WORKSHOP MANUAL
FOR V7 SPORT - 750 S - 850 T

Introduction

Purpose of this manual is to give the necessary instructions for overhauling and carrying out repairs in a rational way.

All data herein contained are meant to give a general knowledge on the main checking operations to be made when overhauling the different groups.

To this end, the manual contains many illustrations, drawings, diagrams and tables to assist in the stripping, checking and assembling operations.

This manual will also be a guidance to anybody who whishes to familiarize with the manufacturing characteristics of the various component parts of the V7 Sport. The knowledge of these will be an essential factor for performing a good job.

• **NOTE -** The terms «right» and «left» used in the text are to be considered as seen by the rider astride the machine.

IDENTIFICATION DATA

(See fig. 4)

Each machine is identified with a serial number which is impressed on the frame down tube and on the L/H crankcase.
This number appears also in the certificate of conformity and it is the only one valid for all legal purposes for the identification of the machine.

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MAIN FEATURES
V7 SPORT - S

ENGINE

Cycle:	4 stroke
Number of cylinders:	2
Cylinders disposition:	«V» type, 90°
Bore:	82.5 mm (3.247″)
Stroke:	70 mm (2.756″)
Displacement:	748.4 cc (45.66 cu.in.)
Compression ratio:	9.8 to 1
Max output:	53 HP at 6300 r.p.m.
Cylinder heads:	in light alloy, hemispherical, with special cast iron inserted seats
Crankshaft:	steel construction
Journal bearings:	AL-TIN alloy
Connecting rods:	steel construction with AL-TIN alloy thin wall hearings
Piston:	in light alloy

Valve gear

OHV, push rod operated via the camshaft.

Ignition

By battery with double contact breaker - automatic advance.

— Initial advance (fixed):	39°
— Automatic advance:	13°
— Total advance:	26°
— Contast breaker gap:	0.37-0.43 mm (.014-.017″)
— Spark plugs:	n. 240 for normal riding (points gap 0.6 mm = .023″) n. 275 for continued use at high speeds (points gap 0.5 mm = = .019″)

Fuel feed

Gravity from the tank - 2.5 W electrovalve controlled or in an emergency from a reserve tap on the R/H side of the machine.

Carburettors

2 Dell'Orto carburettors VHB 30 CD (right) and VHB 30 CS (left) with acceleration pump.

Lubrication

Oil pressure 3.8-4.2 kg/cm² = 54-60 lbs sq.in.).

Cooling

By air. Cylinder and cylinder heads are suitably finned.

Clutch

Dry discs, flywheel driven Lever controlled from the handlebar.

Starting

Electric starter with electromagnetic ratchet control and relay.
Starter button on R/H handlebar half.

Exhaust system

Twin pipes and mufflers.

TRANSMISSIONS

Primary

By helical gears in oil bath - engine-gearbox ratio 1 to 1.235 (17/21).

Speed change

5 speeds, constant mesh gears, frontal engagement, cush-drive incorporated, foot controlled.
Internal gear ratios:

— low gear	1 to 2	(14/28)
— second gear	1 to 1.388	(18/25)
— third gear	1 to 1.047	(21/22)
— fourth gear	1 to 0.869	(23/20)
— high gear	1 to 0.750	(24/18)

Secondary

Constant speed double joint cardan shaft.

— Bevel set ratio (gearbox-wheel)	1 to 4.375 (8/35)

Overall gear ratios:

— low gear	1 to 10.806
— second gear	1 to 7.499
— third gear	1 to 5.657
— fourth gear	1 to 4.695
— top gear	1 to 4.052

CYCLE PARTS

Frame:
tubular structure, duplex disassemblable cradle.

Suspensions:
telescopic front fork with hydraulic dampers. Rear swinging arm with externally adjustable springs.

Wheels

Spoked rims:

— Front	WM 2/1.85 x 18″
— Rear	WM 3/2.15 x 18″

Tyres

Michelin.

— Front	3.25 H 18 ribbed
— Rear	3.50 H 18 studded

Tyre pressures:
— solo
front 2.00 kg/cm² = 28 lbs
rear 2.30 kg/cm² = 33 lbs
— with pillion
front 2.00 kg/cm² = 28 lbs
— rear 2.50 kg/cm² = 35.5 lbs

• **NB.** - The above tire pressures are for normal cruising speed. If using the machine at constant high speed or on motorways, the above pressures should be incresed of 0.2 kg/cm² (2.8 p.s.i.).

Brakes:

— Front (V7 Sport):
Four leading shoes double brake ∅ 220 mm (8.66″) 25 x 2 mm wide (.98 x .078″) lever operated from the right handlebar with a 1.9 mm ∅ (0.74) metal cable.

— Front (V750 S):
Twin disc brake (disc ∅ 300 mm) lever operated from the right handlebar through a master-cylinder and pipes from the master-cylinder to the twin control and from twin control to caliper.

— Rear:
Twin leading shoes brake ∅ 220 mm (8.66″) 25 mm wide (.98″) pedal operated from the right or the left of the machine.

Over-all dimensions and weights

— Wheelbase (fully loaded)	1.470 mts (57.8″)
— Length	2.165 mts (85.2″)
— Width	0.700 mts (27.5″)
— Height	1.035 mts (40.7″)
— Weight (in running order)	225 kgs (495 lbs)

PERFORMANCES

GEAR	MAX SPEED km/h
Low gear	76 = 47.5 m.p.h.
Second gear	110 = 68.7 m.p.h.
Third gear	146 = 91.2 m.p.h.
Fourth gear	179 = 111.8 m.p.h.
High gear	206 = 130 m.p.h.

Fuel consumption (CUNA regulations) 8.58 l. x 100 kms (32.8 m.p.g. imp. - 27.3 m.p.g. USA).

FUEL AND OIL CAPACITIES

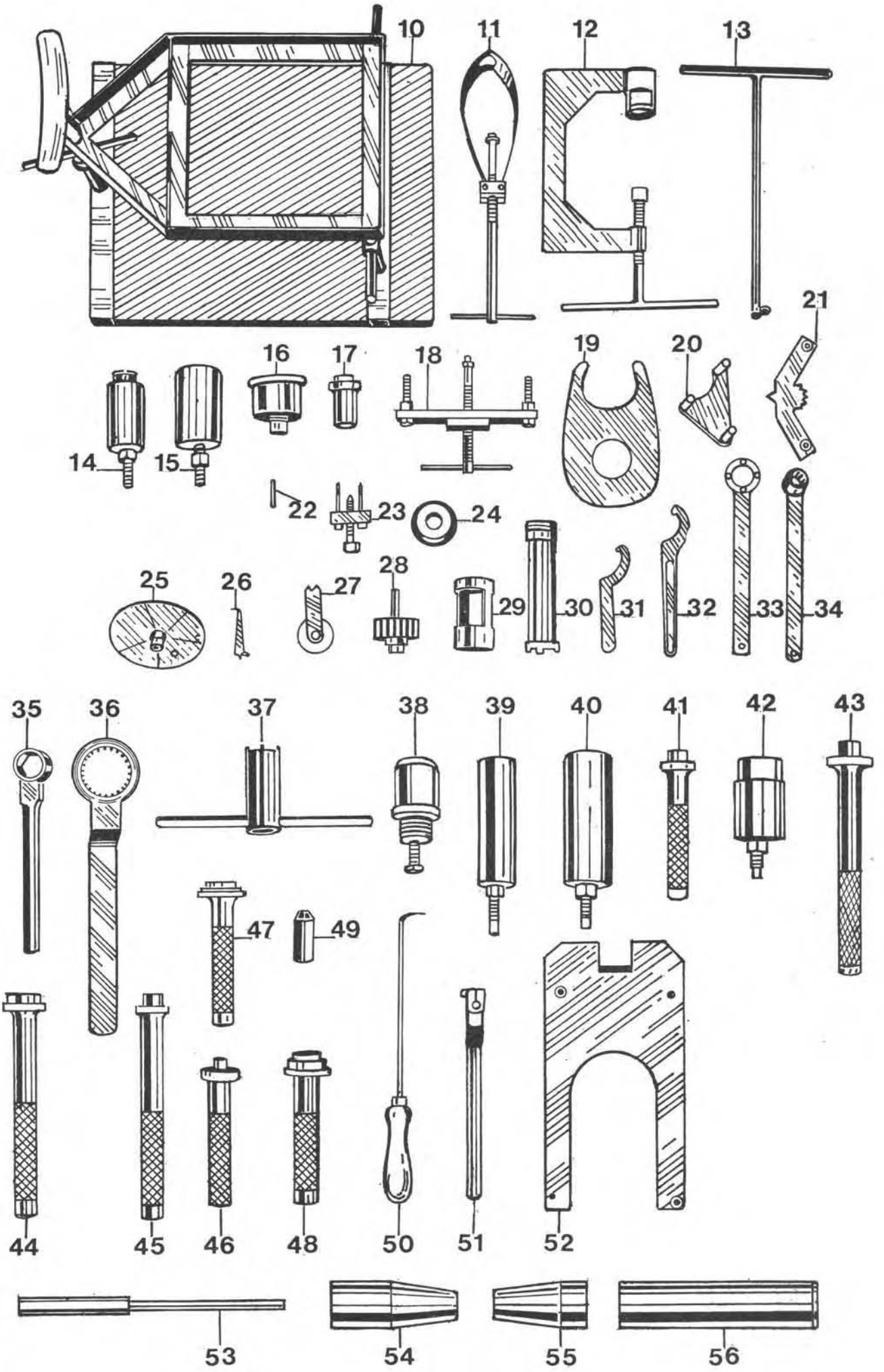
PART TO BE REPLENISHED	RECOMMENDATION	QUANTITY
Fuel tank	19 lts (4.17 gls imp. - 5 gls USA)	Petrol 98/100 NO «RM)
Reserve	2 lts (3 1/2 pints imp. - 4.2 pints USA)	
Sump	3.5 lts (6 pints imp. - 7.3 pints USA)	«Agip SINT 2000 SAE 10 W/50» or equivalent
Gearbox	0.750 lts (1 and 1/3 pints imp. - 1 and 3/4 pints USA)	«Agip F. 1 Rotra MP SAE 90» or equivalent
Rear drive box (Bevel gears)	0.360 lts (12 oz.) of which 0.020 Molikote type A	«Agip F. 1 Rotra MP SAE 90» or equivalent
Front fork dampers (each leg)	0.050 lts (1.8 oz.)	«Agip F. 1 ATF Dexron» or equivalent
Disc brake circuit (750 S model)		(Agip F. 1 Brake fluid» or equivalent

SPECIFIC WORKSHOP TOOLS

(see fig. 5)

FIG. N.	REF. NUMBER	DESCRIPTION
10	14912400	Stand, engine support
11	26907800	Puller, piston pin
12	10907200	Tool, valve stripping and mounting
13	14927000	Wrench, dismantling and adjusting of twin contact breaker
14	12904700	Puller, taper bearing races in rear fork
15	12906900	Puller, roller bearing races in drive box
16	14927100	Tool, fitting of seal on flange with main journal, flywheel side
17	14927200	Tool, fitting of seal in timing cover
18	12913600	Tool flange removal, flywheel side
19	14912900	Tool, holdfast, timing gears (gear operated timing)
20	14927300	Tool, holdfast, camshaft gear, (chain operated timing)
21	12911801	Tool, holdfast, flywheel and starting gear
22	14906600	Tool, removal of alternator
23	32906302	Puller, oil pump gear (gear operated timing)
24	12912000	Tool, mounting of flange with seal on the crankshaft, flywheel side
25	14927400	Tool, for checking valve timing and ignition
26	14927500	Tool, arrow for checking valve timing and ignition
27	12913800	Tool, transfer of position marks on timing gear (gear operated timing)
28	12906500	Tool, clutch mounting
29	12905900	Toul, clutch shaft stripping
30	14927600	Wrench, removal of timing gear nut and driving pinion lockring
31	14922701	Wrench, damper adjusting
32	14927700	Wrench, exhaust pipes lockrings (on cylinder heads)
33	12905400	Wrench, notched, removal of lay shaft lockring
34	12907100	Tool, holdfast, layshaft and rear drive bevel gear
35	14905400	Tool, layshaft nut
36	14912800	Tool, inner clutch body to clutch shaft
37	14912600	Wrench, hooked, clutch body lockring to clutch shaft
38	14928500	Wrench, hooked, clutch shaft lockring
39	14913100	Puller, main shaft roller bearing in gearbox and clutch shaft in cover
40	14913700	Puller, outer roller bearing race for layshaft in gearbox
41	14929200	Punch, removal of clutch bearing in gearbox and layshaft bearing in cover
42	14907000	Puller, main shaft ball bearing in cover

FIG. N.	REF. NUMBER	DESCRIPTION
43	14928900	Punch, pressing of clutch bearing in gearbox and layshaft bearing in cover
44	14929100	Punch, pressing of roller bearing outer race for layshaft in gearbox
45	14928800	Punch, pressing of roller bearing for main shaft in gearbox and clutch shaft in cover
46	14929000	Punch, pressing of main shaft ball bearing in cover
47	14929400	Punch, pressing of seal for clutch shaft in gearbox
48	14929500	Punch, pressing in of layshaft seal
49	14928600	Tool, pressing in of layshaft bearing inner race
50	14929300	Tool, positioning of sliding muffs' forks
51	14928700	Tool, shifting of preselector
52	14929600	Stand, gear box support
53	14926400	Tool, removal of pump floater (disc brake)
54	14926500	Tool, fitting of floater special seal (disc brake) floater
55	14926600	Tool, fitting of gasket on floater (disc brake)
56	14926700	Tool, fitting of pump lockring (disc brake)
		SPECIAL PRODUCTS
	00010000	Teflon (923.499.909)
	00010100	Molycote Type «A»
	00010200	Devcon «F»
	00010400	Loctite 601 (804.585.601)



NUTS AND BOLTS
TORQUE LOADING

DESCRIPTION	PART N.	SPECIFICATIONS			TORQUE kgm	LOADING ft/lbs
		d mm	p mm	hex mm		
CRANKCASE AND COVERS						
Nut, short and long stud	92751103	10	1.5	17	4-4.5	29-32
Nut, push rod stud	13021900	10	1.5	10	4-4.5	29-32
Nut, stud bolts	92602208	8	1.25	13	2.5	18
Screw, journal bearing flange	98054425	8	1.25	13	3	22
Screw, cover and flange, flywheel side	98054425	8	1.25	13	3	22
Screw, short, cover securing	98620325	6	1	Allen 5	1	7
Screw, long, cover securing	98620335	6	1	Allen 5	1	7
Screw, cover securing	98620325	6	1	Allen 5	1	7
Cap, oil drain	12003701	20	1.5	22	5	36
Bolt, oil sump	98052340	6	1	10	1	7
Screw, oil breather tube	98054316	6	1	10	1	7
Oil filler cap	14004900	20	1.5	22	3	22
Screw, recovery pipe band	98054316	6	1	10	1	7
Bolt, hollow, oil rec. pipe	12116600	12	1.5	17	4	29
CYLINDER HEAD AN CYLINDER						
Screw, rocker spindle	98054312	6	1	10	0.6-0.8	4.2-5.7
Screw, rocker box cover	98620330	6	1	Allen 5	1	7
CONNECTING ROD						
Nut, self-locking, big end	92731090	9	1	14	4.6-4.8	33-35
Bolt, flywheel (10 K)	12067701	8	1.25	13	4.2	30
Bolt, slip ring	98054425	8	1.25	13	3	22
VALVE GEARING						
Screw, camshaft flange Nut, camshaft gear	92701187	18	1.5	26	15	108
ELECTRICAL EQUIPMENT						
Screw, Bosch starter motor	98052480	8	1.25	13	3	22
Screw, Bosch starter motor	98052490	8	1.25	13	3	22
Screw, Bosch starter motor	98052490	8	1.25	13	3	22
Screw, Marelli starter motor	98052475	8	1.25	13	3	22
Nut, Marelli starter motor	92602208	8	1.25	13	3	22
Nut, solenoid screw	92602206	6	1	10	1	22
FUEL FEED						
Screw, intake pipe	98620435	8	1.25	13	3	22
LUBRICATION						
Screw, short, oil pump	98108042	8	1.25	13	3	
Screw, long, oil pump	98022455	8	1.25	13	3	22
Screw, bottom filter plate	98024310	6	1	10	1	7
Screw, filter box securing	98020435	8	1.25	13	3	22
Screw, pipe securing	98054430	8	1.25	13	3	22
Bolt, hollow, oil delivery	95990037	8	1.25	13	1.5-1.8	10.5-16

d = diameter; p = pitch; hex = hexagon

DESCRIPTION	PART N.	SPECIFICATIONS			TORQUE kgm	LOADING ft/lbs
		d mm	p mm	hex mm		
IGNITION						
Bolt, generator	98620245	5	0.8	Allen 4	0.5	3.5
Bolt, breaker back plate	98052430	8	1.25	13	3	22
ENGIME TO FRAME ITEMS						
Nut, front bolt	92602312	12	1.25	19	8	58
Nut, rear bolt	92602312	12	1.25	19	8	58
GEARBOX						
Bolt, bearing retainer	98054316	6	1	10	1	7
Nut, layshaft securing	14219310	22	1	27	16-18	115-129
Bolt, breaker bracket	98054316	6	1	10	1	7
Oil filler cap	12002701	20	1.5	22	3	22
Oil level plug	95980610	10	1.5	17	2	14
Screw, lock plate	98054316	6	1	10	1	7
Screw, cover	98620325	6	1	Allen 5	1	7
Screw, cover	98620335	6	1	Allen 5	1	7
Nut, safety	14217410	16	1	24	7-8	50-57
REAR DRIVE						
Screw, bottom plate retaining	98622320	6	1	Allen 5	1	7
Plug, oil filler	12003701	20	1.5	22	3	22
Plug, oil level and drain	95980610	10	1.5	17		18
Nut, bearing retainer on bevel gear	12356700	25	1.5	36	18-20	129-144
Bolt, crown wheel	12356300	8	1.25	13	4.2	31
Bolt, flange securing	98054425	8	1.25	13	2.5	18
FRAME						
Screw, cradle to frame	98663630	12	1.25	Allen 10	8	58
Nut, cradle to frame screw	92602312	12	1.25	19	8	58
Bolt, stand securing	98052545	10	1.5	17	3.5	25
Nut	92602210	10	1.5	17	3.5	25
Screw, battery bracket	98054416	8	1.25	13	2.5	18
Nut	92602208	8	1.25	13	2.5	18
Nut, footrest screw	92602512	12	1.25	19	2	14
Screw, clamp	98062535	10	1.5	17	4.5	32
Cap nut, rear fork spindle	14547800	20	1	30	8	58
Bolt, tie rod to rear fork	98054520	10	1.5	17	4.5	32
Nut	92602210	10	1.5	17	4.5	32
Nut, rear drive box	92602208	8	1.25	13	3.5	25
Nut, rear fork screw	92602206	6	1	10	1	7
Nut, front fender screw	92602208	8	1.25	13	3	22
Screw, splash guard	98054320	6	1	10	1	7
Nut, self locking	92630106	6	1	10	1	7
Nut, rear fender tip	45403003	8	1.25	14	3	22
Screw, fender tip	98052355	6	1	10	1	7
Nut, self locking	92630106	6	1	10	1	7
Nut, rear seat bolt	92602208	8	1.25	13	3	22
Nut, self locking, tool box	92630106	6	1	10	0.3-0.5	2.5-3.5

d = diameter; p = pitch; hex = hexagon

DESCRIPTION	PART N.	SPECIFICATIONS			TORQUE kgm	LOADING ft/lbs
		d mm	p mm	hex mm		
FRONT SUSPENSION						
Bolt, bottom yoke securing	98662535	10	1.5	Allen 8	4.5	32
Bolt, top linking plate	98662535	10	1.5	Allen 8	4.5	32
Plug, top fork	14504500	29	1	32	12-15	86-108
Bolt, bottom cover	98622535	10	1.5	Allen 8	4.5	32
Screw, damper securing	14504800	8	1.25	13	3	22
Bolt, fork cover to wheel spindle	98660540	10	1.5	Allen 8	4.5	32
Screw, headlight lug	98620325	6	1	Allen 5	1	7
REAR SUSPENSION						
Nut, bottom	92603210	10	1.5	17	4.5	32
Bolt, top	98064416	8	1.25	13	3	22
FRONT WHHEEL AND BRAKE						
Screw, front brake lever	98106022	6	1	10	1	7
Nut, tie rod	92602206	6	1	10	1	7
Screw, operating lever	98106022	6	1	10	1	7
Nut, wheel spindle	92603316	16	1.5	24	14-15	101-107
REAR WHEEL AND BRAKE						
Screw, central body securing	98108038	8	1.25	14	3	22
Nut, body screw	92605008	8	1.25	13	3	22
Nut	92603210	10	1.5	17	4	29
Screw, cam levers	98062325	6	1	10	1	7
Nut, tie rod	92603206	10	1.5	17	4.5	32
Nut, rear fork bolt	92602210	16	1.5	17	4.5	32
Nut, rear wheel spindle	92603316	10	1.5	24	14-15	101-107
PEDALS AND CONTROLS						
Screw, starter pin lever	98052325	6	1	10	1	7
Nut, joint adjusting	92602206	6	1	10	1	7
Screw, lever oper; rod	98052325	6	1		1	7
Screw, rod clamp	98622320	6	1	Allen 5	1	7
Screw, ball joint	98052325	6	1	10	1	7
Nut, ball joint screw	92630106	6	1	10	1	7
Screw, gearshift lever	98054425	8	1.25	13	3	22
Nut, gearshift screw	92602406	6	1	10	1	7
Screw, lever fulcrum	98620330	6	1	Allen 5	1	7
Nut, clutch lever	92602406	6	1	10	1	7
Screw, lever fulcrum	98620318	6	1	Allen 5	1	7
STEERING - HANDLEBAR INSTRUMENTS						
Bushing, steering clamping	14516600	25	1	32	17-18	122-129
Nut, self locking, steeringrod	92630106	6	1	10	1	7
Nut, steering damper rod	92630106	6	1	10		7
Bolt, handlebar	98660450	8	1.25	Allen 6	3	22
Bolt, panel securing	98662414	8	1.25	Allen 6	2.5	18

d = diameter; p = pitch; hex = hexagon

DESCRIPTION	PART N.	SPECIFICATIONS			TORQUE kgm	LOADING ft/lbs
		d mm	p mm	hex mm		
ELECTRICAL EQUIPMENT						
Nut, coil securing	92630106	6	1	10	0.3-0.5	2.5-3.5
Nut, regulator screw	92602206	6	1	10	1	7
Nut, rectifier screw	92602205	5	0.8	8	03.-0.5	2.5-3.5
Nut, self locking, brackets	92602208	8	1.25	13	3	22
Nut, self locking, plate screw	92630106	6	1	10	1	7
Nut, lock plate	92630106	6	1	10	1	7
Nut, starter button	92602206	6	1	10	1	7
Nut, courtesy light bracket	92602206	6	1		1	7
FUEL SYSTEM						
Nut, tap connection	14105700	16	1	19	3	22
Bolt, tank securing	98062430	8	1.25	13	3	22
Nut, rubber buffer	92602206	6	1	10	1	7
EXHAUST SYSTEM						
Nut, muffler screw	92602208	8	1.25	13	3	22
Nut, band securing	92603206	6	1	10	1	7
Nut, securing screw	92603206	6	1	10	1	7

d = diameter; p = pitch; hex = hexagon

PRELIMINARY REMARK

During the dismantling operations, it is strongly recommended to keep the various assemblies well apart.

REMOVAL OF THE ENGINE - GEARBOX UNIT FROM THE FRAME

By means of the wrench n. 14927700 (32 in fig. 6) undo the lockrings of exhaust pipes on cylinder heads and after loosening the screws fixing silencers to frame remove the exhaust pipe-silencer assemblies.

Place part n. 14912400 (10 in fig. 7) under the engine oil sump; remove the rods from rear brake and gear-shift levers; remove the cable from the clutch control lever on the gearbox; disconnect all electric wirings; then slide off the engine-gearbox unit from the after undoing all fixing devices.

After removing the engine-gearbox from the frame, wash it down thoroughly in petrol before separating the engine unit from the gearbox.

STRIPPING THE ENGINE UNIT

After separating the engine from the gearbox proceed as follows:

— place an oil tray under the engine, undo plug B in fig. 8, undo filler cap, and drain the oil from the sump.

Remove now:

— spark plugs;

— double contact breaker, after undoing retaining bolts with special wrench part n. 14927000 (13 in fig. 9) and removed the stop plate from the crankcase;

— clutch unit, unscrewing the bolts which secure the starter ring gear. Do this with the ring gear and holdfast tool part n. 12911801 (21 in fig. 10) and unscrew the bolts in a crossed order. After removing the ring gear, withdraw the driven plate, intermediate plate, driven plate, plate pressure cap, pressure plate and springs;

— alternator-generator after undoing the screw which retains it to the crankshaft and using tool part n. 14906600 (22 in fig. 11) to pull out the extractor, after removing its cover;

— timing cover after undoing its securing screws to the crankcase;

— camwheel securing nut to the camshaft using special wrench part n. 14927600 (30 in fig. 12) and flywheel holdfast tool n. 14912900 (19 in fig. 12);

— undo gear pump nut using the special wrench and tool 14927600 (30 in fig. 13). To withdraw the oil pump gear from its driving shaft use tool 32906302 (23 in fig. 14);

— unscrew the distributor gear lockring on the shaft using wrench n. 14927600 (30 in fig. 13) and flywheel holdfast tool 12911801 (21 in fig. 15);

— flywheel. After flattening the lock plates, unscrew the bolts which secure it to the crankshaft using tool 12911801 (21 in fig. 15) and a box spanner;

— cylinder head lubrication pipe after undoing its 3 securing screws;

— rocker box covers;

— rocker spindles;

— rocker arms, springs and washers. Undo nuts and remove adjusting screws from rockers;

— push rods;

— rocker arm supports after unscrewing the 4 nuts and bolts (each head) which secure cylinder and cylinder head to the crankcase;

— cylinder heads complete with valves. From these remove then the collets, top collars, outer springs, inner springs, bottom collars and shims, and finally slip out the valves. Use tool 10907200 (12 in fig. 16) to compress the springs;

— cylinders with gaskets;

— tappets from the crankcase housings;

— piston pin using puller n. 26907800 (11 in fig. 17) and after extracting the circlips;

— piston and from this the piston rings;

— oil sump and gasket after undoing its retaining bolts to the crankcase;

— oil pipe A after flattening the lock plates and undone the crankcase securing screws;

— the complete oil filter unit after undoing the 2 screws which secure it to the crankcase (fig. 18).

The filter unit comprises: body, gasket, wire gauze screen, plate, screws and washers;

— Oil pump after undoing its securing screws to the crankcase. The oil pump consists of: body, driving gear and driven gear;

— con-rod caps after undoing the securing nuts and withdrawn the bolts which secure them to con-rods. Slip out the con-rod caps from the bottom and the con-rod itself from the top of the crank-case. From the con-rod remove now the half bearings;

— camshaft after undoing the screws which secure the flange to the crankcase;

— flange complete with cronkshaft journal, flywheel side after flattening the lockplate flaps and undo-ne the screws which secure it to the crankcase. The flange is withdrawn from its housing in the crankcase by Means of tool 12913600 (18 in fig. 19);

— back out the crankshaft from the flange complete with bearing on the timing side;

— the flange c/ with main journal, timing side, after flattening the lock plates flaps and unscrewing the securing screws;

— oil pressure solenoid (F fig. 72).

CHAIN OPERATED TIMING

After placing holdfast tool n. 14927300 (20 in fig. 20) undo the driving gear to oil pump retaining nut, undo the pinion to crankshaft lockring by means of wrench n. 14927600 (30 in fig. 20) then the gear to camshaft retaining nut by means of wrench n. 14927600 (30 in fig. 21).

OVERHAULING THE ENGINE UNIT

ROCKER BOX COVERS - CYLINDER HEADS VALVES - VALVE SPRINGS

ROCKER BOX COVERS

Ensure that contact surfaces are not bruised and there is no cast defect.

INSPECTION AND OVERHAUL OF CYLINDER HEADS

Ensure that all cooling fins are in good condition and the joining surfaces not deformed. Remove all carbon deposits using a blunt scraper and a wire brush. Check valve seats and guides.

INSPECTION OF VALVE GUIDES

Valve guides are pressed in their housings in the cylinder heads.
Removal and re-fitting is done with a round punch (See fig. 22).
Valve guides should be replaced when the play between valve stem and guide housing is excessive and such play does not disappear by fitting a new valve.
After the guide is pressed into its housing (punch in fig. 23), ream the hole out to bring the internal diameter to the size indicated in fig. 24 — drwg. in fig. 25 — and coupling data table.
Negative allowance in pressing the guides in the head should be in between .046-.075 mm (.0018-.00295″).

VALVE - VALVE GUIDES COUPLING DATA

	VALVE GUIDE I/D	VALVE STEM	CLEARANCE
Inlet valve	8.000-8.022 mm (.3419-.3158″)	7.972-7.987 mm (.3138-.3144″)	0.013-0.050 mm (.0005-.0019″)
Exhaust valve		7.965-7.980 mm (.3136-.3142″)	0.020-0.057 mm (.0008-.0022″)

INSPECTION AND OVERHAUL OF VALVE SEATS

In order to ensure a perfect match with the valve, the seat needs to be ground in.
Inclination angle of the seats is 45° 30′ ± 5 for both inlet and exhaust valves.

INSPECTION OF VALVES

Check the play between stem and guide (see coupling data table and fig. 25).
Inclination angle of the valve head is 45° 30′ ± 5.

CHECKING OF INLET AND EXHAUST VALVE OPENING (see fig. 26)

By each grinding of the valve seats on cylinder heads, check that the springs are compressed between mm 35,7 ÷ 36 after mounting of valves.
After reaching their maximum opening, the valves should have still a play of mm 1.-1.75 (.039-.068″) before the inner spring compresses fully.

INSPECTION OF VALVE SPRINGS
(see fig. 27)

OUTER SPRING

Free length: 52,5-52,6 mm (2.06-2.07″)
Valve closed: 36 mm (1.417″), load 29.5 ± 3 kgs (64 lbs.)
Valve open: 27 mm (1.06″), load 45.5 ± 3 kgs (100 lbs.)
Fully compressed: 22.7-23.25 mm long (.893-.914″)

Free length: 44.7-45 mm (1.759-1.771″)
Valve closed: 31 mm long (1.22″), load 16.7 ± 3 kgs (37 lbs.)
Valve open: 22 mm long (.866″), load 27.75 ÷ 28.25 ± 3 kgs (61-62 lbs.)
Fully compressed: 19.75-20.25 mm (.778″-.796″)

Spring flexibility can be checked with the instrument shown in fig. 28.

MOUNTING OF SPRINGS AND VALVES ON CYLINDER HEAD

— fit the valve, pressed on head, into the guide;
— fit the retaining ring on the valve guide;

— fit following on the valve stem:
  — outer spring washers;
  — bottom plate;
  — inner spring;
  — outer spring;
  — top plate;
— place tool 10907200 (12 in fig. 16) on valve head and top plate, screw in the tool screw so to fit the semi-cones. Repeat this operation for the other valve.

ASSEMBLY OF CYLINDER HEADS

Not to warp the cylinder head, tighten nuts and studs in a crossed sequence (see fig. 26) using a torque wrench loaded at 4-4,5 kgm.
By this assembly always replace gaskets and seals.

CYLINDERS - PISTONS - PISTON RINGS

CYLINDER WEAR

The cyiinder bore should be measured at 3 different heights in a transversal and longitudinal directions. Dial gauge has to be previously set to zero on the slip ring (See fig. 30 and measurement chart fig. 31).

Should the chromium plated surface be worn down to more than 0,1 mm (.0039″) or if any scoring or ovalization is detected, the cylinder should be replaced.

SELECTION OF CYLINDER DIAMETER

CLASS «A»	CLASS «B»	CLASS «C»
82.500 mm (3.2480″)	82.506 mm (3.2482″)	82.512 mm (3.2484″)
82.506 mm (3.2482″)	82.512 mm (3.2484″)	82.516 mm (3.2486″)

• **NB.** - Cylinders must always be matched with pistons of same class.

PISTONS

At the time the engine is overhauled, the piston crown and the piston rings slots should be cleaned of all carbon deposits before proceeding with the clearance checking operation.

If such clearance exceeds the limits indicated in the table, then the cylinders and pistons have to be replaced. For engine balancing, both pistons should be of same weight. The maximum permissible weight difference is 1.5 grams (.05 oz.) see fig.32.

The selection measurements indicated in the table must be taken at 35 mm (1.37″) (see fig. 33 and drwg. fig. 34) from the piston base in an ortogonal sense to the piston pin axis.

Maximum permissible ovalization: 0,055-0.065 mm (.0021-.0025″) less than selection size.

SELECTION OF PISTON DIAMETER

CLASS «A»	CLASS «B»	CLASS «C»
82.458 mm (3.2463″)	82.464 mm (.3.2465″)	82.470 mm (3.2467″)
82.464 mm (3.2465″)	82.470 mm (3.2467″)	82.476 mm (3.2469″)

• **NB.** - Pistons must always be matched with cylinders of same class.

FITTING OF PISTON ON CON-ROD

Before re-fitting the piston on the con-rod heat it in an oil bath at about 60 °C (140 °F) in order to slightly dilatate the hole and so make the introduction of the pin easier.

Clearance between piston pin and piston holes is from 0,06 mm (.00023″) to a negative allowance of 0.004 mm (.00017″).

PISTON RINGS AND OIL SCRAPER

Each piston fits 4 rings (3 compression ad one oil scraper).

When fitting the rings on the piston, pay attention to the end gap which has to be out of line with each other.

Check clearance between ring and slot in piston (See fig. 35). This clearance should be within the values indicated in section «Piston slots and ring height claearance».

Before fitting the rings on the piston it is necessary to insert them in the cylinder barrel to ensure that the gap clearance is as specified (See fig. 36 and section «Piston ring and oil scraper gap».

PISTON RINGS AND OIL SCRAPER PISTON SLOTS HEIGHT CLEARANCE

Top piston ring	0.030-0.062 mm (.0011-.0024″)
Second piston ring	0.030-0.062 mm (.0011-.0024″)
Thir piston ring	0.030-0.062 mm (.0011-.0024″)
Oil scraper	0.030-0.062 mm (.0011-.0024″)

PISTON RING GAP

Compression rings	0.30-0.45 mm	(.012-.018″)
Scraper ring	0.25-0.40 mm	(.010-.016″)

CON-RODS - CRANKSHAFT - MAIN BEARINGS FLYXHEEL AND TIMING SIDES

CON-RODS

When overhauling the con-rods, check the following:

— condition of small end bushings andbush-piston pin clearance;

— weight of con-rods;

— parallelism of the two axis;

— big end bearings.

Bing end bearings are of thin wall type in antifriction alloy and so do not allow any adjustment. If scored, worn or seized, the bearing must be replaced.
In such case, the crankpin has to be reground. Before proceeding with this operation, it is necessary to measure diameter of same at major wear point (See fig. 45) in order to determine the class of the bearing to be replaced and the diameter to which the crankpin has to be ground.
«See tables «Thickness of big end bearings» and «Diameter of crankshaft pin».

THICKNESS OF BIG END BEARINGS

ORIGINAL PRODUCTION BEARING	OVERSIZE		
	0.254 mm (.010″)	0.508 mm (.020″)	0.762 mm (.030″)
from 1.537 mm (.06074″)	1.664 mm (.06551″)	1.791 mm (.0705″)	1.918 mm (.0755″
to 1.543 mm (.0614″)	1.670 mm (.06574)	1.797 mm (.0707″)	1.924 mm (.0757″)

CRANKPIN DIAMETER

ORIGINAL DIAMETER	OVERSIZE BEARING		
	0.254 mm (.010″)	0.508 mm (.020″)	0.762 mm (.030″)
from 43.893 mm (1.730″)	43.729 mm (1.720″)	43.475 mm (1.710″)	43.221 mm (1.700″)
to 43.994 mm (1.732″)	43.740 mm (1.722″)	43.486 mm (1.712″)	43.232 mm (1.702″)

SMALL END BUSHING

The bushing is pressed in and its internal surface should be free of nick or scoring marks. If so, replace the bushing.
The old bush is removed from the small end with a suitable punch.
When re-fitting a new bush, ream out the internal diameter to bring it down to the sizes indicated in the following table (see fig. 37), after it has been pressed in.

I/D OF BUSHING AFTER PRESSING IN AND REAMING	PISTON PIN DIA.	PIN-BHUSING CLEARANCE
22.025 mm (.867″)	22.000 mm (.86614″)	0.021-0.045 mm (.00082-.0017″)
22.045 mm (.8678″)	22.004 mm (.86629″)	

CHECKING PARALLELISM OF AXIS

Before checking the con-rod, check if they are «square» or in other words ensure that both big and small end holes are parallel to each other.
Any eventual deformation can be rectified by means of fork lever set up on the con-rod as shown at fig. Maximum permissible offset of the small and big end axis measured at 200 mm (7.874″) is ± 0,10 (See fig.3 9).

FITTING OF CON-RODS ON CRANKSHAFT

When fitting the con-rod on the crankshaft, ensure that that the holes on the big ends for lubrication are in following positions (see B in fig. 40).

— left cylinder con-rod: upwards;

— right cylinder con-rod: downwards.

Bearing-crankpin assembly clearance goes from a minimum of 0.050 mm (.0019″) to a maximum of 0.085 mm (.0032″) (see drwg. fig. 48).
Con-rod-crankshaft clearance is 0.030-0.040 mm (.00118-.00157) (see fig. 41 drwg. fig. 48).
Fit the con-rod on the crankshaft and tighten the nuts using a torque wrench set at 4.6-4.8 kgm (33-35 ft/lbs) (see fig. 42).
Figure 43 shows the dismantled con-rod group.
For measurements see fig. 44.
Remark: by looking at the engine, clutch side, the milled surfaces (of con-rods and caps) must be on the same side (see A in fig. 40).

Checking weight for engine balancing

The con-rods c/w nuts and bolts should be of same weight.
Maximum permissible difference: 3 grams (see fig. 38).
Static balancing of the craukshaft is obtained by applying a weight of 1.471-1.601 kgs ($3^1/_4$-$3^1/_2$ lbs).

CRANKSHAFT

Check crankpin and main shafts.
If only slightly scored, polish it with very fine carburundum.
If deeply scored or ovalized, the crankshaft should be re-gound and fitted with u/s big end bearings. The undersize range of big end bearings available is: 0.2 mm, 0.4 mm, 0.6 mm (.00787″, .01574″, .02362″).

Crankpin bearing are supplied in the following sizes: 0.254 mm, 0.508 mm, 0.762 mm (.010″, .020″, .030″). Before re-grindig it is necessary to carefully determine the amount of wear (see fig. 45-46-47 drwg. fig. 48) of the crankpin and main shafts in order to decide the new diameter taking into account the available sizes and the necessary clearances.
Assembl clearances are:
— mainshaft-bearing, timing side 0.025-0.057 mm (.0098-.0022″)
— mainshaft-bearing, flywheel side 0.030-0.068 mm (.00118-.0027″)
— crankpin-bearing 0.050-0.085 mm (.0019-.0032″)
When re-grinding the shaft, do not forget to restore the soulder relief radius which is 2-2.5 mm (.078-.090″) for the crankpin, 3 mm (.118″) for the mainshaft, flywheelside, and 1.5-1.8 mm (.058-.070″) on the timing side.

DIAMETER OF MAINSHAFT, FLYWHEEL SIDE

ORIGINAL DIAMETER	UNDERSIZE		
	0.2 mm (.00787″)	0.4 mm (.01574″)	0.6 mm (.02362″)
53.970 mm (2.1248″)	53.770 mm (2.1169″)	53.570 mm (2.1090″)	53.370 mm (2.1013″)
53.931 mm (2.1233″)	53.751 mm (2.1162″)	53.551 mm (2.1063″)	53.351 mm (2.1004″)

DIAMETER OF MAINSHAFT, TIMING SIDE

ORIGINAL DIAMETER	UNDERSIZE		
	0.2 mm (.00787″)	0.4 mm (.01574″)	0.6 mm (.02362″)
37.975 mm (1.4951″)	37.775 mm (1.4872″)	37.575 mm (1.4793″)	37.375 mm (1.4715″)
37.959 mm (1.4944″)	37.759 mm (1.4866″)	37.559 mm (1.4787″)	37.359 mm (1.4707″)

I/D OF MAIN BEARING, FLYWHEEL SIDE

ORIGINAL DIAMETER	UNDERSIZE		
	0.2 mm (.00787″)	0.4 mm (.01574″)	0.6 mm (.02362″)
54.000 mm (2.1260″)	53.800 mm (2.1171″)	53.600 mm (2.1102″)	53.400 mm (2.1024″)
54.019 mm (2.1267″)	53.819 mm (2.1188″)	53.619 mm (2.1109″)	53.419 mm (2.1031″)

I/D OF MAIN BEARING, TIMING SIDE

ORIGINAL DIAMETER	UNDERSIZE		
	0.2 mm (.00787″)	0.4 mm (.01574″)	0.6 mm (.02362″)
38.000 mm (1.4961″)	37.800 mm (1.4883″)	37.600 mm (1.4803″)	37.400 mm (1.4725″)
38.016 mm (1.4967″)	37.816 mm (1.4889″)	37.616 mm (1.4809″)	37.416 mm (1.4731″)

FITTING OF THE FLYWHEEL ON THE CRANKSHAFT

By fitting the flywheel on the crankshaft ensure that the mark «A» (fig. 49) on the shaft is in line with the TDC arrow on the flywheel.

FLANGE COMPLETE WITH MAIN BEARING, FLYWHEEL SIDE

Check that all surfaces which contact the crankcase are smooth and free of scoring, also that the main bearing is not excessively worn (Check against table «I/D of main bearing, flywheel side»).
Ensure that all lubrication ducts are in line with those in the crankcase. Use tool 12912000 (24 fig. 50) for this operation.
This tool will allow easy introduction of the seal in the flange on the crankshaft without damagiing the inner edge of the seal.

SEAL FOR FLANGE - FLYWHEEL SIDE

When overhauling, ensure that the seal is properly pressed into the flange and that the internal surface of the seal which works on the crankshaft is not crumbled or damaged. If so, replace the ring.
Use tool 14927100 (16 in fig. 51) for fitting the seal in the flange c./w. main bearing.

FLANGE COMPLETE WITH MAIN BEARING, TIMING SIDE

Check that the union faces to the crankcase are perfectly smooth and not scored. Also, that the main bearing is not excessively worn. (Check against data in «I/D of main bearing, timing side).

TIMING COVER

Ensure it joining faces are dead smoot and free of scoring.
When overhauling, check that the seal is a proper fit in its housing and the cover and that its inner surface is not crumpled or damaged. Rplace as necessary.
Fitting of seal into the timing cover is made by means of tool n. 14927200 (17 in fig. 52).

CRANKCASE

Check that the joining surfaces of the main bearing carrying flange, the gearbox union faces to the engine block, and the timing cover union face are dead smooth and free from nicks or scoring.
Check the condition of tappet guide housings, if necessary ream out them (see fig. 53) using a drift for 1st or 2nd oversize as specified in table «Coupling data of tappets in crankcase housings».

USEFUL DATA - CRANK MECANISM PARTS
(Manufacturing sizes)

Cylinder barrel dia.	82.500-82.518 mm	(3.247-3.248″)
Piston diameter:		
— selection dia. at 35 mm (1.377″) from piston base	82.476-82.458 mm	(3.247-3.246″)
Piston pin hohsing	22.000-22.006 mm	(.8661-.8663″)
Piston pin diameter	22.000-22.004 mm	(.8661-.86634″)
Main shaft dia., flywheel side	53.970-53.951 mm	(2.1248-2.1240″)
Main shaft dia., timing side	37.975-37.959 mm	(1.4951-1.4944″)
I/D of main bearings c/w flange:		
— flywheel side	54.000-54.019 mm	(2.1260-2.1268″)
— timing side	38.000-38.016 mm	(1.4961-1.4967″)
Undersize range of main bearings available as spare parts	0.2 mm (.00787″), 0.4 mm (.01574″), 0.6 mm (.02362″)	
Crankpin diameter	47.130-47.142 mm	(1.9016-1.8559″)
Original width of con-rod bearings	1.537-1.543 mm	(.0606-.0608″)
Undersize range of big end bearings available as spare parts	0.254 mm (.010″), 0.508 mm (.020″), 0.762 mm (.030″)	
I/D of small end bushing (after pressing in)	22.025-22.045 mm	(.867-.8678″)

TIMING

Thiming data (referred to the clearance of 0,5 mm between rocker and valve) are the following (see fig. 54).

Inlet:

— opens 40° before TDC
— closes 70° after BDC

Exhaust:

— opens 63° before BDC
— closes 29° after TDC

— Normal rocker clearance (cold engine);
— inlet and exhaust 0.22 mm (.8661″).

CAMSHAFT (See fig. 55)

The steel construction camshaft is located in the crankcase and is carried at both ends in suitable housings machined in the crankcase. The camshaft is gear driven directly by the crankshaft.
Valves are operated by push rods, rockers, and tappets.
Tappets guides are machined directly in the crankcase.

DIAMETER OF CAMSHAFT BEARINGS AND HOUSINGS IN CRANKCASE

	CAMSHAFT JOURNALS	HOUSING IN CANKCASE	FITTING CLEARANCE
Timing side	46.984-47.000 mm (1.814-1.850″)	47.025-47.050 mm (1.8511-1.8529″)	0.025-0.066 mm (.0009-.00035″)
Flywheel side	31.894-32.000 mm (1.259-1.259″)	32.025-32.050 mm (1.2607-1.2623″)	0.025-0.066 mm (.0009-.0035″)

TAPPETS
(See fig. 56)

Ensure that the tappet surface contacting the cam on the shaft is dead smooth.

Possible slight scoring or roughness on the surface can be remedied with fine carburuundum.
Ensure that the rod seat is not nicked or scorred.
The following table indicates fitting clearances and available oversizes.

COUPLING DATA OF TAPPETS AND GUIDES IN CRANKCASE

		I/D OF GUIDE HOUSINGS	O/D OF TAPPETS	FITTING CLEARANCE
Original		22.021-22.000 mm (.8669-.8661″)	22.000-21.979 mm (.8661-.9046″)	0 ÷ 0.042 mm (0-.0016″)
Oversize	0.05 mm (.0019″)	22.071 ÷ 22.050 (.8668-.8680″)	22.050-22.029 mm (.8680-.8672″)	0 ÷ 0.042 mm (0-.0016″)
	0.10 mm (.0039″)	22.121-22.100 mm (.8708-.8700″)	22.100-22.079 mm (.8700-.8692″)	0 ÷ 0.042 mm (0-.0016″)

PUSH RODS
(See fig. 57)

Check straightness and that their contacts end are quite smooth.
If necessary, replace the rods.

ROCKER ARMS AND SPINDLES
(See fig. 58)

When overhauling this group, it is necessary to closely check the rocker-spindle clearance against the date given in the following table.
If necessary, replace either the rocker bush or the spindle, or both.
All contact surfaces must be dead smooth.
For timing assembles (see fig. 57).

COUPLING DATA FOR ROCKER ARMS AND SPINDLES

I/D OF ROCKER ARMS BUSH AFTER PRESSING IN AND MACHINING	DIA. OF ROCKER ARM SPINDLE	FITTING CLEARANCE
15.032 ÷ 15.059 mm (.5981-.5929″)	14.983 ÷ 14.994 mm (.5899-.5903″)	0.038 ÷ 0.076 mm (.0015-.0029″)

TAPPET CLEARANCE ADJUSTMENT

(See fig. 59)

This, operation should be carried out with great care in order that the prescribed timing diagram is not altered.
Don't forget that excessive clearance will cause noisy valve operation while no clearance will prevent the valves from closing completely and so damage the seats.
Adjustment is made as shown in the figure on a COLD ENGINE.

— Undo nut «A» and screw in or out bolt «B»;

— using a feeler gauge (C) part n. 12909090, adjust until both the inlet and exhaust rockers have a clearance of 0.22 mm (.00886″);

— finally lock nut A keeping a fast hold on screw B.

TIMING THE VALVES
(gear driven timing)

Remove the rocker box covers and give tappets a provisional clearance of 0.5 mm (.019″).
Rotate the flywheel until the arrow on the same coincides with the center of the projection on the crankcase flange, clutch side.
This will indicate that piston is at TDC with both valves closed and the engine at the end of the compression stroke (See A in fig. 60).
Apply a special degree plate to the flywheel, securing it by means of the crankcase bolts.
The TDC mark on the plate should coincide with the arrow on the flywheel and the center of the jut on the crankcase flange (See A in fig. 60).
Turn the flywheel anticlockwise to bring the flywheel arrow in correspondence with A.S. (exhaust valve opening) which is 117° after TDC (See B in fig. 60).
Fit the distributor gear on camshaft key and using a screwdriver turn the camshaft anticlockwise until the rocker arm on right cylinder head touches the exhaust valve.
Fit now the camwheel on the camshaft and find the position where one of the slots in this wheel is in correspondence with the hole on the camshaft to allow the stop dowel to be inserted without moving the crankshaft or the camshaft.
At the end of this operation, mark the 2 teeth on the camwheel, the tooth of the distribution gear which engages them, and the slot in the camwheel in which the dowel has been inserted (See A and B in fig. 31).
Tighten camwheel securing nut and distributor gear lockring using wrench n. 14927600 (30 in fig. 12-13) and tool 14912900 (19 in fig. 12-13) and adjust tappet clearance of both inlet and exhaust valves to 0.22 mm (.0086″).
Check timing and if all is correct the exhaust valve should start opening when the flywheel arrow is opposite mark A.S. (exhaust valve opening) of the left cylinder n. 2 at 117° after TDC.
Detail of tappets, pushrods, semi cones, springs and collars are shown in fig.

• **NB.** - If replacing the distribution gear and the camwheel without removing the engine from the frame and valve timing has to be re-set, this should be done with the tool specially designed for this purpose which will allow the reference marks on the old gear and wheel to be transferred exactly on the new gears.

— Remove the gears to be replaced;

— insert pin of tool 12913800 (27 in fig. 62) in the marked flywheel slot;

— undo screw A on this tool and rotate arm B until the notch on the same gets in between the 2 marked teeth. The screw down screw A Remove tool from the gear to be replaced and apply it to the new gear. Now insert the tool pin in each of the 5 camwheel slots until the notch on arm B will comprise perfectly 2 teeth.

At this stage mark these two teeth comprised in the arm notch with paint, also the slot in which the tool pin is inserted.
To mark the tooth of the new distribution gear it is sufficient to copy it from the old gear «C» by counting the number of teeth from keyway D.
After the teeth and the slot have been marked, fit the gear on crankshaft and camwheel on camshaft, inserting the pin in the marked slot.
Now tighten the gear securing nut and lockring and rotate the engine to ensure that the marked tooth on the distribution gear engages the two marked teeth on the camwheel.

TIMING THE VALVES
(chain driven timing)

This type of timing is easier. It is only necessary, by fitting of the gear group with mounted chain, to ensure that the mark on the crankshaft pinion is in line with the mark on the camwheel (see A in fig. 63).

CHECKING VALVE TIMING WITH THE ENGINE INSTALLED ON THE ENGINE

To check valve timing with the engine assembled on the machine, proceed as follows:

— remove spark pluges;

— remove rocker box covers and set tappet clearance at 0.5 mm (.019″);

— undo the screws which secure the alternator cover and remove the cover;

— remove the rubber plug from the opening in the gearbox;

— turn the flywheel so as to bring the L/H side cylinder piston at TDC (observe from the slot in the gearbox that «S» is in correspondence with «1» traced at the center of the slot boss (See fig. 65);

— undo the bolt securing the alternator to the crankshaft;

— fit on timing cover special sector n. 14927500 (26 in fig. 64) with arrow «A» in a central position;

— position the degree plate with reference marks part n. 14927400 (25 in fig. 64) on the alternator making sure that mark PMS (TDC) on the plate is opposite arrow A of the previously fitted sector before bolting this to the generator and crankshaft;

— turn the bolted up plate anticlockwise so as to bring mark AS (exhaust valve opening) of cylinder opposite arrow A on the sector.

At this stage, if the operation has been correctly carried out the ehaust valve of the right cylinder should start to open.
After ensuring that the ehaust valve opens in the specified position, re-set tappet clearance to 0.22 mm (.0086″) and:

— remove the sector from the timing cover and the degree plate from the alternator;

— refit the generator-alternator on the crankshaft tightening its securing bolt to the specified torque loading;

— refit the alternator cover on timing cover;

— refit rocker box covers.

TIMING PARTS DATA
(Manufacturing sizes)

I/D of camshaft housing in crankcase:			
— flywheel side	32.025-32.050	mm	(1.2607-1.2617″)
— timing side	47.025-47.050	mm	(.18511-1.8523″)
Diameter of camshaft journals:			
— flywheel side	31.984-32.000	mm	(1.2591-1.2598″)
— timing side	46.984-47.000	mm	(1.8497-1.9504″)
Diameter of tappet guides	22.021-22.000	mm	(.8669-.8661″)
O/D of original tappet	22.000-22.979	mm	(.8661-.8652″)
Tappet oversize range	0.05-0.10	mm	(.0019-.0039″)
I/D of rocker arm holes	15.032-15.059	mm	(.5918-.5929″)
Diameter of rocker arm spindles	14.983-14.994	mm	(.5899-.5903″)
I/D of inlet and exhaust guide housing	14.000-14.018	mm	(.5512-.5519″)
O/D of inlet and exhaust valve guides manufacturing parts spare parts	14.064-14.075	mm	(.5537-.5541″)
	14.107-14.118	mm	(.55541-.55545″)
I/D of inlet and exhaust valve guides (after pressing in)	8.000-8.022	mm	(.3149-.3158″)
Dia. of inlet valve stem	7.972-7.987	mm	(.3138-.3144″)
Dia. of exhaust valve stem	7.965-7.980	mm	(.3136-.3142″)
Dia. of inlet valve head	40.8-41.0	mm	(1.606-1.614″)
Dia. of exhaust valve head	35.8-36.0	mm	(1.409-1.417″)

ENGINE LUBRICATION

The oil sump acts as an oil tank and contains 3.5 liters of oil.
Lubrication is by pressure through a spur gear pump for suction and delivery while recovery is by gravity.
The pump is gear driven directly by the crankshaft.
The oil is sucked directly from the sump, is cleaned by a wire gauze filter, and forced on through suitable ducts machines in the crankcase.
The delivery circuit is provided with a warning light which indicated insufficient oil pressure and a relief valve for pressure regulation.
The oil is sent through the main bearings to the camshaft and from here, through suitable ducts, to the con-rod bearings.
It then comes out from these and is projected by centrifugal force to all other engine parts.
The cylinder heads are lubricated through a suitable pipe.
The engine lubrication system incorporates the following parts:

— oil pump;
— oil cleaner;
— oil pipe with relief valve;
— pipe to breather;
— recovery pipe from breather;
— pipe to cylinder heads;
— recovery pipe from heads and pressue discharge at breather;
— breather unit;
— exhaust pipe, oil and pressure from breather;
— oil pressure solenoid.

OIL DELIVERY PUMP
(See fig. 66)

It is of parallel sour gear type and is secured to the bottom L/H side of the crankcase. It incorporates a driving gear coupled with the crankshaft distribution gear.

INSPECTIONS AND CHECKS

In case of improper operation of the oil pump, the following should be closely checked:

— Depth of gear. Should be 15.983 ÷ 15.994 mm (.6293 ÷ .6897″).
— Gear housings in pump body. Should be 16.000 ÷ ÷ 16.027 mm .6299 ÷ 6309″) (See fig. 67).

If not within the above sizes, the parts should be replaced.
It is also important to check the O/D of the gears is not more than 25.993 ÷ 25.980 mm (1.0233 ÷ 1.0227″) and the I/D of the housing in the pump body 26.000 ÷ ÷ 26.033 mm (1.0236 ÷ 1.0249″) (See fig. 67).
Back lash between pump gear shafts (11.994 ÷ 11.983 mm = .4722-.4717″) and housing of the pump body should be within 0.006 ÷ 0.035 mm (.00023 ÷ .00137″).
Back lash between gears on pump shafts (mm 25.980 ÷ 25.993) and housing on the pump body (mm 26.000 ÷ 26.033) should be within mm 0,007 ÷ 0,053 (see fig. 67 and 68).

OIL DELIVERY PUMP (CHAIN OPERATED)
(See fig. 69)

It is of helicoidal gear type, the driving gear is mounted on two roller bearings «Durkopp Naf 10 x 22 x 20» which are lodged in the pump body.

INSPECTIONS AND CHECKS
(See fig. 70)

In case of improper operation of the oil pump, the following should be closely checked:

— Depth of gear. Should be 13,973 ÷ 14,000 mm.
— Depth of housings in pump body. Should be 14,032 ÷ 14,075 mm.

If not wwithin the above sizes, replace the parts.
The following sizes are also to be checked:

— O/D of gears, within 26,250 ÷ 26,290 mm;
— D/ of housings in pump body, within 26,340 ÷ ÷ 26,390 mm;
— O/D of roller bearing race (Durkopp Naf 10 x 22 x x 20) within 21,989 ÷ 22,002;
— D/ of housing in pump body, within 21,972 ÷ 91,993 mm;
— I/D of roller bearing race (Durkop Naf 10 x 22 x x 20) within 9,990 ÷ 10,002.

If not within the above sizes, replace the parts.
Back lash:

— driven gear shaft (9,985 ÷ 10,000) and housing in pump body (10,013 ÷ 10,035): within 0,013 ÷ 0,050 mm;
— roller bearing outer race (21,989 ÷ 22,002) and housing in pump body (mm 21,972÷21,993): within 0,004 and negative clearance 0,020; (mm 21.972 ÷ 21.989) within in 0,004 and negative 0,030;
— roller bearing inner race (9,990 ÷ 10,002) and pump driving shaft (mm 9,985 ÷ 10,000): within 0,017 and negative clearance 0,010;
— gears on pump driving shafts (26,250 ÷ 26,290 mm) and housings in pump body (mm 26,340 ÷ ÷ 26,390) within: mm 0,050 ÷ 0,140.

OIL CLEANER

The wire gauze oil cleaner is located in a central position at the bottom of the crankcase (B in fig. 18) and is directly connected to the oil pump.
When overhauling, the filter should be completely stripped down, washed in petrol and dried off with compressed air. Ensure the gauze is not damaged and, if necessary, replace it.

The filter consists of (see fig. 71):
— wire gauze;
— filter body;
— securing bolts and screws;
— bottom plate.

OIL PIPING

Clean these these thoroughly with petrol and blow through with an air jet.

OIL PRESSURE RELIEF VALVE

It is mounted in the oil delivery pipe (see A in fig. 18) and is calibrated to give a delivery pressure of 3.8-4.2 kg/cm² (54-60 lbs/sq.in.).
If pressure excees this calibrating, this valve opens by setting pressure within the fixed limits.
It is strongly recommended not to tamper this device which is calibrated in the factory.
To check oil pressure proceed as follows:
— undo the oil pressure solenoid (F. in fig. 72);
— screw in a reading meter in its lodging;
— start the engine and check if pressure is 3.8-4.2 kg/cm² (54-60 lbs/sq.in.);
— if pressure is higher or lower, remove the valve from the oil delivery pipe (A in fig. 18) and adjust it as follows:
  — lower pressure: fit another plate 12150700;
  — higher pressure: remove one or more plates.

OIL BREATER UNIT
(See fig. 72)

It consists of a box incorporating a diaphragm retained against the breather tube by a previously loaded spring.
Breather tube (B), oil return from breater to crankcase (C), oil vent pipe from cylinder head (E), and oil vent pipe to the outside (D) are connected to the box by rubber tubes and retaining bands.
Purpose of the oil breather is to discharge excess pressure and oil mist and it comes into action whenever the relief valve opens in order to restore the pressure to the specified limit.
If the motorcycle is not used for some time, it is possible that eventual foreign matter present in the oil may have deposited on the relief valve causing this to stick with consequent improper operation of the breather and oil leakages from it.

Accordingly, before using the vehicle again, it is a good practice to check that everything is in good order, proceeding as follows:
— remove fuel tank;
— remove support screw;
— slacken both pipe retaining bands;
— back out the breather unit from the left hand side;
— check that the breather valve in this works properly (To do this use a rod introduced in the central pipe of the breather).

If this valve should be stuck, free it by means of the rod and then wash out the inner section with petrol, drying off with compressed air to prevent oxidation of the valve and its sticking again to the vent tube from the engine.
All parts are then re-assembled in a raverse order.

OIL PRESSURE SOLENOID
(See F in fig. 72)

It is connected by cables to the warning light in the control panel and serves to indicate insufficient oil pressure in the circuit.
If this indicator lights up when riding it means that the oil pressure in the circuit is below the specified limits and in such case the machine should be immediately stopped and the oil circuit checked in order to find the fault and remedy it before re-starting.

CHECKING THE OIL LEVEL
(See fig. 73)

Every 300 ÷ 500 km check the level of oil by means of the oil filler dipstick (welded to cap A). If the level is lower add oil of the same quality and features.
For this checking turn the cap A with dipstick by one turn.

CHANGING THE ENGINE OIL
(See fig. 73)

After the first 300 ÷ 500 km and later on every 3000 km a. change the oil in the oil sump. This change has to be carried out by a warm engine. Before filling let the previous oil completely drain.
«A» oil filler cap. (the welded dipstick has two notches, one for min. and one for max. level);
«B» oil drain magnetic cap.

Necessary quantity: l. 3.5 of oil «Agip SINT 2000 SAE 10W/50».

ENGINE ASSEMBLING

After inspections, checks and eventual replacements, all engine parts should be throughly cleaned in petrol and the engine re-assembled as follows:

— secure timing side flange c/w main bearing by means of bolts and lock plates. After tightening, the lock plate flaps should be bend down on the bolts;
— insert crankshaft in timing side flange c/w main bearing and fit the flywheel side flange with bearing on the crankshaft, securing it to the crankcase by means of bolts and lock plates. Bend the flaps of these latter down on the bolt sides. For this operations use tool 12912000 (24 in fig. 50);
— insert camshaft in its housing in crankcase and then bolt down the camshaft support flange to crankcase;
— fit the con-rods c/w big end bearings on crankshaft, con-rod caps also complete with bearings, and secure them to the crankshaft by means of bolts, lock plates and nuts. Refer to chapter «Con-rods», paragraph «Fitting up of con-rods on crankshaft»;
— screw down oil pump on crankcase;
— connect oil cleaner with gasket to oil pump by means of 2 screws;
— connect oil pipe (see «A» in fig. 18) complete with relief valve and gaskets to crankcase by means of bolts and lock plates. After tightening bolts, bend down the plate flaps on the bolts;
— secure oil sup to crankcase after assembling the oil draig plug with a new gasket;
— fit piston c/w rings (drwg. fig. 34) on con-rods. To introduce the pin in the piston and in the small end bushing use tool n. 26907800 (see 11 in fig. 17) after having heated up the piston, as specified. Finally fit the circlips;
— insert tappets in their housings in the crankcase;
— position new gasket between crankcase and cylinder;
— fit cylinder over the long bolts. Lubricate the piston crown and cylinder liner in order to obtain easier fitment;
— insert new gaskets between cylinders and cylinder heads;
— fit cylinder heads on stud bolts;
— secure rocker arms upports to cylinder heads by means of nuts and bolts. See paragraph «Assembling of heads on cylinders. Fit new sealing rings;
— insert push rods in tappets;
— fit rocker arm springs and washers on supports and then insert the spindles. Secure thes to the supports by means of bolts and washers;
— secure cylinder head oil pipe with the hollow bolt and gaskets;
— secure flywheel to the crankshaft with bolts and lock plates using a torque wrench set up at kg/m 4.2 and after having set up on the crankcase stud tool n. 12911801 (21 in fig. 15). Do not forget to bend down the lock plate flaps on the bolt faces at the end of this operation;
— fit Woodruff key and distribution gear on crankshaft, timing side;
— fit camwheel, making sure that its marked slot matches with the camshaft slot in order to introduce the stop pin and that the two marked teeth on the cam wheel engage the marked tooth on distribution gear. To tighten nut securing cam wheel to camshaft use ring gear and flywheel holding tool n. 14912900 (19 in fig. 12) and wrend. 14927600 (30 in fig. 12);
— tighten the engine pinion lockring on the shaft using holdfast tool n. 14912900 (19 in fig. 13) and special wrench n. 14927600 (30 in fig. 13) bend down one lock plate flap on the lockring;
— fit the driving gear on the oil pump driving shaft, to lock the nute use holdfast tool 14912900 (19 in fig. 13);
— secure timing cover to crankcase, inserting new gasket. Tighten the screws in a crossed sequence in securing timing cover to crankcase;
— adjust tappet clearance (see paragraph «Tappet clearance adjustment»);
— fit generator-alternator securing it to the crankshaft with its screw;
— fit alternator flywheel on the crankshaft and lock it by means of its proper screw;
— insert electric connections on the clamps;
— secure double contact breaker to crankcase by means of wrench n. 14927000 (13 in fig. 9);
— adjust contact breaker gaps and check ignition timing (see paragraphs: «Checking and adjustment of the double contact breaker» - «Ignition timing»);
— connect oil pressure solenoid to crankcase (see F in fig. 72);
— fit alternator cover;
— fit new gaskets between cylinder heads and rocker box covers, secure rocker box covers with Allen screws tightening in a coossed sequence;
— fit oil breather on crankcase and pipes on breather;
— pour 3.5 liters of «Agip SINT 2000 SAE 10W/50» through the filler orifice on the crankcase and seal with the plug with dipstick for oil level control;
— For assembling the clutch assembly and starter motor ring gear on the flywheel see paragraph «Clutch unit».

FITTING THE DISTRIBUTION GEAR ASSEMBLY (CHAIN DRIVEN TIMING) ON: CAMSHTFT, CRANKSHAFT, OIL PUMP DRIVING SHAFT

Proceed as follows:

— fit chain on gears as specified in fig. 63;
— fit gear on camshaft taking care that the hole of the same inserts into the shaft pin; the engine pinion on the crankshaft and the other gear on the oil pump driving shaft;

— ensure that the chain guide matches the chain well, if not so adjust it;
— screw in the nut securing driving gear on camshaft and lock the nut by means of wrench 14927600 (30 in fig. 21) after placing the holdfast tool n. 14927300 (20 in fig. 21).

After fitting this assembly and before re-fitting the timing cover on the crankcase, check (by proper turning of the crankshaft) that the marks on the camshaft driving gear and the one on the engine pinion are in line (see A in fig. 63).
If so, the engine is properly timed.

CARBURATION

Engine is gravity fed from the tank by 98/100 regular octane petrol.
Petrol passes through an electrovalve or a tap then through the pipes of the four-way adaptor and from here to the carburetor connections.

FUEL TANK

Capacity 19 liters (5.4 US gls., 4 1/4 gls. imp.) including a reserve of about 2 liters (about 1/2 US gl. or 3/8 imp. gls.). The tank is cradle mounted on the frame over the power unit.
It is secured to the frame by bolts and rubber buffers.
The filler cap on top of the tank is provided with a vent hole and it is well to periodically check that this hole is not clogged up as it would seriously upset carburation.
Under the tank there are:

— at the L/H rear end (as seen from sitting in the seat) an electrovalve. This is actuated and so feeds fuel when the key in the ignition switch is on position «2» (See fig. 74);
— at the R/H side (as viewed from one sitting in the saddle) a tap which is used for the reserve fuel and is opended only in an emergency or in case of failure of the electrovalve. This tap should be opened every now and then to ensure of its proper operation.

This tap has three positions (see fig. 75).

«A» open (vertical).
«R» reserve (horizontal - see «R» on the tap).
«C» closed (horizontal - see «C» on the tap).

PLUG ON THE FUEL TANK
(See fig. 76)

To open this plug press the control button («A»).

CARBURETTORS

This model fits 2 Dell'Orto carburettors type VHB 30 CD (right) and VHB 30 CS (left).
Carburettors have dual control: a throttle twist grip one on the R/H handlebar and an easy starter lever on the left on the left carburettor and on the right for the right carburettor, for starting from cold.

CARBURETTOR SETTING

Choke	30 mm dia.
Throttle valve	40
Ttomizer	265
Main jet	142
Pilot jet	50
Easy starter atomizer	80
Taper needle	V 9 (2nd. notch)
Floater	10 grams

Idling screw open from 2 to 2 and 1/4 turns for the left carburettor and 2 1/4 to 2 3/4 turns for the right carburettor.

ADJUSTING THE CARBURATION
(See fig. 74)

This adjustment must always be made on a warm engine, after checking that the inlet and exhaust valve clearance is correct.
Proceed as follows:

1. Checking synchronization of throttle valves

This operation is done with the inlet sleeve disconnected from the carburattors and turning the throttle grip, keeping the fingers on the carburettor slides in order to determine if these open by the same amount and at the same time. If one valve opens before the other, this can be corrected by means of the cable tensioner on each carburettor (see «C» in fig. 74) acting on these ntil by truning the throttle both valves open simultaneously.

2. Adjusting idling speed

Through screws «D». Screwing these in reduces the flow of petrol, and viceversa increases it. To adjust drive screws «D» fully home and then unscrew them from 2 to 2 1/2 turns for the L/H carburettor and 2 1/4 to 2 3/4 turns for the R/H carburettor.
With the engine running at about 1000-1200 r.p.m., disconnect one of the plug leads and turn screw «D» of the opposite cylinder carburettor in or out on the position which will give the best idling speed, i.e. when the revs are slightly increasing.
The same operation should be repeated on the opposite carburettor. This will give correct idling speed and prevent possible poppings or spit backs.
ENGINE REVOLUTIONS: due to the characteristics of this engine, idling adjustment should never be done with the engine running at less than 1000 r.p.m.

3. To obtain a good idling speed, operate as follows:

Disconnect the R/H cylinder plug lead, start the engine and ensure that it stops after firing 4 or 5 times. If it dies out sooner or later, adjust idling screw «E» to the point where the engine stops after it has fired 4 or 5 times.
Repeat this operation on the R/H cylinder, with the left hand plug lead disconnected. If all is well, the engine should stop after firing 4-5 times. If not, adjust screw E as above until it does so. Finally, re-connect the L/H cylinder plug lead.
4. Refit the rubber sleeve on the carburettor pipes.

ADJUSTING THE CARBURATION BY MEANS OF A «VACUUM METER»
(See fig. 74)

1. Adjusting idling screws on carburettors.
Through screws «D». Screwing these in reduces

the flow of petrol and viceversa increases it.
To adjust drive screws «D» fully home and then unscrew them from 1½ to 2 turns for the L/H carburettor and from 2 to 2½ turns for the R/H carburettor.

2. Remove the two caps «G» from intake tubes and fit there the two pipes of the «Vacuum meter».
3. Adjusting idling speed by acting on throttles (by a warm engine).
Start the engine with throttle control twist grip fully closed, and get about 800 ÷ 900 revs/min. by means of throttle adjusting screws «E» (see fig. 74). Check that the two columns or indicators on the dial of the «Vacuum Meter» are lined up, if not so get this condition by acting on the above screws.
4. Adjust position of screws «D» (see fig. 74 to obtain the highest possible revs/min. Re-check then the position of the columns or indicators of the «Vacuum meter», if necessary repeat operation n. 3.
5. Synchronizing the carburettors.
After idling speed adjustment, get the carburettor synchronization by proceeding as follows:
Start the engine and gradually open twist grip taking care that the two columns or indicators of the «Vacuum meter» are lined up, if not get them in line by means of screws «C» for throttle control cables. After this checking ensure that the two cables at inserting the screws «C» have a play of 1 ÷ 1,5 mm.
6. This checking carried out, remove the «Vacuum Meter» and re-fit the two caps «G».

STARTER CONTROL
(See fig. 74)

The easy start control lever, by a cold engine, is located right on the right carburettor and left on the left carburettor.

«A» Starting position.

«B» Running position.

STRIPPING OF CARBURETTOR
(See fig. 77)

Remove:
— screw (1);
— withdraw easy starter assembly (2) and from this valve gasket (3);
— undo idling scref (4) with spring (5);
— undo throttle slide adjusting screw (6) with spring (7);
— undo mixture chamber cover screw (8); with washers (9);
— remove control cable adjusting screw cap (10);
— undo cable adjusting screw (11) with counternut (12);
— remove mixture chamber cover (13) with gasket (14) and slide return spring (15);
— withdraw throttle slide (17) complete with taper needle stop spring (16) and taper needle (18);
— withdraw the carburettor retaining sleeve on pipe (20) after slackening screw (22) and nut (19);
— withdraw insulator (21) from the carburettor body;
— undo the bowl securing plug (31) with gasket (30) and from the plug remove the accelerator pump which consists of: pump body (23), plunger (24), ball (25), valve seat (26), spring (27), jet holder (28) and main et (29);
— after slackening the screws, remove chamber (42) with gasket (43);
— slide pin (42) and floater (41) out of the chamber;
— unscrew the atomizer (34);
— unscrew easy starter jet (32) complete with seal (33);
— withdraw needle (36) from its seat;
— undo adaptor securing screw from pipe (39) and washer (40);
— remove adaptor (37) with filter (38).

After stripping, all parts should be thoroughly cleaned in a petrol bath and dried off with compressed air. All ducts in the carburettor body should also be blown through with air, as well as all jet orifices.

AIR INTAKE

It is formed by a rubber sleeve fitted on the carburettor intakes.

ENGINE BRAKE TEST

After overhauling, an engine should be suitably run-in and bench tested for output.

SETTING UP OF ENGINE ON THE BENCH

Position the engine on the test bench and connect exhaust pipes, fuel lines and electric cables. Couple flywheel to the hydraulic brake shaft and proceed with the test.

TESTING PROCEDURE

After staring the engine, closely check if:

— there are any oil or fuel leakages from the connections or pipings;

— oil circulation is regular and pressure is as specified (3.8-4.2 kgs/cm² (54-60 lbs/sq. in.);

— in case of irregularities, stop the engine and remedy before proceeding further.

During the initial period of the test, the engine lacks elasticity and shows a notable resistance to rotation and this is due mainly to the friction of parts that need sometime to bed down.
This is particularly experienced on engines that have had pistons, con-rod bearings and main shaft bearings replaced and the main shafts and crankpin reground.
Under the circumstances it will be necessaryy to give to the engine the following running in cycle:

— total running in period 4 hours of which 5 minutes at peak revs.

After running in, if no irregularity is observed, the engine is ready to have its output checked and consequently be assembled on the machine.

CLUTCH

Twin driven plates, dry tye (See fig. 78).

The clutch includes the following parts:

— 8 springs pheripherically set up inside the flywheel in suitable housings;
— externally toothed pressure plate with housing for pressure cap;
— internally toothed driven plate covered with friction material;
— externally toothed intermediate plate;
— internally toothed plate with frictional material;
— cap located in the pressure plate slot.

The clutch unit is housed inside the flywheel and is retained bl the starter motor ring gear secured to the flywheel by means of bolts and toothed washers. Ring gear is driven directly by the starter motor gear.

REMOVAL OF CLUTCH ASSEMBLY

Remove the gearbox unit from the engine, unscrew 8bolts securing the ring gear to the flywheel and withdraw driven plate, intermediate plate, driven plate, pressure cap, spring pressure and springs (use hold foost tool 12911801 [21 fig. 10] and proper wrench).

CHECKING CLUTCH SPRINGS

(See fig. 79)

Ensure all springs are in perfect efficiency and not unloaded.
Springs compressed to 20 mm (.7874″) should give a load of 21-21.5 kgs (46-49 lbs.).
Springs compressed to 17 mm (.6692″) should give a load of 28.7-29.7 kgs (63.2-65.4 lbs.).

CHECKING PRESSURE PLATE

Ensure that this plate is not nicked on the surfaces engaging the pressure cap and that the surface that surface which contacts the driven plate is perfectly flat, otherwise noisy clutch operation will ensue. Check also if the engaging teeth inside the flywheel are in good condition.

CHECKING DRIVEN PLATES

Width of each new plate including lined section is 8 mm (.3149″). Replace the plates any time it is worn down to less than 7.5 mm (.2953″).

CHECKING INTERMEDIATE PLATE

Check flatness of the surface contacting the driven plates or else clutch operation will be noisy. Check also condition of engaging teeth inside the flywheel.

CHECKING STARTING RING GEAR

Check that the surface contacting the driven plate is dead flat or else clutch operation will be noisy. The teeth engaged by the starter motor pinion should also be checked for scoring or nicks. If necessary, replace the ring gear.

CLUTCH ASSEMBLY OPERATION

The flywheel is externally stamped with an arrow which besides indicating TDC, is also a reference mark for assembling the clutch pressure plate.

Correct clutch assembly is carried out as follows:

— insert the 8 springs in their housings on the flywheel, and fit the pressure plate making sure that the punched tooth on this plate enters in the keyway on the flywheel in correspondence with the arrow stamped on its periphery;
— set up tool 12906500 (28 in fig. 10) on the crankshaft, screwing it down just sufficiently to allow the correct positioning of the internal driven plate, the intermediate plate, external driven plate and the ring gear. Then screwn down tightly the bolts which secure the rin ggear to the flywheel. To prevent the flywheel from rotating when tightening these bolts, use tool 12911801 (21 in fig 10) set up on the crankcase stud bolts.

CHECKING CLUTCH CONTROL CABLE

Ensure the cable is not damaged and the inner wire not broken.

CHECKING CLUTCH OPERATING LEVER ON GEARBOX

Check condition of the lever dowel, and adjuster screw.

CHECKING OPERATING LEVER RETURN SPRING

Ensure it has not lost its load or is deformed.

OUTER BODY

Check surface contacted by the lever dowel. If worn or deeply scored, replace the body.

THROWOUT BEARING

Ensure all ball are in perfect state. If not, replace the bearing.

INNER BODY

Inspect the surface contacted by the bearing balls. If worn, replace.

INTERMEDIATE TUBE IN CLUTCH SHAFT

Replace it if worn.

PRESSURE PLATE ROD

Check for deformation or scoring. Replace as necessary.

PRESSURE PLATE ROD CAP

Ensure that the part inserted in the pressure plate is not onduly damaged. If so, replace the cap.

OUTER BODY SEAL RING

If crumbled or has lost its elasticity, replace the seal.

CLUTCH ADJUSTMENT
(See fig. 80)

When play at the handlebar lever is more or less than 4 mm (1/8"), the clutch should be adjusted as follows:

— Slacken thumb screw A and screw in or out adjusting screw A to bring the play to the correct distance. Thumb screw should now be locked.

If this distance is less, the clutch may slip, causing abnormal wear of the plates and irregular engine operation.
If it is more, the plates will not disengage completely, thus causing noisy gearshifts.
This adjustment ca nalso be made by slackening nut D and acting on adjuster C which are bolted on the R/H side of the gearbox.
For adjusting the lever on the gearbox see chapter «Adjusting of clutch control lever on gearbox» (fig. 112).

GEARBOX

(See fig. 81 and 82)

The gearbox is bolted to the engine block and incorporates constant mesh gears with frontal engagement.

Engine-gearbox ratio:	1	to 1.235	(17-21)
Internal gear ratios:			
— Low gear	2	to 1	(14-28)
— 2nd gear	1.388	to 1	(18-25)
— 3rd gear	1.047	to 1	(21-22)
— 4th gear	0.869	to 1	(23-20)
— High gear	0.750	to 1	(24-18)

GEARSHIFT PEDAL

(See fig. 83)

The gearbox is fitted with a positive stop gear change pedal located on the R/H side of the machine.
Gear selections are made by pressing or raising the pedal.
Low gear is selected by raising the pedal and the higher gears by pressing on it. The neutral position is in between 1st and 2nd gear and to locate this it is necessary to first shift back to low gear and then by slight pressure (half a stroke) to find the free position. Starting from frame number VK-14000 it can be mounted on left of right side of the motorcycle.

STRIPPING THE GEARBOX ON THE BENCH

As a first operation drain the oil by unscrewing plug C, level plug A, and filler plug B (see fig. 84).
In order to dismantle the gear box of all components, set it up on support n. 14929600 (52 in fig. 86) and secure this in a vice.

Now remove:

— gear selector operating lever;
— speedo drive;
— loosen layshaft securing nut using tool 12907100 (34 in fig. 85) to hold the layshaft fast and tool 14905400 (35 in fig. 85) to unscrew the nut;
— withdraw the speedo drive gear paying particular attention to the ball which acts as a lock key;
— clutch operating lever from gearbox;
— lever return spring, outer retainer, throwout bearing, inner clutch body, and clutch operating rod.

REMOVAL OF TRANSMISSION COVER

To remove the cover it is first necessary to put the **gearbox in the neutral position**. Undo the Allen head securing screws and using a hide mallet tap the cover to allow it to be separated. When slipping out the layshaft from its bearing, make sure not to mislay the speedo gear shim.

REMOVAL OF GEARBOX COMPONENTS SELECTOR FORK, SLIDING SLEEVE AND HIGH SPEED GEAR

Remove:

— forks selector rod;
— high speed selector fork;
— high speed sliding sleve;
— high speed gear from layshaft;
— high speed gear from main shaft complete with roller cage and bush;
— this done, by the aid of a pointed rod force the stop pin down into its housing(turn the bushing to the right or left and move the gear complete with roller cage and bushing to a position near the shaft hole. Place then the L/H thumb on the spring loaded stop pin to prevent this from shooting agway and at the same time withdraw the gear-cage-bushing assembly with the right hand. Finally, remove stop pin and spring from the drilling in the main shaft.

SELECTOR DRUM

Unscrew the oil breather plug from the top of the gearbox and remove the spring. (The oil breather plug has also the function of retaining the pawl which acts as a stop on the selector drum. This pawl will remain in its housing in the gearbox and can only be removed after the complete gearbox has been stripped).

— undo the securing screws and slip off the neutral indicator solenoid from its housing in the gearbox;
— withdraw the gear selector drum complete with rod, paying particular attention to the position of the shims;
— withdraw the rod from the drum.

LAYSHAFT

(See «1» in fig. 107)

Take off the complete layshaft from the gearbox, and from this remove:

— sealing ring from shaft at the gearbox cover end;
— low speed gear, roller cage and bushing;
— sliding sleeve for 1st and 2nd speed;
— nut at the 4th speed gear side;
— roller bearing;
— adjusting washers;
— fourth speed gear with roller cage and bushing;
— sliding sleeve for 3rd and 4th speed;
— fixed sleeve on shaft;
— shim;
— third speed gear with roller cage and bushing;
— second speed gear with roller cage and bushing.

MAIN SHAFT
(See «2» in fig. 107)

Slide out the shaft from the gearbox. All gears on this shaft are fixed except the high speed gear which is floating on its roller bearing and the high speed sliding muff which together with the bush retaining stop pin and spring have already been removed.
When taking off the main shaft pay attention to the position of the shims and bronze ring.
The main shaft inner bearing race is dismantled from the gearbox by means of special tool n. 14928500 (38 in fig. 88).

CLUTCH SHAFT
(See «3» in fig. 107)

Using tool 14912800 (36 in fig. 86) and hooked wrench 14912600 (37 in fig. 86) and after flattening the ears of the safety washer, remove the fixed clutch body retaining ring from the clutch side and then the fixed body itself.
When dismantling the fixed clutch body observe the position of the seal between body and bearing and the seal in the shaft groove.
Slide out the clutch shaft from the bearing and, if necessary, use a hide mallet to lightly tap it, making sure not to mislay the oil scoop between shaft and bearing.

REMOVING THE CLUTCH SHAFT COMPONENTS

Using puller 14928500 (38 in fig. 89) withdraw the inner race of the roller bearing and the spacer nut. Set up the complete shaft in a vice and using puller 12905900 (29 in fig. 90) compress the spring to the point where the cush drive plate retainers can be slipped off.

Then remove:
— cush plate;
— spring;
— sliding muff;
— intermediate gear.

REMOVING THE BEARINGS FROM THE GEARBOX

If the bearings have been assembled with loctite, as follows:
— Place the complete gearbox unit in an oven and heat up to 150-160 °C (300-350 °F);
— extract the mainshaft roller bearing using puller 14913100 (39 in fig. 91);
— slide out the outer race of the main shaft roller bearing using puller 14913700 (40 in fig. 92);
— remove the clutch shaft seal;
— unscrew the lockplate securing screws;
— remove lock plate;
— remove clutch shaft bearing using punch 14929200 (41 in fig. 93).

REMOVING THE GEARBOX COVER COMPONENTS SELECTOR ASSEMBLY

Using a hide mallet, tap off the selector assembly from the gearbox cover. This group consists of:
— selector return spring;
— spring guiding pin;
— selector drum operating pawls;
— pawl return springs.
To separate the pawls from the selector it is necessary to use the special 3 mm (.11″) to take off the retaining pins from the selector body;
— after loosening the locknut, remove the selector adjusting screw from the gearbox cover.

BEARINGS

If fitted with loctite, these bearings are removed as follows:
— put the transmission cover in an oven and heat up to 150-160 °C (300-350 °F);
— using puller 14907000 (42 in fig. 94) withdraw the mainshaft ball bearing and remove the clutch shaft roller bearing using puller 14913100 (39 in fig. 95);
— remove the layshaft seal;
— unscrew the lockplate securing screws;
— remove lockplate;
— remove layshaft bearing using tool 14929200 (41 in fig. 96).

CHECKING AND OVERHAULING OF GEARBOX COMPONENTS

GEARBOX AND COVER

Check for any cracks, also if the union faces are undamaged and the bosses threads not stripped.

SEALS

Whenever these are removed from their housings, it is best to change them in order to assure perfect tightness.

BALL AND ROLLER BEARINGS

Check their condition and ensure thay are not too slack in their housings. All rolling surfaces should show up very smooth as well as the balls and rollers. If there are any doubts about the efficiency of a bearing, it is best to replace it. (See section «Ball and Roller Bearings»).

MAIN SHAFT

Check wear of the shaft gear teeth and if unduly worn, replace the shaft.

HIGH SPEED GEAR ON MAIN SHAFT

Check for wear of its teeth and if necessary replace the gear.

HIGH SPEED GEAR BUSHING

Ensure the surface contacted by the rollers is quite smooth, also the surface of the inner grooves. If scored or nicked, replace the bushing.

HIGH SPEED BUSHING RETAINER

Replace the retainer if scored or nicked.

SPRING FOR HIGH SPEED GEAR RETAINING BUSH

If deformed or has lost its efficiency, replace it.
Spring should have a load of 1.40 kgs ± 5 (3.1 lbs.) when compressed to 8 mm (.031″).

LAYSHAFT

Should show up very smooth at its contact surfaces. If scored or the threaded portions are stripped, replace the shaft.

SLIDING SLEEVE

Check smoothness of all sliding surfaces and ensure that the front engaging dogs are undamaged.

GEARS ON LAYSHAFT

Check teeth wear, also wear of the engaging dogs. The teeth contact surface should be quite smooth and free from scoring or nicks. In any such case, the gears should be replaced.

ROLLER BEARING SECURING NUT ON LAYSHAFT

Make sure it is not stripped or damages or else change the nut.

BUSHING FOR THE ROLLER CAGE FOR 1st, 2nd, 3rd, AND 4th SPEED GEARS ON LAYSHAFT

Check that the surface contacted by the cages is not scored or nicked. Replace the bushings if not perfectly smooth.

CAGES FOR 1st, 2nd, 3rd, AND 4th SPEED GEARS ON LAYSHAFT

Ensure that all the rollers are in perfect state. If not, replace the cages.

SLIDING SLEEVE OPERATING FORKS

Make sure that all workin surfaces are dead smooth and not worn to such an extent as to have lost their original hardness. Also that the pawls workin in the drum splines are not unduly worn.
In any such case, replace the forks.

GEAR SELECTOR DRUM

Check wear of the drum grooves contacted by the gear selector forks, also wear of the holes where the selector gear stop pawl operates.
Check also the stud bolts contacted by the pawls. If worn replace the drum.

SELECTOR DRUM CARRYING RODS AND GEARSHIFT FORKS

Check straightness of the carrying rods and that they are not damaged at the surface contacted by the forks. If so, replace the rods.

CLUTCH SHAFT

Inspect grooves, threaded sections, and slots. If worn or damaged, replace the shaft.

INNER BODY RETAINING LOCKRING TO CLUTCH SHAFT

Ensure that the threaded portion is undamaged or else replace the retainer.

SAFETY WASHER FOR FIXED BODY RETAINER

Ensure the flaps of the washer are still in good state and replace as necessary.

SEAL BETWEEN CLUTCH FIXED BODY AND BEARING ON CLUTCH SHAFT

If crumbled or no longer efficient, change the seal.

INNER CLUTCH FIXED BODY ON SHAFT

Check if any teeth are broken or worn. All teeth surfaces should be dead smooth. In either case, replace the body.

CUSH PLATE RETAINER ON CLUTCH SHAFT

If deformed, scored or nicked, replace the retainer.

CUSH SPRING PLATE ON CLUTCH SHAFT

Needs no maintenance except that its inner grooves must be smooth.

CUSH SPRING ON CLUTCH SHAFT

Check if not deformed or if it has lost elasticity. When compressed to 37 mm (1.45″) this spring should give a load of 190 kgs (308 lbs.).

COUPLING SLEEVE ON CLUTCH SHAFT

Check smoothness of the internal splines and wear at the engaging end.

IDLE GEAR ON CLUTCH SHAFT

Should not show excessive wear of the teeth. Teeth contact surfaces and inner grooves should be quite smooth. If not, replace the gear.

GEAR SELECTOR ASSEMBLY

Make sure that the pawls slide freely in their seats in the body.
If not, remove the spring loaded pins with suitable pins of 3-4 mm diameter (.11-.15″) which allows the pawls and pins to be slipped out. Using then a 10 mm dia. (.39″) reamer, bore out the pawl housings, clean out with an air jet, lubricate the housing and refit spring and pawls, securing them to the selector body by means of flexible pins.

PAWL ON SELECTOR BODY

Make sure its contact surface is dead smooth, especially the rounded section which operates on the splined drum. This section should never have sharp ands and if necessary smooth out with a fine cut file.

SELECTOR PAWL RETURN SPRING

Check its efficiency and of cracked or deformed, replace the spring.

ASSEMBLING THE GEARBOX ON THE BENCH

After all parts have been inspected, checked, or replaced, the gearbox unit is assembled as follows:

BEARINGS IN GEARBOX AND COVER

As a first operation, the bearing housings and races should be throughly cleaned with a solvent, preferably trichloroethylene). Using a loctite soaked brush, smear lightly the outer races and the bearing housings in gearbox and cover. Make sure that no loctite enters into the balls and/or rollers. The bearings to be fitted with loctite are:

— clutch shaft bearing in gearbox;
— layshaft bearing in gearbox;
— layshaft bearing in gearbox cover.

Use green loctite n. 601 (n° 00010400) GREEN.

PRESSINF OF BEARINGS IN THE GEARBOX HOUSINGS

— After smearing with loctite, the clutch shaft bearing is pressed into its housing by means of punch 14928900 (43 in fig. 97);
— the outer layshaft bearing is pressed in by the aid of punch n. 14929100 (44 in fig. 98);
— main shaft bearing is pressed in with punch 14928800 (45 in fig. 99).

PRESSING OF BEARINGS IN GEARBOX COVER HOUSINGS

— After smearing with loctite, press the layshaft bearing in its housing by the aid of punch 14928900 (43 in fig. 100);
— the mainshaft bearing is pressed in with puch 14929000 (46 in fig. 101), after being smeared with loctite;
— the clutch shaft bearing is pressed in with punch 14928800 (45 in fig. 102).

After pressing the bearings into their housings, leave them to rest for about 12 hours to allow the loctite compound to dry up completely before proceeding with re-assembly of the gearbox components.

ASSEMBLY OF THE CLUTCH SHAFT BEARING RETAINERS IN GEARBOX AND LAYSHAFT BEARING RETAINERS IN GEARBOX COVER

(See part n. 14213003 in fig. 111)

If not perfectly adherent to the races, it will be necessary to spot-face or mill away the projecting ribbings to allow perfect adherence. The threaded portion of the retainer bolts should be smeared with green loctite n. 601 (n° 00010400) GREEN before tightening.

FITTING OF THE GEABOX SEALS FOR CLUTCH SHAFT AND SEALS IN COVER FOR LAYSHAFT AND SELECTOR SHAFT

The seal for the clutch shaft in the gearbox is fitted by means of punch 14929400 (47 in fig. 103).
The seal for the layshaft in the gearbox cover is fitted by means of punch 14929500 (48 in fig. 104).
The seal for the selector shaft is inserted in its housing in the gearbox cover.

FITTING OF THE SELECTOR ASSEMBLY IN GEARBOX

As a first operation, it is necessary to re-assemble the springs and pawls securing them to the selector body by means of flexible pins. Fit then the spring guiding pin, selector return spring, and insert the complete gear selector unit in its housing on the gearbox cover.

INSTALLATION OF THE COMPLETE GEARSHIFT UNIT IN THE BOX

Assembly of the various components in the box is made as follows: main shaft fitting the main shaft in the gearbox it should be shimmed so as to obtain a distance of 167.1-167.2 mm (6.578-6.582″) between the bearing in the box and the bearing in the cover (see fig. 105).
This distance is obtained by the use of shims which are available in the following sizes: 2, 2.1, 2.2 and 2.4 mm (0.78, .082, .086, .094″) (see fig. 105).
The shims are fitted on the shaft at the gearbox end interposing a bronze ring between them.
The actual production fits a throwout bearing n. 92258525 (instead of the bronze ring) and a washer (see fig. 105) between bearing and main shaft in order to get the measure (167.1 ÷ 167.2).
At the end of this operation, press in the roller bearing inner race on the shaft at the gearbox and by the aid of special tool part n. 14928600 (49 in fig. 106).

LAYSHAFT

Before proceeding with this operation it is necessary to re-fit the sliding sleeves and gears as follows:

On shaft at gearbox end
(shaft n. 14213000)

— insert the 2nd speed gear bushing on the shaft making sure that the bushing head faces the gearbox cover;
— roller cage for 2nd speed gear on bushing;
— 2nd speed gear on cage with front engagin dogs turned towards the gearbox cover;
— 3rd speed bushing on shaft with its head facing the 2nd speed gear;
— roller cage for 3rd speed gear on bushing;

— 3rd speed gear on roller cage with front dogs towards gearbox;
— shim between 3rd speed gear and fixed sleeve;

(shaft n. 14213001)

— insert the 2nd speed gear bushing on the shaft making sure that the bushing head faces the gear box cover;
— roller cage for 2nd speed gear on bushing;
— 2nd speed gear on cage with front engaging dogs turned towards the gearbox cover;
— shim between 3rd speed and 2nd speed gear;
— 3rd speed bushing on shaft facing the sliding muff;
— roller cage for 3rd spped gear on bushing;
— 3rd speed gear on cage with front engaging dogs turned towards the gear box;
— fixed sleeve on shaft;
— fixed muff, ensuring that the stepped down end is facing the 3rd speed gear;
— sliding muff for 3rd and 4th speed engagement, ensuring that the stepped down end faces the 3rd speed gear;
— bushing for the 4th speed gear on shaft;
— roller cage on bushing;
— 4th speed gear on shaft, ensuring that the front engaging dogs face the sliding muff.

On the shaft gearbox cover end

Assemble:

— 1st and 2nd speed engaging sleeves;
— bushing for 1st speed gear with its head facing the 2nd speed gear;
— roller cage in first speed gear bushing;
— 1st speed gear on roller cage;
— seal in shaft groove;
— high speed gear with stepped down end fitted on the seal ring.

SHIMMING OF LAYSHAFT

— Fit adjusting washer at the 4th speed gear side and add shims until between these and the high speed gear there is a distance of 144.7-145.2 mm (5.692-5.715″).
This distance is normally obtained by the addition of 2 to 4 shims (see fig. 107);
— fit roller bearing on shaft at the 4th speed gear side;
— tighten nut on layshaft at the 4th speed gear side and then hammer on the nut tang with a chisel in correspondence with the shaft groove in order to form a stop for the nut.
Fit now the complete layshaft in the gearbox.

GEAR SELECTION FORKS AND SELECTOR DRUM

— Fit the 1st, 2nd, 3rd, and 4th speed selector forks on the layshaft sliding sleeves;
— fit the splined selector drum complete with rod in its housing on the gearbox together with a spacer. Looking through the orifice in the ratchet pawl it should be ascertained that one of the 6 holes in the drum is in axis with the pawl hole.
If not, the spacer should be replaced with a larger or smaller one until both holes in the pawl and the drum are dead straight with each other;
— insert the fork fingers in the drum grooves. To position these in the grooves use special tool part n. 14929300 (50 in fig. 108). Fit the dowel in the gearbox drilling, spring and plug, screwing it in provisionally.
Insert the fork retaining rod into the fork holes. Assemble the neutral indicator unit on the gearbox ensuring that the blade contacts button in the drum. Secure this indicator to the gearbox with screws and washers.

CLUTCH SHAFT

First of all it is necessary to assemble the following parts on the shaft:

— idle gear with its engaging teeth facing the gearbox cover;
— coupling sleeve with its engaging dogs facing the idle gear;
— spring;
— cush spring plate;
— using special tool 12905900 (29 in fig. 90) positioned on the spring pressure plate, compress the spring until the 2 retainers can be inserted;
— spacer nut;
— roller bearing inner race in gearbox cover using special tool 14928600 (49 in fig. 109).

On the shaft at the gearbox end fit now:

— seel in its groove on the shaft;
— oil scoop between shaft and gearbox bearing;
— complete shaft in bearing and on the retaining ring in the gearbox.

ASSEMBLY OF THE HIGH SPEED GEAR AND COUPLING SLEEVE ON THE MAIN SHAFT

Proceed as follows:

— Fit roller cage and high speed gear on bushing;
— insert cage-gear-bush assembly in the splined section of the main shaft until it is near the hole drilled in the shaft;
— introduce spring in the shaft drilling and position stop pin on top of the spring;
— with the left hand thumb kee pthe pin pressed down and with the right hand push bushing with cage and gear right in;
— turn the bushing to the right or left until the stop pin clicks into one of the 6 splines of the bush;
— fit high speed engaging sleeve with selector fork on the shaft, then the fork on the rod, inserting the fork finger in the groove on the splined drum.

ASSEMBLY OF GEARBOX COVER

— Fit the retaining washer on the drum together with one or more shims;
— position the drum in the free position (neutral);
— fit a new cover-gearbox union gasket;
— assemble the gearbox cover tapping it lightly with a hide mallet to ensure all shaft seat properly in their housings.

• **NB.** - When the gearbox cover complete with selector unit is re-assembled, ensure that the selector drum is set at the neutral position as otherwise the selector pawls might not enter freely in the two slots indicated by the arrows (see fig. 87).

— Screw 4 cover screws in lightly;
— insert the shim, speedo gear and its stop ball on the layshaft;
— fit up provisionally the layshaft securing nut;
— mount tool 14928700 (51 in fig. 110) on the selector shaft;
— adjust the gearshift control by means of screw A, after having undone locknut B in fig. 110;
— check gear engagement by changing up and down and feeling for the neutral position. If gearshifting presents some difficulty, take the gearbox cover down again and remove or add some shims between drum and gearbox if the problem is difficulty in first and third gear engagement, and between gearbox cover and drum if 2nd and 4th gears do not engage smoothly.

Shim sizes available for this operation are: 0.6, 0.8, 1, and 1.2 mm (.023, .031, .039, .047") (see fig. 111).
When this operation has been done, re-fit the cover as above described and check again if all gears engage properly.
If so, lock the layshaft nut tightly using tool 14905400 (35 in fig. 85) and layshaft holding tool 12907100 (34 in fig. 85).
After tightening this nut, hammer it with a chisel in correspondence of the shaft groove to lock it completely.
Tighten the cover securing screws and remove the tool previously fitted on the selector shaft. Insert the operating lever in the selector shaft and tighten its securing screws.
Lock tightly the oil breather plug which is also the retainer of the spring and stop pin on the gearbox.

REFITTING INNER BODY AND CLUTCH UNIT ON SHAFT

Assemble:

— bearing-inner body seal;
— inner body;
— safety washer;
— inner body locking nut on clutch shaft. Tighten this using tool n. 14912800 (36 in fig. 86) and hooked wrench 14912600 (37 in fig. 86);
— bend one ear of the safety washer in one of the locknut grooves.

REFITTING THE COMPLETE CLUTCH UNIT ON THE MAIN SHAFT AND GEARBOX COVER

Re-fit:

— small rubber tube in shaft;
— inner body;
— throwout bearing on inner body;
— outer body fitted with seal on gearbox cover;
— complete operating lever on gearbox cover with adjusting screw and locknut and securing with cotters and pins;
— lever return spring in its housing in gearbox cover.

FITTING THE GEAR BOX COMPLETE WITH GEARS AND SHAFTS ON THE ENGINE UNIT

— Fit the gearbox on the stud bolts of the engine, taking care that the clutch inner body perfectly matches the two clutch driven plates, previously mounted, and the rod perfectly inserts into its housing on the spring plate bush;
— screws in nuts on stud bolts and screws.

ADJUSTING THE CLUTCH OPERATING LEVER ON THE GEARBOX

— screw in or out screw «B» after loosening counternut «A».
The correct distance to be obtained from the gearbox cover to the center of the round slot which retains the cable terminal (see «C» in fig. 112) is as follows:

FILLING UP THE GEARBOX
(See fig. 84)

— mm 75 a. by clutch lever on gearbox n. 14090201 (rear brake control by cable);
— mm 65 a. by clutch lever on gearbox n. 14090201 (rear brake control by tie rod).

Fit plug C on the gearbox and introduce 0.750 liters (1 and 3/4 US pints) of Agip F. 1 Rotra MP SAE 90 through filler plug B.
Correct oil level is when it starts seeping through level plug A.
Re-fit plugs A and B.

REAR WHEEL DRIVE

Universal double joint «Gleason» type bevel gear rear drive. The double joint is fitted on rear swinging fork bearing at one end of which is fitted the gearbox layshaft and at the other the drive shaft located inside the R/H arm of the rear fork.
Drive shaft and bevel gear pinion are keyed on the sleeve. Pinion teeth engage directly the crown teeth of the bevel set which through an internally toothed sleve, drives the rear wheel.

Bevel gear set ratio (gearbox-wheel):

Z = 83/5 1 : 4,375

Overall gear ratio:

— low gear	1 : 10,806
— 2nd gear	1 : 7,499
— 3rd gear	1 : 5,657
— 4th gear	1 : 4,695
— high gear	1 : 4,052

STRIPPING OF REAR WHEEL DRIVE

First drain the drive box oil by removing drain plug and gasket (C in fig. 113) located at the bottom of the same and then proceed to strip as follows.
With the engine-gearbox unit assembled on the machine remove:

— rear wheel (See «Removal of rear wheel»);
— unscrew the 4 nuts with toothed washers and back out drive box complete with sleeve and drive shaft;
— drive shaft from sleeve and the 2 circlips from the shaft;
— sleeve from bevel pinion;
— gasket and oil seal from drive box;
— using tool n. 12907100 (see 34 in fig. 113/1) and special wrench remowe lockring which secures the bevel pinion;
— remove bearing housing, and from housing extract bevel pinion, both bearings, shims and distance piece;
— housing-drive box gasket and seal ring;
— unscrew the 8 bolts securing flange to drive box, after flattening lock plates;
— complete flange and from same seal ring and ball bearing;
— two gaskets (one between flange and shim and one between shim and drive box);
— shim;
— internally toothed sleeve for rear wheel coupling c/w bevel crown;
— from toothed sleeve, after flattening the lock plates and undoing the 8 securing bolts, remove bevel gear crown;
— remove bearing stop screw and plate;
— roller bearing cage and inner race;
— roller bearing race using puller 12906900 (15 in fig. 114);
— roller bearing cage retaining ring;
— oil seal from drive box;
— filler plug B from drive box and level plug A c/w gaskets (see fig. 113).

Stripping down of universal double joint, rubber pro? tections and securing bands is only possible after the engine-gearbox unit or the rear fork are removed.

INSPECTION AND OVERHAUL

DRIVE BOX

— Check for any cracks in the casing;
— ensure the bearing housing is not demaged or scored;
— ensure union faces are perfectly smooth;
— check efficiency of the seal ring. Replace if crumbled or has lost its elasticity;
— fit new gaskets.

DRIVE BOX FLANGE

Ensure thath:

— flange is not cracked;
— union faces are not scored or nicked;
— bearing and seal housings are not scored or nicked;
— efficiency of seal. Replace if damaged or crumbled.

DISTANCE SHIMS

Are available in 6 different sizes:

0.8 - 0.9 - 1 - 1.1 - 1.2 - 1.3 mm (.031 - .035 - .039 - .043 - .047 - .051″).

Check that union faces are not scored or nicked.

INTERNALLY TOOTHED SLEEVE FOR REAR WHEEL COUPLING

Ensure the surface supporting the ball bearings if faultless and dead smooth and the internal teeth undamaged.

BEVEL GEAR SET

The bevel set consists of a pinion and a crown wheel. Ensure teeth of these are not chipped or excessively

worn. Pinion shank should be free of scoring and the splines dead smooth.

CAGE RETAINING RING

Ensure contact surface is dead smooth and not worn. Replace as necessary.

REAR WHEEL-DRIVE BOX DISTANCE PIECE

Check integrity of all contact surfaces.

BEARING HOUSINGS

Ensure all coupling surfaces and the bearing housings are not scored or worn. The gasket should always be changed.

BEARING SPACER

Ensure that its contact surfaces are not damaged.

BEARING-SPACER SHIMS

Are available in 2 sizes: 0.1 and 0.15 mm (.0039-.0059″). Check flatness and wear. Replace as necessary.

BEVEL GEAR SHIMS

Are available in 3 sizes: 1-1.2-1.5 mm (.039-.047-.059″).

LOCKRING FOR BEVEL PINION

Replace by fitting.

SEALS

Check if still efficient. If crumbled or have lost their elasticity, replace.

DRIVE SHAFT-PINION SLEEVE

Inspect internal splines. If chipped or heavily scored, replace the sleeve.

DRIVE SHAFT

Splines should be in perfect state. If chipped or marked, replace the shaft.

DOUBLE CARDAN JOINT

Ensure the internal splines are dea dsmooth and free from chipping or scoring. Check that the articulation is not too slack or has hardened excessively. If necessary, replace the joint.

GAITER RETAINING BAND

Must not show any crack. If have lost their elasticity, replace.

RUBBER GAITER

If no longer efficient, replace the gaiter.

BALL BEARINGS AND TAPER ROLLER BEARINGS

Check if still in good condition and have not slacked excessively. All races should be dead smooth and even. Ensure the balls and rollers show up bright all over their surface. Replace the bearings if not quite sure of their perfect efficiency.

ASSEMBLING OF REAR WHEEL DRIVE

To assemble rear wheel drive operate in the following sequence:

— insert rear wheel-drive box distance piece;
— press oil seal in drive box;
— fit cage retaining ring;
— fit roller bearing outer race;
— fit roller bearing cage and inner race;
— secure bearing stop screw and plate;
— secure bevel crown to internally toothed sleeve by means of bolts and lock plates (after tightening bolts don't forget to bend down lock plate flaps);
— press ball bearing and seal ring in box flange;
— fit new gasket on drive box and flange. Shim between gaskets;
— secure flange to box by means of bolts and lock plate (lock plate flaps must be bent down **after** the bevel gear set is adjusted);
— fit into bearing housing: front bearing, distance piece, shims and rear bearing;
— fit spacer and adjusting washers on bevel pinion and insert pinion shank into bearing housing, tightening the castellated nut, using proper wrench and holdfast tool n. 12907100 (34 in fig. 113/1). After locking the nut, use a drift to tap on one of the nut slots in order to form a safety jut;
— fit housing with bevel gear on the stud bolts of the drive box and ensure that the teeth of pinion and crown are properly adjusted. (See «Contact check and adjustment of bevel gear teeth»);
— screw in the screws securing flange to drive box and bend down lock plate flaps;
— fit ball bearing on fork, securing it by circlip;
— finally, insert double joint in rear fork ball bearing

and fit gaiters over oint, securing them by band on fork side only. Front side of gaiters will be assembled on the frame.

Remark: By assembling of the drive box take care that oil passages on housing, gasket and fork flange are lined up (see fig. 115).

ASSEMBLING REAR WHEEL DRIVE TO R/H ARM OF REAR FORK

To assemble the rear wheel drive on the rear fork, operate as follows (see fig. 115):

— after positioning circlips in drive shaft grooves, insert shaft into double joint and shaft bevel drive sleeve;

— insert splined portion of bevel pinion (A) into sleeve (B);

— screw up/ligthly the 4 bolts and washers (C), securing drive box (E) to rear fork arm (D). Then insert rear wheel spindle (F) through L/H side arm of rear fork and inside drive box. Tighten 4 bolts (C) and withdraw spindle (F).

LUBRICATIONS

(See fig. 113)

Quantity of oil required:

— 0.360 liter (12.07 oz USA) of which 0.340 liters (11.4 oz.) of Agip F. 1 Rotra MP SAE 90 and 0.020 liters (.67 oz.) of Molykote oil type «A».

CONTACT CHECK AND ADJUSTMENT OF BEVEL GEAR TEETH

Give bevel gear set a pinion-crown clearance of 0.10-0.15 mm (.0039-.0059") (see fig. 115) and before checking teeth contact make sure that the plane formed by the outer surfaces normal to the generating pitch line (see A in fig. 116) is in perfect correspondence.

Teeth contact check is carried out as follows:

— smear crown teeth with lead oxide and then rotate pinion keeping crown braked so that rotation will take place under load and contact marks will appear on the painted surface of the crown gear. Contact is correct when marks left by the pinion teeth on the crown teeth are even all along the flank (see fig. 117).

Contact between the teeth could be incorrect and the following instances might arise:

1 Excessive contact at bottom of tooth flank (see fig. 118). This means that the pinion is too deep into the crown. Withdraw pinion and reduce adjusting shims.

2 Excessive contact at tooth bottom (see fig. 119). This means that the crown if too near to pinion. Get crown far from pinion and increase adjusting shims.

3 Excessive contact at tooth crest (see fig. 120). This means that pinion is too far apart from the crown. Approach pinion to crown, decreasing adjusting shims.

4 Excessive contact at top land (see fig. 121) this means that crown is too far apart from pinion. Approach it by increasing shims.

After each of the above operations it will be necessary to re-set pinion crown clearance at correct distance.

CHECKING SEAL RING EFFICIENCY AND CASTING BLOWS IN ENGINE-UNIT, GEAR BOX, DRIVE BOX

ENGINE UNIT

Checking seal ring efficiency on crankshaft, flywheel side (see fig. 122)

Oil the outer ring surface and connect the compressed air duct to the pipe «A», place one hand on the ring and blow compressed air at 4 kg/cm² checking if there are bubbles on the ring surface. Should bubbles be detected between shaft and seal ring too, this may not depend on a poor efficiency of the seal ring but on a score in the crankshaft. To make sure of this, turn the crankshaft and repeat the above test, should bubbles be still detected it will be necessary to check the crankshaft.
If after this checking there are still oil leakages, ensure that there is no casting blow.

Checking casting blows
(See fig. 122)

Fill oil in the sump, connect the compressed air duct to the pipe «A», place one hand on the crankshaft seal ring, flywheel side, and blow compressed air at 4 kg/cm² seeing that no oil leaks from outer casting surface.

GEAR BOX

Checking seal ring efficiency on clutch shaft
(See fig. 123)

Same as by engine-unit, compressed air is blown through the pipe «B».

Checking casting blows
(See fig.123)

Same as by engine-unit, compressed air is blown through the pipe «B».

DRIVE BOX

Checking seal ring efficency on the drive box cover
(See fig. 124)

Same as by engine-unit, compressed air is blown through the valve of tool «C». (This tool can be obtained from a used rear fork arm by welding a plate with a tyre inner tube valve on the arm top).

Checking casting blows
(See fig. 124)

Same as by engine-unit, compressed air is blown through the valve of tool «C».

REAR FORK

REMOVAL OF REAR FORK

After removing the wheel and the rear drive unit, proceed as follows:

— loosen locknuts on pins spindles of fork support;
— loosen fork spindles by a screwdriver;
— slide off spacer and seal rings on fork;
— remove the roller bearings, use puller 12904700 (14 in fig. 125) for outer races;
— remove spring ring and ball bearing.

INSPECTING THE REAR FORK

Ensure that the rear fork has no abnormal bending, and defective welding; check the conditions of bearing housings and smoothness of contact surface with drive box. Check measures according drwg. in fig. 126.

RE-ASSEMBLING OF REAR FORK

The rear fork is reassembled as follows:

— press both taper roller bearings in their housing;
— fit seal and spacer rings;
— fit fork on frame and screw in spindles of fork support;
— adjust the rear fork by acting with a screwdriver on spindles (see fig. 127) until a free playless swinging of the fork;
— tighten locknuts on spindles.

REAR SUSPENSION

STRIPPING FROM FRAME

Unscrew nuts and remove suspensions from bosses on frame, rear fork and drive box.

CHECK AND OVERHAUL

Check suspension efficiency. If not normal, and provided this is not due to imperfect operation of the shock absorbers, check the condition of springs.

1 Turn the bottom spring securing sleeve on position 1. This is obtained by rotating the sleeve around the damper body until mark 1 on the body coincides with mark 1 on the revolving sleeve.

2 Compress the spring to the point where the top spring plate can be backed out and then remove the spring.

ASSEMBLY OF SPRINGS ON SHOCK ABSORBERS

3 Extend the damper rod fully and check that the spring adjusting sleeve is in position «1» and then fit the spring on the damper body.

4 Compress the spring to the point where the top plate can be inserted.

CHECKING DATA FOR THE REAR SUSPENSIONS

(See fig. 128)

Free length of spring is 277 + 0,5 mm (10.90″).
When compressed by 40 mm (1.57″)
(assembly length 237 mm [9.33″])
should give a load of kgs 49.9 (109.8 lbs).
When compressed by 125 mm (4.92″)
(length 152 mm = 5.98″)
should give a load of 154.5 kgs (418 lbs).
The spring fitted on the damper has 3 lengths according to the position of the sleeve (machine at standstill w/o pillion).
Position 1 = 237 mm (9.33″)
Position 2 = 229.5 mm (9.07″)
Position 3 = 222 mm (8.74″)

REAR SUSPENSION DAMPER

(See fig. 129)

Maximum opening	320 ± 2 mm	(11.88″)
Closed lightly	243 ± 2 mm	(9.56″)
Closed fully	235 mm	(9.25″)

Travel 77 + 8 mm (3.03″) bottoming,
total 85 mm (3.34″).

ADJUSTING THE SHOCK ABSORBERS

The shock absorbers are adjusted as follows:

1 Remove external spring.

2 Extend the damp errod fully, push rubber return bush downwards (see A in fig. 130). Should this be stuck to the counternut, free it by means of a screwdriver, making sure not to damage the chromed damper rod.

3 Unscrew counternut under the eylet (do this by placing the top eyelet in a vice), then remove the eyelet, counternut and rubber bushing (see B in fig. 131).

4 Re-fit counternut and eyelet on the damper rod, depress rod fully and keeping it in this position turn to the left until it reaches the adjusting system (see fig. 132). Do not force too much when forcing to the left as if there is some resistance this means that the adjustment is at the end of its stroke (point «O») from where the various damper adjustment start.

5 The available adjusting space available is 2 and 1/4 turns from point «O».

ADJUSTMENT

Keeping the rod pressed down, turn to the right by the required number of turns (This operation is made easier if the starting point is marked).
For the first adjustment we recommed a rotation of not more than 1 1/2 turns (see fig. 132).

6 Move the rod vertically for about 2 mm (without rotating it) so as to release the adjusting system.

7 Re-fit the rubber bushing on the damper rod (after having undone and removed the counternut and the top eyelet) and then the counternut and toy eyelet. This done, tighten the counternut on the eyelet.

CAUTION

In re-fitting the spring don't forget to put back the rubber stop bush as otherwise the damper will not operate properly.
Both dampers must be adjusted by a similar number of turns.

ADJUSTING THE REAR DAMPER IN THE 3 POSITIONS

In addition to the normal position (I), the damper spring can be adjusted on positions II and III by moving the adjusting sleeve (B) with wrench A (31 in fig. 133) in the standard tool kit in direction of the arrow to compress the spring and viceversa to extend it, bringing mark II or III on the revolving sleeve opposite mark I on the bottom eyelet.

FRONT SUSPENSION AND STEERING

To remove front wheel, handlebar, instrument panel, and front fork from the frame, proceed as follows:

DISMANTLING

- — Remove the assembly wheel-front fender (see Chapter «Wheels»);
- — remove control group and fender;
- — undo screws and remove light, horn and turn light switches;
- — disconnect the steering damper and remove it after undoing its securing nut;
- — undo both the headlight securing bolts to the fork cover lugs and disconnect cables from the headlight terminal. Remove headlight;
- — undo screws and remove booth front turn light indicators;
- — undo thumb screws on speedo and rev-counter cables;
- — undo speedometer, rev-counter and indicator lights panel screws and remove all these parts;
- — undo screws on the instrument panel studs and remove panel;
- — undo top fork plugs and lift out the top linking plate;
- — loosen fork lugs and semi-handlebars clamp screws and remove these from the fork members;
- — undo bottom yoke securing nut and slip out the complete fork assembly from the frame lug and from this the outer bearing races.

DISMANTLING OF FRONT FORK COMPONENTS

- — Undo the screws which secure the bottom yoke to the fork tubes and remove bottom yoke;
- — set up the bottom fork cover in a vice and undo the screw which secures the rod to the fork covers. Withdraw fork tube from cover and from tube remove the rod spring and fork damper;
- — using a pair of pliers remove the rod end seal and slip off:
  - — bottom cap;
  - — spring;
  - — unscrew rod from damper and remove damper;
- — from the bottom cover remove:
  - — gaiters;
  - — seal securing circlip;
  - — seals;
  - — oil drain bolt.

