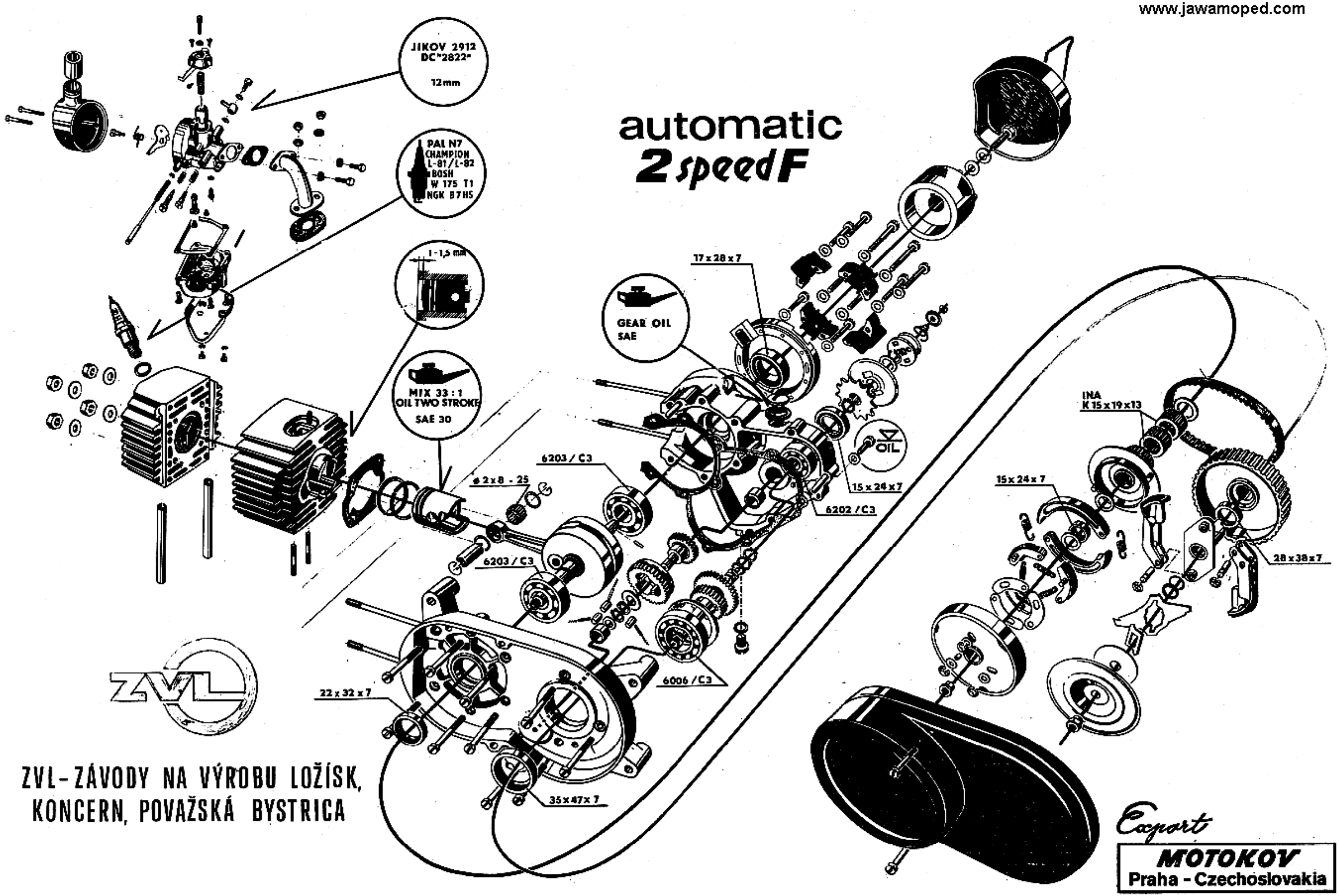
automatic 2 speed F



ZVL

ZVL - ZÁVODY NA VÝROBU LOŽÍSK,
KONCERN, POVAŽSKÁ BYSTRICA

Export

MOTOKOV
Praha - Czechoslovakia

6. Crankshaft

Removal and reinstallation

1. Use a press with a pressure of about 50,000 N.
Before removing the crankshaft, mark the relative positions of the crankshaft flywheels with index lines using a set square.
2. Press the crankpin out of one half of the crankshaft and then out of the other half.
3. Assemble the connecting rod, the crankpin and the cage with needle rollers according to the classification table.
4. Clean thoroughly all parts of the crankshaft, especially the crankpins, which must be perfectly dry
5. Press the crankpin in the flywheel till its face is flush with the outer surface of the flywheel.
6. Fit in position the cage with needle rollers and lubricate the needle rollers with lubricating grease.
7. press the flywheels together – observe the previously made index lines.
8. After reassembly, it is necessary to centre the crankshaft.

Connecting rod	Assembly groups						
I	15	14	13	12	11	roller	
	A	B	C	D	E		gudgeon pin
II	14	13	12	11	10	roller	
	A	B	C	D	E		gudgeon pin
III	13	12	11	10	9	roller	
	A	B	C	D	E		gudgeon pin
IV	12	11	10	9	8	roller	
	A	B	C	D	E		gudgeon pin
V	11;12	10;11	9;10	8;9	7;8	roller	
	A	B	C	D	E		gudgeon pin
VI	10	9	8	7	6	roller	
	A	B	C	D	E		gudgeon pin
VII	9	8	7	6	5	roller	
	A	B	C	D	E		gudgeon pin
VIII	8	7	6	5	4	roller	
	A	B	C	D	E		gudgeon pin
IX	7	6	5	4	3	roller	
	A	B	C	D	E		gudgeon pin
X	6	5	4	3	2	roller	
	A	B	C	D	E		gudgeon pin

