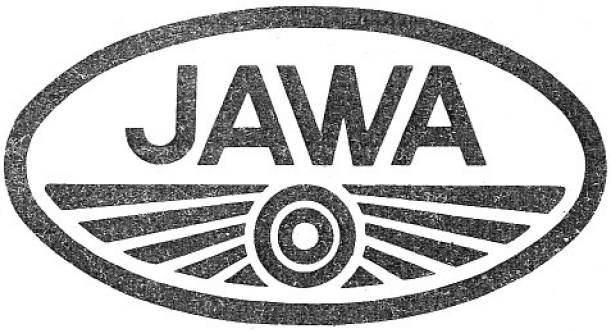
WORKSHOP

MANUAL



350-634/5,6,8

JAWA NÁRODNÍ PODNIK TÝNEC n./SÁZ.

MADE IN CZECHOSLOVAKIA

1989

This WORKSHOP MANUAL has been issued expecially for the use of repair shops with the purpose of assisting the repairmen in more extensive and more complicated repairs of JAWA motor cycles. When describing the individual repair procedures we assume that the repairmen and mechanics will use the set of special tools which have been designed to facilitate the most complicated jobs. This Manual does not contain descriptions of repairs and adjustments described in the Rider´s Handbook handed over to every buyer of a JAWA motor cycle.

Sales and Technical Service Department

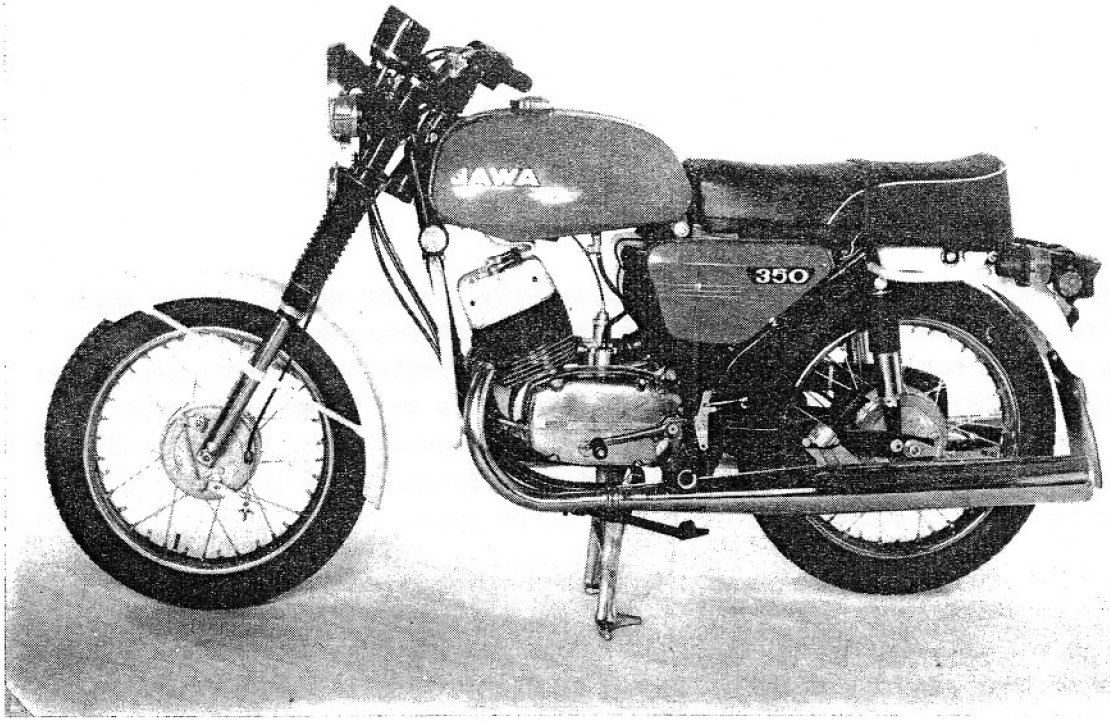


Fig.No. 1 - JAWA 350/634-5,8

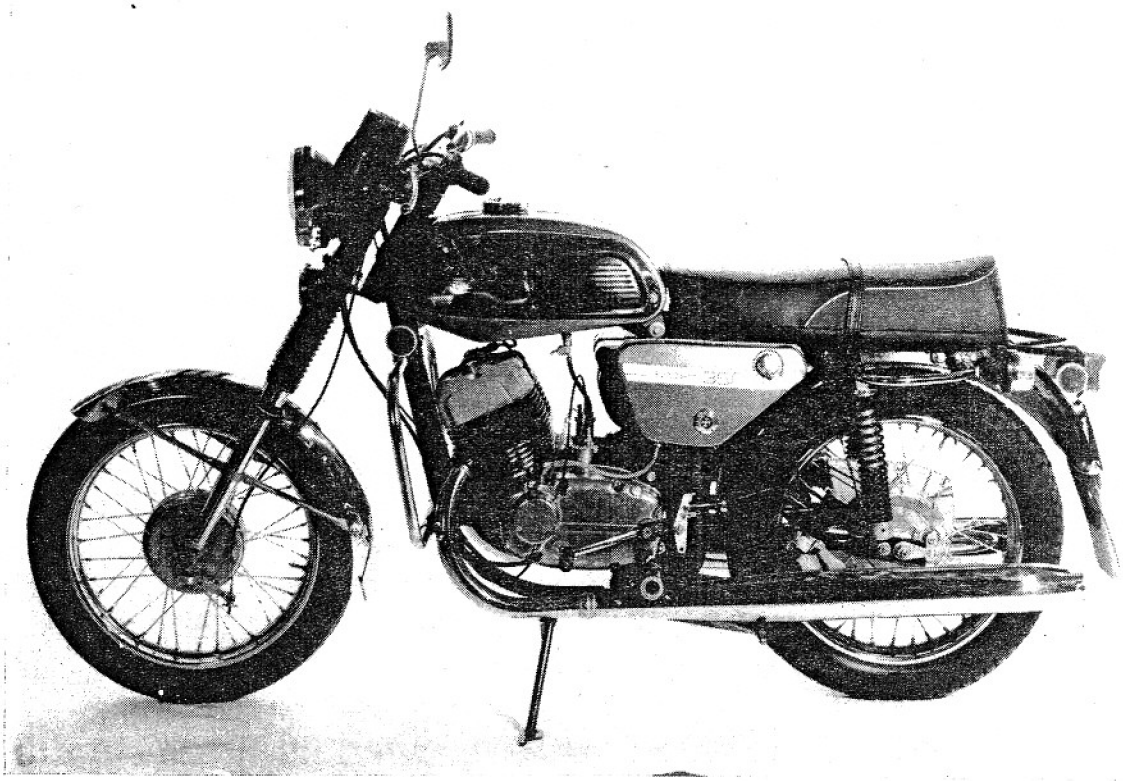


Fig.No. 2 - JAWA 350/634-6

PRE-SALE INSPECTION OF MACHINE

a) Unpack the motor cycle, remove the protective coating of its parts, and fit in position units and parts of equipment separately packed and delivered with the machine.

b) Remove the battery, put it in working condition, charge it, and reinstall it. On the correct electrolyte density and charging depends the service life of the battery.

c) Inspect the motor cycle surface finish. Repair any defects charging the repair expenses to the account of the culprit (hauler, store, manufacturer, etc.). Touch up scratched or otherwise damaged enamel.

d) Check whether the filter element is in position in the intake silencer and whether the intake silencer is properly connected to the carburettor.

e) Check the oil level in the gearbox - top it up if it does not reach up to the mark.

f) Check the oil filling of the front fork paying attention to any traces of oil leakage (oil splotches on the rim, tyre, etc.). If there are no indications of leakage, the oil filling is satisfactory (oil is filled in in the factory in automatically metered out amounts) but if a defect is ascertained remove it, drain the remaining oil, and refill the fork leg (legs) with the recommended amount of fresh oil. Never top up the oil remaining in the fork leg!

g) Remove transport packings (plugs) from the fork lugs or nuts of fork legs. If you fail to do so, an undesirable overpressure builds up during the up and down swing of the front fork resulting in the deterioration of riding characteristics and shortening of the service life of seals and, moreover, no claims regarding damaged seals will be recognized.

h) Check on all positions of the ignition key in the switch box and test the individual parts of electrical equipment (headlamp, direction indicators, horn, tail and stop light, switches on handlebars). Repair defects, if any.

i) Check tyre pressures and adjust them to the recommended values.

j) Check the tension of the secondary chain and adjust it as necessary.

k) Check the proper tightening of the front and rear wheel spindles and the nut of the rear sprocket (chain wheel). If the machine was delivered with the front wheel removed, first tighten the spindle nut, then push down and release several times the front fork, and finally tighten firmly the clamping bolt of the slider end pieces. Do not forget to lock the nut with a cotter pin on machines intended for coupling with a sidecar.

l) Check the adjustment of brakes (dead travel) and adjust the stop swith if necessary.

m) Pour at least one litre of petrol mixed with the recommended oil in the ratio prescribed for the respective machine model into the fuel tank.

n) Start the engine and try the individual positions of the switch box. Switch on all the lights and check at medium engine speed (machine propped up on its stand, the speedometer indicates 50 km with the 4th gear engaged whether the engine runs smoothly and regularly and does not stall when disconnecting the battery fuse. In this way you will make sure that the dynamo covers all the electric power demand.

List of Tools for Previous JAWA Models
Usable also for Model 634-4

Pos. No.	Designation	Product No.	Description	Quantity
1	S-9	16-65671-3	Front fork bush extractor	1
2	S-10	16-67585-3	Exhaust pipe nut spanner	1
3	S-44	9.71.51578.3	Gudgeon pin extractor with extension pieces	1
4	S-46	9.71.51559.4	Injection advance adjusting gauge	1
5	S-48	9.71.51568.4	Dynamo rotor puller	1
6	S-61	9.71.51567.4	Crank mechanism centre bush extractor	1
7	S-62	9.71.51598.3	Crankcase halves separating press with bolts	1
8	S-63	9.71.51589.4	Pawl retaining jig	1
9	S-64	9.71.51590.4	Centering bush drift	1
10	S-66	9.71.51603.3	Cluth pilot plate	1
11	S-68	9.71.51565.4	Tubular wrench "32" for chain wheel nut	1
12	S-71	9.71.51577-4	Bearing extractor	1
13	S-72	9.71.51576.4	Packing ring installer	1
14	S-73	9.71.51599.4	Packing ring protector	1
15	S-80	16-65776-3	Fork leg puller	1
16	S-81	16-19758-3	Tubular wrench for steering stern nut	1
17	S-82	16-19756-3	Hook spanner	1
Additional, new tools:				
18	S-84	9.71.52254.3	Exhaust silencer core extractor	1
19	S-85	9.71.52248.4	Sprocket puller	1
20	S-86	9.71.52253.4	Gudgeon pin drift	1
21	S-87	9.71.52252.4	Gudgeon pin press-out pin, dis.16 mm	1
22	S-88	9.71.52251.4	Connecting-rod small end insert	2
23	S-89	9.71.52255.3	Gate interlock adjusting lever	1
Special service tools for crank mechanism:				
24	S-200	9.71.72590.1	Pressing fixture including attachments	1
25	S-201	9.06.55407.3	Lever	1
26	S-202	9.06.55408.2	Pliers	1

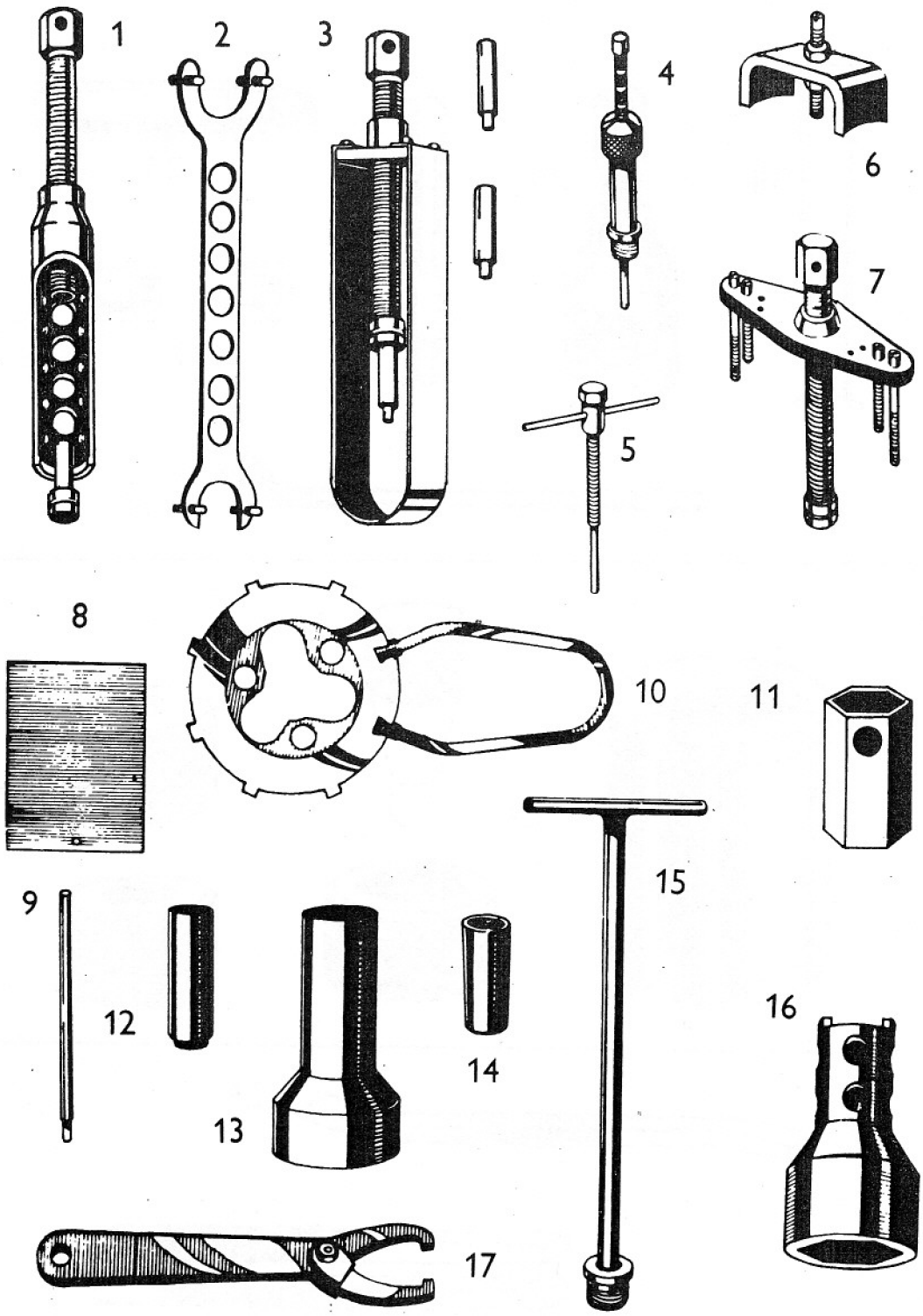
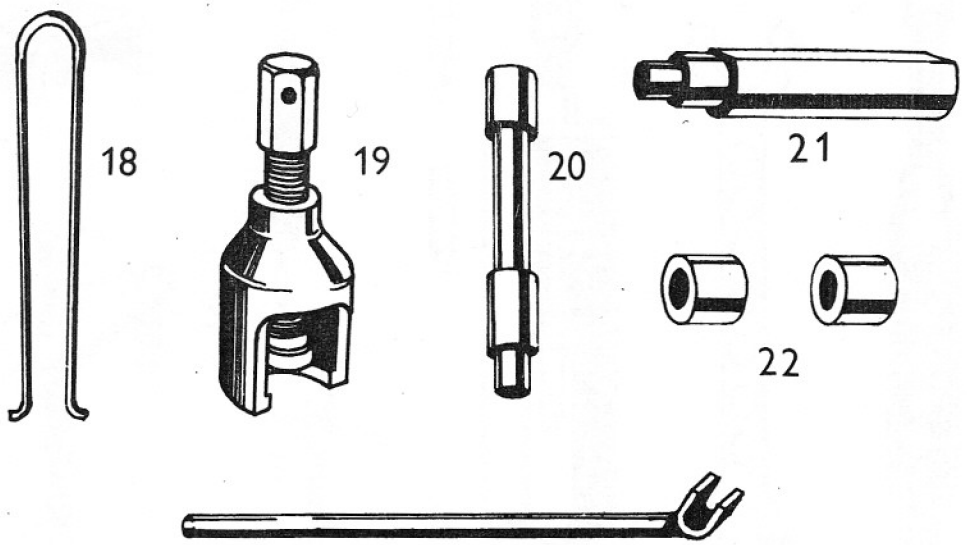
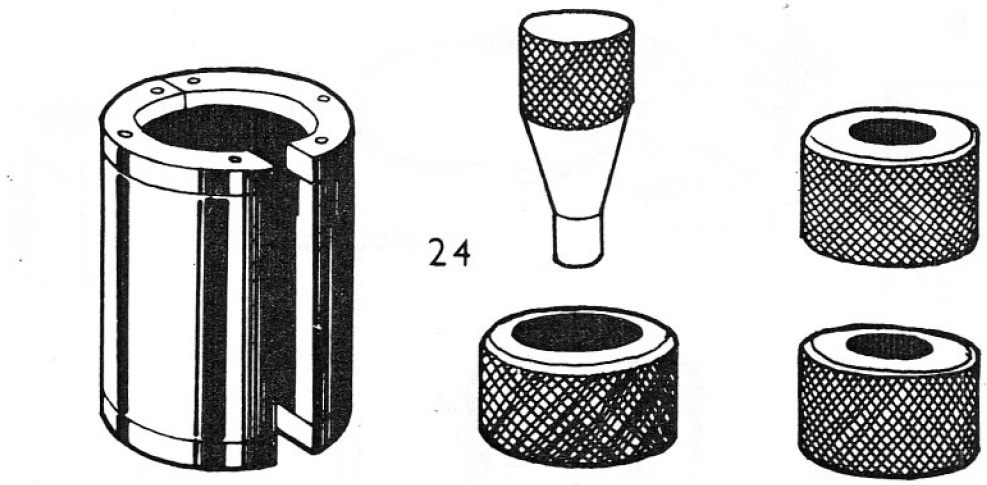


Fig.No.3 Service tools





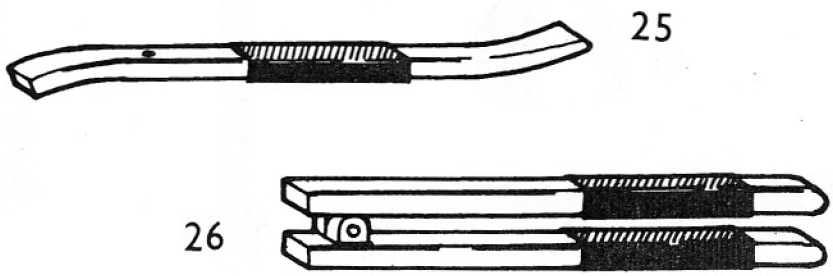


Fig.No.4 Service tools

LIST OF MAIN BEARINGS AND SEALING RINGS

Table No.1

Item No.	Designation	Bearing	Dimension	Units	Location
1	324 163 050 036 (960-630507)	Bearing 6305 C 36	62/25x15	2	Engine
2	324 163 060 036 (960-630607)	Bearing 6306 C 36	72/30x19	1	Crankshaft mechanism
3	324 163 030 000 (960-630300)	Bearing 6303	47/17x13	1	Gearbox
4	324 232 050 000 (961-320500)	Bearing	52/25x20.6	1	Gearbox
5	x	Needle bearing	-	2	Crankshaft mechanism
6	xx	Needle bearing	-	2	Crankshaft mechanism
7	324 163 020 000 (960-630200)	Bearing 6302	42/15x13	2+2	Front and rear wheel
9	324 914 010 452 (960-406350)	Ball	Ø dia 6,35 (1/4")	38+1	Frame head Declutching device
8	324 162 050 000 (960-620500)	Bearing 6205	52/25x15	1	Rear wheel
10	273 521 006 917 (953-025808)	Sealing ring "gufero"	25/62/8	2	Engine
11	273 521 100 303 (954-008107)	"gufero"	8/16x7	1	Speedometer drive
12	273 521 108 603 (953-030410)	"gufero"	30/52x12	1	Gearbox

x - only separate needles and gudgeon pins are supplied - see the "List of Spare Parts"

xx - not supplied. In the case of a defect, replace the complete connecting rod which is supplied complete with the big and small end bearings and the respective journals

