



SERVICE STATION MANUAL

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(EL)**



MP3 125



SERVICE STATION MANUAL

MP3 125

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SERVICE STATION MANUAL

MP3 125

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

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

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

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



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



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



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



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CHARACTERISTICS

CHAR

This section describes the general specifications of the vehicle.

Rules

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

Safety rules

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

Maintenance rules

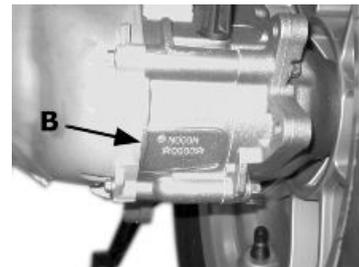
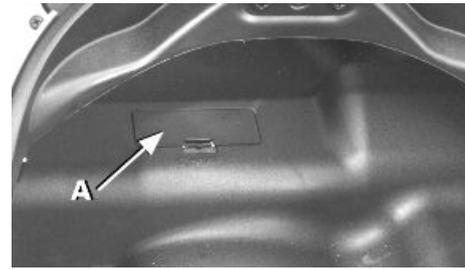
- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. Non-original or non-conforming spares may damage the vehicle.
 - Use only the appropriate tools designed for this vehicle.
 - Always use new gaskets, sealing rings and split pins upon refitting.
 - After removal, clean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

Vehicle identification

Chassis prefix (FULL OPTIONAL): **ZAPM47301**

Chassis prefix (BASE): **ZAPM300**

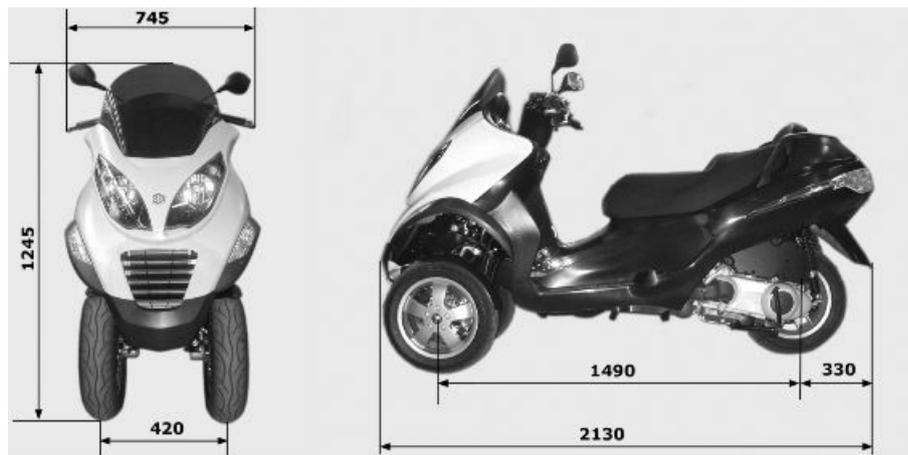
Engine prefix: **M473M**



Dimensions and mass

WEIGHTS AND DIMENSIONS

Specification	Desc./Quantity
Dry weight (FULL OPTIONAL)	210 ± 5 kg
Dry weight (BASE)	199 ± 5 kg
Wheelbase	1490 mm
Height	1245 mm
Width (handlebar)	745 mm
Overall length	2130 mm
Track	420 mm



Engine

DATA

Specification	Desc./Quantity
Type	single-cylinder, four-stroke
Timing system	single overhead camshaft chain driven on the left-hand side, three-arm rocking levers set up with threaded set screw
Bore x stroke	57 x 48.6 mm
Cubic capacity	124 cm ³
Compression ratio	11.5 - 12.5 : 1
Air filter	sponge, impregnated with mixture (50% petrol and 50% oil)
Starting system	electric starter motor with freewheel
Lubrication	with lobe pump (inside the crankcase) controlled by a chain and double filter: mesh and paper
Fuel supply	Unleaded petrol; depression carburettor, electric pump or vacuum pump.
valve clearance	intake: 0.10 mm - discharge: 0.15 mm
Engine idle speed	1,650±100 rpm
Max. speed	100 km/h

Transmission

TRANSMISSION

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

Capacities

CAPACITY

Specification	Desc./Quantity
Engine oil	1200 cm ³
Rear hub oil	Capacity ~ 150 cm ³
Fuel tank capacity	Tank capacity: ~12 l (approximate value)
Fuel reserve	~ 2.0 l (approximate value)
Cooling circuit	Capacity: ~ 2.0 l

Electrical system

ELECTRICAL COMPONENTS

Specification	Desc./Quantity
Ignition/advance	Electronic, with inductive discharge and variable advance with three-dimensional mapping
Spark plug	NGK CR 8EB
Spark plug	Champion RG 4 HC

Specification	Desc./Quantity
Battery	12V-12Ah
Generator	Three-phase alternating current

Frame and suspensions

FRAME AND SUSPENSIONS

Specification	Desc./Quantity
Chassis	Tubular and sheet steel.
Rear suspension	Single arm with two double-acting hydraulic shock absorbers and preloading adjustable to 4 positions.
Front suspension	The tilt mechanism is composed of an articulated parallelogram suspension with die-cast aluminium control arms and two side headstocks plus shock absorbers with hydraulic locking system.

Brakes

BRAKES

Specification	Desc./Quantity
Front brake	Ø 240 mm double disk with hydraulic control activated by the handlebar right-hand lever.
Rear brake	Ø 240 mm disc brake with hydraulic control activated by the handlebar left-side lever.

Wheels and tyres

WHEELS AND TYRES

Specification	Desc./Quantity
Front wheel	Alloy rims: 12" x 3.00"
Rear wheel	Alloy rim: 12"x 3.50"
Front tyre	120/70-12", without inner tube
Rear tyre	Without inner tube: 130/70-12" 62P

TYRE PRESSURE

Specification	Desc./Quantity
Front tyre pressure (rider)	Front tyre pressure (rider): 1.6 bar
Front tyre pressure (rider and passenger)	Front tyre pressure (rider and passenger): 1.8 bar
Rear tyre pressure (rider)	Rear tyre pressure (rider): 2 bar
Rear wheel pressure (rider and passenger):	Rear tyre pressure (rider and passenger): 2.4 bar

N.B.

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

Tightening Torques

STEERING

Name	Torque in Nm
Steering lower ring nut (central headstock)	22 ÷ 27 loosen by 90°
Steering upper ring nut (central headstock)	27 ÷ 33
Handlebar fixing screw	50 ÷ 55
Fixing screws for handlebar control assembly U-bolts	7 ÷ 10

FRAME

Name	Torque in Nm
Engine arm bolt - frame arm	33 ÷ 41
Swinging arm buffer nut	64 - 72
Engine-swinging arm bolt	55 ÷ 61
Frame-swinging arm bolt	55 ÷ 61
Centre stand bolt	31 ÷ 39

FRONT SUSPENSION

Name	Torque in Nm
Shock absorber lower clamp	19 ÷ 26
Upper shock absorber clamp	19 ÷ 29
Front wheel fixing screws	19 ÷ 24
Steering arm bolt nut	20 ÷ 25
Tilt calliper fixing screws	20 ÷ 25
Front wheel shaft	74 ÷ 88
Arm coupling screws	45 ÷ 50
Screws fixing arms to side headstocks	45 ÷ 50
Screws fixing arms to central headstock	45 ÷ 50
Screws fixing the half-arm coupling flange	20 ÷ 25
Fixing screws for tilt locking disc section	20 ÷ 25
Side headstock upper ring nut	20 - 24
Side headstock lower ring nut	12 ÷ 15
Screw fixing sliding stem to shock absorber	45 ÷ 50
Clamp for sliding stem locking device	6.5 ÷ 10.5
Fixing nuts for constant-velocity universal joints	18 ÷ 20
Potentiometer to anti-tilting device clamp	8 ÷ 10
Electric motor to anti-tilting device clamp	11 ÷ 13
Clamp fixing pump bolt to anti-tilting device	11 ÷ 13
Pump to anti-tilting device clamp	11 ÷ 13
Pressure switch to distribution frame	18 ÷ 20
Sensor to tilt gripper clamp	2.5 ÷ 2.9
Pipe terminals to fifth wheel check spring	7 ÷ 11
Joint to anti-tilting device pump	20 ÷ 25
Lower fitting for shock absorber sliding locking clamp pipes	20 ÷ 25
Upper fitting for shock absorber sliding locking clamp pipes	20 ÷ 25

REAR SUSPENSION

Name	Torque in Nm
Upper shock absorber clamp	33 ÷ 41
Shock absorber lower clamp	33 ÷ 41

Name	Torque in Nm
Shock absorber-crankcase attachment bracket	20 ÷ 25
Rear wheel axle	104 ÷ 126
Muffler arm clamping screws	27 ÷ 30

FRONT BRAKE

Name	Torque in Nm
Oil bleed screw	8 ÷ 12
Disc tightening screw (°)	5 - 6
Brake fluid pump - hose fitting	16 ÷ 20
Brake fluid pipe-calliper fitting	20 ÷ 25
Screw tightening calliper to the support	20 ÷ 25
Calliper upper pipe fitting	20 ÷ 25

REAR BRAKE

Name	Torque in Nm
Rear brake disc screws(°)	5 ÷ 6.5
Rear brake calliper-pipe fitting	20 ÷ 25
Rigid / flexible pipe fitting	13 ÷ 18
Rear brake pump-pipe fitting	16 ÷ 20
Rear brake calliper fixing screws	20 ÷ 25

REAR BRAKE

Product	Description	Specifications
(°) Loctite 243	Medium strength threadlock	Apply LOCTITE 243 medium-strength threadlock

MUFFLER

Name	Torque in Nm
Muffler heat guard fixing screw	4 ÷ 5
Screw for fixing muffler to the support arm	20 ÷ 25
Lambda probe clamp on exhaust manifold	40 ÷ 50
Exhaust manifold-muffler joint clamp	12 ÷ 13
Manifold - muffler diaphragm tightening clamp	16 ÷ 18

LUBRICATION

Name	Torque in Nm
Hub oil drainage plug	15 ÷ 17
Oil filter on crankcase fitting	27 ÷ 33
Engine oil drainage plug/mesh filter	24 ÷ 30
Oil filter	4 ÷ 6
Oil pump cover screws	0.7 ÷ 0.9
Screws fixing oil pump to the crankcase	5 - 6
Oil pump control crown screw	10 ÷ 14
Oil pump cover plate screws	4 ÷ 6
Oil sump screws	10 ÷ 14
Minimum oil pressure sensor	12 ÷ 14

ENGINE - CYLINDER HEAD

Name	Torque in Nm
Manifold-silencer retaining bolt	15 ÷ 20
Nut fixing muffler to cylinder head	16 ÷ 18
Camshaft retention plate screw	4 ÷ 6

Name	Torque in Nm
Timing chain tensioner central screw	5 - 6
Timing chain tensioner support screw	11 ÷ 13
Starter ground support screw	11 ÷ 15
Timing chain tensioner slider screw	10 ÷ 14
Inlet manifold screws	11 ÷ 13
Tappet set screw lock nut	6 ÷ 8
Starter ground screw	7 ÷ 8.5
Head fixing side screws	11 ÷ 12
Nuts fixing head to cylinder (*)	27 ÷ 29
Tappet cover screws	6 ÷ 7
Spark plug	12 ÷ 14

ENGINE - TRANSMISSION

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

ENGINE - FLYWHEEL

Name	Torque in Nm
Pick-Up clamping screws	3 ÷ 4
Stator assembly screws (°)	3 ÷ 4
Flywheel cover fixing screws	5 - 6
Flywheel nut (250)	94 ÷ 102
Screw fixing freewheel to flywheel	13 ÷ 15

CRANKCASE AND CRANKSHAFT

Name	Torque in Nm
Internal engine crankcase bulkhead (transmission-side half shaft) screws	4 ÷ 6
Engine-crankcase coupling screws	11 ÷ 13
Starter motor screws	11 ÷ 13
Crankcase timing system cover screws (°)	3.5 ÷ 4.5

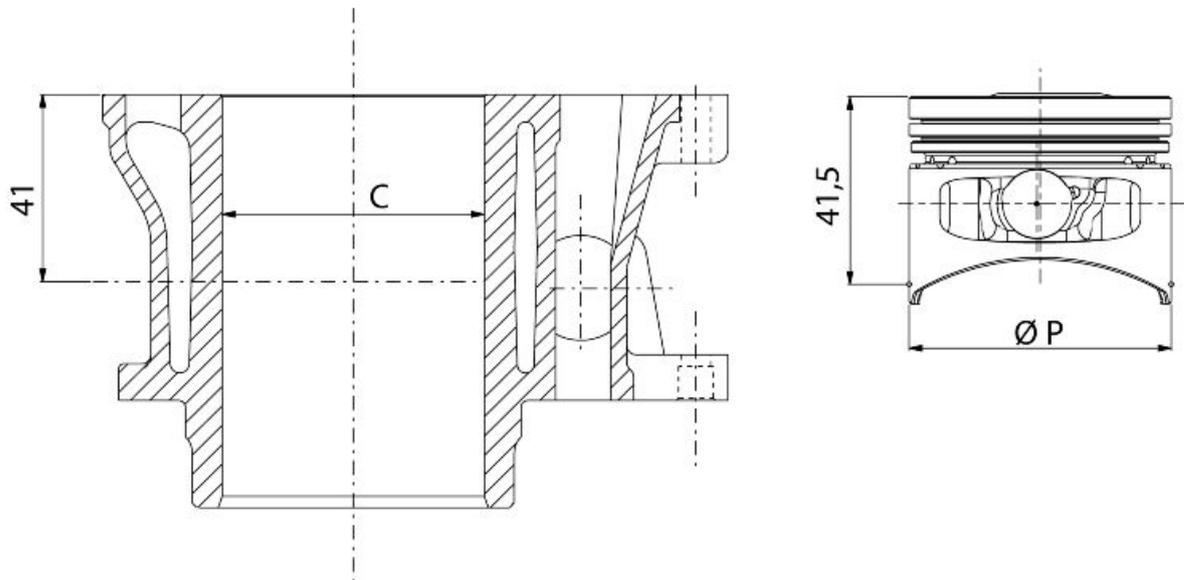
ENGINE - COOLING

Product	Description	Specifications
(°) Loctite 243	Medium strength threadlock	Apply LOCTITE 243 medium-strength threadlock

Overhaul data

Assembly clearances

Cylinder - piston assy.

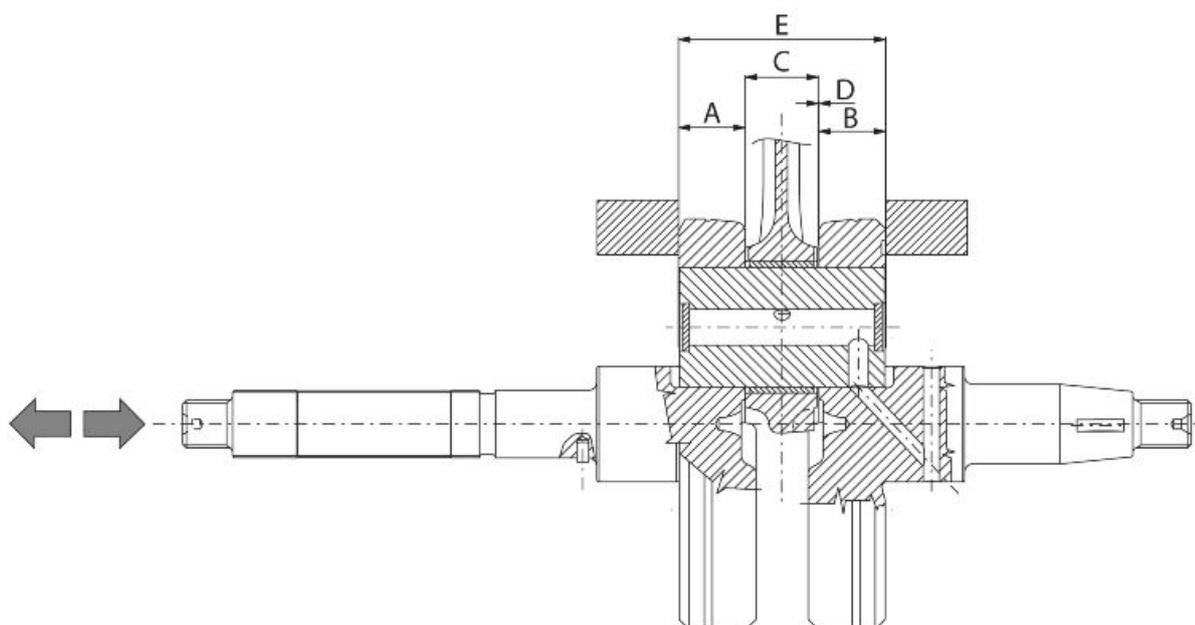
**ENGINE COUPLING CATEGORIES**

Name	Initials	Cylinder	Piston	Play on fitting
Cylinder	A	56.997 ÷ 57.004	56.945 ÷ 56.952	0.045 - 0.059
Cylinder	B	57.004 ÷ 57.011	56.952 ÷ 56.959	0.045 - 0.059
Piston	C	57.011 ÷ 57.018	56.959 ÷ 56.966	0.045 - 0.059
Piston	D	57.018 ÷ 57.025	56.966 ÷ 56.973	0.045 - 0.059
Cylinder 1st Over-size	A1	57.197 ÷ 57.204	57.145 ÷ 57.152	0.045 - 0.059
Cylinder 1st Over-size	B 1	57.204 ÷ 57.211	57.152 ÷ 57.159	0.045 - 0.059
Piston 1st Over-size	C 1	57.211 ÷ 57.218	57.159 ÷ 57.166	0.045 - 0.059
Piston 1st Over-size	D 1	57.218 ÷ 57.225	57.166 ÷ 57.173	0.045 - 0.059
Cylinder 2nd Over-size	A2	57.397 ÷ 57.404	57.345 ÷ 57.352	0.045 - 0.059
Cylinder 2nd Over-size	B 2	57.404 ÷ 57.411	57.352 ÷ 57.359	0.045 - 0.059
Piston 2nd Over-size	C 2	57.411 ÷ 57.418	57.359 ÷ 57.366	0.045 - 0.059
Piston 2nd Over-size	D 2	57.418 ÷ 57.425	57.366 ÷ 57.373	0.045 - 0.059
Cylinder 3rd Over-size	A 3	57.597 ÷ 57.604	57.545 ÷ 57.552	0.045 - 0.059
Cylinder 3rd Over-size	B 3	57.604 ÷ 57.611	57.552 ÷ 57.559	0.045 - 0.059
Piston 3rd Over-size	C 3	57.611 ÷ 57.618	57.559 ÷ 57.566	0.045 - 0.059
Piston 3rd Over-size	D 3	57.618 ÷ 57.625	57.566 ÷ 57.573	0.045 - 0.059

Crankcase - crankshaft - connecting rod

<u>CRANKSHAFT</u>			
Titolo	Durata/Valore	Testo Breve (< 4000 car.)	Indirizzo Immagine
Crankshaft		Crankshaft to crankcase axial clearance	

Crankshaft to crankcase axial clearance



CRANKSHAFT/ CRANKCASE AXIAL CLEARANCE

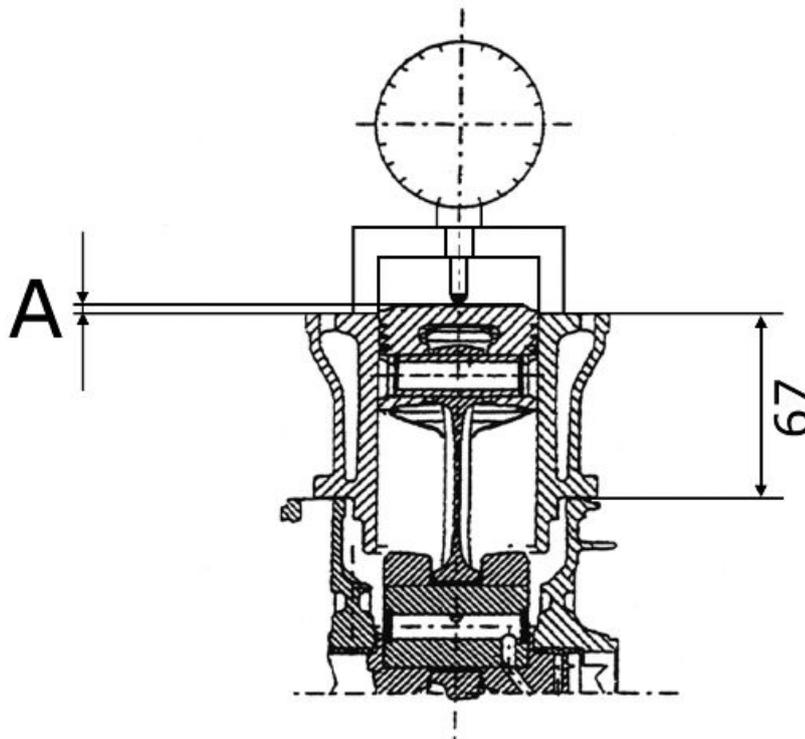
Name	Description	Dimensions	Initials	Quantity
Half-shaft, transmission side		16.6 +0-0.05	A	D = 0.20 - 0.50
Flywheel-side half-shaft		16.6 +0-0.05	B	D = 0.20 - 0.50
Connecting rod		18 -0.10 -0.15	C	D = 0.20 - 0.50
Spacer tool		51.4 +0.05	E	D = 0.20 - 0.50

Slot packing system

Characteristic

Compression ratio

Cr: 11.50 ÷ 13:1



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

N.B.

NO GASKETS AND SEALS SHOULD BE ASSEMBLED BETWEEN THE CRANKCASE AND CYLINDER AND THE DIAL GAUGE EQUIPPED WITH SUPPORT SHOULD BE SET TO ZERO FOR MEASUREMENT «A» TO BE TAKEN WITH THE PISTON AT TOP DEAD CENTRE POSITION AND ON A RECTIFIED PLANE.

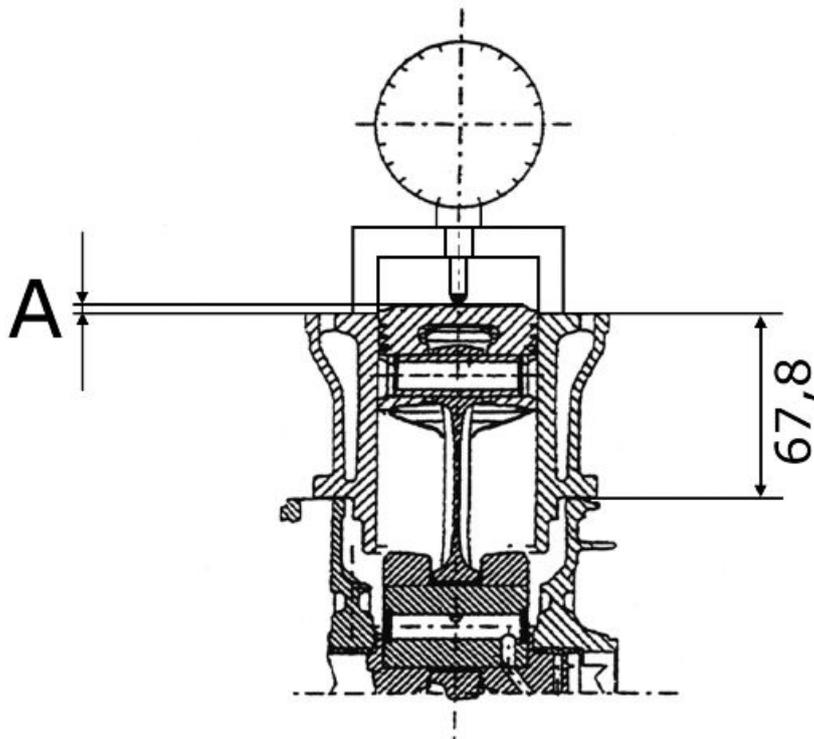
MODELS WITH FIBRE HEAD GASKET (1.1)

Name	Measure A	Thickness
Shimming 125 - Cylinder 67 - Head gasket 1.1 - Base gasket 0.4	2.20 ÷ 2.45	0.4 ± 0.05
Shimming 125 - Cylinder 67 - Head gasket 1.1 - Base gasket 0.6	2.45 ÷ 2.70	0.6 ± 0.05

Characteristic

Compression ratio

Cr: 11.50 ÷ 13:1



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

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MODELS WITH METALLIC HEAD GASKET (0.3)

Name	Measure A	Thickness
Shimming 125 - Cylinder 67.8 - Head gasket 0.3 - Base gasket 0.4	1.40 ÷ 1.65	0.4 ± 0.05
Shimming 125 - Cylinder 67.8 - Head gasket 0.3 - Base gasket 0.6	1.65 ÷ 1.90	0.6 ± 0.05

Products

RECOMMENDED PRODUCTS TABLE

Product	Description	Specifications
AGIP ROTRA 80W-90	Rear hub oil	SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications

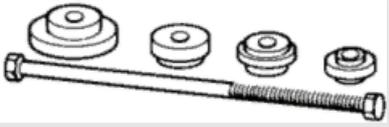
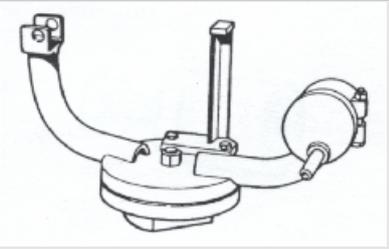
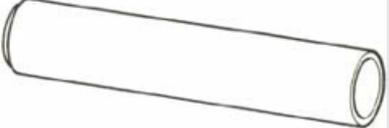
Product	Description	Specifications
AGIP CITY HI TEC 4T	Oil to lubricate flexible transmissions (throttle control)	Oil for 4-stroke engines
AGIP FILTER OIL	Oil for air filter sponge	Mineral oil with specific additives for increased adhesiveness
AGIP GP 330	Calcium complex soap-based grease with NLGI 2;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

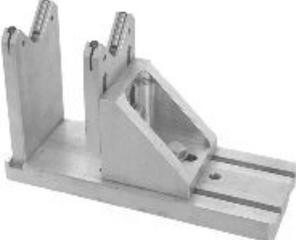
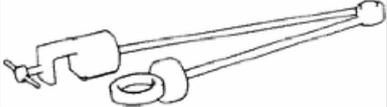
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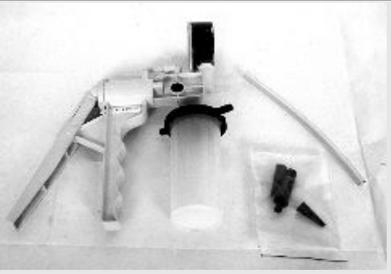
TOOLING

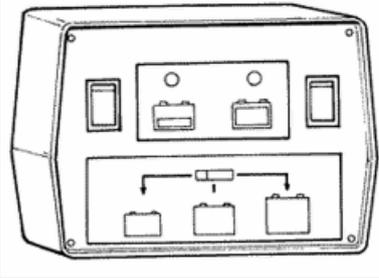
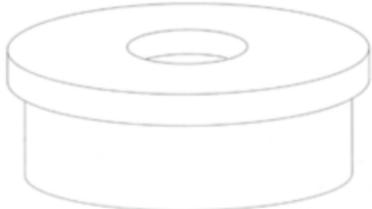
TOOL

APPROPRIATE TOOL

Stores code	Description	
001330Y	Tool for fitting steering seats	
001467Y014	Pliers to extract ø 15-mm bearings	
005095Y	Engine support	
002465Y	Pliers for circlips	
006029Y	Punch for fitting fifth wheel seat on steering tube	
020004Y	Punch for removing fifth wheels from headstock	
020055Y	Wrench for steering tube ring nut	

Stores code	Description	
020074Y	Support base for checking crankshaft alignment	
020150Y	Air heater support	
020151Y	Air heater	
020193Y	Oil pressure gauge	
020262Y	Crankcase splitting strip	
020263Y	Sheath for driven pulley fitting	

Stores code	Description	
020306Y	Punch for assembling valve seal rings	
020329Y	MityVac vacuum-operated pump	
020330Y	Stroboscopic light for timing control	
020331Y	Digital multimeter	
020332Y	Digital rev counter	

Stores code	Description	
020333Y	Single battery charger	
020334Y	Multiple battery charger	
020335Y	Magnetic support for dial gauge	
020357Y	32 x 35 mm adaptor	
020359Y	42x47-mm adaptor	
020360Y	Adaptor 52 x 55 mm	

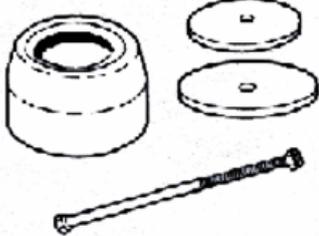
Stores code	Description	
020363Y	20 mm guide	
020375Y	Adaptor 28 x 30 mm	
020376Y	Adaptor handle	
020382Y	Valve cotters equipped with part 012 removal tool	
020382Y011	adapter for valve removal tool	

Stores code	Description	
020393Y	Piston fitting band	
020412Y	15 mm guide	
020423Y	driven pulley lock wrench	
020424Y	Driven pulley roller casing fitting punch	
020426Y	Piston fitting fork	

Stores code	Description	
020431Y	Valve oil seal extractor	
020434Y	Oil pressure control fitting	
020444Y	Tool for fitting/ removing the driven pulley clutch	
020456Y	Ø 24 mm adaptor	
020477Y	Adaptor 37 mm	
020483Y	30 mm guide	

Stores code	Description	
020489Y	Hub cover support stud bolt set	
020428Y	Piston position check support	
020621Y	HV cable extraction adaptor	
001467Y035	Belle for OD 47-mm bearings	
020626Y	Driving pulley lock wrench	
001467Y013	Pliers to extract ø 15-mm bearings	

Stores code	Description	
020627Y	Flywheel lock wrench	
020467Y	Flywheel extractor	
020454Y	Tool for fitting piston pin stops (200 - 250)	
020622Y	Transmission-side oil guard punch	
020480Y	Petrol pressure check set	
020244Y	15 mm diameter punch	

Stores code	Description	
020115Y	Ø 18 punch	
020271Y	Tool for removing-fitting silent bloc	
001467Y017	Driver for OD 36 mm bearings	
020234y	extractor	
020441Y	26 x 28 mm adaptor	
020362Y	12 mm guide	
020358Y	37x40-mm adaptor	

Stores code	Description	
001467Y002	Driver for OD 73 mm bearing	
020641Y	EFI Technology software upgrade	
020469Y	Reprogramming kit for scooter diagnosis tester	
020639Y	Tilt locking control unit software	
020481Y	Control unit interface wiring	

Stores code

Description

020481Y004

Parking control unit interface wiring



020460Y

Scooter diagnosis and tester



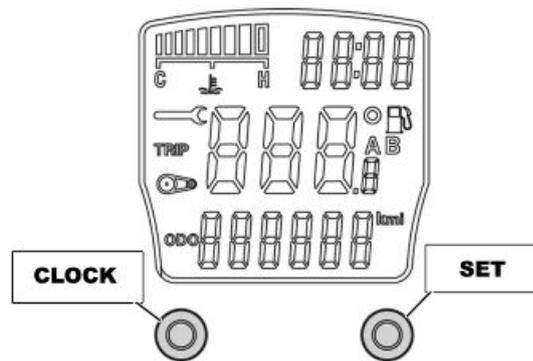
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MAINTENANCE

MAIN

Follow these steps to reset the service icons:

1. With the key set to OFF, hold down the "SET" button and turn the key to ON : the "BELT" and "SERVICE" icons start flashing.
2. Push the "CLOCK" button for less than 1 second and the icons are displayed sequentially. The icon selected remains ON and the other is no longer displayed.
3. Press the "CLOCK" button again for more than 3 seconds to reset the relative maintenance step and the icon is no longer displayed.



Maintenance chart

EVERY 2 YEARS

75

Action

Coolant - change
Brake fluid - change
secondary air filter - cleaning

EVERY 3.000 KM

10'

Action

Engine oil - level check/ top-up

AFTER 1,000 KM

90'

Action

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

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

AFTER 6.000 KM

130'

Action

Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean
Sliding blocks / variable speed rollers - check
Driving belt - check
Coolant level - check
Brake pads - check condition and wear
Brake fluid level - check
Tilt locking gripper control cable - adjustment
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test
Engine oil - change
Oil filter -Replacement
Valve clearance - check

AFTER 12,000 KM AND AFTER 60,000 KM

140'

Action

Engine oil - replacement
Hub oil level - check
Spark plug / electrode gap - check / replacement
Air filter - clean
Engine oil - change
Idle speed (*) - adjustment
Sliding block / variable speed rollers - change
Throttle lever - adjustment
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Tilt locking gripper control cable - adjustment
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check
Vehicle and brake test - road test
Driving Belt - replacement

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

AFTER 18,000 KM AND AFTER 54,000 KM

110'

Action

Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean

Action

Sliding blocks / variable speed rollers - check
Driving belt - check
Coolant level - check
Radiator - external cleaning/ check
Brake pads - check condition and wear
Brake fluid level - check
Tilt locking gripper control cable - adjustment
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test
Engine oil - change
Oil filter -Replacement
Valve clearance - Check

AFTER 24,000 KM AND AFTER 48,000 KM

170'

Action

Engine oil - replacement
Hub oil - change
Spark plug / electrode gap - check / replacement
Air filter - clean
Engine oil - change
Idle speed (*) - adjustment
Sliding block / variable speed rollers - change
Throttle lever - adjustment
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Tilt locking gripper control cable - adjustment
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check
Vehicle and brake test - road test
Driving Belt - replacement

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

AFTER 30,000 KM, AFTER 42,000 KM AND AFTER 66,000 KM

100'

Action

Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean
Sliding blocks / variable speed rollers - check
Driving belt - check
Coolant level - check
Brake pads - check condition and wear
Brake fluid level - check
Tilt locking gripper control cable - adjustment

Action

Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test
Engine oil - change
Oil filter -Replacement

AFTER 36.000 KM

260'

Action

Engine oil - replacement
Hub oil level - check
Spark plug / electrode gap - check / replacement
Air filter - clean
Engine oil - change
Valve clearance - Check
Idle speed (*) - adjustment
Sliding block / variable speed rollers - change
Throttle lever - adjustment
Driving belt - replacement
Coolant level - check
Radiator - external cleaning/ check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid hoses - replacement
Brake fluid level - check
Tilt locking gripper control cable - adjustment
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check
Vehicle and brake test - road test

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

AFTER 72.000 KM

280'

Action

Engine oil - replacement
Hub oil - change
Spark plug / electrode gap - check / replacement
Air filter - clean
Engine oil - change
Valve clearance - Check
Idle speed (*) - adjustment
Sliding block / variable speed rollers - change
Throttle lever - adjustment
Driving belt - replacement
Coolant level - check
Radiator - external cleaning/ check
Steering - adjustment
Brake control levers - greasing

Action

Brake pads - check condition and wear
Brake fluid hoses - replacement
Brake fluid level - check
Tilt locking gripper control cable - adjustment
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check
Vehicle and brake test - road test

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

Carburettor

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

WARNING

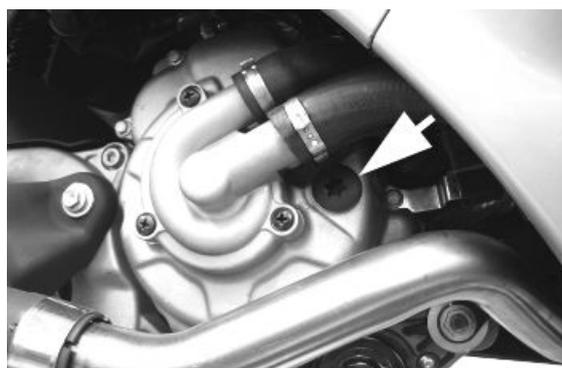
PETROL IS HIGHLY EXPLOSIVE ALWAYS REPLACE THE GASKETS TO AVOID PETROL LEAKS

Checking the spark advance

The ignition advance is determined electronically on the basis of parameters known by the control unit. For this reason it is not possible to declare the reference values based on the engine rpm. The ignition timing value is detectable any time using the diagnostic tester. It is possible to check whether the ignition advance determined by the system does in fact correspond with the value actually activated on the engine, by means of the stroboscopic light.

Proceed as follows:

- Remove the spark plug.
- Remove the transmission crankcase.



- Rotate the driving pulley fan until the reference marks between the flywheel and flywheel cover coincide as shown in the photograph.
- Bring the reference mark onto the transmission side between the fan and the transmission cover as shown in the photograph.
- Refit the spark plug.
- Refit the plastic cap on the flywheel cover.
- Adjust the spark gap to the contact position (no reference mark visible) and install it on engine between the spark plug and spark plug cap
- Connect the induction calliper on the spark gap cable respecting the proper polarity (the arrow on the calliper must be pointing at the spark plug).
- Connect the diagnostic tester.
- Start the engine.
- Select the «parameter» function in this menu.
- Select the stroboscopic light command in the traditional four-stroke engine position (1 spark 2 revs).
- Check that the real values of rpm and ignition advance match those measured using the diagnostic tester.

If the values do not correspond, check:

- distribution timing
- revolution-timing sensor
- Injection control unit

Specific tooling

020460Y Scooter diagnosis and tester

020330Y Stroboscopic light for timing control

020621Y HV cable extraction adaptor

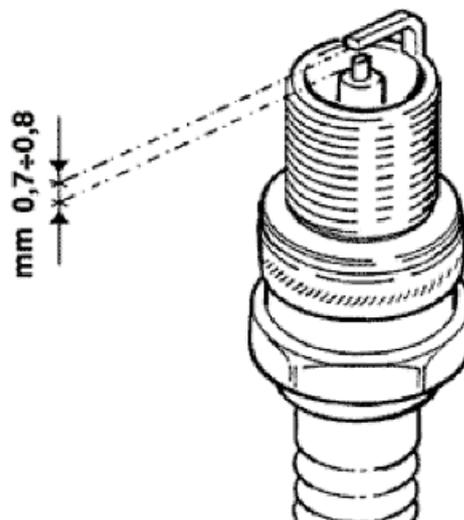
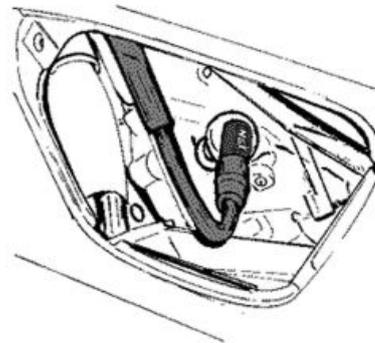




Spark plug

To service the spark plug the engine must be cold, proceed as follows:

- Undo the knob located inside the rear case and remove the saddle.
- Remove the spark plug cap.
- Use the supplied spanner (with retaining rubber ring) to remove the spark plug.
- Disconnect and remove the spark plug cable.
- Examine it carefully and replace it if the insulator is chipped or cracked.
- Measure electrode gap with a thickness gauge and, if necessary, adjust the gap by carefully bending the outer electrode forward or away.
- Make sure the sealing washer is in good condition.
- Fit the spark plug, screw it manually and lock it to the prescribed torque with a spark plug spanner.



CAUTION

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

Characteristic

Electrode gap

0.7-0.8 mm

Electric characteristic

Spark plug

NGK CR 8EB

Locking torques (N*m)

Spark plug 12 ÷ 14

Hub oil

Make sure that there is oil in the rear hub (amount of oil contained ~ 150 cm³). To check the rear hub oil level, proceed as follows:

- 1) Park the scooter on level ground and place it on the centre stand.
- 2) Unscrew the dipstick "A", dry it with a clean rag and then reinsert it, **screwing it tightly into place**;
- 3) Remove the dipstick and check that the oil level is above the first notch from the bottom.
- 4) Screw the dipstick back in, checking that it is locked in place.

N.B.

THE REFERENCE MARKS ON THE HUB OIL LEVEL DIPSTICK, EXCEPT FOR THE ONE INDICATING THE "MAX" LEVEL, REFER TO OTHER MODELS BY THE MANUFACTURER AND HAVE NO SPECIFIC FUNCTION FOR THIS MODEL.

CAUTION



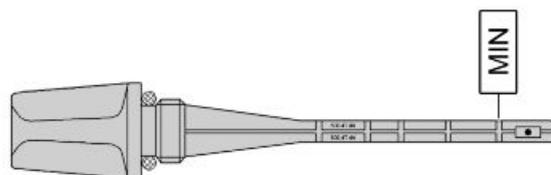
RIDING THE VEHICLE WITH INSUFFICIENT HUB LUBRICATION OR WITH CONTAMINATED OR IMPROPER LUBRICANTS ACCELERATES THE WEAR AND TEAR OF THE MOVING PARTS AND CAN CAUSE SERIOUS DAMAGE.

CAUTION



USED OILS CONTAIN SUBSTANCES HARMFUL TO THE ENVIRONMENT. FOR OIL REPLACEMENT, CONTACT AN AUTHORISED SERVICE CENTRE, WHICH IS EQUIPPED TO DISPOSE OF USED OILS IN AN ENVIRONMENTALLY FRIENDLY AND LEGAL WAY.

CAUTION



UPON REPLACING HUB OIL, AVOID THE OIL COMING INTO CONTACT WITH THE REAR BRAKE DISC.

Recommended products

AGIP ROTRA 80W-90 Rear hub oil

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

Check

- Rest the vehicle on its centre stand on an even surface.
- Unscrew the oil dipstick, dry it with a clean cloth and reinsert it, screwing it in thoroughly.
- Take out the dipstick and check that the oil level reaches the 2nd notch from the bottom.
- Screw the dipstick back into place completely.

Recommended products

AGIP ROTRA 80W-90 Rear hub oil

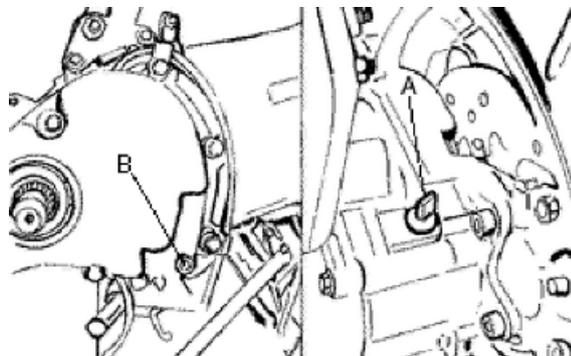
SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications

Locking torques (N*m)

Hub oil drainage plug 15 ÷ 17

Replacement

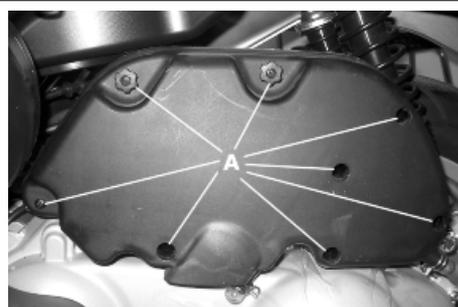
- Remove the oil cap «A».
- Unscrew the oil drainage cap "B" and drain out all the oil.
- Screw on the drainage plug and fill up the hub with oil (about 150 cc)



Air filter

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

- Wash with water and neutral soap.
- Dry with a clean cloth and short blasts of compressed air.
- Soak with a mixture of 50% petrol and 50% **SELENIA AIR FILTER OIL**.



-Drip dry the filter and then squeeze it between the hands without wringing.

CAUTION

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

CAUTION

WHEN TRAVELLING ON DUSTY ROADS, THE AIR FILTER MUST BE CLEANED MORE OFTEN THAN SHOWN IN THE SCHEDULED MAINTENANCE CHART.

Engine oil

Replacement

The engine oil and cartridge filter, "C", must be replaced after the first km, and every 6.000 km thereafter, by an **Authorised Piaggio Service Centre**. The engine should be emptied by draining the oil from the drainage cap "B" of the gauze filter on the flywheel side. In order to facilitate the oil drainage, loosen the cap/dipstick. Since a certain quantity of oil remains in the circuit still, the top-up should be carried out with around $600 \div 650 \text{ cm}^3$ of oil from cap "A". Then start up the scooter, leave it running for a few minutes and switch it off: after five minutes, check the level and if necessary top up **without exceeding the MAX. level**. The cartridge filter must be replaced at every oil change. For top up and change, use new oil of the recommended type.



WARNING



RUNNING THE ENGINE WITH INSUFFICIENT LUBRICATION OR WITH INADEQUATE LUBRICANTS ACCELERATES THE WEAR AND TEAR OF THE MOVING PARTS AND CAN CAUSE IRRETRIEVABLE DAMAGE.

WARNING



EXCESSIVE OIL LEVEL AT TOP-UPS CAN LEAD TO SCALE FORMATION AND VEHICLE MALFUNCTIONING.

CAUTION



USED OILS CONTAIN SUBSTANCES HARMFUL TO THE ENVIRONMENT. FOR OIL REPLACEMENT, CONTACT AN AUTHORISED PIAGGIO SERVICE CENTRE, AS THEY ARE EQUIPPED TO DISPOSE OF SPENT OILS IN AN ENVIRONMENTALLY FRIENDLY AND LEGAL WAY.

CAUTION



USING OILS OTHER THAN THOSE RECOMMENDED CAN SHORTEN THE LIFE OF THE ENGINE.

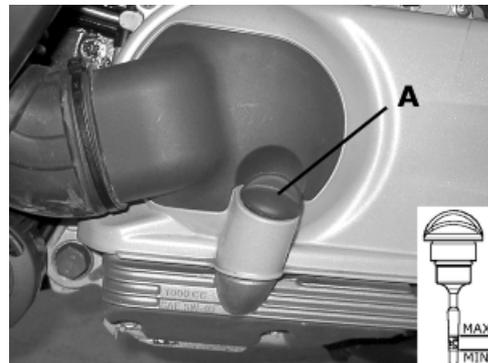
Recommended products

AGIP CITY HI TEC 4T Engine oil

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

Check

Every time the scooter is used, a visual check should be made on the level of the engine oil when the engine is cold. The oil level should be somewhere between the **MAX** and **MIN** index marks on the level bar; the check must be made with the scooter upright, resting on the centre stand. If the check is carried out after the vehicle has been used, and therefore with a hot engine, the level line will be lower; in order to carry out a correct check it is necessary to wait at least 10 minutes after the engine has been stopped, so as to get the correct level.



Checking the ignition timing

-Remove the 4 fixing screws and move away from the engine the flywheel cover fitted with a water pump and cooling manifolds.

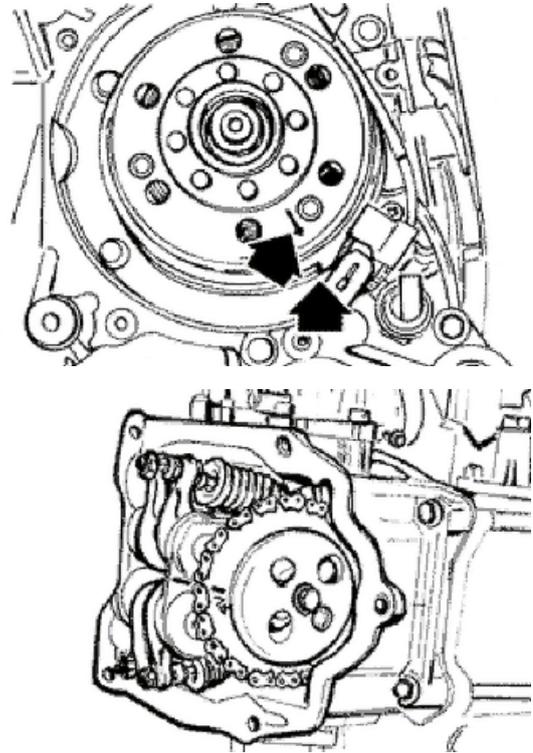
-Rotate the flywheel until the reference matches the crankcase operation end as shown in the figure (TDC). Make sure that the 4V reference point on the camshaft control pulley is aligned with the reference point on the head as shown in the second figure. If the reference mark is opposite the indicator on the head, make the crankshaft turn once more.

-The TDC reference mark is repeated also between the flywheel cooling fan and the flywheel cover.

To use this reference mark, remove the spark plug and turn the engine in the opposite direction to the normal direction using a calliper spanner applied to the camshaft command pulley casing.

N.B.

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



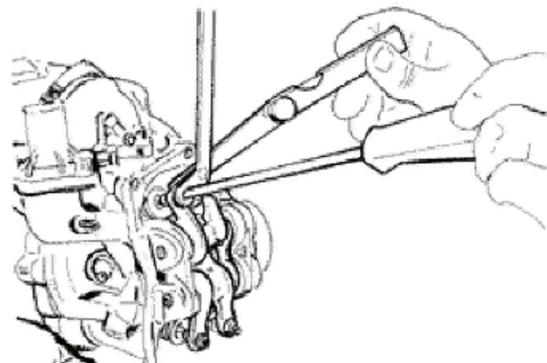
Checking the valve clearance

-To check valve clearance, centre the reference marks of the timing system

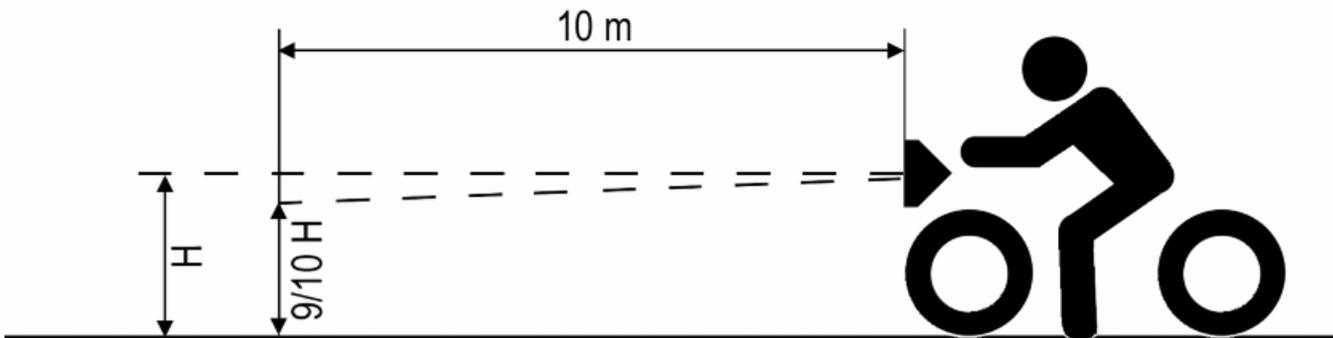
- Use a thickness gauge to check that the clearance between the valve and the register corresponds with the indicated values. When the valve clearance values, intake and drainage respectively, are different from the ones indicated below, adjust them by loosening the lock nut and operate on the register with a screwdriver as shown in the figure.

Intake: 0.10 mm (when cold)

Discharge: 0.15 mm (when cold)

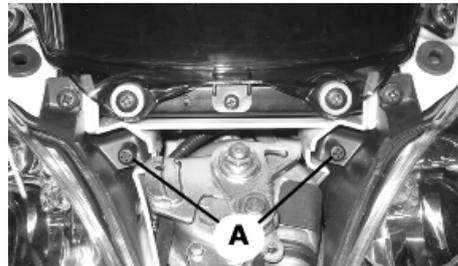


Headlight adjustment



Proceed as follows:

1. Position the unloaded vehicle, in running order and with the tyres inflated to the prescribed pressure, on a flat surface 10 m away from a half-lit white screen; ensure that the longitudinal axis of the vehicle is perpendicular to the screen;
2. Remove the headlight assembly central cover
3. Turn on the headlight and check that the limit of the projected light beam is not over 9/10 or below 7/10 of the distance from the ground to the centre of the vehicle headlight;
4. Otherwise, adjust the headlight with the screws «A» indicated in the figure



N.B.

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

SAS filters inspection and cleaning

Insert the filter into its housing.

Fit the valve support with the 3 screws

Insert the rubber spacer on the valve and proceed with the assembly on the support.

Fix the support with the 2 screws.

Fit the pre-filter and position it matching the 2 references shown in the figure.

Fit the sealing gasket.



Align the drive with the reference on the crankcase cover.

Place the flywheel in the TDC position and align the references as shown in the figure.

Check the correct fitting of the 2 reference dowels and fit the engine cover.

Be careful to properly fit the flywheel connector to the relative supplements.

Secure the rotor cover by using a new gasket with the 4 screws.

Connect the flywheel connector and the valve control vacuum-operated pipe.

Fit the coupling to the valve and position it as shown in the figure.

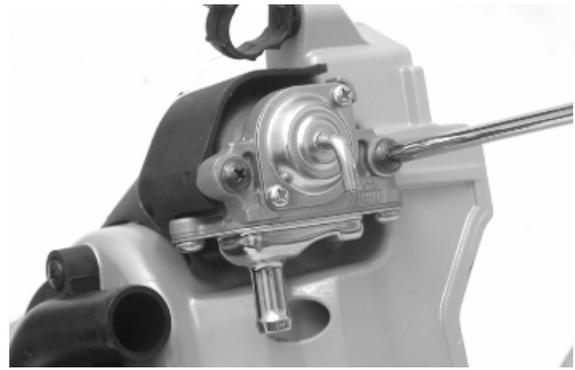
Lock the upper clamp.

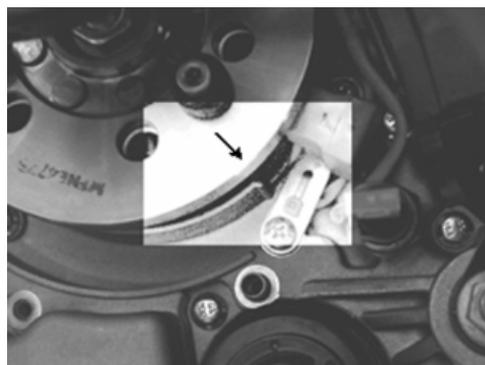
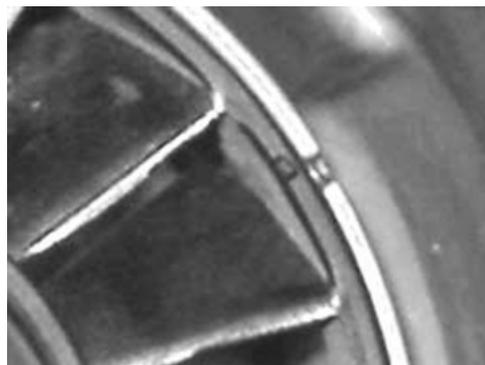
Fix the metal tube to the head using the gasket and the 2 screws.

Lock the lower clamp connecting manifold / pipe.

Locking torques (N*m)

Stator assembly screws (°) $3 \div 4$







Undo the 3 fixing screws "A", remove the secondary air filter cover and then take out the filtering element "B".

- Wash with water and neutral soap.
- Dry with a clean cloth and short blasts of compressed air.

Remove the flywheel cover by operating on its clamps and remove the primary filtering element.

- Wash with water and neutral soap.
- Dry with a clean cloth and short blasts of compressed air.

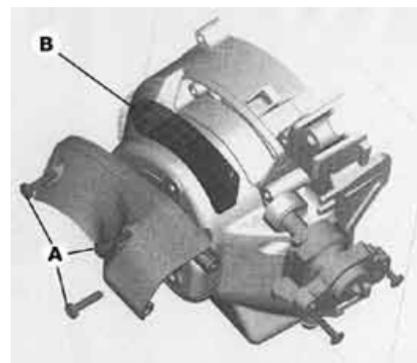
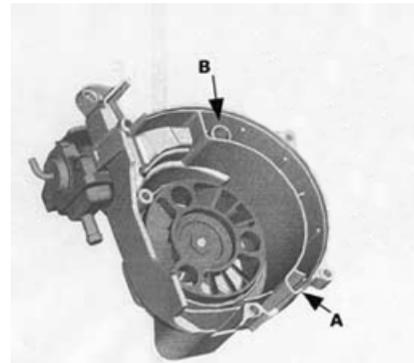
Check that the filter casing is clean paying special attention to "A" and "B" passages

CAUTION

NEVER RUN THE ENGINE WITHOUT THE SECONDARY AIR FILTER

CAUTION

WHEN TRAVELLING ON DUSTY ROADS, THE AIR FILTER MUST BE CLEANED MORE OFTEN THAN SHOWN IN THE SCHEDULED MAINTENANCE CHART.



INDEX OF TOPICS

TROUBLESHOOTING

TROUBL

This section makes it possible to find what solutions to apply when troubleshooting.
 For each breakdown, a list of the possible causes and respective interventions is given.

Engine

Poor performance

<u>POOR PERFORMANCE</u>	
Possible Cause	Operation
The carburettor is dirty; fuel pump or vacuum valve damaged	Remove, wash with solvent and dry with compressed air or replace
Excess of encrustations in the combustion chamber	Descale the cylinder, the piston, the head and the valves
Incorrect timing or worn timing system elements	Time the system again or replace the worn parts
Muffler obstructed	Replace
Air filter blocked or dirty.	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% of specific oil (Selenia Air Filter Oil), then hand dry without squeezing, allow to drip dry and then reassemble.
Automatic starter failure	Check: mechanical movement, electric connection and fuel supply, replace if required.
Oil level exceeds maximum	Check for causes and fill to reach the correct level
Lack of compression: parts, cylinder and valves worn	Replace the worn parts
Transmission belt worn	Replace
Inefficient automatic transmission	Check the rollers and the pulley movement, replace the damaged parts and lubricate the driven pulley moveable guide with Montblanc Molybdenum Grease
Clutch slipping	Check the clutch system and/or the bell and replace if necessary
Overheated valves	Remove the head and the valves, grind or replace the valves
Wrong valve adjustment	Adjust the valve clearance properly
Valve seat distorted	Replace the head assembly
Air filter dirty	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% of specific oil (Selenia Air Filter Oil), then hand dry without squeezing, allow to drip dry and then reassemble.
Defective floating valve	Check the proper sliding of the float and the functioning of the valve

Starting difficulties

<u>DIFFICULT STARTING</u>	
Possible Cause	Operation
Altered fuel characteristics	Drain off the fuel no longer up to standard; then, refill

Possible Cause	Operation
Rpm too low at start-up or engine and start-up system damaged	Check the starter motor, the system and the torque limiter
Incorrect valve sealing or valve adjustment	Inspect the head and/or restore the correct clearance
Engine flooded	Try starting-up with the throttle fully open. If the engine fails to start, remove the spark plug, dry it and before refitting, make the motor turn so as to expel the fuel excess taking care to connect the cap to the spark plug, and this in turn to the ground. If the fuel tank is empty, refuel and start up.
Automatic starter failure	Check: mechanical movement, electric connection and fuel supply, replace if required.
Air filter blocked or dirty.	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% of specific oil (Selenia Air Filter Oil), then hand dry without squeezing, allow to drip dry and then reassemble.
Faulty spark plug or incorrect ignition advance	Replace the spark plug or check the ignition circuit components
The carburettor is dirty; fuel pump or vacuum valve damaged	Remove, wash with solvent and dry with compressed air or replace
Flat battery	Check the charge of the battery, if there are any sulphur marks, replace and use the new battery following the instructions shown in the chapter
Intake coupling cracked or clamps incorrectly tightened	Replace the intake coupling and check the clamps are tightened
Defective floating valve	Check the proper sliding of the float and the functioning of the valve
Carburettor nozzles clogged	Dismantle, wash with solvent and dry with compressed air

Excessive oil consumption/Exhaust smoke

EXCESSIVE OIL CONSUMPTION/SMOKEY EXHAUST

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

Insufficient lubrication pressure

POOR LUBRICATION PRESSURE

Possible Cause	Operation
By-Pass remains open	Check the By-Pass and replace if required. Carefully clean the By-Pass area.
Oil pump with excessive clearance	Perform the dimensional checks on the oil pump components
Oil filter too dirty	Replace the cartridge filter

Possible Cause

Operation

Oil level too low

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

Engine tends to cut-off at full throttle

ENGINE STOP FULL THROTTLE

Possible Cause

Operation

Faulty fuel supply

Check or replace the pump and the vacuum valve, check the vacuum intake and the pipe sealing

Incorrect float level

Restore the level in the tank by bending on the float the thrusting reed of the petrol inlet rod so as to have the float parallel to the tank level with the carburettor inverted.

Water in the carburettor

Empty the tank through the appropriate bleed nipple.

Maximum nozzle dirty - lean mixture

Wash the nozzle with solvent and dry with compressed air

Engine tends to cut-off at idle

ENGINE STOP IDLING

Possible Cause

Operation

Incorrect timing

Time the system and check the timing system components

Cut off device failure

Check that the following parts work properly: valve; diaphragm; spring; and that the air calibration elements are clean; check if the sponge filter is clean too

Incorrect idle adjustment

Adjust using the rpm indicator

Pressure too low at the end of compression

Check the thermal group seals and replace worn components

Faulty spark plug or incorrect ignition advance

Replace the spark plug or check the ignition circuit components

The starter remains on

Check: electric wiring, circuit not interrupted, mechanical movement and power supply; replace if necessary

Minimum nozzle dirty

Wash the nozzle with solvent and dry with compressed air

Excessive exhaust noise

EXCESSIVE EXHAUST NOISE

Possible Cause

Operation

Secondary air device cut-off valve not working

Replace the secondary air device

Depression intake pipe of the secondary air device disconnected or dented

Replace the pipe

Reed valve of the secondary air device does not close correctly and wears out the rubber coupling between the device and the head pipe

Replace the device and the coupling

High fuel consumption

HIGH FUEL CONSUMPTION

Possible Cause	Operation
Float level	Restore the level in the tank by bending on the float the thrusting reed of the petrol inlet rod so as to have the float parallel to the tank level with the carburettor inverted.
Loose nozzles	Check the maximum and minimum nozzles are adequately fixed in their fittings
Fuel pump failure	Check that there is no fuel in the low-pressure duct
Starter inefficient	Check: electric wiring, circuit continuity, mechanical sliding and power supply
Air filter blocked or dirty.	Dismantle the sponge, wash with water and shampoo, then soak it in a mixture of 50% petrol and 50% of specific oil (Selenia Air Filter Oil), then hand dry without squeezing, allow to drip dry and then reassemble.

SAS malfunctions

ANOMALIES IN THE SECONDARY AIR DEVICE

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

Transmission and brakes

Clutch grabbing or performing inadequately

IRREGULAR CLUTCH PERFORMANCE OR SLIPPAGE

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

Insufficient braking

INSUFFICIENT BRAKING

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

Brakes overheating

BRAKES OVERHEATING

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

Electrical system

Battery

BATTERY

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

Turn signal lights malfunction

TURN INDICATOR NOT WORKING

Possible Cause	Operation
Electronic ignition device failure	With the key switch set to "ON" jump the contacts 1 (Blue - Black) and 5 (Red/Blue) on the control unit connector. If by operating the turn indicator

Possible Cause	Operation
	control the lights are not steadily on, replace the control unit; otherwise, check the cable harness and the switch.

