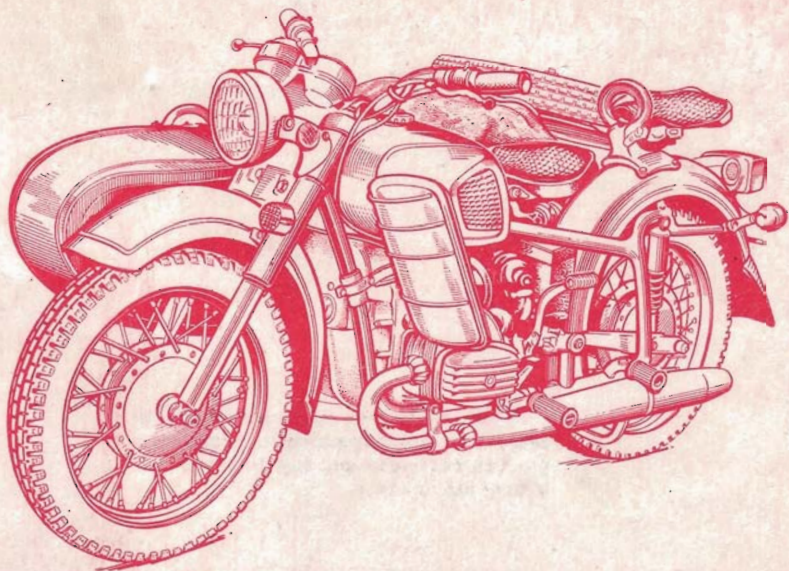




MOTORCYCLE **DNEPR-16**

MODEL
KM3-8.922.6

OPERATION MANUAL
KM3-8.922 P3A

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INTRODUCTION

The DNEPR-16 motorcycle (Fig. 1) boasts increased cross-country capability. Its structural features are sidecar wheel drive, reverse gear, four-stroke overhead valve engine and undercarriage.

The motorcycle is used only with a sidecar. It is distinguished for simplicity and ease of control, high dynamic qualities, comfort, relatively little maintenance effort and economical operation.

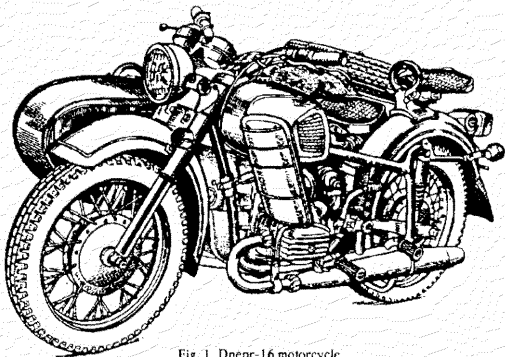


Fig. 1. Dnepr-16 motorcycle

SAFETY PRECAUTIONS AND WARNINGS

Important! During first 2500 km of run all the mechanisms of the motorcycle will run to become well aligned. This time it is inadmissible to overload the motor and to increase the motorcycle speed over that given in section "Running-in New Motorcycle".

It is prohibited to shorten the term, after which the carburetors throttle lifting limiters are to be removed.

When using ethylated petrol for the engine, remember that it is very poisonous. For this reason, avoid using this kind of petrol in closed premises.

Before removing carbon deposit from the surfaces of the cylinder head combustion chambers, piston heads and valve heads, moisten the carbon deposit with kerosene or light oil in order to prevent formation of lead-containing dust.

Avoid using naked flame for lighting or heating oil in the casings of motorcycle units.

Remember that exhaust gases from the engine are poisonous. For this reason, the room in which the engine is started and warmed up must be well ventilated.

When performing maintenance works dealing with rinsing by petrol, start the engine when it becomes fully dry.

SPECIFICATIONS

General Data

Overall dimensions of motorcycle with sidecar,
mm, not greater than:

length	2430
height	1080
width	1700
Wheel base, mm, not greater than	1510
Track, mm, not greater than	1200
Road clearance, mm, not less than	125
Maximum load including the mass of a driver and two passengers, kg, not greater than	260
Maximum speed, km/h, not lower than	95
Check fuel consumption per 100 km, l, not greater than	8.0
Fuel consumption on highway roads, l, not over	10.0
Oil consumption per 100 km, l, not greater than	0.15

Braking distance from 80 km/h speed, m, not longer than	49.2
Dry mass, kg, not over	355

Engine and Fuel-Feed System

Engine type	four-stroke, carburettor, overhead valve, double-cylinder
Displacement volume, cm ³	649
Compression ratio	7.0 (8.5*)
Cylinder bore, mm	78
Piston stroke, mm	68
Maximum power, kW, h. p., not less than	23.5 (32)
Engine speed corresponding to maximum power, min ⁻¹	5200
Maximum torque, N·m (kgf·m), not less than	47 (4.8)
Carburettors	K63T
Fuel	petrol with octane number 72-80 (80-98**)
Air cleaner	with paperboard filter element
Cooling	counter air flow

Transmission

Clutch	dry, double-disk
Gearbox	four-speed, with reverse gear
Gear shifting	with foot pedal to engage four main gears; with hand lever to engage reverse gear
Gearbox gear ratios:	
1st gear	4.11
2nd gear	2.28
3rd gear	1.70
4th gear	1.30
reverse gear	3.67
Main drive	bevel-gear pair with circular tooth

* For operation on petrol with octane number 80-98.

** For compression ratio 8.5.

Main drive gear ratio	4.62
Gear ratio of sidecar wheel reduction gear	2.4
Rear wheel drive	cardan shaft
Sidecar wheel drive	cardan shaft
Differential gear	spur, nonequalizing, asymmetry coefficient of 19 : 11

Running Gear

Frame	tubular, welded
Rear wheel suspension	levered, using double-acting spring-hydraulic shock absorbers with load stepped control
Front fork	telescopic, with spring-hydraulic shock absorbers
Wheels	with cast bodies and adjustable taper roller bearings, interchangeable
Brakes	drum-type; front-wheel brake is double-cam; rear-wheel and sidecar wheel brake is single-cam
Tyres	3.75-19
Sidecar	single-seat, passenger-type body, mounted on rubber springs; wheels with levered suspension using double- acting spring-hydraulic shock absorber identical with motorcycle rear suspension shock absorbers
Sidecar frame	tubular, welded
Seats	two separate or one double

Electrical Equipment

Storage battery	6MTC9
150 W, 12 V a. c. generator	Γ424
Voltage regulator	33.3702
Ignition system	battery-type, 12 V, with ignition advance angle automatic control

Ignition coil	B204
Breaker with automatic spark timer	PM302A
Spark plugs	A14B (A17B*)
Horn	C205B
Headlamp	ΦΓ137-Б

Priming Capacities, l

Fuel tank	19
Engine crankcase	2.20
Gearcase	1.50
Main drive casing	0.10
Differential gear	0.10
Sidcar wheel reduction gear	0.20
Front fork blade	0.13
Suspension shock absorber	0.10

Basic Data for Adjustment and Check-up

Ignition advance angle up to t. d. c.	32°–36° (34°–38°*)
Rocker-to-valve clearance on cold engine (at 15–20 °C), mm	0.07
Breaker point gap, mm	0.4–0.6
Gap between spark-plug electrodes, mm	0.50–0.65 (0.60–0.75**)
Gap between discharger and ignition coil terminal, mm	9
Free travel of gearshift pedal front arm, mm	10–15
Free travel of rear wheel brake pedal, mm, not greater than	45
Type pressure, MPa (kgf/cm ²):	
front wheel and sidcar wheel	0.15–0.16 (1.5–1.6)
rear wheel	0.25–0.26 (2.5–2.6)
Toe-in of wheel planes of motorcycle and sidcar along the length of motorcycle wheel base, mm, not greater than	0±5
Camber angle of rear wheel and sidcar wheel planes	0°±30'

* For operation on petrol with octane number 80–98.

** For spark plug A17B.

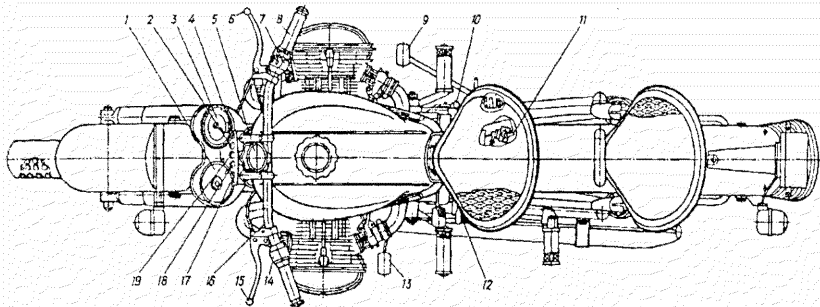


Fig. 2. Motorcycle controls and instrumentation:

1 – ignition lock; 2 – emergency oil pressure transmitter indicator lamp; 3 – speedometer; 4 – turn indicator pilot lamp; 5 – handlebar shock absorber; 6 – front-wheel brake lever; 7 – multigang switch ("day – night" switch and emergency ignition switch); 8 – throttle control handle; 9 – sidecar wheel and rear wheel brake pedal; 10 – reverse handle; 11 – battery switch; 12 – starting mechanism lever; 13 – gear shift pedal; 14 – multigang switch (switching-on of hing and lower beams, turn indicators and horn); 15 – clutch operating lever; 16 – handlebar; 17 – gearbox neutral position indicator lamp; 18 – battery change and generator operation indicator lamp; 19 – high beam indicator lamp

CONTROLS AND INSTRUMENTATION

Arrangement of the motorcycle controls and instrumentation is shown in Fig. 2.

Multigang switch 14 is designed to control upper and lower beams (BEAM switch), the turn indicator (TURN switch) and horn (button).

The turn indicator switch has three positions: a mid (neutral) position (turn indicators are turned off) and two extreme positions whereat the turn indicators are switched on at the right- or left-hand side of the motorcycle.

Multigang switch 7 is designed to turn on the day-and-night conditions consumers (BEAM switch) and to turn off the emergency ignition (ENGINE STOP switch).

Switch BEAM has three positions:

extreme right-hand – clearance (parking) and lower head lamps are switched off;

mid – clearance (parking) head lamps are switched on;

extreme left-hand – clearance and lower head lamps are switched on.

Switch (ENGINE STOP) has two positions:

extreme uppermost ("backward") – the ignition circuit is open, the engine is stopped;

extreme lowermost – the circuit is closed, the engine is ready for starting.

The battery switch is fitted under the saddle and has two positions whereat the circuit is closed or broken.

Ignition lock 1 is mounted in the dashboard. The ignition lock slide can be set with the key to one of the following three positions (Fig. 3):

0 – the key is inserted up to the stop – all the instruments and devices are switched off;

1 – the key is inserted up to the stop and turned clockwise to the first fixed position: the ignition system is switched on, power is applied to the horn button, stop-light switches 7 (Fig. 2) and 14. With the engine not operating, alight on the dashboard are the following lamps: battery charge and generator operation indicator lamp 18 (red), emergency oil pressure transmitter indicator lamp 2 (red) and gearbox neutral position indicator lamp 17 (green) with the main neutral position between 1st and 2nd gears engaged; turn indicator pilot lamp 4 (green) if the turn indicators are switched on; high beam indicator lamp 19 (blue) with the high beam switched on and the BEAM switch lever set to the extreme left-hand position. In this position, it is possible to switch on the upper beam with the aid of BEAM switch.

