



S E R V I C E

In using this manual please note the following points:-

1. Although reference is made throughout to both the „**Standard**“ and the „**Special**“ Max, only the latter is now used in this country.
2. The plates are more easily understood when used in conjunction with an illustrated spare parts catalogue.
3. Unless otherwise stated all nuts and bolts have a **right-hand** thread.
4. The operations described in this manual can only be carried out satisfactorily with the Max **Special Tools** supplied by us. A list of these, together with certain other recommended special tools, not comprised in the actual set, can be found at the end of this book.
5. Only **genuine NSU Spare-Parts** or **Exchange Parts** should be used in carrying out repairs.
6. **Flat Rate Repair Times** are given in order to facilitate the preparation of estimates and invoices and the supervision of work in progress.
7. Index numbers are used to designate individual operations; e.g.:-
or Removal and Replacement of Engine — M 01
 Stripping and Reassembly of Engine — M 02

Taken in conjunction with the use of Flat Rate Repair Times, these index numbers can abbreviate the preparation of orders, instructions, bills, etc.

London, December 1955

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ENGINE

Engine	= Type 251 OSB, unit construction, air-cooled
Cycle	= Four-stroke
Number of cylinders	= 1
Bore	= 69 mm
Stroke	= 66 mm
Capacity	= 247 cc
Compression space	= 38.5 cc
Compression ratio	= 7.4 : 1
Max engine speed	= 7,000 r. p. m.
Output	= 17 h. p.
Compression pressure	= 9.6 atm (141 lb/sq in)
Piston clearance	= marked „KS“ 0.05—0.06 mm (0.0020—0.0024 in) = marked „Mahle“ 0.04—0.05 mm (0.0016—0.0020 in)
Gudgeon pin dia	= 18 mm — 0.005 mm (0.7087 in — 0.0002 in)
Connecting-rod little end dia	= 18 mm + $\begin{matrix} 0.034 \text{ mm} \\ 0.016 \text{ mm} \end{matrix}$ (0.7087 in + $\begin{matrix} 0.00134 \\ 0.00063 \end{matrix}$ in)
Lubrication	= Gear pump (dry sump)
Oil capacity	= 2 litres (3½ pints) SAE 30 in summer SAE 20 in winter, below freezing point SAE 10, if obtainable
Standard fuel consumption	= 3.2 litres/100 km (88.27 m. p. g.)
Valve gear	= Overhead valves mounted in light-alloy cylinder head. Overhead camshaft driven by eccentrics.
Valve timing	= Inlet opens 2° before TDC } Measured with Inlet shuts 20° after BDC } 2 mm Exhaust opens 36° before BDC } (0.08 in) tappet Exhaust shuts 13° before TDC } clearance
Tappet clearance	= Inlet 0.05 mm (0.002 in) } Engine cold Exhaust 0.10 mm (0.004 in) }
Dia. of valve stems	= Inlet 8 mm — 0.040 mm (0.3149 — 0.0016 in) — 0.055 mm (— 0.0022 in) Exhaust 9 mm — 0.045 mm (0.3543 — 0.00177 — 0.060 mm (— 0.00236 in)
Valve guide bores	= Inlet 8 mm + 0.015 mm (0.3149 + 0.0059 in) Exhaust 9 mm + 0.015 mm (0.3543 + 0.0059 in)
Valve spring pressure	= 35 kg (77.2 lb)

CARBURETTOR

Carburettor	= Bing Type AJ 2/26/25, Main jet 105, Slow-running jet 45 Needle jet 2.68 Needle positins: 2 while running in, thereafter 1. Air regulating screw 1½ turns open. Mixing chamber insert 5.
Air cleaner	= Decreases turbulence in the inlet air by passing it through the frame to the wet-air filter.



IGNITION

Ignition timing	= 7.6 mm (0.299 in) before TDC or 36° if adjustment is effected by means of graduated scale, with governor fully open. The lever without the stop is the one by which the timing should be adjusted.
Type of ignition	= Coil ignition
Contact-breaker points gap	= 0.4 — 0.5 mm (0.016 — 0.020 in)
Sparking plug, standard	= Bosch W 240 T 11
Sparking-plug electrode gap	= 0.7 mm (0.028 in) (for Bosch plug)

CLUTCH

Clutch	= Multi-plate dry clutch with rubber shock absorber
Clutch operation	= By hand
Pressure of clutch springs	= about 160 kg (353 lb)
Clutch adjustment	= 5.7 mm (0.224 in) from the top of the nut to the clutch drum.

GEARBOX

Gearbox	= 4-speed unit-construction gearbox
Nature of engagement	= Dogs
Axial play of gearbox shafts	= up to 0.2 mm (0.008 in)
Reduction, engine: gearbox	= 2.583 : 1
Primary drive, engine-gearbox	= Helical gears
Secondary drive, gearbox-rear wheel	= Chain, fully-enclosed

Solo Operation

Gearbox ratios

Bottom gear	3.15 : 1
2nd gear	2.025 : 1
3rd gear	1.406 : 1
Top gear	1 : 1
Reduction gearbox-rear wheel	2.625 : 1

Overall gear ratios

Bottom gear	21.36 : 1
2nd gear	13.73 : 1
3rd gear	9.53 : 1
Top gear	6.78 : 1

Chain sprockets

Gearbox	16 teeth
	15 teeth for cross-country work
Rear wheel	42 teeth
Rear chain,	15.87 mm x 6.48 mm, 106 links
Tyre sizes: front	3.25x19
rear	3.25x19

Sidocar Operation

Gearbox ratios

Bottom gear	3.15 : 1
2nd gear	2.025 : 1
3rd gear	1.406 : 1
Top gear	1 : 1
Reduction, gearbox-rear wheel	3.0 : 1

Overall gear ratios

Bottom gear	24.41 : 1
2nd gear	15.7 : 1
3rd gear	10.89 : 1
Top gear	7.75 : 1

Chain sprockets

Gearbox	14 teeth
	13 teeth for cross-country work
Rear wheel	42 teeth
Rear chain	15.87x6.48 mm, 105 links
Tyre sizes: front	3.25x19
rear	3.5 x19



SERVICE

REPAIR MANUAL

MAX

Technical Data / Page 3

XII. 1955 edition

WHEELS and BRAKES

Wheels	= interchangeable
Tyre pressure, front	= 1.25 atm. (18 1/2 lb/sq in)
Tyre pressure, rear	= 1.5—2.0 atm. (22—29 lb/sq in) depending on load
Trail	= 60 mm (2 3/8 in) (fixed, non-adjustable)
Toe-in of sidecar wheel	= 25—30 mm (1—1 1/4 in) (pointing inwards to front of machine)
Camber of machine	= 15—20 mm (1/2—3/4 in) (leaning outwards)
Camber of sidecar wheel	= 10—15 mm (3/8—1/2 in) (Leaning outwards)
	III. see Instruction Book
Maximum speed (as specified in DIN 70 020)	= about 116 km/hr (72 m.p.h.) carrying two persons sitting upright. about 126 km/hr (79 m.p.h.) carrying one person leaning forward.
Rims	= Well-base rims, 2.15 Bx19
Spokes	= Standard: Front and rear spokes the same. Left-hand 3.5 mm (0.138 in) dia. 210 mm (8.27 in) long. Right-hand 3.5 mm (0.138 in) dia. 169 mm (6.65 in) long. Special: Front and rear spokes the same, but the inner and outer spokes are set at different angles. (From vehicle No. 1 290 150 / 789 958 4 mm — 0.016 in — dia. spokes are fitted).
Leading dimensions	= Standard: Distance from outer
for spoking up wheels	= edge of rim to right-hand hub 11 mm (0.433 in) Special: Left-hand edge of brake drum in line with edge of rim.
Front brake	= Mechanical internal-expanding brake
Rear brake	= Mechanical internal-expanding brake
Brake operation	= Front: Hand lever Rear: Foot pedal.

OTHER DATA

Wheelbase	= 1311 mm (51 5/8 in)
Overall length	= 2051 mm (80 3/4 in)
Maximum width	= 716 mm (28 1/4 in)
Maximum height	= 984 mm (38 3/4 in)
Ground clearance	= 148 mm (5 7/8 in)
Height of saddle	= 780 mm (30 3/4 in)
Frame	= Pressed-steel
Front and rear forks	= Pivoted link sprung forks
Springing, front	= Helical springs, hydraulic shock absorbers
Springing, rear	= Helical springs, hydraulic shock absorbers
Permissible weight of machine	= Standard: about 155 kg (342 lb) = Special: about 165 kg (364 lb)
Permissible all-up weight	= Standard: about 310 kg (683 lb) = Special: about 315 kg (695 lb)
Fuel tank capacity	= Standard: 12 litres (2 5/8 gallons) of which 1.5 litres (2 1/2 pints) is reserve supply = Special: 14 litres (3 1/8 gallons) of which 1.4 litres (2 1/2 pints) is reserve supply

Removing engine from frame and replacing

(M 01)

Special tools required:

none.

1. **Disconnect positive lead from battery**
To prevent short circuit or battery discharging.
2. **Remove foot rests**
Unscrew nut on right-hand side.
3. **Remove silencer and exhaust pipe**
Unscrew bolt and screwed connector.
4. **Remove air filter**
First take off connecting tube and cover plate.
5. **Pull fuel pipe off reserve tap with cup filter**
6. **Dismantle carburettor**
Unscrew carburettor cap, withdraw throttle slide with needle (take care not to damage the parts), and unscrew the clamping ring securing the carburettor.
7. **Drain the oil out of the oil tank**
Disconnect both oil pipes from oil tank.
8. **Disconnect cable for valve lifter from cylinder head**
9. **Remove the support plate**
Unscrew the bolts on the cylinder head and on the frame; take the horn cable out of the clip.
10. Loosen the rear hexagon bolt on the cylinder head. **Note:** This bolt must not be finally removed until the engine is dropped out of the frame, since otherwise it is possible for the engine to tip forward and damage the mudguard.
11. Remove the right-hand crankcase cover. Disconnect the clutch cable from the lever, unscrew the adjuster and nut, and remove the cable.
12. Disconnect the lead from the dynamo (30/51, 15, 61) and pull through the rubber sleeve on the cover.
13. **Remove chain**
Turn until the spring link is on the gearbox sprocket, and undo the spring link. Unhook both ends of the chain from the sprocket and replace the spring link so that the chain cannot drop back into the chaincase. If necessary loosen the bolt on the clip for the chain lubricator, and push down the lubricator.

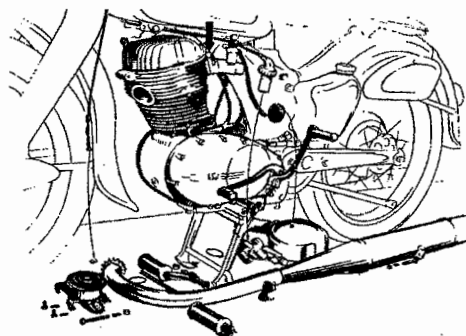


Fig. M 01/1-9

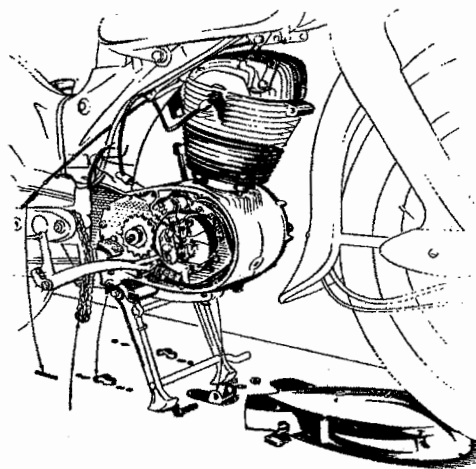


Fig. M 01/10-13

14. **Drop engine out of frame.**
Push the lower section of the chaincase slightly away from the crankcase, remove the engine-attachment links, and withdraw the front lower hexagon bolt. Remove the cover plate, turn the front wheel to the left, wrap the cylinder head in a rag (to avoid scratching the mudguard), hold the engine from the left-hand side of the machine, and after removing the rear hexagon bolt drop the engine out to the left of the frame.

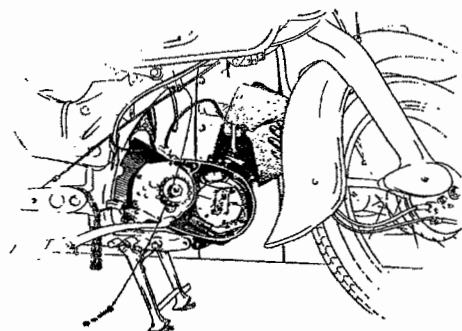


Fig. M 01/14

15. Replace the engine, working in the reverse order. Note: The rear hexagon bolt must not be tightened up until the lower clamps and the front lower hexagon bolt have been tightened up in order to prevent any distortion occurring.

Section 9. Assembly:

The support plate should not be replaced until after the machine has been run and tested on the test bench, after the cylinder-head cover has been replaced and tightened up (see M 02, section 61). If necessary fit the lower cover plate afterwards.

Stripping the engine when it has been removed from the frame

(M 02)

Special tools required:

See sheets „Special tools and additional special tools for Max“.

Note: The engine can also be stripped in a slightly different manner, as follows:

1. Drain oil
2. Remove rocker box cover
3. Strip upper valve gear
4. Remove cylinder head
5. Remove cylinder
6. Remove piston
7. Remove clutch
8. Remove left-hand crankcase cover plate
9. Remove front bearing plate
10. Remove oil pump
11. Strip lower valve gear
12. Withdraw pinion from crankshaft
13. Remove dynamo
14. Remove crankshaft and gears
15. Remove gear changing mechanism
16. Remove the sludge traps and oil pipes
17. Clean and check all parts.

1. Secure engine to assembly stand.
2. Remove ignition lead, sparking plug, and ignition lead adaptor.
3. Remove the rocker box cover and gasket. Turn the engine so that the left side is on top.
4. Remove the kickstarter pedal, the foot-change pedal, and the clutch cover plate.

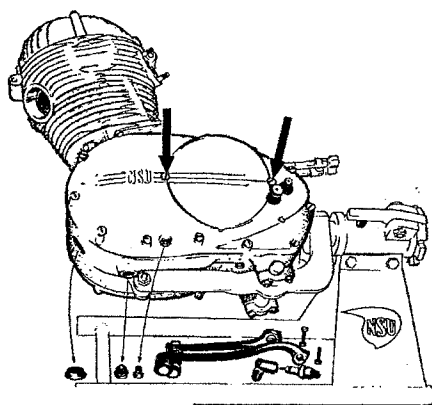


Fig. M 02/1-5

5. Drain off oil.

Remove both the drain plugs and also the plug on the front of the left half of the crankcase to allow air to enter. Stand the engine upright while the oil is being drained off.

6. Remove clutch.

After taking off the clutch cover plate, remove 7 nuts, springs, and spring boxes, the inner housing, the clutch plates, and the thrust rod. Attach the holder (018 103 567) for the clutch back plate, and unscrew the nut from the gear-box shaft. Remove washer and clutch back plate.

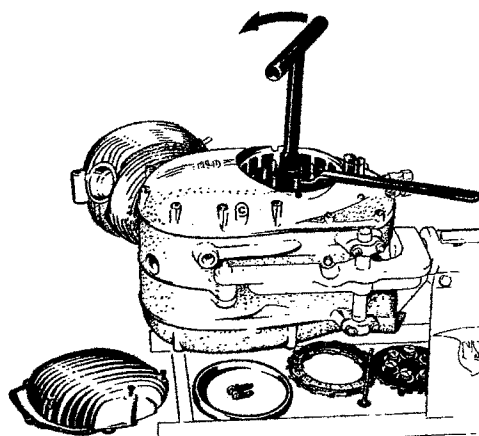


Fig. M 02/6

Screw withdrawing tool (038 103 647) on to the outer clutch housing and remove the housing.

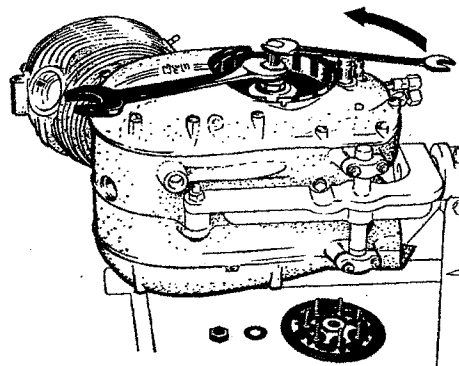


Fig. M 02/6a

7. Remove the left-hand cover plate and gasket. Withdraw the kick-starter spindle complete together with the clutch pinion.

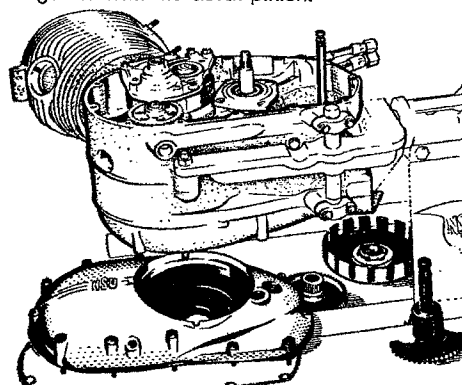


Fig. M 02/7

Turn the engine so that the right side is on top.
Note: Two 5-mm (0.20-in) dia. balls and two thrust rods will drop out.

8. **Remove the automatic timing control.**
To do this the screw must be unscrewed completely.

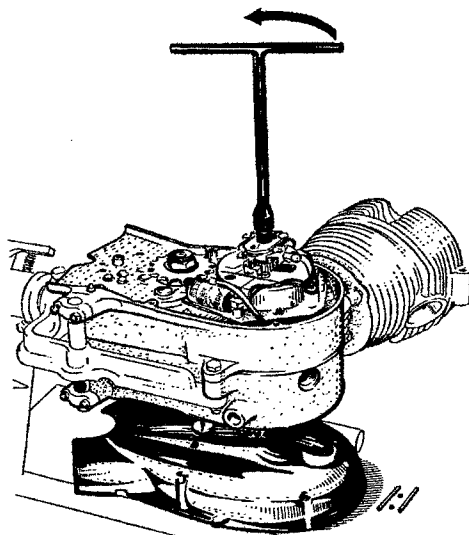


Fig. M 02/8

Push back the dynamo brushes, and hold by means of the spring (to assist reassembly). Remove the bolts in the dynamo housing.

9. **Remove armature.**
Place one of the clutch thrust rods in the armature bore, and screw up the bolt holding the armature. This will force the armature off its shaft. Remove the key.

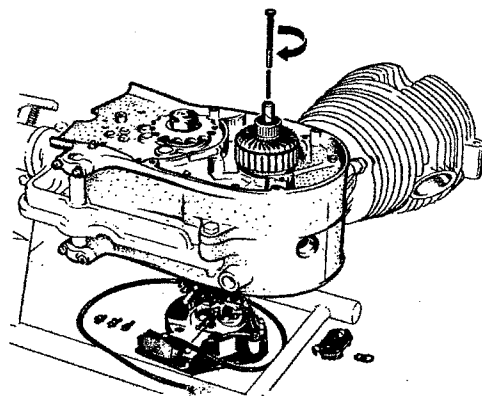


Fig. M 02/9

10. **Remove balance weight.**
Stand the engine upright. Turn the crank until the balance weight points downwards, and loosen the nut on the camshaft spindle. Hold

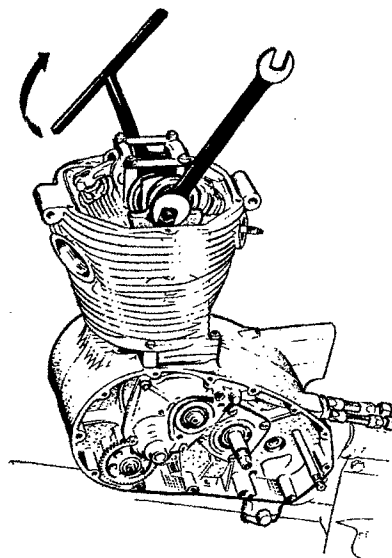


Fig. M 02/10

the nut by means of a 19-mm spanner and turn the spindle by means of a box spanner. Lay the engine sideways, so that the nut and spring washer do not fall into the crankcase when they come clear. Turn the crankshaft until the balance weight points upwards. Remove the balance weight.

