



**Operating Instruction Book
for the MZ - Cross - Country Motorcycle**

ETS 250/1 G-5

VEB MOTORRADWERK ZSCHOPAU - GDR

Introduction

The informations given in this booklet do not include the elementary details of starting, riding and maintaining a motorcycle, because we think that competition riders should be already acquainted with these questions.

We have therefore omitted these informations which might be necessary to the absolute novice and concentrated them on main problems only. Our competition motorcycles require a lower final gear ratio in order to match the purpose. MZ engines enjoy high revs, this creates the danger of over-reving during the running-in period (mainly during a test on the high-way).

Careful running-in during a

minimum mileage of **310 miles respectively 500 km**

will be necessary to allow the engine and other machine parts to „bed down“. Do not forget that the engine should be allowed to rev freely on small throttle openings. Increase the throttle openings, but do not continuously ride on full openings for long distances. Avoid a „set“ throttle position, vary the throttle opening and ride on full speed for long distances after the running-in period only.

Please follow our advise – your MZ bike will give you a lot of pleasure and always show a good performance and reliability!

VEB MOTORRADWERK ZSCHOPAU

– Service-Dept. –

61312

TENORLAND

6x2x5

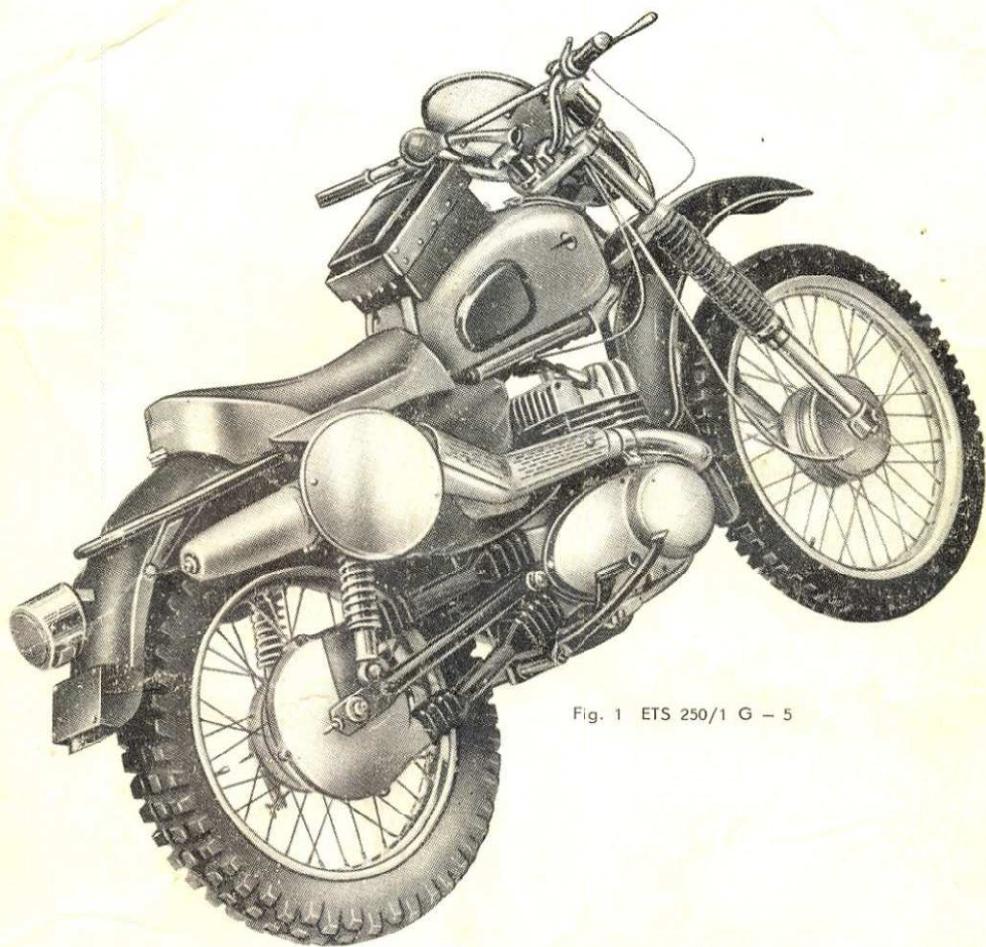


Fig. 1 ETS 250/1 G - 5

Technical Data and Description

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Engine

Max. horsepower	32,0 at 5500 to 6000 rpm
Max. torque	3,3 kpm at 5300 rpm
Bore and stroke	69 x 65 mm
Displacement	243 cc
Compression ratio	11 : 1
Compression volume of cylinder head with fitted spark plug	24,3 cc
Lubrication	Premix Gas/Oil 25 : 1 (2-stroke oil only)
Big and small end bearings	caged needle bearings
Main bearings	2 ball bearings 6305 c003 f 1 ball bearing 6302 c003 f
Main bearing lubricant	by gearbox lubricant

