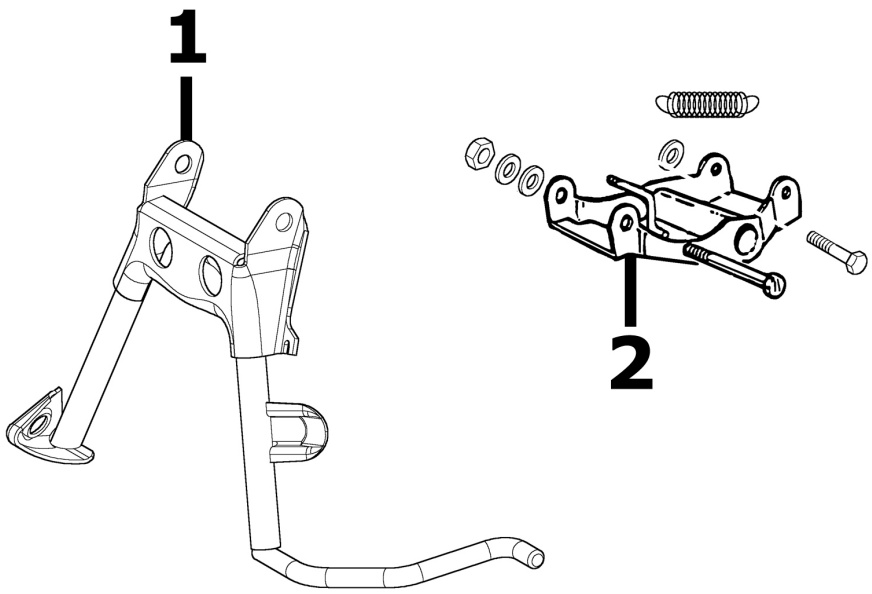
Frame



CHASSIS

	Code	Action	Duration
1	004001	Chassis - Replacement	
2	004023	Front shield beading - Replacement	
3	004149	Front shield cover - Replacement	
4	004159	Plates / Stickers - Replacement	
5	004012	Posterior flanks - Substitution	
6	004059	Spark plug inspection flap - Replacement	

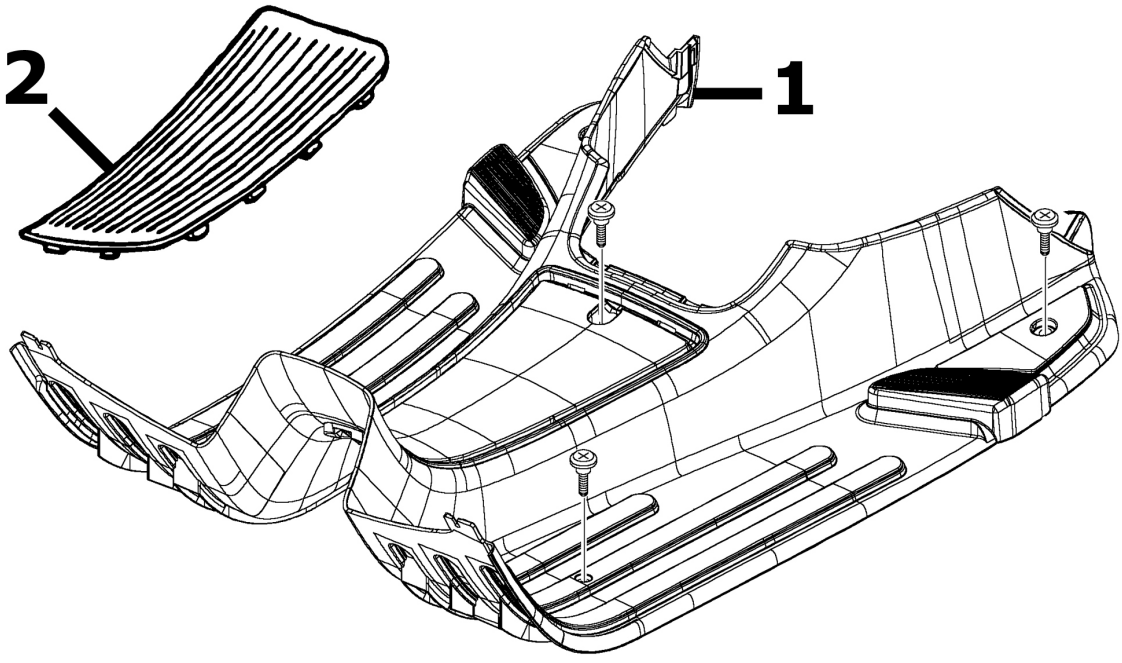
Centre-stand



STAND

	Code	Action	Duration
1	004004	Stand - Replacement	
2	004171	Stand support plate - Replacement	