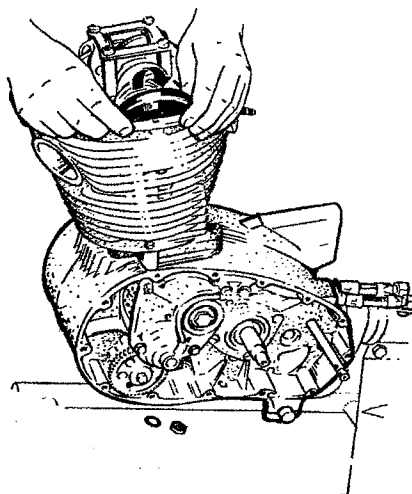


Fig. M 02/10 a

11. **Remove driving pin and camshaft spindle.**
Stand the engine upright, and turn the crankshaft until the two connecting rods for the eccentric drive are on their **top dead centre**. Pull out the driving pin and knock out the camshaft spindle.

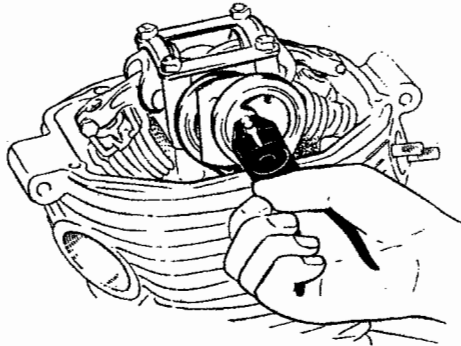


Fig. M 02/11

Press the tie rod away from the camshaft housing, and push it sideways.

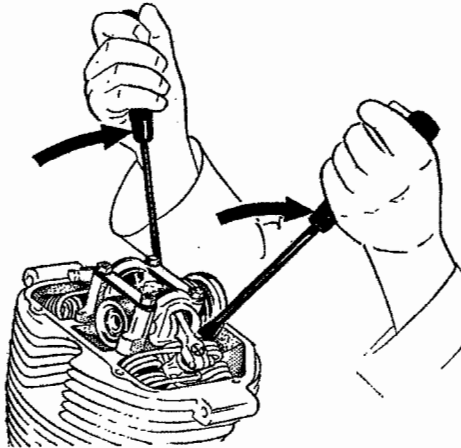


Fig. M 02/11a

12. Remove the camshaft housing

Remove the nuts and lock washers from the bearing brackets, and take off the bearing-bracket straps. Slide two screwdrivers or levers under the rocker arms and force up to remove the camshaft housing.

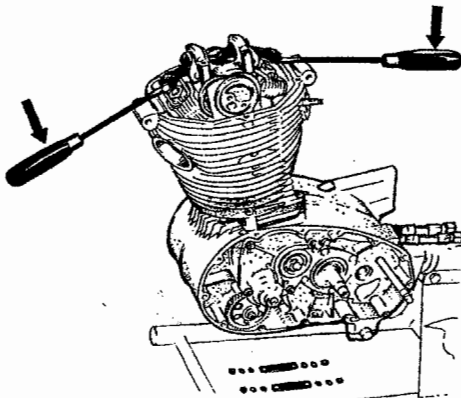


Fig. M 02/12

(Take care not to damage or lose the rubber ring on the bearing bracket (inlet side) or the shims).

13. Remove upper eccentric disc

Mark the front side of the eccentric. Push the tie rod into the groove cast into the cylinder head, press the front connecting rod off the eccentric disc and to the left, and push the rear connecting rod with the upper eccentric disc to the right.

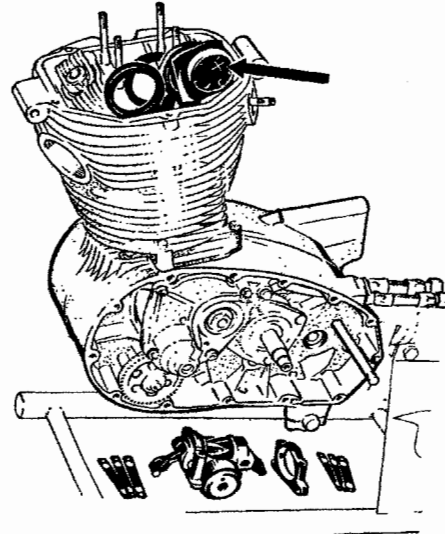


Fig. M 02/13

Turn and withdraw the eccentric disc.

14. Remove cylinder head.

Remove the M 6 nut on the cylinder head, and unscrew four nuts (left-hand thread) on the cylinder flange.

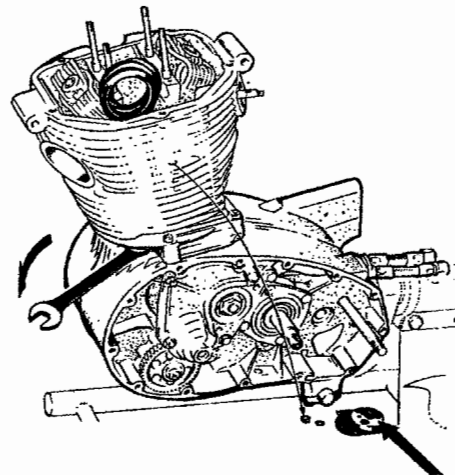


Fig. M 02/14

Remove the cylinder head and gasket.

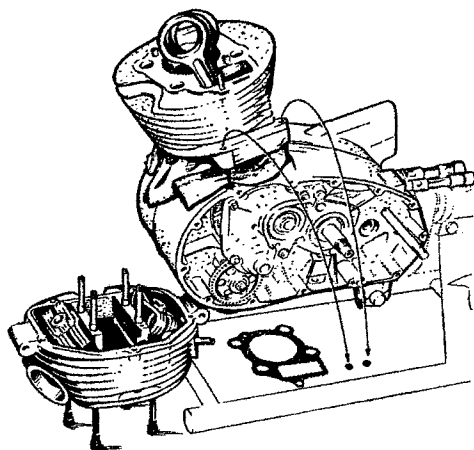


Fig. M 02/14a

15. Remove cylinder.

Unscrew two M 6 nuts on the cylinder flange.
(Cover the crankcase with a rag to keep out dirt).

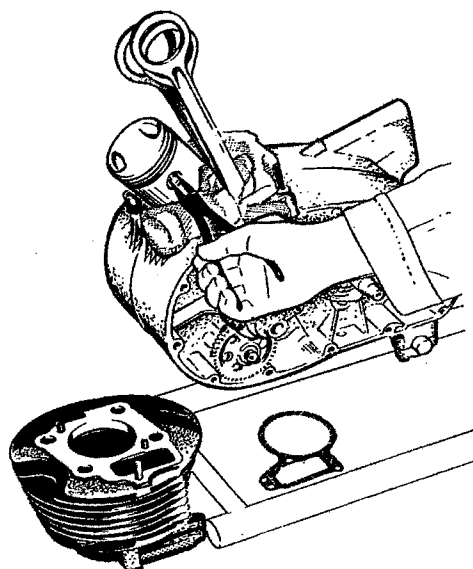


Fig. M 02/15

16. Remove piston.

Remove the circlips. Heat the piston until the gudgeon pin can be pushed out using the gudgeon pin extractor (088 891 908).

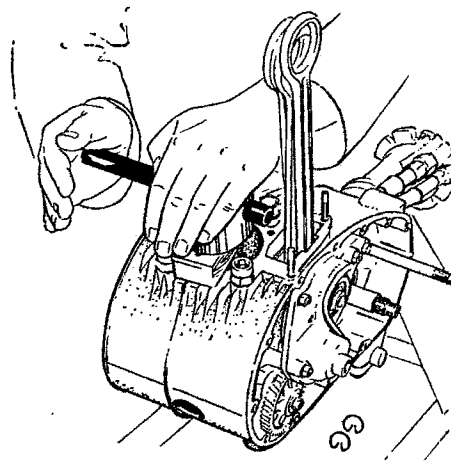


Fig. M 02/16

17. Remove Front Bearing Plate.

Turn the engine so that the left-hand side is on top.

Standard: Unscrew four nuts and one bolt on the bearing plate and one nut and lock washer on the lower eccentric shaft.

Special: Unscrew three nuts and one bolt on the bearing plate and one collar bolt on the lower eccentric shaft.

Support the connecting rod by means of a slotted piece of wood.

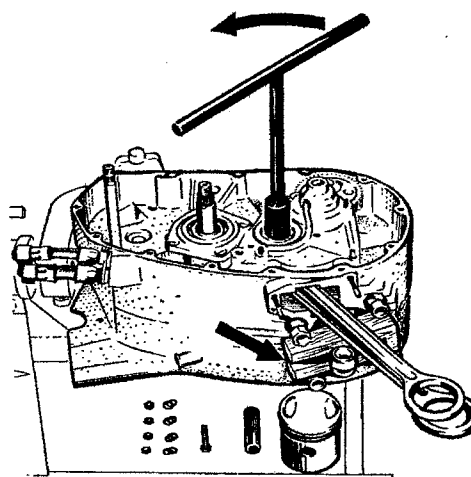


Fig. M 02/17

Attach jig (088 891 900), with the extractor spindle removed to avoid damaging the sealing disc on the bearing plate.

Screw the three M 8 bolts on the fixture up evenly, and the bearing plate will lift off.

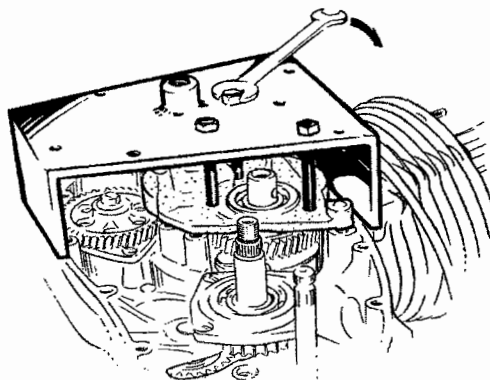


Fig. M 02/17 a

18. Remove Left-Hand Crankshaft Bearing

Remove the nut and lock washer, and remove the ball bearing using withdrawing tool (088 891 917) and spacer bush (088 891 914). Note that there are spacers fitted on the crankshaft under the bearing.

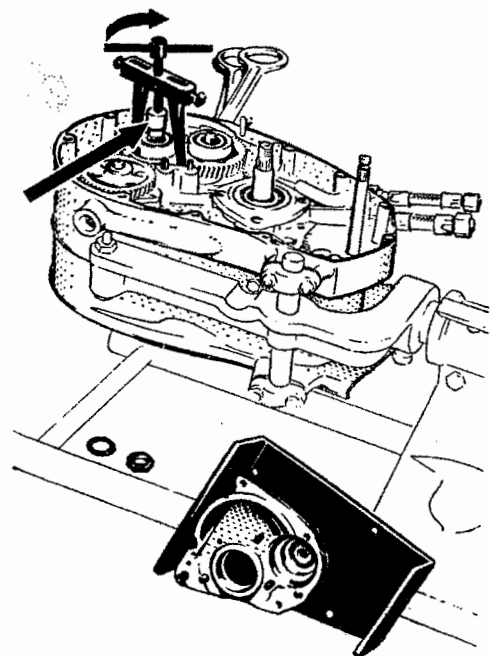


Fig. M 02/18

19. Remove Oil Pump.

Remove the nut for the oil pump, two lock washers, the carrier plate, and the driving pinion. Unscrew three cheese-head screws on the

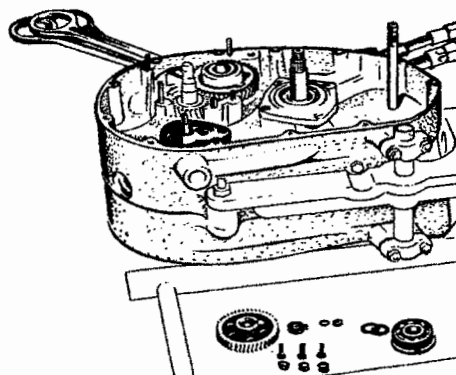


Fig. M 02/19

oil pump, replace the driving pinion, screw the nut on lightly, and then force out the oil pump using two levers or strong screwdrivers.

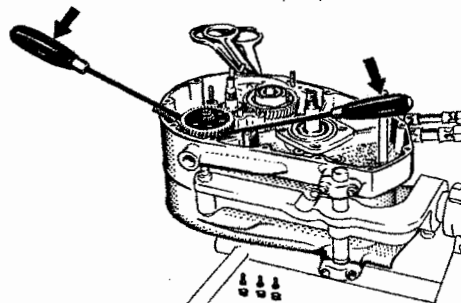


Fig. M 02/19 a

20. Remove lower timing gear

Force off the bearing on the intermediate gear. (There may be shims under the bearing).

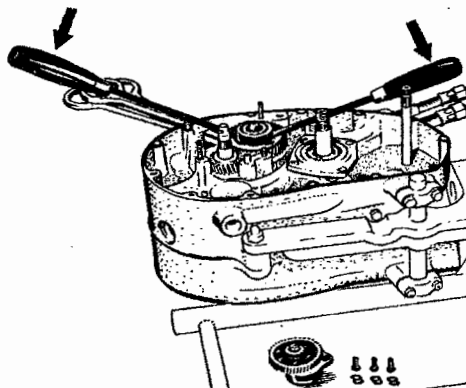


Fig. M 02/20

Remove the intermediate gear with the driving pin, the front eccentric connecting rod, and the lower eccentric complete with the connecting rod attached to it.

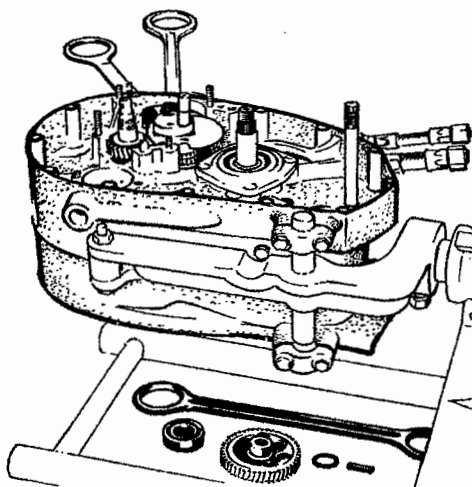


Fig. M 02/20a

The tie rod remains on the bearing bush.

21. Remove driving pinion.

Place the spacer bush (088 891 914) on the left-hand crankshaft stub, and remove the driving pinion with the aid of withdrawing tool (088 891 917).

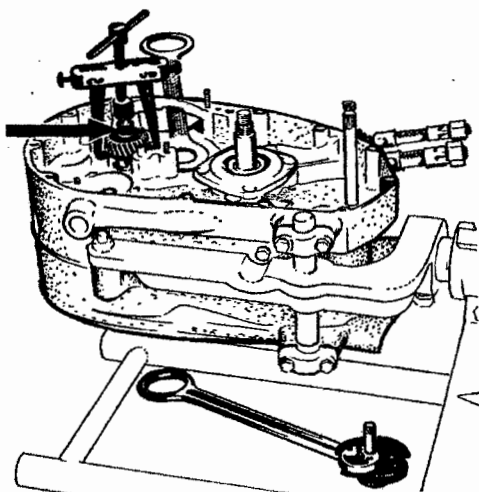


Fig. M 02/21

Turn the crankshaft and remove any burr on the collar of the left-hand crankshaft stub by means of a flat scraper, in order to avoid driving and damaging the bearing bush when removing the crankshaft.

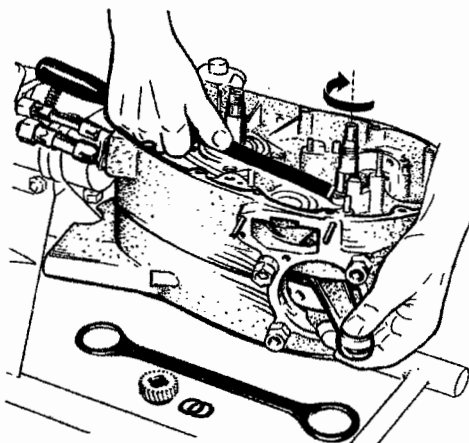


Fig. M 02/21a

22. Checking ball bearings on driving shaft.

Turn the engine so that the right-hand side is on top. Unscrew the nut (with a sealing ring or seal ring pressed in) on the chain sprocket. Hold by means of a length of chain secured to the pin on the assembly stand jig (pin is supplied with the fixture). Turning the driving shaft to and fro will indicate whether the bearing is in good condition.

23. Unscrew sludge traps.

Turn the crankshaft until one of the sludge traps can be seen through the front tapped hole on the left-hand half of the crankcase. Screw in the special screwdriver (038 891 918) and unscrew the sludge traps. An M 6 thread is tapped in the head of the sludge traps so that they can be completely withdrawn using a 6-mm bolt. Remove the second sludge trap in the same way. When the crankshaft is removed from the engine the sludge traps can be unscrewed using a 12-mm (1/2-in) wide screwdriver.

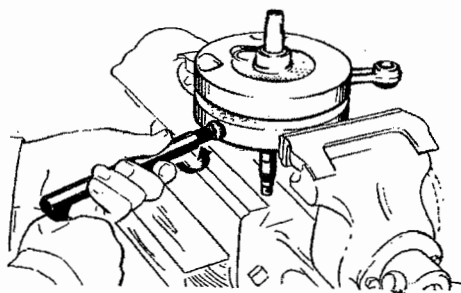


Fig. M 02/23

24. Dismantling Crankcase.

Unscrew four M 6 nuts and five M 7 nuts, each with two lock washers, and three countersunk bolts from the right-hand half of the crankcase. Remove the bolt holding the crankcase to assembly stand fig. Lift off the right-hand crankcase half.

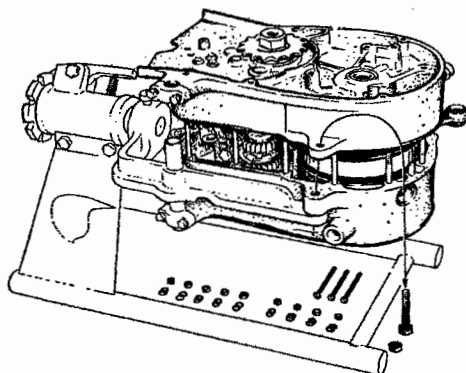


Fig. M 02/24

25. Remove Crankshaft and Gearbox Components.

Remove the crankshaft, if necessary the inner gear change spindle with spring and lever, all gear pinions, the mainshaft, the layshaft, and the complete selector drum. Also the gear pinion for bottom gear on the layshaft, together with its thrust washer, the kickstarter pinion with pawl and spring, the two thrust washers, and the gear-change spindle with the thrust washer.