Carburettor

Type	BVF 30 KN 1-3
Diameter	30 mm
Main jet	130
Needle jet	65
Needle position seen from top	5
Needle type	No 11
Pilot jet	35
Air adjusting screw	approx. 1 turn open
Throttle cut-away	4 mm
Fuel level	28 \pm 1 mm For fine adjustment respectively in order to meet different climatical conditions, the following jets are delivered with each machine:
Main jet	125 and 135 Additional carburettor spare parts: 1 needle clip 2 joint washers for jet block 2 joint washers for float bowl 2 joint washers for mixing chamber cap

Air filter system

Paper element - micro filter - on left-hand side, under carburettor cover - diameter 105 x 140 mm

Electrical equipment

Ignition	Mag-Dynamo (rotary magnet) 6 V
Timing	3.0 mm $-0,5$ b. t. d. c.
Contact breaker gap	0.3 mm -12 THOD
Spark plug	Isolator RM 14/300 S
Electrode gap	0.4 mm -16 THOD
Double ignition	Switch under carburettor cover on right-hand side
Ignition coils	2 units 12 Volt
Headlamp	100 diam. $4''$
Stop and tail lamp	95 mm diam. $4''$
	Stop light contact on rear brake cam.
Bulbs	
Bilux	6 V 35/35 W
Stop light	6 V 15 W
Rear light	6 V 5 W

Gearbox

Clutch	Multi plate wet-type on left hand side of crankshaft
Gear changing	Foot operated (via selector-drum and forks)
Number of speeds	5
Gear ratios	
1st	3.0 : 1 - 12 : 36 t
2nd	1.865 : 1 - 15 : 28 t
3rd	1.333 : 1 - 18 : 24 t
4th	1.048 : 1 - 21 : 22 t
5th	0.833 : 1 - 24 : 20 t

Power train

Engine - gearbox	Helical gears 28 : 68 t - 2.43 : 1
Gearbox - rear wheel	Roller chain 102 (104) links 100 PLUNK 5/8 x 1/4" (15.87 x 6.48 x 10.16 mm) 15 : 45 (52) t
Chain guard	Dirt and water protected chain by profiled rubber tubes

Chassis

Frame	Tubular, single loop-welded
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Suspension front	Telescopic fork with enclosed shockabsorbers, travel way 150 mm <i>5 1/2 INS</i>
rear	Shockabsorbers, travel way 90 mm <i>3 1/2 INS</i>
Wheels	Spoke wheels, with straight spokes
Rims front	1.60 x 21"
rear	1.85 B x 18"
Tyres front	3.00 x 21"
rear	4.00 x 18"
Tyre pressure	In accordance with the type of competition, such as Enduro-Trial-Moto Cross
Brakes	Full width type - front 150 x 30 mm rear 160 x 30 mm
Operation	Front by cable - rear by rod

Dimensions and weights

Overall length	2060 mm <i>6'9"</i>
Overall width	835 mm <i>3'3"</i>
Overall height	1190 mm <i>3'7"</i>
Saddle height	750 mm <i>2'7 1/2"</i>
Ground clearance	210 mm <i>3 1/4"</i>
Dry weight	128 kg

Capacities

Fuel tank	0.75 l approx. 0.8 Qt. <i>750ML 1 1/2 QNTS</i>
	Owners are strongly advised to use nonadditive engine oils only in accordance with the season SAE 40 resp. SAE 20. <i>3 1/4</i>
Oil tank	15 l approx. 4.0 Gall. including a reserve of 1.5 l/0.4 Gall. <i>15</i>
Shockabsorbers front	160cc per stanchion
rear	70cc per shockabsorber
	Viscosity of shockabsorber-fluid: 1.65 to 1.92 c Stokes/50° C.

