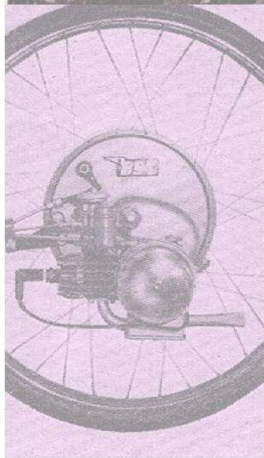


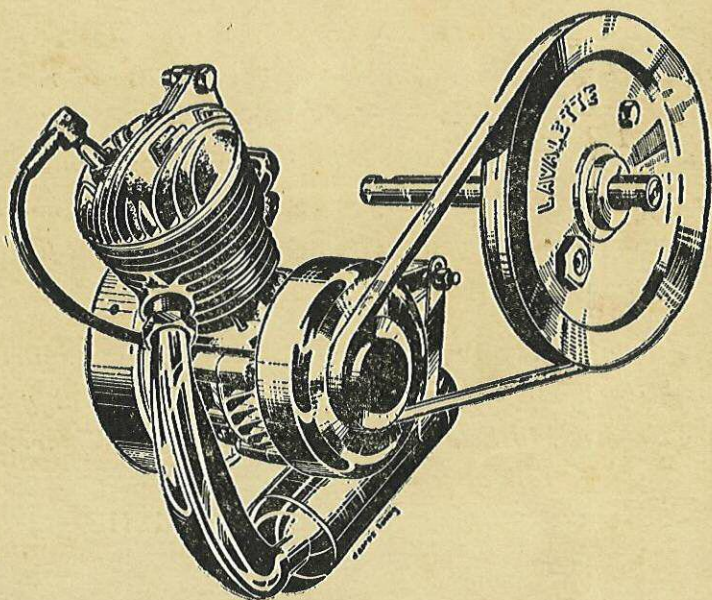
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# MAINTENANCE INSTRUCTIONS

# LAVALETTE ENGINES



FOR AUTOCYCLES AND MOPEDS



**A.C. LAVALETTE**

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Tél. : MON. 99-60



# INTRODUCTION

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*Dear Sir,*

*The present instruction booklet has been carefully prepared for you by LAVALETTE technicians.*

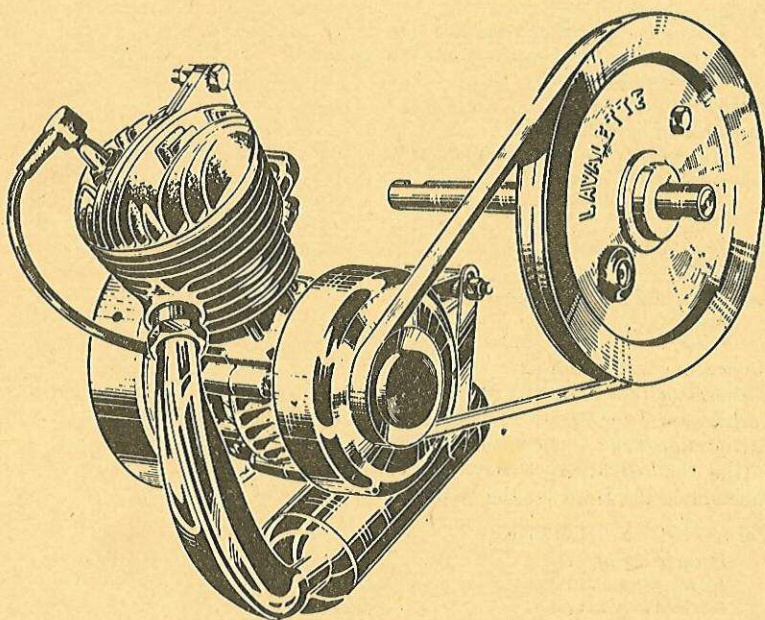
*We do not intend to teach you your job, as we know your proficiency in this respect, but we consider that practical information regarding our products and our methods of assembly should help you by avoiding unnecessary research work, allow you to gain time and thereby give better service to your customers, which is, most justly, our common aim.*

*If you require any further information, you may rest assured that our « After Sales Department » is at your entire disposal, to help you with the greatest pleasure.*

A. C. LAVALETTE

# MAINTENANCE INSTRUCTIONS

# LAVALETTE ENGINES



*Description - Setting - Maintenance*  
*Disassembling - Reassembling - Repairs*



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## FLYWHEEL MAGNETOS

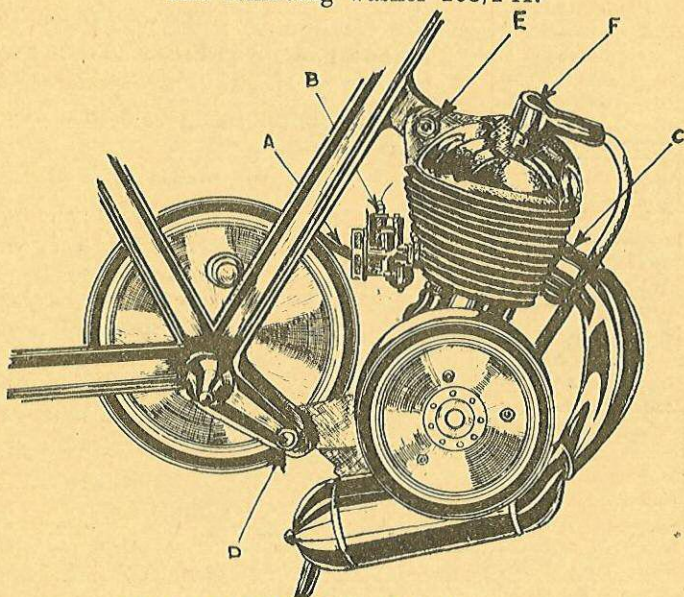
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## DISASSEMBLING

### Removal of the motor

- 1/ the engine covers of the moped.
- 2/ the V belt "A" (534/1 X).
- 3/ the carburettor from inlet "B" (516/2 K).
- 4/ the exhaust, by unscrewing nut "C" (261/1 X) and removing washer 108/1 X.



- 5/ the bolt 519/1 X of the lower rear attachment "D".
- 6/ the bolt 520/1 X of the upper attachment on the cylinder head "E".

*Tools required*

1 flat spanner	32 mm.
1 flat spanner	17 mm.
1 flat spanner	14 mm.
1 tubular wrench	17 mm.
1 tubular wrench	14 mm.

### Removal of the spark-plug (532/1 Z).

- 1/ pull off the rubber thimble "F" (ZNK 1 F 3 Z) to disconnect the cable.
- 2/ unscrew the plug (note that the washer can remain stuck to the cylinder head).

*Tool required* 1 tubular wrench 21 mm.



## Removal of the cylinder head (509/6 X).

- 1/ unscrew the 4 nuts (232/1 Z) on the cylinder studs (229/1 X).
- 2/ remove the 4 washers (231/1 X) under the nuts.
- 3/ loosen the cylinder head by knocking it all round with a wooden mallet. Never knock the cooling-fins, nor insert a tool between the cylinder-head and cylinder.
- 4/ remove the cylinder-head gasket (508/3 X).

*Tools required* 1 wooden mallet.

1 tubular wrench 10 mm.

## Removal of the cylinder (507/3 X oblique exhaust or MLPK 1F 2X straight exhaust).

The motor being held in a vice by its rear support :

- 1/ Place the piston at B D C.

2/ Pull the cylinder vertically, very straight, sliding it on its 4 pins. If it is stuck to the crank-case, knock all around the lower flange "S" with a wooden mallet. Never insert a tool between cylinder and crank-case.

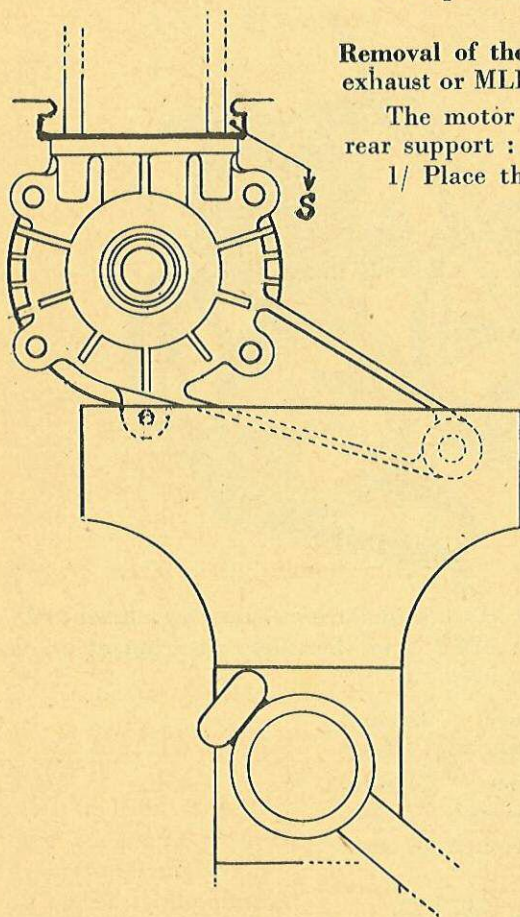
- 3/ Remove gasket (506/3 X).

4/ Remove inlet (516/2 K) by loosening the 2 screws NSR 31 F 5/16 X if it is a cylinder without flange and take off washer (515/1 X).

Loosen clamp (540/1 Z) if it is a flanged cylinder.

*Tools required* 1 wooden mallet.

1 flat spanner 8 mm.

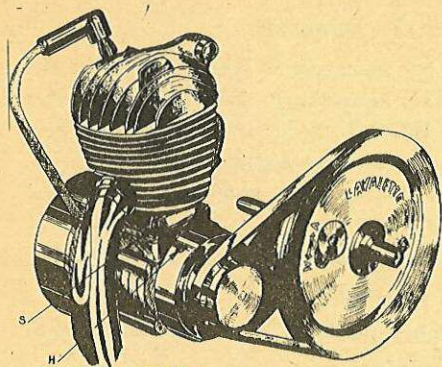


## CLUTCH :

### A - Automatic clutch - removal

- 1/ Take off cover (526/4 X) with a tube having a 30.2 inner dia. using it as a lever (the part is only held in the pulley).





2/ Remove snap-rings (530/1 X) with special pliers.

3/ Remove washer (WMS 7 F 1 X ou 2 X) setting the side-play.

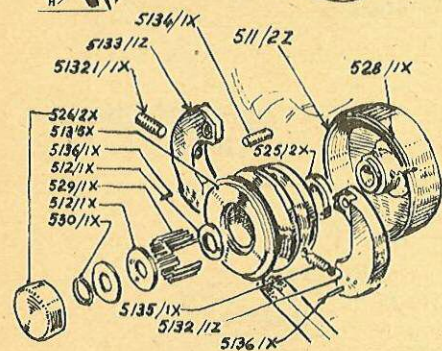
4/ Remove the pulley (513/2 Z) and collect needles (529/1 X) and washers (512/1 X) (when it is mounted on needles and not on a bushing).

5/ Drive out the pin (528/1 X) fixing the cup on the crankshaft, using a pin-punch through hole "H" provided in the cup rim.