Conrod small end	Piston assembly groups		
I	1 / 5	pin / needle	
II	1 / 4	2 / 3	pin / needle
III	1 / 3	2 / 2	pin / needle
IV	1 / 2	2 / 1	pin / needle
	Y	X	piston

Roller - conrod big end		
Classification - dia.4		
Designation	Diameter classification group	Class tolerance limits
1	+ 10	
2	+ 9	
3	+ 8	
4	+ 7	
5	+ 6	
6	+ 5	
7	+ 4	
8	+ 3	
9	+ 2	
10	+ 1	± 0,5
11	0	
12	- 1	
13	- 2	
14	- 3	
15	- 4	

Crankshaft aligning

Check the aligning and the permissible untrue run using a special jig with centres and two dial indicators. The crankshaft must be supported in the centres so that it can rotate. The maximum permissible relative run-out of the functional points is 0.016mm. The functional points in this instance are the shoulders for the bearings. The design of the crankshaft and the manufacturing process guarantee this value. Check the run-out or untrue run before installing the crankshaft in the engine.
Misalignment of the crankshaft is usually caused by a crash, rough handling during transport, dropping the crankshaft on the ground or by an unskilled repair. You will obtain the correct axial (lateral) clearance of the crankshaft in the crankcase if you maintain the dimension 38-0.2mm (distance of the shoulders for the bearings) when pressing the crankshaft together. The minimum distance of the flywheels in place on the crankpin must be 12.2mm.

Crankshaft aligning and straightening procedure

Check the alignment of crankpins as illustrated in Fig 23. If the crankshaft halves are mutually set off, remove the crankshaft from the centres, and using a suitable copper or aluminium pad and a hammer or soft material work on it till the crankpins are aligned as perfectly as possible The two crankshaft halves are not set off if both dial indicators give the same readings when rotating the crankshaft. If after this procedure the mutual run-out of the functional parts is greater than 0.016mm, straighten the crankshaft (its axis) by bending both its halves against each other in the required direction.

This procedure is depicted in Fig. 23. Depending on the deflection of the crankshaft axis (ascertained by dial indicators), bend the flywheels toward each other (- - readings) or away from each other (+ + readings). If necessary, repeat the bending on more planes than the one given in the illustration.

Decisive for the final straightening is the maximum permissible untrue run of the functional part (surfaces) of 0.016mm. If you fail to obtain this value by the described procedure, it means that the crank mechanism is defective and has to be replaced with a new one. As this work requires great skill, it should be done by a highly qualified fitter.

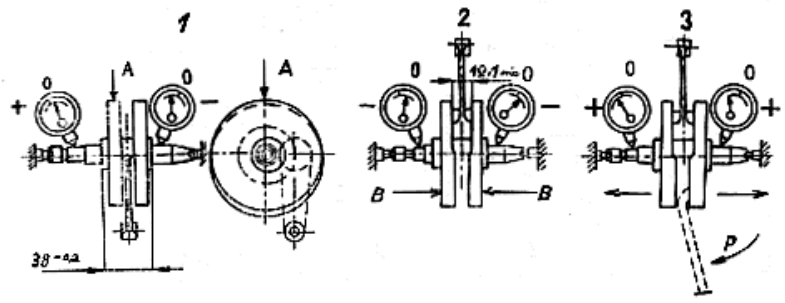


Fig. 23

IV. FRAME

1. Front Telescopic Forks

The front fork can be slid out of the frame head after loosening the steering centre bolt. Before refitting the fork thoroughly, lubricate the sliding parts with mineral jelly.