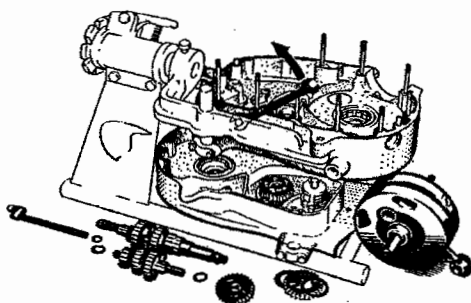


Fig. M 02/25

26. Remove Locking Pin.

Unscrew the hexagonal bolt, retaining spring loaded plunger complete with spring, lock washer, and washers, together with the strip spring for the selector drum.

27. Unscrew both nuts on the clamp for the lower engine mounting, and remove the left-hand crankcase half from the assembly stand fig.

28. Unscrew the cheese-head bolt from the two oil pipes. Remove the oil pipes with seals and rings, and the locking plate.

29. Remove Eccentric Pin and Selector Quadrant

On the right-hand crankcase half unscrew the M 8 nut on the eccentric pin; remove the lock washer, washer, seal, eccentric pin and ratchet plate, and the selector quadrant with the selector lever and the pawl housing. The driving shaft can remain in place provided that it and its ball bearing are in good condition (see section 22 for method of checking ball bearing). Take care not to damage the two needle bearings for the mainshaft.

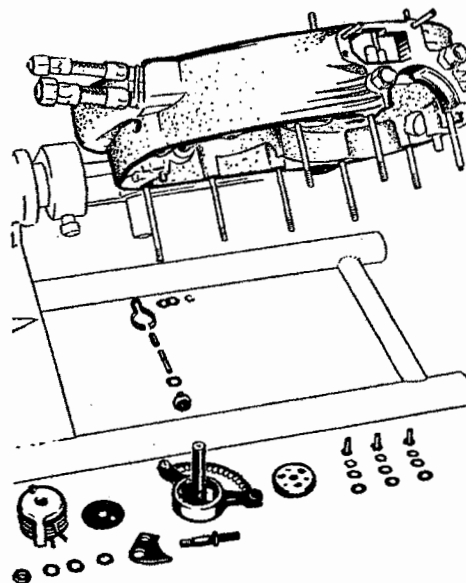


Fig. M 02/28

30. Clean and check all parts.

Assembly of Engine

(M 02)

31. Before fitting roller bearings, heat the crankcase. Then insert the bearing, and when the crankcase has cooled, tap the bearing lightly to make sure it is properly seated.

Note: Place the crankcase on a piece of wood to avoid damaging its surface.

32. Mount the left-hand half of the crankcase in the assembly stand fig, and hold it temporarily by tightening up the two nuts holding the clamp for the lower engine mounting.

33. Stick the crankcase gasket to the left-hand crankcase section with grease. There is no need to check the dimensions of the crankshaft and the crankcase. Since these are manufactured to give an **axial play of 0.3—0.6 mm** (0.012—0.024 in) (see section 45).

34. **Adjust the strip spring for the selector drum**

Place the spring on the crankcase, and pack it up with washers until it cannot be pulled up when it is fitted. Then remove the spring and washers.

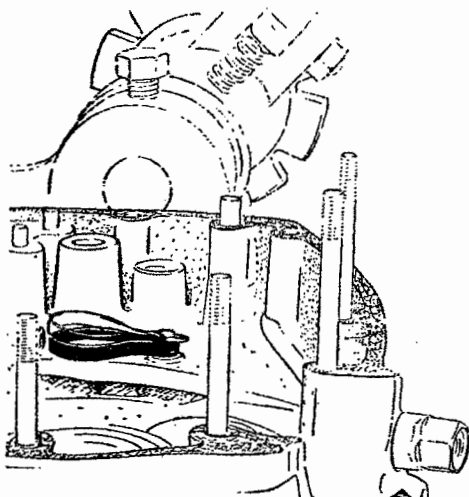


Fig. M 02/34

35. **Fit crankshaft.**

Clean the two plugs and screw them into the left-hand flywheel (see section 23). **Oil all moving parts.** Place the crankshaft in the left-hand crankcase.

36. **Fit the gears**

Place the washer for the kickstarter pinion (082 810 006, 1.2, 1.5, or 1.8 mm thick as required) with its wide bearing surface on the mainshaft ball bearing. Insert the pawl and spring in the kickstarter pinion. Place the complete pinion on its washer in such a way that the **smooth side is downwards**.

37. Grease the washer for the kickstarter pinion (072 710 036, with narrow bearing surface) and stick it to the lower pinion of the complete mainshaft. Push back the starter pawl against the kickstarter pinion with a narrow screwdriver, and carefully insert the mainshaft.

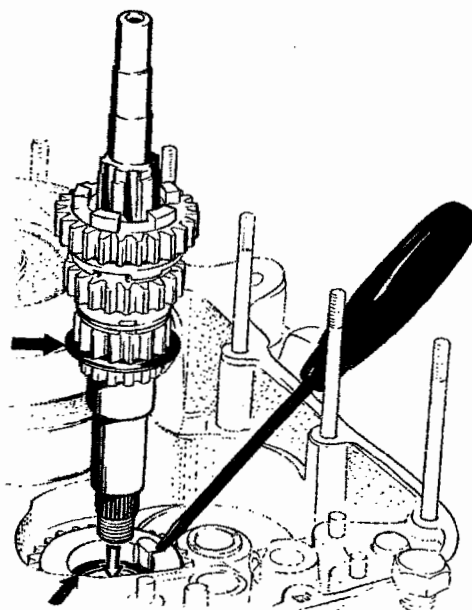


Fig. M 02/37

Hold the kickstarter pinion with the fingers, and turn the mainshaft clockwise. **A clicking sound must be heard.** When the mainshaft is turned anti-clockwise, it must turn the kickstarter pinion.

38. Then place the thrust washer (082 810 012) on the lower bush for the layshaft, and on it place gear pinion (072 710 506) (Bottom gear).

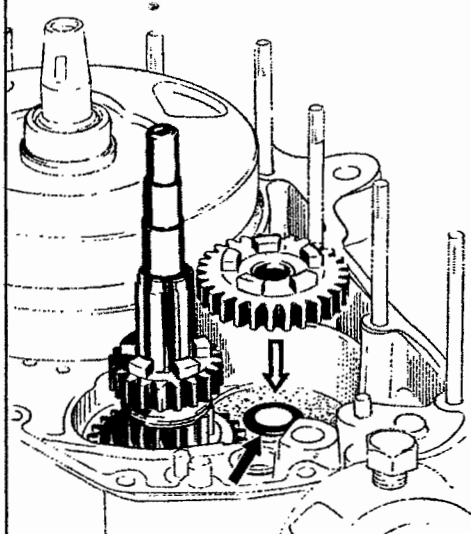


Fig. M 02/38

Place the strip spring on the collar of the selector drum.

Also place the layshaft sliding pinion (recognisable by the groove for the thrust ring) on the lower striker fork so that the **chamfered dogs point upwards**. Place the mainshaft sliding pinion on the upper striker fork so that the **chamfered dogs point downwards**. Now fit the whole assembly so that the sliding pinion on the upper fork slides on the mainshaft and the end of the selector drum enters the bush and the eye of the strip spring. The lower fork with the layshaft pinion remains free.

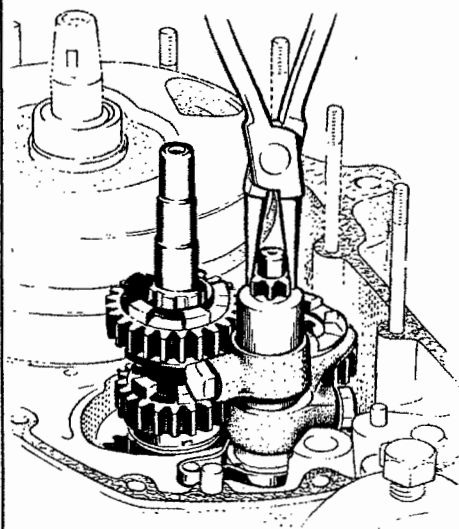
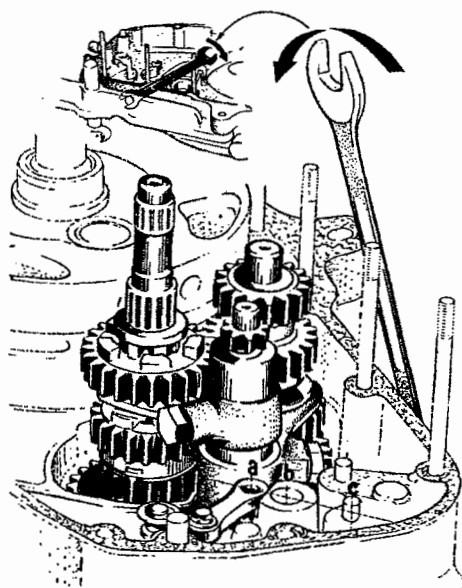


Fig. M 02/38 a

39. Insert the layshaft (long spigot downwards).

Note: Do not displace the thrust washer for the layshaft. Fit the washers for the strip spring and secure with clip. Insert the plunger and spring in its bush. Coat the locking bolt with sealing compound and screw it in. **Engage**

neutral gear: Turn the selector drum to the **right** as far as it will go, at the same time moving the layshaft (Bottom gear). Then turn the selector drum back one notch (neutral) since the right-hand crankcase half can be fitted only when neutral gear is engaged. (See Fig. and sketch). Place pinion (072 710 009) on the layshaft with its dogs pointing towards the sliding pinion. Also place the small pinion (082 810 011) on the layshaft with the higher collar pointing downwards. A thrust washer (082 810 012) must be placed on this pinion, and the ring must be placed on the mainshaft. Finally place the two small needle bearings on the mainshaft and insert the gear-change spindle to which the gear-change link is attached, together with its washer. Place the gear-change link, so that the hole (a) in the link lines up with the hole (b) for the inner gear-change spindle and the 6-mm pin (c).



40. Fit Gear-Change Mechanism.

If it has been removed, re-attach the selector lever to the quadrant. The quadrant should be attached in such a way that the mark "0" stamped on it is visible from above. The pawl housing, with two springs, pawls, and pins, is placed on the selector arm, and the whole is fitted to the selector-drum bearing. Adjust the

pawls (see Fig. M 02/40). Fit the releasing plate and the eccentric pin for the fine adjustment of the gear change mechanism. Attach seal, washer, and lock washer. Lightly tighten up nut.

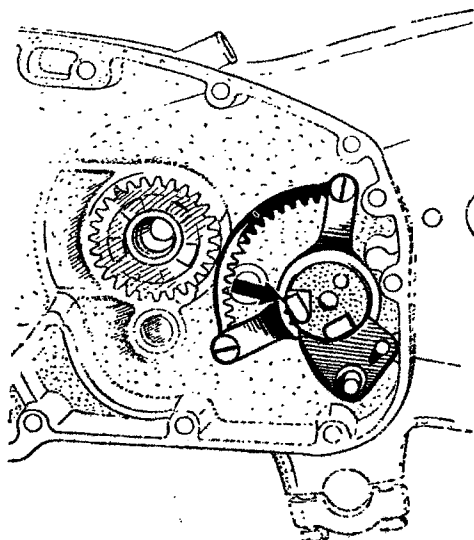


Fig. M 02/40

Then place the washer (072 714 010) on the pawl housing, and insert the inner gear-change spindle (072 714 023).

41. Set Selector Quadrant to Neutral

On the opposite side of the crankcase half remove the M 6x4 hexagon bolt. Adjust the selector quadrant so that the final gap between the teeth lines up with the hole for this bolt when the pawl has disengaged. File the end of an M 6 bolt about 35 mm (1 3/8 in) long to a point, and screw it in (see Fig. M 02/41). The point must reach into the final gap between the teeth at the right-hand end of the quadrant to such an extent that there is about 0.5 mm (0.02 in) play between the end of the bolt and the quadrant.

The mark "0" stamped into the quadrant will then point to the centre of the selector-drum bush (neutral position). Allowing a certain amount of play between the point of the bolt and the quadrant as described above has the advantage that the toothed quadrant and the pinion on the selector drum can then more easily be mated together. Assemble the inner gear-change lever, the sleeve, and the return spring in such a way that the ground ends of the spring bear against the gear-change lever. Then push the assembly onto the inner gear-change spindle so that the ground ends of the spring come to bear against the eccentric pin. When the assembled inner gear-change lever

has been placed on the spindle, press lightly against the lever and at the same time disengage the pawls and turn it slightly clockwise. The gear-change lever will then adopt the correct position with respect to the pawl housing (neutral).

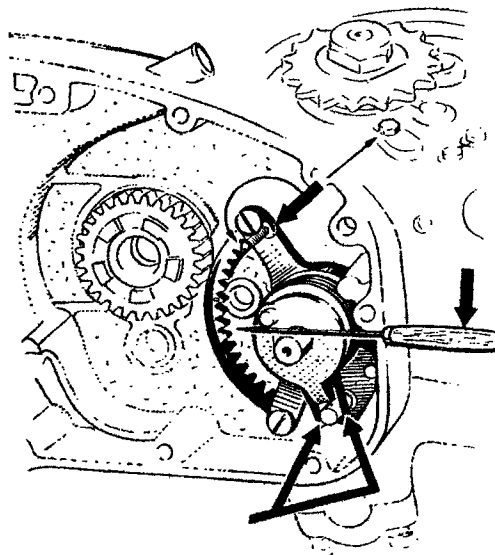


Fig. M 02/41

42. Attach the Right-Hand Crankcase Half.

Grease the mating surface, and place the right-hand half on the left-hand half. Make certain that the spindle on the inner gear-change lever enters the hole in the gear-change link on the gear-change spindle. Leave a gap of about 12 mm (1/2 in) between the two sections of the crankcase, and push the gear-change spindle upwards. Then push down the right-hand crankcase half with one hand, guiding the gear-change spindle with the other hand. If resistance is encountered as the crankcase halves come together, turn the driven shaft slightly. (To bring the teeth into engagement).

43. Check Gear-Change Mechanism.

Tighten up some of the nuts holding the crankcase sections together, and also the nuts and bolts of the assembly stand jig. Replace the pointed bolt by the normal M 6x4 bolt, smearing it with jointing compound before screwing it up. Stand the engine upright.

If the chain sprocket was removed, attach this to the driving shaft. Attach the locking plate and secure with a nut.

44. Check Gear Engagement.

Attach the foot-change pedal temporarily. Engage each gear in turn, and turn the chain sprocket. It must be possible to engage all the gears (rough adjustment). The fine adjustment of the gear-change mechanism (if this is necessary) is effected later.

45. Check Axial Play of Crankshaft.

Press the crankshaft to the left, and measure the distance between the end of the right-hand stub and the crankcase with a depth gauge. Push crankshaft to the right, and again measure this distance. The difference between the two measurements is the axial play. This should not be less than 0.3 mm (0.012 in) or more than 0.6 mm (0.024 in).

If the crankshaft play exceeds 0.6 mm (0.024 in), it will have to be removed from the engine. Place shims under the inner ring of the ball or roller bearing on the **left-hand stub** to bring the value of the play to 0.3 to 0.6 mm (0.012 to 0.024 in).

46. Check Connection Rod Alignment.

Push the inspection pin, (088 891 906) into the little-end bush, and turn the crankshaft until the pin bears against the flange of the crankcase. Check that the pin bears evenly on the flange on either side. If not, line up the connecting rod.

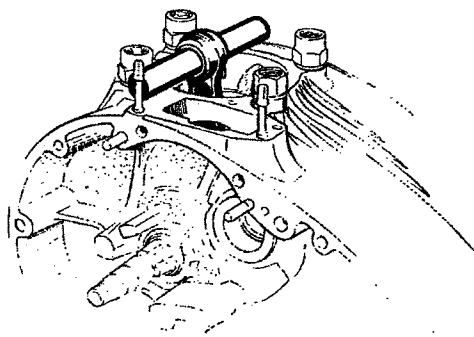


Fig. M 02/46

Screw up and tighten all nuts and bolts. Turn the engine so that the left-hand side is on top.

47. Fitting Pinion on Crankshaft.

Turn the crankshaft so that the crank is at TDC, when the upper of the four feathers on the left-hand stub gives the exact setting. On the pinion a setting mark is stamped directly over one of the splines. When the pinion is placed on the shaft, this spline must mate with the top feather.

There is another mark stamped on the pinion, four teeth to the right of this mark, not counting the tooth immediately over the spline. This is used for setting the intermediate gear.

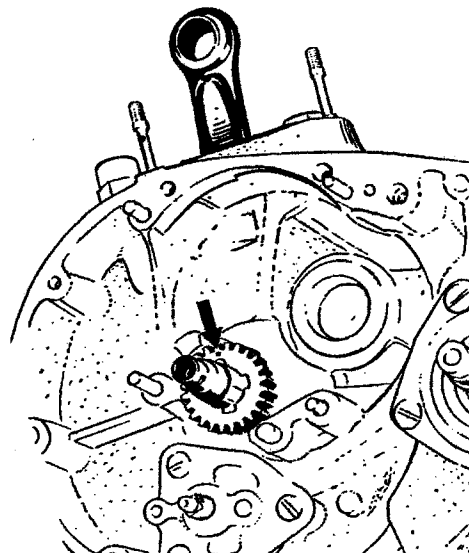


Fig. M 02/47

The pinion is forced on the shaft using the bush (088 891 921) and a nut and spring washer.

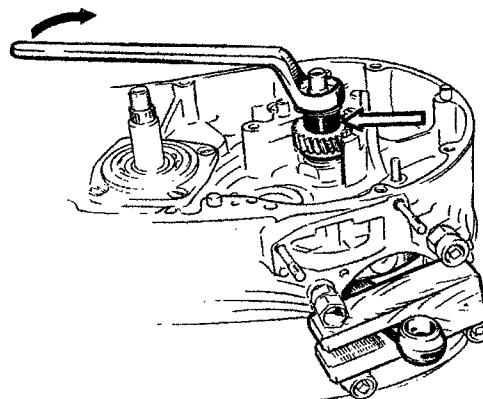


Fig. M 02/47a

48. Centralising the crankshaft and pinion.

Use jig. (088 891 900) to press the crankshaft over to the left, placing a piece of steel or some other suitable packing on the righthand crankshaft stub. Measure the distance between the crankcase and the pinion. To this dimension add **one half the axial play of the crankshaft**. This gives the thickness of the shims which will have to be fitted on final assembly. Since the pinion, the shims, the ball bearing, and the lock washer are screwed tightly together by means of the nut, there will be an axial play



of about 0.15 to 0.30 mm (0.006 to 0.012 in) between the crankshaft and the bearing on either side. Remove jig (088 891 900).

49. Fitting the oil pump.

Place two new rubber rings on the sleeves. Place the complete oil pump in the crankcase and secure with three cheese-head bolts, each with two lock washers. Attach the oil-pump driving pinion, place the carrier plate in position on the spindle, and secure with a nut and two lock washers. If necessary use a slotted piece of wood to support the connecting rod.

