
WORKSHOP MANUAL

618126



X8 125-200



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Not all versions shown in this publication are available in all countries. The availability of single models should be checked at the official Piaggio sales network.

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

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WORKSHOP MANUAL

X8 125-200

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

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

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

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



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



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



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



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INDEX OF TOPICS

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

Vehicle identification

Version 125

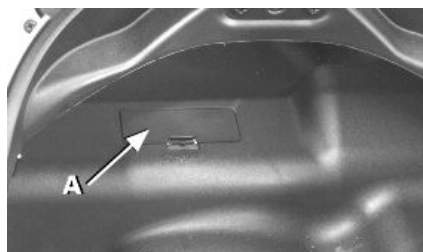
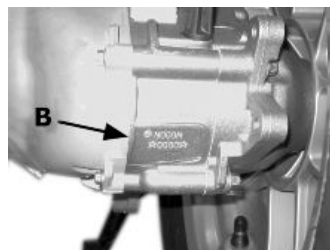
Chassis prefix: ZAPM36300 ÷ 1001

Engine prefix: M363M

Version 200

Chassis prefix: ZAPM36200 ÷ 1001

Engine prefix: M362M



Dimensions and mass

DIMENSIONS AND WEIGHT

Specification	Desc./Quantity
Dry weight	157 kg
Wheelbase	1490 mm
Height	1370 mm
Overall length	2050 mm
Width (handlebar)	760 mm

Engine

DATA 125

Specification	Desc./Quantity
Version	125
Engine	Single-cylinder, four-stroke
Bore x stroke	57 x 48.6 mm
Cubic capacity	124 cm ³
Compression ratio	12 : 1
ignition advance (before TDC)	10° at 2000 rpm - 34° at 6000 rpm
Walbro carburettor	WVF 7G* Ø 29
Carburettor Keihin	CVEK-30
Spark plug	CHAMPION RG 4 HC
Maximum speed	105 km/h
Timing system: 125	Single overhead camshaft driven by chain on left side, three-arm rockers with threaded adjuster.
Valve clearance: intake 125	0,10 mm
Valve clearance: exhaust 125	0,15 mm
Air filter 125	sponge soaked in 50 percent petrol-oil mixture.
Starting system 125	electric starter with Bendix gear
Lubrication 125	lubrication with chain driven lobe pump in crankcase, mesh strainer and cartridge filter.
Fuel supply	Petrol (unleaded, with minimum octane rating of 95) through carburettor
Engine - wheel ratio 125	Long: 1/9,1
Engine - wheel ratio 125	Short: 1/30,36

** The identification letter can vary every time the carburettor is up-dated.*

DATA 200

Specification	Desc./Quantity
Version	200 cc
Engine	single-cylinder, four-stroke
Raffreddamento	A liquido
Bore x stroke	72 x 48.6 mm
Cubic capacity	198 cm ³
Compression ratio	11.5 :1
ignition advance (before TDC)	10° ± 1° at 2000 rpm - 32° ± 1° at 6500 rpm
Walbro carburettor	WVF 7H* Ø 29
Carburettor Keihin	CVEK-30
Spark plug	CHAMPION RG 6 YC
Valve clearance: intake 200	0,10 mm
Valve clearance: exhaust 200	0,15 mm
Timing system 200	Single overhead camshaft driven by chain on left side, three-arm rockers with threaded adjuster.
Air filter 200	sponge soaked in 50 percent petrol-oil mixture.
Starter System 200cc	Electric starter motor with bendix-type drive-gear and torque-limiter
Lubrication 200	lubrication with chain driven lobe pump in crankcase, mesh strainer and cartridge filter.
Power supply 200	Fuel (minimum octane number 95, leadless), with vacuum pump and by carburettor

** The identification letter can vary every time the carburettor is up-dated.*

Transmission**TRANSMISSIONS**

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

Capacities**CAPACITY**

Specification	Desc./Quantity
Engine oil	~ 1000 cc (recommended oil: Selenia HI Scooter 4 Tech)
Fuel tank (including a ~ 2 l reserve)	~ 9.5 l
Rear hub	150 cc (recommended oil: TUTELA ZC 90)
Cooling system fluid	approx. 2.100 ÷ 2.150 l PARAFLU 11FE (Diluted)

Electrical system**ELECTRICAL COMPONENTS - 125cc VERSION**

Specification	Desc./Quantity
Generator 125	Three-phase alternating current
Battery 125	12V-12Ah
Spark plug	NGKCR8EB
Ignition type 125	Electronic capacitive discharge ignition (CDI) and variable advance, with separate HV coil.
variable ignition advance (before T.D.C.) 125	10°±1° at 2000 rpm - 34°±1° at 6000 rpm

ELECTRICAL COMPONENTS 200

Specification	Desc./Quantity
Generator	Three-phase alternating current
Battery	12V-12Ah
Spark plug 200	Champion RG6YC
Ignition type	Electronic capacitive discharge ignition (CDI) and variable advance, with separate HV coil.
variable ignition advance (before T.D.C.) 200	10°±1 at 2000 rpm - 32°±1 at 6500 rpm

Frame and suspensions**FRAME AND SUSPENSIONS**

Specification	Desc./Quantity
Chassis	Tubular and steel sheets.
Front suspension	Hydraulic telescopic fork with Ø 35 mm stem
Rear suspension	Single arm with two double-acting hydraulic shock absorbers and preloading adjustment in 4 positions.

Brakes**BRAKES**

Specification	Desc./Quantity
Front brake	Ø 260 disc brake (left-hand side of vehicle), with hydraulic control operated from the right-hand brake lever on the handlebar.
Rear brake	Ø 240-mm disc brake with hydraulic control activated by handlebar left-side lever.

Wheels and tyres**WHEELS AND TYRES**

Specification	Desc./Quantity
Front wheel	alloy rim: 14" x 3.50
Front tyre	Without inner tube: 120/70-14" 55P
Rear wheel	alloy rim: 12"x3.50
Rear tyre	Without inner tube: 130/70-12" 62P

TYRE PRESSURE

Specification	Desc./Quantity
Front wheel pressure (basic model)	Front wheel inflation pressure (basic model): 2.0 bar
Front wheel pressure (model with accessories)	Front tyre inflation pressure (model with accessories): 2.3 bar
Rear tyre pressure - rider	Rear tyre pressure (rider only): 2.2 bar
Rear tyre pressure (rider and passenger):	2.6 bar

Carburettor**125cc Version**

Kehin

KEHIN CVEK-30 CARBURETTOR

Specification	Desc./Quantity
Depression carburettor	CVEK-30
Body stamping	CVEK
Stamping	303A
Max. jet	105
Minimum jet	38
Max. air jet	70
Minimum air jet	130
Throttle valve spring	100 ÷ 160 g
Minimum mixture set screw initial opening	2 ± ¼
Tapered pin stamping	NDVA
Tapered pin notches position from top	Fixed position
Diffuser nozzle	Ø 2.8
Starter air jet	Ø 1.5 (body)
Starter diffuser nozzle	Ø 1.5 (body)
Starter jet	42
Starter device resistance	~ 20 Ω (at 24°)
Diffuser	Ø 29

N.B.

* THE IDENTIFICATION LETTER MAY VARY WITH EACH CARBURETTOR UPDATE.

Walbro

CARBURETTOR WALBRO WVF-7R

Specification	Desc./Quantity
Depression type	WVF-7R*
Printing on the body	7R1
Max jet printing	100
Max jet	103
Minimum jet	38
Max air jet	60
Minimum air jet	110
Throttle valve spring	100 g
Idle mixture adjustment screw initial opening	2 7/8 ± 1/2
Conical pin printing	653
Conical pin notches position from top	2
Diffuser nozzle	Ø 2.7
Starter air jet	200
Starter diffuser jet	130
Starter jet	48
Starter device resistance	~ 40 Ω
Venturi diffuser	Ø 29 (30.3x27)

N.B.

* THE IDENTIFICATION LETTER MAY VARY WITH EACH CARBURETTOR UPDATE.

200cc Version

Kehin

CARBURETTOR KEIHIN CVEK-30

Specification	Desc./Quantity
Depression carburettor	CVEK-30
Body stamping	CVEK
Stamping	303A

Specification	Desc./Quantity
Max. jet	100
Minimum jet	38
Max. air jet	70
Minimum air jet	115
Throttle valve spring	150 ÷ 250 g
Minimum mixture adjustment screw initial opening	2 ½ ± ¼
Tapered pin stamping	NDWA
Tapered pin notches position from top	Fixed position
Diffuser nozzle	Ø 2.8
Starter air jet	Ø 1.5 (body)
Starter diffuser jet	Ø 1.2
Starter jet	42
Starter device resistance	~ 20 Ω (at 24°)
Diffuser	Ø 29

N.B.

THE IDENTIFICATION LETTER CAN VARY WITH EACH CARBURETTOR UPDATE

Walbro

CARBURETTOR WALBRO WVF-7S

Specification	Desc./Quantity
Depression type	WVF-7S*
Printing on the body	7S
Max jet printing	118
Max. jet	105
Minimum jet	34
Max. air jet	150
Minimum air jet	31
Throttle valve spring	120 g
Minimum mixture set screw initial opening	3 ± 1/4
Tapered pin stamping	465
Tapered pin notches position from top	3
Diffuser nozzle	Ø 2.7
Starter air jet	200
Starter diffuser jet	130
Starter jet	50
Diffuser	Ø 29 (30.3x27.0)

N.B.

THE IDENTIFICATION LETTER CAN VARY WITH EACH CARBURETTOR UPDATE

Tightening Torques

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

FRONT BRAKE

Name	Torque in Nm
Oil bleed screw	8 ÷ 12

Name	Torque in Nm
Disc tightening screw (°)	5 ÷ 6.5
Brake fluid tube-calliper fitting	20 ÷ 25
Brake fluid pump-hose fitting	16 ÷ 20
Tightening screw for calliper support to the fork	20 ÷ 25
Screw tightening calliper to the support	42 ÷ 52

REAR SUSPENSION

Name	Torque in Nm
Upper shock absorber clamp	33 ÷ 41
Lower shock absorber clamp	33 ÷ 41
Shock absorber-crankcase attachment bracket	20 ÷ 25
Rear wheel axle	104 ÷ 126
Muffler arm clamping screws	27 ÷ 30

FRONT SUSPENSION

Name	Torque in Nm
Fork leg screw	6 ÷ 7
Front wheel axle	45 ÷ 50
Fork plate screw	25 ÷ 34

CHASSIS

Name	Torque in Nm
Centre stand bolt	25 ÷ 30
Side stand bolt (°)	35 ÷ 40
Engine arm bolt - frame arm	33 ÷ 41
Swinging arm buffer nut	64 ÷ 72
Frame-swinging arm bolt	64 - 72
Engine-swinging arm bolt	64 - 72

CHASSIS

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

STEERING

Name	Torque in Nm
Upper steering ring nut	30 ÷ 33
Steering lower ring nut	10 ÷ 13 then loosen by 90°
Handlebar fixing screw	50 ÷ 55
Fixing screws for the handlebar control unit U-bolts	7 ÷ 10

ENGINE - COOLING

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

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 - 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

Name	Torque in Nm
Screw fixing freewheel to flywheel	13 ÷ 15

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 - 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
Timing chain tensioner central screw	5 ÷ 6
Timing chain tensioner support screw	11 ÷ 13
Start up counterweight 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

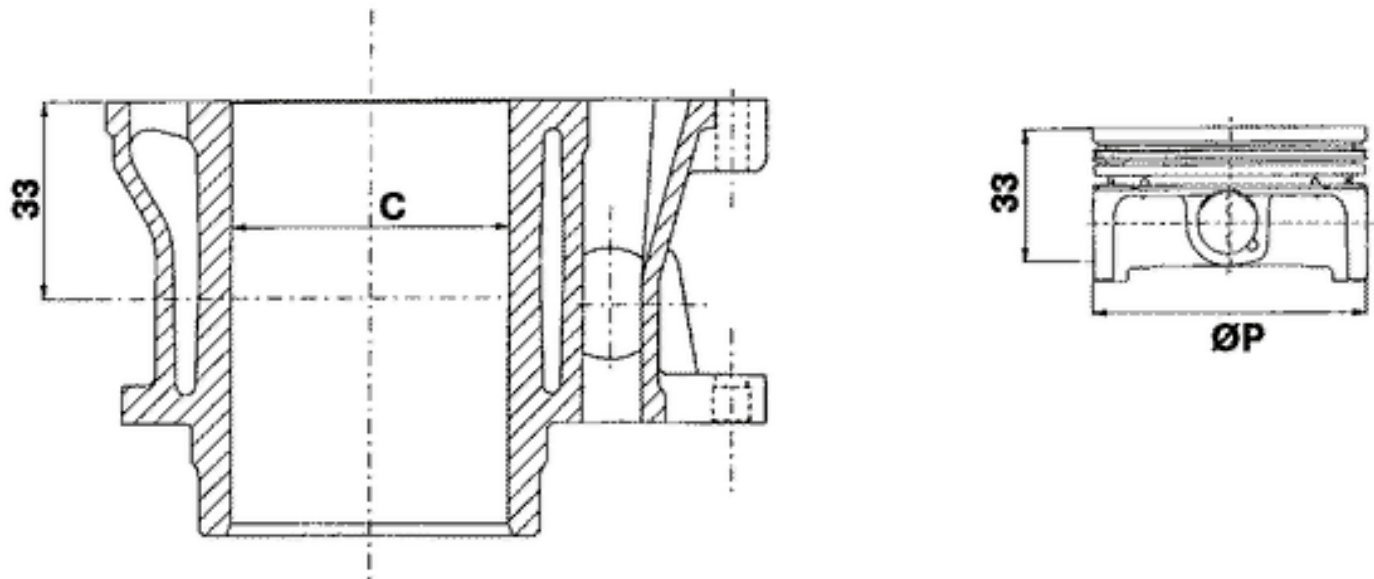
LUBRICATION

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 crankcase	5 - 6
Oil pump command crown screw	10 ÷ 14
Oil pump cover plate screws	4 ÷ 6
Oil sump screws	10 ÷ 14
Minimum oil pressure sensor	12 ÷ 14

Overhaul data

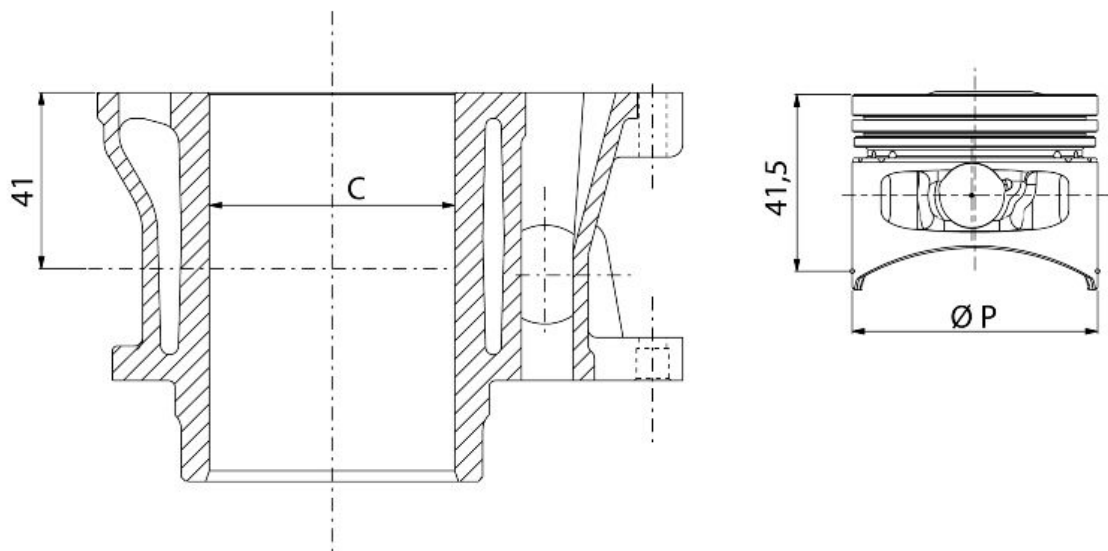
Assembly clearances

Cylinder - piston assy.



ENGINE 200 COUPLING CATEGORIES

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



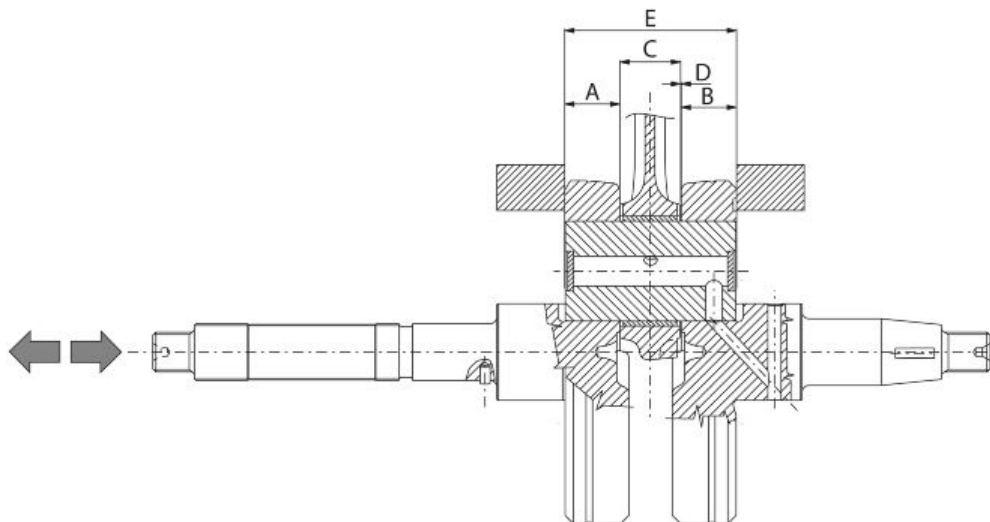
ENGINE 125 COUPLING CATEGORIES

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 Oversize	A1	57.197 ÷ 57.204	57.145 ÷ 57.152	0.045 - 0.059
Cylinder 1st Oversize	B 1	57.204 ÷ 57.211	57.152 ÷ 57.159	0.045 - 0.059
Piston 1st Oversize	C 1	57.211 ÷ 57.218	57.159 ÷ 57.166	0.045 - 0.059
Piston 1st Oversize	D 1	57.218 ÷ 57.225	57.166 ÷ 57.173	0.045 - 0.059
Cylinder 2nd Oversize	A2	57.397 ÷ 57.404	57.345 ÷ 57.352	0.045 - 0.059
Cylinder 2nd Oversize	B 2	57.404 ÷ 57.411	57.352 ÷ 57.359	0.045 - 0.059
Piston 2nd Oversize	C 2	57.411 ÷ 57.418	57.359 ÷ 57.366	0.045 - 0.059
Piston 2nd Oversize	D 2	57.418 ÷ 57.425	57.366 ÷ 57.373	0.045 - 0.059
Cylinder 3rd Oversize	A 3	57.597 ÷ 57.604	57.545 ÷ 57.552	0.045 - 0.059
Cylinder 3rd Oversize	B 3	57.604 ÷ 57.611	57.552 ÷ 57.559	0.045 - 0.059
Piston 3rd Oversize	C 3	57.611 ÷ 57.618	57.559 ÷ 57.566	0.045 - 0.059
Piston 3rd Oversize	D 3	57.618 ÷ 57.625	57.566 ÷ 57.573	0.045 - 0.059

Crankcase - crankshaft - connecting rod**CRANKSHAFT**

Titolo	Durata/Valore	Testo Breve (< 4000 car.)	Indirizzo Immagine
Crankshaft		Crankshaft to connecting rod axial clearance	

Crankshaft to connecting rod axial clearance

**CRANKSHAFT/ CRANKCASE AXIAL CLEARANCE**

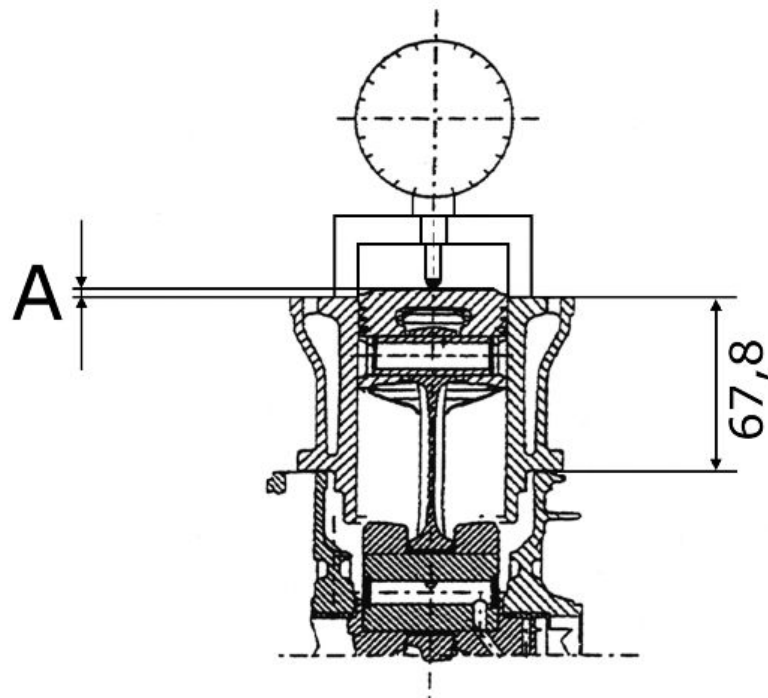
Name	Description	Dimensions	Initials	Quantity
Half-shaft, transmission side		16,6 +0-0,05	A	D = 0.20 ÷ 0.50
Flywheel-side half shaft		16,6 +0-0,05	B	D = 0.20 ÷ 0.50
Connecting rod		18 -0.10 -0.15	C	D = 0.20 ÷ 0.50
Spacer tool		51.4 +0.05	E	D = 0.20 ÷ 0.50

Slot packing system

Characteristic

Compression ratio, 125 models

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.

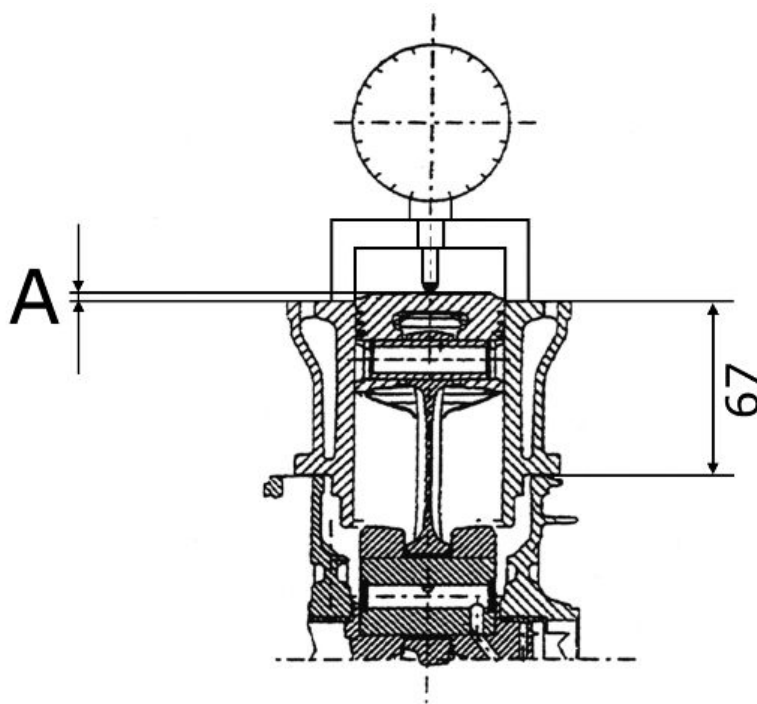
VERSION 125 WITH METAL HEAD GASKET (0.3)

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

Characteristic

Compression ratio, 125 models

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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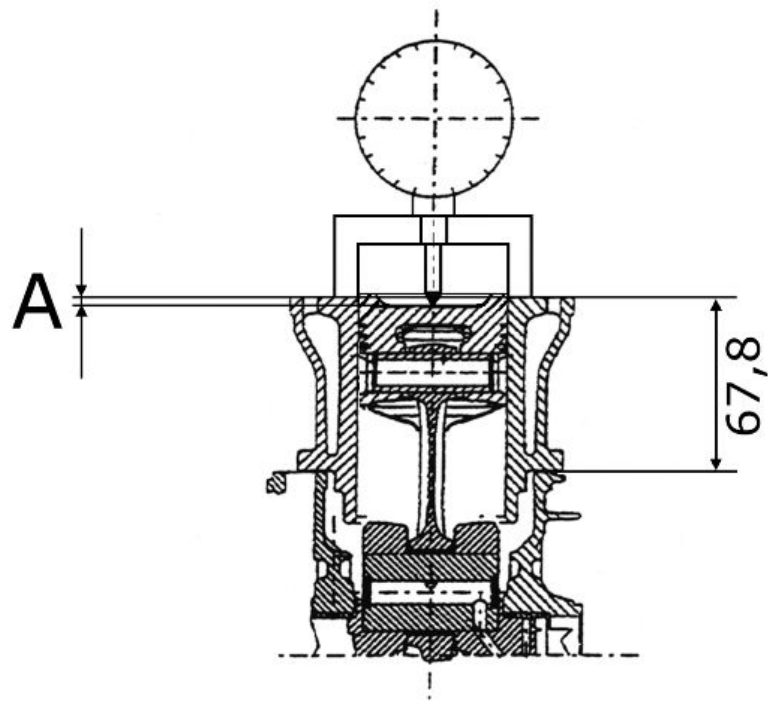
VERSION 125 WITH FIBRE HEAD GASKET (1.1)

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, 200 models

Cr: 11÷12 :1



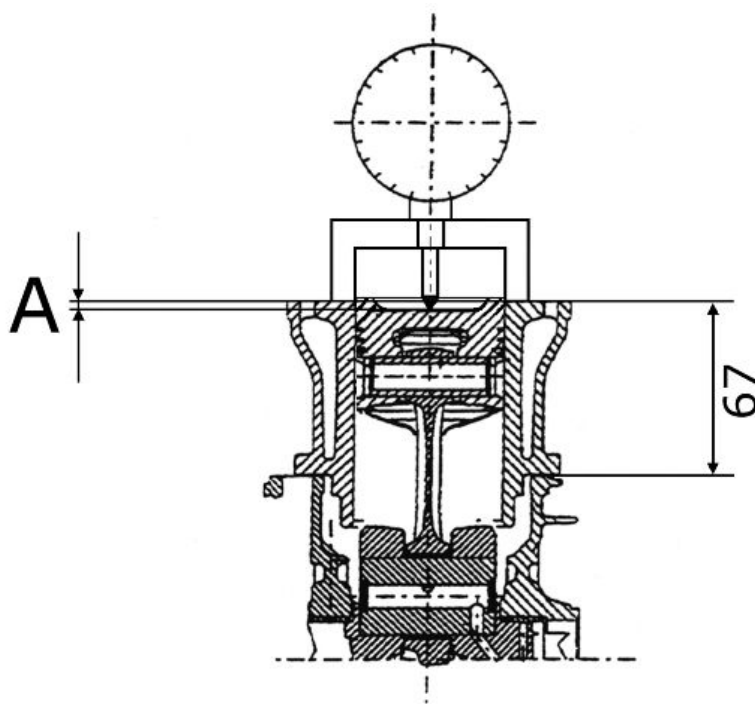
Measurement «A» to be taken, is a value of piston re-entry. It indicates by how much the plane formed by the piston crown descends below the plane formed by the upper part of the cylinder. The further the piston falls inside the cylinder, the less the base gasket to be applied (to recover the compression 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.

VERSION 200 WITH METALLIC HEAD GASKET (0.3)

Name	Measure A	Thickness
Shimming 200 - Cylinder 67.8 - Head gasket 0.3 - Base gasket 0.4	2.50 ÷ 2.40	0.4 ± 0.05
Shimming 200 - Cylinder 67.8 - Head gasket 0.3 - Base gasket 0.6	2.40 ÷ 2.20	0.6 ± 0.05
Shimming 200 - Cylinder 67.8 - Head gasket 0.3 - Base gasket 0.8	2.20 ÷ 2.10	0.8 ± 0.05

Characteristic
Compression ratio, 200 models
Cr: 11÷12 :1



Measurement «A» to be taken, is a value of piston re-entry. It indicates by how much the plane formed by the piston crown descends below the plane formed by the upper part of the cylinder. The further the piston falls inside the cylinder, the less the base gasket to be applied (to recover the compression ratio) and vice versa.

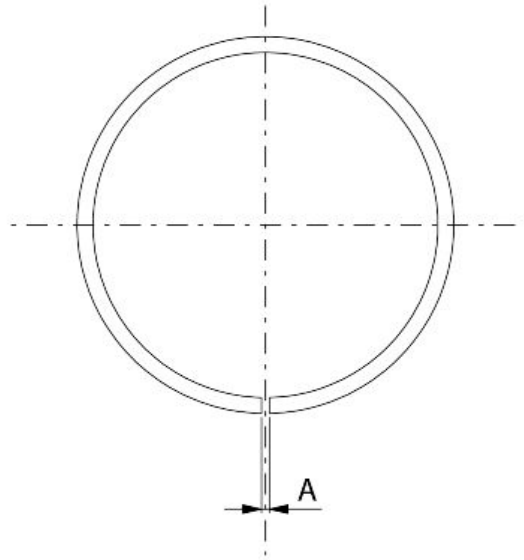
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NO GASKETS AND SEALS SHOULD BE ASSEMBLED BETWEEN THE CRANKCASE AND CYLINDER AND THE DIAL GAUGE EQUIPPED WITH SUPPORT SHOULD BE SET TO ZERO FOR MEASUREMENT «A» TO BE TAKEN WITH THE PISTON AT TOP DEAD CENTRE POSITION AND ON A RECTIFIED PLANE.

VERSION 200 WITH FIBRE HEAD GASKET (1.1)

Name	Measure A	Thickness
Shimming 200 - Cylinder 67 - Head gasket 1.1 - Base gasket 0.4	1.70 ÷ 1.60	0.4 ± 0.05
Shimming 200 - Cylinder 67 - Head gasket 1.1 - Base gasket 0.6	1.60 ÷ 1.40	0.6 ± 0.05
Shimming 200 - Cylinder 67 - Head gasket 1.1 - Base gasket 0.8	1.40 ÷ 1.30	0.8 ± 0.05

Oversizes



ENGINE 125 OVERSIZE

Name	Description	Dimensions	Initials	Quantity
Compression ring		57 x 1	A	0.15 ÷ 0.30
Oil scraper ring		57 x 1	A	0.10 ÷ 0.30
Oil scraper ring		57 x 2.5	A	0.15 ÷ 0.35
Compression ring 1st Oversize		57.2 x 1	A	0.15 ÷ 0.30
Oil scraper ring 1st Oversize		57.2 x 1	A	0.10 ÷ 0.30
Oil scraper ring 1st Oversize		57.2 x 2.5	A	0.15 ÷ 0.35
Compression ring 2nd Oversize		57.4 x 1	A	0.15 ÷ 0.30
Oil scraper ring 2nd Oversize		57.4 x 1	A	0.10 ÷ 0.30
Oil scraper ring 2nd Oversize		57.4 x 2.5	A	0.15 ÷ 0.35
Compression ring 3rd Oversize		57.6 x 1	A	0.15 ÷ 0.30
Oil scraper ring 3rd Oversize		57.6 x 1	A	
Oil scraper ring 3rd Oversize		57.6 x 2.5	A	0.15 ÷ 0.35

ENGINE 200 OVERSIZE

Name	Description	Dimensions	Initials	Quantity
Oil scraper ring		72 x 2.5	A	0.20 ÷ 0.40
Oil scraper ring		72 x 1	A	0.20 ÷ 0.40
Compression ring		72 x 1.5	A	0.15 ÷ 0.30

Products

PRODUCTS

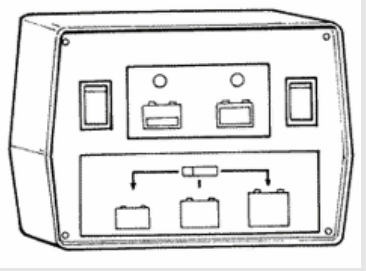
Product	Description	Specifications
AGIP GREASE PV2	Grease for steering bearings and spindle seats	Soap-based lithium and zinc oxide grease containing NLGI 2; ISO-L-XBCIB2 of the swinging arm
MONTBLANC MOLYBDENUM GREASE	Grease for driven pulley shaft adjusting ring and movable driven pulley housing	Grease with Molybdenum disulphide
AGIP FILTER OIL	Oil for air filter sponge	Mineral oil with specific additives for increased adhesiveness
AGIP GREASE MU3	Grease for odometer transmission gear case	Soap-based lithium grease with NLGI 3; ISO-L-XBCHA3, DIN K3K-20
AGIP CITY HI TEC 4T	Engine oil	SAE 5W-40 Synthetic oil that exceed the requirements of API SL, ACEA A3, JASO MA specifications
AGIP GP 330	Calcium complex soap-based grease with NLGI 2; ISO-L-XBCIB2	Grease (brake control levers, throttle grip)
AGIP ROTRA 80W-90	Rear hub oil	SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications
SPECIAL AGIP PERMANENT fluid	coolant	Monoethylene glycol-based antifreeze fluid, CUNA NC 956-16

INDEX OF TOPICS

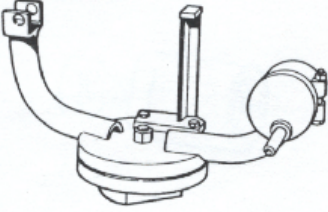
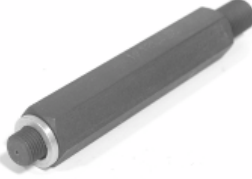
TOOLING

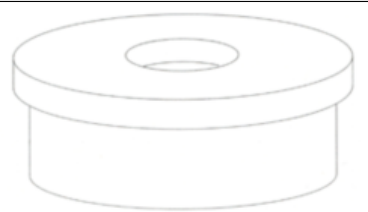
TOOL

APPROPRIATE TOOLS

Stores code	Description	
020151Y	Air heater	
020331Y	Digital multimeter	
020333Y	Single battery charger	
020334Y	Multiple battery charger	
001467Y014	Pliers to extract ø 15-mm bearings	

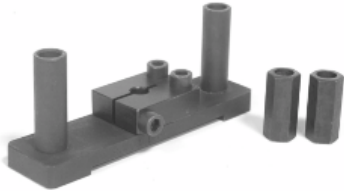
Stores code	Description	
020412Y	15 mm guide	
020335Y	Magnetic support for dial gauge	
020565Y	Flywheel lock calliper spanner	
020439Y	17 mm guide	
020359Y	42x47-mm Adaptor	

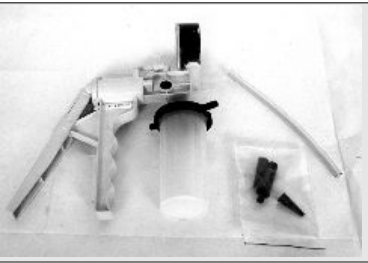
Stores code	Description	
020363Y	20 mm guide	
020459Y	Punch for fitting bearing on steering tube	
020458Y	Puller for lower bearing on steering tube	
005095Y	Engine support	
008564Y	Flywheel extractor	
020434Y	Oil pressure control fitting	

Stores code	Description	
020382Y011	adapter for valve removal tool	
020424Y	Driven pulley roller casing fitting punch	
020431Y	Valve oil seal extractor	
020193Y	Oil pressure gauge	
020306Y	Punch for assembling valve sealing rings	
020360Y	52x55-mm Adaptor	

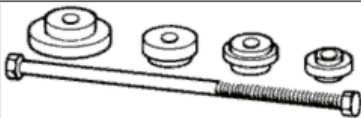
Stores code	Description	
020364Y	25-mm guide	
020375Y	Adaptor 28 x 30 mm	
020376Y	Adaptor handle	
020444Y	Tool for fitting/ removing the driven pulley clutch	
020330Y	Stroboscopic light to check timing	
001467Y035	Belle for OD 47-mm bearings	

Stores code	Description	
020368Y	driving pulley lock wrench	
020319Y	Immobilizer check tester	
020287Y	Clamp to assemble piston on cylinder	
020263Y	Driven pulley assembly sheath	
020262Y	Crankcase splitting strip	
020430Y	Pin lock fitting tool	

Stores code	Description	
020428Y	Piston position check support	
020426Y	Piston fitting fork	
020425Y	Punch for flywheel-side oil seal	
020423Y	Driven pulley lock wrench	
020414Y	28-mm guide	
020393Y	Piston assembly band	

Stores code	Description	
020382Y	Valve cotters equipped with part 012 re- moval tool	
020455Y	10-mm guide	
020442Y	Pulley lock wrench	
020440Y	Water pump service tool	
020329Y	MityVac vacuum-operated pump	
020357Y	32x35-mm Adaptor	

Stores code	Description	
020409Y	Multimeter adaptor - Peak voltage detection	
020456Y	Ø 24 mm adaptor	
020332Y	Digital rev counter	
020074Y	Support base for checking crankshaft alignment	
020055Y	Wrench for steering tube ring nut	

Stores code	Description	
002465Y	Pliers for circlips	
001330Y	Tool for fitting steering seats	
020454Y	Tool for fitting piston pin stops (200 - 250)	
020622Y	Transmission-side oil guard punch	
020444Y011	adapter ring	
020444Y009	wrench 46 x 55	
001467Y	Extractor for bearings for holes	

Stores code	Description	
001467Y013	Pliers to extract Ø 15-mm bearings	
020444Y010	adapter ring	
		

INDEX OF TOPICS

MAINTENANCE

MAIN

Maintenance chart

EVERY 2 YEARS

Action

Coolant - change
Brake fluid - change
Secondary air filter (external/internal) - cleaning (125)

EVERY 3,000 KM

10'

Action

Engine oil - level check/ top-up

AFTER 1,000 KM

65'

Action

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

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

AFTER 6000 KM

120'

Action

Engine oil - replacement
Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean
Engine oil - change
Valve clearance 200 - check
valve clearance 125 - check
Variable speed rollers - check or replacement
Driving belt - checking
Coolant level - check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

AFTER 12,000 KM; 60,000 KM

130'

Action

Engine oil - replacement
Hub oil level - check
Air filter - clean
Engine oil - change
Spark plug - replacement
Idle speed (*) - adjustment
Throttle lever - adjustment

Action
Driven pulley roller casing - Greasing
Driving belt - replacement
Sliding blocks / variable speed rollers - check
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check
Vehicle and brake test - road test

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

At 18000 KM AND AT 54000 KM (VERSION 125 CC)

Action
Engine oil - replacement
Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean
Engine oil - change
Variable speed rollers - check or replacement
Driving belt - checking
Coolant level - check
Radiator - external cleaning/ check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

AT 18000 KM AND AT 54000 KM (VERSION 200cc)

Action
Engine oil - replacement
Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean
Engine oil - change
Valve clearance 200 - check
Variable speed rollers - check or replacement
Driving belt - checking
Coolant level - check
Radiator - external cleaning/ check
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

AFTER 24,000 KM AND AFTER 48,000 KM (125 CM3 VERSION)

175'

Action
Engine oil - replacement
Hub oil - change
Air filter - clean
Engine oil - change
Spark plug - replacement
valve clearance 125 - check
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement

Action

Driving belt - replacement
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Driven pulley roller casing - Greasing
Tyre pressure and wear - check
Vehicle and brake test - road test

(*) See instructions in "Idle speed adjustment" section

AT 24000 KM AND AT 48000 KM (VERSION 200 CC)**Action**

Engine oil - replacement
Hub oil - change
Air filter - clean
Engine oil - change
Spark plug - replacement
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
Driving belt - replacement
Coolant level - check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check
Vehicle and brake test - road test

(*) See regulations in section «Idling speed adjustment»

AT 30000 KM, AT 42000 KM AND AT 66000 KM

80'

Action

Engine oil - replacement
Hub oil level - check
Spark plug/ electrode gap - check
Air filter - clean
Engine oil - change
Variable speed rollers - check or replacement
Driving belt - checking
Coolant level - check
Driven pulley roller casing - Greasing
Brake pads - check condition and wear
Brake fluid level - check
Electrical system and battery - check
Tyre pressure and wear - check
Vehicle and brake test - road test

AT 36000 KM (VERSION 125 CC)**Action**

Engine oil - replacement
Hub oil level - check
Air filter - clean

Action
Engine oil - change
Spark plug - replacement
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
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
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 regulations in section «Idling speed adjustment»

AT 36000 KM (VERSION 200 CC)

Action
Engine oil - replacement
Hub oil level - check
Air filter - clean
Engine oil - change
Spark plug - replacement
Valve clearance 200 - check
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
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
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 regulations in section «Idling speed adjustment»

AFTER 72000 KM

240'

Action
Engine oil - replacement
Hub oil - change
Spark plug / electrode gap - check / replacement
Air filter - clean
Engine oil - change
valve clearance 125 - check
Valve clearance 200 - check
Idle speed (*) - adjustment
Throttle lever - adjustment
Variable speed rollers - check or replacement
Driving belt - replacement

Action
Coolant level - check
Driven pulley roller casing - Greasing
Radiator - external cleaning/ check
Steering - adjustment
Brake control levers - greasing
Brake pads - check condition and wear
Brake fluid hoses - replacement
Brake fluid level - check
Transmission elements - lubrication
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check
Vehicle and brake test - road test

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

Carburettor

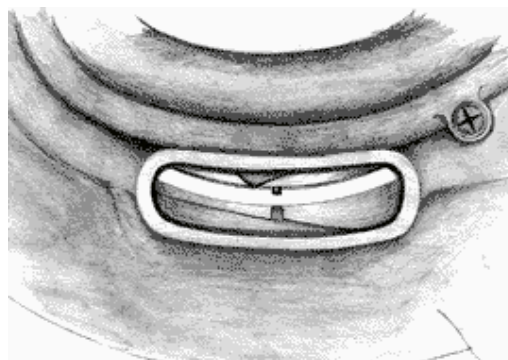
- Disassemble the carburettor in its parts, wash all of them with solvent, dry all body grooves with compressed air to ensure adequate cleaning.
- Check carefully that the parts are in good condition.
- The throttle valve should move freely in the chamber. Replace it in case of excessive clearance due 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

- To check ignition advance, use the stroboscopic light with induction pincers connected to the spark plug power wire.
- Connect the induction pincers being careful to respect the proper polarity (the arrow stamped on the pincers must be pointing at the spark plug).
- Place the light selector in central position (1 spark = 1 crankshaft revolution as in 2 T engines).
- Start the engine and check that the light works properly and the rpm indicator can read also the high rpm (e.g. 8000 rpm).
- If flash unsteadiness or revolution reading error is detected (e.g. half values), increase the resistive



load on the spark plug power line ($10 \div 15 \text{ K}\Omega$ in series to AT cable).

- Remove the plastic cover from the slot on the fly-wheel cover.
- Operating on the flash corrector displacement of the bulb, make the reference on the flywheel cover coincide with level on the water pump drive. Read the advance degrees indicated by the stroboscopic light.
- Check that the advance degrees corresponds with the rotation rpm as indicated in the table.
- If there are anomalies, check the Pick-Up and the control unit power supply (positive-negative), replace the control unit if necessary.
- The brand new control unit prevents that the engine rotation exceeds 2000 rpm.
- The programmed control unit allows the engine to rotate within the prescribed limits.

Characteristic

Check ignition advance 125

$10^\circ \pm 1^\circ$ at 2000 rpm - $34^\circ \pm 1^\circ$ at 6000 rpm

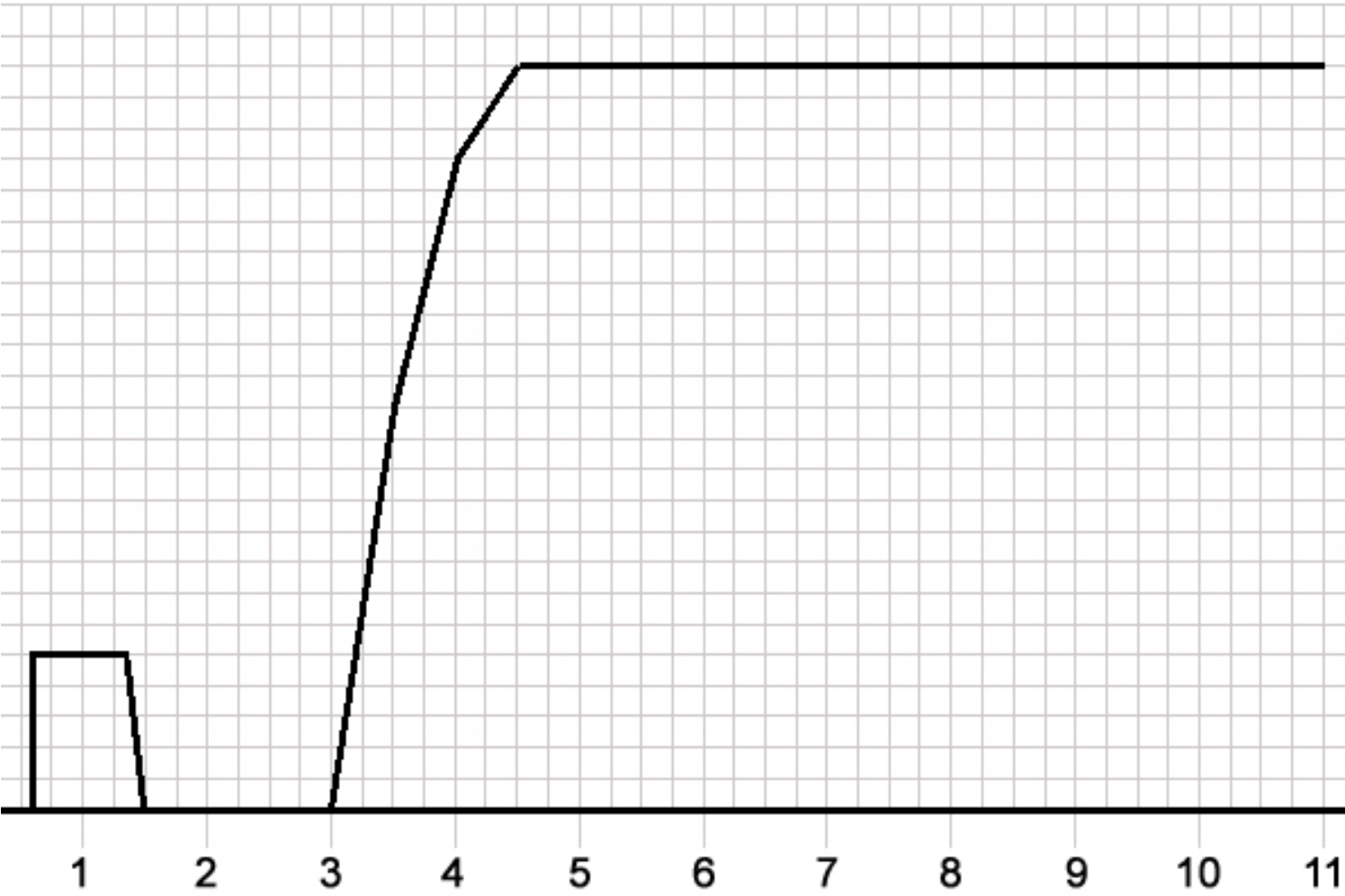
variable ignition advance (before T.D.C.) 200

$10^\circ \pm 1^\circ$ at 2000 rpm - $32^\circ \pm 1^\circ$ at 6500 rpm

Spark advance variation

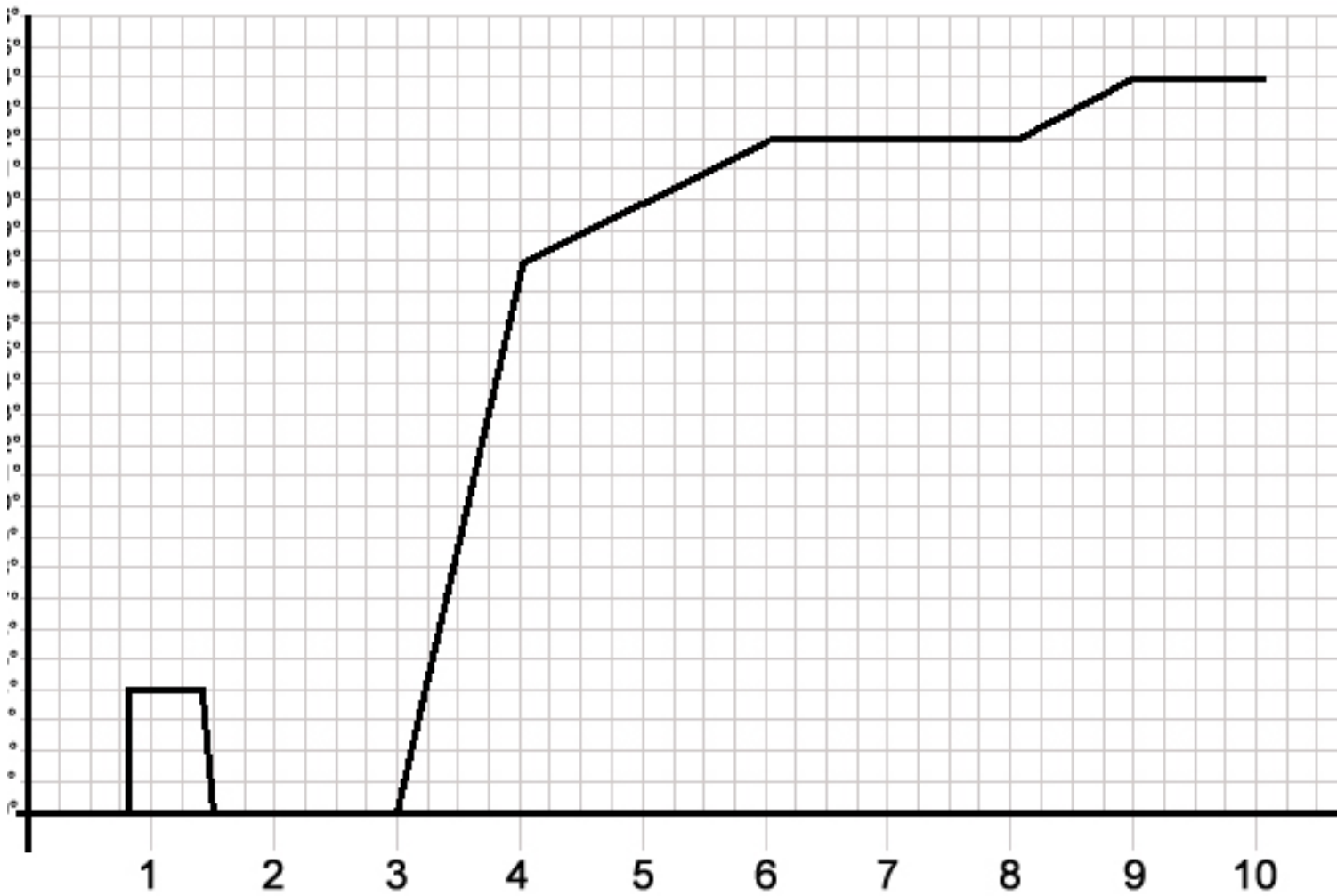
VERSION 125

Specification	Desc./Quantity
Operation threshold	First threshold : 10700 $\pm$ 50 Second threshold : 11000 $\pm$ 50
Reactivation threshold	First threshold : 10600 $\pm$ 50 Second threshold : 10900 $\pm$ 50
Spark elimination	First threshold : 1 spark on 7 Second threshold : 2 sparks on 3



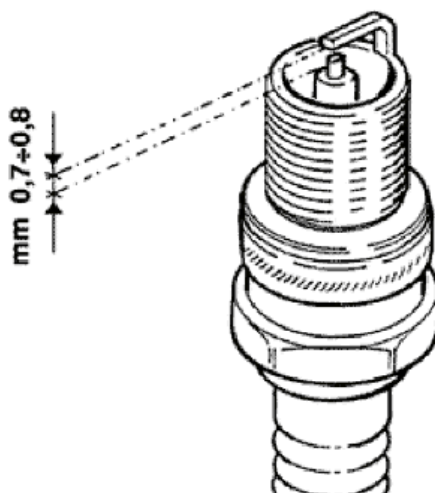
VERSION 200

Specification	Desc./Quantity
Spark elimination	First threshold : 1 spark on 7 Second threshold : 2 sparks on 3
Version 200 : Operation threshold	First threshold : 9900 ±50 Second threshold : 10100 ±50
Version 200 : Reactivation threshold	First threshold : 9800 ±50 Second threshold: 10000 ±50



Spark plug

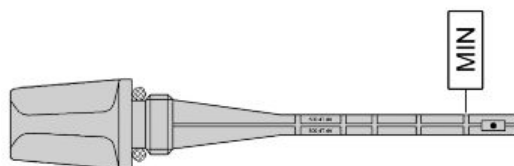




Hub oil

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 CHANGE, 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

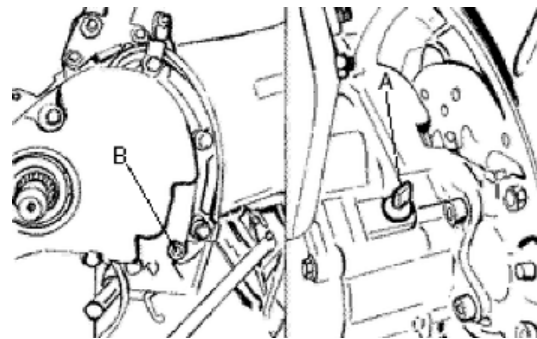
SAE 80W/90 Oil that exceeds the requirements of API GL3 specifications

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.

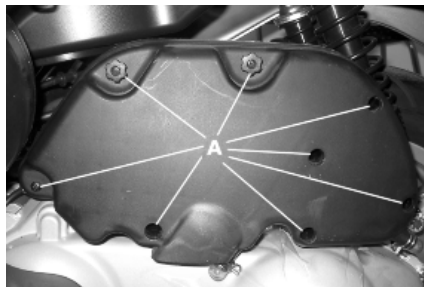
- Wash with water and neutral soap.
- Dry with a clean cloth and short blasts of compressed air.
- Soak with a mixture of 50% petrol and 50% **SELENIA AIR FILTER OIL**.
- Drip dry the filter and then squeeze it between the hands without wringing.