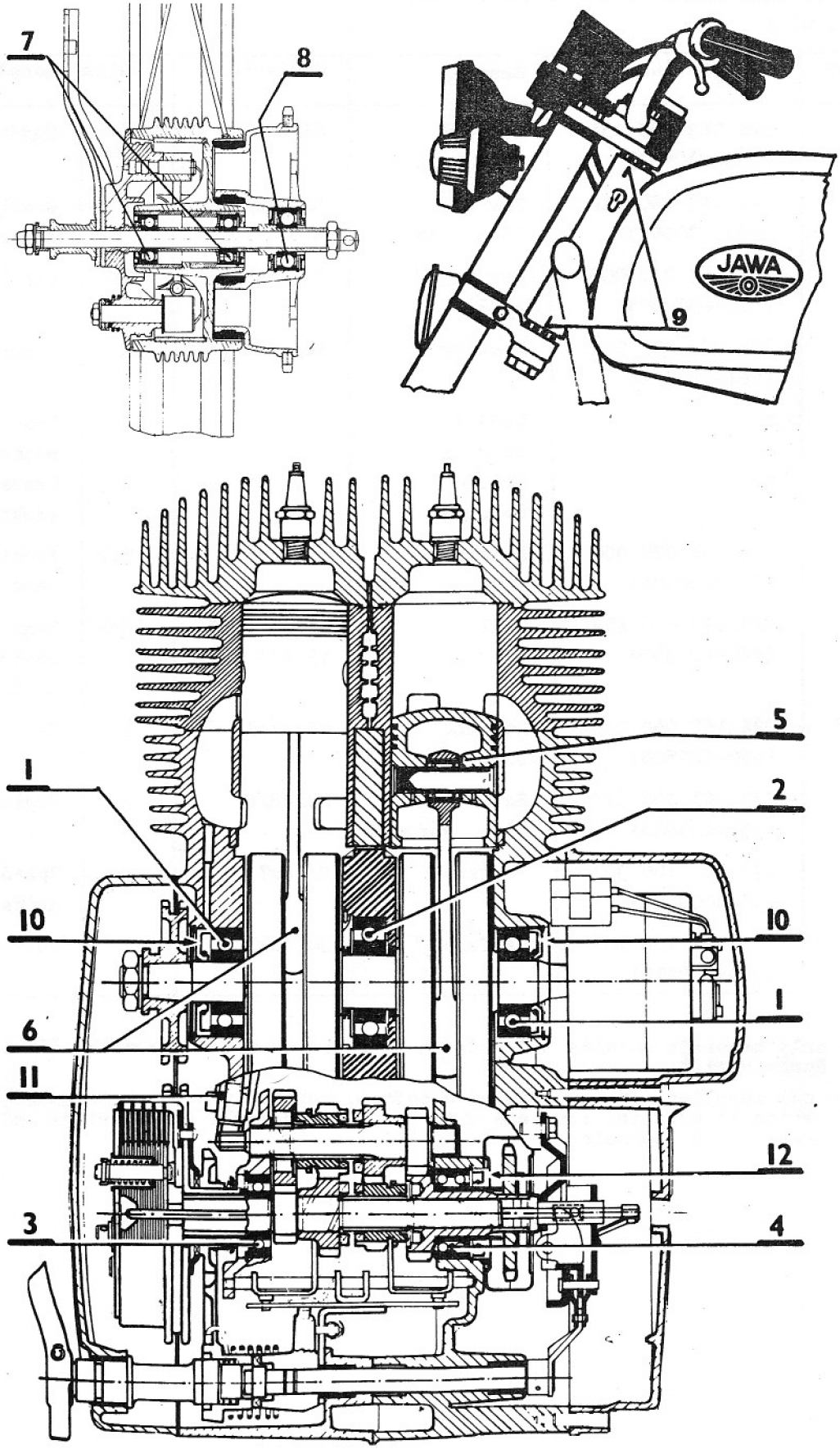


Fig.No.5 Layout of bearings and packing rings

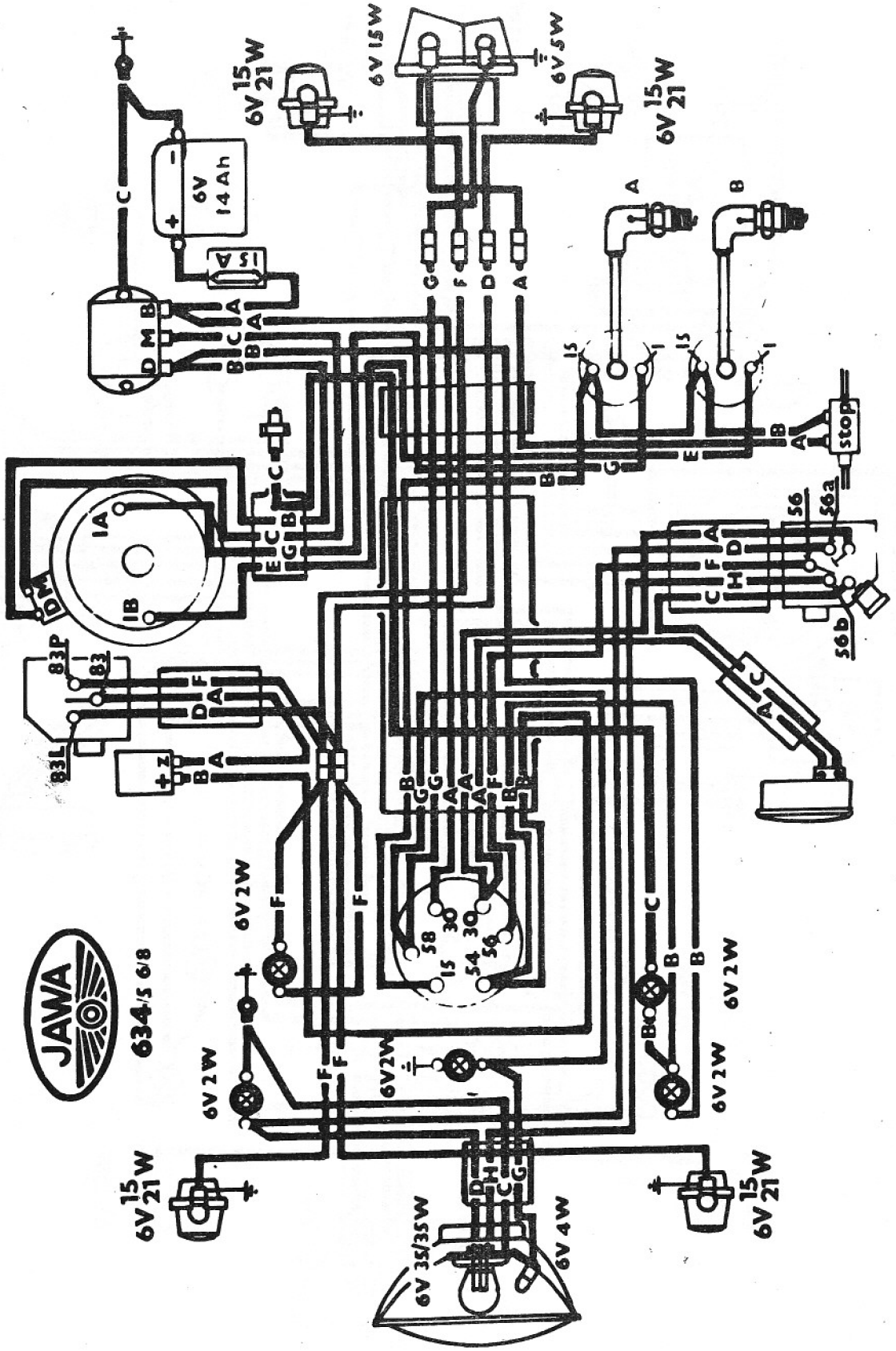


Fig.No. 6 Wiring diagram (single-instrument model)
A-black, B-white, C-blue, D-green,
E-yellow, F-red, G-grey, H-brown

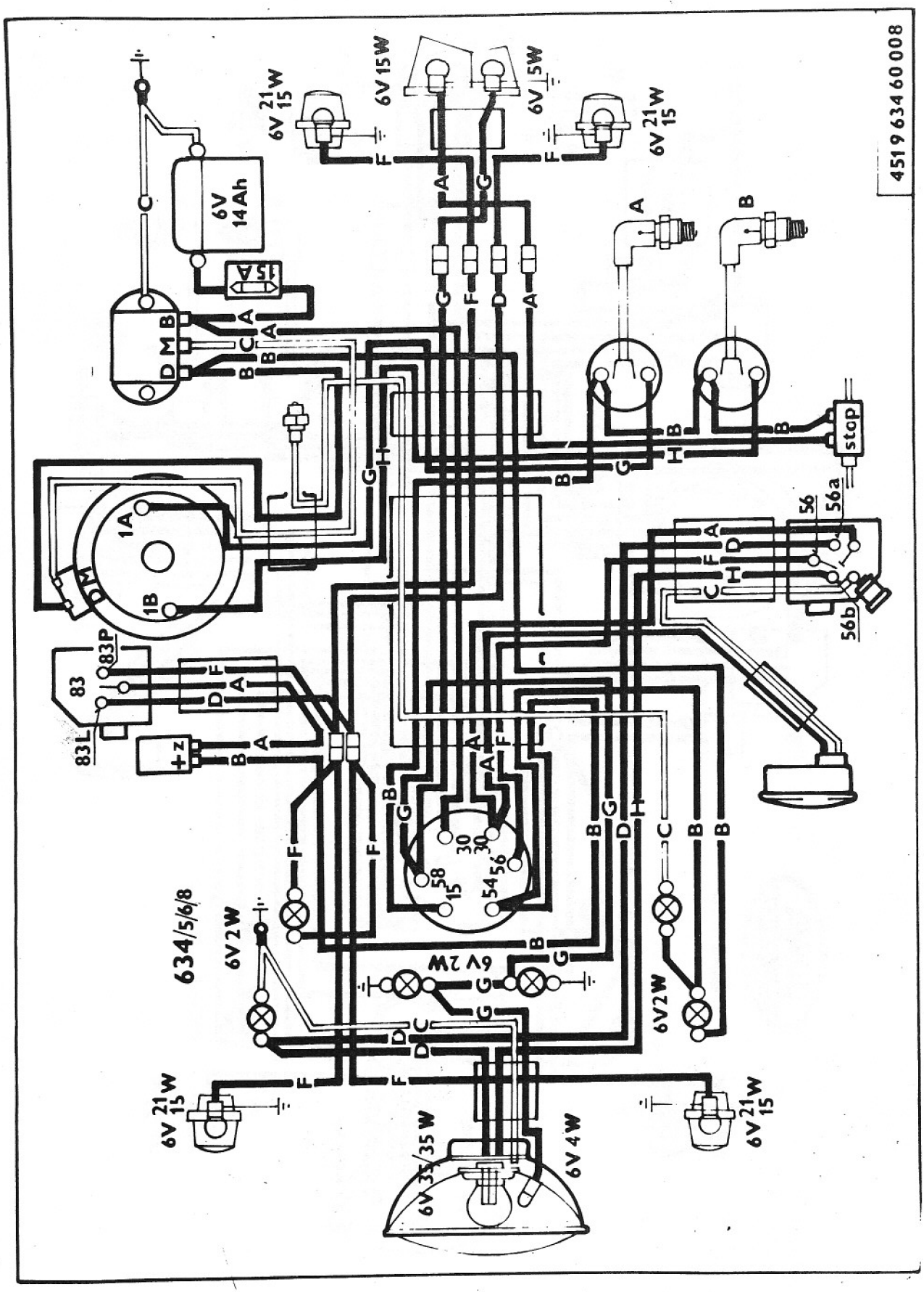


Fig.No. 7 Wiring diagram

A-black, B-white, C-blue, D-green,
E-yllow, F-red, G-grey, H-brown

E N G I N E

1. DISMANTLING AND REASSEMBLY WITHOUT REMOVING ENGINE FROM FRAME

1.1. Pistons

The gudgeon pin is mounted in a needle-roller bearing. Therefore do not remove the pistons without using special tools to prevent some of the needles from dropping out and falling into the engine where they are bound to cause serious damage and from which they can be withdrawn only after a dismantling. The following procedure is recommended:

After having removed the cylinders, plug the holes thus uncovered in the crankcase. Remove piston rings and then the circlips of gudgeon pins using special pliers. Put the S-44 gudgeon pin extractor and/or the S-88 gudgeon pin drift ready to hand. Slide the S-88 insert into the hole in the piston and then thread the S-87 press-out pin into the insert (Fig.8). Place the 3-44 extractor in position

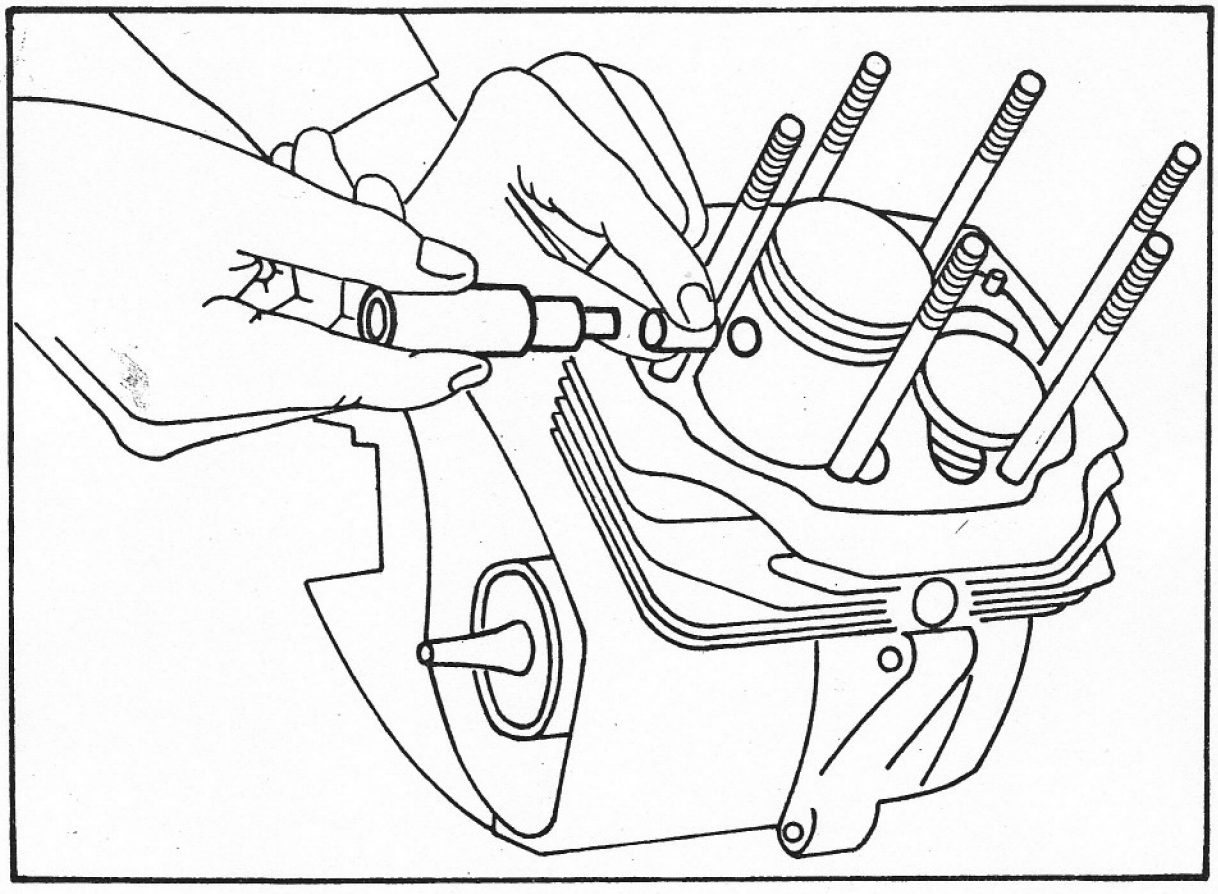


Fig.No.8 Pressing out gudgeon pins

on the piston and insert its extension piece into the S-87 press-out pin. This pin has to be located so that its land is turned toward the cylinder centre bolt. Acting on the S-44 extractor or S-86 drift, push the S-87 press-out pin till its collar ir flush with the piston hole for the gudgeon pin (Fig.9).

Remove the extractor and take out carefully the S-87 press-out pin. Disengage the piston from the connectingrod small end and use a length of locking wire to secure the insert remaining between the needles in the small end together with the original shims behind the needles against falling out (Fig.10).

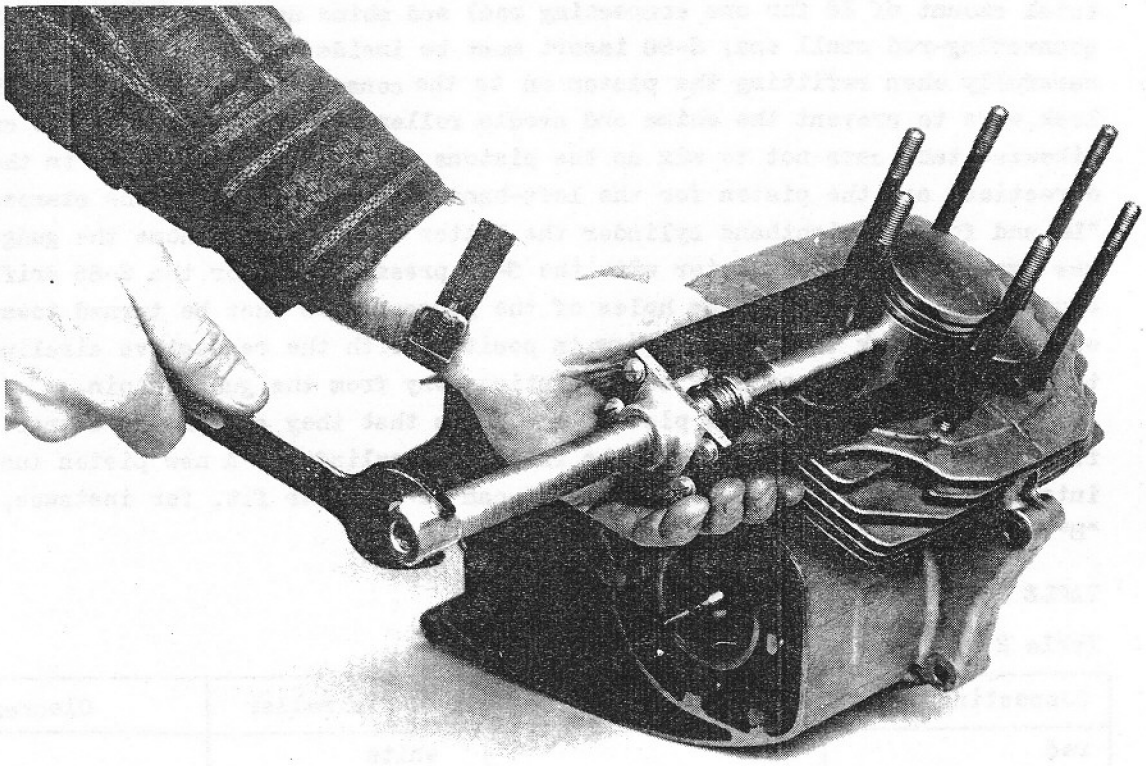


Fig.No.9 Pressing out pistons

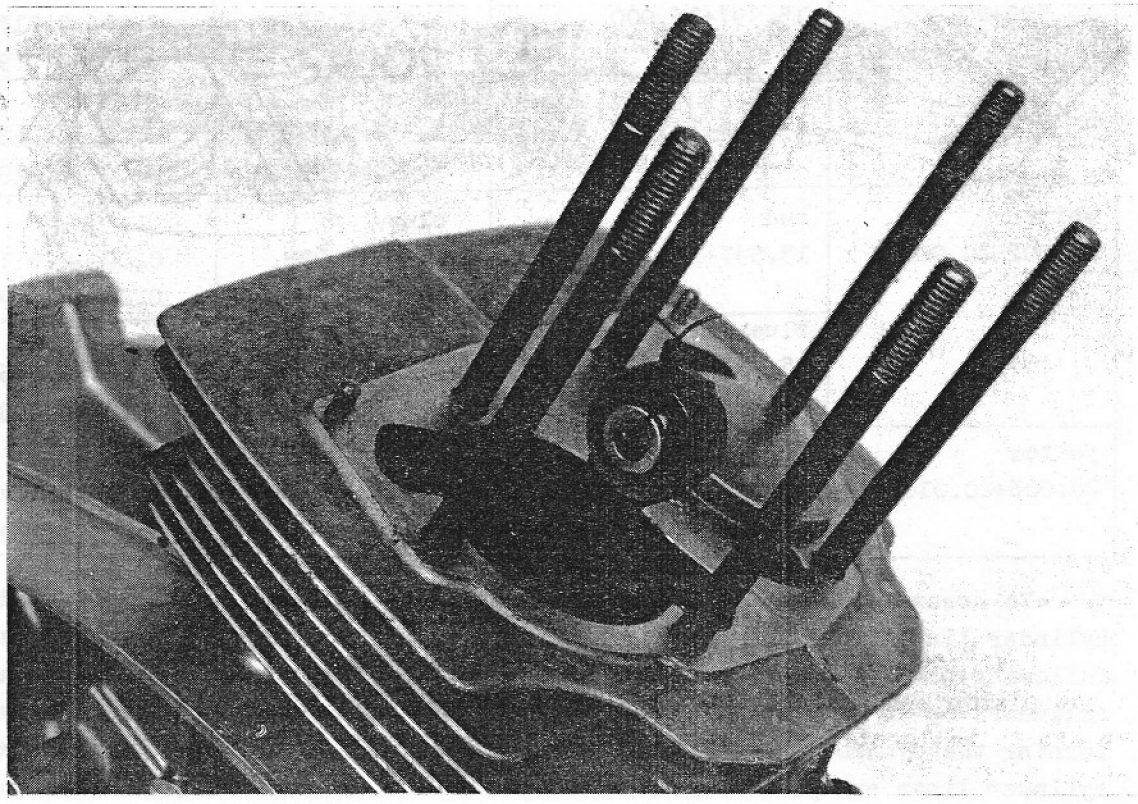


Fig.No.10 Securing small-end bearing

Before reassembly make sure that all the needle rollers (2x13.8 mm in a total amount of 28 for one connecting rod) and shims are in position in the connecting-rod small end. S-88 insert must be inside the bearing. Proceed very carefully when refitting the piston on to the connecting rod after unlocking the lock wire to prevent the shims and needle rollers from falling into the crankcase. Likewise take care not to mix up the pistons - the arrow must point in the forward direction, and the piston for the left-hand cylinder must bear the stamped letter "L" and for the righthand cylinder the letter "P". To press home the gudgeon pins use again the S-44 extractor with the S-87 press-out pin or the S-86 drift. Remember that the relieving holes of the gudgeon pins must be turned toward the outer side. Lock the gudgeon pins in position with the respective circlips with their slightly outward bent ends pointing away from the gudgeon pin.

Before installing new pistons make sure that they are of the correct grading, i.e. A, B or C, with regard to the individual cylinders. A new piston installed into an already slightly worn cylinder can be a closer fit, for instance, piston "B" into the cylinder "A" - see Table 3.