When the BEAM switch lever is set to the mid or extreme left-hand position alight are the motorcycle rear clearance (parking) head lamps, sidecar front and rear head lamps, and speedometer lamp.

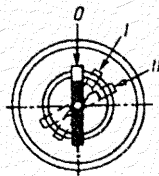


Fig. 3. Position of ignition lock key

When the engine is inoperative, do not leave the ignition key in position I (Fig. 3).

II – the key is inserted up to the stop and turned clockwise to the second fixed position. Alight are the parking light bulb in the head-lamp, motorcycle rear lamp, sidecar front and rear lamps. In this position, the ignition key can be taken out of the lock without disturbing the above-mentioned switchings (parking lights).

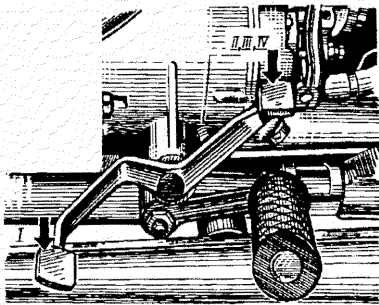


Fig. 4. Gear shifting:
I-IV – gears

Handle 8 serves to control the carburettor throttles. Turning the handle back (towards the driver) will cause the throttles to rise, the amount of combustible mixture supplied to the cylinders will increase and the engine speed will be increased. Turning the handle forwards (from the driver) will cause the throttle to lower, the amount of combustible mixture supplied to the cylinders will decrease and the engine speed will be reduced. The throttle stroke of a new engine, that has not been run in, is limited by the stops. Never attempt to apply force in order to overcome the resistance of the stops as this may cause a cable break.

Sidecar wheel and rear-wheel brake pedal 9 is fitted at the right-hand side of the frame.

Front-wheel brake lever 6 is located at the right-hand side of the handlebar. It is advisable to use the front-wheel brake together with the rear-wheel and sidecar wheel brake.

Reverse handle 10 has two positions: rear – the gear is disengaged, and front – the gear is engaged.

Starting mechanism lever 12 used to start the engine is arranged at the motorcycle left-hand side.

Shift pedal 13 is fitted at the left-hand side of the gearbox and has two bearing pads. On one of them the driver is to set the toe of his foot during gear shifting, and on the other, his heel. When depressing the pedal with the toe, downshifting is effected and the first gear is engaged from the main neutral position, when depressing with the heel, upshifting is performed. Gear shifting is shown in Fig. 4.

Each time after depressing the pedal, the latter returns to the initial position. As the pedal deviates from the mid-position, the clutch disengaging process takes place.

Lever 15 (Fig. 2) is used to operate the clutch. On depressing the lever, the clutch is disengaged. When the lever returns to the initial position, the clutch is engaged. The clutch is to be used during starting-off, braking and gear shifting.

The anti-theft device lock is to be closed by turning the key clockwise and at the same time recessing the bushing after first turning the handlebar fully to the right. To prevent breakage of the lock, avoid turning the handlebar and riding the motorcycle with the key inserted into the lock.

DESIGN, OPERATION AND ADJUSTMENT OF MOTORCYCLE MAJOR ASSEMBLIES AND MAINTENANCE ENGINE

As regards its design features and technical characteristics, the engine (Figs 5, 6, 7) is classified as a road-type hopped-up motorcycle engine.

The horizontal arrangement of cylinders ensures adequate cooling and balancing of the crank gear. Each cylinder has a separate carburettor. This improves engine starting and increases its power.

Crank Gear

The crank gear consists of a crankshaft with connecting rods, pistons with piston rings and piston pins, a crankcase and two cylinders with heads.

Crankshaft. The two-bearing crankshaft is cast from high-duty cast iron and has two throws arranged at an angle of 180° in one plane. The crankshaft consists of a front and a tail journal, a web and two crankpins.

The crankshaft is installed in the engine crankcase on two bearing 30 (Fig. 6) and 39. Fitted on the crankshaft front end is driving timing gear 4 and centrifuge, flywheel 22 is mounted on the tapered portion of the rear end.

The crankshaft sense of rotation is right-hand, if viewed from the front.

Under normal operating conditions, the crankshaft with connecting-rod

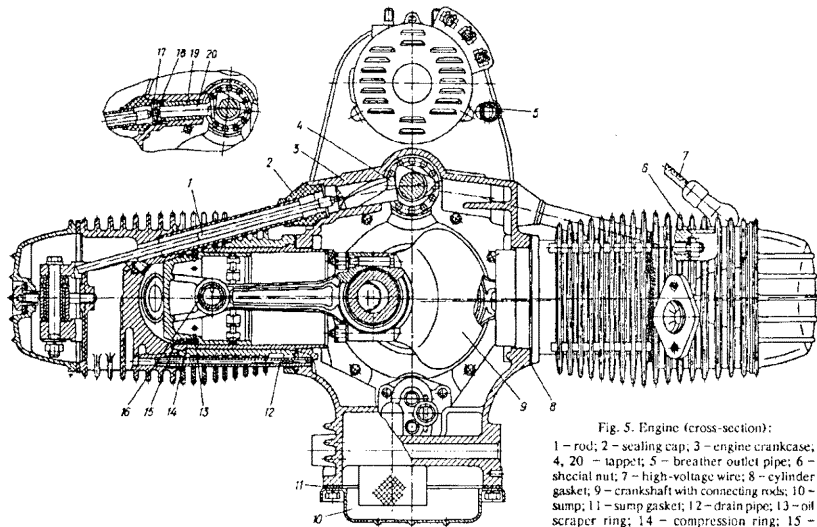


Fig. 5. Engine (cross-section):

1 - rod; 2 - sealing cap; 3 - engine crankcase; 4, 20 - tappet; 5 - breather outlet pipe; 6 - special nut; 7 - high-voltage wire; 8 - cylinder gasket; 9 - crankshaft with connecting rods; 10 - sump; 11 - sump gasket; 12 - drain pipe; 13 - oil scraper ring; 14 - compression ring; 15 - piston; 16 - piston pin; 17 - lock ring; 18 - spring; 19 - tappet guide

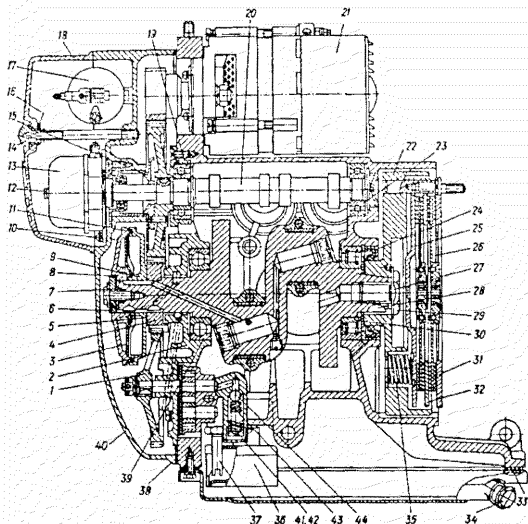


Fig. 6. Engine (longitudinal section):

1 - oil pump drive gear; 2 - front bearing housing with oil pump; 3 - centrifuge screen; 4 - driving timing gear; 5 - driving timing gear gasket; 6 - centrifuge washer; 7 - sealing ring; 8 - centrifuge washer gasket; 9 - centrifuge body; 10 - centrifuge cover; 11 - centrifuge sealing ring; 12 - breaker cover holder with cleat; 13 - motorcycle breaker; 14 - cover fastening nut; 15 - breather; 16 - cover lock ring; 17 - ignition coil; 18 - crankcase front cover; 19 - camshaft front bearing; 20 - camshaft with gear; 21 - generator with gear; 22 - flywheel with clutch pins; 23 - camshaft rear bearing; 24 - crankshaft gland; 25 - clutch driving pressure disk; 26 - clutch driven disk; 27 - flywheel lock washer; 28 - flywheel Woodruff key; 29 - flywheel fastening bolt; 30 - crankcase rear bearing; 31 - clutch driving bearing disk; 32 - clutch driving intermediate disk; 33 - sump gasket; 34 - drain plug; 35 - clutch pressure spring; 36 - oil header; 37 - oil intake pipe; 38 - distributing box gasket; 39 - crankshaft front bearing; 40 - timing box cover; 41 - cotter pin; 42 - plug; 43 - spring; 44 - ball

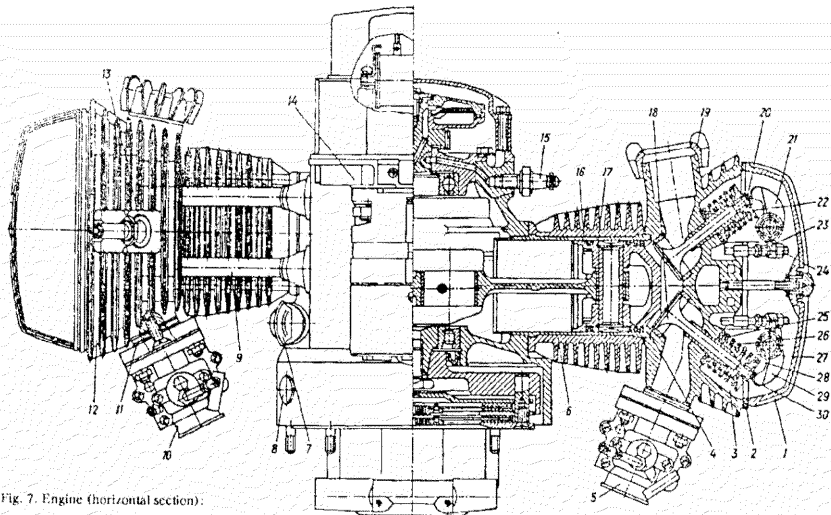


Fig. 7. Engine (horizontal section):

1 - cylinder head cover; 2 - head cover gasket; 3 - right-hand cylinder head with valves; 4 - cylinder head gasket; 5 - right-hand carburettor; 6 - cylinder; 7 - filler plug; 8 - rubber plug; 9 - rod casing; 10 - left-hand carburettor; 11 - carburettor gasket; 12 - left-hand cylinder head with valves; 13 - spark plug; 14 - generator gasket; 15 - emergency oil pressure transmitter; 16 - piston with rings and pin; 17 - piston pin lock ring; 18 - inlet valve; 19 - exhaust pipe fastening nut; 20 - valve stem; 21 - valve guide; 22 - outlet valve; 23 - adjusting bolt; 24 - lock nut; 25 - lower disk; 26 - valve outer spring; 27 - valve inner spring; 28 - upper disk; 29 - left-hand rocker; 30 - block

sliding bearings features a considerable service life. However, in case of engine overhaul it is advisable to replace connecting-rod bearing bushings. This will prevent premature wear of the (crankshaft) crankpins.

Connecting rods assembled with bushings. The connecting rods are steel, forged, I-section type. Press-fitted into the connecting rod small end is a bronze bushing with a precision-made hole for correct fit of a piston pin. The connecting rod big end is asymmetrical, detachable, with thin-walled interchangeable bushings. For correct mounting of connecting rods on the crankshaft, the connecting rod shanks are provided with protrusions which must be outwardly directed with respect to the crankshaft web (for the right-hand connecting rod, the protrusion is directed towards the flywheel, for the left-hand one, towards the centrifuge).