Steering and suspensions

Rear wheel

REAR WHEEL ROTATES WITH ENGINE AT IDLE

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

Controls

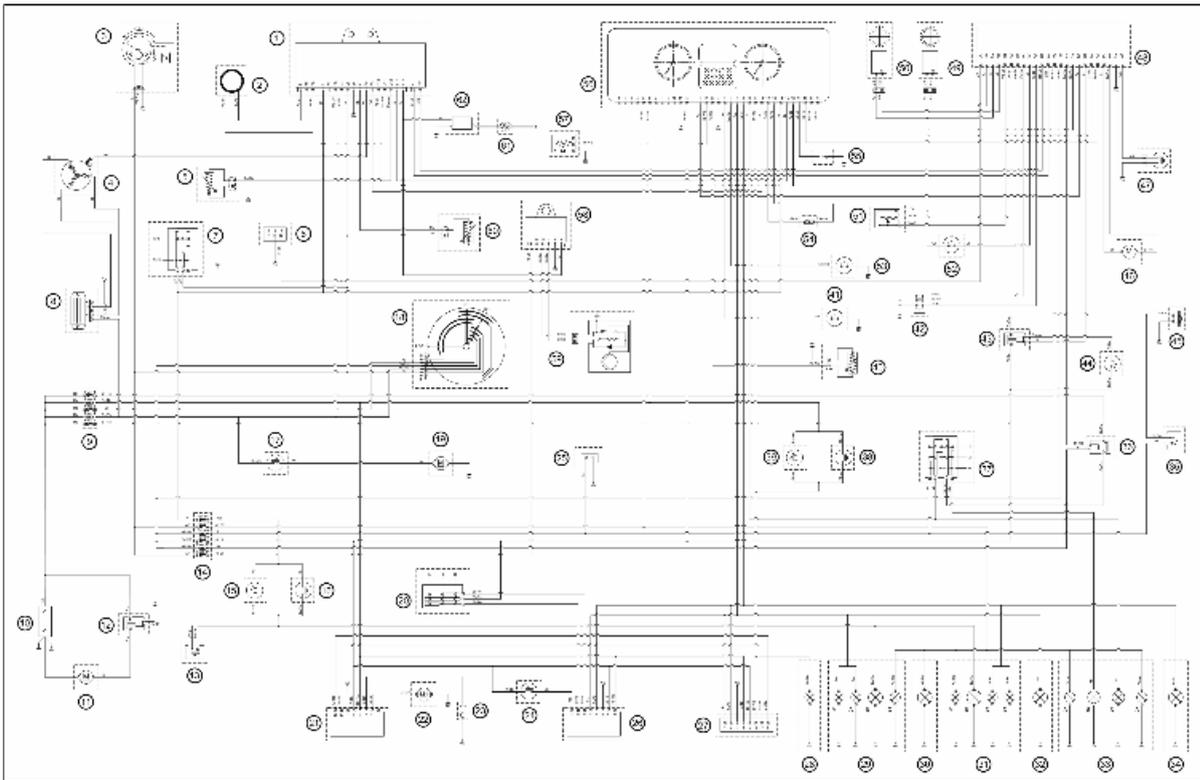
STEERING CONTROLS AND SUSPENSIONS

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

INDEX OF TOPICS

ELECTRICAL SYSTEM

ELE SYS

**KEY**

1. Electronic ignition device
2. Immobilizer aerial
3. Throttle body position
4. Magneto flywheel Pick-up
5. CDI temperature sensor
6. Diagnostics socket
7. Engine stop switch
8. Voltage regulator
9. Main fuses
10. Battery
11. Starter motor
12. Start up remote control switch
13. Starter button
14. Secondary fuses
15. Stop button on rear brake
16. Stop button on front brake
17. Thermoswitch
18. Key switch
19. Radiator electric fan

- 20.** Turn signal switch
- 21.** Saddle opening receiver
 - 1. Aerial
 - 2. Actuator 1
 - 3. Reset
 - 4. +Battery
 - 6. Key
 - 7. Ground
 - 11. Channel 1/3 selection
 - 12. Alarm code out
- 22.** Saddle opening actuator
- 23.** Reset
- 24.** Hazard button
- 25.** Wiring for Tom-Tom
- 26.** Hazard and turn indicator control device
 - 1. Hazard button
 - 2. Left switch
 - 3. Right switch
 - 4. Left turn indicator
 - 5. Right turn indicator
 - 6. Ground
 - 7. Key
 - 8. +Battery
- 27.** Wiring for antitheft device
- 28.** Helmet compartment internal light
- 29.** Rear left turn indicator
 - A. Left turn indicator bulbs
 - B. Stop light bulb
 - C. Tail light bulb
- 30.** Licence plate lamp
- 31.** Rear right turn indicator
 - A. Tail light bulb
 - B. Stop light bulb
 - C. Right turn indicator bulbs
- 32.** Front left turn indicator
- 33.** Headlight assembly
 - A. Tail light bulbs
 - B. Low-beam bulb

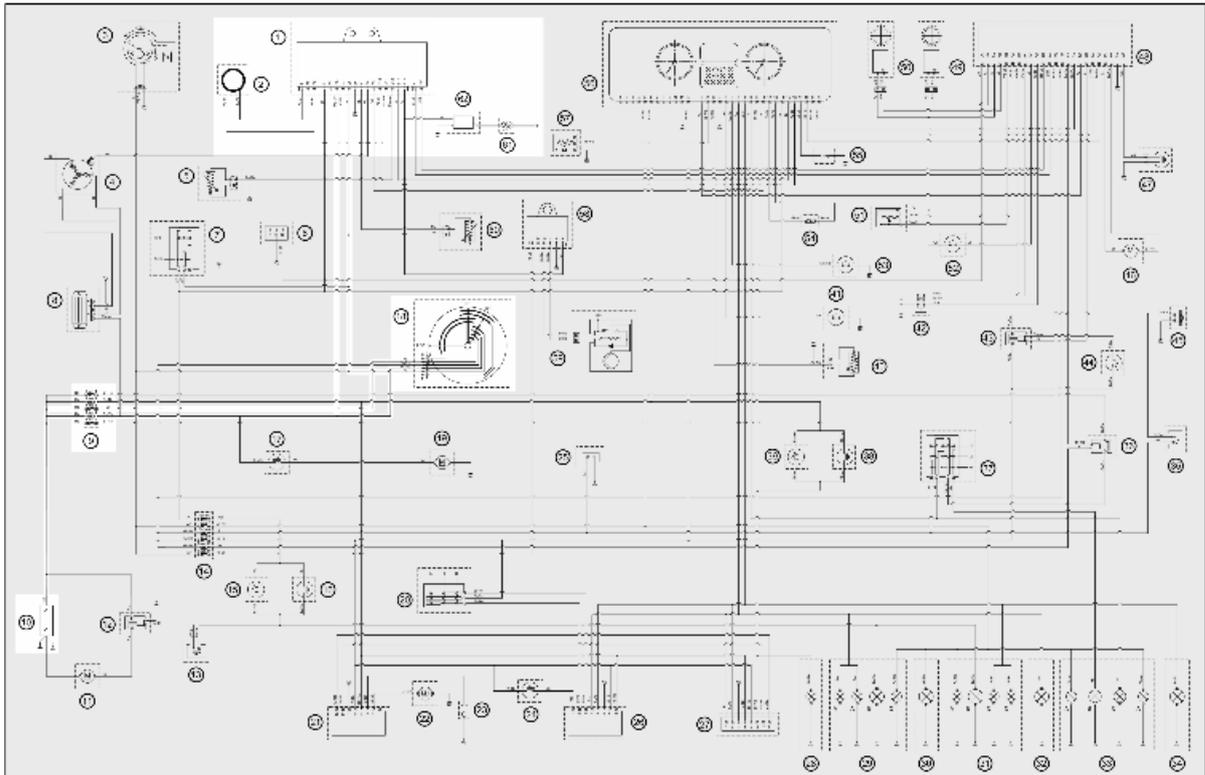
- C. High-beam bulb
- 34. Front right turn indicator
- 35. Horn button
- 36. Remote control headlight
- 37. Light switch
- 38. Helmet compartment light switch
- 39. Helmet compartment light switch
- 40. Instrument panel coolant temperature sensor
- 41. Mode button
- 42. Locking/unlocking switch
- 43. Horn remote control
- 44. Pressure sensor
- 45. Horn
- 46. Geared motor
- 47. Brake calliper sensor
- 48. Parking electronic control unit
- 49. Right wheel revolution sensor
- 50. Left wheel revolution sensor
- 51. Potentiometer
- 52. Rider presence sensor
- 53. Oil pressure sensor
- 54. External temperature sensor
- 55. Parking brake button
- 56. Instrument panel
- 57. Fuel level transmitter
- 58. Electric pump control device (for scooters with electric pump only)
 - 1. +Key
 - 3. Pump ground connection
 - 4. +Pump
 - 5. Ground
 - 6. Engine revs
- 59. Fuel pump (for scooters with electric pump only)
- 60. Starter
- 61. Spark plug
- 62. HV coil

KEY

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

Conceptual diagrams

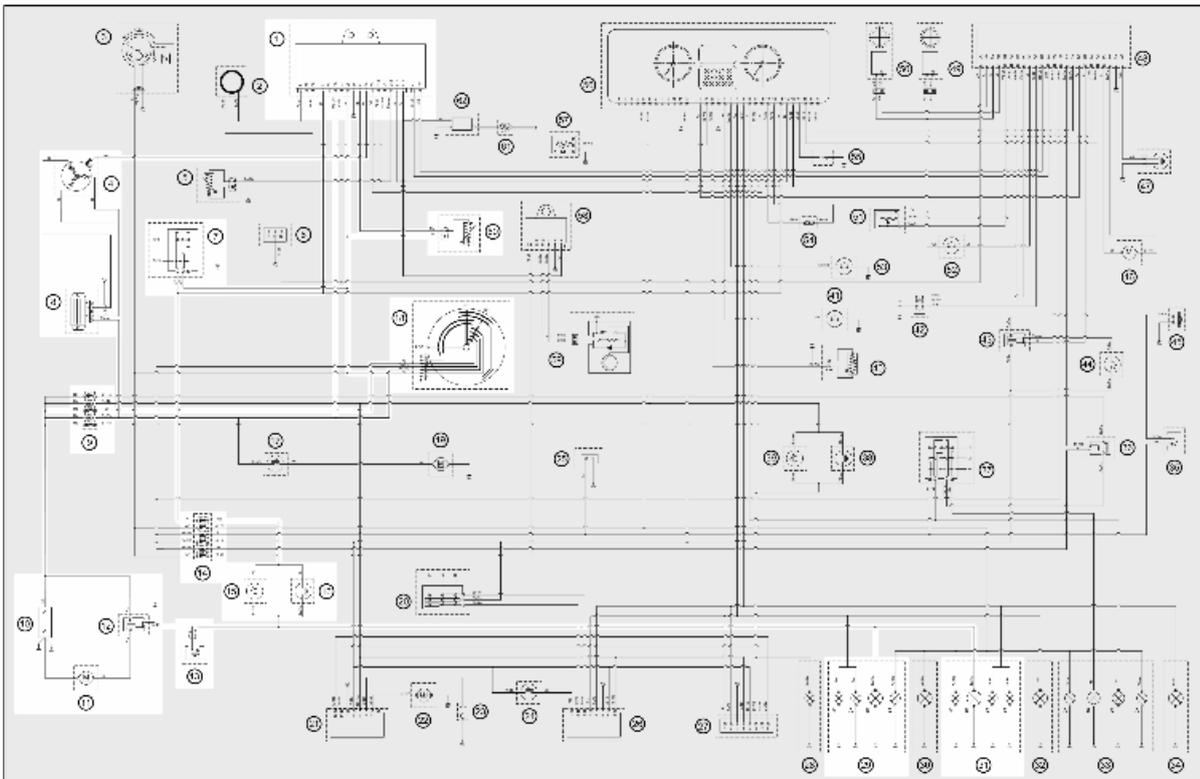
Ignition



KEY

- 1. Electronic ignition device
- 2. Immobilizer aerial
- 9. Main fuses
- 10. Battery
- 18. Key switch
- 61. Spark plug
- 62. HV coil

Battery recharge and starting



KEY

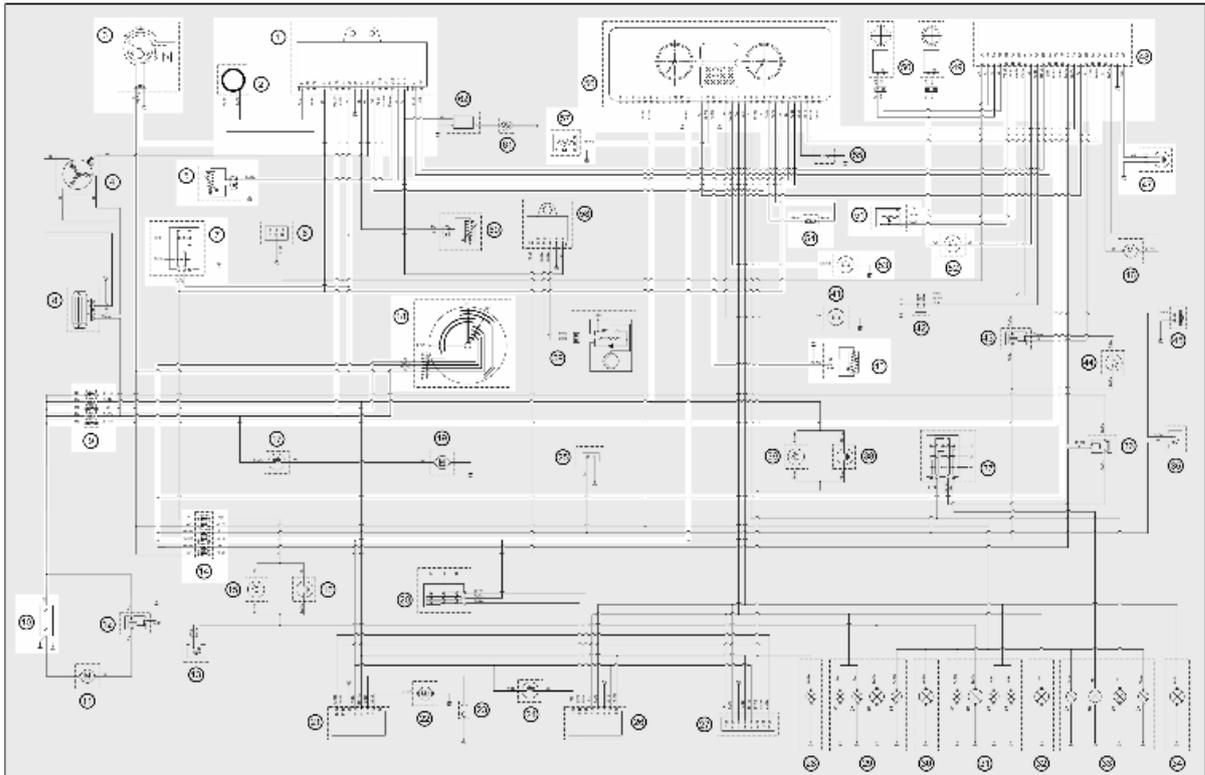
- 1. Electronic ignition device
- 4. Magneto flywheel Pick-up
- 7. Engine stop switch
- 8. Voltage regulator
- 9. Main fuses
- 10. Battery
- 11. Starter motor
- 12. Start up remote control switch
- 13. Starter button
- 14. Secondary fuses
- 15. Stop button on rear brake
- 16. Stop button on front brake
- 18. Key switch
- 29. Rear left turn indicator
- A. Left turn indicator bulbs
- B. Stop light bulb
- C. Tail light bulb

31. Rear right turn indicator

A. Tail light bulb

B. Stop light bulb

C. Right turn indicator bulbs

60. Starter**Level indicators and enable signals section****KEY**

1. Electronic ignition device

2. Immobilizer aerial

3. Throttle body position

5. CDI Temperature sensor

7. Engine stop switch

9. Main fuses

10. Battery

14. Secondary fuses

18. Key switch

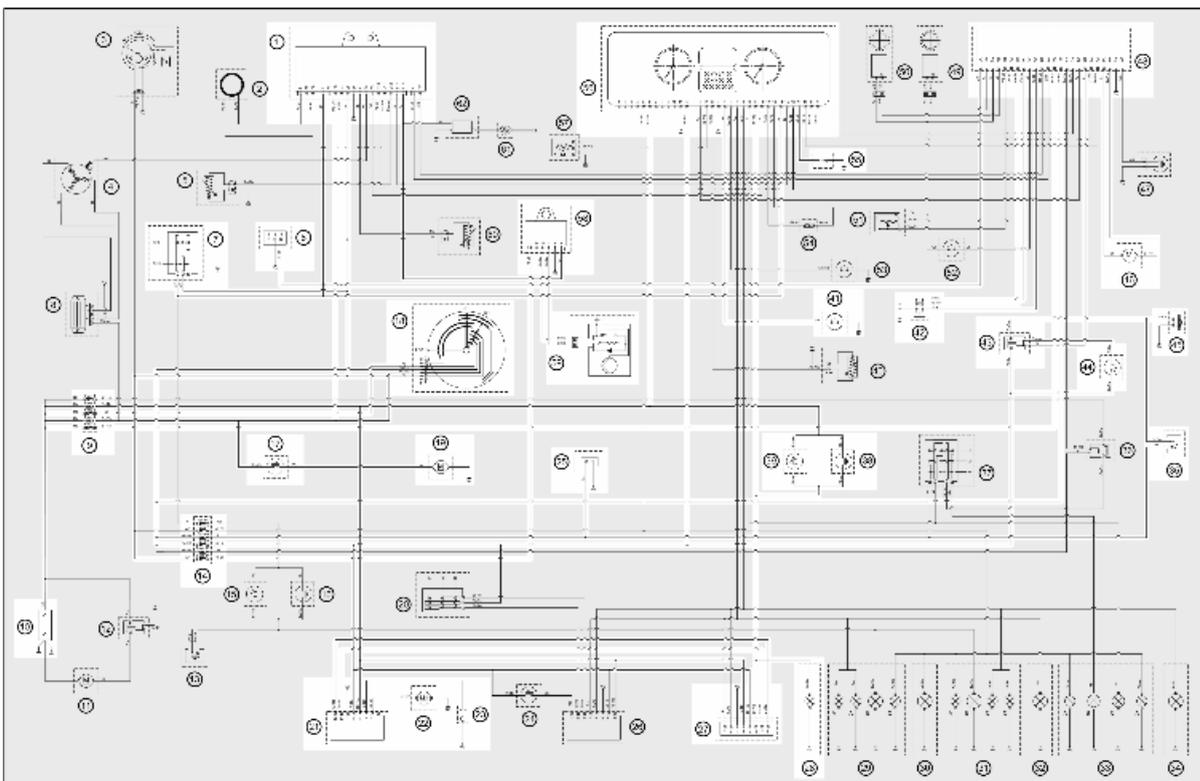
40. Instrument panel cooling liquid temperature sensor

47. Brake calliper sensor

48. Parking electronic control unit

- 49. Right wheel revolution sensor
- 50. Left wheel revolution sensor
- 51. Potentiometer
- 52. Rider presence sensor
- 53. Oil pressure sensor
- 54. External temperature sensor
- 56. Instrument panel
- 57. Fuel level transmitter

Devices and accessories



KEY

- 1. Electronic ignition device
- 6. Diagnostics socket
- 7. Engine stop switch
- 9. Main fuses
- 10. Battery
- 14. Secondary fuses
- 17. Thermoswitch
- 18. Key switch
- 19. Radiator electric fan

21. Saddle opening receiver

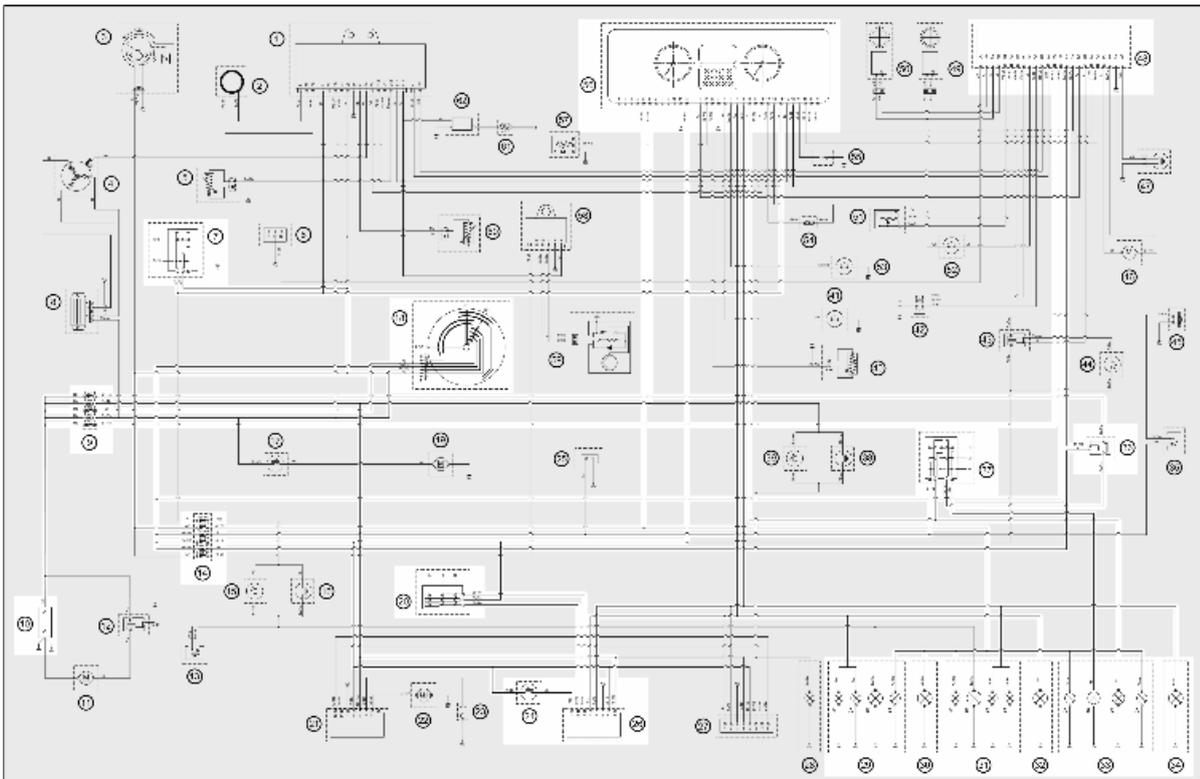
1. Aerial
2. Actuator 1
3. Reset
4. +Battery
6. Key
7. Ground
11. Channel 1/3 selection
12. Alarm code out

22. Saddle opening actuator**23. Reset****25. Wiring for Tom-Tom****27. Wiring for antitheft device****28. Helmet compartment internal light****35. Horn button****38. Helmet compartment light switch****39. Helmet compartment light switch****41. Mode button****42. Locking/unlocking switch****43. Horn remote control****44. Pressure sensor****45. Horn****46. Geared motor****48. Parking electronic control unit****55. Parking brake button****56. Instrument panel****58. Electric pump control device (for scooters with electric pump only)**

1. +Key
3. Pump ground connection
4. +Pump
5. Ground
6. Engine revs

59. Fuel pump (for scooters with electric pump only)

Lights and turn indicators



KEY

- 7. Engine stop switch
- 9. Main fuses
- 10. Battery
- 14. Secondary fuses
- 18. Key switch
- 20. Turn signal switch
- 24. Hazard button
- 26. Hazard and turn signal control device
- 1. Hazard button
- 2. Left switch
- 3. Right switch
- 4. Left turn indicator
- 5. Right turn indicator
- 6. Ground
- 7. Key
- 8. +Battery
- 29. Rear left turn indicator

- A. Left turn indicator bulbs
- B. Stop light bulb
- C. Tail light bulb
- 30.** Licence plate lamp
- 31.** Rear right turn indicator
 - A. Tail light bulb
 - B. Stop light bulb
 - C. Right turn indicator bulbs
- 32.** Front left turn indicator
- 33.** Headlight assembly
 - A. Tail light bulbs
 - B. Low-beam bulb
 - C. High-beam bulb
- 34.** Front right turn indicator
- 36.** Remote control headlight
- 37.** Light switch
- 48.** Parking electronic control unit
- 56.** Instrument panel

Checks and inspections

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

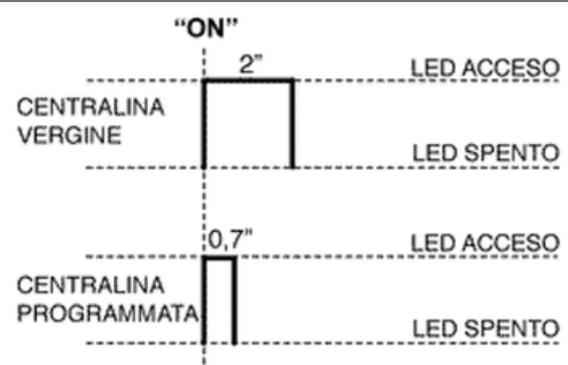
Immobiliser

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

The ignition system consists of:

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

The diagnosis led also works as a blinking light to deter theft. This function is activated every time the key switch is turned to "OFF" and it remains active 48 hours so as not to damage the battery charging process.



When the key switch is turned to "ON", this blinking function is deactivated. A flash then confirms the system has switched to "ON".

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

If the led turns off and remains so when switching to "ON", it is necessary to check if there is battery voltage in the electric control unit.

Connect the immobilizer tester to the diagnosis socket (see ET4 125 manual) located below the spark plug inspection port.

If the serial led remains off, check the control unit voltage supply; in order to do this, disconnect the control unit connector and check if:

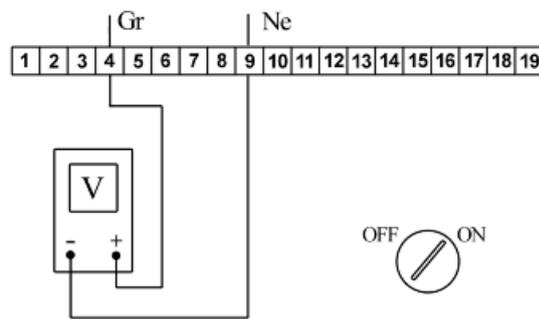
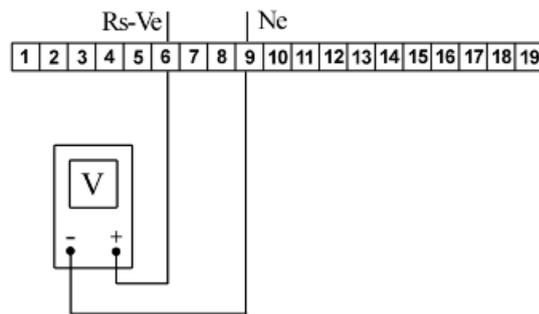
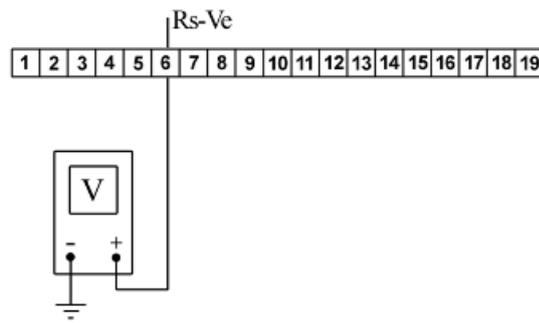
- there is battery voltage between the terminal No. 6 (Red/Green) and the ground connection.
- there is battery voltage between the terminal No. 6 (Red/Green) and the terminal No. 9 (Negative) as shown in the figure.

If no voltage is detected, check the wiring to the battery positive lead and see if 15A fuse No. 4 is in good conditions.

- there is battery voltage between the terminal No. 8 (Orange) and the terminal No. 9 (Negative) with the key switch set to "ON" and the emergency switch set to "RUN".

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

- Engine stop remote control;
- Emergency cut-off switch;
- Key switch contacts.



Virgin circuit

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

Program the system with the MASTER (Brown) and SERVICE (Black) keys as follows:

- Insert the MASTER key, turn it to "ON" and keep it in that position for 2 seconds (limit values: 1 ÷ 3 seconds).
- Alternately insert all the available black keys and turn each one of them to "ON" for 2 seconds.
- Insert the MASTER key again and turn it to "ON" for 2 seconds.

The maximum time to change keys is 10 seconds. A maximum of 7 (Black) service keys can be programmed at one time.

Sequence and times must be strictly observed or it will be necessary to repeat the procedure from the start.

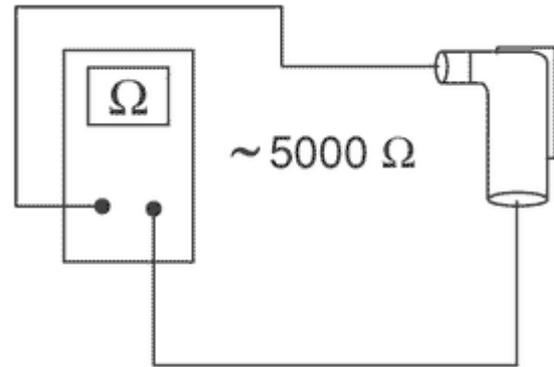
Once the control unit has been programmed, the control unit is inseparably matched with the MASTER key transponder.

This matching allows programming further service keys in case of loss, replacement, etc. Each new time new data is programmed the previously stored one is deleted.

If a service key setting is lost, it is essential to carefully check the efficiency of the high voltage system:

Shielded cap resistance ~ 5000 Ω .

In any case it is advisable to use resistive spark plugs.

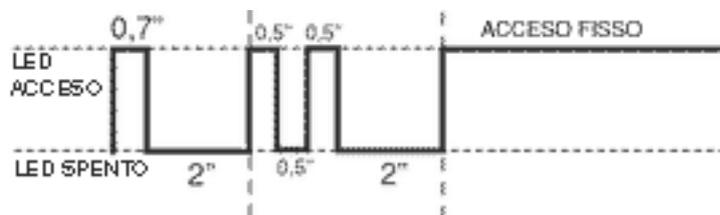


Diagnostic codes

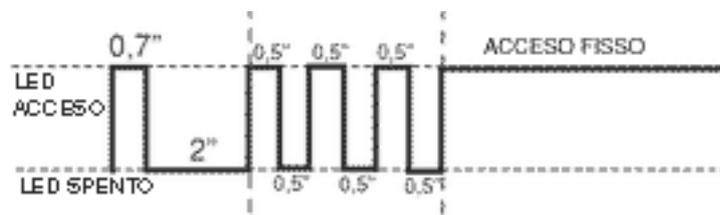
The flash indicating the switching to "ON" can be followed by a phase of programmed failure warnings. That is, the led is off for 2 seconds, and then diagnosis codes are transmitted with 0.5-second flashes. After the failure code indication, a steadily on LED signals that ignition is disabled; see the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

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

Ignition disabled-Vehicle immobilised



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



Diagnostic code - 2 flashes

Diagnosis code: 2-flashes

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

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

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

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

CAUTION

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

Electric characteristic immobilizer aerial

~ 7 ÷ 9 Ohm

Ignition circuit

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

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

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

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

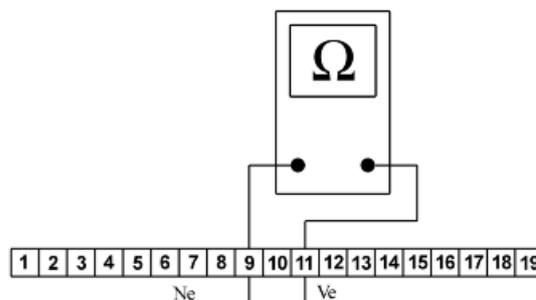
No spark plug

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

- Pick-Up check.

Disconnect the control unit connector and check that the cable between terminal No. 11 (Green) and terminal No. 9 (Black) is not interrupted.

Check the Pick-Up and its power line:



Electric characteristic

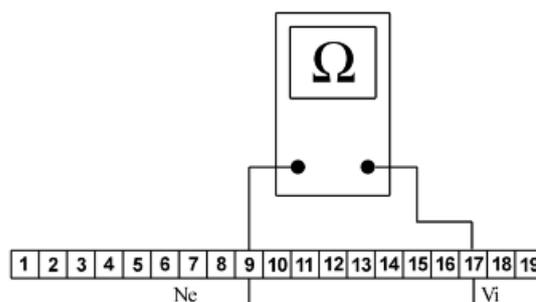
Pick-up resistance value

Pick-up resistance value: 105 ÷ 124 Ohm

If a break in the circuit is found, check again the flywheel and the engine ground connectors (see engine manual). If non-conforming values are detected, replace the Pick-Up, otherwise check the cable harness and the connections. In case conforming values are measured and the wiring and connections check is OK, try replacing the control unit (without programming) and make sure the failure has been solved by checking sparks are produced in the spark plug; only then program the control unit. If no sparks are produced with the new control unit, proceed as follows.

- HV primary coil check

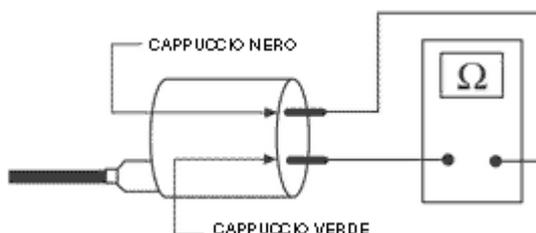
Disconnect the control unit connector and check that the cable between terminal No. 17 (Violet) and terminal No. 9 (Black) is not interrupted (see figure). If non-conforming values are detected, disconnect the two connectors on the HV coil and check its continuity (see figure). If the values are correct, repair the cable harness and restore the connections; otherwise, replace the HV coil.



Electric characteristic

High voltage coil primary resistance value

High voltage coil primary resistance value: 0.4 ÷ 0.5 Ohm



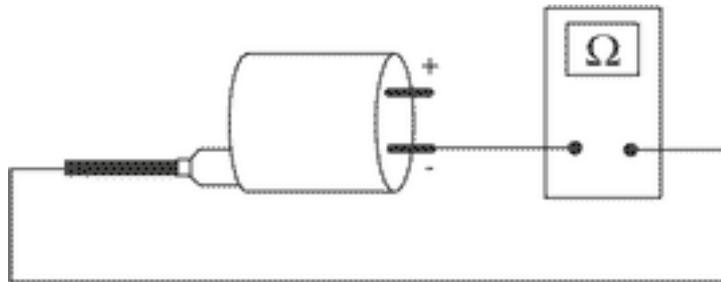
HV coil secondary check

Disconnect the spark plug cap from the HV cable and measure the resistance between the HV cable terminal and the HV coil negative terminal (see figure). If non-conforming values are measured, replace the HV coil. To carry out a more complete diagnosis, check the peak voltage with the multimeter adaptor.

Electric characteristic

High voltage coil secondary resistance value

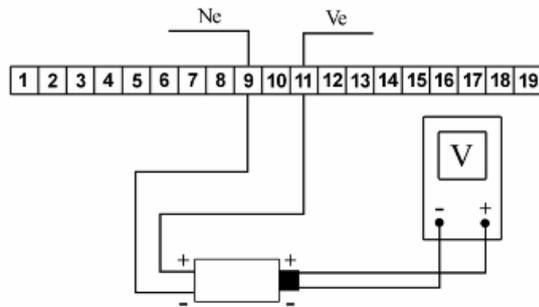
High voltage coil secondary resistance value: $\sim 3000 \pm 300$ Ohm



- Pick-Up.

Disconnect the control unit connector and connect the positive wire to connector No. 11 and the negative wire to connector No. 9 (see figure).

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



Electric characteristic

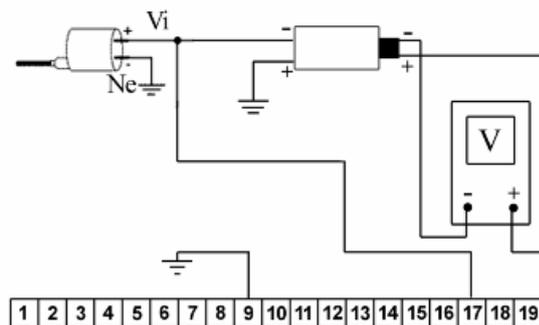
Pick-Up voltage value

Pick-Up voltage value: > 2 Volt

- H.V. coil

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

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



N.B.

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

Electric characteristic

High voltage coil voltage value

High voltage coil voltage value: > 100 Volt

Battery recharge circuit

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

The alternator is directly connected to the voltage regulator.

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

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

Stator check

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

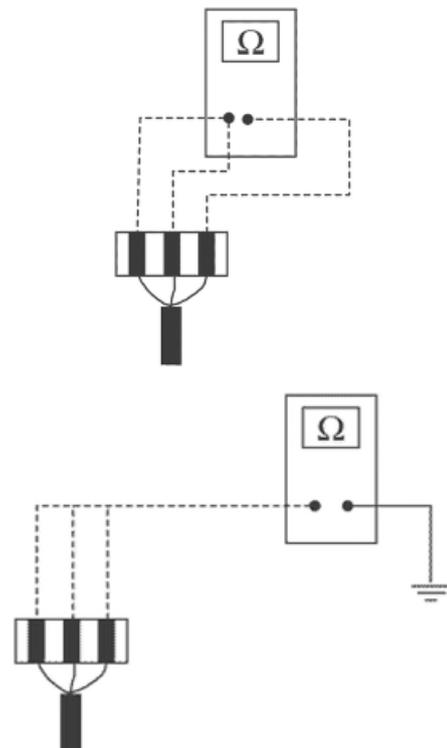
Electric characteristic

Ohm value:

0.7 ÷ 0.9 Ohm

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

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



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

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

Stage indicative resistance: 0.7 - 0.9 Ω

Minimum oil pressure switch check

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

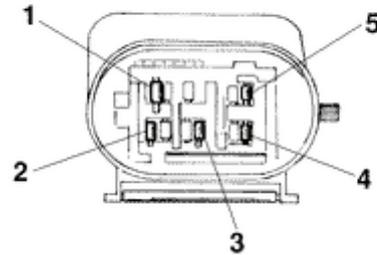
Pick-Up check

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

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

N.B.

VALUES ARE STATED AT AMBIENT TEMPERATURE. A CHECK WITH THE STATOR AT OPERATING TEMPERATURE MAY RESULT IN VALUES HIGHER THAN THOSE STATED.



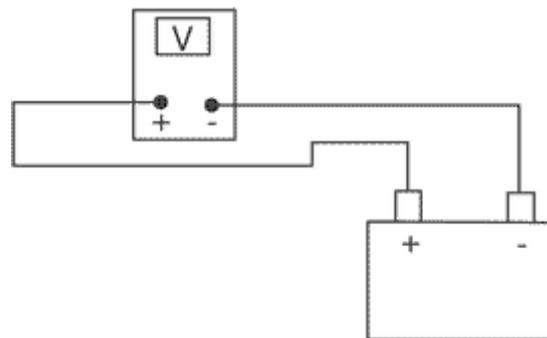
Voltage regulator check

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

The voltage should not exceed 15.2 Volt.

In case higher voltages are detected, replace the regulator.

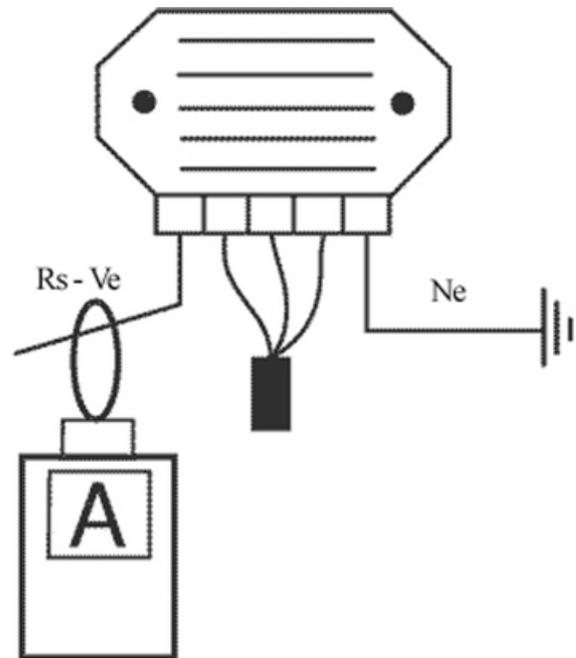
In case of voltage values lower than 14 Volt, check the stator and the corresponding cable harness.



Recharge system voltage check

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

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



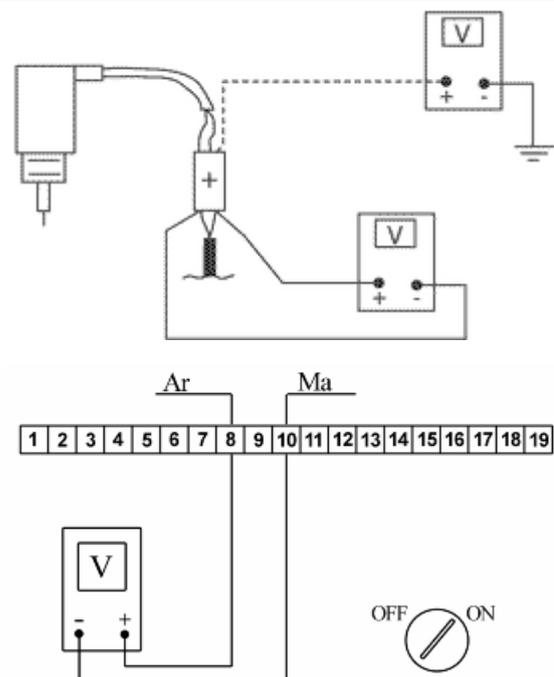
Choke Inspection

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

If voltage is detected, replace the automatic starter as it is surely failing.

If no voltage is detected, connect the multimeter negative terminal to the earth terminal and the positive terminal to the automatic starter orange cable; with the key switch set to «ON» check whether there is battery voltage; if there is no voltage, check the wiring connections to the key switch and that the 15A fuse works properly.

If there is voltage, check again the ignition control unit connector. After disconnecting the starter, start up the engine and keep it at idle speed; then check there is voltage connecting the multimeter



positive probe to terminal No. 8 (Orange), and the negative one to terminal No. 10 (Brown) (see figure).

Replace the control unit if there is no voltage; otherwise, check the wiring connections between the starter and the control unit.

Lights list

LIGHT BULBS TABLE

	Specification	Desc./Quantity
1	Low-beam bulb	Type: HALOGEN (H1) Power: 12V - 55W Quantity: 1
2	High-beam light bulb	Type: HALOGEN (H1) Power: 12V - 55W Quantity: 1
3	Helmet compartment light bulb	Type: CYLINDRIC Power: 12V - 5W Quantity: 1
4	Rear turn indicator bulb	Type: ALL GLASS Power: 12V - 5W Quantity: 2 RHS + 2 LHS
5	Rear tail light bulb	Type: ALL GLASS Power: 12V - 5W Quantity: 1 RHS + 1 LHS
6	Stop light bulb	Type: SPHERICAL Power: 12V - 10W Quantity: 2
7	License plate light bulb	Type: ALL GLASS Power: 12V - 5W Quantity: 1
8	Front turn indicator bulb	Type: ALL GLASS Power: 12V - 10W Quantity: 1 RHS + 1 LHS
9	Front tail light bulb	Type: ALL GLASS Power: 12V - 3W Quantity: 1 RHS + 1 LHS
10	Instrument panel bulb	Type: ALL GLASS Power: 12V - 2W Quantity: 4

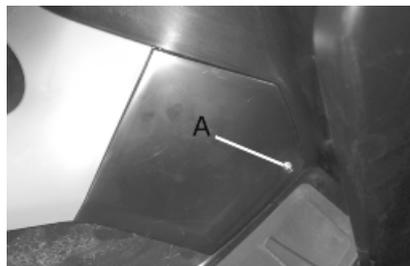
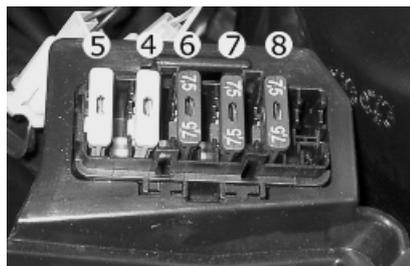
Fuses

The electrical system has eleven fuses divided into two fuse boxes to protect the different installation circuits. One of them is inside the battery compartment and the other is at the right internal side of the footrest. To be able to reach them, loosen the screw "A" and remove the plastic cover. The chart shows the position and characteristics of the fuses in the vehicle.

CAUTION



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



FUSE CHART

	Specification	Desc./Quantity
1	Fuse No. 1	Capacity: 10A Protected circuits: from the battery: headlight remote control Location: battery compartment
2	Fuse No. 2	Capacity: 7.5 A Protected circuits: from the battery: saddle opening receiver, hazard and turn indicator control device, anti-theft device pre-installation, instrument panel, helmet compartment lighting Location: battery compartment
3	Fuse No. 3	Capacity: 15 A Protected circuits: live: parking control ECU, fuses 8, 9 and 10 Location: battery compartment
4	Fuse No. 4	Capacity: 15 A Protected circuits: from the battery: voltage regulator, electric fan, electronic ignition device live: engine stop switch, starter, electronic ignition device, TPS, fuses 7 and 11 Location: battery compartment
5	Fuse No. 5	Capacity: 20A Protected circuits:

Specification		Desc./Quantity
		from the battery: parking control ECU Location: battery compartment
6	Fuse No. 6	Capacity: 4A Protected circuits: start-up, stop lights. Location: footrest
7	Fuse No. 7	Capacity: 4A Protected circuits: panel lighting, tail lights, license plate light Location: footrest
8	Fuse No. 8	Capacity: 7.5 A Protected circuits: lights switch, horn, wiring for Tom-Tom Location: footrest
9	Fuse No. 9	Capacity: 7.5 A Protected circuits: saddle opening receiver, hazard and turn indicator control device, anti-theft device pre-installation, turn indicator switch, instrument panel, horn remote control Location: footrest
10	Fuse No. 10	Capacity: 7.5 A Protected circuits: headlight remote control Location: footrest
11	Fuse No. 11	Capacity: 3A Protected circuits: electric pump control device Location: footrest

Dashboard

- A = Led immobilizer / anti-theft device
 B= Speedometer with twin scale (km/h and mph)
 C = CLOCK switch
 D = Digital display
 E = Front suspension locking system warning light (if available)
 F = SET switch
 G = Rpm indicator
 H = Fuel gauge
 I = Warning light for helmet compartment courtesy light on
 L = Engine control telltale light and injection system failure warning light
 M = Low fuel warning light
 N = Engine stop warning light
 D= Turn indicator warning light
 P = Low oil pressure warning light



Q = Front suspension locking system failure warning light (if available)

R = Warning light for parking brake engaged

C = High-beam warning light

Pushing the «**CLOCK**» button for less than 1 second displays the following sequence:

- TIME
- DATE

To set the clock push and hold the «**CLOCK**» button longer than 3 seconds.

The numbers showing the hours will begin flashing.

Set the hour using the «**SET**» button. Push the «**CLOCK**» button again and the minutes numbers start flashing.

Set the minutes using the «**SET**» button. Push the «**CLOCK**» button again and the day numbers start flashing.

Set the day with the «**SET**» button. Push the «**CLOCK**» button again and the month numbers start flashing.

Set the month with the «**SET**» button. Push the «**CLOCK**» button again and the year numbers start flashing.

Set the year with the «**SET**» button. Press the «**CLOCK**» button again for 4 seconds to exit the adjustment menu.

During the reset process, not pressing any buttons for a period longer than 8 seconds ends the process automatically and the display shows the modified time.

Sealed battery

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

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

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

INSTRUCTIONS FOR THE BATTERY REFRESH AFTER OPEN-CIRCUIT STORAGE

1) Voltage check

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

- If voltage exceeds 12.60 V, the battery can be installed without any renewal recharge.

- If voltage is below 12.60 V, a renewal recharge is required as explained in 2).

2) Constant voltage battery charge mode

- Constant voltage charge equal to 14.40 ÷ 14.70V

-Initial charge voltage equal to 0.3 ÷ 0.5 for Nominal capacity

- Charge time:

10 to 12 h recommended

Minimum 6 h

Maximum 24 h

3) Constant current battery charge mode

- Charge current equal to 1/10 of the nominal capacity of the battery

- Charge time: 5 h

CAUTION

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

CHARGE THE BATTERY BEFORE USE TO ENSURE OPTIMUM PERFORMANCE. INADEQUATE CHARGING OF THE BATTERY WITH A LOW ELECTROLYTE LEVEL BEFORE IT IS FIRST USED SHORTENS THE LIFE OF THE BATTERY.

IF THE VEHICLE IS NOT USED FOR SOME TIME (1 MONTH OR MORE) THE BATTERY NEEDS TO BE RECHARGED PERIODICALLY. THE BATTERY RUNS DOWN COMPLETELY IN THE COURSE OF THREE MONTHS. IF IT IS NECESSARY TO REFIT THE BATTERY IN THE VEHICLE, BE CAREFUL NOT TO REVERSE THE CONNECTIONS TAKING INTO ACCOUNT THAT THE GROUND WIRE (BLACK) MARKED (-) MUST BE CONNECTED TO THE - NEGATIVE TERMINAL WHILE THE OTHER TWO RED WIRES MARKED (+) MUST BE CONNECTED TO THE TERMINAL MARKED WITH THE + POSITIVE SIGN

WARNING

WHEN THE BATTERY IS REALLY FLAT (WELL BELOW 12.6V) IT MIGHT OCCUR THAT 5 HOURS OF RECHARGING ARE NOT ENOUGH TO ACHIEVE OPTIMAL PERFORMANCE.

GIVEN THESE CONDITIONS IT IS HOWEVER ESSENTIAL NOT TO EXCEED 8 HOURS OF CONTINUOUS RECHARGING SO AS NOT TO DAMAGE THE BATTERY ITSELF.

Dry-charge battery

COMMISSIONING A NEW DRY-CHARGED BATTERY

- Remove the battery air pipe stop cap and each single element caps.
- Fill the battery with electrolyte of 1.270+/-0.01 kg/l density (corresponding to 31+/-1 Bé) with an ambient temperature not below 15°C, until it reaches the upper level indicated on the block.
- Tilt the battery slightly to remove any air bubbles formed during filling.
- Place the caps on each single element filling holes without screwing them and leave the battery to rest. During this stage, the battery is subjected to a gasification phenomenon and temperature increases.
- Let it rest until it reaches ambient temperature (this stage can take up to 60 minutes).
- Tilt the battery slightly to facilitate the elimination of any gas bubbles present inside; restore the level using the same filling electrolyte

Note: This is the last time that electrolyte can be added. Future top-ups should be done only with distilled water;

- Before 24 hours elapse, recharge the battery following these steps:
- Connect the battery charger terminals observing the correct polarity;
- With the battery charger drw. 020333Y and/or drw. 020334Y operate the battery charger control by selecting the position corresponding to that capacity;

- Otherwise, charge the battery with direct current equal to 1/10 of rated capacity (e.g. for a battery with a 9Ah rated capacity, the charging current should be 0.9-1.0A) for approximately a 4-6 hour charge.

Note: Batteries that have been stored for a long time may take a longer charging time. The battery chargers drw. 020333Y and drw. 020334Y have an automatic protection which interrupts the recharge after 12 hours to avoid battery harmful heating. In this case, a green LED turns on to indicate the activation of the safety system and not the end of the charge.

- Let the open circuit battery rest for approximately 4-6 hours; then check the off-load voltage using a standard tester.

- If the open-circuit voltage is higher or equal to **12.6V**, the battery is charged adequately. Slightly shake or tilt the battery to eliminate any air bubbles formed during recharging.

- Check the electrolyte levels again, fill them with distilled water up to the upper level line if necessary, clean battery properly, close each single cell cap tightly and install it on the vehicle.

- If the voltage indicated is low, charge the battery another 4-6 hours in the way described above.

Note: With the battery charger drw. 020334Y, it is possible to check the battery charge level with the **Check** function. The value indicated on the display must be higher than the value indicated on the chart; otherwise, recharge the battery again in the same way indicated above.

Connectors

Dashboard

20-WAY INSTRUMENT CONNECTOR

	Specification	Desc./Quantity
1	1	Speed signal
2	2	Fuel level signal
3	3	Water temperature sensor
4	4	Water temperature sensor ground connection
5	5	Remote mode button
6	6	Oil pressure warning light
7	7	Left direction warning light
8	8	Right direction warning light
9	9	High-beam lamp warning light
10	10	Open boot warning light
11	11	Revolution sensor
12	12	Ambient temperature sensor
13	13	Ambient temperature sensor ground connection
14	14	Engine disabled warning light
15	15	Immobilizer warning light
16	16	Engine control warning light
17	17	Parking brake warning light
18	18	Tilt locking warning light
19	19	Tilt locking system failure warning light
20	20	Live positive lead of parking control unit

12-WAY INSTRUMENT CONNECTOR

	Specification	Desc./Quantity
1	5	Lighting
2	6	Battery positive
3	11	Earth
4	12	Live positive lead



Remote seat opening

Zeroing

- Remove the left side fairing to access the saddle opening receiver control unit indicated in the photograph
- Remove the metal terminal and connect it to a good earth point, or to terminal 7 (black), for at least 10 seconds.
- In this operation all the remote controls stored in the control unit will be deleted.



WARNING
THE CONTROL UNIT CAN PROGRAMME UP TO 8 REMOTE CONTROLS.



Programming

Follow these steps to program the remote controls:

1. Insert the remote control key to be programmed in the steering lock key block.

2. Turn the key to «**ON**», press the button on the remote control, release the button, turn the key back to «**OFF**» from the «**ON**» position, all within 4 seconds.

3 Wait 1 to 8 seconds.

4. Repeat steps 2 and 3 for 4 times without removing the key.

The control unit confirms the programming has been successfully executed by opening the saddle.

WARNING

TO STORE THE OTHER REMOTE CONTROLS TO MEMORY, (MAXIMUM 8), YOU NEED TO REPEAT THE WHOLE PROCEDURE AGAIN. FAILURE TO CARRY OUT THESE OPERATIONS WITHIN THE INDICATED TIMES WILL RESULT IN THE AUTOMATIC CANCELLATION OF THE PROCESS FOR PROGRAMMING THE REMOTE-CONTROLLED KEYS.

WARNING

AVOID PRESSING THE REMOTE CONTROL BUTTON MORE THAN ONCE WHEN FAR AWAY FROM THE SCOOTER. THE SYNCHRONISM BETWEEN THE REMOTE CONTROL AND THE RECEIVER CAN BE IMPAIRED. SHOULD THIS BE THE CASE, REPEAT THE PROGRAMMING PROCEDURE. DO NOT KEEP THE REMOTE CONTROL IN PLACES WITH TEMPERATURES EXCEEDING 60° C THE BATTERY WILL RUN DOWN TOO QUICKLY.

WARNING

TO AVOID BATTERY DISCHARGE, THE SADDLE OPENING REMOTE CONTROL RADIO RECEIVER DEACTIVATES 7 DAYS AFTER THE LAST TIME THE VEHICLE WAS SHUT OFF. JUST TURN THE KEY TO «ON» TO REACTIVATE THE RECEIVER.

INDEX OF TOPICS

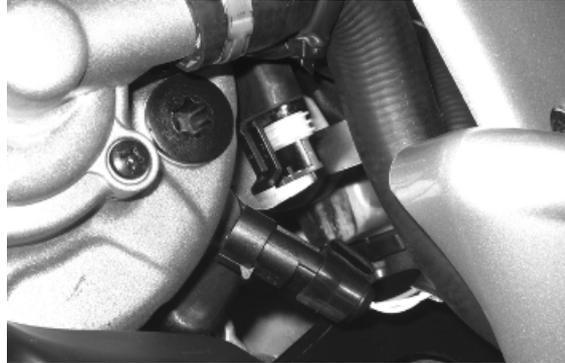
ENGINE FROM VEHICLE

ENG VE

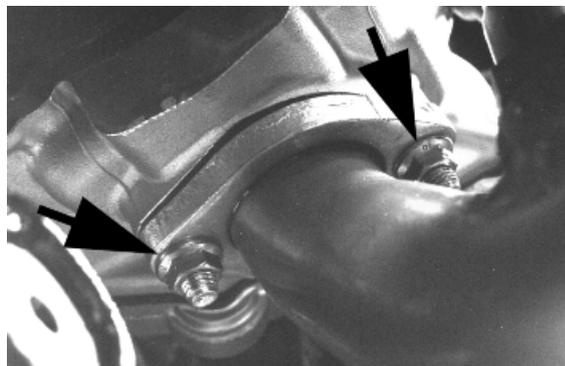
This section describes the operations to carry out when removing the engine from the vehicle.

Exhaust assy. Removal

- Remove the Lambda probe from its support and disconnect it.



- Undo the two exhaust manifold fixings on the head. To undo the nuts fixing the muffler flange to the head properly, you must use a jointed wrench that enables you to get at the right nut as well, according to the direction of travel, that is difficult to get at with a traditional straight wrench.



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



- Remove the lambda probe from the manifold.



CAUTION: SHOULD IT BE NECESSARY TO REMOVE ONLY THE MUFFLER TIP, ALWAYS REPLACE THE GRAPHITE GASKET BETWEEN STUB AND TIP.

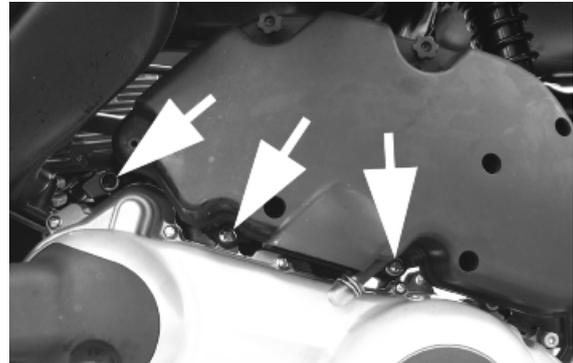
Removal of the engine from the vehicle

- Disconnect the battery
- Remove the engine cover inside the helmet compartment
- Remove the side panels

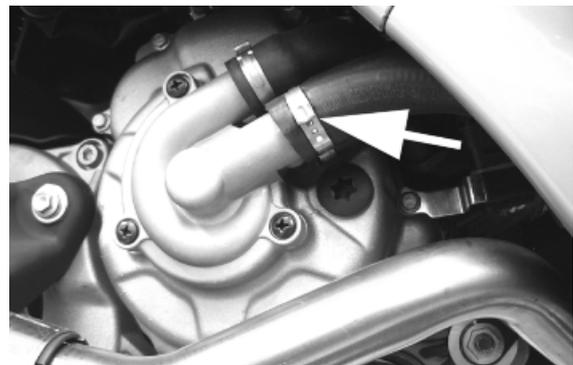
Remove the full muffler assembly.

CAUTION

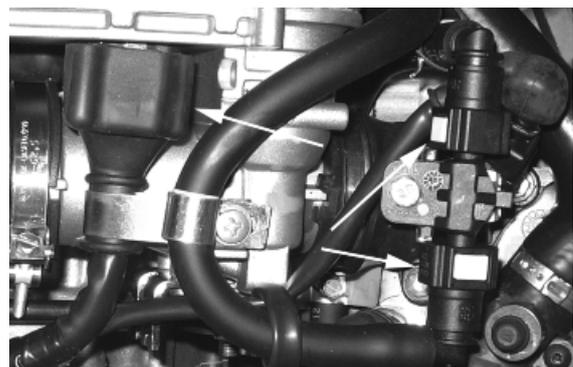
THIS OPERATION MUST BE CARRIED OUT WHEN THE ENGINE IS COLD.



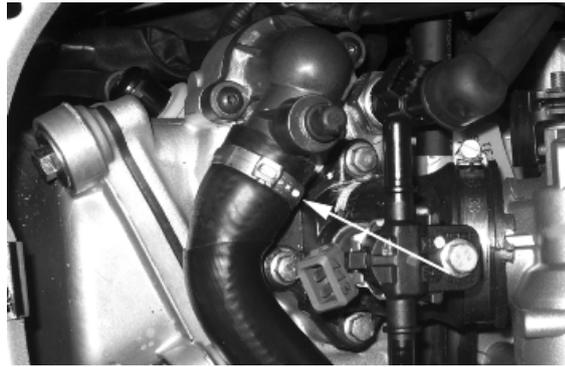
- Remove the rear wheel.
- Remove the pipe feeding coolant into the pump as shown in the photograph and then empty the system.
- Remove the engine coolant outlet pipe as indicated.



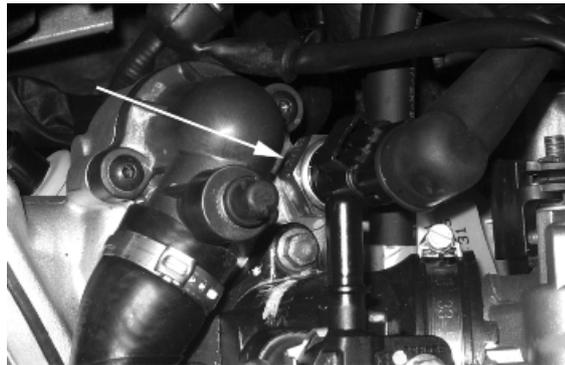
- Disconnect the fuel delivery and return pipes from the injector by removing the screw locking the retaining clip.
- Disconnect the injector wiring and the throttle body control unit wiring.



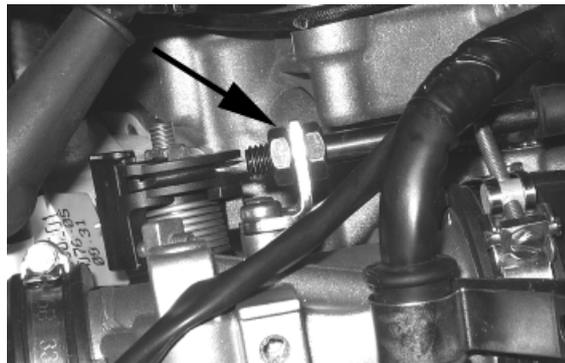
- Remove the coolant outlet pipe from the motor as indicated.



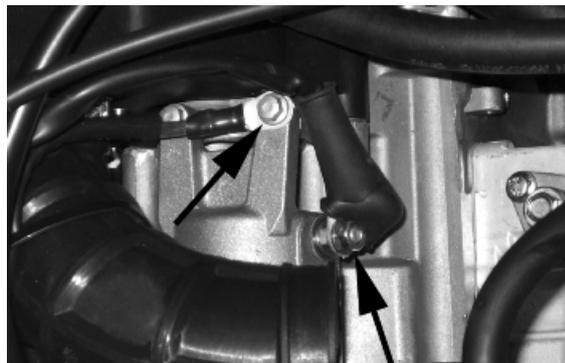
- Remove the spark plug caps.
- Remove the coolant temperature sensor connector indicated in the photo.



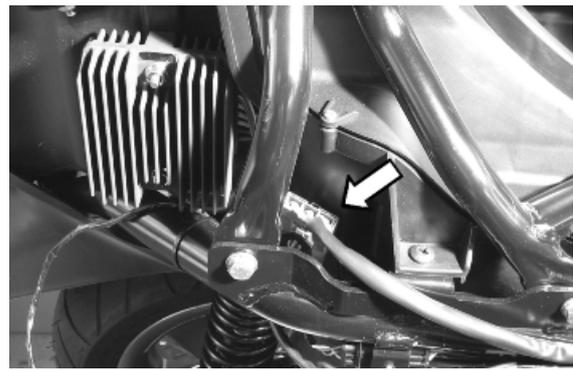
- Remove the throttle cable from the throttle body by undoing the nut shown in the photo.



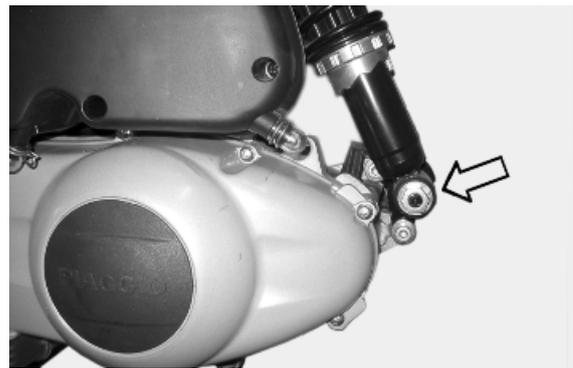
- Remove the positive and negative wiring from the starter motor as shown in the photo.



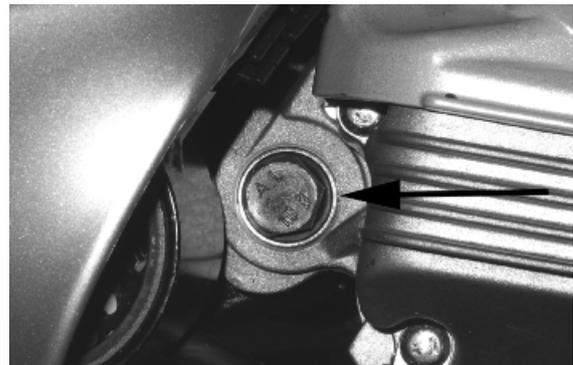
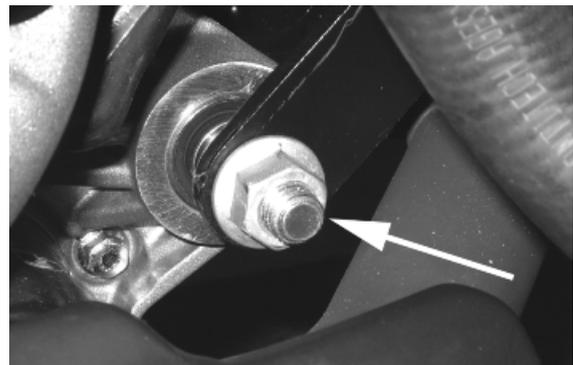
- Disconnect the connectors from the flywheel wiring as shown in the photo.
- Remove the cable from the retaining clip on the flywheel cover.



Remove the lower screw of the left-hand shock absorber.



- Use a jack to support the vehicle properly. Remove the engine-swinging arm fixing pin by undoing the nut and the head of the pin as shown in the photograph.
- The engine is now free.



When refitting the engine onto the scooter, carry out the removal operations but in reverse order and respect the tightening torques shown in the Specifications Chapter.

- Check the engine oil level and if necessary top it up with the recommended type.
- Fill and bleed the cooling circuit.
- Check the functioning of the accelerator and the electrical devices.

CAUTION

PAY PARTICULAR ATTENTION TO POSITIONING THE THROTTLE COMMAND TRANSMISSION PROPERLY.

INDEX OF TOPICS

ENGINE

ENG

This section describes the operations to be carried out on the engine and the tools to be used.

Automatic transmission

Transmission cover

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



Specific tooling

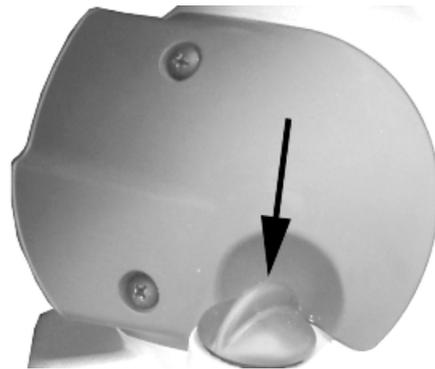
020423Y driven pulley lock wrench

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

- Remove the ten screws.

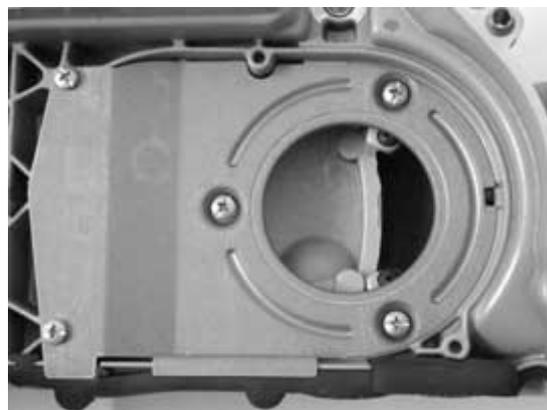
- Remove the transmission cover.

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



Air duct

- Remove the five screws on two different levels as well as the small casing.



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



Removing the driven pulley shaft bearing

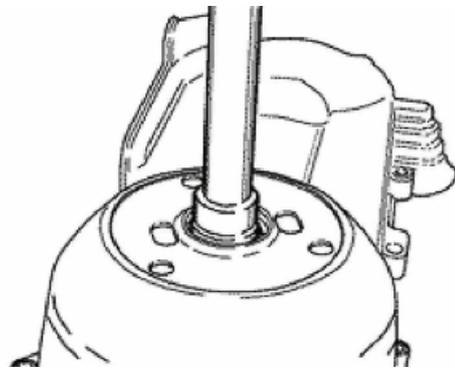
- Remove the clip from the inside of the cover.
- Remove the bearing from the crankcase by means of:

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020412Y 15 mm guide



Refitting the driven pulley shaft bearing

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

CAUTION

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

N.B.

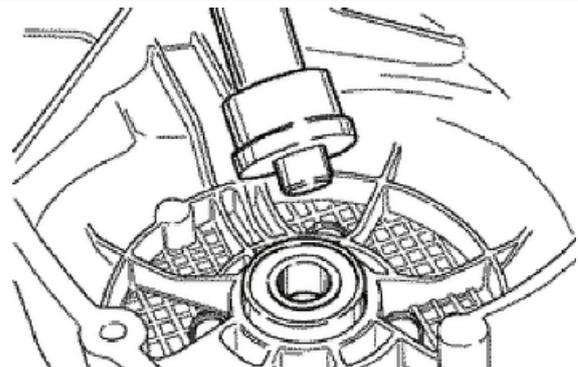
ALWAYS REPLACE THE BEARING WITH A NEW ONE UPON REFITTING.

Specific tooling

020376Y Adaptor handle

020357Y 32 x 35 mm adaptor

020412Y 15 mm guide

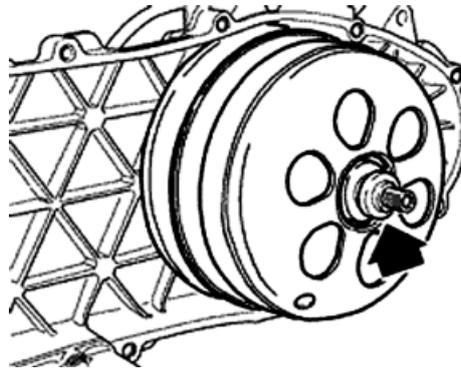


Removing the driven pulley

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

N.B.

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



Inspecting the clutch drum

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

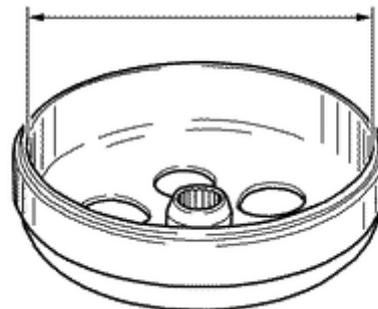
Characteristic

Max. value clutch bell

Max. value: \varnothing 134.5 mm

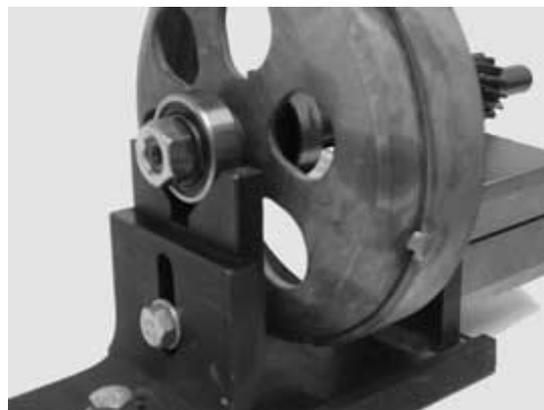
Clutch bell standard value

Standard value: \varnothing 134 - 134.2 mm

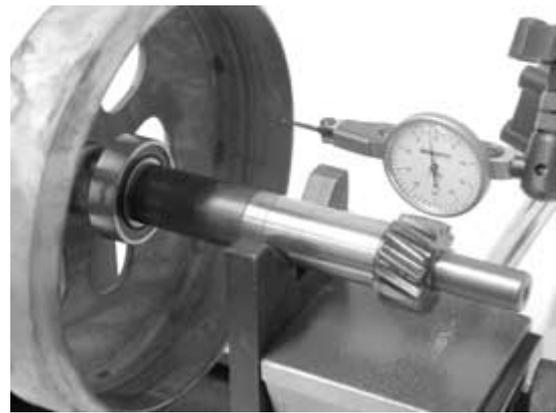


Checking the bell working surface eccentricity

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



- Using a feeler pin gauge and the magnetic base, measure the bell eccentricity.
- Repeat the measurement in 3 positions (Central, internal, external).
- If faults are found, replace the bell.



Specific tooling

020074Y Support base for checking crankshaft alignment

020335Y Magnetic support for dial gauge

Characteristic

clutch bell inspection: Limit eccentricity.

Admissible limit eccentricity: 0.15 mm

Removing the clutch

Clutch removal (125 cm³ H2O)

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

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



CAUTION

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

Specific tooling

020444Y009 46x55 Wrench

020444Y010 adapter ring

Inspecting the clutch

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

N.B.

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

VARIOUS CONDITIONS CAN CAUSE THE CLUTCH TO TEAR.

CAUTION

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

Characteristic

Check minimum thickness

1 mm



Pin retaining collar

- Simultaneously turn and pull the collar manually to remove it.

N.B.

USE TWO SCREWDRIVERS IF YOU HAVE DIFFICULTY.

N.B.

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



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



Removing the driven half-pulley bearing

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



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

Specific tooling

001467Y035 Belle for OD 47-mm bearings

- Remove the roller bearing using the modular punch.

Specific tooling

020376Y Adaptor handle

020456Y Ø 24 mm adaptor

020363Y 20 mm guide



Inspecting the driven fixed half-pulley

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

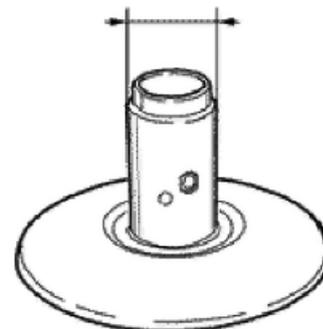
Characteristic

Half-pulley standard diameter

Standard diameter: Ø 40.985 mm

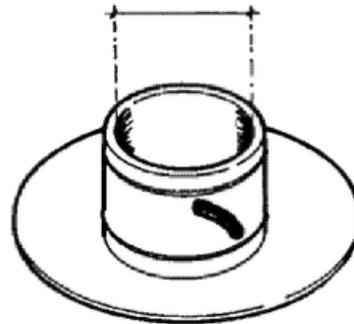
Half-pulley minimum diameter

Minimum admissible diameter Ø 40.96 mm



Inspecting the driven sliding half-pulley

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



Characteristic

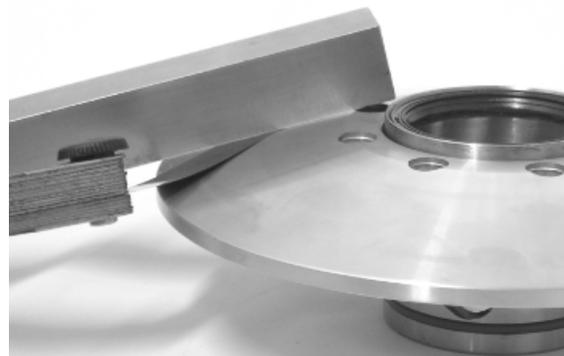
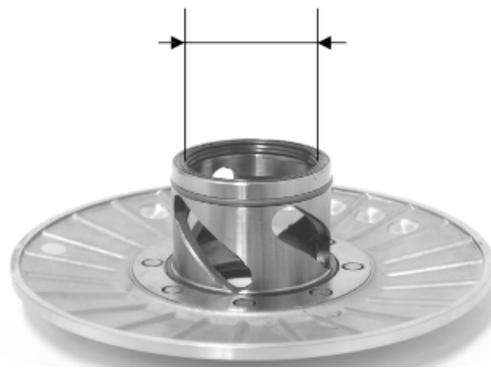
Movable driven half-pulley max. diameter

Max. diameter admitted: Ø 41.08 mm

Movable driven half-pulley standard diameter

Standard diameter: Ø 41.000 ÷ 41.035 mm

- Remove the two internal grommets and the two O-rings.
- Measure the movable half-pulley bushing inside diameter.
- Check that the faying surface with the belt is not abnormally worn.
- Check the riveted joints are functional.
- Check the evenness of the belt faying surface.



MOVABLE DRIVEN HALF-PULLEY DIMENSIONS

Specification	Desc./Quantity
Wear limit	0.3 mm
standard diameter	Diameter 41.000 - 41.035 mm
maximum allowable diameter	Ø 41.08 mm

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

Refitting the driven half-pulley bearing

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

N.B.

FIT THE BALL BEARING WITH THE SHIELD VISIBLE.