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 oil and cartridge filter «C» should be replaced every 6,000 km (125 cc) or 12,000 Km (250 cc) at an **Authorized Piaggio Service Centre**. The engine should be emptied by draining the oil from the filter drainage tap «B» on the flywheel side. In order to facilitate the oil drainage, loosen the cap/ bar. Since a certain quantity of oil remains in the circuit still, the fill-up should be carried out with around 600 ÷ 650 cc of oil from cap «A». Then start up the vehicle, leave it running for a few minutes and switch it off: after around 5 minutes, check the level and top up if necessary **without ever exceeding the MAX level**. The cartridge filter should be replaced every time the oil is changed. For top ups and replacements 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 SERVICE CENTRE, WHICH IS EQUIPPED TO DISPOSE OF USED 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 vehicle is used, visually inspect the level of the engine oil when the engine is cold (after **completely unscrewing** the oil cap/dipstick). The oil level should be somewhere between the MAX and MIN index marks on the level rod; «A»; during the oil check, the vehicle must be resting on its centre stand on an even, horizontal surface.

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, wait at least 10 minutes after the engine has been stopped so as to get the correct level.

Characteristic

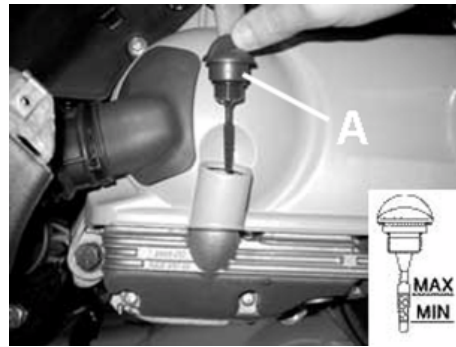
Engine oil (oil and oil filters change)

Capacity: 1.0 l

This operation **must be carried out with the engine cold** and following the procedure below:

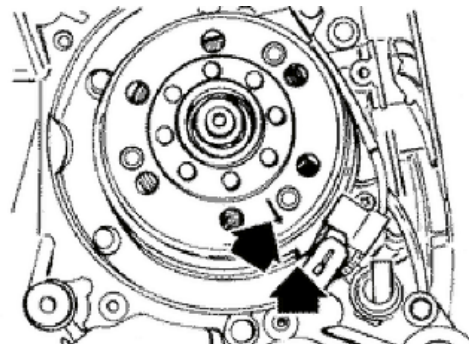
- 1) Rest the scooter on the central stand and on a flat ground.
- 2) Set the strut that regulates the position to its minimum height.
- 3) Screw off cap/dipstick «A», dry it off with a clean cloth and reinsert it, **screwing down completely**.
- 4) Remove the cap/dipstick «A» again and check that the level is between the MAX and MIN marks; top up, if required.

The MAX level as shown in the figure indicates that there is about 1700 cc of oil in the engine. If the check is carried out after the vehicle has been used, and therefore with a hot engine, the level line will be lower; in order to carry out a correct check it is necessary to wait at least 10 minutes after the engine has been stopped, so as to get the correct level.



Checking the ignition timing

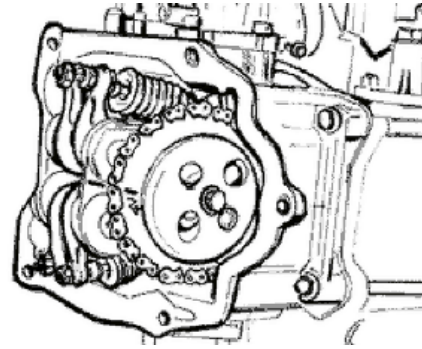
- Remove the 4 fixing screws and move away from the engine the flywheel cover fitted with a water pump and cooling manifolds.
- Rotate the flywheel until the reference matches the crankcase operation end as shown in the figure (TDC). Make sure that the 4V reference point on the camshaft control pulley 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.

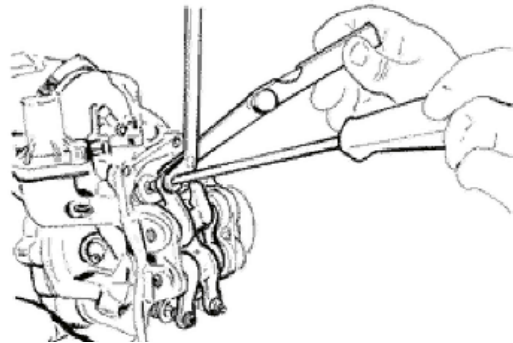
TIME THE TIMING SYSTEM UNIT IF IT IS NOT IN PHASE.



Checking the valve clearance

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

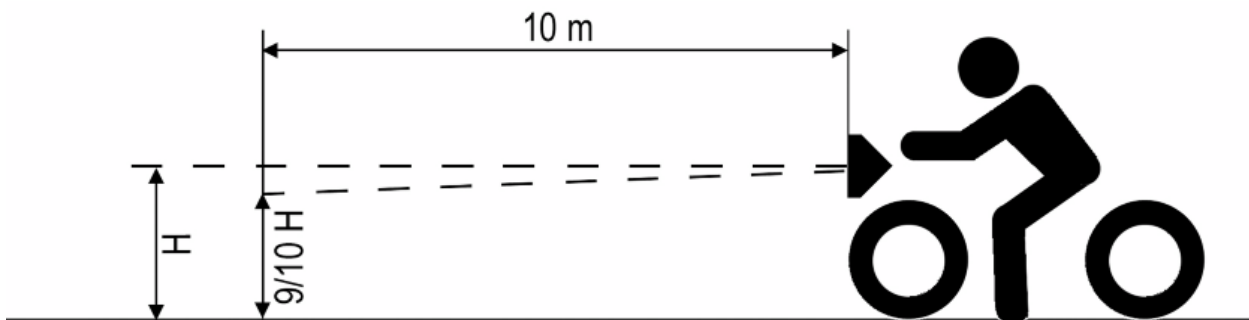
- Use a thickness gauge to check that the clearance between the valve and the register corresponds with the indicated values. When the valve clearance values, intake and drainage respectively, are different from the ones indicated below, adjust them by loosening the lock nut and operate on the register 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 scooter, 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 scooter is perpendicular to the screen;
2. Turn on the headlight and check that the borderline of the projected light beam should be lower than 9/10 of the distance from the ground to the centre of the vehicle's headlight, and higher than 7/10;
3. If not, adjust the projection by turning the central screw «A» set inside the glove box.



N.B.

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

CO check

Preparing the vehicle

- Remove the 2 bottom sides as explained in the Body chapter.
- Remove the 3 fastening screws of the filter box.
- Remove the filter box to access the 6 screws M6 closing the crankcase and the heat guard plate attachments.
- Remove the plate to access the flow adjustment screw on the carburettor.
- Remove the gas cap on the exhaust pipe.
- Using the original washer, install the exhaust gas collection Kit union.
- Suitably orientate the components (Figure 2).
- Close the gas outlet terminal of the tool. - Start the engine and let it warm until the electric fan starts.
- Stop the engine.
- Disconnect the vacuum feeding pipe from the SAS control valve.



- Insert a conical plug into the vacuum feeding pump.
- Connect the MITIVAC vacuum pump to the SAS control valve using a suitable pipe having the same size as the original fitted on the vehicle.
- Start the vacuum up to -0.6 -0.8 Bar so as to close the valve and cut off the SAS system.
- Remove the exhaust gas collection Kit closing cap and connect the analyser properly pre-heated.

N.B.

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

N.B.

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

N.B.

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

N.B.

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

N.B.

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

N.B.

CHECK THE CONDITIONS DISPLAYED BY THE ANALYSER AND THE ENGINE RPM AND ADJUST THE CO VALUE AT 3.8 ± 0.7 AT $1,650 \pm 50$ RPM.

Specific tooling

020332Y Digital rev counter

494929Y Exhaust fumes analyser

020329Y MityVac vacuum-operated pump



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.

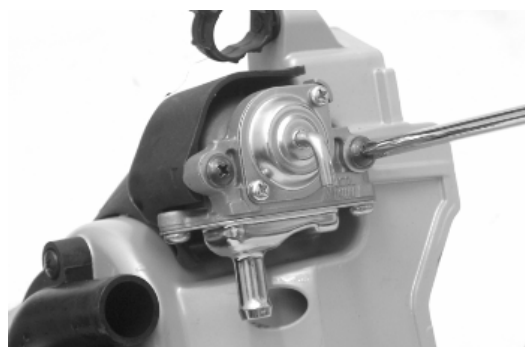
Lock the upper clamp.

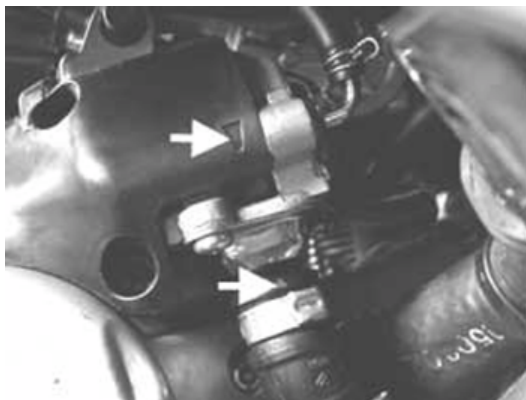
Fix the metal tube to the head using the gasket and the 2 screws.

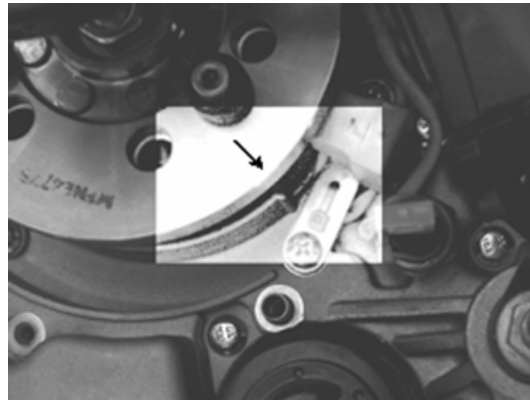
Lock the lower clamp connecting manifold / pipe.

Locking torques (N*m)

Stator assembly screws (°) 3 ÷ 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.

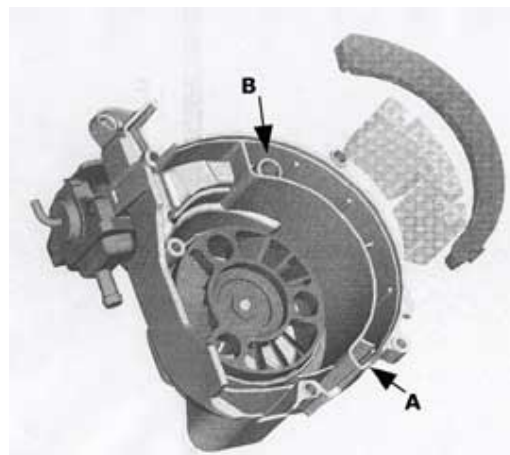
Check that the filter casing is clean paying special attention to "A" and "B" passages

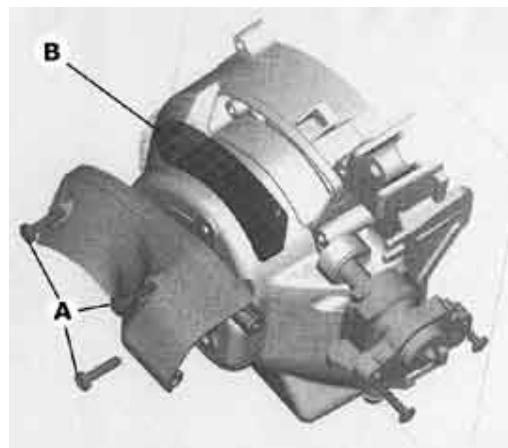
CAUTION

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

Engine

Poor performance

POOR PERFORMANCE

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

DIFFICULT STARTING

Possible Cause	Operation
Altered fuel characteristics	Drain off the fuel no longer up to standard; then, refill
Rpm too low at start-up or engine and start-up system damaged	Check the starter motor, the system and the torque limiter
Incorrect valve sealing or valve adjustment - Engine flooded.	Inspect the head and/or restore the correct clearance 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

Possible Cause	Operation
The carburettor is dirty; fuel pump or vacuum valve damaged	Remove, wash with solvent and dry with compressed air or replace
Battery flat	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
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

Possible Cause	Operation
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 change brake fluid if necessary. Check there is no air in the circuits; if necessary, bleed the air. Check that the front brake calliper moves in axis with the disc.
Fluid leakage in hydraulic braking system	Failing elastic fittings, plunger or brake pump seals, replace

Brakes overheating

BRAKES OVERHEATING

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

Electrical system

Battery

BATTERY

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

Turn signal lights malfunction

TURN INDICATOR NOT WORKING

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

Steering and suspensions

Rear wheel

REAR WHEEL ROTATES WITH ENGINE AT IDLE

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

Controls

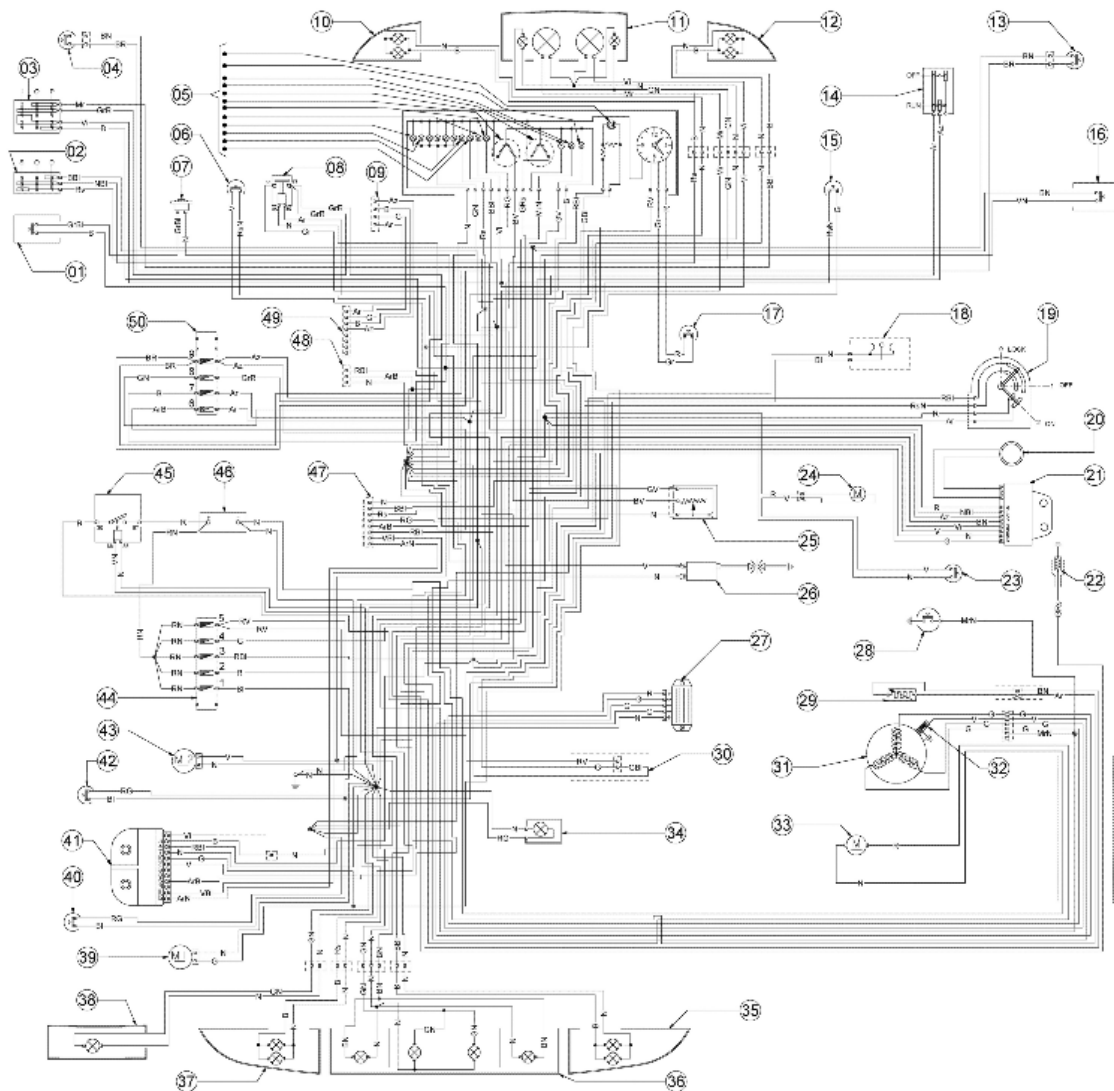
STEERING CONTROLS AND SUSPENSIONS

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 absorber; the condition of the ball bearings and relevant lock-nuts, the limit switch rubber buffers; and the movement bushings. In conclusion, check the tightening torque of the wheel hub, the brake calliper, the shock absorber disc in the attachment to the hub and the steering tube.
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



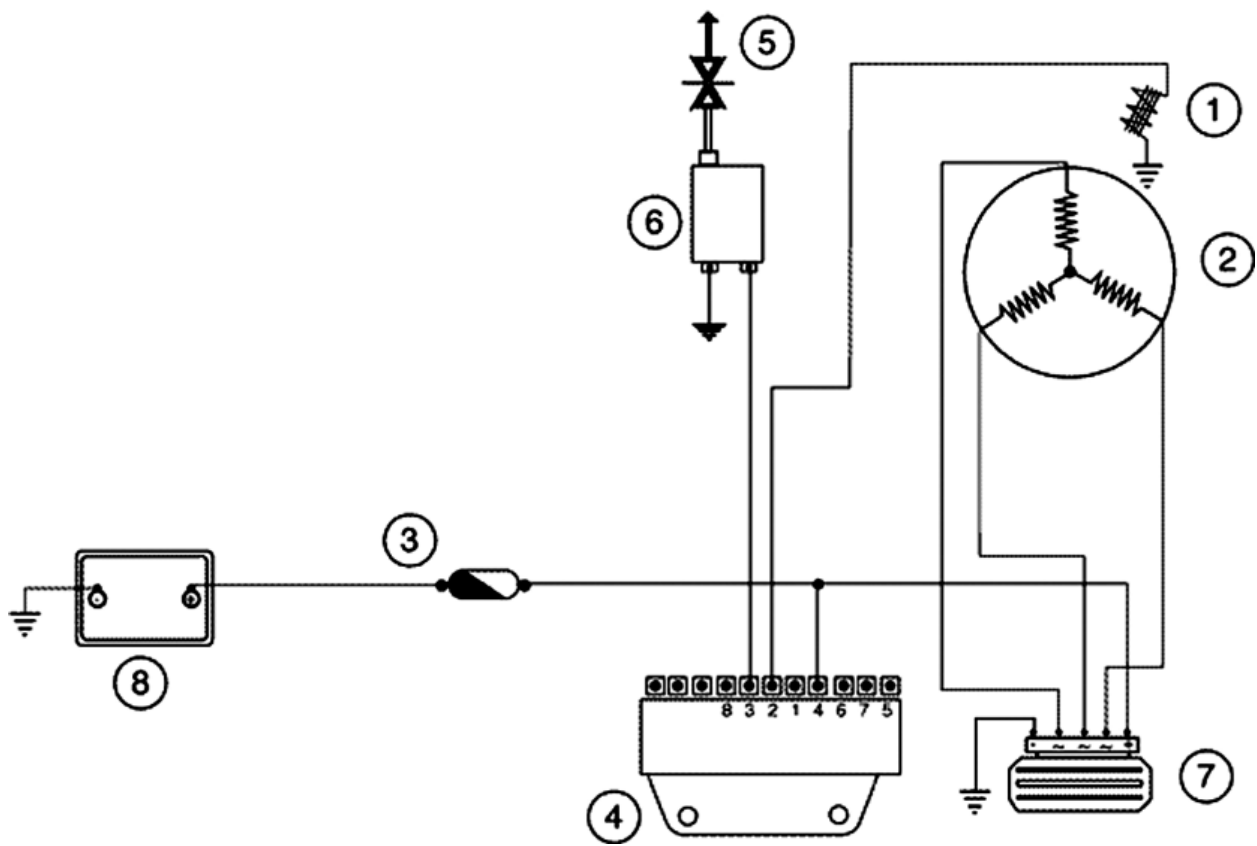
ELECTRIC SYSTEM

Specification	Desc./Quantity
1	Horn button
2	Indicators switch
3	Light switch
4	Stop button on rear brake
5	Instrument panel
6	Open saddle button
7	Horn
8	Headlight remote control switch
9	Radio display preset
10	Front left turn signal lamp
11	Complete headlamp
12	Front right turn signal lamp
13	Stop switch on front brake
14	Engine stop switch
15	Rear trunk push button
16	Start up button
17	Clock reset push button
18	Output
19	Key switch
20	Immobilizer aerial

	Specification	Desc./Quantity
21	Electronic ignition device	
22	Thermistor	
23	Thermal switch	
24	Electric fan motor	
25	Fuel level sender	
26	HV coil	
27	Voltage regulator	
28	Engine oil pressure sensor	
29	Automatic starter	
30	Output for immobilizer diagnostic instrument	
31	Magneto flywheel	
32	Pick - up	
33	Starter motor	
34	Roof lamp for box helmet illumination with lamp	
35	Rear right turn signal lamp	N° 2 lamps 12V - 5W
36	Complete tail lamp	N° 2 lamps for rear position light 12V - 5W, N° 2 lamps for stop light 12V - 10W
37	Rear left turn signal lamp	N° 2 lamps 12V - 5W
38	Licence plate lamp	lamp 12V-5W
39	Actuator for open rear trunk	
40	Rear trunk illumination push button	
41	Actuators control device	
42	Box helmet illumination push button	
43	Saddle opening actuator	
44	Fuses holder	N° 2 fuses (15A), n° 2 fuses (10A) and n° 1 fuse (5A)
45	Remote control switch	12V - 80A
46	Battery	12V-12Ah
47	Anti-theft alarm fitting	
48	Radio unit power preset	
49	Unit radio display preset	
50	Fuses holder	N° 1 fuse (5A), n° 2 fuses (7,5A) and n° 1 fuse (10A)

Conceptual diagrams

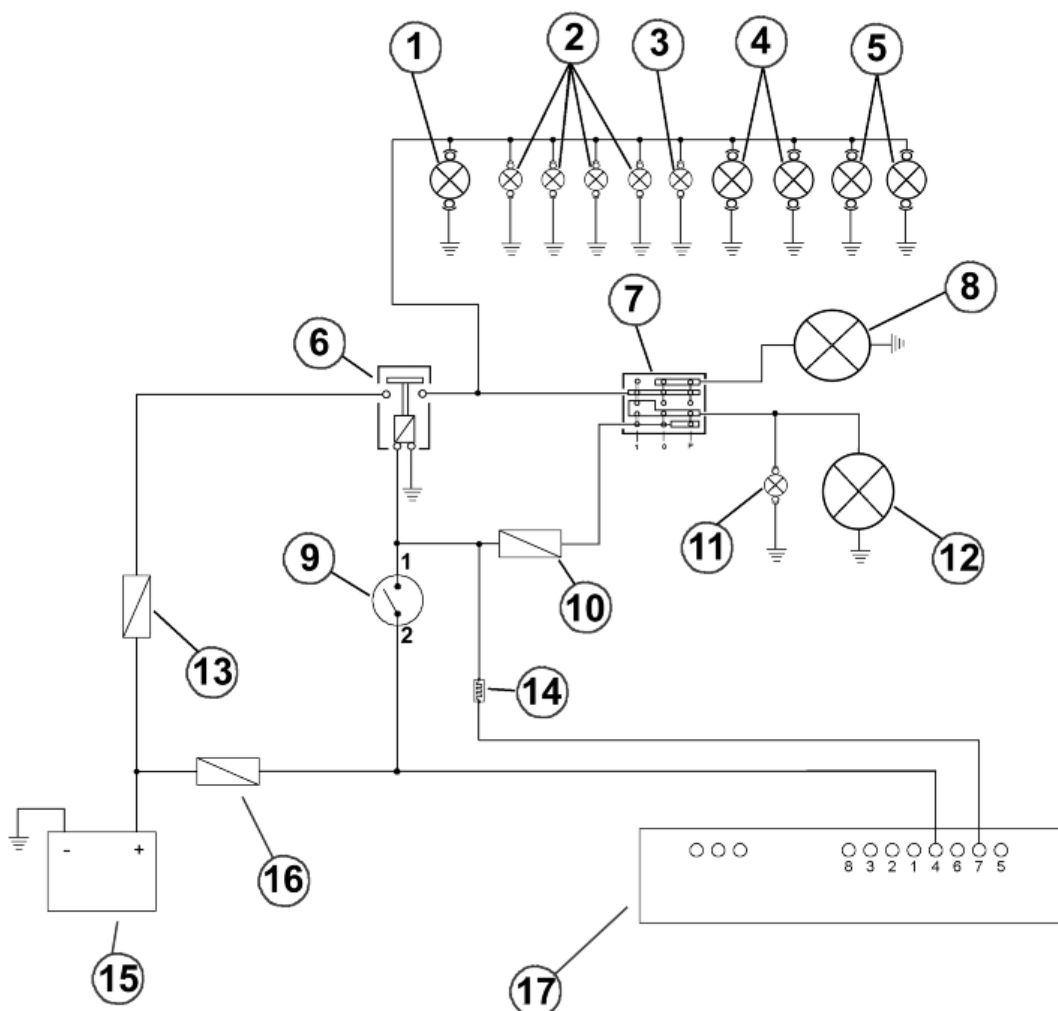
Ignition



IGNITION

	Specification	Desc./Quantity
1	Pick - up	
2	Magneto flywheel	
3	Fuse	15A
4	Electronic controller	
5	Spark plug	
6	HV coil	
7	Voltage regulator	
8	Battery	12V-12Ah

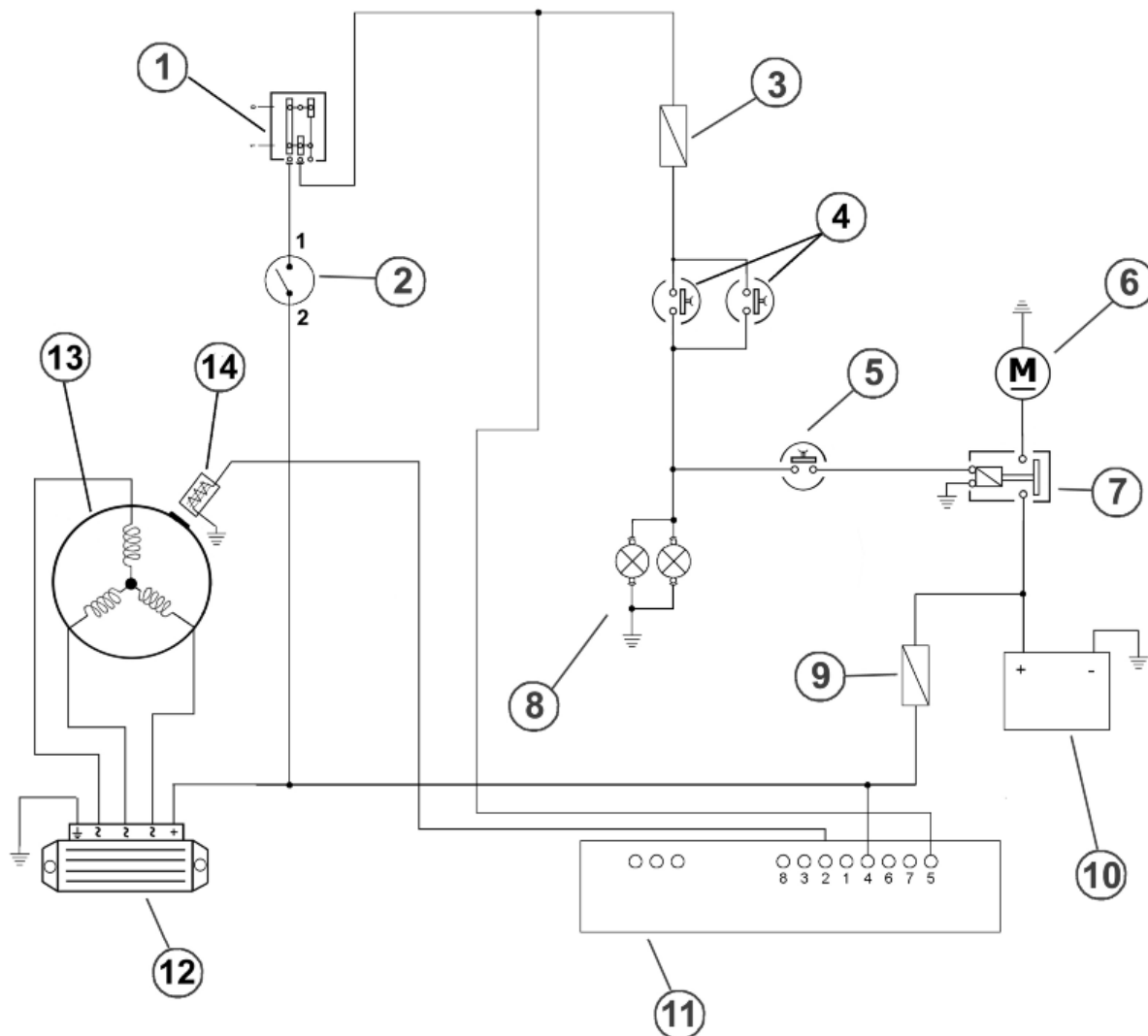
Headlights and automatic starter section



HEADLIGHTS AND AUTOMATIC STARTER SECTION

	Specification	Desc./Quantity
1	Number-plate light bulb	12V 5W
2	Four (4) light dashboard lighting bolbs	12V - 1.2W
3	Headlight warning light	12V - 1.2W
4	Two front parking light bulbs	12V - 5W
5	Two (2) taillight bulbs	12V - 5W
6	Light remote control switch	
7	Light switch	
8	Bulb for dipped beams	12V-55W
9	Key switch contacts	
10	Fuse (Rear position light protection, number plate light, front position light)	7.5A
11	High-beam warning light	12V - 1.2W
12	Bulb for upper beams	12V-55W
13	Fuse (headlight remote control protection)	10 A
14	Automatic starter	
15	Battery	12V 12Ah
16	Fuse	15A
17	Electronic control unit	

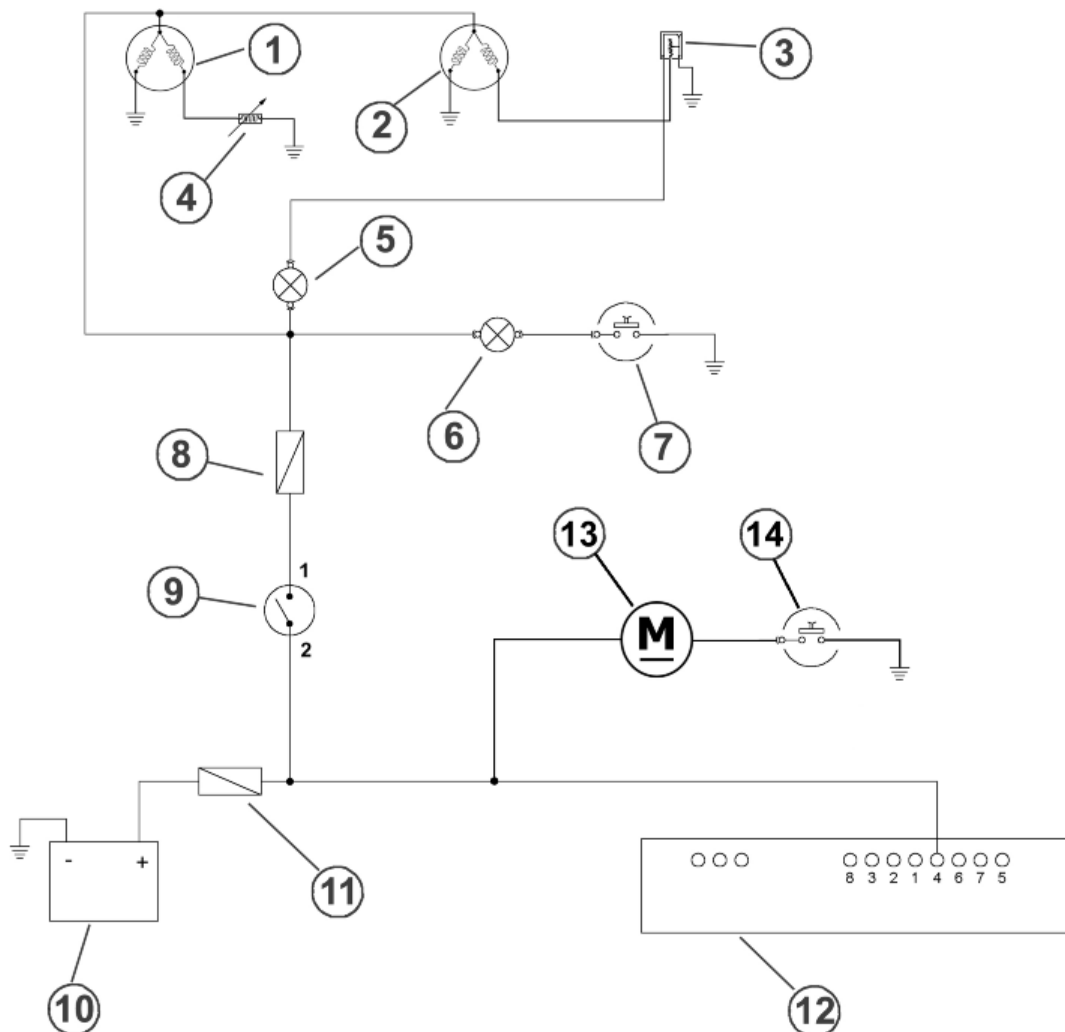
Battery recharge and starting



BATTERY RECHARGE AND START-UP SECTION

	Specification	Desc./Quantity
1	Engine stop switch	
2	Key switch contacts	
3	Fuse	5A
4	Front and rear brake light button	
5	Start up button	
6	Starter motor	
7	Remote starter switch	
8	Two (2) stop light bulbs	12V - 10W
9	Fuse	15 A
10	Electronic ignition	
11	Battery	12V-12Ah
12	Voltage regulator	
13	Magneto flywheel	
14	Pick - up	

Level indicators and enable signals section



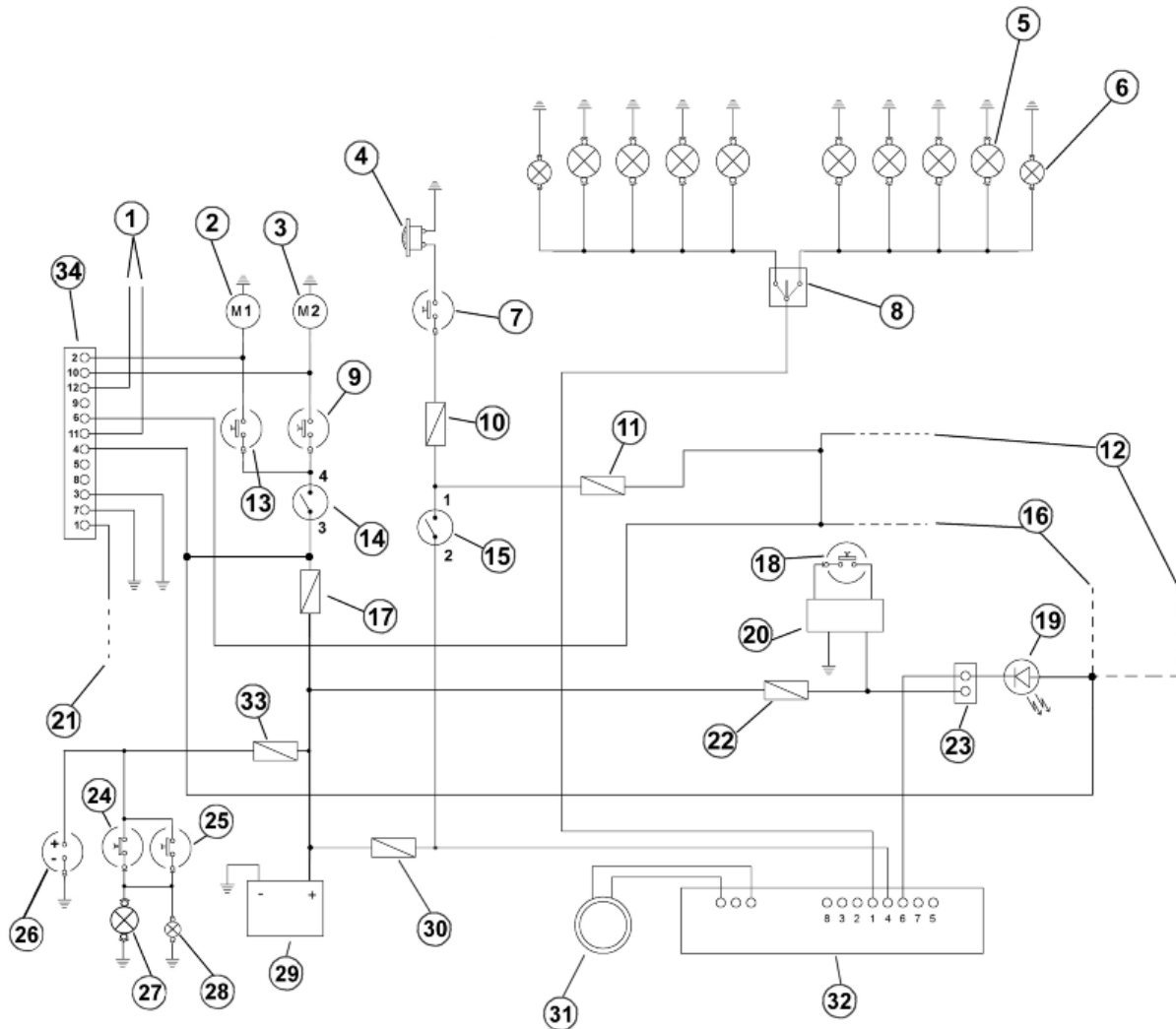
ENABLE SIGNALS

	Specification	Desc./Quantity
1	Coolant temperature gauge	
2	Fuel gauge	
3	Fuel level sender	
4	Thermistor	
5	Low fuel warning light	12V - 2W
6	Low oil pressure warning light	12V - 2W
7	Oil pressure sensor	
8	Fuse (Rear position light protection, number plate light, front position light)	7.5A
9	Key switch contacts	
10	Battery	12V - 12Ah
11	Fuse	15A
12	Electronic ignition	
13	Radiator electric fan motor	
14	Thermal switch for electric fan	

Thermal switch

We inform you that a new thermal switch has been introduced starting with frame number ZAPM2300003507739 (X9) ZAPM3620000003383 (X8) ZAPM2850000001025 (Beverly), in order to prevent possible malfunctioning of the thermal switch.

Turn signal lights



FLASHING LIGHTS

Specification	Desc./Quantity
1	Antitheft
2	Boot opening actuator
3	Saddle opening actuator
4	Horn
5	Eight (8) turn signal light bulbs 12V - 5W
6	Two (2) turn signal warning light bulbs 12V - 2W
7	Horn button
8	Indicators switch
9	Saddle opening button
10	Fuse (Rear position light protection, number plate light, front position light) 7.5A

	Specification	Desc./Quantity
11	Fuse	10 A
12	PICS prewiring	
13	Boot opening button	
14	Key switch contacts	
15	Key switch contacts	
16	Anti-theft alarm fitting	
17	Fuses	10A
18	Clock reset push button	
19	Immobilizer LED	
20	Analogue clock	
21	Antenna	
22	Fuse	5A
23	Output for immobilizer diagnostic instrument	
24	Boot button	
25	Seat button	
26	Socket for users	12V - 180W max
27	Helmet compartment lamp bulb	12V-5W
28	Open boot warning light	12V - 2W
29	Battery	12V - 12Ah
30	Fuse	15A
31	Immobilizer aerial	
32	Electronic ignition	
33	Fuse	15A
34	Actuators control device prewiring	

Checks and inspections

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

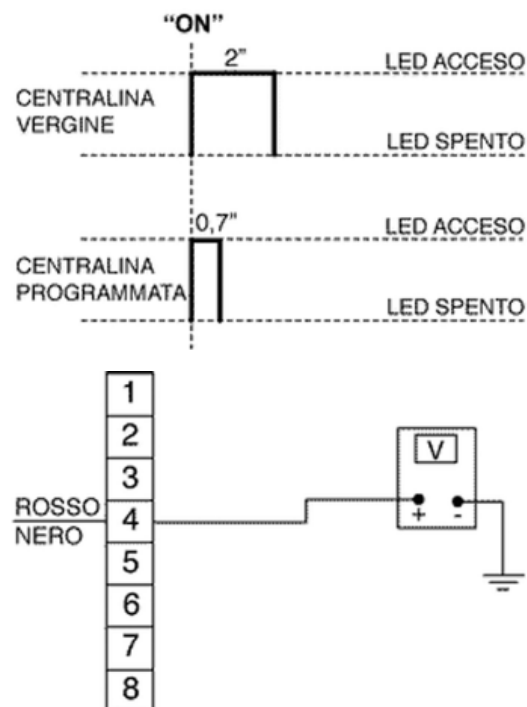
Immobiliser

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

The ignition system consists of:

- electronic control unit
- immobilizer aerial
- master and service keys with built-in transponder
- HV coil
- diagnosis LED
- The diagnostic LED also works as a deterring blinker. 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, proceed to check the control unit supply as follows:

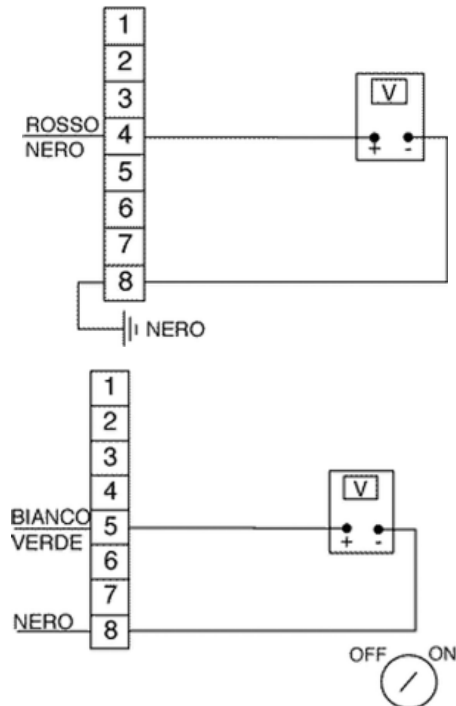
- Disconnect the control unit connector and check if:
- There is battery voltage between terminal No. 4 (Red/Black) and the ground lead.
- There is battery voltage between the terminal No. 4 (Red/Black) and terminal No. 8 (Negative) as shown in the figure.

If no voltage is detected, check the wiring to the battery positive lead and see if the 15A fuse is in good conditions (see the start-up diagram)

- There is battery voltage between terminals No. 5 and No. 8 with the key switch set to "ON", the side stand retracted 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;
- Side stand contacts;
- 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.

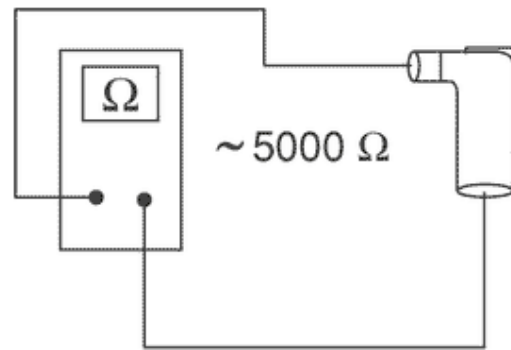
Once the control unit has been programmed, the control unit is inseparably matched with the MASTER key transponder.

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.

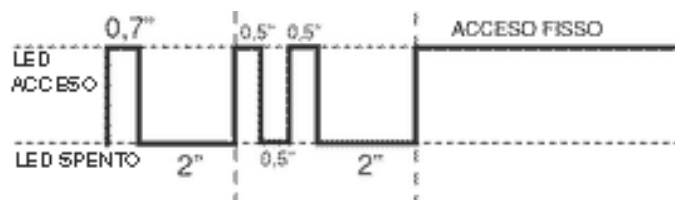


Diagnostic codes

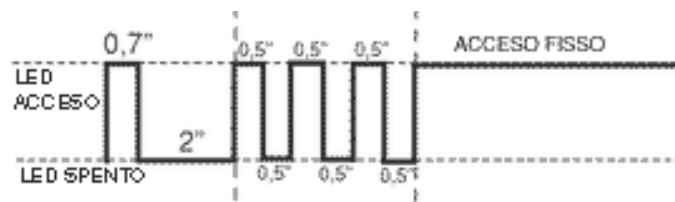
The flash indicating the switching to "ON" can be followed by a phase of programmed failure warnings. That is, the led is off for 2 seconds, and then diagnosis codes are transmitted with 0.5-second flashes. After the failure code indication, a steadily on LED signals that ignition is disabled; see the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

Diagnostic code - 3 flashes

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

- If the failure disappears when the MASTER key is used, proceed to encode the service keys (Black).

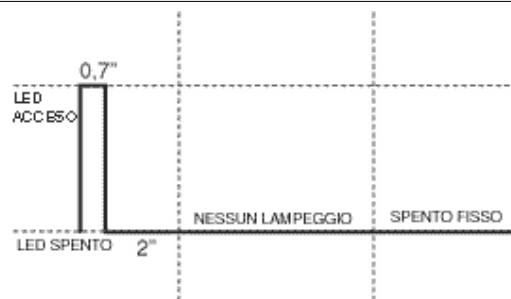
- If the failure persists, it means that the MASTER key and the control unit are not linked; in this case, replace the control unit and then encode the keys.

The immobilizer system is efficient when, after switching over to "ON", only a 0.7-second flash is detected (see diagram).

In this case, the engine can be started.

Example with programmed control unit, transponder, programmed key and aerial working properly.

Ignition is enabled (regular conditions of use)



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.

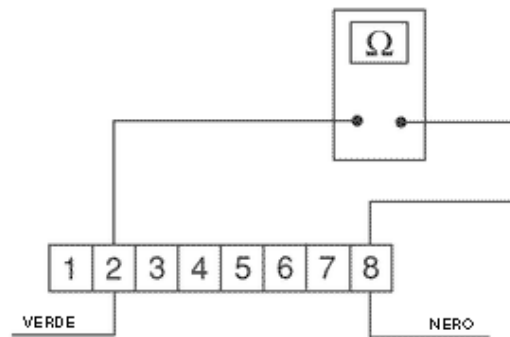
To avoid disturbances in the ignition system during start-up, it is very important that the engine-chassis ground connection bonding is efficient.

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. 2 (Green) and terminal No. 8 (Black) is not interrupted. Check the Pick-Up and its power line:



Electric characteristic

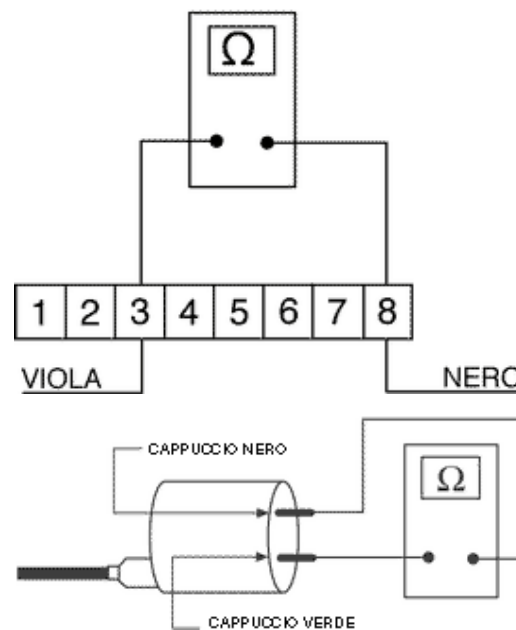
Pick-up resistance value

Pick-up resistance value: $105 \div 124 \text{ Ohm}$

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 two connectors on the HV coil and check continuity (see figure). If non-conforming values are measured, replace the HV coil. If conforming values are measured, check the cable harness taking into account that the HV coil positive wire has a branch that comes into the digital instrument panel (violet cable). Therefore, make sure this line is in perfect conditions. If failures are detected, check the HV coil secondary.



Electric characteristic

High voltage coil primary resistance value

High voltage coil primary resistance value: $0.4 \div 0.5 \text{ Ohm}$

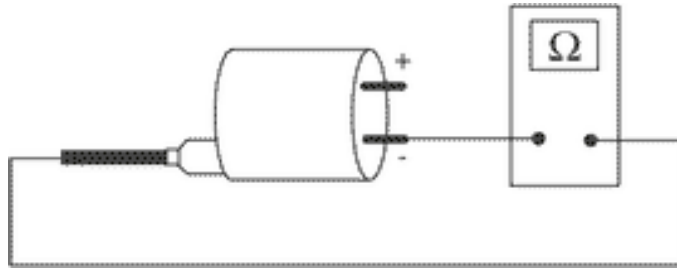
HV coil secondary check

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

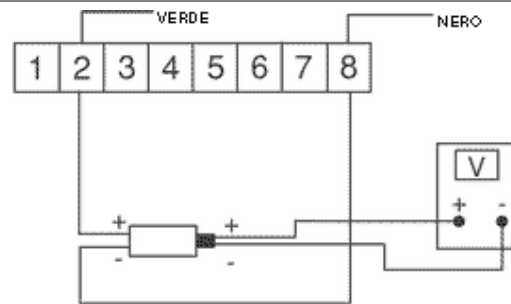
High voltage coil secondary resistance value

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



- Pick-Up.
- Disconnect the control unit connector and connect the positive terminal to connector No. 2 and the negative terminal to connector No. 8 (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.

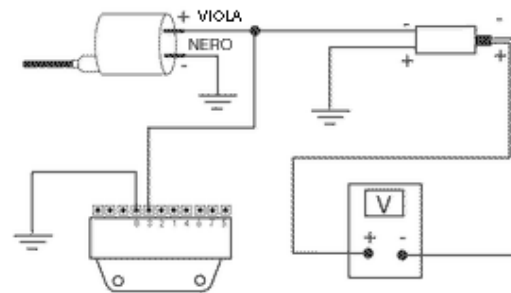
**Electric characteristic****Pick-Up voltage value**

Pick-Up voltage value: > 2 Volt

- HV 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 ground 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

Stator check

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

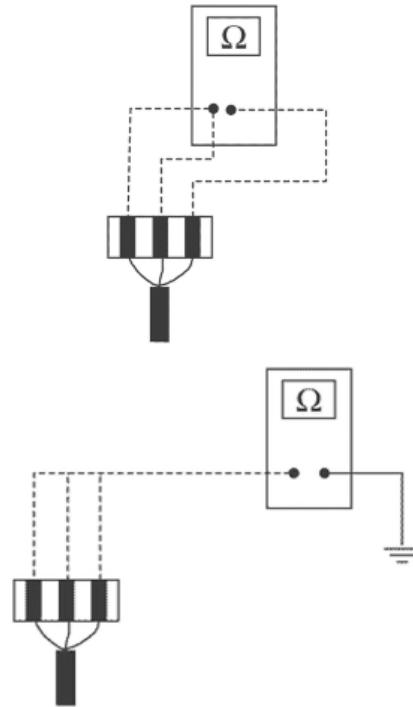
Electric characteristic

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

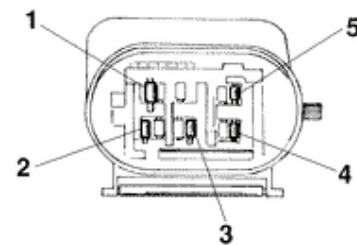
Minimum oil pressure switch check

- 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 ÷ 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.

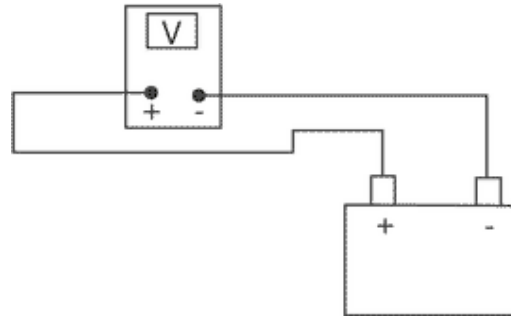
Voltage regulator check

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.

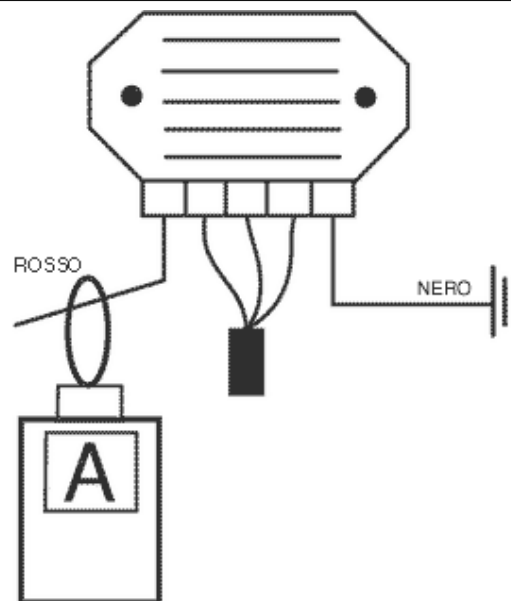
In case of voltage values lower than 14 Volt, check the stator and the corresponding cable harness.



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.

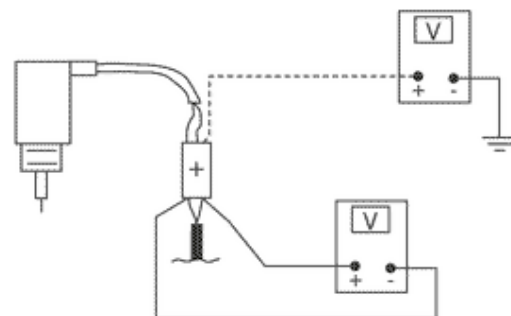
In case the generated current value is lower than 10A, repeat the test using a new regulator and/ stator alternatively.