The connecting rod caps are not interchangeable. The connecting rod bolt nuts are to be tightened and locked.

Piston, piston rings and piston pins. Engine piston 15 (Fig. 5) consists of a crown, skirt and bosses. The piston has four grooves in which piston rings are fitted. Two upper rings 14 (compression) provide the required air-tightness in the cylinder and prevent the gases from breaking through from the combustion chamber into the crankcase.

Two lower rings 13 (oil scraper) serve to remove excess oil from the cylinder walls.

In the third groove fitted is a steel oil scraper ring consisting of four elements: two steel disks, axial and radial spacers.

The lower groove is fitted with cast iron oil scraper ring.

The axis of the piston pin hole is displaced by 1.5 mm from the piston diametral plane, owing to which the piston moves smoothly, without impacts, within the clearance between the piston skirt and cylinder walls upon changing the direction of travel in the top dead center. Stamped on the piston head is an arrow to indicate the correct arrangement of the piston in the cylinder; when mounting, ensure that the arrows on both pistons point forward, i. e., towards the centrifuge.

The compression piston rings are made from special cast iron and have straight locks. The piston ring gap (when fitting into the cylinder) must be within 0.25–0.50 mm.

When installing cylinders on the pistons, see that compression rings are turned with their locks to different sides in order to diminish the gas leakage.

Piston 16 (Fig. 7) is linked with the connecting rod by means of a floating pin whose axial displacement is limited by two spring lock rings 17 inserted into the annular recesses of piston bosses.

Crankcase. Crankcase 3 (Fig. 5) which is cast from aluminium alloy is the main base member of the engine.

Installed on, and secured to, the crankcase are the cylinders with heads and auxiliary mechanisms. In addition, the crankcase serves as an oil reservoir. Rotating inside the crankcase are the crankshaft and camshaft, the timing gear

box is mounted in the front portion of the crankcase and at the top the generator is arranged.

On the underside the crankcase is closed with stamped sump 10. Fitted between the crankcase and sump is sealing gasket 11.

During engine operation, some portion of the air-fuel mixture and exhaust gases force their way into the crankcase through piston ring clearances. Besides, as the pistons move to the lower dead centre, the gases in the crankcase space are compressed and under their pressure the oil may leak out from the crankcase-to-cover joints and through the glands. To prevent this, forced ventilation of the crankcase is used. To open the crankcase inner space to atmosphere as the pistons move down and seal it off from atmosphere as the pistons move upward, breather 15 (Fig. 6) is provided, which is located in the central hole of cover 40 of the timing gear box.

The gases escaping through the breather from the crankcase contain water vapours, owing to which, during operation in winter time, an ice lock preventing the gases from leaving the crankcase may form in the rubber pipe connecting the breather to the air filter. This may cause oil leakage through the glands. For this reason, it is advisable to remove the rubber pipe during operation in winter time at a temperature of 0 °C and below zero.

Cylinders. the engine has identical interchangeable bimetallic cylinders 6 (Fig. 7). The cylinder is essentially an aluminium jacket with a cast iron sleeve. The lower portion of the cylinder is provided with a flange having holes passing through all the fins, for anchor studs fastening the cylinders and their heads to the crankcase. The cylinder upper portion has an annular collar entering the recess in the head.

Fitted between the cylinder and head is sealing gasket 4.

Cylinder heads. Cylinder heads 3 and 12 manufactured from aluminium alloy have fins on the outside to increase the cooling surface. The combustion chamber of the head is hemispherical in shape. On the side opposite to the combustion chamber, the head has four brackets with holes in which rockers are fastened. A threaded hole for the spark plug is made in the upper part of the head.

Care of Crank Gear

During daily maintenance, clean the crankcase, cylinders and cylinder heads to remove dirt and dust; in doing so, make sure the fins are clean since the fins clogged up with dirt will deteriorate engine cooling. Check to see that there is no oil leakage in the inner space of the engine crankcase.

If air-tightness is disturbed due to improper fitting or damage caused to paper or rubber gaskets, gland seals, air will leak in and the pressure will rise in the engine crankcase; this will lead not only to oil leakage at the joints and through gland seals, but also to premature oil contamination and increased wear of engine parts.

After 10 000 km run, clean off the carbon from the combustion chambers of cylinder heads, pistons, piston rings and valves. The presence of carbon in the engine may cause knocks reducing the engine service life.

If oil consumption in the engine exceeds 0.25 l per 100 km run, replace the piston rings.

VALVE TIMING GEAR

The valve timing gear controls the opening and closing of the outlet and inlet valves at the appropriate instants corresponding to a definite crankshaft rotation angle. The valve timing gear consists of camshaft 3 (Fig. 8), tappets 4 (Fig. 5), rods 1, rockers 21 (Fig. 7) and 29, adjusting bolts 23, lock nuts 24, outlet (22) and inlet (18) valves with caps 20, springs 26, 27, bearing disks 25, 28 and blocks 30. Mounted at the front part of the camshaft is driven gear 2 (Fig. 8) with which driving timing gear 4 and generator drive gear 1 move into mesh. The camshaft is installed in the engine crankcase on two ball bearings 19 (Fig. 6) and 23. The correct valve timing is ensured by matching the marks on timing gears 2 (Fig. 8) and 4 during assembly.

The engine may be fitted with tappets of another design (see ref. Nos 17, 18, 19 and 20, (Fig. 5) whose working end is faced with a special alloy.

When operating the engine, carbides, borides may break off the faced working surface of the tappet to a depth of 0.35 mm, that cannot exert detrimental effect on the cam-tappet pair serviceability.

Valve Adjustment

Normal operation of the engine is greatly, dependent upon the value of expansion clearance between the valve stem and rocker end.

It should be remembered that on an air-cooled engine, due to absence of a water jacket and provision of considerable finning on the cylinders, crankcase and cylinder heads,

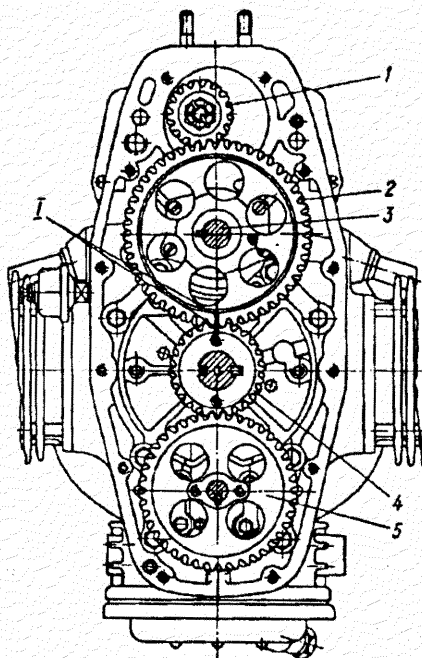


Fig. 8. Engine gears:

- 1 - generator gear; 2 - camshaft driven gear; 3 - camshaft; 4 - driving timing gear; 5 - oil pump gear; I - marks

operation of the valve gear timing drive can be well discerned by ear. For this reason, periodic knocks of the valves and tappets with normal clearances between the valve stem (cap) and rocker end, as well as uniform (not harsh) noise of high-pitch tone arising during operation of the valve timing gear drive should not be regarded as defect symptom.

Before checking and adjusting the clearance, place a tray under the cylinder head, remove the cylinder head cover and drain the oil that has accumulated. Set the piston to the top dead centre of compression stroke by turning over the crankshaft so that mark B on the flywheel is brought into coincidence with the mark on the engine crankcase; this must be watched through the peephole in the engine crankcase with the rubber plug removed (Fig. 9).

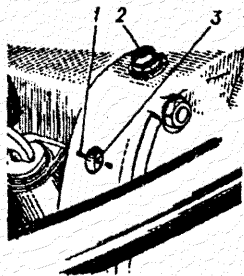


Fig. 9. Arrangements of marks on engine crankcase and flywheel:

1 – mark on engine crankcase;
2 – plug; 3 – mark B on flywheel

In this position, both (inlet and outlet) valves will be fully closed and their rockers must freely swing on their pins. Then, using a 0.07 mm thick flat feeler gauge, check the clearance between both rockers and valves.

If the clearance is set improperly, slacken lock nut 24 (Fig. 7) and, rotating adjusting bolt 23 in one direction or the other, set the required clearance. Following that, tighten up the lock nut. The clearance is to be adjusted on a cold engine and must be equal to 0.07 mm. If there is no clearance or the clearance is too small, the valve will not fit closely to its seat at the instant of closure; if the clearance is too large, the beginning of valve opening will lag behind and filling the cylinder with air-fuel mixture will be impaired. To adjust the clearance in the other cylinder, turn the crankshaft by one revolution (by 360°), following which check and adjust the valves as directed above.

Valve Grinding

After every 10 000 km run of the motorcycle, check the timing gear valves for good condition and, if necessary, grind them to fit their seats.

Valve grinding is necessitated by deterioration of air-tightness due to wear of chamfers, appearance of pits and other defects on seat chamfers and valve heads.

To check the valve head for close fitting to the seat, pour some kerosene into the inlet and outlet ducts of the cylinder head. If the kerosene seeps through the fitted valve-to-seat surfaces in less than 10 s, the valves have to be ground in.

To grind a valve to its seat, remove the valve, secure the cylinder head in a vice, apply a thin layer of grinding paste to the valve head chamfer and insert the valve into the cylinder head guide bushing. Fit a brace or drill on the valve stem end. Use may be made of a length of a petrol hose to be rotated between

the palms of your hands. Pressing the valve against the seat, rotate it in either direction so that a turn of the valve in one direction is approximately twice as great as a turn in the other direction, i.e., so that the valve is gradually turned through in one direction. At the moment of changing the direction of valve rotation, it is necessary to force it out of the seat.

When grinding the valve to the head seat, be careful not to remove from the working chamfers more metal than required as this will reduce the number of permissible repairs. Toward the end of the grinding, it is necessary to decrease the amount of paste used and at the last stage and do the grinding by applying pure oil.

An external sign of satisfactory grinding is a one-tone dull colour of the working surfaces of the valve head and seat.

After grinding, thoroughly wash the valves, valve seats, guide bushings, filler and cylinder head compression chamber so as to completely remove the grinding paste. After this is done, check the valve fit for air-tightness, for which purpose re-install the valves and pour kerosene successively into the inlet and outlet ducts of the cylinder head. There must be no kerosene seepage within 10 s. In case the kerosene begins to seep before the specified time has elapsed, an additional grinding is required.

Ignition Timing Adjustment and Checking

In order to facilitate the checking and adjustment of ignition timing, mark P (early ignition point) is provided on the flywheel external surface, this mark can be seen through the peephole in the crankcase (Fig. 9) when turning over the flywheel.

Before starting to check or set ignition timing, it is necessary to adjust the breaker contacts gap. Then connect a test lamp with one wire to the ignition coil low-voltage terminal (to which a wire extending to the breaker is attached) and with the other, to the frame. One can make such a checking device by oneself, using bulb A12-1, a lamp holder and two wires, preferably with alligator clips at the ends.

Take out the rubber plug closing the peephole on the engine crankcase and, turning over the crankshaft with a starting lever in the direction of its rotation, match mark P on the flywheel with the mark on the engine crankcase.