The other fork leg is similarly dismantled.

OVERHAUL OF TELESCOPIC FRONT FORK
(See fig. 134).

FORK ROD

Check that the chrome plated section of the fork rod which slides in the bottom cover is in good condition and free from scoring.
Ensure the rod is perfeetly straight and the threeaded portion in good state.

Rod diameter:

34.740-34.715 mm (1.3672-1.3662″)

Rod-cover fitting clearance:

0.010-0.085 mm (.00039-.00334″)

BOTTOM FORK COVER

It is in light alloy. Ensure its inner part is not scored or nicked.

I/D of cover:

34.750-34.790 mm (1.3678-1.3654″)

Cover-rod assembly clearance:

0.010-0.085 mm (.00039-.00334″)

FORK SPRING
(See fig. 135)

Ensure that spring is not deformed or cracked.
Free length of spring is 418.500 - 423.500 (16.475 - 16.672″).
Spring length (on assembly) should give a load of 11.3 kgs (23 lbs) when compressed to 16 mm (.629″).
Spring length (static load) should give a load of 48.9 kgs (97.5 lbs) when compressed to 66 mm (2.598″).
Spring at end of travel should give a load of 104,4 kgs (229.7 lbs) when compressed to 141 mm (5.551″).

RUBBER GAITER ON FORK COVER

Check if cracked or in bad state and replace as necessary.

SEAL CIRCLIPS IN COVER

Replace if no longer efficient.

SPRING RETAINER ON DAMPER ROD

Check if still in good condition and replace it if no longer efficient.

RUBBER RING ON FORK DAMPER

Ensure it is not squashed or crumbled and replace as necessary.

FORK DAMPERS

Should never be tampered with. Check both at same time to ensure they have the same load to prevent irregular operation of the fork.
If the dampers are no longer efficient, return them to the makers or replace them.

STEERING DAMPER

Should never be tampered with. In case of irregular operation, return it to the makers or replace it.

BOTTOM FORK YOKE

Ensure straightness of the steering column. If offset or the threaded portion is damaged or stripped, replace the yoke.

STEERING BEARINGS

Check wear and if still in good state.
Races and rollers should show up quite bright and smooth allover their surface. If any fault is detected, replace the bearing. (See Chapter «Beomgs»).

RE-ASSEMBLY OF FORK COMPONENTS

Proceed os follows:

— insert rubber ring on damper;
— screw nut on damper rod;
— screw tube on damper rod and lock the previously fitted nut;
— insert spring on tube;
— insert stop cap on tube;
— fit circlip in its housing on tube;
— insert rod housing on damper rod;
— insert the complete tube-spring-damper assembly in the fork;
— fit seals on cover;
— fill in thecover with 0,050 l. (50 cc) of Agip F. 1 ATF Dexron;
— screw drain bolt with washer on cover;
— fit both rubber gaiters on fork and insert the complete tube-damper assembly in the fork cover.

• **NB.** - The other fork leg is similarly assembled.

— Fit the dust cap on bottom yoke, shim for the lower bearing and the bearing;
— fit outer bearing races on frame lug;
— insert both complete legs in the bottom steering yoke and secure this to the fork tubes with Allen screws;
— insert the fork on the frame;
— fit top bearing on frame and the dust cover on top of it;
— tighten nut on steering column after ensuring that the fork is adjusted i.e. that it can turn freely without any play;
— insert the handlebar halves in the fork members. Insert the headlight supports and fix them in position with Allen screws;
— insert the steering lock plate on the steering column;
— fit the top linking plate on the fork member and steering column and secure it with bolts and washers;
— screw stud on fork dampers;
— re-fit steering damper assembly and secure it bracket;
— re-fit the instrument panel complete with speedo, rev-counter, and indicator support complete of all indicators.

Fitting of: fenders, wheels, handlebars, and brake controls is proceeded by reversing removal sequence.

STEERING DAMPER ASSEMBLY

It is fitted on the steering column and is controlled by a knob located on top of the column (see fig. 136).

— position «A»: damper disconnected;
— position «B»: damper connected.

WHEELS AND BRAKES

REMOVAL OF FRONT WHEEL (shoe brake)
(See fig. 137)

Removal of the wheel from the machine is carried out as follows:

— disconnect the front brake cable from brake levers on hub covers;
— slacken counternuts C and remove cable adjusting screws D; from the covers;
— undo nut «A» which secures the wheel spindle to the R/H bottom fork cover;
— slacken the bottom cover screws to wheel spindle Band withdraw spindle from the hub and bottom fork covers;
— push the wheel down just enough to free the hub cover from the anchoring lug on the L/H fork cover;
— withdraw the wheel.

DISMANTLING THE FRONT WHEEL HUB (shoe brake)

Operate as follows:

— Remove both R/H and L/H hub covers from the drum;
— after undoing bolts which secure levers to cams, remove levers and rod from hub covers;
— remove sealing rings and withdraw the brake shoes and cams from the hub cover;
— remove retainer, bearing, distance piece, the other bearing and retainer from the hub.

REMOVAL OF REAR WHEEL
(See fig. 138)

Removal of rear wheel is carried out as follows:

— undo nut «A» which secures the anchoring stay to the drive box;
— undo nut «B» which secures the wheel spindle to the drive box.

Cable controlled rear brake:

— slacken cable tensioner with counternut «E»;
— disconnet brake control cable «D» from cam lever on the hub cover.

Link controlled rear brake:

— slacken thumb screw «A» in fig. 147 and slide bush out of control link;
— slacken bolt «C» on ther rear fork link and withdraw wheel spindle F;
— slacken both knobs A in fig. 139, raise the rear fender tip;
—push the wheel to the left just enough to free the gear from the internally toothed sleeve in the drive box;
— remove wherl.

DISMANTLING OF REAR WHEEL HUB

To dismantle the rear wheel hub proceed as follows:

— back out the complete hub cover;
— after undoing the screws which retain the cams, remove from the hub cover both cam levers complete with forks;
— withdraw the brake shoes and operating cams from the hub cover;
— undo both nuts and remove the brake shoes retaining pins from the hub cover;
— remove retaining ring from hub cover.

CHECKING AND OVERHAULING WHEELS AND BRAKES

Ensure that all wheel components are within the specified limits and not excessivily worn or crumbled otherwise replace the damaged parts. Refer to sizes indicated in fig. 140 for truing the front wheel and fig. 141 for the rear wheel.

ADJUSTING THE HUB COVER COMPLETE WITH SHOES ON FRONT WHEEL HUB
(See fig. 142)

— Turn the brake shoe linings to the specified size i.e. 219.800-219.950 mm (8.653-8.659″). Do this operation with cam in open position and the cam operating lever at 119.800-120.000 mm (4.716-4.724″) from anchoring lug;
— ensure that the internal diameter of the drum is 219.900-220.000 mm (8.657-8.661″) and in case of slight scoring grind the inner hub surface with very fine grain emery paper.

ADJUSTING THE HUB COVER COMPLETE WITH SHOES ON REAR WHEEL HUB
(See fig. 143)

— Turn the brake shoe linings down to the specified size i.e. 219.800-219.950 mm (8.659-.0785″) diameter. Do this operation with the cam fully open and operating lever at 116.800-117.000 mm (4.637-4.606″) from anchoring lug;
— ensure the I/D of the drum is 219.900-220.000 mm (8.659-8.661″). In case of slight scoring or slight marks, grind the inner surface of the drum with very fine grain emery paper.

ASSEMBLY OF FRONT WHEEL (shoe brakes)

ASSEMBLY OF FRONT WHEEL HUB

To assemble the front wheel hub proceed as follows:

R/H side of hub cover

— fit taper roller bearing in its housing, then retainer.

L/H side of hub cover

— fit bearing spacer between bearings and press ball bearing in its housing, then retainer.

ASSEMBLY OF HUB COVERS ON DRUM

— After having assembled the cams on the hub cover and the shoes complete with springs on the cams and the pins securing them with circlips, the adaptors on the operating levers, the brake rod and adjusting nut on the fork adaptor, the levers complete with forks and rod on cams, refit the complete hub covers on the hubs.

ASSEMBLY OF FRONT WHEEL ON FORK BOTTOM COVERS (shoe brake)

(Shee fig. 137)

This is done as follows:

— lean the machine on one side and insert the wheel between the fork legs. In doing so ensure that the housings on the hub covers enter the anchoring lugs on the fork covers;

— insert the wheel spindle in the right fork member, the wheel hub and the left fork member and secure it with its nut and washer;

— tighten the bottm fork links with Allen head screws.

CONTROL CABLES (shoe brake)

The front brake is provided with two control cables which act on the R/H and the L/H brake block. The R/H cable incorporates the stop cutout.
If the stop cutout should fail, it is necessary to change the cable. Ensure that cables and casings are in good conditions. If not, replace the cables.

ADJUSTING THE FRONT BRAKE (shoe brake)

(See fig. 144)

The lever is correctly adjusted when there is about 20-25 mm play (3/4 to 1″) at the lever end before the linings contact the drums.
To adjust undo thumb screw A and act on adjuster B.
To adjust the brake shoes on the linings in order that they wwill act simultaneously, operate as follows:

— disconnect the control cable from the brake block lever on the right;

— adjust brakes on the L/H drum acting on the cable adjuster (D), after having loosened conternut C on the lefh hub cover, until there is 20-25 mm play (3/4 to 1″) at the handlebar lever;

— connect control cable on the R/H hub cover;

— pull the handlebar lever fully and act on screw D after undoing conternut C on the R/H hub cover until the linings are in contact with the drum.

After adjustment put your thumbs on the cable operating levers on the hub-covers and ensure that by pulling the handlebar lever both the hub cover lever act simultaneously.

ASSEMBLY OF REAR WHEEL

ASSEMBLY OF REAR WHEEL HUB

To the assemble the nub proceed as follows:

Drive box side

— fit roller bearing, bushing and seal.

Hub cover side

— fit the bearing spacer, shims, roller bearing, bushing and seal. If there is too much axial play, remove one or more shims, if the wheel does not turn freely add shims;
— fit the hub cover after having assembled the pins, cams, and shoes, and control levers complete with fork adaptor and rod.

ADJUSTING AXIAL PLAY ON THE TAPER ROLLER BEARING ON THE REAR WHEEL HUB

(See fig. 145)

The taper roller bearings in the rear wheel hub should have an axial play of 0.05 mm with no grease on them (.0019″).
Bedding down or wear of the hub components may increase this play and so influence unfavorably machine stability.

To correctly adjust these bearings proceed as follows:

1 Remove the group from the hub, wash it in petrol and dry with air jet.

2 Re-fit this group on the hub interposing between left bearing B and spacer C a shim A of such size as to bring play down to ZERO. Wheel rotation will have hardened somewhat.

3 Dismantle the L/H bearing again (B) and add to shim A a 0.10 mm (.0039″) shim.
This additional shim will ensure correct wheel rotation. Lubricate the bearings with Agip F. 1 brease 30. Re-fit bearing E with retainer D on the hub.

4 Fit the wheel on the fork legs and the rear fork and tighten the spindle securing nut at a torque loading of 14-15 kg/m (101-107 lbs/sq. in.).

ADJUSTMENT OF REAR BRAKE (cable controlled)

(See fig. 146)

Periodically check that play at the lever end (C) is not more than 20-25 mm (3/4 to 1″) before the linings contact the drum.
To adjust operate on thumb screw A after loosening conternuts B.

Position of lever C can be adjusted to suit the rider requirements operating on thumb screw D after loosening counternut E.
At the end of this operation, holding fast screw D, tighten counternut E against the forked support.

ADJUSTMENT OF REAR BRAKE (link controlled)

(See fig. 147)

To adjust, screw in or out the thumb screw «A» which is threaded, on the brake control link.
To avoid excessive play screw in this thumb screw «A» on the link, ensuring that the play at the lever end «B» is not more than 20-25 mm before the linings contact the drum.

ADJUSTING THE WHEEL SPOKES

Check that all spokes are tightened and the truing of the wheel by proceeding as follows:

— turn the wheel and check its truing. If necessary, act on right of left spokes until the wheel turns properly. This checking has to be carried out after the first 500 km and later on every 1500 km or so.

BALANCING THE WHEEL

To improve stability and decrease high speed wobbling, the wheels have to be kept balanced. It is recommended to balance the wheels by means of proper balancing machines, if at disposal; otherwise proceed as follows:

— after removing the wheel, checking spoke tightining and wheel truing, suspend it on a fork;
— spin the wheel lightly several times and see if it always stops in different positions, thus indicating a correct balance;
— if one point of the wheel always stops at the bottom, put a balance weight to the spoke opposite this point;
— repeat this adjustment until the wheel is correctly balanced, then fix the balance weights to the spokes by means of pliers.

Balance weights are available in following sizes:

gr 15 (part n. 12611601)
gr 20 (part n. 12616102)
gr 30 (part n. 12616103)

An imbalance of less than 15 grams normally does not affect the motorcycle stability.

REMOVAL OF FRONT WHEEL AND HYDRAULIC BRAKING CIRCUIT FROM FRONT FORK AND HANDLEBAR

To remove the front wheel from the motorcycle operate as follows:

— remove rubber caps, undo drain plugs («H» in fig. 148) and drain the fluid from the braking circuit;

— undo the screws securing pipes on twin control and caliper and remove pipes and hydrostop switch;

— undo screws and nuts then remove caliper and front fender from fork members;

— undo lock nut («A» in fig. 147/1) securing wheel spindle to the right fork member;

— undo screws («B» in fig. 147/1) securing frok members to wheel spindle;

— slide wheel spindle («C» in fig. 147/1) out of hub and fork members;

— raise the bike to enable wheel slipping of fork members;

— undo the securing nut and remove twin control at the fork bottom yoke;

— after removing the cap and undoing the screw from master cylinder slide the pipe off;

— remove master cylinder from handlebar after undoing securing screws.

FRONT WHEEL BRAKING CIRCUIT

The hydraulic braking circuit on the front wheel consists of:

— master cylinder, on the right handlebar, lever controlled;
— caliper, on both right and left fork members;
— two braking discs;
— twin control at the fork bottom joke;
— one pipe from master cylinder to twin control;
— two pipes from twin control to caliper;
— brake pads, controlled by pistons inside the caliper, which are actuated by the fluid pressure.

GENERAL MAINTENANCE

Foor a good efficiency of the braking circuit on front wheel it is recommended to follow these directions:

— periodically check the fluid level in the rsevoir on the handlebar, it has never to be lower than 8 mm under max. level;
— every 500 km fill up the fluid reservoir taking the fluid from an original container to be opened only by fluid pouring;
— completely renew the fluid every 15000 km or at least once a year.

The fluid pipes have to be always full and without air; a long and elastic movement of the control lever evidences the presence of air bubbles.
Use only fresh recommended fluid in case of washing of the braking circuit; no alcohol is to be used for washing and no compressed air for drying up.
Recommended fluid: Agip F. 1 Brake Fluid.

AIR BLEEDING

(See fig. 148)

This operation is required every time when the movement of the control lever is long and elastic because of presence of air bubbles inside the braking circuit.

Proceed as follows:

— turn the handlebar until the master cylinder (fluid reservoir) «A» reaches the horizontal position;
— if necessary fill up the fluid reservoir «A» (take care that during the whole operation the fluid level is not lower than 8 mm than max.;
— act on caliper one time right and one time left.

a) Take off the rubber cap then fit a transparent flexible pipe «I» on drain plug «H»; the other end of this duct will be plunged into a transparent container «L» partially filled up with fluid of the same type;

b) loosen drain plug «H»;

c) completely operate several times the brake control lever «B» release it slowly and wait for a few seconds before operating it again. Repeat this operation until the pipe plunged into the transparent container emits airless fluid;

d) keep the control lever «B» completely drawn and lock the drain plug «H» then remove pipe «I» and fit the rubber cap.

If this air bleeding has been carried out correctly, the efficiency of the brake fluid will be immediately realized after the initial idle movement of the lever «B»; if it is not so, repeat the air bleeding.

Remark: The air in the braking circuit is not completely bled by the above operation; the remaining air is automatically bled after a short time riding; thus causing a less elastic and shorter lever movement.

GENERAL DIRECTIONS FOR REMOVAL OF COMPONENTS FROM THE BRAKING CIRCUIT

Before starting removal, clean the outer parts of components and plug pipe ends to prevent entering of foreign material.
After removal of components, clean and take off grease from metallic parts by means of trichloroethylene, rubber parts will be cleaned using the recommended fluid; trichloroethylene must not get in touch with rubber gaskets.
Handle precision parts with care not to damage them.
After cleaning dry up by means of unfrayed rags and moisten cylinder and piston walls with brake fluid to avoid corrosion.

MASTER CYLINDER (FLUID RESERVOIR)

(See fig. 149)

It consists of a light alloy body (1) incorporating the fluid reservoir (2); this body includes also a cylinder housing which acts as a floater guide (3).
The floates has two housings for gasket (5) and gasket (4) and engages the lever end (6).
A bush (8) guided return spring (7) ensure the floater return.
The floater stop is given by washer (9) and ring (11) incorporating scraper (10) which prevents entering of moisture and foreign material.
Screw (12) secure the control lever (6) to the master cylinder while thumb screw (13) adjust clearance between lever and floater which must be 0.05-0.15 mm by feeler gauge measurement.
A higher or lower clearance would damage working efficiency either of lever or of master cylinder.
The fluid reservoir has a gaiter (14) preventing fluid exit n case the motorcycle falls down; this gaiter is secured by cap (15).

INSPECTION AND CHECKING

Periodically check the fluid level in the reservoir, it has never to be lower than 8 mm under maximum level.
Every 5000 km fill up the fluid reservoir; take the fresh fluid from an original container to be opened only by pouring. The brake fluid is a hygroscopic one and requires complete renewal every 15.000 km or at least once a year.

Check the clearance of 0.05-0.15 mm between floater and lever end. Periodically grease scraper (10) and and floater stem (3); do not use mineral oil or grease.

INSPECTION AND REPLACEMENT OF MASTER CYLINDER COMPONENTS
(See fig. 149 and fig. 151)

In case of uncorrect action of master cylinder (fluid leakages at lever action side, decreasing braking ability) it is necessary to replace gaskets (4 and 5).

Operations are as follows:

— drain the fluid from fiuid reservoir (2);
— remove and plug delivery pipe (16);
— remove the control lever (6);
— insert tool n. 14926400 (53 in fig. 151) into the fluid pass hole and pull the floater (3) outside by lightly using a mallet taking care not to score the hole walls and the outer surfaces of floater (3);
— from floater (3) remove lock ring (11), scraper (10) and washer (9);
— from master cylinder (1) remove return spring (7) and guide bush (8);
— clean accurately oater (3) and master cylinder body (1) and check that they are not damaged. Check also I/D of master cylinder and O/D of floater (3):
  — max. allowed hole dia. mm 15.918
  — min. allowed floater dia. mm 15.832
— check gaskets (4 and 5) if still in good conditions do not remove them; if replacement is necessary remove them by means of a proper tool;
— fit new gaskets (4 and 5) on floater (3) by using tool n. 14926500 (54 in fig. 151) for gasket (5) and tool n. 14926600 (55 in fig. 151) for gasket (4) (pay attention to the mounting position of gasket [5]);
— on floater (3) fit washer (9) scraper (10) (check its good condition) and lock ring (11);
— fit return spring (7) on floater (3) and guide bush (8);
— fit the whole assembly into the master cylinder hole;
— fit lock ring (11) by tool 14926700 (56 in fig. 151) by lightly using a mallet until washer (9) is a travel end;
— connect oil delivery pipe to master cylinder body (1);
— fit lever (6) and check clearance between lever end and floater (3);
— fill up fluid reservoir (2) and drain the air from the braking circuit.

Remark: Before mounting moisten rubber and metallic parts with brake fluid; do not use mineral oil or grease.

CALIPER
(See fig. 150)

It consists of two light alloy bodies (1) joined by two screws (2). Each body includes a cylinder housing acting as a piston guide (3). Sealing is ensured by a gasket (4) lodged in a groove inside the cylinder housing. This sealing is automatically adjusted because brake pad (5) wearing increases piston exit out of cylinder housings.
A dust guard cap (6) prevents entering of moisture or foreign material. The two pistons act directly on the two pads which are secured by two pins (7) each locked by a spring ring (8).
A taper pin (10) pressed in spring (9) prevent pad flapping and make disc setting easier, after braking.
Cap (11) prevents pads from getting too much wet because of mud and water.
Brake fluid is delivered to caliper through hole (12) while hydraulic connection between caliper bodies is provided through two inner holes. Sealing is ensured by gasket (13).
Each body is provided with drain plug «H» for air draining.

INSPECTION AND CHECKING

Every 5000 km check the wearing conditions of pads as follows:

— remover cap (11);
— remove taper pin (10) and spring (9);
— slip off pin, pad retainer (7);
— slip off pads;
  thickness must be:
  — new pad mm 9
  — wear limit mm 6

If thickness is under this wear limit, it is necessary to replace the pads. The friction material has not to be used until to reach the metallic plate which, by touching, would definitely damage the disc and avoid thermal insulation betweenbrake flluid and pad.
Pads are replaced as follows:

— pull pistons (3) into inner caliper bodies (1); take care not to damage dust guard caps (6);
— fit new pads;
— fit pins (7) pad retainers, taper pin (10) and spring (9).

After pad replacement it is not necessary to carry out the air draining of the braking circuit; operate several times the control lever until the caliper pistons reach their normal position (pad-disc clearance 0,2 mm).

Remark: By pad replacement it is recommended to take a little amount of fluid out of fluid reservoir as backing of pistons into housing might cause the fluid to overflow.

Caution: For about 100 km or so, pay attention to operate new pads in order to allow the frictional material a correct efficiency.

INSPECTION AND REPLACEMENT OF CALIPER COMPONENTS

The replacement of caliper gaskets is necessary when fluid leakages occur through cylinder housings; fluid traces will be seen o nbrake discs, and caliper while the fluid level in the reservoir will be lower and lower.

Fluid leakages also involve a poor braking efficiency and elastic control lever movement.
To replace caliper gaskets proceed as follows:

— remove and plug down fuild delivery pipe;

— remove caliper from fork member;

— remove taper pin (10), spring (9), pins — pad retainer — (7) and pads (5);

— dismantle caliper in two bodies;

— remove dust guard cap (6) from the leaking caliper body;

— from this body take off piston by means of a compressed air jet taking care not to damage piston surface;

— by means of a needle remove defective gasket from its housing taking care not to score cylinder housing wall;

— clean accurately piston (3) and cylinder housing and check their condition;
It is recommended to check I/D of cylinder housing and O/D of piston:
  — max. I/D of cylinder housing mm 38.071
  — min. O/D of piston mm 37.930

— fit a new gasket in the cylinder housing groove;

— fit piston (3) into its cylinder housing (use only hand fingers for this operation);

— fit dust guard cap (6), after checking ifn ot damaged, and secure it in its housing on both piston and caliper body;

— join the two caliper bodies, taking care that the gasket (4) is properly lodged in its housing; srew in the two screws (2) by means of a wrench with torque kg/m 4 ÷ 4.5;

— re-assemble caliper on fork member screwing wrench with torque kg/m 4 ÷ 4.5;

— fit pads (5), pins — pad retainer (7) spring (9) and taper pin (10);

— connect fluid delivery pipe to caliper;

— drain the air from the braking circuit.

Remark: Before mounting moisten rubber and metallic parts with brake fluid; do not use mineral oil or grease.

PIPES

Inspection and checking

Conditions of flexible pipes have to be accurately checked.
Damaged pipes must be immediately replaced.

BRAKING DISC

The braking disc is the rotating unit on which the action of braking pads is actuated; consequently its features can remarkably affect braking efficiency.
For use on motorcycles, the surface of this disc is particularly treated to prevent oxidation.
This treatment is also made on braking parts of the disc but after some braking this protection is carried away from the braking parts, thus involvig the correct coupling of pads and disc.

INSPECTION AND CHECKING

The braking disc must be accurately clean; withoutt rust, oil, grease, or other dirt, and must not be deeply scored.

Damaged disc must be rectified on special machines.
Data for parallelism checking, max. allowed shape tolerances:

— contact surface and braking part of the disc mm 0.050
— braking part of the disc mm 0.050
— braking part of the disc (circular check) mm 0.015
— braking part of the disc (radial check) mm 0.060

Min. disc thickness, as indicated by manufacturers, must be absolutely respected.
In case of replacement or overhauling of the disc, it is necessary to check the wobbling of thesame by means of a proper gauge that must not read more than 0.2 mm.
In case of higher wobbling check mounting condition of disc on wheel hub and wheel bearings play.
Torque of screws securing to wheel hub is kg/m 2,2 ÷ 2,4.

BRAKING CIRCUIT FAULTS

FAULT CAUSES	REMEDIES
Brake screeching	
Caliper unfully locked	Screw in securing screws
Defective or missing taper pin springs	Insert new spring
Pad wearing off limit	Fit new pads, after checking disc conditions
Dirty pads; oil or grease	Replace pads
Fitting of wrong pads	Replace pads
Brake wobbling	
Disc wobbling higher than 0.2 mm	Rectify or replace disc
Piston locking	
Braking disc excessive heating on normal riding	
Piston locking, pads glued to disc	Check pistons conditions, clean pad housings in caliper
Playless control lever	Adjust lever play according the directions
Poor braking	
Braking disc dirty with oil or other material	Clean braking disc
Too much worn or vitrified pads	Replace pads, check up braking disc
Pads, dirty with oil or grease	Replace pads
Piston locking	Get piston sliding
Brake blocking	
Too high frictioning pads	Fit proper pads
High disc oxidation	Rectify disc
High pad wearing	
Pads locked in housings, ever touching braking disc	Clean pad housing in caliper check coupling with their guides
Piston locking	Get piston sliding
Disc deeply scored	Rectify or replace disc
Irregular or slantways pad wearing	
Dirty pad housings	Clean pad housings
Unproper piston sliding	Get proper sliding
Taper pin springs defective	Replace springs
Slantways mounted caliper	Check and mount properly
Too long control lever stroke	
Braking disc wobbling higher than 0,2 mm	Rectily or replage braking disc
Presence of air bubbles inside the braking circuit	Bleed the air from the braking circuit
Braking disc deeply scored	Rectify or replace braking disc

FAULT CAUSES	REMEDIES
Floater in master cylinder does not return	
U-bolt securing screws too much tightened	Slightly undo the screws
Lever screw too much tightened (not original part)	Slightly undo the screw
Uncorrect coupling between lever and its housing on master cylinder (too much thickness)	Replace lever
Deformed scraper by etching liquids	Replace scraper
Dirty brake fluid	Strip master cylinder, cleand and check components (seizing and scoring not allowed)
Defective floater return spring	Replace the spring
Fluid leaking from fluid reservoir	
Gaiter uncorrectly fitted	Fit gaiter properly into its housing and smmothly close cap.
Damaged gaiter	Replace gaiter
Damaged fluid reservoir rim	Repair or replace master cylinder

RECOMMENDATIONS

Braking circuit rubber parts (for master cylinder: gaskets, scraper ring, gaiter — for caliper: gasket joining caliper bodies, dust guard cap) are made of a special compound, brake fluid resistant; on the other hand such compound cannot bear etching action of mineral oils, solvents and Diesel oil sometimes used for washing purposes, on the motorcycle.
It is then strongly recommended to avoid any contact of these liquids with braking circuit rubber parts.
On the master cylinder, it might occur that the scraper ring — because of contact with such liquids — melts and glues with floater, affecting the sliding of the same.

BALL AND ROLLER BEARINGS

All ball and roller bearings used on this machine are generously dimensioned for longer life.

INSPECTION

Examine carefully the outer raceway of the inner race and the inner raceway of the outer race. Raceways must be perfeetly smooth and glossy. Should any cracks, nicks, or surface roughness be detected, the complete bearing must be replaced.
Balls and roller must be unimpaired and positively smooth all over their surface. If any fault is detected, replace the bearing.

Never attempt to repair a bearing as such repairs are extremely difficult and never give good results. When pressing in bearings make sure to always operate on the ring which is being pressed in.
Bear in mind that new bearings, before being pressed into a housing or on to a shaft, show a slight backlash (in the range of tousandths of mm only). Such backlash will decrease after the bearing is fitted, but it should not disappear completely otherwise ball and/or rollers would work under stress and the bearing get damaged in a short time.
In journals and thrust bearings a higher end play (in the range of hundredths of mm) is allowed.

FRAME

The frame is made up of two parts: one conventional and the other by two bottom side member which form the cradle carrying the engine and which can be removed.

INSPECTIONS AND OVERHAUL OF THE FRAME

Especially after an accident, check that the frame has not deformed, cracked, or has parts unwelded. Check sizes against fig. 152. If deformed, replacement is recomended.

CENTER AND SIDE STAND RETURN SPRING

Check that springs have not lost their elasticity. Under a load of 30 kgs (62 lbs) the spring should extend 10 mm (.39″).

ELECTRICAL EQUIPMENT

(See wiring diagram fig. 170)

BATTERY FEATURES

Tension	12 V
Charge intensity (3' at 18°)	120 A
Capacity	32 Ah
Length	238 mm (9.37")
Width	127 mm (5")
Height	165 mm (6.49")

The battery is located in the central part of the machine (see A in fig. 153).

INSPECTION AND MAINTENANCE

Battery access if obtained by lifting up the saddle using a suitable lever and disconnecting its anchoring straps.

CLEANING

The battery should always be kept in a perfectly clean and dry condition, especially its top part. Clean it using a hard bristle brush. The cleaning operation is done with the plugs tightened down to prevent dust or foreign matter from entering the electrolyte. Check that there are no cracks in the sealing compound of each single cell (and consequent leakages). Eliminate leaks, if any as the electrolyte will always cause corrosion of any material it might contact.

CHECK AND GREASING OF TERMINAL BLOCK

To undo or tighten the cable terminal locking, use always open ended wrenches.
Never tap on the terminals in order to make removal or fitting easier as this might cause stresses resulting in battery cracks or the terminals detachment with consequent electrolyte leakages.
After a thorough cleaning, terminal and clamps should be smeared with pure vaseline jelly to prevent oxidation. The bottom part of the cable terminals and terminal blocks should be smeared with particular care. Never use lubricating greases.
After cleaning and smearing with vaseline, secure cable terminals to terminal blocks very tightly.

CHECKING ELECTROLYTE LEVEL

Every 3000 kms check electrolyte level and eventually top up each cell with distilled water using a glass or plastic funnel Correct level is attained when the electrolyte tops the plate separators by about 5 mm (3/16"). Always use distilled water and never sulphuric acid. Topping up must be done on a cold battery which has been at rest for about 6 hours.
If the electrolyte level of any one cell drops abnormally, check for possible leakages due to cracks and in such case it is necessary to immediately repair or change the battery.

MEASURING DENSITY AND TEMPERATURE OF ELECTROLYTE

(See fig. 153)

This operation should be carried out periodically in each cell after topping up.
Use a hydrometer as shown in the pictures (153-154) to check density. Use a thermometer with its rounded end completely immerged in the liquid to check temperature.

CORRECTION OF SPECIFIC GRAVITY READING IN RESPECT OF TEMPERATURE

All readings should be brought down to the standard temperature of 25 °C (77 °F).
For each 10 °C (50 °F) difference it is necessary to add or detract 7 g/l i norder to bring the reading to the said value of 25 °C.
For example: a reading of 15 °C (59 °F) = 1.290 sp.g. the corresponding gravity at 25 °C (77 °F) will be 1.290 − 7 = 1.283 a reading of 35 °C (95 °F) = 1.275 the corresponding gravity at a temperature or 25 °C shall be 1.275 + 7 = 1.282 sp.g.
This corrective factor should always be within 1.270-1.280.
When measuring specific gravity the following precautions should be taken:

— take reading at eye level holding the tube vertically and ensuringh that the float is free (see fig. 154);
— after measurement put back the acid in the cell from which it was taken;
— if any drops of acid have dripped, dry them with a woollen cloth.

The following table indicates specific ratings in respect to climate.

CLIMATE	OPECIFIC GRAVITY AT FILLING	SPECIFIC GRAVITY AT END OF CHARGE	MAX. TEMPERATURE PERMISSIBLE DURING CHARGE
TEMPERATE (normally below 32 °C [89 °F])	1260	1270-1280	50 °C
TROPICS (normally over 32 °C [89 °F])	1230	1220-1230	60 °C

PUTTING THE DRY CHARGED BATTERIES IN SERVICE

Batteries are supplied with dry charge plates. In an emergency, these batteries can be used without previous charge after being topped up.

Keep the battery in a dry place.

1 Fill the battery with chemically pure sulphuric acid — specific gravity 1.280 (32 °Bé) measured at 20 °C (68 °F), in tropic 1.230 (27 Bé) at 28 °C (82 °F). Correct level is 5 mm (3/16″) over the plate separators.

2 After replenishement, check temperature and specific gravity of acid. Temperature should not be less than 20 °C (68 °F) and specific gravity not less than 1.270 (1,220 in tropics). With these readings, **the battery is ready for use.**
However, with external temperature under 5 °C (23 °F) and if after filling up the temperature is less than 20 °C (68 °F) it is necessary to proceed with a re-activation charge for 30 minutes at a current intensity 3 times higrer than indicated at point 6.

3 A week after this operation, check the acid level in each cell and if necessary add sulphuric acid.

4 Caution: if the specific gravity and temperature levels indicated at point 2 are not reached, a regular charge is required.

5 Caution: if the battery is not used within a week from filling, so that the generator can charghe it sufficiently, it will be necessary to recharge it.

6 Normal chargin is done at a current intensity corresponding to 1/20 of the battery capacity i.e. 66 Ah : 20 = 3.3 A or 200 Ah : 20 = 10 A.
In any case, charging should proceed until the tension stays constant for 2-3 hours with 2.6-2.7 V per cell.
After this, check acid level and if necessary add sulphuric acid. For proper mixing of the liquind, continue the charge for a further 15 minutes.
During the carge, temperature should not exceed 40 °C (105 °F). In tropics 50 °C (125 °F). If the temperature is higher, stop the charge and allow the battery to cool down.

7 For successive charges it is possible to use a current of double intensity than stated at 5. Up to the gasification point (2.4 V each cell), higher current intensities are allowed.

8 The battery is charged when the tension of 2.6-2.7 V each cell and the specific gravity of 1280 (1230 in tropics) remains constant.

9 Ensure that the acid level is always at specified level while the battery is in use, adding distilled water as necessary (Remember that only water evaporates). Check electrolite level every month or, in the very hot seasons, every werk.

10 If after charging the battery is not used, it is necessary to recharge it every 3 months.

ALTERNATOR (see fig. 155)

MAIN FEATURES

Brand BOSCH	G1 (R) 14 V 13 A 19 n. 0120340001
Drive	directly by crankshaft
Output W/V	180/14
Current intensity Ah	13
Charge starting r.p.m.	980
Peak revs r.p.m.	10.000
Max. permissible eccentricity	0.06 mm
Minimum commutator dia.	28.6 mm
Field winding resistance	6.30 ohm + 10%
3-phase winding resistance of stator (A.C.)	0.5 ohm + 10%

TESTING THE ALTERNATOR ON THE BENCH

Output data (with regulator):

Load	Top speed
5 A	1350 r.p.m.
10 A	2300 r.p.m.
13 A	6000 r.p.m.

REGULATOR (see A in fig. 156)

Brand BOSCH	AD 1/14 V n. 0190601009
Test speed	4500 r.p.m.
Test load	13 Amp.
Adjusting voltage	13.9 ÷ 14.8 V
Set load at nominal voltage	330 ÷ 360 W

RECTIFIER

Brand BOSCH	14 V/15A

STARTER MOTOR
(See fig. 157)

Brand BOSCH	Bendix (DG(L) 12 V 0.4 PS) n. 0.001.160.010
Voltage	12 V
Current intensity Ah	24
Output	0.4 HP
Poles	4
Exciter winding	in series
Miminum commutator ring dia.	31.2 mm
Minimum brus length	11.5 mm
Brush pressure	750-1600 grams
Lengthwise commutator tolerance	0.05-0.2 mm
Pinion	8 teeth - mod. 2.5
Pinion rotation	anticlockwise

TEST BENCH OF STARTER MOTOR
(See diagramm fig. 158)

The main electrical line from the bench is to be connected to the motor plug. Ensure the clamp does not get in touch with the motor casing.

LUBRICATION OF SPINDLE AND BUSHING

(See lubrication chart fig. 159)
Special BOSCH 1 V 13 oil and use special BOSCH 1 v 13 oil and silicon grease BOSCH FT 2 v 3.

INGNITION SYSTEM

This system includes:
— double contact breaker (**Marelli S 311 A**);
— ignition coils (**Marelli BM 200 C**);
— spark plugs (normal touring: **Marelli CW 240 L**; continued use at high speed: **Marelli CW 275 L - Lodge 4MLNY - Champion N 3**);
— high and low tension leads.

DOUBLE CONTACT BREAKER
(See fig. 160)

Marelli S 311 A incorporating contact points, 2 condensors, and the automatic advance unit. It is driven by the camshaft through a gear machined on same.

TEST DATA

SPECIFICATIONS

MARELLI PART N.	ROTATION SENSE	NOMINAL VOLTAGE	AUTOMATIC ADVANCE	CYLINDER N.	CONDENSOR CAPACITY F
S 311 A	Counterclockwise	12 V	13° ± 1	2	0,25

VOLTAGE TEST

Check dielectric strength with a 3 seconds test using 500 V-50 Hz a.c.

MECHANICAL CHECK

MARELLI PART N.	CONTACTS OPENING mm	PRESSURE ON CONTACTS gr	BREAKER ARM OPENING ANGLE	BREAKER ARM CLOSING ANGLE
S 311 A	0.37-0.43	500-600	180° $\pm \frac{0°}{5°}$	180° $\pm \frac{0°}{5°}$
Breaker arm angle: 225° ± 1.				

AUTOMATIC ADVANCE DEVICE

Consits of two suitably shaped centrifugal weights suitably shaped and pivoted on the spindles of the plates which are solid with the driving shaft.
At a predetermined number of revs, the weights begin to move and by means of a suitable slot in the same they entrain the pins secured to the cam plate, thus causing an angular displacement of the cam in respect to the distributor shaft. Return of weights is obtained by return springs hooked to the pins and their rest position is also determined by the pin when it contacts the end of the slot.
Every engine speed requires the equivalent ignition moment according to a curve which is determined in relation to the engine speed. Automation of the automatic adance is then representend by a diagram (see fig. 161). This unit is part of th edouble contact breaker unit.

CONDENSER (see A in fig. 160)

Marelli type **CE 36 N**.

The condensers are inserted in parallel with the contact points of both breakers and their function is to expedite the current break and at the same time to damper the strong sparking originating at the points as a result of the break in the primary windings.
The condensors consits of 2 tin foil strips insulated by the interposition of paper strips. The whole is then rolled up and dipped in a special insulating oil sealed in a casing.
One of the tin foild is internally connected to the metallic case while the other is connected to an insulated terminal.
Condenser is part of double contact breaker.

COILS (See fig. 162)

Tre **Marelli** type **BM 200 C** coils consist mainly of 2 windings, the primary of which is formed by a few hundredths turns of fairly thick wire and the second by a few thousandths turns of thinner gauge wire.

TESTING DATA

SPECIFICATIONS

Feed current	12 V
Dia. of coil body	46 mm
Employment	on motorvehicles
N. of cylinders	1 or 2

WINDINGS RESISTANCE AT 20 °C

Primary	3,35 Ω ± 6%
Secondary	6,200 Ω ± 10%

COIL TESTS

Connect up the coil as shown in diagram, inserting in the circuit a 3 point normalized spark gap instrument as used for 4 cylinder engines (i.e. S 86 A) having a 60° ± 3° contact closing angle.
Turning the distributor at the specified speed and feeding the coils at the current specified in the following table, one should obtain the following spark plug values.

MAIN LINE VOLTAGE VOLTS	DISTRIBUTOR SPEED r.p.m.	CRITICAL LENGTH OF SPARK PLUG	
		COLD mm	HOT mm
8	75	8	6
12	450	10	9
12	1500	7	6

The hot engine measurement should be amde after at least 2 hours of operation at nominal current with distrinutor at 900 r.p.m.
Each test last 10 seconds during which the spark should be regular. Critical length of spark can be defined as the spark should be regular.
Critical length of spark can be defined as the spark gap distance at which one starts to note no sparking.

PERFORATION TEST

At the temperature of 20 °C ± 5°, ensure that coil stands up to a tension of 1000 V eff. (50 Hz) applied for 3 seconds between a primary clamp and casing without electrical descharges.

MAINTENANCE, INSPECTION, AND ADJUSTMENT OF DOUBLE CONTACT BREAKER
MAINTENANCE

Every 3000 kms (1800 miles) lubricate the cam felt.

INSPECTION

Remove the contact breaker cover by undoing its securing screws.
If contacts «A» and «B» are fouled or greasy, clean them with a petrol soaked cloth. If damaged in any way, replace them.
Check points breaker gap «A» (R/H cylinder, red cable) and breaker «B» (L/H cylinder, green cable) which should be 0.37-0,43 mm (.014-.017").
If this distance is not correct, adjust the gap as follows.

ADJUSTMENT OF CONTACT POINTS
(See fig. 164)

Contacts points «A» - R/H cylinder (rider on soadle)

— Bring cam «I» to maximum lift, slacken screws C and D and acting on notch F move plate E to the position which will give the correct distance, relocking then screws C and D.

Contact points «B» - L/H cylinder (rider on saddle)

— Bring cam «I» to maximum lift, loosen screws G and H and acting on notch M move plate L to the position which will give the correct distance, retightening then screws G and H.

CHECKING AND ADJUSTING IGNITION TIMING (FIXED ADVANCE) (see fig. 164-165)

Remove the rubber plate which seals the inspection hole on the R/H side of the gearbox, in proximity of the flywheel.
To find the exact moment when the points of breakers A and B (fig. 164) start separating, it is best to use a suitable timing device mounted in between the clamp terminal of the breaker which is being tested and the ground.

TIMING OF THE R/H CYLINDER
(See fig. 165)

— Rotate the flywheel anticlockwise until the piston is at the end of the compression stroke (both valves closed).
In this position, mark «D» on the flywheel (TDC of R/H cylinder) should coincide with mark 1 on the rim of the inspection hole;
— rotate now the flywheel clockwise to a point about 15 mm (.59″) in a forward position to the flywheel mark (2 in fig. 165) and then rotate back the flywheel very slowly to bring mark 2 in coincidence with mark 1 on the inspection hole rim.
Purpose of this operation is to recover any backlash of the gears. In this position, fiixed advance mark 2 is 13° from TDC («D») and so at the commencement of the points separation (A in fig. 164).

TIMING OF THE L/H CYLINDER
(See fig. 165)

— Rotate the flywheel anticlockwise until the piston is at the end of the compression stroke (with both valves closed). In this position mark «S» on the flywheel (TDC of the L/H cylinder) should coincide with mark 1 on the gearbox inspection hole;
— rotate now the flywheel clockwise to a point about 15 mm (.59″) in a forward position to flywheel fixed advance mark 3 (see fig. 165) and slowly rotate the flywheel backwards on the position where fixed advance mark 3 is in coincidence with mark on the inspection hole rim.
Purpose of this operation is to recover any gear backlash. In this position, fixed advance mark 3 is 13° from TDC «S» and so at the point where the contact points stars separating («B» in fig. 164).

• **NB.** - If the points A and B in fig. 164 do not start opening in the above positions, the ingition timing needs adjustment.

ADJUSTMENT OF IGNITION TIMING

R/H cylinder (contact breaker «A» - red cable)

— Set points of contact breaker «A» at correct distance (see chapter «Inspection of double contact breaker);
— loosen contact breaker securing screws to crankcase by means of wrench 14927000 (13 in fig. 9) and move the breaker to the right or left to find the position where the points start opening when mark 2 in fig. 165 (fixed advance mark) on the flywheel coincides with mark 1 on the rim of the inspection hole, proceeding as described in «Checking and adjustment of ignition timing»;
— finally re-tighten the contact breaker by means of wrench 14927000 (13 in fig. 9) and fix securing screws.

L/H cylinder (contact breaker «B» - green cable)

— Set contact points of breaker «B» at a correct distance (see chapter «Inspection and of double contact breaker»);
— proceeding as described in «Checking and adjusting ignition timing of the L/H cylinder» (Contact breaker «B» fig. 164), set flywheel mark 3 in fig. 165 in coincidence with mark 1;
— loosen screws «O» and «P» (fig. 164) which secure the contact breaker plate «B» and by acting on notch «Q» move the plate to the position where the points of breaker «B» start opening;
— finally tighten screws «O» and «P».

CHECKING THE INGNITION TIMING (FIXED ADVANCE) WITH THE ENGINE ASSEMBLED ON THE MOTORCYCLE

CHECKING THE IGNITION TIMING (R/H cylinder)
(See fig. 165)

Proceed as follows:
- remove alternator cover after loosening securing screws to distribution cover;
- fit tool with arrow «A» n. 14927500 (26 in fig. 64) on the threaded hole of distribution cover;
- undo the screw securing alternator to crankshaft;
- remove the rubber plug on the gear box inspection hole (on R/H of gear box);
- turn alternator clockwise until the mark «D» on flywheel (TDC of right cylinder) coincides with the marks «1» on inspection hole rim (for mark «D» and marks «1» see fig. 165);
- fit tool n. 14927400 (25 in fig. 64) on the alternator; then bring mark «P.M.S. (TDC) of this disc in line with the arrow of tool «A» and tightly lock the screw on crankshart paying attention not to shift P.M.S. mark (TDC) coinciding with arrow «A»;
- turn alternator, with checking disc on it, anticlockwise until the mark «A.F.» on the disc comes in line with arrow «A» at this point the contact breaker for R/H cylinder («A» in fig. 164) must start opening.

To check if contact breaker open correctly at the fixed point, it is recommended to use a proper light indicator set to be inserted between the clamp of contact breaker for R/H cylinder and the ground.

Checking the ignition timing (L/H cylinder)

Proceed as by the checking of R/H cylinder by carrying out following changes:
- turn flywheel clockwise until the mark «S» comes in line with marks «1» on hole inspection rim;
- undo the screw securing tool n. 14927400 (25 in fig. 64) and get the mark «P.M.S.» (TDC) in line with arrow «A» the lock the screw;
- insert light indicator set between the clamp of contact breaker for L/H cylinder and the ground.

CHECKING THE IGNITION ADVANCE (fixed and automatic) BY MEANS OF A STROBOSCOPE LAMP
(See fig. 54 and diagram fig. 166)

Ignition data:

— fixed advance	13°
— automatic advance	26°
— full advance (fixed and automatic)	39° ± 3°

CHECKING THE FULL ADVANCE (fixed and automatic)

Following marks are indicated on check disc n. 14927400 (25 in fig. 64)
- P.M.S. (top dead centre)
- A.F. (fixed advance)
- A.T. (full advance, fixed and automatic).

This disc has to be mounted on the alternator (as previously described) while the tool n. 14927500 (26 in fig. 64) with arrow «A» has to be mounted on the distribution cover (as previously described).
After fitting the check disc and arrow tool, turn the flywheel so that its mark «D» comes in line with marks «1» on inspection hole rim (see fig. 165) and mark «P.M.S.» (TDC) on the check disc comes in line with arrow «A» (see fig. 64) (for this operation see «Ignition timing for R/H cylinder».
To check ignition advance (fixed and automatic) by means of a stroboscope lamp proceed as follows:
- connect stroboscope lamp cable to R/H cylinder spark plug (sitting on saddle);
- connect the two clamped cables of stroboscope lamp to a battery; positive clamp (÷) to positive pole and the other clamp to battery negative pole (—);
- start the engine and direct the stroboscope lamp beam on arrow «A»; check ignition advance — fixed and automatic — of R/H cylinder;
- checking of ignition advance of L/H cylinder is carried out as above, taking note that stroboscope lamp cable is to be connected to L/H cylinder spark plug. Turn alternator so that mark «S» on flywheel comes in line with marks «1» on the inspection hole rim; then undo the screw securing the chcek disc on alternator and bring mark P.M.S. (TDC) on the disc in line with arrow «A». Now start the engine;
- check that arrow «A» is in line with mark «A.F.» (fixed advance) and mark «A.T.» (full advance - fixed and automatic) for both R/H and L/H cylinders at following engine revs.:
  - mark «A.F.» (fixed advance at 1500 r.p.m. ± 100
  - mark «A.T.» (full advance) (fixed and automatic) at 4500 r.p.m. ± 100

If checking detects that arrow «A» is in line with marks «A.F.» and «A.T.» on the check disc at above engine revs. this means that ignition advance (fixed and automatic) on both R/H and L/H cylinders is correct.

CONNECTION OF THE CONTACT BREAKER CABLES TO IGNITION COILS (see fig. 167)

Do not forget that red cable «C» of the R/H cylinder breaker has to be connected to coil A and that green cable D for the L/H cylinder breaker has to be connected to coil B.

SPARK PLUGS (see fig. 168)

This model fits spark plugs n. 240 (points gap 0.6 mm = .23″) and in the tool kits are included 2 fur-

ther plugs n. 275 (points gap 0.5 mm = .019″).
The 240 thermal degree plug is recommended for normal touring rides. The 275 thermal degree plug is recommended for continued use of the machine at high speed.
The spark plugs are best cleaned with petrol and a wire brush, using a needle for the inner part.

In re-fitting the plugs ensure they are properly started for a few turns. If not properly started, the cylinder head thread may get stripped.
If overtightened the thread may get strained.
In any case, the plugs should be replaced every 10.000 kms. (6000 miles) even if they still appear in good conditions.

ELECTRIC HORNS (See fig. 169)

The horn circuit includes:
— high pitched tone horn;
— low pitched tone horn;
— control button on the L/H side of the handlebar;
— ground on frame.

SPECIFICATIONS

Combined horn, **Belli** make:
— High pitch horn (90/12/2): absorbption 3 A;
— Low pitch horn (90/12/4): absorbption 4 A;
— Total combined absorption: 7 A.

OVERHAUL AND REPAIR INSTRUCTION

If any horn loses its tone or fails altogetner, check if this is not due to some fault in the electric system.
If the horn does not work, ensure the pushbutton is not faulty or any wire is disconnected in the terminal block.
If horn gives an irregular sound, check if securing bolt is well tight.
If the horn sounds uninterruptedly, inspect the grounded contact between button and horns.
Should this inspection fail to determine the trouble, the fault lies obviously in the horns themselves and they should be replaced or repaired by a specialized shop.

LIGHTING EQUIPMENT

HEADLIGHT - EUROPEAN VERSION (See fig. 170)

This model fits a 40/45 W two-filament bulb for high and low beam and a 4 W bulb for parking or town driving light.
Acces to the lamp is obtained by undoing screw 1 and pulling the rim from below in order to slip it out of the top retaining lug (2).
To replace the bulb it is necessary to disconnect the faston cables, remove retaining springs 3 and withdraw it from the inside.

HEAD LIGHT (USA VERSION):

sealed beam insert 40/45 W.

INSTRUMENTS PANEL
(See fig. 171)

This incorporates:
— speedometer (1);
— Rev-counter (2);
— red indicator light for insufficient battery charge (3);
— orange neutral indicator (4);
— red indicator light for insufficient oil pressure (5);
— green indicator light showing lights on (European version);
— red parking light indicator (USA version).

IGNITION SWITCH
(See fig. 172)

The ignition key has 5 positions:
— «0» (vertical) machine at standill, key not removable;
— «1» (key turned anticlockwise). Machine at standstill, key removable. The sterring is locked on removal of key;
— «I» intermediate position (key turned rloikwise between position «O» and position «2»). Key removable. The key can be removed without locking the steering;
— «2» running position or ammachine ready to set out (key turned clockwise). For daylight driving no other operation is necessary. For night driving, the lighting switch must be actuated (see fig. 175);
— «3» is only for engine starting (key turned clockwise from position «2»). As soon as the engine starts, on releasing, the key return automatically in position 2.

DISMANTLING THE IGNITION SWITCH
(See fig. 173)

— disconnect electric cables;
— move ignition key towards pawl A and withdraw key;
— undo screws B;
— press pawl A by the aid of a pointed tool and withdraw the complete switch C from its housing D.

STARTER BUTTON
(See fig. 174)

It is located on the R/H handlebar. With key in position (2 see fig. 172) the machine is ready to set out. To start the engine pull clutch lever fully and press button A.

LIGHT AND HORN SWITCH
(See fig. 175)

It is located on left handlebar:

«A» **Light switch**
— position «1» = parking light (town driving light);
— position «2» = low beam.

«B» **Dimmer switch**
— position «3» = low beam;
— position «4» = high beam (or vice versa).

«C» **Horn button**

TERMINAL PLATE WITH FUSES
(See B in fig. 176)

It is located in the central part of the motorcycle. To get access to this, raise the saddle by acting the proper leve on the left eide of motorcycle.
— n. 8 of 15 A;
— n. 1 of 25 A.

COURTESY LIGHT
(See A in fig. 176)

Raising the saddle lights the lamp. Bulb fitted: 3 W.

TAIL AND STOP LIGHT

This unit is secured to the rear fender and fits a two-filament bulb for plate illumination (5 W) and stop light (20 W).
Front brake (shoe): incorporated in the right brake control cable.
Front brake (disc): incorporated in the L/H side of twin control at bottom yoke.

Rear brake (cable): incorporated in the control cable.
Rear brake (link): incorporated on frame, spring joined to control lever.

BULBS (12 V)

— Headlight:
40/45 two-filament bulb for low and high beam.
5 W bulb for parking light, (European version).

— Tail lamp:
5/21 W two-filament bulb for parking light and stop.

— Instrument panel:
1.2 W red bulb for insufficient oil pressure.
1.2 W orange bulb for neutral indicator.
1.2 W red bulb for insufficient generator charge.
1.2 W green light indicating lights on.

— Rev-counter and speedometer illumination:
3 W bulb.

— Courtesy light:
3 W bulb.

— Turn light indicators:
21 W bulbs.

TURN INDICATOR LIGHTS (REAR AND FRONT)

Electric wiring is fit for mounting of these assemblies (even if the production machines do not fit them). The front lights are to be mounted on headlight and its supporting lugs.

— The rear lights are to be mounted, by means of screws, on the rear side of machine lift grips.

Connect then lights to electric wiring.

CABLES

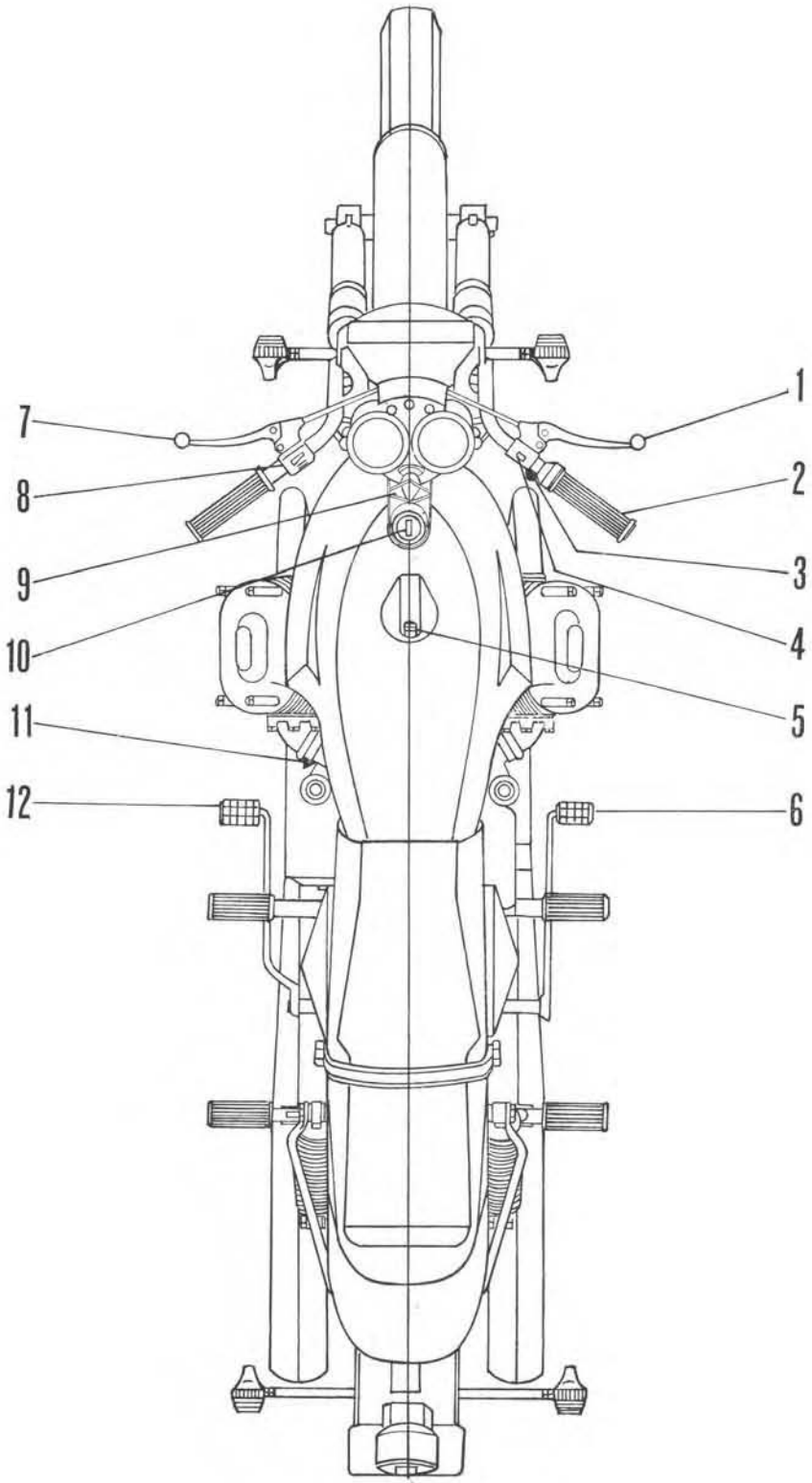
Check these over periodically to ensure they are in good condition.
Replace as necessary.

• **NB.** - If any extra accessories are added, ensure that these are connected to terminals which can stand the extra load without going beyond the capacity of the terminal itself or the H.T. loads, thus avoiding possible damage to the electric system.

CONTROLS AND ACCESSORIES (Front Shoe Brakes)

(See fig. 177)

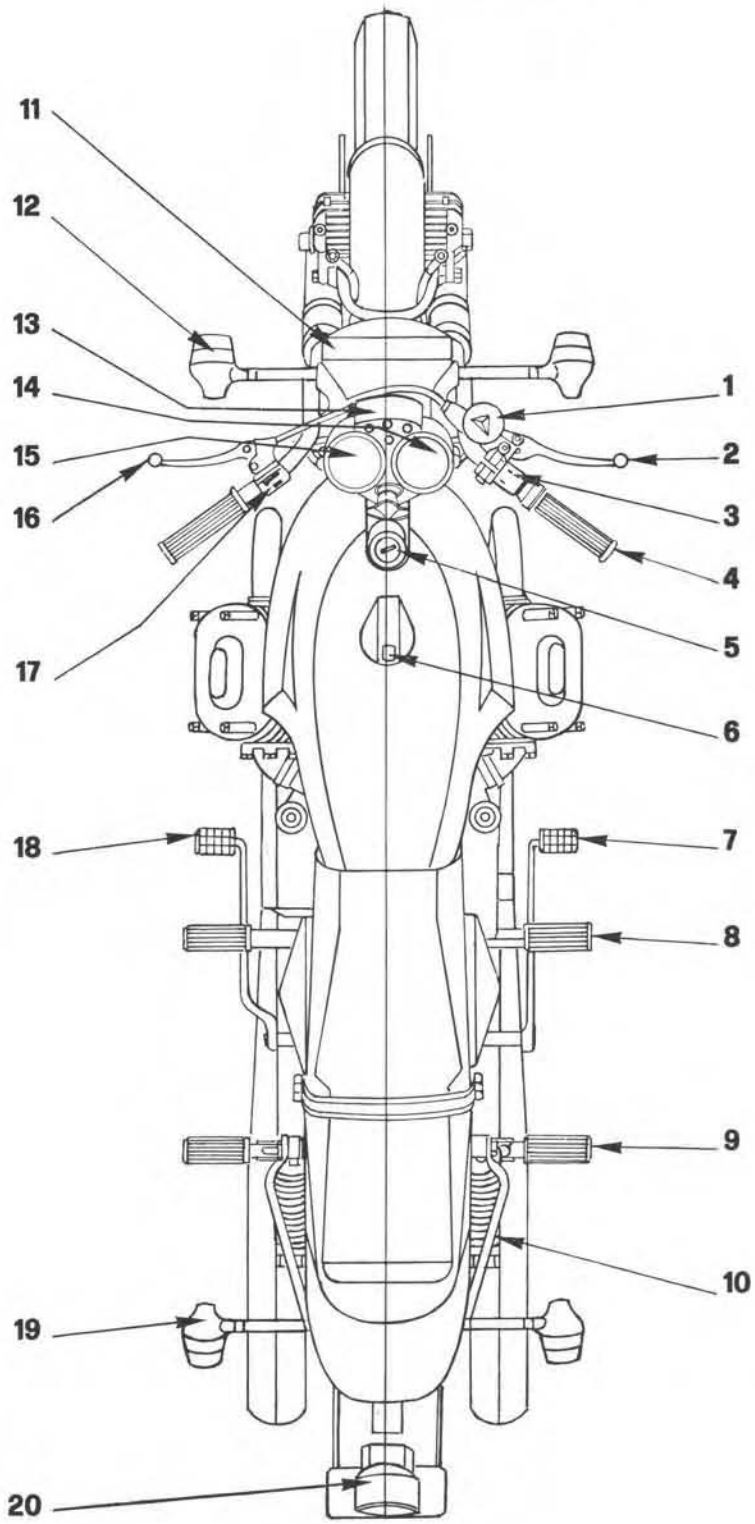
1 Front brake control lever.
2 Throttle control grip.
3 Engine starter button.
4 Turn light switch.
5 Fuel tank filler cap opening button.
6 Gear change control lever.
7 Clutch control lever.
8 Light switch and horn button.
9 Steering damper control knob.
10 Control key.
11 Carburettor starter control lever.
12 Rear brake control lever.



CONTROLS AND ACCESSORIES (Front Disc Brakes)

(See fig. 178)

1 Master cylinder (brake fluid reservoir).
2 Front brake control lever.
3 Turn light switch.
4 Throttle control grip.
5 Starting switch and steering locking.
6 Fule tank filler cap.
7 Rear brake control lever.
8 Front foot-rest.
9 Rear foot-rest.
10 Rear dampers.
11 Headlight.
12 Front turn lights.
13 Indicator lights panel.
14 Speedometer.
15 Rev. counter.
16 Clutch control lever.
17 Light switch and horn button.
18 Gear change pedal.
19 Rear turn lights.
20 Tail light.



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LUBRICATION AND MAINTENANCE CHART

(See fig. 179)

MONTHLY (EVERY 3000 KM)

1 Check electrolite level in battery.

PERIODICALLY

2 Check tyre pressure.

AFTER FIRST 500 KM

3 Replace crankcase oil.
4 Tighten all nuts and bolts.
5 Check tightening of wheel spokes and wheel truing.
6 Check clearance between rocker and valve.

EVERY 500 KM

7 Check oil level in crankcase.

EVERY 1500 KM

8 Check tightening of wheel spokes and wheel truing.

EVERY 3000 KM

9 Replace oil in crankcase.
10 Check clearance between rocker and valve.
11 Check oil level in gear box.
12 Check oil level in rear drive box.

EVERY 5000 KM

13 Check fluid level in fluid reservoir (front disc brakes).

EVERY 10000 KM

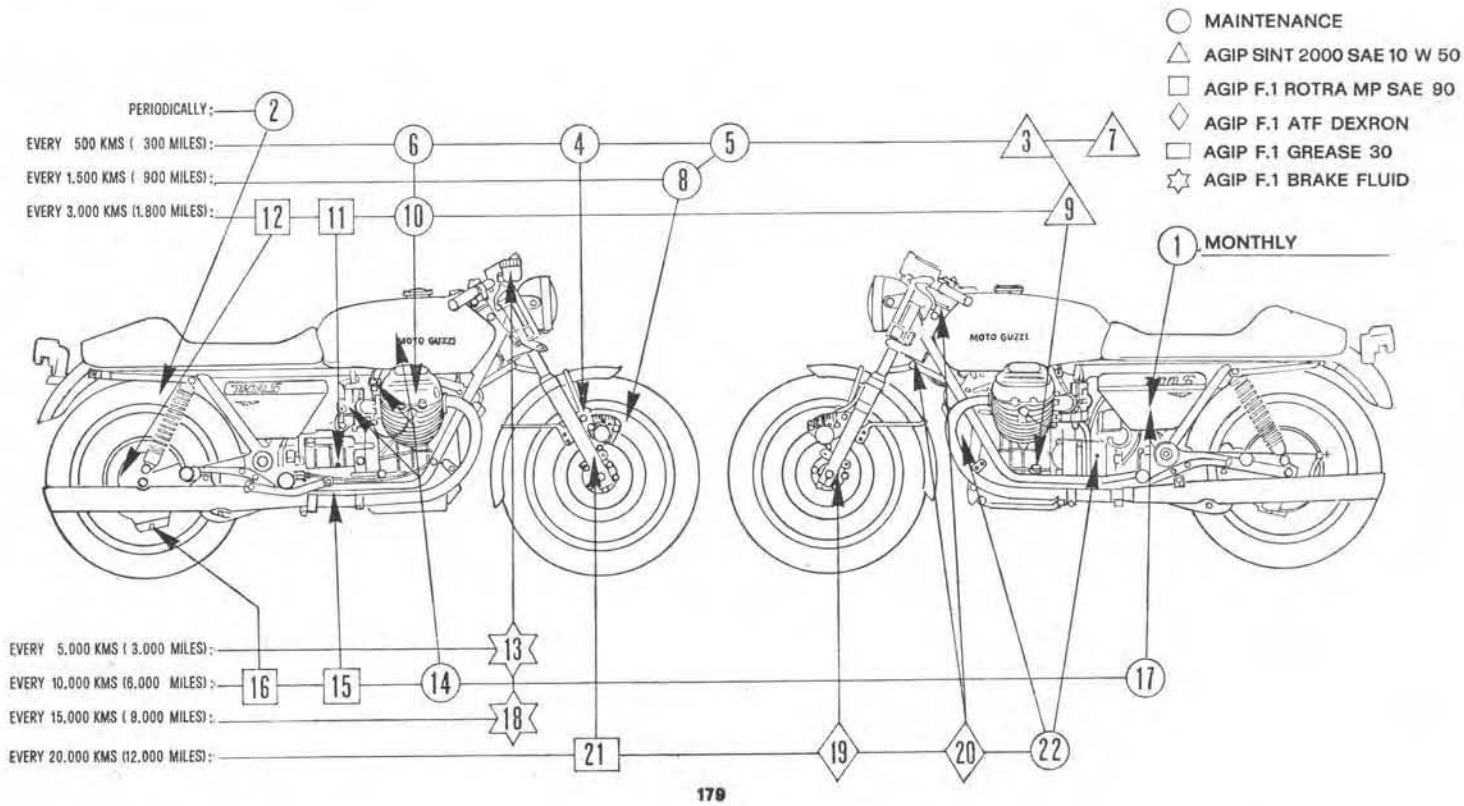
14 Clean fuel tank, fuel tap filters and fuel line.
15 Replace oil in gear box.
16 Replace oil in rear drive box.
17 Clean and grease battery connections.

EVERY 15000 KM

18 Replace the fluid of front braking circuit.

AFTER FIRST 20000 KM

19 Check conditions of wheel bearings, pack with grease «Agip F. 1 Grease 30».
20 Check conditions of steering bearings, pack with grease «Agip Grease 30».
21 Replace oil in fork members (Agip F. 1 ATF Dexron l. 0.050 each member).
22 Clean starter motor commutator and alternator slip ring using a petrol moistened rag.



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WIRING - DIAGRAM

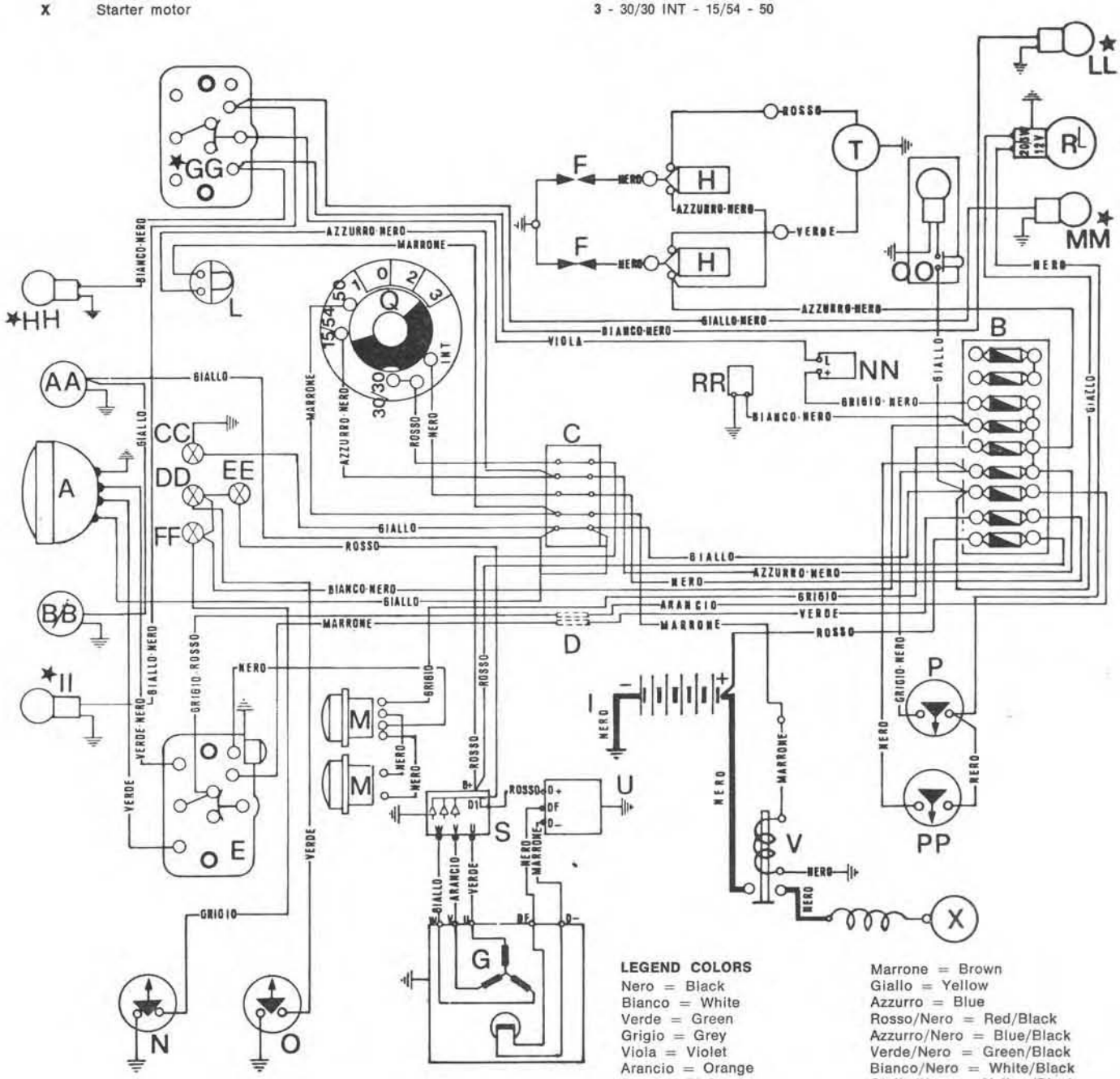
(See fig. 180)

A	Headlight: (buld 40/45W - 12V - bulb 5W - 12V) European version
	Sealed beam insert (40/45W - 12V) USA version
B	Terminal block block with fuses
C	Distibuting block
D	Faston connectors
E	Switch, lighting and horn control
F	Spark plug
G	Generator
H	H.T. Coils
I	Accumulator
L	Engine starting bottom
M	Horn
N	Oil pressure indicator cutout
O	Neutral position indicator cutout
P	Rear stop light cutout
Q	Ignition switch
R	Number plate and stop light
S	Rectifier
T	Double contact breaker
U	Voltage regulator
V	Solenoid
X	Starter motor

AA	Speedometer (bulb 12V - 3W)
BB	Rev. counter (bulb 12V - 3W)
CC	Green warning light (12V - 1,2W) lights on (European version)
	Or red warning light (12V - 1,2W) partking (USA version)
DD	Orange warning light (12V - 1,2W) neutral indicator
EE	Red warning light (12V - 1,2W) oil pressure
FF	Red warning light (12V - 1,2W) battery charge
GG	Turn indicator lights cutout
HH	Front turn light, right (orange)
II	Front turn light, left (orange)
LL	Rear turn light, right (orange)
MM	Rear turn light, left (orange)
NN	Flasher unit relay
OO	Courtesy light
PP	Front stop light cutout
RR	Electrovalve

IGNITION SWITCH POSITION

0 -
1 - 30/30 INT
2 - 30/30 INT - 15/54
3 - 30/30 INT - 15/54 - 50



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LEGEND COLORS

Nero = Black	Marrone = Brown
Bianco = White	Giallo = Yellow
Verde = Green	Azzurro = Blue
Grigio = Grey	Rosso/Nero = Red/Black
Viola = Violet	Azzurro/Nero = Blue/Black
Arancio = Orange	Verde/Nero = Green/Black
Rosa = Pink	Bianco/Nero = White/Black
Rosso = Red	Giallo/Nero = Yellow/Black
	Grigio/Nero = Grey/Black

ADDITIONS AND CHAGES FOR 850-T MODEL

MAIN FEATURES

ENGINE

Cycle:	4 stroke
Number of cylinders:	2
Cylinder disposition:	«V» type 90°
Bore:	83 mm
Stroke:	78 mm
Displacement:	844 cc
Compression ratio:	9.5
Max. output:	53 HP at 6300 r.p.m.
Max. revs output:	6000 r.p.m.

Valve gear

— inlet:	valve opens	20° before TDC
	valve closes	52° after BDC
— exhaust:	valve opens	52° before BDC
	valve closes	20° after TDC

Rocker clearance for valve timing: 1.5 mm
Normal rocker clearance (cold engine): 0.22 mm

2 Dell'Orto Carburettors type VHB 30 CD (right) type VHB 30 CS (left).

Lubrication

By pressure with gear pump.
Oil pressure 3.8 ÷ 4.2 kg/cm² (pressure relief valve).
Oil pressure solenoid.

Generator-alternator

On the front crankshaft (14 V - 13 A).

Ignition

By battery with double contact breaker.

— Initial advance:	8°
— Automatic advance:	26°
— full advance (fixed and automatic):	34°
— Contact breaker gap:	mm 0.42 ÷ 0.48
— Spark plugs:	∅ 14 x 1.25 (long thread) thermal degree 240
— Spark plug point gap:	0.6 mm
— Ignition coils:	n. 2

Starting

Electric starter (12 V - 0.7 HP) with electromagnetic rachet control and relay. Toothed crown joined to flywheel.
Starter button on R/H handlebar.

TRANSMISSIONS

Clutch

Dry discs, flywheel driven. Lever controlled from the handlebar (L/H side) .

Speed change

5 speed, constant mesh gears· frontal engagement, cush drive incorporated foot controlled from L/H side of vehicle.

Secondary drive

Bevel set ration (gearbox-wheel): 1.465 (Z = 8/37).
Overal lgear ratioes:

1ow gear:	1:11.424
2nd gear:	1: 7.928
3rd gear:	1: 5.980
4th gear:	1: 4.963
high gear:	1: 4.284

CYCLE PARTS

Frame:	tubular structure, duplex craddle.
Suspensions:	telescopic front fork with hydraulic dampers. Rear swinging arm with externally adjustable springs.
Wheels:	spoked rims, WM 3/2.15 x 18" front and rear.
Tyres:	Front studdedtyre 3.50 H - 18 Rear studdedtyre 4.10 H - 18 Tyre pressure: front, solo: 1.8 kg/cm² with pillion: 1.8 kg/cm² rear, solo: 2.2 kg/cm² with pillion: 2.5 kg/cm²

• **NB.** - The above tyre pressure are for normal cruising speed. Ir using the machine at constant high speed or on motorways, the above pressure should be increased of 0.2 kg/cm².

Brakes:	Front disc hydraulic brake, caliper with twin braking cylinder (disc ∅ mm 300). Lever controlled from the right handlebar. Rear shoe mechanical brake (∅ 220 x 25) pedal operated from the R/H side of the motorcycle.

Overall dimensions and weights

Wheelbase:	m 1.470
Max. lenght:	m 2.200
Max. width:	m 0.780
Max. height:	m 1.060
Min. ground clearance:	m 0.150

Weight of motorcycle (in running order): kg 235 a.

Performances

Max. speed solo:

Low gear:	km/h 66
2nd gear:	km/h 95
3rd gear:	km/h 126
4th gear:	km/h 152
top gear:	km/h 184
Max. speed at max. r.p.m.:	km/h 202

Fuel consumption: l 7.27 x 100 km (CUNA regulations).

Electrical equipment

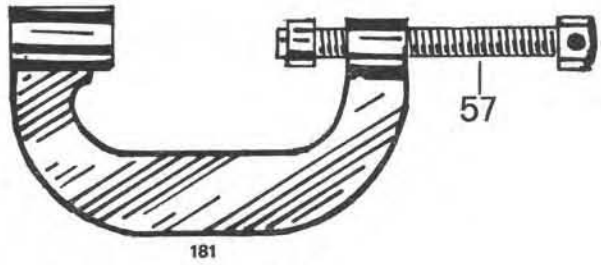
Battery:	12 V - 32 Ah
Headlight (bulb) (European Model):	
high and low beam:	12 V - 45/40 W
town driving:	12 V - 5 W
Head light (USA version): Sealed beam insert 40/45 W	
Tail light (bulb): town driving or parking and stop light:	12 V - 5/20 W
Turn lights (bulbs):	12 V - 21 W
Instrument panel (bulbs):	n. 4 (12 V - 1.2 W)
Horns:	12 V

FUEL AND OIL CAPACITIES

Part to be replenished	Quantity	Recommendation
Fuel tank	25 lts	Petrol, super (98/100 NO-RM)
Reserve	4 lts	
Sump	3.5 lts	Oil «Agip SINT 2000 SAE 10 W/50»
Gear box	0.750 lts	Oil «Agip F.1 Rotra MP SAE 90»
Rear drive box	0.360 lts of which:	
	0.340 lts	Oil «Agip F.1 Rotra MP SAE 90»
	0.020 lts	Oil «Molykote» type A
Front fork	0.050 lts	Oil «Agip F.1 ATF Dexron»
Disc brake circuit		Fluid «Agip F.1 Brake Fluid»

SPECIFIC WORKSHOP TOOLS

FIG. N.	REF. NUMBER	DESCRIPTION
57	13907860	Puller, piston pin (fig. 181)



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CYLINDERS - PISTONS - PISTON RINGS

(See fig. 182 and 183)

SELECTION OF CYLINDER DIA.

CLASS «A»	CLASS «B»	CLASS «C»
83.000	83.006	83.012
83.006	83.012	83.018

Cylinders must always be matched with pistons of same class.

SELECTION OF PISTON DIA.

CLASS «A»	CLASS «B»	CLASS «C»
82.968	82.974	82.980
82.974	82.980	82.986

Pistons must always be matched with pistons of same class.

PISTON RINGS
(See fig. 183)

— n. 2 upper compression rings
Ø 83 mm - thick. mm 1.478-1.490
— n. 1 intermediate oil scraper
Ø 83 mm - thick. mm 1.478-1.490
— n. 1 lower oil scraper
Ø 83 mm - thick. mm 3.978-3,990

PISTON PIN
(See fig. 183)

— Length:
mm 59.970-59.984 - Ø mm 22.000 ÷ 22.004
— Piston pin coupling data:
play mm 0.006 to a negative clearance of mm 0.004.

REMOVAL OF PIN FROM PISTON

After removal of circlips, use tool n. 13907860 (57 in fig. 181) to slide pin out of piston and con-rod small end.

CRANKSHAFT
(See fig. 184)

The only change is in crankpin dia. (see following table):

CRANKPIN DIAMETER

SELECTION A-B	ORIGINAL Ø mm	OVERSIZE BEARING		
		0,254	0,508	0,762
«A» blue mark on shoulder flywheel side	44.008 ÷ 44.014	43.754 ÷ 43.766	43.500 ÷ 43.512	43.246 ÷ 43.258
«B» white mark on shoulder flywheel side	44.014 ÷ 44.020			

Clearance between crankpin and bearing: min. 0.030 - max. 0.054.

Remark: Crankpin of nitride treated crankshafts must not undergo any oversize bearing. Such crankshafts have been mounted on vehicles indicated in a special list at your hands. For eventual adjustments send the shafts back to «SEIMM MOTO GUZZI».

CRANKSHAFT BALANCING

Static balancing of crankshaft is obtained by applying a weight of kg 1.586 ÷ 1.616.
Max. offset in axis parallelism: crankpin and main bearing pin must not overcome mm 0,02 at mm 40.

TIMING DATA

(See chapter «Timing data»)
Timing data (referred to the clearance of 1,5 mm between rocker and valve) are the following (see fig. 185):

— inlet:

opens 20° before TDC
closes 52° after BDC

— exhaust:

opens 52° before BDC
closes 20° after TDC

Normal rocker clearance (cold engine) mm 0.22.

ENGINE LUBRICATION BY FILTER CARTRIDGE

A certain number of 850 T model bikes fits an oil cleaner which in addition to a wire gauze filter is also provided with a filter cartridge.
This ensure an almost integral filtering before the oil passes in the pump and lubricating channels.

OIL SUMP
(See fig. 186)

It fits:

— «A» filter cartridge, removable;

— «B» magnetic oil drain plug;

— «D» wire gauze filter;

— «E» oil pressure relief valve.

FILTER CARTRIDGE
(See fig. 186)

To remove filter cartridge «A» from sump proceed as follows:

— undo plug «B» and let the oil fully drain;

— undo securing screws and remove sump «C» including:
  — filter cartridge «A»;
  — wire gauze filter «D»;
  — oil pressure relief valve «E»;

— undo filter cartridge «A» and replace it by another original one.

By this operation, wash and dry with a compressed air jet also wire gauze filter «D» before mounting sump «C» on the crankcase. Remember to replace gasket between crankcase and cover; fill up l. 3.5 of oil «Agip SINT 2000 SAE 10 W/50».

WIRE GAUZE FILTER
(See fig. 186)

It is screwed on the oil sump and is calibrated to allow an oil pressure of kg/cmq 3.8-4.2 in delivery circuit.
Should pressure be higher than calibrated, this valve opens and bring pressure into fixed limits.

CHECKING THE OIL LEVEL

Every 500 km check oil level in the oil sump (level almost at max. mark on the dipstick welded to filler cap «A» (see fig. 20).
If level is lower top up with oil of same features. This checking will be carried out after engine running for a few minutes and dipstick «A» must be fully screwed.
Use «oil Agip SINT 2000 SAE 10 W/50.

REAR SUSPENSION

(See fig. 187)

Shock absorber springs can be adjusted in five different positions by means of lever «F». Take note that the marks «I», «II», «III», «IV», «V» on the sliding body must be in line with the «red» mark on the fixed body («A» and «B» in above fig.).
Should suspension efficiency be not normal, replace shock absorbers.

REMOVAL OF SPRINGS FROMS SHOCK ABOSRBERS

(See fig. 187)

Before removal of springs, check that the red mark «A» on the fixed body is in line with the mark «I» of sliding body «B»; pull cap «D» to compress the springs to the point allowing removal of semicollars «C» release spring and slip off cap and spring.

CHECKING DATA FOR THE REAR SUSPENSIONS

(«E» in fig. 187 and drwg.)

— free length of the spring is mm 300.

Position «I»

Assembly compression:	mm 54	- load kg 63
End stroke compression:	mm 129	- load kg 163

Position «II»

Assembly compression:	mm 59	- load kg 70
End stroke compression:	mm 134	- load kg 171

Position «III»

Assembly compression:	mm 63	- load kg 74
End stroke compression:	mm 138	- load kg 178

Position «IV»

Assembly compression:	mm 66,5	- load kg 79
End stroke compression:	mm 141,5	- load kg 184

Position «V»

Assembly compression:	mm 69,5	- load kg 83
End stroke compression:	mm 144,5	- load kg 190
Max. allowed spring distortion:	mm ± 3	
Allowed spring load tolerance:	10%	

FRONT SUSPENSION

FRONT FORK

Sealed damper type. See chapter «Front Suspension and steering - Inspection and checking of the front fork».
For inspection measures see drwg. 188.
Replenishing quantity: l. 0.050 of Agip F. 1 ATF Dexron per fork member.

WHEELS AND BRAKES

The standard 850-T model fits one only braking disc on the R/H side of the front wheel and one caliper secured to the R/H side fork cover.
To slip front wheel off from fork members, it is not necessary to remove caliper from fork cover.
For removal and re-fitting of the front wheel, see chapter «Removal of front wheel».

REMOVAL OF PARTS TO BE REPLACED

Proceed as follows:
— remove wheel from fork members;
— flatten stop plates locking nuts and bolts securing braking disc to wheel hub;
— undo nuts and slip off bolts;
— drain the fluid from the braking circuit and undo hydrostop switch (front stop light).

FITTING OF TWIN DISC AND BRAKING CIRCUIT ON L/H SIDE OF WHEEL HUB

To make orders for necessary parts easier, a twin disc kit has been arranged under part number 17923000.

Fitting operations are as follows:

— fit twin braking disc on the L/H side of wheel hub;

— fit stop plates on new bolts;

— fit bolts onleft disc, left flange, hub, right flange and right disc;

— fit lock plates nuts and screw in by means of a wrench with torque of kg/m 4 ÷ 4.3; bend down stop plates on nuts and bolts and after checking everything is normal (see chapter «Braking Disc») fit the wheel between fork members and on caliper (R/H side) then lock securing bolts and nut.

— fit caliper on L/H side of fork and front fender by means of bolts, washers, shims and nut; check fitting is correcte (see chapter «Caliper»);

— fit a gasket between twin control and pipe, then fit L/H side pipe, another gasket and screw in hydrostop switch (front stop light);

— fit pipe with screw and two gaskets on L/H side caliper;

— fill up braking circuit with «Agip F. 1 Brake Fluid» then drain the air bubbles (see chapter «Draining the air from the braking circuit).

MAINTENANCE, INSPECTION AND ADJUSTMENT OF DOUBLE CONTACT BREAKER

Contacts gap for 850-T model must be within mm 0.42 ÷ 0.48.
For descriptions and adjustments see Chaapter «Maintenance Inspection and Adjustment of Double Contact Breaker».

CHECKING AND ADJUSTING IGNITION TMING (FIXED ADVANCE)

See chapter «Checking and adjusting ignition timing» considering the following changes:

TIMING OF THE R/H CYLINDER

In this position, fixed advance mark 2 is 8° from P.M.S. (TDC) «D» and so at the commencement of the point separation (see A in fig. 164).

TIMING OF THE L/H CYLINDER

In this position fixed advance mark 3 is 8° from P.M.S. (TDC) «S» and so at the commencement of the point separation (see B in fig. 164).

CHECKING THE IGNITION TIMING (FIXED ADVANCE) WITH THE ENGINE ASSEMBLED ON THE MOTORCYCLE

(See fig. 165)

Only the mark «A.F.» (fixed advance) changes, namely 8° instead of 13°.

CHECKING THE IGNITION ADVANCE (FIXED AND AUTOMATIC) BY MEANS OF A STROBOSCOPE LAMP

(See fig. 64 and diagram fig. 188)

Ignition data

— fixed advance: 8°
— automatic advance: 26°
— full advance (fixed and automatic): 34°

CHECKING THE FULL ADVANCE (FIXED AND AUTOMATIC)

Changes:
— A.F. (fixed advance) 8° instead of 13°;
— A.T. (full advance) 34° instead of 39°.

SPARK PLUGS

The 850-T model fits spark plugs n. 240 (points gap 0.6 mm).
For other description see chapter «Spark Plugs».

ELECTRICAL EQUIPMENT

Starter motor

Brand:	BOSCH DF - 12 V - O5 PS n. 0001157016
Voltage:	12 V
Output:	0.5 HP
Current Intensity Ah.:	36
Pinion:	Z = 8 - mod. 2.5
Pinion rotation:	counterclockwise

ELECTRICAL TESTS

RUNNING	VOLTAGE	CURRENT	SPEED	TORQUE
Unloaded	11.5 V	20 ÷ 40 A	6500 ÷ 8500 rpm	—
Loaded	9 V	170 A	3200 ÷ 3500 rpm	kgm 0.15
Short circuit	8 V	280 ÷ 360 A	—	kgm 0.75

LIGHTING EQUIPMENT

IGNITION SWITCH

The ignition key has 4 positions:

— «0» (vertical) machine at standstill, key not removable.

— «1» (key turned anticlockwise). Machine at standstill, key removable. Steering is locked by removal of key and handlebar turning right or left.

— «I» (key turned clockwise) between positions «0» and «2» key removable. The key can be removed without locking the steering.

— «2» (key turned clockwise) for engine starting, all controls in.

LIGHTS SWITCH

— OFF Lights off.

— PARK Town driving light.

— L Low beam.

— H High beam.

HORN, FLASHING LIGHT AND TURNING LIGHTS SWITCH

Left, on the handlebar («C» in fig. 190).

— HORN Horn button.

— FLASH Flashing light control.

— OFF Turning lights control.

— Left Left turning lights on.

— Right Right turning lights on.

ENGINE STARTING AND STOPPING BUTTON

(See «A» in fig. 191)

Right, on the handlebar.
Ignition switch key in position «2» and button «1».
START pressed (see «A»).
To stop the engine (emergency case) shift lever in position «3» or «4» OFF.

TERMINAL BLOCK WITH FUSES

(See fig. 192)

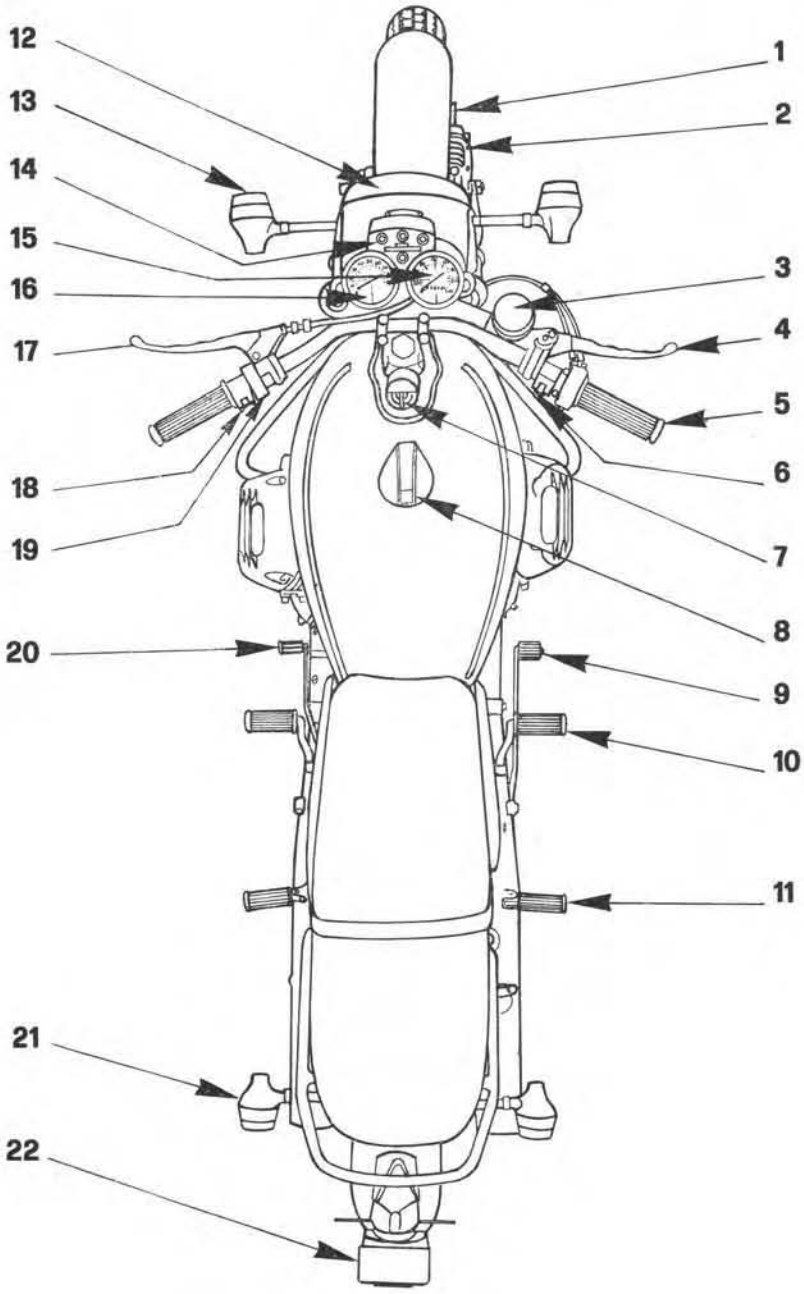
Under the seat, it includes 6 (15 A) fuses.

CONTROLS AND ACCESORIES

(See fig. 193)

1 Front brake disc.
2 Front brake caliper.
3 Master cylinder (brake fluid reservoir).
4 Front brake control lever.
5 Throttle control grip.
6 Engine starting and emergency stoppin button.
7 Key switch.
8 Fuel tank filler cap.
9 Rear brake control lever.
10 Foot-rest.
11 Pillion foot-rest.
12 Headlight.
13 Front turning lights.
14 Instrument panel.
15 Speedometer.
16 Rev. counter.
17 Clutch control lever.
18 Horn, flashing light and turning lights button.
19 Lighting switch.
20 Gear change lever.
21 Rear turning lights.
22 Tail lamp.

• **NB.** - Right or left is referred for controls as seen from riding position.



193

LUBRICATION AND MAINTENANCE CHART

(See fig. 194)

MONTHLY (EVERY 3000 KM)

1 Check electrolite level in battery.

PERIODICALLY

2 Check tyre pressure.

AFTER FIRST 500 KM

3 Replace crankcase oil.
4 Tighten all nuts and bolts.
5 Check tightening of wheel spokes and wheel truing.
6 Check clearance between rocker and valve.

EVERY 500 KM

7 Check oil level in crankcase.

EVERY 1500 KM

8 Check tightening of wheel spokes and wheel truing.

EVERY 3000 KM

9 Replace oil in crankcase.
10 Check clearance between rocker and valve.
11 Check oil level in gear box.
12 Check oil level in rear drive box.

EVERY 5000 KM

13 Check fluid level in fluid reservoir (front disc brakes).

EVERY 10000 KM

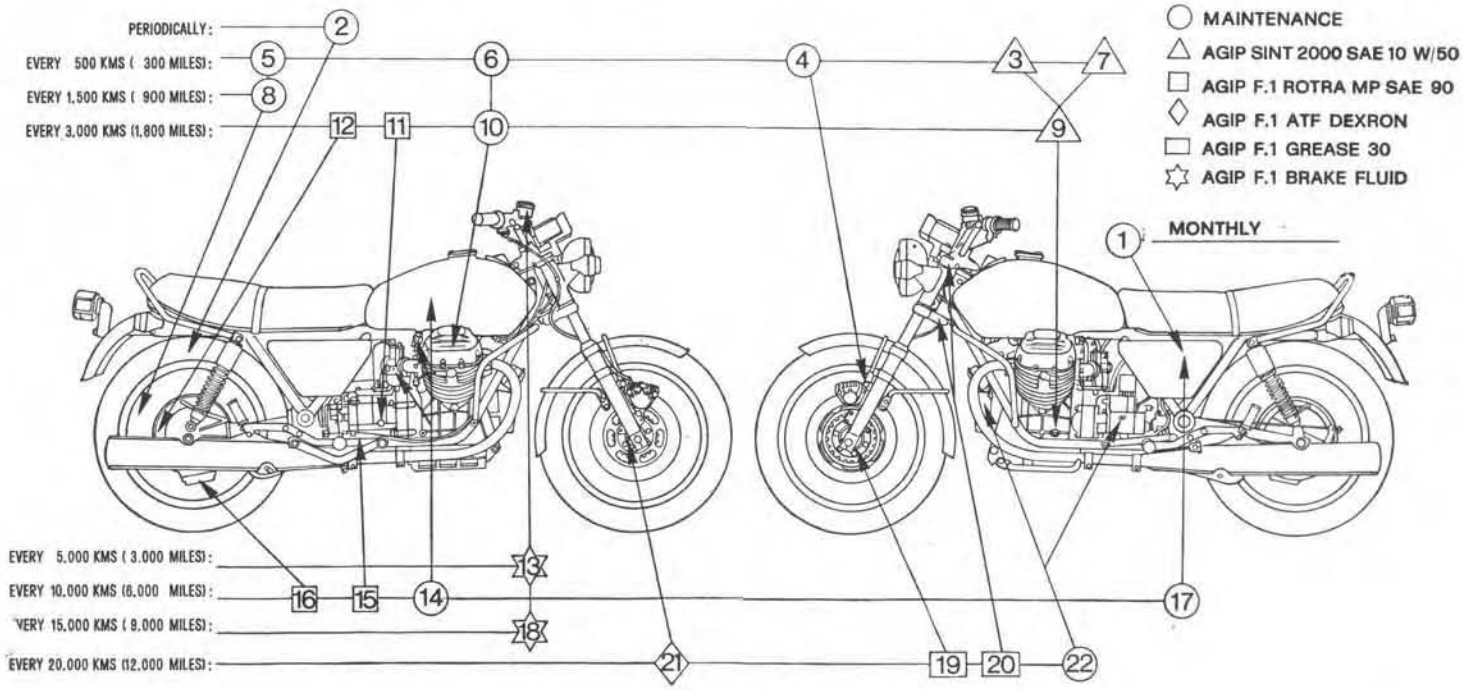
14 Clean fuel tank, fuel tap filters and fuel line.
15 Replace oil in gear box.
16 Replace oil in rear drive box.
17 Clean and grease battery connections.

EVERY 15000 KM

18 Replace the fluid of front braking circuit.

AFTER FIRST 20000 KM

19 Check conditions of wheel bearings, pack with grease «Agip F. 1 Grease 30».
20 Check conditions of steering bearings, pack with grease «Agip F. 1 Grease 30».
21 Replace oil in fork members («Agip F. 1 Dexron» l. 0.050 each member).
22 Clean starter motor commutator and alternator slip ring using a petrol moistened rag.



194

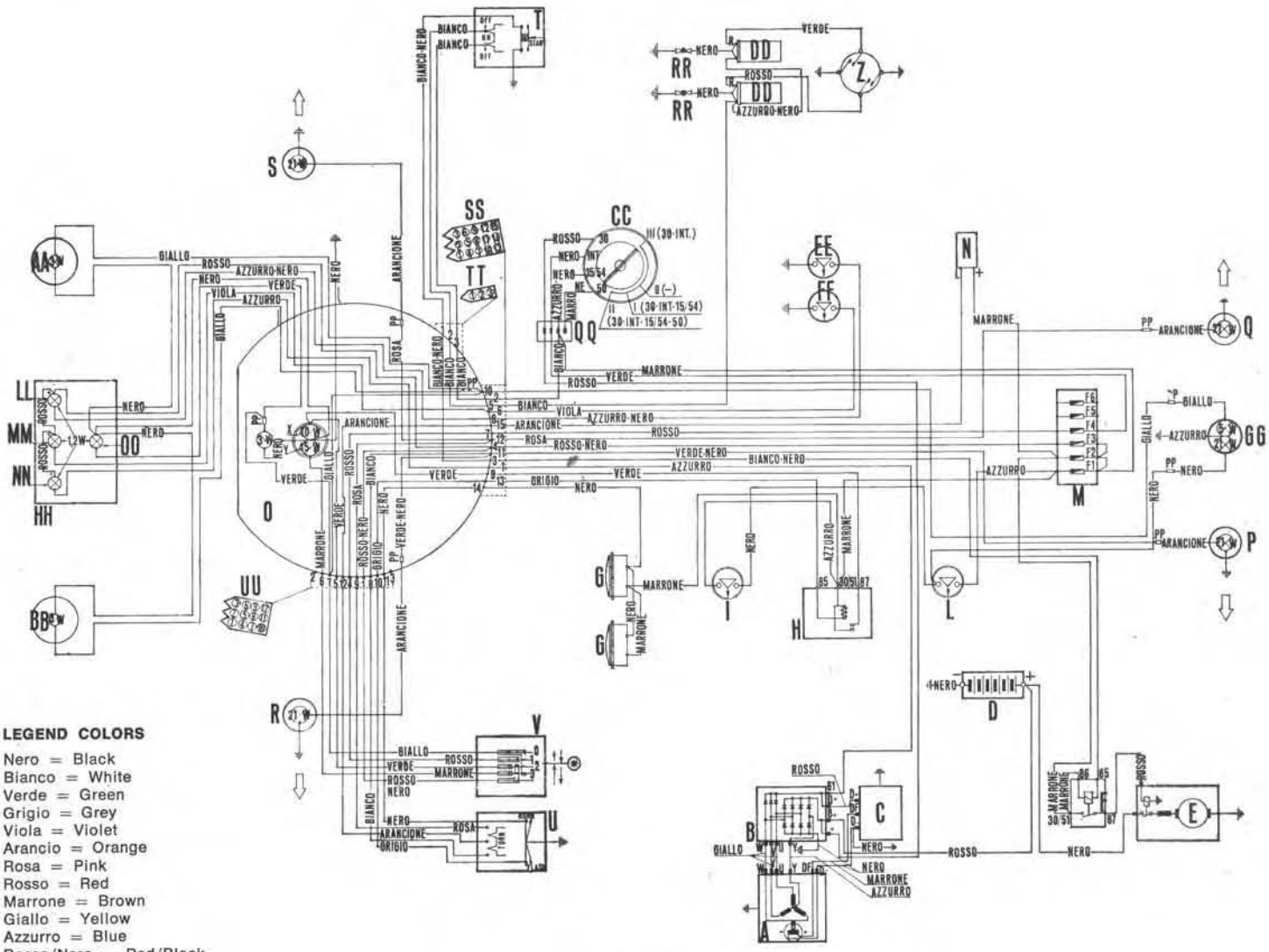
WIRING DIAGRAM - LEGEND (European version)

(See fig. 195)

A - Generator
B - Rectifier
C - Regulator
D - Battery
E - Starter motor
F - Starter motor relay
G - Horn
H - Flashing light relay
I - Hydrostop
L - Rear stop switch
M - Terminal block with fuses
N - Flasher unit
O - Asymmetric light
P - Left turn signal, rear
Q - Right turn signal, rear
R - Left turn signal, front
S - Right turn signal, front
T - Engine starter and stop switch
U - Control device, turn signals, horn, flashing light
V - Light switch; dimmer, city light, parking light
AA - Speedometer
BB - Rev. counter
CC - General commutator
DD - H.T. coil
EE - Oil light switch
FF - Neutral light switch
GG - Number plate and stop light
HH - Instrument panel
LL - Oil pressure light (red)
MM - Neutral light (orange)
NN - Battery light (red)
OO - City light (green)
QQ - 4-way connector «AMP»
RR - Spark plugs
SS - 15-way connector «MOLEX»
TT - 3-way connector «MOLEX»
UU - 12-way connector «MOLEX»
X - Low beam
Y - High beam
Z - Contact breaker

Fuses

F1 - **15 A** - Horn, stop, signals relay
F2 - **15 A** - Starter relay, flasher unit
F3 - **15 A** - Head light, lights LL; MM; NN
F4 - **15 A** - Parking light, light OO
F5 - **15 A** - Reserve
F6 - **15 A** - Reserve



LEGEND COLORS

Nero = Black
Bianco = White
Verde = Green
Grigio = Grey
Viola = Violet
Arancio = Orange
Rosa = Pink
Rosso = Red
Marrone = Brown
Giallo = Yellow
Azzurro = Blue
Rosso/Nero = Red/Black
Azzurro/Nero = Blue/Black
Verde/Nero = Green/Black
Bianco/Nero = White/Black
Giallo/Nero = Yellow/Black
Grigio/Nero = Grey/Black

195

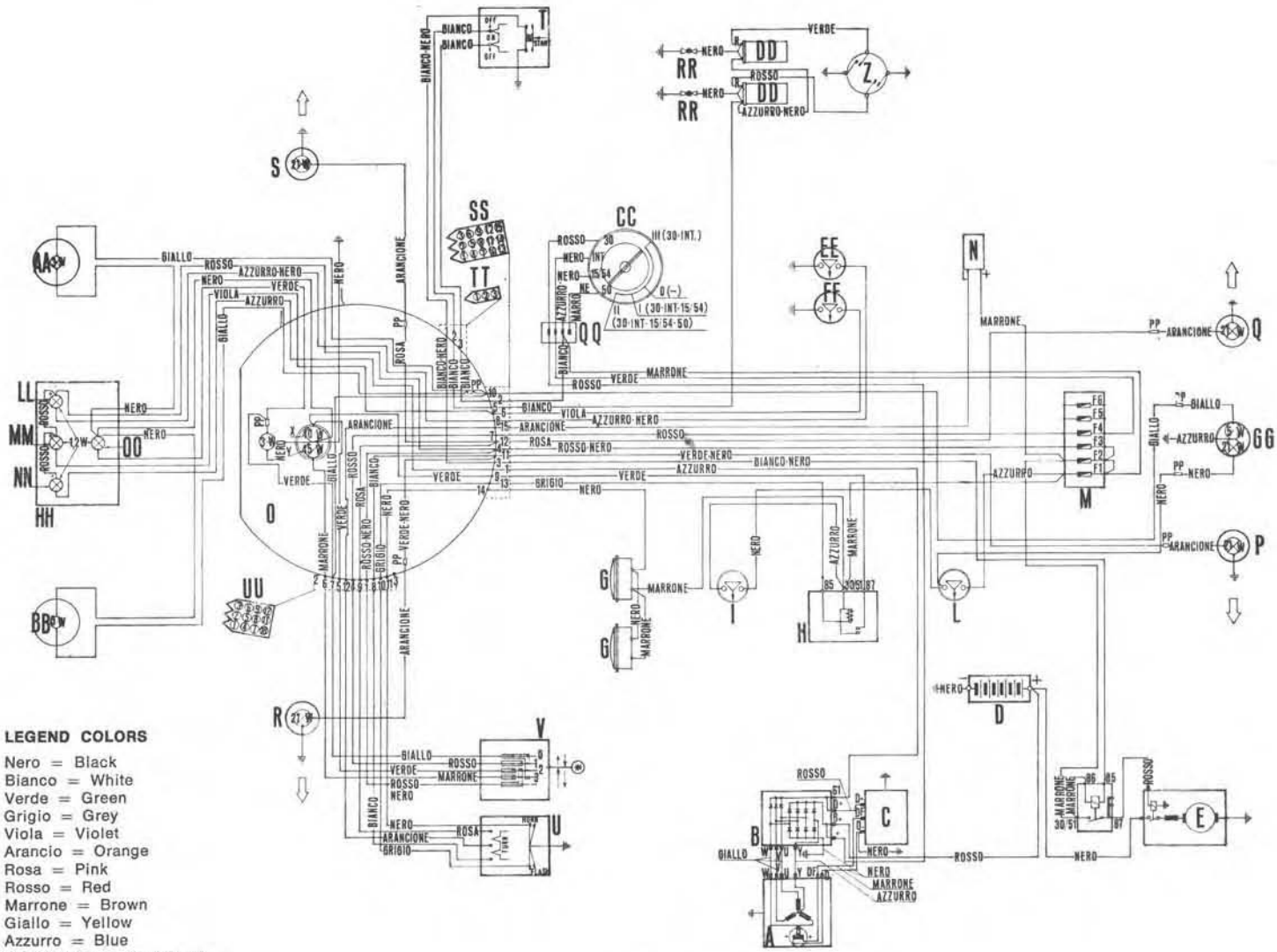
WIRING DIAGRAM - LEGEND (U.S.A. version)

(See fig. 196)

A Generator alternator
B Rectifier
C Voltage regulator
D Battery
E Starter motor
F Relay for starter motor
G Horn
H Relay flashing light
I Hydrostop
L Rear stop light cutout
M Terminal fuse holder
N Flasher unit (turning lights)
O Asymmetric headlight
P Rear turning light, left
Q Rear turning light, right
R Front turning light, left
S Front turning light, right
T Engine starting and stopping switch
U Horn, flashing light, turning lights, control switch
V Lights switch, with travel cutout from dimmer to town driving and parking light
AA Km counter
BB Rev. counter
CC Ignition switch
DD H.T. coil
EE Oil pressure indicator cutout
FF Neutral indicator cutout
GG Number plate and stop light
HH Instrument panel
LL Oil pressure indicator light (red)
MM Neutral indicator light (orange)
NN Battery charge indicator light (red)
OO Parking indicator light (red) (USA version)
PP Faston connectors
QQ 4-way connector «AMP»
RR Spark plugs
SS 15-way connector «MOLEX»
TT 3-way connector «MOLEX»
UU 12-way connector «MOLEX»
X Lowe beam light
Y High beam light
Z Contact breaker

Fuses

F1 - 15A - Horn, stop lights - Turning lights relay
F2 - 15A - Starter motor relay - Flasher unit
F3 - 15A - Headlights - Indicator lights LL MM NN
F4 - 15A - Parking lights - Indicator light OO
F5 - 15A - Spare fuse



LEGEND COLORS

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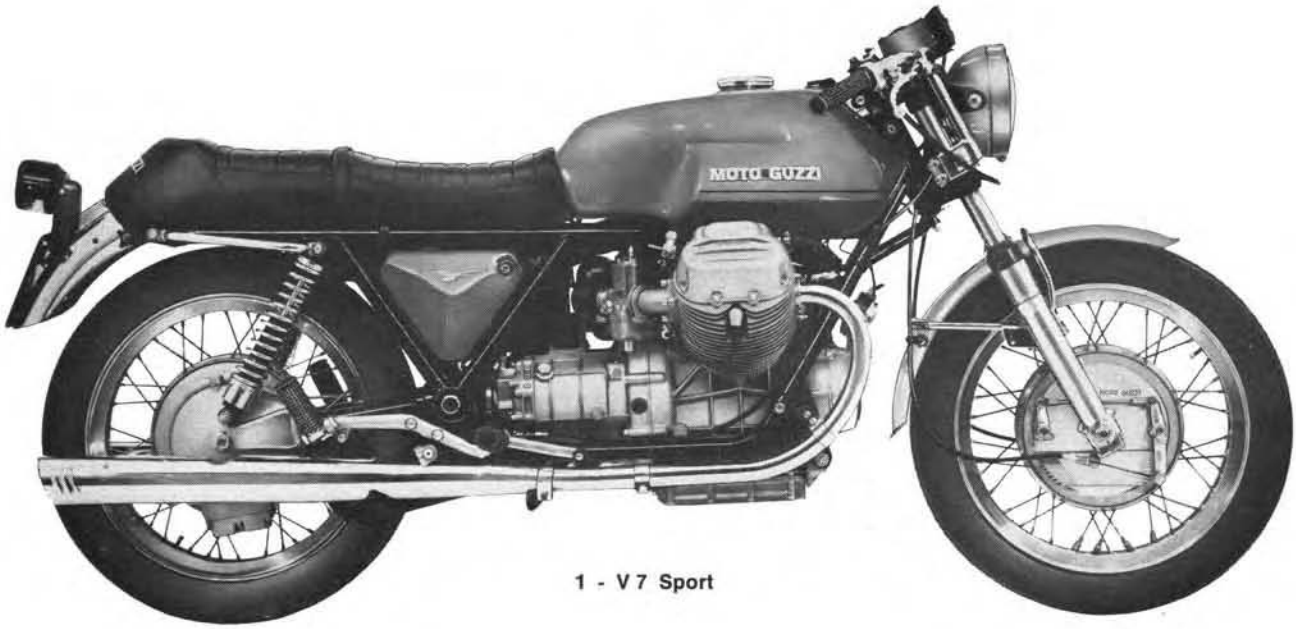
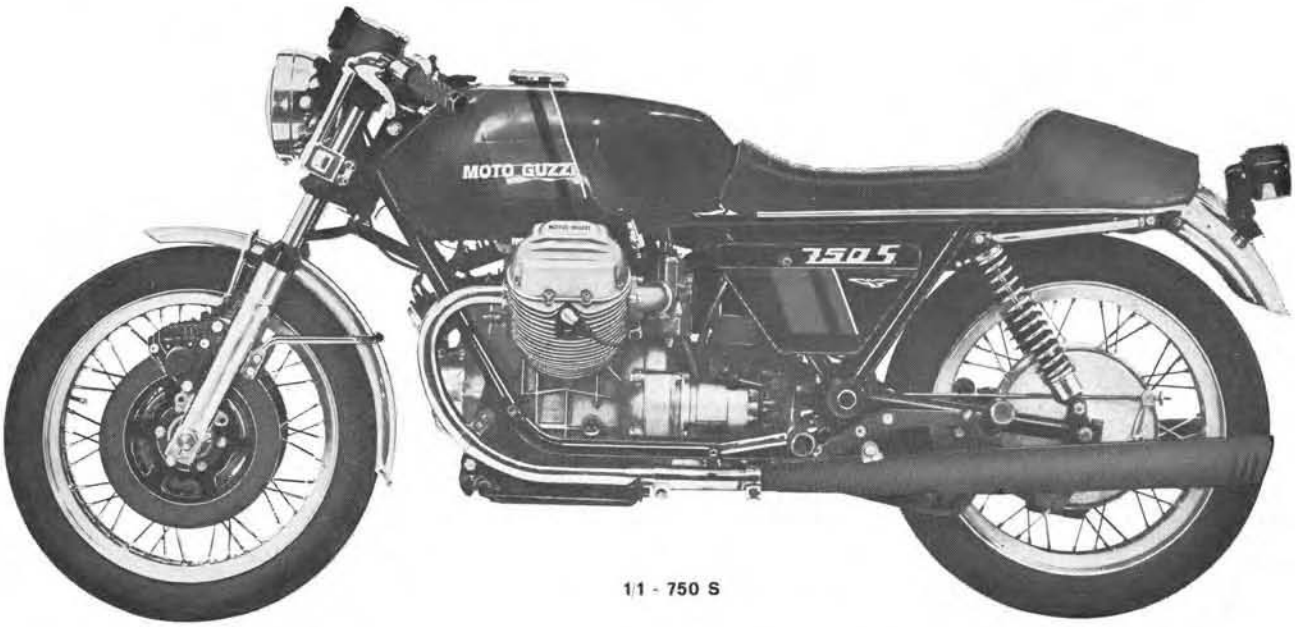
Giallo = Yellow
Azzurro = Blue
Rosso/Nero = Red/Black
Azzurro/Nero = Blue/Black
Verde/Nero = Green/Black
Bianco/Nero = White/Black
Giallo/Nero = Yellow/Black
Grigio/Nero = Grey/Black