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020424Y Driven pulley roller casing fitting punch

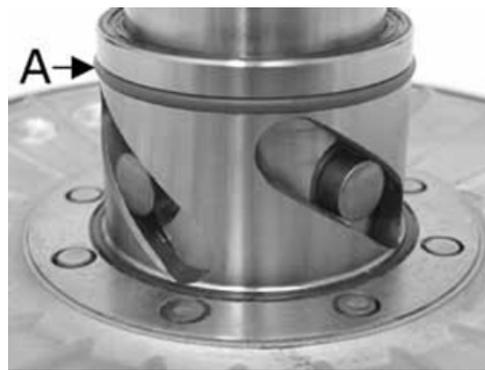


Refitting the driven pulley

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



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



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



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

N.B.

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

Specific tooling

020263Y Sheath for driven pulley fitting

Recommended products

AGIP GREASE SM 2 Grease for the tone wheel revolving ring

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



Inspecting the clutch spring

- Measure the length of the spring, while it is relaxed.

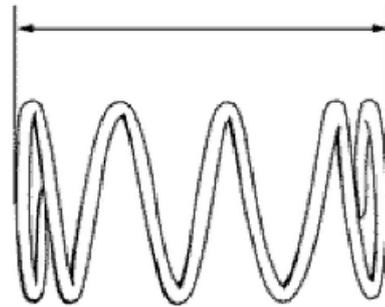
Characteristic

Standard length

106 mm

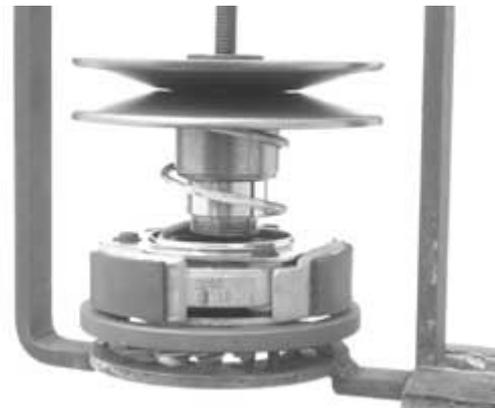
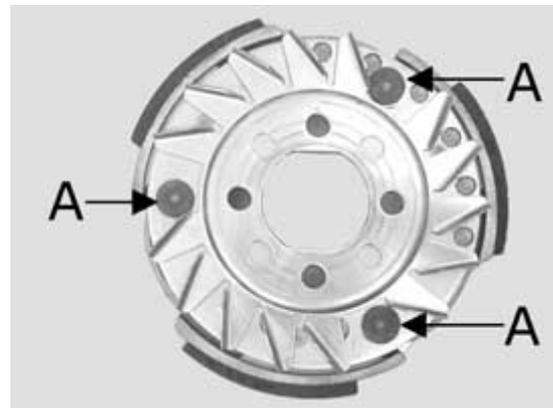
Acceptable limit after use:

101 mm



Refitting the clutch

- Support the driven pulley spring compressor appropriate tool with the control screw in vertical axis.
- Arrange the tool with the medium length pins screwed in position «F» on the inside.
- Insert the adapter ring No 8 in the pins.
- Preassemble the cooling fan to the clutch in such a way that the keying facets are aligned and the 3 pin heads (A) of the mass axis can be seen in full.
- Insert the clutch on the adapter ring.
- Lubricate the end of the spring that abuts against the servo-system closing collar.
- Insert the spring with relevant plastic holder in contact with the clutch.
- Insert the driving belt into the pulley unit according to their direction of rotation.
- Insert the pulley unit with the belt into the tool.
- Slightly preload the spring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Place the tool in the clamp with the control screw on the horizontal axis.
- Fully preload the spring.
- Apply the clutch lock nut and tighten it to the specified torque using the specific 46x55 spanner.



- Loosen the tool clamp and insert the belt according to its direction of rotation.
- Lock the driven pulley again using the appropriate tool.
- Preload the clutch contrast spring with a traction/rotation combined action until it reaches the pulleys maximum opening and place the belt on the minimum rolling diameter.
- Remove the driven pulley /belt assembly from the tool.



N.B.

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

N.B.

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

N.B.

AN EXCESSIVE QUANTITY CAN DAMAGE THE CLUTCH OPERATION.

Specific tooling

020444Y011 adapter ring

020444Y009 46x55 Wrench

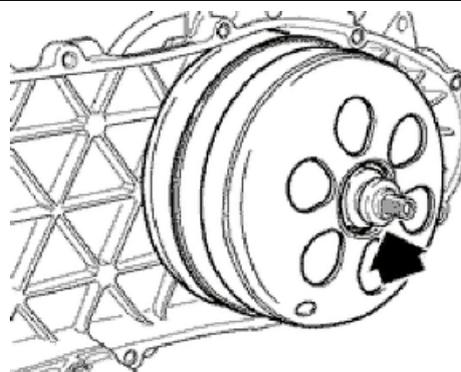
Locking torques (N*m)

Clutch unit nut on driven pulley 55 ÷ 60



Refitting the driven pulley

- Reassemble the clutch bell and spacer.



Drive-belt

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

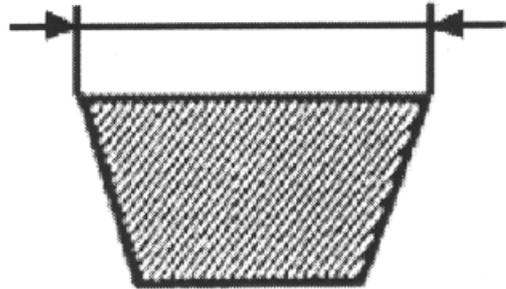
Characteristic

Driving belt - standard width:

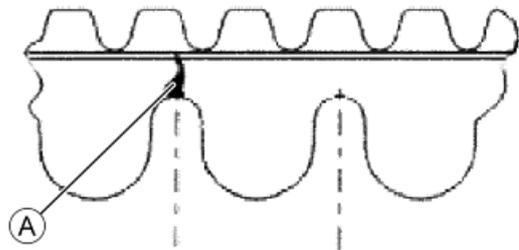
22.5 ± 0.2 mm

Driving belt - minimum width:

21.5 mm



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

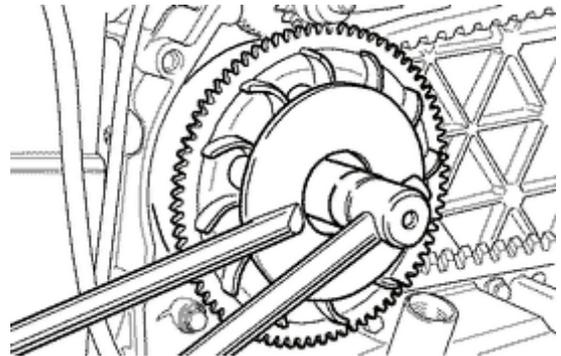


Removing the driving pulley

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

Specific tooling

020368Y driving pulley lock wrench



Inspecting the rollers case

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

CAUTION

DO NOT LUBRICATE OR CLEAN SINTERED BUSHINGS

Characteristic

Roller: Minimum diameter permitted

Ø 18.5 mm

Sliding bushing: Minimum admissible diameter

Ø 25.95 mm

Movable driving half-pulley bushing: Maximum allowable diameter

Ø 26.12 mm

Roller: Standard Diameter

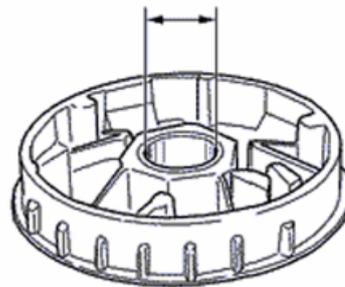
Ø 18.9 ÷ 19.1 mm

Sliding bushing: Standard Diameter

Ø 25.959 ÷ 25.98 mm

Movable driving half-pulley bushing: Standard Diameter

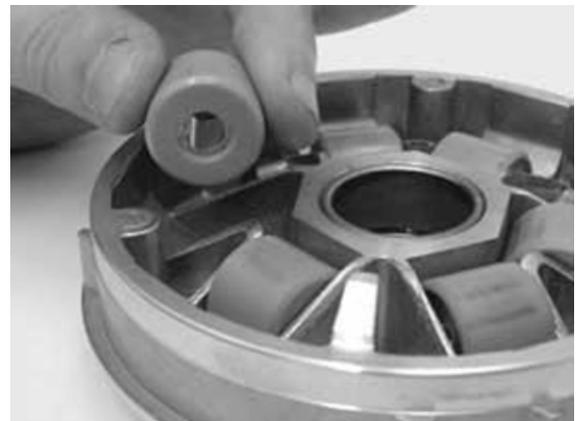
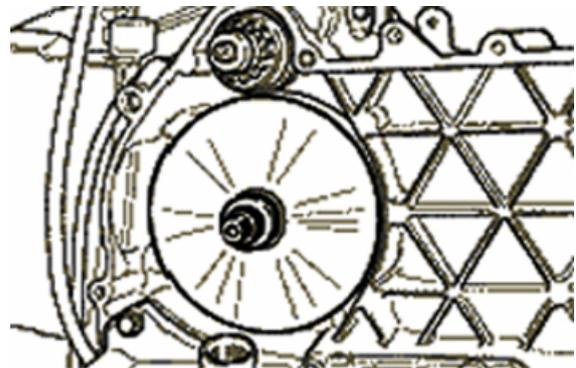
26.000 - 26.021 mm



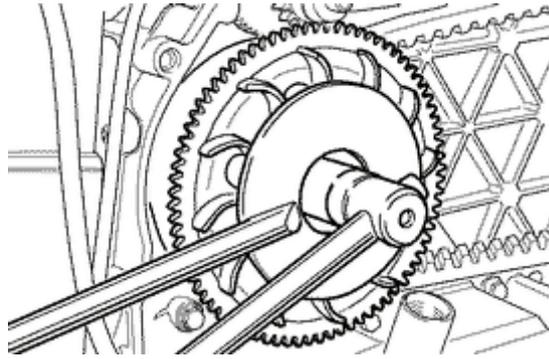


Refitting the driving pulley

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



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

**CAUTION**

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

Specific tooling

020368Y driving pulley lock wrench

Locking torques (N*m)

Drive pulley nut 75 ÷ 83

Refitting the transmission cover

- Check the presence of the 2 centring dowels and the correct installation of the sealing gasket for the oil sump on the transmission cover.
- Replace the cover tightening the 10 screws at the specified torque.
- Refit the oil loading cap/bar.
- refit the steel washer and the driven pulley nut.
- Tighten the nut to the prescribed torque using the lock wrench and the torque wrench tools.
- Replace the plastic cover.

**Specific tooling**

020423Y driven pulley lock wrench

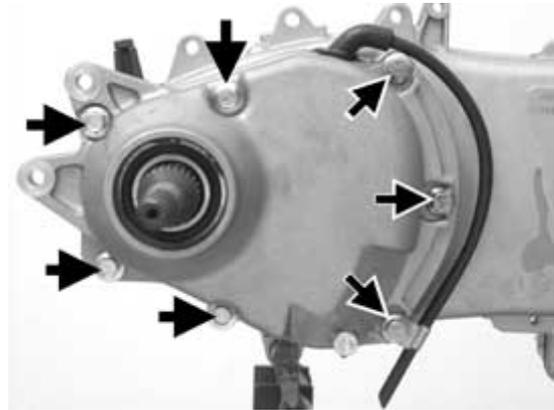
Locking torques (N*m)

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

End gear

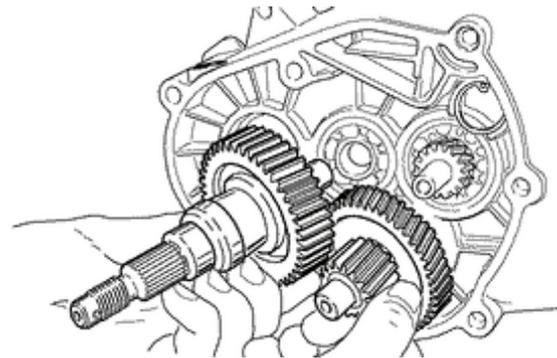
Removing the hub cover

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



Removing the wheel axle

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



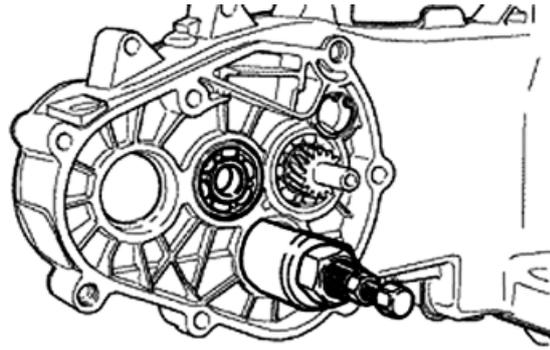
Removing the hub bearings

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

Specific tooling

001467Y013 Pliers to extract \varnothing 15-mm bearings





Removing the wheel axle bearings

Hold up the hub cover and take out the bearing.

Specific tooling

020376Y Adaptor handle

020477Y Adaptor 37 mm

020483Y 30 mm guide



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

Specific tooling

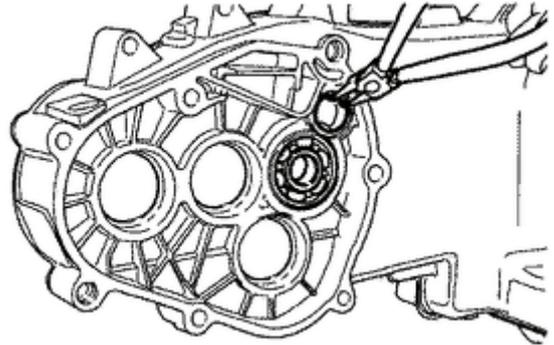
020359Y 42x47-mm adaptor



Removing the driven pulley shaft bearing

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

- Extract the driven pulley shaft from its bearing.
- Remove the oil guard using a screwdriver, working from inside the bearing and being careful not to damage the housing, make it come out of the belt transmission side.
- Remove the seeger ring shown in the figure



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

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020363Y 20 mm guide



Inspecting the hub shaft

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



Inspecting the hub cover

- Check that the fitting surface is not dented or distorted.
- Check the bearing bearings.
- In case of anomalies, replace the damaged components.

Refitting the wheel axle bearing

Support the hub cover on a wooden surface.

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

Specific tooling

020150Y Air heater support

020151Y Air heater

020376Y Adaptor handle

020360Y Adaptor 52 x 55 mm

020483Y 30 mm guide

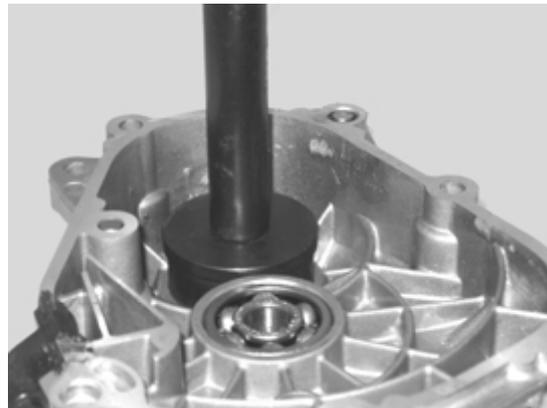


Assemble the seeger ring.



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

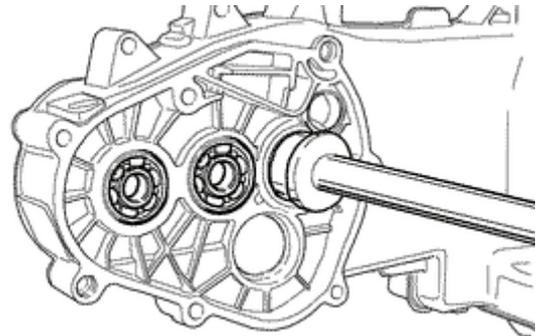
The 52 mm side of the adaptor must be turned towards the bearing.



Refitting the hub cover bearings

In order to fitting of the hub box bearings, the engine crankcase and the cover must be heated with the special heat gun.

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



Specific tooling

020150Y Air heater support

020151Y Air heater

020376Y Adaptor handle

020359Y 42x47-mm adaptor

020412Y 15 mm guide



N.B.

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

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

N.B.

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

Specific tooling

020376Y Adaptor handle

020359Y 42x47-mm adaptor

020363Y 20 mm guide



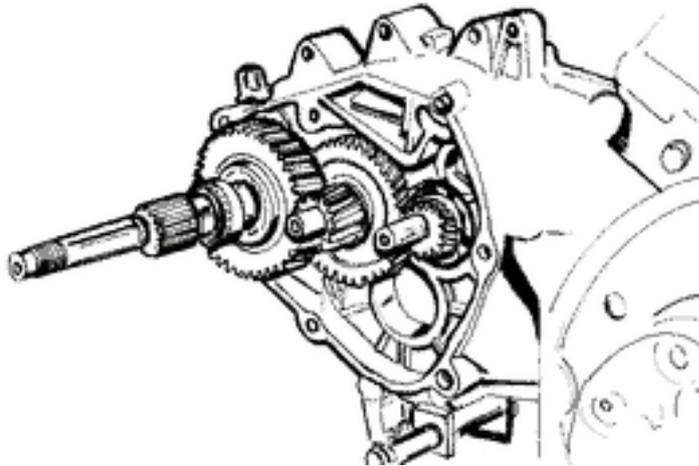
N.B.

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

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

Refitting the hub bearings

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

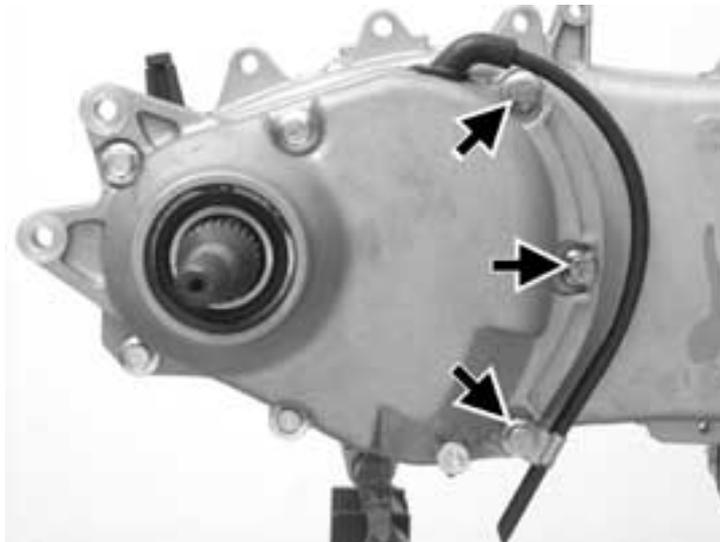


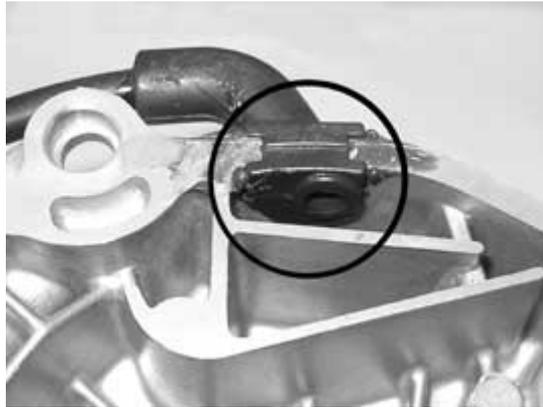
Refitting the ub cover

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

Locking torques (N*m)

Rear hub cover screws 24 ÷ 27

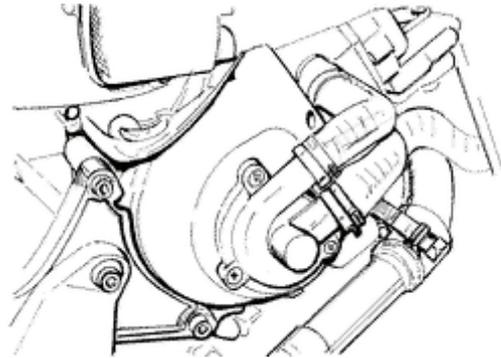




Flywheel cover

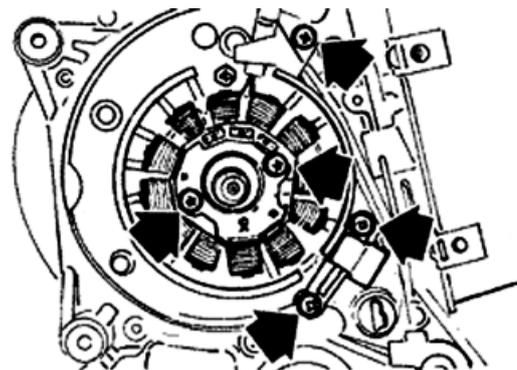
Removing the hub cover

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



Removing the stator

- Remove the electric terminal of the minimum oil pressure switch.
- Remove the two Pick-Up screws and the one for the wiring harness bracket as well as the two stator fixing screws shown in the figure.
- Remove the stator and its wiring.

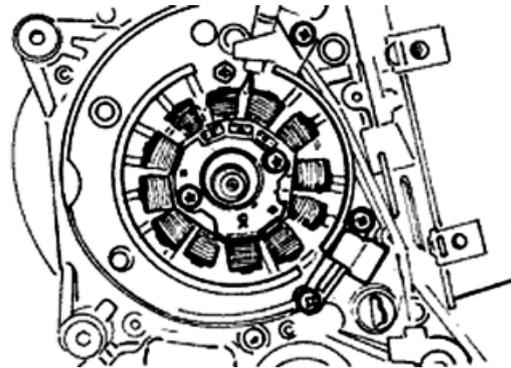


Refitting the stator

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

N.B.

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



Locking torques (N*m)

Stator assembly screws (°) 3 ÷ 4

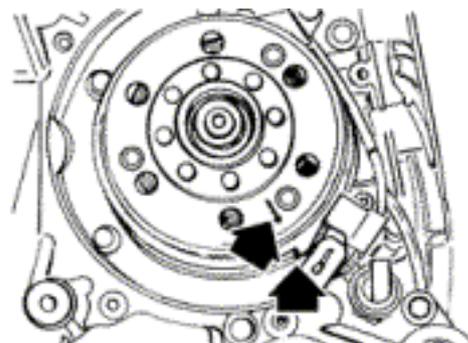
Refitting the flywheel cover

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



CAUTION

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



Flywheel and starting

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

Removing the flywheel magneto

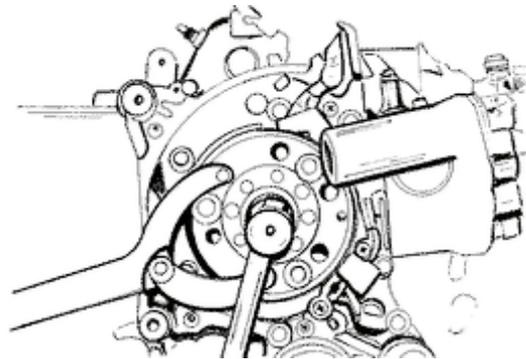
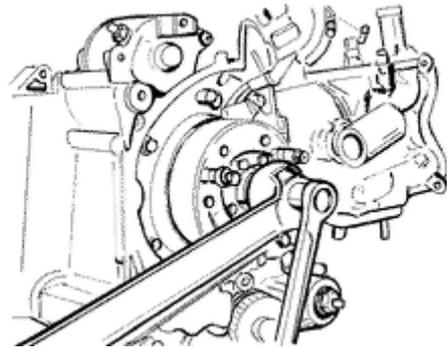
- Lock the rotation of the Flywheel with the calliper spanner tool.
- Remove the nut.
- Take out the flywheel.

CAUTION

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

N.B.

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



Inspecting the flywheel components

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

Refitting the flywheel magneto

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

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

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

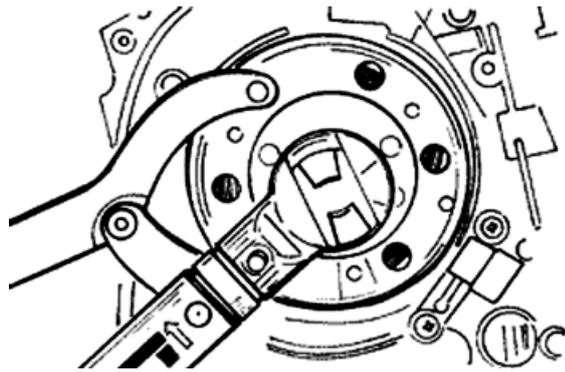
N.B.

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

Specific tooling

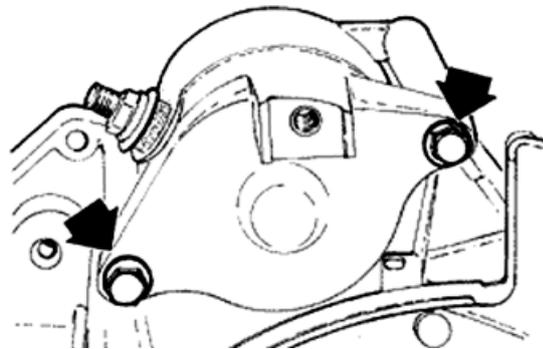
020565Y Flywheel lock calliper spanner



Locking torques (N*m)Flywheel nut $54 \div 60$ **Refitting the starter motor**

- Fit a new O-ring on the starter motor and lubricate it.

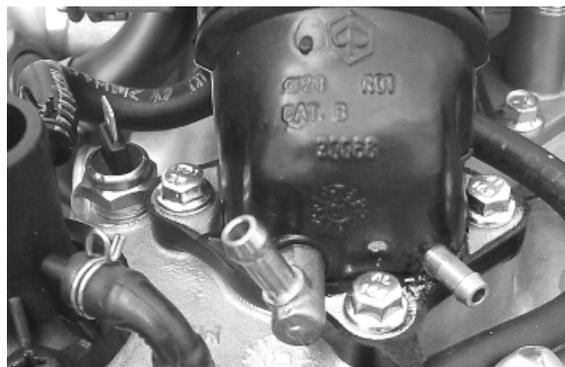
- Fit the starter on the crankcase, locking the two screws to the prescribed torque.

Locking torques (N*m)Starter motor screws $11 \div 13$ **Cylinder assy. and timing system****Removing the intake manifold**

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

N.B.

SCREWS AGAINST ACCIDENTAL OPERATION ARE PROVIDED.



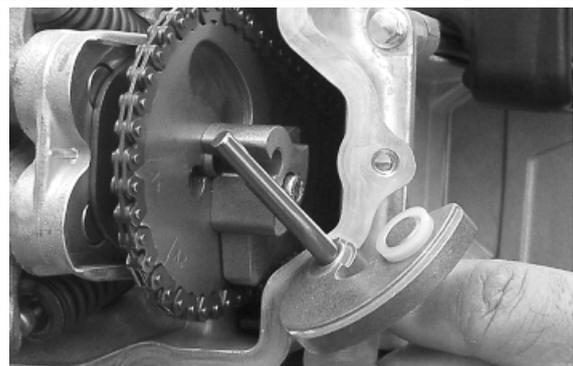
Removing the rocker-arms cover

- Remove the 5 screws indicated in the figure

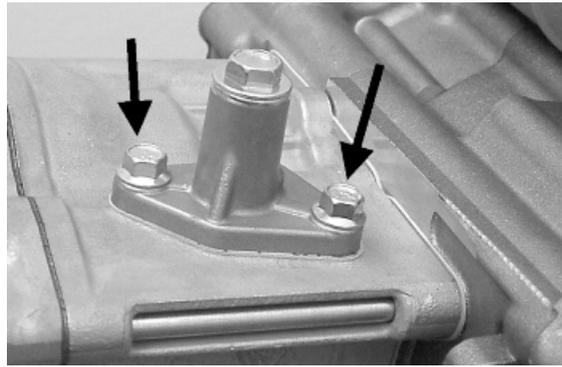


Removing the timing system drive

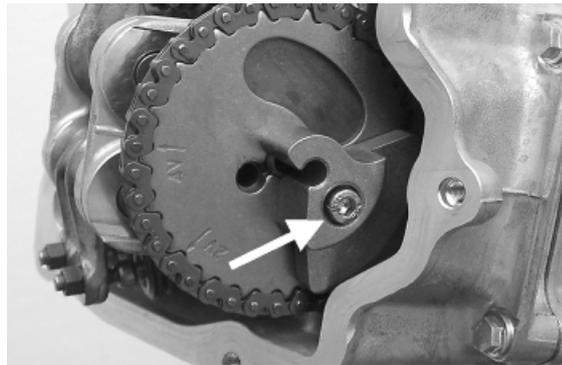
- First remove the parts listed below: transmission cover, drive pulley with belt, oil sump with spring and by-pass piston, oil pump pulley cover, O-ring on the crankshaft and the sprocket wheel separation washer.
 - Remove the tappet cover.
 - Remove the central screw fastener and the automatic valve-lifter retaining cover, as shown in the figure.
-
- Remove the return spring of the automatic valve lifter unit and the automatic valve lifter unit and its end of stroke washer.



- Loosen the central screw on the tensioner first.
- Remove the two fixings shown in the figure.
- Remove the tensioner with its gasket.



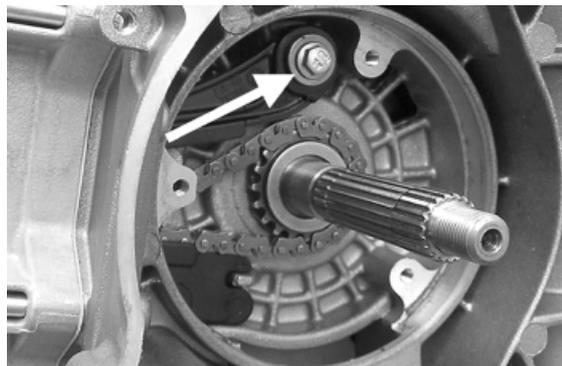
- Remove the internal hex screw and the counterweight shown in the figure.



- Remove the camshaft control pulley with its washer.



- Remove the command sprocket wheel and the timing chain.
 - Remove the screws indicated in the figure, the spacer bar and the tensioner slider.
- The chain tensioning pad must be removed from the transmission side. As regards the lower chain guide pad, it may only be removed after the head has been removed.



N.B.

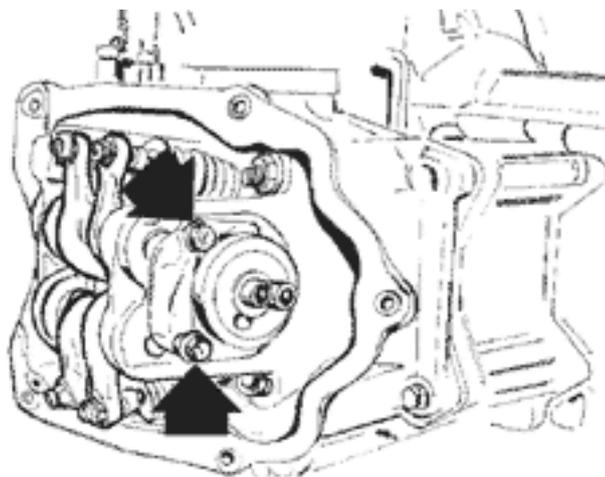
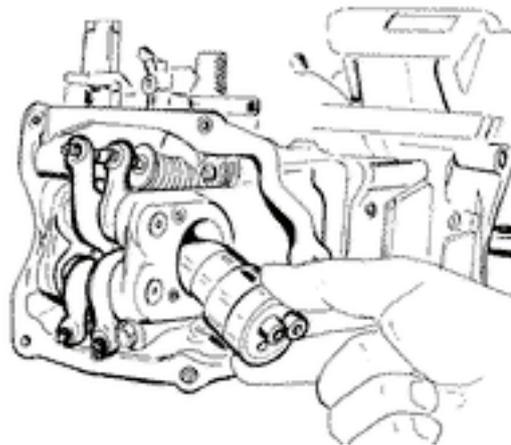
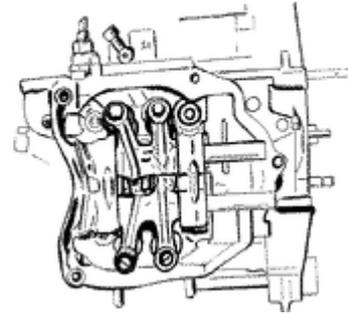
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

Removing the cam shaft

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

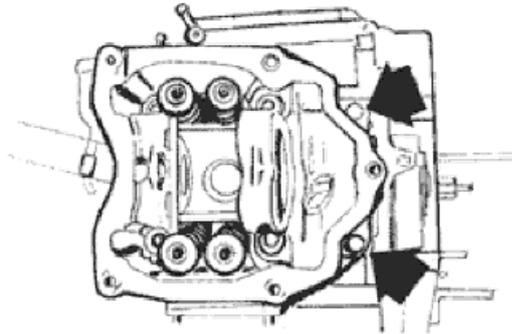
N.B.

**IN CASE OF NEED, THE HEAD MAY BE RE-
MOVED WITH THE CAMSHAFT, PINS, ROCK-
ING LEVERS AND FIXING BRACKET. THE
HEAD CAN ALSO BE REMOVED WITHOUT RE-
MOVING THE CHAIN AND THE DRIVING
SHAFT CHAIN TIGHTENER.**



Removing the cylinder head

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



N.B.

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

Removing the valves

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

CAUTION

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

Specific tooling

020382Y011 adapter for valve removal tool

020382Y Valve cotters equipped with part 012 removal tool

020306Y Punch for assembling valve seal rings



Removing the cylinder - piston assy.

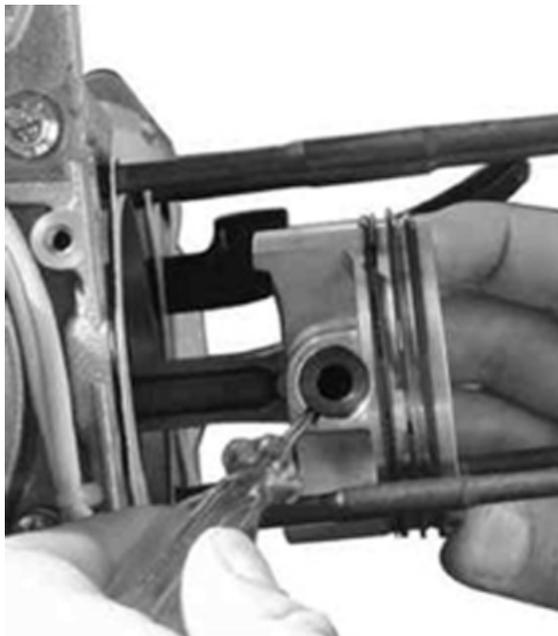
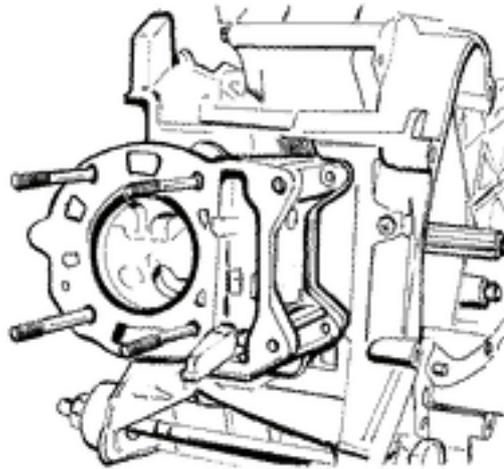
- Remove the chain guide pad.
- Pull out the cylinder.
- Remove the cylinder base gasket.
- Remove the two stop rings, the wrist pin and the piston.
- Remove the piston seals.

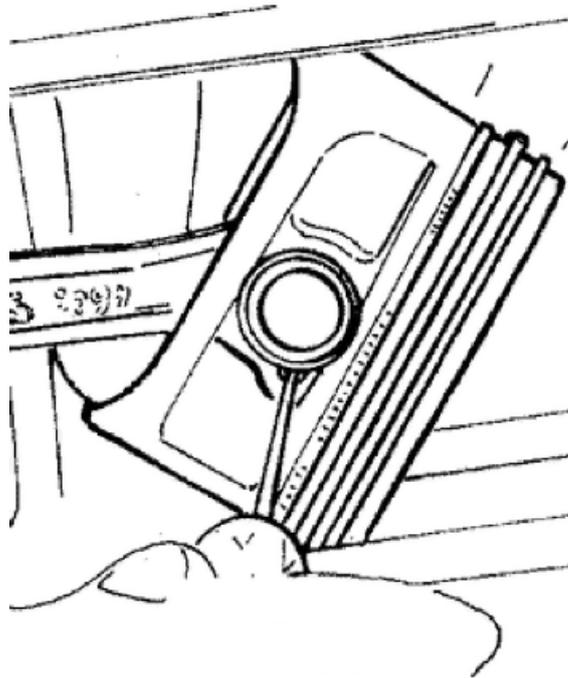
CAUTION

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

N.B.

BE CAREFUL NOT TO DAMAGE THE SEALING RINGS DURING REMOVAL.





Inspecting the small end

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

N.B.

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

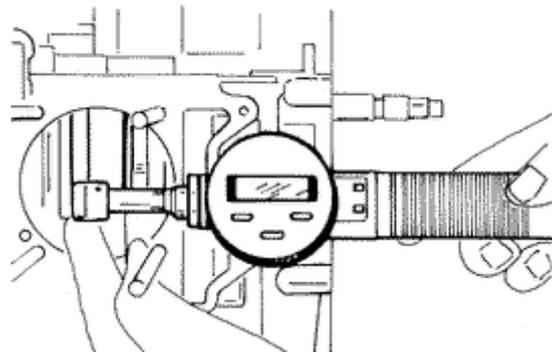
Characteristic

Rod small end check-up: Maximum diameter

15.030 mm

Rod small end check-up: Standard diameter

15 +0.015+0.025 mm



Inspecting the wrist pin

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

d: 41.1 mm (from the crown)

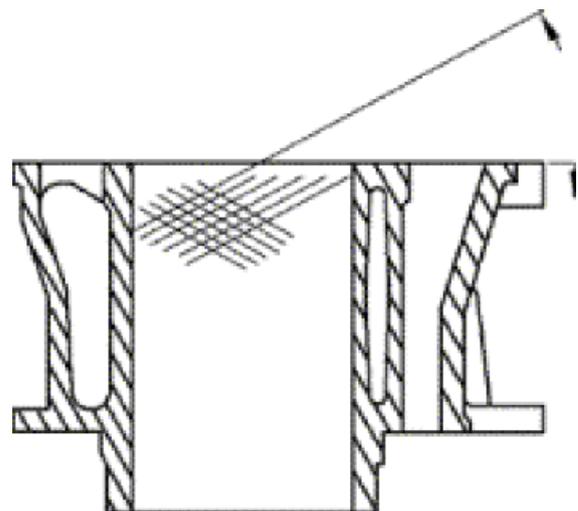
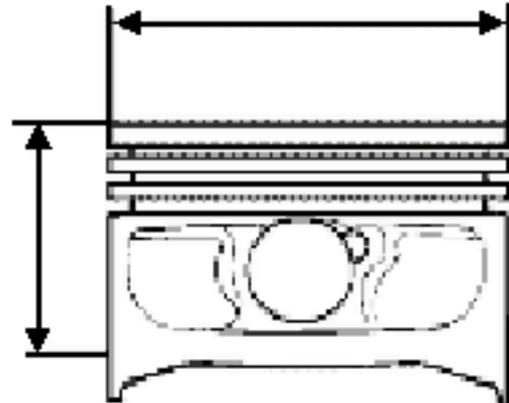
- Using a bore meter, measure the inner cylinder diameter at three different points according to the directions shown in the figure.
- Check that the head matching surface exhibits no deformations or wear.

Maximum admissible displacement: 0,05 mm

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

N.B.

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



Characteristic

Pin diameter Standard diameter:

56.997 ÷ 57.025

piston diameter

56.945 ÷ 56.973 mm

Pin diameter: Standard clearance

0.015 ÷ 0.029 mm

Pin diameter Standard diameter

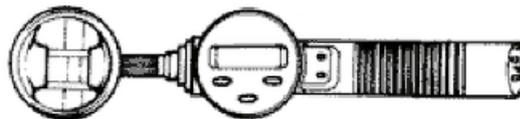
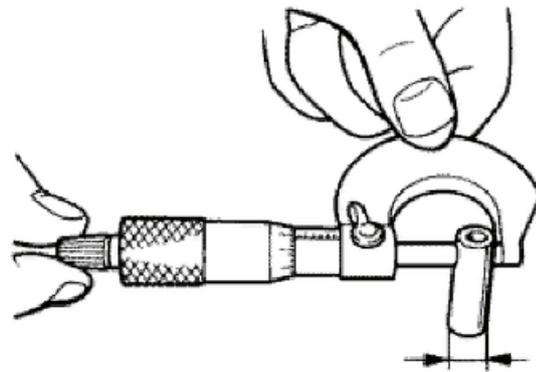
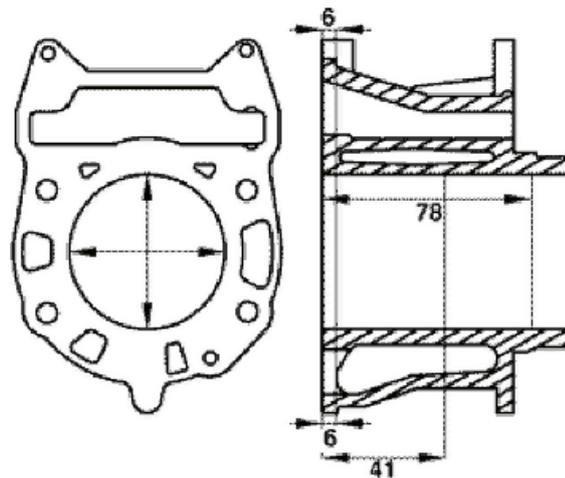
14.996 - 15.000 mm

Wrist pin seat on the piston: Standard diameter

15.001 ÷ 15.006 mm

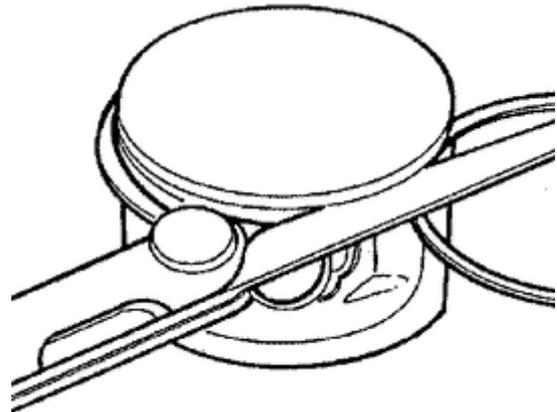
**Diameter of the wrist pin seat on the piston:
Standard clearance**

0.001 ÷ 0.010 mm



Inspecting the piston

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



Removing the piston

- Install piston and wrist pin onto the connecting rod, aligning the piston arrow the arrow facing towards the exhaust.
 - Fit the pin stop ring onto the appropriate tool.
 - With opening in the position indicated on the tool
- S = left
D = right
- Place the wrist pin stop ring into position using a punch
 - Fit the wrist pin stop using the plug as shown in the figure

CAUTION

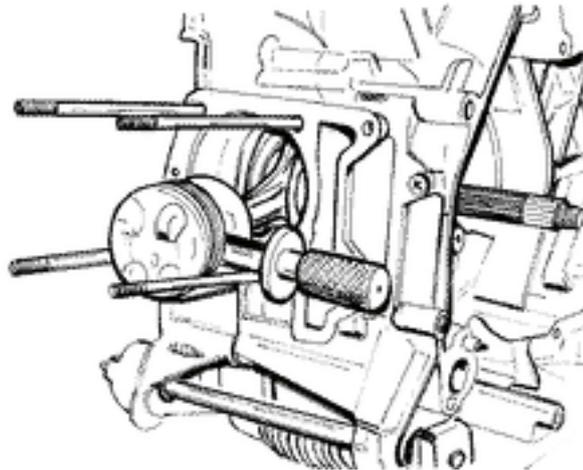
USING A HAMMER MIGHT DAMAGE THE STOPS' HOUSING.

N.B.

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

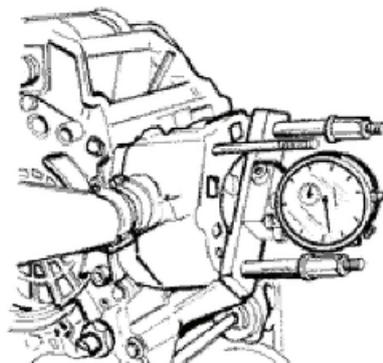
Specific tooling

020430Y Pin lock fitting tool



Choosing the gasket

- Provisionally fit the piston into the cylinder, without any base gasket.
- Assemble a dial gauge on the specific tool Support to check piston position 020428Y
- Set the dial gauge to zero placing the tool on a contrasting surface. Keeping the zero position, assemble the tool on the cylinder and lock it with 2 supplied nuts as shown in the figure.
- Rotate the crankshaft until TDC (the inverted point of the dial gauge rotation)
- Position the dial gauge on the piston as shown in the figure and measure how much the piston protrudes.



- By means of the table shown in the specifications chapter identify the cylinder base gasket thickness to be used for refitting. The proper identification of the cylinder base gasket thickness allows maintaining the correct compression ratio.
- Remove the specific tool and the cylinder.

N.B.

MEASURE PISTON PROTRUSION.

See also

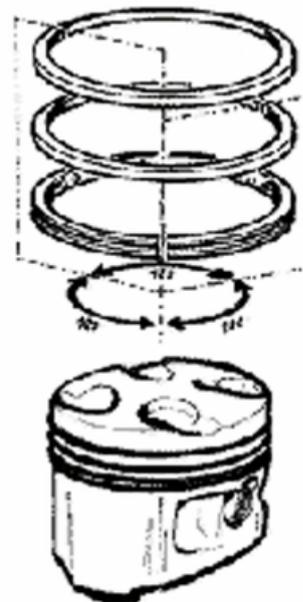
[Slot packing system](#)

Refitting the piston rings

- Place the oil scraper spring on the piston.
- Refit the oil scraper ring with the join of spring ends on the opposite side from the ring gap and the word 'TOP' towards the crown of the piston. The chamfered side of the oil scraper ring should always be facing the piston crown.
- Fit the middle piston ring with the identification letter facing the crown of the piston. In any case, the step must be facing opposite the piston top.
- Fit the top piston ring with the word 'TOP' or the reference mark facing the crown of the piston.
- Offset the piston ring gaps on the three rings by 120° to each other as shown in the figure.
- Lubricate the components with engine oil.

N.B.

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



Refitting the cylinder

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

N.B.

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

Specific tooling

020393Y Piston fitting band

020287Y Clamp to assemble piston on cylinder



Inspecting the cylinder head

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



Characteristic

bearing «A»

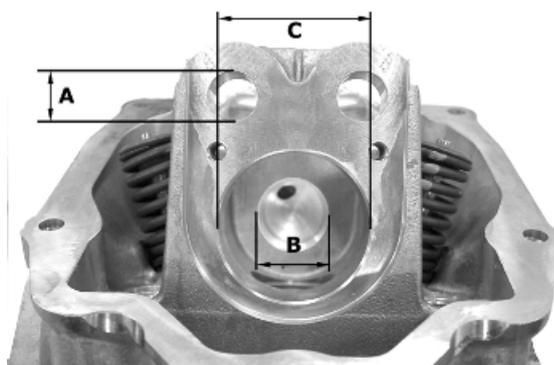
Ø 12.000 - 12.018 mm

bearing «B»

Ø 20.000 ÷ 20.021 mm

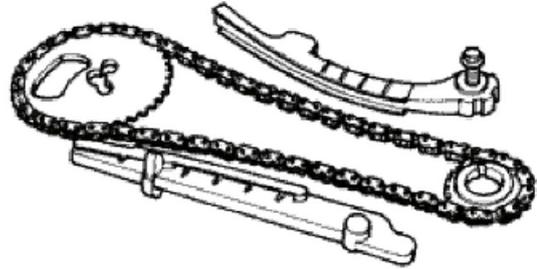
bearing «C»

Ø 37.000 - 37.025 mm



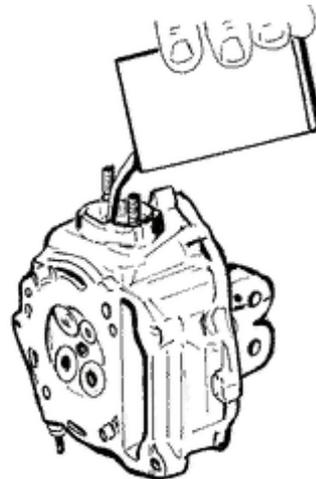
Inspecting the timing system components

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



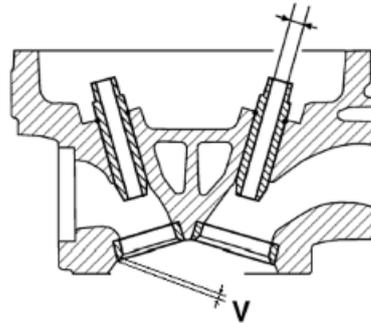
Inspecting the valve sealings

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



Inspecting the valve housings

- Check the width of the imprint on the valve seat «V» wear limit max. 1.6 mm.
- Remove any carbon formation from the valve guides.
- Measure the inside diameter of each valve guide.
- Take the measurement at three different heights in the rocker arm push direction.
- If the width of the impression on the valve seat or the diameter of the valve guide exceed the specified limits, replace the cylinder head.



Characteristic

Valve seat wear Intake guide

limit accepted: 5.022

Valve seat wear Exhaust guide

Standard diameter: 5.000 ÷ 5.012 mm

Valve seat wear Intake guide

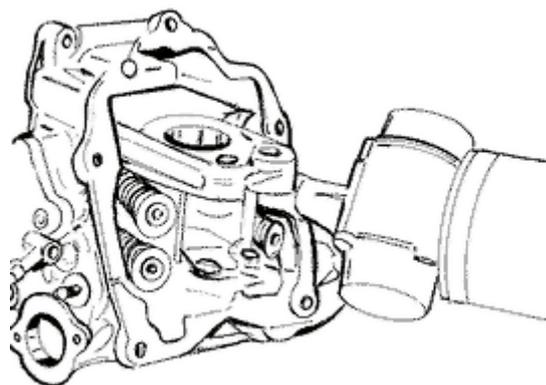
Accepted limit 5.022

Valve seat wear Exhaust guide

Standard diameter: 5.000 ÷ 5.012 mm

Inspecting the valves

- Measure the diameter of the valve stems in the three positions indicated in the diagram.
- Calculate the clearance between valve and valve guide.
- Check that there are no signs of wear on the surface of contact with the articulated register terminal.
- If the checks above give no failures, you can use the same valves. For best sealing results, it is advisable to grind the valves. Grind the valves gently with a fine-grained lapping compound. During the grinding, keep the cylinder head with the valve axes in a horizontal position. This will prevent the lapping compound residues from penetrating between the valve stem and the guide (see figure).



CAUTION

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

N.B.

DO NOT CHANGE THE POSITIONS THE VALVES ARE FITTED IN

Characteristic**Valve check standard length**

Outlet: 94.4 mm

Valve check standard length

Inlet: 94.6 mm

Valve check Maximum admissible clearance

Outlet: 0.072 mm

Valve check Maximum admissible clearance

Inlet: 0.062 mm

Valve check standard clearance

Outlet: 0.025 ÷ 0.052 mm

Valve check standard clearance

Inlet: 0.013 ÷ 0.040 mm

Valve check Minimum admissible diameter

Outlet: 4.95 mm

Valve check Minimum admissible diameter

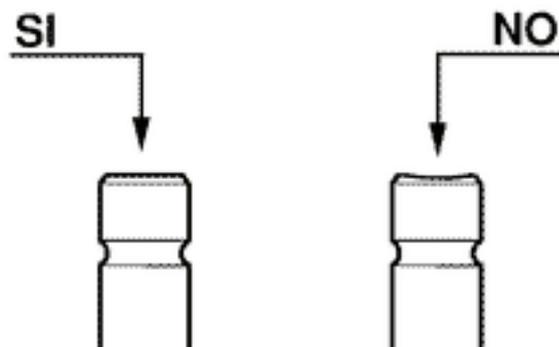
Inlet: 4.96 mm

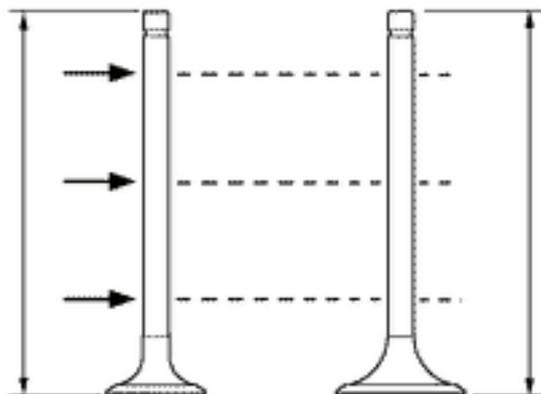
Valve check Standard diameter:

Inlet: 4.972 ÷ 4.987 mm

Valve check Standard diameter:

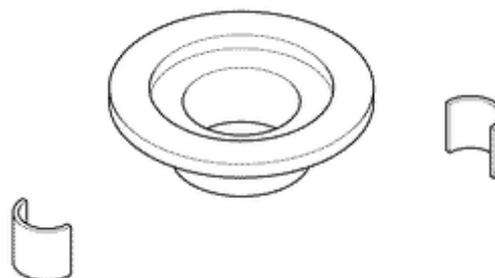
Outlet: 4.96 ÷ 4.975 mm





Inspecting the springs and half-cones

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



Refitting the valves

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

N.B.

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

Specific tooling

020306Y Punch for assembling valve seal rings

020382Y Valve cotters equipped with part 012 removal tool

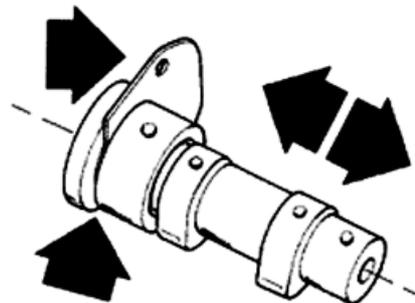
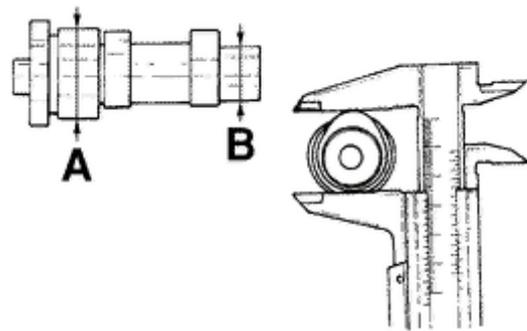
020382Y011 adapter for valve removal tool





Inspecting the cam shaft

- Inspect the cam shaft for signs of abnormal wear on the cams.
 - Check the cam height.
 - Check there is no wear on the cam shaft retaining plate and its associated groove on the cam shaft.
 - If any of the above dimensions are outside the specified limits, or there are signs of excessive wear, replace the defective components with new ones.
 - Check there are no signs of wear on the automatic valve-lifter cam, or the end-of stroke roller, or the rubber buffer on the automatic valve-lifter retaining cover.
 - Check that the valve lifting spring has not yielded.
 - Replace any defective or worn components.
 - Check the rocker pins do not show signs of wear or scoring.
 - Measure the internal diameter of each rocker arm.
- Check there are no signs of wear on the pad from contact with the cam and on the jointed adjustment plate.



Characteristic

Internal rocker arm diameter: Standard diameter

Diameter 12.000 - 12.011 mm

Rocker arm pin diameter: Standard diameter

Diameter 11.977 - 11.985 mm

Cam shaft check: Maximum admissible axial clearance

0.42 mm

Cam shaft check: Standard axial clearance:

0.11 - 0.41 mm

Cam shaft check: Standard height

Outlet: 29.209 mm

Cam shaft check: Standard height

Inlet: 30.285 mm

Cam shaft check: Minimum admissible diameter

Bearing B diameter: 19.950 mm

Cam shaft check: Minimum admissible diameter

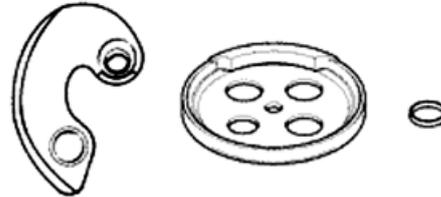
Bearing A Ø: 36.94 mm

Cam shaft check: Standard diameter

Bearing B diameter: 19.959 ÷ 19.98 mm

Cam shaft check: Standard diameter

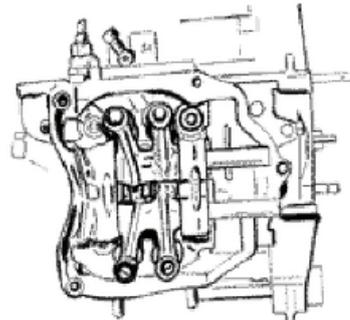
Bearing A Ø: 36.95 ÷ 36.975 mm



Refitting the head and timing system components

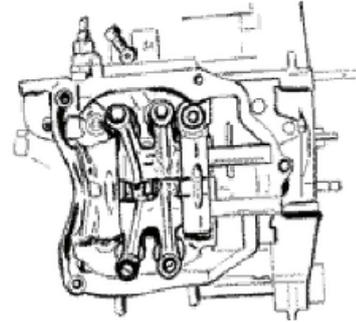
Assemble the lower timing chain sprocket wheel on the crankshaft, with the chamfer facing the insertion side.

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

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

Fit the pins and rocking levers.

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



Locking torques (N*m)

Plate screws 4 ÷ 6 Nm

Insert the spacer on the cam shaft.

- Rotate the engine so that the piston is at top dead centre, using the reference marks on the flywheel and the crankcase.
- Holding this position insert the chain on the camshaft control pulley.
- Insert the pulley on the cam shaft while keeping the reference 4V in correspondence with the reference mark on the head.
- Assemble the counterweight with the corresponding fixing screw and tighten to the prescribed torque.



Locking torques (N*m)

Counterweight screw 7 ÷ 8.5

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

N.B.

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

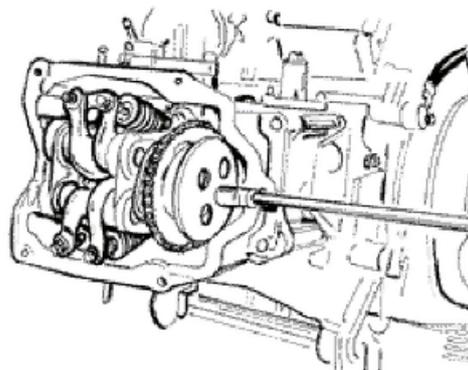


Assemble the limiting bell using the counterweight fixing screw as a reference.

- Tighten the clamping screw to the prescribed torque.

Locking torques (N*m)

Limiting bell screw 11 ÷ 15 Nm



Set the tensioner cursor to the rest position.

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

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



Locking torques (N*m)

Tensioner screws 11 ÷ 13 Tensioner cover 5 ÷ 6 Nm

Adjust valve clearance

- Fit the spark plug.

Electrode distance 0.8 mm

Locking torques (N*m)

Spark plug 12 ÷ 14

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

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

- Reassemble the oil pump control, the chain compartment cover, the by-pass and the oil sump as described in the lubrication chapter.
- Reassemble the driving pulley, the belt and the transmission cover as described in the transmission chapter.

Locking torques (N*m)

Tappet cover screws 6 - 7 Nm

TIMING SYSTEM COMPONENTS ASSEMBLY

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

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

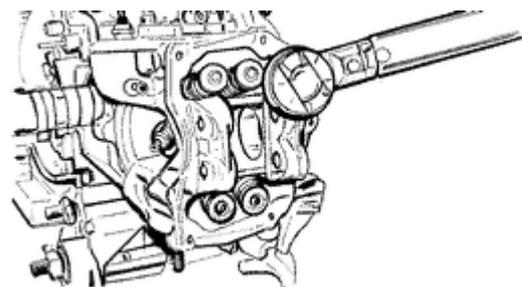
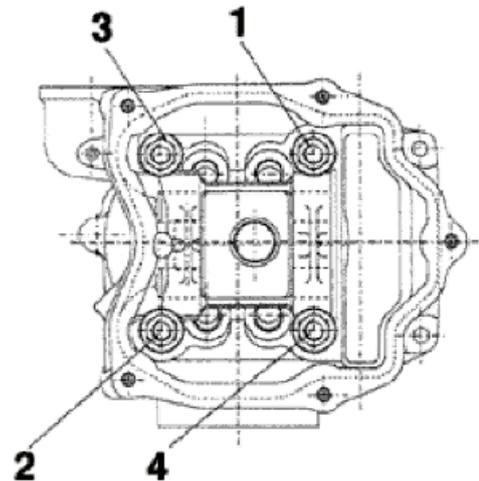
- Fit the timing chain guide pad.
- Insert the centring dowel between the cylinder head to the cylinder, fit the cylinder head gasket and the cylinder head.
- Lubricate the stud bolt threading.
- Tighten up the nuts to a pre-torque of 7 ± 1 N·m
- Rotate by a 180° angle (2 rotations of 90° each)
- To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

N.B.

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

Locking torques (N*m)

Timing chain tensioner support screw 11 ÷ 13



Refitting the rocker-arms cover

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

Locking torques (N*m)

Tappet cover screws 6 - 7 Nm

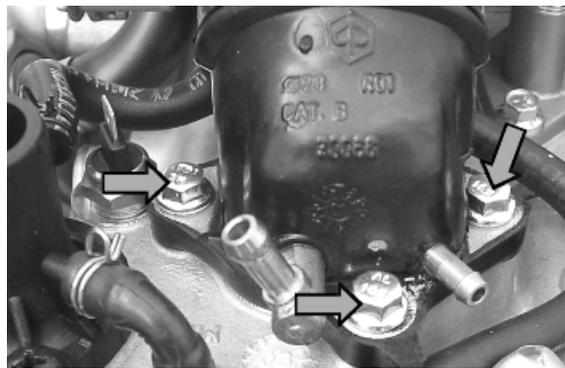


Refitting the intake manifold

Fit the intake manifold and do up the three screws.

N.B.

FOR SPECIAL SCREWS USE COMMERCIALY AVAILABLE INSERTS AND INSERT HOLDERS.



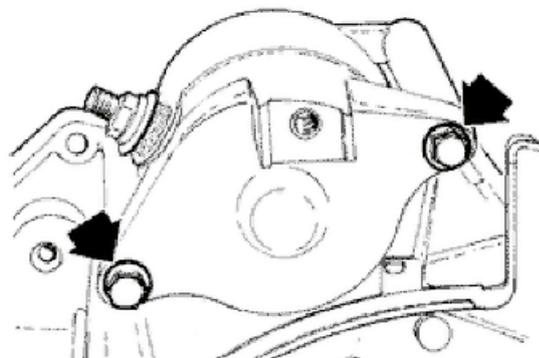
Crankcase - crankshaft

Splitting the crankcase halves

First remove the following units:

transmission cover, driving pulley, driven pulley and belt, rear hub cover, gears, bearings and oil seals as described in the **transmission** chapter.

- Remove the oil sump, the by-pass, the chain compartment cover and the oil pump as in the **lubrication** chapter.



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

- Remove the oil filter and the oil pressure switch.

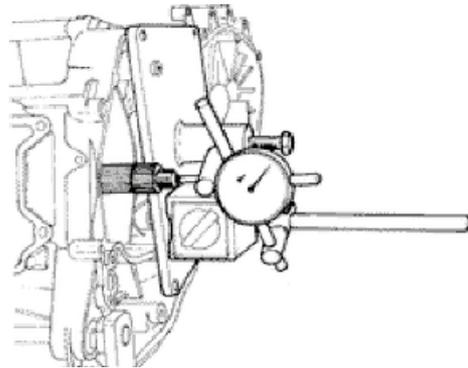
- Remove the cylinder/piston/head unit as described in the **cylinder head timing system** chapter.

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

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

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

Standard clearance: $0.15 \div 0.40$ mm



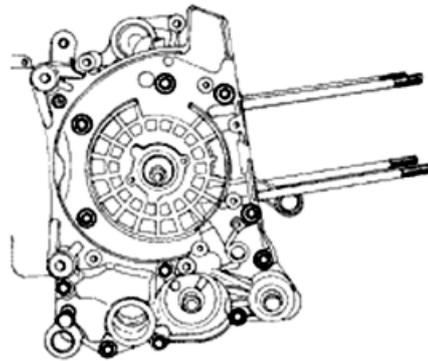
Remove the 11 coupling screws to the crankcase.

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

Remove the crankshaft.

CAUTION

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

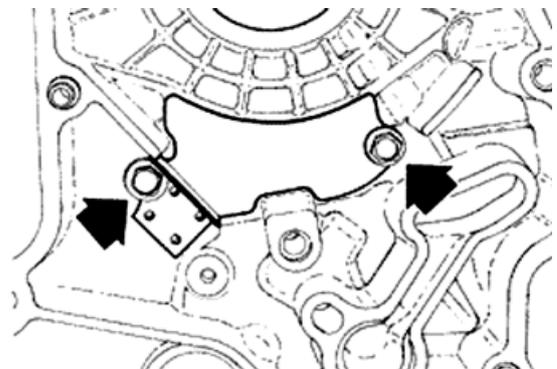


- Remove the coupling gasket of the crankcase halves.

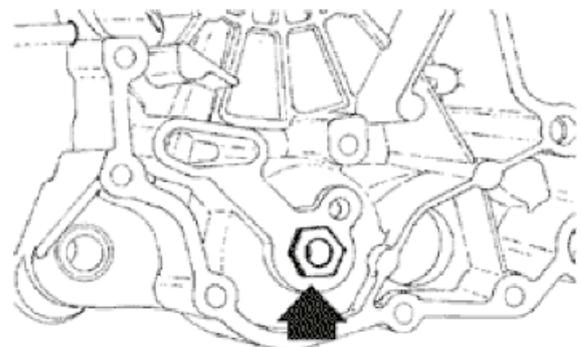
- Remove the two screws and the internal cover shown in the diagram.

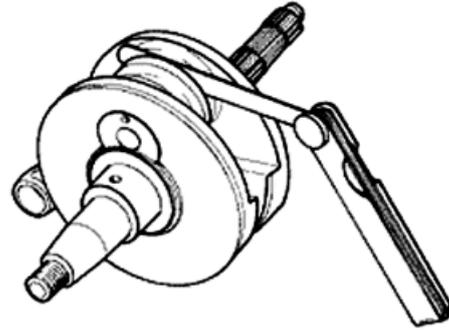
CAUTION

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



- Remove the oil guard on the flywheel side.
- Remove the oil filter fitting shown in the diagram



Fitting clearance**Connecting rod axial clearance 0.20 - 0.50**

Check the radial clearance on the connecting rod.

Standard clearance: $0.036 \div 0.054$ mm

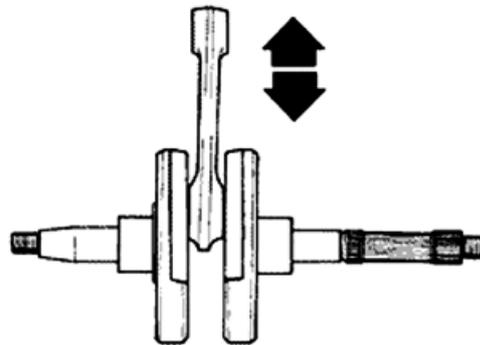
-Check the surfaces that limit the axial free-play are not scored and measure the width of the crankshaft between these surfaces, as shown in the diagram.

Standard dimensions:

$55.75 \div 55.90$ mm

N.B.

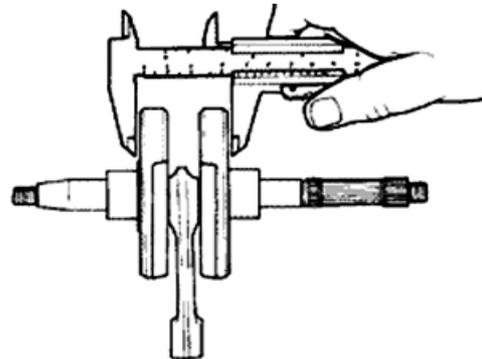
WHEN MEASURING THE WIDTH OF THE CRANKSHAFT, MAKE SURE THAT THE MEASUREMENTS ARE NOT MODIFIED BY THE RADIIUSES OF FITTINGS WITH THE CRANKSHAFT BEARINGS.



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

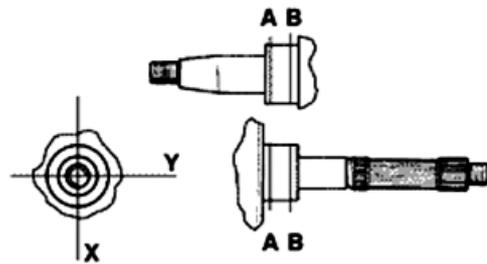
N.B.

IN CASE OF NEW UTILISATION, MAINTAIN THE FIRST FITTING POSITION.



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

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



Characteristic

Standard diameter - Category 2

29.004 ÷ 29.010

Standard diameter - Category 1

28.994 ÷ 29.000

<u>STANDARD DIAMETER</u>	
Specification	Desc./Quantity
Standard diameter - Category 2	29.004 ÷ 29.010
Standard diameter - Category 1	28.994 ÷ 29.000

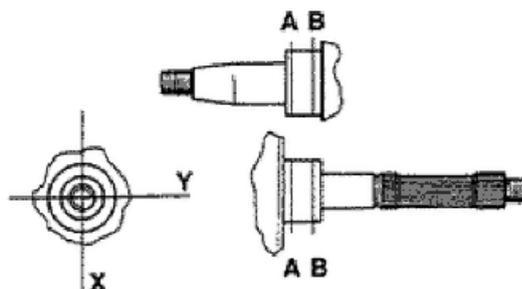
Inspecting the crankshaft alignment

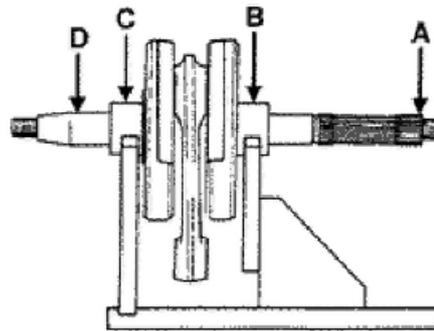
Measure the capacity of both axes X-Y

Specific tooling

020074Y Support base for checking crankshaft alignment

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





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

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

The connecting rod head bushings cannot be replaced. For the same reason, the connecting rod may not be replaced and, when cleaning the crankshaft, be very careful that no impurities get in through the shaft's lubrication holes.