6/ Loosen cup (511/2 Z) by knocking it with a bronze or wooden mallet. Knock lightly to avoid distortion.

*Tools required* 1 tube 30 mm (inner dia.).

- 1 snap-ring pliers.
- 1 pin-punch 5 mm.
- 1 bronze mallet.



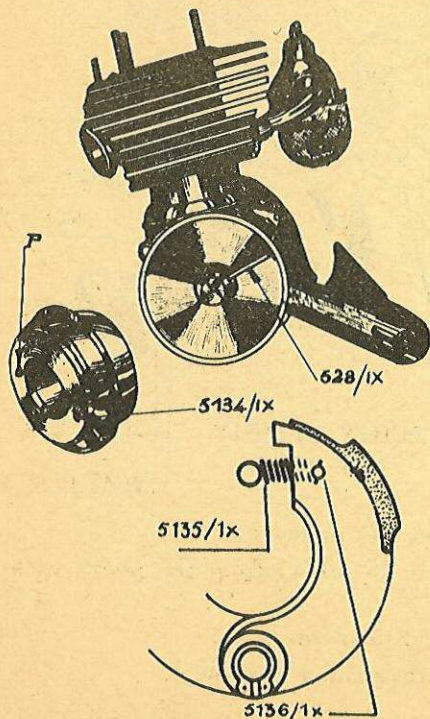
### Disassembling the clutch

a/ for uncoupling the weights :

- insert a hexagonal screw (5.75 mm) in the shaft (5134/1 X) tapped to this purpose.
- hold the head of the screw in a vice and give a few light knocks on the pulley P with a mallet to remove the shaft.

b/ remove spring (5135/1 X) by driving out pins (5136/1 X) with a pin-punch.

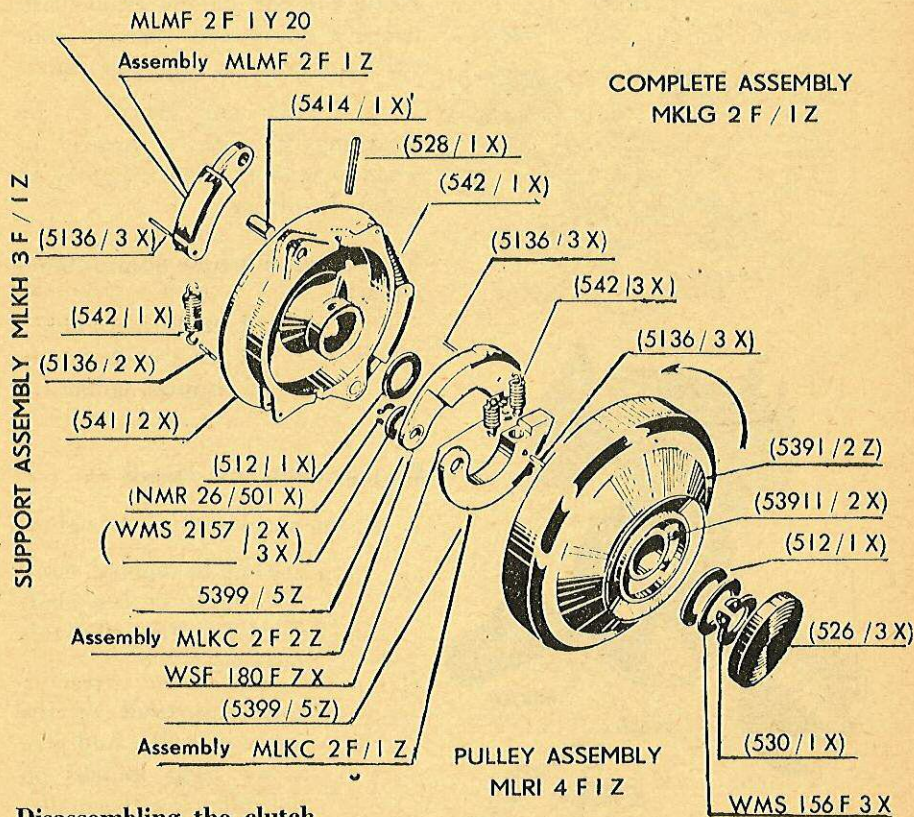
*Tool required* 1 pin-punch 2 mm.





## B - Multimatic clutch (MLKG 2 F 1 Z) - removal

- 1/ Take off cover (526/3 X) by inserting a screw-driver in the slots provided, remove the snap-rings (530/1 X), washers (WMS 7 F 3 X) and (WMS 7 F 1 X or F 2 X), as described above in the case of the automatic clutch.
- 2/ Remove the pulley (MLRI 4 F 1 Z) and the 2 washers (512/1 X and WMS 156 F 3 X).
- 3/ Drive out pin (528/1 X) locking the weight-support (MLKH 3 F) to the crank-shaft with a pin-punch.
- 4/ Loosen the support by knocking light blows round it with a wooden mallet, to avoid damage.



### Disassembling the clutch

- a/ To remove the weights on the pulley :
  - remove snap-ring (NMR 26/501 X) from the pivot, with special pliers.
  - remove washers (WMS 2157/2 or /3 X).
  - unhook the springs with a small steel hook.



b/ To remove springs: WSF 180 F 7 X (locking weight)

542/3 X (starting weight):

— drive out pins (5136/3 X) as in the case of an automatic clutch (see above).

c/ To remove the weights from their support (MLKH 3 F 1 Z)

— unhook springs (542/1 X) with pliers or a small hook.

— drive out shafts (5414/1 X) with a pin-punch.

d/ To remove springs :

— drive out pins 5136/2 X as on the pulley.

Tools required 1 pin-punch 5 mm.

1 hook.

## FLYWHEEL MAGNETO VM/BBK 1/17 GF 19 T and 1/10 GF 20 T

- removal:

1/ Remove the 2 screws (WSR 77 F 4 X) fixing cover (ZMK 2 F 3 X).

2/ Unscrew center nut (WMU 92 F 1 X) with a tubular wrench (14 mm) after having secured the rotor with a strap or a flywheel-clamp.

3/ Unscrew the screw of the flywheel extractor (special Lavalette tool n° (EF 68 F ) until it no longer projects inside the tool "O".

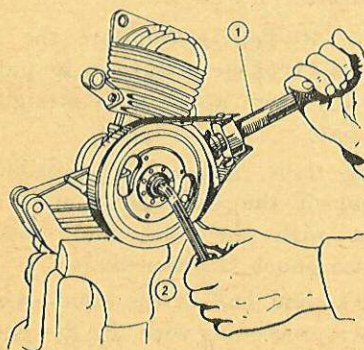
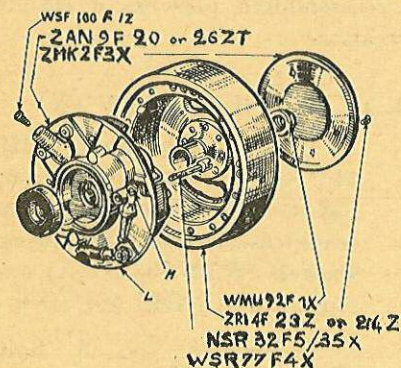
4/ Screw the extractor "O" in the place of the center nut.

5/ Hold the extractor "O" with a flat spanner or a flywheel-clamp and tighten the extractor-screw (1) with a spanner (2) until the rotor is loosened.

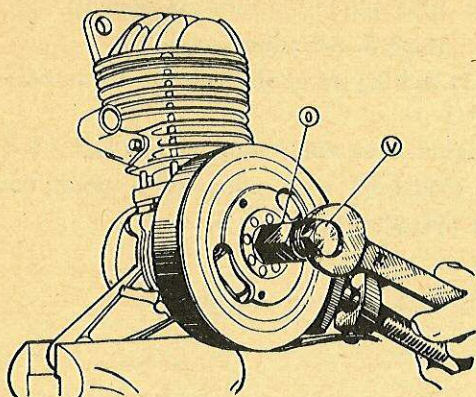
6/ Finish extracting the rotor by hand.

Remove the plug wire and disconnect the earth-lead "M" and lamp-wire "L".

7/ Remove the 2 screws (NSR 32 F /35 X) fixing the stator and the 2 spring-washers (WMS 11 F 5 X).







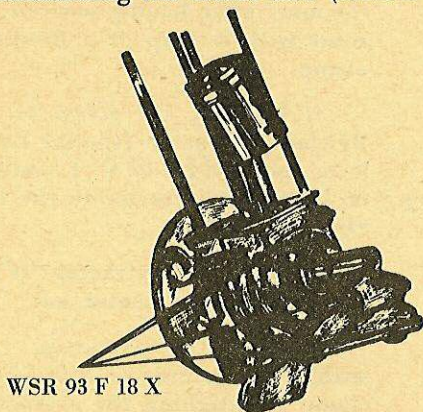
### *Tools required*

- 1 tubular wrench  
14 mm.
- 1 flat spanner  
14 mm.
- 1 flywheel-clamp.
- 1 flywheel extractor EF 68 F (right or left).

### **Disassembling**

The stator being removed or remaining on the motor, the disassembling of its components: condenser, coils, contact-breaker is most easy. The reassembling presents a certain difficulty and is described hereafter.

### **Disassembling the crank-case (MLGE 3 F 3 X and MLGE 2 F 4 X)**



1/ Remove the 5 nuts (NMU 44/2 X) from the bolts holding together the 2 halves of the crank-case, as well as the spring-washers (WMS 135 F 5 X) and flat washers (NMS 601/2 X).

2/ Remove the 5 bolts (WSR 93 F 18 X).

3/ Try to separate the 2 halves of the crank-case by pulling them apart in a straight line.

If, owing to the bearings being tight, this is not possible, give a few knocks on the end of the crank-shaft with a leather mallet until it is flat with the case, and finish extracting the shaft with a bronze punch (12 mm dia.).

Repeat this operation with the second half of the crank-case, but great care must be taken when proceeding with the flywheel side, to avoid damaging the threads on the crankshaft. Never try to insert a tool between the two halves of the crank-case.

Remove seal (504/4 X).

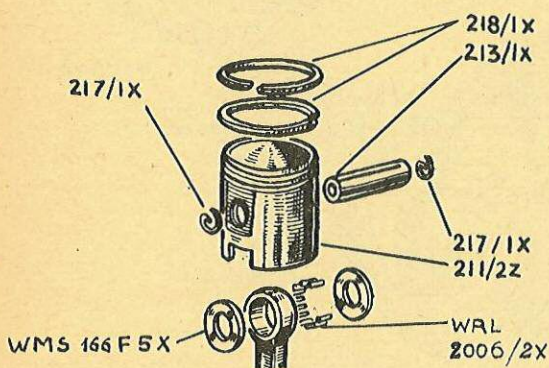


4/ Dip each half of the crank-case in boiling water during 1 minute, then, holding it with a rag, knock on the outer side with a leather mallet, the ball-bearing must fall out by its own weight.

5/ Drive out seals (289/1 Z) and felt washer (WNS 67 F 10 X).

*Tools required* 1 leather mallet.  
1 bronze punch 12 mm.  
1 flat spanner 10 mm.  
1 tubular wrench 10 mm.

### Disassembling the piston



1/ Remove snap-rings (217/1 X) with flat pliers.