Fuel and lubricants

Fuel	Premium Grade Fuel - Octane rating 90 to 100
Engine oil	Two Stroke Oil - recommended brands: Shell 2 T, Castrol 2 T, Stenn's C, Blendzall Goldlabel, Rockdorf 2 C

Mixing ratio during and after the completion of the running-in period:

25 : 1 = 4 %

We reserve the right to modify or deviate from this specification in the interest of the technical development.

Pre-start preparations

As we can not know the several sizes of the purchasers of our bikes, we ask new owner to adjust the brake and clutch control levers in such a way that all of them can be easily handled in all riding positions.

Do not tighten the brake and clutch control lever, because too tight levers might break when crushing. It is advisable to have besides the spare part link already in the tool kit, some spark plugs, one reel of insulating tape and a piece of binding wire.

It is also recommended to have one spare micro filter which should be kept in a waterproof bag.

Maintenance and carework

Lubrication chart

Grease points

Grease points for grease gun

Rear swinging fork bolt
Brake pedal
Speedometer drive

Lubrication by oil-feeder

Brake and clutch control
Twist grip and choke control
Secondary chain

Apply grease to

Twist grip
Brake cam, front and rear
Contact breaker cam felt

Hypoidoil

Felt wiper

Recommended lubricants

Engine oil, Castrol XL, Shell X 100
Engine oil, Castrol XL, Shell X 100
Castrol LM, Shell Retinax

Castrol XL, Shell X 100
Castrol XL, Shell X 100
Castrol XL, Shell X 100

Castrol LM, Shell Retinax
Castrol LM, Shell Retinax
Castrol LM, Shell Retinax

Hypoidoil (compound similar)

Note: Owners are advised to follow the instructions given in the lubrication chart. — Do not use grease to lubricate the swing fork bolt — this will create clogged lubrication channels!

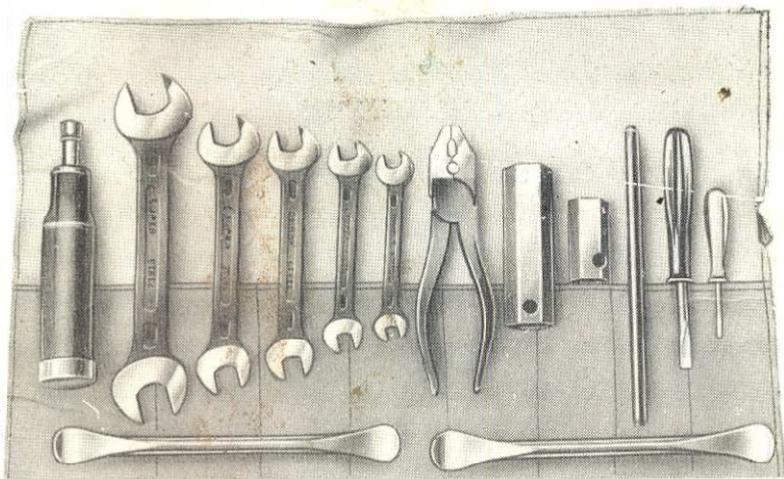


Fig. 2 Tool kit

with additional cable controls for front brake, clutch and twist grip control, as well as several carburettor spare parts and two sprockets.

Front wheel suspension

The hydraulically damped telescopic front fork is equipped with progressive springs. The mouthpiece of the telescope tubes is conically shaped (1) and will keep off any „pumps“ during operation because of the increasingly narrowing ring gap.

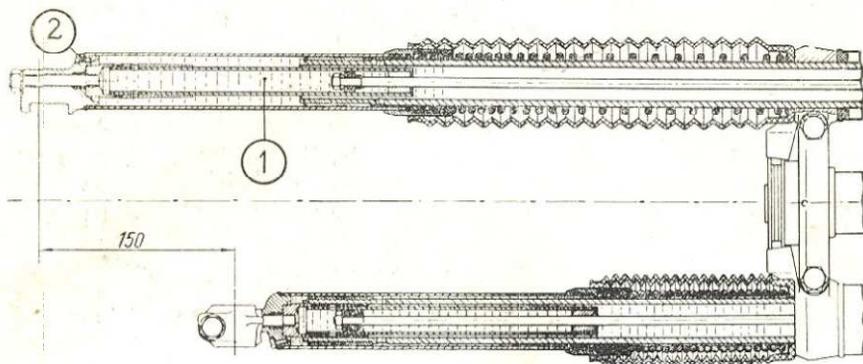


Fig. 3 Sectional drawing of telescopic front fork

Shockabsorber-fluid is drained off by removing of both screws for oil draining (2) and refilled at the top of the stanchions after loosening the cap nuts.