50. Fit the lower eccentric shaft.

If the tie rod was removed, replace this with the **chamfered** edge of the hole pointing towards the crankshaft. Fit the lower eccentric shaft complete with eccentric rod and needle bearings in the eccentric shaft bearing bush, and fit the front eccentric rod. **Attach both the eccentric rods with the word "innen"** (Stamped on the rod) **facing the crankshaft.**

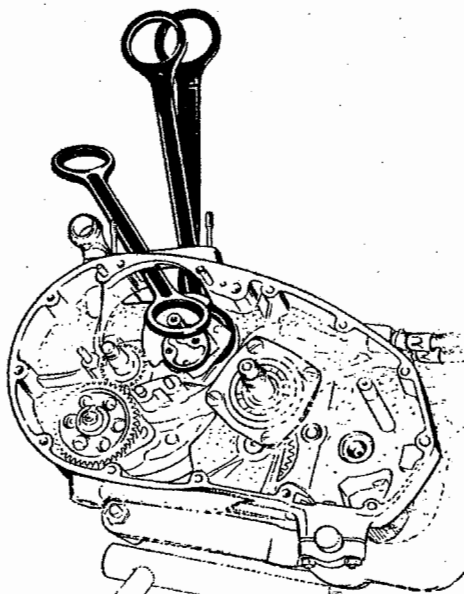


Fig. M 02/50

Fit the intermediate gear (note the setting marks on the 8th and 9th teeth to the left of the hole for the driving pin), and turn the crankshaft until the two holes for the driving pin are in line. Then insert the driving pin.

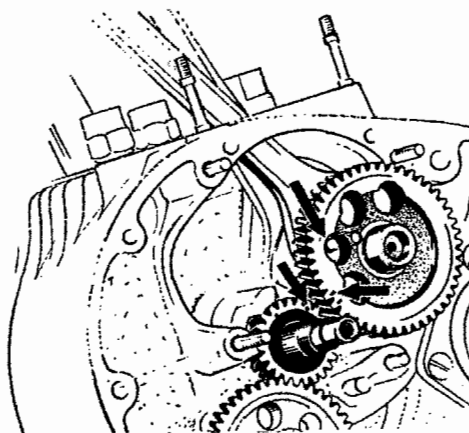


Fig. M 02/50 a

51. Position the intermediate gear.

To do this measure the distance between the crankcase and the collar of the intermediate

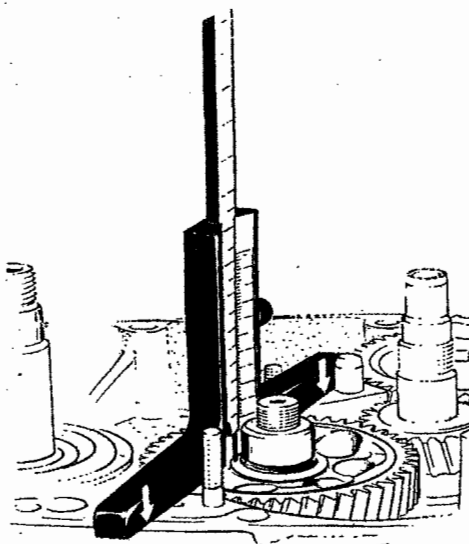


Fig. M 02/51

gear and the distance from the ball bearing in the bearing plate and the mounting flange on the plate. (First tap the bearing lightly to make sure that it is firmly seated).

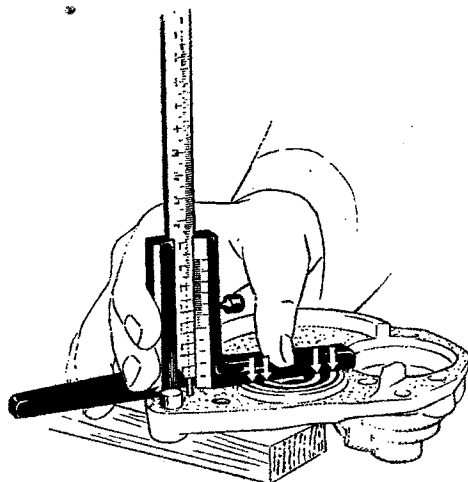


Fig. M 02/51 a

Fit shims so as to reduce the difference between these two readings to about 0.2 mm (0.008 in).

52. Attach bearing plate.

Place spacer washers on the pinion. Place the ball bearing on the left-hand crankshaft stub, fit a lock washer, and tighten up the nut. Use a slotted piece of wood to support the connecting rod. **The lip on the seal ring in the bearing plate must point towards the crankcase.** Hit the bearing plate lightly with a hammer to make sure that it seats properly. Place a lock washer on the eccentric shaft, and tighten up the nut. Turn the engine so that the right-hand side is on top.

53. Fit the electrical installation.

Fit the Woodruff key for the armature, slip the armature on, and attach the casing with the ignition lead. Lightly tighten up three cheese-head bolts, with lock washers and plain washers. Attach the automatic timing control and secure it. Place the dynamo brushes on the commutator. Turn the engine so that it is upright.

54. Fit the piston and cylinder.

Fit a circlip in the piston. Heat the piston, and use the gudgeon pin extractor (088 891 908) to push the gudgeon pin into the piston. The piston is the right way round when the arrow points to the front of the engine. Fit the second circlip, covering the hole for the cylinder in the crankcase while doing so. Push the piston down on to the slotted piece of wood supporting the connecting rod. Stick the cylinder base gasket on the cylinder flange. Carefully compress the piston rings with the special pliers (088 891 901), and slide the cylinder over the piston. Remove the special pliers and the piece of slotted wood. Tighten up the cylinder-head bolts. Both cylinder-head sleeves must be in the top of the cylinder.



Fig. M 02/54

55. Timing Ignition.

Place the piston at TDC. Adjust the gap at the contact-breaker points to 0.4 mm (0.016 in).

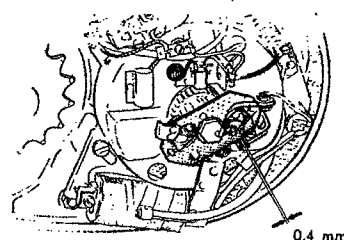


Fig. M 02/55

Time the ignition so that, with the fly-weights fully extended (the weight **without** a stop is the one by which the timing should be adjusted), ignition occurs when the piston is .6 mm before TDC.

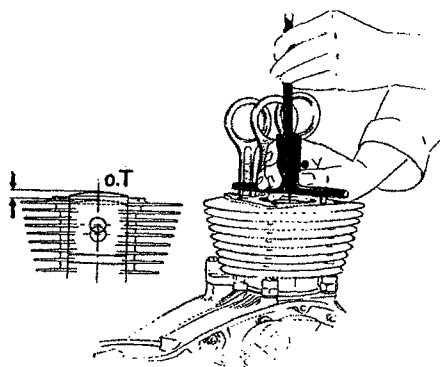


Fig. M 02/55 a

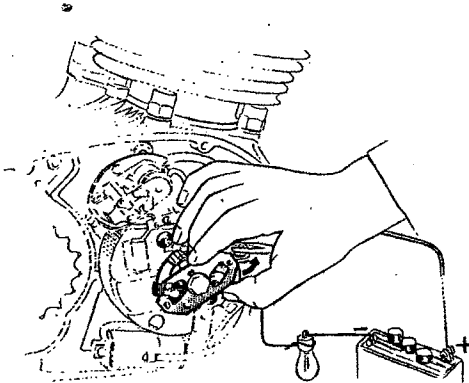


Fig. M 02/55 b

For timing the ignition exactly, use a battery and a bulb which lights up at the point of ignition. Connect the battery and lamp up in the following way: 1 lead containing the lamp from battery + ve terminal to terminal 15 on the dynamo, the other lead from battery — ve terminal to crankcase (earth).

When the crankshaft is turned in the normal direction of rotation of the engine, the lamp will light up at the moment ignition takes place. Note that it is the instant at which the lamp first lights up which is required.

If this test shows that the ignition timing requires adjustment (for it to occur at 7.6 mm before TDC), the dynamo housing will have to be turned. If the ignition is too far advanced, turn the housing in the direction of rotation of the engine, while if the ignition is too far retarded, turn the housing in the opposite direction. Then secure the dynamo.

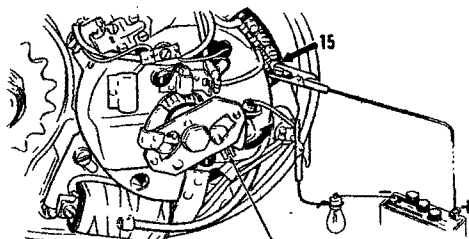


Fig. M 02/55 c

Another method of timing the ignition is to use a piece of very thin fibre-less paper, which is placed between the contacts and which can just be withdrawn without damage at the moment when ignition occurs.

56. Fit the cylinder head.

Apply the cylinder-head gasket. Fit the cylinder head, and then screw up the M 6 nut using washer. Screw up the nut with the double hexagon a couple of turns first, and then tighten up the other three nuts alternately (left-hand thread).

57. Fit Eccentric Drive.

Turn the engine so that both eccentric rods are at TDC.

Thoroughly oil the bushes. Push the tie rod in the groove provided in the cylinder head, and fit the upper eccentric disc in the following manner: Pull the rear eccentric rod to the right and insert the eccentric disc (note the markings). Turn the eccentric disc anti-clockwise, and pull the rear eccentric rod slightly to the left. Continue turning the disc and at the same time push it into the front eccentric rod (do not use force).

58. Attach complete camshaft housing.

Place 0.4 mm (0.016 in) shims on **left and right-hand sides** of cylinder head, taking care that the oil channel in the cylinder head (inlet side) is not covered. Then fit the complete camshaft housing with the two bearing brackets and the rubber sealing ring.

Note! The cams on the camshaft must point downwards. Tilt the camshaft housing with the aid of a lever so that the tie rod can be slipped onto the collar of the bush. Fit and secure the two straps for the bearing brackets. Knock the tie rod right home using a copper or brass punch. Place eccentric assembly over camshaft and insert checking mandril (088 891 907) so that it projects evenly on either side over the machined surface on the cylinder head.

59. Lining up Camshaft Housing.

Measure the distance between the checking mandril and the machined surface on the cylinder head by means of a feeler gauge.

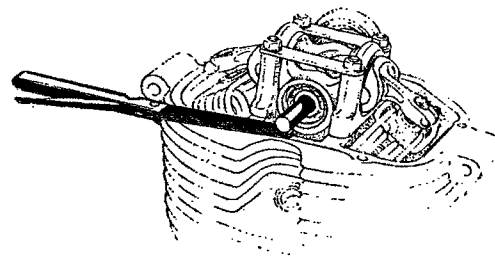


Fig. M 02/59

The distance should be the same on both sides, although that on the sparking-plug side can be up to 0.05 mm (0.002 in) less than the other. If the distance on the sparking-plug side is too large, shims will have to be removed, while if it is too small, extra shims will have to be added, the thickness of the shims amounting to about 1/3 the measured difference. Remove the setting pin and insert the pin for the camshaft from the right-hand side.

60. Attach Balance Weight.

Turn the engine until the holes for the driving pin in the eccentric disc and in the camshaft are in line. Insert the driving pin, and turn the crankshaft until the driving pin is at the bottom. Attach the balance weight, fit a lock washer, screw on the nut, and tighten up from both sides. Tighten up the nut in the manner described in section 10. Turn the crankshaft so that the balance weight is at the bottom.

61. Adjust Tappet Clearance.

Turn the crankshaft so that the piston is at TDC. Both valves must be closed. Adjust the tappet clearance, the valves being **inlet valve 0.05 mm (0.002 in) and exhaust valve 0.10 mm (0.004 in) with the engine cold**. Tighten the pinch bolts. Fit the gasket and cover. (The cover is removed when the engine is fitted in the frame in order to check the oil circulation. Make certain that the balance weight is pointing downwards). Turn the engine so that the left-hand side is on top.

62. Fit the Pinion for the Clutch and the Complete Starter Shaft.

Make certain that the end of the spring is firmly held behind the lower rib in the crankcase.

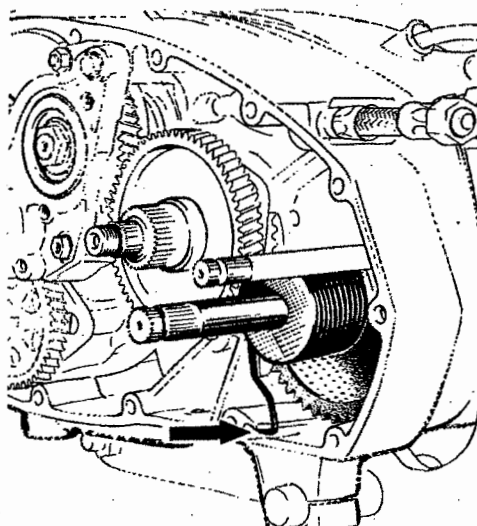


Fig. M 02/62

63. Fit the Left-Hand Crankcase Cover.

Stick on the gasket. Place guide bush (088 891 904) on the clutch pinion. Fit and secure the crankcase cover. Remove the guide bush.

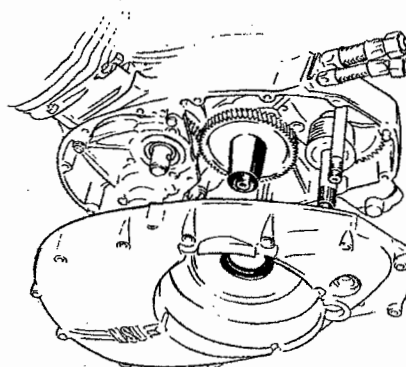


Fig. M 02/63

64. Fit the Clutch.

Place the outer clutch housing and the clutch body on the splined shaft, and secure (use holder 018 103 567). Then insert a lined clutch plate, followed by a steel clutch plate (**the bent tabs must point upwards**). Another lined plate is then inserted followed by a steel plate (without bent tabs). Then insert a lined plate and a steel plate (**with the bent tabs pointing downwards**). Finally insert another lined plate and the clutch trust rod. Insert the inner housing. Fit the spring boxes and springs and screw up the slotted nuts. Using the gauge (088 891 911) screw up the nuts until the distance between the top face of the nut and the inner housing is 5.7 mm. For the fine adjustment of the clutch see section 65.

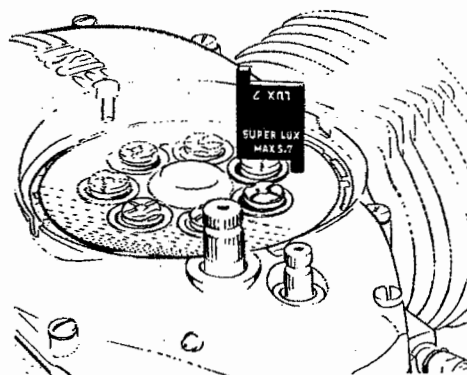


Fig. M 02/64

Screw in the two oil drain plugs and the plug with the magnetic insert. Turn the engine so that it is upright.

65. Checking the Gear-Change Mechanism.

Attach the gear-change pedal to the shaft, and engage the various gears while turning the chain sprocket. When changing up into 2nd and 3rd gear, and when changing down from 4th to 3rd and from 3rd to 2nd gears, it is essential that a distinct click be heard when the gear is engaged and the pedal is allowed to return slowly to its mid position. If the click is not heard the eccentric pin (fine adjustment) on the right-hand side of the crankcase must be turned one way or the other until the clicks are heard in the gears specified above. When the gear-change mechanism is correctly adjusted, tighten the hexagon nut on the eccentric pin by means of the special spanner (048 422 015) using a screwdriver to hold the pin. Remove the foot-change pedal.

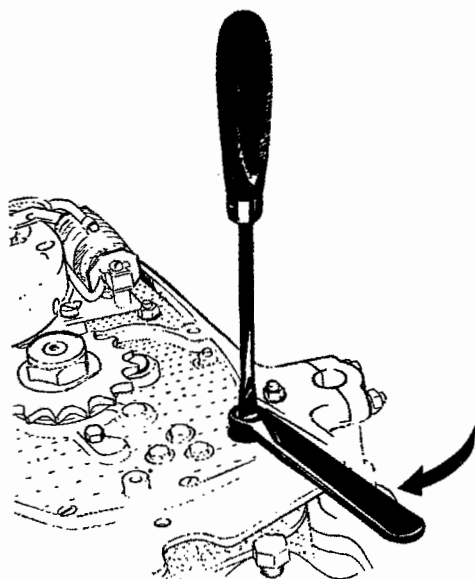


Fig. M 02/65

66. Fit the Right-Hand Crankcase Cover.

Turn the engine so that the right-hand side is on top. Fit two 5-mm dia. balls and the two thrust rods in the gearbox mainshaft in the following order: ball — rod — ball — rod. Attach the cover (first secure a 6-mm dia ball in the thrust spindle with grease), and secure with four bolts. Unscrew the plug on the right-hand cover and remove the thrust bolt and the hexagon nut. The fifth bolt for the cover is screwed into the thrust spindle of the clutch lever until the clutch is lifted about 1.5 to 2 mm (0.06 to 0.08 in). Turn the engine so that it is upright.

67. Checking Clutch Adjustment.

Attach the kickstarter crank. If the clutch rubs when the engine is turned over, the slotted nuts will have to be tightened up or slackened off. When the clutch is properly adjusted remove the bolt in the thrust spindle and screw it into the cover. Screw in the thrust bolt and hexagon nut until the clutch lever has about 1.5 mm (0.06 in) play on the inside. Replace the plug. Remove the kickstarter crank.

68. Fit the Cover for the Clutch and Attach the Gear-Change Pedal and the Kickstarter Crank.

Turn the engine so that the left-hand side is on top. Fit and secure the clutch cover and also the gear-change pedal and the kickstarter crank. (Watch out for the teeth on the starter spindle). The gear-change pedal must be horizontal.

69. Turn the engine upright. Screw in the sparking plug. Attach the ignition lead and plug. Thread the rubber sleeve over the sparking plug. Fit the ring and seal to the oil inlet and outlet connections. Attach both oil pipes (the thicker in the rear hole), and secure with locking plate and bolt.

70. Loosen the clamps and remove the engine from the assembly stand.

Tools Required:

- Normal tools and equipment, and also special tools.
(See sheets "Special tools and additional special tools for Max").

Removing and Fitting Front Wheel (F 01)

1. **Standard:** Remove the three fixing bolts, loosen the hexagon bolt on the left-hand pivoted link, and **unscrew the spindle**. Remove the wheel.

Special: Disconnect the brake cable. Unscrew both pinch bolts on the pivoted links. Unscrew the spindle nut, and **withdraw the spindle**. Remove the wheel, disconnecting the speedometer drive and the brake anchorage. The latter can be left hanging on the forks.

2. Replace in the reverse order.

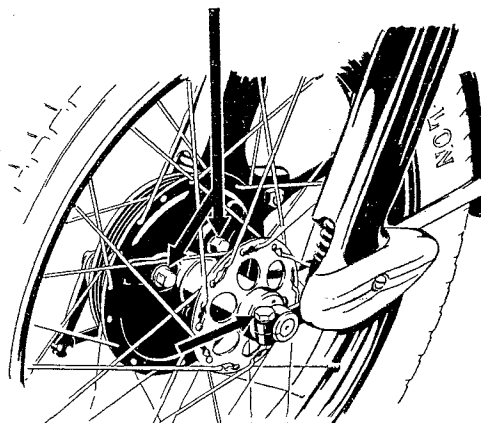


Fig. F 01

Removing and Fitting Rear Wheel (F 02)

1. **Standard:** Unscrew the three fixing bolts. Unscrew the nut on the right-hand end of the spindle. **Unscrew the spindle**. Remove the mudguard and take out the rear wheel.

Special: Disconnect the brake rod. Remove the mudguard. Unscrew the spindle nut and **withdraw the spindle**. Pull the wheel to the left clear of the six driving pins, and take it out to the rear.