2/ Gently drive out gudgeon-pin (213 1 X) by knocking with a mallet on a shouldered bronze punch (10 mm dia.).

If the rod small-end is fitted on a needle-bearing (WRL 2006/2 X) care must be taken of the needles and 2 washers (WMS 166 F 5 X)

If the rod assembly is still fitted in the crank-case, fill-in the opening through which the rod passes with a rag to prevent the needles from falling into the crank-case.

If the rod assembly is removed, drive out the gudgeon-pin while holding the piston upside down to recover the needles without difficulty.

3/ To remove the piston-rings (218/1 X) slip a piece of tin-foil between them and the piston.

*Tool required* 1 shouldered bronze punch 10 mm.

### Disassembling the pedal-shaft pulley (MLRI 2 FIY 10 or 524/1 Z)

Proceed as described above for the clutch-pulley.

- Remove the cap (526/1 X) with the tube used for removing the cap of the automatic clutch.
- Take off felt ring (525/1 X).
- Remove snap-ring (530/2 X) with special pliers.
- Pull off the pulley and remove: shims (522/1 X or /2 X), needles, sprocket (523/1 X) and spacer washer (5381/1 X).



## Remark

According to the type of pedal-shaft fitted to the moped, the assembly can comprise either :

1 set of needles (529/2 X) - shouldered pedal-shaft (521/1 Z or /2 Z or /5 Z). Fig. 14

Or needle bearing WKL 5 F 16 Z - separated by a sleeve (5382 /1 X) - smooth shaft (521/7 Z- TTA) or MLAC 3 F 1 Z (DASL). Fig. 15

Fig 14

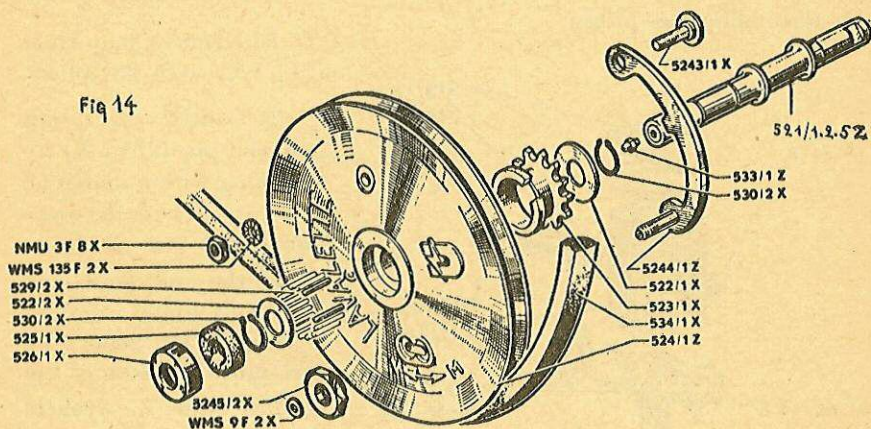
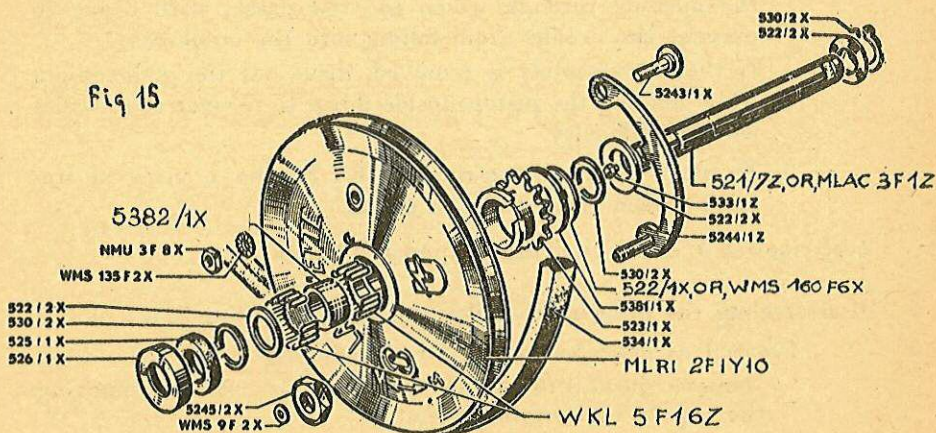


Fig 15



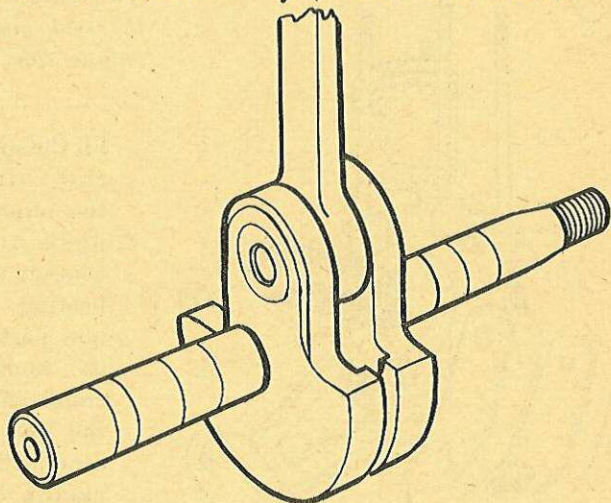


## REASSEMBLY

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### FITTING THE ROD ASSEMBLY in the crank-case and assembling the crank-case.

- Dip both halves of the crank-case in boiling water for several minutes.
- Then holding them with a rag fit the ball-bearings (NKL 5 F 15 Z) in their recesses. They must fit easily. Let the halves of the crank-case cool off.
- Take hold of rod assembly (MLGT 1 F 6 E 10 A).



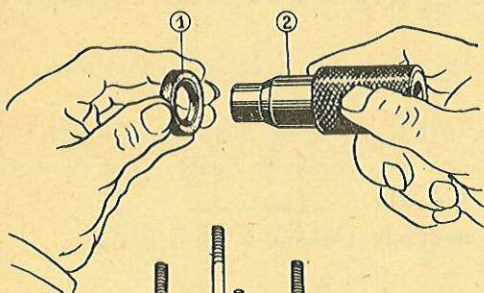
- Fit the shaft of the rod assembly (flywheel-magneto end) into the corresponding half of the crank-case and push until the elasticity of the washer is felt.
- Carefully clean the sealing surface of the crank-case halves.
- Fit the second half of the crank-case without forgetting gasket (504/4 X) which must have been coated with LOWAC paste-perfect seal n° 5 (sealing paste).
- Reassemble the two crank-case halves with the 5 bolts (WSR 93 F 18 X). Do not forget to fit a washer (NMS 601/2 X) and a spring washer (WMS 135 F 5 X) under each nut (NMU 44/2 X).
- Tighten lightly (the nuts must only be locked after fitting the cylinder-head).
- Fit the 4 cylinder pins (229/1 X). Do not screw too tight to avoid breaking the bosses.



## FITTING OIL-SEALS 289/1 Z.

Use the special tool n° EF 50 F.

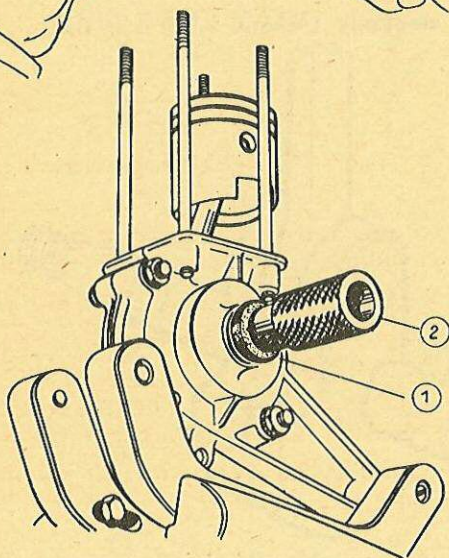
### A - Fitting the oil-seal on the clutch side.



— Lubricate the oil-seal entirely with oil.

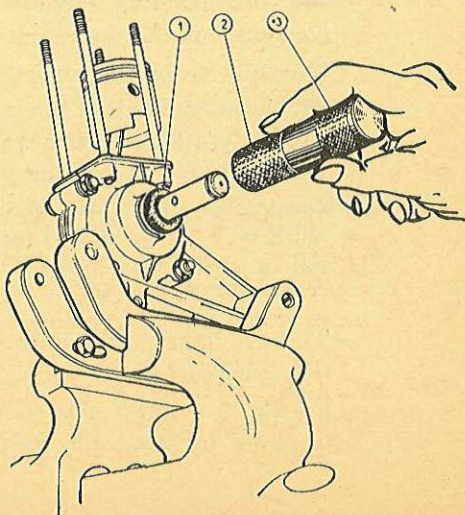
Remove the cap from the spindle and fit the seal (1) on the end of the spindle (2).

*The ring-like spring of the seal must be on the engine side.*



— Fit the spindle carrying the oil-seal over the crank-shaft and push until it is in contact with the ball-bearing. The seal is now partly engaged in its housing on the crank-case. Remove the tool by pulling it away, the seal remaining in its place.

— Turn the tool around, fit the cap (3) over the smooth end. Slide the tool over the crank-shaft until part 2 is in contact with the oil-seal. Give a few gentle taps on the cap with a mallet until the outer side of the oil seal is flush with the crank-case.





**B - Fitting the oil-seal 289/1 Z on the flywheel-magneto side.**

The crank-shaft being conical on this side, the seal can easily be slid on by hand.

Finish as shown in fig. 19.

*Tool required* special spindle EF 50 F.

**Assembly of piston 211/2 Z.**

Before assembling, slide part of the piston in the cylinder and check its normal play. A 6/100 mm gauge must be a close fit.

**A - With rod small-end on a needle-bearing.**

- Fit into the rod small-end a small tube 13 mm long and with 10 mm dia.
- Slide the 19 needles (WRL 2006/2 X) between the tube and the rod small-end.
- Stick 2 washers (WMS 166 F 5 X) with thick grease on each side of the rod.
- Warm the piston by dipping it during several minutes in hot oil.
- Fit the piston over the rod small-end. The piston-ring locating dowels must be opposite the inlet-port.
- Slide gudgeon-pin (213/1 X) cold into the warm piston, and, if necessary, push it in with a mallet. The pin pushes out the tube leaving the needles and washers correctly located.
- Finish the setting of the gudgeon-pin with the shouldered punch used for disassembling.
- Center the gudgeon-pin and fit the 2 span-rings (217/1 X).

**B - With rod small-end on a sleeve.**

The gudgeon-pin is slid cold in the piston previously warmed as explained above. Fit the 2 snap-rings. There are no washers.

*Tool required* 1 tube 10 mm dia. 13 mm long.

**FITTING PISTON-RINGS 218/1 X.**

Slide the rings into their grooves by means of a small leaf of tin-foil, slid between the rings and the piston. The rings must rotate freely in their grooves.

**ASSEMBLY OF CYLINDER 507/3 X (oblique exhaust) or MLPK 1 F 2 X (straight-exhaust).**

- Carefully clean the top of the crank-case.

