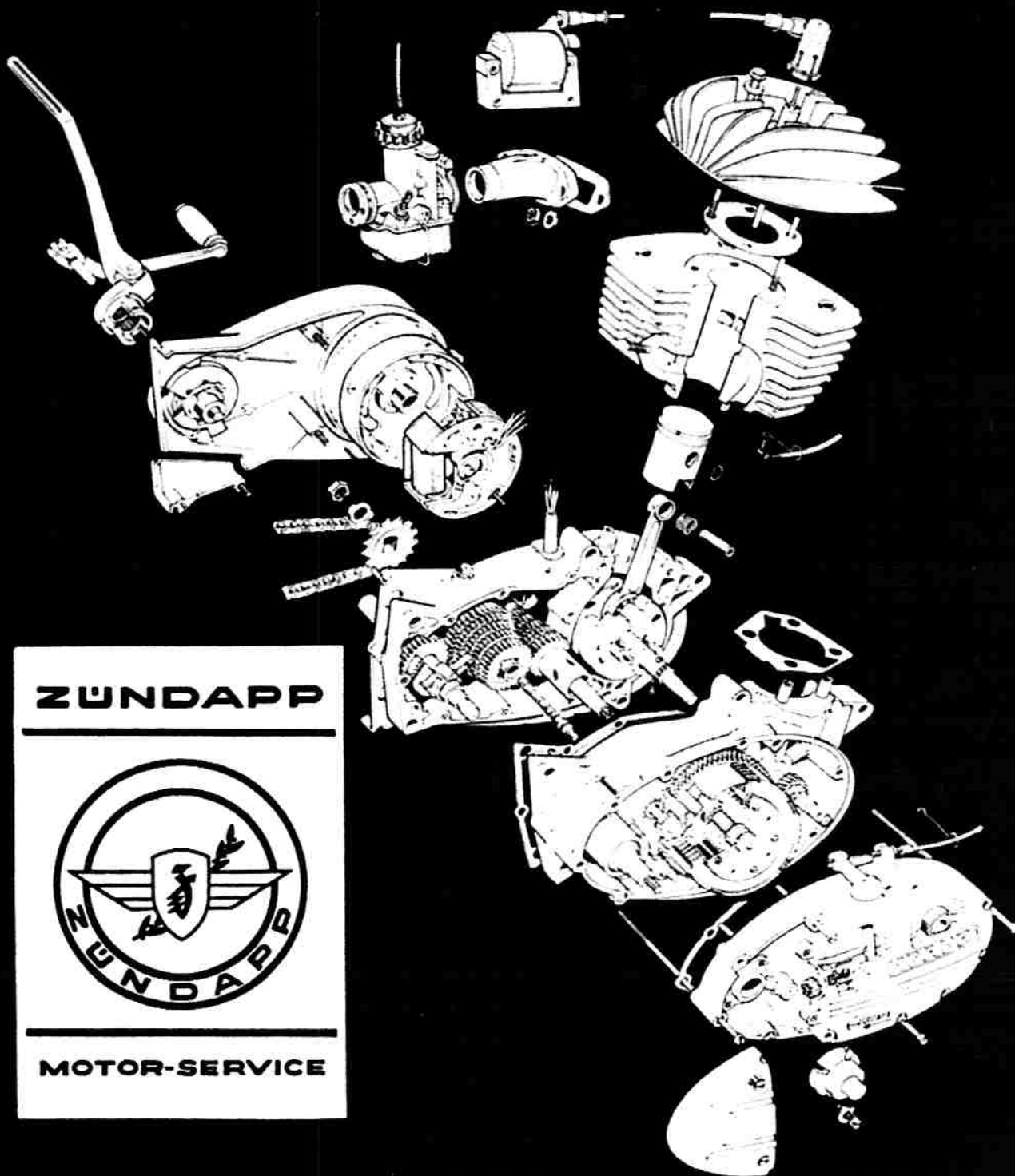




ZUNDAPP



MOTOR-SERVICE

Workshop Manual for Two-Stroke-Engine

100 and 125 cc

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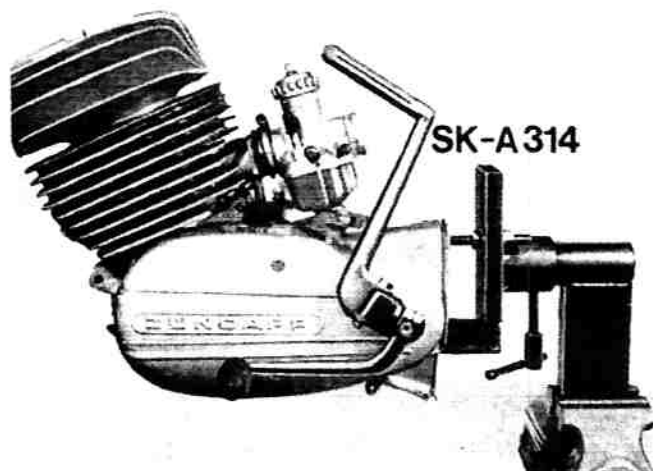


Fig. 1

Dismantling the Engine

Clamp engine into holding fixture SK-A 314 with (swivelling) adjustable reception arm (fig. 1).

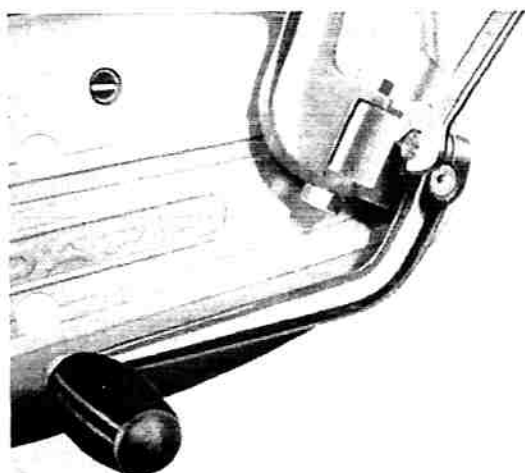


Fig. 2

Take off gear pedal, first removing the hexagon bolt with the 10-mm open or socket spanner (this is done before the engine is taken from the frame, fig. 2).

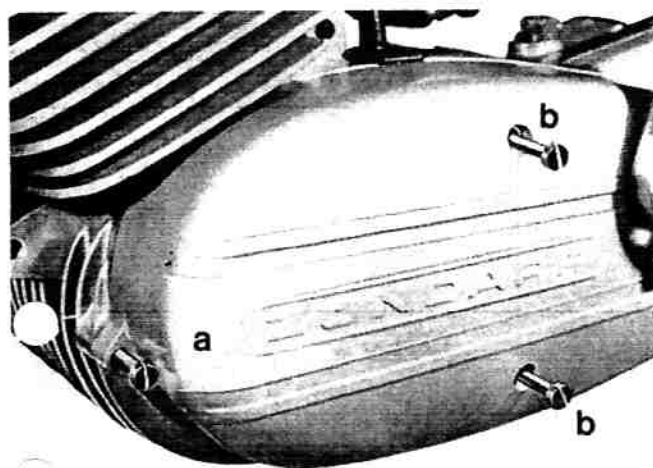


Fig. 3

a) Taking off housing cover, left

Slacken screw (a), M6 x 22, 2 screws (b), M6 x 40, take off left housing cover, complete with kick-starter, kick-starter spring and cover plate which also serves as kick-starter stop (fig. 3).

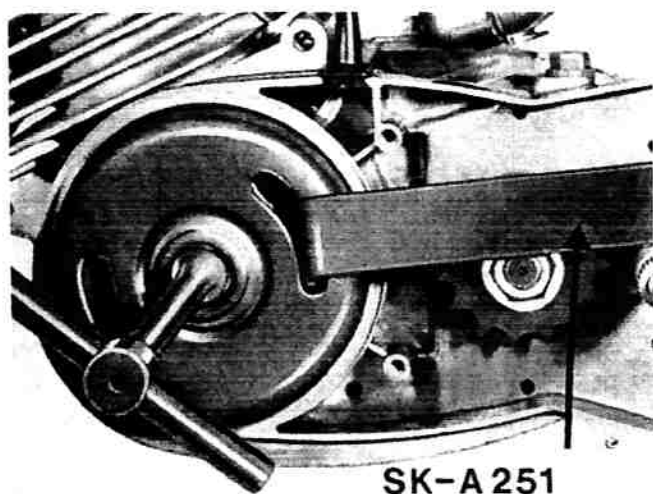
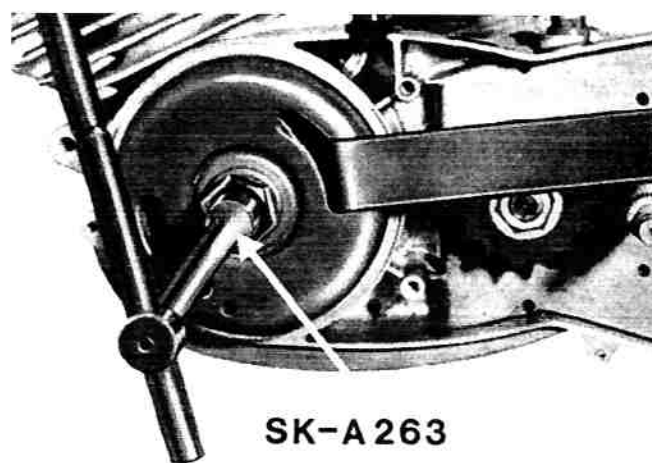


Fig. 4

Take off pole plate nut with 14-mm socket key, holding plate fast with special tool SK-A 251 (fig. 4).

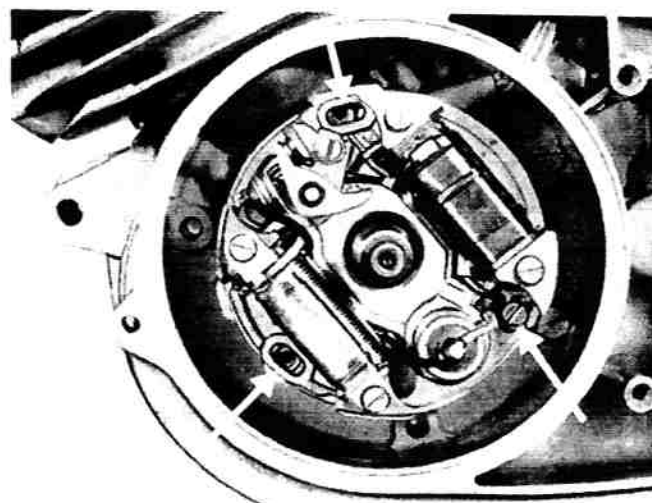
Fit press-off bolt SK-A 263 to pole plate, hold fast with bar SK-A 251 and pull the pole plate from the crankshaft. Do not lose the key which locates the plate on the crankshaft. If the plate is difficult to press off, run the bolt down to torque load, then vibrate it by light blows from a plastic hammer (fig. 5).

Fig. 5



Take off the 3 fixing screws, M4 x 16, then remove the baseplate (fig. 6).

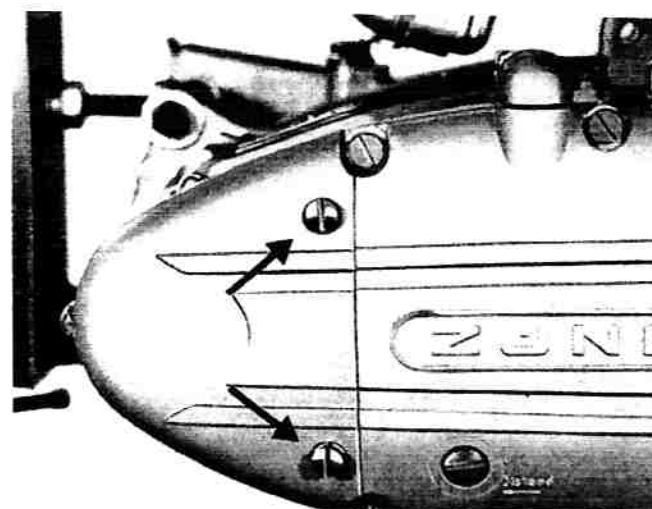
Fig. 6



b) Taking off clutch and setting cover and clutch end cover

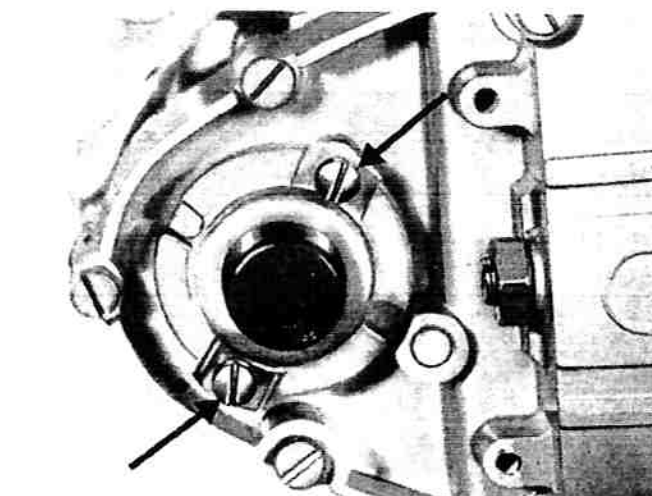
Take off 2 oval-head countersunk screws, M5 x 20, fixing the cover over clutch and selector setting controls to the right-hand housing cover, then take off the connector cover (fig. 7).

Fig. 7



Slacken the 2 screws, M6 x 12, fixing the clutch setting bell cover, then take off the cover (fig. 8).