2. Replace in the reverse order.

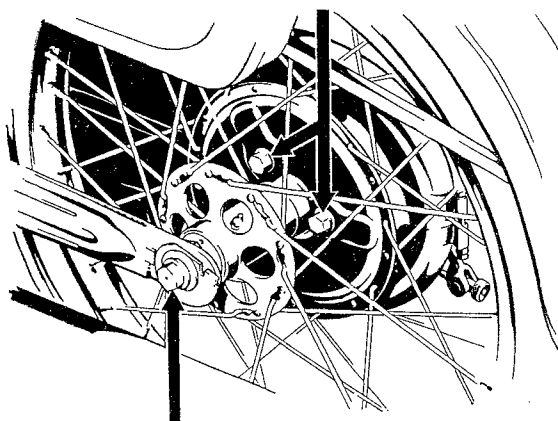


Fig. F 02

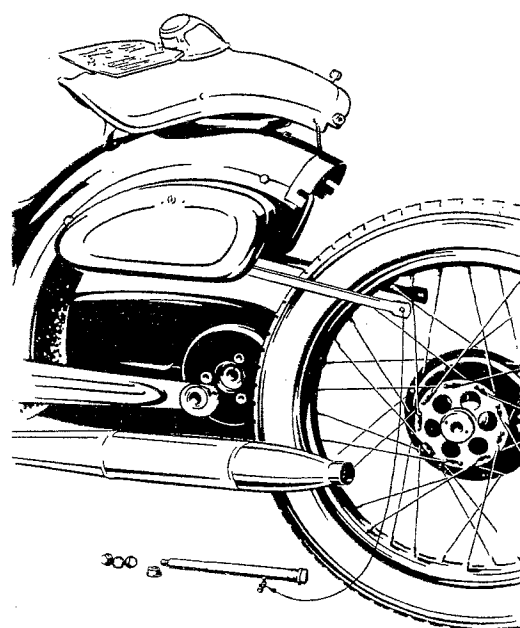


Fig. F 02 a

Ball Bearing and Seal in Hub. Removal and Fitting. (F 03)

1. Remove front or rear wheel from frame.
(see F 01 or F 02).
2. **Standard:** Unscrew the locking on the left-hand side by means of the special key. Use extractor to withdraw bearing.

Special: Knock out the bearing sleeve with a punch and remove the brake plate. Remove the ring for the seal on the right-hand side. Push up the distance tube and knock out the ball bearing, washer, and seal to the left. Remove the circlip and seal on the right-hand side, and knock out the right-hand ball bearing.

3. Replace in the reverse order. (The seal is mounted in carrier ring).

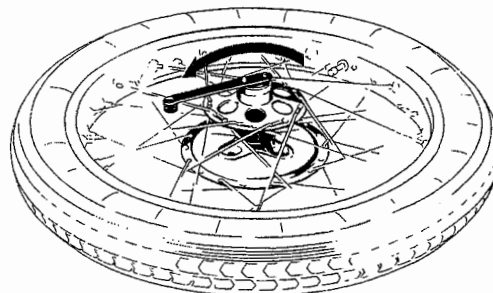


Fig. F 03

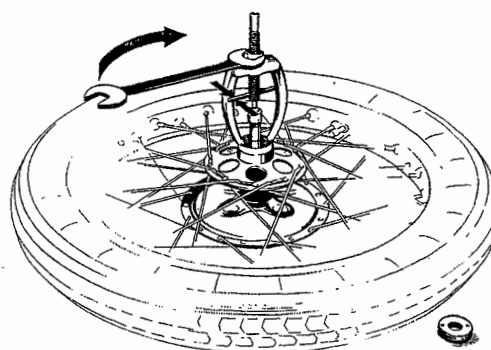


Fig. F 03 a

Front Brake Drum. Removal and Fitting. (F 04)

1. **Special:** No separate operation required
(see F 01).
2. **Standard:** Disconnect the cable from the brake lever. Remove the countersunk screw and the flexible shaft. Remove the brake plate and the brake drum after unscrewing the 3 bolts on the pivoted link.
3. **Standard:** Replace in the reverse order.

Rear Brake Drum. Removal and Fitting. (F 05)

1. **Special:** No separate operation required
(see F 02).
Standard: Remove the rear wheel (see F 02).
Remove the chaincase (see F 64).
Remove the chain (see M 25).
2. **Standard:** Unscrew the three bolts on the right-hand crankcase cover. Disconnect the brake rod from the brake lever. Unscrew the nut on the brake-drum bearing flange and remove the thrust washer the eccentric plate, and the rear thrust washer. Remove the brake drum and brake plate.
3. **Standard:** Replace in the reverse order.

Front Brake Drum. Dismantling and Assembly. (F 06)

1. **Special:** Operation not required (see F 02).
Standard: Remove the front wheel from the frame (see F 01). Remove the front brake drum (see F 04).
2. **Standard:** Remove the circlip and cover on the left-hand side, and knock out the bearing bush using a brass punch. Remove the bearing plate from the brake drum. If it is defective knock out the ball bearing. Push out the seal with a screwdriver.
3. **Standard:** Replace in the reverse order.

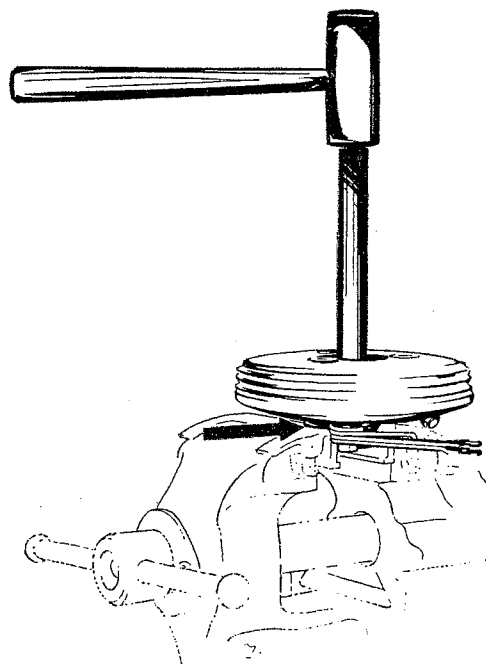


Fig. F 06

Rear Brake Drum and Cush-Drive. Dismantling and Assembly. (F 07)

1. **Standard:** Remove the rear wheel (see F 02).
Remove the rear brake drum (see F 05).
Remove the chaincase (see F 64).
Remove the chain (see M 25).
Special: Remove the rear wheel (see F 02).
Remove the chaincase (see F 64).
Remove the chain (see M 25).
2. **Standard:** Knock out the bearing flange, remove the brake plate, and remove the circlip and the washer underneath it. Knock the bearing flange, the bush, and the shock-absorber rubbers out of the brake drum. Remove the bush.
Special: Remove the nut on the rear-wheel drive, the washer (752 021), the eccentric plate, and washer (852 071). Remove the rear-wheel drive unit from the forks, and hold in a vice by the flat on the bearing bush. Remove the spring clip from the bearing flange and take out the spacer. Remove the rubber shock-absorber elements.
3. Replace in the reverse order. **Lightly** oil the rubber shock-absorber elements to make them easier to assemble.

Renew Brake Linings. Dismantle and Assemble Brake Shoes. (F 08)

1. **Standard:** Remove the front wheel (see F 01).
Remove the front brake drum (see F 04).
or:
Remove the rear wheel (see F 02).
Remove the rear brake drum (see F 05).
Remove the chaincase (see F 64).
Remove the chain (see M 25).
Special: Remove the front wheel (see F 01).
or:
Remove the rear wheel (see F 02).
2. **Special:** Remove the locking ring and washer on the bearing pin.
3. Tilt up one brake shoe with a screwdriver. The springs and brake shoes will then fall clear. Cut off the rivet heads on the inside of the brake shoes with a chisel. Then knock out the rivets with a punch and remove the brake linings.
4. When riveting on the new linings insert and clench over the central rivets first, and work outwards, in order to make certain that the linings are a good fit over the whole of the brake shoe. Attach both springs to the brake shoes, and fit the shoes in place.

Speedometer Drive. Removal and Fitting. (F 09)

1. **Standard:** Remove the front wheel (see F 01).
Remove the front brake drum (see F 04).
Special: Remove the front wheel (see F 01).
2. **Standard:** After removing the stud pull the worm wheel out of the brake plate with a pair of pliers. Remove the bearing and force the large worm wheel out of the brake drum.
- Special:** Unscrew the stud in the speedometer casing and withdraw the speedometer driving worm.
3. Replace in the reverse order.

Front Forks. Removal and Fitting. (F 20)

1. Remove the front wheel (see F 01).
2. Open the headlamp and unscrew both hexagon nuts. Remove the flexible shaft. Remove the headlamp and allow it to hang on one side (place a piece of cloth under it). Turn the forks to the left. Unscrew the damper knob. Remove the spring, the two spring washers, and the cap. Unscrew the two hexagon nuts (36 mm across flats) and remove the nut and bolt, the two lock washers, and the distance sleeve from the anchoring element on the front of the petrol tank. Remove the tab washer, the two friction discs, the anchor plate, and the handlebar support complete with handlebars. Allow the handlebars to hang down to one side (place a piece of cloth under them). Remove the lock washer. Unscrew the aligning nut using tool (048 422 003) and extension ring (078 791 902). Remove the top race, turn the forks **straight ahead**, and withdraw them downwards.

Note: Be careful of the ball bearings which will fall out! (19 1/4-in balls in both the upper and the lower set).

3. **Fitting:** Attach the ball bearings to the top and bottom races with grease, and push the forks gently into place from underneath. As soon as they are in position turn them to the left so that they cannot slip out again. The remainder of the assembly process is performed in a similar manner, but in the reverse order, to the stripping. Tighten up the aligning nut until there is no play in the forks, but they are able to turn freely.

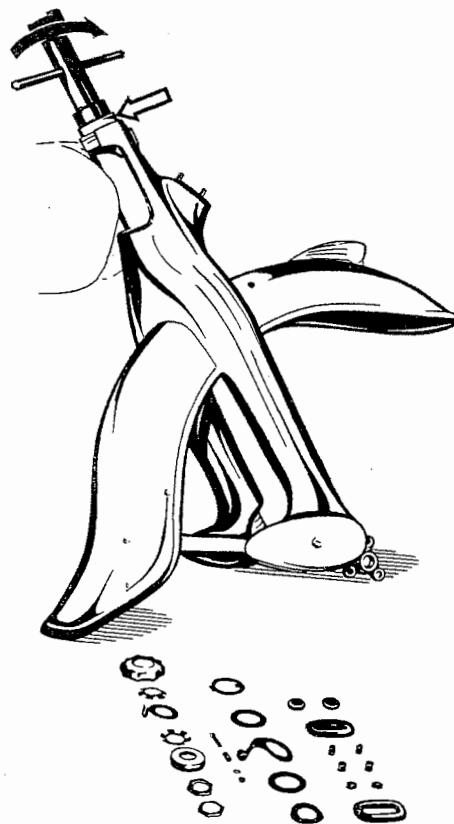


Fig. F 20

Steering-Head Bearings, Races, and Balls. Removal and Fitting. (F 21)

1. Remove the front wheel (see F 01).
Remove the forks (see F 20).
2. Knock out the lower bearing race through the two holes provided in the forks; use a 5-mm dia. punch, and hit up from underneath. Two holes are also provided at top and bottom of the steering head on the frame for knocking out the ball-bearing races.

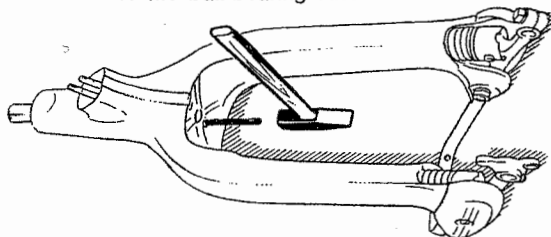


Fig. F 21

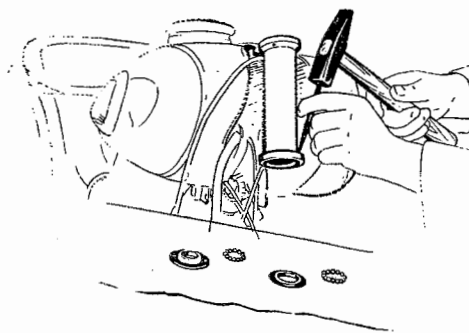


Fig. F 21 a

Front Springs. Removal and Fitting. (F 22)

1. Remove front wheel (see F 01).
Remove front brake drum (see F 04).
2. Remove covers (one countersunk screw each). Remove circlip on the inside of the bearing pin. Push the pivoted link up slightly, and knock out the bearing pin. The pivoted link can then be swung round to the rear. Unscrew the complete spring assembly using special spanner (078 791 901).
3. Assemble in the reverse order. (On older machines note that the larger cutout in the cover goes to the rear). The bearing pins must be thoroughly oiled.

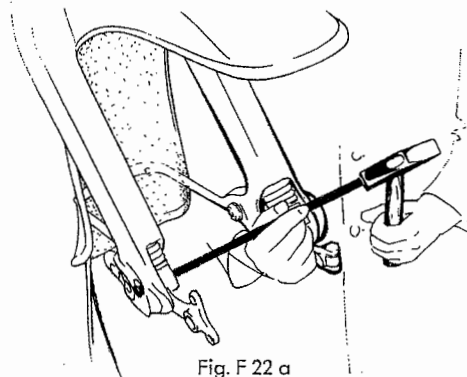


Fig. F 22 a

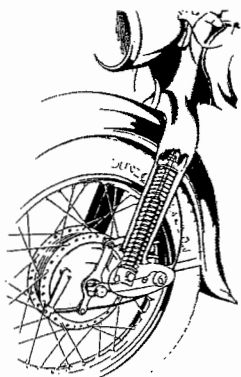


Fig. F 22

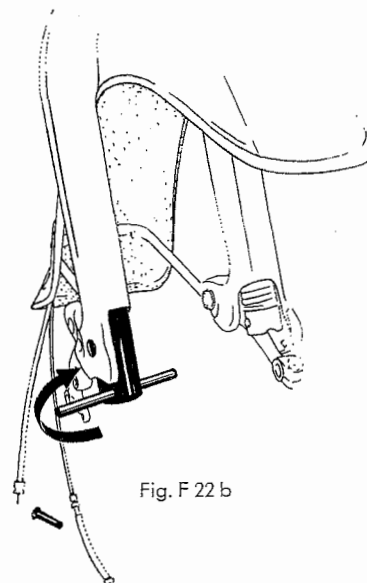


Fig. F 22 b

Telescopic Shock Absorbers. Removal and Fitting. (F 23)

1. Remove the front wheel (see F 01).
Remove the front brake drum (see F 04).
Remove the front forks (see F 22).
2. Loosen the threads by means of a number of blows.
Standard: Hold the spring in a vice. Unscrew the two M 8 nuts on the shock absorber and the upper spring retainer, and screw the upper spring retainer out of the spring with the aid of special key (078 791 901). Remove the shock absorber. When changing the front springs both the upper and the lower spring retainers must be removed.
3. Replace in the reverse order.

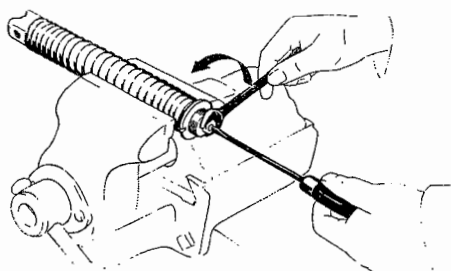


Fig. F 23

Special: Stripping and assembling pre-stressed spring and shock absorber. From vehicle No. 1 288 521 / 788 809.

1. Remove spring and shock absorber, using special key (078 791 901). Place complete assembly in fixture (088 891 922), and tighten nut slightly. Hold the shock-absorber tie rod with a screwdriver and unscrew both nuts. Unscrew the nut on the jig and remove the spring retainer, the cover, the sleeve, the two rubber washers, and the spring.
2. Assembly: Place the shock absorber in the fixture. Pull the tie rod completely out. Attach the sleeve, one rubber washer, and the knurled nut, and press together with the jig until the sleeve projects from the spring retainer. Fit the rubber washer and the covers and secure with both nuts.

To tighten up the lower nut and to hold it while tightening up the lock nut, it is advisable to use a special spanner. This can be made up in any workshop out of an ordinary 14-mm 12-sided ring spanner, the thickness being reduced to 4 mm (0.16 in) and the outside of the ring section being reduced if necessary to ensure that the spanner does not extend beyond the nut when it is tightened up and does not bind against the edge of the knurled nut.

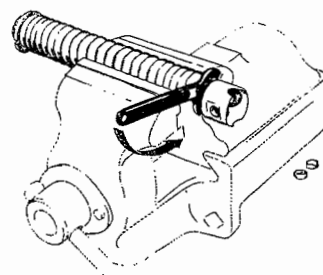


Fig. F 23 a

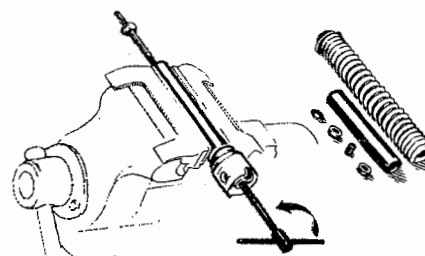


Fig. F 23 b

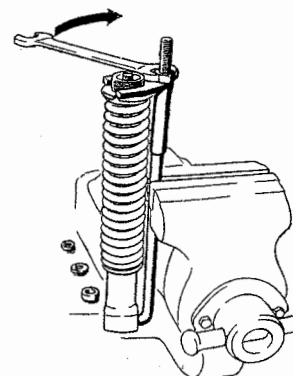


Fig. F 23 c

Pivoted Links (Left-Hand and Right-Hand). Removal and Fitting. (F 24)

1. Remove front wheel (see F 01).
Remove front brake drum (see F 04).
2. Remove both covers after unscrewing the two countersunk screws. Remove the circlip on the inside of the bearing pin. Press the pivoted link

slightly upwards and knock out the bearing pin. Unscrew the hexagon nut on the inside. Withdraw the bearing bolt and remove the pivoted link.

3. Replace in the reverse order.



Replacing Bushes in Pivoted Links.

(F 25)

1. Remove front wheel (see F 01):
Remove front brake drum (see F 04).
Remove pivoted links (see F 24).
2. Knock out old bushes, and press in new. Then
ream out to 17.01—17.018 mm.

Front Mudguard. Removal and Fitting.

(F 26)

1. Remove front wheel (see F 01).
2. Disconnect cable from brake lever, detach
speedometer drive cable from brake plate. Unscrew the two bolts on the mudguard stay and on the inside of the mudguard at the top. Remove mudguard.
3. Replace in the reverse order.

CONTROLS and CABLES

Handlebars (and Fittings). Removal and Fitting.

(F 40)

1. After disconnecting the cables (see F 45, 50, 51, 52, and 55) unscrew the pinch bolt on the dipper switch and the countersunk screw on the air control lever, and remove these two items with their leads and cable. Unscrew the two hexagon bolts on the front of the handlebar mounting. Remove the handlebars and fittings.
2. Replace the complete handlebar in the reverse order.

Handlebar Bend. Stripping and Assembly.

(F 41)

1. Remove the handlebars (see F 40).
Remove the control levers (see F 44).
Remove the throttle twistgrip (see F 45).
Remove the fixed grip (see F 47).
Disconnect the cables for the clutch, hand brake, air control, and valve lifter.
2. Assemble in the reverse order.

Speedometer. Removal and Fitting.

(F 42)

1. Open headlamp casing. Unscrew speedometer cap nut and hexagon nut. Remove clip. Disconnect lead for illumination. Withdraw speedometer upwards.
2. Replace in the reverse order.

Speedometer Drive Cable. Removal and Fitting.

