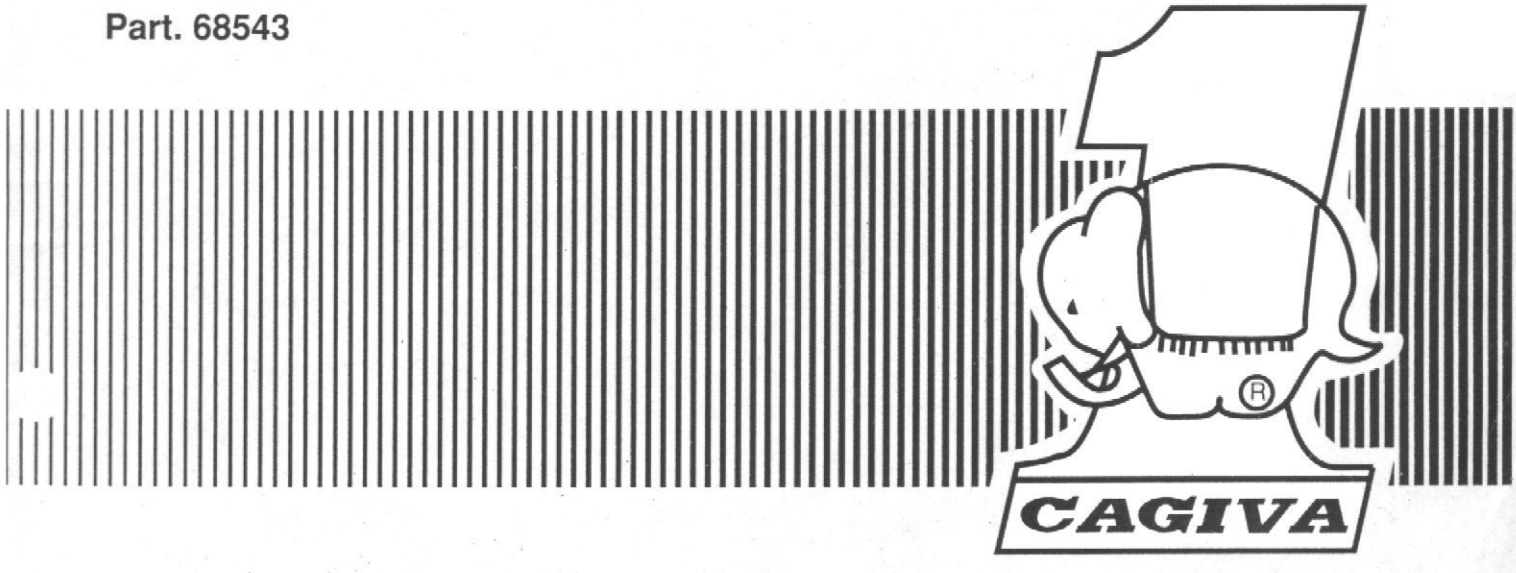
WORKSHOP MANUAL

MITO

Part. 68543



Workshop Manual

MITO

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Part. N. 68543 (10-90)

Foreword

*This publication intended for **CAGIVA** Workshops has been prepared for the purpose of helping the authorized personnel in the maintenance and repair work of the motorcycles herewith dealt with. The perfect knowledge of the technical data contained herein is essential for a more complete professional training of the operator.*
The paragraphs have been completed with schematic illustrations evidencing the subject concerned, in order to enable a more immediate understanding.
This manual contains information with particular meanings:



Accident prevention rules for the operator and for the personnel working near by.



Possibility of damaging the vehicle and/or its components.



Additional information concerning the operation under way.

Useful suggestions

***CAGIVA** suggests, in order to prevent troubles and in order to have an excellent final result, to generically comply with the following instructions:*

- *in case of repair work, weigh the impressions of the Customer who complains about the improper operation of the motorcycle, and formulate proper clearing questions about the symptoms of the trouble.*
- *detect clearly the cause of the trouble. This manual gives the theoretical bases which however shall be integrated by the personal experience and by the attendance to training courses periodically organized by **CAGIVA**.*
- *rationally plan the repair work in order to prevent dead time as for instance procurement of spare parts, tool preparation, etc.*
- *reach the component to be repaired and perform only the required operations. In this connection, it will be useful to consult the disassembly sequence contained in this manual.*

General instructions for repair work

1. Always replace the seal rings and split pins with new components.
2. When loosening or tightening nuts or bolts, always start from the bigger ones or from the center. Lock at the prescribed torque wrench setting following a crossed run.
3. Always earmark the components or positions which could be mistaken one for another at the time of assembly.
4. Use original ***CAGIVA*** spare parts and the lubricants of the recommended brands.
5. Use special tools, where specified.
6. Consult the **Service Bulletins** as they may contain up-dated adjustment data and repair methodologies.

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BEWARE!

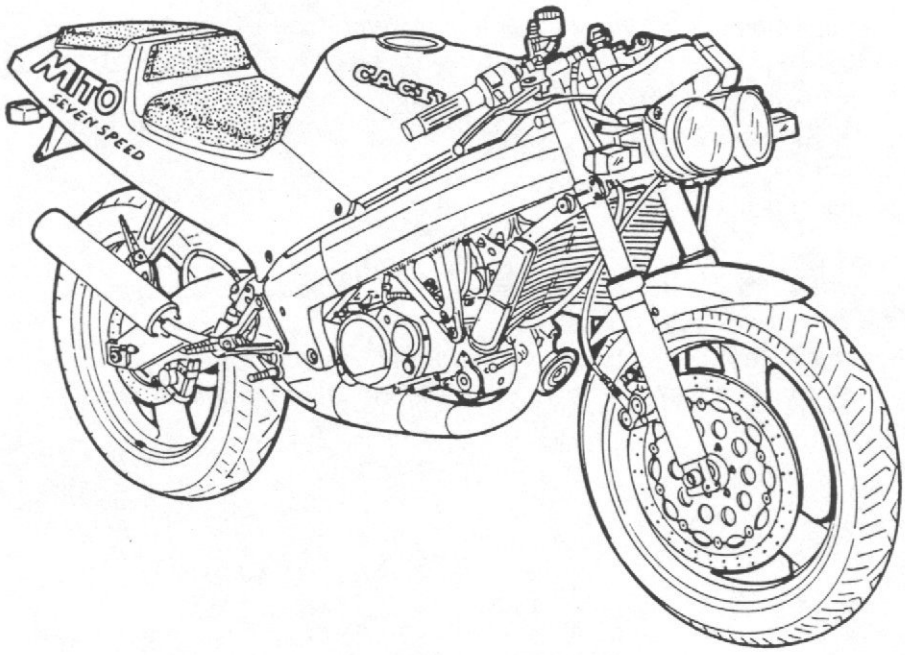
The bike is equipped with separate lubrication and warning light for oil reserve. For a correct operation of the motorcycle always make sure that, by turning the key to position «ON», the oil warning light goes «ON» together with the neutral warning light; when you go into a gear both of them will come OFF.

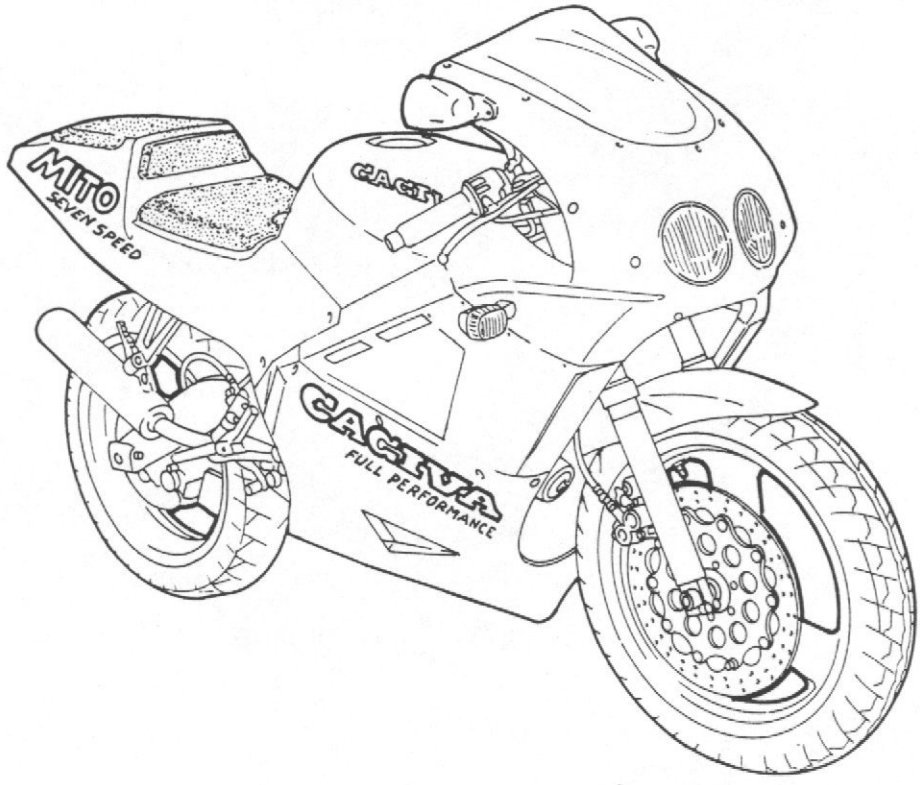
CAUTION

FUEL

— *With temperature lower than -5°C fill up the fuel tank with 1% mixture rather than petrol only.*

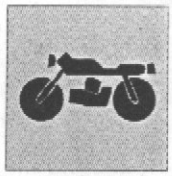
— *Do not start engine with battery disconnected from connection cables of electric system; warn. lights and parking lights should be damaged.*


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FULL PERFORMANCE

Summary

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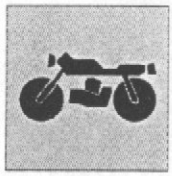


Section

A

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ENGINE

Single-cylinder, two-stroke engine, with lamellar suction and electronic control C.T.S. valve on the exhaust system.

Bore	2.204 in.
Stroke	1.992 in.
Capacity	7.602 cu.in.
Compression ratio (with closed lights)	6,3:1

FUEL FEEDING

Intake setting by lamellar valve.

DISTRIBUTION DIAGRAM

TRANSFER:	124°
EXHAUST:	
With closed valve	170°
With open valve	192°
Carburetor	Dell'Orto PHBH 28 RD

LUBRICATION

ENGINE

Through variable delivery pump.

SHIFTING and MAIN TRANSMISSION

Through the oil contained in the engine block.

COOLING

With liquid circulation through a pump.

Big bent radiator, constrained to the frame.

IGNITION

Electronic.

Make	KOKUSAN
Ignition advance:	14° 30' before T.D.C. (corresponding to 0.039 in. of piston stroke before T.D.C)
Spark plug	type CHAMPION N2C
Electrode gap	0.019 in.

STARTING

Electric.

TRANSMISSION

Cluster constant-mesh gears.

Primary ratio	Z 20/65=1:3.25

Gear ratios

1st	2,727
2nd	1,857
3rd	1,411
4th	1,142
5th	0,956
6th	0,863
7th	0,818
Final drive ratio	Z 14/43=1:3,071
Gearing chain	5/8"x1/4"

Total ratios

1st	27,224
2nd	18,538
3rd	14,092
4th	11,408
5th	9,548
6th	8,621
7th	8,167

Oil-bath multi-disc clutch type.

BRAKES

Front brake

Perforated fixed disc, with hydraulic control and floating caliper.

Disc diameter	12.59 in.
Brake caliper	BREMBO
Pad area	6.076 sq.in.

Rear brake

Perforated fixed disc, with hydraulic control and fixed caliper.

Disc diameter	9.055 in.
Brake caliper	BREMBO
Pad area	3.41 sq.in.

FRAME

Double cross-member with extruded tubular and aluminium melted parts; rear tailpiece with square steel pipes.

Steering angle	30° for side
Steering axis angle	25°
Front fork caster	3.858 in.

SUSPENSIONS

Front suspension

Tele-hydraulic fork with possible adjustment of the inner spring preload.

Producer	MARZOCCHI
Legs diameter	1.496 in.
Front wheel bump position (on the sliding axis)	4.842 in.

Rear suspension

Light alloy floating fork with "banana" shaped R.H. arm. Progressive leverage suspension (SOFT DAMP system) and hydraulic mono-damper with helical spring. The spring preload can be adjusted.

Damper make	MARZOCCHI
Rear wheel vertical travel	5.255 in.

WHEELS

Three-spoke light alloy **front** rim.

Make	GRIMECA
Dimensions	2,75"x17"

Three-spoke light alloy **rear** rim.

Make	GRIMECA
Dimensions	4,00"x17"

TYRES

Front (*)

Manufacturer and type	PIRELLI TUBELESS MT75
Dimensions	100/80-17"
or:	
Manufacturer and type	MICHELIN TUBELESS RADIAL
Dimensions	110/70-R17"
Inflation pressure (in cold condition)	
driver only	2,0 bar PIRELLI; 1,9 bar MICHELIN
with passenger	2,1 bar PIRELLI; 2,0 bar MICHELIN

Rear (*)
Manufacturer and type ..... PIRELLI TUBELESS MT75
Dimensions ..... 140/70-S17"
or:
Manufacturer and type ..... MICHELIN TUBELESS RADIAL
Dimensions ..... 150/60-ZR17"
Inflation pressure (in cold condition)
driver only ..... 2,1 bar PIRELLI; 2,0 bar MICHELIN
with passenger ..... 2,3 bar PIRELLI; 2,2 bar MICHELIN

(*) In alternative, **PIRELLI** and **MICHELIN** on model without fairing.
MICHELIN on model with fairing.

ELECTRIC SYSTEM

The ignition system is composed by:
- Generator: 12V-120W for a full battery recharge;
- Starting motor 12V-500W;
- Electronic coil;
- Electronic device;
- Voltage rectifier;
- Solenoid starter;
- Starting control system;
- Ignition spark plug.

The electronic control of the exhaust valve is composed by the following parts:
- Opening valve control system;
- Valve control motor 12V-3,3 W.

The components of the electric system are:
- Double headlight with bilux lamps 12V-25/25W and parking light bulbs 12V-5W;
- Dashboard with instruments bulbs 12V-2W and warning lights 12V-1,2W;
- Blinker with bulb 12V-10W;
- Battery 12V-9A;
- NO. 4 fuses 15A, two spare-fuses;
- Tail light with stop light 12V-21W and parking light bulb 12V-5W.

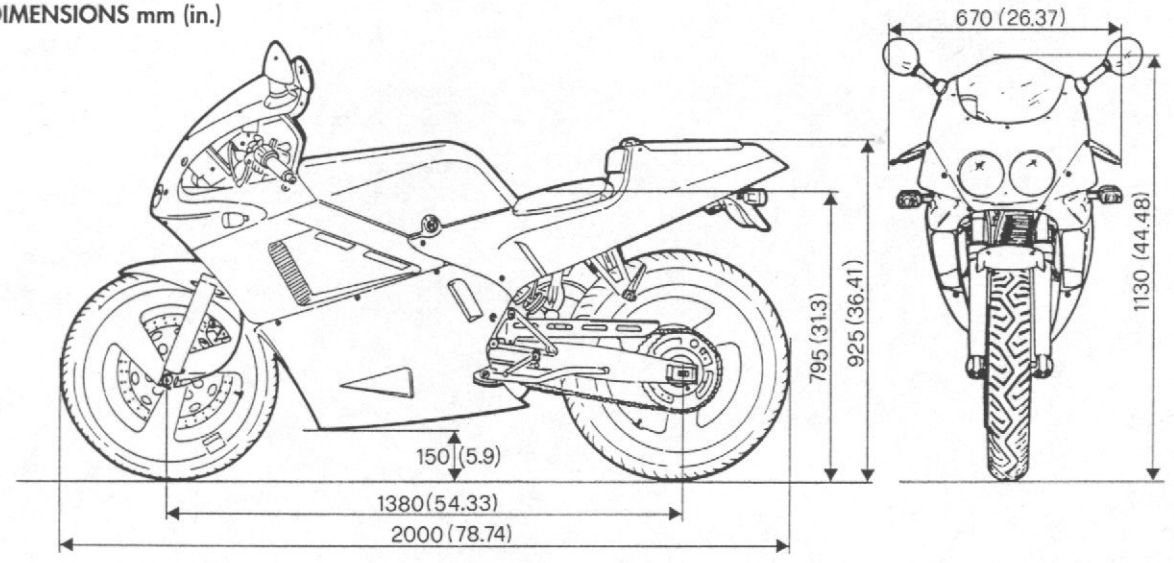
PERFORMANCES

Max. actual speed ..... 96.1 mile/h
Fuel average consumption ..... 9.3 mile/l

WEIGHTS

Total dry wheight (model with fairing) ..... 266.75 lb.
Total dry wheight (model without fairing) ..... 259.04 lb.

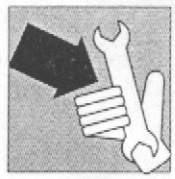
OVERALL DIMENSIONS mm (in.)



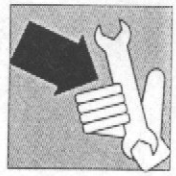
SUPPLY	TYPE	QUANTITY (liters)
Fuel tank	Super fuel 98-100 ON (min)	18
Reserve	(warning lamp comes ON)	4
Fuel mixture oil	AGIP 2T RACING PLUS	1
Change gear and main transmission oil	AGIP F.1 SUPERMOTOROIL SAE 15W50	0,800
Front fork oil	Specific "MARZOCCHI" SAE 7,5	(see page I.5)
Cooling system fluid	AGIP NUOVO PERMANENT EXTRA	1,5
Hydraulic brake fluid	AGIP BRAKE FLUID DOT 4	—
Drive chain lubrication	AGIP CHAIN AND DRIVE SPRAY	—
Flexible connections	AGIP GREASE 30	—

REMARK - At temperature lower than –5°C fill up the fuel tank with 1% mixture rather than petrol only.

WARNING! - Use of additives in fuel or lubricants is not allowed.



Section **B**



	Mileage															
	1000	1500	2000	3000	4000	5000	6000	7000	8000	9000	10000	11000	12000	13000	14000	15000	16000
Spark plug	CP				CP	S			CP		S			CP		S	
Gearbox oil	S				C		S			C		S			C		S
Air filter						P					P					P	
Carburettor						P					PC					P	
Cleaning of exhaust opening, valve						P					P (*)					P	
Cleaning of combustion chamber, piston, piston rings						P					P					P	
Clutch assembly	C				C			C			C			C			C
Tyres	C				C			C			C			C			C
Hydraulic brake fluid	C		C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
Braking system											X						
Pad wearing				C			C			C			C			C	
Nuts and bolts locking	C				C			C			C			C			C
Speedometer cable drive				L			L			L			L			L	
Flexible drives				CL			CL			CL			CL			CL	
Side leg axis						L					L					L	
Fuel and oil tanks											P						
Oil filters						P					P					P	
Fuel filters and pipes	P					P					P					P	
Steering column bearings	C											C					
Wheel hub bearings											C						
Front fork oil											S						
Sprocket, crown gear	C					C					S					C	
Secondary transmission chain	CL		CL	CL	CL	CL	CL	CL	CL	CL	S	CL	CL	CL	CL	CL	CL
Chain tensioner				L			L			L			L			L	
Throttle control	C				CL			CL			CL			CL			CL
Cooling fluid		C		C		C		C		C	S		C		C		C

P = Cleaning.
C = Check and eventually adjust.
L = Lubrication.
S = Replacement.
X = Air bleeding, checking of disc wearing.
(*) = Replace the exhaust valve (replacement should be made every 10,000 km).

Operations suggested at 1000 and 3000 Kms. are mentioned on Service Coupons included in the Maintenance and Warranty booklet.

After the first 1.000 Km, check the driving torque of the rotor fastening nut which must be: 6,7 + 7,1 Kgm (65,7 + 70 Nm).



Section C



ENGINE

Trouble	Cause	Remedy
Engine won't start or starts with difficulty	**Inadequate compression**	
	1. Piston seizure	Replace
	2. Con-rod small or big end seized	Replace
	3. Piston rings worn	Replace
	4. Cylinder worn	Replace
	5. Low torque cylinder head nuts	Tighten to correct torque settings
	6. Spark plug loose	Tighten
	No or weak spark	
	1. Spark plug faulty	Replace
	2. Spark plug dirty or wet	Clean or dry
	3. Spark plug gap too large	Adjust
	4. Ignition coil faulty	Replace
	5. H.T. leads damaged or short circuiting	Check
	6. Ignition switch faulty	Replace
	Fuel not reaching carburettor	
	1. Tank breather pipe clogged	Clean
	2. Automatic cock locked	Replace
	3. Vacuum piping clogged	Clean
	4. Carburettor fuel filter dirty	Clean
	5. Float valve faulty	Replace
	6. Rocker blocking float valve	Free
	Carburettor flooding	
	1. High fuel level in float bowls	Adjust
	2. Float valve worn or stuck open	Replace or free
Engine cuts out easily	1. Spark plug dirty	Clean
	2. Electronic control unit faulty	Replace
	3. Carburettor jets blocked	Clean
Engine noisy	**Piston noise**	
	1. Excessive play between piston and cylinder	Replace
	2. Excessive coke in combustion chamber or on piston crown	Clean
	3. Piston rings or ring seats worn	Replace
	Crankshaft noise	
	1. Main bearings worn	Replace
	2. High radial and axial play at con-rod big end	Replace
	3. The countershaft is not installed properly	Arrange it right
	4. Drive shaft and countershaft gears are damaged	Replace them
	Clutch noise	
	1. Plates worn	Replace
	2. Excesive free play between clutch drum and drive plates	Replace
	Gearbox noise	
	1. Gears worn	Replace
	2. Gear splines worn	Replace
	Drive chain noise	
	1. Chain stretched or badly adjusted	Replace or adjust
	2. Engine sprocket and rear wheel sprocket worn	Replace

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Trouble	Cause	Remedy
Clutch slip	1. Insufficient clutch adjuster free play	Adjust
	2. Clutch springs weak	Replace
	3. Clutch plates worn	Replace
Clutch drag (it is not disengaged)	1. Excessive clutch adjuster free play	Adjust
	2. Spring tension uneven	Replace
	3. Clutch plates bent	Replace
Gears not engaging	1. Clutch not releasing	Adjust
	2. Gearshift forks' bent or seized	Replace
	3. Gearchange pawls worn	Replace
	4. Gearshift forks control pins damaged	Replace
Gearchange lever doesn't return	1. Selector return spring weak or broken	Replace
Slips out of gear	1. Sliding dogs worn	Replace
	2. Gear splines worn	Replace
	3. Sliding dog seats on gears worn	Replace
	4. Splines gearshift forks' control shaft worn	Replace
	5. Gearshift forks control pins worn	Replace
	6. Gearshift forks worn	Replace
Engine lacks power	1. Air filter dirty	Clean (foam filter)
	2. Carburettor main jet blocked or wrong size	Clean or replace
	3. Poor quality fuel	Replace
	4. Breather union loose	Tighten
	5. Spark plug gap too large	Adjust
	6. Ignition advance too low	Adjust
	7. Inadequate compression	Find cause
	8. Deposits on the exhaust valve	Clean it
Engine overheating	1. Excessive coke on combustion chamber and/or piston crown	Clean
	2. Insufficient engine oil, or wrong oil used	Top up or replace
	3. Radiator air flow blocked	Clean
	4. Poor seal at cylinder head gasket	Replace
	5. Ignition advance too high	Adjust
	6. Clutch slipping	Adjust
Drops of coolant on spark plugs electrodes	1. Faulty cylinder head gasket seal	Replace
	2. Cylinder head leaking	Replace
Oil sump level increases due to presence of coolant	1. Faulty water pump rotor shaft seal	Check



FRAME, WHEELS AND SUSPENSION

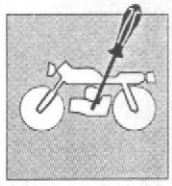
Trouble	Cause	Remedy
Difficult to turn handlebars	1. Low tyre pressure	Inflate
	2. Bent steering head pillar	Replace
	3. Stearing head bearings worn or seized	Replace
Handlebar vibrates	1. Front fork legs bent	Replace
	2. Front wheel spindle bent	Replace
	3. Frame bent	Replace
	4. Front wheel rim buckled	Replace
	5. Front wheel bearings worn	Replace
Suspension too hard	1. Fork backstroke too fast	Adjuste
	2. Too much oil in the fork legs	Drain excess
	3. Fork legs oil too thick	Replace
	4. Too much pressure in the tires	Deflate
Suspension too soft	1. Fork backstroke too slow	Adjuste
	2. Insufficient oil in front fork stanchions	Top up
	3. Front fork stanchion oil of too low a viscosity	Replace
	4. Weak front fork springs	Replace
	5. Weak rear shock absorber spring	Replace
Wheel (front and rear) vibrates	1. Wheel rim buckled	Replace
	2. Wheel hub bearings worn	Replace
	3. Wheel spindle nut loose	Tighten
	4. Rear swinging arm bearings worn	Replace
	5. Chain tensioner incorrectly set	Adjust
Rear suspension noisy	1. Link rod bearings or spacers worn	Replace
	2. Shock absorber ball joints worn	Replace
	3. Shock absorber faulty	Replace
Poor (front and rear) braking	1. Air in the brake system	Bleed
	2. Insufficient fluid in reservoir	Top up
	3. Pads and/or disc worn	Replace
	4. Disc damaged	Replace
	5. Brake pedal incorrectly adjusted	Adjust

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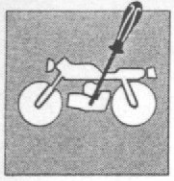


ELECTRICS

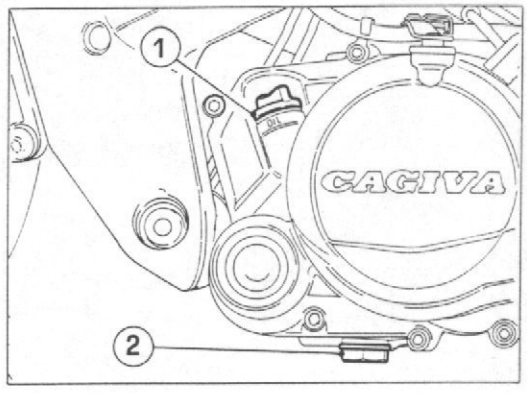
Trouble	Cause	Remedy
Spark plug becomes dirty too frequantly	1. Mixture too rich 2. Air filter dirty 3. Piston rings worn 4. Piston or cylinder worn	Adjust carburettor Clean (foam filter) Replace Replace
Spark plug overheats	1. Mixture too lean 2. Spark plug gap to small	Adjust carburettor Adjust
Generator charging too low or not at all	1. Wires to voltage regulator connected incorrectly or short circuiting 2. Faulty voltage regulator 3. Generator coil faulty 4. Battery fluid level low	Connect correctly or replace Replace Replace Top up with distilled water
Generator charging too high	1. Voltage regulator faulty	Replace
Battery corrosion	1. Charging voltage too high or too low (When not in use the battery should be recharged at least once a month) 2. Too much or too little battery fluid; incorrect specific gravity	Replace the battery Return to correct level; replace electrolytic fluid
The battery is discharged fast	1. Battery terminals dirty 2. Battery fluid low 3. Impurities in battery fluid or specific density too high	Clean Top up with distilled water Replace electrolytic fluid
Start motor won't start or slips	1. Battery flat 2. Control button on right hand switch unit faulty 3. Starter solenoid faulty 4. Starter motor faulty 5. Control gear or flywheel crown worn	Recharge Replace Replace Repair or replace Replace



Section **D**



Change gear and main transmission lubrication D.5
Lubrication pump delivery setting D.7
Cooling liquid level control D.8
Cooling liquid drain and top up D.9
Throttle control cable adjustment D.11
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Adjustment of the electronic valve control cables tension D.24
Compression ratio control D.26
Adjustment of the gearbox control pedal position D.28
Check and oil change in the front fork D.29



1) Filler plug and level gauge
2) Drain plug

Change gear and main transmission lubrication.

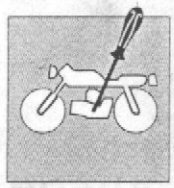
The lubrication of the change gear and main transmission is carried out by the oil contained in the engine block. In order to check its level, carry out the following operations keeping the motorcycle upright:

- turn OFF the engine and wait some time to let the engine cool down and the oil uniformly level out in the engine block;
- STREAMLINED VERSION; remove the lower fairing as described in the chapter "GENERAL OPERATION";
- unscrew the filler plug (1) with the rod, clean and put this one in place again without screwing;
- pull out the plug and check the oil level; if necessary, top it up.

The oil quantity in the crankcase must never exceed 48.8 cu.in. In case any topping up is made, it is necessary to suitably warm up the engine, then turn it off and check the oil level again as described above. This checking should be carried out every 1860 ml.

After the first 620 ml, and afterwards every 3100 ml. it is necessary, after warming up the engine, to change the engine oil.

In order to carry out this operation, remove the drain plug (2) located in the bottom of the crankcase, and fully drain the exhausted oil. Then screw the plug again by inserting the relevant gasket.

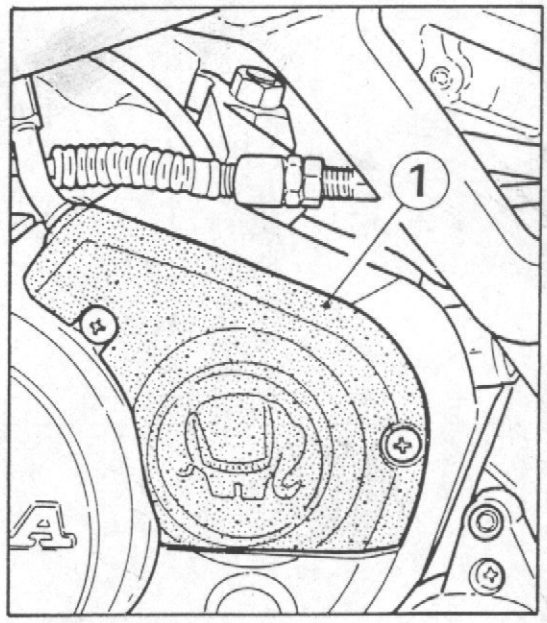


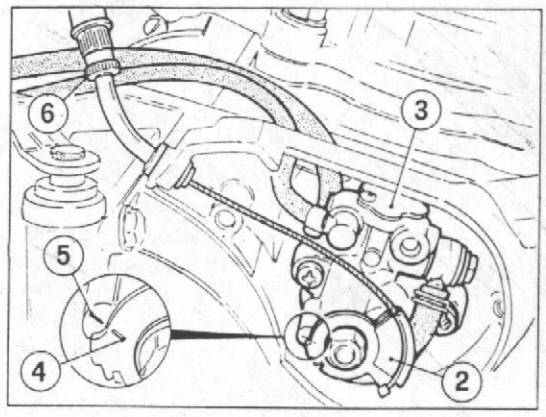
Lubrication pump delivery setting.

The oil flux delivered by the pump and arriving to the carburetor changes in relation with engine speed and throttle valve opening. In order to operate on the oil pump (3) it is necessary to remove the plastic protection cover (1).

Adjustment is correct when a check shows that conditions are as follows:

– with the throttle twist grip completely closed, the mark (4) stamped on the oil pump control lever (2) is in line with the reference mark (5) situated on the oil pump body. Effect any adjustment necessary using the adjuster (6) at the oil pump cover exit. Keep in mind that, by unscrewing the adjuster (6), the oil delivery increases, by screwing the adjuster the delivery decreases.





1) Oil pump compartment cover

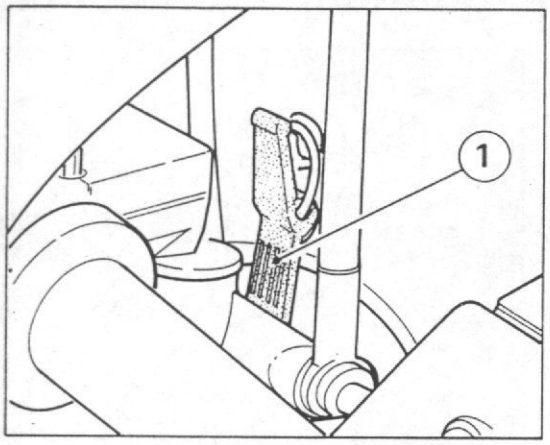
2) Pump control lever

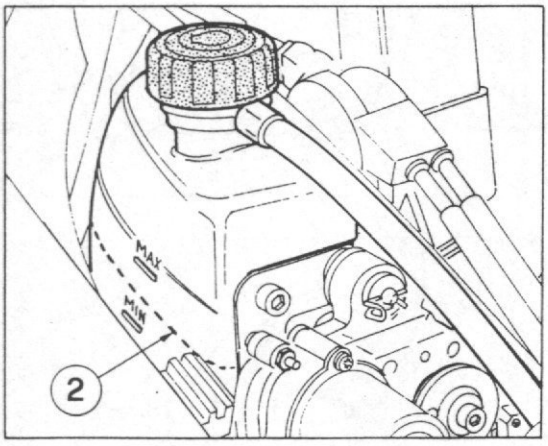
3) Oil pump

4) Mark on the lever

5) Mark on the pump body

6) Adjustment on the pump control lever





1) Belt to fix.
front tank

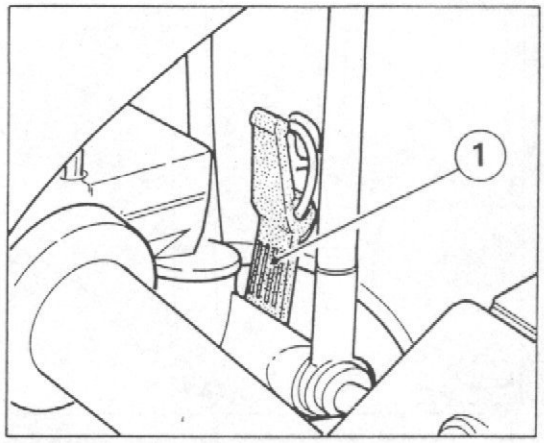
2) Liquid level

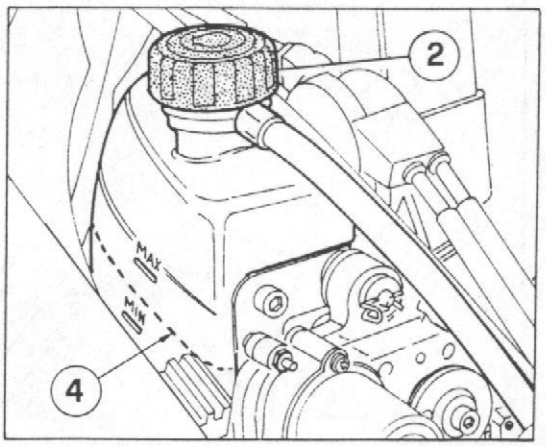
Cooling liquid level control.
Perform the check every 930 miles, **with cold motor**, as follows:
- unblock front belt (1) and lift the fuel tank fixing it with the special rod;
- place the motorbike in vertical position;
- check that the level (2) inside the expansion tank is set between the two notches for MIN and MAX.

If not, top up through the load plug of this tank.

If a large quantity of water is needed, replace the cooling liquid completely.

Part. N. 68543 (10-90)

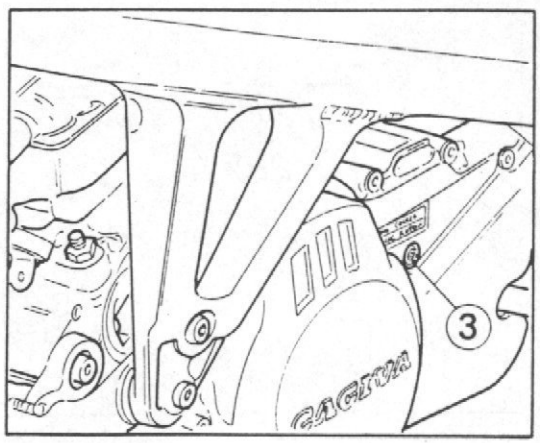


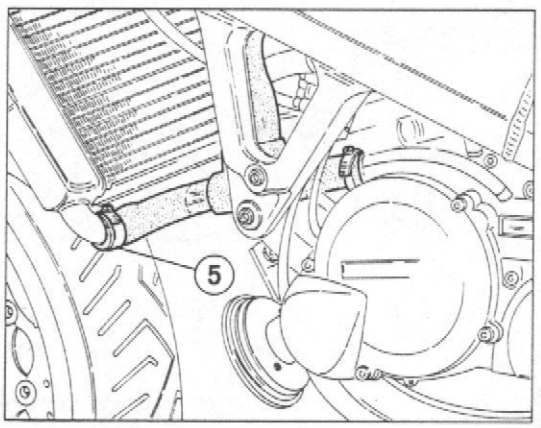


Cooling liquid drain and top up.

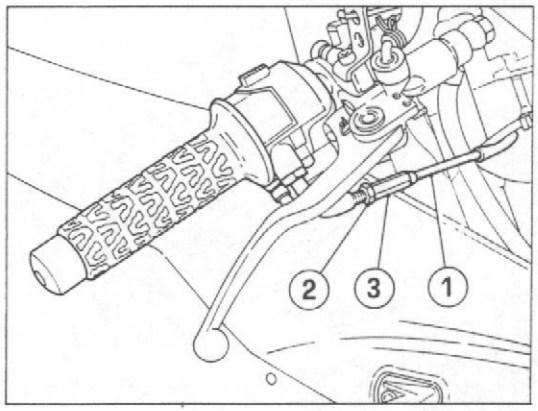
The cooling liquid replacement is needed every 6200 miles or every 2 years and must be performed **with cold motor**, as follows:

- STREAMLINED VERSION; remove the lower fairing as described in the chapter "GENERAL OPERATION";
- unblock front belt (1) and lift the fuel tank fixing it with the special rod;
- remove the expansion tank plug (2);
- remove the drain screw (3) on the left side of the crankcase and, in order to speed up the draining operation, unloose the clamp (5) on the radiator/engine connection sleeve and take it out from the radiator side;
- slope the motorbike on the left, to make the liquid come out easily;
- Let the liquid drain completely;
- reassemble the drain screw and the radiator/engine connection piping;
- pour the required quantity of fluid in the expansion tank; close the plug (2);
- get the motor temperature to 70° ca. in order to eliminate any possible air bubble;
- fit the motorcycle upright and make sure that the fluid level (4) in the expansion tank is between the MIN and MAX notches; otherwise top up;
- reassemble the removed parts.





1) Belt to fix. front tank
2) Expansion tank cap
3) Drain screw
4) Liquid level
5) Clamp on the radiator

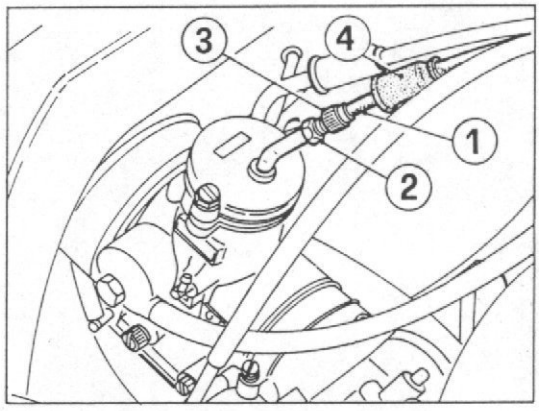


Throttle control cable adjustment.

Check proper adjustment of the throttle control cable by operating as follows:

- move the flexible cable (1) forward and backward to make sure that 0.039 in. approx. clearance is provided;
- if it is not so, release the counternut (2) and suitably rotate the turnbuckle (3) (by unscsrewing it the clearance decreases, by screwing the clearance increases);
- lock the counternut (2) again.

A clearance of 1 mm approx. is to be provided also on the cable located on the carburettor cover; otherwise make the adjustment as described above, after removing the protection cap (4).

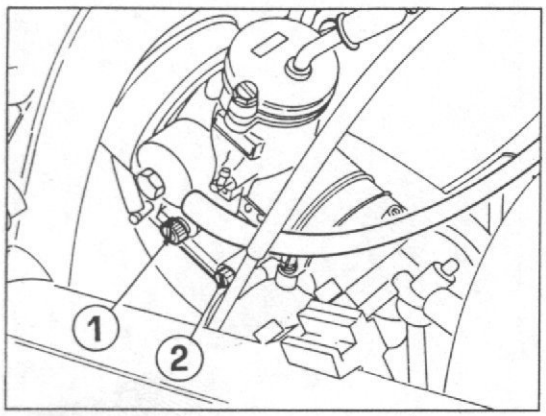


1) Flexible cable

2) Counternut

3) Turnbuckle (adjuster)

4) Protection cap



1) Throttle valve adjusting screw

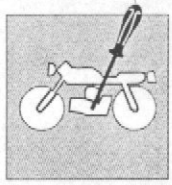
2) Mixture ratio adiustina screw

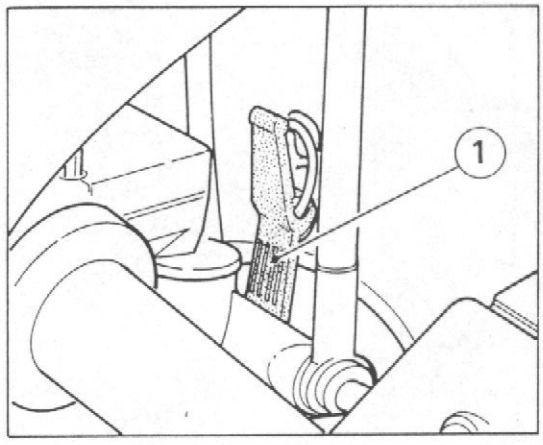
Idling adjustment.

After making sure that the control cable has 0.03937 in. clearance at least in the cable terminal on the carburettor and control, when the throttle control knob is in close position, idling adjustment can be made as follows:

- STREAMLINED VERSION: remove the R.H. side half fairing as described in the chapter "GENERAL OPERATION";
- screw the adjusting screw (1) of the throttle valve until quite high r.p.m. are attained (2000 r.p.m.); by rotating clockwise the speed increases, by rotating counterclockwise the speed decreases;
- screw or unscrew the screw (2) adjusting the mixture ratio until the engine rotation is as even as possible;
- progressively unscrew the adjusting screw (1) of the throttle valve until 1000 rpm are obtained.

For high speed, mixing is automatic and it is not possible to operate manually. In case of irregular running of the engine, clean the carburettor.

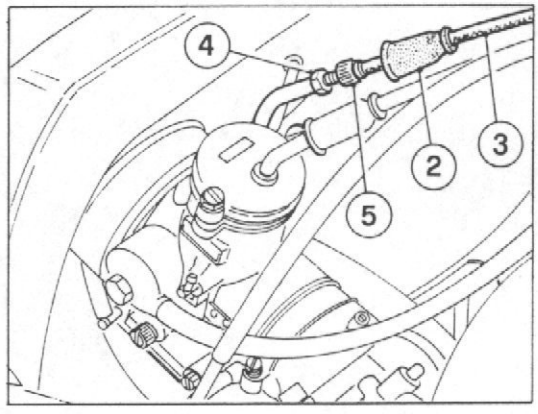




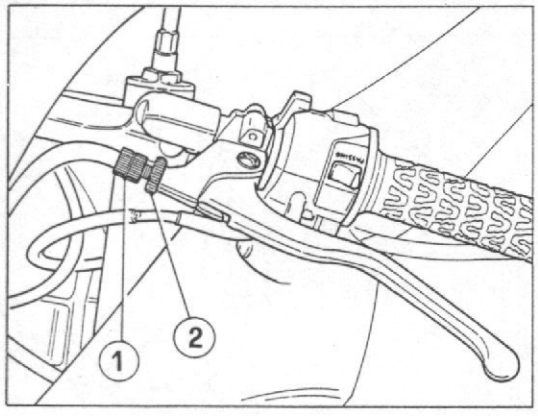
Starter control cable adjustment.

