DERBI

BALAS ROJAS

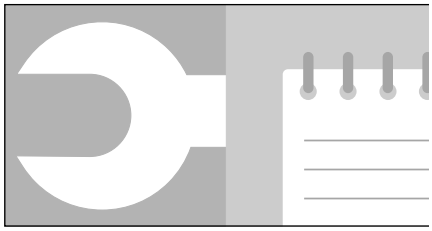
WORKSHOP MANUAL
BOULEVARD 125/150/200 c.c.

Workshop Manual

125

150

boulevard



This manual has been prepared by Nacional Motor, S.A.U. for use in the workshops of Derbi distributors and sub-agencies. It is assumed that all those who use this manual for the maintenance and repair of Derbi vehicles should have a knowledge of the basic principles of the mechanics and methods required for the repair of such vehicles. Major variations in the technical specifications of the vehicles or in specific repair operations shall be communicated to workshops by means of updates to this manual.

Nevertheless, completely satisfactory work cannot be performed where the necessary facilities and tools are not available: we therefore request that you consult those pages of this manual which discuss these specific tools and the catalogue of specific tools and equipment.

The most important information in this manual is highlighted by the following notices:

N.B.: This indicates a note giving key information which helps to make a procedure easier and more straightforward.

Caution - This indicates specific procedures which must be followed to avoid causing damage to the vehicle.

Warning - This indicates specific procedures which must be followed to avoid any mishap to the mechanic working on the vehicle.

Safety Rules

- In those cases where it is necessary to have the engine running in order to carry out work on the vehicle, care should be taken to ensure that the area is well-ventilated, and if necessary use appropriate fans; never start the engine in a closed space. Exhaust gases are poisonous.
- Battery electrolyte contains sulphuric acid. The eyes, clothing and the skin should be protected. Sulphuric acid is highly corrosive; if it enters into contact with the eyes or the skin, wash with copious amounts of water and seek medical advice immediately.
- The battery produces hydrogen, a gas which in certain circumstances may be highly explosive. Do not smoke or permit open flames or sparks in the vicinity of the battery, in particular while the battery is being charged.
- Petrol fuel is highly inflammable, and under certain circumstances may be explosive. No smoking should be allowed in the working area, and open flames or sparks should be avoided.
- Brake pads and brake shoes should be cleaned in a well-ventilated area, aiming the jet of compressed air used for cleaning in such a way that the dust produced from brake wear cannot be inhaled. The brake pads and brake shoes do not contain asbestos; nevertheless inhaling the dust is dangerous to the health.

Maintenance rules

- Use original DERBI spare parts and the lubricants recommended by the manufacturer. Non-original and non-compliant spare parts may damage the vehicle.
- Use only the specific tools designed for this vehicle.
- Always use new gaskets, oil seals, and clips when reassembling the machine.
- After stripping the machine, clean all components with a non-inflammable solvent, or one with a high ignition point. Lubricate all working surfaces before re-assembly, except for conical fittings.
- After rebuilding the machine, check that all the components have been correctly installed, and that they work properly.
- During the stripping, servicing, and reassembly operations, use metric tools exclusively. Metric screws and nuts are NOT interchangeable with those using English measurements. Using inappropriate tools and securing elements may cause damage to the machine.
- In those cases where work on the machine involves the electrical circuits, check that the electrical connections are correctly re-connected, in particular earthing connections and battery connections.

1. DIMENSIONS	125 C.C.	150 C.C.	200 C.C.
OVERALL LENGTH mm	1860	=	=
OVERALL HEIGHT mm	1165	=	=
WHEELBASE mm	1305	=	=
OVERALL WIDTH AT HANDLEBARS mm	690	=	=
OVERALL HEIGHT AT HANDLEBARS mm	1060	=	=
USEFUL LENGTH SADDLE mm	650-700	=	=
HEIGHT OF FOOTBOARD OR FOOTREST mm	350/400	=	=
USEFUL HEIGHT OF SADDLE mm	805	=	=
USEFUL LENGTH OF FOOTREST mm	350	=	=
MINIMUM GROUND CLEARANCE mm	170	=	=
OVERALL WIDTH FRONT mm	470	=	=
OVERALL WIDTH REAR mm	580	=	=
CLEARANCE INNER SHIELD TO SADDLE mm	300	=	=
STEERING ANGLE	24,5º	=	=
FORKS TRIANGLE (LEADING ANGLE x E/C BARS) *	10mm/206mm	=	=
WHEEL AXLE LEADING -TRAILING mm	Leading 17 mm	=	=
STEERING TRAIL mm	89	=	=
SHOCK ABSORBER MOUNTING ANGLE	22.5	=	=
ENGINE-GROUND MOUNTING ANGLE	13,8º	=	=
2. TYRES. BRAKES. SUSPENSION			
FRONT TYRE (TYPE)	130/60x13”	=	=
FRONT TYRE (PRES.-SINGLE RIDER/RIDER & PILLION)	1,4/1,6	=	=
REAR TYRE (TYPE)	130/60x13”	=	=
REAR TYRE (PRES.-SINGLE RIDER/RIDER & PILLION)	1,6/1,18	=	=
FRONT BRAKE (DRUM or DISC - DIAMETER)	DISC Diam. 220 mm	=	=
REAR BRAKE (DRUM or DISC - DIAMETER)	DRUM Diam. 140 mm	=	=
FRONT FORKS (NORMAL - INVERTED)	CONVENTIONAL	=	=
FRONT FORKS (MECHANICAL - HYDRAULIC)	HYDRAULIC	=	=
FRONT FORK BARS - DIAMETER mm	35mm	=	=
FRONT WHEEL AND SUSPENSION STROKE mm	75/75mm	=	=
SHOCK ABSORBER PIN DIAMETER mm	10mm	=	=
REAR WHEEL AND SUSPENSION STROKE mm	75mm	=	=
3. TECHNICAL PARAMETERS OF THE ENGINE			
BASIC ENGINE (TYPE)	125cc 4-stroke 2-valve	150cc 4-stroke 2-valve	200 4-stroke 2-valve
BORE x STROKE	57 x 48,6 mm	62,6 x 48,6 mm	72 x 48,6 mm
CUBIC CAPACITY	124,015cm³	149,58 cm³	198 cm³
MAXIMUM POWER	7,61 Kw at 7500 R.P.M	8,13 KW at 7000 R.P.M	12,5 CV at 6750 R.P.M
MAXIMUM TORQUE	9,35 Nw-m at6500 R.P.M	11,54 Nw-m at 6000 R.P.M	17,2 N.m at 5250 R.P.M
COOLING	FORCED AIR-COOLED	FORCED AIR-COOLED	FORCED AIR-COOLED
VARIABLE SPEED DRIVE TRANSMISSION RATIO	1:2,7/1:0,809=3,34	1:2,7/1:0,809=3,34	2,7:1 / 0,809:1
CLUTCH	DRY, CENTRIFUGAL	DRY, CENTRIFUGAL	DRY, CENTRIFUGAL
TRANSMISSION REDUCTION GEAR RATIO	9.97	9.2	9.2:1
POWER/WEIGHT RATIO	< 0,11 Kw/Kg	< 0,11 Kw/Kg	< 0,11 Kw/Kg
4. VEHICLE PERFORMANCE FIGURES			
MAX. SPEED	98 Km/h	102 Km/h	102 Km/h
5. CAPACITY PARAMETERS			
PETROL TANK WITH RESERVE	9L	=	=
HELMET BOX CAPACITY (HELMET TYPE)	FULL-FACE MAX.	=	=
TOP CASE (YES - NO)	Yes, 35L	=	=
TOTAL VEHICLE KERB WEIGHT	123 Kg	127 Kg	124 Kg
6. ELECTRICAL PARAMETERS			
STAND. BATTERY, requiring/not requiring mainten.	12V 9A, requiring maint.	=	=
MAGNETO 12V 160w =	12V 160w	=	=
MAX SPEED ON SPEEDOMETER	140Km/h	=	=
HEADLAMP BULB (W) 1	2V 35/35 w HS1 Halogen	=	=
PARKING LIGHT (W)	12V 5w	=	=
STANDARD TAIL LIGHT	FAIRED INTO BODYWORK	=	=
TAIL / STOP LIGHT BULB (W)	12V 21/5w	=	=
REGISTRATION PLATE LIGHT	12V 5w	=	=
INDICATOR LIGHT BULBS (W)	12V 10w	=	=

Indispensable Tools

Name	Drawing Number
Hub	001467Y Part.9
Pliers, 15 mm	001467Y013
Magneto extractor tool	008564Y
Oil pressure manometer gauge	020193Y
Half-pulley assembly sleeve	020263Y
Piston assembly skirt (125 cc engine)	020287Y
Valve sealing ring assembly punch	020306Y
Adapter 32 x 35 mm Driven Pulley shaft bearing assembly	020357Y
Adapter 42 x 47 mm hub bearing assembly	020359Y
Adapter 52 x 55 mm hub bearing assembly	020360Y
Guide 20 mm hub bearing assembly	020363Y
Guide 25 mm driven pulley ball-bearing assembly	020364Y
Driving pulley immobilising spanner (125 cc Engine)	020368Y
Adapter 28 x 30 mm driven pulley ball-bearing assembly	020375Y
Sleeve for adapters	020376Y
Boss (tool for stripping valves)	020382Y011
Piston assembly skirt (180 cc engine)	020393Y
Guide 15 mm hub bearing assembly	020412Y
Guide 28 mm hub bearing assembly	020414Y
Clutch hub immobilising spanner	020423Y
Driven pulley roller-cage assembly punch	020424Y
Magneto-side oil seal punch	020425Y
Support for projecting part of piston	020426Y
Piston assembly fork	020428Y
Pin clips assembly tool (125 cc engine)	020430Y
Valve oil seal extractor tool	020431Y
Oil pressure manometer gauge connector	020434Y
Guide 17 mm shock absorber bracket bearing assembly	020439Y
Water pump service tool	020440Y
Drive pulley immobilising spanner	020442Y
Driven semi-pulley spring compressor tool	020444Y
Pin clips assembly tool (180 cc engine)	020454Y
Guide 10 mm belt roller bearing assembly	020455Y
Magneto securing compass spanner	020565Y

Recommended Tools

Name	Drawing Number
Support: to be fitted with the following parts: 15-Tube, 22-Cross-bar, 23-Nut, 44-Plate, 46-Vice	002095Y
Pliers for snap rings	002465Y
Crankshaft alignment tool	020074Y
Air-heater support for “METABO HG 1500/2”	020150Y
Air-heater for “METABO HG 1500/2”	020151Y
Crankcase separation plate	020262Y
Immobiliser control tester	020319Y
Vacuum pump, Mitivac type	020329Y
Strobe gun for 2-stroke and 4-stroke engines	020330Y
Digital multimeter	020331Y
Digital tachometer counter	020332Y
Individual battery charger	020333Y
Multiple battery charger	020334Y
Magnetic support and comparator	020335Y
Adapter for multimeter (measurement of peak voltages)	020409Y
Exhaust gas analyser	494929

SYMPTOM	POSSIBLE CAUSE	ACTION
Poor performance	Dirty carburettor; injection pump or one-way valve faulty	Strip, wash with solvent, and dry using compressed air, or replace
	Excessive deposits in combustion chamber	Decoke cylinder, piston, cylinder head and the valves
	Incorrect timing adjustment, or worn distributor elements	Reset distributor timing, and replace worn parts.
	Blocked exhaust pipe silencer	Replace
	Blocked or dirty air filter	Try cleaning filter with air jet: failing that, replace
	Slipping clutch	Check and if necessary replace the clutch assembly and clutch hub
	Ineffective automatic transmission	Check rollers, and sliding action of pulleys, replace faulty parts, and lubricate the driven moving pulley guide using grease (Montblanc Molybdenum Grease)
	Worn belt	Replace
	Poor compression; wear in piston rings, cylinder or valves	Replace the worn parts
	Oil level higher than maximum mark	Check causes and ensure level is correct
Difficulty in starting	Dirty carburettor; injector pump or one-way valve faulty	Strip, wash with solvent, and dry using compressed air, or replace
	Faulty spark-plug, or incorrect timing advance	Replace spark-plug or check ignition circuit components
	Blocked or dirty air filter	Try cleaning filter with air jet: failing that, replace
	Ineffective choke	Check; mechanical sliding action and the device
	Engine drowned	Run starter with throttle fully open. If the engine does not start, remove and dry the spark-plug, and before re-installing it turn the engine to force out excess fuel, taking care to keep the spark-plug cap connected to the spark-plug, and the plug in contact with ground. If the fuel tank has run dry, start the engine only after re-fuelling.
	Valves not seating correctly or incorrectly adjusted	Service cylinder head and/or correct valve play
	Revolutions on starting too low or engine and starter assembly faulty	Check starter motor, and installation
	Fuel characteristics altered	Empty tank of defective fuel and refuel

Wash the jet with solvent and dry using compressed air

SYMPTOM	POSSIBLE CAUSE	ACTION
Engine tends to stop at full throttle	Dirty main jet – low carburation	Wash the jet with solvent and dry using compressed air
	Water in the carburettor	Empty the carburettor float chamber, using the appropriate purge method
	Incorrect float level	Restore correct float level
	Faulty fuel supply circuit	Check and if necessary replace the pump and one-way valve, check the vacuum intake and that the line is air-tight
	Air-filter box does not seal properly	Check and if necessary replace
Engine tends to stop at idle	Idle jet dirty	Wash the jet with solvent and dry using compressed air
	Choke stays open	Check: electrical connections, continuity of circuit, mechanical sliding operation, and power supply
	Faulty spark-plug or incorrect ignition advance	Replace spark-plug or check ignition circuit components
	Final compression pressure too low	Check seals on heating assembly, and replace worn parts
	Idle speed incorrectly adjusted	Adjust using tachometer
	Cut-off device faulty	Check effectiveness of valve; membrane, spring, and clean air vents; check filter sponge clean
	Incorrect distributor timing adjustment	Reset distributor timing, and check distribution elements
Excessive fuel consumption	Blocked or dirty air filter	Clean with compressed air or replace
	Ineffective choke	Check: electrical connections, continuity of circuit, mechanical sliding operation, and power supply
	Fuel pump faulty	Check that there is no fuel in the vacuum line
	Weak jets	Check for blockage in main and idle jet seat
	Float level	Check and reset correct fuel level in carburettor
Juddering or uneven clutch operation	Faulty clutch	Check that there is no grease on the weights Check that the contact surface between the clutch weights and the hub is preferably centred and appears the same for all three weights Check that the clutch hub is not scored or unusually worn

SYMPTOM	POSSIBLE CAUSE	ACTION
Braking installation	Poor braking performance	Chech for worn pads (Minimum 1,5 mm.) Chech that the brake disc are not worn, scored or mis-sharpen Check for correct brake fluid level in cylinders Check for air in circuits, if necessary, bleed Check that the front brake caliper moves axially with the disc Check and, if necessary, change the brake fluid
	Brake noise	Check for worn brake pads
Battery	This is the component in the entire installation which requires the most constant attention, and the most careful maintenance If the vehicle is left unused for more than a certain period (1 month or more) it is necessary to recharge the battery periodically. Over a period of about three months the battery will tend to discharge completely. When the battery has to be replaced in the motorcycle, be careful not to invert the connections, and note that the black earth cable must be connected to the negative terminal, and the other cable, marked with a red colour must be connected to the positive terminal marked with a "+" sign.	
Steering controls and suspension	Steering becomes stiffer	Check the tightness of the upper and lower collars. If uneven turning is noticed in the steering even after adjusting the collars, check the ball bearing seats; replace these if they are jammed or if the balls appear flattened.
	Excessive steering play	As above
	Noisy suspension	If the front suspension is noisy, check: effectiveness of front shock absorber; the state of the ball bearings and their lock nuts; the rubber stop plugs; the sliding bosses. Finally check the torque settings of the wheel bushing, the brake caliper, the disc, and the shock absorber at its securing points with the bush and the steering tube.
	Suspension losing oil	Replace the shock absorber Check the steering caps for wear and adjustment.

Check ■ Replace ●	x 1000 Km	1	6	12	18	24	30	36	42	48	54	60	66	72
	Months	4	12	24	36	-	-	-	-	-	-	-	-	-
Engine Oil	Check level/fill up	EVERY 3000 Km								EVERY 3000 Km				
Engine Oil	Replace		●	●	●	●	●	●	●	●	●	●	●	●
Hub Oil Level	Check	●	■	■	■	●	■	■	■	●	■	■	■	●
Spark Plug/Spark Plug Gap	Check/Replace		■	●	■	●	■	●	■	●	■	●	■	●
Air Filter	Check /Replace		■	●	■	●	■	●	■	●	■	●	■	●
Oil Filter	Replace		●	●	●	●	●	●	●	●	●	●	●	●
Valve Play	Check		■			■				■				■
Check idle / Carburettor	Adjust	■		■		■		■		■		■		■
Throttle control	Adjust	■		■		■		■		■		■		■
Roller cage	Check or Replace		■	■	■	■	■	■	■	■	■	■	■	■
Transmission Belt	Replace		■	●	■	●	■	●	■	●	■	●	■	●
Speedometer Unit	Grease			■		■		■		■		■		■
Steering	Adjust	■		■		■		■		■		■		■
Brake levers	Grease	■		■		■		■		■		■		■
Brake Pads	Check for wear	EVERY 3000 Km								EVERY 3000 Km				
Brake flexible hoses	Replace							●						●
Brake Fluid Level	Check	■	■	■	■	■	■	■	■	■	■	■	■	■
Brake Fluid	Replace	EVERY 2 YEARS								EVERY 2 YEARS				
Transmissions	Lubrication			■		■		■		■		■		■
Safety Locks	Check	■		■		■		■		■		■		■
Suspensions	Check			■		■		■		■		■		■
Wiring harness and Battery	Check	■	■	■	■	■	■	■	■	■	■	■	■	■
Headlight Beam	Check / Adjust			■		■		■		■		■		■
Tyre condition and wear	Check condition and wear		■	■	■	■	■	■	■	■	■	■	■	■
Tyre pressures	Check	■	■	■	■	■	■	■	■	■	■	■	■	■
Check vehicle and brakes	Road test	■	■	■	■	■	■	■	■	■	■	■	■	■
Labour time		60'	100'	135'	90'	160'	75'	185'	75'	160'	90'	135'	75'	210'

TORQUE SETTING TABLE

DESCRIPTION - PART		Torque Setting in N-m
UPPER SHOCK ABSORBER SECURING ELEMENT	- FRAME M8 x 100 8.8	20 ÷ 25
LOWER SHOCK ABSORBER SECURING ELEMENT	- ENGINE M10 x 150 8.8	30 ÷ 40
ENGINE BRACKET SECURING ELEMENT	- FRAME M10 X150 10.9	55 ÷ 60
ENGINE SECURING ELEMENT	- ENGINE BRACKET M10 x 150 8.8	30 ÷ 40
ENGINE BRACKET SECURING ELEMENT	- ENGINE BRACKET M10 x 150 8.8	30 ÷ 40
SILENTBLOC SECURING BRACKET	- FRAME M8 x 125 8.8	15 ÷ 19 Sealed
FILTER BOX SECURING ELEMENT	- ENGINE M6 x 100	8 ÷ 10
HORN SECURING ELEMENT	- FRAME M6 x 100	8 ÷ 10
STEERING FORKS SECURING ELEMENT	- FRAME M30.5 x 150	90 ÷ 130
EXHAUST PIPE TUBE SECURING ELEMENT	- CYLINDER M6 X 100	9 ÷ 12
EXHAUST PIPE SECURING ELEMENT	- CRANKCASE M8 x 125	15 ÷ 19 Sealed
HANDLEBAR SECURING ELEMENT	- STEERING FORKS M10 x 150 8.8	30 ÷ 40
FRONT WHEEL SECURING ELEMENT	- FORKS M12 x 175 8.8	45 ÷ 60
FORK LEG CLOSING SECURING ELEMENT	- FORKS M6 x 100	8 ÷ 10
DISC BRAKE SECURING ELEMENT	- FRONT WHEEL M6 x 10.9	11 ÷ 20 Sealed
FRONT BRAKE CALIPER SECURING ELEMENT	- FORKS M8 x 125 8.8	17 ÷ 19 Sealed
REAR WHEEL SECURING ELEMENT	- ENGINE M16 x 125 10.9	115 ÷ 125
CENTRAL STAND SECURING ELEMENT	- CRANKCASE M10 x 150 8.8	30 ÷ 40
LUGGAGE RACK SECURING ELEMENT	- FRAME M6 x 100 8.8	8 ÷ 10
FOOT REST BRACKET SECURING ELEMENT	- FRAME M8 x 125 8.8	15 ÷ 19 Sealed
ENGINE ASSEMBLY		
LUBRICATION		
TRANSMISSION OIL DRAIN PLUG		24 ÷ 30
OIL FILTER		4 ÷ 6
OIL PUMP COVER SCREWS		0,7 ÷ 0,9
OIL PUMP SCREWS		5 ÷ 6
PUMP DRIVE PULLEY CHAIN SCREWS		10 ÷ 14
CHAIN COVER SCREWS		35 ÷ 45
OIL SUMP SCREWS		10 ÷ 14
CYLINDER HEAD - CYLINDER		
SPARK PLUG		12 ÷ 14
CYLINDER HEAD COVER SCREWS		13 ÷ 13
CYLINDER HEAD – CYLINDER SECURING NUTS		28 ÷ 30
CYLINDER HEAD SIDE SECURING SCREWS		11 ÷ 13
DISTRIBUTOR ELEMENTS SCREWS		7 ÷ 8,5
CAMSHAFT SCREWS		7 ÷ 6
TENSIONER SHOE SCREWS		10 ÷ 14
HUB SCREW		11 ÷ 15
TENSIONER SCREW		11 ÷ 13
TENSIONER CENTRAL SCREW		5 ÷ 6
TRANSMISSION		
BELT SUPPORT ROLLER SCREW		11 ÷ 13
CLUTCH ASSEMBLY NUT		55 ÷ 60
FIXED DRIVE SEMI-PULLEY NUT		75 ÷ 83
TRANSMISSION COVER SCREWS		11 ÷ 13
DRIVEN PULLEY SHAFT NUT		54 ÷ 60
BOSS COVER SCREWS		24 ÷ 27
MAGNETO		
STATOR ASSEMBLY SCREWS		3 ÷ 4
MAGNETO NUT		52 ÷ 58
CRANKCASE AND CRANKSHAFT		
INTERNAL ENGINE CRANKCASE PARTITION SCREW		4 ÷ 6
OIL FILTER CONNECTOR		28 ÷ 30
ENGINE CRANKCASE SCREWS		11 ÷ 13
PRE-FILTER COVER		24 ÷ 30
STARTER MOTOR SCREWS		11 ÷ 13
MISCELLANEOUS		
VARIOUS METAL SECURING ELEMENTS TO FRAME		3,5 ÷ 4,5
VARIOUS METAL SECURING ELEMENTS TO FRAME		8 ÷ 10
VARIOUS METAL SECURING ELEMENTS TO FRAME		15 ÷ 1,9
VARIOUS PLASTIC SECURING ELEMENTS TO FRAME		1 ÷ 2
VARIOUS PLASTIC SECURING ELEMENTS TO FRAME		2 ÷ 35

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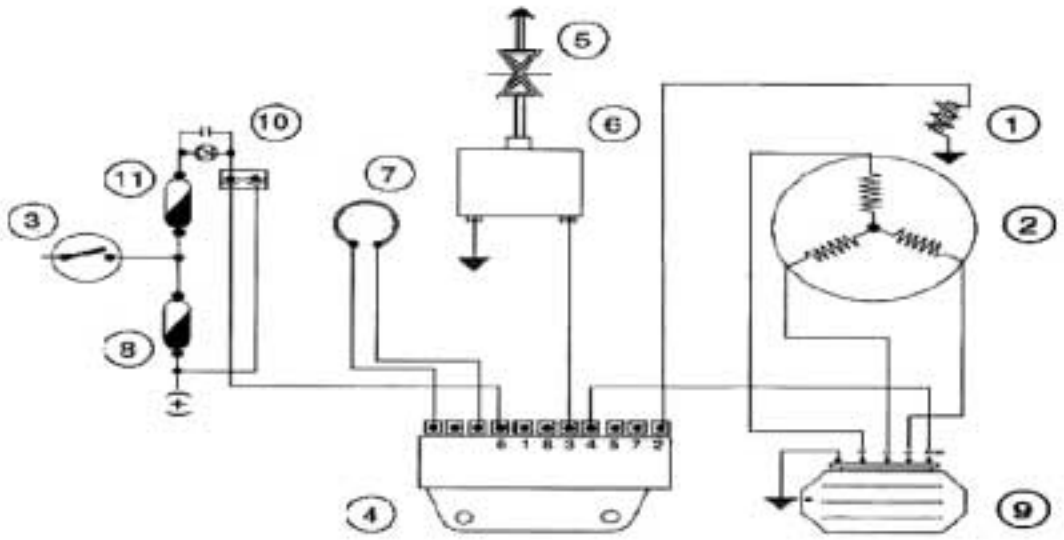
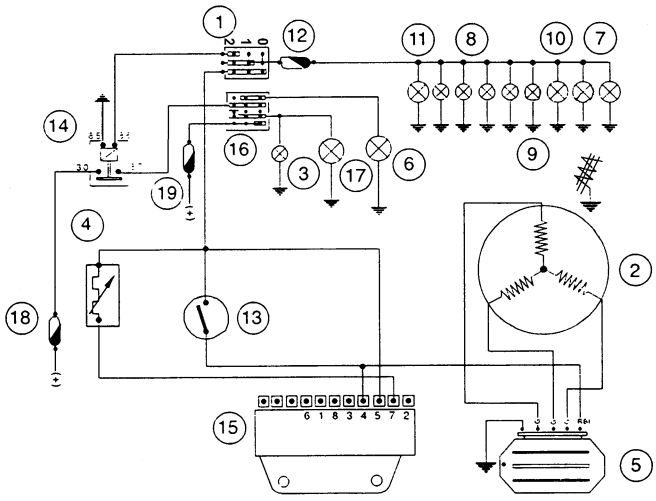


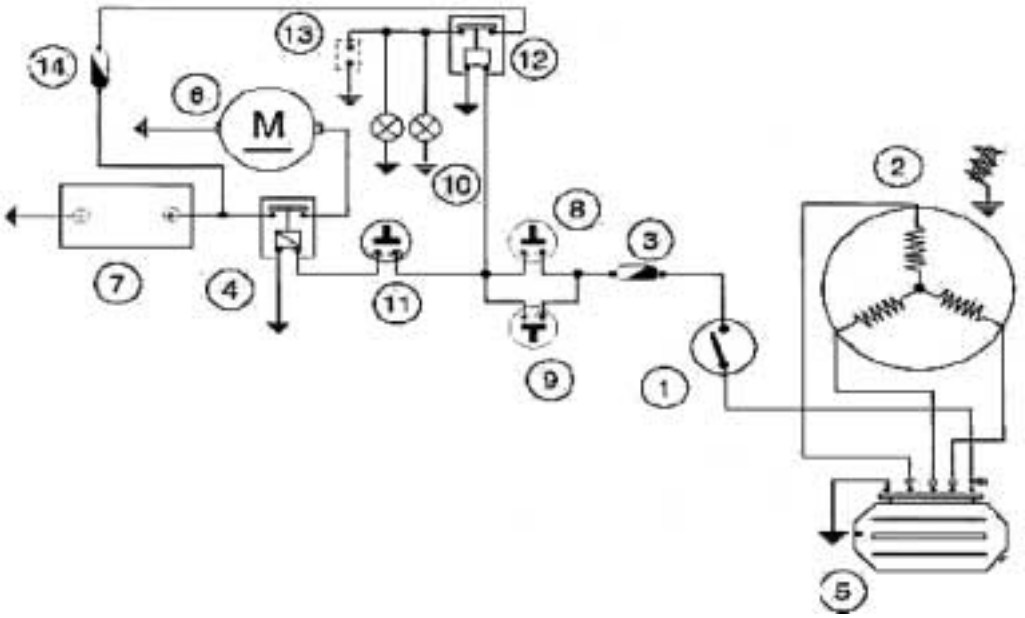
1 PICK-UP
2 MAGNETO
3 IGNITION SWITCH CONTACTS
4 ELECTRONICS UNIT
5 SPARK PLUG
6 H.T. COIL
7 IMMOBILISER AERIAL
8 FUSE, 7.5 A (A)
9 VOLTAGE REGULATOR
10 DIAGNOSTICS TESTER OUTPUT
11 FUSE, 5A (A)

Lights and automatic choke section



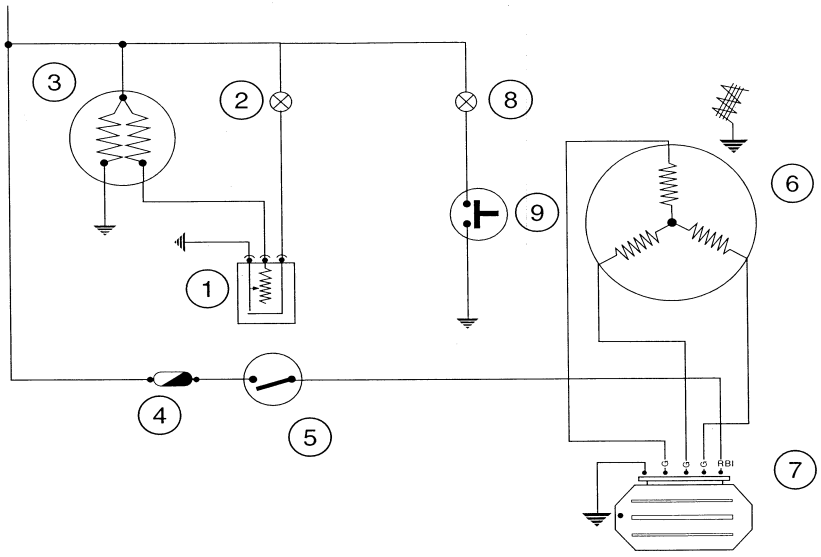
1 LIGHTS SWITCH
2 MAGNETO
3 HEADLIGHTS PILOT LIGHT 12v 1.2w
4 AUTOMATIC CHOKE
5 VOLTAGE REGULATOR
6 DIPPED BEAM HEADLIGHT BULB 12v 55w (H7)
7 5w FILAMENT IN TAIL LIGHT BULB 12v 5/21w
8 INSTRUMENT PANEL LIGHT BULB 12v 1.2w 4-OFF
9 LIGHTS PILOT LIGHT 12v 1.2w
10 DIPPED BEAM HEADLIGHT BULB 12v 5w
11 REGISTRATION PLATE LIGHT 12v 5w
12 FUSE 5A
13 IGNITION SWITCH CONTACTS
14 HEADLIGHT REMOTE CONTROL
15 ELECTRONICS UNIT
16 HEADLIGHTS DIP SWITCH
17 HEADLIGHTS (12v 55w (H3))
18 FUSE, 10A
19 FUSE, 7.5A

Battery charger and starter motor section



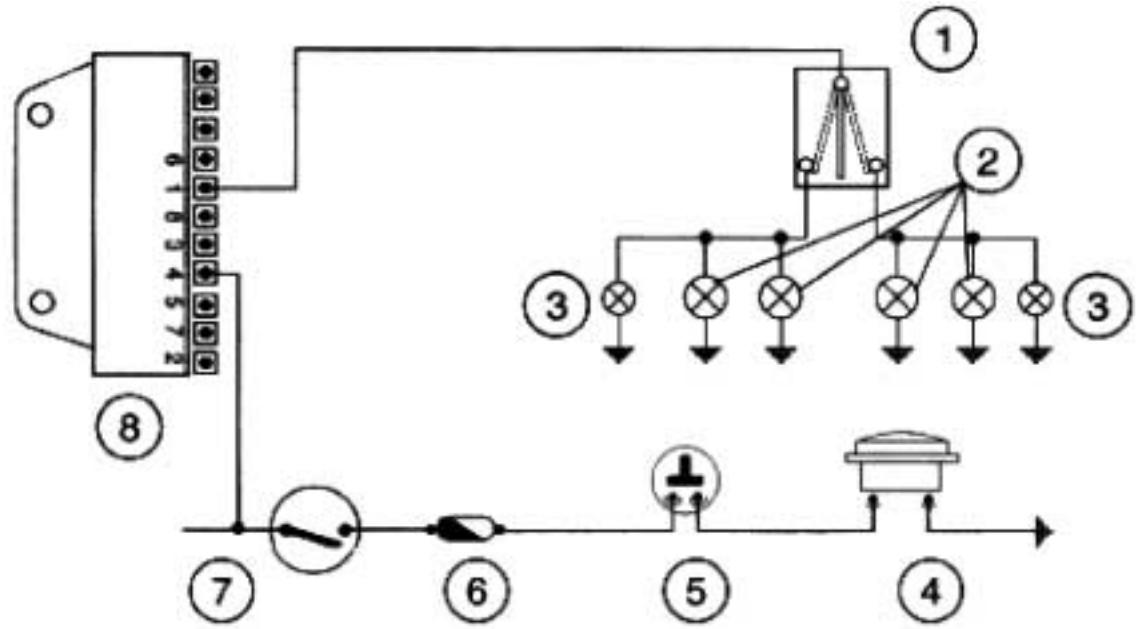
1 IGNITION SWITCH CONTACTS
2 MAGNETO
3 FUSE, 7.5A
4 ELECTRIC START REMOTE CONTROL
5 VOLTAGE REGULATOR
6 STARTER MOTOR
7 BATTERY, 12V 12 Ah
8 FRONT STOP SWITCH AND STARTER CHECK
9 REAR STOP SWITCH AND STARTER CHECK
10 21w FILAMENT IN STOP LIGHT BULB 12v 5/21w
11 STARTER PUSH BUTTON
12 STOP LIGHT REMOTE CONTROL
13 ADDITIONAL STOP PRE-INSTALLATION (14w)
14 FUSE, 10A

Pilot lights and level indicators

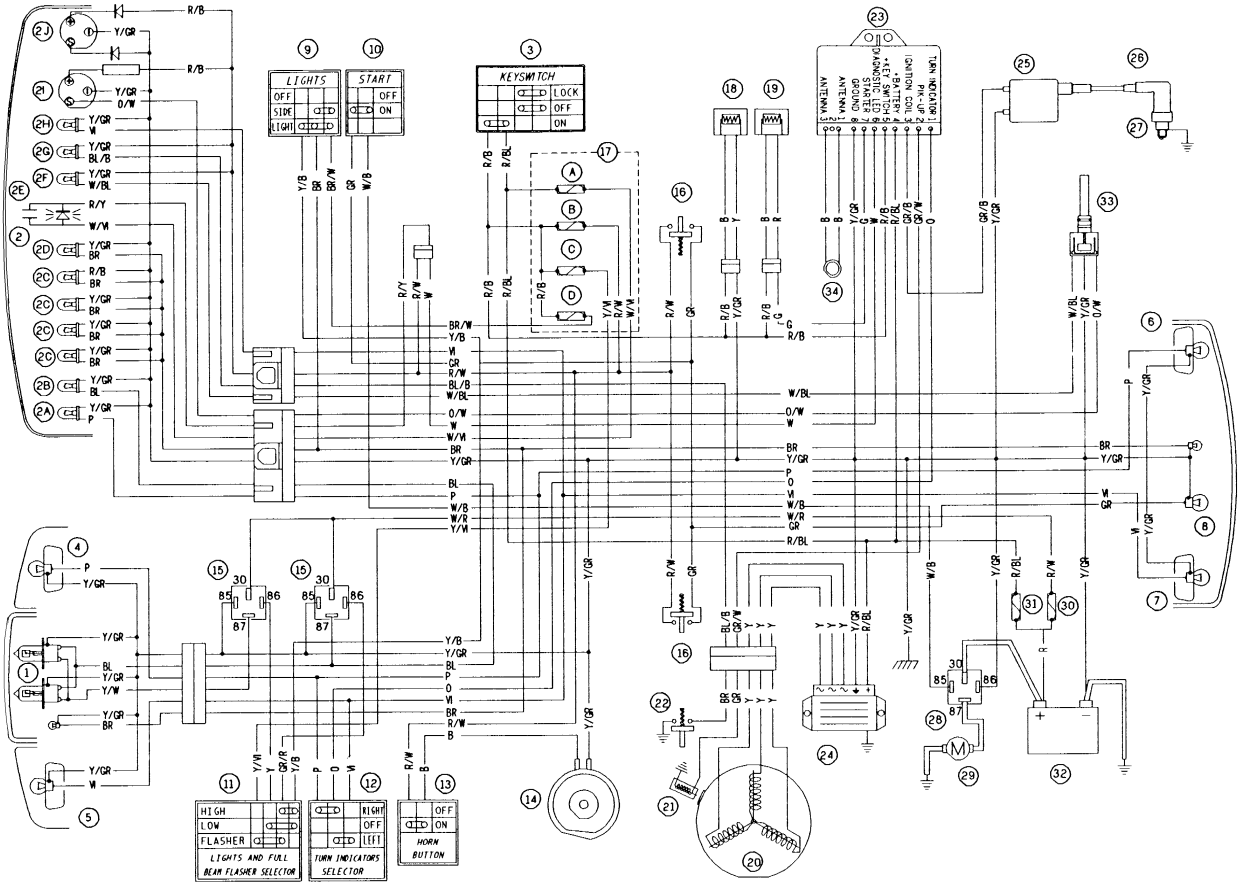


1 FUEL LEVEL SENSOR
2 FUEL RESERVE PILOT LIGHT 12v 1.2 w
3 FUEL LEVEL INDICATOR
4 FUSE, 7.5 A
5 IGNITION SWITCH CONTACTS
6 MAGNETO
7 VOLTAGE REGULATOR
8 OIL PRESSURE PILOT LIGHT 12v 2w
9 ENGINE OIL PRESSURE SENSOR

Indicator lights and horn section



1 INDICATOR SWITCH
2 INDICATOR LIGHTS 12V 10w 4-OFF
3 INDICATOR PILOT LIGHT BULBS 12v 2w
4 HORN
5 HORN PUSH-BUTTON
6 FUSE, 7.5 AMPS
7 IGNITION SWITCH CONTACTS
8 ELECTRONICS UNIT

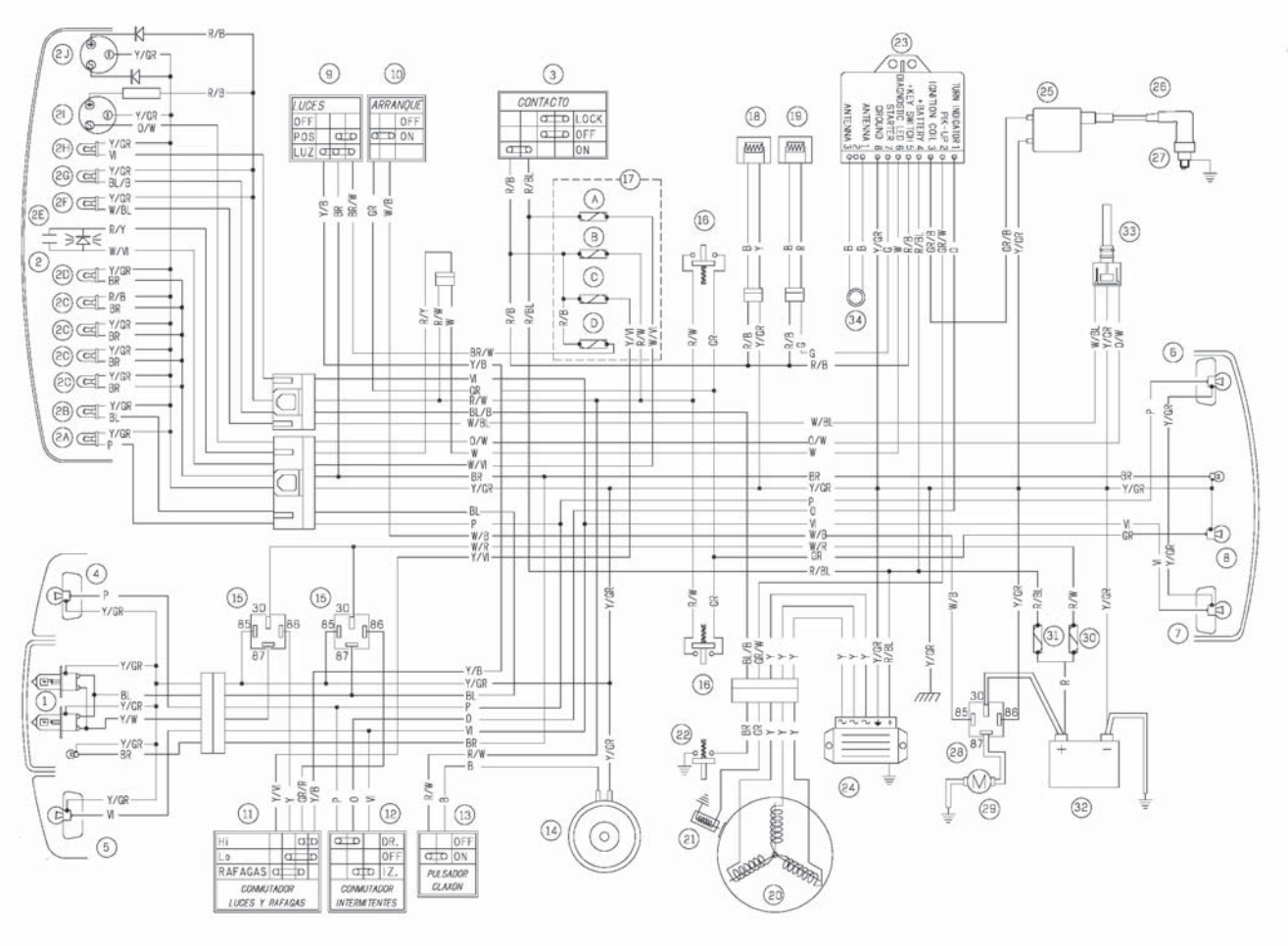


1 HEADLIGHT ASSEMBLY 2 x 12V 35/35W - SIDE LIGHT 12V 5W
2 INSTRUMENT PANEL
- 2A RIGHT TURN INDICATOR CONTROL PILOT LAMP 12V 2W
- 2B FULL BEAM CONTROL PILOT LAMP 12V 1,2W
- 2C INSTRUMENTS PANEL LIGHT 12V 1.2W
- 2D LIGHTS CONTROL PILOT LAMP 12V 1.2W
- 2E DIAGNOSTIC LED OUTPUT
- 2F FUEL WARNING CONTROL PILOT LAMP 12V 2W
- 2G ENGINE OIL LOW PRESSURE PILOT LAMP 12V 2W
- 2H LEFT TURN INDICATOR CONTROL PILOT LAMP 12V 2W
- 21 BATTERY VOLTMETER
- 2J FUEL LEVEL TRANSMITTER

3 KEYSWITCH
4 FRONT RIGHT TURN INDICATOR 12V 10W
5 FRONT LEFT TURN INDICATOR 12V 10W
6 REAR RIGHT TURN INDICATOR 12V 10W
7 REAR LEFT TURN INDICATOR 12V 10W
8 TAIL LIGHT TAIL - BRAKE LIGHT BULBS 12V 5W - 12V 10W
9 LIGHTS SELECTOR SWITCH
10 START BUTTON
11 LIGHTS SELECTOR - FULL BEAM FLASHER
12 TURN INDICATORS SELECTOR
13 HORN BUTTON
14 HORN
15 LIGHTS CONTACTOR
16 BRAKE LIGHT BUTTON
17 FUSE BOX
- A FUSE 5A (DIAGNOSTIC LED)
- B FUSE 5A (STOP-HORN-INSTRUMENT PANEL)
- C FUSE 7,5A (FULL BEAM FLASHER)
- D FUSE 5A (SIDE LIGHT)

18 CARBURETTOR HEATING ELEMENT
19 AUTOMATIC CHOKE
20 FLYWHEEL MAGNETO
21 PICK - UP
22 OIL PRESSURE SENSOR
23 ELECTRONIC IGNITION DEVICE
24 VOLTAGE REGULATOR
25 H.T. COIL
26 SPARK PLUG COVER
27 SPARK PLUG
28 STARTER MOTOR CONTACTOR
29 STARTER MOTOR
30 FUSE 15A (LIGHTS CONTACTOR)
31 FUSE 15A (GENERAL IGNITION)
32 12V 9Ah BATTERY
33 FUEL LEVEL SENSOR
34 IMMOBILIZER ANTENNA

D	F	UK	I	E	
Orange	Orange	Orange	Arancio	Naranja	O
Grün	Vert	Green	Verde	Verde	GR
Schwarz	Noir	Black	Nero	Negro	B
Braun	Marron	Brown	Marrone	Marron	BR
WeiB	Blanc	White	Bianco	Blanco	W
Grau	Gris	Gray	Grigio	Gris	G
Gelb	Jaune	Yellow	Giallo	Amarillo	Y
Blau	Blau	Blue	Azzurro	Azul	BL
Rot	Rouge	Red	Rosso	Rojo	R
Rosa	Rosa	Pink	Rosa	Rosa	P
Violett	Violet	Violet	Viola	Violeta	VI



1. HEADLIGHT ASSEMBLY 2 x 12V 35/35W - SIDE LIGHT 12V 5W
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   - 2A. RIGHT TURN INDICAT. CONTROL PILOT LAMP 12V 2W
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   - 2D. LIGHTS CONTROL PILOT LAMP 12V 1.2W
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   - 2F. FUEL WARNING CONTROL PILOT LAMP 12V 2W
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   - 2I. BATTERY VOLTMETER
   - 2J. FUEL LEVEL TRANSMITTER
3. KEYSWITCH
4. FRONT RIGHT TURN INDICATOR 12V 10W
5. FRONT LEFT TURN INDICATOR 12V 10W
6. REAR RIGHT TURN INDICATOR 12V 10W
7. REAR LEFT TURN INDICATOR 12V 10W
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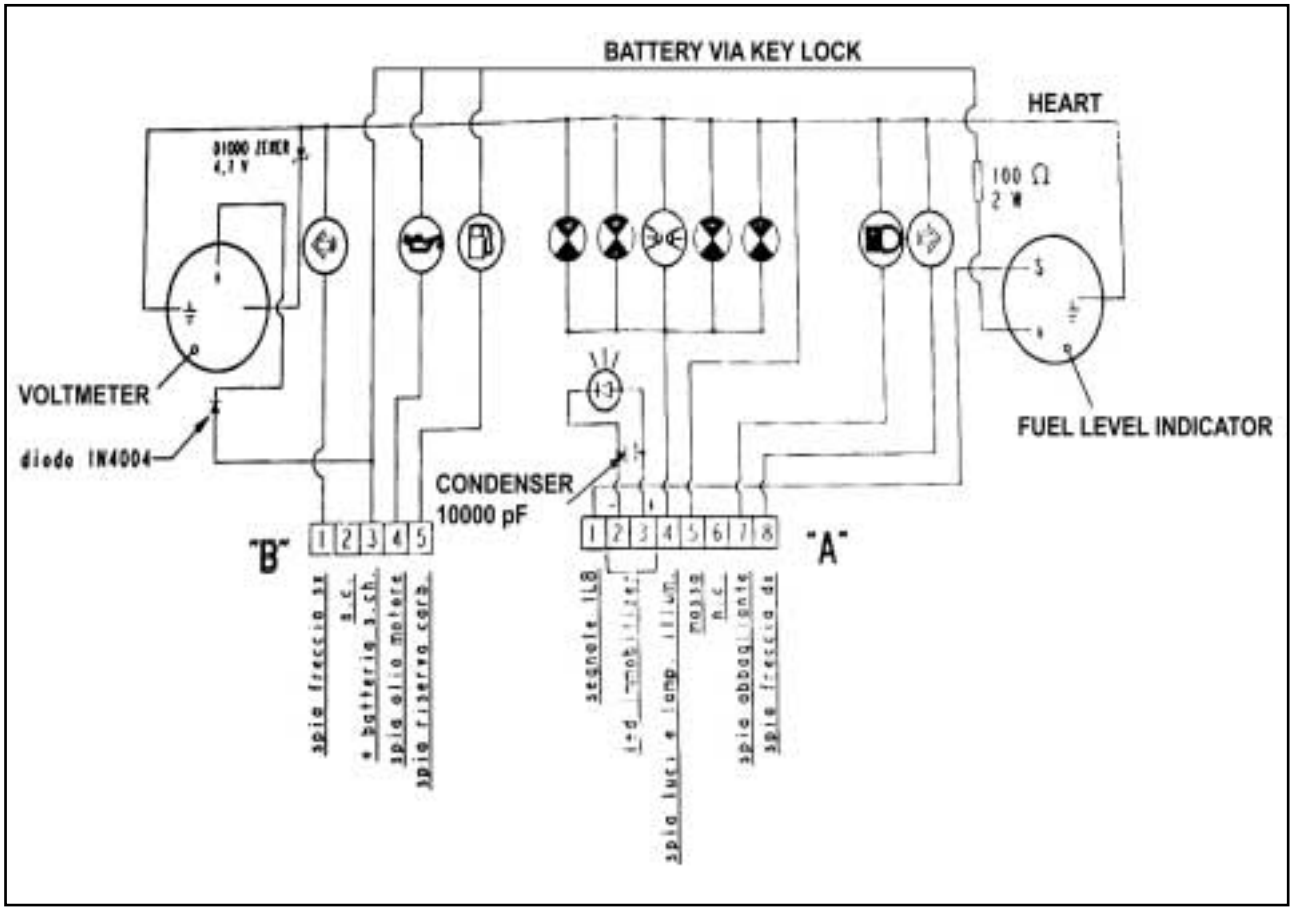
33. FUEL LEVEL SENSOR
34. IMMOBILIZER ANTENNA

	D	F	UK	I	E
O	Orange	Orange	Orange	Arancio	Naranja
GR	Grün	Vert	Green	Verde	Verde
B	Schwarz	Noir	Black	Nero	Negro
BR	Braun	Marron	Brown	Marrone	Marron
W	WeiB	Blanc	White	Bianco	Blanco
G	Grau	Gris	Gray	Grigio	Gris
Y	Gelb	Jaune	Yellow	Giallo	Amarillo
BL	Blau	Blau	Blue	Azzurro	Azul
R	Rot	Rouge	Red	Rosso	Rojo
P	Rosa	Rosa	Pink	Rosa	Rosa
VI	Violett	Violet	Violet	Viola	Violeta



"A"

1. ILB Signal.
2. Immobiliser LED.
3. Immobiliser LED.
4. Dipped beam headlight pilot light.
5. Earth.
6. No connection.
7. Full beam headlight pilot light.
8. Right indicator light pilot light.