Switch on the ignition and fully move apart weights 14 (Fig. 10) of the automatic spark timer. If, at the instant the weights are drawn apart to the fullest possible extent, the test lamp will light up (the breaker contacts become open), the ignition point is set correctly.

If, with weights fully parted, the test lamp fails to light up, the ignition is late; if it lights up before the weights are fully parted, the ignition is early.

In order to set the required ignition point, slacken the screws fastening the breaker and legs and fully move apart the automatic timer weights, turn breaker

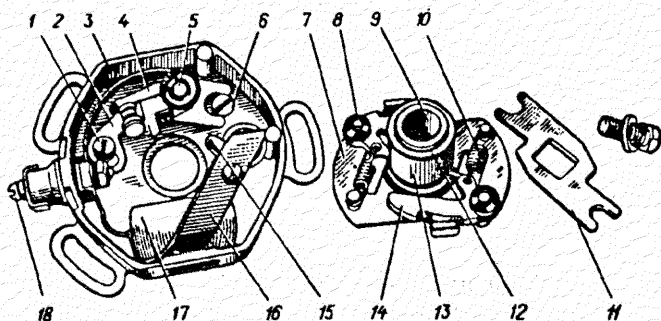


Fig. 10. Breaker ПМ302А with automatic spark timer:

1 – screw; 2 – contact leg; 3 – breaker body; 4 – breaker lever; 5 – lever pin; 6 – eccentric; 7 – automatic spark timer; 8 – weight pin; 9 – bushing; 10 – spring; 11 – carrier; 12 – locking ring; 13 – cam; 14 – weight; 15 – wick; 16 – capacitor holder; 17 – capacitor; 18 – terminal

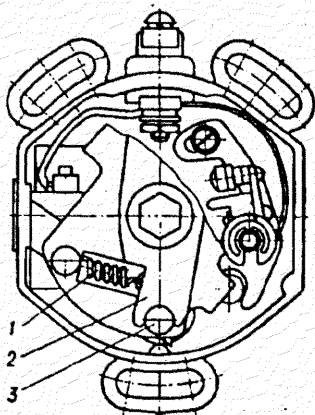


Fig. 11. Installing the carrier onto ПМ302А automatic spark timer:

1 – spring; 2 – carrier; 3 – weight pin

body 3 clockwise if the ignition is late, or counterclockwise if the ignition is early, until the test lamp comes on.

Fix the breaker body in this position and secure it with screws and leg. Without disconnecting the test lamp, check again the ignition timing for proper adjustment. If the ignition point is set correctly, disconnect the test lamp and reinstall the breaker cover.

The value of ignition advance angle is to be found in Section "Specifications" (refer to "Basic Data for Adjustment and Check-up").

At the same time check and, if required, adjust the gap between the dischargers and ignition coil terminals, which must be 9 mm.

The springs of the automatic spark timer must not be bent or extended since they are specially calibrated. When removing and reinstalling automatic spark timer IIM302A, take care to note the position of carrier 2 (Fig. 11). To set the latter properly, match the slots of the carrier with weight pins 3 so that the openings through which springs 1 can be seen are rectangular in shape (refer to Fig. 11).

Breaker Point Gap Adjustment

In order to adjust the breaker point gap, turn over the crankshaft so that the breaker cam is set to the position ensuring the maximum opening of the contacts. Slacken stop screw 1 (Fig. 10) and, turning eccentric 6 with a screwdriver in one direction or the other, set the breaker point gap equal to 0.4–0.6 mm.

The gap is to be measured with a flat feeler gauge to be found in the motorcycle set of spare parts, tools and accessories.

After setting the required gap, tighten up screw 1.

To facilitate fulfilment of this operation undo the screw fastening the automatic spark timer and remove carrier 11.

In this case the cam with the automatic spark timer will freely turn over on the camshaft shank. Turning a cam to one or other side ensures access to the breaker contacts, stop screw 1 and eccentric 6 when checking and adjusting clearance in the breaker.

LUBRICATION SYSTEM

The engine lubrication system is combined-type (forced-feed and by splash). A lubrication diagram is presented in Fig. 12.

Oil is to be poured into the crankcase through the filling hole and is closed with plug 2 with an oil level dipstick. From there, the oil is sucked in through gauze filter 3 by the gear pump installed in the body of the front bearing which is actuated from the gear that is in mesh with the timing gear driving pinion. The oil pump has two gears mounted in the body, these gears feed oil to main oil line 7. To prevent the oil pressure in the system from rising above permissible level, reducing valve 5 is fitted in the oil pump body.

During normal operation of the oil system, the excessive oil pressure forces out the reducing valve and excess oil is by-passed back into the oil pump suction duct.

The reducing valve does not require any adjustment in the process of usage.

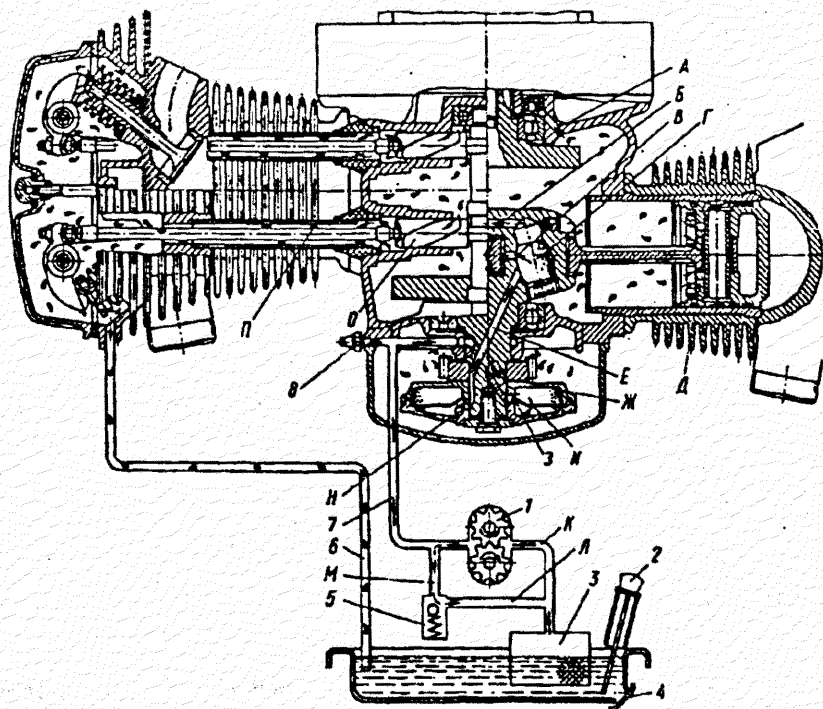


Fig. 12. Engine lubrication diagram:

1 - oil pump; 2 - filler plug; 3 - gauze filter; 4 - drain hole plug; 5 - reducing valve; 6 - drain pipe; 7 - main oil line; 8 - emergency oil pressure transmitter; A - oil drain duct; B - oil supply duct in web; B - hole for connecting-rod bearing lubrication; Γ - trap; Д - hole for piston pin lubrication; E - crankshaft oil discharge duct; Ж - crankshaft oil supply duct; 3 - oil supply hole in centrifuge body; H - hole in screen; K - suction duct; J - by-pass duct; M - reducing valve oil supply duct; H - hole for oil drain from centrifuge; O - slot in tappet for oil supply to cylinder head; П - oil supply duct in rod casing

From the oil line, the oil is supplied to the annular groove in the front bearing body and then further on via the duct to the centrifuge body. The oil purified in the centrifuge is fed through crankshaft oil drain duct E and oil supply duct B in the crankshaft web to traps Γ provided in the crankpins and, from there, passes via holes B to the connecting rod bushings.

The fast moving parts of the crank gear promote intensive oil splashing and formation in the crankcase of oil mist used to lubricate the working surfaces of cylinders, piston pins, connecting rod small ends, tappet guides, main rolling bearings, valve timing gears, camshaft cams and ball bearings, tappets and other friction parts.

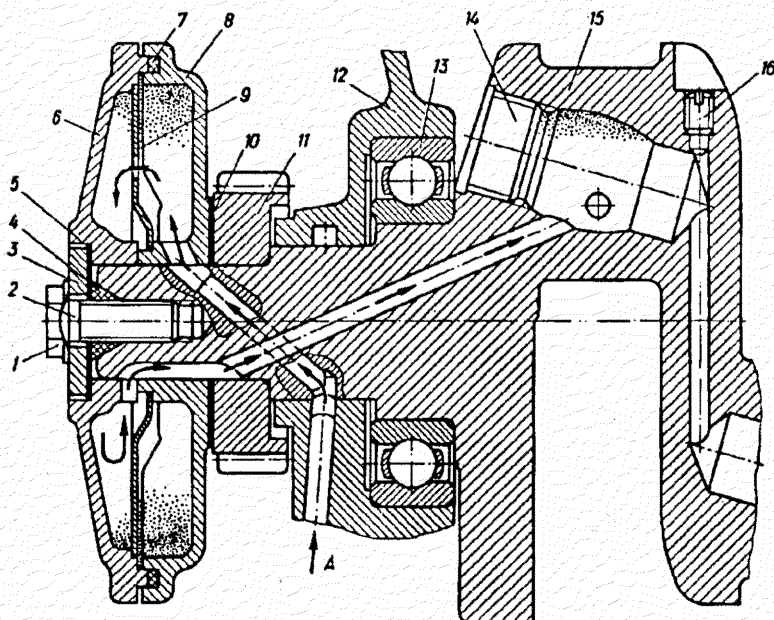


Fig. 13. Centrifuge and front main ball bearing:

1 – centrifuge fastening bolt; 2 – lock washer; 3 – centrifuge washer; 4, 7 – sealing ring; 5 – gasket; 6 – centrifuge cover; 8 – centrifuge body; 9 – screen; 10 – timing gear gasket; 11 – driving timing gear; 12 – front bearing housing; 13 – front main ball bearing; 14 – plug; 15 – crankshaft; 16 – screw; A – from oil pump

After getting into tappet slots O, the atomized oil enters the rod casings, settles in them and flows down into the cylinder heads. Here the oil is splashed by the valves and springs and lubricates the valves and rockers. Excess oil flows down drain pipe 6 back into the crankcase. If the mushroom tappets 20 (Fig. 5) are installed on the engine, the atomized oil gets into the rod casings through the hole in the crankcase near the tappet guide bushings.

To discharge accumulating oil baffled by the flywheel gland, oil drain duct A is provided in the crankcase.

To prevent oil seepage from the crankcase to the clutch, a rubber gland is

fitted on the flywheel hub, and a rubber gland on the camshaft excludes ingress of oil to the breaker.

The centrifuge is basically a fine oil filter. Before reaching the centrifuge, the oil is cleaned by the oil header gauze only. Centrifuge aluminium body 8 (Fig. 13) and cover 6 installed on the crankshaft front journal are locked with a key and secured with bolt 1 through the use of special washer 3 fitted in the centrifuge cover. To prevent spontaneous unscrewing of bolt 1, lock washer 2 is provided. Mounted between the centrifuge body and cover is screen 9 with one oblong hole for oil passage from the body space into the centrifuge cover space and further on via the ducts to the connecting rod bearings. The correct position of the hole in the screen with respect to the ducts is ensured by a nib entering the centrifuge body.