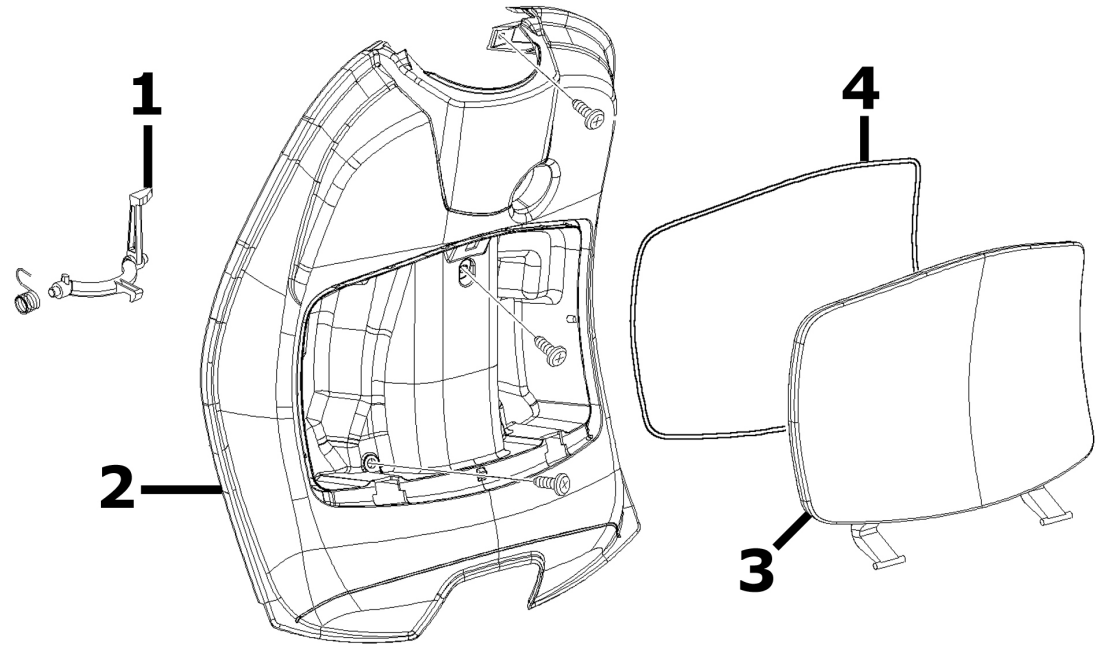
Footrests



FOOTREST

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

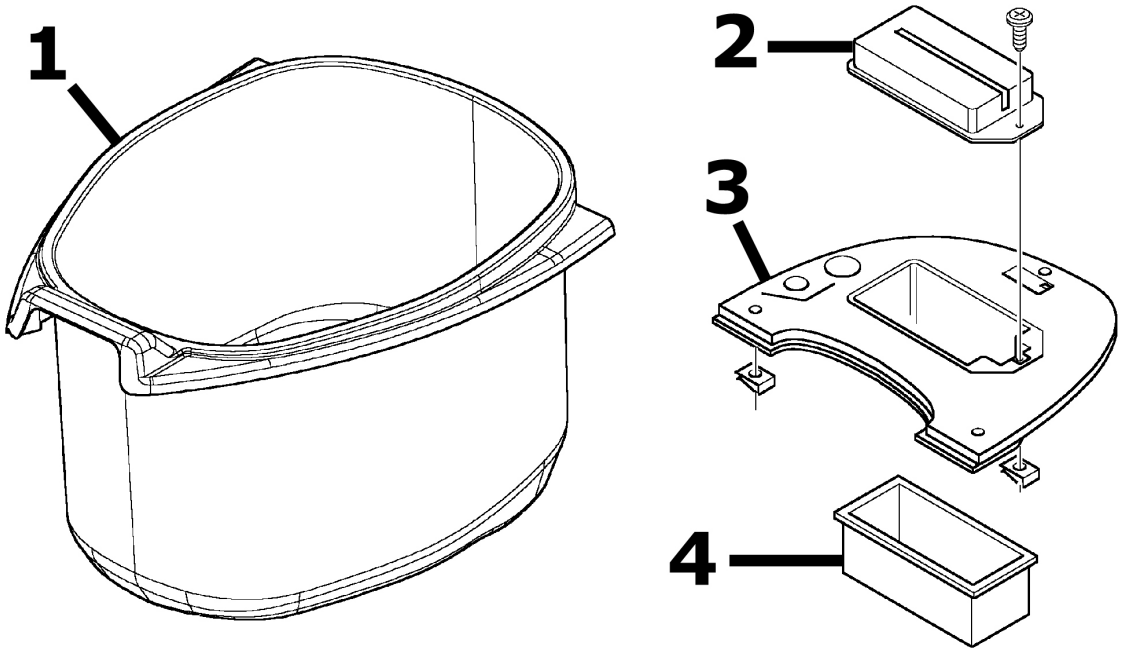
Rear cover



KNEE-GUARD

	Code	Action	Duration
1	004174	Glove-box remote opening linkage - Replacement	
2	004065	Knee-guard - Removal and refitting	
3	004081	Glove comparment door - Replacement	
4	004082	Trunk gasket - Replacement	