"B"

1. Left indicator light pilot light.
2. No connection.
3. + Battery via key lock.
4. Engine oil pressure pilot light.
5. Fuel reserve pilot light.

Electronic start (immobiliser installation)

The electronic start is installed with a DC power supply and includes an anti-theft vehicle immobiliser in the same unit.

The electronic start installation comprises the following:

- the main unit
- the immobiliser aerial
- the master/service key with incorporated transponder
- H.T. coil
- Diagnostics LED

The diagnostics led also carries out the function of dissuasory flasher. This function is activated every time the ignition switch is turned to the “OFF” position, and, so as not to discharge the battery, remains active for only 48 hours.

When the ignition switch is in position “ON”, the dissuasory flasher is switched off, and then it gives a flash to confirm that the switch is in the “ON” position.

The time the flash lasts depends on the program in the electronics unit.

When the LED is switched off and remains off even when the switch is turned “ON”, the following checks should be performed:

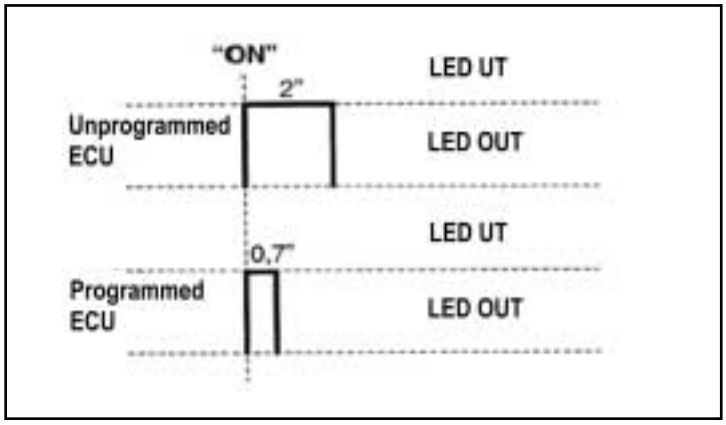
- check for voltage at the battery
- check state of fuses: main fuse 15A, LED protection fuse 5A

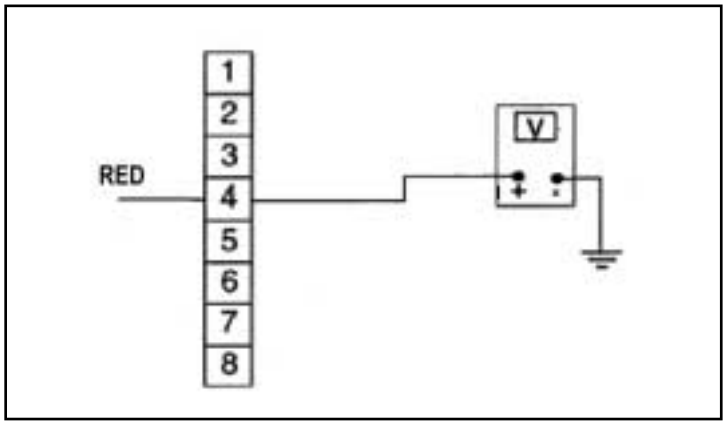
Connect the immobiliser tester to the diagnostics socket which is located behind the front left fuse box cover.

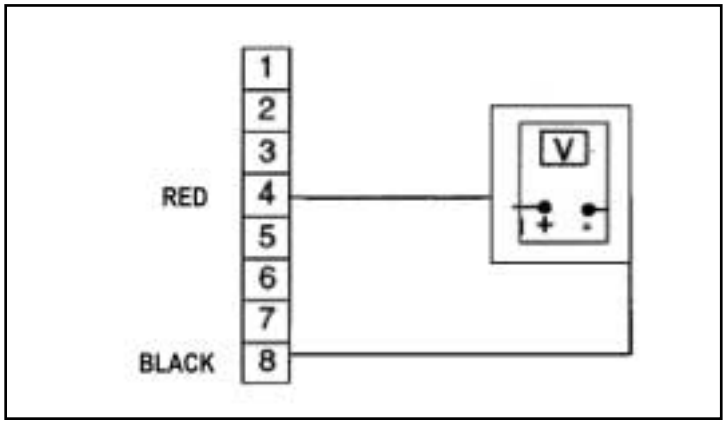
If the LED remains off, check the power supplies at the electronics unit as shown below:

Disconnect the electronics unit connector, and check the following conditions:

- battery voltage exists between terminal no. 4 (Red) and earth
- battery voltage exists between terminals no. 4 (Red) and no. 8 (negative) as shown in the diagram.

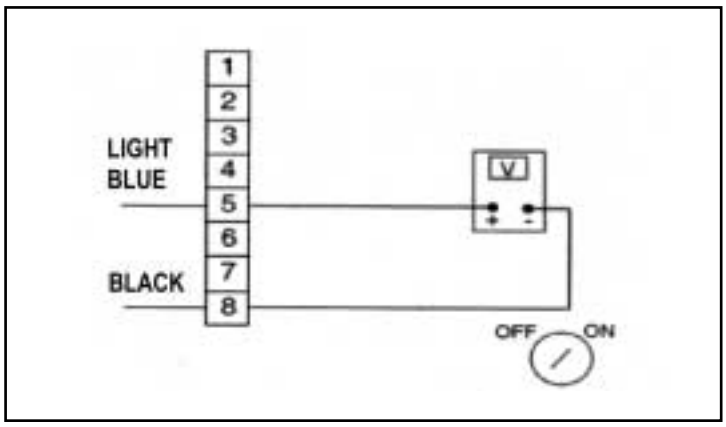






- battery voltage exists between terminals no. 5 and no. 8 with the ignition switch in the “ON” position, and the emergency stop switch in “RUN”.

If any faults are discovered, replace the electronics unit.



New installation

When the ignition installation is not coded, it permits the engine to run, but with a limit of 2,000 rpm, and when the throttle is opened to accelerate, a distinct loss of power is noted.

In order to code the installation, is it necessary to use the MASTER key (coloured brown), and the SERVICE key (coloured blue), as shown below.

- insert the MASTER key, turn the switch to “ON” and hold this position for 2 seconds (limiting values: 1-3 seconds).
- Insert all the available blue keys, one after the other, turning each key to the “ON” position for 2 seconds.
- Insert the MASTER key again, and turn to the “ON” position for 2 seconds.

The maximum time limit allowed for changing keys is 10 seconds.

In any one memorisation session an upper limit of 7 service keys (coloured blue) will be accepted. It is essential to observe the sequence and the time limits, if not it will be necessary to start the whole procedure again from the beginning.

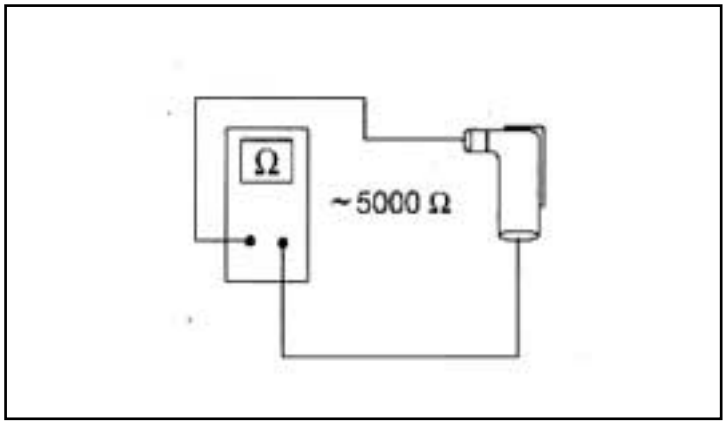
Once the electronics units has been programmed, an unbreakable link will have been established between the electronics unit and the MASTER key transponder.

While this link is maintained, it is possible to carry out new service key memorisations, if one becomes lost, is replaced, and so on. Each memorisation session deletes the previous session.

When the memorisation of the services keys is lost, it is vital to check thoroughly the correct state of the high tension circuit:

Protector cap resistance ~ 5,000 Ω

Under all circumstances it is recommended to use resistance spark plug caps as shown in the figure.



Diagnostics codes

After the flash indicating the fault that has occurred has turned to “ON”, a phase indicating fault codes may be started.

This is performed with an initial condition of LED off for a period of 2 seconds, followed by the transmission of the diagnostics codes with flashes of 0.5 seconds.

After indicating the breakdown code, the LED remains permanently on with no flashing, to show that it is not possible to start the engine, see the diagram.

CODE – TWO FLASHES

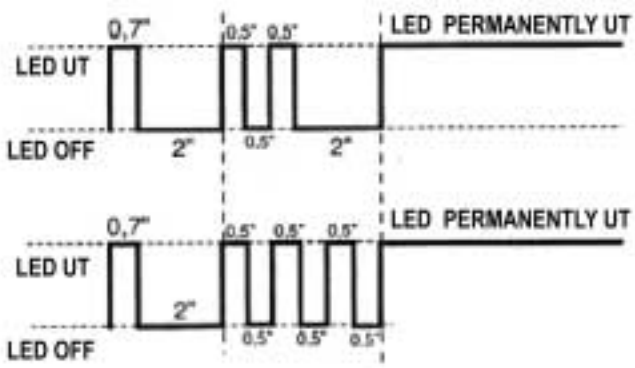
Example with unit programmed, missing transponder, and/or aerial in poor condition.

Ignition disabled – vehicle immobilised

CODE – THREE FLASHES

Example with unit programmed, aerial in operating condition and unknown transponder code.

Ignition disabled – vehicle immobilised



Diagnostics code: 2 flashes

If a 2-flash code is found, carry out the following checks:

Check whether the fault persists after changing the key (including the MASTER). If the fault exists with any of the keys, disconnect the electronics unit aerial connector, and check for continuity in the aerial using multimeter part no. 020331Y.

Value of resistance: ~ 7 – 9 Ω

If the value is different, change the aerial.

If no fault is found, replace the electronics unit.

Caution – before carrying out the memorisation procedure with the new electronics unit, check that no fault code is shown. This check is necessary in order to avoid wasting a new unit to no purpose.

Diagnostics code: 3 flashes

If a 3-flash code is found, carry out whether the fault persists when the MASTER key is also inserted into the ignition lock.

If the fault disappears when the MASTER key is used, it is necessary to carry out a re-coding procedure with the service key (coloured blue).

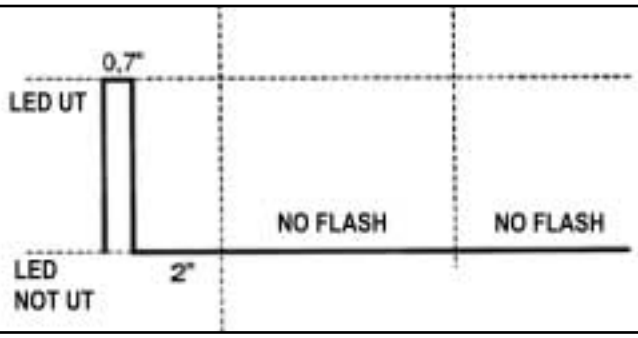
If the fault persists, this means that the MASTER key and the electronics unit are not linked; in this case, it is necessary to replace the electronics unit and carry out the ensuing key coding procedure.

The immobiliser installation is in operating condition when after switching to the “ON” position, a flash of only 0.7 seconds is recorded (see figure).

In this case, it is possible to start the engine.

Example with unit programmed, transponder present, key programmed and aerial in operating condition.

Ignition enabled – vehicle in normal working order



Installation of the Ignition

Once the immobiliser installation has been enabled, it will be possible to obtain a spark at the spark plug through the H.T. coil, and the signals proceeding from the Pick-Up.

The basic power supply is the battery, and the installation is calibrated such that any possible battery voltage loss is detected immediately by the electric start system, and has virtually no effect upon the ignition system.

The Pick-Up is connected to the electronics unit via a single cable, which means that the return connection from the electronics unit to the Pick-Up is via the frame and the engine earth cable.

To avoid any problems in the ignition installation during the electric start phase, it is very important to ensure a good earthing connection between the engine and the frame.

Failure in the power supply to the spark plug

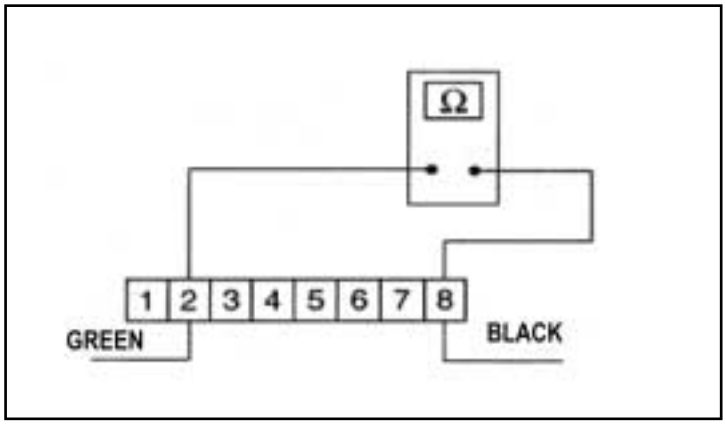
If there is not current to the spark plug while the LED indicates that ignition is possible, carry out the following check operations:

- Check the Pick-Up

Disconnect the electronics unit connector, and to verify the continuity between the terminal no. 2 (green) and the terminal no. 8 (Black). The control anticipates the Pick-Up and its plinea of feeding.

Resistance value: 105 ÷ 124 Ω

If is an interruption of the circuit,check for continuity between the magneto and the engine earth (see engine manual). If anomalous values are found, replace the Pick-up or repair the cable.



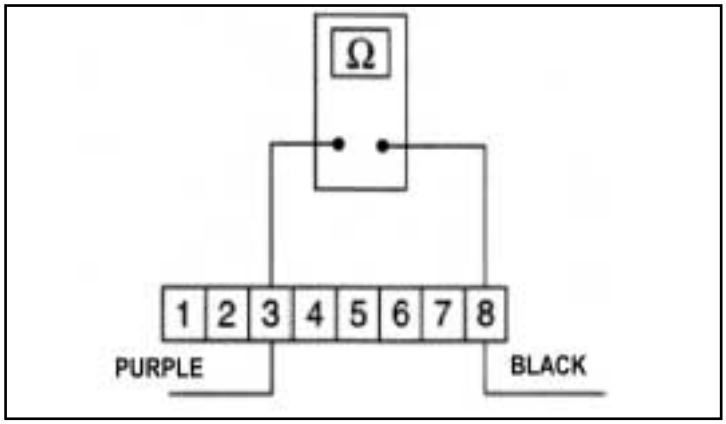
- Verification of the H.T. Primary Coil

Disconnect the electronics unit connector and check for continuity between terminals no. 3 and no. 8 (see diagram).

Resistance value: 0.4 ~ 0.5 Ω

If non-standard values are found, repeat the test directly on the positive and negative terminals of the Primary H.T. coil.

If non-standard values are found, repair the cable or replace the H.T. coil.

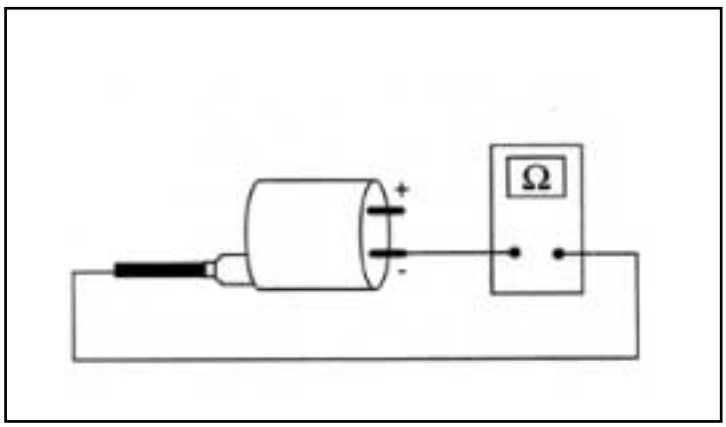


- Verification of the H.T. Secondary Coil

Disconnect the spark plug cap from the H.T. cable, and measure the resistance between the end of the H.T. cable and the H.T. coil negative terminal (see diagram).

Resistance value: ~3000 ± 300 Ω

If non-standard values are found, replace the H.T. coil. In order to carry out a more complete diagnostics test, it is possible to perform a check on the peak voltage by means of the multimeter adapter, drawing number 020409Y.



Pick-Up

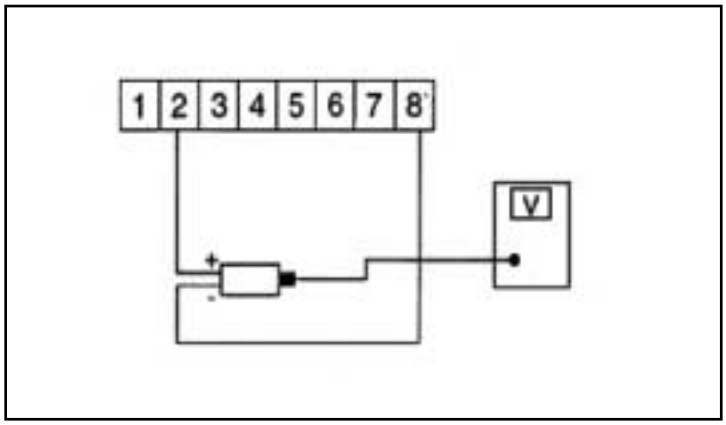
Disconnect the electronics unit connector and connect the positive terminal to connector no. 2, and the negative terminal to connector no. 8 (see diagram).

Turn the engine using the starter motor, and measure the voltage produced by the Pick-Up.

Voltage reading: > 2 V

If non-standard readings are obtained, replace the Pick-Up.

N.B.: the multimeter must be set to read Direct Current



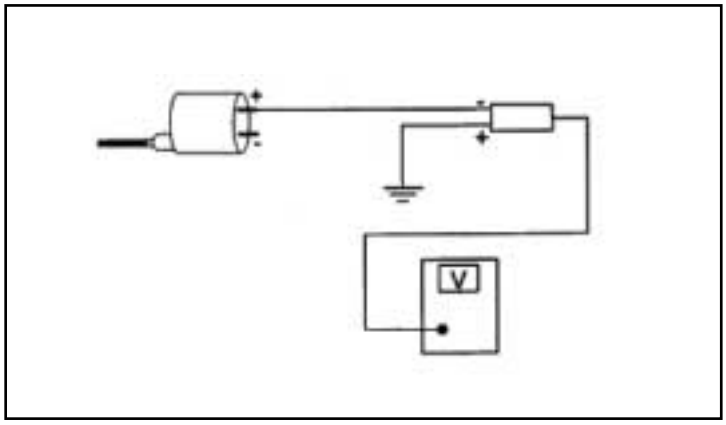
H.T. Coil

With the electronic unit and the H.T. Coil connected as normal, measure the voltage at the primary coil during the starter test, using the peak voltage adapter, connecting the positive terminal to earth and the negative terminal to the positive terminal on the coil.

Voltage reading: > 100 V

If the voltage readings are out of range, replace the electronics unit.

N.B.: the positive terminal of the primary H.T. coil is identified by its black colour.



Battery Charger Installation

The battery charger installation involves the use of a three-phase generator with permanent magneto.

The generator is connected directly to the voltage regulator.

In turn, the voltage regulator is connected directly to earth and to the positive terminal on the battery, through the 15A protection fuse.

It can be seen therefore that the system does not involve any connection with the ignition switch.

The three-phase generator produces significant recharge power, and even at the lowest revolutions, it obtains a good compromise between power requires and stability of the idle speed. For this reason, it is indispensable to set the idle speed according to specifications.

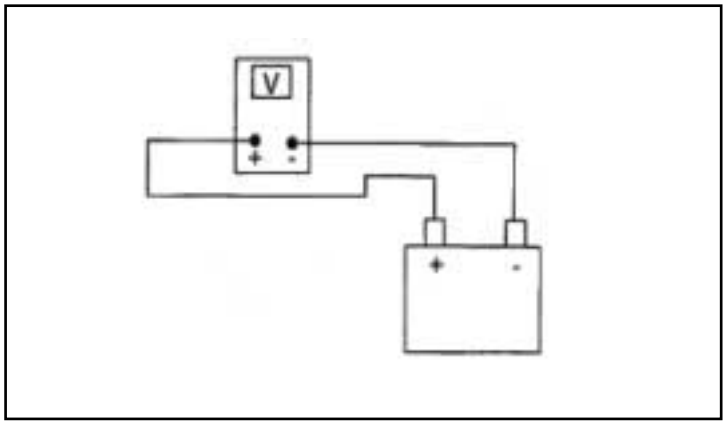
Checking the voltage regulator

With the battery fully charged and the lights switched off, measure the voltage between the battery terminals with the engine at high revolutions.

The voltage should not exceed 15.2 V.

If higher voltages are recorded, replace the voltage regulator.

If the readings are lower than 14 V, check the stator and related cabling.



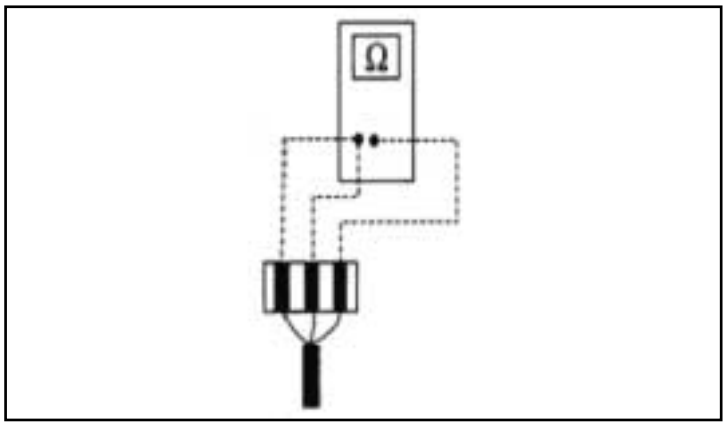
Checking the stator

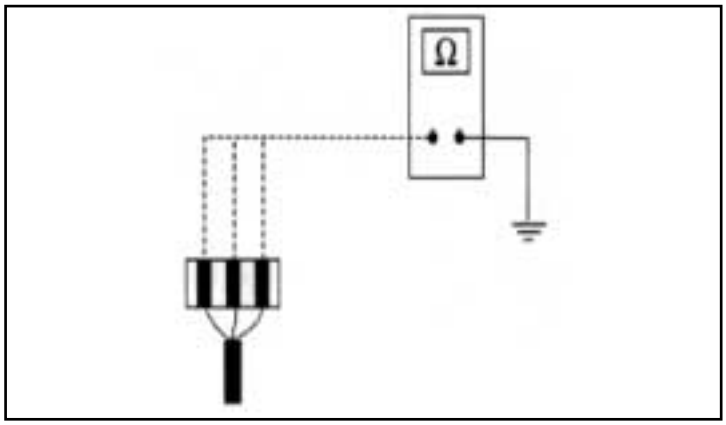
Disconnect the voltage regulator connector and check for continuity between each yellow cable and the other two.

Resistance reading: 0.7 – 0.9 Ω

A check should also be carried out to ensure that each yellow cable is insulated from earth.

If non-standard readings are obtained, repeat the check directly at the stator terminals, and if out-of-range readings are still obtained, replace the stator or repair the cable.

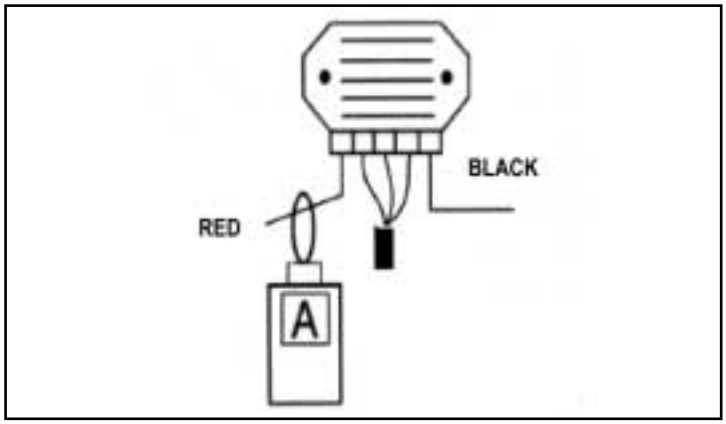




Checking the current draw of the charger installation

Connect the armature clip of an ammeter to the positive cable of the voltage regulator, measure the battery voltage, and after switching on the vehicle lights with the engine stopped, wait for the voltage to adjust to 12v. Start the engine, and measure the current drawn by the installation with the lights switched on and the engine at high revolutions.

Where the reading of the current drawn is lower than 10A, repeat the test using in succession the voltage regulator and/or a new stator.



Checking the automatic choke section

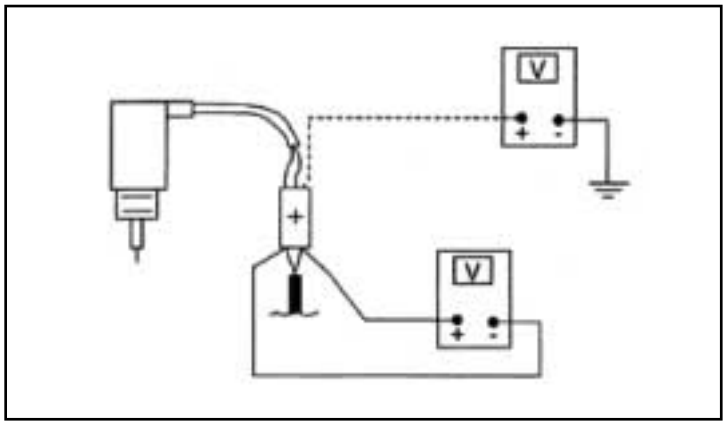
For checks on the resistance and operation of this component, refer to the engine section. For checks relative to the power supply, keep the installation connector connected, and check that there exists battery voltage at the two terminals with the engine running (see diagram).

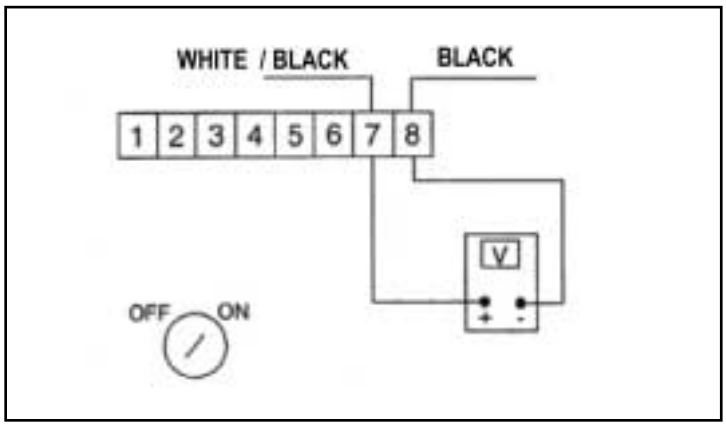
If no voltage is present, connect the negative terminal of a multimeter to earth and the positive terminal to the orange coloured cable of the automatic choke device; with the ignition switch in the “ON” position, check for battery voltage; if there is no battery voltage, check the cable connecting to the ignition switch.

If voltage is present, repeat the check with the ignition electronics unit connector.

Keeping the choke connected, remove the electronics unit connector, ignition switch to “ON”, and check for voltage connecting the multimeter with the positive terminal to terminal no. 7 (White/Black) and the negative terminal to terminal no. 8 (Black) (see diagram).

If voltage is not present, replace the electronics unit; if voltage is present, reconnect the cable connecting the choke and the electronics unit.





The direction indicators do not operate

If the direction indicators do not work, carry out the following verification operations:

Disconnect the electronics unit connector, and check that there is battery voltage between terminal no. 4 (Red) and earth.

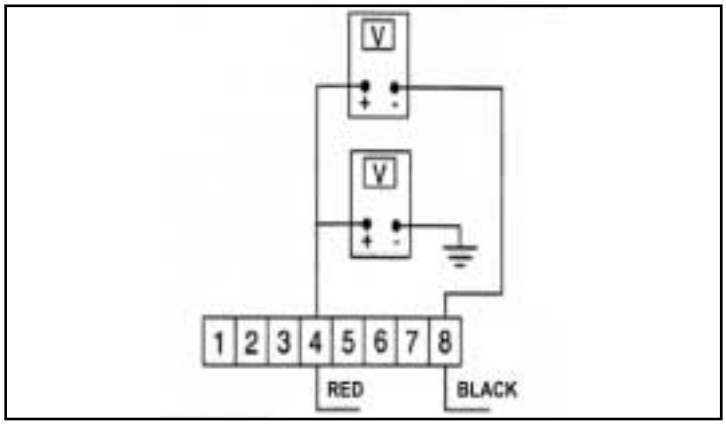
Check that there is also battery voltage between terminal no. 4 (Red) and terminal no. 8 (Black)

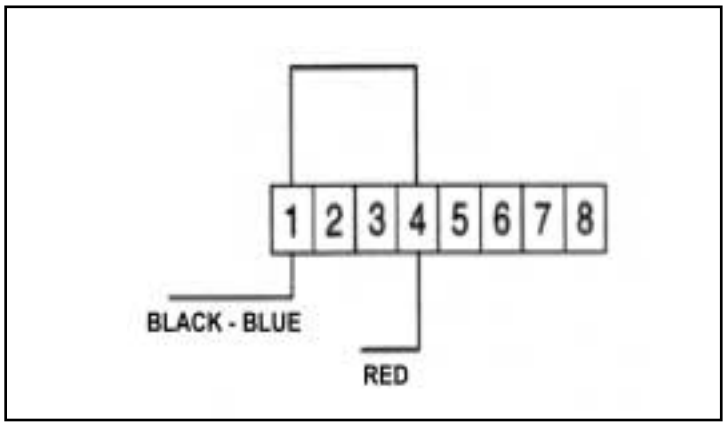
If no voltage is present, check the cabling and the connections, and of there is no voltage, carry out the following verification operations:

- bridge the terminals no. 1 (Black/Blue) and no. 4 (Red) (see diagram), and operate the direction indicator switch alternately to the left and to the right, and check that the lights come on.

If the lights come on, replace the indicator unit, because it is faulty.

If the lights do not come on, check the cabling connecting the indicator unit to the indicator switch, and repeat the test.



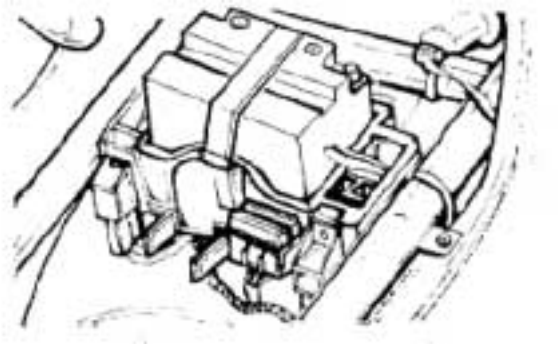


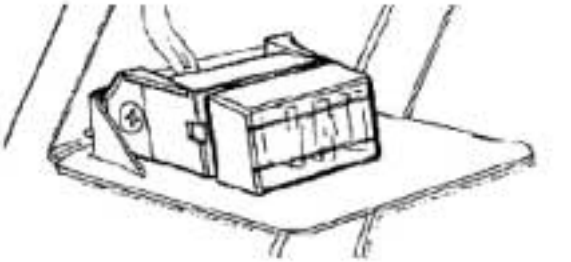
Fuses

The electrical installation is equipped with:

- four protection fuses mounted on the battery bracket;
- four protection fuses for the various circuits in the installation, place in the interior of the fuse box cover situated in the rear inner left of the shield.

The table shows the characteristics of the various fuses, used in the vehicle.





Caution **before replacing any blown fuse, recharge the battery and correct the fault which caused the fuse to blow.**

Do not attempt to replace any fuse using any other material (for example, a length of electric wire) or with a fuse of a higher rating than specified.

POWER SUPPLY FUSE	CIRCUITS PROTECTED
15 A direct current	Lighting relay
15 A direct current	General contact
7.5 A direct current	Headlamp flash
5 A direct current	Side lights
5 A direct current	Diagnostics LED
5 A direct current	Stop light - horn - instrument panel

List of Bulbs

Purpose	*Type*	*Power*
Dipped headlight bulb	Halogen	12v 35w
Full beam headlight	Halogen	12v 35w
Front position light	all-glass	12v 5w
Front direction indicator lights	Spherical	12v 10w x 2
Tail light/stop light bulb	Spherical	12v 5w / 12V 10w
Rear direction indicator light bulbs	Spherical	12v 10w x 2
Instrument panel illumination light bulbs	all-glass	12v 1.2w x 4
Position light/dipped headlight pilot light bulb	all-glass	12v 1.2w
Storage compartment illumination light bulb	Spherical	12v 5w
Registration plate illumination light bulb	cylindrical	12v 5w

FRONT FORKS

Suspension stroke .....76 mm.
Leg diameter .....35 mm.
Oil capacity (each leg).....95 c.c.
Type of oil.....SAE 10 W

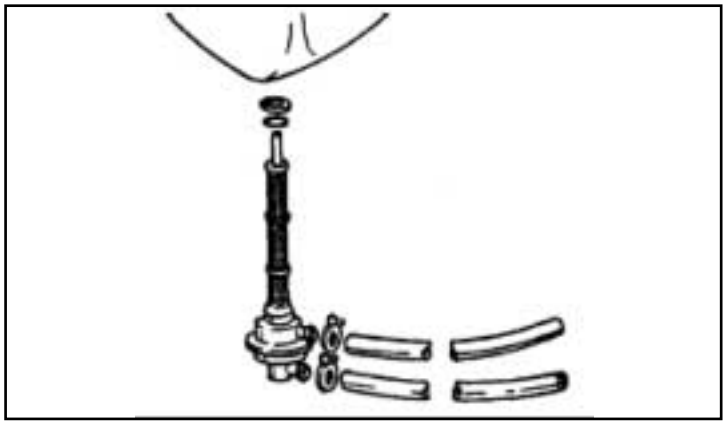
REAR SUSPENSION

Hydraulic shock absorber

Length of shock absorber .....300 mm
Stroke of shock absorber .....60 mm
Length of spring .....223 mm
Spring compression force to 35 mm .....147 kg/m
Spring compression force to 60 mm .....830 kg/m
Stem.....10 mm

Vacuum cock pre-filter cleaning

- drain the fuel tank completely
- withdraw the fuel supply and return lines
- slacken off the clip and withdraw the cock
- Clean the tank and the fuel cock pre-filter
- Reassemble the cock, taking care that the O-R ring is in its place
- Align the cock as shown in the figure and tighten up the clip.



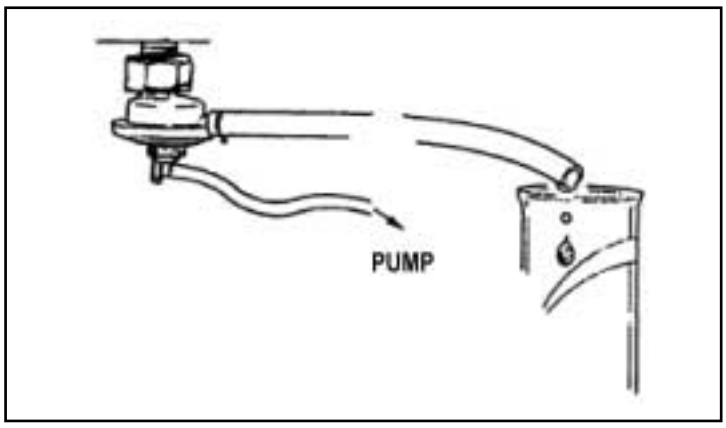
Vacuum cock

- disconnect the fuel supply line and the carburettor vacuum line
- check that there is no leaked fuel in either line
- close the fuel outlet
- using the MITIVAC pump (part no.19.1.20329) apply 0.1 bar of vacuum to the cock
- ensure that the vacuum remains stable and that there are no fuel leaks into the system
- connect the vacuum line to the manifold
- place the fuel line with its outlet at the same level as the cock
- turn the engine using the starter motor for 5 seconds with the carburettor throttle at minimum position
- remove the fuel into a graduated burette.

  Minimum flow: 20 cc

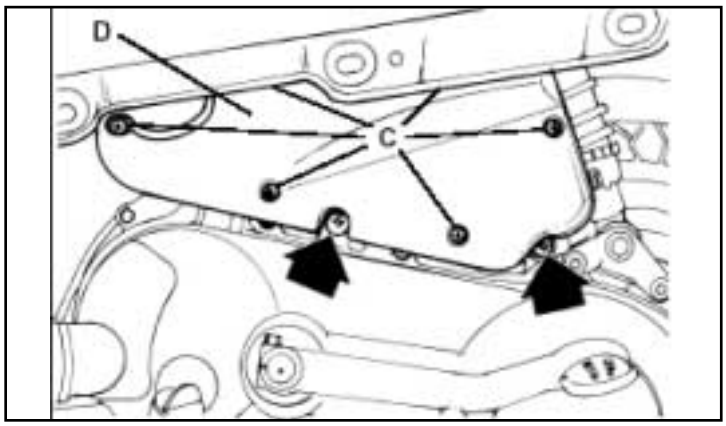
N.B.: The measurement may be affected by an incorrect number of turns, or by incorrect placing of the tube. In this case the tendency would be to obtain a lower quantity of fuel.

The vacuum intake on the manifold has a reduced section in order to improve the pulses of vacuum, thus ensuring a constant flow at the cock.



Air filter

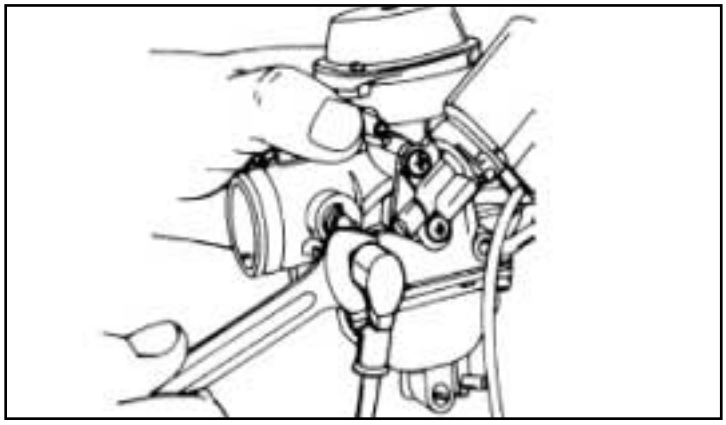
- to clean the air filter, carry out the following operations: remove the filter box cover, D, after first withdrawing the 6 securing screws, C; remove the 2 filter box securing screws (see figure) and then turn it to remove the 2 upper and four lower screws, and withdraw the air filter. Clean the air filter with soap and water, and then dry it using compressed air; finally submerge the filter in a 50-50 mixture of AGIP Oil Filter oil and petrol. Lastly squeeze out the excess oil. Allow to dry and reinstall.
- Ensure that the mass of the filter is correctly installed
- Check that the air flow channels are not deformed
- Check that the air filter box is correctly fitted and is properly sealed.



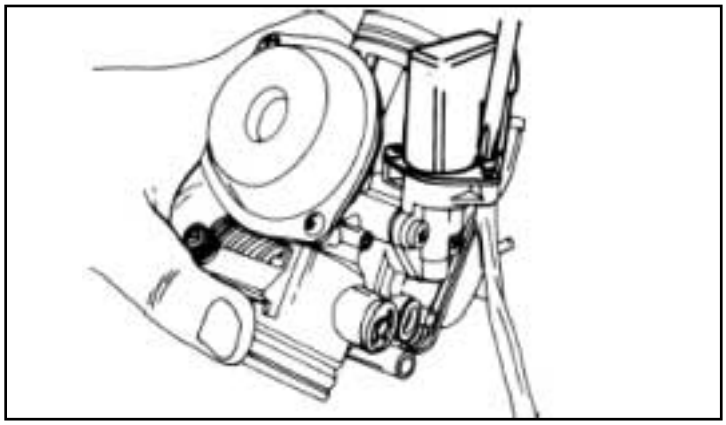
N.B.: failure to observe these instructions will cause incorrect vacuum in the interior of the filter box: this will lead to incorrect carburettor operation.

Stripping the carburettor

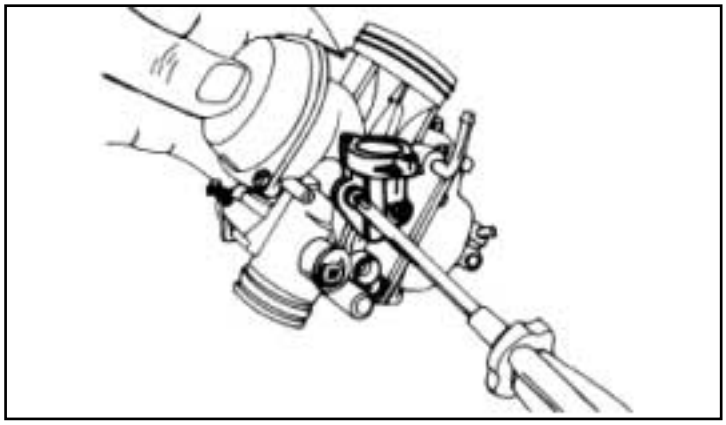
- in order to disconnect the carburettor from the engine, carry out the sequence of operations described in the Cylinder, Cylinder Head, and Distribution chapter
- Remove the discharge tube and the ventilation tube from the float chamber
- Withdraw the heater.



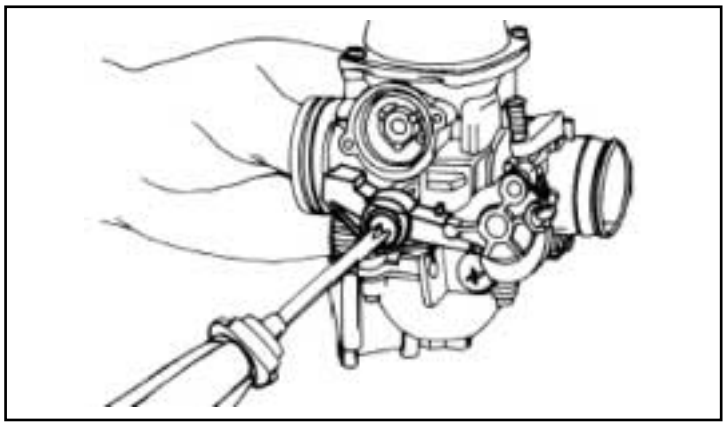
- Remove the protection, the stirrup, and the choke, by loosening the 2 screws shown in the figure.



- remove the 2 securing screws and the choke bracket together with the gasket.

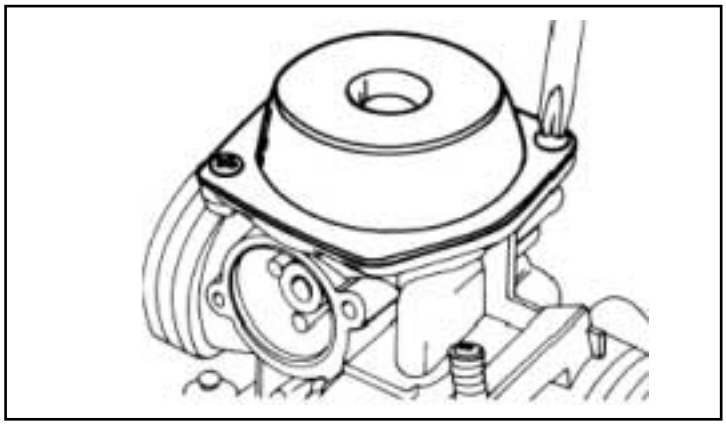


- remove the securing screw as shown in the figure, the rocker arm and the accelerator pump drive spring

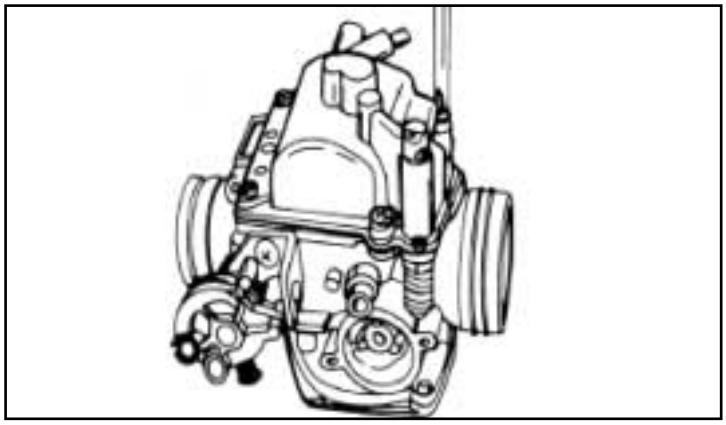


- withdraw the 2 securing screws as shown in the figure, the vacuum chamber cover, and the spring.

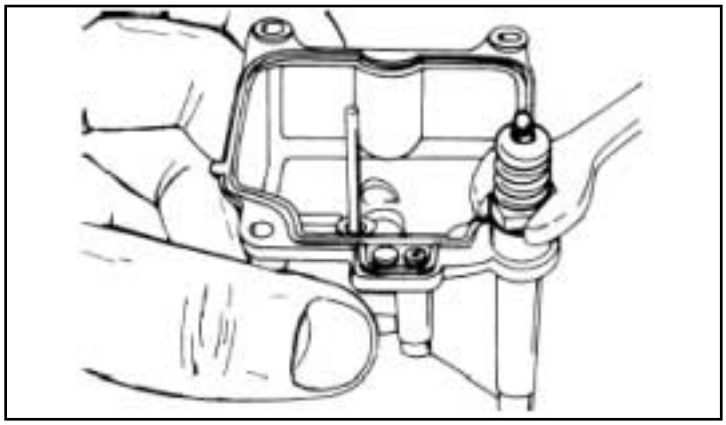
Warning – while stripping the cover be careful to ensure that the spring is not released unexpectedly.