(F 43)

1. Unscrew hexagon nut for speedometer drive cable from the brake plate and withdraw the speedometer drive cable. Open headlamp, unscrew the cap nut, and withdraw the upper end of the speedometer drive cable. Loosen the clip on the mudguard and pull the shaft upwards clear of the mudguard.
2. Replace in the reverse order.

Control Levers. Removal and Fitting.

(F 44)

1. Disconnect the cables (see F 50, 51, 52, and 55). The hand-brake lever, air lever, clutch lever, and valve lifter can be removed if the pivot bolts are removed. If the grips are first taken off (see F 45 and F 47) the brackets can be slid off the handlebars after the pinch bolts have been loosened.
2. Assemble in the reverse order.

Throttle Twistgrip. Removal and Fitting.

(F 45)

1. Roll the outer end of the rubber grip back for about 20 mm (3/4 in). Unscrew the countersunk screw in the end cap and remove it. Disconnect the end cap from the slider, turn the twistgrip slightly outwards, and remove it.
2. Assemble in the reverse order.

Fixed Grip or Rubber Grip on Twistgrip. Removal and Fitting.

(F 47)

1. Slightly lift the inner end of the rubber grip with a small screwdriver and pour in a few drops of petrol. Withdraw the grip with a twisting motion.
2. To replace the grips, wet the handlebars with petrol and push the grip on quickly with a twisting motion.

Slider. Removal and Fitting.

(F 48)

1. Remove the throttle twistgrip (see F 45).
2. Loosen the clamp bolt on the carburettor. Unscrew the cap. Unscrew the jet holder. Turn the float chamber. Turn the carburettor outwards. Withdraw the throttle and air slides. Detach the cable from the throttle slide, and the cable can then be disconnected from the slider on the handlebars.
3. Assemble in the reverse order.

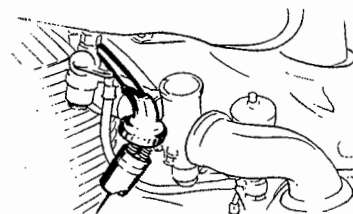


Fig. F 48

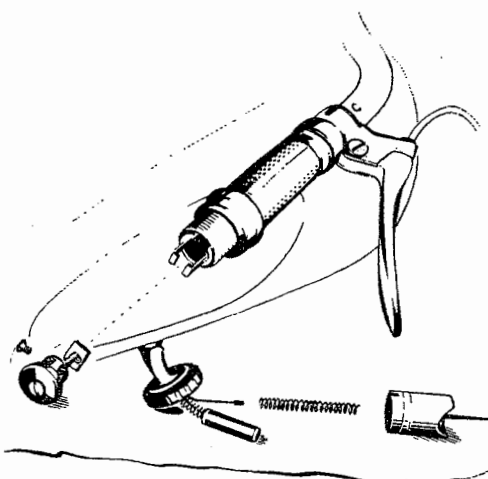


Fig. F 48 a

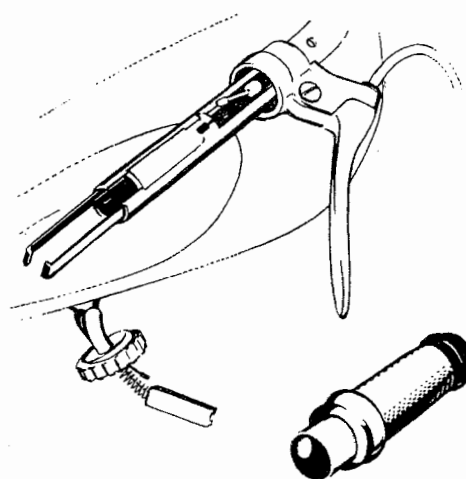


Fig. F 48 b



Clutch Cable. Removal and Fitting.

(F 50)

1. Remove the right-hand crankcase cover (see M 50).
2. Unscrew the lock nut on the adjuster. Disconnect the nipple on the cable from the slot in the clutch-operating lever, taking care not to lose the helical spring. Pull the cable and adjuster out of the cover. Disconnect the cable from the clutch control lever.
3. Replace in the reverse order.

Hand-Brake Cable. Removal and Fitting.

(F 51)

1. Disconnect the cable from the brake lever on the brake plate. Loosen the lock nut and unscrew the adjuster. Straighten two clips on the right-hand inside of the mudguard, and disconnect the cable from the control lever.
2. Replace in the reverse order.

Valve-Lifter Cable. Removal and Fitting.

(F 52)

1. Disconnect the cable from the control lever. Unscrew the adjuster on the cylinder head (shaft). Disconnect the lower end of the cable.
2. Replace in the reverse order.

Throttle Cable. Removal and Fitting.

(F 53)

1. Remove the throttle twistgrip (see F 45).
2. Unscrew the clip on the carburettor body and on the connecting tube. Unscrew the jet holder on the carburettor body and turn the float chamber outwards. Unscrew the cap. Withdraw the throttle and air slides from the carburettor. Disconnect the cable from the throttle slide and from the slider in the twistgrip and withdraw it from the handlebars.
3. Replace in the reverse order.

Air Control Cable. Removal and Fitting.

(F 55)

1. Disconnect the cable from the air slide (see F 53). Then unscrew the countersunk screw on the control lever and disconnect cable from the lever and the casing.
2. Replace in the reverse order.

FRAME

Frame, Front Part. Removal and Fitting.

(F 60)

1. Remove saddle (see F 72).
Remove fuel tank (see F 80).
Remove engine (see M 01).
Partly remove headlamp (see E 13).
Disconnect clutch cable from handlebar control lever.
Remove handlebars (see F 40).
Remove front wheel (see F 01).
Remove front forks (see F 20).
Remove oil tank (see F 83).
Remove frame, rear part (see F 61).
Remove rear wheel (see F 02).
Remove exhaust pipe (see F 70).
Remove rear mudguard (see F 62).
Remove chaincase (see F 64).
Remove rear forks (see F 63).
Remove rear springing (see F 65).
Remove centre stand (see F 74).
2. Replace in the reverse order.

Frame, Rear Part. Removal and Fitting.

(F 61)

1. Remove rear wheel (see F 02).
Remove chaincase (see F 64).
Remove rear brake drum (see F 05).
Remove oil tank (see F 83).
Remove silencer (see F 70).
2. Remove silencer attachment by unscrewing the three bolts on the rear part of the frame. Unscrew the two self-locking nuts on the two expansion bolts and then remove the rear part of the frame. Take care not to damage the two armoured leads which run from the cable harness into the rear part of the frame.

Note! If a new rear frame is to be fitted, the following items will also have to be removed:

- Battery (see E 16).
- Battery box (see E 15).
- Tool box (see F 76).
- Rear mudguard (see F 62).

Rear Mudguard. Removal and Fitting.

(F 62)

1. Detach reflector and rear light (see E 09).
2. Remove rear light and withdraw cable. Unscrew the bolts on the left and right-hand stays. Unscrew the collar nuts. Remove the mudguard.
3. Replace in the reverse order.

Rear Forks. Removal and Fitting. (F 63)

1. Remove rear wheel (see F 02).
Remove chaincase (see F 64).
Remove rear brake drum (see F 05).
Remove rear part of frame (see F 61).
2. Remove the cover strip. Unscrew the hexagon nut on the upper arm of the forks from the spring holder using a screwdriver inserted in the slot of the fork bolt to prevent rotation. Remove the locking ring from the rear-fork spindle, and knock out the spindle. Use a punch with a counterbore to accommodate the grease nipple. A number of washers of various thicknesses will be found between the frame and the rear forks to take up any side play in the forks.
3. Replace in the reverse order, noting that the cover strip must be fitted with the chamfered edge to the rear.

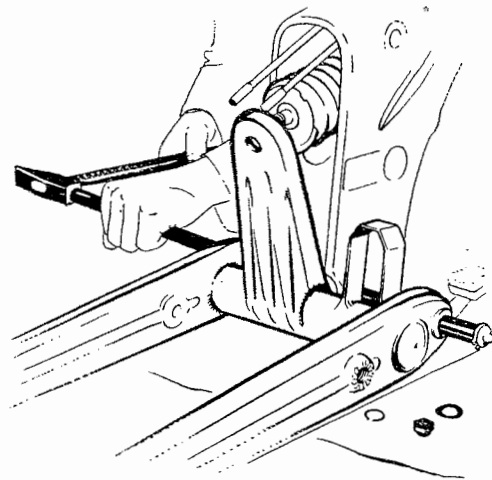


Fig. F 63 a



Fig. F 63

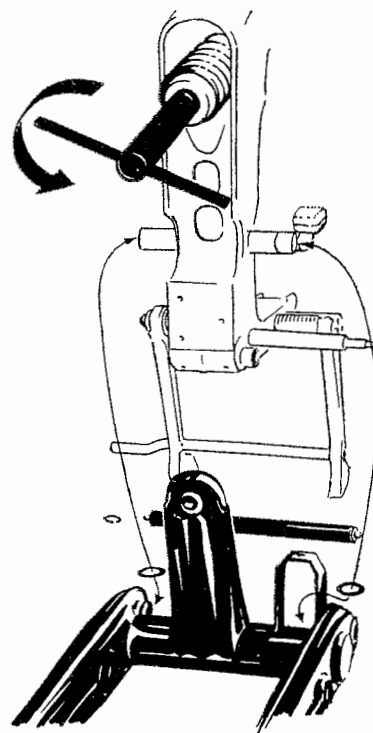


Fig. F 63 b

Chaincase. Removal and Fitting.

(F 64)

1. Unscrew the nut and lock nut on the rear hexagon bolt and remove the distance tube (in the centre). Unscrew two bolts with lock washers above and below the rear axle. Unscrew the hexagon bolts on the top and bottom halves of the chaincase (at the front). Then slightly loosen the five countersunk screws on the right half of the crankcase and remove the two sections of the chaincase.
2. Replace in the reverse order. When fitting the chaincase sections make certain that they mate properly.

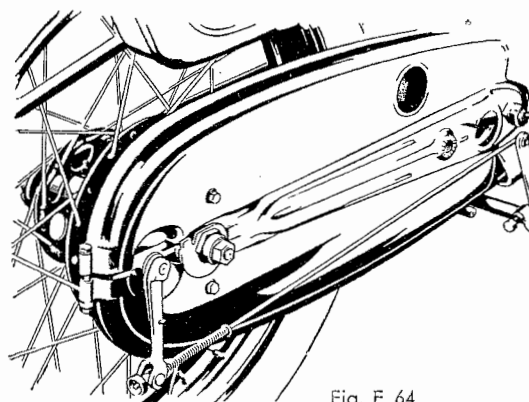


Fig. F 64

Rear Springing. Removal and Fitting.

(F 65)

1. Remove the rear wheel (see F 02).
Remove the chaincase (see F 64).
Remove the brake drum (see F 05).
Unscrew the bolt and remove the air filter cover.
Remove the oil tank (pipes can be left attached to the tank) (see F 83).
Remove the rear part of frame (see F 61).
Remove the rear forks (see F 63).
2. Standard: Then unscrew the complete rear springing assembly, including shock absorber,

from the rear forks using the special key (078 791 905). Hold the spring in a vice, and unscrew the two M 10x1 nuts on the shock absorber and the upper spring holder. Unscrew both spring holders from the spring using a special key (088 891 913 or 078 791 905). Take care not to lose the washers and rubber rings.

3. Replace in the reverse order. It is **absolutely essential** that the slot in the fork bolt on the telescopic shock absorber is horizontal.

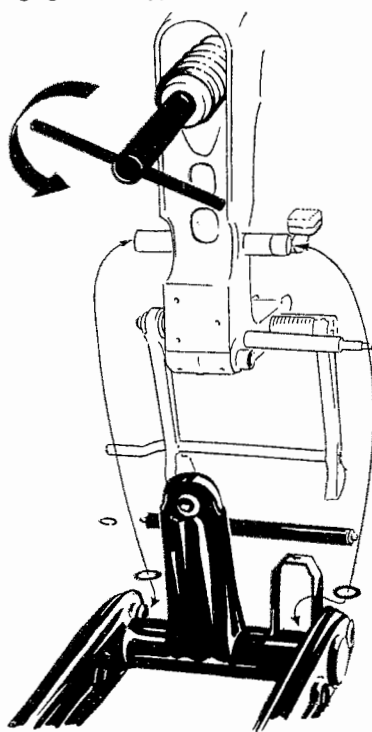


Fig. F 65

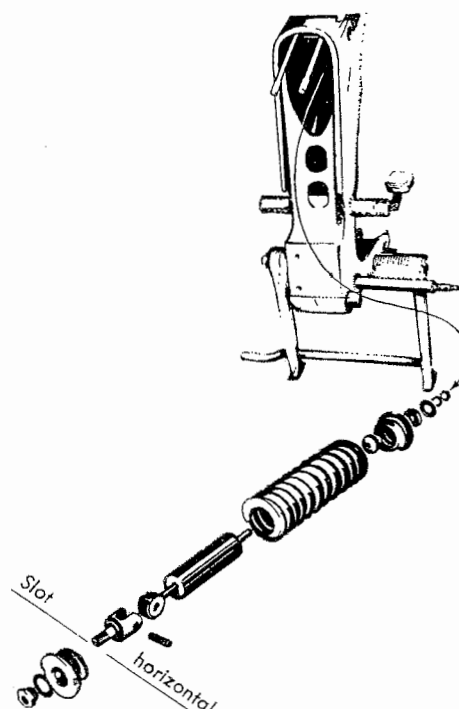


Fig. F 65 a

1. **Special: Removal and Fitting of Pre-Stressed Springs and Shock Absorber** from frame No. 1 288 521 / 788 809. Attach fixture (088 891 923) to the frame. Tighten the turnbuckle slightly. Remove the silencer attachment by unscrewing three bolts. Unscrew the flat-head screw. Remove the two self-locking nuts on the rear frame. Remove the rear part of the frame and the cover strip. Unscrew the hexagon nut and the lock washer (lock the tie rod with a screwdriver). Loosen the turnbuckle and remove the fixture. Remove the locking ring and knock out the rear-fork spindle using a suitable punch (take care not to lose the thrust washers). Remove the forks complete with spring and washer. Unscrew the shock absorber using key (088 891 920).
2. **Assembly:** Attach the complete shock absorber, using key (088 891 920). Pull the tie rod

out completely. Insert spring and washer. Fit rear forks with thrust washers. Knock in and lock the spindle (use oil).

Pull the fork up by means of jig (088 891 923) until the hexagon nut and lock washer can be tightened up. **The slot in the tie rod must be horizontal.**

Place the cover strip on the rear part of the frame so that the narrow edge of the strip is at the front. Attach the rear part of the frame and screw up the self-locking nuts one or two turns. Screw up the turnbuckle on the fixture until the holes in the front and rear parts of the frame line up, and screw in the centre screw (flat head) using lock washers. Remove the jig. Tighten up the self-locking nuts. Make certain that the cover strip is in its proper position. Fit the silencer attachment.

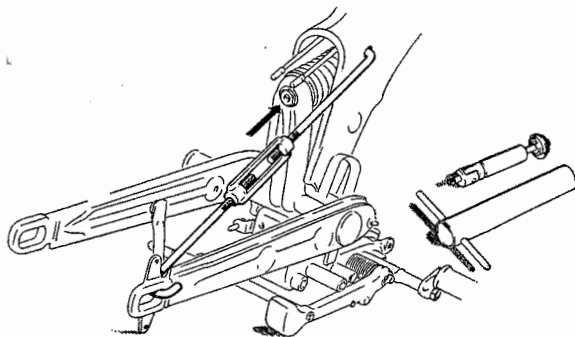


Fig. F 65 b

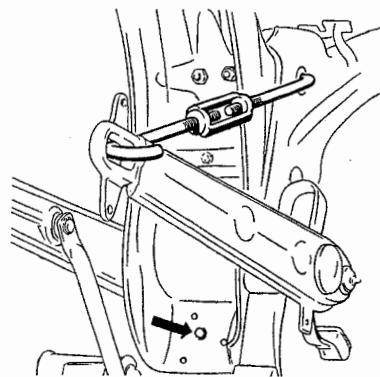


Fig. F 65 c

Exhaust System. Removal and Fitting. (F 70)

1. Unscrew the nut on the right-hand end of the foot-rest rod. Remove the right-hand foot rest and its hanger. Withdraw the rod and left-hand foot rest to the left. Unscrew the hexagon bolt on the silencer attachment. Unscrew the exhaust pipe from the cylinder head with the special spanner supplied in the kit of tools provided with the machine. Unscrew the M 6 bolt and the nuts on the silencer pipe clamp. Remove the silencer from the exhaust pipe. Remove the exhaust pipe from the cylinder head and withdraw it complete with its seal.

2. Replace in the reverse order.

Pivoted Saddle and Spring. Removal and Fitting.

(F 72)

1. Unscrew the M 10x1 nut on the left-hand side of the saddle support underneath the fuel tank, as also the M 10x1x108 hexagon bolt. A thread is tapped on the left-hand side of the saddle support. Withdraw the saddle with springs, rubber plug, and spring cups. Take care not to lose the two thrust washers.
2. Assemble and replace in the reverse order. Make certain that the bearing bushes on the frame on the spring cover and the two springs and spring cups are well greased.

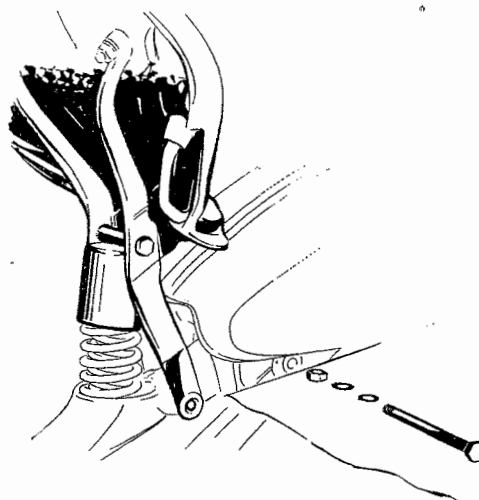


Fig. F 72

Centre Stand (and Return Springs). Removal and Fitting.

(F 74)

1. Remove the left-hand split pin and knock the spindle out to the right. Remove the stand and springs.
2. Replace in the reverse order. Make certain that the return springs are properly seated.

Luggage Carrier. Removal and Fitting.

(F 75)

1. Unscrew the three hexagon bolts on the rear part of the frame and remove the luggage carrier.
2. Replace in the reverse order.

Tool Box. Removal and Fitting.

(F 76)

1. Open the tool box and unscrew either three M 6 hexagon nuts with lock washers or three hexagon bolts with lock washers. Remove tool box.
2. Replace in the reverse order.

Petrol Tank. Removal and Fitting.

(F 80)

1. Remove saddle. (see F 72).
2. Close fuel tap and pull off tubing. Unscrew M 7x15 hexagon bolt with two lock washers and one plain washer on the rear tank mounting a few turns. Unscrew either two M 8x15 hexagon bolts with lock washers or one M 8x98 hexagon bolt with lock washer and nut (depending on fittings employed) on the two front mounting brackets on the frame. If the second type of fitting is used there will also be a spacer tube to remove. Lift the front of the fuel tank. Bend up the clip for the cable harness and remove it. Push the tank slightly to the rear and lift off.
3. Replace in the reverse order.

Knee Grips. Removal and Fitting. (F 81)

1. Insert a small screwdriver in the slit in the rubber under the badge, and unscrew the M 6x6 screw situated under the slit. Take off the knee grip. The rubber knee grip can easily be stripped off the mounting plate.
2. When replacing the knee grip it is advisable first to screw the mounting plate lightly to the tank, allowing it to hang vertical. Then lightly damp the rubber grip with petrol and pull it over the mounting plate. Turn the knee grip to its correct position and tighten up the screw through the slit in the rubber.