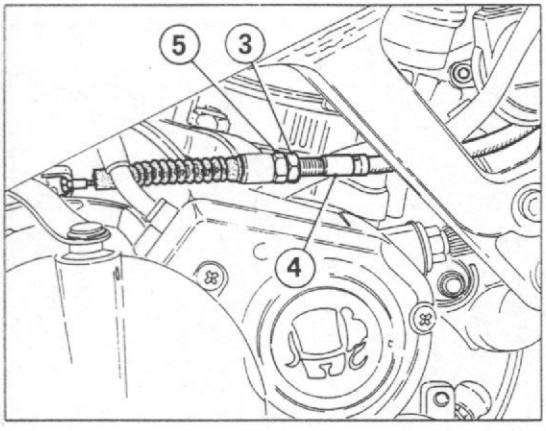
The starter cable can be only adjusted on the carburettor as follows:

- release the belt (1) and lift the fuel tank by holding it with the suitable rod;
- remove the rubber cap (2);
- move the cable (3) forward and backward to make sure that 0.03937 in. approx. clearance is provided;
- if it is not so, release the counternut (4) and suitably rotate the adjuster (5);
- tighten the counternut again and put the rubber cap on the adjuster;
- finally fasten the fuel tank.



1) Tank front fastening belt
2) Cap
3) Starter control cable
4) Counternut
5) Adjuster





Clutch control lever adjustment.

The idle stroke of the control lever must be always 0.118 in. approx. before starting to disengage the clutch. Small adjustments must be made by means of the adjuster located on the control as follows:

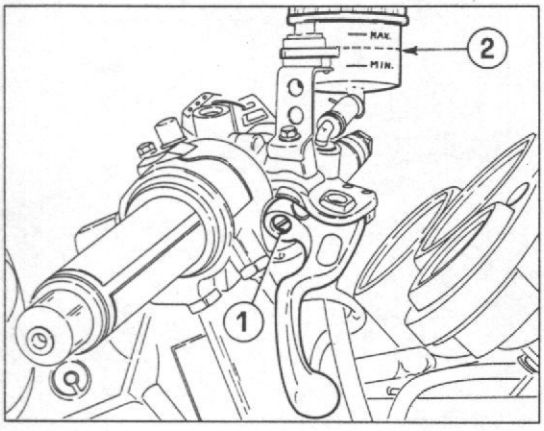
- unloose the counternut (2) and operate on the adjuster (1); by unscrewing the clearance decreases, by screwing the clearance increases;
- tighten the counternut again.

Should the adjuster on the control be not enough to take up the required clearance, operate on the other adjusting unit located near the disengagement lever, on the right side of the engine:

- unloose the counternut (5);
- operate on the nut (3) of the control cable (4) until the proper clearance is obtained;
- lock the counternut (5) against the nut (3).

Check the clearance on the control lever.

1) Adjuster on the control
2) Counternut on the control
3) Nut on disengagement side
4) Control cable
5) Counternut on disengagement side



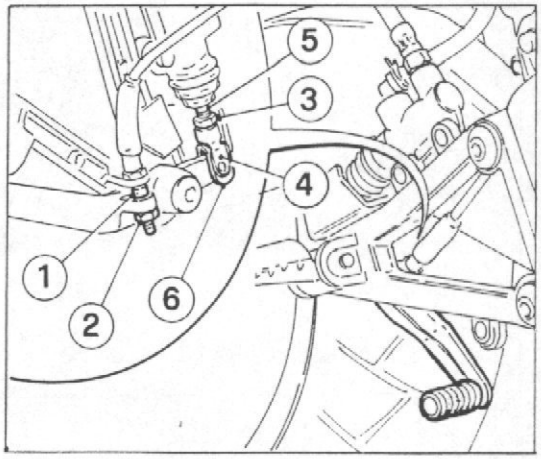
1) Adjusting screw

2) Level of the fluid

Front brake control lever adjustment.

Make sure that the clearance between the float and the lever tip on the pump is 0.00196÷0.0059 in.; otherwise operate on the adjusting screw (1). Periodically lubricate the scraper ring and the float rod with the required fluid.

The level (2) of the fluid in the tank must be always included between the MIN and MAX notches. Any lowering of the fluid level can allow the inlet of air in the system, resulting in a longer lever stroke.



Rear brake pedal position adjustment.

The position of the rear brake pedal as to the foot-rest can be modified according to the pilot's requirements as follows:

- STREAMLINED VERSION: remove the lower fairing as described in the chapter "GENERAL OPERATION";
- unloose the counternut (2) in the inner part of the pedal;
- screw or unscrew the adjusting screw (1) depending on whether you wish to move away from or approach the foot-rest;
- unloose the counternut (3) on the pump control rod and release the fulcrum pin (4) of the lever;
- by screwing the rod (5) on the fastening hook (6) the lever will lower and vice versa;
- tighten the counternut (3) and put in place the pin (4) with the relevant fastening hook (6) on the lever.

Adjust the clearance as described in the following paragraph.

1) Adjusting screw

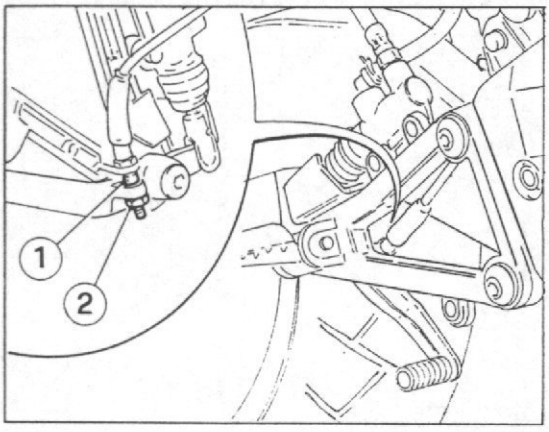
2) Counternut

3) Counternut on the pump control rod
de la pompe

4) Rod fulcrum pin

5) Pump control rod

6) Fastening hook



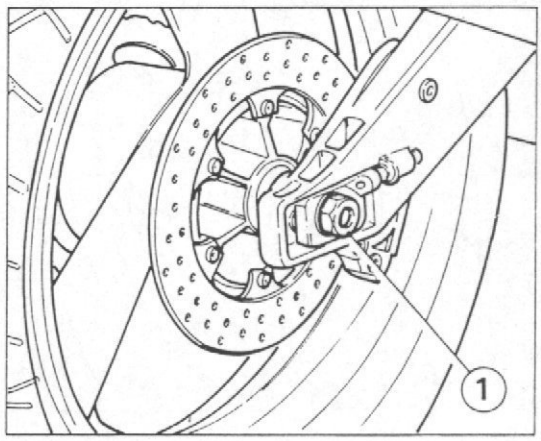
Rear brake adjustment.

The adjustment of the rear brake is carried out by operating on the adjusting unit located in the bottom of the pedal.

By moving the pedal up and down, manually make sure that a clearance of 1 to 2 mm is provided. Should the clearance be greater, unloose the counternut (2) and screw the adjusting screw (1). If the clearance is less operate in the opposite way.

1) Adjusting screw

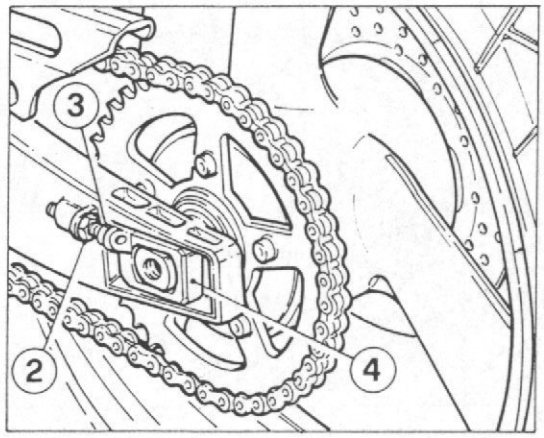
2) Counternut

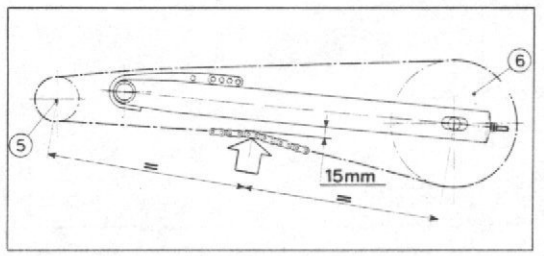


Chain tension adjustment.

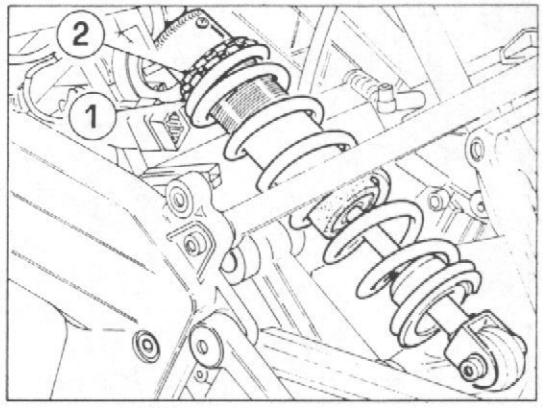
The chain is correctly adjusted when, with motorbike in vertical position and completely drained, reflects the condition shown in the figure below. If not, it is necessary to perform its adjustement as follows:

- loosen the nut (1) of the wheel pin;
- release the lock nut (2);
- insert a 0.196 in. setscrew wrench in the suitable hole on the chain tightener and operate on the adjusting screws (3) until the proper tension is restored;
- make sure that the notches marked on the chain tighteners (4) are aligned, on both the sides, with those located on the fork;
- lock the counternut (2);
- lock the nut (1) of the wheel pin;
- check the chain tension again.





1) Wheel pin nut
2) Counternut
3) Adjusting screw
4) Chain tightener
5) Chain pinion
6) Rear ring gear



1) Adjusting ring nut

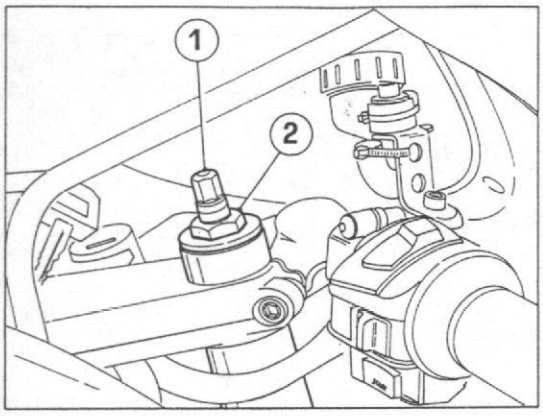
2) Lock ring nut

Rear damper adjustment.

In order to change the damping action of the rear damper, it is necessary to operate on the preloading of the damper spring as follows:

- remove the rear fairing as described in the chapter "GENERAL OPERATION";
- measure the length of the preloaded spring by means of a gauge in order to restore the standard operating conditions set by the manufacturer;
- unloose the upper lock ring nut (2);
- operate on the adjusting ring nut (1), unloosing it to obtain a softer action of the spring and tightening to get a stronger action;
- tighten the lock ring nut.

In case of defective operation or oil leakage, replace the damper.



1) Adjuster

2) Bearing pipe cap

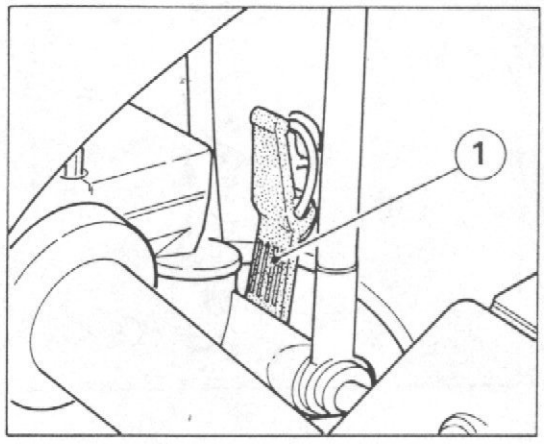
Front fork adjustment.

The front fork is provided with adjusters to change the preloading of the springs inside the rods. These adjusters (1) are provided with reference notches in order to find out the using position as to the top of the caps (2) of the bearing pipes.

By screwing these adjusters, a stronger damping action is obtained; by unscrewing them the action got is softer.

It is necessary that both the adjusters are located on the same reference notch.

The manufacturer locates these adjusters on the 3rd notch.

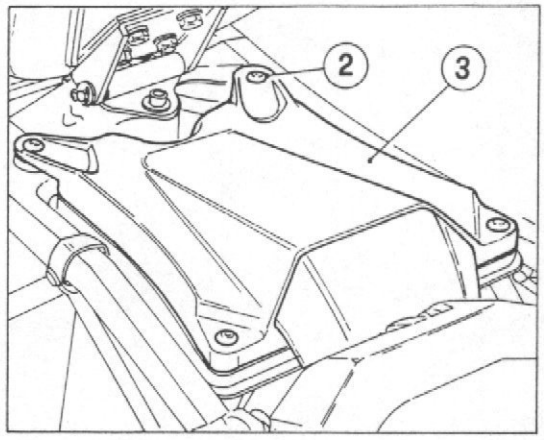


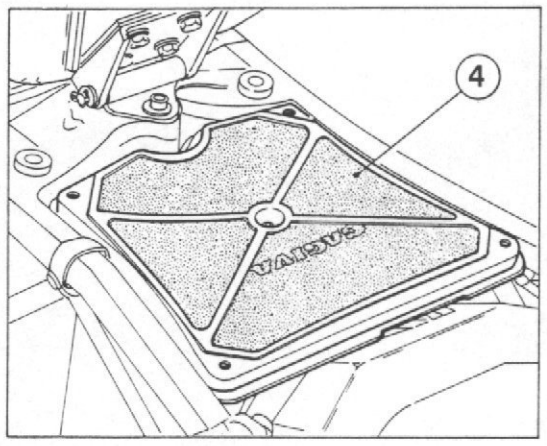
Air filter cleaning.

Access to the air filter is allowed as follows:
- remove the rear fairing as described in the chapter "GENERAL OPERATION";
- release the front belt (1) and lift the fuel tank holding it by means of the suitable rod;
- remove the four fastening screws (2) of the filter box cover (3);
- remove the above-said cover;
- remove the filterning element (4) and clean it.

This operation is to be made every 3100 ml. Under particularly heavy conditions, for example a prevailing use on dusty roads, clean more often.

As regards reassembly, follow the rules stated above in the opposite way.



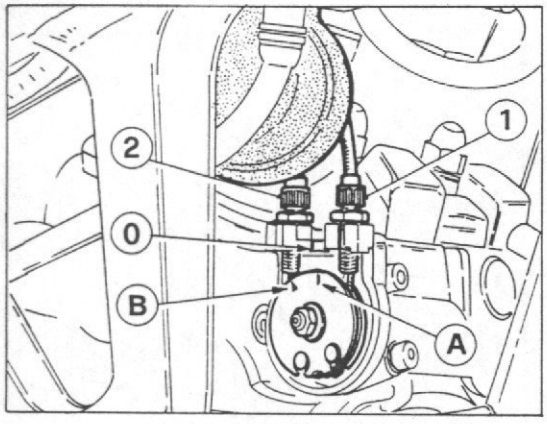


1) Tank front fastening belt

2) Cover fastening screw

3) Filter box cover

4) Filternig element

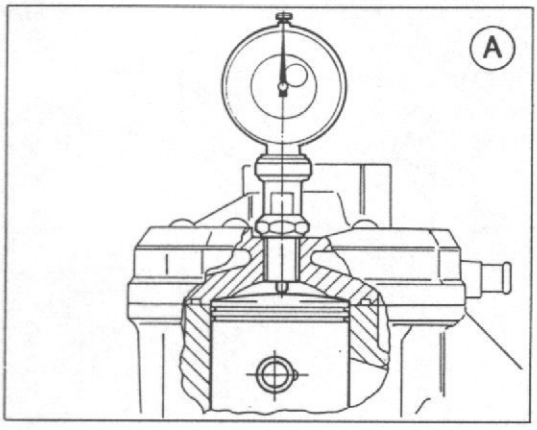


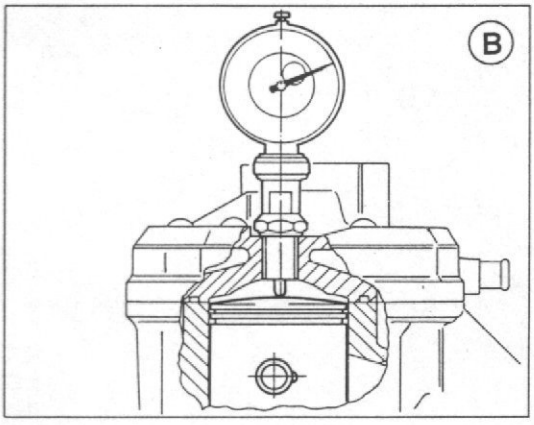
1-2) Adjuster
0) Fixed index on the cover
A-B) Index on the pulley

Adjustment of the electronic valve control cables tension.
This adjustment must be performed at each replacement of one of these cables or one of the elements which can affect the valve control. In order to correctly adjust the tension, act as follows:
- STREAMLINED VERSION: remove the lower fairing as described in the chapter "GENERAL OPERATION";
- let slide the registers protection caps and the control protection upwards;
- unloose both registers by unscrewing the nuts;
- act on the register (1) so that the index (0) on the cover and the index (A) on the pulley are aligned: in such condition the valve will be at closure limit stop;
- fasten the register lock-nut (1) after having completely eliminated the clearance;
- turn the ignition key in "ON" position; turn it again in "OFF" position and, by acting on the register (2), check that the pulley index (B) is aligned with the cover fixed index (0);
- screw the register lock-nut (2) after having eliminated any possible clearance.

Place the protections again.

WARNING - By turning the ignition key in ON position, check the presence of the two acoustic alarms for the exhaust valve opening and closing. This "CHECKING TURN" shows that the valve is neither encrusted nor jammed, thus the motor turns regularly.



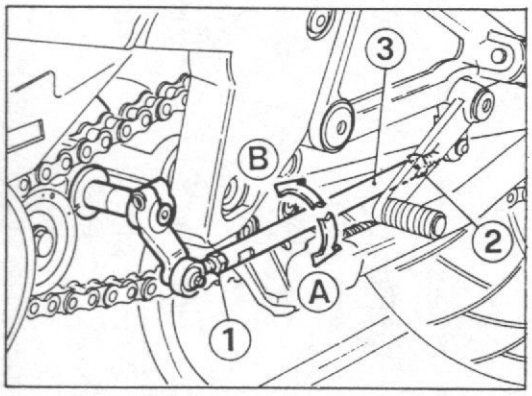


B-A = 1,35÷1,50 mm
B-A = 0.053÷0,059 in.

Compression ratio control.

To check if the compression ratio is correct, proceed as follows:

a) remove the cylinder together with the heads from the block;
b) remove the piston from the connecting rod, properly clean it, insert it in the cylinder till it touches the corresponding profile on the explosion chamber (this chamber too must be free form incrustations);
c) screw a comparator in the sparking plug hole and reset it in the piston position shown in figure A;
d) remove the piston and reassemble it on the connecting rod;
e) remount the cylinder together with the head by placing a 0.0196 in. gasket on the block;
f) place the piston at the top dead center and control the reading on the comparator, which must be included between 0.053 in. (not less) and 0.059 in. (figure B);
g) in case of different readings, reset the right condition by using a cylinder base gasket having the right thickness.



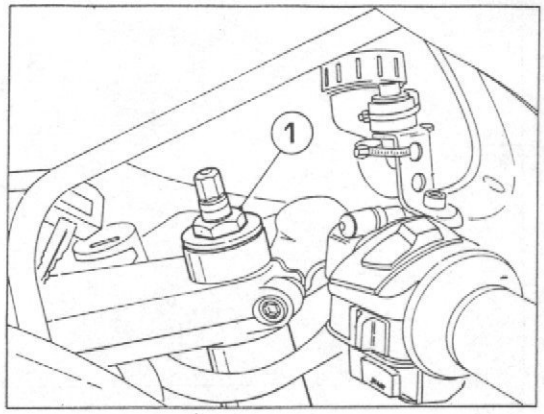
1-2) Counternut

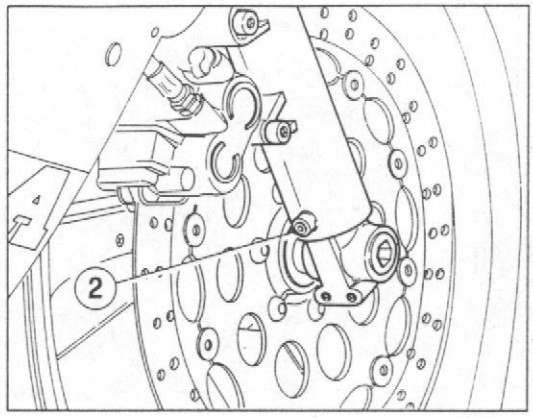
3) Rod

Adjustment of the gearbox control pedal position.

The position of the gearbox control pedal can be changed according to the piloting requirements as follows:

- STREAMLINED VERSION: remove the lower fairing as described in the chapter "GENERAL OPERATION";
- release the counternuts (1) and (2);
- rotate the rod (3) in the direction indicated by the letter (A) to lower the pedal position;
- rotate the rod (3) in the direction indicated by the letter (B) to raise the pedal position;
- at completion of the adjustment, tighten the counternuts (1) and (2) again.





Check and oil change in the front fork.

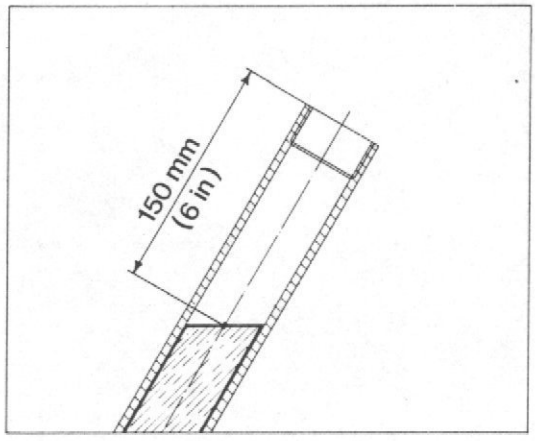
For the proper operation of the fork, it is indispensable that both the fork legs contain the same quantity of oil.

Check the oil level inside the fork legs as follows:

- remove the caps (1) from the top of the bearing pipes;
- remove the preloading tubes and the springs from the inside of the bearing pipes and drain the oil inside the preloading tubes;
- make the legs reach their end of stroke and make sure that the level is at 5.905 in. from the upper end of the bearing pipes.

Should the oil be changed, follow the above-said procedure, then:

- unscrew the drain screws (2) located on the bottom of the legs and let the exhausted oil flow out;
- reassemble the drain screws making sure that the gaskets are in good conditions;
- pour 17.08 cu.in. oil in each leg; the oil must be of the type indicated at paragraph "SUPPLIES";
- make sure that the level is at 5.905 in. from the upper end of the bearing pipes;
- put springs and preloading tubes in place and screw the caps (1) again.

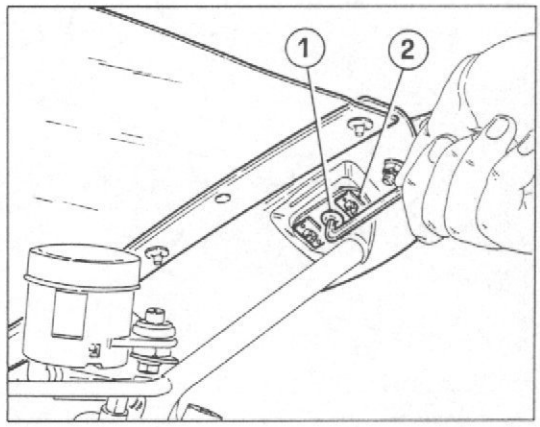


1) Bearing pipe cap
2) Drain screw

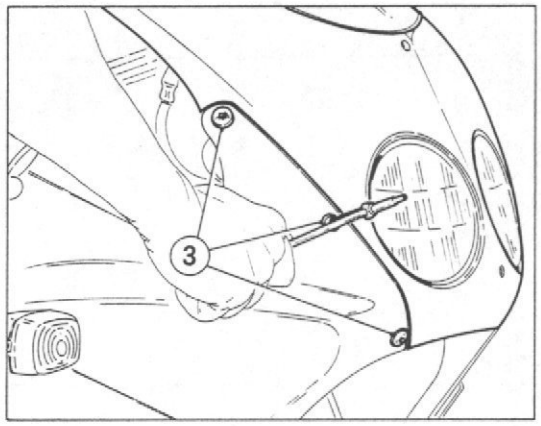
Section **E**

Headlight fairing removal (STREAMLINED VERSION) E.5
Lower fairing removal (STREAMLINED VERSION) E.6
Seat and rear fairing removal E.7
Tank removal E.8
Draining system removal E.10
Cooling system removal E.11
Exhaust valve control removal E.12
Removal of the electric connections of the engine E.12
Removal of the oil pump and clutch control cables ... E.13
Carburettor removal E.14
Removal of the gearbox control transmission and driving chain E.15
Engine removal E.15

Part. N. 68543 (10-90)

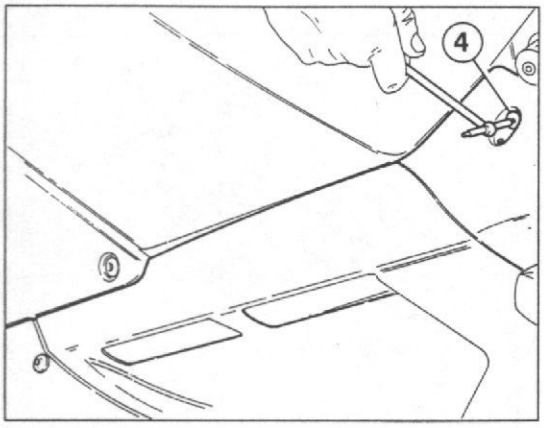


Headlight fairing removal (STREAMLINED VERSION).
Unscrew the two screws (1) fastening the headlight fairing and the driving mirrors to the supporting frame.
Release the mirrors from the suitable hooks (2) on the frame.

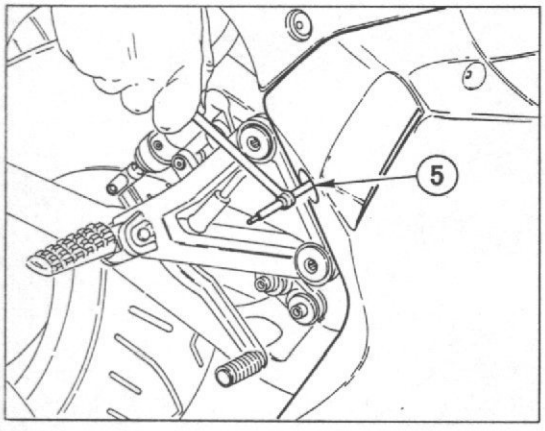


Unscrew the six screws (3) fastening the headlight fairing to the half fairings; remove the headlight fairing.

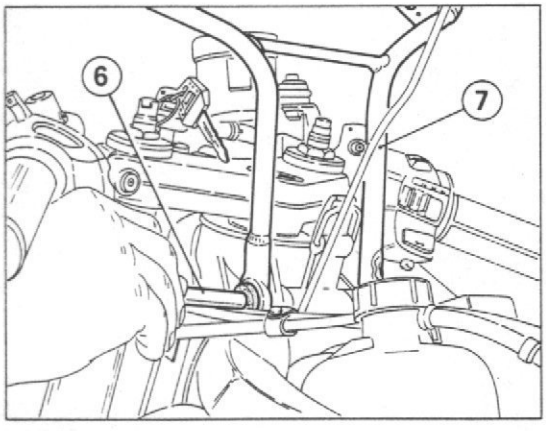
Pay attention to the nylon washers located under the screws fastening all the body parts; they must be utilized again upon reassembly.



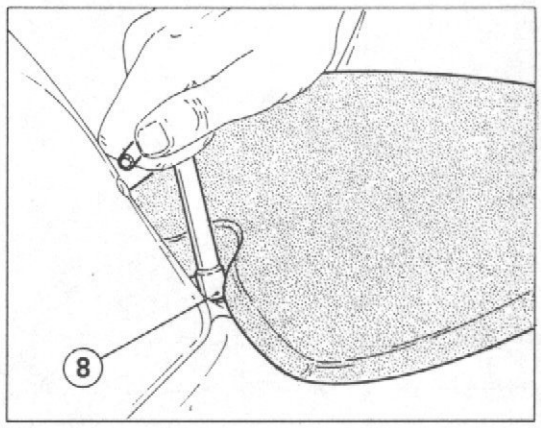
Lower fairing removal (STREAMLINED VERSION).
Unscrew the two lateral screws (4) fastening the fairing to the fulcrum pin of the headlight fairing supporting frame.



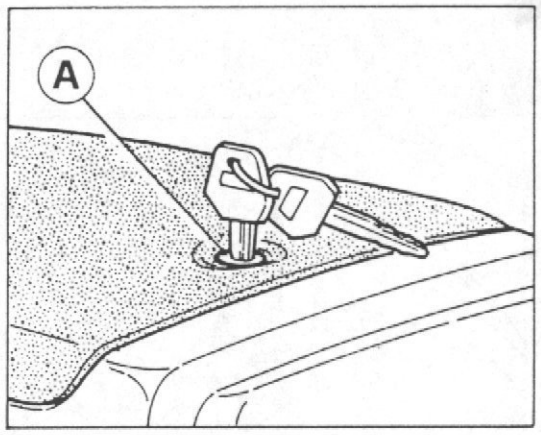
Unscrew the two screws (5) fastening the back of the fairing to the frame.
Disconnect the connectors of the turn indicators (Blue/Blue cables for the L.H. indicator and Red-Black/Blue cable for the R.H. one).
Remove the fairing by extracting it from the bottom.



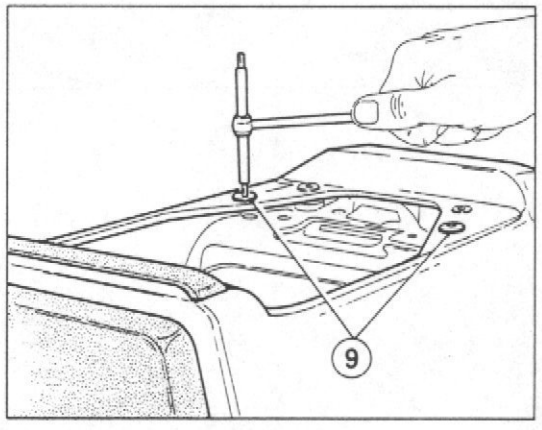
Remove the fulcrum pin (6) of the headlight fairing supporting frame (7); remove the headlight fairing.



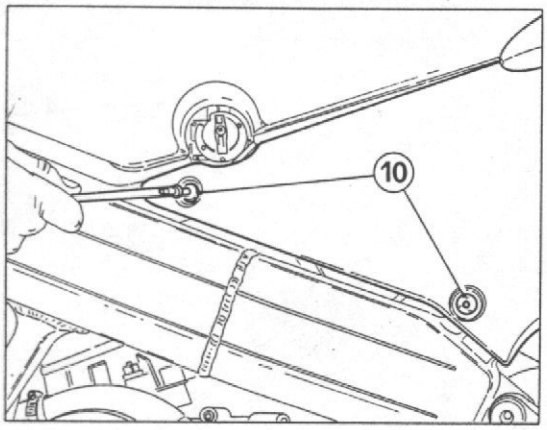
Seat and rear fairing removal.
Unscrew the front fastening screw (8) of the pilot seat.
Extract it from the rear fairing.



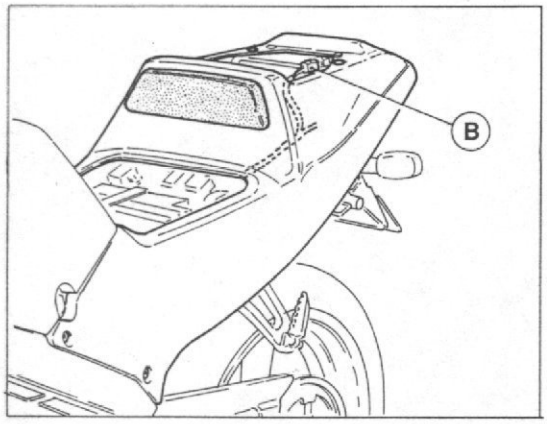
Remove the passenger seat by operating on the rear lock (A) with the switch key.



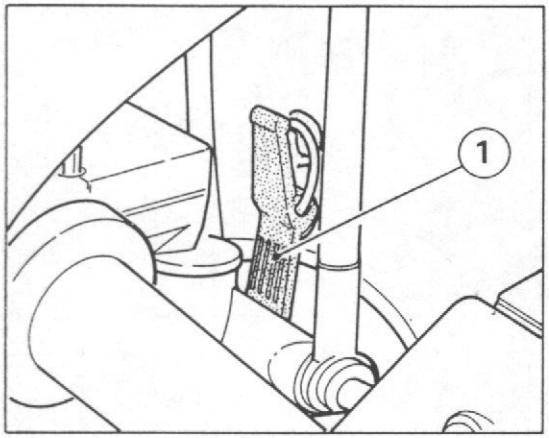
Unscrew the two screws (9) fastening the fairing to the supporting frame in the back.



Unscrew the four screws (10) fastening the rear fairing to the bearing frame.

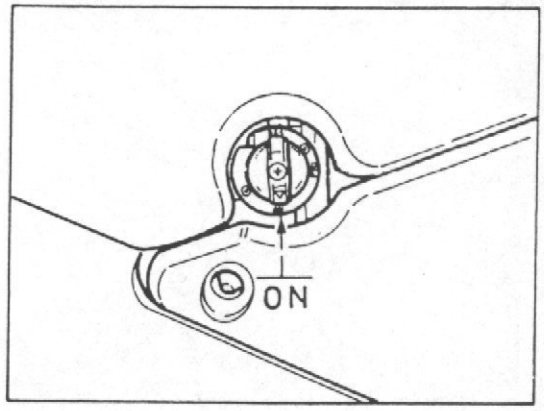


Disconnect the connector (B) of the rear harness, located in the inner compartment under the passenger seat. Remove the full rear fairing.

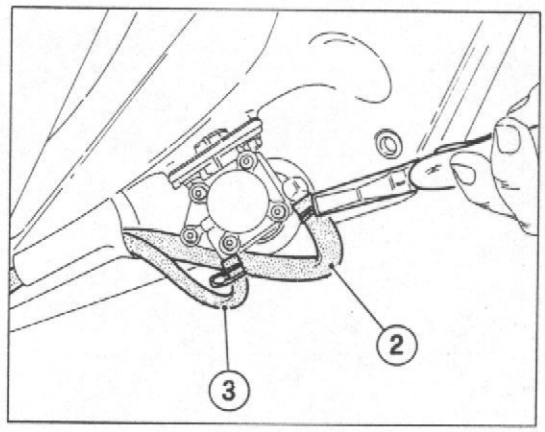


Tank removal.
Release the front belt (1) and lift the fuel tank, holding it by means of the suitable rod.

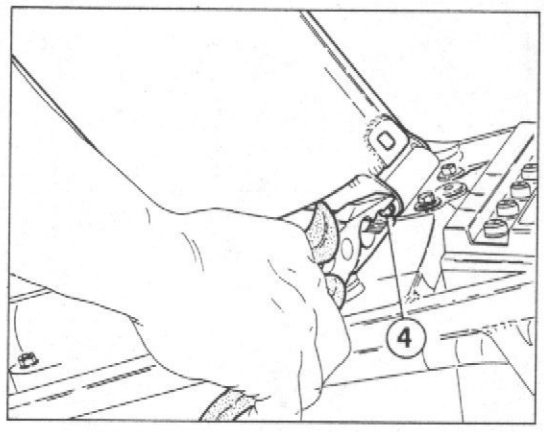
Set the fuel cock on "ON" position.

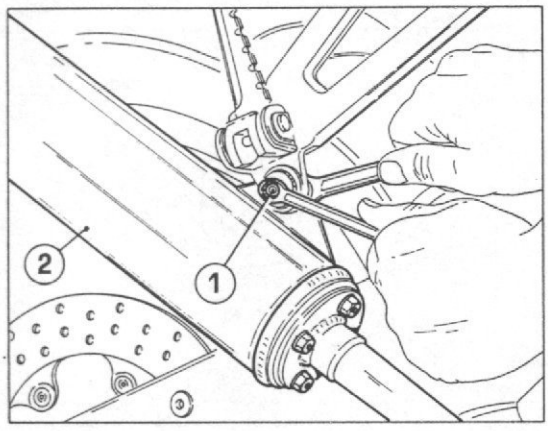


Unloose the clamps on the supply pipes (2) (bigger pipe) and on the piping (3) connected to the suction union. Remove the said pipings from the cock.

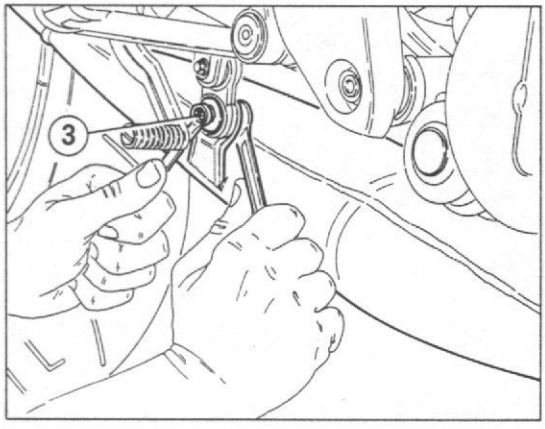


Take out the cotter on the rear fulcrum pin (4) of the fuel tank. Take out the pin and remove the tank with the breather piping.

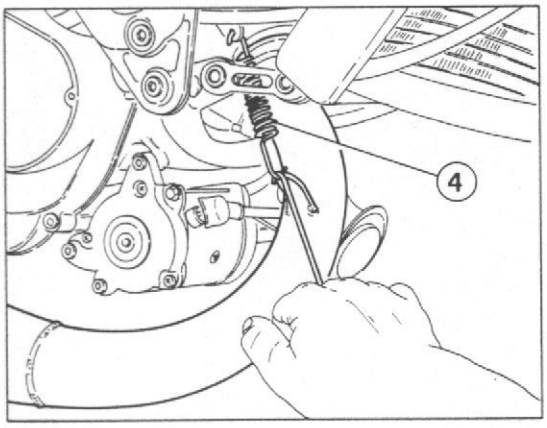




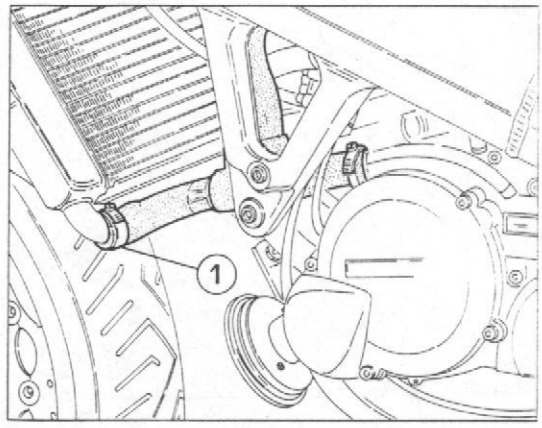
Draining system removal.
By means of a 8 mm setscrew wrench for the screw (1) and a 10 mm one for the relevant nut, release the silencer (2) from its fastening to the passenger foot-rest support. Recover the spacer, rubber pad and washer.



By means of the same wrenches, unscrew the screw (3) on the plate fastening the drain pipe to the R.H. pilot foot-rest support. Recover the spacer, rubber pad and washer.

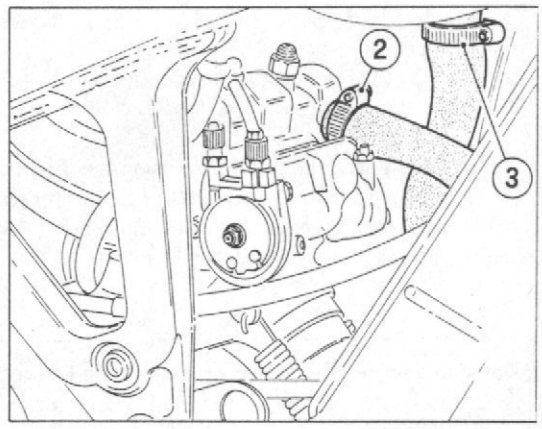


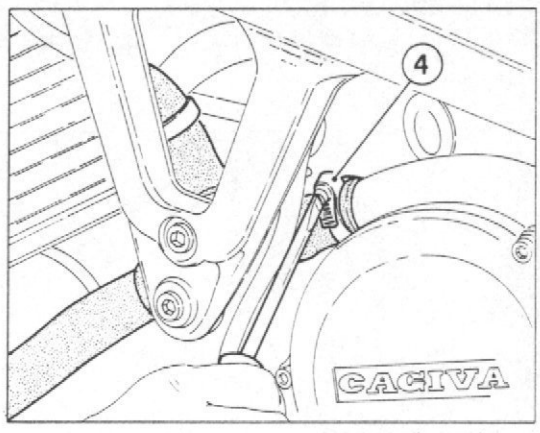
By means of the suitable tool, unhook the springs (4) from the fastening on the drain pipe. Remove the full drain pipe and recover the sealing gaskets on the cylinder.

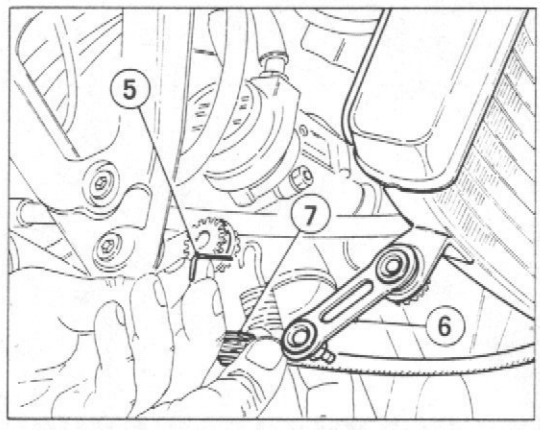


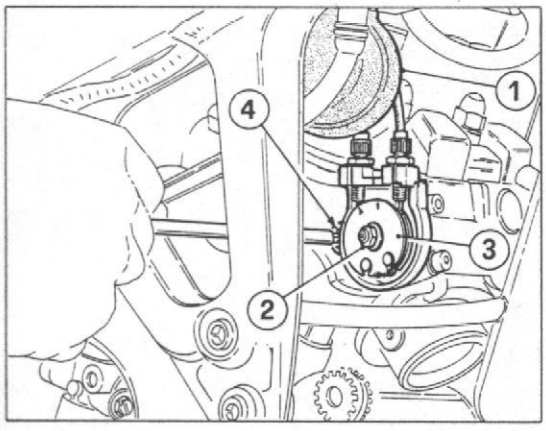
Cooling system removal.

Drain the cooling fluid as described in the chapter "ADJUSTMENTS".
Unloose the clamps on the sleeve connecting the radiator (1), the head (2), the expansion tank (3) and the pump (4). Remove the said sleeve.
Take out the retainer (5) and disconnect the radiator support (6) on the R.H.side.
Unscrew the ring nut on the rev. counter cable (7), on the engine transmission.
After this operation, the radiator can be moved back as to the engine.