Filling quantities per stanchion 160cc shockabsorber fluid, with a viscosity of 1.65 to 1.95⁰ E/50⁰ C – 8 to 11 cStokes/50⁰ C.

(On temperatures exceeding 25⁰ C, we recommend the use of shockabsorber-fluid with viscosity approximately 10 1/10 higher)

Steering head angle	63 ⁰
Positive castor	88 mm

Gearbox oil changing

After a mileage of approx. 1850 respectively 3000 km, the gearbox lubricant must be drained off. Two drain screws are provided at the bottom of the engine. Please be advised that the engine must be at working temperature, to make sure that the lubricant is entirely drained.

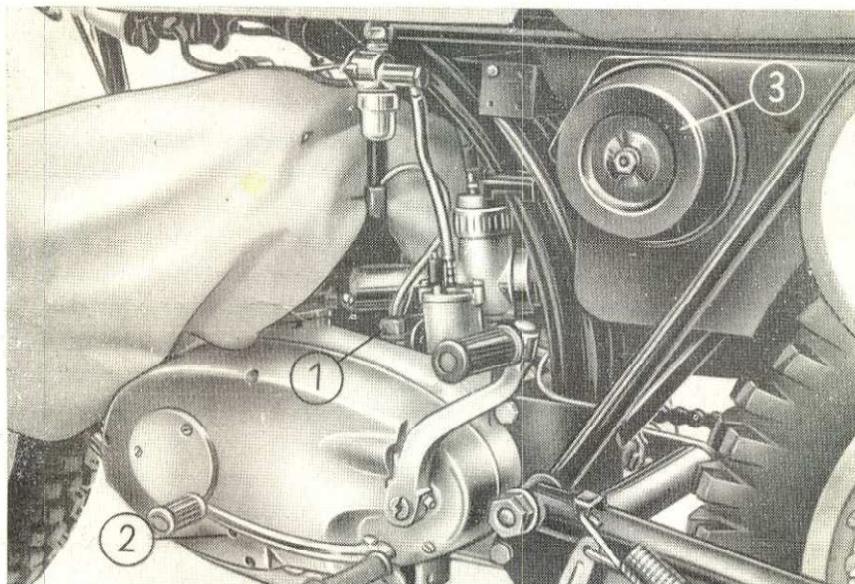


Fig. 4 ETS 250/1 G - 5

- (1) Filling plug with breather pipe
- (2) Oil level control screw
- (3) Filter plug

Refill „None additive engine oil“ only – Molybdenum or Graphite added engine oils **will cause the clutch to slip, in any case!**

Oil level can be checked by the oil control screw (below kickstarter).

Please use for refilling a graduate.

Too much oil will make working the clutch like a turbulence brake!

Carburettor adjustment

Make always sure –even during the competition – that the ventilation hole in the tank filler cap is absolutely free. This is necessary to ensure a trouble-free fuel supply, which is the pre-condition for full performance and satisfactory running of the engine.

The basic adjustment of the carburettor you will find under „Technical Data“. When adjusting the carburettor, please consider the condition under which the machine is operated. The operation of the bike in high mountains or under extreme high temperatures will require a more lean adjustment of the carburettor, whilst running the machine under cool or damp weather conditions will need a more rich adjustment.

Responsible for the correct carburettor adjustment is always the spark plug, which will tell you everything about engine operating conditions. Any test in this respect must be carried out on a distance of at least 6 miles respectively 10 km, in order to make sure that the spark plug will show up directly the result of the re-adjustment.

The spark plug face should be only slightly coated with soot and should show a grey or brownish colour, electrodes must be clean.

In spite of the fact that the engine is mainly not operated at idle speed, it is advisable to adjust the correct idling in order to make sure that the perfect air/fuel ratio is achieved. Otherwise this might create considerable troubles if the competition includes a so-called „start test“. Correct adjustment can only be achieved with the engine at working temperature. Make sure when adjusting the carburettor that neither the machine nor the carburettor is in an inclined position! If you are in doubt of the carburettor position, use a rule to make sure that it is not inclined.