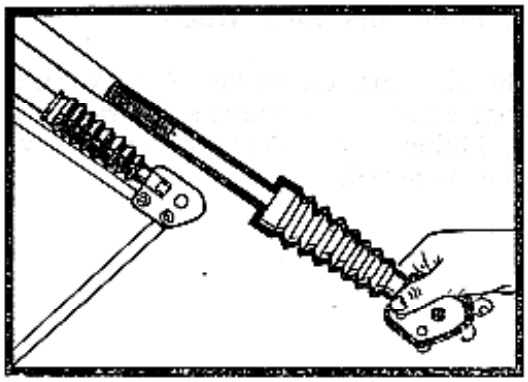
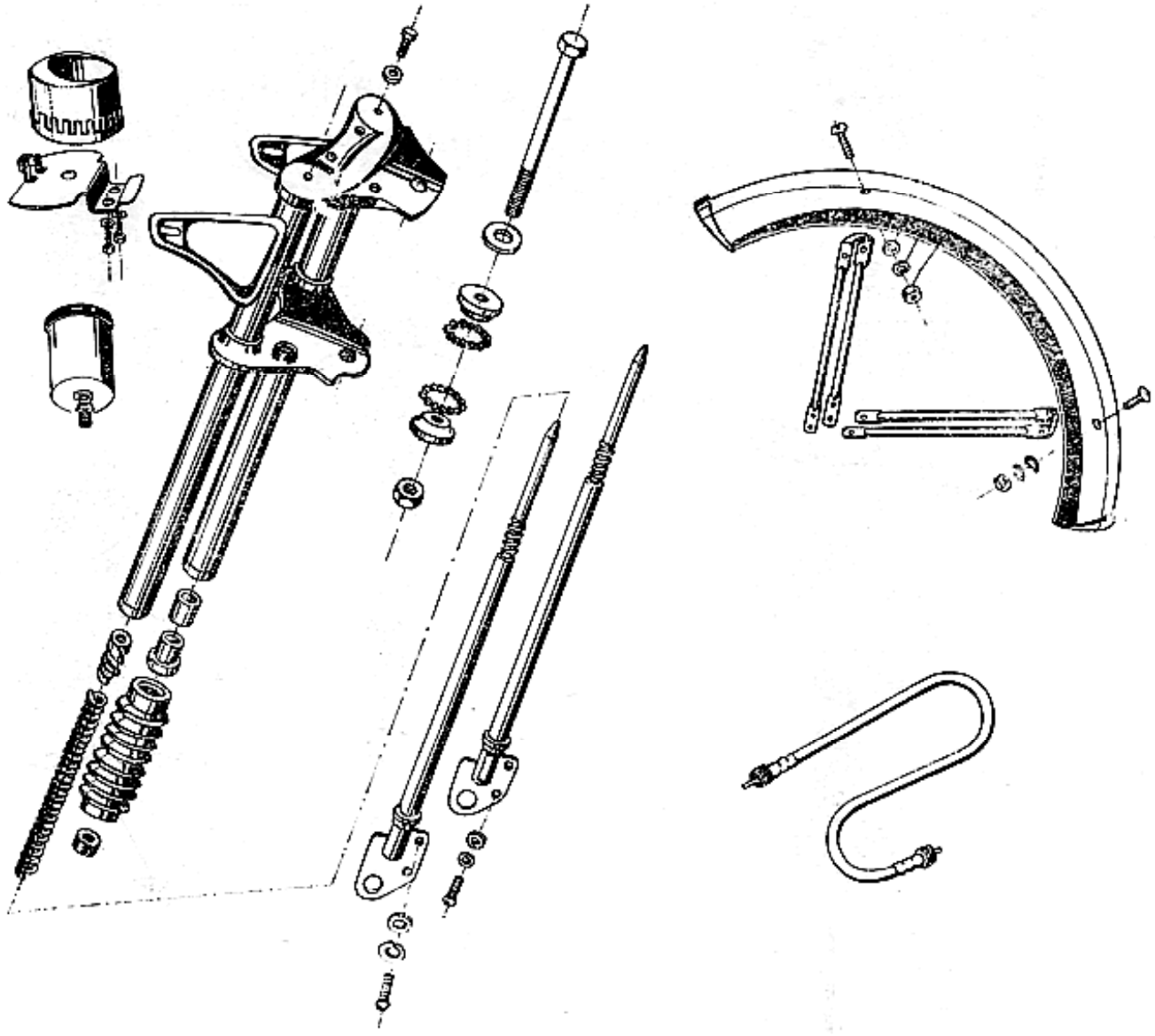


Fig. 24 Removing front telescopic fork slider

Fig. 25 Front telescopic fork



2. Front and Rear Wheel

The minimum dimension of the worn brake-shoe linings which still ensures safe braking is dia. 81.5 mm. Linings worn down below this value have to be renewed.