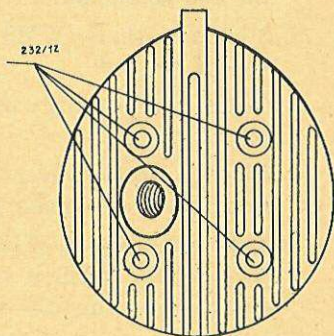




- Fit gasket (506/3 X) after having coated it with LOWAC paste-perfect seal n° 5 (sealing paste), taking great care not to tear it.
- Fit a special clip over the piston-rings after checking that their cuts are correctly located on their dowels.
- Place the piston at T D C.
- Slide the cylinder gently along its pins, helping the piston to slide in.
- Remove the clip which is pushed down by the cylinder and push the cylinder completely down.

#### Assembly of cylinder-head (509/6 X).

- Fit the cylinder-head gasket (508/3 X).
- Put the cylinder-head over the cylinder.
- Tighten the 4 cylinder-head nuts (232/1 Z) crosswise after having fitted washers (231/1 X).
- Lock the 5 crank-case nuts.
- Obturate the sparking-plug hole to avoid dirt from entering the combustion-chamber.



*Tool required* 1 clip for setting the piston rings.

At this stage of reassembling, it is advisable to test the motor with compressed air to check the tightness of the crank-case. The operation is described at the end of this manual.

## ASSEMBLY OF THE CLUTCH.

### I - Automatic clutch.

#### Cup 511/3 Z :

- After lubricating the crank-shaft, slide cup on to it, it must slide close fit.
- Use a tube having a 15 mm inner dia. to push the cup until the pin holes in the hub and in the crank-shaft coincide. Center the holes with a 5 mm rod.

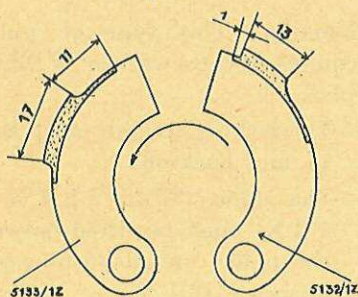


- Fit pin (528/1 X) into the hole in the hub and drive it in until its end is flush with the hub. Use a pin-punch (5 mm) passed through the hole provided in the hub of the cup.

## Pulley 513/5 X:

### a) Assembly

- Couple the starting-weight (5132/1 Z) and locking-weight (5133/1 Z) by means of spring (5135/1 X).
- The spring is hooked, at each end, to pins (5136/1 X).
- These pins once completely driven into the weights are blocked by hammering with a needle on the edge of their holes in order to rivet them slightly.
- Locate the 2 weights on the pulley by shaft (5134/1 X) which must be driven in with a mallet. It must be locked by aid of a screw-driver as described above for the pins.



**Remark :** Great care must be taken regarding the relative positions of the weights. Hold the pulley in your hand, the outer side towards you and the articulation of the weights at its lowest position :

- the starting-weight (having the shortest lining: 13 mm) must be to the right;
- the locking-weight (having the longest lining: 20 mm) must be to the left.

The exact back-off dimensions of both weights are indicated hereafter.

### b) Assembly of the pulley (when on needle bearing)

- Fit a washer (512/1 X) on the crank-shaft.
- Then fit the pulley. Put the motor down on the flywheel side and place the 18 needles (529/1 X) between pulley and crank-shaft.
- Lubricate with grease BOSCH (FT 1 V 4) the size of a pea.
- Fit a second washer (512/1 X).
- Set the weights as follows :  
Slide the pulley slightly forwards to uncover the 2 screws (51321/1 X). Loosen or tighten them in order that :  
1° the starting-weight must be just off contact but without any play ;



2° a distance of .1 to .15 mm is provided between the cup and the lining of the locking-weight.

— Set the side play with shims WMS 7 F 1 X (1/10th mm) and WMS 7 F 2 X (2/10 th mm).

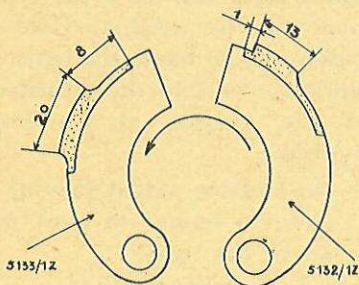
— Fit snap-ring (530/1 X) after having cleaned out its groove. If burrs are found they must be removed with a whetstone and the groove cleaned with a very fine-grade emery-paper. This precaution must be taken each time a snap-ring is fitted.

— Fit cover (526/4 X).

**c) Assembly of the pulley (when on a self-lubricating bushing 53911/1 X).**

The assembly and setting are the same as in the case of needle-bearing.

Fit in the following order: 1 washer (512/1 X), 1 washer (WMS 173 F 1 X), the pulley on its bushing, the shims (WMS 7 F 1 X or F 2 X), 1 washer (512/1 X), snap-ring (530/1 X), cover (526/4 X).



**Remarks :** This type of pulley requires an extra washer: WMS 173 F 1 X.

— The locking weight must have 11 mm back-off.

— The shims (WMS 7 F 1 X or F 2 X) must be fitted between the pulley on its bushing and washer (512/1 X).

— The pulley must fit easily on the shaft after applying a slight

coating of oil to the bushing. Never use grease.

— Before assembly the bushing and crank-shaft must be perfectly clean and free from any scratches or traces of seizing.

— Never use a reamer.

— Never clean the bushing with any grease or oil-solvent (petrol, gasoline, etc.) as this would remove the impregnated oil and a seizure would rapidly result.

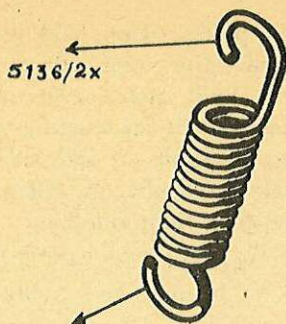
## **II - Multimatic clutch.**

**Support (MLKH 3 F 1 Z).**

**a) Assembling :**

— Fit the spring (542/1X) to the driving-weights (MLMF 2F 1Z)





by means of pins (5136/3 X) (9.5 mm long.). *Attention* : do not mistake with pins (5136/2 X-12 mm long.) which are to be fitted in the support itself.

Fit pins (5136/3 X and /2 X) and lock them as described above for the automatic clutch.

— Assemble the weights to the support by means of the 2 shafts (5414/1 X) driven home with a

hammer and locked at each end by hammering on a screw-driver in 4 places.

— Hook the springs on pins (5136/2 X) with aid of a small hook.

#### b) Fitting :

— Place the support on the crank-shaft and fix with a pin as described above for fitting the cup 511/3 Z of automatic clutch.

— Fit 2 washers (512/1 X).

**Pulley (MLRI 4 F 1 Z).**

#### a) Assembly :

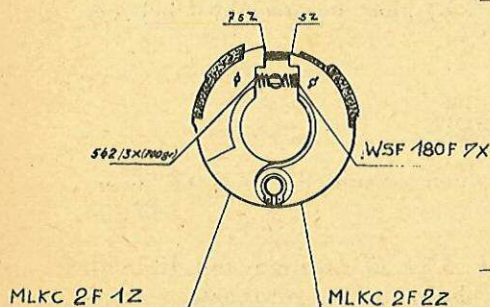
— The starting-weight (MLKC 2 F 1 Z) and the locking-weight (MLKC 2 F 2 Z) are very similar in aspect.

They can however be distinguished :

— by the back-off of their lining: the starting-weight has a back-off to the rear, the locking-weight has a back-off at the front.

the height of the weights at their rest-point, can also differ : the starting-weight is 7.5 mm high. the locking-weight is 5 mm high.

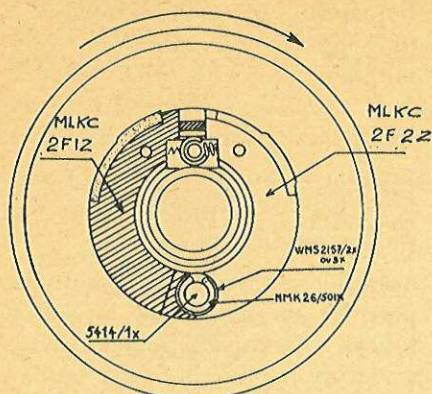
— By means of pins (5136/3 X-9.5 mm long) fit the springs to the weights and lock the pins.



**IMPORTANT:** Spring (542/3 X)—700 grs load—must be fitted to the starting-weight, and spring (WSF 180 F 7 X)—3 kgs load—to the locking weight.

Pay great care not to reverse the fitting of the springs nor to distend them before assembly as their load would be modified. Starting and locking would no longer take place when required.





— The pulley being held in your hand—the inner side towards you and their pivot at the bottom—fit the starting-weight on its pivot on left side and locking-weight on the same pivot on right side.

— Fit washer (WMS 2157/2 X and /3 X) on pivot to set side-play.

— Fit snap-ring (NMR 26/501 X).

— Hook spring of the starting-weight, then of the locking-

weight on the metal support provided under the weight stop-thrust, by means of a small hook.

#### b) Fitting:

— Slide pulley on the crank-shaft with all the precautions described above for fitting pulley of the automatic clutch on self-lubricating bushing.

— Fit washer (WMS 7 F 1 X or F 2 X).

— Fit washer (WMS 7 F 3 X).

— Fit snap-ring (530/1 X). Between snap-ring and washer a clearance of 1/10th to 2/10th mm must be provided.

— Fit cover 526/3 X.

**Remark:** Washers (WMS 7 F 1 or F 2 X) must be assembled between the pulley and washer (WMS 7 F 3 X).

### ASSEMBLY OF FLYWHEEL-MAGNETO.

A Stator.ZPT32 F11 or14 Z (type n° when assembled : ZAN 9 F 26 or 27 ZT).

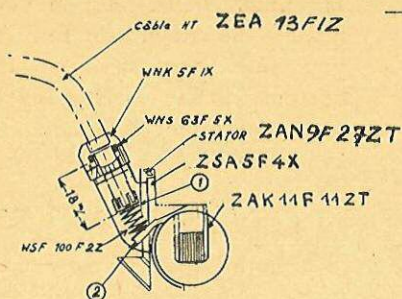
#### a) Assembling:

— Put HT terminal (ZSA 5 F 4 X) in position and fit with 2 screws (NSR 38 F 4/8 X)—heads on the rotor side.

— Fit into the terminal contact-spring (WSF 100 F 2, Z), the collar being upwards and press home.

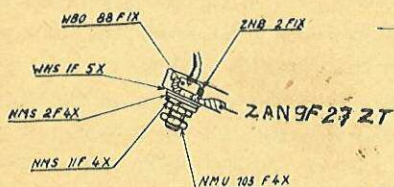
— Solder carefully on the earth-bolt (WBO 88 F 1 X) the primary output wire of the ignition-coil (ZAK 11 F 11 ZT) the wire of condenser (ZKO 29/516 Z) and the wire of the circuit-breaker (take care that the soldering must not be too thick and touch the rotor).





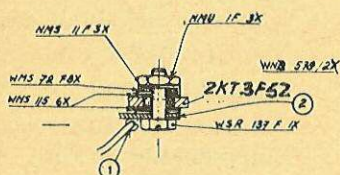
- Fit the ignition-coil on the two supports provided on the stator with screws (NSR 32 F 5/20 X) without forgetting spring-washers (NMS 11 F 5 X).