In order to prevent damaging the connecting rod bushings, do not attempt cleaning the lubrication duct with compressed air.

- Make sure that the 2 caps on the crankpin are properly fitted.
- A wrong installation of a cap can seriously affect the bushing lubrication pressure.

N.B.

THE MAIN BEARINGS ARE NOT GRINDABLE

Specific tooling

020074Y Support base for checking crankshaft alignment

Characteristic

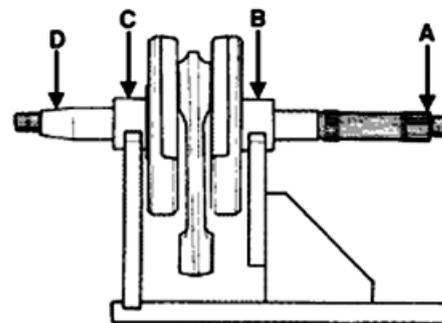
Off-line maximum admitted

A = 0.15 mm

B = 0.01 mm

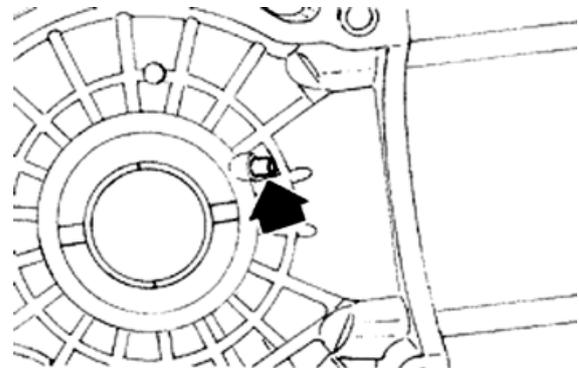
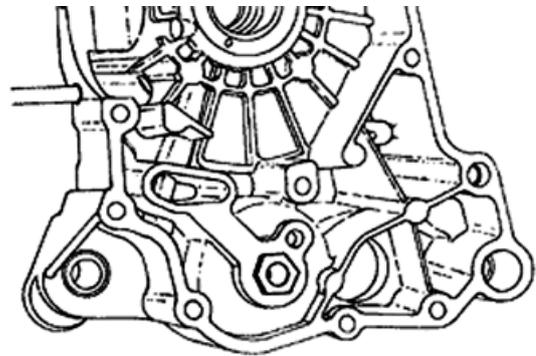
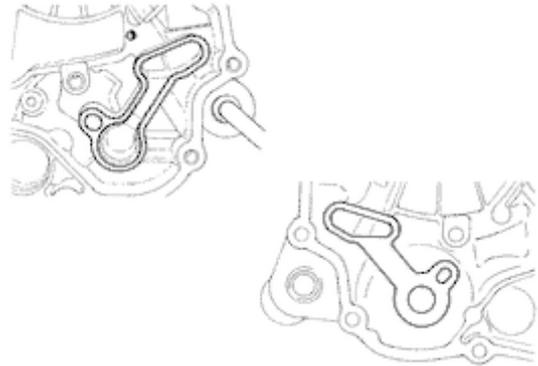
C = 0.01 mm

D = 0.10 mm



Inspecting the crankcase halves

- Before proceeding to check the crankcase halves, thoroughly clean all surfaces and oil ducts.
- On the transmission-side crankcase half, take particular care when handling the oil pump compartment and the oil ducts, the by-pass duct, the main bushings and the cooling jet on the transmission side (see diagram).
- Take particular care, also, that there are no signs wear in the oil by-pass valve housing (see Chapter Lubrication), as this could prevent a good seal in the valve, which regulates the oil pressure.
- On the flywheel side crankcase half, take particular care cleaning the oil ducts for the main bushings, the oil duct for the jet that lubricates the cylinder head and the oil drainage duct at the flywheel side oil seal.
- Inspect the coupling surfaces on the crankcase halves for scratches or deformation, taking particular care with the cylinder/crankcase surfaces and the crankcase halves surfaces.
- Defects in the crankcase coupling gasket between the crankcase halves or the mating surfaces shown in the diagram, could cause a drop in the oil pressure lubricating the main bearings and connection rod.
- Check the main bearing seats that limit axial clearance in the crankshaft show no signs of wear. The dimension between these seats is measured by way of the procedure described previously for measuring the crankshaft axial clearance and dimensions.



N.B.

THE JET IS FED THROUGH THE MAIN BUSHINGS. PROPER OPERATION OF THIS COMPONENT IMPROVES THE PISTON TOP COOLING. CLOGGING HAS EFFECTS THAT ARE DIFFICULT TO DETECT (PISTON TEMPERATURE INCREASE). FAILURE OR LEAK CAN CONSID-

ERABLY DECREASE THE MAIN BUSHING AND CONNECTING ROD LUBRICATION PRES-SURE.

N.B.

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

Inspecting the crankshaft plain bearings

- T

o obtain a good bushing lubrication it is necessary to have both an optimal lubricating pressure (3,2 bar) and a good oil flow rate; the bushings must be correctly positioned so as not to obstruct the oil supply channels.

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

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

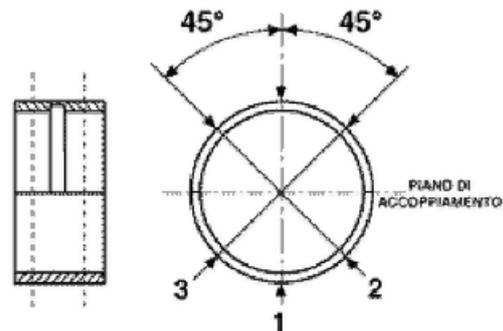
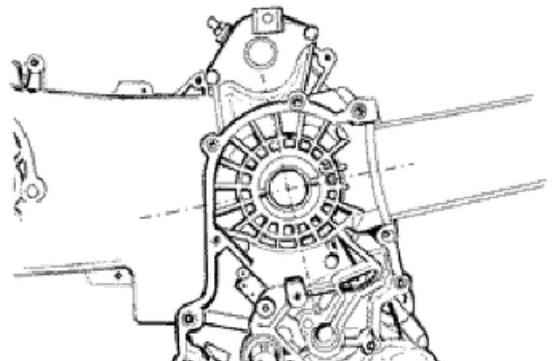
- To prevent obstructions in the oil feeding channels, the matching surface of the two half-bearings must be perfectly perpendicular to the cylinder axis, as shown in the figure.

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

- Check the inside diameter of the main bushings in the three directions indicated in the diagram.

- Repeat the measurements for the other bushing half. see diagram.

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



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

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

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

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

TYPE	IDENTIFICATION		
A	RED		
B	BLUE		
C	YELLOW		
	Type "A" - RED	Type "B" - BLUE	Type "C" - YEL- LOW
Crankshaft half-bearing	1.970 ÷ 1.973	1.9703 ÷ 1.976	1.976 ÷ 1.979
Bush- ing cat- egory	Crank- case halves category	Internal bush- ing diameter after fitting	Possible fitting
A	1	29.025 ÷ 29.040	Original
B	1	29.019 ÷ 29.034	Original and spare
	2	29.028 ÷ 29.043	
C	2	29.022 ÷ 29.037	Original

Match the shaft with two category 1 crank webs with the category 1 crankcase (or cat. 2 with cat.

2) Furthermore a spare crankcase cannot be matched with a crankshaft with mixed categories.

The spare crankshaft has half shafts of the same category.

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

N.B.

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

N.B.

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

N.B.

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

Characteristic

Standard driving depth

1.35 ÷ 1.6

Diameter of crankcase without bushing

32.953 ÷ 32.963

Refitting the crankcase halves

Studs

Check that the stud bolts have not worked loose from their seat in the crankcase.

Check the depth of stud bolt driving with a gauge, as indicated in the photograph. If it varies significantly from the driving depth indicated, it means that the stud bolt has yielded.

In this case, replace it.



By working on two fitted cylinder head fixing nuts, nut and lock nut, as shown in the photograph, remove the stud bolt from its seat.

Clean the threaded seat on the carter thoroughly. Refit a new stud bolt and apply the special product on the threading crankcase side.

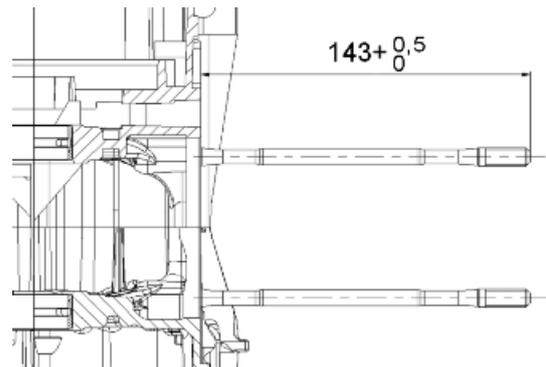
Tighten up to the depth of the driving indicated.



Recommended products

Loctite 'Quick Set' Strong 270 threadlock

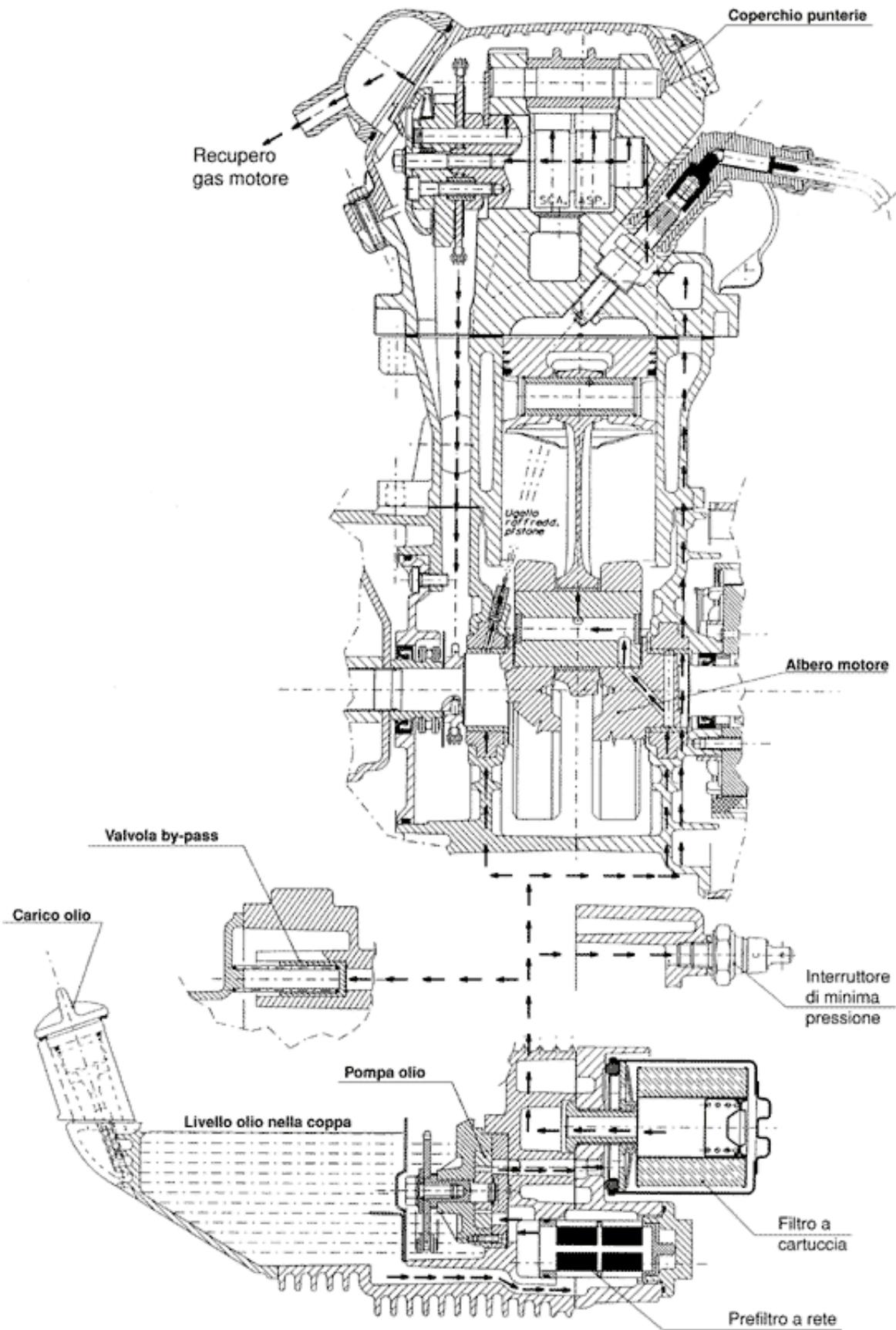
Strong 270 threadlock



Lubrication

Conceptual diagrams

LUBRICATION CIRCUIT



Oil pressure check

- After removing the flywheel cover as described in the "Flywheel" chapter, remove the electrical connexion of the minimum oil pressure switch and then remove the switch.
- With engine idling at 1650 rpm check that the oil pressure is between 0.5 ÷ 1.2 atm.
- With engine at 6000 rpm check that the oil pressure is between 3.2 ÷ 4.2 atm.
- Remove the appropriate tools once the measurement is complete, refit the oil pressure switch and washer, tightening it to the specified torque and fit the fan cover.
- If the oil pressure is outside the specified limits, in the following order, check: the oil filter, the oil by-pass valve, the oil pump and the crankshaft seals.

N.B.

THE CHECK MUST BE CARRIED OUT WITH OIL AT THE CORRECT LEVEL AND WITH AN OIL FILTER IN GOOD CONDITION.

Characteristic

Oil pressure

Minimum pressure admitted at 6000 rpm: 3.2 atm.

Locking torques (N*m)

Minimum oil pressure sensor 12 ÷ 14



Crankshaft oil seals

Refitting

- Fit the internal bulkhead by locking the two screws to the prescribed torque.
- Fit the oil filter fitting and tighten it to the specified torque.
- Place a new gasket on one of the crankcase halves, preferably on the transmission side, together with the locating dowels.
- Lubricate the main bushings and insert the crankshaft in the transmission side crankcase half.
- Reassemble the two crankcase halves.

For the 200 models reposition the shim washers as in the original fitting.

- Fit the 11 screws and tighten them to the prescribed torque.
- Lubricate the flywheel oil seal.
- Using the appropriate tool, assemble the oil seal.
- Fit a new O-ring on the pre-filter and lubricate it.
- Insert the filter on the engine with the relative cap. Tighten to the specified torque.

N.B.

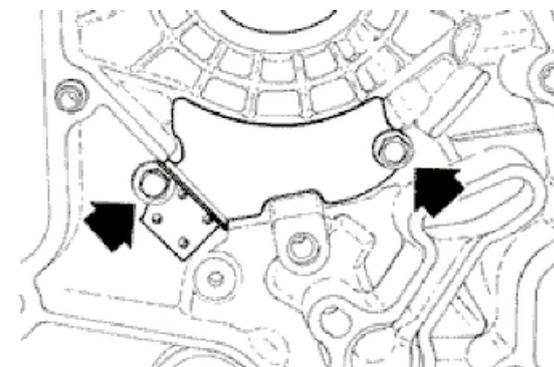
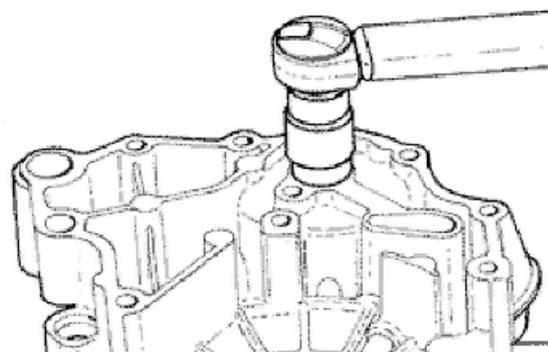
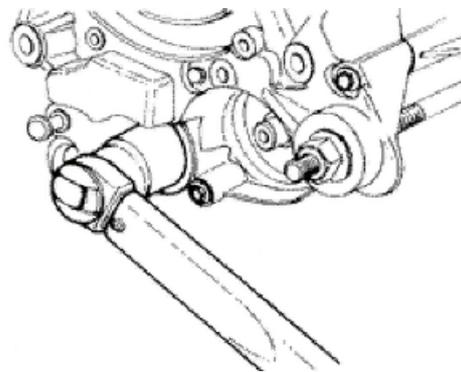
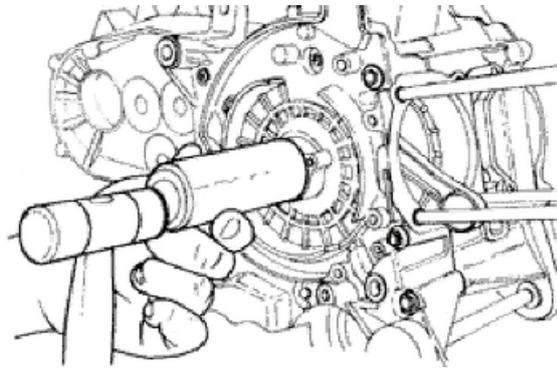
FAILURE TO USE THE SPECIFIC TOOL CAN RESULT IN AN INCORRECT DEPTH POSITION AND AS A CONSEQUENCE IN INADEQUATE OIL SEALING.

Specific tooling

020425Y Punch for flywheel-side oil seal

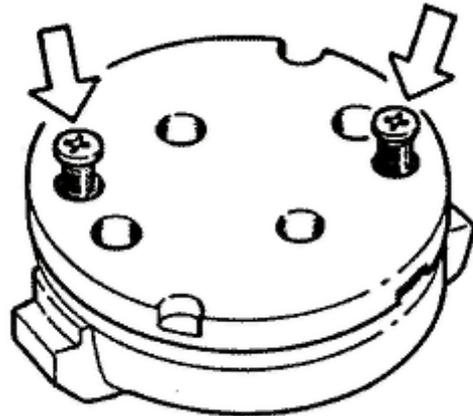
Locking torques (N*m)

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



Oil pump

- Check there are no signs of wear on the oil pump shaft or body.
- Check there are no signs of scoring or wear on the oil pump cover.
- If you detect non-conforming measurements or scoring, replace the faulty parts or the unit.
- Fit the pump cover in the position that permits the crankcase fixing screws to be aligned.
- Make sure the gasket is positioned properly and refit the pump on the engine crankcase. The pump can only be fitted in one position.
- Tighten the screws to the prescribed torque.
- Fit the sprocket wheel with a new O-ring.
- Fit the chain.
- Fit the central screw and the belleville washer. Tighten to the prescribed torque.
- Fit the oil pump cover by tightening the two screws to the prescribed torque.



N.B.

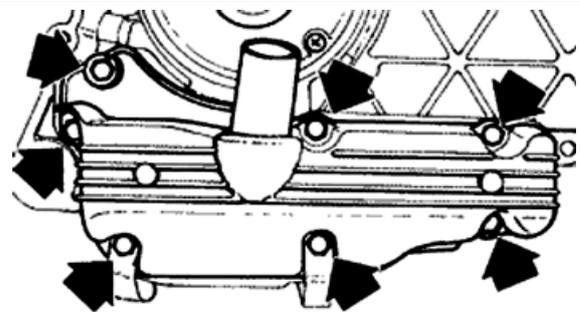
FIT THE BELLEVILLE WASHER SO THAT ITS OUTER RIM TOUCHES THE PULLEY. MAKE SURE THAT THE PUMP TURNS FREELY.

Locking torques (N*m)

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

Removing the oil sump

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



- Remove the screw, the by-pass piston, the gasket and centring dowels shown in the figure.

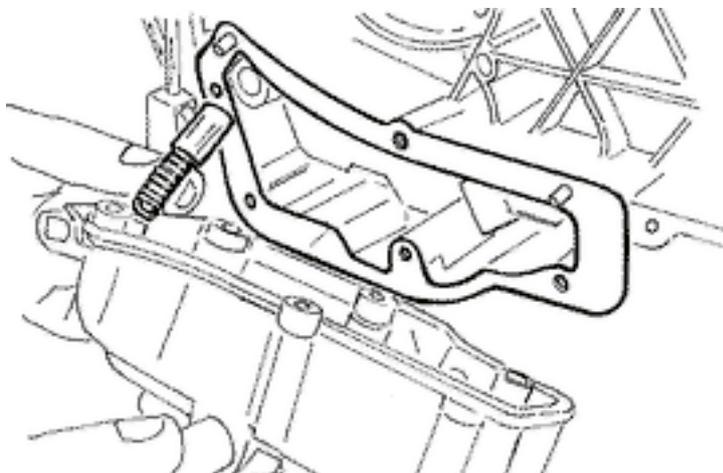
Inspecting the by-pass valve

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

Characteristic

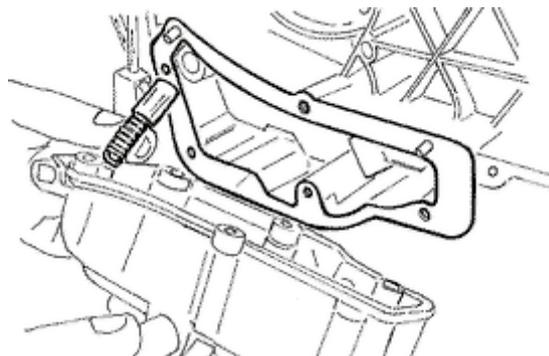
By-pass check up: Standard length

54.2 mm



Refitting the oil sump

- Refit the by-pass valve plunger in its housing.
- Insert the pressure-regulating spring.
- Fit a new sump seal.
- Refit the two centring dowels.
- Refit the sump, taking care to locate the spring in the appropriate recess machined into the inside of the sump.
- Refit the rear brake cable brackets and the screws in the reverse order from which they were removed.
- Tighten the screws to the prescribed torque.



- Refit the drive pulley assembly, the drive belt, the sprocket wheel and the transmission cover, as described in the "Transmissions" chapter.

- **When testing the lubrication system, refer to chapter "Crankcase and Crankshaft", regarding lubrication of the crankshaft and connecting rod**

Locking torques (N*m)

Oil sump screws 10 ÷ 14

SAS valve

Inspecting the one-way valve

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



If anomalies are detected, replace the pump.

N.B.

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

N.B.

ABSENCE OF VIBRATION INDICATES INEFFICIENT SEALING

Specific tooling

020329Y MityVac vacuum-operated pump

Inspecting the cut-off

- Remove the SAS valve
 - Connect the MITYVAC pump in depression mode (VACUUM) to the depression valve socket CUT - OFF
 - Apply a vacuum value higher than 0.5 BAR
 - Check that this value is kept at all times
 - If a worn seal is detected, replace it.
 - With a "T" bypass and flexible rubber hoses make a parallel connection between the rubber coupling and the depression uptake of the CUT-OFF valve.
 - Connect the bypass to the MITYVAC pump
 - Set the pump set to the depression position (VACUUM)
 - Using a pair of long flat pliers, pinch the rubber hose next to the valve
 - Operate the pump until a vacuum higher than 0.5 BAR is created
 - Release the hose and check how the vacuum reacts
 - Under normal functioning the vacuum undergoes a slight fall and then readjusts. There follows a slow and continuous loss of depression up to approximately 0.4 BAR. At this point the valve opens and the depression is suddenly set to zero.
- Lack of tightness or the fact that the valve opens at different vacuum values should be regarded as anomalies. In this case, replace it.

N.B.

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

N.B.

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

Specific tooling

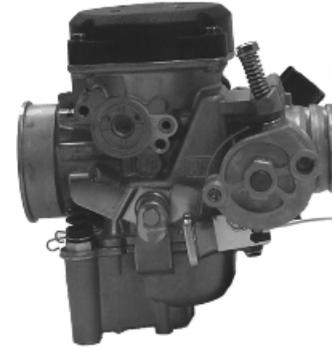


020329Y MityVac vacuum-operated pump

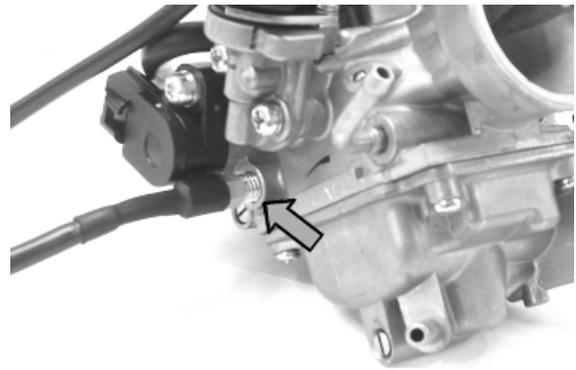
Fuel supply

Removing the carburettor

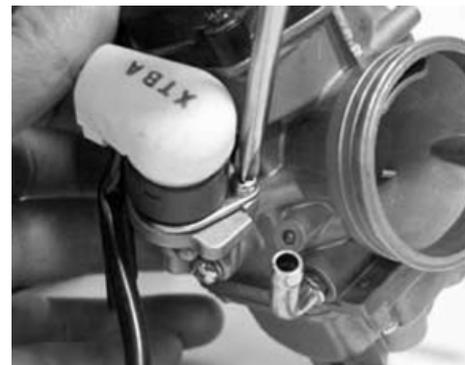
- To detach the carburettor from the engine, it is necessary to move the air filter and remove the throttle control transmission, the automatic starter connection, the clamps anchoring the carburettor to the filter housing and to the inlet manifold, the air delivery pipe to the diaphragm, the heater, the intake fitting and the TPS cable.



- Remove the heater



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



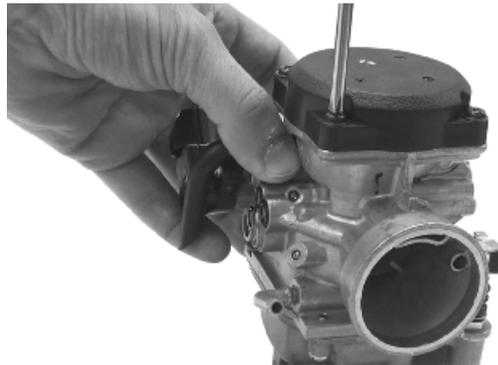
-
- Remove the 2 screws and the starter support with the gasket.



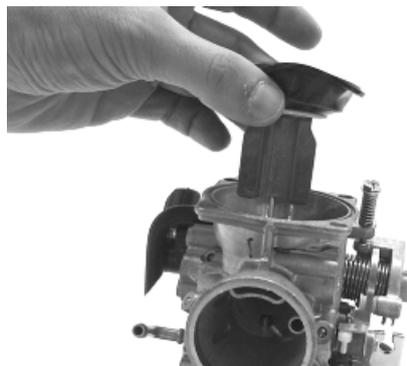
-
- Remove the 4 fixing screws shown in the figure and the vacuum chamber cover.

WARNING

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



-
- Remove the vacuum valve together with the diaphragm.



Remove the tapered pin from the vacuum-operated valve



- Remove the 4 screws indicated in the figure.



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



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

N.B.

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

N.B.

AVOID REMOVING THE PISTON OF THE PUMP AND ITS CONTROL.

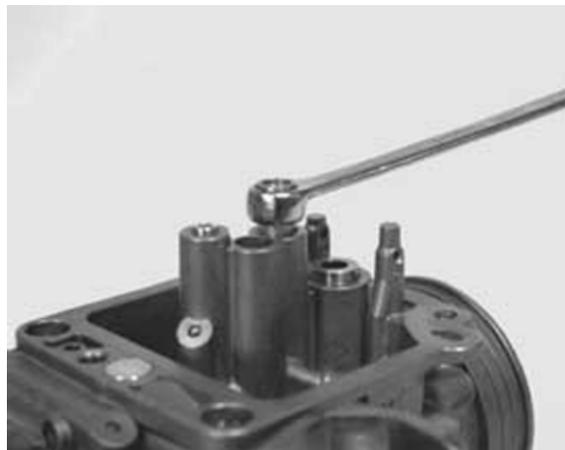


Adequately support the carburettor and using a rod and hammer remove the float pin acting from the throttle control side.

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



-Remove the maximum nozzle.



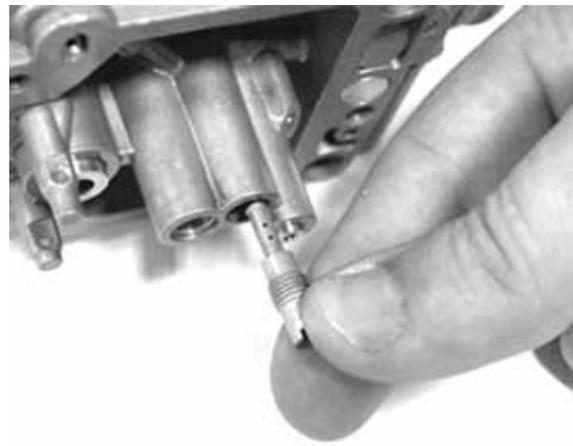
-Remove diffuser.



- Remove the sprayer.

N.B.

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



-Remove the minimum nozzle.



- Remove the minimum flow set screw and the spring.

CAUTION

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

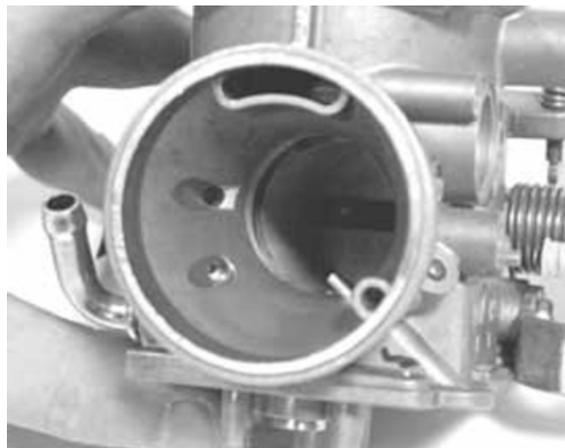


Refitting the carburettor

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



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



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



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

N.B.

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

- Check that there are 5 closing ball joints for the operating pipes on the carburettor body.
- Check that the coupling surfaces, the tank and the diaphragm are not dented.
- Check that the depression valve housing pipe is not scratched.
- Check that the throttle valve and the shaft do not show abnormal wear.
- Check that the plunger seat does not show abnormal wear.
- Replace the carburettor in case of irregularities.
- Check that the return spring of the accelerating pump rocking lever is not deformed by over-stretching.

N.B.

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

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



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



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



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

N.B.

INTRODUCE THE RETURN SPRING ON THE FLOAT PLATE ADEQUATELY

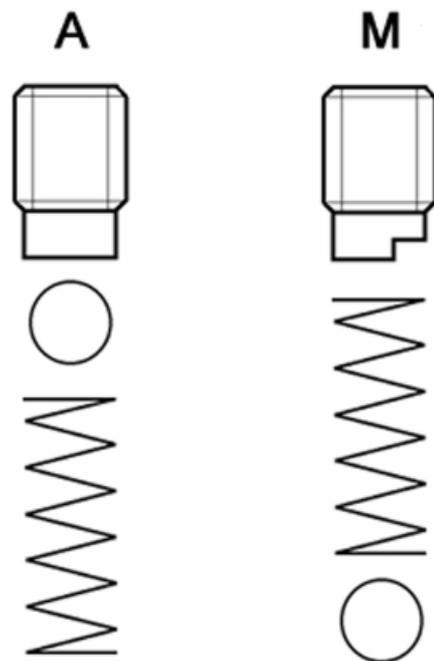
- Remove the drainage screw from the tank, wash and blow it properly and make sure the acceleration pump pipes are clean.
- Operate the acceleration pump piston repeatedly and blow with compressed air.
- Reassemble the acceleration pump valves following this order:

INTAKE VALVE (A)

- Spring
- Ball
- Nozzle

IN VALVE (M)

- Ball
- Spring
- Nozzle



N.B.

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

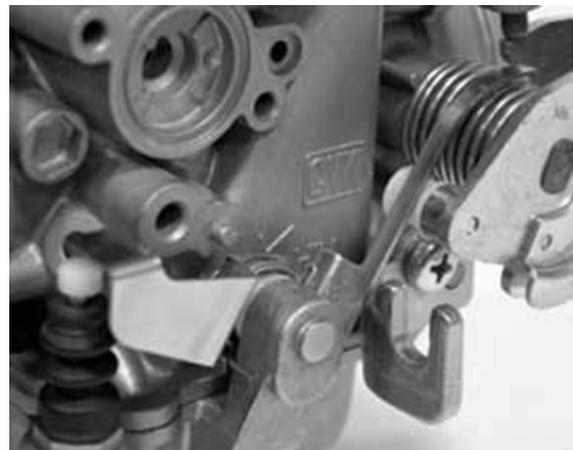
- Check the screw tightness introducing a small amount of fuel in the tank.
- Assemble a new gasket on the tank.
- Assemble the tank on the carburettor body fastening the 4 screws.
- Check that the control roller is free to rotate in its own seat.

N.B.

MAKE SURE THE TANK GASKET IS CORRECTLY INTRODUCED

N.B.

AVOID DEFORMING THE ACCELERATION PUMP CONTROL ROCKING LEVER.



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



- The screw final position should be determined by an exhaust fume analysis.

- Adjust the carburettor by turning the screw twice from the close position.

Level check

- Place the carburettor inclined as shown in the figure.



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

Inspecting the valve and needle

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



N.B.

THE VALVE CAN BE INSERTED IN ONLY ONE POSSIBLE POSITION.



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



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



Inspecting the automatic choke device

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



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

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

N.B.

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

Characteristic

Check the automatic starter: Kehin: Protrusion value

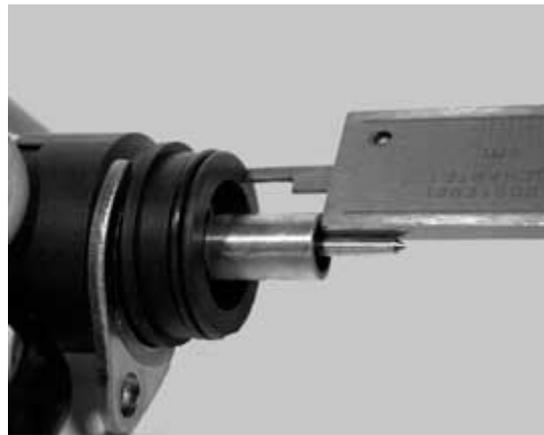
10 mm at about 20°C

Check the automatic starter: Keihin maximum time

5 min

Starter resistance:

20 Ohm



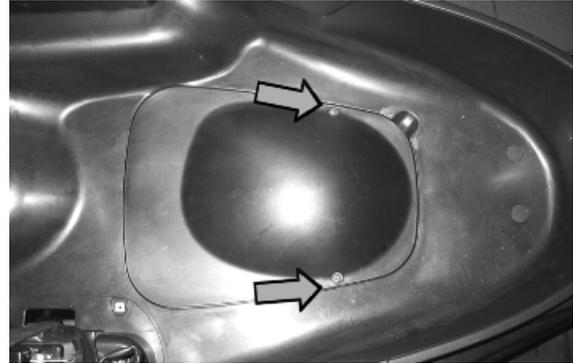
Adjusting the idle

- The engine does not require frequent idle speed adjustments, but it is essential to strictly follow certain rules when adjusting the idle speed.
- Before adjusting the carburettor make sure to respect the lubrication requirements, valve clearance, and complying timing, spark plug should be in optimum conditions, air filter clean and sealed, and the exhaust system tight.
- Warm up the engine until the electrical fan is activated at least once.
- Using the rpm indicator (020332y), adjust the idle set screw until reaching $1600 \div 1700$ rpm.

N.B.

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

After adjusting the idle speed, proceed with the TPS zero setting.



INDEX OF TOPICS

SSUSPENSIONS

SUSP

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

Front

Removing the front wheel

- Remove the 5 fixing screws indicated in the photograph.

Locking torques (N*m)

Wheel fixing screw 20 ÷ 25



Front wheel hub overhaul

- Remove the ball bearing seeger ring indicated in the photograph



Extract the ball bearing using the specific tool

Specific tooling

001467Y014 Pliers to extract ø 15-mm bearings

001467Y017 Bell for bearings, outside Ø 39 mm



- Remove the oil seal on the roller bearing side using a screwdriver.



- Remove the roller bearing using the specific tool

Specific tooling

020376Y Adaptor handle

020456Y Ø 24 mm adaptor

020363Y 20 mm guide



- Heat the roller bearing seat with a heat gun
- Use the specific tool to introduce and push the bearing until it stops, with the shielded side facing out
- Refit the ball bearing locking seeger ring

Specific tooling

020151Y Air heater

020376Y Adaptor handle

020359Y 42x47-mm adaptor

020412Y 15 mm guide



- Use the specific tool to fit and push the roller casing until it stops
- Refit the oil seal on the roller bearing side
- Lubricate the area between the roller bearing and the ball bearing

Specific tooling

020038Y Punch

Recommended products

AGIP GREASE MU3 Grease for odometer transmission gear case

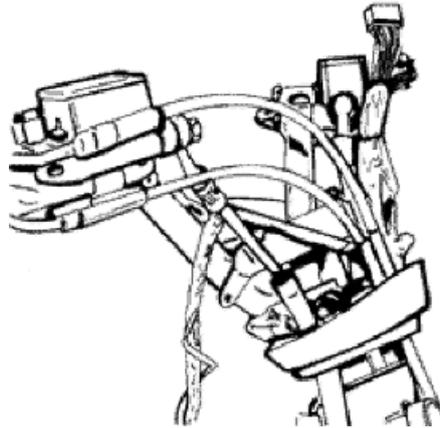


Soap-based lithium grease with NLGI 3; ISO-L-XBCHA3, DIN K3K-20

Handlebar

Removal

- Remove the two handlebar covers as explained in the Bodywork Chapter.
- Remove the handlebar wiring fixing clips and disconnect the electric connectors from the brake levers.
- Unscrew the fittings, then remove the front and rear brake pump piping.
- Remove the flexible transmission of the accelerator and remove the throttle.
- Loosen the clamp fixing the handlebar to the steering tube and pulling upwards, remove the handlebar, then remove the lower plastic cover.



N.B.

IF THE HANDLEBAR IS BEING REMOVED TO REMOVE THE STEERING, IT IS ONLY NECESSARY TO TILT THE HANDLEBAR FORWARD ONTO THE FRONT PART OF THE VEHICLE WITHOUT REMOVING THE PARTS FITTED SO AS TO AVOID DAMAGING THE SHAFTS.

Refitting

Carry out the above operations by working in the reverse order from those of the removal.

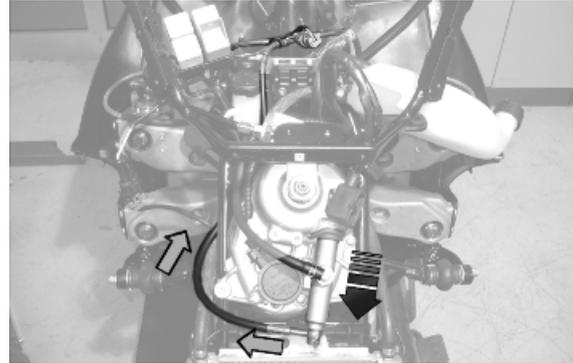
Locking torques (N*m)

Handlebar fixing screw 50 ÷ 55

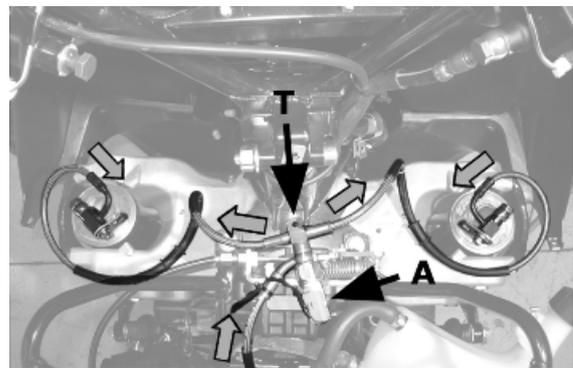
The tilt mechanism

Hydraulic system layout

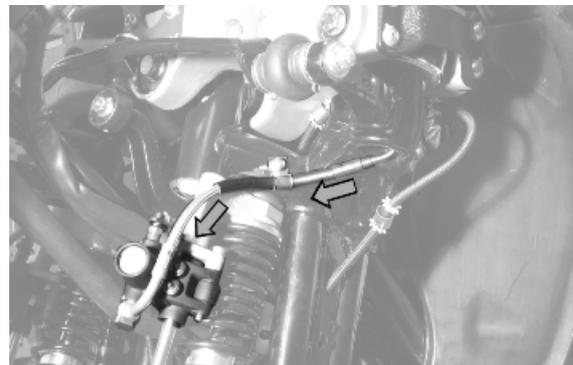
When tilting is locked, the geared motor activates the hydraulic pump indicated in the photograph and pressurises the circuit.



The pressurised oil reaches the distribution frame "T" and the pressure sensor "A". Then, the pipes branch out to reach the upper joints on the side steering tubes.

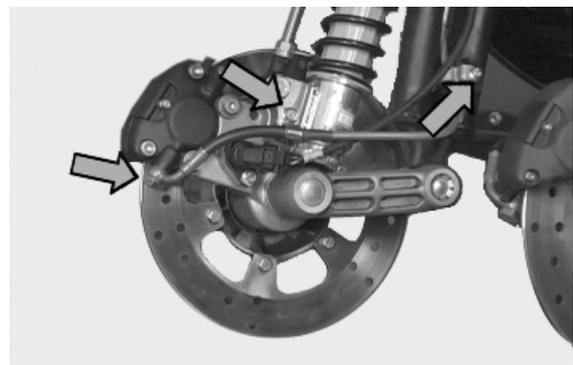


Through the rigid-flexible pipes inside the side steering tubes, the oil reaches the stem sliding locking device placed parallel to the shock absorber.

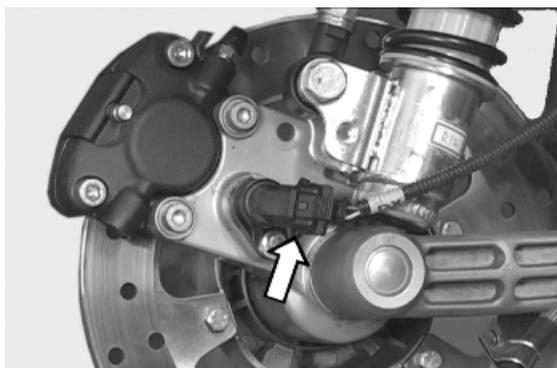


Steering tubes

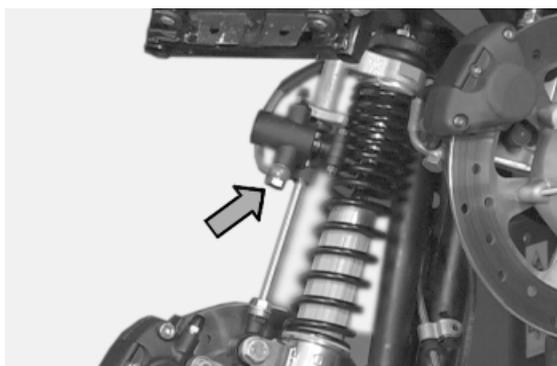
Remove the brake calliper pipe retainers and the hydraulic pipe fitting from the brake calliper making sure there is a container to collect the brake fluid.



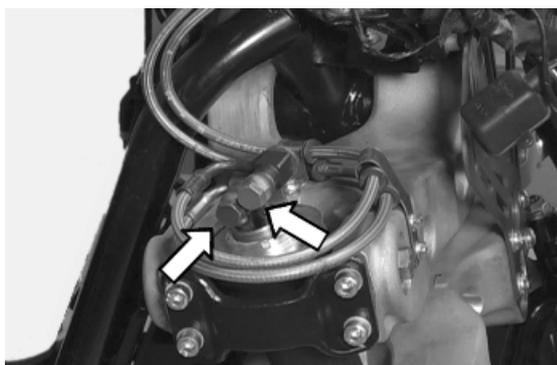
Disconnect the tone wheel connector indicated in the photograph.



Remove the hydraulic pipe fitting from the sliding locking device, making sure again that the liquid drained is collected.



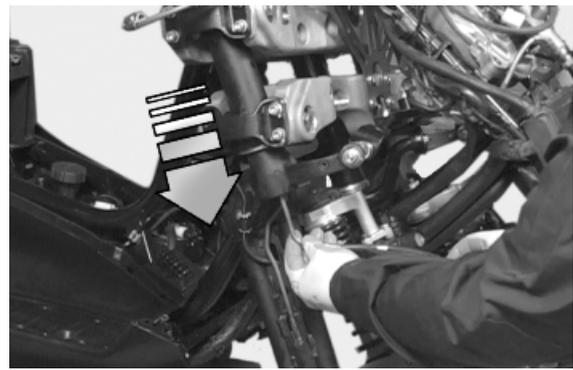
Remove the upper fittings, on the parallelogram, of the brake hydraulic pipes and the suspension lock indicated in the photograph.



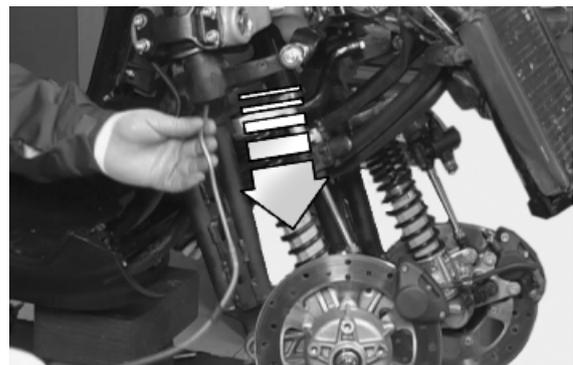
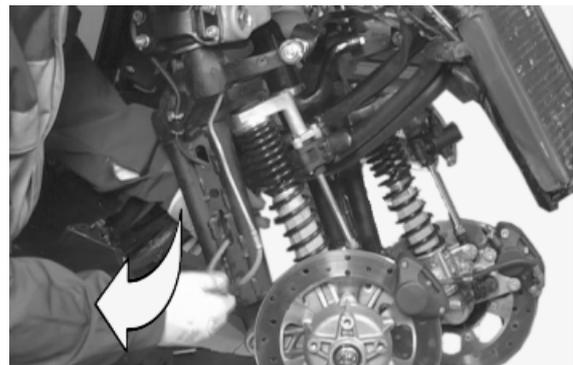
Remove the hydraulic pipe fitting fixing nuts indicated in the figure from the support bracket.



Remove the suspension tilt locking device pipes from the headstock.

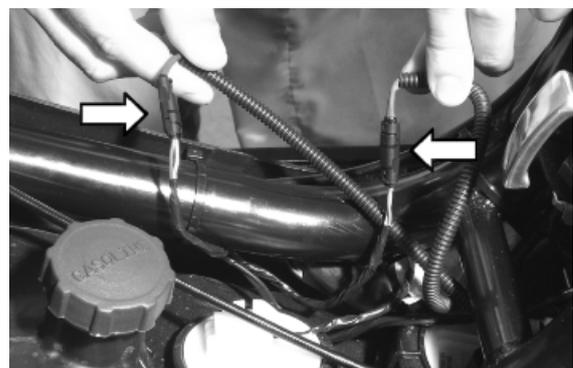


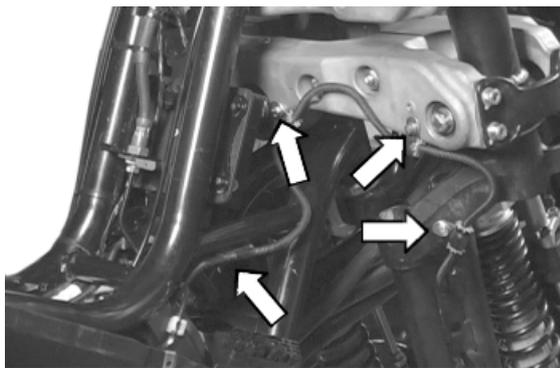
Remove first the flexible part of the calliper from the steering tube as shown in the photograph, and then remove the rigid part.



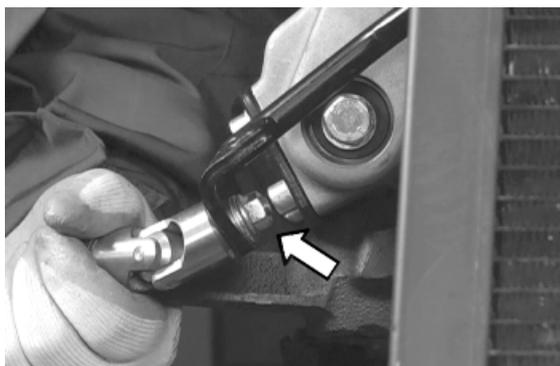
Remove the tone wheel wiring by disconnecting the connector on the fuel tank after removing the chassis central cover.

After that, remove the retainers indicated in the figure.





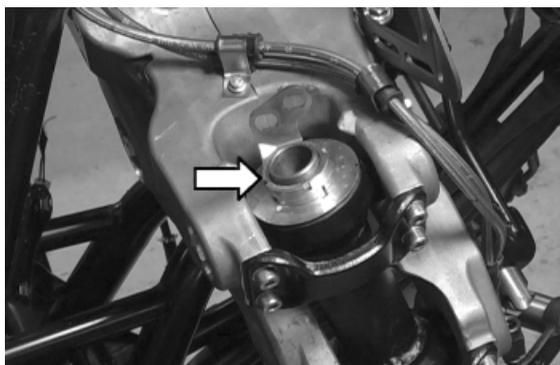
Remove the constant-velocity universal joint from the steering bar by undoing the nut indicated in the photograph.



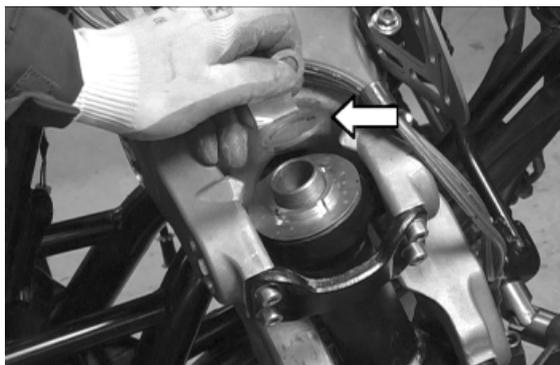
Use a specific tool to remove the upper tightening ring nut of the steering tube.

Specific tooling

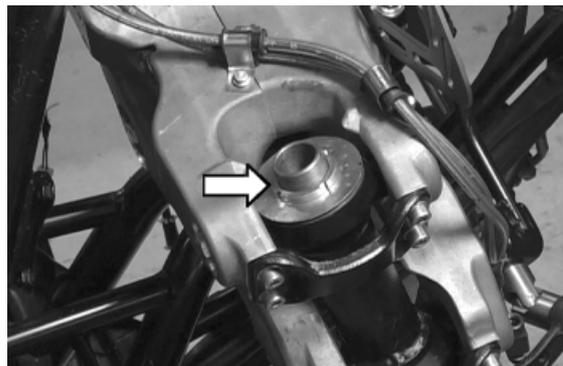
020055Y Wrench for steering tube ring nut



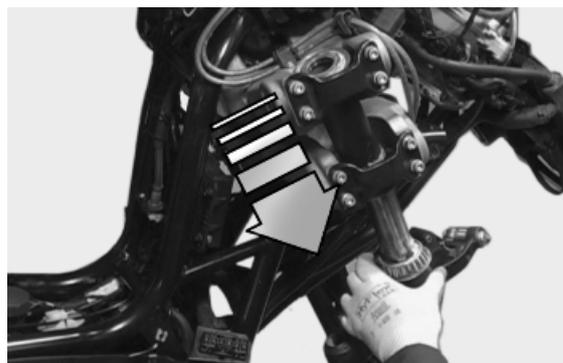
Remove the hydraulic pipe support bracket.



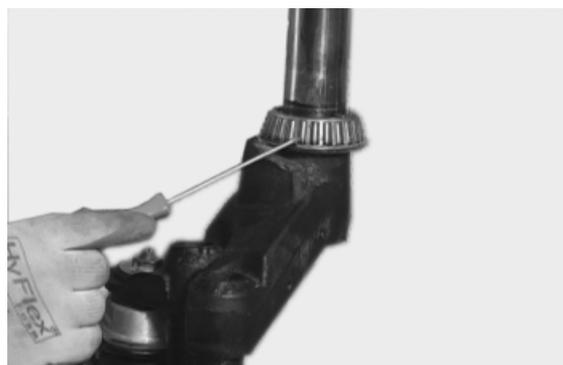
Remove the steering tube lower ring nut and the protection cap indicated in the photograph.



Now, it is possible to remove the steering tube.

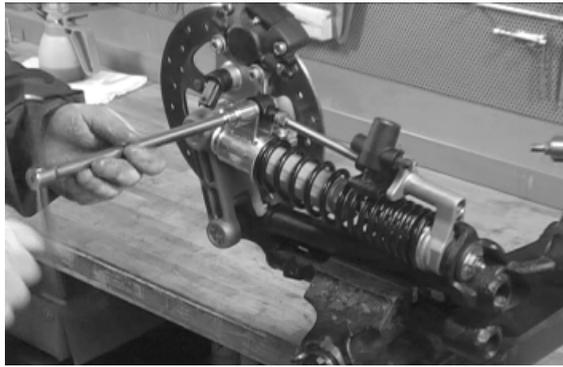


Check that the roller tapered bearing does not show signs of abnormal wear. If it is, replace it.

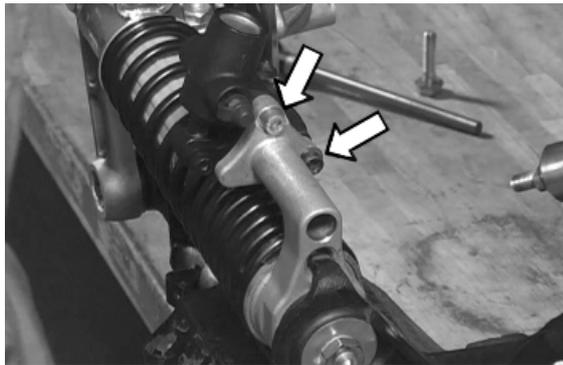


THE OPERATIONS DESCRIBED BELOW CAN ALSO BE CARRIED OUT EVEN WHEN THE SUSPENSION IS FITTED

Remove the lower retainer of the sliding stem shown in the photograph.



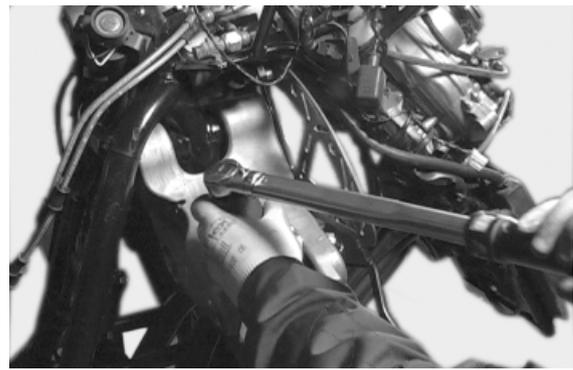
Remove the sliding stem locking device retainers indicated in the photograph.



Check that the sliding stem locking device does not show signs of abnormal wear.



For refitting, follow the operations for removal but in reverse order, observing the prescribed torques and greasing the bearings and their seats.



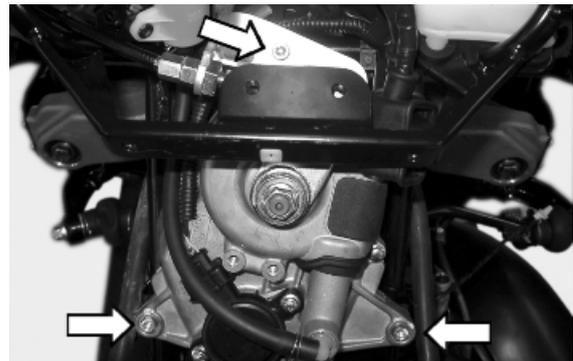
STEERING TUBES

Name	Torque in Nm
Side headstock upper ring nut	20 - 24
Side headstock lower ring nut	12 ÷ 15
Screw fixing sliding stem to shock absorber	45 ÷ 50
Clamp for sliding stem locking device	6.5 ÷ 10.5
Fixing nuts for constant-velocity universal joints	18 ÷ 20

Parallelogram device

Remove the steering tubes.

To facilitate removal operations of the brake disc sector, loosen the 3 fixing screws in the hydraulic electro-actuator indicated in the photograph.

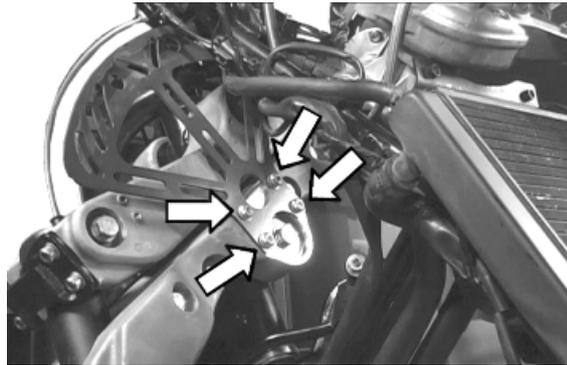


Remove the hydraulic pipe retainers from the parallelogram.

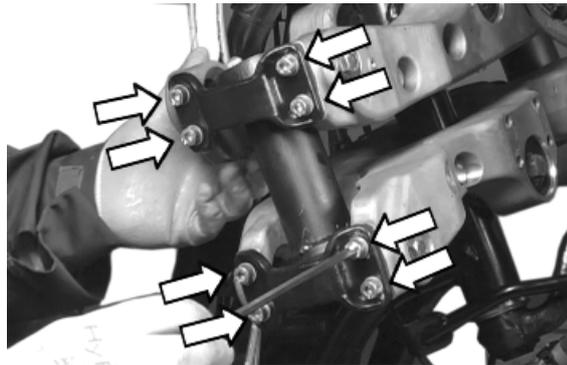




Remove the 4 screws fixing the tilt brake disc sector indicated in the photograph.



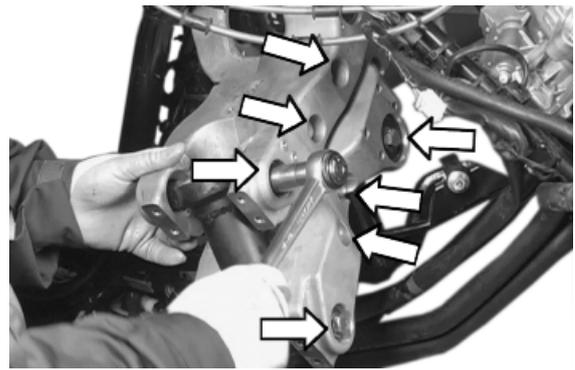
Remove the retainers indicated in photograph of the half-arms joint flange.



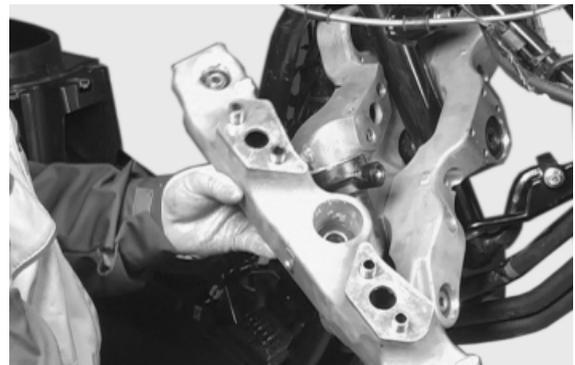
To facilitate the operations indicated below, remove the suspension locking electronic control unit indicated in the photograph.



Remove the arm coupling retainers from the parallelogram by loosening the retainers indicated. For easy refitting operations, remember to take note of the positions of the components.



Separate the half-arms by hitting slightly with a wooden mallet where possible alternatively to the left and right side of the parallelogram.



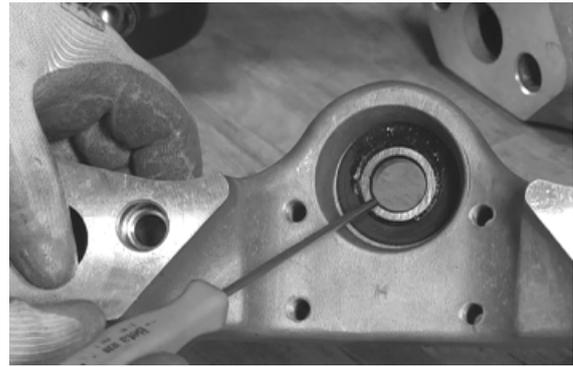
Remove the headstocks.



Carry out a visual check of the upper and lower bearings on the headstocks and their seats. Replace them in case of signs of abnormal wear.



Check the ball bearings on the parallelogram arms. Replace them in case of signs of abnormal wear.



Check the inside tracks of the parallelogram bearings on the chassis.



For refitting, follow the operations for removal but in reverse order, lubricating the locking pins on the parallelogram half-arms and observing the prescribed torques.



PARALLELOGRAM DEVICE

Name	Torque in Nm
Arm coupling screws	45 ÷ 50
Screws fixing arms to side headstocks	45 ÷ 50
Screws fixing arms to central headstock	45 ÷ 50
Screws fixing the half-arm coupling flange	20 ÷ 25

Name	Torque in Nm
Fixing screws for tilt locking disc section	20 ÷ 25

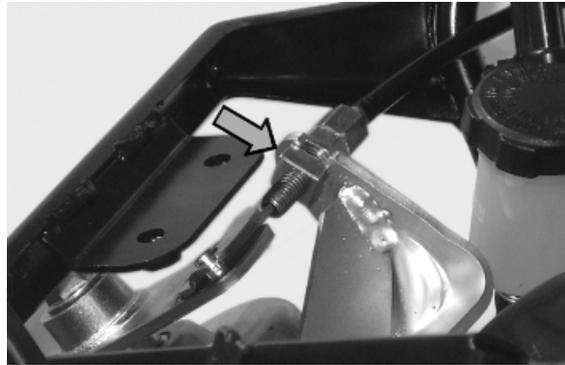
Geared motor and Suspension locking system

Before removing the geared motor:

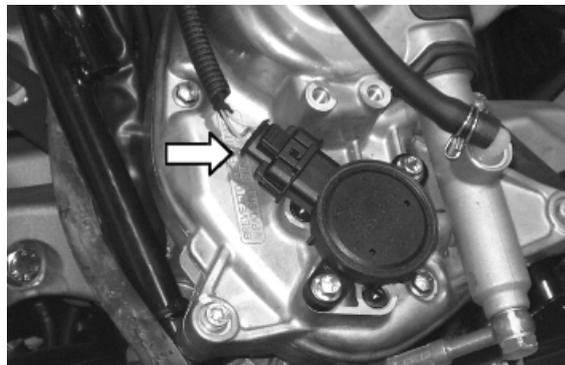
Disable the suspension lock.

- Remove the front shield.

With the set nut indicated in the photograph, remove the tensioning cable of the suspension locking mechanical calliper.



Remove the electrical connection of the geared motor position potentiometer.



Remove the electrical connection of the geared motor electric motor.



Disconnect the hydraulic pipes between the pump and the sliding stem locking clamps. Empty the system and use a container to collect the brake fluid.

CAUTION

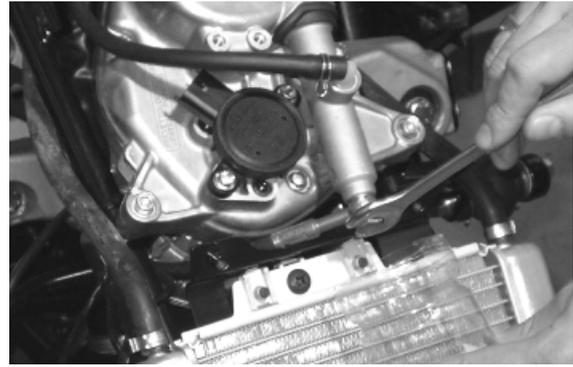
ELIMINATE ANY REMAINING BRAKE FLUID SPILLS.



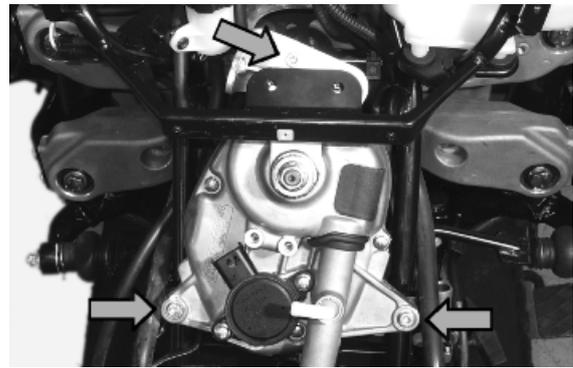
WARNING: BRAKE FLUID IS HIGHLY POISONOUS. DO NOT INGEST OR SWALLOW. IF AC-



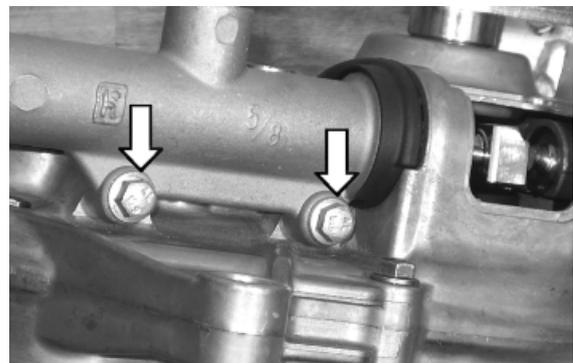
ACCIDENTALLY SWALLOWED, DRINK LARGE QUANTITIES OF MILK OR WATER AND SEEK MEDICAL ADVICE IMMEDIATELY. BRAKE FLUID DESTROYS SKIN AND OCULAR TISSUE. IF YOU ACCIDENTALLY SPILL BRAKE FLUID ON YOURSELF, TAKE OFF YOUR CLOTHES, WASH WITH HOT WATER AND SOAP AND SEEK MEDICAL ADVICE IMMEDIATELY. IF BRAKE LIQUID GETS ACCIDENTALLY IN CONTACT WITH YOUR EYES, RINSE WITH ABUNDANT FRESH WATER AND SEEK MEDICAL ADVICE IMMEDIATELY. KEEP BRAKE FLUID OUT OF THE REACH OF CHILDREN.



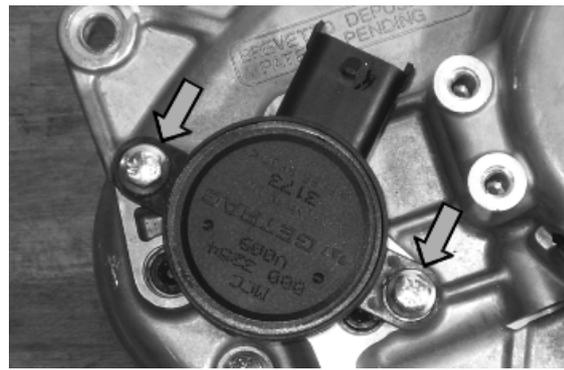
Remove the 3 fixing screws indicated and remove the whole geared motor.



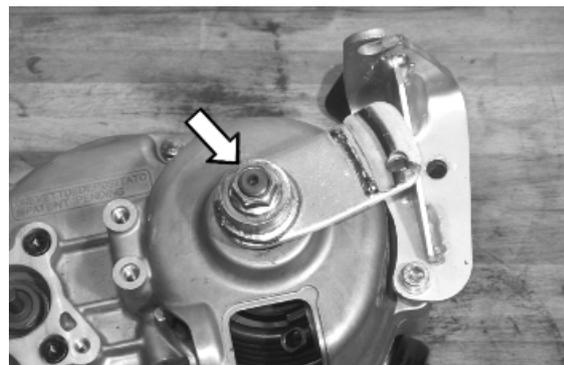
Use a screwdriver to remove the plastic access cover to the pump joint/geared motor
 Unscrew the pump joint screw.
 Unscrew the two geared motor pump locking screws.



Unscrew the two potentiometer screws.
 When refitting, plug the potentiometer in D-type connector, afterwards place it with its electric connection directed to the opposite side of the pump.



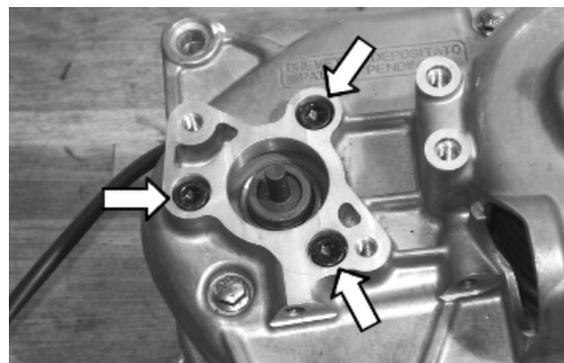
Remove the nut indicated in the figure, if necessary lock the lever with a vice making sure not to spoil the surface.
 In case of difficulties when removing the lever, use the specific tool.
 Remove the tongue and then, the moulded washer.



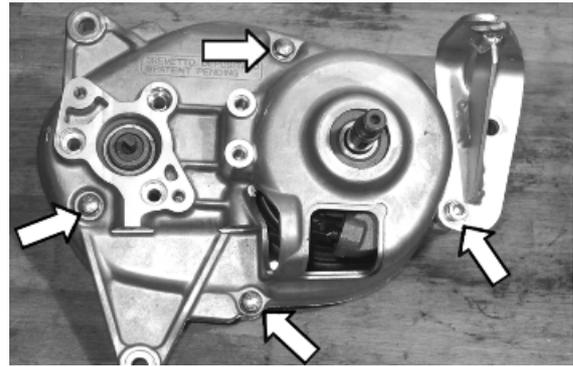
Specific tooling

020234y extractor

Remove the three fixing screws of the electric motor.
 It is important to mark the direction of the electric motor position in order to refit it correctly.