Choke Inspection

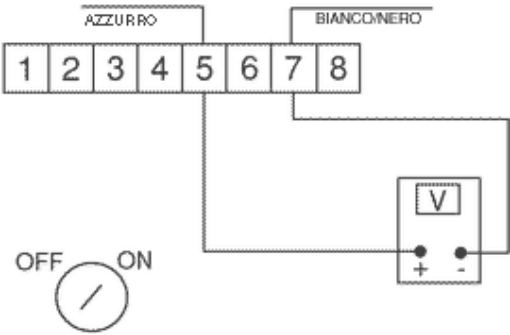
Refer to the engine section to check the resistance and operating conditions of the component. As regards voltage supply, keep the connector connected to the system and check that the two terminals receive battery voltage when the engine is on (see figure).

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 the engine and keep it at idle speed. Check if there is voltage when the multimeter positive probe is connected to the terminal No. 5 (Sky blue) and the negative one to the terminal No. 7 (Black/ White) (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

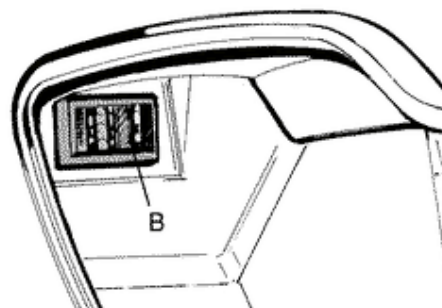
Function	Power
Low-beam light bulb	12V - 55W
High-beam light bulb	12V - 55W
Front position light bulb	12V-5W x 2
Front turn indicator bulbs	12V-10W x 2
Rear tail light bulbs	12V-5W x 2
Stop light bulb	12V-2.3W x 5
Rear turn indicator bulbs	12V-10W x 2
Instrument panel lighting bulb	12V-2W x 5
Glove-box light bulb	12V - 5W
License plate lighting bulb	12V - 5W

Fuses

The electric system is equipped with:

- four protective fuses «A» into the helmet compartment,
- four fuses «B» for the system circuitry safety, located inside the port in the rear left side of the shield.

The tables shows the features of the fuses on the vehicle.



CAUTION

BEFORE REPLACING A BLOWN FUSE, FIND AND SOLVE THE FAILURE THAT CAUSED IT TO BLOW. NEVER TRY TO REPLACE THE FUSE USING ANY OTHER MATERIAL (A PIECE OF ELECTRICAL WIRE, FOR EXAMPLE) OR A FUSE OF A DIFFERENT RATING THAN THAT SPECIFIED.

Electric characteristic

Light indicator on digital instrument panel, front and rear side/taillights

7.5 A

Digital instrument panel, diagnostic led indicator on analogue instrument.

10 A

Brake lights, vehicle start-up enabling signal

7.5 A

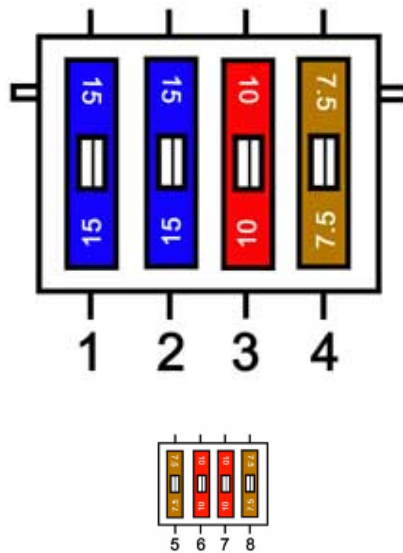
Horn, upper beam and indicator on "Passing" function

10 A



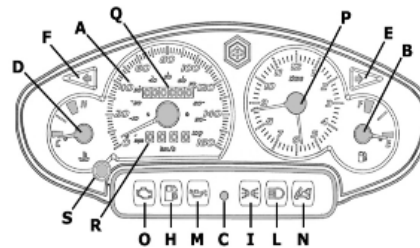
FUSES

	Specification	Desc./Quantity
1	Helmet compartment, 12-V socket	15 A
2	General (battery recharge, lights, radiator electric fan, electronic control unit).	15 A
3	Headlight (upper and dipped beams).	10 A
4	Digital instrument panel	7.5 A



Dashboard

- A = Twin scale speedometer (km/h and mph)
- B = Fuel gauge
- C = Antitheft device LED
- D = Coolant temperature gauge
- E = Right turn indicator warning light
- E = Left turn indicator warning light
- H = Low fuel warning light
- I = Lights ON warning light
- L = High-beam warning light
- M = Low oil pressure warning light
- N = Helmet compartment light ON warning light
- O = Preset warning light
- P = Analogue clock
- Q = Total odometer
- R = Trip odometer
- S = Trip odometer reset button



The clock, powered directly by the vehicle's battery, may be set by pressing the «T» button located inside the LHS glove-box on the knee-guard panel.

Pressing the button for less than one second will add one minute to the displayed time; Keep the «T» button pressed to rapidly increase the 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 cell cap.
- 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 cell filling hole 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

CONNECTOR A

	Specification	Desc./Quantity
1	1	Engine oil pressure warning light
2	2	electronic control unit
3	3	+ Battery
4	4	To the clock reset button
5	5	Instrument panel lighting and headlight warning light bulb
6	6	Earth
7	7	+ Clock battery
8	8	Right direction warning light

CONNECTOR B

	Specification	Desc./Quantity
1	1	Left turn indicator warning light
2	2	Water thermometer
3	3	Live battery
4	4	Engine control warning light
5	5	Low-fuel warning light

CONNECTOR C

	Specification	Desc./Quantity
1	1	Fuel level gauge
2	2	Earth
3	3	ABS warning light preinstallation
4	4	High-beam lamp warning light
5	5	Open boot warning light

Dashboard

12-WAY INSTRUMENT CONNECTOR

	Specification	Desc./Quantity
1	BATTERY POSITIVE LEAD (+30)	BATTERY POSITIVE LEAD (+30)
2	SPEEDOMETER SENSOR POWER SUPPLY	SPEEDOMETER SENSOR POWER SUPPLY
3	SPEEDOMETER SENSOR BACK TO GROUND	SPEEDOMETER SENSOR BACK TO GROUND
4	REVOLUTION SENSOR INPUT	REVOLUTION SENSOR INPUT
5	BATTERY POSITIVE LEAD (+30)	BATTERY POSITIVE LEAD (+30)
6	ANTITHEFT DEVICE LED	ANTITHEFT DEVICE LED
7	KEY POSITIVE TERMINAL (+15)	KEY POSITIVE TERMINAL (+15)
8	SPEEDOMETER SENSOR INPUT	SPEEDOMETER SENSOR INPUT
9	GROUND	GROUND
10	AIR TEMPERATURE SENSOR BACK TO GROUND	AIR TEMPERATURE SENSOR BACK TO GROUND
11	EMERGENCY LIGHT BUTTON (HAZARD) INPUT	EMERGENCY LIGHT BUTTON (HAZARD) INPUT
12	LIGHTS ON INPUT	LIGHTS ON INPUT

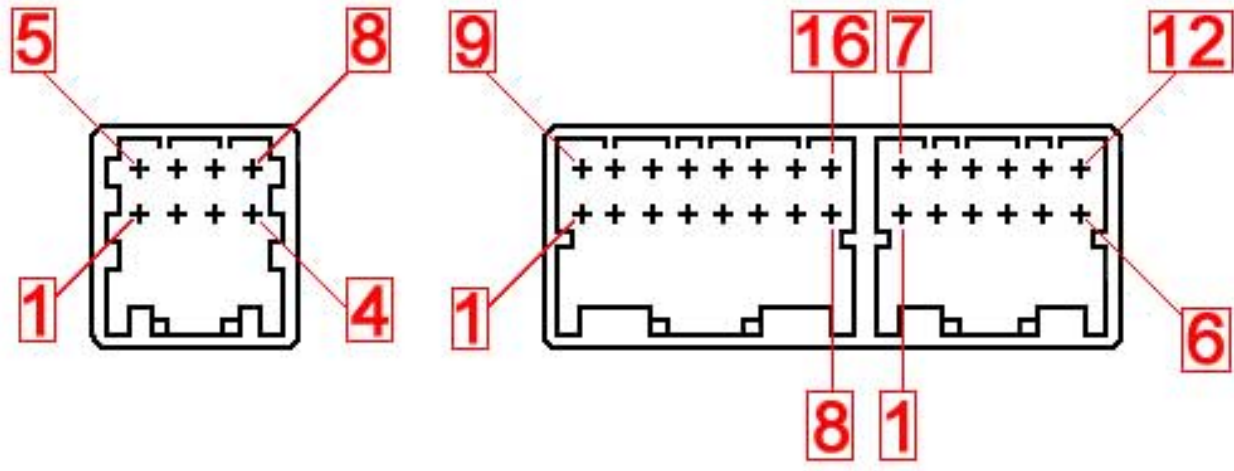
8-WAY INSTRUMENT CONNECTOR

	Specification	Desc./Quantity
1	GROUND ANALOGUE CHART	GROUND ANALOGUE CHART
2	BATTERY POSITIVE LEAD (+30) FOR ANALOGUE CARD	BATTERY POSITIVE LEAD (+30) FOR ANALOGUE CHART
3	ANALOGUE CARD SERIAL CLOCK OUTPUT	ANALOGUE CARD SERIAL CLOCK OUTPUT

Specification		Desc./Quantity
4	ANTITHEFT DEVICE LED OUTPUT	ANTITHEFT DEVICE LED OUTPUT
5	ANALOGUE CARD SERIAL DATE OUTPUT	ANALOGUE CARD SERIAL DATE OUTPUT
6	LIGHTS ON OUTPUT	LIGHTS ON OUTPUT
7	(Not connected)	
8	(Not connected)	

16-WAY INSTRUMENT CONNECTOR

Specification		Desc./Quantity
1	GENERAL USE WARNING LIGHT INPUT	GENERAL USE WARNING LIGHT INPUT
2	ABS WARNING LIGHT INPUT (NOT CONNECTED)	ABS WARNING LIGHT INPUT (NOT CONNECTED)
3	STOP LIGHT NOT WORKING OUTPUT	STOP LIGHT NOT WORKING OUTPUT
4	RIGHT TURN INDICATOR OUTPUT	RIGHT TURN INDICATOR OUTPUT
5	RIGHT TURN INDICATOR BUTTON INPUT	RIGHT TURN INDICATOR BUTTON INPUT
6	LEFT TURN INDICATOR BUTTON INPUT	LEFT TURN INDICATOR BUTTON INPUT
7	HIGH-BEAM WARNING LIGHT INPUT	HIGH-BEAM WARNING LIGHT INPUT
8	AIR TEMPERATURE SENSOR INPUT	AIR TEMPERATURE SENSOR INPUT
9	ENGINE UNABLE TO START WARNING LIGHT INPUT	ENGINE UNABLE TO START WARNING LIGHT INPUT
10	OIL PRESSURE WARNING LIGHT INPUT	OIL PRESSURE WARNING LIGHT INPUT
11	STOP LIGHT NOT WORKING WARNING LIGHT INPUT	STOP LIGHT NOT WORKING WARNING LIGHT INPUT
12	LEFT TURN INDICATOR OUTPUT	LEFT TURN INDICATOR OUTPUT
13	TURN INDICATOR OFF SWITCH INPUT	TURN INDICATOR OFF SWITCH INPUT
14	RESET SERVICE MANAGEMENT BUTTON INPUT	RESET SERVICE MANAGEMENT BUTTON INPUT
15	WATER TEMPERATURE SENSOR INPUT	WATER TEMPERATURE SENSOR INPUT
16	FUEL LEVEL SENSOR INPUT	FUEL LEVEL SENSOR INPUT



INDEX OF TOPICS

ENGINE FROM VEHICLE

ENG VE

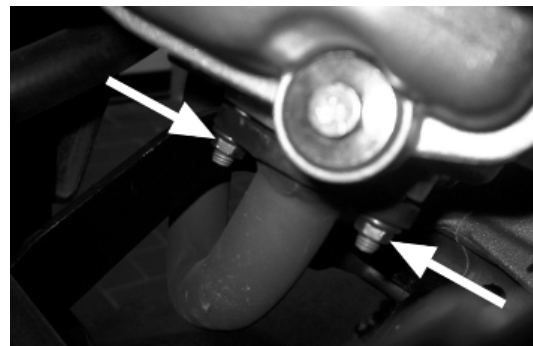
This section describes the operations to make to separate of the motor of the vehicle.

Exhaust assy. Removal

- Unscrew the 3 screws fixing the muffler to the engine crankcase and the supporting arm;
- Loosen the bolt holding the muffler to the exhaust manifold; after that, remove the muffler backwards.

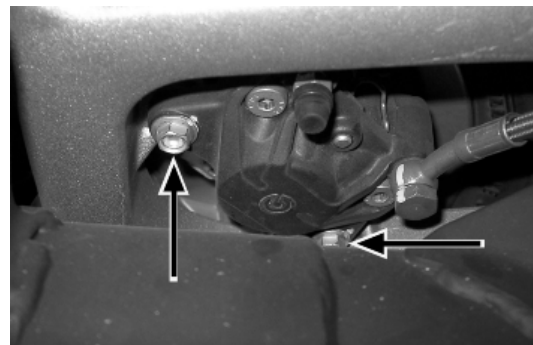


- Unscrew the 2 nuts that fix the exhaust manifold to the head and remove it.

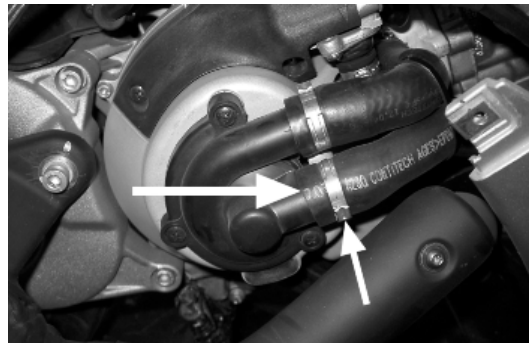


Removal of the engine from the vehicle

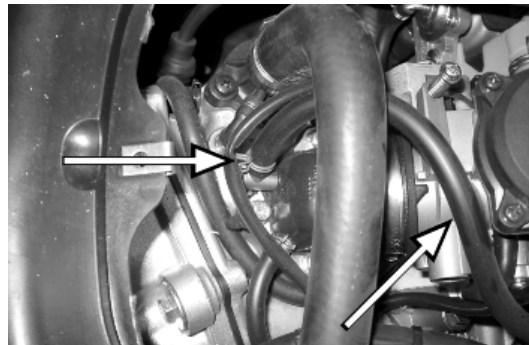
- Remove the side panels
- Undo the 2 screws fixing the rear brake calliper to the supporting arm and remove it.
- Keep the pipes connected to the calliper and move it aside towards the vehicle front part so as not to hinder the next removal operations.



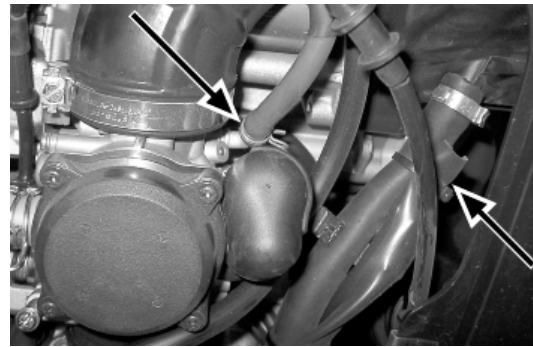
- Empty the cooling system.
- Remove the clamps and disconnect the coolant feeding (engine compartment) and return (water pump) pipes.



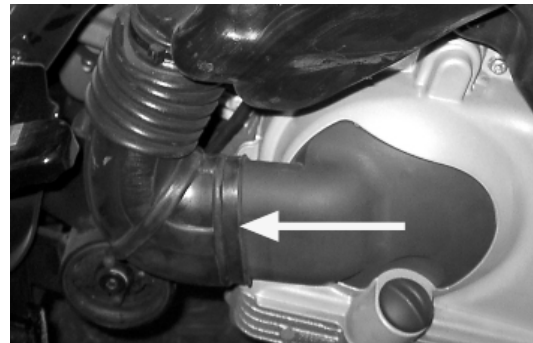
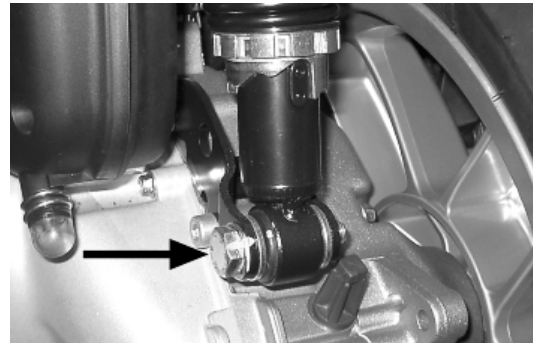
- Remove the holding springs and remove the coolant out pipes;
- Remove the holding springs and remove the petrol pump low-pressure tube from the inlet manifold;
- Move the accelerator wire from the throttle control rocking lever; unscrew the adjuster and disconnect the transmission from the carburettor.
- Disconnect the HV wire from the spark plug;
- Disconnect the thermistor electrical connection after removing the rubber cap.



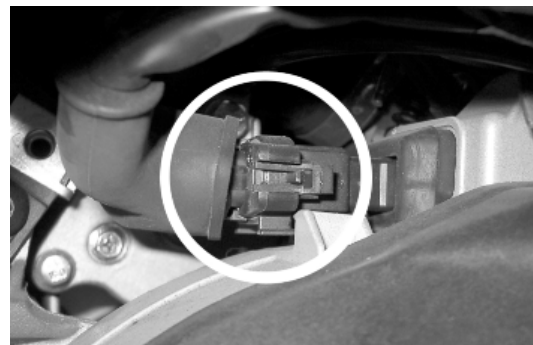
- Remove the holding spring and move the petrol feed pipe to carburettor;
- Cut the plastic clamp and disconnect the starter supply connection.



- Loosen the two screws fixing the rear shock-absorbers to the crankcase and the mounting arm;
- Cut the zip-tie on the transmission air duct, and then detach the manifold from the air intake on the frame.

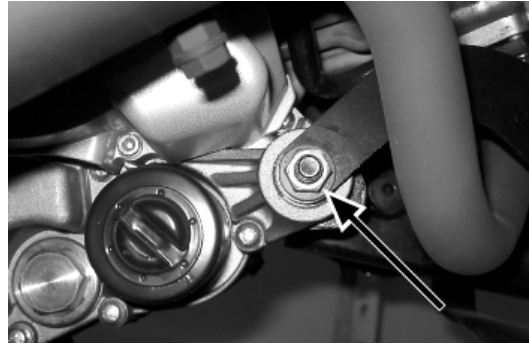


- Disconnect the electric connector linking the magneto flywheel to the vehicle cable harness.
- Remove the starter motor electrical connections operating on the two screws.
- Remove the footrest and the left side fairing; move the lower central cover slightly to the outside; after that, remove the three supporting plate fixing screws from the swinging arm buffer. Remove the buffer seal seeger ring



and remove the supporting plate from the swinging arm buffer.

- Support the vehicle adequately with the jack. Remove the engine - swinging arm fixing pin operating on the nut and the pin head.
- The engine is now free.



Locking torques (N*m)

Engine swinging arm pin nut 33 ÷ 41 Lower shock absorber clamp 33 ÷ 41 Rear brake calliper tightening screws 20 ÷ 25

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ENGINE

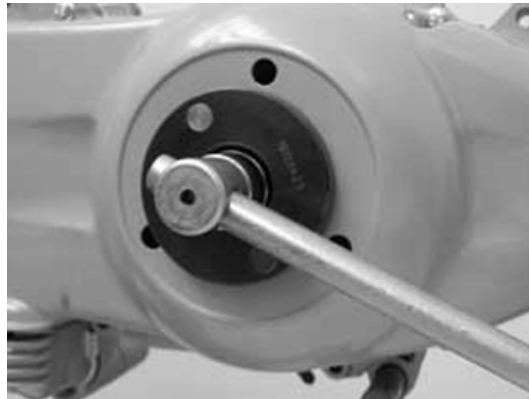
ENG

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

Version 125

- Remove the 4 screws and the housing.



- Remove the 5 screws, found 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

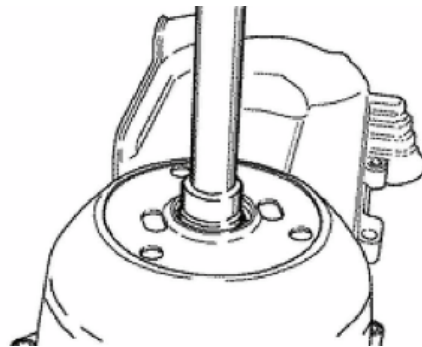
- Remove the clip from the inside of the cover.
- Remove the bearing from the crankcase by means of:

Specific tooling

020376Y Adaptor handle

020375Y Adaptor 28 x 30 mm

020412Y 15 mm guide



Refitting the driven pulley shaft bearing

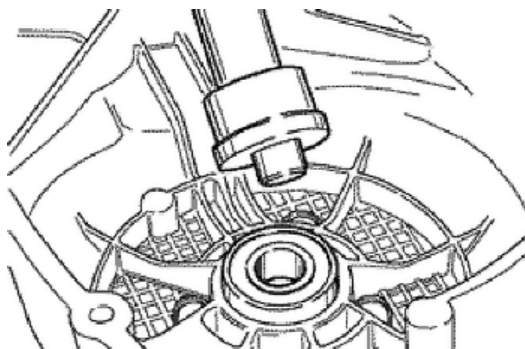
- Slightly heat the crankcase from the inside so as not to damage the painted surface.
- Insert the bearing in its seat.
- Refit the Seeger ring.

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 32x35-mm Adaptor

020412Y 15 mm guide

Baffle roller

Metallic roller

Removal

Belt support roller (200 cm³ models only)

- Check that the roller does not show signs of wear and that it turns freely.
- Remove the special fixing screw and the roller together with the bearing.



Refitting

- Heat the roller and insert the bearing using the specific punch:

Specific tools:

Specific tooling

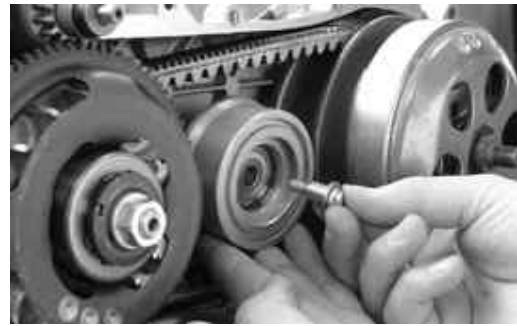
020455Y 10-mm guide



- Refit the roller with the special screw.
- Tighten to the specified torque.
- Refit the intake throat with the O-ring, the sump sealing gasket and a the fan housing.

Locking torques (N*m)

Anti-flapping roller 12 - 16

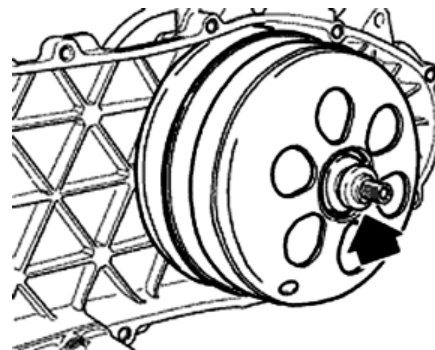


Removing the driven pulley

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

N.B.

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



Inspecting the clutch drum

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

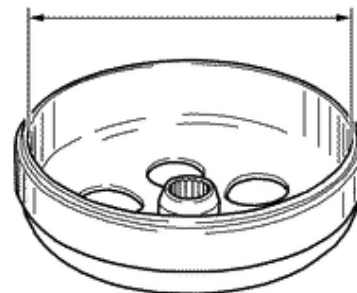
Characteristic

Max. value clutch bell

Max. value: $\varnothing$ 134.5 mm

Clutch bell standard value

Standard value: $\varnothing$ 134 - 134.2 mm



Checking the bell working surface eccentricity

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



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

Specific tooling

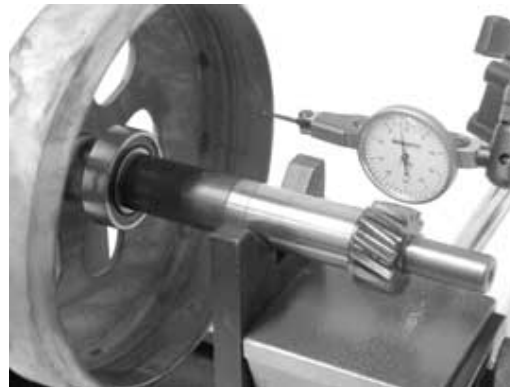
020074Y Support base for checking crankshaft alignment

020335Y Magnetic support for dial gauge

Characteristic

clutch bell inspection: Limit eccentricity.

Admissible limit eccentricity: 0.15 mm



Removing the clutch

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 wrench 46 x 55

020444Y010 adapter ring

- Fit the special driven pulley spring compressor tool with the medium-length pins in position "C" screwed up from the inner side of the tool.
- Introduce the adapter ring 11 with the chamfering facing the inside of the tool.
- Fit the driven pulley unit on the tool with the insertion of the 3 pins in the ventilation holes in the mass holder support.
- 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 9 to remove the nut fixing the clutch in place.
- Separate the driven pulley into its components (Clutch and spring with its plastic holder)

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 wrench 46 x 55

020444Y011 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 FAYING SURFACE AND MUST NOT BE DIFFERENT FROM ONE ANOTHER. VARIOUS CONDITIONS CAN CAUSE THE CLUTCH TO TEAR.

CAUTION

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

Characteristic**Check minimum thickness**

1 mm



Pin retaining collar

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

N.B.

USE TWO SCREWDRIVERS IF YOU HAVE ANY DIFFICULTY.

N.B.

BE CAREFUL NOT TO PUSH THE SCREWDRIVERS IN TOO FAR TO AVOID DAMAGE THAT COULD COMPROMISE THE O-RING SEAL.

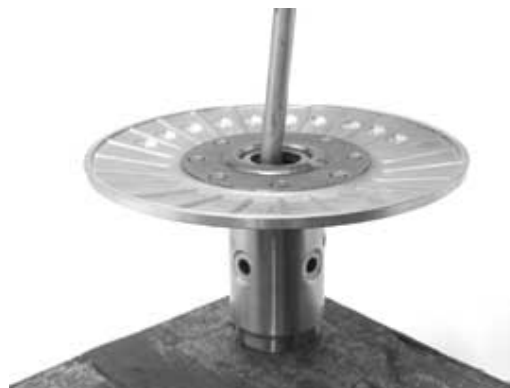


- Remove the 4 torque server pins and pull the pulley halves apart.



Removing the driven half-pulley bearing

- Check there are no signs of wear and/or noise; - 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.
- Check the riveted joints are functional.
- Check the evenness of the belt contact surface.

Characteristic**Half-pulley minimum diameter**

Minimum admissible diameter: Ø 40.96 mm

Half-pulley standard diameter

Standard diameter: Ø 40.985 mm

Wear limit

0.3 mm



- Misurare il diametro esterno del boccolo della puleggia.
- Verificare la superficie di contatto con la cinghia non presenti usure anomale.

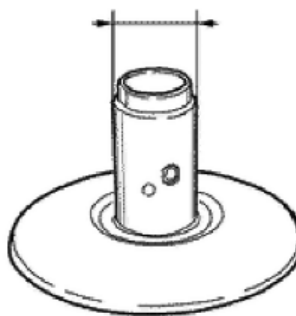
Characteristic

Half-pulley standard diameter

Standard diameter: $\varnothing$ 40.985 mm

Half-pulley minimum diameter

Minimum admissible diameter: $\varnothing$ 40.96 mm



Inspecting the driven sliding half-pulley

- Rimuovere i 2 anelli di tenuta interni e i 2 O-R;
- Misurare il diametro interno del boccolo della semipuleggia mobile.

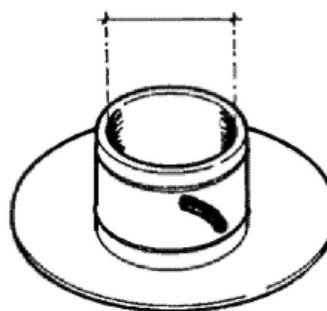
Characteristic

Movable driven half-pulley max. diameter

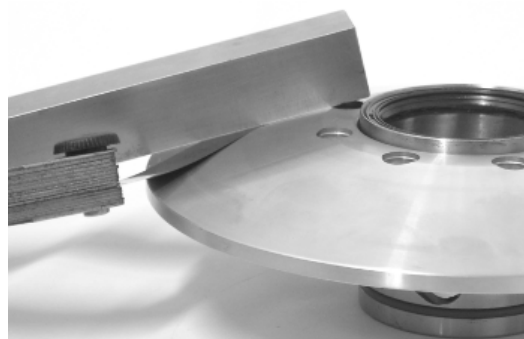
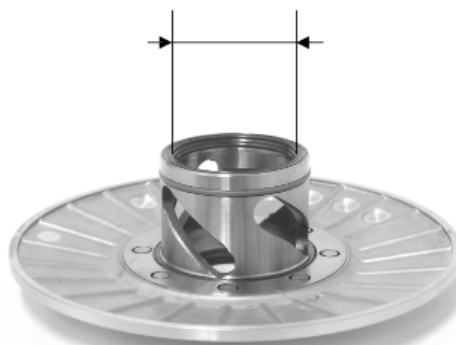
Max. diameter admitted: $\varnothing$ 41.08 mm

Movable driven half-pulley standard diameter

Standard diameter: $\varnothing$ 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 casing as shown in the figure.
- For the fitting of the new ball bearing, follow the example in the figure using a modular punch.

Fit the snap ring

WARNING

N.B.

FIT THE BALL BEARING WITH THE VISIBLE SHIELD

Specific tooling

020376Y Adaptor handle

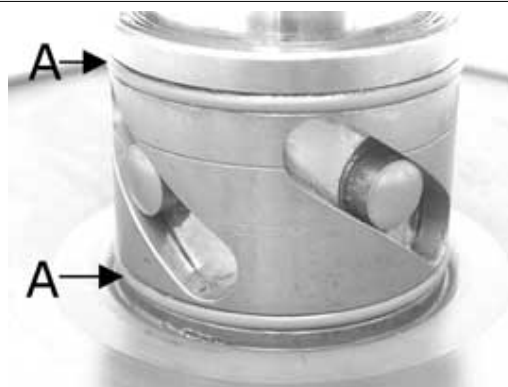
020375Y Adaptor 28 x 30 mm

020424Y Driven pulley roller casing fitting punch

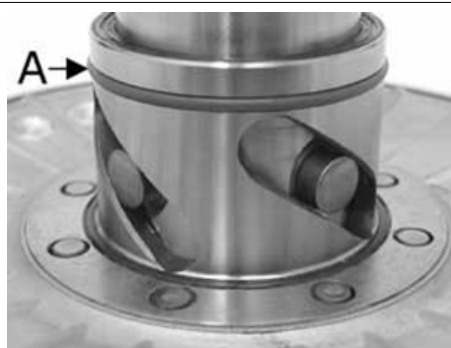


Refitting the driven pulley

- Inserire i nuovi paraoli ed anelli O-R sulla semi-puleggia mobile.
- Lubrificare leggermente di grasso gli anelli O-R (A) indicati in figura.



- 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 Driven pulley assembly sheath

Recommended products

AGIP GREASE SM 2 Grease for the tone wheel revolving ring

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

Inspecting the clutch spring

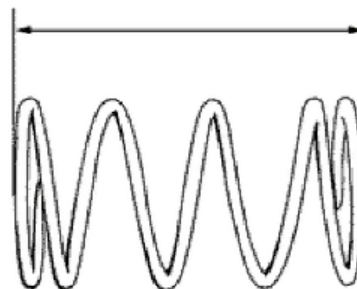
- Misurare la lunghezza libera della molla della semipuleggia condotta mobile.

Caratteristiche tecniche**Lunghezza standard**

106 mm

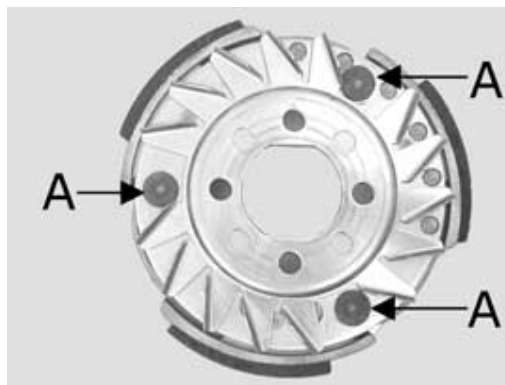
limite dopo l'uso

101 mm

**Refitting the clutch**

Version 125

- 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 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 its plastic holder in contact with the clutch.
- Insert the driving belt into the pulley unit according to their direction of rotation.
- Insert the pulley unit with the belt into the tool.



- Slightly preload the spring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Place the tool in the clamp with the control screw on the horizontal axis.
- Fully preload the spring.
- Apply the clutch 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 specific tool.
- Preload the clutch return 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 unit 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.

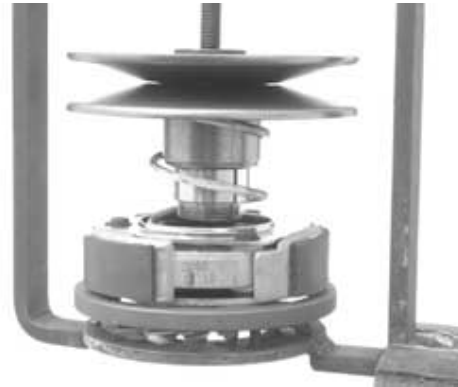
Specific tooling

020444Y011 adapter ring

020444Y009 wrench 46 x 55

Locking torques (N*m)

Clutch unit nut on driven pulley 55 ÷ 60



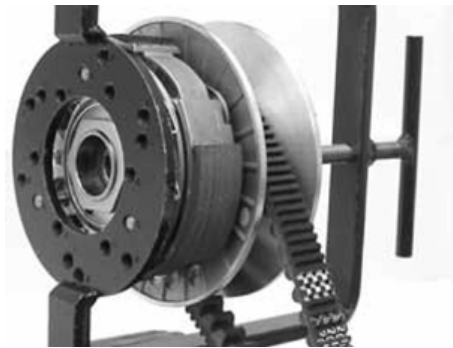
- Support the driven pulley spring compressor appropriate tool with the control screw in vertical axis.
- Arrange the tool with the medium length pins screwed in position "C" on the inside.
- Introduce the adapter ring 11 with the chamfering facing upwards.
- Insert the clutch on the adapter ring.
- Lubricate the end of the spring that abuts against the servo-system closing collar.
- Insert the spring with its plastic holder in contact with the clutch.
- Insert the driving belt into the pulley unit according to their direction of rotation.
- Insert the pulley unit with the belt into the tool.
- Slightly preload the spring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Place the tool in the clamp with the control screw on the horizontal axis.
- Fully preload the spring.
- Apply the clutch fixing nut and tighten it to the prescribed torque using the special 46x55 wrench.
- Loosen the tool clamp and insert the belt according to its direction of rotation.
- Lock the driven pulley again using the specific tool.
- Preload the clutch return spring with a traction/rotation combined action and place the belt in the smaller diameter rolling position.
- Remove the driven pulley /belt unit from the tool.

N.B.

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

N.B.

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

Specific tooling

020444Y Tool for fitting/ removing the driven pulley clutch

020444Y011 adapter ring

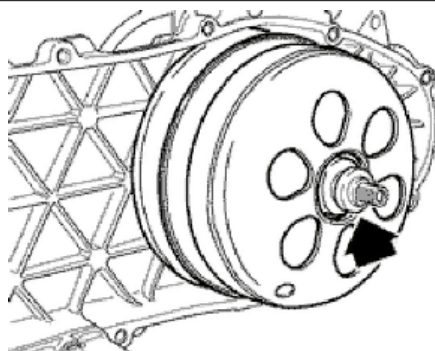
020444Y009 wrench 46 x 55

Locking torques (N*m)

Nut locking clutch unit on pulley 55 ÷ 60 Nm

Refitting the driven pulley

- Reassemble the clutch bell and spacer.



Drive-belt

- Verificare che la cinghia di trasmissione non sia danneggiata.
- Verificare la larghezza della cinghia.

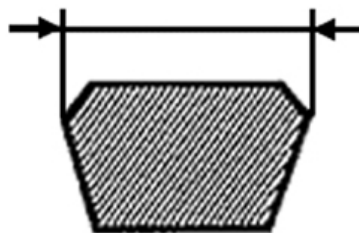
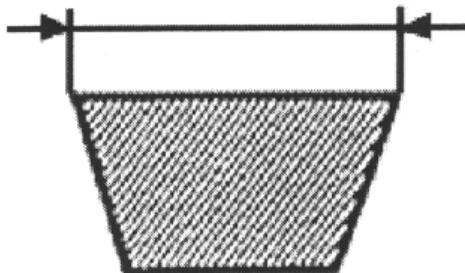
Caratteristiche tecniche

Cinghia di trasmissione - larghezza standard:

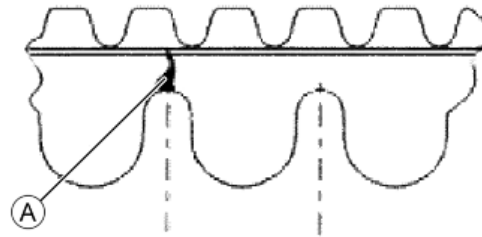
22,5 ± 0,2 mm

Cinghia di trasmissione - larghezza minima:

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 toothing does not show signs of incisions or cracking (see figure): The rim bottom of the tooth must not have incisions or cracking; if it does, change the belt.



Removing the driving pulley

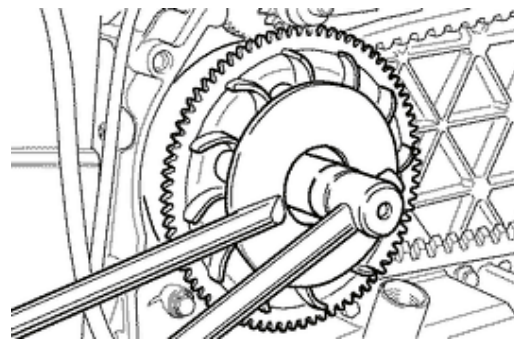
Driving pulley removal (125)

- 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.

Appropriate tools:

Specific tooling

020368Y driving pulley lock wrench



Driving pulley removal

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

Appropriate tools:

Specific tooling

020442Y Pulley lock wrench

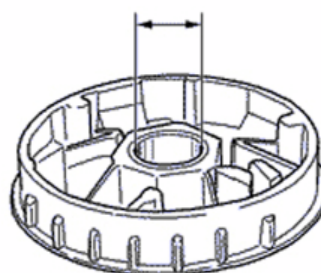


- Remove the entire start-up crown unit with the torque limiter.
- Remove the fixed driving half-pulley together with the O-ring and the steel washer touching the bushing.



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 (200): Minimum diameter allowed

Ø 20 mm

roller (125): Minimum diameter allowed

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 (200): Standard Diameter



Diameter 20.5 - 20.7 mm

roller (125): Standard Diameter

Ø 18.9 ÷ 19.1 mm

Sliding bushing: Standard Diameter

Ø 25.959 ÷ 25.98 mm

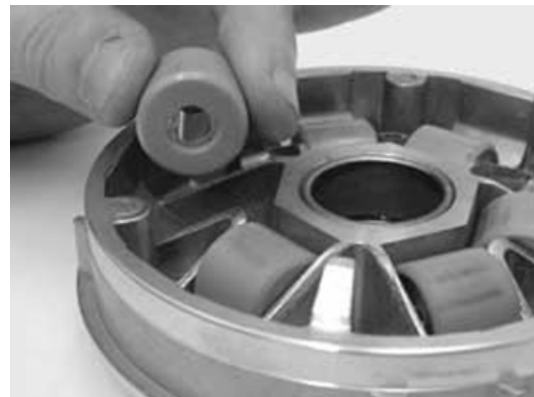
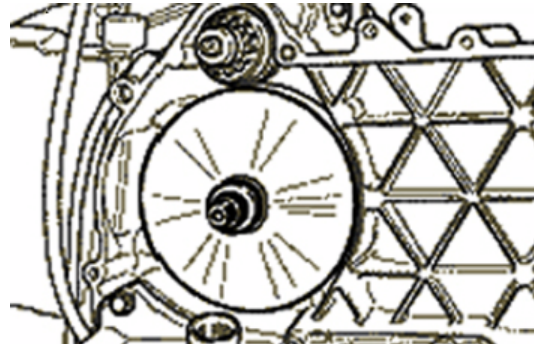
movable driving half-pulley bushing: Standard Diameter

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



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



Specific tooling

020442Y Pulley lock wrench

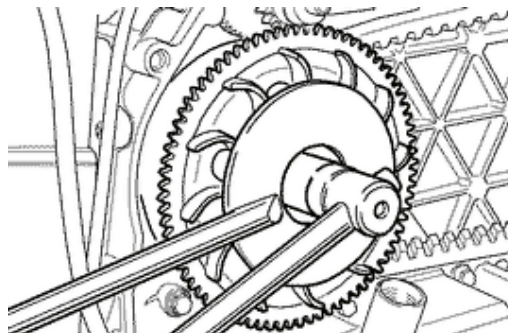
Recommended products

Loctite "Super Rapido" Loctite "Super Rapido" 243

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

Locking torques (N*m)**Drive pulley nut 75 ÷ 83**

- 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 that there are 2 centring dowels and that the sealing gasket for the oil sump on the transmission cover is adequately fitted.
- Replace the cover and tighten the 10 screws to the specified torque.
- Refit the oil loading cap/bar.
- Refit the steel washer and the driven pulley nut.
- Tighten the nut to the prescribed torque using the lock wrench and the torque wrench tools.
- Refit the plastic cover.

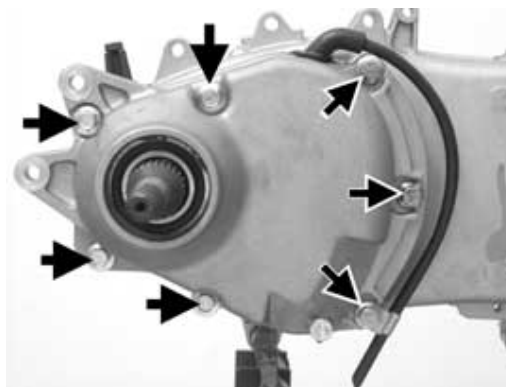
**Specific tooling****020423Y Driven pulley lock wrench****Locking torques (N*m)**

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

End gear

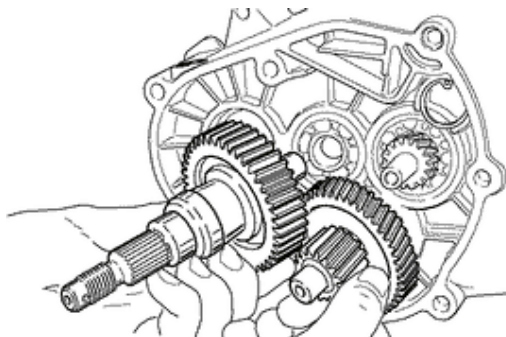
Removing the hub cover

- Empty the rear hub through the oil drainage 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.



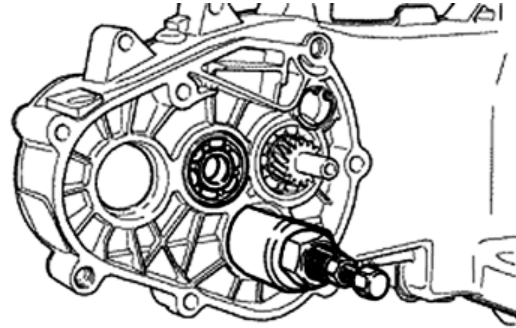
Removing the hub bearings

- 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 ø 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

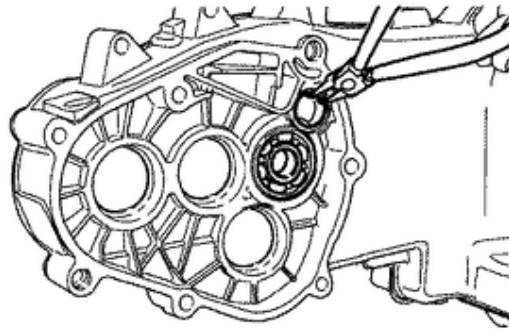
020359Y 42x47-mm Adaptor



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 52x55-mm Adaptor

020483Y 30 mm guide

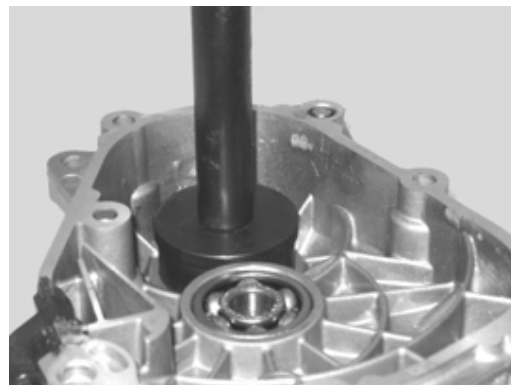


Assemble the seeger ring.



- 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.

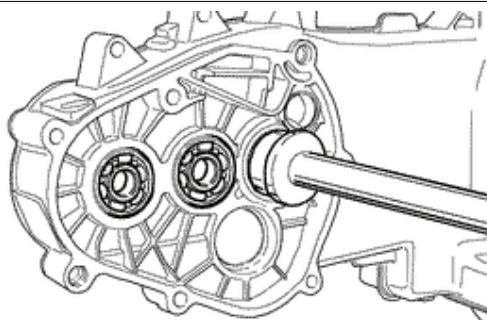
The 52 mm side of the adapter must be turned towards the bearing.



Refitting the hub cover bearings

In order to fit 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, ADEQUATELY 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



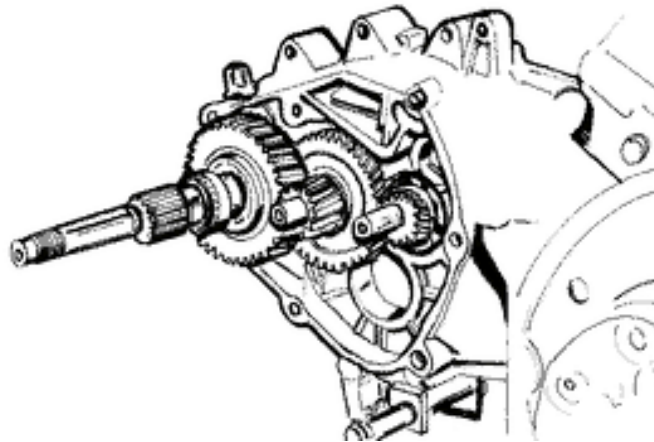
N.B.

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.

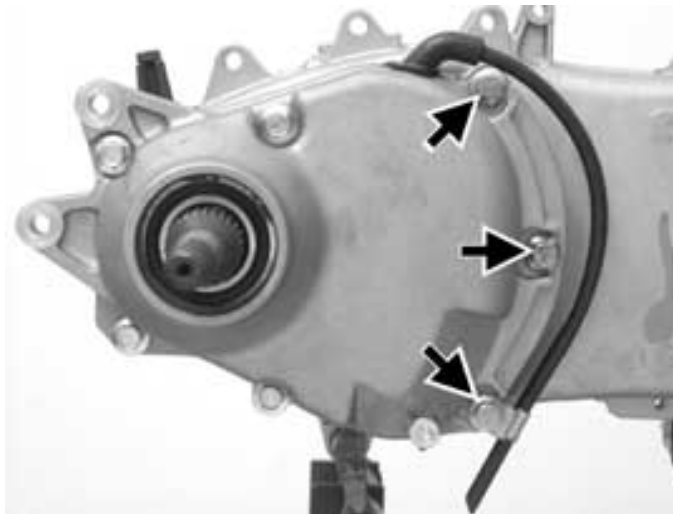


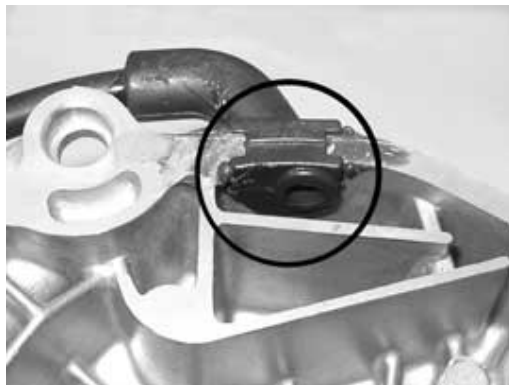
Refitting the ub cover

- 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

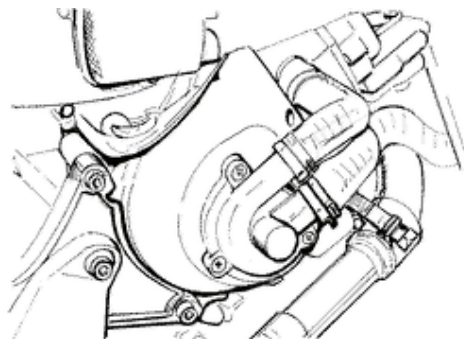




Flywheel cover

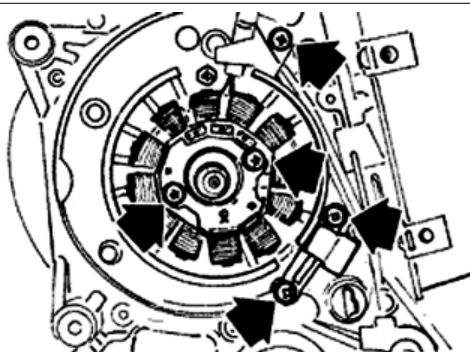
Removing the hub cover

- 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

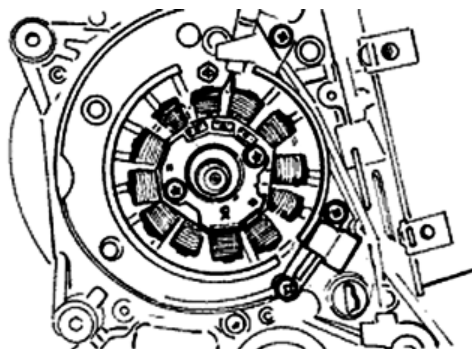
- Refit the stator and flywheel carrying out the removal procedure in reverse, tightening the retainers to the specified torque.
- Place the cable harness as shown in the figure.
- Stator screws and Pick-Up

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

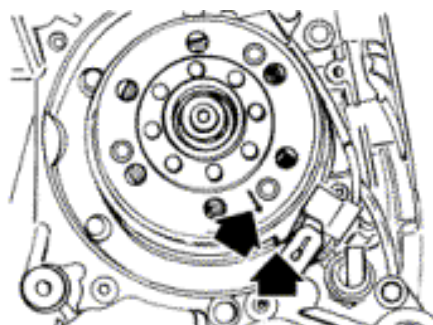


Refitting the flywheel cover

- 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

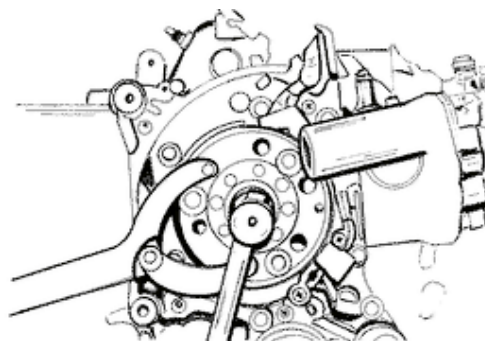
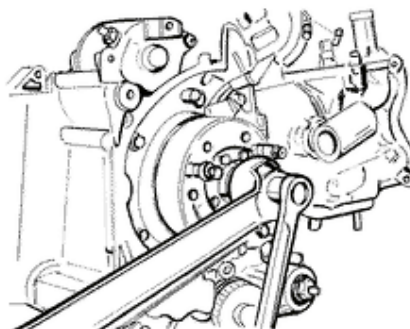
- Lock the rotation of the Flywheel with the calliper spanner tool.
- Remove the nut.
- Take out the flywheel.

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

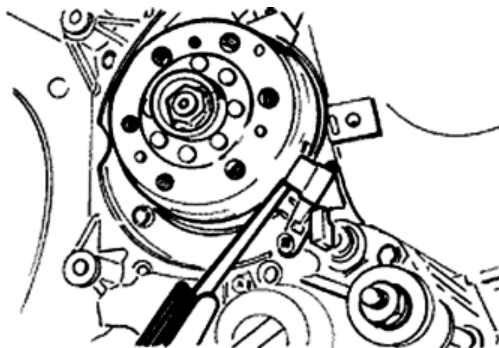
- Fit the flywheel being careful to insert the key properly.
- Lock the flywheel nut to the prescribed torque
- Check that the Pick-Up air gap is between 0.34 ÷ 0.76 mm.

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

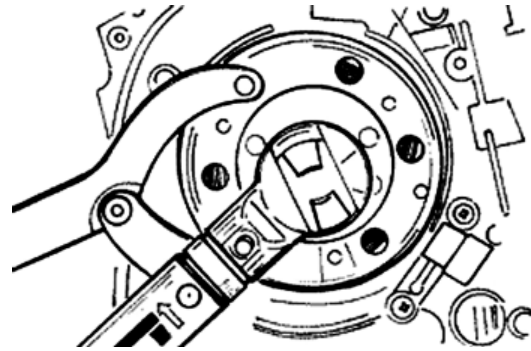


Specific tooling

020565Y Flywheel lock calliper spanner

Locking torques (N*m)

Flywheel nut 54 ÷ 60

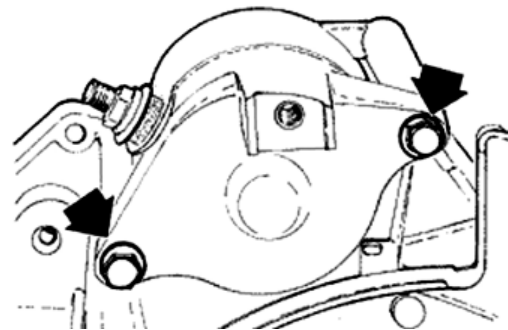


Refitting the starter motor

- Fit a new O-ring on the starter motor and lubricate it.
- Fit the starter on the crankcase and lock the 2 screws to the prescribed torque.