Fig. 8



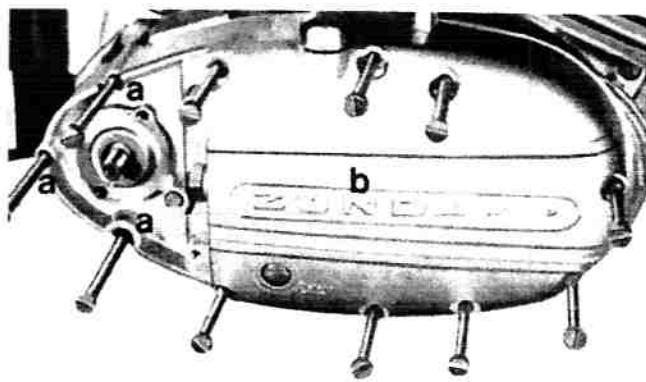


Fig. 9

Take off 11 screws fixing the clutch housing cover:

- a) 3 screws, M6 x 140
 - b) 8 screws, M6 x 154
- (fig. 9)

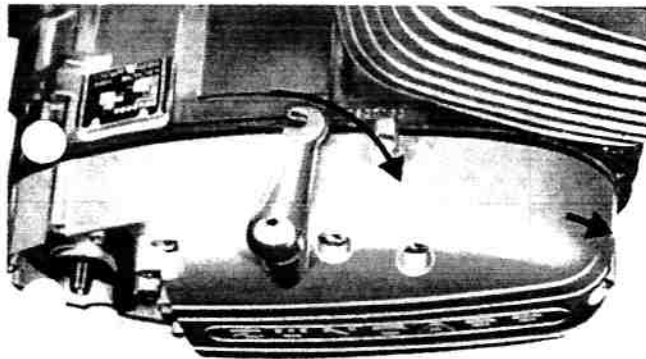


Fig. 10

Move the clutch lever to press the clutch housing cover off. At the same time, lightly tap a plastic hammer against the front side of the cover to help in prizing it off (fig. 10).

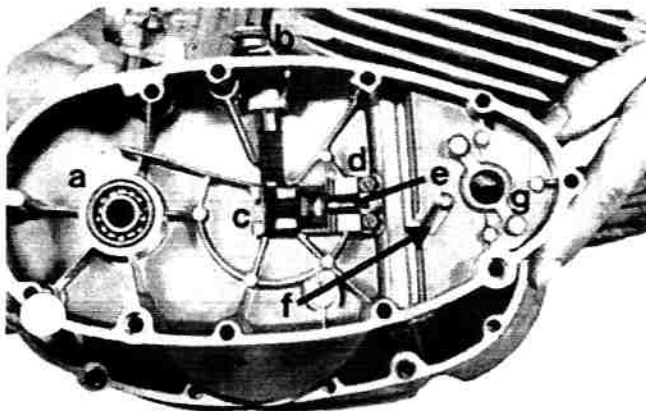


Fig. 11

Located in the clutch housing cover are:

- a) 1 bearing 6201 (3rd crankshaft bearing)
 - b) 1 clutch spindle with lever
 - c) 1 clutch tongue
 - d) 2 laminated springs for clutch tongue
 - e) 1 threaded ball-head stud to reset the clutch tongue
 - f) 1 spindle for the sliding selector
 - g) 1 bush for the kick-starter spindle
- (fig. 11)

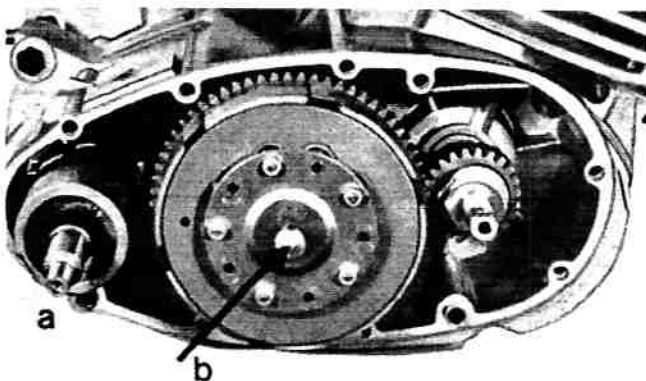


Fig. 12

- c) Taking off gear selector spindle and clutch thrust pin

Take off selector pedal spindle (a) and thrust pin (b) complete with washers under the pin (fig. 12).

d) Dismantling the clutch

Mount puller tool SK-A 235 by 3 bolts, M6 x 210 (SK-A 326), and unscrew the five M4 nuts with the 7-mm box spanner. Slacken the binding screw and you can then take off thrust plate, clutch springs and spring sleeves (fig. 13).

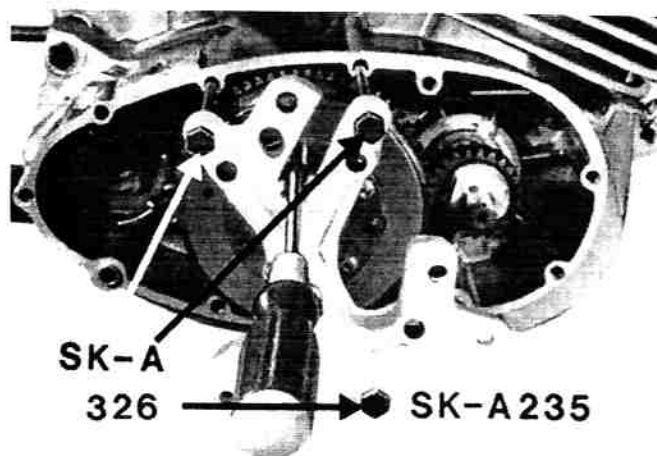


Fig. 13

Fit hold-down key SK-A 279 to clutch cover plate, slacken clutch nut with the 19-mm box spanner (fig. 14).

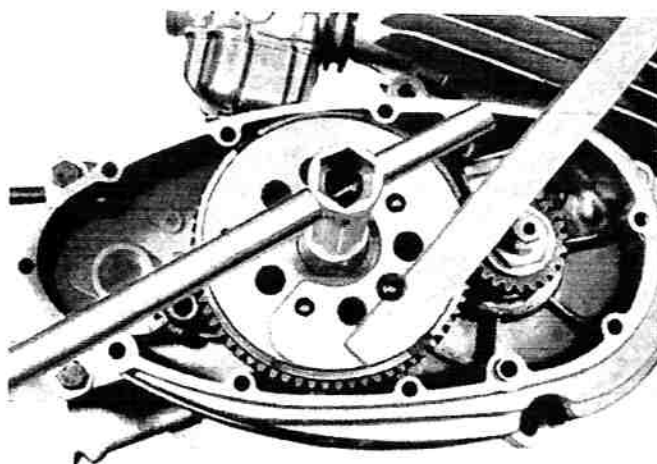


Fig. 14

Remove complete clutch, clutch hub and packing washers (a) behind hub (fig. 15).

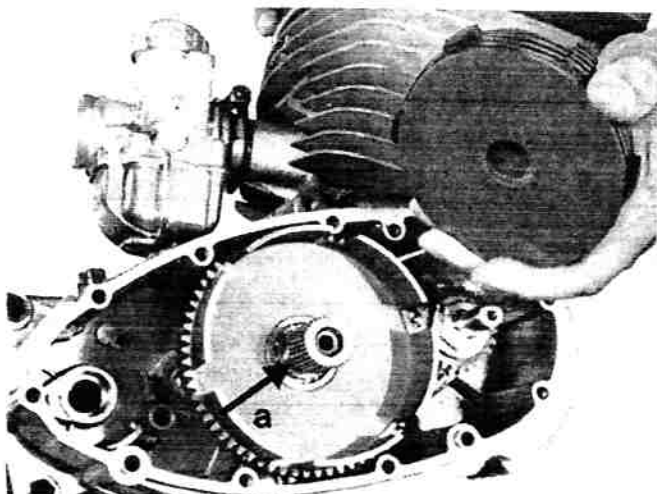


Fig. 15

Pull out clutch gear rim with ball bearing 6003 (fig. 16).

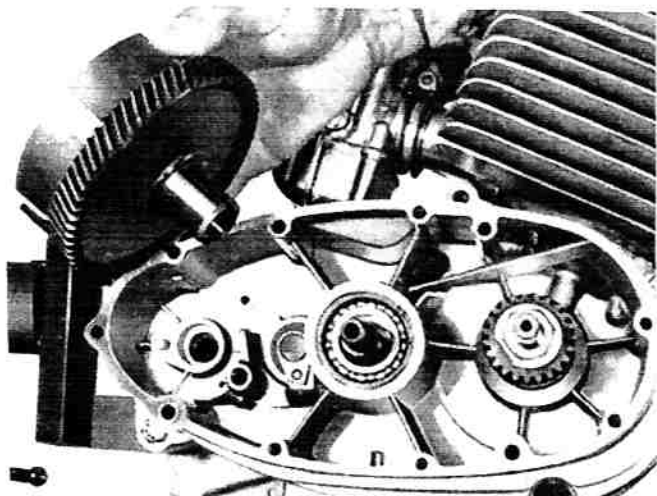


Fig. 16

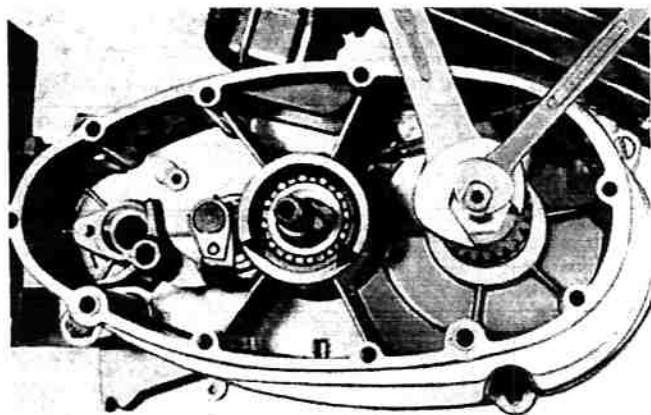


Fig. 17

e) **Taking off chain sprocket, selector link with sliding gear and crankshaft gear**

To take the gear off the crankshaft, bend up locking washer, hold crankshaft fast with 10-mm open spanner applied to the flats and take off the hexagon nut with the 22-mm open spanner. **Note: left-hand thread.** Under the gear lie two 5-mm balls. Take off link with sliding selector gear, moving the selector spindle to and fro as you do so (fig. 17).

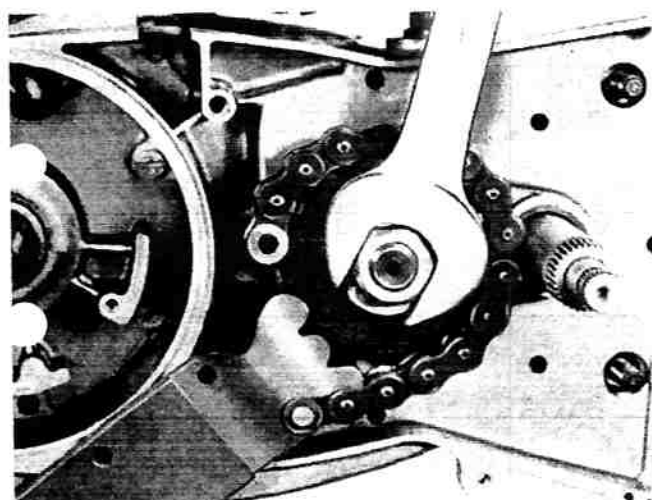


Fig. 18

Bend up the sprocket tab washer, take off the hexagon nut with a 22-mm spanner, then take off the sprocket. Use the chain key as a hold-down (fig. 18).

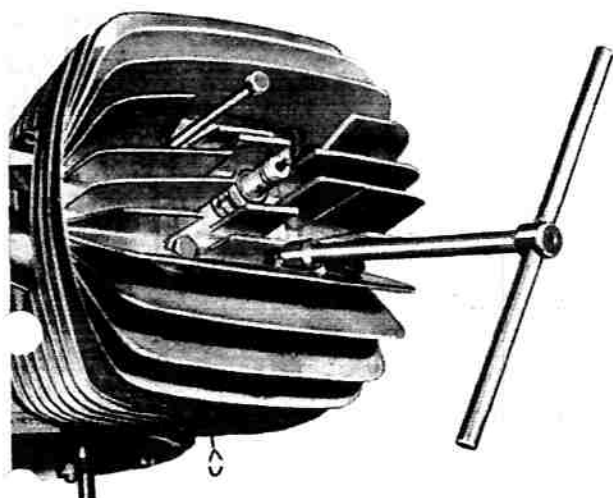


Fig. 19

f) **Taking off cylinder head, cylinder and piston**

To take off cylinder head and cylinder, slacken the 4 hexagon bolts, M7 x 115, with the 11-mm box spanner complete with the washers under them. You can now lift off cylinder head, head gasket, cylinder and base gasket (fig. 19).

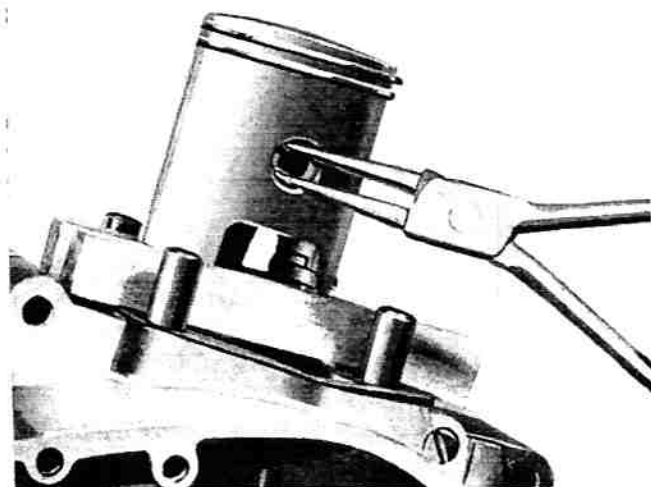


Fig. 20

Cover up the crankcase, then take out the gudgeon pin clips with a pair of pointed pliers. Do not use a screwdriver (fig. 20).