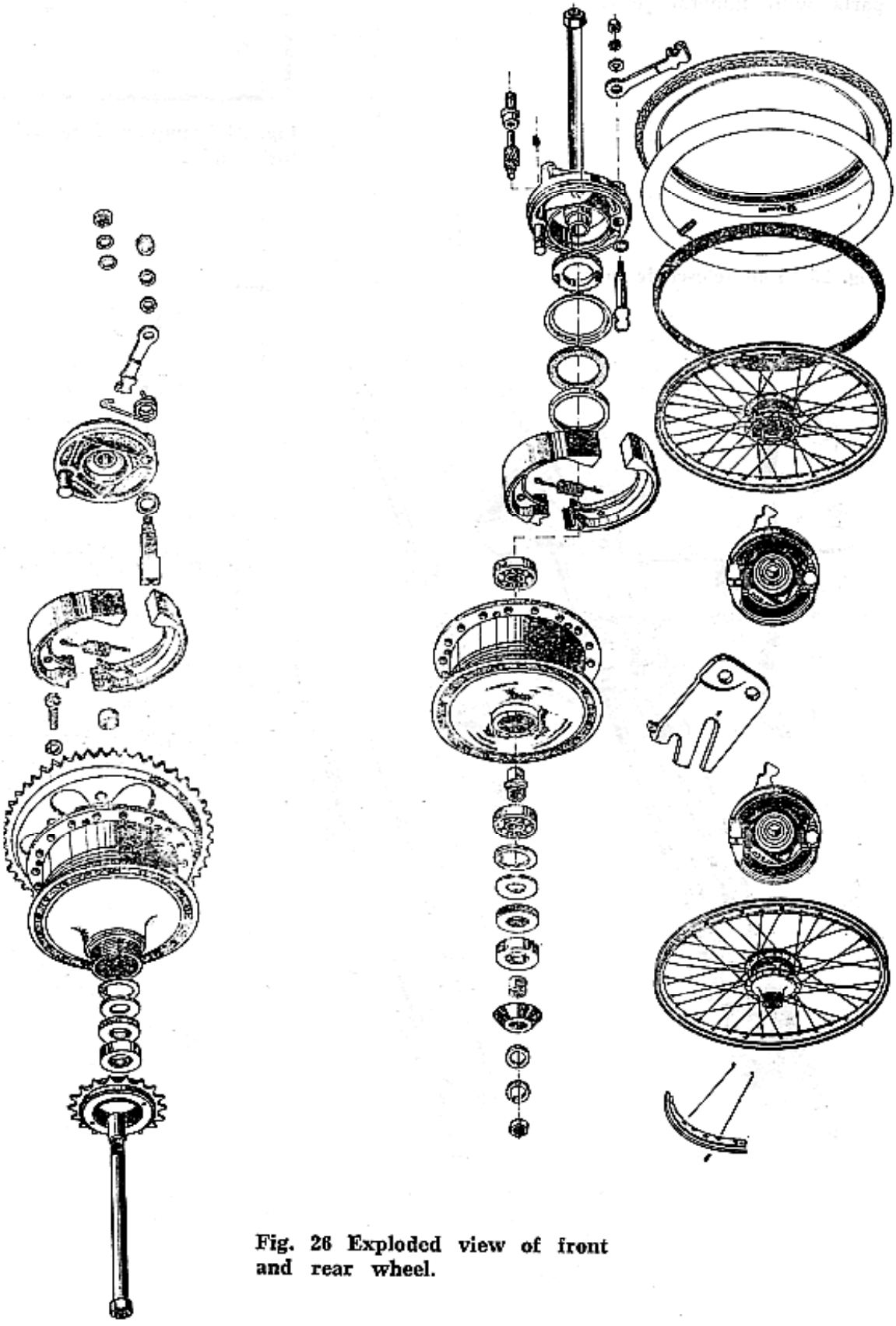
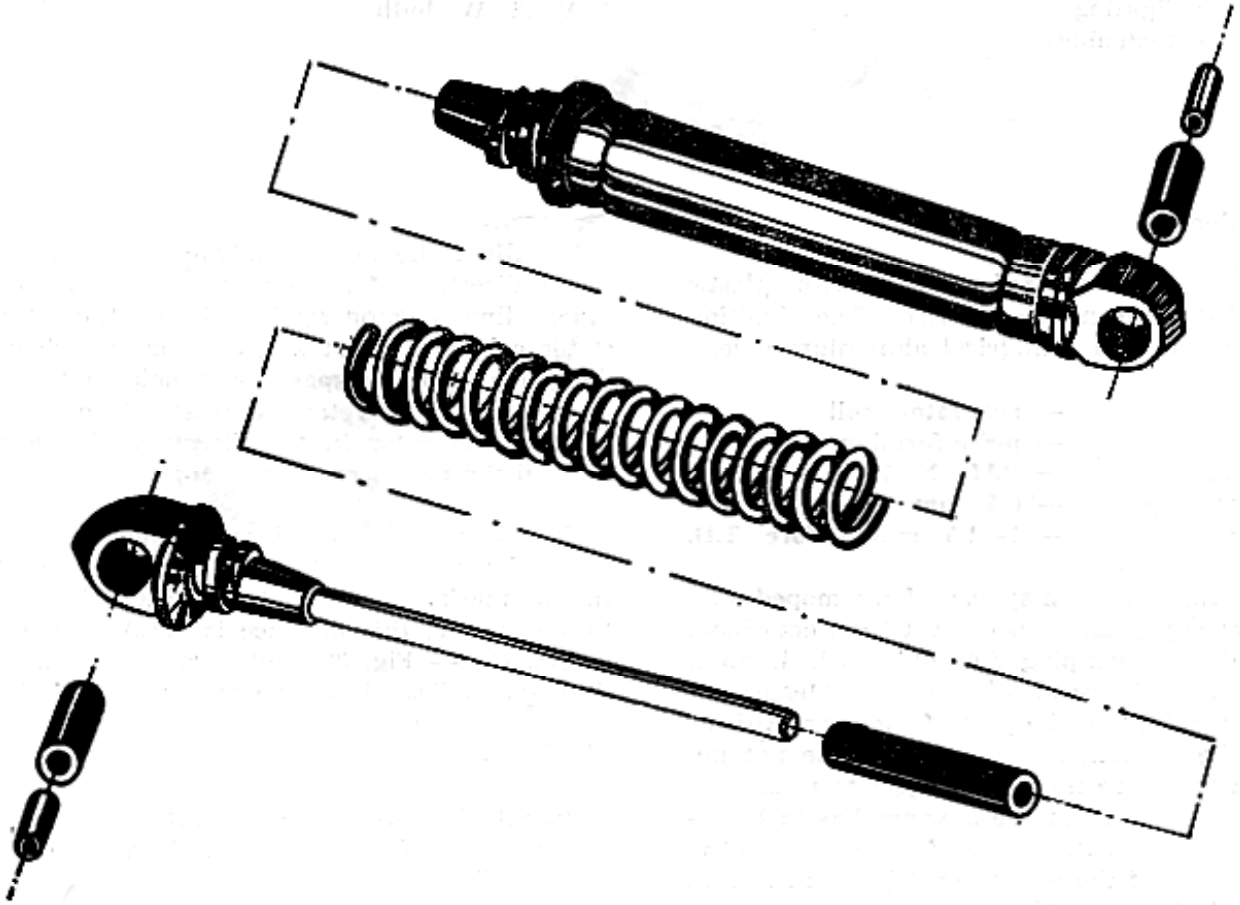


Fig. 26 Exploded view of front and rear wheel.

3. Rear Telescopic Suspension Units

The moped is fitted with rear telescopic suspension units of simple design and without shock absorbers. They work with a stroke of 60 mm, and they require no maintenance. To remove them, loosen the two M 8 nuts fastening them to the pins in the frame and to the rear swinging arm.

Fig. 27 Rear telescopic suspension unit.



Dismantling telescopic suspension units

a) unscrew the top spring retaining lug,
b) screw the spring out of the bottom retaining lug.

Reverse the dismantling procedure to reassemble the telescopic suspension units. Before refitting, lubricate the top lug guide of each unit with lubricating grease.

V. ELECTRICAL EQUIPMENT

1. Alternator

Electric current is supplied by the alternator fitted with a rotor with permanent magnets. The lamps are fed with current from three stator coils connected in series with an output of 20 W at a voltage of 6 V.

Another stator coil supplies current to the ignition coil and the thyristor block controlled by the pulse-forming stator coil.

Lamps:

Headlight	**6 V / 21 W bulb**
Tail light	**6 V / 5 W bulb**
Speedometer lighting (outside bulb fastening)	**6 V / 2 W bulb**
Speedometer lighting (inside bulb fastening)	**6 V / 1.2 W bulb**

2. Ignition

Contactless, thyristorized system with plastic encapsulated semiconductor device. The ignition coil is enclosed in a cylindrical aluminium case.