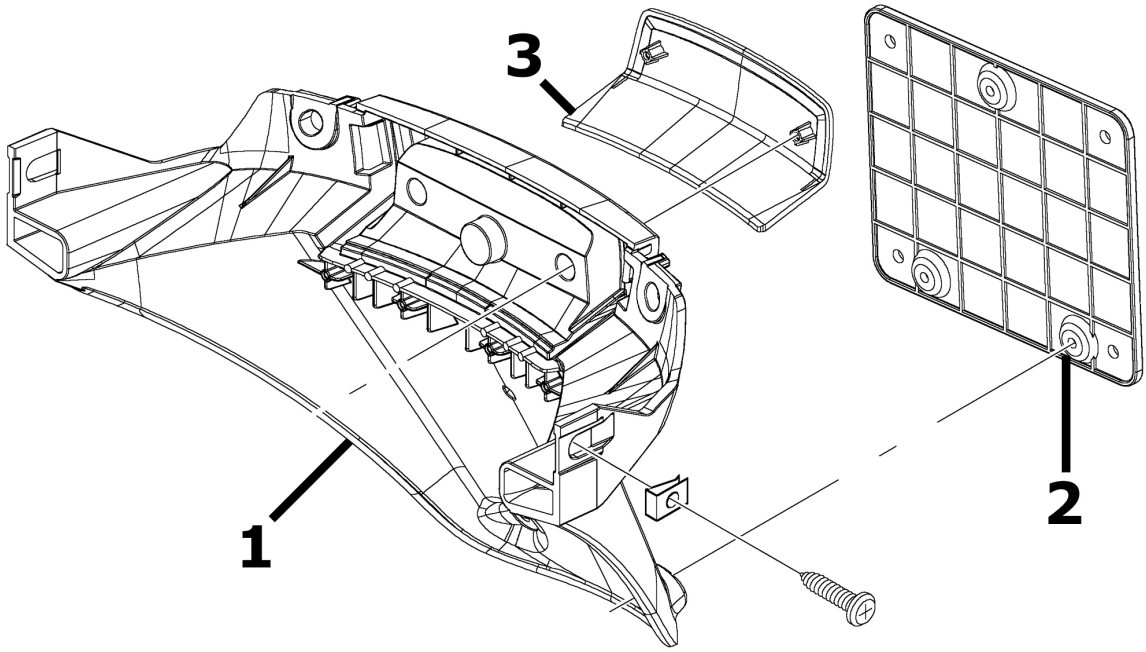
Underseat compartment



UNDERSEAT

	Code	Action	Duration
1	004016	Helmet compartment - Replacement	
2	005046	Battery cover - Replacement	
3	004011	Chassis central cover - Replacement	
4	004071	Battery compartment - Replacement	

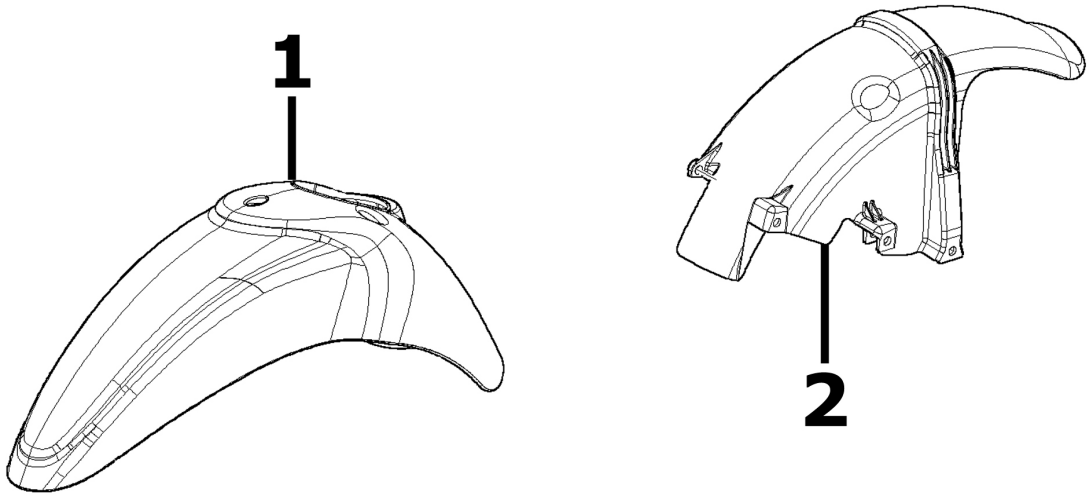
Plate holder



SUPPORT PLATE

	Code	Action	Duration
1	004136	License plate holder - Replacement	
2	005048	Number plate holder - Replacement	
3	005032	Number plate light cover - Replacement	