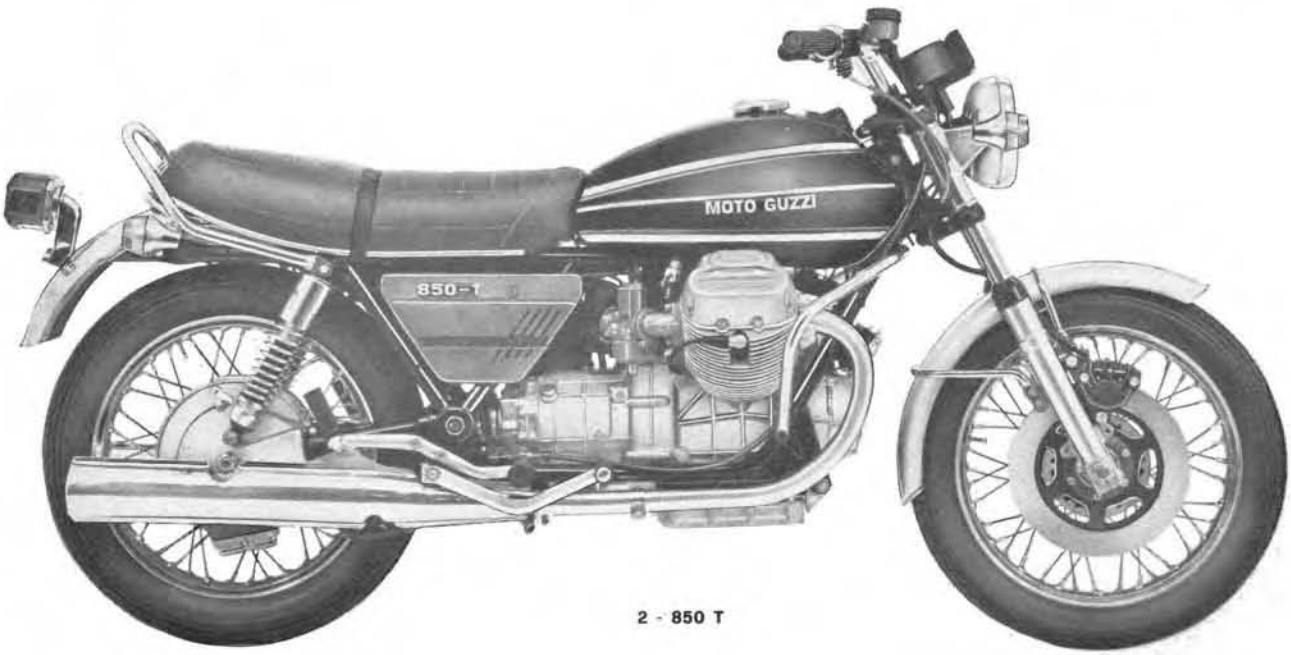
196



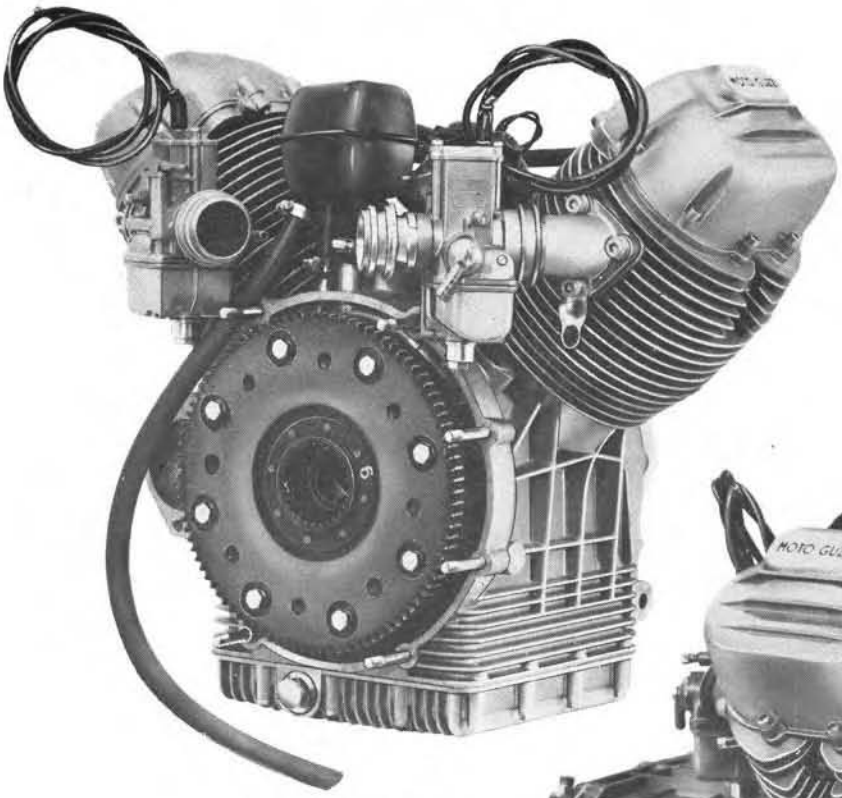
1 - V 7 Sport



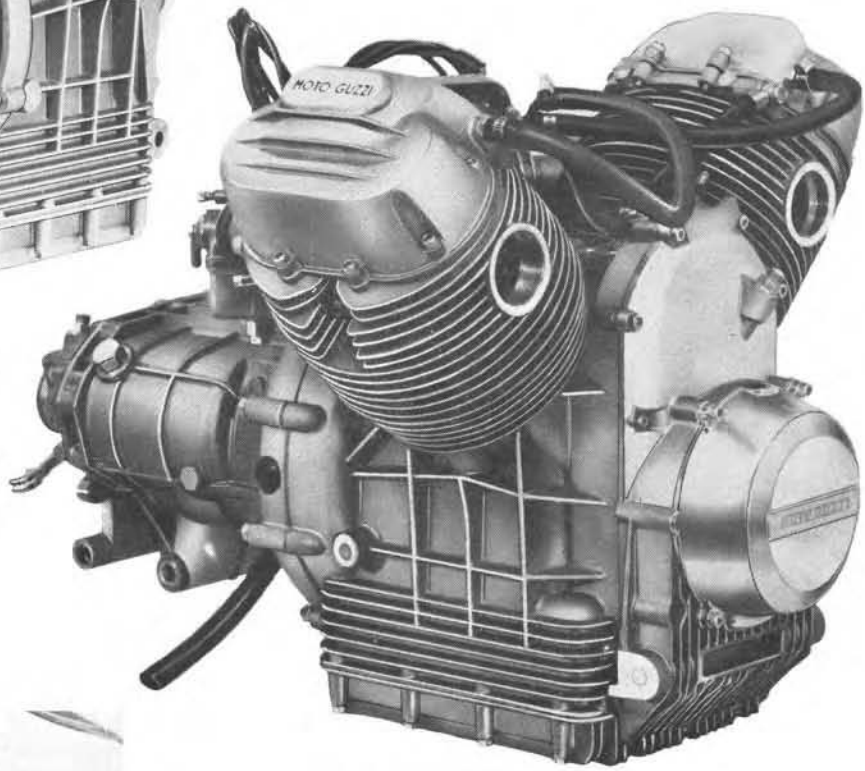
1/1 - 750 S



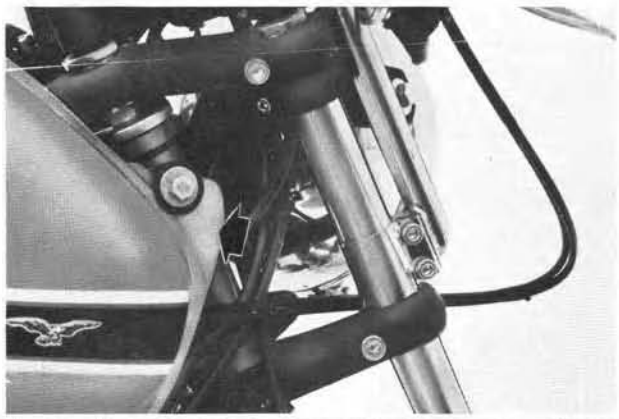
2 - 850 T



3 - Motore senza cambio



3/1 - Motore con cambio



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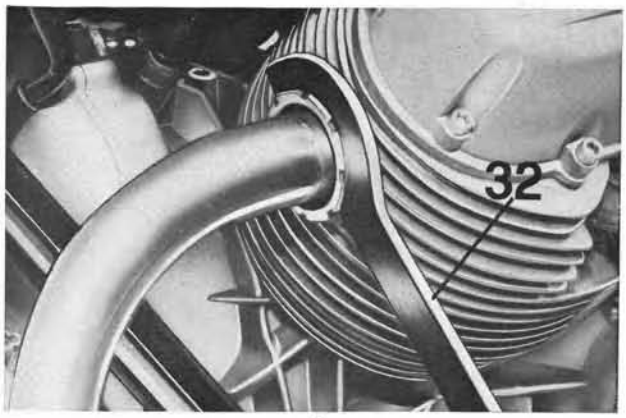

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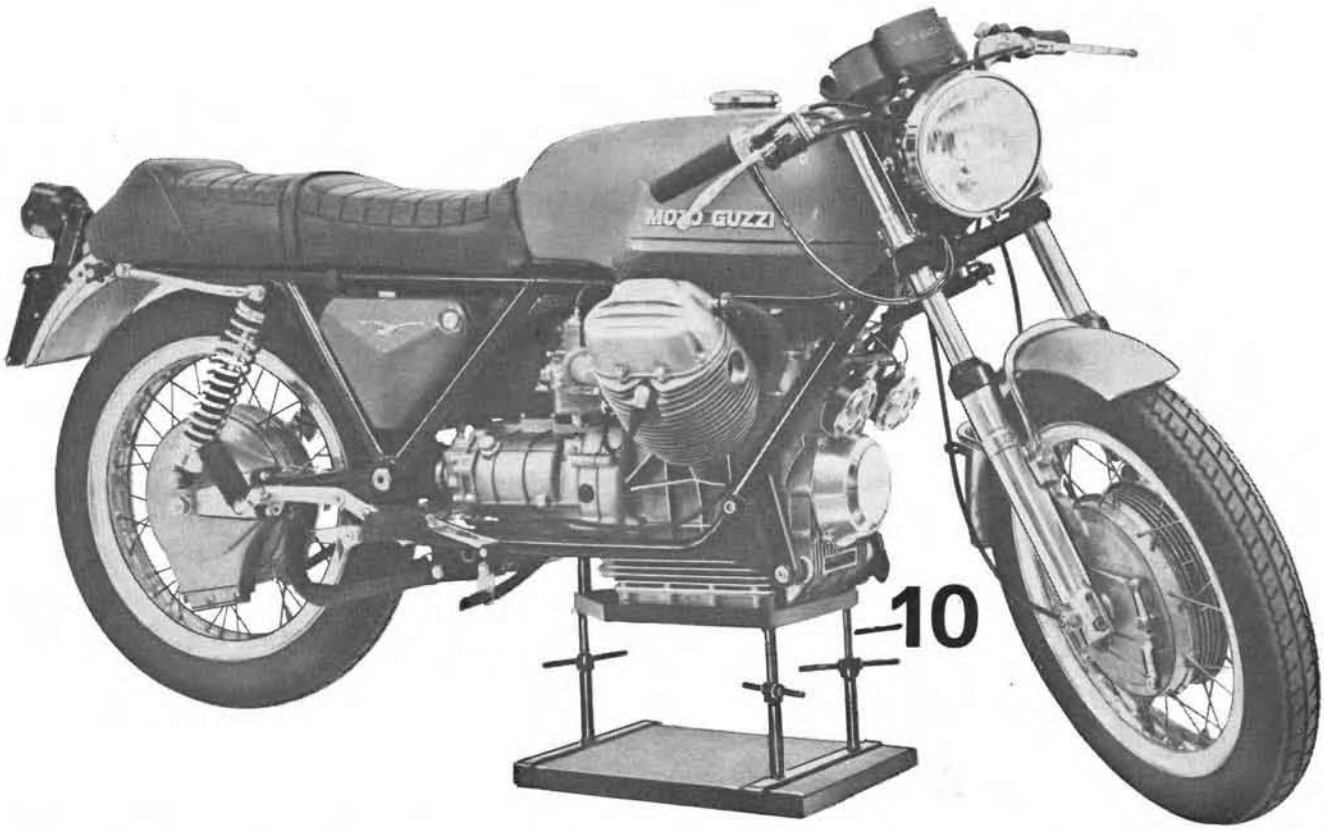

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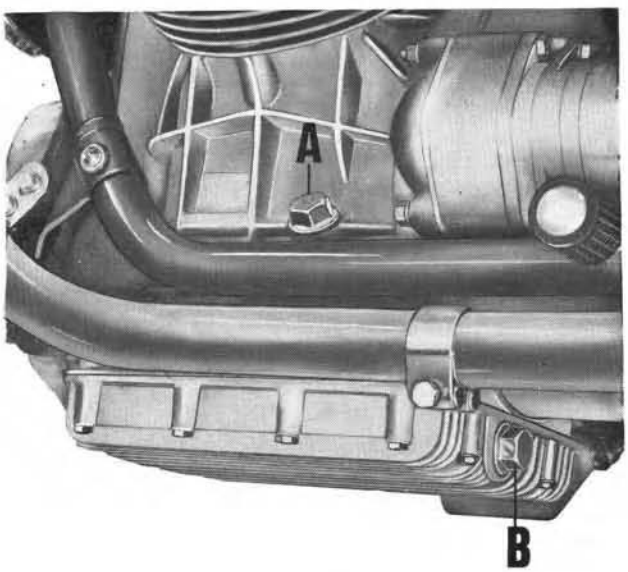

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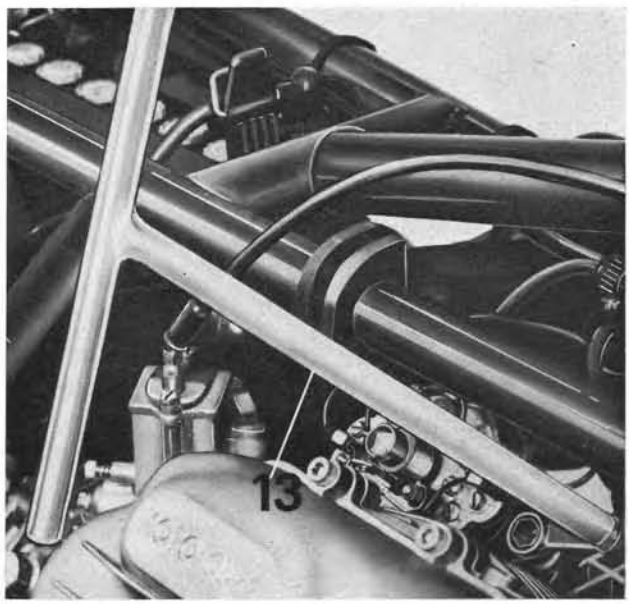

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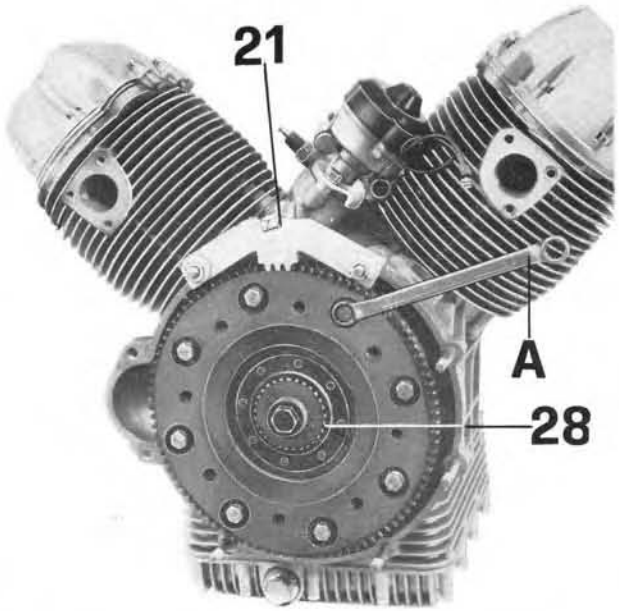

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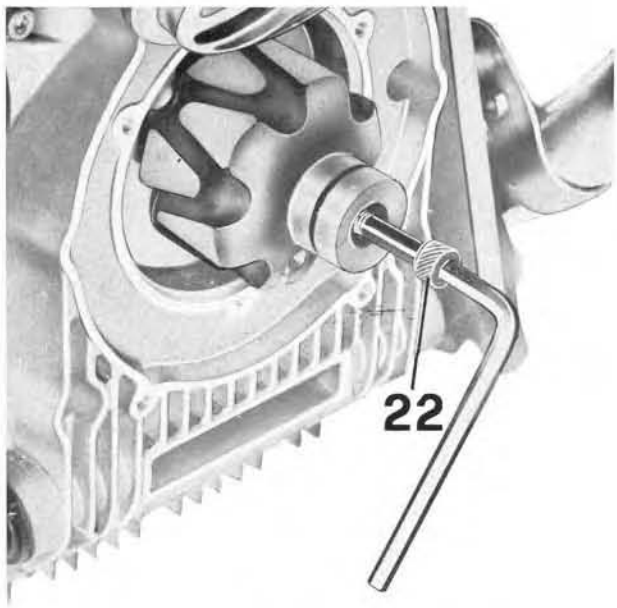

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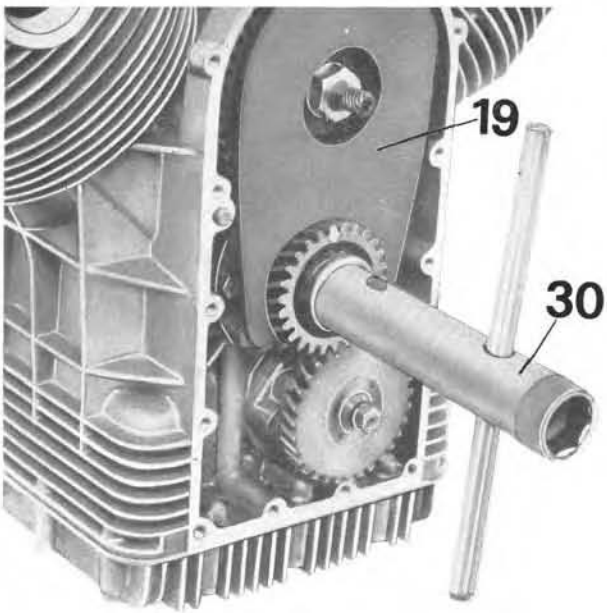

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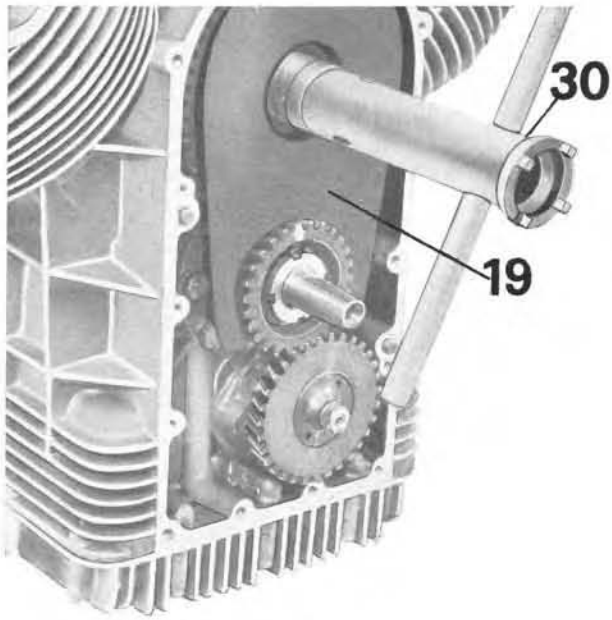

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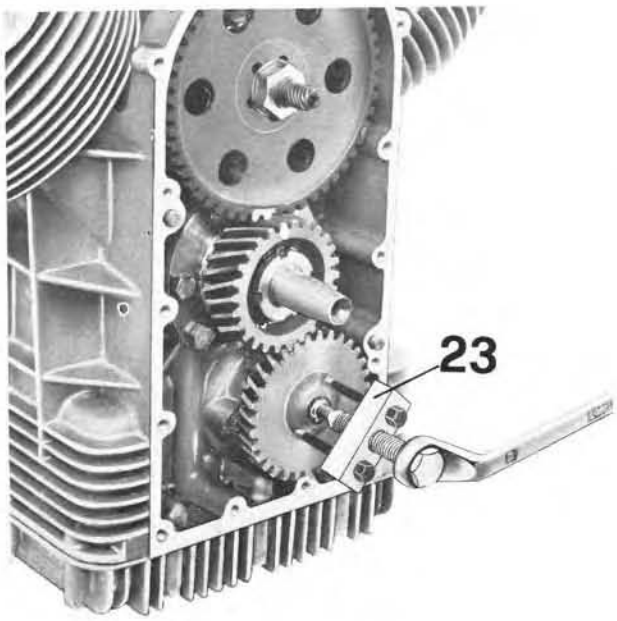

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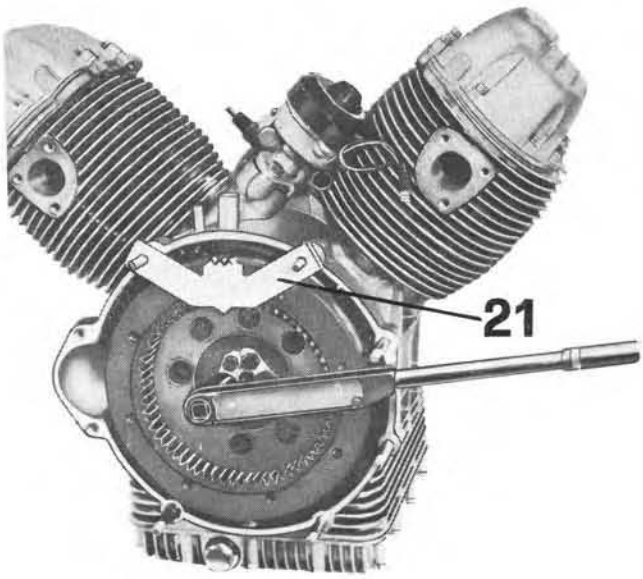

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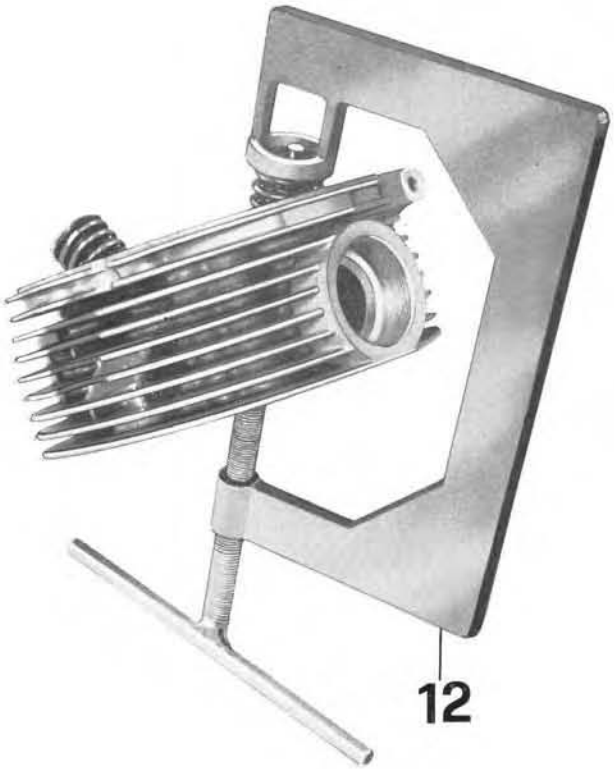

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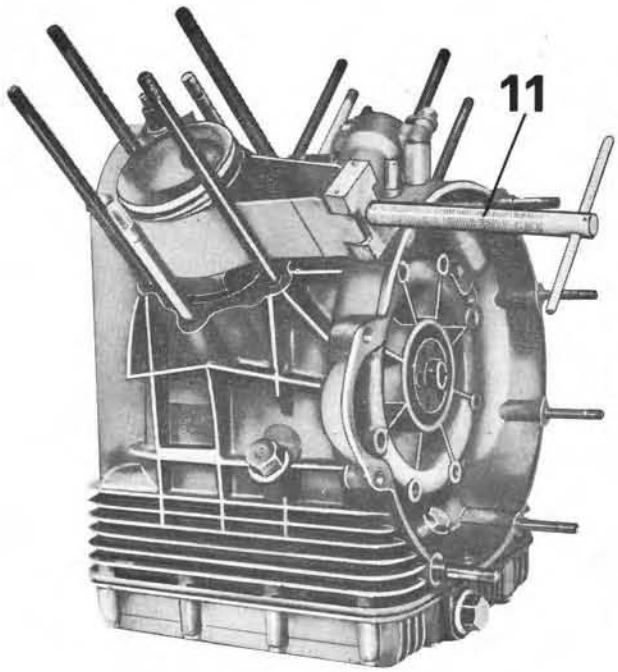

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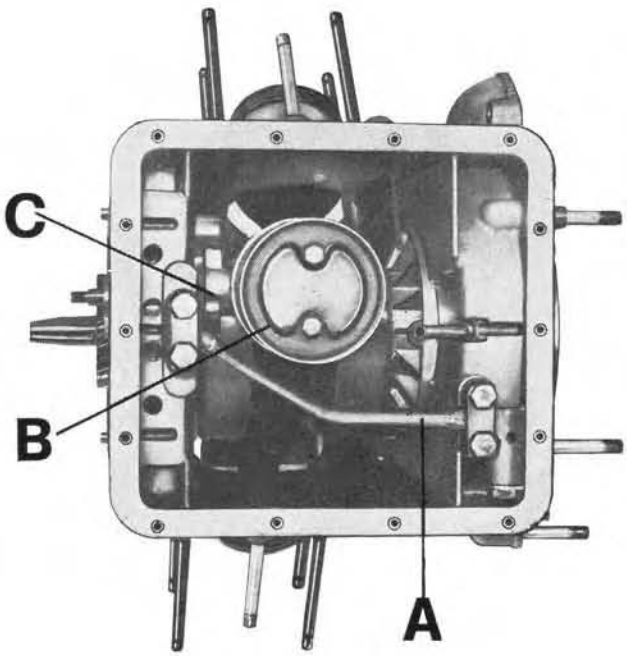

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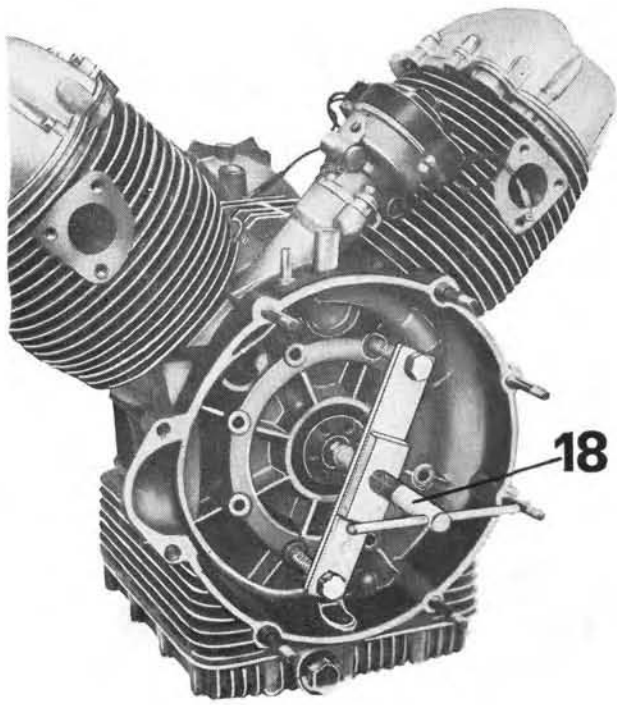

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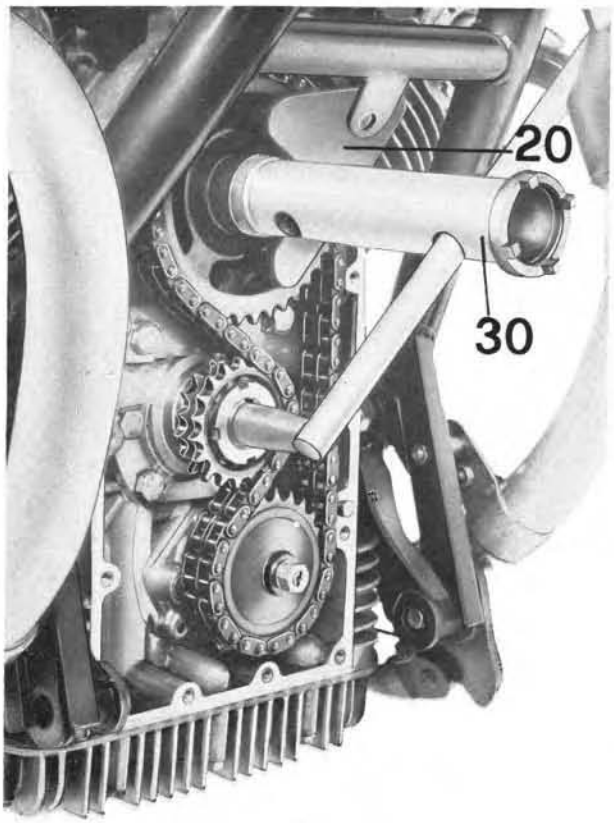

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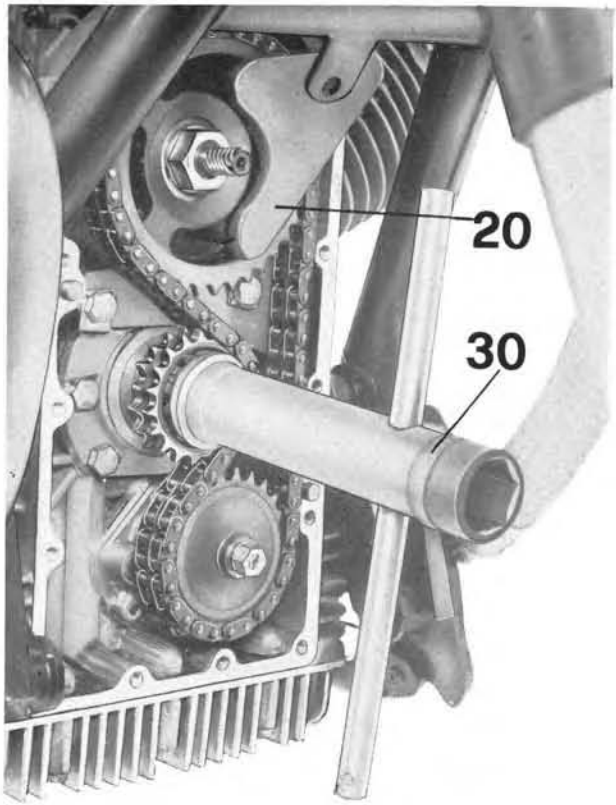

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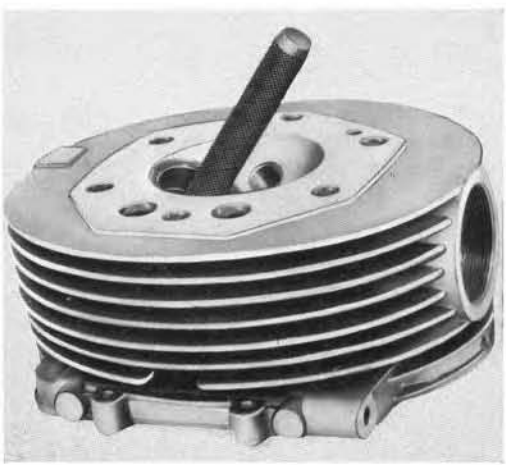

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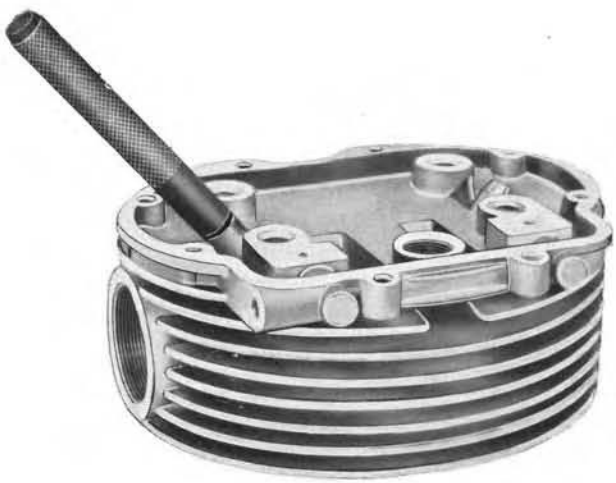

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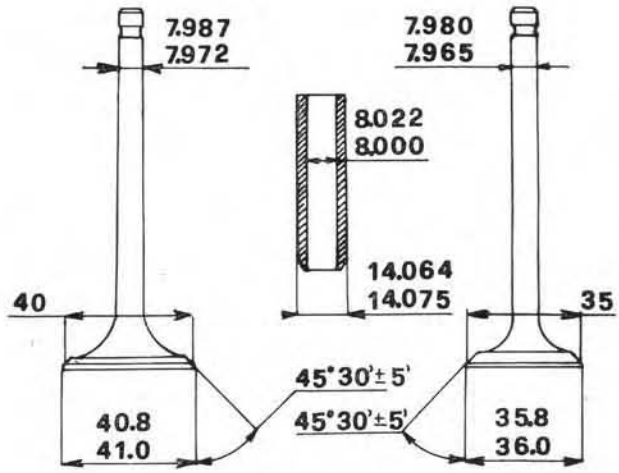
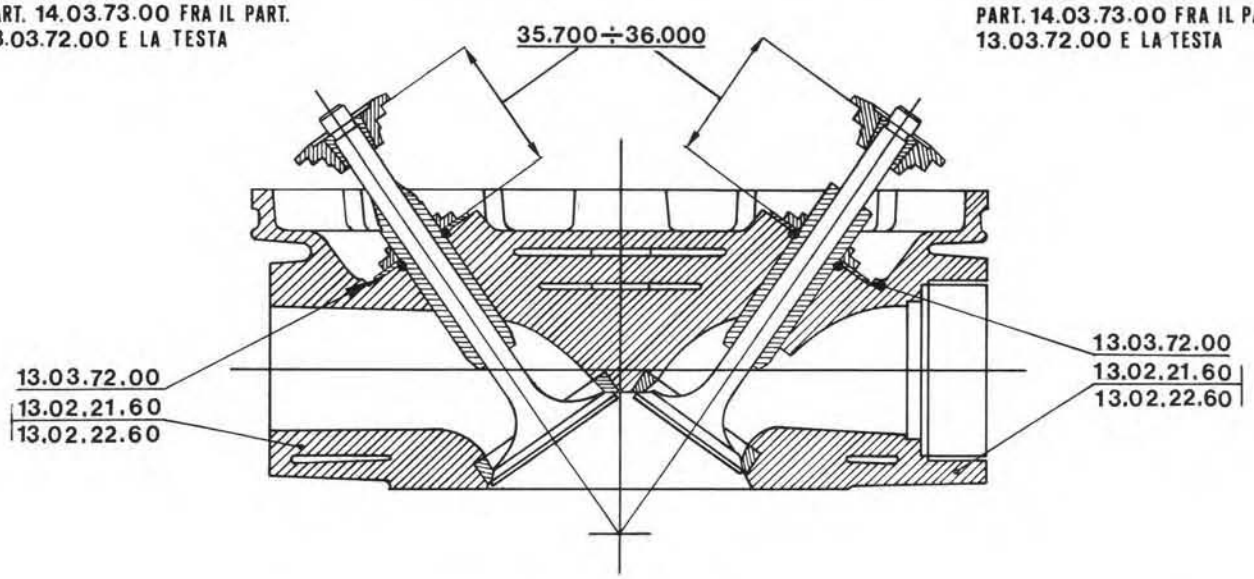


25

-ASPIRAZIONE-
INTERPORRE DA 1 A 7 RANELLE
PART. 14.03.73.00 FRA IL PART.
13.03.72.00 E LA TESTA

-SCARICO-
INTERPORRE DA 0 A 6 RANELLE
PART. 14.03.73.00 FRA IL PART.
13.03.72.00 E LA TESTA



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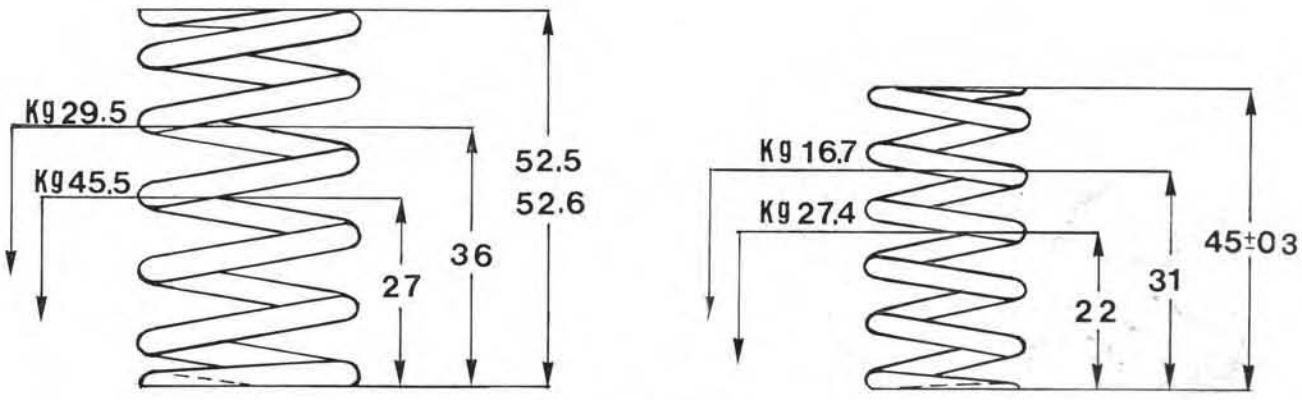

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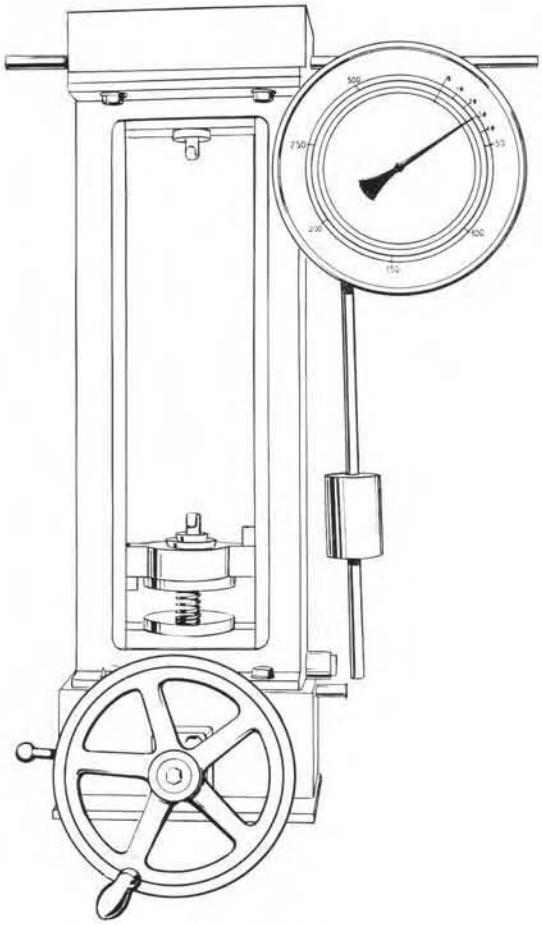

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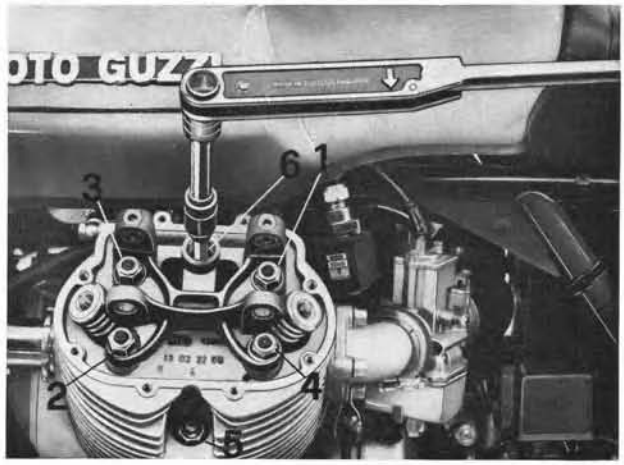

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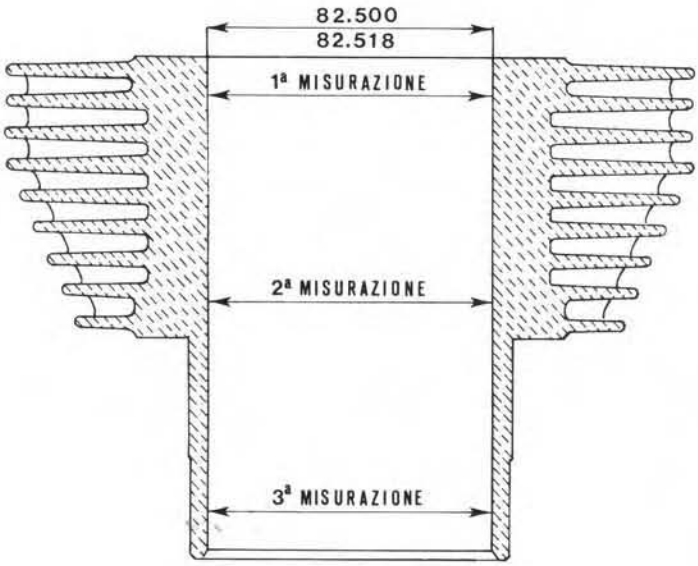

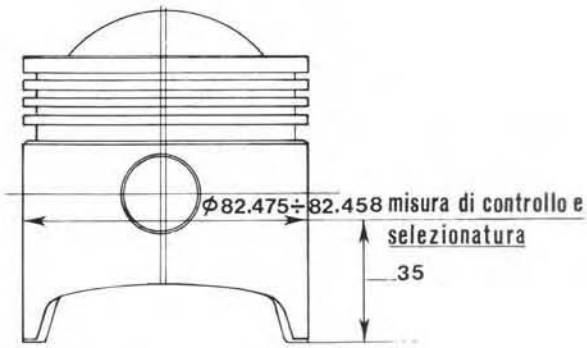

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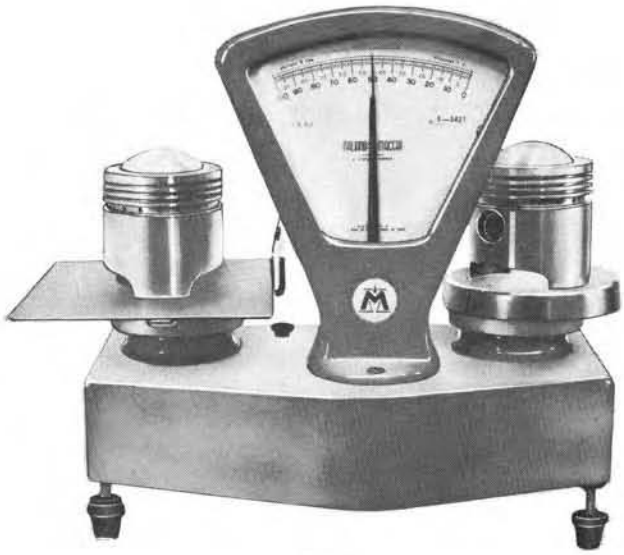

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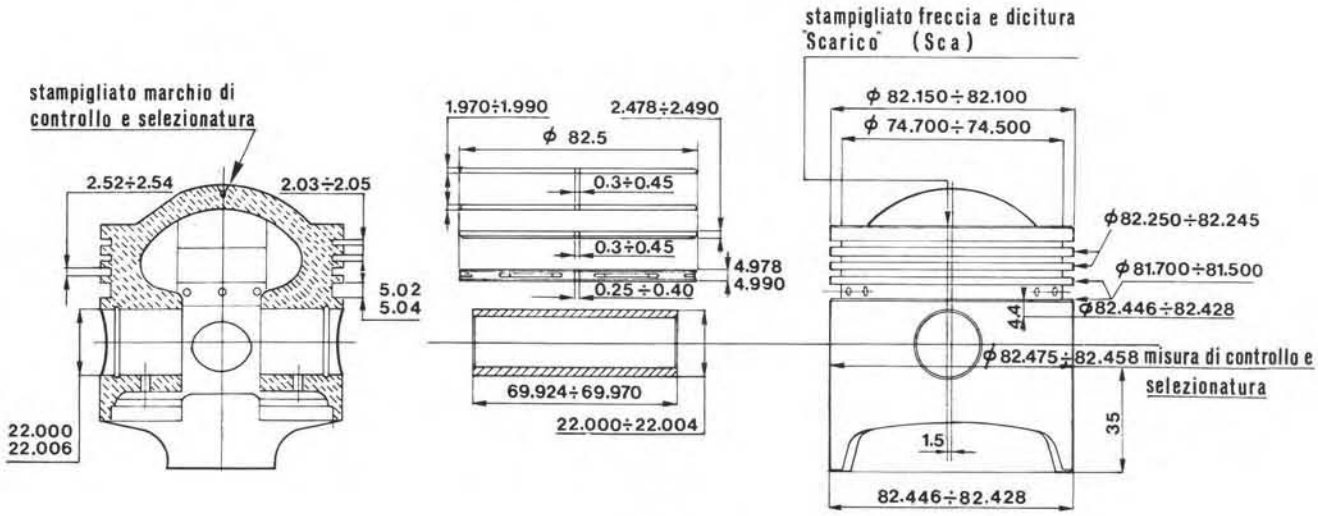

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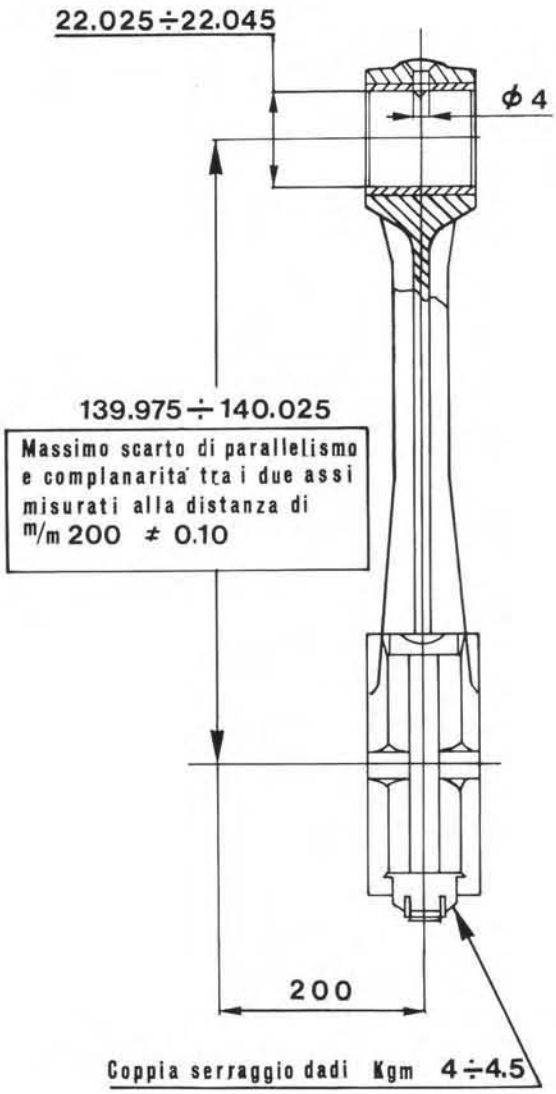

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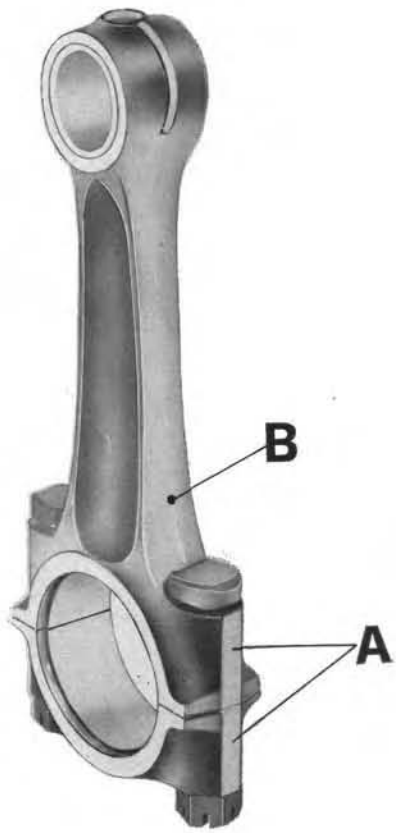

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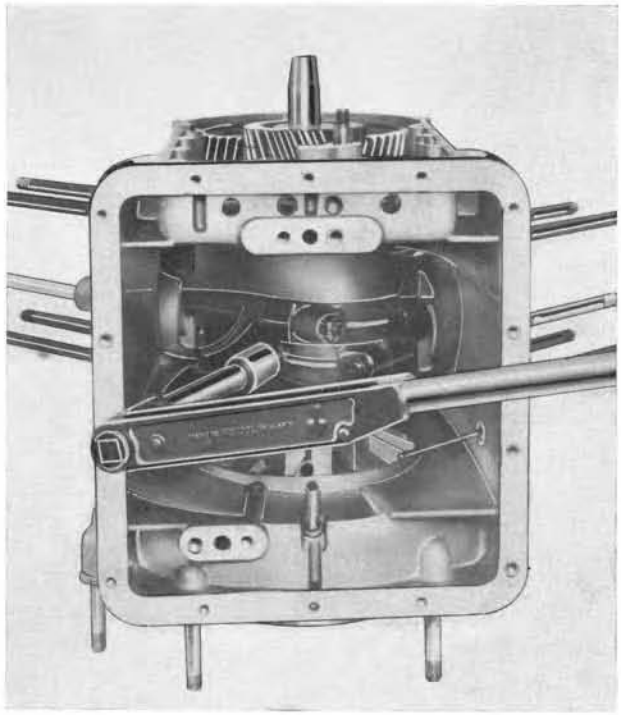

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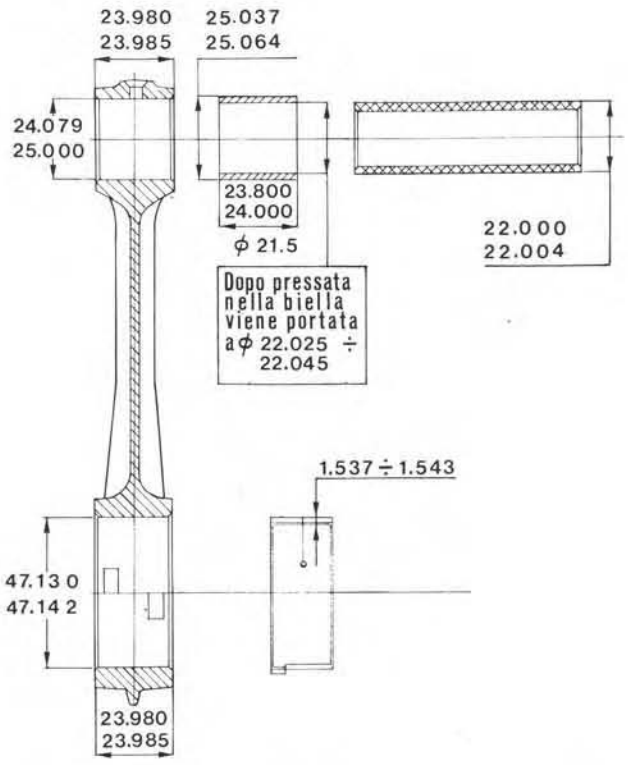

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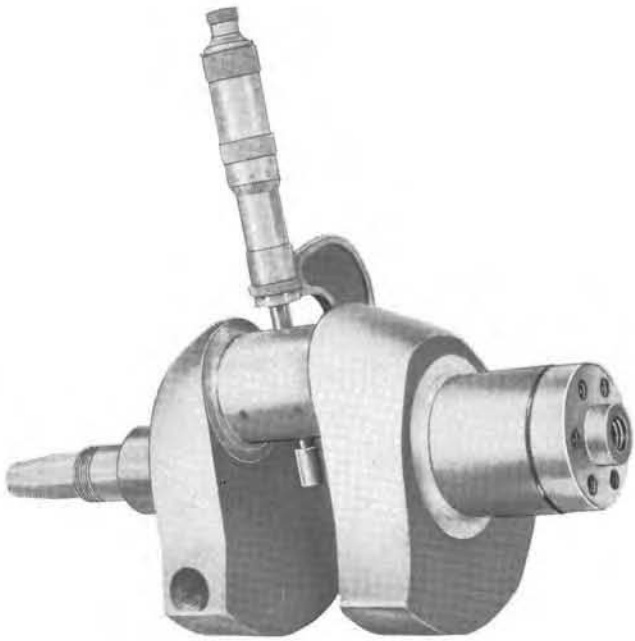

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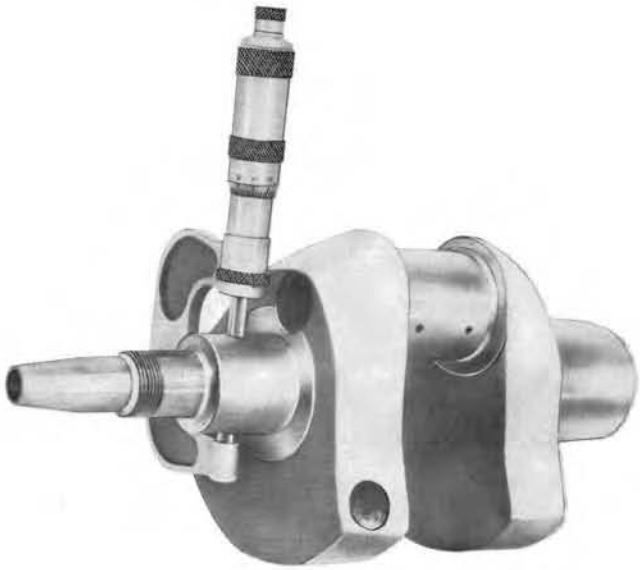

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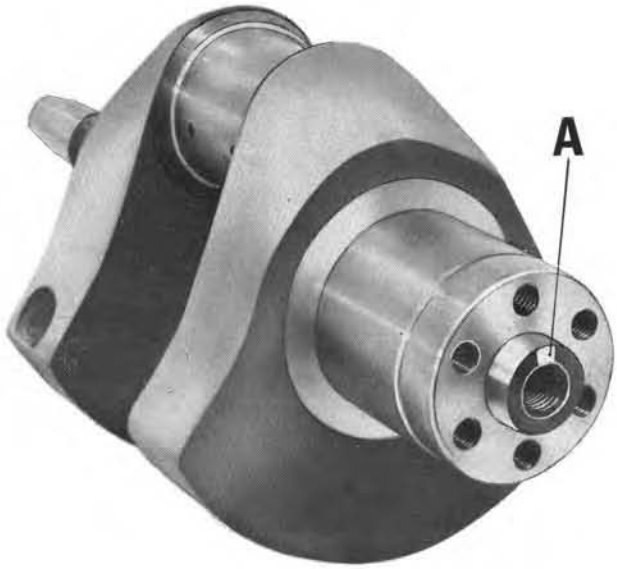

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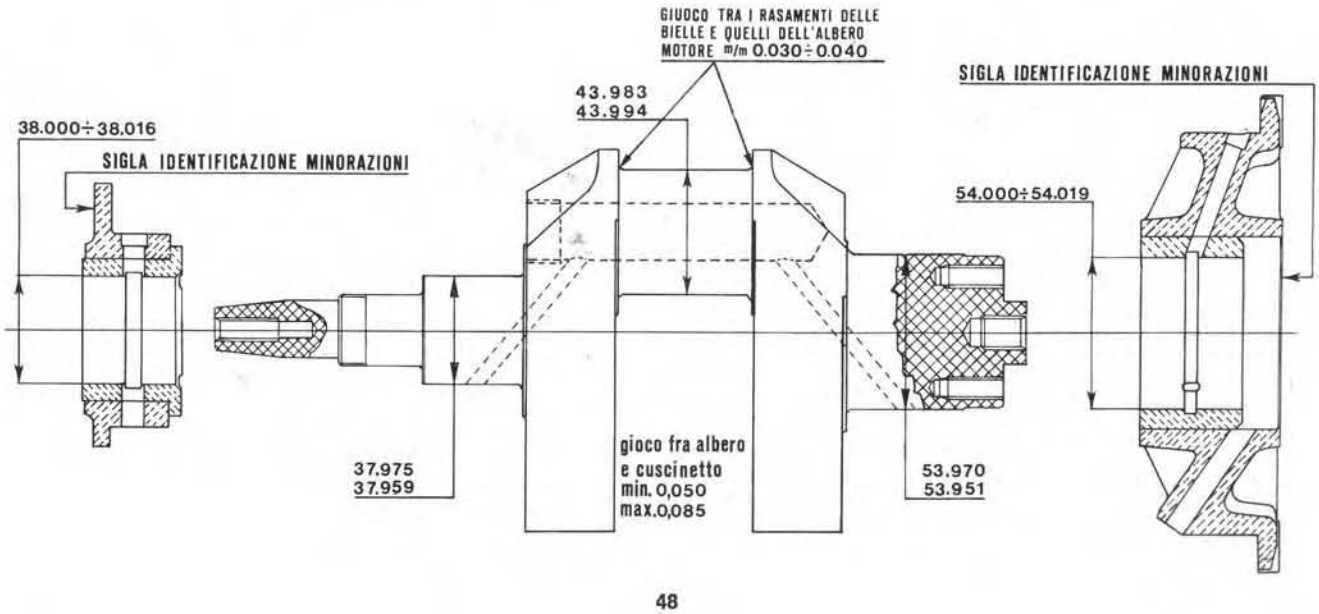

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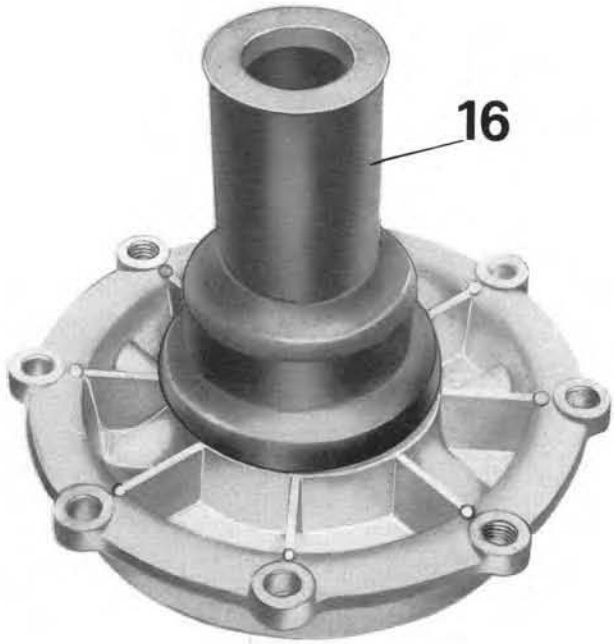

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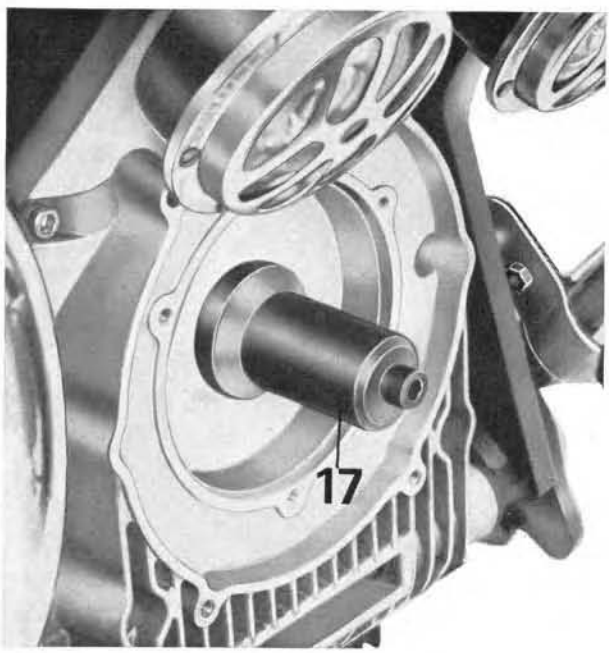

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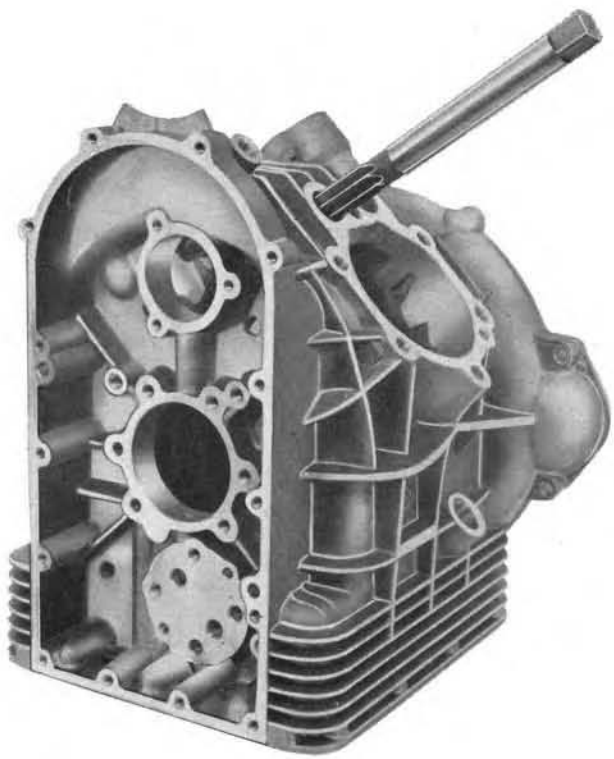

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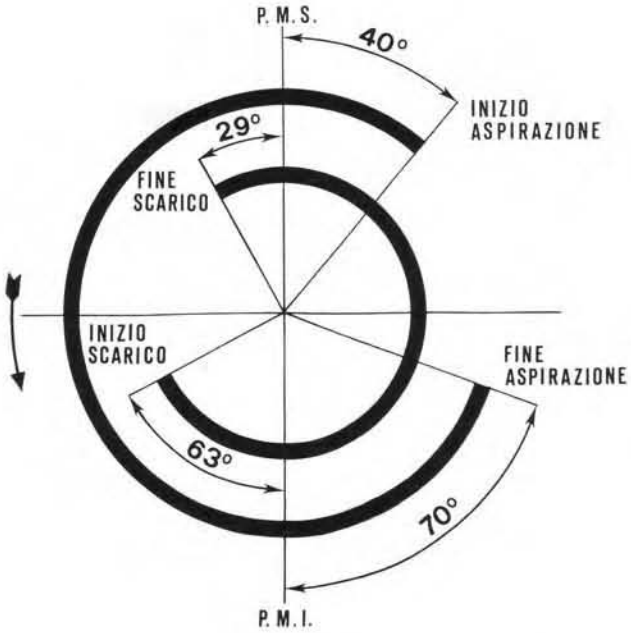

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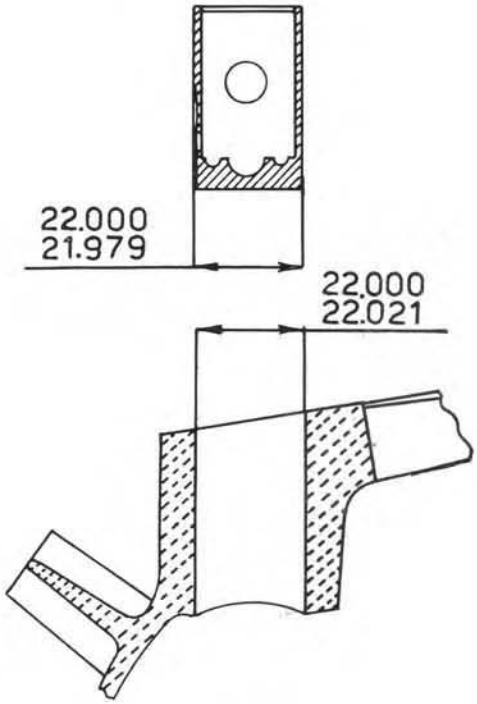

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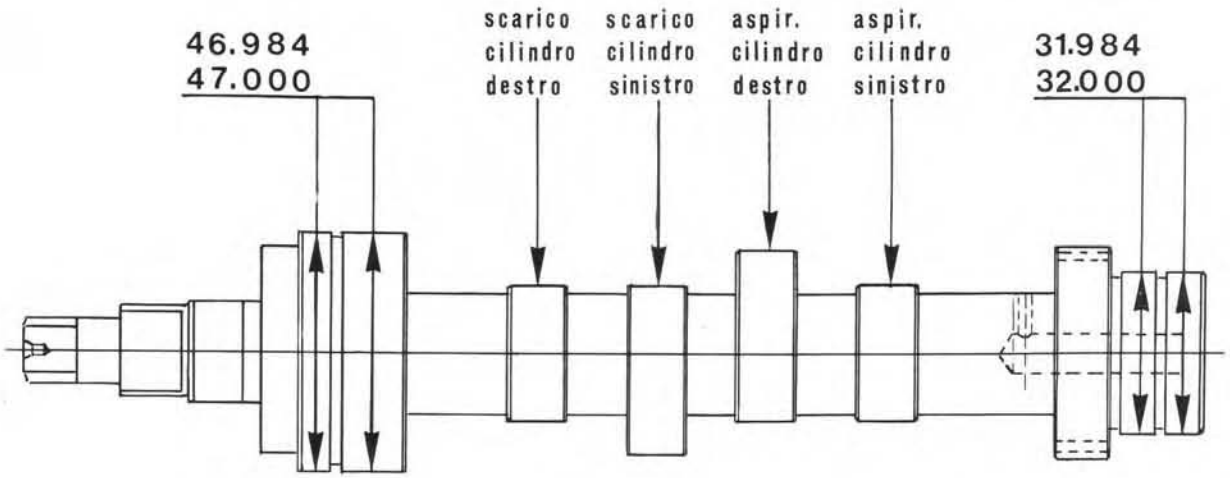

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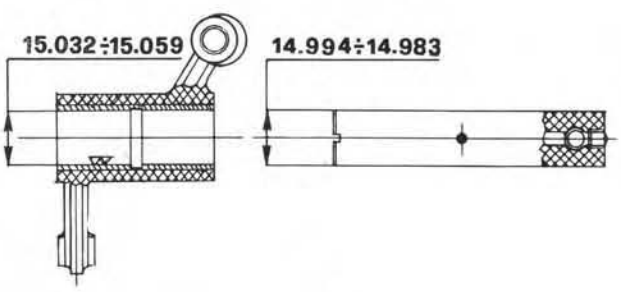

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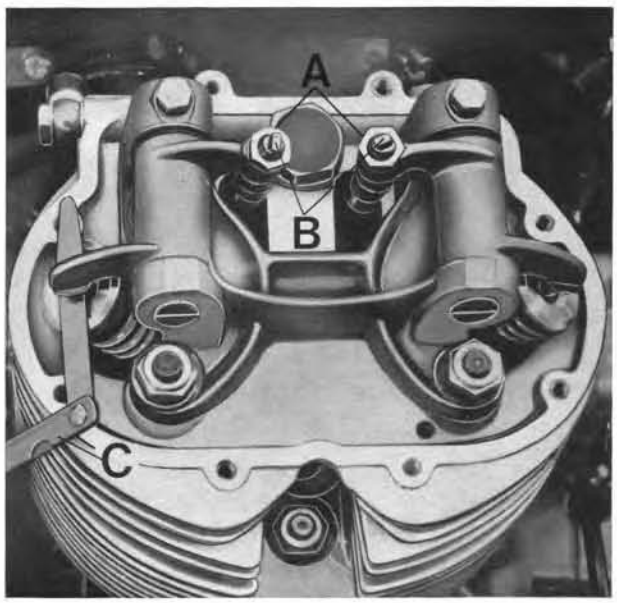

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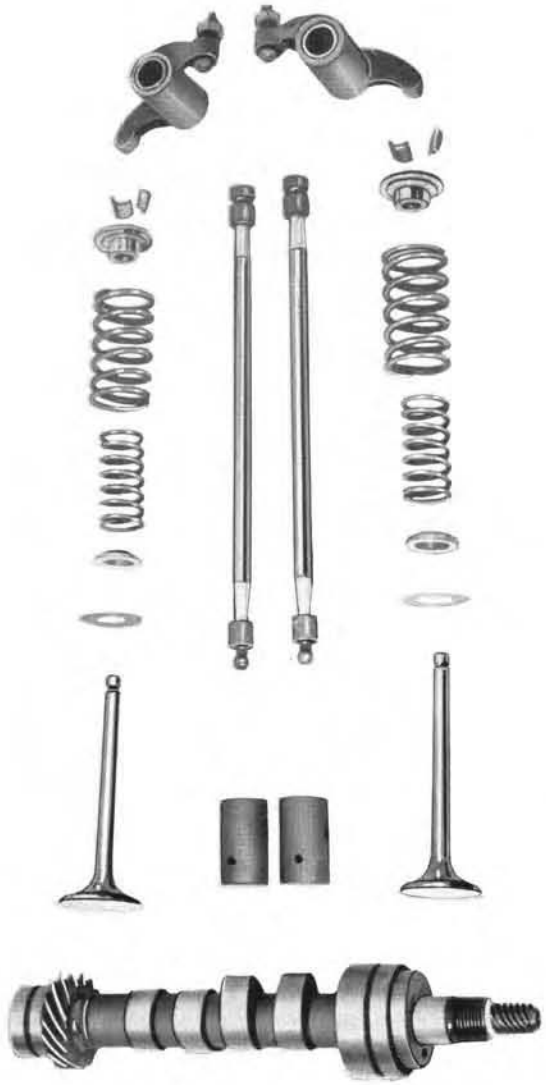

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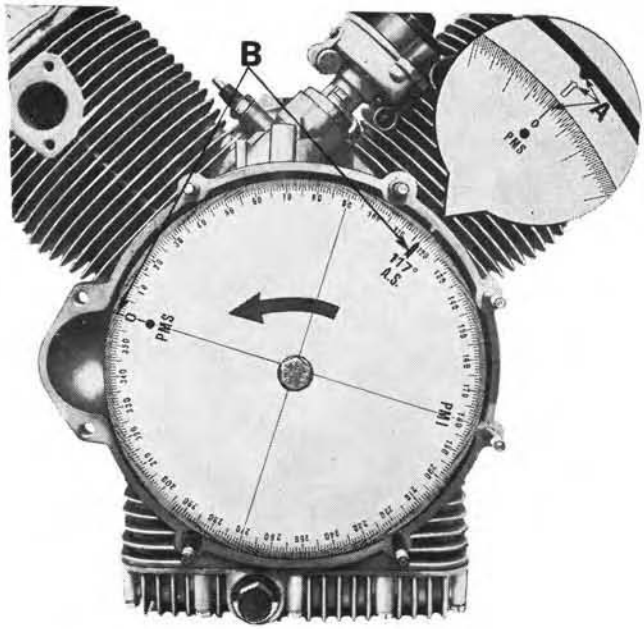

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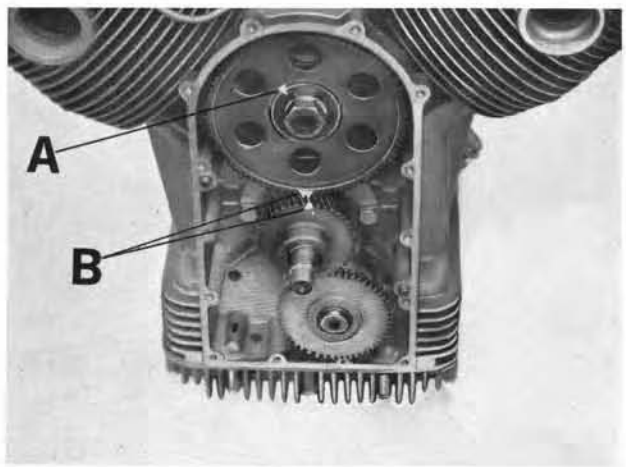

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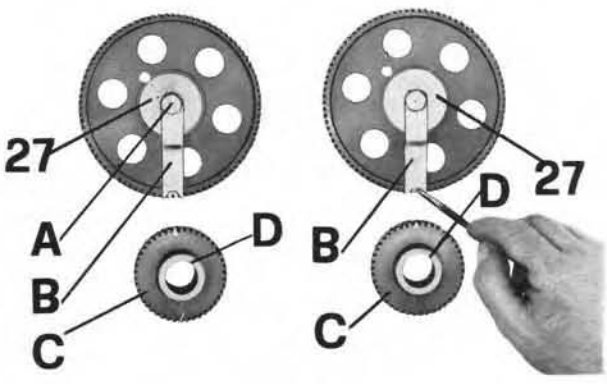

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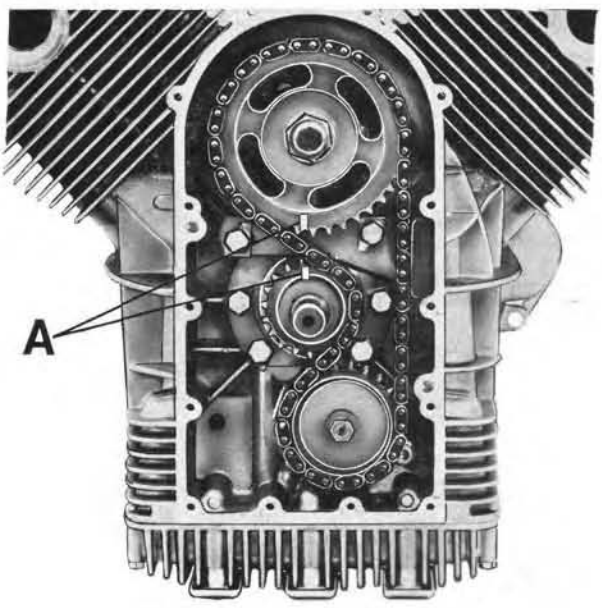

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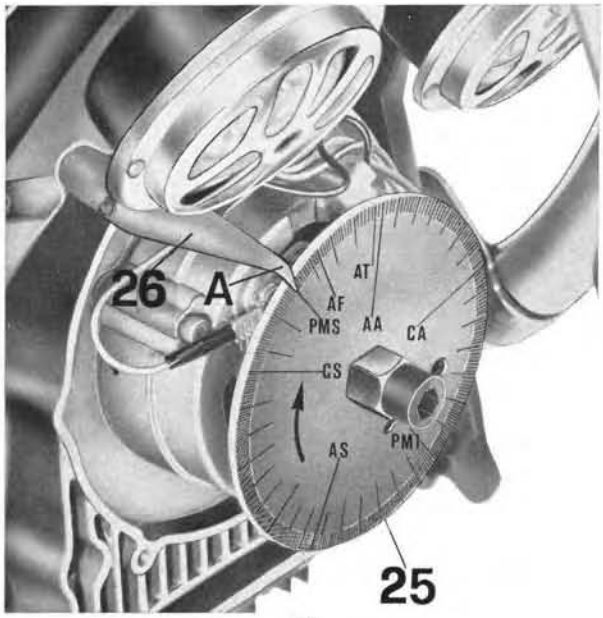

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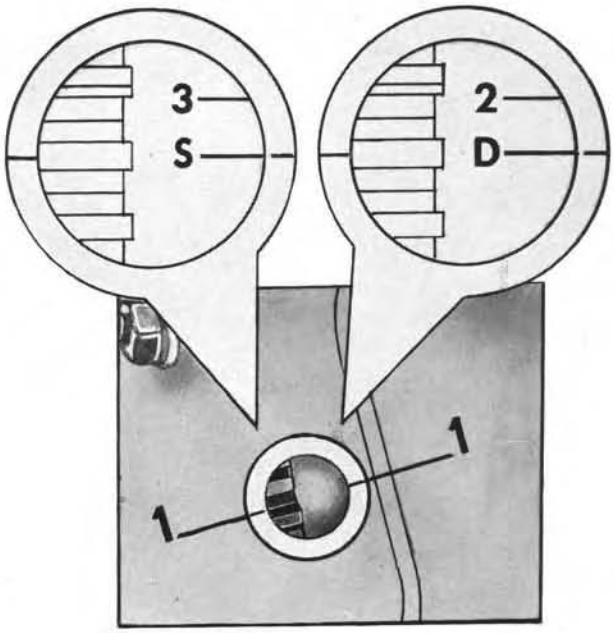

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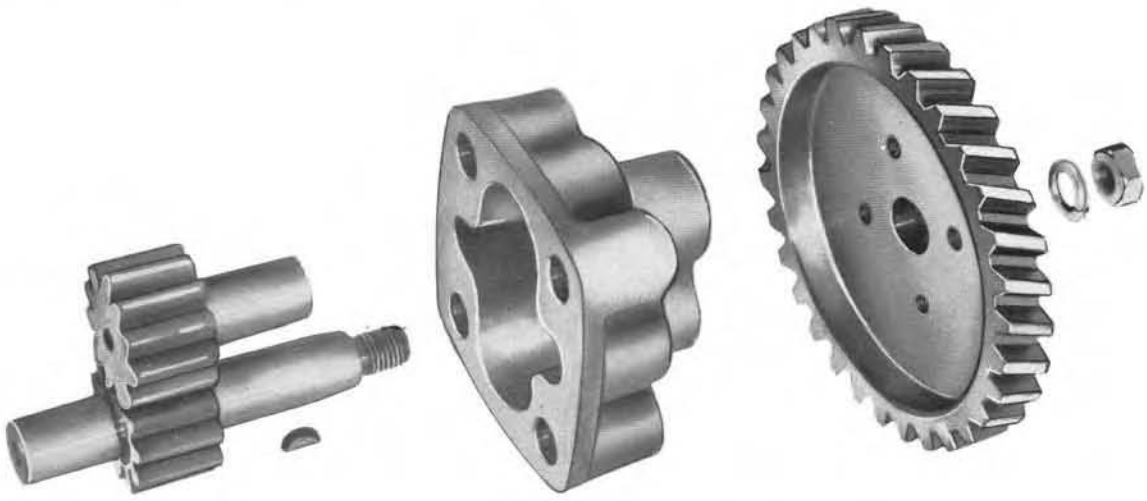

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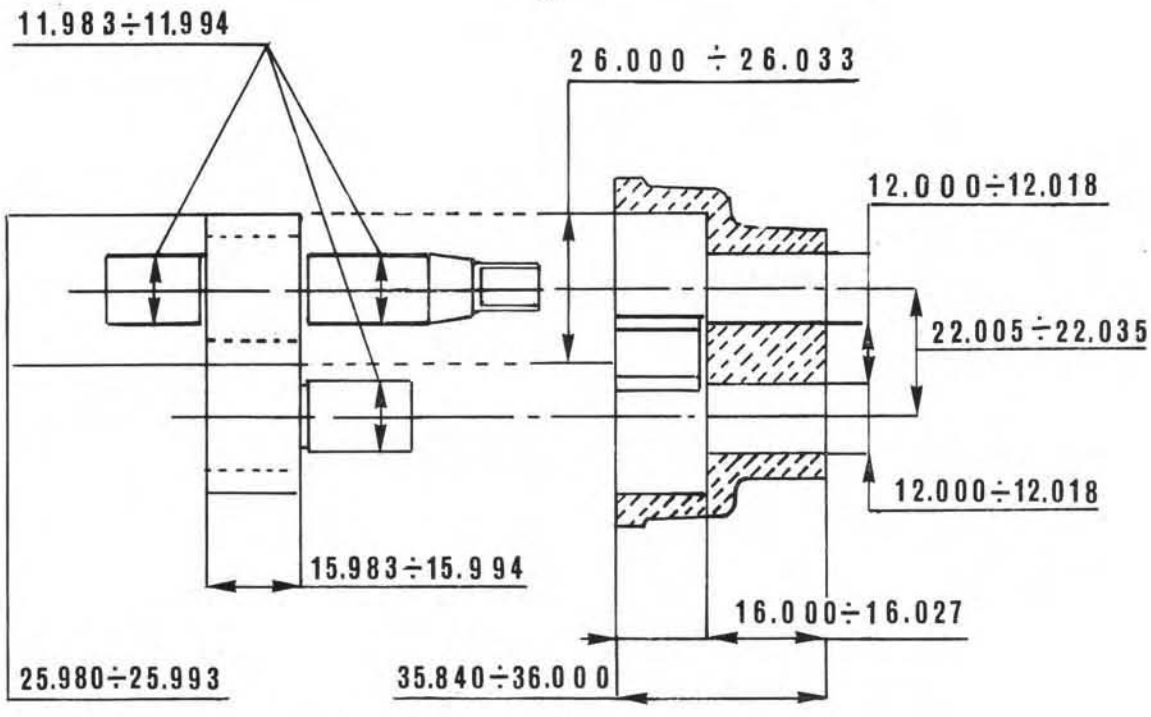

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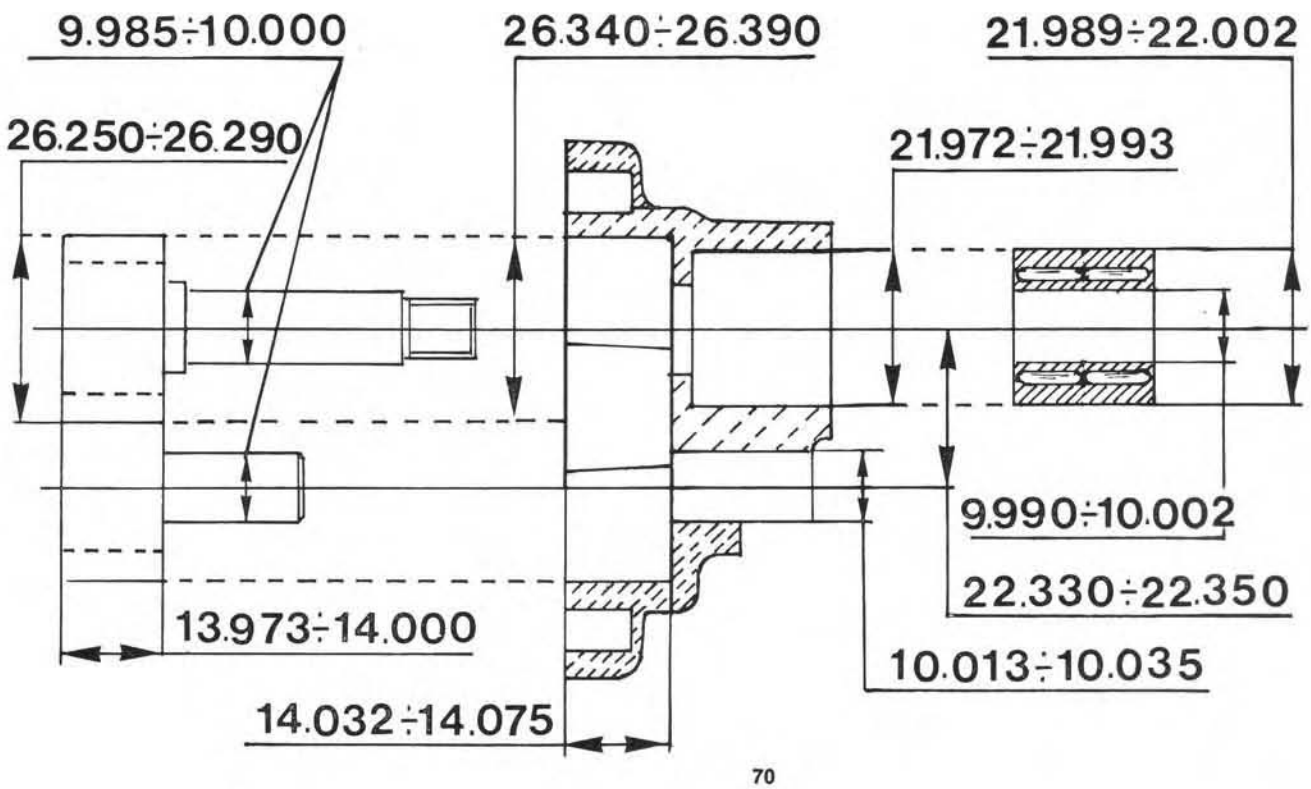

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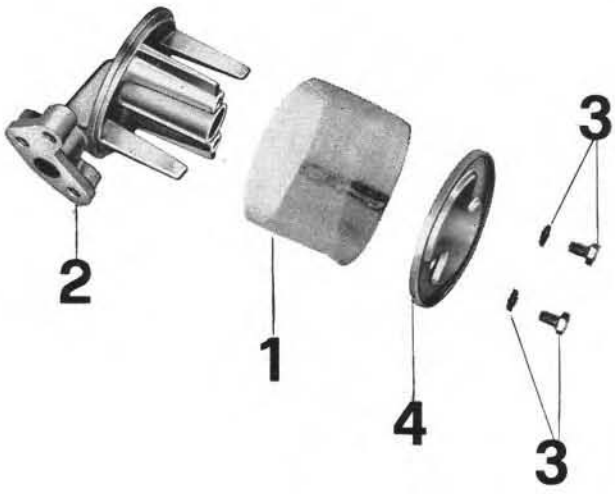

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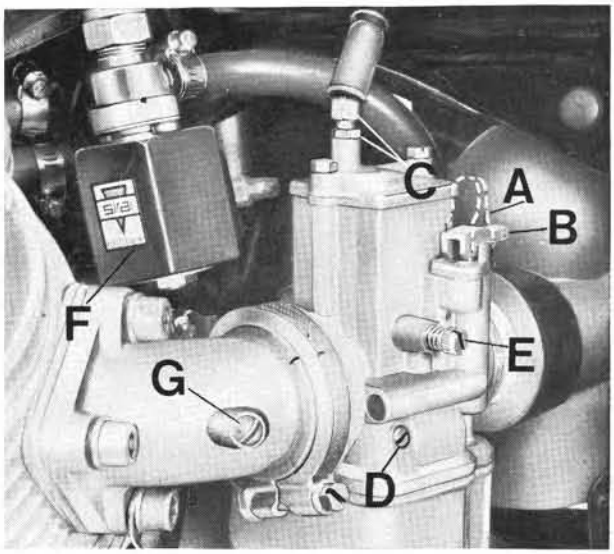

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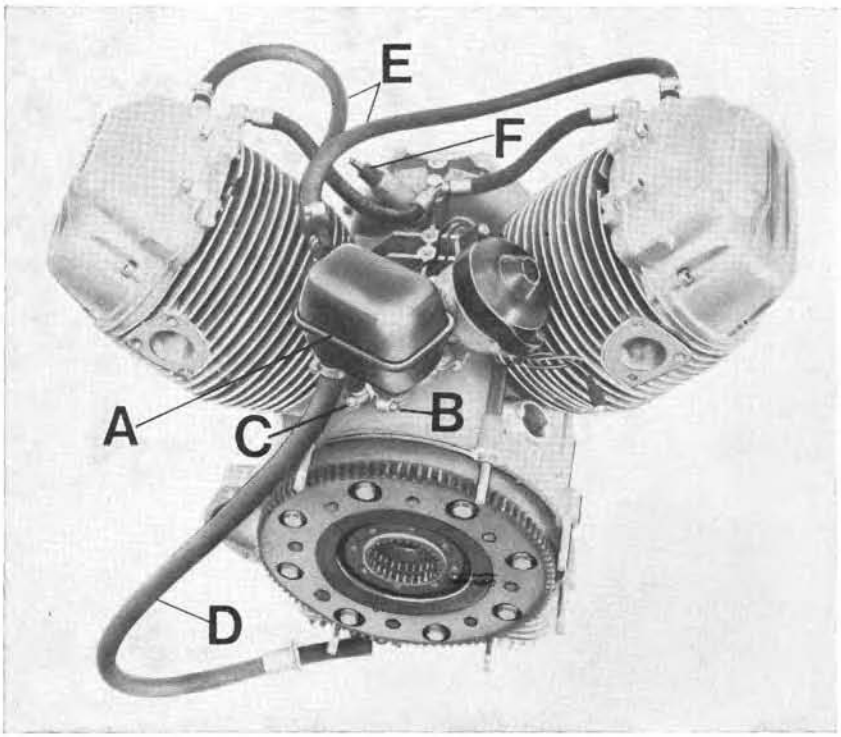

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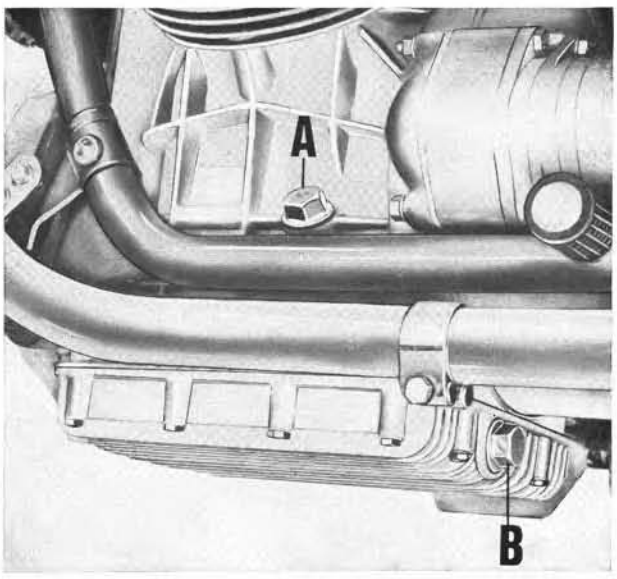

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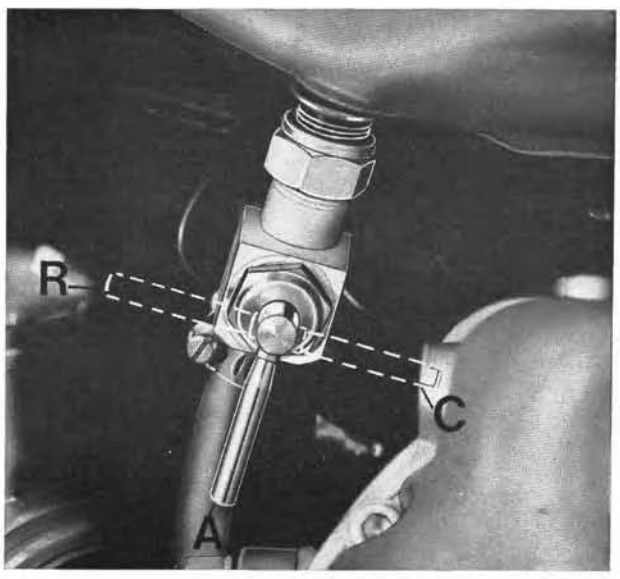

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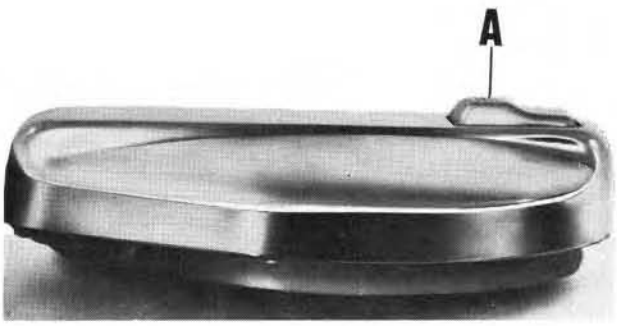

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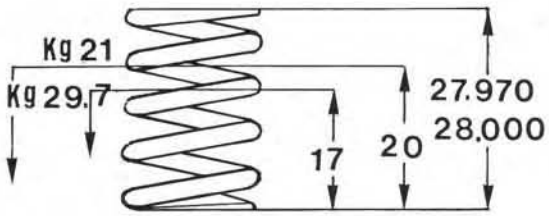

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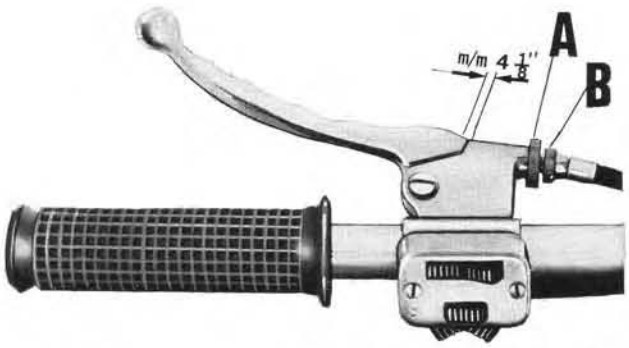

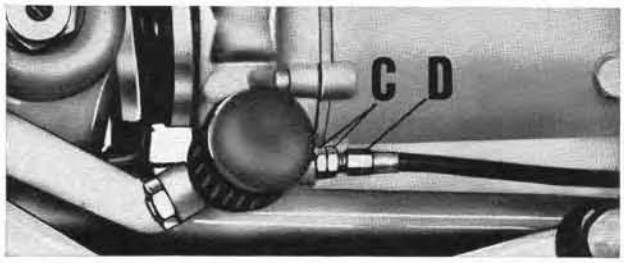

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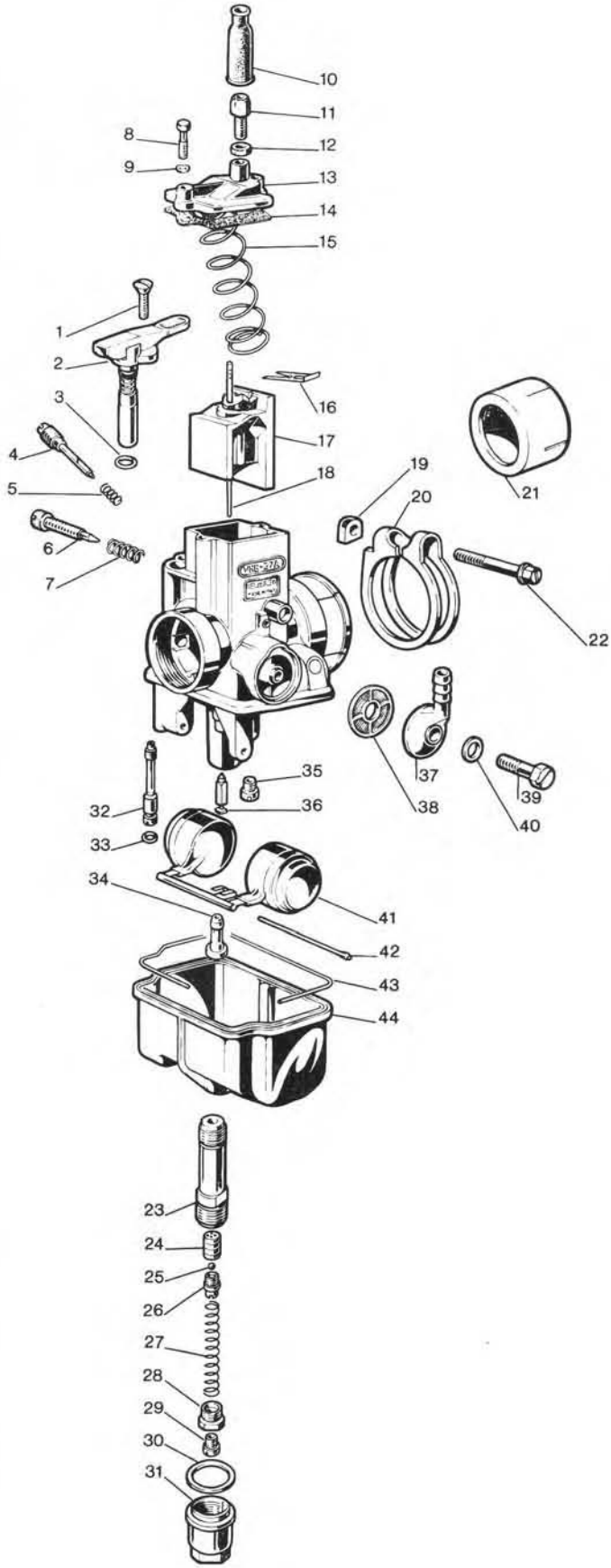

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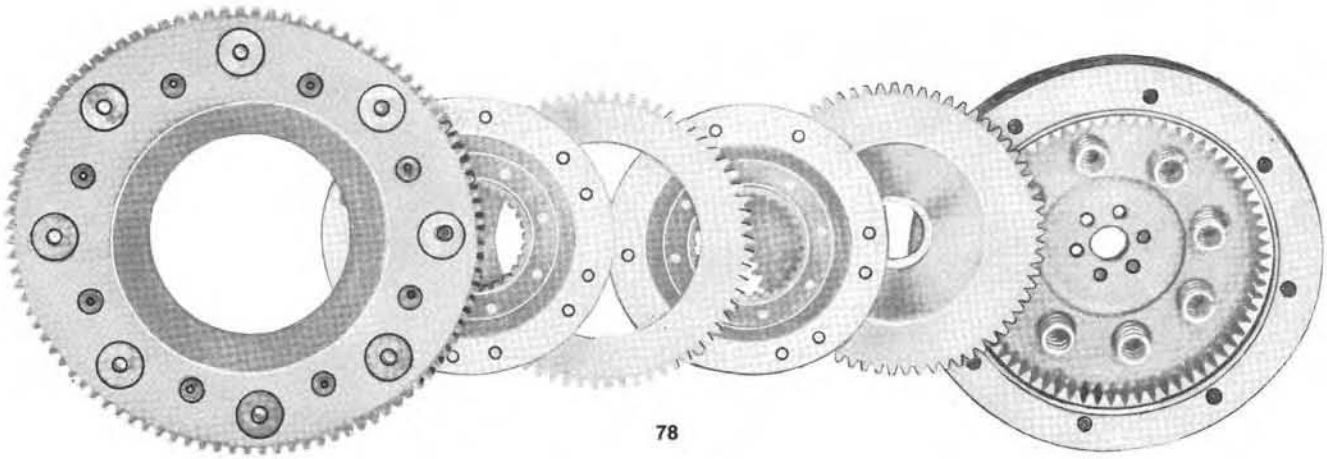

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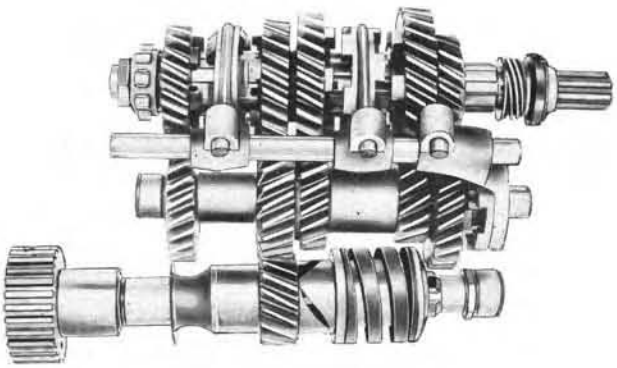

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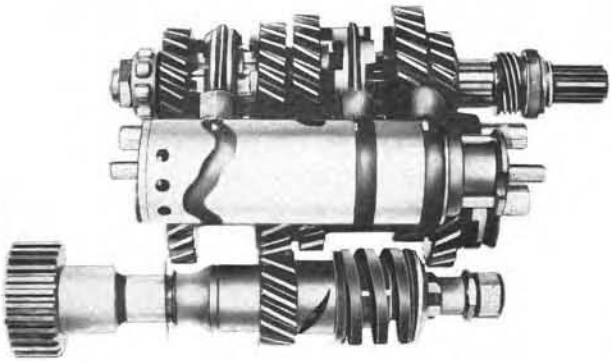

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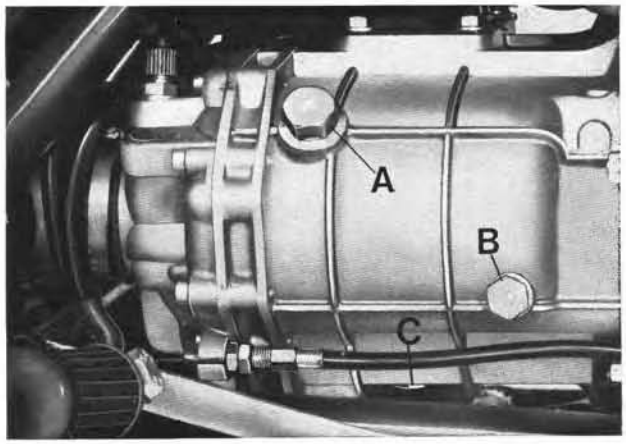

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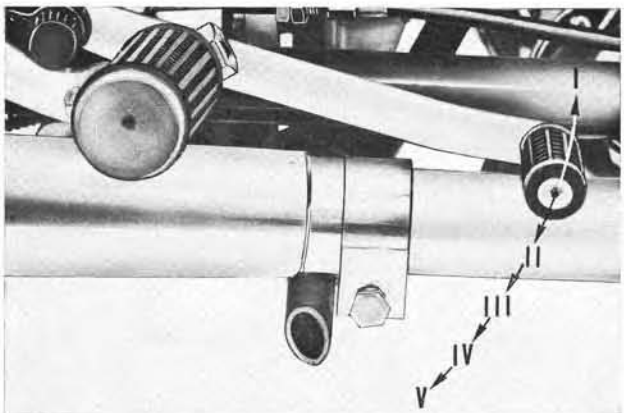

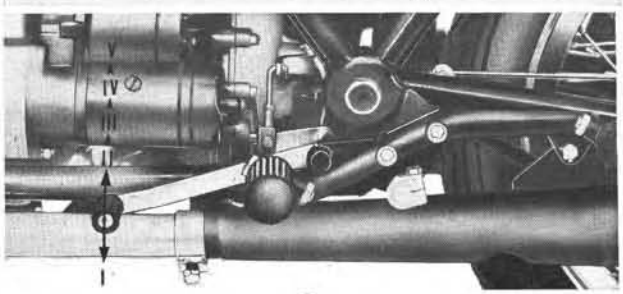

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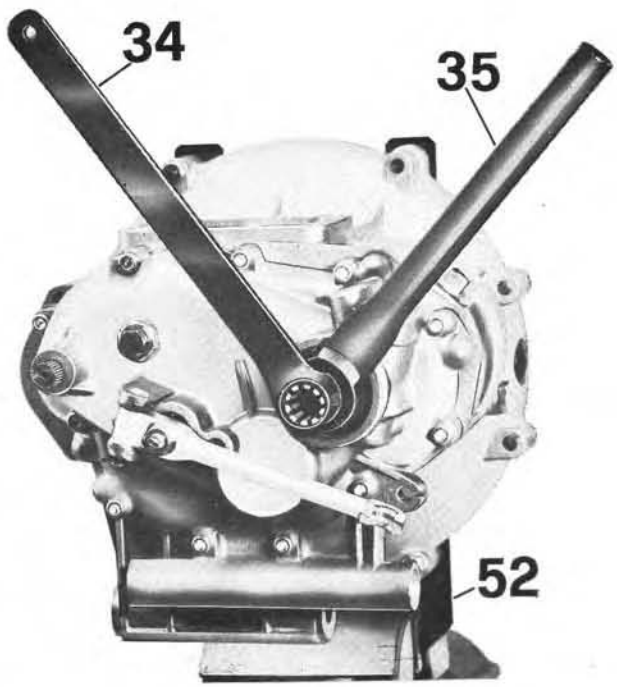

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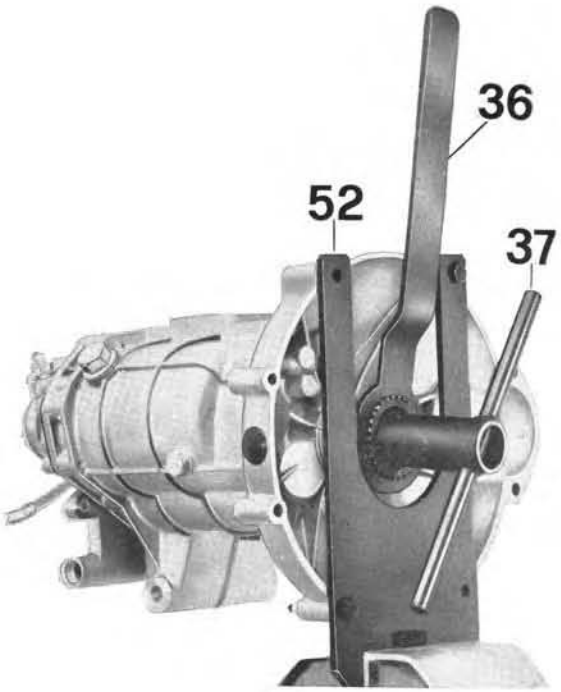

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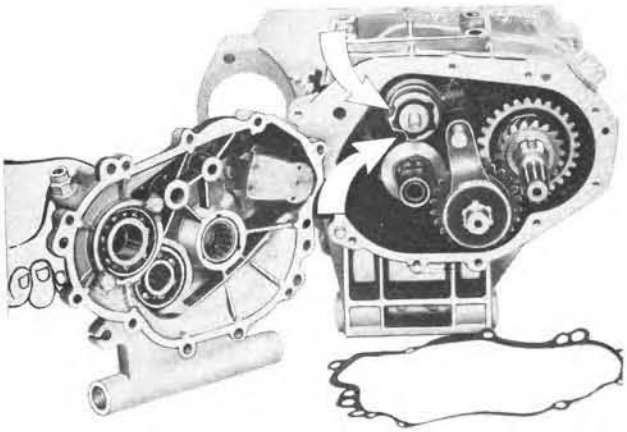

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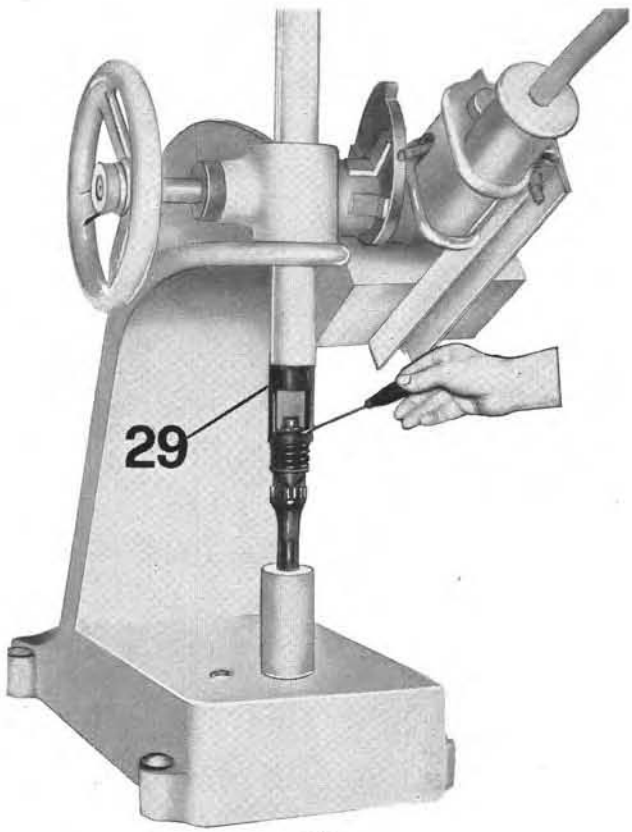

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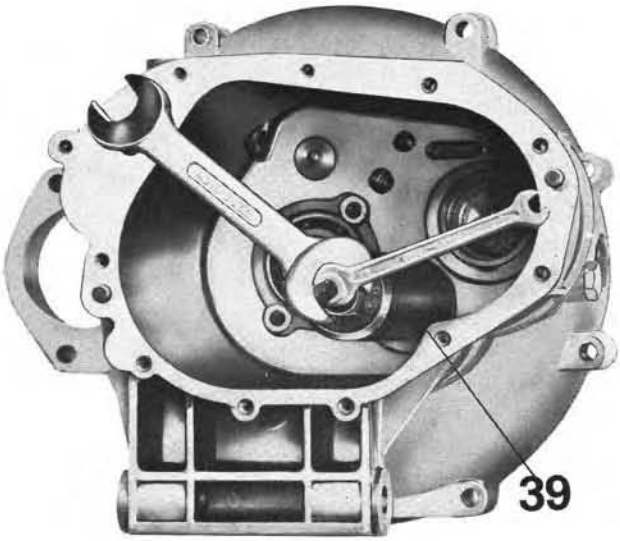

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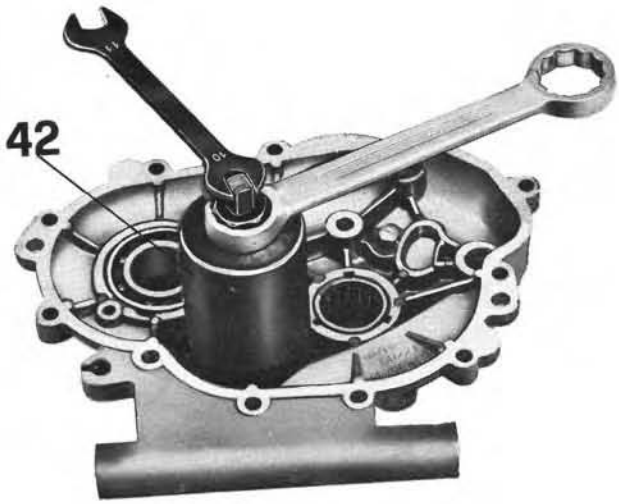

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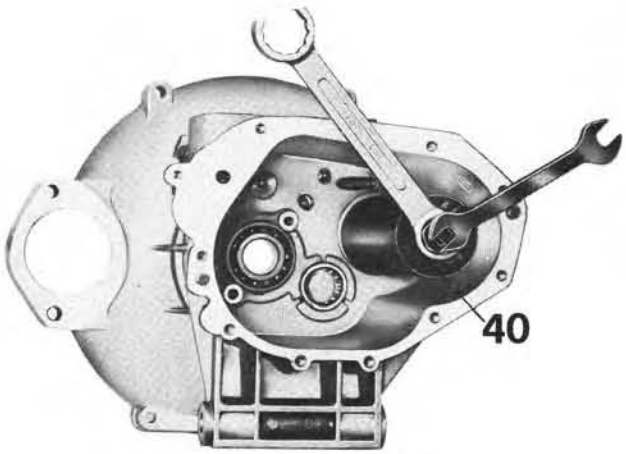

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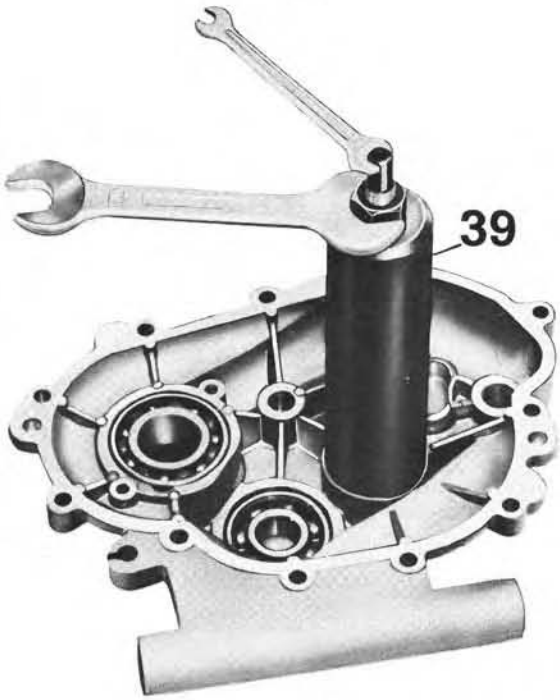

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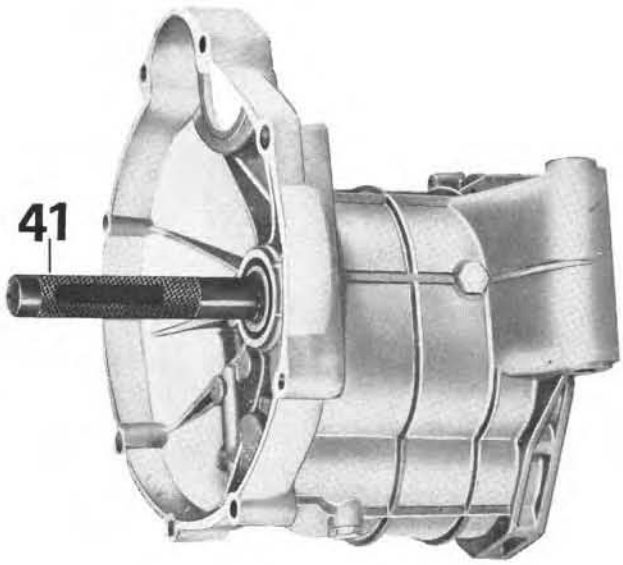

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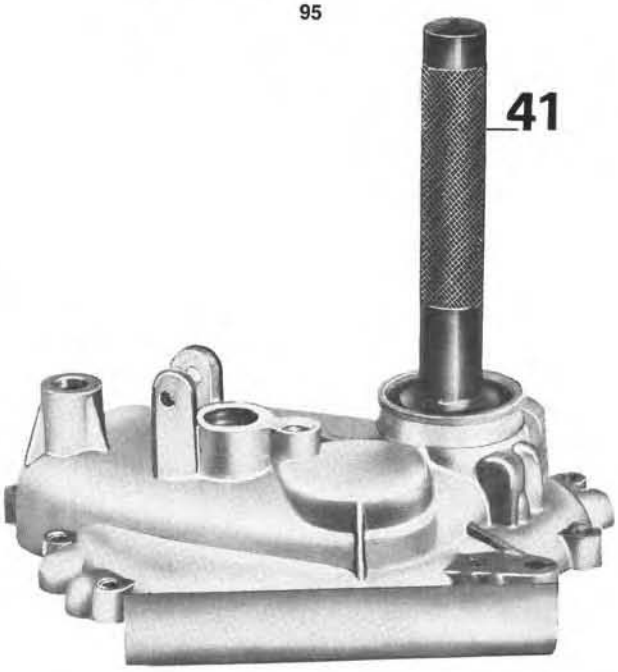

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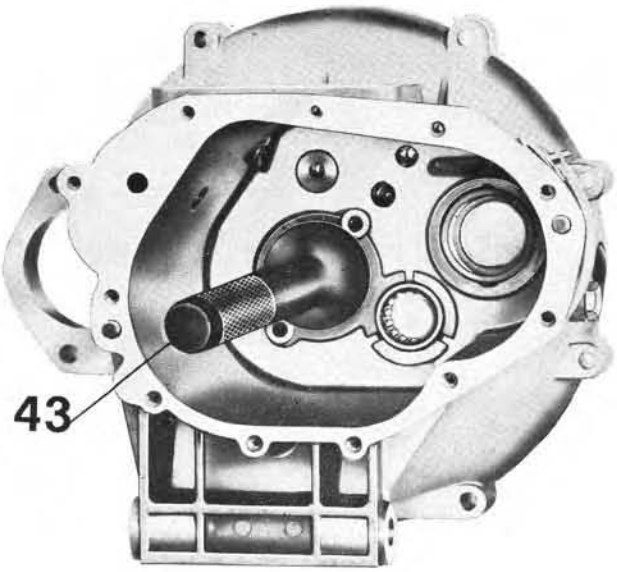

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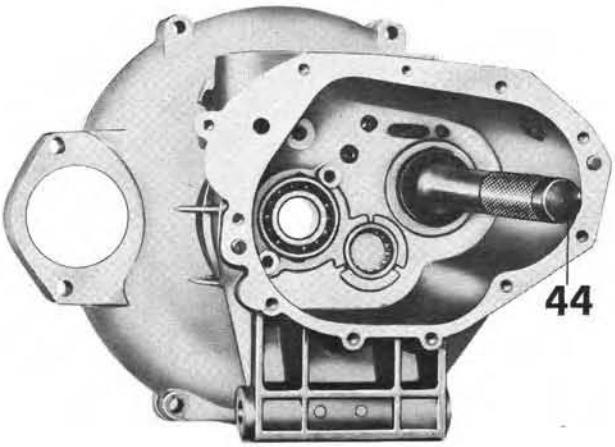

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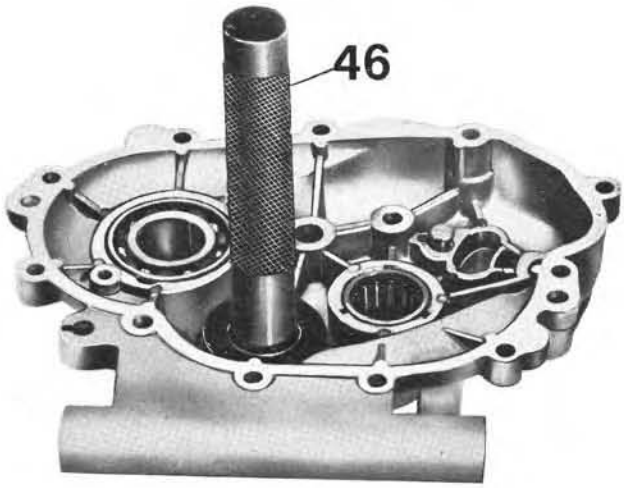

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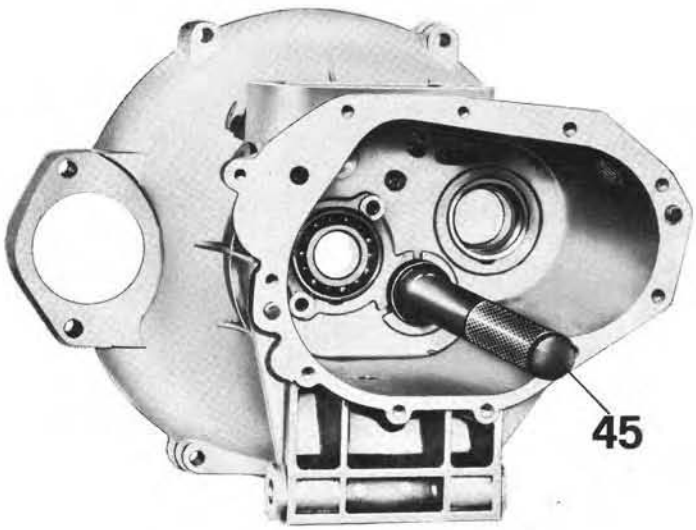

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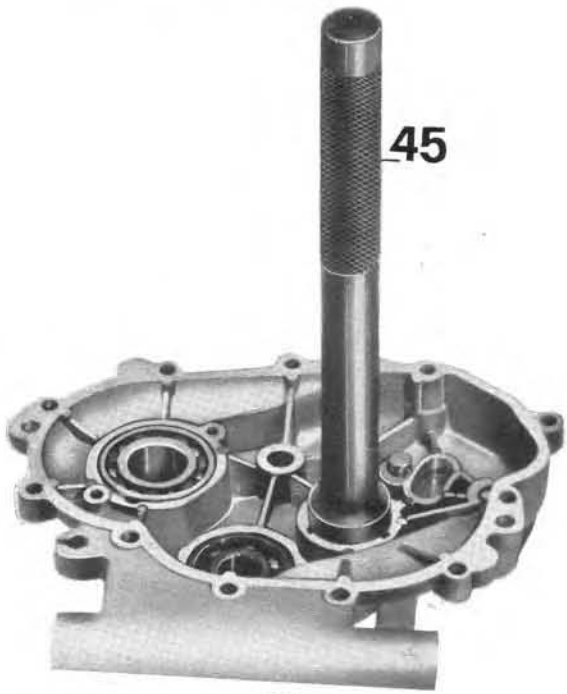

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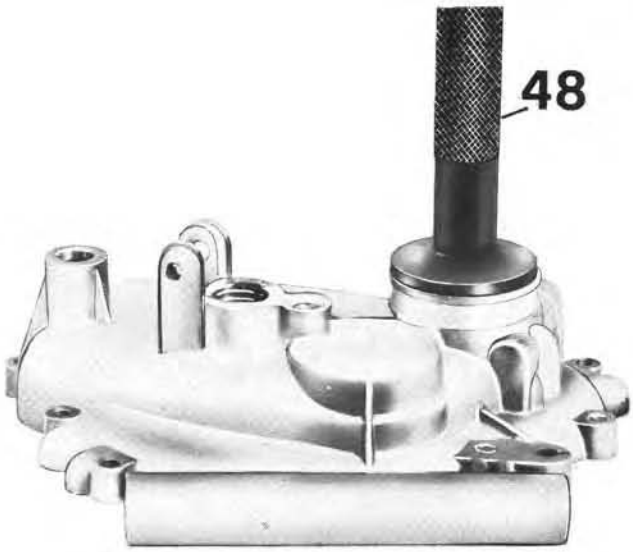