Take off the piston rings, fit gudgeon pin press-off tool SK-A 268 and press out the pin. **Note:** Immediately take the gudgeon pin needle bearing off the con-rod and store it away in a clean wrapping (fig. 21).

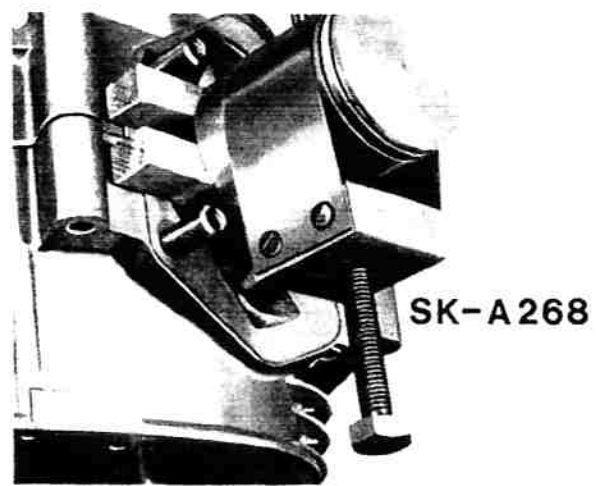


Fig. 21

g) Dismantling the crankcase

Take off the remaining housing screws, M 6 x 45 (a), from left, 2 in ignition magneto casing (fig. 22).

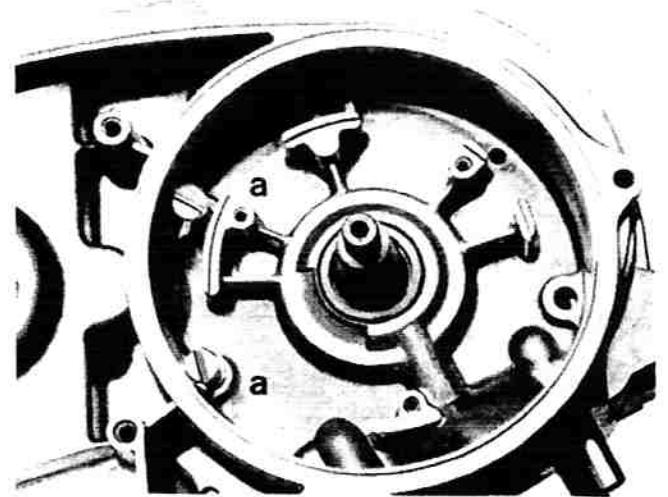


Fig. 22

On the right-hand side, take 1 bolt, M 6 x 65 (b), off the cylinder base (fig. 23).

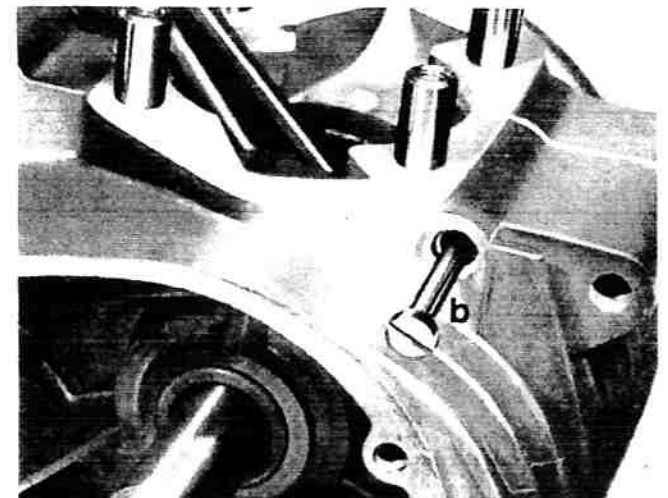


Fig. 23

Next, take the complete gearbox block from the clamping fixture and place it, right-hand side down, on two wooden planks. Press simultaneously on selector and kick-starter spindles and separate the two housing halves, then carefully lift away the top half. To help the work along, it may be necessary to vibrate the housing with light blows from a plastic hammer (fig. 24).

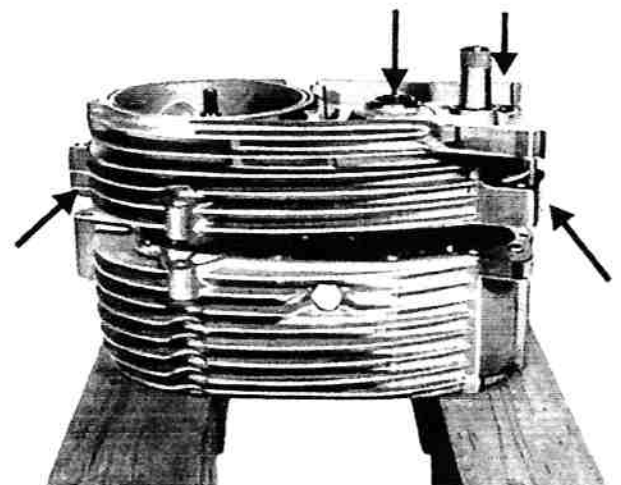


Fig. 24

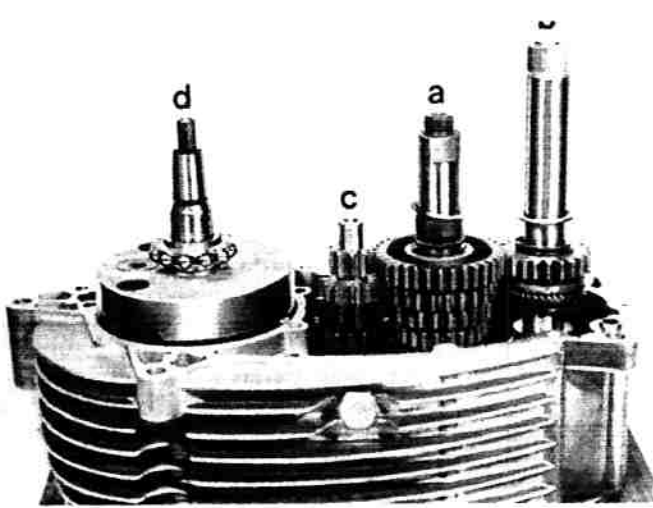


Fig. 25

h) Taking off gear train and crankshaft

Before you take any shaft off, note and memorise its packing and spacer washers! Take shafts off in the following sequence:

Selector spindle (a) with selector gears (lift up at lowest gear to keep spindle, balls and gears together), Kick-Starter spindle (b), Main shaft (c), complete with 0.2 mm packing washer and spacer tube, Crankshaft (d).

Inspect all shafts and gears for wear after removal (fig. 25).

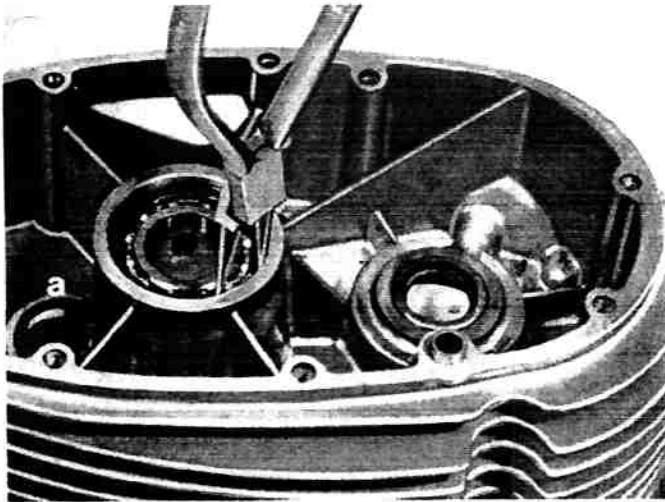


Fig. 26

i) Taking selector spindle bearing off right-hand housing section

Snap out the circlip, then take from the right-hand housing section ball bearing 16005 in which the clutch gear runs (fig. 26).

k) Taking off split journal bearings

Take off the ball retainers of the crankshaft journal bearings. You can then pull off the inner races with a standard puller tool. To remove the outer races, heat the housings and knock them against a wooden plank (fig. 27).

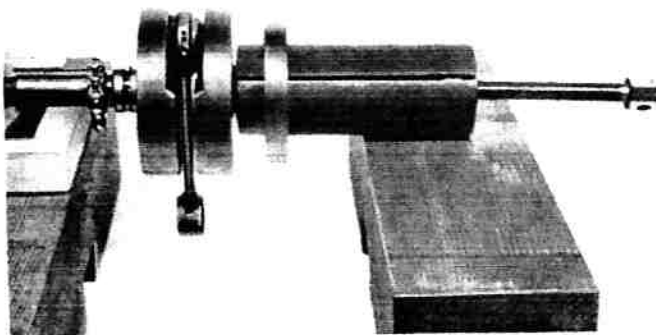


Fig. 27

2. Assembling the Engine

Before you start to re-assemble, thoroughly clean all engine parts, remove the old sealing compound from the gearbox parting faces, (unless a paper gasket was used) and check that all parts are in perfect condition. Replace worn or damaged parts with **Original ZUNDAPP spares**. Always fit new seals and gaskets. Make sure to drive all parts, such as bearings, shafts, etc. home all the way into their reception bores.

To mount inner and outer races of the split journal bearings, heat the respective housing part to approx. 85° C.

Lubricate all running and stop faces of moving parts with clean oil of the grade specified by us.

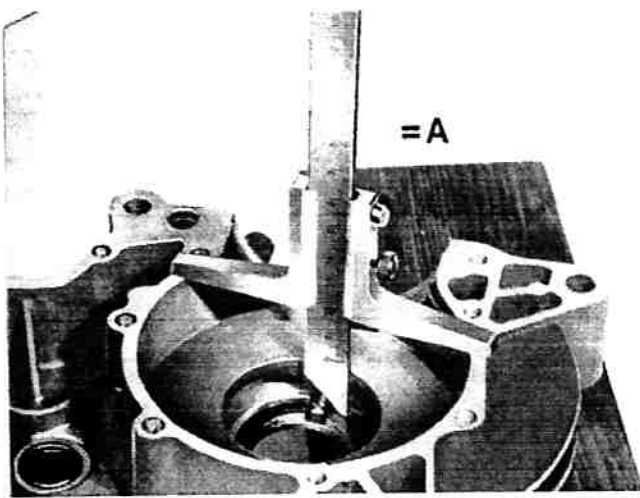


Fig. 28

a) Crankshaft gauging

Fit gasket on to right-hand housing, then with a depth gauge measure dimension A (fig. 28) = housing parting face to stop face of outer race.

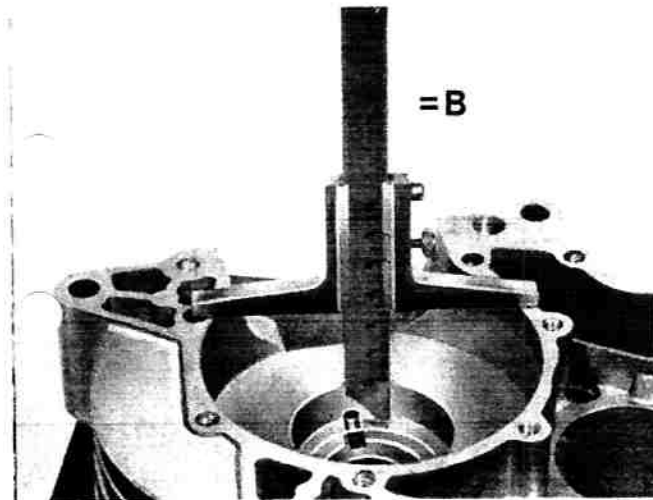


Fig. 29

Repeat on the left housing side = dimension B (fig. 29).

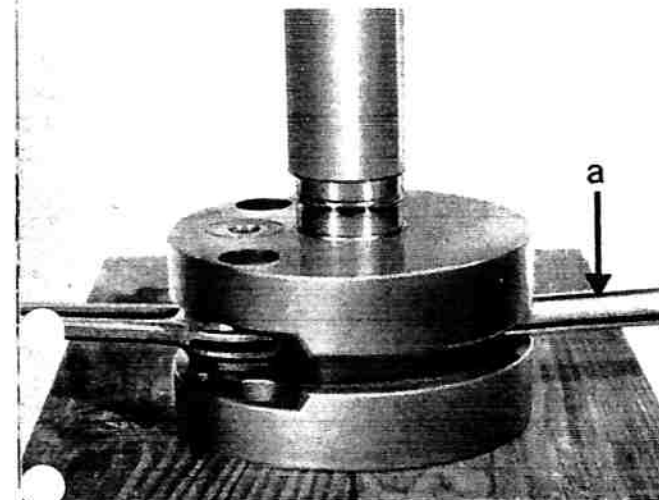


Fig. 30

Press inner races of journal bearings on to crankshaft until they stop against the crank webs. To do so, wedge a suitable object (such as bar a) into the space between the webs opposite the journal so that their clearance will not alter (fig. 30).

Fit the ball retainers and outer races, then with a calliper gauge measure across both outer races = dimension C.

Permissible axial play should be 0.05 to 0.1 mm (.002"-.004").