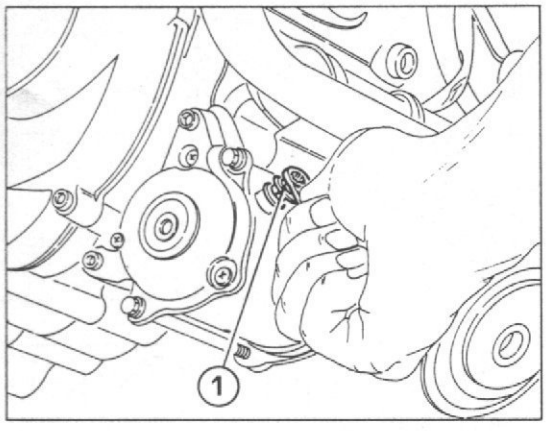




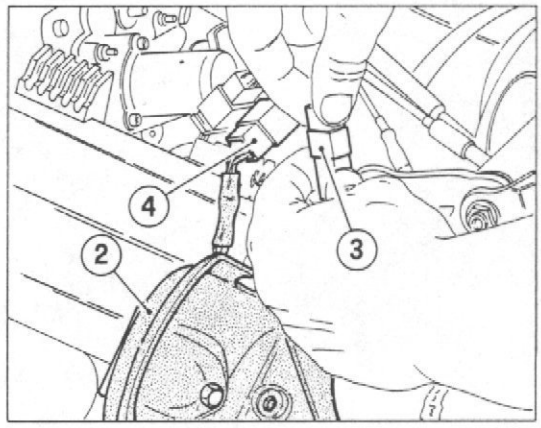




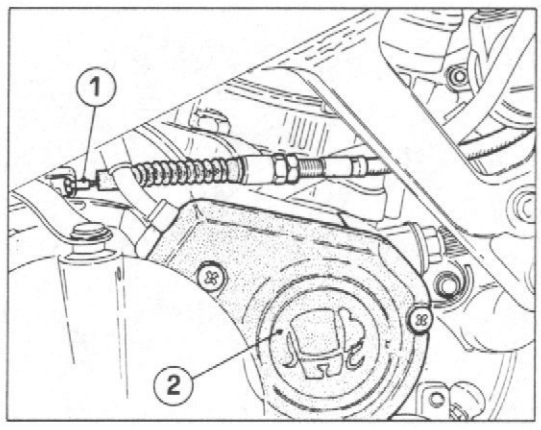
Exhaust valve control removal.
Lift the protection cap (1) from the valve.
Using a 8 mm Allen wrench, loosen the nut (2) corresponding to the control pulley fulcrum (3) of the shaft. Loosen the screw (4) of the control cables support base and extract the base-pulley unit from the shaft; in this way, the control cables will remain connected to the pulley, so, during reassembly, it won't be necessary to check its clearance.



Removal of the electric connections of the engine.
Disconnect the pipe from the sparking plug.
Disconnect the cable on the cooling fluid temperature indicator on the head.
Unscrew the nut (1) on the start motor and disconnect the supply cable.



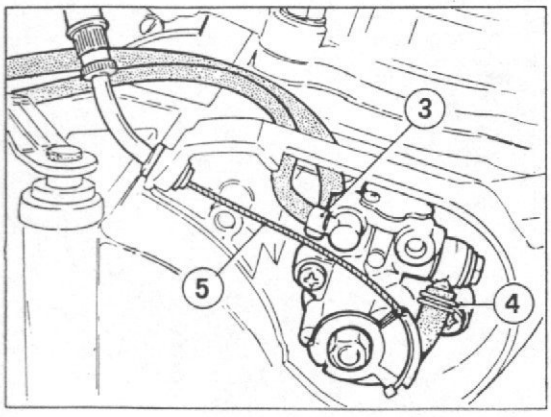
By operating on the inner L.H. side of the bearing frame, unscrew the nut and remove the protection cover (2) of the electric wiring harness. Disconnect the connector (3) of the alternator (Yellow cables) and the control box (4) (Red/black cables). Disconnect the pin on the cable of the idle gearbox indicator (R.H. side of the frame).



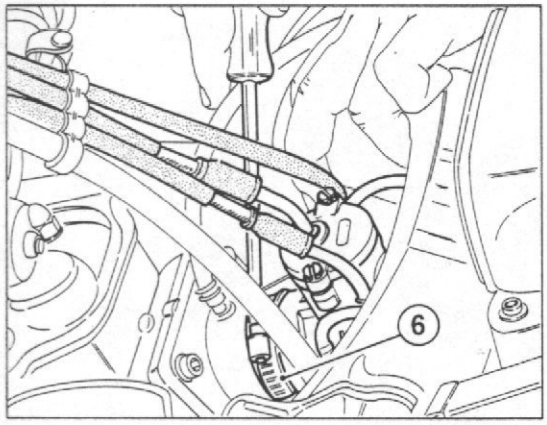
Removal of the oil pump and clutch control cables.

Unhook the terminal of the clutch control cable (1) from the disconnecting lever on the engine; take out this cable from the supporting plate on the engine.

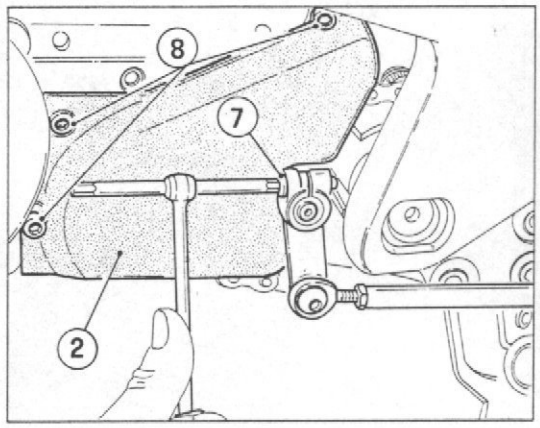
Remove the cover (2) of the oil pump compartment on the R.H. side of the engine.



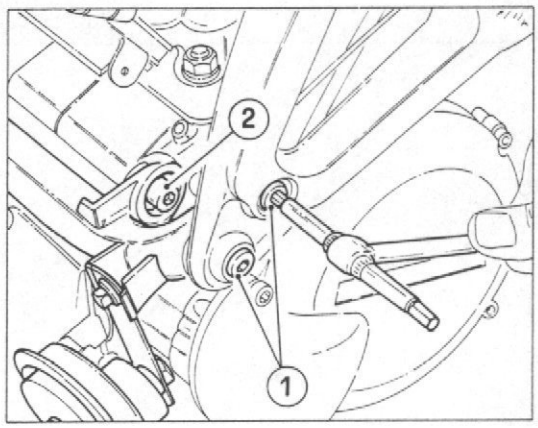
By means of the suitable pliers code **49767**, unloose the clamp (3) on the oil delivery piping from the pump to the carburettor; disconnect this piping.
Unloose the clamp (4) on the pump-oil tank piping; disconnect this piping from the union on the pump.
Take out the terminal of the control cable (5) from the pump pulley and remove this cable from the casing.



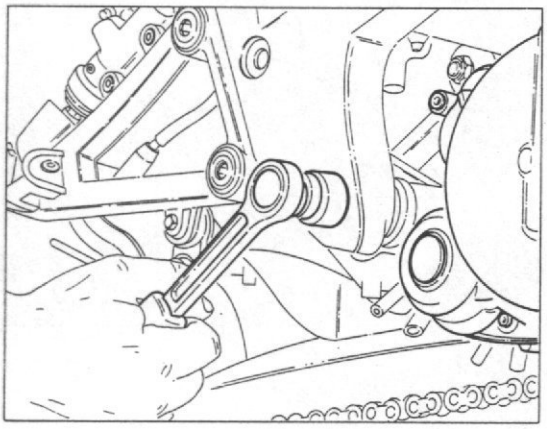
Carburettor removal.
Remove the air inlet sleeve from the filter box.
Unloose the clamp (6) on the union between the carburettor and the suction union; remove the carburettor from the union and hold it connected to the filter box and the control cables.



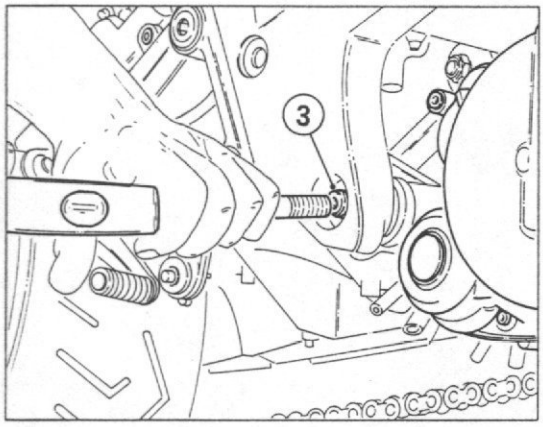
Removal of the gearbox control transmission and driving chain.
Fully unscrew the fastening screw (7) from the gearbox control transmission lever. Remove this lever from the gearbox control shaft.
Unscrew the three fastening screws (8) of the pinion protection cover and remove it. Break the links of the chain and take it out of the engine pinion.



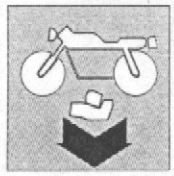
Engine removal.
Arrange a support under the engine.
By means of a 6 mm setscrew wrench, unscrew the four screws (1) fastening the engine front support to the frame.
In order to better carry out the following operations, it is advisable to unscrew the screw (2) fastening the support to the engine, locking the nut on the opposite side; remove the front support.



By means of a 22 mm socket wrench, operate on the R.H. side of the frame and unscrew the fastening nut of the fork pin.



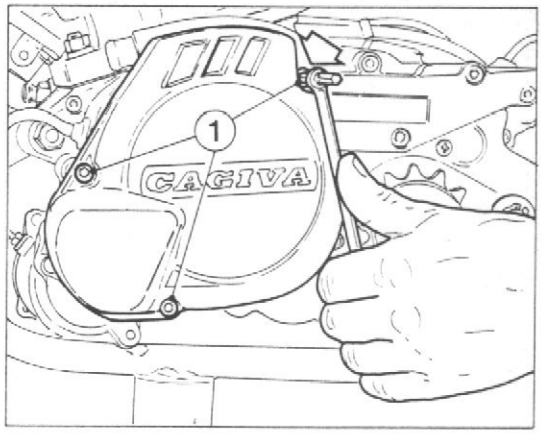
By means of a suitable pad, make the fork pin (3) come out of its seat, until the engine is released from this fastening.
Remove the full engine from the frame.



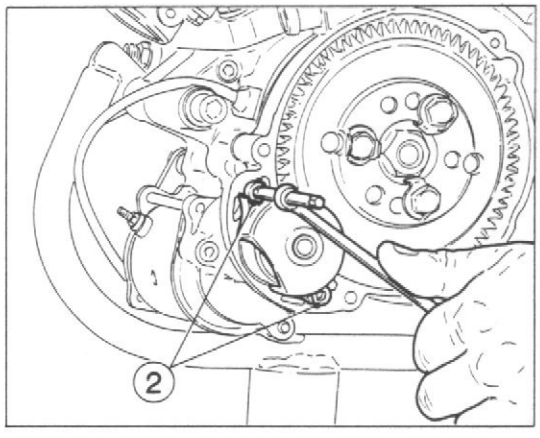
Section **F**

Disassembly of the flywheel and L.H. half-crankcase components F.7
Clutch cover disassembly F.10
Disassembly of the clutch and R.H. half-crankcase components F.11
Disassembly of gear components F.15
Thermal assembly removal F.16
Exhaust valve disassembly F.19
Separation of half-crankcases F.21

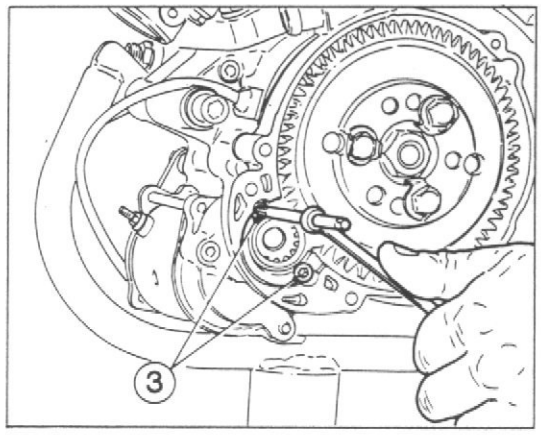
Remove the cover on the flywheel side after unloosing the three fastening screws (1). The shorter screw is shown by an arrow, on the figure.
Remove the gasket which should be replaced when reassembling.



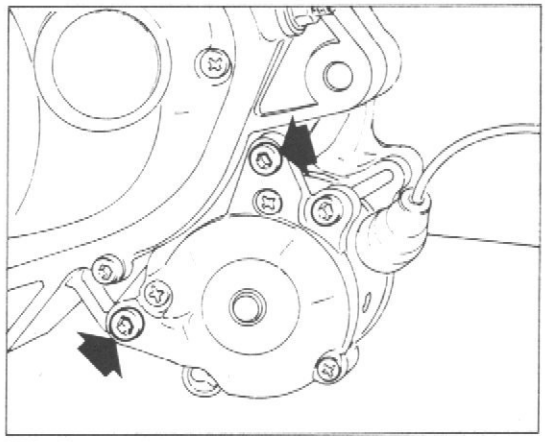
After unloosing the two fastening screws (2), remove the cover and the starting motor drive. Pull out the whole drive.

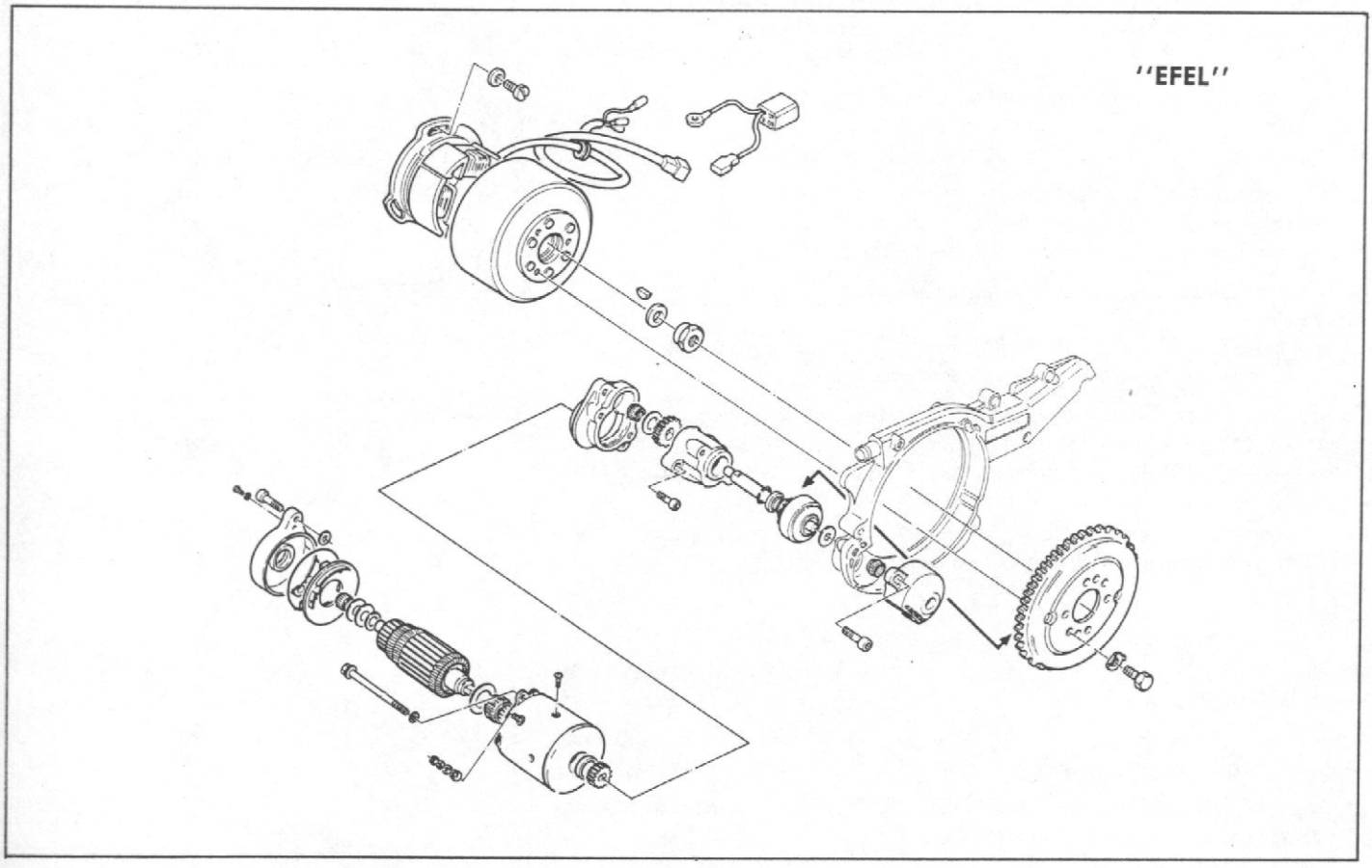


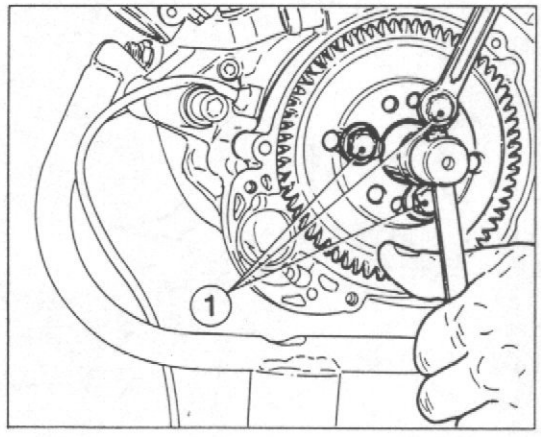
Unloose the two starting motor inside fastening screws (3).



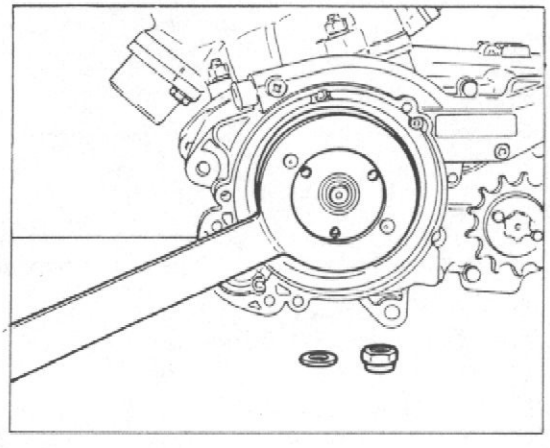
Unloose the two screws fastening the starting motor to the R.H. half-crankcase. Keep the washers, if any, between the starting motor bearing plate and the half-crankcases. Pull out the motor from the right side.



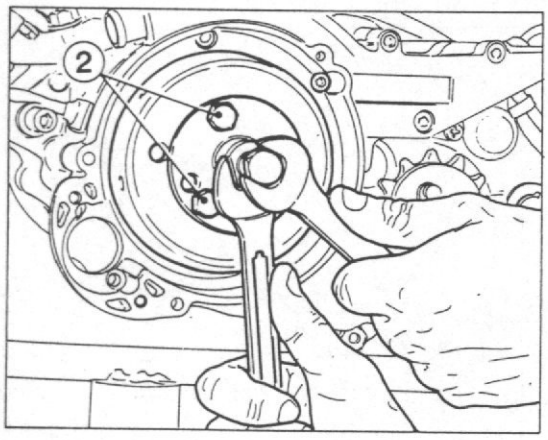

''EFEL''



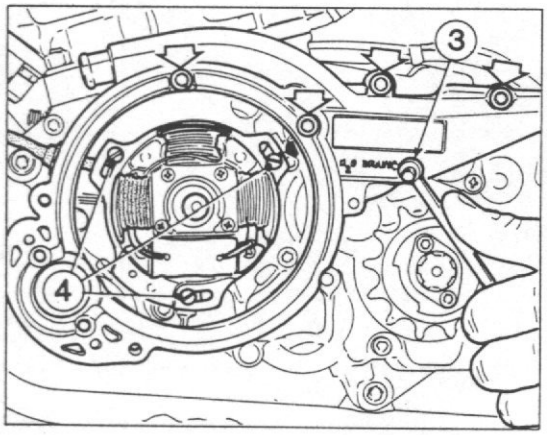
Disassembly of the flywheel and L.H. half-crankcase components.
Straighten the bent edge of the safety washers and unloose the three screws (1) fixing the starting crown on the rotor. During this operation it is necessary to prevent the flywheel from turning by locking the middle nut with a 22 mm. socket wrench. Remove the crown. During the reassembling arrange the crown so that the two peripheral holes, having a larger diameter, are coaxial to the corresponding holes placed on the rotor.



Prevent the rotor from turning by applying tool code **46614** on it. Unscrew the rotor lock nut with the help of a 22 mm. socket wrench, turning it anticlockwise. Remove the convex washer which shall be arranged, during reassembling, with its convex part turned towards the nut.



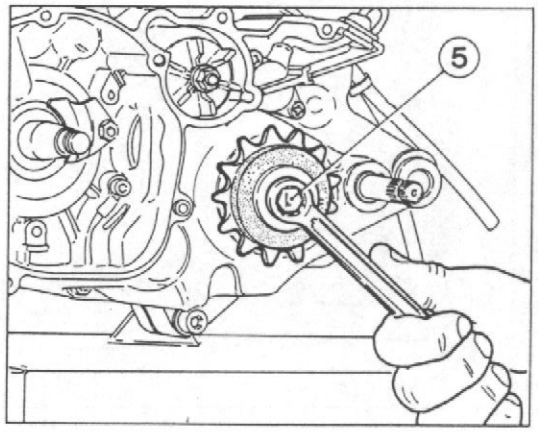
Use tool code **51614** and fix it to the rotor with three suitably sized screws (2). Holding the tool with a 19 mm. allen wrench and turning the middle screw clockwise, remove the rotor from the engine shaft with a 17 mm. Allen wrench.



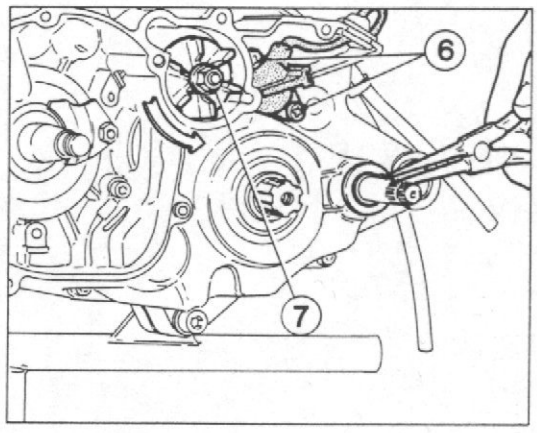
Unloose the five screws fastening the flange on the L.H. half-crankcase. Pay attention to screw (3) which is longer than the others and is provided with a gasket under its head. Remove the flange and the gasket.

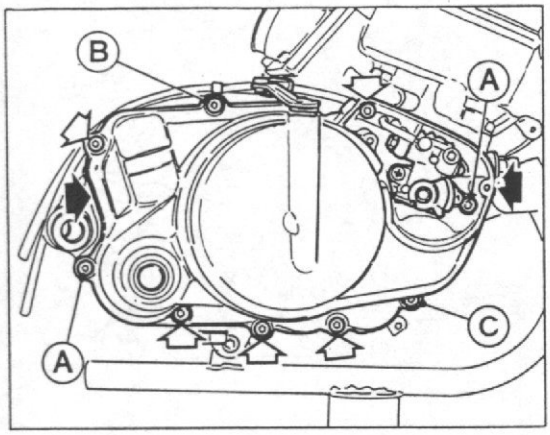
Unloose the three screws (4) fastening the stator to the L.H. half-crankcase; release the fairlead rubber ring and take out the stator complete with harness. When the half-crankcases are reassembled, the notch on the stator shall be in correspondence of the upper R.H. fixing point.

Unscrew the fastening screw (5) of the chain pinion. Remove the washer and the pinion.

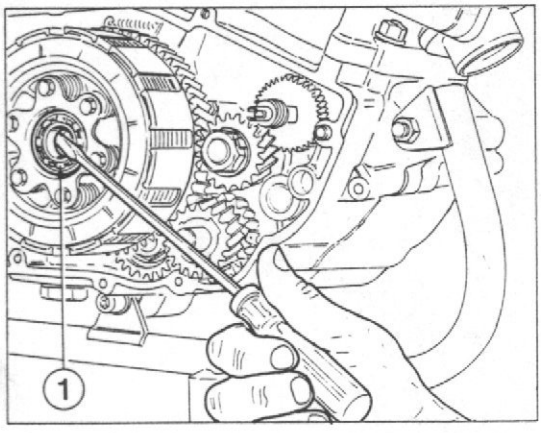


Unscrew the fastening nut (7) of the water pump rotor and take the water pump out of the pump control shaft.
Remove the lock ring on the selector shaft, keeping the washers and the shims if any.
Unloose the two screws (6) fastening the neutral gear position indicator and remove the latter. Pull out the peg and the spring from the positive shaft.

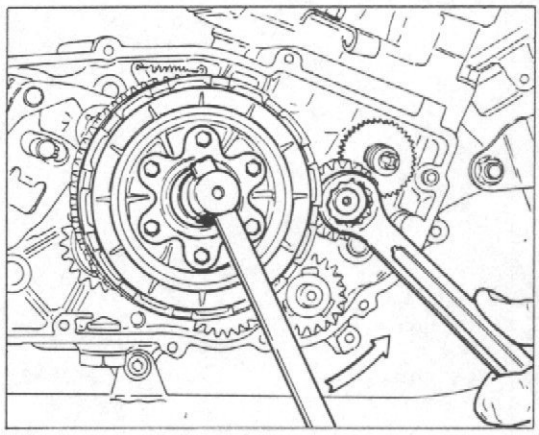




Clutch cover disassembly.
Unloose all the clutch cover fastening screws considering that, during reassembling, of the three longer screws (A) and (C), the two screws (A) are in correspondence of the two centering bushes, and that a spacing bush and a oil pump pipe fastening plate are mounted under screw (B).
Levering the points shown by the full arrows, take out the half-crankcase cover and remove it together with the packing and the oil pump.

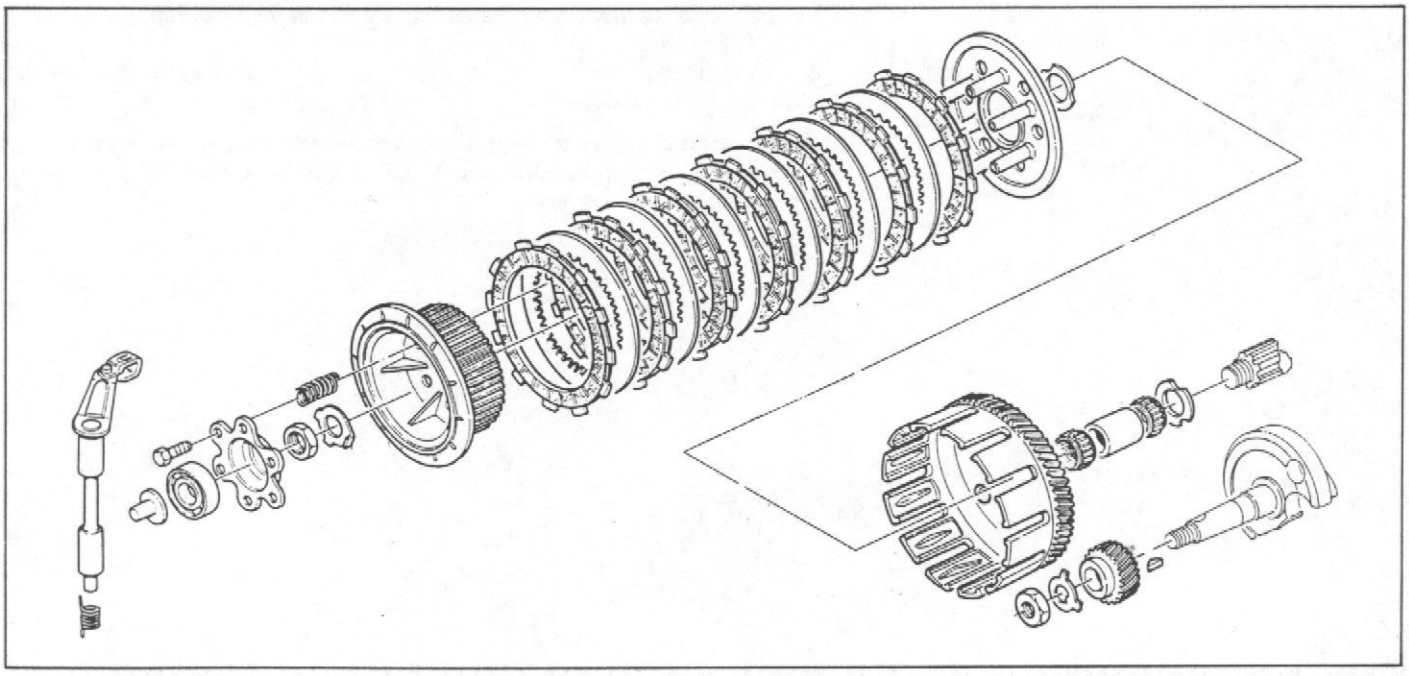


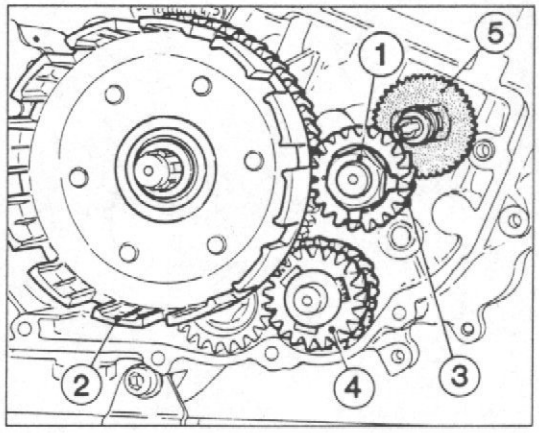
With the help of a screwdriver pull out bearing (1) from the inside of the clutch spring check disc.



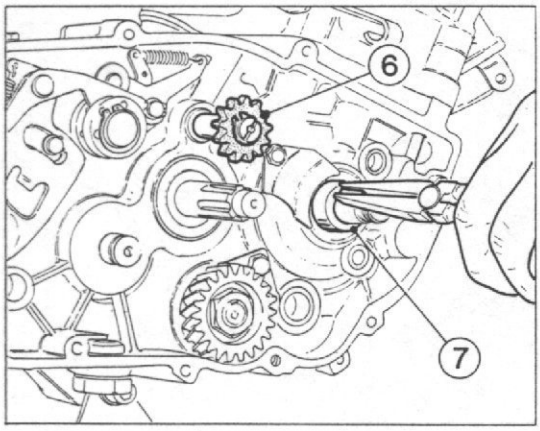
Disassembly of the clutch and R.H. half-crankcase components.
To unloose the plate-holding hub fastening middle nut, provisionally arrange the generator rotor on the drive shaft and lock it with the suitable tool code **51614**.

In this occasion it is recommendable to straighten the bent part of the engine sprocket fastening nut washer and to unloose the nut itself which shall be taken out later on.

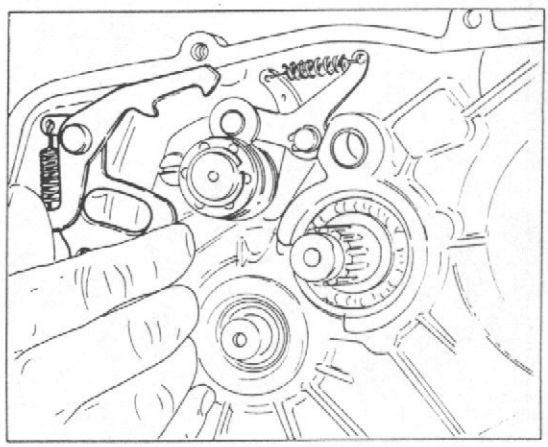




Pull out the three-point washer, clutch housing (2), the two roller cages, the inner spacer and the other three-point washer from the main shaft.
Remove nut (1) after unloosing it, the washer and gear (3) of the main drive.
Take out the couple of driving gears (4) of the countershaft and keep the washers.
Take out sprocket (5) controlling the oil pump, complete with transmission shaft. Pay attention, during reassembling, to the position of the washers.

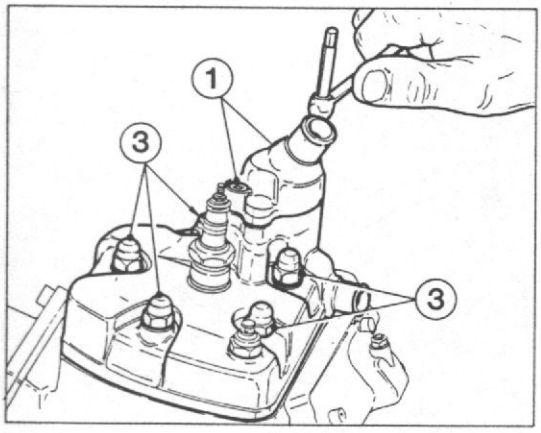


Extract the shaft provided with water pump control gear (6).
Remove the crankshaft tongue, extract the spacer (7), the oil pump control gear and the revolution counter.
Remove the OR ring and the spacer.



Disassembly of gear components.
Release the selector fork from the main shaft (as shown in the figure) and pull out the selector shaft.

REMARK! - If this intervention is made only for replacing the crankshaft, it is not necessary to remove the other particulars.
This will avoid the gearbox disassembly when half-crankcases are removed: gearbox components will remain installed in the R.H. half-crankcase.



Thermal assembly removal.

The disassembly of the head, cylinder and piston can be anticipated and it is independent of the disassembly operations carried out so far.

Now it is necessary to remove the head-cylinder assembly in order to disassemble the engine half-crankcases.

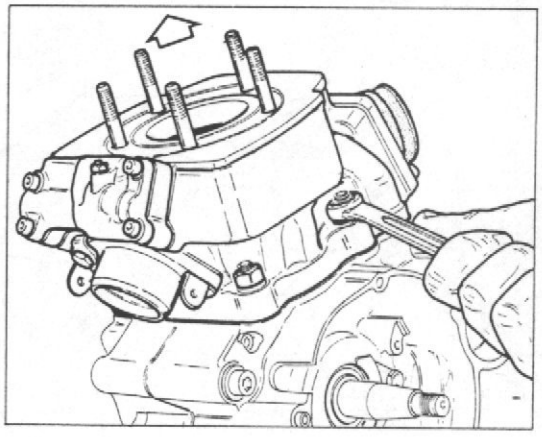
Unloose the two socket head screws (1) and heaxonal-head screw (2) fastening the thermostat cover.

Remove this cover, the gasket and the thermostat.

Unscrew the five blind rings (3) fastening the head on the cylinder and keep the gasket placed under them.

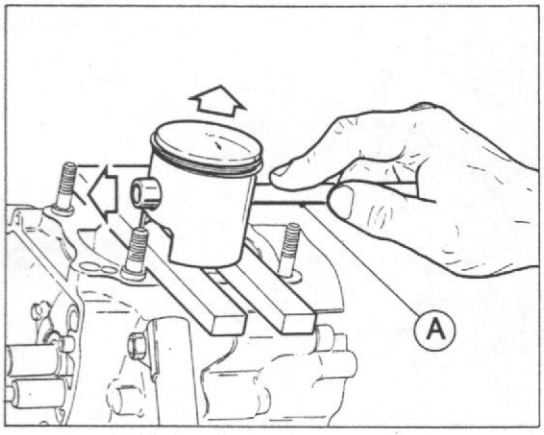
Remove the two O-rings under the head.

WARNING: The O-rings between the head and the cylinder should always be replaced at any reassembly.



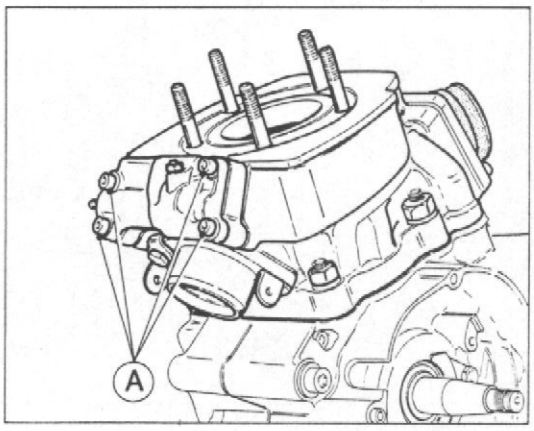
Unloose the four nuts fastening the cylinder on the cranckase. Consider that, when reassembling it, the clutch adjuster supporting plate should be arranged under the R.H. rear nut.
Take out the gasket between cylinder and cranckase.

WARNING - When extracting the cylinder avoid to have it turned, since piston ring ends could enter the grooves preventing them from coming out and damaging the same rings. To avoid this risk it is also advisable that extraction is made with piston at B.D.C.



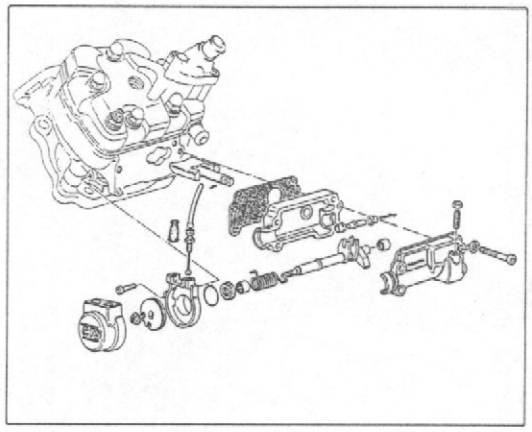
Take out a piston pin lock and by suitably supporting the piston, pull out the piston pin with the help of a parallel pin (A).
Remove the roller cage from the connecting rod.

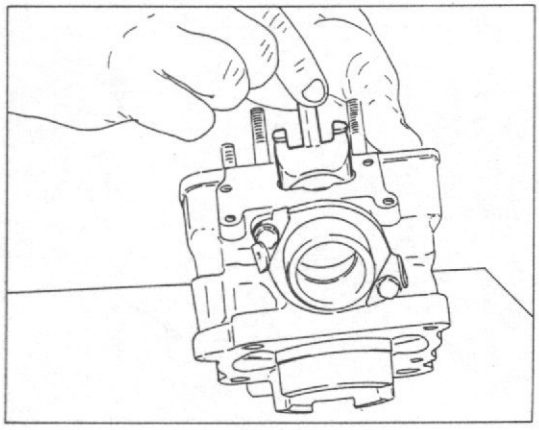
REMARK - Arrow printed on the piston must be directed towards the exhaust duct, when re-assemblying.



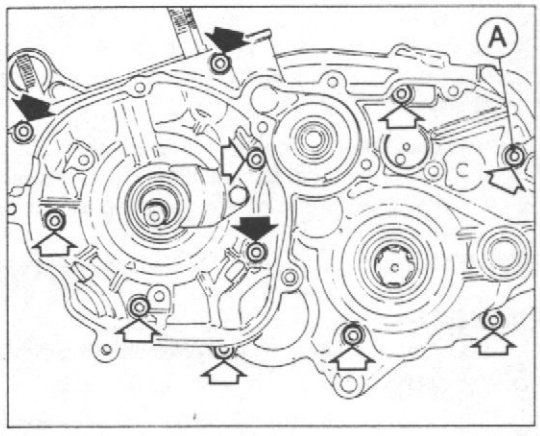
Exhaust valve disassembly.

– Unloose the four screws (A) and pull out the two shells complete with valve.
This operation is possibile when the valve is new or clean, while if it is dirty this operation may be difficult and it is necessary to open the two half-covers containing the drive shaft. Strike it with a rubber mallet in order to divide them, as the two parts are joined with a sealer.

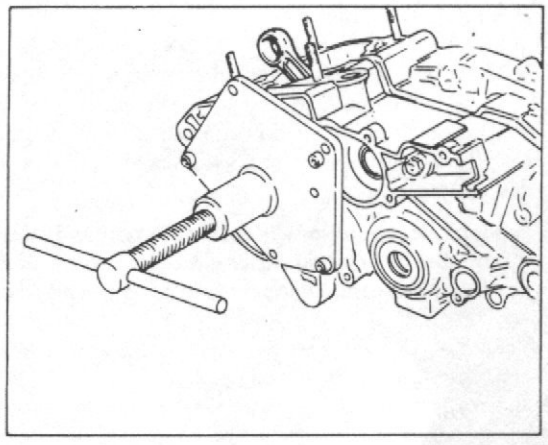




– Take out the fork from the pin and pull the latter out from the valve. Now pull out the valve from the cylinder seat with the help of a pair of pliers, or, if this is not enough, push it with a drift pin from inside outwards, without damaging the surface of the valve itself. Clean the valve as described in chapter "OVERHAULING".

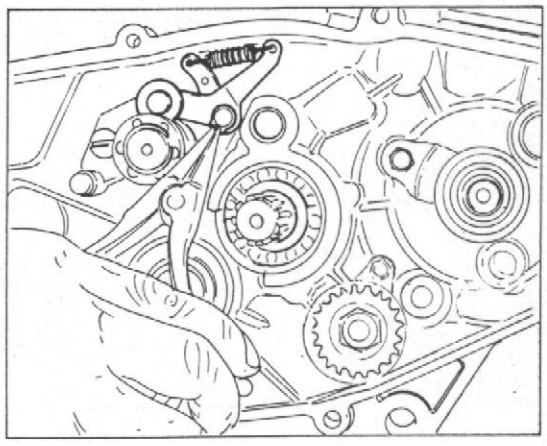


Separation of half-crankcases.
Now it is possibile to divide the two half-crankcases.
Unloose the eleven fastening screws on the L.H. half-crankcase.
When reassembling it, keep in mind that the three longer screws are those shown with the full arrows.
Furthermore screw (A) located on the motor right end, shall fix the fastening key of the cranckase breather pipe.
The gearbox being in neutral position, and after having applied tool no. **33048** on the L.H. crankcase (with 3 screws of proper size) act on the central pin and arrange crankcases splitting.



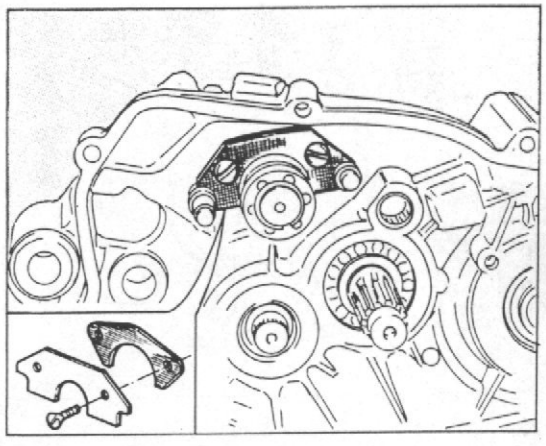
REMARK - This tool acts on the crankshaft; therefore it may occur that the rear side of engine - not being directly affected by its splitting action - tends to remain closed or to turn.
Therefore we suggest to beat with a plastic mallet on the secondary shaft, pinion side, at the same time of tool operation.
Gearbox components and the crankshaft will remain inside the R.H. crankcase.
Remove gasket.

During these operation requiring a continuous handling of the crankcase it may happen that the exhaust valve control shaft comes out from the crankcase and that the washer placed under it falls inside it. To avoid this risk it is enough to keep this shaft in its seat with the help of an adhesive tape.