The centrifuge body and cover are sealed by special rubber ring 7. To reduce oil leakage, sealing ring 4 is fitted between the crankshaft end face and washer.

Care of Lubrication System

In operating the motorcycle, keep the oil level in the crankcase at the upper mark of an oil dipstick. If the oil level drops to the lower mark on the dipstick, engine operation is inadmissible. Oil should be added from clean vessels and through a funnel with a gauze (using the latter is a must), taking care to prevent ingress of dust, dirt and moisture into the crankcase.

Before checking the oil level, wipe the oil dipstick clean and insert it into the filling hole of the crankcase up to the stop, without screwing up the plug. Change oil when the engine is hot.

Prior to changing oil in the crankcase, thoroughly clean the plugs of the filling and drain holes of the crankcase and screw them out. Then drain the used oil, screw in the drain hole plug and fill in fresh oil. After every 10 000 km run, wash the engine lubrication system. For this purpose, screw out a drain hole plug, discharge the used oil, screw in the drain hole plug and pour 1.2–1.5 l of oil into the crankcase; for washing, start the engine, allow it to operate for 2–3 min and discharge the oil again. Remove and wash the crankcase sump. Following that, pour fresh oil into the crankcase.

In winter time, heat oil before priming up to a temperature of 70–80 °C.

It should be remembered that even a short-time disturbance of lubrication system operation may lead to an engine breakdown.

Excessive overheating of cylinders and heads, power drop and knocks in the engine are an indication of insufficient lubrication.

Operation of the lubrication system is checked by diaphragm-type emergency oil pressure transmitter 8 (Fig. 12) which operates when the pressure in the system drops down to 0.13–0.18 MPa (1.3–1.8 kgf/cm²).

A pressure drop is signalled by the dashboard-mounted indicator lamp of the emergency oil pressure transmitter. When the ignition is switched on, the indicator lamp will light up, after starting the engine, the lamp will go out. If

the indicator lamp is alight with the engine operating, this means that the oil pressure transmitter or engine is out of order. In this case engine operation is impermissible until faults are detected and eliminated.

In case the indicator lamp of the emergency oil pressure transmitter comes on instantaneously at the engine average speed, which may occur as a result of metal particles getting under reducing valve ball 44 (Fig. 6), it is necessary to clean the valve seat. For this purpose, drain oil from the crankcase, remove the sump, disassemble the reducing valve (withdraw cotter pin 41, plug 42, spring 43 and ball 44) and clean the seat.

It is advisable to perform cleaning of the seat with the help of a 10 mm dia drill sharpened at angle of 90° by turning it manually and applying slight pressure to it. It is permissible to seal the valve seat with a 10 mm dia ball by gently tapping it (two or three times) with a hammer weighing 0.1–0.2 kg through a drift (use may be made of a tommy bar to be found in a tool bag). Following that, turn over the crankshaft two or three times and re-assemble all the parts in reverse order.

When the engine is overheated or operates at a low idling speed (with engine speed of 800 min^{-1}), the indicator lamp may light up with the lubrication system in good working order. It is advisable to periodically screw out the oil pressure transmitter and check oil pressure with the help of a test pressure gauge. The oil pressure at the average rotational speed of a warmed-up engine must be not lower than 0.3 and not higher than 0.6 MPa (3 and 6 kgf/cm^2 , respectively).

In the process of engine operation, under the action of centrifugal forces, dirt is separated from the oil and settles on the centrifuge body and cover. For this reason, the centrifuge must be cleaned after every 10 000 km run.

FUEL-FEED SYSTEM

The fuel-feed system includes the following: a petrol tank, three-way cock with a filter and settler, two carburettors, air cleaner, air ducts and fuel lines.

Fuel Cock with Settler The cock is screwed into the petrol tank threaded bushing. Arranged in the cock lower portion is settler 5 (Fig. 14) with filter gauze 6. Petrol is fed through one of the two fuel line pipes 10 and 11 of different height.

Slide valve 3 mounted in the cock body has one axial and two radial holes. One of them (a through hole) is coincident with a hole in high fuel pipe 11 (main fuel), the other being in line with the duct of the low fuel pipe 10 (reserve fuel).

Provided on the other side of the body are two unions for connection of fuel rubber hoses extending to the carburettors.

The cock handle has three positions: O (ON) – cock turned on; 3 (OFF) – cock turned off; P (R) – cock turned on for fuel reserve consumption.

The reserve contains close to 2 l of fuel.

To wash the settler and gauze filter of the fuel cock, unscrew the lower nut, separate the settler and cup with the filter from the cock, clean them of dirt and wash in pure petrol.

When re-installing the settler, make sure the sealing gasket is intact and properly fitted.

The engine is supplied from two carburettors K63T installed on the cylinder heads.

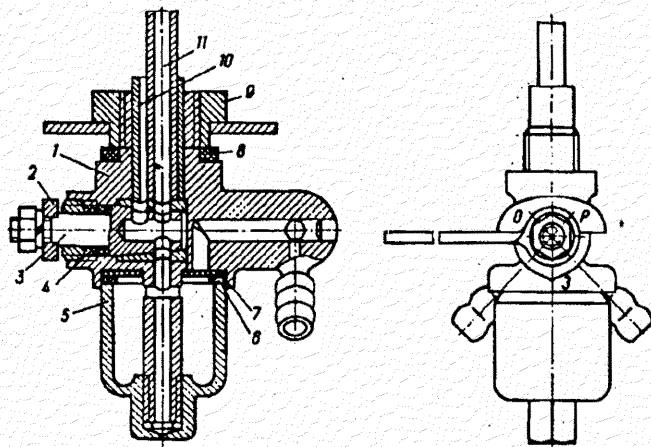


Fig. 14. Fuel cock:

1 – body; 2 – handle; 3 – slide valve; 4 – slide valve sealing gasket; 5 – settler; 6 – filter gauze; 7 – settler sealing gasket; 8 – fuel cock sealing gasket; 9 – threaded bushing; 10 – reserve fuel (petrol) pipe; 11 – main fuel pipe

The carburettor design is shown in Fig. 15.

Carburettors K63T. Carburettors of this type are interchangeable and identical in design.

Carburettor adjustment. Before starting to adjust the carburettors, check the gap between the electrodes of spark plugs, breaker point gap and the clearance between the valve stems and rocker ends.

Idling speed adjustment. Prior to adjustment, make sure there is a clearance between the cable sheath end piece and union, this clearance must be within 2–3 mm. If there is no clearance or the clearance is greater than

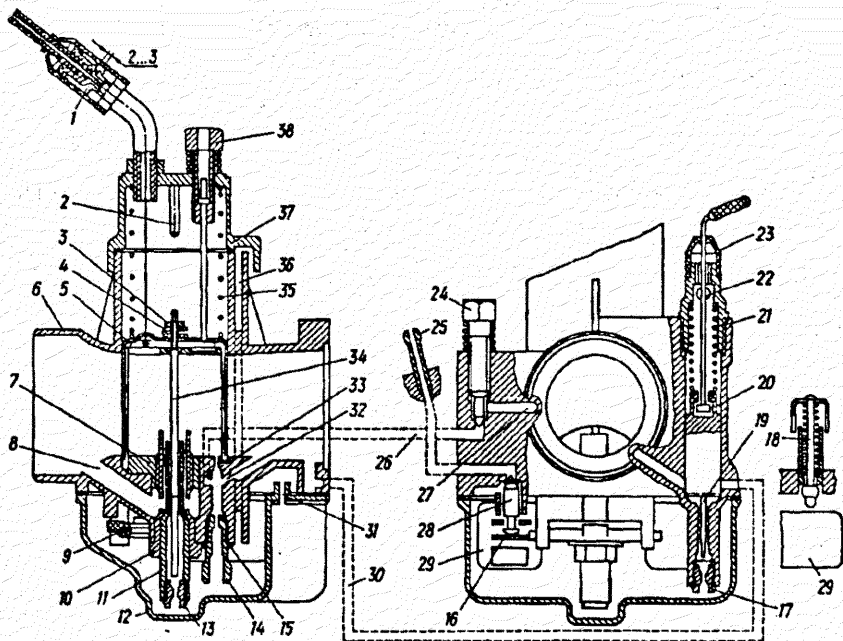


Fig. 15. Carburettor K63T:

1 – union with lock nut; 2 – throttle lift limiter; 3 – lock nut; 4 – dosing needle cleat; 5 – throttle; 6 – body; 7 – nozzle chamber; 8 – atomizer air duct; 9 – float lever pin; 10 – atomizer body; 11 – atomizer; 12 – float chamber cover; 13 – main fuel jet; 14 – slow-speed fuel jet; 15 – lock washer; 16 – fuel valve stop for fuel level adjustment; 17 – starting device fuel jet; 18 – float depressor; 19 – plunger needle; 20 – starting device plunger; 21 – spring; 22 – rod; 23 – cap; 24 – slow-speed air-fuel ratio adjusting screw; 25 – fuel inlet connection; 26 – slow-speed jet air duct; 27 – air duct; 28 – fuel valve; 29 – float; 30 – air-fuel mixture supply duct from starting device; 31 – drain hole; 32 – emulsion hole; 33 – transition hole; 34 – dosing needle; 35 – throttle spring; 36 – float chamber-to-atmosphere duct; 37 – body cover; 38 – crankshaft slow-speed adjusting screw

required, slacken the lock nut of union 1 (Fig. 15) and rotating the latter clockwise or counterclockwise, adjust the clearance and secure the union with the lock nut. This clearance must be the same on both carburetors.

Carburettor adjustment for a low idling speed of the engine is to be carried out on a warmed up operating engine. If a warmed up engine stops at the minimum idling speed, the idling system should be adjusted.

Adjust each of the carburetors separately, proceeding as follows: using screw 38, set the minimum steady speed of the engine, then gradually turn back screw 24 until the engine begins to miss, following that, slowly turn the screw forward until the engine starts to operate steadily; next, using screw 38, again

reduce the extent to which the throttle is opened until the minimum steady engine speed is achieved, at the same time the mixture composition is to be regulated with screw 24. The operations described above should be performed until the minimum steady engine speed is achieved.

Follow the same procedure to adjust the carburettor of the other cylinder.

After the idling speed adjustment, the engine speed must be the same during operation of the left- and right-hand cylinders. This is to be checked by alternately disconnecting the right- and left-hand cylinders by removing the caps from the spark plugs.

Check by listening if there is any change in the engine speed during operation of each of the cylinders. If the engine speed is different at the right- and left-hand cylinders, the carburettors should be adjusted by screwing in or unscrewing throttle screws 38 until the same speed is achieved.

To make sure the idling speed is steady, sharply open and close the throttles (by turning the throttle control handle).

If the engine operates steadily at a slow rotational speed, but stops when the throttle is sharply opened, screw in screw 24 by $1/4$ to $1/2$ turn (the mixture will become richer); if the engine stops when the throttle is sharply closed, undo screw 24 by $1/4$ to $1/2$ turn (the mixture will become poorer).

Air-fuel mixture adjustment under engine operating conditions. Engine running under operating conditions (at average loads) is dependent on the needle position in the throttle, therefore, carburettor adjustment consists in the selection of the proper position of the needle.