Example:

$$\begin{array}{r} A = 44.4 \text{ mm} \\ + B = 38.2 \text{ mm} \\ \hline \end{array}$$

$$82.6 \text{ mm}$$

$$- C = 80.3 \text{ mm}$$

$$\hline 2.3 \text{ mm}$$

$$- 0.1 \text{ mm} = \text{axial play}$$

$$= 2.2 \text{ mm}$$

(fig. 31)

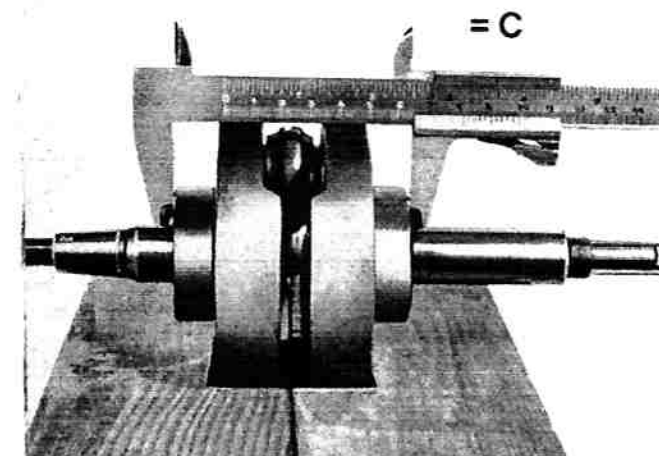


Fig. 31

Make up the difference of 2.2 mm by fitting 1.1 mm packing washers on both sides behind outer races (a) into the housings (fig. 32).

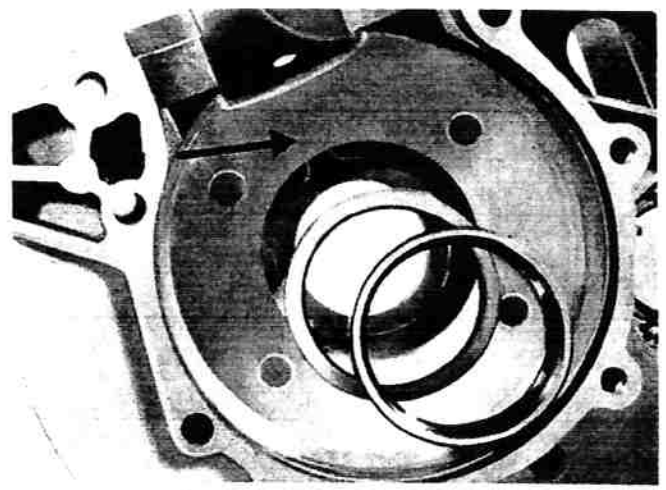


Fig. 32

b) Pre-assembling kick-starter spindle

Gauge clearance of opposing teeth between driver and kick-starter gear; it should be 0.6 to 0.8 mm (.024"-.031"). Make up any divergence from this by fitting or removing washers between circlip and driver. Fit a washer of constant 1 mm thickness to the short stub end (fig. 33).

(For engines with kick-starter spring fitted inside, see figs. 81-85).

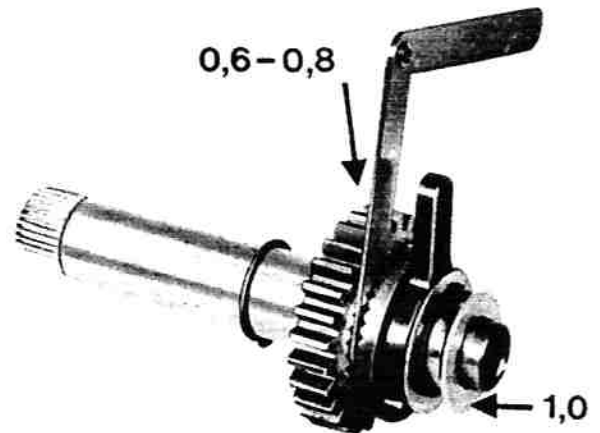


Fig. 33

c) Pre-assembling main drive shaft

Fit a washer of 0.2 mm thickness between gear cluster and spacer tube. For proper lubrication, the bores in the tube must lie on the gear side (fig. 34).

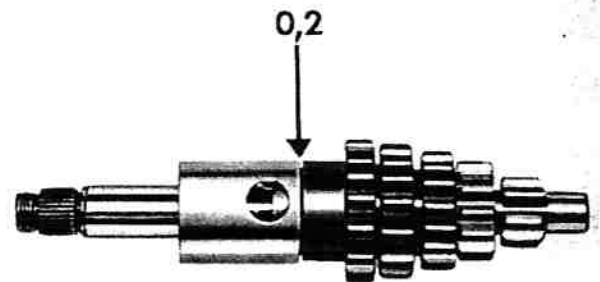


Fig. 34

d) Gauging selector spindle gear cluster

First gauge dimension from end face of spindle to side face of top gear (fig. 35).



Fig. 35



Fig. 36

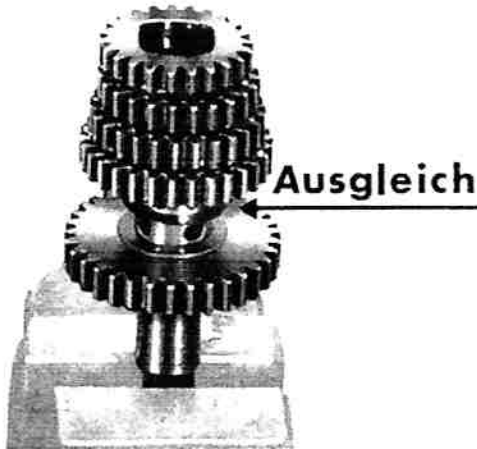


Fig. 37

Second dimension runs from spindle end face to shoulder on spindle (fig. 36).

Dynamic balancing between 1st and 2nd gear – gears must be mounted as follows:

Lubricating groove of 1st (speed) gear faces 2nd (speed) gear. Having gauged the gear set, fit spacer washers as required. On the remaining selector gears, an arrow at the side points in the running direction, i.e. to the next larger. Before you fit the gear, introduce the 4 balls of 7 mm dia. without grease into the matching bores in the spindle. If selector gears were correctly gauged and fitted, the top gear side face will be precisely flush with the collar on the spindle (fig. 37).

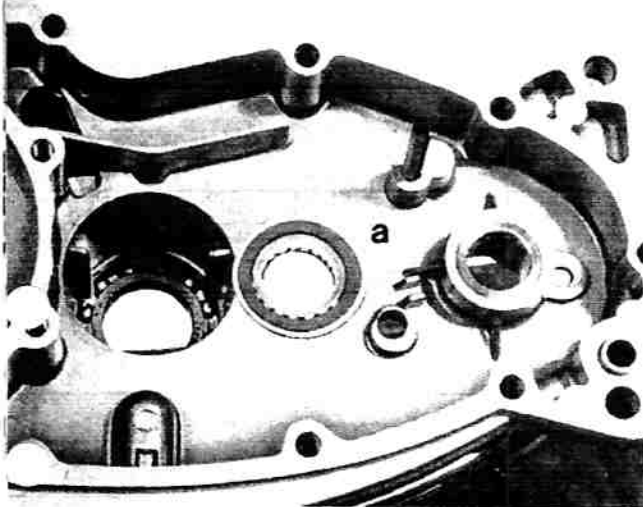


Fig. 38

e) Mounting selector spindle bearing into right-hand housing section

Fit check plate and the 19 rollers, 5 x 3.5 dia., followed by upper check plate for the spindle into the right-hand housing half (a) with a generous grease packing. The bevel of the smaller diameter top check plate must face to the top (fig. 38).

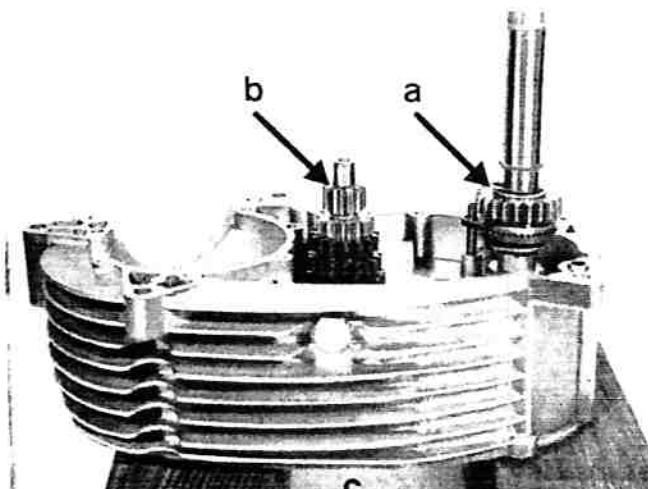


Fig. 39

f) Fitting kick-starter spindle, main drive shaft and selector spindle

When introducing the kick-starter spindle, make sure to hook the driver brake spring on to clamping pin (a). Fit main shaft (b). For accurate centering of the shaft in its bearing, it may be advisable to fit clutch gear (c) from below (fig. 39).

Fit complete selector spindle. For easier mounting into the roller bearing, it is advisable to fit the strongly tapered guide SK-A 300 (fig. 40).

g) Gauging kick-starter spindle

On the left housing half, gauge clearance from sealing face to bush = 45.7 mm. Find clearance from parting face of right-hand half to circlip (stop for kick-starter spindle) = 44.2 mm.

Example:

$$\begin{array}{r} 45.7 \text{ mm} \\ - 44.2 \text{ mm} \\ \hline = 1.5 \text{ mm} \end{array}$$

Dimensions are assumed to show the procedure. To obtain the required axial play of 0.1 to 0.2 mm, fit 1.3–1.4 mm packing washers ahead of the kick-starter spindle circlip. Fit gauging frame SK-A 206 for this work (fig. 41).

h) Gauging selector spindle

Again use gauging frame SK-A 206 to measure clearance from parting face of left housing to inner race of ball bearing = 47.1 mm. Then find clearance from parting face of right housing half to selector spindle collar = 46.3 mm.

Example:

$$\begin{array}{r} 47.1 \text{ mm} \\ - 46.3 \text{ mm} \\ \hline = 0.8 \text{ mm} \end{array}$$

(fig. 42).

Here, too, the figures are assumed. To obtain the required axial play of 0.1 mm, fit 0.7 mm packing washers to collar (a) of the selector spindle. Fix crankshaft (fig. 43).

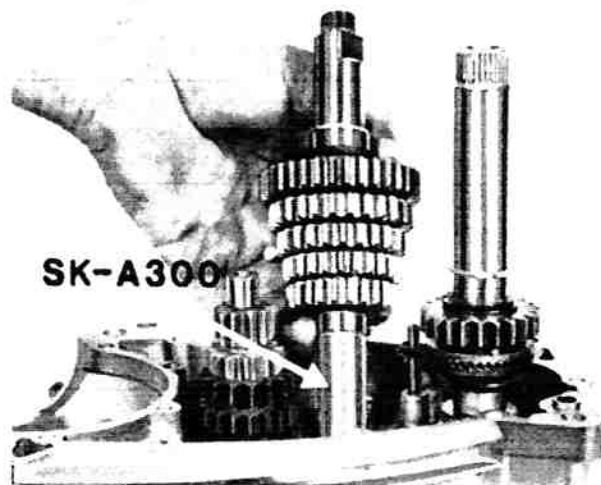


Fig. 40

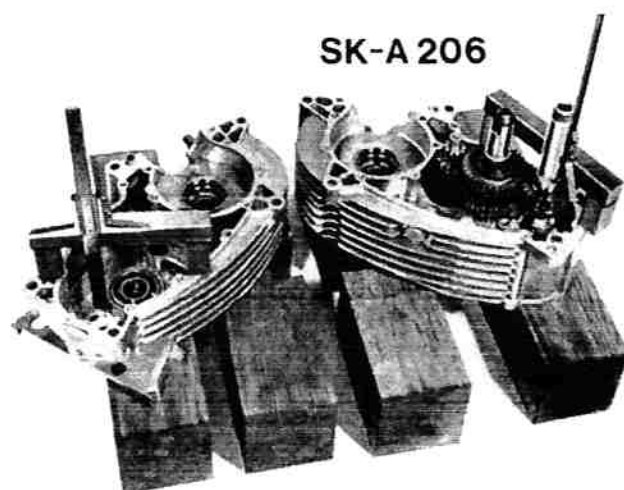


Fig. 41

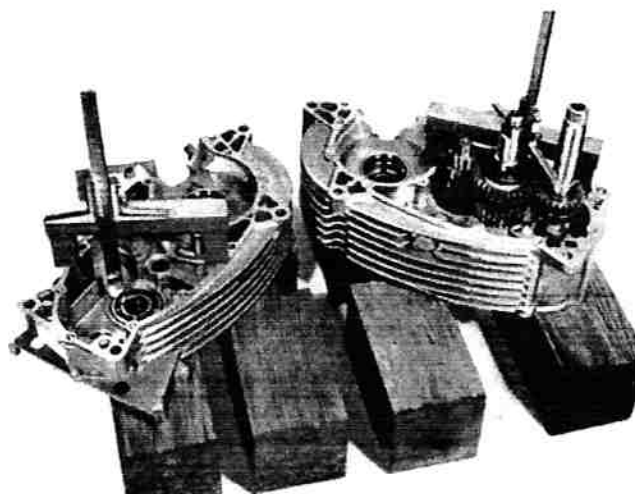


Fig. 42

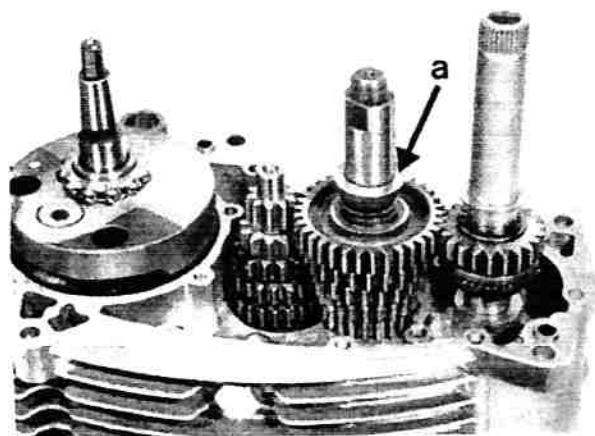


Fig. 43

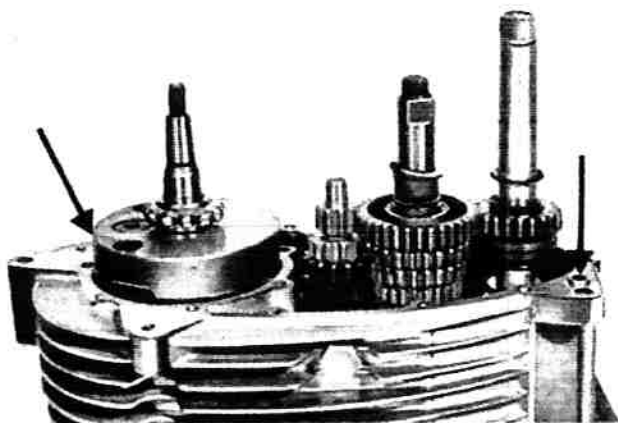


Fig. 44

i) **Mounting the crankcase**

Mount two press-fit bushes, chamfered end pointing up, into the bores of the right housing half (fig. 44).