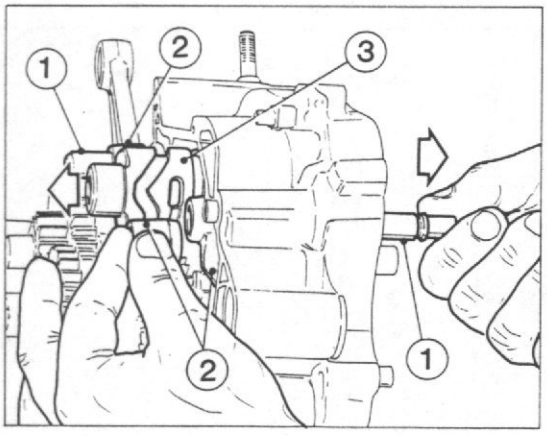


In case that the components (as shafts, gears etc.) replacement is not required, it is advisable to remark the thrust washers position so that the original shimming is respected during reassembly.

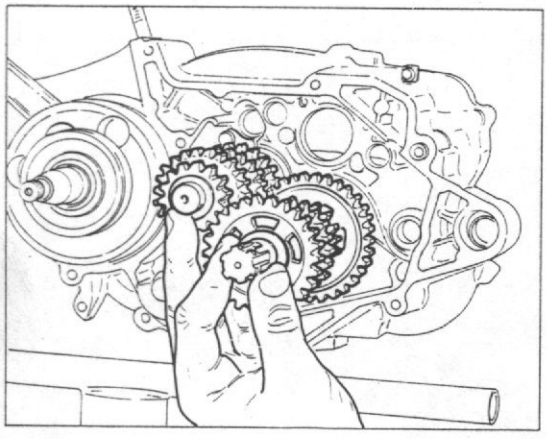
Also in case of components replacement comply with the original shimming, as starting point.



Operating on the outer side of R.H. crankcase, remove the seeger ring from the 5th and 6th gear fork pin end.
Extract the pawls from pin.
Remove the two screws fastening the retaining plate and extract the same plate together with the thrust plates.

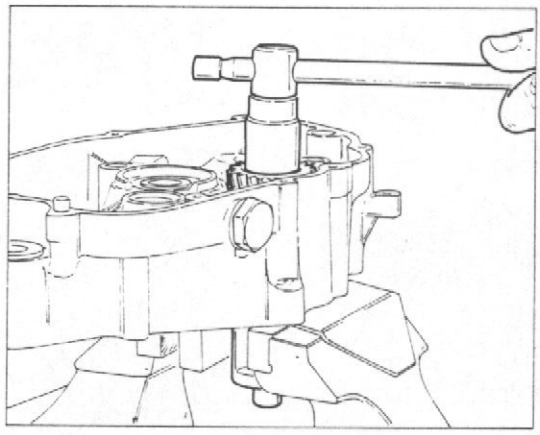


Pull out the two fork pins (1) from the outer part of the R.H. half-crankcase.
Remove the four forks (2) and positive shaft (3) from the inner side.



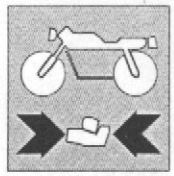
Take out the two gear shafts complete with gears.
If it is necessary to remove the drive shaft from the R.H. half-crankcase, use the same tool code 33048 previously used for disassembling the half-crankcases.

REMARK - For crankshaft extraction absolutely avoid to beat on its end, even with plastic mallets.



In order to remove the bearing, which shall remain integral to the drive shaft, on its L.H. side, it is necessary to use tool code **YA 2271**. Pay attention, when reassembling it, to the washer which is to be fit between the shaft and the bearing.

To take out the countershaft, it should be put in a vice (provided with aluminium jaws) and the nut is to be loosened with a 22 mm. socket wrench. Pull out the gear, keep the key and pull out the shaft from the opposite site.



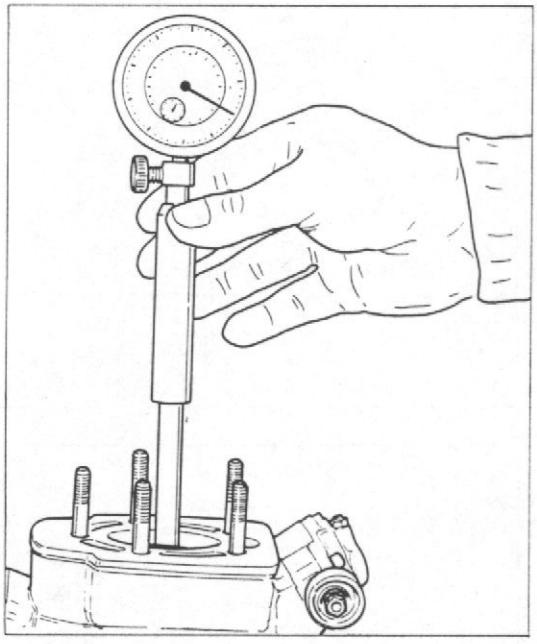
Section **G**

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Piston groove height G.8
Cylinder-piston assembly G.9
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Particulars cleaning.
All particulars have to be cleaned with petrol and dried with compressed air.

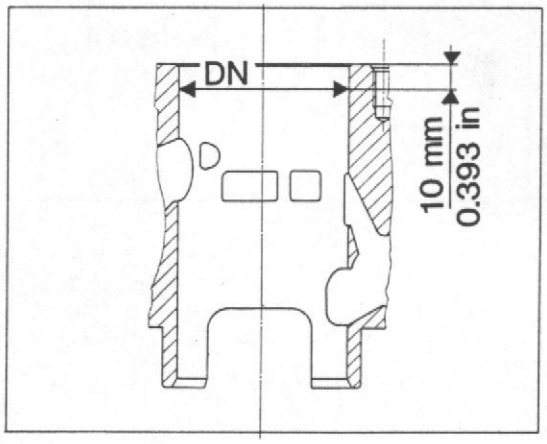
During this operation, inflammable vapours are developped and metallic particles may be ejected at high speed, therefore we recommend to operate in a room free from open flames or sparks and the operator wearing protective glasses.

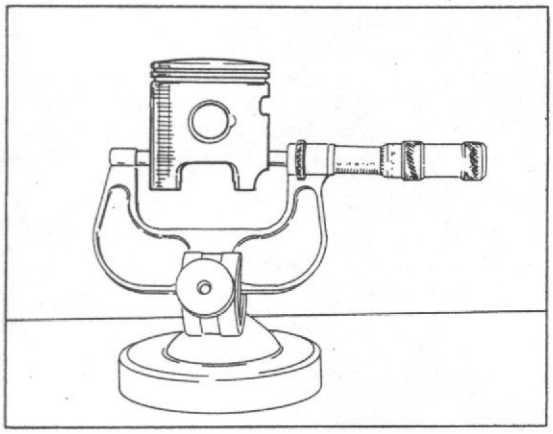
Couplings.
In order to allow the engine an operation under the best conditions, giving the highset performances, it is absolutely necessary that all couplings are made within the prescribed tolerances. In fact, a "tight" coupling is the reason for very harmful seizures as soon as moving parts are heated up; while a "loose" coupling will cause vibrations which increase wear of moving parts, in addition to give annoyance.



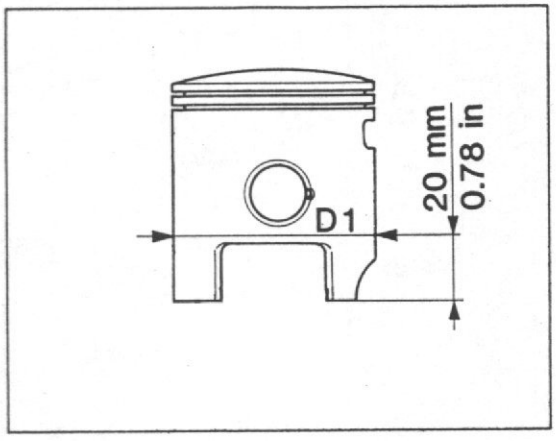
Cylinder.
Light alloy cylinder with "NIKASIL" coating liner.
After cylinder operation, ovalisation admitted is 0.00059 in. max.
In case of damage or excessive wear cylinder has to be renewed.
Cylinders are marked with a letter stating their class.

Cylinder measurement.
Check that the inner surface is perfectly smooth and exempt from scores.
Arrange measurement of the liner diameter at 0.3937 in. from top surface, as shown in figure, in the admission and exhaust axis direction.



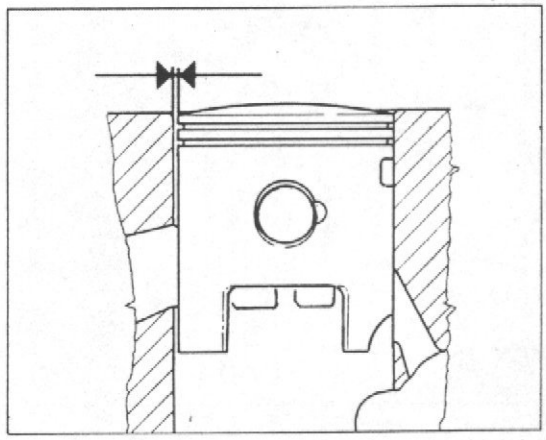


Piston.
Carefully clean the piston ceiling and the piston ring grooves from carbon deposits. Effect a careful visual and dimensional checking of piston: no traces of shrinkage, score, crack or damage must be remarked.
Piston diameter has to be measured at 0.78 in. from the skirt base, perpendicularly to the pin axis.



Piston groove height.

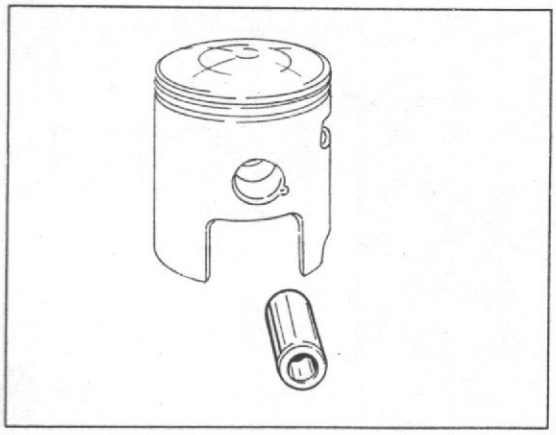
Standard / Standard Standard / Standard / Standard	Limite max. di usura / Max. wear limit Limite max. d'usure / Max. Verschleissgrenze / Límite máx. de desgaste
1,250÷1,230 (0.0492÷0.0484)	1,33 mm (0.052 in.)



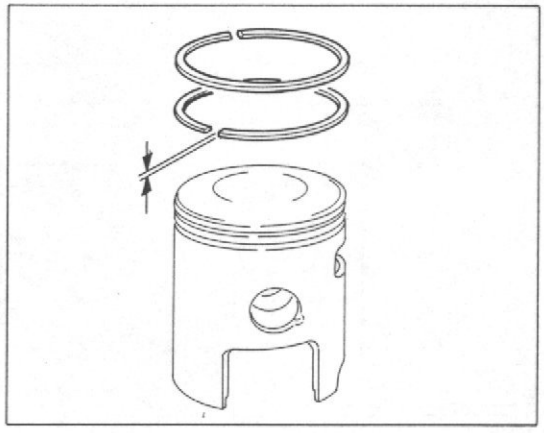
Cylinder-piston assembly

Cylinder-piston assemblies are supplied already coupled and in case that different class cylinders and pistons have been exchanged, it is necessary to carry out diameters measurement as shown in figures at pages G.6-G.7.
Arrange these measurements at a stablized temperature of 68°F.
Best mating clearance DN-D1= 0.00157±0.00019 in. Wear limit 0.00275 in.

Cylinder		Piston		Clearance mm (in.)	Piston code (spare part)
Mark	Dimensions DN mm	Mark	Dimensions D1 mm		
A opp. NERO A or BLACK A ou NOIRE A od. SCHZARZ A o NEGRO	55,990÷56,000 (2.2043÷2.2047)	A	55,950÷55,960 (2.2027÷2.2031)	da 0,03 (0.00118) a 0,05 (0.00196)	8A00 54888/1
B opp. BLU B or BLUE B ou BLEU B od. BLAU B o AZUL	56,000÷56,010 (2.2047÷2.2051)	B	55,960÷55,970 (2.2031÷2.2035)	da 0,03 (0.00118) a 0,05 (0.00196)	8A00 54888/2
C opp. ROSA C or PINK C ou ROSE C od. ROSA C o ROSADO	56,010÷56,020 (2.2051÷2.2055)	C	55,970÷55,980 (2.2035÷2.2039)	da 0,03 (0.00118) a 0,05 (0.00196)	8A00 54888/3



Piston pin.
It must be perfectly smooth, without any scores, steps or blueings due to overheating. Renewing the piston pin it is necessary to replace also the roller cage (in accordance with the selections laid out on page G.11).



Piston rings.

Visually inspect the piston ring and its piston groove state. If the piston ring is weared up or damaged it must be renewed (spares come in couple).

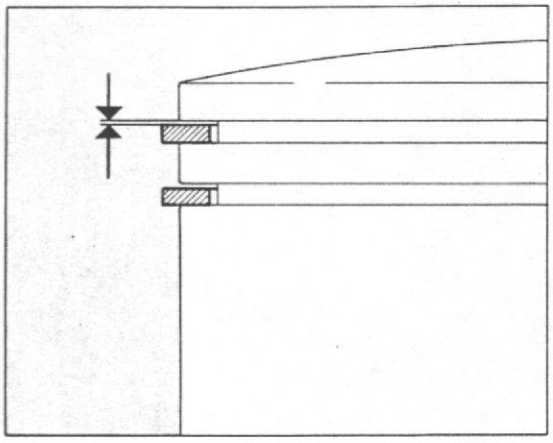
If the piston ring groove on piston is in the same conditions, piston and piston ring have to be replaced, both of them.

When a new piston ring is installed on the used piston, check that the piston groove is not weared up in an uneven manner.

Piston ring has to stay perfectly parallel to the piston groove surfaces. If it is not the cause, piston must be renewed.

Piston ring height.

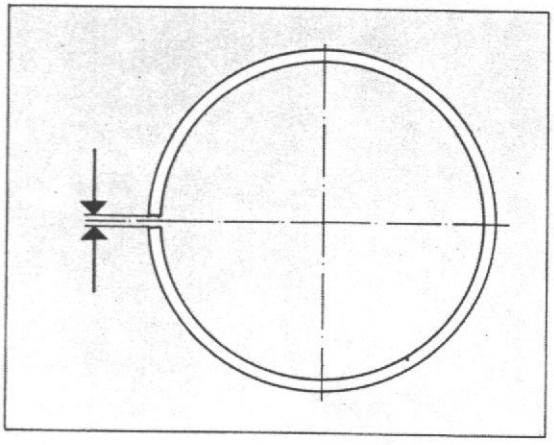
Standard / Standard Standard / Standard / Standard	Limite max. di usura / Max. wear limit Limite max. d'usure / Max. Verschleissgrenze / Límite máx. de desgaste
1,190÷1,178 (0.0468÷0.0463)	1,15 mm (0.045 in.)



This table shows the axial play between lower piston ring, upper piston ring and groove in the piston.

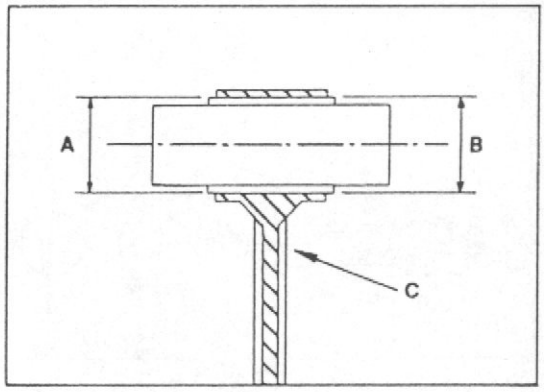
Piston-rings - grooves play.

Standard / Standard Standard / Standard / Standard	Limite max. di usura / Max. wear limit Limite max. d'usure / Max. Verschleissgrenze / Limite máx. de desgaste
0,040÷0,072 mm (0.0015÷0.0028 in.)	0,20 mm (0.0078 in.)



Cylinder-piston rings play.
Insert the piston ring into the cylinder bottom (where wearing is the lowest) and position it well in "square" and measure the distance between the two ends.

Standard / Standard Standard / Standard / Standard	Limite max. di usura / Max. wear limit Limite max. d'usure / Max. Verschleissgrenze / Limite máx. de desgaste
0,15÷0,35 mm (0.0059÷0.0137 in.)	1,00 mm (0.0039 in.)



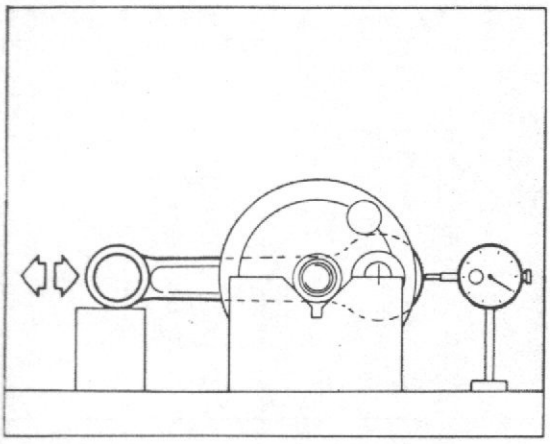
Coupling among gudgeon, piston and connecting rod end.

The following table shows the possible couplings which allow to get the right radial clearance of 0.000078 to 0.000393 in.

If, during engine overhaul, a clearance higher than the allowed limit of 0.00059 is obtained and if the color mark (C) on the connecting rod is not visible, check the connecting rod small end diameter "A" and, according to this one, install the correct needle cage.

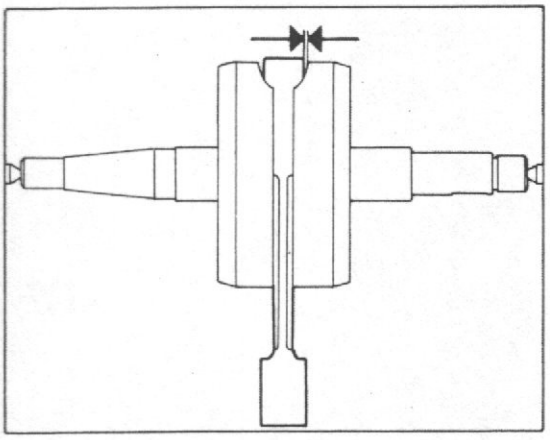
NOTE: When ordering the needle cage, specify its selection.

Hole selection colour «A» connecting rod small end (in.)	Cage selection «B»
Giallo - Yellow - Jaune - Gelb - Amarillo 19,994÷19,996 (0.7871÷0.7872)	−3 ÷ −5
Verde - Green - Vert - Grün - Verde 19,996÷19,998 (0.7872÷0.7873)	−3 ÷ −5
Bianco - White - Blanc - Weiss - Blanco 19,998÷20,000 (0.7873÷0.7874)	−1 ÷ −3 −2 ÷ −4
Nero - Black - Noir - Schwarz - Negro 20,000÷20,002 (0.78740÷0.78747)	0 ÷ −2 −1 ÷ −3
Rosso - Red - Rouge - Rot - Rojo 20,002÷20,004 (0.78747÷0.78757)	0 ÷ −2



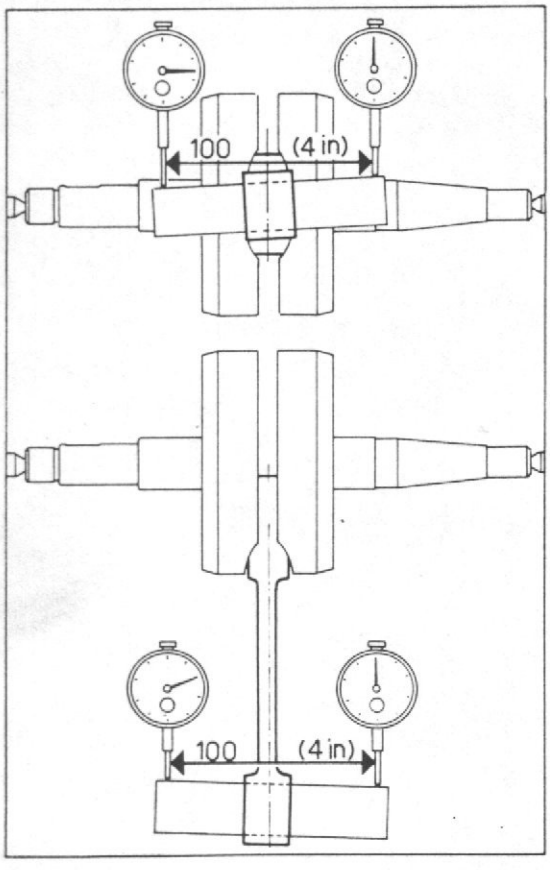
Con.rod big end radial play.

Standard / Standard Standard / Standard / Standard	Limite max. di usura / Max. wear limit Limite max. d'usure / Max. Verschleissgrenze / Límite máx. de desgaste
0,014÷0,022 mm (0.00055÷0.00086 in.)	0,050 mm (0.0019 in.)



Crankshaft out-of-axis.

Standard / Standard Standard / Standard / Standard	Limite max. di usura / Max. wear limit Limite max. d'usure / Max. Verschleissgrenze / Límite máx. de desgaste
0,50÷0,60 mm (0.019÷0.023 in.)	0,75 mm (0.029 in.)



Connecting rod.

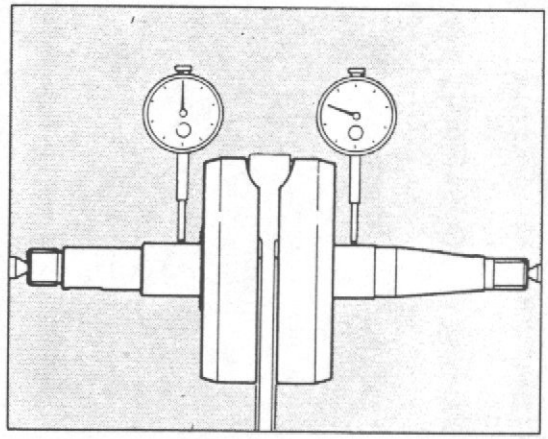
The connecting rod, due to the stresses it is submitted to, is subject to modify in a more or less evident way its initial dimensions. Tests of the connecting rod will try to check its integrity.

When the verified figures are not within the max. wear limits it will be necessary to replace it.

To carry out these tests it is not necessary to disassemble con.rod from the crankshaft.

Con.rod bending.

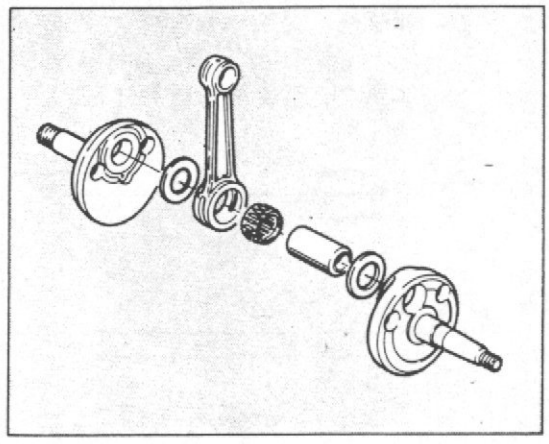
Standard	Max. wear limit
max. 0,025/100 mm (max. 0.00098 in./4 in.)	0,05/100 mm (0.0019 in./4 in.)



Crankshaft out-of-axis.

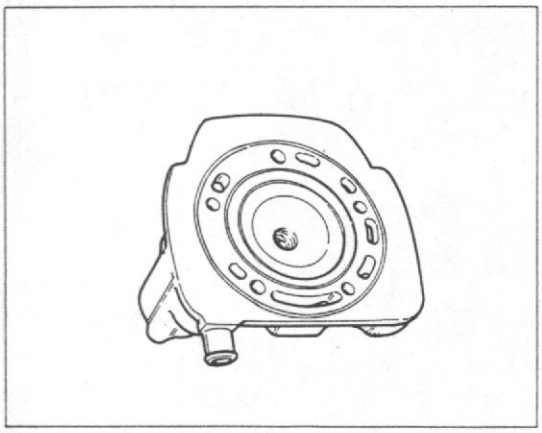
Crankshaft.
Main journals must not present any scores, or grooves; their threads, key seats and slots have to be in good conditions.

Standard	Max. wear limit
under 0.00078 in. 0.02 mm	0,05 mm (0.0019 in.)

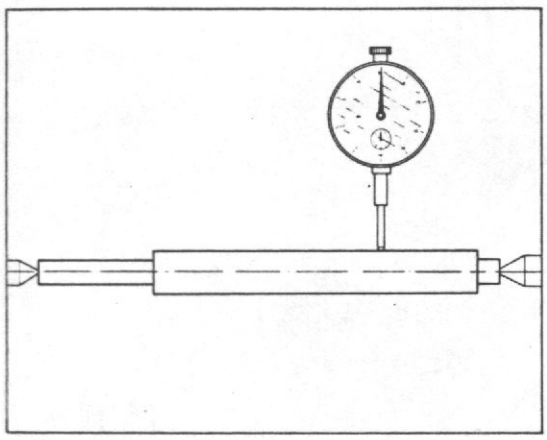


To disassemble the crankshaft use a press and proper punches.
When re-assemblying respect the prescribed tolerances.

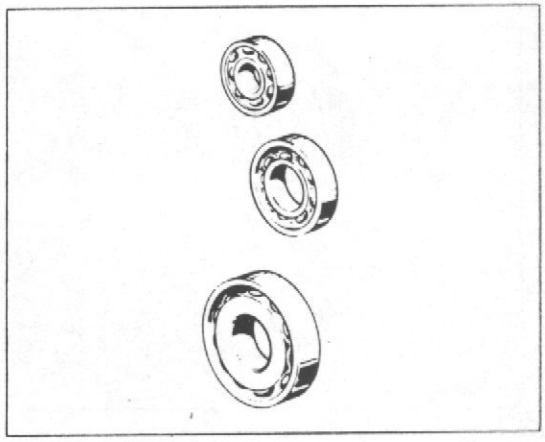
Install the crankpin in the half-flywheels using oil of viscosity ENGLER 50°C=3 (cSt 40°C=32 viscosity).



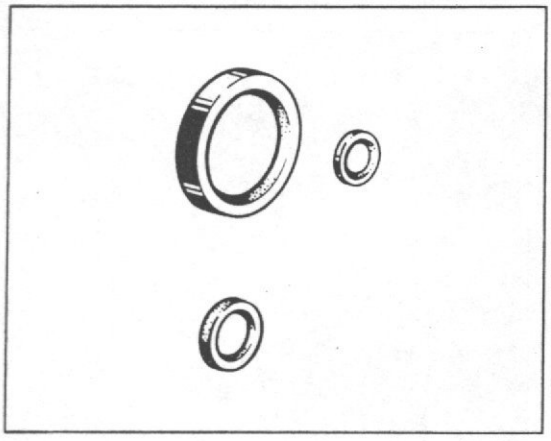
Head.
Remove the carbon deposits from the combustion chamber. Check that no crack is remarkable and that sealing surfaces are without any scores, steps or damages. Planarity must be perfect and the spark plug seat thread as well.



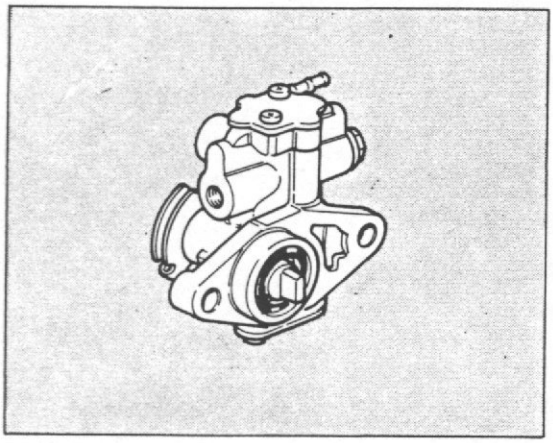
Checking straightness of various shafts.
By positionning the shaft between two counterpoints and measuring with a dial gauge, check that the index displacement is not higher than 0.00196 in.



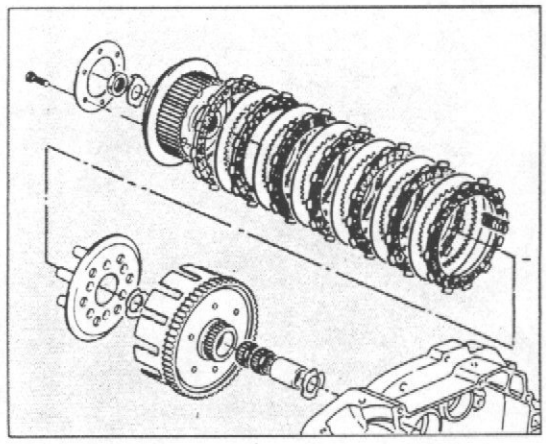
Bearings.
Thoroughly wash with petrol and dry with compressed air. Do not rotate the bearings. Lightly lubricate and slowly rotate the inner ring by hand. No rotation uneveness, hard spots or excessive clearance must be noticed. It is expedient to replace the bearings at any engine overhauling. The main bearings must always be replaced in pairs and must be installed with the **writing towards the outer side**. To replace the bearings it is necessary to heat the crankcase in oven at 194°F÷212°F temperature and remove the bearing by plug and hammer. Install the new bearing (while the crankcase is still very hot) perfectly in spare with the housing axis, using a tubular punch and exercising the pressure only on the outer ring of the bearing. Leave it cool and make sure that the bearing is tightly fixed to the half crankcase.



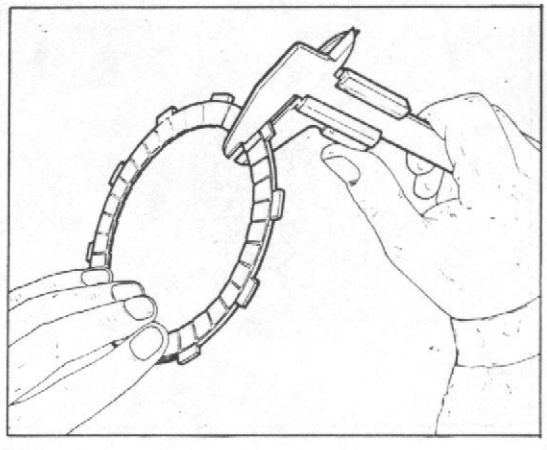
Seal rings replacement.
Replace seal rings at every engine overhauling. Install new seal rings by placing them in "square" inside their seats, using suitable beaters. After installation, lubricate with oil the ring lip.
Perform this operation with the greatest care and attention.



Lubricating oil pump.
The lubricating oil pump does not require any special maintenance, therefore is hat not to be dismantled or checking of its components.

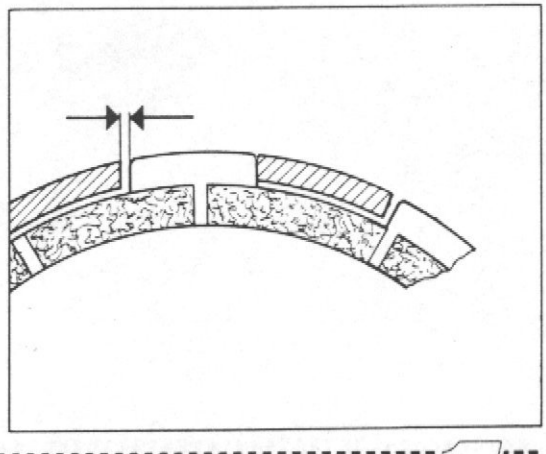


Clutch assembly.
Check that all components of clutch assembly are in very good conditions.
Clutch discs must not present any trace of burning, scores, or distortion; discs presenting friction material must be of a thickness as stated in table hereunder.



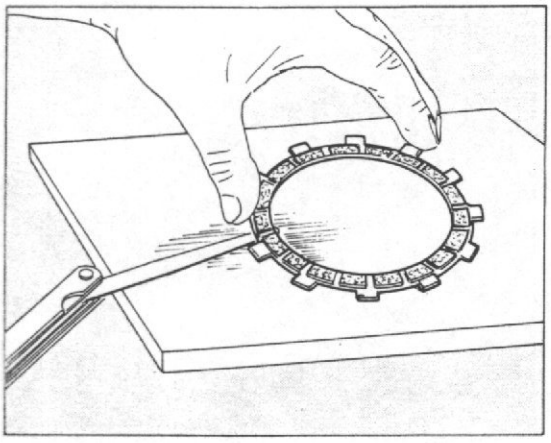
Friction disc thickness.

Standard	Max. wear limit
3,05÷2,95 mm (0.120÷0.116 in.)	2,8 mm (0.11 in.)



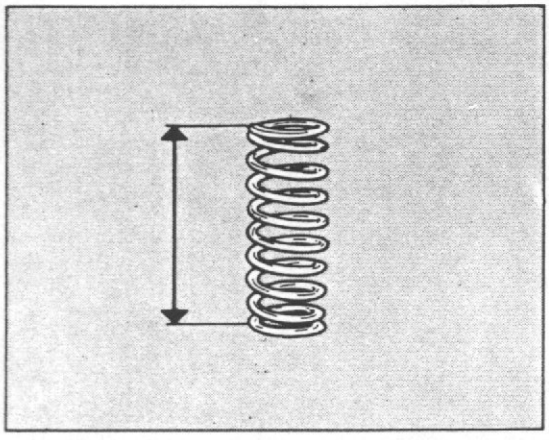
Clutch housing-friction disc clearance.

Standard	Max. wear limit
0,25÷0,45 mm (0.0098÷0.0177 in.)	0,8 mm (0.031 in.)



Friction disc distortion.

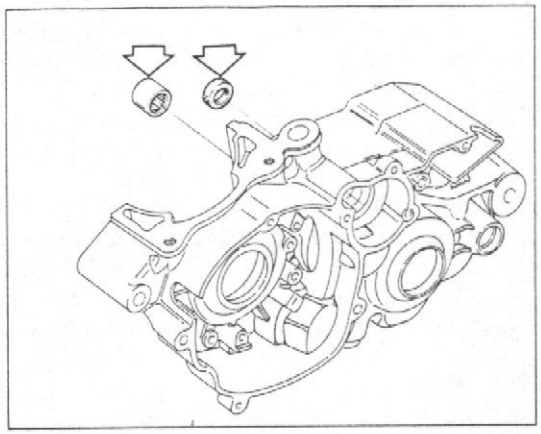
	Standard Standard	Max. wear limit
Disc with friction material	(within 0.0019 in.)	0,2 mm (0.0078 in.)
Disc without friction material	(within 0.0004 in.)	0,25 mm (0.098 in.)



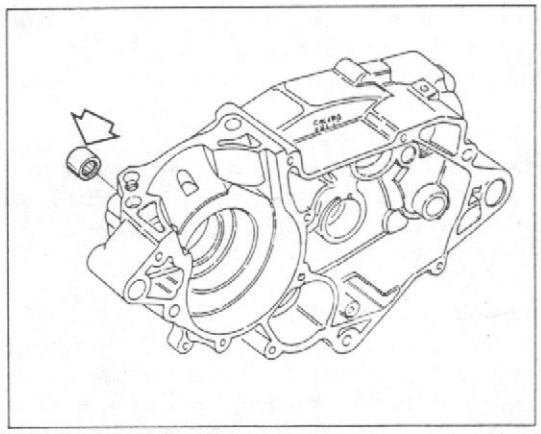
Clutch springs must have a free length not lower than 1,240 in.

Free check lenght	
Standard	Max. wear limit
33,8÷32,2 mm (1.33÷1.26 in.)	31,5 mm (1.240 in.)

To remove the gear main shaft roller bush and the seal ring from the water pump shaft, use the suitable tool code **43823**.

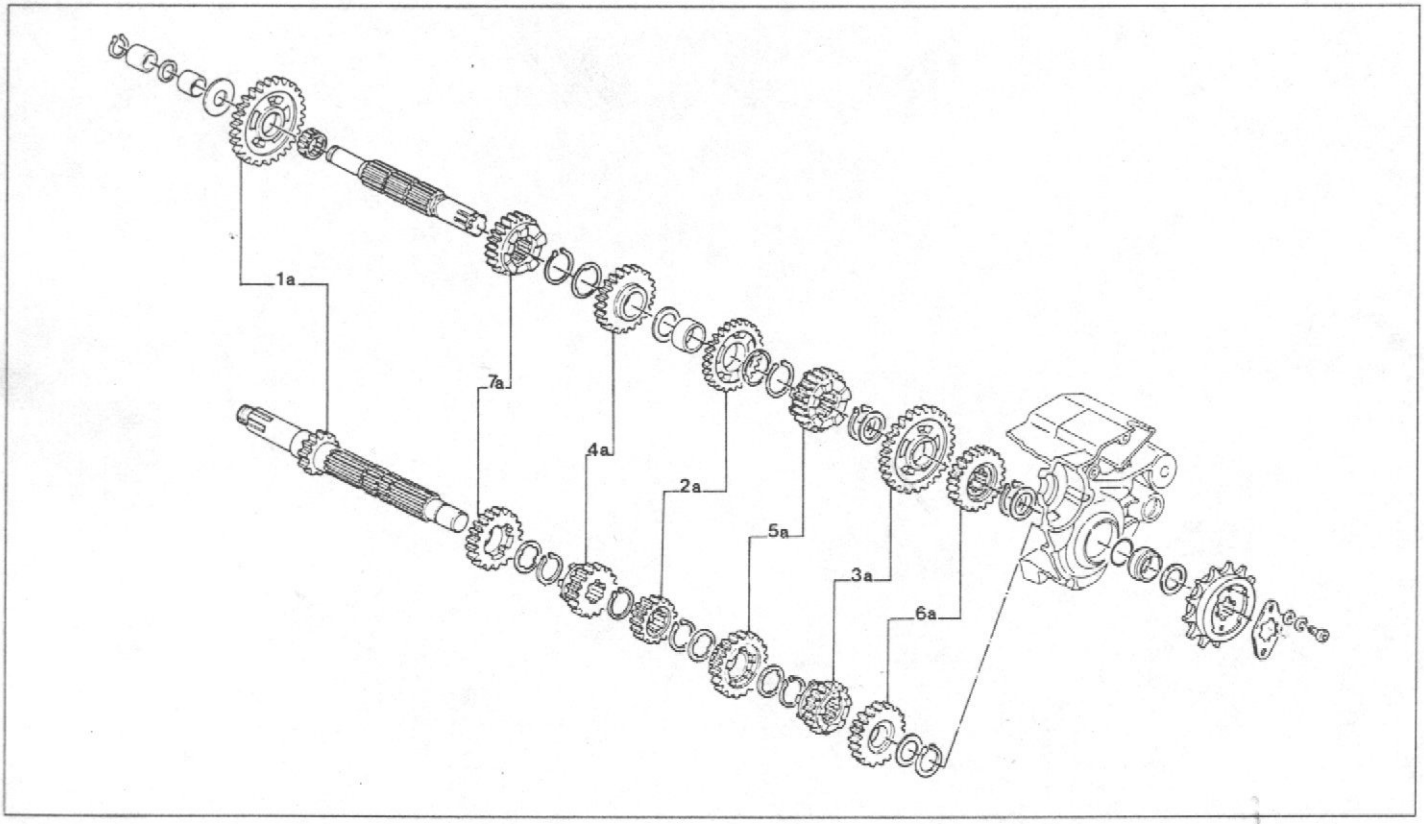


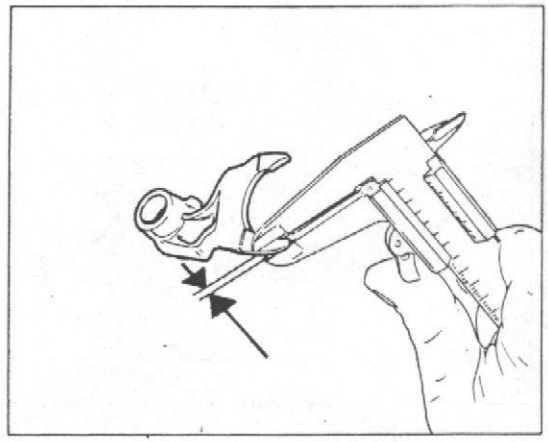
To extract the roller cage of oil pump control shaft, a special puller no. **33054** has been provided.



Gearbox.

Check the condition of frontal engaging dogs of gears, to be in a perfect state check that neutral gears are free to rotate on their shafts and at the same time have not a play higher than 0.0039 in. Shaft threads and grooves must be in perfect conditions.
Check also the components of gearshifting mechanism, to be in very good conditions.
Check that selector slot width is complying with tolerances prescribed.

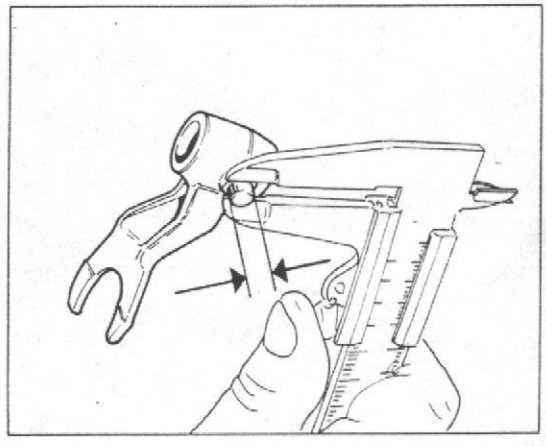




Gear selector fork.
Visually inspect the selector forks and replace the distorted ones. A distorted fork causes difficulties in gear shifting or allows the quick disengagement under load.

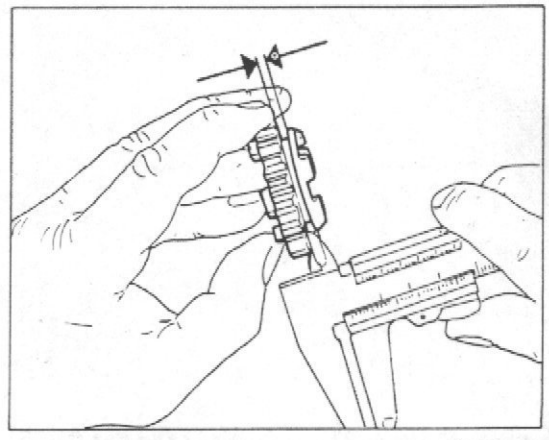
Fork sliding end thickness.

Standard	Max. wear limit
3,39÷3,49 mm (0.133÷0.137 in.)	3,35 mm (0.132 in.)



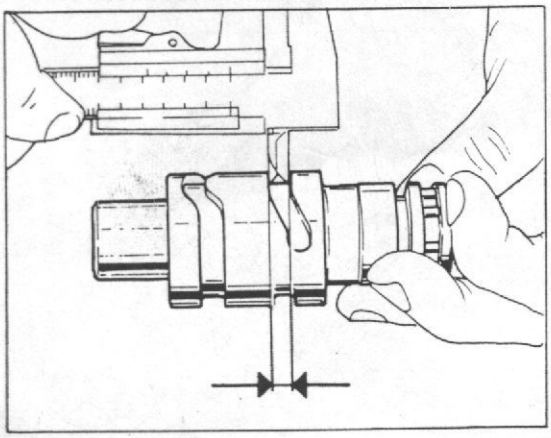
Fork driving pin diameter.

Standard	Max. wear limit
5,8÷5,9 mm (0.228÷0.232 in.)	5,75 mm (0.226 in.)