The need for such adjustment arises as a result of changes in climatic conditions, for instance, when passing from a summer to winter in-service period; during a running-in period or for increasing the engine power at the expense of its economical operation. Adjustment is to be performed by moving dosing needle 34 along the thread with respect to cleat 4 by rotating it after first slackening lock nut 3. When the needle is screwed into the cleat, the former rises with respect to the atomizer hole and the mixture becomes richer; with the needle screwed out, the mixture will become poorer. Turning the needle by one revolution causes it to move for 0.5 mm.

On completing the adjustment, tighten up lock nut 3.

Correct adjustment of carburettors for the middle load conditions is to be checked by sharply increasing the engine speed.

When, in this case the knocking is heard in the carburettor, the mixture must be enriched by raising the needle.

Setting the fuel level in the float chamber. If the fuel level in the float chamber is too high, fuel consumption is increased or engine pick-up is insufficient, and also after replacement of the fuel valve or float, it is necessary to set the normal fuel level in the carburettor float chamber.

In order to set the fuel level in the float chamber, remove the float chamber cover and install the carburettor in a vertical position – with the float chamber up. In this position, the band on the float lateral surface (in its middle position) must

be parallel to the carburettor body plane adjacent to the float chamber cover and the distance between the float band and this plane must be equal to (13 ± 1) mm. If required, change the position of the float by bending fuel valve stop 16.

Care of carburettors. After every 5000 km run, it is advisable to wash and blow off the carburettors. Wash carburettor parts with clear petrol. After washing, blow over the carburettors and their parts with air or dry them. It is impermissible to wipe parts with a cleaning cloth or some other similar materials. For cleaning the jets, avoid using a steel wire so as not to change the cross-section of the jet holes since this may disturb the normal operation of the carburettors.

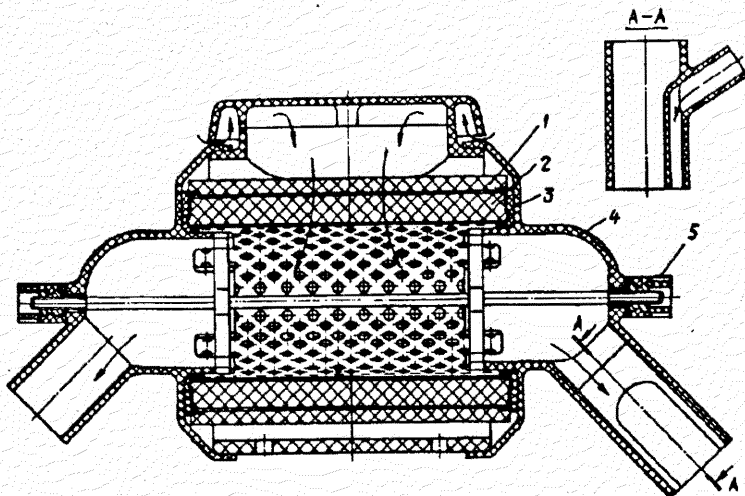


Fig. 16. Air cleaner:

1 – preliminary filter; 2 – filter; 3 – gasket; 4 – cover; 5 – special nut

In case the motorcycle is to be operated for a long time under hot climate conditions (at temperatures of 35 to 40 °C and higher) and also at an altitude of 2000 m and higher above the sea level, it is advisable to lower the dosing needle and, if the motorcycle is to be used under cold climate conditions (at air temperatures from minus 15 °C and lower), the dosing needle should be raised.

Fuel leakage through carburettor drain hole 31 indicates that the float chamber fuel valve is leaky. In this case it is necessary to wash the fuel valve or replace its elastic washer, eliminate scratch marks and nicks on the valve seat.

Air Cleaner (Fig. 16) – is mounted on the gearcase and attached to the carburettors with the rubber branch pipes.

Dry filter element of the air heater consists of filter 2 – papeboard bellows and a preliminary filter made from non-woven synthetic material. The preliminary filter serves a coarse filter element: large particles of dust, drops of water coming in together with air are retained with the filter. From the filter inner space the cleaned air is supplied via the air ducts to the carburettors.

Care of Fuel-Feed System

During check inspection, make sure the tank is filled with fuel, verify the fuel feed to the carburettors, reliability of fuel line connections, operation of the carburettor throttle control drive.

When carrying out maintenance No. 2, remove the dirt that has accumulated in the settler a fuel cock, wash and clean the fuel filters, blow air through the jets and carburettor ducts and wash the float chambers.

If fuel supply is insufficient, the engine power drops sharply, backfire appears in the carburettors and the engine speed does not correspond to the normal position of the throttle control handle. In this case first of all make certain that the hole in the fuel tank plug, through which the tank is vented to atmosphere, is not clogged. Then, after turning off the fuel cock, screw out the settler, clean and wash it and the filter contained in it. After a trip, it is advisable to drain petrol from the petrol tank and blow out the cock with compressed air (with the cock in two positions – O and P) (Fig. 14).

Periodically check the intake air lines for air-tightness of connections and good condition since inleakage of unpurified air will cause premature wear of engine parts.

When operating the motorcycle on asphalt roads, after 5000 km run, it is advisable to clean the preliminary filter element, that have been removed from the filter beforehand, by blowing compressed air through it. For this purpose, unscrew special nut 5 (Fig. 16), take off cover 4 and extract filter 2. For blow-through, use may be made of a motorcycle pump. The air filter is to be blown through in a similar manner. Direct an air jet to the filter inner surface.

After 10 000 km run, replace the filter element with a new one.

When riding over dusty roads, the element must be cleaned and replaced more frequently. In exceptional cases it is permissible to re-use the filter element after washing it.

Washing is to be done in a solution of detergents ОП-7, ОП-10 or domestic-use powdered detergents in warm (40 to 50 °C) water. Concentration of detergents should be 20 to 25 g per litre of water.

The filter element is to be put into the above-mentioned solution for 15 to 30 min and then washed by successively immersing and rotating it. Next, the filter element should be rinsed in clean warm water and thoroughly dried.

With a considerable ingress of moisture into the filter element of the air filter, the engine may miss.

Therefore, running the motorcycle in rain, remove the preliminary filter from the filter. After riding, the filter element should be dried and re-installed.

TRANSMISSION

The motorcycle transmission consists of interconnected units designed to transmit the torque from the engine crankshaft to the rear wheel and sidecar wheel, and also to change the tractive force at the driving wheel.

The transmission includes the clutch, gearbox, main drive with a differential gear and reduction gear.

Clutch

The dry double-disk clutch is designed to transmit the torque from the engine to the gearbox, to disengage the engine from the gearbox when changing the gears, and to ensure smooth engagement during getaway of the motorcycle.

The clutch consists of driven and driving parts and clutch release mechanism. The clutch driving parts include flywheel 7 (refer to Fig. 22) and pressure (8), intermediate (9) and bearing (11) disks mounted on the flywheel pins.

At the centre of the pressure disk is a square hole into which clutch release rod 12 enters.

The bearing disk is fastened to the pin ends with screws which are locked by prick punching the bearing disk into the slot of screw head.

The clutch driven parts comprise two driven disks 10 having, on either side, moulded-in linings made from friction material; the disks move into mesh with the splined portion of the gearbox primary shaft.

The correct use of the clutch will considerably increase its service life.

Avoid riding with the clutch slippage. When starting off and changing the gears, smoothly engage the clutch. Sudden engagement of the clutch with the engine operating at a high rotational speed leads not only to rapid wear of the disk friction linings, but also overloads transmission parts and increases tyre wear.

The clutch has two control linkages: from the clutch operating lever arranged on the handlebar (hand drive), and from the shift pedal (foot drive).

When using the hand drive, throw out the clutch before the gear is engaged (or changed over) and smoothly release the clutch operating lever after engaging (changing over) the gear.

When the foot drive is used, the clutch is disengaged automatically in the process of engagement (changing over) of the next gear, without acting on the manual clutch operating lever.

In this case, after engaging the gear, hold the pedal with the toe and heel of your foot, gradually returning the pedal to the initial position and at the same time increasing the engine speed.

Adjustment of Clutch Release Drive

The clutch release drive is to be adjusted as required with the aid of adjusting bolt 6 (Fig. 22) and adjusting screw 20 of clutch cable 19. First adjust the foot drive. If the latter is properly adjusted, there must be a small clearance between the adjusting bolt end and intermediate rod 5. The presence of a clearance is indicated by the rocking of shift pedal 1.

The free travel of the shift pedal front arm must be within 10–15 mm. The amount of slide block 16 travel, with the clutch disengaged manually, must not be greater than the value of the slide block travel during clutch disengagement with the shift pedal. To check the hand drive for correct adjustment, proceed as follows: by depressing the shift pedal (up to the stop) with your foot, perform full engagement of the required gear. Withdraw the clutch operating lever manually towards the handle on the handlebar. Perception of cable tensioning is bound to appear only at the end of lever travel (at a distance of 1...5 mm from the handle). If this distance is found to be greater or less than specified, then turning back or forward the adjusting screw, ensure the required value.

After adjusting the clutch drive, secure the adjusting bolt and adjusting screw with lock nuts.

Gearbox

The double-shaft four-speed gearbox incorporates a reverse gear and automatic clutch release mechanism actuated during gear shifting. The gearbox design is shown in Figs 17–23.

Shafts. Primary shaft 9 (Fig. 17) is mounted on two ball bearings. The shaft is made integral with two rims of the 1st, 2nd speed and reverse gears. The 3rd and 4th speed gears are press-fitted. The 4th speed gear is kept from turning on the shaft by a Woodruff key. The 3rd speed gear is linked with the 4th speed gear by means of end face protrusions.

Secondary shaft 10 is also mounted on two ball bearings and has a toothed rim for reverse sliding gear 20. Press-fitted on the shaft are two splined sleeves 11 which are prevented from turning by keys. The 1st, 2nd and 3rd speed gears are free to rotate on metal ceramic bushings, and the 4th speed gear, on a bronze bushing. The gears are linked to the shaft with the aid of gearshift movable sleeves 13. No special supply of lubricant to the friction surfaces is provided.

Starting mechanism. This includes starting (33) and intermediate (5) shafts with gears. Freely rotating on the intermediate shaft are two gears with 12 ratchet teeth on the end faces. The shaft front end is press-fitted into the casing.

Toothed quadrant 30 is press-fitted on the splines of the starting shaft. The quadrant is pressed with the aid of a torsion spring against rubber buffer 5 (Fig. 19).

The spring is wound up by turning bushing 1 (Fig. 17) mounted in the casing front wall by one-half revolution counterclockwise.