Remove the four screws indicated in the figure, remove the flexible transmission supporting bracket, separate the two crankcase halves, if necessary, use a rubber mallet to hit the flexible transmission lever in order to separate the two crankcases.



Remove the retaining seeger ring of the bearing of the flexible transmission lever control shaft bearing.

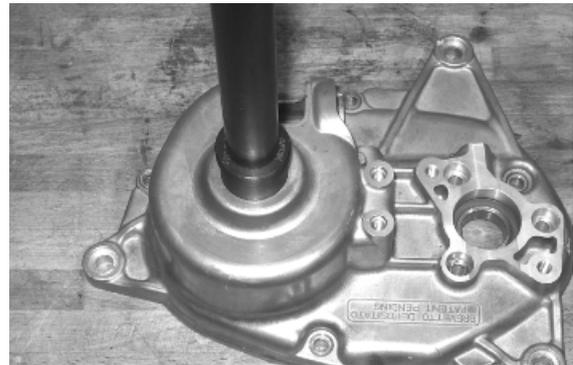
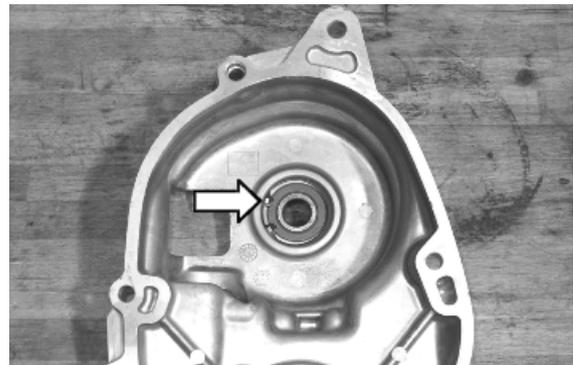
Remove the bearing with the specific tool.

Specific tooling

020376Y Adaptor handle

020441Y 26 x 28 mm adaptor

020362Y 12 mm guide



Extract the electric motor bearing with the specific tool.

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020363Y 20 mm guide



Hold the crankcase in a perfectly horizontal position, heat it with a heat gun at a temperature of about 120 °C, use the specific tool to fit the bearing of the flexible transmission lever control shaft. Hit slightly with a mallet if necessary.

Refit the bearing check seeger ring.

Specific tooling

020151Y Air heater

020376Y Adaptor handle

020362Y 12 mm guide

020357Y 32 x 35 mm adaptor



Hold the crankcase in a perfectly horizontal position, heat it with a heat gun at a temperature of about 120 °C, use the specific tool to fit the bearing of the electric motor. Hit slightly with a mallet if necessary.

Specific tooling

020363Y 20 mm guide

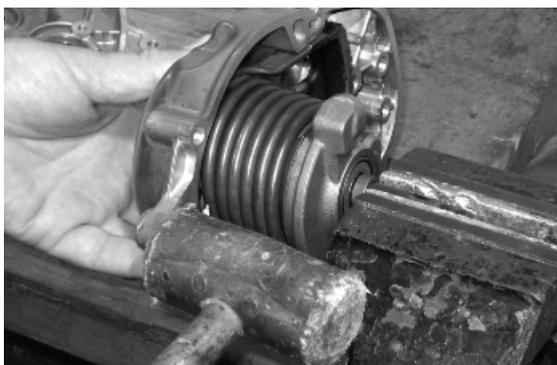
020358Y 37x40-mm adaptor

020151Y Air heater

020376Y Adaptor handle



Remove the spring/toothed sector unit from its fitting, slightly hit with a mallet if necessary to release the unit.



Extract the bearing of the spring/toothed sector unit with the specific tool.

Specific tooling

001467Y002 Driver for OD 73 mm bearing



Extract the bearing of the electric motor with the specific tool.



Hold the crankcase in a perfectly horizontal position, heat it with a heat gun at a temperature of about 120 °C, use the specific tool to fit the bearing of the spring/toothed sector unit. Hit slightly with a mallet if necessary.

Specific tooling

020360Y Adaptor 52 x 55 mm

020151Y Air heater

020376Y Adaptor handle



Hold the crankcase in a perfectly horizontal position, heat it with a specific heat gun at a temperature of about 120 °C, use the specific tool to fit the bearing of the electric motor. Hit slightly with a mallet if necessary.

Specific tooling

020363Y 20 mm guide

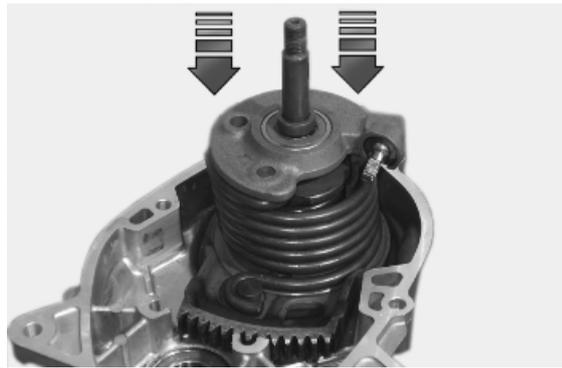
020151Y Air heater

020376Y Adaptor handle

020477Y Adaptor 37 mm



Refit the spring/toothed sector unit, hold the crankcase in a perfectly horizontal and stable position, place the spring/toothed sector unit keeping it perfectly perpendicular to the bearing already fitted on the crankcase; if necessary, slightly hit the unit shaft end with a mallet and protect the thread by screwing in a nut.



Fit the pinion and align the reference on the pinion teeth with the reference indicated on the second slot of the toothed sector.

Grease the pinion and the toothed sector with specific grease.

Refit the toothed sector spacer.



Recommended products

MONTBLANC MOLYBDENUM GREASE MON-TBLANC MOLYBDENUM GREASE

Molybdenum disulphide grease

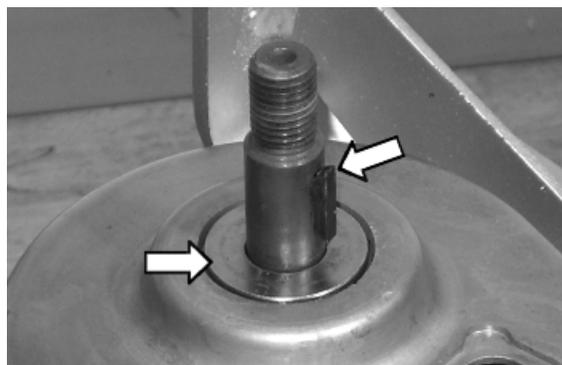


Lubricate the interference areas, match the crankcase halves with slight hits of a mallet to get them into contact.

Place the flexible transmission supporting bracket, refit the four screws, screw them to the prescribed torque.

Locking torques (N*m)

Geared motor crankcase halves coupling screws 11 ÷ 13



Refit the electric motor; check the position is correct by means of the reference indicated during removal.

The motor should be so positioned that it does not protrude from the reduction unit mould, see figure. Tighten the screws to the prescribed torque.



Locking torques (N*m)

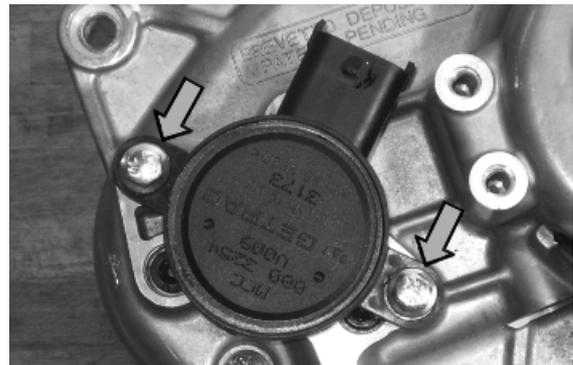
Electric motor coupling screws 11 ÷ 13

Place the moulded washer of the flexible transmission control lever shaft and the tongue.

Refit the flexible transmission control lever as shown in the figure.



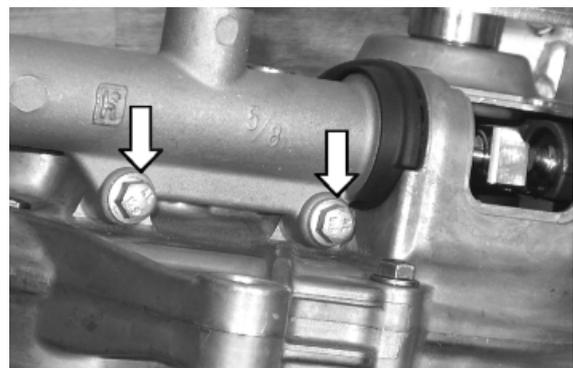
Refit the potentiometer (not forcing in the D-type connector ensures a sole position) with the connector directed to the opposite side of the hydraulic pump.



Refit the hydraulic pump on the geared motor body and tighten the screws to the prescribed torque.

Fit but not tighten the pump stem coupling screw and refit the plastic protection cap.

The synchronisation procedure should be complete when the installation is finished.



Locking torques (N*m)

Geared motor hydraulic pump tightening screws 11 ÷ 13

Remove the two bracket screws after releasing the spring and freeing the flexible transmission adjustment.

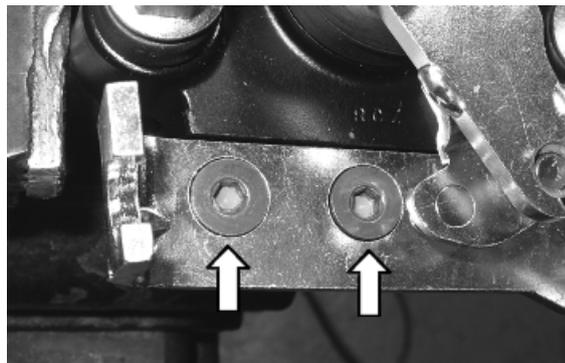
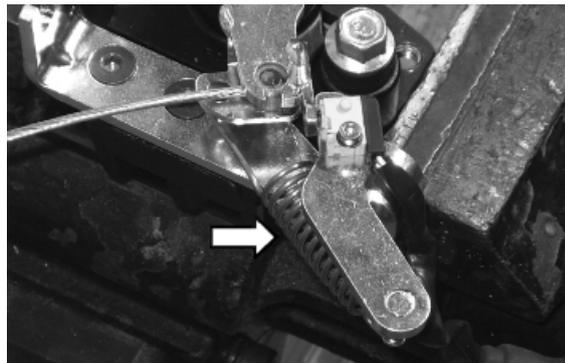
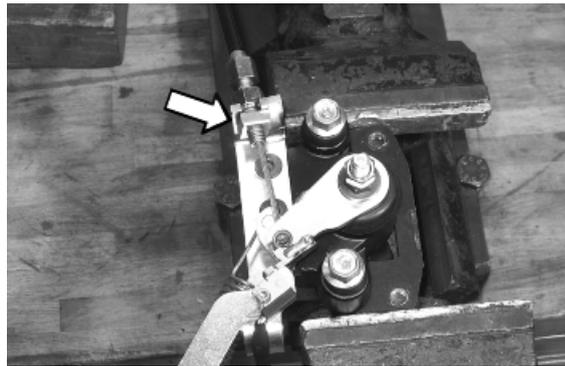
CAUTION: A FIRST PRODUCTION BATCH WILL BE EQUIPPED WITH DOUBLE COAXIAL SPRING.

It is very important to remove the flexible transmission from its fitting only for replacement.

When refitting, tighten the two bracket screws and the flexible transmission lever nut to the prescribed torque.

Locking torques (N*m)

Bracket tightening screws $8 \div 12$



Unscrew the Allen screw and remove the switch. When refitting, place the switch with the button oriented to the stop indicated on the calliper lever; observing the reference indicated on the switch supporting bracket.

After refitting, check in detail that the switch is regularly activated by the stop on the lever.

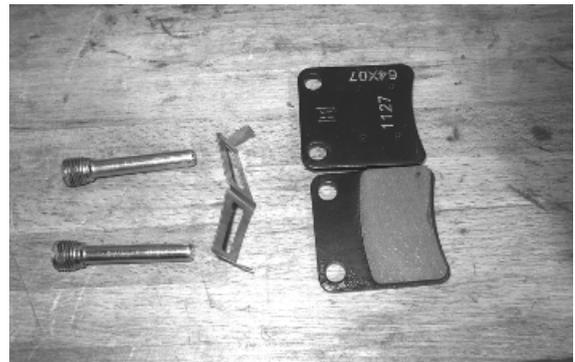
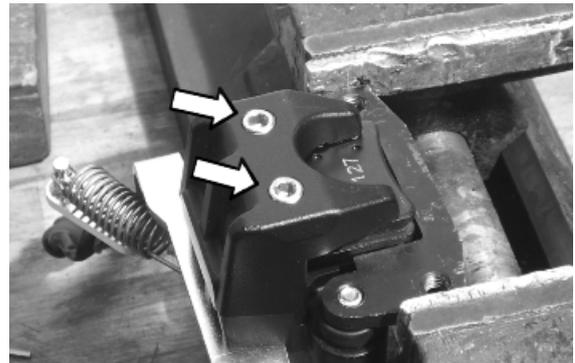




Unscrew the two pad pin screws, remove the pads with the spring.

When refitting, tighten the two screws to the prescribed torque and use Threadlock.

When refitting, adjust the cable properly so that the switch is pushed when the system is unlocked.



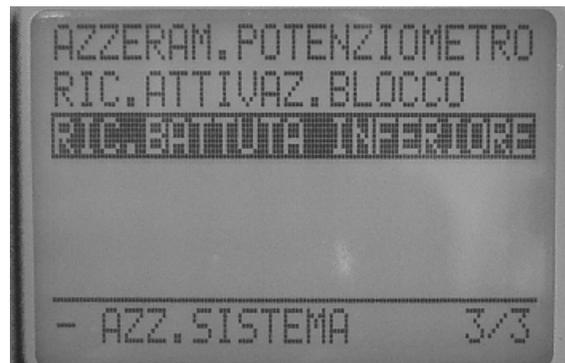
Select the SYSTEM RESET option from the main menu



Turn the key switch to ON
 Select the LOWER STOP SEARCH option from the SYSTEM RESET menu

WAIT

PROCEDURE IN PROGRESS



The hand-held computer indicates the outcome of the stop search operation:

POSSIBLE LIMIT STOP VALUES. TO EXIT, PRESS A KEY AND TURN OFF AND ON. SELECT PARAMETERS TO ADJUST AT 12°.

Check the geared motor if the hand-held computer does not indicate this.



Select the PARAMETERS option from the main menu



The hand-held computer displays the option: RELATIVE POTENTIOMETER ANGLE

This function is active coming from the LOWER STOP SEARCH procedure.

NOTE: a slight oscillation of the angle value between 0.00° and 0.50° is considered normal

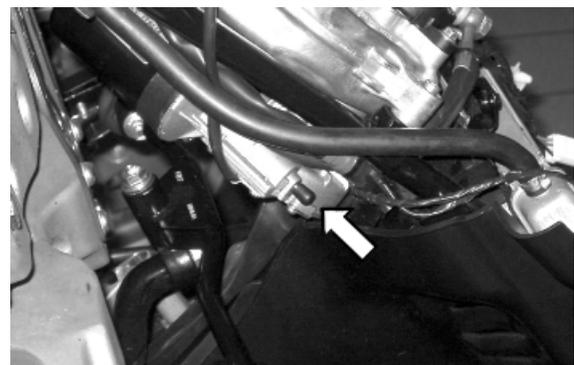


Remove the protection cap of the geared motor set screw

Use a plain slot screwdriver to turn the set screw anticlockwise until replicating the 12° condition on the hand-held computer

RELATIVE POTENTIOMETER ANGLE 12° (a slight value oscillation is considered normal)

Refit the protection cap

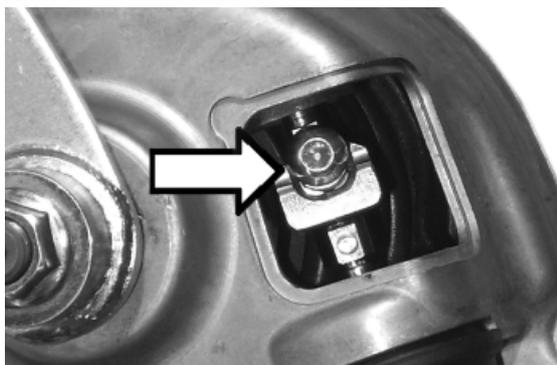




Remove the protection cap, align the pump control and lock the screw to the prescribed torque

Locking torques (N*m)

Clamp fixing pump bolt to anti-tilting device 11 ÷ 13



Select the SYSTEM RESET option from the MAIN menu



Select the POTENTIOMETER RESET option from the SYSTEM RESET menu and press OK.

WAIT....

PROCEDURE IN PROGRESS



The hand-held computer displays the words: CHECK THAT THE CONTROL IS SET AT 12° FROM THE LOWER STOP. PRESS OK TO CONTINUE

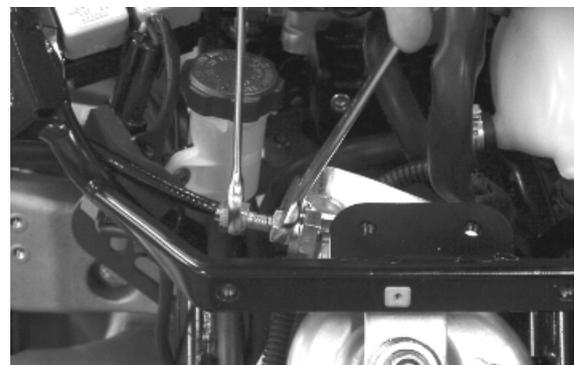
Press OK

The hand-held computer displays the words: POSSIBLE LIMIT STOP VALUES. PRESS A KEY AND SHIFT OFF AND ON

If this is not successful, the tilt locking mechanism remains locked for safety.

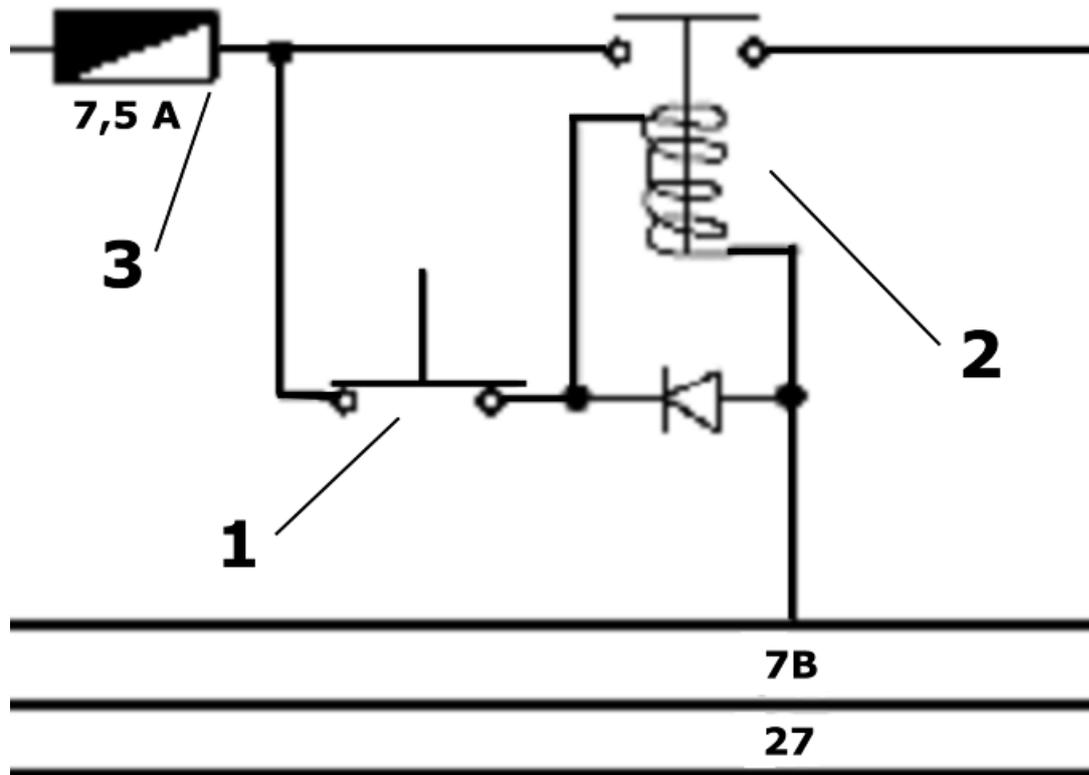


Adjust the flexible transmission so that a small clearance is left to guarantee switch activation on the tilt locking calliper



Electrical devices test

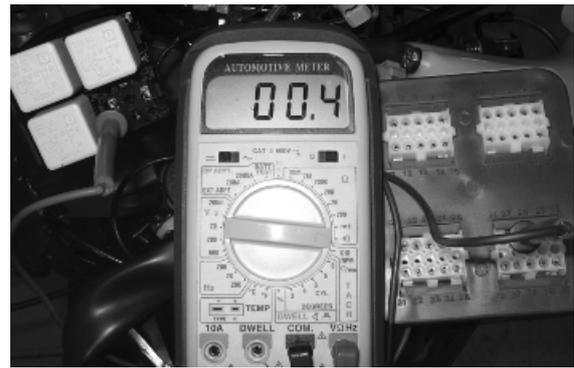
PRESSURE SWITCH



- 1: PRESSURE SWITCH
- 2: HORN REMOTE CONTROL
- 3: FUSE No. 11, 7.5A

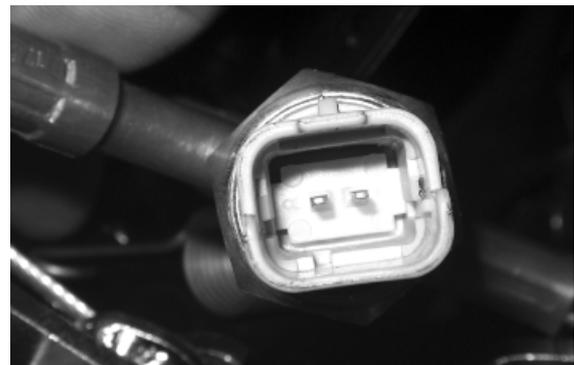
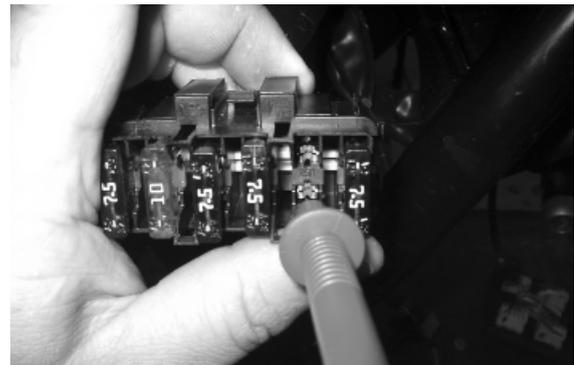
Check 7.5 A fuse No. 11 for efficiency. With interface wiring disconnected from the control unit, check the continuity of the blue - black cable between pressure sensor connector and the horn remote control base as indicated in the photograph. Check the continuity between pin 27 and the remote control base white cable.



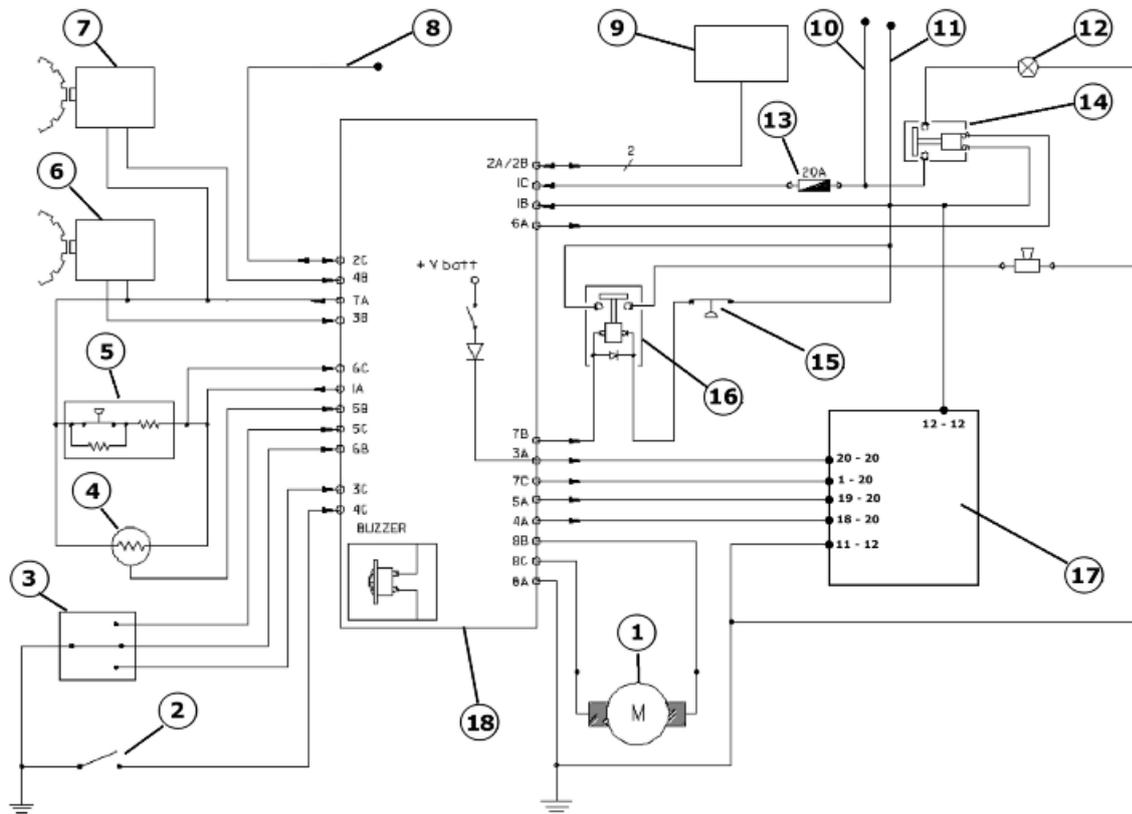


Check the continuity of the yellow - red cable between the pressure switch connector and the fuse-box and between the remote control base and the fuse-box.

With a multimeter, also check the pressure switch operation as well as the continuity at rest as this is normally closed switch.

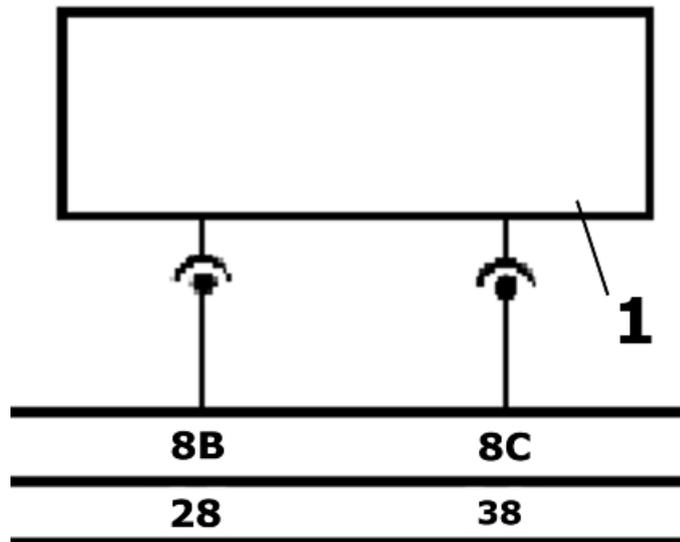


PRINCIPLE DIAGRAM FOR TILT LOCKING ELECTRICAL SYSTEM



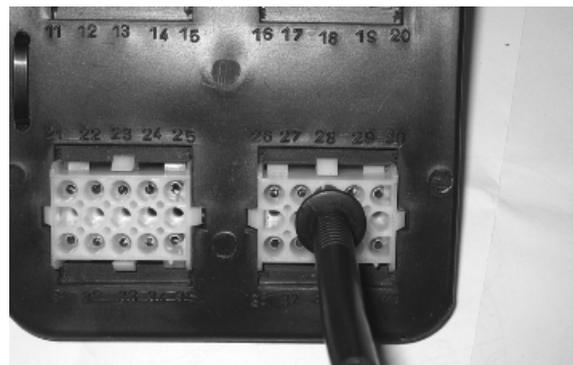
1. GEARED MOTOR
2. TILT LOCKING CALLIPER SWITCH
3. TILT UNLOCKING-LOCKING CONTROL SWITCH
4. POTENTIOMETER
5. RIDER PRESENCE SENSOR
6. LEFT SPEED SENSOR
7. RIGHT SPEED SENSOR
8. DIAGNOSTIC TESTER SERIAL LINE
9. ENGINE CONTROL UNIT
- 10.+ DIRECT BATTERY
- 11.+ LIVE BATTERY
- 12.LOW-BEAM LIGHT
- 13.FUSE No. 3, 20A
- 14.LOW-BEAM LIGHT REMOTE CONTROL
- 15.PRESSURE SWITCH
- 16.HORN REMOTE CONTROL
- 17.INSTRUMENT PANEL
- 18.TILT LOCKING SYSTEM CONTROL UNIT

GEARED MOTOR

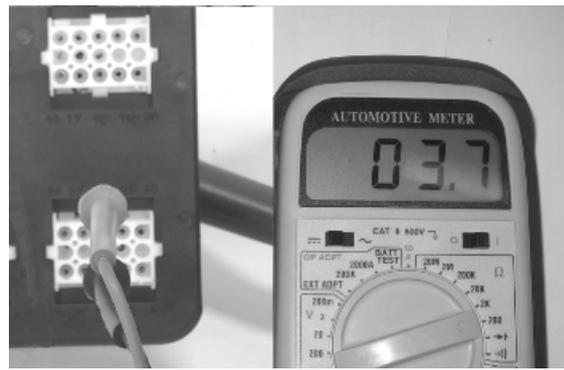


1: GEARED MOTOR

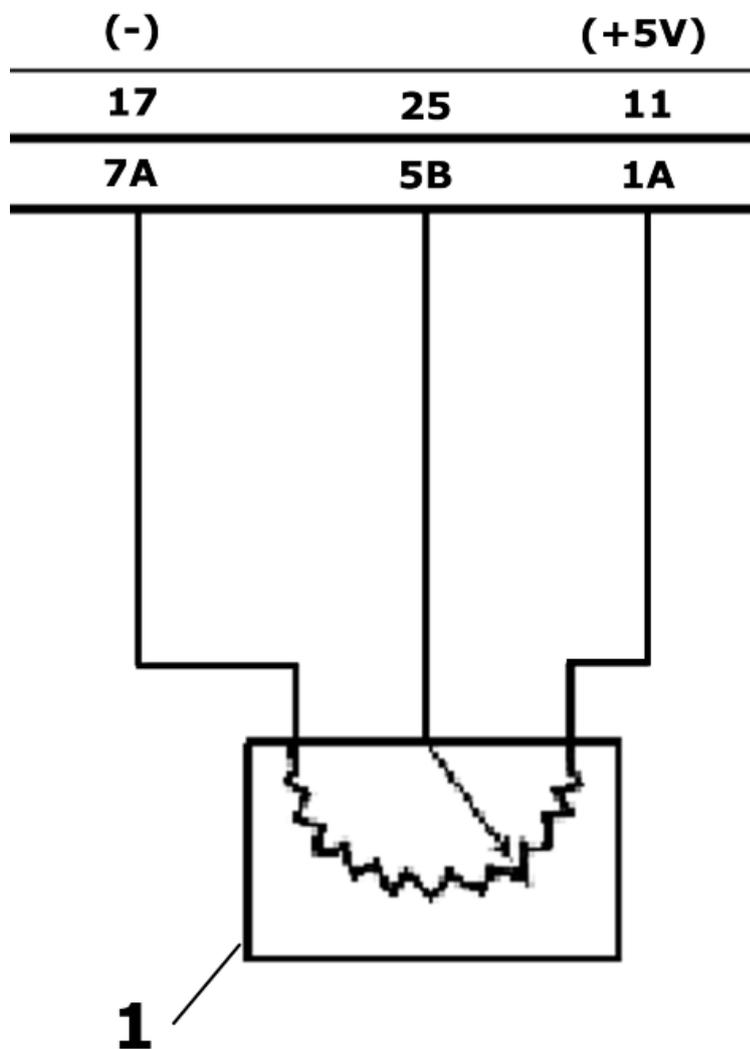
With the interface wiring disconnected from the control unit, check the continuity between pin 28 and the yellow cable, between pin 38 and the blue cable on the geared motor connector



With the interface wiring disconnected from the control unit, check the continuity of the geared motor winding placing the multimeter probes on pins 28 and 38 as indicated in the figure

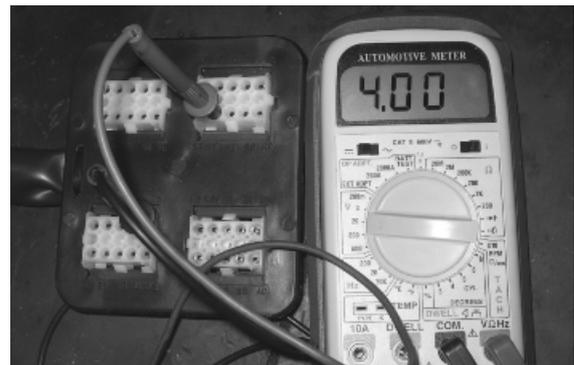
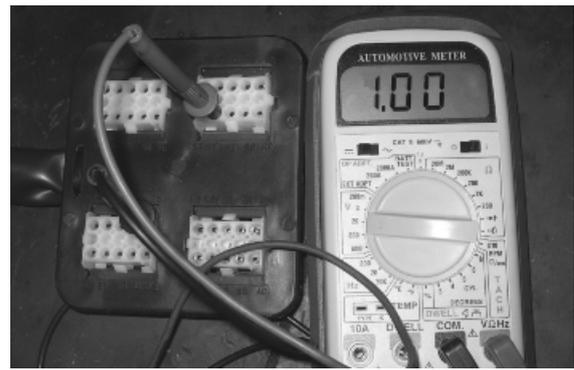


POTENTIOMETER

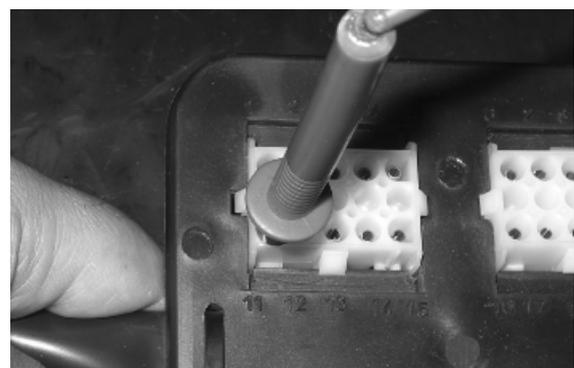
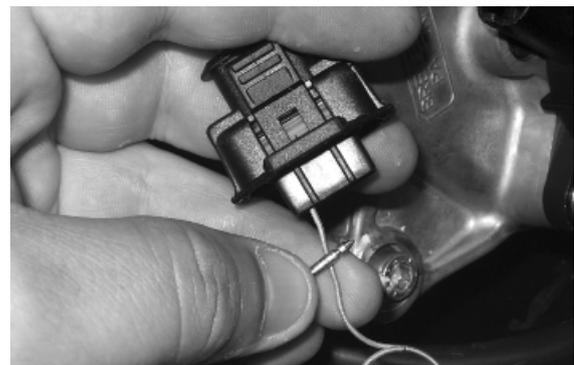


1: POTENTIOMETER

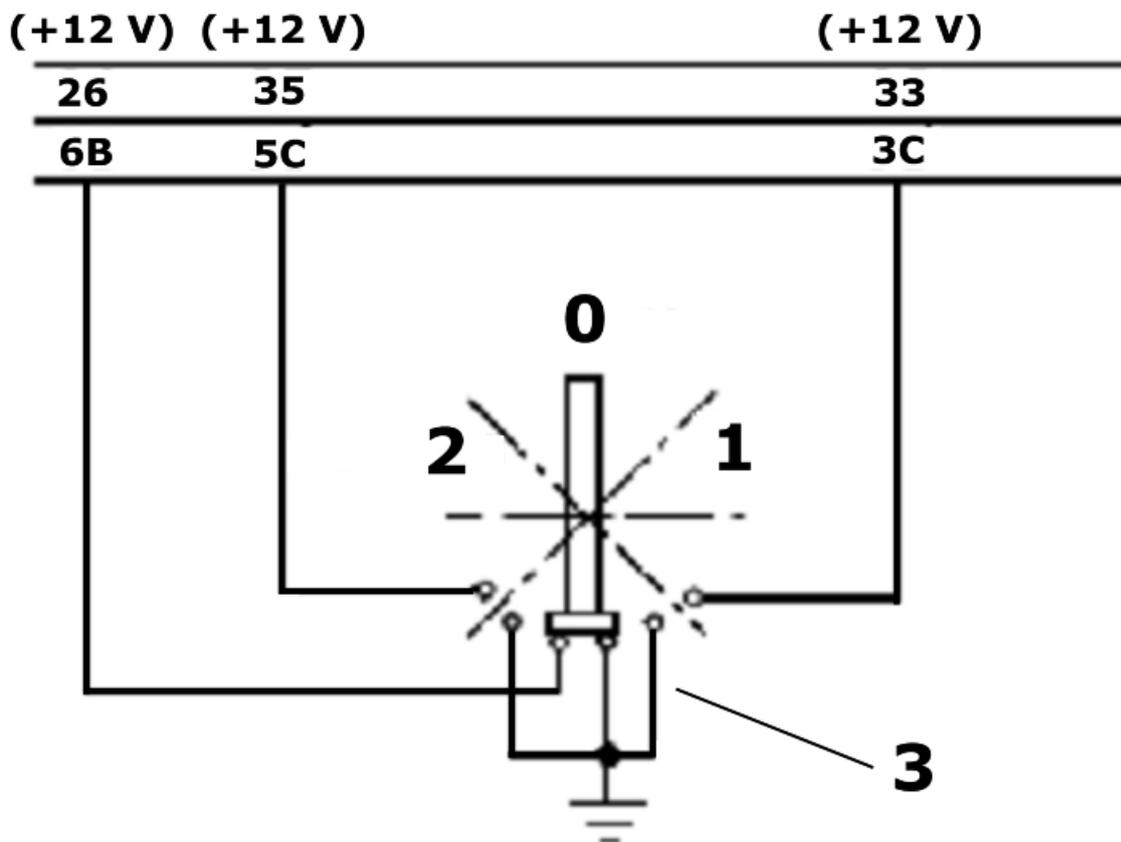
With interface wiring connected to the control unit, secure the vehicle on its centre stand and switch to "ON". Select the reading scale on 20 V. Insert the multimeter probes on pins 17 (black) and 25 (red). Check that the voltage in the activated locking condition is 4V and 1V in the locking rest condition.



With the interface wiring disconnected from the control unit, check the continuity between pin 17 and the yellow cable of the potentiometer connector, between pin 25 and the green-blue cable, between pin 11 and the orange-blue cable. Also check that these lines are insulated from each other and earth.



TILT LOCKING-UNLOCKING SWITCH



- 0: REST POSITION
- 1: LOCKING POSITION
- 2: UNLOCKING POSITION
- 3: TILT LOCKING-UNLOCKING SWITCH

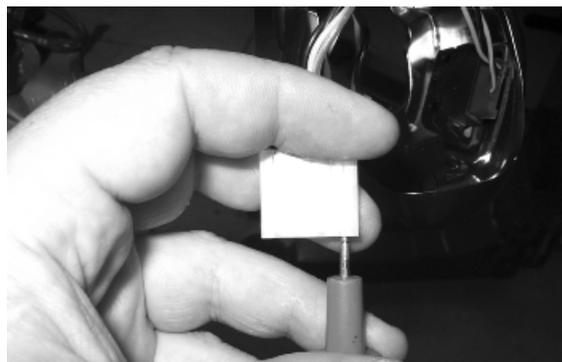
With interface wiring disconnected from the control unit, check the continuity of the electrical lines between the interface wiring and the tilt locking-unlocking switch:

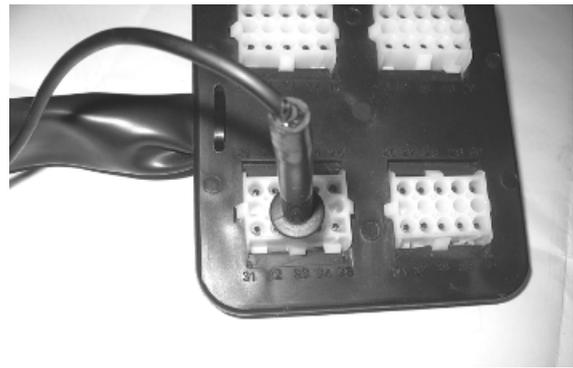
Pin 26 and green - grey cable

Pin 35 and violet - black cable

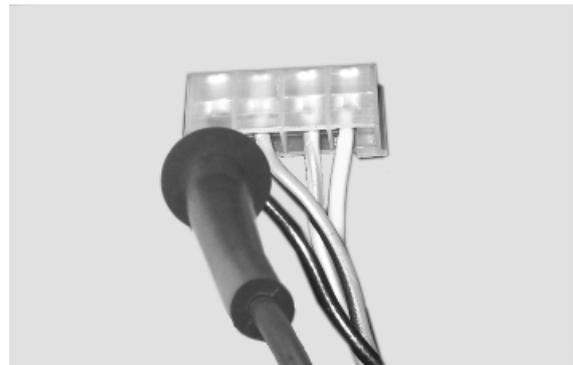
Pin 33 and yellow - blue cable

Also check that the above indicated electrical lines are insulated from the earth.



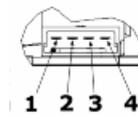


Check the continuity between the black cable on the connector and an earth point on the chassis.



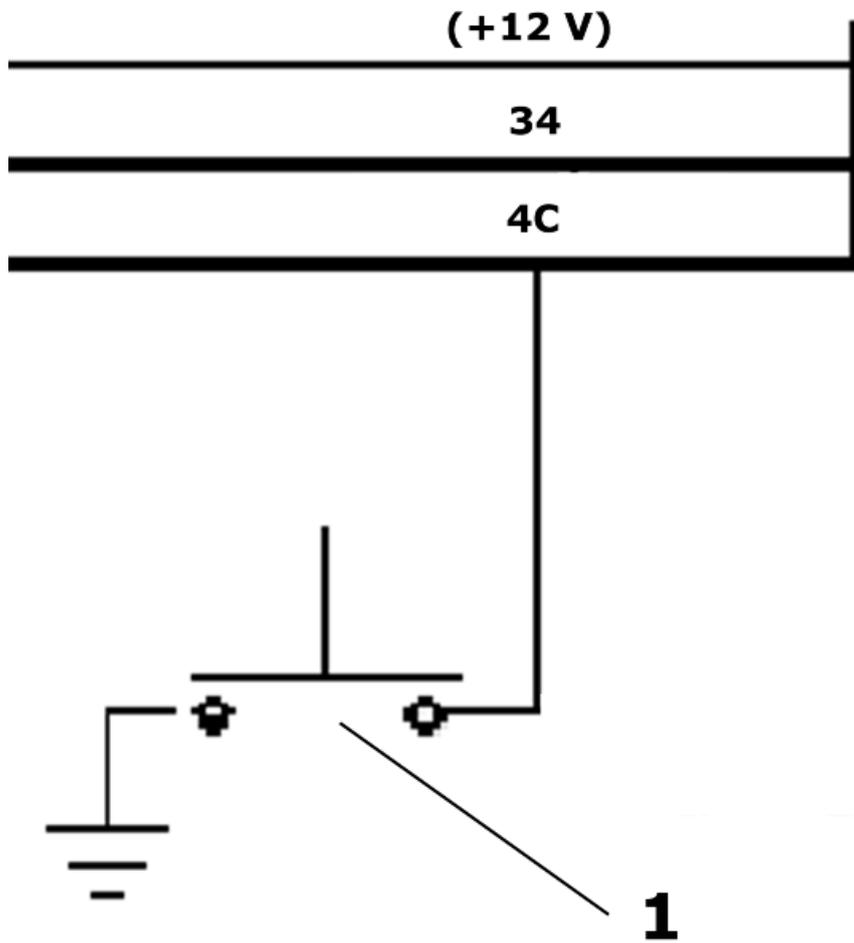
With a multimeter, check the operation of the tilt locking-unlocking switch referring to the diagram indicated in the figure.

1. EARTH
2. LOCK
3. REST
4. UNLOCK



	2	3	4	1
$\overline{0}$			⊖	⊖
0		⊖	—	⊖
$\overline{0}$	⊖	—	—	⊖

TILT LOCKING CALLIPER SENSOR



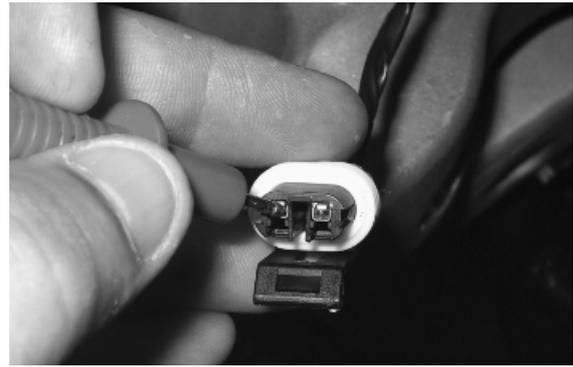
1: TILT LOCKING CALLIPER SENSOR

The tilt locking calliper sensor is a normally opened switch. Check its correct operation with a multi-meter.

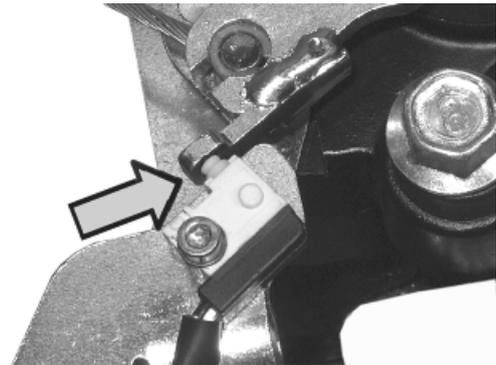


With interface wiring disconnected from the control unit, check the continuity between pin 34 and the brown cable of the tilt locking gripper sensor connector on the system side.

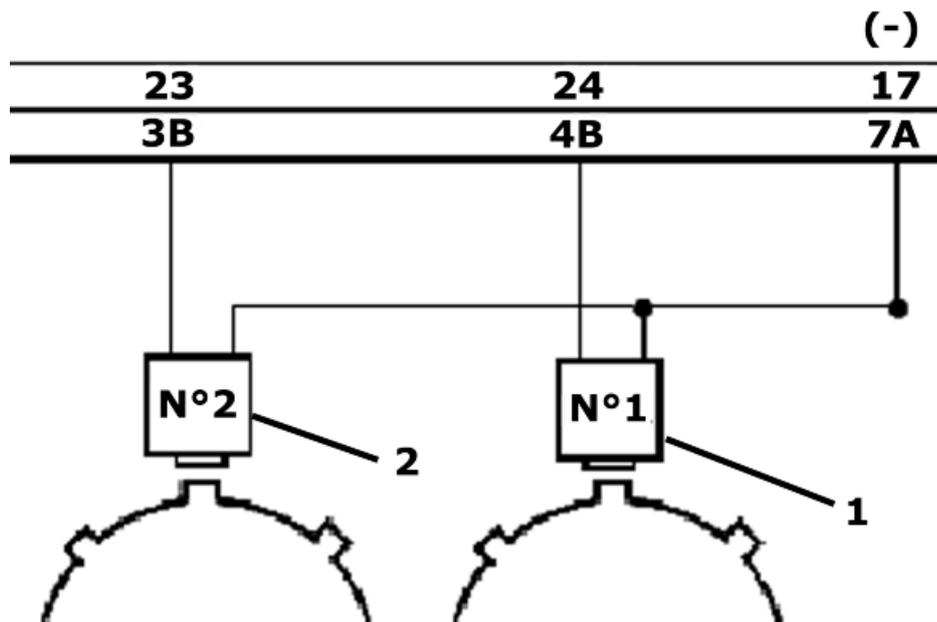
Check the continuity of the connector black cable and an earth point on the chassis



Also check that the flexible transmission control lever activates the limit stop switch properly.



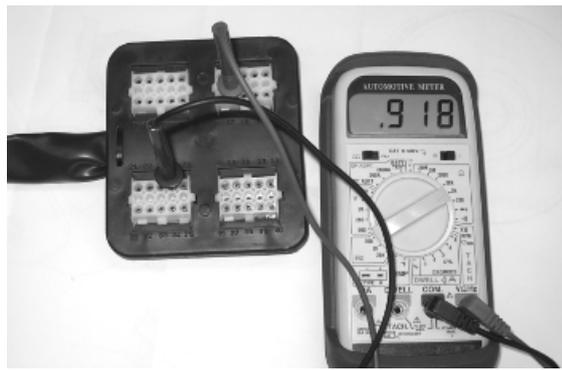
TONE WHEEL SENSOR



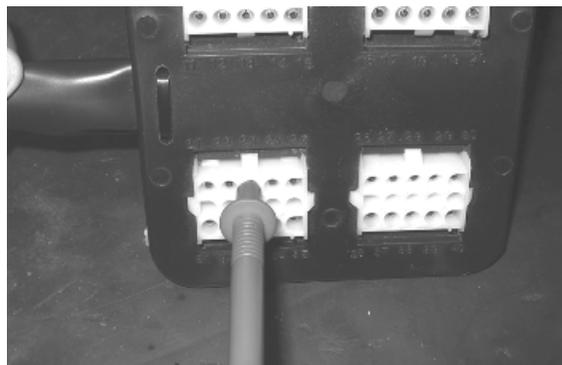
1: Right tone wheel

2: Left tone wheel

With interface wiring disconnected from the parking electrical control unit and connected to the system, check that the sensor resistance between pins 23 - 17 and 24 - 17 is between 774 and 946 Ohm at a temperature of approximately 20°



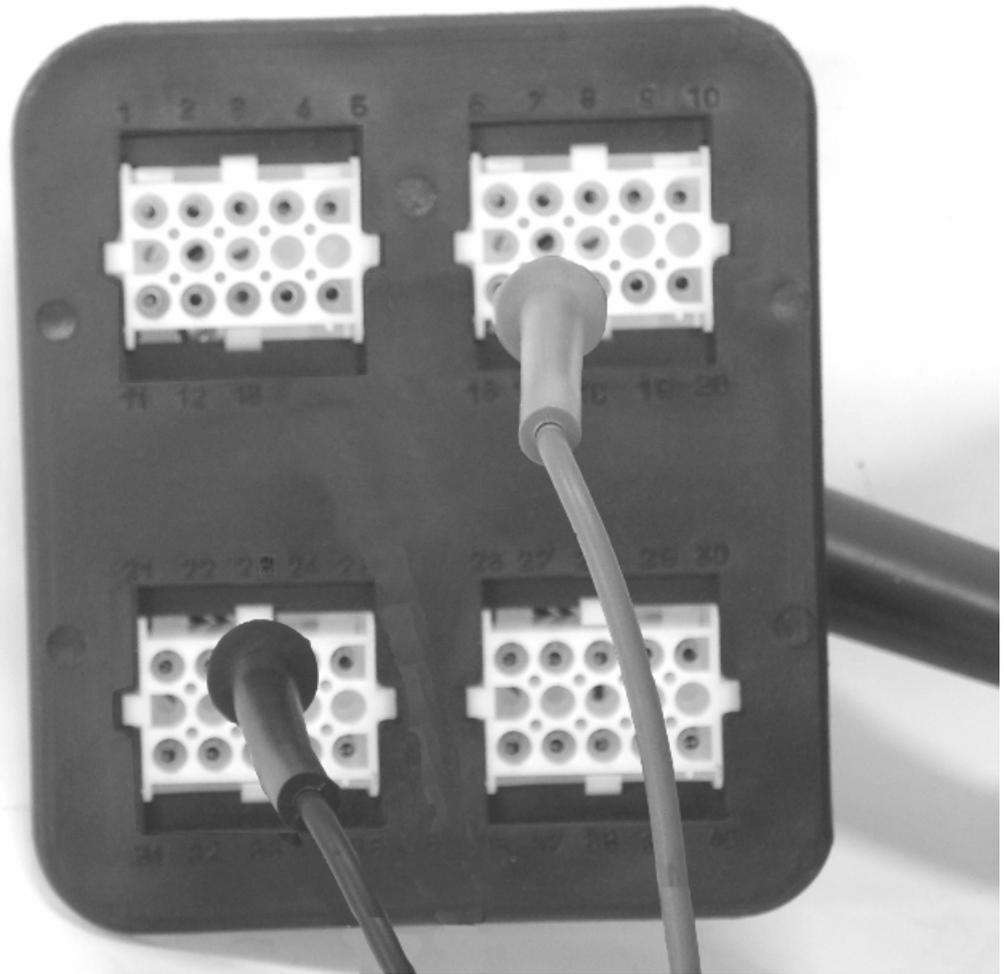
With interface wiring disconnected from the control unit, check the continuity between pin 23 and the brown cable of the LEFT wheel revolution sensor connector; between pin 17 and the red cables of the LEFT wheel revolution sensor and brown cable of the RIGHT sensor; between pin 24 and the red cable of the RIGHT wheel revolution sensor



In case of failures, check the continuity between pin 23 and the connector green cable on the fuel tank after removing the chassis central cover; between pin 17 and the yellow cables on both connectors; between pin 24 and the red cable on the connector.



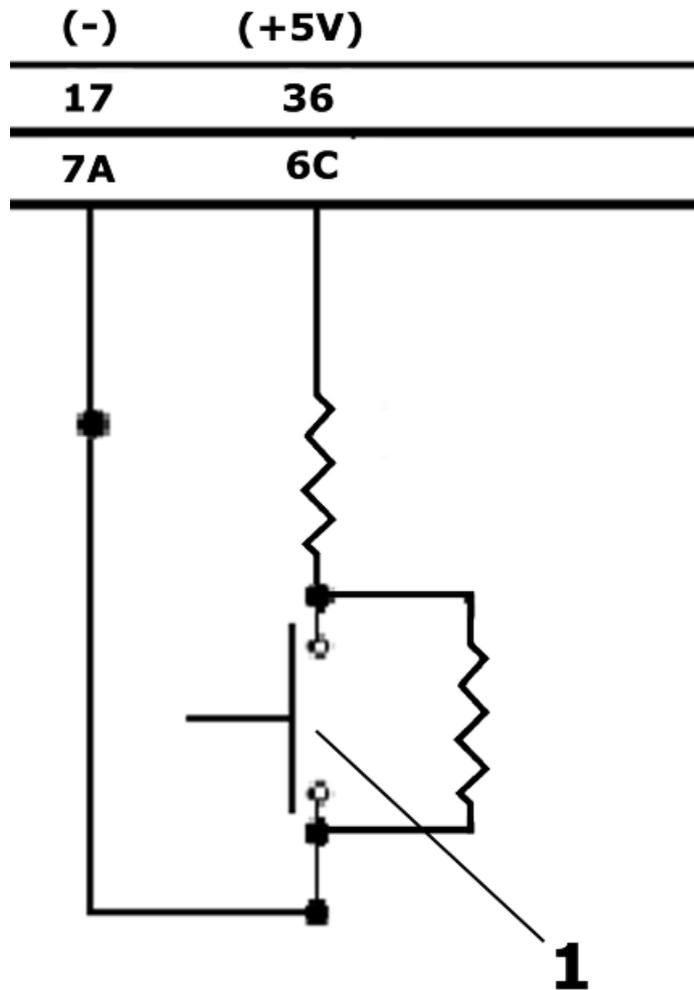
With interface wiring disconnected from the control unit and the connectors disconnected from wheel turning sensors, check that pin 23 - 17 and 24 - 17 are insulated from each other and from earth.



With a thickness gauge, check that the air gap between the screw head and the sensor is between 0.35 and 1 mm



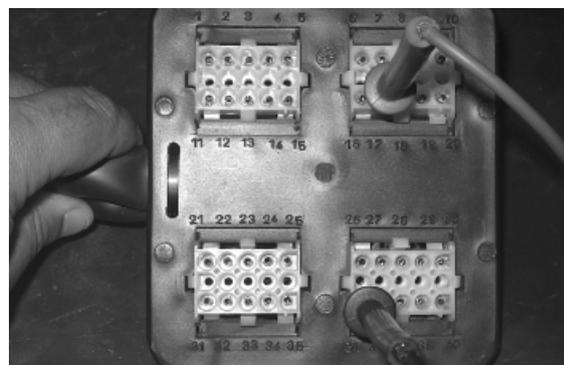
RIDER PRESENCE SENSOR



1: RIDER PRESENCE SENSOR

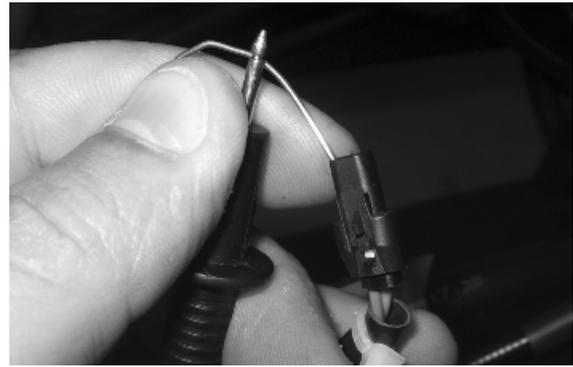
With interface wiring disconnected from the control unit and connected to the system, check the following conditions:

- pin 17 - 36: resistance $15 \div 18$ kOhm when the rider is not seated on the saddle.
- pin 17 - 36: resistance of about 3 kOhm when the rider is seated on the saddle



Check the continuity between the interface wiring pin 17 and the yellow cable of the rider presence connector.

Check the continuity between the interface wiring pin 36 and violet cable of the rider presence connector.



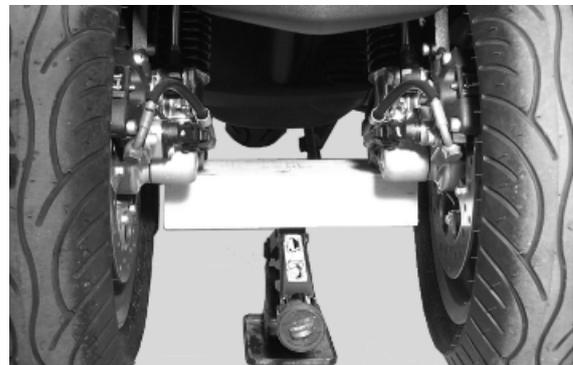
Wheel alignment

Tool fitting



Metodo di utilizzo dell'attrezzatura

- Verificare che la pressione pneumatici sia corretta.
- Posizionare il veicolo su un pavimento piano privo di asperità e irregolarità .
- Posizionare il veicolo sul cavalletto centrale.
- Assicurarsi che il sistema di stazionamento sia sbloccato.
- Sollevare le ruote anteriori come mostrato in foto
- Verificare la regolarità di rotazione dei cerchi ruota e l'eventuale presenza di giochi anomali dei cuscinetti e delle sospensioni.
- Verificare che il comando dello sterzo non presenti giochi anomali su giunti e cuscinetti. In caso contrario procedere



con le necessarie riparazioni e successive regolazioni.

Characteristic

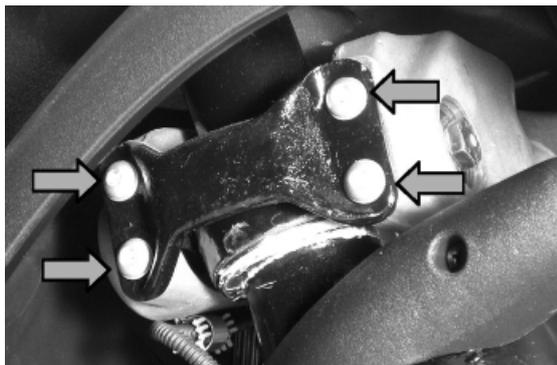
Front tyre pressure (rider)

Front tyre pressure (rider): 1.6 bar

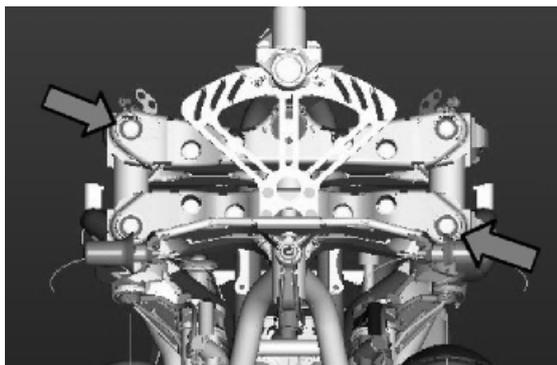
Rear tyre pressure (rider)

Rear tyre pressure (rider): 2 bar

- Get the vehicle off the stand, back on the ground.
- Remove the right lower coupling plate of the half-arm by undoing the screws indicated in the photograph.

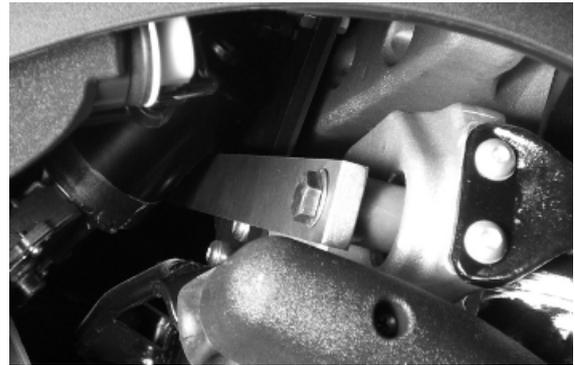


- Remove the right upper screw and the left bottom screw of the parallelogram unit .





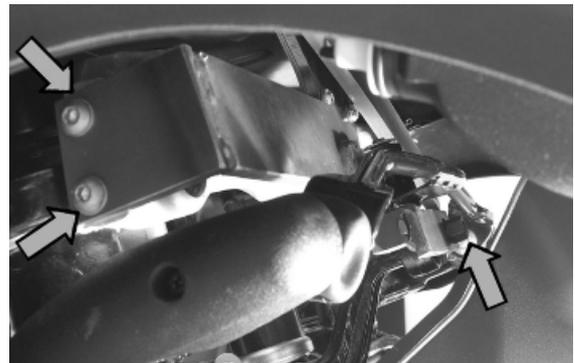
- Fit the bracket locking the parallelogram in the holes of the previously removed screws; use the screws supplied with the tool and be careful to correctly centre the spacer in the bearing.



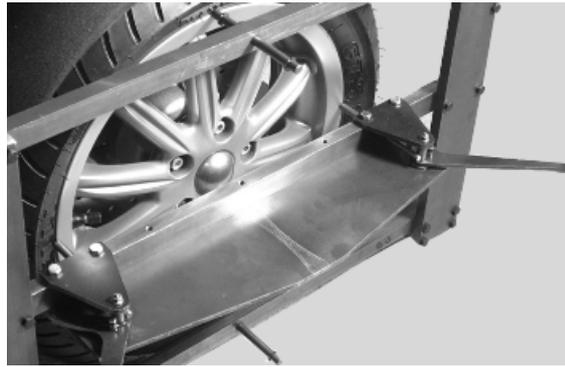
- Remove the nut fixing the steering control arm and keep the original washer in position.



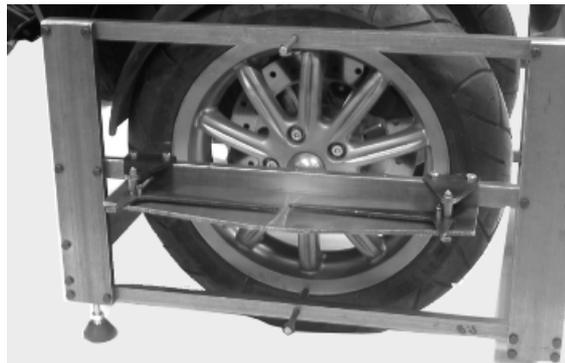
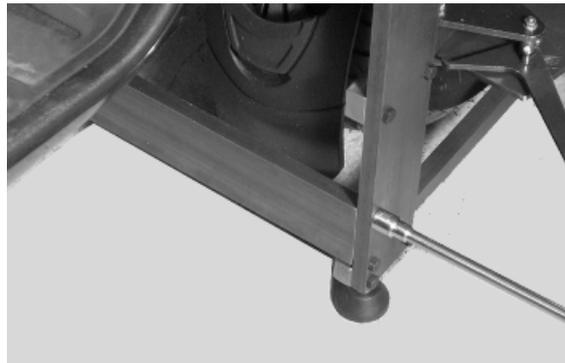
- Fit the steering guiding bracket in a straight riding position, fix one end to the attachment of the half-arm coupling flange and the other end to the screw fixing the steering control arm.



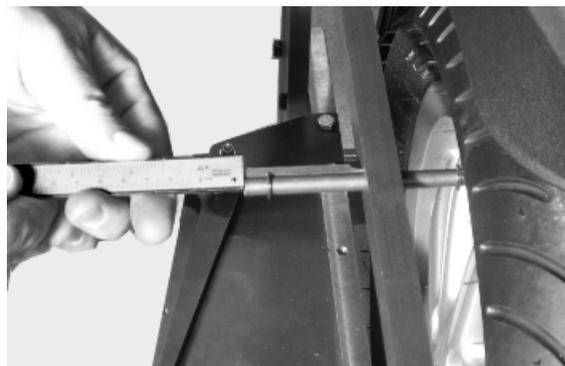
- Place the frame so that the sliders come into contact with the rim maximum diameter but without interfering with the tyre. If required, reposition the frame by operating the 3 adjustable support feet.



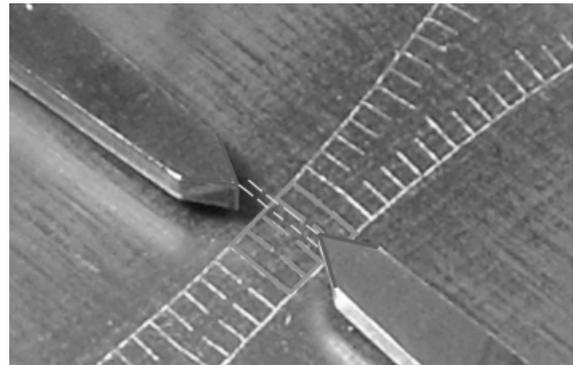
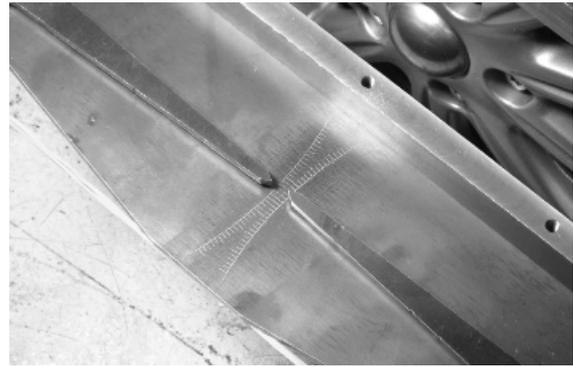
- Fit the frame locking bracket



- Make sure the frame is adequately centred by checking with a gauge that the lugs along the vertical axis show the standard protrusion.



- Check that the pointers of both tyres are correctly aligned, as shown in the photograph. Maximum misalignment allowed: 4 notches



Rear

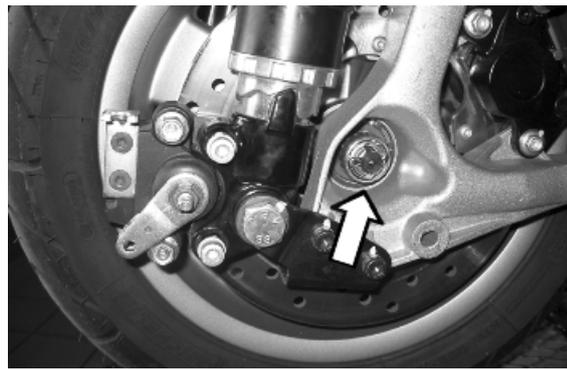
Removing the rear wheel

Remove the full muffler assembly.

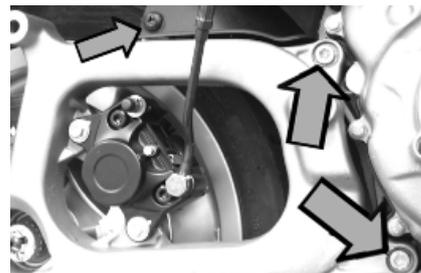
- Remove the screw fixing the right-hand shock absorber to the bracket
- Remove the two screws supporting the brake calliper on the bracket



- Remove the cotter pin, the cap, the wheel axle fixing nut and the outer one of the two spacers.



- Remove the mud guard clamping screw
- Remove the two screws fixing the bracket to the engine



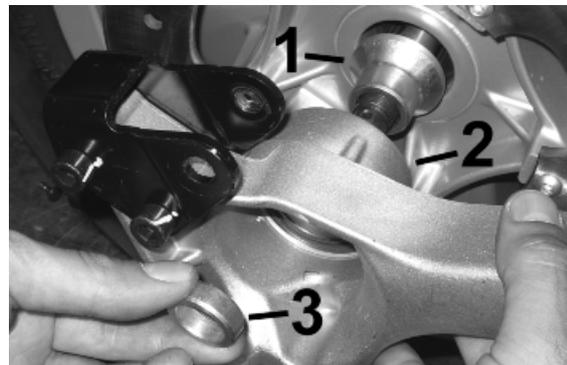
- Undo the wheel axle bracket, using the heat gun if necessary.