Do not overtighten the air pilot screw (1) otherwise a flash will be the result narrowing the diameter of the channel.

Open one turn! The throttle stop screw (2) should be unscrewed, so that the engine is idling with the twist grip closed. Afterwards try to find the highest rev by screwing the air pilot screw slowly to and fro. Then lower the throttle stop screw until the idle speed is back to normal. Continue in this proceedings until you have found the most favourable position i. e. when unscrewing the air pilot screw, the engine will not rev up.

For better acceleration of the engine it is recommendet to close the air pilot screw 1/4 turn. Do not forget to secure the screw. If no results are gained with the basic adjustment, the following check should be carried out:

Too rich: Air passage to the air filter is clogged or the element is wet. The joint washer between the jet block and mixing chamber is defect. This will cause the engine running too rich, because of external fuel supply.

Too lean: Additional air in the venturi system will cause an imperfect air/fuel ratio, with the result of a lean mixture.

Check the paper element and the insulation flange between intake manifold and cylinder for absolute tightness. At the same time, make sure that the rubber tube between carburettor and air filter is tight and do not forget to tighten the clip. The breather pipe for dynamo ventilation must be in its proper position so that additional air can not reach the carburettor system. At last check that the rubber caps on top of the cable adjusters are absolutely tight – to prevent water to reach the mixing chamber.

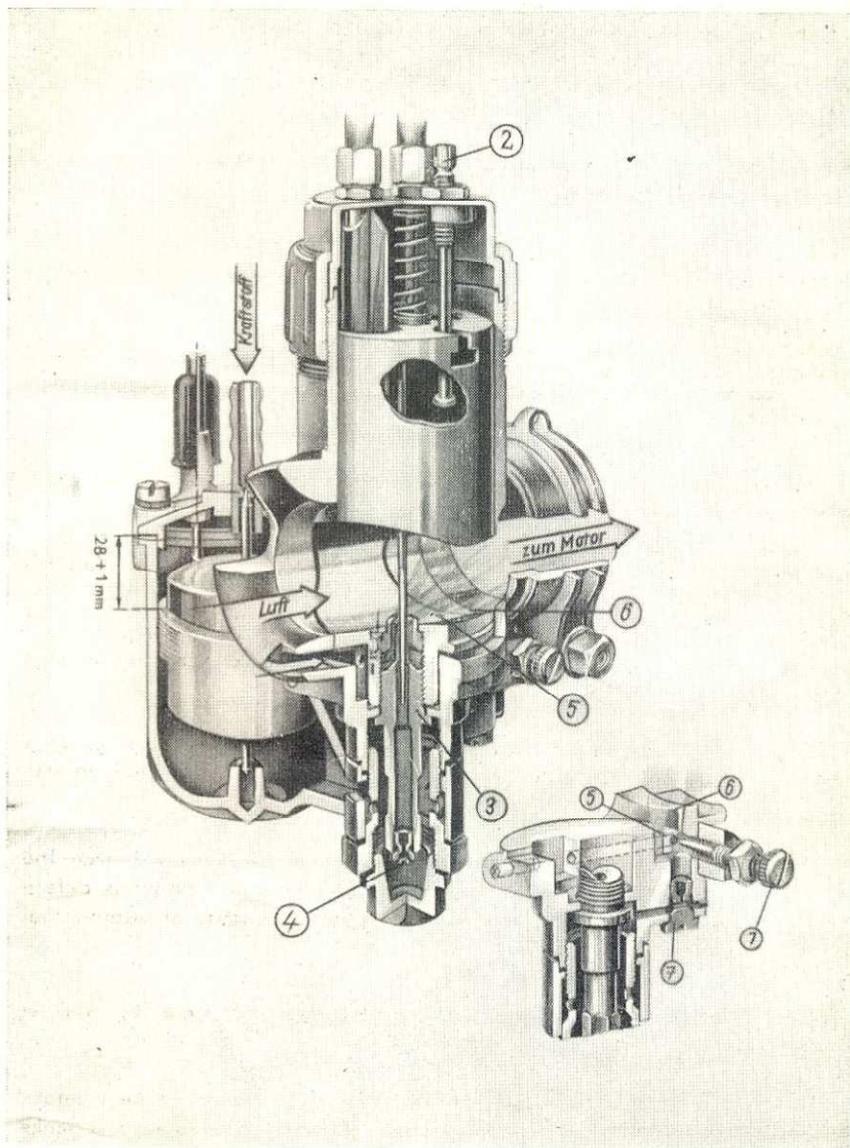


Fig. 5 Section drawing of the carburettor

- | | |
|-------------------------------|------------------------|
| (1) Pilot air adjusting screw | (5) Transfer channel |
| (2) Throttle stop screw | (6) Idle speed channel |
| (3) Needle jet | (7) Pilot jet |
| (4) Main jet | |

Air filter and silencer

Please clean out the whole filter system after each competition. Do not clean the paper element with water – this will cause to clog the element. Stroke the filter element slightly on an even surface to get out the dust.