TABLE OF GUDGEON PIN BEARING ASSEMBLIES

Table 2

Connecting rod	Gudgeon pin	Needle roller	Clearance
red 19.994+19.998	blue 15.994+15.997	white 1.994+1.996 1.993+1.995	 0.005+0.016 0.007+0.018
blue 19.998+20.002	red 15.997+16.000	white 1.994+1.996 1.993+1.995	 0.006+0.017 0.008+0.019
	blue 15.994+15.997	blue 1.996+1.998 1.995+1.997	 0.005+0.016 0.007+0.018
white 20.002+20.006	red 15.997+16.000	blue 1.996+1.998 1995+1.997	 0.006+0.017 0.008+0.019
	blue 15.994+15.997	red 1.998+2.000 1.997+1.999	 0.005+0.016 0.007+0.018
yellow 20.006+20.010	red 15.997+16.000	red 1.998+ 2.000 1.997+1.999	 0.006+0.017 0.008+0.019

To assure yourself that the piston skirt is perfectly parallel with the cylinder liner (that the piston and cylinde are in perfect alignment) make the following check before installing piston rings on the piston. Fit tentatively the cylinders on the pistons (without piston rings) and rotate the crank mechanism by turning the dynamo rotor to see whether there is an adequate clearance between the cylinder liner and piston both in the piston T.D.C. and B.D.C. If the piston leans against one side and returns to this position after forcing it away, it is neses-sary to remove the cylinder and to bend carefully the connecting rod with the piston to the opposite side. This cylinder and piston aligning procedure is called the connecting rod angle setting.

A

In the setting is correct, the piston clearance in the cylinder liner must be equal on either side and there must be no sticking. For reboring, the cylinders must be clamped to their bearing surface to ensure the required perpendicularity. Measure every cylinder after reboring and determine its new grading enabling the use of a correct pistan. Graning diameters (bores) for rebored cylinders are to be found in Table 4.

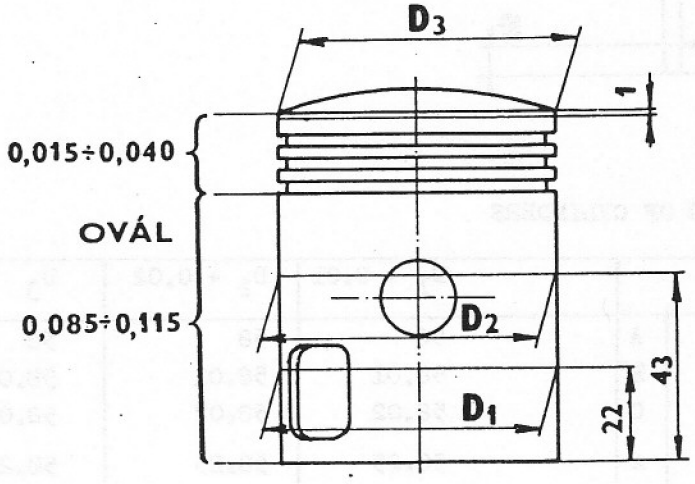


Table 3 - GRADING OF PISTONS

Designation			D_1-0.01	D_2-0.01	D_3-0.01
L 319 231 011 550 (661-090202)	normal	A	57,95	57.925	57.71
		B	57,96	57.935	57.72
R 319 231 011 540 (661-090203)		C	57.97	57.945	57.73
L 319 231 011 551 (661-090212)	1st	A	58.20	58.175	57.96
		B	58.21	58.185	57.97
R 319 231 011 541 (661-090213)	rebore	C	58.22	58.195	57.98
L 319 231 011 552 (661-090222)	2nd	A	58.45	58.425	58.21
		B	58.46	58.435	58.22
R 314 231 011 542 (661-090223)	rebore	C	58.47	58.445	58.23
L 319 231 011 553 (661-090232)	3rd	A	58.70	58.675	58.46
		B	58.71	58.685	58.47
R 319 231 011 543 (661-090233)	rebore	C	58.72	58.695	58.48
L 319 231 011 554 (661-090242)	4th	A	58.95	58.425	58.71
		B	58,96	58.935	58.72
R 319 231 011 544 (661-090243)	rebore	C	58.97	58.945	58.73

Only basic dimensions are given in this table because of the intricate shape of the pistons.

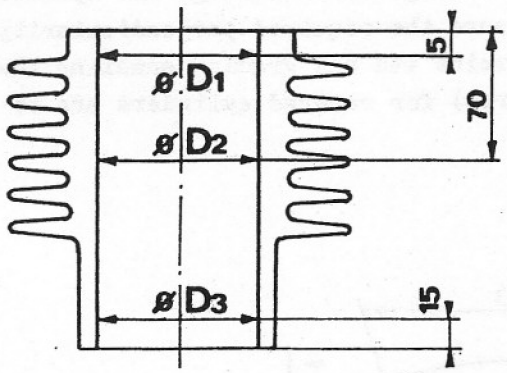


Table 4 - GRADING OF CYLINDERS

		D_1 + 0.01	D_2 + 0.02	D_3 + 0.02 - 0.01
Normal	A	58	58	58
	B	58.01	58.01	58.01
	C	58.02	58.02	58.02
	A	58.25	58.25	58.25
1st rebore	B	58.26	58.26	58.26
	C	58.27	58.27	58.27
	A	58.50	58.50	58.50
2nd rebore	B	58.51	58.51	58.51
	C	58.52	58.52	58.52
	A	58.75	58.75	58.75
3rd rebore	B	58.76	58.76	58.76
	C	58.77	58.77	58.77
	A	59.00	59.00	59.00
4th rebore	B	59.01	59.01	59.01
	C	59.02	59.02	59.02

Note:

The manufacturer ships spare (replacement) cylinders exclusively of basic (standard) dimensions. Dimensions specified in the table refer only to rebores. For various reasons it is very difficult to rebore cylinders to hundredths of millimeter tolerances and so it is necessary to measure (at several points) the diameter of the cylinder bore after reboring and to find the matching piston (of suitable grading) on the basis of the measurements. Do not forget to change correspondingly the cylinder grading marking on the cylinder upper surface.

For new as well as overhauled engines (with rebored cylinders) it is possible to use the right-hand and left-hand cylinders of a different grading (but not of different rebore classes), naturally with due regard to the respective grading classes of pistons matched with the cylinders. If the rebore is somewhere between the two grading classes, for instance 58.27 mm, it is possible to use either the class "B" or "C" piston. With the class "B" piston, the runnung-in is quicker while the possibility of piston knicking in a cold engine is reduced whed using the class "C" piston.

1.2 Carburettor

The very first to do before adjusting the carburettor is to see whether the size of the main petrol jet corresponds to the design (version) of the intake silencer. On motor cycles with a noise damping insert in the inlet of the intake silencer, the main jet must be of a smaller size. Check the main jet size also when installing a new carburettor.

Noise in decibels	Carburettor	Main jet	Idling jet	Needle position	Fast-idling scres
84+1	2926 SBDb 2802	115	55	4th Running-in 3rd after "	1/2 0,5-1,5
84	2926 SBDb 2801	92	55	3rd running-in 2nd after "	1/2 0,5-1,5
84+1 Oilmaster	2926 SBDMb 2783	115	55	4th running-in 3rd after "	1/2 0,5-1,5
84	x	92	55	3rd running-in 2nd after "	1/2 0,5-1,5
82 Holland Oilmaster	x	98	55	3rd running-in 2nd after "	1/2 0,5-1,5

x Replacement carburettors are not shipped as units. If necessary, fit carburettors specified in the table with different jets.

1.3 Primary Transmission

Remove the kickstarter lever (after having turned it to the starting position) and then two screws holding down the left-hand crankcase cover. If the oil has not been drained before then, put a suitable vessel under the cover and remove the cover by prizing of off carefully. Remove the clutch plates, unlock the M 12 mainshaft nut and slide the S-66 pilot plate into the clutch centre dresser. Use the "19" tubular spanner to remove the M 12 nut (Fig.11) and the "24 spanner to remove the nut of the primary sprocket (Fig.12). Lift out the clutch centre drum, pull off the primary sprocket using the S-85 puller (Fig.13), and remove it together with the chain and clutch chain wheel (toothed drum) from the shafts (Fig.14). If the primary sprocket is a too tight fit on the taper, tension the puller as much as possible and tap the head of the puller bolt. If even this procedure fails to free the sprocket, heat up carefully its hub with a flame to make it expand sufficiently for the sprocket to be pulled off easily.

In the majority of cases, it is possible to remove the clutch chain wheel without pulling off the primary sprocket (if the chain has already been somewhat stretched). Push and pull the clutch chain wheel several times on the mainshaft until the distance sleeve of the chain wheel slides out sufficiently to be grabbed and pulled out. At a convenient inclination of the clutch chain wheel, the slackened primary chain can be pulled over the teeth of the primary sprocket.

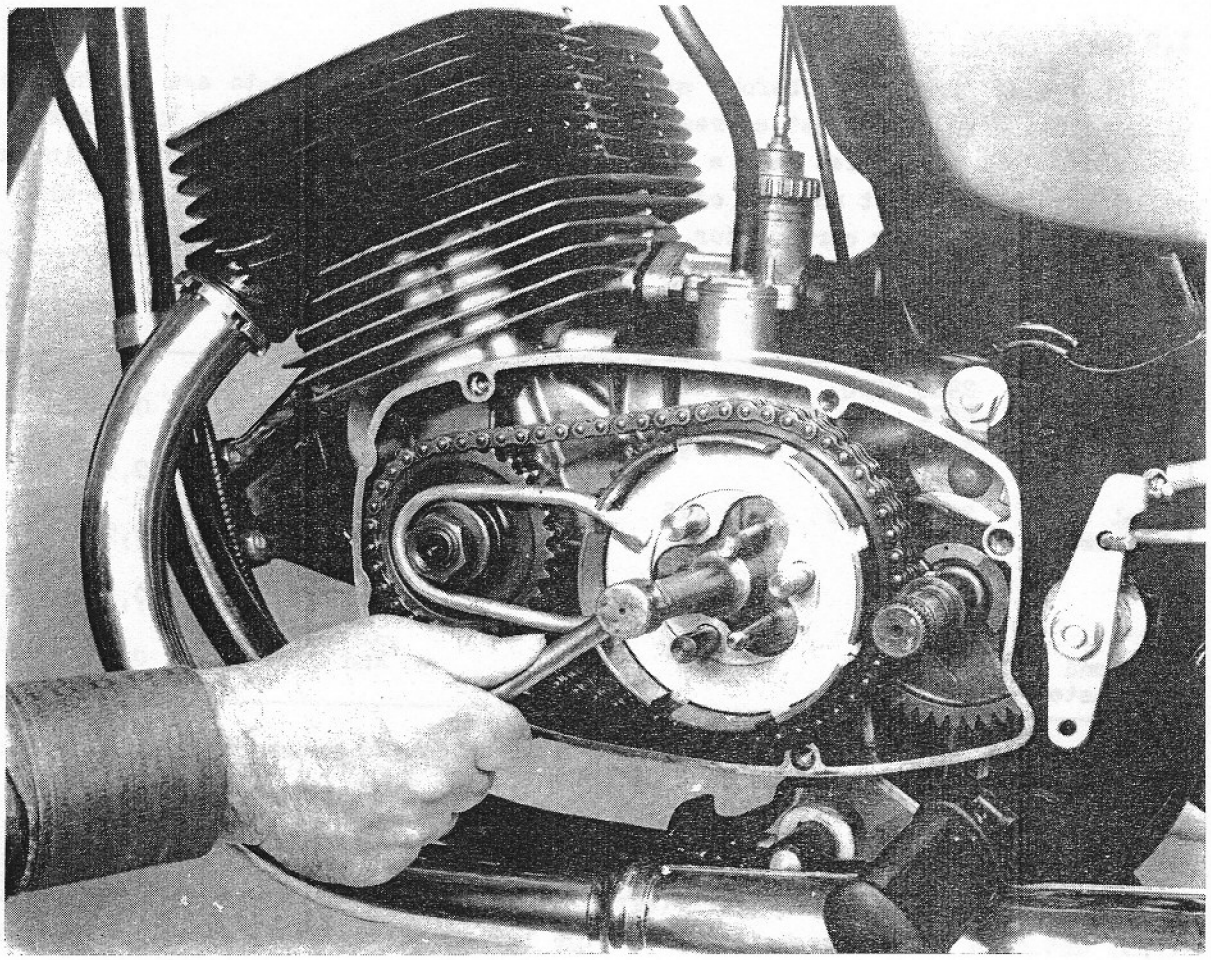


Fig.No. 11

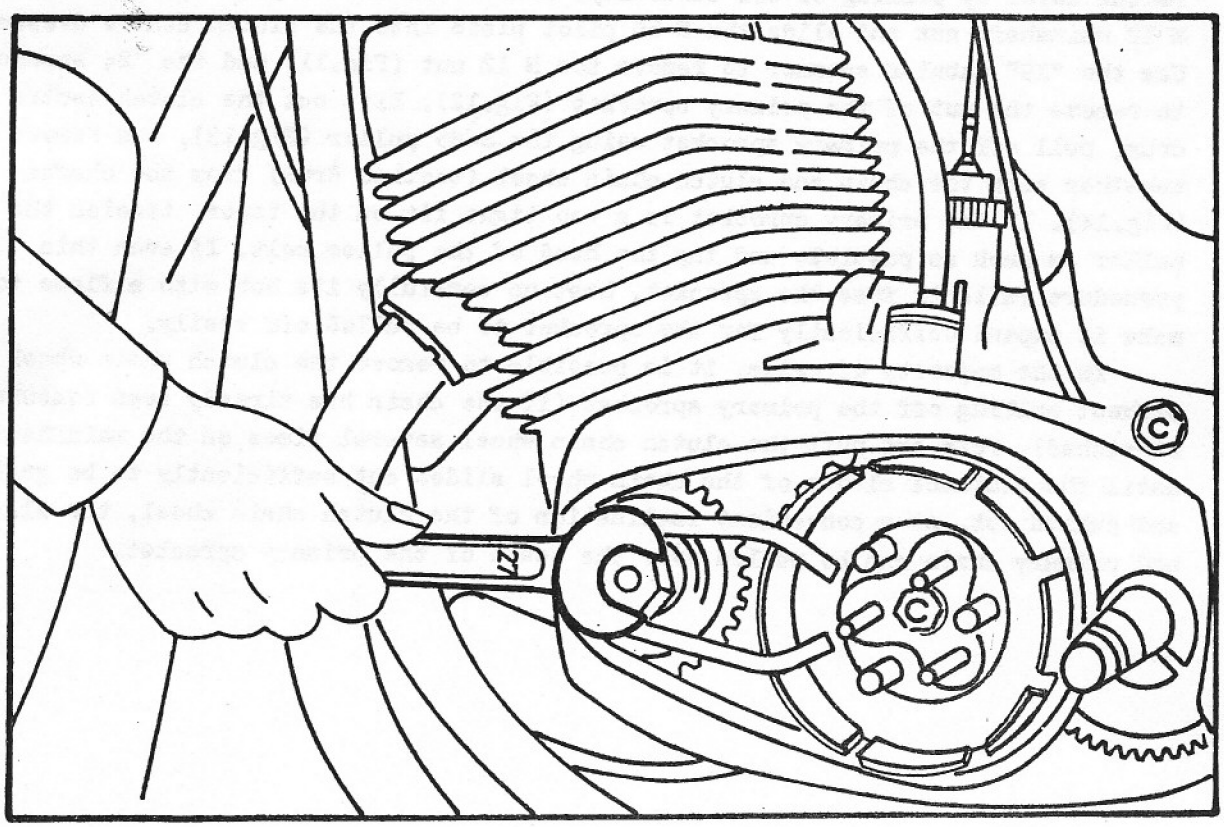


Fig.No. 12

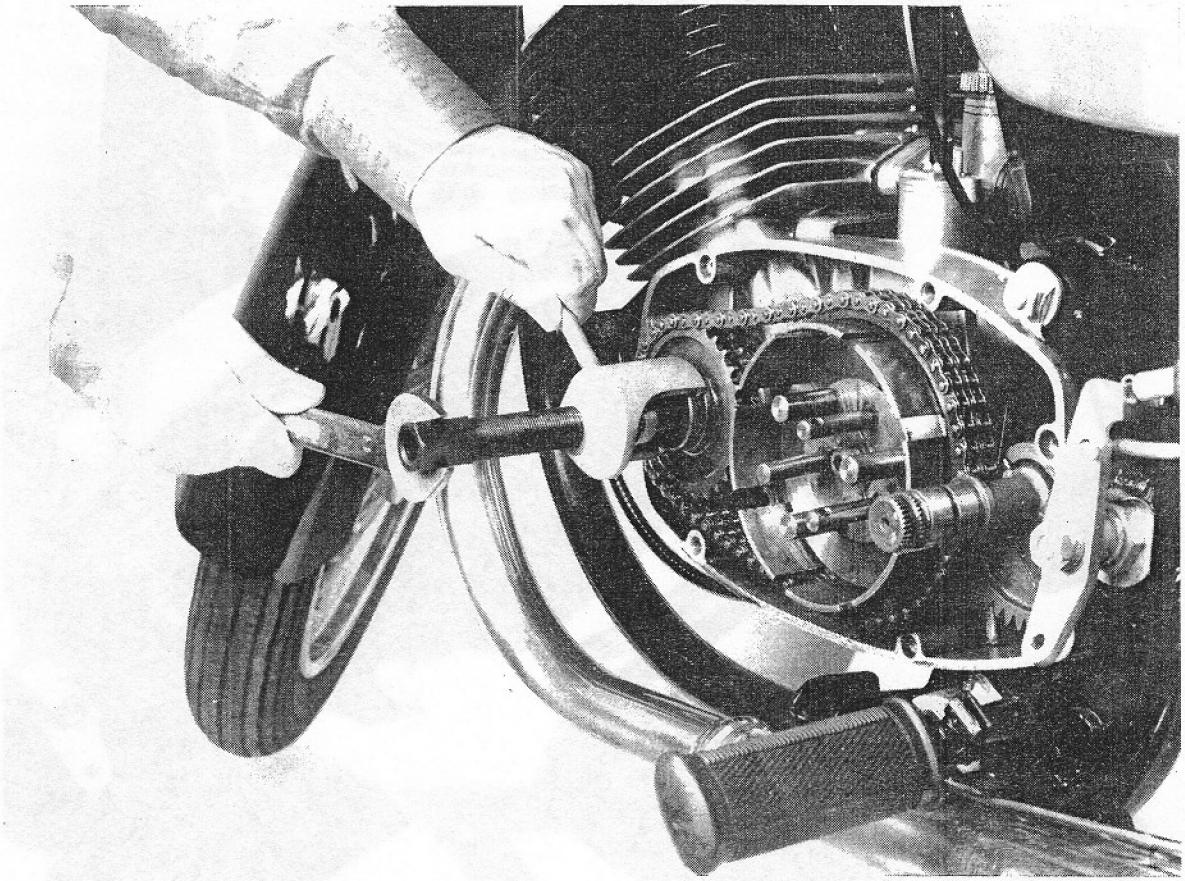


Fig.No.13 Extraction of primary sprocket

Reassembly:

Fit the primary sprocket on the cleaned and dried crankshaft taper and thread the shim, spacer and, provisionally, the clutch chain wheel on the gearbox mainshaft. Apply a steel ruler to the flanks of the sprocket and clutch chain wheel at the point of the toothing to make sure that they form a single plane, which is important with regard to the service life of the primary transmission chain and the noise of the primary transmission. Correct any deviations by putting steel shims of a suitable thickness on the maindshaft between the bearing and bearing shim of the clutch chain wheel. After having completed the parallelity check, remove again the clutch chain wheel.

Before reinstalling the starting mechanism, check the shaft seal for condition. Install the starting mechanism with the starter shaft turned to the starting position. Fit the sprocket and the clutch chain wheel with the primary transmission chainin position on them on to the crankshaft taper and mainshaft. Slip the clutch centre drum on the mainshaft together with its lock washer. Fasten now the clutch centre drum with the respective nut and lock the washer. Tighten the nut of the primary sprocket on the crankshaft. During these operations use the S-66 pilot plate. Insert now alternately the friction and steel clutch plates while making sure that the clutch plate dogs enter freely into the slots in the clutch chain wheel. When installing new clutch plates, measure first their total thickness which should be between 18.25 and 19 mm for the five plates. Install the oiled clutch release rod with disk into the mainshaft, locate the pressure plate with springs, insert the respective washers above the springs, and then compress the springs over the washers one after the other using a "10" spanner while slipping lock pins above the washers.