Locking torques (N*m)

Starter motor screws 11 ÷ 13



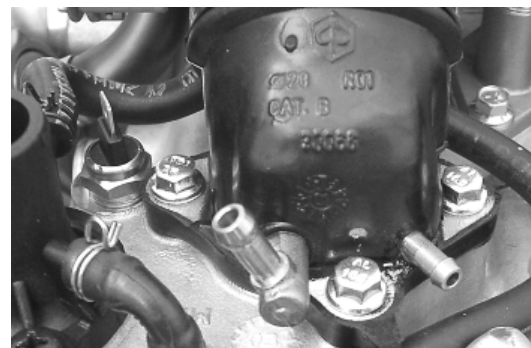
Cylinder assy. and timing system

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.

TAMPERPROOF SCREWS ARE SUPPLIED WITH 125 CC MODELS.



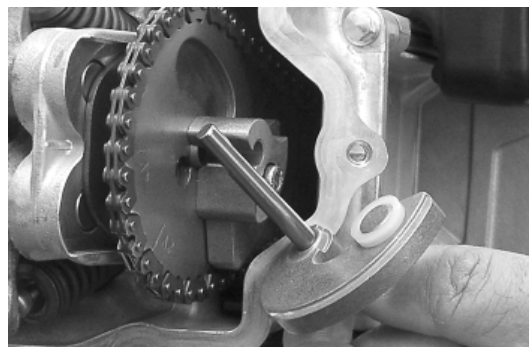
Removing the rocker-arms cover

- Remove the 5 screws indicated in the figure

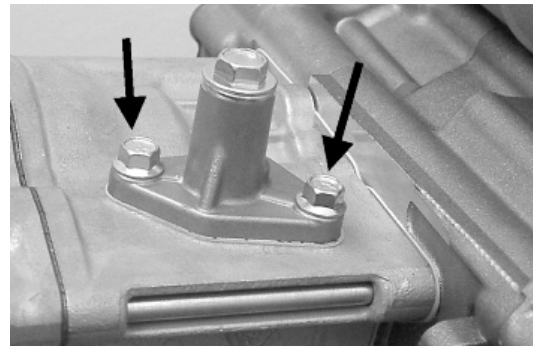


Removing the timing system drive

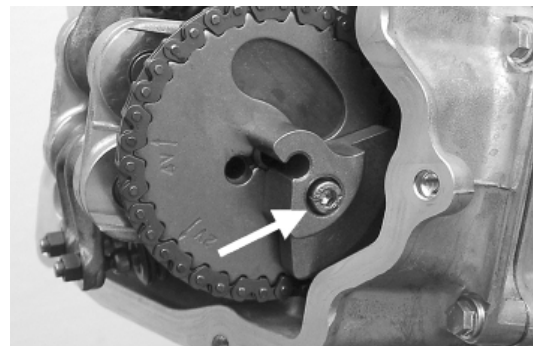
- First remove the parts listed below: transmission cover, drive pulley with belt, oil sump with spring and by-pass piston, oil pump pulley cover, O-ring on the crankshaft and the sprocket wheel separation washer.
- Remove the tappet cover.
- Remove the central screw fastener and the automatic valve-lifter 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.

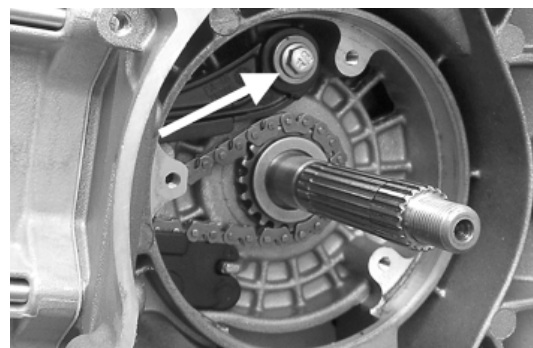


- Remove the camshaft control pulley with its washer.



- 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 tensioner slider must be removed from the transmission side. As regards the lower chain guide slider, it may only be removed after the head has been removed.



N.B.

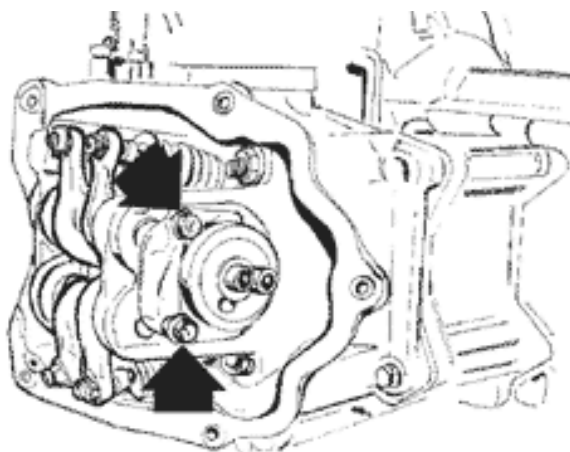
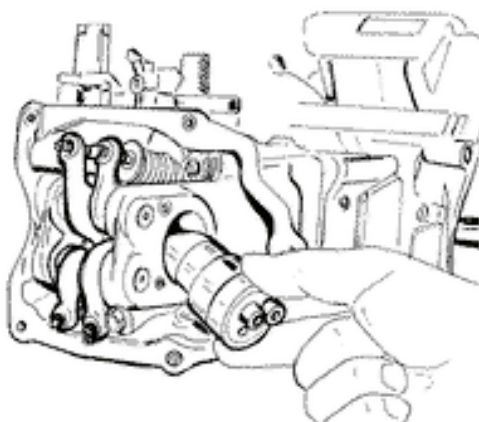
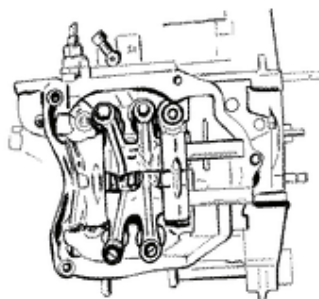
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

Removing the cam shaft

- Remove the 2 screws and the camshaft retainer shown in the diagram.
- Remove the camshaft.
- Remove the pins and the rocking levers from the flywheel side holes.

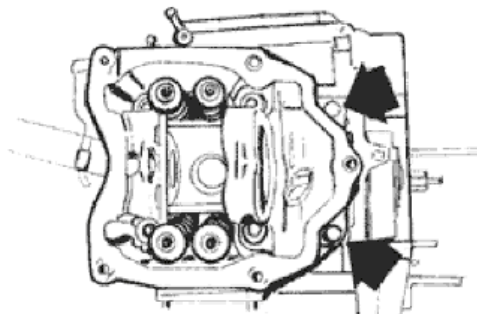
N.B.

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



Removing the cylinder head

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



N.B.

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

Removing the valves

- Using the appropriate tool fitted with an adaptor, remove the cotters, caps, 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 sealing rings



Removing the cylinder - piston assy.

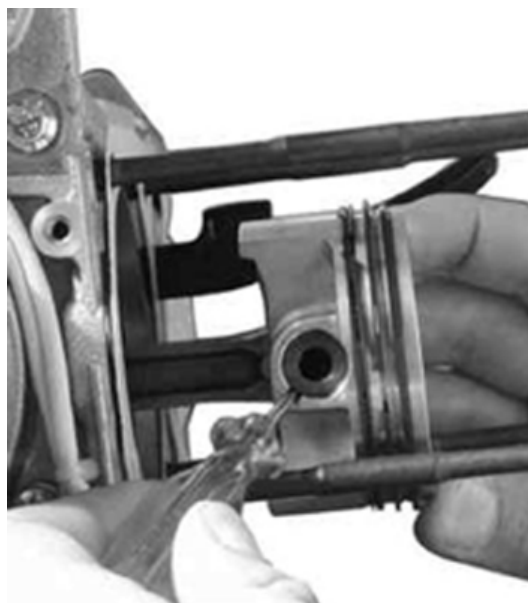
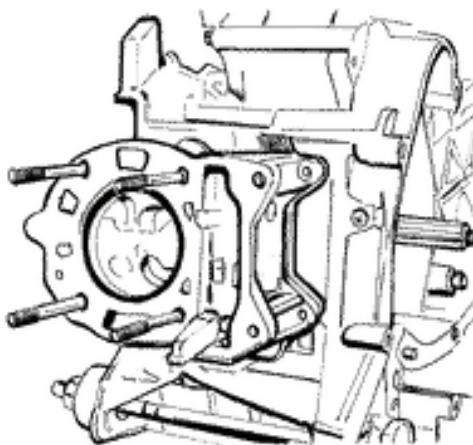
- Remove the chain guide pad.
- Pull out the cylinder.
- Remove the cylinder base gasket.
- Remove the two stop rings, the wrist pin and the piston.
- Remove the piston seals.

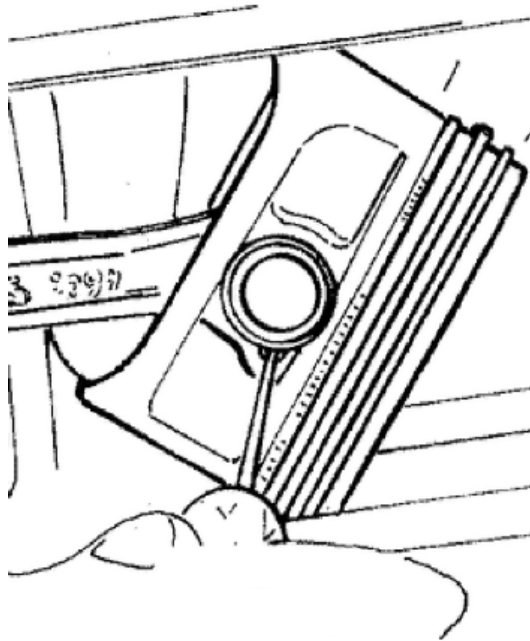
CAUTION

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 IT SHOWS SIGNS OF WEAR OR OVERHEATING.

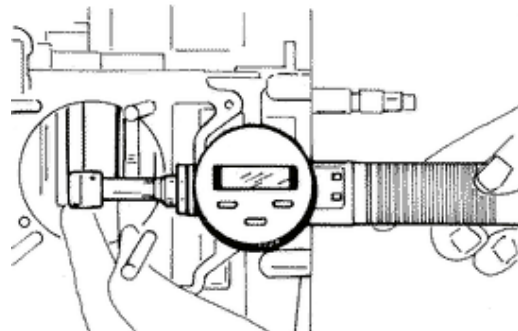
Characteristic

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

- Check the pin outside diameter.
- Calculate the coupling clearance between pin and connecting rod end.
- Measure the capacity diameter on the piston.
- Calculate the coupling clearance between pin and piston.
- Measure the piston outside diameter according to a direction orthogonal to the pin axis.
- Take the measurement in the position shown in the figure.

125 cc: 41.1 mm (from top) 200 cc: 5 mm (from base)

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

Maximum admissible out of plane: 0,05 mm

- Pistons and cylinders are classified into categories based on their diameter. Coupling is made in pairs (A-A, B-B, C-C, D-D).
- The cylinder adjustment operation must be carried out with a finishing complying with the original angle.
- The cylinder surface must exhibit a roughness of 0.9 micron.

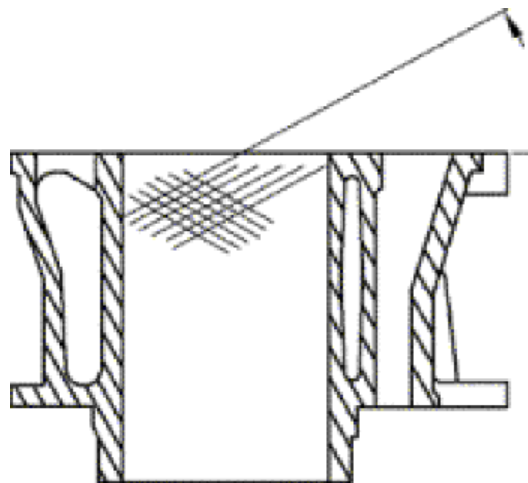
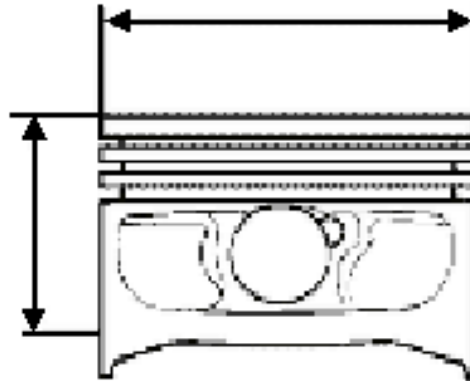
- This is required for ensuring a good settling of the sealing rings, thereby ensuring a low oil consumption and excellent performance.

For engine 125 cc

- There are uprated pistons for the cylinder adjustment, divided into three categories 1°, 2°, 3° equal to 0.2-0.4-0.6 mm of uprating. These are classified in the 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

Piston pin diameter: Standard diameter: 200 - 250 cc

68,990 ÷ 69,018

Pin diameter Standard diameter: 125 cc

56.997 ÷ 57.025

Piston pin diameter: Piston 200 - 250

68,933 ÷ 68,961 mm

piston diameter

56.945 ÷ 56.973 mm

Pin diameter: Standard clearance

0.015 ÷ 0.029 mm

Pin diameter Standard diameter

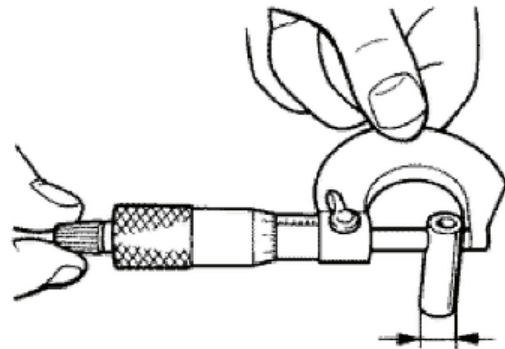
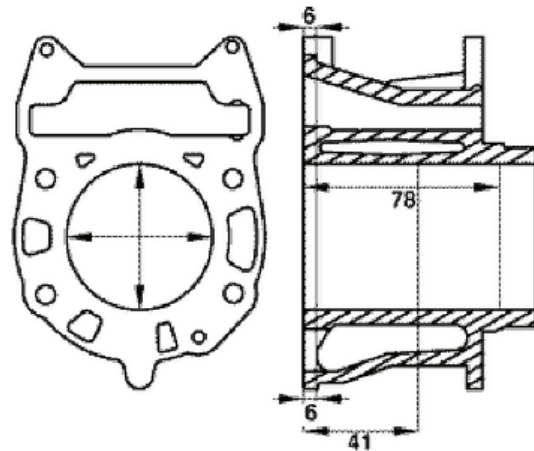
14.996 - 15.000 mm

Wrist pin seat on the piston: Standard diameter

15.001 ÷ 15.006 mm

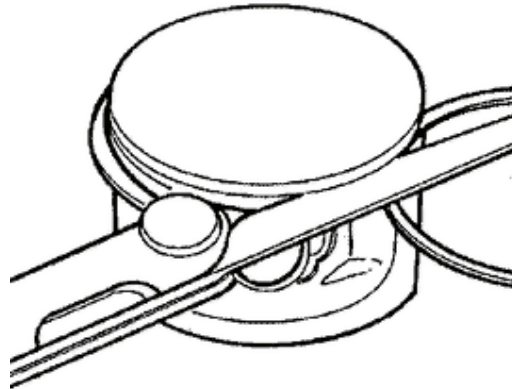
**Diameter of the wrist pin seat on the piston:
Standard clearance**

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.



125 cc

Inspecting the piston rings

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

N.B.

BEFORE REPLACING ONLY THE PISTON RINGS, ENSURE THAT THE CLEARANCE BETWEEN THE PISTON RINGS AND THE PISTON RING GROOVES, AND BETWEEN THE PISTON AND THE CYLINDER, IS AS SPECIFIED. IN ANY CASE, NEW PISTON RINGS USED IN COMBINATION WITH A USED CYLINDER MAY HAVE DIFFERENT BEDDING CONDITIONS THAN THE STANDARD.



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.

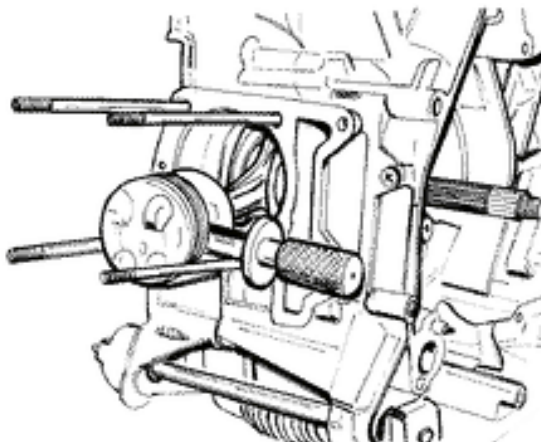
N.B.

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

Specific tooling

020430Y Pin lock fitting tool

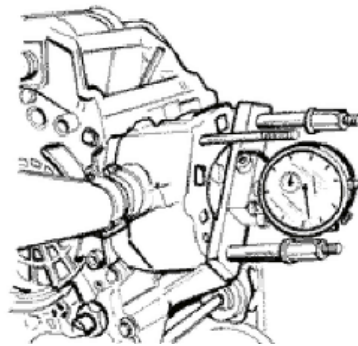
020454Y Tool for fitting piston pin stops (200 - 250)





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. Correctly identify the cylinder base gasket thickness to keep the correct compression ratio.
- Remove the specific tool and the cylinder.



N.B.

**PISTON PROTRUSION IS MEASURED IN 125 ENGINES
WHILE INTRODUCTION IS MEASURED IN 200 ENGINES.**

See also

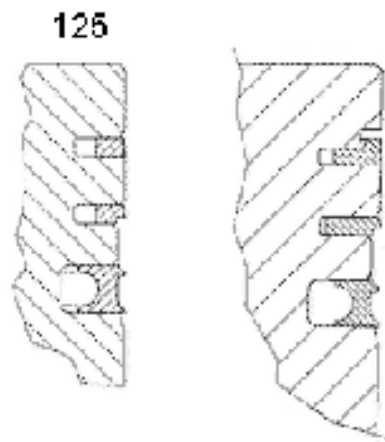
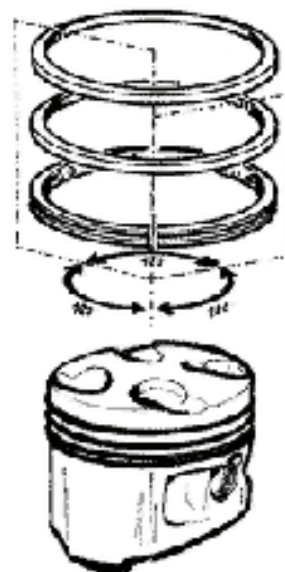
[Slot packing system](#)

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.
- The 200 engine takes the 1st segment with L section.

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 assembly band

020287Y Clamp to assemble piston on cylinder



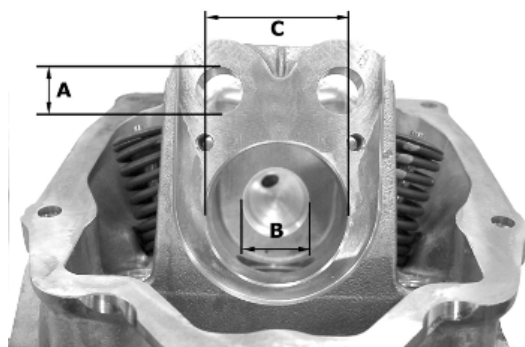
Inspecting the cylinder head

- Using a trued bar and a feeler thickness 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 rocking lever 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»

Diameter 12.000 - 12.018 mm

bearing «B»

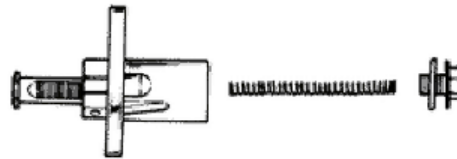
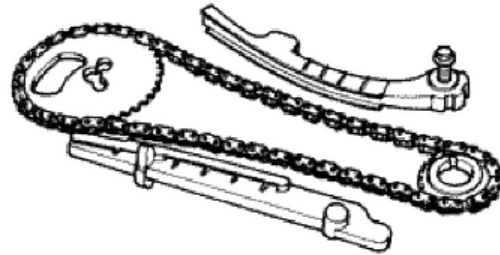
Ø 20.000 ÷ 20.021 mm

bearing «C»

Ø 37.000 - 37.025 mm

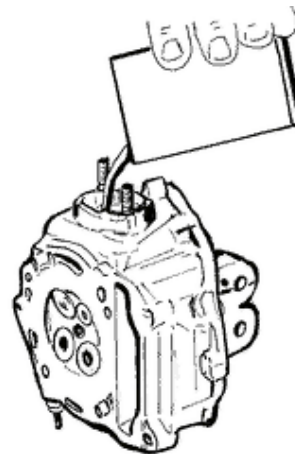
Inspecting the timing system components

- Check that the guide slider and the tensioner slider are not worn out.
- Ensure that the camshaft control pulley chain assembly and the sprocket wheel are not worn.
- If you detect wear, replace the parts or, if the chain, sprocket wheel and pulley are worn, replace the whole unit.
- 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 unit.



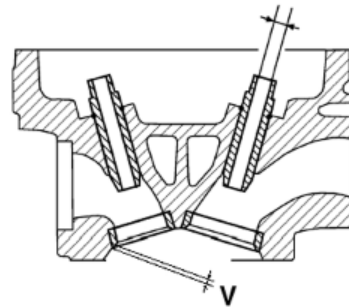
Inspecting the valve sealings

- 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 Intake guide

Standard diameter: 5.000 ÷ 5.012 mm

Valve seat wear Exhaust guide

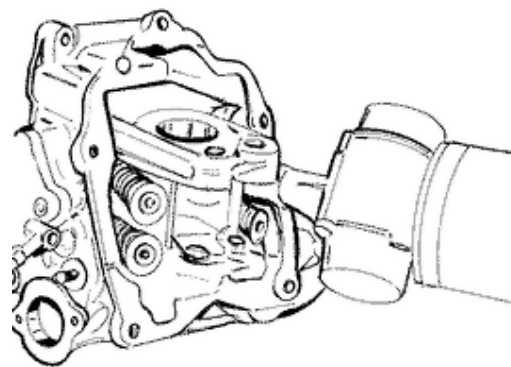
Accepted limit 5.022

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 facing surface with the articulated set screw terminal.
- If no anomalies are found during the above checks, you can use the same valves. For best sealing results, it is advisable to grind the valves. Grind the valves gently with a fine-grained lapping compound. Upon 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**

Exhaust: 94.4 mm

Valve check Standard length

Inlet: 94.6 mm

Valve check Maximum admissible clearance

Exhaust: 0.072 mm

Valve check Maximum admissible clearance

Inlet: 0.062 mm

Valve check standard clearance

Exhaust: 0.025 ÷ 0.052 mm

Valve check standard clearance

Inlet: 0.013 ÷ 0.040 mm

Valve check Minimum admissible diameter:

Exhaust: 4.95 mm

Valve check Minimum admissible diameter:

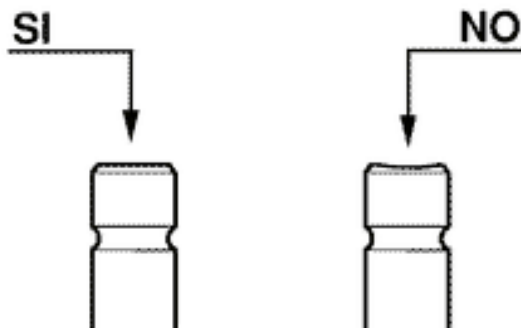
Inlet: 4.96 mm

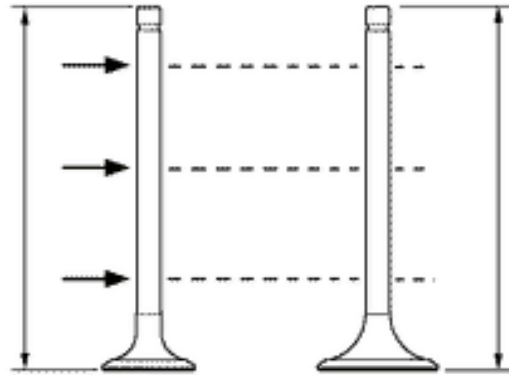
Valve check Standard diameter:

Inlet: 4.972 ÷ 4.987 mm

Valve check Standard diameter:

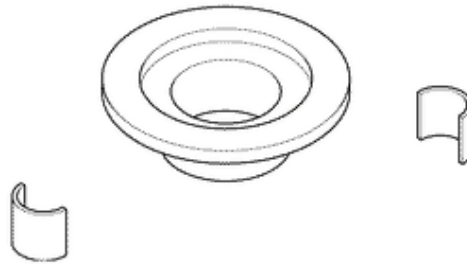
Exhaust: 4.96 ÷ 4.975 mm





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 spring retaining 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 sealing rings

020382Y Valve cotters equipped with part 012 removal tool

020382Y011 adapter for valve removal tool

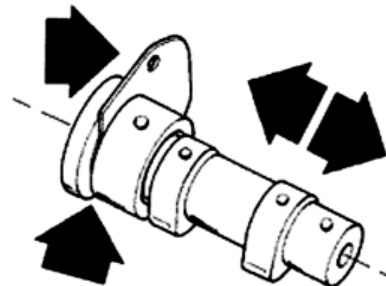
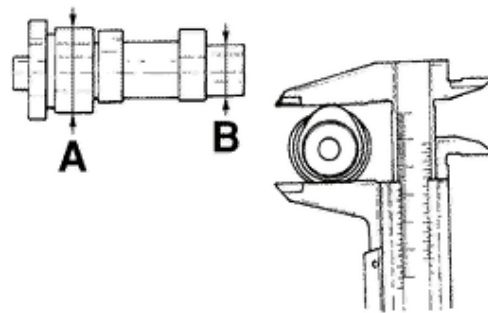




Inspecting the cam shaft

- Inspect the camshaft for signs of abnormal wear on the cams.
- Check the cam height.
- Check there is no wear on the camshaft retaining plate and its associated groove on the camshaft.
- 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 rocking lever pins do not show signs of wear or scoring.
- Measure the internal diameter of each rocking lever.

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



Characteristic

Rocking lever inside diameter: Standard diameter

Diameter 12.000 - 12.011 mm

Rocking lever pin diameter: Standard diameter

Diameter 11.977 - 11.985 mm

Camshaft check: Maximum admissible axial clearance

0.42 mm

Camshaft check: Standard axial clearance:

0.11 - 0.41 mm

Camshaft check: Standard height

Exhaust: 29.209 mm

Camshaft check: Standard height

Inlet: 30.285 mm

Camshaft check: Minimum admissible diameter

Bearing B diameter: 19.950 mm

Camshaft check: Minimum admissible diameter

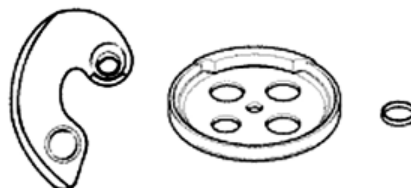
Bearing A Ø: 36.94 mm

Camshaft check: Standard diameter

Bearing B diameter: 19.959 ÷ 19.98 mm

Camshaft check: Standard diameter

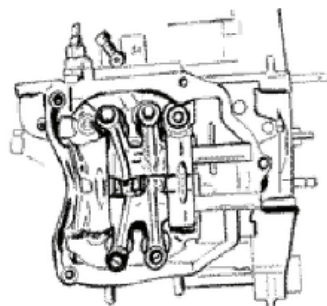
Bearing A Ø: 36.95 ÷ 36.975 mm



Refitting the head and timing system components

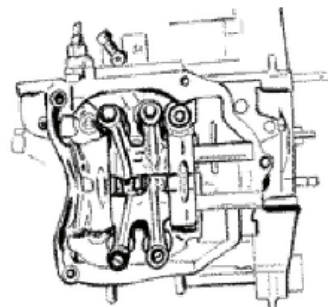
Assemble the lower timing chain sprocket wheel on the crankshaft, with the chamfer facing the insertion side.

- 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°.

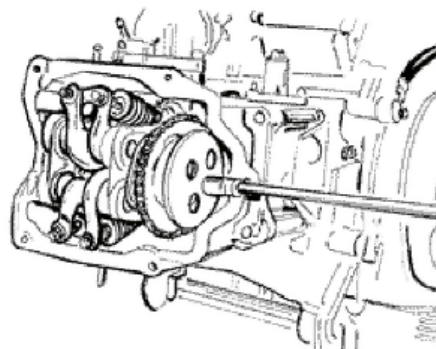


Assemble the limiting bell using the counterweight fixing screw as a reference.

- 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 Nm
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
Counterweight screw	7 ÷ 8.5
Plate screws	4 ÷ 6 Nm

Name	Torque in Nm
Slider screw	10 ÷ 14 Nm

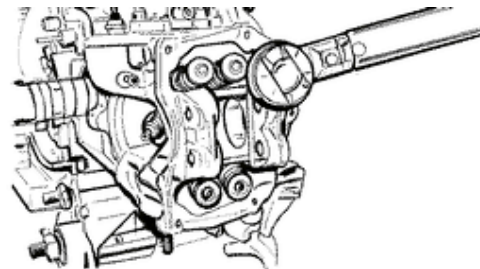
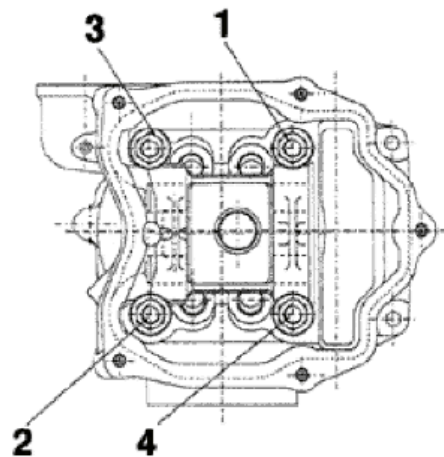
- Fit the timing chain guide pad.
- Insert the centring dowel between the cylinder head to the cylinder, fit the cylinder head gasket and the cylinder head.
- Lubricate the stud bolt threading.
- Tighten up the nuts to a pre-torque of 7 ± 1 N·m
- Rotate by a 180° angle (2 rotations of 90° each)
- To 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 and tighten 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

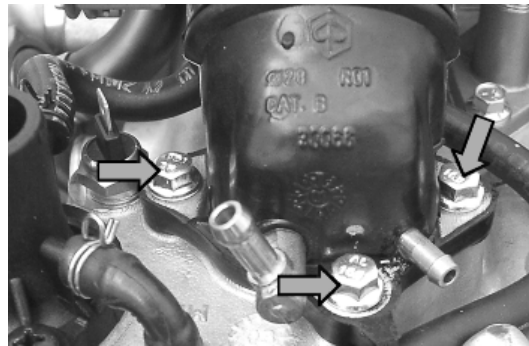


Refitting the intake manifold

Fit the intake manifold and do up the three screws.

N.B.

USE COMMERCIALY AVAILABLE INSERTS AND INSERT HOLDERS FOR THE SPECIAL SCREWS FOR 125 CM³ MODELS.

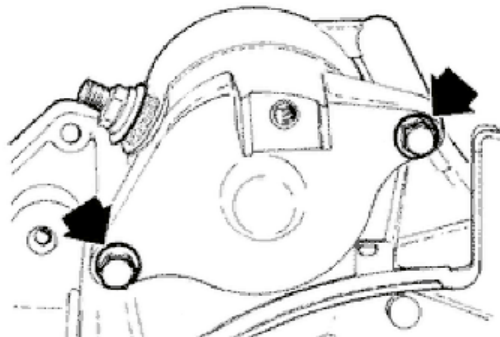


Crankcase - crankshaft

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.



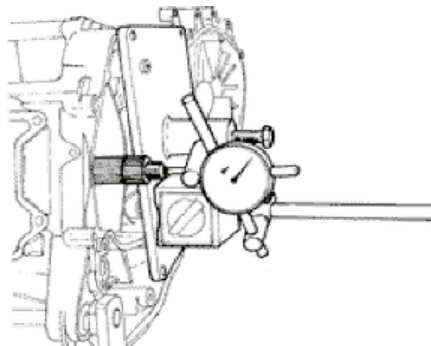
- Remove the flywheel cover together with the water pump, the flywheel and the stator as described in the **magneto flywheel** chapter.
- Remove the oil filter and the oil pressure switch.
- Remove the cylinder/piston/head unit as described in the **cylinder head timing system** chapter.

- 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 crankcase coupling screws.

- Split the crankcases while keeping the driving shaft inserted on one of the 2 half-crankcases.

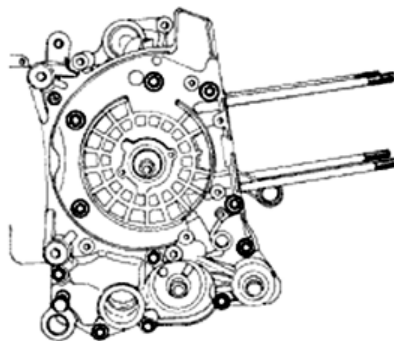
Remove the driving shaft.

N.B.

The crankshaft of the 200 cm³ version has two steel shim washers. Take note of their fitting position.

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.

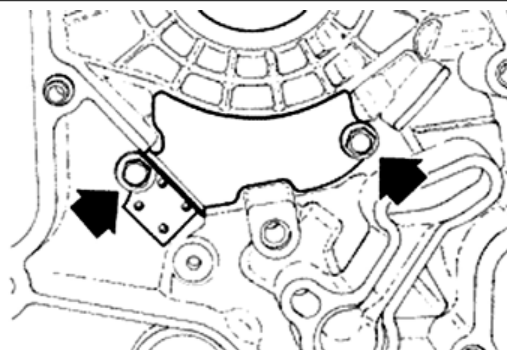


- Remove the coupling gasket of the crankcase halves.

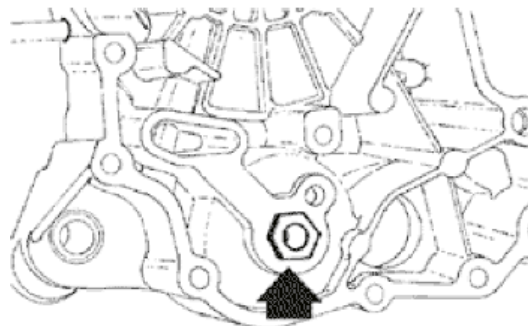
- Remove the two screws and the internal cover shown in the diagram.

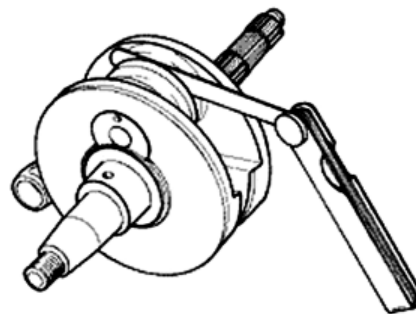
CAUTION

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.

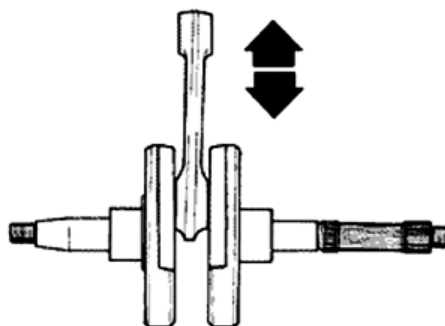
Standard dimensions:

$55.75 \div 55.90$ mm (125 cc)

$51.40 \div 51.45$ mm (200 cc)

N.B.

WHEN MEASURING THE WIDTH OF THE CRANKSHAFT, MAKE SURE THAT THE MEASUREMENTS ARE NOT MODIFIED BY THE RADIUS 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.

Shim washers (only 200 cc)

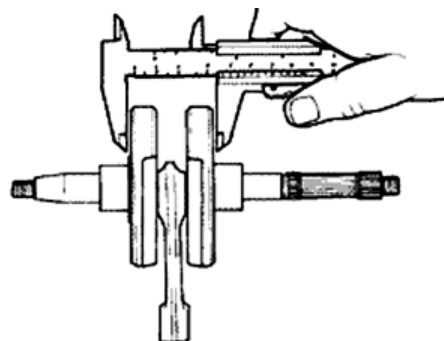
- Check the thickness of the shim washers.

Standard thickness: $2.175 \div 2.225$ mm

- Check that the shim washers are not stripped.

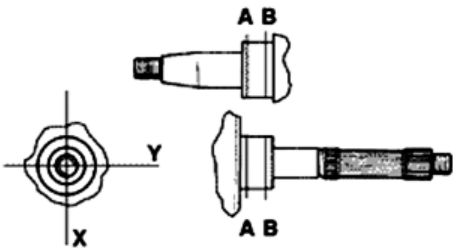
N.B.

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 the driving shaft ends according to the axes and planes shown in the figure. Half-shafts are classified into two categories, Cat. 1 and Cat. 2. The table is shown below.



Characteristic

Standard diameter (125 - 200) Cat. 2

29.004 ÷ 29.010

Cat. 1 - Standard diameter (125-200) evo

28.994 ÷ 29.000

STANDARD DIAMETER

Specification	Desc./Quantity
Standard diameter (125 - 200) Cat. 2	29.004 ÷ 29.010
Cat. 1 - Standard diameter (125-200) evo	28.994 ÷ 29.000

Inspecting the crankshaft alignment

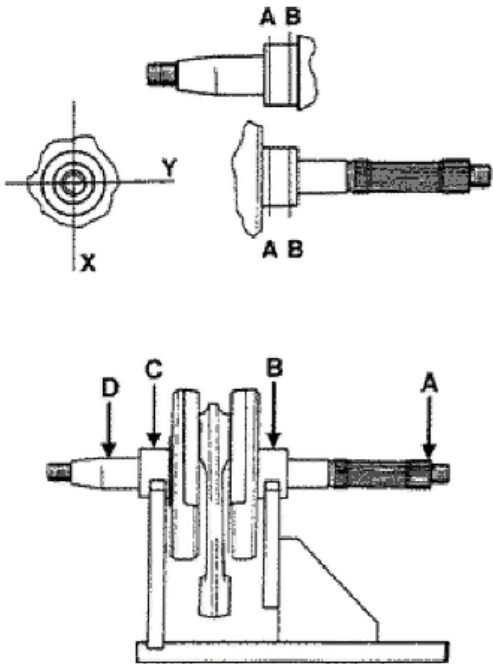
Measure the capacity of both axes X-Y

Specific tooling

020074Y Support base for checking crankshaft alignment

CRANKSHAFT ALIGNMENT

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

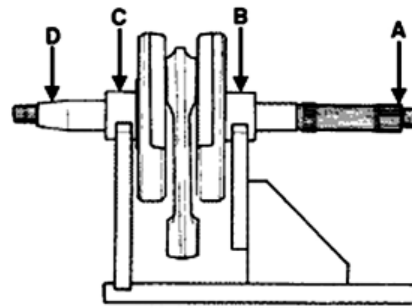
Off-line maximum admitted

A = 0.15 mm

B = 0.01 mm

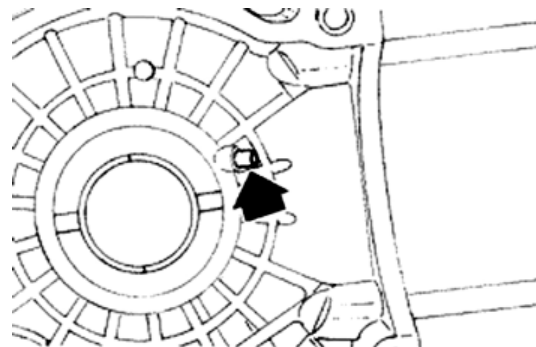
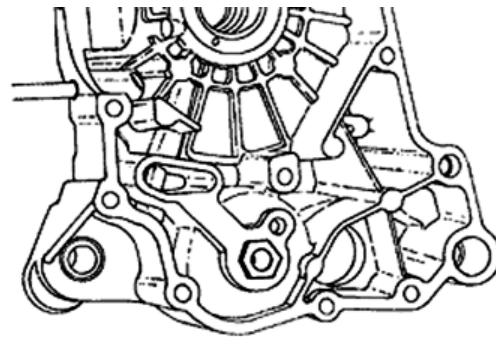
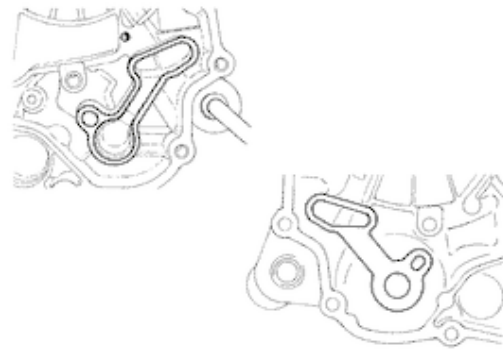
C = 0.01 mm

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 PISTON CROWN COOLING. CLOGGING HAS EFFECTS THAT ARE DIFFICULT TO DETECT (PISTON TEMPERATURE INCREASE). FAILURE OR LEAKS CAN CAUSE A CONSIDERABLE DROP IN THE LUBRICATION PRESSURE FOR MAIN BUSHINGS AND CONNECTING ROD .

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.

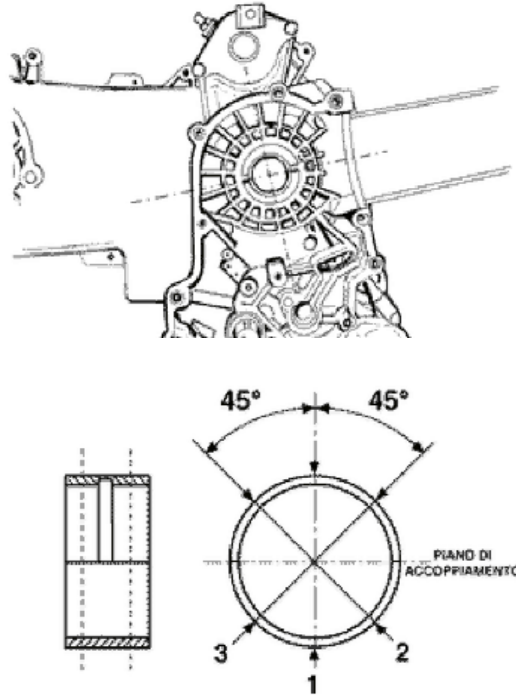
- Check the inside diameter of the main bushings in the three directions indicated in the diagram.

- 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" -	Type "B" -	Type "C" -
	RED	BLUE	YELLOW
Crankshaft	1.970 ÷	1.9703 ÷	1.976 ÷
half-bearing	1.973	1.976	1.979

Bushing category	Crankcase halves category	Internal bushing diameter after fitting	Possible fitting
A	1	29.025 ÷ 29.040	Original
B	1	29.019 ÷ 29.034	Original and
	2	29.028 ÷ 29.043	spare
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 RE-

LIEVED 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

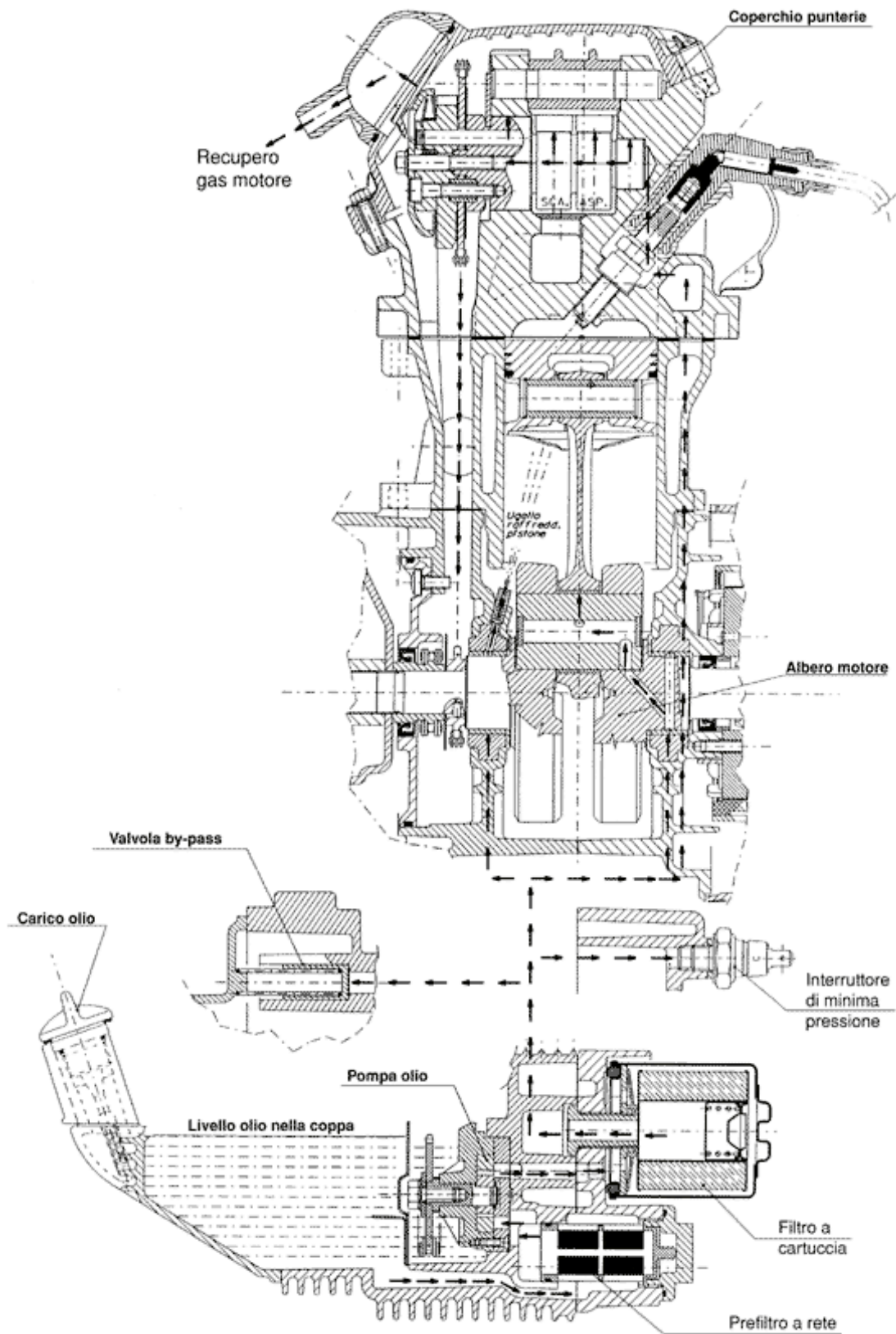
32.953 ÷ 32.963

Refitting the crankcase halves

Lubrication

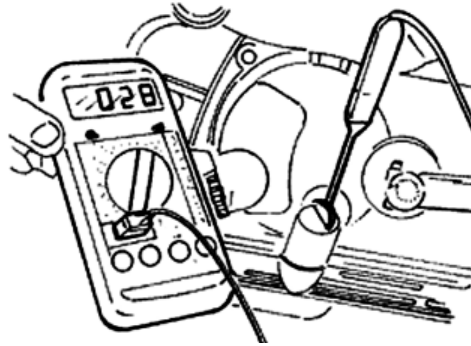
Conceptual diagrams

LUBRICATION CIRCUIT



Oil pressure check

- After removing the flywheel cover as described in the "Flywheel" chapter, remove the electric connexion of the minimum oil pressure switch and then remove the switch.
- With the engine idling at 1650 rpm and the oil temperature at $\sim 90^{\circ}\text{C}$, check that the oil pressure is between $0.5 \div 1.2 \text{ atm}$.
- With the engine idling at 6000 rpm and the oil temperature at $\sim 90^{\circ}\text{C}$, check that the oil pressure is between $3.2 \div 4.2 \text{ atm}$.
- 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 not within 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 PROPER CONDITION.

Characteristic

Oil pressure

Minimum pressure admitted at 6000 rpm: 3.2 atm.

Locking torques (N*m)

Minimum oil pressure sensor $12 \div 14$



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.

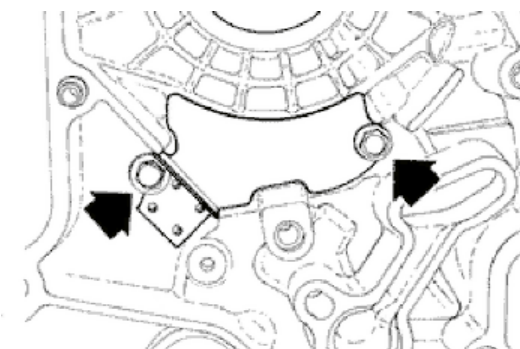
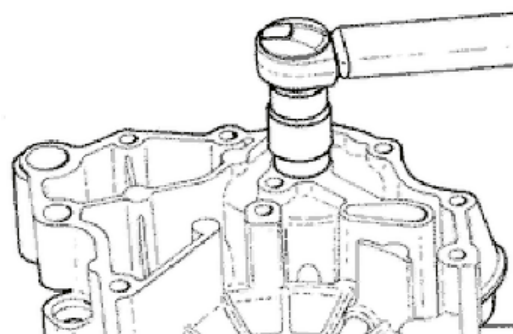
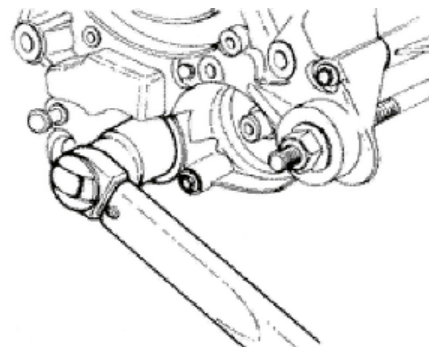
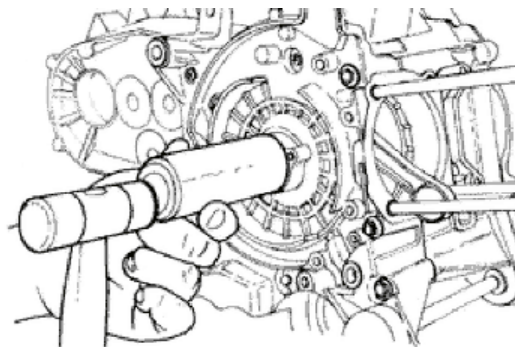
FAILURE TO USE THE SPECIFIC TOOL CAN RESULT IN AN INCORRECT DEPTH POSITION AND AS A CONSEQUENCE IN INADEQUATE OIL SEALING.

Specific tooling

020425Y Punch for flywheel-side oil seal

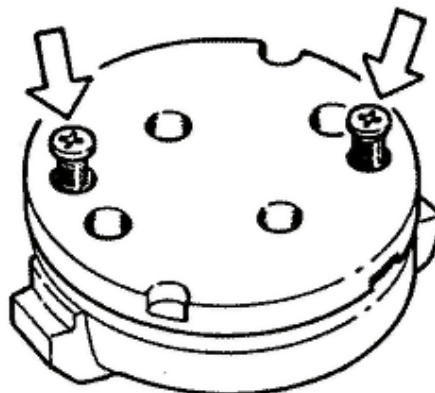
Locking torques (N*m)

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 clamping 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.

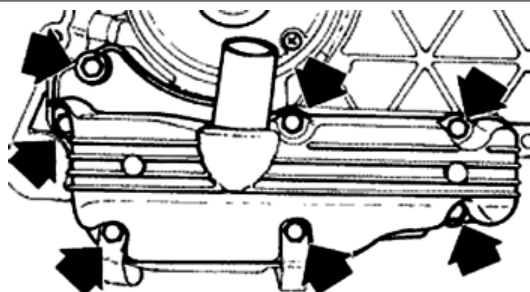
FIT THE BELLEVILLE WASHER SO THAT ITS OUTER RIM TOUCHES THE PULLEY. MAKE SURE THAT THE PUMP TURNS FREELY.

Locking torques (N*m)

Screws fixing oil pump to crankcase 5 - 6 Oil pump command 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 above.
- Remove the 7 screws, shown in the diagram, and the 2 rear brake fluid pipe fixing brackets.
- Remove the screw, the by-pass piston, the gasket and the centring dowels shown in the figure.



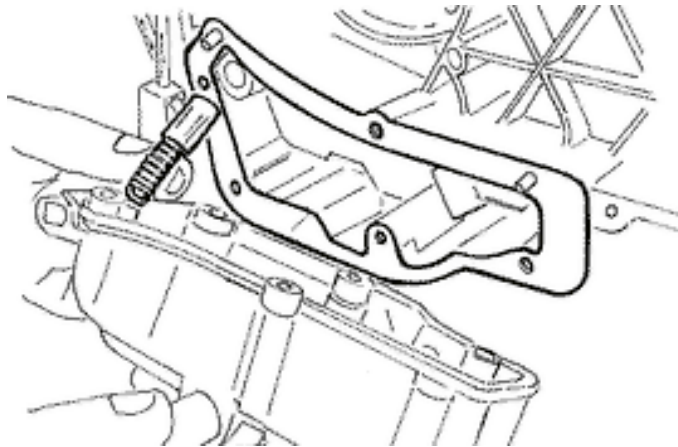
Inspecting the by-pass valve

- 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

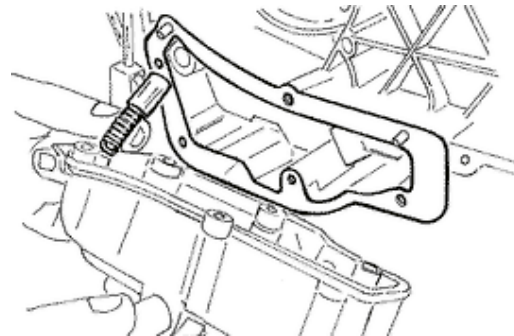
By-pass check up: Standard length

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 driving 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", regard-**



ing 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 low-pressure mode (VACUUM) to the CUT-OFF valve vacuum intake.
- Apply a vacuum value higher than 0.5 BAR.
- Check that this value is kept all the time.
- 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 vacuum intake of the CUT-OFF valve.
- Connect the bypass to the MITYVAC pump.
- Set the pump set to the low-pressure mode (VACUUM).
- Using a pair of long flat pliers, choke the rubber hose next to the valve.
- Operate the pump until vacuum is higher than 0.5 BAR.
- Release the hose and check how the vacuum reacts.
- Under normal functioning conditions 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 MALFUNCTIONING

N.B.