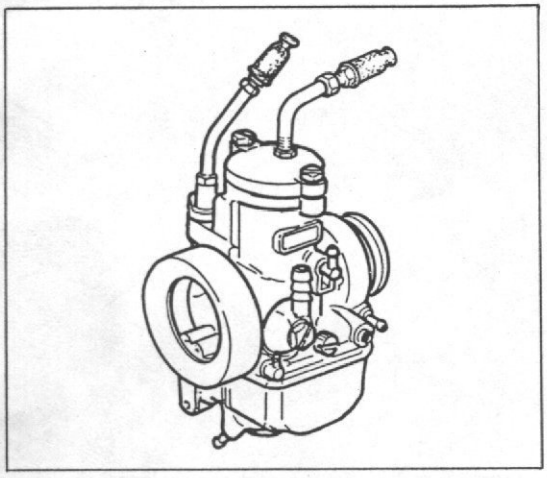
Gear groove lenght.

Standard	Max. wear limit
3,65÷3,72 mm (0.143÷0.146 in.)	3,8 mm (0.150 in.)



Control shaft groove width.

Standard	Max. wear limit
6,05÷6,15 mm (0.238÷0.242 in.)	6,20 mm (0.244 in.)

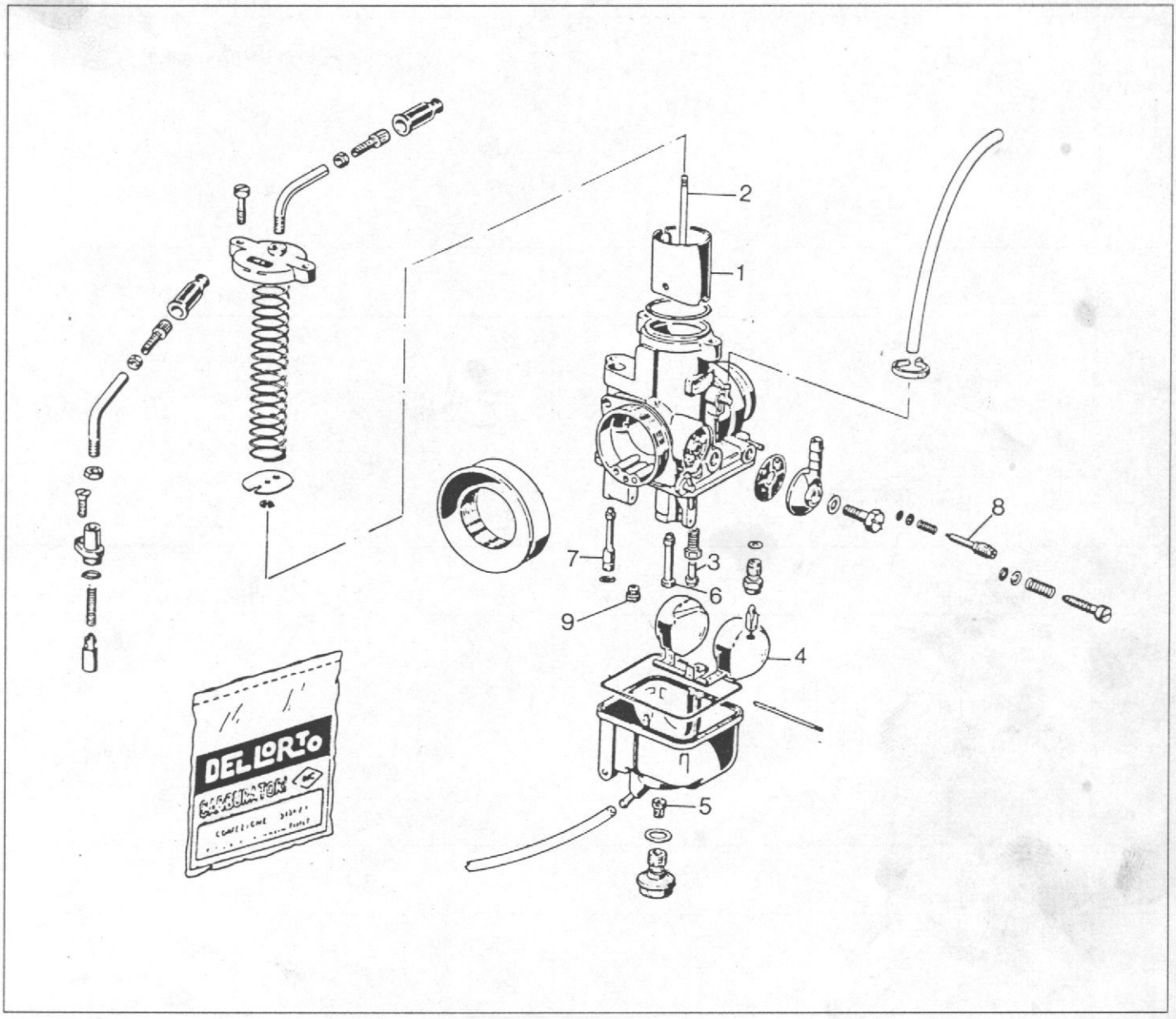


Carburettor overhauling.

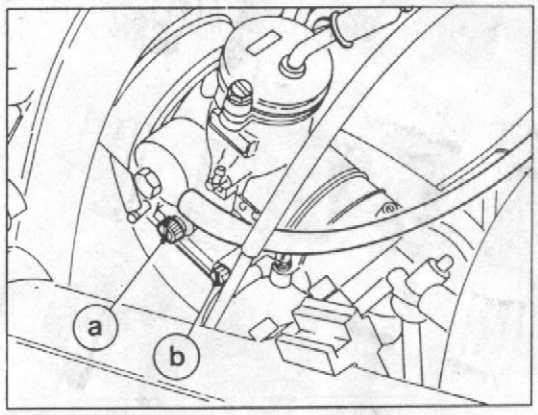
Carefully wash with petrol and dry with compressed air components of the carburettor. Carefully clean all jets and ducts with compressed air only, never use needles or metallic wires.

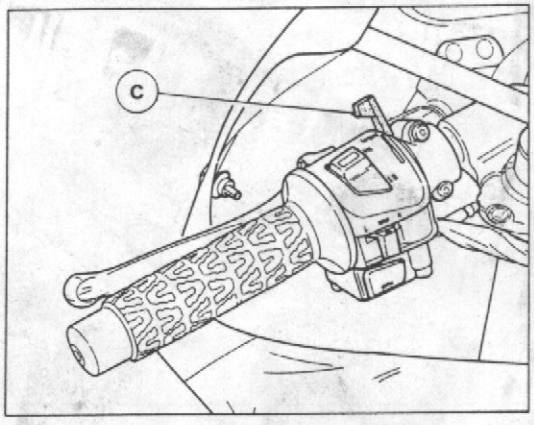
Check that the gate valve is in good conditions and free to slide in its seat, without excessive play. Check that the needle jet and the sprayer are in good conditions and the needle valve is perfectly sealing.

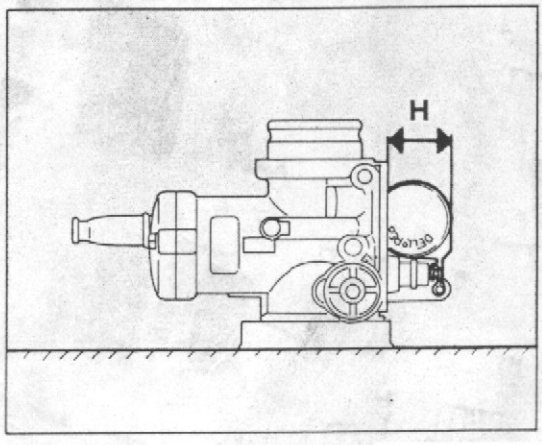
Part. N. 68543 (10-90)



Ref.	Description	PHBH 28 RD
1	Gas valve	45
2	Needle jet	x 19 (2nd notch)
3	Idle jet	48
4	Float	6,5 gr.
5	Main jet	148
6	Sprayer	266 T
7	Idling jet	65
8	Air screw opened of turns	1
9	Power jet	90







H 24,5÷23,5 mm (0.96÷0.92 in.)

ADJUSTMENT

a) - Idling

The idling adjustment is to be carried out when engine is warmed up by loosening valve adjustment screw (a) until a quite high speed is reached. Tithten or unscrew the air adjustment screw (b) until the utmost regular engine rotation is achieved. Unscrew the screw (a) little by little until the idling revolutions numbers is attained.

b) - Intermediate operation

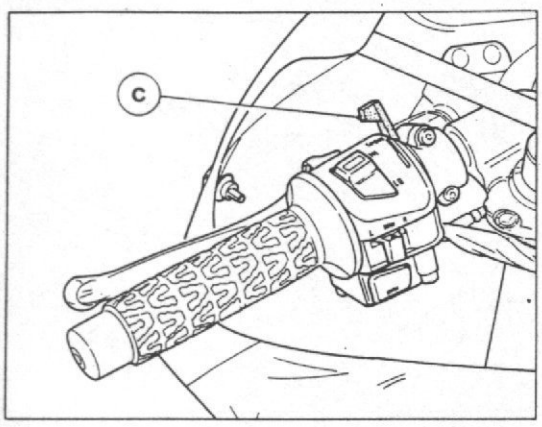
From the idling to 1/5 approx. of the throttle valve whenever the mixture strenght is to be changed, a valve is to be fitted with a smaller front exhaust to enrich, rsp. greater for a mixture leaning. From 1/5 to 4/5 of the throttle opening, the valve is mainly metered by the conical needle fitted on the valve and clamped in an intermediate groove. Were the mixture strenght to be changed, then the conical needle is to be lowered for mixture leaning rsp. lifted up for enrichment, while varying the fixing notch.

c) - Full-power

During full-power running, the fuel supply is generally metered by the full-power jet. Hence, if the adjustment is to be corrected, fit a greater full-power jet to enrich, a smaller one to get mixture strength leaning.

d) - Levelling

Make sure that the float has the proper weight as stated on it, is not warped and rotates freely on its pin. Hold the carburettor body in the indicated position so that the rocker arm gets in sligh touch with the needle, and the needle with the seat. In this conditions, make sure that the two half-floats are at the required height as to the body level.



USAGE

Start

The starting with cold engine is to be performed with throttle closed and opening the start valve by means of lever (c) to be positioned vertically.
In case of remote control (cable) relevant control located on the motorcycle is to be fully opened. At a not too low ambient temperature, keep slightly open the throttle too.
As soon as the normal operating temperature of the engine is reached, the start valve is to be closed up, as the enriched mixture as obtained would trouble the regular engine running.

MAINTENANCE

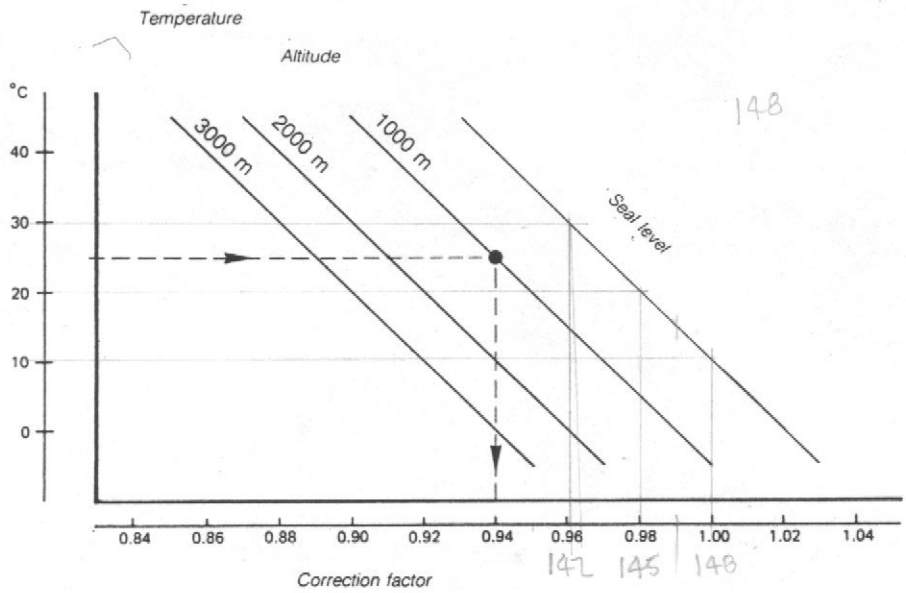
To keep the carburetor in the best working conditions, keep strictly to the following rules:
– clean the carburetor after removing it, wash and blow air jets into all of its components and into the body too, with special care for the ducts or set up parts.
– Check for perfect efficiency all the carburetor components particularly the spray nozzle, the conical needle and the gasoline needle valve: no wear signs, are allowed. Check the float, which must weight as indicated thereon. Before fitting it again, be sure that the gasoline needle valve is perfectly tight in its seat.
– Refit carburetor and change the worn out parts with new original ones.

Correction factor of the main jet.

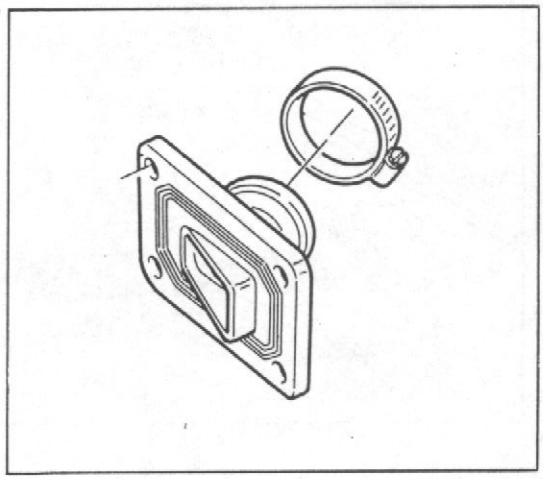
The main jet considerably affects carburetion, hence the general performance of the engine. Climatic factors, such as the outdoor temperature and the altitude, highly affect the behaviour of the air-gasoline mixture inside the carburettor. It is therefore necessary to change the size of the original jet according to the correction factor shown in the diagram on the left.

EXAMPLE:

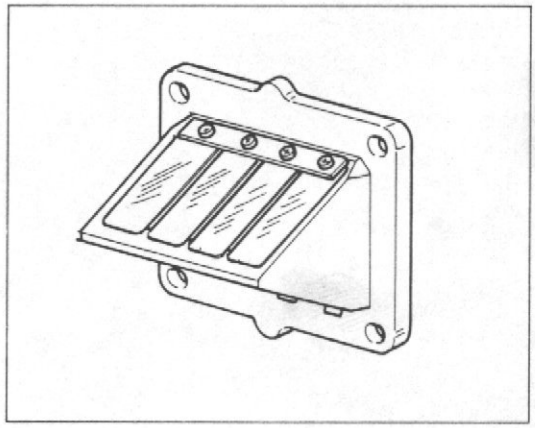
With a 77°F outdoor temperature and 39,37 in. altitude, a correction factor of 0.94 is obtained. Therefore the main jet to be assembled in replacement of the original one (148) shall be: 148 x 0.94 = 139.

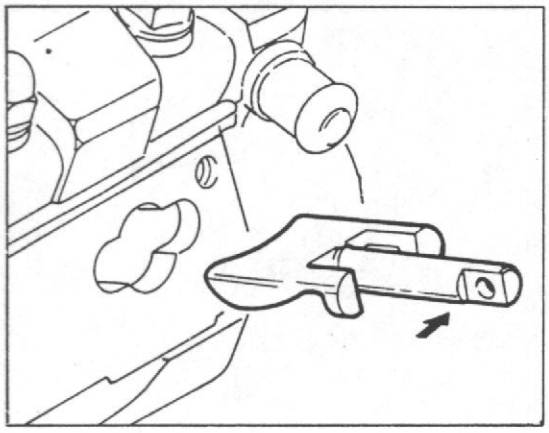


Suction coupling.
Check that the suction coupling is not worn out or damaged. If necessary, replace it.

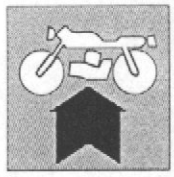


Blade valve.
Check that the blades are not worn or broken.
If not, replace the blades and the blade stroke stop plates. During details reassembly, apply "Loctite" on the screws.





Exhaust valve.
Every 3100 ml. clean the valve using a plug brush or a striker plate with sand paper to clean the flat surfaces. Replace the valve every 6,200 ml.



Section **H**

General directions H.5
Reassembly of the drive shaft H.6
Reassembly of gear numbers H.7
Clutch reassembly H.14
Reassembly of the piston-cylinder-head unit H.15
Reassembly of the valve on the cylinder H.17
Valve end-of-stroke register H.18
Head re-assembly H.20
Balance countershaft phasing H.21
Clutch cover reassembly H.23

General directions.

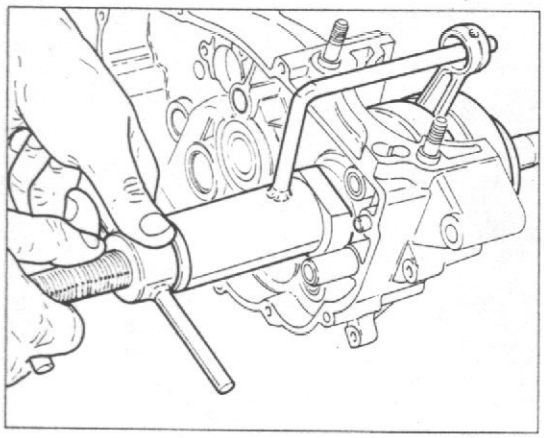
For a correct re-assembly follow in the adverse sense what shown for dismantling, however paying a special attention to every operation we specifically mention. We remind you that gaskets, oil rings, clamps and sealing washer in deformable material (as copper, aluminium, fibers, etc.) and self-locking nuts havealways to be renewed.

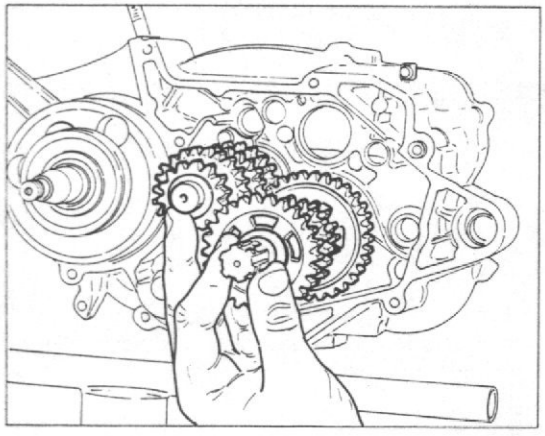
Bearings have been studied and drawn for a well determined number of working hours.

Considering the difficulty of assessing bearing wear, it is especially important to replace bearings on bikes that are used off-road or in other extreme conditions.

What above is suggested in addition to the size verification of the single componets, as foreseen in the proper chapter (see paragraph "ENGINE OVERHAULING").

We emphasize the importance of thoroughly cleaning all components; bearings and all particulars subject to wear have to be lubricated with engine oil, before re-assembly. Screws and nuts must be locked at the prescribed torques.

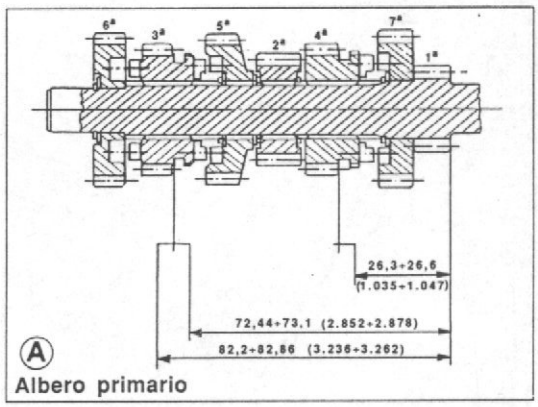


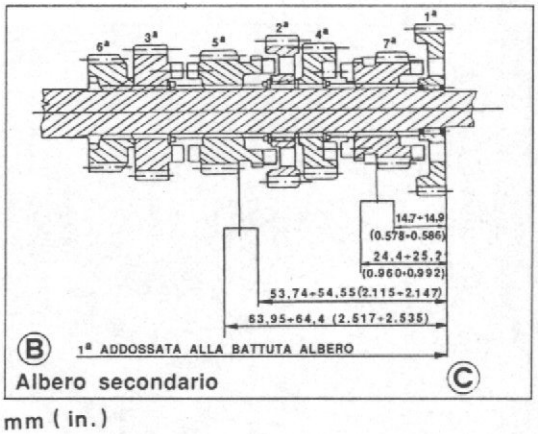


Reassembly of the drive shaft.
To reassemble the drive shaft on the R.H. half-crankcase use tool code **33047**. If this has not been done during the disassembly, it is necessary to remove the oil seal stop plate by unloosing the fastening screw (when it is reassembled lock it with "Loctite"). In this condition only, the tool can lay on a flat surface and it shall be possibile to properly install the drive shaft into its seat.

Before inserting it, lubricate the contact surfaces with engine oil.

Reassembly of gear numbers.
Insert into the R.H. crankcase both primary and secondary shafts of gearbox, at the same time, with their original thrust washers; for a correct gearbox operation, check the inspection quotes as shown in figures.



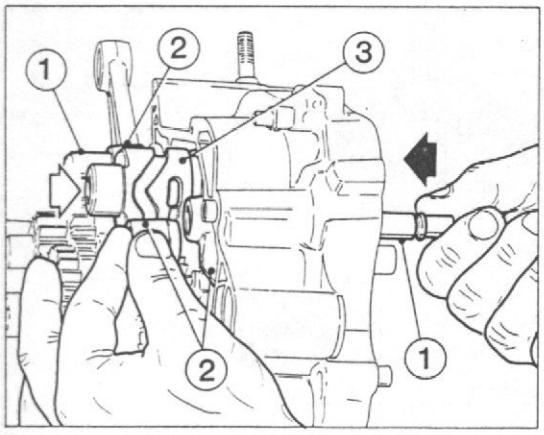


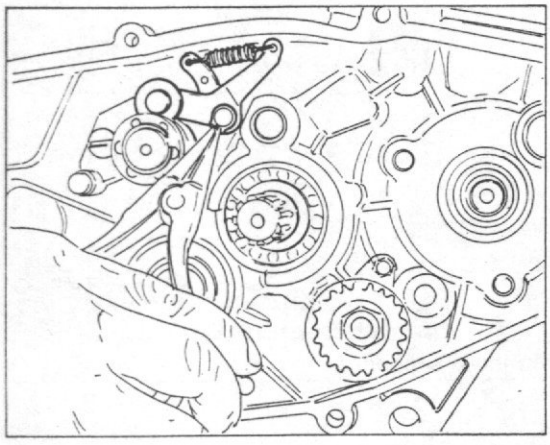
mm (in.)

A Main shaft

B Layshaft

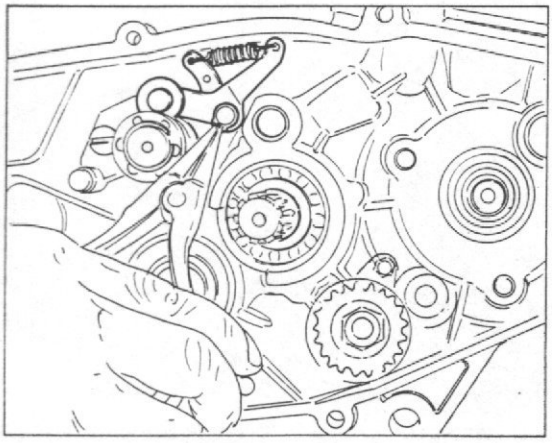
C 1st gear aligned with the shaft ledge

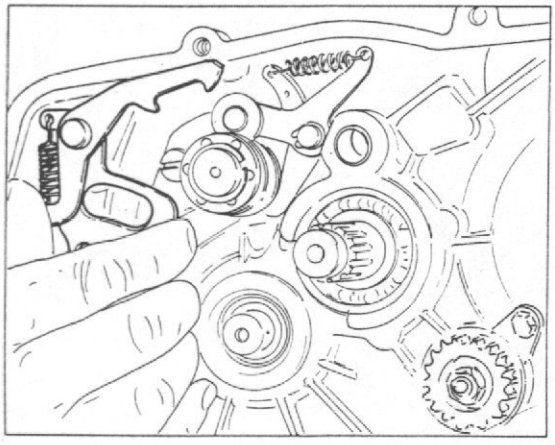




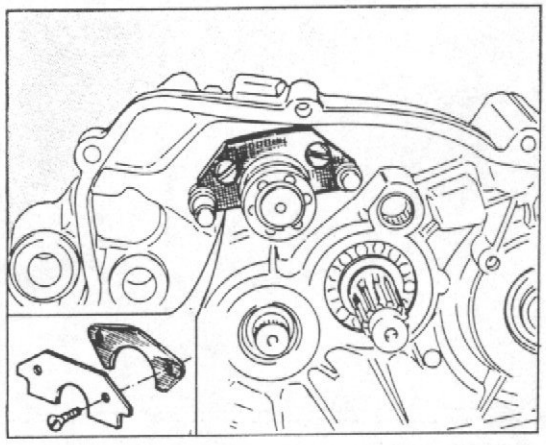
Insert the positive shaft and fix it with the plate and the play adjusting washers. Arrange positive shaft (3) to neutral position (the neutral indicator notch is up).
Insert gear forks (2) in their seats on the gears; connect the fork control pawls in their relevant seats on the positive shaft.
Mount fork sliding pins (1) from the half-crankcase outer side (the longer pin should be mounted in correspondence of the forks 1a-4a and 2a-3a).
Arrange the gasket between the half-crankcases using a sealant. Check the arrangement of the centering bushes.
Do not forget to fit the suitable shimmming washer on the L.H. side, between the drive shaft and the bearing; close the two half-crankcases checking the correct arrangement of the gasket.

BEWARE! - In case of imperfect sealing of gasket, the following operating deficiencies may be noticed:
Air passage with consequent weakeness of mixture and possible engine seizure.
Oil leakage from the gearbox chamber to the crankshaft chamber; this could cause a quick lubricant consumption with overheating and gearbox seizure.
During the half-crankcases mating, check their perfect alignment and correct position.
Verify that crankshaft and gearbox shafts freely rotate (neutral position). In case that rotation of above shafts does not occur correctly, it will be advisable to strike with a few blows of plastic mallet on these shafts to allow their correct bedding. In case of persistent unevenness, it is advisable to open the crankcases again.
After crankcases mating, close with a clean cloth the cylinder housing in order to avoid the accidental immission of dirt or foreign bodies inside the crankshaft chamber.

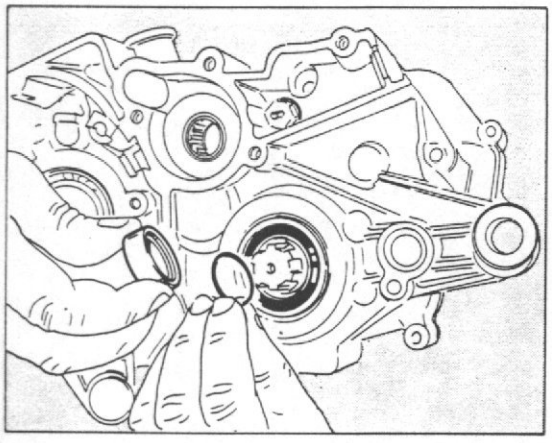


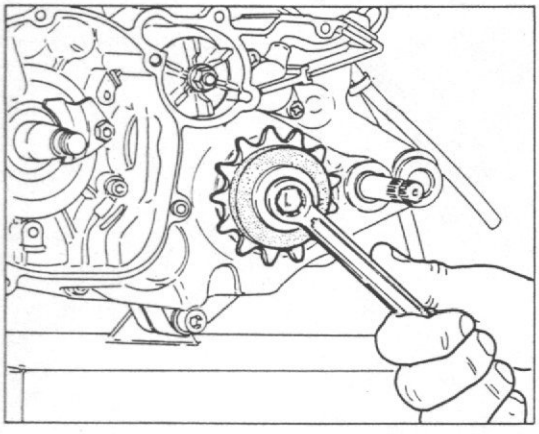


Remount the neutral and gear fixing pawls and apply the suitable snap ring.
Insert, from the half-crankcase outer side, the spring, the inner bush, the washer and the selector shaft. From the opposite side, fit the new oil seal, the washer and the stop ring on the end of the above mentioned shaft.

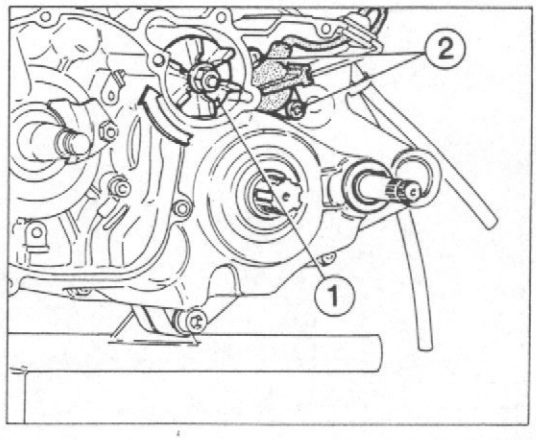


Check the speed engaging fork play, acting as follows:
engage one gear and check that the desmodromic shaft has a certain end play; repeat this operation on every single speed.
Not verifying any play, it will be necessary to modify by adding or removing shims under the retaining plate of the desmodromic shaft, after having removed selector shaft and pawls again.
Shims are supplied with thickness of 0.0079 and 0.012 in.
If in spite of this adjustment, the end float lack remains, this deficiency could be due to:
- bent sliding fork (to be identified and eventually replaced);
- faulty position of shims on sides of gearbox shafts.

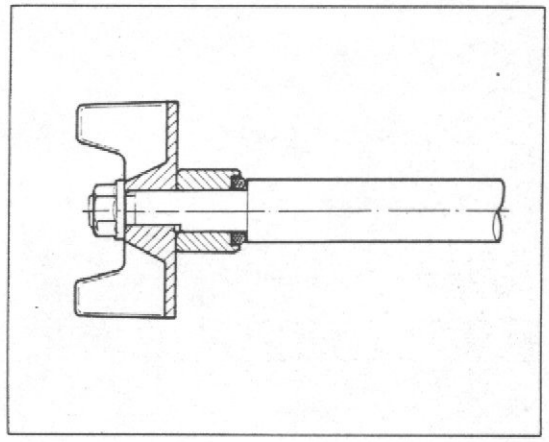


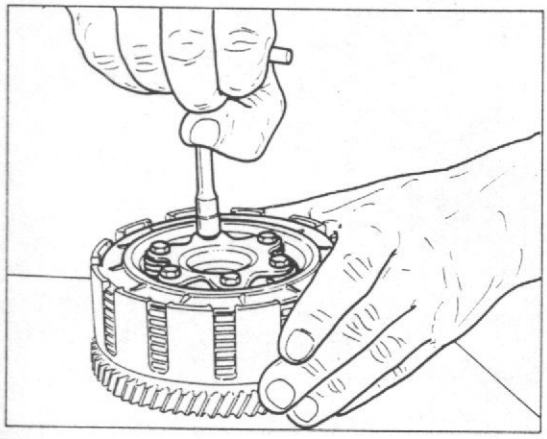


With the help of a suitable inserting device fit the new oil seal on the L.H. side of the secondary shaft; arrange the O-ring on the spacer and fit the spacer on the shaft. Fit the shimming washer and mount the lock ring. Fit the chain pinion and lock it with the screw and washer on the secondary shaft. Fit the new oil seal on both ends of the cranckase in correspondence of the drive shaft. Mount their relevant stop plates, locking the screws with "Loctite".
Mount the spacer and the O-ring on the motor shaft R.H. shaft.
On the crankshaft R.H. side insert in the following order: the first spacer, the OR ring, the oil pump control pinion, the second spacer, the tongue, the primary drive gear (with the cylindrical part turned outside), the stop washer and the nut. Insert in the corresponding seat the thrust, the pump control gear , the counter shaft and the second thurst.

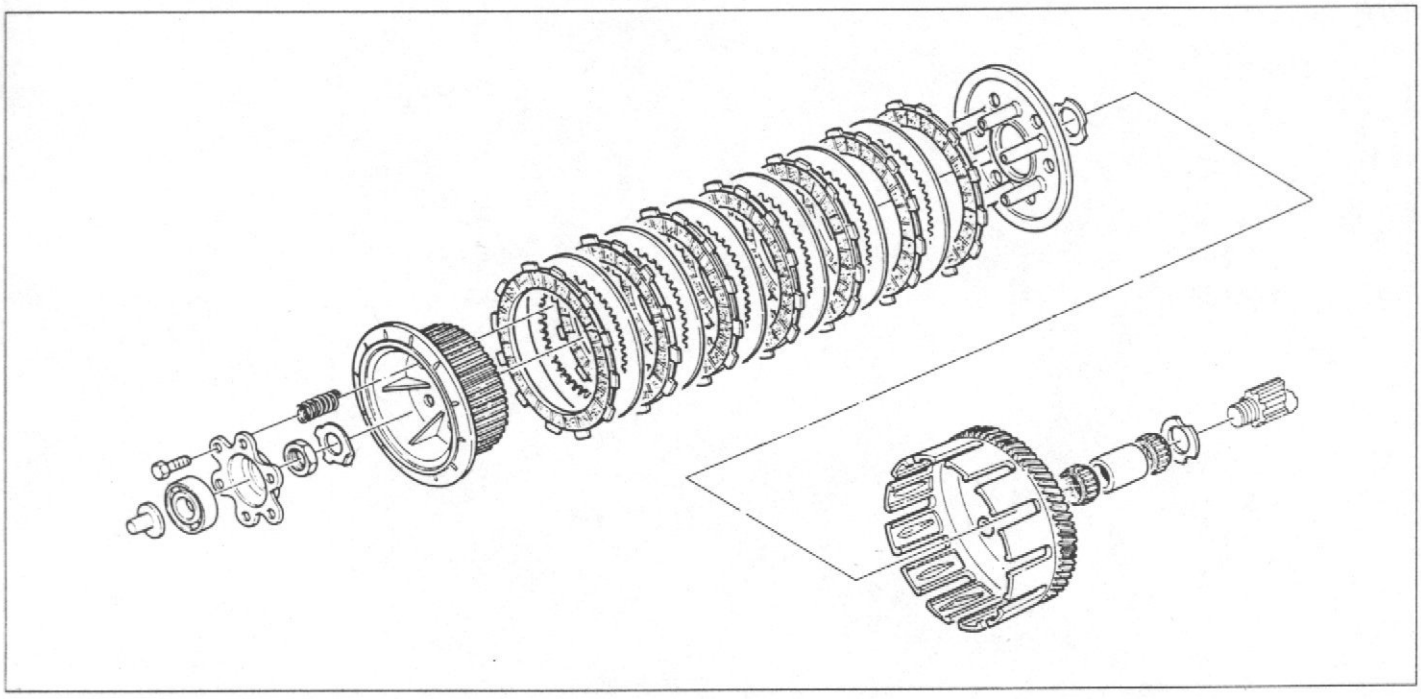


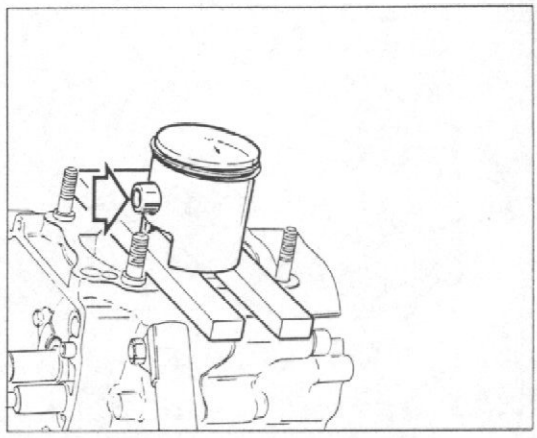
Fit the water pump control shaft on the R.H. half-crankcase, on which the control gear and the stop snap ring should have already been mounted. On the L.H. side, mount the O-ring, the spacer (the part without load is the O-ring seat). Fit the locking nut and tighten it, suitably supporting the gear to prevent the shaft from turning. Remount the spring and the neutral cap in their seat on the positive shaft; fit a new O-ring and remount the neutral indicator locking the two fastening screws (2) with "Loctite".



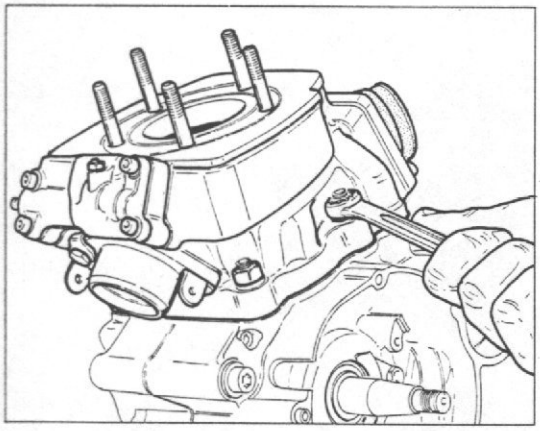


Clutch reassembly.
Provisionally insert the clutch pressure disc in the clutch housing; insert all the plates into the housingalternating a lined plate (the first one of the pack should be lined) to a smooth one. Fit the hub, the springs, the check disc and lock the whole assembly, at the recommended torque, with the six hexagonal-head screws. Now fit the three-point washer, the spacer and the two roller cages on the main shaft.



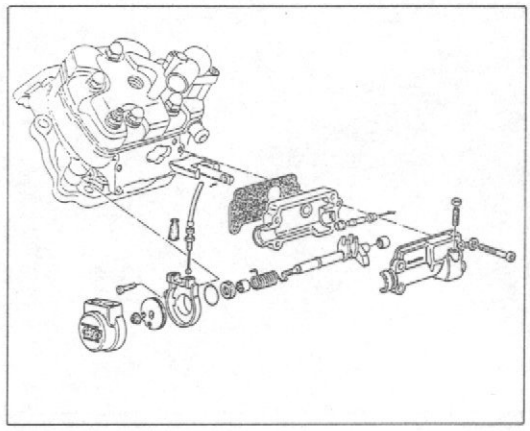


Reassembly of the piston-cylinder-head unit.
Insert the roller cage on the connecting rod small end, fit the piston on the connecting rod turning it so that the arrow marked on the head is turned towards the exhaust. Fit the pin by hand and lock it with the suitable locks.



Having a cylinder provided with valve unit, and before inserting the piston inside the cylinder, check that the piston is in the bottom dead center position and lubricate the components with motor oil. By menas of your fingers (or using the appropriate inserting device), press on the clamp ends and carefully insert the piston inside the cylinder.

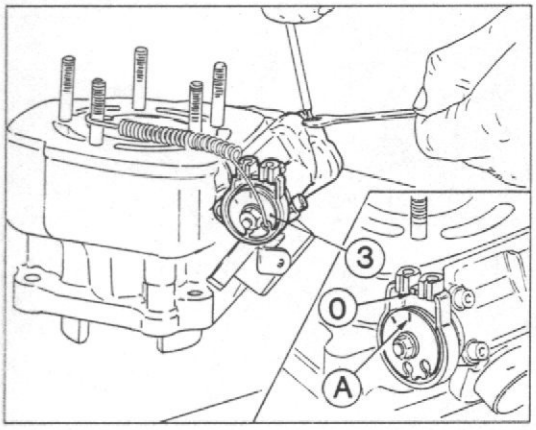
During the insertion phase, don't turn the cylinder because the clamp ends may enter the ducts.

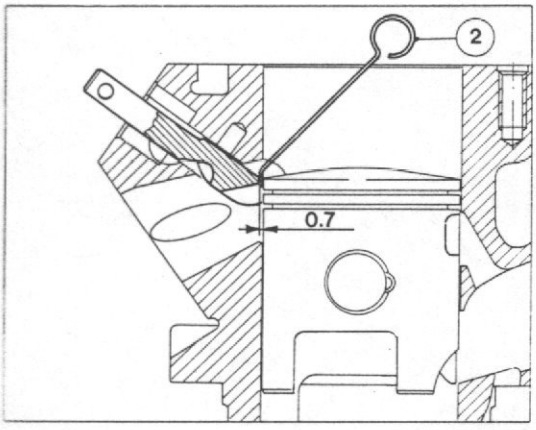


Reassembly of the valve on the cylinder.

After having cleaned all the elements, assemble them as follows:

- insert the valve inside the cylinder seat;
- insert the gasket and the lower half-cover;
- clean the contact surfaces of the two half-covers;
- insert the push pin, with the corresponding bushing, into the valve rod end;
- insert the spring into the valve control pin and hook it in the correct seat;
- insert the needle cages on both side of the pin and oil seal, then insert the pin inside the lower cover seat, by hooking it to the push pin;
- apply some sealing material on the contact surfaces of the two half-covers and mount the external half-cover by pushing the spring terminal, in this way the spring will be preloaded, then fasten the 4 screws;
- insert the OR ring in the valve cover projecting side.

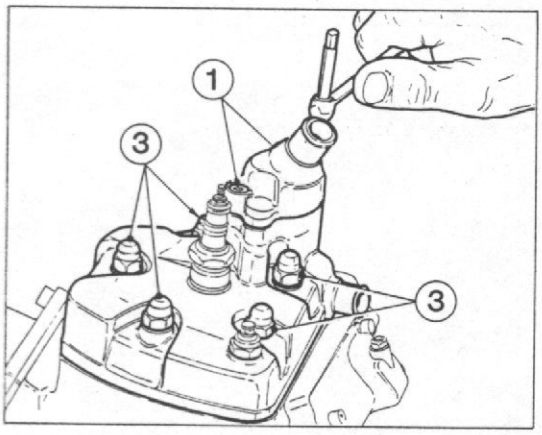




Valve end-of-stroke register.

If replacements have been performed or if the valve unit has been detached from its connections, it is necessary to check the end-of-stroke conditions and the control cables clearance as follows:

- insert the cover and fasten it to the cylinder through the appropriate screw;
- insert the pulley (3) on the control shaft terminal, turn it counterclockwise to the end of stroke and keep it in this position by means of a spring (see figure);
- after having loosend the nut, act on the register through an Allen wrench;
- insert the piston inside the cylinder and, through a proper pin (2), check that the clearance between valve and piston is 0.027 in.;
- in this condition, the fixed index (0) on the cover and the one (A) on the pulley must be aligned;
- by applying "Loctite", lock the nut on the register so as to avoid possible loosening;
- if the pulley or the cover have been replaced, mark the above mentioned indexes on the new components;
- in order to adjust the control cables tension, see par. "Electronic valve control cables tension adjustment".

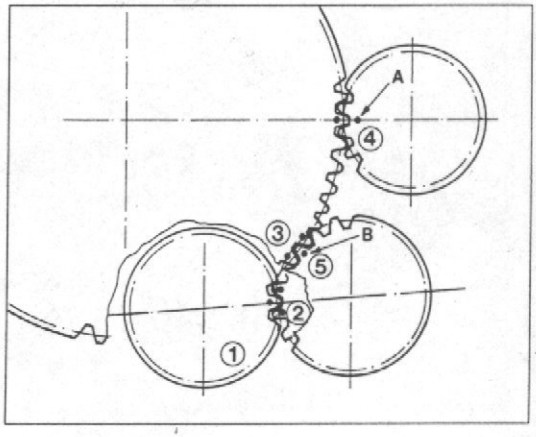


Head re-assembly.

Lock the cylinder and head fastening nuts (3) at the recommended torque and working crosswise. Remount the thermostat, the gasket and the cover fastening it with the suitable screws (1).

At every dismantling of the cylinder-piston assembly it is advisable to check the blade valve to be exempt from sealing faults, distortion or blade breaks. In these cases, replace components or better, the complete valve.

For checking and overhauling operations, see at paragraph "ENGINE OVERHAULING".