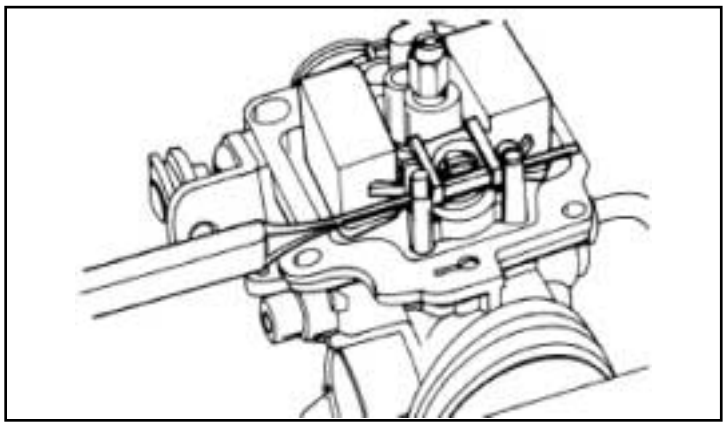
- Remove the vacuum valve and the membrane
- Remove the 4 screws shown in the figure, and the chamber and its gasket.



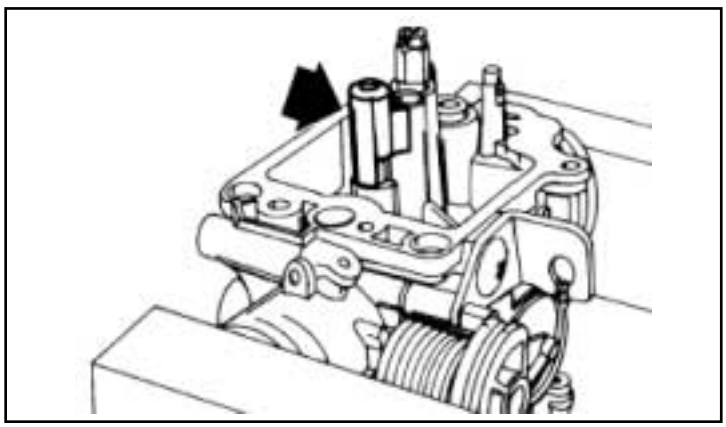
- Remove the accelerator pump piston from the chamber together with the collar, the deflector, the O-R ring, and the spring, as shown in the figure.



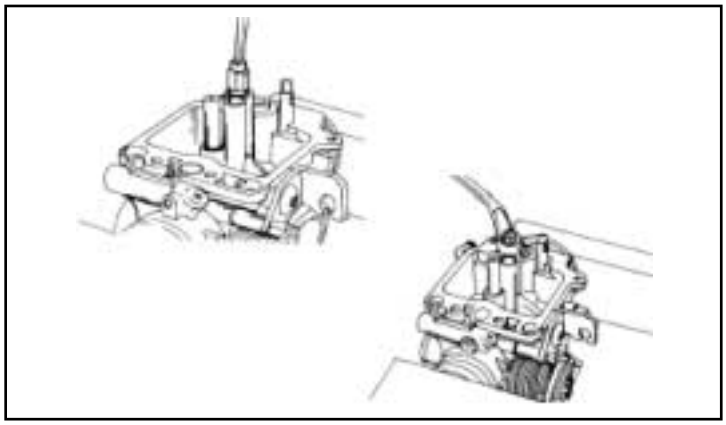
- Support the carburettor properly, and then, using a hammer and punch, remove the float pin, working from the throttle control side.
- Remove the float and the needle.



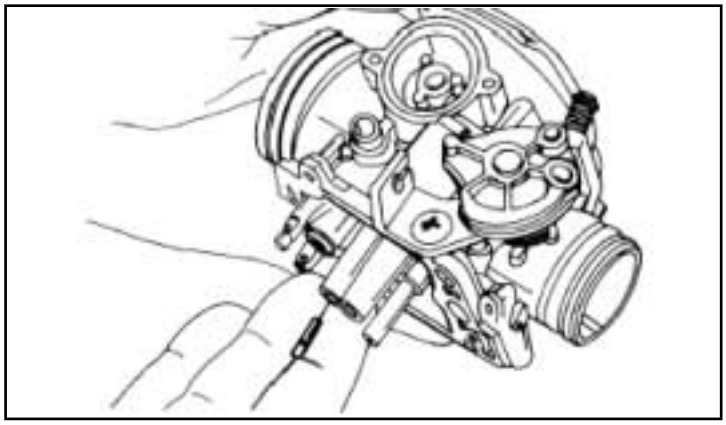
- remove the carburettor transporter cap for the choke jet as shown in the figure.



- Remove the main jet.
- Remove the emulsifier.

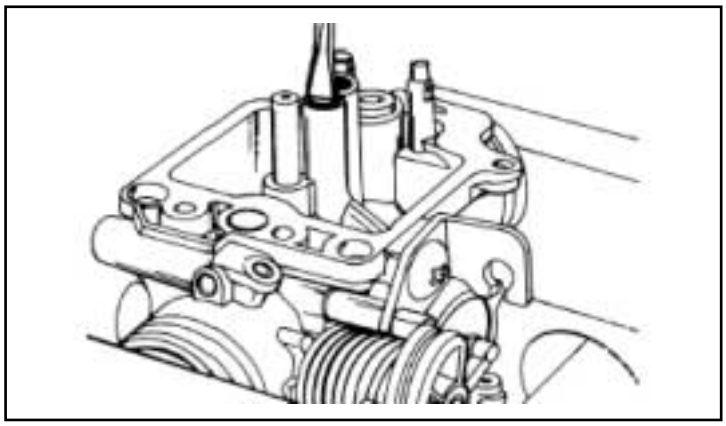


- Remove the atomiser, by tilting the carburettor body.

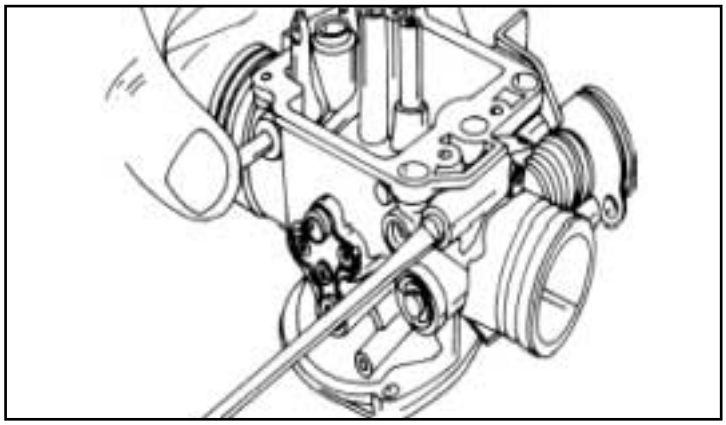


N.B.: It is necessary to carry out this operations, in order to avoid losing the atomiser, during the carburettor body cleaning phases. When the atomiser is stuck in its seating, do not strip it out, to avoid damaging the parts.

- Remove the minimum jet.



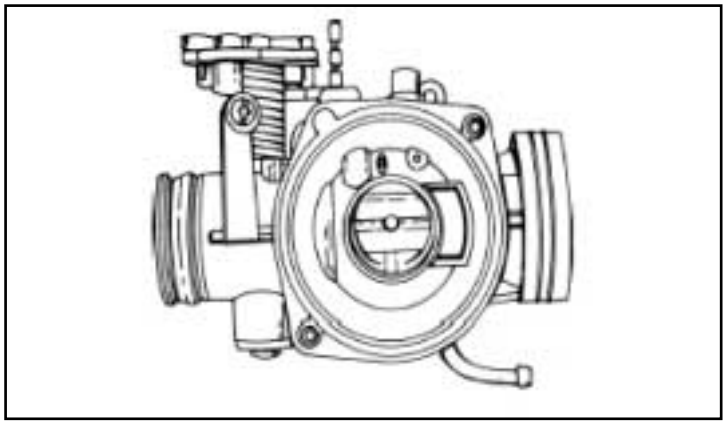
- Remove the minimum flow adjustment screw and the O-R ring, the washer, and the spring.



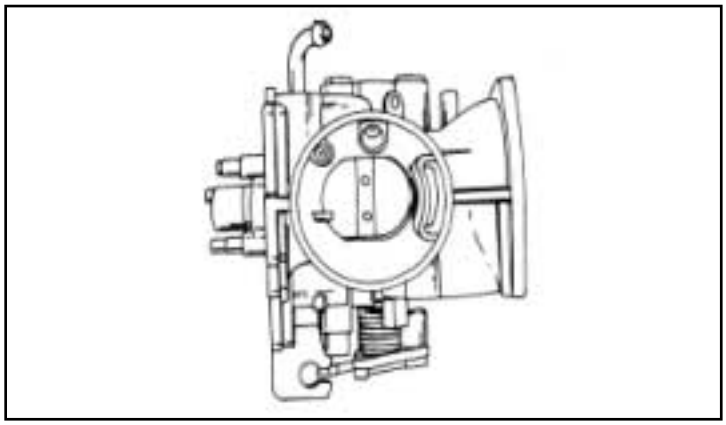
Warning - Do not attempt to remove the components inserted into the carburettor body, such as: the fuel supply pipe, the needle seat, the choke jet, the progressive manifold chamber, and the supply jet, the minimum and maximum air set screw, the butterfly valve drive shaft. Avoid removing the screws securing the butterfly valve to its shaft: these screws have been punched after assembly and removing them will damage the shaft.

Assembling the carburettor

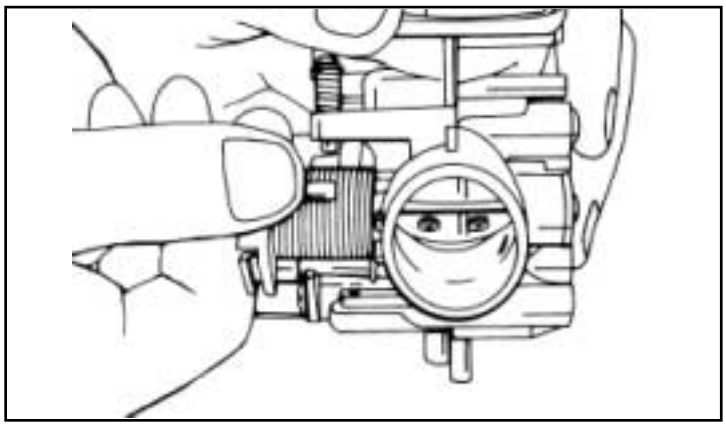
- Before reassembling the carburettor it is important to carry out a thorough cleaning of the carburettor body using petrol and compressed air.
- Pay particular attention to the fuel inlet channel and the needle seat.



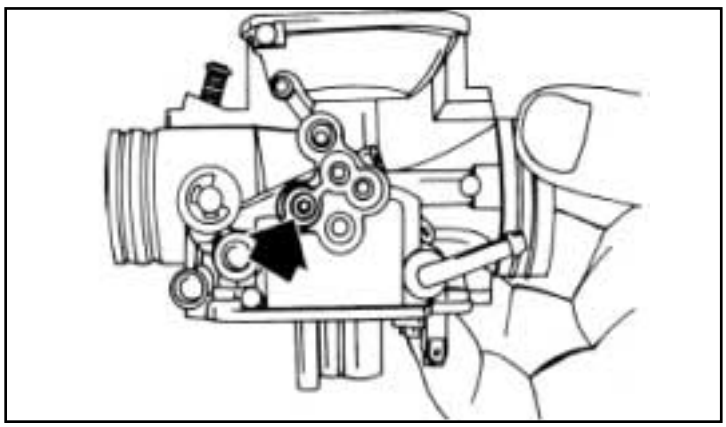
- For the main jet circuit, check the airway shown in the figure very carefully.



- For the minimum jet circuit, take care to ensure that the following points are properly cleaned: airway, the outlet section controlled by the fuel flow set screw, and the progressive outlets near the butterfly valve.



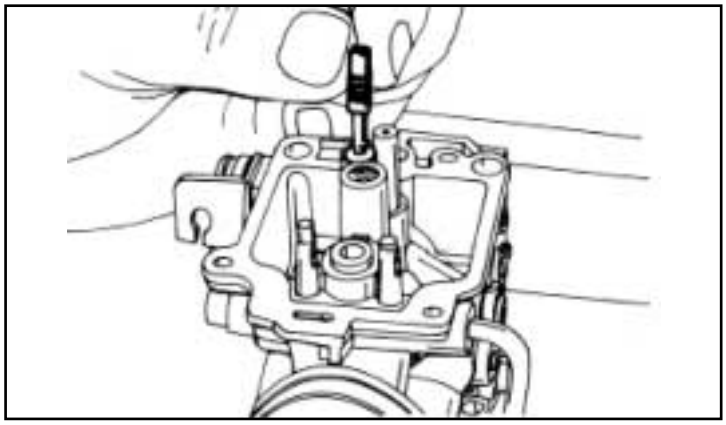
- For the choke jet circuit, take care to ensure thorough cleaning of the channel connecting to the jet, because there are hidden ways in the interior of the jet support which are inaccessible.
- Carefully blow the supply jet clean.
- This outlet section is extremely small and is orientated towards the butterfly valve. Failure to orientate this jet correctly will lead to incorrect atomisation.



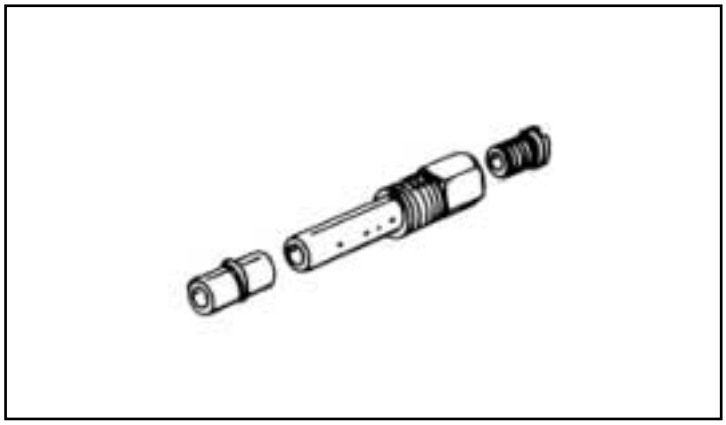
- Verify that the five spheres closing off the production ways are present in the carburettor body.
- Verify that the flat seating faces for the chamber and the membrane show no unevenness.
- Verify that the vacuum valve seat way is not scratched.
- Verify that the butterfly valve and its shaft do not show any unusual signs of wear.
- Verify that the needle seat does not show any unusual signs of wear.
- If there are any anomalies, replace the carburettor.

N.B.: in order to avoid causing damage do not introduce metal objects into the ways.

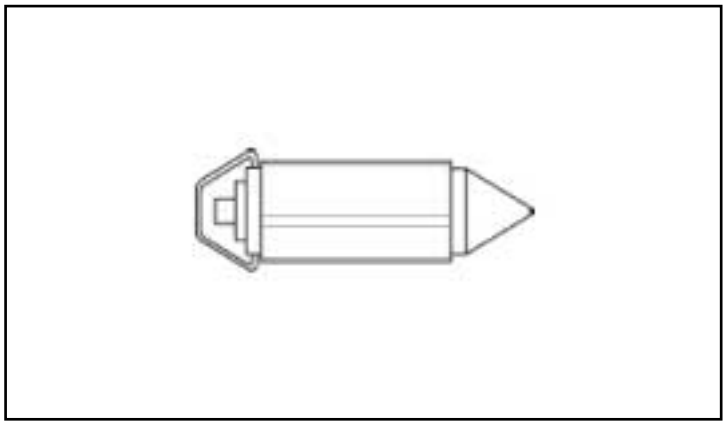
- Carefully wash and dry the minimum jet, using a blast of air, and reassemble.



- Carefully wash and blow dry the components of the main jet, atomiser, emulsifier, and jet.
- Insert the atomiser in the carburettor body with the shorter cylindrical part facing towards the emulsifier.
- Assemble the emulsifier, taking care to ensure that the atomiser is correctly installed, and secure.
- Mount the main jet.



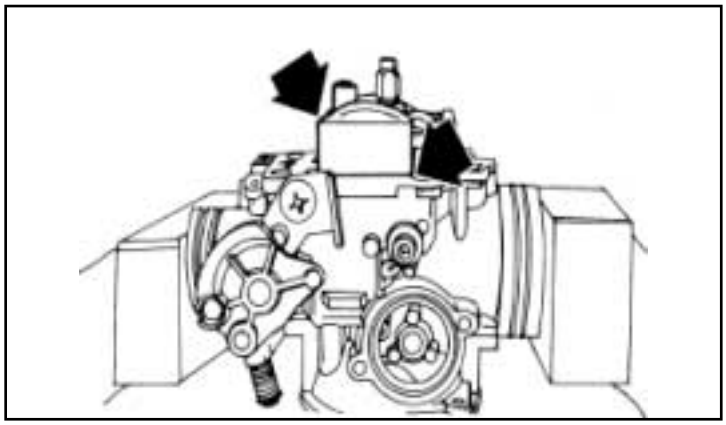
- Verify that the conical needle shows no signs of wear on the sealing surface with the shock absorbing pin and the return spring.
- In case of signs of wear replace the needle.
- Verify that the float shows no signs of wear on the pin seating or on the needle contact plate, nor signs of entry of fuel.
- In case of signs of wear replace the float.
- Assemble the float with the needle, inserting the pin from the fuel inlet tube side.



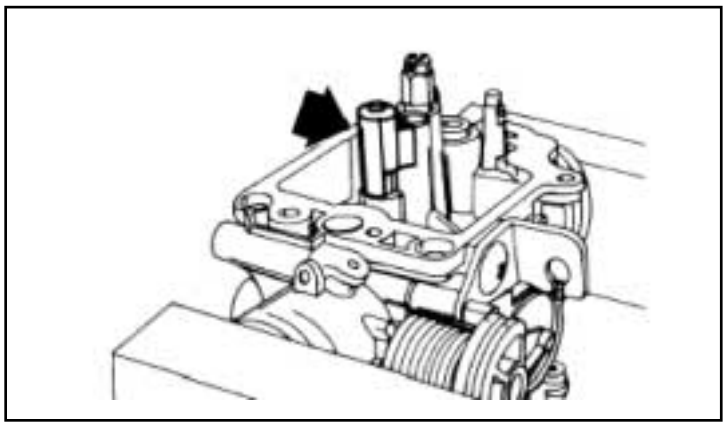
N.B.: take care to ensure correct insertion of the return spring on its plate on the float.

Verification of level

- Take care to ensure that the mating surface of the float is parallel with the plane of the chamber, with the carburettor in an inverted position.
- If different alignments are found, modify the orientation of the metal needle control plate until the position described above is found.
- If the plate is deformed, ensure that it remains parallel to the float pin.

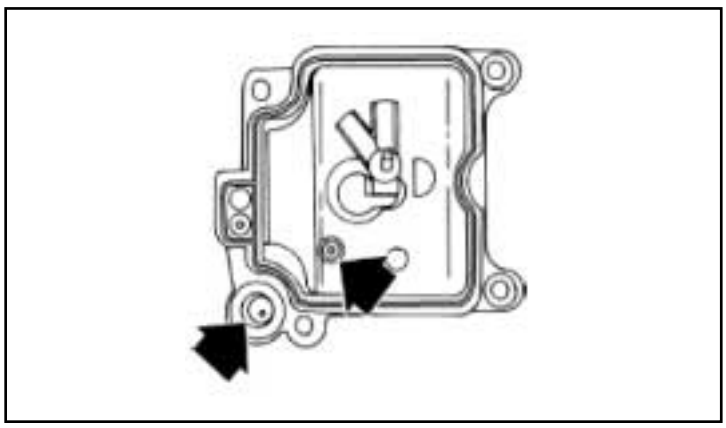


- wash and dry the carburettor transport cap carefully and assemble it over the choke jet.

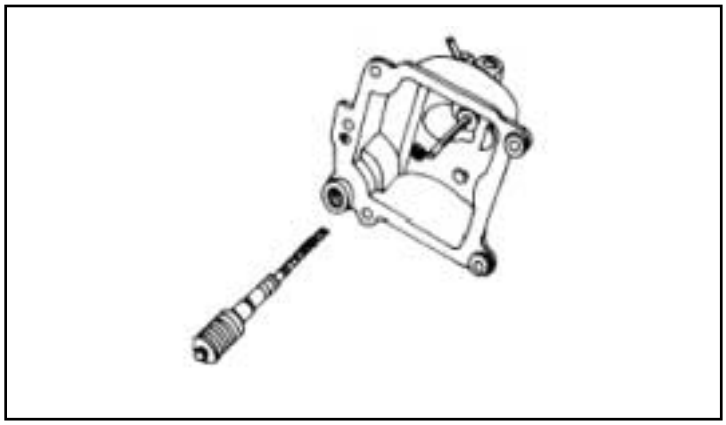


N.B.: Failure to assemble this piece leads to deteriorated cold starting performance, since the choke jet in this event takes old fuel from the bottom of the chamber.

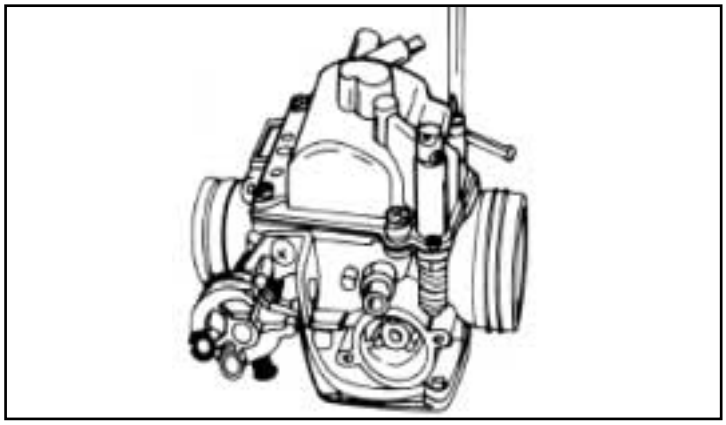
- Remove the chamber drain screw, wash and dry the chamber carefully, paying particular attention to cleaning the fuel supply pump intake and outlet valve.
- Since these are one-way valves, blow the intake valve delicately with compressed air from the inner side of the chamber, and the outlet valve from the piston pump seat side.



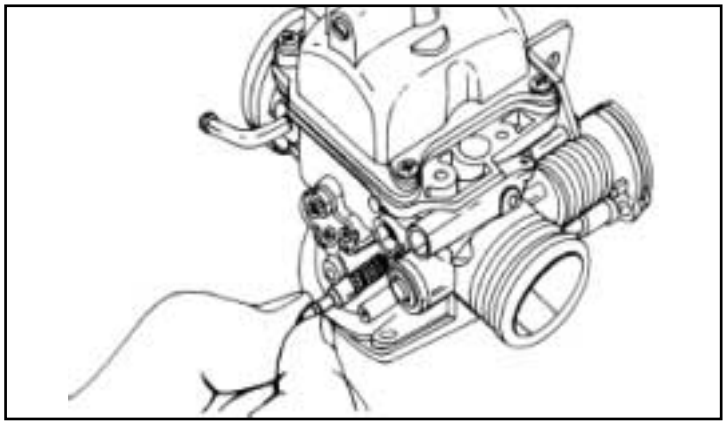
- Verify that the fuel supply pump piston and its corresponding seat in the chamber show no signs of wear.
- In the event that signs of wear are found, replace the defective parts.
- Verify that the fuel supply pump piston return spring is not worn
- Fit a new O-R ring and a new bellows gasket, re-assemble the piston assembly to the chamber.
- Fit a new O-R ring on the chamber drain screw, and lock the screw.



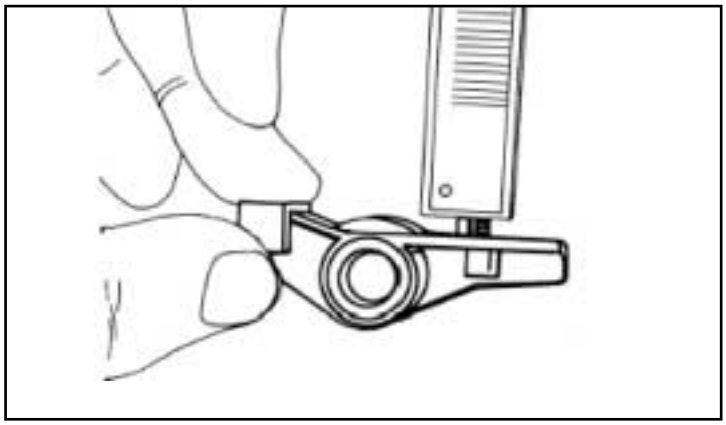
- Check that the screw seals correctly by adding a small quantity of fuel into the chamber.
- Fit a new gasket over the chamber.
- Assemble the chamber to the carburettor body, and tighten the 4 screws to the specified torque setting.



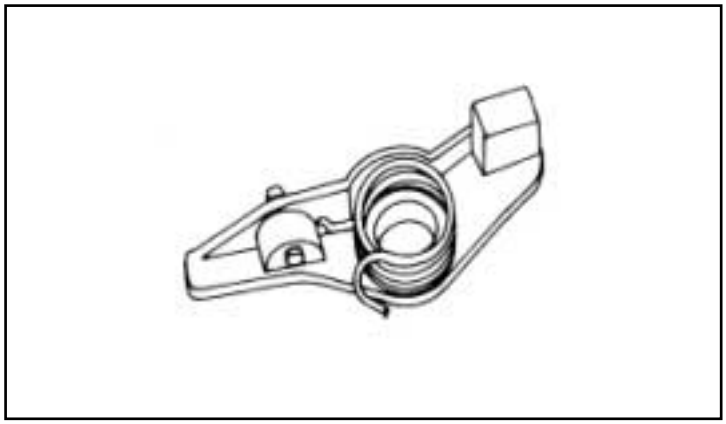
- Wash and blow dry the flow screw carefully, fitting a new O-R ring.
- Pre-fit the components onto the screw in the order shown: spring, washer, and the O-R.
- Tighten the fuel flow screw into the carburettor body.
- The final position of the fuel flow screw will be determined by analysing the exhaust gases.
- Prepare the carburettor for the adjustment by unscrewing the screw by two turns from the fully closed position.



- check that the fuel supply pump drive rocker shows no signs of unusual wear.
- Check that the rocker stroke stop screw projects by 3 + 0.1 mm.

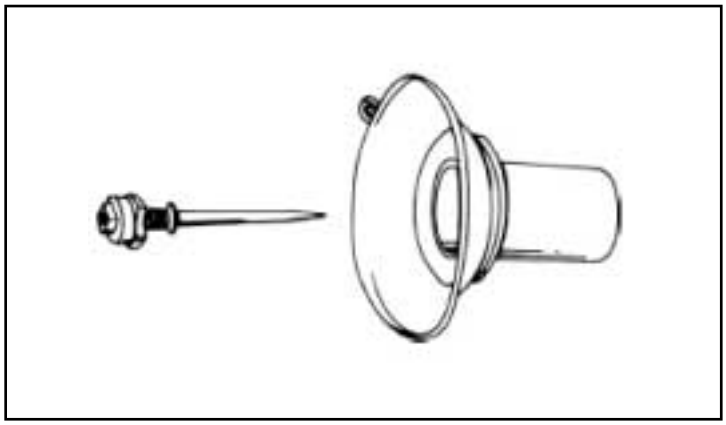


- Check that the rocker return spring has not become weakened.
- Pre-assemble the rocker and the spring as shown in the figure.
- Assemble the rocker on the carburettor while keeping the butterfly valve open.
- Assemble the rocker securing screw and tighten to the specified torque setting.
- Ensure that the assembled mechanism works correctly.

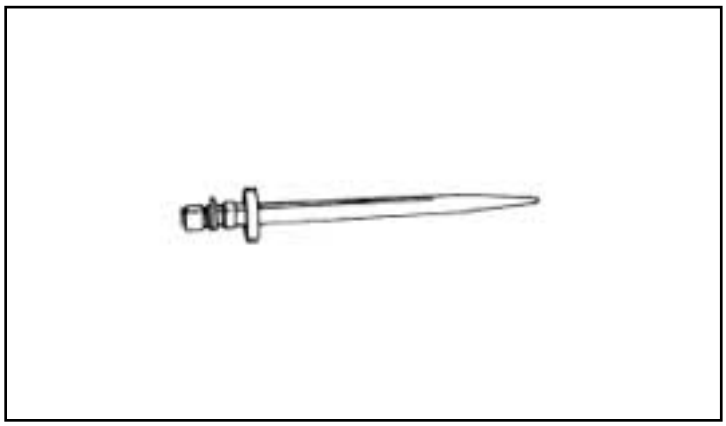


Checking the vacuum valve and the conical needle

- Unscrew the bayonet fitting 1/8 of a turn and withdraw, removing the spring and the vacuum valve needle.

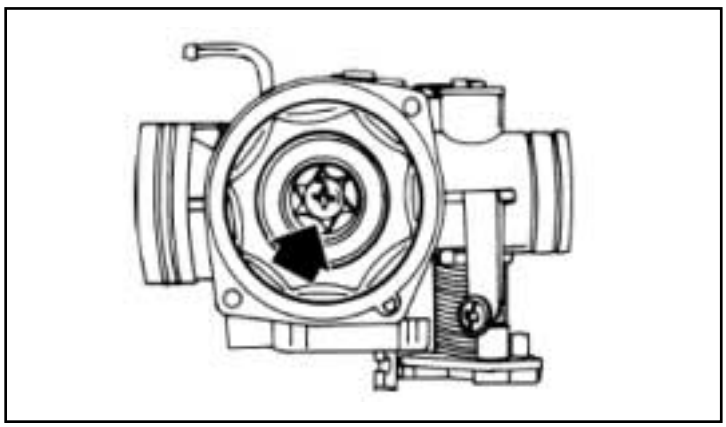


- Check that the needle shows no signs of wear and that the stop is set on the second notch.
- Check that the vacuum valve snows no signs of scratching around its external diameter.
- Check that the two vacuum supply ports are not blocked.



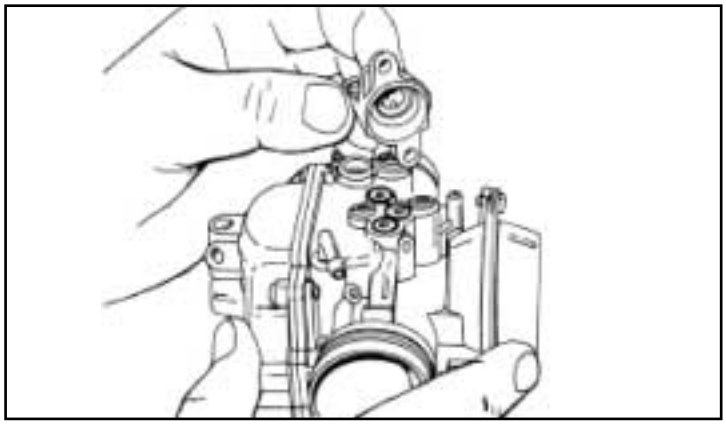
N.B.: The two ports have different diameters.

- Check that the membrane is not torn and has not become hardened.
- If it is seen to have deteriorated, replace it.
- Reassemble with the conical needle over the vacuum valve.
- Ensure correct positioning of the spring on the needle and the bayonet fitting on its seat.
- Assemble the fitting by turning 1/8 of a turn.



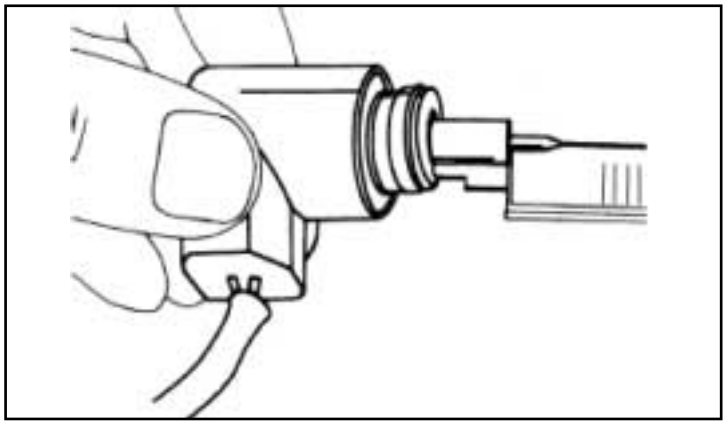
- Assemble the vacuum valve onto the carburettor body, taking care that the conical needle is correctly inserted into the interior of the atomiser.
- Set the phase of the vacuum valve rotation by inserting the tail of the membrane into the appropriate seat: in this position, when the membrane is correctly assembled to the valve, the main vacuum supply port is situated over the diffuser shaft and on the side of the butterfly valve, see figure.
- Reassemble the spring onto the valve.
- Reassemble the vacuum chamber cover, aligning the reference on the cover with the orientation mark on the membrane.
- Lock the screw by tightening to the specified torque setting.

- Wash and blow dry the choke bracket.
- Fit a new gasket on the carburettor body and lock the two securing screws.



Checking the automatic choke

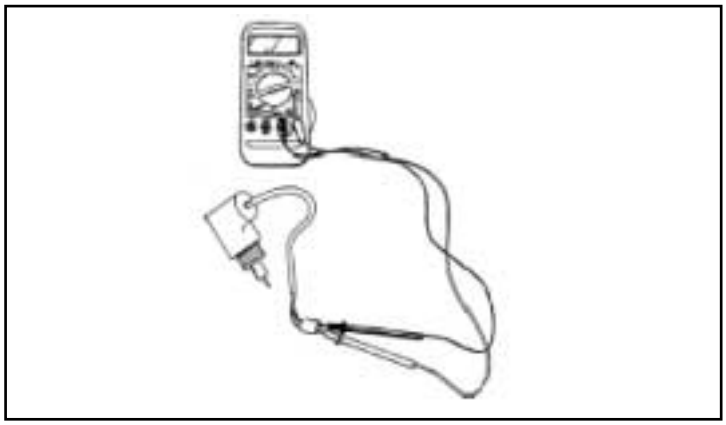
- Check that the automatic choke piston shows no signs of scratching or oxidation.
- Check that the piston runs smoothly along the seating to the bracket.
- Check that the piston sealing gasket show no sign of deformation.
- The automatic choke should enter into the housing by a distance which is a function of the ambient temperature.
- Measure the amount the piston projects out of its housing as shown in the figure and verify the appropriate reading.
- Check that the choke is correctly adjusted to the ambient temperature.



Measurement of the amount of projection: 13 mm

- The choke should disconnect progressively when heated electrically.
- Check the resistance of the choke when adjusted to the ambient temperature.

Resistance reading: 30 – 40 Ω

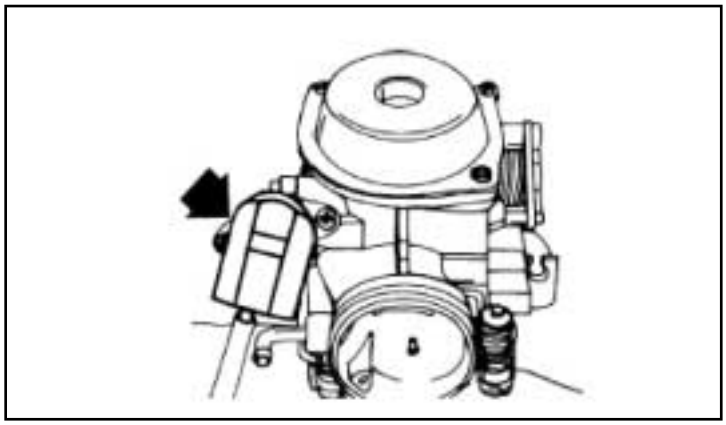


- Supply the automatic choke using a 12 V battery and confirm that the piston reaches its maximum projection measurement.

Maximum projection reading: 19 mm
Maximum extension time: 5 minutes

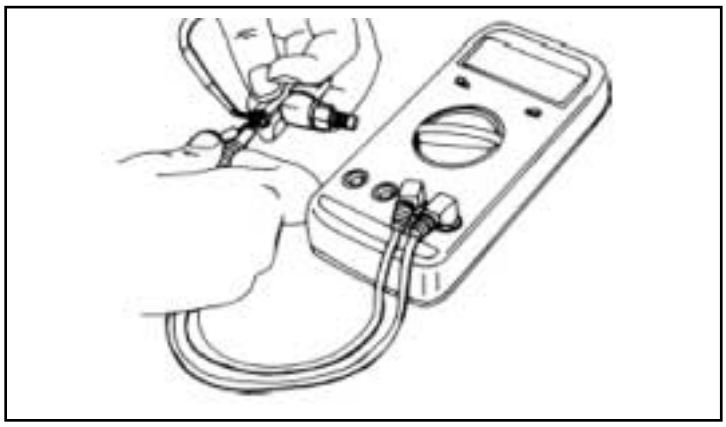
- The effective heating time depends on the ambient temperature.
- If projection and resistance readings, or the timings, are different from those specified, replace the automatic choke.

- While assembling the automatic choke onto the carburettor, take care that the O-R ring is correctly located. Insert the plate with the milled side resting on the choke, and tighten the 2 securing screws.
- Align the choke as shown in the figure.
- Assemble the protector baffle.



- Check the heater resistance at ambient temperature.

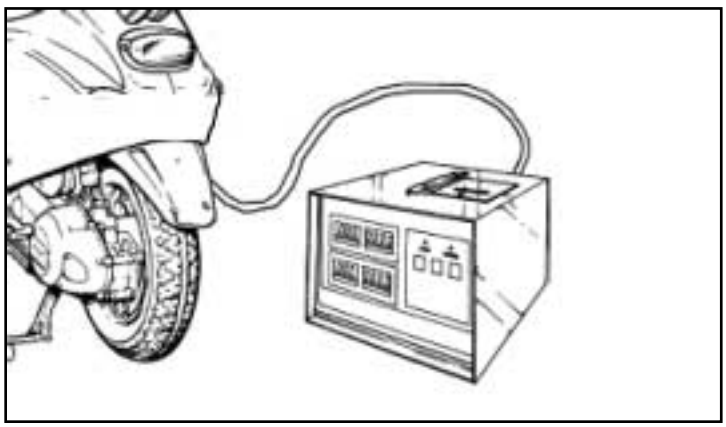
Resistance at ambient temperature: ~ 15 Ω



- If different readings are obtained, replace the part.
- Reassemble the heater onto the carburettor.
- Reassemble the vent tube and the chamber drain tube.
- Install the carburettor onto the engine, as described in the Cylinder, Cylinder Head, and Distribution chapter.

Idle adjustment

- The engine does not require very frequent idle adjustment, but it is very important that the adjustment is carried out while observing certain rules.
- Before adjusting the carburettor, ensure that the engine is properly lubricated, that the valve play and distribution timing are as specified, the spark-plug in best working order, the air filter clean and tightly sealed, and the exhaust pipe installation is completely gas-tight.

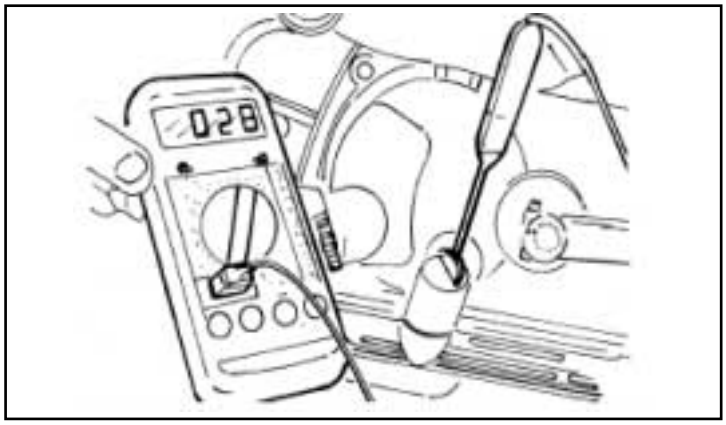


- Heat the engine for at least 5 minutes running at 50 kph.
- Connect the vehicle to the exhaust gas analyser, by inserting the analyser probe into an extension tube fitted hermetically to the silencer outlet.

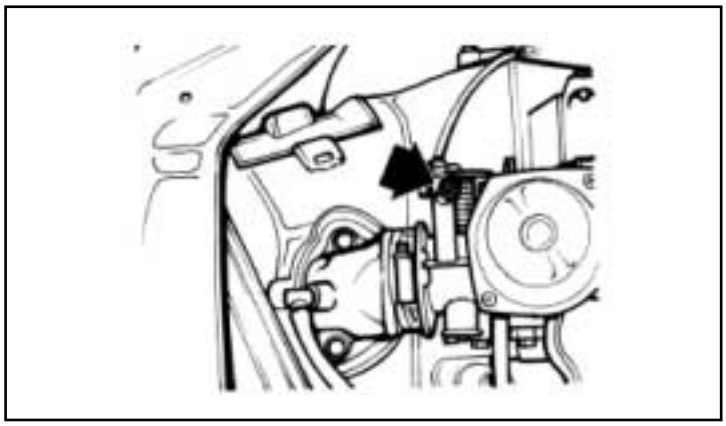
Maximum length of tube: 40 ÷ 50 cm

N.B.: the extension tube is indispensable in order to avoid analysing the exhaust gas contaminated with atmospheric oxygen. It is indispensable to use a previously heated exhaust gas analyser and in proper working order in order to adjust the reading of the gases to zero and the correct flow of gas. Failure to observe these norms will lead to incorrect readings.

- Connect the multimeter thermometer (part number 10.1.20331) to the manifold, using an oil filled plug specially made for inserting the probe.
- Start the engine and before carrying out the idle adjustment, ensure that the temperature of the oil has reached between 70 ÷ 80ºC.



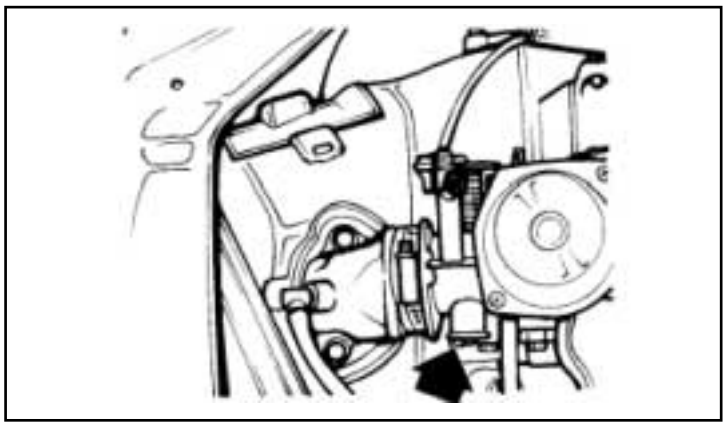
- By using the both the analyser rev counter and a separate rev counter (part number 19.1.20332) , adjust the idle adjustment screw until a speed of 1600 ÷ 1650 rpm has been obtained.



N.B.: The ignition installation is of the lost spark type, and produces considerable power. Difficulties in obtaining readings may ensue when using non-recommended rev counters.

The rev counter is considered to be correctly fitted when it is able to read even very high speeds at 6,000 ÷ 8,000 rpm.

- Adjust the flow adjustment screw until a percentage of carbon monoxide (CO) of 3.5 + 0.5% is obtained; loosening the screw increase the CO reading (rich fuel-air mixture), while tightening the screw reduces the CO reading (weak fuel-air mixture).
- When the correction of the flow adjustment screw leads to an increase in revolutions, adjust the rpm again, and then the fuel flow adjustment screw again, until stable readings are obtained.



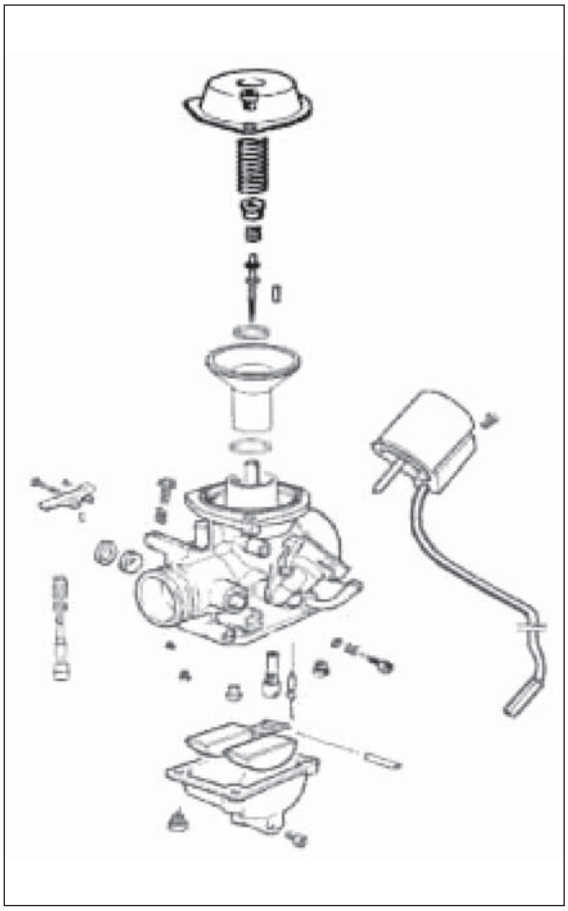
- Idle speed carburation is considered to be correct when the temperature, revolutions, and Carbon Monoxide percentage readings are observed. Other information may be obtained from the analyser:
- Percentage CO; readings higher than 13.8% are considered to be correct. Lower readings indicate loss of gas-tightness in the exhaust pipe installation.

- Unburnt hydrocarbons are measured in parts per million (ppm) and the HC reading drops as the engine speed increases, and at idle speed it is normal to find readings of 200 ÷ 400 ppm. Emission values such as these are considered normal for an engine with a motorcycle distribution diagram. The indication of much higher values may arise from loss of power in the engine due to excessively weak mixture (low CO), faults in the ignition, or perhaps incorrect distributor timing, or the drain valve being blocked or not hermetically sealed.

- Strip the carburettor down to its component parts, wash all the parts carefully with solvent. Dry all the airways in the carburettor body using compressed air to ensure total cleanliness.

- Check the condition of all the parts very carefully.

- The throttle valve should rotate freely in its seat. In the event of excessive play, replace the carburettor.



TECHNICAL CHARACTERISTICS VERSION 125/150

Version	125 c.c.	150 c.c.
Type: WVF WALBRO	WVF6E	WVF6AG15
Diffuser diameter	28 mm	28 mm
Conical needle notch from above	2ª	2ª
Main jet	84	82
Minimum jet	33	34
Fuel needle seat	1,5 mm	1,5 mm
Minimum air jet	100	50
Basic adjustment of fuel flow screw (prior to CO adjustment)	3 gm	3 gm
Gas valve diameter	Ø 33	Ø 33
Choke jet	50	50
Type of conical needle	51c	465
Maximum air jet	70	150

Warning

The gasoline is inflammable. To always substitute the meetings to prevent losses of gasoline.

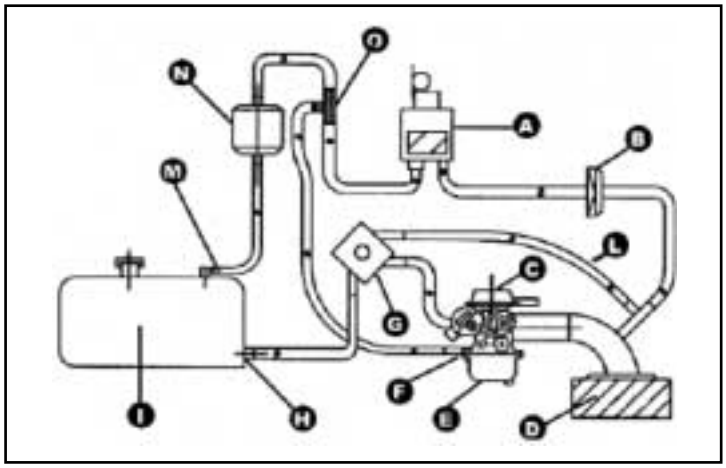
TECHNICAL CHARACTERISTICS VERSION 200

Versión	200 c.c.
Depression type	CVEK 30
Printing on the body	CVEK
Printing	303A
Max. jet	100
Minimum jet	38
Max. air jet	70
Minimum air jet	115
Gas valve spring	150 ÷ 250 gr
Idle mixture adjustment screw initial opening	2 ½ ± ¼
Conical pin printing	NDWA
Conical pin notches position from top	Fixed position
Emulsifier nozzle	Ø 2,8
Starter air jet	Ø 1,5 (body)
Starter emulsifier jet	Ø 1,2
Starter jet	42
Starter device resistance	~ 20 Ω (a 24º)
Choke	Ø 29

Note

* The identification letter can vary every time the carburettor is update.