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

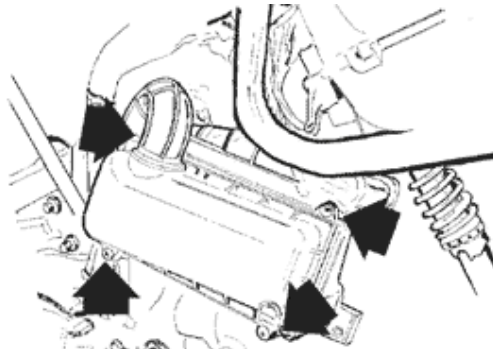
Specific tooling

020329Y MityVac vacuum-operated pump



Fuel supply

- To clean the filtering element proceed as follows: remove the 4 filter cover fixing screws indicated in the figure; remove the cover and take out the paper filtering element, clean with compressed air and refit.
- Make sure the filtering element is in the correct position.
- Check that the air passage sections are not damaged or deformed.
- Check the correct sealing of the coupling between the filter housing and the cover.



N.B.

FAILURE TO OBSERVE THESE INSTRUCTIONS MAY RESULT IN WRONG VACUUM INSIDE THE FILTER HOUSING, WHICH IN TURN MAY PRODUCE VARIATIONS IN CARBURETION.

Removing the carburettor

Kehin

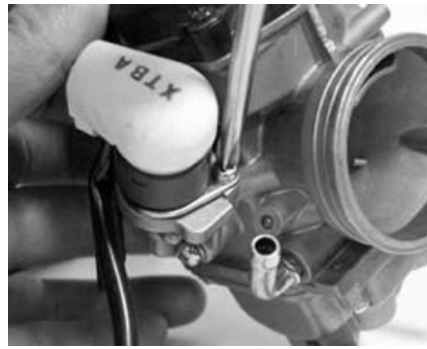
- To detach the carburettor from the engine, it is necessary to move the air filter and remove the transmission throttle control, the automatic starter connection, the clamps anchoring the carburettor to the filter housing and to the inlet manifold, the air delivery pipe to the diaphragm, and the intake fitting.
- Take out the carburettor and rotate it so as to remove the screw with the water joint and the pipes.



N.B.

THIS LAST OPERATION IS NECESSARY SO AS NOT TO EMPTY THE COOLING SYSTEM.

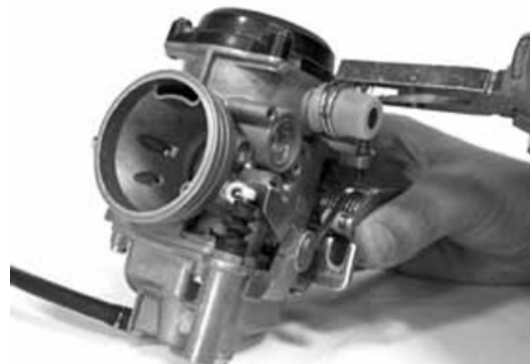
-
- Remove the protection, the bracket and the starter acting on the screw shown in the figure.



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



-
- Remove the clamp and cover with the airing filter of the diaphragm chamber.



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

WARNING

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

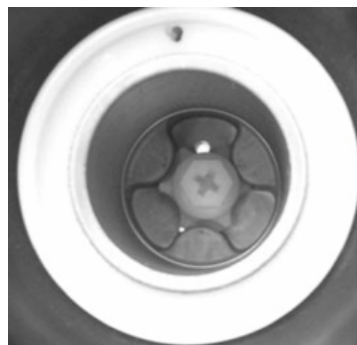




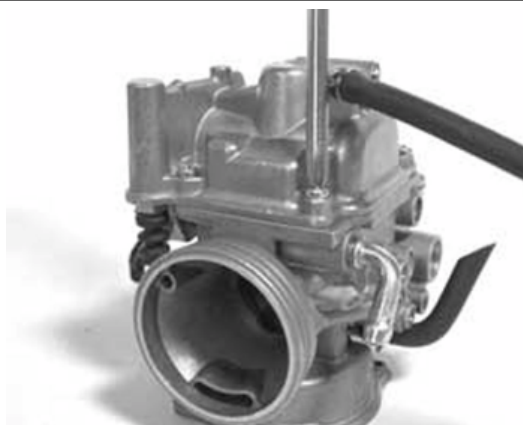
- Remove the vacuum valve together with the diaphragm.



- Unscrew the bayonet joint 1/8 of a turn and remove, take out the spring and vacuum valve needle



- 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.

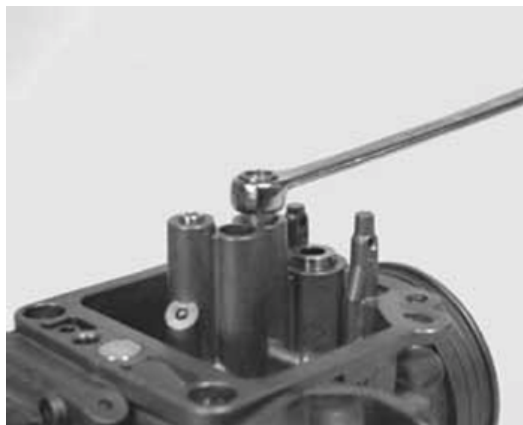


Adequately support the carburettor and using a rod and hammer remove the float pin acting from the throttle control side.

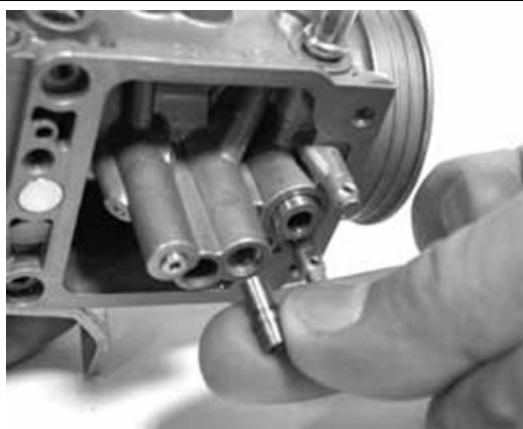
- Remove the float and the plunger.
- Remove the maximum nozzle



-Remove the maximum nozzle.



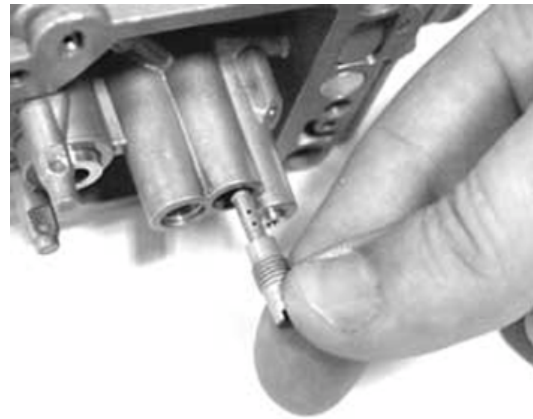
-Remove diffuser.



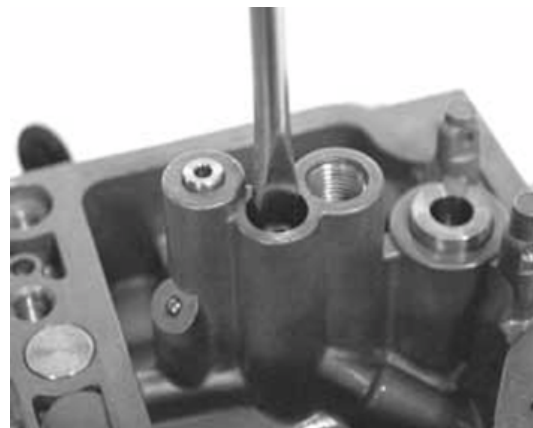
- Remove the sprayer.

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.



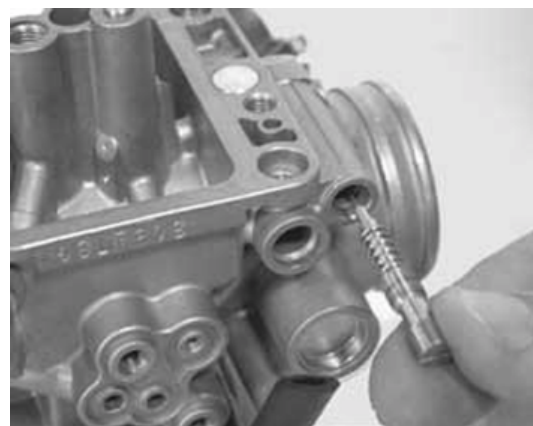
- Remove the minimum nozzle.



- 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.



Walbro

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

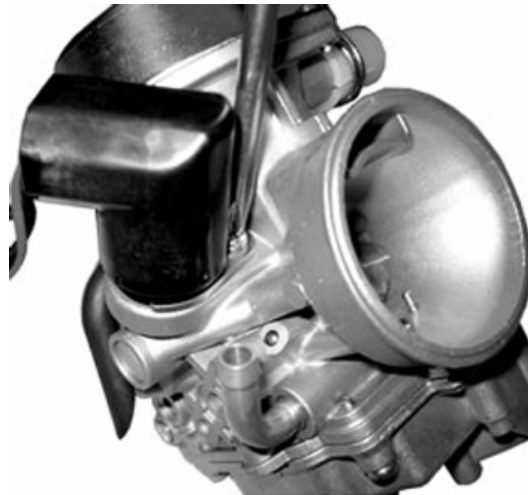
- Take out the carburettor and rotate it so as to remove the screw with the water joint and the pipes

N.B.

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



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



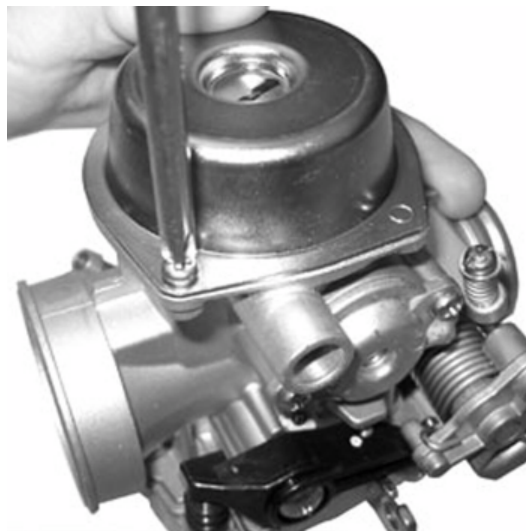
Remove the clamp and cover with the airing filter of the diaphragm chamber.



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

N.B.

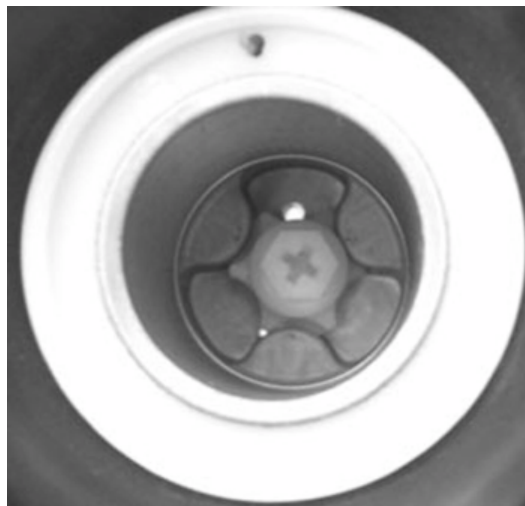
DURING THE REMOVAL OF THE COVER TAKE SPECIAL CARE NOT TO RELEASE THE SPRING ACCIDENTALLY.



Remove the vacuum valve together with the diaphragm.



Unscrew the bayonet joint 1/8 of a turn, remove it, take out the spring and vacuum valve plunger



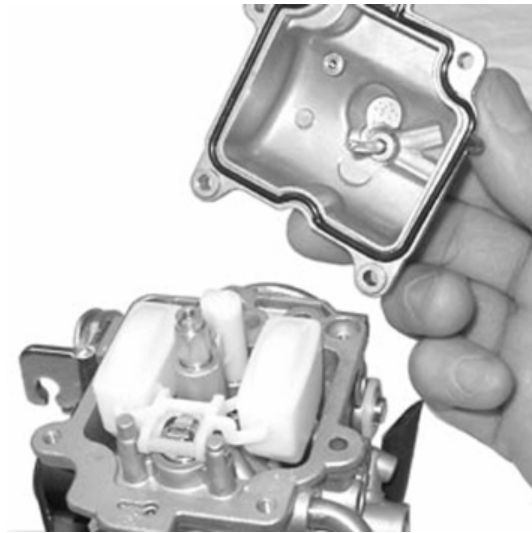
Remove the 4 screws shown in the figure.



Remove the tank with the intake pump, its control and gasket.



Remove the acceleration pump piston with the ring nut, the hood, the O-Ring and the spring from the tank as shown in the figure.



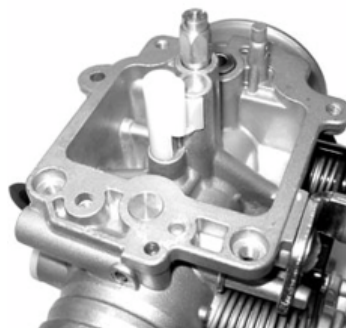
Adequately support the carburettor and using a rod and hammer remove the float pin acting from the throttle control side.
Remove the float and the plunger.



Remove the cover of the duct from the carburettor to the starter nozzle as shown in the figure.



- Remove the maximum nozzle.
- Remove diffuser.



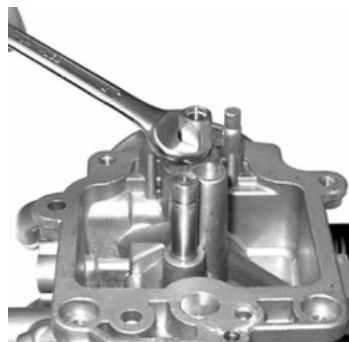
Remove the sprayer.

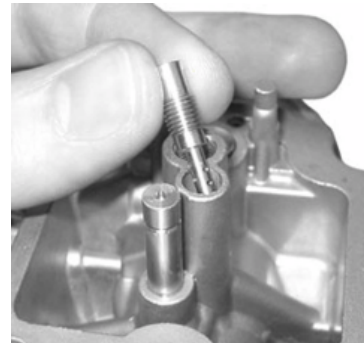
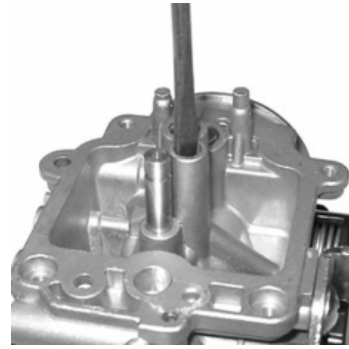
N.B.

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



- Remove the minimum nozzle.



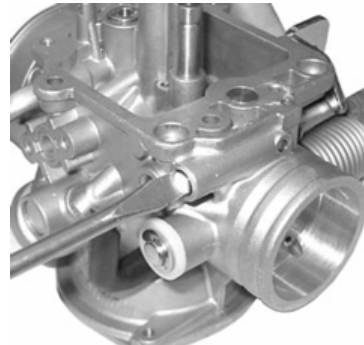


Remove the minimum flow screw with the O-ring, the washer and the spring.

-Remove the 2 fixing screws, the cover, the spring, and the cut-off device diaphragm.

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 THE ASSEMBLY AND THEIR REMOVAL DAMAGES THE SHAFT.



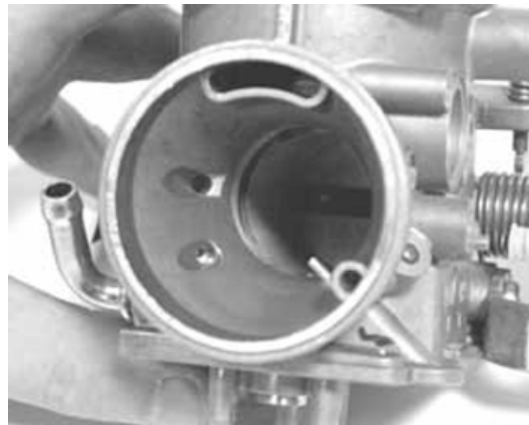
Refitting the carburettor

Kehin

- 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**

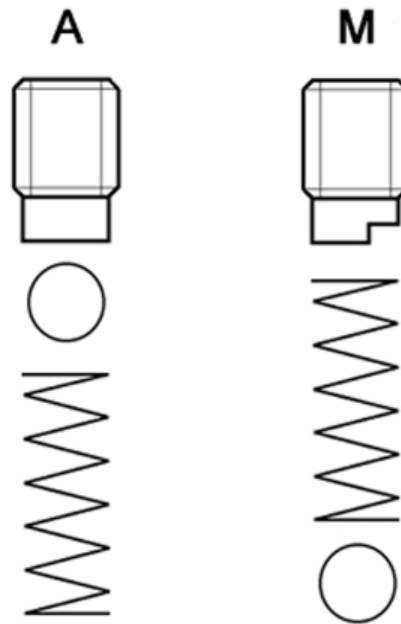
- Remove the drainage screw from the tank, wash and blow it properly and make sure the acceleration pump pipes are clean.
- Operate the acceleration pump piston repeatedly and blow with compressed air.
- Reassemble the acceleration pump valves following this order:

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.

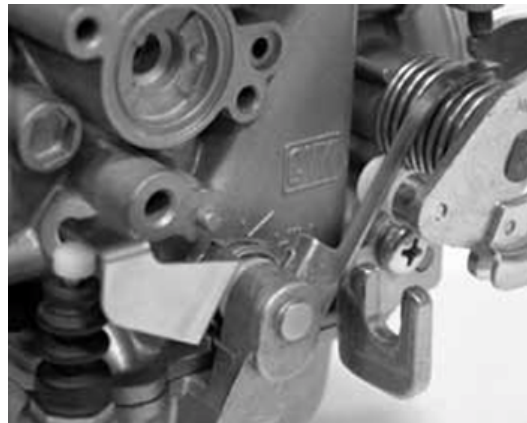
- Check the screw tightness introducing a small amount of fuel in the tank.
- Assemble a new gasket on the tank.
- Assemble the tank on the carburettor body fastening the 4 screws.
- Check that the control roller is free to rotate in its own seat.

N.B.

MAKE SURE THE TANK GASKET IS CORRECTLY INTRODUCED

N.B.

AVOID DEFORMING THE ACCELERATION PUMP CONTROL ROCKING LEVER.



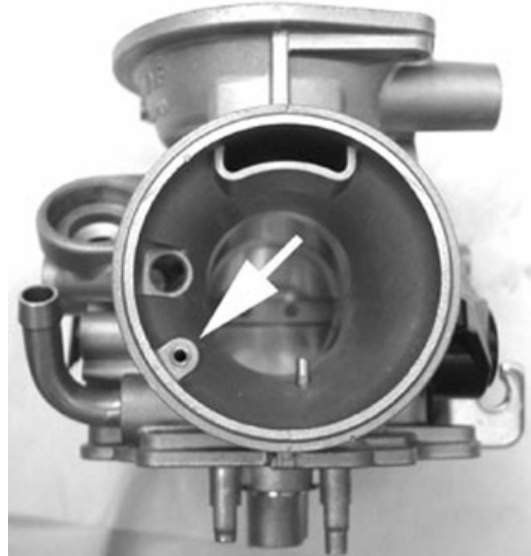
- Wash and blow the flow screw properly.
- Check that screw is not deformed and/or rusty.
- Assemble the spring on the screw.
- Screw the flow screw on the carburettor body.



- The screw final position should be determined by an exhaust fume analysis.
- Adjust the carburettor by turning the screw twice from the close position.

Walbro

- 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.
- Carefully clean the air holes indicated 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.

N.B.

THE MINIMUM AIR IS CONTROLLED BY TWO ADJUSTMENTS. THE CUT-OFF ONE IS INDICATED DIRECTLY IN THE CARBURETTOR BODY.

- 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.

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 cylindric 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.

- Assemble the float with the plunger introducing the pin on the carburettor feeding tube side.

N.B.

INTRODUCE THE RETURN SPRING ON THE FLOAT PLATE ADEQUATELY



Level check

Kehin

- 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.

Walbro

- Make sure the float coupling surface is parallel to the tank surface with the carburettor in inverted position.
- If different positions are detected, change the plunger control metal plate direction to obtain the position described above.
- If the plate gets deformed, make sure it remains parallel to the float pin.

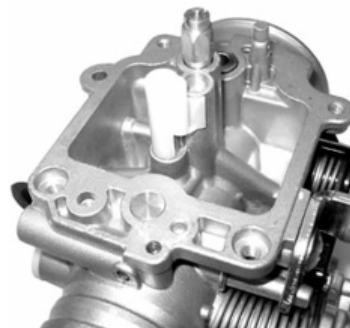
N.B.

WITH INVERTED CARBURETTOR, THE FLOAT WEIGHT SHOULD NOT EXCEED THE TAPERED PIN SPRING THRUST. OTHERWISE, CHECK THAT THE FLOAT IS NOT HEAVY DUE TO FUEL INFILTRATION. REPLACE THE FLOAT AND THE TAPERED PIN, IF NECESSARY.

- Wash and blow the carburettor duct cover properly and introduce it in the starter nozzle.

N.B.

INCORRECT ASSEMBLY OF CARBURETTOR DUCT COVER ON THE STARTER NOZZLE CAUSES A NEGATIVE COLD START-UP SITUATION: THE STARTER NOZZLE TAKES UP THE OLD FUEL FROM THE BOTTOM OF THE TANK.



- Remove the drainage screw from the tank, wash and blow the tank properly and make sure the acceleration pump intake and supply valve are clean.
- Being the valves unidirectional, blow them carefully with compressed air, at the inner side of the tank for the intake valve and at the pump piston housing for the supply valve.
- Check that there are no signs of wear in the acceleration pump piston and its corresponding seat in the tank.
- In case of wear, replace the defective parts.
- Check that the acceleration pump piston contrast spring is not worn.
- Assemble a new O-Ring and a new bellows gasket. Reassemble the piston unit on the tank.
- Assemble a new O-Ring on the tank drainage screw and lock it.



- 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.



- Wash and blow the flow screw properly and assemble a new O-Ring.
- Preassemble the components on the screw as follows: spring, washer and O-ring.
- Screw the flow screw on the carburettor body.
- The screw final position should be determined by an exhaust fumes analysis.



- Prepare the carburettor for adjustment by rotating the screw 3 turns from the close position.
- Check that the rocking lever control of the accelerating pump does not show abnormal wear.
- Check that the end of stroke screw of the rocking lever protrudes 3.2 mm.



Check that the return spring of the rocking lever is not loaded.

- Preassemble the spring and rocking lever as shown in the figure.
- Assemble the rocking lever on the carburettor keeping the throttle valve open.
- Lock the fixing screw of the rocking lever.
- Make sure that the mechanism works correctly.



Inspecting the valve and needle

Kehin

- 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.

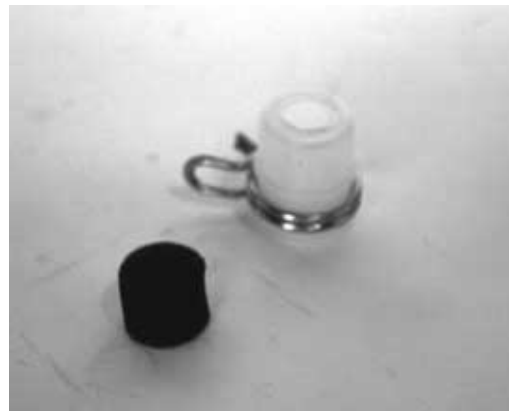
THE VALVE CAN BE INSERTED IN ONLY ONE POSSIBLE POSITION.



- 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 filter sponge of the ambient pressure intake.



- Reassemble the filter with its clamp.



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



Walbro

- Check that the pin does not show signs of wear and that the lock is in the 3rd of the 3 notches.
- Check that the valve does not show threads around its external diameter.
- Check that the 2 vacuum supply holes are not clogged.

N.B.

THE 2 VACUUM SUPPLY HOLES ARE OF DIFFERENT DIAMETERS.



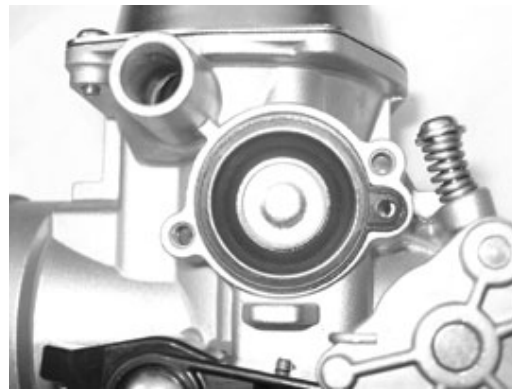
- Check that the diaphragm is not worn or has hardened.
- If it does, replace it.
- Refit the tapered pin on the vacuum valve.
- Make sure the spring is in the correct position on the plunger and inserted in its housing.
- Assemble the coupling by rotating it 1/8 of a turn.



- Reassemble the vacuum gas valve on the carburettor body being careful that the tapered pin is inserted into the sprayer.
- Time the vacuum valve rotation inserting the diaphragm tab in its place.

When the diaphragm is correctly assembled to the valve, the main vacuum supply hole is positioned axially with the diffuser, on the throttle valve side.

- Refit the spring on the valve.
 - Refit the vacuum chamber cover matching the reference mark with the orientation of the diaphragm.
 - Tighten the screws to the prescribed torque.
 - Check the cut-off valve correct functioning.
- Check that the diaphragm is not worn or has hardened. Check the free length of the spring.



Characteristic

Walbro: Standard length of cut-off spring

24 mm

- Reassemble the diaphragm and the metal pin placed on the valve.
- Reassemble the spring and the cover. The vacuum intake should be facing upwards.

Inspecting the automatic choke device

- Check that the piston of the automatic starter is not deformed or rusty.
- Check that the piston slides freely from the seat to the support.
- Check that the sealing gasket of the piston 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 the 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 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 2 fixing screws.
- Position the starter as shown in the figure.
- Assemble the protection casing.

Characteristic

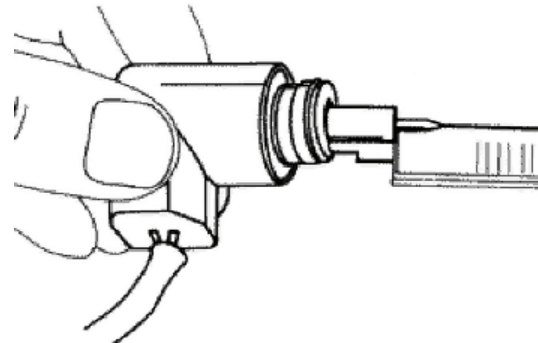
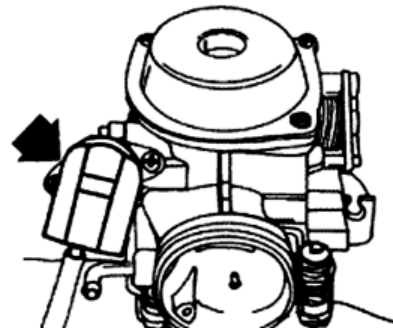
Check the auto starter: Protrusion Value for Walbro

12.5 ÷ 13 mm at approx. 20°C

Check the automatic starter: maximum protrusion

18.5 ÷ 19 mm

Check the automatic starter: Max. time:



5 min

Electric characteristic

Check the automatic starter: Resistance

around 30 Ω

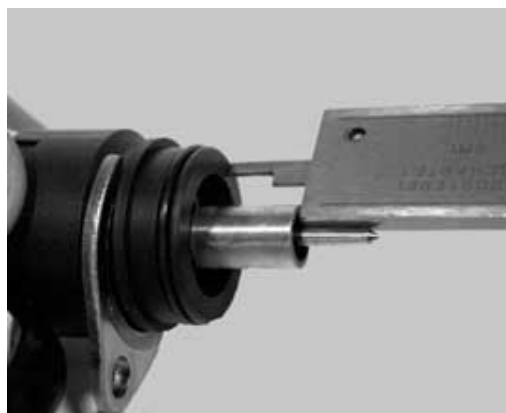
Kehin

- 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

XX ÷ XX mm at approx. 20°C

Check the automatic starter: Kehin maximum protrusion

XXX ÷ XXX mm

Check the automatic starter: Keihin maximum time

5 min



Walbro

- 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 (20 - 25° C).

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.



Characteristic**Check the auto starter: Protrusion Value for Walbro**

12.5 ÷ 13 mm at approx. 20°C

Check the automatic starter: Walbro maximum protrusion

18.5 ÷ 19 mm

Check the automatic starter: Walbro max. time

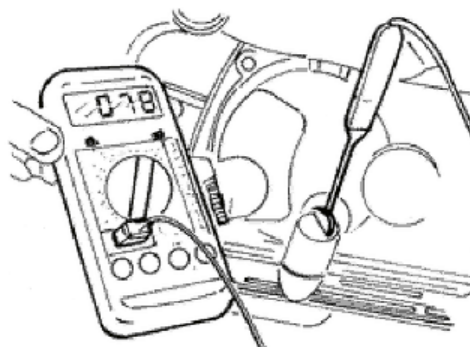
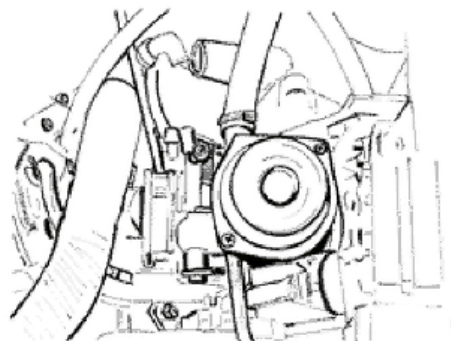
5 min

Electric characteristic**Walbro Resistance**

approx. 40 Ω

Adjusting the idle

- The engine does not need frequent idle adjustments, however it is very important to make any adjustments fully respecting some standards.
- Before adjusting the carburettor make sure to respect the lubrication requirements, valve clearance, and complying timing, spark plug should be in optimum conditions, air filter clean and sealed, and the exhaust system tight.
- Warm up the engine by running it at least 5 minutes at approximately 50 kph.
- Connect the vehicle to the exhaust fumes analyser inserting the probe into a sealed extension pipe placed at the muffler exit end.
- Connect a millimetre thermometer (020331y) on the sump, using a cover with oil expressly prepared for probes.
- Start the motor and before adjusting the idle speed make sure that the oil temperature is between 70 ÷ 80°C.
- Using the rpm indicator or any other instrument (020332y), adjust the idle screw to obtain 1600 rpm ÷ 1700 rpm
- Adjust the flow screw until the carbon monoxide (CO) percentage is 3.1 ÷ 4.5%, when the screw is



loosened the CO value rises (rich mix). Tightening the screw decreases the CO (lean mix).

- If the adjustment of the flow screw causes a rpm increase readjust the revs again and if necessary, the flow screw to reach stable values.

- When the oil temperature, the numbers of revs and the percentage of carbon monoxide are respected the idle carburetion is considered correct.

From the analyser we can draw further information:

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

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

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

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

N.B.

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

N.B.

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



CORRECT COUPLING OF THE RPM INDICATOR WILL BE
INDICATED WHEN IT CAN READ RPM OVER 6000 ÷ 8000

Characteristic**Idle adjustment: Pipe sizes**

Ø 40 mm

Idle adjustment: length

500 ÷ 600 mm

INDEX OF TOPICS

SUSPENSIONS

SUSP

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

Front

Removing the front wheel

- Remove the front brake calliper after undoing the screws fixing it to the leg.
- Loosen the wheel axle locking nut.
- Loosen the two wheel axis safety screws on the leg on the RHS.
- Remove the wheel axis being careful to recover the odometer transmission.

Front wheel hub overhaul

Check that the wheel bearings do not show signs of wear.

If you have to replace the wheel bearings, proceed as follows:

- Remove the plastic cover on the tone wheel side to avoid damage by loosening the 5 fixing screws.
- Remove the two bearings on the odometer drive side using the pliers 14 or 34 and the bell detail 9.
- Remove the internal spacer.



*** Either tool can be used.**



- Support the front wheel with two wooden shims that make it possible to avoid scratching in the case of contact with the rim.
- Insert the punch (consisting of adaptor handle, 15 mm adaptor and guide) from the odometer drive side to permit the removal of the brake disc side bearing and the spacer bushing.



Specific tooling

020376Y Adaptor handle**020456Y Ø 24 mm adaptor****020412Y 15 mm guide**

- Heat the bearing seat on the side the brake disc with the heat gun.



- Insert the bearing using the punch consisting of adaptor handle, 42x47 mm adaptor and 15 mm guide, and drive it up to the stop.



- Reinsert the spacer bushing on the brake disc side using the appropriate tool and take it to the stop.

**Specific tooling****020376Y Adaptor handle****020359Y 42x47-mm Adaptor****020412Y 15 mm guide****020201Y Spacer bushing driving tube**

- Turn over the wheel and insert the internal spacer with the part fitted with the Seeger ring facing the bearing on the brake disc side installed previously.



-
- Heat the bearing seat on the odometer drive side with the heat gun.



-
- Insert the two bearings using the punch consisting of adaptor handle, 32x35 mm adaptor and 15 mm guide, and drive it up to the stop.

Specific tooling

020376Y Adaptor handle

020357Y 32x35-mm Adaptor

020412Y 15 mm guide



-
- Refit the cap and tighten the five fixing screws.



Refitting the front wheel

- Check that the seal of the relative contact track on the wheel of the odometer transmission is in good condition.
- Insert the wheel axle, after greasing it, from the side of the clamp on the fork leg and also insert the transmission itself.
- -Tighten the wheel axle nut to the prescribed torque.



Locking torques (N*m)

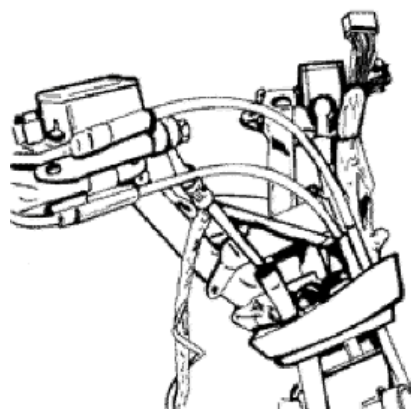
Wheel axle nut 45 ÷ 50 Safety screw on fork leg
6 ÷ 7



Handlebar

Removal

- Remove the 3 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 (*) 43 ÷ 47

Front fork

Removal

- Remove the front wheel.
- Remove the handlebar and tip it onto the shield back plate being careful not to damage the plate.
- Using the appropriate tool, loosen and remove the upper ring nut, the space washer, the counter ring nut and the spacer ring.
- Extract the fork.

N.B.

TAKE CARE TO SUPPORT THE FORK SO AS TO PREVENT IT FROM COMING OFF ABRUPTLY

Specific tooling

020055Y Wrench for steering tube ring nut

See also

[Removing the front wheel](#)
[Removal](#)



Overhaul

- With the 10 mm hexagonal wrench for internal parts loosen the upper stem closing cap.



- Loosen the stem support clamp and remove fork leg and stem.



- Remove the first spring featuring 15 turns.
- Remove the spring support plate.
- Remove the second spring featuring 21 turns.
- Drain the oil.
- Separate the stem from the leg by removing the screws with copper washer shown in the figure. To prevent the rotation of the pumping insert a 12 mm hexagonal wrench for internal parts in the stem.



- Remove the dust guard ring using a screwdriver as shown in the figure.



- Remove the oil guard safety lock using a screwdriver.
- Using the appropriate special tool, remove the oil seal.
- Insert the tie rod complete with cable into the oil guard.
- Insert in sequence the two half-rings per Ø 35-mm stems.



- Keeping the tie rod in vertical position, insert the bell for the Ø 35 mm stems.
- Insert the nut in the thread and take out the oil guard



Specific tooling
020487Y Fork oil seal extractor

SPRING LENGTH CHECK

Specification	Desc./Quantity
Standard length	15-turn spring: 116.3 + 2-1 mm
Standard length	21-turn spring: 175.7 + 2-1 mm
Allowable limit after use:	15-turn spring: 114.3 mm
Allowable limit after use:	21-turn spring: 173.7 mm



Check there are no signs of wear or seizing up between the stem and the leg. Otherwise, replace the damaged parts.

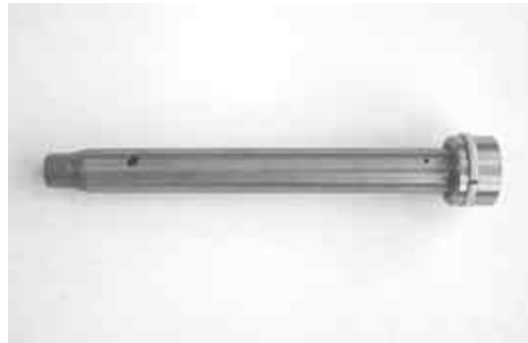
Characteristic**Maximum leg diameter**

35.10 mm

Minimum stem diameter

34.90 mm

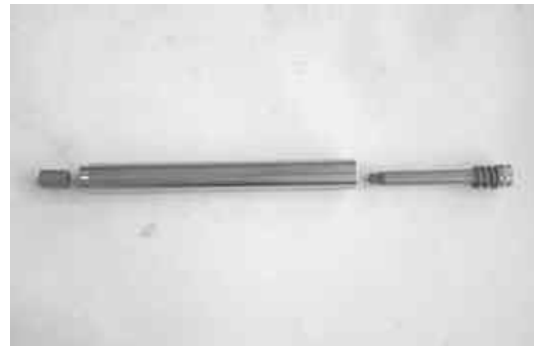
Check that the oil holes on the pumping element are not clogged. - Check that the O-ring shows no sign of damage.



- Insert a new oil guard with the special adaptor handle and take it to the stop.
- Insert the safety clip.
- Insert a new dust guard.



- Insert the contrast spring into the pumping member.
- Insert the pumping element inside the stem.
- Insert the pumping element guide bushing at the lower stem end.
- Insert the stem in the leg being careful not to let the stem guide bushing come out.



- Inset and screw up the copper washer to the prescribed torque. To avoid the rotation of the pumping element insert a 12 mm hexagonal wrench on the stem for internals.
- Put 125 ± 1 cc of oil in the stem.



Recommended products

AGIP FORK 7,5W Oil for front fork

Hydraulic oil SAE 7,5W

- Insert the 21 winding springs, the support plate with the chamfer facing downwards and then the 15 winding spring.



- Insert the stem into the fork clamp.
- Do up the clamp once to allow the stem closure upper cap to be tightened.
- Check that the sealing ring on the cap is in good working order, then tighten the cap on the stem to the prescribed torque.



- Loosen the fork clamp screws and ensure the stem closure cap is fitted properly on the clamp.
- Tighten the clamp screws to the prescribed torque.

Specific tooling**020376Y Adaptor handle****020359Y 42x47-mm Adaptor****Locking torques (N*m)****Fork clamp screws 20 ÷ 25 Stem upper cap 15 ÷ 30 Lower screw with copper washer 25 - 35**

Refitting

- Grease using lithium soap grease on the roller bearings.

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

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



- Insert the fork into the headstock.
- Insert the spacer ring.
- Using an appropriate tool do up the first ring nut in the steering tube (upper steering ball bearing). Lock with a torque of 10 ÷ 13 Nm and rotate the wrench anticlockwise by 90°.
- Install the space washer.
- Using the appropriate tool tighten the second locking ring in the steering tube to a torque of 30 ÷ 36 Nm.
- Install the handlebars on the steering tube, paying attention to the centring, aligning the recess on the handlebar with that on the steering tube as shown in the figure.
- Tighten the handlebar fixing screw on the steering tube to the prescribed torque.



- Refit the three handlebar covers as described in the «Bodywork» Chapter.
- Install the front wheel.
- Refit the brake calliper on the fork leg.

Specific tooling

020055Y Wrench for steering tube ring nut

Locking torques (N*m)

screw fixing handlebar to the steering tube 45 ÷ 50 Upper steering ring nut 30 ÷ 36 Steering lower ring nut 10 ÷ 13 then loosen by 90° Tightening screw for calliper support to the fork 45 ÷ 55 Front wheel axle 45 ÷ 50

**See also**

[Refitting the front wheel](#)

Steering bearing

Removal

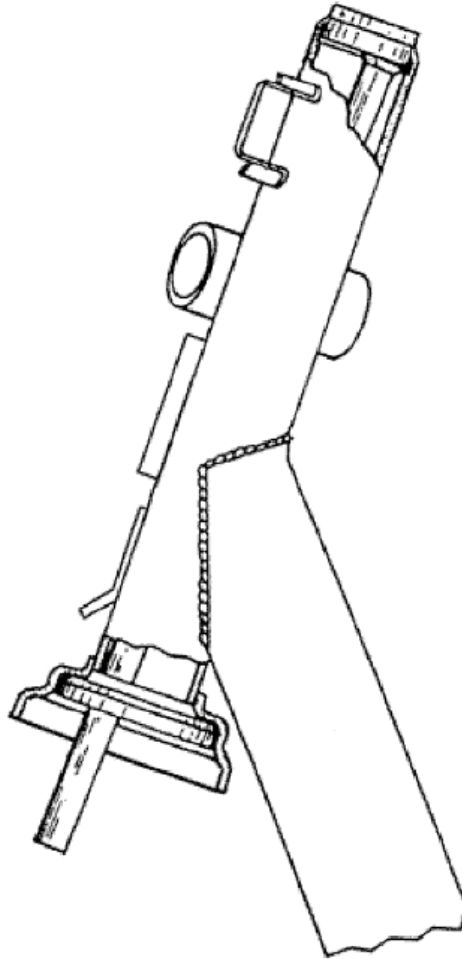
Remove upper bearing with an appropriate tool.

N.B.

USE THE APPROPRIATE TOOL AGAIN TO REMOVE THE LOWER HOUSING OF THE STEERING LOWER BEARING

Specific tooling

020004Y Punch for removing fifth wheels from headstock



Refitting

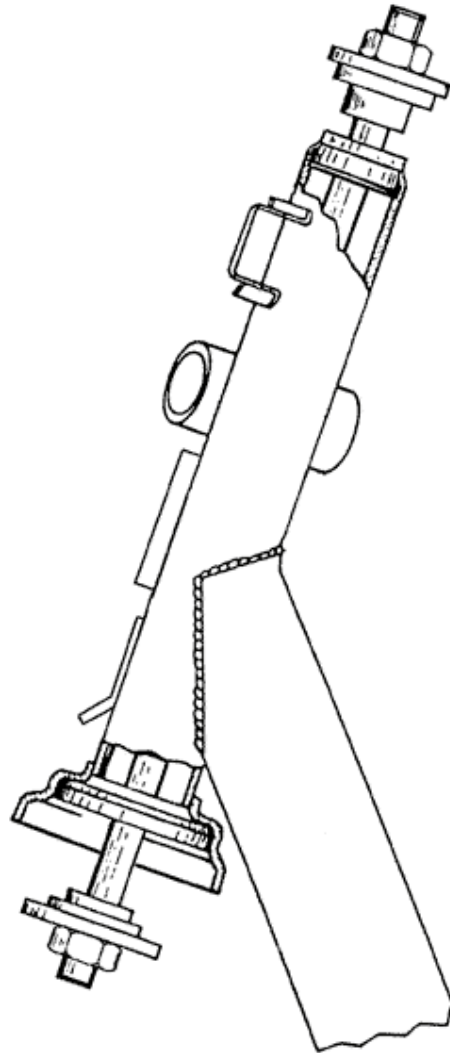
Insert the lower and upper bearing on the chassis using an appropriate tool.

N.B.

ASSEMBLE THE LOWER HOUSING ON HE STEERING TUBE WITH A TUBE SECTION OF AN ADEQUATE DIAMETER.

Specific tooling

001330Y Tool for fitting steering seats



Rear

Removing the rear wheel

Removal

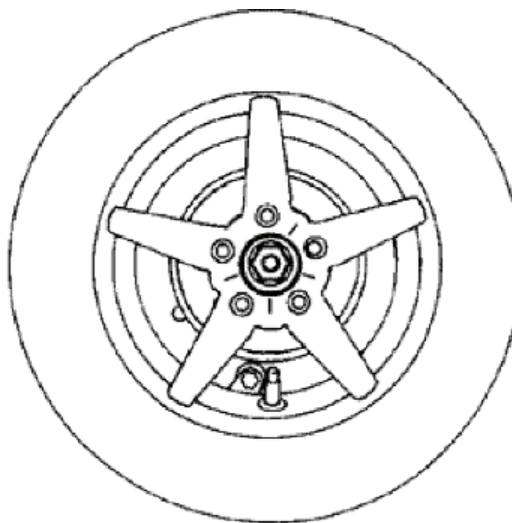
- Unscrew the four fixing screws and remove the muffler and the relevant bracket;
- Unscrew the central retaining nut.

Reassembly

Carry out the previous operations in reverse order.

Locking torques (N*m)

Rear wheel axle 104 ÷ 126 Rear wheel fixing screws 33÷37



Swing-arm

Removal

- Place the scooter on its centre stand;
- Support the engine adequately;
- Loosen the nut shown in the figure and pull out the spindle from the left-hand side.



- Loosen the nut and lock nut on the left-hand side of the scooter (see figure) and unscrew the spindle from the opposite side.
- Remove the retaining screw of the rear brake pipe shown in the figure.



- Loosen the nut on the inside of the frame from the left-hand side (see figure) and remove the relevant spindle;
- Remove the swinging arm.

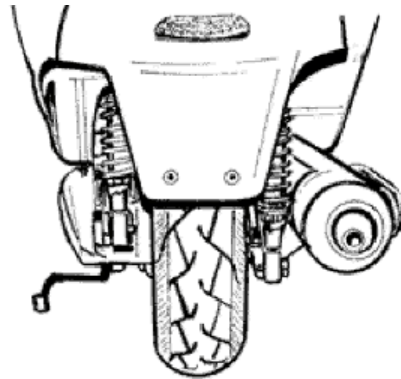


Shock absorbers

Removal

Proceed as follows:

- Undo the screw fixing the shock absorber spring unit to the engine (A) on one side and the corresponding support (B) on the other;
- remove the saddle and the helmet compartment;
- undo the two upper nuts (one on each side) fixing the shock absorber spring unit to the chassis and remove the shock absorbers.



Refitting

Carry out the previous operations but in reverse order.

Locking torques (N*m)

Lower shock absorber clamp $33 \div 41$ Upper shock absorber clamp $33 \div 41$

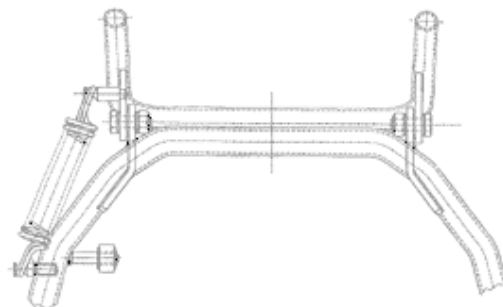
Centre-stand

Removal

- Unhook the springs.
- Loosen the nut.
- Pull out the screw.

Reassembly

- Install the sealing rings on the support tube of the stand;



- Carry out the operations described above in reverse order, then insert the sealing rings into their seats.

CAUTION

Lubricate the following parts with grease: spring coupling pins, bushings on stand fixing bracket.

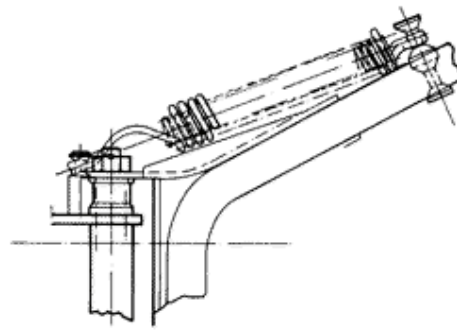
Recommended products**AGIP GREASE PV2 Grease for control levers on the engine**

White anhydrous-calcium based grease to protect roller bearings; temperature range between -20 °

C and +120 °C; NLGI 2; ISO-L-XBCIB2

Locking torques (N*m)

stand retaining bolt 20 ÷ 25



INDEX OF TOPICS

BRAKING SYSTEM

BRAK SYS

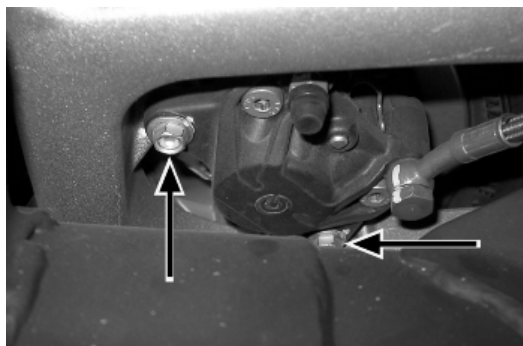
This section è is devoted to the description of the braking system components.

Rear brake calliper

Removal

Proceed as follows:

- remove the exhaust pipe;
- loosen fitting and detach brake lines, without spilling any brake fluid on the tyre;
- remove the two fixing screws hence detach the brake calliper.

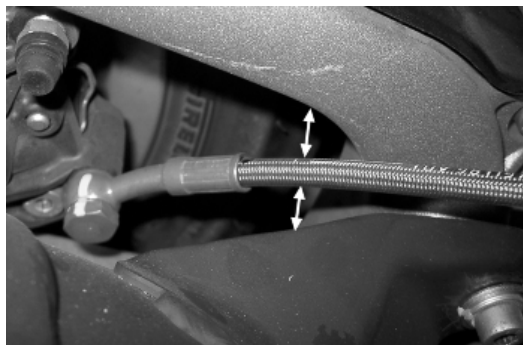


Refitting

- Fit the calliper by tightening the two clamping screws,
- fit the brake piping by means of the fitting screw,
- bleed the rear brake circuit,
- refit the muffler

N.B.

WHEN FITTING THE BRAKE TUBING, BE CAREFUL THAT IT PASSES EQUIDISTANT BETWEEN THE UPPER SUSPENSION SUPPORT ARM BRANCH AND THE MUFFLER BRACKET AND THAT IT PASSES PROPERLY THROUGH THE CABLE HOLE IN THE FRAME.



Locking torques (N*m)

Rear brake calliper fixing screws 20 ÷ 25 Rear
brake calliper-pipe fitting 20 ÷ 25 Muffler arm
clamping screws 27 ÷ 30

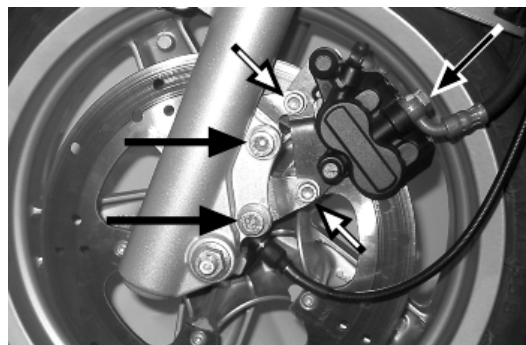


Front brake calliper

Removal

Proceed as follows:

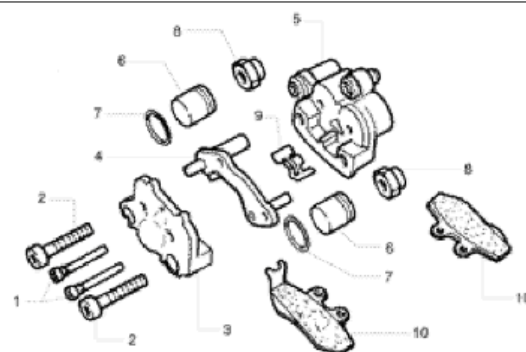
- place a suitable container, then disconnect the oil pipe from the calliper;
- Remove the two screws (indicated in the figure) fixing the calliper to the support and remove the calliper.



Overhaul

Proceed as follows:

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



5) Check:

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

Refitting

- 1) insert the pistons (6) and the sealing rings (7) in the body;
- 2) place the guide rubbers (8) and refit the fixed plate (4);
- 3) assemble the reaction plate (3) tightening the screws (2), insert the brake pad check spring (9)

and then the pads, fixing them with the corresponding screws (1);

5) place the calliper on the disc and lock it to the strut by tightening the fixing screws;

6) fix the pipe joint on the calliper at the prescribed torque.

Functioning

This is a floating type calliper.

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

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

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

The brake pad lock spring

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

CAUTION

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

Locking torques (N*m)

Brake fluid tube-calliper fitting 20 ÷ 25 Pad fastening pin 19.6 ÷ 24.5

Refitting

- Screw the screws and the fitting to the specified torque and bleed the system.

Locking torques (N*m)

Screw tightening calliper to the support 42 ÷ 52 Brake fluid tube-calliper fitting 20 ÷ 25

Front brake disc

Removal

Remove the wheel and check that the axial deviation of the braking surface is within the recommended values:

- If this is not the case, replace the disc and repeat the test.

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

Front/rear disc replacement

- 1) disassemble the front/rear wheel;
- 2) loosen the two fixing screws and remove the disc.

When refitting, position the disc correctly, respecting the direction of rotation, and apply medium threadlock.

N.B.

THE SURFACE OF THE DISC WITH THE STAMPED ARROW INDICATING THE DIRECTION OF ROTATION MUST FACE THE SHOCK ABSORBER.

Recommended products

(°) Loctite 243 Medium-strength threadlock

Apply LOCTITE 243 medium-strength threadlock

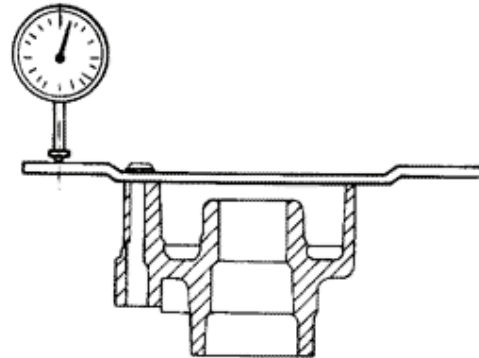
Characteristic

Brake discs check: Max. axial deviat.