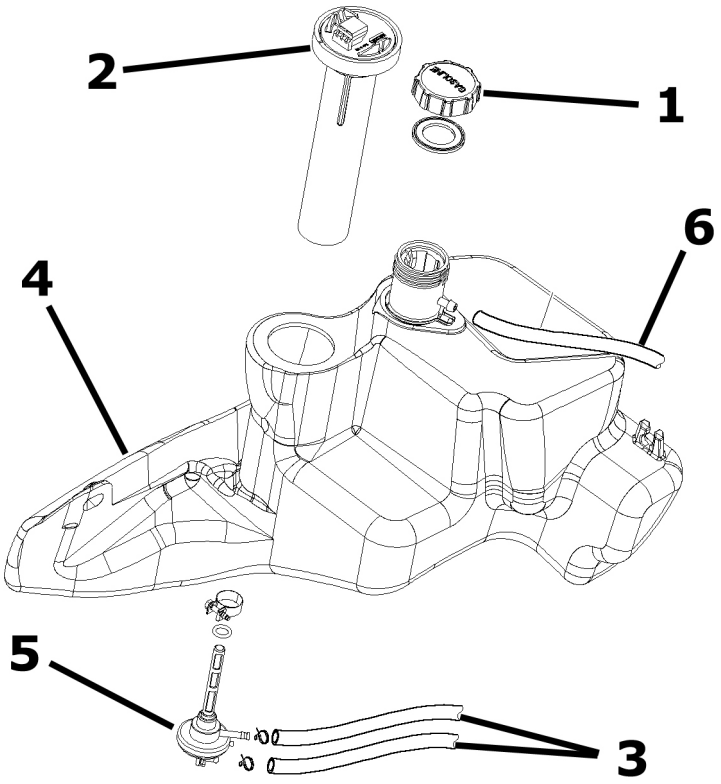
Mudguard



MUDGUARDS

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

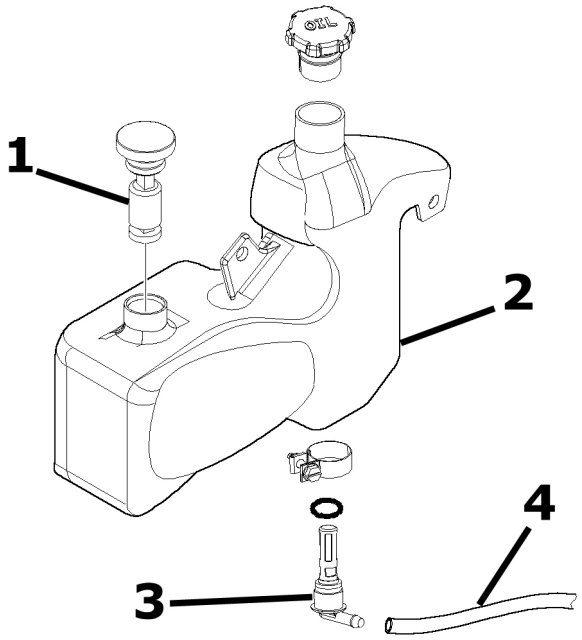
Fuel tank



FUEL TANK

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

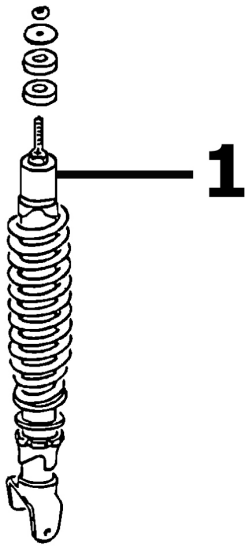
Tank oil



OIL TANK

	Code	Action	Duration
1	005018	Oil tank float - Replacement	
2	004017	Oil tank - Replacement	
3	004095	Oil tank tap - Replacement	
4	004091	Oil tank line - Replacement	

Rear shock-absorber



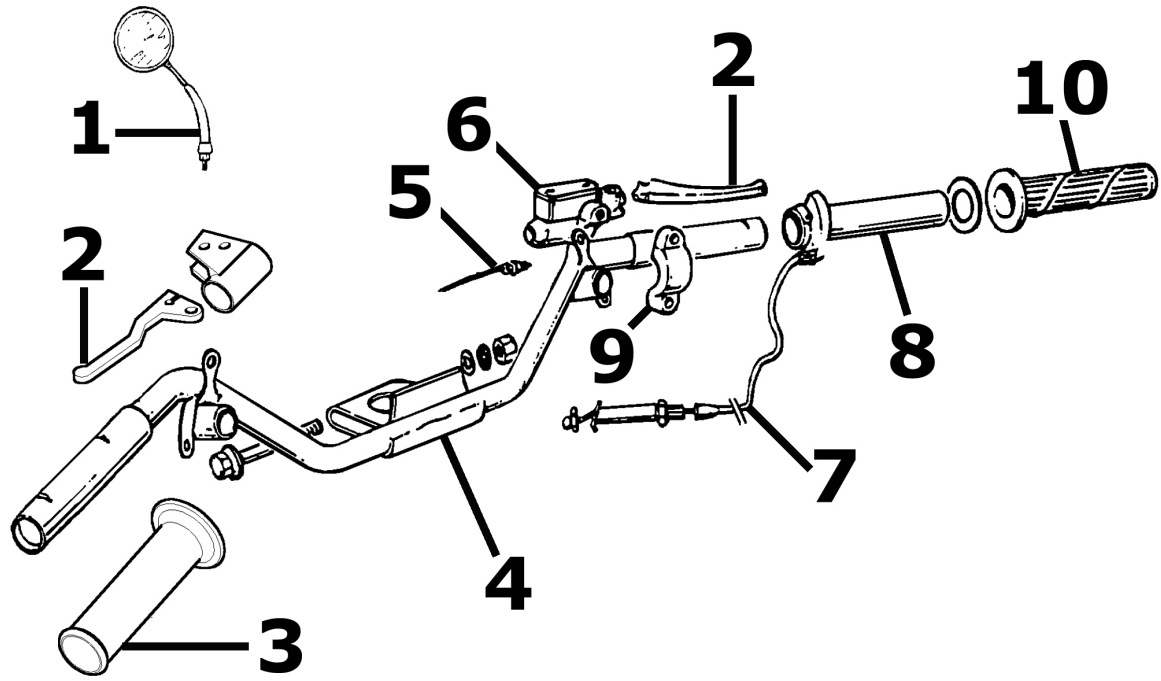
REAR SHOCK ABSORBER

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

Steering column bearings

Handlebar covers

Handlebar components



HANDLEBAR COMPONENTS

	Code	Action	Duration
1	004066	Rearview mirrors - Replacement	
2	002037	Complete gas control - Replacement	
3	002071	Left knob - Replacement	
4	003001	Handlebar - Removal and refitting	
5	005017	Stop light switch - Replacement	
6	002024	Brake pump - Removal and reinstallation	