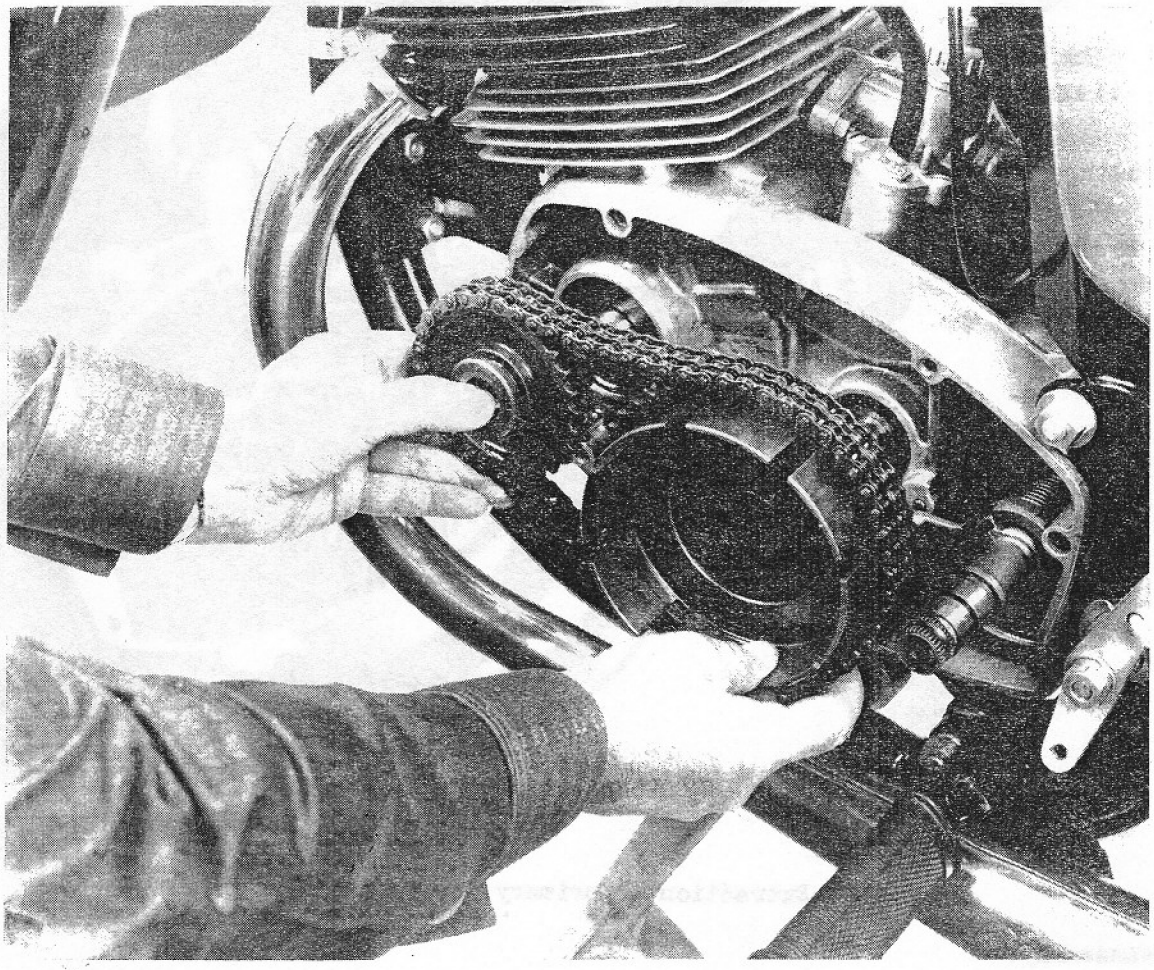


Fig.No.14 Removing primary transmission

Smear with motor grease the cleaned and undamaged mating surface of the crankcase and place thereon the undamaged, preferably new, gasket. Smear with oil the starter shaft and reinstall the left-hand crankcase cover. Tighten properly its M 8 fastening screws. Refit the kickstarter lever and test gear shifting and starting.

1.4 Speedometer Drive

Remove the primary transmission as described in chapter 1.3. Remove the M 6 screw from the bottom part of the engine, holding down the speedometer drive end piece. Push the speedometer drive out of the engine. In the bottom part of the left-hand crankcase half there is a boss in which the speedometer drive is securaly held by a grub screw. Remove this grub screw and use a rod (preferably an aluminium rod) to drive the speedometer drive body out of the crankcase together with its packing ring.

When reinstalling the speedometer drive, slip a new packing ring (8x16x7) to the drive shaft so that the ring spring points inside the engine. Then use a tube or a tubular spanner with an outside diameter of 15 mm to tap home carefully the speedometer drive into its mounting (pushing the tube or tubular spanner through the hole in the crankcase) till the slot on the surface of the drive coincides with the threaded hole for the grub screw in the crankcase.

Tighten the grub screw and secure it from working loose by a centre punch. Then proceed with the reassembly of the primary transmission as described in chapter 1.3.

1.5 Kickstarter Return Spring

The kickstarter return spring cen be replaced with a new one without removing the clutch chain wheel (primary transmission).

Drain the oil from the gearbox or put the motor cycle on its right side after removing the battery.

Remove the kickstarter lever and push the starter shaft inward while turning it to the starting position. Remove the left-hand crankcase cover, turn the starter shaft anticlockwise, and slide it outof its mounting. Withdraw the starter quadrant together with the spring.

Install the new spring so that one end of it is safely retained by the pin provided for this purpose in the crankcase. Thread the other end into the hole in the quadrant and turn the quadrant so that it can snap into the correct position, i.e. with the centre of its hole aligned with the centre of the hole in the starter dog. Then push in the starter shaft (with the return spring) while turning it to the starting position, i.e. clockwise, in which the starting mechanism holds together.

This job requires a certain amount of skill. A simpler thoug more time consuming procedure is the replacement of the spring after the removal of the complete primary transmission - see chapter 1.3.

1.6 Shifter Shaft with Driving Lug and Pawls

First remove the primary transmission mechanism - see chapter.1.3. Rotate

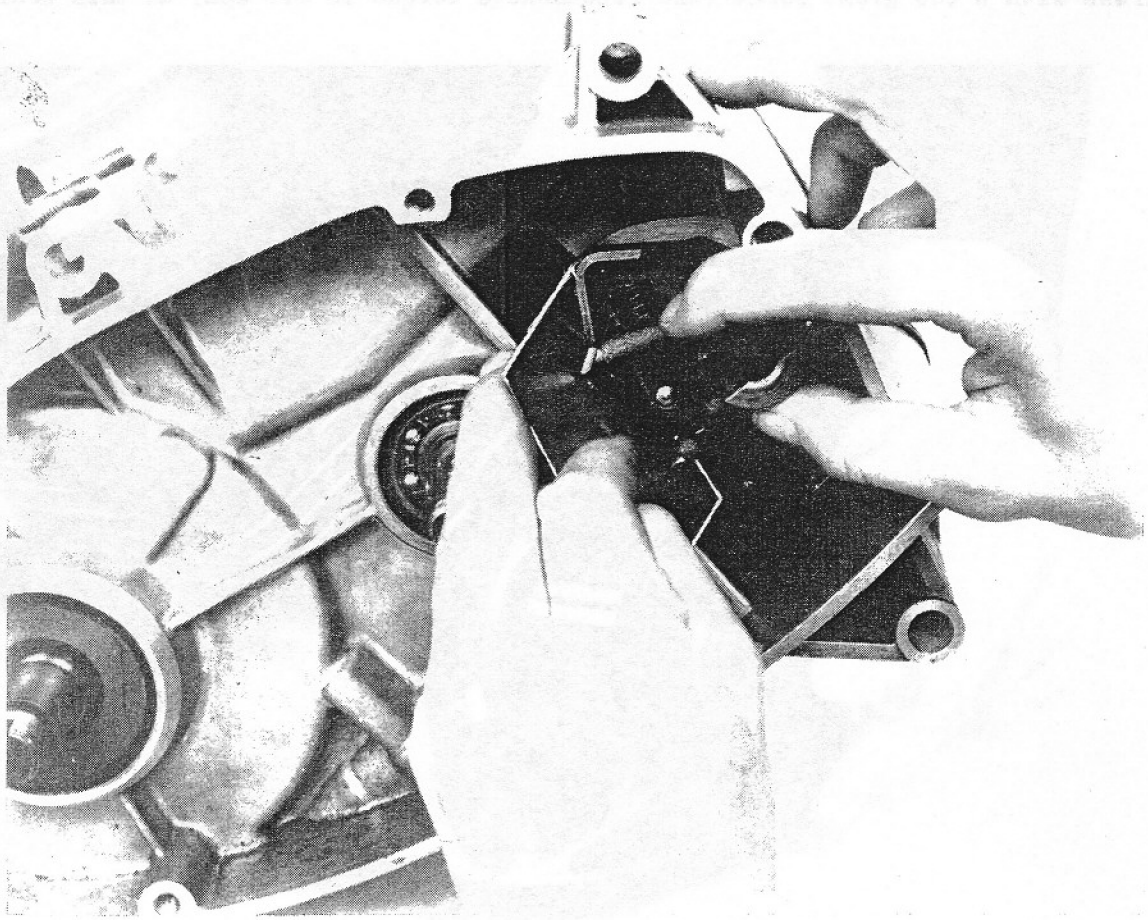


Fig.No.15 Removing shifter shaft

slightly the starter shaft and withdraw it together with the starting quadrant and return spring. Remove the bracket with the clutch release mechanism (chapter 1.8), drive out (upward) the pin fastening the clutch release cam on to the shaft, and lift off the cam. Insert the S-63 pawl retaining jig between the shifter gate and the pawls and push carefully the shifter shaft with the driving lug and pawls from its mounting (Fig.15).

When reassembling the mechanism rest the S-63 pawl retaining jig on the pawls of the driving lug. Remember that the driving lug pin must be inserted correctly between the return springs in the shifter gate. For further reassembly reverse the described dismantling procedure (1.6).

1.7 Dynamo

Remove the right-hand crankcase cover and disconnect cables from the dynamo. Remove two M 6 screws ("10" spanner) holding down the stator, and slide out the stator. After lifting it off, it is recommended to remove fasteners of the carbon brushes and to withdraw the brushes from their guides to prevent their being damaged during reassembly. Remove the M 6 screw holding down the rotor and lift off the cam with the aid of a screwdriver inserted under it. Use the S-48 rotor puller to pull the rotor off the shaft (Fig.16).

Put the rotor into the stator, and put away the dynamo in a safe place where it cannot get damaged or, if necessary, hand it over for repair.

Reverse the described procedure when reinstalling the dynamo. First reinstall the rotor including the cam and then refit the stator. Do not tighten the stator screws with a too great force (the recommended torque is 0.6 kpm) as this would

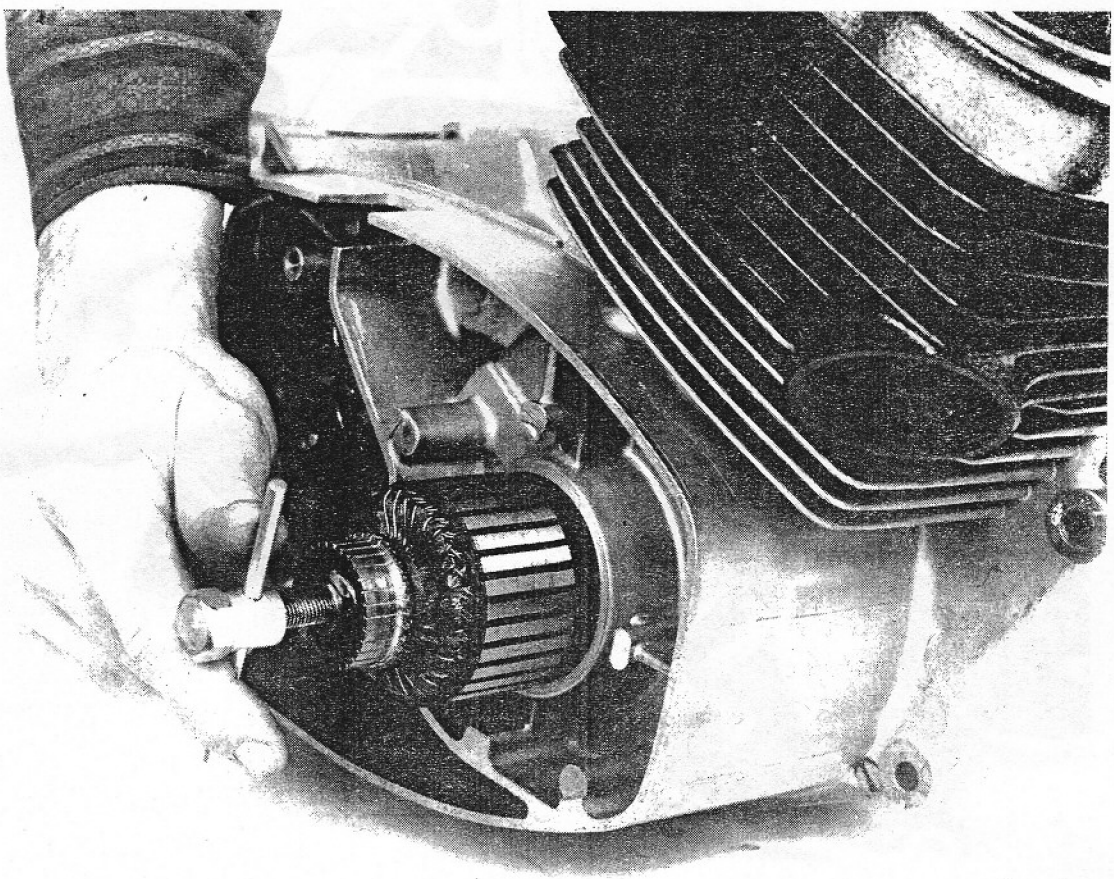


Fig.No.16 Pulling dynamo rotor off the shaft

result in distorting the contact-breaker base plate. Slip brushes into the brush holder minding their correct position. If the brushes are shorter than 8 mm, replace them with new ones. Lock the brushes in position using the respective spring fasteners (clips). Saturate the cam wiper felt with grease but be careful not to apply too much grease which could then splash or flow down between the contact-breaker points. Finally adjust the ignition advance and the contact-breaker point gap. This adjustment is described in a separate chapter.

1.8 Declutching Mechanism

Remove the brake pedal or screw off the winged nut of the rear brake cable. Remove the right-hand cover of the engine (crankcase), loosen the screw fastening the bowden cable in the clamp, and pull out the cable. Use "10" spanner to remove three screws attaching the bracket of the declutching mechanism to the crankcase right-hand side, and take off the bracket.

Reverse this procedure when reinstalling the declutching mechanism.

1.9 Secondary Sprocket

Remove the declutching mechanism - see chapter 1.8. Detach the front sleeves of the rubber chain guards and remove the outer cover of the secondary sprocket (Fig.17).

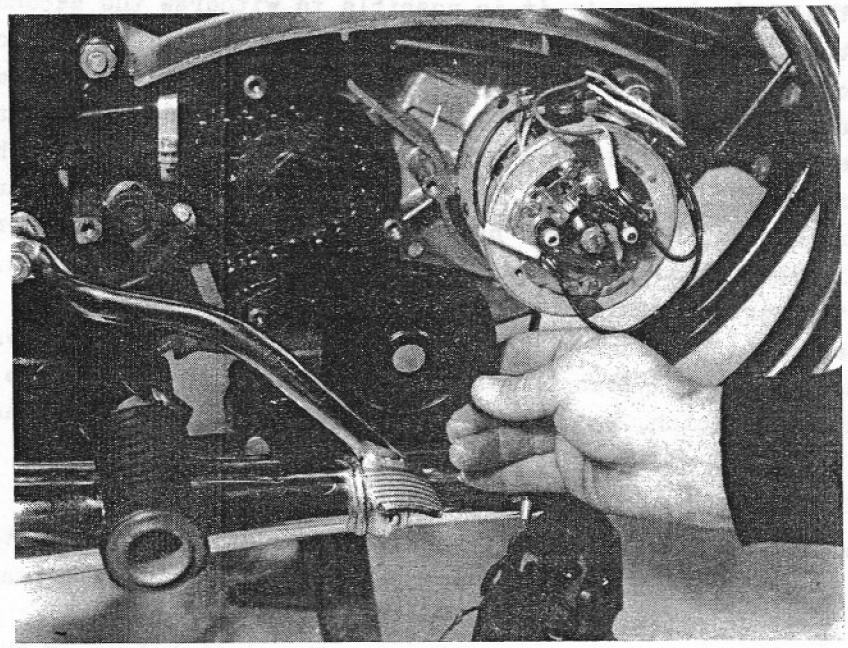


Fig.No.17 Removing secondary sprocket cover

Unlock the lock washer and screw off the nut using the S-68 tubular wrench. Now slide the secondary sprocket with the slackened chain and inner cover out of its mounting. It is not necessary to disconnect the chain.

Reverse this procedure when reinstalling the secondary sprocket.

Warning!

Proceed very carefully when reinstalling the secondary sprocket. No resistance must be felt when slipping it on the splines. When driving it home forcibly you run the risk of moving the bearing into the crankcase in spite of its being protected against normal stressing by a thrust shim. Even a slight pushing of the bearing into the crankcase is bound to result in a serious damage to the shifter forks and gears of the gearbox.

2. CRANKCASE DISMANTLING AND REASSEMBLY
(with engine removed from frame)

2.1 Removing Engine from Frame

After having removed the seat, disconnect the battery fuse and pull cables off the spark plugs. Shut off the fuel cock, free the front part of the fuel tank by pushing out the hold-down springand swing up the fuel tank. Screw off the carburettor cap and withdraw the throttle cable with the sliding throttle valve. Remove the nuts (hollow screws) of the exhaust pipes (elbows), swing the exhaust pipes out of the way, and remove the M 8 screw fastening the front part of the left-hand exhaust silencer. Then loosen two M 8 screws of the left-hand exhaust silencer rear bracket to facilitate the removal of the footrests tie bolt used also as the engine clamping bolt. Remove the grub screw of the speedometer drive at the engine and withdraw the flexible shaft from the engine. Remove the right-hand crankcase cover and disconnect the leads from the dynamo. Remove the dynamo - see chapter 1.7. Disconnect the clutch cable from the hand-controlled clutch release mechanism and remove the bracket of the declutching mechanism. After having detached the front sleeves of the rubber chain guards remove the outer cover of the secondary sprocket and unlock the sprocket nut. Slacken the rear wheel spindle and chain tensioners, and move the rear wheel in the forward direction as far as it will go. Using the S-68 tubular wrench screw off the sprocket nut. Now that the chain is slack, it is possible to withdraw the secondary sprocket with the chain and inner cover from its mounting without disconnecting the chain. Disconnect the lead (cable) from the neutral terminal (disconnect the connector on latest models). Remove all screws and bolts holding the engine in position in the frame. Standing on the left-hand side of the machine, hold the engine by the right-hand cylinder at the exhaust port with the left hand and by the kickstarter lever with the right hand. Lift the front end of the engine as high as possible and pull it leftward out of the frame by its rear end. Be careful not to damage the surface finish of the machine.

When reinstalling the engine into the frame, tighten first the rear bolts and then the screws holding down the front end of the engine. Fill the gearbox with oil, adjust the clutch, and tension the secondary transmission chain.

2.2 Basic Dismantling

Clamp the front end of the engine into the jaws of a vice so as to have access to the engine left-hand side. Remove the carburettor, the primary transmission gear, cylinder heads, cylinder, and pistons.

Remove the thirteen M 6 screws bolting together both halves of the crankcase and remove the crankcase from the vice.

2.3 Splitting the Engine

Using the S-64 drift drive the front centre bush and the rear guide pin from the left-hand side of the crankcase into its right-hand side (Fig.18).

Screw the S-62 separating press into the M 6 threads in the crankcase (for fastening the dynamo stator) and pull uniformly the right-hand half of the crankcase off the bearings of the crankshaft mechanism with the connecting rod in the top position to enable its passing through the centre cutout of the crankcase (Fig.19).

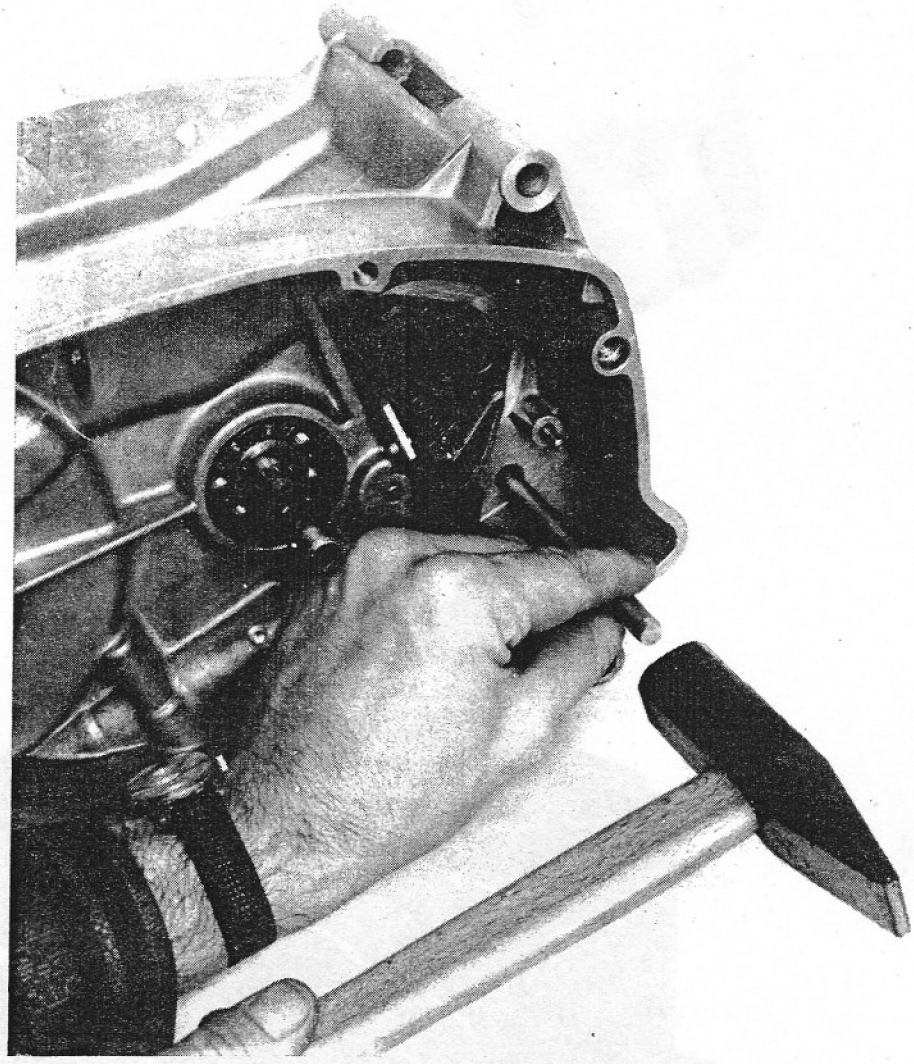


Fig.No.18 Driving out centering bush

If the right-hand crankcase half tends to jam during pulling off, tap lightly its rear part (from the space of the carburettor) to assists the uniform pulling off. As soon as there is a sufficient gap between the two crankcase halves withdraw the centre insert from between the cylinders to make way for the passage of the connecting rod. Then complete the splitting of the ingine (separation of the halves) and lift off the right-hand half.