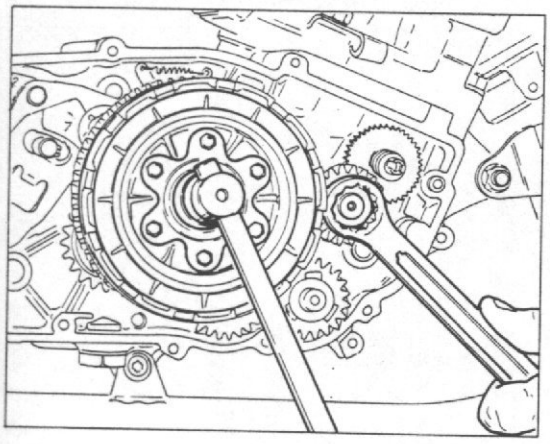
Balance countershaft phasing.

Phase the gear on countershaft (1) with lower transmission gear (2); the teeth concerning the phasing are marked. In this way the countershaft axle and transmission axle shall be aligned.

Arrange the piston at its bottom dead center.

Fit clutch housing (3) on the main shaft and phase it with main transmisison gear (4) on the drive shaft.

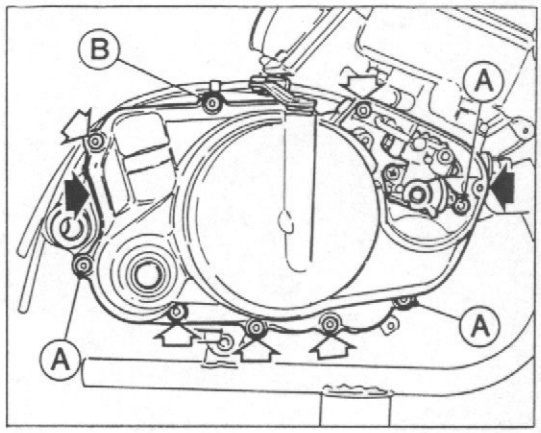
To make sure that the phasing has been carried out properly, check that there are 7 teeth of housing (3) between marking (A) on the drive shaft gear and marking (B) on upper transmission gear (5).



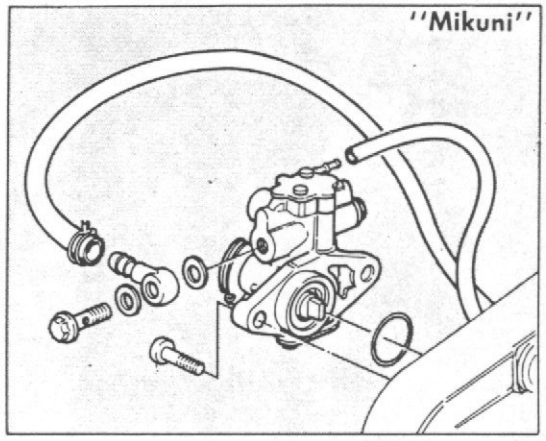
Insert the second three-point washer on the housing and fit the previously packed plates inside it.
Lock the middle nut at the recommended torque and carefully bend the safety washer.
Mount the clutch thrust bearing.

REMARK - The driving and driven discs package must freely slide both on central hub and clutch housing.

In case of difficult sliding, causing a faulty clutch operation, dismantle this group again and remove the obstacle. Also a tight locking of central nut could cause imperfections of clutch operation.



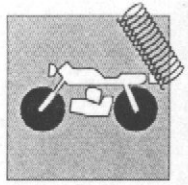
Clutch cover reassembly.
Check the correct position of the centering bushings, then reassemble the R.H. cover. Insert the spacer and the oil pump pipes fastening plate under the screw (B); remember that the three screws (A) are longer.



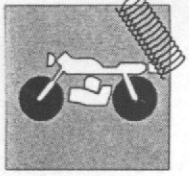
Provisionally install the oil pump.
Its final installation should be performed after connection of oil inflow and outflow, once the engine has been installed on the vehicle.

On the fastening screws apply Loctite.

For pump adjustment see the paragraph "ADJUSTMENTS".

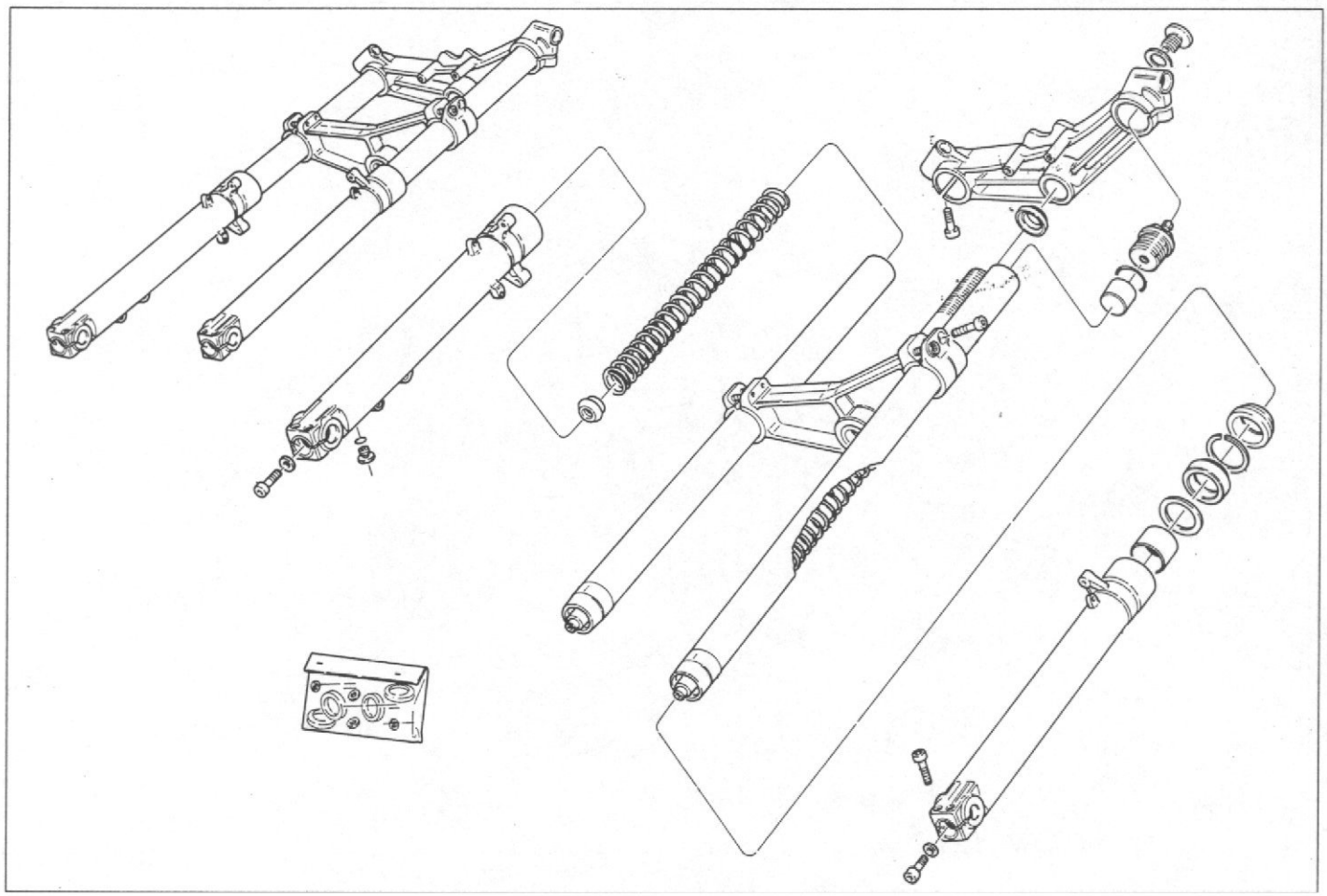


Section



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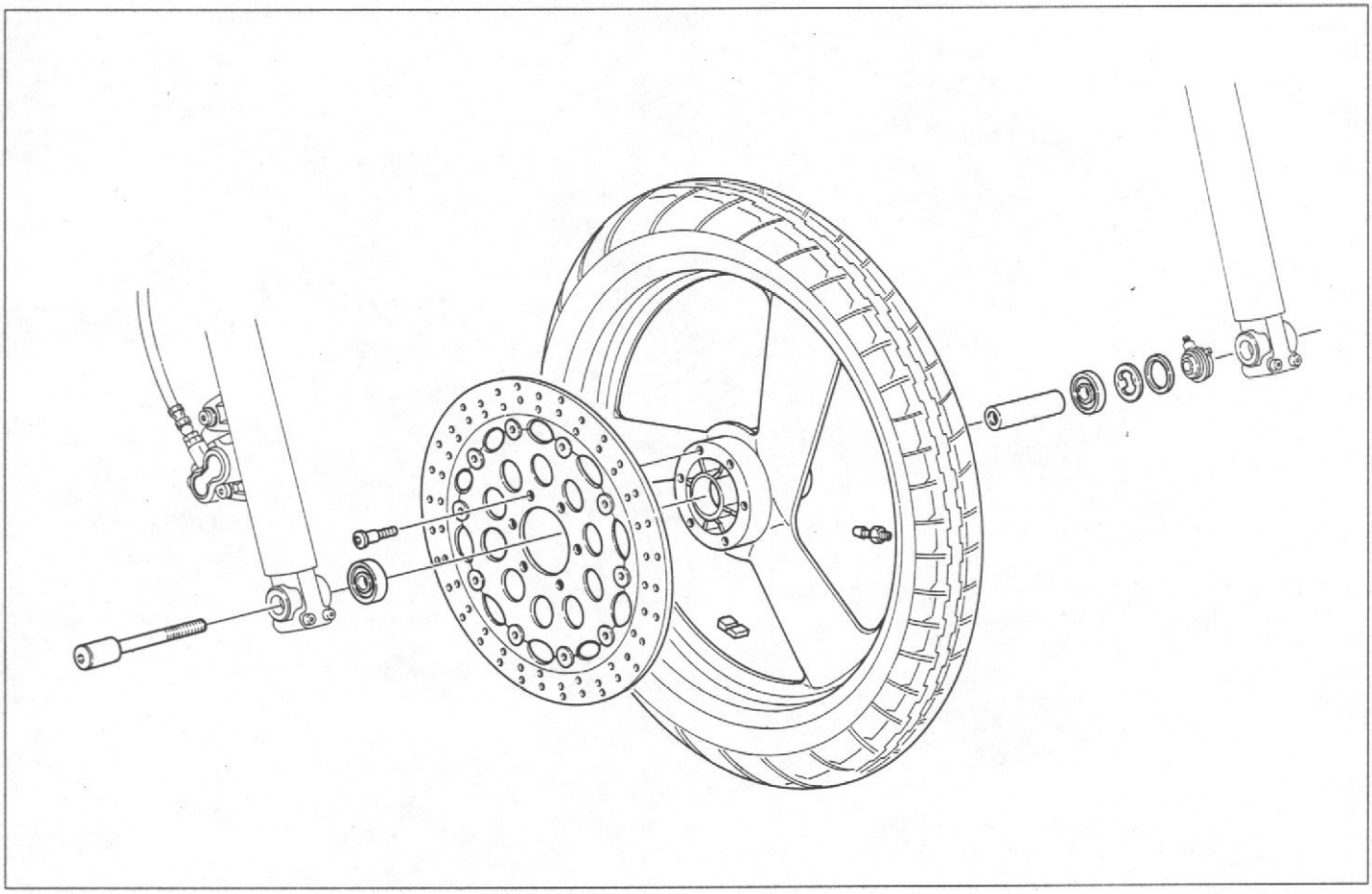
Part. N. 68543 (10-90)



Front suspension.

The front suspension consists of a telehydraulic fork with helical springs, provided with inner spring preloading adjusting system.

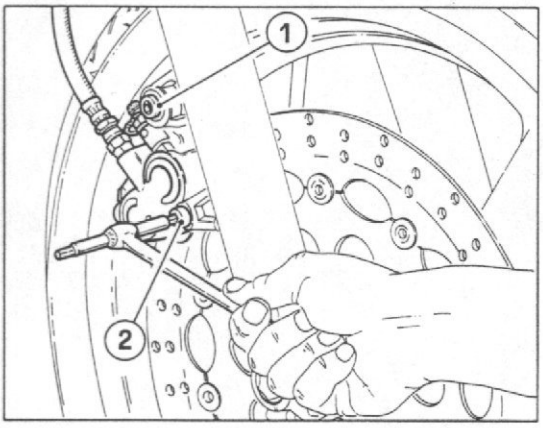
Producer	MARZOCCHI
Legs diameter	1.49 in.
Front wheel bump position (on the sliding axis)	4.84 in.

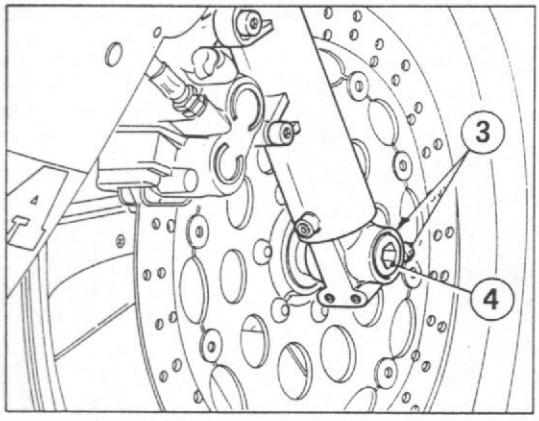


Front wheel.

Three-spoke light alloy wheel rim. Odometer transmission unit located on the L.H. side of the wheel hub.

Make	GRIMECA
Dimensions	2,75" x 17"
Tyre, manufacturer and type	PIRELLI TUBELESS - MT 75
Dimensions	100/80-17"
or:	
Manufacturer and type	MICHELIN TUBELESS RADIALE
Dimensions	110/70-R17"
Inflation pressure (in cold condition) (driver only)	2,0 bar PIRELLI; 1,9 bar MICHELIN
Inflation pressure (in cold condition) (with passenger)	2,1 bar PIRELLI; 2,0 bar MICHELIN





Front wheel removal.

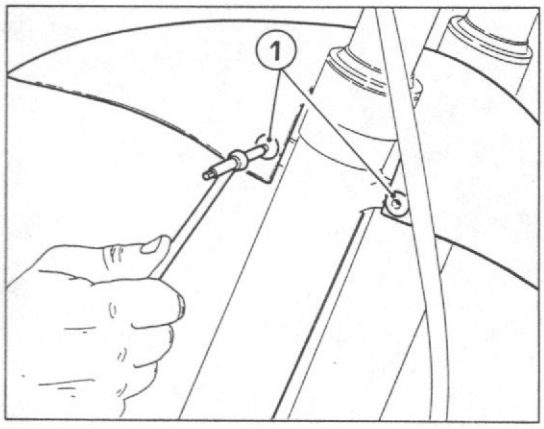
Arrange a support under the engine in order to have the front wheel raised from ground and proceeed as follows:

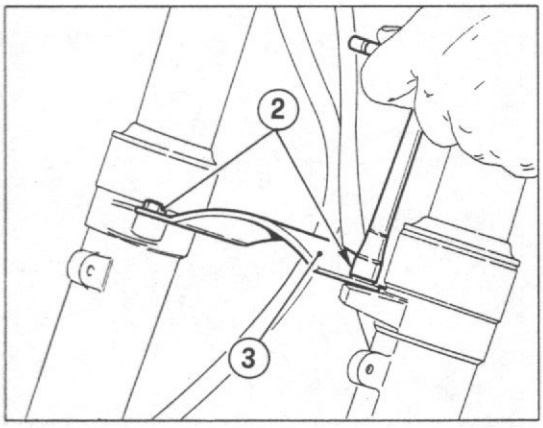
- remove the brake caliper from the R.H. leg by unscrewing the upper screw (1) by means of a 7 mm setscrew wrench and the lower fastening screw (2) by means of a 6 mm setscrew wrench;

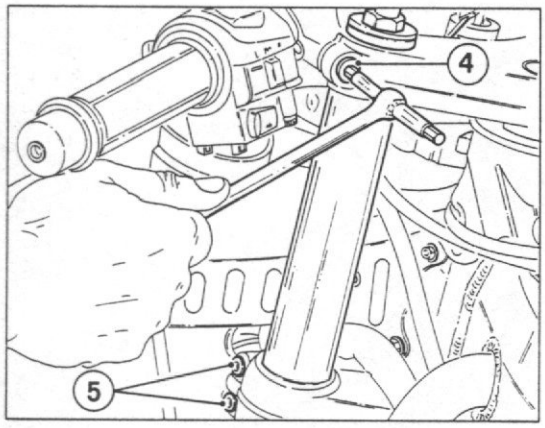
In these conditions pay attention not to actuate the front brake lever; partial approaching of the pads would be obtained causing the brake oil level to lower.

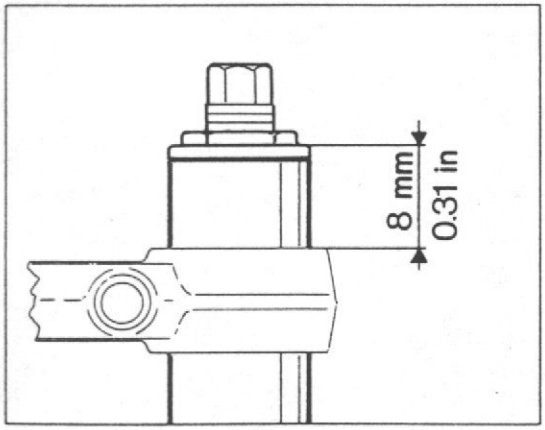
- unloose the screws (3) locking the wheel pin (4) on the legs;
- unscrew and remove the wheel pin (4) by means of a 17 mm setscrew wrench;
- on the R.H. side, remove the odometer transmission device (the flexible cable will remain locked to the transmission device);
- remove the full wheel.

For reassembly, carry out the same operations in the opposite way with great care.







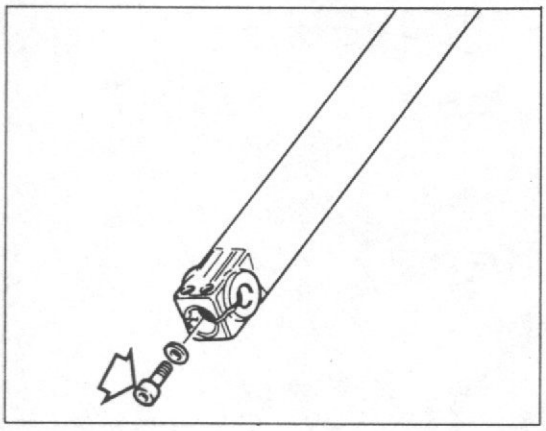


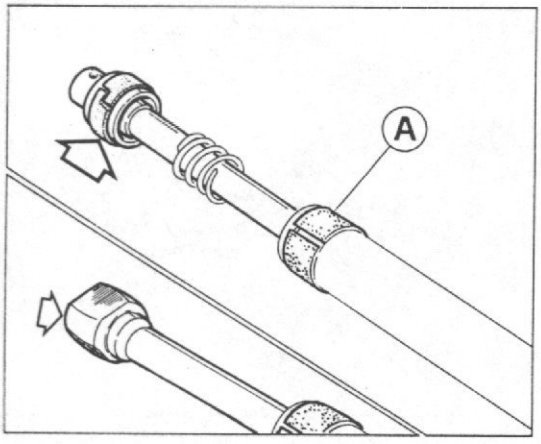
Removing the front forks.

Place a support under the engine so that the front wheel is raised from the ground;operating as follows;

- remove the front wheel following the instructions in the section «Removing the front wheel»;
- unscrew the four screws (1) fastening the front mudguard to the fork legs; recover the inner spacers and the nylon washers;
- unscrew the four screws (2) fastening the fork stiffening plate (3); remove the said plate;
- unloose the two screws (4) fastening each tube to the steering head and the four screws (5) to the steering base;
- extract the fork legs.

During reassembly, position the fork legs 0.315 in. over the steering head surface (see figure).





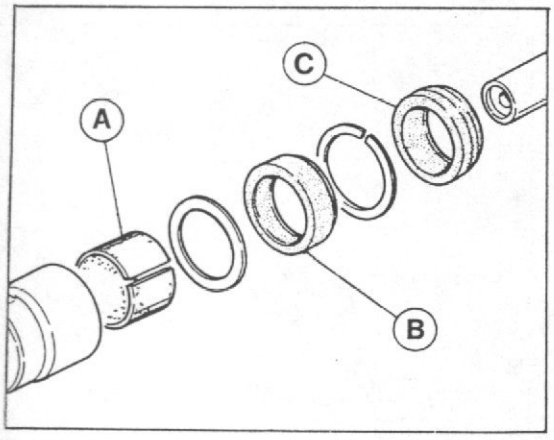
Front fork overhauling.

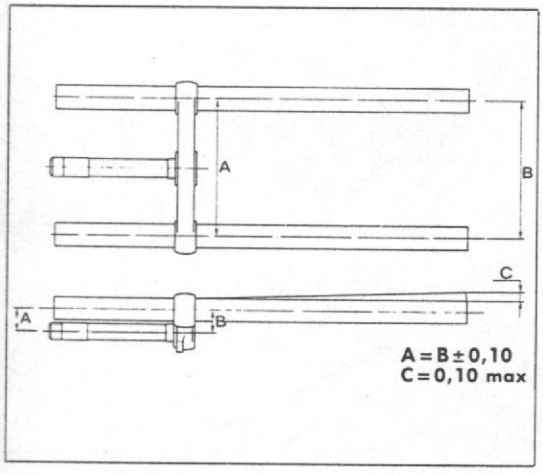
By removing the screw located at the base of each sleeve, it is possible to extract the bearing pipe from the sleeve.

By unscrewing the upper cap, after extracting the preloading tube and the spring, it is possible to remove the piston-damper rod assembly.

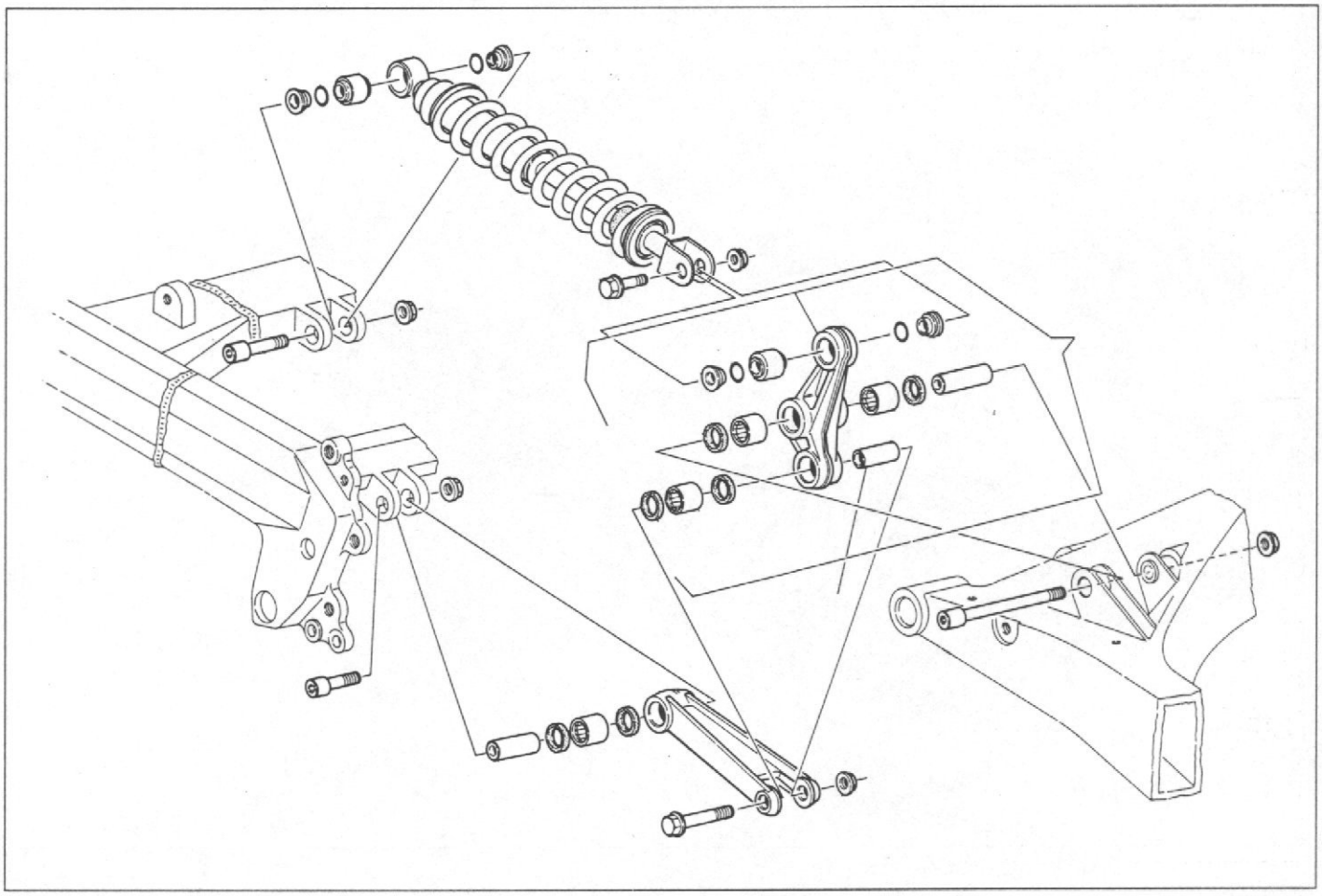
Now carry out the following checkings:

- inspect the outer surface of the two bearing pipes and the inner surface of the two sleeves; no scorings, scratches or shrinking points must be noticed;
- make sure that each bearing pipe slides freely inside its sleeve, but without too much clearance; if clearance is too much, it is necessary to replace the lower and upper guide bushes (A);
- check straightness of the bearing pipes (max. error allowed 0.0039 in.);
- fit the bearing pipes in the steering base, tighten the fastening screws and make sure of conformance to the figure;
- check the wear state of the damper piston circlip; if it is worn or scored, replace it.

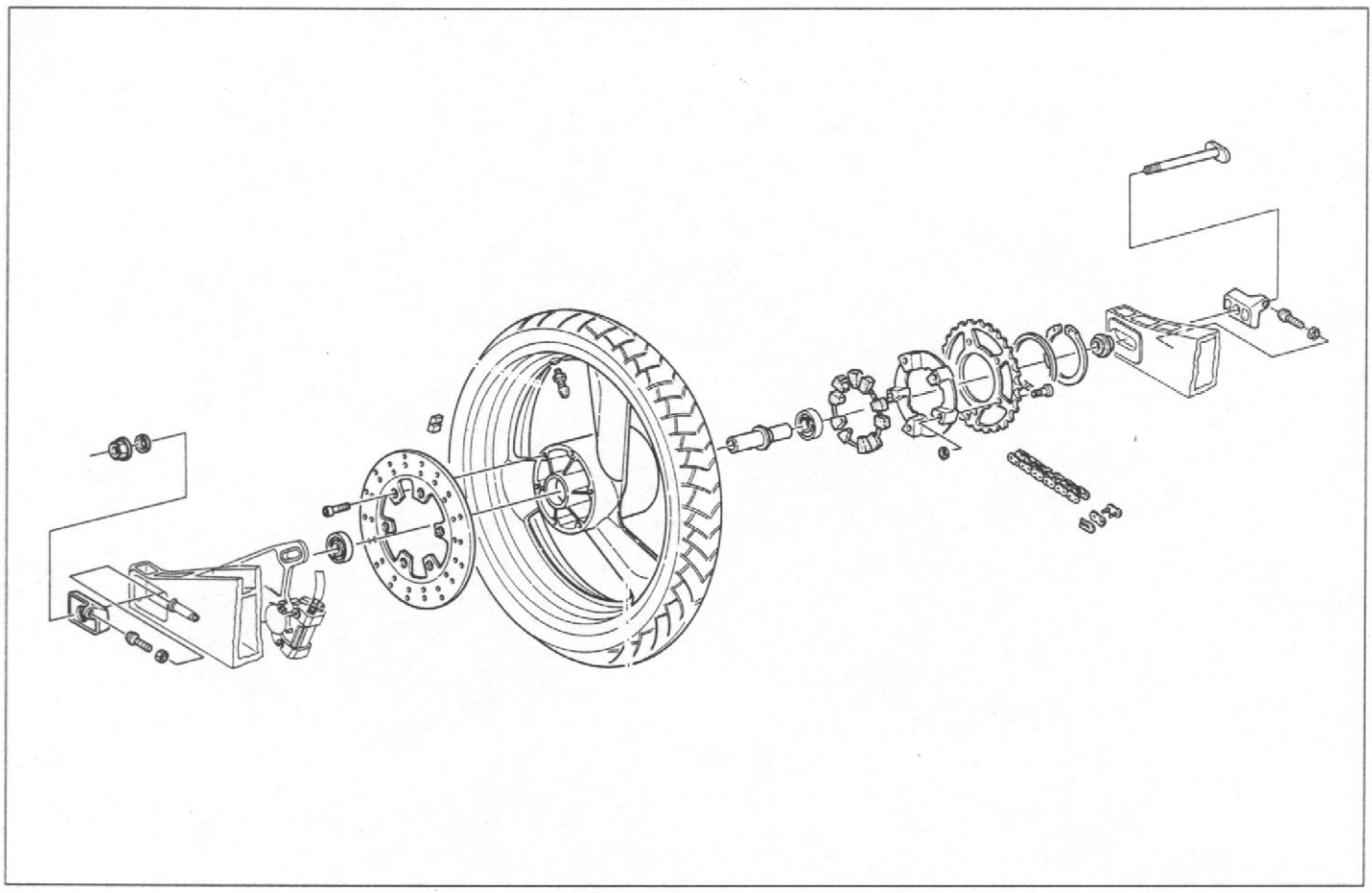




Replace the seal rings (B) and the dust scraper (C) upon every overhaul of the fork. When reassembling, pay attention to the assembly of the two damper units; the damper unit working on rebound phase is provided with a seal circlip and must be mounted in the R.H. bearing pipe, whilst the damper unit working on the compression phase is provided with a piston with three flat faces and must be mounted on the L.H. bearing pipe. When fitting the damper in the bearing pipe, it is necessary to use a special fitter (supplied by the manufacturer) in order not to damage the sealing surface of the piston circlip. Before fitting the bearing pipes into the sleeves provided with new gaskets, it is necessary to lubricate the gasket sliding surfaces. Then fill the legs as described in the chapter "ADJUSTMENTS".



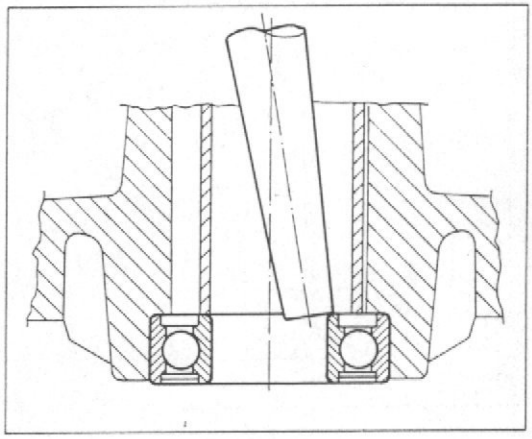
Rear suspension.
Rear swinging fork with hydraulic single damper. The fork pin is fixed sideways to the frame and wheel both in the fork bearings and in the engine cranckase bearings. This systems give the motorcycle a better stiffness. The damper, driven through a system of links with progressive action (SOFT DAMP) is provided with spring preload adjustment according to the weight carried and to the type ofground.

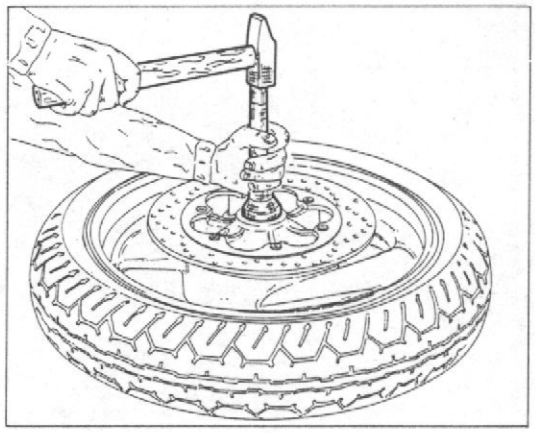


Rear wheel.

Three-spoke light alloy wheel rim. Damping flexible coupling.

Make	GRIMECA
Dimensions	4,00" x 17"
Tyre, manufacturer and type	PIRELLI TUBELESS - MT 75
Dimensions	140/70 - S17"
or:	
Manufacturer and type	MICHELIN - TUBELESS RADIALE
Dimensions	150/60-ZR17"
Inflation pressure (in cold condition) (driver only)	2,1 bar PIRELLI; 2,0 bar MICHELIN
Inflation pressure (in cold condition) (with passenger)	2,3 bar PIRELLI; 2,2 bar MICHELIN





Front and rear wheel overhauling.

Check the wear state of the hub bearings. In case of excessive clearance (radial and axial), operate as follows:

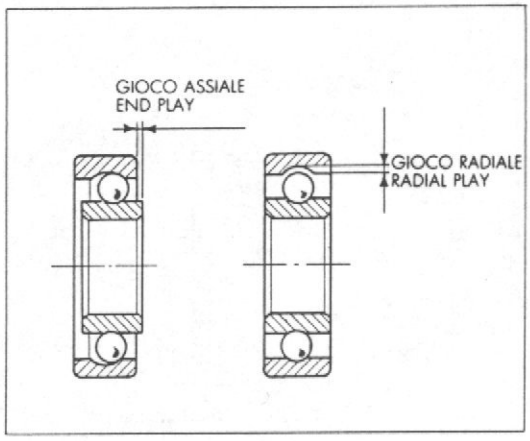
- lay the hub on a flat support with hole, allowing for the passage of the removed bearing.
- use a hammer and a pin to exercise pressure only on the bearing inner ring (see fig.) up to its removal;
- continuously change the pressure position so to get an extraction as regular as possible;
- extract the spacer and perform the same operations for the other bearing.

Removed bearings must not be reassembled.

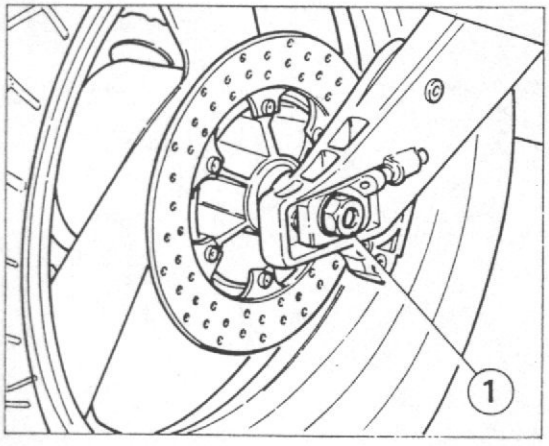
When reassembling new bearings check the seat. It must be clean and without grooves or scratches. Grease the seat before fitting the bearing, then put it in the seat using a proper tubular pad, exercising pressure only on the bearing outer ring up to the complete inserting.

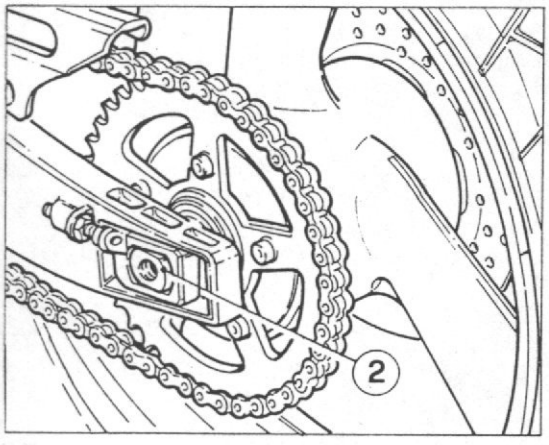
Place the spacer and then proceed with the placing of the other bearing.

Check their alignment by placing the wheel pin.



After every intervention on wheels their balancing is advisable.



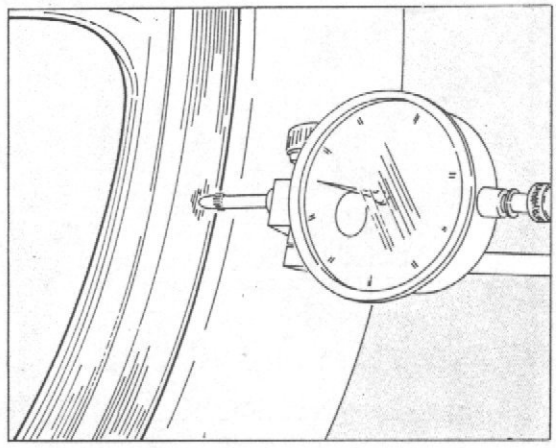


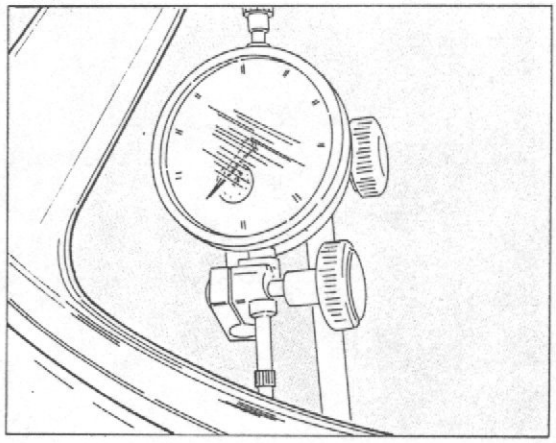
Rear wheel removal.

Arrange a support under the engine in order to have the rear wheel raised from ground and proceed as follows:

- remove the nut (1) of the wheel pin (2) and extract the wheel pin;
- push forward the wheel to allow the chain to be released from the gear;
- extract the full wheel and recover the spacer on the chain side.

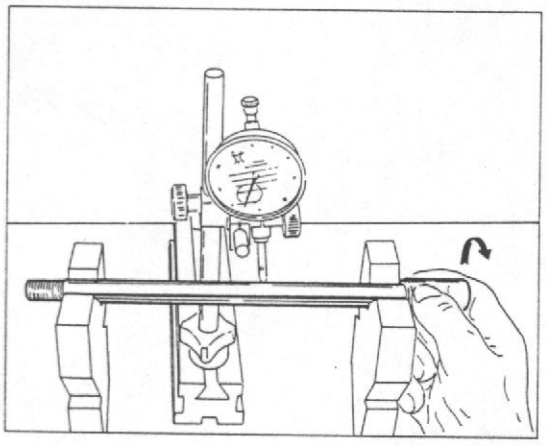
When reassembling, adjust the tension of the chain as described in the chapter "ADJUSTMENTS".





Rim warpage for front and rear wheel.
The table below shows the control value that the wheel rim must undergo.
Too much skid and eccentricity are generally caused by any worn bearings. In this case replace the bearings. If this operation does not get round this trouble, replace the rim or the wheel.

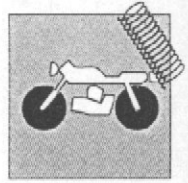
	Standard / Standard Standard / Standard Standard	Limite max. di usura / Max. wear limit Limite max. d'usure / Max. Verschleissgrenze Límite máx. de desgaste
Side skid	0.5 mm less than 0.019 in.	2 mm (0,078 in.)
Eccentricity	0.8 mm less than 0.031 in.	

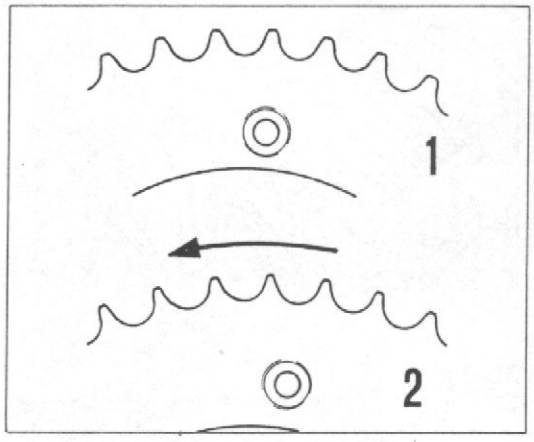


Wheel rim axle bending.
If the bending figure is over the allowable max. limit, straighten or replace the axle.
If the axle can not the straightened within the limits of prescribed max. limit replace it.

Axle out-of-track

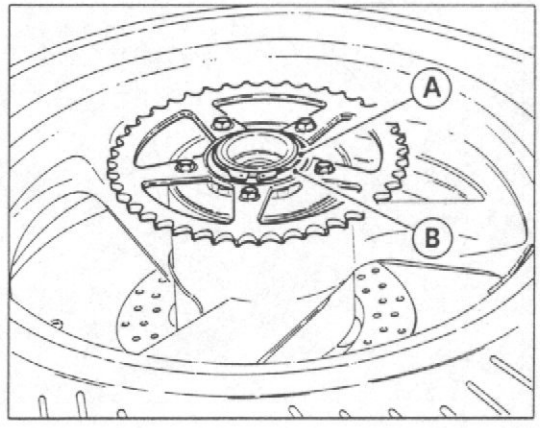
	Standard / Standard Standard / Standard Standard	Limite max. / Max. limit Limite max. / Max. Verschleissgrenze Limite máx.
Front wheel axle	less than 0.004 in. 0,1 mm	0.2 mm (0.008 in.)





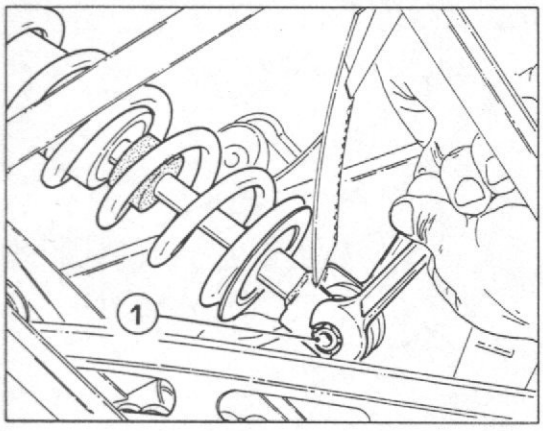
Rear ring gear.
The side figure shows the tooth contour by normal and excessive wear conditions. If the ring gear is too worn, replace it as follows:
- remove the stop ring (A) and extract the ledge washer (B);
- unscrew the five screws (and their nuts inside the flange) which fasten the flexible coupling flange; extract the ring gear.

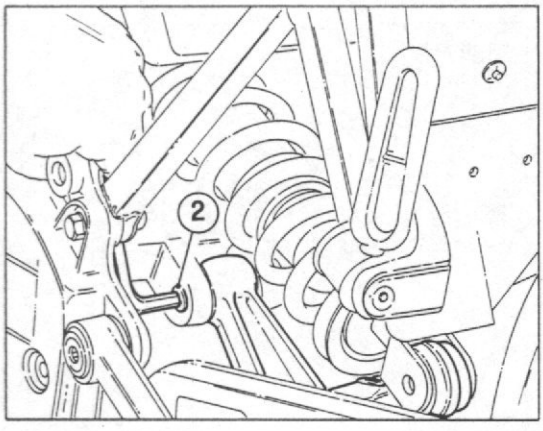
By every ring nut, replace also the pinion and the transmission chain.