After approximately 50 operating hours of the machine it is advisable to replace the filter element. In order to be on the safe side, participation riders are advised to carry one spare filter element when participating.

Timing adjustment and electrical equipment

For timing adjustment it is necessary to loose feed wire (1 – fig. 7) from ignition switch (connection 15) at upper contact point. This is absolutely necessary in order to avoid demagnetization of rotary magnet by battery current (from adjusting tool). Do not loose feed wire at condenser as casting alloy could slacken in the end.

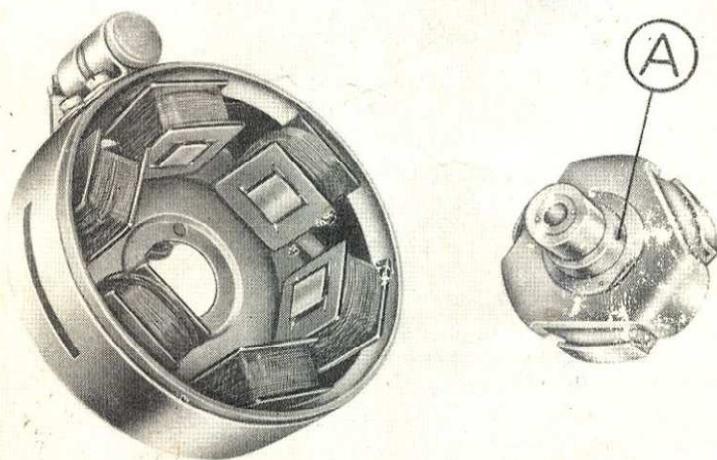


Fig. 6 Mag-Dynamo with rotary magnet
(A) Thread M 24 x 1.5 for extractor

First contact breaker gap is to be adjusted to 0.3 mm. For this purpose rotary magnet fastening screw (2) is turned in such a way that the lobe of cam is below contact lever cam. Adjusting is done by turning the eccentric screw (4) after loosening screw (3).

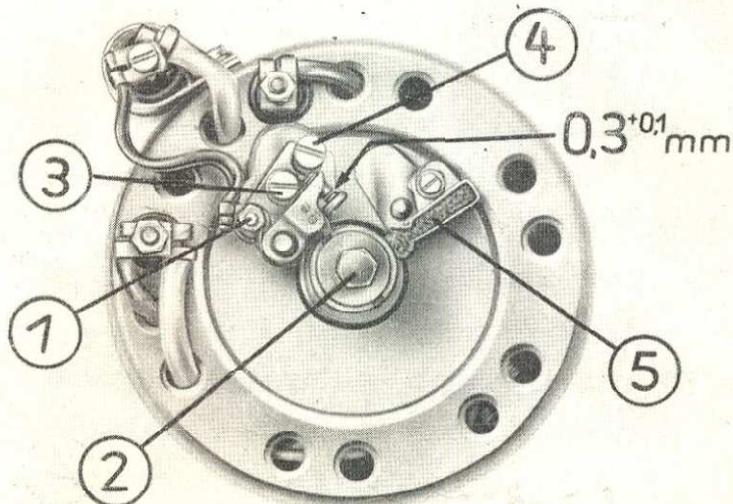


Fig. 7 Adjusting of contact breaker gap

with the points wide open the feeler gauge should just slip through.

Felt wiper ist to be lubricated after fifty hours of operating by means of viscous gear oil. It should be in touch with cam lobe only otherwise oil is „pumped“ out and contact points are coated with oil then.

A new bikes contact breaker gap is to be checked after about 5 hours of operating as contact lever cam has adapted to cam shape then.