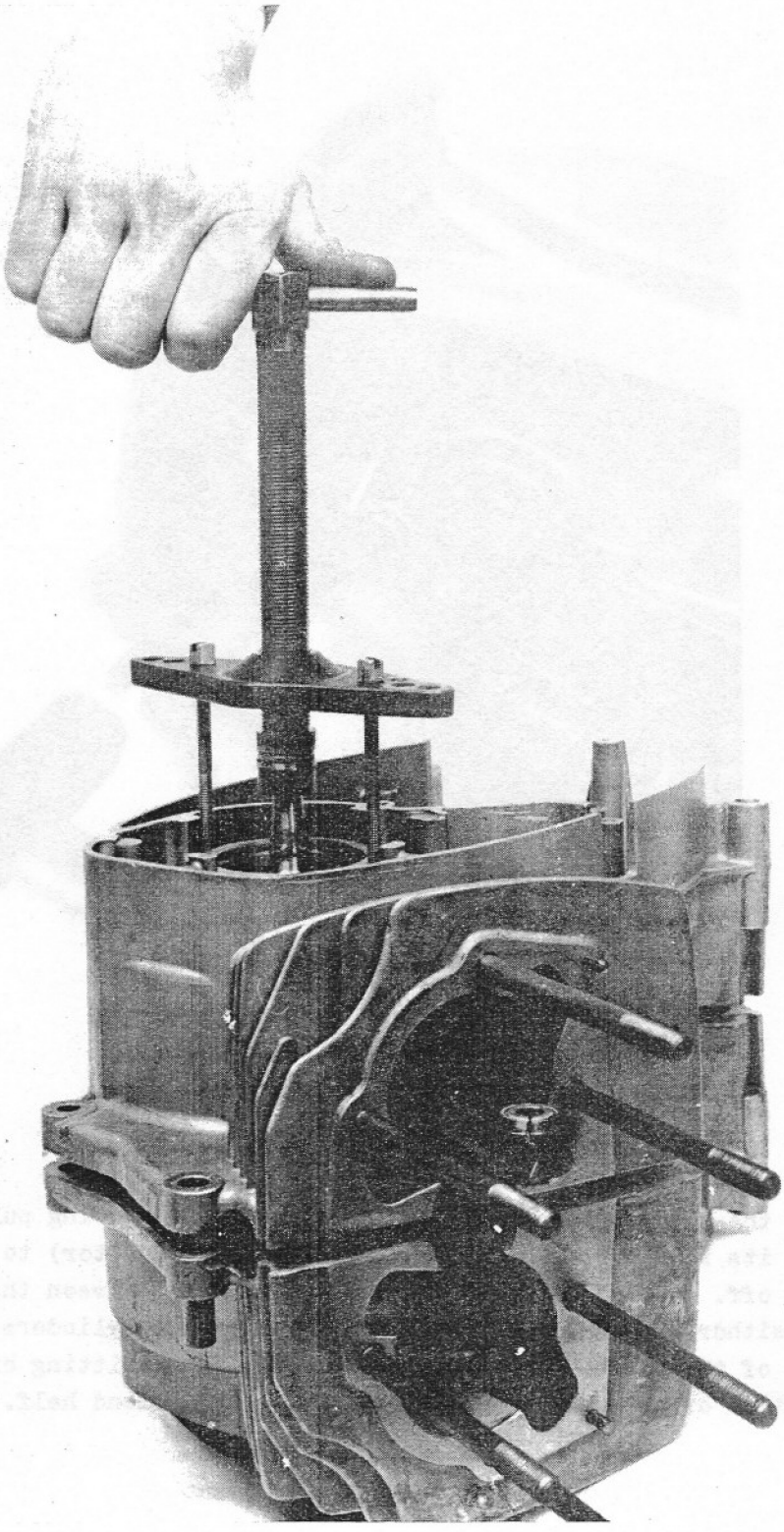


Fig.No. 19

2.4 Gearbox, Gear Shifting Mechanism, Crank Mechanism

In this stage of engine dismantling it is possible to carry out repairs of the gearbox and gear shifting mechanism without pressing the crank mechanism out of the other half of the crankcase.

For a thorough inspection of the gearbow remove the shifter fork rod, the shifter forks, the layshaft, the gears, and use a soft mallet to tap the mainshaft out of its bearing.

If it is necessary to remove also the shifter gate (incorrect function or when a regrinding of the crankcase half is indicated) remove the four centre-punch secured screws and turn the gate to a position convenient for its withdrawing. When intending to remove also the crank mechanism for inspection or repair, schrew the S-62 separator by means of two M 8 screws into the threaded holes for schrews of the left-hand crankcase cover and press the crank mechanism out of the left-hand crankcase half, again with the left-hand connecting rod in its top position (Fig.20). If bronze bushes of the layshaft are worn or sticking and they

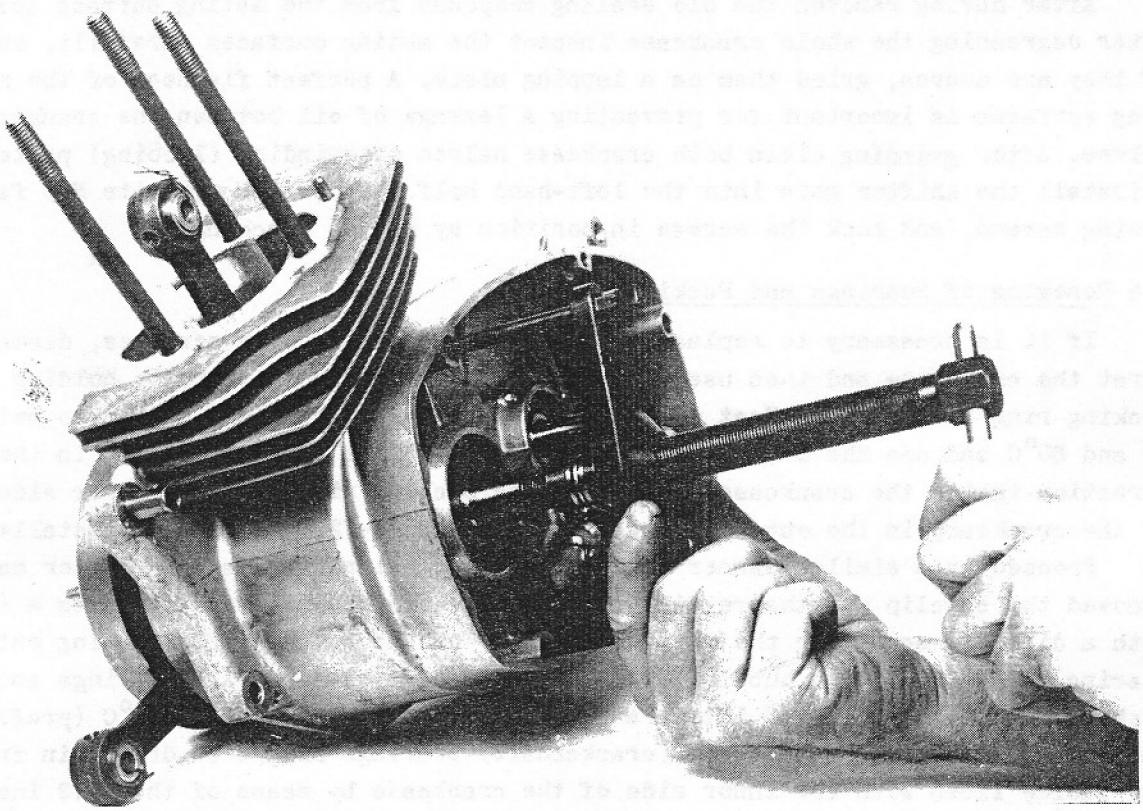


Fig.No.20 Pressing crank mechanism out of crankcase left-hand half

have to be replaced, drive them with the drift inside the crankcase.

To facilitate replacement of the bushes remove the speedometer drive from the crankcase left-hand half - see chapter 1.4. Press new bushes into the crankcase heated up to a temperature of 80 to 100°C and then ream them to diameters specified in Table 5.

In the case the bush has been spinning (slipping) in the crankcase bore with the rotating shaft, it is necessary to use an oversize bush and ream the bore in the crankcase to the diameter specified in Table 6.

When installing the right-hand bush mind the correct position of the oil hole and check the through hole for clear passage after having presses in the bush.

Do not forget to clean thoroughly the oil hole and insides of the new bushes after their reaming.

Dismantling and reassembly of the crank mechanism itself are described in a separate chapter.

Table 6

HOLES FOR LAYSHAFT BUSHES IN CRANKCASE	
Dia. 17 U 8	- 0.633 - 0.060
BUSH OUTSIDE DIAMETER 17	+ 0.011 + 0.016 + grooving
BUSH INSIDE DIAMETER 14 H 8	+ 0.027 + 0.000
OVERSIZE BUSHES HAVE THE OUTSIDE DIAMETER	+ 0.1

2.5 Flatness Check of Crankcase Halves Mating Surfaces

After having removed the old sealing compound from the mating surface and after degreasing the whole crankcase inspect the mating surfaces carefully, and if they are uneven, grind them on a lapping plate. A perfect flatness of the mating surfaces is important for preventing a leakage of oil between the crankcase halves. After grinding clean both crankcase halves of grinding (lapping) paste. Reinstall the shifter gate into the left-hand half, tighten firmly its M 5 fastening screws, and lock the screws in position by centre punching.

2.6 Renewing of Bearings and Packing Rings

If it is necessary to replace worn or noisy bearings with new ones, dismentle first the crankcase and then use circlip pliers to remove the circlip holding the packing ring in position. Heat up the crankcase to a temperature somewhere between 60 and 80°C and use the S-71 bearing extractor to drive out the bearing in the direction inside the crankcase. Thendrive the packing ring from the inner side of the crankcase in the outward direction using the S-72 packing ring installer.

Proceed in a similar manner when driving out mainshaft bearings. After having removed the circlip and the retaining shim. drive the bearing inward using a tube with a diameter equalling the outside diameter of the bearing. For driving out the bearing of the gear with hub follow again the same procedure. All bearings and bushes have to be installed into crankcase halves heated up tu 80-120°C (preferably in an electric oven). Main (crankcshaft) bearings should be driven in from the inside flush with the inner side of the crankcase by means of the S-72 installer, and the mainshaft bearing and the bearing of the gear with hub as far as to the previously installed circlip. Reinstall the packing rings only after having reconnected both crankcase halves. After installing the mainshaft bearings, lock them in position with the respective shims to prevent their displacement.

2.6.1 Renewing of Packing Rings

When comtemplating a replacement of only the packing rings, it is not necessary to remove the engine from the frame. Just remove the primary transmission gear (1.3), the dynamo (1.7), or the secondary sprocket (1.9).

2.7 Gearbox

To have a perfectly reassembled gearbox (after replacing some of its parts or if there are frequently recurring defects) it is necessary to begin with the reinstallation of its parts into crankcase halves without the crank mechanism to be able to give the layshaft the necessary play (axial clearance). To determine the play, fit the layshaft into the bush together with the 1st-speed gear and bolt together the crankcase halves provisionally with several screws. Push and pull the layshaft to check its play which should be within the range from 0.3 to 0.6 mm. Then remove the layshaft again.

2.7.1

After heating up the left-hand crankcase half to some 100-120°C, place therein the checked crank mechanism with its centre face plate (provided it has been removed rom the crankcase left-hand half). As far as heating up is concerned, use only a gas or an electric heater covered with a metal sheet for better heat distribution and place thereon the crankcase half so that the area of the main bearing is nearest to the heating surface. This is in case you do not intend to heat up the whole crankcase in an electric oven. On no account is it permitted to heat up the crankcase with a direct flame.

Place the heated up crankcase (half) on wooden blocks or a wooden case so that its front and rear ends are supported by them, and locate into it the crank mechanism as quickly as possible and so that the lock pin of the centre ring slips home into the recess in the crankcase. Remember that the crank mechanism must be inserted and never driven into the main bearing. If the crankshaft gets jammed in the bearings, push it out again (see engine dismantling), heat up the crankcase to a higher temperature, and repeat the installing procedure.

2.7.2

Adjust the shifter gate into one of the centre positions (extreme positions are unsuitable).

2.7.3

Fit the mainshaft with the 19-teeth wheel secured in position by the wire-formed retaining ring into the crankcase left hand. Fit the gear with 16 teeth on the shaft splines with the three dogs pointing downward.

2.7.4

Locate the shifter-fork pins into the upper and lower slots of the gate while sliding the upper shifter fork into 16-tooth gear on the main shaft. Thread the shifter-fork guide rod through the forks with the collared end pointing downward.

2.7.5

Locate the gear with 24 teeth with its flat side turned toward the bronze bush and fit the gear with 16 teeth on to the shifter fork so that its three dogs point upward. Thread the layshaft (with the previously installed and secured gear with 16 teeth) through both gears.

Test gear shifting by turning the gate to positions of the individual speed gears, especially after having installed a new gate in the following manner:

a) Engage the 1st-speed gear and check whether the gear with 16 teeth on the layshaft meshing with the 24 teeth of the 1st-speed gear has an exial clearance of at least 0.2 to 0.3 mm. At the same time check whether there is a clearance between the shifter-fork pins and the ends of slots in the gate. If the

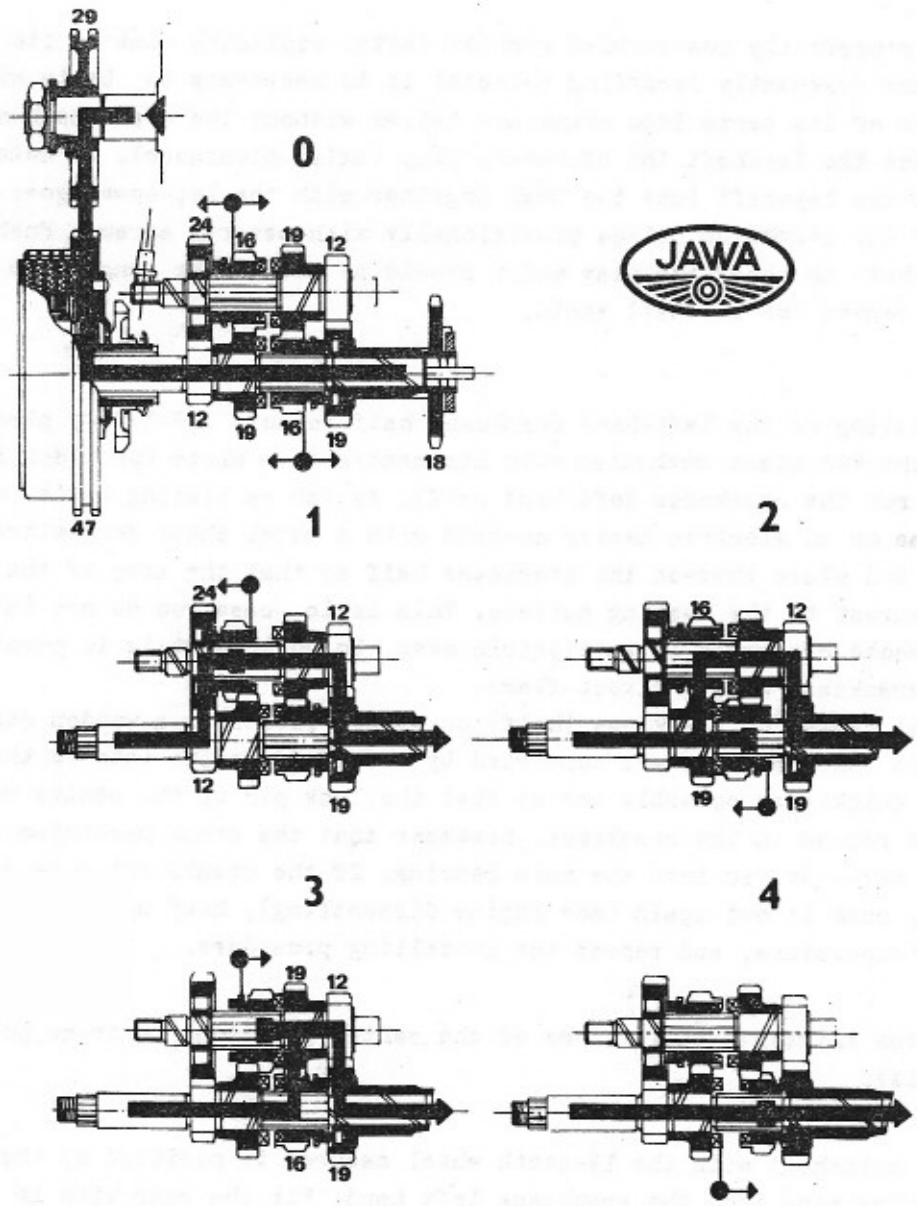


Fig.No.21 Transmission diagram

pins abut against the ends of the slots (the fork has not the required side clearance in the gear guiding slot) bend carefully the holder of the gate interlock into the required position using the S-89 gate unterlock adjuster.

b) Engage the neutral position between the 1st-and 2nd-speed gears and check whether the dogs of the 16-tooth gear on the layshaft clear safely the face of the 1st-speed gear and the cogs of the 2nd-speed gear (19 teeth) when lifting the lower shifter fork. In this instance too the required clearance can be adjusted by changing the position of the gate interlock.

c) Shifting into the second and third gear presents usually no difficulties.

d) With the 4th-speed gear engaged, the face of the splined mainshaft should protrude from the 3rd-speed gear (16 teeth) 0.1 to 0.2 mm. At the same time make sure that the shifterfork pins do not abut against the ends of slots in the gate - see paragraph a).

A

2.8 Reconnecting the Crankcase Halves

Heat up the right crankcase half in the same way as the left half - see section 2.7.1. Apply a good quality sealing compound on the mating surface of the left half and part of the aluminium centre ring. Oil the ends of the mainshaft and layshaft, and the right-hand crankshaft journal. Engage the neutral between the first- and second-speed gears, and turn the connecting rod to its top position so that it can pass through the cut-out in the crankcase without difficulty. Coat the mating surfaces of the centre insert also with a sealing compound and place the insert in the centre recess of the crankcasse. Fit the well heated right half of the crankcase on to the crankshaft as quickly as possible while rotating the hub of the gear with hub to make the gears engage properly.

Drive home the front centering bush and the rear centering pin and clamp both halves of the crankcase together by tightening the M 6 screws. Wait till the crankcase cools down and retighten the screws. Use a tube of a suitable diameter to tap home the inner rings of ball bearings on the crankshaft to embed properly the balls in the race. Lubricete the bearings with engine oil.

Drive home both packing rings of the crankshaft after making sure that the ends of the spiral spring are properly interconnected. Use the S-72 packing ring installer (Fig.22) and fit the oil smeared S-73 protector on the crankchaft jour-

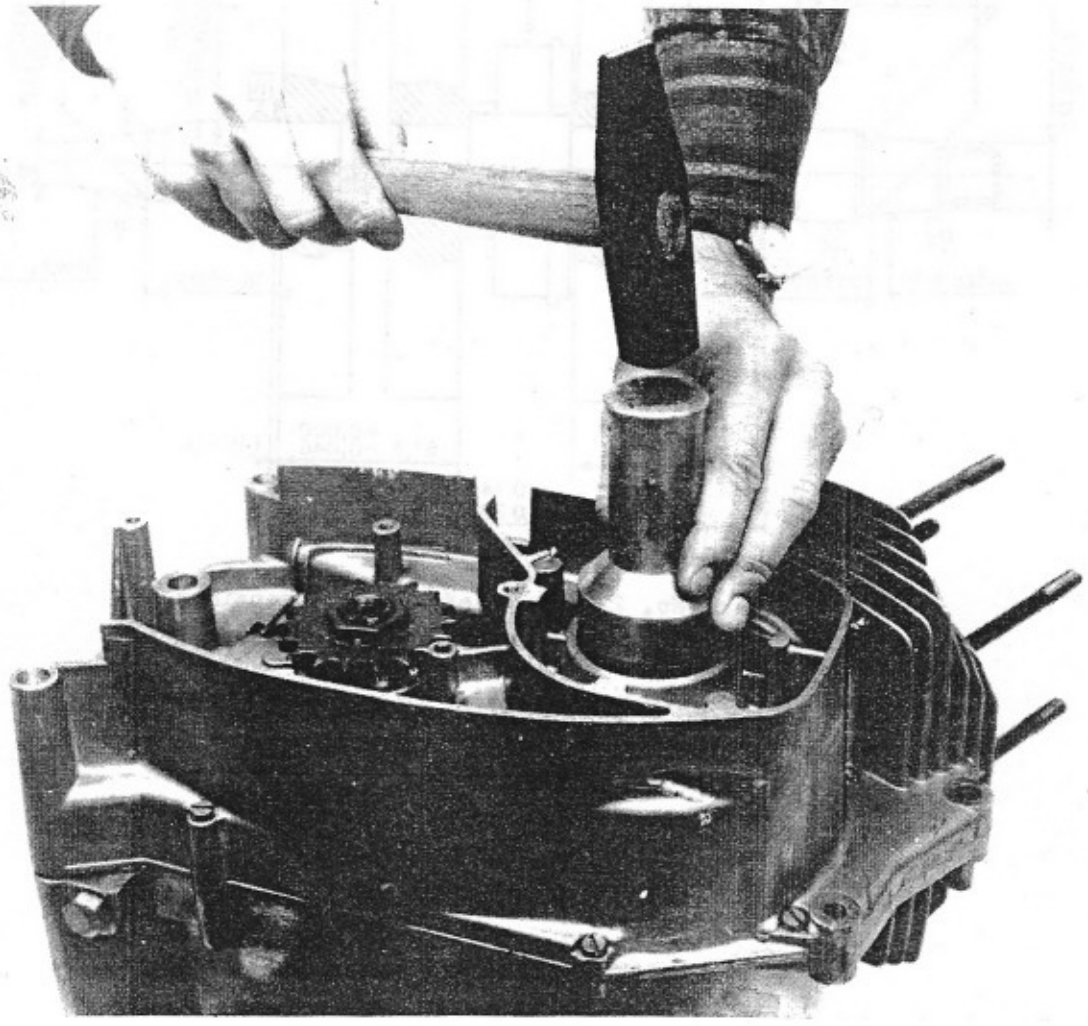


Fig.No.22 Driving out crankshaft bearings

nal to prevent the bending over of the ring sealing strip. Lock the packing rings in position by circlips.