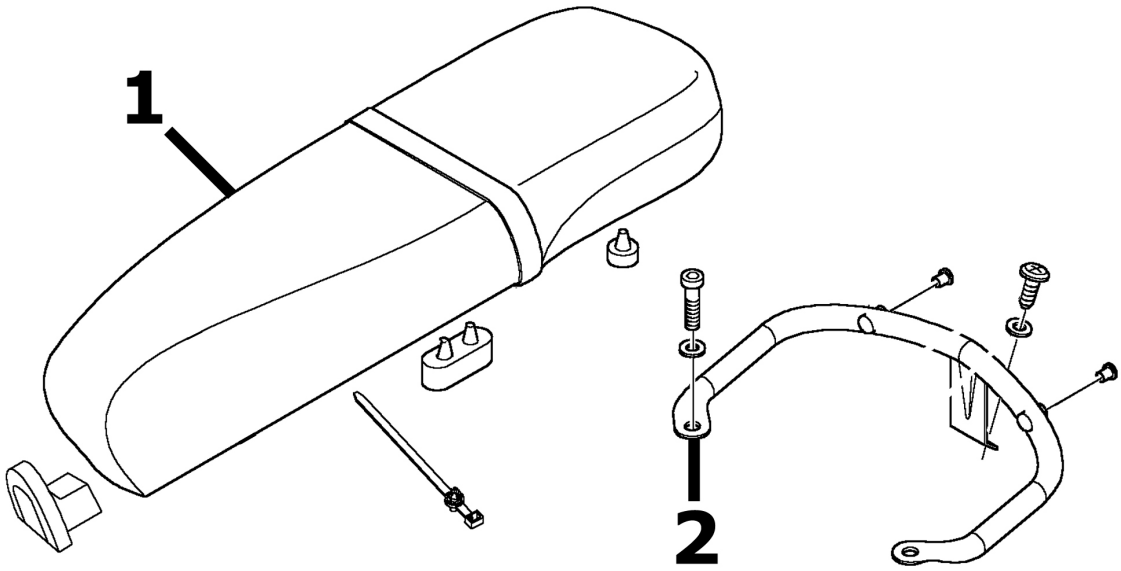
	Code	Action	Duration
7	002054	Throttle or splitter cable assembly - Replacement	
8	002060	Complete gas control - Replacement	
9	004162	Mirror U-bolt and/or brake pump fitting - Replacement	
10	002059	Right knob - Replacement	