Feeding	— generator coil
Starting	— pulse-forming coil
Spark plug	— PAL N 7R
Plug point gap	— 0.5 mm
Ignition advance	— 1—1.5 mm before T.D.

The described ignition system of the moped does not require any maintenance apart from occasional cleaning of the spark plug. Any defect which might occur is usually the result of unskilled interference or rough handling on the part of the user. Adjustment of the ignition advance is likewise not necessary as there are no parts subject to wear. The only instances in which the advance has to be readjusted is the working loose of the stator screws or the removal of the alternator. Therefore refrain from interfering with the ignition system in any way. In the case of a defect, have the repair done by a skilled electrician.

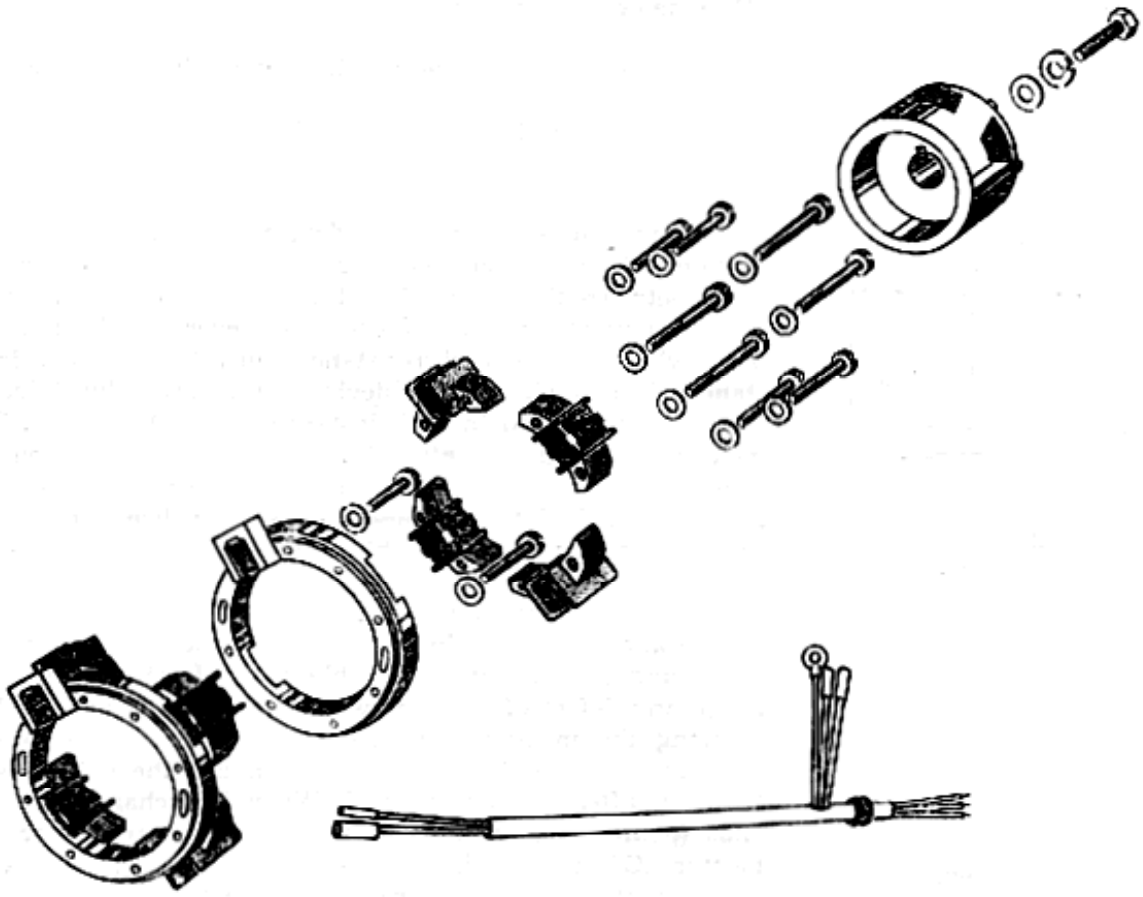
To adjust the ignition advance, turn the rotor in the direction of the arrow „A" (Fig. 29) till the index lines (timing marks) „B" on the rotor and stator coincide. Insert an indicator or a depth slide gauge into the spark plug hole and measure the depth to the retracted piston. Then continue rotating the rotor in the direction of the arrow „A" till the piston reaches its top position (T.D.C.).

The distance read off the indicator or depth gauge from the point of the coincidence of the timing marks to the piston T.D.C. should be 1 to 1.5 mm. If this distance is greater, loosen the screws (E) — Fig. 30, and turn the stator in the direction indicated by the arrow „C". If the distance is smaller, turn the stator in the direction of the arrow „D".

Repeat this procedure till obtaining the specified advance of 1 to 1.5 mm. Then retighten the screws „E" and recheck the advance.

3. Moped Wiring Diagram
(is placed on page 30)

Fig. 28 Alternator
The nominal air gap between the rotor and the coils is 0.3 mm.