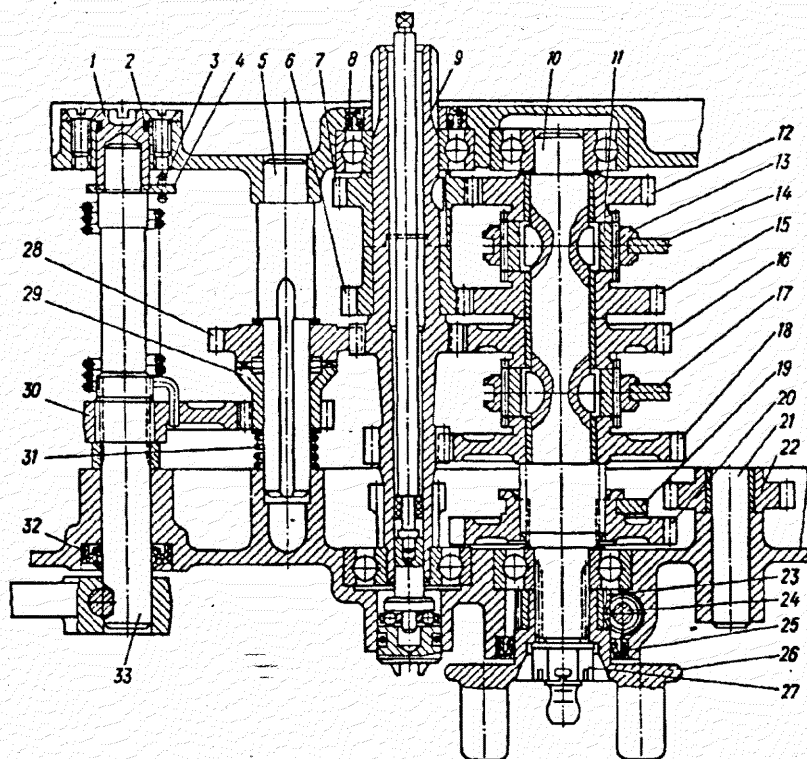


Fig. 17. Layout of shafts:

1 - starting shaft bushing; 2 - sealing rubber ring; 3 - starting shaft spring; 4 - spring stop; 5 - intermediate shaft; 6 - primary shaft 3rd speed gear; 7 - primary shaft 4th speed gear; 8 - gland; 9 - primary shaft; 10 - secondary shaft; 11 - splined sleeve; 12 - secondary shaft 4th speed gear; 13 - gearshift sleeve; 14 - 3rd and 4th speed shift fork; 15 - secondary shaft 3rd speed gear; 16 - secondary shaft 2nd speed gear; 17 - 1st and 2nd gear shift fork; 18 - secondary shaft 1st speed gear; 19 - reverse shift fork; 20 - secondary shaft reverse sliding gear; 21 - idle gear shaft; 22 - idle reverse gear; 23 - speedometer drive driving gear; 24 - speedometer drive driven gear; 25 - gland; 26 - elastic coupling disk; 27 - slotted nut for fastening elastic coupling disk; 28 - starting mechanism large gear; 29 - starting mechanism small gear with end face ratchet; 30 - toothed quadrant of starting mechanism shaft; 31 - spring; 32 - gland; 33 - starting mechanism shaft

The bushing is sealed by rubber ring 2, and the shaft, by a double-edge carcass-type gland. The starting lever is attached to the starting shaft by means of a wedge bolt. When the starting lever is depressed with the foot, the quadrant is thrown into mesh with the intermediate shaft small gear which becomes linked, with the aid of the end face ratchet, to the large gear, the latter being in constant mesh with the 2nd speed gear of the gearbox primary shaft. After starting the engine, remove your foot from the starting lever which, together

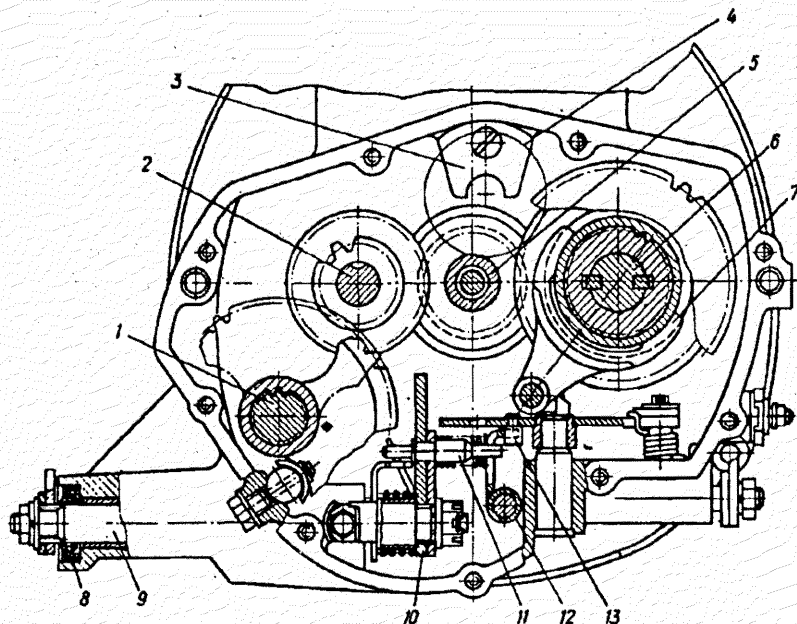


Fig. 18. Gearbox (cross-section):

1 – starting mechanism shaft; 2 – intermediate shaft; 3 – idle gear stop; 4 – idle gear installation place; 5 – primary shaft; 6 – secondary shaft; 7 – gearshift fork; 8 – gland; 9 – shifter shaft; 10 – crank-cam; 11 – crank pin; 12 – gearshift mechanism pawl; 13 – gearshift disk pin

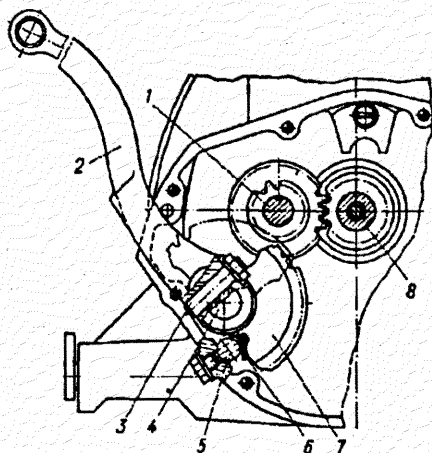


Fig. 19. Starting mechanism:

1 – intermediate shaft; 2 – starting mechanism lever; 3 – wedge bolt; 4 – starting mechanism shaft; 5 – rubber buffer of starting mechanism quadrant; 6 – buffer strap; 7 – toothed quadrant; 8 – primary shaft

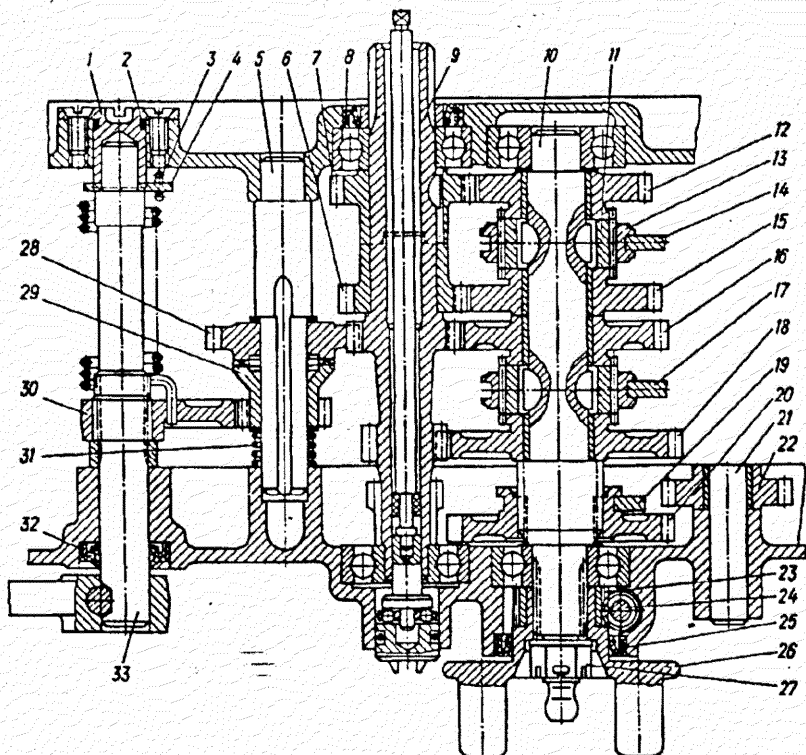


Fig. 17. Layout of shafts:

1 - starting shaft bushing; 2 - sealing rubber ring; 3 - starting shaft spring; 4 - spring stop; 5 - intermediate shaft; 6 - primary shaft 3rd speed gear; 7 - primary shaft 4th speed gear; 8 - gland; 9 - primary shaft; 10 - secondary shaft; 11 - splined sleeve; 12 - secondary shaft 4th speed gear; 13 - gearshift sleeve; 14 - 3rd and 4th speed shift fork; 15 - secondary shaft 3rd speed gear; 16 - secondary shaft 2nd speed gear; 17 - 1st and 2nd gear shift fork; 18 - secondary shaft 1st speed gear; 19 - reverse shift fork; 20 - secondary shaft reverse sliding gear; 21 - idle gear shaft; 22 - idle reverse gear; 23 - speedometer drive driving gear; 24 - speedometer drive driven gear; 25 - gland; 26 - elastic coupling disk; 27 - slotted nut for fastening elastic coupling disk; 28 - starting mechanism large gear; 29 - starting mechanism small gear with end face ratchet; 30 - toothed quadrant of starting mechanism shaft; 31 - spring; 32 - gland; 33 - starting mechanism shaft

The bushing is sealed by rubber ring 2, and the shaft, by a double-edge carcass-type gland. The starting lever is attached to the starting shaft by means of a wedge bolt. When the starting lever is depressed with the foot, the quadrant is thrown into mesh with the intermediate shaft small gear which becomes linked, with the aid of the end face ratchet, to the large gear, the latter being in constant mesh with the 2nd speed gear of the gearbox primary shaft. After starting the engine, remove your foot from the starting lever which, together

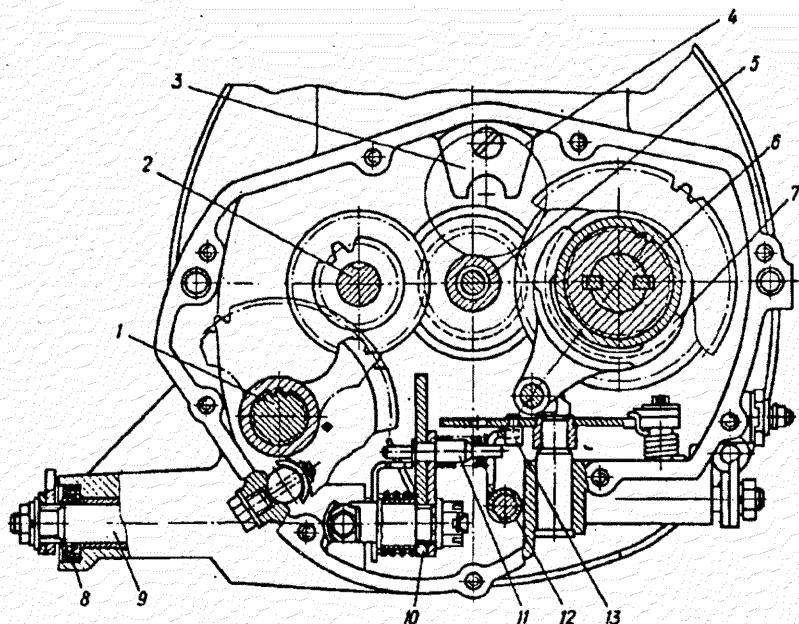


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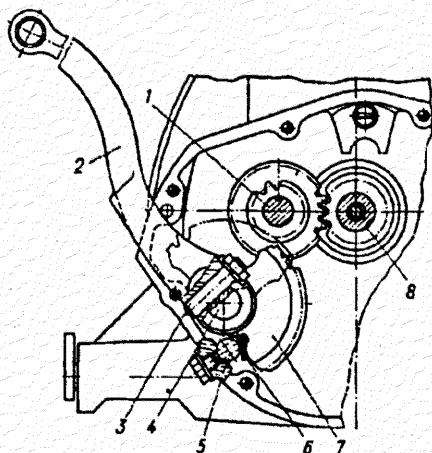