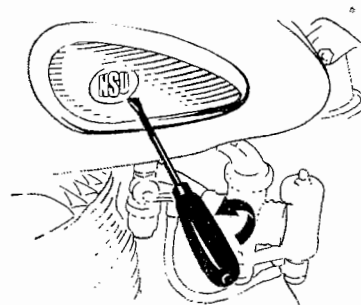


Fig. F 81

Fuel Tap. Removal and Fitting. (F 82)

1. Remove the fuel pipe from the tap. Lean the machine over to the right. Unscrew the cap nut between the tank and the fuel tap. Remove the tap.
2. Replace in the reverse order. Make certain that the cap nut is screwed up tightly and that the adaptor for the petrol pipe is in the correct position.

Oil Tank. Removal and Fitting. (F 83)

1. Remove air filter cover. Unscrew the pinch bolt on the air filter tube. Remove the cover complete with tube. Then slacken back the cap nuts securing the two oil pipes, and remove the drain plug and filler cap. Drain the oil out of the tank. Remove the mounting bolts and washers. Unscrew the cap nuts and remove the oil tank. Unscrew the oil filter and clean all the parts.
2. Replace in the reverse order.

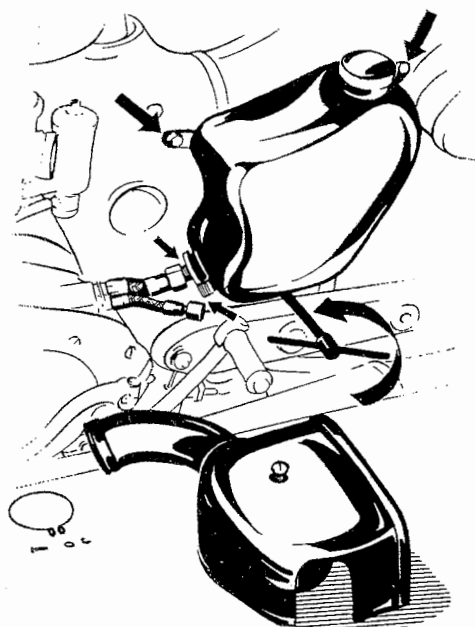


Fig. F 83

ELECTRICAL INSTALLATION

Cable Harness. Removal and Fitting.

(E 01 to E 05)

To prevent damage always disconnect the battery before starting work on the electrical system.

1. Remove the right-hand crankcase cover (see M 50).

Remove the rear wheel (see F 02).

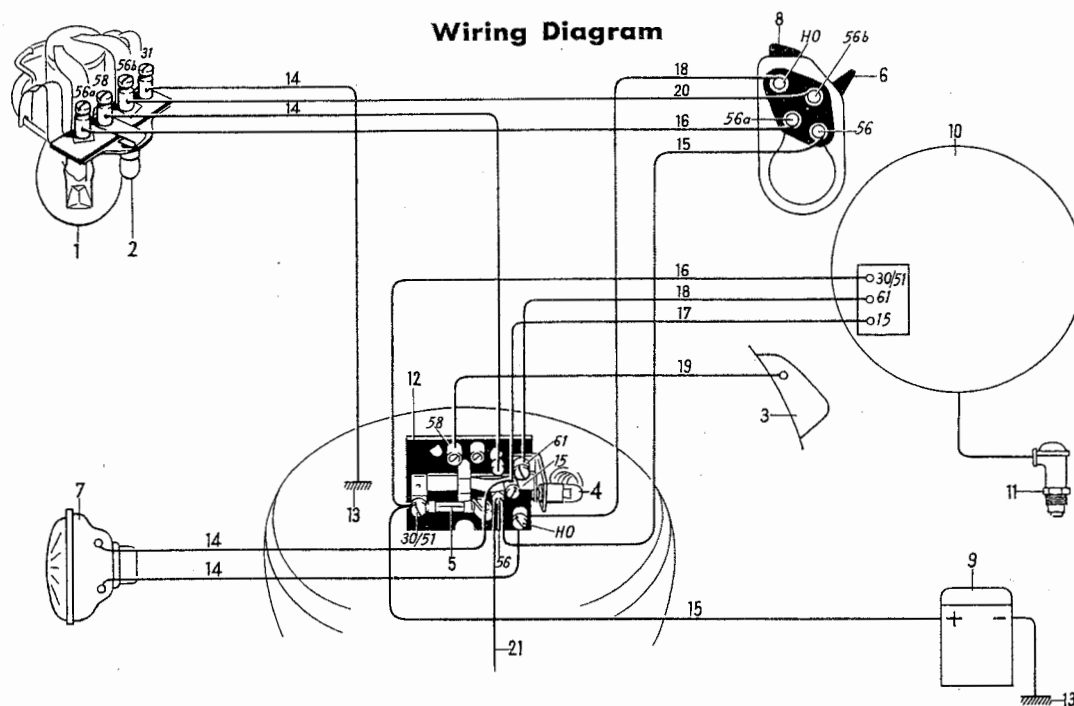
Remove the saddle (see F 72).

Remove the petrol tank (see F 80).

2. When disconnecting and connecting leads, check by means of the wiring diagram. If necessary mark the leads as they are disconnected.

3. The best way of inserting new leads is to pull them through with the old leads (connect the ends together). In the case of the lead to the rear light the cable clips on the inside of the rear part of the frame must be undone.

For E 05 dipper lead see E 10.



- | | |
|---------------------------|---------------------------------|
| 1 = Head Light Bulb | 12 = Base Plate |
| 2 = Parking Light Bulb | 13 = Earth |
| 3 = Rear Lamp | 14 = Black |
| 4 = Ignition Warning Lamp | 15 = White |
| 5 = Fuse | 16 = Red |
| 6 = Dip Switch | 17 = Yellow |
| 7 = Horn | 18 = Blue |
| 8 = Horn Button | 19 = Green |
| 9 = Battery | 20 = Grey |
| 10 = Generator | 21 = Cable to Speedometer Light |
| 11 = Spark Plug | |

Horn. Removal and Fitting.

(E 08)

1. Unscrew all screws and disconnect leads. Remove horn.
2. Replace in reverse order.

Rear Light. Removal and Fitting.

(E 09)

1. Unscrew bolt on rear light casing and remove casing. Take out bulb and disconnect lead. Unscrew clip and remove with rubber base pad.
2. Replace in reverse order.

Dipper Switch. Removal and Fitting.

(E 10)

1. Unscrew cheese-head screw on lower part of switch. Remove switch. Remove terminal strip from casing and disconnect lead.
2. Replace in reverse order.

Headlamp Glass and Reflector. Removal and Fitting.

(E 12)

1. Open the headlamp after unscrewing the lower slotted screw. Turn the spring clip on the rear of the reflector upwards and withdraw the bulb holder and the terminal strip. Use a screwdriver to remove the two stirrup springs between the reflector and the mounting ring. Bend up the clips for the springs and remove the reflector.
2. When inserting the glass remember that there are different types of glass available. In one the flutes should be vertical and the clear section on top, while in the other the flutes are in the form of a triangle which should be fitted with the point downwards. Replacing the glass and reflector is effected in the reverse order to removal.

Note! Do not touch the polished surface of the reflector.

If the headlamp glass is to be replaced the six spring clips for holding the reflector which are fitted between the rim and the mounting ring must be removed with the aid of a small screwdriver.

Headlamp. Removal and Fitting.

(E 13)

1. **In order to avoid causing any damage, make a point of disconnecting the battery before starting work.**
2. Replace in the reverse order, connecting up the leads in accordance with the wiring diagram.

Unfasten the screw and remove the headlamp cover. Turn up the clip and remove the reflector. Unscrew the knurled nut on the speedometer drive cable and withdraw the shaft downwards clear of the headlamp casing. Unscrew the hexagon nut on the speedometer bracket; remove the speedometer illumination bulb from the speedometer head and withdraw it upwards. Remove the dipper switch from the handlebars. Disconnect the lead from the terminal on the ignition switch, bend up the clip, and withdraw the cable harness downwards. Unscrew two nuts on the casing and the forks. Disconnect terminal 31 and remove both bulbs. Take off headlamp casing.

Battery. Removal and Fitting. (E 15)

1. Open battery box. Remove the rubber band and take out the battery. Disconnect +ve and -ve terminals.
2. When reconnecting the battery, make certain that the -ve terminal is earthed.
3. Replace in the reverse order.

Battery Box. Removal and Fitting. (E 16)

1. Remove the battery (see E 15).
2. Unscrew the nuts on the two rear mounting bolts and remove the box. If the box is to be replaced, remove the rubber pads and stick them in place in the new box.
3. Replace in the reverse order.

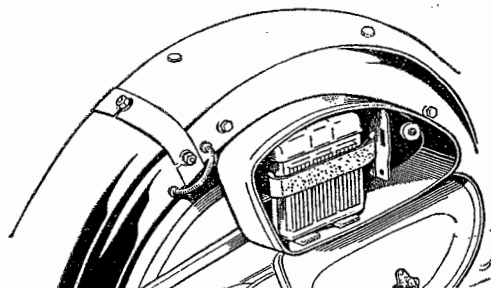


Fig. E 16

CARE and MAINTENANCE

Grease Vehicle (W 01)

1. Follow the instructions given in the lubrication chart and in the Instruction Book.

<u>Lubrication Point</u>	<u>Method of Lubrication</u>	<u>Lubricant</u>
*Engine (including gearbox) 6, 14, 15	see p. 3	In warm weather SAE 30. Use a branded engine oil. In cold weather SAE 20, below freezing point SAE 10, if obtainable. Use a branded engine oil.
Control levers 16, 17	Apply a few drops of oil.	
Chain Lubricating pad 5	see p. 3	Use branded SAE 30 oil.
Air filter 7	see p. 3	As for engine
Front wheel spring bearings, joints and brake controls, stand bearings 1, 2, 8, 9, 10, 11, 12, 13	apply a few drops of oil and grease	Thin oil
Brake pivots (on Full Hub Brakes)	Remove occasionally, clean off old grease, pack with fresh grease	High-pressure grease
High pressure grease nipples, 1, 2, with full hub also on swinging link 18, 20, 21	Several strokes with grease gun	
Rear fork 3, 4	see p. 3	
Front and rear hub, brake-drum bearing on rear wheel 23, 24, 25	see p. 3	
Throttle twist grip and choke lever 26	Grease internal parts	
Cables	Use lubricating apparatus	Chain grease
Steering-head bearing 27	see p. 3	
Rear chain 19	see p. 3	
Contact breaker lubricating pad 28	see p. 3	Hot bearing grease: pour point 150—160° C (300—320° F)
Sludge traps on crankshaft 22	clean: see p. 3	

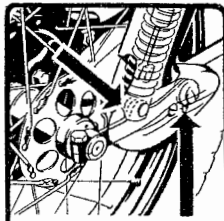
* Do not add any graphite compound to the lubricating oil.

Centrifugal force will cause an additive of this type to become lodged in the sludge traps on the crankshaft, and will in time block the oil passages to the crank pin, thereby interrupting the flow of oil to the connecting rod.



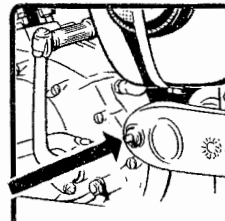
1 R. Swinging link & Front fork spring bearing

Every 500 km



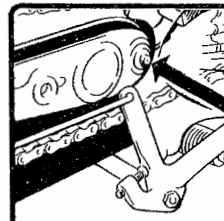
2 L. Swinging link & Front fork spring bearing

Every 500 km



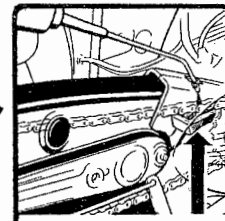
3 Rear Fork axle L. side

Every 500 km



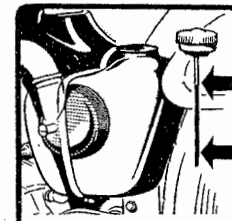
4 Rear Fork axle R. side

Every 500 km



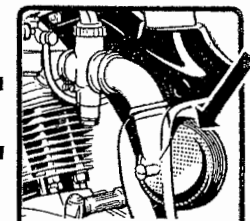
5 Chain lubricating pad

Every 500 km



6 Check oil level

Every 1000 km



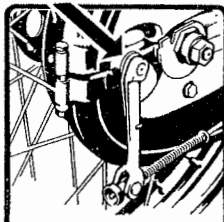
7 Air filter

Every 1000 km



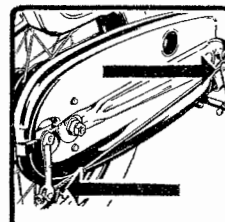
8 Front Brake arm

Every 1000 km



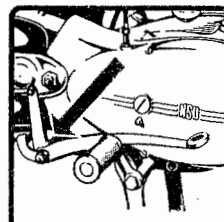
9 Rear Brake arm

Every 1000 km



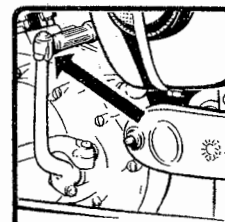
10 Brake rod: Fr. & Rear connections

Every 1000 km



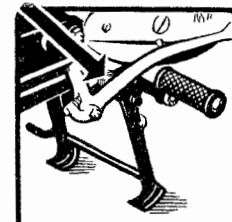
11 Brake pedal bearing

Every 1000 km



12 K/S crank

Every 1000 km



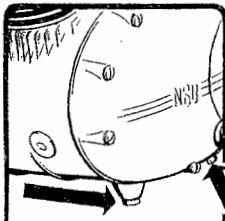
13 Centre stand bearings L. & R.

Every 1000 km



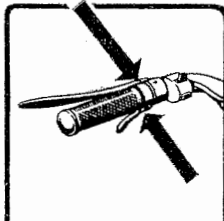
14 Change oil in Tank

Every 2000 km



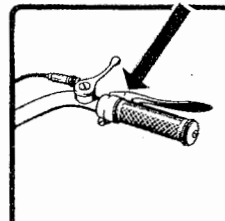
15 Change engine oil

Every 2000 km



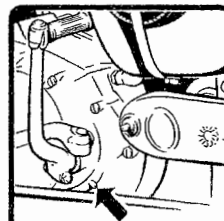
16 Clutch and Decompressor levers

Every 2000 km



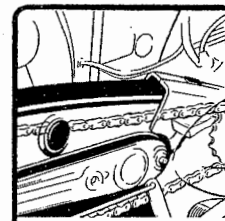
17 Hand-brake lever

Every 2000 km



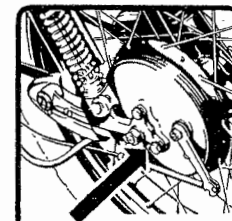
18 K/S crank

Every 2000 km



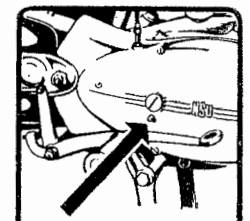
19 Chain

Every 4000 km



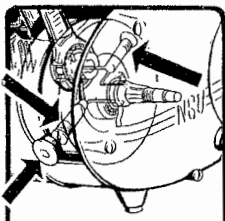
20 Speedometer Drive

Every 4000 km



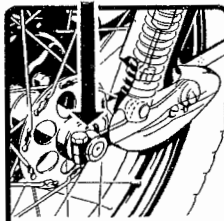
21 Clutch actuating pin

Every 4000 km



22 Crankshaft sludge trap

Every 4000 km



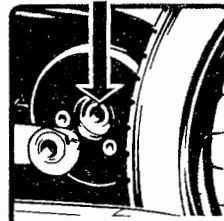
23 Front wheel hub

Every 10000 km



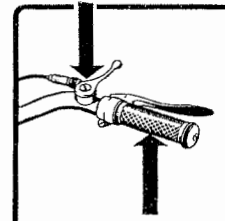
24 Rear wheel hub

Every 10000 km



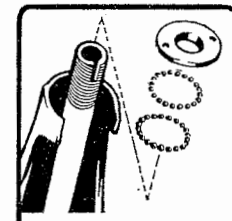
25 Rear wheel drum bearings

Every 10000 km



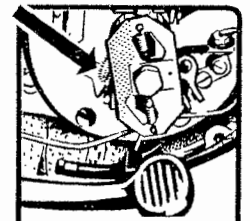
26 Throttle Twist grip & choke lever

Every 10000 km



27 Steering column bearings

Every 10000 km



28 Contact breaker lubricating pad.

Every 10000 km

Lubrication

Clean all grease points or nipples before lubricating. During bad weather grease the running gear and control linkages (front and rear forks, front fork bearings, brake linkage, and the kickstarter spindle) more frequently than specified. If a squeak develops, grease **at once!**

Rear fork. Force in grease until it emerges from the bearings on either side.

Felt pad for lubricating chain. After removing the rubber plug on the top of the chaincase, soak this thoroughly in oil.

Checking oil level. Allow the engine to idle until the oil level in the tank remains constant. Then stop the engine and at once top up with oil to the level of the upper mark on the dipstick and **no higher**. The oil level must not be allowed to fall below the level of the lower mark on the dipstick. Wipe the dipstick with a dry rag before making the measurements.

Air filter. After removing the cover lift out the filter element and wash it thoroughly in petrol. Blow through with compressed air, and then dip it in thin oil. Allow the surplus oil to drip off. If necessary clean before the specified mileage has been covered.

Oil change. On the **oil tank** remove the filler plug (with dipstick) when the engine is warm, and also the drain plug. Allow all the used oil to drain off. Then unscrew the gauze filter.

On the **engine** remove the drain plugs on the bottom of the crankcase and on the left-hand crankcase cover. Allow all the used oil to drain off, leaning the machine over to the left to make sure that the crankcase cover is completely emptied. Clean the three drain plugs with petrol, and also the gauze filter, with which particular care should be taken; then replace them on the engine and oil tank.

Pour 1 litre (1 3/4 pints) of SAE 20 engine oil into the oil tank. Run the engine in neutral for a few minutes, and look into the tank to make sure the oil is being circulated properly. Drain off this oil completely as described above, and pour in 1 litre (1 3/4 pints) of fresh engine oil. **Allow the engine to run until the oil level in the tank remains constant, and then at once top up with fresh oil to the level of the upper mark on the dipstick, and not higher. Oil capacity 2 litres (3 1/2 pints).**

Driving chain. The condition and tension of the chain is checked by viewing it through the inspection port on the chaincase. The chaincase can be removed if the two front and the three rear bolts are unscrewed. Then remove the flat spring on the chain and undo the spring link. When the chain has been removed, wash it thoroughly in petrol or paraffin, using a brush, bending each link in turn to make sure that all the dirt is removed. Rinse the chain through in petrol or paraffin, and then lay it in heated chain grease and move it to and fro. When the grease has partly cooled remove the chain and allow any surplus grease to drip off. The spring on the spring link should be attached in such a way that its closed end points in the direction of motion of the chain.