Tap home the centre insert. For further reassembly of the engine it is recommended to clamp its front end again in a vice and then to preceed with the individual jobs described in previous chaptere. Do not hurry to refill the gearbox with oil but give the sealing compound time to dry well between the crankcase halves, i.e. till the next day.

2.9 Refitting Engine into Frame

Reverse the procedure of engine removal - see chapter 2.1 - while paying attention to the following points:

Smear the ball under the adjusting screw before reinstalling the declutching mechanism bracket. After refitting the engine into the frame and after reconnecting the clutch cable, adjust the semi-automatic and manual clutch release mechanism as described in the Rider´s Handbook.

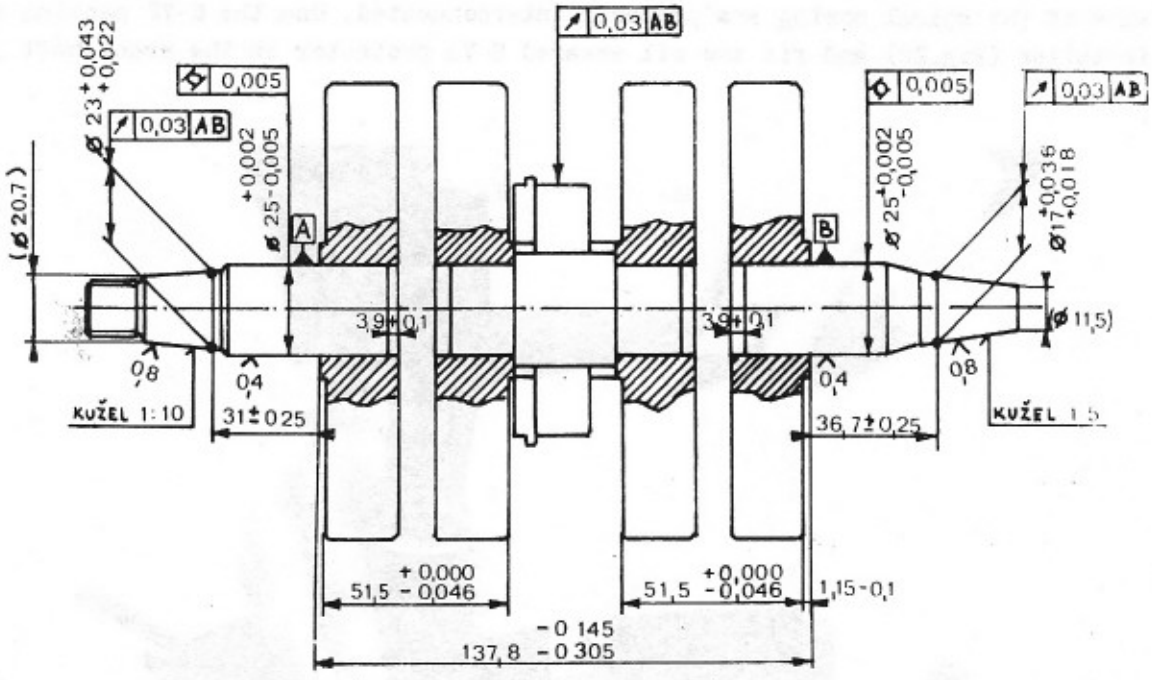


Fig. No. 23 Crankshaft check dimensions

3. CRANK MECHANISM DISMANTLING AND REASSEMBLY

3.1 Crank Dismantling Mechanism

Use the tubular spanner "12" to screw off the nuts of bolts clamping the split face plate and separate the two halves by means of the 3-61 centre bush extractor (Fig. 24). Never use a chisel or screwdriver. Apply a square to the

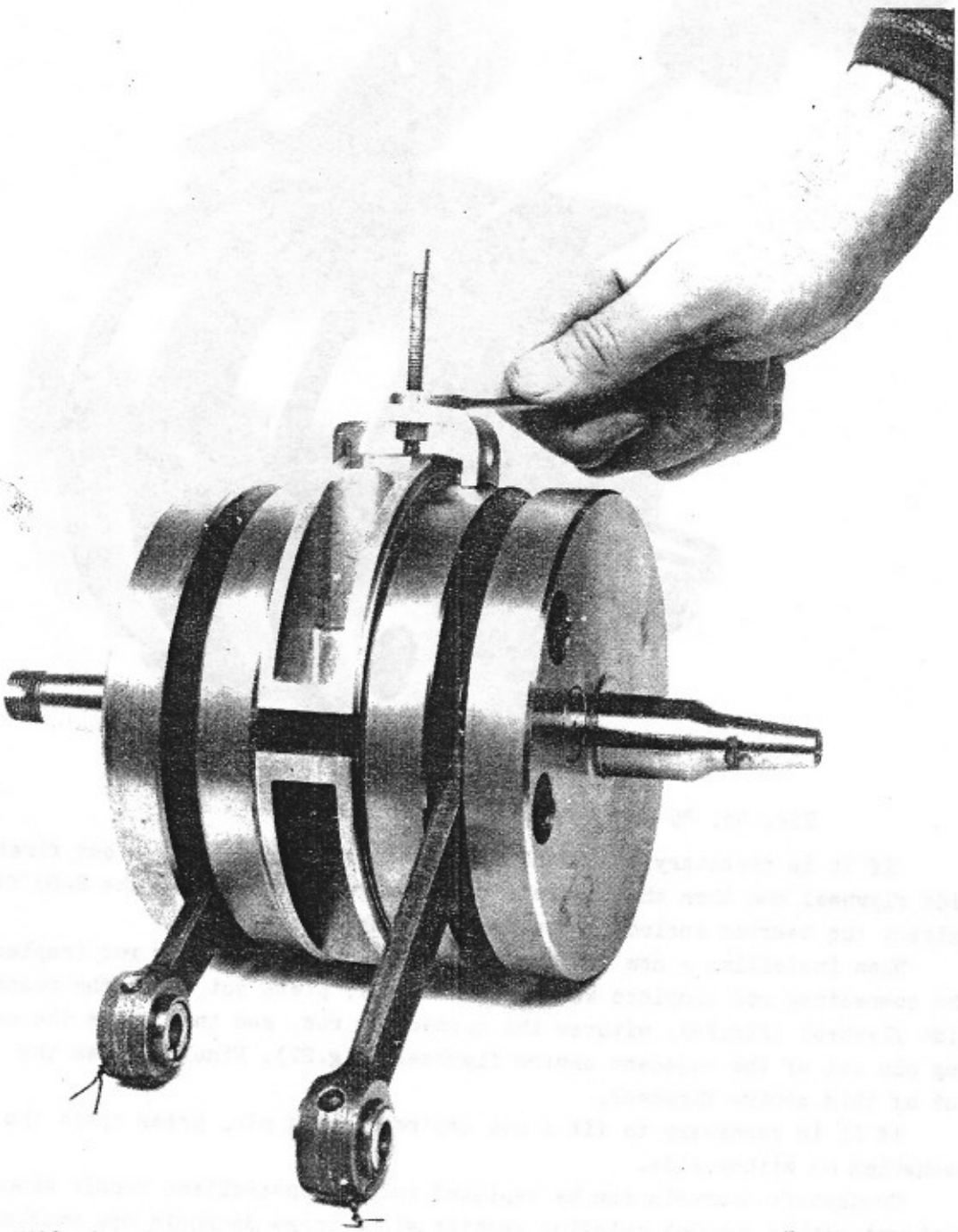


Fig.No.24 Splitting crank mechanism centre face plate (ring)

flywheels (counterweights) and mark their relative positions with a scriber. The most suitable positions are about 90° from the crankpin regardless of the side (Fig.25). For pressing the flywheels apart and for pressing them together later on you will need a press with a pressing pressure in the range from 8 to 10 tons and a special split supporting cylinder (S-200).

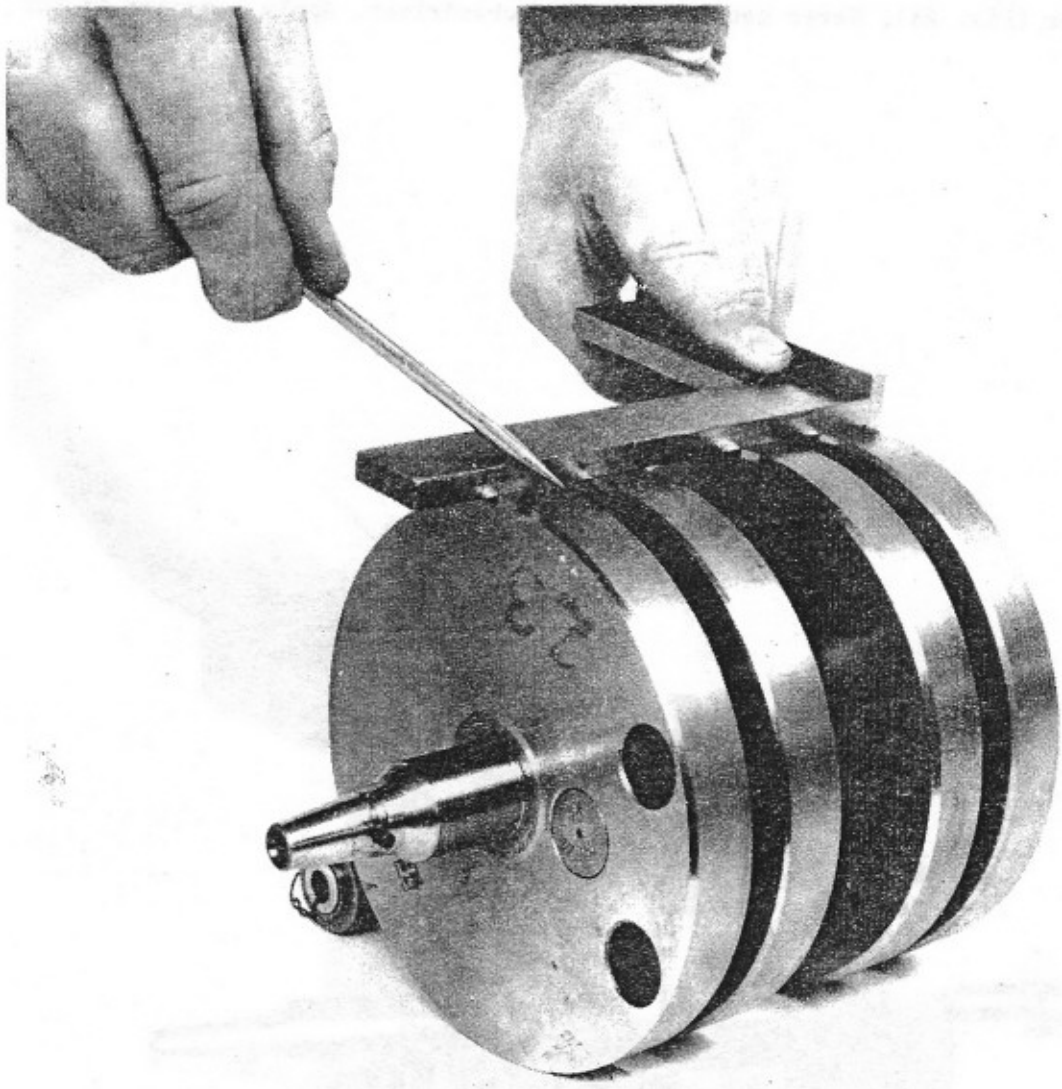


Fig. No. 25 Crank mechanism dismantling

If it is necessary to install a new centre bearing, press out first the left side flywheel and then the adjacent centre flywheel. Then use the S-60 fixture to extract the bearing including the spacing ring.

When installing a new left-hand or right-hand connecting rod (replace always the connecting rod complete with the crankpin), press out first the respective side flywheel (Fig.26), withrew the connecting rod, and then press the centre bearing pin out of the adjacent centre flywheel (Fig.27). Finally press the crankpin out of this centre flywheel.

If it is necessary to fit a new centre bearing pin, press apart the crank mechanism on either side.

Crankshaft journals can be replaced only in specialized repair shops equipped with a special grinding machine since spare journals are available only as unground semi-products, the surfaces and tapers of which have to be ground to

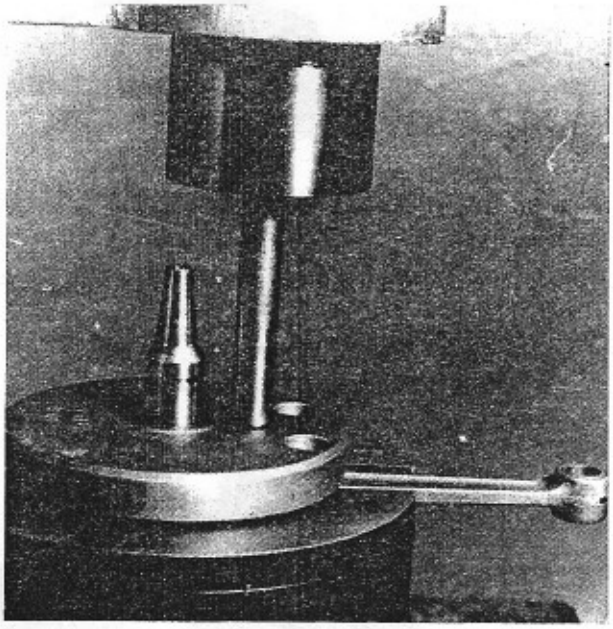


Fig.No.26 Crank mechanism dismantling

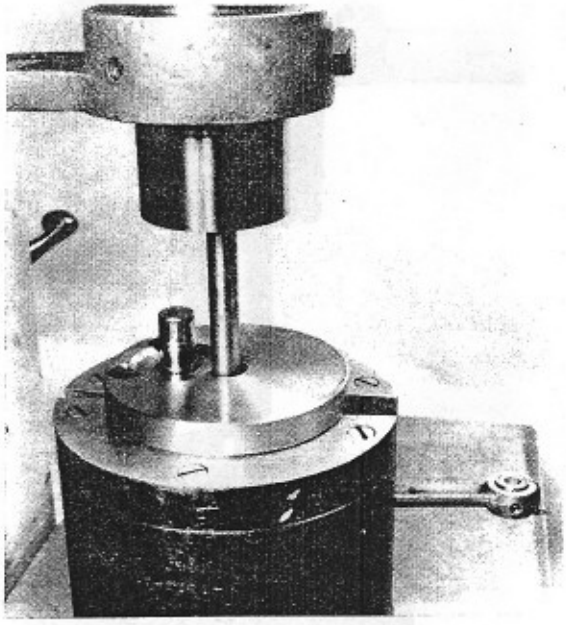


Fig.No.27 Crank mechanism dismantling

the recommended dimensions only after pressing together the whole crank mechanism and after its centering (alignment). The dimensions are give in Fig.23. The journals should be pressed from the inner side of the respective flywheel to such a depth that the journal recesses 3.9 + 0.1 mm from the inner face of the flywheel. Before pressing in the right-hand crankshaft journal set it in a position, in which the centre of the pin for the dynamo rotor is ligned with the crankpin.

3.2 Reassembling Crank Mechanism

The following instructions apply to the reassembly of a completely dismantled crank mechanism (including crankshaft journals). When reassembling the individual subassemblies, proceed according to the respective paragraphs.

a) First press crankpins into the inner (centre) flywheels so that their faces are parallel with the outer surfaces of the flywheels. The crankpins must be exactly perpendicular to the flywheel surfaces. For this job use the square or guide rule included in the set of special fixtures delivered for the dismantling and reassembly of crank mechanism (Fig.28).
b) Set the inner right-hand flywheel absolutely level and press the centre crankpin into it exactly perpendicular to the flywheel surface. Measure the perpendicularity using again the square of the respective guide rule. Then drive or press on the crankpin the lower spacing ring and the bearing No. 6306 well lubricated with bearing grease. Complete this reassembly by driving home the upper spacing ring and finally the labyrinth seal with its larger diameter turned toward the bearing.
c) Press the inner left-hand flywheel on the centre crankpin assembled with the bearing and labyrinth seal as far as it will go and so that the index lines on both inner flywheels coincide (Fig.29).

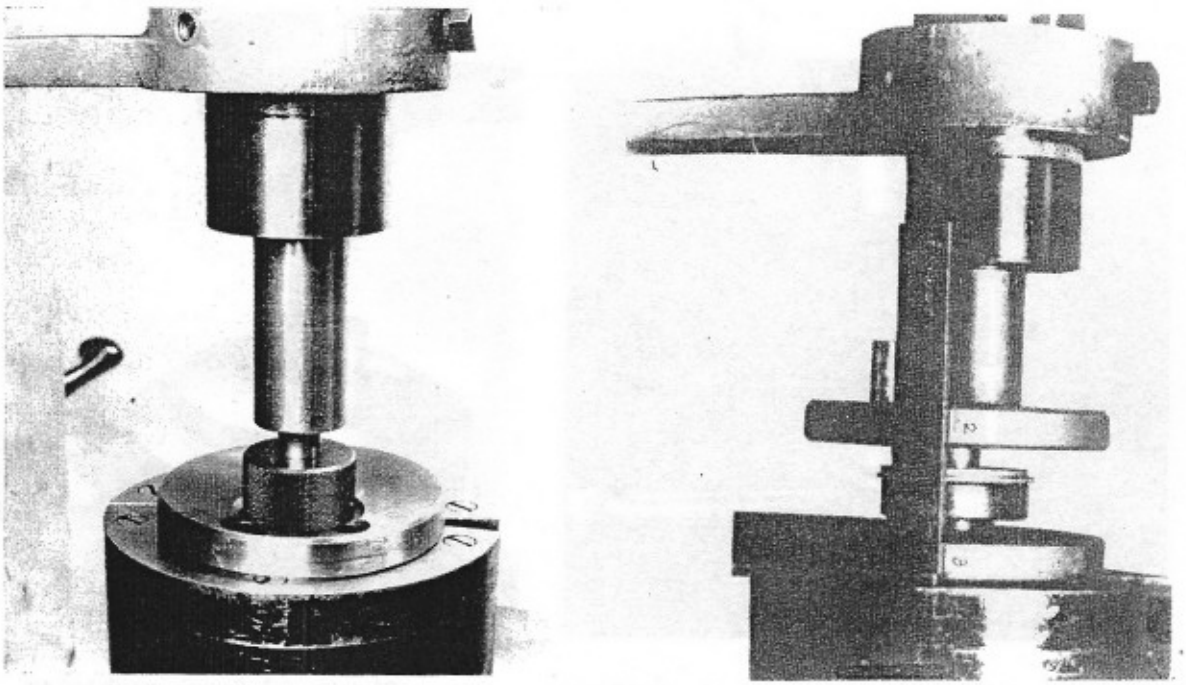


Fig.No.28-29 Crank mechanism reassembly

d) Apply a thin film of oil on the left-hand crankpin and slip thereon the needle-roller bearing and the connecting rod (big end). Take care not no mix up the connecting rods as it is very importand to observe the grading (class) of bearings and crankpins - see the respective table. Wipe dry the upper part of the crankpin. Support the flywheel at the point of the bearing No. 6306 and press the outer left-hand flywheel on the crankpin checking again its perpendicularity with regard to the crankpin by means of the square and making sure that the index lines on both flywheels coincide. Press home the flywheel till the face of the crankpin is flush with the face (surface) of the flywheel.

e) Proceed in the same way when reassembling the right-hand half of the crank mechanism (Fig.30).

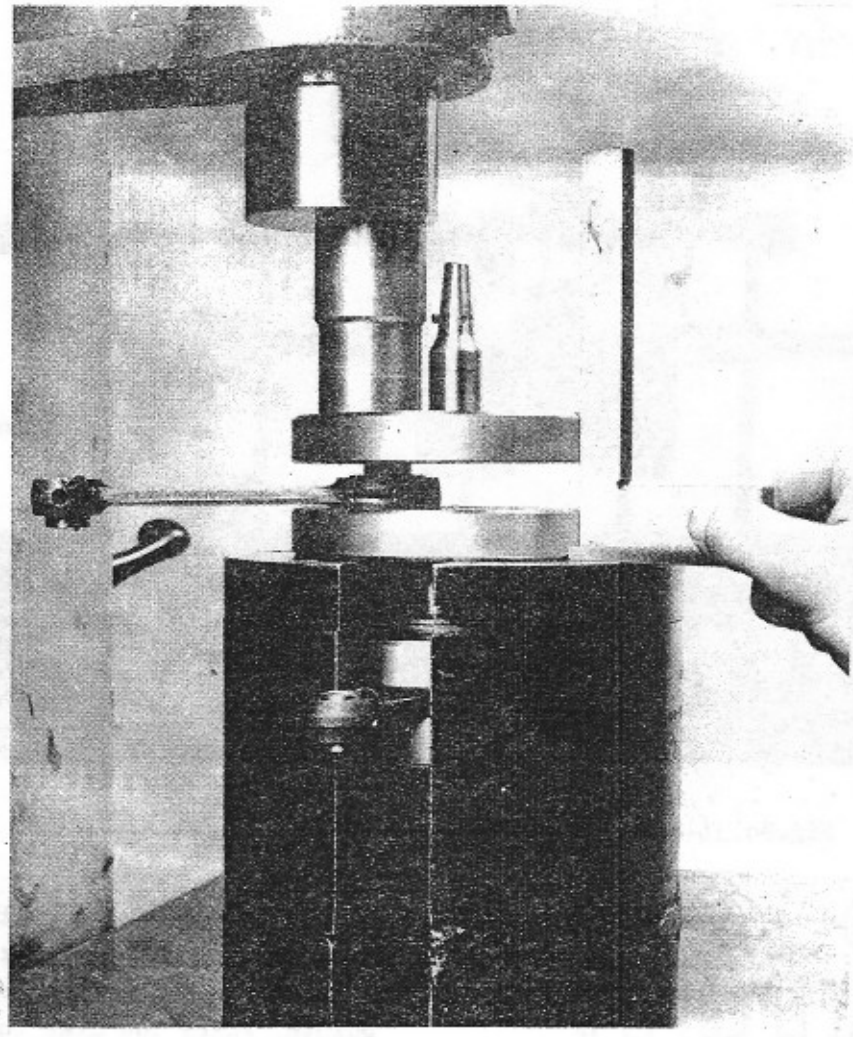


Fig. No.30 Crank mechanism reassembly

3.3 Crank Mechanism Centering

Before centering the crank mechanism measure the parallelity and alignment of flywheels using a steel rule (tool maker's knife edge) at a point normal to the connecting line of the crankpin and journal. In the case of a misalignment, tap the right-hand or left-hand flywheel with a copper mallet into the required position and check the axial clearance of connecting rods with reference to the respective table. Do not use an iron hammer to tap the flywheels or crankpins (journals) when centering the crank mechanism. It is possible, however, to use an iron wedge, the S-201 lever or the S-202 pliers when it is necessary to "open" the flywheels.