Ignition advance adjustment

Fig. 29

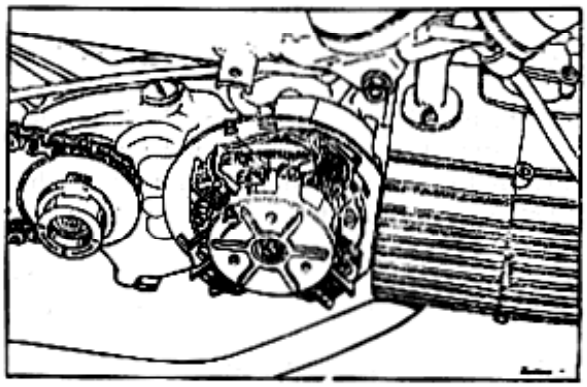
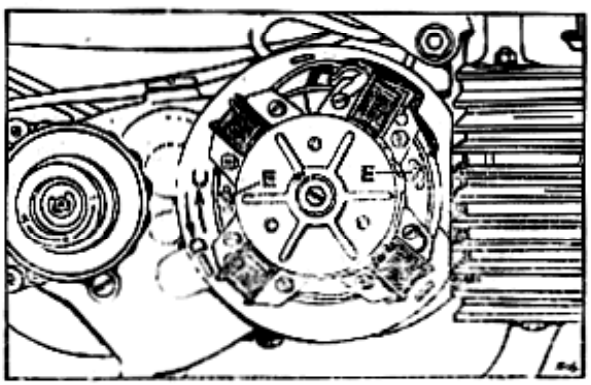
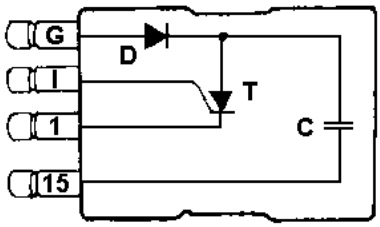


Fig. 30





Ohmmeter indications

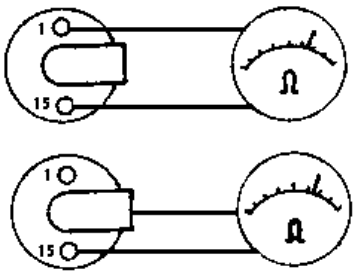
It is recommended to use an ohmmeter with 1.5 to 3 V in-feed.

Use ohmmeter with 1 kiloohm (10 kiloohms) range scale.

When checking semiconductor device, start with its internal connections. To check the thyristor trigger circuit, measure the resistance between the outlets **I** and **1**, and repeat the measuring after interchanging the measuring ends (i.e. reversing the fed-in voltage polarity). The measured resistance must be different in both instances. The semiconductor device is unequivocally defective if the resistance measured in both instances nears 0 or ∞ . During the measuring between points **G** and **1** (and also when interchanging the measuring ends) the indication in both instances must be ∞ If a certain deviation is measured in one direction (+ to **G**), the thyristor has a leakage which represents a defective condition. With a faultless semiconductor device, the measurements in both directions between the points **G—I** and **1—15** must indicate ∞ With some measuring instruments (with a higher response of the measuring system), it is possible to find within the 10 kiloohm range any defect of parts between the points **G** and **15**. When connecting the measuring points so that the positive pole is to **G**, the instrument will show a deflection but the pointer will return to ∞ after a brief interval. When interchanging the measuring ends (points), the instrument indicates ∞ resistance. If the capacitor C is shorted, the first measuring will show a resistance of constant value. In the case of a short-circuit of the diode, the phenomenon of the first measuring is bound to appear also after the interchange of the points. It goes without saying that in the case of the interruption of D or C , ∞ would be measured in both directions. We should like to point out that with the phenomenon accompanying the first measuring, the capacitor becomes charged to the voltage of the measuring instrument and the check can be repeated only after the spontaneous discharging of this capacitor which might take several minutes up to an hour.

A faultless ignition pole should give an ohmmeter reading of about 220 ± 10 ohms between pole core, vehicle frame (ground) and pole outlet (red lead)

A faultless pulse-forming coil should give an ohmmeter reading of about 17 ± 1 ohms between the stator carrier and its outlet (yellow lead).



The resistance between the terminals **1** and **15** must be less than 1 ohm.

The resistance between the terminal **15** and the H.T. outlet should be about 6,000 ohms. A defect can be ascertained unequivocally by this measuring only in the case of an interruption of the circuit — the measuring instrument indicates ∞ (infinite resistance).

Defects of the ignition coil are rare and therefore it is recommended to check before its renewal the condition of the connecting leads and terminals.

Replace the H.T. coil only with an original coil,
Part No. 443 212 210 800 — 4 V.

VI. CAUSES OF DEFECTS AND THEIR REMOVAL

A. ENGINE

Engine will not start

1. Shut fuel cock.
2. Empty fuel tank.
3. Choked fuel hose, strainer or fuel jet. Water in float chamber.
4. Faulty ignition -- carbon deposits on spark plug electrodes, defective spark plug insulator, excessive plug point gap, defective thyristor device defective ignition coil or stator carrier.
5. Over flooded engine.
   Remedy: Shut off the fuel cock and work the pedals with the machine on its stand or pedal along till the engine fires. Use the decompressor if the moped is fitted with it. Then open the fuel cock. It may also be necessary to unscrew the spark plug and clean it and to turn the engine several times to expel excessive fuel through the spark plug hole. Reinstall the spark plug and repeat the starting procedure.
6. Slipping or defective starting clutch. This you can ascertain by removing the crankcase cover on the ignition side when you will be able to see whether the crankshaft with the rotor is rotating.

Engine runs erratically

1. Overheated engine,
2- Faulty spark plug,
3. Partly obstructed fuel supply or choked main jet
4. Leaky crankcase.
5. Faulty cable terminal.
6. Faulty ignition.
7. Imperfectly vented fuel tank.

Loss of power

1. Clogged air cleaner.
2. Clogged exhaust silencer.
3. Damaged crankcase sealing ring.
4. Damaged piston, cylinder or piston rings.
5. Leaky cylinder head.
6. Maladjusted ignition advance.

Engine power is satisfactory, but acceleration is poor or peak speed cannot be attained.

1. Brake shoes are fouling the drums.
2. Under inflated tyres.
3. Slipping starting clutch or 2nd-speed clutch

B. TRANSMISSION

This chapter deals with the less frequent defects which can occur in operation.