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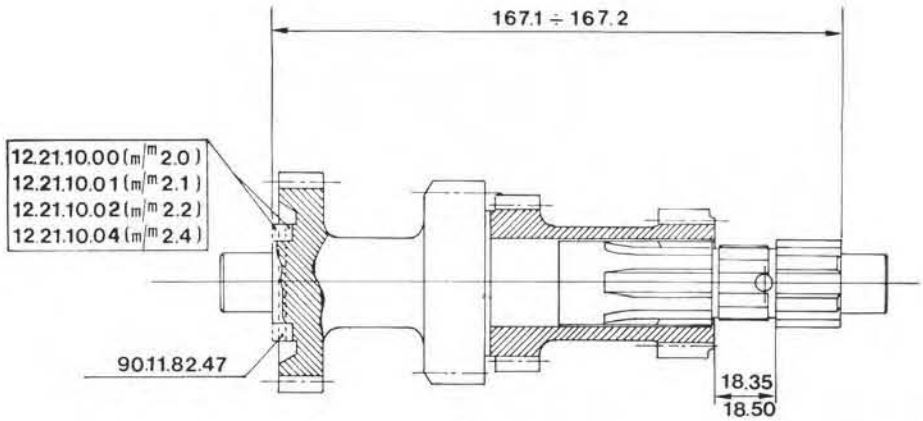

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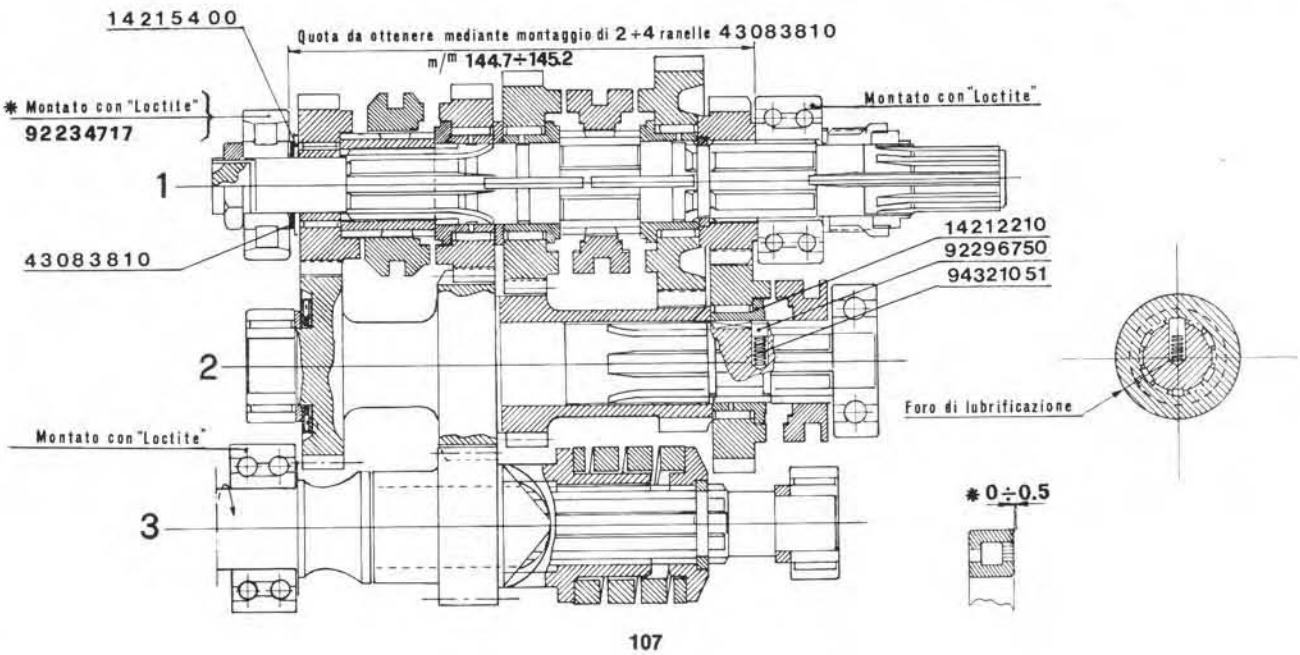

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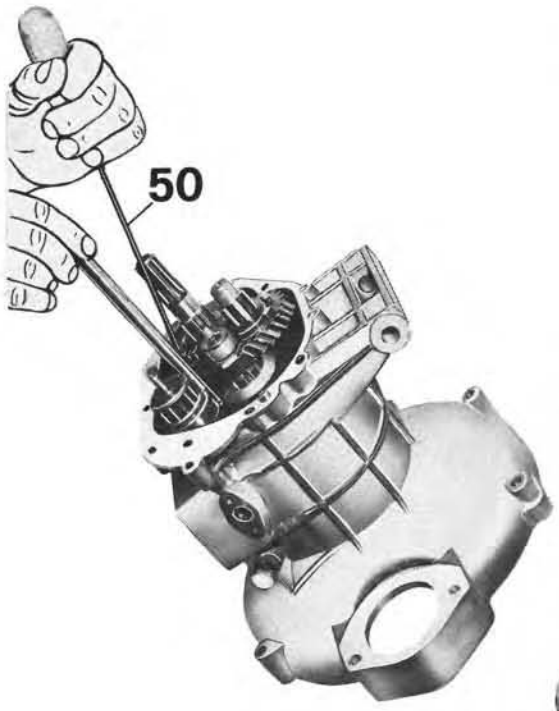

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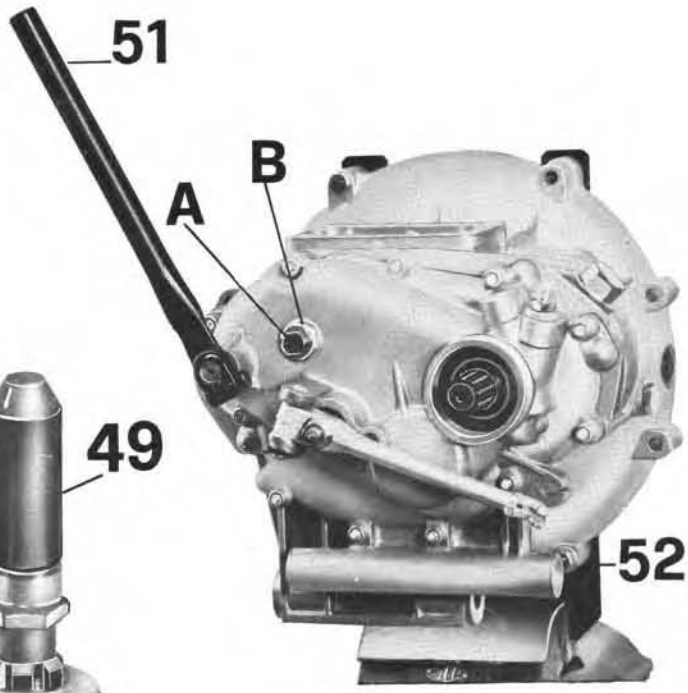

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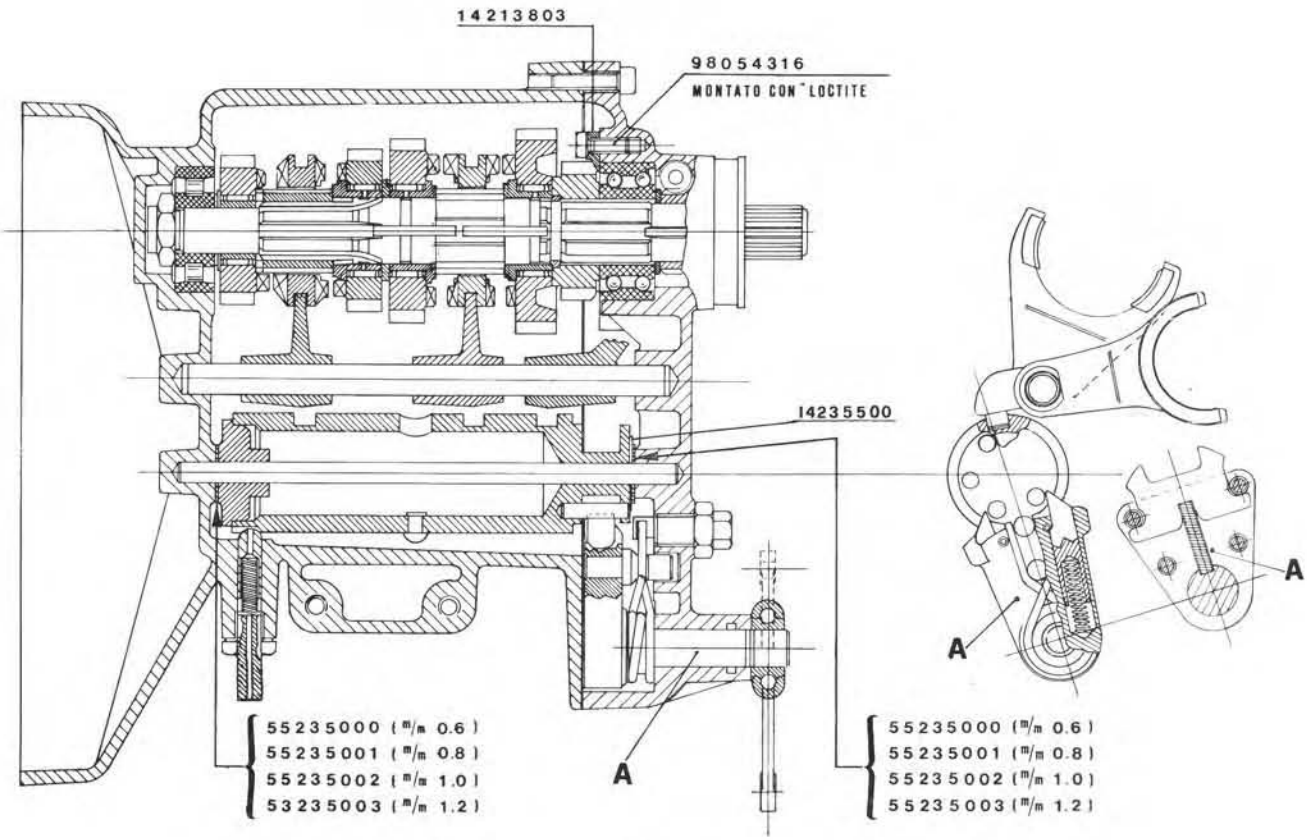

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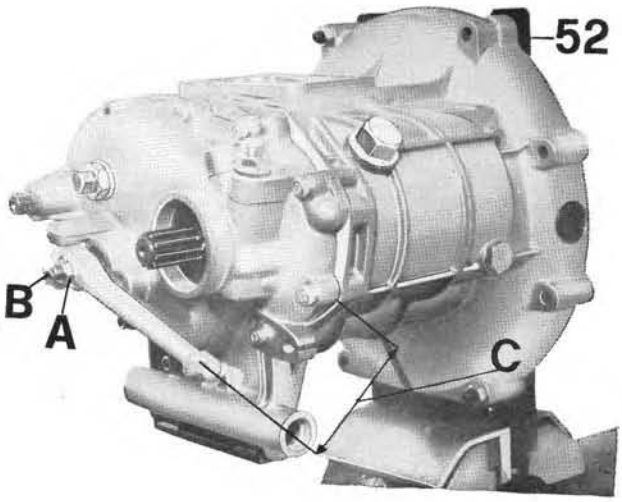

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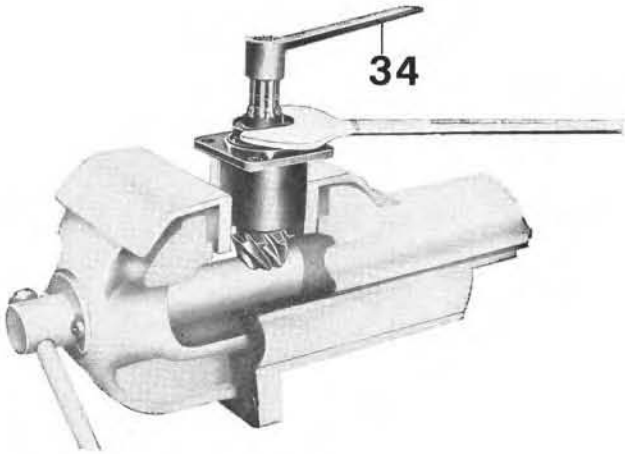

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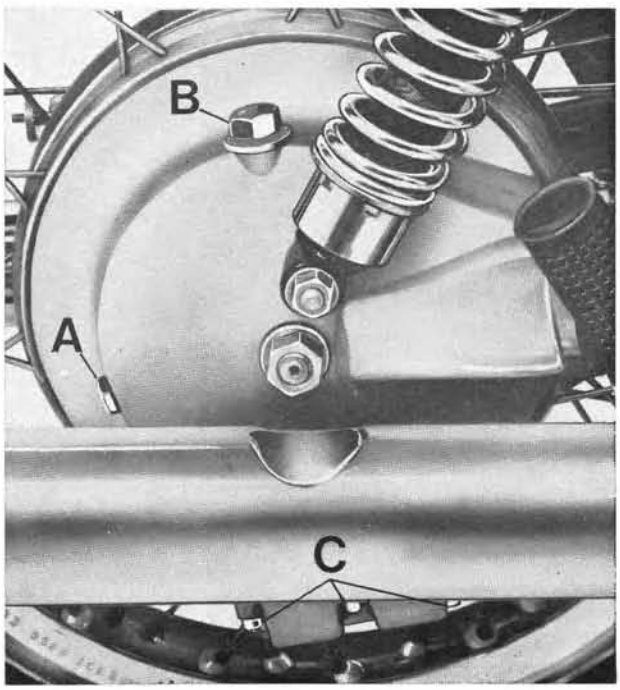

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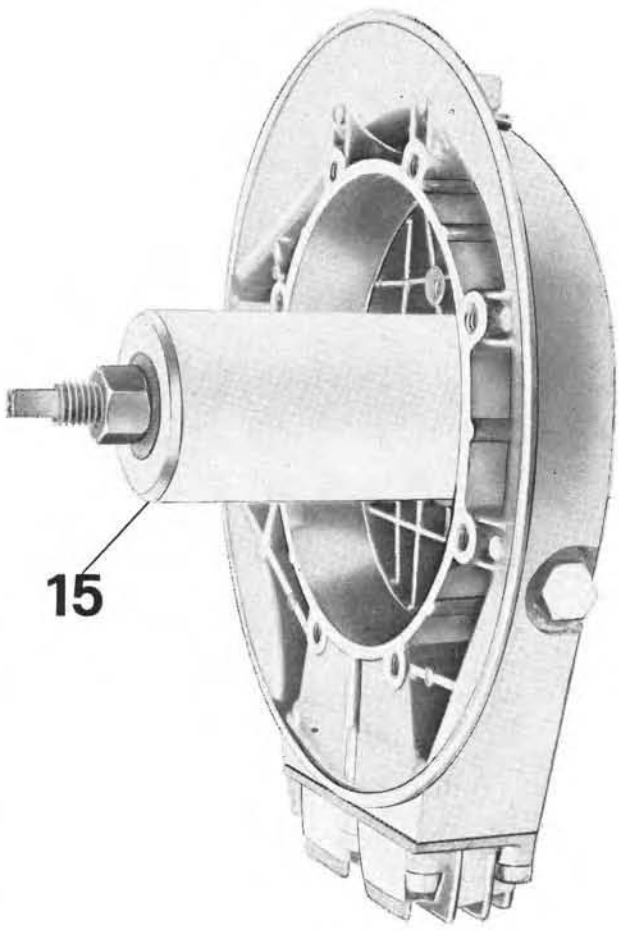

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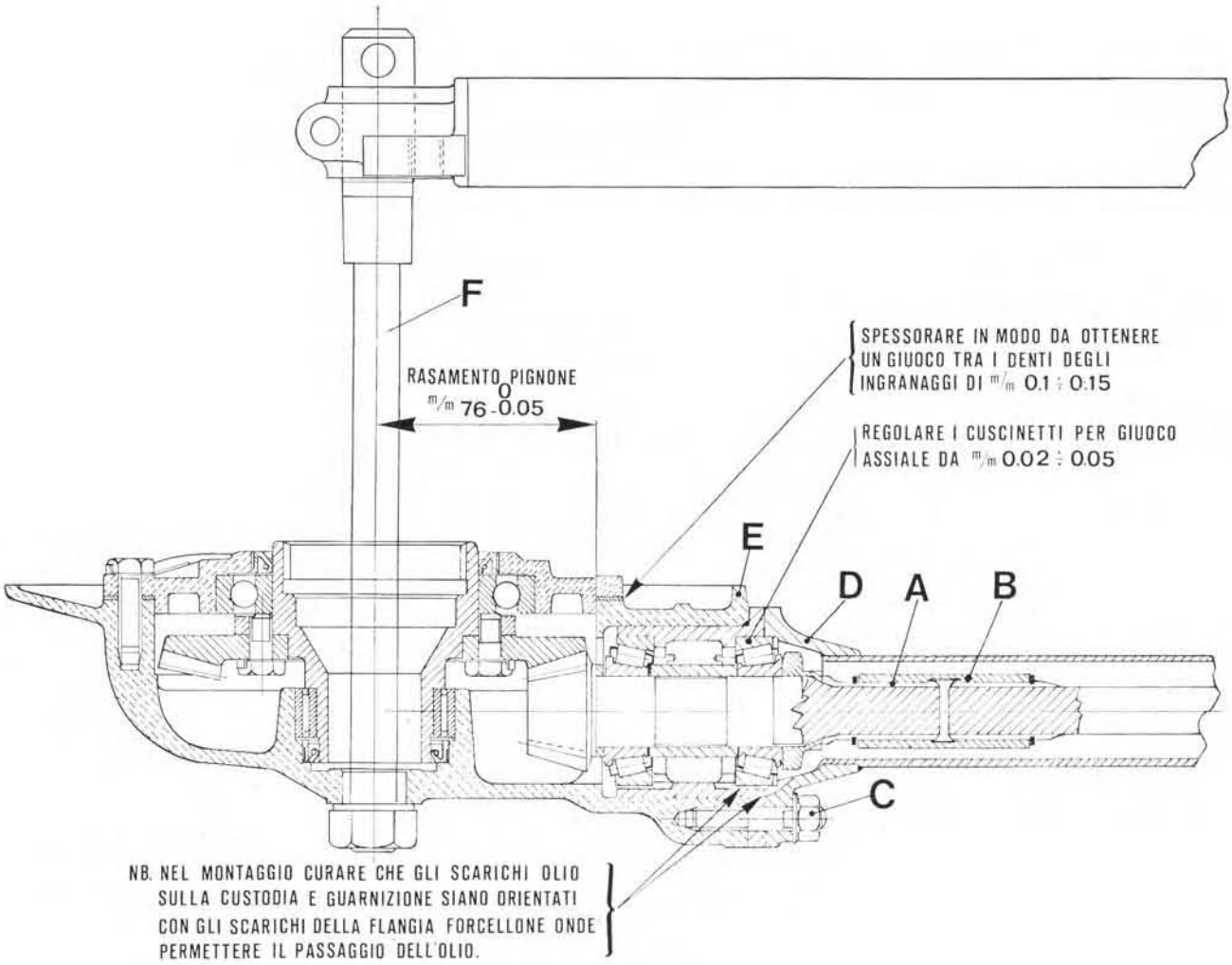

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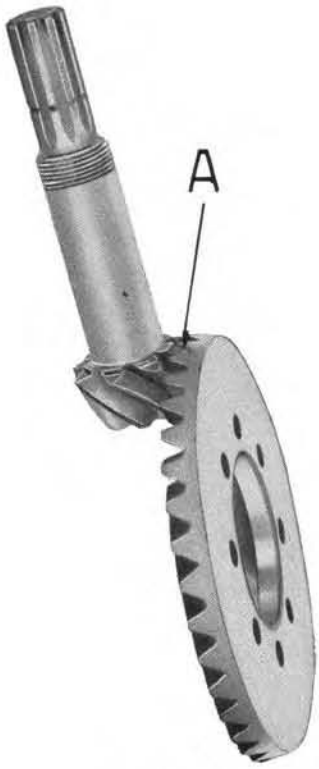

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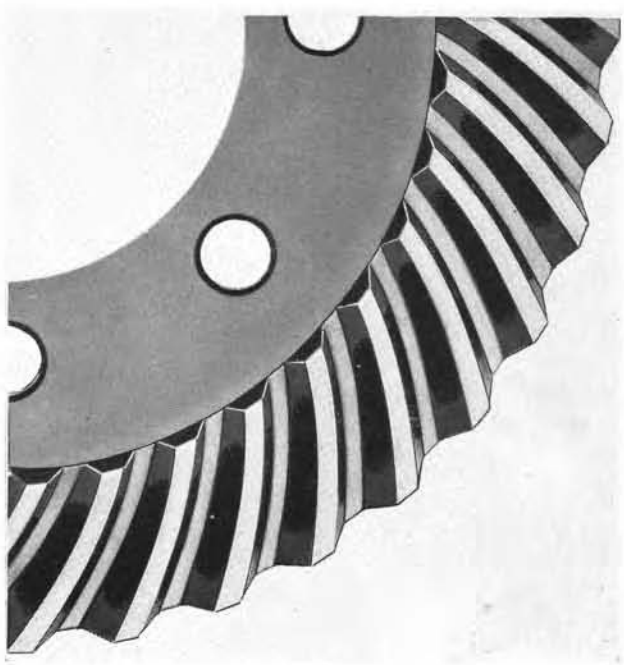

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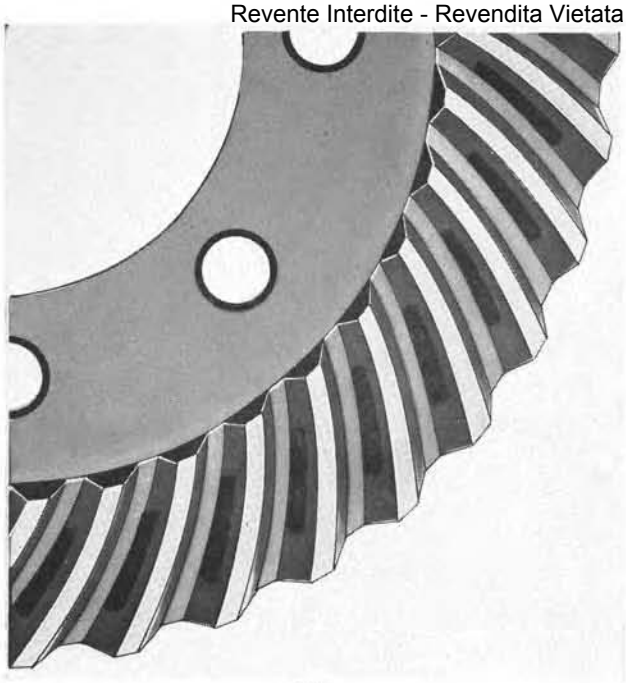

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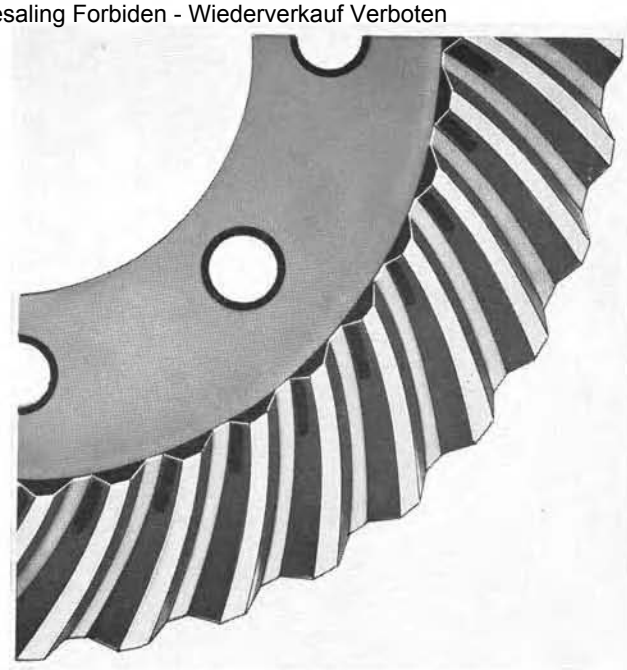

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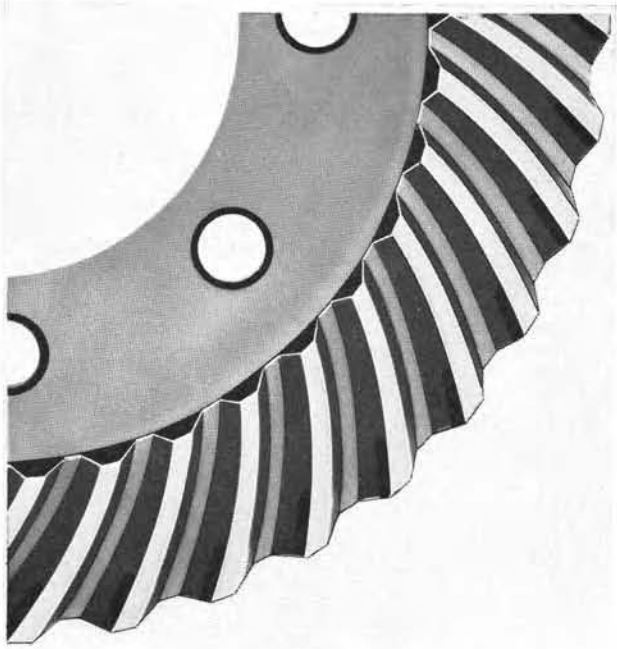

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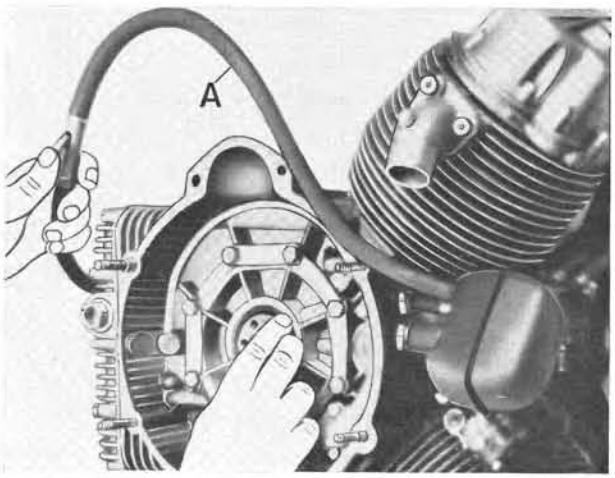

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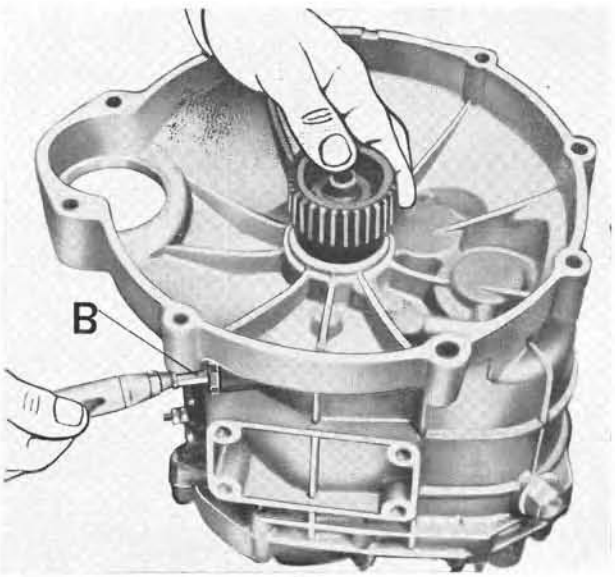

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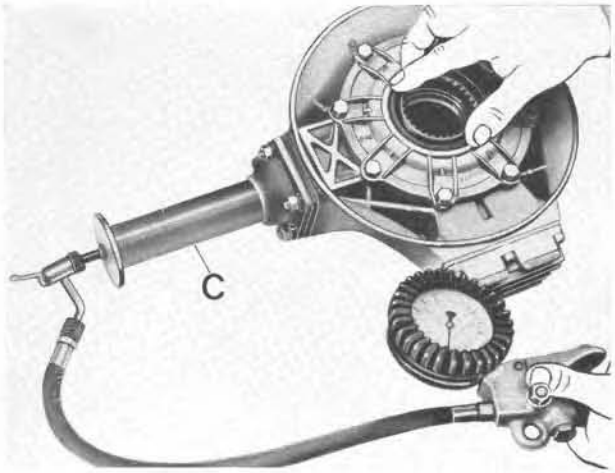

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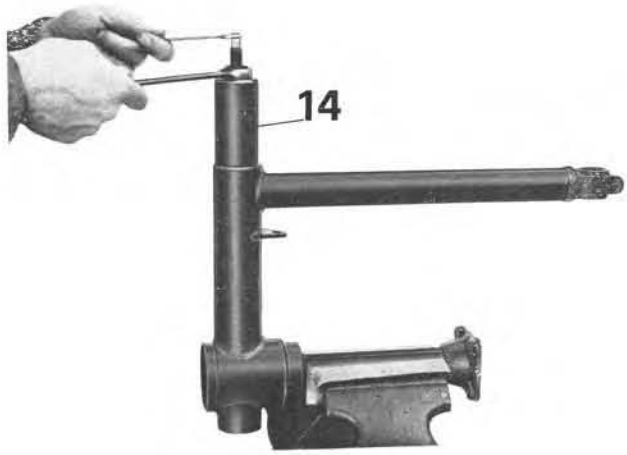

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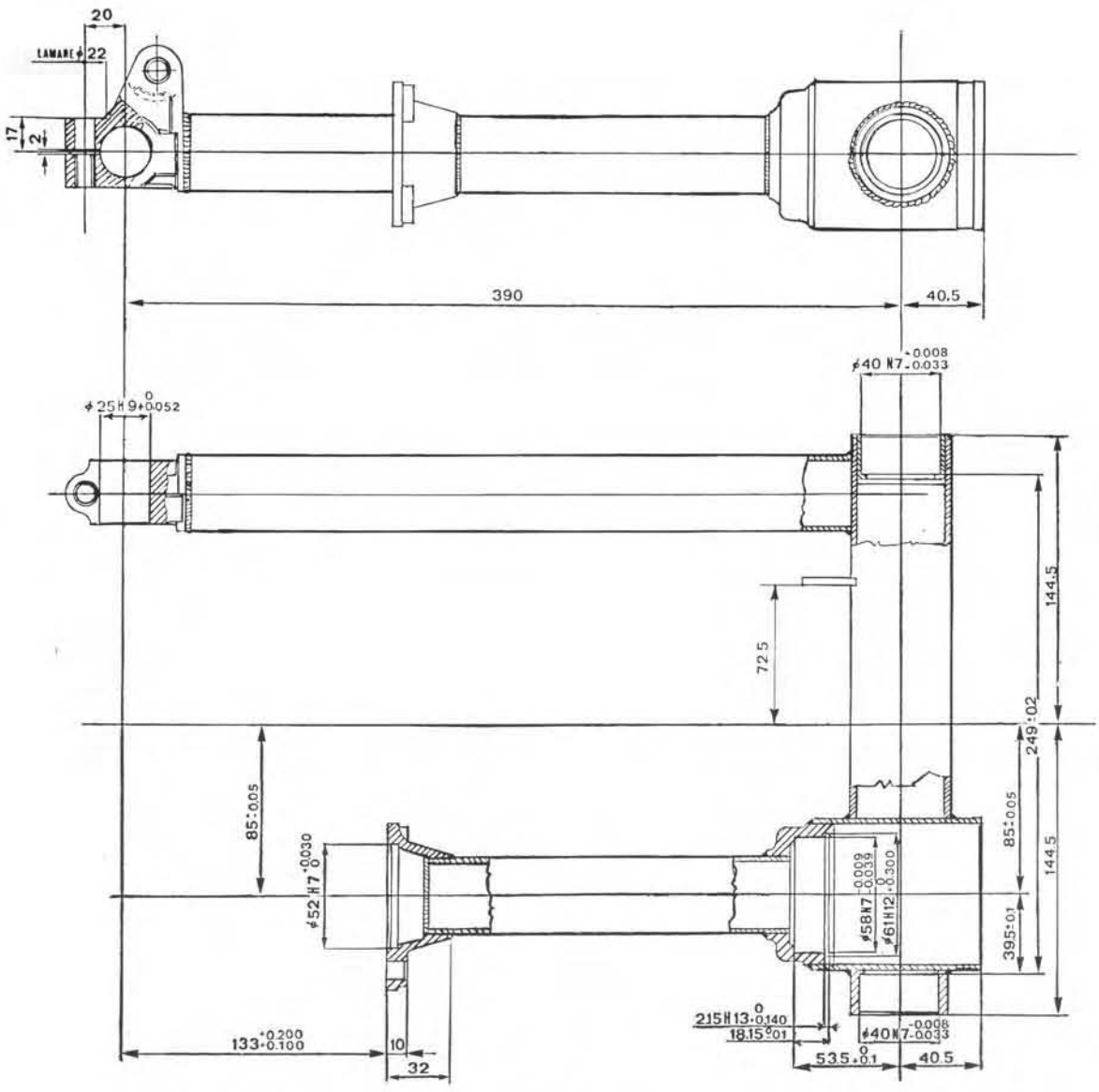

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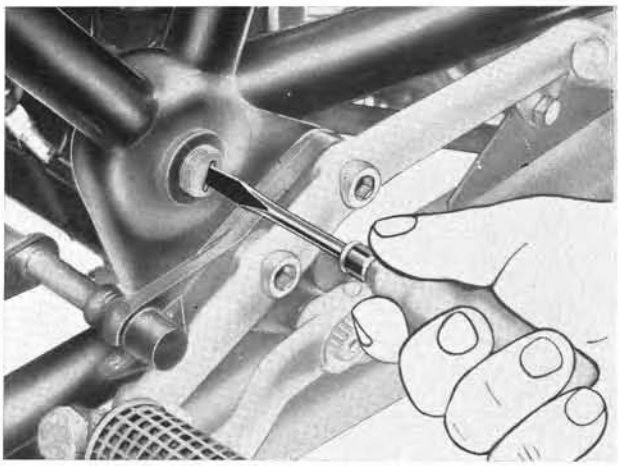

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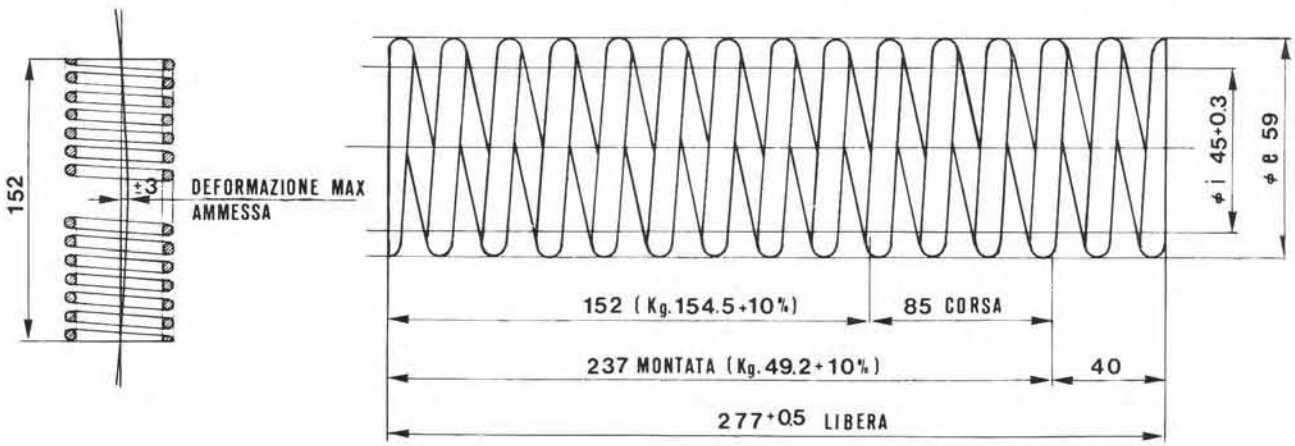

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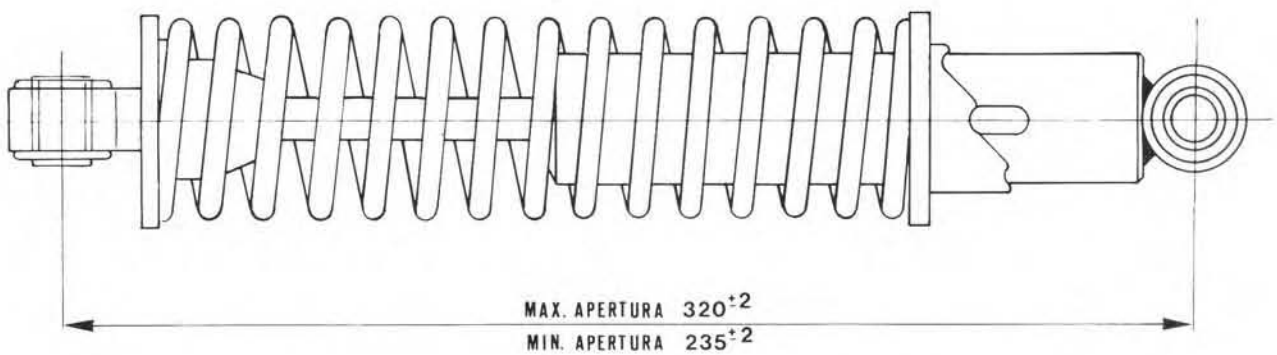

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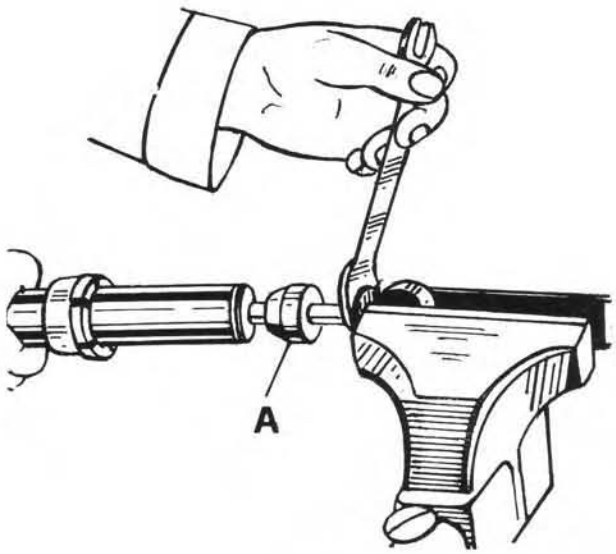

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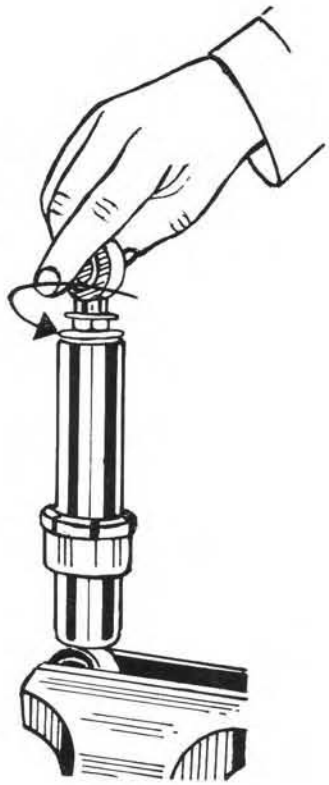

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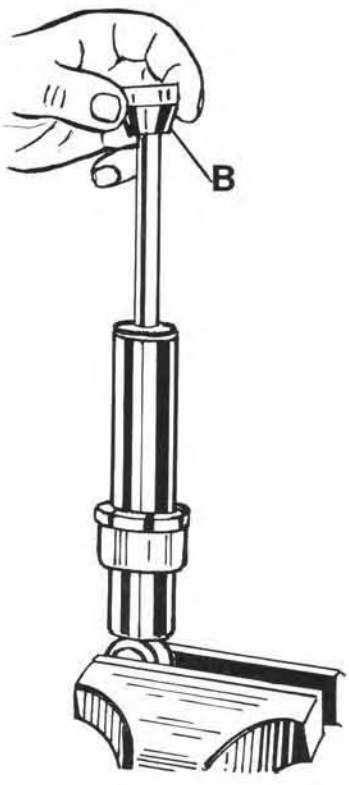

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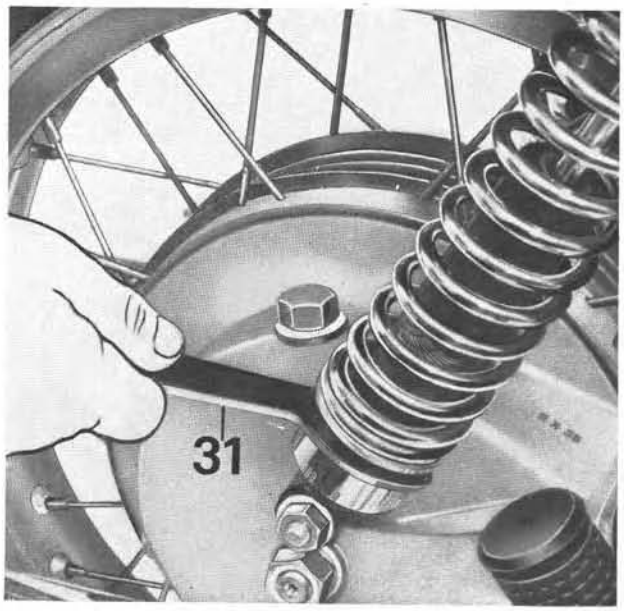

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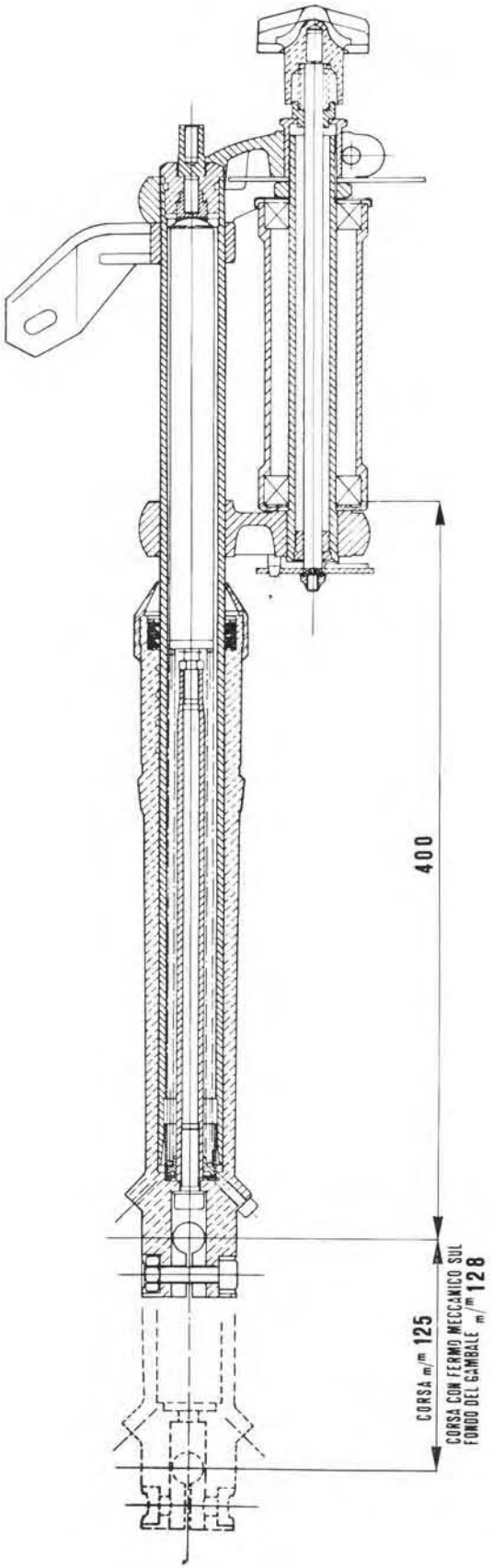

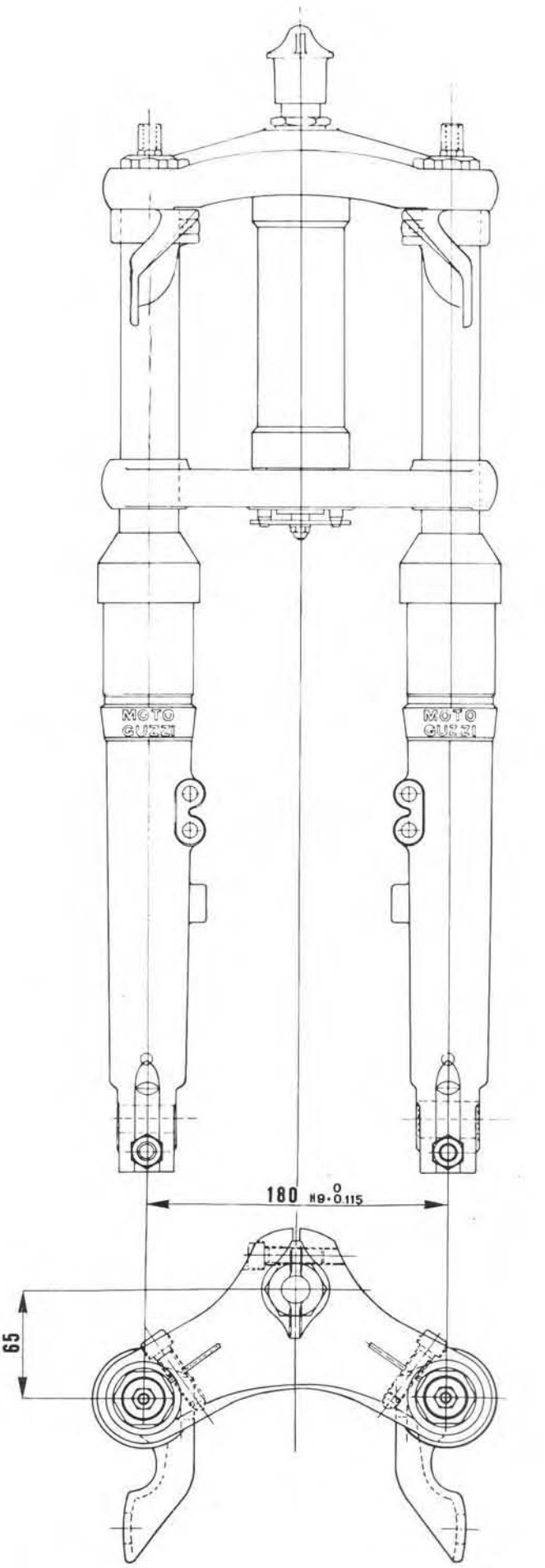

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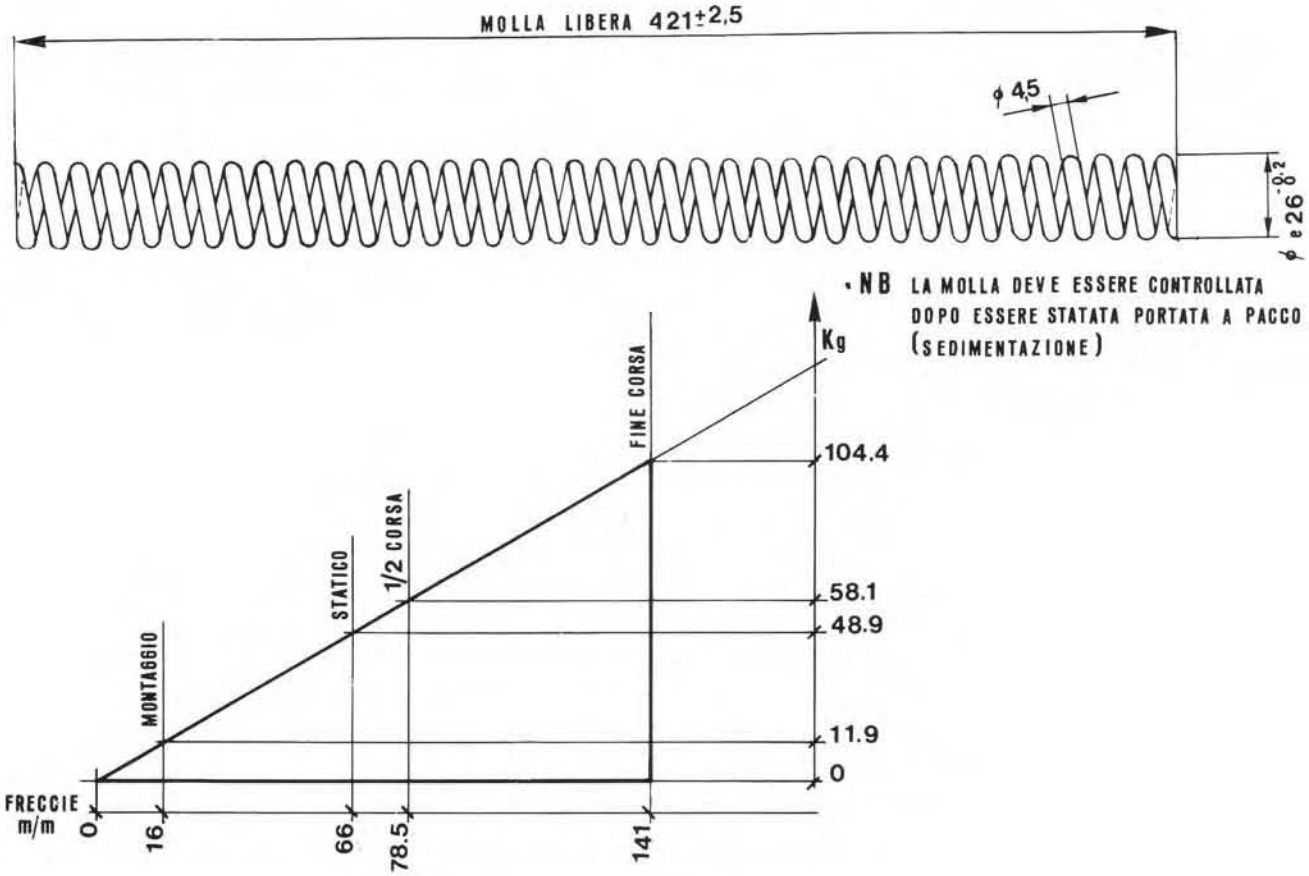

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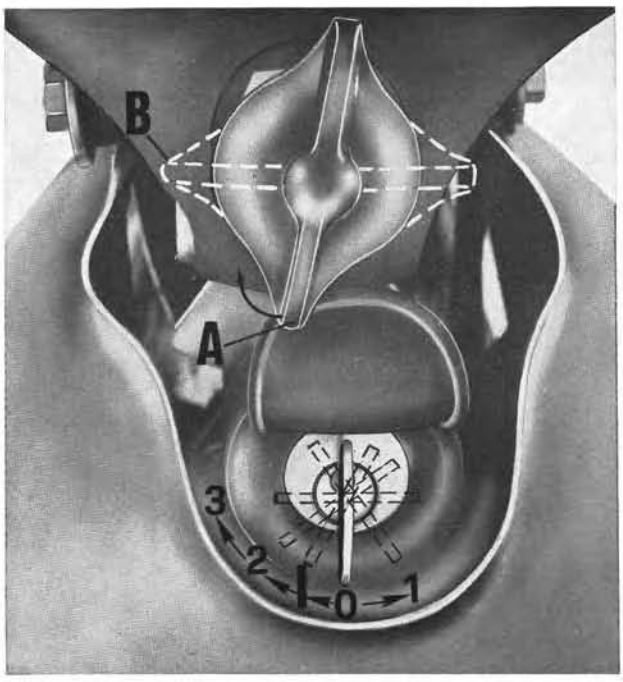

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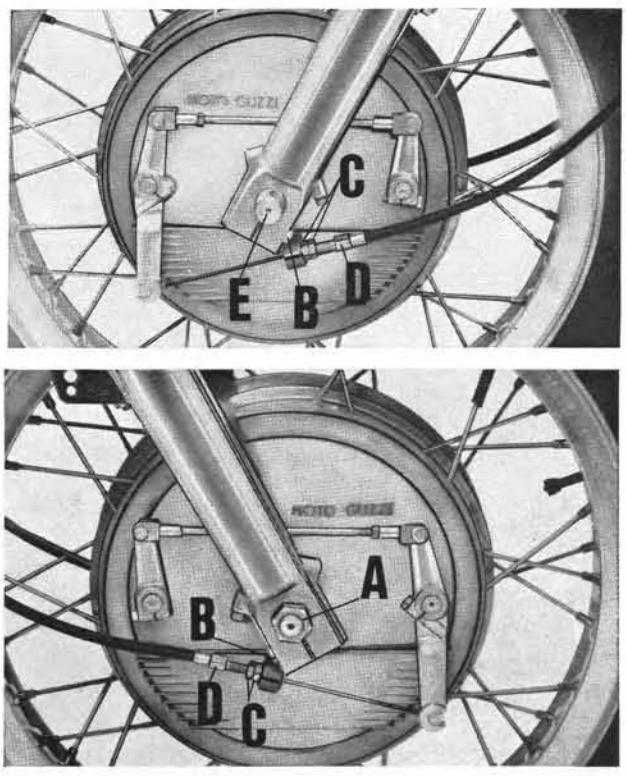

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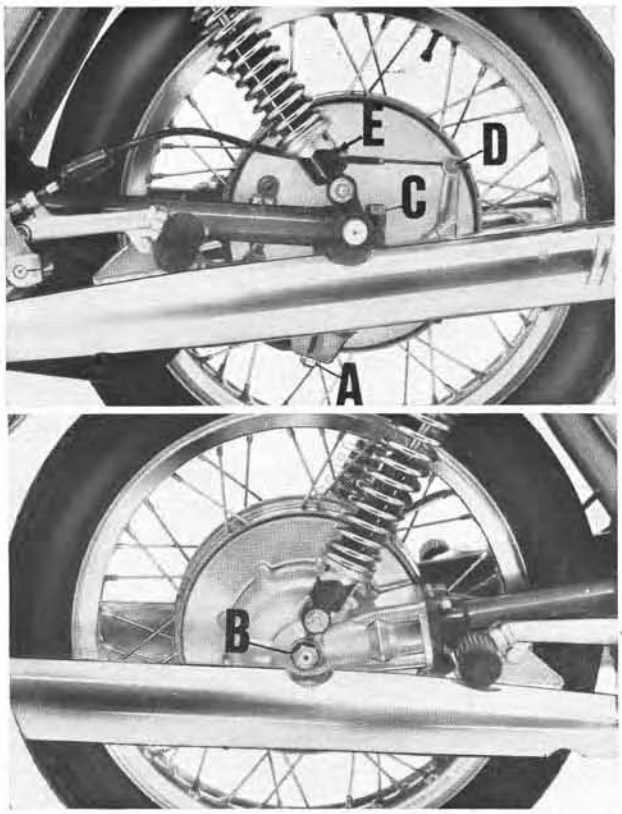

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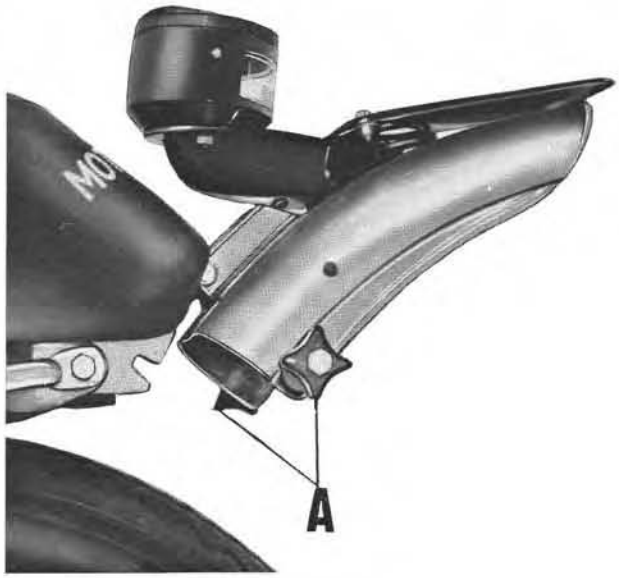

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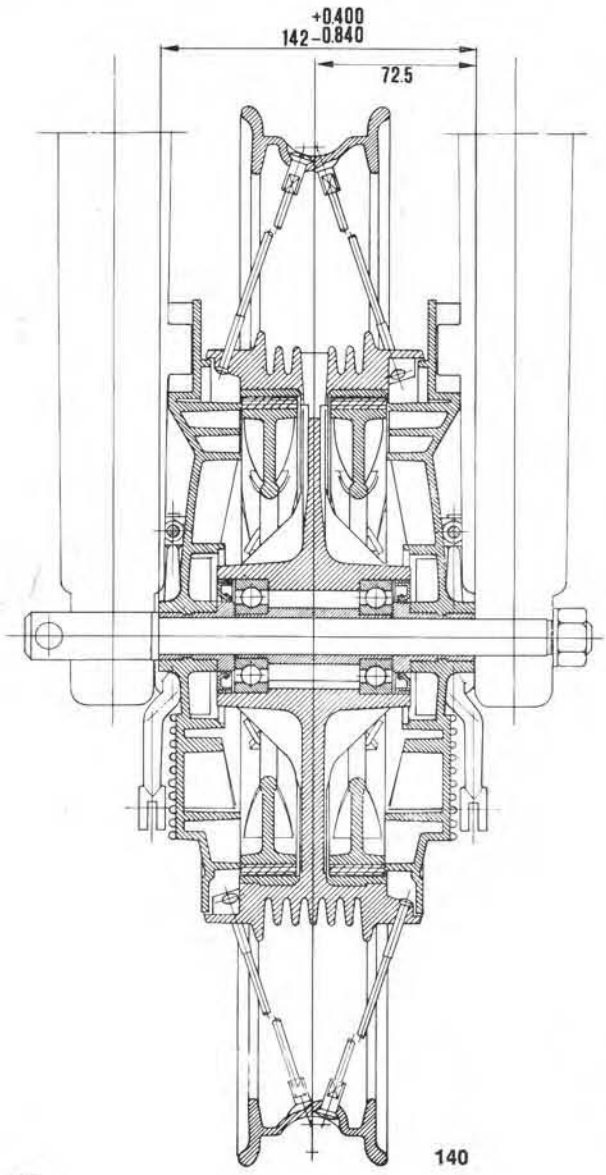

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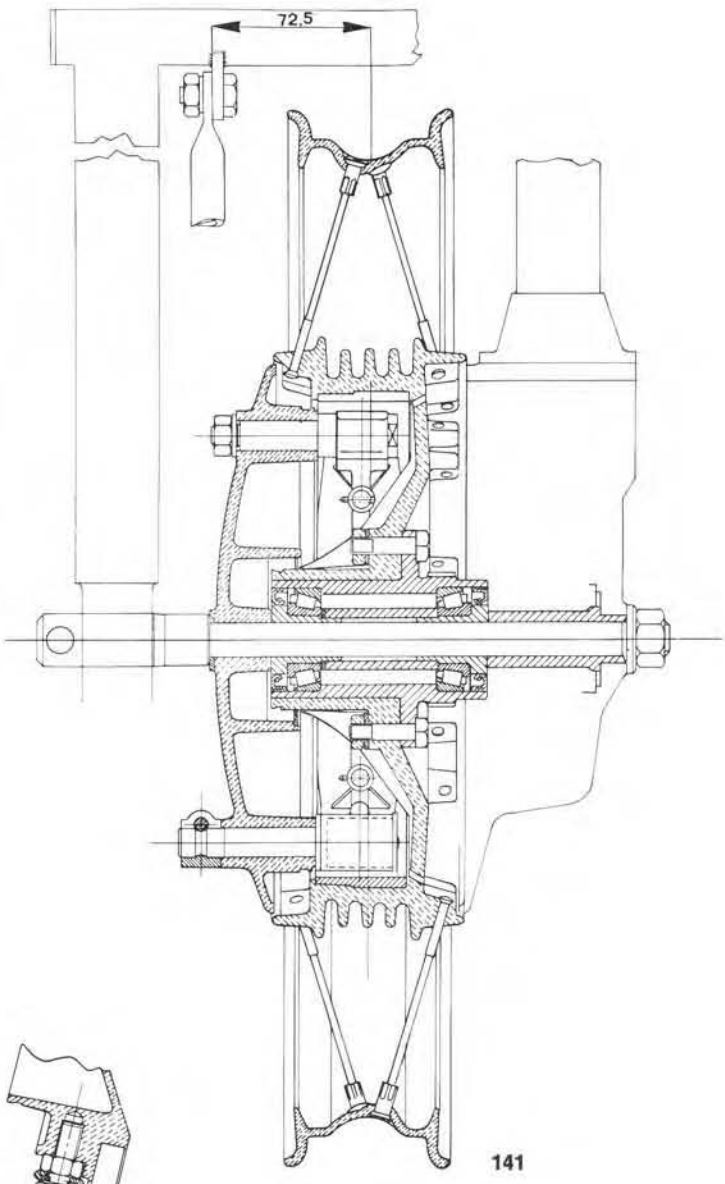

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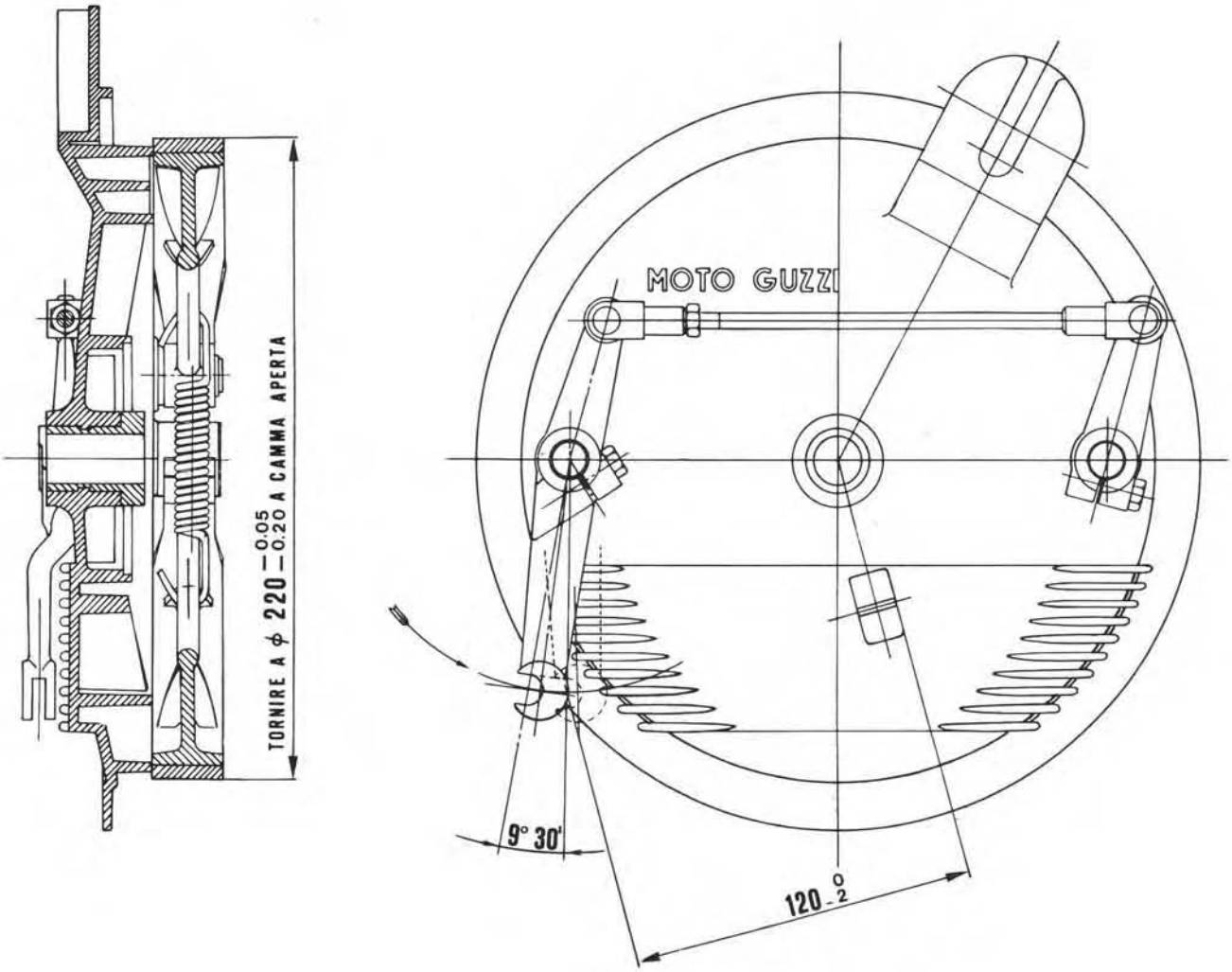

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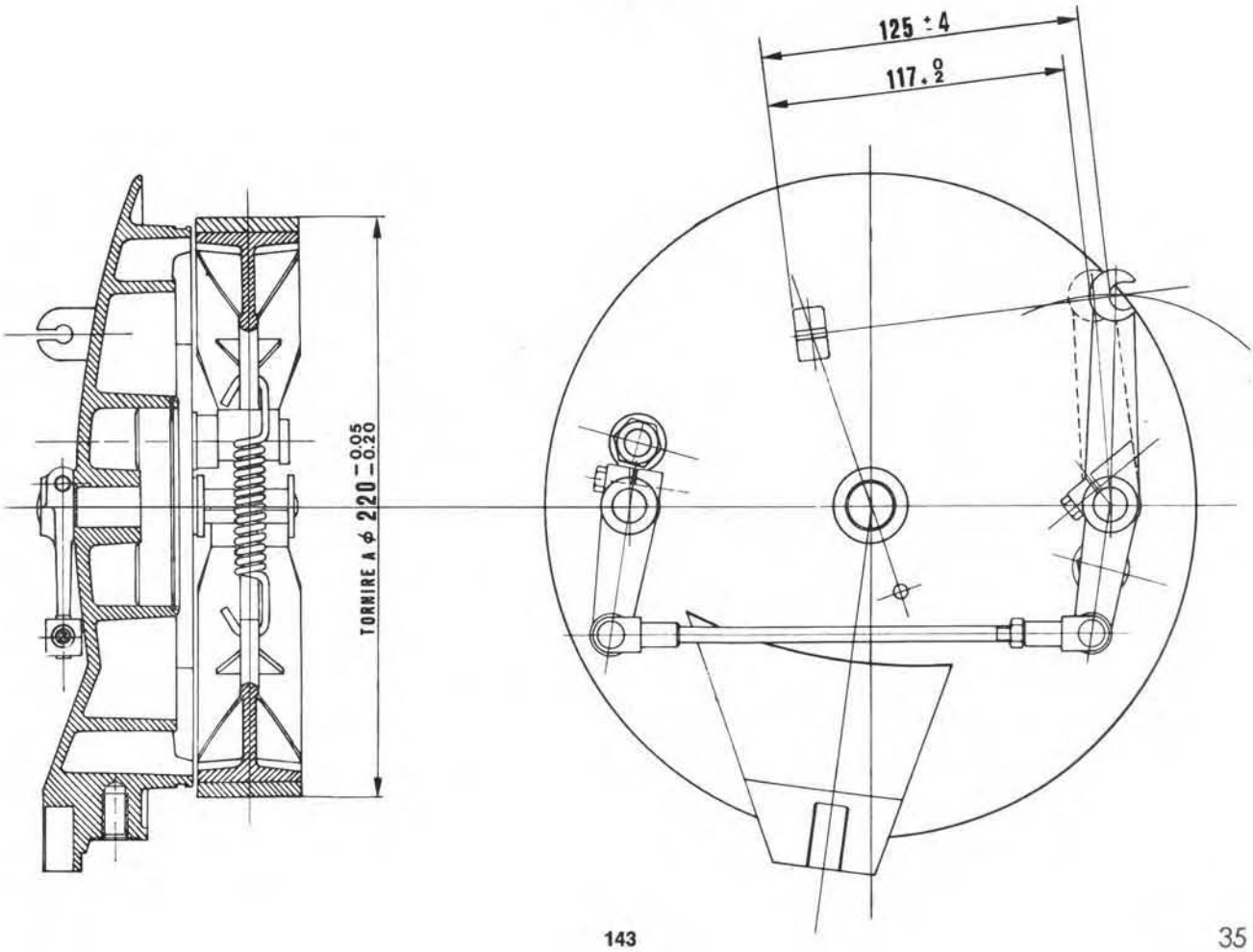

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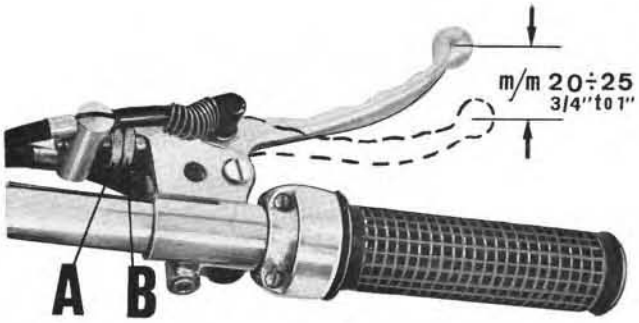

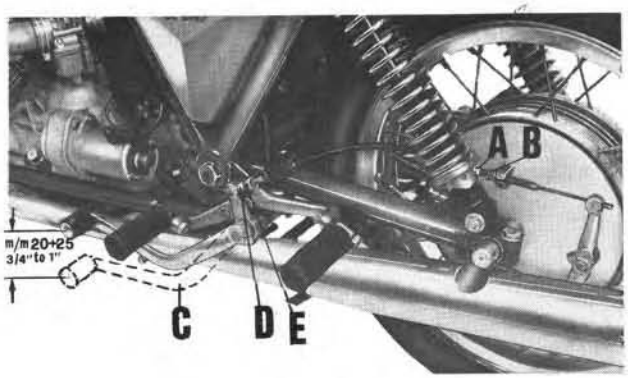

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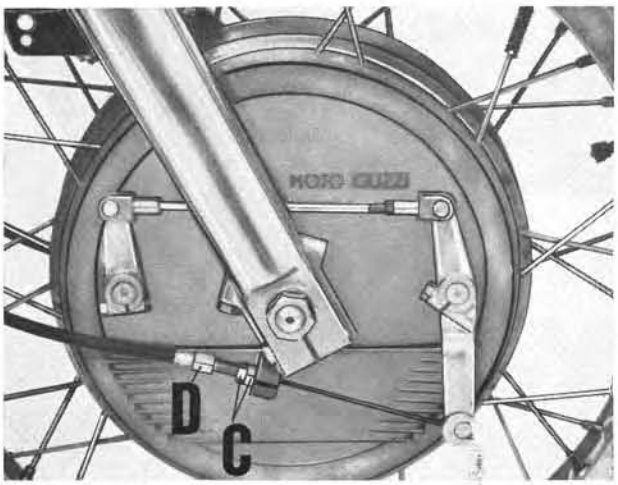

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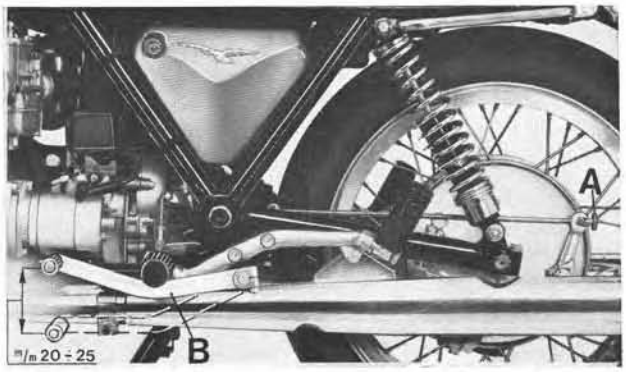

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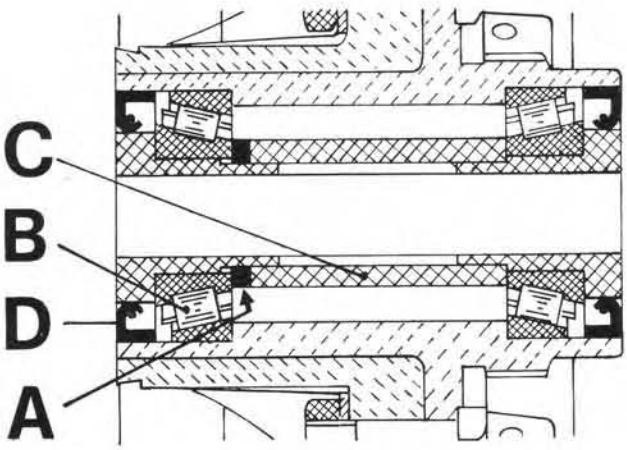

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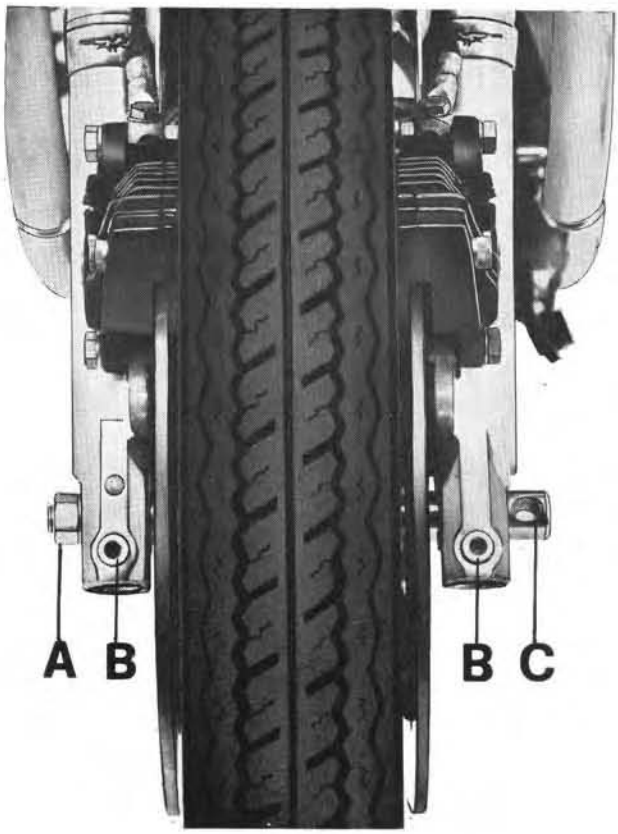

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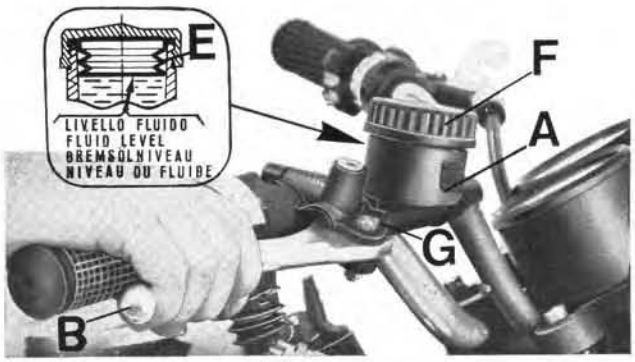

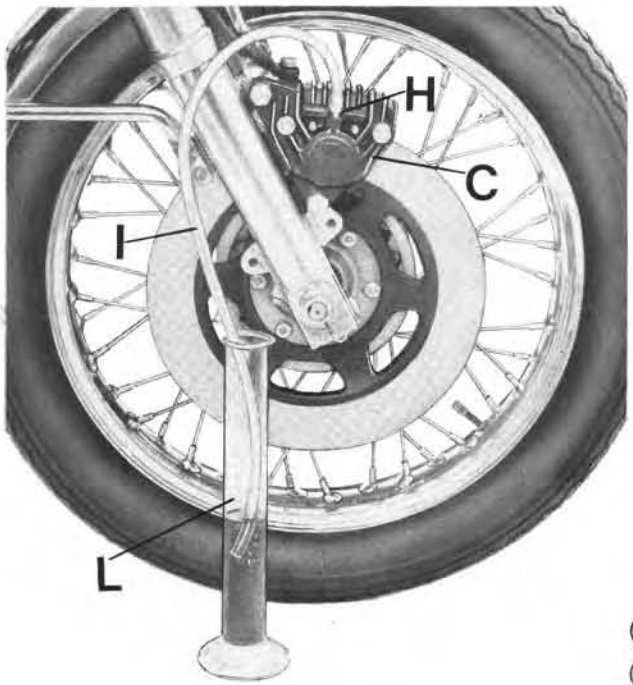

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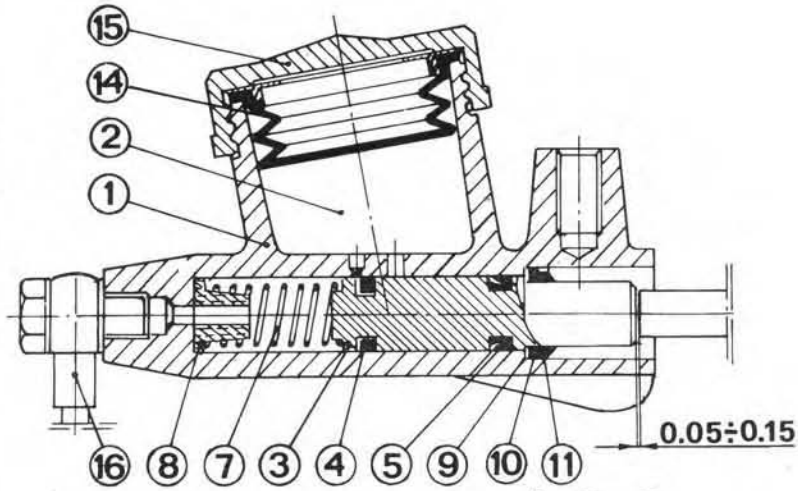

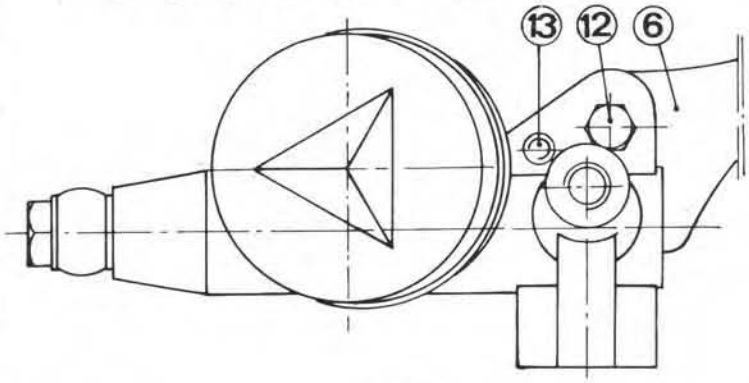

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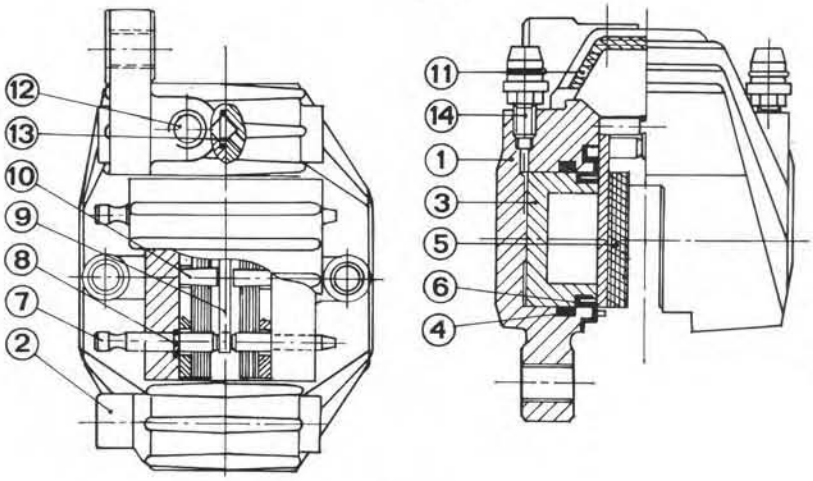

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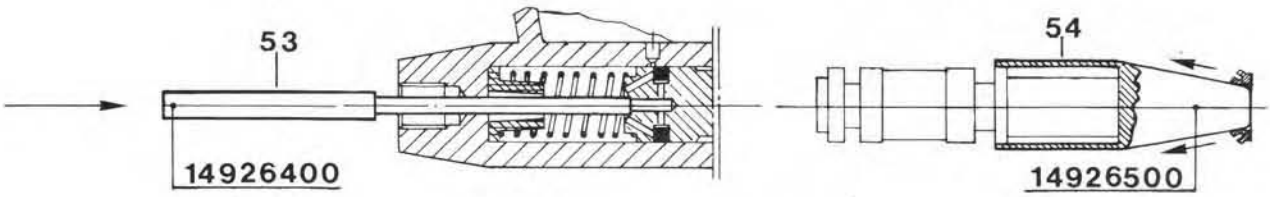

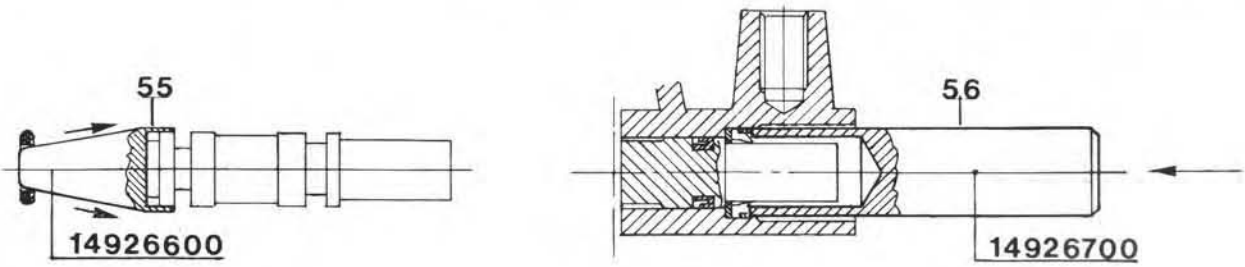

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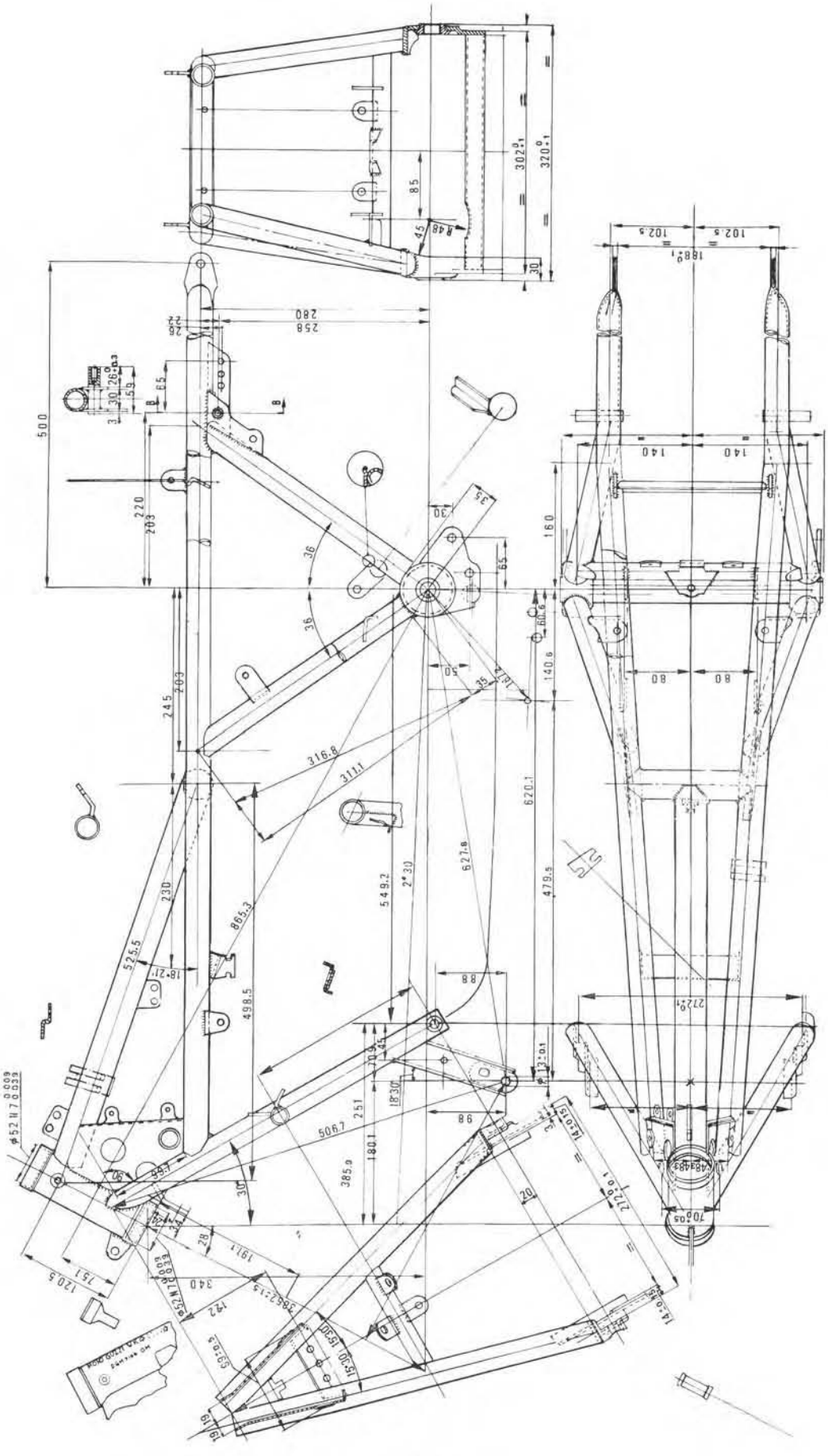

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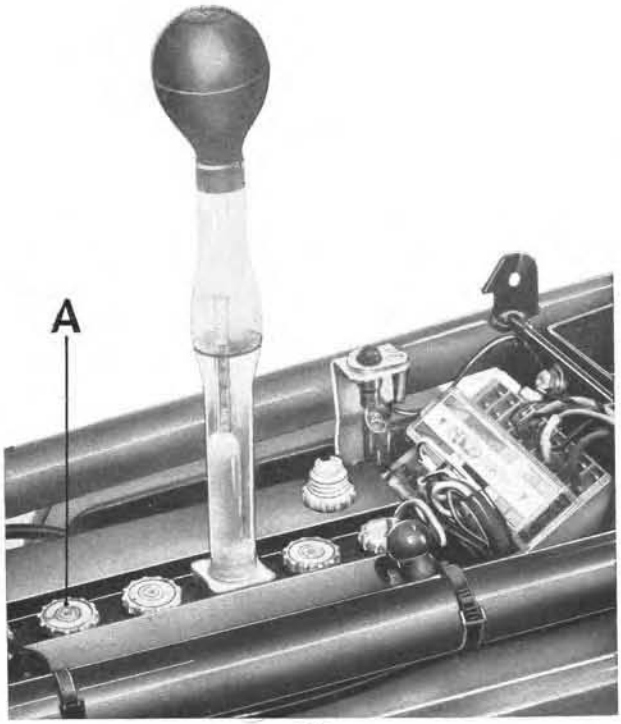

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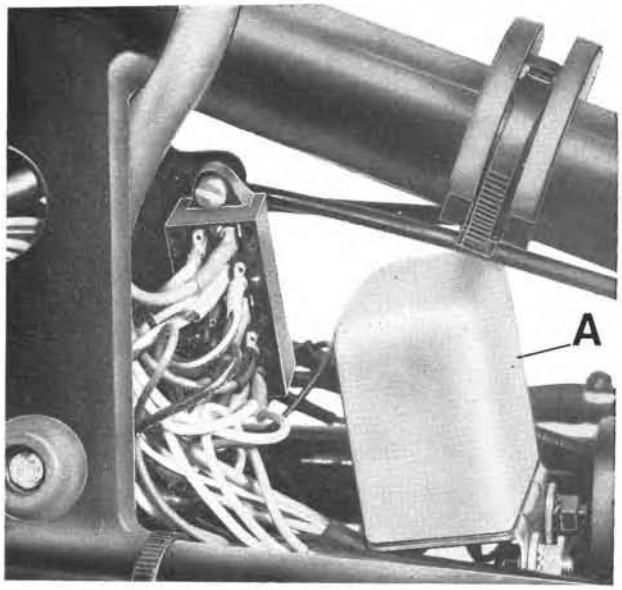

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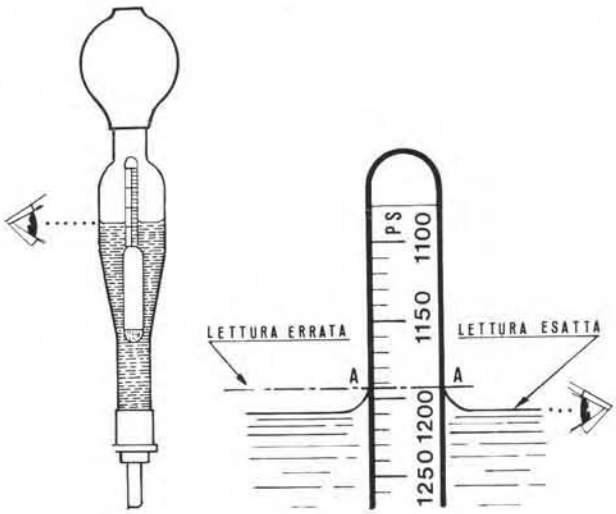

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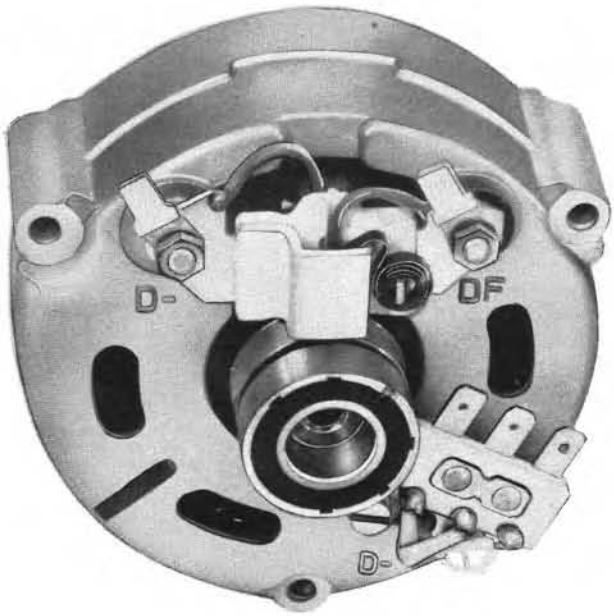

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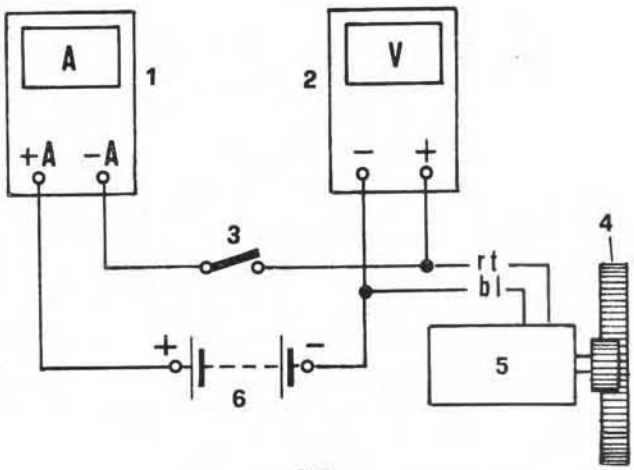
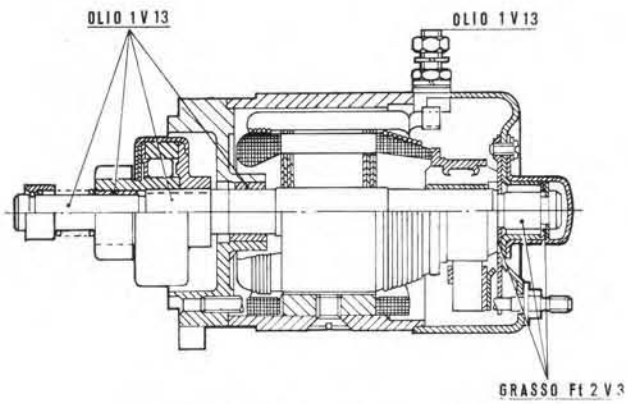
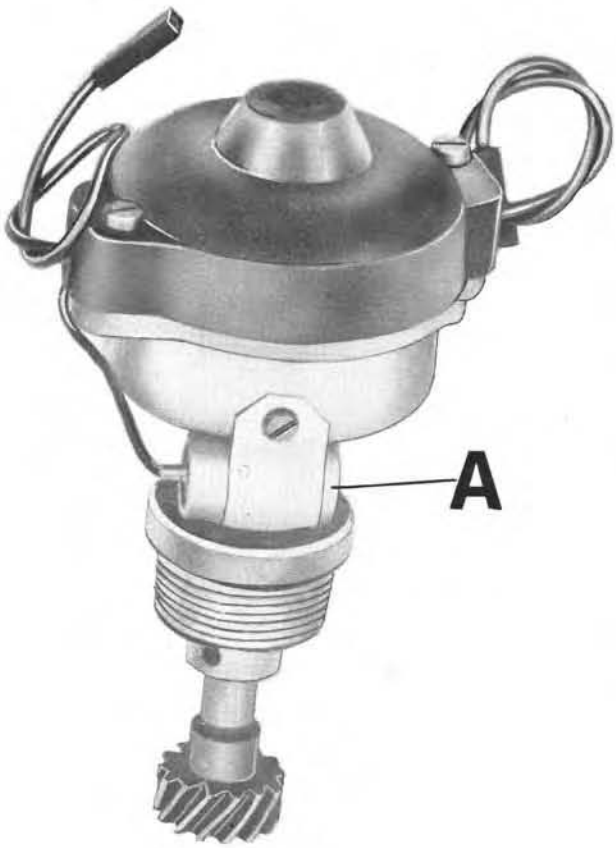


158

1 Tester - 2 Volmetro - 3 Interruttore
4 Corona - 5 Motorino - 6 Batteria



159 Schema di lubrificazione



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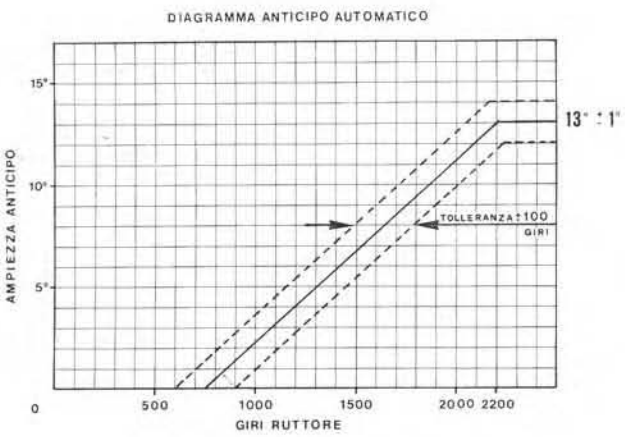

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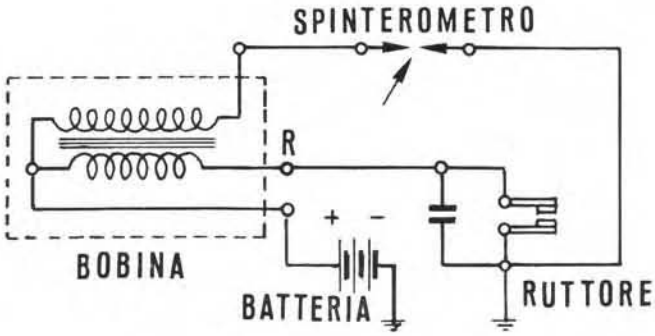

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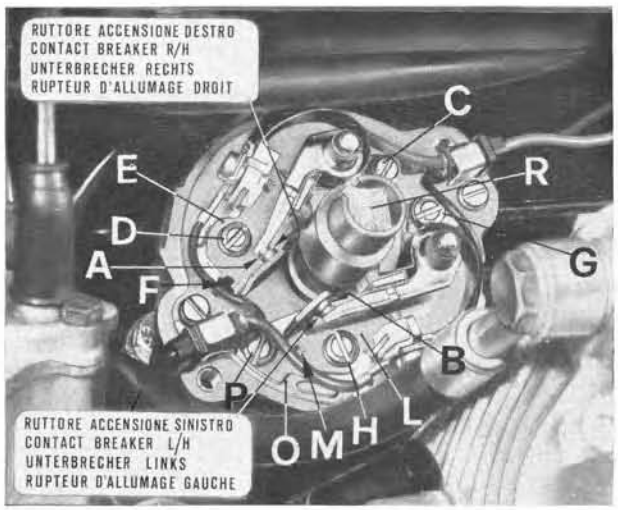

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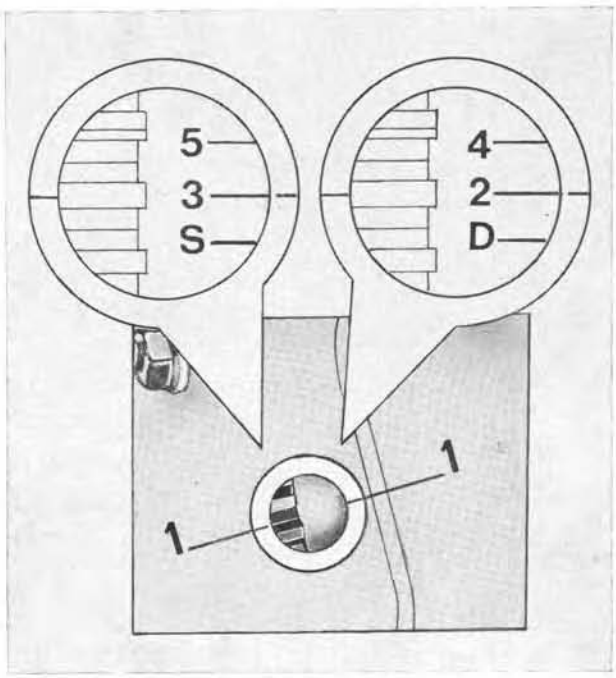

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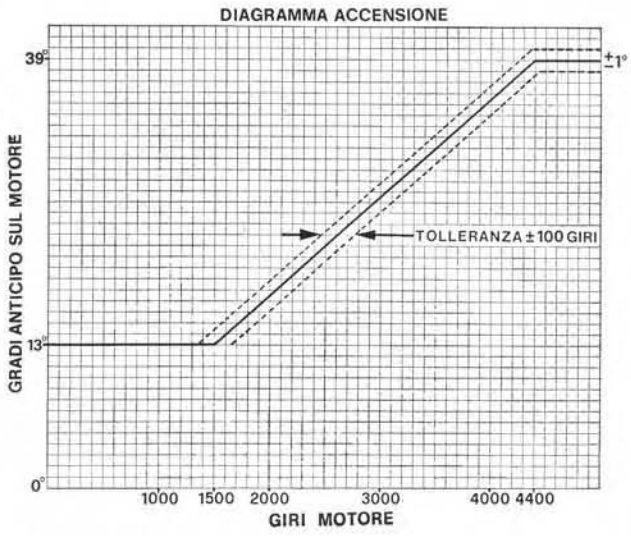

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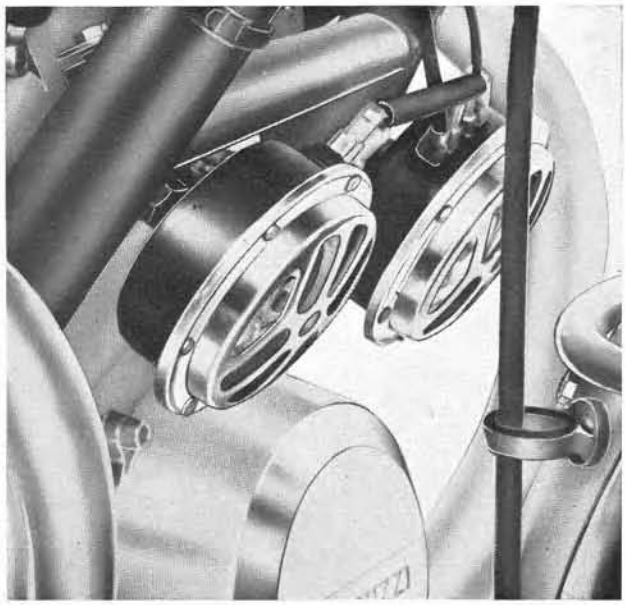

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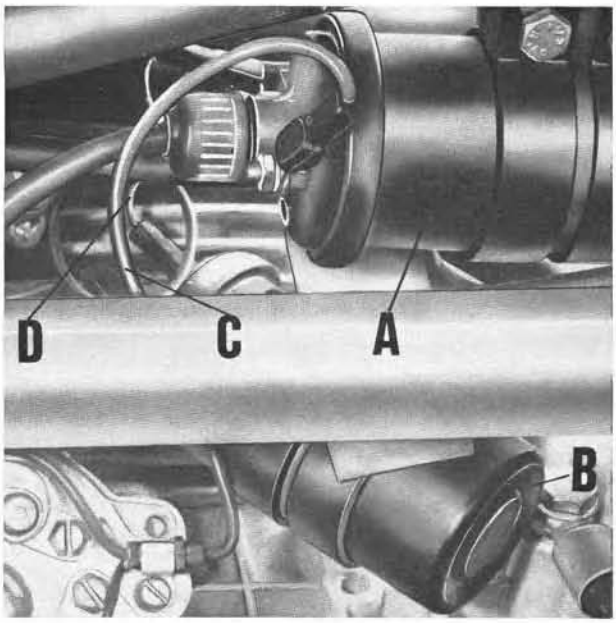

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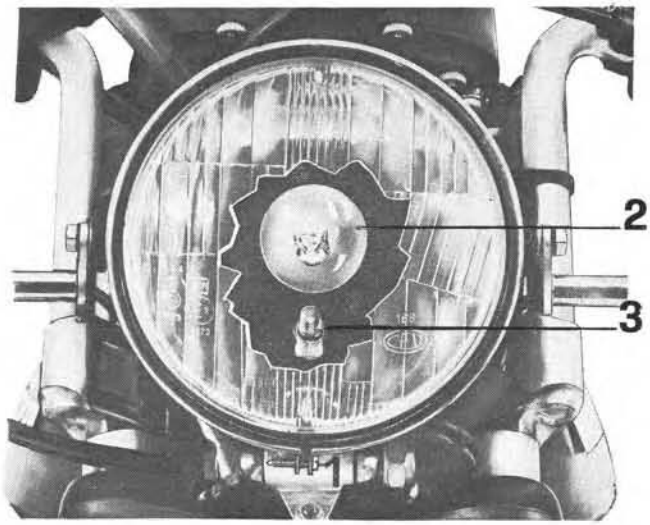

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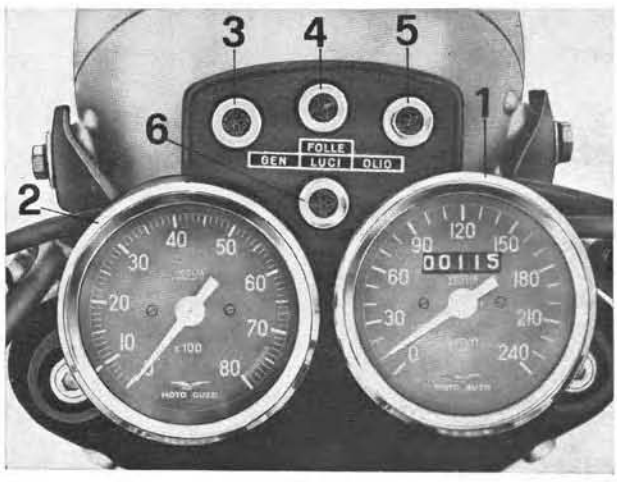

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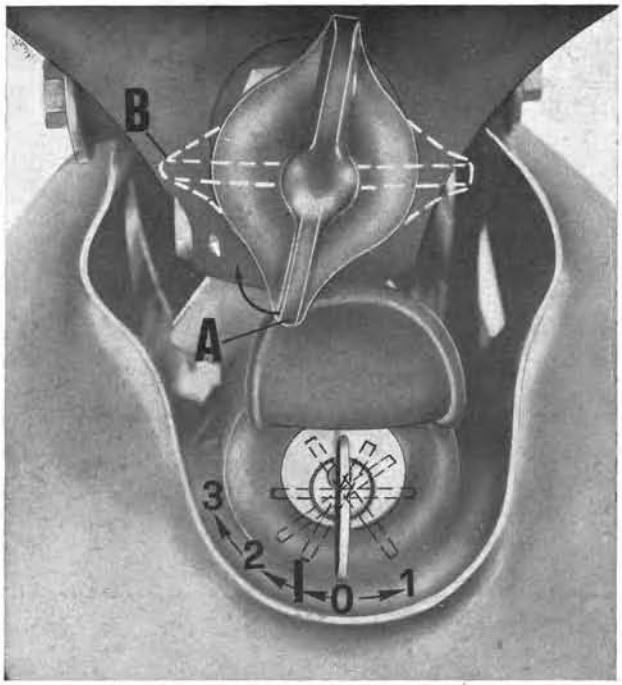

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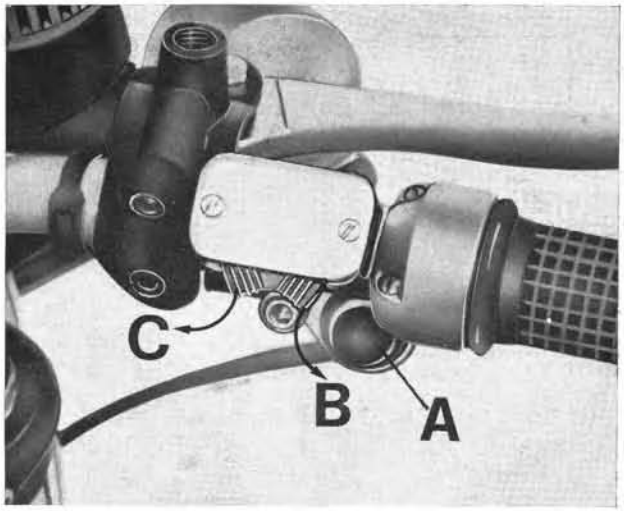

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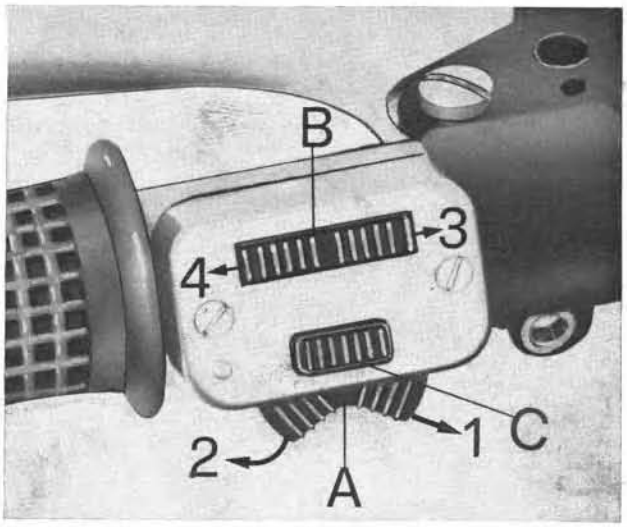

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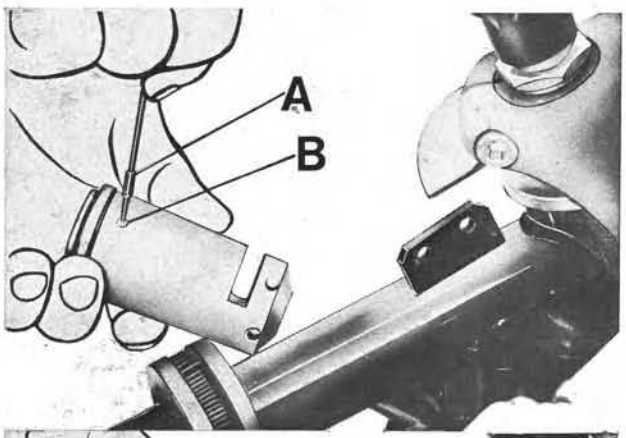

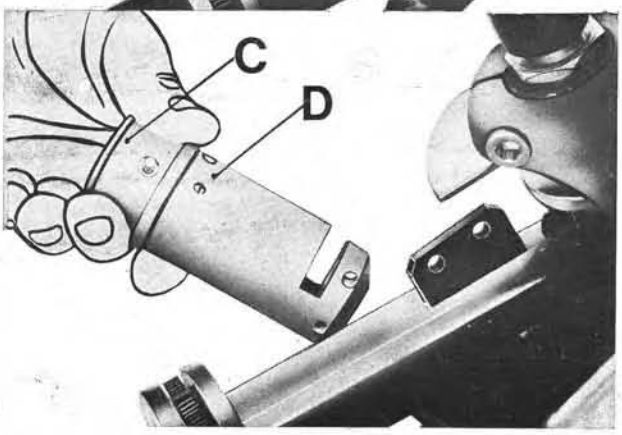

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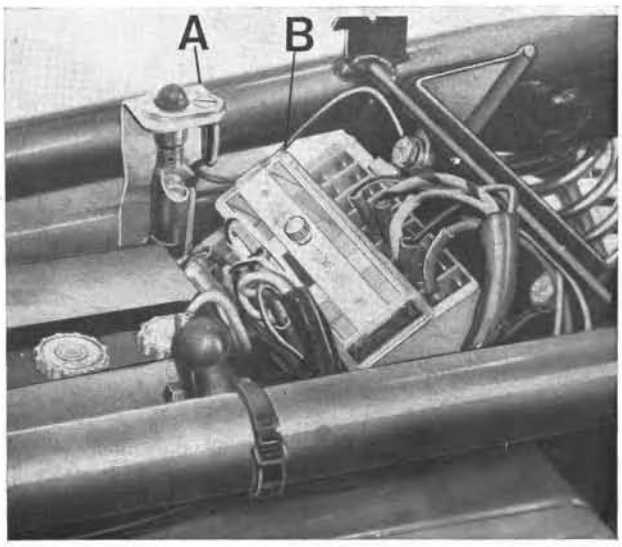

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MOTO GUZZI

850 T3

ADDITIONS AND CHANGES FOR 850-T 3 MODEL

PREMIER MOTOR CORPORATION

RAILROAD STREET & PLANT ROAD, HASBROUCK HEIGHTS, NEW JERSEY 07604
SOLE DISTRIBUTOR IN U.S. AND CANADA

MAIN FEATURES

ENGINE

2-cylinder 4-stroke	
Cylinder disposition	« V » 90°
Bore	mm 83
Stroke	mm 78
Displacement	cc 844
Compression ratio	9,5
Output	HP 68,5 SAE at 7.000 r.p.m.

Valve gear

O.H.V. push rod operated.

Carburation

2 Dell'Orto carburetors type VHB 30 CD (right), VHB 30 CS (left).

Lubrication

Pressure ,by gear pump.
Normal lubrication pressure 3,8 ÷ 4,2 kp/sqcm (controlled by relief-valve).
Electrically controlled oil pressure gauge.
Wire gauze and cartridge oil filters.

Generator

Front (14 V - 20 A) on the mainshaft.

Ignition

By battery, with double contact breaker and automatic advance.
Ignition data:

Initial advance (fixed)	2°
Automatic advance	31°
Full advance	33°

Contact breaker gap mm 0,37 ÷ 0,43
Spark plugs:
Marelli CW 7 L; BOSCH W 225; AC - 44 XL
Plug points gap mm 0,6
2 ignition coils.

Starting

Electric starter (12 V - 0,6 HP) with electromagnetic ratchet control. Ring gear bolted on flywheel. Starter botton, (START) right on the handlebar.

TRANSMISSIONS

Clutch

Dry type, multiplates, flywheel driven. Lever controlled from handlebar (left).

Primary drive

via the gearbox.
Ratio: 1 : 1,235 (Z = 17/21).

Gear box

Five speeds, frontal engagement, constant mesh gears. Cush drive incorporated.
Pedal controlled from left side of the motorcycle.
Ratio:

low gear 1 : 2	(Z = 14/28)
2nd gear 1 : 1,388	(Z = 18/25)
3rd gear 1 : 1,047	(Z = 21/22)
4th gear 1 : 0,869	(Z = 23/20)
top gear 1 : 0,750	(Z = 28/21)

Secondary drive

cardan shaft (bevel gear set).
Ratio: 1 : 4,714 (Z = 7/33).
Overall gear ratio (engine/wheel):

low gear	1 : 11,643
2nd gear	1 : 8,080
3rd gear	1 : 6,095
4th gear	1 : 5,059
top gear	1 : 4,366

FRAME

Duplex cradle, tubular structure.

Suspension

Telescopic front fork incorporating sealed hydraulic dampers.
Rear swingin fork with externally adjustable springs.

Wheels

Spoked rims, WM 3/2,15 x 18 front and rear.

Tires

Front 3,50 H - 18 H or 100/90 H - 18 H.
Rear 4,10 H - 18 H or 110/90 H - 18 H.

Brakes

Front:
Hydraulic disc brake, (right) twin braking cylinder caliper. Hand lever controlled from the handlebar (R/H). Hydraulic transmission, free from rear braking system.
Disc dia. 300 mm.
Braking cylinder dia. 38 mm.
Master cylinder dia. 12,7 mm.
Twin hydraulic disc brake, (left) featured and dimensioned as above. Pedal lever controlled from the motorcycle (R/H). Hydraulic transmission, bound to rear braking system.

Rear:
Hydraulic disc brake, twin braking cylinder caliper. Pedal lever controlled from the motorcycle (R/H).
Disc dia. 242 mm.
Braking cylinder dia. 38 mm.
Master cylinder dia. 15,875 mm.
Pedal control actuates both twin front (left) and rear brakes at the same time.

Dimensions and weights

Wheelbase	m 1,470
Max. width	m 0,780
Max. length	m 2,200
Max. height	m 1,060
Min. ground clearance	m 0,150
Curb weight	kg 243

PERFORMANCES

Maximum speed in each gear, solo riding:

Gears	Speed	
low gear	km/h	71,837
second gear	km/h	103,502
third gear	km/h	137,339
fourth gear	km/h	165,329
top gear	km/h	195

Fuel consumption: l. 6 x 100 km.

FUEL AND OIL CAPACITIES

GROUP OR PART	LITRES	TYPE
Fuel tank (Reserve l. 4)	24	Petrol 98/100 NO-RM
Sump	3	Agip SINT 2000 SAE 10 W/50
Gear box	0,750	Agip F.1 Rotra MP SAE 90
Rear drive box (bevel set lubrication)	0,230	Agip F.1 Rotra MP SAE 90
	0,020	Molykote type A
Front fork (each leg)	0,060	Agip F.1 ATF Dexron
Front and Rear Brakes		Agip F.1 Brake fluid SAE J 1703

CYLINDERS - PISTON - PISTON RINGS

(See fig. 182 and 183)

SELECTION OF CYLINDER DIA.

CLASS « A »	CLASS « B »	CLASS « C »
83.000	83.006	83.012
83.006	83.012	83.018

Cylinders must always be matched with pistons of same class.

SELECTION OF PISTON DIA.

CLASS « A »	CLASS « B »	CLASS « C »
82.968	82.974	82.980
82.974	82.980	82.986

Pistons must always be matched with pistons of same class.

PISTON RINGS (See fig. 183)

— n. 2 upper compression rings
Ø 83 mm - thick. mm 1.478-1.490
— n. 1 intermediate oil scraper
Ø 83 mm - thick. mm 1.478-1.490
— n. 1 lower oil scraper
Ø 83 mm - thick. mm 3.978-3.990

PISTON PIN (See fig. 183)

— Length:
mm 59.970-59.984 - Ø mm 22.000 ÷ 22.004.
— piston pin coupling:
play mm 0.006 to a negative clearance of mm 0.004.

REMOVAL OF PIN FROM PISTON

After removal of circlips, use tool n. 13907860 (57 in fig. 181) to slide pin out of piston and con-rod small end.

CRANKSHAFT (See fig. 184)

The only change is in crankpin dia. (see following table):

CRANKPIN DIAMETER

SELECTION A-B	ORIGINAL Ø mm	OVERSIZE BEARING		
		0,254	0,508	0,762
« A » white mark on shoulder, flywheel side	44.008 ÷ 44.014	43.754 ÷ 43.766	43.500 ÷ 43.512	43.246 ÷ 43.258
« B » white mark on shoulder, flywheel side	44.014 ÷ 44.020			

Clearance between crankpin and bearing: min. 0.030 - max. 0.054.
Remark: Nitride treated crankshafts. For eventual adjustments send them back to « SEIMM MOTO GUZZI ».

CRANKSHAFT BALANCING

Static balancing of crankshaft is obtained by applying a weight of kg 1.586 ÷ 1.616.
Max. offset in axis parallelism: crankpin and main bearing pin must not overcome mm 0,02 at mm 40.

TIMING DATA

(See chapter « Timing data »)

Timing data (referred to the clearance of 1,5 mm between rocker and valve) are the following (see fig. 185):

— inlet:
opens 20° before TDC
closes 52° after BDC
— exhaust:
opens 52° before BDC
closes 20° after TDC

Normal rocker clearance **(cold engine)** mm 0.22.

CARBURETION

CARBURETTORS (See fig. 196)

N. 2 Dell'Orto Carburettors « VHB 30 CD » (right) « VHB 30 CS » (left).
Double controls:

- throttle control grip, right on the handlebar;
- starter control lever for starting a cold engine, located on left cylinder head cover « A »: starting position, « B »: riding position.

Note:

When the starter lever is in riding position « B » ensure that there is a clearance of about 3 mm between starter control cable ends and adjuster screws on both carburettors.