Refitting the rear wheel

To fit, follow the removal steps but in the reverse sequence, being careful to fit the spacers on the wheel axle as shown in the photograph.

Locking torques (N*m)

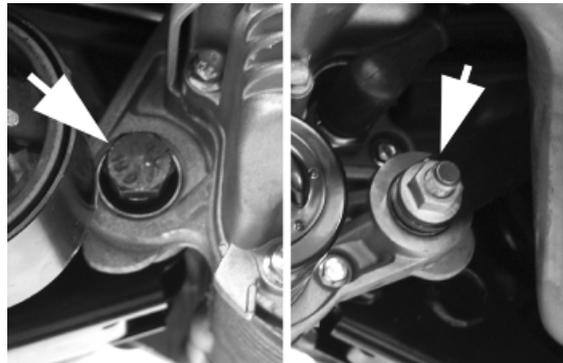
Muffler arm clamping screws 27 ÷ 30 **Rear wheel axle nut** 104 ÷ 126 **Shock absorber-crankcase attachment bracket** 20 ÷ 25 **Lower shock absorber clamping screw** 33 ÷ 41 Nm **Rear brake calliper fixing screws** 25 ÷ 30 Nm



Swing-arm

Removal

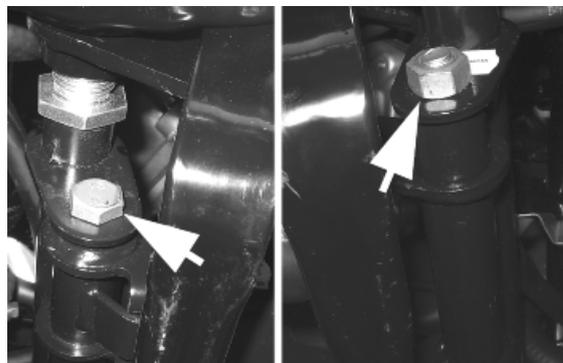
- Place the scooter on its centre stand;
- Remove the swinging arm/engine fitting shown in the photo
- Move the engine back



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



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



- Undo the nut on the LHS shown in the figure and remove the corresponding bolt from the opposite side.
- Remove the swinging arm.



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



Overhaul

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



Characteristic

Standard clearance

0.40 ÷ 0.60 mm

Allowable limit after use:

1.5 mm

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



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

Characteristic

Standard clearance

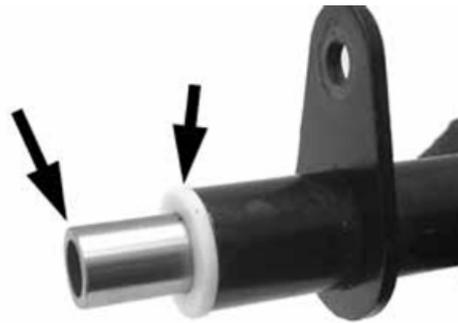
0.40 ÷ 0.60 mm

Allowable limit after use:

1.5 mm



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



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



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

Specific tooling

020244Y 15 mm diameter punch

020115Y Ø 18 punch

Characteristic

Length of the swinging arm tube on the engine side:

L 175.3 + 0.3 0

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

L 183 + 0.3 0

Engine side swinging arm plastic bushing shim:

3.5 ± 0.05 mm

Frame-side swinging arm plastic bushing shim:

3.5 ± 0.05 mm

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

290 ± 0.1 mm



Length of the swinging arm tube on the frame side:

283 ± 0.1 mm

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



Recommended products

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

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

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



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



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



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



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



Refitting

- To refit, perform the removal operations in reverse.
- Grease the bearings and the rolling parts with the recommended grease.

-Complete the fitting by tightening the nuts on the relative bolts to the proper tightening torque.

Locking torques (N*m)

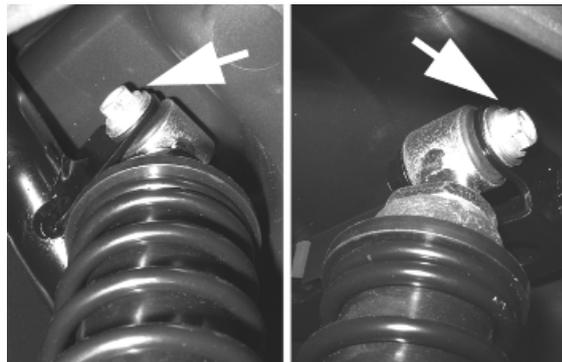
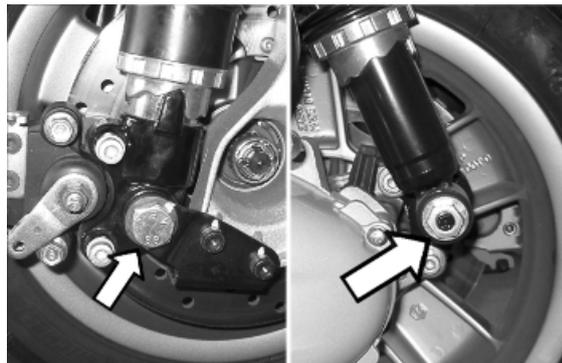
Engine-swinging arm bolt 55 ÷ 61 Frame-swinging arm bolt 55 ÷ 61 Swinging arm buffer nut 64
- 72 Engine arm bolt - frame arm 33 ÷ 41

Shock absorbers

Removal

Proceed as follows:

- place the scooter on its centre stand;
- lift the engine a little with a jack so as to free the two shock absorbers;
- remove the muffler
- undo the shock absorber spring assembly clamping screw from the support fixed to the engine on the one side and from that fixed to the muffler on the other;
- unscrew the two upper nuts (one on each side) fixing the shock absorber spring assembly to the frame and remove the shock absorbers.



Refitting

Carry out the previous operations but in reverse order.

Locking torques (N*m)

Shock absorber lower clamp 33 ÷ 41 Upper shock absorber clamp 33 ÷ 41

Centre-stand

REMOVAL

- Use a jack to support the vehicle properly.
- Remove the two return springs from the centre stand.
- Undo the nut shown in the figure.
- Remove the bolt from the right side.
- Remove the centre stand.



FITTING

- On refitting tighten the nut to the specified torque.

Locking torques (N*m)

Centre stand bolt 31 ÷ 39

INDEX OF TOPICS

BRAKING SYSTEM

BRAK SYS

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

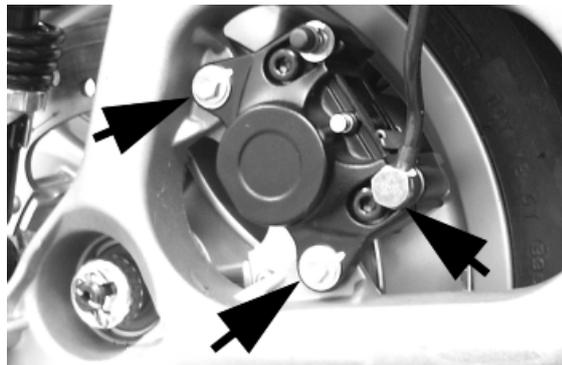
Rear brake calliper

Removal

- Remove the muffler.
- Remove the two rear brake calliper devices fastening them to the support as shown in the photograph.

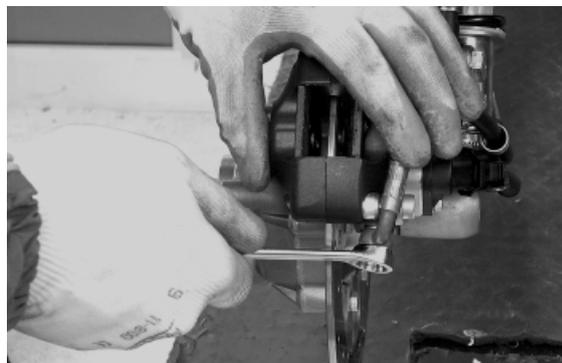
N.B.

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



Removal

Place a container under the calliper, unscrew the tube-calliper joint and empty the braking system. For easy draining of the braking system fluid, open the pump reservoir cap.



Loosen the two screws indicated in the figure and remove the calliper from the support.

When refitting, tighten the two calliper retainers to the prescribed torque.

Locking torques (N*m)

Screw tightening calliper to the support 24 ÷ 27



Removal

Remove the split pin.

Use new split pins when refitting.

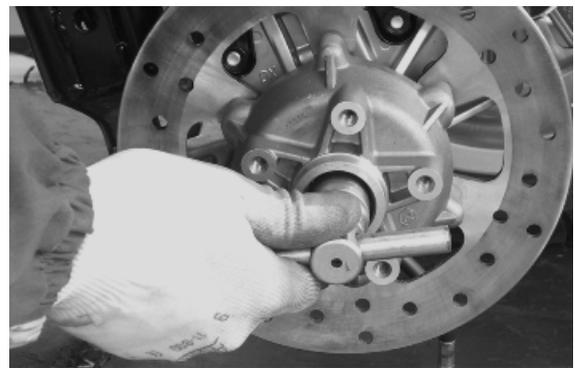


Undo the wheel hub nut.

- When refitting, secure to the specified torque.

Locking torques (N*m)

Wheel axle nut 74 ÷ 88



Remove the seeger ring, after that, remove the hub with the help of a rubber mallet slightly hitting on the brake disc side, turning the wheel hub at the same time.



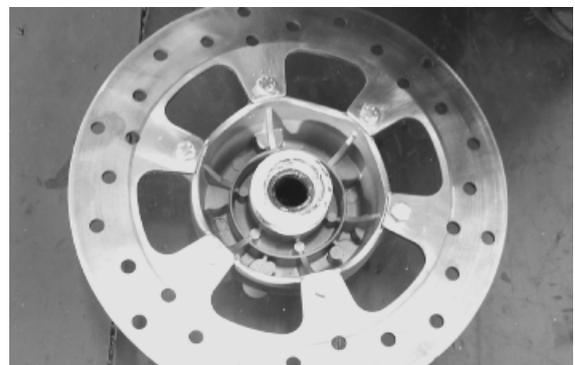
Loosen the 6 screws indicated in the figure and remove the brake disc from the wheel hub.

- When refitting, secure to the specified torque.

Recommended products

Loctite 242 product description

Apply LOCTITE medium type 242 threadlock



Removal

Rest the vehicle on its centre stand and use the corresponding jack to lift the two front wheels; unscrew the five Allen screws indicated in the figure



Remove the pad upper closing cap.



Remove the pad pin lock with a screwdriver, paying attention not to spoil the calliper surface treatment.

Use a corresponding measuring punch to extract the pad pin, if necessary move the brake pipes manually to release the pin.

Then, remove the spring and the pads.

Fit a new pad kit following the procedure but in reverse order.



Locking torques (N*m)

Wheel fixing screw 20 ÷ 25

Front brake pump

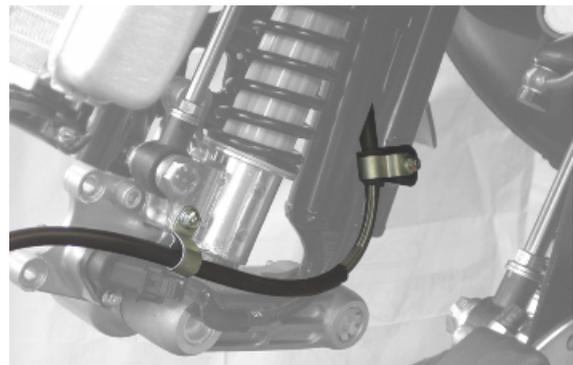
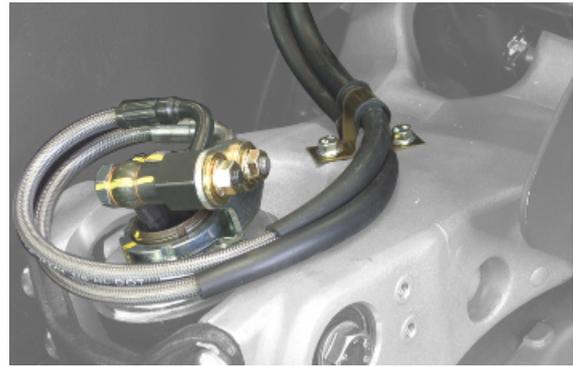
Brake pipes

Front brake pipes removal

Unscrew the braking splitter screw.

Disconnect the brake pipes removing the two metallic straps indicated in the figure.

Remove the brake oil tube fitting from the rigid pipe inside the front suspension arm and loosen the hydraulic joint fixing nut of the suspension locking to release the brake pipes.



Front brake pipes removal

Remove front Shield.

Remove front wheel and mudguard.

Disconnect the brake pipes from the calliper and drain the brake fluid.

Then, remove the plastic and metallic straps.

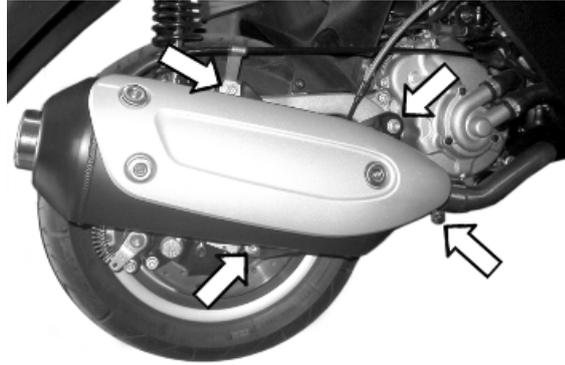
Unscrew the brake pump pipes as indicated in the figure.



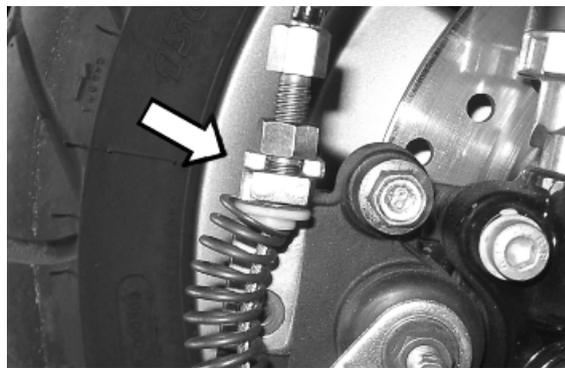
Parking brake

Remove the muffler loosening the 3 screws and the strap on the drainage tube indicated in the photograph.

When refitting, place the parking brake flexible transmission retaining strap correctly.



Loosen the transmission set screw and release the cable from the calliper.

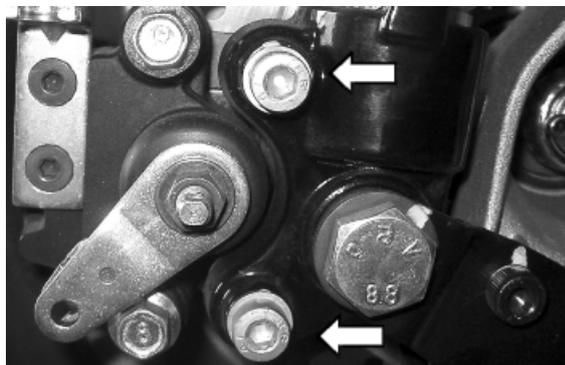


Remove the two fixing screws of the mechanic calliper and remove the calliper. To check calliper components, refer to the chapter on the tilt locking calliper.

When refitting, secure to the specified torque.

Locking torques (N*m)

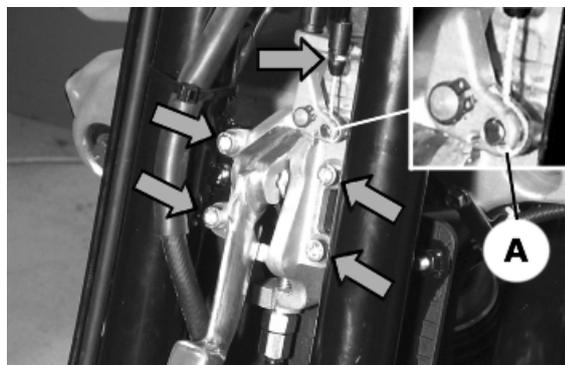
Screw tightening calliper to the support 20 ÷ 25



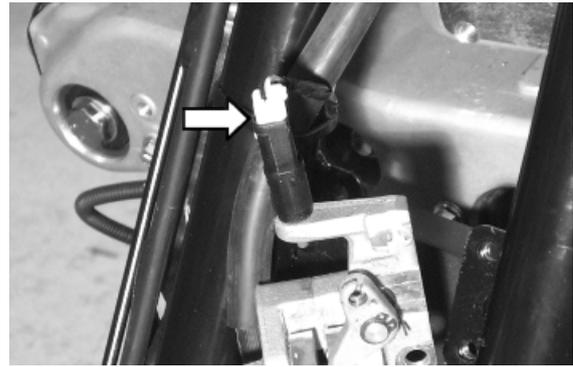
After removing the shield back plate, remove the engaging cable for the safety mechanism removing it from its fitting.

Remove the 4 screws shown in the figure.

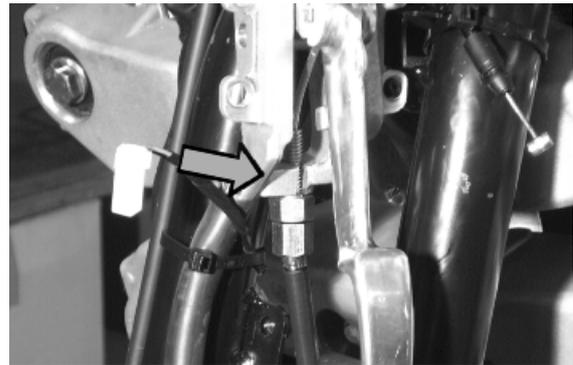
When refitting, pay attention to insert the metallic cable peg in the fitting marked «A» as indicated in the enlarged photograph.



Remove the electric connection from the engaged parking brake warning light switch.



Remove the parking brake cable from the lever by operating the set screw indicated in the photograph.



INDEX OF TOPICS

COOLING SYSTEM

COOL SYS

System bleed

- Start up the engine until the operating temperature is reached.
- Remove the rubber hood over the bleed valve
- Obtain a rubber tube that is of the right length to connect the valve to the expansion tank
- Place one end of the pipe on the bleed valve and the other in the expansion tank
- Loosen the screw by **two** turns until the communication hole is revealed with the head as shown in the photo
- Wait until only coolant comes out of the rubber pipe so as to eliminate any air bubbles inside the circuit.
- Tighten the bleed valve respecting the maximum torque.
- Bring the coolant up to the correct level inside the expansion tank



Locking torques (N*m)

Bleed screw: 3

INDEX OF TOPICS

CHASSIS

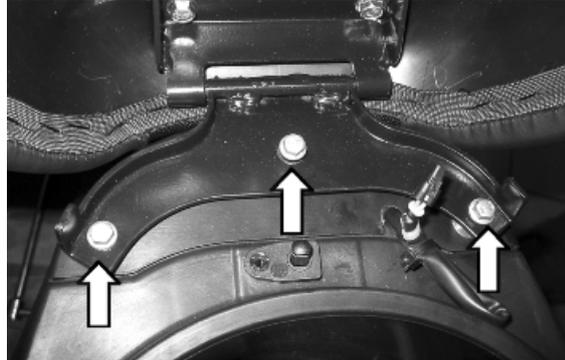
CHAS

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

Seat

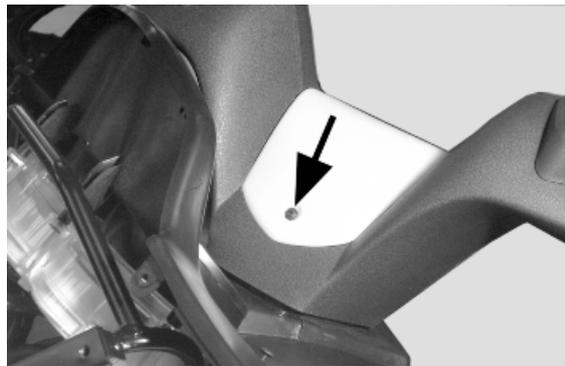
Lift the saddle and disconnect the rider presence sensor.

Remove the three fixing screws.



Front handlebar cover

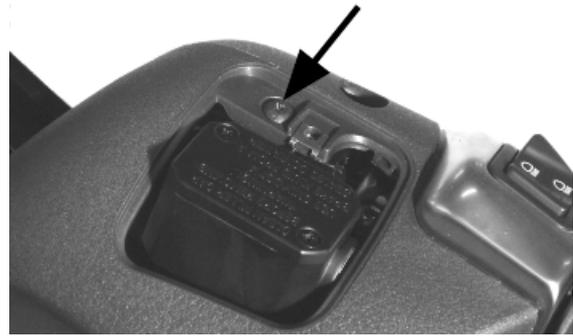
Remove the upper cap by operating on the Allen screw indicated in the figure.



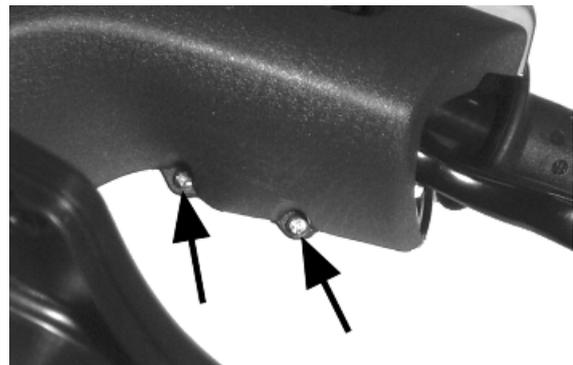
Remove the two brake pump caps.



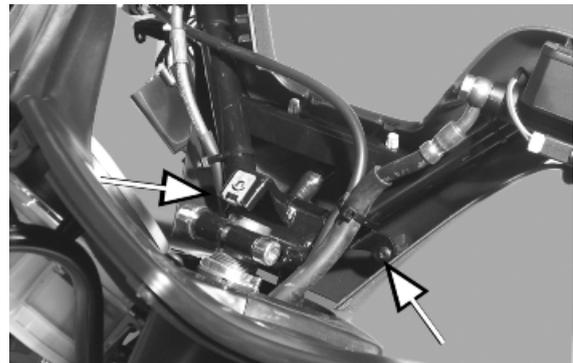
Remove the two screws under the brake pump caps previously removed.



Unscrew the two pairs of screws in the lower part of the half-handlebar.



After removing the front part of the handlebar cover, access the two screws fixing the rear part to the handlebar, as indicated in the photograph.



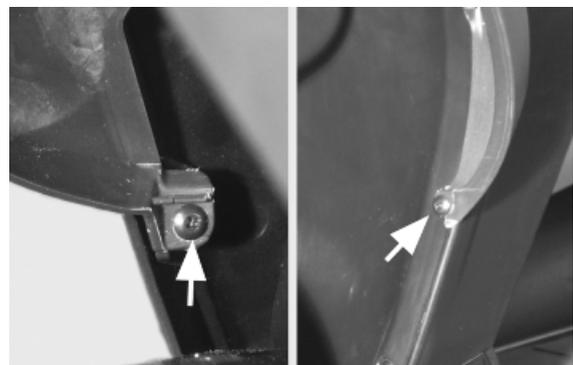
Headlight assy.

Remove the radiator cover.

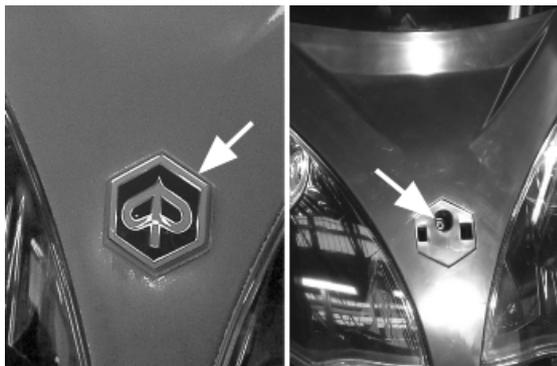
Remove the two wheelhouses with the turn indicator.

Unscrew the two screws fixing the wheelhouse to the shield.

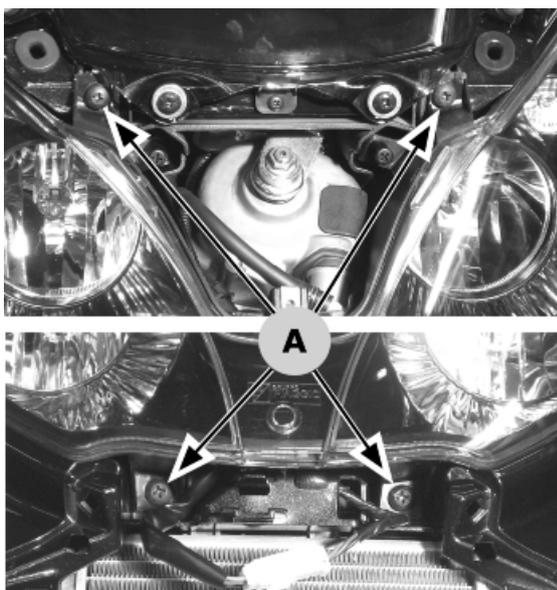
Disconnect the cable guide; after that, turn the wheelhouse anticlockwise (inwards) to release it from the shield supports.



To remove the shield central finishing, remove the PIAGGIO clip-on badge paying attention not to spoil the paint, unscrew the screw underneath and remove the finish carefully.



Remove the four screws "A" and disconnect the wiring.



See also

[Radiator cover](#)

Frame central cover

Remove the three screws on the right and the left side.

Open the refuelling compartment and remove the tank cap so as to remove the central cover.

Disconnect the cable, refuelling compartment opening.



See also

[Handles and top side fairings](#)

[Knee-guard](#)

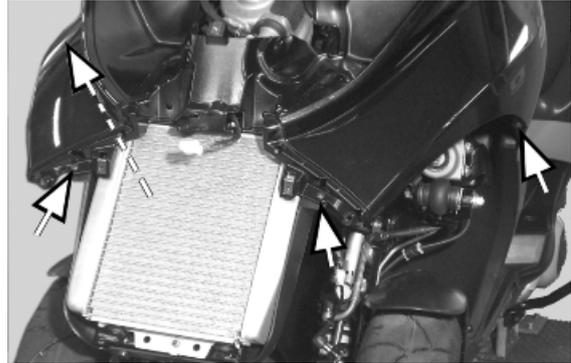
[Seat](#)

Legshield

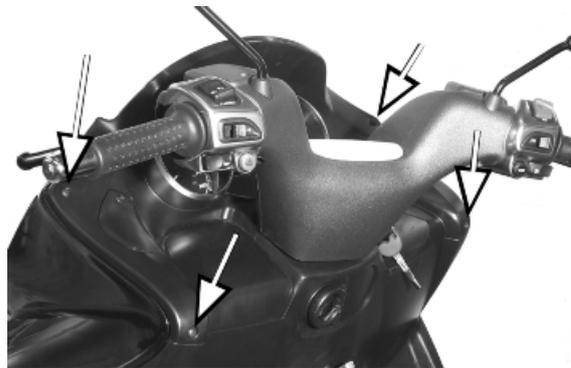
Remove the front headlight assembly.

Remove the spoiler.

Remove the two front screws and the two screws under the wheelhouse.



Remove the four screws on the shield back plate.



See also

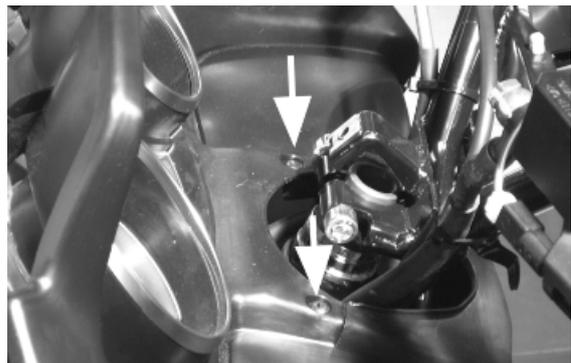
[spoiler](#)
[Headlight assy.](#)

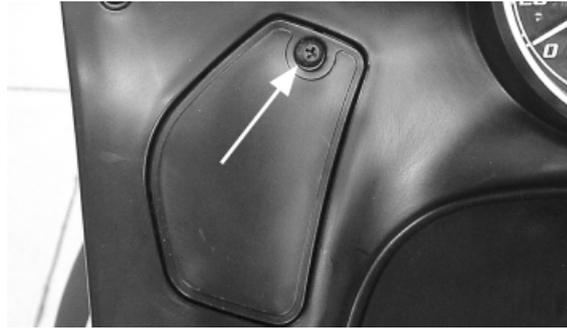
Knee-guard

- Remove the front shield.

- Remove the spoiler.

- Remove the two central screws and the coolant cap cover screw.

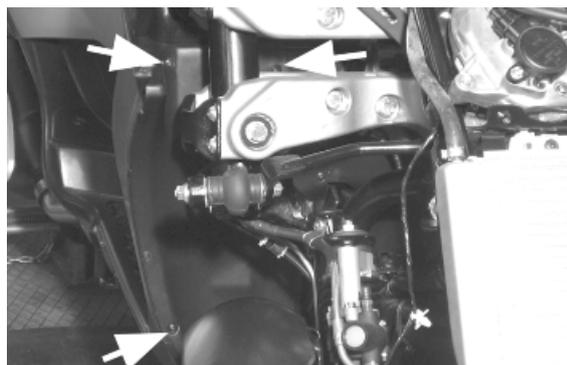
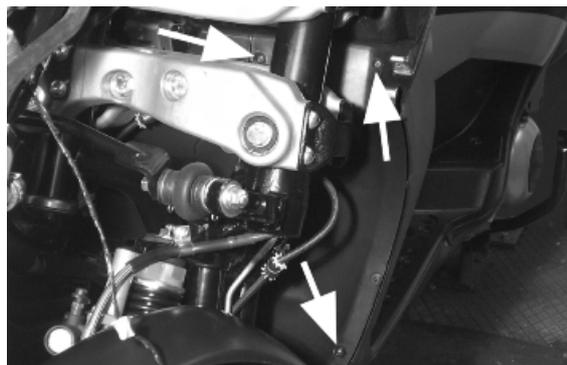




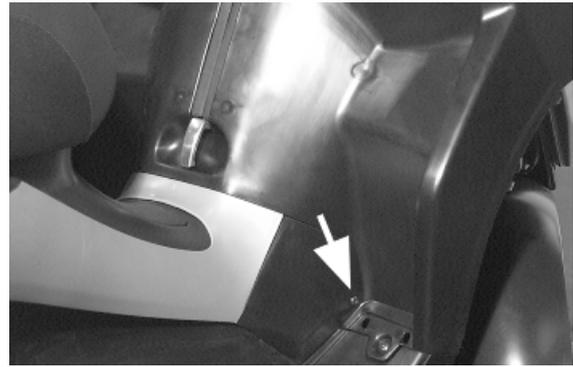
- Remove the expansion tank fixing screw and the frame from the instrument panel and manually release the unions with the shield back plate.
- Unhook the instrument panel wiring.



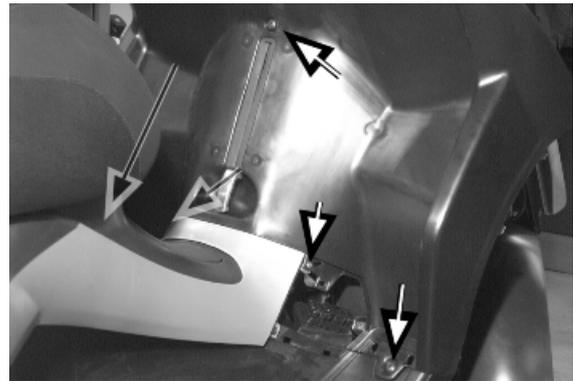
- Remove the six screws and the cable guide strap in the front part of the shield back plate.



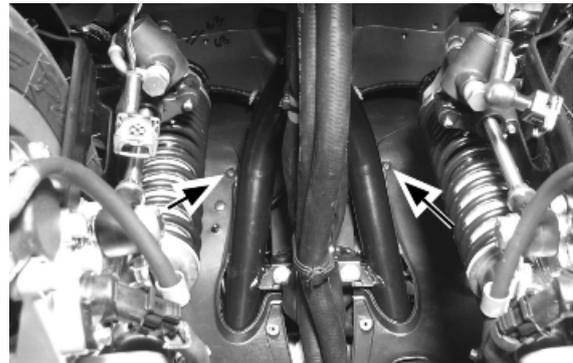
-
- Remove the key switch plastic ring and the two plastic covers near the footrest.



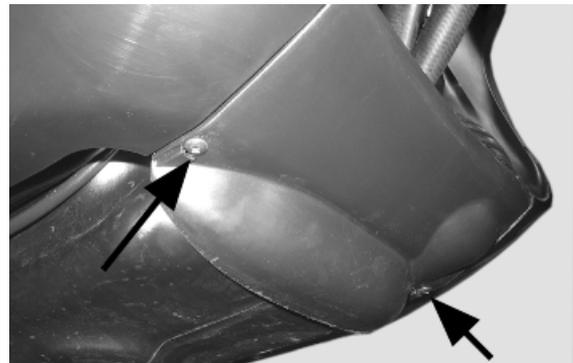
-
- Remove the five screws on the shield back plate rear part.



-
- Remove the two shield back plate front screws, see figure.



-
- Remove the two shield back plate lower screws.
 - Remove the external temperature sensor connection.

**See also**

[Legshield spoiler](#)

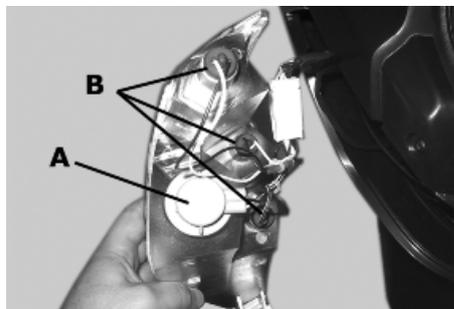
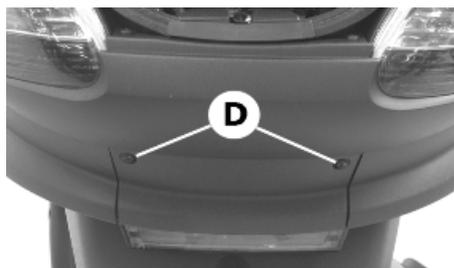
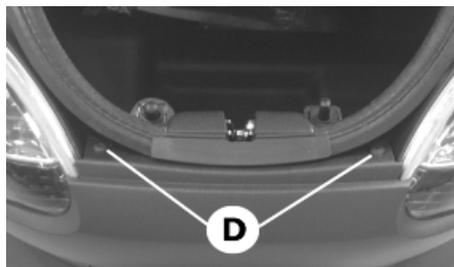
Taillight assy.

Open the rear case cover, remove the two screws «D», and then, the other four fixing screws «D» to pull out the headlight assembly from its fitting.

Follow this procedure to remove the bulbs:

Remove the snap-on bulbs «B».

Remove the bulbs «A» on the bayonet by turning them 30° clockwise.



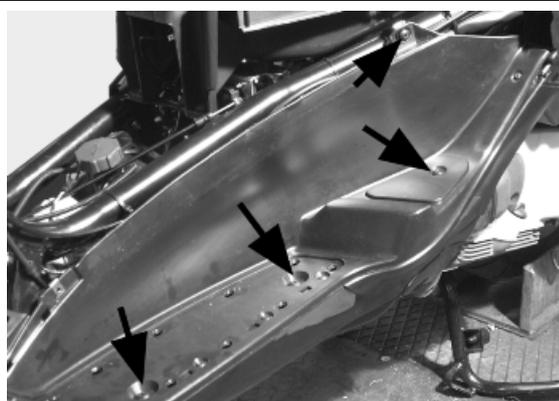
Footrest

Remove the central cover.

Remove the four screws and extract the half-footrest.

Follow the same procedure for both half-footrests.

Release the fuse-box

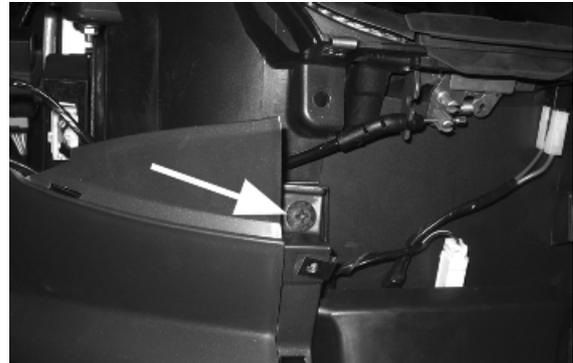


See also

[Frame central cover](#)

Side fairings

Remove the rear screw under the rear cover.

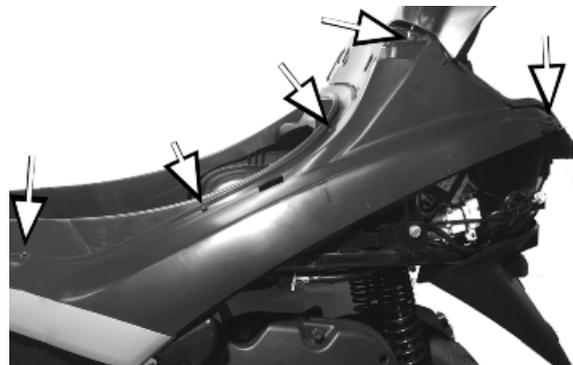


Remove the screw on the fairing front part, pull the fairing to release the hooks.

Follow the same procedure for both fairings.



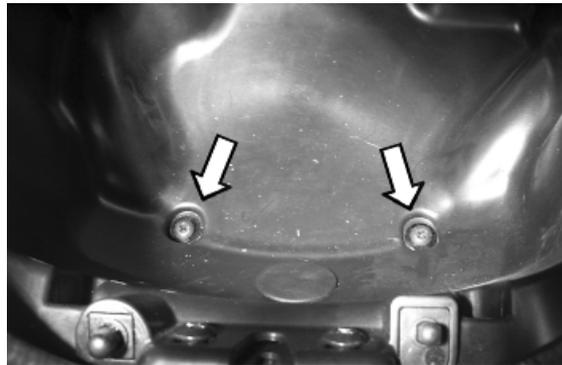
Remove the five screws on the right side and the five on the left side, indicated in the figure.



License plate holder

Remove the two lateral screws and the two screws inside the rear case.

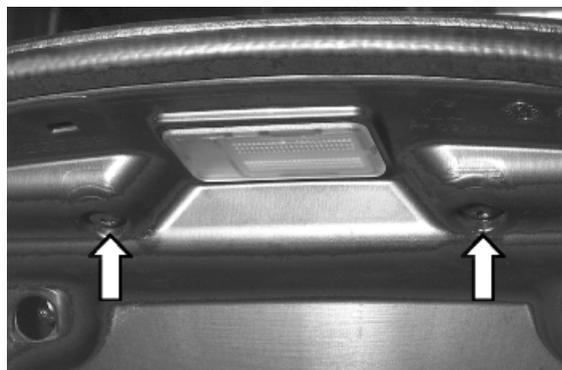
Operate a slight upwards thrust on the case to release license plate support from the chassis.



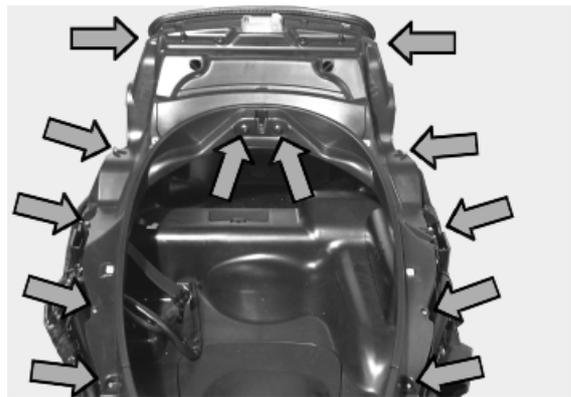
Helmet bay

Remove the chassis central cover.

Remove the four external screws and the two screws inside the rear case to remove the frame.



Remove the upper frame, unscrewing the ten upper screws, the two saddle closing screws and the case light wiring.

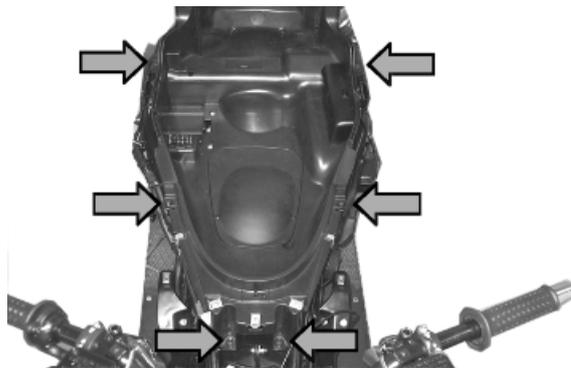
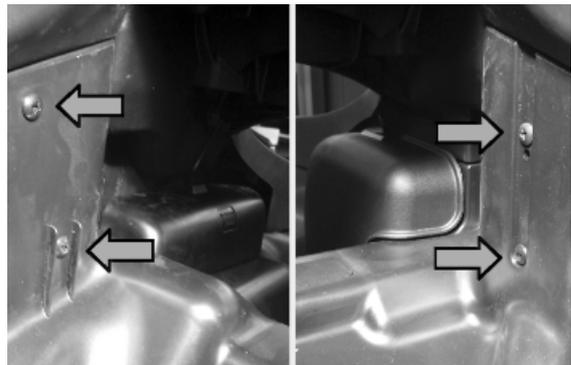


Remove the rear case internal screws indicated in the photograph, to detach the supporting plates of the voltage regulator on one side and the saddle opening switch on the other.

Remove the six upper screws.

Release the case latch.

Remove the case light front and rear switch connections, the HV coil, the battery leads and the fuse-box.



See also

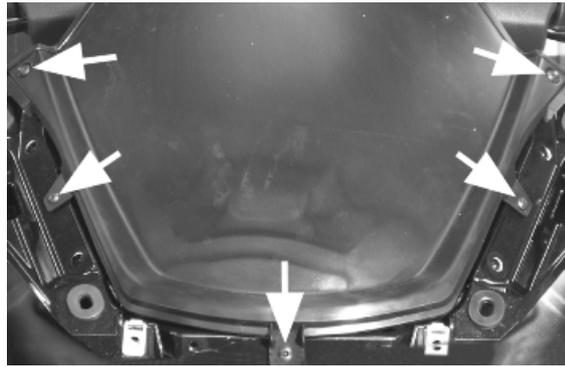
[Frame central cover](#)

spoiler

Remove the shield central finish; then, screw the six screws indicated in the figure.



Remove the five screws indicated in the figure.



See also

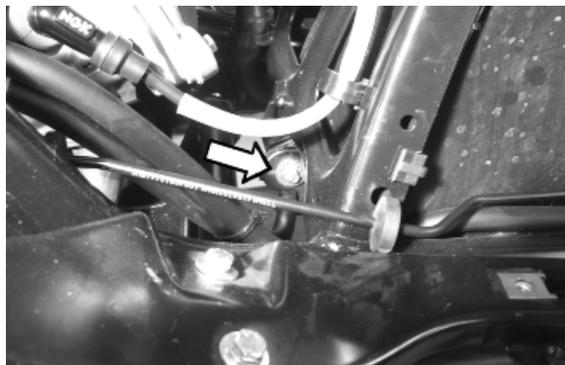
[Headlight assy.](#)

Fuel tank

Remove the chassis central cover.

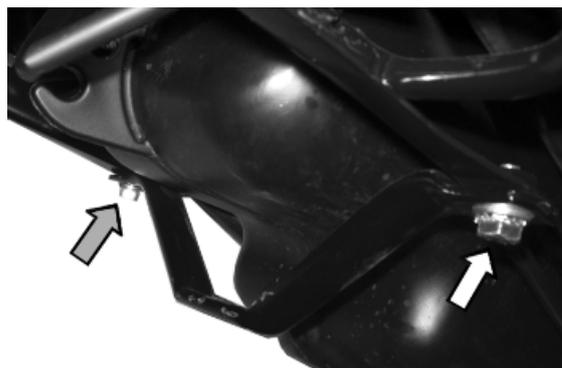
Remove the footrest.

Remove the three tank retainers.



Remove the two lower bracket retainers indicated in the figure.

Disconnect the electric wiring and the fuel pipes.



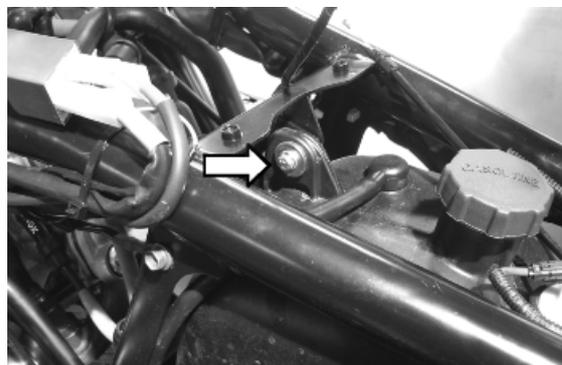
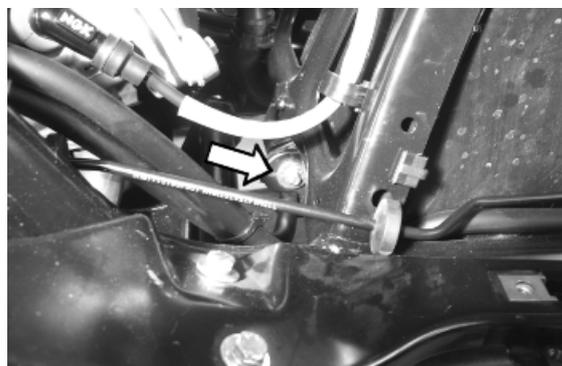
See also

[Footrest](#)

Remove the chassis central cover.

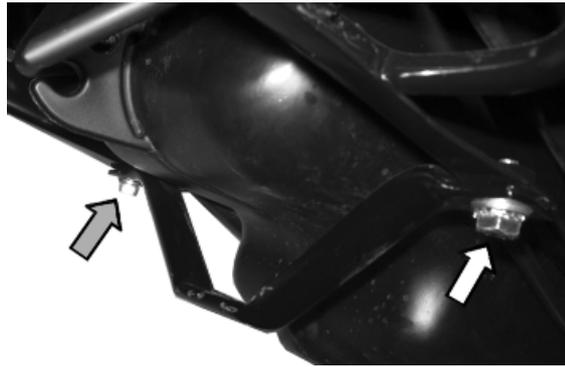
Remove the footrest.

Remove the three tank retainers.



Remove the two lower bracket retainers indicated in the figure.

Disconnect the electric wiring and the fuel pipes.



See also

[Footrest](#)

Top-case

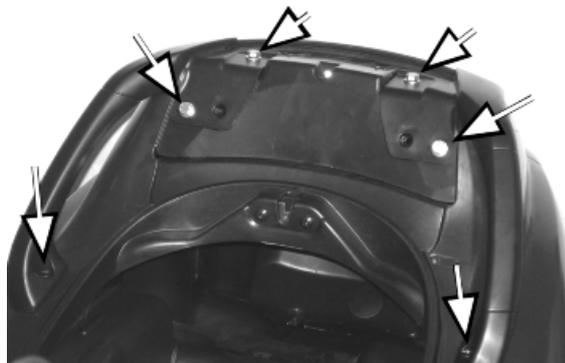
Rear

Remove the four fixing screws of the cover and release it from the two leverages.



Handles and top side fairings

Remove the six screws indicated in the figure.

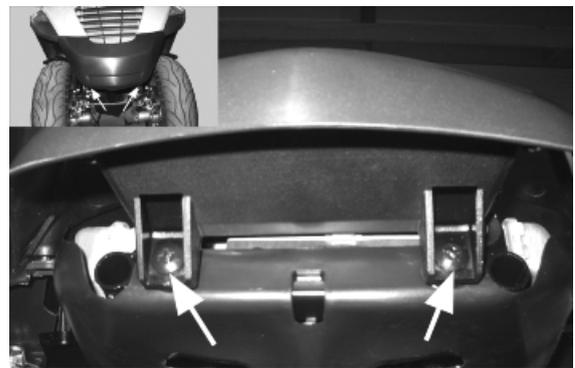


Radiator cover

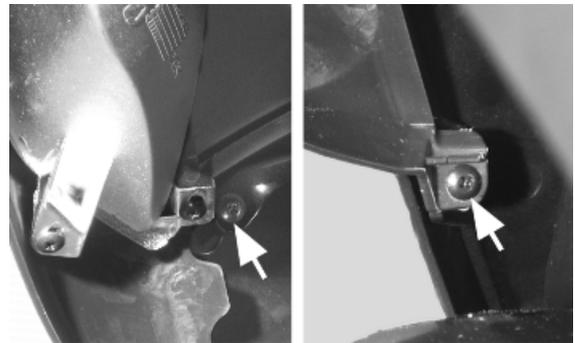
Remove the two front screws indicated in the photograph



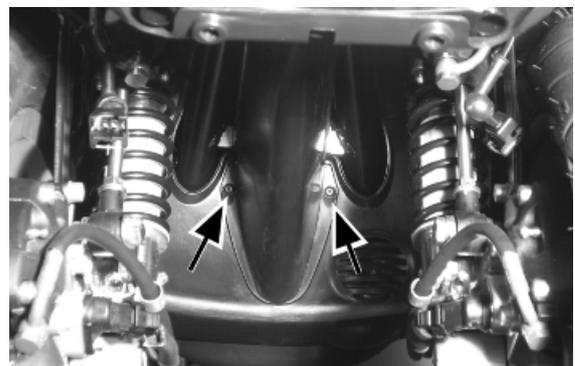
Remove the two lower retainers with the bushing

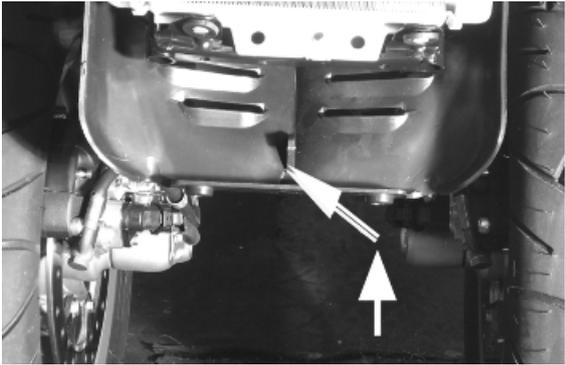


Remove the two rear retainers and then, the two wheelhouse front retainers.



Remove the two screws fixing the radiator lower protection to the shield back plate.
After that, press up and pull the protection front part so as to release it from the radiator frame.





INDEX OF TOPICS

PRE-DELIVERY

PRE DE

Carry out the listed tests before delivering the vehicle.

Warning- be very careful when handling fuel.

Position the plastic cover supplied with the coupling on the steering tube as shown in the figure.



Aesthetic inspection

Appearance check:

- Paintwork
- Fitting of plastics
- Scratches
- Dirt

Tightening torques inspection

Lock check

- Safety locks
- clamping screws

Safety locks

- Rear shock absorber upper fixing
- Rear shock absorber lower fixing
- Front shock absorber upper fixing
- Front shock absorber lower fixing
- Sliding stems fixing
- Break callipers fixing
- Front wheels fixing screws
- Front wheels axle nut
- Rear wheel axle nut
- Chassis - engine swinging arm fixing
- Handlebar lock nut
- Lower ring nut for side steering tubes
- Upper ring nut for side steering tubes

- Lower ring nut for central steering tube
- Upper ring nut for central steering tubes
- Constant-velocity universal joints

Electrical system

- Battery
- Main switch
- Lights: high beams, low beams, side/taillights (front and rear) and relevant warning lights
 - Regulating the headlights according to the regulations currently in force
- Front and rear stop light buttons and bulb
- Turn indicators and their warning lights
- Instrument lighting
- instruments: fuel and temperature indicator
- Instrument panel lights
- Horn
- electric start up
- Engine stopping with emergency stop switch
- Electric opening of saddle with remote control
- Tilting system locking - unlocking button

CAUTION

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

CAUTION

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

WARNING

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

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

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

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

KEEP OUT OF THE REACH OF CHILDREN

CAUTION

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

Levels check

Level check:

- Hydraulic brake system liquid level.
 - Tilt locking system fluid level
 - Rear hub oil level
 - Engine coolant level
 - Engine oil level
-

Road test

Test ride

- Cold start
 - Instrument operations
 - Response to the gas command
 - Stability on acceleration and braking
 - Rear and front brake efficiency
 - Parking brake efficiency
 - Rear and front suspension efficiency
 - Abnormal noise
 - Tilting system locking - unlocking efficiency
-

Static test

Static control after the test ride:

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

CAUTION

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

CAUTION

NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES OR TYRES MAY BURST.

Functional inspection

Functional check up:

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

INDEX OF TOPICS

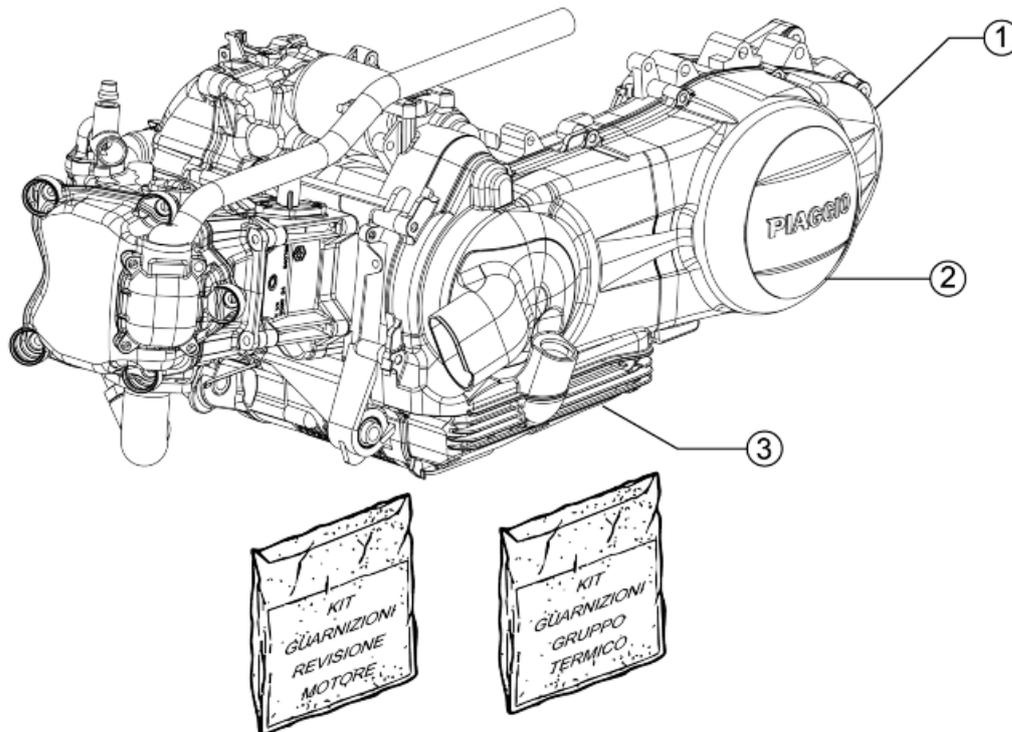
TIME

TIME

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

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

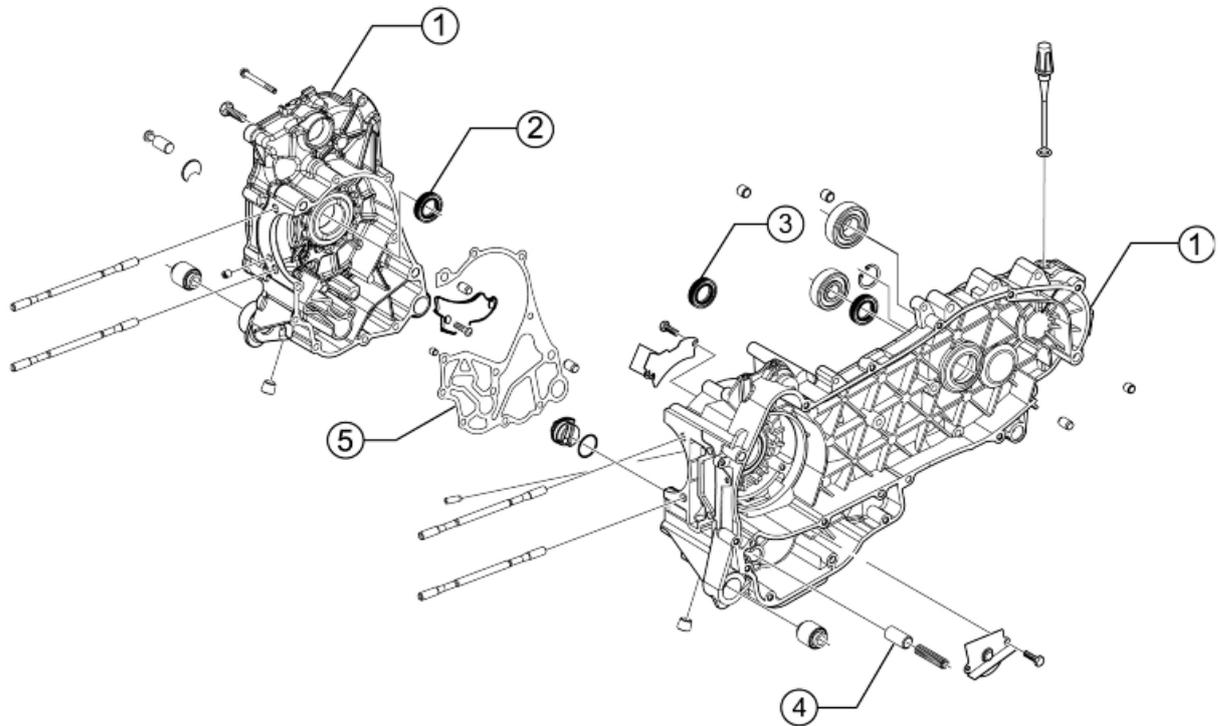
Engine



ENGINE

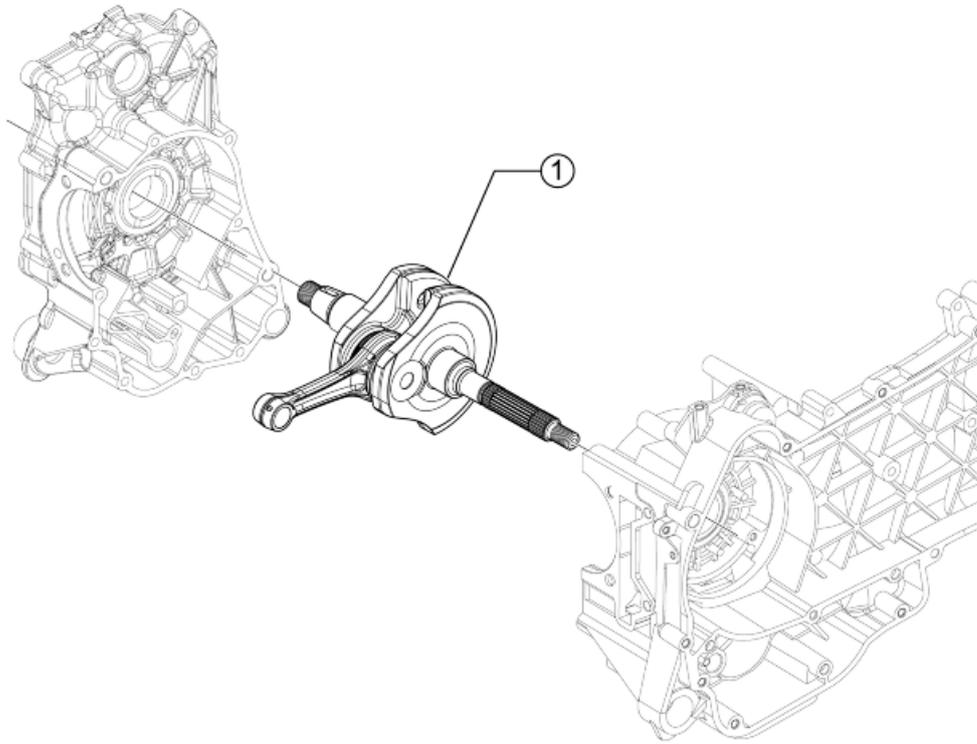
	Code	Action	Duration
1	001001	Engine from chassis - Removal and refit.	
2	001127	Engine - Complete service	
3	003064	Engine oil - Change	

Crankcase



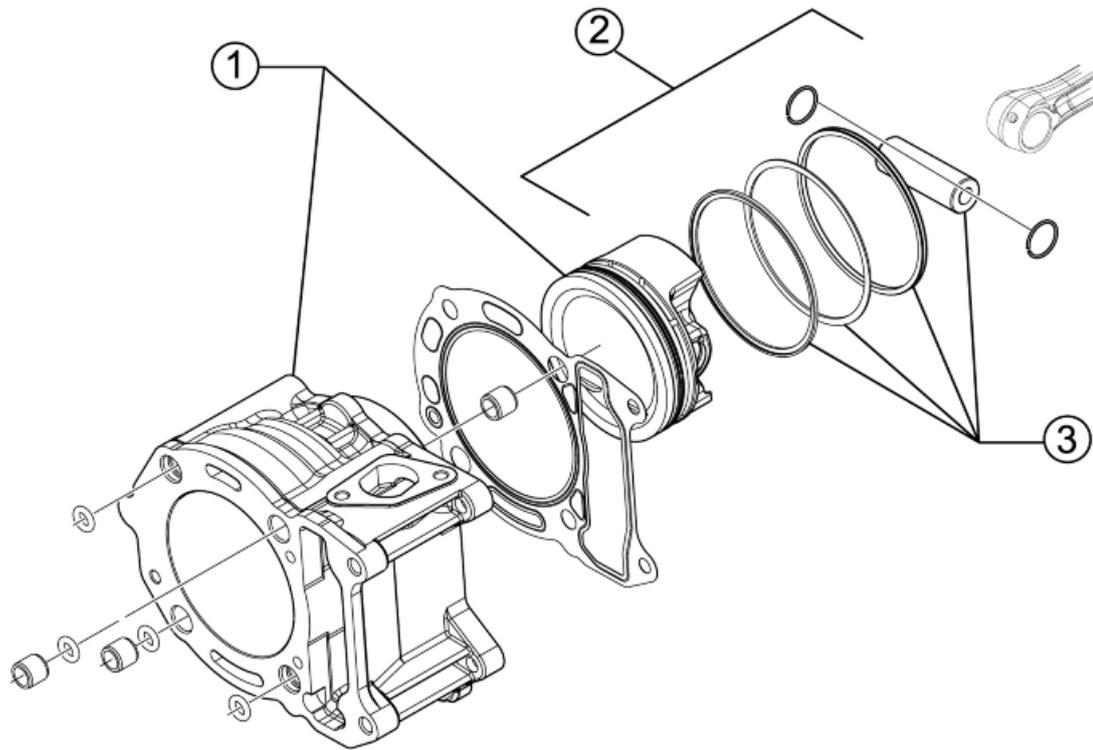
CRANKCASE

	Code	Action	Duration
1	001133	Engine crankcase- Replacement	
2	001099	Oil seal, flywheel side - Replacement	
3	001100	Oil seal, clutch side - Replacement	
4	001124	Lubrication by-pass - Replacement	
5	001153	Crankcase halves gasket - Replacement	

Crankshaft**CRANKSHAFT**

	Code	Action	Duration
1	001117	Crankshaft - Replacement	

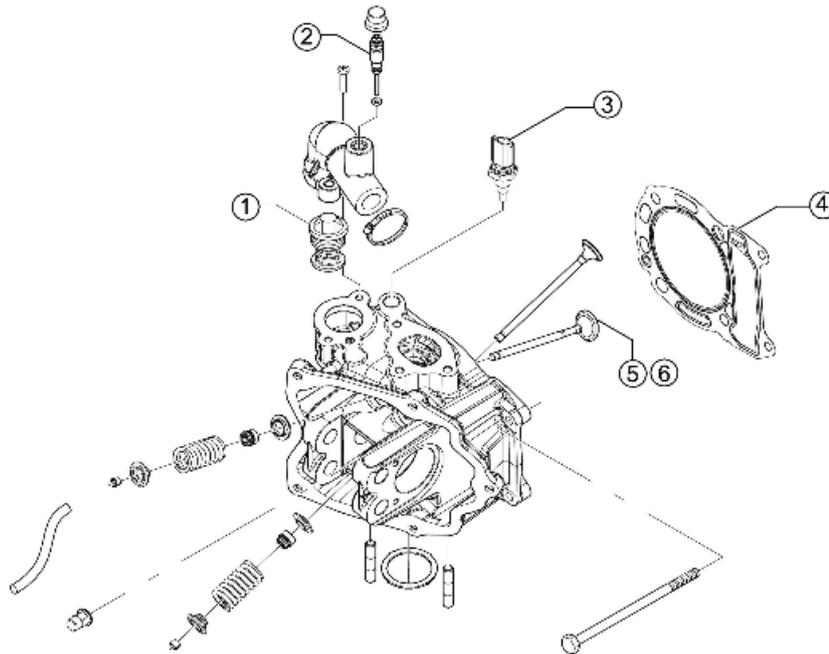
Cylinder assy.



CYLINDER GROUP

	Code	Action	Duration
1	001002	Cylinder / Piston - Replacement	
2	001154	Pin-ring-piston assembly - Service	
3	001176	Rings / Pin - Replacement	

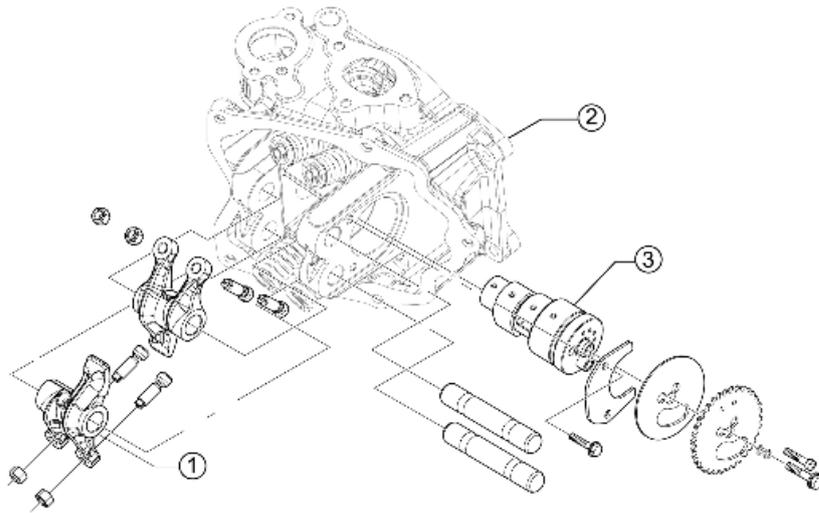
Cylinder head assy.



HEAD UNIT

	Code	Action	Duration
1	001057	Thermostat - Replacement	
2	007012	Coolant bleed valve - Replacement	
3	001083	Thermistor - Replacement	
4	001056	Head gasket - Replacement	
5	001045	Valves - Replacement	
6	001049	Valves - Adjustment	

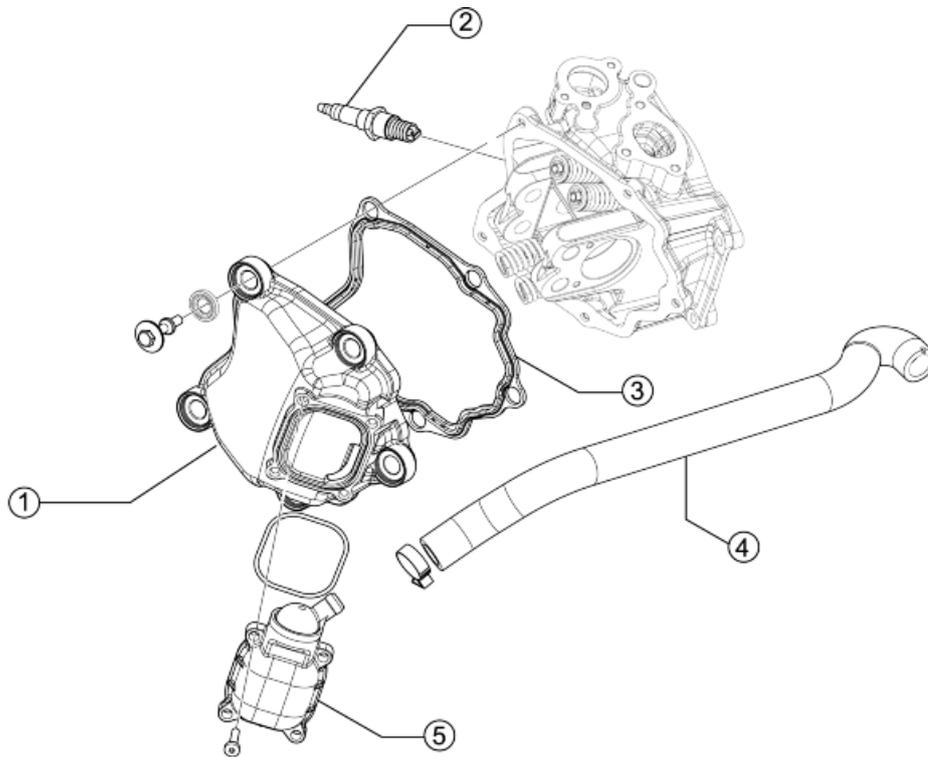
Rocker arms support assy.