CALIFORNIA EVAPORATIVE EMISSION SYSTEM



This system consist of:

A) Canister
B) 1 - Way purge control valve
C) Carburetor vent line
D) Cylinder
E) Carburetor
F) Purge line
G) Fuel pump
H) Feed line
I) Fuel tank
L) Vacuum line
M) Fuel tank vent line
N) 2 - Way & Roll-Over valves
O) "T" valve

Replacing the front brake pads

Caution - The brake pads are not symmetrical, and are not interchangeable.

The pads must be replaced when the thickness of the friction material is lower than 1.5 mm.

Fit new brake pads and insert the securing stud into the corresponding stop clip.

N.B.: When changing the brake pads, it is necessary to check the guide stud for wear in the area where it makes contact with the brake pads (replace if there are evident signs of wear). Moreover, while inserting the stud, take great care not to stretch the pad pressure spring.

Caution - Just as is specified in the programmed maintenance schedule, it is recommended to lubricate the front and rear brake levers at the point where they apply pressure on the brake cylinder push rod.

Aesthetic Checks
· Paintwork
· Plastic fittings
· Scratches
· Dirt

Check for locking
· Security locking
· Securing screws

Electrical installation
· Main switch
· Headlights: full beam, dipped beam, position lights, parking light, and associated pilot lights
· Adjustment of beam according to regulations in force
· Tail light, parking light, stop light
· Front and rear brake stop light switches
· Direction indicators and associated pilot lights
· Instrument panel lights
· Instrument panel: petrol and temperature indicator lights
· Instrument panel pilot lights
· Horn
· Choke

Verification of levels:
· Hydraulic brake fluid system level
· Rear hub oil level

Road test:
· Cold start
· Operation of instruments
· Response to throttle control
· Stability under acceleration and braking
· Front and rear brake performance
· Front and rear suspension performance
· Abnormal noises

Static test after road test:
· Hot start
· Choke operation
· Stability in idle (turning handlebar)
· Smooth steering rotation
· Any leaks

Functional verifications:

· Hydraulic brake installation	Brake lever travel
· Mechanical brake installation	Brake lever travel
· Clutch	Verification of correct operation
· Engine	Verification of throttle travel
· Other Verification of documentation	
	Verification of frame number and engine number
	Basic tool kit
	Installation of registration number plate
	Check on locks
	Check on tyre pressures
	Assembly of rear-view mirrors and any other accessories

Caution - The battery should be charged before use to ensure maximum performance. Failure to ensure sufficient battery charge before first use with a low electrolyte level will lead to premature battery failure.

Warning - Before charging the battery, remove the caps from each cell.
Keep open flames and sparks away from the battery while charging.
Remove the vehicle from the machine, disconnecting the negative terminal first.

Caution - When installing the battery, first install the positive cable, followed secondly by the negative cable.

Warning - The battery electrolyte is poisonous and can cause serious burns. Battery electrolyte contains sulphuric acid. Avoid contact with the eyes, skin, and clothes.

In the event of contact with the eyes of the skin, wash with abundant water for 15 minutes, and consult a doctor immediately.

In the event of swallowing battery liquid, immediately drink copious quantities of water or vegetable oil. Call a doctor immediately.

Batteries produce explosive gases; keep away from open flames, sparks or cigarettes. Keep the area ventilated while charging the battery in enclosed spaces. Always protect the eyes when working near batteries.

KEEP AWAY FROM CHILDREN

Caution - Do not use fuses with a higher rating than recommended. Use of a fuse with an incorrect rating may cause damage to the entire machine, or even produce a risk of fire.

Caution - The inflation pressure of the tyres is to be checked and adjusted when at ambient temperature.

Caution - Do not exceed the specified inflation pressures, because the tyre may

Safety locking of securing elements:

Upper shock absorber securing front	20 ÷ 30 N.m
Lower shock absorber securing front	20 ÷ 25 N.m
Upper shock absorber securing Rear	20 ÷ 25 N.m
Lower shock absorber securing Rear	33 ÷ 41 N.m
Wheel hub nut	75 ÷ 85 N.m
Rear wheel rim to hub securing screw	20 ÷ 25 N.m
Swinging arm stud to frame	64 ÷ 72 N.m
Swinging arm stud to engine	33 ÷ 41 N.m
Motor arm stud to frame arm	33 ÷ 41 N.m

TECHNICAL SPECIFICATIONS:125 CC 4-STROKE ENGINES

Type:	Single-cylinder 4-stroke
Bore:	57 mm
Stroke:	48,6 mm
Cubic capacity:	125 cm³
Compression ratio:	10,1 ÷ 11,1 : 1
Carburettor:	WALBRO VWF6
Lubrication system:	Forced lubrication using chain-driven lobe pump inside crankcase with double mesh filter.
Fuel:	Petrol (minimum 95 octane, lead free) via carburettor
Cooling system:	Forced air
Maximum power:	76 Kw at 7500 r.p.m.
Ignition advance:	Variable microprocessorcontrolled 10º±1 at 1,650 rpm, or 26º±1 at 6,000 rpm
Spark Plug:	Champion RG 4 HC
Transmission system:	Automatic expanding pulley variable speed drive using trapezoidal belt, autom.c clutch, gear reduction.
Valve clearances:	inlet: 0.10 mm - Exhaust: 0,15 mm
Recommended engine oil:	AGIP 4T SAE 10W40
Quantity:	1000 cc.
Hub oil:	AGIP GEAR 80W90
Quantity:	100 cc.

TECHNICAL SPECIFICATIONS: 150 CC 4-STROKE ENGINES

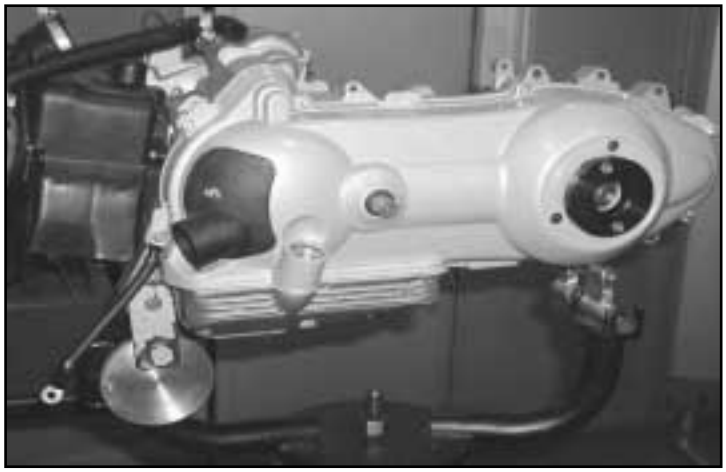
Type:	single-cylinder 4-stroke
Bore:	62,6 mm
Stroke:	48,6 mm
Cubic capacity:	149,58 cm³
Compression ratio:	10,1 ÷ 11,1 : 1
Carburettor:	WALBRO VWF6
Lubrication system:	Forced lubrication using chain-driven lobe pump inside crankcase with double mesh filterPor gasolina
Fuel:	Petrol (minimum 95 octane, lead free) via carburettor
Cooling system:	Forced air
Maximum power:	8,13 Kw at 7000 r.p.m.
Ignition advance:	Variable microprocessorcontrolled, 10º±1 at 1,650 rpm, or 26º±1 at 6,000 rpm
Spark Plug:	Champion RG 4 HC
Transmission system:	Automatic expand. pulley variable speed drive using trapezoidal belt, automatic clutch, gear reduction.
Valve clearances:	Inlet: 0.10 mm - Exhaust: 0.15 mm
Recommended engine oil:	AGIP 4T SAE 10W40
Quantity:	1000 cc.
Hub oil:	AGIP GEAR 80W90
Quantity:	100 cc.

TECHNICAL SPECIFICATIONS: 200 CC 4-STROKE ENGINES

Version:	200 cc
Engine:	Four-stroke mono-cylinder
Bore x stroke	72 x 48,6 mm
Cubic capacity	198 cm³
Compression ratio	11,5 : 1
Ignition advance (before T.D.C)	10º ÷ 1º at 2000r.p.m - 32º ± 1º at 6500 r.p.m
WALBRO	WVF 7H* Ø 29
KEIHIN Carburettor	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 pertol-oil mixture.
Starter system 200	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.
Transmission	With automatic expandable pulley variator, trapezoidal belt, automatic clutch, gear reducer and transmission compartment with forced circulation.
Rear hub	100 cc
Engine oil	~ 1000 cc
Tank capacity	Tank capacity 12l. (indicative value)
Reserve	Reserve 1,8l. (indicative value)

Disassembling the engine from the frame

- Disconnect the battery and the electrical terminals.
- Disconnect the transmission and tubes.
- Disconnect the transmission air intake, the air filter and the silencer.
- Remove the rear wheel.
- Drain the oil from the engine.
- Withdraw the engine.



Special tool number 19.1.25095

Re-installing the engine in the frame

- Offer up the engine to the frame following the reverse order from disassembly.
- Fill the crankcase with the recommended oil up to the level indicated.
- Verify the correct operation of the throttle.
- Adjust the rear brake.

Torque settings
- Engine securing screw
  20 ÷ 27 N-m.
- Rear shock absorber securing screw
  20 ÷ 27 N-m.

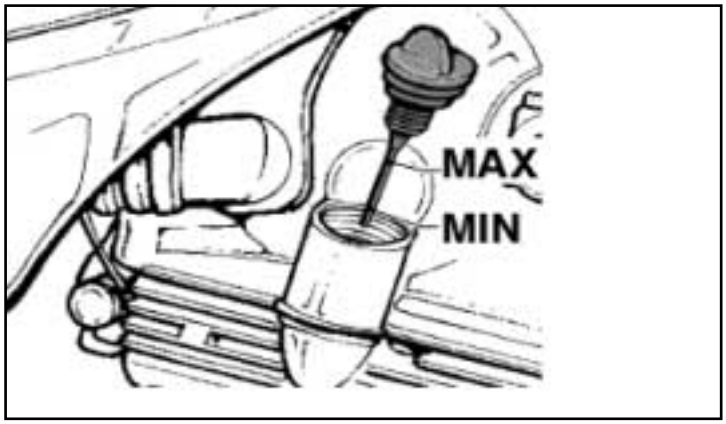
Warning - take extreme care when handling petrol

Caution - when installing the battery, connect the positive cable first, and then the negative cable.

Caution - It is recommended to use protective glasses when using percussion tools.

Engine oil and filter
Checking the oil level

- Start the engine and bring it up to operating temperature.
- Stop the engine and wait for 5 ÷ 10 minutes for the oil to flow down to the oil manifold.
- Withdraw the filler cap/dipstick and clean it, and then screw it fully home.
- Remove the filler-cap/dipstick, and confirm that the oil reaches a level between the MIN and MAX levels, as shown in the figure.



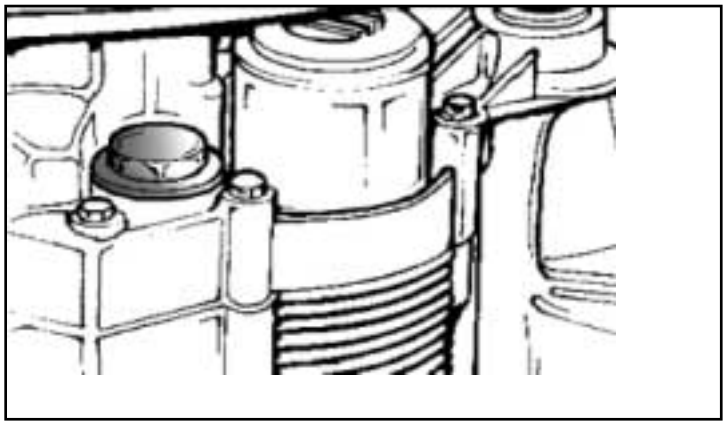
Replacing the oil and the oil filter

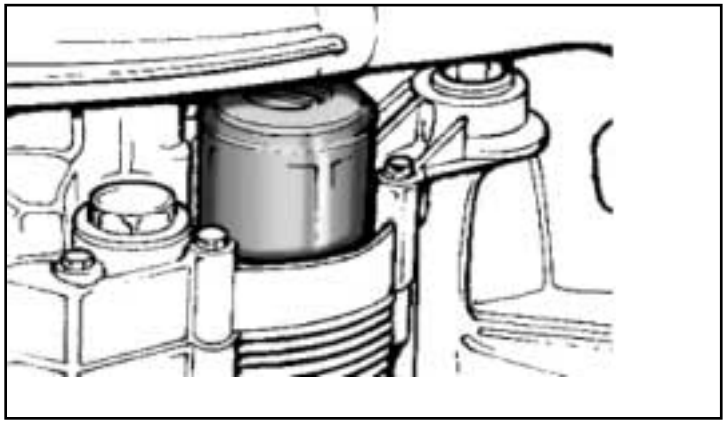
N.B.: The engine oil should be replaced with the engine hot.

- Drain the oil by removing the drain plug and/or the pre-filter access as shown in the figure.
- Let the oil flow out.
- Remove the filler cap.
- Remove and clean the pre-filter using compressed air.
- Remove the silencer.
- Use a filter wrench to remove the oil filter cartridge.
- Take care to ensure that the pre-filter O-rings and the drain plug are in good condition.
- Grease them and replace the pre-filter and the drain plug, and lock them to the specified par setting.
- Install a new oil filter cartridge, taking care to grease the O-ring before assembly, by screwing it down to the point where it makes contact with the gasket, and finally push it home with the hand.
- Replace the silencer.
- Fill the oil manifold with oil until it reaches a level between the MIN and MAX marks with the filler cap fully screwed home.
- Close the filler cap.
- Start the engine to charge the oil filter and the lubrication system with oil.
- Stop the engine, wait for approximately 5 ÷ 10 minutes.
- Top up the oil to the MAX level.

- Oil drain plug torque setting:
  25 ÷ 28 N-m.

- Recommended oil:
  AGIP CITY 4 T 10W-40





Transmission oil
Checking the oil level

- Place the machine on its stand on a smooth level surface.

Changing the oil

- Remove the inspection cap.
- Remove the drain plug.
- Drain the oil completely.
- Re-fit the drain plug.
- Torque setting: 3 ÷ 5 N-m.
- Replace the seals on the cap and plug.
- Fill with oil through the inspection port, right up to the level of the inspection cap.

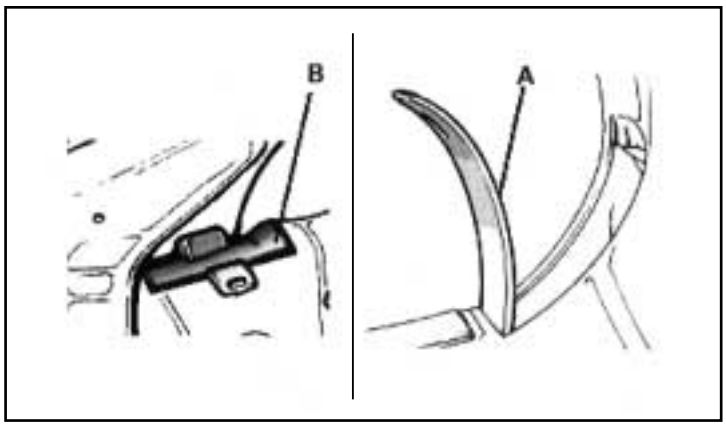
  Truncated oil capacity 100 cc .

- Re-fit the inspection cap.

  Torque setting 3 ÷ 5 N-m

- Check that there is no oil leakage

1. Remove cover “A” after first unscrewing the securing screw.
2. Withdraw the helmet box.
3. Lift off the spark plug cap.:
4. Pull cover “B” on the engine deflector upwards and off.
5. Using the spark plug spanner supplied with the basic tool kit, unscrew the spark plug and remove.



- Examine the spark plug carefully, and if the insulation is chipped or damaged, replace.
- Measure the distance between the electrodes using a feeler gauge and if necessary adjust the gap by bending the outer electrode with great care.
- Ensure that the sealing washer is in good condition.
- Assemble the spark plug, screwing it in first by hand, and then locking it tight using the spark plug spanner from the basic tool kit.

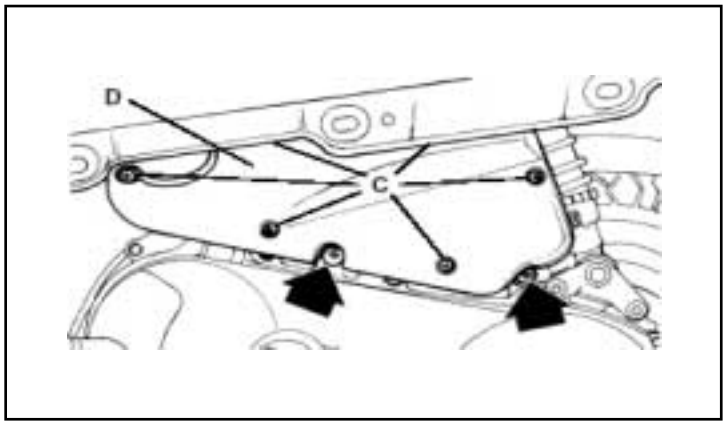
Torque setting: 12 ÷ 14 N-m

Gap between the spark plug electrodes: 0.8 ÷ 0.9 mm

Recommended spark plug:
Champion RG 4HC

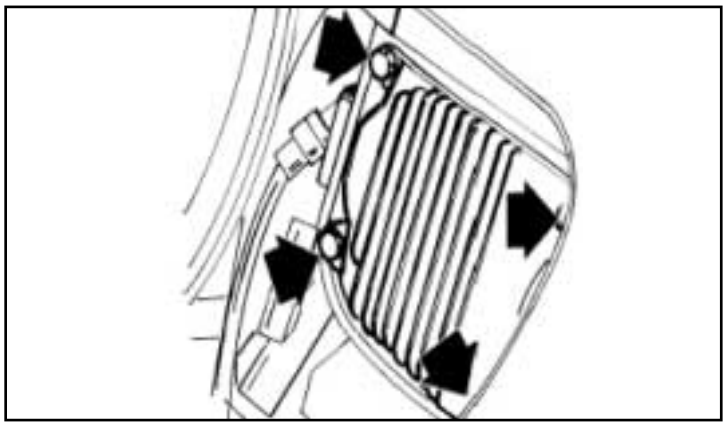
Air filter

- In order to clean the air filter carry out the following operations: Remove cap “D” from the air cleaner box, after first unscrewing the 6 securing screws “C”; remove the two box securing screws (see figure) and then turn it to remove the 2 upper screws and the 4 lower screws and withdraw the air filter. Clean it by washing it with soap and water, and then dry using compressed air. Finally submerge the air filter in a bath containing a 50% mixture of AGIP FILTER OIL and petrol. Lift the filter out of the mixture, squeeze it to remove excess liquid, allow to dry, and re-assemble.
- Take care to ensure that the filter mass is correctly inserted.
- Verify that the air channels show no signs of deformation.
- Check that the air filter box seals correctly on its seating.



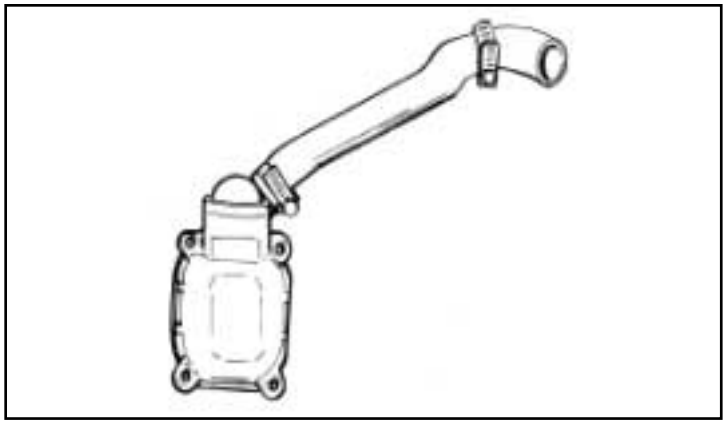
Disassembling the valve lifter cover

- Remove the 4 valve lifter cover securing screws; withdraw the entire valve lifter cover from the decanter cover and the valve lifter cover sealing O-ring.



Decanter cover

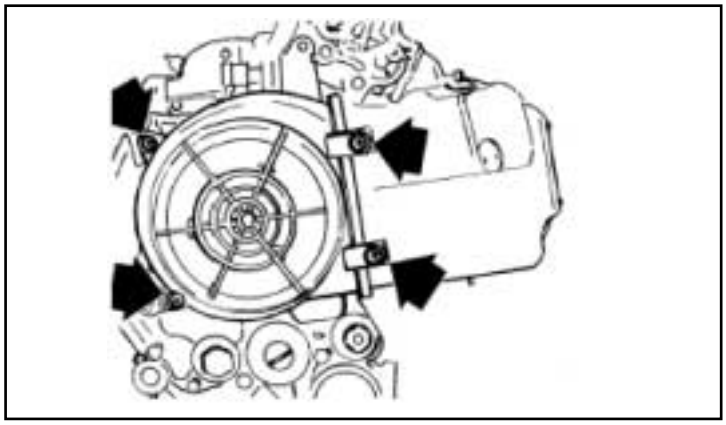
- Remove the 4 decanter cover securing screws.
- Withdraw the valve cover complete and the O-ring.
- Verify the sealing tightness of the O-ring, and the correct operation of the one-way valve. Ensure that the valve allows gases to leave but not to enter the interior of the engine. If any fault is discovered, replace the entire decanter cover, and on re-assembly tighten the securing screws to the correct torque setting.



Torque setting: 3 ÷ 4 N·m

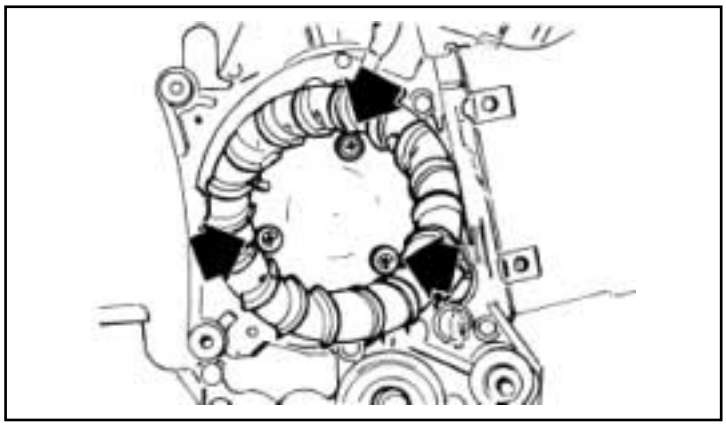
Fan cover deflector

- Remove the 4 securing screws as shown in the figure.



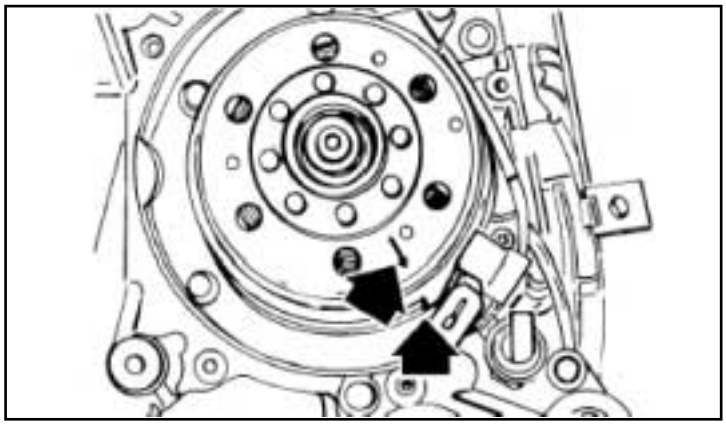
Dis-assembly of the cooing fan

- Remove the 3 securing screws as shown in the figure.

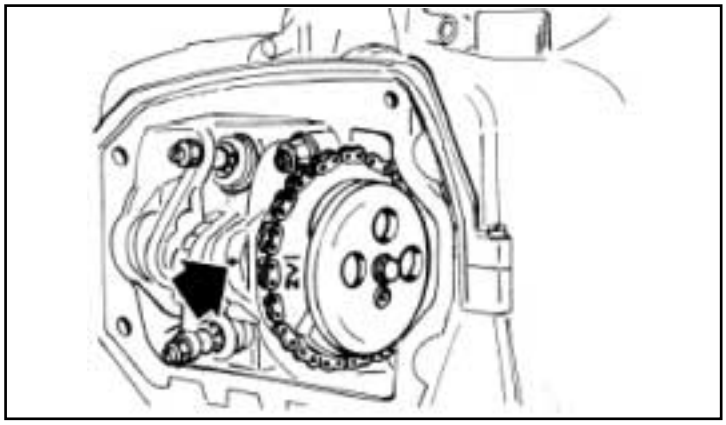


Checking correct distribution timing

- Turn the magneto until the timing reference mark coincides with the end of the crankcase as shown in the figure.
- Ensure that the 2V timing mark located on the cam-shaft drive pulley is aligned with the timing reference mark on the head, as shown in the second figure.
- When the timing mark is located in a position opposite the index mark on the head, give the cam-shaft one additional turn.



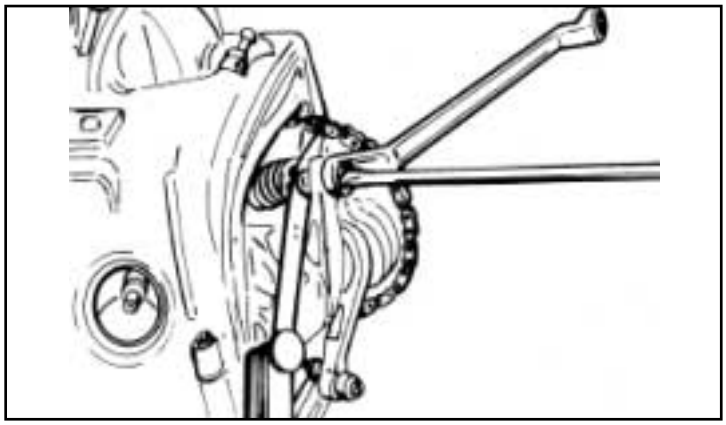
N.B.: In the event that the camshaft timing assembly is not correctly timed, carry out the timing operation as described in.



Checking and adjusting the valve clearance

- In order to carry out the check on the valve clearance, it is first necessary to line up the camshaft timing reference marks as described in the previous paragraph.
- Use a feeler gauge to check that the clearance between the valve and the tappet match the recommended specifications. In the event that the valve clearances, on the inlet and the exhaust valve are not the same as the recommended values below, they should be adjusted. This can be done by loosening the lock nut and using a screwdriver to turn the adjuster as shown in the figure.

Inlet valve clearance: 0.10 mm
Exhaust valve clearance: 0.15 mm

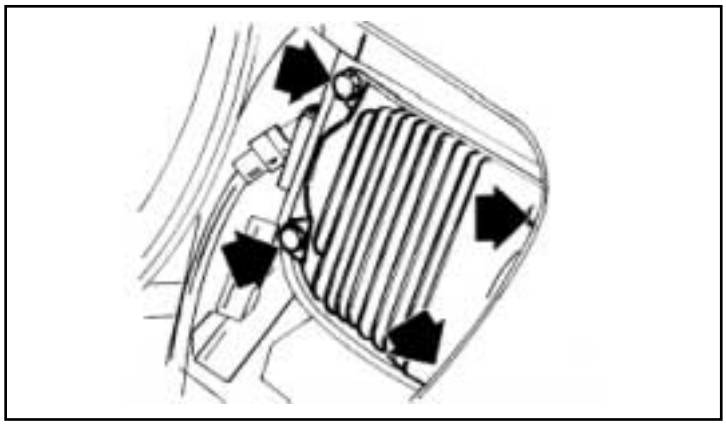


Assembly of the valve lifter cover

- Perform the same operations as before in reverse order to dis-assembly, and tighten the securing screws to the correct torque setting.

N.B.: Install a new O-ring on the valve lifter cover.

Torque setting: 11 ÷ 13 N-m



Checking the final compression pressure

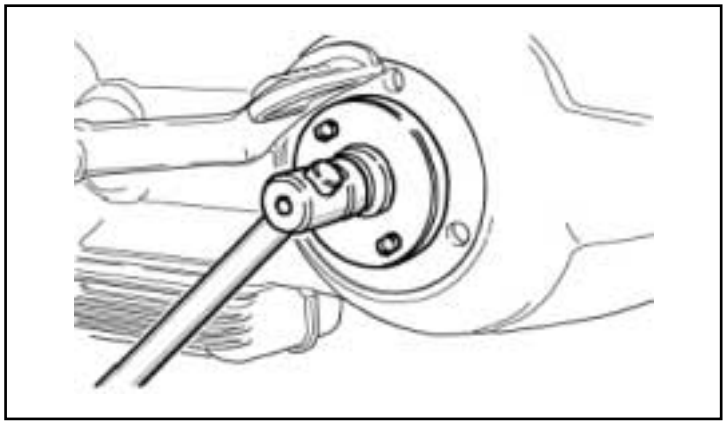
- When the engine is cold, remove the spark plug cap and the spark plug access cover.
- Remove the spark plug. Fit into the spark plug seating a compression tester manometer gauge, using an adapter for a 10 mm spark plug tightened to the correct torque setting.
- Turn the engine using the starter motor and with the throttle setting wide open, until the manometer gauge reading stabilises. If the pressure is normal, remove the test tool and re-assemble in the reverse order to dis-assembly. If lower pressures than the recommended ones are found then check the engine rotation speed during the test: if this is low, check the starter installation, while if the engine rotation speed is correct or slightly higher check the compression ratio, the correct sealing of the hot parts (compression rings – valves etc. cylinder, cylinder head, and timing).

N.B.: If difficulty is encountered in inserting the manometer gauge adapter, the procedure is to disconnect the engine – swinging arm pin and move the engine assembly towards the rear of the vehicle sufficiently to allow the adapter to enter.

Torque setting: 12 ÷ 14 N-m

Drive cover

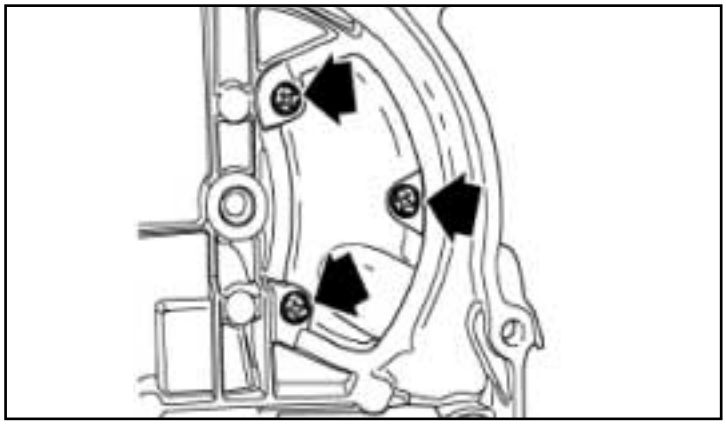
- In order the dis-assemble the drive cover it is necessary to extract the small plastic cap by levering with a screwdriver on the marks, and using the clutch hub locking spanner as shown in the figure (part number 19.1.20423), undo the driven pulley shaft lock nut and the washer.
- Extract the filler cap/dipstick from the engine oil filler port.
- Remove the 10 securing screws and the earthing cable secured below one of them.
- Now it is possible to lift of the drive cover.



In the event that this operation is carried out directly on the machine with the engine still installed, it is necessary first to remove the cooling air hose and the air filter box securing screws.

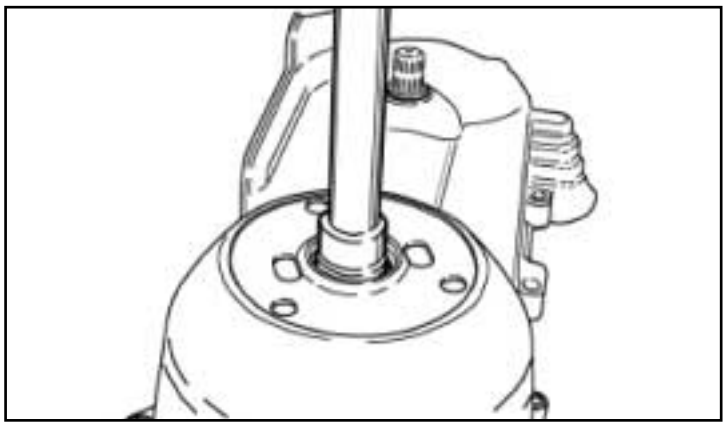
Dis-assembling the inlet port

- In order to dis-assemble the drive cover inlet port, it is only necessary to unscrew the three screws as shown in the figure.



Driven pulley shaft support bushing

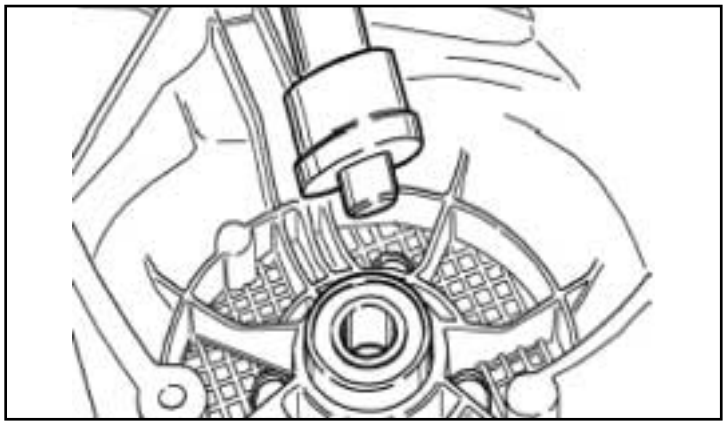
- Remove the Seeger ring on the inner face of the cover.
- Using the special tools (part numbers 19.1.20376 - 19.1.20375) extract the bush from the crankcase.



Caution - In order to avoid damaging the paintwork on the cover, use an appropriate surface to rest it on.

Fitting the driven pulley shaft support bush

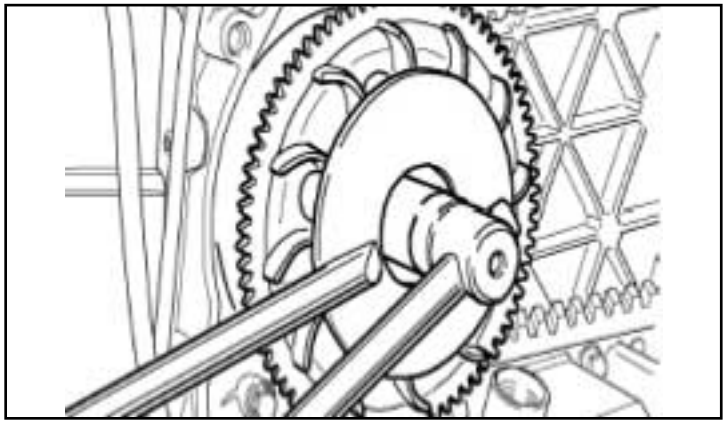
- Lightly heat the crankcase, on the inner face so as not to damage the painted surface, using the appropriate special tools (part numbers 19.1.20376 - 19.1.20357 - 19.1.20412).
- Insert the bush into its seat, and fit the Seeger ring again.



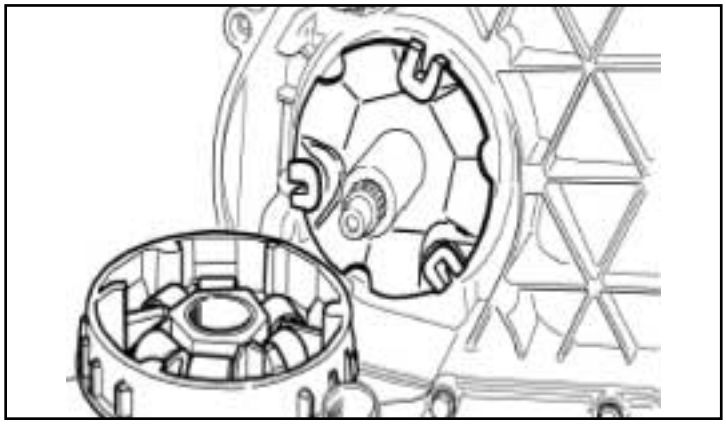
N.B.: Use a new bushing every time the sub-assembly is re-assembled.

Dis-assembling the drive pulley

- Block the drive pulley using the special tool (part number 19.1.20368) as is shown in the figure.
- Remove the central nut and the bend-up lock washer, withdraw the movement pick-up and the 2 washers.
- Remove the fixed semi-pulley and the steel washer.

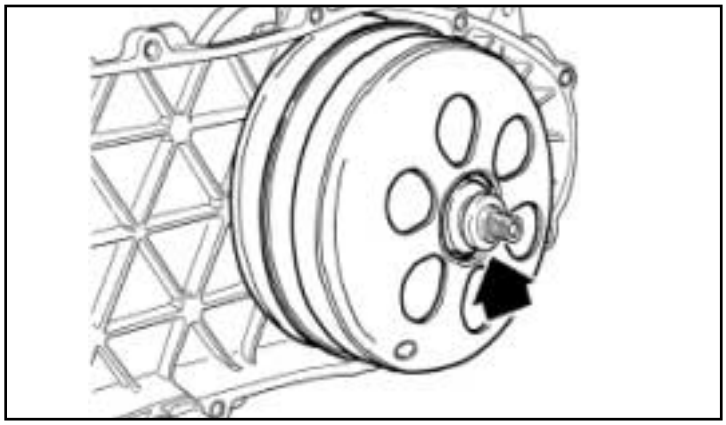


- Pull off the drive belt, and withdraw the moving semi-pulley together with its bushing, taking great care not to let the rollers loosely mounted on it to escape.
- Withdraw the roller counter-plate together with its guide sliders.



Disassembling the driven pulley

- Withdraw the distance piece, the clutch hub and the entire driven pulley sub-assembly.

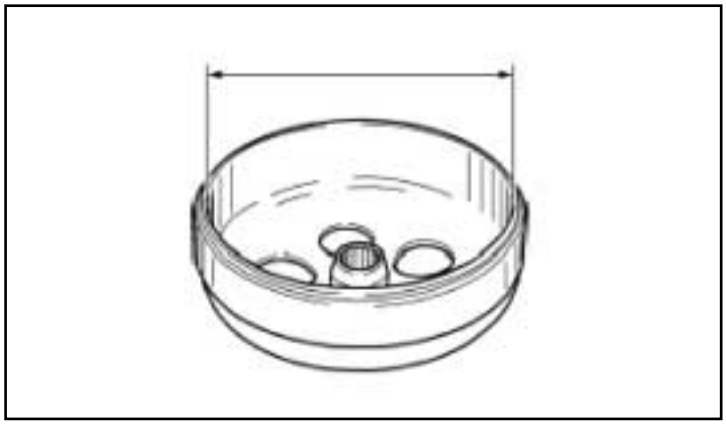


N.B.: The sub-assembly can be disassembled even with the moving pulley in place.

Driven pulley
- Check that the clutch hub is not worn or damaged.
- Measure the internal diameter of the clutch hub.

  Standard measurement:
  Ø 134.2 mm diameter

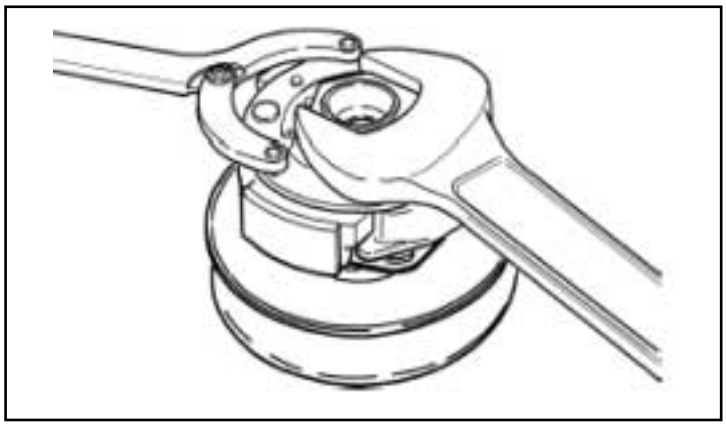
  Maximum value:
  Ø 134.5 mm diameter



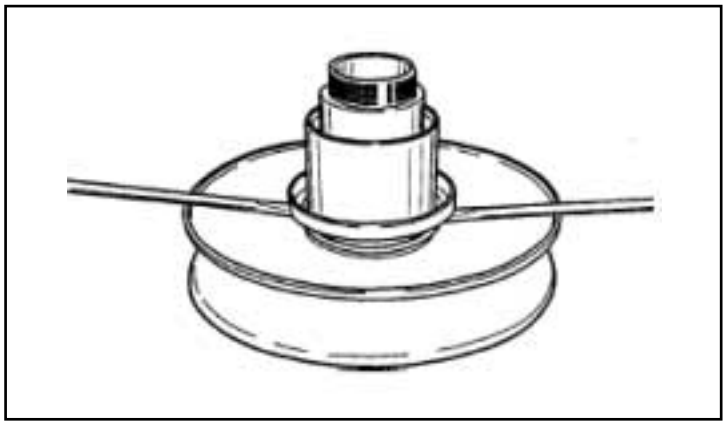
N.B.: Check for eccentricity: maximum eccentricity reading 0.20 mm

Dis-assembling the clutch
- Using the compass spanner (special tool, part number 19.1.20565) lock the clutch assembly from rotating.
- Use a 46 mm spanner (19.1.20444/9) to unscrew the clutch lock nut.
- Withdraw the clutch and the clutch spring.

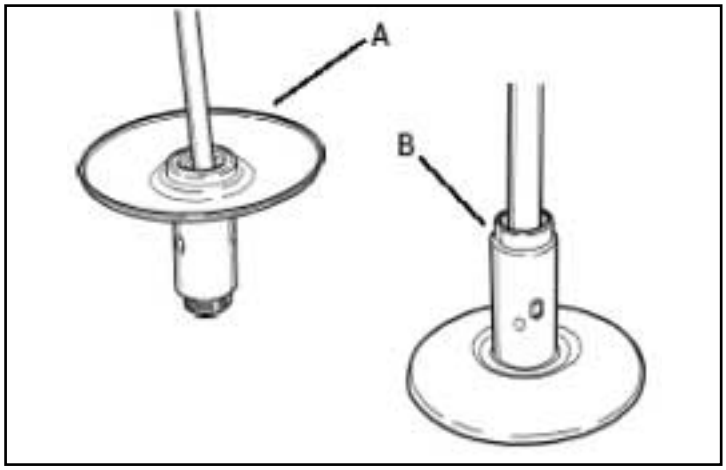
Caution - During the operation of stripping down the hub, keep the clutch in its housing, and thus counteract the force of the spring.



Pin restraining collar
- Withdraw the collar by levering with two screwdrivers.
- Extract the 3 guide pins and the moving semi-pulley.



Fixed driven semi-pulley bearings
- Check that there are no signs of wear or noise, and if there are, replace the bearings.
- Remove the lock ring by levering with two screwdrivers with a flat face.
- Use a hammer and punch to extract the ball bearing as is shown in figure **A.**
- Extract the ball bearing using a hammer and a punch of the right diameter entering from the side shown in figure **B.**

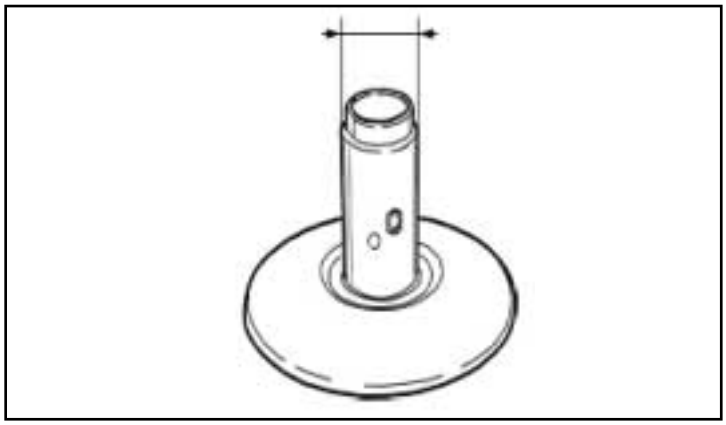


Fixed driven semi-pulley

- Measure the exterior diameter of the pulley bearing.

  Minimum diameter allowed:
  40.96 mm Ø

  Standard diameter: 40.965 mm Ø

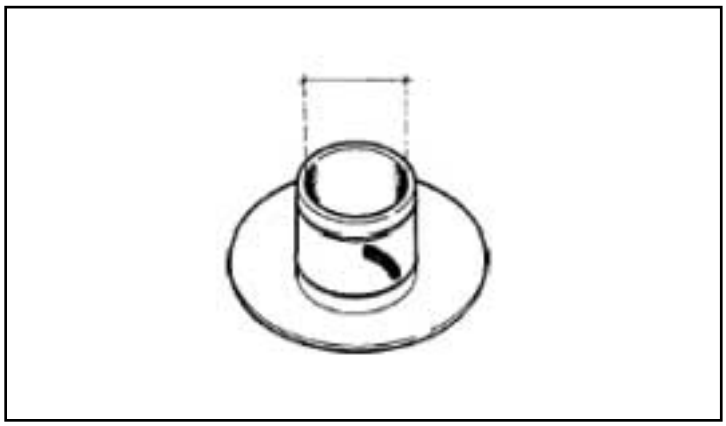


Moving driven pulley

- Extract the two internal seals, and the 2 O-rings.
- Measure the internal diameter of the moving semi-pulley bearing.

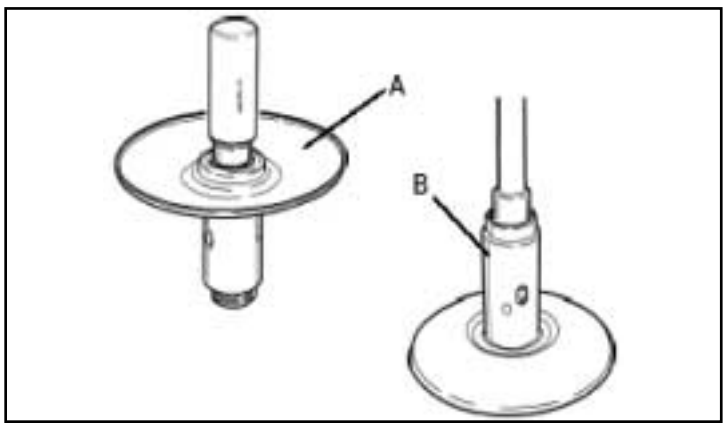
  Minimum allowed diameter:
  41.08 mm Ø

  Standard diameter: 41.035 mm Ø



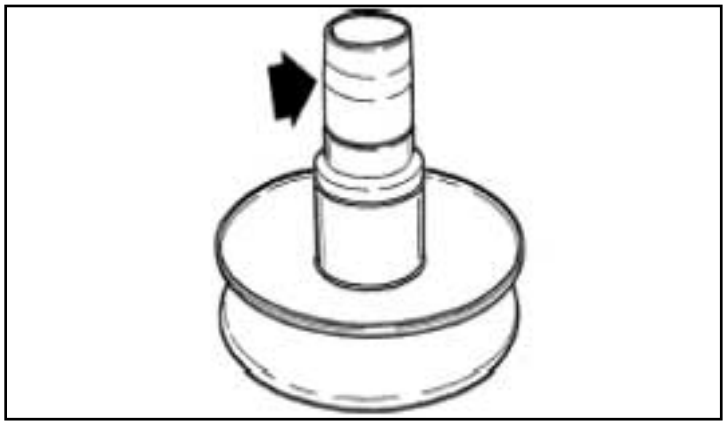
Assembling the fixed driven semi-pulley bearings

- Fit a new roller cage bearing using the special punch (part number 19.1.20424) as is shown in figure **A.**, aligning it with the writing facing outwards.
- When fitting a new ball bearing work as is shown in figure **B**, using the special punch (part number 19.1.20375 - 19.1.20376); lastly fit the Seeger ring.



Assembling the moving driven semi-pulley

- Check the internal diameter of the 2 seating points of the moving semi-pulley.
- Check the surfaces where the drive belt makes contact with the pulley.
- Install new oil seals and O-rings on the moving semi-pulley.
- Assemble the semi-pulley on the bearing using the appropriate protector sleeve (19.1.20263).