STANDARD CARBURETTOR SETTING

Choke	∅ mm 30
Throttle	40
Atomizer	265
Main jet	120
Idling jet	50
Starter jet	80
Needle	V 9 (2nd notch)
Float	10 grams

Idling adjuster screw: open 1 turns and a half.

ADJUSTING THE CARBURETION (See fig. 196)

Adjusting by hand.
This adjustment is made as follows:

1 Get the engine at its running temperature.

2 Screw idling adjusting screws « C » fully in; then screw them out by one turn and a half.

3 By means of your hands feel if pressure at exhaust tubes is the same. In case of differences, act on screw « D » of one carburettor until the pressure will be the same (idling speed will be kept at 900-1000 r.p.m. about; consequently it will be necessary to screw in the carburettor screw of the cylinder having a lower pressure or to screw out the carburettor screw of cylinder having a higher pressure).

4 Get the best carburetion for each cylinder by acting on screws « C » (this will be at the point where the r.p.m. increase slightly) then get idling speed according to point 3.

5 Disconnect one plug lead at a time and check that the engine stops after firing 5-6 strokes. If this does not occur, get it by proceeding as follows:

— screw out screw « D » of the cylinder causing the engine firing more than 5-6 strokes;
— screw in screw « D » of the cylinder causing the engine firing less than 5-6 strokes.

6 Adjust idling speed to 900-1000 r.p.m. by screwing in or out in the same quantity screws « D ».

7 After closing the throttle control grip, check that there is a clearance of mm 1 ÷ 1,5 between cable ends and adjuster screws « E ».

8 Check that both gas valves open at the same time by proceeding as follows:

— Turn slowly the throttle control grip and check by means of your hands that the pressure at exhaust pipes increases simultaneously. In case such increase is not simultaneous, adjust the carburettor of the cylinder in question by screwing adjuster « E » in (after loosening its counternut) until the pressure is the same for both pipes.

ADJUSTING BY MEANS OF A « VACUUM METER »

See proper instructions in chapter « Adjusting by means of a "Vacuum Meter" ».

AIR FILTER CARTRIDGE (See fig. 28)

Every 10000 km or so, replace the air filter cartridge « A ». It is located in a proper housing which is joined to the oil breather assembly under the fuel tank.
This replacement is better done by our dealers.
To remove the filter « D » from the oil breather assembly « A » proceed as follows:

— lift the saddle and fix it by its proper rod;
— remove the tool box after unhooking its holding bracket;
— unhook the fuel tank, rear side, holding bracket and slip off the fuel tank (after closing the taps and disconnecting the fuel lines);
— disconnect electrical wiring from the battery and unkook its holding brackets;
— unhook the brackets holding springs « F » and take rubber manifold « G » out of intake on carburettors and oil breather;
— unscrew nut « B » fixing the oil breather to the housing «C» and slipp off the oil breather « H » (after disconnecting it from intakes and lines). Remove now the filter « D » with bottom « E » from the oil breather.

After replacing the filter by a new original one, assemble the group by reversing the above operations.

ENGINE LUBRICATION

The 850-T 3 fits an oil cleaner which in addition to a wire gauze filter is also provided with a filter cartridge.
This ensures an almost integral filtering before the oil passes in the pump and lubricating channels.

OIL SUMP (See fig. 186)

It fits:
— « A » filter cartridge, removable;
— « B » magnetic oil drain plug;
— « D » wire gauze filter;
— « E » oil pressure relief valve.

FILTER CARTRIDGE (See fig. 186)

To remove filter cartridge « A » from sump proceed as follows:
— undo plug « B » and let the oil fully drain;
— undo securing screws and remove sump «C» including:
  — filter cartridge « A »;
  — wire gauze filter « D »;
  — oil pressure relief valve « E »;
— undo filter cartridge « A » and replace it by another original one.

By this operation, wash and dry with a compressed air jet also wire gauze filter « D » before mounting sump « C » on the crankcase. Remember to replace gasket between crankcase and cover; fill up l. 3.5 of oil « Agip SINT 2000 SAE 10 W/50 ».

OIL PRESSURE RELIEF VALVE (See fig. 186)

It is screwed on the oil sump and is calibrated to allow an oil pressure of kp/sqcm 3.8-4.2 in delivery circuit.
Should pressure be higher than calibrated, this valve opens and bring pressure into fixed limits.

CHECKING THE OIL LEVEL

Every 500 km check oil level in the oil sump (level almost at max. mark on the dipstick welded to filler cap « A » (see fig. 20).
If level is lower top up with oil of same features.
This checking will be carried out after engine running for a few minutes and dipstick « A » must be fully screwed.
Use oil « Agip SINT 2000 SAE 10 W/50 ».

SECONDARY DRIVE

cardan shaft (bevel gear set).
Ratio: 1 : 4,714 (Z = 7/3).
Overall gear ratio (engine/wheel):

low gear	1 : 11,643
2nd gear	1 : 8,080
3rd gear	1 : 6.095
4th gear	1 : 5,059
top gear	1 : 4,366

REAR DRIVE BOX

Checking the oil level (See fig. 199)

Every 3000 km (2000 miles) check that the oil level is nearly at the inspection hole « A ».
If the level is not correct, fill up with oil of the same type and features.

Changing the oil

Every 10000 km (6000 miles) change the oil in the rear drive box.
This operation should be carried out a short time after a ride when the oil is still warm and easily drained.
Remember to drain all the old oil before introducing fresh oil.
« A » inspection level plug.
« B » oil filler cap.
« C » oil drain plug.
Quantity required:
l. 0,230 of oil « Agip F. 1 Rotra MP SAE 90 »
l. 0,020 of oil « Molykote A ».

OIL LEAKAGE BETWEEN GEARBOX AND ENGINE UNIT

To detect oil leakages between gearbox and engine unit proceed as follows:

— first ascertain if the oil leaking outside comes from the gearbox or from the engine unit; this is quite easy to do by smelling the oil itself. As a matter of fact the oil coming from the gearbox smells bad and is more viscous (if this checking is done (cold-group) while the oil coming from the engine unit is less viscous and does not smell;

— if the oil comes from the gearbox, the leakage may be caused by the following:

1 Poor sealing between clutch pressure plate rod (14085700) and intermediate tube (12085901) in clutch shaft; see if the rod is very oily and slides freely into the clutch shaft (to ensure a proper sealing, the rod must force on the tube and this must force on the clutch shaft). In this case, it is advisable to check that the clutch plates are not oily.

2 Poor sealing of the ring (90403547) mounted on the gearbox, flywheel side; check ring resilience and wear, see if there is an oil drop under the ring itself. Should it be worn-out, check the surface of the clutch inner body contacting the ring in question. This surface must not be rough and must not show any crush or score.

3 If the clutch inner body (14081811) contains oil inside (where is locked the nut with washer securing the clutch inner body to the clutch shaft); check if the two sealing rings on clutch inner body and clutch shaft (90706235 and 90706235) have not lost resilience and efficiency.

4 Porosity in the gearbox; to check this, operate as follows: set the gearbox on a bench, the clutch housing side upwards (see Pict. 123); fill the clutch housing side with water and blow compressed air at 4 Kp/sqcm through the breather tube « B » (Pict. 123).
In case of casting porosity, small bubbles will be visible in the water. Seal the porosity by means of latex or special plasters (Araldite or Devcon).

If the clutch slides because of oil leakages between engine unit and gearbox and the oil passes between the clutch pressure plate rod and the intermediate tube and it is ascertained that the oil comes out from the engine crankcase, this may be caused by the following:

5 Oil leaking through the seal ring mounted on the crankcase flange, flywheel side; check ring resilience and wear, if worn-out inspect the crankshaft surface contacting the ring itself. This surface must be perfectly smooth.

6 Eventual porosity in the engine crankcase; for this checking set the engine on a bench, the flywheel side upwards, « see Pict. 122 » (remove first the flywheel from the engine unit) and fill it with water, blow compressed air at 7 Kpsqcm through the breather tube «A» (Pict. 122). In case of casting porosity, small bubbles will be visible in the water. Seal the porosity by means of latex or special plasters (Araldite or Devcon).

7 If the bands securing the rubber tubes of the engine oil breather are slackened, the oil may flow between the rubber and the metal tubes going between gearbox and engine unit.

8 See if the two lower bolts securing the flange, flywheel side, (12011400) to the engine crankcase are dry; should they be oily, set some « Teflon » tape on the bolt thread.

9 See that the lower stud bolt securing the gearbox to the engine unit is not oily where the reference bushing is located (left side); otherwise set some « Teflon » tape on the stud bolt thread.

OIL LEAKAGE FROM THE REAR WHEEL DRIVE

For this checking, operate as follows:
— fit the tool « C » (Pict. 124) on the drive box (this tool can be obtained from a used rear fork right arm by welding a plate with a valve, tyre inner tube type, on the arm top);
— set the drive box into a small basin filled with water and blow compressed air through the valve of the tool «C» (Pict. 124) at 4 kp/sqcm. In case of casting porosity, small bubbles will be visible in the water. Seal the porosity by means of latex or special plasters (Araldite or Devcon).
Check also that there is no oil leaking between the drive box and the lower pin securing the rear fork. Should this pin be oily, set some « Teflon » tape on the pin thread.
N. See pages 28-29 for pictures.

REAR SUSPENSION

The rear suspension of this model can fit two different types of shock absorber springs.
The former with 5 positions, adjustable by means of an incorporated lever.
The latter with 3 positions, adjustable by means of a wrench delivered with the tool kit.

Springs data

Free length:	mm 270
Under kg 61 load:	mm 230
Under kg 122 load:	mm 190
Under kg 235 load:	mm 116

FONT SUSPENSION

FRONT FORK

Sealed damper type. See chapter « Front Suspension and steering - Inspection and checking of the front fork ».

For inspection measures see drwg. 188.
Replenishing quantity: l. 0.060 of Agip F. 1 ATF Dexron per fork member.

WHEELS AND BRAKES

The 850-T 3 fits n. 3 hydraulic braking discs. The features for master cylinders calipers and discs are at page 95.
For checking and overhauling of the above parts see from page 58 to page 63.

ADJUSTING THE FRONT BRAKE (RIGHT) CONTROL LEVER (See fig. 200)

After fitting a feeler gauge between floater in master cylinder and the end of the control lever get the correct play of mm 0,05 ÷ 0,15 by acting on screw « G ».

CHECKING BRAKE PADS WEARING

Every 5000 km (3000 miles) check brake pad thickness:

— new pad: mm 9;
— wear limit: mm 6 a.

If thick. is under the wear limit, it is necessary to replace the pads. After this operation has been carried out, do not drain the air but only operate the control lever on the handlebar « B » fig. 200 several times until the caliper pistons reach their normal position.
By the replacement of the pads, check the condition of the fluid pipes, should they be damaged, replace them immediately.

CHECKING THE BRAKE DISCS (See L fig. 200 - 201)

The brake disc must be accurately clean, without oil, fat or other dirt and must not show any deep scoring.
In case of replacement or overhauling of the brake disc, it is necessary to check its wobbling. This checking is carried out by means of a proper gauge that must never read more than 0,2 mm.
Should wobbling be higher, carefully check the mounting of the disc on the hub and the play of the hub bearings.
Connection torque between disc and hub is kg/m 2,2 ÷ 2,4.

CHECKING THE FLUID LEVEL AND CHANGING THE FLUID IN RESERVOIRS (See fig. 200 - 201)

For a good working of brakes these directions are to be followed:

- periodically check the fluid level (it has to be nearly at the gaiter « E » located in the fluid reservoir « A » on the right handlebar for the right front brake and under the right battery cover for both left front and rear brakes; it has never to be lower than 8 mm under maximum level;
- periodically top up the fluid reservoir « A » (if necessary) after loosening the cap « F »; take the fluid form an original container which must only be opened when using the fluid;
- completely renew the brake fluid every 15.000 km (9000 miles) or at least once a year. The fluid pipes have to be always full and without air; a long and elastic movement of the control lever « B » evidences the presence of air inside them.
Use only fresh fluid in case of washing.

No alcohol is to be used for washing and no compressed air for drying up; use Trichloroethylene for metallic parts.

Fluid to be used: « Agip F. 1 Brake Fluid ».

AIR BLEEDING (See fig. 200 - 201)

This operation is required when the movement of the control lever on the handlebar is long and elastic because of the presence of air inside the braking circuits.
Operations are as follows:

Front braking circuit, right (See fig. 141)

- turn the handlebar until master cylinder (fluid reservoir) « A » reaches the horizontal position;
- if necessary, top up the fluid reservoir « A » (take care that during the air draining the fluid does not go 8 mm lower than the maximum level);
- act on a caliper body only « C » at a time:

a) take out the rubber cover, then fit a transparent flexible pipe « H » on the drain plug « D »; the other end of this duct will be plunged into a transparent container « I » partially filled up with fluid of the same type;

b) loosen the drain plug « D »;

c) completely operate several times the brake control lever « B » on the handlebar, release it slowly and wait for a few seconds before operating it again. Repeat this operation until the pipe plunged into the transparent container emits airless fluid;

d) keep the control lever «B» completely drawn and lock the drain plug « D », then remove pipe « H » and mount the rubber cover.
If the air bleeding has been correctly carried out, a direct and efficient working of the fluid will be realized immediately after the initial idle moveemnt of the lever « B »;
otherwise repeat the whole operation.

Rear and left front braking circuits (See fig. 202)

Proceed as by the right front braking circuit but with following changes:

point c: completely operate the control pedal « B » at the R/H side of the motorcycle.

point d: keep the control pedal « B » completely pushed down.

ADJUSTING THE CONTROL PEDAL FOR REAR AND LEFT FRONT BRAKES (See fig. 203)

— fit a feeler gauge between floater in master cylinder and lever end « G » then get the correct play of mm 0,05 0,15 by acting on adjuster « A »;

— remove circlip, slip out pin and loosen counternut « B »; now screw in or out fork « C » until the ideal position of control pedal « E » is reached;

— re-fit pin and circlip.

After adjusting, loosen counternut « E » and adjust lever return stop screw « D ».

REMOVAL OF WHEELS

FRONT WHEEL (fig. 19)

— undo caliper « A » securing screws and remove caliper « A » with pipe from right fork cover.
— Undo wheel spindle lock nut « B » (left side).
— Undo screws securing fork covers to wheel spindle « C ».
— Slip off spindle « D »; care the position of spacer « E ».
— Lift the motorcycle so to disengage the braking disc (left wheel side) from caliper.

To re-assemble the wheel operate vice-versa. After re-assembling check clearance between pad and disc (See chapter «Checking pad wearing»).

REAR WHEEL

— Undo the screw securing left silencer to frame; and remove silencer from exhaust tube after undoing the screw securing its fixing clamp.
— Loosen nut « B » on the spindle, drive box side.
— Undo wheel spindle securing screw « C », on rear swinging arm.
— Take spindle « D » out of drive box, wheel hub and rear swinging arm.
— Take braking disc out of caliper « E ».
— Remove caliper from stop pin on rear swinging arm; place it on motorcycle lifting handgrip.
— Lean the motorcycle to the right so to free the wheel « F » from rear swinging arm and drive box.

To re-fit the wheel operate viceversa.
Remember to fit caliper on the rear swinging arm (left) and to check clearance between pad and braking disc. (See proper chapter in section « Maintenance »).

ADJUSTING THE SPOKES

Check that all spokes are tightened and the wheel is correctly trued by proceeding as follows:

■ spin the wheel and check its truing if necessary act on right or left spokes until the wheel turns properly. This checking has to be carried out after the first 500 km (300 miles) and later on, every 1500 km (900 miles) or so.

WHEEL BALANCE

To improve stability and decrease vibrations at high speeds the wheels have to be kept balanced.
Operations are as follows:

■ after removing the wheel and checking spoke tightening and wheel truing suspend it on a fork;
■ spin the wheel lightly several times and see if it stops always in various positions, thus indicating a correct balance;
■ if one point of the wheel always stops at the bottom, put a balance weight on a spoke opposite that point.
■ repeat this operation until the wheel is correctly balanced then fix the balance weights to the spokes by means of pliers.

Balance weights are available from our dealers in sizes of 15, 20, 30 grams.
Normally, an imbalance of less than 15 grams does not affect the motorcycle stability.

TYRES

The tyre condition is of main importance as stability of motorcycle, riding comfort and even rider safety are depending on this factor.
It is therefore quite advisable not to use tyres with tread lower than 1.5 ÷ 2 mm respectively front and rear tyre.
A wrong tyre pressure can also affect stability of motorcycle and shorten type life.
Correct pressure is:

— front wheel: solo or with pillion kp/cm²: 2
— rear wheel: solo kp/cm²: 2.3
— with pillion: kp/cm²: 2.5.

These data are for normal riding (touring). In case of constant high speed or motorway riding increase tyre pressure 0,2 kg/cm².

MAINTENANCE, INSPECTION AND ADJUSTMENT OF DOUBLE CONTACT BREAKER

Contacts gap for 850-T3 model must be within mm 0,37 ÷ 0.43.
For descriptions and adjustments see Chapter « Maintenance Inspection and Adjustment of Double Contact Breaker ».

CHECKING AND ADJUSTING IGNITION TMING (FIXED ADVANCE)

See chapter « Checking and adjusting ignition timing » considering the following changes:

TIMING OF THE R/H CYLINDER

In this position, fixed advance mark 2 is 2° from P.M.S. (TDC) « D » and so at the commencement of the point separation (see A in fig. 164).

TIMING OF THE L/H CYLINDER

In this position fixed advance mark 3 is 2° from P.M.S. (TDC) « S » and so at the commencement of the point separation (see B in fig. 164).

CHECKING THE IGNITION TIMING (FIXED ADVANCE) WITH THE ENGINE ASSEMBLED ON THE MOTORCYCLE
(See fig. 165)

Only the mark « A.F. » (fixed advance) changes, namely 2° instead of 13°.

CHECKING THE IGNITION ADVANCE (FIXED AND AUTOMATIC) BY MEANS OF A STROBOSCOPE LAMP
(See fig. 64 and diagram fig. 188)

Ignition data

— fixed advance: 2°
— automatic advance: 31°
— full advance (fixed and automatic): 33°

CHECKING THE FULL ADVANCE (FIXED AND AUTOMATIC)

Changes:

— A. F. (fixed advance) 2° at 1000 r.p.m. ± 200 r.p.m.
— A. T. (full advance) 33° at 6000 r.p.m. ± 200 r.p.m.

SPARK PLUGS

The 850-T 3 model fits spark plugs:
Marelli CW 7 L; Bosch W 225 T 2; AC - 44 x L.
For other description see chapter «Spark Plugs».

ALTERNATOR

Main Features:

Brand:	Bosch (G1 - 14V - 20A - 21")
Drive:	directly from crankshaft
Max. output:	280 W - 14 V
Max. amperage:	20
Charge starting:	1000 rpm
Peak charge:	10000 rpm
Rotation: (as seen from collector side)	clockwise

ELECTRICAL EQUIPMENT

Starter motor

Brand:	BOSCH DF - 12 V - O6 PS
Voltage:	12 V
Output:	0,6 HP
Current Intensity Ah.:	35
Pinion:	Z = 8 - mod. 2.5
Pinion rotation:	counterclockwise

ELECTRICAL TESTS

RUNNING	VOLTAGE	CURRENT	SPEED	TORQUE
Unloaded	11.5 V	20 ÷ 40 A	6500 ÷ 8500 rpm	—
Loaded	9 V	170 A	3200 ÷ 3500 rpm	kgm 0.15
Short circuit	8 V	280 ÷ 360 A	—	kgm 0.75

INSTRUMENTS AND CONTROLS

INSTRUMENT PANEL (U.S.A. MODEL) (fig. 4)

1 Mile counter.

2 Rev.-counter.

3 Orange neutral indicator. It lights when the gearbox is in neutral position. It may be well to make sure that this position is correct. In any case it is a good practice to pull the clutch before starting.

4 Red light indicating parking light on.

5 Red warninè light. Oil pressure gauge. It goes out when the pressure is sufficient for normal engine lubrification. Should it not go out, the pressure is not correct; in this case the engine has to be stopped and suitable checkings are to be carried out.

6 High beam warning light (red).

7 Red warning light indicating insufficient current from the generator for battery charge. It must go out when the engine reaches a certain number of revolutions.

By day riding all warning lights are to be out. By night riding the parking warning light only and eventually the high beam warning light are on.

CHANGES FOR « EUROPE MODEL »

1 Km counter.

4 Green town driving light.

6 High beam warning light (blue).

By night riding the town driving warning light, only and eventually the high beam warning light are on.

KEY SWITCH (fig. 5)

The key has three positions.

« 1 » (turned anticlockwise) Standstill, key removable.

« 0 » (vertical) Standstill, key not removable.

« 2 » (turned clockwise) Ready to start, all controls are in. Key not removable.

LIGHTING SWITCH (LIGHTS) (fig. 207 « A »)

Left, on the handlebar, 4 positions.

« 1 » OFF Lights off.

« 2 » PARK Parking light (USA). Town driving light (Europe).

« 3 » L Low beam.

« 4 » H High beam.

« 5 » To come back to position OFF press the button towards the lefts.

HORN, FLASHING LIGHT AND TURN SIGNAL CONTROLS (fig. 207 « B »)

Left, on the handlebar.

« 6 » HORN Horn button.

« 7 » FLASH Flashing light button.

« 8 » OFF Turn signals button.

« 9 » When turned to the right operates the right signals.

« 10 » When turned to the left operates the left signals.

ENGINE STARTING AND EMERGENCY STOPPING (fig. 208)

Right, on the handlebar.
With the ignition key in position « 2 » in fig. 206 the motorcycle is ready to be started. To start the engine (see « A ») press the button « 1 » START.
To stop the engine (in case of emergency) turn the button in position « 3 » or « 4 » OFF.
After engine stopping reset key in position « O » fig. 206.

GEARSHIFT PEDAL (fig. 209)

On the left side of the motorcycle.
Low gear: pedal down.
2. 3. 4. and top gear: pedal up.
Neutral position: between low and 2 nd gear.

Before operating the gearshift pedal, the clutch lever has to completely pulled in.

TERMINAL BLOCK WITH FUSES (fig. 210)

It is locate dunder the seat and holds n. 6 15 A fuses.

« 1 » Rear stop light horn, flashing light.

« 2 » Starting relay. Turn signals.

« 3 » Warning lights. Oil-gen-N Low - High beam with warning light.

« 4 » Parking or town driving lights - Instruments.

« 5 » } Spare fuse.
« 6 » }

STEERING LOCKING (« A » in fig. 211)

To lock:
— turn handlebar fully to the right.
— insert key into lock set, turn it anticlockwise and push it fully in, release it and take it off.
To release:
— insert key into lock set, turn it anticlockwise release it and take it off.

LIGHTS (U.S.A. model)

HEADLIGHT

— Sealed beam insert type: 45/40 W - 12 V.

TAIL LIGHT

— Number plate lighting parking light and stop light: bulb 5/21 W - 12 V.

Turn signals: 21 W - 12 V.
Indicators, instrument panel: bulb 1,2 W - 12 V.
Indicators, mile and rev. counters: bulb 3 W - 12 V.

REPLACEMENT OF BULBS (fig. 212/1)

TAIL LIGHT

— Undo screws « C » securing reflector to tail light; push bulb inwards and turn it to the left at the same time, then slip it off.

TURN SIGNALS

— Undo screws « D » securing reflectors to signal lights; push bulbs and turn them to the left at the same time, then slip them off.

By re-fitting of reflectors screw in uniformly, do not lock screws too much to prevent braking of same.

INSTRUMENTS PANEL, MILE AND REV. COUNTERS

— Slip off bulb sockets and replace bulbs.

HEADLIGHT BEAM ADJUSTING (fig. 212/1)

For a safe riding and not to trouble crossing riders, the headlight beam has always to be set at a corrent height.
For horinzontal setting act on screw « A ».
For vertical setting undo connections « E » and shift the headlight by hand up or down in order to get the correct height.
The centre of the high beam must not be higher than 0,86 m measured at 3 m distance with motorcycle not on stand and rider on saddle.

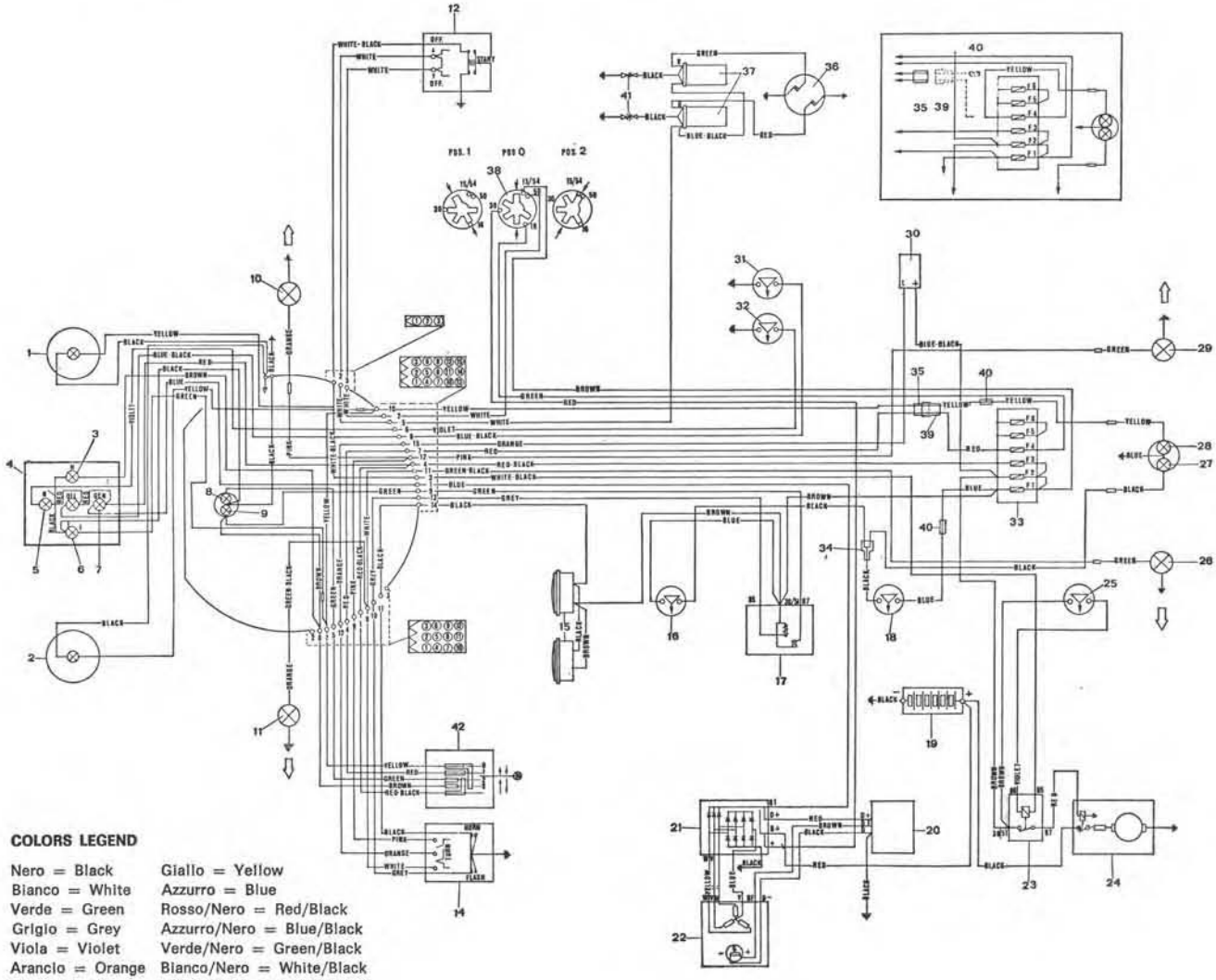
CHANGING THE WIRING DIAGRAM FOR VEHICLES WITH COMPULSORY LIGHTING ON, WHEN STARTING THE ENGINE

To achieve this change it is necessary to take off the wire group which connects connector « 35 » to fuse n. 4 (red cable) and to connection « 40 » (yellow cable). This wire group is connected to connector « 35 » through connector « 39 ».
After disconnecting the yellow cable (rear parking light) from connector « 40 », connect it to fuse n. 4 as indicated in the wiring diagram.
Connector « 35 » will be re-fitted, into the insulated housing which supports the flasher unit for turn signals.
This change accomplished, notice that instrument lights and indicator light « I » (Low beam) are not protected by fuse n. 4 but by fuse n. 3.

WIRING DIAGRAM (U.S.A. model)

(fig. 213/1)

1 - Mile counter (bulb 3 W)
2 - Rev. counter (bulb 3 W)
3 - High beam indicator light (1,2 W)
4 - Oil pressure indicator light (1,2 W)
5 - Neutral indicator (light (1,2 W)
6 - Low beam indicator light (1,2 W)
7 - Generator charge indicator light (1,2 W)
8 - Low beam (40 W)
9 - High beam (45 W)
10 - Right front turn signal light (21 W)
11 - Left front turn signa llight (21 W)
12 - Engine starting and stopping switch
13 - Lighting switch
14 - Switch; turn signal, horns, flashing light
15 - Horns Power 7 A)
16 - Front brake stop light cutout
17 - Flashing light relay
18 - Rear brake stop light cutout
19 - Battery
20 - Regulator
21 - Rectifier
22 - Alternator
23 - Starter motor relay
24 - Starter motor
25 - Clutch cable cutout
26 - Left rear turn signal (21 W)
27 - Rear brake stop light (21 W)
28 - Number plate and parking light (5 W)
29 - Right rear turn signal (21 W)
30 - Flasher unit
31 - Oil pressure cutout
32 - Neutral position cutout
33 - Terminal block with fuses (16 A)
34 - 3-way connector
35 - 4-way connector
36 - Contact breaker
37 - Coils
38 - Ignition switch (3 positions)
39 - 4-way connector
40 - 2-way connector
41 - Spark plugs
42 - Light switch, with stop device from position « High-Low Beam » to position « Parking light »



COLORS LEGEND

Nero = Black	Giallo = Yellow
Bianco = White	Azzurro = Blue
Verde = Green	Rosso/Nero = Red/Black
Grigio = Grey	Azzurro/Nero = Blue/Black
Viola = Violet	Verde/Nero = Green/Black
Arancio = Orange	Bianco/Nero = White/Black
Rosa = Pink	Giallo/Nero = Yellow/Black
Rosso = Red	Grigio/Nero = Grey/Black
Marrone = Brown	Grigio/Rosso = Grey/Red

ADDITIONS AND CHANGES
FOR 850-T3 - "LAPD„ POLICE MODEL (USA)

INSTRUMENTS AND CONTROLS

INSTRUMENT PANEL (fig. 214/1)

1 Mile counter, speedometer.
2 Left turn indicator warning light (green).
3 Right turn indicator warning light (green).
4 « H » high beam warning light (red).
5 « N » neutral positon warning light (orange).
6 « Gen » warning light indicating insufficient battery charge from generator (red).
7 « Oil » warning light indicating insufficient oil pressure (red).
8 « Park » warning light (green) indicating side stand in parking position.
9 « L » warning light, parking (red).
10 « Purs » warning light (red) indicating red lights on.
11 « Rad » warning light (violet) indicating radio on.
12 « Light » switch for additional lights.
13 « Emerg » switch controlling simultaneous flashing of rear turn indicator lights (the switch controls also the flashing of warning lights « 2 » and « 3 »).
14 Odometer reset.

CONTROL BUTTONS FOR RADIO, SIRENE AND RED LIGHTS (fig. 215/1)

This group is mounted on the right handlebar:
« 1 » Radio control button (white).
« 2 » Sirene control button (blue).
« 3 » Red lights control (red).
« 4 » Sirene control (blue).

TERMINAL BLOCK WITH FUSES (fig. 211)

The terminal block is located on the right side of the motorcycle.
Access to the terminal block is made possible by removal of the right motorcycle side cover and terminal block cover.
It incorporates n. 6 16 A fuses.

Key controlled

« 1 » Rear stop light, horns, flashing lights.
« 2 » Starter motor relay.
« 3 » Warning lights: « Oil - Gen - N » - Headlight: high beam, low beam and warning lights.
« 4 » Rear parking lights, instrument lighting, warning light « L » rear blue lights.

Out of key control

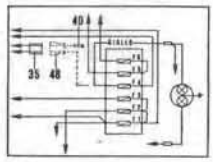
« 5 » Red lights and warning light « Purs »; additional light.
« 6 » Turn indicator lights with their warning lights.

WIRING DIAGRAM

(fig. 216/1)

1 - Mile counter, speedometer (bulb 3 W)
2 - Additional light (bulb 5 W)
3 - « H » high beam warning light (bulb 1,2 W)
4 - « Oil » Oil pressure warning light (bulb 1,2 W)
5 - « N » Neutral position warning light (bulb 1,2 W)
6 - « L » Low beam (bulb 1,2 W)
7 - « Gen » Generator warning light
8 - Low beam } bulb 40/45 W
9 - High beam }
10 - Turn indicator light, front/right (bulb 21 W)
11 - Turn indicator light, left/front (bulb 21 W)
12 - Engine starting and stopping control
13 - Additional light switch
14 - Control switch: turn indicator lights, horns, flashing
15 - Horn (Consumption 7 A)
16 - Front brake switch
17 - Flashing light relay
18 - Rear brake switch
19 - Battery
20 - Regulator
21 - Rectifier
22 - Alternator
23 - Starter motor relay
24 - Starter motor
25 - Switch on clutch control wire
26 - Turn indicator light - rear/left (bulb 21 W)
27 - Rear stop light (bulb 21 W)
28 - Number plate and tail light (bulb 5 W)
29 - Turn indicator light - rear/right (bulb 21 W)
30 - Turn indicator lights flasher unit
31 - Oil pressure switch
32 - Neutral switch
33 - Terminal block with fuses (16 A fuses)
34 - 3-way connector
35 - 4-way connector (Amp)
36 - Breaker
37 - Coils
38 - Ignition switch (3 positions)
39 - Control actuating simultaneous flashing of turn indicator lights
40 - 2-way connector
41 - Spark plugs
42 - Light switch with travel limit from position « High/Low beam » to position « Parking light »
43 - Right turn indicator warning light (bulb 1,2 W)
44 - Left turn indicator warning light (bulb 1,2 W)
45 - « Park » Side stand parking position warning light (bulb 1,2 W)
46 - « Purs » Red pursuing lights warning lights (bulg 1,2 W)
47 - « Rad » Radio warning light (bulb 1,2 W)
48 - 4-way connector (Amp)
49 - Connection
50 - Red pursuing lights (front) - (bulb 35 W)
51 - Control: red lights - radio - syrene
52 - Syrene relay
53 - Coil control device
54 - Control device for side stand warning light
55 - Syrenes (90 W)
56 - Rear blue lights (bulb 5 W)
57 - Spare fuse

The devices no. 53 and no. 54 and cables « A - B - C - D » are supplied only on request: when the above parts are not installed, the white cable coming from clamp no. 5 (15-way Molex - Headlight) must be connected directly on to the coil (connection no. 40 to be eliminated).



CHANGING THE WIRING DIAGRAM FOR VEHICLES WITH COMPULSORY LIGHTING ON, WHEN STARTING THE ENGINE.

To achieve this change it is necessary to take off the wire group which connects connector «35» to fuse n. 4 (red cable) and to connection «40» (yellow cable). This wire group is connected to connector «35» through connector «48».

After disconnecting the yellow cable (rear parking light) from connector «40», connect it to fuse n. 4 as indicated in the wiring diagram.

Connector «35» will be re-fitted, into the insulated housing which supports the flasher unit for turn signals.
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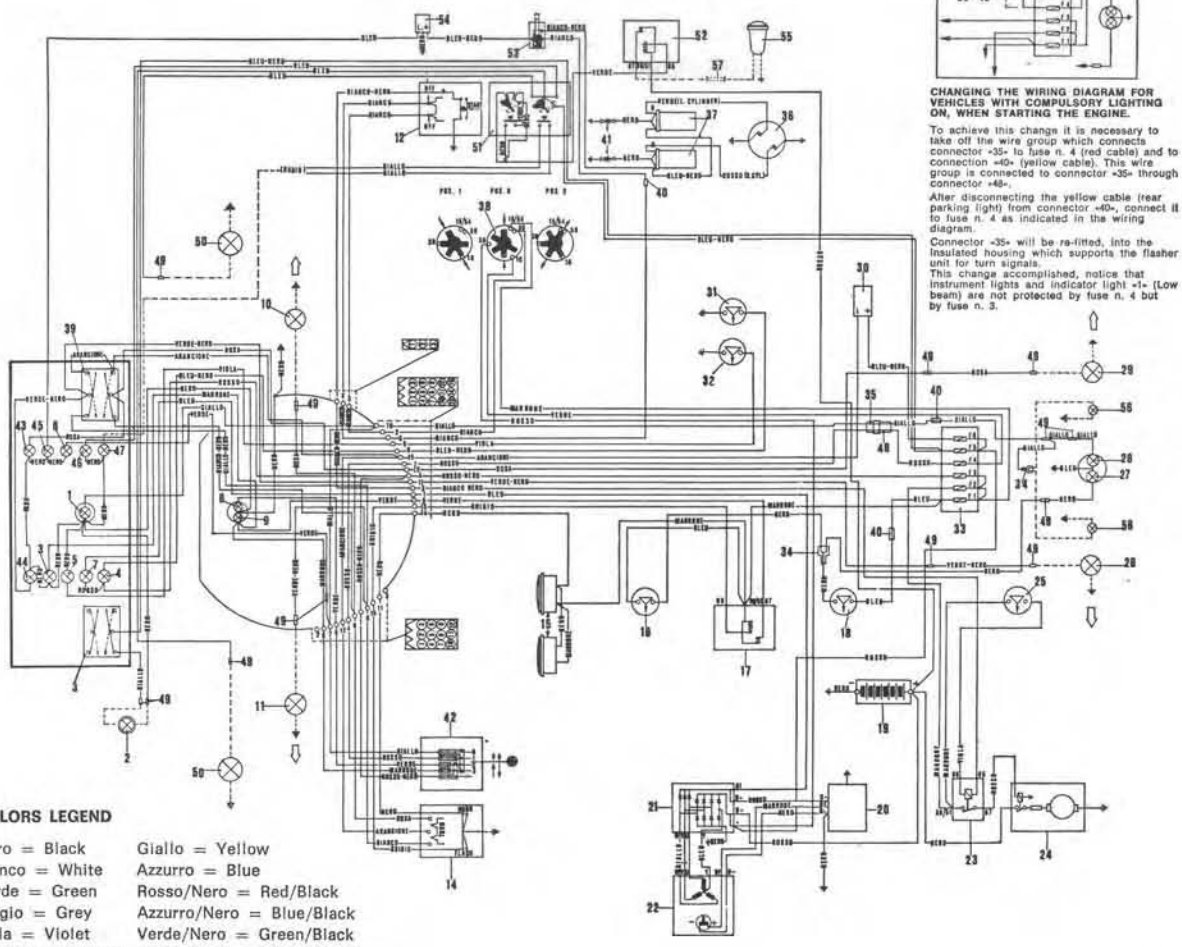

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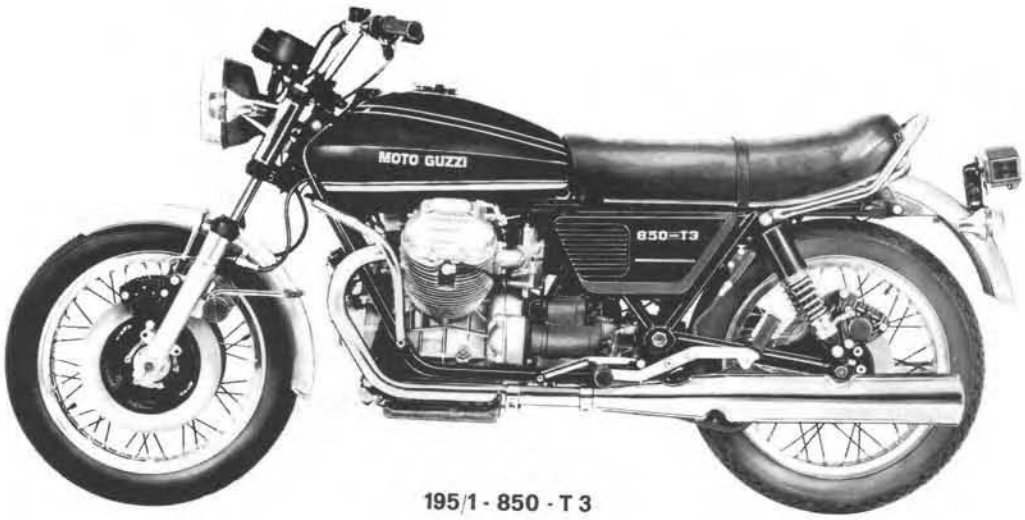

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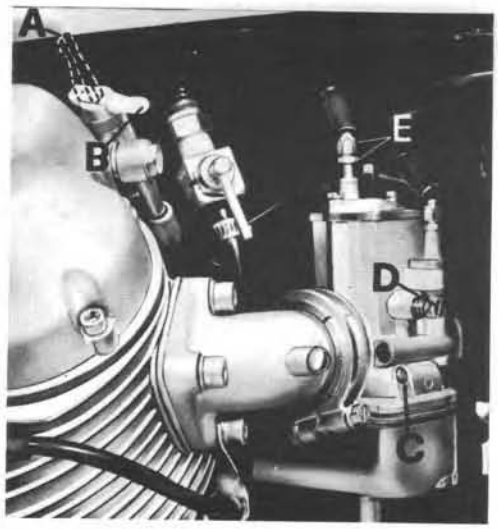

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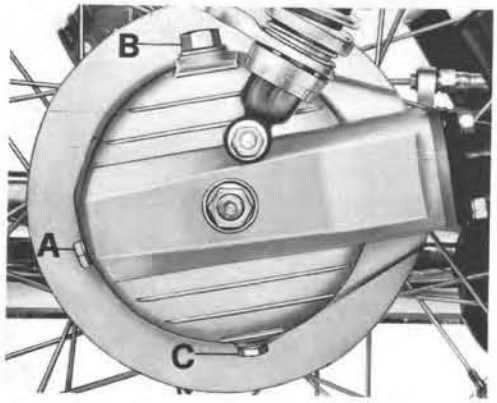

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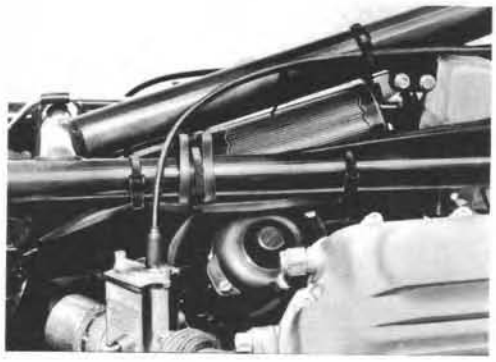

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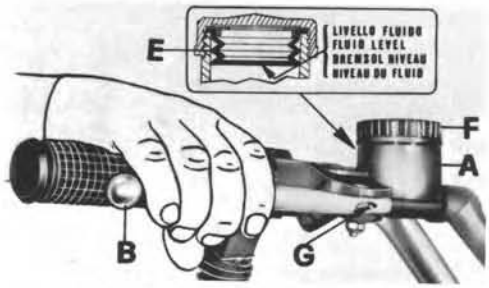

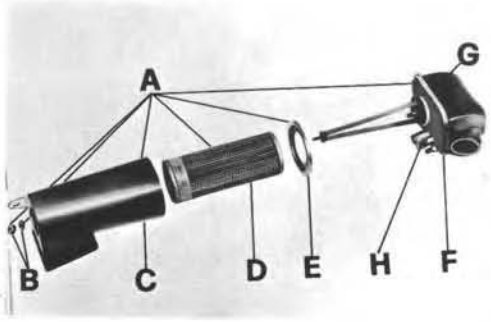

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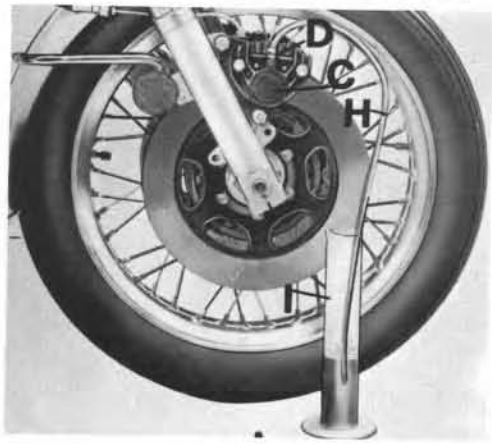

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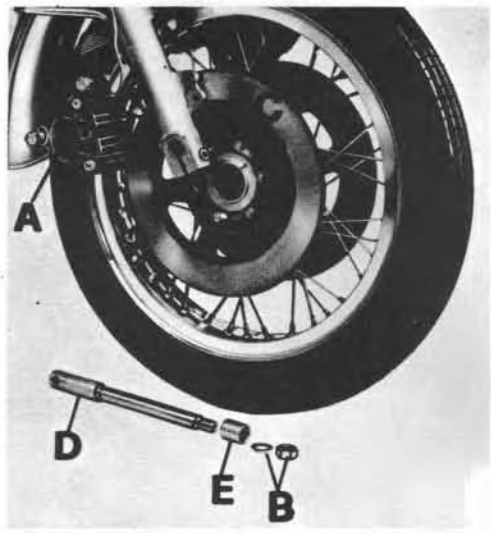

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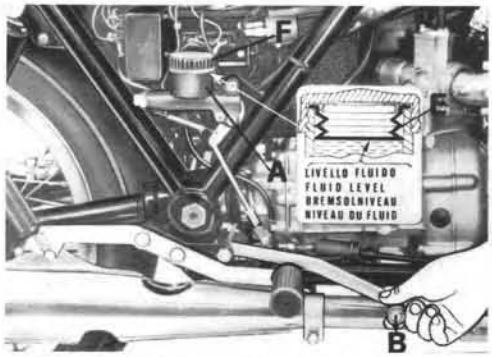

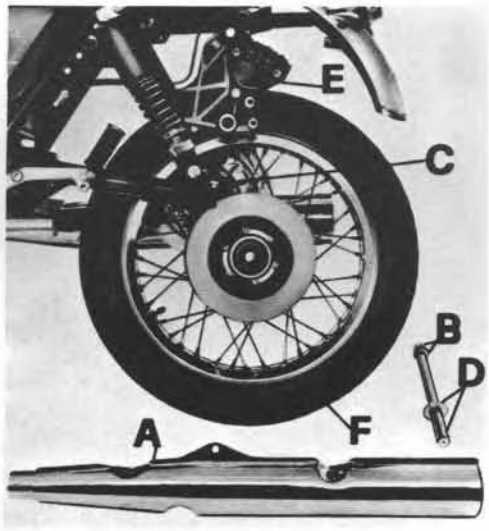

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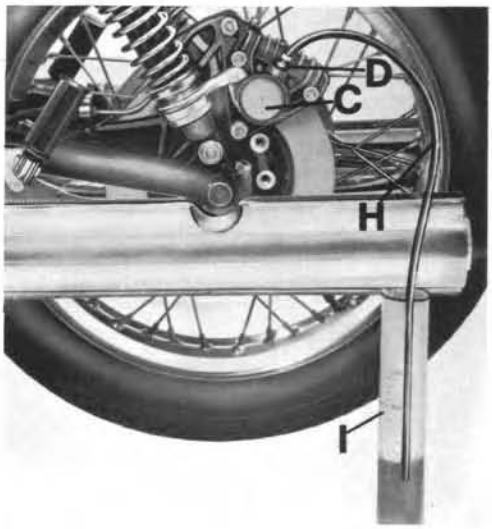

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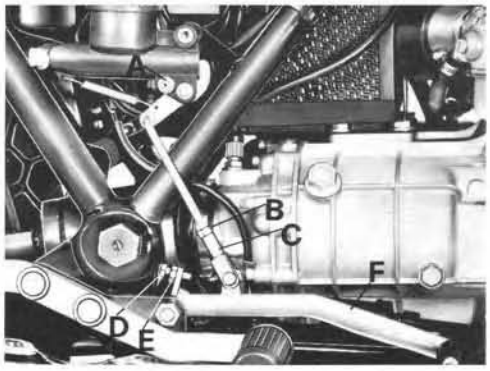

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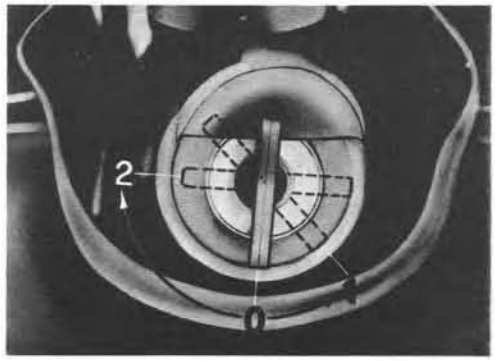

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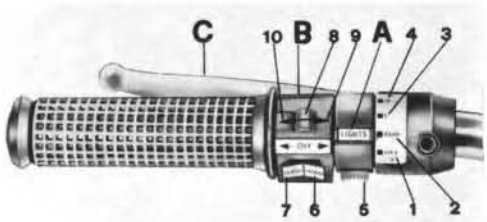

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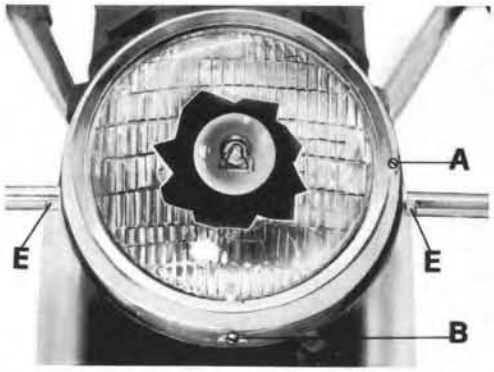

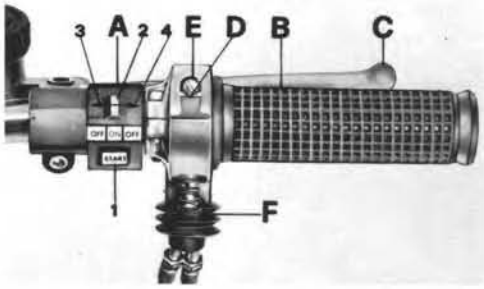

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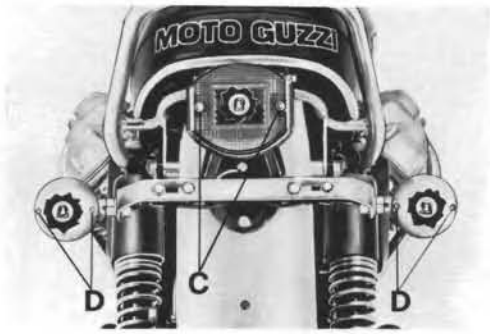

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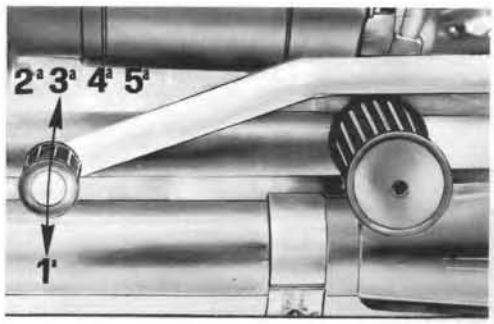

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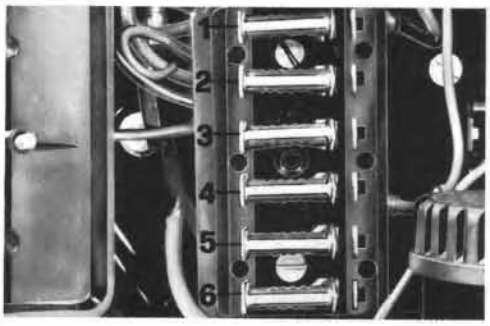

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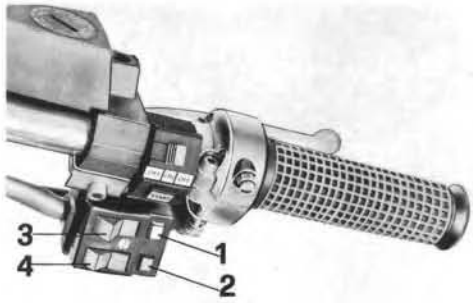

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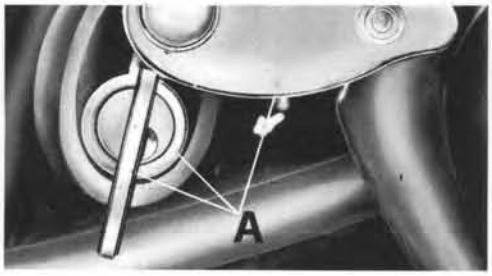

211

MOTO GUZZI

V 1000 I-CONVERT

ADDITIONS AND CHANGES TO THE WORKSHOP MANUAL FOR V7 SPORT - 750 S - 850 T

Cod. n. 18 92 01 51

17_1000Convert Additif V7Sport-750S-850T(GB)

Il semble manquer certaines pages. Difficile de comparer avec la version F qui a été entièrement re-écrite.
Les pages manquantes sont probablement des pages de liaison ou des photos de la machine

- Page "162.jpg" du scan original correspond à la page 163

Les pages 61 à 64 ont été rajoutées (Figures 247 à 254) : manquantes de la version originale, issues de la VF

- les pages 164 et 168 d'origine doivent être vierges

- Schéma électrique Europe récupéré de la version française
- Schéma électrique Police Europe : scan incomplet au centre. Voir la section "Schémas électriques" du site
- Schéma électrique USA : scan incomplet au centre. Voir la section "Schémas électriques" du site
- Schéma électrique USA - LAPD : scan incomplet au centre. Voir la section "Schémas électriques" du site

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Seems any pages missing. Probably union pages or general pictures

Pages 61 to 64 (fig 247 to 254) are missing in the original scan : added from french version

Pages 164 and 168 are probably blank

- wiring diagram Europe model : from french version. Center part missing in the original scan
- wiring diagram Police Europe model : center part missing in the original scan. See "Wiring diagrams" section for complete diagram
- wiring diagram USA model : center part missing in the original scan. See "Wiring diagrams" section for complete diagram
- wiring diagram Police USA - LAPD model : center part missing in the original scan. See "Wiring diagrams" section for complete diagram

MAIN FEATURES

ENGINE

2-cylinder, 4-stroke

Cylinder disposition	« V » 90°
Bore	mm 88
Stroke	mm 78
Displacement	cc 948,8
Compression ratio	9,2
Max. output	HP 71 SAE at 6500 rpm

Valve gearing

O.H.V. push rod operated.

Carburetion

N. 2 Dell'Orto Carburettors:
VHB 30 CD (right);
VHB 30 CS (left).

Lubrication

Pressure, by gear pump.
Wire gauze and cartridge filters in oil pump.
Normal lubrication pressure 3,8 ÷ 4,2 Kp/cm².
Controlled by pressure relief valve.

Generator, Alternator

Front, on the crankshaft (14 V - 20 A).

Ignition

By abttery, with double contact breaker and automatic advance.
Ignition data:

— initial advance (fixed)	0 ÷ 2°
— automatic advance	31 ÷ 33°
— full advance (f. + a.)	33°
— spark plugs	Marelli CW 7L Marelli CW LP Bosch W 225 T2 Champion N 9 Y
— plug points gap	mm 0,6

— n. 2 ignition coils.

Starting

Electric starter (12 V - 0,7 HP) with electromagnetic ratche control. Ring gear bolted on the flywheel. Starter button (START) on the right side of the handlebar.

TRANSMISSIONS

Hydraulic converter

Type « SACHS » allowing the motorcycle to gradually start without any clutching.
Max. converting ratio 1,60 : 1.

Clutch

Dry type, multiplate. Hand controlled by lever on the left side of the handlebar.

Primary drive

By gears, ratio 1 : 1,57 (Z = 19/22).

Gearbox

Two speed, foot operated from the left side of the vehicle.

Gear ratio:
— 1 st. speed (Z = 18/24) = 1 : 1,333
— 2 nd. speed (Z = 22/22) = 1 : 1

Secondary drive

By cardan shaft, bevel gear set.
Ratio: (Z = 9/34) = 1 : 3,788

Overall ratio (engine-wheel):
— 1 st. speed 1 : 6,12
— 2 nd. speed 1 : 4,58

CYCLE

Frame

Duplex cradle, tubular structure.

Wheels

Spoked rims, WM 3/2,15 x 18" front and rear.

Tyres

Front and rear ,10 H 18" or 110/90 H 18".
Tyre pressure front:
— solo, or with pillion 2,1 Kp/cm².

Tyre pressure rear:
— solo 2,4 Kp/cm²
— with pillion 2,6 Kp/cm².

The above data are understood for normal riding (cruising speed).
If using the motorcycle at constant high speed, or con high ways, it is recommended to increase pressure by 0,2 Kp/cm².

Brakes

Front wheel

Twin disc brake, two independent controls with hydraulic hoses and double cylinder calipers.
Controls: right front brake, hand controlled by means of the lever joined to the master cylinder on the right side of the handlebar.
Left front brake, foot controlled together with rear brake.

Disc	Ø mm 300
Cylinder	Ø mm 38
Master cylinder	Ø mm 12,7

(right brake, hand controlled.

Rear wheel

Disc brake, foot controlled from the right side of the vehicle, hydraulic hose and double cylinder caliper.
Rear brake and left front brake are connected throught hydraulic circuit. Both brakes are actuated by same pedal on the right side of the vehicle.

Disc	Ø mm 242
Cylinder	Ø mm 38
Master cylinder	Ø mm 15,875

Parking brake

Mechanical brake, acting on the hydraulic rear wheel brake. The load given by a parked vehicle on its side stand comes to block up the rear braking disc through a lever trasmission system.

Dimensions and weights

Wheelbase	m 1,470
Max. length	m 2,200
Max. width	m 0,850
Max. height	m 1,100
Min. ground clearance	m 0,150
Curb weight (without accessories)	Kg 261 approx.

PERFORMANCES

Max. speed, solo riding:

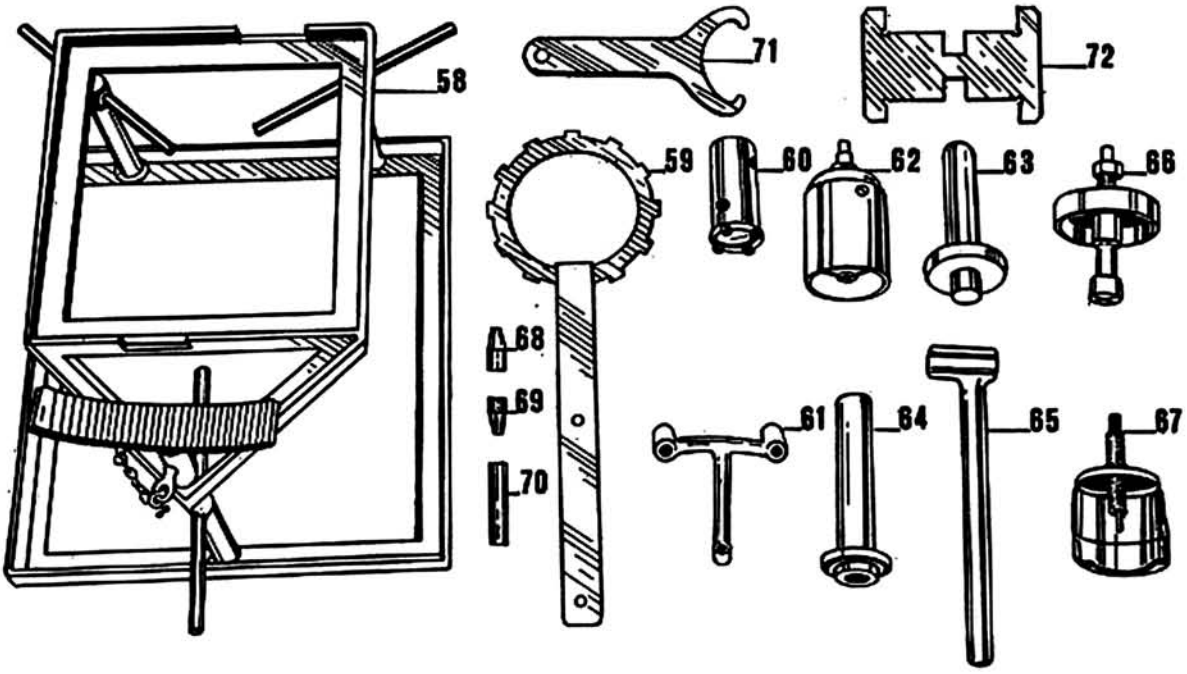
Low	Km/h 130
Drive	Km/h 174
Fuel consumption	lt 6 x 100 Km

FUEL AND OIL CAPACITIES

GROUP OR PART	O.TIES lt	RECOMMENDED TYPES
Fuel tank	24	Petrol 98/100 NO-RM
Reserve (warned by light)	4	
Engine oil sump	3	Oil Agip Sint 2000 SAE 10 W/50
Gear box	0,600	Oil Agip F. 1 Rotra MP SAE 90
Converter circuit (filling q.ty after eventual overhauling)	1,5 ÷ 1,7	Agip F. 1 ATF Dexron
Rear drive box	0,230 0,020	Oil Agip F. 1 Rotra MP SAE 90 Oil « Molykote » type « A »
Front fork (each leg)	0,070	Agip F. 1 ATF Dexron
Braking circuits		Fluid Agip F. 1 Brake Fluid SAE J 1703

SPECIFIC WORKSHOP TOOL
(fig. 236)

N. FIG.	N. REF.	DESCRIPTION
58	18 91 24 50	Engine support.
59	18 91 18 50	Tool, holdfast, flywheel and clutch housing.
60	18 92 76 50	Wrench, nut fixing camwheel and pinion ring.
61	18 91 38 50	Dial gauge holder.
62	18 90 69 50	Puller, removal of ball bearing on the gearbox cover.
63	18 92 91 50	Punch, pressing of the seal ring on the gearbox cover.
64	18 92 89 50	Punch, pressing of ball bearing on the gearbox.
65	18 92 71 50	Tool, holdfast, bevel gear shaft on the drive box.
66	18 92 72 50	Puller, removal of cardan joint bearing on the rear swinging fork.
67	18 92 73 50	Puller, removal of spacer and ball bearing on layshaft.
68	18 92 65 00	Tool, fitting of lip gasket on the floater in the master cylinder for right front brake (also for: 750 S 3 - 850 T 3).
69	18 92 66 00	Tool, fitting of thoroid gasket on the floater in the master cylinder for right front brake (also for: 750 S 3 - 850 T 3).
70	18 92 67 00	Tool, fitting of lock ring on master cylinder for right front brake (also for: 750 S 3 - 850 T 3).
71	12 91 27 00	Wrench, adjusting of « Lims » rear suspensions.
72	14 92 69 00	Tool, checking of floater parallelism, VHB carburettors.



INCHES AND MILLIMETERS CONVERSION CHART

MILLIMETERS TO DECIMAL (inches) EQUIVALENT

mm	= DECIMAL (Inches)	mm	= DECIMAL (Inches)	mm	= DECIMAL (Inches)	mm	= DECIMAL (Inches)	mm	= DECIMAL (Inches)	mm	= DECIMAL (Inches)
1	.039	21	.827	41	1.614	61	2.402	81	3.189	125	4.921
2	.079	22	.866	42	1.654	62	2.441	82	3.228	150	5.906
3	.118	23	.906	43	1.693	63	2.480	83	3.268	175	6.890
4	.157	24	.945	44	1.732	64	2.520	84	3.307		
5	.197	25	.984	45	1.772	65	2.559	85	3.346		
6	.236	26	1.024	46	1.811	66	2.598	86	3.386	200	7.874
7	.276	27	1.063	47	1.850	67	2.638	87	3.425	225	8.858
8	.315	28	1.102	48	1.890	68	2.677	88	3.465	250	9.843
9	.354	29	1.142	49	1.929	69	2.717	89	3.504	275	10.827
10	.394	30	1.181	50	1.969	70	2.756	90	3.543		
11	.433	31	1.220	51	2.008	71	2.795	91	3.583	300	11.811
12	.472	32	1.260	52	2.047	72	2.835	92	3.622	325	12.795
13	.512	33	1.299	53	2.087	73	2.874	93	3.661	350	13.780
14	.551	34	1.339	54	2.126	74	2.913	94	3.701	375	14.764
15	.591	35	1.378	55	2.165	75	2.953	95	3.740		
16	.630	36	1.417	56	2.205	76	2.992	96	3.780	400	15.748
17	.669	37	1.457	57	2.244	77	3.031	97	3.819		
18	.709	38	1.496	58	2.283	78	3.071	98	3.858		
19	.748	39	1.535	59	2.323	79	3.110	99	3.898		
20	.787	40	1.575	60	2.362	80	3.150	100	3.937		

DECIMAL (inches) TO METRIC EQUIVALENT

= mm	DECIMAL (Inches)	= mm	DECIMAL (Inches)	= mm	DECIMAL (Inches)	= mm	DECIMAL (Inches)	= mm	DECIMAL (Inches)	= mm	DECIMAL (Inches)
.001	.025	.120	3.048	.320	8.128	.520	13.208	.720	18.288	.920	23.368
.002	.051	.130	3.302	.330	8.382	.530	13.462	.730	18.542	.930	23.622
.003	.076	.140	3.556	.340	8.636	.540	13.716	.740	18.796	.940	23.876
.004	.102	.150	3.810	.350	8.890	.550	13.970	.750	19.050	.950	24.130
.005	.127	.160	4.064	.360	9.144	.560	14.224	.760	19.304	.960	24.384
.006	.152	.170	4.318	.370	9.398	.570	14.478	.770	19.558	.970	24.638
.007	.178	.180	4.572	.380	9.652	.580	14.732	.780	19.812	.980	24.892
.008	.203	.190	4.826	.390	9.906	.590	14.986	.790	20.066	.990	25.146
.009	.229	.200	5.080	.400	10.160	.600	15.240	.800	20.320		
.010	.254	.210	5.334	.410	10.414	.610	15.494	.810	20.574	1.000	25.400
.020	.508	.220	5.558	.420	10.668	.620	15.748	.820	20.828	2.000	50.800
.030	.762	.230	5.842	.430	10.922	.630	16.002	.830	21.082	3.000	76.200
.040	1.016	.240	6.096	.440	11.176	.640	16.256	.840	21.336	4.000	101.600
.050	1.270	.250	6.350	.450	11.430	.650	16.510	.850	21.950	5.000	127.000
.060	1.524	.260	6.604	.460	11.684	.660	16.764	.860	21.844	10.000	254.000
.070	1.778	.270	6.858	.470	11.938	.670	17.018	870	22.098	15.000	381.000
.080	2.032	.280	7.112	.480	12.192	.680	17.272	.880	22.352	20.000	508.000
.090	2.286	.290	7.366	.490	12.446	.690	17.526	.890	22.606	25.000	635.000
.100	2.540	.300	7.620	.500	12.700	.700	17.780	.900	22.860	50.000	1.270.000
.110	2.794	.310	7.874	.510	12.954	.710	18.034	.910	23.114	100.000	2.540.000

INCHES AND MILLIMETERS CONVERSION CHART

FRACTIONS (Inches) TO DECIMALS (Inches) and METRIC EQUIVALENTS

FRACTION (Inches)	= DECIMAL (Inches)	= mm
	1/64	.016	.397
1/32		.031	.794
	3/64	.047	1.191
1/16		.063	1.588
	5/64	.078	1.984
3/32		.094	2.381
	7/64	.109	2.778
1/8		.125	3.175
	9/64	.141	3.572
5/32		.156	3.969
	11/64	.172	4.366
3/16		.188	4.763
	13/64	.203	5.159
7/32		.219	5.556
	15/64	.234	5.953
1/4		.250	6.350
	17/64	.266	6.747
9/32		.281	7.144
	19/64	.297	7.541
5/16		.313	7.938
	21/64	.328	8.334
11/32		.344	8.731
	23/64	.359	9.128
3/8		.375	9.525
	25/64	.391	9.922
13/32		.406	10.319
	27/64	.422	10.716
7/16		.438	11.113
	29/64	.453	11.509
15/32		.469	11.906
	31/64	.484	12.303
1/2		.500	12.700
	33/64	.516	13.097
17/32		.531	13.494
	35/64	.547	13.891
9/16		.563	14.288
	37/64	.578	14.684
19/32		.594	15.081
	39/64	.609	15.478
5/8		.625	15.875
	41/64	.641	16.272
21/32		.656	16.669
	43/64	.672	17.066
11/16		.687	17.463
	45/64	.703	17.859
23/32		.719	18.256
	47/64	.734	18.653
3/4		.750	19.050
	49/64	.766	19.447
25/32		.781	19.844
	51/64	.797	20.241
13/16		.813	20.638
	53/64	.828	21.034
27/32		.844	21.431
	55/64	.859	21.828
7/8		.875	22.225
	57/64	.891	22.622
29/32		.906	23.019
	59/64	.922	23.416
15/16		.938	23.813
	61/64	.953	24.209
31/32		.969	24.606
	63/64	.984	25.003

(Inches)	= mm
1	1.000	25.400
2	2.000	50.800
3	3.000	76.200
4	4.000	101.600
5	5.000	127.000
10	10.000	254.000
15	15.000	381.000
20	20.000	508.000
25	25.000	635.000
50	50.000	1270.000
100	100.000	2540.000

Removal of the engine unit from the frame:

— set the vehicle on the center stand;
— loosen the screws and remove the windshield group together with connections;
— loosen the screws and remove side bags, side bag housings and rear safety bar;
— lift the saddle, using its proper rod;
— detach the wiring from the level indicator and electro-valve;
— by means of pliers spread the retaining springs, then remove the pipes from the fuel tap and electro-valve;
— unhook the clamp securing the fuel tank (rear side) and slide out the tank from the bushings on the frame (front side);
— loosen the screws securing exhaust pipes to cylinder heads;
— loosen the screws on the clamps securing exhaust pipes and silencers to expansion chamber;
— loosen the screws securing silencers to frame; then remove exhaust pipes and silencers;
— remove the battery covers;
— unhook the bracket and remove the tool box;
— detach the electric wiring, unhook the securing clamps and remove the battery;
— loosen the filter screw from the converter reservoir and drain the liquid from the reservoir itself;
— loosen the screw securing drain pipe to converter cover, then drain the liquid;
— undo the blind nut securing the recovery pipe, remove the pipe from the holder on the converter cover and drain the liquid from the converter radiator;
— detach the parking brake control cable from the lever on the caliper;
— loosen the screws and remove: mechanical and hydraulic caliper from the holder, paying attention to the quantity of shims between the calipers and the caliper holder, then fix the hydraulic caliper to the frame;
— loosen the wheel spindle nut on the drive box side and the screw securing the pin itself to the swing arm; then slide out the wheel spindle from drive box, wheel hub and rear swing arm;
— slide out the caliper holder together with its spacer, paying attention to the position of the spacer itself (the lowered side must face the wheel hub);
— slide out the gear on the wheel hub from the drilled pin on the drive box, shifting the wheel towards the left side of the swing arm;
— lean the vehicle to the right and remove the wheel from the drive box and the rear swing arm;
— undo the nuts securing the rear suspension to the drive box and swing arm;
— loosen the screws on the clamps securing the gaiter covering the cardan joint;
— loosen the nuts on the pivot screws, then the screws securing the swing arm to frame and remove the rear swing arm complete with drive box and u-joint from the layshaft in the gearbox;
— set the block n. 18 91 24 50 (58 in fig. 237) under the engine unit and screw in the three screws in such a way as to lift the engine unit off the ground;
— detach the wires from spark plugs and starter motor; then take off the alternator cover and detach the electric wiring from alternator, parking brake cutout, coils, oil pressure cutout;
— loosen the screws securing the front fender (rear side) and the nuts on the engine mounting bolts;
— detach the speedometer cable from the gearbox housing;
— remove the circlip and connecting pin on the control lever for the integrated braking system. Remove the cotter pin and fixing pin on the gearbox lever;
— remove the engine mounting bolts, then take off the frame cradle arms complete with center and side stands;
— loosen the securing screws and remove the starter motor from the converter cover;
— lift the frame unit, then take off the engine-gearbox unit from the frame (see fig. 238). An assistant will be needed for this operation.

To separate the engine-converter unit from the clutch-gearbox ass.y proceed as follows:

— the engine-gearbox unit has to be placed on the support block in such a way that the gearbox side is upwards, to prevent the converter oil from draining out; then loosen the securing nuts and separate the gearbox ass.y from the engine unit (see fig. 239).

— drain the converter oil with a syringe (see fig. 240);
— flatten the wings of the securing plates, then loosen the retaining screws and remove the converter and the starter ring gear (see fig. 240/1);
— remove the cylinder head covers, then bring the pistons to T.D.C. (closed valves) and slide out the rocker;
— remove the rocker-push rods assembly, then loosen the nuts and remove rocker holders and cylinder heads;
— remove the alternator from the crankshaft, using the proper Allen key and pin 14906600;
— take off the gaskets between cylinders and cylinder heads, then remove the cylinders and take off the gaskets between cylinders and crankcase;
— using pliers take off the piston pin circlips, then using the special tool 26 90 78 00 (11 in fig. 17) slide out the piston pins.
Caution: when removing cylinder head, piston and cylinder ass.les, pay attention to take left and right ass.y well apart;
— flatten the wings of the securing plates, fit the special tool 18 91 18 50 (59 in fig. 241) on the flywheel and remove the flywheel;
— loosen the screws and remove the valve gearing cover; this cover fits the converter feed pump, which is controlled by the camshaft and the valve controlling the pressure of the converter hydraulic circuit;
— loosen the nut securing the oil pump gear, using eye wrench and holdfast tool n. 14 92 73 00;
— loosen the nut securing the camwheel using the tool 14 92 73 00 (20 in fig. 242) and special wrench 18 92 76 50 (60 in fig. 242);
— flatten the washer securing wings and take out the ring using tool 14 92 73 00 (20 in fig. 243) and special wrench 14 92 76 00 (60 in fig. 243);
— remove the valve gear and chain ass.y from the shafts;
— loosen the screws and remove the camshaft securing flange and the camshaft from the holders on the crankcase;
— loosen the screws and remove the oil sump from the crankcase. The oil sump will be complete with filters and oil pressure relief valve;
— loosen the nuts and dismantle the con-rod caps, then remove the conrods through the cylinder holes in the crankcase;
— flatten the wings of securing plates, remove piping and securing screws then remove the flange, from the crankshaft, flywheel side, using the tool 12 91 36 00 (18 in fig. 19);
— dismantle the crankshaft from the flange, valve gearing side;
— flatten the wings of the securing plates, loosen the screws and remove the flange, valve gearing side;
— dismantle the cylindre head, using tool 10 90 72 00 (12 in fig. 16) and proceed as follows;
— set the tool on the upper plate and valve;
— screw in the tool screw to tighten the tool itself; in order to avoid any tool distortion, tap on the tool head, if a strong resistance in screwing is found; this beating will make the two semicones free from the upper plate;
— screw in to remove the two semicones from the upper plate;
— take out the tool, then remove upper plate, outer spring, inner spring bottom plate, shims and finally the valve.

CHANGES FOR ENGINE OVERHAULING- ROCKER COVERS - CYLINDER HEADS - VALVES - SPRINGS

RE-FITTING OF HEADS ON CYLINDERS

Pay attention that the cylinder lubrication hole (arrow « A ») is aligned with both the gasket lubrication hole (arrow « B ») and the head lubrication hole (arrow « C »), fig. 244.

In order not to damage the cylinder head when locking the nuts, it is necessary to follow a crossed sequence (1 - 2 - 3 - 4 - 5 - 6 - fig. 29) and torque to 4 ÷ 4,5 Kgm (approx. 20 pounds). Remember to always replace the gasket between cylinder and head.

CYLINDERS - PISTONS - PISTON RINGS

CYLINDERS

Cylinder wearing

The cylinder bore should be measured at 3 different heights, turning the dial gauge 90°. The dial gauge has to be previously set to zero on the slip ring (see fig. 245 and Drwg. 246) also make sure that cylinder and piston are matched (A with A, or B with - see the arrow and fig. 248).

Selection of cylinder Ø

CLASS « A »	CLASS « B »
88,000 ÷ 88,009	88,009 ÷ 88,018

• **N.B.** - Cylinders must always be matched with pistons of the same class.

Oversize of cylinder Ø

For spare part purpose, two oversizes are allowed, namely:
— 4/10 oversize Ø = mm 88,400 ÷ 88,418
— 6/10 oversize Ø = mm 88,600 ÷ 88,618.

PISTONS (see Drwg. 246)

Selection of piston Ø

CLASS « A »	CLASS « B »
87,933 ÷ 87,942	87,942 ÷ 87,951

• **N.B.** - Cylinders must always be matched with pistons of the same class.

Oversize of piston Ø

For spare part purpose, two oversizes are allowed, namely:
— 4/10 oversize Ø = 88,351 ÷ 88,333
— 6/10 oversize Ø = 88,551 ÷ 88,533
The measuring for Ø selection has to be done at 22 mm distance from the piston bottom and on a perpendicular plane in respect to the piston pin axis (see fig. 245 and Drwg. 246).

Fitting of piston on con-rod small end, using piston pin

Heat the piston in oil bath to a temperature of about 60 °C (140 °F).
This will dilate the hole in the piston and allow easier insertion of the piston pin.

Coupling clearance between piston pin and bushing for con-rod small end (see Drwgs. 246-247 and fig. 249)

I/Ø OF BUSHING AFTER PRESSING IN AND REAMING mm	PISTON PIN Ø mm	PIN-BUSHING CLEARANCE mm
22,025 ÷ 22,045	22,000 ÷ 22,004	0,021 ÷ 0,045

Coupling clearance between piston pin and piston pin holes

PISTON PIN Ø mm	PISTON PIN HOLE Ø mm	CLEARANCE
22,000 ÷ 22,004	22,000 ÷ 22,006	From 0,06 to a negative allowance of mm 0,04

PISTON RINGS

Each piston fits: n. 1 upper ring, n. 1 intermediate ring, n. 1 oil scraper. When fitting, the piston ring end gap has to be out of line with each other ring.

Coupling clearance between piston rings and ring slots (see « A » in fig. 250)

Piston rings and oil scaper: mm 0,30 ÷ 0,062.

Clearance for piston ring end gap (see « B » in fig. 250)

Upper and intermediate rings: mm 0,30 ÷ 0,45.
Oil scaper: mm 0,25 ÷ 0,40.

Fitting of the piston on the con-rod small end (see fig. 251)

Pay attention that the side stamped (SCA) which is indicated by the arrow « A » in the picture, must face the exhaust duct, when fitting the piston to the con-rod small end.

Fitting of cylinder on the crankcase (see fig. 252)

Pay attention that the cylinder lubrication hole « A » is aligned with the lubrication hole « B » of the gasket between cylinder and crankcase. The cylinder hole « C » must then be aligned with the holes « A » and « B » and the lubricating hole « D » of the gasket betwen cylinder and head must be aligned with the holed « A », « B », « C ».
Also rember to fit the seal rings « E » on the short bolts. Fit first the gasket between crankcase and cylinders.

CON-RODS - CRANKSHAFT - MAIN BEARINGS, FLYWHEEL AND VALVE GEARING SIDES

Selection for crankshaft and con-rod

The con-rods « A » - white marked - must be matched with the crankshaft « B » - white marked -; while the con-rods « A » blue marked - must be matched with the crankshaft « B » - blue marked.

Crankpin ∅ « A » and « B » class

SELECTION	ORIGINAL ∅	UNDERSIZE		
		mm 0,254	mm 0,508	mm 0,762
CLASS « A » BLUE MARKED ON SHOULDER FLYWHEEL SIDE	44,008 44,014	43,754 43,766	43,500 43,512	43,246 43,258
CLASS « B » WHITE MARKED ON SHOULDER FLYWHEEL SIDE	44,014 44,020			

— clearance between crankpin and bearing: Min. 0,030, Max. 0,054;
— coupling clearance between flange with bearing ,flywheel side, and crankshaft: mm 0,040 ÷ 0,075;
— coupling clearance between flange with bearing, velve gearing side, and crankshaft: mm 0,028 ÷ 0,060;
— clearance between con-rods and crankshaft shims: mm 0,030 ÷ 0,040.

Fitting of the flange, valve gearing side, on the crankcase (fig. 255)

Pay attention that the lubrication hole, indicated by the arrow « A » on the flange has to be aligned with the lubrication hole indicated by the arrow « B » on the crankcase.

Lock the screws with the securing wings; after locking, bend the wings on the screw hexagonal arrows.
Fit the chain tensioner, paying attention that the spacers have to be fitted between the crankcase and the chain tensioner; after locking the screws bend the securing wings on the screws.
Fit then the crankshaft through the flywheel side on the bushing of the flange, valve gearing side.

Fitting of the flange with bearings, flywheel side, on crankcase and crankshaft (fig. 257)

Pay attention that the lubrication hole indicated by arrow « A » on the flange is aligned with the lubrication hole indicated by the arrow « B » on the crankcase.
Lock the screws, then bend the screw wings.

Fitting of con-rods on the crankshaft (fig. 256)

Pay attention to the position of the lubrication holes, indicated by the arrows « A »:
— con-rod for right cylinder; hole downwards;
— con-rod for left cylinder; hole upwards. The milled surfaces of con-rod and con-rod cap must coincide (see fig. 257).

Fitting of the flywheel on the crankshaft

Pay attention that the reference mark indicated by the arrow « A » on the crankshaft is aligned with the reference mark indicated by the arrow « B » on the outer flywheel (fig. 258).
Fit tool 18 91 50 50 on the flywheel (59 in fig. 259) and torque the bolts to about 4,2 Kp/m (10 pounds) then bend over the screw wings.

VALVE GEARING

TIMING DATA (fig. 260)

Referred to the clearance of 0,5 mm between rocker and valve.

Inlet:

— opens 20° before T.D.C.
— closes 52° after B.D.C.

Exhaust:

— opens 52° before B.D.C.
— closes 20° after T.D.C.

Working clearance between rocker and valve, cold engine, mm 0,22.

Ø of camshaft holders and holder seats on the crankcase:

	Ø CAMSHAFT HOLDER mm	Ø HOLDER SEAT mm	COUPLING CLEARANCE mm
Valve gearing side	47,000 46,984	47,025 47,050	0,025 ÷ 0,066
Flywheel side	32,000 31,984	32,025 32,050	

Coupling data for tappets and tappet seat on the crankcase:

	Ø TAPPET SEAT mm	Ø OUTER TAPPET mm	COUPLING CLEARANCE mm
Original Ø	22,021 ÷ 22,000	21,996 ÷ 21,978	0,004 ÷ 0,043
Oversize Ø 0,05	22,071 ÷ 22,050	22,046 ÷ 22,028	
Oversize Ø 0,10	22,121 ÷ 22,100	22,096 ÷ 22,018	

FITTING OF CAMSHAFT AND GEARING WITH CHAIN

After fitting the oil pump and the chain tensioner ass.y proceed as follows:

— fit the camshaft « A » in fig. 261 onto the seats in the crankcase and secure the shaft to the crankcase, using flange « B » in fig. 261 and screws with toother washers « C » in fig. 261;
— fit the gear ass.y with chain « D » in fig. 261 on the gears of camshaft, crankshaft, and oil pump shaft (this group has already been mounted previously) paying attention to the alignment of the reference marks « E » in fig. 261 on the gears (camwheel and engine pinion) thus indicating the valve operation is correctly timed; then fit the stop pin « F » in fig. 261 into the camshaft hole « H » in fig. 261; also pay attention to the key seat on the engine pinion « I » in fig. 261;
— lock the nut with spring washer « M » fig. 261 securing the camwheel on the camshaft using tool n. 14 92 73 00 (20 in fig. 262) and special wrench 18 92 76 50 (60 in fig. 262);
— lock the ring with washer « M » fig. 261 securing the engine pinion on the crankshaft ,using tool 14 92 73 00 (20 in fig. 263) and special wrench 14 92 76 00 (60 in fig. 263); flatten one washer wing into a ring hollow;
— lock the nut with washer « N » fig. 261 securing the control gear on the oil pump shaft, using tool 14 92 73 00 and special eye wrench, remember to set the key « O » fig. 261 onto the shaft itself.

After this fitting, check again the alignment of the two reference marks on the gears (camwheel and engine pinion) « A » fig. 264, then fit tappets « Q » into the seats « P » on the crankcase (see fig. 261).

CHECKING THE VALVE TIMING WITH ENGINE ON VEHICLE

— Remove the spark plugs from the cylinder heads;
— loosen the screws and remove the rocker covers;

— set clearance between rocker and valve to mm 1,5;

— loosen the screws and take off the flywheel cover;

— remove the rubber cap from the inspection hole on the right side of the converter cover;

— using a proper tool, rotate the alternator until the right hand piston is at T.D.C. (closed valves); looking through the inspection hole, the letter « D » must be seen at the middle of the mark on the hole rim;

— fit the tool with arrow 12 92 75 00 (26 in fig. 265) onto the valve gearing cover and lock it by means of the screw;

— loosen the screw securing alternator to crankshaft and fit the degree wheel 14927400 25 in fig. 265) on the alternator itself; after pointing the mark P.M.S. (T.D.C.) with the point of the checking tool, secure the disc-alternator group to the crankcase by means of the alternator screw;

— looking through the inspection hole, ensure that the letter « D » of the wheel is still at the middle of the mark on the hole rim;

— rotate the alternator with the degree wheel 128° clockwise, starting from the P.M.S. (T.D.C.) mark which is aligned with the point of the checking tool.

At this tage, under normal conditions, the exhaust valve of the right cylinder must start opening. After checking everything is normal, re-set the rocker-valve clearance to 0,22 mm then fit rocker covers and rubber cap on the inspection hole; remove the checking tool from the valve gearing cover and the degree wheel from the alternator. Lock the alternator securing screw and re-fit the alternator cover on the valve gearing cover. Re-fit the spark plugs onto the cylinder heads.

ENGINE LUBRICATION

DESCRIPTION

This type of engine fits an oil filter which, in addition to a wire gauze, filter « D » is also provided with a filter cartridge « A » fig. 266 This ensures an almost integral filtering before the oil passes in the pump and lubricating channels.

OIL SUMP (fig. 266)

The oil sump « C » fits:
« A » filter cartridge, replaceable;
« B » magnetic oil drain plug;
« D » wire gauze filter;
« E » oil pressure relief valve.

FILTER CARTRIDGE, REPLACEABLE (fig. 266)

The filter cartridge « A » has to be replaced every 15.000 Km (9,000 miles) (five oil changes) by proceeding as follows:
— undo the drain plug « B » with aluminium washer as well as the plug « F » with aluminium washer on the crankcase and let the oil drain into a basin, which has been previously set under the sump « C »;
— loosen the screws securing the sump to the crankcase and remove the complete sump « C »;
— take off the cartridge « A » the wire gauze « D » and the oil pressure relief valve;
— wash the sump « C » in gasoline and blow it out with compressed air;
— wash the wire gauze filter in gasoline and blow it out with compressed air;
— using a pressure gauge check if the oil pressure relief valve « E » operates at the specified rate of Kp/cm² 3,8 ÷ 4,2 (55 - 60 p.s.i.) otherwise see the paragraph « Oil pressure relief valve ».

Fit all the components onto the oil sump, replace the gasket between sump and crankcase, then secure the sump to the crankcase by means of its securing screws.
Now fill the crankcase with 3 lt (approx. 3 quarts) oil « AGIP SINT 2000 SAE 10 W/50 » or equivalent.
Ensure that the oil level is at the max. mark on the oil filler dipstick; then re-fit the dipstick.

WIRE GAUZE FILTER (fig. 266)

The wire gauze filter « D » is secured to the sump « C » by means of a bolt with a securing plate; when replacing the filter cartridge « A », it is advisable to take off the wire gauze filter too and to wash it in gasoline and blow it out with compressed air.

OIL PRESSURE RELIEF VALVE (fig. 266)

The oil pressure relief valve « E » is screwed on the oil sump « C ».
It is calibrated for allowing a pressure of Kp/cm² 3,8 ÷ 4,2 (55 - 60 p.s.i.) in the oil delivery circuit. In case of higher pressure, this valve opens, thus adjusting the pressure to the specified limits.
If, because of any reason, the valve opens before the running pressure is reached, it is necessary to take off the valve and put one or more shims upon the spring « G » until, according to a pressure gauge reading, the valve opens at the specified pressure.

CHECKING OF OIL LEVEL (fig. 267)

Every 500 Km (300 miles) check the oil level in the crankcase (it must be nearly at the max. mark stamped on the cap filter dipstick « A »). In case of lower level, fill with the proper oil. Check oil level after engine has run for a few minutes and fully screw the cap filler dipstick « A ».
Oil to be used: « AGIP SINT 2000 SAE 10 W/50 » or equivalent.

CHECKING THE OIL PRESSURE WITH ENGINE ON VEHICLE

— Detach the electric wiring from the oil pressure solenoid, which is located on the left front side of the crankcase;
— remove the solenoid;
— connect the pressure gauge pipe to the solenoid hole in the crankcase;
— start the engine and check if the running pressure is Kp/cm² 3,8 ÷ 4,2 (55 - 60 p.s.i.).

For more accurate checking, it is advisable to attach the pressure gauge to the front right safety bar and to ride for at least 5 miles at different speeds ensuring that the gauge reading is still Kp/cm² 3,8 ÷ 4,2 (55 - 60 p.s.i.).
If everything is normal ,remove the pressure gauge pipe, re-fit the solenoid and connect the electric wiring.

CECKING OIL LEAKAGE IN THE CRANKCASE

If some engine oil leaks from the relief tube which is located under the converter box, it is necessary to check the following:
— ensure that the seal ring on the flange, flywheel side, is not worn; in case of wear check that the crankshaft surface which contacts this seal is perfectly smooth;
— ensure that the crankcase does not show any casting flaws. Set the engine on a bench, the flywheel side upwards (see fig. 122). First remove converter and flywheel from the crankshaft. Fill with water and blow compressed air at about 4 Kp/cm² (55 p.s.i.) through the bleather tube (« A » in fig. 122).
Casting flaw, if any, will be evidenced by small bubbles in the water. Close the casting flaws with latex or special sealers (Araldite or Devcon);

— ensure that the bands securing the rubber tubes of the engine breather are well tightened; otherwise it is possible that the oil flows between rubber and metal tubes and from there between converter box and engine;

— ensure that the two lower bolts securing the flange, flywheel side, to the crankcase are dry; if they are wet with oil, put some « Teflon » tape on the bolt thread;

— ensure that the lower stud bolt securing the convertor box to the engine, left side, is not wet with oil at the point where the reference bushing is located; if wet, put some « Teflon » tape on the stud bolt thread.

CARBURETTORS (see fig. 268)

N. 2 Dell'Orto: VHB 30 CD (right), VHB 30 CS (left).

CONTROLS

— throttle control, on the right side of the handlebar;

— control lever for starting a **cold engine** "Starter" on the rocker cover for left cylinder.

This lever controls the starters of both carburettors at the same time:

« A » starting position, for a cold engine;
« B » riding position.

Note - ensure that there is mm 3 clearance between the control cable ends and the adjuster screws « H » for both carburettors, when the lever is in position « B ».

STANDARD CARBURETTOR SETTING

Throttle	Ø mm 30
Choke	40
Atomizer	265
Main jet	130
Idling jet	50
Starting jet	80
Needle	U 9 (2nd notch)
Floater	gr 10
Idling screw opening (fuel)	1½ turns.

FLOATER LEVELLING (see fig. 268/1)

To level the floaters in carburettors proceed as follows:

1 loosen the screws securing the bottom chamber to the carburettor body and take out the chamber itself;

2 turn the carburettor upside down (without bottom chamber) so that the needle on the floater body closes the petrol flow in;

3 place the tool 14 92 69 00 (72 in fig. 236) on the plane of the carburettor body (where the bottom chamber is screwed to) and make sure that the two floaters lightly touch the tool inside.
Otherwise adjust either the floater pin or the floaters themselves (paying attention that these are very brittle parts) until the floaters are properly aligned with the tool.
The clearance between the carburettor body plane and the floater upper side has to be:
— mm 23,5 (for carburettors having 10 gr floaters);
— mm 24,5 (for carburettors having 14 gr floaters).

ADJUSTING THE CARBURETION AND THE IDLING SPEED (HAND ADJUSTMENT) (fig. 268)

Proceed as follows:

1 warm the engine to its normal running temperature;

2 fully screw in the screws « E » idling adjuster, then unscrew them one turn and a half;

3 check with your hands if the exhaust pipe pressures are equal.
If necessary turn screw « D » of a carburettor until the pressure is the same. (Idling speed should be kept at about 900 ÷ 1000 rpm; as a consequence it will be necessary to screw in the screw of the carburettor for the cylinder giving a lower exhaust pressure, or to screw out the screw of the carburettor for the cylinder giving a higher exhaust pressure);

4 turn screws « E » to get the best carburetion for each cylinder (it is realized by an increase of rpm) and adjust idling speed according to point 3;

5 detach one spark plug lead at a time and check that the engine in both cases stops after firing 5-6 strokes. If this does not occur screw out screw « D » of the carburettor marking the engine fire more than 5-6 strokes, or — if this is the case — screw in the screw « D » of the carburettor making the engine fire less than 5-6 strokes;

6 adjust idling speed to 900 ÷ 1000 rpm by screwing or unscrewing both screws « D » by the same amount;

7 with throttle control grip closed, check that there is a clearance of 1 ÷ 1,5 mm between cable ends and adjuster screws « F » of both carburettors;

8 ensure that the throttles open simultaneously by proceeding as follows:
— gradually turn the throttle control grip and check that the exhaust pipe pressure increases in synchronization, using both hands (an assistant will be needed fort this operation).

If the pressure increase of one cylinder is advanced, adjust its carburettor by gradually screwing in adjuster « F », after loosening counternut « G », until the synchronization of both exhaust pipes pressure is reached.

ADJUSTING THE CARBURETION BY MEANS OF A VACUUM GAUGE (fig. 269)

1 using screw « A » adjust the fuel flow: by unscrewing is the fuel flow increased, by screwing is the fuel flow decreased.
To adjust, fully screw in then unscrew one turn and a half;

2 remove the hole caps from the inlet tubes and connect the "Vacuum gauge" pipes « F » to the holes « E »;

3 adjust idling speed by means of throttle adjusters (to be done on a warm engine); start the engine with throttle control grip closed (900 ÷ 1000 rpm) and turn throttle adjusters « B » until the two mercury columns of the "Vacuum gauge" « F » are aligned;

4 adjust the position of the fuel flow adjusting screws « A » to reach the highest possible idling speed, then re-check the position of the two mercury columns of the "Vacuum gauge". repeat eventually the adjustment according to point 3;

5 Synchronization of carburettors:
idling speed adjusted, synchronize the carburettors by proceeding as follows:
— start the engine and gradually open the throttle control grip, checking that the two mercury columns of the "Vacuum gauge" « F » are aligned, otherwise turn the adjusters of control cables « C » (loosen firts the counternuts) until the alignment is reached;
— ensure now that the two cables have an idle travel of mm 1 ÷ 1,5 at the screw connections;
— remove then the pipes from the holes «E» and re-fit the screws with their washers;
— also cheack that the two control cables for the "Starters" have an idle travel of mm 3 at the adjuster screw connections.

AIR FILTER CARTRIDGE REPLACEMENT ON ASSEMBLED VEHICLES (fig. 270)

Every 10.000 Km (6000 miles) replace the aif filter cartridge « C »; it is housed in a box together with the oil breather ass.y, under the fuel tank.
To remove the air filter cartrdige « C » from the housing « A » proceed as follows:

— lift the saddle and secure it with the proper rod;

— remove the tool box, unhooking the bracket;

— unhook the fuel tank holder, rear side, and remove the fuel tank itself (first close the taps and detach the pipes);

— detach the electric wiring from the battery, unhook the battery brackets and remove the battery;

— unhook the springs securing the brackets « E » ,slide out the rubber sleeve « F » from carburettors and breather;

— unhook the breather « G » with pipes « I » from the holders « H », then undo the securing nut « B » and remove the filter « C » with bottom « D ». Paying attention to: reference notch and assembling positioning.

Replace the filter « C » with a new one and rr-fit the components reversing the dismantling sequence.

CONVERTER

The hydraulic converter "SACHS" allows the motorcycle to gradually start without any clutching.
Max. converting ratio: 1,60 : 1.

CONVERTER OIL CIRCUIT (fig. 271)

Description

The oil is circulated by the pump « C », on the valve gearing cover, through the pipe « B » from the reservoir « A » and is then delivered to the converter through the pipe « D ».
The oil then goes to the radiator « F », through the pipe « E », and from the radiator « F » to the reservoir « A » through the pipe « G ».
A drain pipe « I » delivers the oil to the reservoir « A » from the converter cover « H ». The reservoir also includes a breathing tube « L ».

INSPECTION AND CHECKING

Converter oil piping

Check the condition of all pipes and inspect them.
If damaged or leaking, replace them. Remove the pipes and wash in gasoline, blow with compressed air to dry.

Oil converter radiator

Inspect the radiator and if leaking replace it. If the reservoir is not damaged, blow it out with compressed air.

Converter reservoir filter

Ensure that the filter gauze is not damaged, otherwise replace the filter. Wash the filter in gasoline and blow it with compressed air for blowing.

Converter oil reservoir

Remove and wash in gasoline, dry with compressed air.

CONVERTER LUBRICATION (fig. 271)

Checking the oil level

Every 500 Km (300 miles) check the oil level in the reservoir. This level must never be over the (MAX) or under the (MIN) marks, stamped on the inspection cap dipstick « M ».
For filling use only the recommended lubricant, paying attention that the necessary quantity to bring the level from (MIN) to (MAX) is about lt 0,250 (Approx 8 ounces).
The inspection cap is to be fully screwed in.
Recommended lubricant: AGIP F. 1 ATF Dexron or equivalent.

Replacing the oil in the converter hydraulic circuit (fig. 271)

Every 30.000 Km (18000 miles) it is necessary to replace the oil in the hydraulic circuit by proceeding as follows:
— unscrew the filler cap « M » on the reservoir;
— remove the filter « N » from the reservoir;
— loosen the connection « O » on the gearbox housing.

Drain the oil from reservoir and radiator, wash the filter « N » in gasoline and blow it with compressed air; re-fit by reversing the removal sequence. Pay attention to the fact that the converter oil will never be fully drained.
Refill with new oil (about 1,5 lt) (approx. 1 ½ quarts) in the reservoir and proceed according the following paragraph.

Filling the converter hydraulic circuit (after eventual overhauling)

If, when overhauling, the converter, the pipes and the reservoir have been fully drained, reservoir filling and level checking will have to be done according the following procedure:
— set the motorcycle on the center stand, in level position, and fill up the reservoir until (MAX) mark. (1,7 lt about) (approx. 1½ quarts);
— start the engine and let it idle for a few minutes, ensuring that there is still oil in the reservoir, add oil if necessary;
— stop the engine and check the oil level according paragraph "Converter lubrication checking the oil level".

Converter oil pump (fig. 272)

The converter oil pump is located on the valve gearing cover and directly controlled by the camshaft.
The pump consists of:
— outer rotor « A »;
— inner rotor « B »;
— rotor control pin « C »;
— pump control shaft « D »;
— pump control intermediate shaft « E »;
— pump body « F » with OR and seal ring « G », seeger ring « I » or plate « L » and screws securing the pump body to the cover « M ».

INSPECTION AND CHECKING (fig. 273)

— **valve gearing cover:** check the condition of the converter pump seat; it must not be damaged or scored in any way.
Ø of converter pump seat: mm 40,650 ÷ 40,675;
— **outer rotor:** check the inner and outer profiles for damage or scoring:
outer Ø: mm 40,570 ÷ 40,540;
thick.: mm 9,025 ÷ 9,010;

outer profile: mm 35,895 ÷ 35,870;
inner profile: mm 24,230 ÷ 24,205;
eccentricity between
inner profile and outer: mm 0,05 max.;
flank plane in respect
to axis: mm 0,030 max.
according to dial gauge reading;

— **Inner rotor:** check trueness of inner and outer profiles;
Ø outer profile: mm 29,770 ÷ 29,745;
Ø inner profile: mm 11,018 ÷ 11,000;
length of the
control pin hollow: mm 15,150 ÷ 15,000;
rotor thick.: mm 9,025 ÷ 9,010;
ecentricity between
hole and outer profile: mm 0,050 max.;
flank plane in respect
to axis: mm 0,030 max.
according to dial gauge reading;

— **control shaft:** check trueness of the same;
outer Ø for pump
body: mm 14,000 ÷ 13,973;
Ø for inner rotor: mm 10,984 ÷ 10,966;
length: mm 34,780 ÷ 34,760;

— **control pin on the shaft:**
length: mm 14,500 ÷ 14,650;

— **intermediate shaft:**
max. length: mm 31,600 ÷ 31,400;

— **oil pump body:** check the trueness of the side entering the seat on the valve gearing cover:
Ø for the side entering the seat on the valve
gearing cover: mm 40,625 ÷ 40,586;
inner Ø: mm 14,018 ÷ 14,000;
thick. for the side entering the seat on the
valve gearing cover: mm 19,960 ÷ 19,908;

— **coupling clearances:**
between seat on the valve gearing cover and
pump body: mm 0,050 ÷ 0,064;
between hole on the pump body and control shaft: mm 0,000 ÷ 0,045;
between inner rotor hole and pump control shaft: mm 0,016 ÷ 0,052;
between inner rotor hollow
and control pin: mm 0,500

CONVERTER OIL PRESSURE RELIEF VALVE (fig. 272)

This valve is located on the valve gearing cover and consists of the following:

— valve cap « N »;
— cap gasket « O »;
— pressure adjuster bottom « P »;
— valve spring « Q »;
— valve balls « R ».

The valve is calibrated to allow a running pressure of 1,8 ÷ 2 Kg/cm² (25-29 P.S.I.).
If the pressure is higher, the valve opens adjusting the pressure to specified limits.
Should the valve not open at the running pressure, take out one pressure adjuster bottom « P » and re-check until the valve opens at proper pressure rates.

FITTING THE CONVERTER OIL PUMP OR PRESSURE RELIEF VALVE ON THE VALVE GEARING COVER (fig. 272)

First pay attention that, when mounting the pump onto the valve gearing cover, the two rotors show the reference mark « 1 » outwards and the oil passage hollows « 2 » of the pump body are aligned with the cover hollows, the pin « C » on the rotor shaft « D » fits well into the hollow of the inner rotor « B » and the seal ring « OR » between pump body and cover « G » is not damaged, the seal ring on the pump body « H » shows no profile damage; the seeger « I » (for vehicles mounting this ring) is not damaged. If vehicles mount the plate « L », check plate smoothness and adhesion to the inner surface of the pump body « F ». Check also the trueness of the intermediate shaft ends « E ».
After fitting, tighten the screws in crossed sequence.
When mounting the oil pressure relief valve check the trueness of the spring (a new spring has a free length of mm 38 ± 0,35, while under compressione of about Kg 2,5 ± 0,125 or 5 pounds, it has a length of mm 19,5). Also check trueness of the ball and the flat aluminium washer, then lock the cap.
To ensure that the valve opens at the running pressure of Kp/cm² 1,8 ÷ 2 (25-30 p.s.i.), it is necessary to fit a pressure gauge onto one of the cover holes, while compressed air is blown onto the other.

FITTING THE CONVERTER AND THE STARTING RING GEAR ON THE FLYWHEEL

To fit the converter and the starting ring gear on the flywheel, proceed as follows:

— set the ring gear, aligning ring gear with flywheel holes;
— set the converter and screw in the four screws with plates securing ring gear and converter to the flywheel, tighten slightly;
— on the crankcase stud bolts fit first the gauge holder 18 91 38 50 (61 in fig. 273/1) then fit the gauge « A » on the holder;
— rotate the converter slowly, paying attention that the gauge indicator does not move more than 0,05 ÷ 0,06 mm;
— if the indicator displacement is larger, take out the converter and turn it one or two turns, until the displacement of the indicator is within the specified limits;
— at this stage remove the dial gauge and the holding block from the crankcase;
— fit tool 12 91 18 01 (21 in fig. 274) on the stud bolts, after setting two bushings under the tool, for aligning the bolts with the ring teeth;
— tighten the screws in crossed sequence, then bend the screw wings and remove the tool with the bushings.

If the engine-converter ass.y is not immediately fitted on the clutch-gearbox ass.y it is advisable to cover the oil input hole on the converter, using a proper cap, to prevent foreign materials from entering the oil circuit.

CLUTCH

Dry type, multiplate. Hand controlled by lever on the left side of the handlebar.

PRIMARY DRIVE BY GEARS

Ratio: 1 : 1,57 (Z = 19/22).

GEARBOX

Two speed, foot operated from the left side of the vehicle (see fig. 274/1).

Ratio:

1st. speed (Low)
(Z = 18/24) = 1 : 1,33 (Toe down);
2nd. speed (Drive)
(Z = 22/22) = 1 : 1 (Heel down).

REMOVAL OF THE CONVERTER COVER FROM THE GEARBOX HOUSING (fig. 275)

Loosen the screw « A » which secures the pipe « B » at the bottom of the converter cover, then undo the screws securing the cover to the gearbox housing « C » and remove the converter cover, complete with clutch inner body « D », from the gearbox housing « E ».

REMOVAL OF THE CLUTCH INNER BODY FROM THE CONVERTER COVER (fig. 276-277)

Rotate the clutch inner body quite slowly, thus making possible an access in sequence to the various screws through the static body hole (see the arrow « A » in fig. 276); loosen the screws using the proper wrench. Then slide out the clutch body « B » from the cover « A ». From the body shaft remove: the seal ring « C » (OR type) the seeger ring « D », using proper pliers, the bearing « E » and the flange « F » complete with retaining ring.
Remove the oil passages « G » and the flanged shaft « H » from the cover « A », then take off the seal rings « I » and « L » (OR type) in fig. 274 from the flanged shaft.

INSPECTION AND OVERHAULING OF VARIOUS COMPONENTS (fig. 277)

— check the trueness of the hole « A » on the cover, where the flanged shaft « H » is fitted; no damage or scores;
— check the trueness of flanged shaft « H » surface contacting the cover « A » and ensure that the shaft tang entering the converter is quite smooth;
— check the trueness of the seal rings « I » - « L » - « C » and « F » (on the flange);
— check the trueness of the clutch body « B » and the body shaft tang teeth.

COUPLING DATA COVER/FLANGED SHAFT - FLANGED SHAFT/CONVERTER (fig. 278)

Converter housing

— Ø of flanged shaft seat: mm 60,000 ÷ 60,030.

Flanged shaft

— Ø of the shaft side entering the converter housing: mm 59,990 ÷ 59,971;
— Ø of the shaft side entering the converter: mm 27,700 ÷ 27,679;
— Ø of bushing seat: mm 22,000 ÷ 22,021.

Bushing for flanged shaft

— outer Ø mm 21,972 ÷ 21,942;
— inner Ø: mm 18,000 ÷ 18,018.

Shaft with clutch plate holder

— Ø of side entering the flanged shaft bushing: mm 17,994 ÷ 17,983.

Crankshaft

Ø of the hole on the shaft hub, flywheel side, where the converter pin enters: mm 13,000 ÷ 13,027.

Converter

Ø of the flanged shaft seat: mm 27,770 ÷ 27,783;
Ø of the converter pin which enters the seat on the crankshaft: mm 12,985 ÷ 12,957.

Coupling clearances

— between converter cover Ø and flanged shaft: mm 0,010 ÷ 0,059;
— between seat Ø on the converter and flanged shaft side entering the seat: mm 0,070 ÷ 0,104;
— between bushing seat Ø and bushing outer Ø: mm 0,058 ÷ 0,149;
— between bushing inner Ø and Ø of the shaft with clutch plate holder: mm 0,006 ÷ 0,035;
— between converter pin and hole on the crankshaft: mm 0,016 ÷ 0,043.

FITTING OF THE FLANGED SHAFT AND SHAFT WITH CLUTCH PLATE HOLDER ON THE CONVERTER HOUSING (fig. 277)

In fitting the flanged shaft « H » on the housing « A » pay attention to following alignments: holes « M » on the shaft with holes « N » on the housing; hole « O » on the flanged shaft with hole « P » on the housing.

First check trueness, then fit the seal ring « L » (OR type) between housing and shaft; then fit the flanged shaft « H », and the seal ring « I » (OR type). Now fit the flanged shaft, already complete with: flange, seal ring « F », bearing « E », seeger ring sealing for bearing and flange, on the shaft « D » and seal ring « C » (OR type). Rotate the shaft to ensure the alignment between flanged shaft hole and housing threaded hole (through the gear hole) and screw in the screws according the access sequence.
Remember to re-fit the oil passages « G » and the pipe « Q », onto the housing, using the proper screw.

REMOVAL OF THE CLUTCH ASS.Y FROM THE GEARBOX HOUSING

Take off the ring securing the clutch ass.y to its housing, using the special tool (« A » in fig. 279 - 55 90 04 00) and screw in the pressure plate rod until the plates are free in the housing. At this stage remove the ring securing the plates, using screw drive « B » (fig. 279) then slide out (fig. 280) externally toothed plates « B »; loosen counternut « C », adjuster nut « D » and take off the rod « E » with bushing « F » and bearing « G », the spring pusher « H » with springs « I » and shims « L »; first take out the circlip « N », then remove the pin « M », the lever « O » with cap « P » and the lever return spring « Q ».

REMOVAL OF THE CLUTCH HOUSING

To remove the clutch housing from the shaft, fit tool 18 91 18 50 (59 in fig. 281) on the housing and using tool n. 14 92 76 00 (30 in fig. 281) undo the nut securing the housing to the shaft, then slide out the housing with the seal ring (OR type).

REMOVAL OF THE GEARBOX HOUSING COVER (fig. 282)

First drain the oil, take off the bottom « A », the element « B », the spacer « C », the seal ring « D » (OR ring), the drain plug with the aluminium washer « E », the cap with washer spring and gear stop pin « F »; then loosen the screws « G » and take off the cover « H » and the gasket « I ».

REMOVAL OF BEARINGS FROM THE GEARBOX HOUSING COVER

— using puller 18 90 65 50, remove the ball bearing (62 in fig. 283);
— if the ball bearing is locked on the shaft (due to the spacer), use puller 18 92 73 50 (67 in fig. 285) to remove bearing and spacer for layshaft;
— using puller 14-91 31 00 (39 in fig. 284) remove the roller bearings.

RE-FITTING OF BEARINGS ON THE GEARBOX HOUSING COVER

— press the roller bearings on the cover, using punch 14 92 92 00 (41 in fig. 286);
— press the ball bearing on the cover, using punch 18 92 89 50 (64 in fig. 287);
— press the ball bearing seal ring on the cover ,using punch 18 92 91 50 (63 in fig. 288).

REMOVAL OF SHAFTS, GEAR, SLEEVE, FORK AND FORK CONTROL SHAFT ON THE GEARBOX HOUSING (fig. 289-290)

Remove the spacer ring « A », the gear on the layshaft « B », the main shaft « C », the clutch shaft « D » (if some resistance is found in removing the clutch shaft, using a leather mallet tap from outside to inside).
First loosen the securing screw on the fork « F », then remove the fork control shaft « E ». Remove the fork « G » from the sleeve, the sleeve « H » from the layshaft, then the layshaft « I » from its seat on the gearbox housing, finally remove the low speed gear « L ».

REMOVAL OF BEARINGS FROM THE GEARBOX HOUSING

Using puller 12 91 37 00 (40 in fig. 291), remove the bearing for clutch, main and layshafts.
First flatten the wings of the securing plates, then loosen the screws and remove the piece securing bearing to gearbox housing.

RE-FITTING OF BEARINGS AND SECURING RING ON THE GEARBOX HOUSING

To re-fit the bearings on the gearbox housing use the special tool 14 92 89 00 (43 in fig. 292). Fit the clutch shaft bearing, set the securing piece and lock the screws with securing plates; then bend the plate wings on the screws.
Now press the cluth shaft securing ring, using punch 14 92 94 00 (47 in fig. 293).

RE-FITTING OF SHAFTS, SLEEVES, FORK WITH CONTROL SHAFT, AND GEARS ON THE GEARBOX HOUSING

Before fitting the layshaft « A » on the gearbox housing, fit the low speed gear « B » and the shim « C » with the bevelled side facing the gear on the shaft itself (see fig. 294).
Then fit the clutch shaft « D » in fig. 289, the main shaft « C » in fig. 289, the sleeve « H » in fig. 289 on the layshaft; the fork « G » fig. 289 on the sleeve « H » in fig. 289; the control shaft « E » in fig. 289 (with lever in horizontal position) on the fork; then secure the shaft to the fork, using the screws « F » in fig. 289, the drive speed « B » and the shim « A ».
Then fit the throwout bearing « A » in fig. 295 and one or more shims « B » in fig. 295.
Clearance between shim and bearing on gearbox housing cover: mm 0,15 ÷ 0,20.

RE-FITTING OF THE GEARBOX HOUSING COVER ON THE GEARBOX HOUSING (fig. 282)

Fit a new gasket « I » between housing and cover, then fit the cover « H » and secure it to the housing with screws « G », screwing in crossed sequence; then fit the gear stop pin and the spring and lock the securing cap with aluminium washer « F » onto the gearbox housing cover.

Finally, fit the seal ring « A » in fig. 296 (OR type), the spacer « B » in fig. 296 (it must not rotate freely on the shaft) the seeger ring, spacer stop, « C » in fig. 296 onto the layshaft, pay attention that the seal ring « C » is properly seated on the layshaft, then fit the piece « D » in fig. 296 and bottom « E » in fig. 296.

RE-FITTING OF THE CLUTCH HOUSING

Before re-fitting the clutch housing « M » in fig. 282, remember to fit the seal ring « L » (OR type) fig. 282 on the shaft and screw in the nut « N » in fig. 282.
To lock this nut use tool 18 91 18 50 (59 in fig. 297) and special tool 14 92 76 00 (30 in fig. 297).

RE-FITTING OF THE CLUTCH ASS.Y

Fit the springs « A » in fig. 298 into their seats on the clutch housing, the shims « B » in fig. 298 on their seats on the spring pusher plate (pay attention that these shims do not fall down when fitting the spring pusher plate « C » fig. 298 onto the clutch housing; it will be useful to slightly grease them before entering their seats on the clutch housing).
Fit the bearing « A » in fig. 299, the bushing « B » in fig. 299, the clutch rod « C » in fig. 299 into the seat on the spring pusher plate, then screw in the nut on the rod, cover side, to sufficiently compress the springs, thus allowing the fitting of the clutch plates onto the clutch housing.
Set one shaft with plate holder « A » in fig. 300 n. 18 24 58 50 on the spring pusher plate (the holder centralizes the plates). Fit the clutch plates starting with an externally toothed friction plate, then fit an internally toothed metal plate and so until the last externally toothed disc with no friction material; then fit the ring securing the clutch plates in its seat on the clutch housing. This type of clutch consists of:

— n. 6 friction plates (Ferodo) externally toothed « B » in fig. 300;
— n. 5 metal plates internally toothed « C » in fig. 300;
— n. 1 metal plate externally toothed « D » in fig. 300 for the securing ring;
— n. 1 ring securing the clutch plate ass.y on the clutch housing « E » in fig. 300.

At this stage, it is necessary to undo the nut « A » in fig. 301 and fit the clutch control lever « B » in fig. 301 with cap « C » in fig. 301 on the cover, using the fixing pin « D » in fig. 301 and circlip « E » in fig. 301; remember to fit the spring « F » in fig. 301 into the seat on the housing and onto the lever tang.

ADJUSTING THE CLUTCH LEVER (fig. 301)

Screw in the nut « A » on the clutch control rod, holding the rod fast by means of tool 55 90 04 00; the clearance between the cable adjuster holder « H » and the inner seat of the control cable end « I » must be:

— 33 mm on a new engine;
— 30 mm on a used engine.

RE-FITTING OF THE GEARBOX HOUSING ONTO THE ENGINE-CONVERTER ASS.Y (fig. 302)

When fitting the gearbox housing onto the engine-converter ass.y, it is encessary to pay attention to the position of the bushing « A »; the bushing notched side must face the converter. Fit the gearbox housing on the crankcase stud bolts, lock the nuts using the proper tool, then fit the starter motor on the crankcase cover.

INSPECTION AND CHECKING CLUTCH PLATES

The friction plates (Ferodo) have a thickness of mm 3,15 ÷ 3,35; replace them if thickness is mm 0,5 lower.
The internally toothed plates must be quite even and without damage or scoring, otherwise replace them.

CLUTCH SPRINGS (fig. 79)

Check the trueness of the springs.
The spring free length is mm 27,970 ÷ 28,000.
A spring compression to 20 mm gives a load of Kg 21,0 ÷ 21,5 (45-47 lbs).
A spring compression to 17 mm gives a load of Kg 28,7 ÷ 29,7 (63-65 lbs).
Should these specifications not be found, replace the springs.

CLUTCH PRESSURE ROD

Ensure that the rod is straight and check the trueness of the thread holding the adjuster; if the thread is in any way damaged, replace it.

MAIN SHAFT

Check the trueness of the gear teeth; if too worn, replace the gears.

CLUTCH SHAFT

Check the trueness of gear and shaft teeth, if too worn, replace.

LAYSHAFT (see Drwg. 303)

Check the trueness of the teeth where the sleeve is sliding; if too worn, replace the shaft.
Ø of the shaft where the low and drive speed gear bushings are working: mm 27,960 ÷ 27,927.

LOW AND DRIVE SPEED GEARS (see Drwg. 303)

Check the trueness of the gear teeth; if they are too worn, replace the gears:

— inner Ø of gears (bushing seat): mm 32,000 ÷ 32,039.