ROCKING LEVERS SUPPORTING UNIT

	Code	Action	Duration
1	001148	Valve rocking levers - Replacement	
2	001126	Head - Replacement	
3	001044	Camshaft - Replacement	

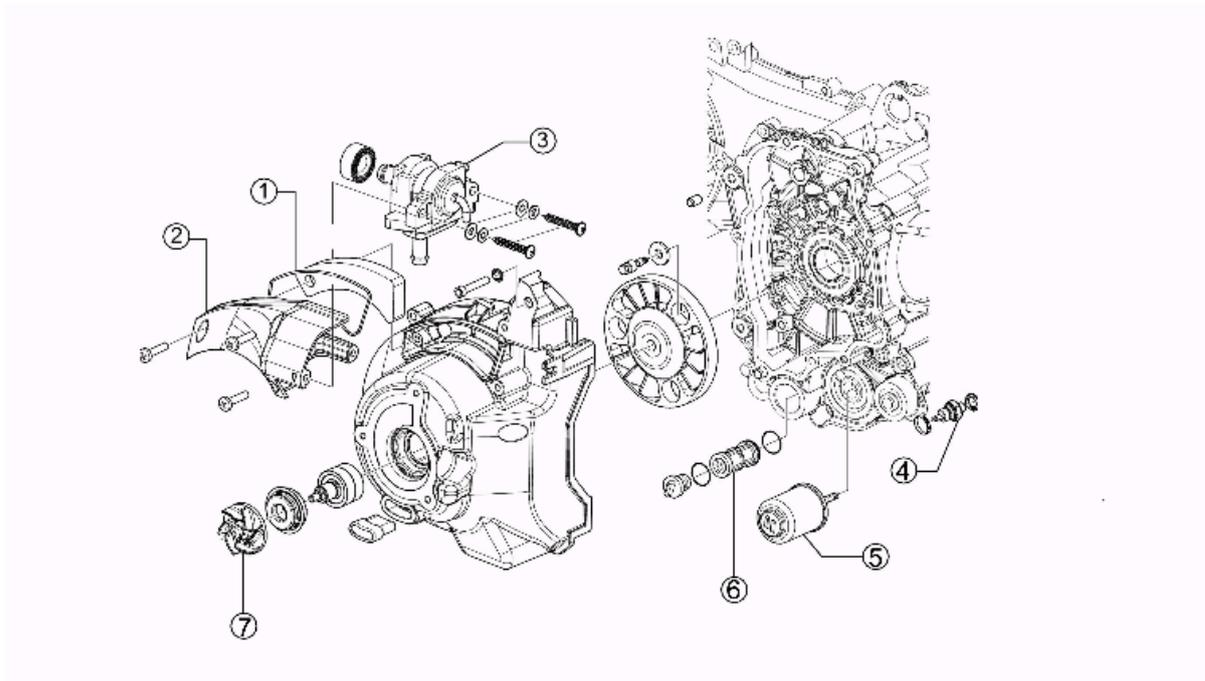
Cylinder head cover



HEAD COVER

	Code	Action	Duration
1	001089	Head cover - Replacement	
2	001093	Spark plug - Replacement	
3	001088	Head cover gasket - Replacement	
4	001074	Oil vapour recovery pipe - Replacement	
5	001159	Oil vapour recovery tank - Service	

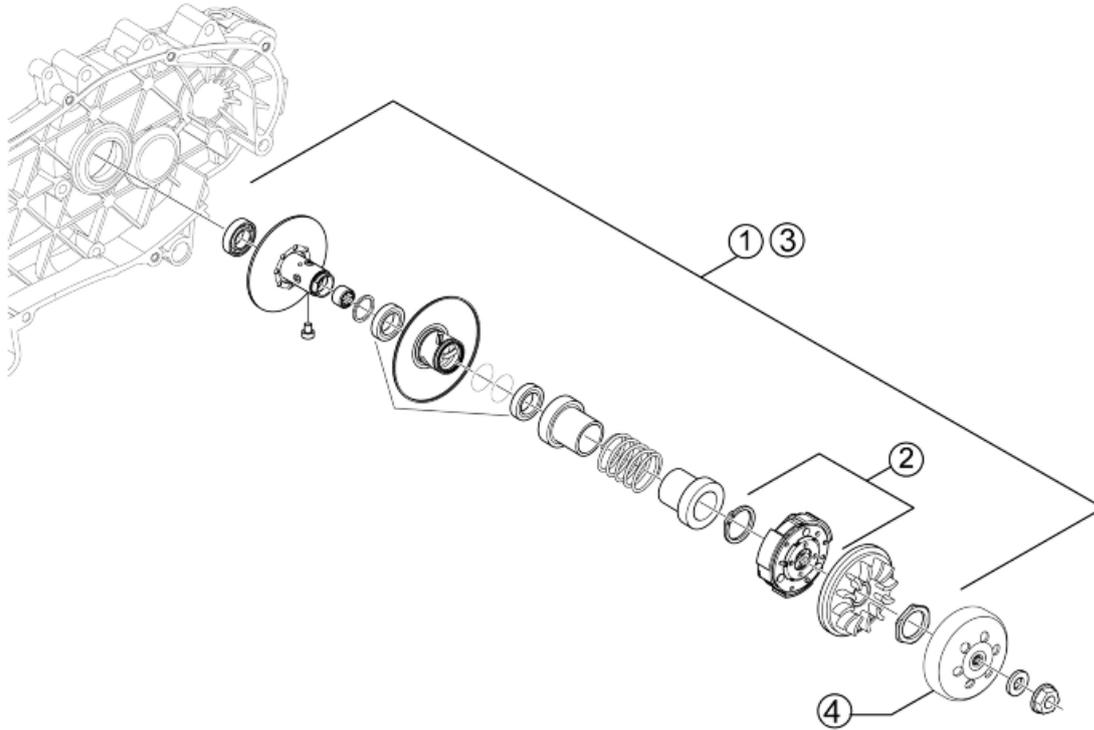
Oil filter



OIL FILTER

	Code	Action	Duration
1	001161	Secondary air filter - Replacement	
2	001162	Secondary air filter box - Replacement	
3	001174	SAS valve - Replacement	
4	001160	Oil pressure sensor - Replacement	
5	001123	Oil filter - Replacement	
6	001102	Mesh oil filter - Replacement / Cleaning	
7	001113	Water pump / Pump rotor - Replacement	

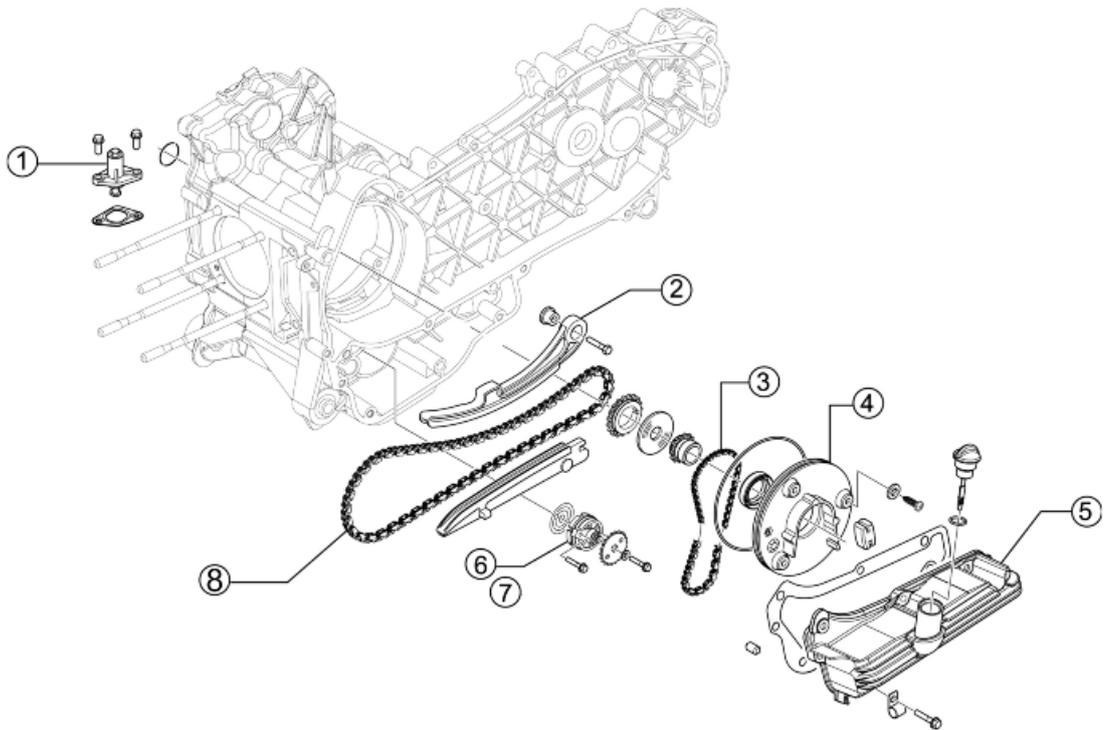
Driven pulley



DRIVEN PULLEY

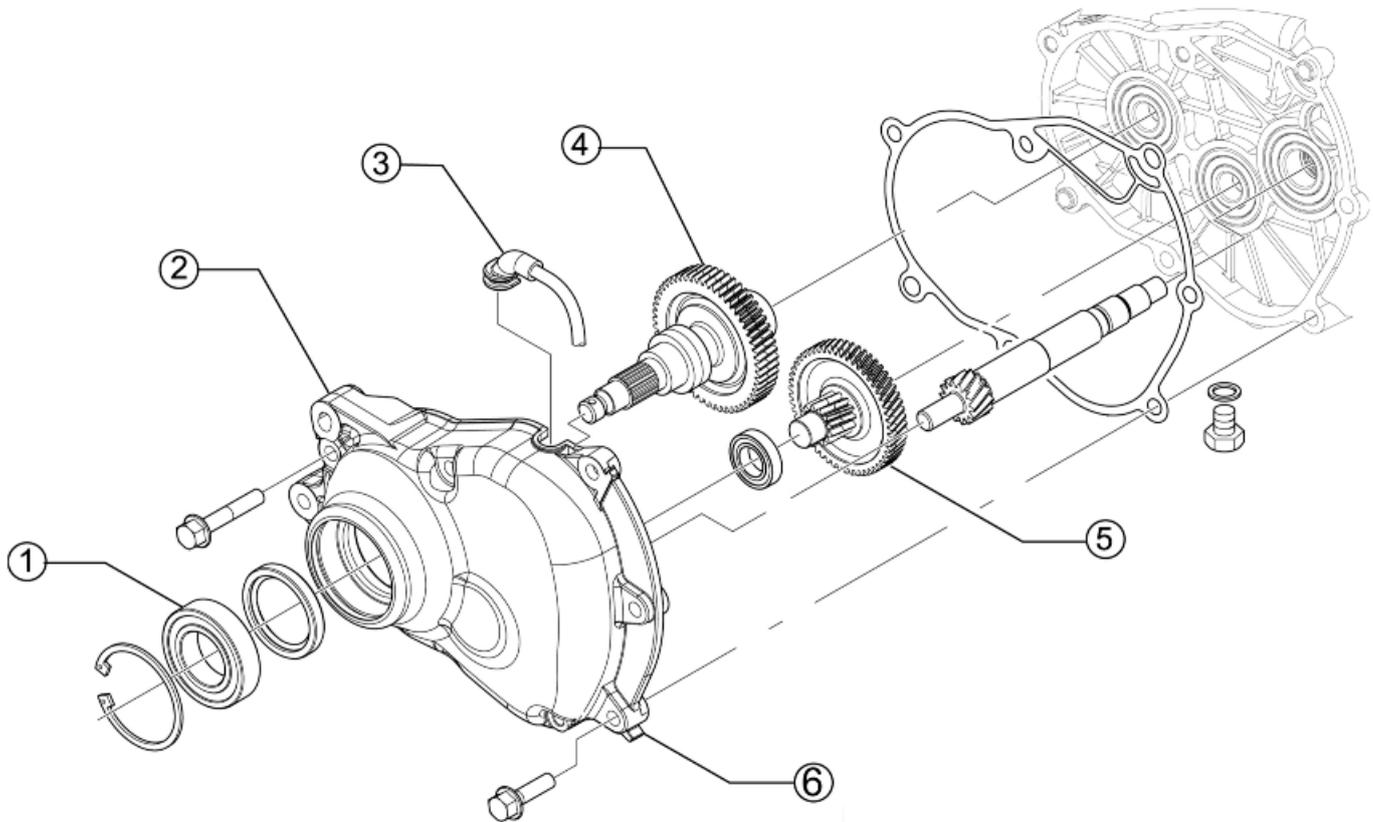
	Code	Action	Duration
1	001012	Driven pulley - Service	
2	001022	Clutch - Replacement	
3	001110	Driven pulley - Replacement	
4	001155	Clutch bell - Replacement	

Oil pump



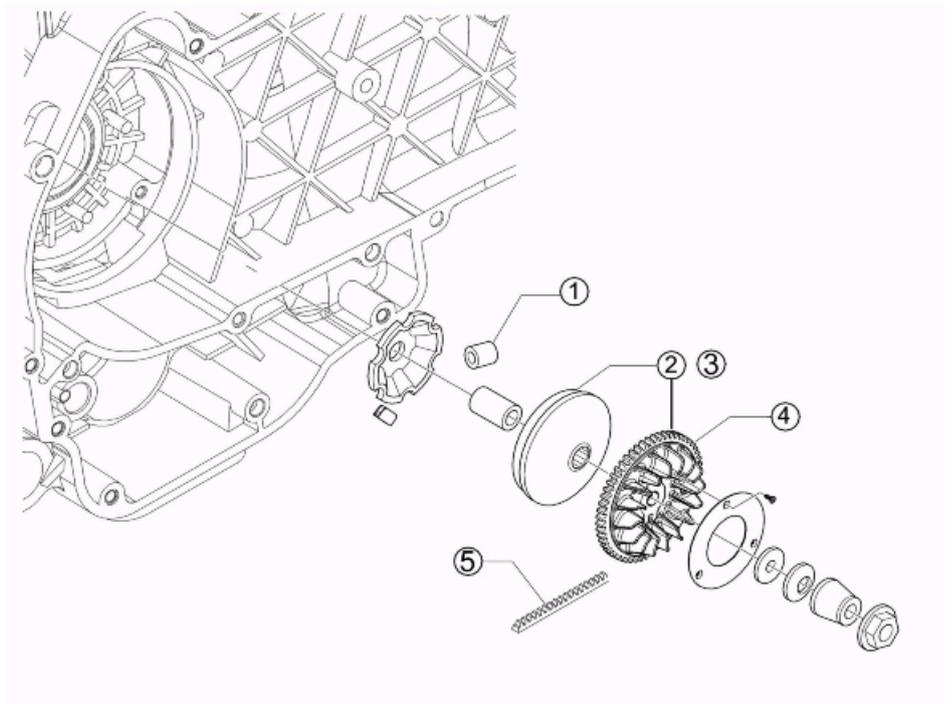
OIL PUMP

	Code	Action	Duration
1	001129	Chain tightener - Service and replacement	
2	001125	Chain guide pads - Replacement	
3	001122	Oil pump chain - Replacement	
4	001172	Chain cover flap - Replacement	
5	001130	Oil sump - Replacement	
6	001042	Oil pump - Service	
7	001112	Oil pump - change	
8	001051	Belt/Timing chain - Change	

Final gear assy.**FINAL REDUCTION GEAR ASSEMBLY**

	Code	Action	Duration
1	002031	Rear wheel hub bearings - Replacement	
2	003065	Gear box oil - Replacement	
3	004180	Reduction gear breather pipe - Replacement	
4	004125	Rear wheel axle - Replacement	
5	001179	Hub drive shaft -replacement	
6	001156	Gear reduction unit cover - Replacement	

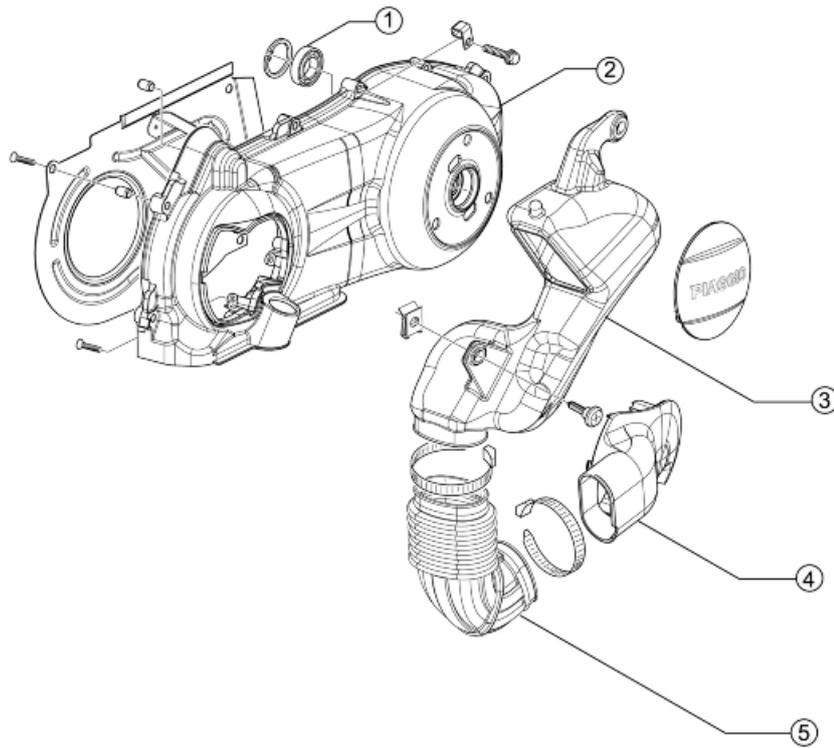
Driving pulley



DRIVING PULLEY

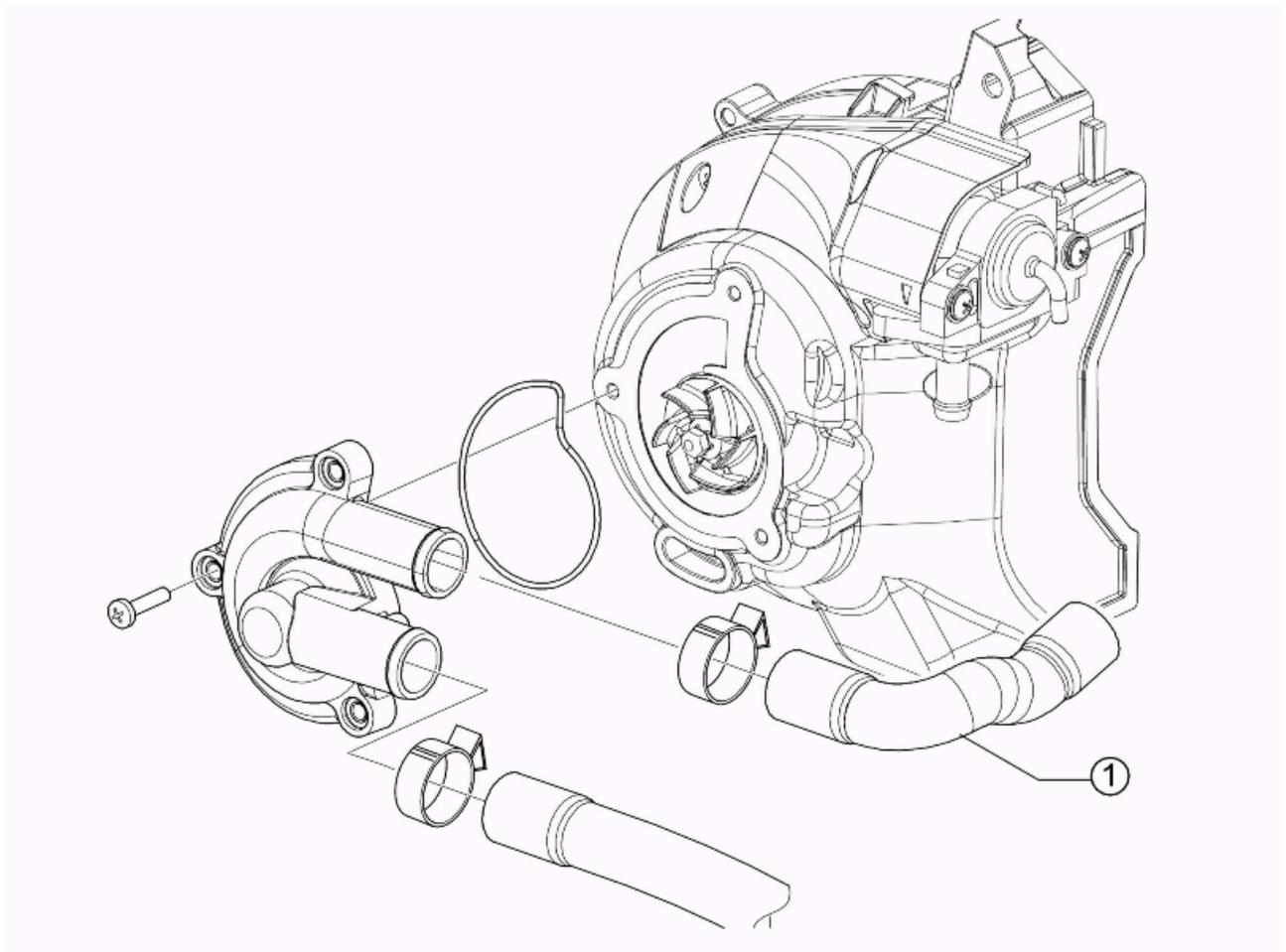
	Code	Action	Duration
1	001177	Variator rollers / shoes - Replacement	
2	001066	Driving pulley - Removal and Refitting	
3	001006	Driving pulley - Service	
4	001086	Driving half-pulley - Replacement	
5	001011	Driving belt - Replacement	

Transmission cover

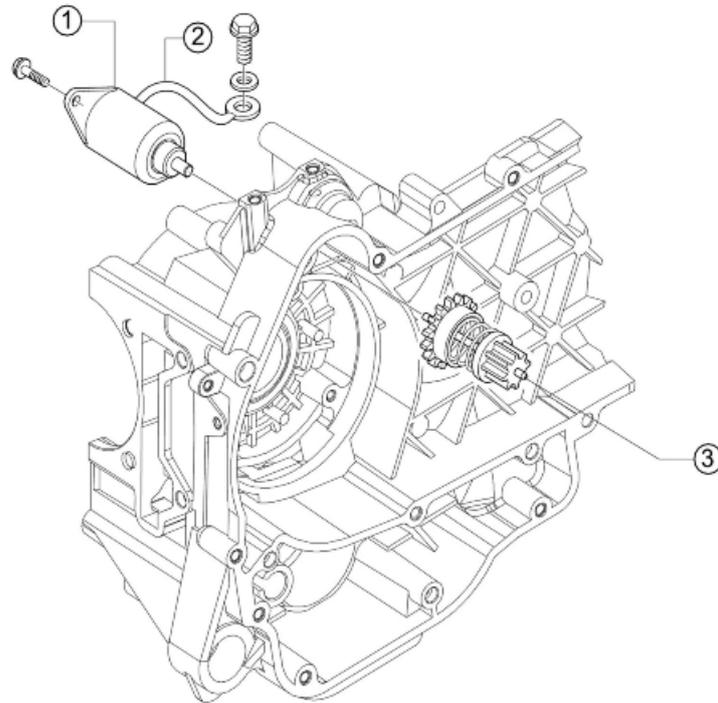


TRANSMISSION COVER

	Code	Action	Duration
1	001135	Transmission cover bearing - Replacement	
2	001096	Transmission crankcase cover - Replacement	
3	001131	Transmission air intake - Replacement	
4	001170	Air deflector - Replacement	
5	001132	Transmission air inlet pipe - Replacement	

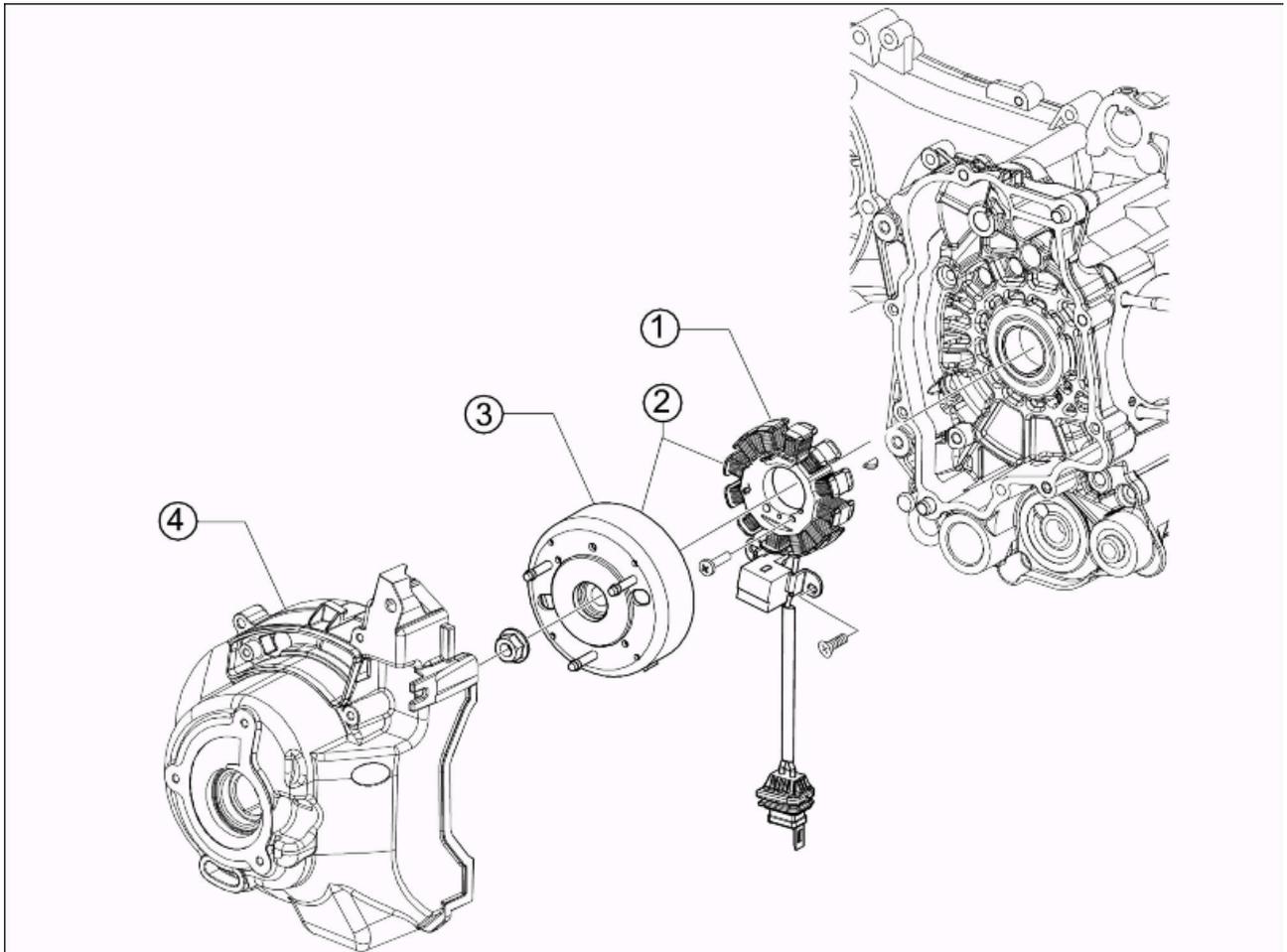
Water pump**WATER PUMP**

	Code	Action	Duration
1	007009	Head-pump by-pass rubber coupling - Replacement	

Starter motor**ELECTRICAL START UP**

	Code	Action	Duration
1	001020	Starter motor - Replacement	
2	005045	Starter motor cable harness - Replacement	
3	001017	Start-up pinion - Replacement	

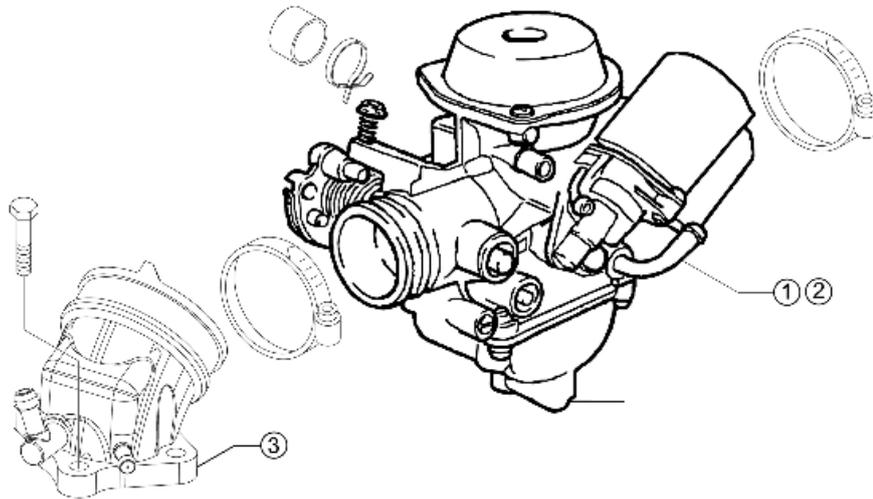
Flywheel magneto



MAGNETO FLYWHEEL

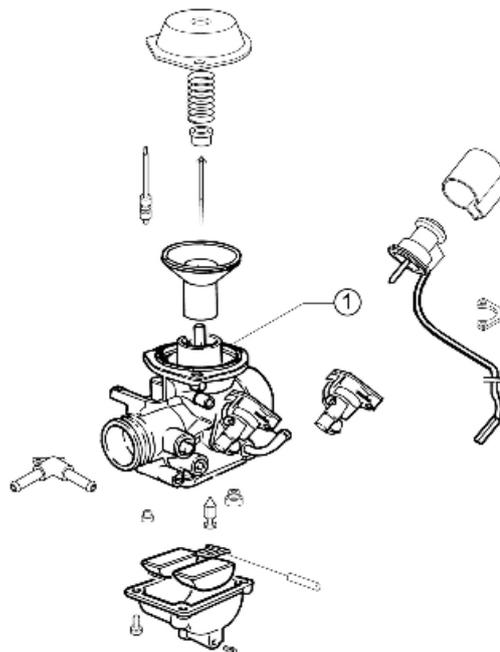
	Code	Action	Duration
1	001067	Stator - Removal and Refitting	
2	001058	Complete flywheel - Replacement	
3	001173	Rotor - Replacement	
4	001087	Flywheel cover - Replacement	

Carburettor



CARBURETTOR

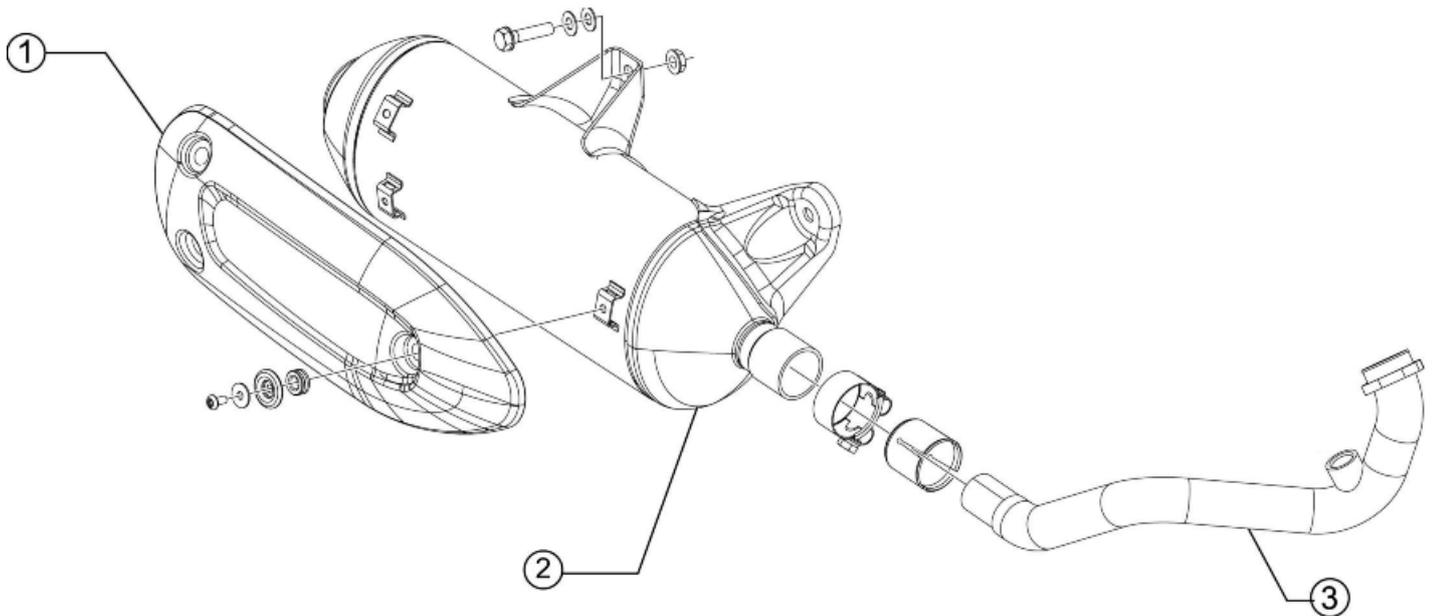
	Code	Action	Duration
1	001063	Carburettor - Replacement	
2	003058	Carburettor - Adjustment	
3	001013	Intake manifold - Replacement	



CARBURETTOR EXPLODED VIEW

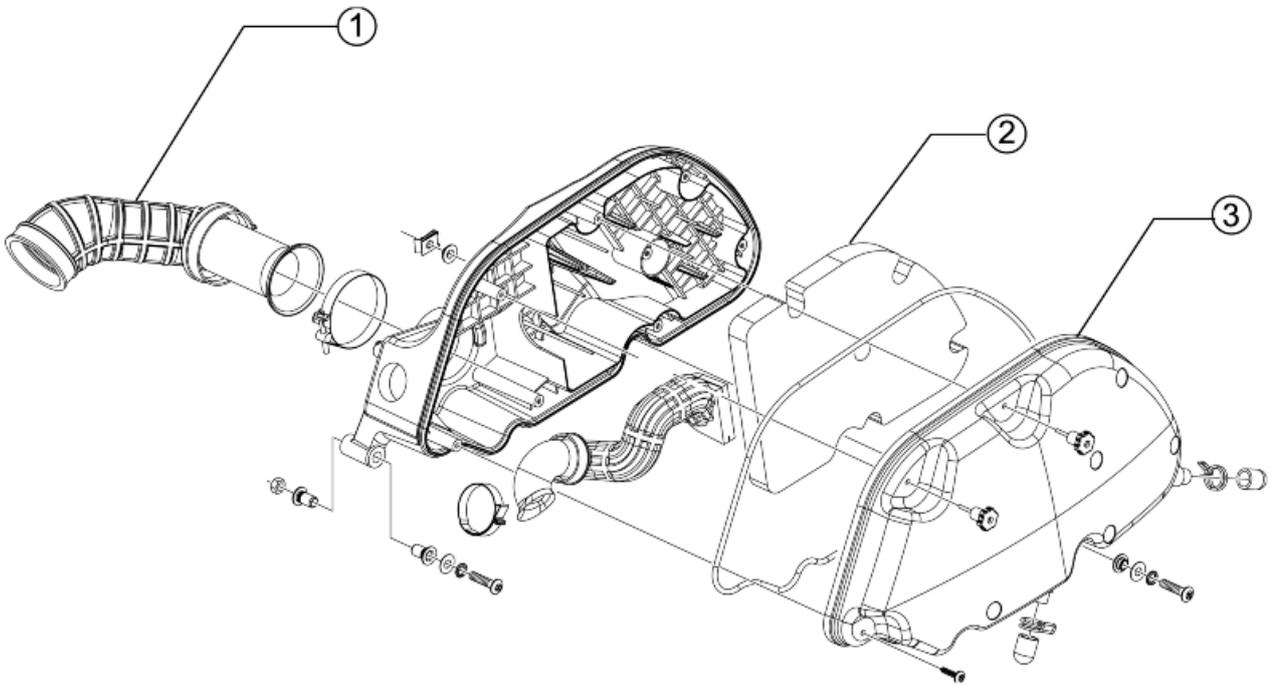
	Code	Action	Duration
1	001008	Carburettor - Inspection	

Exhaust pipe



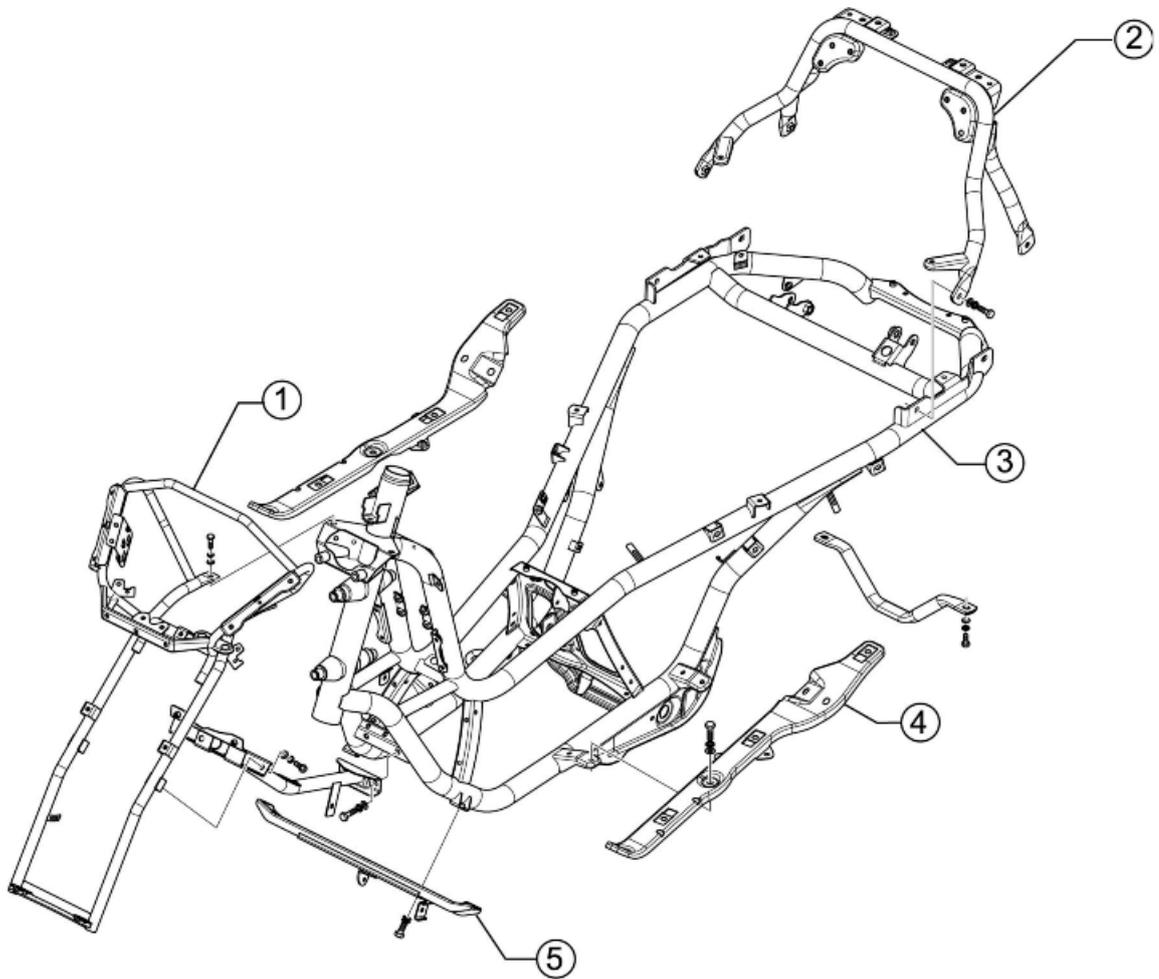
MUFFLER

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

Air cleaner**AIR CLEANER**

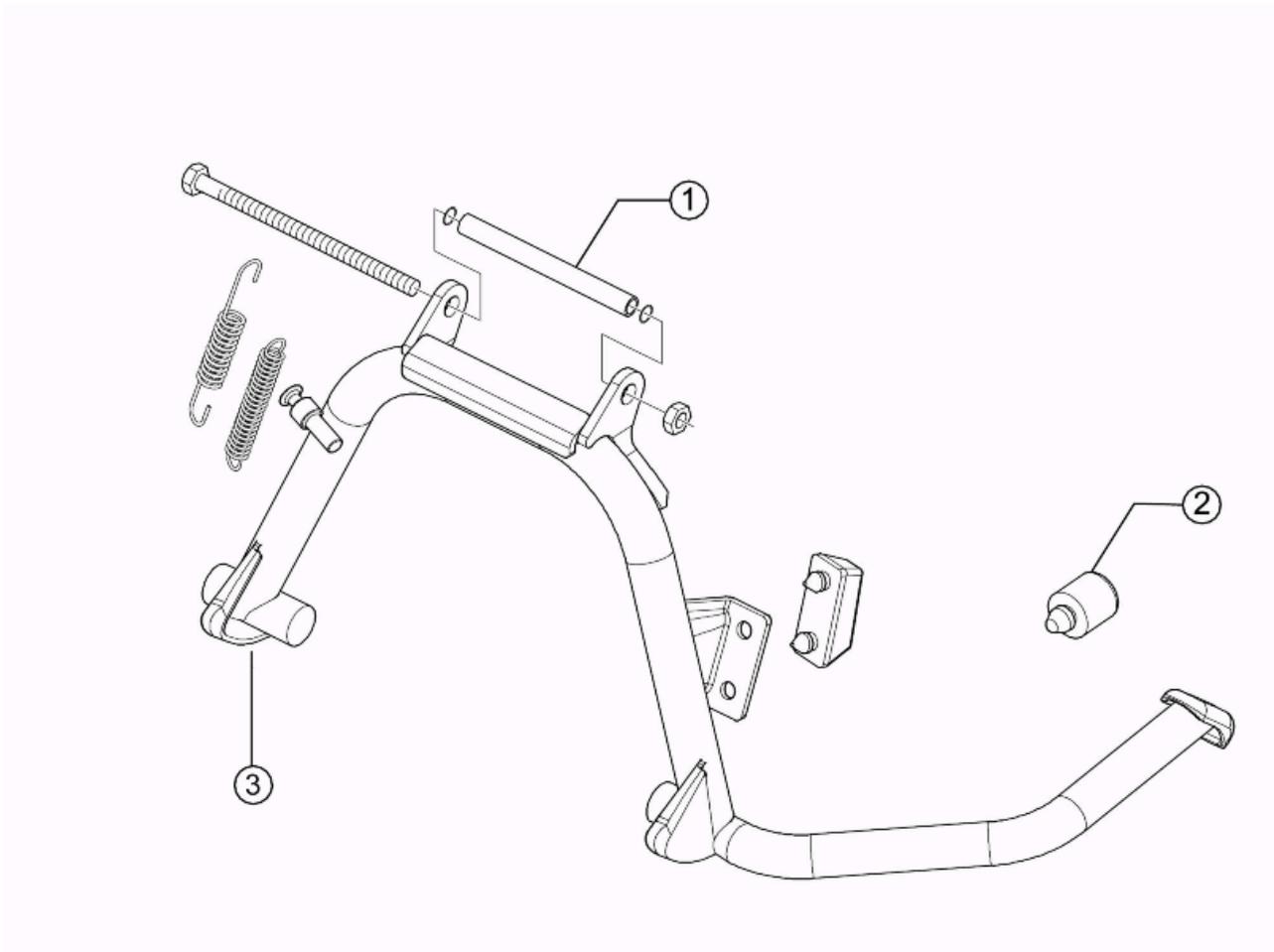
	Code	Action	Duration
1	004122	Air cleaner carburettor fitting - Replacement	
2	001014	Air filter - Replacement / cleaning	
3	001015	Air filter box - Replacement	

Frame



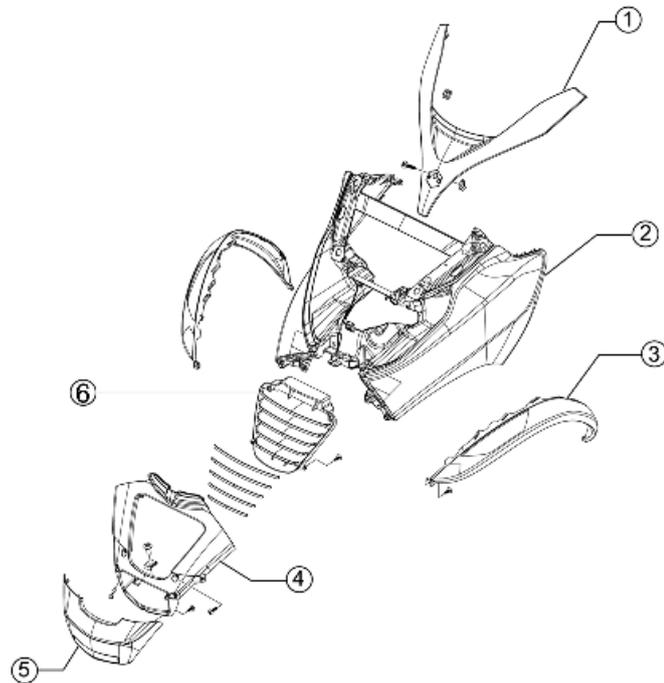
CHASSIS

	Code	Action	Duration
1	004146	Front frame - Replacement	
2	004116	Rear frame - Replacement	
3	004001	Frame - replace	
4	004147	footboard support bracket one side - Replacement	
5	004143	Footrest support - replace	

Centre-stand**STAND**

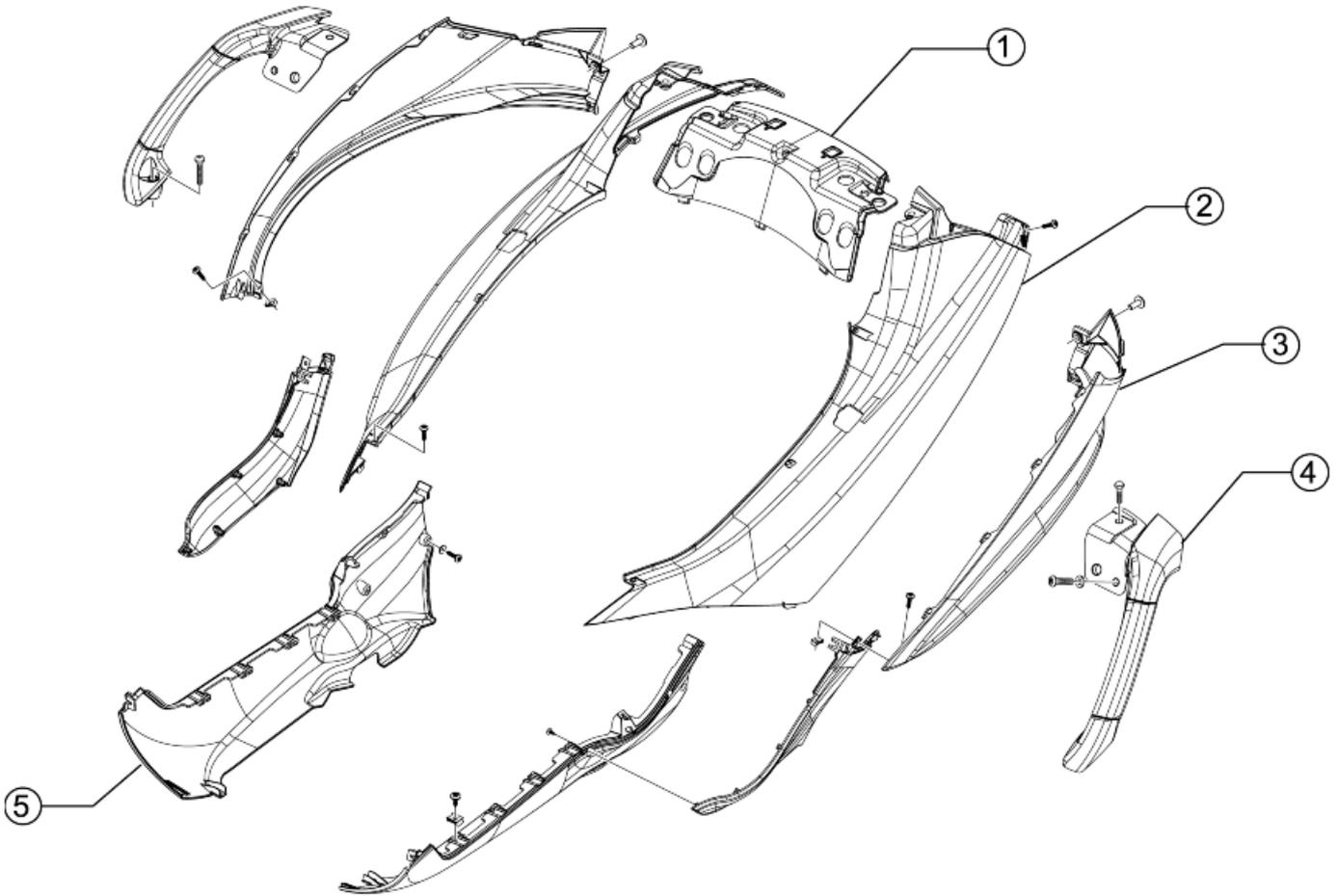
	Code	Action	Duration
1	001053	Stand bolt - Replacement	
2	004179	Stand buffer - Replacement	
3	004004	Stand - Replacement	

Legshield spoiler

**FRONT SHIELD**

	Code	Action	Duration
1	004020	Headlight frame - Replacement	
2	004064	Front shield - Replacement	
3	004055	Turn indicator frame - Replacement	
4	004149	Shield central cover - Replacement	
5	004022	Shield lower section - Replacement	
6	004167	Grill / radiator cover - Replacement	

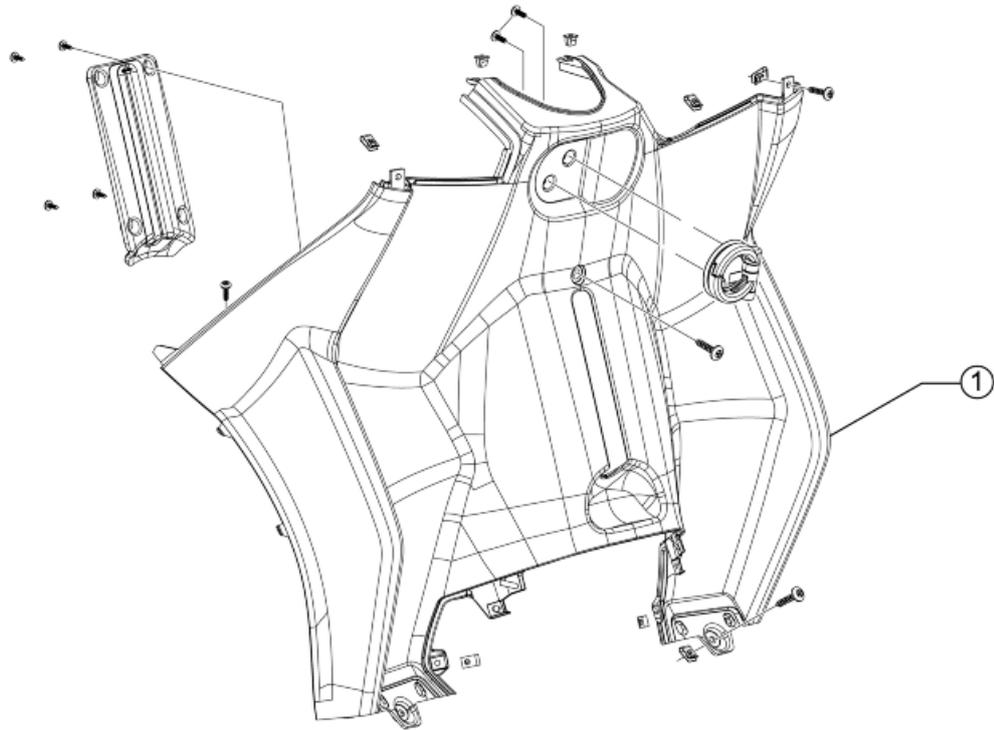
Side fairings



SIDE COVERS

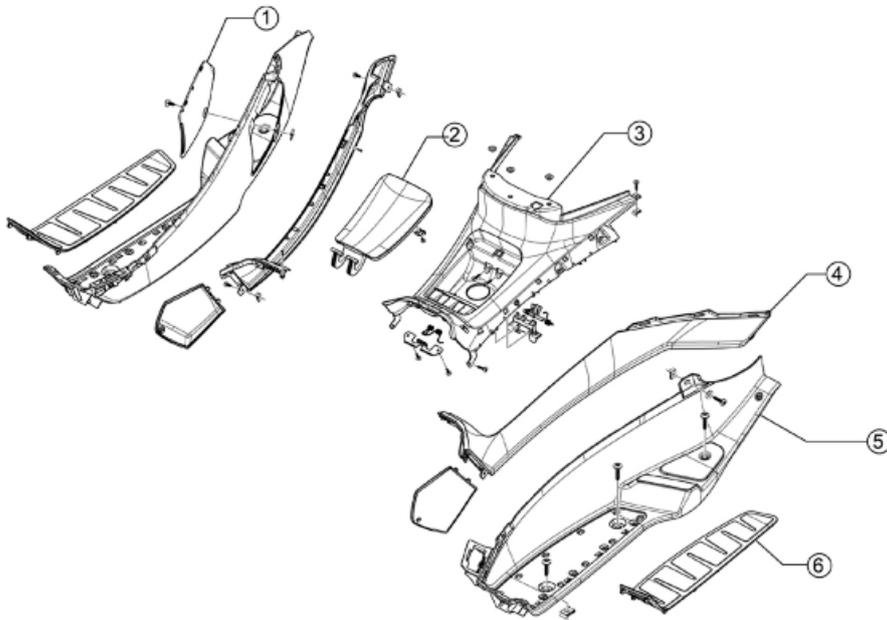
	Code	Action	Duration
1	004036	Lower chassis cover - Replacement	
2	004129	Rear fairing - Replacement	
3	004085	Fairing (1) - Replacement	
4	004068	Passenger handgrip - Replacement	
5	004037	Side aprons-Replacement	

Rear cover

**REAR SHIELD**

	Code	Action	Duration
1	004065	Front shield, rear part - Removal and refitting	

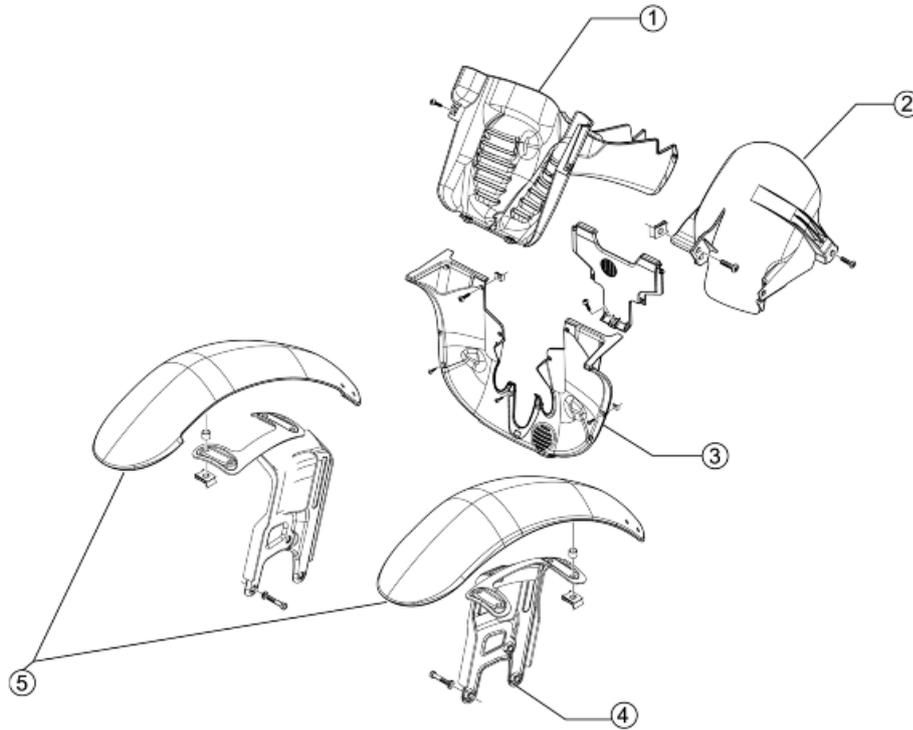
Central cover



CENTRAL COVER

	Code	Action	Duration
1	004059	Spark plug inspection flap - Replacement	
2	004135	Fuel tank lid - Replacement	
3	004011	Central chassis cover - Replacement	
4	004012	Rear fairings - Removal and refitting	
5	004015	Footrest - Removal and Refitting	
6	004075	Front mat - Replacement	

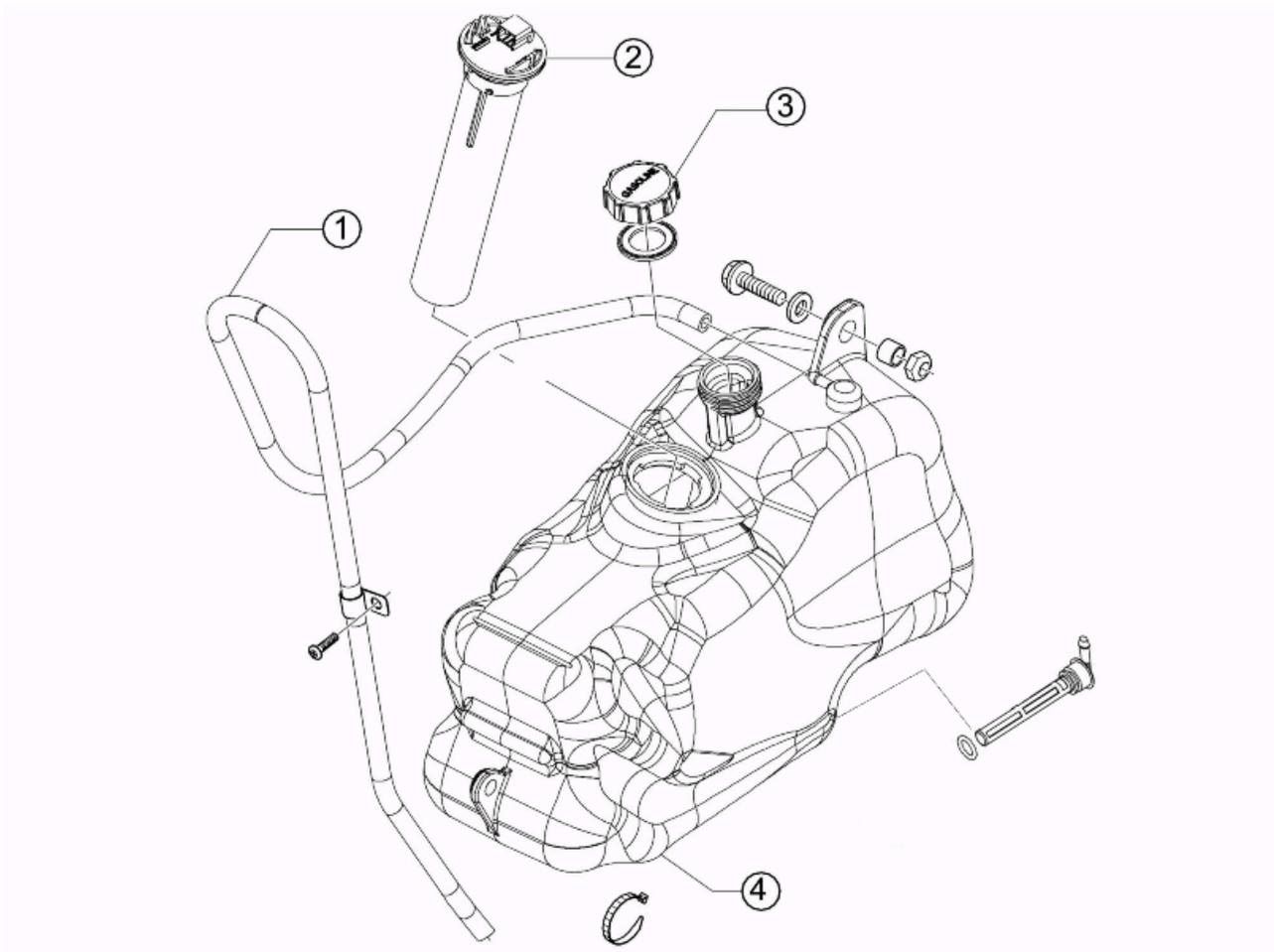
Mudguard



MUDGUARDS

	Code	Action	Duration
1	007015	Radiator air intake - Replacement	
2	004009	Rear mudguard - Replacement	
3	004181	Lower cover - Replacement	
4	004184	Front mudguard support - replacement	
5	004002	Front mudguard - Replacement	

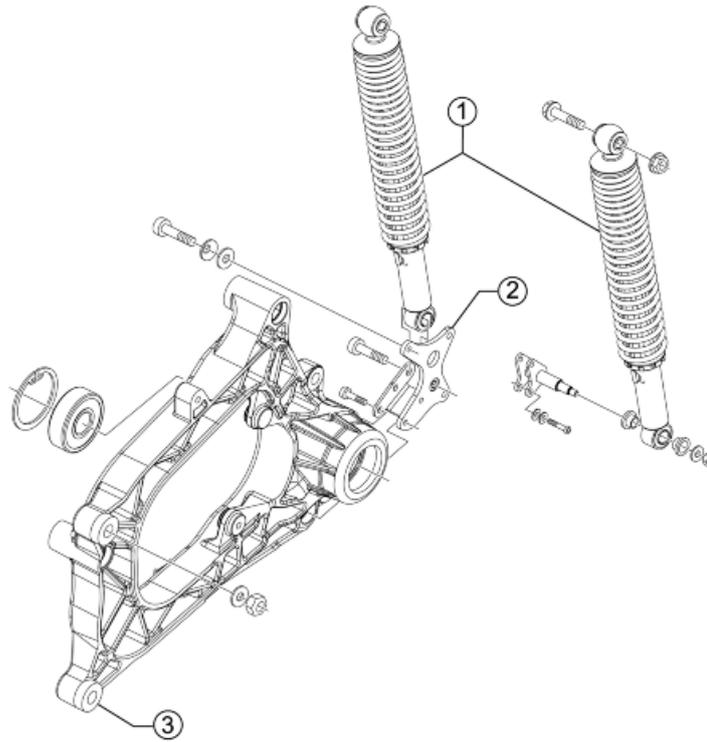
Fuel tank



FUEL TANK

	Code	Action	Duration
1	004137	Injector pump pipe - Replacement	
2	005010	Tank float - Replacement	
3	004168	Fuel tank cap - Replacement	
4	004005	Fuel tank - Replacement	

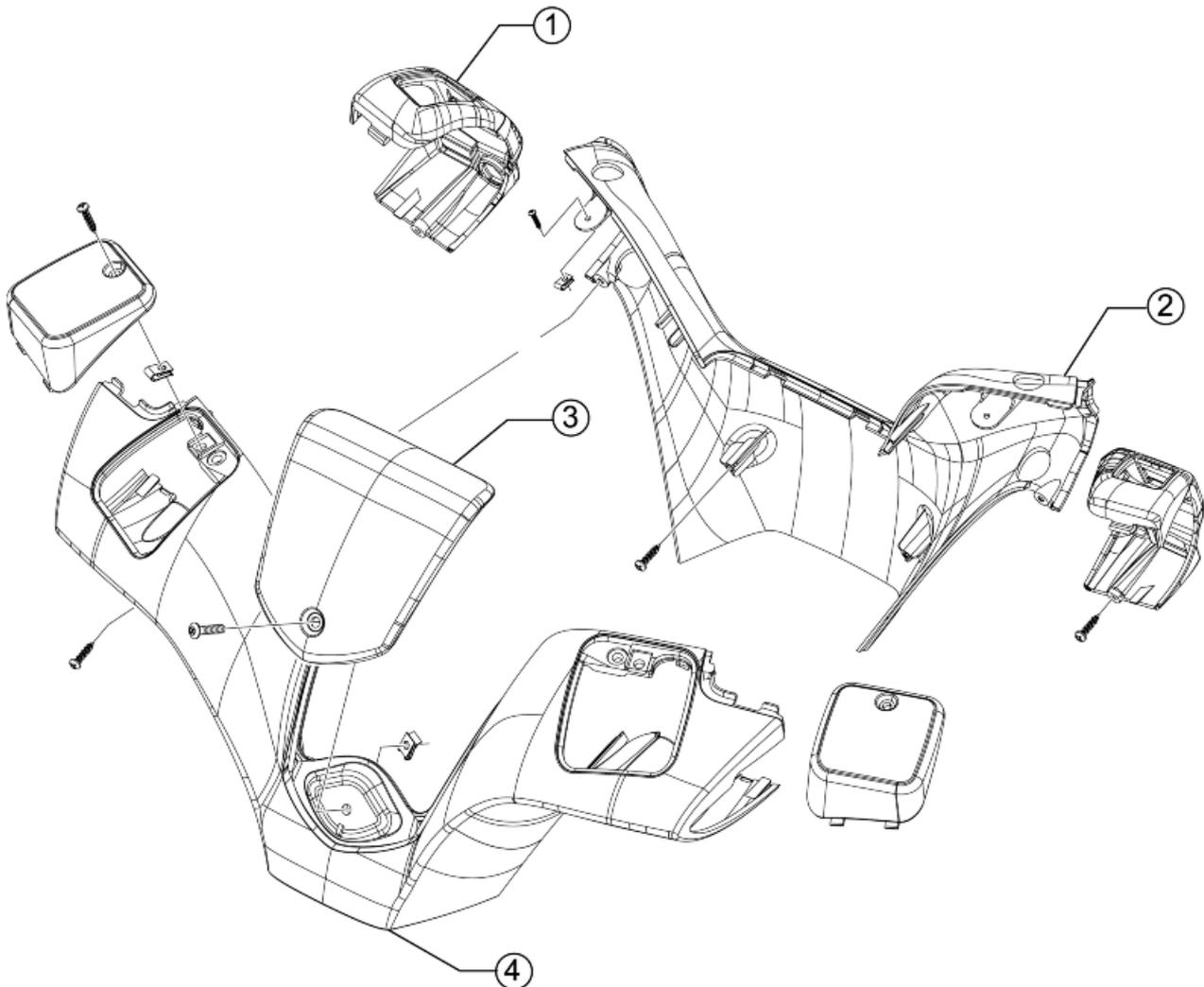
Rear shock-absorber



REAR SHOCK ABSORBERS

	Code	Action	Duration
1	003007	Rear shock absorber - Removal and Refitting	
2	003035	Shock absorber support and brake calliper - Replacement	
3	003077	muffler/rear shock absorber support arm - Service	

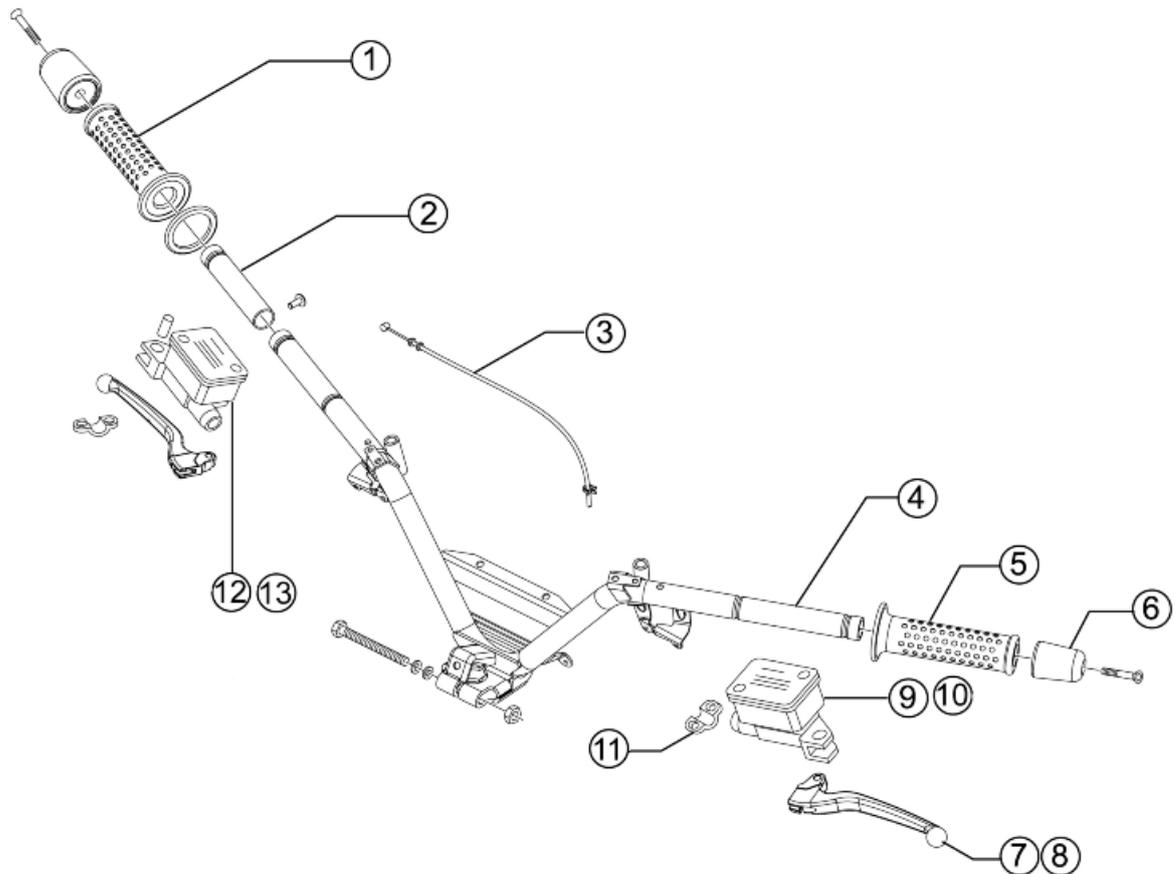
Handlebar covers



HANDLEBAR COVERS

	Code	Action	Duration
1	000307	RIGHT OR LEFT CONTROL ASSEMBLY REPLACEMENT	
2	004019	Rear handlebar cover - Replacement	
3	004026	Handlebar cover - Replacement	
4	004018	Front handlebar cover - Replacement	