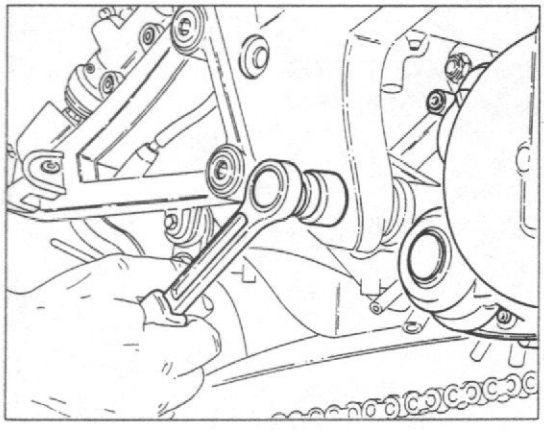


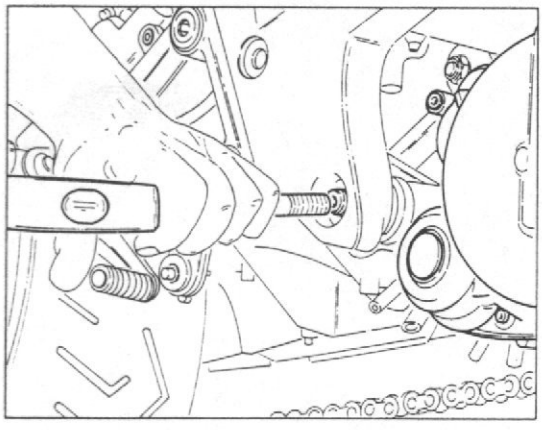
1) Normal wear

2) Excessive wear









Rocking fork removal and overhauling.

To remove the fork from its connection to the frame and engine proceed as follows:

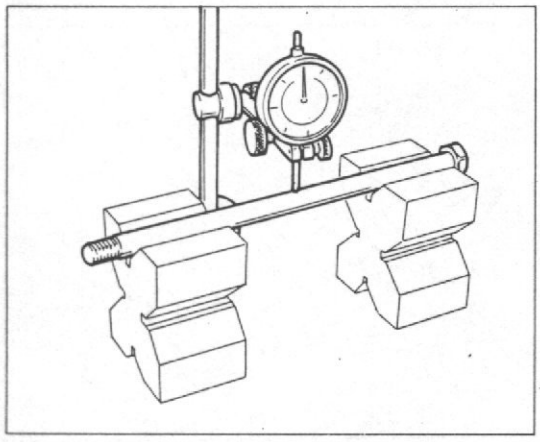
- remove the rear wheel as described in the paragraph "Rear wheel removal";
- by means of a 14 mm setscrew wrench, hold the nut and unscrew the lower fulcrum screw (1) of the damper; extract this screw;
- unscrew the screw (2) with a 8 mm setscrew wrench, holding the nut on the opposite side with a 14 mm wrench; extract this screw;
- unscrew the nut on the R.H. side of the fork pin by means of a 22 mm socket wrench;
- make the pin come out and extract the fork together with its leverages.

Check parallelism of the fork pin (see paragraph "Fork pin overhauling") and check by hand the wear state of the needle bushes and the relevant bushings; rotate the bushing inside the bearing; in case any friction or noise is noticed, replace.

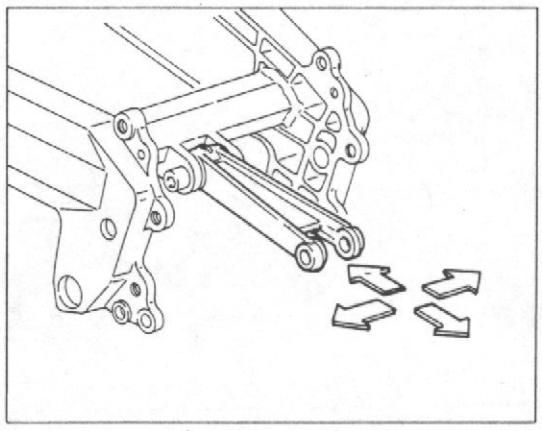
In case of replacement of bearings, fit them in place by means of the suitable pads.

The gaskets and bearings removed must be always replaced.

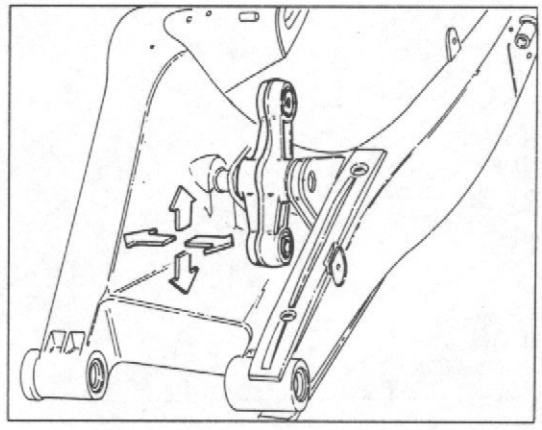
Apply some grease inside the bearings before assembly.

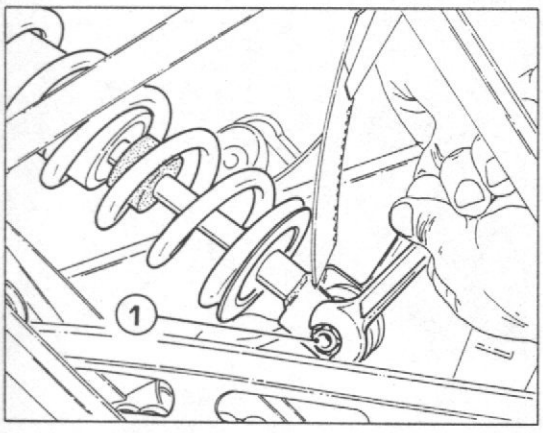


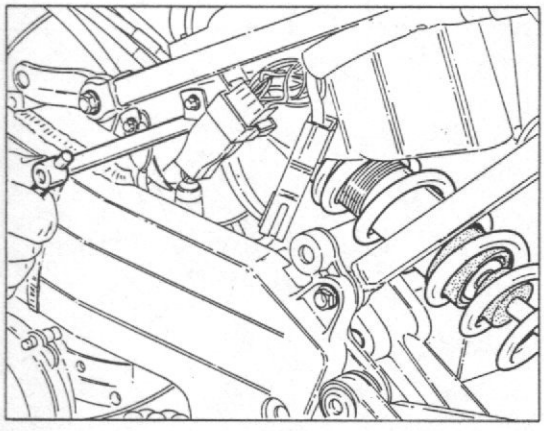
Overhauling the swinging arm pivot pin.
Using a comparator, check the swinging arm pivot pin for distortion.
Position the pin on two identical contacts. Rotating the pin and moving it horizontally and take the distortion reading with the instrument; distortion limit: 0.0118 in.



Overhauling of the connecting rod and of the rear suspension rocker arm.
With the connecting rod and the rocker arm still mounted on the frame and of the fork respectively, manually check their radial and axial play, pulling these parts in any direction.
The connecting rod and rocker arm have been designed with a certain amount of axial play in order to allow the shock absorber to always find the ideal operating position. If however there is any radial play it will be necessary to remove the component from the fork or frame and carry out a check on the internal spacer of the bearings.



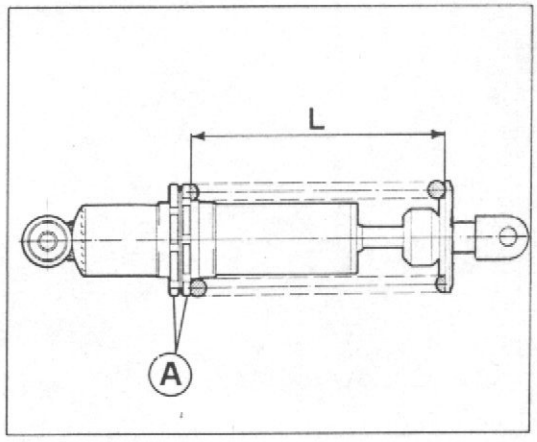


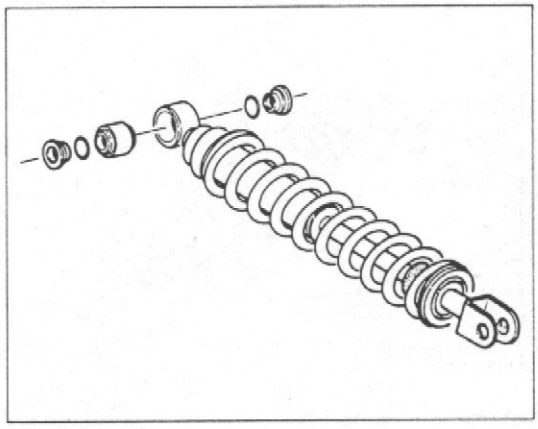


Rear damper removal.

Arrange a support under the engine in order to have the rear wheel raised from ground and proceed as follows:

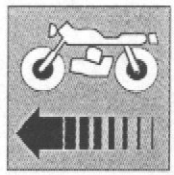
- by means of a 14 mm setscrew wrench, hold the nut and unscrew the lower fulcrum screw (1) of the damper; extract this screw;
- with a 8 mm setscrew wrench, unscrew the upper fulcrum screw, holding the nut on the opposite side with a 14 mm setscrew wrench;
- remove the damper.





Rear damper overhauling.
Before removing the spring, check its length with the damper assembled; the value (L) detected must be restored upon reassembly.
Spring standard length (L): 7.874 in.
Unloose the two ring nuts (A) until the lower cup can be extracted; extract the cup and the spring.
Check the spring free length: 8.267 in. Service limit: 8.070 in.
Carry out the following checkings:
- check the rod conditions: it must not be damaged or distorted, otherwise replace the damper;
- check any oil leakages: if they are of great extent replace the damper;
- if a too free movement is noticed in both the directions (rebound and compression) when compressing the damper, this means that the internal parts are worn and the damper must be replaced;
- check the wear state of the ball joints: if too much clearance is noticed, they are to be replaced.

The damper contains gas under pressure and must not be opened for any reason.



Section

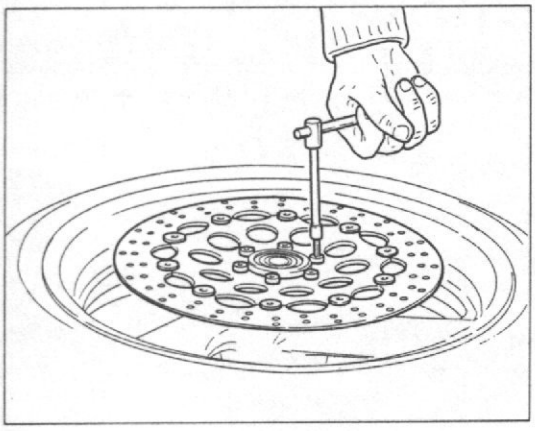
L

Braking system L.5
Brake discs L.6
Wear check and replacement of brake pads L.8
Brake calipers overhauling L.12
Brake pump overhauling L.16
Braking system bleeding L.18

Part. N. 68543 (10-90)

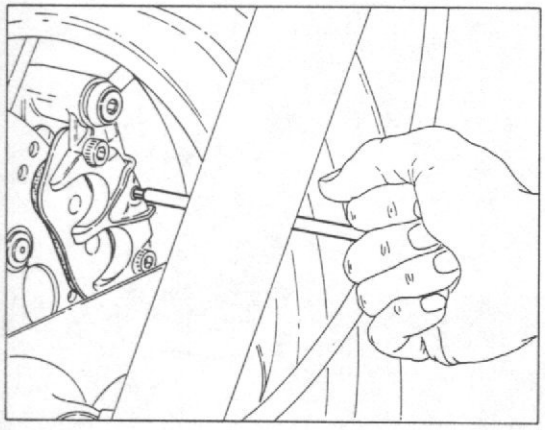
Braking system.
The braking system is made up of two fully independent circuits. Eachcircuit is provided with a caliper connected to a hydraulic-control pump with separated tank containing the fluid. The front caliper and disc are floating, whilst the rear ones are fixed. Both the discs are made up of steel.

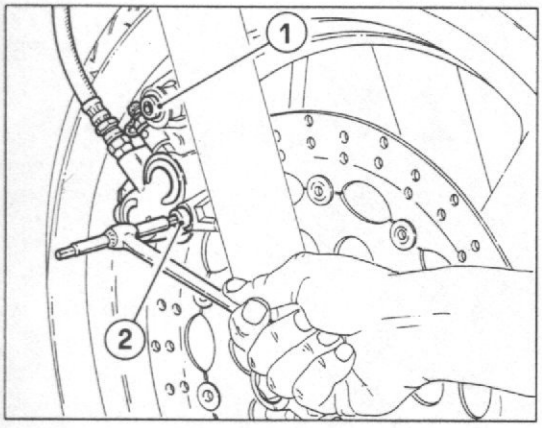
1 - Front brake oil tank
2 - Front piping
3 - Front caliper
4 - Front disc
5 - Rear brake oil tank
6 - Rear piping
7 - Rear caliper
8 - Rear disc
9 - Rear brake pump
10 - Front brake pump

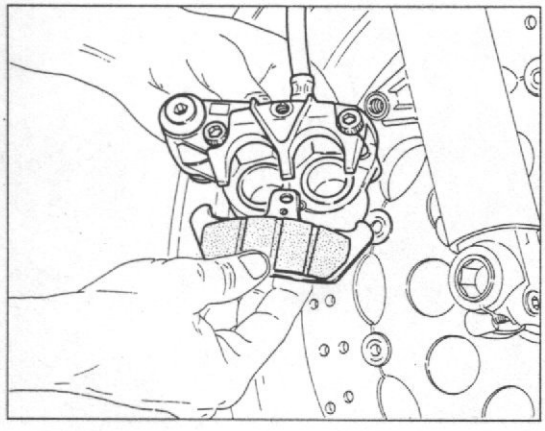


Brake discs.

Control of the disc is important; it must be perfectly clean, i.e. without rust, oil, grease or any other dirt and no deep scorings must be noticed.
Diameter of front brake disc: 12.59 in.
Thickness of front disc (new): 0.157 in.
Thickness of front disc at max wear limit: 0.13 in.
Diameter of rear brake disc: 9.05 in.
Thickness of rear disc (new): 0.157 in.
Thickness of rear disc at max wear limit: 0.13 in.
The front disc of this motorcycle is floating, i.e. it consists of a part integral to the wheel rim, and a braking band that, by means of special bushings where the disc can slide freely, is able to get the proper position under the effect of the brake caliper.
Should the disc be replaced, both the components are to be replaced.
For the rear disc, the distortion shall not exceed 0.011 in. (this measure is to be taken with a comparator and with the disc mounted on the rim).
To remove the disc from the wheel rim, it is necessary to unscrew the six fastening screws.
Upon reassembly, perfectly clean the bearing surfaces and screw down the screws according to the required driving torque.







Wear check and replacement of brake pads.

Check the wear state of the brake pads every 1860 ml. The pad is worn when the grooves got on the friction material are no more visible (in the rear caliper it is necessary to remove the pad inspection cover). In this case replace the pad pair as follows:

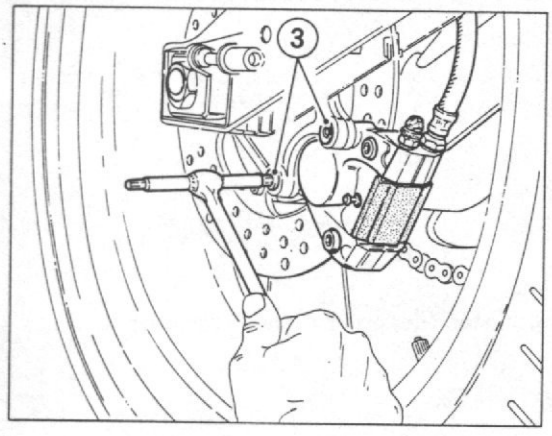
FRONT BRAKE

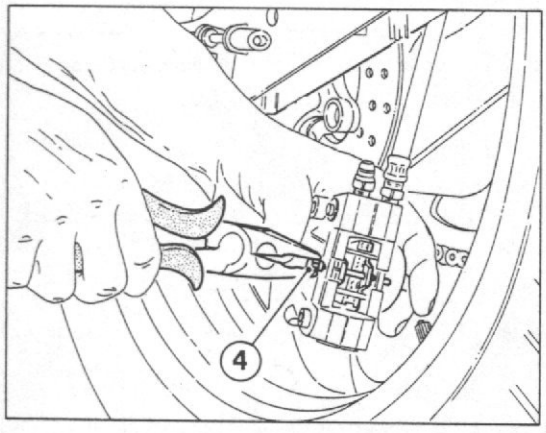
- by means of a setscrew wrench, unloose the central peg on the inner side of the caliper;
- remove the caliper from the fork sleeve by unscrewing the two fastening screws (1) and (2), by means of a 7 mm setscrew wrench for the screw (1) and a 6 mm wrench for the screw (2);
- extract the worn pads;

When replacing the pads, it is advisable to remove some fluid, because the fluid could overflow from the tank owing to the backing of the plungers in the cylinders.

- with the help of a lever push the plungers inward, then fit the new pads;
- fit the central peg and tighten it without locking;
- fasten the caliper to the sleeve by means of the suitable screws (1) and (2);
- lock the central peg.

IMPORTANT - For about a hundred km, it is advisable to act cautiously on the new pads, in order to allow a proper and complete settling of friction materials.





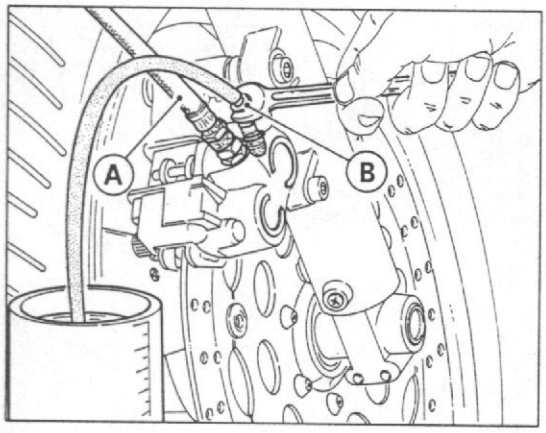
REAR BRAKE

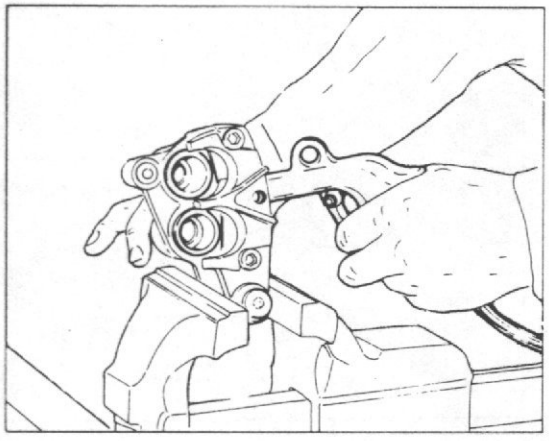
- unscrew the two screws (3) fastening the caliper to the support plate;
- extract the central peg (4);
- extract the flat spring and the relevant pins;
- extract the pads (with the help of a suitable peg, if necessary);

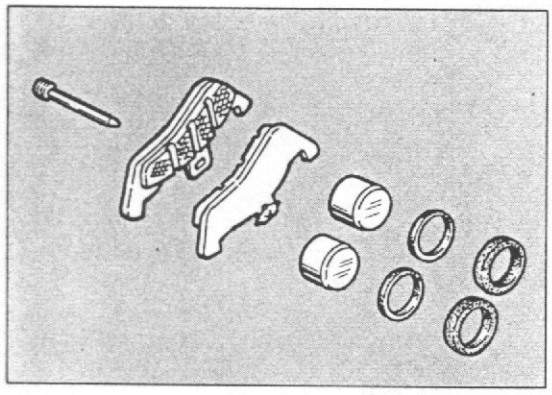
When replacing the pads, it is advisable to remove some fluid, because the fluid could overflow from the tank owing to the backing of the plungers in thecylinders.

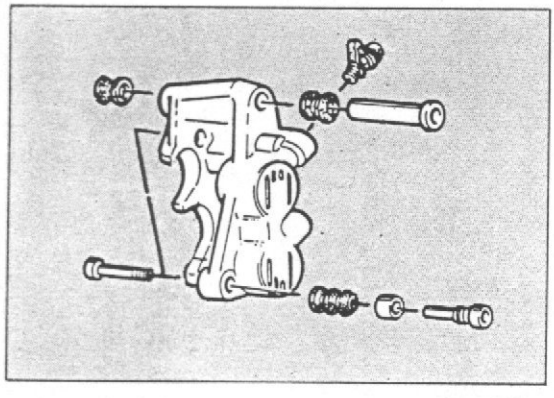
- push the plungers into the half-calipers, paying attention not to damage the dust covers;
- fit the new pads in the caliper;
- reassemble the pad retaining pins with the spring and the central peg;

By operating as described above, after replacing the pads in both the calipers, the system need not be bled, it is enough to actuate the control lever repeatedly until the plungers reach their standard position.









Brake calipers overhauling.

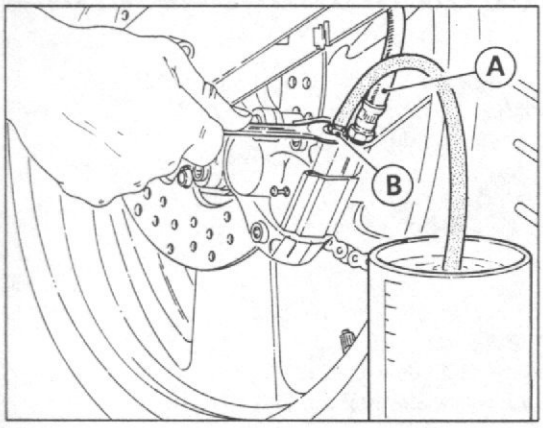
The gaskets are to be replaced when any fluid leakages occur through the cylinders; any fluid traces will be noticed on the disc and on the caliper, also the fluid level will lower continuously in the tank. The fluid leakages are joined to a decrease in the braking effect and an elastic reaction of the control lever.

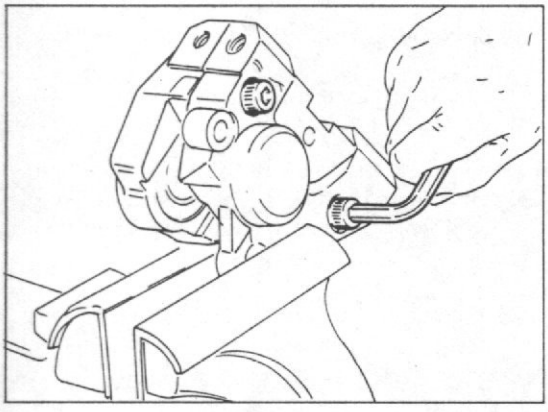
Operate as follows to replace the gaskets:

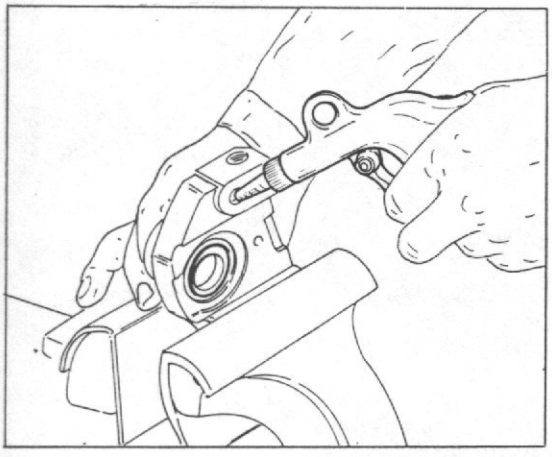
FRONT CALIPER

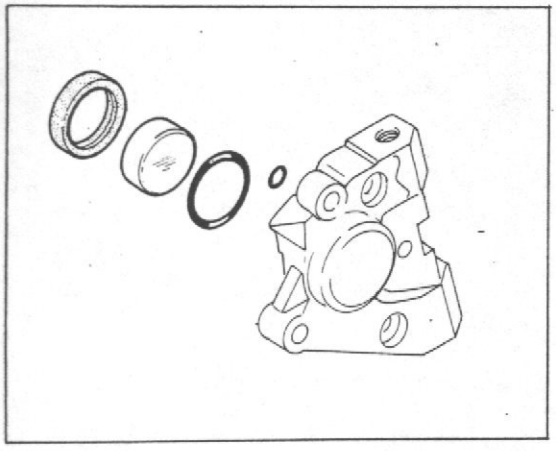
- empty the circuit by removing the tank cap and connecting a tube on the breather union;
- actuate the lever and rotate the breather union (B) as described in the paragraph "Braking system bleeding" until the cicruit is fully empty;
- disconnect the piping (A) from the caliper;
- remove the caliper and pads as described in the paragraph "Wear check and replacement of brake pads";
- locate the caliper on a vice (see figure) and make the plungers come out by blowing compressed air in the fluid inlet hole;
- remove the defective gasket from its seat with the help of a bit, paying attention not to score its seat;
- carefully clean the seat and the plungers, check whether these ones are damaged: in this case replace them;
- reassemble a new gasket in the cylinder groove;
- assemble the plunger in the relevant seat by pressing with your fingers only;
- reassemble the dust-tight gasket (it must be well fastened to both the plunger seat and the half caliper seat);
- reassemble the pads and the caliper on the sleeve; connect the piping (A).

Fill the circuit by pouring new oil through the tank and carry out the bleeding as described in the chapter "Braking system bleeding".





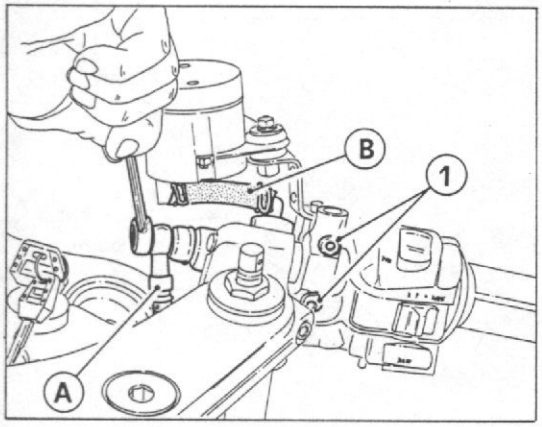


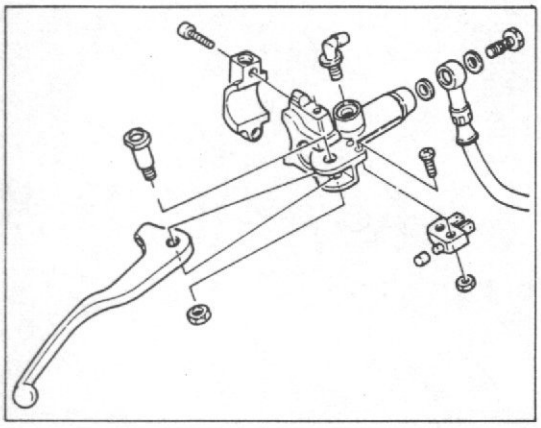


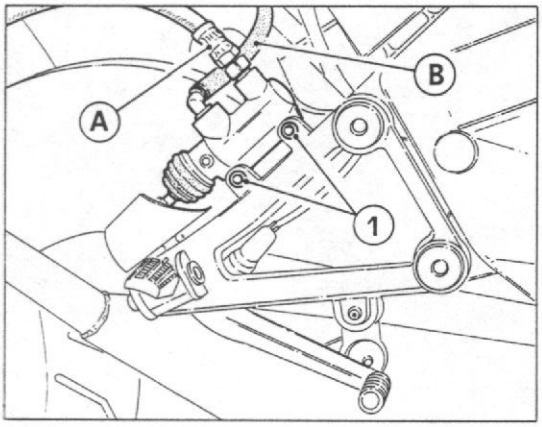
REAR CALIPER

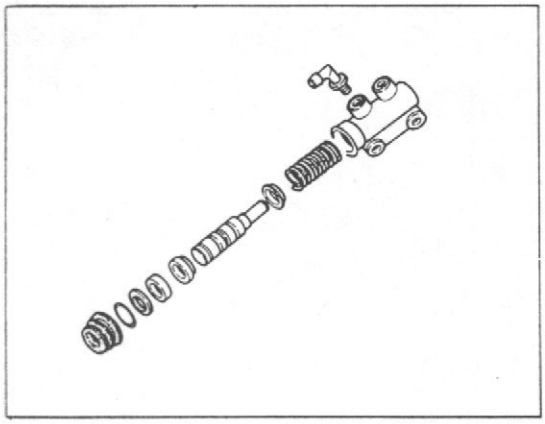
- empty the circuit by removing the tank cap and connecting a tube on the breather union;
- disconnect the piping (A) from the caliper;
- actuate the lever and rotate the breather union (B) as described in the paragraph "Braking system bleeding" until the cicruit is fully empty;
- remove the caliper and pads as described in the paragraph "Wear check and replacement of brake pads";
- with the help of a vice, split up the caliper in two half-calipers by unscrewing the two fastening screws;
- replace the gaskets by operating in the same way as for the front caliper;
- join the two half-calipers, making sure that the joining gasket is located in its seat; tighten the two fastening screws according to the required torque;
- reassemble the pads and the caliper on the supporting plate and connect the piping (A).

Fill the circuit by pouring new oil through the tank and carry out the bleeding as described in the chapter "Braking system bleeding".







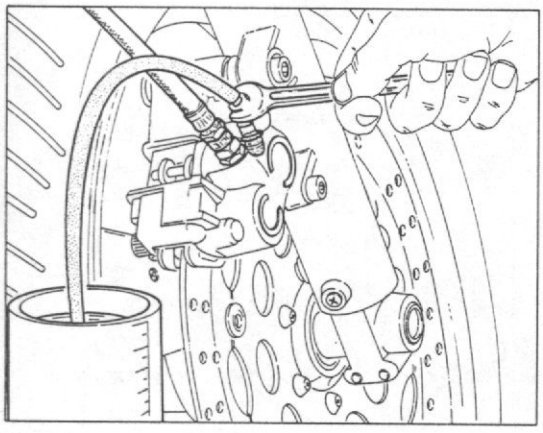


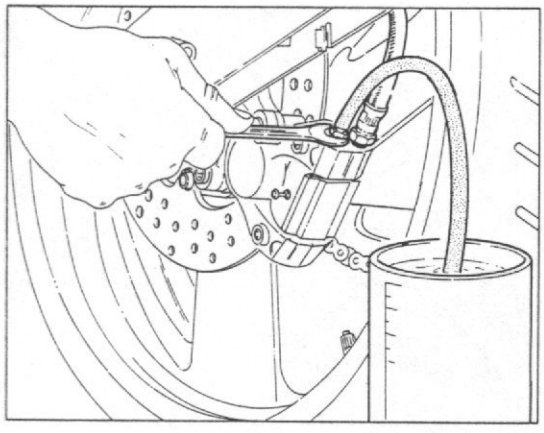
Brake pump overhauling.

In case of defective operation or fluid leakage from the plunger gasket, the gaskets are to be replaced as follows:

- empty the circuit through the breather union;
- disconnect the piping (A) connecting the pump to the caliper;
- disconnect the piping (B) connecting the pump to the tank;
- unscrew the two screws (1) and remove the pump-lever assembly from its fastening to the half-handlebar;
- unscrew the fulcrum pin of the front lever (in the rear pump it is enough to extract the control pin and the relevant cover);
- extract the pump elements;
- carry out all the necessary replacements by operating as described for the brake caliper;
- reassemble the pump and the relevant control lever;
- connect the removed pipings;
- fill the circuit by pouring new oil through the tank and carry out the bleeding.

Before reassembly, wet the metal parts with the required fluid or the suitable grease. Do not use any mineral oils and greases.





Braking system bleeding.

The braking system is to be bled whenever the lever stroke is long and elastic owing to any air in the circuit, or when the fluid is to be replaced. For the bleeding proceed as follows:

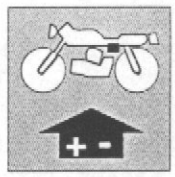
a) fill the tank with the required brake fluid; make sure that the fluid does not drop below the minimum level during the bleeding operation;
b) repeatedly actuate the lever or the brake pedal in order to fill the braking circuit, at least partially;
c) fit a transparent flexible pipe on the breather union (B) and plunge the pipe end in a basin containing exhausted brake oil;
d) strongly pull the lever (or pedal) of the pump and hold it in this position;
e) unloose the breather union,let the brake fluid come out (only air will come out first) and lock the union without forcing;
f) release the lever (or pedal), wait some instants and repeat the cycle "d" and "e" until the fluid coming out of the pipe has no air bubbles;
g) lock the breather union according to the required torque and restore the fluid level in the tank.

The brake fluid is highly corrosive: avoid all contact with skin; in case of accidental contact, carefully rinse with running water.

The brake fluid is corrosive to paints and plastic parts.

If bleeding has been properly made, you shall feel the direct action without elasticity of the fluid just after the initial idle stroke of the lever. If that is not the case, repeat the bleeding action.

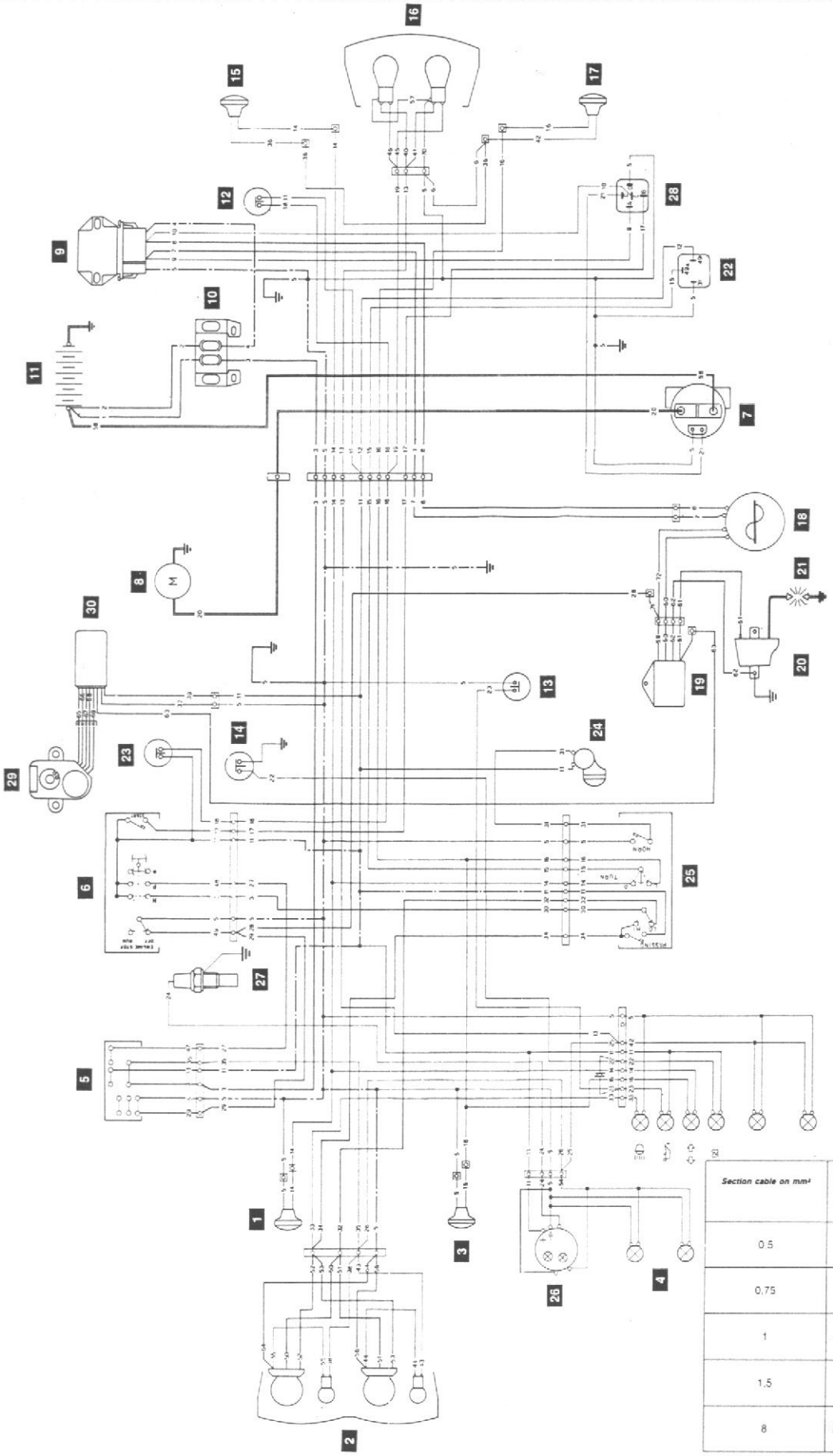
Bleeding does not fully eliminate the air in the circuit; the little remaining quantities are automatically eliminated during a short period of use of the motorcycle; this entails less elasticity and a shorter stroke of the control lever.



Section **M**

Key to wiring diagram M.6
Cable colour coding M.6
Electric ignition equipment M.8
Battery M.9
Generator M.11
Electronic device M.11
Coil M.11
Alternator checking M.12
Rectifier-regulator M.13
Checking the voltage regulator M.14
Spark plug M.15
Checking the recharge system on vehicle M.16
Fuses box M.17
Solenoid starter M.17
Ignition timing and checking M.18
Starter Motor M.19
Starter motor maintenance M.19
Headlamp M.20

WIRING DIAGRAM



Section cables coding

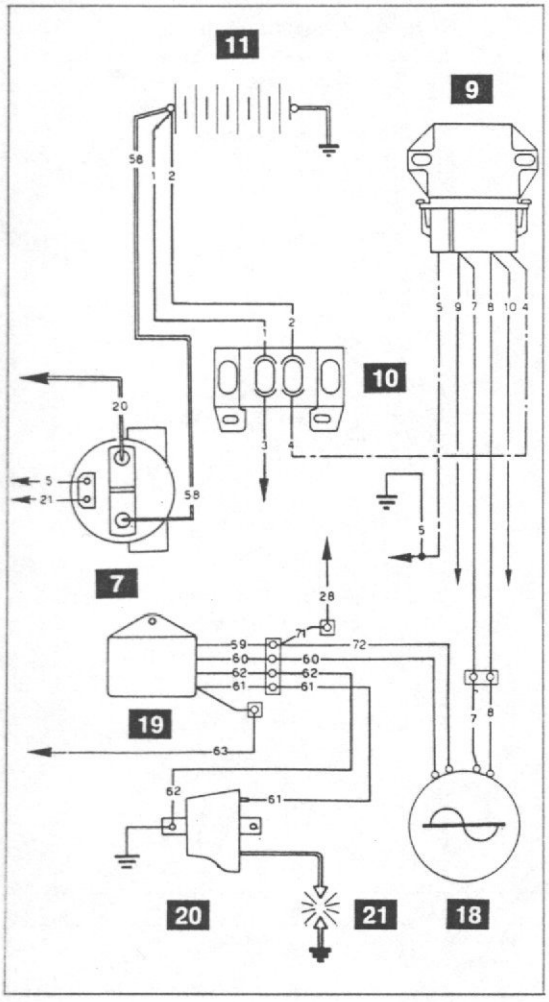
Section cable on mm²	Cables N°
0.5	5, 6, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 21, 22, 23, 24, 25, 26, 31, 33, 35, 36, 38, 40, 41, 42, 43, 44, 45, 46, 54, 55, 57, 70
0.75	7, 8, 27, 28, 29, 30, 32, 34, 37, 39, 47, 48, 49, 50, 51, 52, 53, 56, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 71, 72
1	4
1.5	1, 2, 3
8	20, 58

Key to wiring diagram.

1 RH front indicator
2 Headlamp
3 LH front indicator
4 Instrument lighting
5 Key switch
6 Right switch
7 Starter switch
8 Starter motor
9 Regulator
10 Regulator
11 Battery
12 Rear stop switch
13 Oil level switch
14 Neutral switch
15 RH rear indicator
16 Rear light
17 LH rear indicator
18 Alternator
19 Electronic unit
20 H.T. coil
21 Spark plug
22 Turn signal flash device
23 Front stop switch
24 Horn
25 Left switch
26 Thermometer
27 Thermistor
28 Starting control box
29 Petrol level switch
30 Valve control motor
31 Valve control center unit

— Cable colour coding

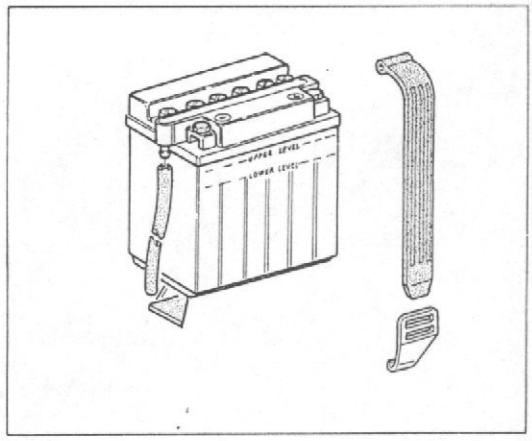
POS.	COLORE / COLOR	POS.	COLORE / COLOR
1	Rosso - Red	37	Bianco-Nero/White-Black
2	Rosso - Red	38	Giallo - Yellow
3	Rosso - Red	39	Arancio-Bianco/Orange-White
4	Arancio - Orange	40	Giallo - Yellow
5	Blu - Blue	41	Giallo - Yellow
6	Blu - Blue	42	Blu - Blue
7	Giallo - Yellow	43	Giallo - Yellow
8	Giallo - Yellow	44	Blu - Blue
9	Giallo - Yellow	45	Verde - Green
10	Giallo - Yellow	46	Verde - Green
11	Verde-Nero/Green-Black	47	Grigio - Grey
12	Verde-Nero/Green-Black	48	Giallo - Yellow
13	Giallo - Yellow	49	Bianco-Rosso/White-Red
14	Rosso-Nero/Red-Black	50	Nero - Black
15	Blu-Nero/Blue-Black	51	Nero - Black
16	Azzurro - L.T. Blue	52	Bianco/White
17	Giallo-Rosso/Yellow-Red	53	Bianco/White
18	Verde - Green	54	Giallo - Yellow
19	Verde - Green	55	Blu - Blue
20	Nero - Black	56	Blu - Blue
21	Giallo-Blu/Yellow-Blue	57	Blu - Blue
22	Giallo-Verde/Yellow-Green	58	Rosso - Red
23	Rosa - Pink	59	Nero-Rosso/Black-Red
24	Arancio - Orange	60	Rosso-Nero/Red-Black
25	Giallo - Yellow	61	Bianco-Blu/White-Blue
26	Giallo - Yellow	62	Nero-Bianco/Black-White
27	Giallo-Nero/Yellow-Black	63	Bianco-Blu/White-Blue
28	Bianco-Rosso/White-Red	64	Blu - Blue
29	Bianco-Rosso/White-Red	65	Rosso - Red
30	Verde-Rosso/Green-Red	66	Nero - Black
31	Grigio - Grey	67	Arancio - Orange
32	Nero - Black	68	Blu - Blue
33	Bianco - White	69	Giallo - Yellow
34	Bianco - White	70	Blu - Blue
35	Giallo - Yellow	71	Nero-Rosso/Black-Red
36	Blu - Blue	72	Nero-Rosso/Black-Red



Electric ignition equipment.
The ignition equipment is composed of:
— Generator 12V-120W
— Electronic coil
— Electronic unit
— Voltage regulator
— Electric starter switch
— Spark plug

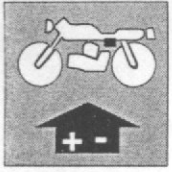
For the key to electrical components and cable colour coding see the wiring diagram.

Part. N. 68543 (10-90)



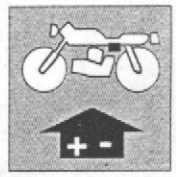
Battery.
The 12V-9 Ah battery is delivered dry and must be activated by introducing in its cells some electrolyte specifications of which are remarkable on the card put on the bike. After this operation have the battery at rest for two hours. Then have a 8 hours charge with current **not higher than 1 A**.
This charge finished, bring electrolyte to level and connect battery to the breather pipe, then putting it into its seat.
Connect the red cable to + and the blue one to – after taking out the bolt joining the battery cables one another.