LOW AND DRIVE SPEED GEAR BUSHINGS (see Drwg. 303)

Ensure that the bushings are not scored or damaged, otherwise replace them:

— bushing outer Ø: mm 32,000;
— bushing inner Ø: mm 28,000 ÷ 28,033.

THROWOUT BEARING ON THE MAIN SHAFT

Check the working condition of the rollers, if they are damaged or worn replace the bearing.

COUPLING CLEARANCE, SHAFT/BUSHING - GEAR/BUSHING

Between layshaft and low and drive speed gear bushing: mm 0,040 ÷ 0,106.
Between low and drive speed gear and bushing: mm 0,000 ÷ 0,390.

SLIDING SLEEVE CONTROLLING LOW AND DRIVE SPEEDS

Ensure that the inner teeth sliding on the layshaft and the outer teeth engaging low and drive speed are not damaged or worn, otherwise replace the sleeve itself.
If this sleeve is not of modified type, it is advisable to replace also the fork and the fork control shaft.
The modified sleeves have been introduced starting from the gearbox housing number G 01001.

SLEEVE CONTROL FORK

The old fork is a unit type; therefore if the control pawls are too worn, it is necessary to replace the whole fork.

The modified fork has removable pawls, therefore if the pawls are too worn it is necessary to replace the pawl links only.
This modification has been introduced starting from the gearbox housing number G 01001.

FORK CONTROL SHAFT

Check that the shaft is straight and the teeth engaging on the fork are not damaged or worn, otherwise replace the shaft.
If the shaft is old type, it is advisable to replace also the fork and the sleeve.
The modification has been introduced starting from the gearbox housing number G 01001.

CLUTCH HOUSING

If the clutch slides ,this may be caused by:

— oil flowing from the gearbox to the clutch due to a defective sealing of the ring on the clutch housing hub because of the ring being worn or the hub not being smooth. If this is the case, replace ring and housing as well.

— in case of the above, the oil level in the gearbox housing decreases.

SEAL RINGS

Ensure that the rings on the housing and on the shaft are not damaged; otherwise replace them.

RATIO:

Bevel gear ratio (gearbox-wheel): (Z = 9/34) 1 : 3,788.

OVERALL RATIO (engine-wheel):

— 1st speed (Low) 1 : 6,12;
— 2nd speed (Drive) 1 : 4,58.

REMOVAL OF THE REAR DRIVE BOX (fig. 304)

Before removing the rear drive box, drain the oil by undoing the drain screw « C » with Al. washer, the filling screw « B » with Al. washer and the level inspection screw « A » its Al. washer:

— loosen the nuts securing rear drive box to rear swing arm and take off the box with the gasket (OR type) « D »;
— from the box take off the housing complete with pinion « E » and gasket (OR type) « F »;
— flatten the securing plate wings and loosen the screws « G » which secure the cover « H » to the box « I »;
— remove the cover « H » and the gaskets « L » with shim « M »;
— from the box take off the drilled pin « N » with crown;
— then take off spacer « O » seal ring « P » roller bearing « Q ».

DISMANTLING OF THE HOUSING

To loosen the nut securing pinion to housing use proper tool 18 92 71 50 (65 in fig. 305) and wrench.
The nut loosened, the following parts can be removed from the housing:

— bevel gear with shims;
— bevel bearings;
— spacer between bearings;
— shims between bearing and spacer;
— finally, base housing.

SELECTION OF PINION-CROWN

Pinion and crown must have the same number (see « A » and « B » fig. 306).

ASSEMBLING OF THE HOUSING

To assemble, reverse the dismantling sequence; if no part has been replaced, ensure that there is the same quantity of shims spacer/bearing and bearing/pinion.
If some replacement has been made, it will be necessary to adjust shimming.
The nut must be locked using tool 18 92 71 50 (65 in fig. 305) and proper eye wrench.

FITTING OF THE HOUSING ONTO THE BOX (fig. 306/1)

When fitting the housing « A » on the box « B » pay attention to align the box lubricating holes « B » with the housing lubricating holes « C »; remember to fit the seal ring « D » (OR type) between housing and box.
Also ensure that, when fitting the connection sleeve between pinion and cardan shaft « E », the sleeve hollowed side faces the bevel pinion « I » (see arrow « F »). When fitting the complete rear drive box, onto the rear swing arm, remember to fit the seal ring « G » (OR type) between box and arm.

COUPLING, PINION-CROWN (fig. 307)

Check the correspondence of the plane formed by the gear couple.
This checking is made as follows:

— provisionally secure the housing to the rear drive box, using two nuts « A » with washer;
— smear the crown teeth with lead oxyde;
— rotate the pinion, hold the crown in such a way that the rotation leaves a contact trace on the crown smeared surface. If contact is normal, the trace of the pinion teeth on the crown will be even along the whole tooth flank.

Also make sure that the pinion teeth are 1 ÷ ÷ 2 mm longer that the crown teeth (see arrow « B »).

FITTING OF THE COVER ONTO THE REAR DRIVE BOX (fig. 308)

Proceed as follows:

— onto the box fit first the gasket « A », then the shim « B » and finally the other gasket « A »; pay attention to the alignment of the lubrication holes.

Also pay attention that the wording « BASSO » « C » is downwards and the arrow stamped on the cover « D » is aligned with the arrow stamped on the box « E »; this checked, screw in the screws fully but without locking.

CHECKING THE CLEARANCE BETWEEN PINION AND CROWN (fig. 309)

— Insert the legs of a universal puller « A » and connect them inside the ass.y crown-drilled pin;
— fit also a piece of light alloy « B » and screw the puller on this piece;
— using one hand rotate the pinion « C », the other hand will draw and release the tool « A » in such a way as to make sure that the clearance is normal.

If clearance is not normal, it is necessary to replace the shim « B » in fig. 308 to bring clearance to normal tolerance.

The shims are supplied in various sizes, namely:

— partn. 17 35 54 00 (mm 0,8);
— partn. 17 35 54 02 (mm 0,9);
— partn. 17 35 54 04 (mm 1,0);
— partn. 17 35 54 06 (mm 1,1);
— partn. 17 35 54 08 (mm 1,2);
— partn. 17 35 54 10 (mm 1,3).

CHECKING OF OIL LEAKAGE FROM THE REAR DRIVE BOX

Proceed as follows:

— fit the tool « C » fig. 124 onto the box (this tool can be made from a used rear swinging fork right arm, welding on its top a plate with a valve from an inner tube);
— set the box in a small tank full of water and blow compressed air through the tool valve « C » fig. 124, with about 4 Kp/cm² (57 p.s.i.) pressure.
Porosity will be determined by air bubbles in the water.

If this in the case, seal any holes with latex or special sealers (Araldite or Devcon).
Ensure also that there is no oil leaking between the rear drive box and the lower pin securing the rear suspension. If the pin is wet because of oil, put some « Teflon » tape on the pin thread.

FITTING OF THE REAR DRIVE BOX ONTO THE RIGHT SIDE OF THE REAR SWING ARM

Proceed as follows:

— fit the sleeve « E » in fig. 306 onto the bevel pinion, paying attention that the sleeve hollowed side must face the pinion shaft;
— fit the seal ring « G » in fig. 306 (OR type) between housing and rear swing arm, then fit the four box stud bolts into the holes on the rear swing arm « A » in fig. 310;
— fit the wheel spindle « B » in fig. 310 on both the rear swing arm and rear drive box;
— lock the nuts « C » in fig. 310 with washers.

The nuts locked, take off the wheel spindle « B », making sure that it slides smoothly.
If some resistance is found in taking off the wheel spindle, it is necessary to slacken the nuts « C » and turn the box to the right or to the left until the spindle « B » slides properly.
Then fit the cardan joint « H » in fig. 306 onto the bearing on the right side of the rear swing arm « A » in fig. 310 and onto the sleeve, which has already been fitted on the bevel pinion shaft « I » in fig. 306.

FRAME

The frame consists of two parts: the upper part, which is technically called the frame, and two lower tubes which form the engine holding cradle.

CHECKING AND OVERAHULING

After an accident, inspect the frame for distortion or cracking, particularly on welded points. For this inspection follow the measures which are indicated on the Drwg. in fig. 310/1.
In case of very high frame distortion, it is advisable to replace it.

RETURN SPRING FOR CENTER AND SIDE STANDS

Inspect the springs for distortion and check their trueness.

Central stand return spring:

Free length: mm 94 ÷ 95.
Tension under load of Kg 30 (66 lbs) ± 5%: mm 10.

Side stand return spring:

Free length: mm 183.
Tension under load of Kg 10,2 (22 lbs): mm 7.

REAR SWING ARM

OVERHAULING

Inspect the rear swing arm for abnormal bending or cracking at welded points, check the condition of bearing seats and the smoothness of the connecting surface to the rear drive box. For this inspection see Drwg. 311.

REMOVAL OF BEARINGS FROM THE REAR SWING ARM

The cardan joint bearing is removed using puller 18 92 72 50 (66 in fig. 312); the rear fork pin bearings are removed using puller 12 90 47 00 (14 in fig. 125).

ADJUSTING THE REAR SWING ARM PLAY (fig. 313)

The rear swing arm has to swing freely, without any play.
Pay attention that for proper adjustment the pins must extend the same length.
For this adjustment use a screw driver « A » and a gauge « B ».

REAR SUSPENSION

This machine fits two rear shock absorbers with hydraulic dampers which can be adjusted to three positions, using the proper wrench in the tool kit « A » in fig. 314.
In case of improper damper action, return them to the manufacturer for overhauling.
Caution: for good vehicle stability, both damper springs have to be adjusted to the same position.

SPRING FEATURES

Free length:	mm 270.
Length under Kg 61 (135 lb.) load:	mm 230.
Length under Kg 122 (270 lb.) load:	mm 190.
Length under Kg 235 (520 lb.) load:	mm 116.

FRONT FORK

After an accident, inspect the front fork for abnormal bending.
Centerline distance between fork legs: mm 195,000 ÷ 195,115.
For other measures, see Drwg. fig. 188.

Fork spring, partn. 14 52 66 00

Free length: mm 421 ± 2,5.

Load given by mm 16 compression: Kg 11,3 (25 lbs.).
Load given by mm 141 compression (travel end): Kg 104,4 (230 lbs).

Fork spring, partn. 18 52 66 00

Free length: mm 415 ± 2,5.
Load given by mm 13,5 compression: Kg 12 (26 lbs.) ± 3%.
Load given by mm 138,5 compression: Kg 123,7 (272 lbs.) ± 3%.

REMOVAL OF FORK COVER ASS.Y WITH ROD AND DAMPER FROM THE FORK LEGS

After removing the front wheel from the fork legs (see chapter removal of the front wheel from the fork legs) proceed as follows:

— drain the oil, undoing the screws with gasket « A » from the fork covers « B »;
— loosen the screws securing the mudguard « D » to the fork cover « B »;
— loosen the upper screw « E » securing the cover ass.y to the fork legs « F ».

REMOVAL OF FORK LEGS (fig. 316)

First loosen the following:

— the screws securing the fork legs to the steering head « A »;
— the screws securing the fork legs to the steering bottom « B ».

Then slide out the two fork legs « C » (see arrow « D »).

OVERHAULING

Fork legs

Check the trueness of the leg chromed surface sliding into the cover; it must be in good condition and without damage or scoring, it must also the straight and the threading must be in good condition.
The Ø of the leg chromed part sliding into the cover is mm 34,715 ÷ 34,690.

Fork cover

The fork cover is made of light alloy. Ensure that the inner surface where the leg is sliding into, is not scored or too worn.
The inner Ø of the cover, where the leg is sliding into, is mm 34,750 ÷ 34,790.

Coupling clearance between leg and cover

mm 0,045 ÷ 0,100.

FITTING OF DAMPERS WITH ROD AND SPRINGS ONTO THE FORK COVERS (fig. 317)

Pay attention to the following:

— the two hollows must insert into the inner pawls of the bushing « A » while the outer pawl « B » of the above bushing must properly insert into the inner hollow of the cover « C ».
To properly insert, it is necessary (after fitting the damper ass.y into the cover) to slightly turn the cover to the right or to the left (see arrow « D ») until the inserting click occurs.
At this stage, screw in the screw « E » with Al. washer on the cover bottom, to secure the ass.y damper/rod/spring to the cover itself.

FILLING THE FORK COVERS WITH OIL

Before fitting and securing the cover ass.y with dampers onto the fork legs, it is necessary to fill each cover with lt 0,070 (approx. 2 ounces) of oil « Agip F. 1 ATF Dexron ».

REMOVAL OF THE FRONT WHEEL FROM THE FORK LEGS (fig. 318)

— Fit the stand 18 91 24 50 (58 in fig. 211) under the engine crankcase sump, the side holding the gearbox housing must face the front wheel; then screw in the stand screws in such a way as to lift the machine;
— loosen the screws « A » securing the hydraulic caliper « B » to the fork left leg « C »;
— loosen the nut on the wheel spindle « D » (right side);
— loosen the screws « E » securing the spindle to the fork covers « C »;
— slide out the spindle « F » from fork covers and wheel hub, then take the braking disc off right caliper and fork legs. Make sure that the spacer « G » is located on the right side.

Re-fitting takes place in reversed sequence.

REMOVAL OF THE REAR WHEEL FROM REAR DRIVE BOX AND REAR SWING ARM LEFT SIDE (fig. 319)

— set the machine on the center stand;
— first loosen the screw securing the clamp « B » which attaches silencer to expansion chamber, then loosen the screw with nut washer « A » securing the left silencer;
— detach the parking brake control cable « C » from the lever on the mechanical caliper;
— loosen the screws « D » and take the mechanical caliper « F » off the braking disc « E »;
— loosen the nut with washer « H » on the wheel spindle rear drive box side;
— loosen the screw « I » securing the wheel spindle to the left rear swing arm, then take off the wheel spindle « L »;
— take off the caliper holder with hydraulic calipers « G » from the stop pawl on the left rear swing arm (it is advisable to secure the calipers/holder ass.y to the frame);
— take off the space between caliper holder and hub « M »;
— shift the wheel towards the left swing arm in such a way as to take the wheel gear off the drilled pin on the rear drive box;
— lean the vehicle to the right side to remove the wheel from drive box and swing arm.

Re-fitting takes place in reversed sequence, paying attention to fit the caliper holder onto the stop pawl of the left swing arm.
The lowered side of the spacer « M » between caliper holder and wheel hub must face the hub itself and the spacer must be trued onto the hub.
Re-fit the mechanical caliper on its holder and secure it by means of screws and washers, using shims to eventually true the caliper itself.
Connect the parking brake control cable to the lever on the mechanical caliper.

CHECKING THE PLAY FOR THE PARKING BRAKE CONTROL LEVER (fig. 320)

If this cable is not properly adjusted, loosen the two counternuts « A » and screw in or out the adjuster « B ».

CHECKING THE CLEARANCE BETWEEN THE FLOATER IN FRONT BRAKE MASTER CYLINDER AND ITS CONTROL LEVER (fig. 321)

This clearance must be within mm 0,05 ÷ 0,15.
To correctly adjust, fit a feeler gauge « A » 12 90 90 90 and screw in or out the adjuster « B » until the proper clearance is reached.

BRAKING DISC TRUING BETWEEN THE BRAKE PADS (fig. 322)

To correctly true the braking disc between the braking pads « A » it is necessary to increase or decrease the shim quantity on the screws « B » which secure the caliper to the fork leg, until the disc is correctly trued between the pads.
The shims are supplied in the following thicknesses:
— partn. 95 10 02 32 (mm 0,5);
— partn. 95 10 02 33 (mm 0,8).

CHECKING THE CLEARANCE BETWEEN BRAKE LEVER AND FLOATER IN MASTER CYLINDER AND ADJUSTING THE POSITION OF THE CONTROL PEDAL, FOR LEFT FRONT AND REAR BRAKES (fig. 323)

The clearance between floater and lever « B » must be within mm 0,05 ÷ 0,15.
To correctly adjust this clearance, set a feeler gauge « A » 12 90 90 90 between lever and floater and screw in or out the adjuster « C » until the specified clearance is reached.
To adjust the position of the control pedal « D » it is necessary to take out the circlip and then the securing pin « E »; then loosen the counter nut « F » and screw in or out fork « O » to bring the control pedal to the desired position.
Then lock the counternut « F » on the fork « G » and fit pin and circlip.
The position adjusted, loosen its counternut and adjust then the screw « H » stopping the lever return travel.

REPLACING THE BRAKING PADS IN CALIPERS (fig. 324)

For this replacement it is necessary to remove the hole cover « A », then to take off the pins « B » pad retainers, the positioning spring « C » and the pin « D »; then replace the pads « E ».
The pads replaced, it is necessary to operate several times the hand control lever, if for the right front brake, or the foot control pedal if for the rear and left front brake, until the pads properly couple the discs.

CHECKING THE FLUID LEVEL IN THE MASTER CYLINDER (FLUID RESERVOIR) FOR RIGHT FRONT BRAKE (fig. 325)

— loosen the cap « A » and check if the oil level is between the first and second ring of the rubber gaiter (see arrow « B »). This level must never fall more than 6 mm under "Max." mark (see Drwg. « C »).

FLUID LEVEL IN THE MASTER CYLINDER (FLUID RESERVOIR) FOR REAR AND LEFT FRONT BRAKE (fig. 323)

When the fluid level falls under « Min » mark, the floater with rod « I » contacts the electric clamps on the master cylinder cover « L », thus activating the red warning light « Brake » on the instrument panel.
In this case it is necessary to bring the fluid level to « Max » mark.

AIR BLEEDING, RIGHT FRONT BRAKING CIRCUIT (fig. 326)

— Turn the handlebar until the master cylinder (fluid reservoir) reaches the horizontal position;
— if necessary add fluid, paying attention that during the bleeding, the liquid itself does not fall more than 6 mm under the recommended level;
— work on one caliper half at a time;
— remove the caps « A » and the cover « B » fit the flexible transparent tubes « C » onto the drain plugs, insert the other end of these tubes into a transparent container « D » which is partially filled with fluid of recommended type;
— loosen the drain plug « E » of one caliper half;
— fully operate the hand control lever « F » on the handlebar, release it slowly before operating it again. Repeat until the tube in the transparent container emits airless fluid;
— hold the lever « F » drawn and lock the drain plug « E » then work on the other caliper half; now take off the pipe « C » and re-fit the cover « B » and the rubber caps « A ».

If the air bleeding has been properly carried out, the direct and non-spongy action of the lever will be realized immediately after the initial idle movement of the lever itself. If this does not occur, it is necessary to repeat the bleeding.

AIR BLEEDING, REAR AND LEFT FRONT BRAKING CIRCUIT (fig. 327)

Proceed as specified in the previous chapter, but operate the foot control pedal « F » on the right side of the machine.
Notice: if it is necessary to replace the lip gasket, the thoroid gasket and the lock ring on the master cylinder for right front hydraulic brake (for 750 S 3 - 850 T 3 - V 1000 Convert) use the tools n. 68 - partn. 18 92 65 00; n. 69 - partn. 18 92 66 00; n. 70 - partn. 18 92 67 00; as indicated under chapter « Specific Tools » and in fig. 236.

ELECTRIC EQUIPMENT

ALTERNATOR

Main Features

Brand	Bosch (G1 - 14V - 20 A 21")
Control	Directly controlled by the crankshaft
Max. output	280 W - 14 V
Max. amperage	20 Amp
Charge starting	1000 rpm
Peak	10.000 rpm
Rotation (as seen from commutator side)	Clockwise

STARTER MOTOR

Brand	Bosch (DF(L) 12 0,6 PS)
Voltage	12 V
Output	6 HP
Amperage	35 Amp
Pinion	8-teeth, mod. 2,5
Pinion rotation	counteclockwise

TEST DATA

RUNNING	VOLTAGE	AMPERAGE	RPM
Vacuum	11,5 V	20 ÷ 40 A	6500 ÷ 8500
Load	9 V	170 A	3200 ÷ 3500
Short circuit	8 V	280 ÷ 360 A	—

DOUBLE CONTACT BREAKER

Main features

Contact points gap: mm 0,37 ÷ 0,43
Contact pressure: gr 550 ± 50
Opening angle: 180° ± 5°
Closing angle: 180° ± 5°
Timing angle
between the two points: 225° ± 1°
Ignition automatic advance diagram (see Drwg. 327/1).

ADJUSTING THE CONTACT POINTS FOR RIGHT CYLINDER BREAKER (RED CABLE) (fig. 328)

Rotate the breaker shaft until the contact points reach their max. gap; at this stage fit the feeler gauge « A » 12 90 90 90 between the contact points, check that the gap is as specified: mm 0,37 ÷ 0,43 (.015"-.018").
If the gap is more or less, loosen the screws « B » and « C » and turn the plate « D » to the right or to the left, acting on the notch « E » with a screw driver, until the specified gap is reached.

ADJUSTING THE CONTACT POINTS FOR LEFT CYLINDER BREAKER (GREEN CABLE) (fig. 239)

Rotate the breaker shaft until the contact points reach their max. gap; at this stage fit the feeler gauge « A » 12 90 90 90 between the contact points, checking that the gap is as specified: mm 0,37 ÷ 0,43 (.015"-.018").
If the gap is more or less, loosen the screws « B » and « C » and turn the plate « D » to the right or to the left, acting on notch « E » with a screw driver, until the specified gap is reached.

IGNITION TIMING FOR RIGHT CYLINDER (RED CABLE) (fig. 330)

After adjusting the breaker contact points and fitting the double breaker onto the engine, proceed as follows:

— connect the feed clamp of unit « A » to the red cable, and the ground clamp « B » to a fin on the engine crankcase;
— rotate the alternator clockwise, using tool « C », until the letter « D » stamped on the flywheel (right cylinder) is aligned with the mark at the middle of the inspection hole rim « E »; piston must be at T.D.C. (closed valves);
— rotate the alternator counterclockwise until the mark « A.F. » stamped on the flywheel (static advance) is aligned with the mark at the middle of the inspection hole rim « E ».

At this stage ,the indicator « F » starts moving clockwise.

If the indicator does not move the above specified point, loosen the screws securing double breaker to crankcase usint tool 14 92 70 00 (13 in fig. 330) and turn the breaker to the left or to the right until the indicator « F » starts moving at the specified point.
Then lock the screws securing breaker to crankcase and detach the clamps from the red cable.

IGNITION TIMING FOR LEFT CYLINDER (GREEN CABLE) (fig. 331)

After timing the right cylinder (red cable), proceed with the left cylinder (green cable).
Proceed as specified under the previous paragraph, paying attention to the followings changes.

— Connect the feed clamp « G » to the green cable;
— rotate the alternator clockwise, using tool « C », until the letter « S » stamped on the flywheel (left cylinder) is aligned with the mark at the middle of the inspection hole rim « E ».

If the indicator does not move at the above specified point, loosen the screws « H » using a screwdriver and turn the plate to the right or to the left until the indicator starts moving at the specified point.
Then lock the screws and detach the feed clamp from the green cable, the ground clamp from the crankcase fin, then re-fit the breaker cover.

CECKING THE IGNITION ADVANCE (STATIC + AUTOMATIC) FOR RIGHT CYLINDER BY MEANS OF A « STROBOSCOPE LAMP » (fig. 332-333/1)

— Remove the rubber cap from the inspection hole « A », which is located on the gearbox housing, right side;
— conect the stroboscope cable « A » to the right cylinder spark plug lead;
— connect the stroboscope clamped cables to the battery; the clamp « B » marked (+) to the battery positive pole (+), the clamp « C » marked (—) to the battery negative pole (—);
— first remove the cover, then rotate the flywheel, using the proper screw, clockwise in such a way as to align the letter « D » stamped on the flywheel with the mark at the middle of the inspection hole rim « E »;
— start the engine and point the stroboscope light into hole « E », checking that the advance mark « AF » is aligned with the mark at the middle of the inspection hole rim «A» at 1000 ÷ 1200 rpm ± 200 and the full advance mark (static + dynamic) « AT » is aligned with the mark at the middle of the inspection hole rim « F » at 6000 ÷ 6200 rpm ± 200.

If the marks for static and full advances align with the mark at the middle of the inspection hole rim at above rpm, this means that everything is normal.

CHECKING THE IGNITION ADVANCE (STATIC + DYNAMIC) FOR LEFT CYLINDER BY MEANS OF A STROBOSCOPE LAMP
fig. 333/1)

Proceed as specified in the previous paragraph, paying attention to connect the stroboscope cable to the spark plug lead for the left cylinder and bring the letter « S » stamped on the flywheel in line with the mark at the middle of the inspection hole rim « F ».

IGNITION DATA

Initial advance (Static)	0 ÷ 2°
Automatic (Dynamic)	31°
Full advance	31° ± 33°

HEADLIGHT (EUROPE MODEL)
(fig. 334)

The headlight insert is adjustable type; it can be laterally adjusted by turning screws « A » and vertically adjusted by turning screws « C ». The center of the high beam must not exceed the height of m 0,86 (34 inches) measured at m 3 (10 feet) distance with machine not on stand and rider on saddle.
To replace the bulbs, loosen the screw « B », unhook the headlight insert, remove the two holders and replace the bulbs.

TAIL LIGHT (fig. 335)

Bulb replacement

Access to the bulbs is made possible by unscrewing the screws « D » securing reflector to tail light housing, pressing the bulb, turning and taking out at the same time.

NUMBER PLATE LIGHT (fig. 335)

Bulb replacement

Loosen the screws « F » securing the transparent cover to the light housing, press the bulb in, turn and take out at the same time.

TURN SIGNALS (fig. 335)

Bulb replacement

Loosen the screws « E » securing the reflectors to the signal light housing, press the bulb in, turn and take out at the same time.

Caution: In re-fitting the reflectors onto tail light, number plate light, and turn signal light, do not screw in too tightly to avoid breaking the reflector.

BULBS

Headlight

— high and low beam	40/45 W - 12 V
— town driving or parking light	3 W - 12 V

Tail light

— parking and stop light	5/21 W - 12 V
Number plate light	5 W - 12 V
Turn signals	21 W - 12 V
Warning lights	1,2 W - 12 V
Instrument lighting (tach/speedometer - rev. counter)	3 W - 12 V

INSTRUMENT PANEL (fig. 336)

1 Tach/speedometer;
2 Warning light (green); left turn signal;
3 Warning light (green); right turn signal;
4 « **h** » Warning light (Europe model, blue, U.S.A. model red), high beam;
5 « **n** » warning light (orange) signalling the disengagement of transmission power and supply of engine starting relay;
6 « **gen** » warning light, (red) indicating current delivery from alternator. It must go out when the engine reaches a certain number of revs;
7 « **oil** » warning light (red) oil pressure gauge. It goes out when the oil pressure is sufficient for normal engine lubrication. Should it remain on, this means that oil pressure is not correct. In this case the engine has to be stopped and suitable checkings are to be carried out;
8 « **Park** » warning light (green) indicating parking brake engaged. This warning light flashes by turning the ignition key to position « 2 » fig. 337. If the side stand is not up, the engine cannot be started;
9 « **I** » warning light (Europe model, green, U.S.A. model red) indicating parking lights on (by parking);
10 « **Brake** » warning light (red) indicating incorrect fluid level in rear and left front brake reservoir. When this warning light is on, fill the fluid reservoir and check that the braking circuit has no leaks;
11 « **Fuel** » warning light (red) fuel reserve. To use the reserve fuel, bring the tap lever on the right fuel tank in position « R »;
12 « **light** » courtesy light switch (available);
13 « **Emerg** » switch, right and left emergency flashers;
14 Odometer reset.

IGNITION KEY (fig. 337)

« **0** » vertical, standstill - key removable;
« **1** » turned counterclockwise: standstill, button « A » (Lights) fig. 242 in line with « Park » lights parking light on - key removable;
« **2** » turned clockwise, all controls in - key not removable. After making sure that the side stand is in rest-position (warning light « Park » out) and power transmission is disengaged (warning light « n » on) start the engine by pressing button « Start » fig. 339.

LIGHTING SWITCH (LIGHTS) (fig. 338)

It is located on the left side of the handlebar and has four positions:
1 « **Off** » lights out;
2 « **Park** » parking light or town driving;
3 « **L** » low beam;
4 « **H** » high beam.
Light selection is obtained by turning the switch « A » (LIGHTS) to the above positions.
To go from position « **2** » (Park) to position « **1** » (Off) it is necessary to shift safety button « **5** » to the left.

HORN, FLASHING LIGHT AND TURN SIGNALS (fig. 338)

Controls are incorporated in block « B »:
6 « **Horn** » horn control switch;
7 « **Flash** » flashing light control (headlight);
8 turn signal control button when turned to the right (position **9**) operates the right signals, when turned to the left (position **10**) operates the left signals.

ENGINE STARTING AND STOP BUTTON (fig. 339)

Right, on the handlebar.
With the ignition key in position « **2** » fig. 337, the engine is ready to be started.
To start the engine press button « **1** » (START).
To stop the engine (in case of emergency) turn the lever « **2** » to position « **3** » or « **4** ».
After stopping the engine, set the ignition key fig. 241 to position « **0** ».

ELECTROVALVE

The electrovalve (electronic petcock) « A » (see fig. 268) is mounted on the left side of the motorcycle, under the fuel tank and feeds the carburettors.
It works when the ignition key fig. 337 is in position « **2** ».

TERMINAL BLOCK WITH FUSES (fig. 340)

It is located on the right side of the motorcycle, and is accessible on removal of right battery cover and block cover.
It holds n. 6 16 A fuses.

Key controlled

« **1** » Rear stop light - Horn - Flash;
« **2** » Starter relay - Warning light « **n** » - Electrovalve.
« **3** » Warning lights: oil - Gen - Brake - Fuel. Headlights: high and low beam and warning lights;
« **4** » Parking light - Instrument lighting - Warning light « **L** ».

Out of key control

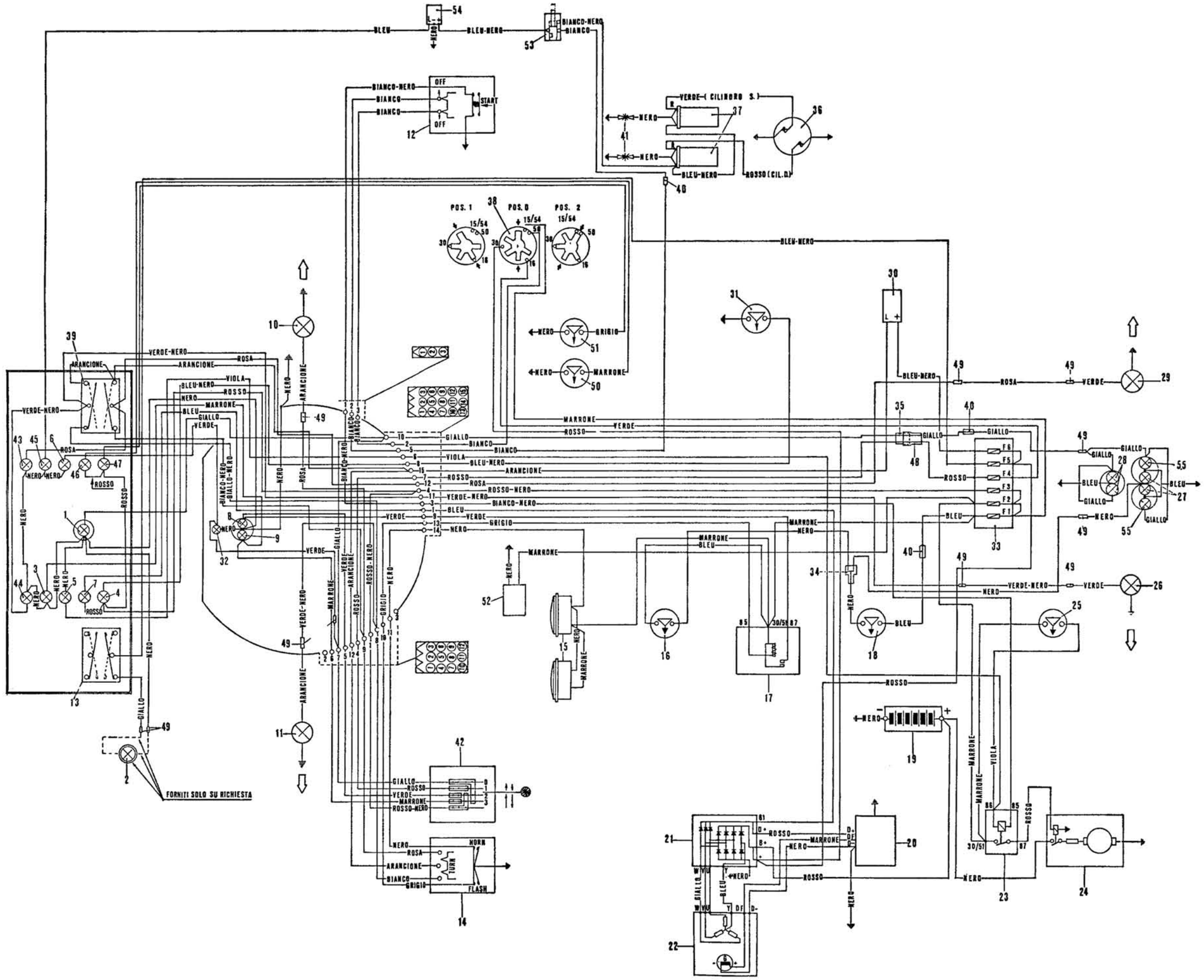
« **5** » Additional courtesy light;
« **6** » Turn signals and warning lights.

MOTORCYCLE SIDE STAND AND PARKING BRAKE LIGHT (fig. 341)

The motorcycle is equipped with a rod « A » which acts as side stand and parking brake control as well.
When it is in parking position (fully out) a special device breaks current delivery to ignition coils.
The warning light « Park » on the instrument panel, alerts the rider by flashing to bring the side stand in rest position to allow the engine to be started.

WIRING DIAGRAM (EUROPE MODEL)
(fig. 342)

1 Speedometer (bulb 3 W)
2 Additional light (bulb 5) - only on request
3 High beam warning light (bulb 1,2 W) « H »
4 Oil pressure warning light (bulb 1,2 W) « Oil »
5 Neutral position warning light (bulb 1,2 W) « N »
6 Town driving warning light (bulb 1,2 W) « L »
7 Generator charge warning light (bulb 1,2 W) « Gen »
8 Low beam } bulb 40/45 W
9 High beam }
10 Turn indicator light - front, right (bulb 21 W)
11 Turn indicator light - left, front (bulb 21 W)
12 Engine starting and stopping control
13 Additional light switch
14 Control: Turn indicator lights, horns, flashing lights
15 Horns (Consumption: 7 A)
16 Front brake switch
17 Flashing light (Flash) relay
18 Rear brake switch
19 Battery
20 Regulator
21 Rectifier
22 Alternator
23 Starter motor relay
24 Starter motor
25 Switch on clutch control wire
26 Turn indicator light - rear, left (bulb 21 W)
27 Rear stop light (bulbs 5/21 W)
28 Number plate light (bulb 5 W)
29 Turn indicator light - rear, front (bulb 21 W)
30 Turn indicator lights, flasher unit
31 Oil pressure switch (on the engine crankcase)
32 Town driving light, front (bulb 3 W)
33 Terminal block with fuses (16 A fuses)
34 3 way connector
35 4 way connector « Amp »
36 Breaker
37 Coils
38 Ignition switch (3 positions)
39 Switch actuating rear turn indicator lights flashing
40 2 way connector
41 Spark plugs
42 Light switch with travel limit from position « High/Low beam » to position « Town driving light »
43 Right turn indicator warning light (bulb 1,2 W)
44 Left turn indicator warning light (bulb 1,2 W)
45 Warning light indicating « Side Stand » in position « Park » (bulb 1,2 W)
46 Brake fluid level warning light « Brake » (bulb 1,2 W)
47 Fuel level warning light « Fuel » (bulb 1,2 W)
48 4 way connector (Amp)
49 Connection
50 Brake fluid level indicator
51 Fuel level indicator
52 Electrovalve (2,5 W)
53 Coil control device
54 Commutator for side stand warning light « Park » position
55 Rear parking light (bulb 5/21 W)



COLORS LEGEND

Nero	= Black	Giallo	= Yellow
Bianco	= White	Azzurro	= Blue
Verde	= Green	Rosso/Nero	= Red/Black
Grigio	= Grey	Azzurro/Nero	= Blue/Black
Viola	= Violet	Verde/Nero	= Green/Black
Arancio	= Orange	Bianco/Nero	= White/Black
Rosa	= Pink	Giallo/Nero	= Yellow/Black
Rosso	= Red	Grigio/Nero	= Grey/Black
Marrone	= Brown	Grigio/Rosso	= Grey/Red

CHANGES FOR (EUROPE POLICE MODEL)

INSTRUMENTS AND CONTROLS (fig. 343)

1 Tach./speedometer.
2 Left turn indicator warning light.
3 Right turn indicator warning light.
4 « H » high beam warning light.
5 « N » neutral position warning light.
6 « Gen » warning light indicating insufficient battery charge from alternator.
7 « Oil » warning light indicating insufficient oil pressure.
8 « Park » warning light indicating side stand in parking position.
9 « L » warning light, parking.
10 « Purs » warning light indicating red lights on.
11 « Rad » warning light indicating radio on.
12 « Light » switch for additional lights.
13 « Emerg » switch controlling simultaneous flashing of rear turn indicator lights (the switch controls also the flashing of warning lights « 2 » and « 3 »).
14 Odometer resetting.

CONTROL BUTTONS FOR RADIO, SIREN AND RED LIGHTS (fig. 344)

This group is mounted on the right handlebar:
« 1 » Radio control button (white).
« 2 » Sirene control button (blue).
« 3 » Red lights control (red).
« 4 » Siren control (blue).

FUEL TAPS

The motorcycle fits two fuel taps under the fuel tank, rear.
Tap position:

« A »	Open	(vertical).
« R »	Reserve	(horizontal - see « R » on the taps).
« C »	Closed	(horizontal - see « C » on the taps).

TERMINAL BLOCK WITH FUSES (fig. 340)

The terminal block is located on the right side of the motorcycle.
Access to the terminal block is made possible by removal of the right side cover and terminal block cover.
It incorporates n. 6, 16 A fuses.

Key controlled

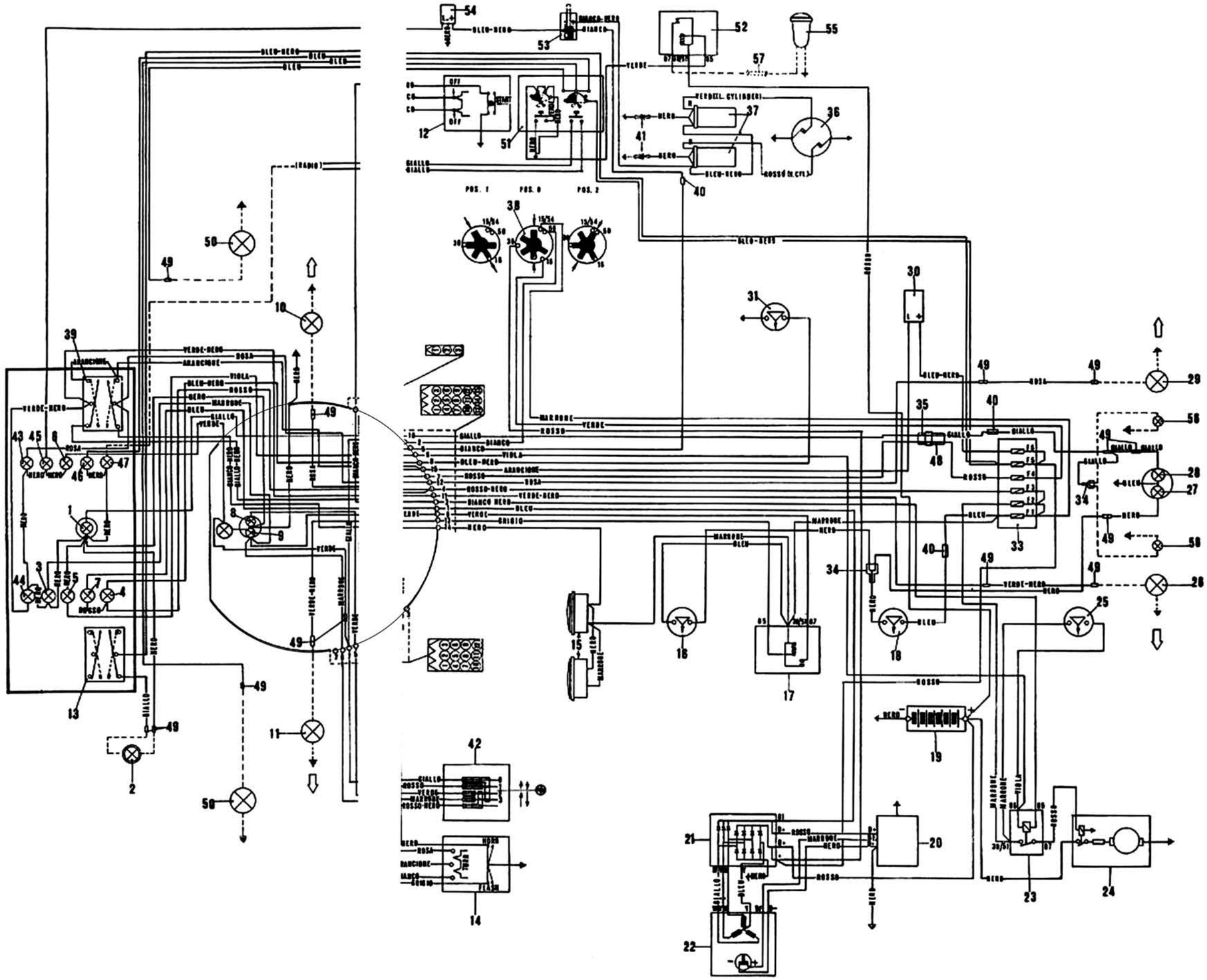
« 1 » Rear stop light, horns, flashing lights.
« 2 » Starter motor relay, warning light « N ».
« 3 » Warning lights: « Oil - Gen » - Headlights: high beam, low beam and warning lights.
« 4 » Rear parking lights, instrument lighting, warning light « L » rear blue lights.

Out of key control

« 5 » Red lights and warning light « Purs »; additional light.
« 6 » Turn indicator lights with their warning lights.

WIRING DIAGRAM (EUROPE POLICE MODEL)
(fig. 345)

1 Speedometer (bulb 3 W)
2 Additional light (bulb 5) - only on request
3 High beam warning light (bulb 1,2 W) « H »
4 Oil pressure warning light (bulb 1,2 W) « Oil »
5 Neutral position warning light (bulb 1,2 W) « N »
6 Town driving warning light (bulb 1,2 W) « L »
7 Generator charge warning light (bulb 1,2 W) « Gen »
8 Low beam } bulb 40/45 W
9 High beam }
10 Turn indicator light - front, right (bulb 21 W)
11 Turn indicator light - left, front (bulb 21 W)
12 Engine starting and stopping control
13 Additional light switch
14 Control: Turn indicator lights, horns, flashing lights
15 Horns (Consumption: 7 A)
16 Front brake switch
17 Flashing light (Flash) relay
18 Rear brake switch
19 Battery
20 Regulator
21 Rectifier
22 Alternator
23 Starter motor relay
24 Starter motor
25 Switch on clutch control wire
26 Turn indicator light - rear, left (bulb 21 W)
27 Rear stop light (bulbs 5/21 W)
28 Number plate light (bulb 5 W)
29 Turn indicator light - rear, front (bulb 21 W)
30 Turn indicator lights, flasher unit
31 Oil pressure switch (on the engine crankcase)
32 Town driving light, front (bulb 3 W)
33 Terminal block with fuses (16 A fuses)
34 3 way connector
35 4 way connector « Amp »
36 Breaker
37 Coils
38 Ignition switch (3 positions)
39 Switch actuating rear turn indicator lights flashing
40 2 way connector
41 Spark plugs
42 Light switch with travel limit from position « High/ Low beam » to position « Town driving light »
43 Right turn indicator warning light (bulb 1,2 W)
44 Left turn indicator warning light (bulb 1,2 W)
45 Warning light indicating « Side Stand » in position « Park » (bulb 1,2 W)
46 Brake fluid level warning light « Brake » (bulb 1,2 W)
47 Fuel level warning light « Fuel » (bulb 1,2 W)
48 4 way connector (Amp)
49 Connection
50 Red pursuing lights (front) - (bulb 35 W)
51 Control: red lights - radio - syrene
52 Syrene relay
53 Coil control device
54 Control device for side stand warning light
55 Syrenes (90 W)
56 Rear blue lights (bulb 5 W)
57 Spare fuse



COLORS LEGEND

Nero	= Black	Giallo	= Yellow
Bianco	= White	Azzurro	= Blue
Verde	= Green	Rosso/Nero	= Red/Black
Grigio	= Grey	Azzurro/Nero	= Blue/Black
Viola	= Violet	Verde/Nero	= Green/Black
Arancio	= Orange	Bianco/Nero	= White/Black
Rosa	= Pink	Giallo/Nero	= Yellow/Black
Rosso	= Red	Grigio/Nero	= Grey/Black
Marrone	= Brown	Grigio/Rosso	= Grey/Red

CHANGES FOR USA MODEL

HEADLIGHT (fig. 346)

Sealed beam insert 40/45 W.

REPLACING OF BULBS

Tail light (fig. 335)

Undo screws « D » securing reflector to tail light, push the bulb in and turn it at the same time, then slip it out.

Turn indicator light (fig. 335)

Undo screw « E » securing reflector to turn indicator lights, push the bulbs in and turn them at the same time, then slip them out.
By re-fitting of reflectors, screw in carefully the fixing screws to avoid breaking the reflectors.

Number plate light (fig. 335)

Undo screws « F » securing the light glass, push the bulb in and turn it at the same time, then slip it out.

Instrument panel, Speedometer, Rev. Counter

Take bulb sockets out of instrument panel, speedometer and rev. counter, then replace the bulbs.

BULBS

Headligh:

— sealed beam insert	45/40 W

Tail light:

— parking and stop light	5/21 W
— number plate light	5 W
Turn indicator lights	21 W
Warning lights	1,2 W
Speedometer and rev. counter lights	3 W

ADJUSTING THE HEADLIGHT BEAM (fig. 336)

The headlight must always be adjusted at the right heigh, either for safe riding or to avoid annoyance to oncoming riders. For horizontal adjusting turn screw « A », for vertical adjusting turn screw « C » until the correct height is reached.
The high beam centre must not be higher than m 0,86 (approx 3.4″) measured at m 3 (approx 11″) distance with motorcycle not on stand, rider on saddle.

WIRING DIAGRAM (U.S.A. MODEL)
(fg. 347)

1 Mile counter, speedometer (bulb 3 W)
2 Additional light (bulb 5) - only on request
3 High beam warning light (bulb 1,2 W) « H »
4 Oil pressure warning light (bulb 1,2 W) « Oil »
5 Neutral position warning light (bulb 1,2 W) « N »
6 Low beam and parking warning light (bulb 1,2 W) « L »
7 Generator charge warning light (bulb 1,2 W) « Gen »
8 Low beam
9 High beam } bulb 40/45 W
10 Turn indicator light - right, front (bulb 21 W)
11 Turn indicator light - left, front (bulb 21 W)
12 Engine starting and stopping control
13 Additional light switch
14 Control: Turn indicator lights, horns, flashing lights
15 Horns (Consumption: 7 A)
16 Front brake switch
17 Flashing light (Flash) relay
18 Rear brake switch
19 Battery
20 Regulator
21 Rectifier
22 Alternator
23 Starter motor relay
24 Starter motor
25 Switch on clutch control wire
26 Turn indicator light - rear, left (bulb 21 W)
27 Rear stop light (bulbs 5/21 W)
28 Number plate light (bulb 5 W)
29 Turn indicator light (bulb 21 W) left, rear
30 Turn indicator lights, flasher unit
31 Oil pressure switch (on the engine crankcase)
32 Town driving light, front (bulb 3 W)
33 Terminal block with fuses (16 A fuses)
34 3 way connector
35 4 way connector « Amp »
36 Breaker
37 Coils
38 Ignition switch (3 positions)
39 Switch actuating rear turn indicator lights flashing
40 2 way connector
41 Spark plugs
42 Light switch with travel limit from position « High/Low beam » to position « Town driving light »
43 Right turn indicator warning light (bulb 1,2 W)
44 Left turn indicator warning light (bulb 1,2 W)
45 Warning light indicating « Side Stand » in position « Park » (bulb 1,2 W)
46 Brake fluid level warning light « Brake » (bulb 1,2 W)
47 Fuel level warning light « Fuel » (bulb 1,2 W)
48 4 way connector (Amp)
49 Connection
50 Brake fluid level indicator
51 Fuel level indicator
52 Electrovalve (2,5 W)
53 Coil control device
54 Commutator for side stand warning light « Park » position
55 Rear parking light (bulb 5/21 W)

COLORS LEGEND

Nero	= Black	Giallo	= Yellow
Bianco	= White	Azzurro	= Blue
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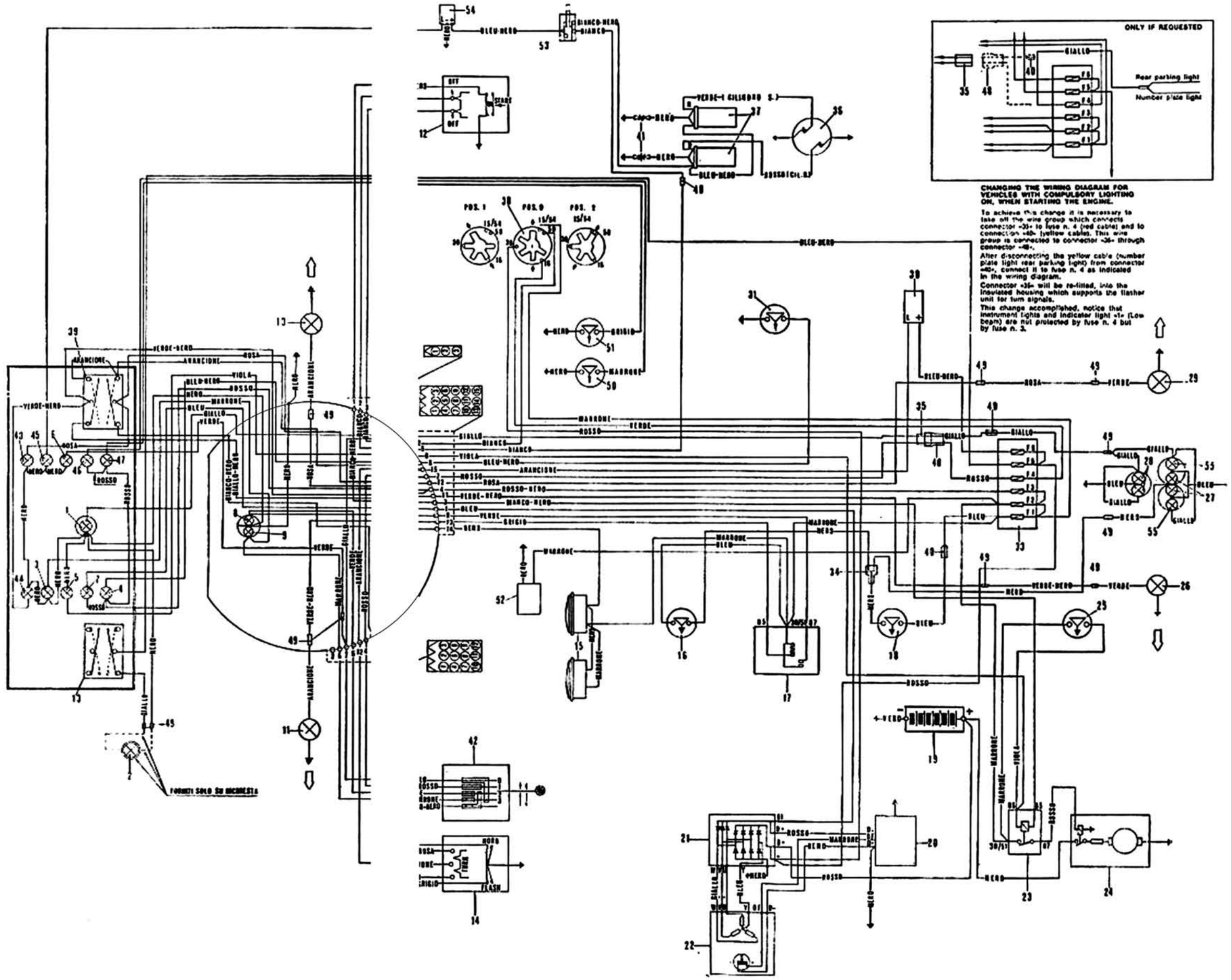
Grigio	= Grey	Azzurro/Nero	= Blue/Black
Viola	= Violet	Verde/Nero	= Green/Black
Arancio	= Orange	Bianco/Nero	= White/Black
Rosa	= Pink	Giallo/Nero	= Yellow/Black
Rosso	= Red	Grigio/Nero	= Grey/Black
Marrone	= Brown	Grigio/Rosso	= Grey/Red



CHANGES FOR U.S.A. « LAPD » MODEL

INSTRUMENTS AND CONTROLS (fig. 343)

1 Mile counter, speedometer.
2 Left turn indicator warning light (green).
3 Right turn indicator warning light (green).
4 « H » high beam warning light (red).
5 « N » neutral position warning light (orange).
6 « Gen » warning light indicating insufficient battery charge from generator (red).
7 « Oil » warning light indicating insufficient oil pressure (red).
8 « Park » warning light (green) indicating side stand in parking position.
9 « L » warning light, parking (red).
10 « Purs » warning light (red) indicating red lights on.
11 « Rad » warning light (violet) indicating radio on.
12 « Light » switch for additional lights.
13 « Emerg » switch controlling simultaneous flashing of rear turn indicator lights (the switch controls also the flashing of warning lights « 2 » and « 3 »).
14 Odometer resetting.

CONTROL BUTTONS FOR RADIO, SIRENE AND RED LIGHTS (fig. 344)

This group is mounted on the right handlebar:
« 1 » Radio control button (white).
« 2 » Sirene control button (blue).
« 3 » Red lights control (red).
« 4 » Sirene control (blue).

FUEL TAPS

The motorcycle fits two fuel taps under the fuel tank, rear.

Tap position:
« A » Open (vertical).
« R » Reserve (horizontal - see « R » on the taps).
« C » Closed (horizontal - see « C » on the taps).

TERMINAL BLOCK WITH FUSES (fig. 340)

The terminal block is located on the right side of the motorcycle.
Access to the terminal block is made possible by removal of the right side cover and terminal block cover.

Key controlled

It incorporates n. 6, 16 A fuses.
« 1 » Rear stop light, horns, flashing lights.
« 2 » Starter motor relay, warning light « N ».
« 3 » Warning lights: « Oil - Gen » - Headlights: high beam, low beam and warning lights.
« 4 » Rear parking lights, instrument lighting, warning light « L » rear blue lights.

Out of key control

« 5 » Red lights and warning light « Purs »; additional light.
« 6 » Turn indicator lights with their warning lights.

MAINTENANCE AND ADJUSTMENTS

CHECKING THE FLUID LEVEL IN THE FLUID RESERVOIR (MASTER CYLINDER) FOR FRONT LEFT AND REAR BRAKING CIRCUIT (fig. 347)

For a proper working of braking circuits follow these directions:
— often check the fluid level; a correct level must be nearly at the rubber gaiter « E » in the fluid reservoir (master cylinder) « A ». Such level must never be lower than mm 8 (.3149") under max.;
— top up periodically or whenever necessary in the fluid reservoirs (master cylinders) «A» after loosening caps « F » and removing rubber gaiters « E ».

For all other maintenance and adjustments see paragraph from page 27 to page 28.

WIRING DIAGRAM (U.S.A - LAPD MODEL)
(fig. 348)

1 Mile counter, speedometer (bulb 3 W)
2 Additional light (bulb 5 W)
3 « H » High beam warning light (bulb 1,2 W)
4 « Oil » Oil pressure warning light (bulb 1,2 W)
5 « N » Neutral position warning light (bulb 1,2 W)
6 « L » Low beam and parking warning light (bulb 1,2 W)
7 « Gen » Generator warking light
8 Low beam } bulb 40/45 W
9 High beam }
10 Turn indicator light, front/right (bulb 21 W)
11 Turn indicator light, left/front (bulb 21 W)
12 Engine starting and stopping control
13 Additional light switch
14 Control switch: turn indicator lights, horns, flashing
15 Horns (Consumption: 7 A)
16 Front brake switch
17 Flashing light relay
18 Rear brake switch
19 Battery
20 Regulator
21 Rectifier
22 Alternator
23 Starter motor relay
24 Starter motor
25 Switch on clutch control wire
26 Turn indicator light - rear, left (bulb 21 W)
27 Rear stop light (bulbs 5/21 W)
28 Number plate and tail light (bulb 5 W)
29 Turn indicator light - rear, front (bulb 21 W)
30 Turn indicator lights, flasher unit
31 Oil pressure switch
32 Town driving light, front (bulb 3 W)
33 Terminal block with fuses (16 A fuses)
34 3 way connector
35 4 way connector « Amp »
36 Breaker
37 Coils
38 Ignition switch (3 positions)
39 Control actuating simultaneous flashing of turn indicator lights
40 2 way connector
41 Spark plugs
42 Light switch with travel limit from position « High/Low beam » to position « Town driving light »
43 Right turn indicator warning light (bulb 1,2 W)
44 Left turn indicator warning light (bulb 1,2 W)
45 « Park » Side stand parking position warning light (bulb 1,2 W)
46 « Purs » Red pursuing lights warning lights (bulb 1,2 W)
47 « Rad » Radio warning light (bulb 1,2 W)
48 4 way connector (Amp)
49 Connection
50 Red pursuing lights (front) - (bulb 35 W)
51 Control: red lights - radio - syrene
52 Syrene relay
53 Coil control device
54 Control device for side stand warning light
55 Syrenes (90 W)
56 Rear blue lights (bulb 5 W)
57 Spare fuse

COLORS LEGEND

Nero	= Black	Giallo	= Yellow
Bianco	= White	Azzurro	= Blue
Verde	= Green	Rosso/Nero	= Red/Black
Grigio	= Grey	Azzurro/Nero	= Blue/Black
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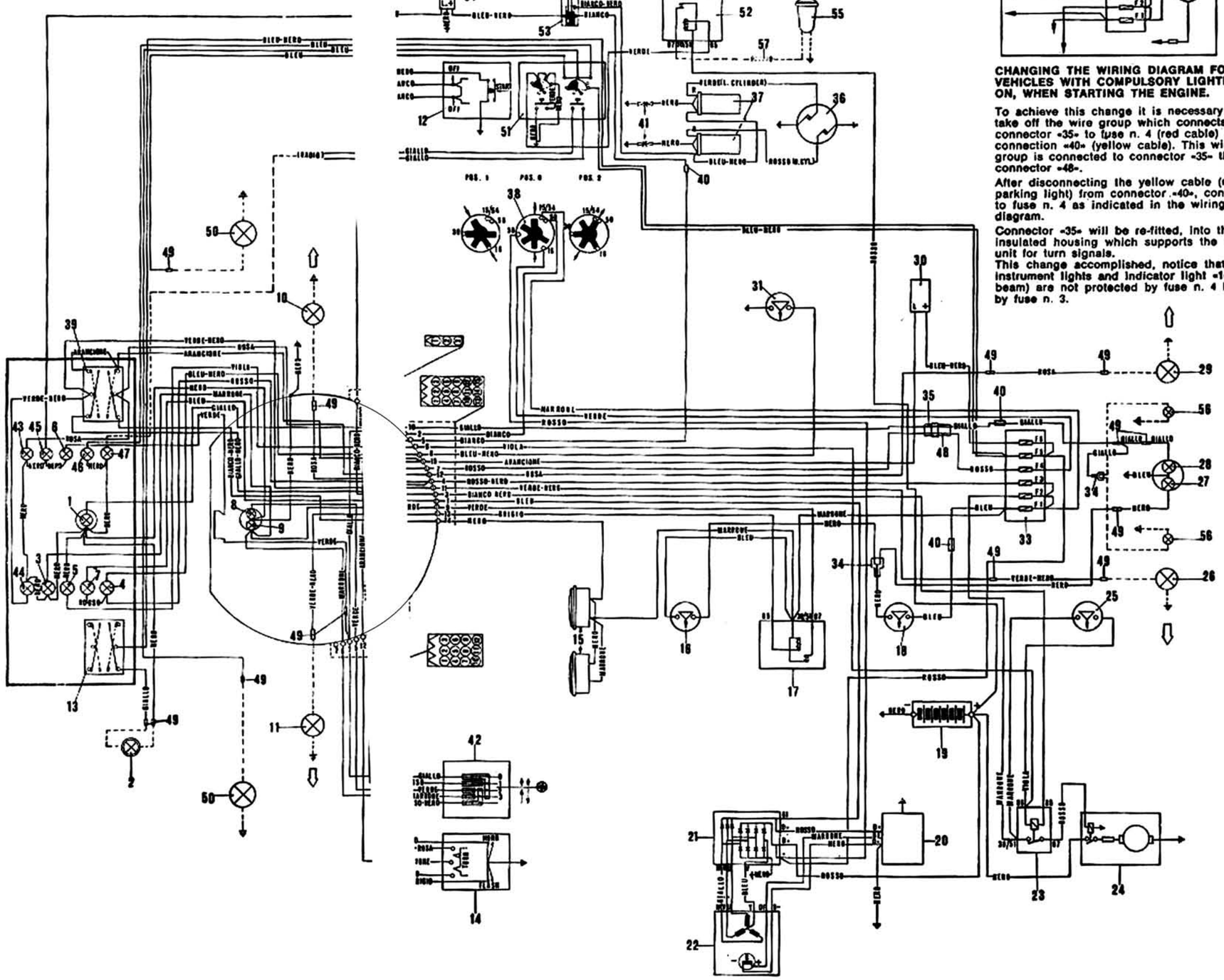
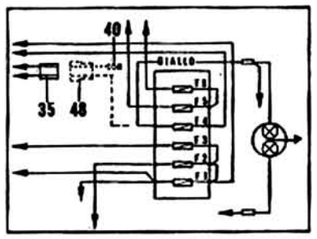
Marrone	= Brown	Grigio/Rosso	= Grey/Red



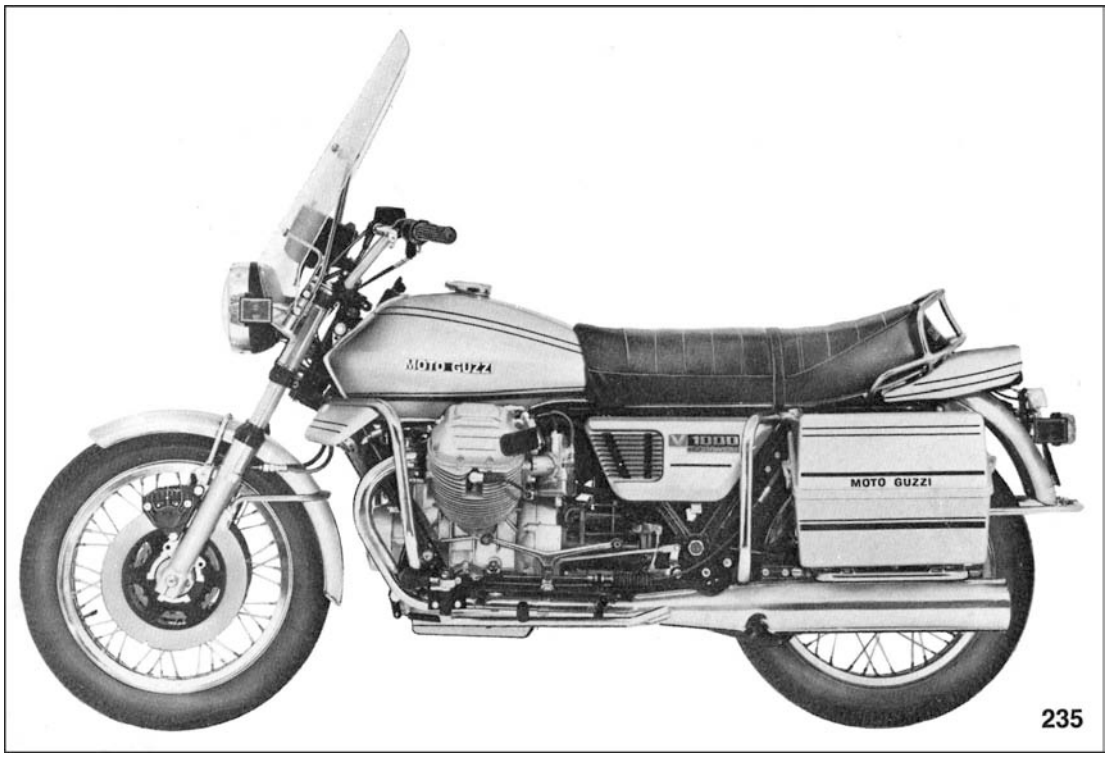


CHANGING THE WIRING DIAGRAM FOR VEHICLES WITH COMPULSORY LIGHTING ON, WHEN STARTING THE ENGINE.

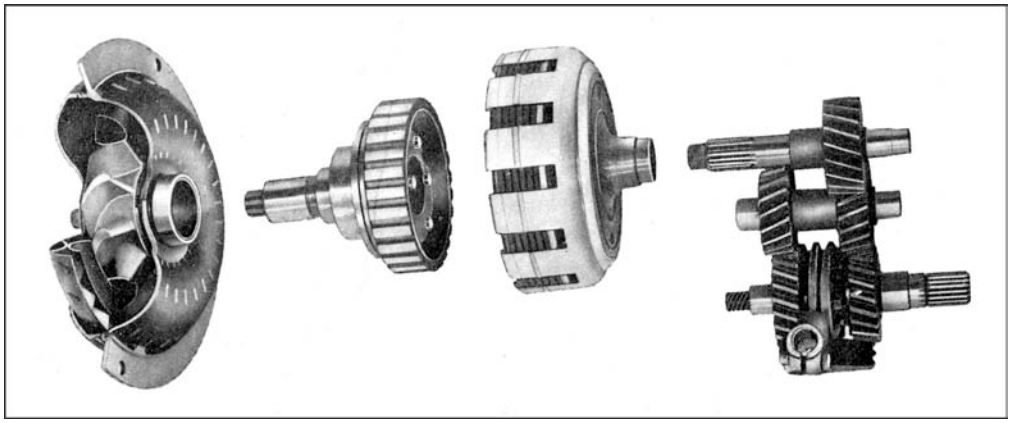
To achieve this change it is necessary to take off the wire group which connects connector «35» to fuse n. 4 (red cable) and to connection «40» (yellow cable). This wire group is connected to connector «35» through connector «48».

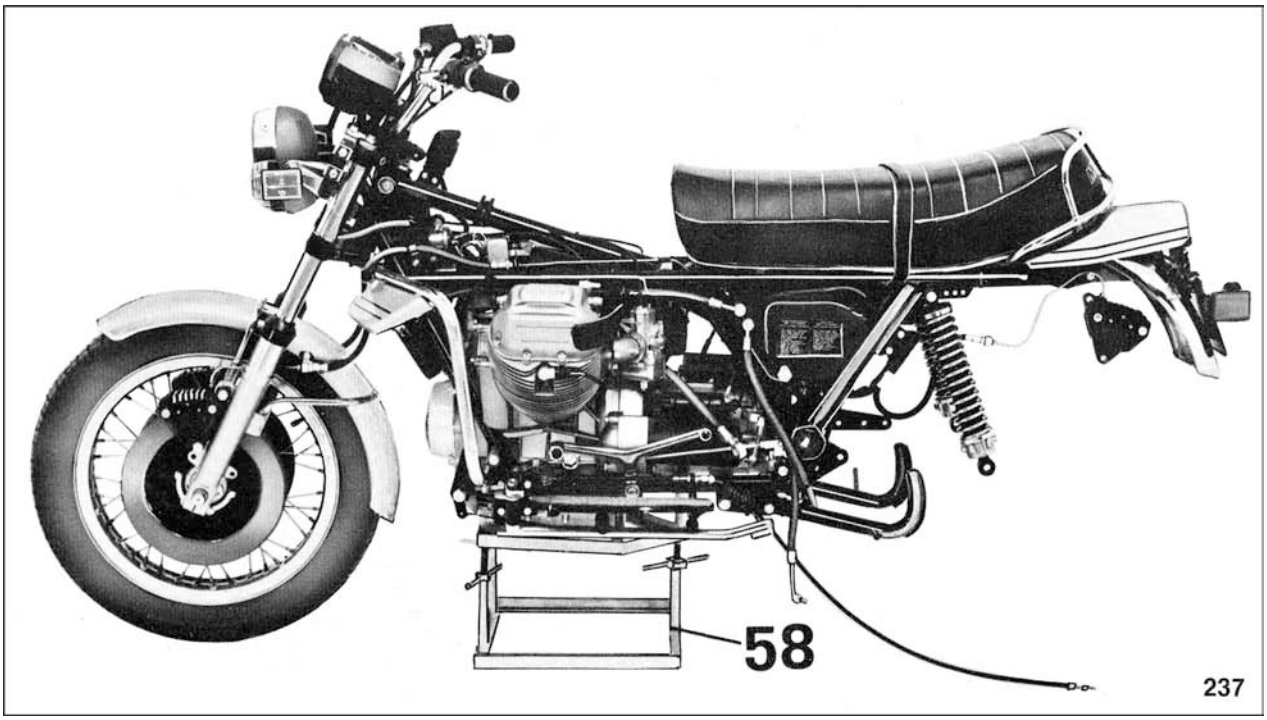
After disconnecting the yellow cable (rear parking light) from connector «40», connect it to fuse n. 4 as indicated in the wiring diagram.

Connector «35» will be re-fitted, into the insulated housing which supports the flasher unit for turn signals.
This change accomplished, notice that instrument lights and indicator light «1» (Low beam) are not protected by fuse n. 4 but by fuse n. 3.

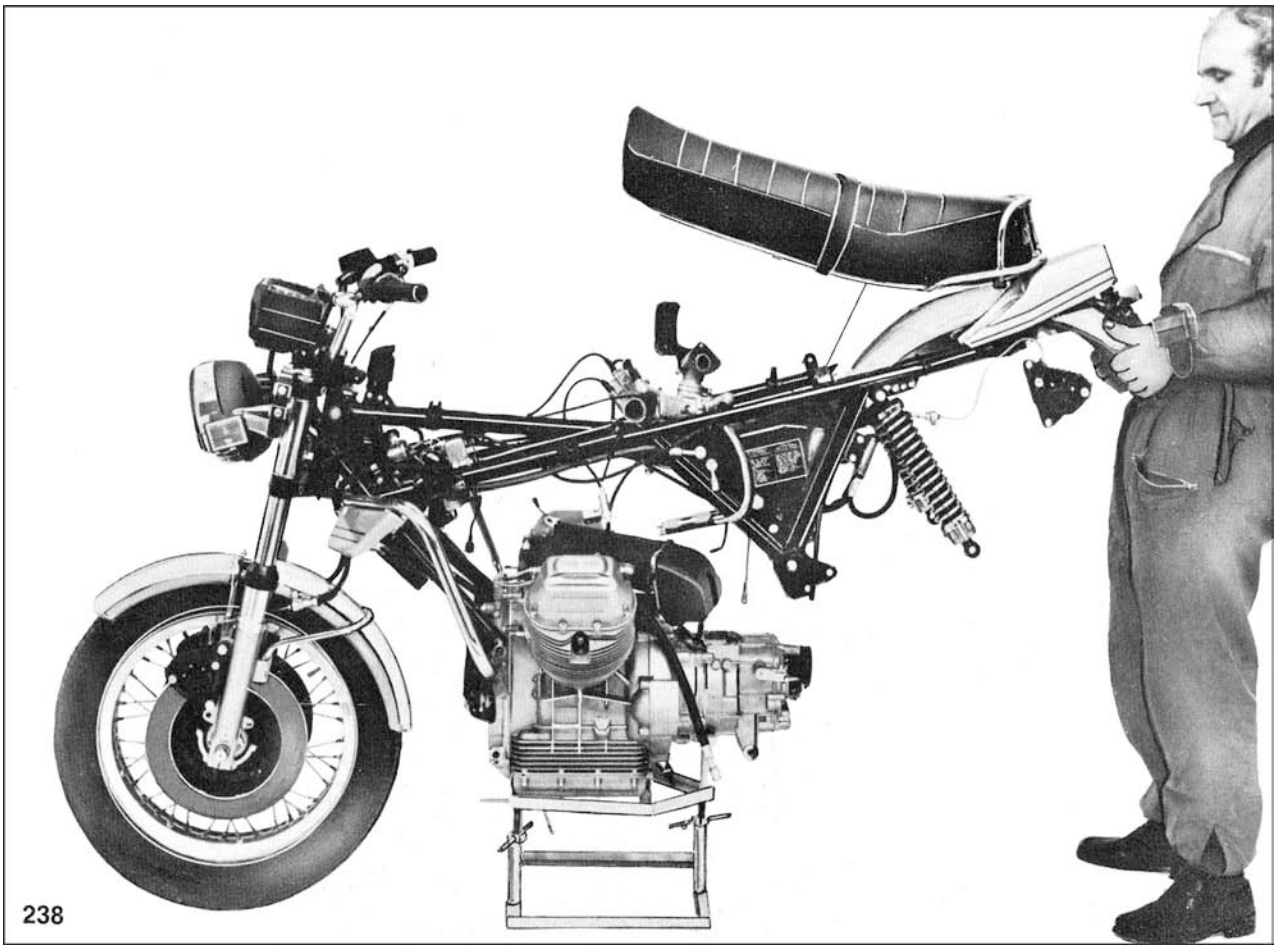


235





237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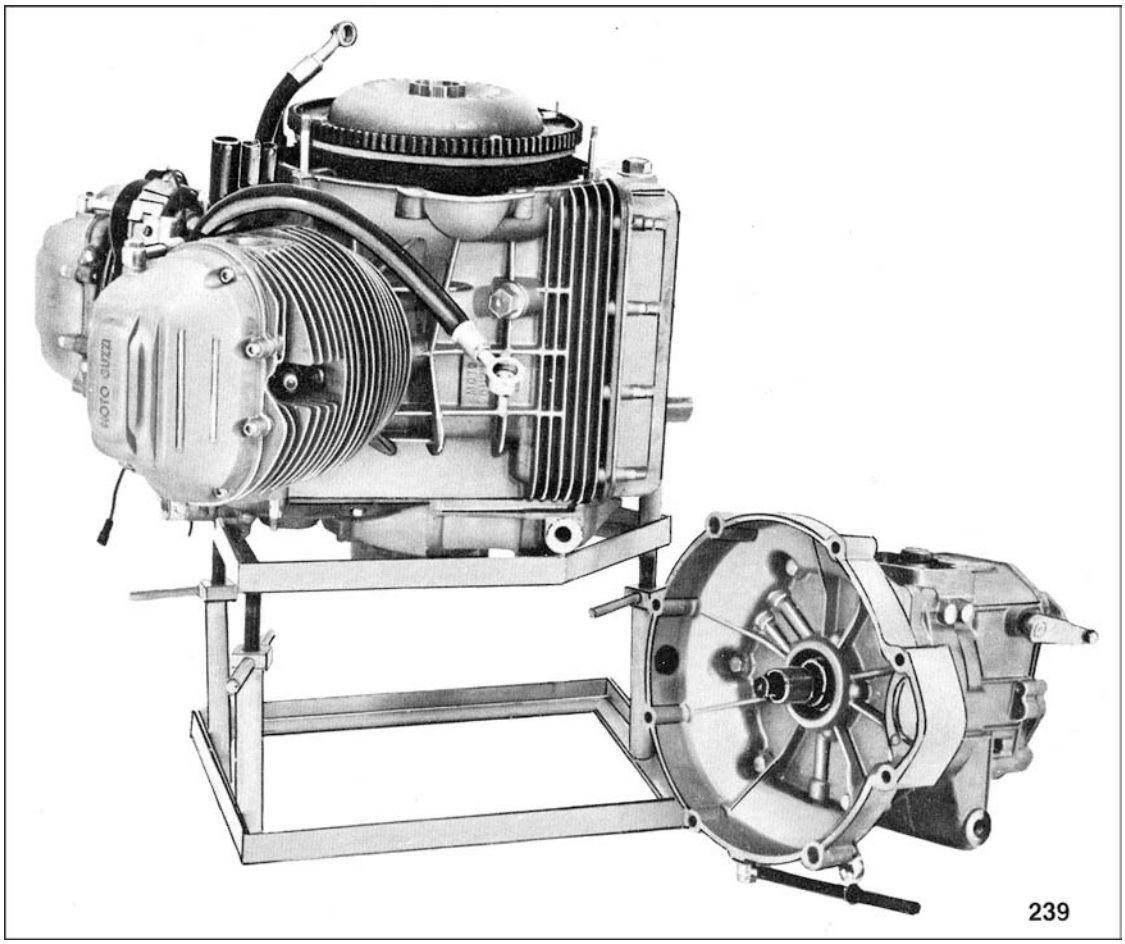
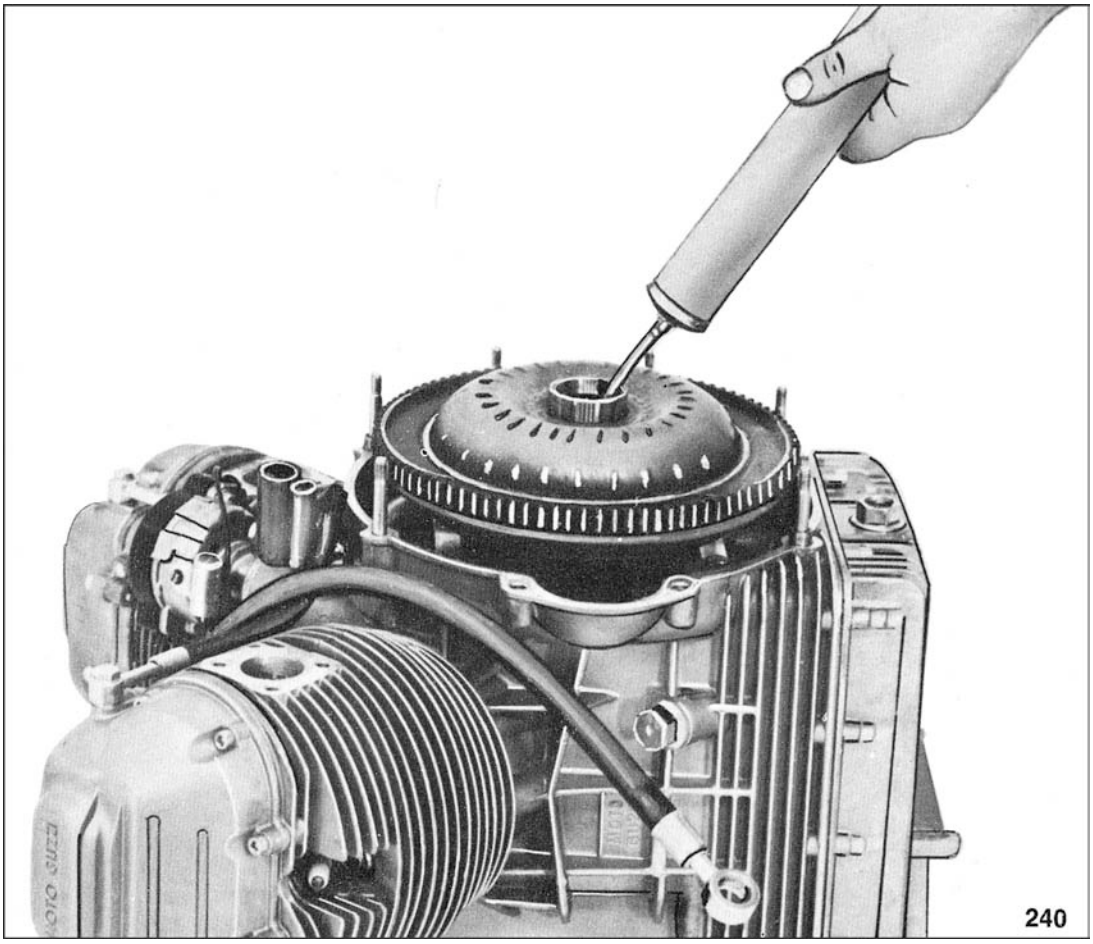

239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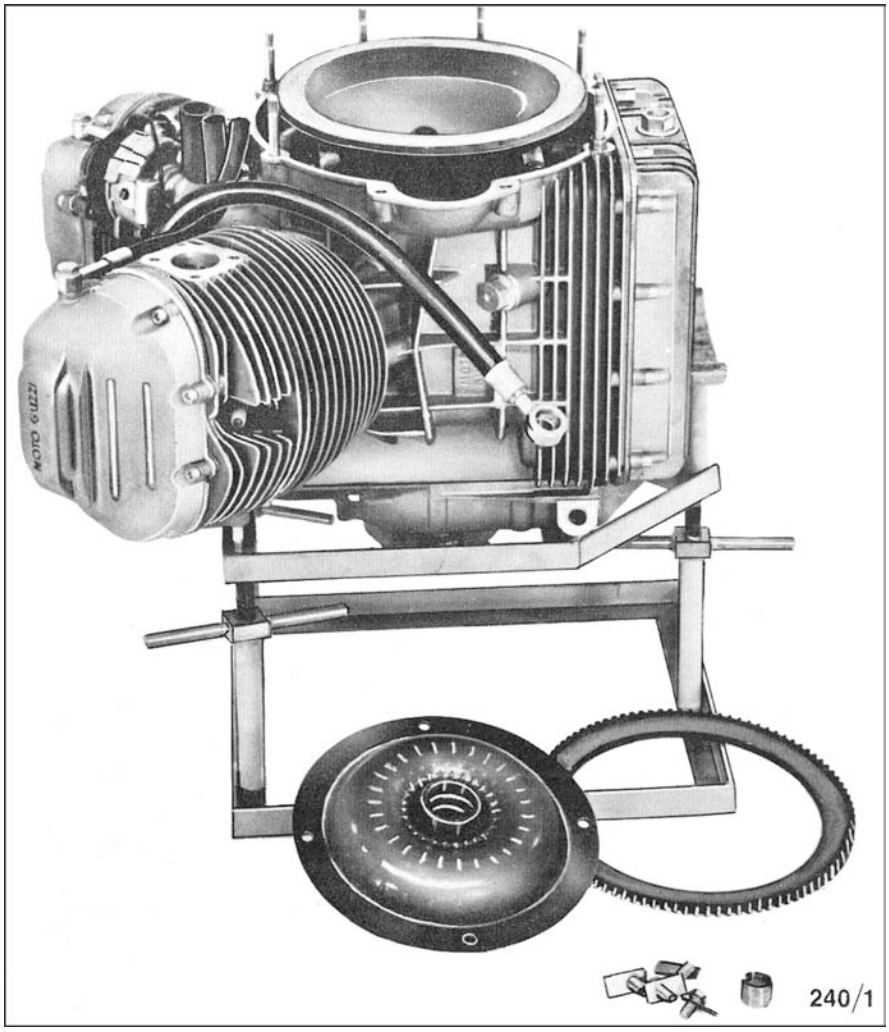
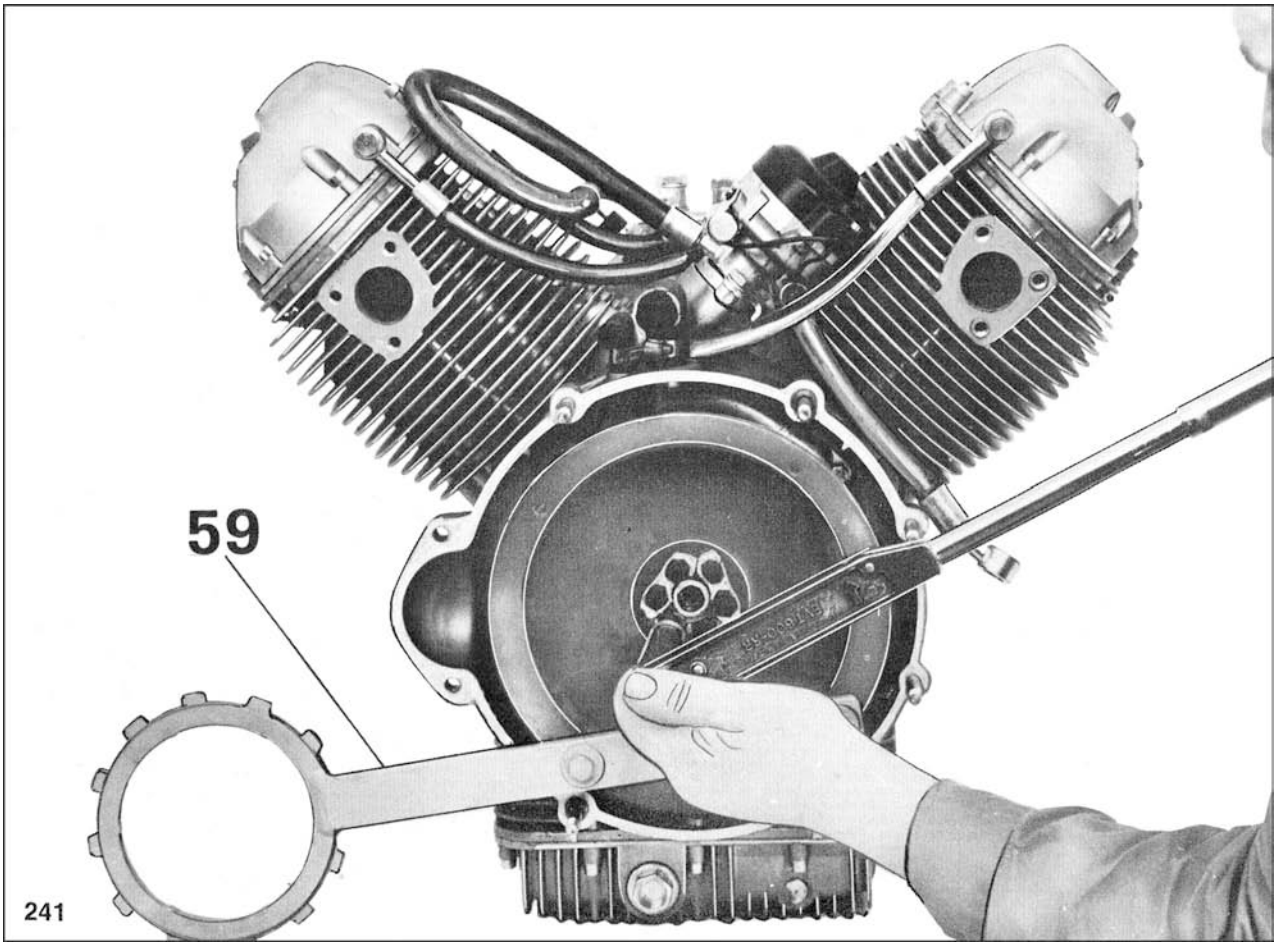

240/1


59
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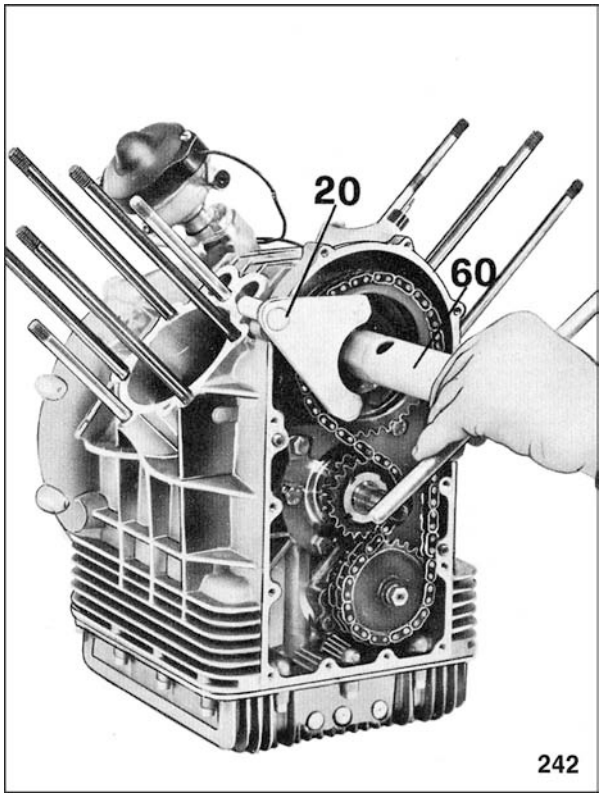
20
60
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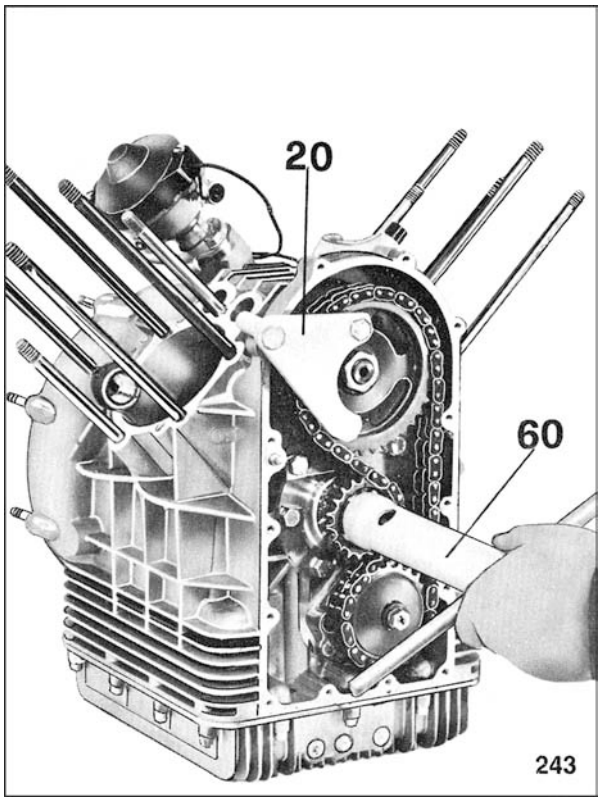
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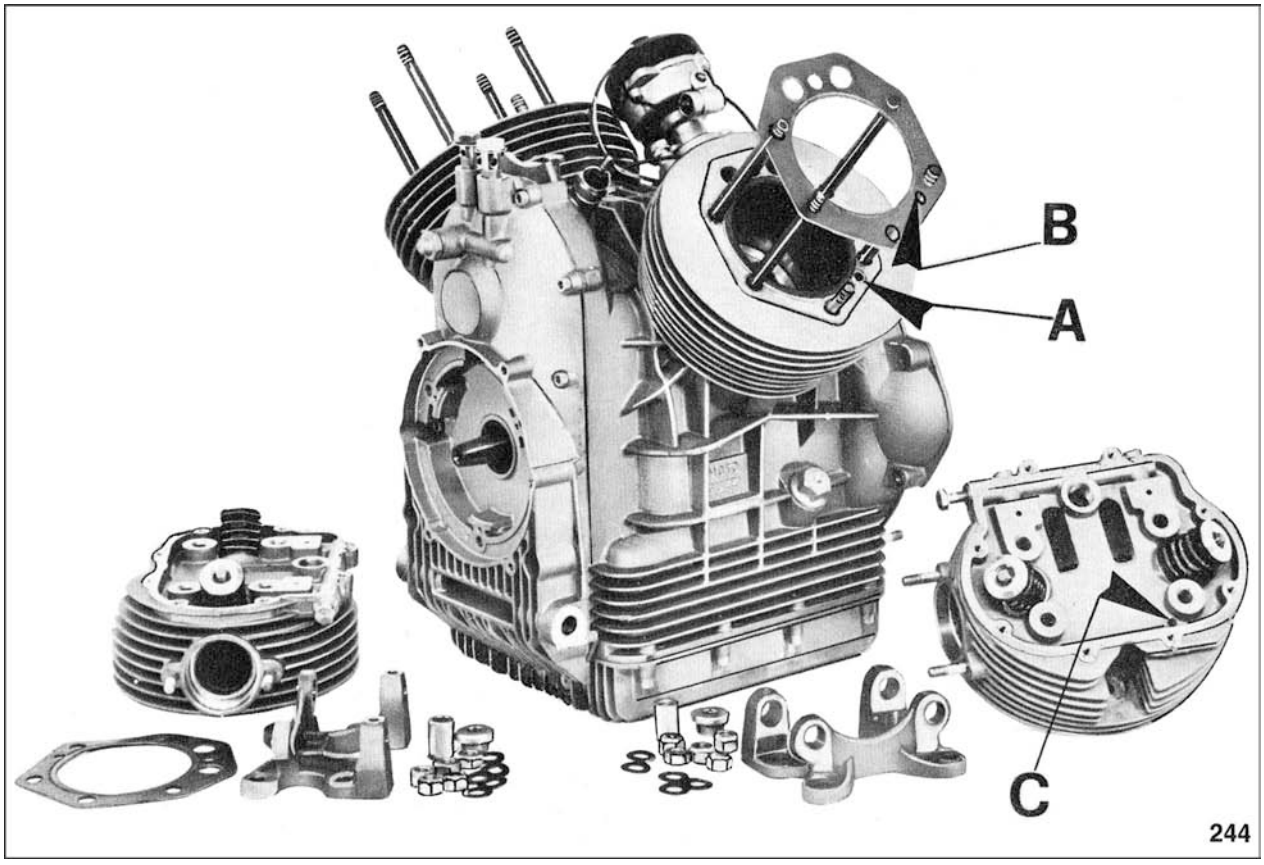
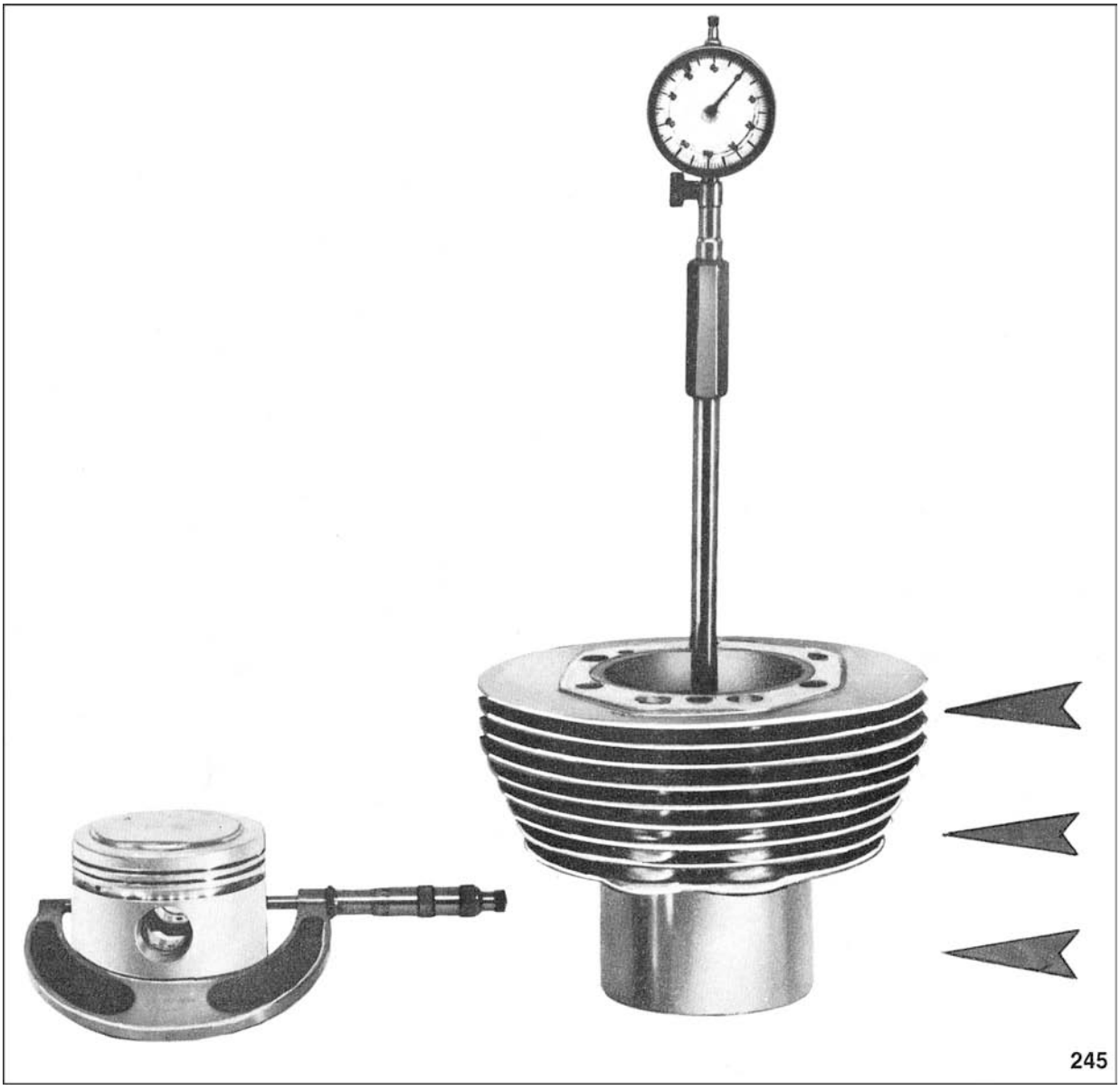

B
A
C
244



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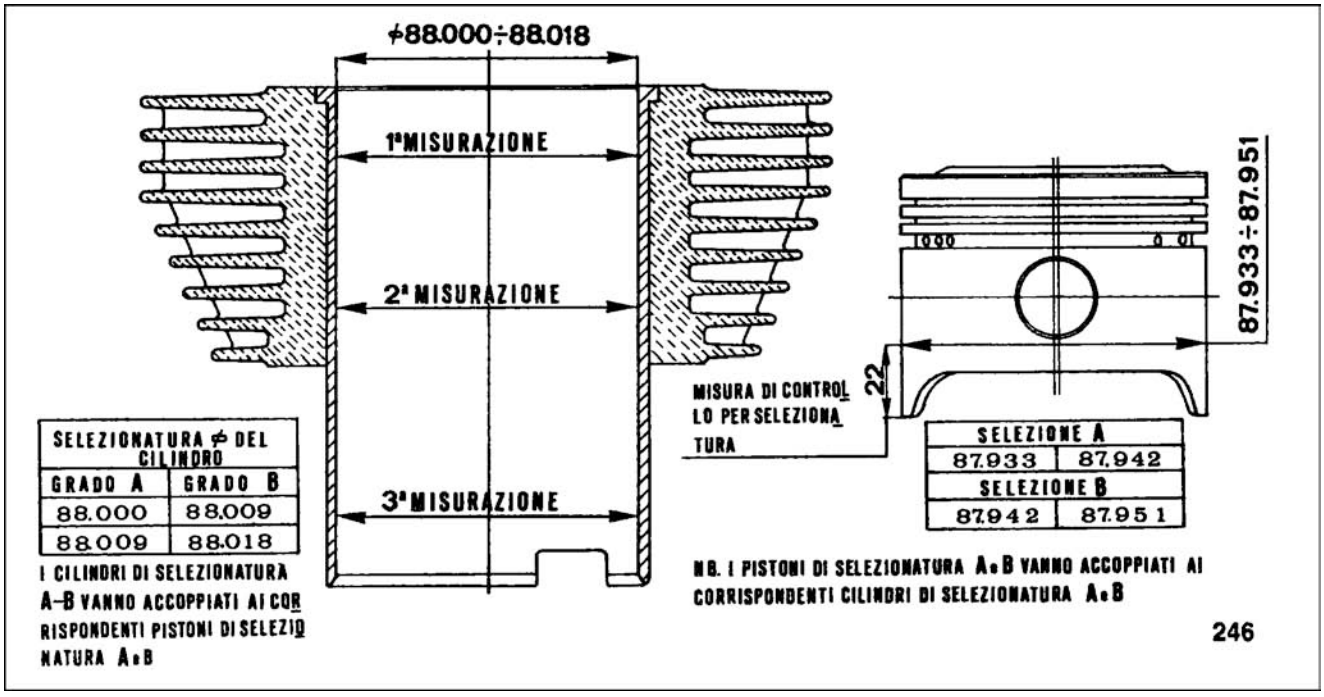


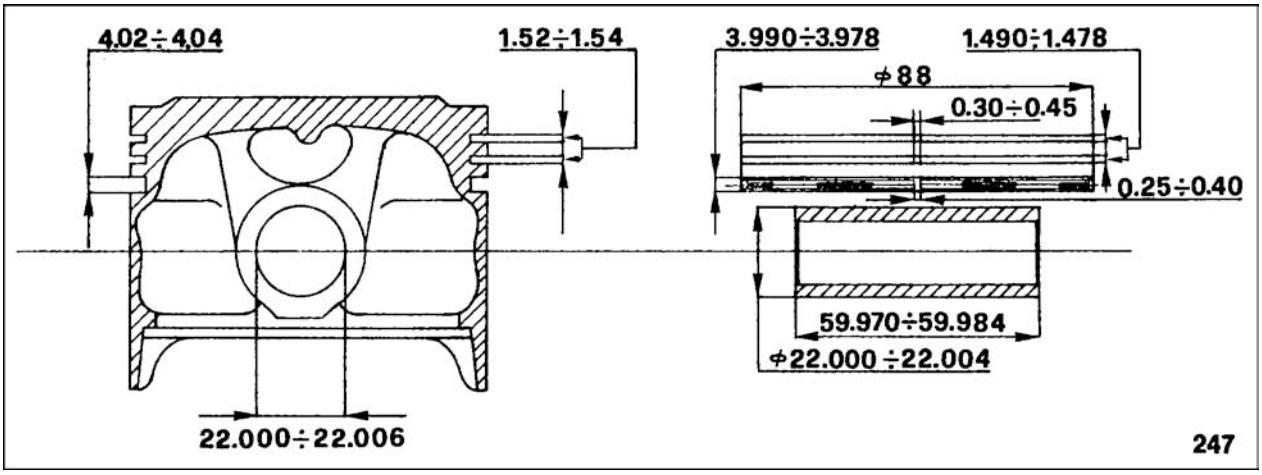
SELEZIONATURA ϕ DEL CILINDRO	
GRADO A	GRADO B
88.000	88.009
88.009	88.018

I CILINDRI DI SELEZIONATURA A-B VANNO ACCOPPIATI AI CORRISPONDENTI PISTONI DI SELEZIONATURA A e B

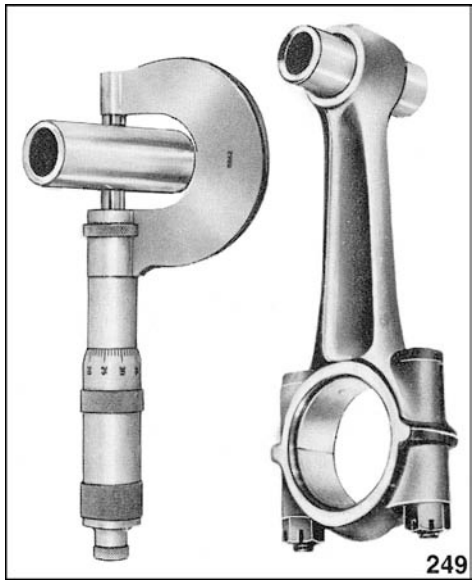
SELEZIONE A	
87.933	87.942
SELEZIONE B	
87.942	87.951

NB. I PISTONI DI SELEZIONATURA A e B VANNO ACCOPPIATI AI CORRISPONDENTI CILINDRI DI SELEZIONATURA A e B

246


4.02÷4.04
1.52÷1.54
3.990÷3.978
1.490÷1.478
ϕ88
0.30÷0.45
0.25÷0.40
59.970÷59.984
ϕ22.000 ÷22.004
22.000÷22.006
247


A
248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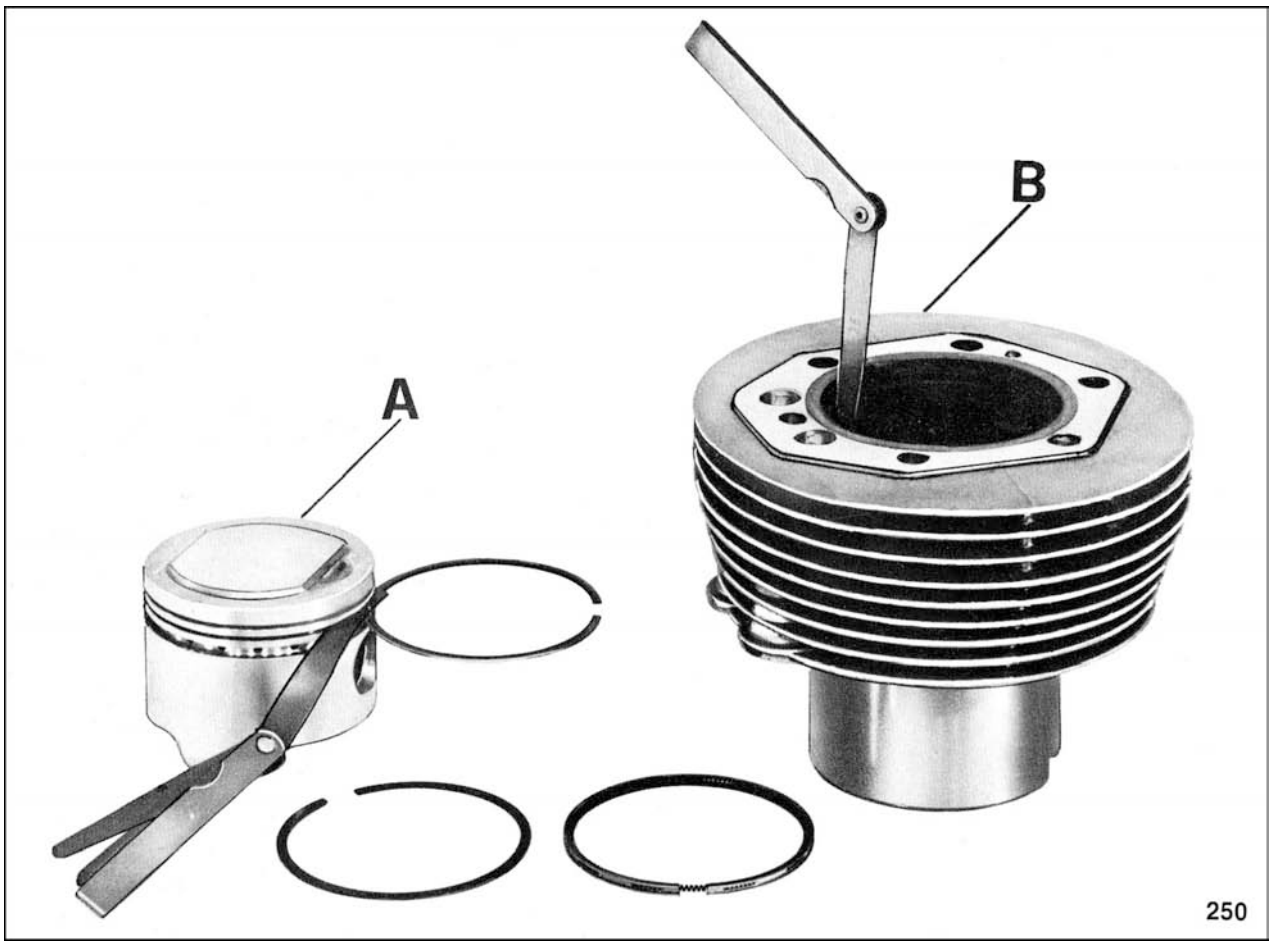
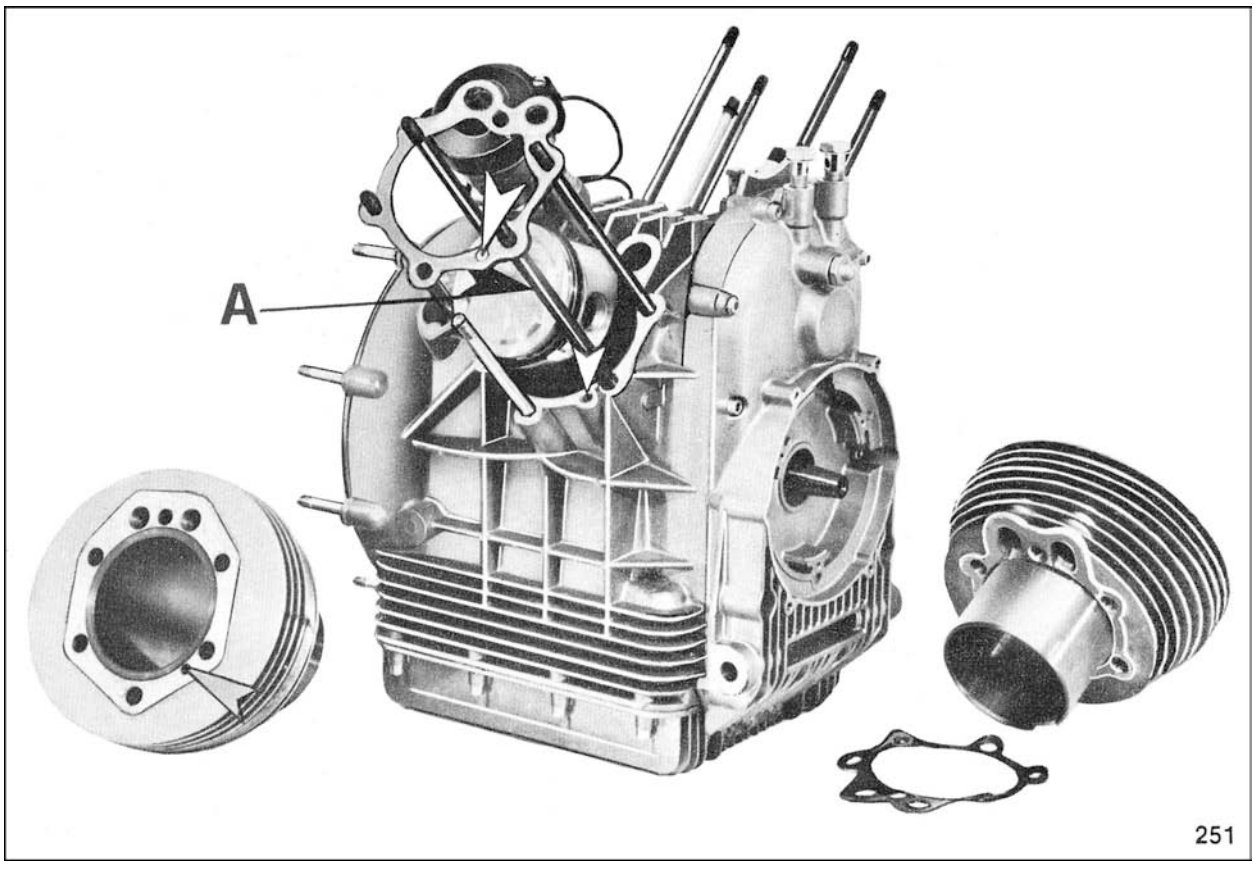
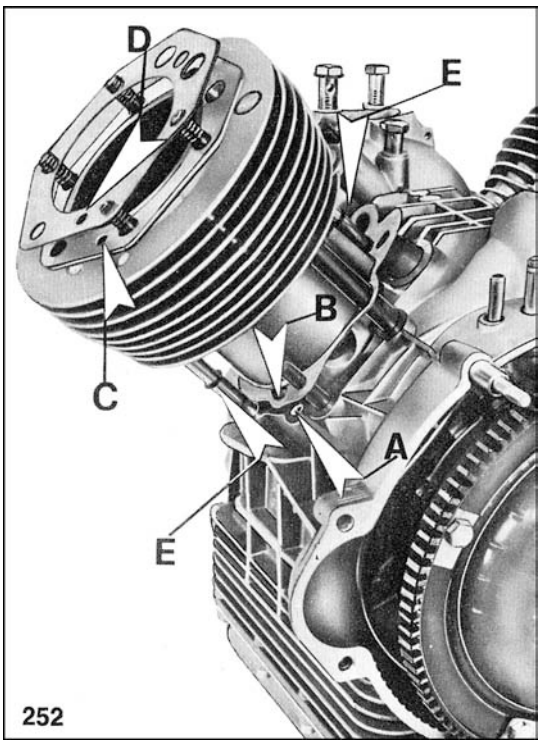
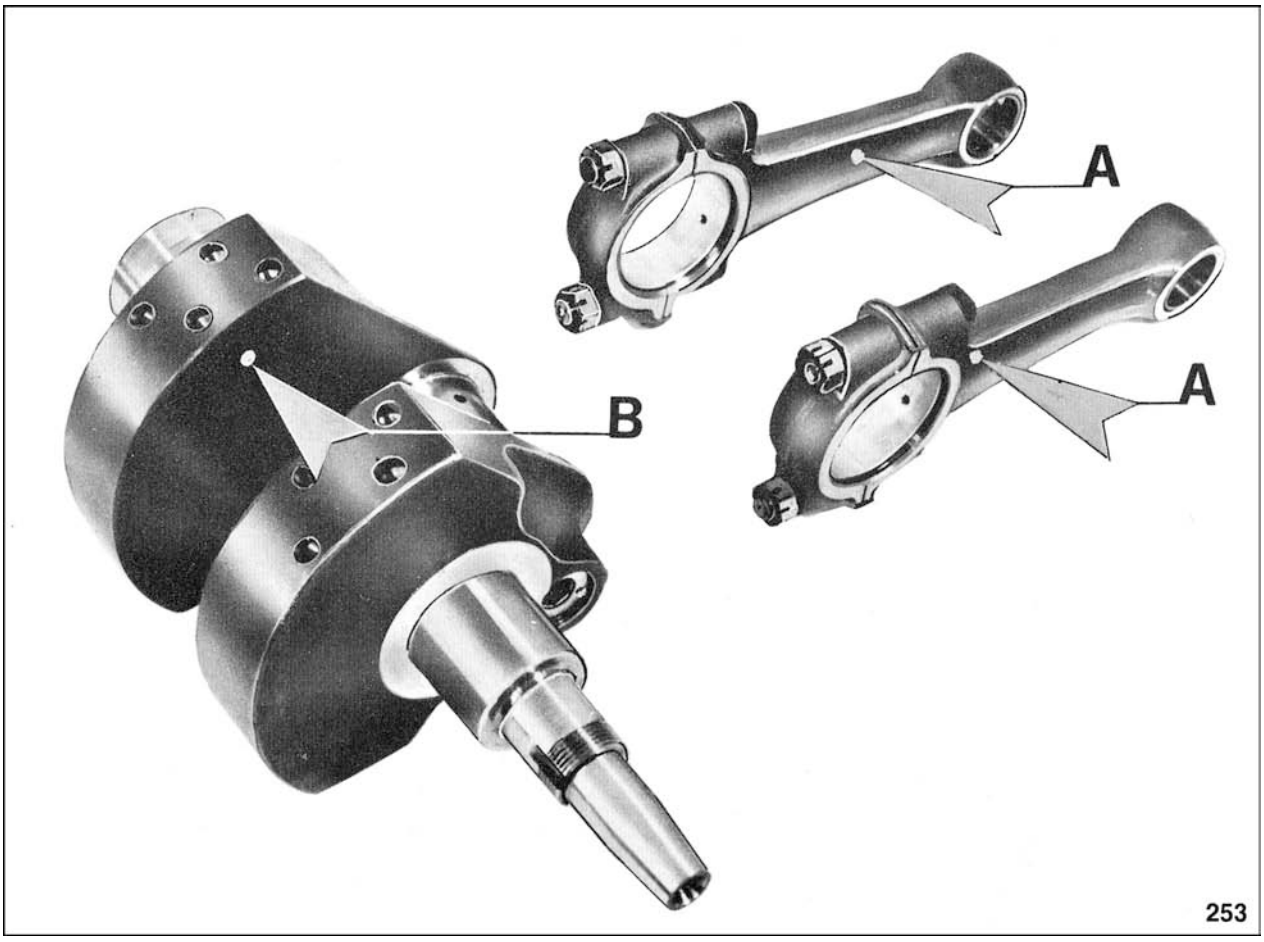
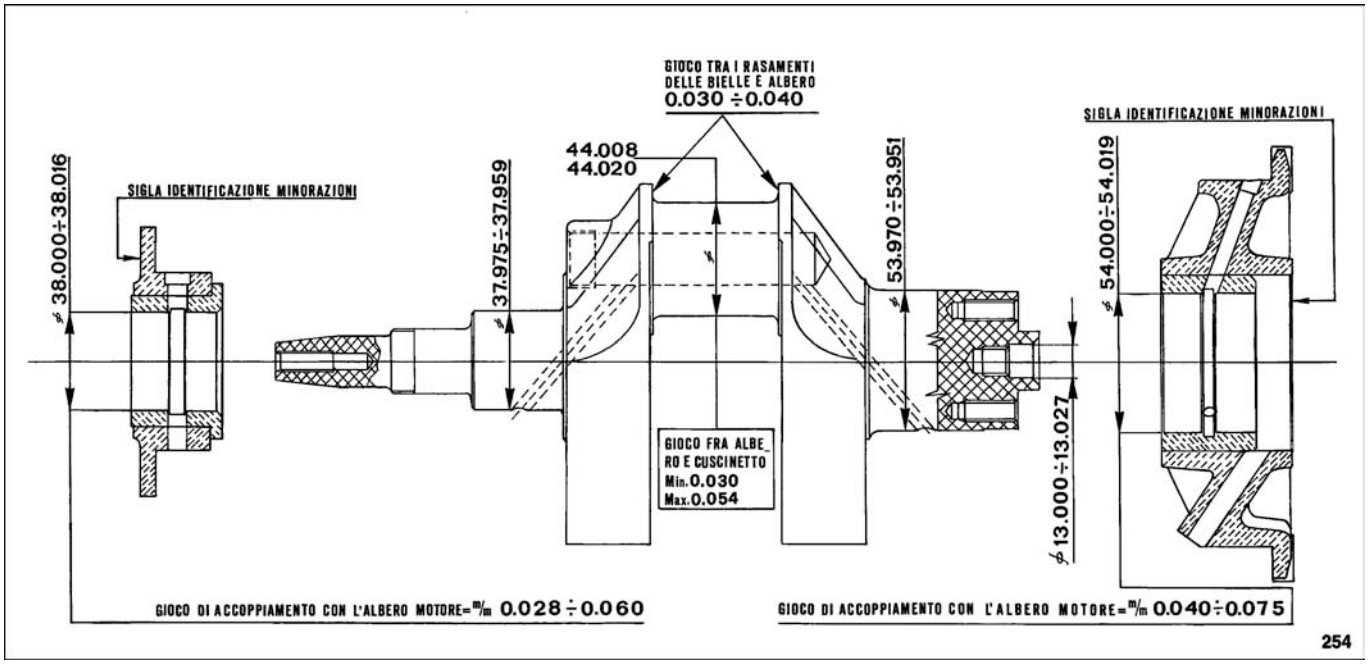
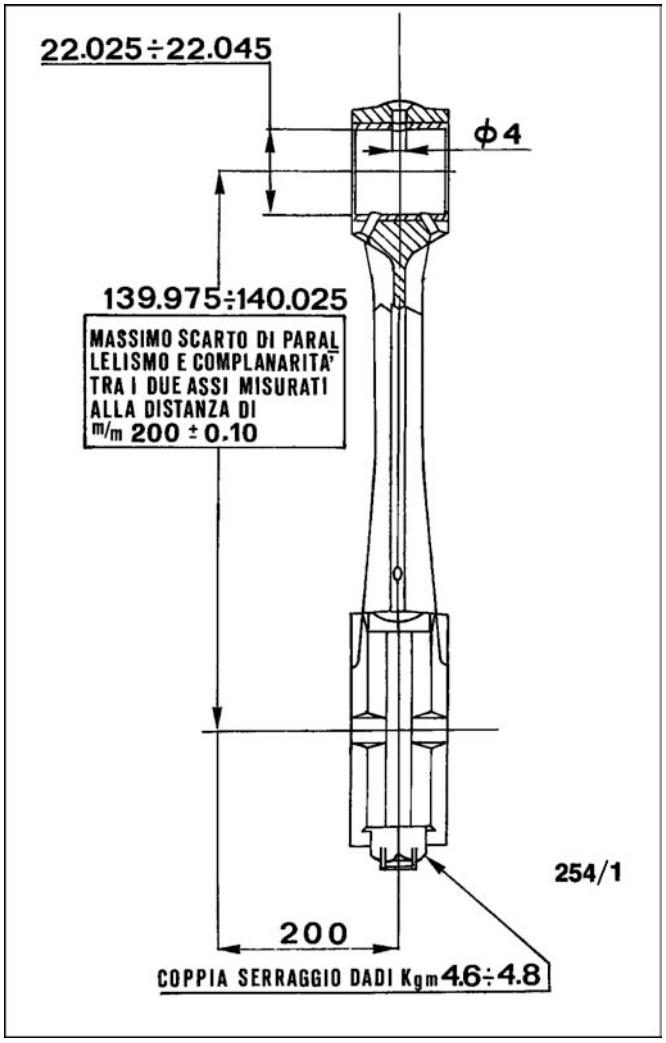