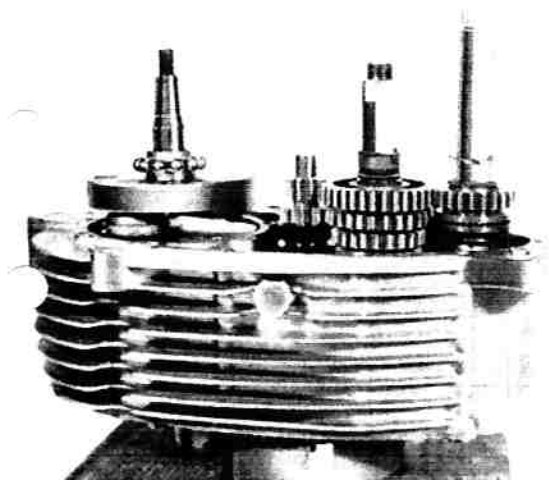


Fig. 45

Centre main drive shaft on bearing in right housing half; if necessary, insert clutch gear from below to do so (fig. 45).

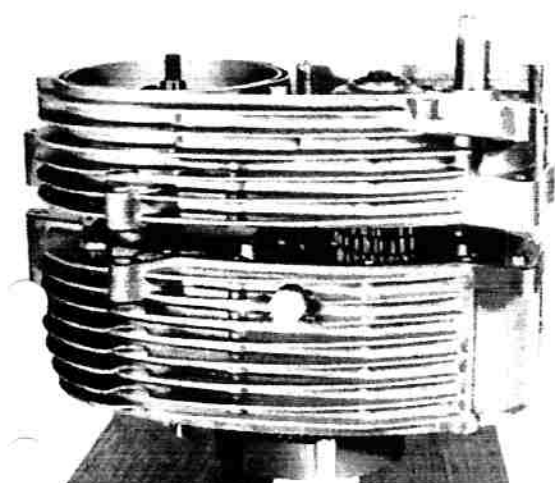


Fig. 46

Fit left housing half (fig. 46).

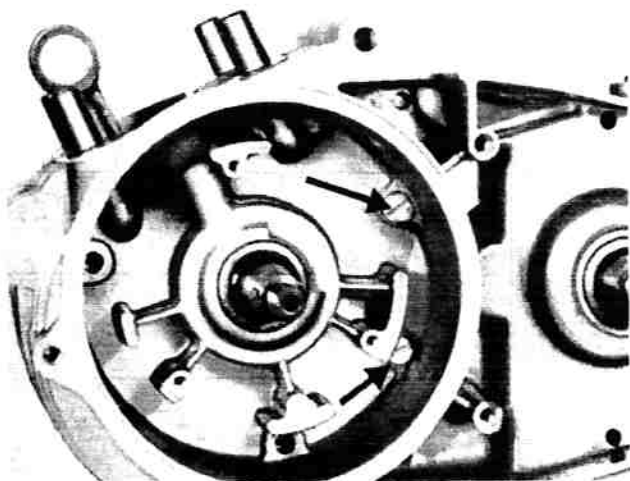


Fig. 47

Bolt together both halves from the left with 2 screws, M 6 x 45 in the magneto casing.

Running down torque is 0.75–0.85 mkp (.965–1.85 lb-ft) (fig. 47).

From the right, fit one bolt, M 6 x 65, at the cylinder base (running-down torque 0.75–0.85 mkp/.965–1.85 lb-ft) and place engine block into clamping fixture SK-A 314 (fig. 48).

k) Checking selector spindle seat in left housing bearing

Fit a ring (made in your workshop) of the following dimensions:

Height	7 mm
Outer dia.	34 mm
Inner dia.	20.5 mm

on the selector spindle, flush against the housing. Fit chain sprocket, run down sprocket nut to draw spindle all way into the inner ball bearing race and unload the rollers in the right-hand housing. Then take nut, sprocket and ring off again. Finally, test that all shafts run easily (fig. 49).

To fit the sealing rings on the crankshaft, use the special tools

Assembly sleeve SK-A 217 and hollow mandrel MV6-734 (fig. 50).

Fit the selector spindle sealing ring with sleeve SK-A 217, drive it home with hollow mandrel MV 6-734. Fit sealing ring for kick-starter spindle with mandrel MV 6-734. Note that chamfered end of ring must face the housing (fig. 51).

SK-A314

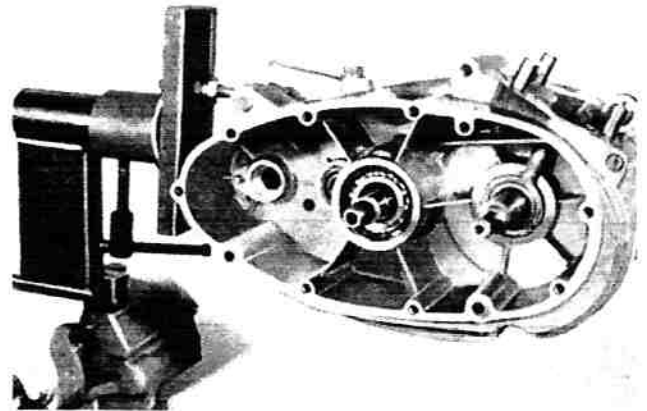


Fig. 48

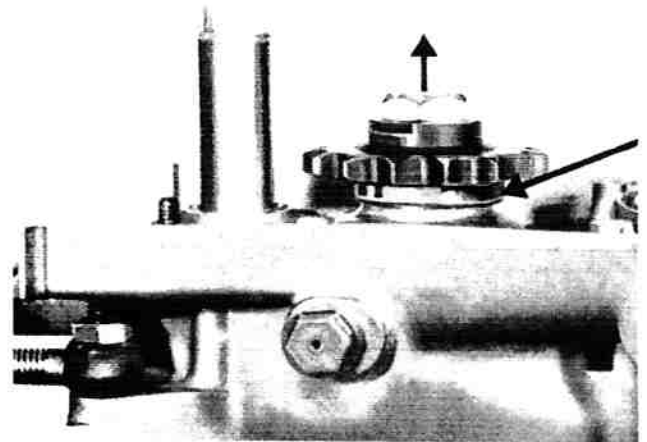


Fig. 49

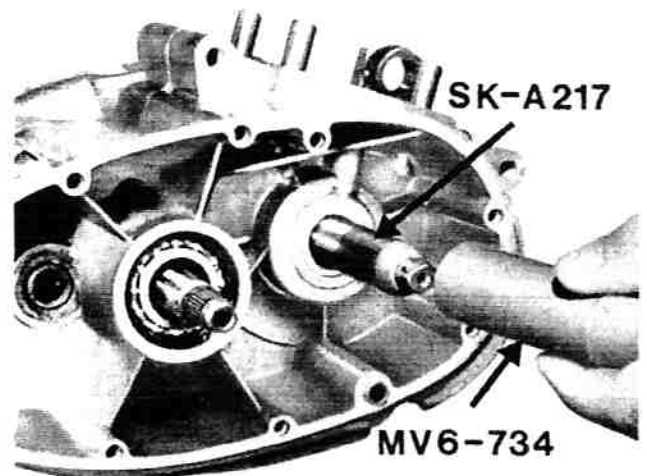


Fig. 50

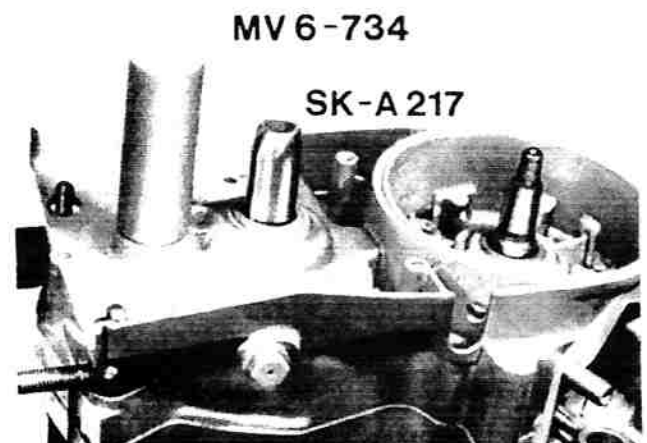


Fig. 51

SK-A303

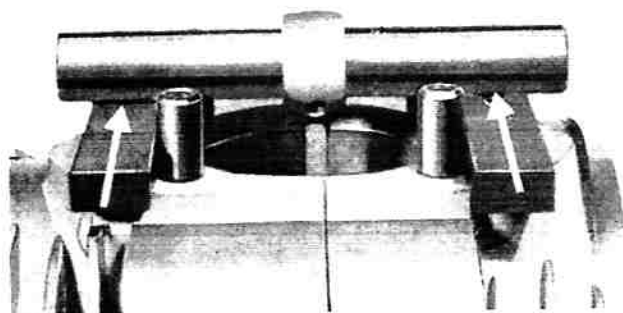


Fig. 52

1) Inspecting the connecting rod

Place two metal bars of identical size against the sides of the con-rod. Fit gauging mandrel SK-A 303 into con-rod (without needle bearing), turn crankshaft until mandrel uniformly contacts both bars. Turn crankshaft in the opposite direction and repeat (testing con-rod running through 180°, fig. 52).

Eliminate any irregularity by straightening the con-rod with bar MV 6-115 (fig. 53).

MV 6-115

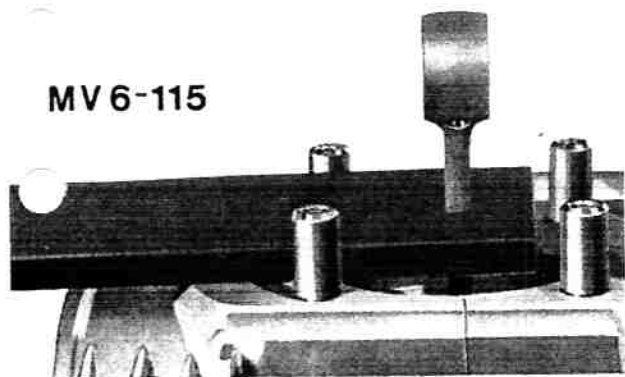


Fig. 53

Fit piston – marking „Auslass“ (outlet) facing the exhaust. Introduce gudgeon pin with special tool SK-A 275, cover up crankcase, then fit circlips (fig. 54).

SK-A 275

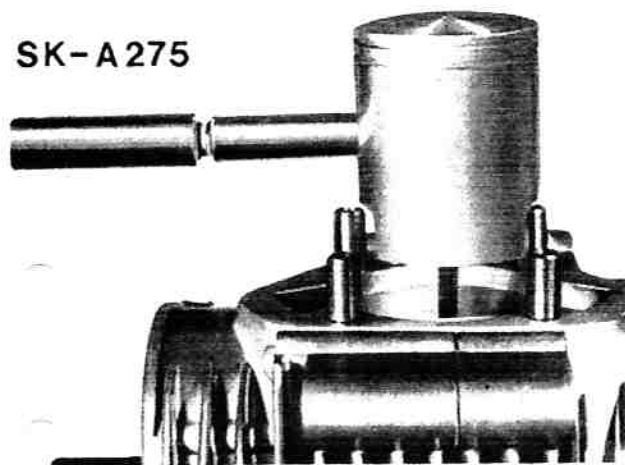


Fig. 54

Fit cylinder base gasket **without sealing compound**.

Fit piston rings, support piston with a fork-shaped tool made in your workshop. Fit a piston ring strap and mount the cylinder. Introduce piston into cylinder cautiously and with a sensitive touch to avoid piston ring fractures. Mount cylinder, head gasket and cylinder head, run them down with the 4 hexagon bolts, M 7 x 115, not forgetting the 4 washers. Tighten bolts in alternate sequence diagonally across with a running-down torque of 1.8–2.0 mkp (13–14.5 lb-ft). Before you fit a new piston ring, check the ring gap which should be approx. 0.1 mm (.004"). To do this, fit the ring into the cylinder, then measure the gap with a feeler gauge (fig. 55).

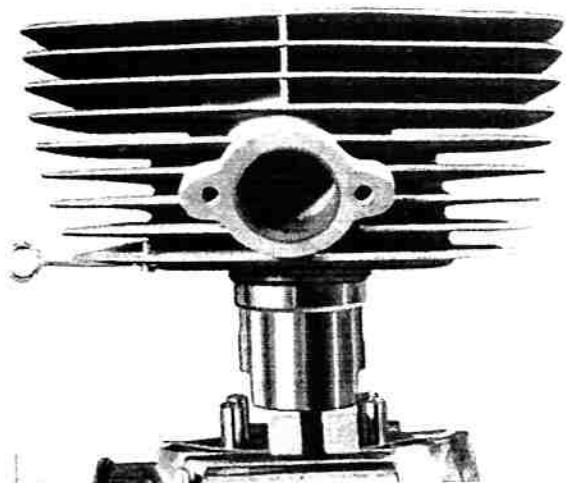


Fig. 55

m) Mounting chain sprocket, selector link with sliding selector, clutch gear and drive pinion on crankshaft

Fit chain sprocket and secure with locking washer and hexagon nut. Hold the assembly fast with the chain key, run down nut at a torque of 7.0–7.5 m/kp (50.75–54.37 lb-ft).