Handlebar components

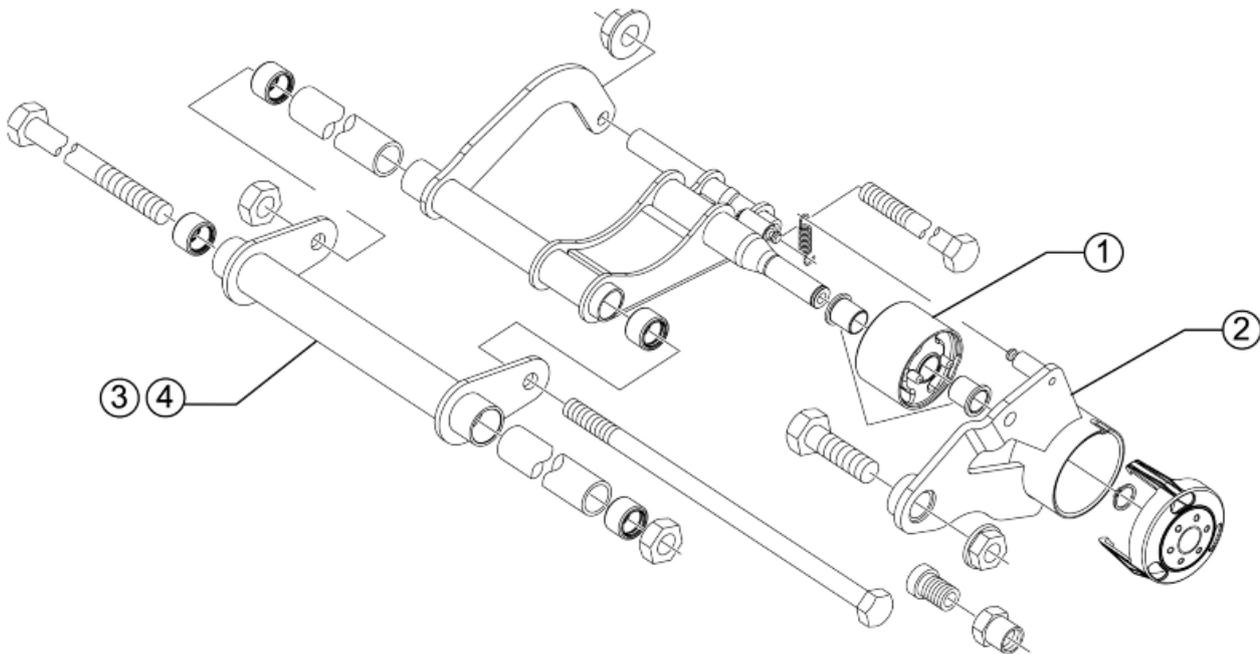


HANDLEBAR COMPONENTS

	Code	Action	Duration
1	002059	Right-hand knob - Replacement	
2	002060	Complete throttle control - Replacement	
3	002063	Throttle control transmission - Replacement	
4	003001	Handlebar - Replacement	
5	002071	Left knob - Replacement	
6	003059	Counterweight - Replacement	
7	002037	Brake lever - Replacement	
8	002048	Rear brake calliper - Replacement	
9	002067	Rear brake pump - Replacement	
10	002080	Rear brake oil bleeding system - Replacement	
11	004162	Mirror support and/or brake pump fitting U-bolt - Replacement	
12	002024	Front brake pump - replace	

	Code	Action	Duration
13	002047	Front brake fluid and air bleeding system - Replacement	

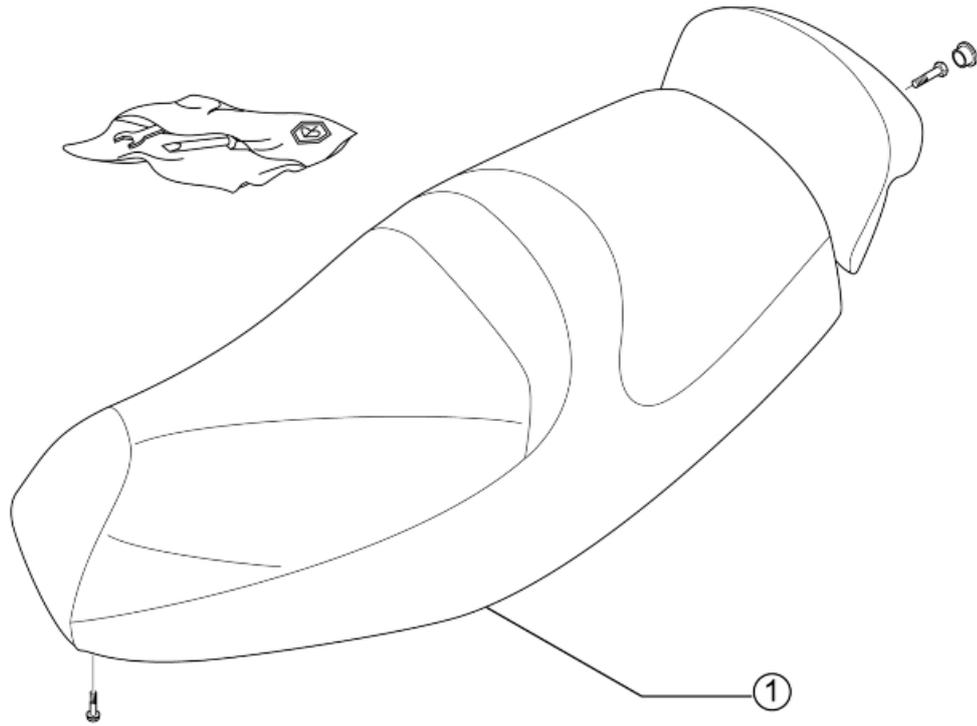
Swing-arm



SWINGING ARM

	Code	Action	Duration
1	004058	Silent block - Replacement	
2	003081	Swinging arm support flange - replace	
3	001072	Swinging arm - Engine-chassis connection - Replacement	
4	003080	Swinging arm on frame - Replacement	

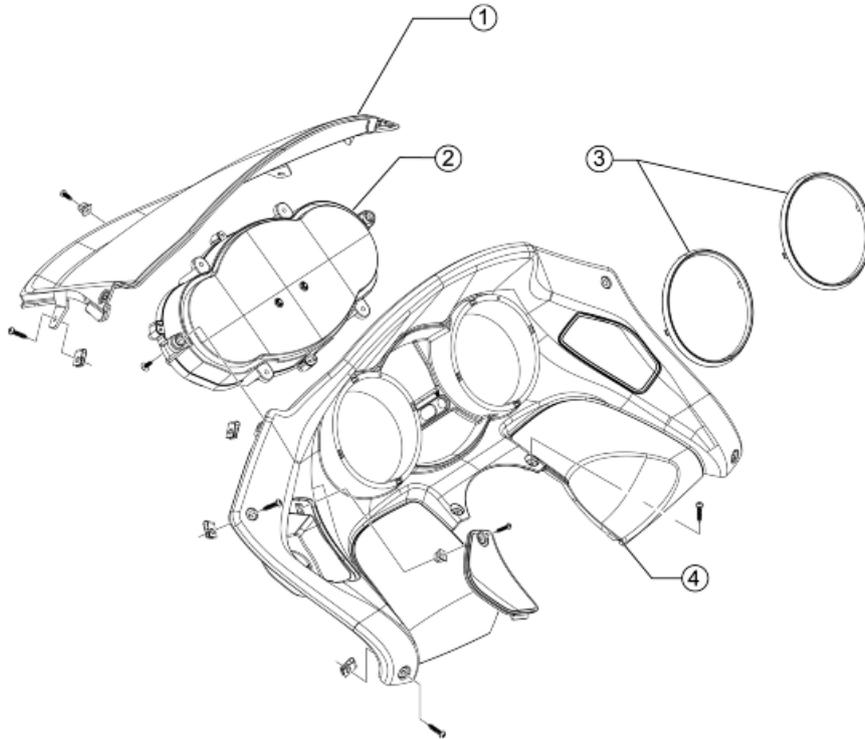
Seat



SADDLE

	Code	Action	Duration
1	004003	Saddle - Replacement	

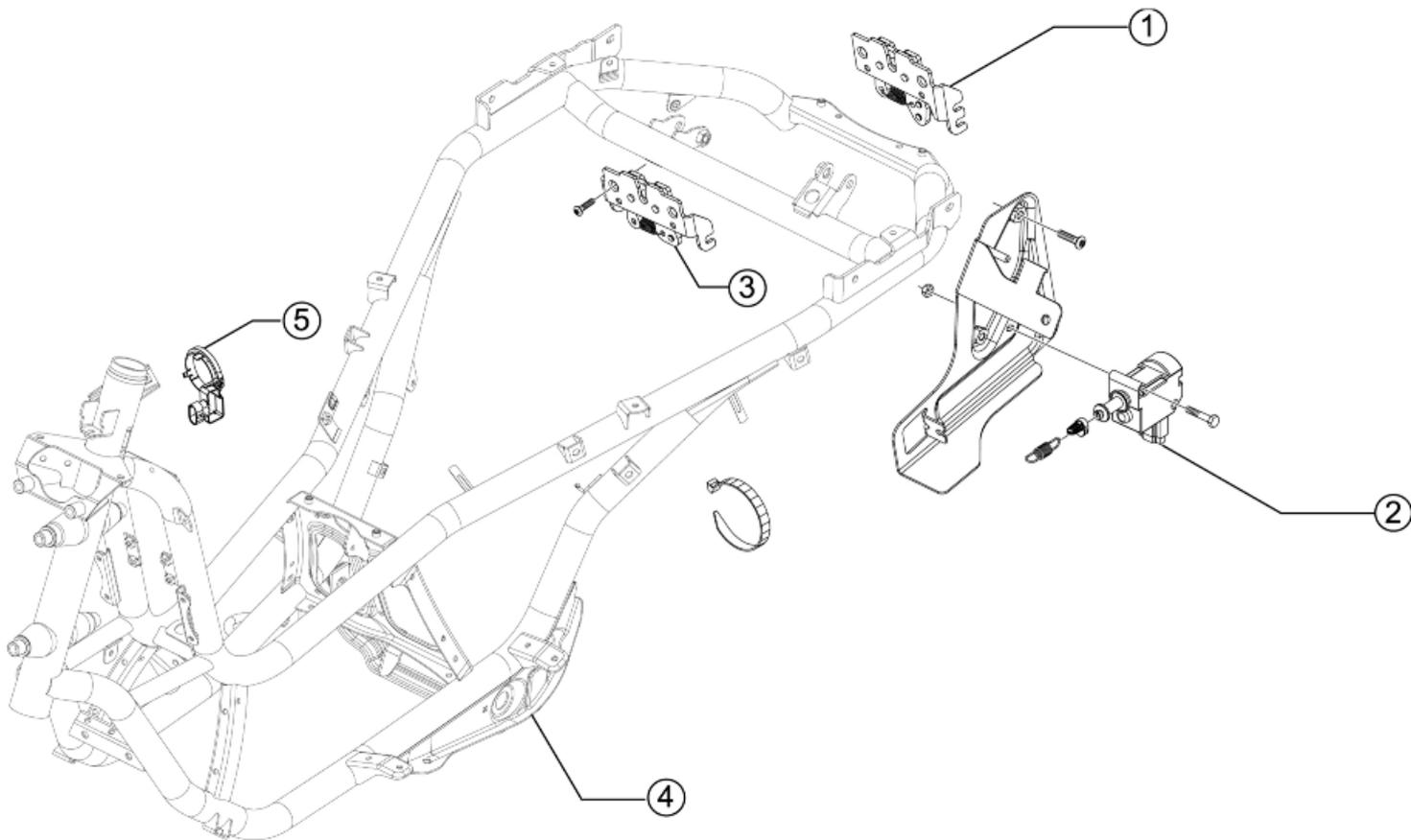
Instrument panel



INSTRUMENT PANEL

	Code	Action	Duration
1	004021	Shield upper section - Replacement	
2	005014	Odometer - Replacement	
3	004099	Odometer housing - Replacement	
4	004035	Instrument panel - Replacement	

Locks

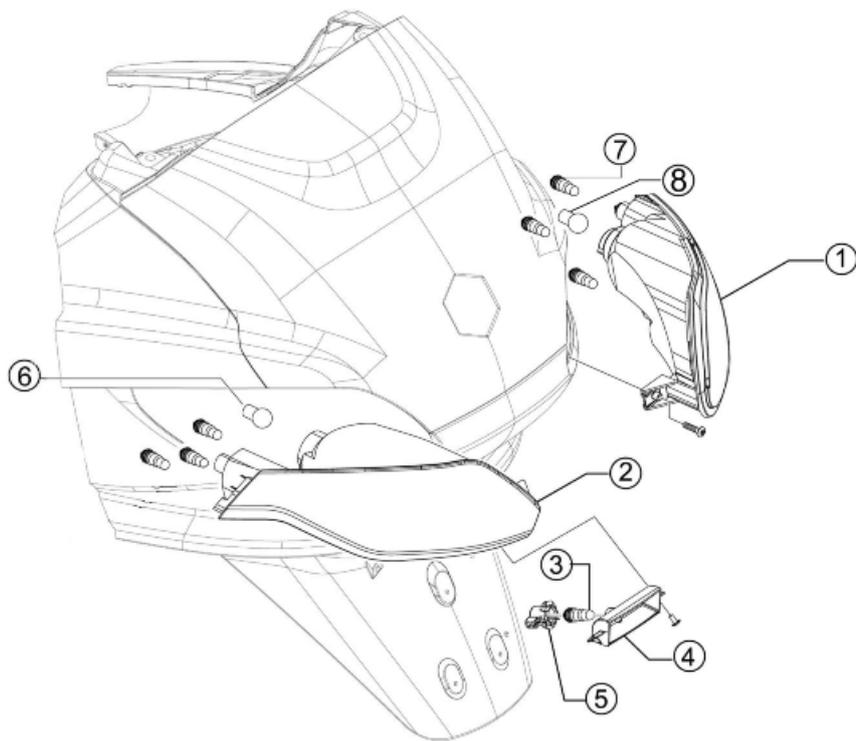


Locks

	Code	Action	Duration
1	004172	Rear case closure hook - Replacement	
2	005099	Electric saddle opening activator - Replacement	
3	004054	Saddle lock catch - Replacement	
4	004001	Chassis - Replacement	
5	005072	Immobilizer aerial - Replacement	

Turn signal lights

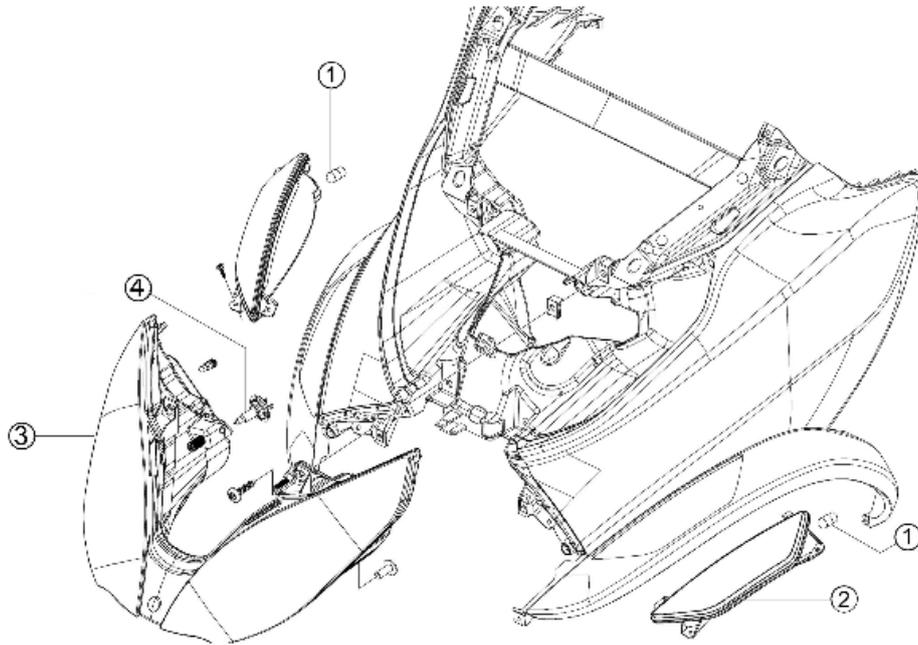
Rear lights



REAR TURN INDICATORS INDICATOR LIGHTS

	Code	Action	Duration
1	005005	Taillight - Replacement	
2	005022	Rear turn indicators - Replacement	
3	005031	Licence plate light bulb - Replacement	
4	005032	Licence plate light glass - Replacement	
5	005131	Licence plate light support - Replacement	
6	005066	Rear light bulbs - Replacement	
7	005068	Rear turn indicator bulb - Replacement	

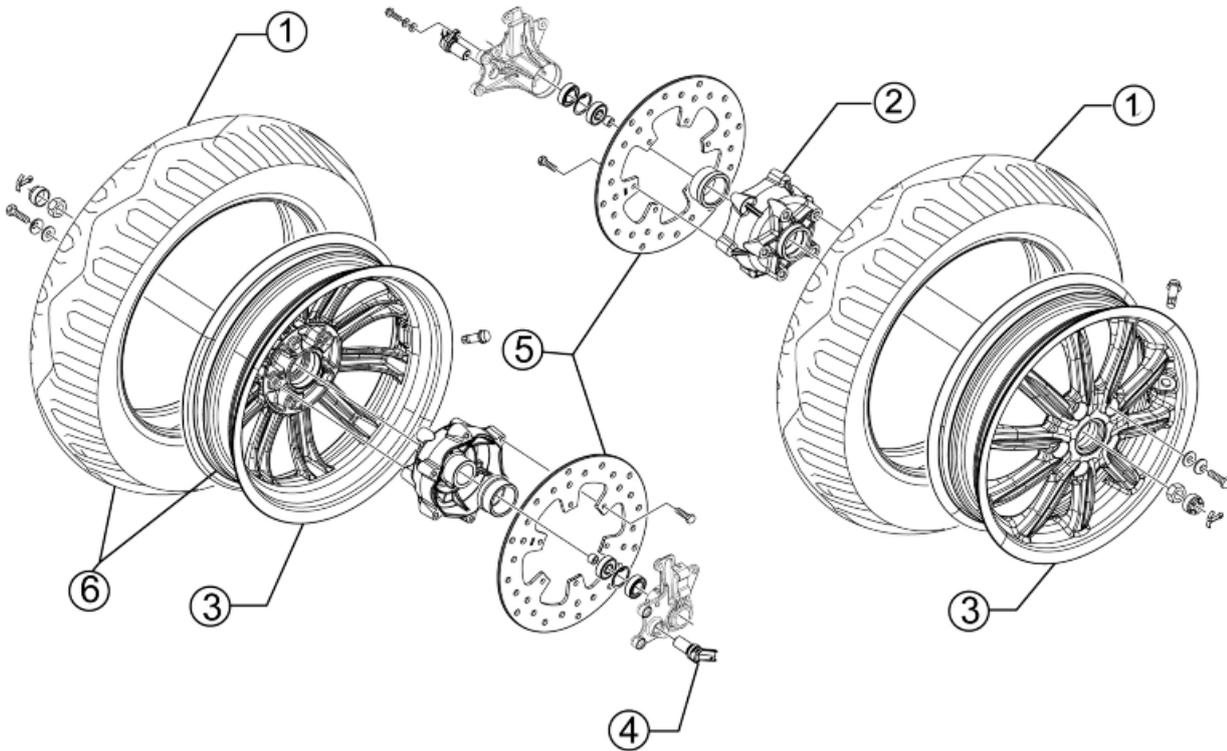
Front lights



FRONT TURN INDICATORS INDICATOR LIGHTS

	Code	Action	Duration
1	005067	Front turn indicator bulb - Replacement	
2	005012	Front turn indicators - Replacement	
3	005002	Front light - replacement	
4	005008	Headlight bulbs - Replacement	

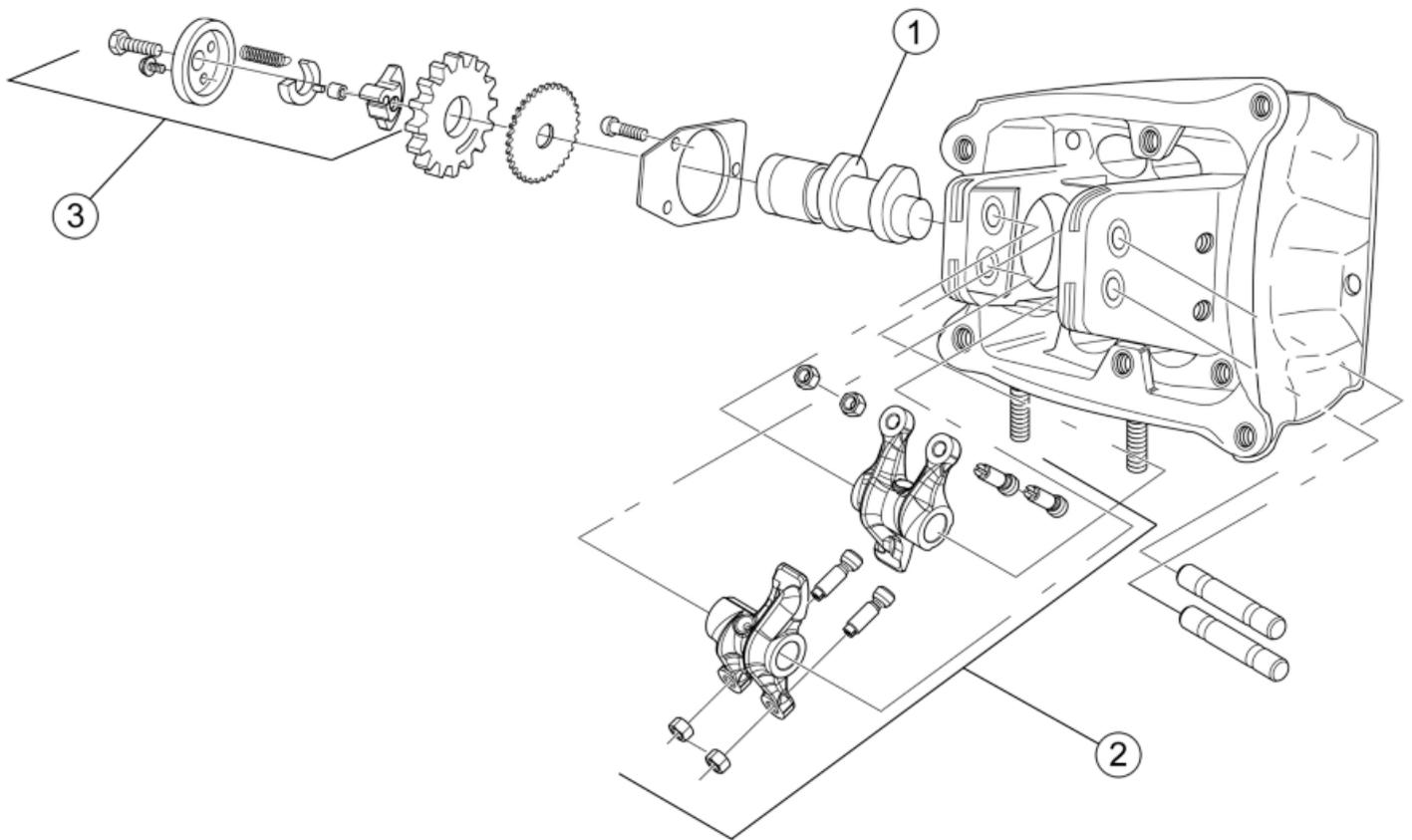
Front wheel



FRONT WHEELS

	Code	Action	Duration
1	003047	Front tyre - Replacement	
2	003033	Front wheel hub- Replacement	
3	003037	Front wheel rim- Replacement	
4	005089	Tone wheel - Replacement	
5	002041	Front brake disc - Replacement	
6	004123	Front wheel - Replacement	

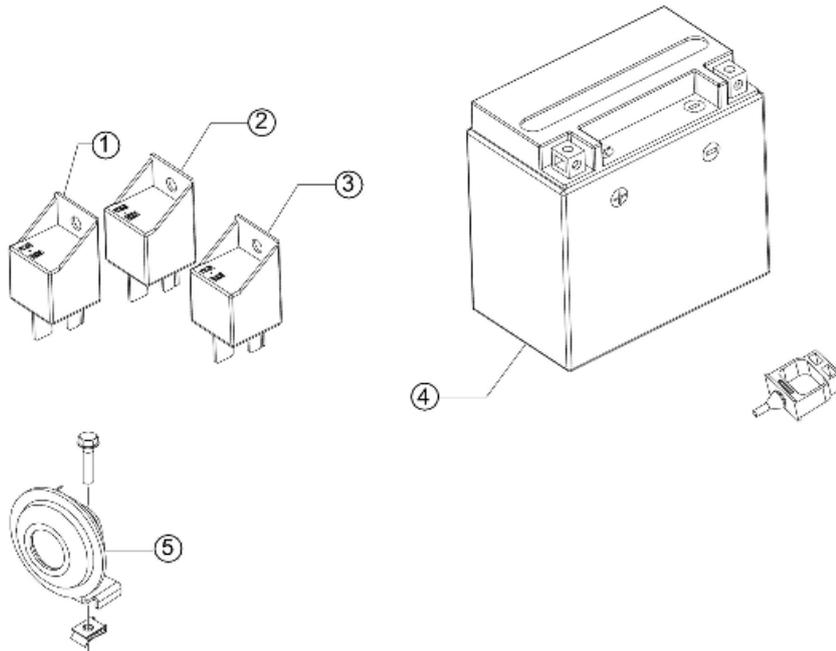
Rear wheel



REAR WHEEL

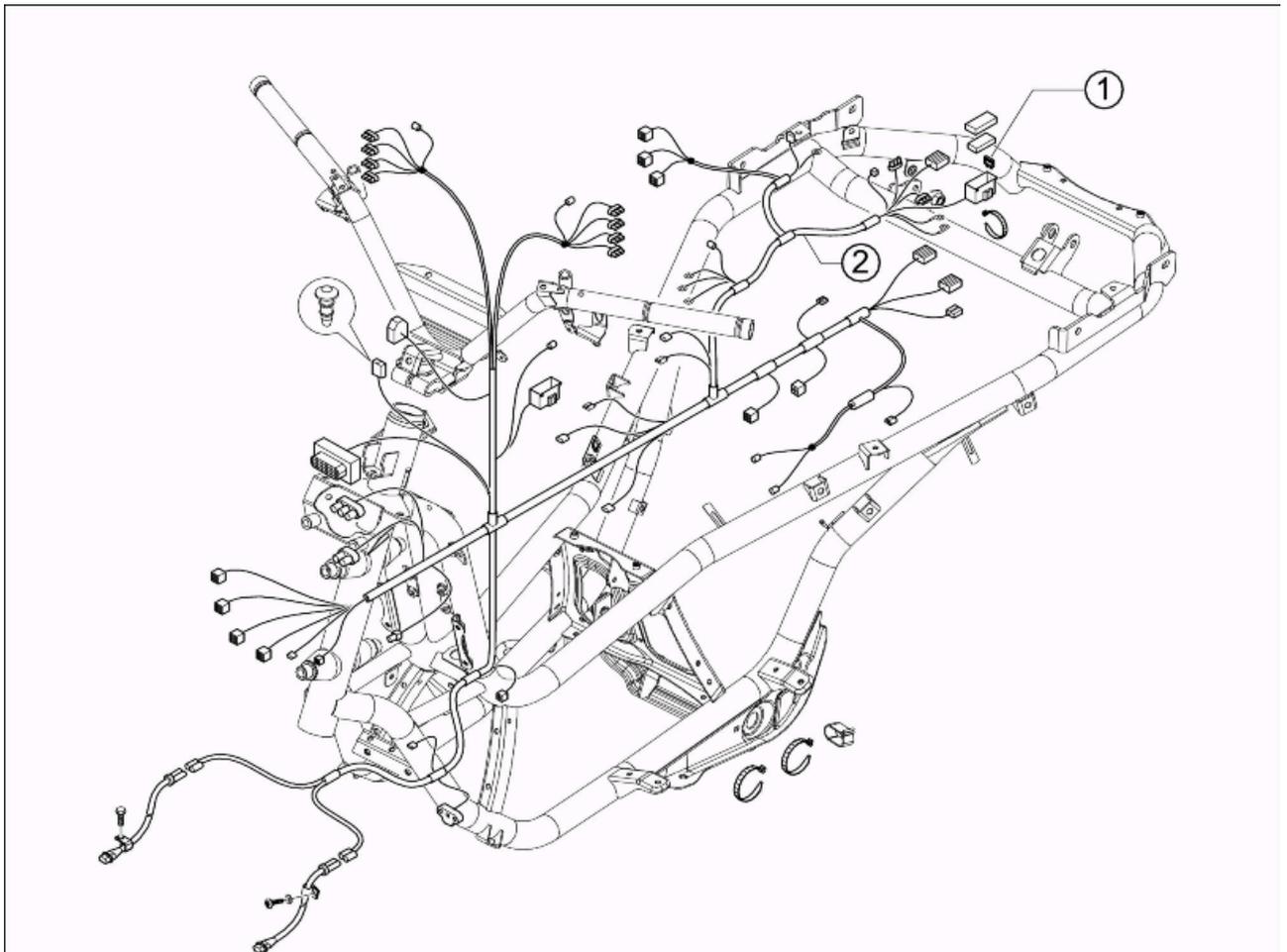
	Code	Action	Duration
1	002070	Rear brake disc - Replacement	
2	001016	Rear wheel - Replacement	
3	001071	Front wheel rim - Removal and refitting	
4	004126	Rear wheel tyre - Replacement	

Electric devices



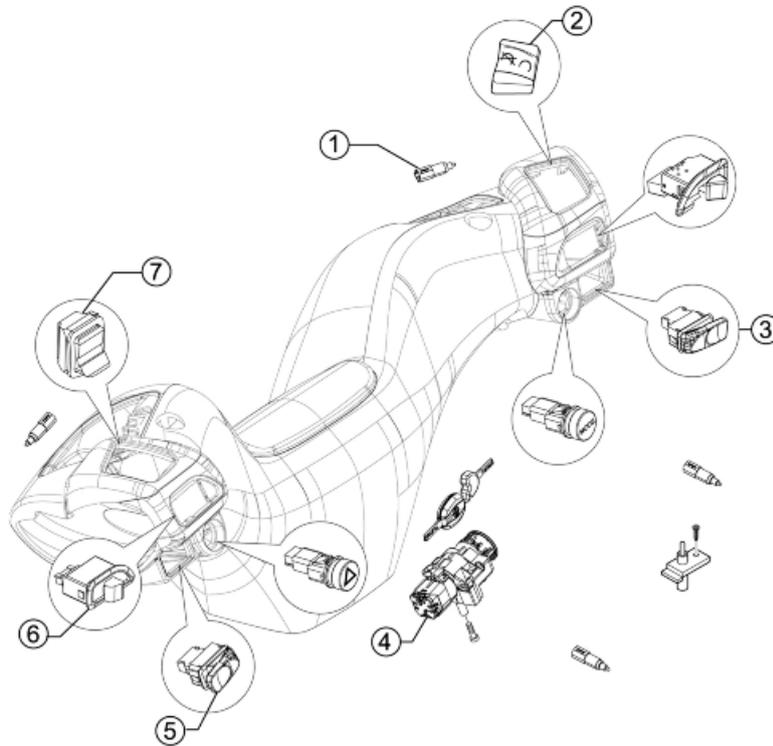
ELECTRICAL DEVICES

	Code	Action	Duration
1	005075	Stop remote control - Replacement	
2	005035	Headlight remote control - Replacement	
3	005011	Start-up remote control switch - Replacement	
4	005007	Battery - Replacement	
5	005003	Horn - Replacement	

**CABLE HARNESS**

	Code	Action	Duration
1	005001	Electrical system - Replacement	
2	005114	Electrical system - Service	

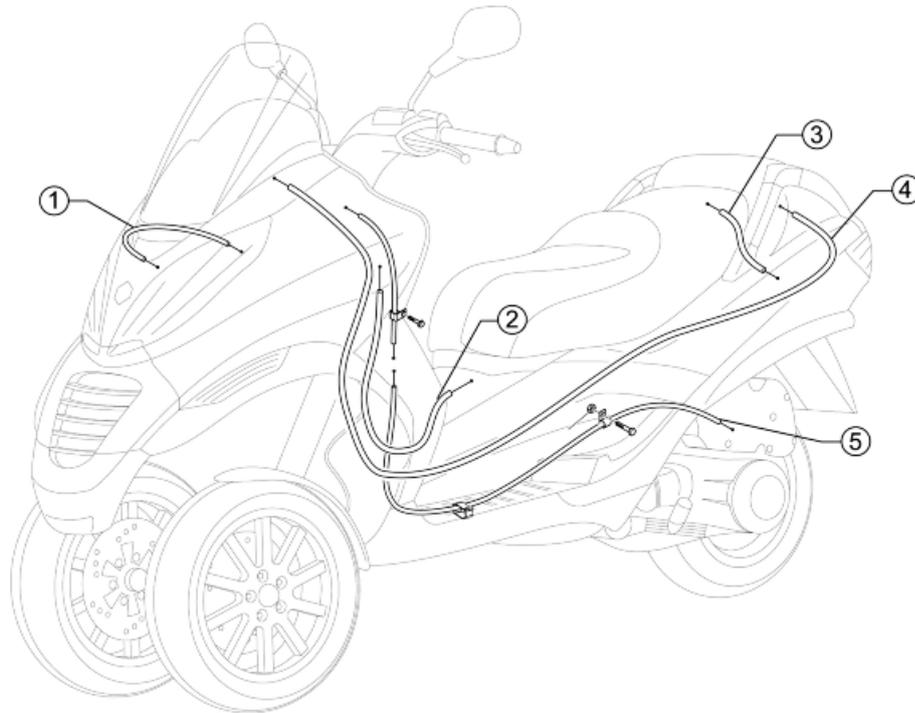
Electronic controls



HANDLEBAR CONTROLS

	Code	Action	Duration
1	005017	Stop switch - Replacement	
2	005077	Emergency stop switch - Replacement	
3	005041	Starter button - Replacement	
4	004010	Antitheft lock - Replacement	
5	005040	Horn button - Replacement	
6	005006	Light or turn indicator switch - Replacement	
7	005039	Headlight switch - Replacement	

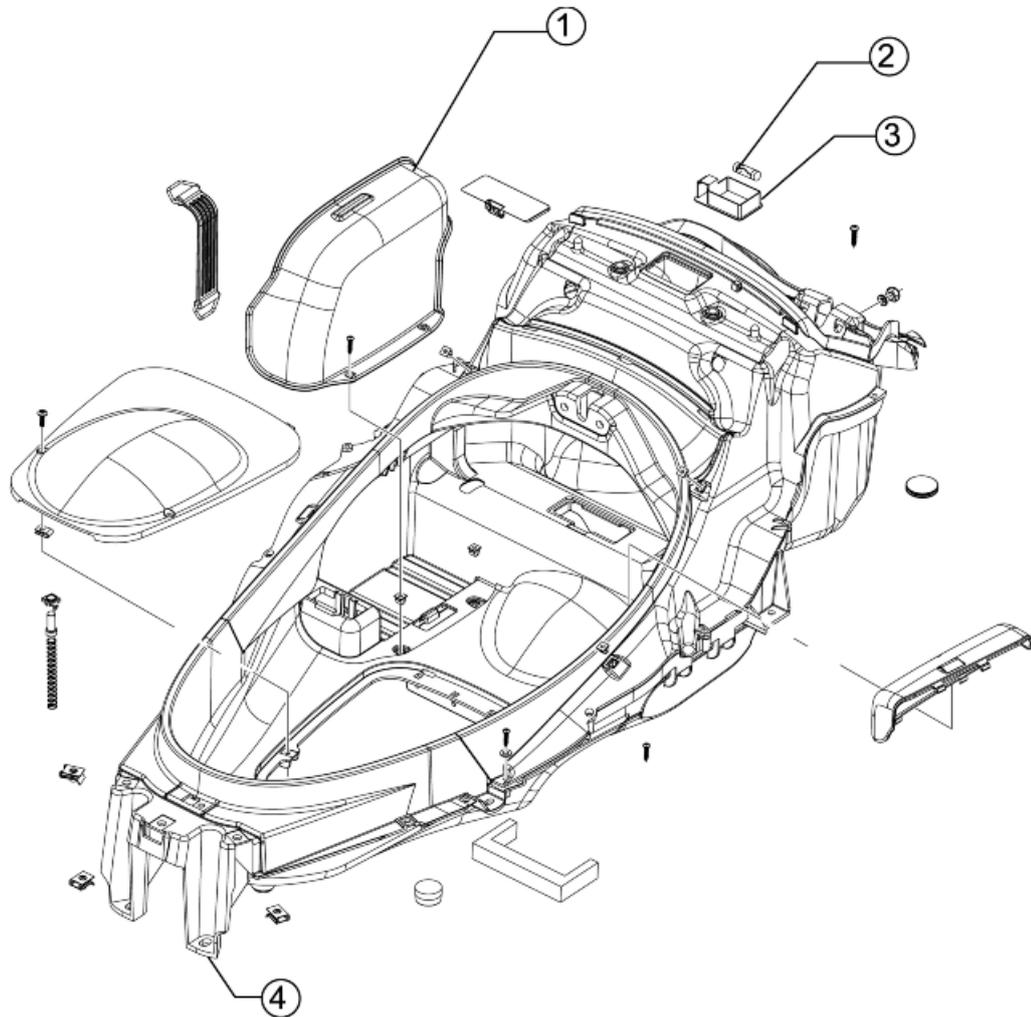
Transmissions



LOCKS TRANSMISSIONS

	Code	Action	Duration
1	003094	Tilt locking calliper control cable - replacement	
2	002082	Fuel tank cap opening drive - Replacement	
3	002083	Saddle opening transmission - Replacement	
4	002093	Trunk opening transmission - Replacement	
5	003061	Accelerator transmission - Adjustment	

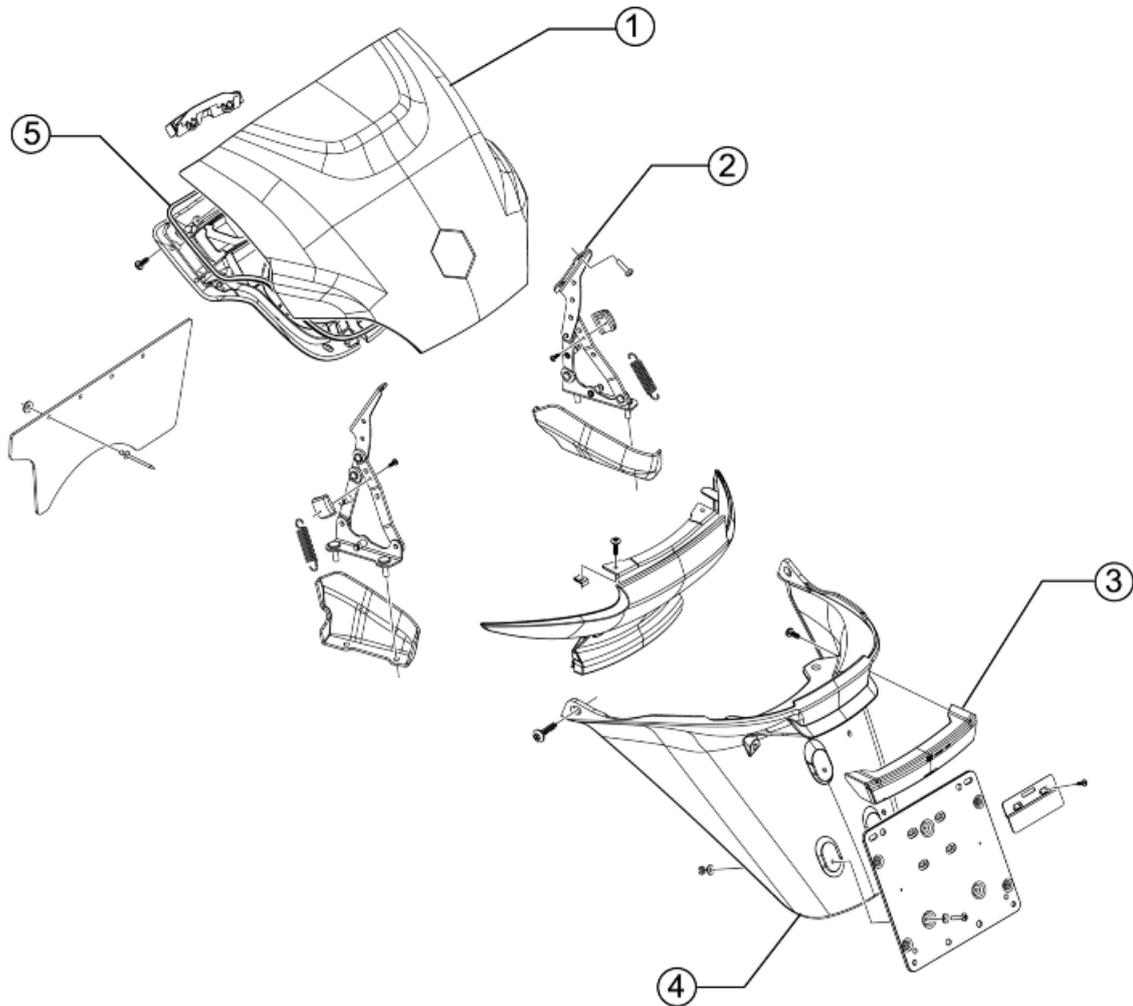
Helmet bay



HELMET COMPARTMENT

	Code	Action	Duration
1	005046	Battery cover - change	
2	005026	Helmet compartment light - Replacement	
3	005027	Helmet compartment bulb support - Replacement	
4	004016	Helmet compartment - Replacement	

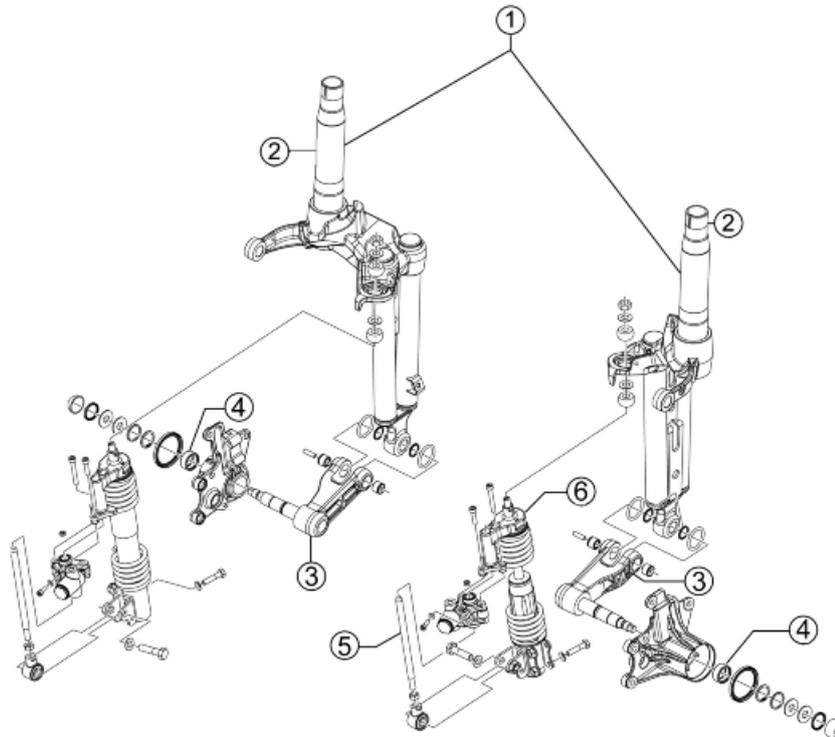
Rear side fairings



REAR COVERS

	Code	Action	Duration
1	004081	Glove box door - Replacement	
2	004174	Trunk leverage	
3	004141	Cat's eye - Replacement	
4	005048	Licence plate holder - Replacement	
5	004082	Trunk gasket - Replacement	

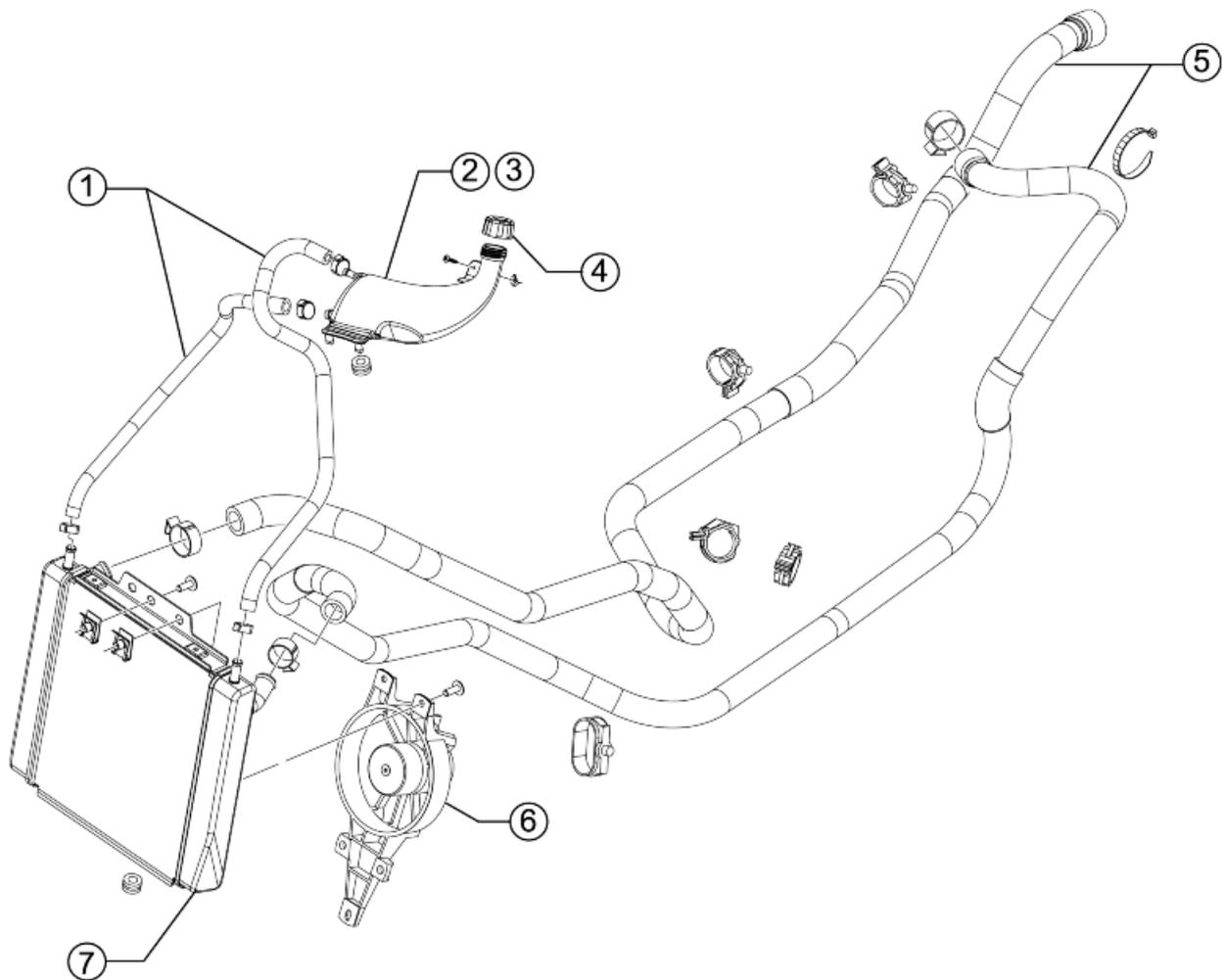
Front suspension



FRONT SUSPENSION

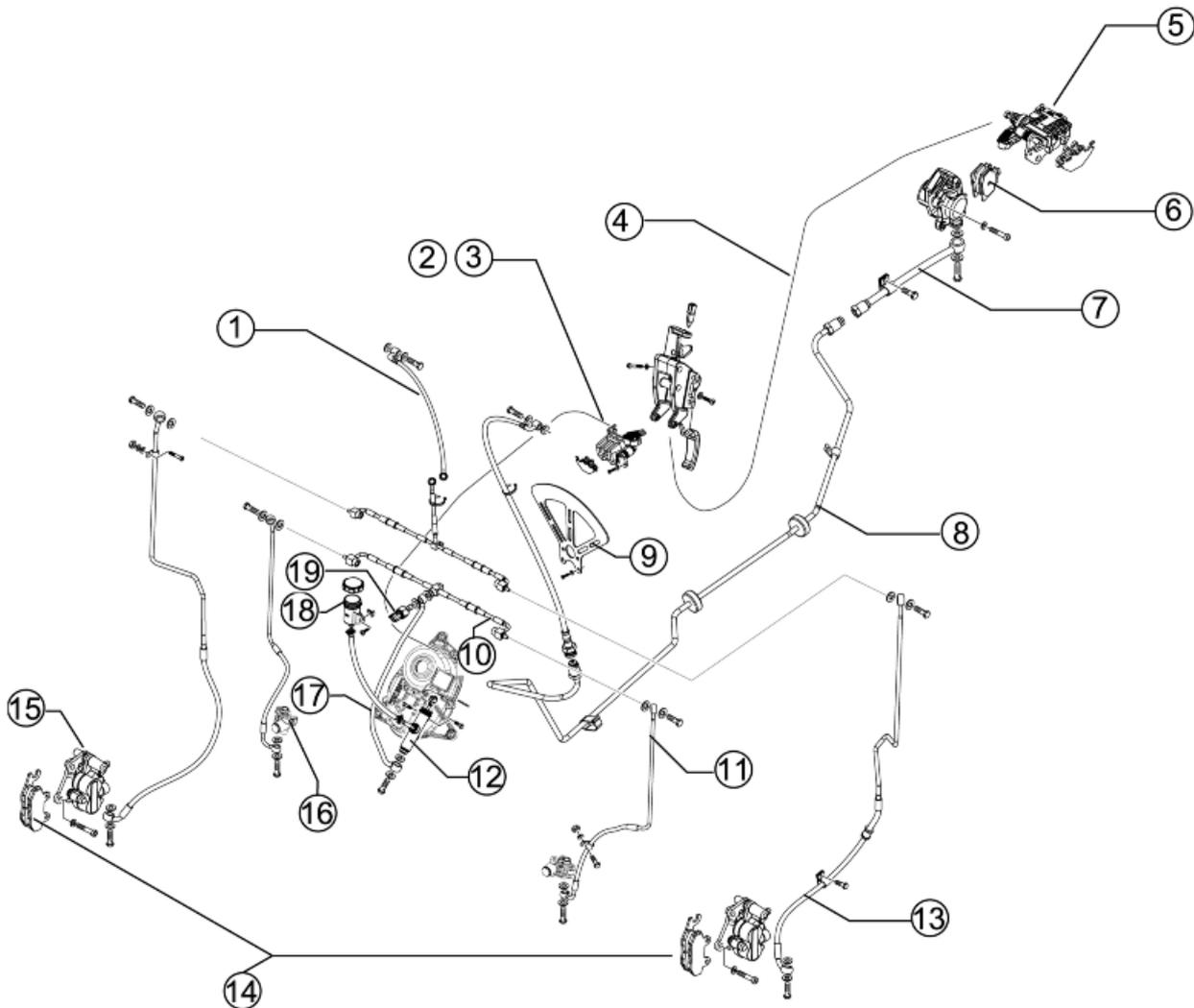
	Code	Action	Duration
1	003010	Front suspension - Service	
2	003111	Side steering tube - replacement	
3	003038	Front wheel axle - Removal and Refit.	
4	003040	Front wheel bearings - Replacement	
5	003107	Sliding stems - replacement	
6	003113	Front shock absorber - replacement	

Cooling system



COOLING SYSTEM			
	Code	Action	Duration
1	007013	Expansion tank - radiator connection pipe - Replacement	
2	001052	Coolant and air bleed - Replacement	
3	007001	Expansion tank - Replacement	
4	007024	Expansion tank cap - Replacement	
5	007003	Coolant delivery and return pipe - Replacement	
6	007016	Fan with support - Replacement	
7	007002	Water radiator - replacement	

Braking system

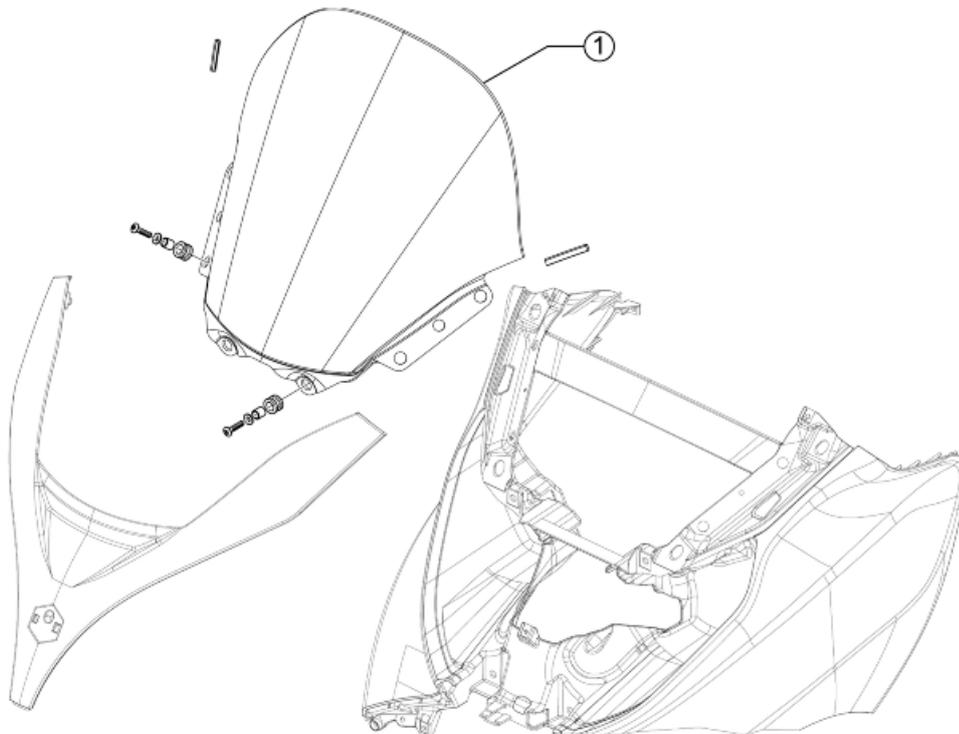


BRAKE SYSTEM

	Code	Action	Duration
1	002025	Brake piping - Replacement	
2	003096	Tilt locking calliper- replacement	
3	003100	Tilt locking calliper pads - replacement	
4	003108	Parking brake flexible transmission - replacement	
5	003109	Parking brake mechanical calliper - replacement	
6	002002	Shoes - Rear brake pads - Replacement	
7	002020	Rear brake pipes - Removal and refitting	
8	002081	Rear brake disc piping - Replacement	
9	003118	Tilt locking disc section - replacement	

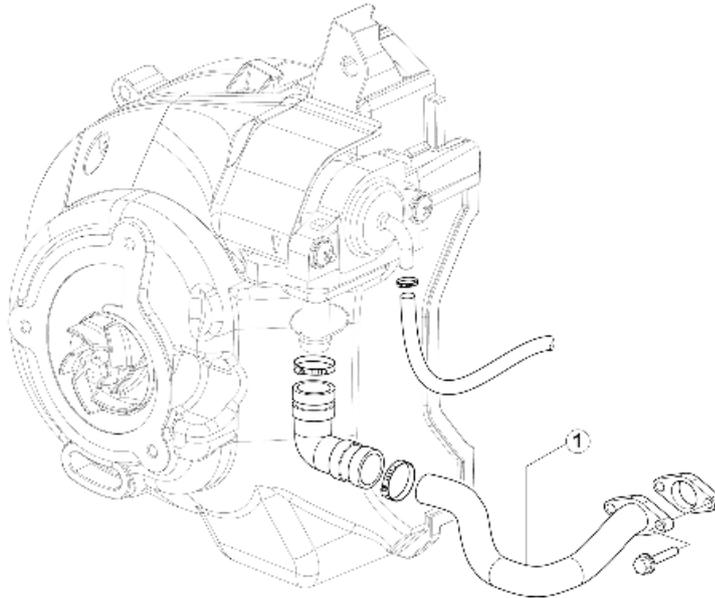
	Code	Action	Duration
10	003103	Splitter for suspension locking system hoses- replacement	
11	003102	Hoses for the splitter-calliper suspension locking system - replacement	
12	003088	Tilt locking hydraulic pump - replacement	
13	002021	Front brake piping - Replacement	
14	002007	Front brake pads - Replacement	
15	002039	Front brake calliper - Replacement	
16	003104	Suspension system locking calliper- replacement	
17	003119	Hoses for the pump-splitter suspension locking system - replacement	
18	003105	Suspension locking system brake fluid - repl.	
19	003106	Suspension locking system pressure sensor-Replacement	

Windscreen



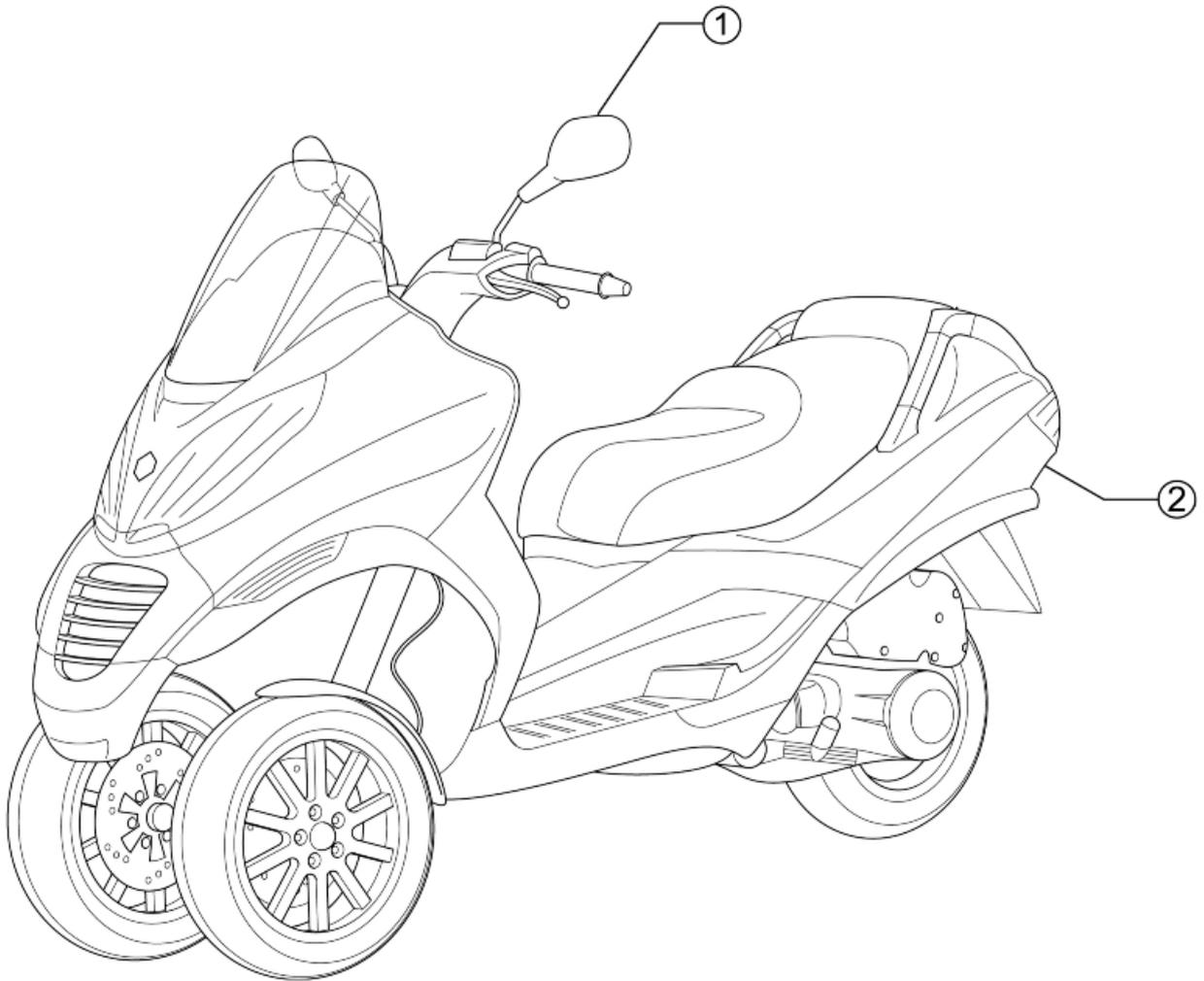
WINDSHIELD

	Code	Action	Duration
1	004101	Windshield - Replacement	

Secondary air box**SECONDARY AIR HOUSING**

	Code	Action	Duration
1	001163	SAS valve / Head connection - Replacement	

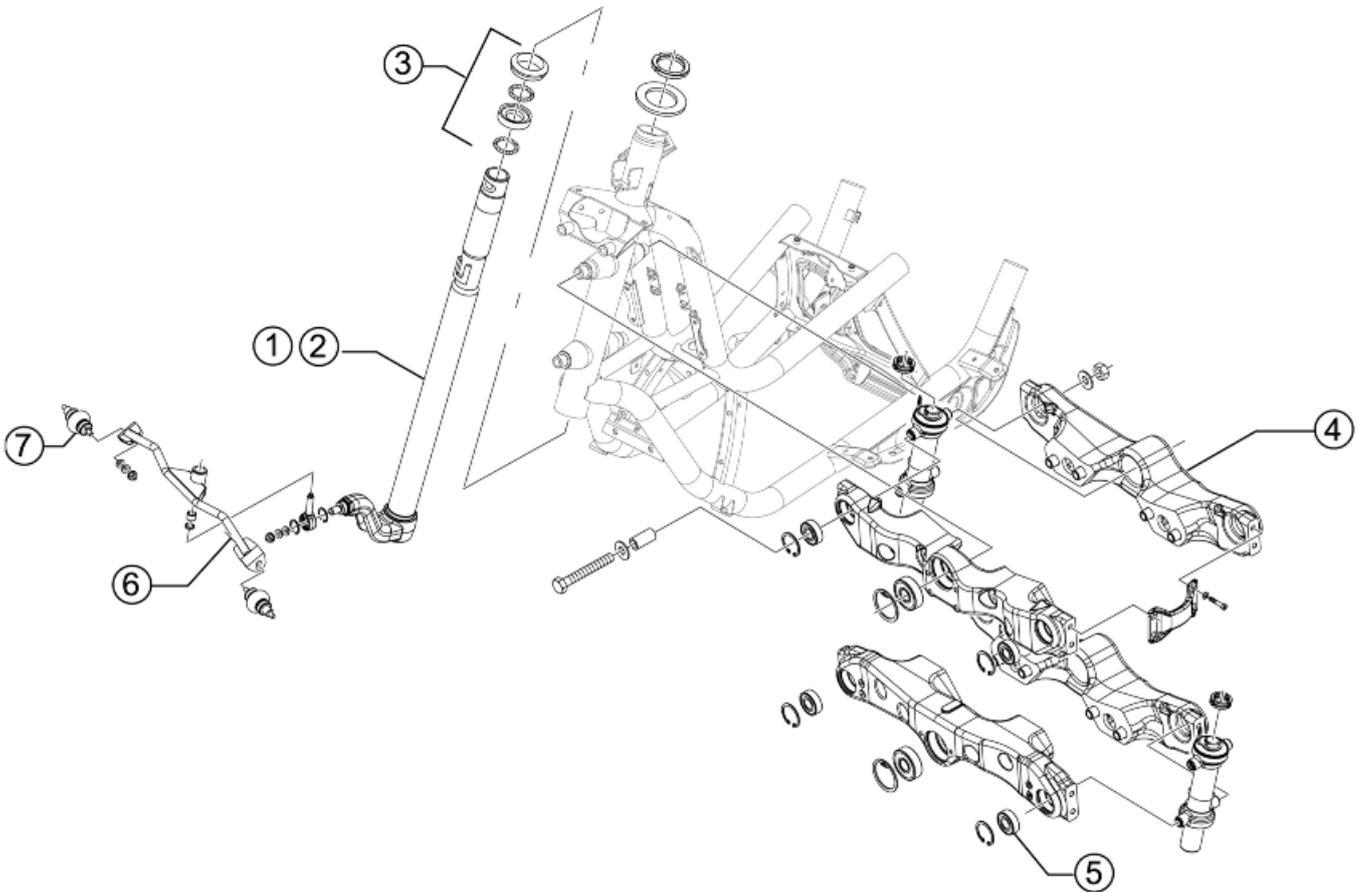
Stickers



TRANSFERS

	Code	Action	Duration
1	004066	Rear-view mirror - Replacement	
2	004159	Plates / Stickers - Replacement	

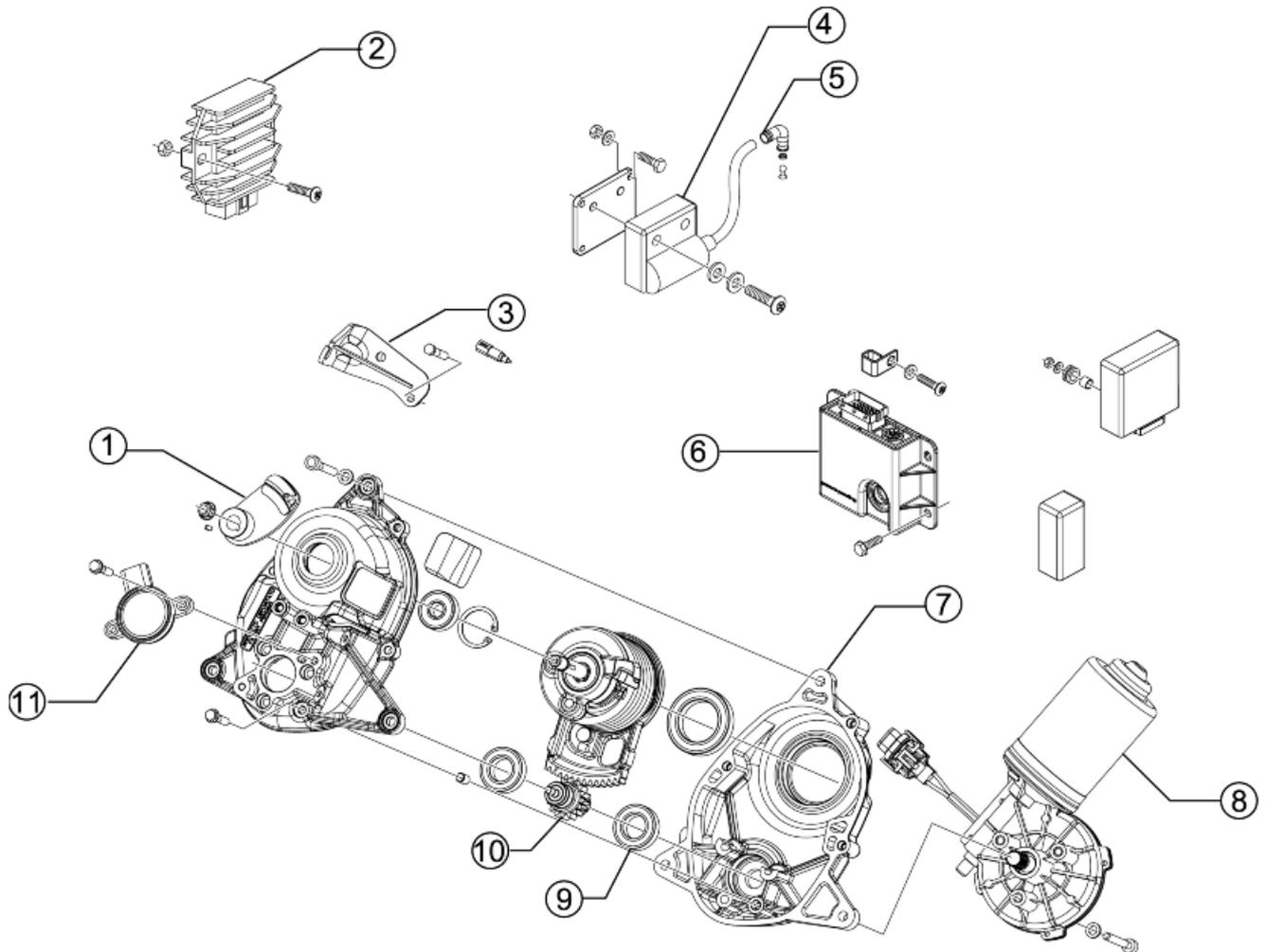
The tilt mechanism



TILT MECHANISM

	Code	Action	Duration
1	003073	Steering clearance - Adjust-ment	
2	003112	Central steering tube - re- placement	
3	003002	Steering fifth wheel - Re- placement	
4	003115	Parallelogram arms - re- placement	
5	003114	Parallelogram bearings - re- placement	
6	003116	Steering rod - replacement	
7	003117	Constant-velocity universal joint - replacement	

Geared motor



GEARED MOTOR

	Code	Action	Duration
1	003101	Tilt locking calliper control lever - replacement	
2	005009	Voltage regulator - replace	
3	003095	Tilt locking calliper support bracket - replacement	
4	001069	HV coil - replace	
5	001094	Spark plug cap - Replacement	
6	003120	Tilt locking control unit - replacement	
7	003093	Geared motor crankcase - replacement	
8	003090	Geared electric motor - replacement	
9	003092	Geared motor bearings - replacement	
10	003091	Geared motor pinion - replacement	

	Code	Action	Duration
11	003089	Geared motor potentiometer - replacement	