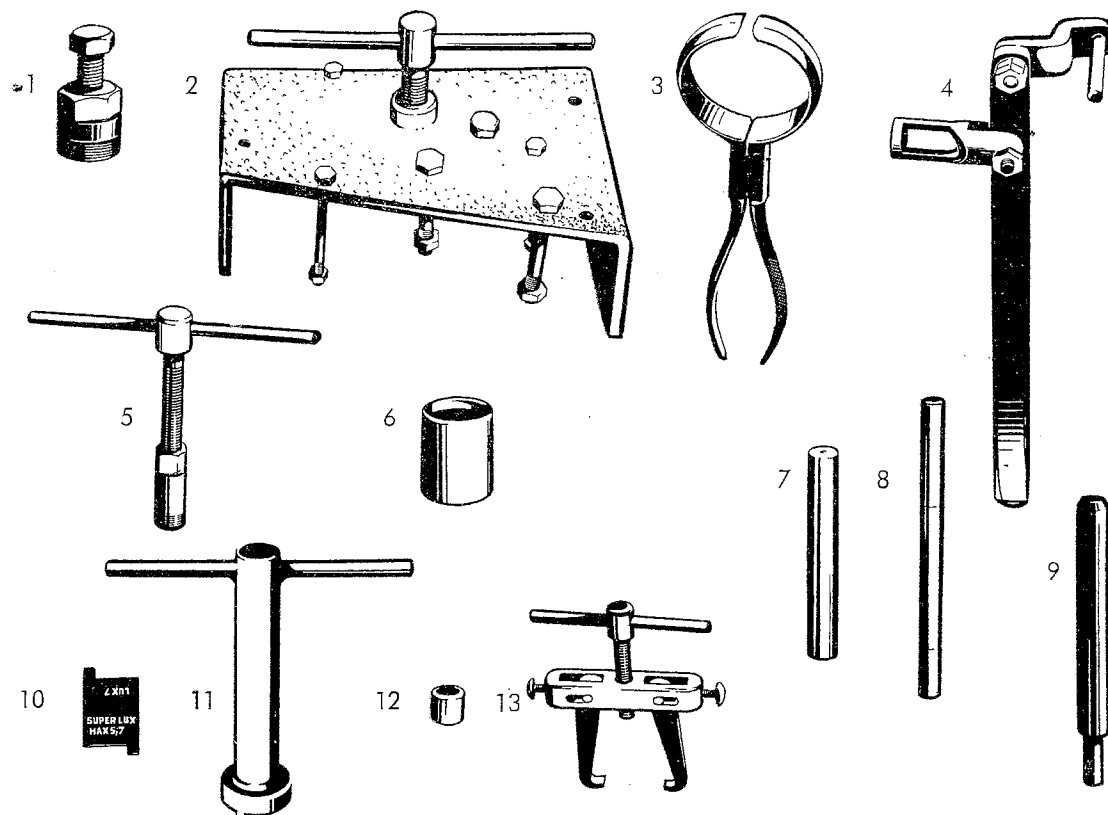
Front and rear hubs. Remove the wheels. Unscrew the locking ring. In the case of a full-width hub withdraw the bearing bush. Remove all traces of old grease and pack with fresh grease.

Brake-drum bearings on rear wheel. Remove the wheel. Remove the chaincase and the driving chain. Unscrew the cap nut on the end of the forks, and remove the bearing bush and cover plate, or, in the case of full-width hubs, the bearing bush, from the brake drum. Remove all traces of old grease, and pack with fresh grease.

Sludge traps on crankshaft. Unscrew the plug on the front of the crankcase. Turn the crankshaft by means of the kickstarter until it is in the correct position, and unscrew both sludge traps. Clean these out thoroughly in petrol, and replace them; lock them in place by means of a centre-punch. Don't forget the plug and washer on the crankcase.

Steering-head Bearings. After removing the steering-head damper, the handlebar mounting, and the aligning nut together with the upper race, clean all the components of both the upper and lower bearings, and repack in fresh grease.

Lubricating pad on contact breaker. Spread a layer of the specified grease to a thickness of 1 mm (0.04 in) on the pad and rub it in.



One set of special Tools for the Max Comprises:

Fig. No. 1	1 Extractor for clutch drum	938 103 647
Fig. No. 2	1 Jig for withdrawing and fitting bearing plates and crankshaft	088 891 900
Fig. No. 3	1 pair Piston-ring pliers	088 891 901
Fig. No. 4	1 Jig for removing and fitting valves	088 891 902
Fig. No. 5	1 Extractor for needle-bearing bushes	088 891 903
Fig. No. 6	1 Assembly bush for seal on clutch pinion	088 891 904
Fig. No. 7	1 Inspection spindle for connecting rod	088 891 906
Fig. No. 8	1 Checking mandril, for camshaft housing	088 891 907
Fig. No. 9	1 Gudgeon pin extractor	088 891 908
Fig. No. 10	1 Gauge for clutch	088 891 911
Fig. No. 11	1 Key for spring holder — Rear Spring (Max from vehicle No. 1 248 495 / 748 605).	078 791 905
Fig. No. 12	1 Spacer bush for withdrawing driving pinion	088 891 914
Fig. No. 13	1 Withdrawing tool for driving pinion	088 891 917

These tools are supplied only in complete sets, the number for which is **088 891 910**.

On the next page there are descriptions of other special tools, some of which had previously been developed for other types of machine, but which are also necessary **for carrying out repairs to the Max properly and efficiently.**

The right to make alterations in the design and construction or in the price is reserved.



SERVICE

SPECIAL TOOLS FOR MAX

MAX

Special Tools / Page 2

XII. 1955 edition

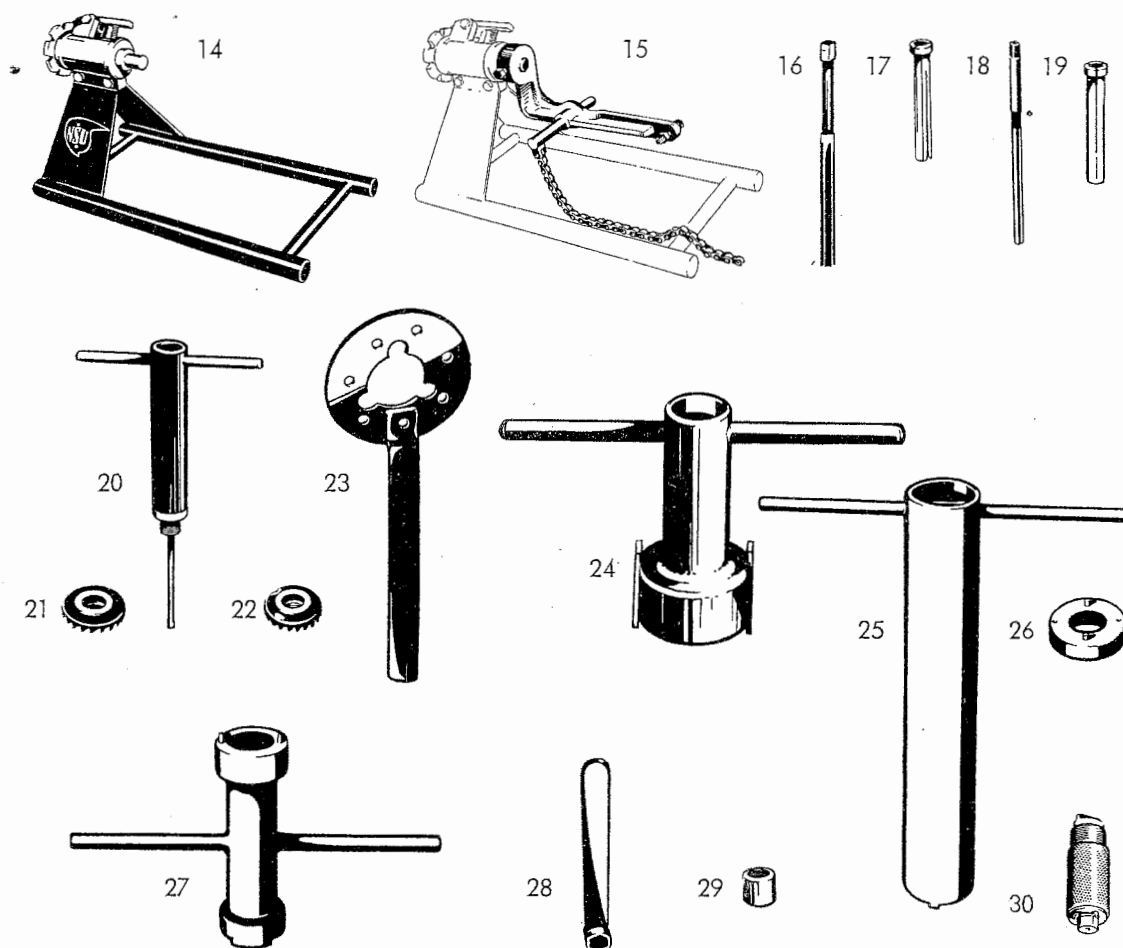


Fig. No. 14	1 Assembly stand, jig	All	048 422 000
Fig. No. 15	1 Clamping attachment (less chain)	Max/Lux	078 791 900
Fig. No. 16	1 Reamer, 8.00 mm dia., for inlet valve guide	Max	088 891 912
Fig. No. 17	1 Guide bush, 6.5x8.00 mm dia. for inlet valve guide	Max	088 891 915
Fig. No. 18	1 Reamer, 9.00 mm dia., for exhaust valve guide	Max/Konsul	128 110 345
Fig. No. 19	1 Guide bush, 6.5x8.98 mm dia., for exhaust valve guide	Max/Konsul	088 891 916
Fig. No. 20	1 Standard holder for valve seat cutters	Fox 4-stroke	048 422 020
Fig. No. 21	1 Valve seat cutter	Konsul	128 110 341
Fig. No. 22	1 Spherical cutter	Max	088 891 924
Fig. No. 23	1 Holder for clutch	Quick/Lux/Max	018 103 567
Fig. No. 24	1 Box spanner for spring holder (up to vehicle No. 1 248 494 / 748 604)	Lux/Max	088 891 913
Fig. No. 25	1 Box spanner for front fork springs	Lux/Max	078 791 901
Fig. No. 26	1 Extension ring for steering-head taper	Lux/Max	078 791 902
Fig. No. 27	1 Box spanner for steering-head taper	Fox	048 422 003
Fig. No. 28	1 Special spanner	Fox	048 422 015
Fig. No. 29	1 Bush for forcing on driving pinion	Super-Lux/Max	088 891 921
Fig. No. 30	1 Key for sludge traps	Max	088 891 918

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SERVICE

FLAT RATE TIMES FOR REPAIR TASKS

MAX
Flat Rate Repair Times
Page 1
XII. 1955 edition

The standard times are calculated for work carried out on vehicles with standard equipment. The time required for any cleaning that may be necessary is **not** included.

Engine

M 01	Remove engine from frame and replace (with test run on bench)
M 02	Dismantle and assemble engine (with necessary adjustments)
M 04	Remove and fit cylinder head
M 05	Strip and assemble cylinder head
M 06	Adjust tappets
M 07	Grind in valves, true up valve seats
M 08	Remove and fit camshaft housing
M 09	Strip and assemble camshaft housing
M 10	Remove and fit cylinder and piston
M 11	Decarbonise cylinder head and exhaust system
M 12	Remove and fit gudgeon pin (including reaming)
M 15	Remove and fit clutch
M 16	Remove and fit left-hand crankcase cover
M 17	Remove and fit radial seal for clutch
M 18	Remove and fit starter spring
M 19	Remove and fit compression spring for kickstarter pawl
M 21	Remove and fit chain sprocket (on engine)
M 22	Remove and fit radial seal on chain-sprocket nut
M 25	Remove and fit rear chain
M 30	Fit replacement crankshaft or replace bearings and bed in
M 31	Remove and fit crankcase
M 35	Remove and fit gearbox and gearchange mechanism
M 36	Remove and fit gearbox mainshaft bearings and bushes
M 37	Adjust gearchange mechanism by means of eccentric pin
M 40	Remove and fit eccentric rod valve gear
M 41	Remove and fit bearing plate
M 42	Remove and fit seal for left-hand crankshaft stub in bearing plate
M 45	Remove and fit oil pump
M 46	Strip and assemble oil pump
M 47	Change oil; clean oil filter gauze and sludge traps
M 48	Remove and fit oil pipes
M 50	Remove and fit right-hand crankcase cover

Ignition system and dynamo

Z 01	Adjust ignition timing
Z 02	Remove and fit dynamo; adjust
Z 03	Remove and fit contact-breaker points; adjust
Z 04	Remove and fit condenser; check
Z 05	Remove and fit ignition coil; check
Z 06	Remove and fit ignition leads
Z 07	Remove and fit regulator; check

Time for task (hrs)	Additional work required	Total time (hrs)
Temps élémentaires (heures)	Opérations annexes nécessaires	Temps total (heures)
Gedetailleerde richttijd (uur)	Vereiste bijkomstige werkzaamheden	Totaal-tijd (uur)
1½	—	1½
11¼	M 01	12¾
2½	M 01	4
½	M 01, M 04	4½
½	—	½
¾	M 01, M 04 M 05, M 06	5¾
1¼	—	1¼
½	M 08	1¾
1	M 01, M 04	5
½	M 01, M 04	4½
¼	M 01, M 04, M 10	5¼
1½	—	1½
1	M 15	2½
¼	M 15, M 16	2¾
¼	M 15, M 16	2¾
¼	M 15, M 16	2¾
¼	M 50	½
¼	M 50	½
¼	M 50	½
¼	M 01, M 02	13
¼	M 01, M 02	13
¼	M 01, M 02	12¾
¼	M 01, M 02	13
¼	—	¼
½	M 01, M 04, M 08, M 10, M 15, M 16 M 18, M 41,	9¼
¼	M 15, M 16	2¾
¼	M 15, M 16, M 41,	3
¼	M 15, M 16, M 41,	3
¼	M 15, M 16, M 41, M 45	3¼
½	—	½
¼	—	¼
¼	—	¼
¼	M 50	½
½	M 50	¾
¼	M 50	½
¼	M 50	½
¼	M 50	½
½	M 50	¾

Carburettor

- V 01 Remove and fit air filter; clean 1/4
- V 02 Remove and fit carburettor; clean and adjust 1/4

Wheels, brakes, and forks

- F 01 Remove and fit front wheel 1/4
- F 02 Remove and fit rear wheel 1/4
- F 03 Remove and fit ball bearings and seals in hub 1/2
- F 04 **Standard:** Remove and fit front brake drum 1/4
- F 05 **Standard:** Remove and fit rear brake drum 1/4
- F 06 **Standard:** Strip and assemble front brake drum 1/4
- F 07 **Standard:** Strip and assemble rear brake drum and shock absorber 1/4
- Special:** 1/4
- F 08 **Standard:** Renew brake linings (each brake), strip and assemble brake shoes 3/4
- Special:** 3/4
- F 09 **Standard:** Remove and fit speedometer drive 1/4
- Special:** 1/4
- F 20 Remove and fit front forks 1 3/4
- F 21 Remove and fit bearing shells, races, and balls 1
- F 22 Remove and fit front fork springs 1/2
- F 23 Remove and fit telescopic shock absorbers 1/4
- F 24 Remove and fit pivoted links (left-hand and right-hand) 3/4
- F 25 Replace bushes in pivoted links 1/2
- F 26 Remove and fit front mudguard 1/2

Controls and Bowden Cables

- F 40 Remove and fit handlebars (with fittings) 1/2
- F 41 Remove and fit handlebar bend 1/2
- F 42 Remove and fit speedometer 1/4
- F 43 Remove and fit flexible shaft 1/4
- F 44 Remove and fit control levers 1/4
- F 45 Remove and fit throttle twistgrip 1/4
- F 47 Remove and fit fixed grip or rubber grip on twistgrip 1/4
- F 48 Remove and fit slider in twistgrip 1/4
- F 50 Remove and fit clutch cable 1/4
- F 51 Remove and fit hand-brake cable 1/4
- F 52 Remove and fit valve-lifter cable 1/4
- F 53 Remove and fit throttle cable 1/4
- F 55 Remove and fit air control cable 1/4

Time for task (hrs)	Additional work required	Total time (hrs)
Temps élémentaires (heures)	Opérations annexes nécessaires	Temps total (heures)
Gedetailleerde richttijd (uur)	Vereiste bijkomstige werkzaamheden	Totaal-tijd (uur)
1/4	—	1/4
1/4	V 01	1/2
1/4	—	1/4
1/4	—	1/4
1/2	F 01 or F 02	3/4
1/4	F 01	1/2
1/4	F 02, F 64, M 25	1
1/4	F 01, F 04	3/4
1/4	F 02, F 05, F 64, M 25	1 1/4
1/4	F 02, F 64, M 25	1
3/4	F 01, F 04 or F 02, F 05, F 64, M 25	1 1/4
3/4	F 01 or F 02	1 3/4
1/4	F 01, F 04	1
1/4	F 01	3/4
1 3/4	F 01	1/4
1	F 01, F 20	2
1/2	F 01, F 04	3
1/4	F 02, F 04, F 22	1
3/4	F 01, F 04	1 1/4
1/2	F 01, F 04, F 24	1 3/4
1/2	F 01	3/4
1/2	—	1/2
1/2	F 40, F 44, F 45, F 47	1 1/2
1/4	—	1/4
1/4	—	1/4
1/4	—	1/4
1/4	—	1/4
1/4	—	1/4
1/4	F 45	1/2
1/4	M 50	1/2
1/4	—	1/4
1/4	—	1/4
1/4	F 45	1/2
1/4	—	1/4

Frame

F 60	Remove and fit frame, front part
F 61	Remove and fit frame, rear part (additional when replacing)
F 62	Remove and fit rear mudguard
F 63	Remove and fit rear forks
F 64	Remove and fit chaincase
F 65	Remove and fit rear springing
F 70	Remove and fit exhaust system
F 72	Remove and fit pivoted saddle (and springs)
F 74	Remove and fit centre stand (with return springs)
F 75	Remove and fit luggage carrier
F 76	Remove and fit tool box
F 80	Remove and fit petrol tank
F 81	Remove and fit knee grips
F 82	Remove and fit fuel tap
F 83	Remove and fit oil tank

Electrical Installation

E 01	Horn lead	} Remove and fit cable harness
E 02	Rear-light lead	
E 03	Battery lead	
E 04	Lighting lead	
E 05	Remove and fit dipper lead	
E 08	Remove and fit horn	
E 09	Remove and fit rear light	
E 10	Remove and fit dipper switch	
E 12	Remove and fit headlamp glass and reflector	
E 13	Remove and fit headlamp	
E 15	Remove and fit battery	
E 16	Remove and fit battery box	

Care and Maintenance

W 01	Grease machine
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Time for task (hrs)	Additional work required	Total time (hrs)
Temps élémentaires (heures)	Opérations annexes nécessaires	Temps total (heures)
Gedetail- eerde richtijd (uur)	Vereiste bijkomstige werkzaamheden	Total- tijd (uur)
1/4	M 01, F 01, F 02, F 20, F 40, F 61, F 62, F 63, F 64, F 65, F 70, F 72, F 74, F 80, F 83	9 3/4
1 1/4	F 02, F 05, F 65, F 70, F 83 F 76, E 15, E 16	3 3/4
1/4	E 09	1/2
1 1/2	F 02, F 05, F 61, F 64	3 1/2
1/4	—	1/4
1/2	F 02, F 05, F 61, F 63, F 64, F 83	4 1/2
1/4	—	1/4
1/4	—	1/4
1/4	—	1/4
1/4	—	1/4
1/4	—	1/4
1/4	F 72	1/2
1/4	—	1/4
1/4	—	1/4
1/2	—	1/2
1/4	M 50, F 72, F 80, F 02	2 1/4
1/4	E 10	1/2
1/4	—	1/4
1/4	—	1/4
1/4	—	1/4
3/4	—	3/4
1/4	—	1/4
1/4	E 15	1/2
1/4	—	1/4