Further centering procedure is a job requiring special skill and the use of a centering apparatus with centres and three dial indicators (see Fig.31). The folowing description of the procedure is therefore only informative.

Align the crank mechanism by tapping the flywheels only after having it removed from the centres of the centering apparatus. It is important to have the apparatus always in a perfect condition to obtain undistorted measuring results. For the elimination of misalignment (eccentricity deviations) exceeding the specified value of 0.02 to 0.03 mm see separate instructions.

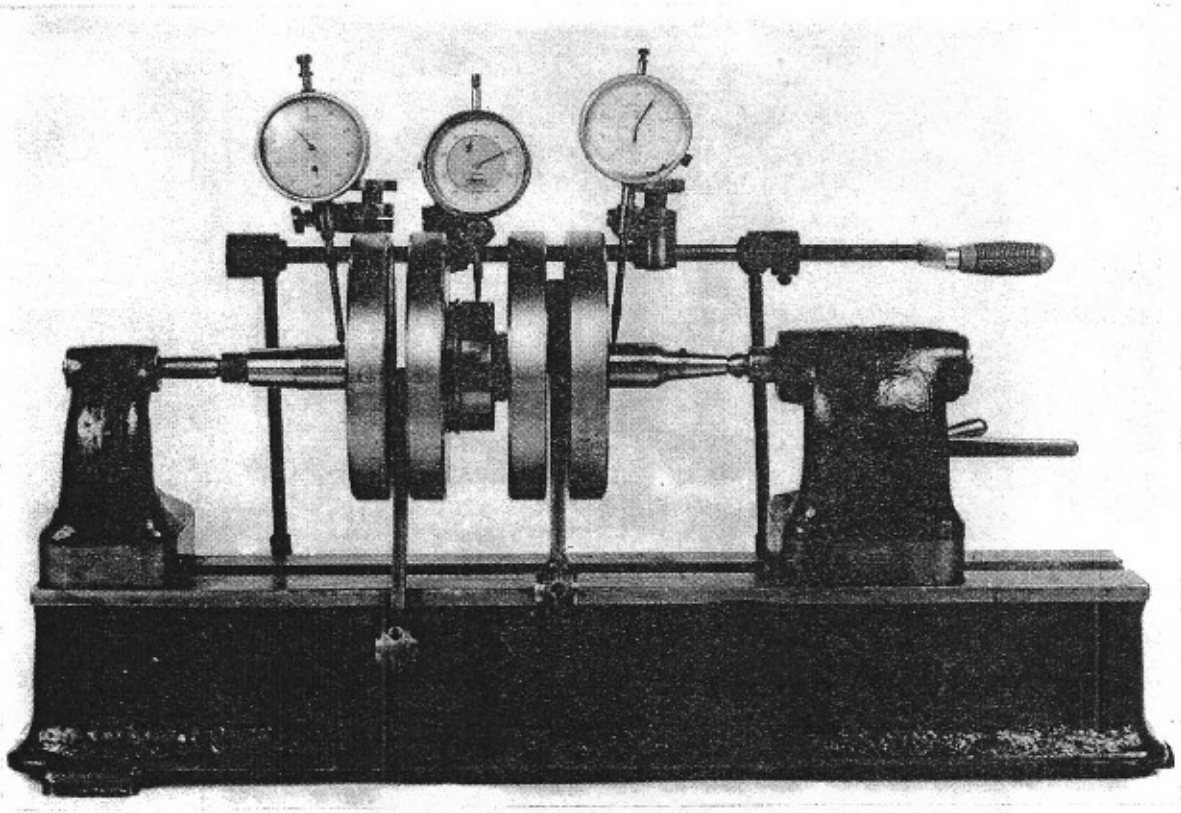


Fig.No.31 Measuring of crank mechanism parts

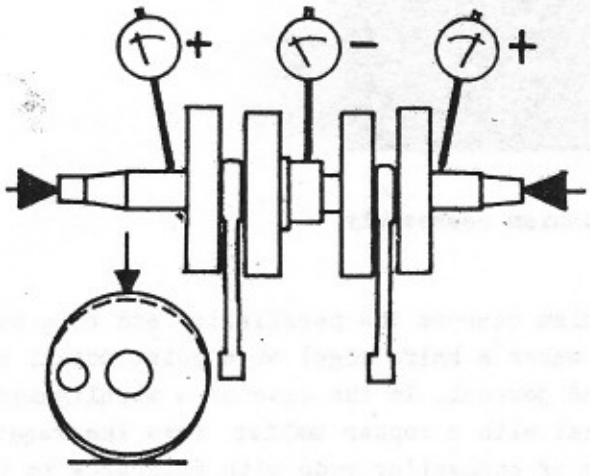


Fig. No.32

Fig.32. The surfaces of the flywheels are not flush. Make chalk marks on the surface of the flywheel at the points, where the dial indicators read the maximum value. Remove the crankshaft mechanism from the centres and support the centre flywheels so that the outer flywheel is turned with its marks upward. Tap the marked areas with a copper mallet until the desired effect is achieved (the surfaces of all flywheels must be flush when applying the steel (toolmaker's knife adge) rule).

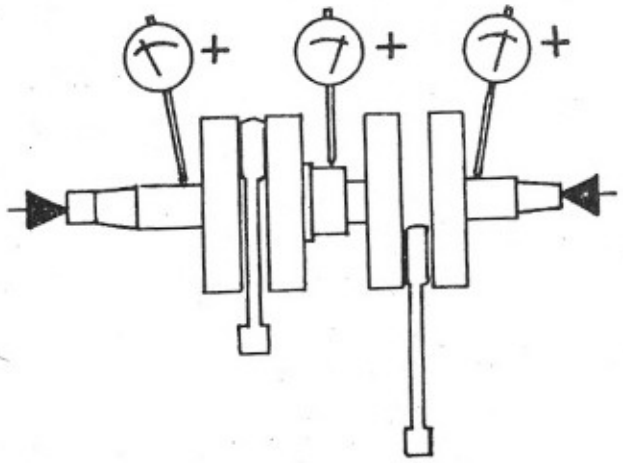


Fig. No. 33

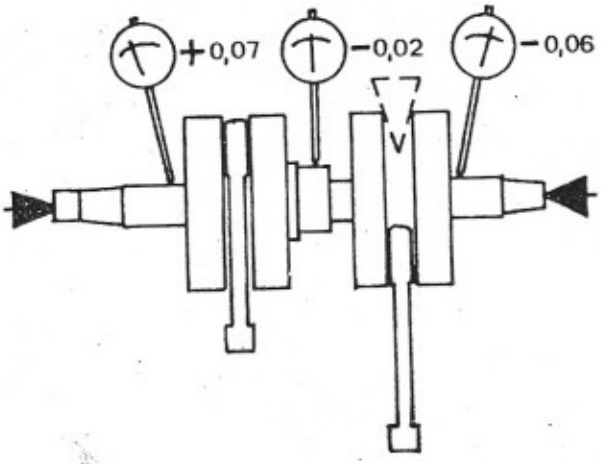


Fig. No. 34

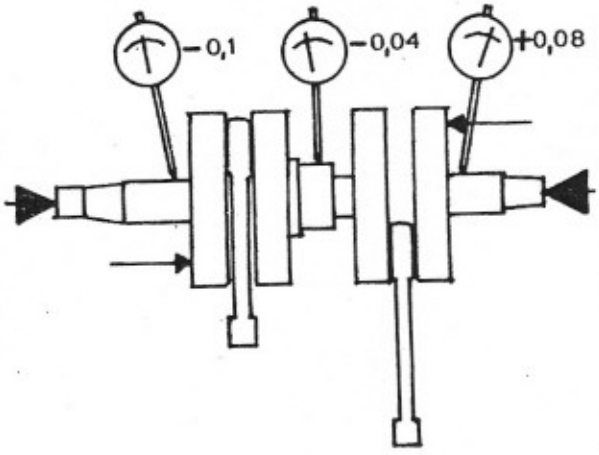


Fig. No. 35

Fig. 33. Mark with chalk the points, where the dial indicators read the maximum values. In the described case (Fig.27), the intire crankshaft mechanism is bent. After its removal from the centres, support one of the outer flywheels so that the chalk marks are high up- Hold down the opposite part of the mechanism with the hand and tap the centre flywheels with a copper mallet at the marked points. Alternatively, use the special expanding fixture (drum) included in the set of fixtures for pressing together the crankshaft mechanism, for expanding (forcing apart) the inner flywheels opposite the marked points direct in the centres.

Fig.34. The left-hand and right-hand flywheels are constricted at the point opposite to the connecting-rod pins. Remove the flywheels from the centres and force them apart by a steal wodge driven sensitively by tapping between the flywheels in the space opposite to the connecting-rod pins or use the expanding pliers S-202, supplied with the set of the pressing fixtures. Clamp again the crankshaft mechanism between the centres for rechecking. Ir only a slight expansion is necessary, leave the crankshaft mechanism between the centres and force them apart with a lever.

Fig.35. The left-hand and right-hand flywheels are open (separated) and it is necessary to bring them together at points opposite to the connecting-rod pins. After removing the flywheels from the centres, deliver a blow to the flywheels from the side, as indicated by the arrows.

Note: Repeat the centering and checking till the maximum permissible eccentric running (run-out) of 0.02 + 0.03 mm of the crankpins is abtained.

After completing the centering of the crank mechanism, install the perfectly clean centre ring (face plate).

4. CHASSIS

4.1 Steering Lug and Stem - Removal

This job is described in detail in the Rider's Handbook. For screwing off the top nut of the steering stem use the S-81 tubular wrench (41 mm) the other end of which (with dogs) is intended for the removal of the bottom nut.

Note:

When reinstalling the steering stem or when merely adjusting the clearance, tighten firmly the bottom nut and then back it off just enough for the front fork to move freely without undue clearance in the bearings.

4.2 Front Fork Legs - Dismantling and Reassembly

Both the dismantling and reassembly are described in the Rider's Handbook. Use the S-80 fork leg puller for the removal and reinstallation of fork legs.

Fork leg dismentling (replacement of worn bushes, slider, repair or replacement of hydraulic shock absorber):

1) Use a 10 mm tubular spanner to remove the screw (5) retaining the end piece of the shock-absorber piston rod and screw off the nut (6) using the S-82 hook spanner. Then pull the slider out of the fork leg tube.

   Remove the circlip (7) and pull off both bushes (8 and 9) including the spacer (10) with the aid of the S-9 extractor (Fig.36). Yyou can do without this fixture after carefully warming up the bushes when it is possible to pull them off with the hand (protected with a piece of cloth). Now you can remove the upper sleeve of the slider with its nut (6) and its main parts, i.e. the packing ring preventing oil leakage between the threads of the slider tube and the nut, and the shaft seal sealing off the fork leg tube.

2) After having removed the circlip (11) using special pliers for Seger type circlips it is possible to withdraw the shock absorber from the fork leg tube. Defects of front fork shock absorbers are very rare, and if they occur, they are recognized by the following symptoms:

   a) a metallic sound is heard (of metal striking against metal) when the fork "shoots up" or when it gets completely compressed)
   b) poor damping effect;

   Causes:

   a) piston dropped off the piston rod
   b) piston rod disengaged from its end piece
   c) dislodged quide pin of the end piece - distortion of the shock absorber (incorrect reinstallation after the first oil change - this defect cannot be claimed under the warranty after the first 500 kilometres travelled)
   d) worn piston surface or worn inner surface of the shock absorber
   e) insufficient oil filling.

   If it is necessary to dismantle the shock absorber, clamp the piston rod (12) in a vice with protective aluminium jaws, and screw off the end piece with the pin (13) and the lock nut (14). Pull the piston rod with the piston (15) out of the shoch absorber pressure tube (16). Reinstall the piston rod into the pressure tube very carefully to avoid damaging the non-return valve. Screw the nut (14) and the end piece (13) on to the piston rod, and then tighten firmly the nut to lock safely the piston rod in position.

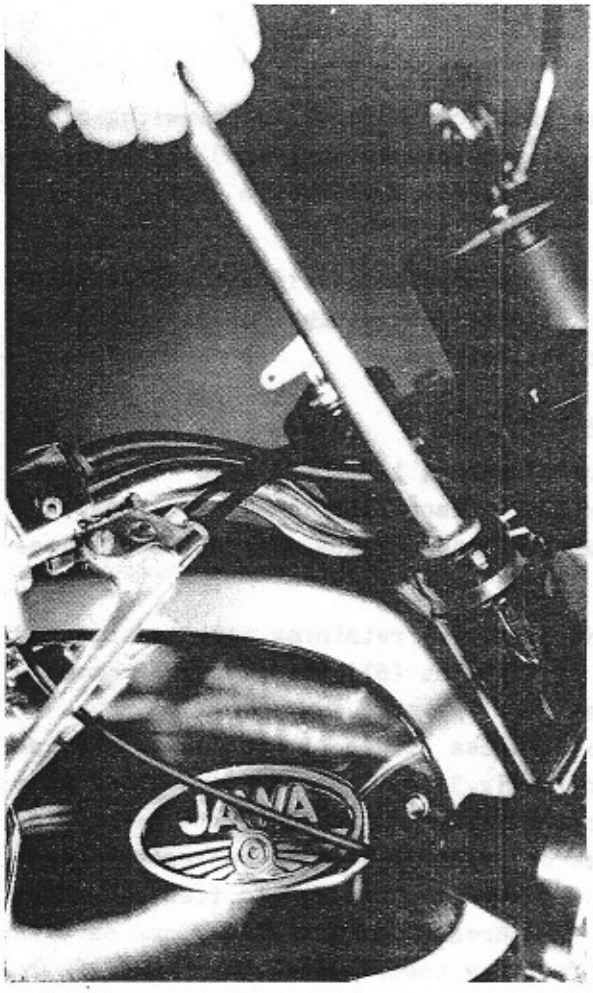


Fig.No. 36 Dismantling front fork legs

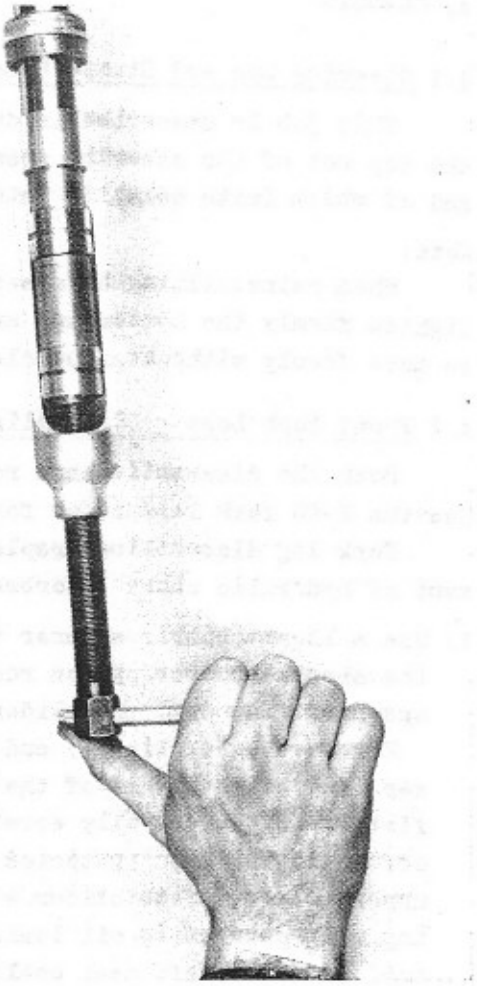


Fig.No. 37 Reinstalling fork leg bushes and sleeve

3) Before reinstalling the fork leg make sure that there are no scratches on the surface of the fork leg tube. Superficial scratches can be removed by polishing with fine emery cloth (a deeply scratched tube has to be replaced with a new one). If the seal of the nut (6) is damaged, replace the complete nut (Part No. 450-41-260) or take apart the original nut and replace only the defective parts.

   Dismantling of the nut (6) is simple. Screw it on the slider held by its end in a vice and prize off the pressedon cap of the nut with a screwdriver or a flat chisel. Withdraw the leather cup and use again a screwdriver to prize off the packing ring. Then remove the "O" ring out of the grrove. Before pressing in the new packing ring (labyrinth seal) make sure that the joint of its spring is well tightened. Locate the sheet-metal cap on the nut with the new seal and tap it home carefully.

4) Before reassembling the fork leg, clean all its parts well. First slip the nut (6) with a new "O" ring on to the fork leg tube, and after it the upper sleeve of the slider and both moderately heated up bushes (8 and 9) with the spacer (10) between them. Secure the bushes with circlips (7).

5) Fit the assembled hydraulic shock absorber into the fork leg tube and secure it using the circlip (11). Slip the slider on to the oiled bushes and fasten the piston rod end (13) with the slider compressed using the screw (5) with washer (17) and the new packing ring (18). Rotate the piston rod end with the

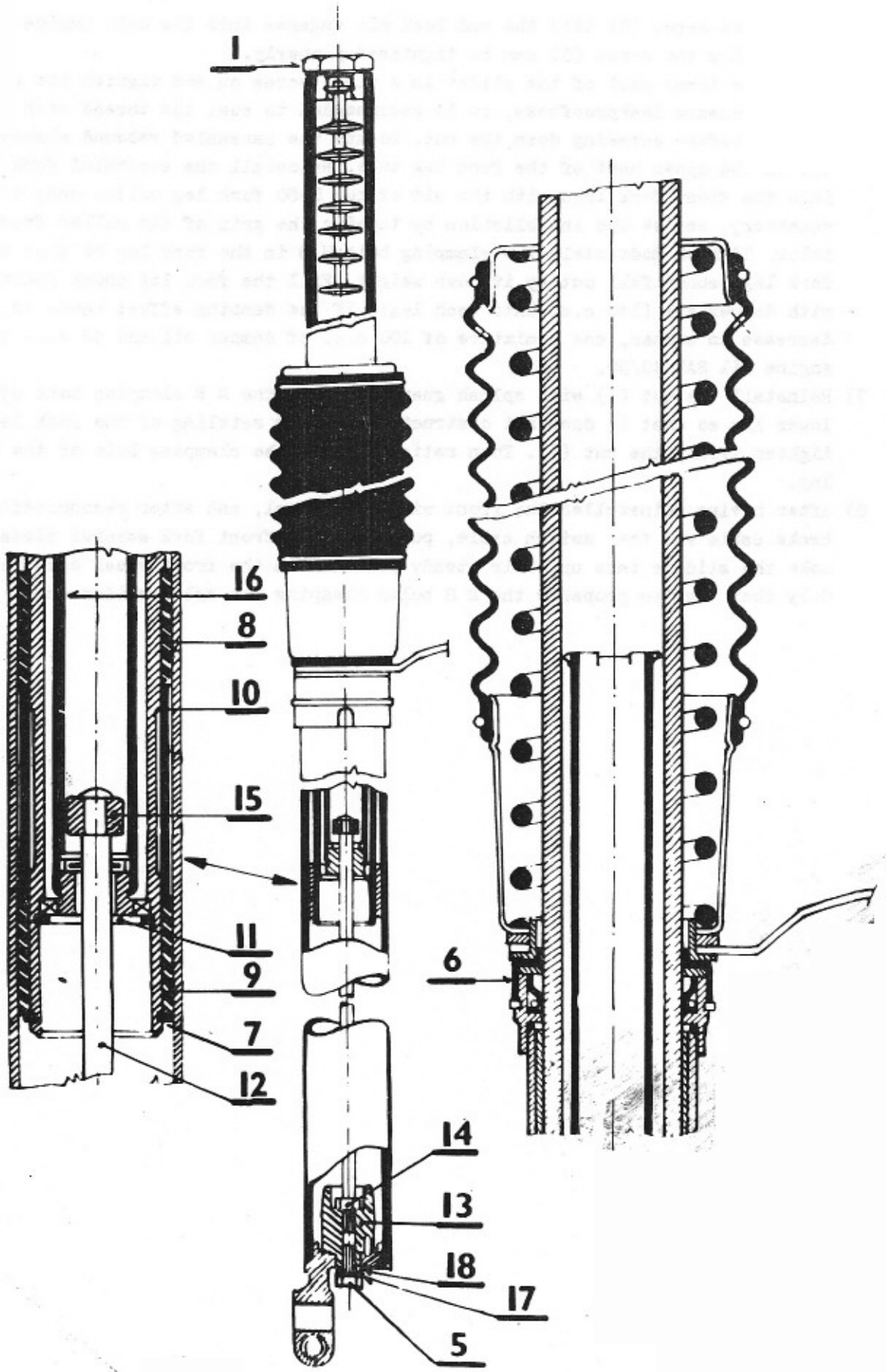


Fig. No. 38 Sectional view of front fork leg.

aid of the screw (5) till the end lock pin engages into the hole inside the slider. Now the screw (5) can be tightened properly.