Swing-arm

SWINGING ARM

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

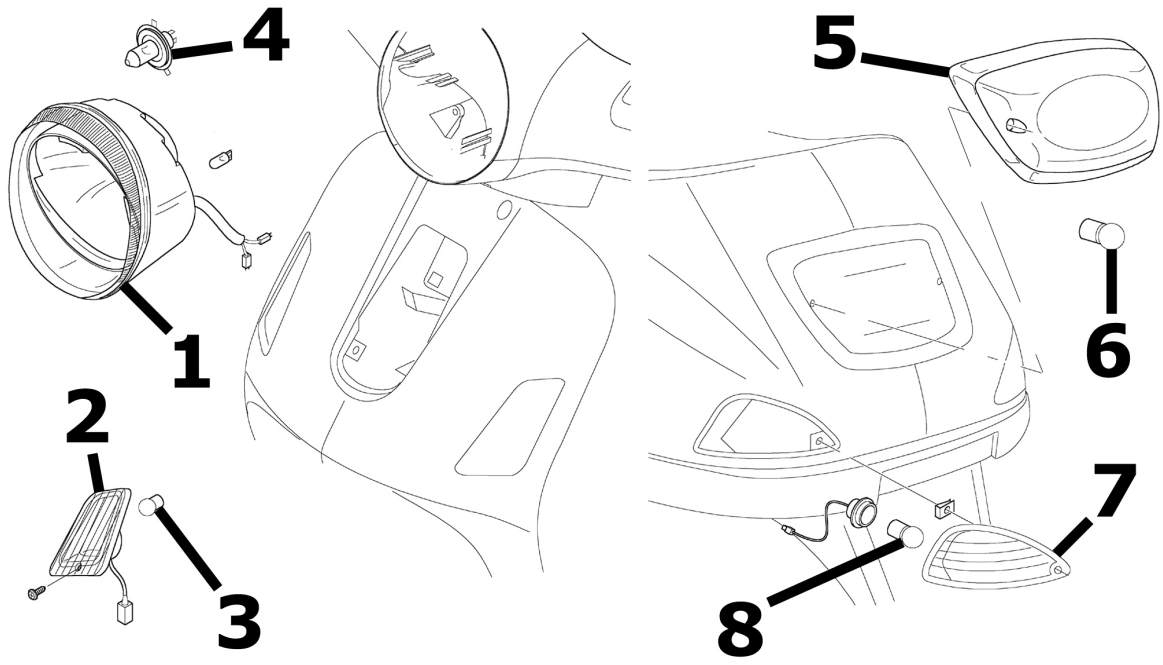
Seat



SADDLE

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

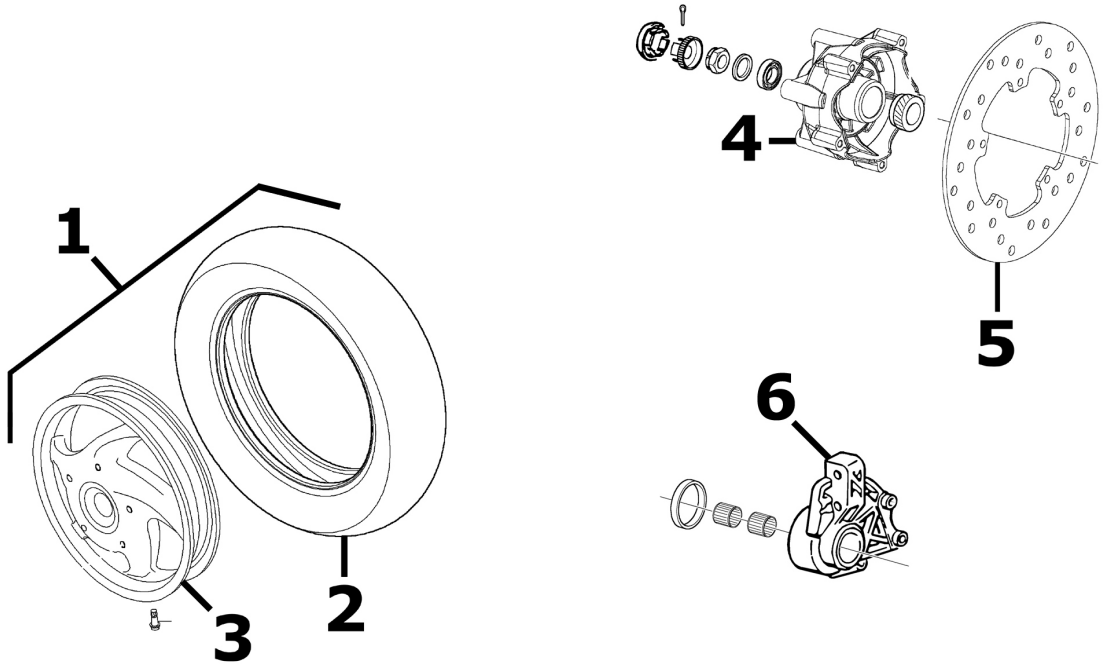
Turn signal lights



TURN SIGNAL LIGHTS

	Code	Action	Duration
1	005002	Headlight - Replacement	
2	005012	Front turn signal light - Replacement	
3	005067	Front direction indicator bulb - Replacement	
4	005008	Front headlights - Replacement	
5	005005	Rear light - Replacement	
6	005066	Rear light bulbs - Replacement	
7	005022	Rear turn signal light - Replacement	
8	005068	Rear turn indicator bulb - Replacement	