As regards identification of causes of incorrect function of 2nd-speed engaging mechanisms, it is assumed that a rider of the specified weight rides on the moped with correctly inflated tyres on a level road in calm weather and that the moped has no contributory rolling resistance as, for instance, maladjusted brakes, and that the secondary transmission mechanisms have not been interfered with, e.g. by exchanging the original sprocket for another one with a different number of teeth.

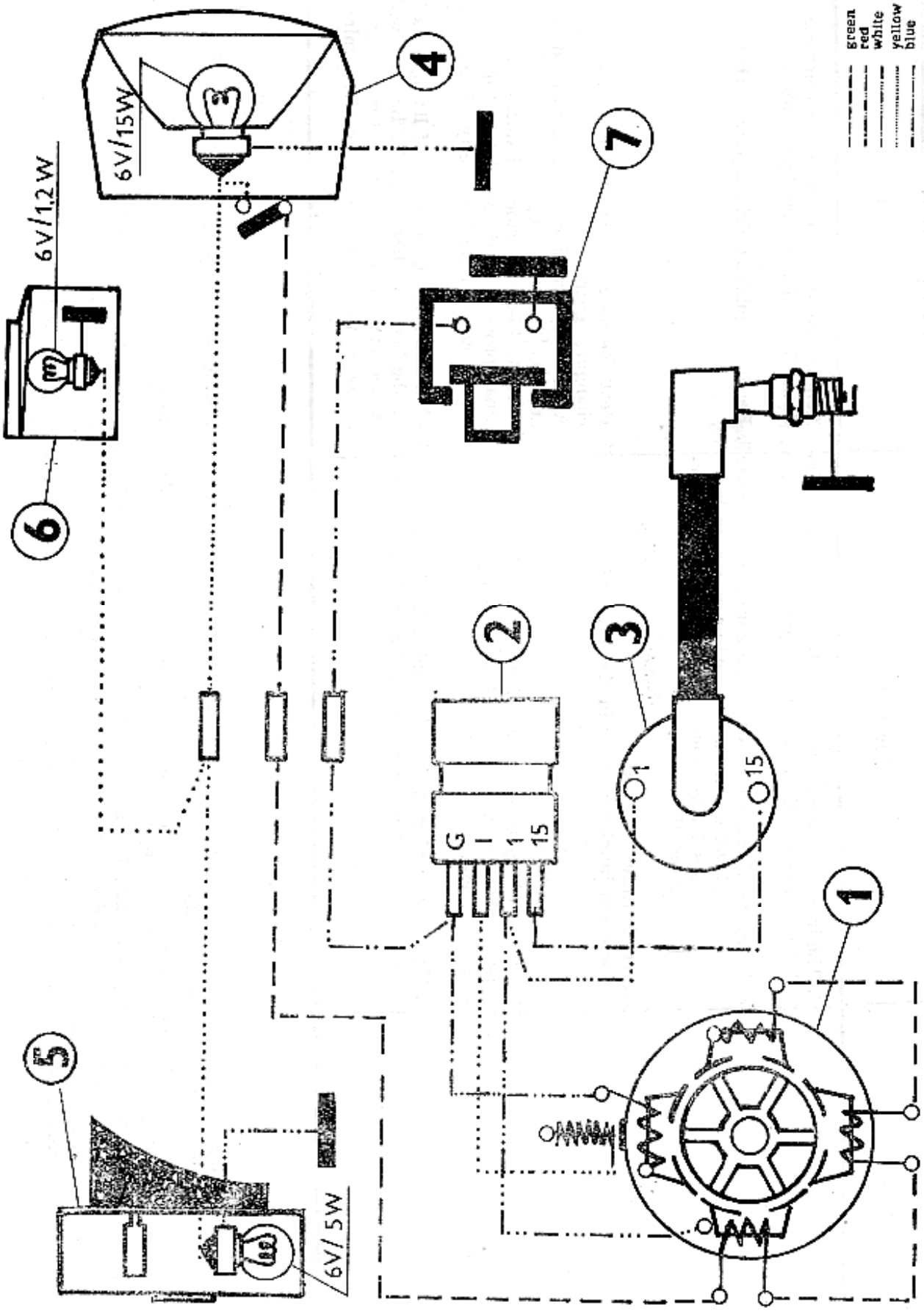
Defect	Cause	Removal
Engine will not start. Faultless freewheel in rear wheel.	Slipping 2nd-speed clutch 1. Oil on drum friction surface. 2. Water on drum friction surface. 3. Regulating driver (driving dog) clamped between parts does not move and does not expand 2nd-speed shoes. 4. Worn lining of 2nd-speed shoes. Regulating driver strikes against shoe pivot during starting and does not force shoes against drum inner surface.	 1. Degrease drum surface and lining 2. Wipe dry drum surface and lining. 3. Work free or renew driver. Possible defect of M 10 x 1.25 nut, e. g. obliquely cut thread. 4. Renew 2nd-speed shoes
	2nd-speed clutch faultless, indented belt rotates, starting clutch slips. 1. Oil or water on lining. 2. Worn or torn off lining, broken shoe.	 1. Degrease or wipe dry. 2. Renew starting shoe.
Engine starts, but starting is difficult	Resistances in pedal system (central assembly).	Lubricate pedal cranks and shaft and adjust correct tension of chain if it is too taut.
Engine starts only when pushing down the pedal energetically	1. Excessive preload of starting shoe springs. 2. Starting shoes move with difficulty. 3. 2nd-speed clutch shoes foul the shoe driver.	1. Renew or expand springs. 2. Work them free. 3. Work free 2nd-speed shoes.
Rear wheel rotates at idling speed with moped propped on stand.	1. Too high idling speed. 2. GUFERO sealing ring not fully pressed home in small pulley. 3. Starting shoes do not retract fully. 4. Starting shoes driven mostly when starting clutch is warmed up. Probably interchanged shoes.	1. Decrease idling speed. 2. Press sealing ring home (flush with pulley). 3. Check chamfering of leaf spring edges. 4. Install shoes in their correct place.
Slipping starting clutch.	1. Worn friction lining.	1. Renew shoes.