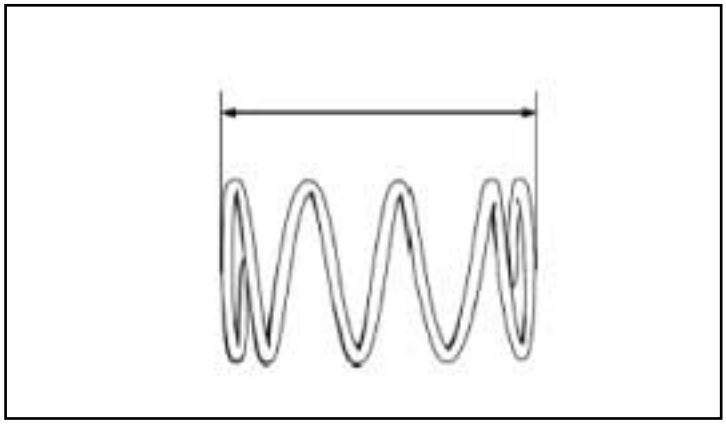


- Check that there are no signs of wear on the pins and the collar, and re-assemble the pins and collar.
- Using a grease gun with a curved nozzle, lubricate the driven pulley assembly using 6 grams of AGIP MU 3 grease; this operation should be performed by forcing grease through one of the ports in the interior of the bearing until grease is seen to come out of the opposite port. It is necessary to perform the operation in this way in order to avoid grease finding its way outside the O-rings.

Spring

- Measure the free length of the moving driven semi-pulley spring.

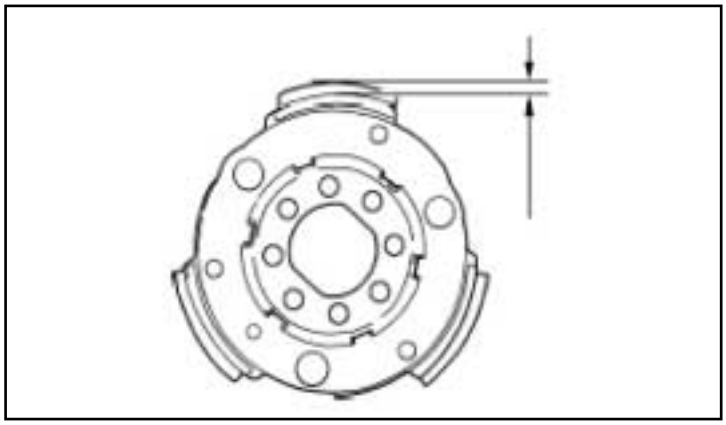
Standard length: 106 mm



- Check the thickness of the friction material on the clutch weights.
  Minimum allowed thickness: 1 mm
- The clutch weights should not show any signs of grease, and if this should occur, examine the driven pulley assembly.

N.B.: When the clutch weights are running in, they should show a central contact surface, and there should be no differences between them. If they are seen to be in different condition, this may cause clutch judder.

Caution - do not open the weights using tools, so as to avoid any variation in the loading on the return springs.

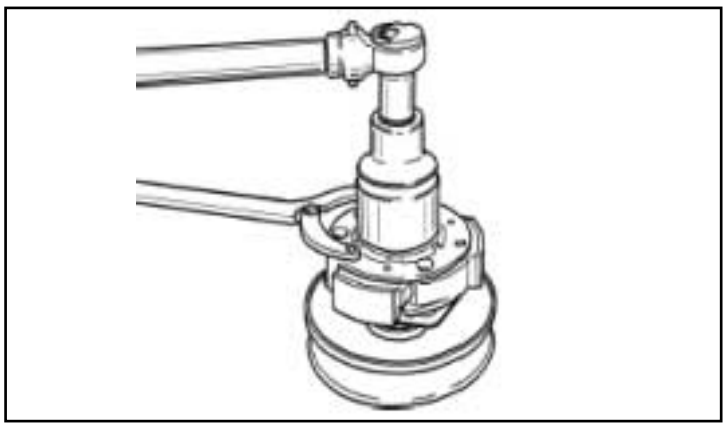


Assembling the clutch assembly

- Re-assemble the clutch assembly by carrying out the same operations in reverse order from dis-assembly. Use the compass spanner to lock while securing the clutch nut to its specified torque setting.

Caution - In order to avoid causing damage to the clutch nut, use a socket spanner with a bevel of reduced dimensions. During the clutch assembly lock nut assembly operation, keep the assembly in its housing until the clutch nut has been set on its thread and given a few turns.

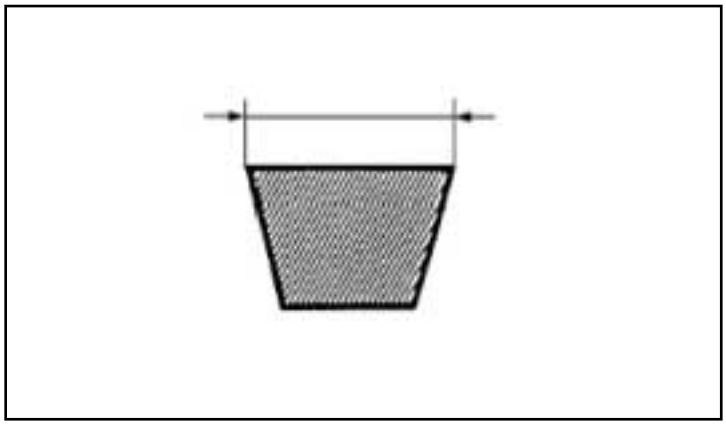
Torque setting: 55 ÷ 60 N-m



Drive belt

- Check that the drive belt is undamaged.
- Check the width of the belt.

Minimum width: 21.5 mm
Standard width: 22.5 ± 0.2 mm



Driving pulley

- Check that the internal bearing shown in the figure shows no signs of wear, and measure the internal diameter.

Maximum allowed diameter:
Ø 26.12 mm max diameter

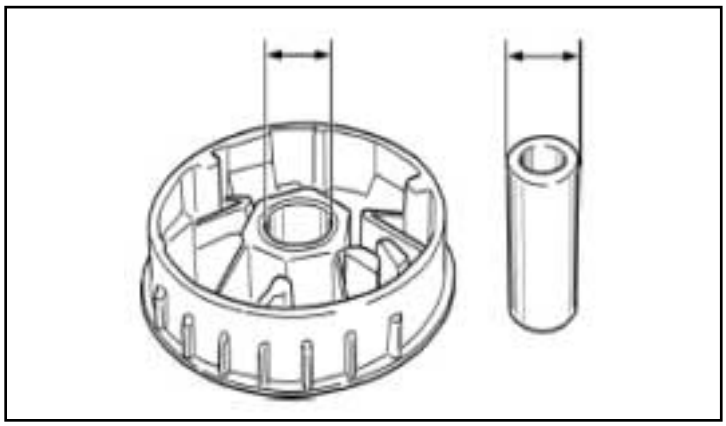
Standard diameter:
Ø 26.021 mm diameter.

Caution - do not lubricate or clean the journal.

- Measure the external diameter of the pulley sliding bush as shown in the figure.

Minimum allowed diameter:
Ø 25.95 mm max diameter

Standard diameter:
Ø 25.959 mm diameter.

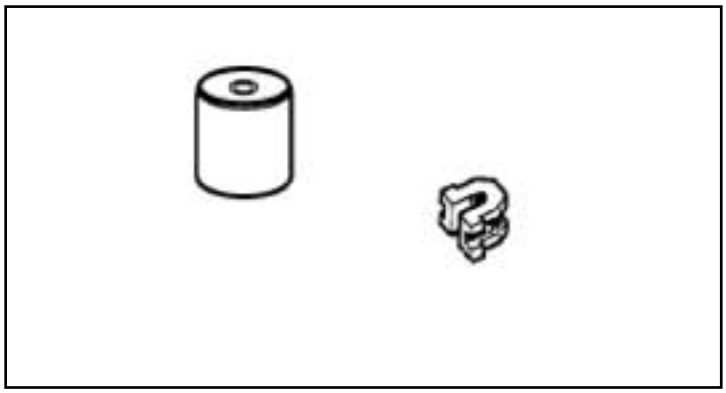


- Check that the rollers are not damaged or worn.

Minimum allowed diameter:
Ø 18.5 mm max diameter

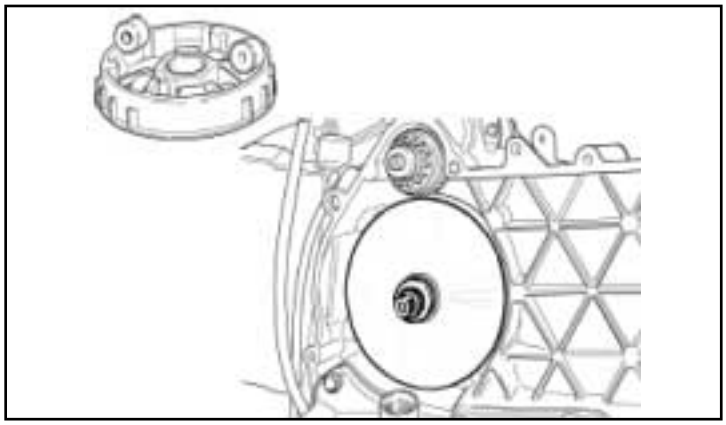
Standard diameter:
Ø 18.9 mm diameter.

- Check that the roller counter-plate sliders are not worn.
- Check the condition of wear in the roller seating slots and in the surfaces where the belt makes contact on both semi-pulleys.

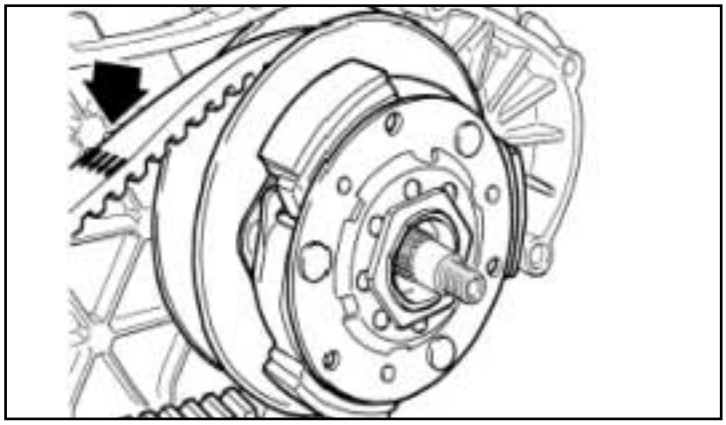


Assembly of the moving semi-pulley and bearing

- Pre-fit the moving semi-pulley with the roller counter-plate, placing the rollers as shown in the figure.
- Fit the assembly together with the bearing onto the engine shaft.

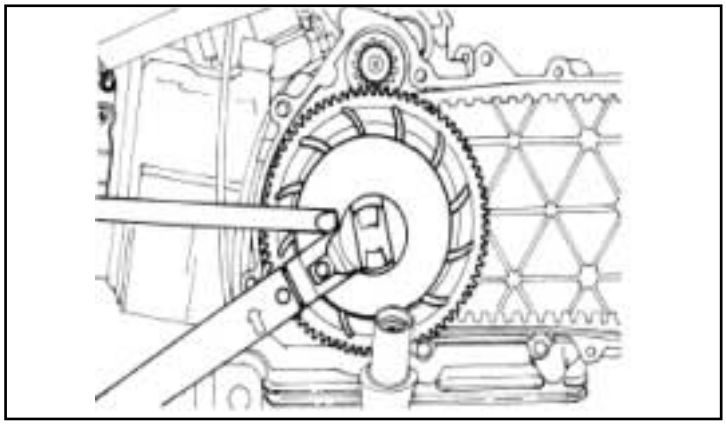


- Open up the rear pulley and fit the drive belt over it, taking care to observe the correct direction of rotation. It is extremely important when securing the front pulley assembly, to ensure that the drive belt lies freely inside it, so as to avoid any inappropriate pressure of the moving semi-pulley.



Assembly of the fixed semi-pulley

- Reassemble the parts which compose the subassembly (rear thickness plate, fixed semi-pulley, front thickness plate, movement pickup, washer and nut); apply Loctite "Super-Rapid" type 242 E thread seal to all threads, and set the nut to the recommended torque setting.
- Block the semi-pulley from rotating by means of the compass spanner (part number 19.1.20368)

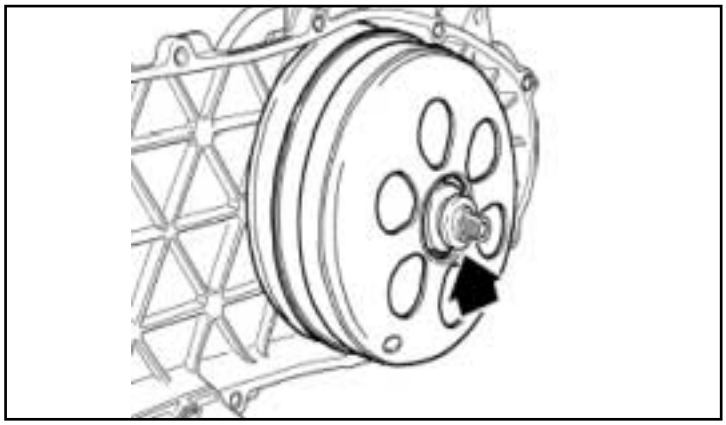


N.B.: replace the nut with new every time the drive is re-assembled.

Torque setting: 75 ÷ 83 N-m

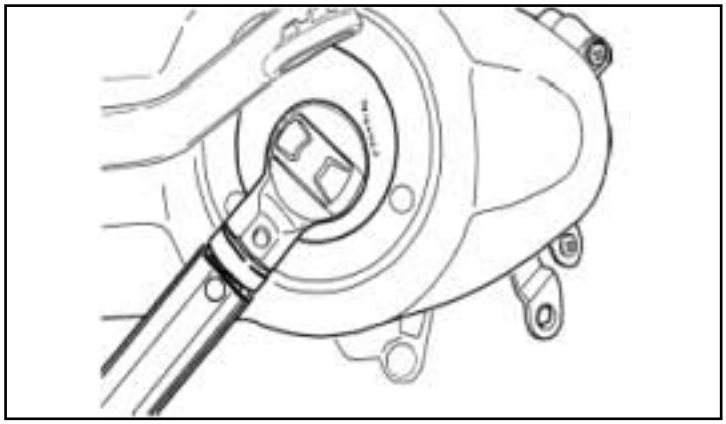
Assembling the clutch hub

- Re-assemble the clutch hub and the distance piece.



Assembling the drive cover

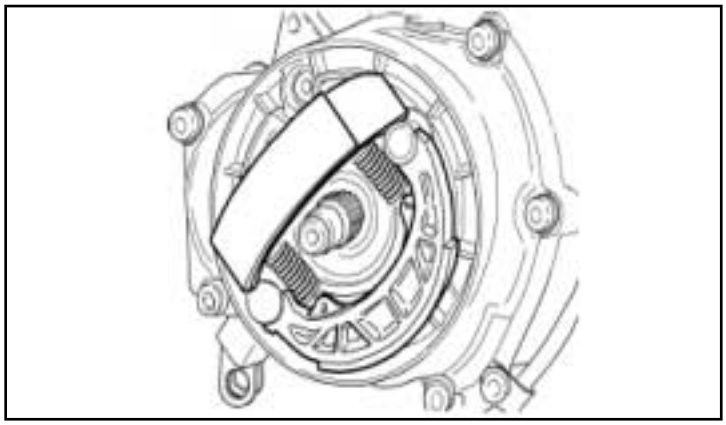
- Take care to ensure that the centring pins are in place, together with the oil-tight gasket on the oil sump.
- Re-assemble the drive cover tightening the 10 securing screws to the recommended torque.
- Re-fit the oil filler cap/dipstick.
- Re-fit the steel driven pulley shaft nut washer and the driven pulley shaft nut and apply Loctite "super-Rapid" type 242E thread seal onto the threads.
- Using the special tool (part number 19.1.20423) and a torque spanner, tighten the nut to the recommended torque.
- Re-fit the small plastic cover piece.



Cover torque setting: 11 ÷ 13 N·m
Driven pulley shaft nut torque setting:
54 ÷ 60 N·m

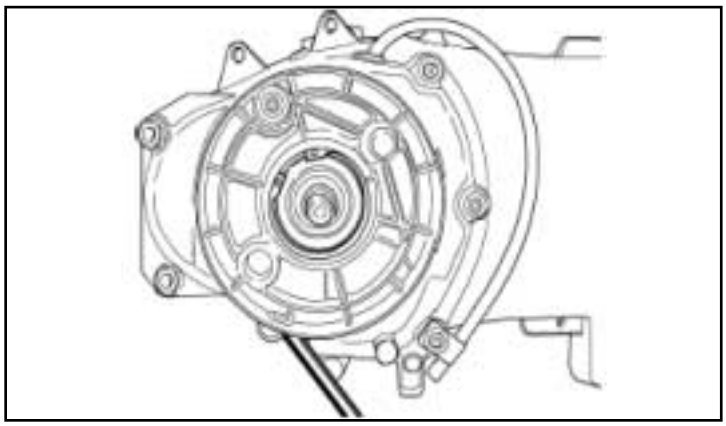
Disassembling the brake shoes
- Withdraw the rear brake shoes by twisting one of the pair as shown in the figure.

N.B.: When this operation is carried out with the brake still assembled in the machine, it is first necessary to remove the silencer and the rear wheel.

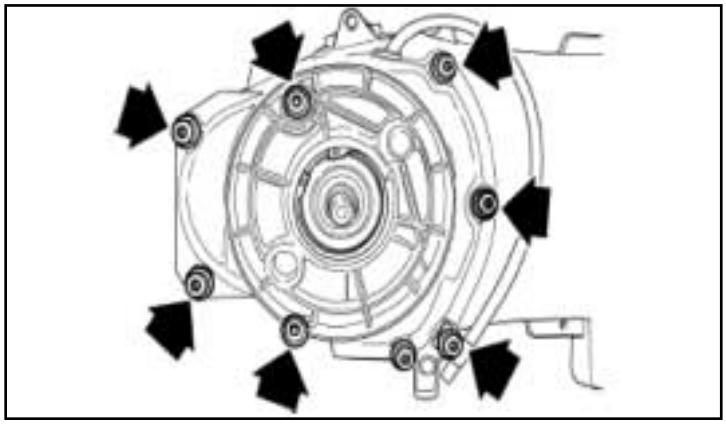


Disassembling the rear brake lever and operating arm
- Remove the screw as shown in the figure, and then withdraw the operating arm.

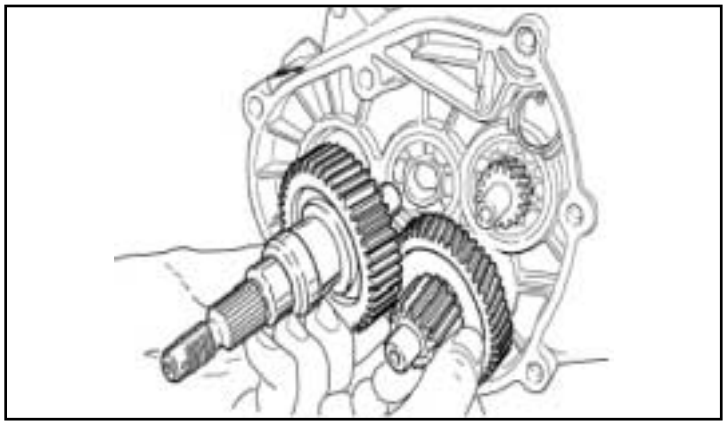
N.B.: In order to ensure easy removal of the operating arm, do not turn it while disassembling.



Rear hub
- Drain the oil from the rear hub after removing the oil drain plug as shown in the figure.
- Withdraw the brake shoes and their washers
- Remove the 7 securing screws and washers shown in the figure.
- Withdraw the hub cover and gasket.

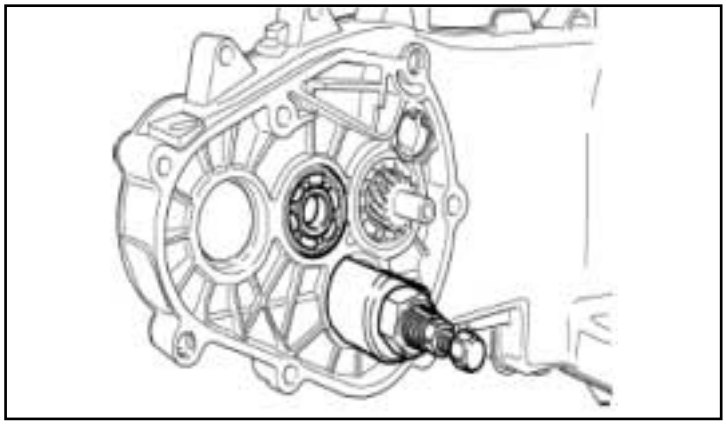


Disassembly of the wheel shaft
- Remove the wheel shaft with the gearing complete with the intermediate gears.



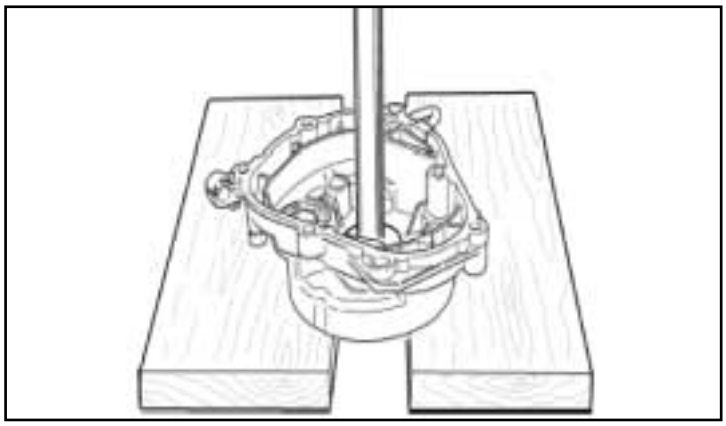
Hub case bearings

- Check the condition of the bearings in the hub case (for wear, play and noise). In the event that any faults are discovered, proceed as described below.
- In order to strip the three 15 mm bearings, 2 on the crankcase and 2 on the hub cover, use the special extractor tool (part number 19.1 21467/13/9).

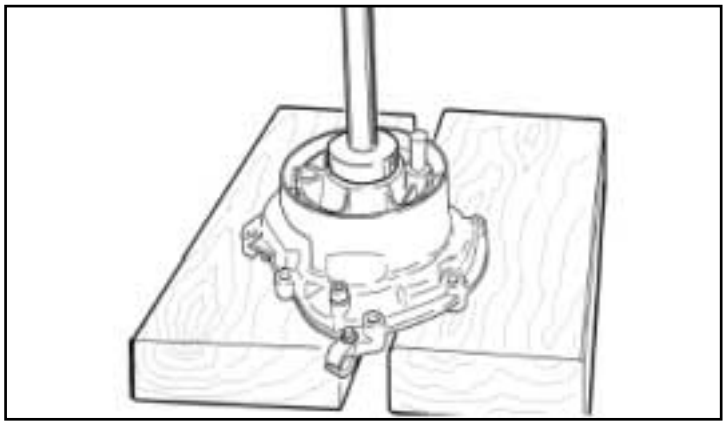


Dis-assembly of the wheel shaft bearings in the hub cover

- Remove the Seeger ring from the outside of the hub cover.
- Extract the bearing using the appropriate tools (part numbers 19.1.20376-19.1.20364-19.1.20375). Be careful to support the hub cover properly, as shown in the figure.

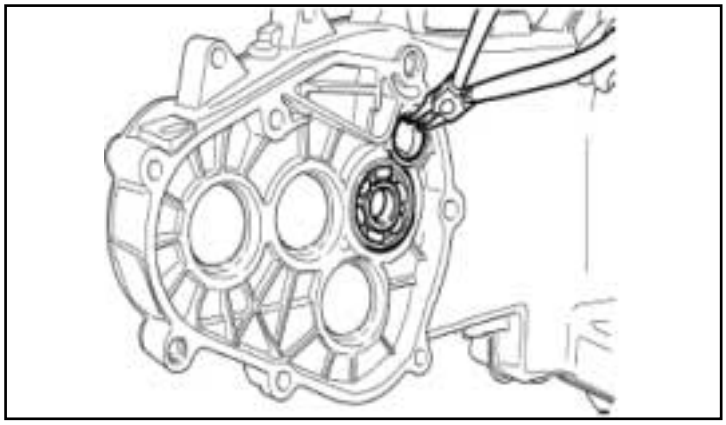


- Withdraw the oil seal using the special extractor tools (part numbers 19.1.20376-19.1.20359), as shown in the figure.



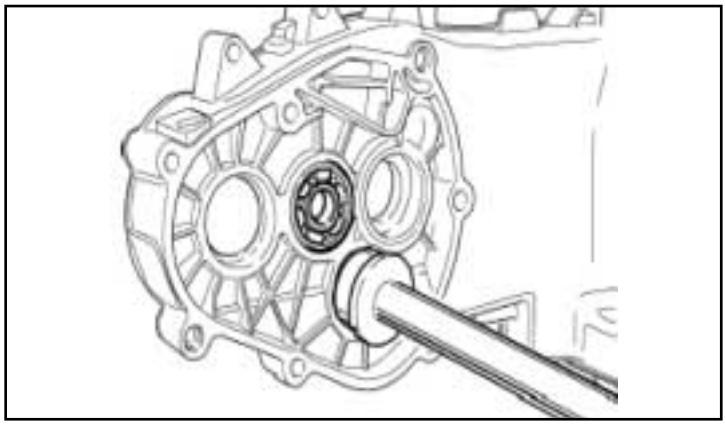
Stripping the driven pulley shaft

- In order to carry out the dis-assembly of the driven pulley shaft, the bearing and the oil seal, first remove the drive cover and the clutch assembly, as has been described above.
- Withdraw the driven pulley shaft from the bearing.
- Extract the oil seal, working from the inside of the bearing, and taking great care not to damage the oil seal seating, and forcing it out on the drive side.
- Extract the Seeger ring as shown in the figure.
- Extract the driven pulley shaft bearing using the special punch (part number 19.1.20376-19.1.20363-19.1.20375).



Assembling the hub cover bearings

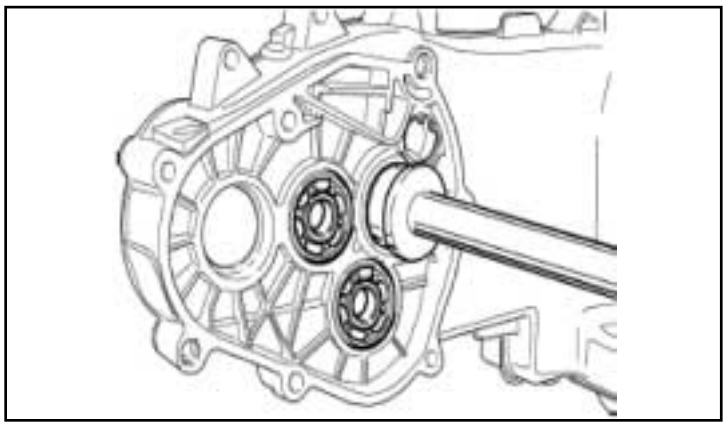
- In order to assemble the hub cover bearings it is first necessary to heat up the parts using the recommended heat gun (part numbers 19.1.20150 – 19.1.20151)
- The three 15 mm bearings should be fitted using the special tools (part numbers 19.1.20412-19.1.20359)



N.B.: In vehicles with a close pitch, these bearings should be placed in the seatings as shown in the figure.

Assembling the driven pulley shaft bearing

- Heat up the parts using the special heat gun (part numbers 19.1.20150 –19.1.20151).
- Reassemble the driven pulley shaft bearing using the special tools (part numbers 19.1.20376-363-359), and positioning it so that the ball-bearings can be seen on the inside face of the hub.
- Re-fit the Seeger ring fitting the opening away from the bearing as shown in the figure, and the new oil seal flush with the surface of the crankcase.

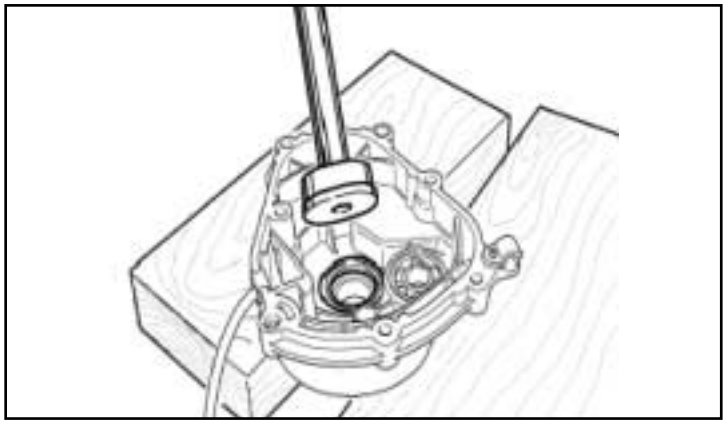


Checking the hub cover

- Check that the mating surfaces shown no signs of warping or deformations.
- Check that the bearing seatings and the brake operating arm seatings are in sound condition.
- In the event of locating any faults, replace the hub cover.

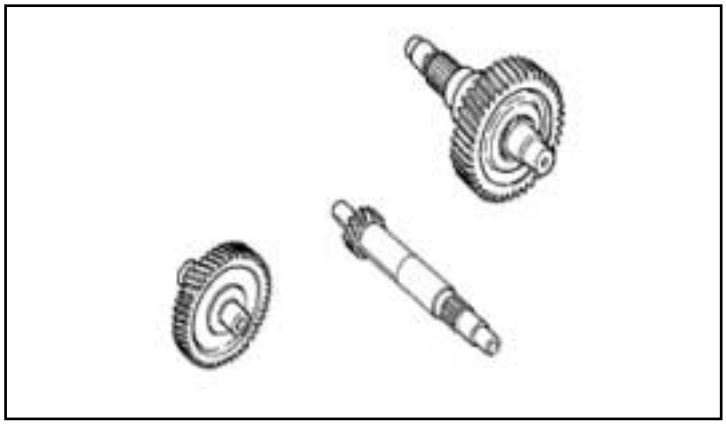
Assembling the wheel shaft bearing

- Heat up the parts using the special heat gun (part numbers 19.1.20150 - 19.1.20151).
- The wheel shaft bearing mounted in the hub cover should be fitted using the special tools (part numbers 19.1.20364-19.1.20360- 19.1.20376).
- Fit the Seeger ring.
- Fit the oil seal flush with the inner surface of the hub cover as shown in the figure, using the appropriate special tools (part numbers 19.1.20376-19.1.20360), and with the sealing lip facing into the interior of the hub.



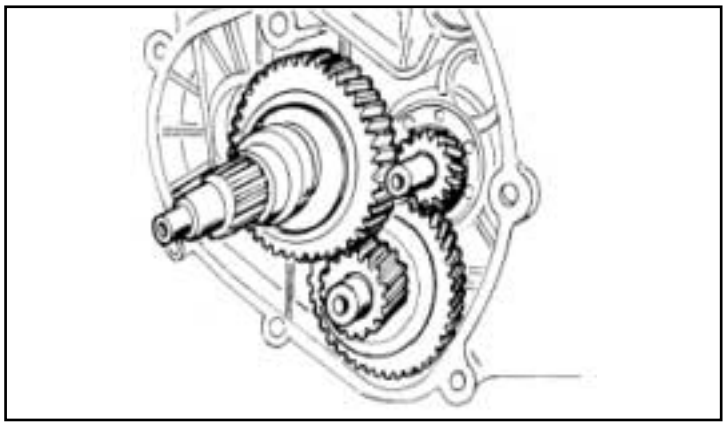
Checking the hub shafts

- Check that the three shafts show no signs of wear or deformations in the surface with gear teeth, in the bearing seatings, and in the oil seal seatings.
- In the event of finding any faults, replace the defective parts.



Assembling the hub gears

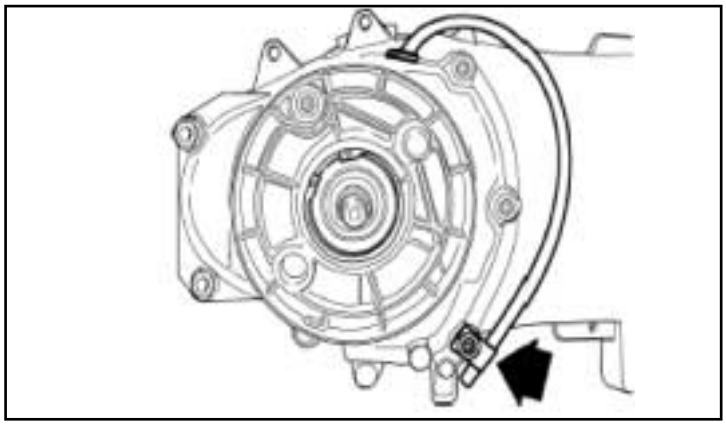
- In the case of vehicles with close pitch, fit the three shafts as shown in the figure.



Assembling the hub cover

- Fit a new gasket aligning over the centring pins.
- Fit the cover, taking care to align the pressure relief tube correctly.
- Tighten the 7 securing screws to the recommended torque setting, locating the tube support clip in the position shown in the figure.

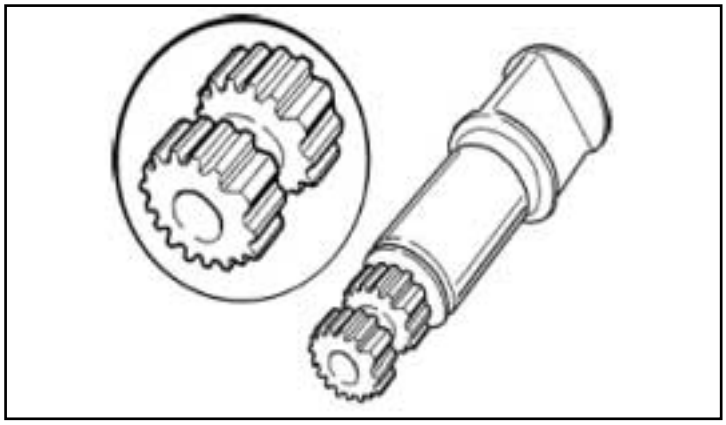
Torque setting: 24 ÷ 27 N·m



Assembling the rear brake operating arm

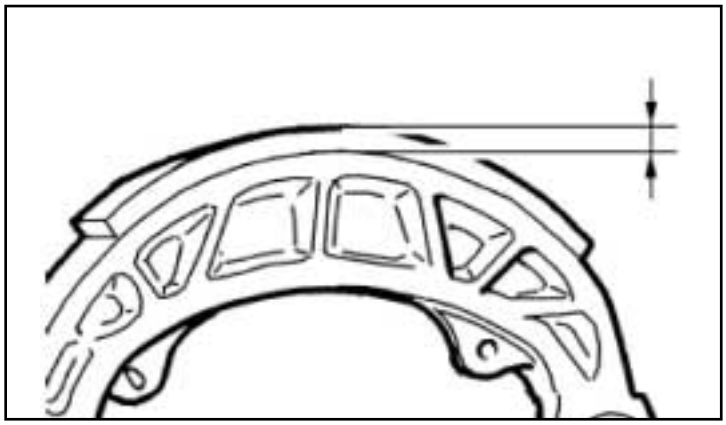
- Check that the rear brake operating arm and rear brake shaft show no signs of wear.
- If any defects are found, replace the operating arm.
- Fit the 2 O-rings, lubricating them with AGIP grease.
- Fit the operating arm and the lever onto the engine crankcase, taking care that to align the two profiles with the double-toothed gear shown in the figure.
- Tighten the securing screw to the recommended torque setting

Torque setting: 11 ÷ 13 N·m.



Assembling the brake shoes

- Check that the thickness of the friction material is grater than the minimum specified.
  Minimum allowed thickness: 1 mm.
- Check that there are no signs of wear at the operating arm support points, or on the pivot stud.
- Check that the springs show no signs of wear or damage.
- In the event that defects are found, replace the brake shoes.
- Fit the brake shoes with the springs in the reverse order to assembly.

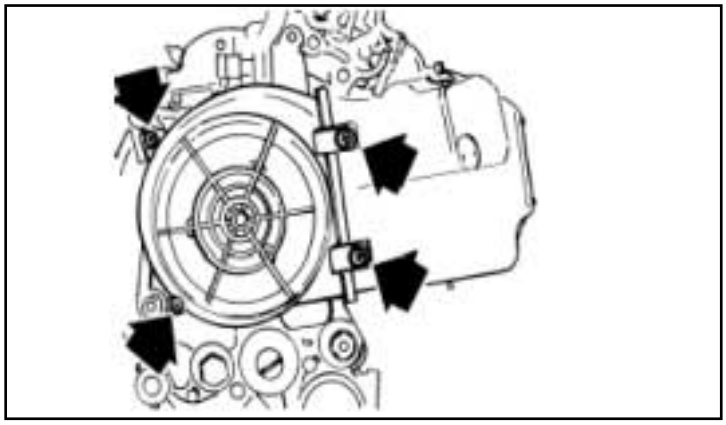


N.B.: If noise is detected in the rear brake, check that the shoes are correctly situated on the pivot stud. For the same reason, the springs should take on a curved shape, resting on the supports located on the hub cover.

Dis-assembling the fan cover deflector

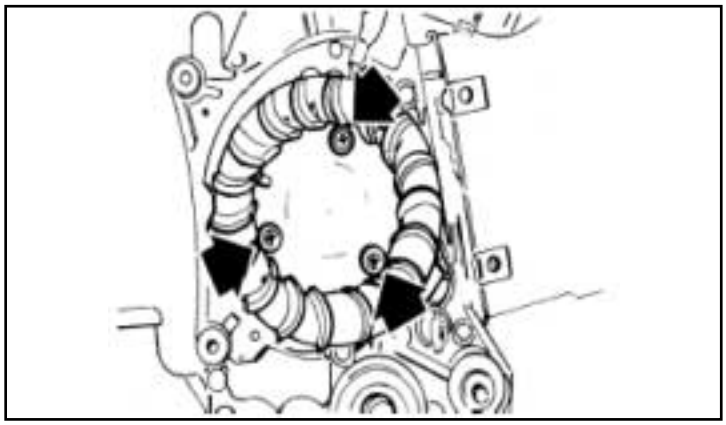
- After first removing the 4 securing screws, remove the deflector.

Caution – When withdrawing the deflector, remove the connector from its housing on the deflector.



Dis-assembling the cooling fan

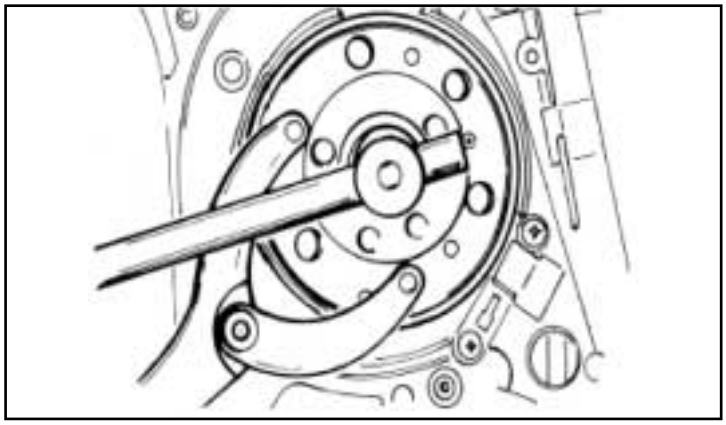
- Remove the cooling fan after first undoing the 3 securing screws as shown in the figure.



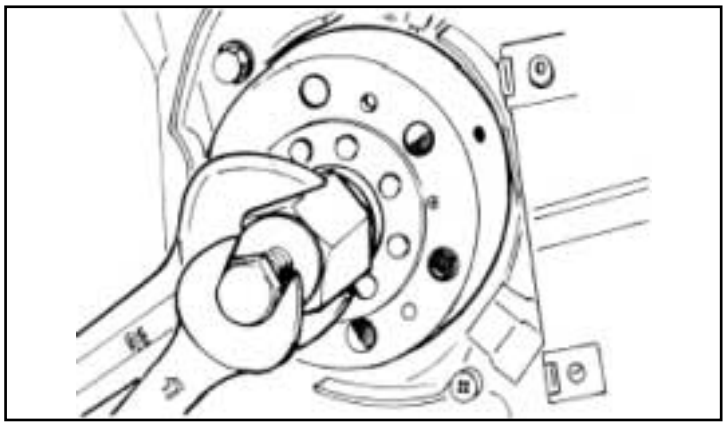
Dis-assembling magneto

- Block the magneto from rotating by means of the compass spanner (part number 19.1.20565).
- Withdraw the nut.

Caution - Using a different compass spanner than the one which forms part of the basic tool kit may cause damage to the stator coils.

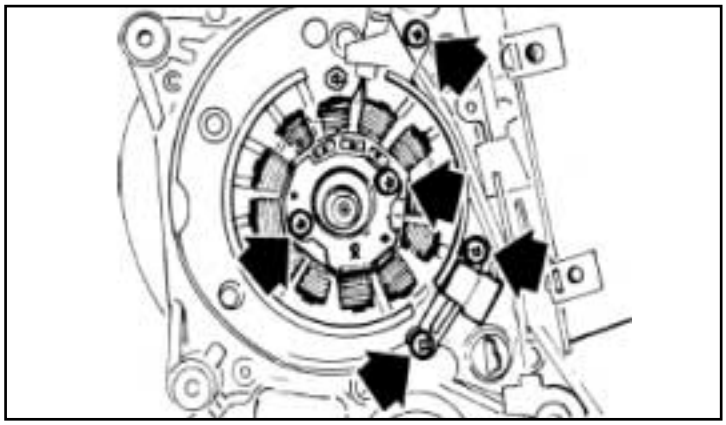


- Withdraw the magneto using the special extractor tool (part number 19.1.48564).



Stripping the stator

- Remove the electrical terminal on the minimum oil pressure bulb.
- Remove the 2 pick-up securing screws, the cable restraint strap securing screw, and the 2 stator securing screws as shown in the figure.
- Withdraw the stator and wiring.



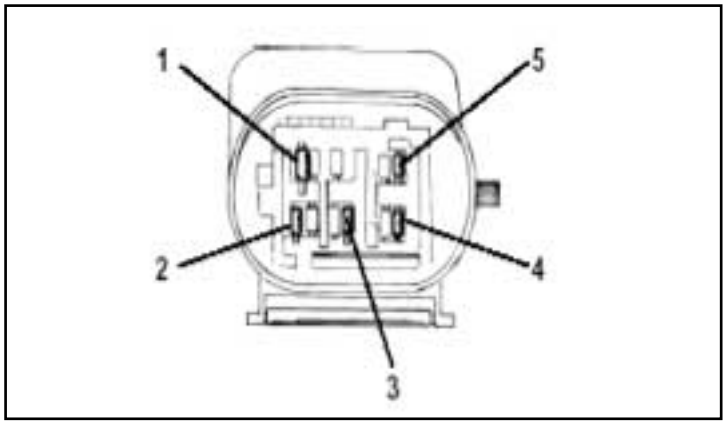
Checking the stator

- Use a tester to check for continuity (approx. 1) between connections 5-3 and 5-1.
- Check earth insulation over the three stator phases, 5-earth, 3-earth, 1-earth.

  Minimum resistance: 740 ± 10 m.

Checking the oil pressure bulb

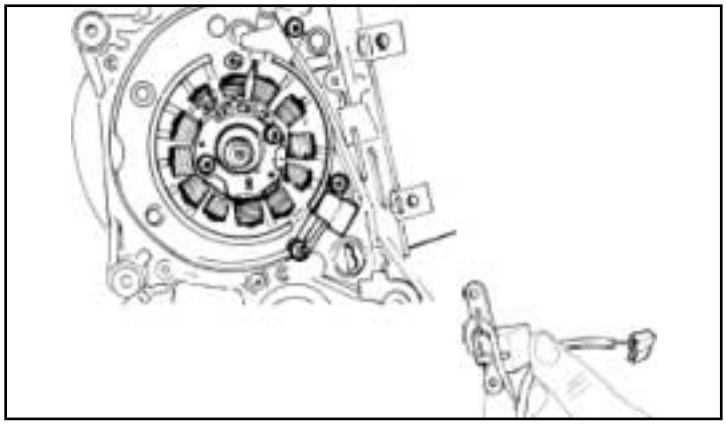
- Use a tester to check for continuity between connection 4 and earth (with the engine stopped).



Checking the Pick-Up
- Check that there is a resistance reading of approximately 105 ÷ 124 at 20ºC between connections 4 and earth.
- If different readings from those indicated are found, replace the faulty parts.

N.B.: The values indicated are based on ambient temperature. Checking the stator at operating temperatures will give reading higher than those indicated.

Checking the magneto
- Check the integrity of the internal plastic elements in the magneto and the Pick-Up operating plate.

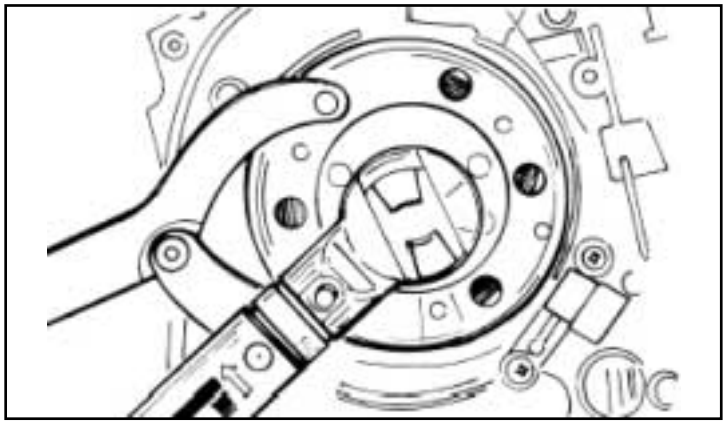


Assembling the Stator assembly
- Re-assemble the stator and the magneto in reverse order to stripping, taking care to tighten the securing screws to the recommended torque settings.
- Refit the cabling as shown in the figure.

N.B.: The Pick-Up cable should be placed between the upper securing screw and the reference stud, as shown in the detail view.

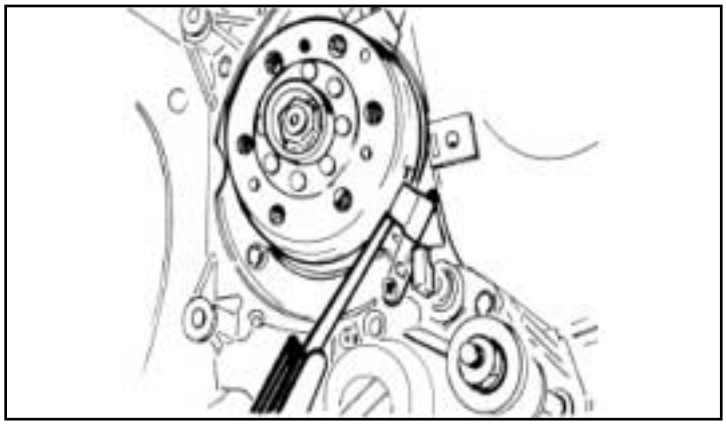
Assembling the magneto
- Fit the magneto taking care to ensure that the key is inserted correctly.
- Lock the magneto nut to the torque setting recommended.

Torque setting: 52 ÷ 58 N·m.



- Check that the Pick-up gap falls between 0.34 ÷ 0.76 mm.
- When assembling the Pick-Up there is not expected to be adjustment of the gap.
- Different readings are caused by deformations occurring in the Pick-Up support.

N.B.: Variations in the magneto gap will cause changes in the minimum output engine speed of the ignition system.