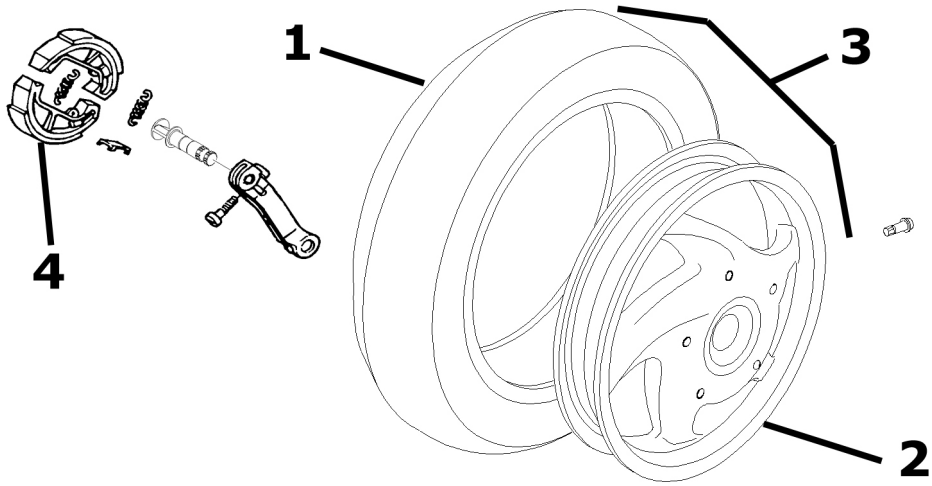
Front wheel



FRONT WHEEL

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

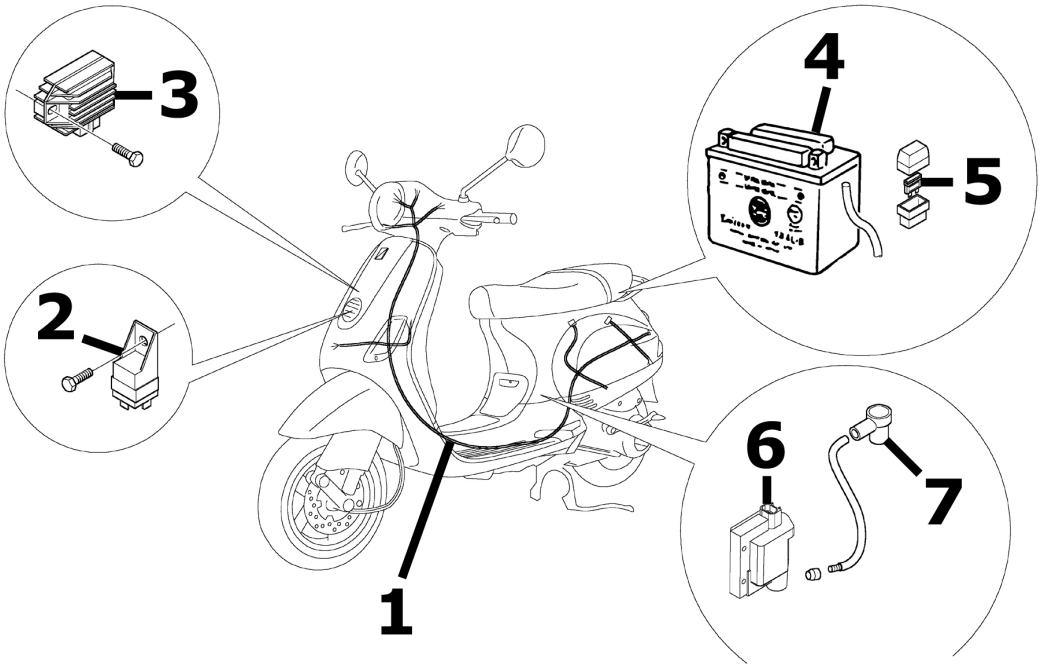
Rear wheel



REAR WHEEL

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

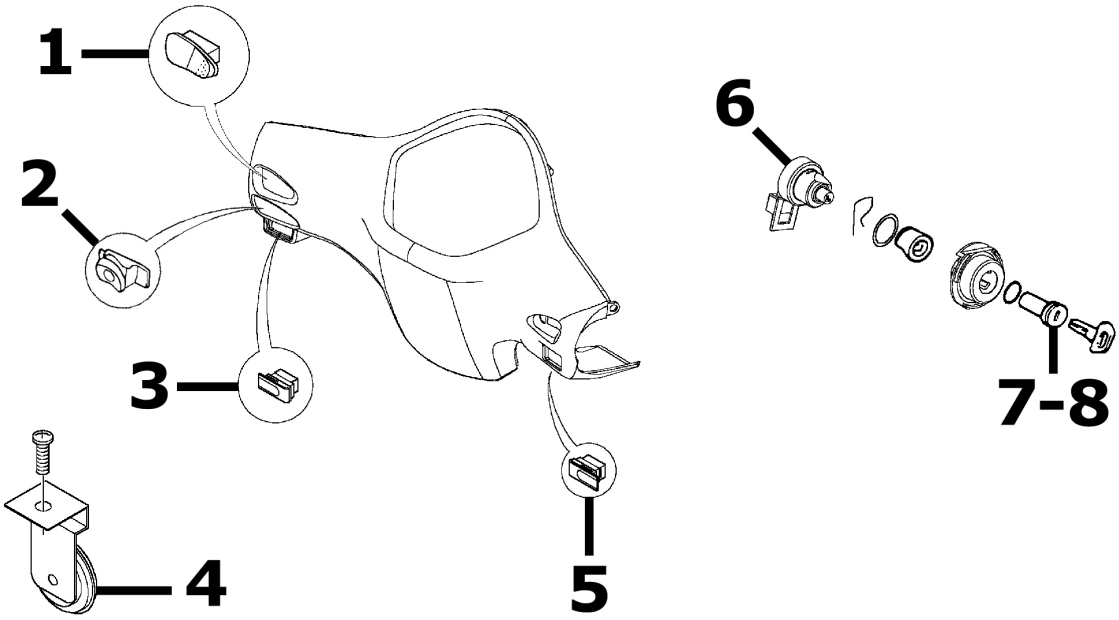
Electric devices



ELECTRIC COMPONENTS

	Code	Action	Duration
1	005001	Electric circuit - Replacement	
2	005011	Start-up remote control switch - Replacement	
3	005009	Voltage regulator - Replacement	
4	005007	Battery - Replacement	
5	005052	Fuse (1) - Replacement	
6	001023	Controller - Replacement	
7	001094	Spark plug cap - Replacement	