0.1 mm

Locking torques (N*m)

Disc tightening screw (°) 5 ÷ 6.5



Disc Inspection

- Remove the front wheel
- Use a micrometer to check the disc thickness as shown in the photograph
- Repeat the measurement in at least 6 points on the disk
- Remove the front brake calliper
- In order to secure the appropriate tool adequately use a metal plate with M8 threaded hole and fix it to one of the two front brake calliper attachment points
- Place the dial gauge on the disk outer edge
- Make the wheel hub turn and check the disk deviation



Specific tooling

020335Y Magnetic support for dial gauge

Characteristic

Standard thickness:

4 +0.2-0.2 mm

Max. deviation allowed:

0.1 mm

See also

[Removing the front wheel](#)
[Removal](#)

Front brake pads

Removal

Proceed as follows:

- disassemble the front wheel.
- remove the two screws indicated in the figure.
- remove the stop ring and withdraw the pin.
- slide the two pads down.
- repeat these operations for the brake calliper on the opposite side.

N.B.

Minimise difficulty for this operation by removing the callipers from their supports without removing the oil pipe.



Rear brake pads

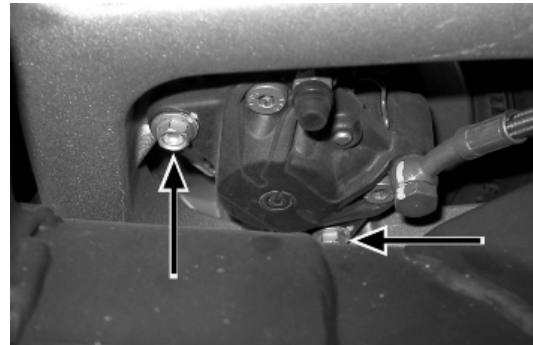
Removal

Proceed as follows:

- remove the silencer.
- loosen the two screws shown in the figure.
- remove the lock ring and the pin.
- extract the two pads from the bottom.
- Fit the new pads and insert the pin so that it engages into the pads' aligning holes.

CAUTION

PADS MUST BE REPLACED IF THE FRICTION MATERIAL THICKNESS IS LESS THAN 1.5 MM.



See also

[Exhaust assy. Removal](#)

Fill

Front

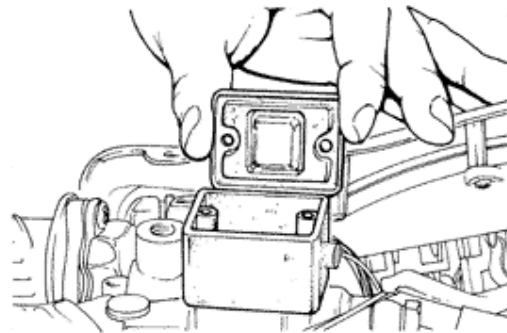
- Rest the scooter on its stand on level ground.
- Refill the brake circuit reservoir to the maximum level with the recommended fluid;
- Connect the bleed fitting to the appropriate tool pipe (Mityvac manual pump);
- Actuate the tool at the bleed fitting, at the same time constantly top up the brake reservoir to prevent air being drawn into the system, until no more air escapes at the bleed fitting:

The operation is finished when only oil comes out of the bleed screws;

- Close the bleed screw and tighten to the prescribed torque.

N.B.

IF AIR CONTINUES TO COME OUT DURING THE BLEED OPERATION, EXAMINE ALL THE FITTINGS. IF SAID FITTINGS DO NOT SHOW SIGNS OF BEING FAULTY, LOOK FOR THE AIR INPUT AMONG THE VARIOUS SEALS ON THE PUMP AND CALLIPER PISTONS. WHEN CARRYING OUT THE OPERATION, BRAKE FLUID MAY LEAK FROM THE BLEED SCREW ON THE CALLIPER AND ON THE



DISC. IN THIS CASE; CAREFULLY CLEAN THE CALLIPER AND DEGREASE THE BRAKE DISC.

Specific tooling

020329Y MityVac vacuum-operated pump

Locking torques (N*m)

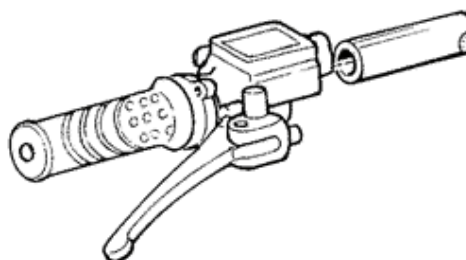
Oil bleed screw 8 ÷ 12

Front brake pump

Removal

- 1) remove the front and rear handlebar covers;
- 2) placing a suitable container to catch the oil, disconnect the oil pipe from the calliper and work the brake lever until no more oil comes out;
- 3) disconnect the oil pipe from the pump then unscrew the two u-bolt clamping screws and remove the pump.

- On refitting, tighten up the fitting to the specified torque and bleed the system.



Locking torques (N*m)

Brake fluid pump-hose fitting 16 ÷ 20

Overhaul

- 1) Remove the brake lever by loosening the fixing screw; open the cover (2) and take out the diaphragm (3);
- 2) Remove the cap and unscrew the internal parts in the specified order;
- 3) Check that:
 - The body of the pump shows no signs of internal damage or corrosion;
 - The piston shows no sign of damage or abnormal wear;
 - The piston return spring is in good condition.

Refitting

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

1. Tank cover screw
2. Tank cover
3. Diaphragm
4. Bellows
5. Seal ring

- 6. Piston
- 7. Gasket
- 8. Spring
- 9. Tank

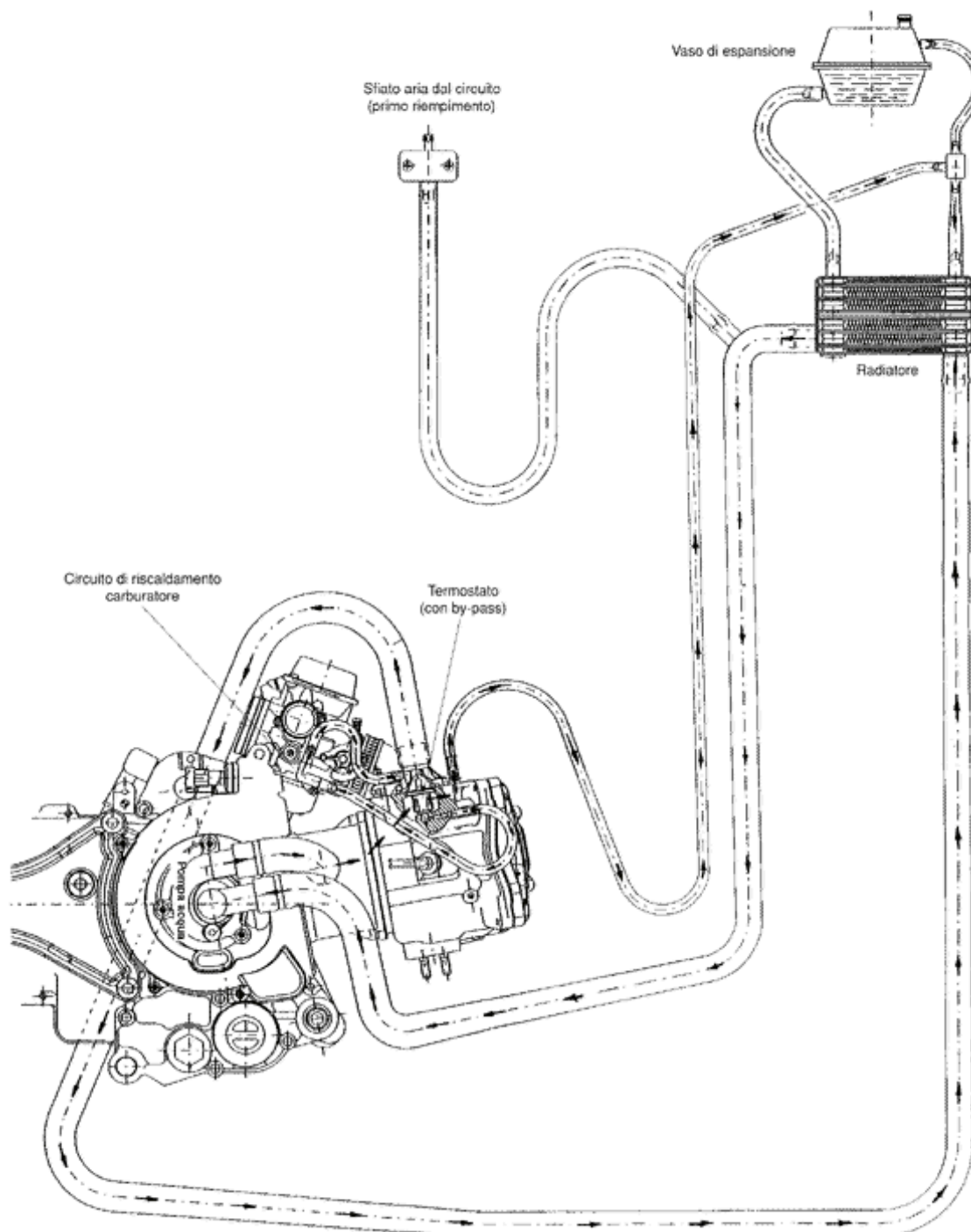
CAUTION

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

INDEX OF TOPICS

COOLING SYSTEM

COOL SYS

Circuit diagram

Water pump - overhaul

Check components

- Check that the rotor does not show abnormal wear or dents;
- Check that the rotor shaft is not rusty;
- Check that there is no rust on the bearing seats or the ceramic seal;
- Check that the drive does not show dents and that it is perfectly integral with the steel hub.

With a hot air gun heat the flywheel cover on the inner side.

- Place the flywheel cover on the ring base following the same procedure as for removal.
- Place the two bearings on the specific punch.
- Use grease to keep the bearings on the appropriate tool.
- Use a plastic mallet to insert the bearings on the housing up to the stop.
- Assembly the ceramic ring and the corresponding rubber gasket. The ceramic ring chamfering should always face towards the gasket.
- Lubricate the rubber gasket and insert the unit on the flywheel cover.

Use the punch of the appropriate tool manually if necessary.

Insert the drive on the guide on the support base facing part of the appropriate tool, being careful to check that the convex part faces upwards.

- Insert the flywheel cover with bearings on the appropriate tool.
- Insert the shaft together with the mechanical gaskets on the bearings.
- With the appropriate punch and socket, insert the shaft in the bearings and the drive until the end of stroke of the appropriate tool cannot be seen.
- Reassemble the rotor cover with a new O-Ring.
- Tighten the 3 fixing screws to the torque below.

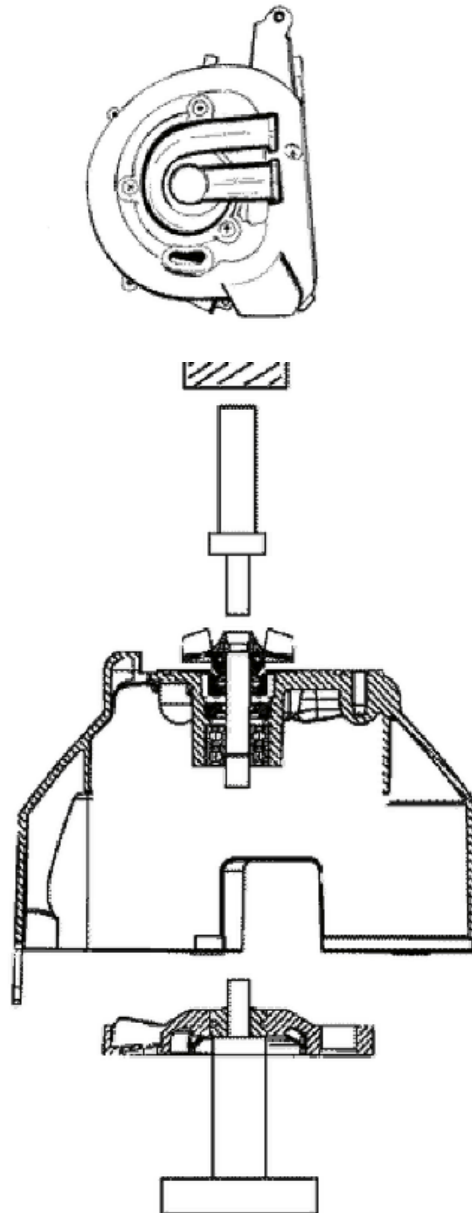
N.B.

AVOID OVERHEATING AS THIS MAY ALTER THE PAINTED SURFACE.

N.B.

ALWAYS USE NEW BEARINGS.

N.B.



ALWAYS USE NEW CERAMIC RING AND GASKETS. ASSEMBLING THE CERAMIC SEALING RING IN A MANNER OTHER THAN MANUALLY MAY DAMAGE THE RING.

N.B.

Centre the punch well on the rotor. Push the shaft in and check that the wheel flywheel cover is level. Failure to respect this procedure damages the drive.

N.B.

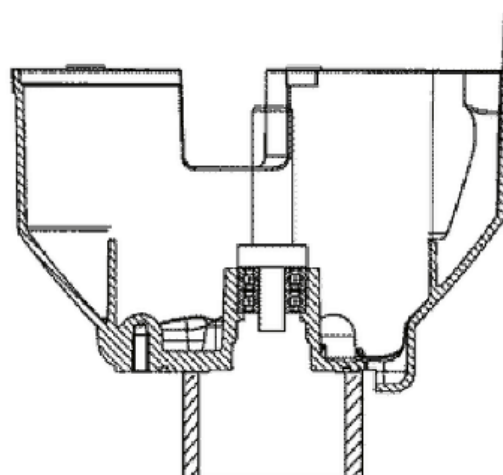
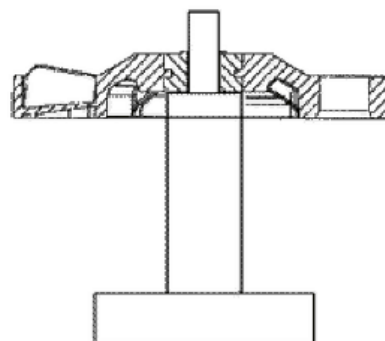
DO NOT LUBRICATE THE O-RING. FAILURE TO RESPECT THIS RULE RESULTS IN RING DISTORTION.

Specific tooling

020440Y Water pump service tool

Locking torques (N*m)

Water pump rotor cover 3 ÷ 4



Water pump ceramic seal

Our Leader, Quasar, and Master liquid cooled engines are equipped with water pumps fitted with the ceramic seal in the subject. This component is intended to guarantee the leak tightness of the coolant in relation to the pump shaft. The seal achieved via two special ceramics, a static one and a spinning one, kept in contact by the thrust of a spring, coaxially mounted onto the pump shaft. The efficiency of this system is guaranteed by the accurate machining and cleaning of the components as they are fitted; in any case, ceramic seals are subjected to a running in period. During this period ($1,000 \pm 1,500$ km), there may be small leaks through draining holes, which remain visible on the aluminium crankcase. This phenomenon is particularly visible there where the hole is more exposed (Quasar and Master). In

such cases we recommend cleaning the casing in order to be able to check again for leaks after a distance of more than 1500 km. If leaks continue or in the event of real losses, the ceramic seal should be replaced. For these operations, observe the tools and instructions given in the relevant service station manuals.

Note: The ceramic seal may be overhauled according to the following couplings:

- Coupling "A": seal ring no. 485084 with ceramic seal no. 486216
- Coupling "B": seal ring no. 841329 with ceramic seal no. 841330

The couplings above may be selected according to their availability, as they are interchangeable.

- Check the water pump if noise in the bearings or liquid leaking from the drainage hole inside the cover is detected.

- Remove the flywheel cover together with the water pump from the engine (see chapter 4).

- Remove the rotor cover by unscrewing the 3 retainers indicated in the figure.

- Place the flywheel cover on the ring base forming part of the tool drawing No 020440Y

With an appropriate socket and punch, forming part of the specific tool 020440y, extract the shaft together with the rotor from the drive and the bearings.

- Use a screwdriver to remove the static part of the ceramic seal from the flywheel cover.

- Place the flywheel cover below the socket making sure it is perfectly levelled.

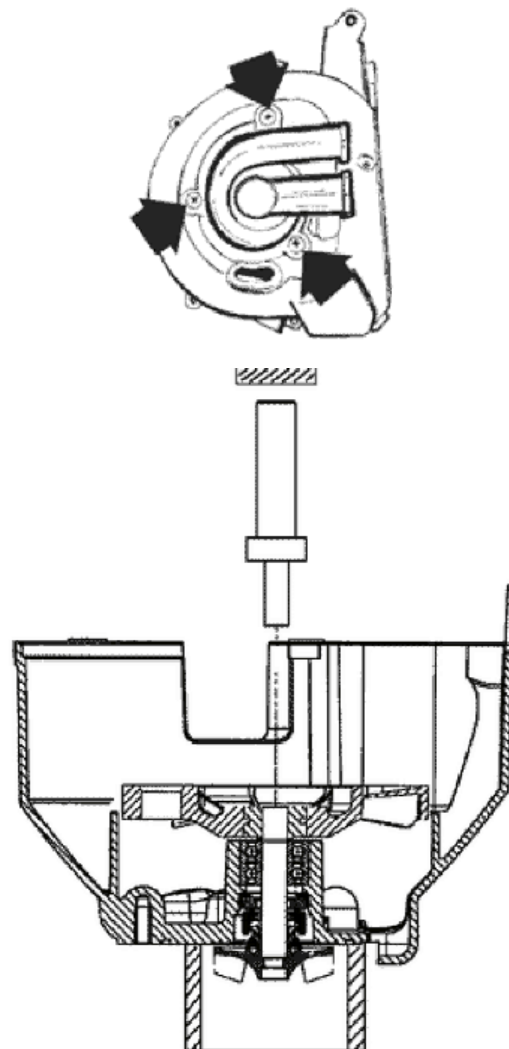
- Use the punch in the inverted position to extract the two ball bearings.

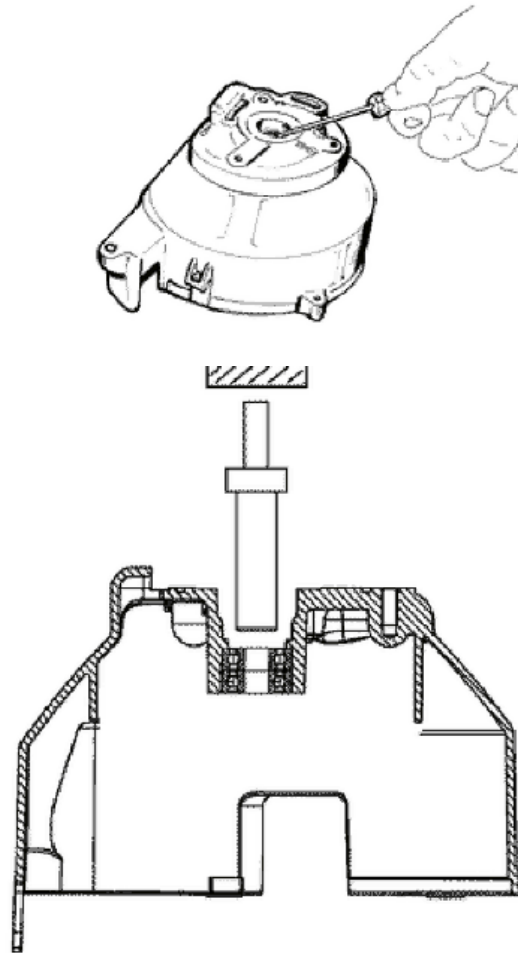
N.B.

To avoid damaging the cover surface that retains the coolant, use the ring base with the accurately machined surface facing the flywheel cover.

Specific tooling

020440Y Water pump service tool





Thermostat

Removal

- Loosen the two screws indicated in the figure and remove the thermostat cover.
- Remove the thermostat with its gasket.



Check

- Visually check that the thermostat is not damaged.
- Prepare a metal container with approx. 1 litre of water.
- Immerse the thermostat, keeping it in the centre of the container.
- Immerse the multimeter temperature probe, near the thermostat.
- Warm up the container using the heat gun.
- Check the temperature when the thermostat starts to open:
- Heat up until the thermostat is completely open
- Replace the thermostat if it does not work properly.



CAUTION

TO EXECUTE THE TEST CORRECTLY, MAKE SURE NEITHER THE THERMOSTAT NOR THE THERMOMETER TOUCHES THE CONTAINER.

Specific tooling

020331Y Digital multimeter

020151Y Air heater

Characteristic

Thermostat check: opening travel

3.5 mm at 80°C

Thermostat check: Opening start temperature

69.5 ÷ 72.5°C

- 1) Look to see that the thermostat is not damaged.
- 2) Fill a metal container with approx. 1 litre of water.

Immerse the thermostat, and keep it in the centre of the container.

Immerse the multimeter temperature probe drawing No° 020331Y close to the thermostat.

Heat the container with a hot air gun drawing No° 020151Y.



Check the temperature when the thermostat starts to open:

Opening start temperature: $69.5 \div 72.5^{\circ}\text{C}$

Heat up until the thermostat is completely open.

Opening travel: 3.5 mm at 80°C

CAUTION - To execute the test correctly, make sure neither the thermostat nor the thermometer touches the container.

3) Replace the thermostat if it is not working properly.

Refitting

- Place the thermostat with the bleeding hole at the highest point.
- Make sure that the rubber gasket is positioned properly.
- Fit the thermostat cover with the connection for the carburettor heating pipe facing the flywheel.
- Tighten the two screw to the torque indicated below.



Locking torques (N*m)

Thermostat cover screws $3 \div 4$

INDEX OF TOPICS

CHASSIS

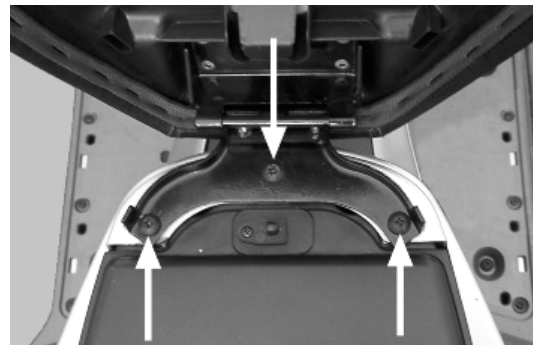
CHAS

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



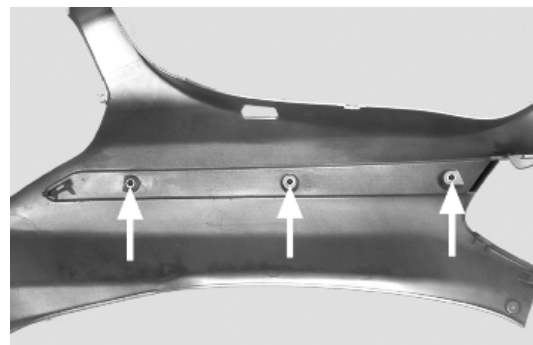
Seat

- Raise the saddle
- Undo the three screws fixing the plate to the central cover and remove the saddle.



Side fairings

- Remove the side panel
- Undo the three clamping screws of the bumper band and remove it.

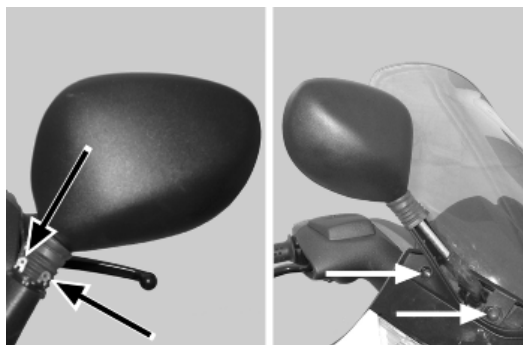


See also

[Handles and top side fairings](#)

Driving mirrors

- Remove the joint rubber of the mirror housing from the bottom;
- Unscrew the two screws, then remove the covering from the support arm;
- Remove the 2 lower retainers fixings the mirror to the frame.



Rear handlebar cover

- - Remove the front handlebar cover
- Remove the three clamping screws of the rear handlebar cover and remove it.



See also

[Front handlebar cover](#)

Instrument panel

- Remove the instrument panel support and tip it.
- Unscrew the two clamping screws to remove the instrument panel.

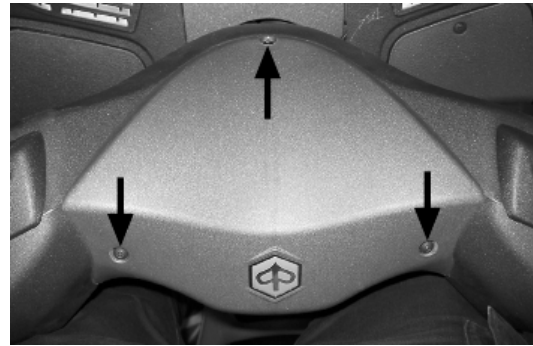


See also

[Analogue instrument panel support](#)

Front handlebar cover

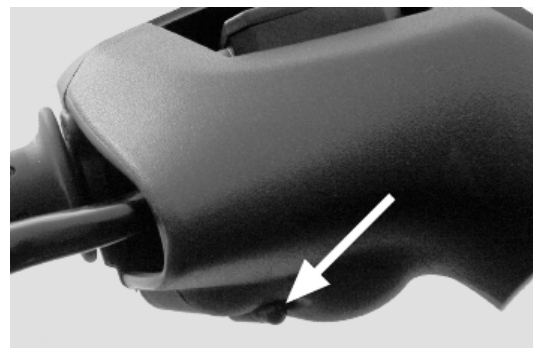
- Undo the three clamping screws of the upper handlebar cover and pull it upwards.



- Undo screw «B», then remove cover «A».

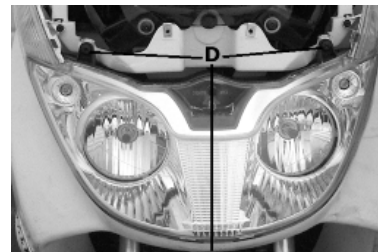


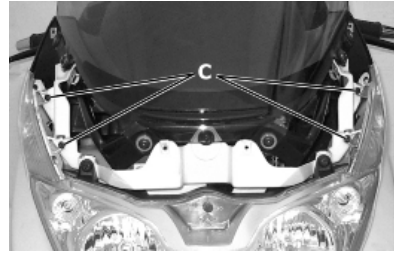
- Undo the two clamping screws at the bottom.



Headlight assy.

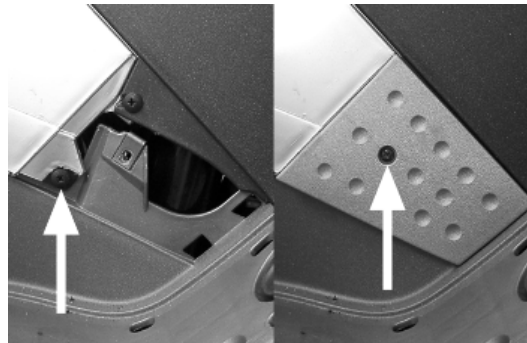
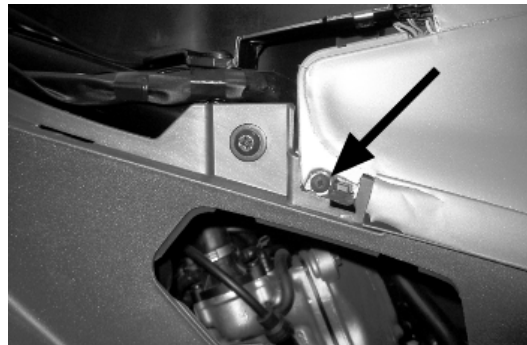
- Remove the upper cover of the headlight
- Undo the two upper clamping screws, the lower screw and remove the headlight assembly
- Undo the two clamping screws of each turn indicator and remove them



**See also**[Flyscreen](#)

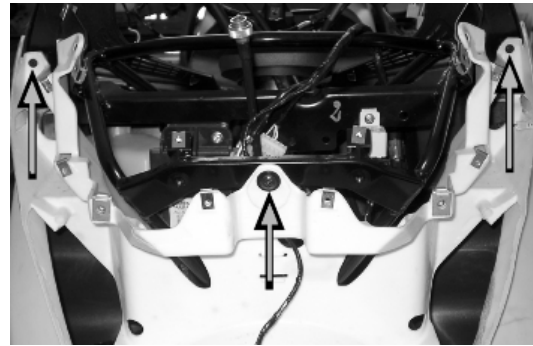
Frame central cover

- Remove the saddle
- - Remove the shield back plate
- - Remove the side panels
- Undo the two rear clamping screws
- Detach the covering caps of the front screw and remove the screws

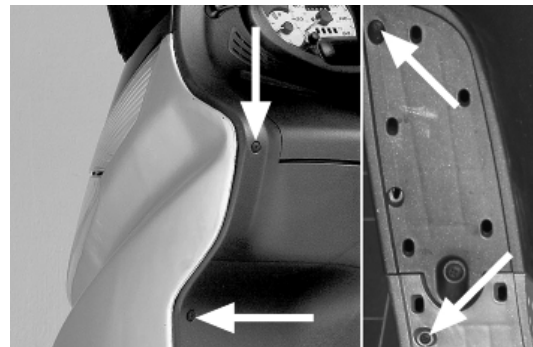
**See also**[Seat](#)[Knee-guard](#)[Handles and top side fairings](#)

Legshield

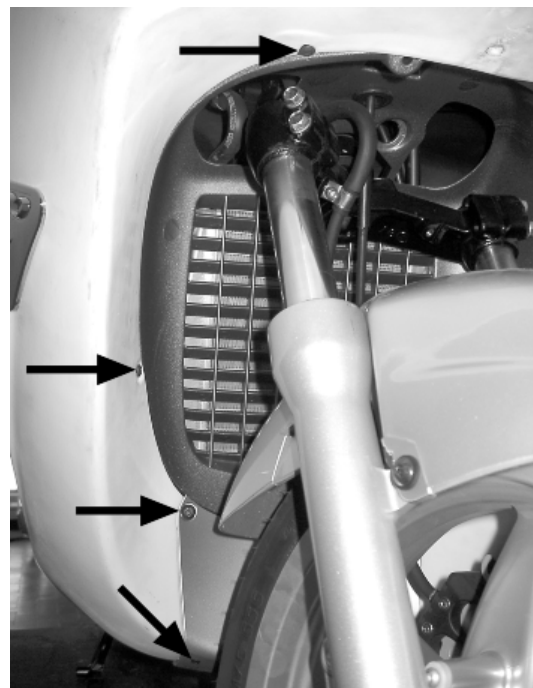
- Remove the front headlight
- Remove the upper three fixings



- Remove the eight clamping screws (4 each side) on the shield back plate.



- Remove the eight clamping screws (four per side) for fixing the shield with the radiator grille and the spoiler.

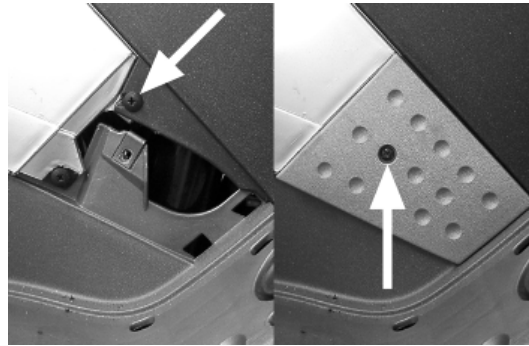


See also

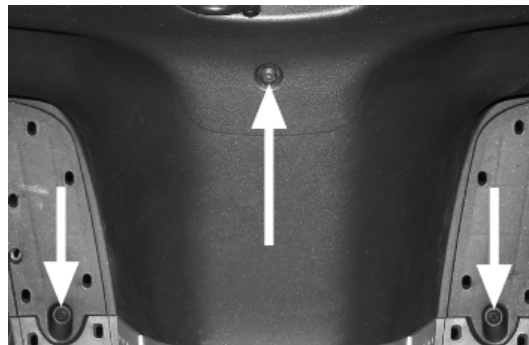
Headlight assy.

Knee-guard

- - Remove the front shield.
- Remove the expansion tank from the shield back plate and fix it to the small front frame in such a way that it does not turn over;
- Disconnect the clock setting button and electrical socket connection;
- Undo the cap clamping screws of the lower screw cover and remove them.



- Remove the three clamping screws on the frame;
- Remove the shield back plate by removing the lower part;
- To make the operation easier it might be necessary to turn the steering alternately to right and left to free the upper appendages.

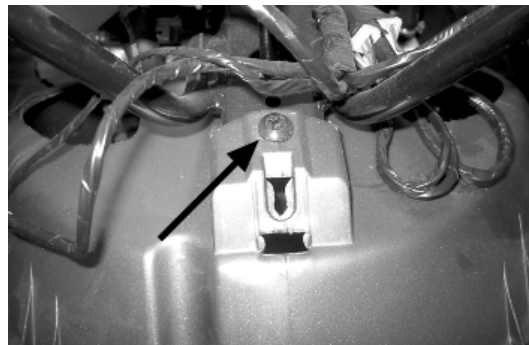


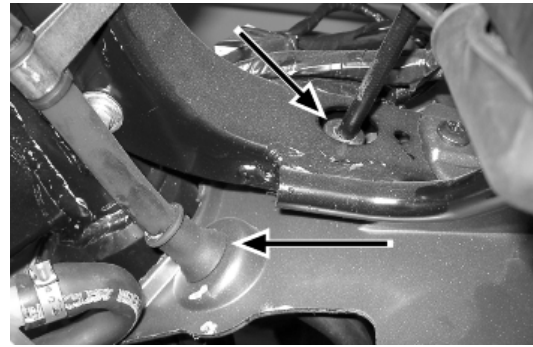
See also

[Legshield](#)

Front wheel housing

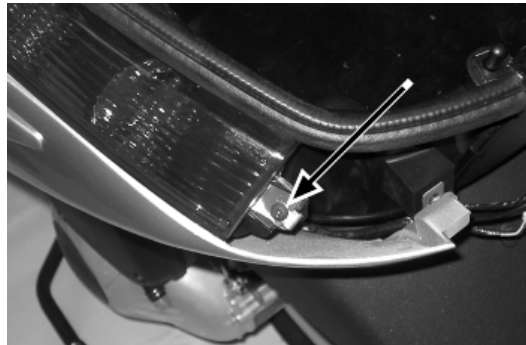
- Remove the front fork;
- Unscrew the central stud of the wheel well at the frame;
- Disconnect the brake pipe to the pump and pull it out;;
- Remove the odometer transmission..



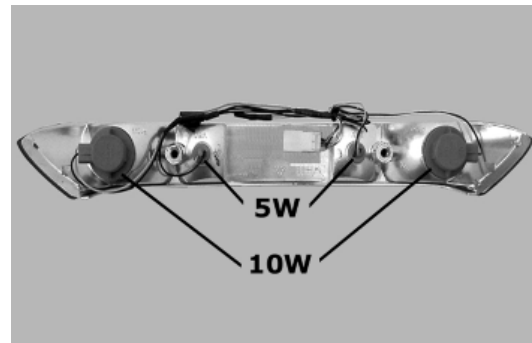


Taillight assy.

- After accessing the rear glove box, undo two rear light clamping screws «D».
- Once you have removed the rear light, remove screw «E» and remove the turn indicator.

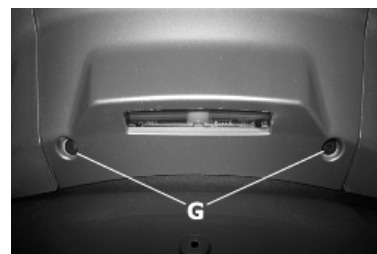


- Central lights: parking lights;
- Side lights: stop lights.



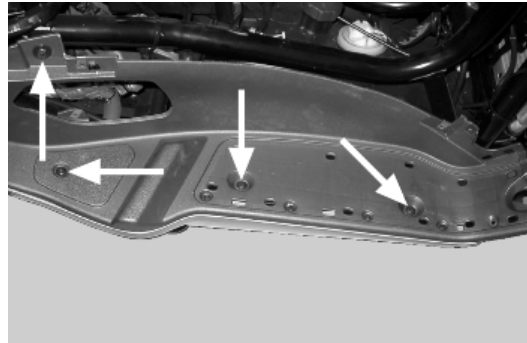
License plate light

- Remove the two screws «G», then remove the side panels and light support junction after disconnecting the electrical connection.



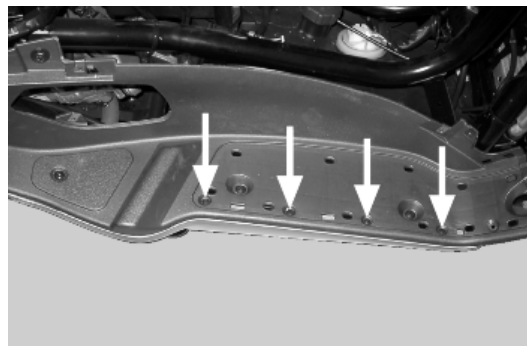
Footrest

- - Remove the central cover of the frame.
- Undo the four clamping screws of the footboard and remove it.



- Undo the four clamping screws on the edge of the footboard and remove the lower cover.

The diagram illustrate what to do on the right-hand footboard; follow the same procedure to remove the left-hand footboard.

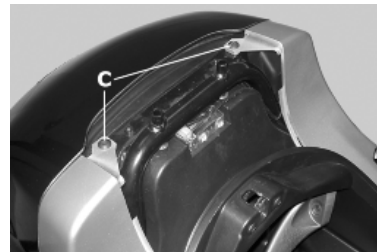


See also

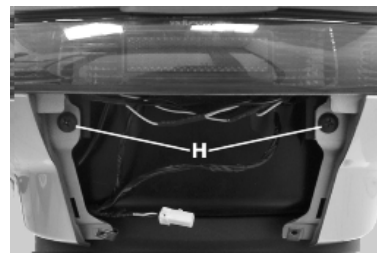
[Central cover](#)

Side fairings

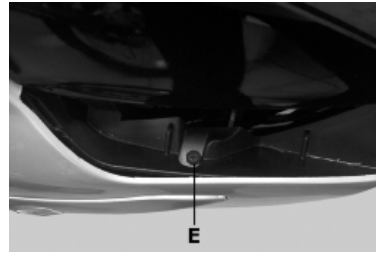
- Remove the passenger grab handle
- Remove the two upper side panel clamping screws «C».



- Remove the licence plate light support then undo the two side panel clamping screws «H» underneath it.



- Undo screw «E» under the turn indicator.



- Remove the four screws «F», then remove the side panel by pulling it backwards to free the teeth hooking it to the central cover.

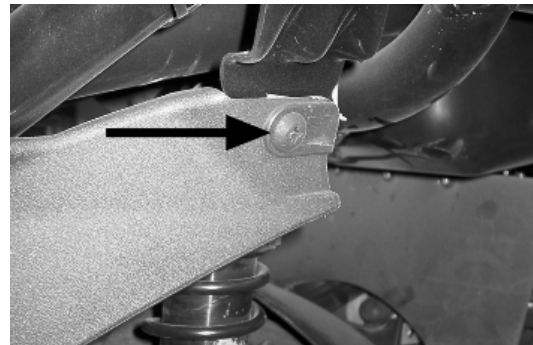


See also

[Handles and top side fairings](#)
[License plate light](#)

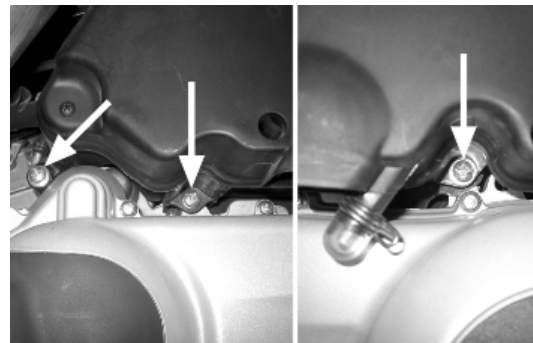
License plate holder

- Remove the rear and side fittings and the pipe above the helmet compartment retaining frame;
- Remove the two side licence plate support clamping screws;
- Lift the helmet compartment to allow the licence plate support to free itself from the two threaded appendages on the rear frame tube.

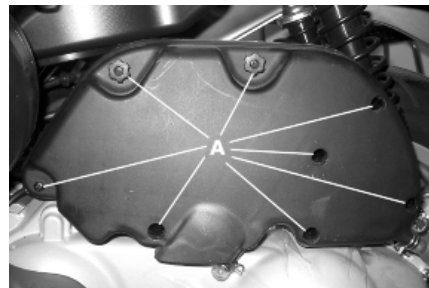
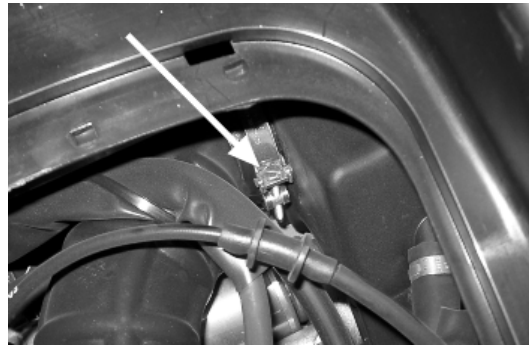


Air filter

- Remove the left-hand side panel;
- Undo the three screws fixing the box to the crankcase;
- Loosen the hose tightening screw on the carburettor and remove the hose;
- Push the box upwards to free it from the appendages on the crankcase and remove it ;



- Undo the clamping screws «A» (two of which are on the knob-type head) and remove the air-box cover.

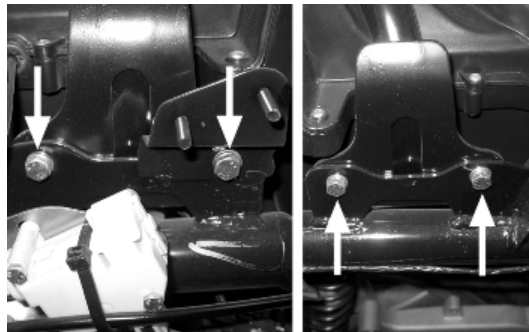


See also

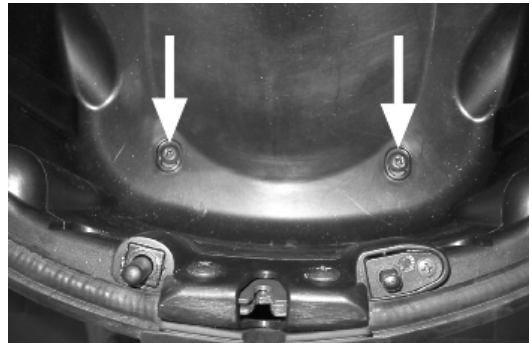
[Side fairings](#)

Helmet bay

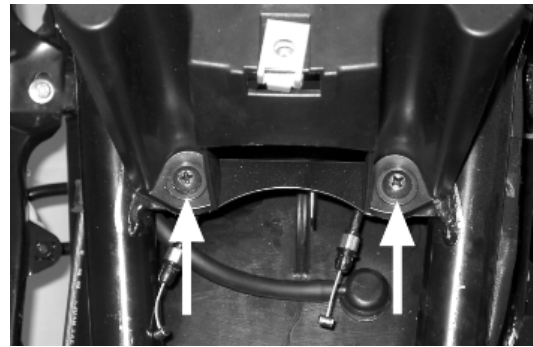
- - Remove the central cover of the frame.
- Remove the three clamping screws of the rear handlebar cover and remove it.



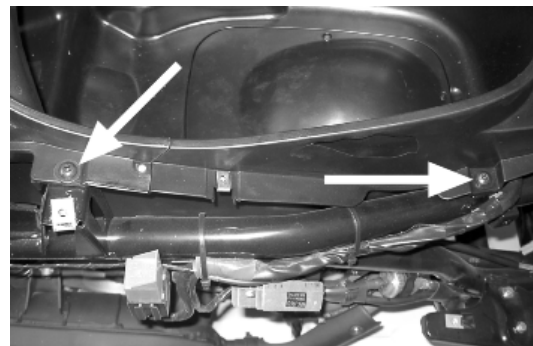
- Open the glove box flap;
- Undo the 2 screws two on the bottom of the helmet compartment.



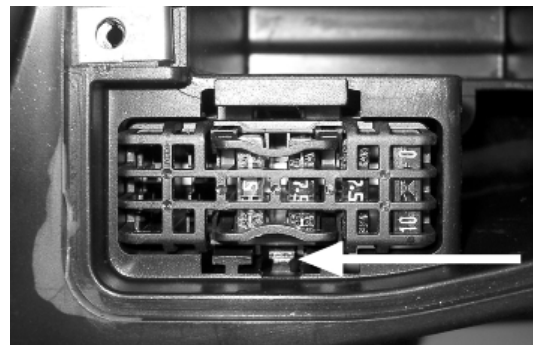
-
- Undo the 2 screws located in the front part of the helmet compartment.



-
- Undo the 4 screws (2 per side) on the sides of the helmet compartment.



-
- Raise the helmet compartment as far as possible;
 - Disconnect the electrical connection of the light and the two buttons for activating it ;
 - Remove the glove box flap hook
 - Remove the saddle hook, unhook the control transmission from it and pull it out through the lateral through hole in the compartment;
 - Pull the right and left fuse box out downwards freeing the hook tooth with a screwdriver from above

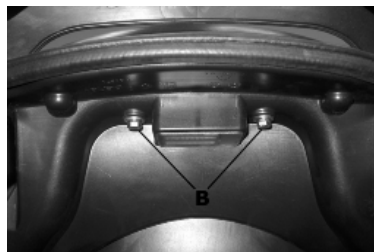


See also

[Frame central cover](#)

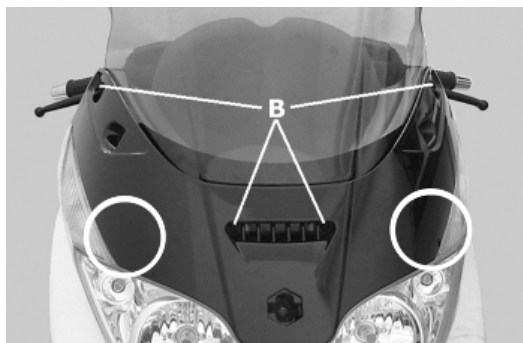
Handles and top side fairings

- Remove the passenger grab handle by undoing the two upper screws «A» and the two lower screws «B» in the helmet compartment.



Flyscreen

- Remove the driving mirrors;
- Undo the four clamping screws «B», then extract the cover being careful with the 2 teeth coupling it to the turn indicators.



- Remove the four clamping screws;
- Remove the windshield being careful to collect the washers supporting the rubber support blocks.

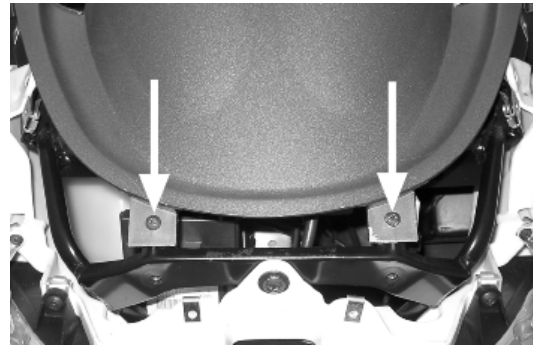


See also

[Driving mirrors](#)

Analogue instrument panel support

- Remove the windscreen;
- Undo the two front screws.



- Undo the two screws at the side of the handlebar cover and the two on the upper part of the shield back plate;
- Move the covering from the front small frame and undo the connection of the odometer transmission;
- Remove the whole assembly being careful of the odometer socket coming out of the small frame tubes;
- Remove the instrument panel connector.



See also

[Flyscreen](#)

INDEX OF TOPICS

PRE-DELIVERY

PRE DE

Carry out the listed tests before delivering the vehicle.

Warning - Be very careful when handling fuel.

Aesthetic inspection

Appearance check:

- Paintwork
 - Fitting plastic parts
 - Scratches
 - Dirt
-

Tightening torques inspection

Lock check

- Safety locks
- clamping screws

Safety locks

Rear shock absorber upper fixing

Rear shock absorber lower fixing

Front wheel axle nut

Wheel hub nut

Frame - swinging arm bolt *

Swinging arm bolt - Engine

Engine arm pin - Frame arm

Handlebar lock nut

Steering lower ring nut

Upper steering ring nut

Electrical system

Electrical system:

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

- Horn
- Starter

CAUTION

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

WARNING

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

CAUTION

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

WARNING

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

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

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

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

KEEP OUT OF THE REACH OF CHILDREN

CAUTION

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

Levels check

Level check:

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

Road test

Test ride

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

- Abnormal noise
-

Static test

Static control after the test ride:

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

CAUTION

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

CAUTION

NEVER EXCEED THE RECOMMENDED INFLATION PRESSURES OR TYRES MAY BURST.

Functional inspection

Functional check up:

Braking system (hydraulic)

- Lever travel

Braking system (mechanical)

- Lever travel

Clutch

- Proper functioning check

Engine

- Throttle travel check

Others

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

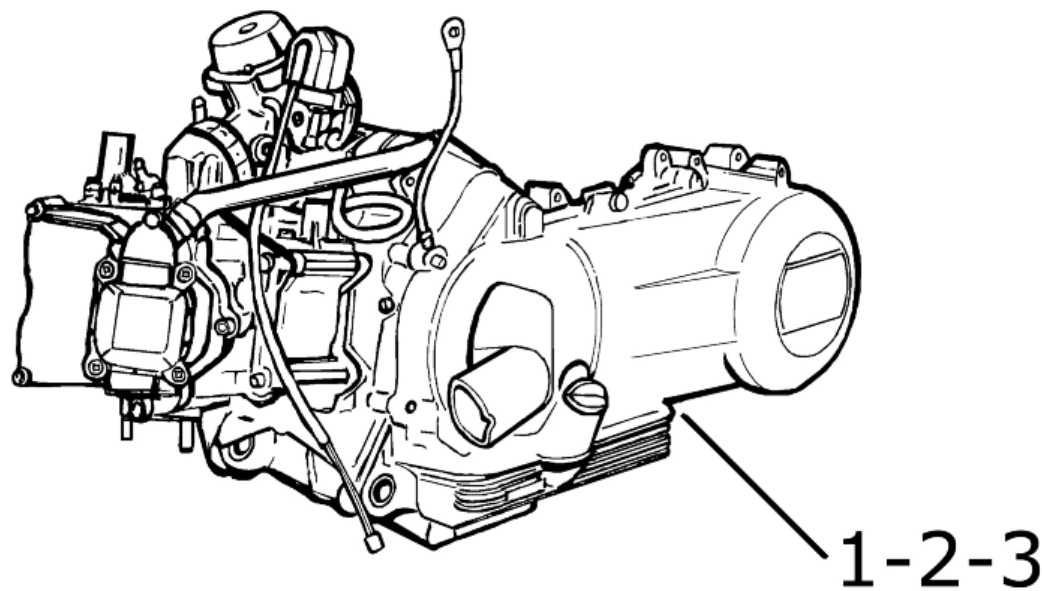
INDEX OF TOPICS

TIME

TIME

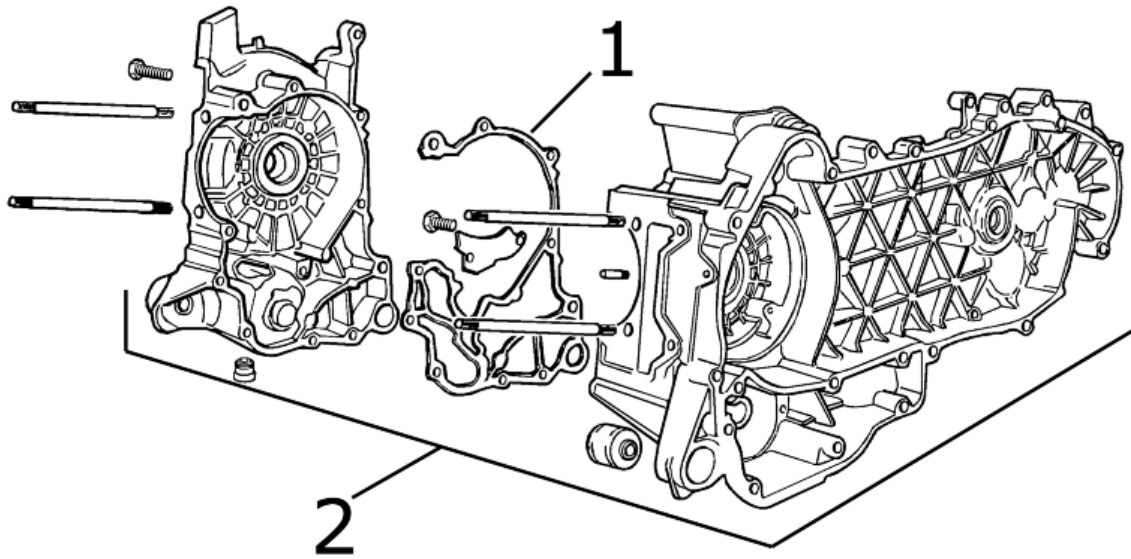
This section is devoted to the time necessary to carry out repairs.
The description, code and predetermined time for each operation are specified.