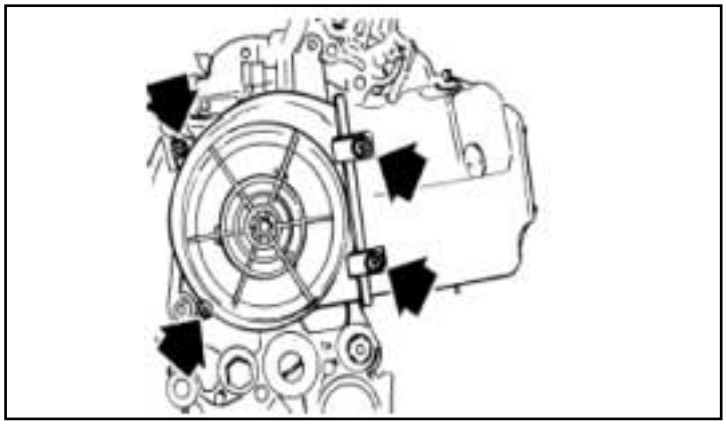


Assembling the fan cover and the magneto deflector

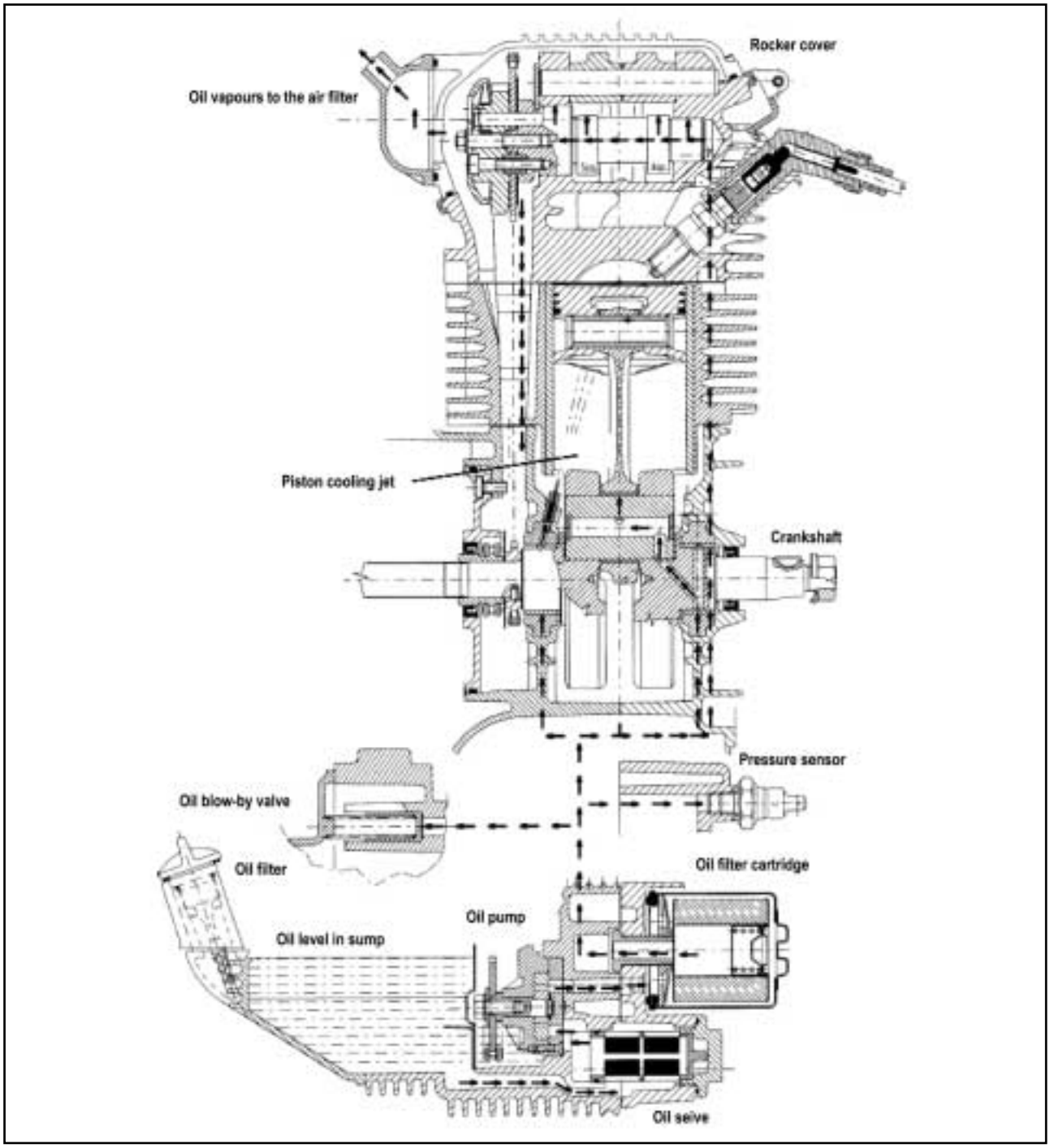
- Remount the parts in the reverse order from disassembly.

Caution - Take care to ensure that the magneto connector is correctly located.

- Ensure that the distance pieces are present on the 2 rear deflector securing screws.
- The long distance piece should be fitted at the top.

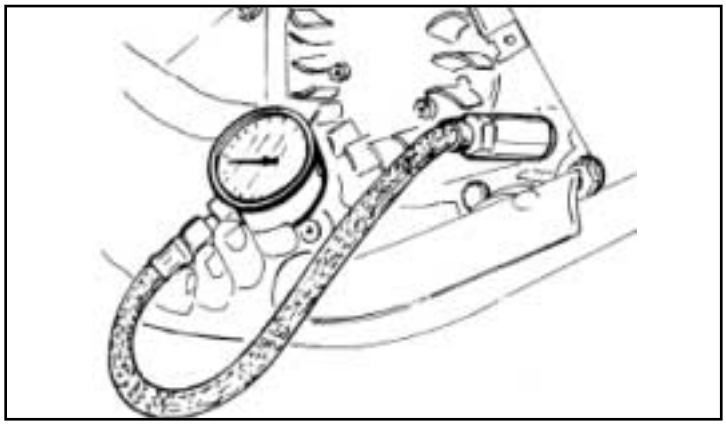


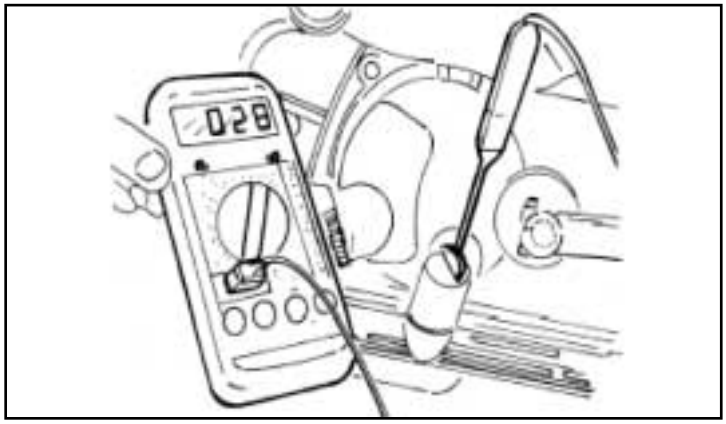
ENGINE - LUBRICATION



Checking the oil pressure

- After removing the fan cover deflector as described in the chapter “The Magneto”, disconnect the electrical terminal of the minimum oil pressure bulb and extract the bulb.
- With the engine running at idle, 1650 rpm, and the engine oil at a temperature of approximately 90ºC, check that the oil pressure reading lies between 0.5 and 1.2 atmospheres.
- With the engine running at 6,000 rpm, and the oil temperature at approximately 90ºC, check that the oil pressure falls between 3.2 and 4.2 atmospheres.
- After completing the check, withdraw the specific testing tools mounted on the engine, refit the oil pressure bulb and lock it to the torque setting prescribed, and fit the fan cover deflector.
- If non-standard oil pressure readings are recorded, move on to check, in this order, the oil filter, the bypass, the oil pump, and the seatings over the engine shaft.





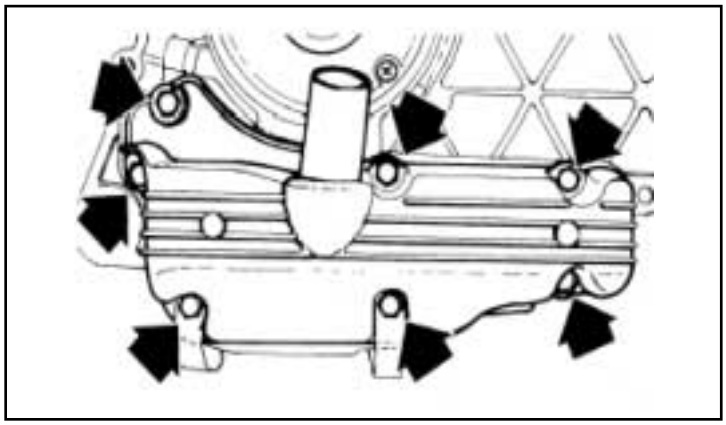
N.B.: the check should be carried out with the engine oil exactly at the correct level, and with the oil filter in good condition.

Minimum oil pressure allowed:
3.2 atmospheres.

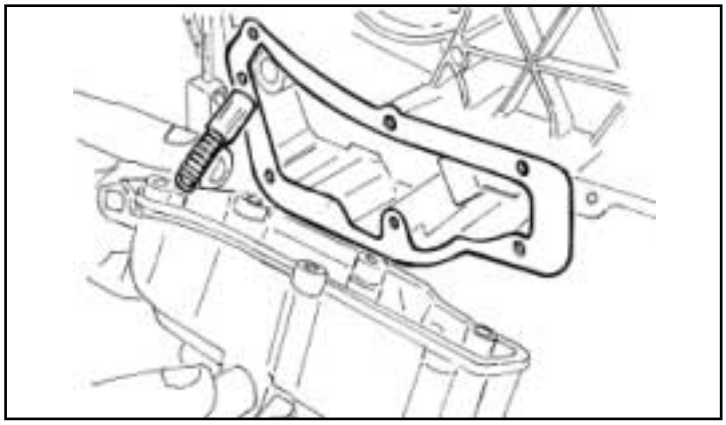
Torque setting: 12 ÷ 14 N·m.
(Valid also for the connector of control)

Disassembling the oil sump oil pressure regulating by-pass

- Remove the oil filler cap, the drive cover the drive pulley assembly complete with the drive belt and the gear wheel, as described in Chap 3 “The Drive”.
- Drain the oil from the sump as has been described above.
- Remove the 7 securing screws as shown in the figure together with the 2 securing clips attaching the drive to the rear brake.



- Remove the spring, the by-pass piston and the gasket as shown in the second figure.

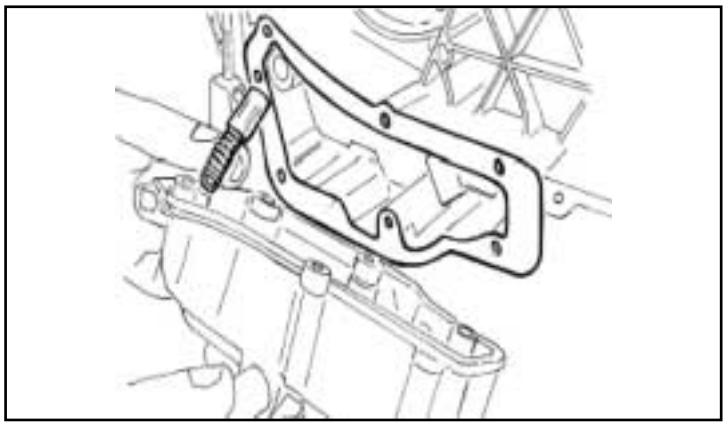


Checking the By-pass

- Check the free length of the spring.

  Standard length: 54.2 mm

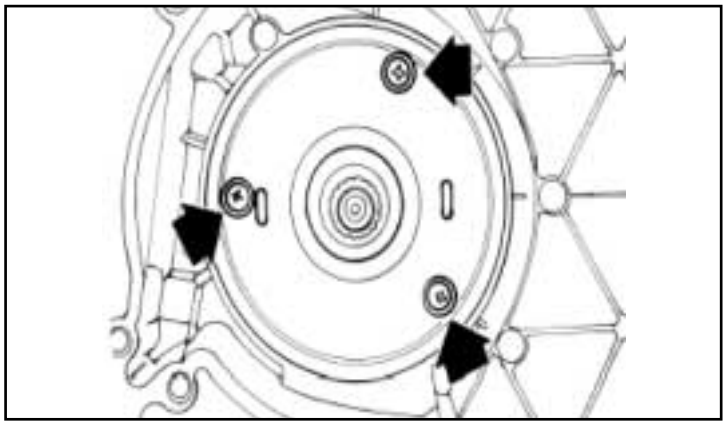
- Check that the piston does not show any signs of scoring.
- Ensure that the piston can move freely over the crankcase, and that a sufficiently good seal is maintained.
- If the piston is either scored or does not move freely, clean off any dirt or replace with new parts.



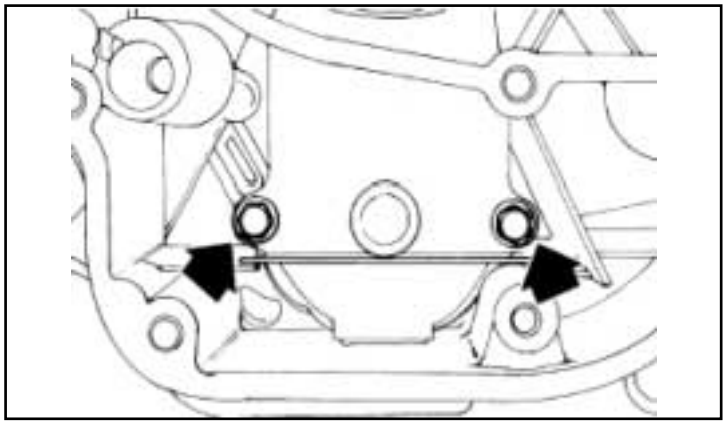
Checking the oil pump

- Remove the chain housing cover by releasing the 3 securing screws, as shown in the figure, together with the copper washers.
- Extract the cover using the appropriate lugs.

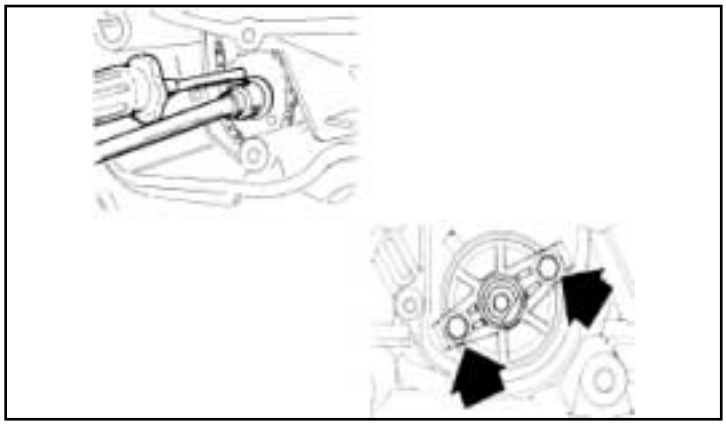
N.B.: In order to avoid the lugs breaking, pull out with a movement parallel to the line of the engine shaft.



- Remove the small oil pump drive pulley cover after removing the two securing scores as shown in the figure.
- Immobilise the oil pump drive pulley, using a screwdriver inserted in the hole provided for that purpose.



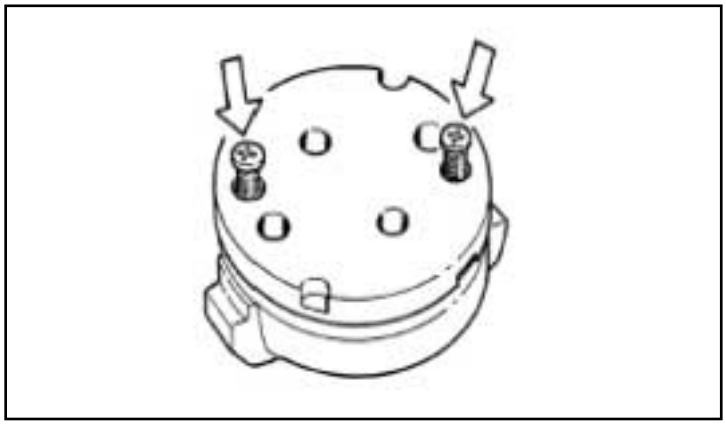
- Remove the central securing screw with the hollow washer as shown in the figure.
- Remove the chain complete with the pulley.
- Remove the engine shaft drive pinion.
- Remove the oil pump after unscrewing the two securing screws shown in the figure.
- Remove the sealing gasket.



N.B.: It is advisable to mark the chain to ensure that it will be maintained in the same direction of rotation.

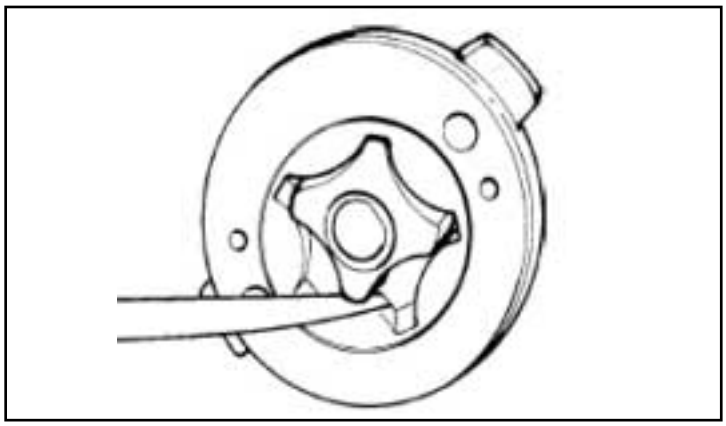
Checking the oil pump

- Remove the two securing screws and the small oil pump cover.
- Remove the internal rotor spring washer.
- Remove the rotors and then carry out a thorough wash using petrol and compressed air.
- Refit the two rotors onto the pump body while keeping in view the 2 reference points as shown in the second figure. Assemble locking ring,



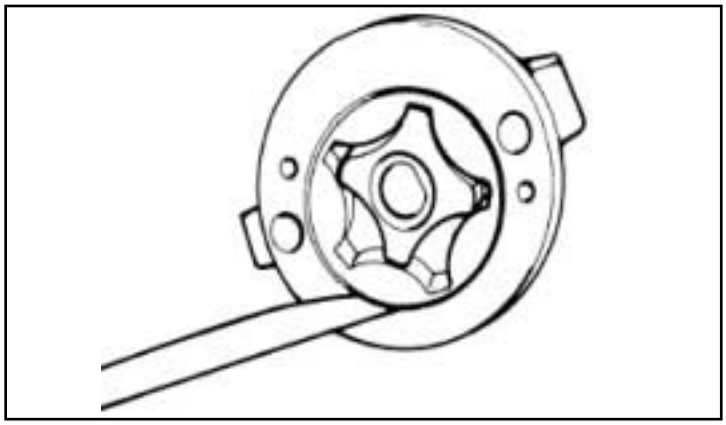
- Check the distance between the rotors in the position shown in the figure using feeler gauges.

  Maximum play allowed: 0.12 mm



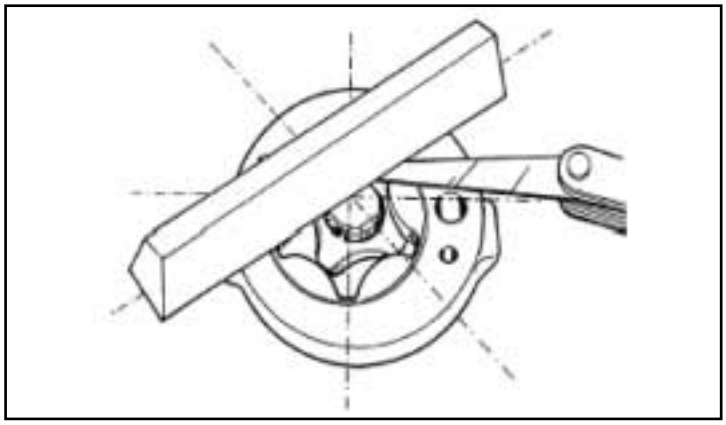
- Check the distance between the external rotor and the pump body, see figure.

  Maximum play allowed: 0.20 mm



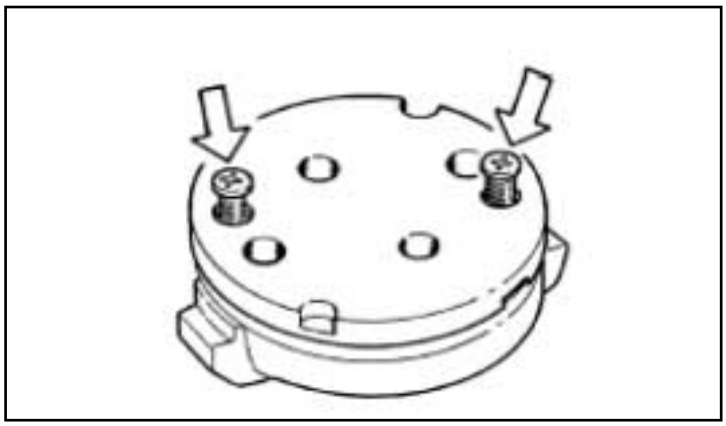
- Check the axial play between the rotors using a straight edge as a reference plane as shown in the figure.

  Upper permissible limit: 0.09 mm



Assembling the oil pump
- Check that there are no signs of wear on the pump shaft and body.
- Check that the pump cover show no signs of wear or scratching.
- If incorrect readings are found, or scratching, replace the defective parts or the entire assembly.
- Fit the pulley onto the pump, the central securing screw to the torque specified, and the bend-up washer.

  Torque setting: 12 ÷ 14 N·m

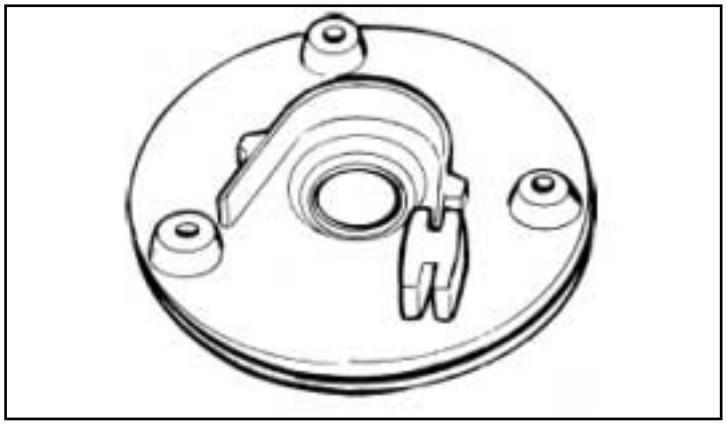


N.B.: Fit the bend-up washer on the outer perimeter and in contact with the pulley.

- Fit the small cover on the pump and tighten the two securing screws to the recommended torque setting.

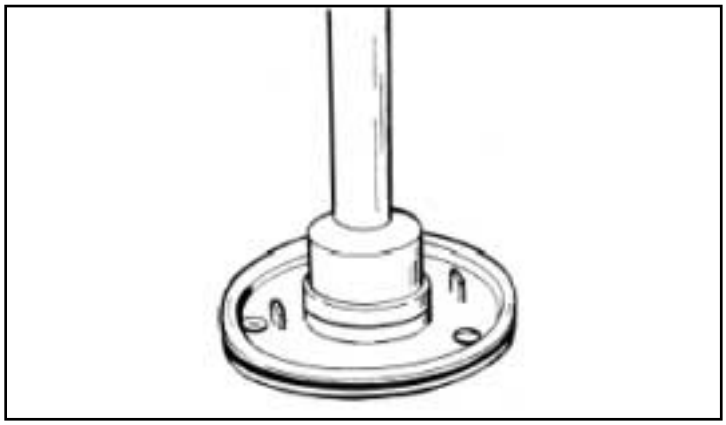
  Torque setting: 0.7 ÷ 0-9 N·m

Chain cover
- Check that there are no signs of wear in the tensioner slider.
- Where damage is found, replace the part or mount it the other way around, so that the other side will be subject to wear.



- Remove the oil seal using the special tools (part number 19.1.20376-19.1.20357).
- Fit a new oil seal using the special tools (19.1.20376-19.1.20359), flush with the outer surface.
- Fit a new O-ring and grease it thoroughly, using grease.
- Fit the cover over the engine crankcase, set the three securing screws with copper washers, and fit the cover into its seating, tightening the three securing screws.
- Block the 3 securing screws to the required torque.

  Torque setting: 4 ÷ 5 N·m.



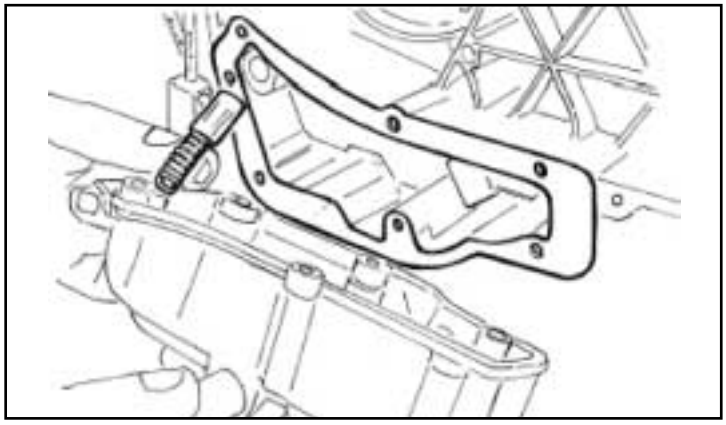
Assembling the by-pass and the oil manifold pump

- Re-fit the by-pass piston in its seating.
- Insert the adjuster spring.
- Fit a new oil sump gasket.
- Offer up the sump taking care to insert the spring in the extension located on the collector Itself.
- Fit the securing screws again and the rear brake drive support clips in the reverse order from dis-assembly.
- Tighten up the securing screws to the recommended torque setting.

  Torque setting: 11 ÷ 13 N·m

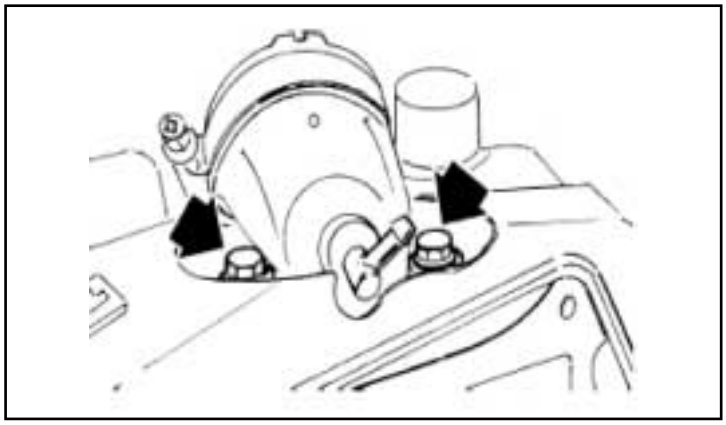
- Reassemble the drive pulley assembly, the belt, the gears, and the transmission cover, as described in the Chapter on Transmissions.

- **For the checks corresponding to lubrication problems in the rocker link articulation, please refer to the Chapter "Crankcase and Engine Shaft".**



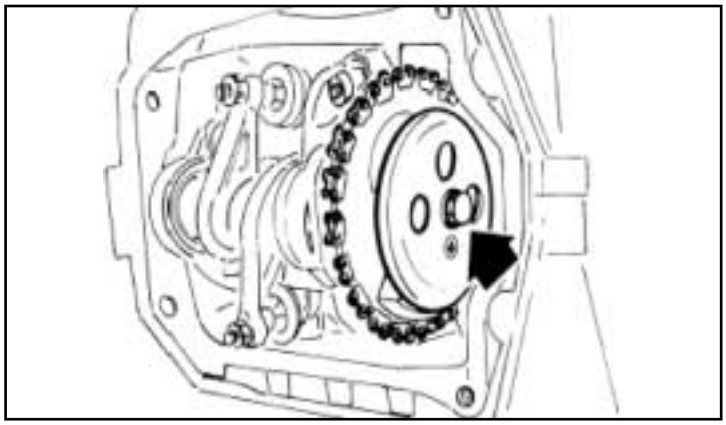
Dis-assembling the cooling system deflectors

- Remove the magneto cover deflector and the fan; please refer to Chapter “Magneto”.
- Remove the tappet cover together with the decanter cover; please refer to Chapter “General and Maintenance Information”.
- Slacken off the clamp and take the carburettor off the manifold.
- Remove the two securing screws as shown in the figure and withdraw the manifold.
- Withdraw the two self-tapping screws and the securing screw on the side of the crankcase.
- Remove the two deflectors and the spark-plug seat cover.
- Remove the deflector to crankcase sealing gasket.

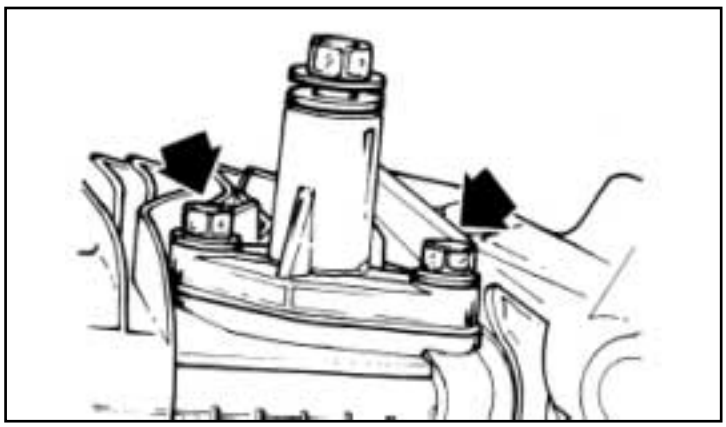


Dis-assembling the timing drive

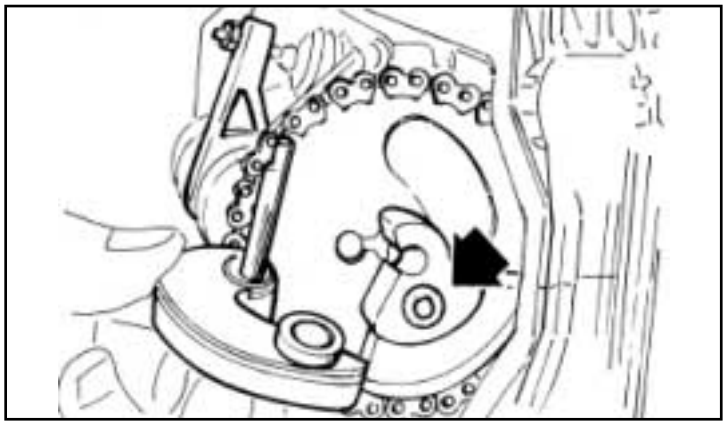
- Remove the part listed as follows: drive cover, drive pulley and drive belt, starter pinion, oil sump and spring and By-pass piston, oil pump pulley cap, O-Ring on engine shaft, and the pinion distance washer.
- Remove the tappet cover.
- Extract the central screw and washer from the tappet weight retaining hub as shown in the figure.
- Remove the automatic tappet weight return spring, the tappet weight and stop washer.



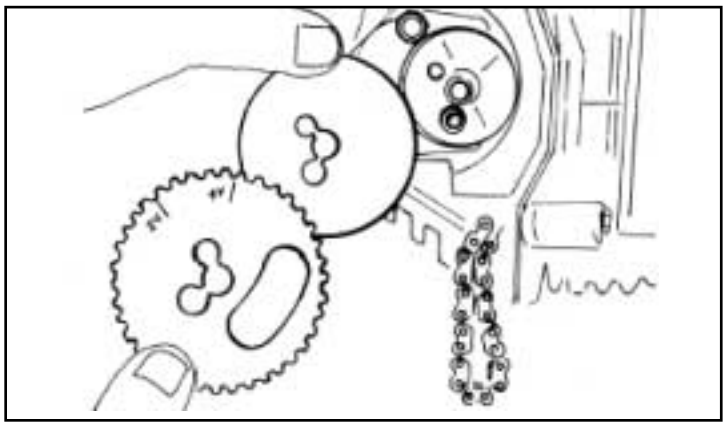
- First slacken off the central tensioner securing screw.
- Remove the two securing screws as shown in the figure.



- Remove the internal hex head screws and the counterweight as shown in the figure.

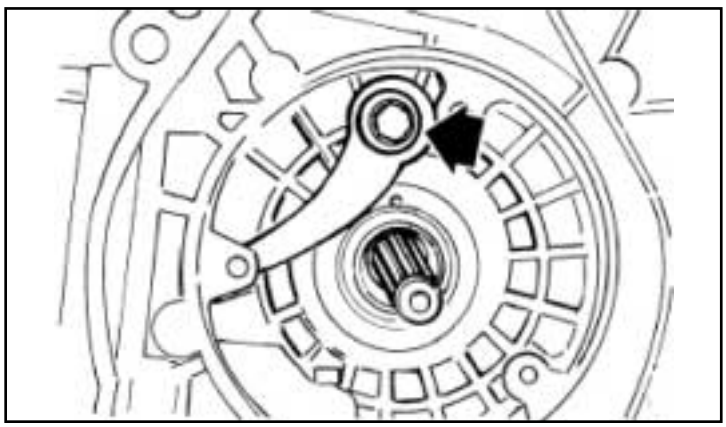


- Remove the camshaft drive pulley and the washer.
- Withdraw the timing drive pinion from the engine shaft.



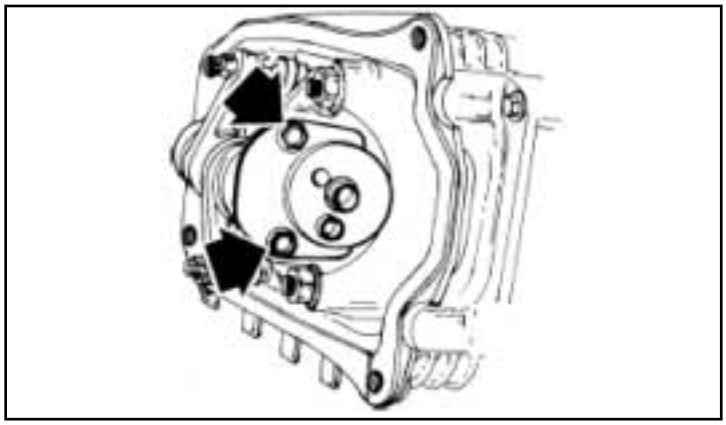
- Remove the screw as shown in the figure, the distance piece and the tensioner as shown in the figure.

N.B.: It is recommended to matchmark the chain to assure maintenance of the direction of rotation. In order to remove the tensioner shoe, it is necessary to work from the transmission side. The chain guide shoe can only be removed after disassembling the cylinder head.

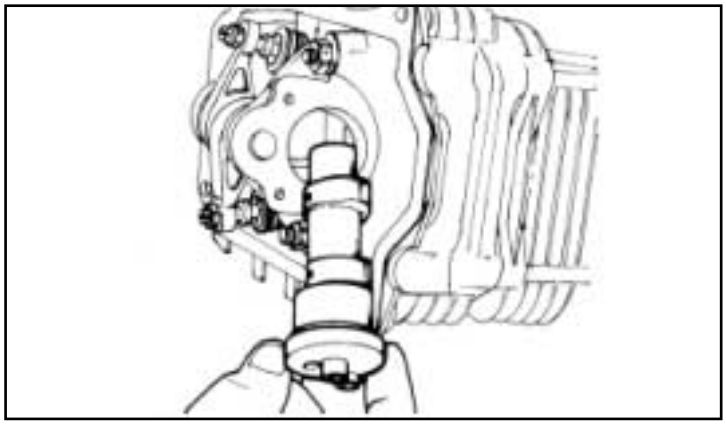


Dis-assembling the camshaft and the rockers

- Remove the two camshaft securing screws and clamp as shown in the figure.

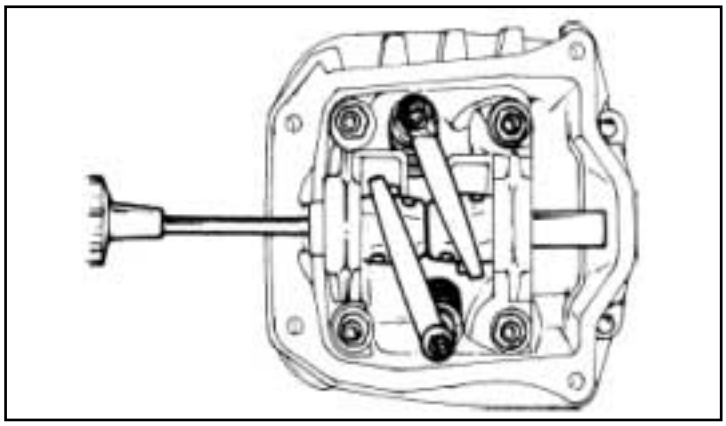


- Remove the camshaft.



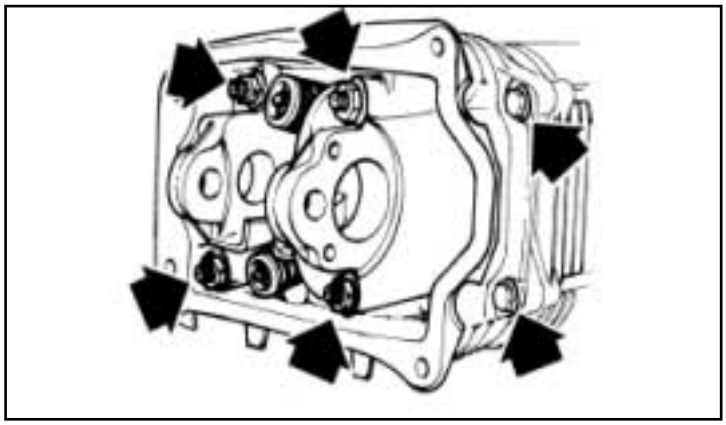
- Remove the rocker shaft working from the hole on the magneto side.
- Remove the rockers and the spring washer.

N.B.: Matchmark the assembly position of the rockers in order to avoid inverting the operation of inlet and exhaust.



Dis-assembling the cylinder head

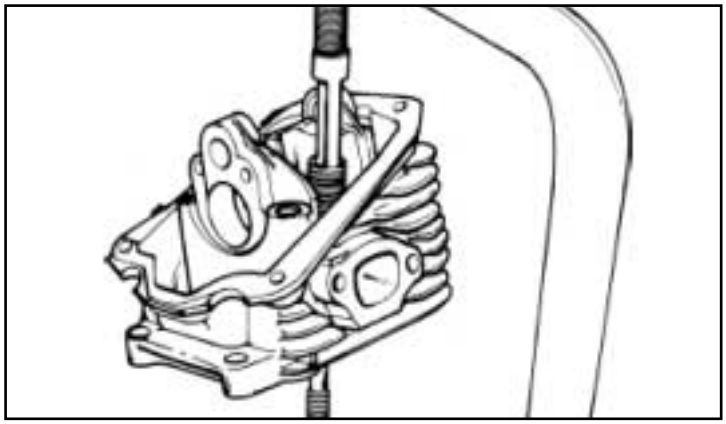
- Remove the spark-plug.
- Remove the 2 side securing screws as shown in the figure.
- Slacken off the 4 cylinder head-cylinder securing nuts in two or three rotations around the nuts following a cross pattern.
- Withdraw the cylinder head, the 2 centring pins and the gasket.



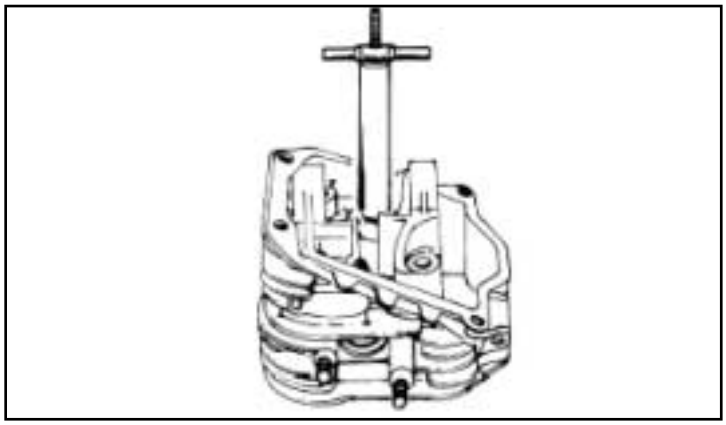
N.B.: If necessary, the cylinder head may be removed with the camshaft, rocker shaft and securing pin. The cylinder head may also be removed without withdrawing the chain or chain tensioner.

Dis-assembling the valves

- Use the special tool (part number 19.1.20382/11) fitted with the part shown in the figure to move on to remove the semi-cones, the spring plates, and the two valves.



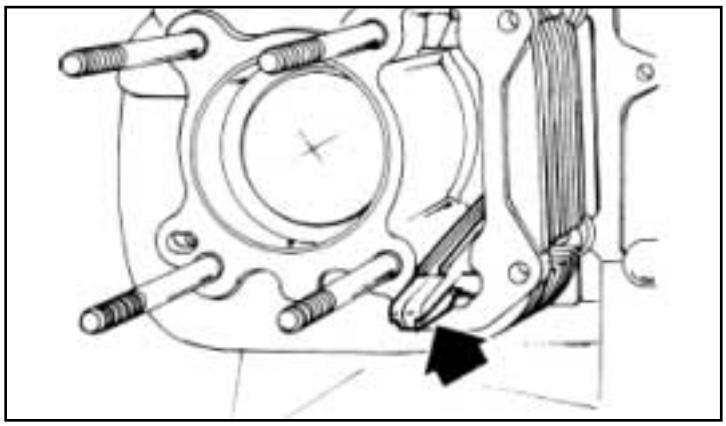
- Remove the oil seal using the appropriate special too (part number 19.1 20431).
- Remove the lower spring supports.



Dis-assembling the cylinder and the piston

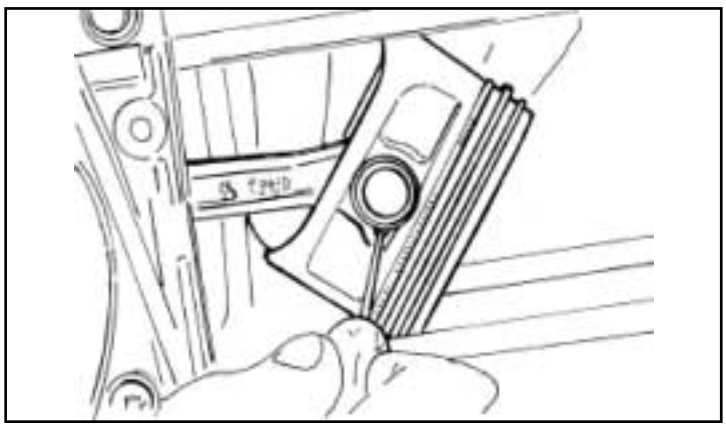
- Remove the chain guide shoe.
- Remove the cylinder base gasket.

Caution - in order to avoid damaging the piston, support it properly while dis-assembling the cylinder.



- Remove the 2 locking rings, the gudgeon pin, and the piston.
- Remove the piston rings from the piston.

N.B.: Take particular care not to damage the piston rings when dis-assembling them from the piston.



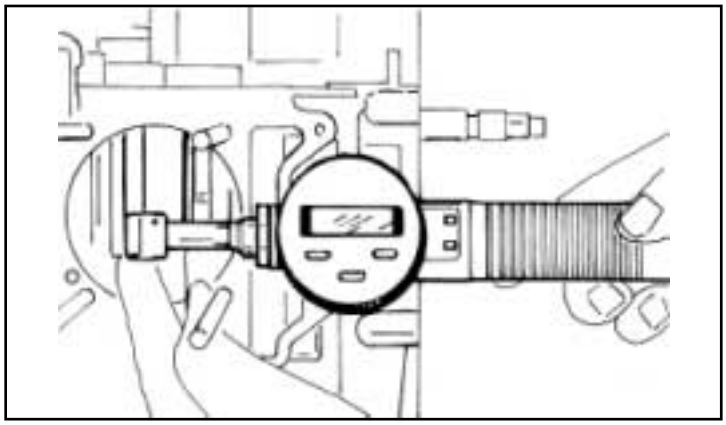
Checking the connecting rod little end.

- Use a internal micrometer measure the internal diameter of the little end.

Standard diameter: 15 $^{+0,015}_{+0,025}$ mm.

Maximum permitted diameter: 15.030 mm.

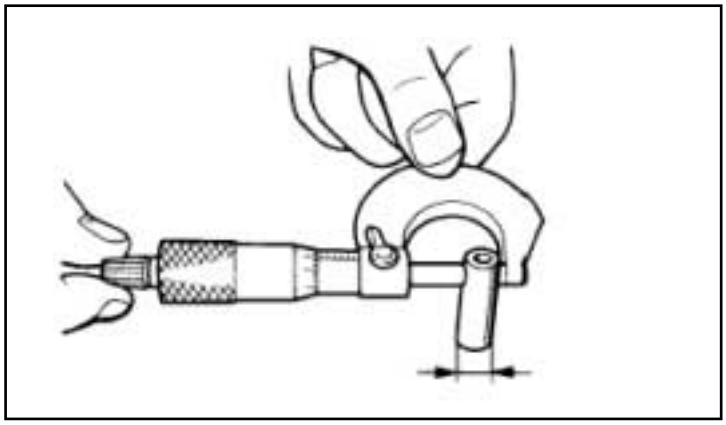
N.B.: When the diameter of the connecting rod little end is greater than the maximum permitted diameter, or if it shows signs of wear or localised heating, replace the engine shaft as described in the Chapter “Crankcase and Engine Shaft”.



Gudgeon pin diameter

- Check the outside diameter of the gudgeon pin.

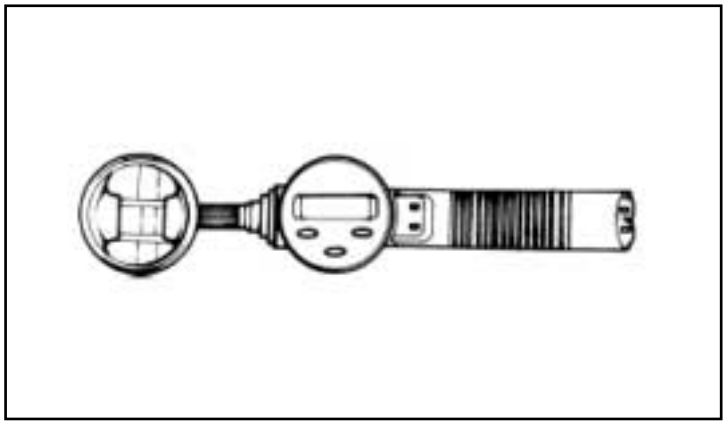
  Standard diameter: 15 mm
  Minimum acceptable diameter: 14.994 mm



- Calculate the play arising from matching the gudgeon pin to the piston.

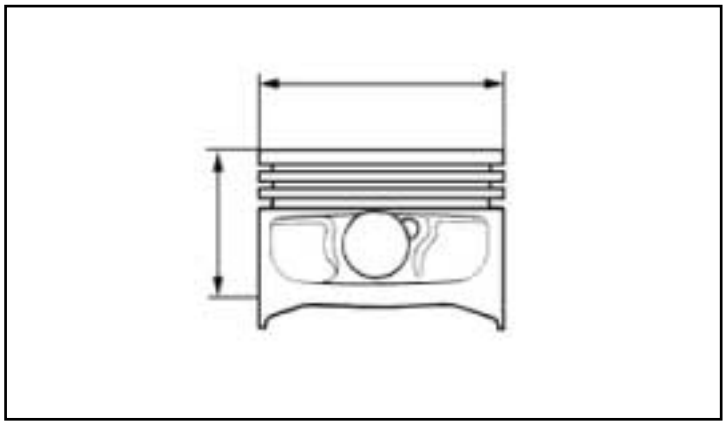
  Standard play: 0.001 ÷ 0.010 mm

N.B.: The gudgeon pin seatings are fitted with two lubrication channels: for this reason, the diameter should be measured in the direction parallel to the axis of the piston.



- Measure the external diameter of the piston following a direction square to the gudgeon pin axis.
- The measurement should be made at a depth of 36.5 mm from the crown of the piston, as is shown in the figure.

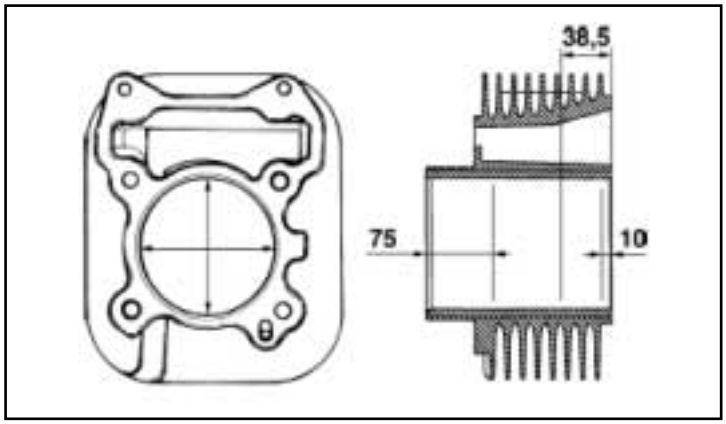
N.B.: The gudgeon pin seatings are fitted with two lubrication channels: for this reason, the diameter should be measured in the direction parallel to the axis of the piston.