After this a timing tool (if possible equipped with a dial indicator) is placed in spark plug hole and screwed tight. Crankshaft is rotated by rotary magnet fastening screw (2 – fig. 7) until piston ist at t. d. c. Now an adjustment tool (equipped with a weak current battery and provided with a warning lamp or with a buzzer) is connected between minus (crankcase) and connecting screw (1) – feed wire always is loosened while doing so. After this **crankshaft is turned back (anti-clockwise) till piston is 3.00 mm b. t. d. c. (this is equivalent to 22° 15' crankshaft degrees)**. When timing tool (or dial indicator) shows 2.9 mm, the warning lamp should be on or a buzzing can be heard.

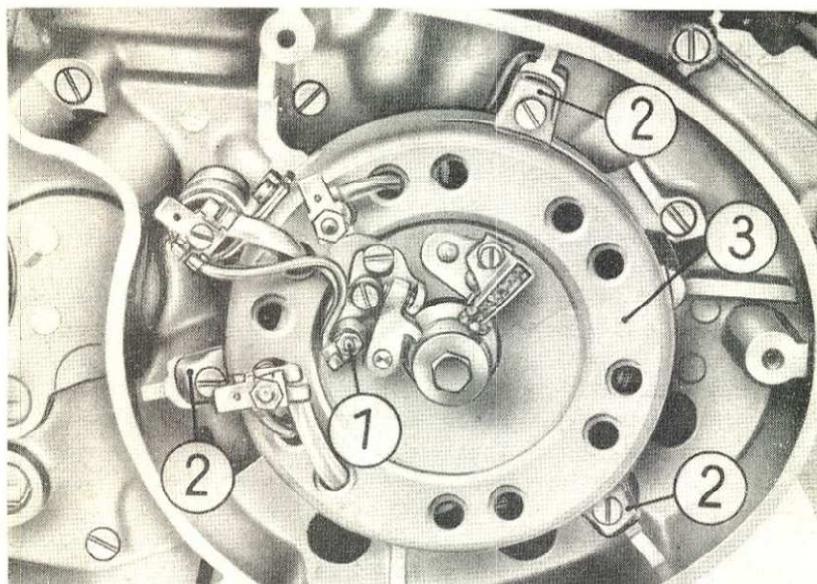


Fig. 8 Timing adjustment

If not, you have to loosen the three fastening screws for claws (2) and to turn coil box (3) in compliance with necessary.

You will get more pre-ignition after turning it to the right – less after turning it to the left.

After tightening the fastening screws (2) you should check contact breaker and pre-ignition once more – by radial removal of coil box adjustment might be changed again.

All coils of coil box (3 – fig. 8) are connected with one end of winding with earth and they are connected in parallel.

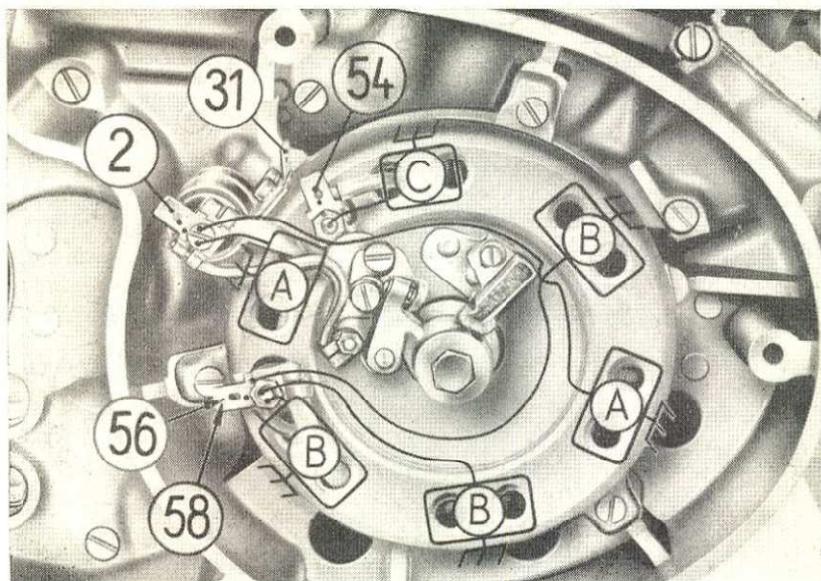


Fig. 9 Connecting diagram

- (A) Low-tension coils for ignition
- (B) Coils for head light
- (C) Small coil for stop light
- (31) Minus lead (towards frame)
- (2) Ignition voltage for change-over switch
- (54) Lead for stop light switch
- (56) Lead for dimmer switch (for head light)
- (58) Lead for tail light

Please mind in this connection our wiring diagram (see supplement) together with fig. 9.