Engine



ENGINE			
	Code	Action	Duration
1	001001	Engine - Replacement	
2	001136	Exhaust emissions - Adjustment	
3	003064	Engine oil - Change	

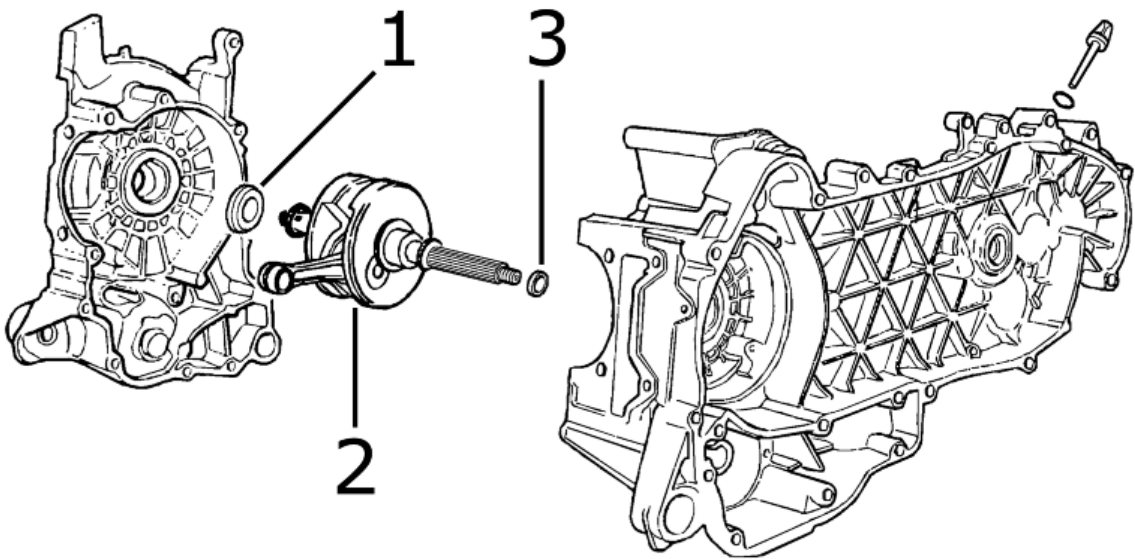
Crankcase



CRANKCASE

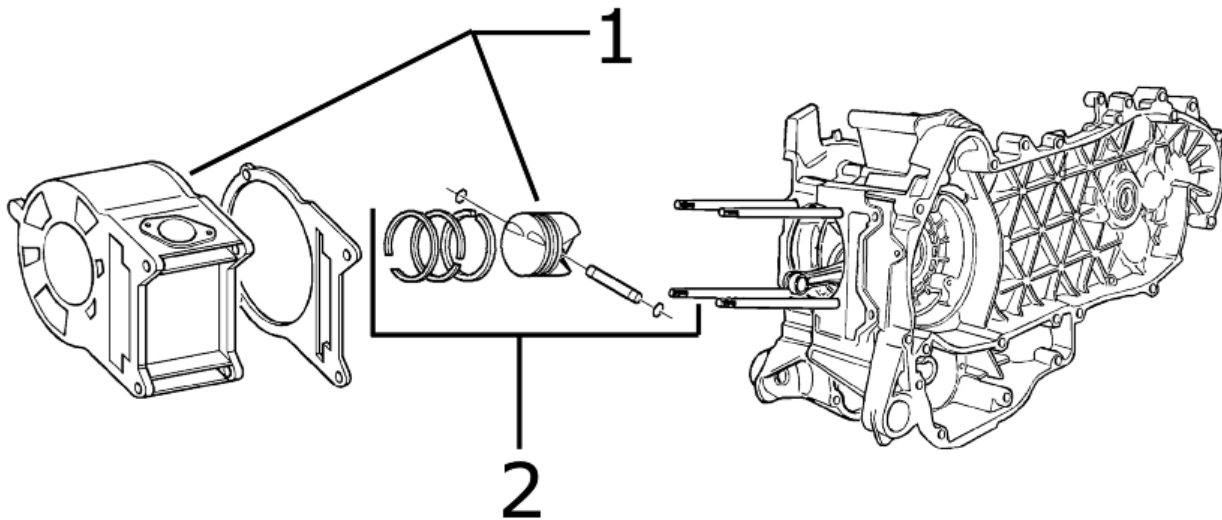
	Code	Action	Duration
1	001153	Crankcase gasket - Replacement	
2	001133	Engine crankcase - Replacement	

Crankshaft



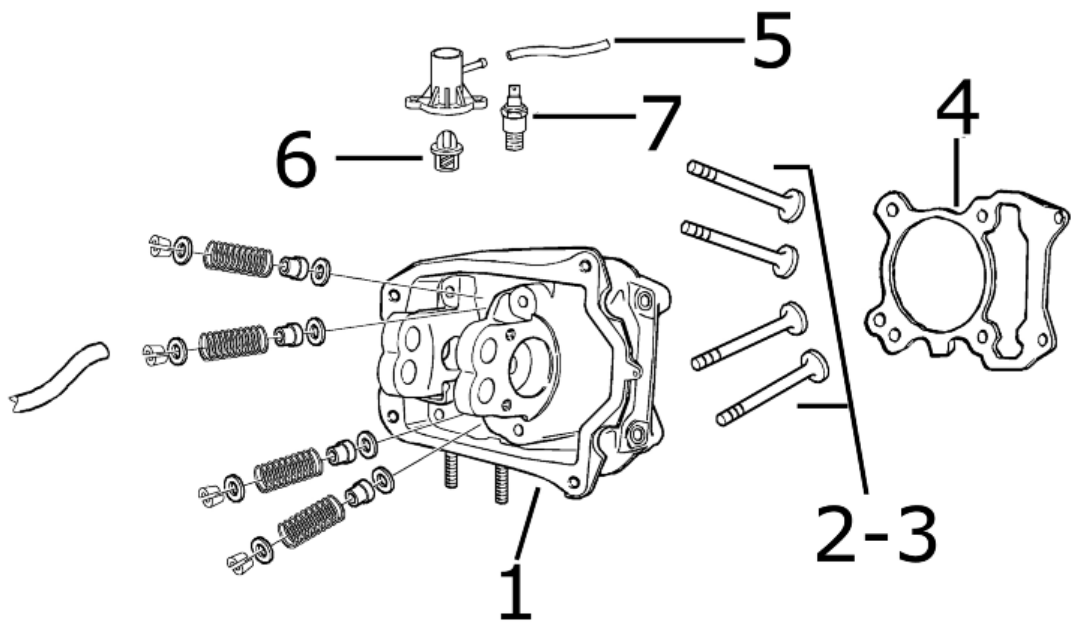
CRANKSHAFT

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

Cylinder assy.**CYLINDER UNIT - PISTON**

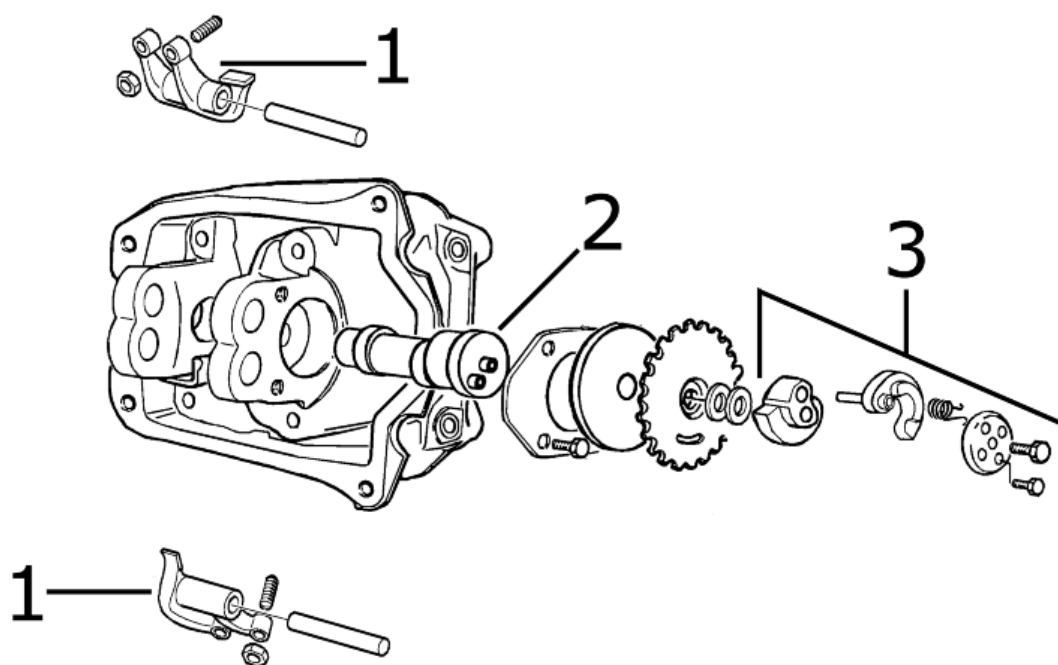
	Code	Action	Duration
1	001002	Cylinder / Piston - Replacement	
2	001176	Rings / Pin - Replacement	

Cylinder head assy.



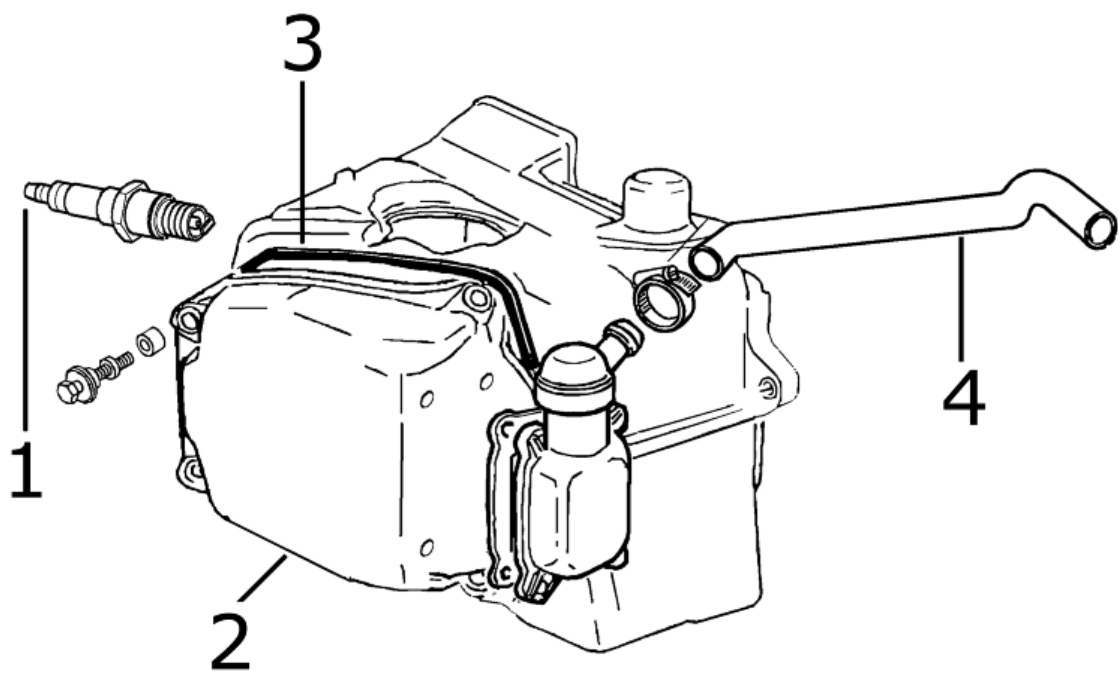
CYLINDER HEAD ASSEMBLY

	Code	Action	Duration
1	001126	Head - Replacement	
2	001045	Valves - Replacement	
3	001049	Valves - Adjustment	
4	001056	Head gasket - Replacement	
5	007009	Cylinder / pump rubber coupling - Re- placement	
6	001057	Thermostat - Replacement	
7	001083	Thermistor - Replacement	

Rocker arms support assy.**ROCKING LEVER UNIT**

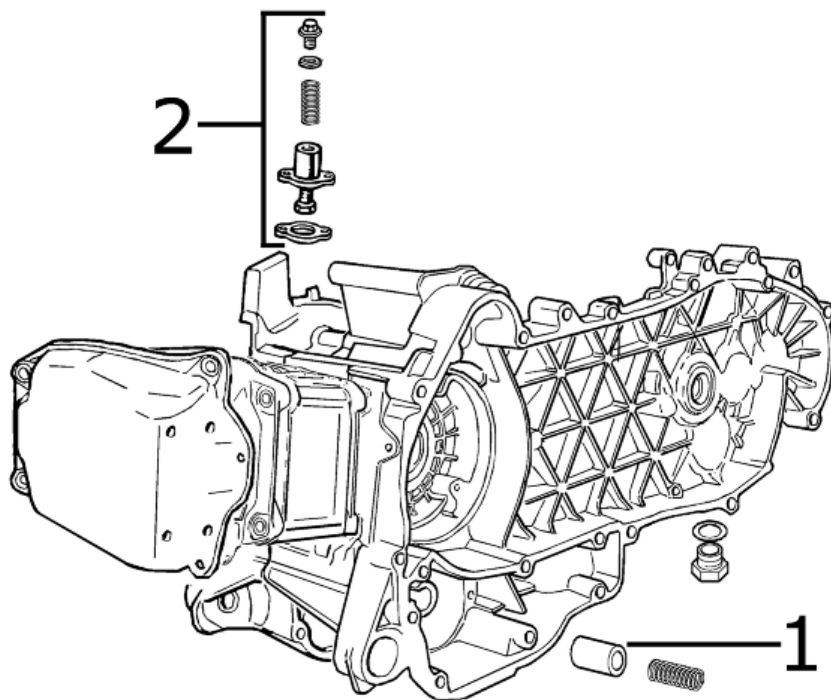
	Code	Action	Duration
1	001148	Valve rocking levers - Replacement	
2	001044	Camshaft - Replacement	
3	001169	Decompressor - Replacement	

Cylinder head cover



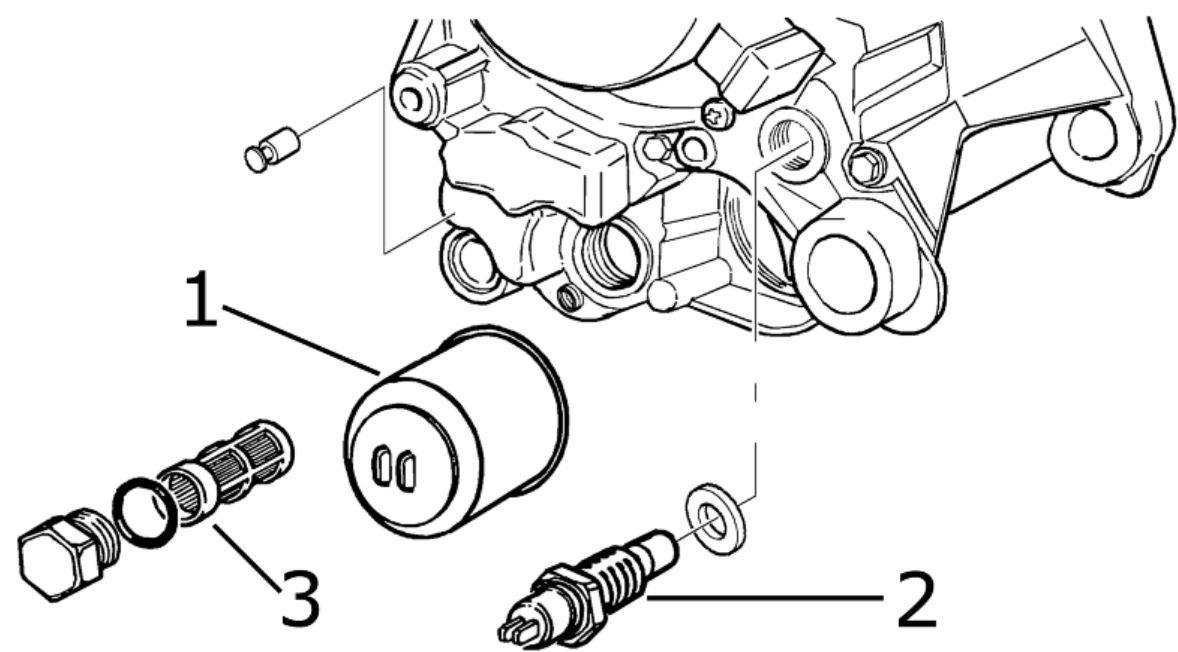
HEAD COVER

	Code	Action	Duration
1	001093	Spark plug - Replacement	
2	001089	Head cover - Replacement	
3	001088	Head cover gasket - Replacement	
4	001074	Oil vapour recovery pipe - Replacement	

Chain tensioner**CHAIN TIGHTENER**

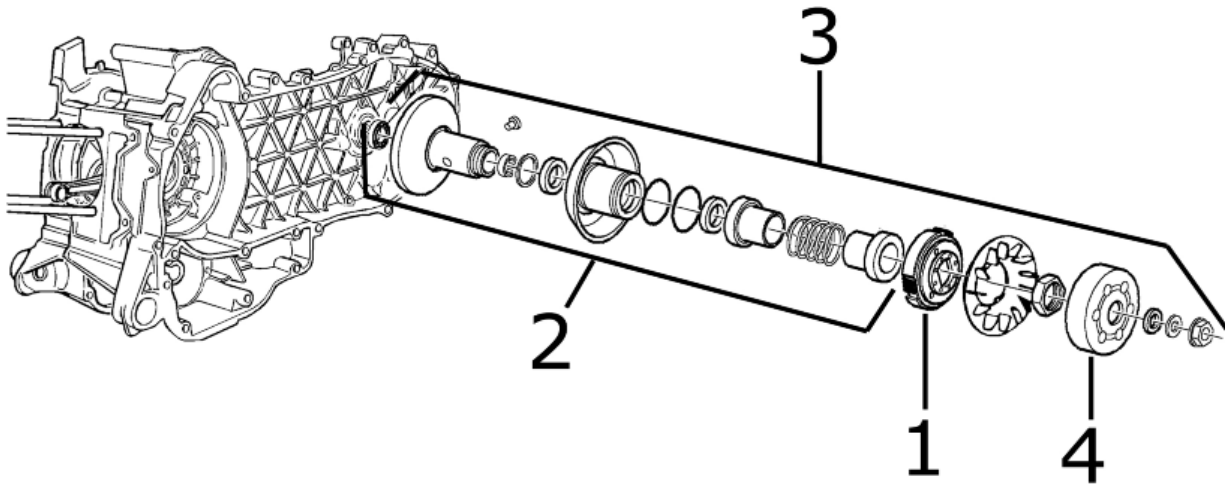
	Code	Action	Duration
1	001124	Lubrication by-pass - Replacement	
2	001129	Chain tightener - Replacement	

Oil filter



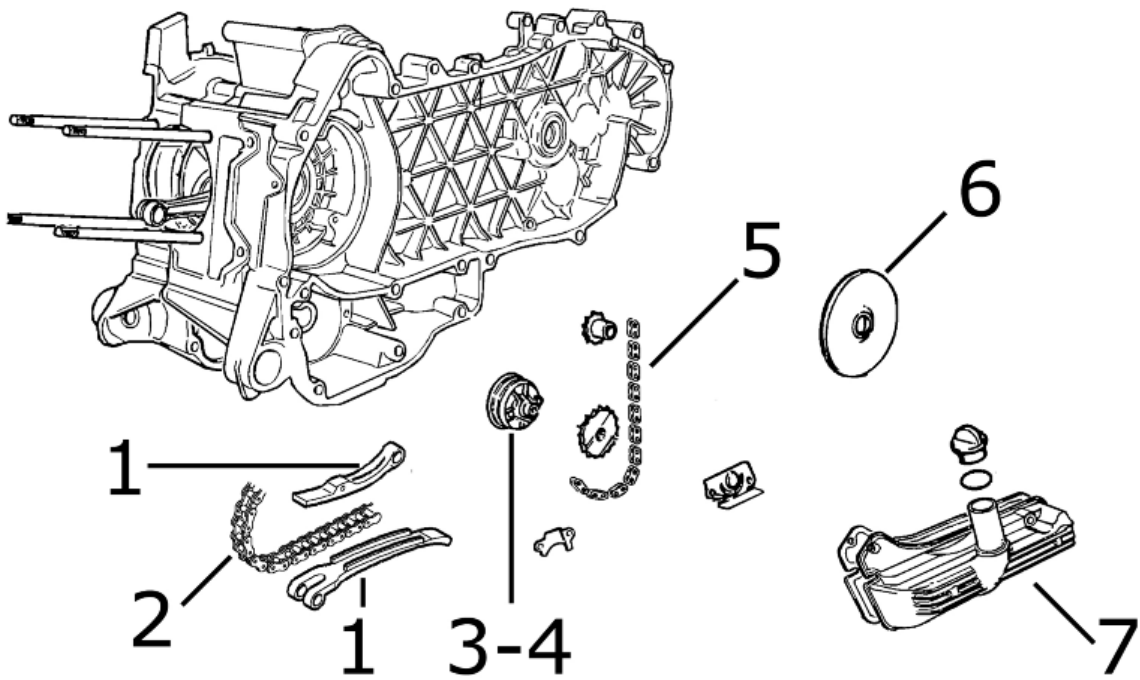
OIL FILTER

	Code	Action	Duration
1	001123	Oil filter - Replacement	
2	001160	Oil pressure sensor - Replacement	
3	001102	Oil mesh filter - Change / Cleaning	

Driven pulley**DRIVEN PULLEY**

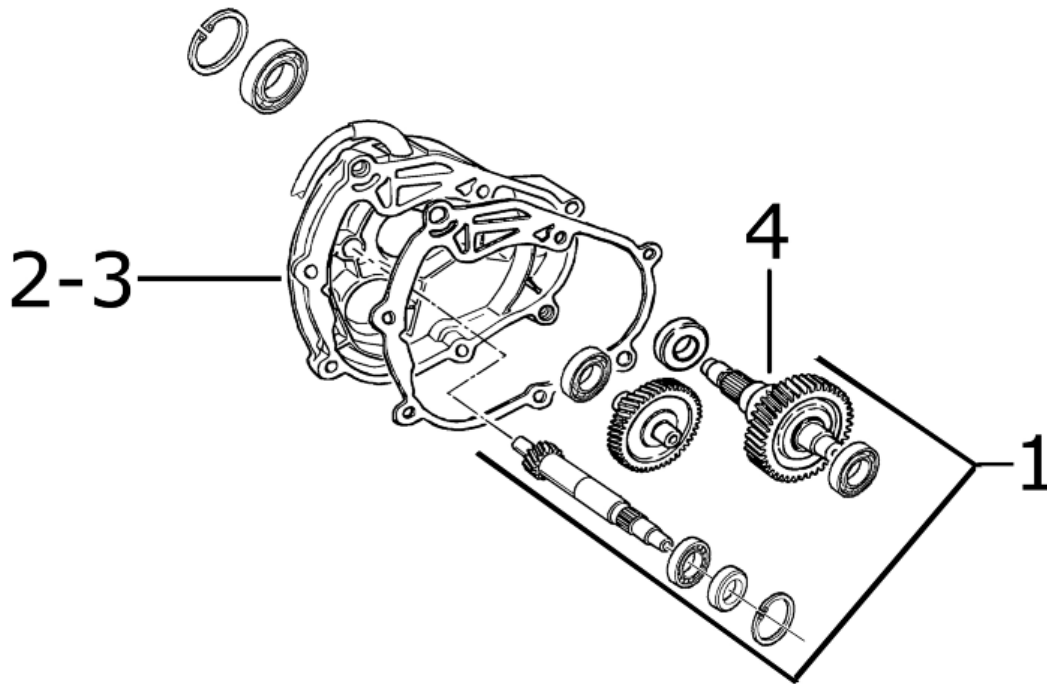
	Code	Action	Duration
1	001022	Clutch - Replacement	
2	001012	Driven pulley - Service	
3	001110	Driven pulley - Replacement	
4	001155	Clutch bell housing - Replacement	

Oil pump



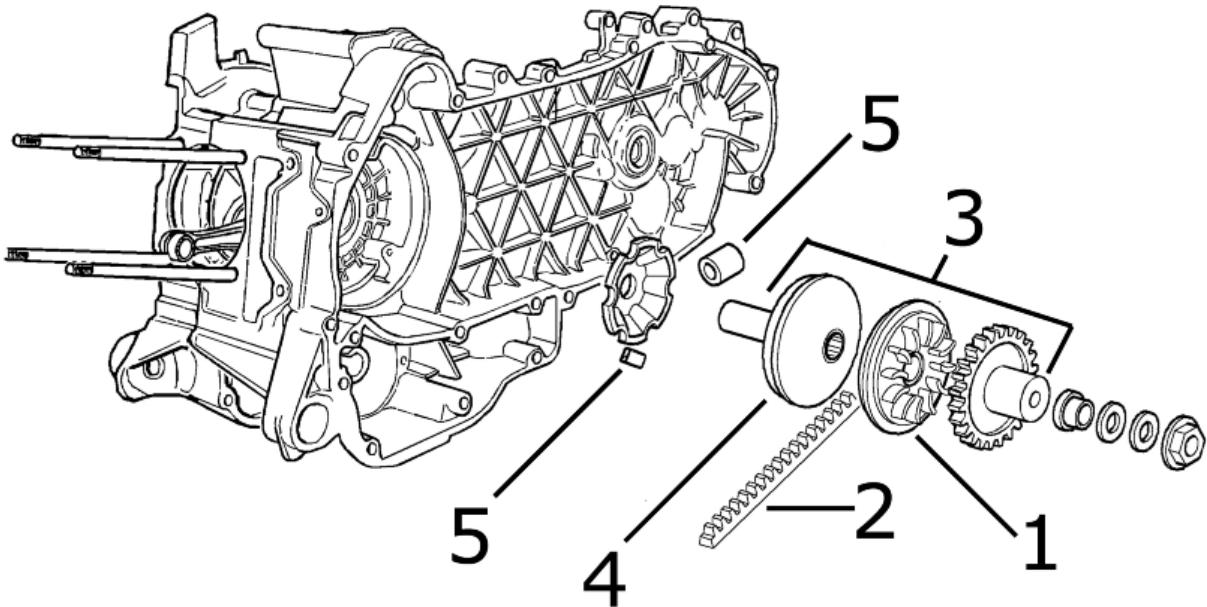
OIL PUMP

	Code	Action	Duration
1	001125	Chain guide sliders - Replacement	
2	001051	Distribution belt - chain - Replacement	
3	001042	Oil pump - Service	
4	001112	Oil pump - Replacement	
5	001122	Oil pump chain	
6	001172	Chain cover flap - Replacement	
7	001130	Oil sump - Replacement	

Final gear assy.**FINAL REDUCTION**

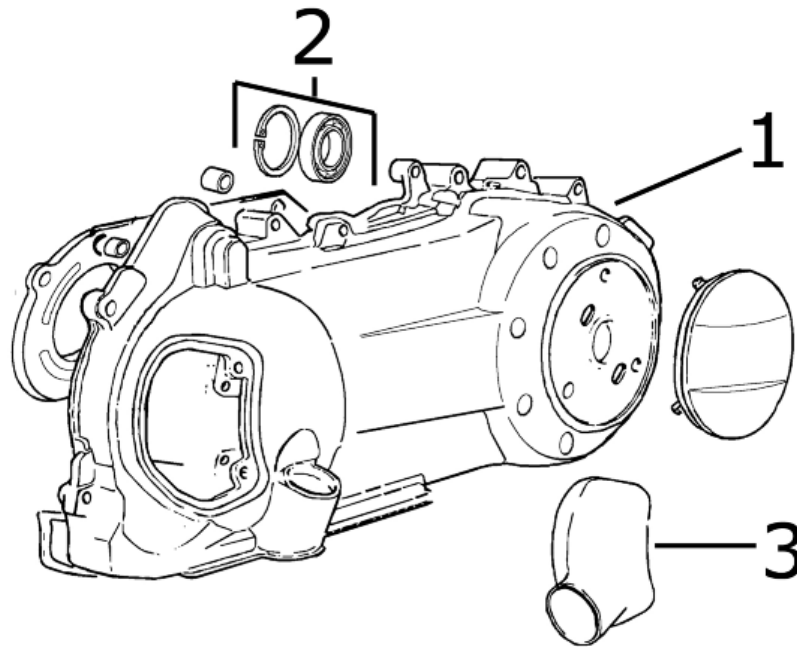
	Code	Action	Duration
1	001010	Reduction gear - Replacement	
2	003065	Gear box oil - Replacement	
3	001156	Geared reduction unit cover - Replacement	
4	004125	Rear wheel axle - Replacement	

Driving pulley



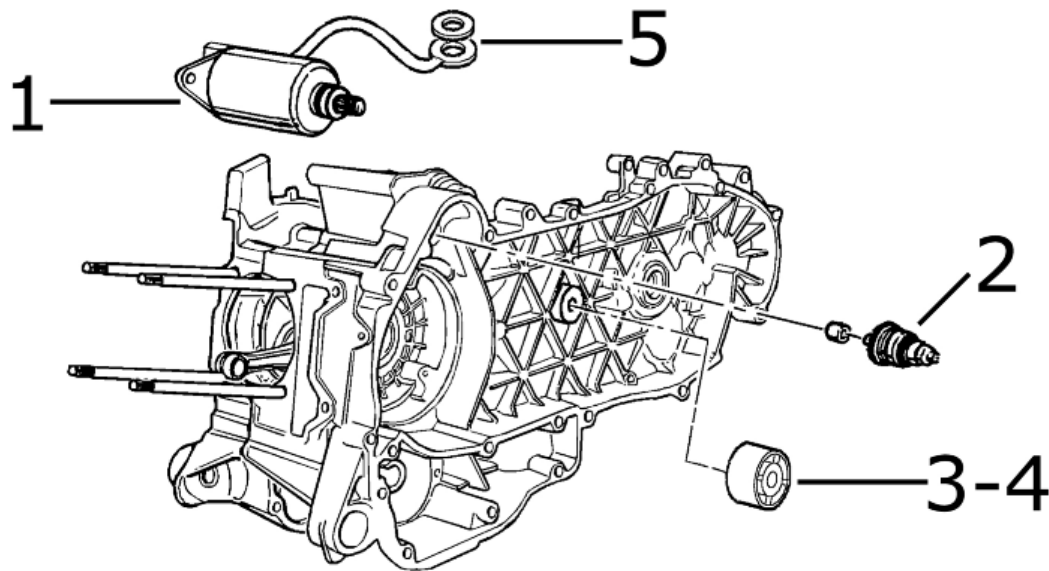
DRIVING PULLEY REPAIR TIME

	Code	Action	Duration
1	001086	Driving half-pulley - Replacement	
2	001011	rear-view belt - Replacement	
3	001006	rear-view pulley - Service	
4	001066	driving pulley - Replacement	
5	001177	Variator rollers / shoes - Replacement	

Transmission cover**TRANSMISSION COVER**

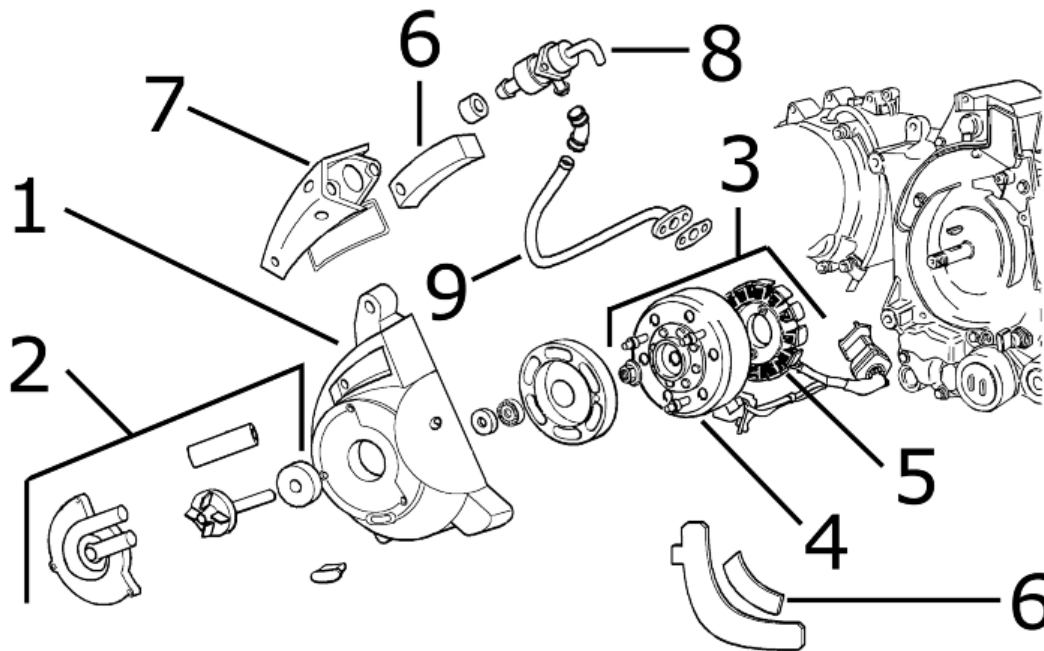
	Code	Action	Duration
1	001096	Transmission crankcase cover - Replacement	
2	001135	Transmission cover bearing - Replacement	
3	001170	Air deflector - Replacement	

Starter motor



STARTER MOTOR			
	Code	Action	Duration
1	001020	Starter motor - Replacement	
2	001017	Starter sprocket wheel - Replacement	
3	001141	Anti-flapping roller - belt - Replacement	
4	001175	Anti-vibration roller - Service	
5	005045	Starter motor cable assembly - Replacement	

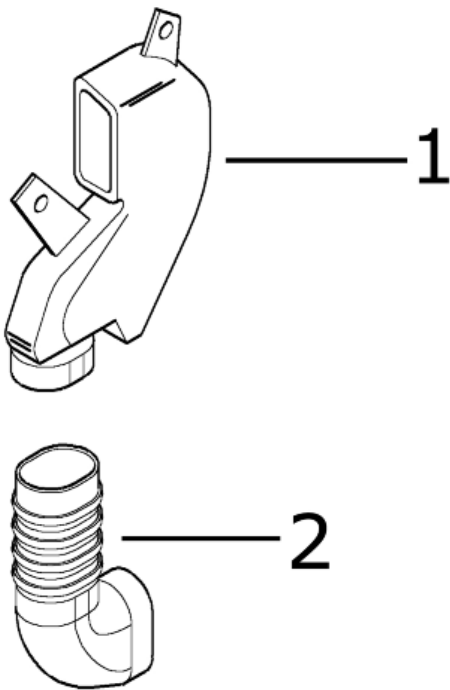
Flywheel magneto



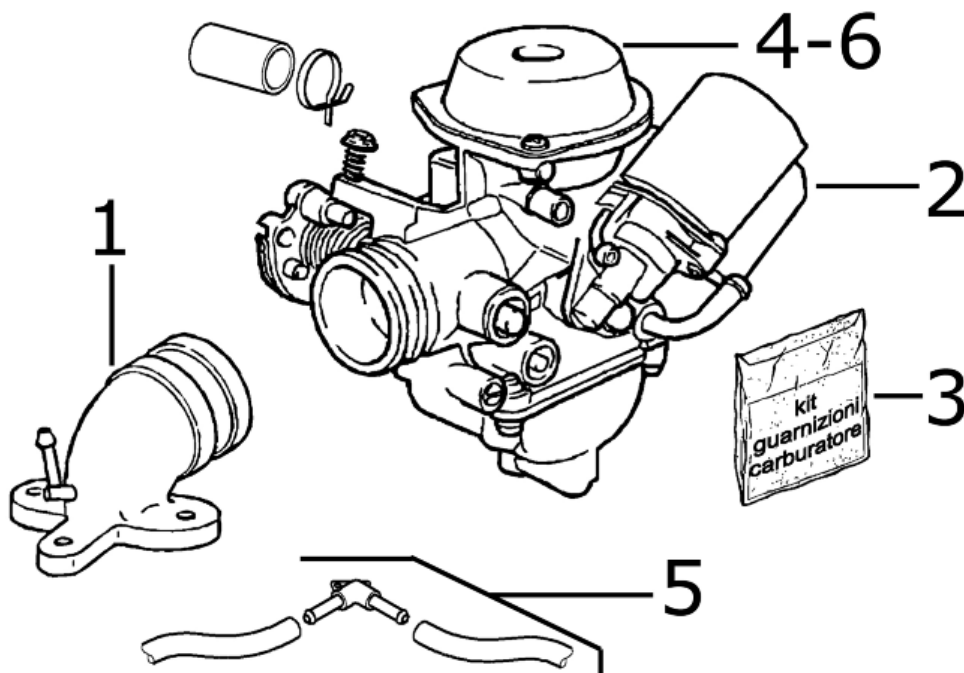
MAGNETO FLYWHEEL AND SECONDARY AIR

	Code	Action	Duration
1	001087	Flywheel cover - Replacement	
2	001113	Water pump / Pump rotor - Replacement	
3	001058	Flywheel - Replacement	
4	001173	Rotor - Replacement	
5	001067	Stator - Replacement	
6	001161	Secondary air filter - Replacement / Cleaning	
7	001162	Secondary air housing - Replacement	
8	001174	SAS valve - Replacement	
9	001163	SAS valve / Head connection - Replacement	

Belt cooling duct

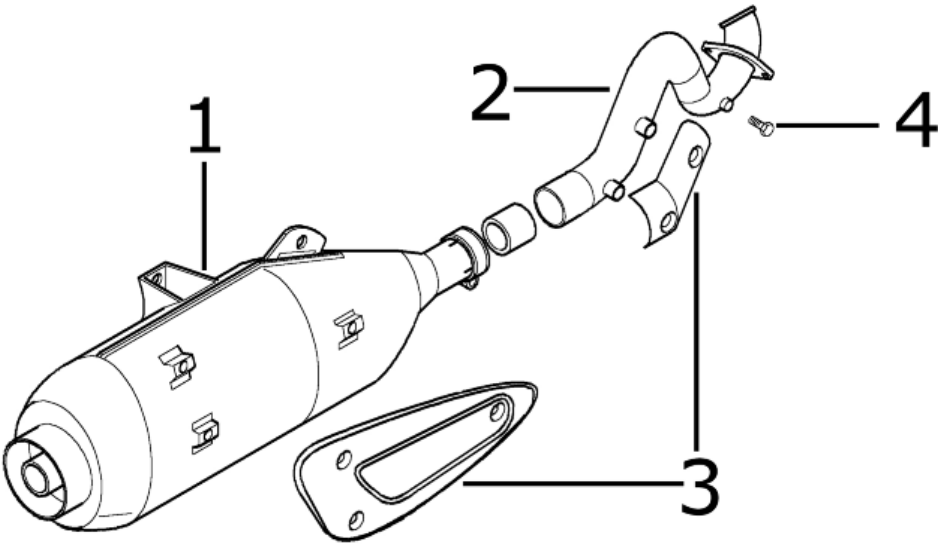


BELT COOLING TUBE			
	Code	Action	Duration
1	001131	Transmission air inlet - Replacement	
2	001132	Transmission air inlet tube - Replacement	

Carburettor**CARBURETTOR**

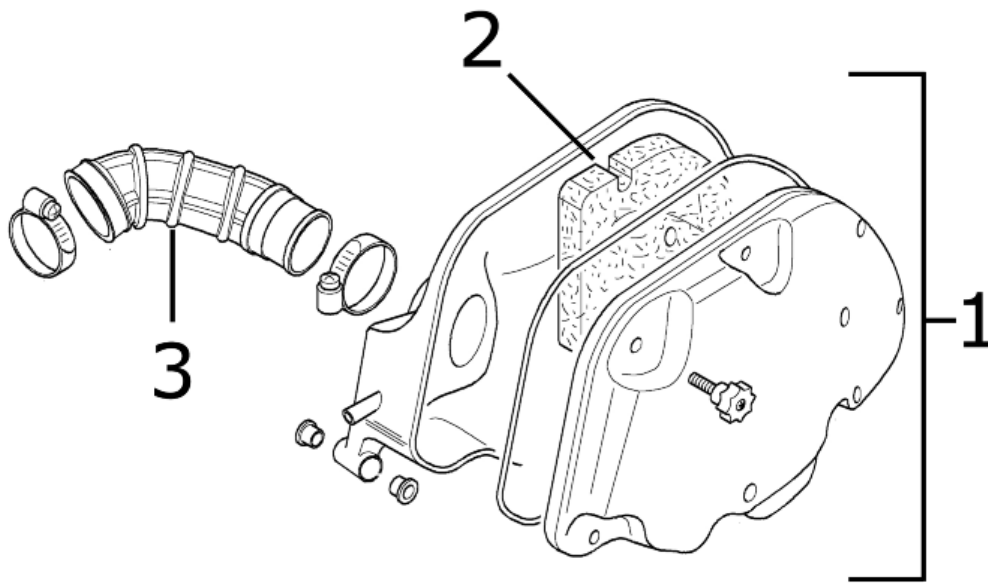
	Code	Action	Duration
1	001013	Intake manifold - Replacement	
2	001081	Automatic choke - Replacement	
3	001008	Carburettor - Inspection	
4	001063	Carburettor - Replacement	
5	007020	Carburettor heating tubing - replacement	
6	003058	Carburettor - Adjustment	

Exhaust pipe



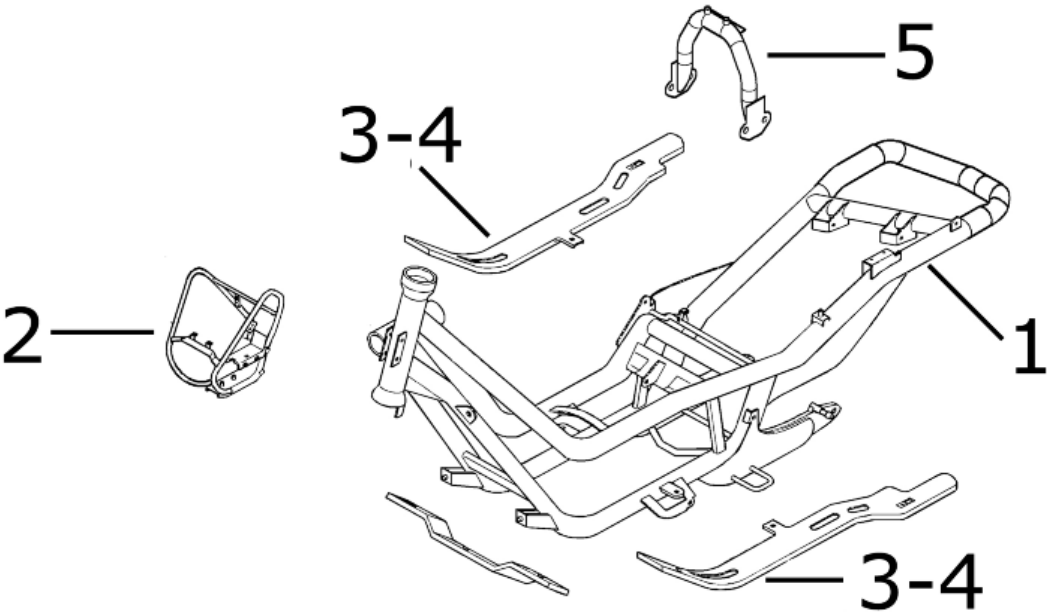
MUFFLER

	Code	Action	Duration
1	001009	Muffler - Replacement	
2	001092	Exhaust manifold - Replacement	
3	001095	Muffler guard - Replacement	
4	001136	Exhaust emissions - Adjustment	

Air cleaner**AIR CLEANER**

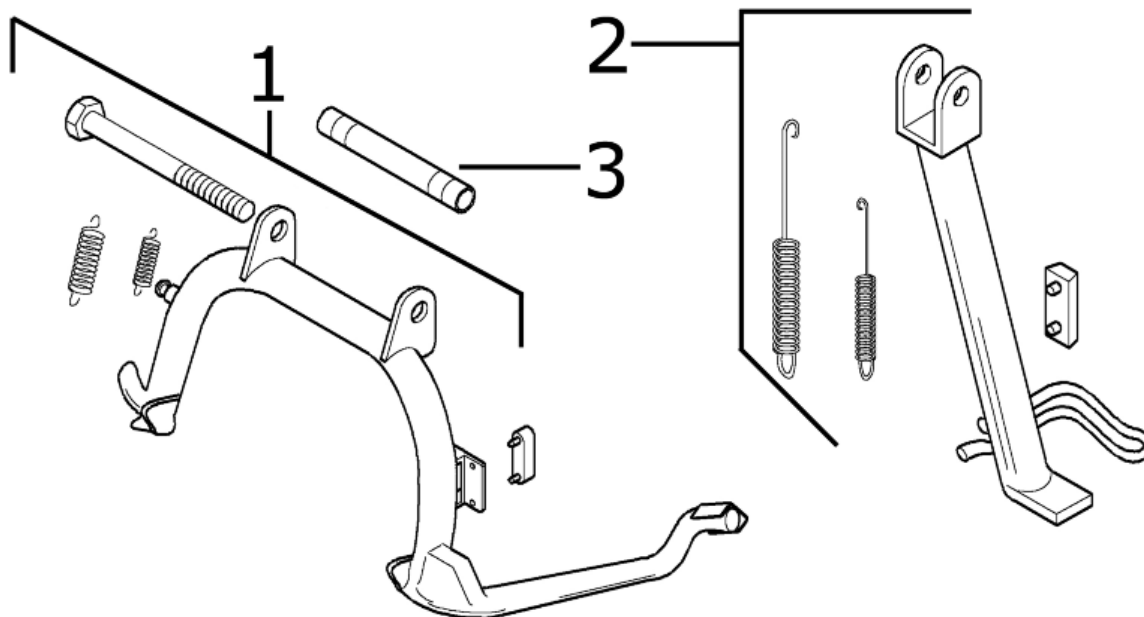
	Code	Action	Duration
1	001015	Air filter box - Replacement	
2	001014	Air filter - Replacement / cleaning	
3	004122	Air cleaner/ carburettor union - Replacement	

Frame



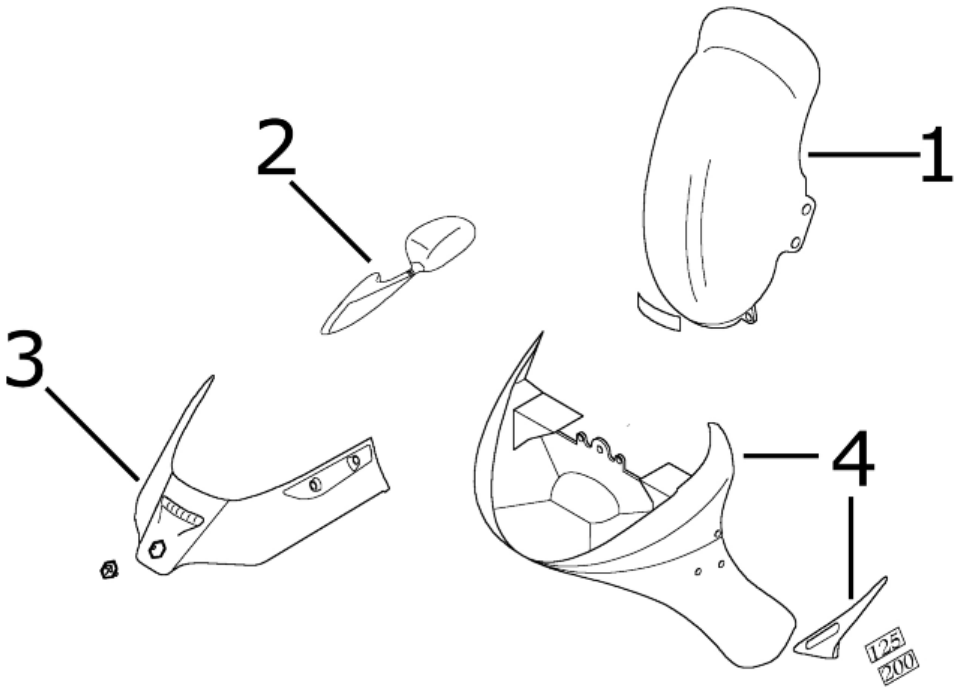
CHASSIS

	Code	Action	Duration
1	004001	Chassis - Replacement	
2	004146	Front frame - Replacement	
3	004147	Footrest support bracket, one side - Replacement	
4	004148	Footrest support bracket, both sides - Replacement	
5	004116	Rear frame - Replacement	

Centre-stand**STAND REPAIR TIME**

	Code	Action	Duration
1	004004	Stand - Replacement	
2	004102	Side stand - Replacement	
3	001053	Stand bolt - Replacement	

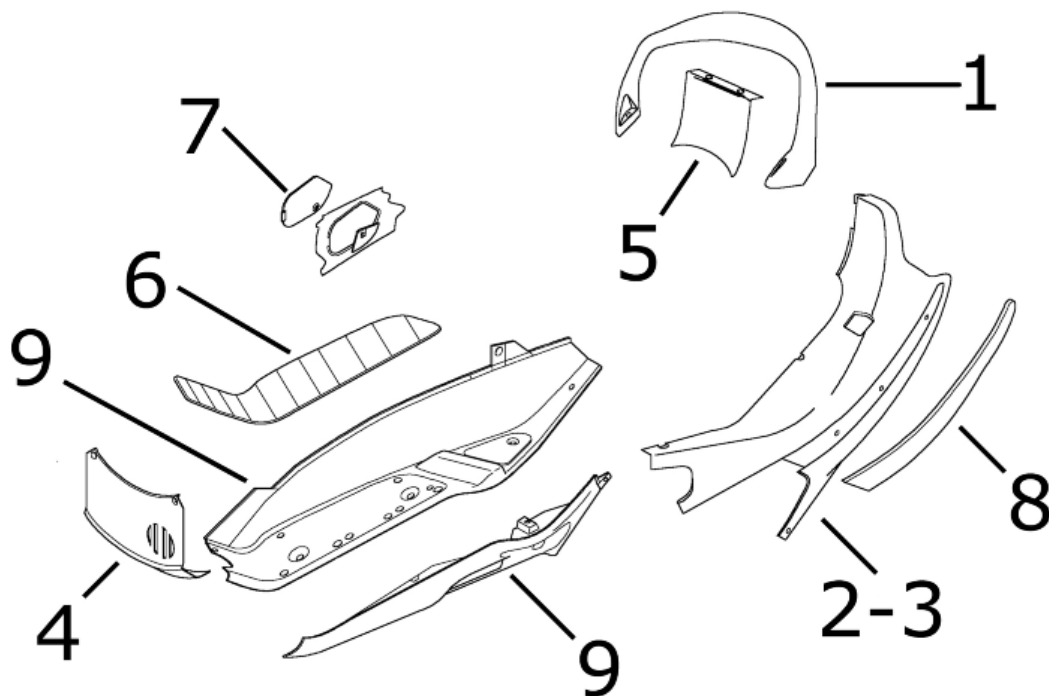
Legshield spoiler



FRONT SHIELD

	Code	Action	Duration
1	004101	Windshield - Replacement	
2	004066	Rear-view mirror - Replacement	
3	004020	Headlight frame - Replacement	
4	004064	Legshield - Replacement	

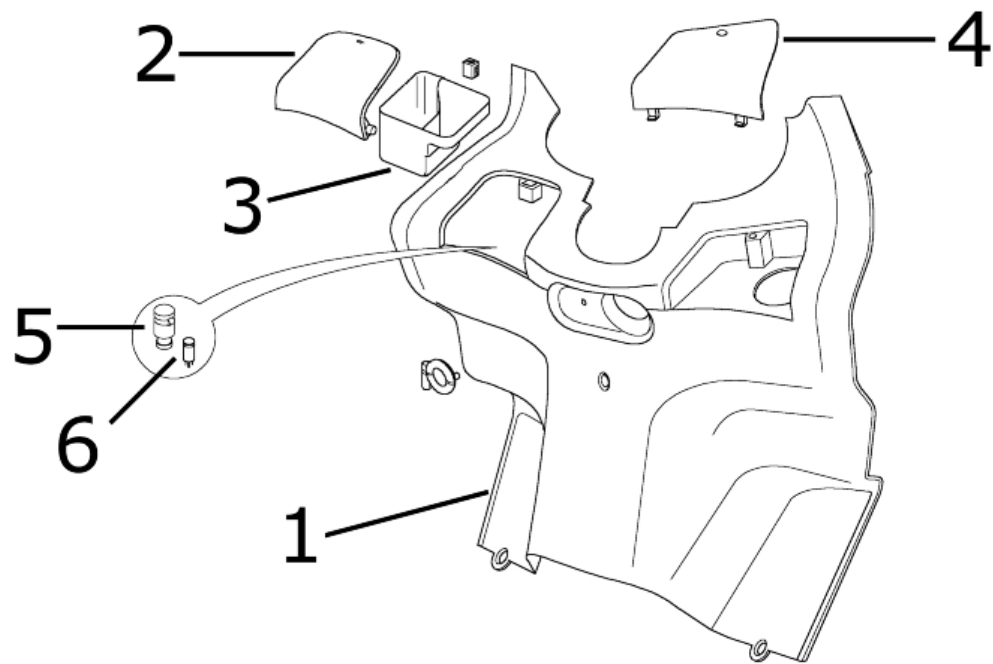
Side fairings



SIDE COVERS

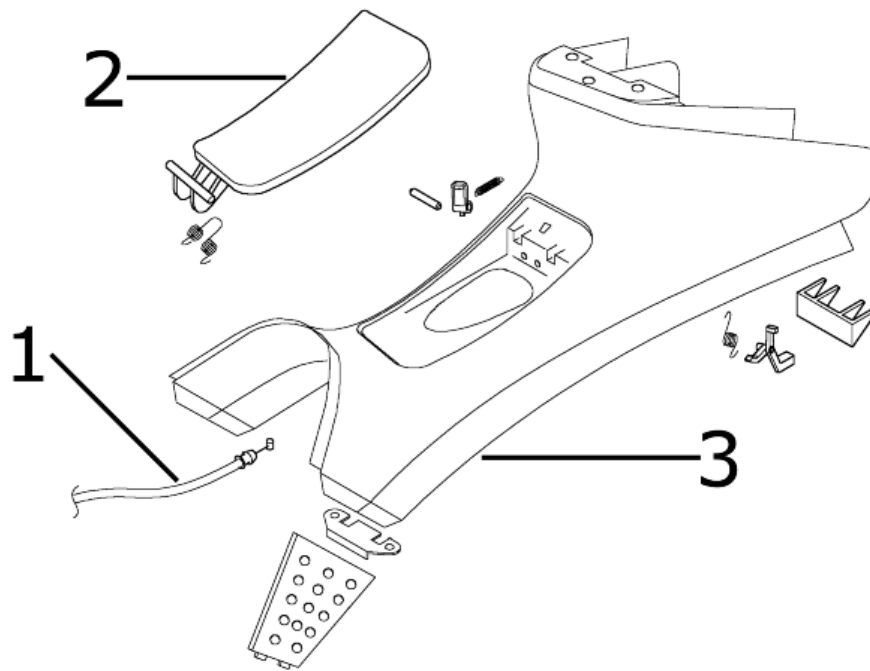
	Code	Action	Duration
1	004068	One passenger grab handle - Replacement	
2	004085	Fairing (1) - Replacement	
3	004012	Rear side panels - Replacement	
4	004053	Spoiler - Replacement	
5	004036	Frame cover - Replacement	
6	004075	Front mat - Replacement	
7	004059	Spark plug inspection flap - Replacement	
8	004013	Side bumper- Replacement	
9	004015	Footrest - Replacement	