A
B
250

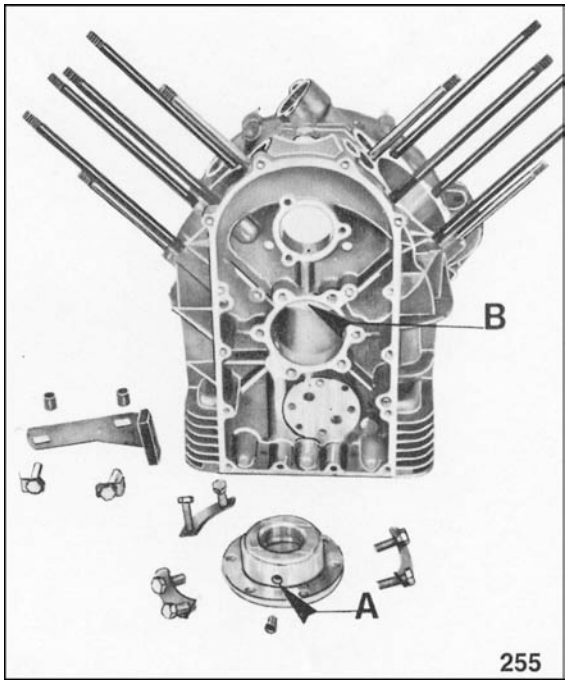

A
251

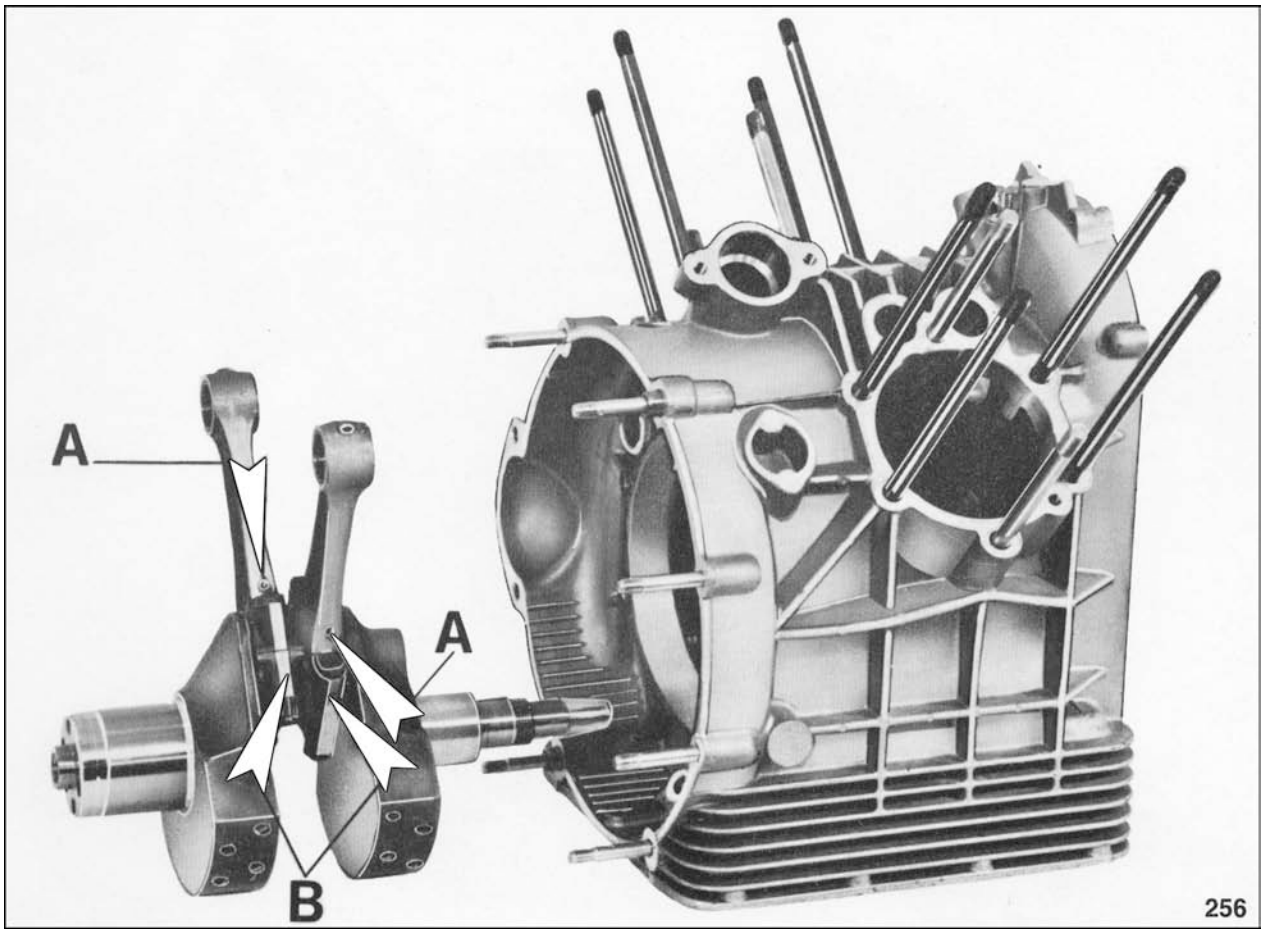

D
E
B
C
A
E
252

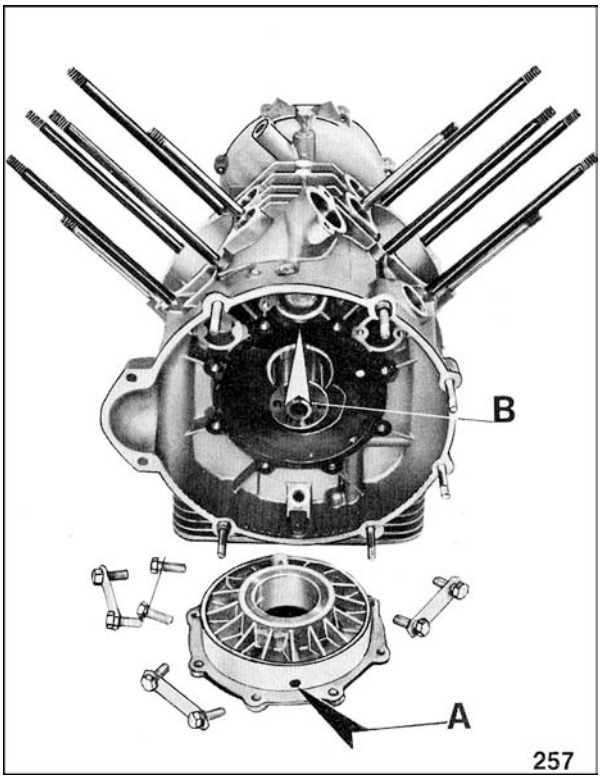

A
A
B
253

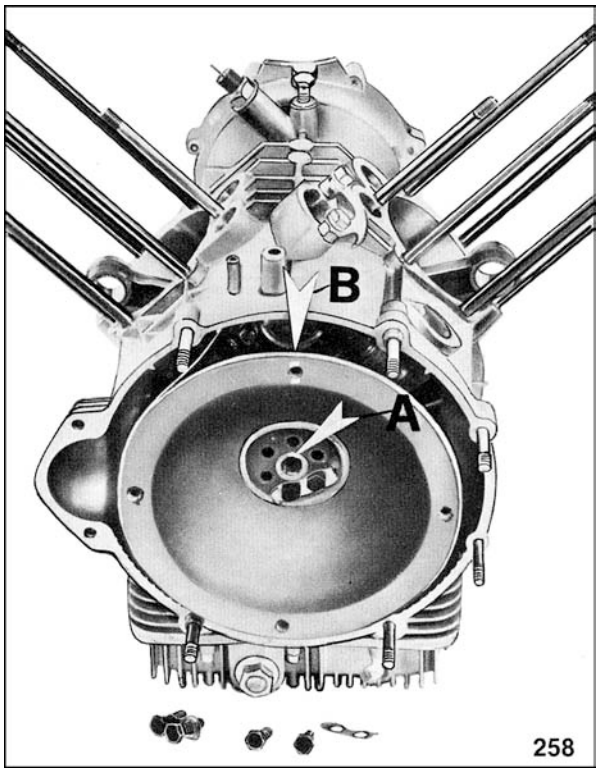

GIOCO TRA I RASAMENTI
DELLE BIELLE E ALBERO
0.030 ÷ 0.040
SIGLA IDENTIFICAZIONE MINORAZIONI
SIGLA IDENTIFICAZIONE MINORAZIONI
44.008
44.020
38.000÷38.016
37.975÷37.959
53.970÷53.951
54.000÷54.019
13.000÷13.027
GIOCO FRA ALBE-
RO E CUSCINETTO
Min. 0.030
Max. 0.054
GIOCO DI ACCOPPIAMENTO CON L'ALBERO MOTORE=m/m 0.028÷0.060
GIOCO DI ACCOPPIAMENTO CON L'ALBERO MOTORE=m/m 0.040÷0.075
254

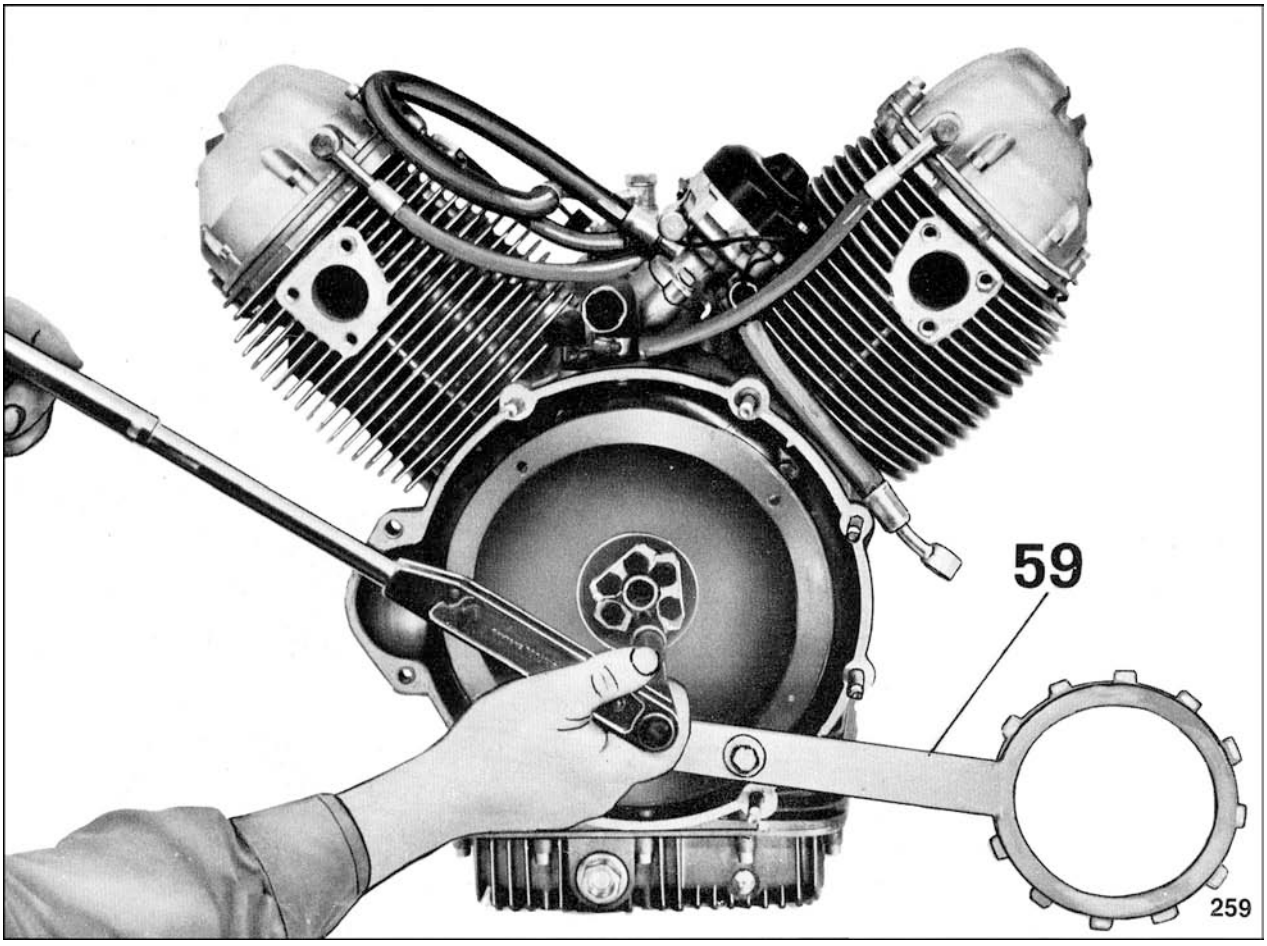

22.025÷22.045
ϕ4
139.975÷140.025
MASSIMO SCARTO DI PARALLELISMO E COMPLANARITA' TRA I DUE ASSI MISURATI ALLA DISTANZA DI m/m 200 ± 0.10
254/1
200
COPPIA SERRAGGIO DADI Kgm 4.6÷4.8

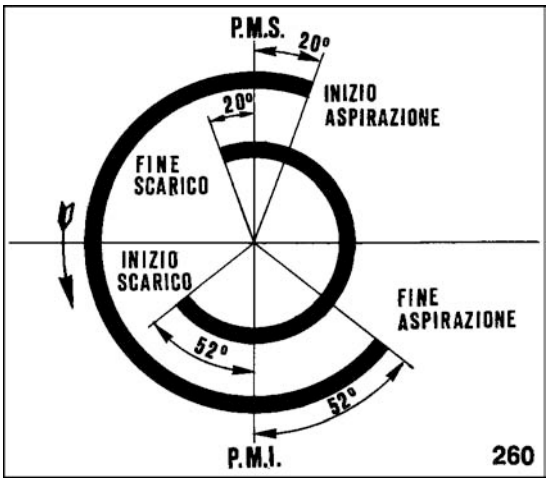

B
A
255

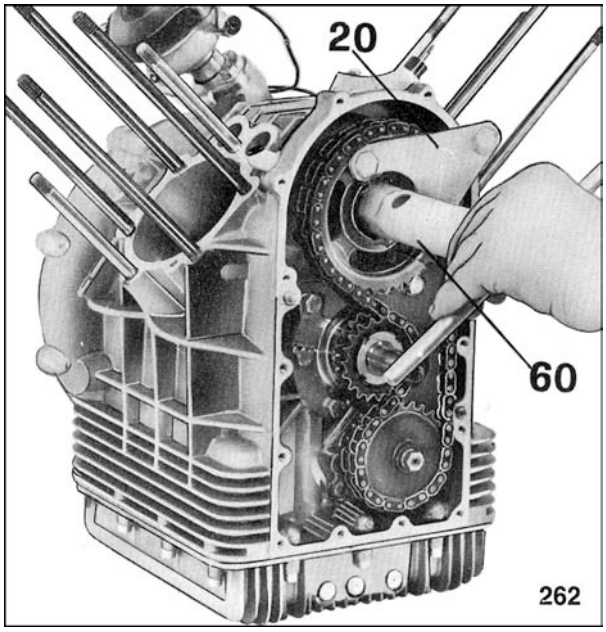

A
A
B
256


B
A
257


B
A
258


59
259


P.M.S.
20°
20°
INIZIO
ASPIRAZIONE
FINE
SCARICO
INIZIO
SCARICO
FINE
ASPIRAZIONE
52°
52°
P.M.I.
260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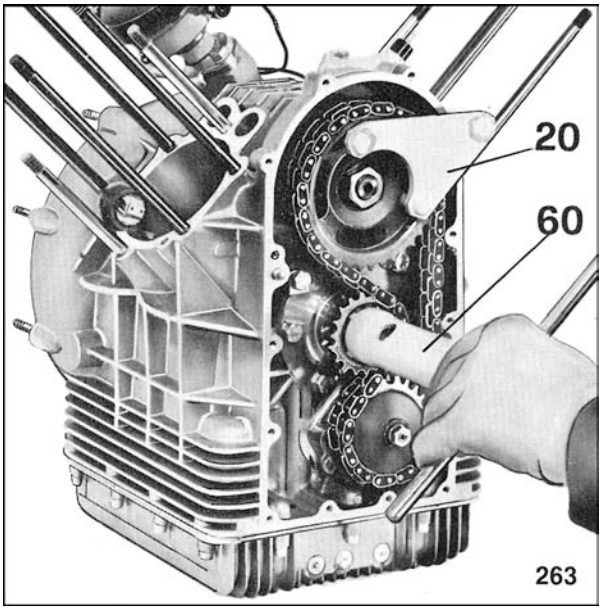
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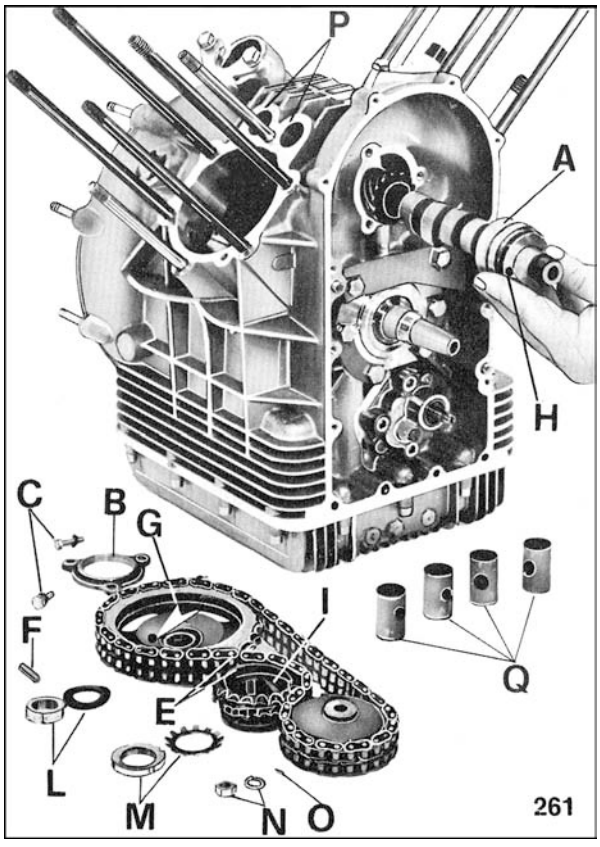
P
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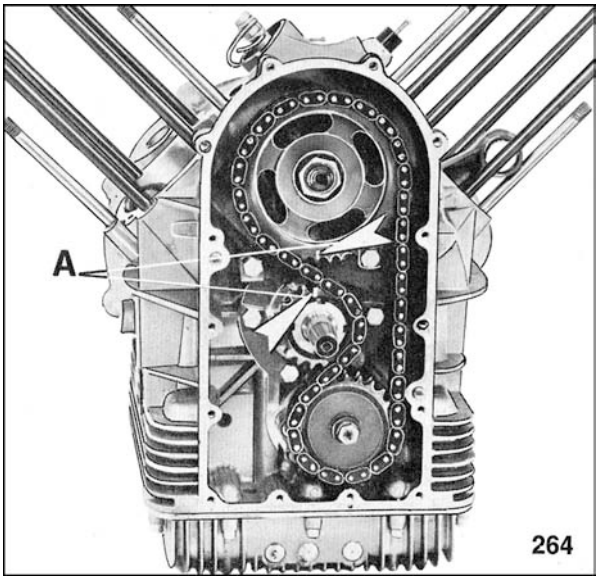
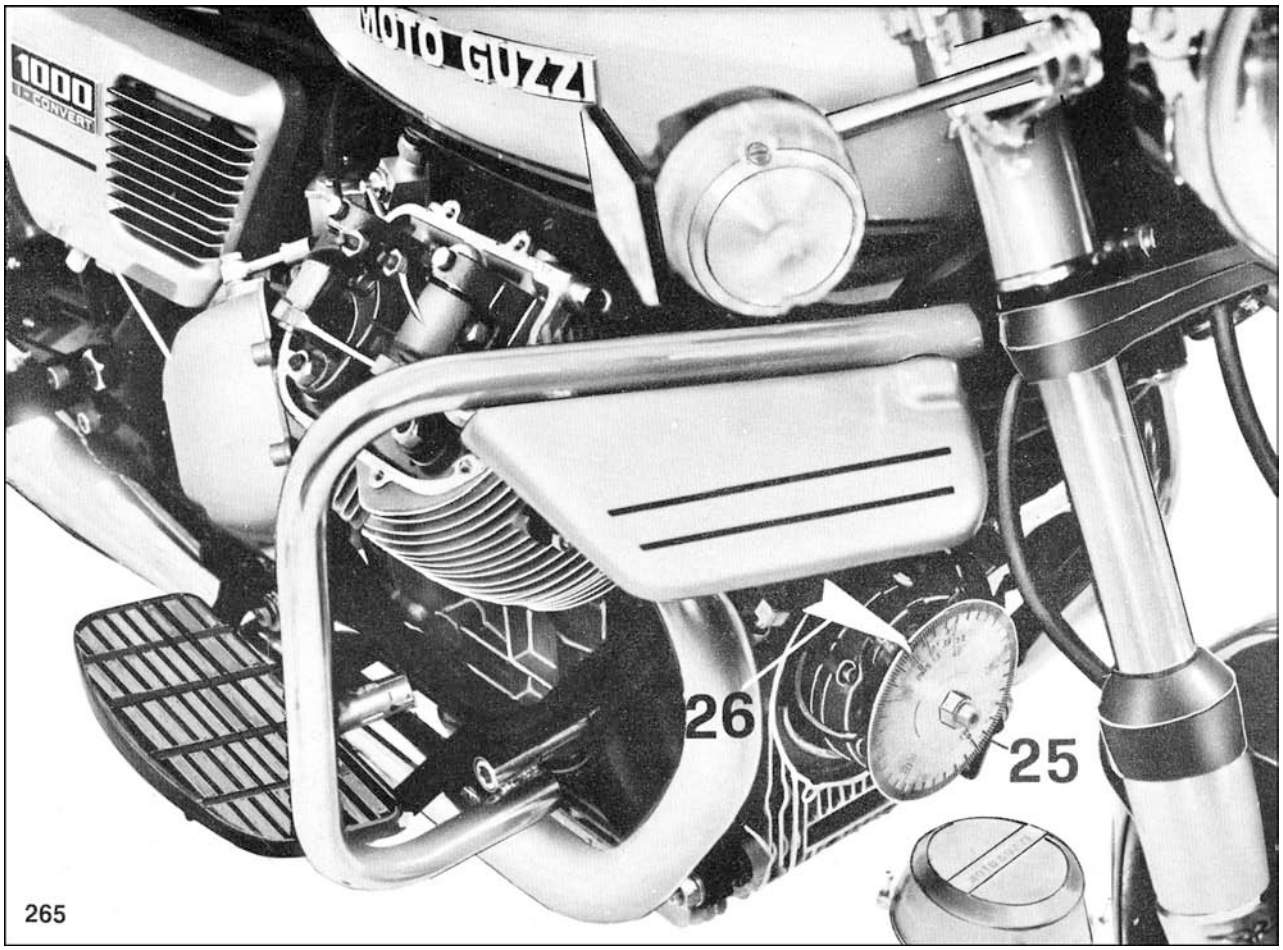
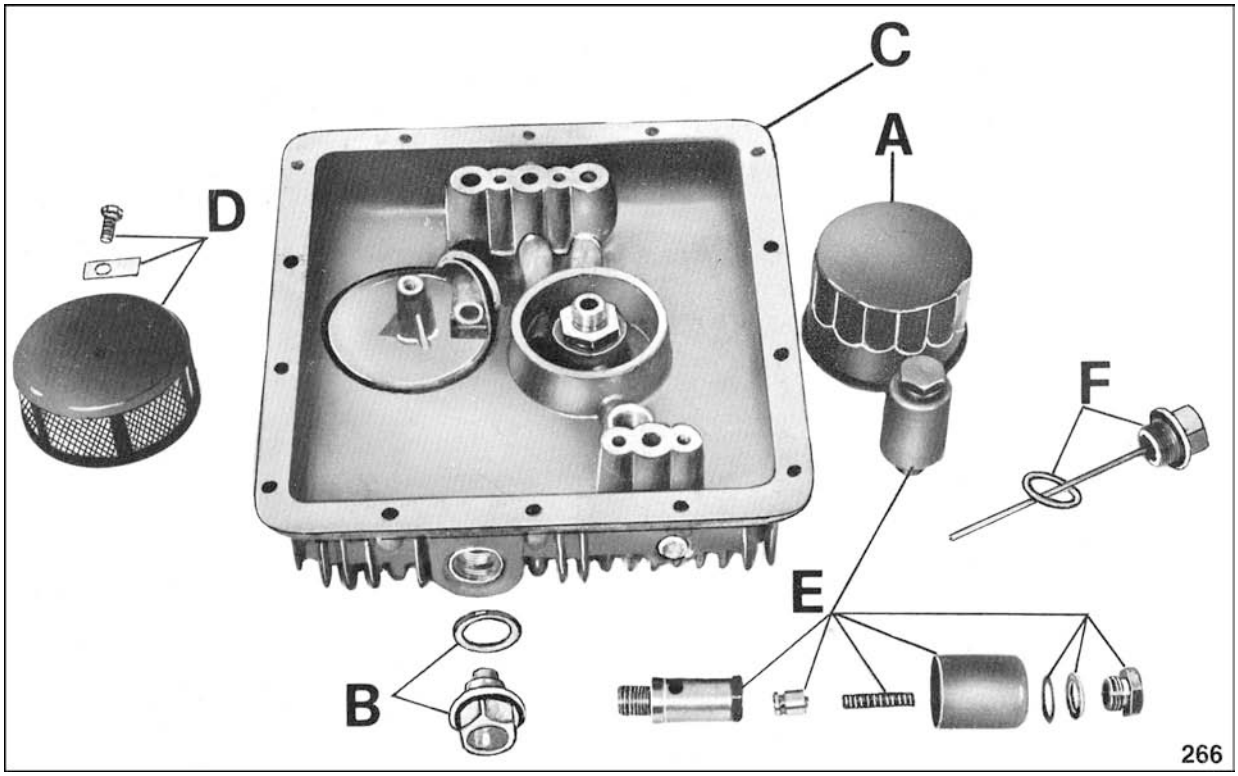
261


A
264


MOTO GUZZI
1000
26
25
265


C
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E
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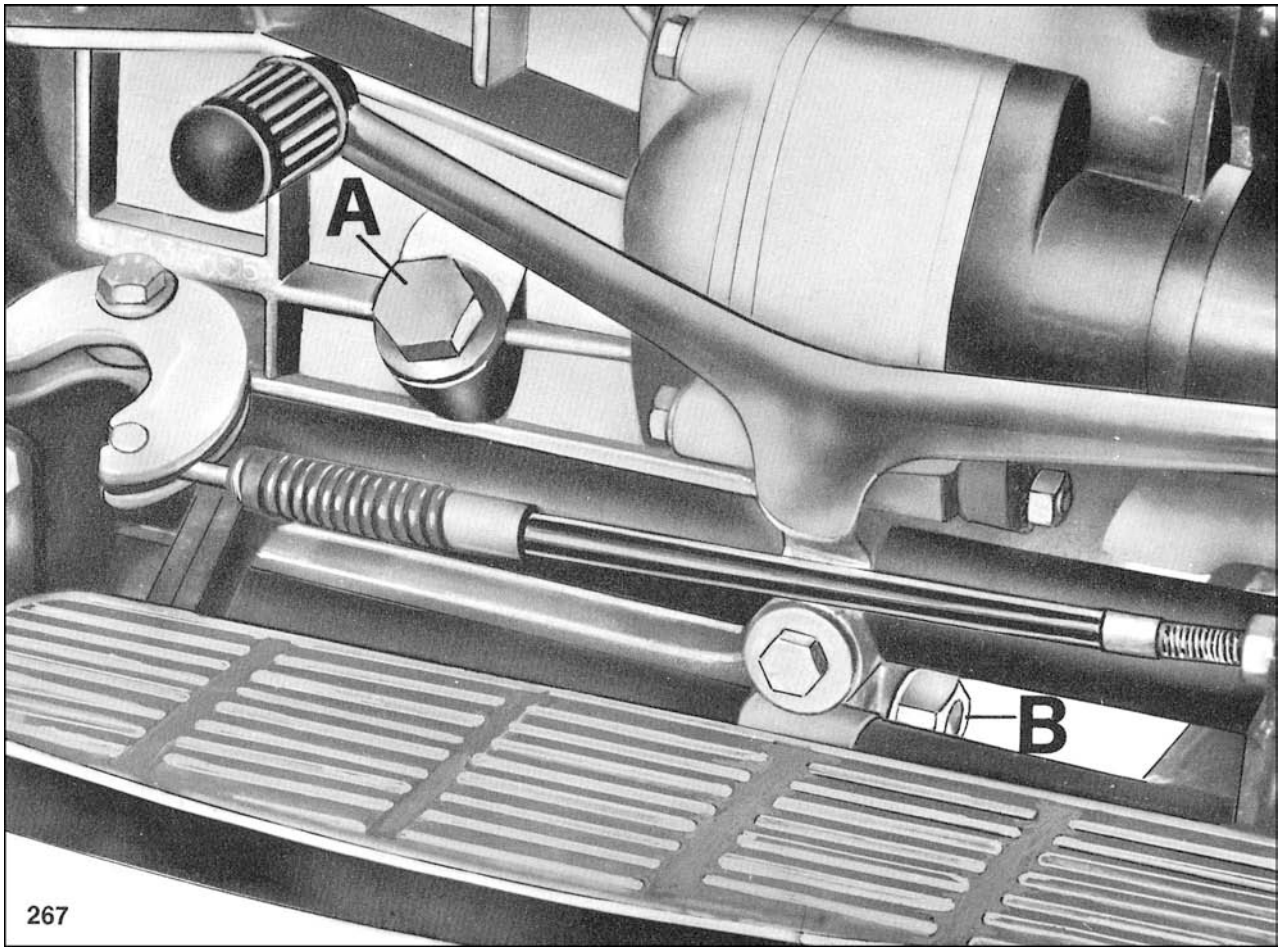
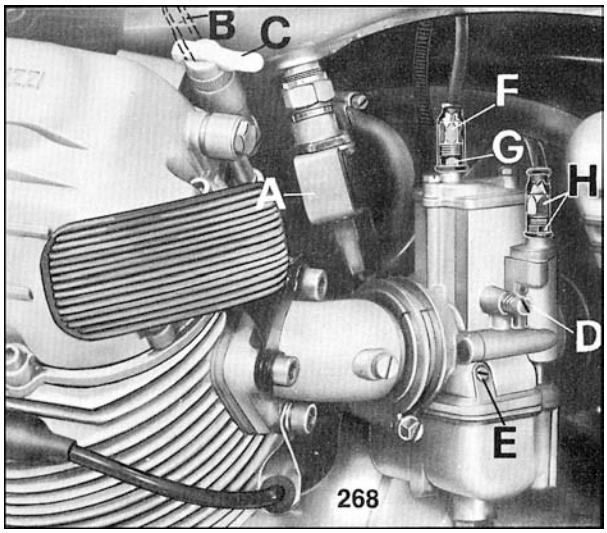
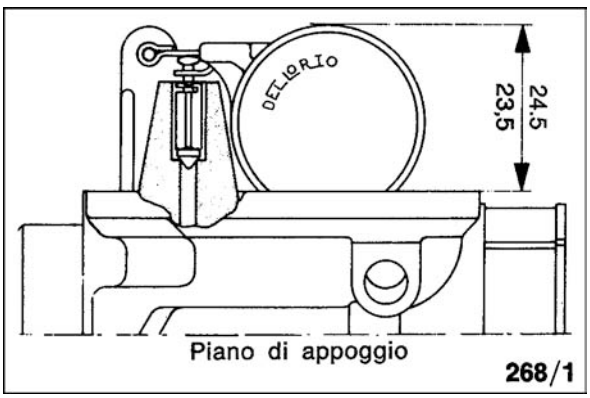
266



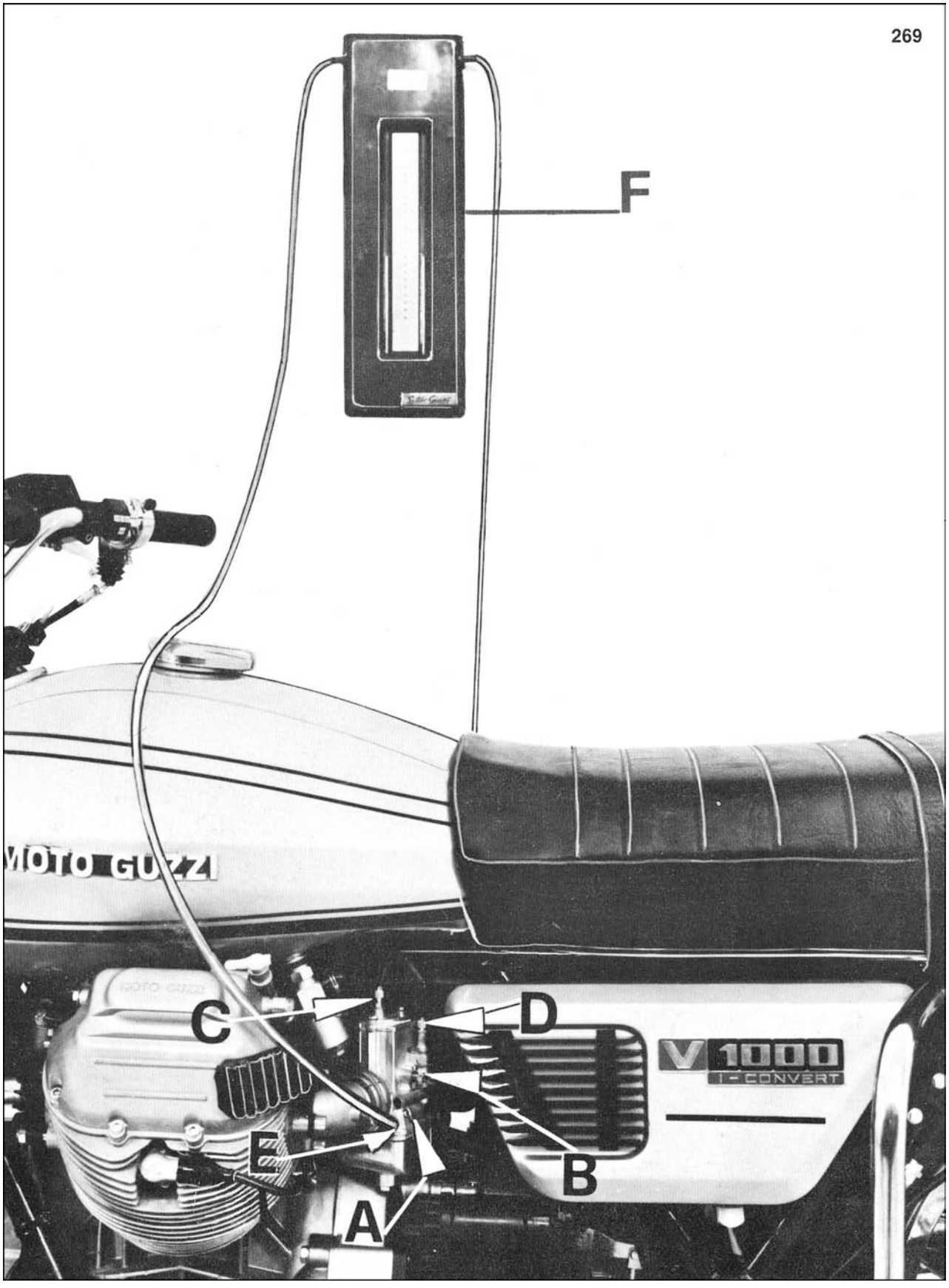
267



268



268/1


269
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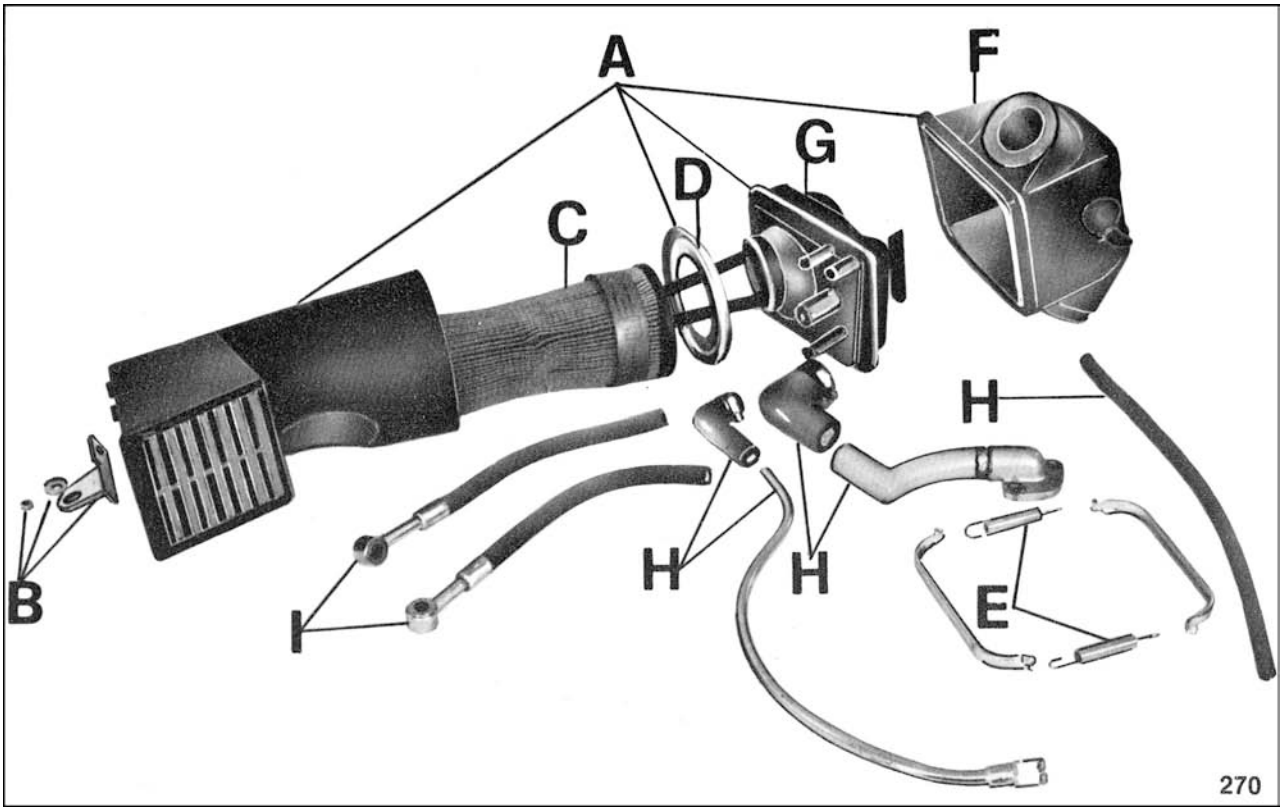
V 1000
I - CONVERT


A
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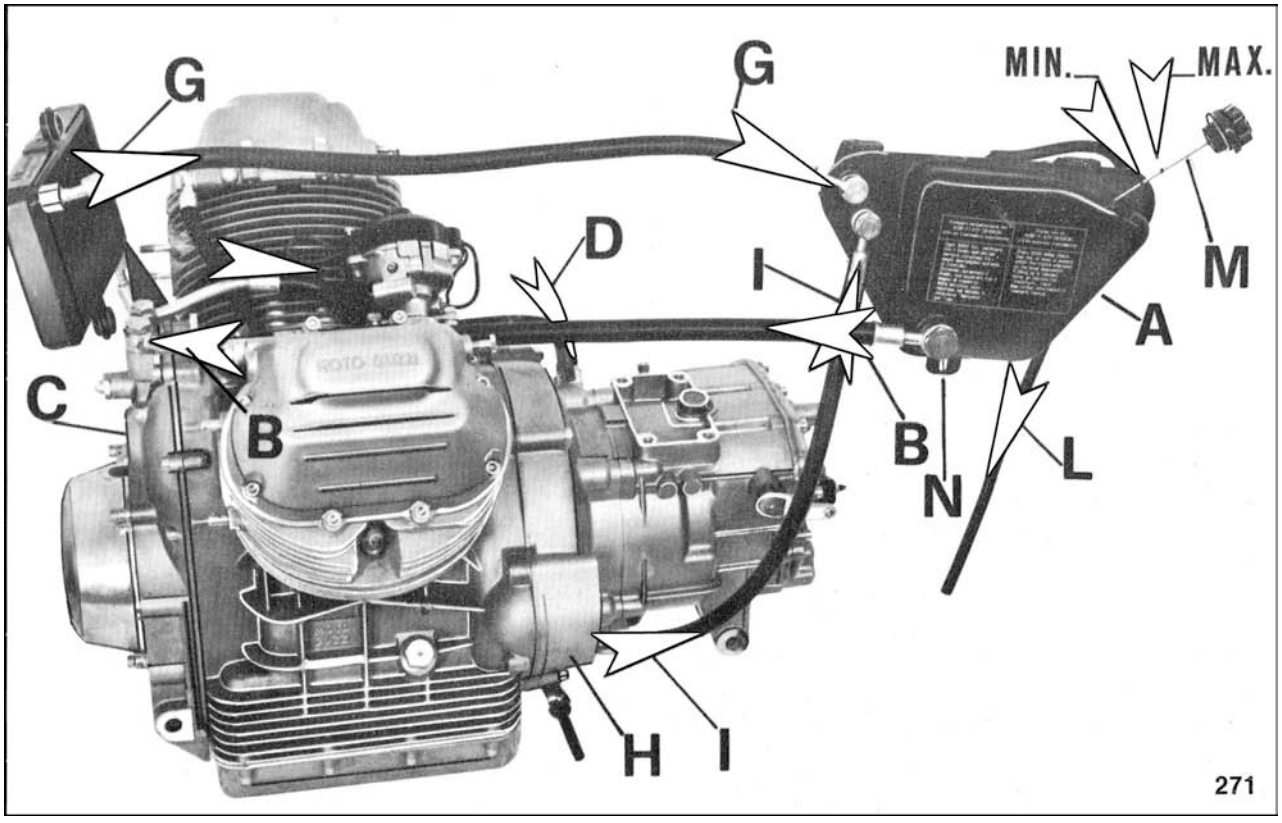
270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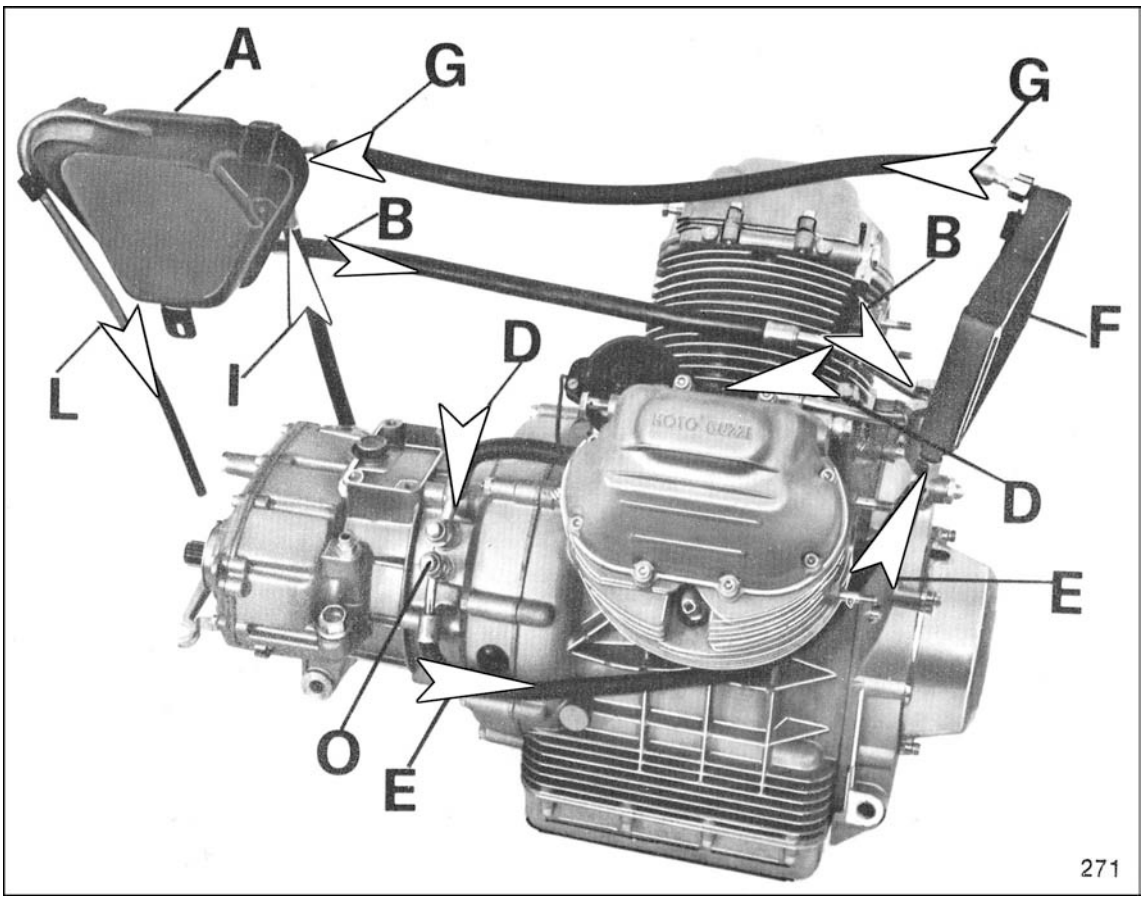
271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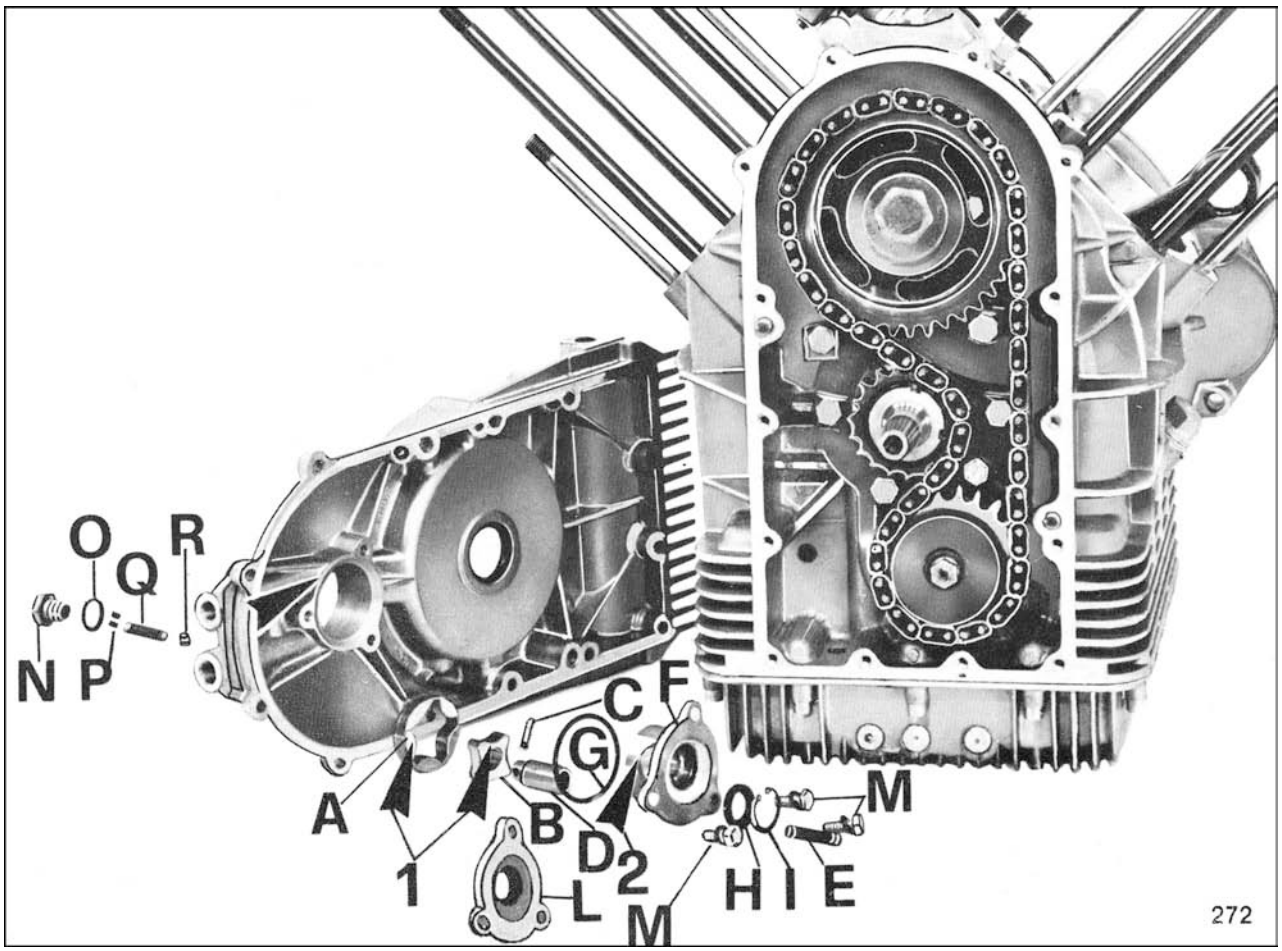
271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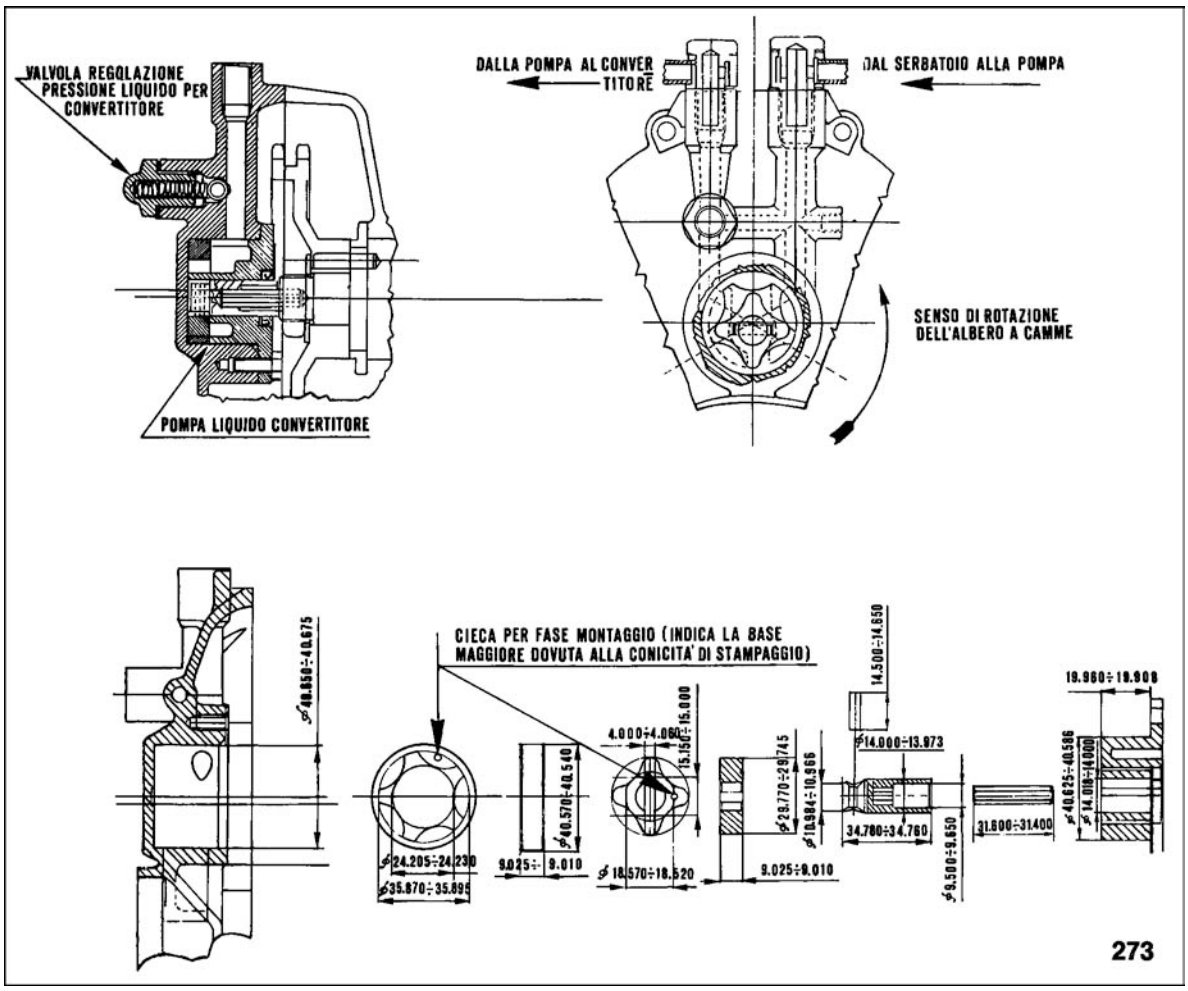
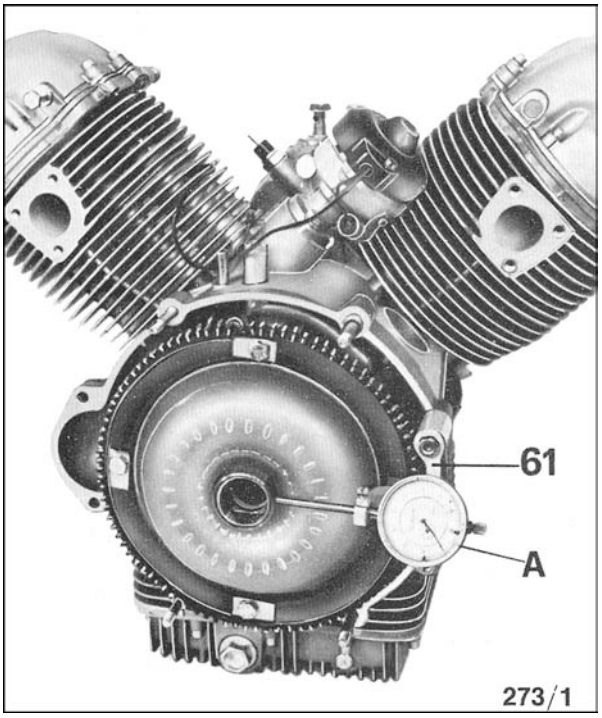
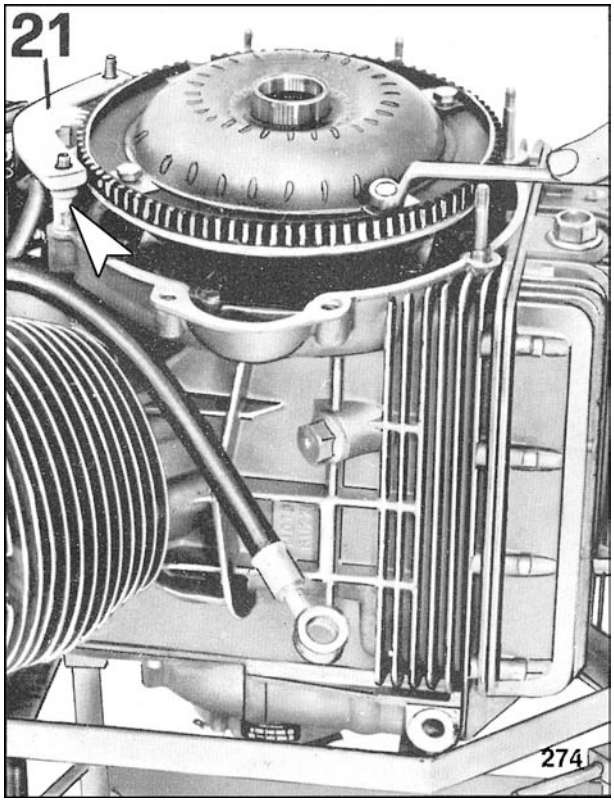
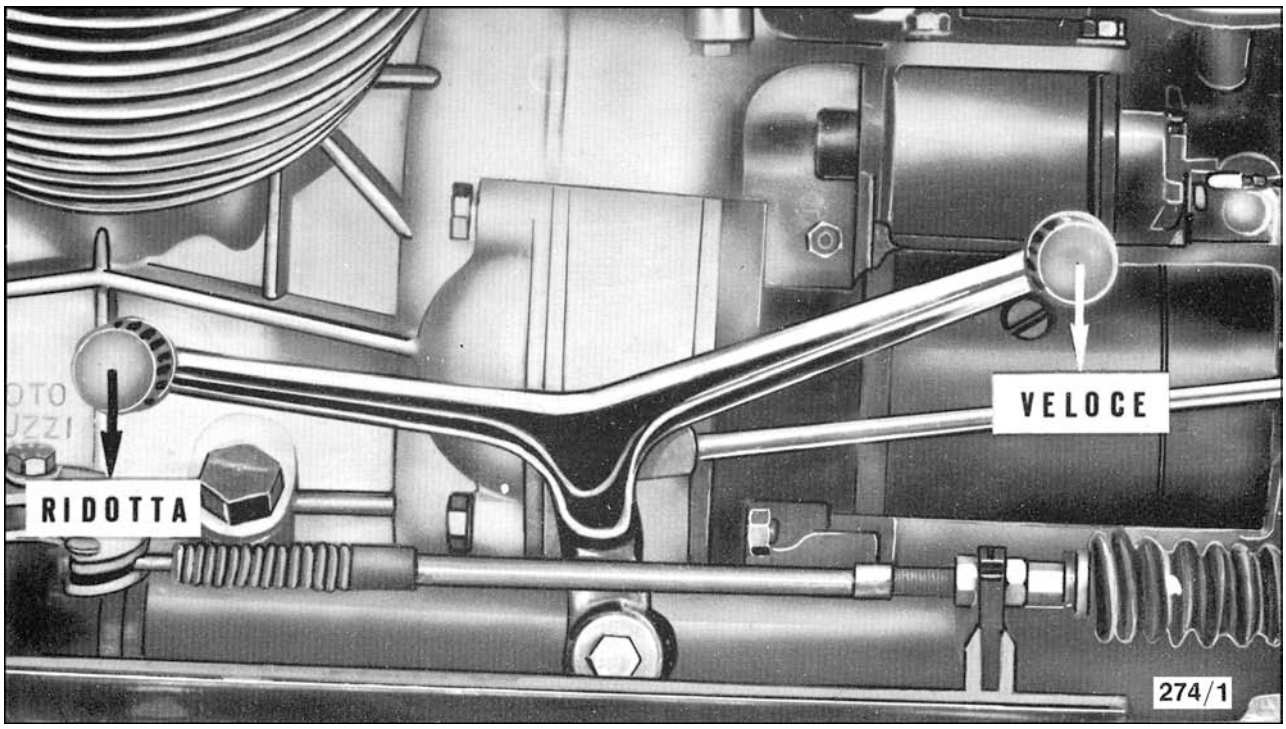
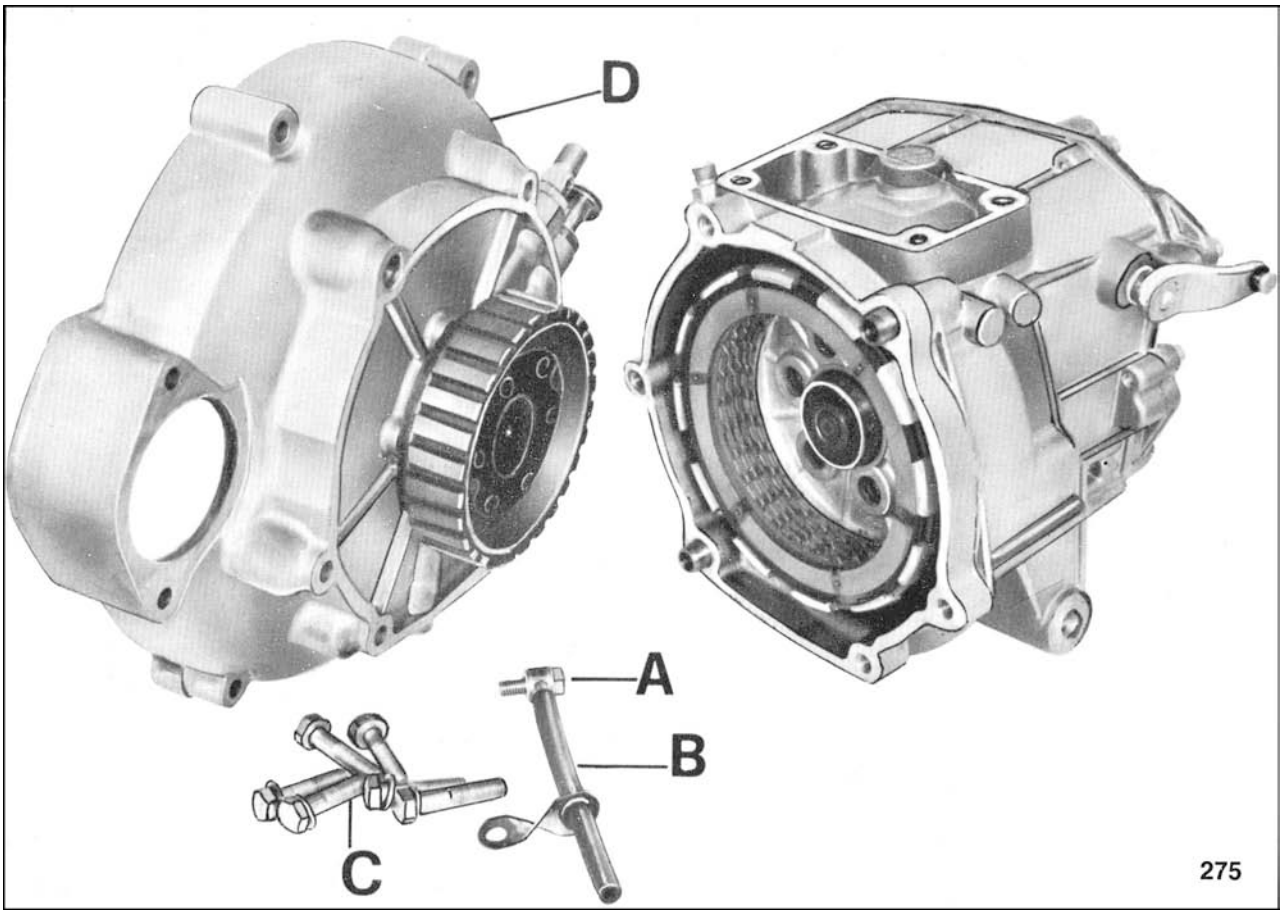
272


VALVOLA REGOLAZIONE PRESSIONE LIQUIDO PER CONVERTITORE
DALLA POMPA AL CONVER TITORE
DAL SERBATOIO ALLA POMPA
SENSO DI ROTAZIONE DELL'ALBERO A CAMME
POMPA LIQUIDO CONVERTITORE
CIECA PER FASE MONTAGGIO (INDICA LA BASE MAGGIORE DOVUTA ALLA CONICITA' DI STAMPAGGIO)
273


61
A
273/1


21
274


RIDOTTA
VELOCE
274/1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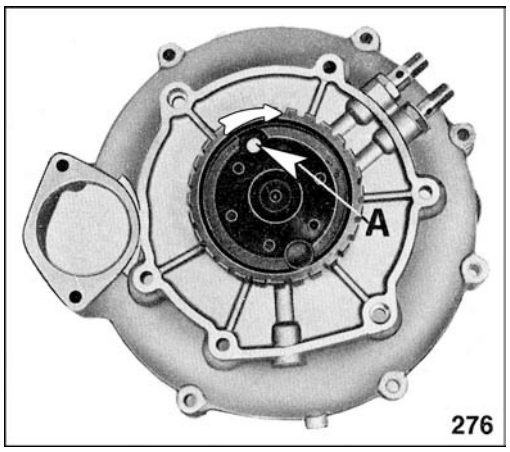
275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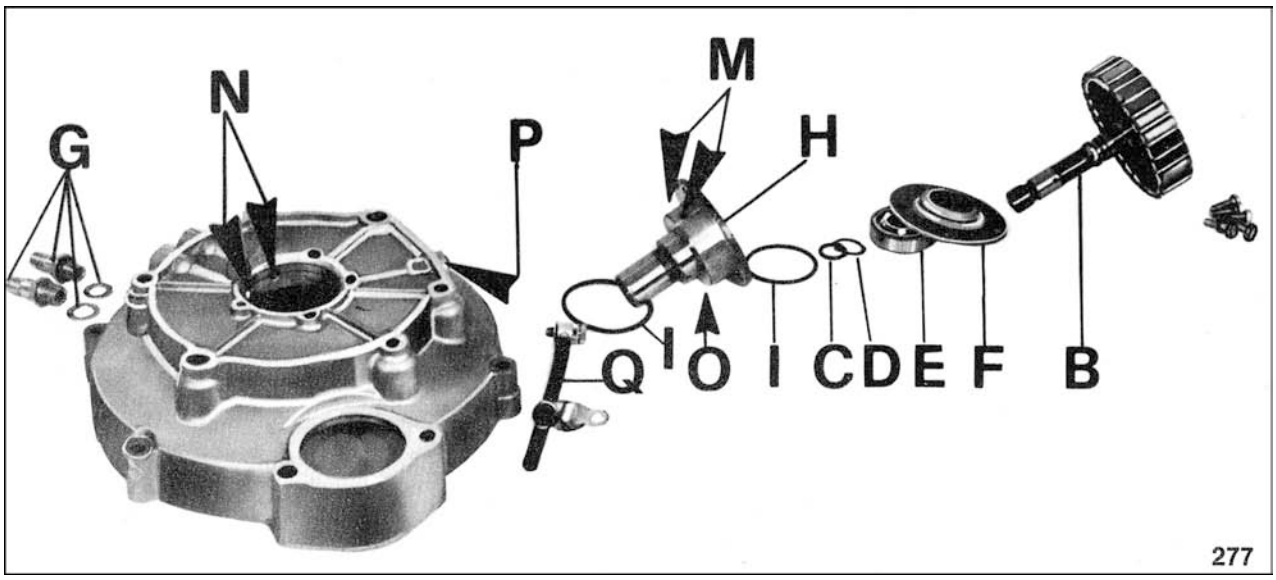
276


G
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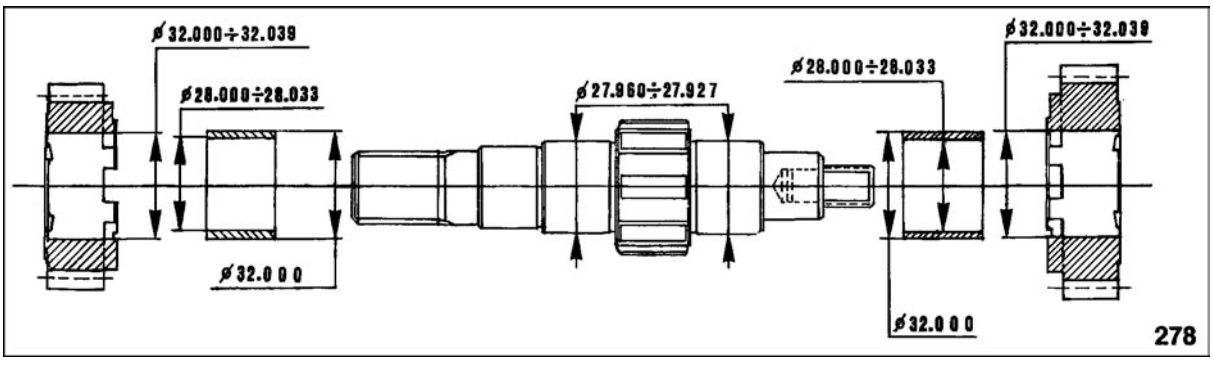
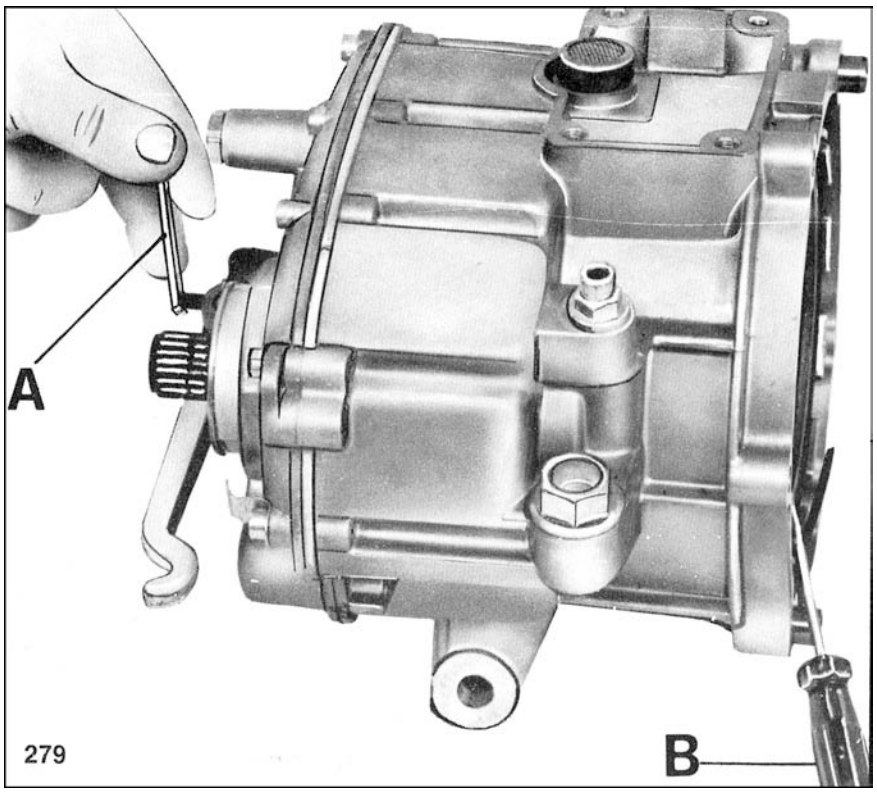
277


ø32.000÷32.039
ø28.000÷28.033
ø27.960÷27.927
ø28.000÷28.033
ø32.000÷32.039
ø32.000
ø32.000
278


A
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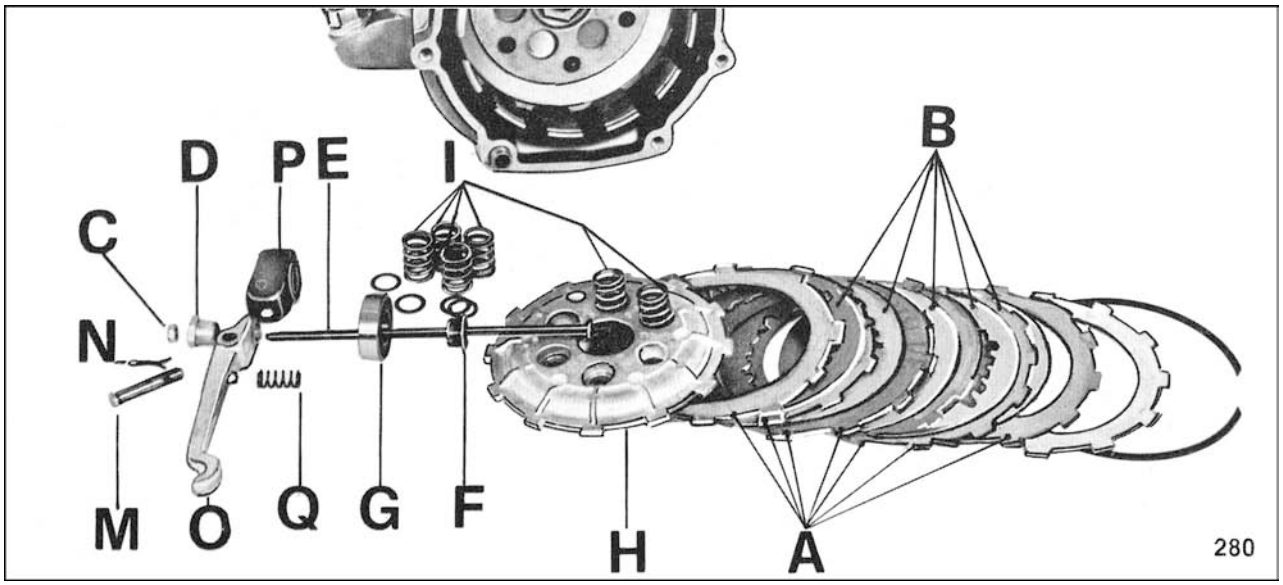
279


D
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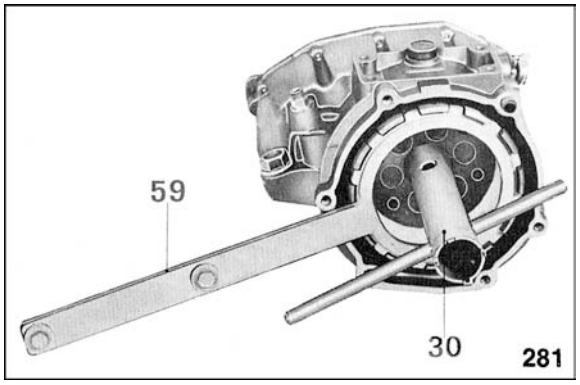
280


59
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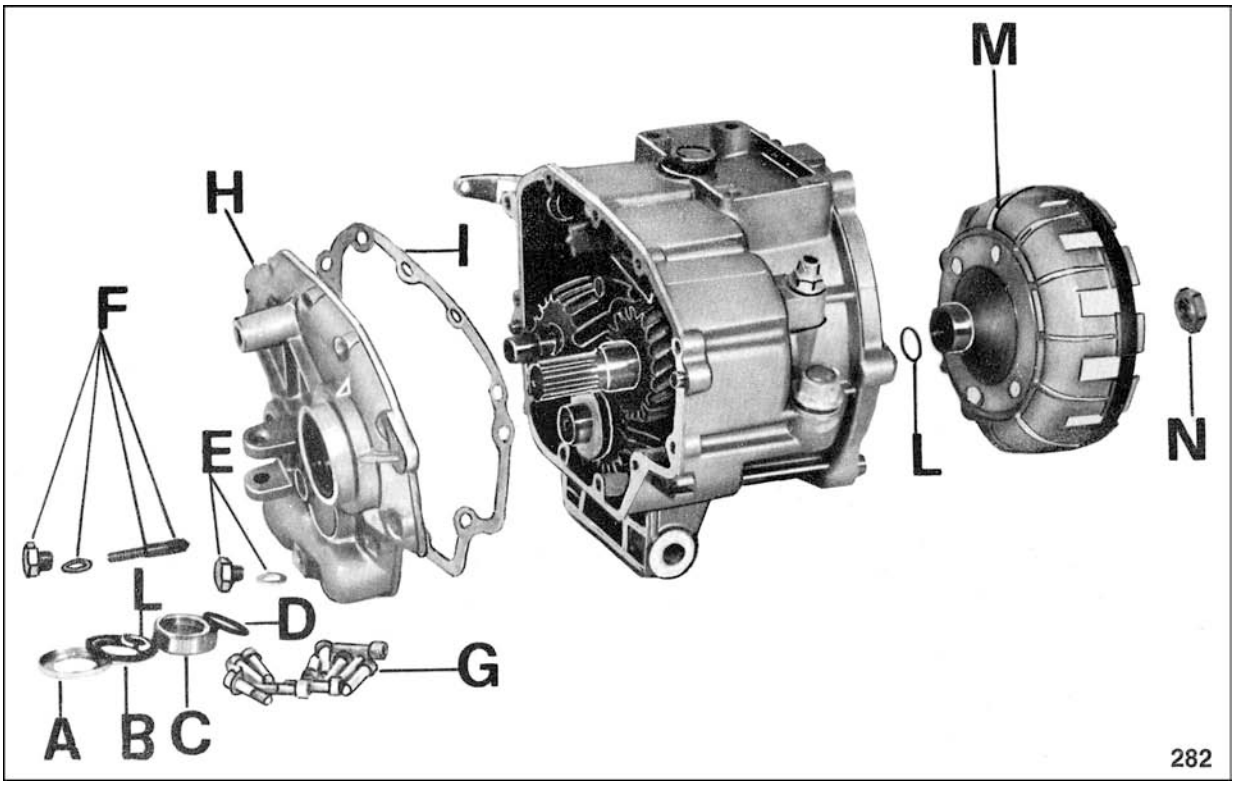
281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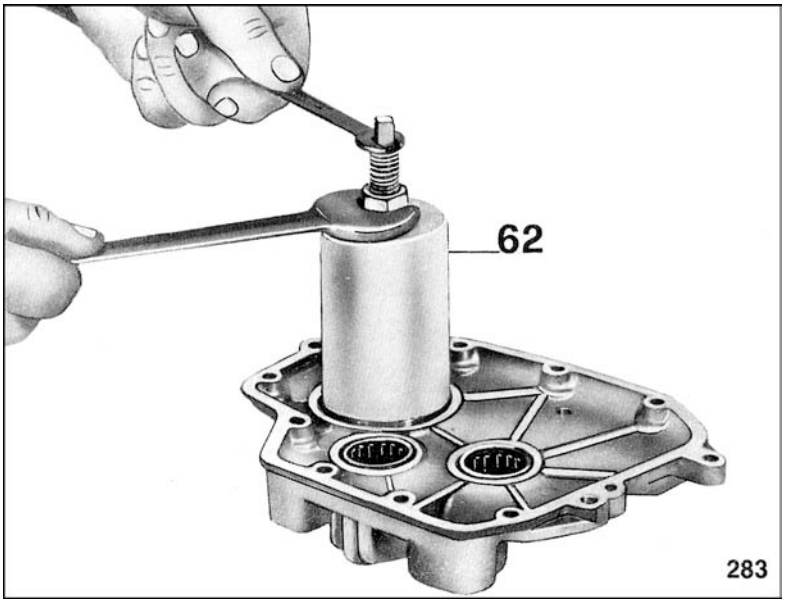
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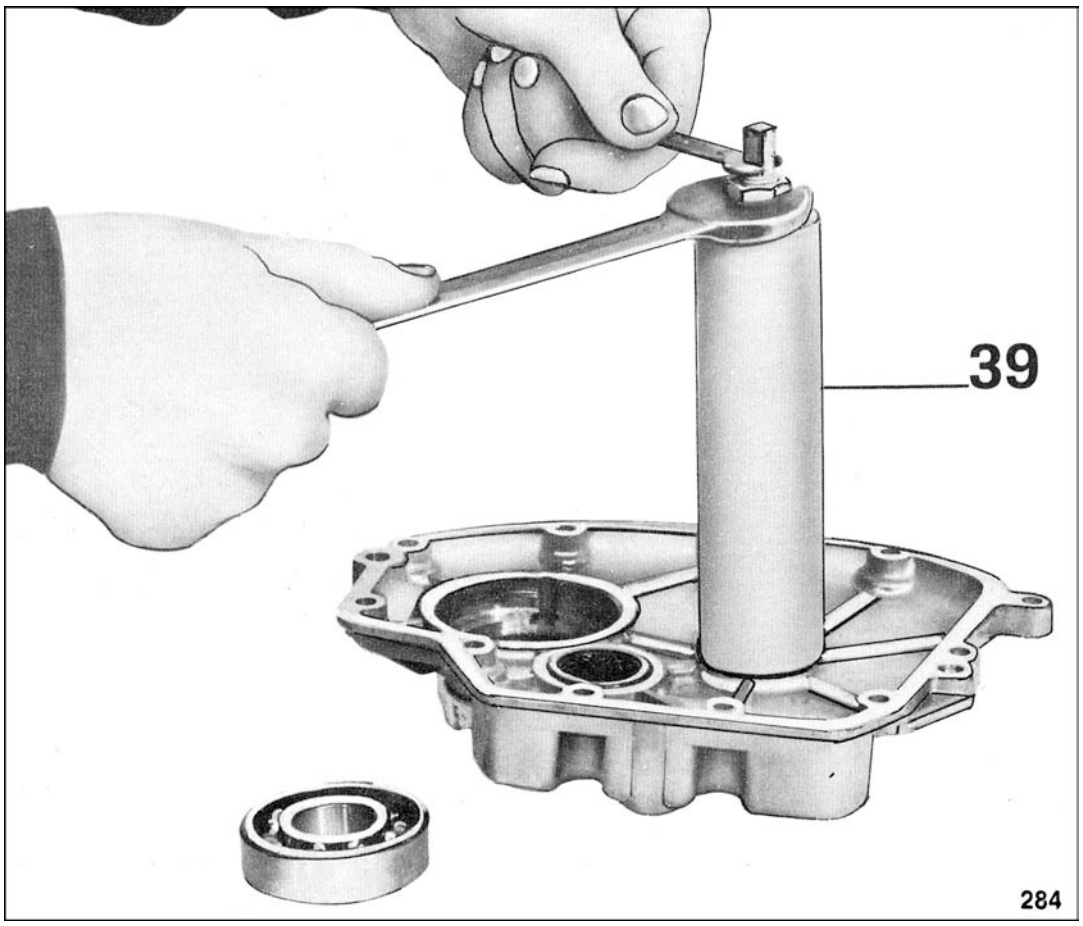
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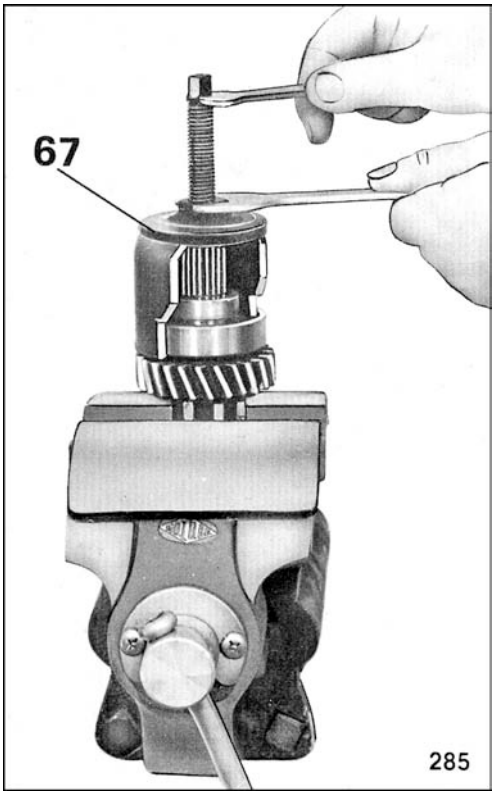
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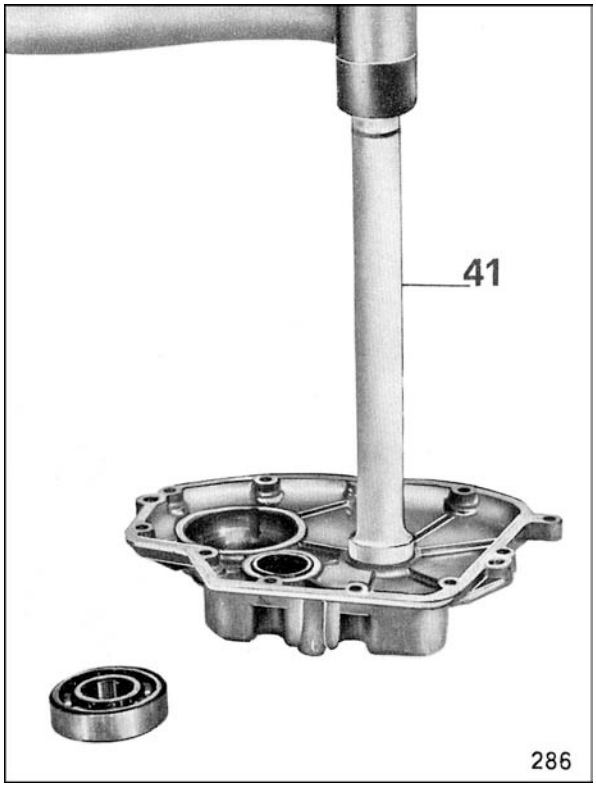
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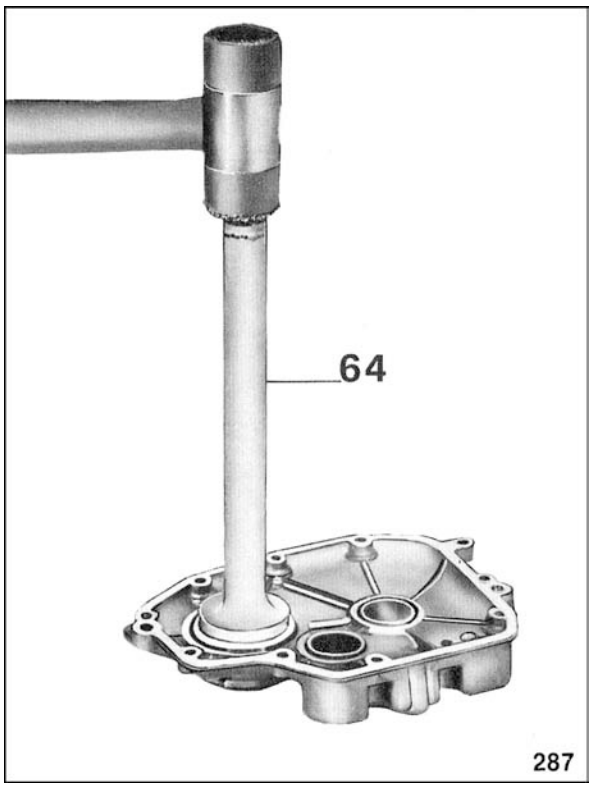
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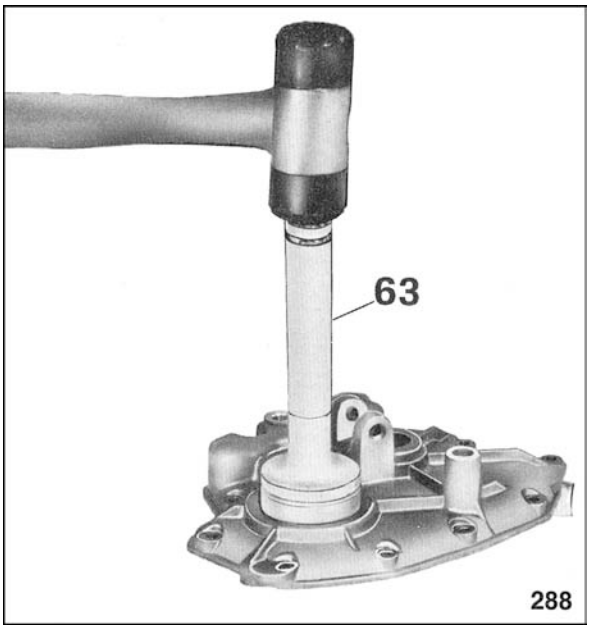
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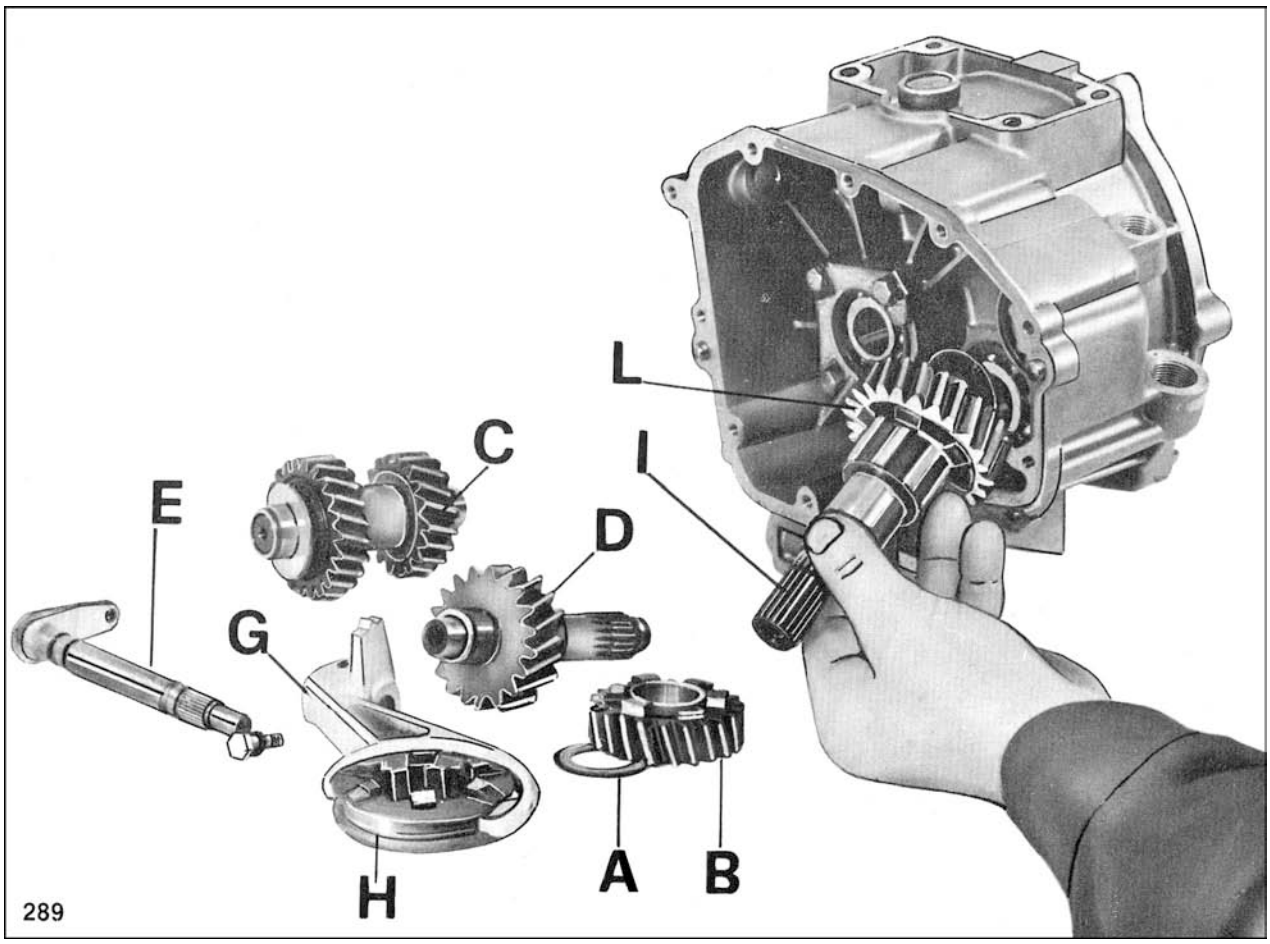
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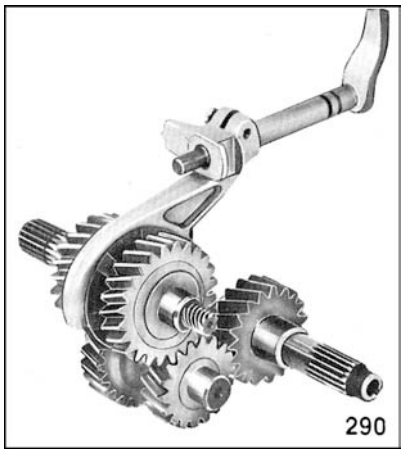
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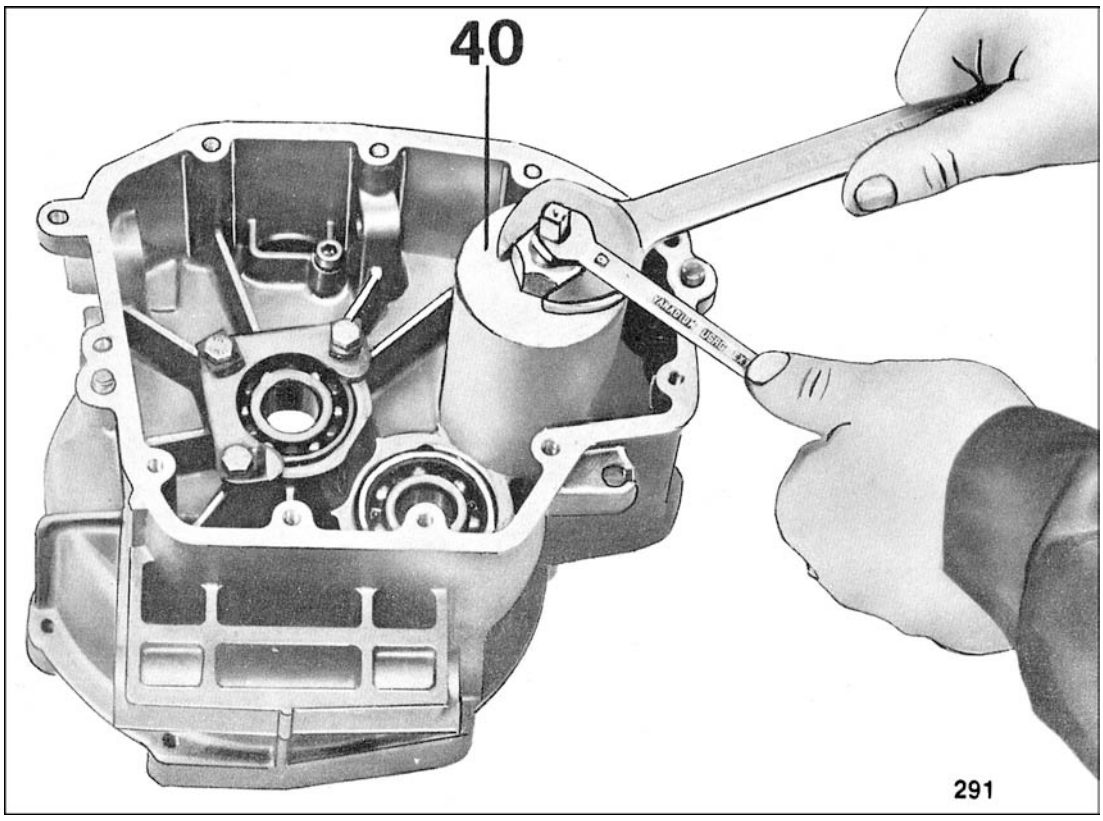
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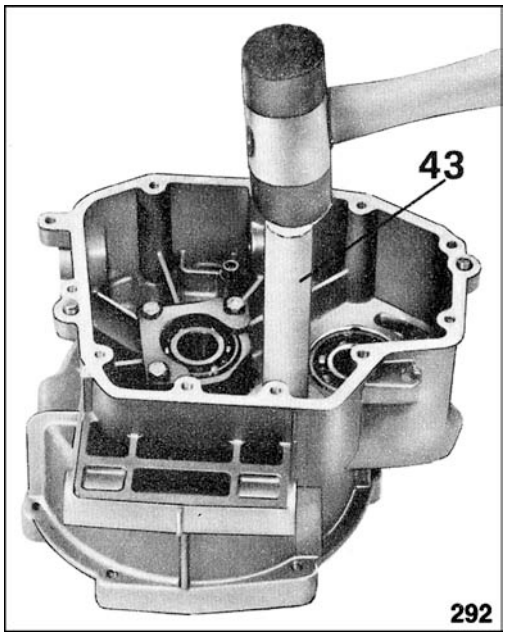
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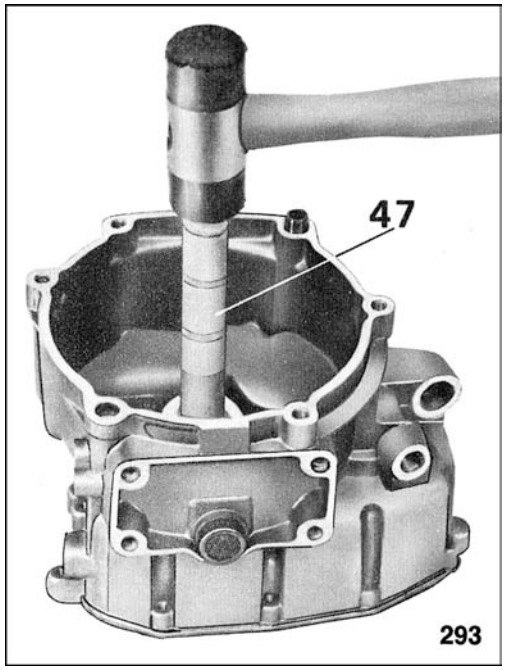
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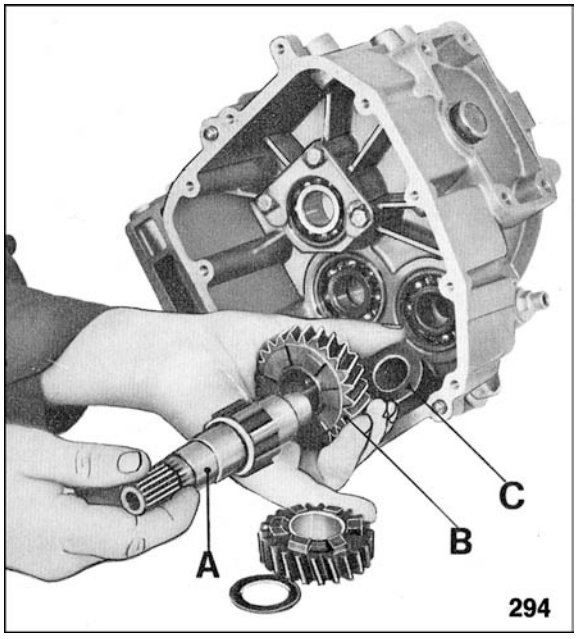
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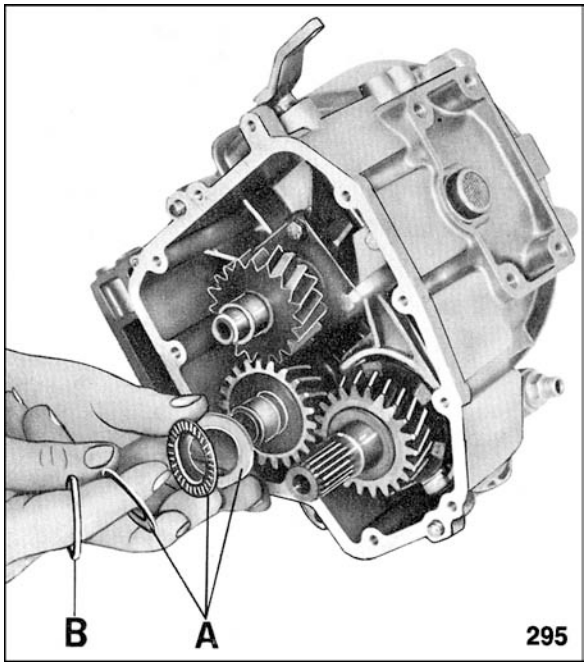
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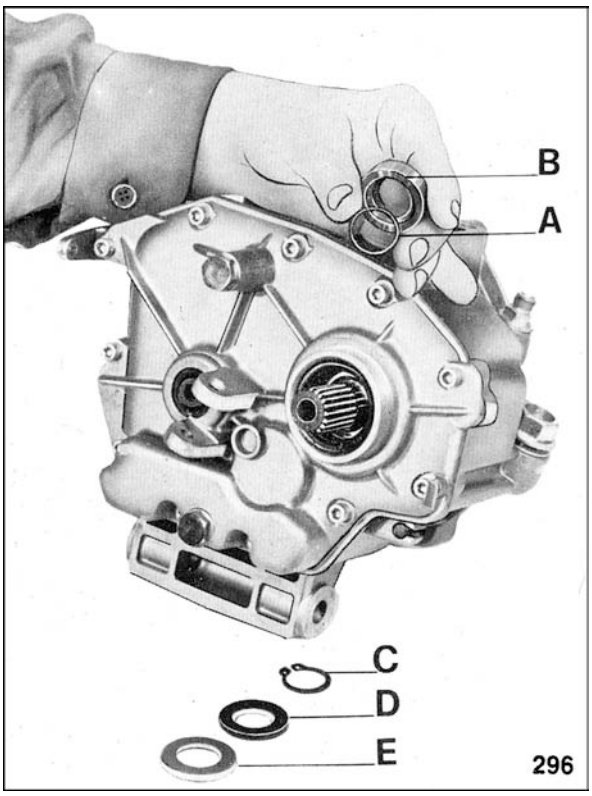
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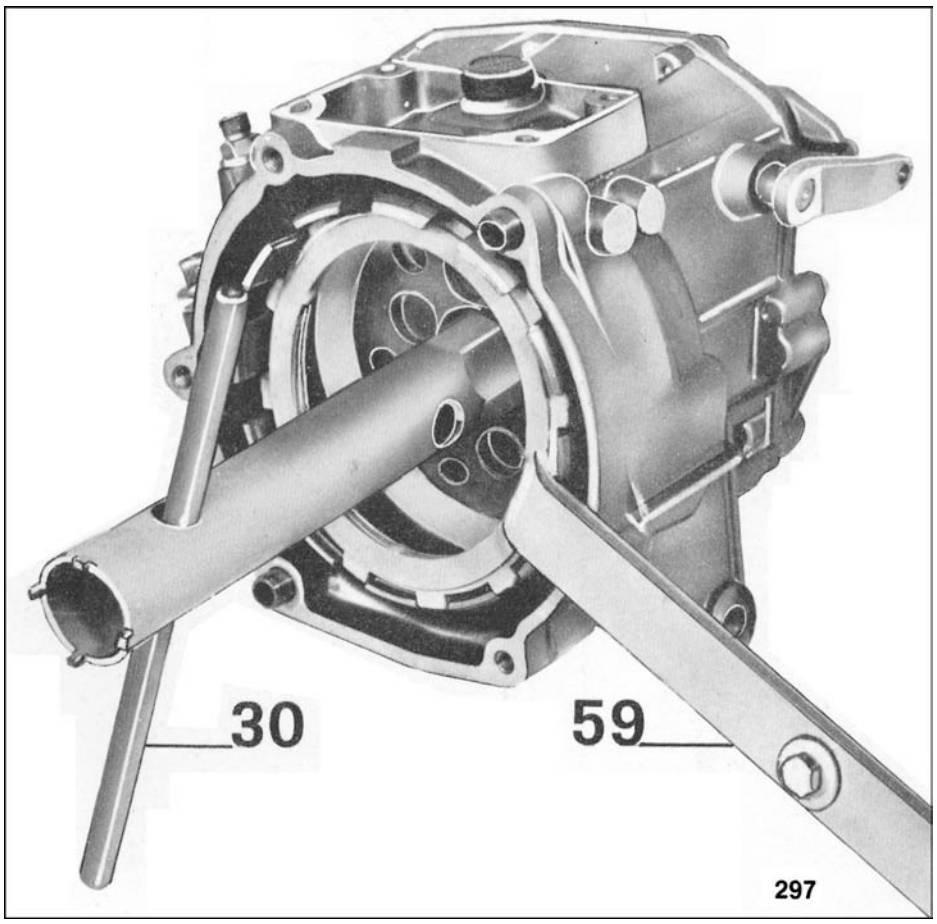
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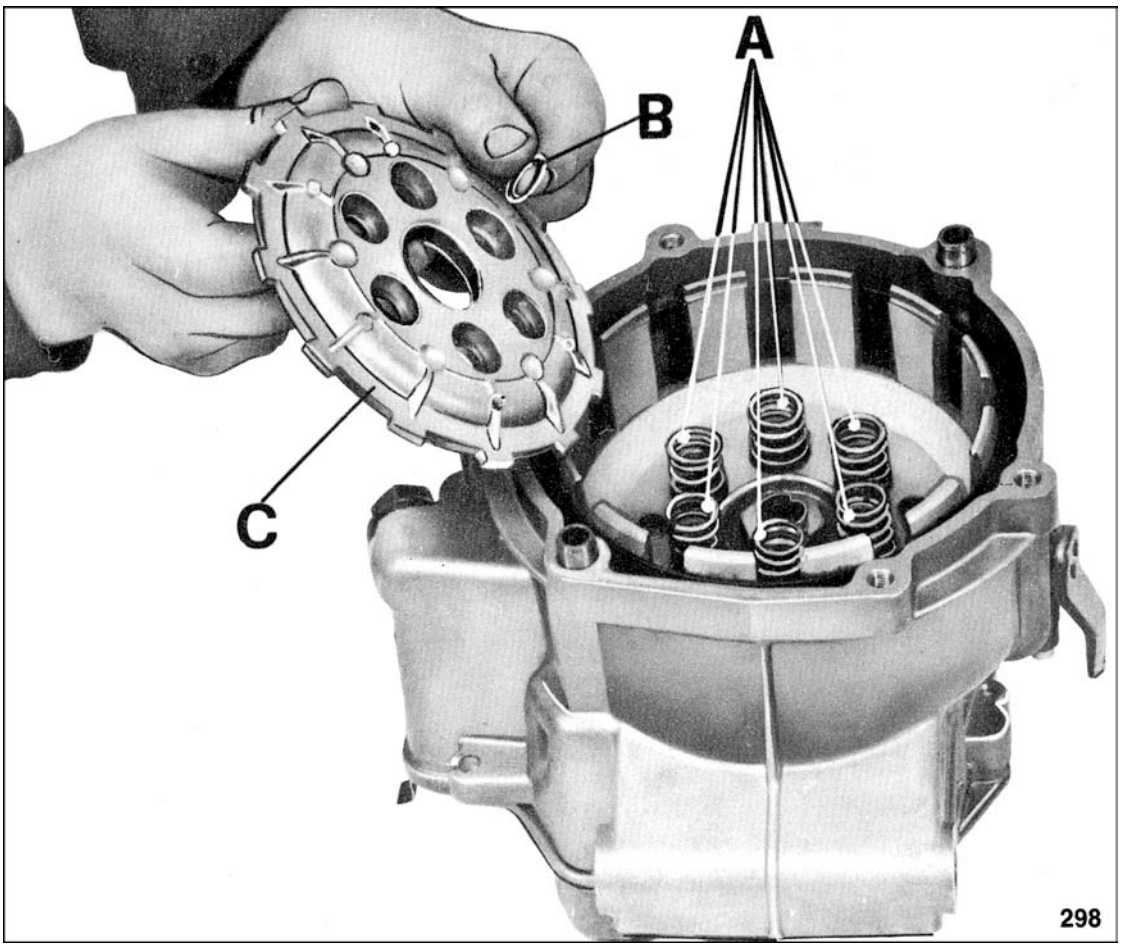
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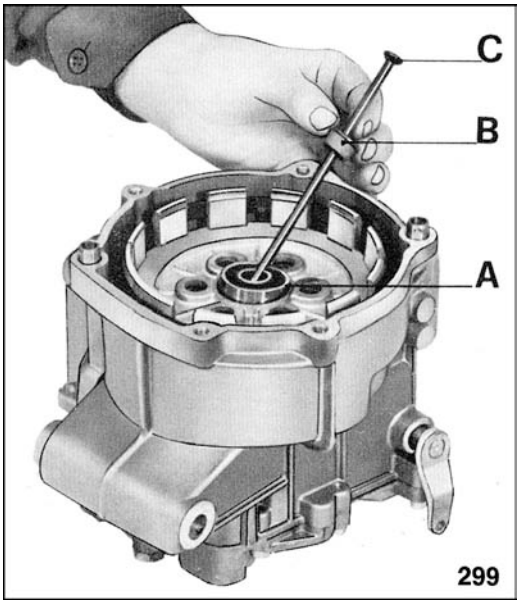
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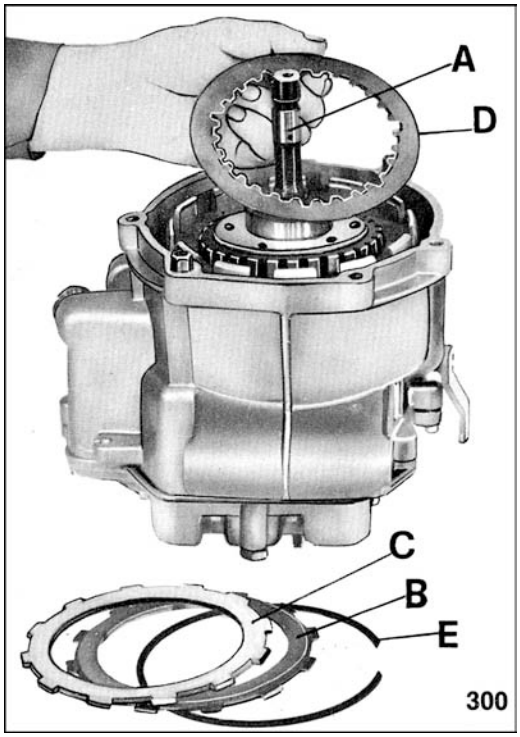
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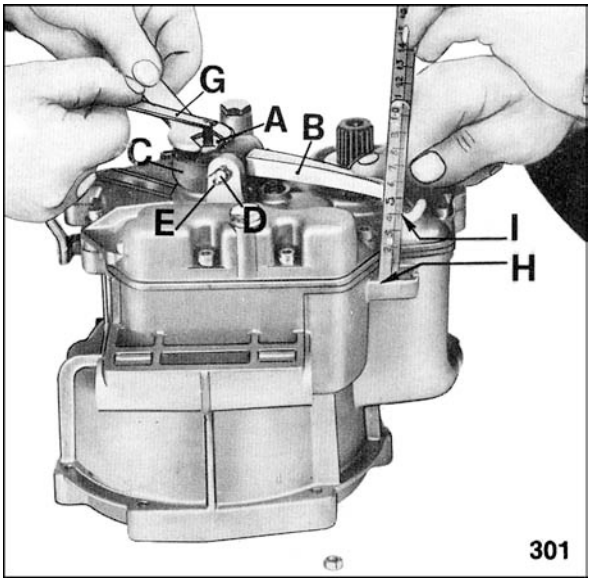
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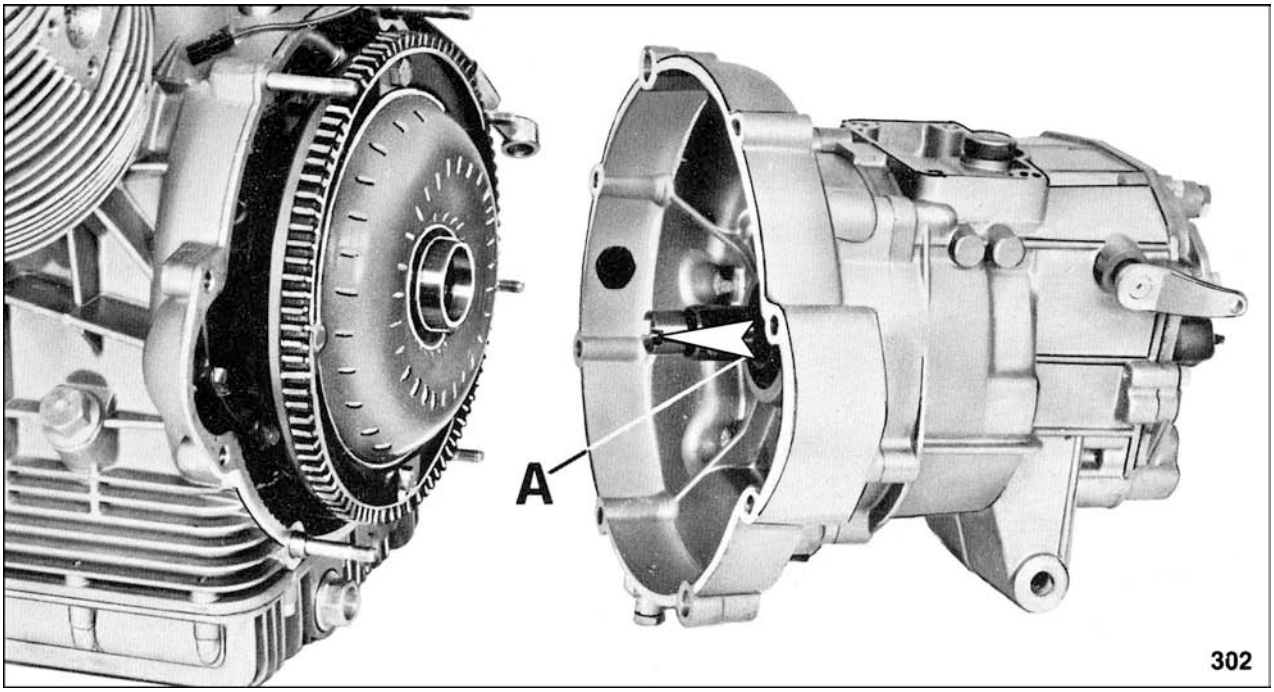
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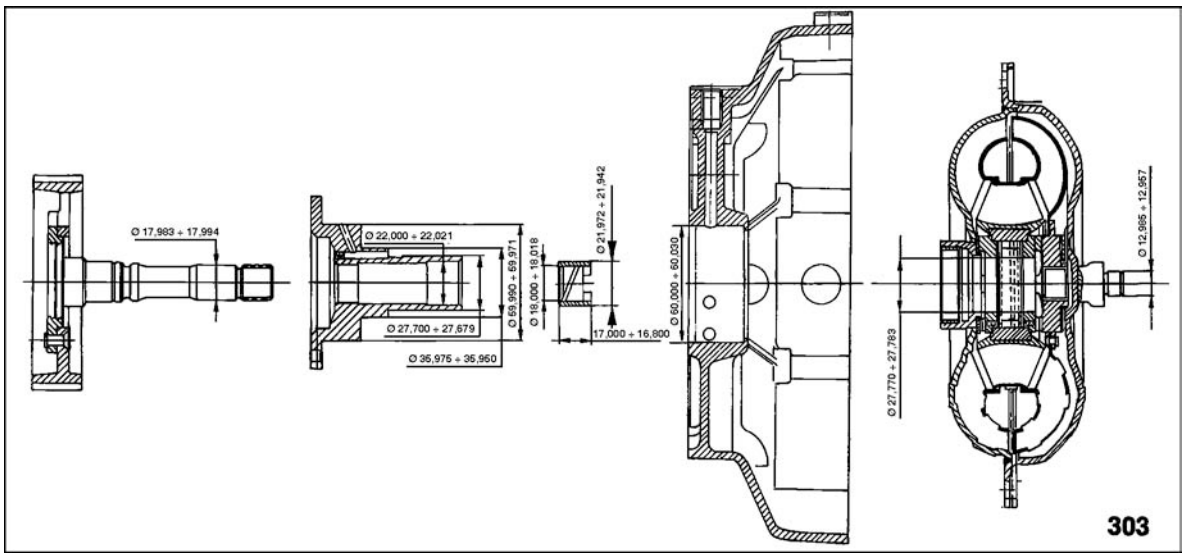
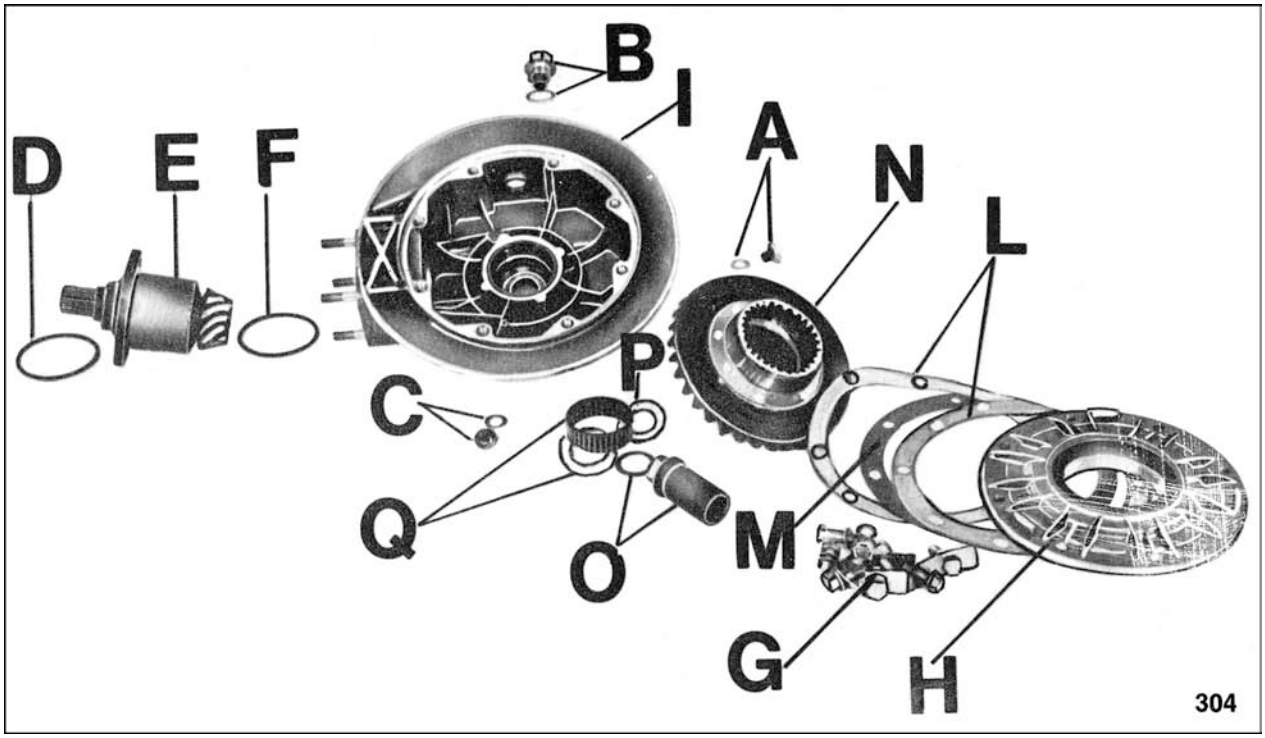