Before assembling take care that the contact-strip (2) is straight and fits correctly into the rectangular opening in the HT terminal. It must be inserted between the two lower coils of the contact-spring.



- Fit the condenser (ZKO 29/516 Z) in the hole provided in the stator, by means of screw (NSR 38 F 4/8 X) and spring-washer (NMS 11 F 4 X).

- Place the earth-bolt (WBO 88 F 1 X) in the hole provided in the stator immediately under the condenser. Insulating- plate (ZNB 2 F 1 X)— white and square— must be assembled between the bolt and the stator.



- The earth-bolt must be fitted by assembling outside the stator the following parts :

- 1 insulating-washer (WNS 1 F 5 X).
- 1 flat washer (NMS 2 F 4 X).
- 1 spring-washer (NMS 11 F 4 X).

lock with nut (NMU 103 F 4 X) tightly blocked (.18 mkg).

- Place eccentric (ZBO 11 F 1 X) in the recessed hole of the stator (just beside the breaker pivot).
- Place contact-support (ZKT 3 F 5 Z) without fixing it.
- After lubricating the contact-breaker pivot, slide on pawl (ZUH 3 F 5 Z).
- Fit an insulating bush (WNB 578/2 X) in the hole provided in the lug of the contact-support.
- Assemble with screw (WSR 137 F 1 X) on the lug
  - under and in the following order: terminal of the earth wire (1), pawl spring (2)
- 1 insulating-washer (WNS 115/6 X).



- above and in the following order: 1 insulating washer (WNS 115/6 X).
- 1 flat washer (WMS 72 F 8 X).
- 1 spring washer (NMS 11 F 3 X).

— lock with nut (NMU 1 F 3 X).

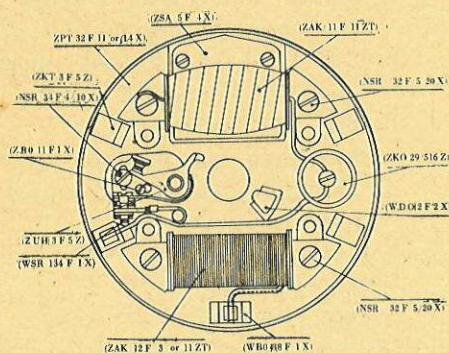
- Fit the contact-holder with screw (NSR 34 F 4/10 X) after setting under the head of screw :

1 flat washer (NMS 2 F 4 X).

1 spring-washer (NMS 11 F 4 X).

- Solder the wire of the lighting coil (ZAK 12 F 3 or 11 ZT) on the lighting terminal (WBO 88 F 1 X) similar to the earth bolt (pay attention to the thickness of solder).

- Fix the lighting-coil on the two lower supports on the stator (the wire must pass between the coil and the stator and not between coil and rotor) with 2 screws (NSR 32 F 5/20 X) and 2 spring-washers (NMS 11 F 5 X).



- Fit the lighting-terminal in the hole beneath the coil with the aid of insulator (ZNB 2 F 1 X).

- Place felt (WDO 2 F 1 X) in its holder after impregnating it with oil.

- Take an ignition-cable (11 strand) 200-mm long and preferably 7 mm dia.

- on one end fix an ignition-plug clip (WKS 1 F 3 X).

— slide over a rubber thimble (ZNK 1 F 3 Z).

— on the other end slide HT cap-nut (WNK 5 F 1 X) without omitting washer (WNS 63 F 7 X).

— bare the end of the wire for 10 mm and turn the strands back, umbrella-wise.

- Introduce the bared end of the cable into the HT terminal and push in for about 18 mm to ensure correct contact.

- Screw HT cap-nut (WNK 5 F 1 X) without locking too hard to avoid breaking.

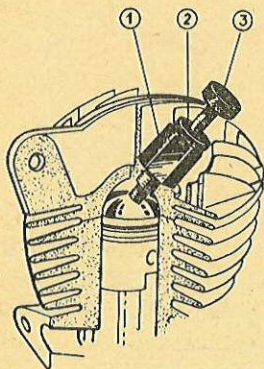


### b) Fitting:

- Slide the stator on the crank-shaft and fix it to the crank-case with 2 screws NSR 32 F 5/35 X fitted with 2 spring-washers (NMS 11 F 5 X). Lock correctly.

### B - Rotor (ZRI 4 F 23 or 24 Z)

- Place the rotor on the conical end of the crank-shaft without blocking it, but sufficiently tight to rotate the mobile assembly.
- Loosen slightly screw (NRS 34 F 4/10 X) fixing the contact-holder.
- By turning the rotor by hand in both directions, set the platinum contacts at their maximum spacing. Then by rotating eccentric (ZBO 11 F 1 X) with a screw-driver introduced through one of the openings in the rotor, set this spacing at .4 mm (use a gauge of this thickness).
- Lock screw (NSR 34 F 4/10 X).
- Time the ignition as follows :



- take the special timing-device (Lavalette tool n° EF 67 F) and unscrew the nut (2) and screw (3) until it only projects at the other end by 4 threads.
- screw the tool (1) in the sparking-plug orifice of the cylinder-head.
- screw-in screw (3) by 5 or 6 turns. Check by means of the mark on the head of the screw.
- raise and lower the piston slightly near its TDC by oscillating the rotor with one hand—with the other, slowly unscrew screw (3), until the exact position is reached where piston and screw are no longer in contact.
- the piston is then at T D C.
- lock screw (3) by means of lock-nut (2).
- turn the engine backwards by means of the rotor.
- screw-in screw (3) 3 1/2 turns.
- bring piston into contact again by turning the rotor in the correct direction.
- the piston is then at the ignition-point which corresponds to 4. mm advance.

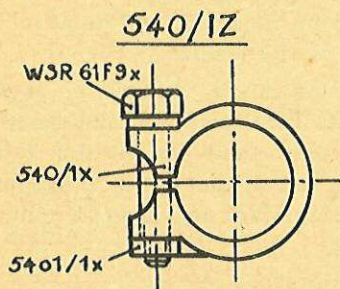


- Pull the rotor slightly back until it rotates freely on the crank-shaft.
- Hold the clutch with one hand to keep the piston in contact with screw (3). Turn the rotor slowly to right and left with the other hand until the contact screws begin to lift.
- Make a mark on the flange of the rotor and another, opposite, on the visible part of the crank-case.
- Lock the rotor by screwing the center nut (WMU 92 F 1 X) with a tubular wrench.
- Make sure that the contacts lift when the two marks previously made coincide.
- Fit cover (ZMK 2 F 3 X) with the 2 screws (WSR 77 F 4 X).
- Remove the timing-device and in its place screw a 14 mm spark-plug. The electrodes must have been carefully cleaned with a metal brush and their gap set at .4 mm with a 10 watts flywheel-magneto or at .6 mm with a 30 watt one.
- Fix the connection-cable clip to the spark-plug and cover carefully with the rubber thimble.

*Tools required* 1 timing-tool EF 67 F.  
1 marking-tool.

## FITTING THE CARBURETTOR.

### 1/ On a flanged cylinder.



- Adapt the inlet-connection (516/2 K) by means of 2 screws (NSR 31 F 5/16 X) fitted with spring-washers (NMS 11 F 5 X). Between the connection and the cylinder insert a joint (515/1X).

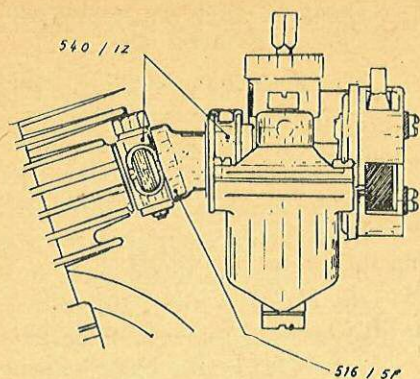
- Fix a clamp (540/1 Z) with its screw loosened, on the tubular outlet of the carburettor. Slide this outlet on to the inlet connection and push home.

- Tighten the clamp slightly. It must only be locked once the motor is fitted to the moped, the carburettor being in a perfectly vertical position.

### 2/ On a cylinder fitted with an inlet-collar.

- Fit a clamp (540/1 Z) on to inlet-connection (516/5 F) and





slide connection on to the cylinder inlet-collar. Push home.

- Fit the carburettor as described above. Only lock the collars after fitting motor to moped in order to check the vertical position of the carburettor.

The settings of the different types of carburettors are as follows :

ZENITH 12 M S  
49 cu.cm.

— main-jet 52  
idle-jet 40  
emulsion-tube OB

GURTNER D 12 G 508  
(right or left) 49 cu.cm.

— main-jet 24

ZENITH 13 M S  
60 cu.cm.

— main-jet 54  
idle-jet 45  
emulsion-tube Y

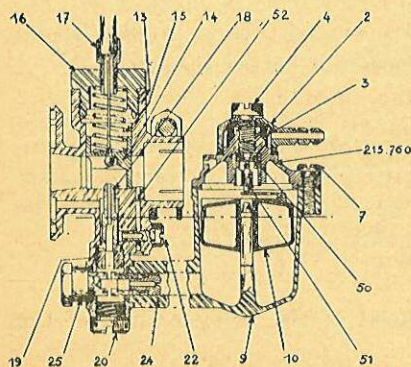
ZENITH 13 M X  
60 cu.cm.

— main-jet 62  
idle-jet .8  
emulsion-tube : 2 holes 6/10 mm at 11 mm from the base.

## CARBURETTOR TYPE ZENITH 12 M S:

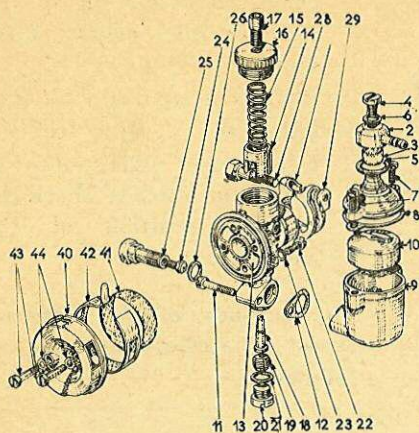
These carburettors consist of two elements: the main housing through which gas flows and the float-chamber. They are held together by two screws, one of them carrying the main-jet.

Petrol reaches the carburettor through the horizontal and rotatable



inlet (2). Its flows through strainer (3) which serves as a filter and arrives at the seat (50) of the float-needle. The plastic float is fitted with a patent spring-device ensuring a perfectly constant level whatever the vibrations. The float (10) slides on a central spindle which reduces friction to a minimum. The float-needle seat and float-needle cannot be disassembled and replacing them means





changing the float-chamber cap. This is a metal cap.

The float-chamber (9) is fitted to the main housing (13) by a screw in a lug and by the main-jet holder (25). The main-jet holder carries the main-jet (24). After being calibrated by this main-jet, the petrol flows into the emulsion tube (18) held in place by a screw (19). A slide-valve (14) in the main housing modifies, according to its position, the quantity of gas mixture entering the cylinder.

This mixture comprises petrol delivered by the main-jet and air entering the carburettor. The correct dosing is obtained at all times by an emulsion of petrol in the emulsion-tube and by the shape of the lower end of the slide-valve (14).