Operating voltage of electrical equipment is 6 V – excepted are the high-tension ignition coils which are 12 V.

From connection (2 – fig. 9) feed wire for double-ignition runs to change-over switch for ignition and from there to connection „15” of both ignition coils. Connections „1” of ignition coils are on earth.

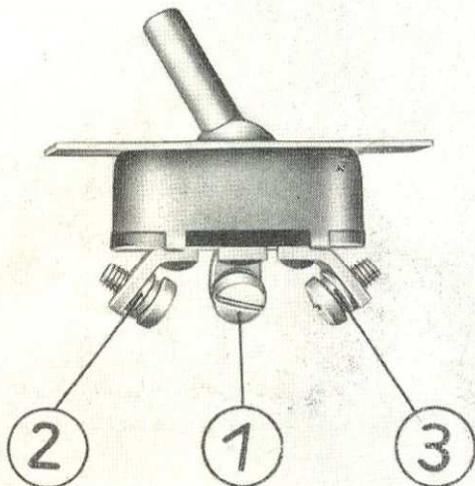


Fig. 10 Connections of ignition change-over switch

- (1) Feed line to Mag-Dynamo
- (2) towards spark plug I
- (3) towards spark plug II

Do never forget to tighten dynamo cover perfectly and make sure that breather pipe for dynamo is waterproof fitted. Some tape might be sufficient in case of necessity.

Rear wheel drive

Apart from regular chain maintenance it is very important to check the shock-absorber rubber element as well as the cover plate (see arrow) for possible wear. The cover plate is equipped in order to reduce the deformation of the shock-absorber rubber element under extreme stress.

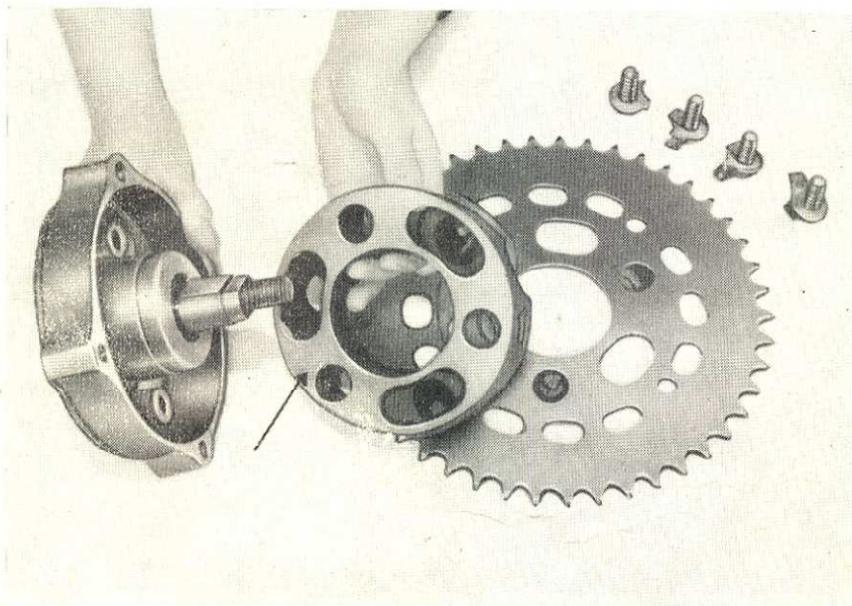


Fig. 11 Rear wheel drive, dismantled

When re-assembling please make sure to proceed in the correct manner.

For any repairwork of the engine please consult the repair manual for ES 175/2 – 250/2 as well as the supplement for ETS Trophy Sport models (with added five-gear diagram).

The mentioned manuals are available through MZ-Ersatzteilvertrieb, 9363 Gornau / GDR.

Spare parts supply

Spare parts for the MZ Scrambler and Moto-Cross models are only available through the competent MZ Importers who are supplied by our MZ Ersatzteilvertrieb, 9363 Gornau, GDR – DDR.

In order to avoid any mistakes when ordering spare parts we ask you to state the Number of the chassis and engine.

VEB MOTORRADWERK ZSCHOPAU – GDR –
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Dead line: November 1973