Rear cover



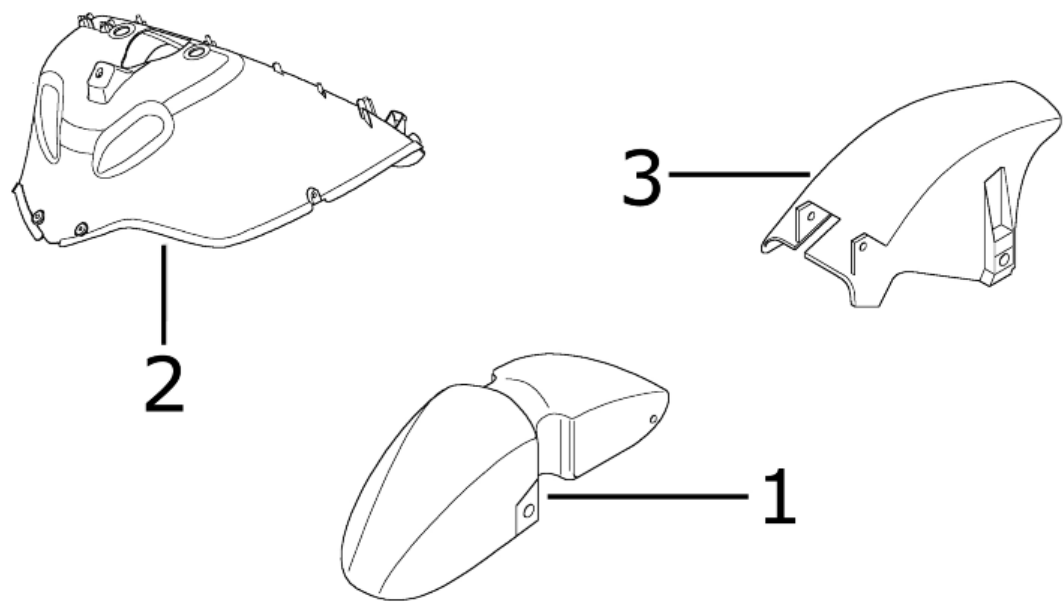
SHIELD BACK PLATE

	Code	Action	Duration
1	004065	Shield back plate - Replacement	
2	004156	Glove box flap and/or support - Replacement	
3	004145	Glove box - Replacement	
4	007024	Expansion tank cap - Replacement	
5	004142	electric socket - Replacement	
6	005085	Reset button - Replacement	

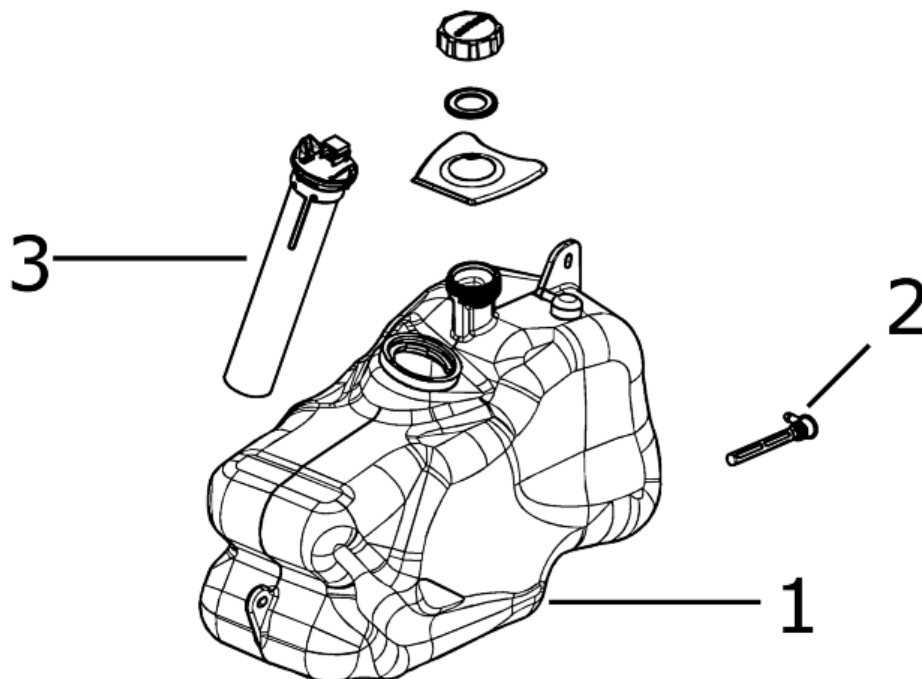
Central cover**CENTRAL COVER**

	Code	Action	Duration
1	002082	Fuel tank cap opening drive - Replacement	
2	004135	Fuel tank lid - Replacement	
3	004011	Frame central cover - Replacement	

Mudguard

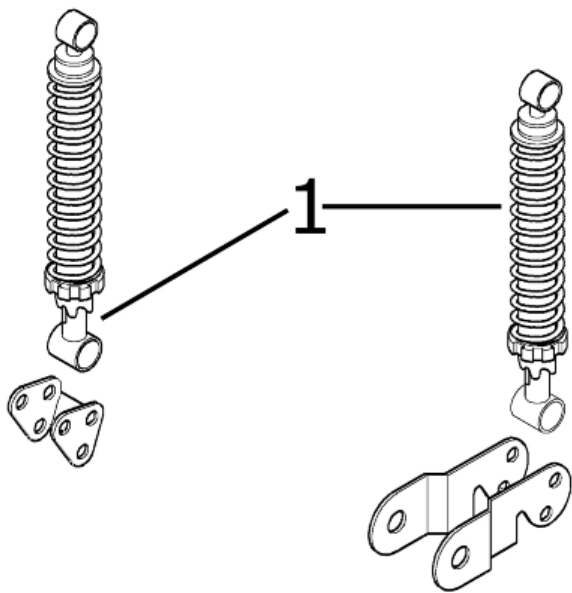


MUDGUARDS			
	Code	Action	Duration
1	004002	Front mudguard - Replacement	
2	004167	Grille / radiator cover - Replacement	
3	004009	Rear mudguard - Replacement	

Fuel tank**FUEL TANK**

	Code	Action	Duration
1	004005	Fuel tank - Replacement	
2	004007	Fuel valve - Replacement	
3	005010	Tank float - Replacement	

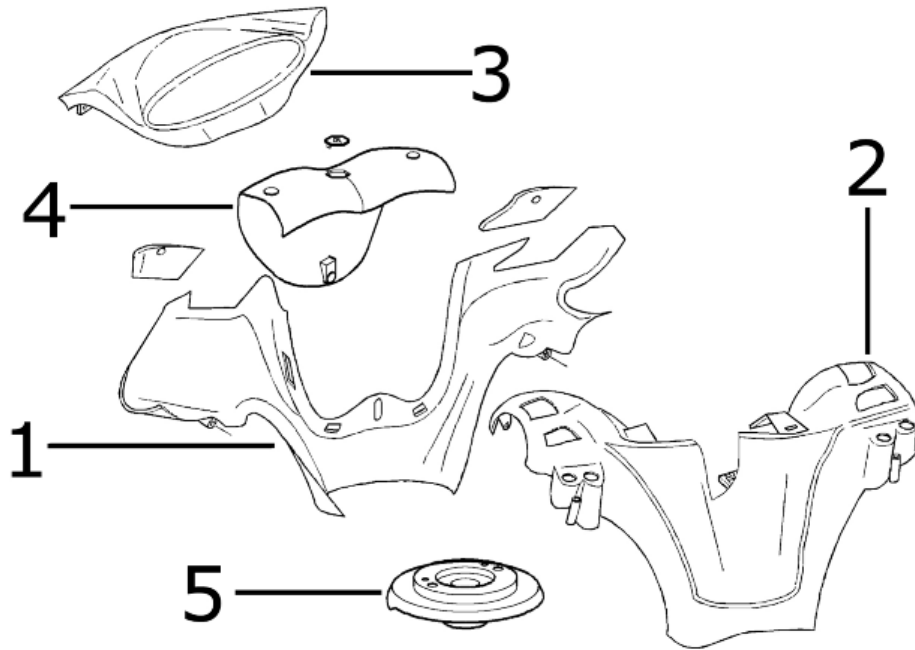
Rear shock-absorber



REAR SHOCK ABSORBER

	Code	Action	Duration
1	003007	Rear shock absorber - Replacement	

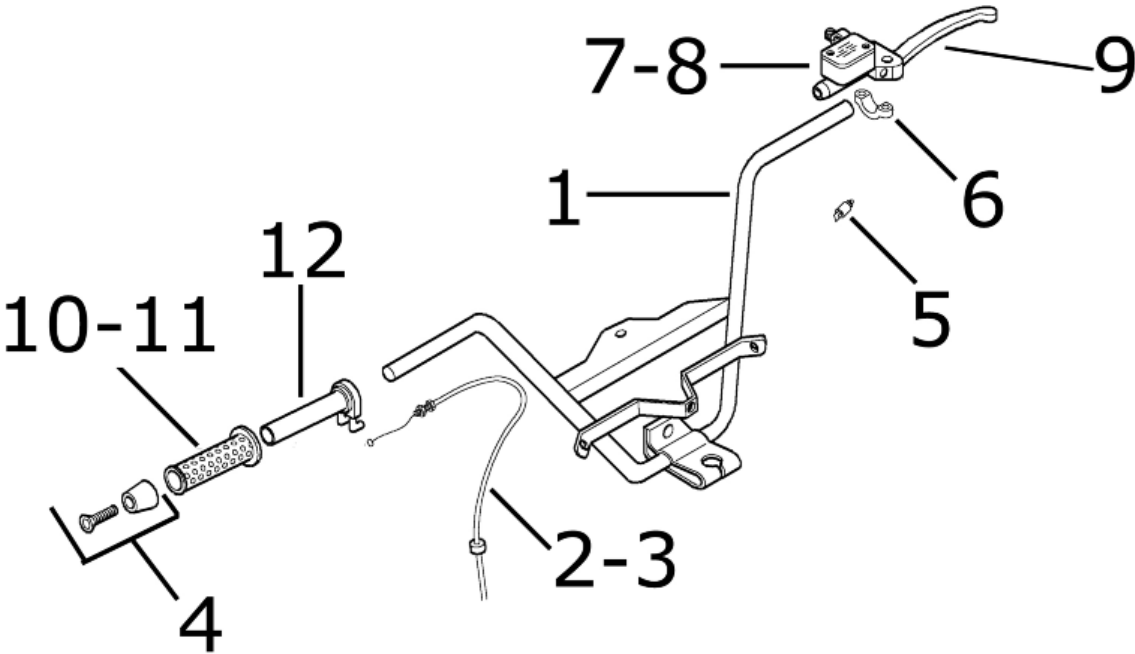
Handlebar covers



HANDLEBAR COVERS

	Code	Action	Duration
1	004018	Front handlebar cover - Replacement	
2	004019	Rear handlebar cover - Replacement	
3	004099	Odometer housing - Replacement	
4	004026	Handlebar cover - Replacement	
5	003043	Steering tube dust guard - Replacement	

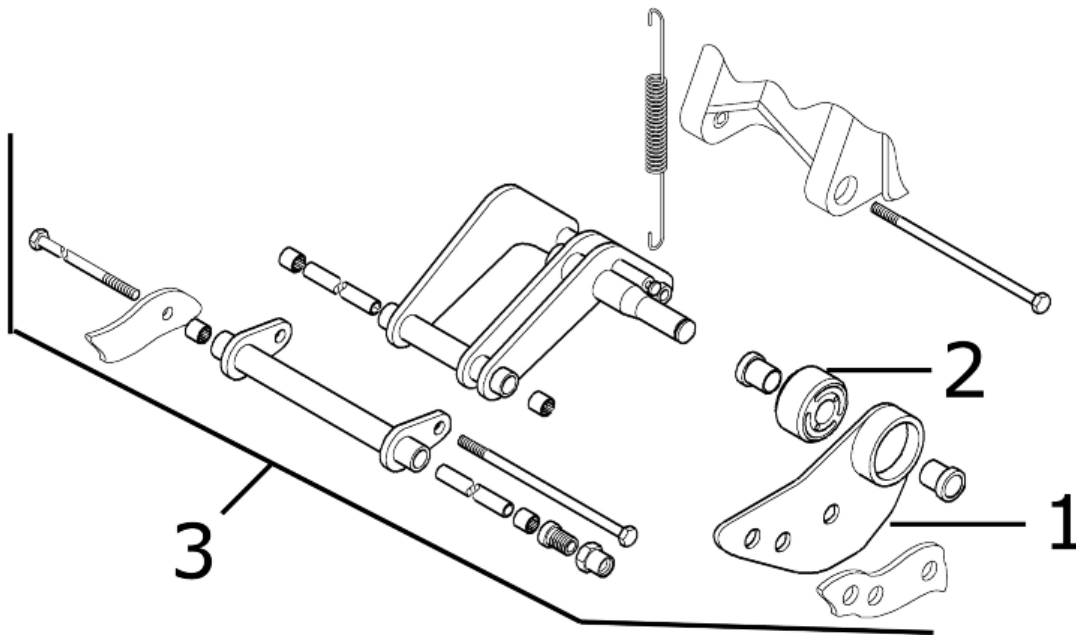
Handlebar components



HANDLEBAR COMPONENTS

	Code	Action	Duration
1	003001	Handlebar - Replacement	
2	002063	Throttle control transmission - Replacement	
3	003061	Accelerator transmission - Adjustment	
4	003059	Counterweight - Replacement	
5	005017	Stop switch - Replacement	
6	004162	Mirror support and/or brake pump fitting U-bolt - Replacement	
7	002024	Front brake pump - Replacement	
8	002067	Rear brake pump - Replacement	
9	002037	Brake lever - Replacement	
10	002071	Left knob - Replacement	
11	002059	Right-hand knob - Replacement	
12	002060	Complete throttle control - Replacement	

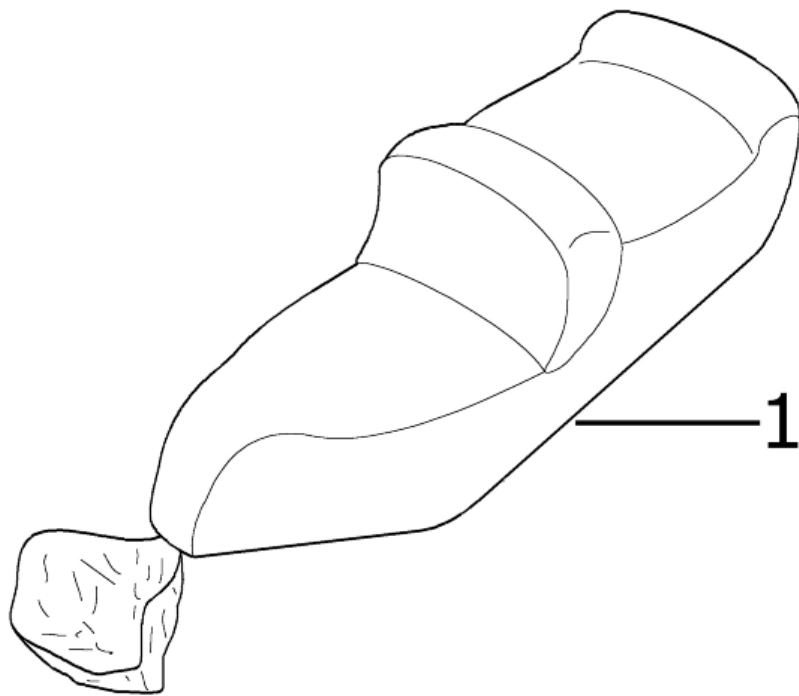
Swing-arm



SWINGING ARM

	Code	Action	Duration
1	003081	Swinging arm supporting flange - Replacement	
2	004058	Silent-block - Replacement	
3	001072	Engine/frame swinging arm attachment - Replacement	

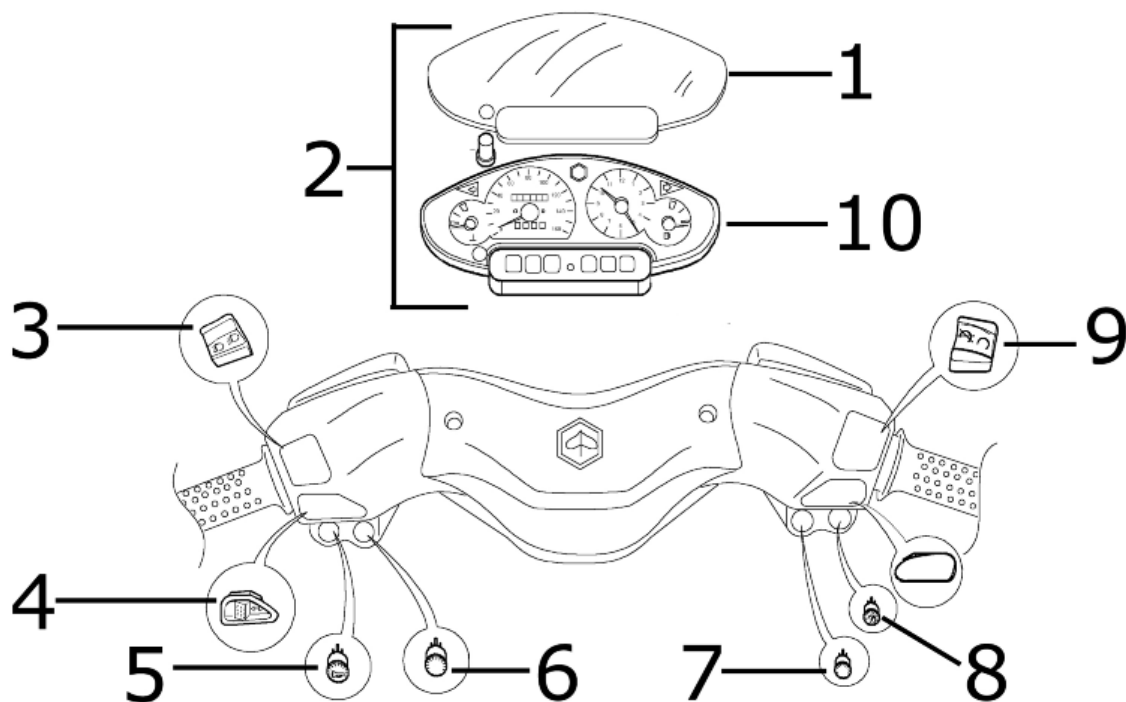
Seat



SADDLE

	Code	Action	Duration
1	004003	Saddle - Replacement	

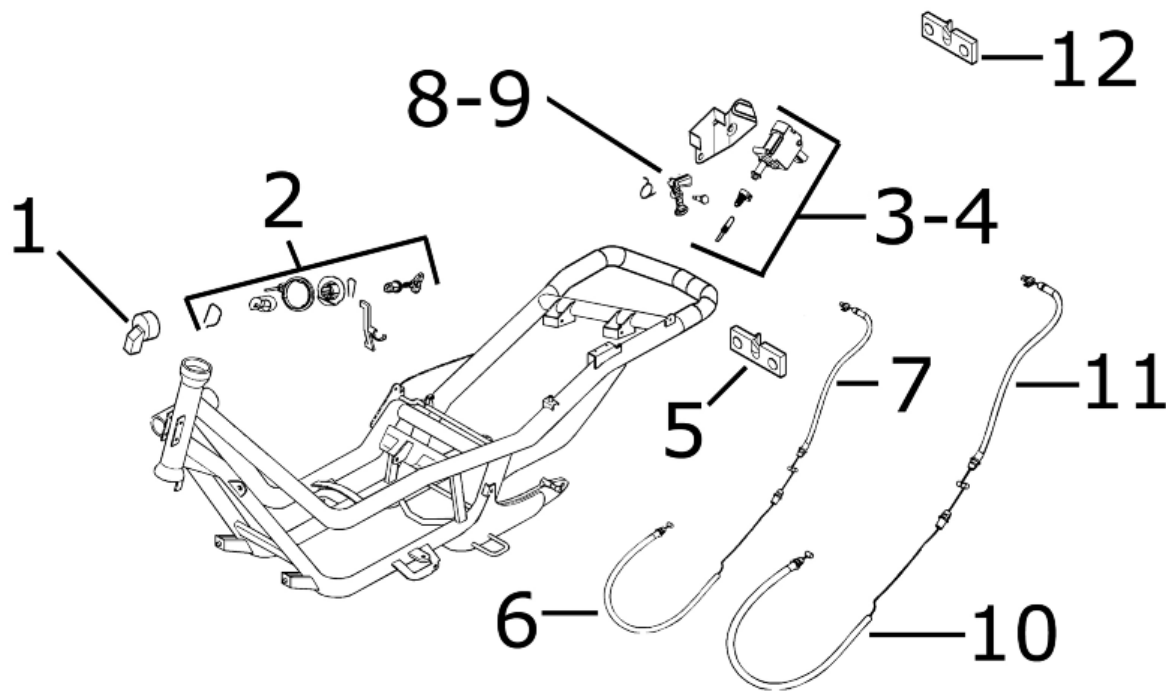
Instrument panel



INSTRUMENT PANEL + COMMANDS ON HANDLEBAR

	Code	Action	Duration
1	005078	Odometer glass - Replacement	
2	005014	Odometer - Replacement	
3	005006	Light switch or turn indicators - Replacement	
4	005039	Light switch - Replacement	
5	005040	Horn button - Replacement	
6	005121	Saddle opening button - Replacement	
7	005132	Trunk opening button - Replacement	
8	005041	Starter button - replace	
9	005077	Emergency stop switch - Replacement	
10	005038	Dashboard warning/telltale lights - Replacement	

Locks

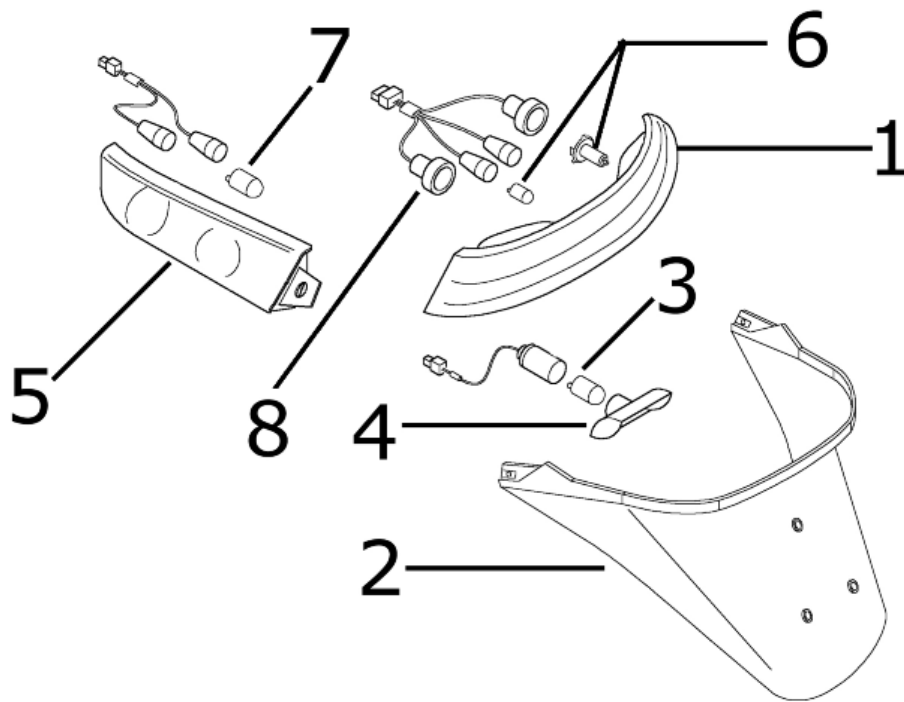


LOCKS + LOCK TRANSMISSIONS

	Code	Action	Duration
1	005016	Key switch - Replacement	
2	004010	Anti-theft lock - Replacement	
3	005099	Electric saddle opening activator - Replacement	
4	005133	Electric glove box activator - Replacement	
5	004054	Saddle lock catch - Replacement	
6	002083	Saddle opening transmission - Replacement	
7	002092	Transmission splitter/ hook transmission - Replacement	
8	004173	Trunk opening splitter - Replacement	
9	004158	Saddle opening splitter - Replacement	
10	002093	Top box opening transmission - Replacement	
11	002094	Trunk splitter/ hook transmission - Replacement	
12	004172	Rear case lock catch - Replacement	

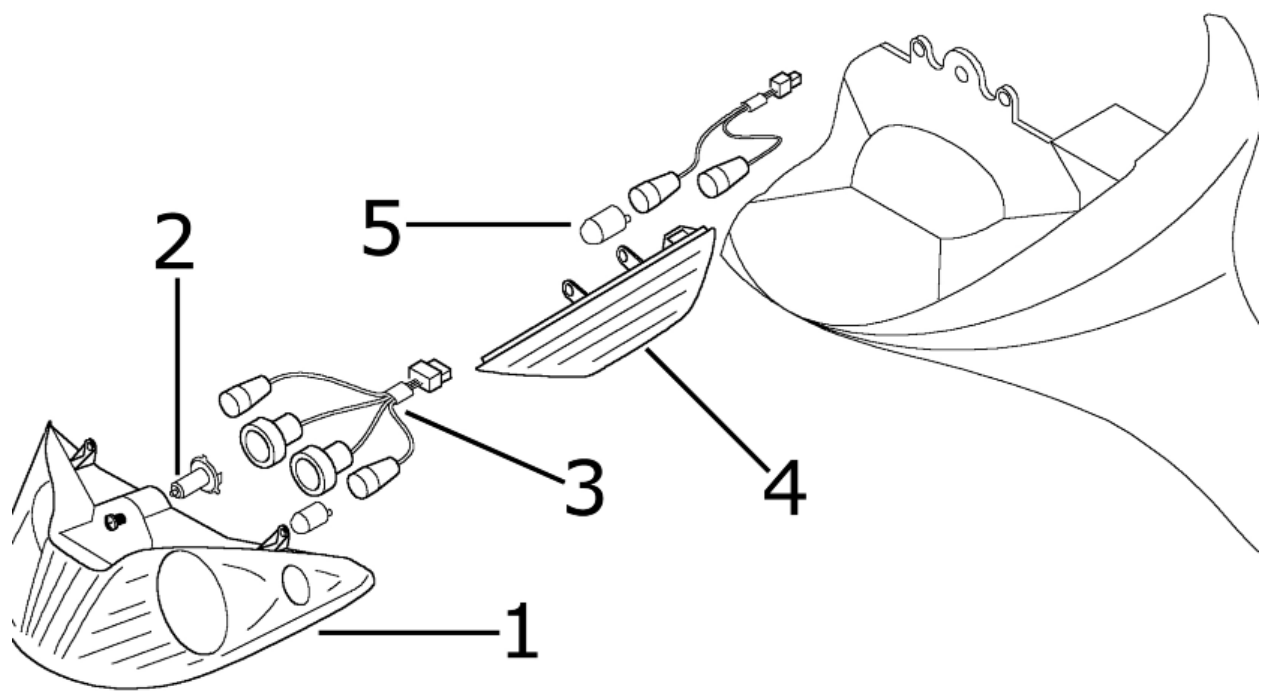
Turn signal lights

Taillight

**REAR LIGHTS**

	Code	Action	Duration
1	005005	Taillight - Replacement	
2	005048	number plate holder - Replacement	
3	005031	number plate light bulb - Replacement	
4	005032	number plate light glass - Replacement	
5	005022	Rear turning indicators - Replacement	
6	005066	Rear light bulbs - Replacement	
7	005068	Rear turning indicator bulb - Replacement	
8	005030	Rear headlight cable unit- Replacement	

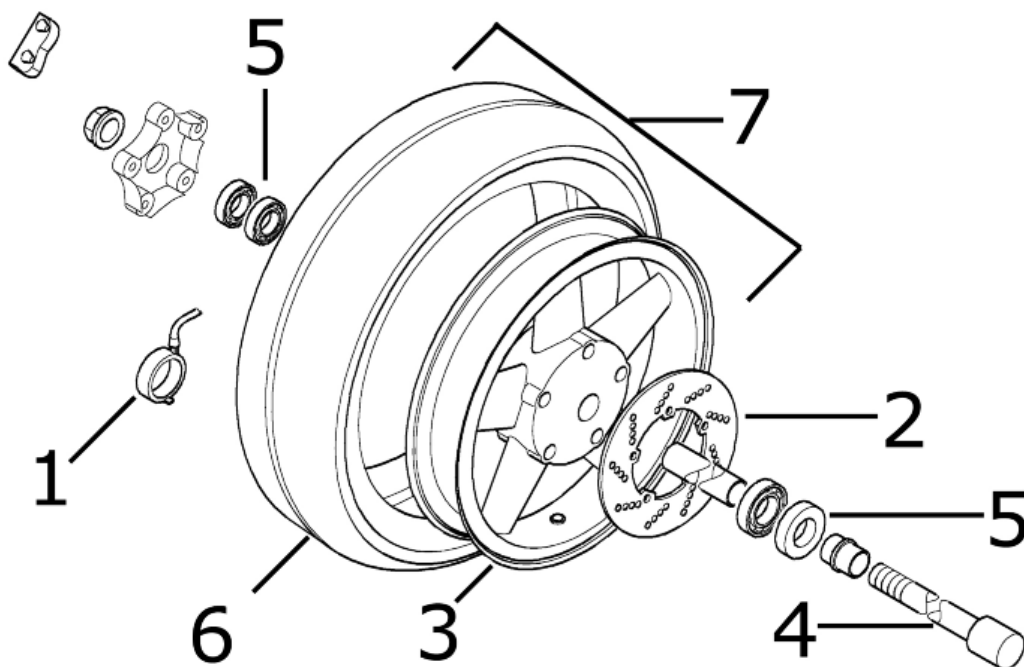
Headlight



INDICATOR LIGHTS

	Code	Action	Duration
1	005002	Front light - replacement	
2	005008	Headlight bulbs - Replacement	
3	005044	Front lights cable unit- Replacement	
4	005012	Front turning indicators - Replace- ment	
5	005067	Front turning indicator bulb - replace- ment	

Front wheel



FRONT WHEEL

	Code	Action	Duration
1	002011	Odometer movement sensor - Replacement	
2	002041	Front brake disc - Replacement	
3	003037	Front wheel rim- Replacement	
4	003038	Front wheel axle - Replacement	
5	003040	Front wheel bearings - Replacement	
6	003047	Front tyre - replace	
7	004123	Front wheel - Replacement	
8	003063	Tyre pressure - Check	

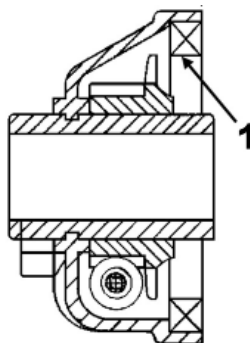
Grease tone wheel or drive

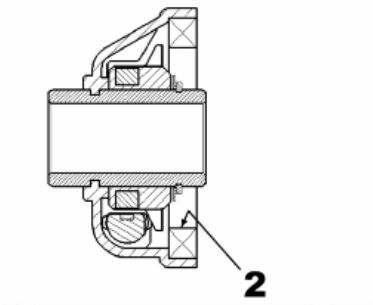
Please take note that the code has been introduced:

900001 - Tone wheel / drive greasing - 15'.

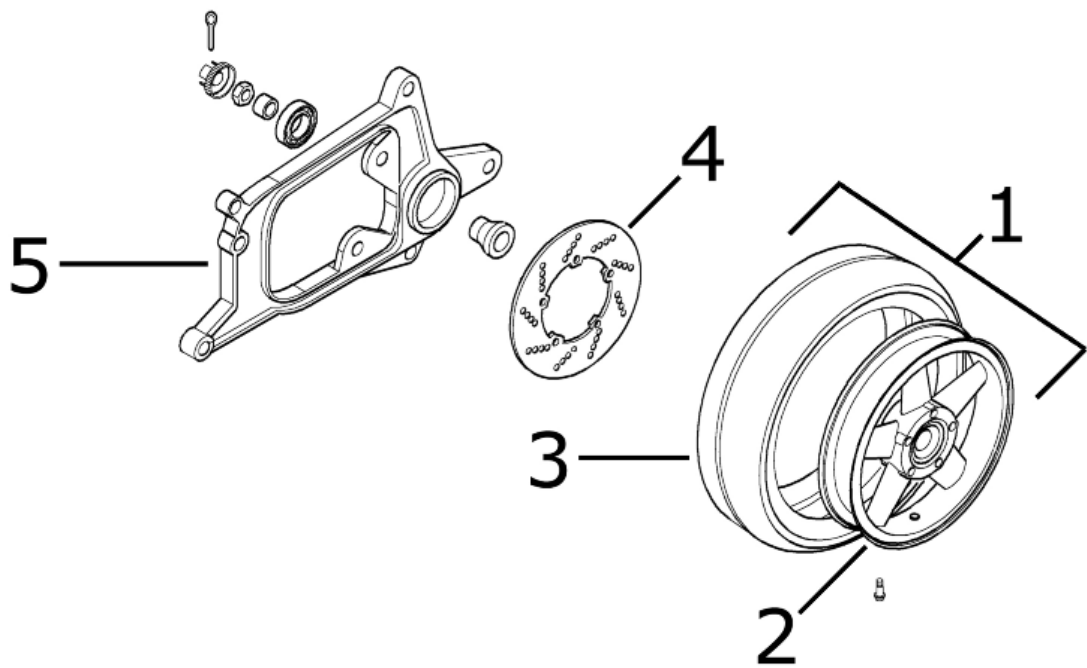
Never mistake the codes 002011 (movement sensor replacement) and 005089 (tone wheel replacement) in the event of noise of the indicated components. The grease recommended is TUTE-LA MRM 2 (soap-based lithium grease with Molybdenum disulphide).

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



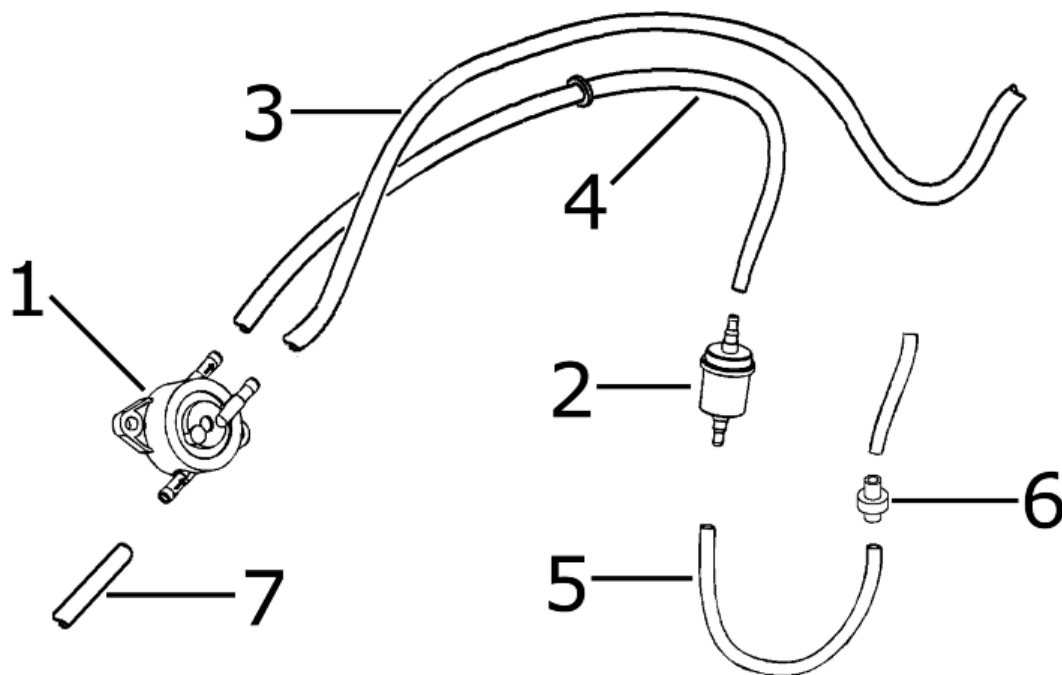


Rear wheel



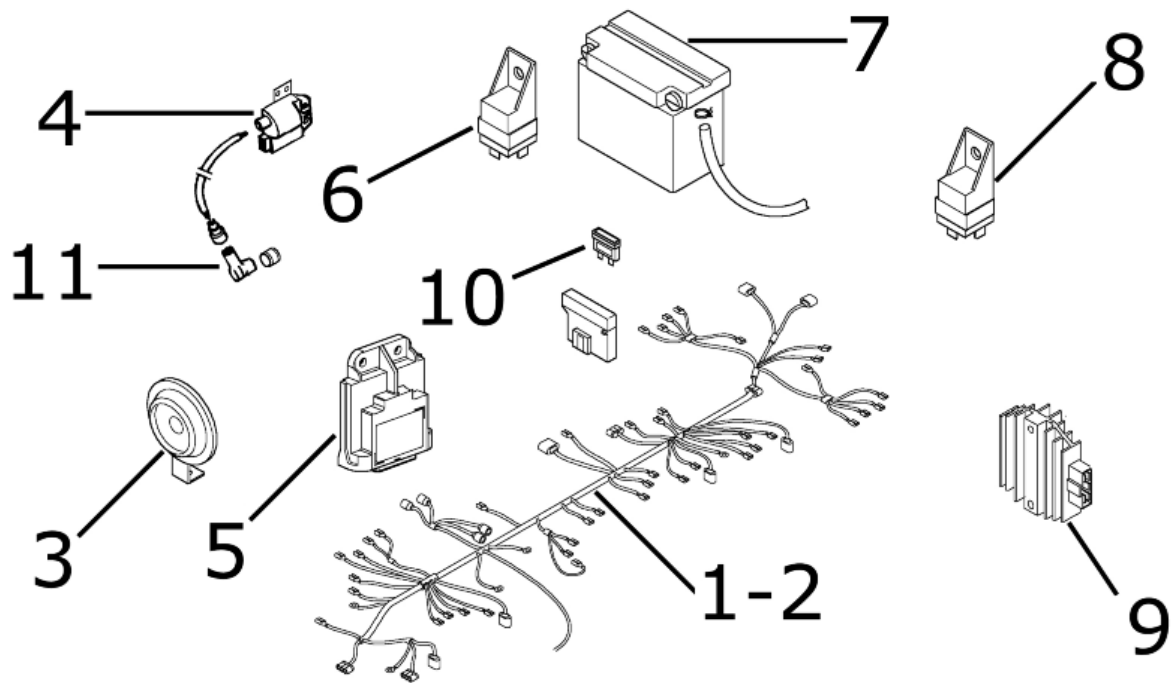
REAR WHEEL

	Code	Action	Duration
1	001016	Rear wheel - Replacement	
2	001071	Rear wheel rim - Replacement	
3	004126	Rear wheel tyre - Replacement	
4	002070	Rear brake disc - Replacement	
5	003077	muffler/rear shock absorber support arm - Service	

Fuel pump**FUEL PUMP**

	Code	Action	Duration
1	004073	Fuel pump - Replacement	
2	004072	Fuel filter - Replacement	
3	004086	Petrol pump depression tube - Replacement	
4	004087	Filter / petrol pump pipe - Replacement	
5	004137	Pump / carburettor hose - Replacement	
6	004139	Fuel no return valve - Replacement	
7	004089	Tank / petrol pump pipe - Replacement	

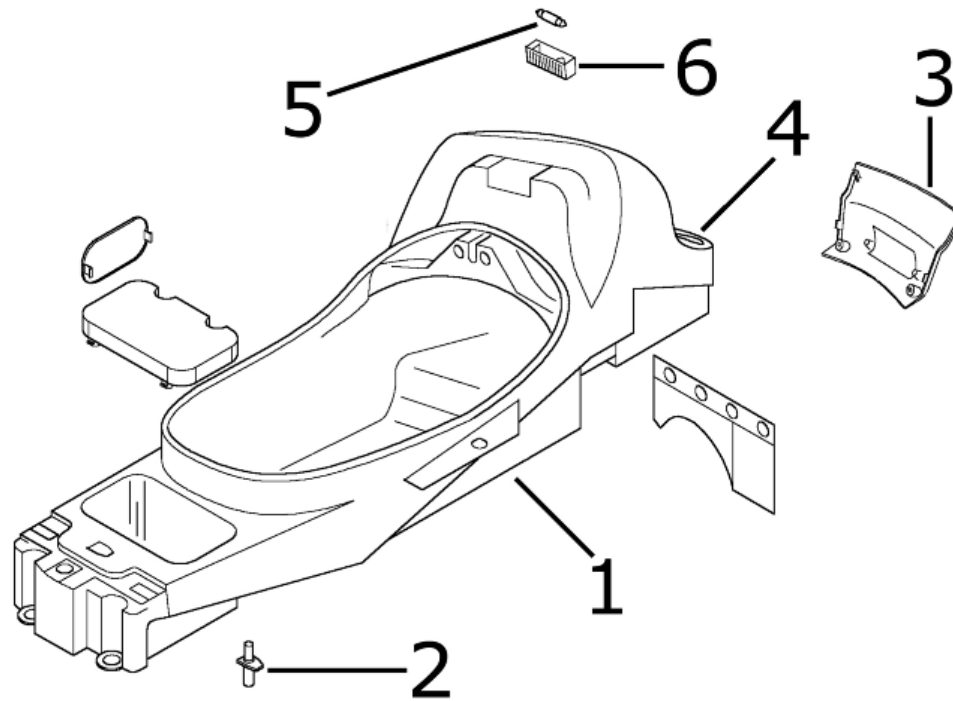
Electric devices



ELECTRICAL DEVICES

	Code	Action	Duration
1	005001	Electrical system - Replacement	
2	005114	Electrical system - Service	
3	005003	Horn - Replacement	
4	001069	HV coil - replace	
5	001023	Control unit - Replacement	
6	005035	Headlight remote control - Replacement	
7	005007	Battery - Replacement	
8	005011	Start-up remote control switch - change	
9	005009	Voltage regulator - Replacement	
10	005052	Fuse (1) - Replacement	
11	001094	Spark plug cap - Replacement	

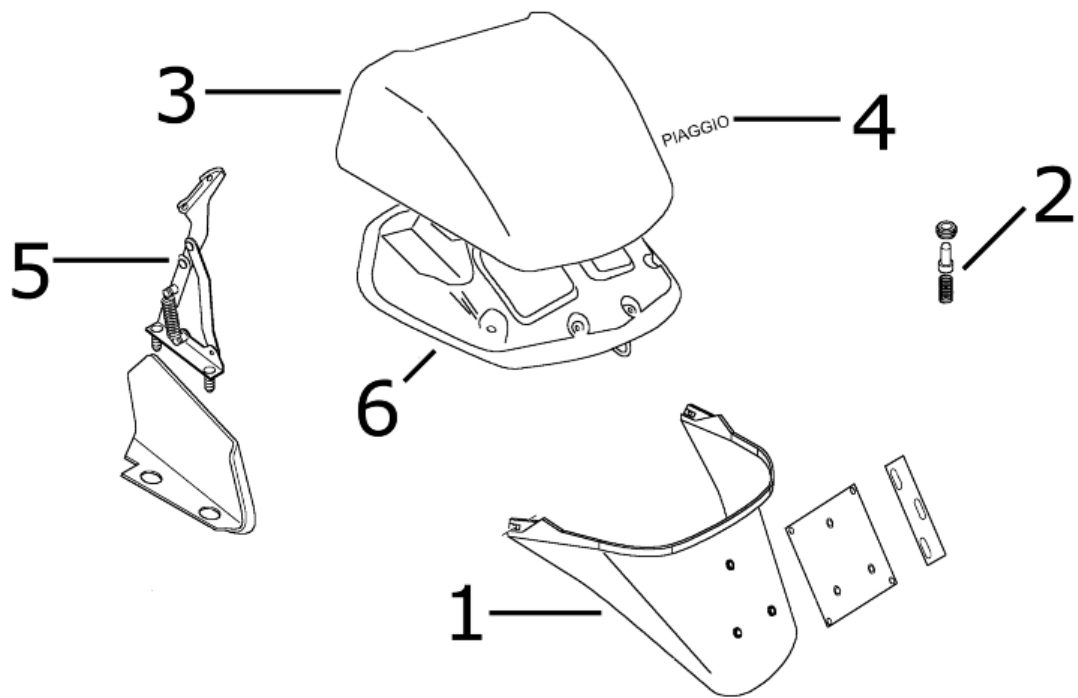
Helmet bay



HELMET COMPARTMENT

	Code	Action	Duration
1	004016	Helmet compartment - Replacement	
2	005033	Glove-box light switch - Replacement	
3	004036	Frame cover - Replacement	
4	004082	Trunk gasket - Replacement	
5	005026	Helmet compartment light - Replacement	
6	005027	Helmet compartment bulb support - Replacement	

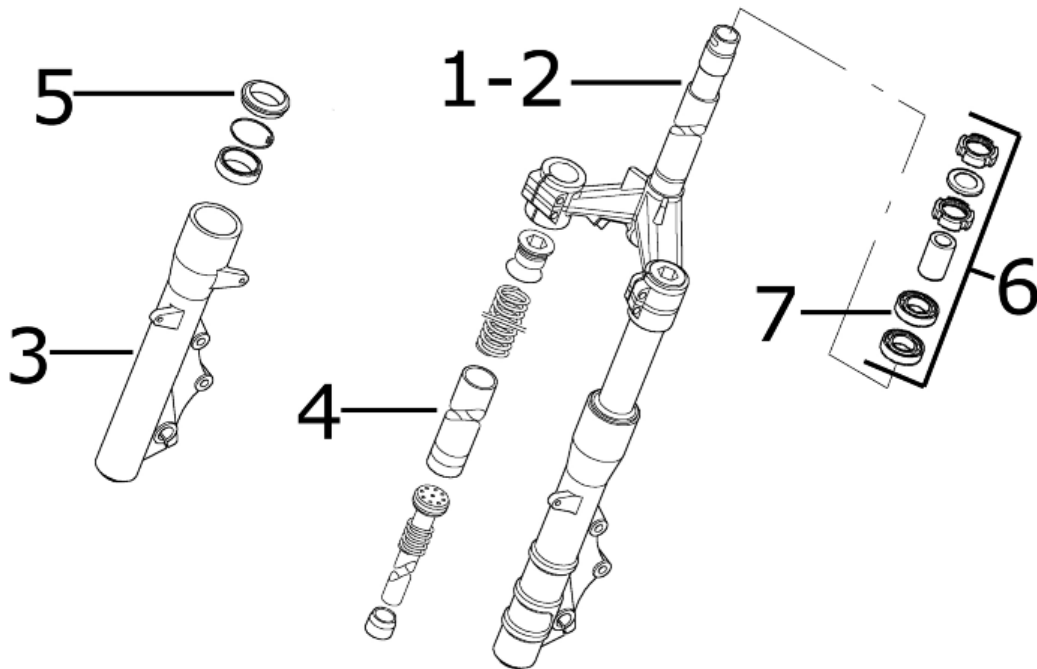
Rear side fairings



REAR COVERS

	Code	Action	Duration
1	005048	number plate holder - Replacement	
2	005033	Glove-box light switch - Replacement	
3	004081	Top box lid - Replacement	
4	004159	Plates / Stickers - Replacement	
5	004174	Top box leverage	
6	004080	Trunk flap support - Replacement	

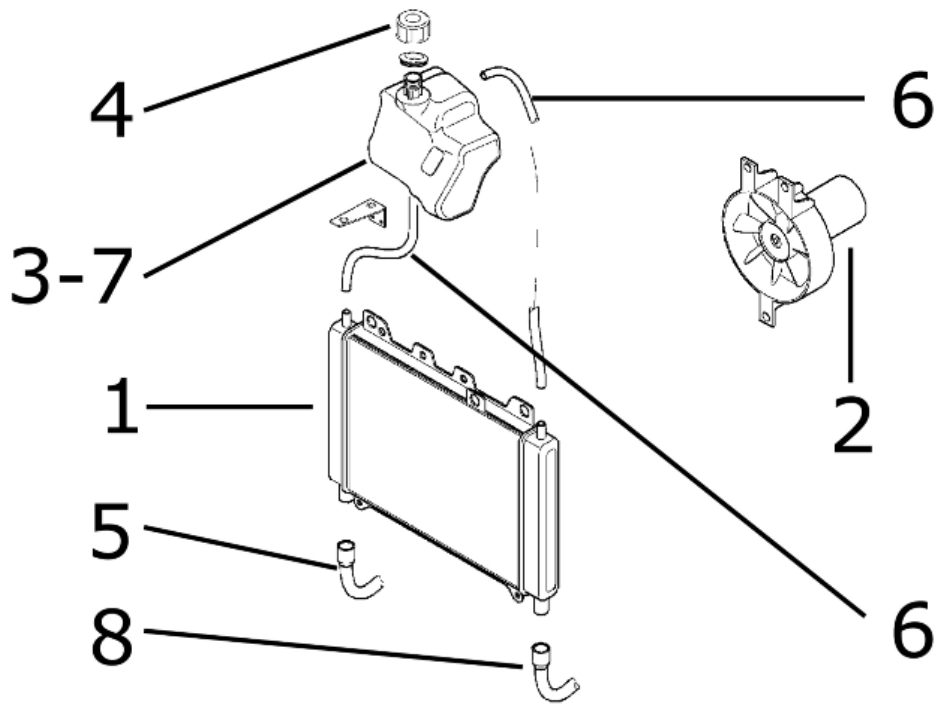
Front suspension



FRONT SUSPENSION

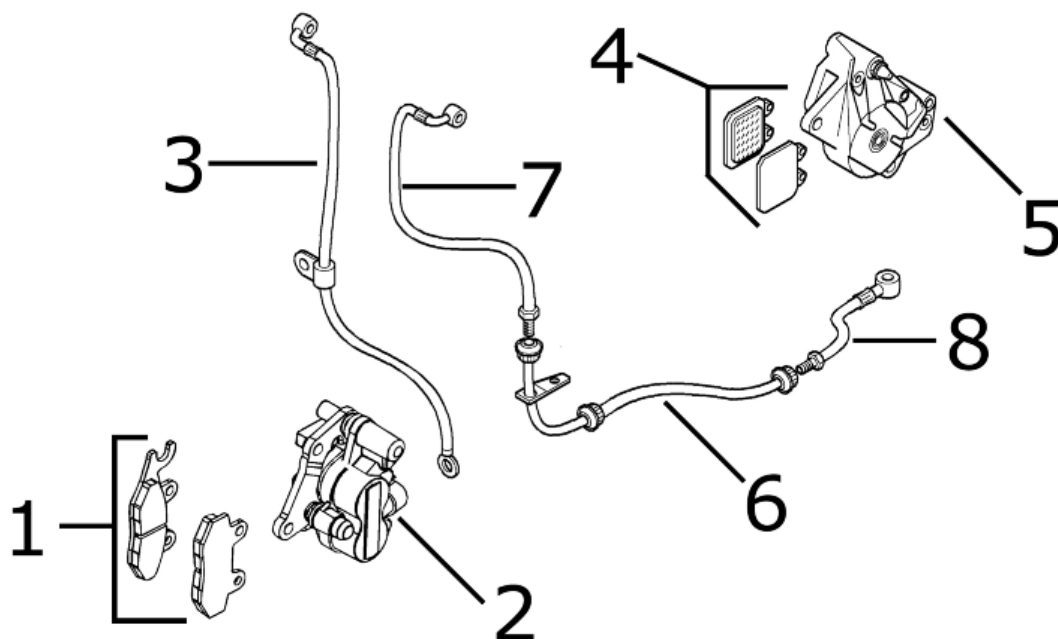
	Code	Action	Duration
1	003051	Complete fork - Replacement	
2	003010	Front suspension - Service	
3	003076	Fork sheath - Replacement	
4	003079	Fork stem - Replacement	
5	003048	Fork oil seal - Replacement	
6	003002	Steering thrust washer - Replacement	
7	004119	Upper steering bearing - Housing	

Cooling system



COOLING SYSTEM			
	Code	Action	Duration
1	007002	Water radiator - replacement	
2	007016	Fan with support - Replacement	
3	007001	Expansion tank - Replacement	
4	007024	Expansion tank cap - Replacement	
5	007019	Connection water pump pipe / return pipe - Replacement	
6	007013	Expansion tank - radiator connection pipe - Replacement	
7	001052	Coolant and air bleed - Replacement	
8	007022	Coolant delivery pipe - Replacement	

Braking system



BRAKE SYSTEM

	Code	Action	Duration
1	002007	Front brake pads - Replacement	
2	002039	Front brake calliper - Replacement	
3	002021	Front brake piping - Replacement	
4	002002	Rear brake pads - Replacement	
5	002048	Rear brake calliper - Replacement	
6	002081	Rear brake rigid pipes - Replacement	
7	002025	Brake piping - Replacement	
8	002020	Rear brake disc piping - Replacement	

A

Air filter: *46, 231*

B

Battery: *60, 67, 82, 83*

Brake: *206, 209–212*

C

Carburettor: *10, 40, 160, 171, 258*

E

Engine oil: *46*

Engine stop:

F

Fuel: *59, 160, 268, 280*

Fuses: *80*

H

Headlight: *49, 225, 227*

Hub oil: *44*

I

Identification: *7*

Instrument panel: *224, 235, 274*

M

Maintenance: *7, 36*

Mirrors: *224, 234*

O

Oil filter: *249*

S

Saddle:

Shock absorbers: *203*

Spark plug: *43, 75*

Stand:

Start-up:

T

Tank: *268*

Transmission: *9, 59, 92, 111, 254*

Tyre pressure:

Tyres: *10*