- Use an interior micrometer to measure the internal dimensions of the cylinder following the directions shown in the figure, and at three different depths.
- Check that the mating surface with the cylinder head shows no signs of wear or deformation.

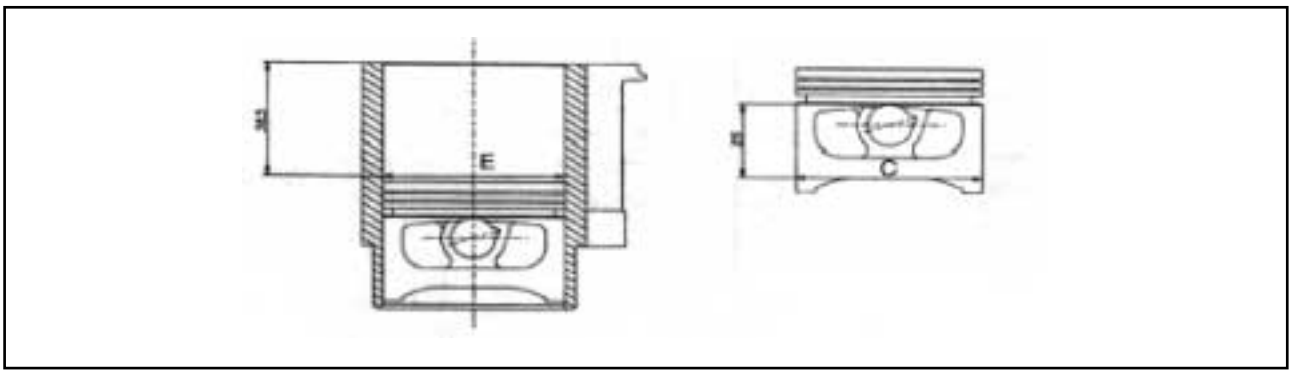
  Maximum permitted out of true: 0.05 mm

- The pistons and cylinders are classified into categories according to their diameters. Matching is carried out with similar categories as follows: A-A, B-B, C-C, D-D.



Vehicle Servicing Data 125 cc. 57 x 48,6 4T

Assembly Clearance



Mating classes

Value in mm.

PART	Dimensions	Mating classes			ASSEMBLY CLEARANCES
		Class	Cylinder	PISTÓN	
Cylinder	57 +0,025	A	56,997 ÷ 57,004	56,945 ÷ 56,952	0,045 0,059
		B	57,004 ÷ 57,011	56,952 ÷ 56,959	
Piston, cast pockets Piston, finished pockets	56,959 +0,014	C	57,011 ÷ 57,018	56,959 ÷ 56,966	
		D	57,018 ÷ 57,025	56,966 ÷ 56,973	
Cylinder, 1st oversize	57,2 +0,025	A1	57,197 ÷ 57,204	57,145 ÷ 57,152	
		B1	57,204 ÷ 57,211	57,152 ÷ 57,159	
Pistón 1st oversize	57,159 +0,014	C1	57,211 ÷ 57,218	57,159 ÷ 57,166	
		D1	57,218 ÷ 57,225	57,166 ÷ 57,173	
Cylinder, 2n oversize	57,4 +0,025	A2	57,397 ÷ 57,404	57,345 ÷ 57,352	
		B2	57,404 ÷ 57,411	57,352 ÷ 57,359	
Pistón 2n oversize	57,359 +0,014	C2	57,411 ÷ 57,418	57,359 ÷ 57,366	
		D2	57,418 ÷ 57,425	57,366 ÷ 57,373	
Cylinder, 3rd oversize	57,6 +0,025	A3	57,597 ÷ 57,604	57,545 ÷ 57,552	
		B3	57,604 ÷ 57,611	57,552 ÷ 57,559	
Pistón 3rd oversize	57,559 +0,014	C3	57,611 ÷ 57,618	57,559 ÷ 57,566	
		D3	57,618 ÷ 57,625	57,566 ÷ 57,573	

Vehicle Servicing Data 125 cc. 57 x 48,6 4T

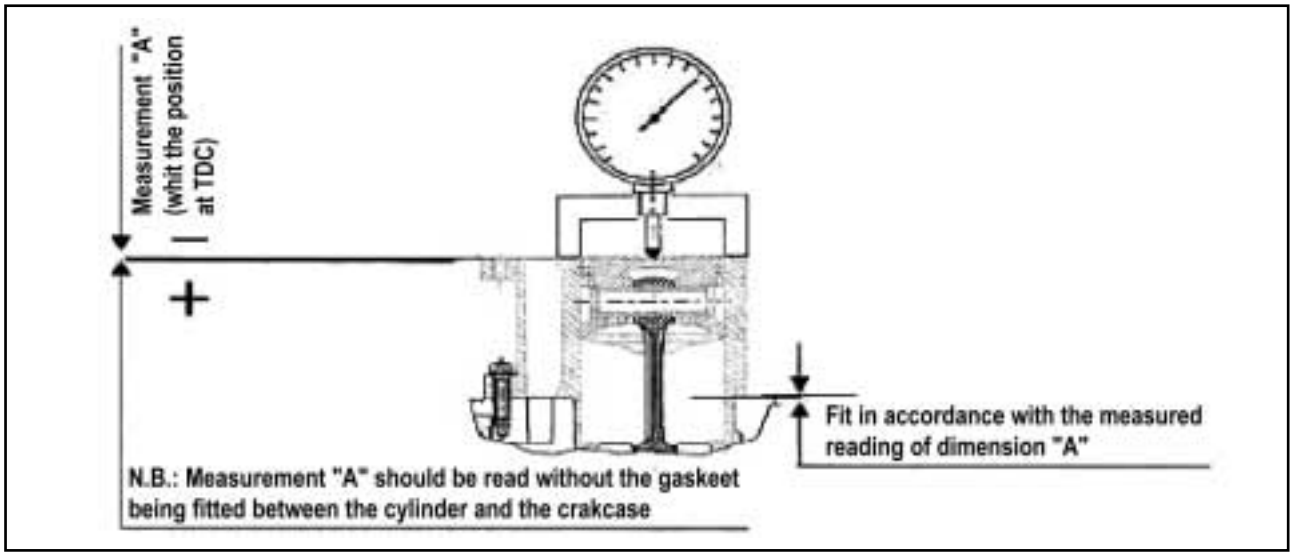
Oversize table

Value in mm.

DESIGNATION	DIMENSIONS	CATEGORY DESIGNATION	ASSEMBLY CLEARANCES
1st oil seal piston rings	57 x 1	A	0,20 ÷ 0,40
2nd oil seal piston rings	57 x 1	A	0,10 ÷ 0,30
3rd oil seal piston rings	57 x 2,5	A	0,15 ÷ 0,35
Compresion ring 1st oversize	57,2 x 1	A	0,20 ÷ 0,40
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
Compresion ring 2nd oversize	57,4 x 1	A	0,20 ÷ 0,40
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
Compresion ring 3rd oversize	57,6 x 1	A	0,20 ÷ 0,40
Oil scraper ring 3rd oversize	57,6 x 1	A	0,10 ÷ 0,30
Oil scraper ring 3rd oversize	57,6 x 2,4	A	0,15 ÷ 0,35

SYSTEM OF THICKNESSES TO MAINTAIN THE COMPRESSION RATIO

RC = 10,4 ÷ 11,2



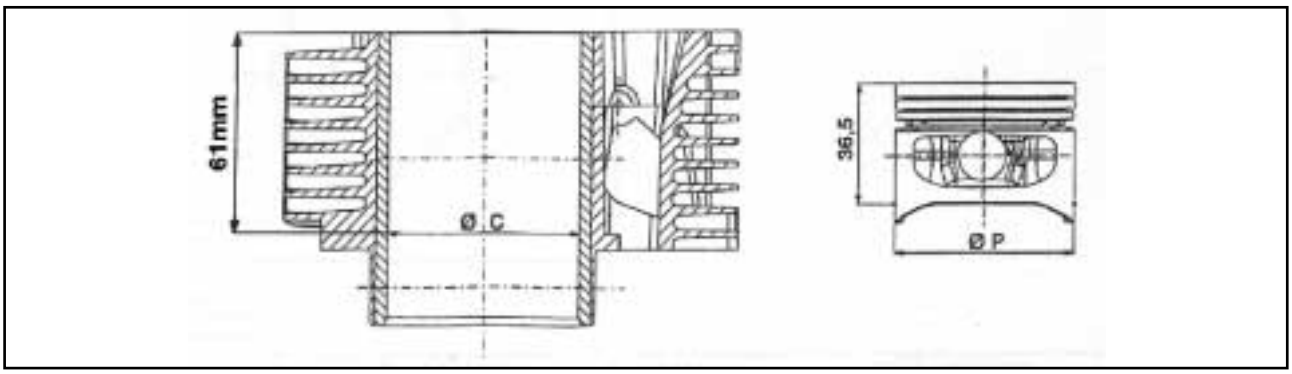
- Calculate the difference between the two measurements, using the table shown on the right. Identify the thickness of the cylinder base gasket to be used in re-assembly. The correct identification of the cylinder base gasket will give the correct compression ratio.
- Withdraw the special tool and the cylinder.

Measured dimension (mm)	Cylinder base gasket thickness (mm)
1 ÷ 1,1	0,8 ± 0,05
1,1 ÷ 1,3	0,6 ± 0,05
1,3 ÷ 1,4	0,4 ± 0,05

Standard Compression Ratio (CR): 10.6 ± 0.5

Vehicle Servicing Data 150 cc. 62,6 x 48,6 4T

Assemble clearances



Mating classes

Value in mm.

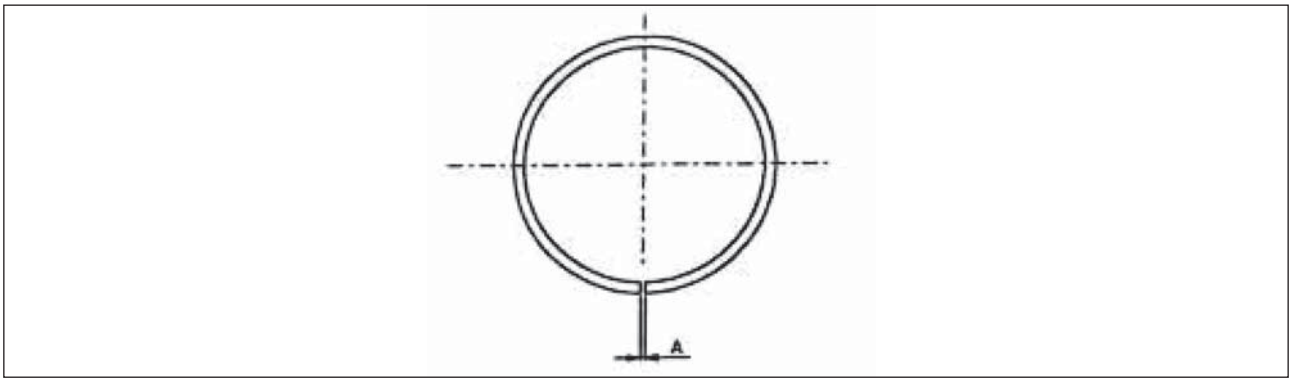
PART	Dimensions	Mating classes			ASSEMBLY CLEARANCES
		Class	Cylinder	Piston	
Cylinder Ø C	62,6 $^{+0,008}_{-0,020}$	A	62,580 ÷ 62,587	62,533 ÷ 62,540	0,040 ÷ 0,054
		B	62,587 ÷ 62,594	62,540 ÷ 62,547	
Piston Ø P	62,547 ±0,014	C	62,594 ÷ 62,601	62,547 ÷ 62,554	
		D	62,601 ÷ 62,608	62,554 ÷ 62,561	
Cylinder 1st oversize Ø C	62,8 $^{+0,008}_{-0,020}$	A1	62,780 ÷ 62,787	62,733 ÷ 62,740	
		B1	62,787 ÷ 62,794	62,740 ÷ 62,747	
Piston 1st oversize Ø P	62,747 ±0,014	C1	62,794 ÷ 62,801	62,747 ÷ 62,754	
		D1	62,801 ÷ 62,808	62,754 ÷ 62,761	
Cylinder 2nd oversize Ø C	63,0 $^{+0,008}_{-0,020}$	A2	62,980 ÷ 62,987	62,933 ÷ 62,940	
		B2	62,987 ÷ 62,994	62,940 ÷ 62,947	
Piston 2nd oversize Ø P	62,947 ±0,014	C2	62,994 ÷ 63,001	62,947 ÷ 62,954	
		D2	63,001 ÷ 63,008	62,954 ÷ 62,961	
Cylinder 3rd oversize Ø C	63,2 $^{-0,008}_{-0,020}$	A3	63,180 ÷ 63,187	63,133 ÷ 63,140	
		B3	63,187 ÷ 63,194	63,140 ÷ 63,147	
Piston 3rd oversize Ø P	63,147 ±0,014	C3	63,194 ÷ 63,201	63,147 ÷ 63,154	
		D3	63,201 ÷ 63,208	63,154 ÷ 63,161	

VEHICLE SERVICING DATA 150 CC. 62,6 X 48,6 4T

Oversize table

Value in mm

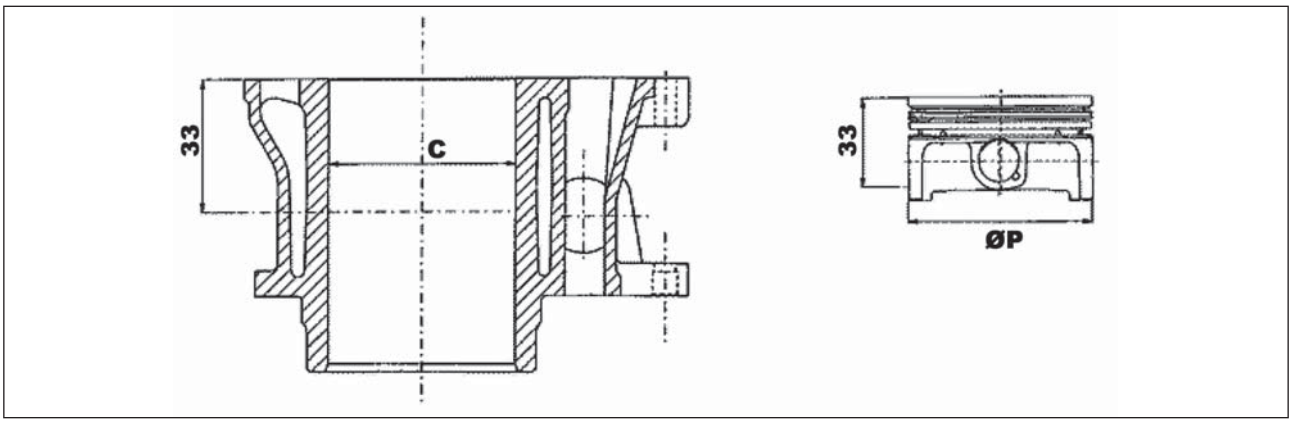
DESIGNATION	DIMENSIONS	CATEGORY DESIGNATION	ASSEMBLY CLEARANCES
1st oil seal piston rings	62,6 x 1	A	0,15 ÷ 0,30
2nd oil seal piston rings	62,6 x 1	A	0,20 ÷ 0,40
3rd oil seal piston rings	62,6 x 2,5	A	0,20 ÷ 0,40
Compresion ring 1st oversize	62,8 x 1	A	0,15 ÷ 0,30
Oil scraper ring 1st oversize	62,8 x 1	A	0,20 ÷ 0,40
Oil scraper ring 1st oversize	62,8 x 2,5	A	0,20 ÷ 0,40
Compresion ring 2nd oversize	63,0 x 1	A	0,15 ÷ 0,30
Oil scraper ring 2nd oversize	63,0 x 1	A	0,20 ÷ 0,40
Oil scraper ring 2nd oversize	63,0 x 2,5	A	0,20 ÷ 0,40
Compresion ring 3rd oversize	63,2 x 1	A	0,15 ÷ 0,30
Oil scraper ring 3rd oversize	63,2 x 1	A	0,20 ÷ 0,40
Oil scraper ring 3rd oversize	63,2 x 2,5	A	0,20 ÷ 0,40

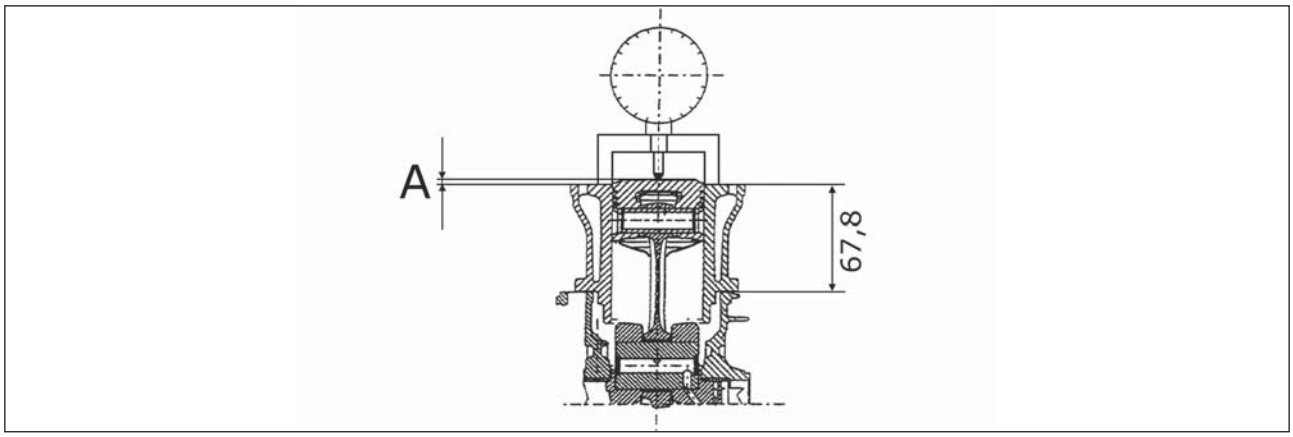


CYLINDER - PISTON ASSY

Categories coupling 200

NAME	PLAY	INITIALS	CYLINDER	PISTON	PLAY ON FITTING
Cylinder	72 + 0,018 - 0,010	B	71,997 + 72,004	71,960 + 71,967	0,030 - 0,044
Cylinder	72 + 0,018 - 0,010	A	71,990 + 71,997	71,953 + 71,960	0,030 - 0,044
Piston	71,967 ± 0,014	D	72,011 + 72,018	71,974 + 71,981	0,030 - 0,044
Piston	71,967 ± 0,014	C	72,004 + 72,011	71,967 + 71,974	0,030 - 0,044





The lenght <**A**> to be measured refers to the pieston protrusion. It indicates the amount by which the surface formed by the piston crown tops the surface formed by the upper part of the cylinder. The more the piston descends into the cylinder, the less the base gasket to be applied (to recover the compression ratio) will be and vice versa.

Note

The measurement of <**A**>, must be carried with the piston at the TDC, without any gasket installed between the crankcase and the cylinder, and after resetting the comparator, complete with support, on a rectified surface.

125 cc VERSION WITH METALLIC HEAD GASKET (0,3)

NAME	MEASURE A	THICKNESS
Thicknesses 125	1,40 ÷ 1,65	0,4 ± 0,05
Thicknesses 125	1,65 ÷ 1,90	0,6 ± 0,05

Characteristic

Compression ratio - 200cc version

Rc: 11 ÷ 12:1

200 cc VERSION WITH METALLIC HEAD GASKET (0,3)

NAME	MEASURE A	THICKNESS
Thicknesses 200	2,50 ÷ 2,40	0,4 ± 0,05
Thicknesses 200	2,40 ÷ 2,20	0,6 ± 0,05
Thicknesses 200	2,20 ÷ 2,10	0,8 ± 0,05

Characteristic

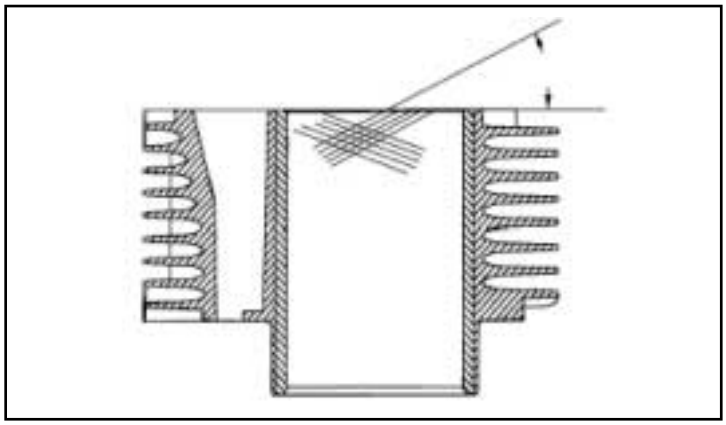
Compression ratio - 125cc version

Rc: 11,50 ÷ 13:1

OVERSIZE 200CC ENGINE

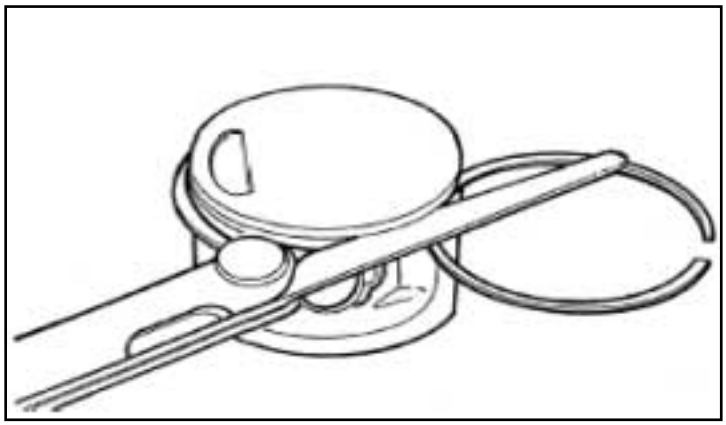
NAME	DENOMINATION	DIMENSIONS	INITIALS	QUANTITY
Scraper ring lining		72 x 2,5	A	0,20 ÷ 0,40
Scraper ring lining		72 x 1	A	0,20 ÷ 0,40
Compression lining		72 x 1,5	A	0,15 ÷ 030

- The cylinder should be re-bored in such a way as to ensure that the finish observes the original angulation.
- The cylinder surface should present a roughness of 0.9 microns
- This is indispensable in order to ensure correct fit of the oil seals, and in this way guarantee minimum oil consumption and optimum performance.
- Oversize pistons are available to match the cylinder, subdivided into three classes 1st, 2nd, and 3rd, corresponding to 0.2, 0.4 and 0.6 mm oversizes. The oversizes are in turn divided into four classes: A-A, B-B, C-C, and D-D.



Piston

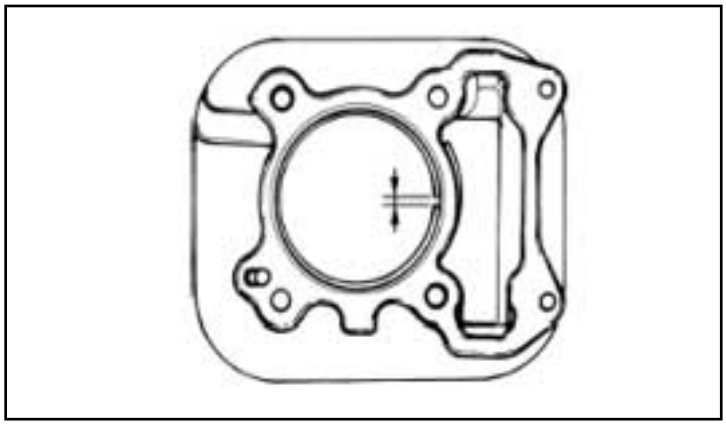
- Take care to clean the grooves for the oil seal piston rings very carefully.
- Using appropriate feeler gauges, measure the mating clearance between the oil seal piston rings and the piston grooves, as shown in the figure.
- If clearances are found to be greater than those indicated in the table, replace the piston.



	Normal clearance (mm)	Wear limit: max. clearance
Top ring	0,025 ÷ 0,070	0,080
Middle ring	0,015 ÷ 0,060	0,070
Oil scraper ring	0,015÷ 0,060	0,070

Oil seal rings

- Insert the pistons rings one by one into the cylinder, in the area where it is still the original diameter. The rings should be inserted perpendicular to the bore, using the piston to push them down.
- Measure the gap at the ends of the piston rings, as shown in the figure, using feeler gauges.
- If the measured gaps are higher than those shown in the table, the piston rings should be replaced.

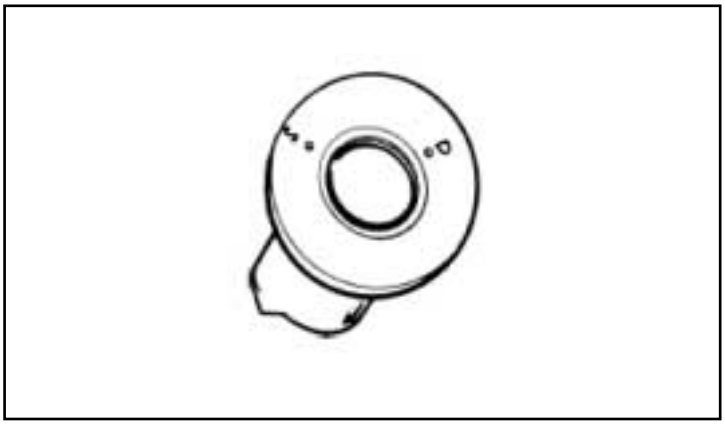


N.B.: Before proceeding to replace the piston rings, take care to observe the specifications relating to the match between the piston rings and the piston grooves, and between the piston and the cylinder. It should be borne in mind that fitting new piston rings into a used cylinder may give rise to conditions where the fit is different from the normal values.

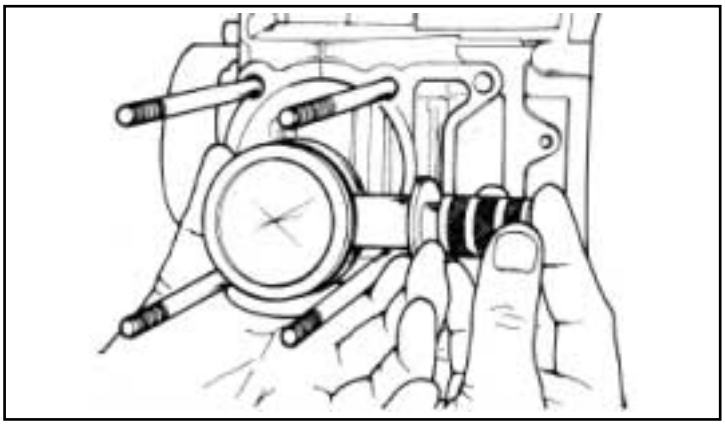
	Normal gap	maximum gap
Top ring	0,15÷ 0,30	0,40
Middle ring	0,20 ÷ 0,40	0,50
Oil scraper ring	0,20 ÷ 0,40	0,50

Fitting the piston

- Fit the piston, with the gudgeon pin, over the connecting rod, taking care to align the piston so that the arrow faces the exhaust port.
- Insert the gudgeon pin locking ring using the special tool (part number 19.1.20.430).



- With the locking ring gap in the position indicated in the tool, insert the locking ring into position with the punch.
- Then fit the gudgeon pin seal using the punch as shown in the figure.

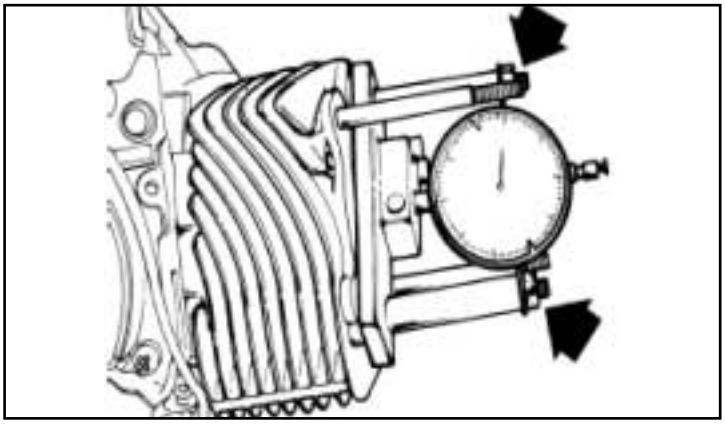


N.B.: The tool for fitting the locking rings should be employed using hand pressure only.

Caution - Using a hammer may cause damage to the ring seatings.

Checking the piston for concavity

- Fit the cylinder provisionally over the piston, without using a gasket at the cylinder base.
- Mount a comparator onto the special tool (part number 19.1.20428).
- Set the comparator to zero using a reference plane, using a preset load, for example, of 5 mm. Keeping this zero position, place the tool. Over the cylinder, and secure it using the two securing screws as shown in the figure.
- Turn the engine shaft until it reaches TDC (the point at which the comparator reverses its direction of rotation).



- Calculate the difference between the two measured readings: and using the table shown at the right, identify which cylinder base gasket should be used for re-assembly. Correct identification of the thickness of the cylinder base gasket will give the correct compression ratio.
- Withdraw the special tool from the cylinder.

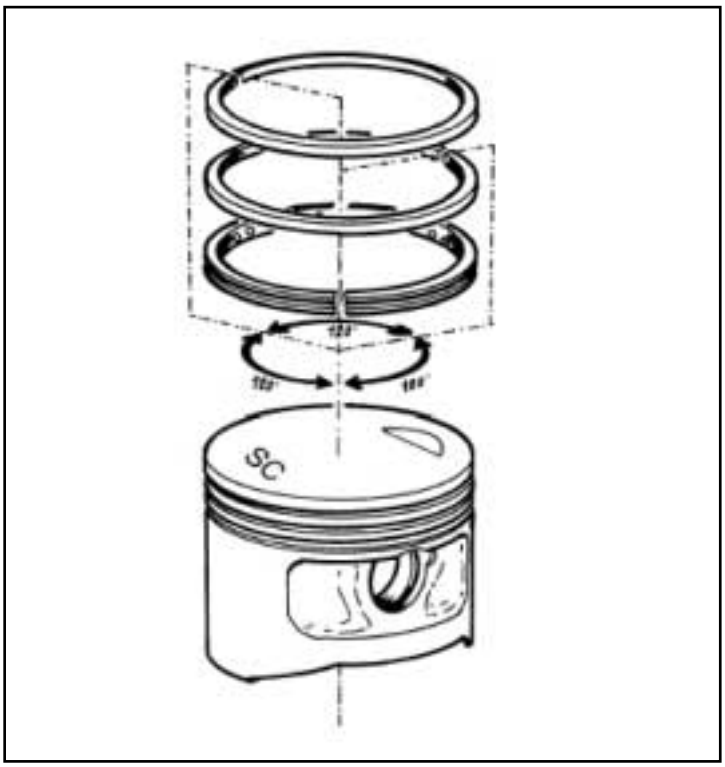
Measured dimensions (mm)	Base Gasket thickness (mm)
1 ÷ 1,1	0,8 ± 0,05
1,1 ÷ 1,3	0,6 ± 0,05
1,3 ÷ 1,4	0,4 ± 0,05

150 cc.

Normal compression ratio:
CR = 10.6 ± 0.5

Fitting the oil-seal piston rings

- Fit the oil seal piston ring spring over the piston.
- Fit the oil seal piston ring, keeping the gap on the side opposite to the gap in the spring, and the wording “TOP” facing up towards the crown of the piston. The manufactured step must in all circumstances be fitted so as to face up towards the crown of the piston.
- Fit the 2nd piston ring, the oil seal ring, with its identification letter or the words “TOP” facing up towards the piston crown. The manufactured step must in all circumstances be fitted so as to face down away from the crown of the piston.
- Fit the 3rd piston ring, the oil seal ring, with its identification letter or the wording “TOP” facing up towards the piston crown.

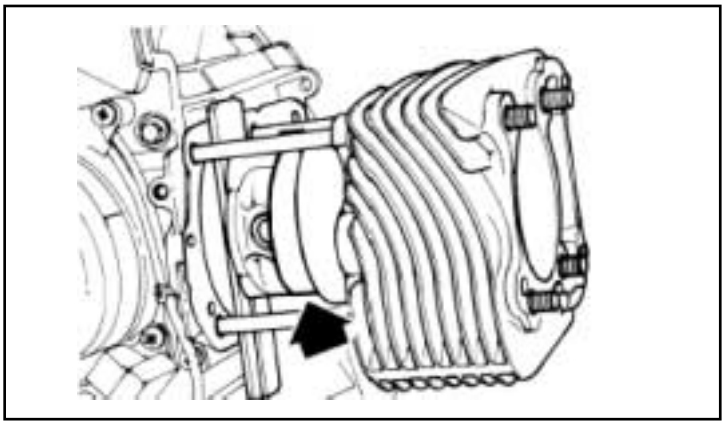


N.B.: In order to achieve a closer fit with the two oil seal piston rings, they are manufactured with the surface in contact with the cylinder of a conical section.

- Fit the piston rings with the gaps out of phase by 120º as shown in the figure.
- Lubricate the parts with engine oil.

Fitting the cylinder

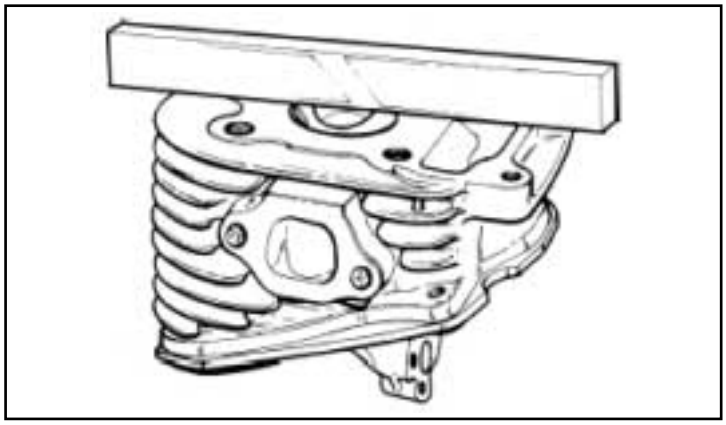
- Offer up the new cylinder base gasket, chosen with the thickness as determined above.
- Using the special fork tool (part number 19.1.20426) and the piston ring compressor (part number 19.1.20427), assemble the cylinder over the piston as shown in the figure.



N.B.: Before fitting the cylinder, carefully blow out the oil ways and grease the cylinder lining.

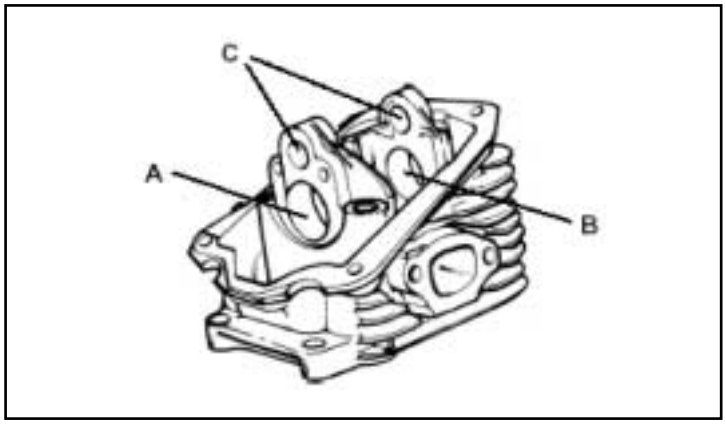
Checking the cylinder head

- Use a straight edge to check that the flat mating surface of the cylinder head shows no signs of wear or unevenness.



Maximum out of true: 0.05 mm

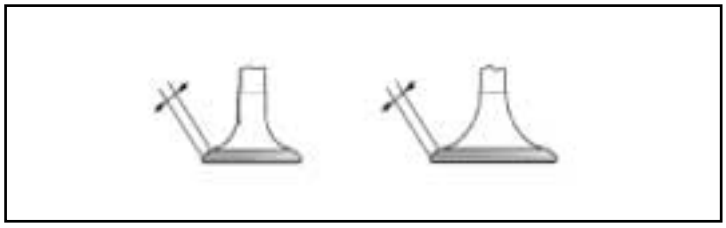
- Check that the camshaft seatings and the rocker shaft seatings show no signs of wear.
- Check that there is no wear on the mating surface for the cylinder head cover, the inlet manifold, of the exhaust manifold.



	Normal Diameter (mm)
A	Ø 12 ÷ 12,018
B	Ø 20 ÷ 20,021
C	Ø 32,5 ÷ 32,525

Checking the seating of the valves

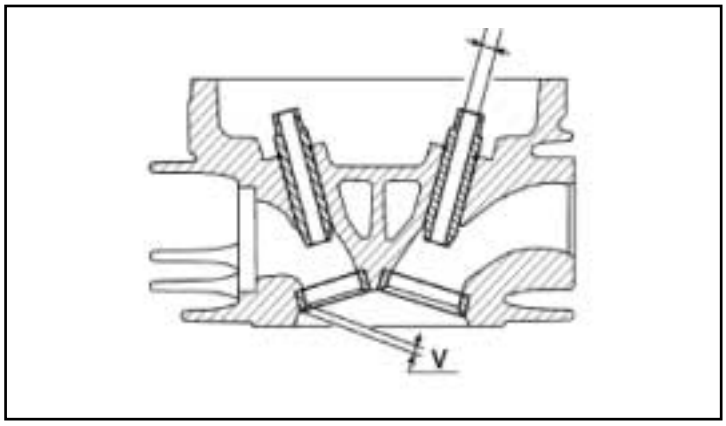
- Measure the width of the sealing surface with the valve seats.



Sealing surface width
Inlet: 3.1 mm
Exhaust: 3 mm

Checking the valve seats

- Clean the valves guides of any carbon deposits.
- Measure the internal diameter of each valve guise.
- Carry out the measurements in accordance with the direction of the rocker force, and at three different depths.



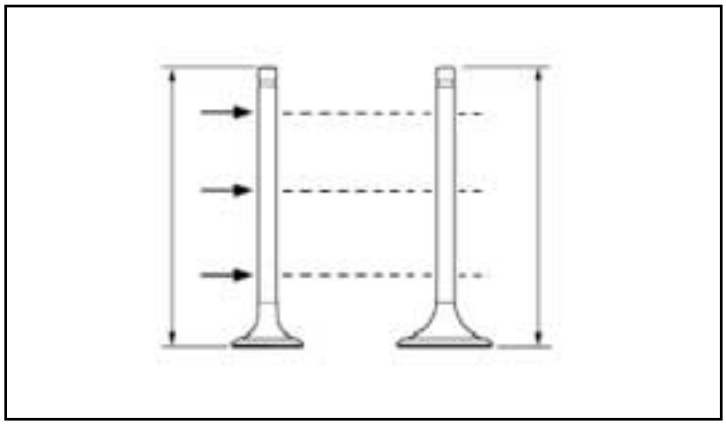
Exhaust valve guide
Normal diameter: 5.022 mm

Inlet valve guide

- Normal diameter: 5.022 mm

- In the event that the readings of the width of the valve seating on the valve seat surface, or the diameter of the valve guide exceed the specified values, replace the cylinder head. Check the width of the seating surface on the valve seat **"V"**: maximum limit of wear: 1.6 mm

Checking the valves
- Check the diameter of the valve stem at the three points as shown in the figure.



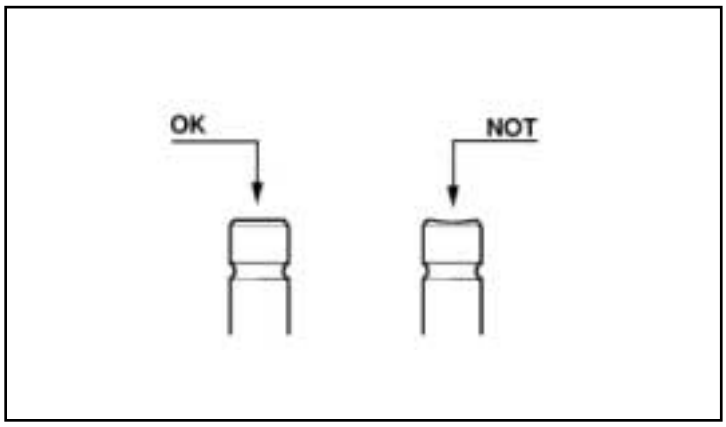
Minimum permitted diameter
Inlet: 4.96 mm
Exhaust: 4.95 mm

- Calculate the play between the valve and the valve guide.

Normal play:
Inlet: 0.013 ÷ 0.040 mm
Exhaust: 0.025 ÷ 0.052 mm

Maximum permitted play:
Inlet: 0.062 mm
Exhaust: 0.072 mm

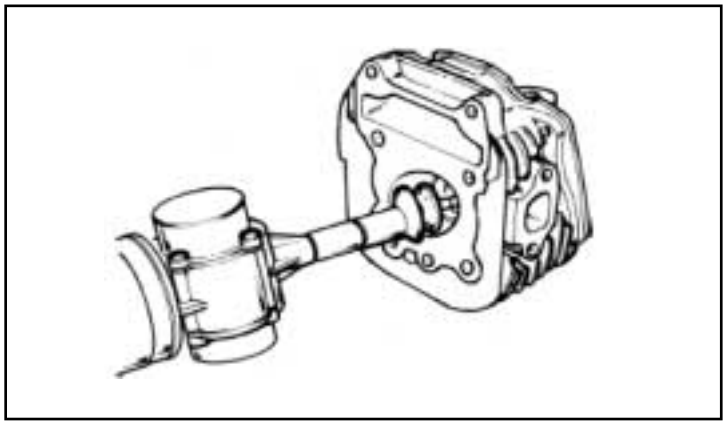
- Check that there is no wear on the contact surface of the articulated adjustment point.



Normal length of the valve
Inlet: 80.6 mm
Exhaust: 79.6 mm

- If the sealing surface of the valve is measured to be greater that the specified limit, has a non-continuous surface in one or more points, or is clearly curved, replace the valve.

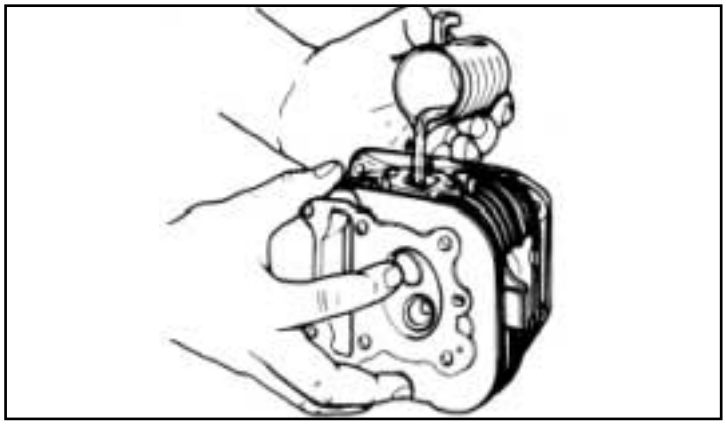
- If the checks carried out as described above show no signs of defects in the valves, the same ones may be used again. In order to achieve better sealing characteristics, it is recommended to grind the valves. This should be done working carefully and using fine grain grinding paste. While grinding the valves, support the cylinder head with the axis of the valves in a horizontal position, so as to avoid deposits of grinding paste entering into the valve guide – valve stem contact area (see the figure).



Caution - in order to avoid scratching the contact surface, do not continue to rotate the valve once the grinding paste has been used up. Wash the cylinder head and the valves very carefully using a product appropriate for the type of grinding paste used.

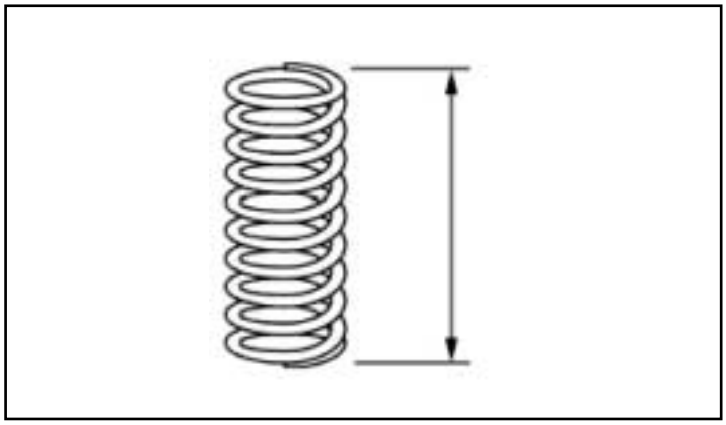
Testing the valve seat seal

- Insert the valves into the cylinder head.
- Test the two valves in turn.
- The test is carried out by filling the manifold with petrol, and checking whether the petrol seeps out past the valve while holding it shut with a finger.



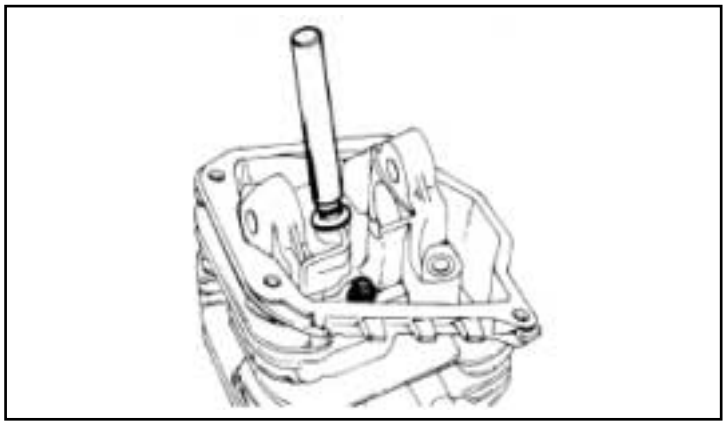
Checking the spring, bearing plates and semi-cones

- Check that the upper spring bearing plates and the semi-cones show no signs of defects.

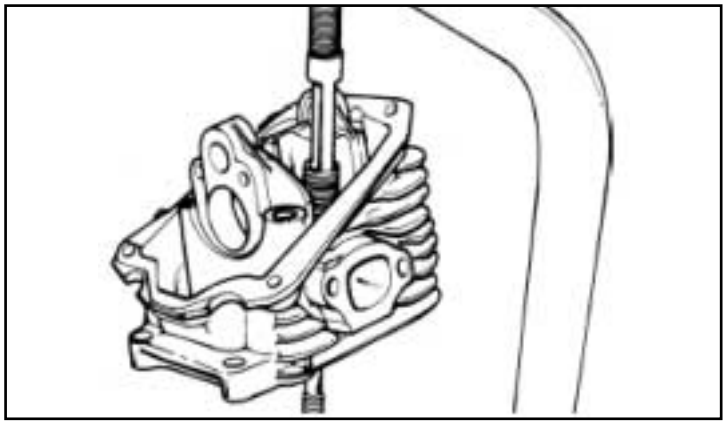


Assembling the valves

- Lubricate the valves guides using engine oil.
- Insert the valve spring bearer plates into the cylinder head.
- Using the special punch tool (part number 19.1.20306) insert the two retaining rings in turn.

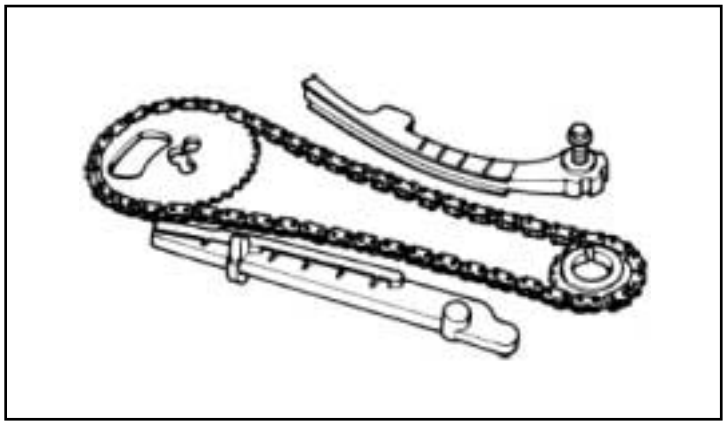


- Insert the valves, the valve springs, and the valve spring bearer plates. Using the special tool (part number 19.1.20382/11), with part no. 11 fitted, compress the valve springs and insert the semi-cones into their seatings.