At the lowest position of the slide-valve, the main-jet no longer receives from the cylinder a sufficient suction to let through any mixture. The suction is then felt through orifice (52) under the slide-valve by the idle-jet. (22) This jet then delivers petrol received from the float-chamber via the cap (18). This petrol mixes with the air flowing under the slide-valve (14) and allows the motor to idle. The quantity of gas now delivered is set by the position of the slide-valve which can be modified by a screw (17). A spring (15) always tends to press the slide-valve downwards.

Cold-starting of the motor is obtained by closing the main air-inlet. For cold-starting a flap (42) can close the main air-inlet, thus causing the gas-mixture to be richer. This flap can be operated by hand or by means of a bowden-cable.

A circular metal air-inlet (40) is also provided. It is fitted with an air-flap and an air-filter (41), but it does not act as a silencer.

### Setting :

This is most easily done. The carburettor is fitted with an appropriate slide-valve and the setting is limited to the choice of the correct main-jet (24). The setting of idling speed is made by modifying the idle-jet, and acting on screw (17) setting the throttle cable.

### Maintenance:

From time to time check the cleanliness of the air-fitter and of the strainer at the petrol inlet.



## CARBURETTOR TYPE ZENITH 13 M X :

These carburettors are of a horizontal type. They comprise a central float-chamber. The main-jet is fitted at the center of a ring-like float. This ensures a constant level in the chamber, whatever the position of the motor. These carburettors are completely dust-tight. All the ventilation circuits, as well as the secondary air-inlet and the float-chamber air-vent open into the main air-inlet before the air-filter. All the air entering the motor is therefore filtered.

### Operation :

Petrol reaches the carburettor through the rotatable inlet (1), flows through the carburettor strainer (3) and reaches the float-needle seat (41). A constant level in the float-chamber (7) results from the float (8) operating the float-needle.

During normal running the petrol is delivered by the main-jet (22), emulsified in the atomizer (23) by the air entering through duct (43) and arriving at the upper part of the atomizer. Automatic operation is obtained by the action of emulsion holes (44) drilled in the atomizer tube (23).

The needle (46) fitted to the slide-valve (15) allows for a correct dosage of the mixture according to the position of the slide-valve.

### Idling :

#### a) *Float-chamber setting :*

The idle-jet (24) is dipped in the petrol in the float-chamber. The petrol it delivers flows through duct (47) before being emulsified by air penetrating through the calibrated opening (48). The delivery of the mixture is then controlled by an idling calibrating-jet (49) in the outlet slide-valve (25).

The idling speed is modified by setting the slide-valve stop-screw (29) or the screw setting the cable-sheath (19).

#### b) *Emulsifier setting (does not exist on type 13 M X-Z) :*

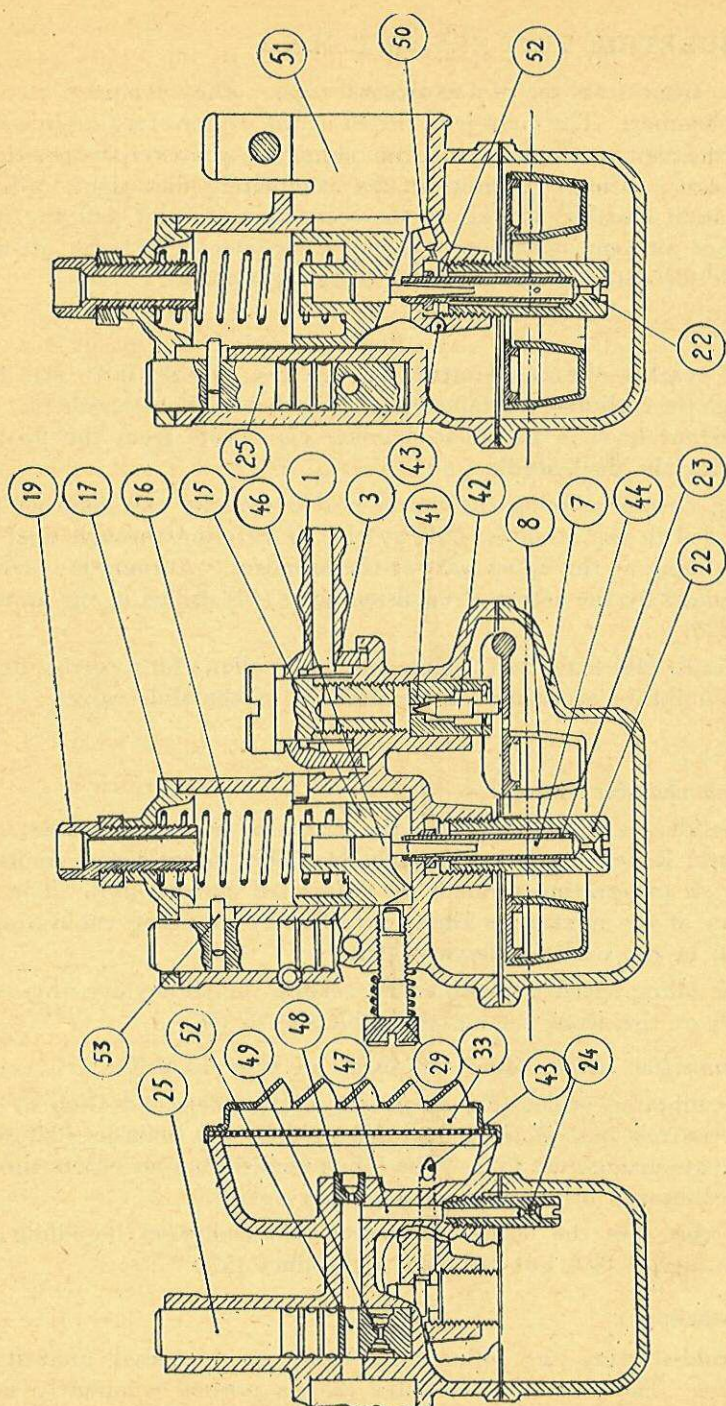
A calibrated orifice (50) opens-out in the inlet-connection at (51). It controls part of the petrol delivered by the main-jet (22) set in the atomizing-duct (52). The idling emulsifying air enters through a calibrated orifice (43) of the main device.

In this case the outlet slide-valve (25) comprises no idling calibrating-jet (49) but only an outlet-duct (52).

### Cold-starting :

For cold-starting the idling-jet delivers an increased quantity of mixture. The starting slide-valve (25) is pressed completely down.







In this position, the calibrating-jet (49) is put off-circuit and the mixture flows through a larger duct (52). It is sometimes advisable to open slightly the gas slide-valve when starting under very low temperatures.

After the motor is started-up, the slide-valve (25) is brought up to its normal position by a dowel (53) in the main slide-valve (15) when it is opened by the throttle.

### Float-Chamber :

It is fitted under the main housing of the carburettor by 2 screws which are easy to reach. The float (8) can also be easily removed as well as all the different setting parts.

### Main-jet:

The main-jet (22) is fitted at the center of the float and is the main-duct. By disassembling it, the atomizer can be removed.

### Slide-valve needle :

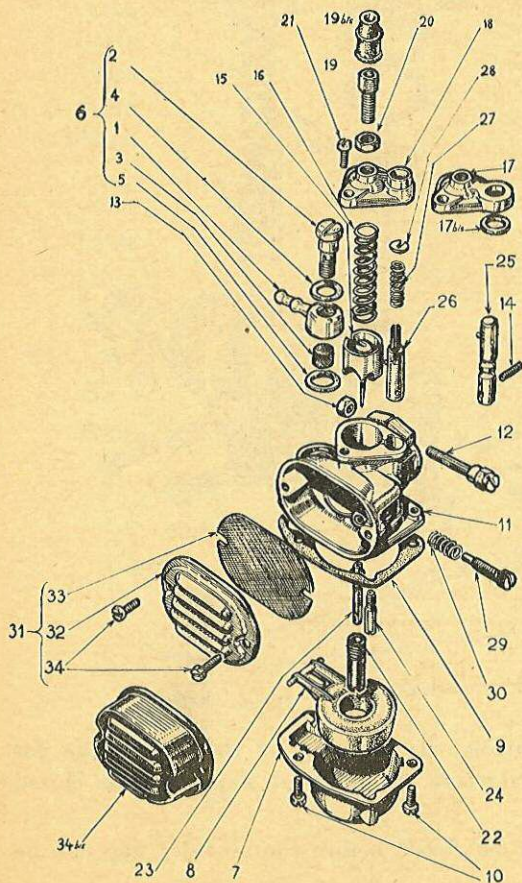
The needle is tight-fitted in the slide-valve (15). It must not be disassembled.

### Slide-valve :

By removing the cover (17) and spring (16), the slide-valve can easily be reached.

### Slide-valve control :

The end of the cable sheath is stopped by the recess provided in the screw (19). The ball at the end of the cable is inserted in a recess in the slide-valve and can easily be removed. When reassembling, the spring (16) must be compressed in order to slip the ball into its recess.

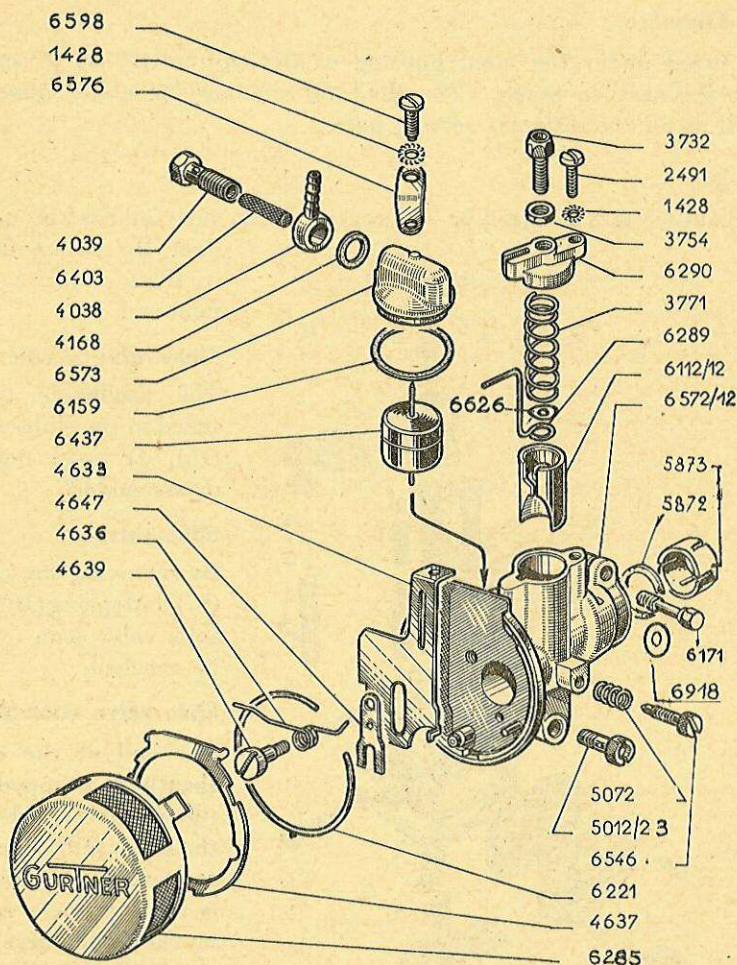




## Setting:

Theoretically the settings must not be modified except the idling-speed which must be modified after the running-in of the motor or according to its state of wear. It can be modified by setting-screws (19) or (29).