On these engines, the sprocket has two flats. Fit gear on crankshaft, run down nut at 1.8–2.0 mkp (13–14.5 lb-ft), holding the crankshaft down with a 10 mm open spanner applied to its flats. The balls which lock the gear have 5 mm dia. Turn selector spindle to and fro and fit selector link, set it to 2nd gear position. Introduce clutch gear (fig. 56).

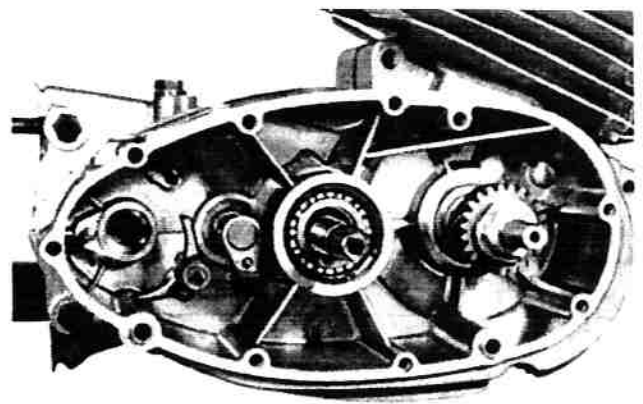


Fig. 56

n) Gauging main drive shaft

Fit clutch hub, cover plate and clutch nut. With a wooden chock or other aid, raise the cover plate to its top position, mount gauging frame SK-A 206 across the clutch on the housing parting faces. With the depth gauge measure clearance from frame to end face of main drive shaft (fig. 57).

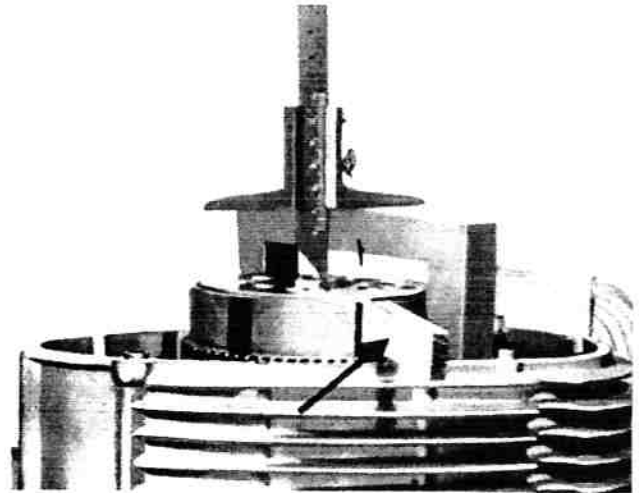


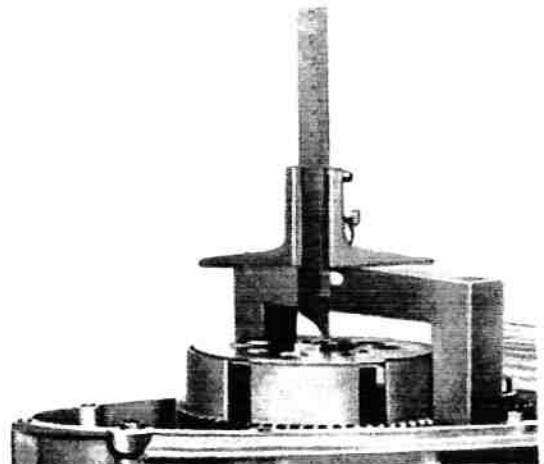
Fig. 57

Take the chock away again, press shaft home to the stop against the gearbox. Repeat the gauging procedure (fig. 58).

Example:

Clearance without chock	29.2 mm
– with chock	– 28.4 mm
	= 0.8 mm
– axial play	0.1 mm
	= 0.7 mm

Fig. 58



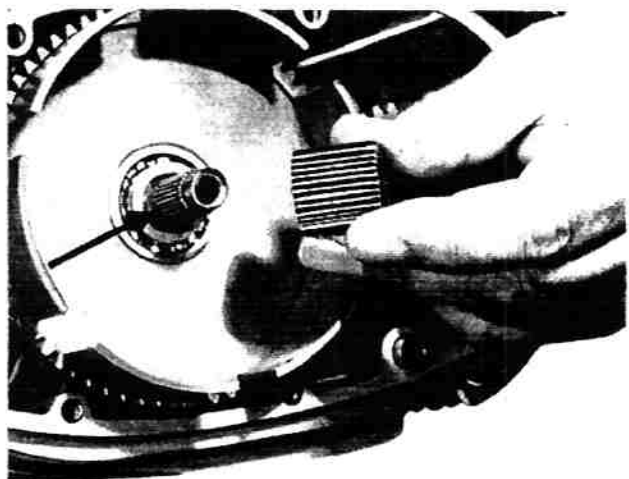


Fig. 59

The figures are assumed to show the procedure. To obtain the specified axial play of 0.1 mm, fit 0.7 mm packing washers between ball bearing in clutch gear and clutch hub (see arrow in fig. 59).

o) Mounting the clutch

You can now mount the clutch backplate, liner and steel plates and the thrust plate. To facilitate precise alignment of the bores for the spring sleeves, the clutch hub has a line mark, all other splined plates have a marking bore. Beneath the marking bore on the backplate, an additional arrow must be brought into alignment with the line mark on the clutch hub. Also make sure that the raised side of the topmost steel plate faces the gearbox. Having fitted the fifth plate, fit the cover plate, again with the dished side facing the gearbox. Fit the nut to the cover plate, hold fast with key SK-A 279 and run nut down at a torque of 3.0–3.3 mkp (21.75–23.92 lb-ft) (fig. 60).

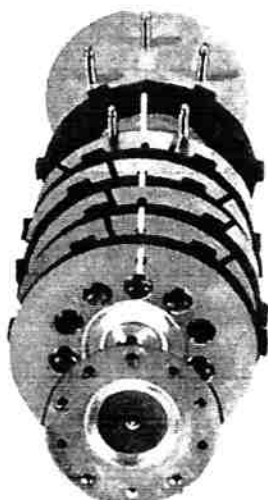
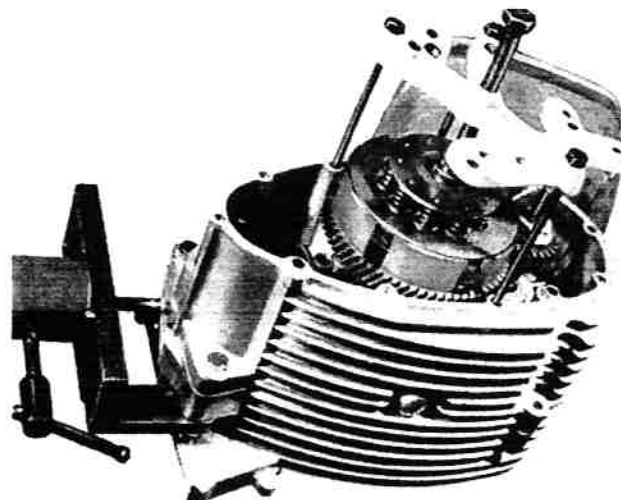


Fig. 60

Next, fit the spring sleeves with clutch springs (always replace worn springs in a complete set). Fit special tool SK-A 235 by its 3 bolts and slide the thrust plate between the centre clamping bolt on the tool and the clutch springs. Compress the clutch springs and you can then fit the five M 4 nuts and run them down uniformly at a torque of 0.12–0.15 mkp (.87–1.01 lb-ft) (fig. 61).

Take off the special tool, fit thrust pin with associated packing washers to the thrust plate.

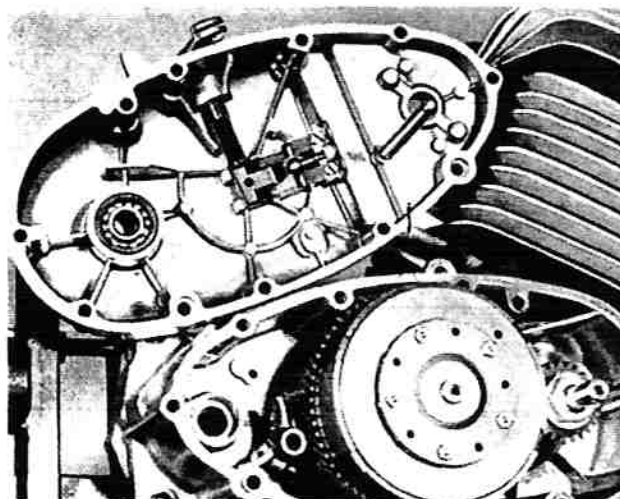
Fig. 61



p) Clutch setting

To obtain the largest possible clutch re-setting range, the clutch tongue must now be set to the thrust pad. Coat the pad with chalk, fit clutch housing cover, operate clutch lever on housing. Take cover off again, check that pad contacts the tongue roughly at its centre. If not, shift the load pattern with the setscrew for the thrust plate on the clutch housing cover, then lock the setting. Finally, check play of clutch lever at the housing. With the lever at rest, you should be able to move it by hand by about 2–3 mm at the cable hook-in clip. If play is too large or small, fit or remove washers under the thrust pad (fig. 62).

Fig. 62



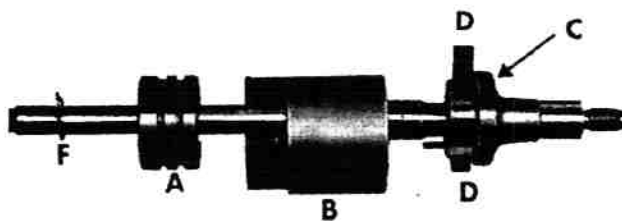


Fig. 63

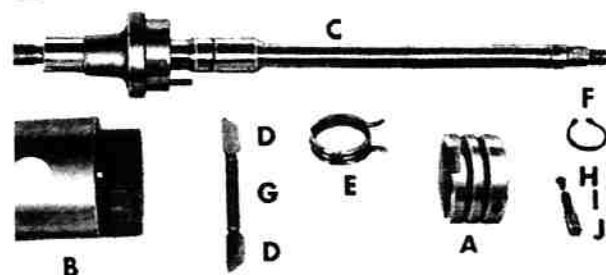


Fig. 64

q) Dismantling and mounting gear selector spindle

Fig. 63 shows the spindle with its components in the sequence of their assembly. The two selector pawls (D) with spring, are mounted in bearing (C). Housing (B) engages over these above it lies pawl locator (A) with return spring. The whole assembly is secured with circlip (F). In case of damage to the spindle, complete replacement assemblies are supplied, but the return spring is also available as a separate part (fig. 63).

Gear change spindle components:

- A) Pawl locator
 - B) Housing
 - C) Spindle
 - D) Pawl
 - E) Return spring
 - F) Circlip
 - G) Spring
 - H) Oval rivet
 - I) Compression spring
 - J) Stop bolt
- (fig. 64).

Clamp the selector spindle by the thread for the setting bell into a vice with soft jaw liners, take off top circlip (fig. 65).

Fig. 65



Fig. 66

Hold the housing cupped in your hands at the bottom, so that as you lift it off you can catch the spring-loaded pawls with the pawl locator (fig. 66).

Fit pawls and pawl spring into their reception on the spindle. Note that the larger side faces of the tapered pawls must face the cylindrical pin in the pawl bearing on the spindle (fig. 67).

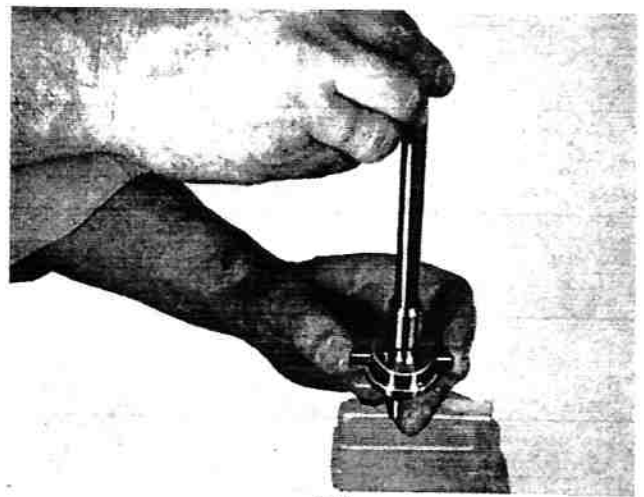


Fig. 67

You can use sleeve SK-A 301 to facilitate assembly. Slide it over the pawls so that it will keep them pressed in (fig. 68).

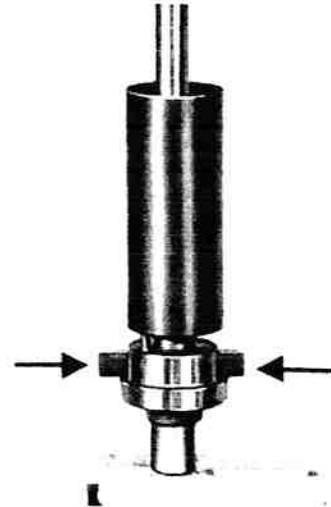


Fig. 68

Fit the housing on the spindle, keeping the pawls pressed in. The housing collar with the inner stop recesses must lie on the same spindle side as the cylindrical pin (fig. 69).