Ø 17,983 ÷ 17,994
Ø 22,000 ÷ 22,021
Ø 69,990 ÷ 69,971
Ø 18,000 ÷ 18,018
Ø 27,700 ÷ 27,679
Ø 36,975 ÷ 35,950
Ø 21,972 ÷ 21,942
17,000 ÷ 16,800
Ø 60,000 ÷ 60,030
Ø 27,770 ÷ 27,793
Ø 12,985 ÷ 12,957
303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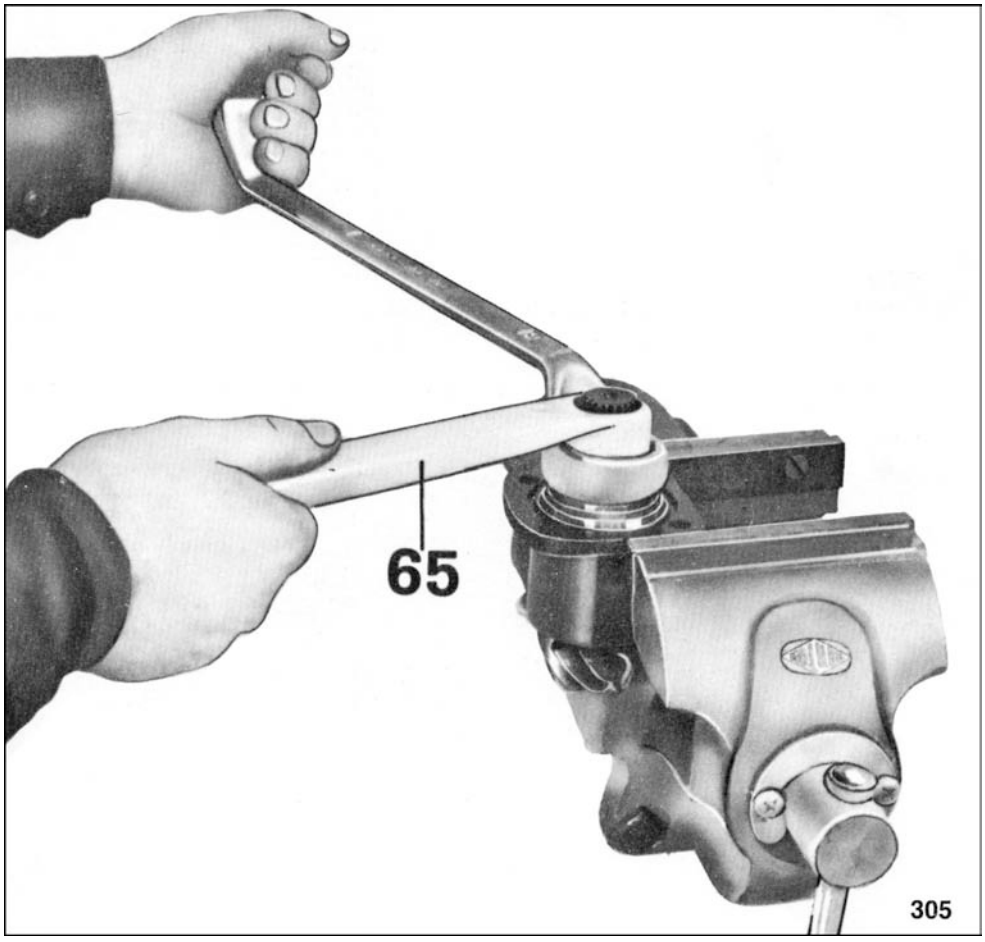
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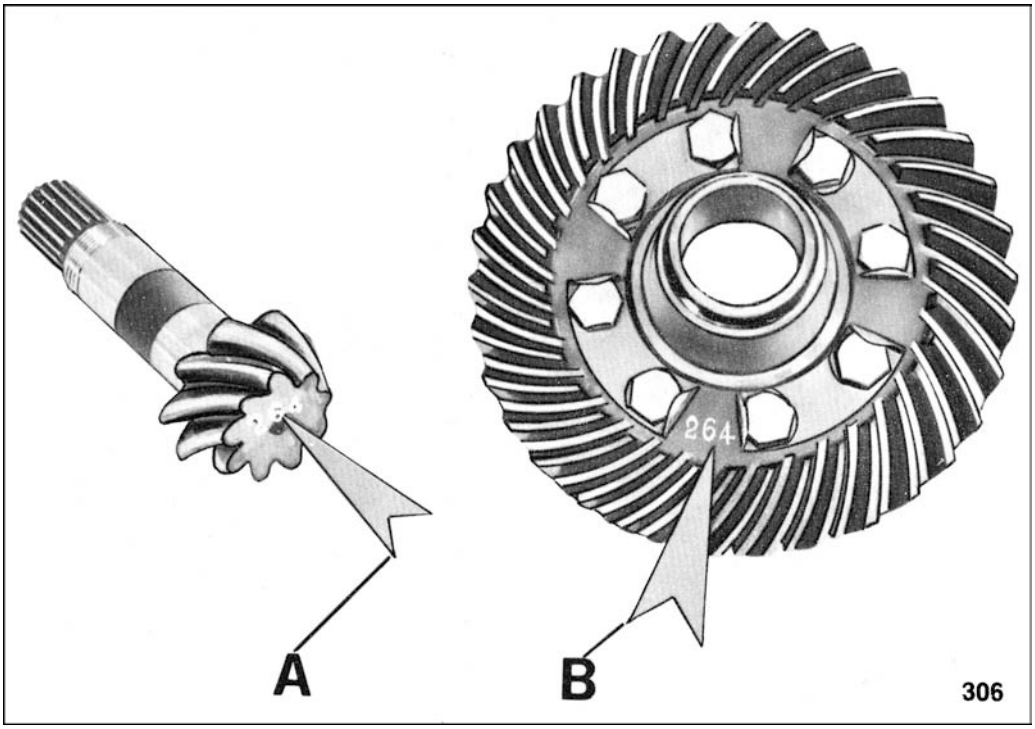
264
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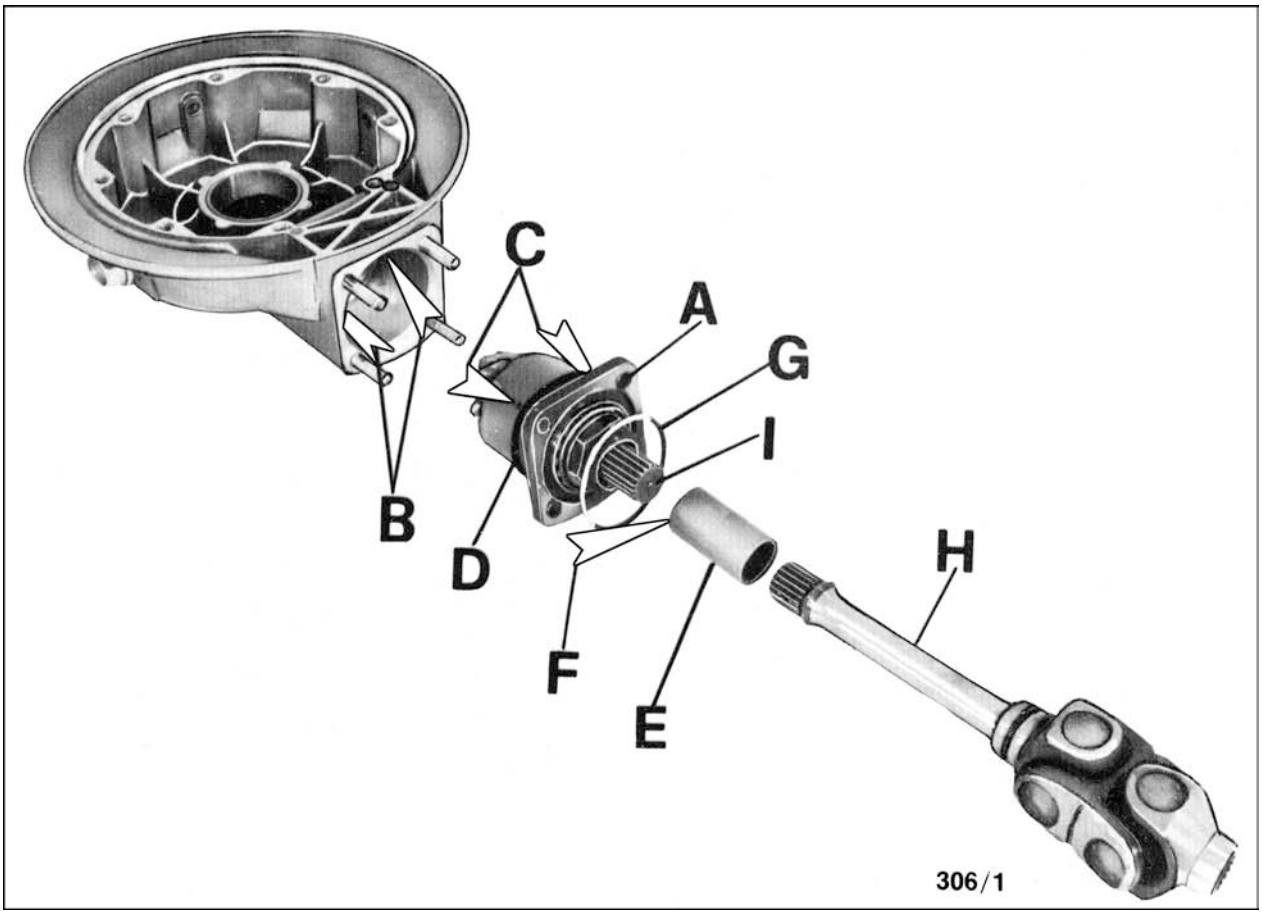
306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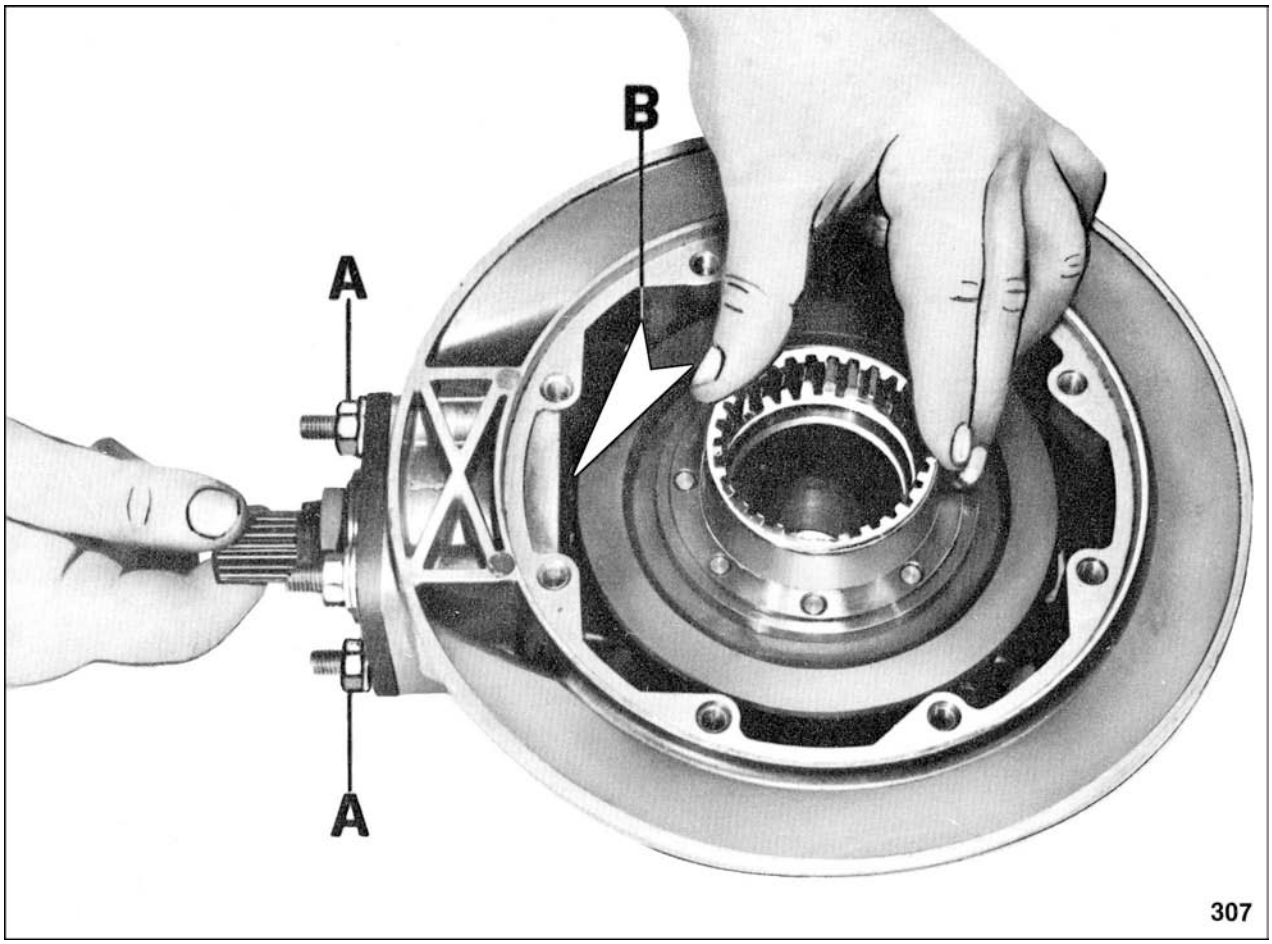
306/1



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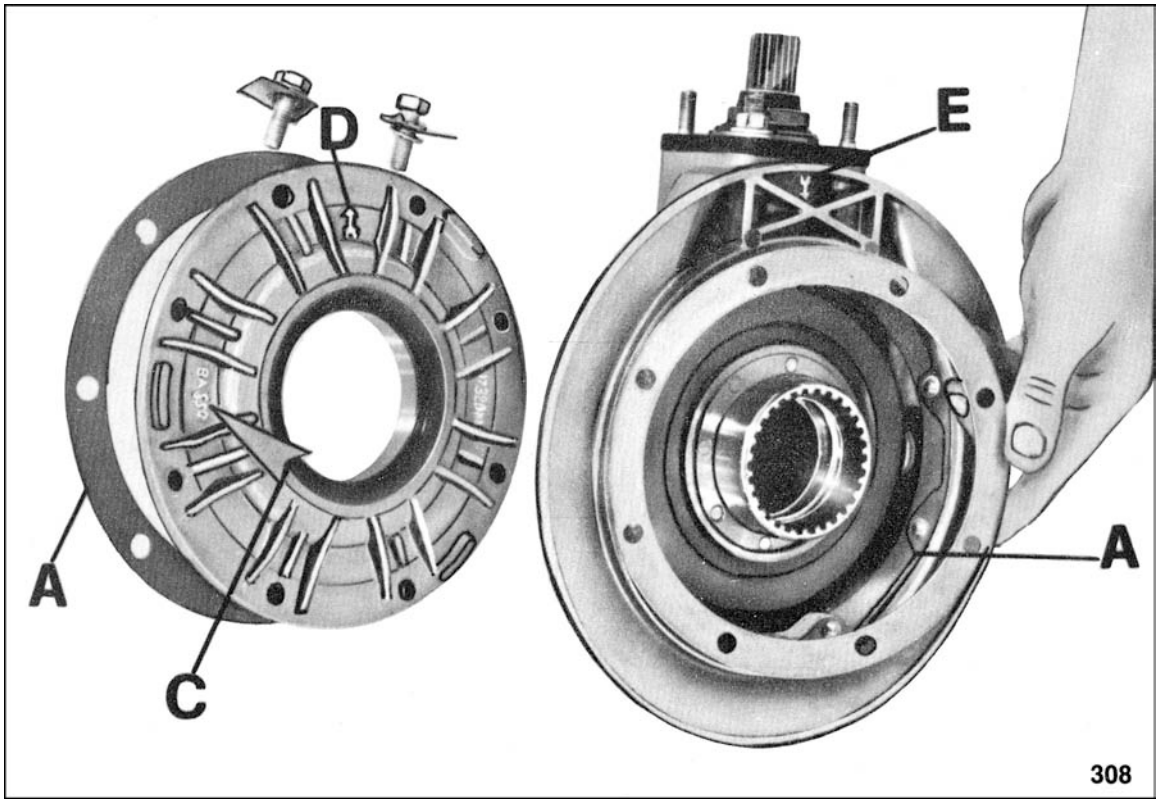

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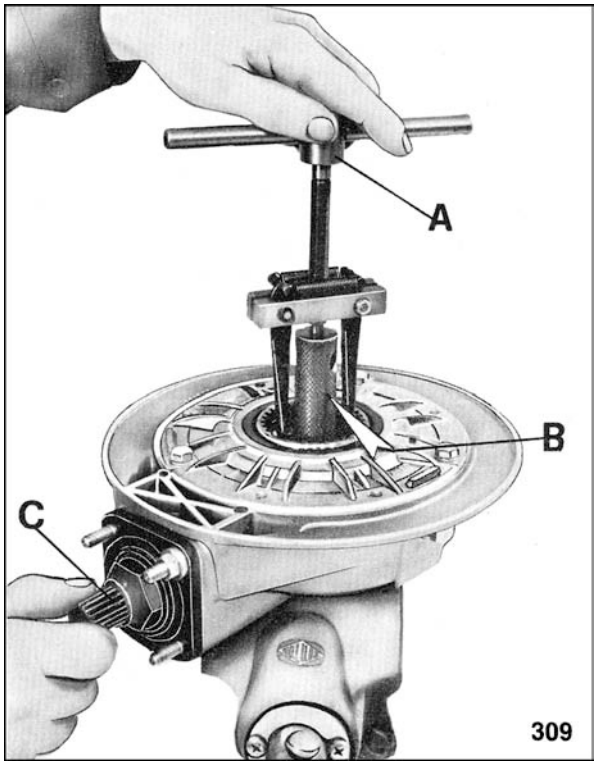
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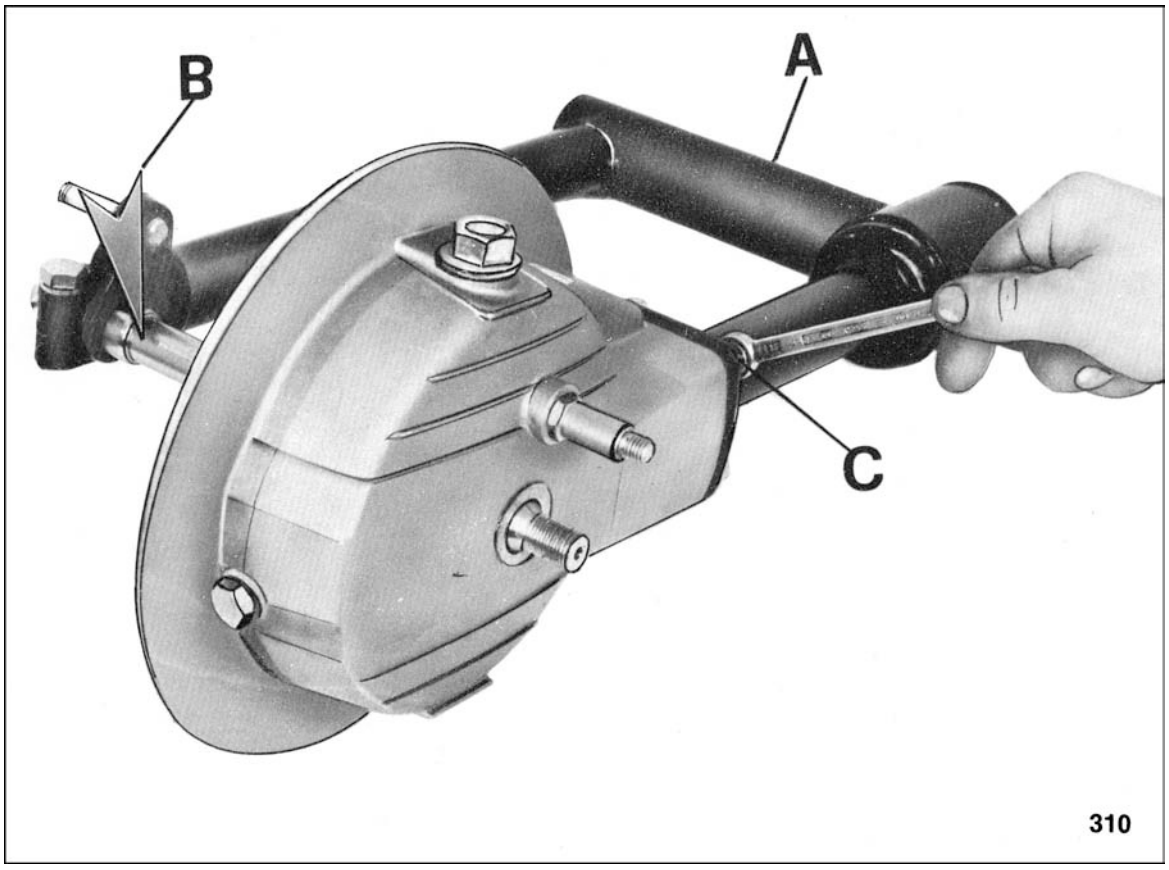
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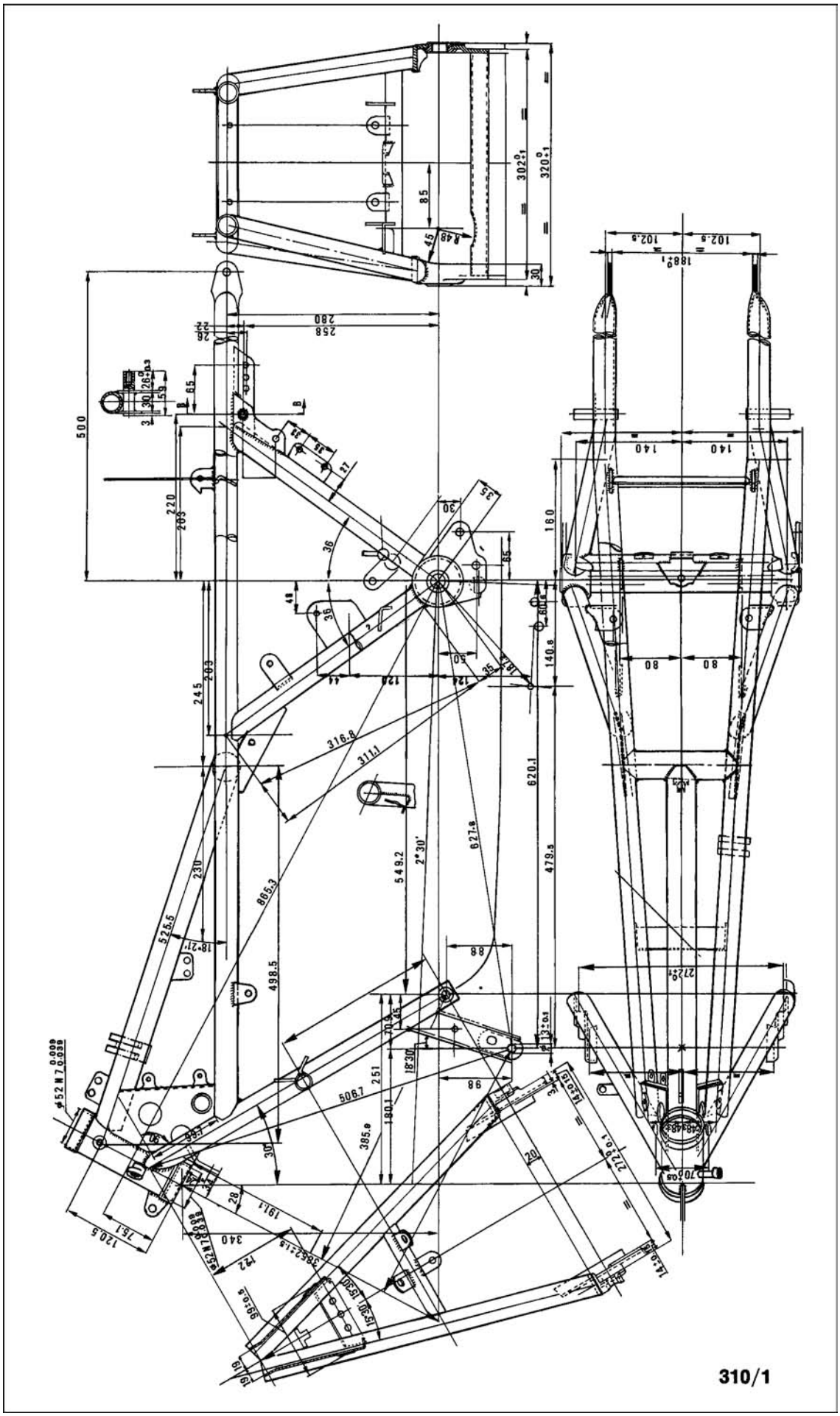
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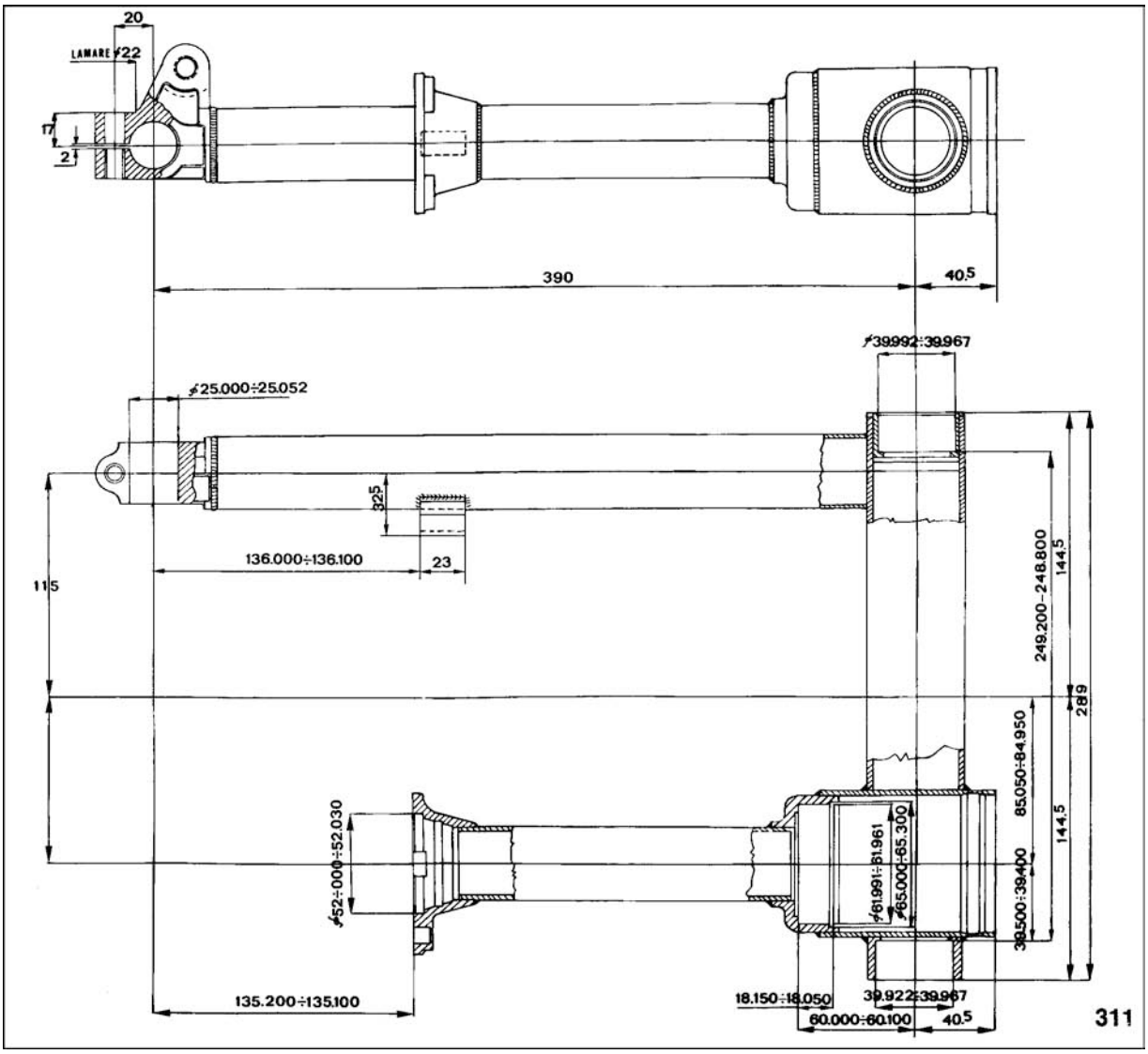
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LAMARE ⌀22
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⌀39.992÷39.967
⌀25.000÷25.052
325
136.000÷136.100
23
115
249.200-248.800
144.5
289
85.050÷84.950
144.5
⌀52÷000÷52.030
⌀61.991÷61.961
⌀65.000÷65.300
38.500÷38.400
135.200÷135.100
18.150÷18.050
39.922÷39.967
60.000÷60.100
40.5
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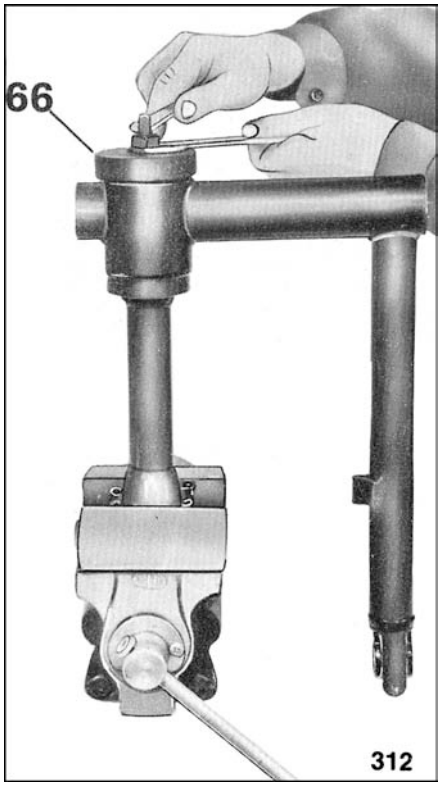
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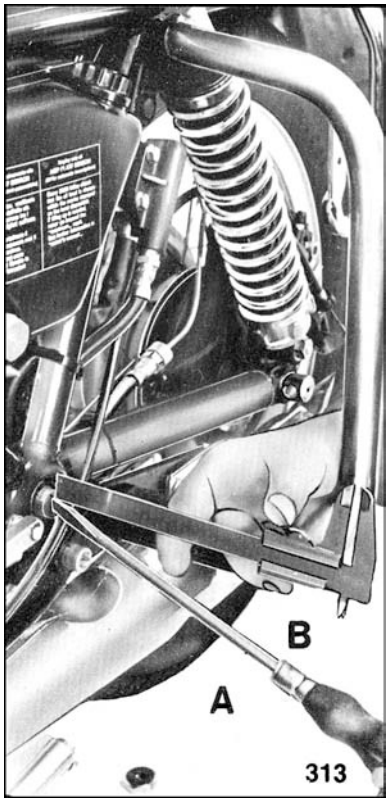
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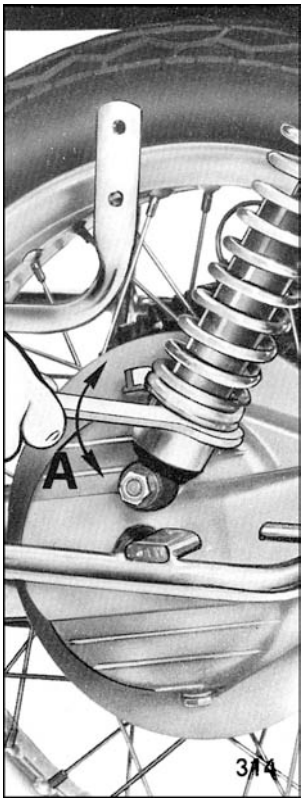
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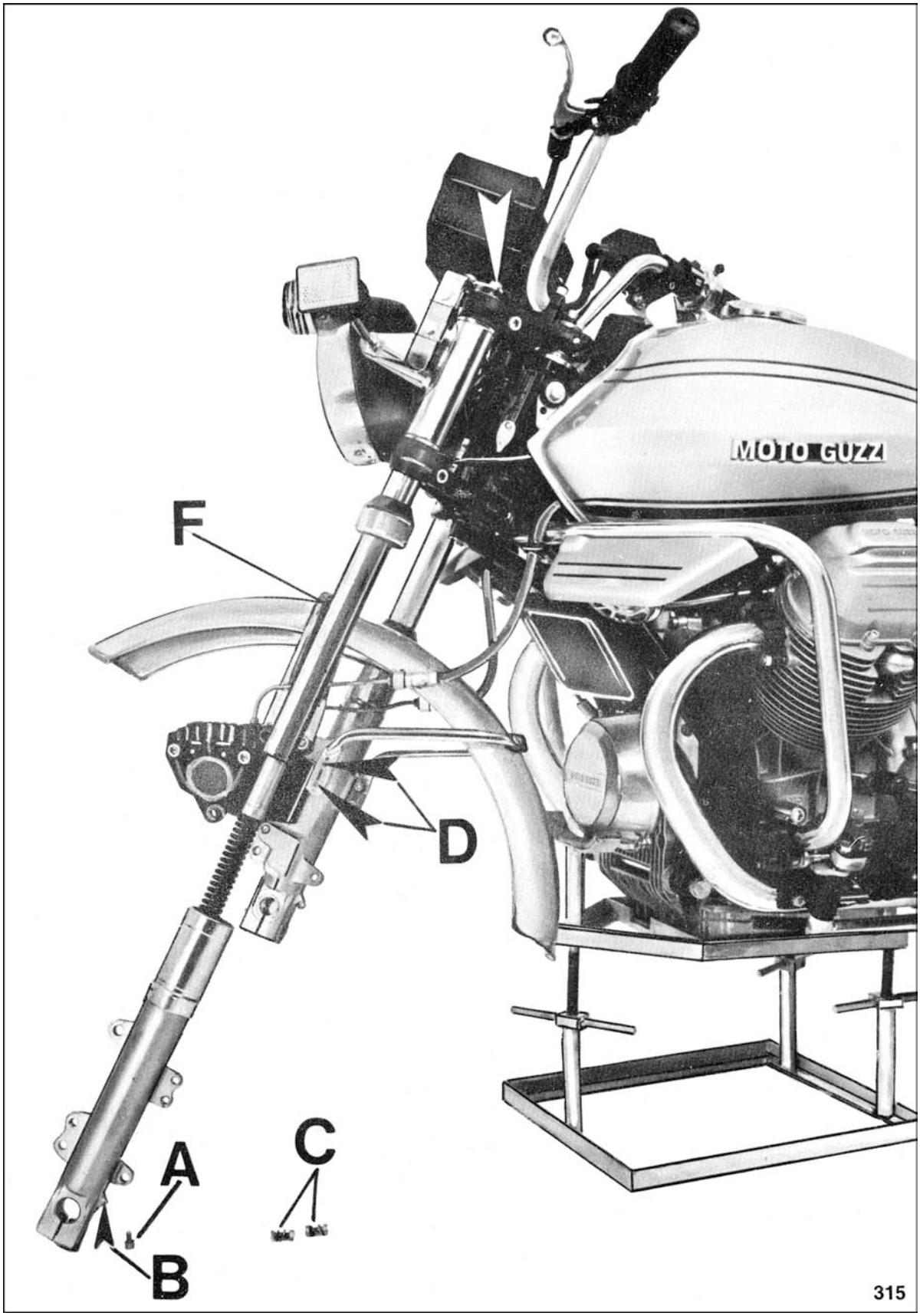
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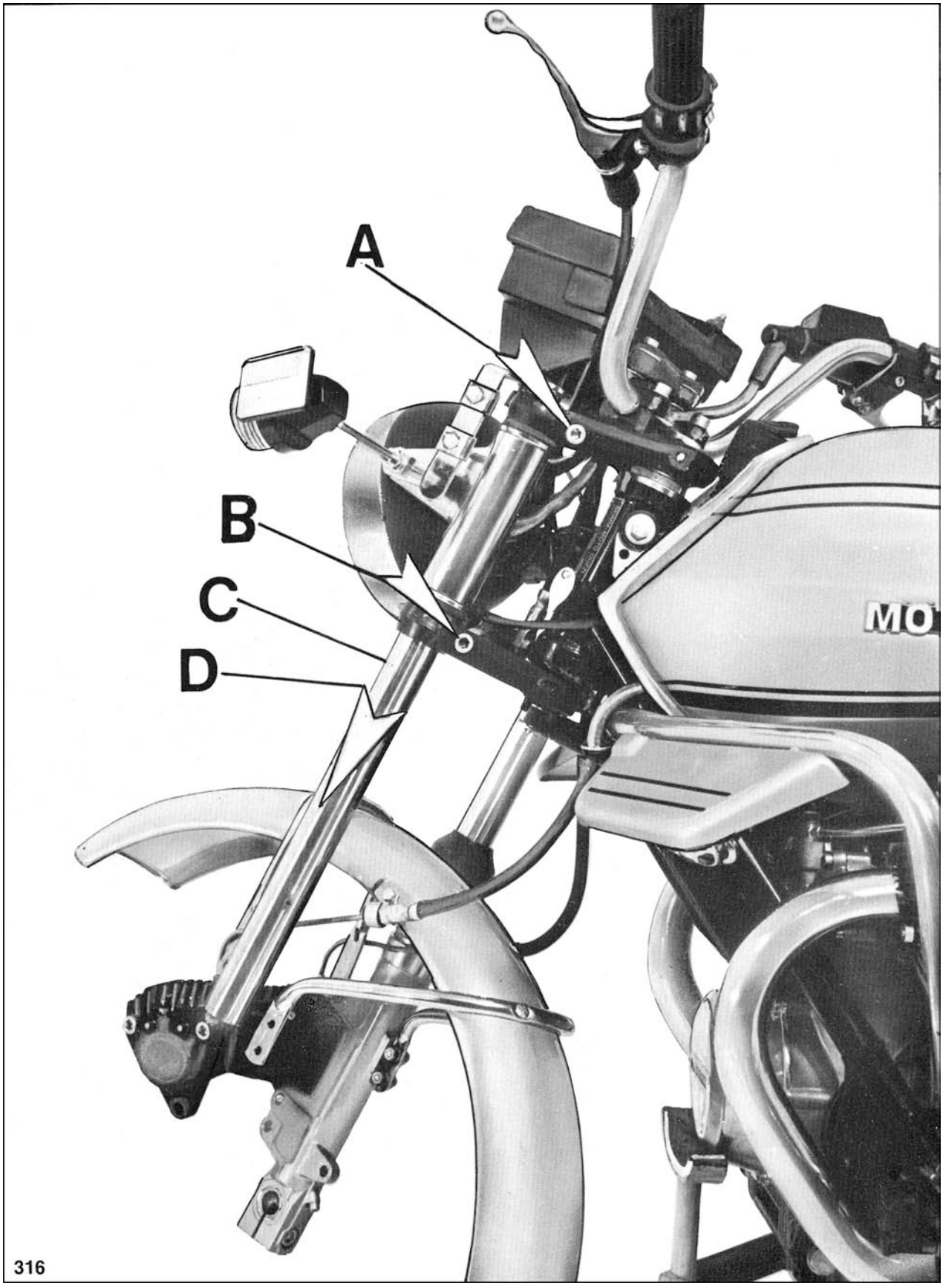
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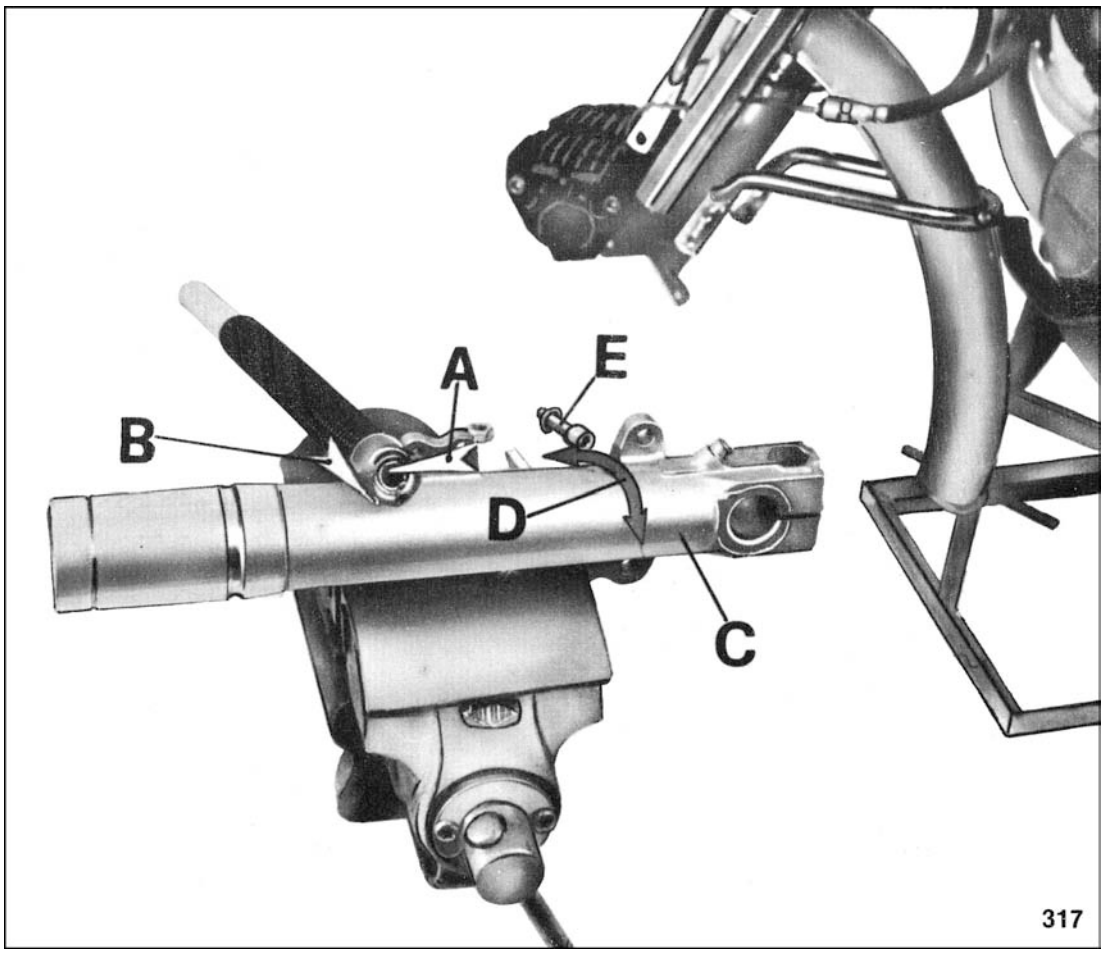
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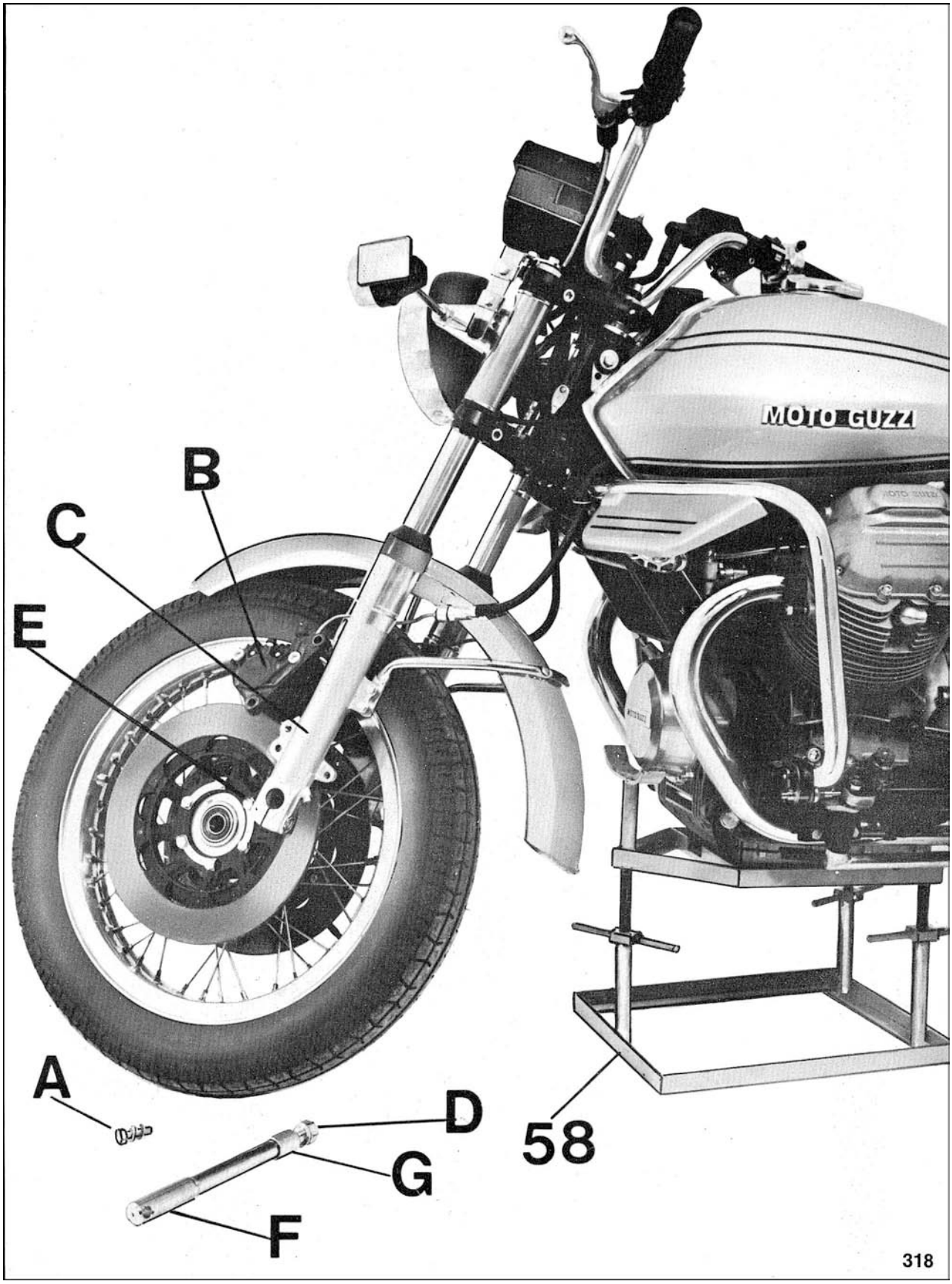
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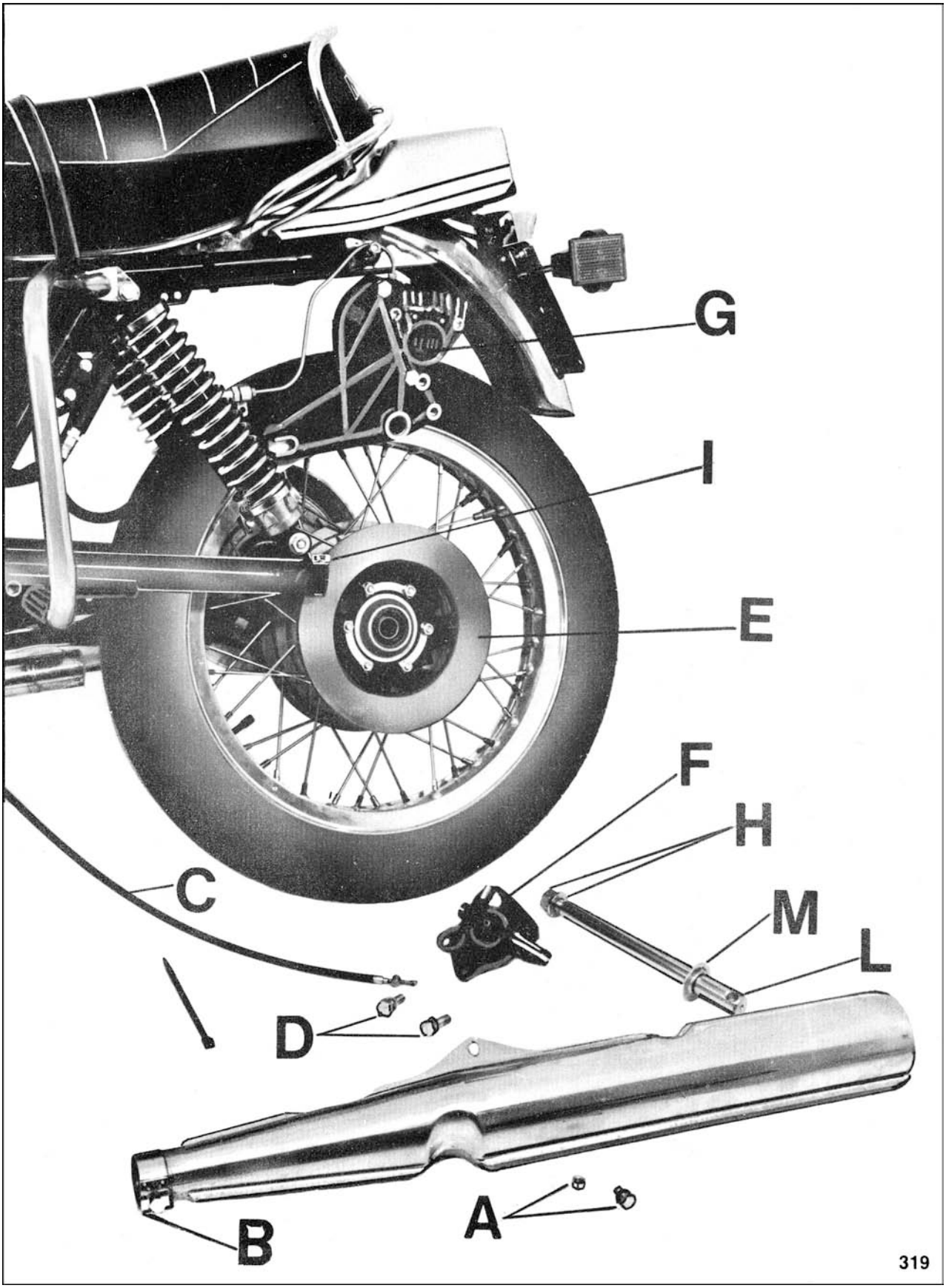
318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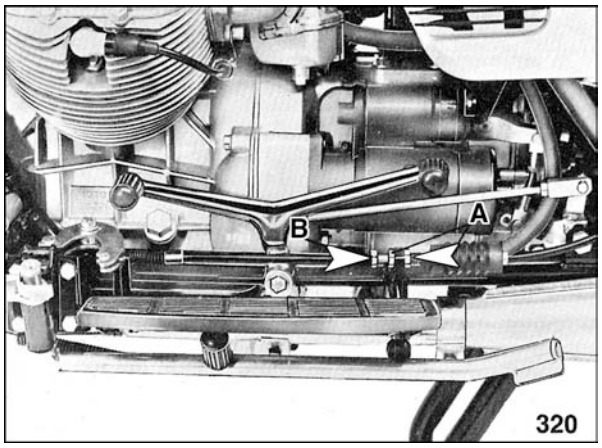
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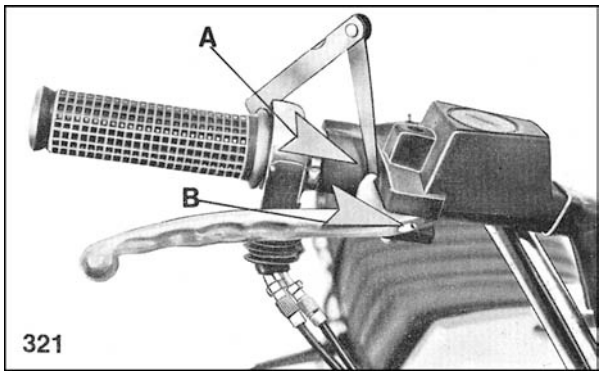
320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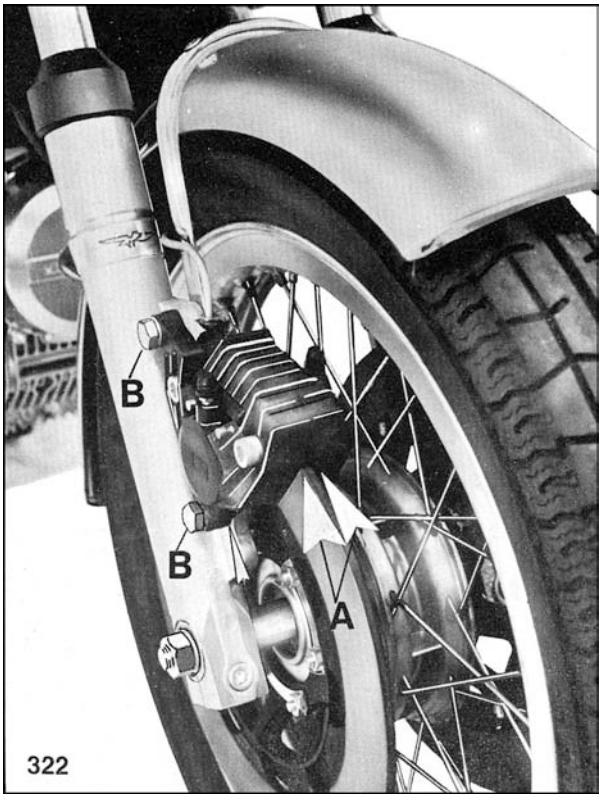
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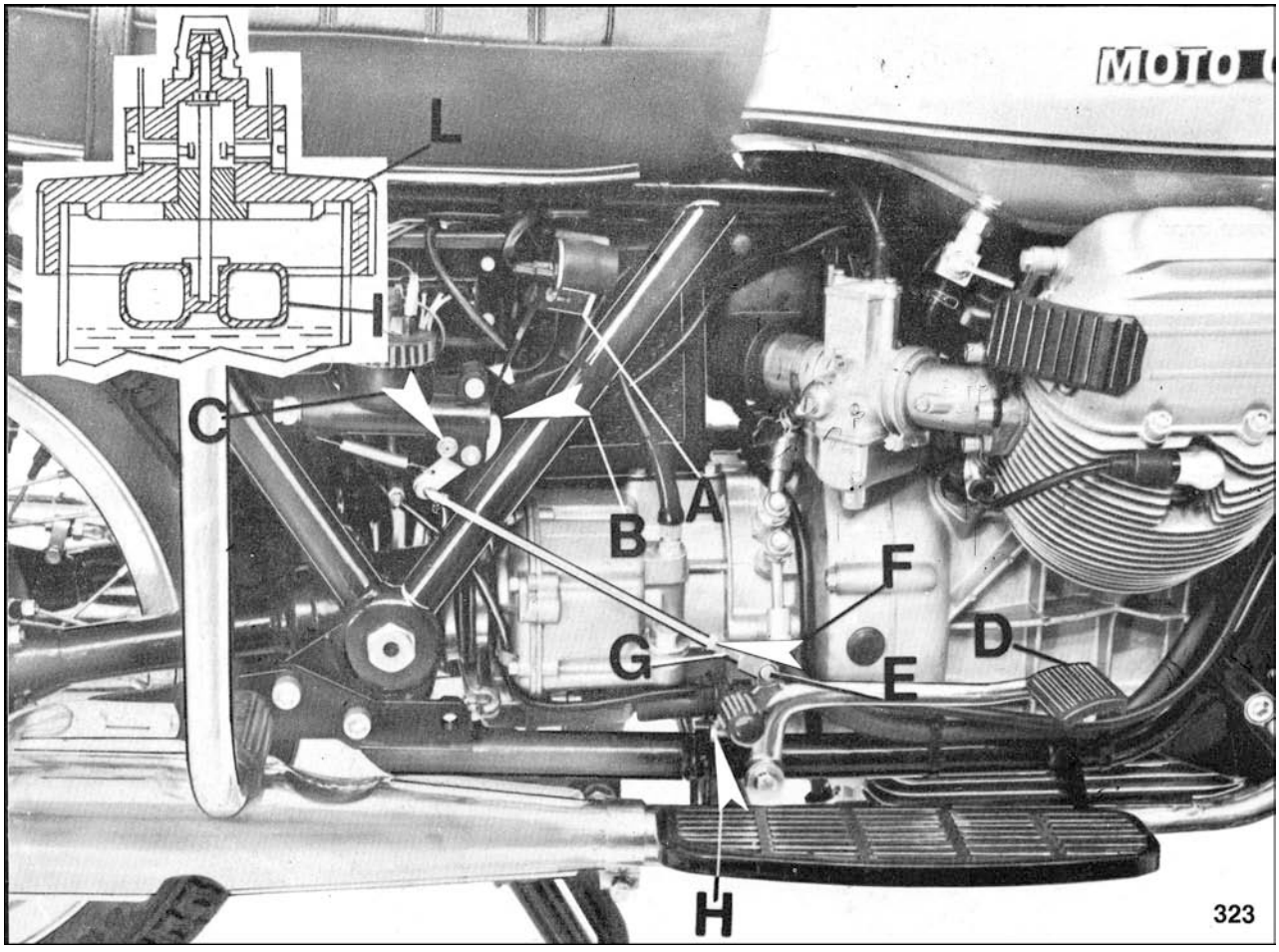
322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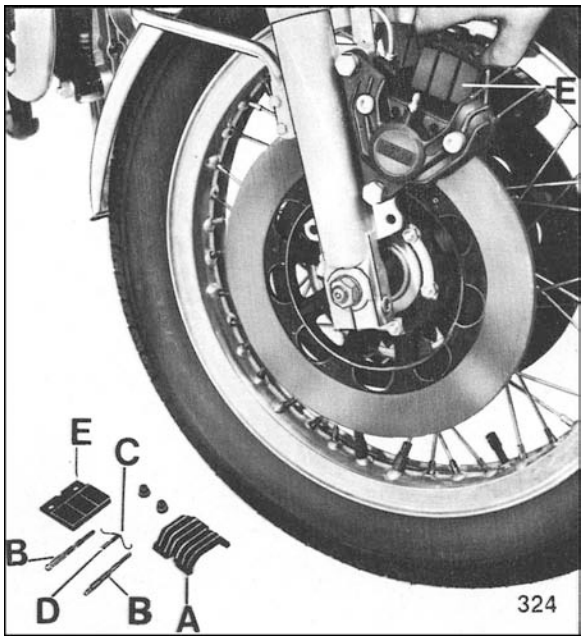
323



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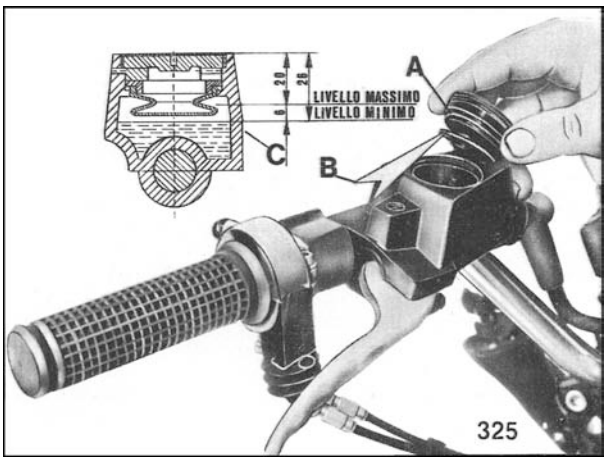

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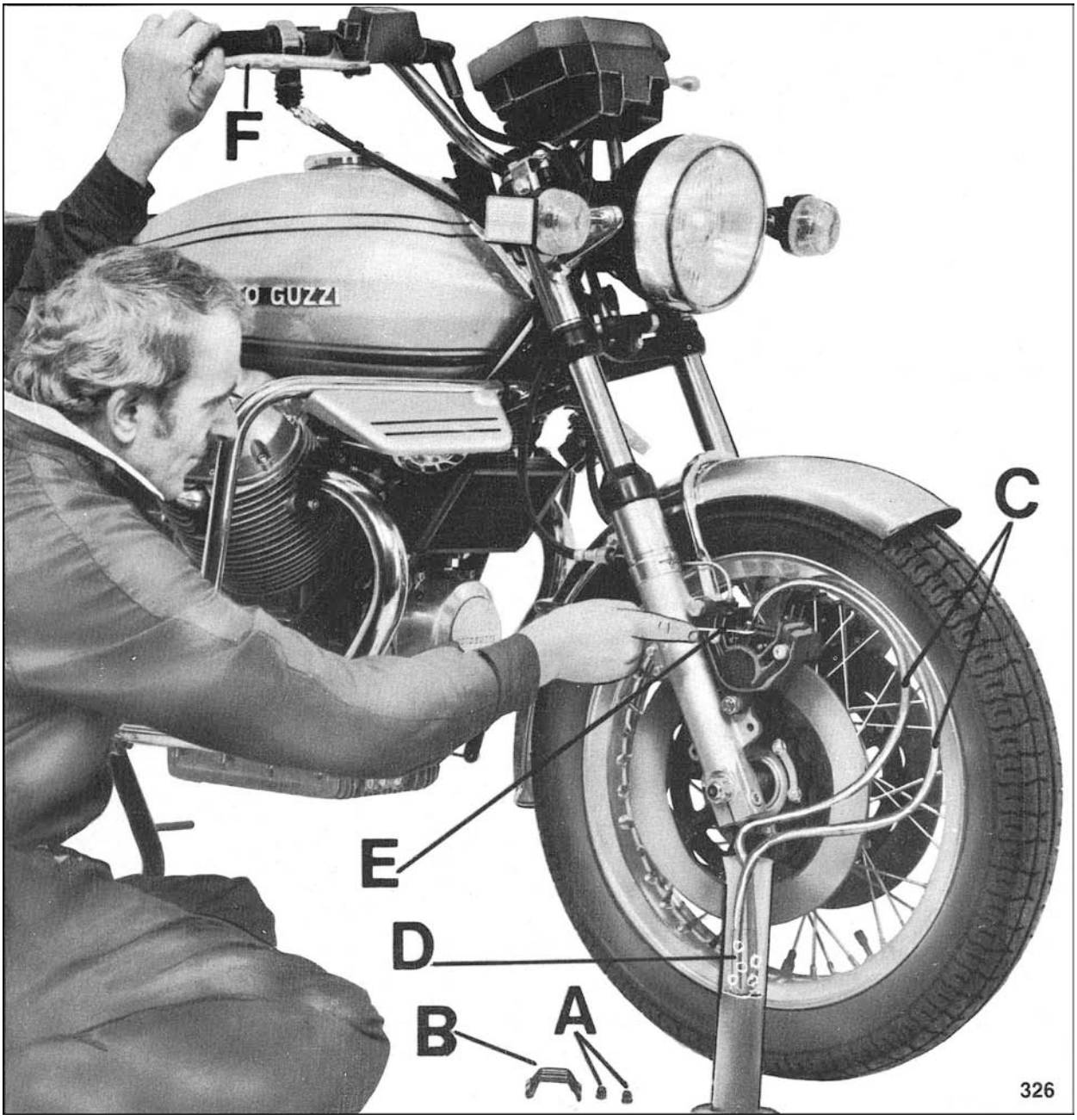

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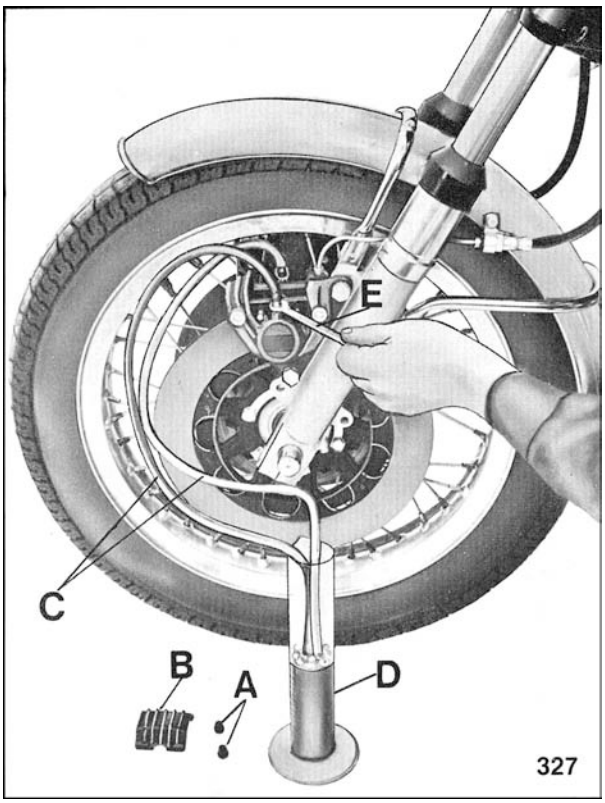
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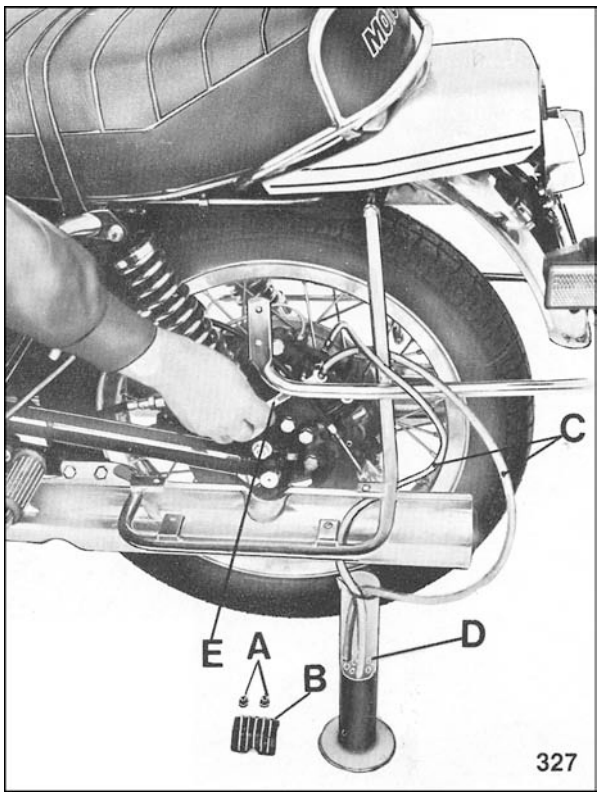
327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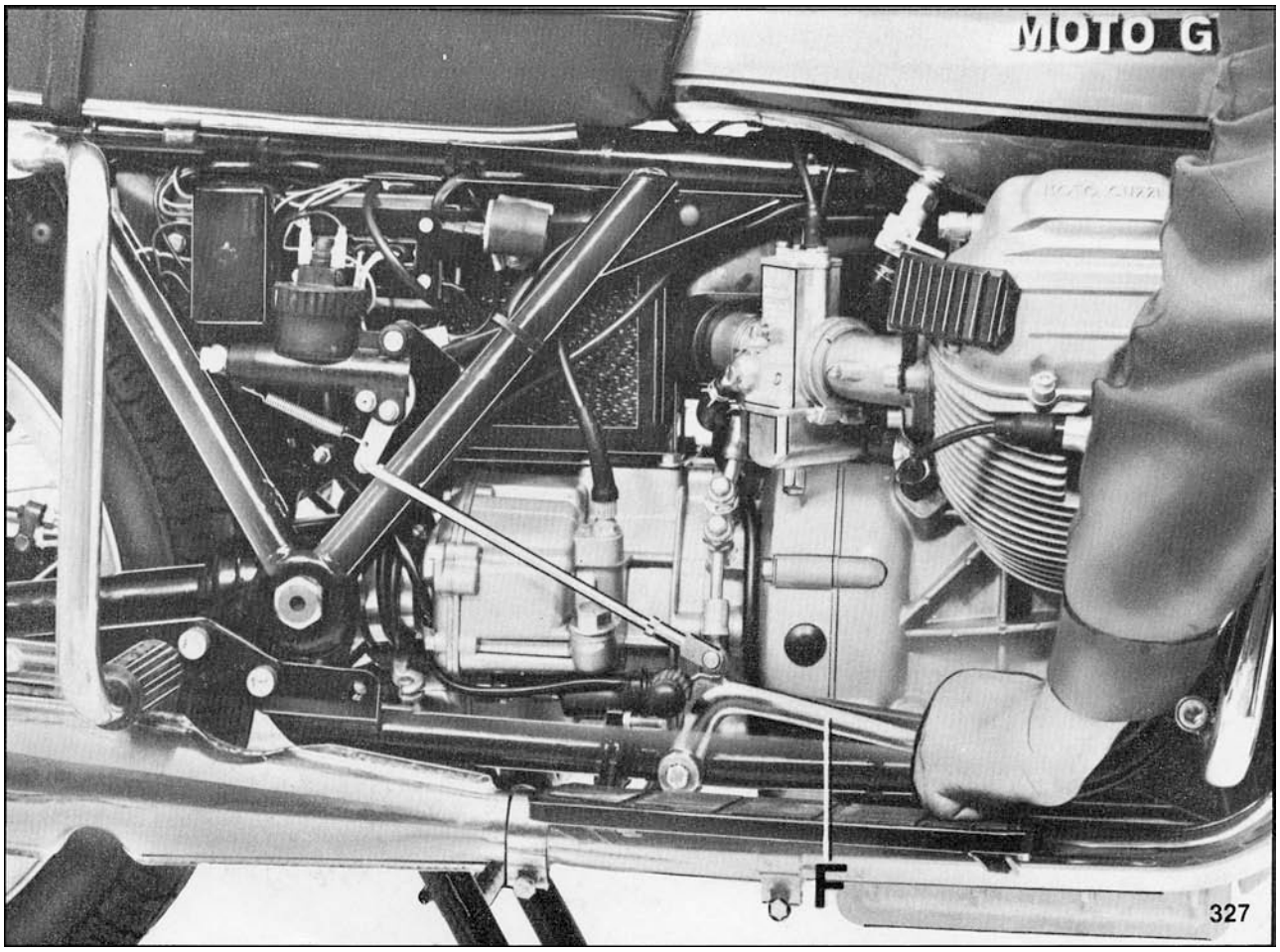
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327

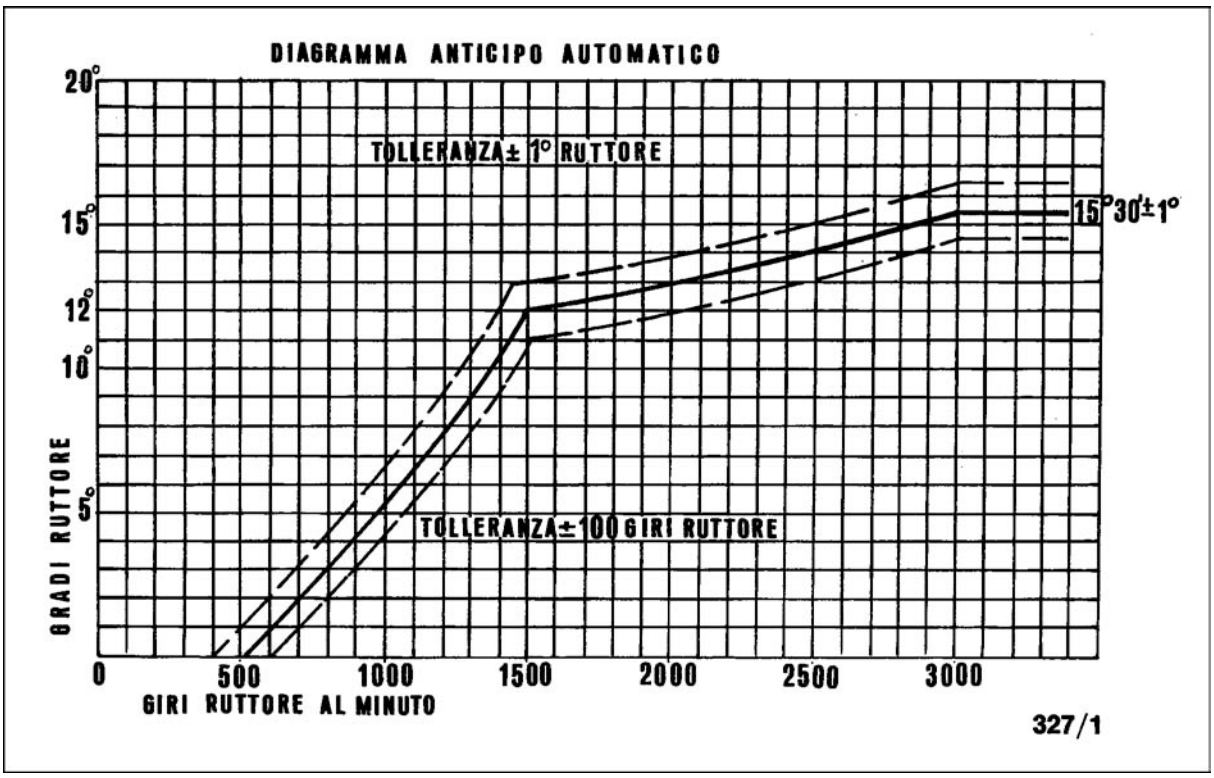
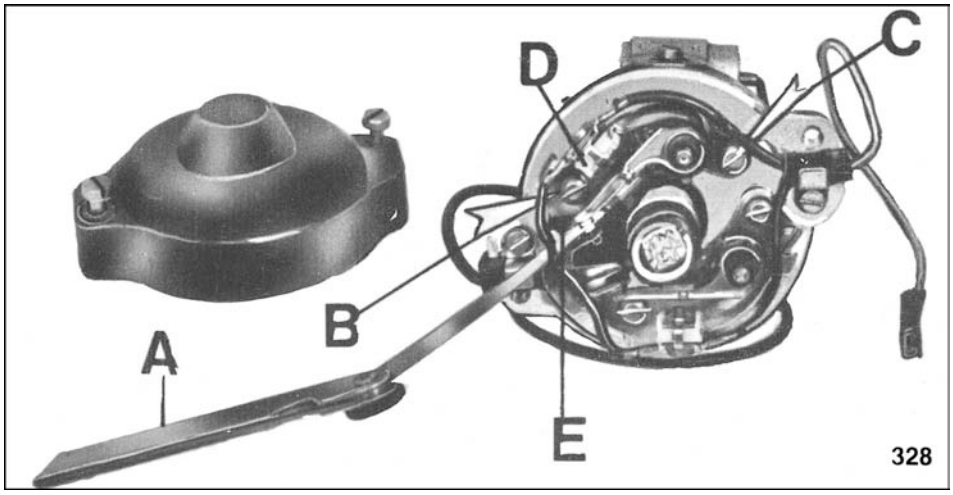


DIAGRAMMA ANTICIPO AUTOMATICO
20°
15°
12°
10°
5°
0
TOLLERANZA ± 1° RUTTORE
15°30' ± 1°
TOLLERANZA ± 100 GIRI RUTTORE
GRADI RUTTORE
500
1000
1500
2000
2500
3000
GIRI RUTTORE AL MINUTO
327/1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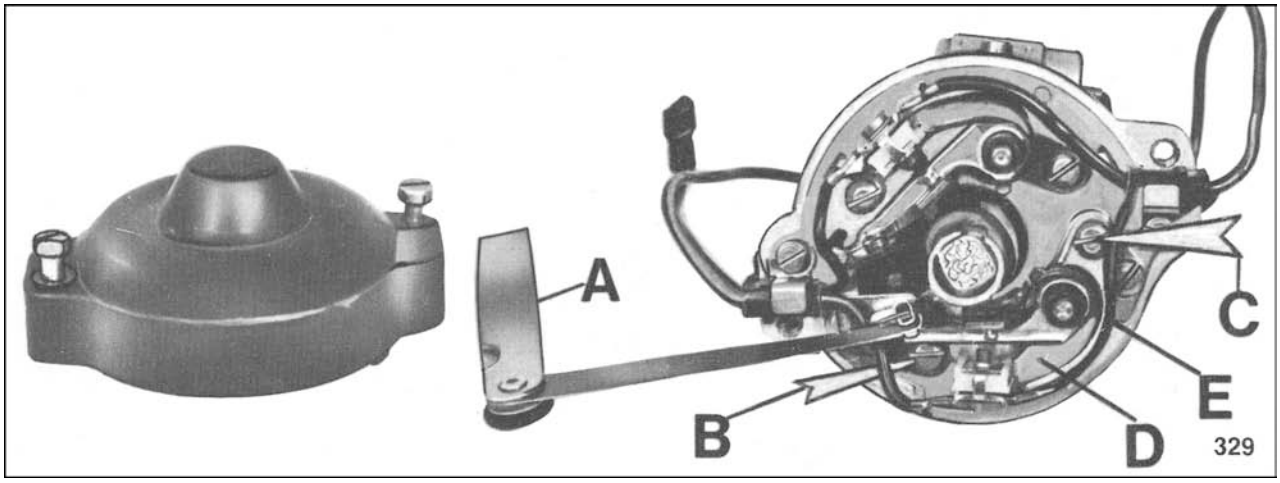
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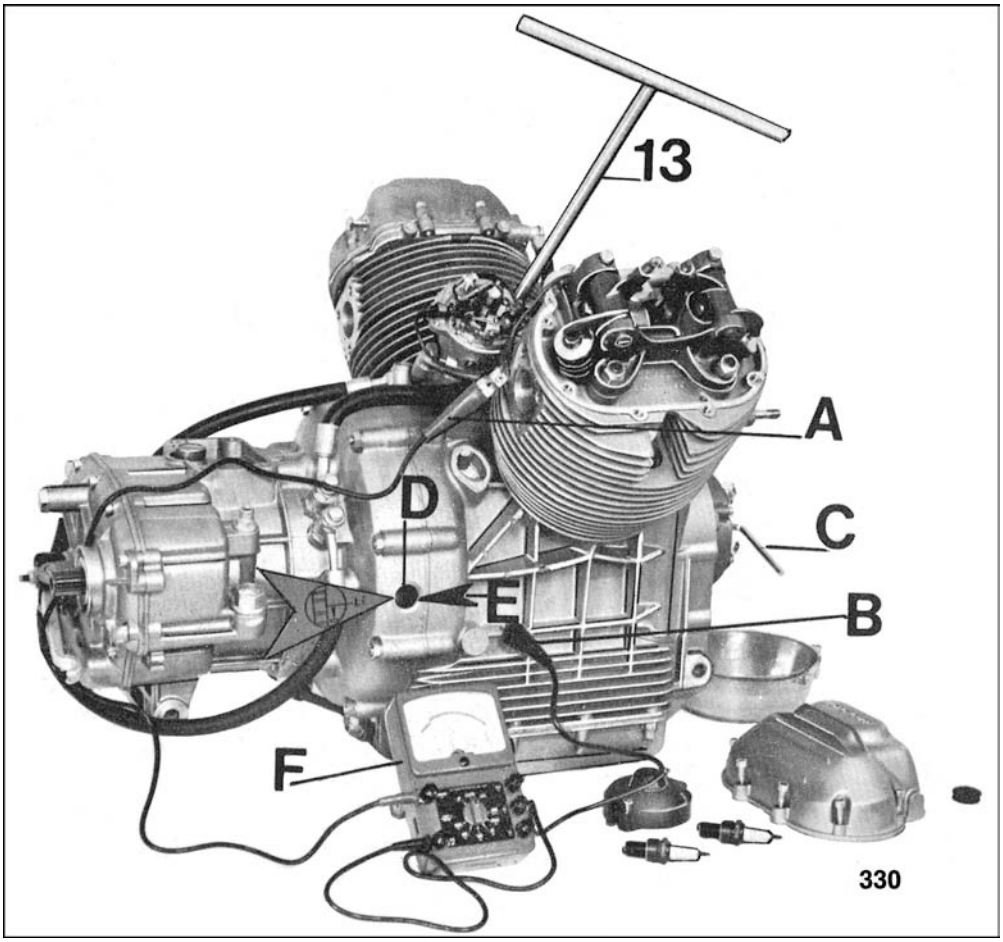
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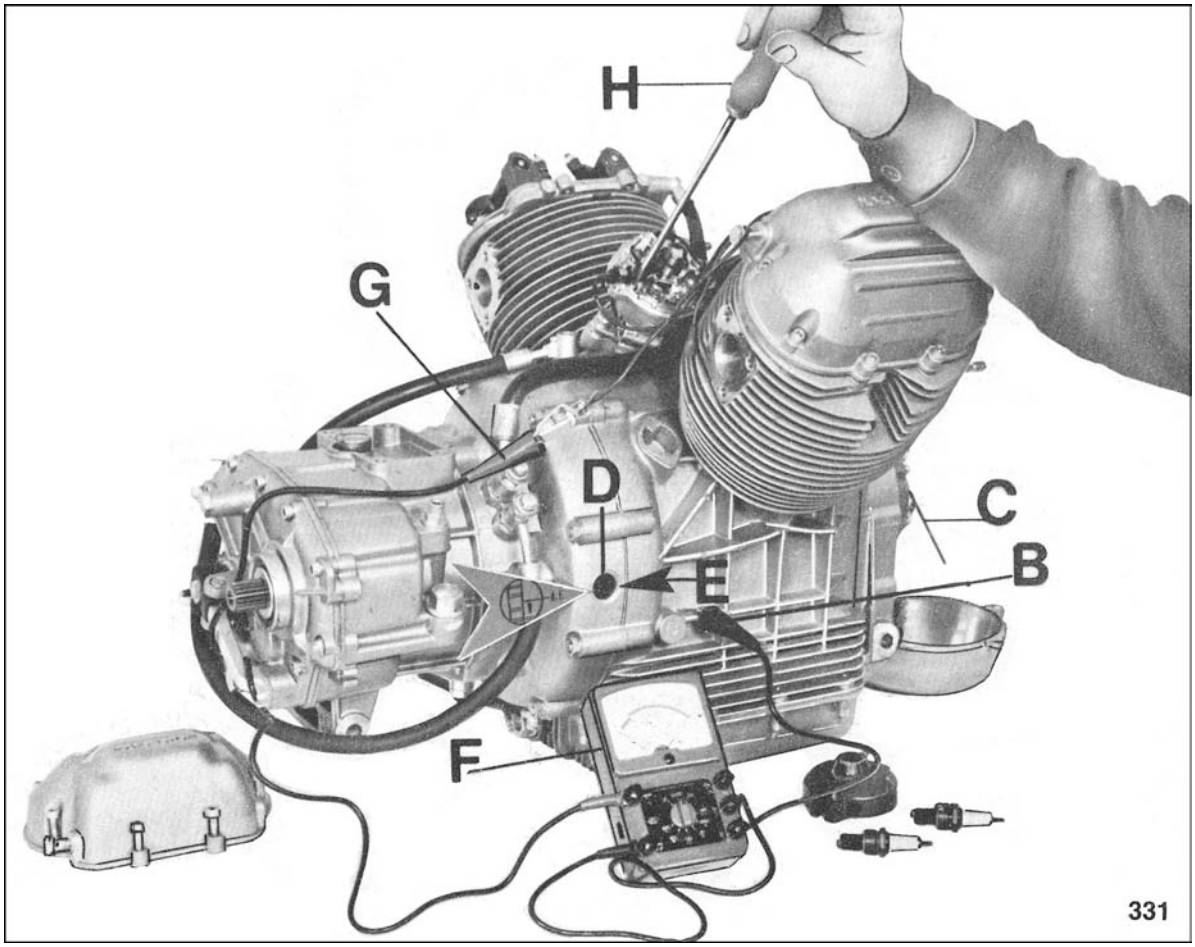
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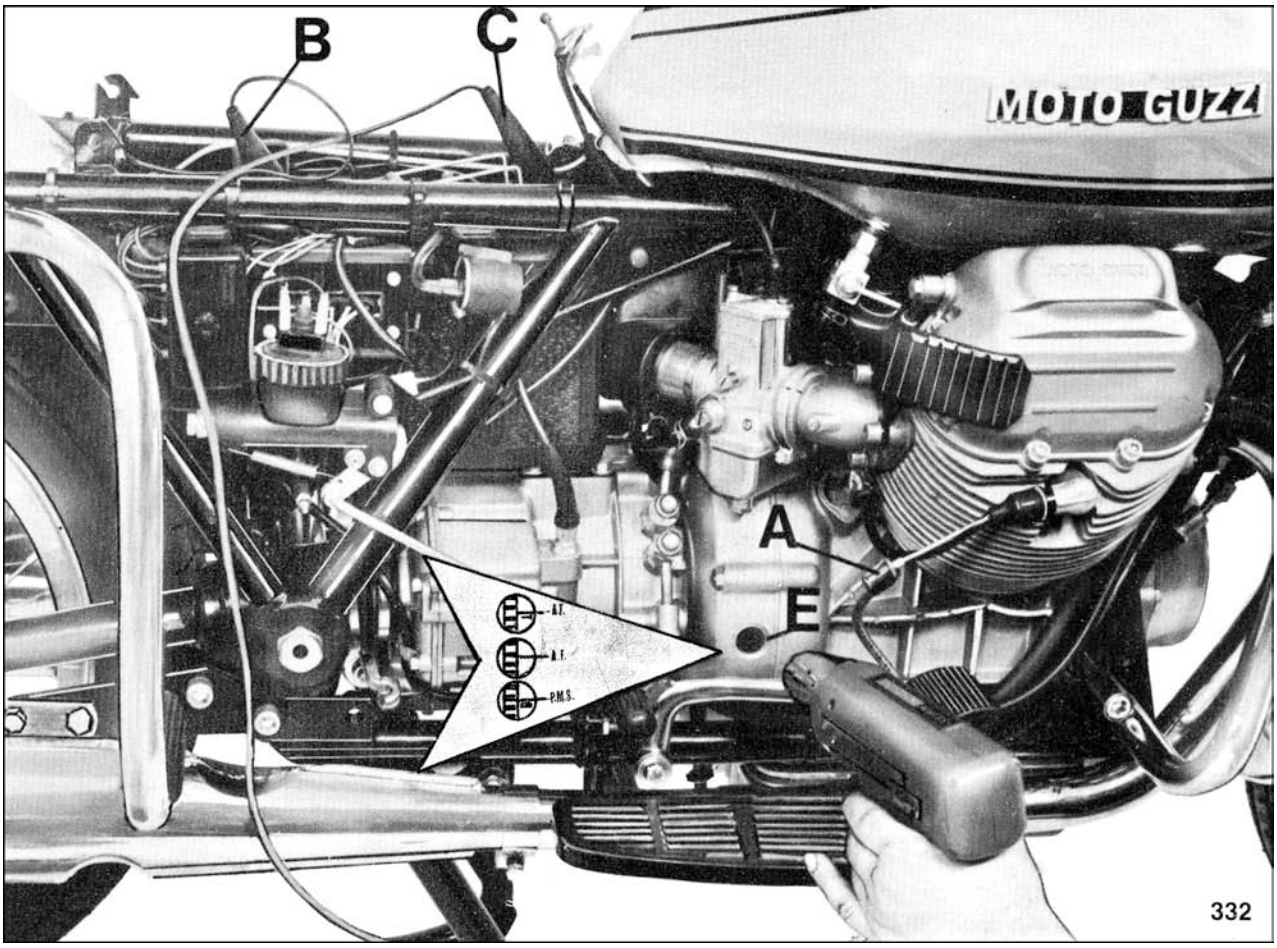
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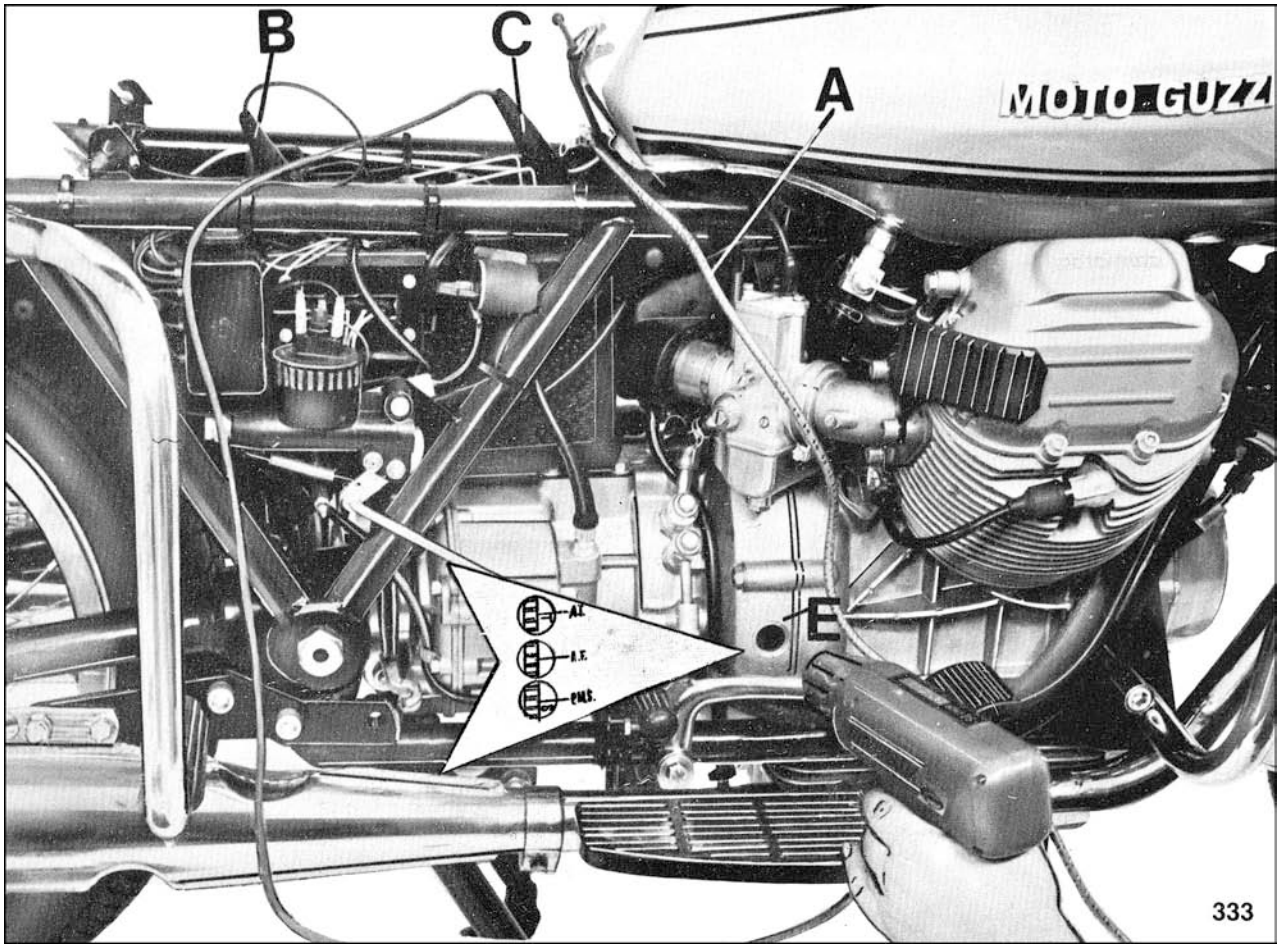
332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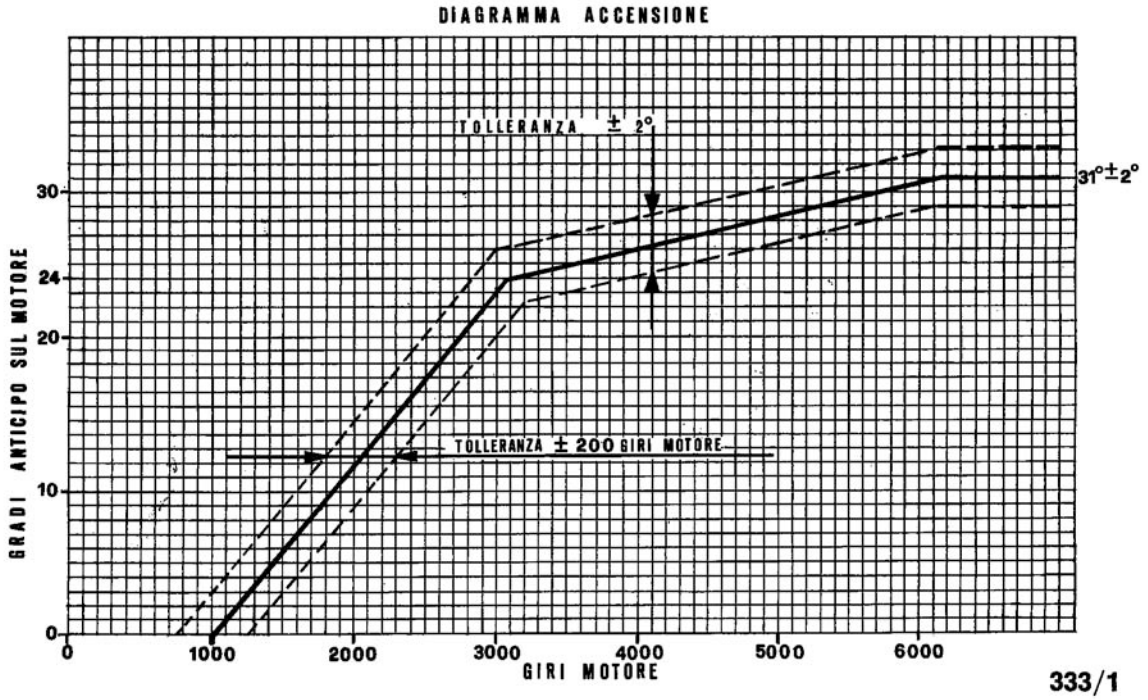
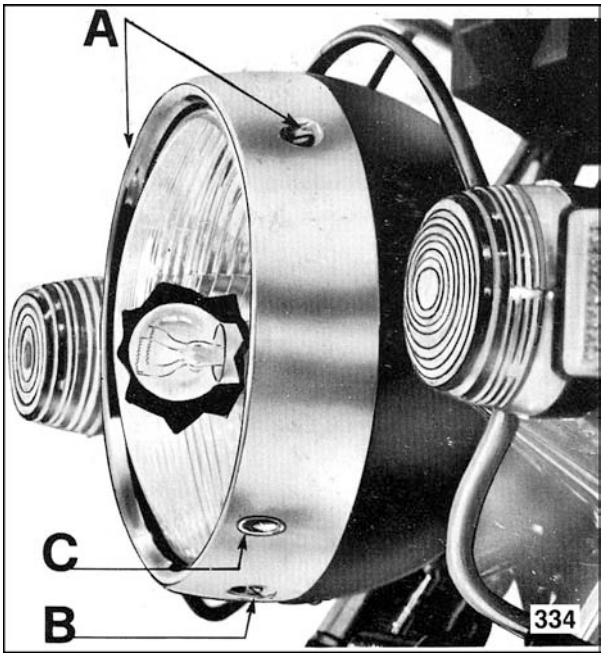


DIAGRAMMA ACCENSIONE
TOLLERANZA ± 2°
31°±2°
TOLLERANZA ± 200 GIRI MOTORE
GRADI ANTICIPO SUL MOTORE
0
10
20
24
30
0
1000
2000
3000
4000
5000
6000
GIRI MOTORE
333/1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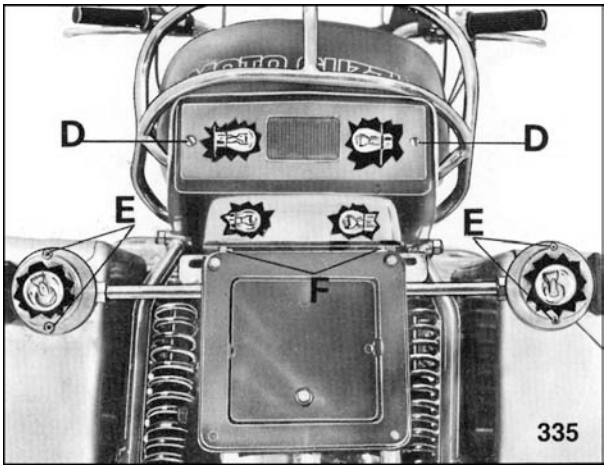
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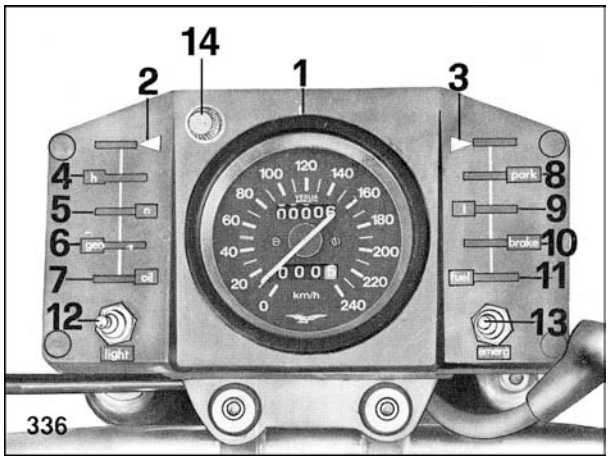

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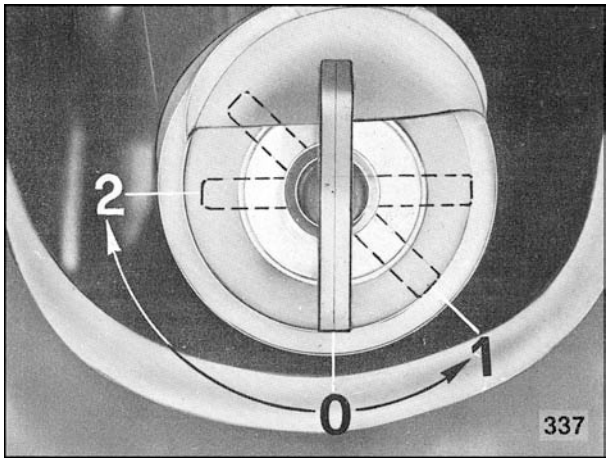

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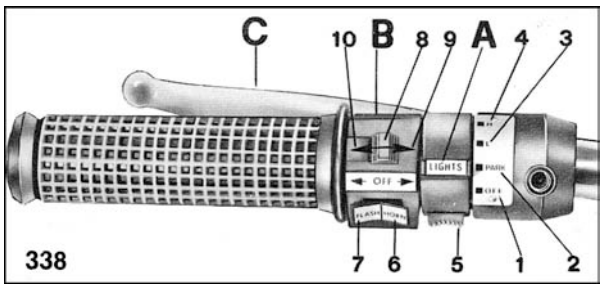

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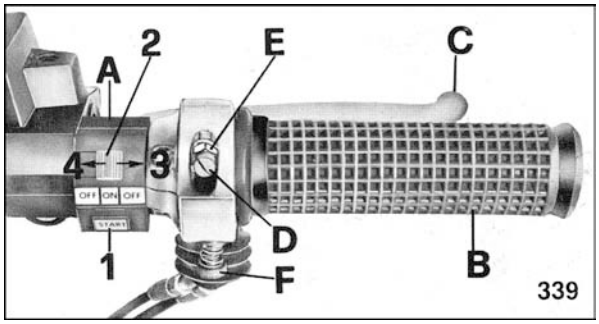

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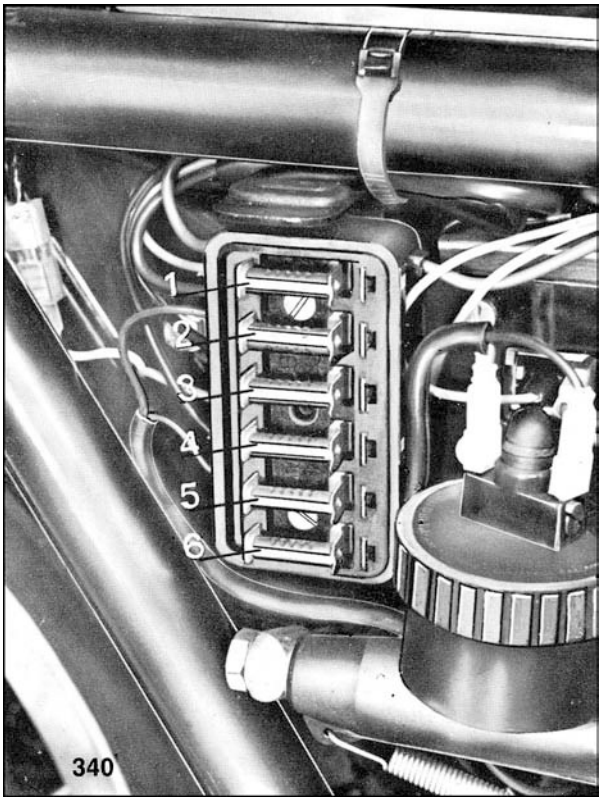

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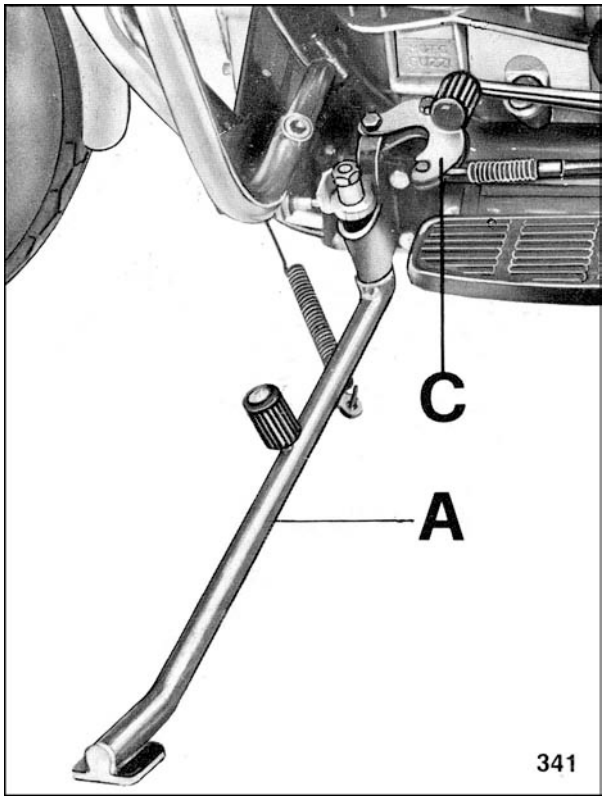

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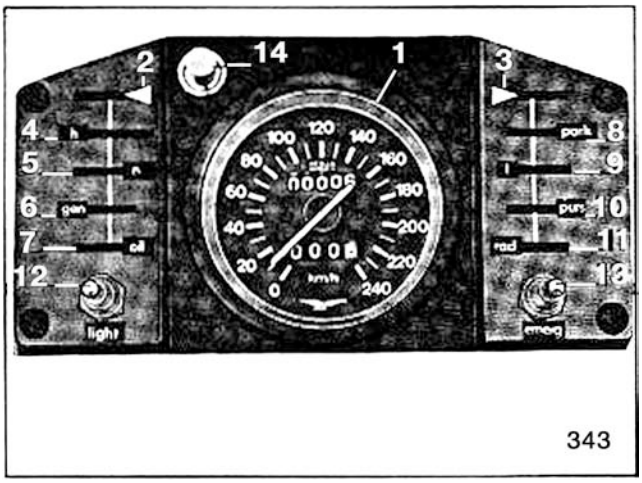
14
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11
12
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km/h
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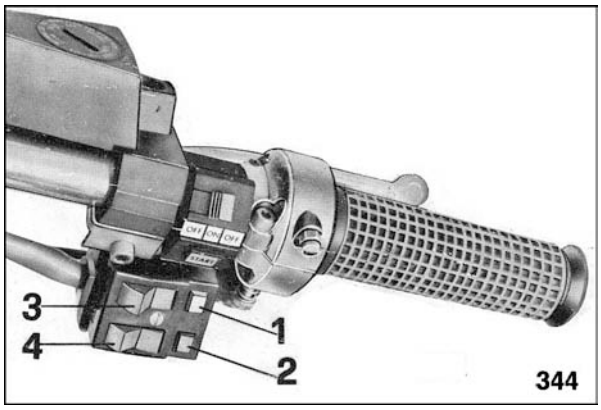
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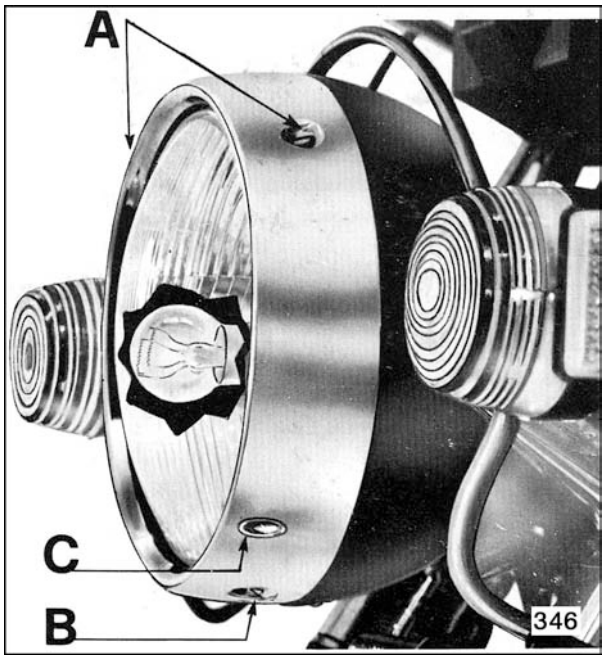
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346

Moto Guzzi Torque Specifications

(V7 Sport, T, and T3)

Description	Part Number	Specifications			Torque kgm	Torque ft/lbs
		Diameter	Pitch	Hex		
Crankcase and covers						
Nut, short and long stud	9275-1103	10	1.5	17	4 to 4.5	29 to 32
Nut, push rod stud	1302-1900	10	1.5	10	4 to 4.5	29 to 32
Nut, stud bolts	9260-2208	8	1.25	13	2.5	18
Screw, journal bearing flange	9805-4425	8	1.25	13	3	22
Screw, cover and flange, flywheel side	9805-4425	8	1.25	13	3	22
Screw, short, cover securing	9862-0325	6	1	Allen 5	1	7
Screw, long, cover securing	9862-0335	6	1	Allen 5	1	7
Screw, cover securing	9862-0325	6	1	Allen 5	1	7
Cap, oil drain	1200-3701	20	1.5	22	5	36
Bolt, oil sump	9805-2340	6	1	10	1	7
Screw, oil breather tube	9805-4316	6	1	10	1	7
Oil filter cap	1400-4900	20	1.5	22	3	22
Screw, recovery pipe band	9805-4316	6	1	10	1	7
Bolt, hollow, oil rec. pipe	1211-6600	12	1.5	17	4	29
Cylinder head and cylinder						
Screw, rocker spindle	9805-4312	6	1	10	0.6 to 0.8	4.2 to 5.7
Screw, rocker box cover	9862-0330	6	1	Allen 5	1	7
Connecting rod						
Nut, self-locking, big end	9273-1090	9	1	14	4.6 to 4.8	33 to 35
Bolt, flywheel (10 K)	1206-7701	8	1.25	13	4.2	30
Bolt, slip ring	9805-4425	8	1.25	13	3	22
Valve gearing						
Screw, camshaft flange						
Nut, camshaft gear	9270-1187	18	1.5	26	15	108
Electrical Equipment						
Screw, Bosch starter motor	9805-2480	8	1.25	13	3	22
Screw, Bosch starter motor	9805-2490	8	1.25	13	3	22
Screw, Bosch starter motor	9805-2490	8	1.25	13	3	22
Screw, Marelli starter motor	9805-2475	8	1.25	13	3	22
Nut, Marelli starter motor	9260-2208	8	1.25	13	3	22
Nut, solenoid screw	9260-2206	6	1	10	1	22
Fuel feed						
Screw, intake pipe	9862-0435	8	1.25	13	3	22
Lubrication						
Screw, short, oil pump	9810-8042	8	1.25	13	3	
Screw, long, oil pump	9802-2455	8	1.25	13	3	22
Screw, bottom filter plate	9802-4310	6	1	10	1	7
Screw, filter box securing	9802-0435	8	1.25	13	3	22
Screw, pipe securing	9805-4430	8	1.25	13	3	22
Bolt, hollow, oil delivery	9599-0037	8	1.25	13	1.5 to 1.8	10.5 to 16
Ignition						
Bolt, generator	9862-0245	5	0.8	Allen 4	0.5	3.5
Bolt, generator back plate	9805-2430	8	1.25	13	3	22

Moto Guzzi Torque Specifications

(V7 Sport, T, and T3)

Description	Part Number	Specifications			Torque kgm	Torque ft/lbs
		Diameter	Pitch	Hex		
Engine to frame items						
Nut, front bolt	9260-2312	12	1.25	19	8	58
Nut, rear bolt	9260-2312	12	1.25	19	8	58
Gearbox						
Bolt, bearing retainer	9805-4316	6	1	10	1	7
Nut, layshaft securing	1421-9310	22	1	27	16 to 18	115 to 129
Bolt, breaker bracket	9805-4316	6	1	10	1	7
Oil filler cap	1200-2701	20	1.5	22	3	22
Oil level plug	9598-0610	10	1.5	17	2	14
Screw, lock plate	9805-5316	6	1	10	1	7
Screw, cover	9862-0325	6	1	Allen 5	1	7
Screw, cover	9862-0335	6	1	Allen 5	1	7
Nut, safety	1421-7410	16	1	24	7 to 8	50 to 57
Rear drive						
Screw, bottom plate retaining	9862-2320	6	1	Allen 5	1	7
Plug, oil filler	1200-3701	20	1.5	22	3	22
Plug, oil level and drain	9598-0610	10	1.5	17		18
Nut, bearing retainer on bevel gear	1235-6700	25	1.5	36	18 to 20	129 to 144
Bolt, crown wheel	1235-6300	8	1.25	13	4.2	31
Bolt, flange securing	9805-4425	8	1.25	13	2.5	18
Frame						
Screw, cradle to frame	9866-3630	12	1.25	Allen 10	8	58
Nut, cradle to frame screw	9260-2312	12	1.25	19	8	58
Bolt, stand securing	9805-2545	10	1.5	17	3.5	25
Nut	9260-2210	10	1.5	17	3.5	25
Screw, battery bracket	9805-4416	8	1.25	13	2.5	18
Nut	9260-2208	8	1.25	13	2.5	18
Nut, footrest screw	9260-2512	12	1.25	19	2	14
Screw, clamp	9806-2535	10	1.5	17	4.5	32
Cap nut, rear fork spindle	1454-7800	20	1	30	8	58
Bolt, tie rod to rear fork	9805-4520	10	1.5	17	4.5	32
Nut	9260-2210	10	1.5	17	4.5	32
Nut, rear drive box	9260-2208	8	1.25	13	3.5	25
Nut, rear fork screw	9260-2206	6	1	10	1	7
Nut, front fender screw	9260-2208	8	1.25	13	3	22
Screw, splash guard	9805-4320	6	1	10	1	7
Nut, self locking	9263-0106	6	1	10	1	7
Nut, rear fender tip	4540-3003	8	1.25	14	3	22
Screw, fender tip	9805-2355	6	1	10	1	7
Nut, self locking	9263-0106	6	1	10	1	7
Nut, rear seat bolt	9260-2208	8	1.25	13	3	22
Nut, self locking, tool box	9263-0106	6	1	10	0.3 to 0.5	2.5 to 3.5

Moto Guzzi Torque Specifications

(V7 Sport, T, and T3)

Description	Part Number	Specifications			Torque kgm	Torque ft/lbs
		Diameter	Pitch	Hex		
Front suspension						
Bolt, bottom yoke securing	9866-2535	10	1.5	Allen 8	4.5	32
Bolt, top linking plate	9866-2535	10	1.5	Allen 8	4.5	32
Plug, top fork	1450-4500	29	1	32	12 to 15	86 to 108
Bolt, bottom cover	9862-2535	10	1.5	Allen 8	4.5	32
Screw, damper securing	1450-4800	8	1.25	13	3	22
Bolt, fork cover to wheel spindle	9866-0540	10	1.5	Allen 8	4.5	32
Screw, headlight lug	9862-0325	6	1	Allen 5	1	7
Rear suspension						
Nut, bottom	9260-3210	10	1.5	17	4.5	32
Bolt, top	9806-4416	8	1.25	13	3	22
Front wheel and brake						
Screw, font brake lever	9810-6022	6	1	10	1	7
Nut, tie rod	9260-2206	6	1	10	1	7
Screw, operating lever	9810-6022	6	1	10	1	7
Nut, wheel spindle	9260-3316	16	1.5	24	14 to 15	101 to 107
Rear wheel and brake						
Screw, central body securing	9810-8038	8	1.25	14	3	22
Nut, body screw	9260-5008	8	1.25	13	3	22
Nut	9260-3210	10	1.5	17	4	29
Screw, cam levers	9806-2325	6	1	10	1	7
Nut, tie rod	9260-3206	10	1.5	17	4.5	32
Nut, rear fork bolt	9260-2210	16	1.5	17	4.5	32
Nut, rear wheel spindle	9260-3316	10	1.5	24	14 to 15	101 to 107
Pedals and controls						
Screw, starter pin lever	9805-2325	6	1	10	1	7
Nut, joint adjusting	9260-2206	6	1	10	1	7
Screw, lever oper; rod	9805-2325	6	1		1	7
Screw, rod clamp	9862-2320	6	1	Allen 5	1	7
Screw, ball joint	9805-2325	6	1	10	1	7
Nut, ball joint screw	9263-0106	6	1	10	1	7
Screw, gearshift lever	9805-4425	8	1.25	13	3	22
Nut, gearshift screw	9260-2406	6	1	10	1	7
Screw, lever fulcrum	9862-0330	6	1	Allen 5	1	7
Nut, clutch lever	9260-2406	6	1	10	1	7
Screw, lever fulcrum	9862-0318	6	1	Allen 5	1	7
Steering - handlebar instruments						
Bushing, stearing clamping	1451-6600	25	1	32	17 to 18	122 to 129
Nut, self locking, steering rod	9263-0106	6	1	10	1	7
Nut, steering damper rod	9263-0106	6	1	10		7
Bolt, handlebar	9866-0450	8	1.25	Allen 6	3	22
Bolt, panel securing	9866-2414	8	1.25	Allen 6	2.5	18

Moto Guzzi Torque Specifications

(V7 Sport, T, and T3)

Description	Part Number	Specifications			Torque kgm	Torque ft/lbs
		Diameter	Pitch	Hex		
Electrical equipment						
Nut, coil securing	9263-0106	6	1	10	0.3 to 0.5	2.5 to 3.5
Nut, regulator screw	9260-2206	6	1	10	1	7
Nut, rectifier screw	9260-2205	5	0.8	8	0.3 to 0.5	2.5 to 3.5
Nut, self locking, brackets	9260-2208	8	1.25	13	3	22
Nut, self locking, plate screw	9263-0106	6	1	10	1	7
Nut, lock plate	9263-0106	6	1	10	1	7
Nut, starter button	9260-2206	6	1	10	1	7
Nut, courtesy light bracket	9260-2206	6	1		1	7
Fuel system						
Nut, tap connection	1410-5700	16	1	19	3	22
Bolt, tank securing	9806-2430	8	1.25	13	3	22
Nut, rubber buffer	9260-2206	6	1	10	1	7
Exhaust sytem						
Nut, muffler screw	9260-2208	8	1.25	13	3	22
Nut, band securing	9260-3206	6	1	10	1	7
Nut, securing screw	9260-3206	6	1	10	1	7