## CARBURETTOR TYPE GURTNER D 12 G 508



The twist-grip throttle controls the opening of the slide-valve for normal running. For cold-starting the air-inlet flap must be closed by hand.

The twist-grip throttle must be closed before the air-inlet flap can be closed.



Only close the air-inlet flap (starter) for cold-starting. Once the motor is running, increase speed moderately, then after a few moments, according to the temperature, give the twist-grip throttle a sharp twist to open the air-inlet flap.

To operate correctly, a carburettor must be absolutely vertical, and the clamp, fitting it to the inlet, well tightened without any play. The petrol and air filters must be clean.

To remove the slide-valve unscrew the cap-screw pull out the valve (care must be taken not to lose the spring or the engaging dowel. Press the spring against the cap, rotate the flap-holding strip and release the valve.

For reassembling, after fitting the cable-end, make sure that the flap-holding strip is correctly located and closes the slot in the flap.

The float-chamber must be periodically cleaned. Operate as follows:

- disconnect the petrol feed-pipe;
- loosen the cap-screw;
- twist the stirrup and remove the cap;
- disengage the float (with great care as it is fragile);
- pour petrol into the chamber and rinse carefully;
- clean the petrol and air-inlet filters.

## FITTING THE PEDAL-SHAFT PULLEY (524/1 Z or MLRI 2 F 1 Y 10).

1/ On shouldered pedal-shaft (521/1 Z, /2 Z or /5 Z):

- Fit a washer (522/1 X).
- Take a spare shaft having the same diameter as the pedal-

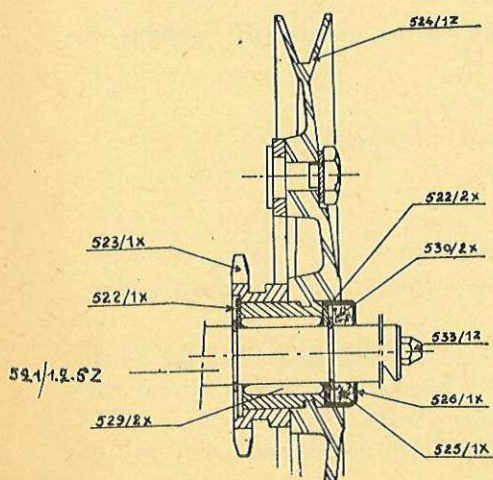
shaft (16 mm) and insert 20 needles (529/2 X) coated with grease between this shaft and the pulley (524/1 Z).

Fit the chain-sprocket (523/1 X) on the pulley flange, teeth outward.

- Slide the pulley gently from the spare shaft on to the pedal-shaft, the needles remaining correctly located.

- Fit a washer (522/2 X).

- Insert a snap-ring (530/2 X) in its groove and check that it penetrates completely without exerting any effort.

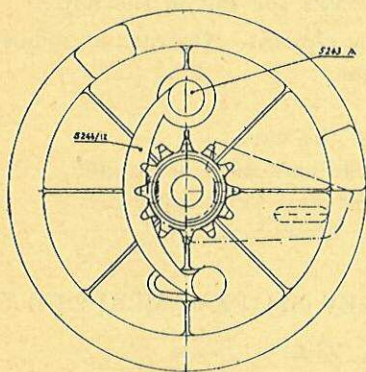




- Place a felt ring (525/1 X).
- Fit cover (526/1 X).
- Lubricate the grease-nipple on the end of the pedal-shaft with a pressure-pump.

**Remark:** If the locking-arm (5244/1 Z) has been disassembled, it must be fitted before placing the needles. This offers no difficulty. After fitting nut (5245/2 X) insert washer (WMS 9 F 2 X) in the recess on the nut and flatten out the end of the shaft with a blow from a hammer to lock the nut.

## 2/ On a smooth pedal-shaft (521/7 Z) fitted with 3 snap-rings:



- Fit a washer (522/1 X).
- As described above, use a spare shaft (16 mm dia.) to introduce in the pulley :
  - a first needle bearing (WKL 4 F 16 Z) coated with grease;
  - a spacer sleeve (5382/1 X);
  - a second needle bearing (WKL 4 F 16 Z) coated with grease.
- Place chain-sprocket (523/1 X) on the flange of the pulley, the teeth

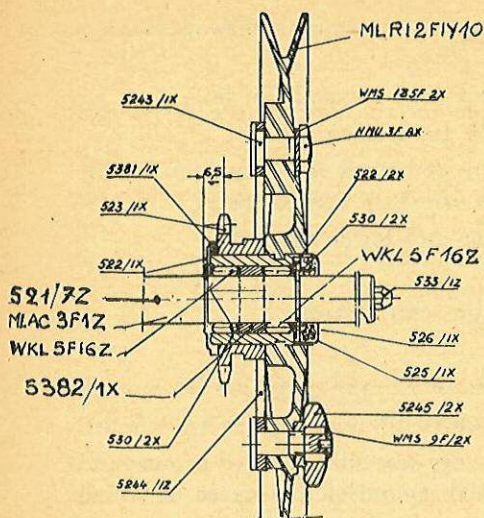
turned outwards.

- Fit spacer-washer (5381/1 X) against the sprocket and fix it with a coat of grease.
- Slide the pulley gently on to the pedal-shaft, without disturbing the needles.
- Fit a washer (522/2 X).
- Insert a snap-ring (530/2 X) in its groove.
- Fit a felt-ring (525/1 X).
- Fix cover (526/1 X).
- Lubricate with a pressure-pump.

## 3/ On a smooth pedal-shaft (521/7 Z or MLAC 3 F 1 Z) fitted with 2 snap-rings:

Operate as described above in the case of pedal-shafts bearing 3 snap-rings. However snap-ring (530/2 X) being omitted, the lateral clearance is obtained by fitting a washer (WMS 160 F 6 X) 3 mm thick instead of washers (522/1 X and /2 X) which in the previous case were set on each side of the snap-ring.





Washer (WMS 160 F 6 X) takes the place of :

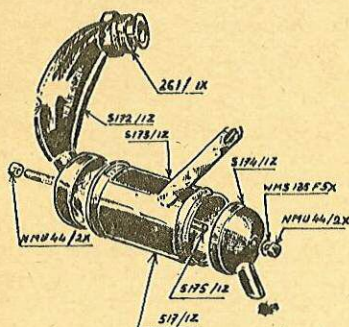
- washer (522/2 X) between snap-ring 530/2 X and bottom bracket.
- snap-ring (530/2 X).
- washer (522/1 X) between snap-ring and spacer sleeve (5381/1 X).

## ASSEMBLING THE MOTOR ON THE MOPED.

- Fit the motor by its upper support (cylinder-head support) by means of bolt (520/1 X), nut (NMU 48/2 X) and a spring-washer (NMS 13 F 10 X). Do

not tighten.

- Fix the exhaust (517/1 Z) to the cylinder by nut (261/1 X) after inserting a joint (108/1 X).
- Fix the lower motor-support by means of bolt (519/1 X),

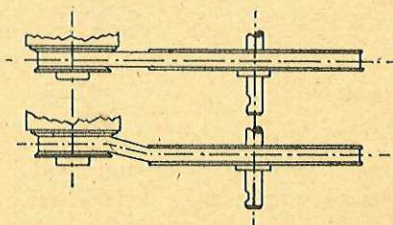
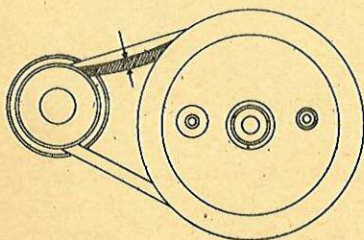


- nut (NMU 1 F 8 X) and spring-washer (WMS 135 F 2 X). The rear exhaust-lug must be inserted on bolt (519/1 X) between the spring-washer and the lug on the moped frame.

- Fit the V belt and check its tension.

The tension is correct when flexion does not exceed 1 cm when tested by hand.

If the flexion is too great, remove





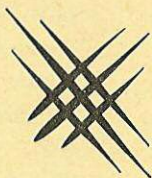
the belt, loosen the bolt, push the motor forward with a lever, and lock the bolt.

Make sure that the 2 pulleys are correctly in line.

Refit the V belt and check its tension.

This operation must be renewed until the alignment of the pulleys and the tension of the belt are correct.

- Lock the bolts of the upper and lower supports.
  - Fit the chain.
  - Adapt the petrol-pipe to the carburettor.
  - Fit the throttle-cable.
  - Connect the stator earth-terminal to the switch on the moped.
  - Connect the lighting-terminal to the moped's electric-circuit.
- These connections must be very carefully checked as unsound connections may cause faulty operation the cause of which is difficult to trace.
- Reassemble protection-covers and left pedal.





## MISCELLENEOUS REMARKS

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### DECARBONIZING

This consists in removing carbon deposits accumulated on the walls of combustion-chambers in petrol engines, and, in the case of two-stroke engines, the inlet and outlet-ports are easily clogged up.

When these carbon deposits reach a certain thickness, the running of the engine can be impeded.

Their presence in the combustion-chamber, where they easily become red as a result of the heat, can cause detonating and knocking.

By preventing a correct flow of the gases through the inlet-port, and of the burnt gases through outlet-port, exhaust and silencer, they cause a loss of efficiency and heating of the engine.

Too high oil content in the petrol mixture, the use of bad quality oil, a faulty setting of the carburettor increase the carbon deposit.

It is therefore impossible to fix the exact mileage after which decarbonizing becomes necessary. Abnormal heating of the engine or lack of "pull" are sufficient indications that this operation is required. Theoretically the first decarbonizing should take place after 1,000 miles and renewed thereafter every 1,200 miles.

As explained above, disassemble exhaust, silencer, cylinder-head, carburettor and cylinder.

As soon as the cylinder is removed, obturate the opening in the crank-case with a clean rag to prevent dirt from penetrating. Use a soft-metal scraper (bronze or aluminium) to avoid scratching the cylinder-head or the piston :

- Scrape the carbon deposit in the exhaust-ports but do not remove the line of carbon above the piston-ring mark.
- Clean out the cylinder-head.
- Scrape the top of the piston but do not remove the carbon in the piston-ring grooves (unless the rings are stuck) nor the deposit on the piston between top of piston and upper piston-ring as this improves the tightness, acting as an extra joint with the line on the cylinder.
- Clean the entrance to the exhaust and pass a chain to and fro through the exhaust-pipe.

Decarbonizing can be better obtained by heating the outside of the exhaust with a blow-lamp but this spoils the chromium plating.

- Knock on the exhaust with a mallet to unstick the carbon.
- Decarbonizing the silencer is easy as this part can be completely disassembled. If it cannot be disassembled, dip it in a solution of soda or burn it with a blow-lamp.



**Spark-plug** (every 600 miles approximately) :

The plug-gap must be set between .4 and .5 mm with 10 watts flywheel magnetos and between .5 and .6 mm with 30 watts magnetos.

The plug-points must be cleaned first with a metal brush. It is advisable to change the plug-washer each time the plug is removed.