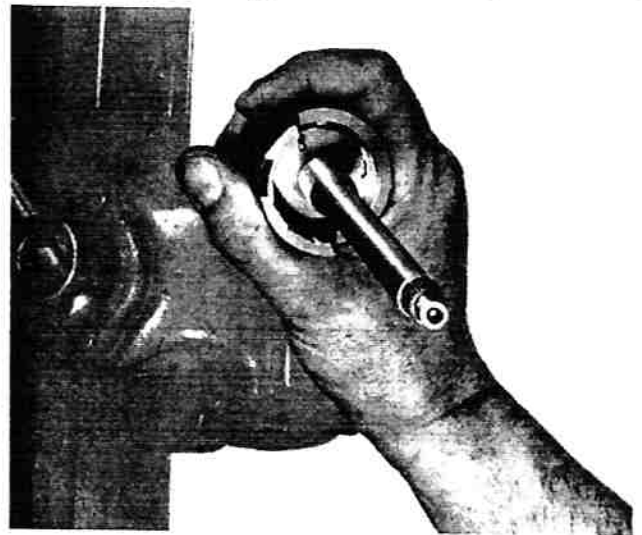


Fig. 69

Fit the return spring fully unloaded into the pawl locator, top spring end into the lower recess, bottom end into the upper recess. It is advisable to ease the ends along with flat pliers, so that they will enter far enough into the recesses. Next turn the spring with screwdriver, pliers or other tool. You can make this easier by using a second screwdriver to press the spring against the pawl locator recesses as you turn it (fig. 70).



Fig. 70

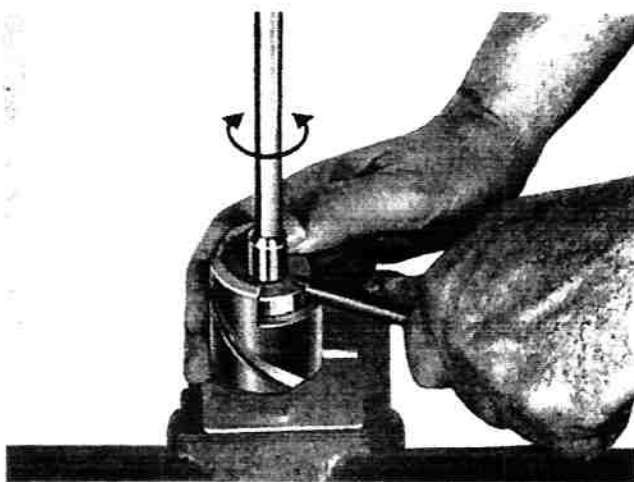


Fig. 71

Mount pawl locator with fitted return spring on the selector spindle, making sure to guide the cylindrical pin in the pawl bearing trough the two return spring ends. With the assembly correctly mounted – and supporting mandrel SK-A 213 fitted into the locator recess – you should be able to move the locator to both sides under spring-loading (fig. 71).

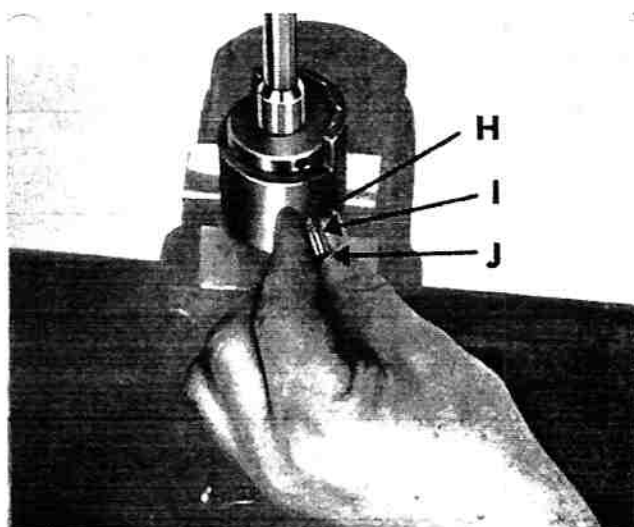


Fig. 72

Fit the circlip into its groove on the spindle, then turn the locator until the bore at the side which takes oval rivet (H), compression spring (I) and stop bolt (J) is exposed. Fit these parts in the sequence listed, then turn the locator until the stop bolt engages in the recesses for the inner housing stop. To mount the spindle, engage 2nd gear (fig. 72).

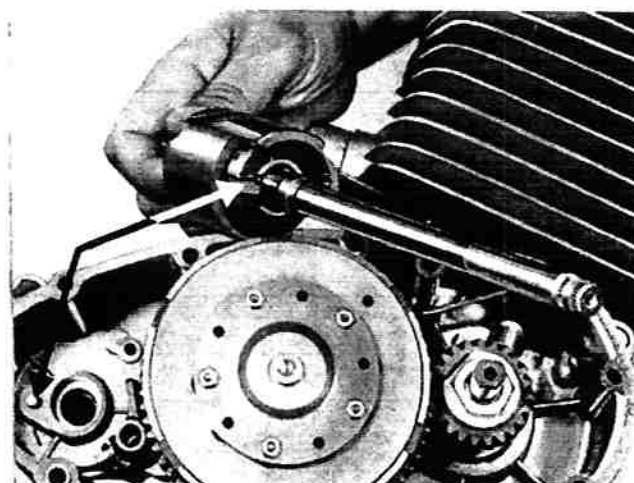


Fig. 73

Fit the selector spindle into its bearing on the kick-starter spindle. Note that the diagonal groove of the selector housing should engage on the mating sliding shoe on the sliding gear and the pawl locator recess over the pin in the right-hand main housing section. Oil all moving parts (fig. 73).

r) Mounting the clutch housing cover

Insert 2 press-fit bushes into the right-hand housing half, fit the gasket, then the clutch housing cover. Fit the 11 housing screws:

3 screws, M 6 x 140 (a)

8 screws, M 6 x 154 (b)

and run them down at a torque of 0.75–0.85 mkg (.965–1.85 lb-ft) (fig. 74).

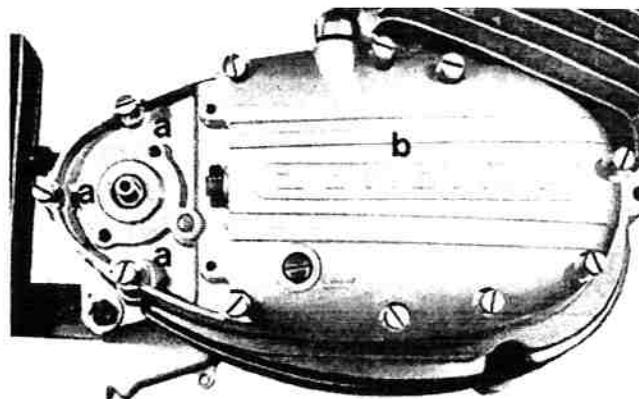


Fig. 74

s) Setting gear selector spindle

The spindle should have a little axial play. Lightly press it to the left (seen in driving direction) against the stop. Screw on the setting bell until it contacts the housing without altering axial spindle location (fig. 75).

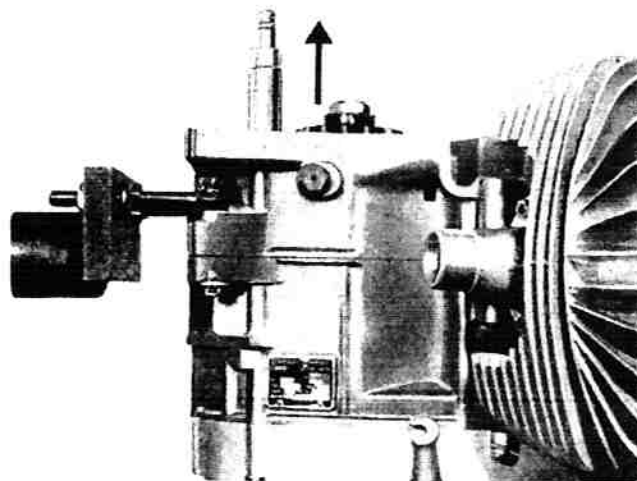


Fig. 75

Pull selector spindle to the right, turn setting bell further against the housing, counting each quarter turn. Then turn back by half the quarter turns counted and secure with the fixing screws to the housing.

Fit cover for clutch and re-setting control (connector cap) and fix with the two oval-head countersunk screws, M 5 x 20 (fig. 76).

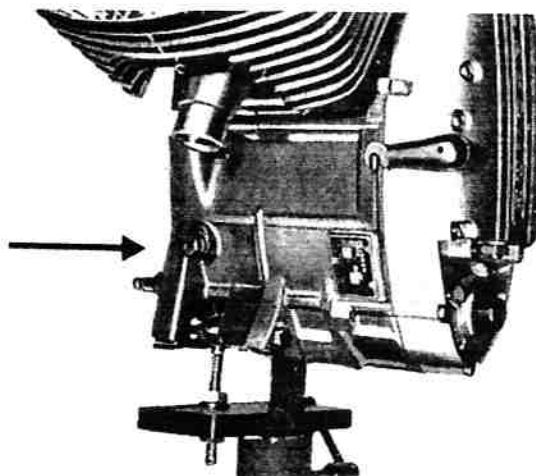


Fig. 76



Fig. 77

t) Mounting the ignition system

Fit baseplate and run down the 3 screws, M 4 x 16, by hand only at first, since they may have to be slackened again for setting. Then slide grommet with cable into the housing reception, fit key into crankshaft keyway and slide on the pole plate.

Caution: Take care not to push the key out of its seat again while you fit the plate. Fit locknut and, holding the pole plate fast with tool SK-A 251, run it down with a socket spanner at a torque of 3.5–4 mkp (25.37–29. lb-ft).

u) Setting ignition timing

Set the contact breaker gap to 0.35–0.45 mm (.014"–.018"). Then find TDC with dial gauge and holder SK-A 315 or similar instrument. Next, turn pole plate back in the opposite sense to engine running direction until piston reaches the specified ignition timing position. Check the setting with a standard tester or inspection lamp. Check setting once again after running down the baseplate fixing screws (fig. 77).

v) Taking off kick-starter spring and collared lever

Take off the circlip, lift cover plate at the stop nose on one side only. Hold the kick-starter lever fast and unload the spring.

Take kick-starter lever with collar and sealing ring away to the bottom, cover with stop away to the top. You can then replace the kick-starter spring (fig. 78).

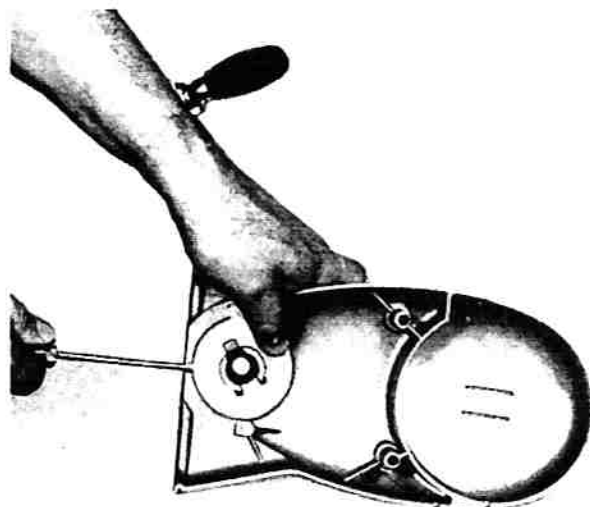
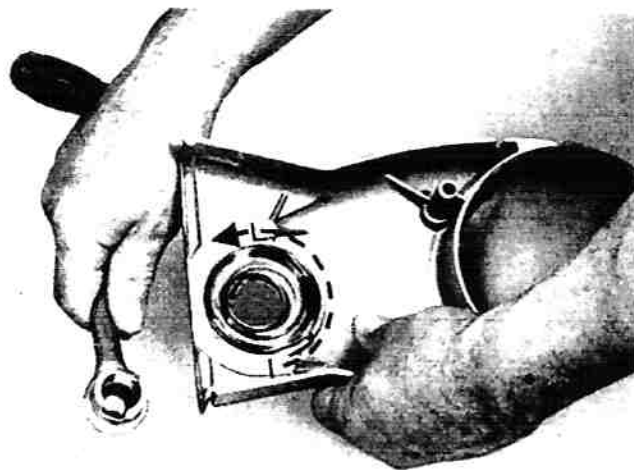


Fig. 78

w) Assembling the kick-starter

With the left housing cover completely taken off, first fit the starter spring so that it can be tensioned anti-clockwise, looking towards the cover inside. Grease the spring well. Next, introduce the cover plate by its small nose into the inner spring loop, fit the kick-starter lever, its collar pointing upwards, from the other side (note checkplate between housing cover and collar) so that it engages on the larger nose. Hold housing cover with one hand, and with the other pre-load the kick-starter lever and spring by about one turn, until the stop nose lies ahead of the upper housing stop. Finally, secure with the circlip (fig. 79).

Fig. 79



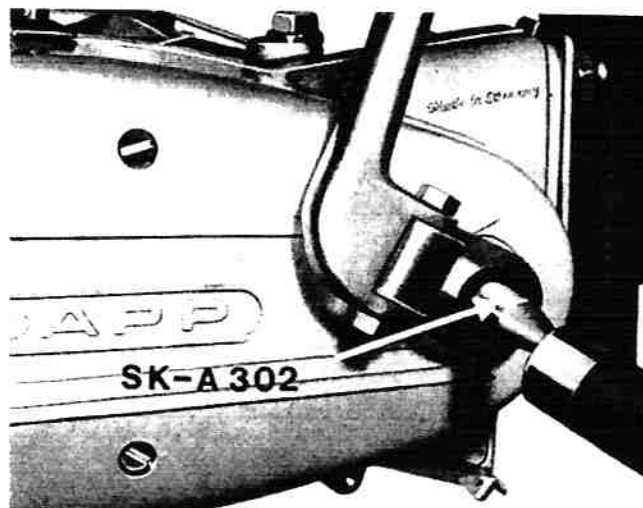
The following jobs can only be carried out once the engine has been fitted back into the frame:

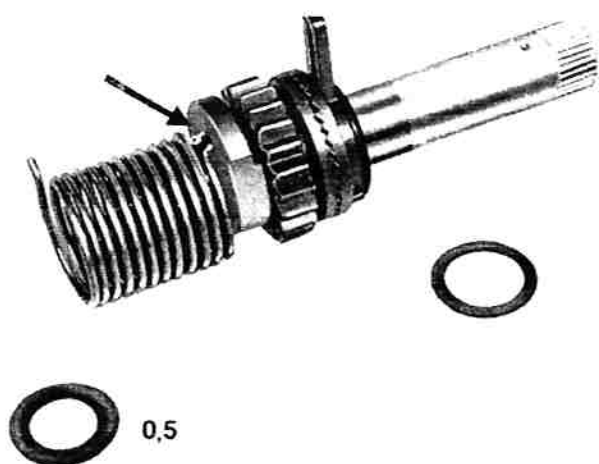
Fit left housing cover and secure with the 2 cylindrical screws.