Defect	Cause	Removal
Engine starts and runs, starting clutch in good working condition but moped does not start moving in first gear or moves for only a brief period and then force closing is interrupted. Sometimes force closing is restored when decreasing engine speed.	1. Freewheel in engine does not engage firmly. 2. Damaged — worn face for freewheel rollers.	1. Change oil in transmission. Use oil of lower viscosity in frosty weather. 2. Renew freewheel gear.
When starting off at full throttle on level road, engine overspeeds in first gear. This may not necessarily be considered a defect.	1. 2nd-speed shoes move sluggishly. 2. Increased frictional resistance between regulating driver and shoe brass layer. 3. Engine has an output surpassing the recommended output or a different torque characteristic.	1. Work them free. 2. Burnish hard chrome-plated lands on regulating driver, or renew the driver. Never lubricate contact areas as friction dapmsps vibration of 2nd-speed shoes in final gear-change stage. 3. Not considered as defect as long as moped peak speed is observed. — Accelerate with only partly open throttle.
When starting off at full throttle on level road, the engine fails to attain the required speed in first gear and soon changes to the 2nd gear. This is normal when riding downhill because of decreased rolling resistances.	1. Insufficient engine power, moped often cannot attain its specified peak speed.	1. Proceed as per section „Loss of power."
Changing from 1st to 2nd gear takes longer than normally.	1. First to fourth gear change takes longer because of cold clutch which has not yet attained its normal service temperature. 2. Oil or grease on regulating driver and shoe contact areas. Light vibration might occur in final stage of 2nd gear engagement.	1. Not regarded as defect. 2. Degrease.

Defect	Removal	Cause
Changing from 1st to 2nd gear takes very long or it does not take place at all. When the 2-nd speed clutch is sliding it is not allowed to drive more then 1 km. High temperature can reduce the lifetine of driving belt.	Slipping 2nd speed clutch. 1. Dirt or oil on friction areas. 2. Water on friction areas. 3. Interchanged 2nd-speed shoes. It is also possible that the lining touches the drum on the less effective trailing side.	1. Remove dirt, degrease drum and linings with suitable degreasing agent. Then run in the clutch (formation of final friction layer). Find cause of contamination (defective GUFERO sealing ring, O ring, burrs). 2. Without dismantling dry the clutch by letting it slip. 3. Replace shoes correctly or wait till lining settles down on the whole working surface. Gears have to be changed about 20 to 25 times before a new lining, made so that it touches the drum on the leading edge, has settled down to enable the function of the whole working surface.
Changing from 1st to 2 nd gear takes a shorter time than normally or a very short time. Exceptionally, the moped even starts from rest in 2nd gear or a change from 2nd to 1st gear takes place when riding uphill.	Imperfect control of retraction of 2nd-speed shoes by regulating driver. 1. Check movability of inner driver (regulating driver contact under load. Hard chrome-plated lands on inner driver must be bright and undamaged.	1. This defect can be identified and also removed by replacing inner driver with a new one.
	Changed properties of this contact can also be brought to light by a comparison test of 1st-to-2nd-gear change under load (at full throttle): A) Moving along in 2nd gear, decelerate by applying the brakes to change down from the 2nd to the 1st gear. After releasing the brakes, the transmission will change smoothly from the 1st to the 2nd speed. B) Then decelerate by throttling down. This will release the regulating driver which will turn to the opposite side. On acceleration, the changing up from the 1st to the 2nd gear is different — more sudden than in point A). This indicates that the regulating driver does not set readily on the inner driver and that the contact areas (lands) are not in satisfactory condition.	

Defect	Removal	Cause
	2. The inner driver must turn and bear against the working surfaces with a certain peripheral clearance.	2. Renew the parts. It is not recommended to thin down faces of the parts by grinding.
	3. Defective chromium layer between regulating driver and brass layer on clutch shoe and or destroyed brass layer. Oxides formed there by pressure increase friction between the parts.	3. Renew regulating driver, renew shoe.
	Other harmful factors: 4. Increased humidity of air in the space of clutches.	4. Heat the space of clutches by a short ride without changing gears. After every washing of the moped, start the engine and let it warm up.
	5. High working temperature of 2nd-speed clutch built up by changing gears in rapid succession (fifteen and more times).	5. A 10- to 15-second ride will suffice to restore the original properties of the clutch. This is actually no defect but a normal property of friction linings.
	6. Thick layer of particles of abraded friction material in the form of scales covering the working surface.	6. Find and remove the cause of lining abrasion. Remove the layer mechanically, for instance with fine abrasive (emery) paper, taking care not to change the shape of the settled down (bedded) lining.

Optimum gear change in model 210 moped, 2nd gear — 40 km/hr. at full-throttle acceleration.
(2nd speed clutch warmed up to service temperature).
After starting from rest, the 2nd gear is engaged within a distance of 26 metres.
Permissible gear-change tolerance limits: +30 m, —5 m.
Engagement of 2nd gear begins at a distance of 18 metres and is completed in about 1.5 to 2 seconds.
A cold 2nd-speed clutch prolongs the distance by 9 metres (first to fourth gear change).
An overheated 2nd-speed clutch shortens the distance by 3 metres.
According to speedometer readings, the moped should attain about 24 km/hr. in 1st gear at full throttle and the change to the 2nd gear should be completed at a speed of about 28 km/hr.



Wiring Diagram

1. Alternator 2. Thyristor ignition unit 3. Induction ignition coil 4. Head lamp 5. Tail lamp 6. Spee dometer 7. Ignition switch off