6) Clamp the lower part of the slider in a vice, screw on and tighten the nut (6). To ensure leakproofness, it is recommended to coat the thread with varnish before screwing down the nut. Locate the assembled rebound element (3) on the upper part of the fork leg tube. Reinstall the assembled fork leg into the front fork lugs with the aid of the S-80 fork leg puller and, if necessary, assist the installation by tapping the grip of the puller from below. Tighten moderately the clamping bolt M 8 in the fork lug so that the fork leg cannot fall out by its own weight. Fill the fork leg shock absorber with damper oil (140 c.c. into each leg). If the damping effect tends to decrease in summer, use a mixture of 100 c.c. of damper oil and 40 c.c. of engine oil SAE 40/50.
7) Reinstall the nut (1) with splash guards. Loosen the M 8 clamping bolt of the lower lug so that it does not obstruct the proper settling of the fork leg and tighten firmly the nut (1). Then retighten well the clamping bolt of the lower lug.
8) After having reinstalled the front wing, the wheel, and after reconnecting the brake cable and the switch cable, push down the front fork several times to make the sliders take up their steady position on the front wheel spindle. Only then tighten properly the M 8 bolts clamping the split slider ends.

5. ELECTRICAL EQUIPMENT

5.1 Table 7 - List of Bulbs Used

Bulb	Type designation	Location	Quantity
Bulb	6 V-35/35W BA 20d	Headlamp high beam	1
Bulb	6 V-15W BA 15s	Stop-light	1
Bulb	6 V-15W BA 15s	Direction indicators	4
or	6 V-21W BA 15s		
Bulb	6 V-5W BA 15s	Tail-light	1
Bulb	6 V-4W BA 9s	Parking light	1
Bulb	6 V-2W BA 9s	Tell-tale lamps	4
Bulb	6 V-2W BA 9s	Speedometer dial illumination	1
Bulb	6 V-2W BA 4s	Tachometer illumination	1

5.2 Table 8 - Sparking plugs

Normal use of motor cycle	
Pal super	N 8
Champion	L 81
Bosch	W 225 T1
Lodge	2 HN
K L G	F 80
	F 75
A C	42 FF
Autolite	AE 3
N G K	B-7HZ
Magnetti	CW 67 NJ
marelli	CW 7N
Marschal	35, 35S
Isolar	M 14-225

5.3 Ignition Advance Adjustment

In the majority of cases it is possible to use the S-46 special gauge screwed into the cylinder head. For more accurate measurements use a dial gauge with a special end piece provided with the spark plug thread. When using a separate dial indicator fasten it to a bracket to be screwed on to the cylinder head bolt after having removed the cylinder head. Here we intend to described the most current method of ignition advance adjustment when using the S-46 gauge. To chcek the beginning of the opening of cantact breaker points when the gap must not exceed 0.05 mm, use a checking bulb as shown in Fig.39. Connect one of its wires to the contact breaker terminal and the other one to the current supply. As a rule, adjust the advance first for the right-hand cylinder (upper contact breaker) and then for the left-hand cylinder (lower contact breaker).

a) Check the tightening of the dynamo and rotor fastening screws, preferably with the aid of a torque spanner.

Warning!
An excessive tightening of the screws is apt to result in a distortion of the upper part of the dynamo stator. The recommended tightening torque is 0.6 kpm.

A

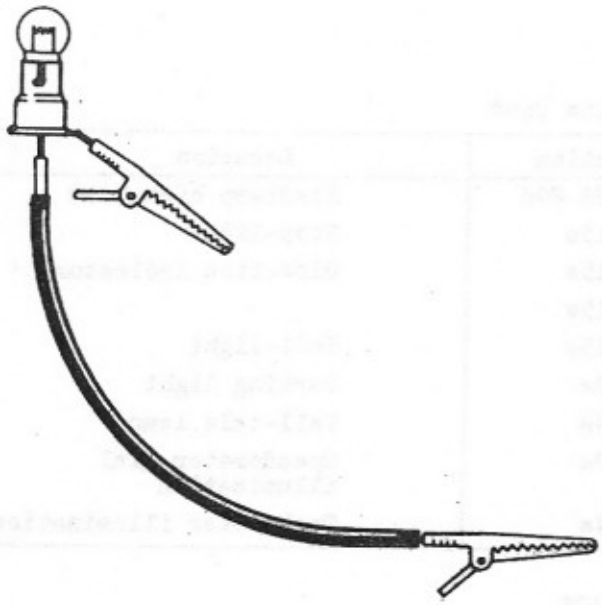


Fig.No.39 Injection advance checking bulb

b) Check the condition of the contact-breaker points and smooth their contact areas with a fine file or abrasive stick as necessary. If the points are worn or heavily burnt (pitted) replace the rockers and counter-points with new ones. Make sure that the closed points bear on each other with their whole contact areas, and if this is not the case, bend the contact-breaker arm as necessary.

c) Screw the S-46 gauge into the threaded hole for the spark plug of the right-hand cylinder without tightening it. The bearing surface of the gauge should have a clearance of about 1 mm which will enable you to set its basic position accurately for the subsequent measuring.

d) Hold the head of the screw fastening the dynamo rotor in the spanner "10" and rotate the crank mechanism to find the pistion T.D.C. position (Fig.40). With the piston in this position measure the distance (gap) between the contact-breaker points using either the feeler gauge of the motor cycle tool kit or a special service feeler gauge. The 0.3 mm feeler must be a slide fit, the 0.4 mm feeler must not pass (Fig.41). Adjust this gap after loosening the fixed contact. Do not forget

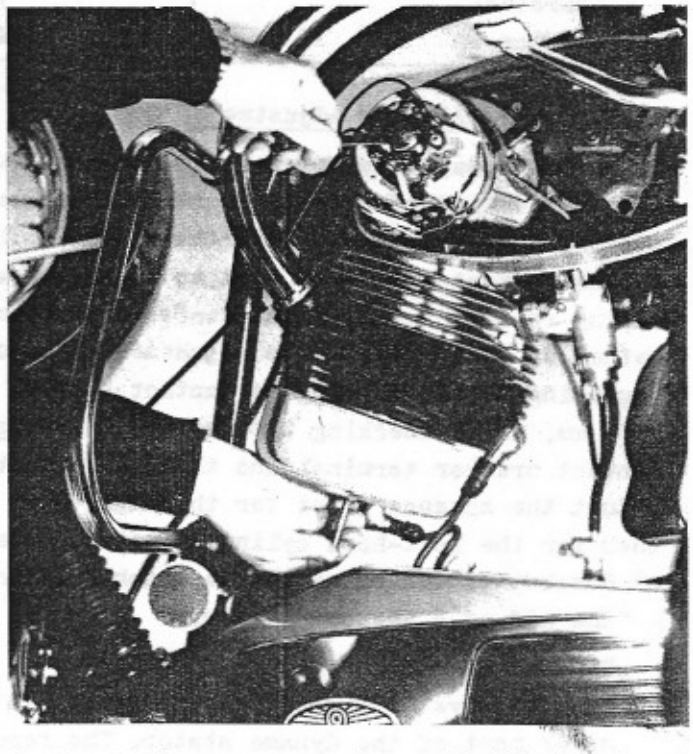


Fig.No.40 Advance measuring and adjustment

A

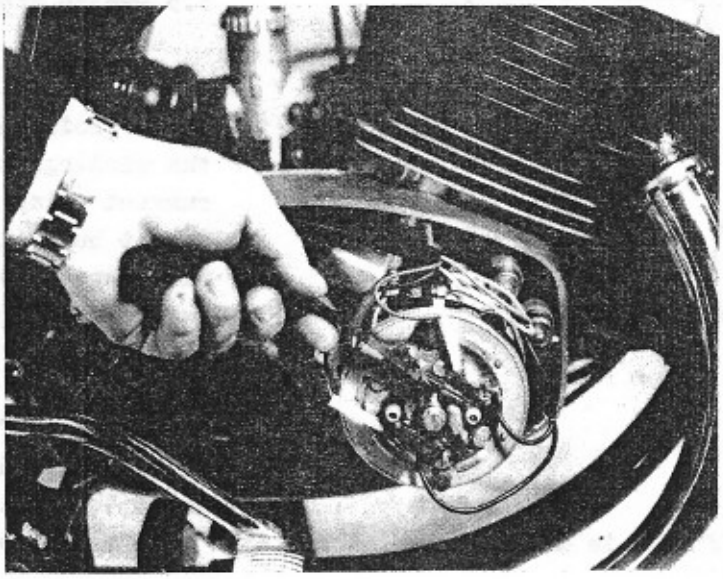


Fig. No.41 Checking contact-breaker point gap

to tighten the respective screw after having adjusted the gap.

e) Check whether the piston is in its T.D.C. position and turn the S-46 gauge so thet the index line on the rod coincides with the reference edge. Rotate the crankshaft anticlockwise to make the piston descend 2.7 to 3.2 mm (adjust to 3 mm), i.e. by the recommended advance value.

f) With the piston in this position the points must just begin to open, i.e. the gap between the contact-breaker points must not be more than 0.05 mm. The connected checking bulb must blink or go out. If the gap is larger or smaller, loosen two screws holding down the cyrlular armature backplate and turn the backplate clockwise (to decrease the gap) or anticlockwise (to increase the gap). Then retighten the screws and check again by rotating the crankshaft that the points open (the checking bulb goes out) when the piston has descended by the specified distance.

g) When adjusting the advance for the other (left-hand) cylinder proceed in the same manner with the only exception of turning but the backplate of the lower contact breaker instead of the armature backplate when adjusting the point gap.

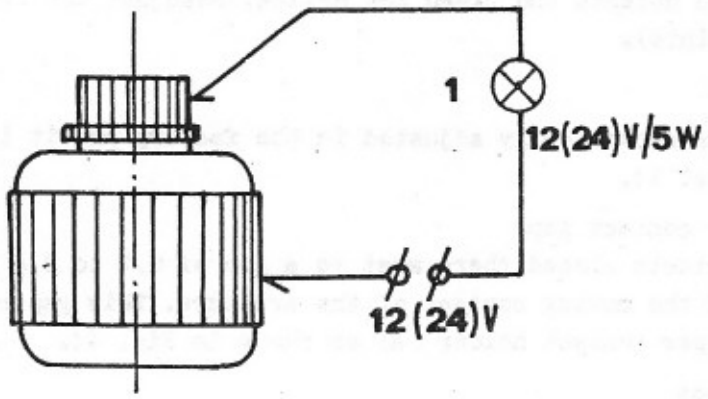


Fig.No.42

5.4 Dynamo Rotor Checking (Fig.42)

To carry out the frame short-circuit test of the rotor winding it to 12-24-volt current using a 12/24-volt, 5-watt bulb (1) as shown in Fig.42. Connect one wire to the rotor frame and pass the end of the other wire over the commutator. The bulb glows only if there is a defect.

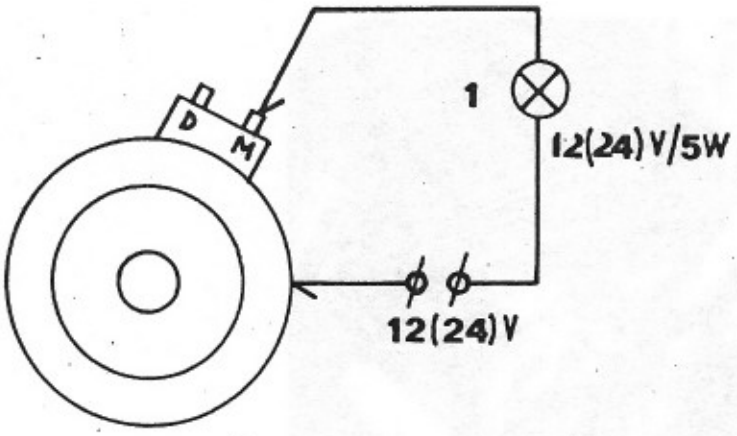


Fig. No.43

5.5 Dynamo Stator Checking

To carry out the frame short-circuit test of the stator coil windings connect the windings to 12-24-volt current using a 12/24-volt, 5-watt bulb (1) as shown in the respective illustration. The bulb must not light up. If there is a short-circuit check whether the individual connections of the coils are well insulated and do not touch the inside surface of the stator shell. If this is not the case, the stator has to be replaced with a new one.

5.6 Regulator Relay

Basic Check of Regulator Relay

If the warning lamp does not go out while the engine is running but keeps glowing even at increased engine speed with full or reduced intensity, or if it does not light up after stopping the machine and reinserting the key into the switch box, it indicates the possibility of the regulator relay failure. Another indication of a defect of the relay is the poor charging of the battery or its overcharging.

First make sure that the correct relay has been installed. Then inspect the leads and earthing of the relay. All connections must have a bright-metal contact. Measure the battery voltage and check the electrolyte density. Check the correct operation of the dynamo without the voltage regulator. If the dynamo operates faultlessly, test the regulator relay either on a test stand or, tentatively, direct on the machine.

Regulator Relay Inspection

Before adjusting the voltatge regulator inspect carefully the regulator relay. Remove any mechanical ascertained defects and clean the device. Readjust the relay after smoothing the contacts (points).

Mechanical Adjustment

The regulator relay has been mechanically adjusted in the factory and it is useually not necessary to readjust it.

1) Checking of voltage regulator contact gaps
With the upper and centre contacts closed there must be a gap of 0.2 to 0.4 mm between the lower contact and the moving contact of the armature. This gap can be adjusted by bending the upper contact holder (A) as shown in Fig. 44.

2) Checking of switch contact gaps
The contact gap of the open switch must be 0.4 to 0.6 mm. This gap can be adjusted by changing the radius of the bent arm of the armature end-plate stop (B) as shown in Fig.45.

Checking of Regulator Relay Electric Adjustment

In the first place make sure that the control resistor on the voltage regulator base plate is not mechanically demaged. The ceramic body must not be cracked, the surface or parts of the surface of the resistor must not be charred, its outlets must be properly soldered. Resistance values: 8 ohms with 2-ohm tap to loading capacity of 8 to 10 watts and/or two separate resistors, i.e. 1 x 2 ohms/8 watts for switching and 1 x 6 ohms/8 watts for control (regulation). Connect the regulator relay to the test stand and see to it that all wires have a perfect contact with terminals. Check the ratings of a cold regulator relay with the cover in position. Remove the cover only when adjusting the ratings of the relay.

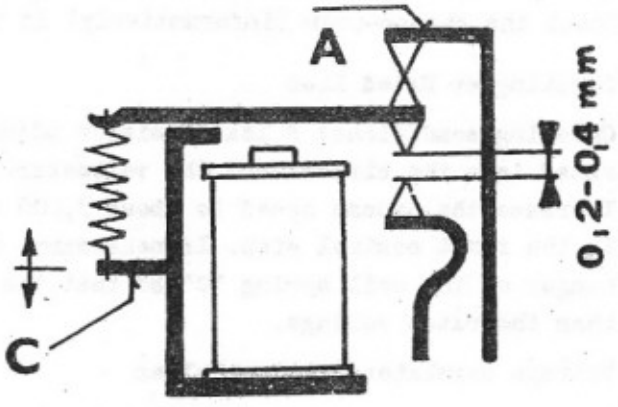


Fig.No. 44

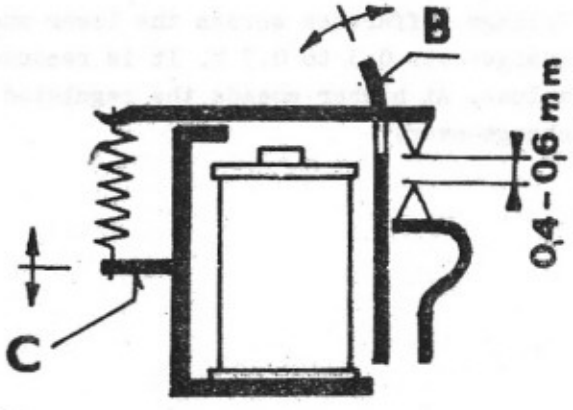


Fig. No. 45

A. Voltage Regulator

1) Voltage Checking at Low Load

Checking conditions: The circuit incorporates a load resistor adjusted to 2 volts and a voltmeter connected to the terminal "B". Increase the dynamo speed to the maximum when the voltmeter reading stabilized and stops rising. At this speed, the voltmeter must indicate the maximum recommended voltage while the regulator is working in the second control step. i.e. over the lower contact. At a certain moment during the speed decrease the armature is attracted to the upper contact and the regulator begins to work in the first control step alternately opening and closing the control resistor. In this speed region, the regulator must work noiselessly, the armature must not knock (regulate alternately over the upper and lower contacts). The knocking is a defect caused by an incorrect change-over, i.e. the low or negative difference of voltage regulated in the first or the second control step. At a small change-over, increase the air gap between the armature and the coil by bending the flexible holder of the moving contact at the point of bend "A" and at a great change-over decrease the air gap. When adjusting the change-over to the recommended value, increase and decrease the speed alternately and read off the deflections of the voltmeter when the armature changes over from one control circuit to the other. The table value of the maximum voltage can be

adjusted by bening the hanger of the coil spring (Fig. 44 "C") - increased spring tension increases the regulating (control) voltage and vice versa. Check the change-over (informatively) in the region of 2,000 to 4,000 r.p.m.

2) Checking at Rated Load

Checking conditions: A load resistor adjusted to the rated output is incorporated into the circuit and the voltmeter is connected to the terminal "B". Increase the dynamo speed to about 3,000 r.p.m. at which the regulators works in the first control step. If necessary, correct the setting by bending the hanger of the coil spring "C" so that the minimum service voltage is not lower than the rated voltage.

Voltage Regulator Setting Values

Switching voltage	Regulated voltage at low load		Regulated voltage at rated load		Back current
	step I	step II	step I	step II	
6.1 - 6.5 V	-		max. 7.7 V	min. 6.9 V	5-6 A

Voltage difference across the lower and the upper contact during regulation - change-over 0.3 to 0.7 V. It is recommended to use the maximum change-over values. At higher speeds the regulated voltage must always be higher (positive change-over).

B. Switch

1) Switching Voltage Check

Checking conditions: A voltmeter is connected between the terminal "D" and the frame, the terminal "B" is connected over an ammeter and load resistor to the frame. The dynamo frame and the frame of the regulator relay must be interconnected. Switch in the load resistor adjusted to 2 amperes. Increase slowly the speed and watch the voltmeter readings immediately before the closing of contacts. The reading of the voltmeter before the sudden drop (at the moment of the ammeter pointer deflection) is the value of the switching voltage. If necessary adjust this value to specifications by bending the hanger of the coil spring "C" (Fig.45). The switching voltage rises with the increased tension (pull) of the spring and decreases with the decreasing spring tension. The auxiliary switching contact on the bronze buttress plate must be adjusted so that its bearing surface is always 0.1 mm below the level of the adjacent (main) contact.

2) Back Current Check

Checking conditions: The terminal "B" is connected to the battery over an ammeter (with zero in the middle of the scale). The other pole of the battery is connected to the dynamo frame.

Increase the dynamo speed to the rated speed, and then decrease the speed gradually while watching the ammeter. The current reading will drop toward zero. After the pointer has passed over zero, back current from the battery flows through the dynamo. At a certain value of the back current, the switch must open and disconnect the dynamo from the battery. The necessity of adjusting the back current never arises during the normal use of the machine.

Check the back current at a battery voltage ranging from 6.0 to 6.3 volts. It is bound to be different at other voltages. The average value of the back current varies from 5 to 6 amperes.

3) Checking of Electric Parameters on the Machine

For information purposes it is also possible to test the regulator relay installed on the machine by

a) checking the switching voltage (into battery)
b) checking the regulating voltage at low load (after starting the engine disconnect the battery and load the dynamo only by ignition)
c) checking the back current.

Connect the measuring instruments in the same way as when testing the regulator relay on a test stand.

A. Discharged or poorly charged battery

1) The dynamo is excited	a) Voltage regulator regulates "low". b) Interrupted winding of switch voltage coil. c) Interrupted circuit of regulator relay. d) Switch armature jammed - foreign matter got between the core and armature during inexpert openning of regulator relay. e) Switch contacts dirty or burnt. Burnt contacts are found on engines the idling speed of which greatly varies causing the closing and opening region into the region of idling speed. During this untypical running the switch contacts keep closing and opening while an arc is formed between them. This defect has to be removed first. f) Switch contacts are dirty and their transition resistance is too high.
2) The dynamo is not excited	a) Defective dynamo. b) Sticking regulating contacts of control step II or burnt (dirty) regulating contacts of control step I of voltage regulator or limiter. These sticking or burnt contacts may be the result of defects of excitation winding or resistor.
3) The dynamo charges only at high speed	a) Inter-turn short-circuit of excitation winding, dirty commutator, sticking brushes, dynamo short-circuiting caused by moisture or carbon-brush dust. b) Dirty contacts of control step I - imperfect contact.

B. Battery overcharging, excessive evaporation of water and electrolyte

1) Dynamo voltage regulated too "high"	a) Incorrectly adjusted voltage regulator
2) Dynamo voltage is not regulated and rises suddenly at a speed increase	a) Sticking contacts of control step I. b) Regulator armature jammed (sticking) on upper contact. c) Interrupted winding of voltage regulator coil. d) Short-circuited excitation winding or wire between the dynamo terminal "M" and voltage regulator.
3) Voltage regulator regulates correctly in the first control step but at increased speed the voltage is too high	a) Contacts of control step II dirty or burnt - no contact between them.

C. Other defects

1) Dynamo shows signs of overloading	a) Defective control resistor.
2) Regulator relay works ununiformly in the whole speed range	a) Intermittent contact on terminals of the broken spring b) Slackened connections in the dynamo, out-of-round commutator, sticking brushes c) Interrupted control resistance
3) Regulator relay work ununiformly at high speed	a) Short-circuiting of armature at high speed due to movement of winding caused by centrifugal force b) Too great a gap of contacts of control step II c) Occasional sticking of armature d) Interrupted control resistance.
4) Switch contacts do not open	a) Sticking switch contacts. This defect may occur at increased and irregular idling speed the result of which is an alternate creepy closing and opening of switch contacts. First attend to this defect. Sticking of contacts may also be caused by the drop of switching voltage into the idling speed region b) Faulty earthing of regulator relay.