Fit sealing ring of kick-starter spindle with assembly sleeve SK-A 302.

Fix gear change pedal with its screw (fig. 80).

Fig. 80





x) Fitting kick-starter spring mounted inside

Fit kick-starter spring with the end pointing along the axis engaging in the bore for the stop shoe (fig. 81).

Fig. 81

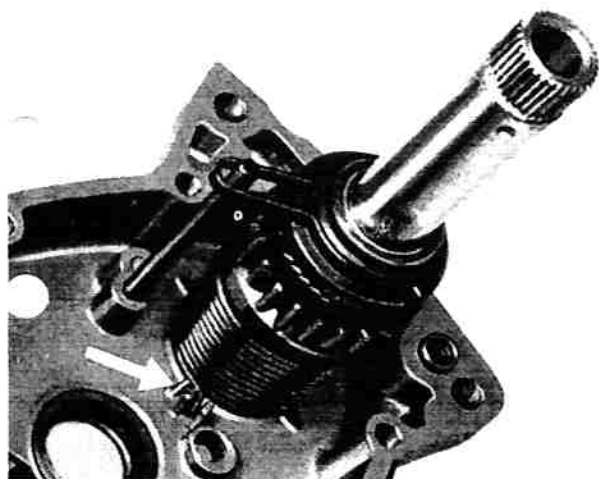


Fig. 82

Fit the 0.5 mm washer on the kick-starter spindle bearing bush into the right-hand housing, then mount spindle in the housing. Make sure that the brake spring engages on the clamping pin on the housing and the curved end of the kick-starter spring lies between the two locating studs on the housing (fig. 82). Then continue the assembly as described from fig. 44 onwards.

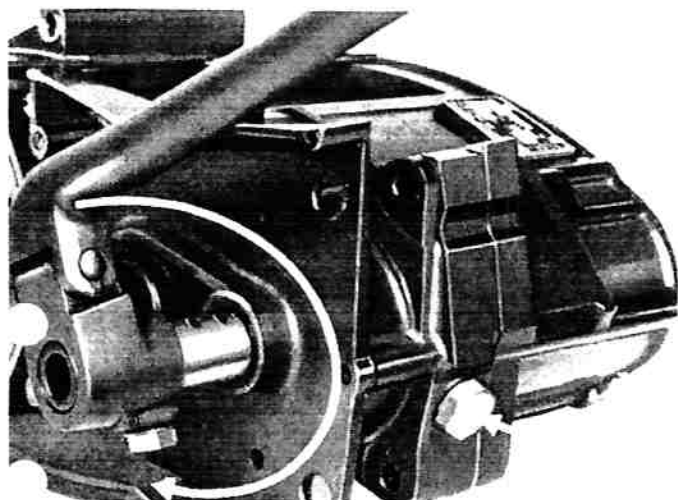


Fig. 83

Having bolted the housing sections together, preload the kick-starter by turning it through a full turn (about 360°) in the operating direction. Then, holding the spindle fast, screw its stop screw in at the rear of the left housing (fig. 83).

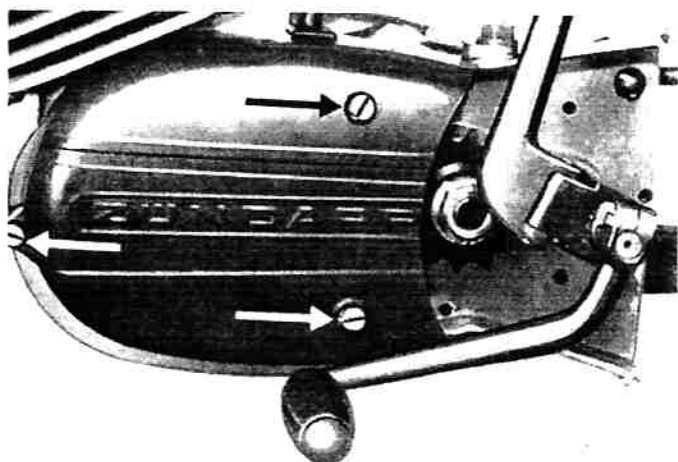


Fig. 84

Fit left housing cover with sealing ring for dynamo and fix with 3 screws:

2 BM 6 x 40

1 AM 6 x 22

at a running-down torque of 0.75 to 0.85 mkg (.965–1.85 lb-ft).

Fit sealing ring to kick-starter spindle with assembly sleeve SK-A 302 (fig. 84).

4. Engine Faults and their Causes

1. Engine will not start

Cause: Fuel tap closed, starting aid on float not operated, clogged jet, carburettor flooded (engine „drowned“), ignition not switched on, defective spark plug, spark too weak, sparking gap of plug too large, plug short circuited by dirt, water or oil.

2. Engine blows back when starting

Cause: Ignition timing too far advanced.

3. Engine starts poorly

Cause: Mixture too lean (press float plunger), idling jet clogged, plug dirty or oily, electrode gap too large or too small (weak spark), water in fuel.

4. Engine starts up, but quickly cuts out again

Cause: Carburettor has emptied because fuel tap was closed.

5. Engine starts, but stops again when accelerating

Cause: Main jet or fuel line clogged, engine still too cold, carburettor badly set.

6. Engine starts, but carburettor 'spits back' when accelerating (engine chatters or sneezes)

Cause: Engine very cold, mixture too lean, jet clogged or too small, carburettor badly adjusted (transition stages poorly set), ignition too much retarded, carburettor draws in air.

7. Engine starts, but runs irregularly and sputters when accelerating

Cause: Mixture too rich (fit smaller jets, alter needle setting on piston), air filter clogged, float runs over, ignition cuts out, plug oily or sooty.

8. Engine runs but misfires (noisy exhaust)

Cause: Ignition cuts out, mixture too lean.

9. Engine knocks or sputters

Cause: Ignition too far advanced, glowing coking deposits or hot spark plug ignite the mixture, main jet too small.

10. Engine performance is poor

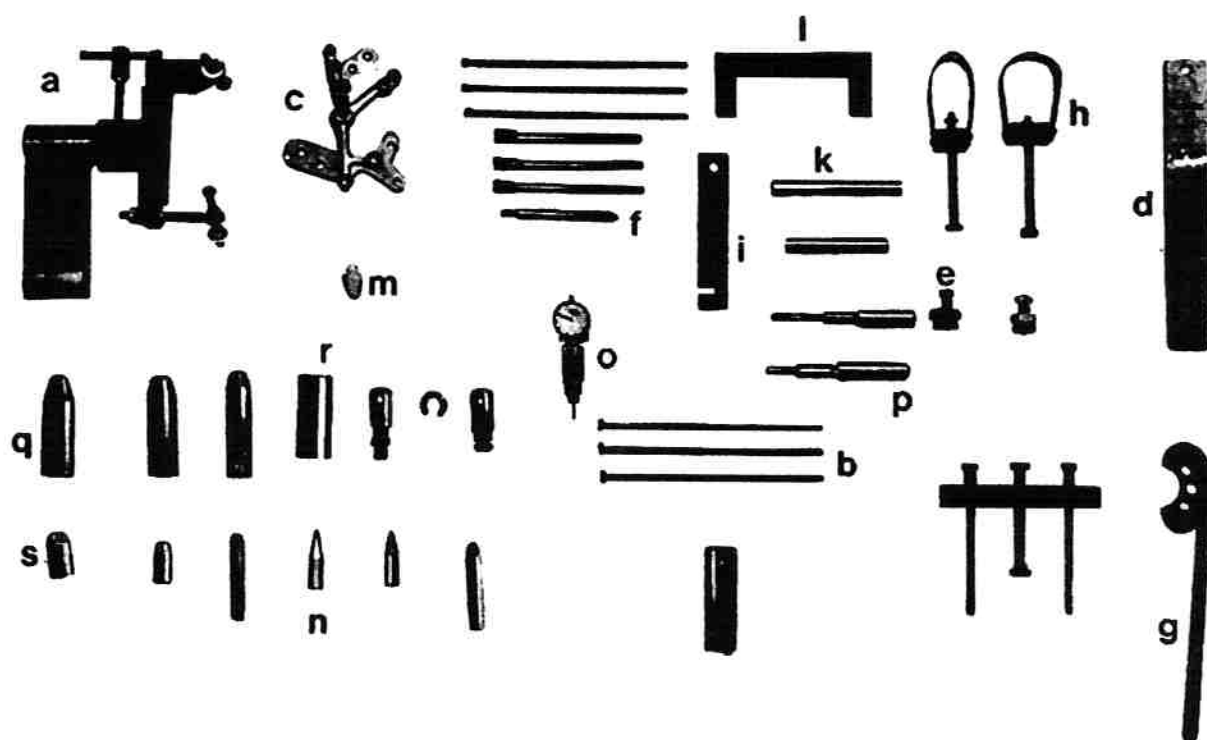
Cause: Mixture is too lean or too rich, ignition too far retarded, exhaust clogged, piston leak, intake or exhaust ports clogged by coking deposits, air filter dirty, brakes drag, friction losses in transmission.

11. Float Housing runs over

Cause: Foreign particle in fuel has lodged on float needle seat, float needle has come off float spring or was wrongly fitted.

5. Special Tools

	Order No.	Description	Uses see Fig. No.
a	SK-A 314	Engine clamping fixture	1-23, 48-80
b	SK-A 326	Clamping studs	13, 61
c	SK-A 235	Housing puller tool	13, 61
d	SK-A 251	Hold-down bar	4, 5
e	SK-A 263	Press-off bolt	5
f	SK-A 213	Supporting stud	71
g	SK-A 279	Hold-down key	14
h	SK-A 268	Gudgeon pin press-off tool	21
i	MV-6-115	Straightening bar	53
k	SK-A 303	Gauging mandrel	52
l	SK-A 206	Gauging frame	41, 42, 57, 58
m	SK-A 300	Centering mandrel	40
n	SK-A 302	Assembly sleeve	80, 84
o	SK-A 315	Dial gauge	77
p	SK-A 275	Inserting mandrel	54
q	MV-6-734	Hollow mandrel/selector spindle	50, 51
r	SK-A 301	Assembly sleeve	68
s	SK-A 217	Assembly sleeve/selector spindle	50, 51



Special tools not listed here are not needed for these engines.

7. Technical Data

Engine: Type	285-13 L0	285-15 L0	286-10 L0
Design	Single-cylinder two-stroke, monobloc with gearbox		
Cubic capacity	123 cc	123 cc	98 cc
Bore	54 mm (2.126")	54 mm (2.126")	48 mm (1.890")
Stroke	54 mm (2.126")	54 mm (2.126")	54 mm (2.126")
Compression	11 : 1	11 : 1	10,5 : 1
Max. output	12.5 DIN (13 SAE) h.p. 7.000 rpm	15 DIN (16 SAE) h.p., 7.500 rpm	10 DIN (10.5 SAE) h.p., 6.800 rpm
Max. torque	1.31 md, 6.500 rpm	1.45 md, 7.400 rpm	1.1 md, 6.500 rpm
Carburettor: Type	Bing 1/24/157	Bing 1/26/	Bing 1/19/35
Main jet	120		98
Needle jet	2,68		2,70
Idling jet	35		45
Idling speed (air control)			
Throttle	2 turns open		2 1/2 turns open
Needle setting	2		3
Electrical System: Type	Bosch flywheel magneto	Bosch flywheel magneto	Bosch flywheel magneto
Ignition coil	external	external	external
Spark plug, heat rating	260	260	260
Electrode gap	0.4 mm (.016")	0.4 mm (.016")	0.4 mm (.016")
Contact breaker gap	0.4 mm (.016")	0.35-0.4 mm (.014"-0.016")	0.4 mm (.016")
Ignition timing			
at TDC	2.2-2.5 mm (.086"-0.098")	2.2-2.5 mm (.086"-0.098")	2.2-2.5 mm (.086"-0.098")
Headlight bulb	6 V, 35 W	6 V, 35 W	6 V, 35 W
Rear light bulb	6 V, 5 W	6 V, 5 W	6 V, 5 W
Brake light bulb	6 V, 18 W	6 V, 18 W	6 V, 5 W
Gearbox			
Design	Steel ball selector gear train	Steel ball selector gear train	Steel ball selector gear train
No. of gears	5	5	5
Gear change	Pedal	Pedal	Pedal
Gearbox oil and capacity	SAE 80, 450 cc	SAE 80, 450 cc	SAE 80, 450 cc
Gearbox transmission ratios			
1st gear	1 : 3.40	1 : 3.40	1 : 3.40
2nd gear	1 : 2.166	1 : 2.166	1 : 2.167
3rd gear	1 : 1.533	1 : 1.533	1 : 1.533
4th gear	1 : 1.263	1 : 1.263	1 : 1.263
5th gear	1 : 1.052	1 : 1.052	1 : 1.053
Clutch	Multi-plate oilbath	Multi-plate oilbath	Multi-plate oilbath
Primary drive	Spur gear	Spur gear	Spur gear
Reduction ratio engine/gearbox	1 : 2.8	1 : 2.8	1 : 2.8
Final drive	1/2 x 5/16"	1/2 x 5/16"	1/2 x 5.2 mm (.203")