Electronic controls



ELECTRIC CONTROLS

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

	Code	Action	Duration
8	004010	Antitheft lock - Replacement	

Transmissions

TRANSMISSIONS

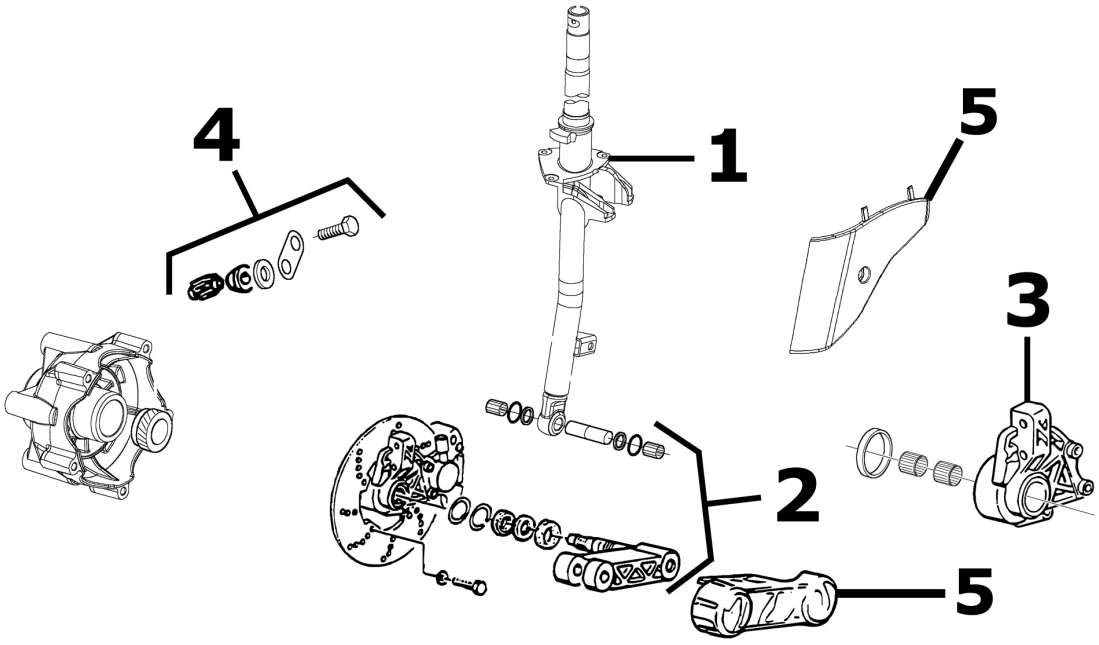
	Code	Action	Duration
1	002051	Odometer transmissions assembly - Replacement	
2	002012	Splitter - Replacement	
3	002057	Splitter-carburettor cable assembly - Replacement	
4	002058	Mixer splitter cable assembly - Replacement	
5	002053	Rear brake transmissions assembly - Replacement	
6	002049	Odometer cable - Replacement	
7	003061	Throttle cable - Adjustment	

Brake callipers

BRAKE LEVER

	Code	Action	Duration
1	002021	Front brake line - Replacement	
2	002007	Front brake shoes/pads - Removal and refitting	
3	002039	Front brake calliper - Removal and refitting	
4	002047	Front brake liquid and circuit bleeding - Replacement	

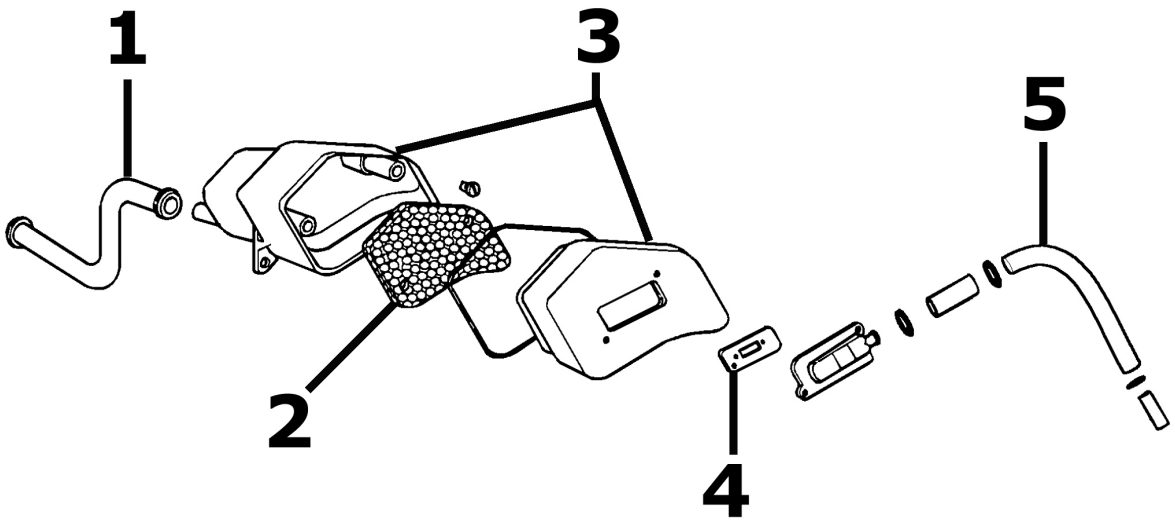
Front suspension



FRONT SUSPENSION

	Code	Action	Duration
1	003045	Steering column - Replacement	
2	003010	Front suspension - - Revision	
3	003035	Shock abs. and brake caliper support - Replacement	
4	001064	Speedometer gear - Replacement	
5	003044	Shock absorber cover - Replacement	

Secondary air box



SECONDARY AIR BOX

	Code	Action	Duration
1	001164	Crankcase secondary air junction - Replacement	
2	001161	Secondary air filter- Replacement / Cleaning	
3	001162	Secondary air box - Replacement	
4	001163	Exhaust secondary air junction - Replacement	
5	001165	Secondary air valve - Replacement	