Only under these conditions, motorcycle is ready to start.

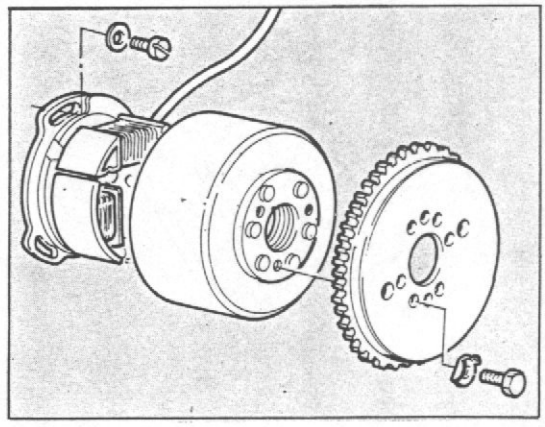


Remind that the battery life is depending upon its maintenance and not upon its operation period or distance run.
EVERY MONTH, or more frequently, under an hot climate, it is necessary to check its level and, if the case, to add distilled water in its cells.
In case that to frequent charges with distilled water are required, check the recharge circuit.
Battery must be kept clean and greased on terminals. When the motorcycle remain inactive, carry out a fresh charge EVERY MONTH.

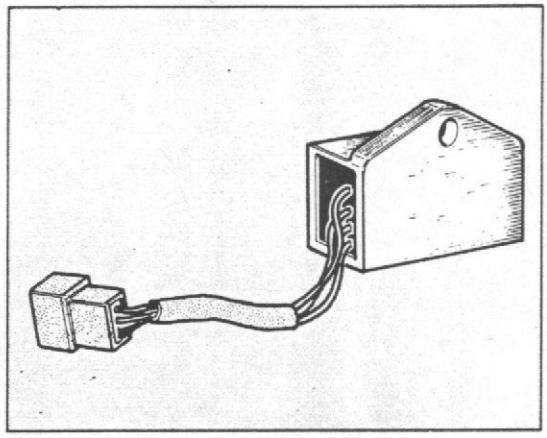
Do not start the engine with battery disconnected from connection cables of electric system, since same should be damaged.



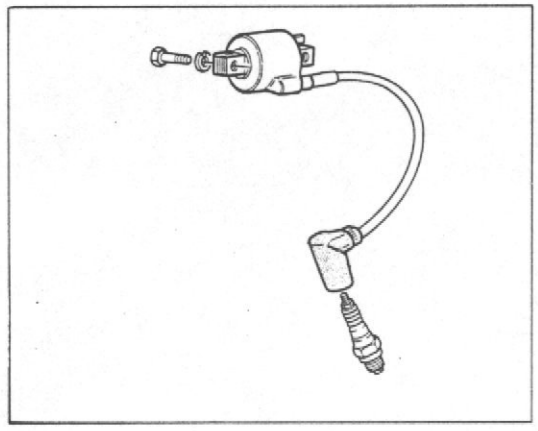
Generator.
It is consisting in a 12V - 120W alternator placed into the L.H. side cover of the engine.
Ignition spark start: about 350 r.p.m.

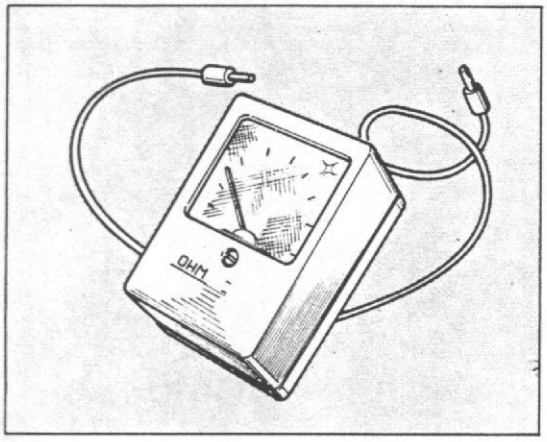


Electronic device.
The electronic device is fastened to the electric cable protection cover located inside the L.H. upper beam of the bearing frame.



Coil.
The coil is fastened to the engine lubrication oil tank, in the back. Make sure that the ground cable is properly fastened in any oxide- and paint-free spot.





Alternator checking.

From regulator disconnect the two yellow cables coming from alternator, taking care to insulate them so that no risk of contact may raise.

Have the engine heated up about 3000 r.p.m. and measure the tension under no-load using to this purpose a voltmeter for alternate current with scale up to 50V.

This instrument will show a certain voltage.

If no movement is noticed or an high lack of voltage balance is noticed between the yellow cables in respect with the earth, it means the stator is defective; therefore it will be necessary to arrange an Ohmmeter verification, measuring insulation between the tested cable and the earth.

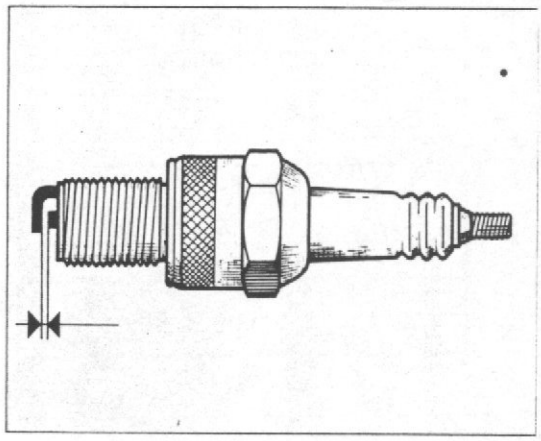
The insulation must be total.

Checking the voltage regulator.

With the lights off, run the engine at 6000 rpm. The battery voltage should increase gradually unit it reaches the preset regulator setting (approx. 14÷15 V), while charging current should decrease gradually until it reaches 0.5 A.

- If the charging current does not drop and the battery **voltage continues to increase above** 15 V then the regulator is faulty and should be replaced.
- If on the other hand the voltage remains below 13 V and the charging current remains high then the battery is probably faulty or discharged. Recharge the battery.
- If the voltage does not increase to the required value and the current remains low then the alternator should be checked.

To check the alternator, disconnect the 2 yellow cables from the regulator and use a tester or a lamp tester to check that the yellow cables or the winding are not earthing. If these parts are functionning properly then the regulator is faulty and should be replaced.



Spark plug.

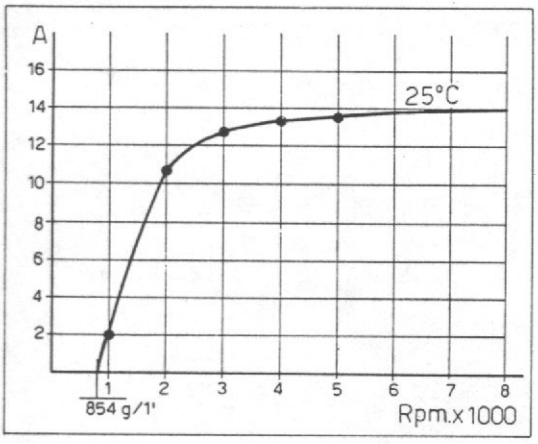
Use CHAMPION N2C spark plugs; the spark plug gap is: 0.019 in. Clean the dirt away from the base of the spark plug before removing it from the cylinder.

It is very useful to examine the state of the spark plug just after it has been removed from the engine since the deposits on the plug and the colour of the insulator provide useful indications concerning the heat rating of the plug, carburation, ignition and general engine condition.

Before refitting the plug, throughly clean the electrodes and the insulator using a brass-metal brush.

Apply a little graphite grease to the plug thread; fit and screw the plug home by hand and then tighten to the correct torque using a plug spanner.

Plugs which have cracked insulators or corroded electrodes should be replaced.

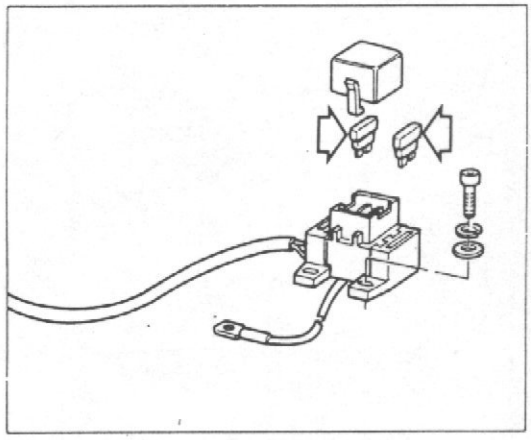


Checking the recharge system on vehicle.

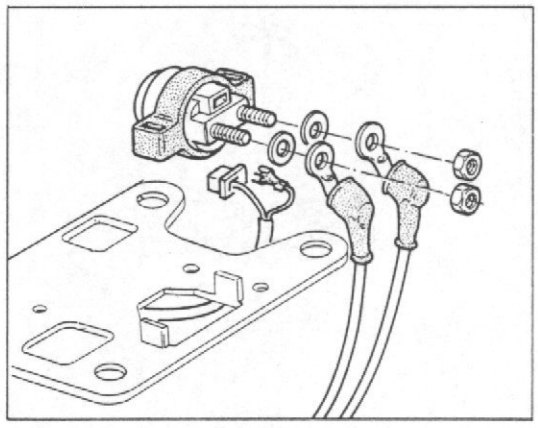
The recharge system is consisting in a flywheel alternator generating a single-phase current regulated by an electronic diodes regulator.

System checking is carried out as follows:

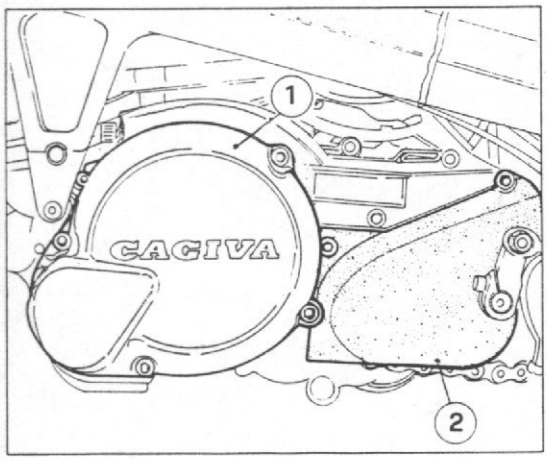
- ascertain that the electric installation and connections are correct and fuses not burnt.
- Disconnect the positive pole of battery and interpose between it and the + pole an Ammeter for direct current.
- Fit a d.c. voltmeter between the positive and negative pole of the battery and make sure that the battery tension is ranging between 12.5 and 14 V (if not, recharge it). Insert the contact key and start engine, progressively increasing speed up to about 6000 r.p.m.

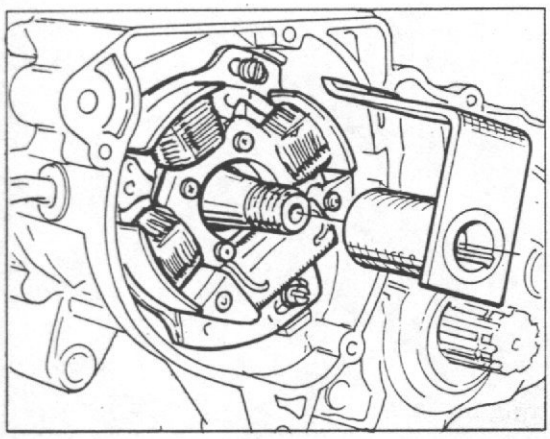


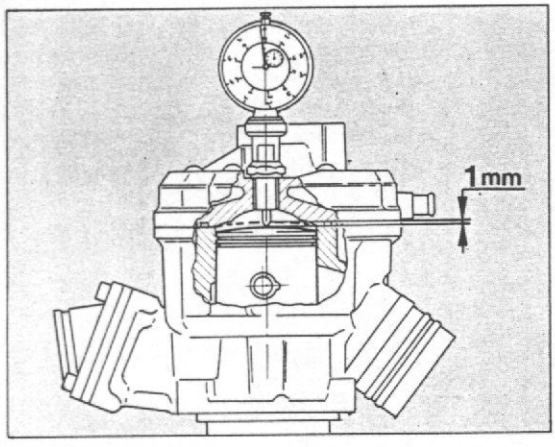
Fuses box.
It is located in the panel holding the electric devices under the pilot seat. Access to the fuses is allowed by removing the transparent protection cover. The box contains 4 fuses of 15A, two of which are spare fuses. Replace the fuse with a spare or a new one having the same characteristics.



Solenoid starter.
The solenoid starter is elastically connected to the panel holding the electric devices, under the pilot seat. In case of disassembly, to connect it to the installation, carefully follow the main diagram.







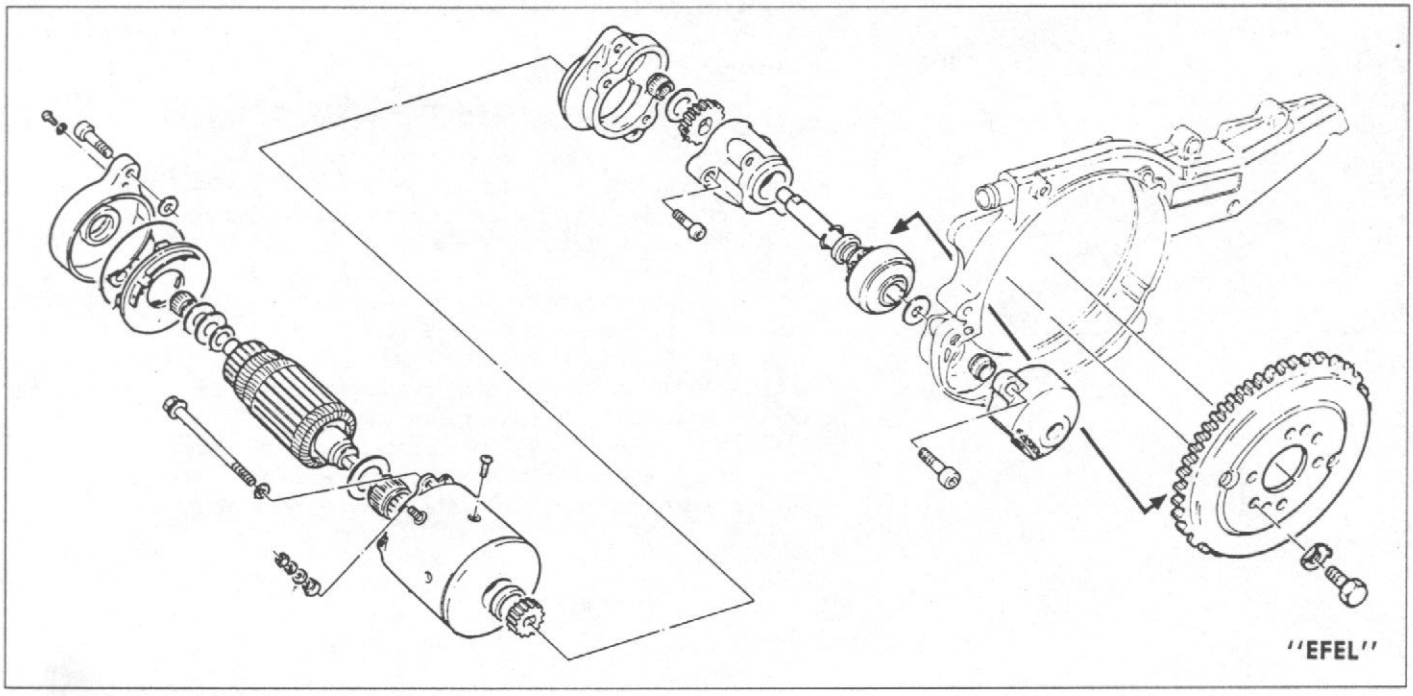
Ignition timing and checking.

To operate on the flywheel-alternator it is necessary to remove the engine L.H. cover (1) and the chain pinion protecting cover (2). Ignition, electronic type, does not require any maintenance; in case of components removal carry out its timing operating as follows: with the aid of a dial gauge and without rotor re-assembly, install too no. **48803** (3) on the crankshaft, bring piston to T.D.C. and in this position put the dial gauge on zero; have the notch placed on the stator in coincidence with the one on the tool and check that piston has carried out a stroke of or 0.03937 in. In case this does not occur, loosen the three stator screws and rotate it until the correct advance conditions is restored.

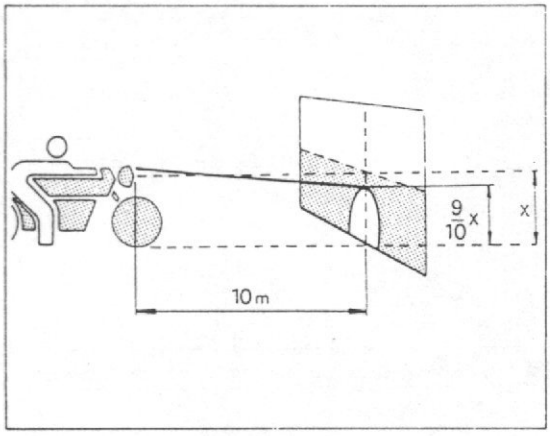
Starter Motor.
Nominal voltage: 12 V.
Absorber power: 500 W

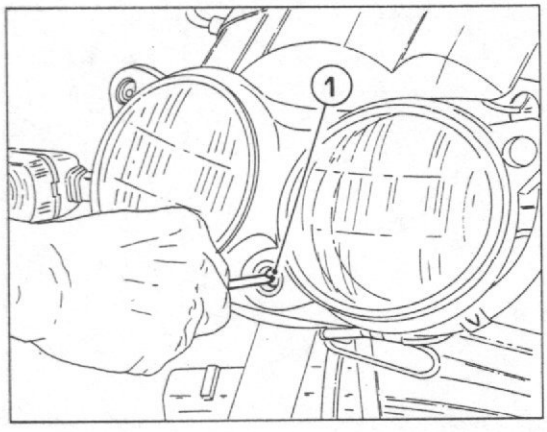
Prova a vuoto - Free running check - Essai à vide - Leerlaufpruefung - Prueba a vacío	
Voltage	11,2 V
Current	30 A
Speed	10.000 G/1' - R.P.M. - tr/1' - /Min.

Prova di spunto - Check under load - Essai de démarrage - Anlasspruefung - Prueba de despuntado	
Voltage	6,4 V
Current	212 A
Torque	0,4 Kgm - Kg.m - Kgm - KGM



Starter motor maintenance.
Maintenance operations on the starter motor involve checking the brushes for wear, that the stator and rotor do not touch, and that they are correctly insulated. It is advisable to carefully lubricate the motor's moving parts with «AGIP F.1 GREASE 30».





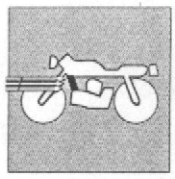
1) Light adjustment screw.

Headlamp.

The front headlamp is fitted a dipping bulb for main and dipped beams and a pilot/side lamp bulb.

Particular care should be taken to adjust the headlamp beam; adjust as follows:

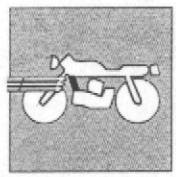
- position the motorcycle at 33 ft from a flat wall;
- check that the bike is on a level surface and that the headlamp axis is at right angles to the wall;
- the bike should be in a vertical position;
- measure the distance from the ground to the centre of the headlamp lens and then mark a cross at the same height on the wall;
- switch on to dipped beam; the upper limit of the beam should be at a height which is no greater than 9/10 of the height from the ground of the centre of the headlamp;
- adjust the headlamp orientation by turning the screw (1) (in the STREAMLINED VERSION a hole for the screwdriver is provided on the headlight fairing);
- by tightening the screw (1) the light beam is directed downwards;
- by unloosing the screw (1), the light beam is directed upwards.



Section **N**

Check of the coolant level N.5
Cooling system N.6
Engine cooling system overhaul N.8

Part. N. 68543 (10-90)



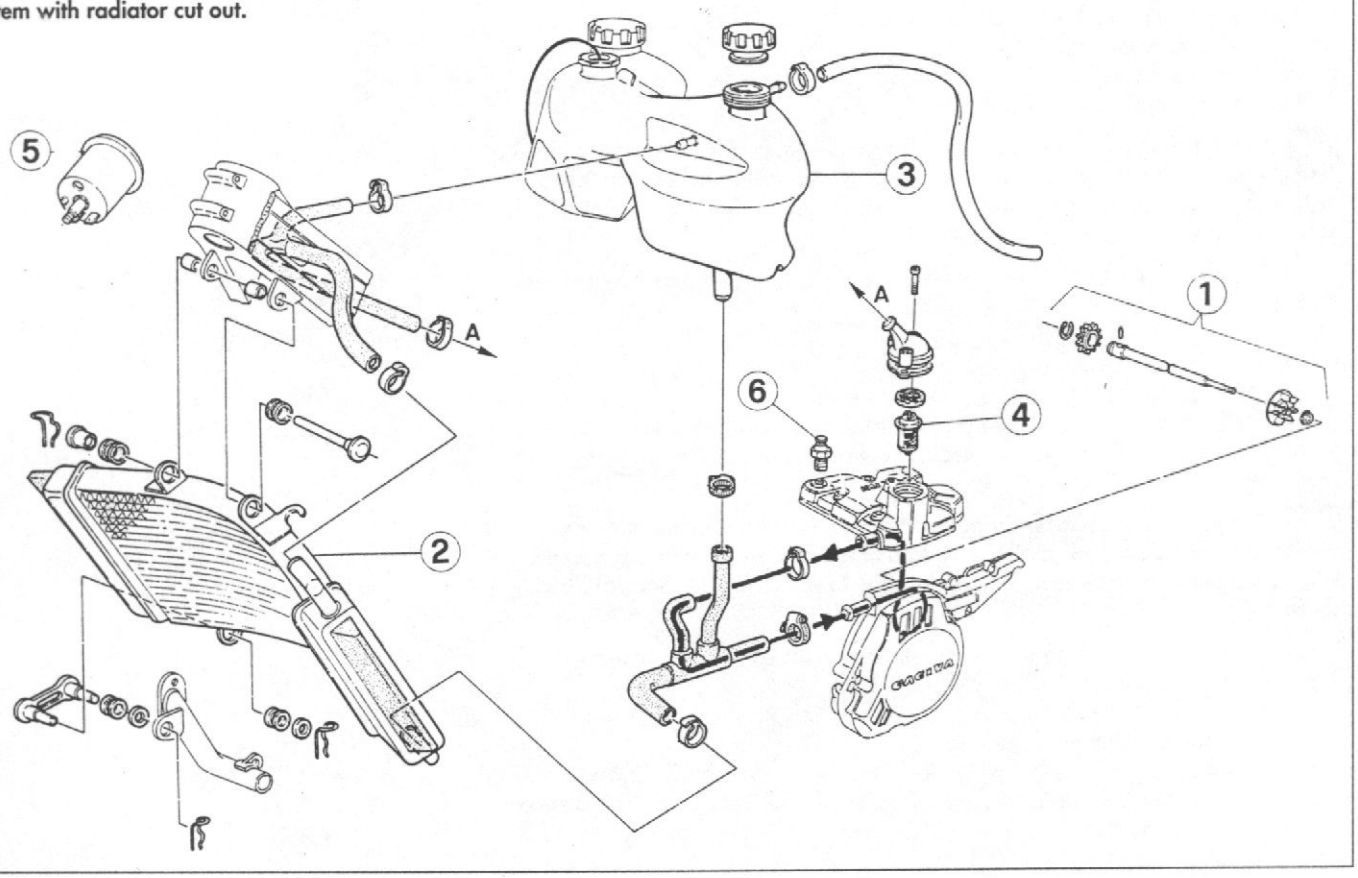
Check of the coolant level.

The coolant absorbs the heat of the thermic assembly (piston, cylinder, head) and delivers it to the external air by means of the radiator. For a good operation of the cooling system, it is very important to check periodically (every 900 mi.) the level of the liquid.

The absence of a heat exchange element (water) between thermic mass and radiant mass could cause an overheating in the piston-cylinder assembly with consequent seizures and, worse, damage to the crank mechanism (driving shaft).

However if engine overheating is noticed, indicated by the special thermometer, check that radiator is completely filled up.

System with radiator cut out.



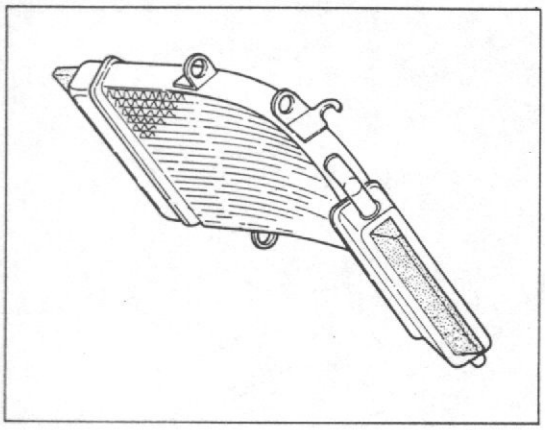
Cooling system.

The cooling system is of forced-circulation type with a centrifugal pump (1) located on the L.H. side of the engine and a big-size vertical flow radiator (2).

An expansion tank (3) compensates the thermal expansions of the coolant and the internal cavities of the head and cylinder, keeping the system completely full in all conditions.

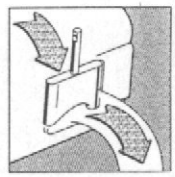
The temperature of the coolant is adjusted by a suitable thermostat (4) and is indicated by a thermometer (5) actuated by a thermistor (6) located on the cylinder head.

The thermostat opens when the the coolant temperature attains approx. 149°F, therefore till that time the cooling system cuts out the radiator. After attaining approx. 149°F, the thermostat opens and the coolant passes into the radiator.

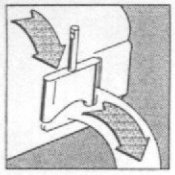


Engine cooling system overhaul.

Verifying too high temperatures of the coolant, check the radiant mass. Whether on fins obstructions to the air stream as leaves, bugs, mud etc.are noticed , remove these obstructions, taking care not to damage the radiator. If distortions are noticed, it is advisable to straighten them, restoring the air passage. The radiantr mass has not to be clogged or damaged for more than the 20% of its surface. If the damaged surface is over this limit, it shall be advisable to replace the radiator. Periodically check the connecting sleeve.This will avoid water leakages and consequent engine seizures. If pipes show cracks, swellings or hardenings due to sleeve desiccation, their replacement shall be required.



Section O



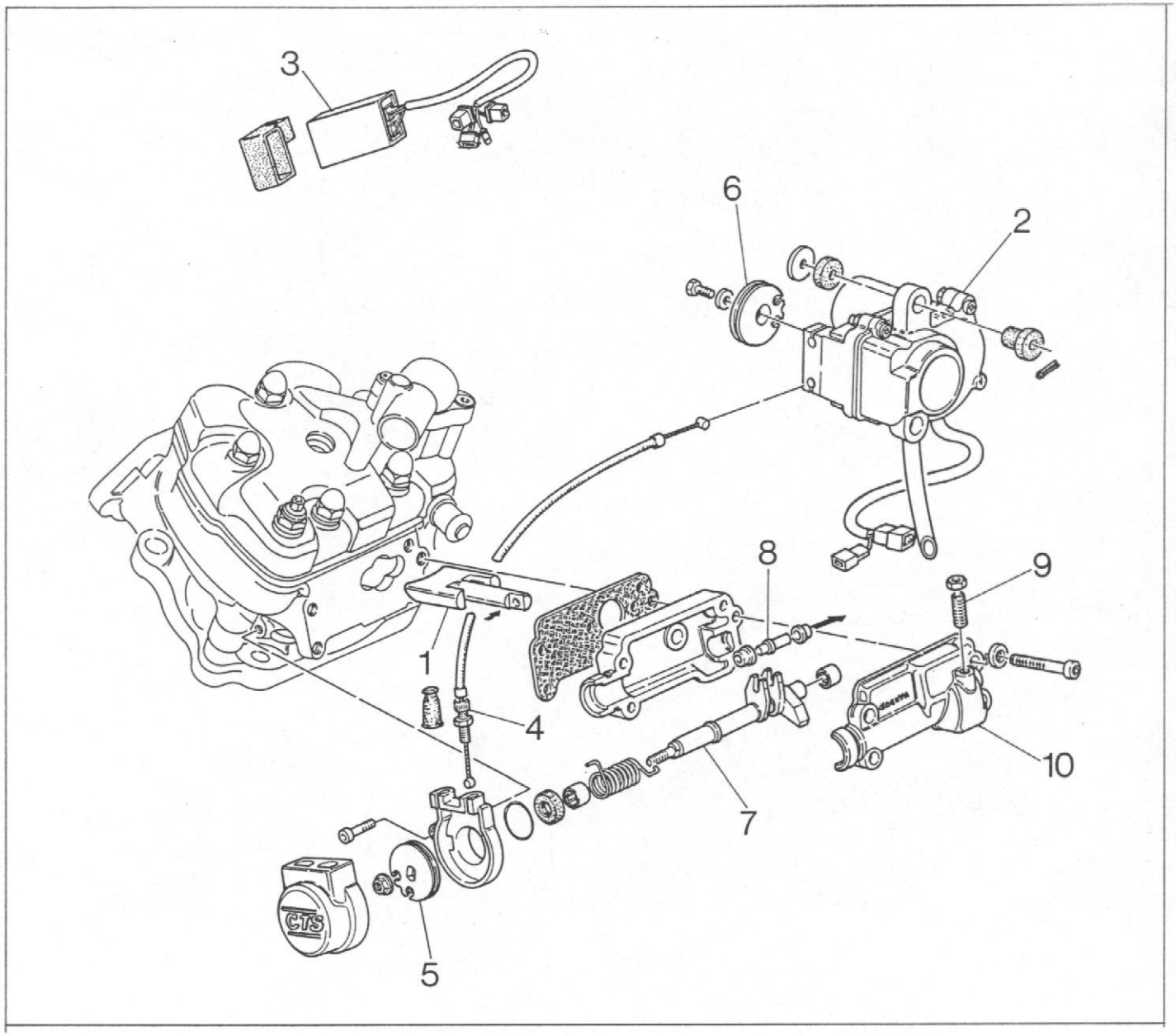
C.T.S. exhaust valve.

The cylinder is provided with a C.T.S. valve (1) (Cagiva Torque System) which allows, by varying the exhaust diagram according to parameters stored by an electronic device and sent to the valve through an actuator, a good operation at each r.p.m.

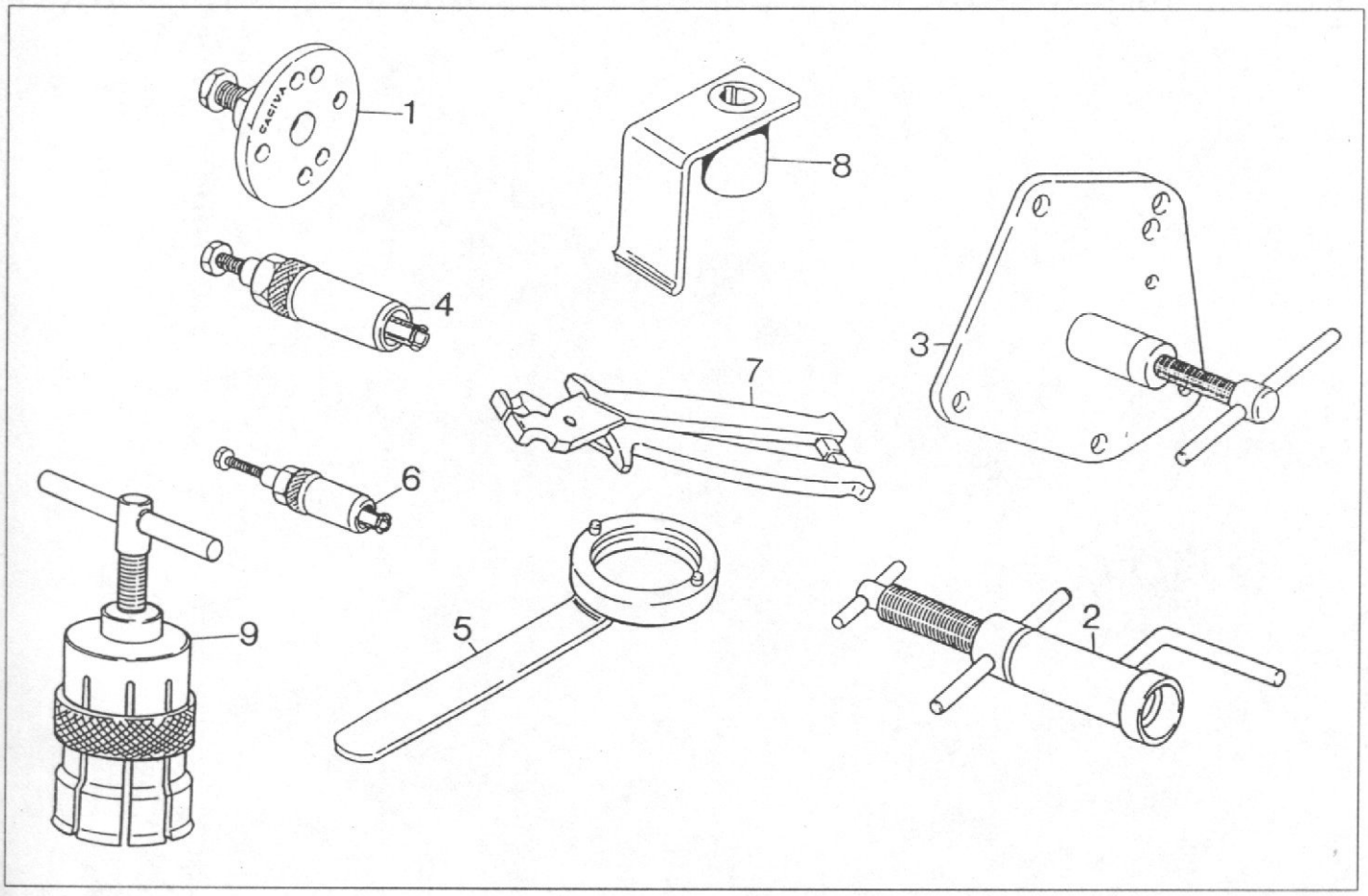
This valve, whose opening occurs at 7250 r.p.m., is controlled by an actuator (2) operated by an electronic device (3); both components are mounted on the frame L.H. side.

The connection between actuator and valve is performed through flexible cables provided with registers for clearance adjustment. These cables move two pulleys constrained to the valve control shaft (5) and to the actuator (6) respectively.

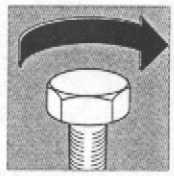
The shaft (7) controls the valve by means of a pin (8). The limit stop position can be adjusted by acting on the grain (9) placed on the cylinder cover (10).


3
6
2
8
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1
4
10
7
CTS
5

Section **W**

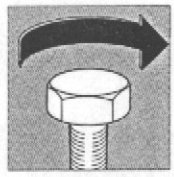


POS. N.	N. CODICE CODE NO.		DESCRIPTION
1	800051614		Rotor puller
2	800033047		Installing tool crankshaft right
3	800033048		Crankcase splitting tool
4	800043823		Needle bearing puller main shaft and seal ring water pump
5	800046614		Rotor holding tool
6	800033054		Needle bearing puller oil pump shaft
7	800049767		Plier installing clamp
8	800048803		Ignition control tool
9	80Y002271		Crankshaft bearing extractor



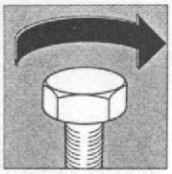
Section

X



ENGINE

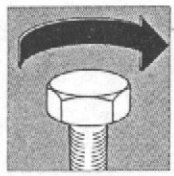
USE	THREADING	N.m.	Kgm	LB/FT
Cylinder nut	M8x1.25	19.6÷21.6	2÷2.2	14.4÷15.8
Cylinder head nut	M8x1.25	19.6÷21.6	2÷2.2	14.4÷15.8
Inlet valve screw	M6x1	6.8÷7.8	0.7÷0.8	5÷5.8
Check nut for countershaft sprocket	M14x1.25	49÷58.8	5÷6	35.9÷43
Primary drive pinion nut	M14x1.25	49÷58.8	5÷6	35.9÷43
Pinion screw	M8x1.25	18.6÷20.6	1.9÷2.1	13.7÷15.1
Pulley nut	M5x0.8	6.8÷7.8	0.7÷0.8	5.1÷5.8
Crankcase screw	M6x1	7.8÷8.8	0.8÷0.9	5.8÷6.5
Bearing plate screw	M6x1	7.8÷8.8	0.8÷0.9	5.8÷6.5
Clamp screw for R.H. cover	M6x1	6.8÷7.8	0.7÷0.8	5÷5.8
Oil pump screw	M5x0.8	2.45÷3.43	0.25÷0.35	1.8÷2.5
Coil screw	M6x1	8.8÷10.7	0.9÷1.1	6.5÷8
Stator plate clamp screw	M5x0.8	2.6÷3.1	0.27÷0.32	1.9÷2.3
Rotor nut	M12x1.25	75.5÷81.4	7.7÷8.3	55.7÷60
Spark plug (CHAMPION N2C)	M14x1.25	20÷30	2÷3	15÷22
Starter clamp screw	M6x1	6.8÷7.8	0.7÷0.8	5÷5.8
Starter spacer clamp screw	M6x1	6.8÷7.8	0.7÷0.8	5÷5.8
Clamp screw for clutch spring disc	M5x0.8	5.4÷5.9	0.55÷0.6	3.9÷4.3
Clamp nut for clutch hub	M14x1	27.4÷31.4	2.8÷3.2	20÷23
NOTE - If not otherwise specified, standard tightening torques for the following thread:	M5x0,8	4,9÷6,86	0,5÷0,7	3,6÷5,04
	M6x1	8,82÷9,81	0,9÷1	6,48÷7,2
	M8x1,25	21,56÷23,52	2,2÷2,4	15,86÷17,30



TORQUE WRENCH SETTINGS

FRAME

USE	THREADING	N.m.	Kgm	LB/FT
Motor front fastening screw	M8x1,25	24,5÷27,44	2,5÷2,8	14,4÷20,16
Screw fastening the cross member to the frame	M8x1,25	24,5÷27,44	2,5÷2,8	14,4÷20,16
Seat frame fastening screw	M8x1,25	24,5÷27,44	2,5÷2,8	14,4÷20,16
Rear foot-rest support fastening screw	M8x1,25	24,5÷27,44	2,5÷2,8	14,4÷20,16
Helmet lock plate fastening screw	M6x1	11,76÷12,74	1,2÷1,3	8,64÷9,36
Helmet lock fastening screw	M6x1	4,9÷6,86	0,5÷0,7	3,6÷5,04
Screw fastening the small frames to the main frame	M6x1	11,76÷12,74	1,2÷1,3	8,64÷9,36
Clutch U-bolt fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Screw fastening the oil pipe to the pump	M10x1,25	17,64÷19,6	1,8÷2	12,96÷14,4
Gearbox pedal fastening pin	M8x1,25	21,56÷23,52	2,2÷2,4	15,84÷17,28
Gearbox lever fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Brake pump fastening screw	M6x1	9,8÷11,76	1÷1,2	7,2÷8,64
Brake tank clamp screw	M6x1	2,94÷4,9	0,3÷0,5	2,16÷3,6
Tank cover fastening screw	M3x0,5	2,94÷3,92	0,3÷0,4	2,16÷28,8
Front oil tank screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Oil tank plate fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Pin screw	M20x1	58,8÷63,7	6÷6,5	43,2÷46,8
Fork pin check nut	M14x1,5	63,7÷68,6	6,5÷7	46,8÷50,4
Screw fastening the rocker arm to the fork	M10x1,25	35,28÷39,2	3,6÷4	25,9÷28,8
Screw fastening the connecting rod to the frame	M10x1,25	35,28÷39,2	3,6÷4	25,9÷28,8
Screw fastenign the connecting rod to the rocker arm	M10x1,25	35,28÷39,2	3,6÷4	25,9÷28,8
Shock-absorber screw	M10x1,25	35,28÷39,2	3,6÷4	25,9÷28,8
Shock-absorber screw	M10x1,25	35,28÷39,2	3,6÷4	25,9÷28,8
Chain pad fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Front fender screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Rear mudguard front fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Rear mudguard rear fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Plate holder fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Carter fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Screw fastening the valance panel to the fairing	M6x1	3,92÷5,88	0,4÷0,6	2,88÷4,32
Screw fastening the valance panel to the frame	M6x1	3,92÷5,88	0,4÷0,6	2,88÷4,32
Under fairing fastening screw	M6x1	3,92÷5,88	0,4÷0,6	2,88÷4,32
Screw fastening the valance panel to the under-fairing	M6x1	3,92÷5,88	0,4÷0,6	2,88÷4,32
Tail front fastening screw	M6x1	3,92÷5,88	0,4÷0,6	2,88÷4,32
Driving mirror fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Flange-plate fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Earth cables fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Fuses block screw	M5x0,8	0,98÷1,47	0,10÷0,15	0,72÷1,08
Cover fastening nut		3,92÷5,88	0,4÷0,6	2,88÷4,32
Head-light fastening nut (motorcycles with fairing)	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Rear head-light fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Remote control switch cables fastening nut	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Blinker fastening screw	M6x1	3,92÷5,88	0,4÷0,6	2,88÷4,32
Blinker fastening screw	M6x1	3,92÷5,88	0,4÷0,6	2,88÷4,32
Hook fastening screw	M5x0,8	5,88÷7,84	0,6÷0,8	4,32÷5,76
Plate screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Brake disc screw	8x1,25	17,64÷19,6	1,8÷2	12,96÷14,4
Front wheel axle	20x1,5	49÷53,9	5÷5,5	36÷39,6
Caliper fastening pin	10x1,25	29,4÷34,3	3÷3,5	21,6÷25,2
Caliper fastening screw on driving side	10x1,25	44,1÷49	4,5÷5	32,4÷36



USE	THREADING	N.m.	Kgm	LB/FT
Brake disc screw	6x1	9,8÷11,76	1÷1,2	7,2÷8,64
Sprocket screw	M8x1,25	26,46÷29,4	2,7÷3	19,44÷21,6
Rear wheel pin flanged nut	M20x1,5	70,56÷78,4	7,2÷8	51,84÷57,6
Screw fastening the caliper to the plate	M8x1,25	22,54÷24,5	2,3÷2,5	16,56÷18
Silencer fastening screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Screw fastening the support to the frame	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Exhaust clamp screw	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Screw fastening the silencer to the frame	M6x1	5,88÷7,84	0,6÷0,8	4,32÷5,76
Instruments fastening nut	M5x0,8	3,92÷5,88	0,4÷0,6	2,88÷4,32
Instruments dashboard fastening screw	M5x0,8	1,96÷3,92	0,2÷0,4	1,44÷2,88
Seat front fastening screw	M6x1	1,96÷3,92	0,2÷0,4	1,44÷2,88
Flanged self-locking nut	M6x1	1,96÷3,92	0,2÷0,4	1,44÷2,88

Lock all nuts and screws at the correct locking torque, using a dynamometric wrench.
A screw or nut, when incorrectly locked, can be damaged or loosen completely, with subsequent damage to the bike and injuries to the rider. A screw or nut locked over the prescribed wrench torque setting can be damaged, have the thread broken or cut down, therefore loosening completely. Above table states the list of torque wrench settings for main screws and nuts, in connection with the thread diameter, pitch and specific use.
All these figures have to be applied to threads cleaned with solvent.

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