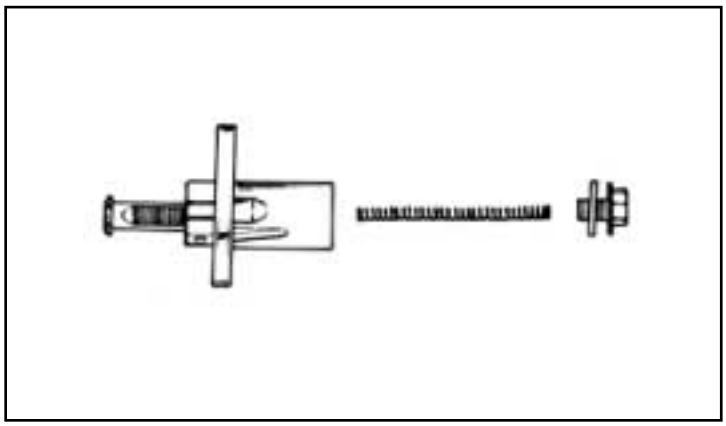


Checking the timing components

- Check that the guide shoe and the tensioner shoe are not excessively worn.
- Verify that there are no signs of wear in the chain, camshaft drive pulley and pinion assembly.
- If signs of wear are found, replace the parts, or if the chain, the pinion or the pulley are worn, replace the whole assembly.



- Remove the central securing screw and washer, and the tensioner spring. Check that there are no signs of wear in the one-way system.
- Check that the tensioner spring is in good working condition.
- If signs of wear are found, replace the entire assembly.

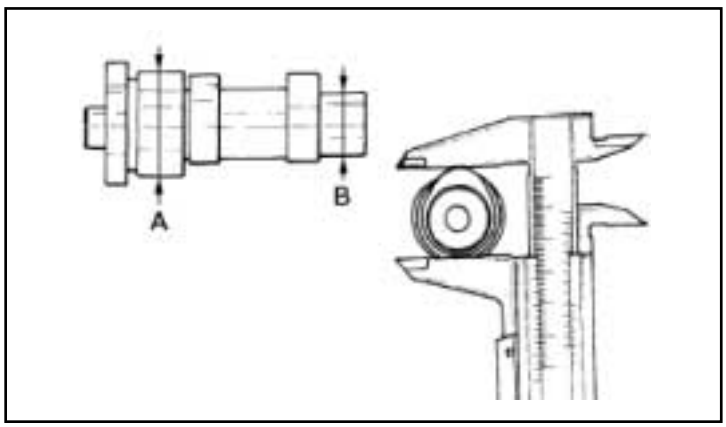


Checking the camshaft

- Check that there are no signs of wear or scratching on the camshaft bearing surfaces.

Normal diameter
Diameter surface A:
Ø 32.5 +0.025 -0.041 mm
Diameter surface B:
Ø 20 +0.020 -0.033 mm

Minimum permissible diameter
Diameter surface Ø A: 32.440 mm
Diameter surface Ø B: 19.950 mm

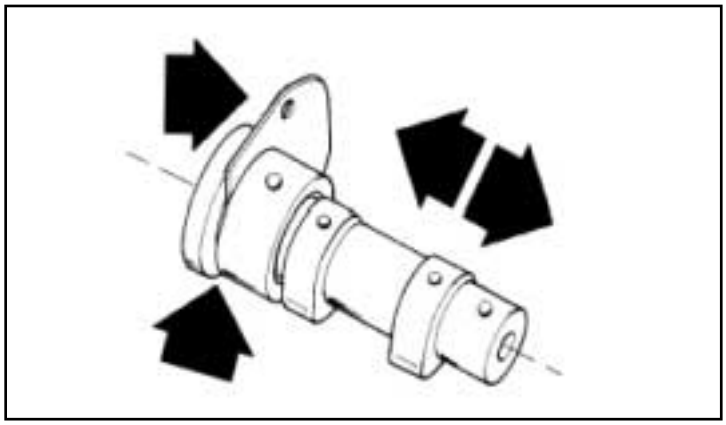


Normal height
Inlet: 27.8 mm
Exhaust: 27.8 mm

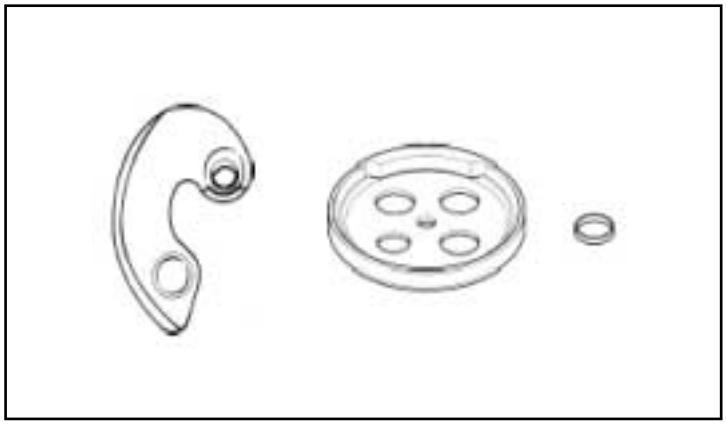
- Check that there are no signs of wear or scratching on the cams.

Maximum permissible axial play: 0.42 mm

- If any signs of wear, or measurements different from those specified are found, replace the defective parts.



- Check that there are no signs of wear in the automatic tappet cam, in the stop roller, or in the rubber stop on the restraining hub.
- Check that the tappet spring is not out of shape.
- If wear is found, replace the faulty parts.

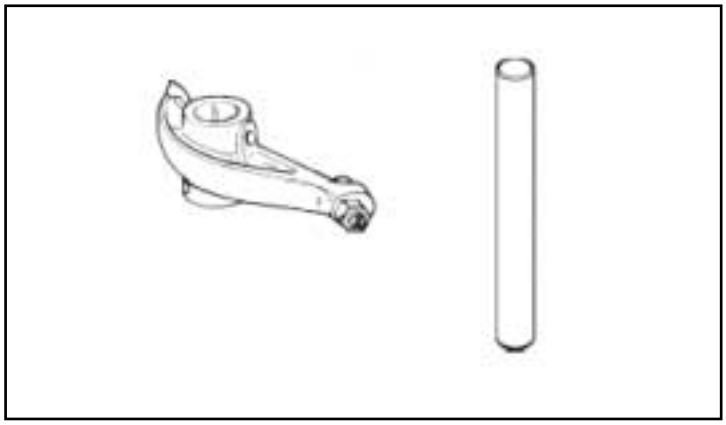


- Check that the rocker shaft show no signs of wear or scratching.

Minimum permissible diameter:
Ø 11.970 mm diam.

- Check the internal bore diameter of each rocker.

Maximum permissible diameter:
Ø 12.030 mm diam.



- Check that there are no signs of wear on the cam contact shoe or on the articulated adjustment plate.
- Check that the are no signs of wear on the spring washer controlling the axial play of the rockers. If any signs of defect are found, replace the damaged parts.

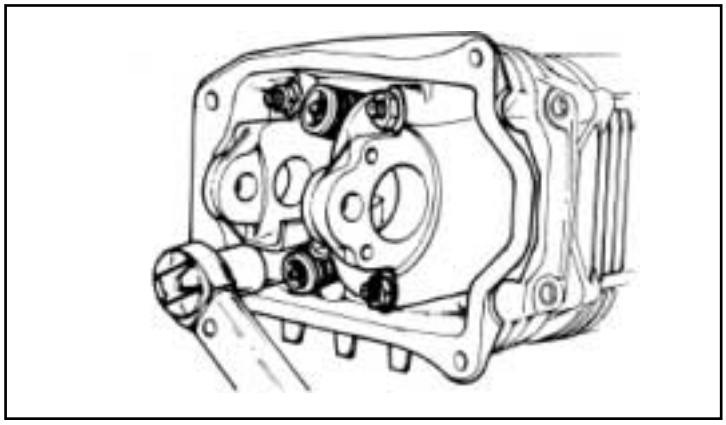
Assembling the cylinder head and timing components

- Insert the timing chain guide shoe. Insert the cylinder head – cylinder centring the pins. Place the cylinder head gasket on the cylinder and offer up the cylinder head.
- Tighten up the nuts and lock them in sequence up to the recommended torque setting in 2 or 3 rotations in a cross pattern.

Torque setting: 28 ÷ 20 N·m

- Fit the two timing chain side securing screws and lock them to the recommended torque setting.

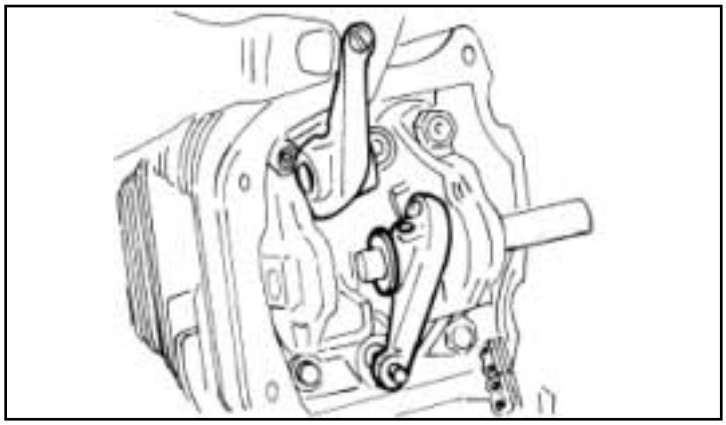
Torque setting: 11 ÷ 13 N·m



N.B.: Before assembling the cylinder head take care to ensure that the oil way is perfectly clean, by blowing it through with a jet of compressed air.

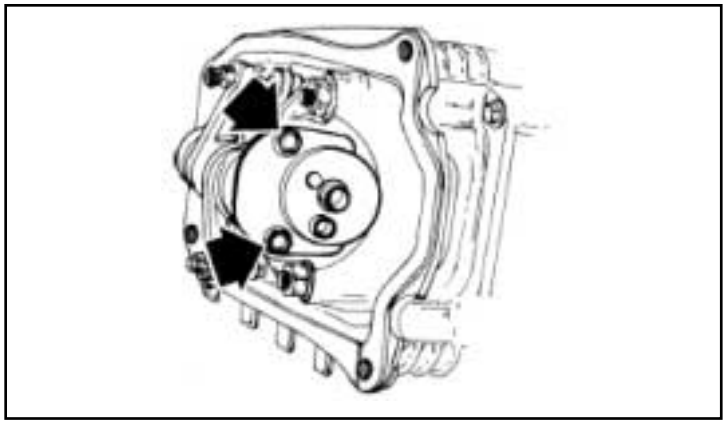
Assembling the cylinder head and the timing components

- Fit the timing chain drive pinion onto the engine shaft with the chamfer facing the insertion side.
- Assemble the timing chain over the engine shaft.
- Insert the tensioner shoe through the cylinder head.
- Fit the distance piece and securing screw.
- Fit the rocker shaft, the exhaust rocker, the spring washer, and the inlet rocker.
- Lubricate the 2 rockers through the upper oil holes.
- Lubricate the 2 cam shaft bearing surfaces and fit the camshaft to the cylinder head with the cams away from the rockers.



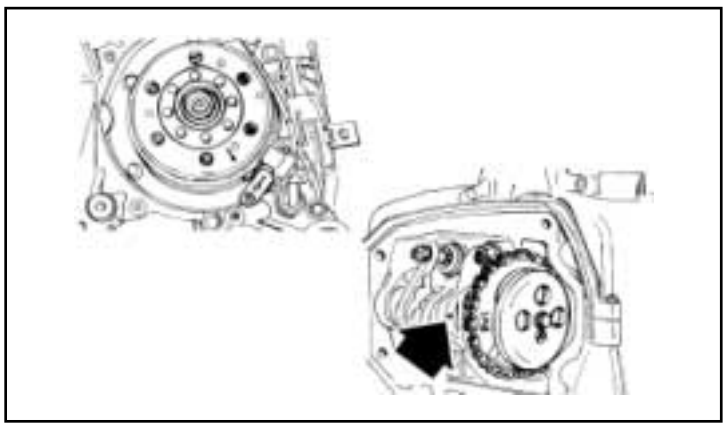
- Assemble the retainer plate and tighten the 2 securing screws as shown in the figure, locking them to the recommended torque setting.

Torque setting: 4 ÷ 6 N-m



- Assemble the distance piece onto the cam shaft.
- Place the piston in the Top Dead Centre position, using the reference marks located on the magneto and the engine crankcase.
- Keeping this orientation, place the timing chain onto the camshaft drive pulley, with the 2V timing mark aligned with the reference point marked on the cylinder head.
- Fit the pulley onto the camshaft.
- Assemble the counterweight with its securing screw tightened up to the recommended torque setting.

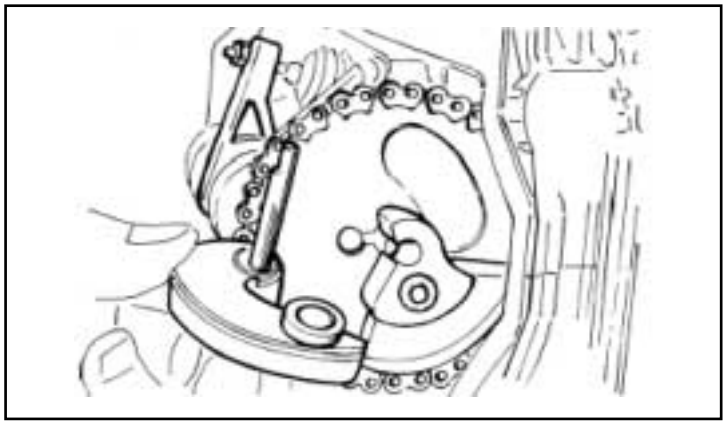
Torque setting.: 7 ÷ 8.5 N·m



- Insert the stop ring on the valve lifter weight and fit the valve lifter lever over the camshaft.

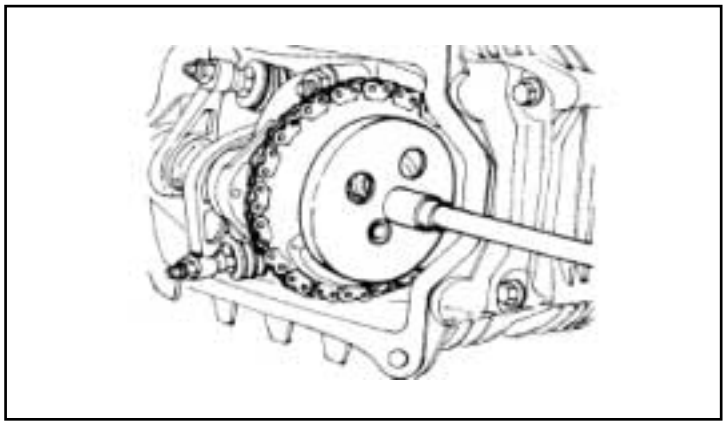
N.B.: Lubricate the stop ring with grease to avoid it accidentally slipping and falling into the interior of the engine.

- Fit the valve lifter return spring.
  During this operation the spring should be loaded to about 180º.



- Fit the retaining hub using the counterweight securing screw as a reference point.
- Lock the central securing screw up to the recommended torque.

Torque setting: 12 ÷ 14 N·m

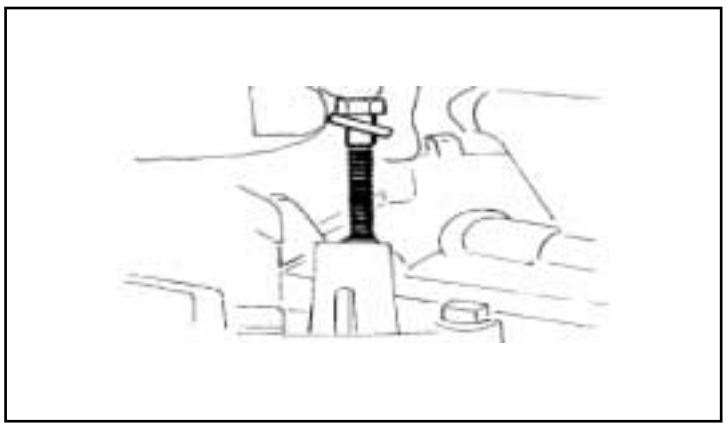


- Place the tensioner runner in its resting position.
- Assemble the tensioner over the cylinder using a new gasket, and lock the 2 securing screws up to the recommended torque.

Torque setting: 11 ÷ 13 N·m

- Insert the spring with the central securing screw and washer and lock to the recommended torque.

Torque setting: 5 ÷ 6 N·m



- Set the valve clearance as described in Chapter 1.
- Fit the spark plug.

Torque setting: 12 ÷ 14 N·m

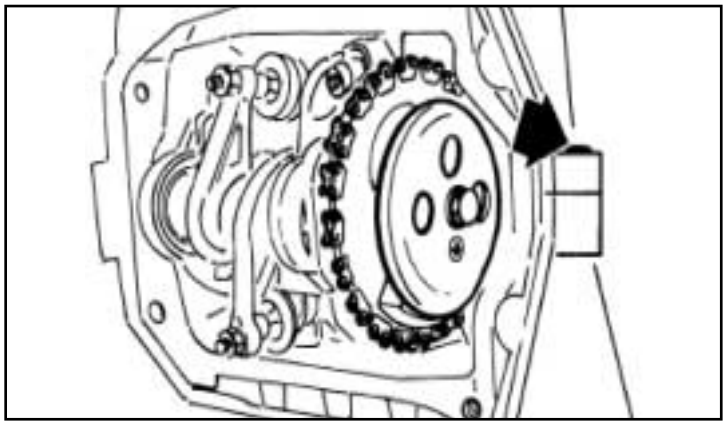
Specified spark plug: Champion RG4HC

Spark plug gap: 0.8 mm

- Place the deflector sealing gasket onto the cylinder head.
- When assembling use the timing chain side extensions as a reference point.
- Fit the deflector securing screw to the crankcase locking to the recommended torque, together with the 2 self-tapping half cover joining screws.

Torque setting: 3 ÷ 4 N·m

- Take care to ensure that the gasket does not slip from its sealing surface during assembly.
- Fit the spark plug access cover.

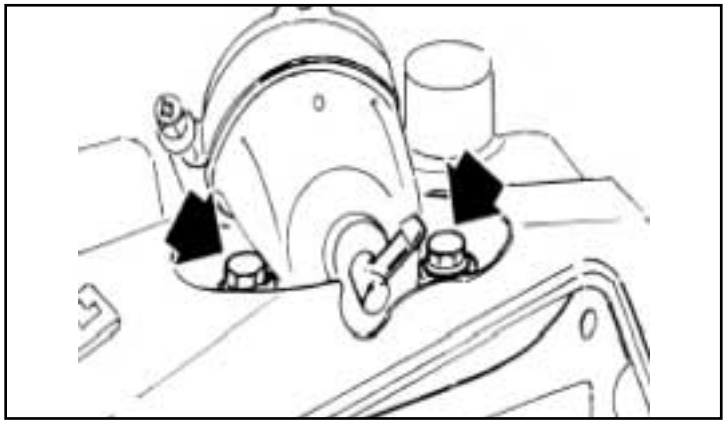


- Fit the inlet manifold, locking the 2 securing screws up to the recommended torque.

Torque setting: 11 ÷ 13 N·m

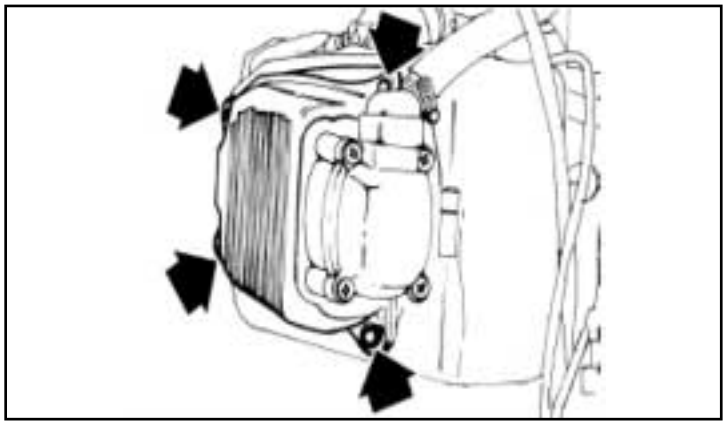
- Offer up the carburettor to the inlet manifold and tighten up the clamp.

N.B.: Align the carburettor correctly by means of the extension located on the inlet manifold.



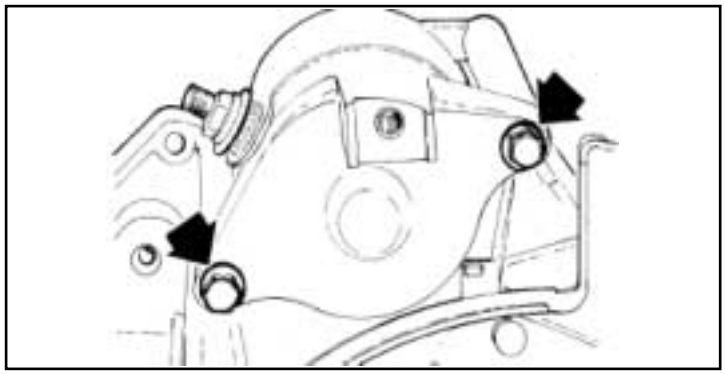
- Reassemble the cylinder head cover, locking the 4 securing screws up to the recommended torque.

Torque setting: 11 ÷ 13 N·m



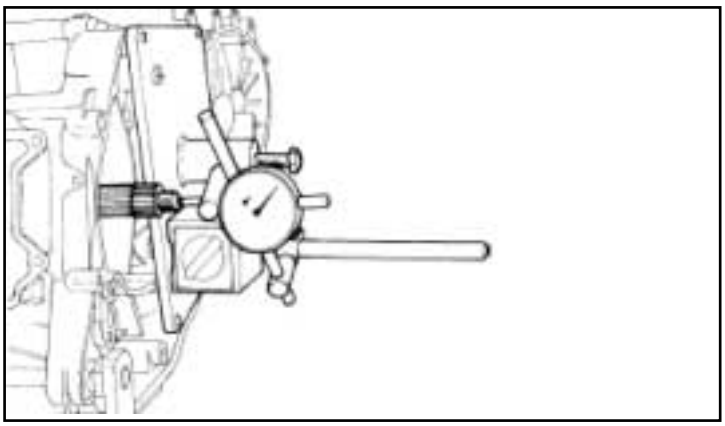
- Reassemble the fan and deflector.
- Reassemble the oil pump drive, the chain seating cover, the by-pass, and the oil sump, as described in the chapter on the Lubrication system.
- Reassemble the drive pulley, the belt and the drive cover as described in the chapter on the Drive.

- First remove the following assemblies: drive cover, drive pulley, driven pulley and belt, rear hub cover, gears, bearings, and oil seals, as described in the chapter on the **Drive.**
- Remove the oil sump. The By-pass, the chain seating cover, and the oil pump, as described in the chapter on **Lubrication.**
- Remove the magneto cover deflector, the fan, the magneto, and the stator, as described in the chapter on the **Magneto.**
- Remove the oil filter and the oil pressure bulb.
- Remove the cylinder-piston-cylinder head assembly, as described in the chapter on **Cylinder, Cylinder Head, Timing.**
- Remove the 2 securing screws as shown in the figure and the starter motor.



- Before opening the engine crankcase halves, it is necessary to check the axial play on the engine shaft. In order to do this, the special plate and support with comparator tool (part number 19.20.262-19.1.20335).

Normal play: 0.15 ÷ 0.40 mm

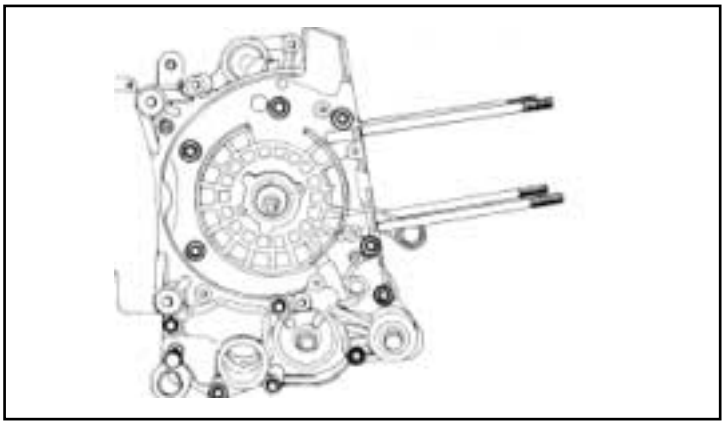


Opening the engine crankcase halves

- Remove the 11 crankcase securing screws as shown in the figure.
- Separate the crankcase halves, keeping the engine shaft in one of the two halves.

Caution - failure to observe this advice may lead to the engine shaft being accidentally dropped.

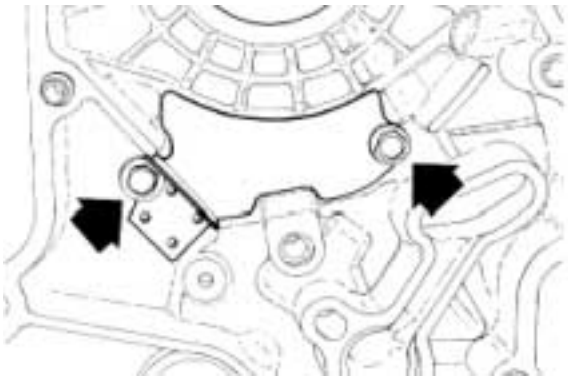
- Remove the engine shaft.



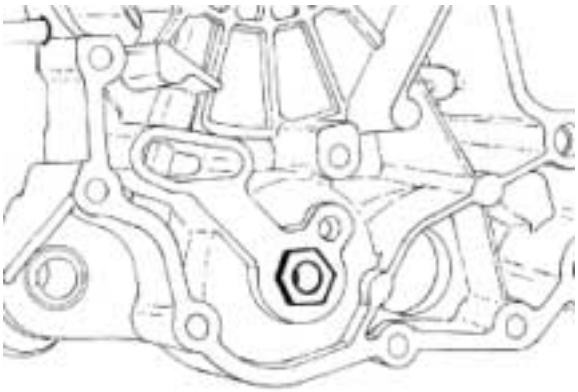
Caution - During the crankcase half opening and extraction of the engine shaft operation, take care to ensure that the threaded ends of the shaft do not strike the block bearings. Failure to observe this advice may lead to damage being caused to the block bearings.

- Remove the crankcase half sealing gasket.

- Remove the 2 securing screws and the internal divider as shown in the figure.

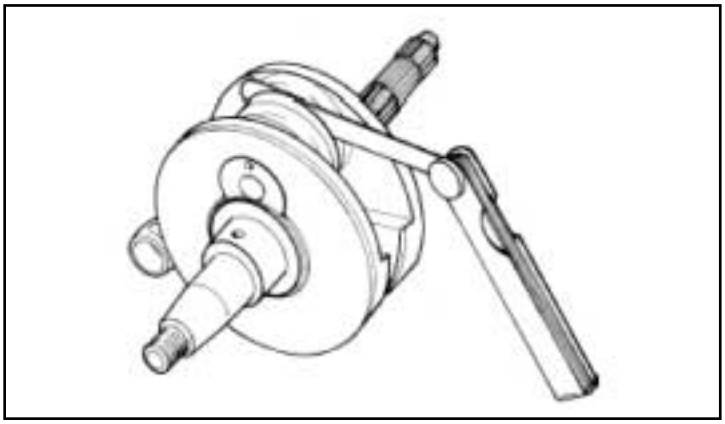


- Remove the oil seal on the magneto side.
- Remove the oil filter connector as shown in the figure.



- Check the axial play on the connecting rod big end.

Normal axial play: 0.20 ÷ 0.50 mm

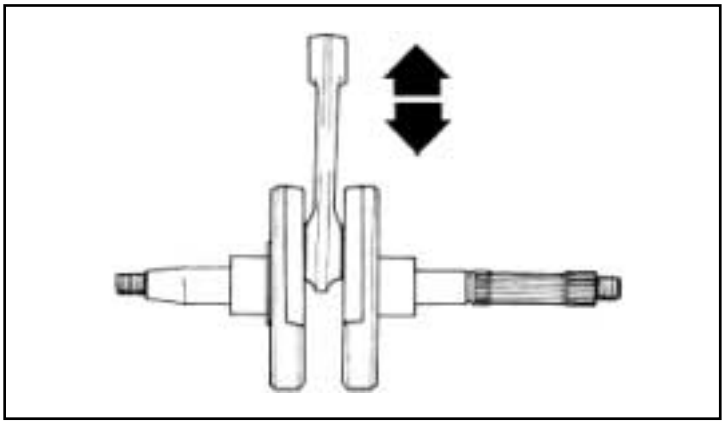


- Check the radial play on the connecting rod big end.

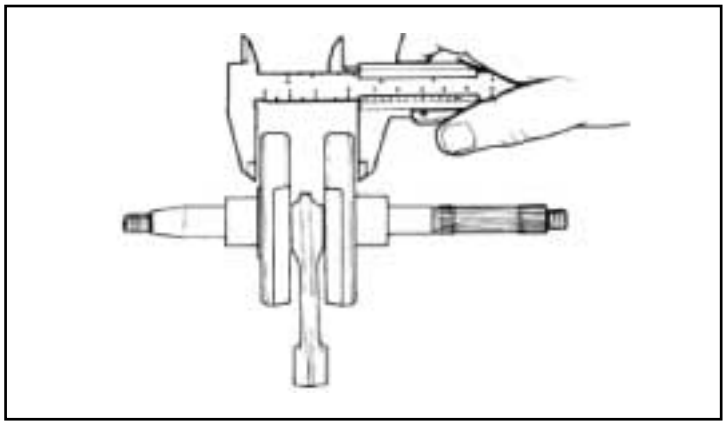
Normal radial play: 0.036 ÷ 0.054 mm

- Check that the retaining surfaces of the axial play show no signs of scratching, and use a gauge to check the width of the engine shaft as shown in the figure.

N.B.: Take care to ensure that the measurement is not affected by the connecting ribs with the engine shaft bearing surfaces.



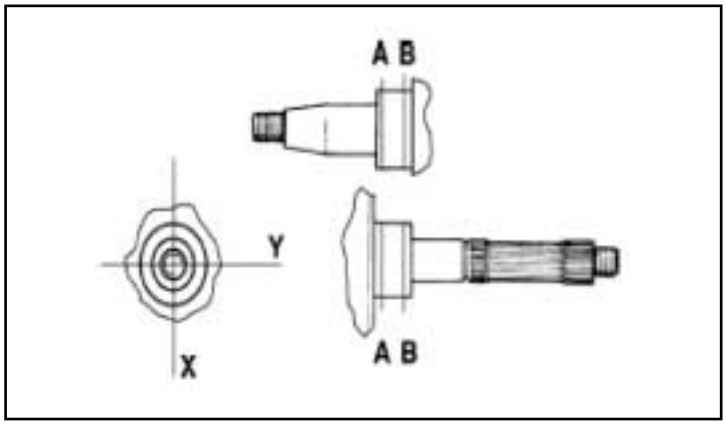
Normal measurement: 55.75 ÷ 55-90 mm.



Caution - The engine shaft may be used again if the measured width lies inside the normal values and if the surfaces are not scratched.

- When the engine shaft-crankcase axial play is greater than normal, but the engine shaft show no signs of any defect, the problem is definitely caused by wear of faulty installation in the crankcase.

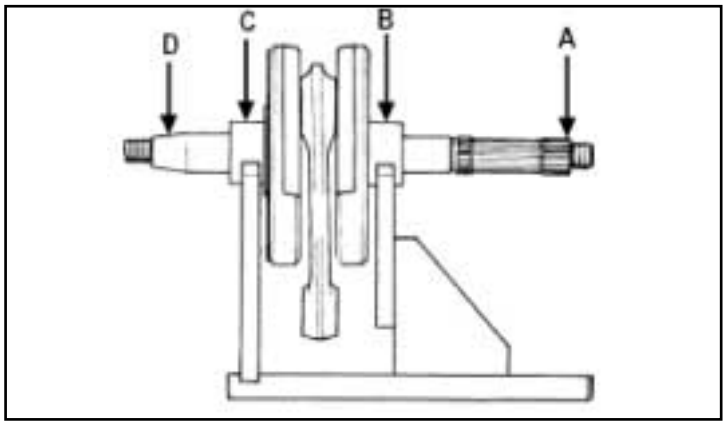
- Check the diameters of both engine shaft bearing surfaces in the axes and planes as shown in the figure. engine shaft-crankcase. The semi-crankshafts are classed in two categories, Cat.1 and Cat. 2 , as shown in the following table.



	standard diameter
Cat.1	28.994 ÷ 29.000
Cat. 2	29.000 ÷ 29.006

Checking crankshaft alignment

- Mount the engine shaft onto the special support tool (part number 19.1.20074), and measure the deviation from true alignment at the 3 points shown in the figure.



Maximum out of alignment: **A** = 0.15 mm
B = 0.01 mm
C = 0.01 mm
D = 0.10 mm

- Check the engine shaft cones, the spline seating, the oil seal seating, the milling, and the threaded ends for good condition.
- If any defects are found, replace the engine shaft.

N.B.: The block bearings cannot be adjusted. The connecting rod big end bearings cannot be replaced.

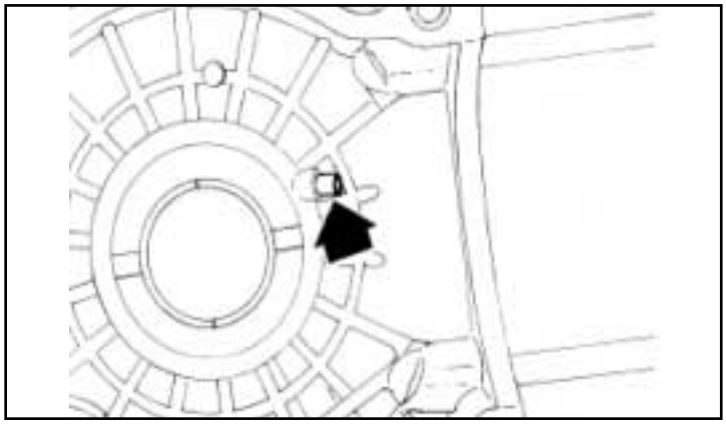
For the same reason, the connecting rod cannot be replaced, and during cleaning, great care must be taken not to allow any dirt to get into the crankshaft oil way port.

In order to avoid causing damage to the connecting rod bearings, do not clean the oil ways with compressed air.

- Take care to ensure correct assembly of the 2 shock absorbers on the handle button.
- Incorrect assembly of the shock absorbers may have a serious impact on the oil pressure in the bearings.

Checking the engine crankcase halves

- Before carrying out the checks on the crankcase halves, it is necessary to clean all the surfaces and oil ways thoroughly.
- In the case of the drive side crankcase half, pay special attention to the oil pump seating and oil ways, the oil channel and the by-pass, the block bearings, and the drive side cooling jet, as shown in the figure.

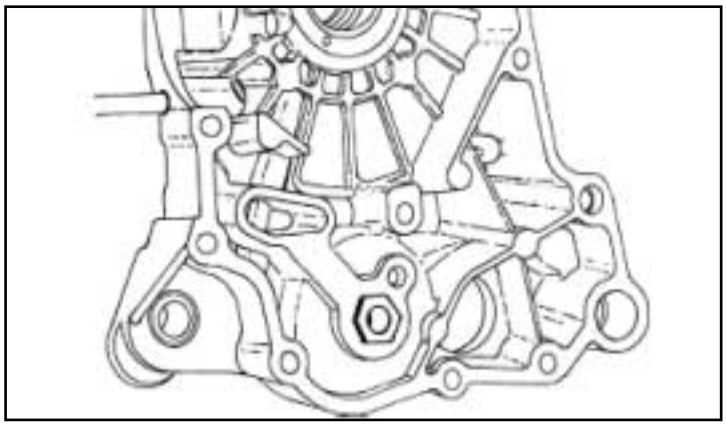


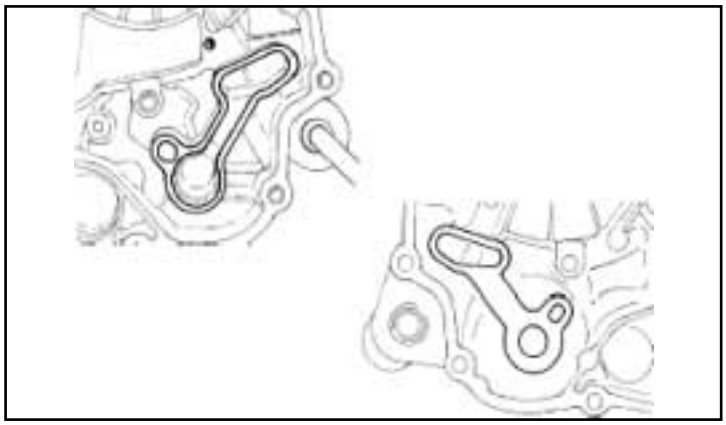
N.B.: The cooling jet is fed through the block bearings. The proper operation of this component improves the cooling of the piston crown. If it becomes blocked, the consequences are difficult to detect (increased piston temperature). Failure or loss of the jet may cause the lubrication pressure of the block bearings and the connecting rod bearings to fall drastically.

As has already been described in the chapter on Lubrication, it is very important to ensure that the by-pass seating shows no signs of wear which may affect the correct sealing of the lubrication pressure regulating piston.

- In the case of the magneto side crankcase half, take care with the oil ways for the block bearings, the oil way and jet feeding oil to the cylinder head, the drain channel for the magneto side oil seal.

N.B.: The cylinder head lubrication oil way is fitted with a louvre jet so as to provide the cylinder head with “low pressure” type lubrication; this system was chosen co as to keep the oil temperature in the oil sump down. Any blocking of this louvre jet will adversely affect the lubrication of the cylinder head and the components of the timing mechanism. Failure of the jet causes a reduction of oil lubrication pressure at the block bearings and the connecting rod bearing.



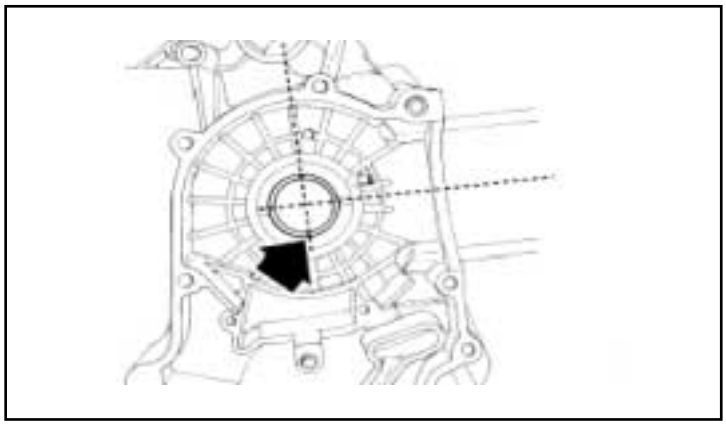


- Check that the mating planes show no signs of dents or deformation, and in particular the cylinder-crankcase plane, and the crankcase half mating surfaces.
- Any failure occurring in the crankcase mating surface gasket or of the planes shown in the figure may cause the loss of oil pressure and consequently have an adverse impact on the lubrication oil pressure to the block bearings and the connecting rod bearings.
- Check that the crankshaft axial play restraining surfaces show no signs of wear. For checking dimensions follow the stipulations for checking axial play and dimensions for the crankshaft.

Checking the bearings

- In order to ensure good lubrication of the bearings it is necessary to achieve optimum lubrication oil pressure (4 bar) and a good flow of oil, and in this respect it is essential that the bearings are correctly located to avoid causing obstructions to the oil supply oil ways.
- The block bearings are made up of 2 half bushes, one solid, and the other with perforations and channels for lubrication.
- The solid half bush is intended to support the thrust caused by the combustion, and is therefore to be located on the side opposite to the cylinder.
- So as to avoid obstructing the oil feed channels it is vital that the mating plane of the half bushes is perfectly perpendicular to the cylinder axis, as shown in the figure.
- The section of the oil supply oil ways is also affected by the depth to which the bearings are inserted with respect to the crankshaft axial play restraining plane.

Normal insertion depth 1.35 ÷ 1.6

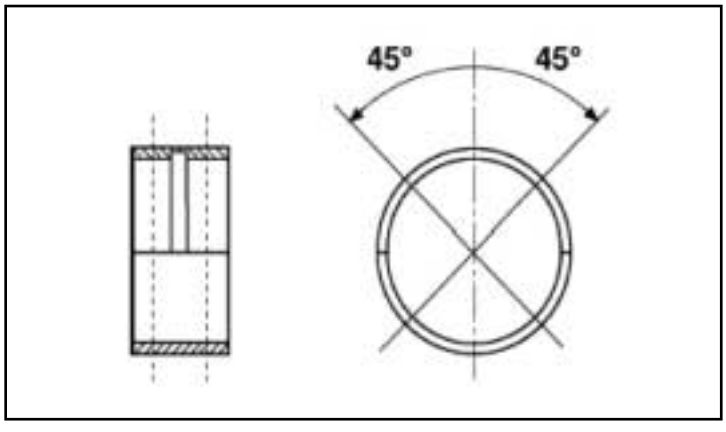


N.B.: In order to maintain such a positioning of the bearings with respect to the crankcase, the insertion is carried out by applying pressure to steel rings introduced when joining the two crankcase halves.

- The normal diameter of the bearings after insertion is variable, as a function of the selection of mating sizes.
- The bearing seating in the crankcase halves are classified into 2 categories as for the engine crankshaft, Cat.1 and Cat. 2.

- The bearings are divide into 3 classes by their thickness. Please refer to the table below.

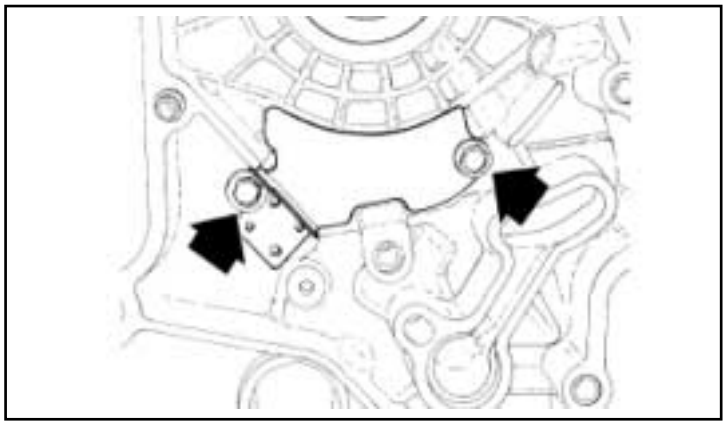
Class	Identification
A	Red
B	Dark Blue
C	Yellow



Closing the crankcase

- Fit the internal division and lock the 2 securing screws to the recommended torque setting.

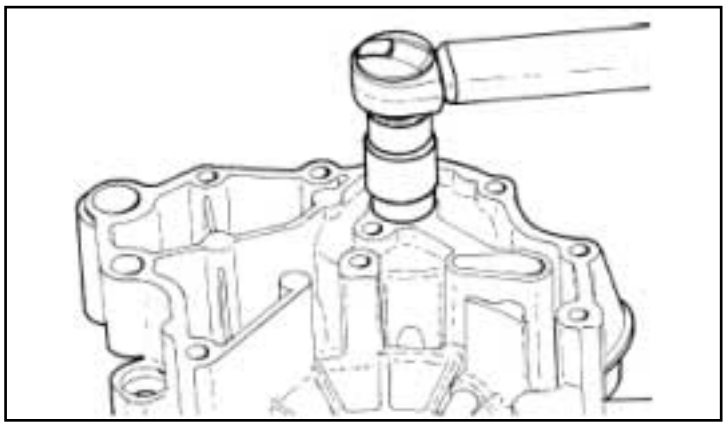
Torque setting 4 ÷ 6 N·m.



- Fit the oil filter connector, and tighten to the recommended torque setting.

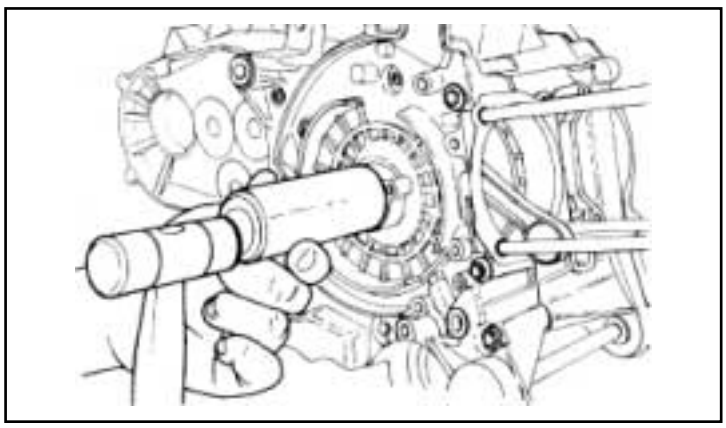
Torque setting 28 ÷ 30 N·m.

- Offer the gasket up to the crankcase half, together with the centring pins, preferably using the drive side crankcase half.



- Lubricate the block bearings, insert the crankshaft into the drive side crankcase half.
- Mate the two crankcase halves.

N.B.: While assembling the crankcase halves and the crankshaft, take care to ensure that no damage is caused to the block bearings by the crankshaft threaded ends.

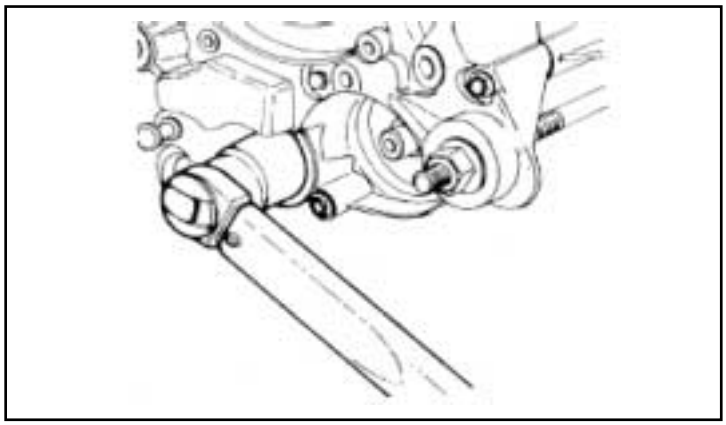


- Fit the 11 crankcase half securing screws and tighten to the recommended torque setting.

Torque setting 11 ÷ 13 N·m

N.B.: Remove any gasket material protruding from the crankcase mating joint on the cylinder plane, to ensure the best sealing conditions.

- Lubricate the magneto side oil seal.
- Using the special insertion tool (part number 19.1.20425) fit the oil seal.



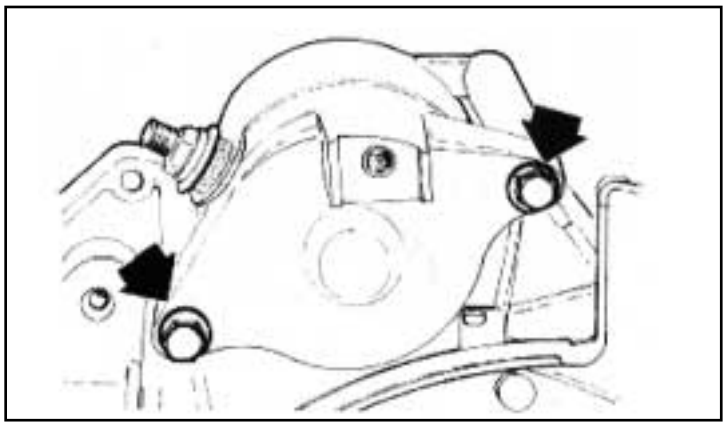
N.B.: Failure to use the correct tool may lead to an incorrect seating depth and therefore cause incorrect operation of the oil seal.

- Fit a new O-Ring to the pre-filter, and lubricate it.
- Offer up the pre-filter to the engine, and secure tightening to the recommended torque setting.

Torque setting 25 ÷ 28 N·m

Assembly of the starter motor

- fit a new O-ring to the starter motor and lubricate it.
- Assemble the starter motor to the engine crankcase, and tighten the 2 securing screws to the recommended torque setting.



Torque setting 11 ÷ 13 N·m

- **Re-assemble all the remaining parts as described in the chapters on the Cylinder, cylinder head and timing, Lubrication, Magneto, and Drive.**

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