### **Carburettor:**

Disassembling and setting have been described above (see "carburetors"). It must be remembered that if the engine has been flooded owing to a faulty operation of the float-needle valve, the carburettor must be aired.

For this: remove the spark-plug, close the petrol-tap, empty the carburettor, open the throttle to full and rotate the engine by means of the pedals.

### **Clutch:**

#### **A - Automatic**

The setting of the weights is described above (see "assembling"). It must be noted that lubrication in excess, or the use of an inappropriate grease can cause grease to reach the linings and result in their being damaged and the clutch slipping.

Before assembling pass a fine-grade emery-paper inside the cup to clean it.

If the weights require being backed-off, this must be done with a very fine file to avoid tearing.

The back-off must be between .8 and 1 mm deep:

- on the starting-weight—back-off for 1 mm at the front leave a bearing-surface 13 mm long and back-off at rear.
- on the locking-weight (pulley fitted on needles) back-off for 8 mm at the front leave a bearing-surface 20 mm long and back-off at rear.
- on the locking-weight (pulley fitted on self-lubricating bush) back-off for 11 mm at front, leave a bearing-surface 17 mm long and back-off at rear.

The weights must be replaced if owing to excessive wear of the linings the underlying metal becomes visible.

#### **B - Multimatic**

This type of clutch requires no particular maintenance.

After first 60 miles check inner surface of the cup and clean with a fine-grain emery-cloth as metal particles can have gathered.

Never use a ream inside the self-lubricating bushing and never clean it with a solvent. All the weights must work perfectly dry.



The 2 pulleys (clutch and crank-axle) must be correctly in-line to ensure proper life of the bearing. This bearing exists in 2 lengths : 16 mm and 20 mm.

If a 20 mm bearing is to be fitted in the stead of a 16 mm one, the thickness of the hub of the starting and locking-weights support must be reduced by 4 mm.

#### **Crank-case tightness test:**

After a repair of the crank-case or of its seal-washers, and if the necessary equipment is available, it is advisable to test the tightness of the crank-case.

Remove the flywheel-magneto and clutch assembly. Obturate the exhaust and set the piston at T D C. Connect the inlet to a compressed-air pipe and dip the motor in a petrol tank. Set the pressure of air at 1 kg (1 atm).

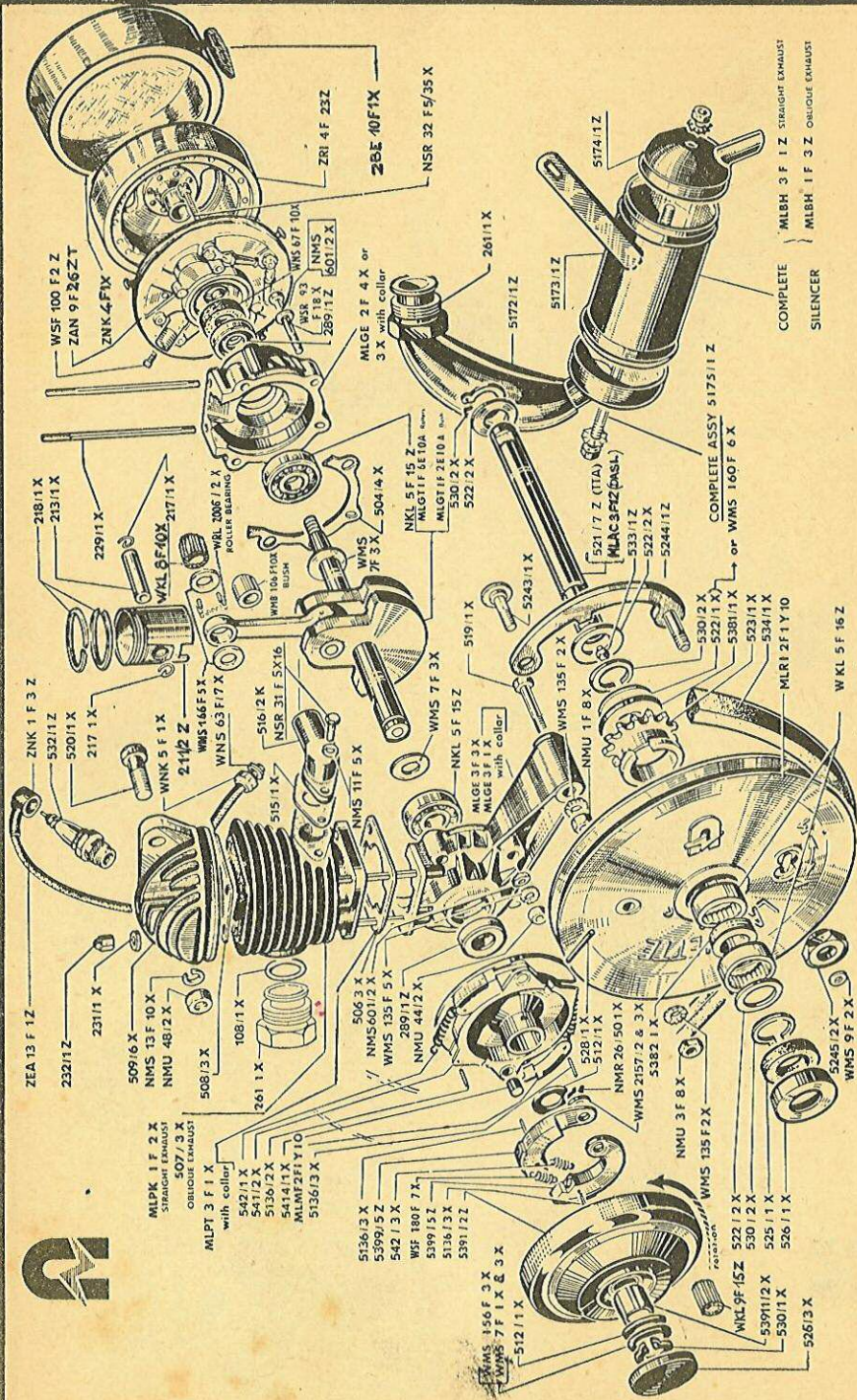
If bubbles of air appear, the leakage can easily be found.

This test requires compressed-air produced by a compressor or supplied from a bottle fitted with a pressure-reducer.









**LAVALETTE**

**A.M.L. 50/2**

**FLYWHEEL MAGNETO**

with

VM/BK 1/17 GF 19 T







SUPPORT ASSEMBLY  
MLKH 3 F / 1 Z



CLUTCH

COMPLETE ASSEMBLY  
MKLG 2 F / 1 Z

MLMF 2 F 1 Y 20

Assembly MLMF 2 F 1 Z

(5414 / 1 X)

(528 / 1 X)

(542 / 1 X)

(5136 / 3 X)

(542 / 1 X)

(5136 / 2 X)

(541 / 2 X)

(512 / 1 X)

(NMR 26 / 501 X)

(WMS 2157 / 2 X  
3 X)

5399 / 5 Z

Assembly MLKC 2 F 2 Z

WSF 180 F 7 X

(5399 / 5 Z)

Assembly MLKC 2 F / 1 Z

(5136 / 3 X)

(542 / 3 X)

(5391 / 2 Z)

(53911 / 2 X)

(512 / 1 X)

(526 / 3 X)

(530 / 1 X)

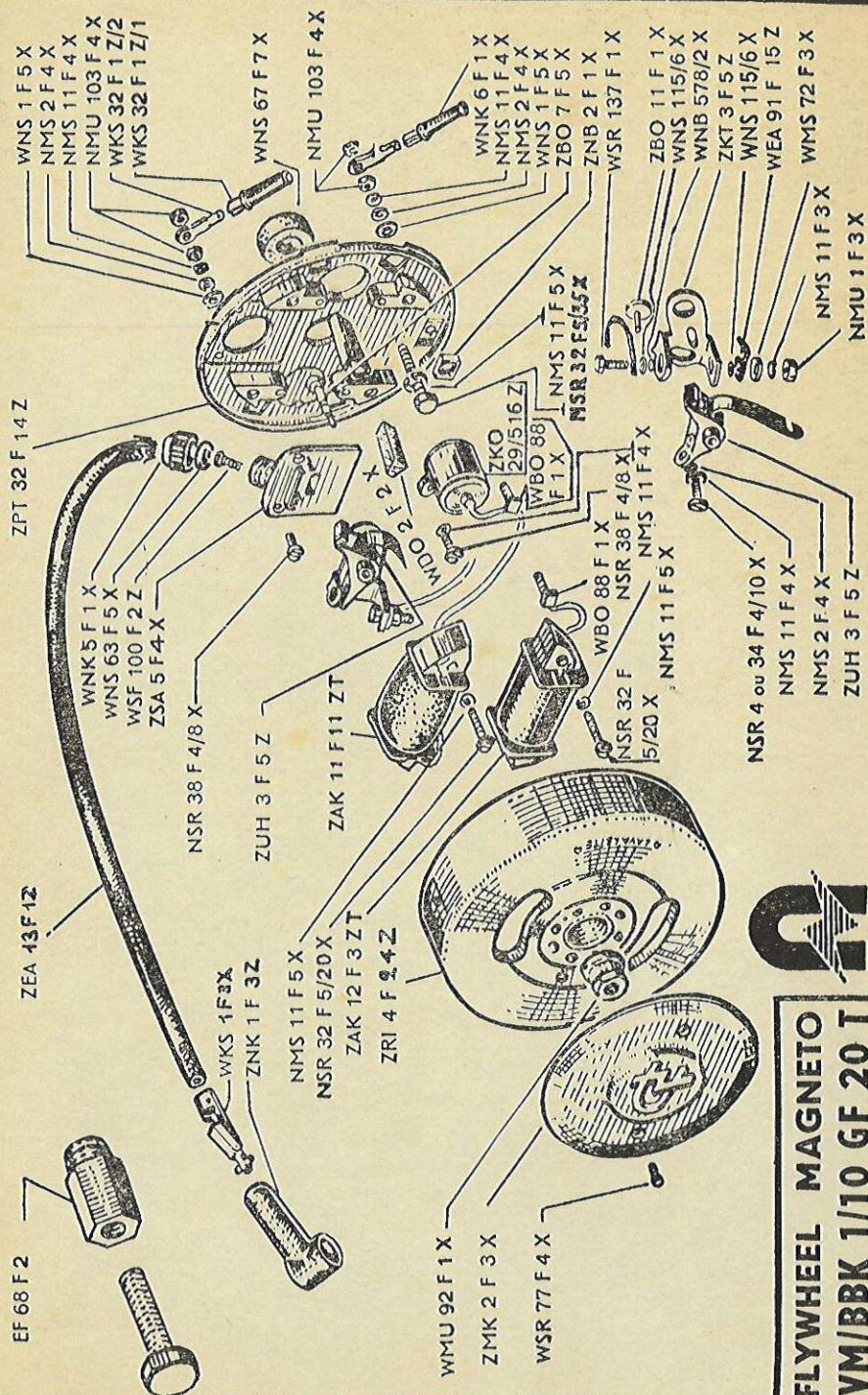
WMS 156 F 3 X

PULLEY ASSEMBLY  
MLRI 4 F 1 Z









**FLYWHEEL MAGNETO  
VM/BBK 1/10 GF 20 T**