Fig. 19. Starting mechanism:

1 – intermediate shaft; 2 – starting mechanism lever; 3 – wedge bolt; 4 – starting mechanism shaft; 5 – rubber buffer of starting mechanism quadrant; 6 – buffer strap; 7 – toothed quadrant; 8 – primary shaft

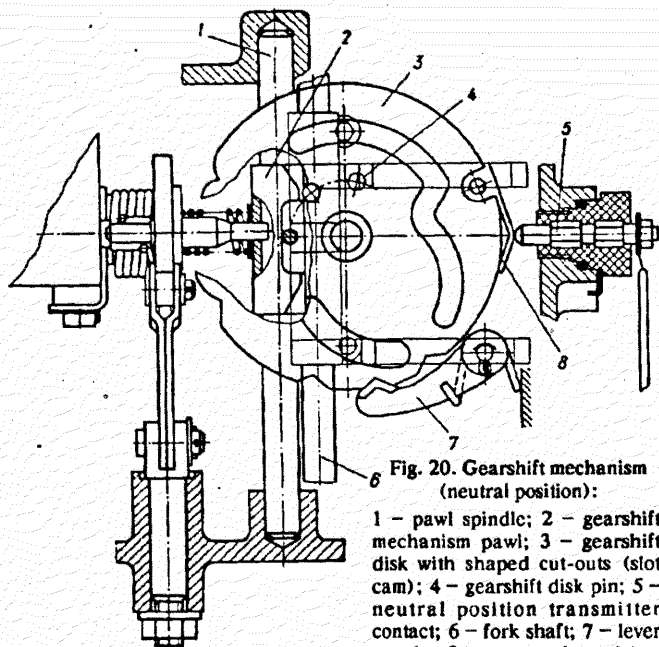


Fig. 20. Gearshift mechanism (neutral position):

1 - pawl spindle; 2 - gearshift mechanism pawl; 3 - gearshift disk with shaped cut-outs (slot cam); 4 - gearshift disk pin; 5 - neutral position transmitter contact; 6 - fork shaft; 7 - lever catch; 8 - neutral position transmitter spring

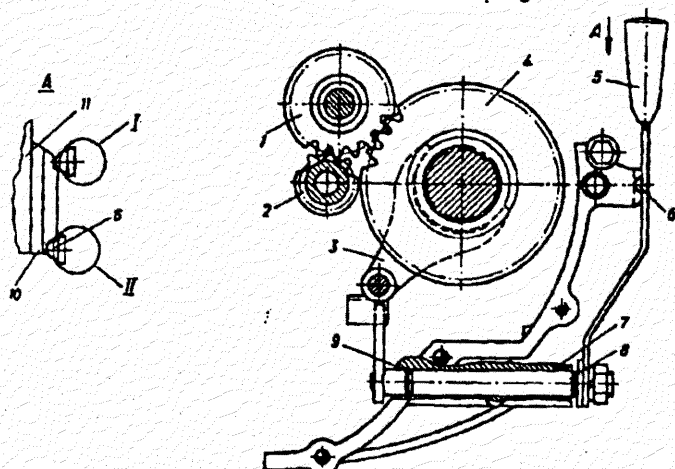


Fig. 21. Reverse shift mechanism:

1 - Idle reverse gear; 2 - primary shaft reverse gear; 3 - reverse shift fork; 4 - secondary shaft reverse sliding gear; 5 - reverse shift handle; 6 - spherical-head screw; 7 - sealing rubber ring; 8 - reverse shift fork lever; 9 - pin; 10 - cover; 11 - casing; I - gear engaged (front position); II - gear disengaged (rear position)

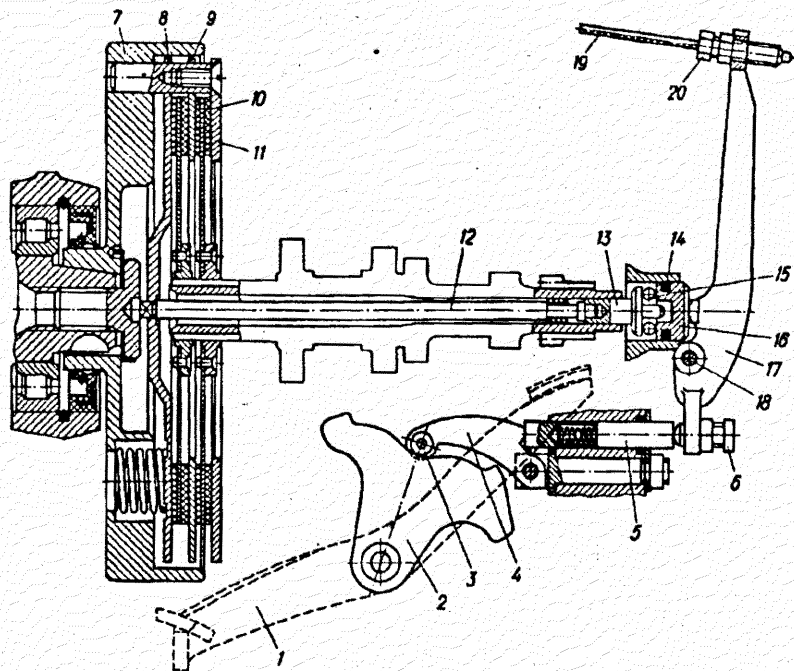


Fig. 22. Clutch and clutch release mechanism actuated at gear shifting:

1 – foot gearshift pedal; 2 – crank-cam; 3 – roller; 4 – inner lever; 5 – intermediate rod; 6 – adjusting bolt; 7 – engine flywheel; 8 – pressure disk; 9 – intermediate disk; 10 – driven disk; 11 – bearing disk; 12 – clutch release rod; 13 – rod end piece; 14 – sealing rubber ring; 15 – thrust ball bearing; 16 – slide block; 17 – outer clutch release lever; 18 – pivot; 19 – clutch manual control cable; 20 – clutch cable adjusting screw

with the quadrant, will return to the initial position under the action of the return spring. In this case the quadrant impact will be taken up by the rubber buffer with a steel lining.

Gearshift mechanism. Four forward speeds are engaged by splined sleeves 13 on the secondary shaft, which are set in motion along the shaft by the shift forks. These latter have special protrusions entering the shaped cut-outs of gearshift disk 3 (Fig. 20). When the disk is turned, the forks move along shaft 6 mounted in the casing. Fitted on the gearshift disk are three pins 4 and neutral position transmitter spring 8.

In the neutral position, the transmitter spring closes through an insulated contact the electric circuit of the indicator lamp located on the dashboard. When

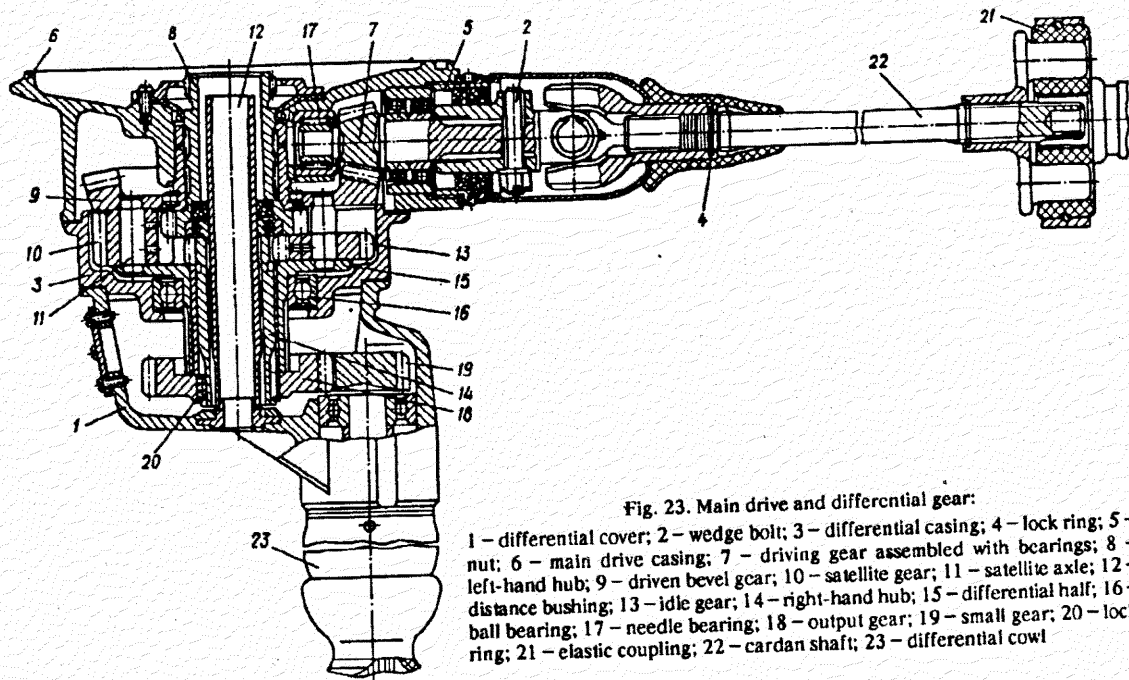


Fig. 23. Main drive and differential gear:

1 - differential cover; 2 - wedge bolt; 3 - differential casing; 4 - lock ring; 5 - nut; 6 - main drive casing; 7 - driving gear assembled with bearings; 8 - left-hand hub; 9 - driven bevel gear; 10 - satellite gear; 11 - satellite axle; 12 - distance bushing; 13 - idle gear; 14 - right-hand hub; 15 - differential half; 16 - ball bearing; 17 - needle bearing; 18 - output gear; 19 - small gear; 20 - lock ring; 21 - elastic coupling; 22 - cardan shaft; 23 - differential cowl

depressing one of the arms of the foot shift pedal with the foot, shifter shaft 9 (Fig. 18) linked to the crankcam turns through a certain angle. Fitted in the crank is a pin entering the slot of pawl 2 (Fig. 20) sliding along spindle 1.

The pawl acting on one of the pins of the gearshift disk turns the latter. The disk is located with the aid of a lever catch. The reverse speed is put in with the help of handle 5 (Fig. 21) positioned at the right-hand side of the gearbox. Owing to its elasticity, the handle is locked in position on the bevels of the gearcase and cover by screw 6 having a spherical head. If the lever handle is shifted forward, the reverse shift fork and secondary shaft sliding gear move forward. As this takes place, the sliding gear comes into mesh with the idle gear installed on the gearbox cover. The idle gear is in constant mesh with the primary shaft reverse gear.

The reverse gear may be engaged only on the spot and with the gearshift mechanism in the main neutral position (between 1st and 2nd gear).

When any of the gears is put in, it is impossible to engage the reverse gear. This is prevented by a special protrusion on the reverse shift fork, this protrusion enters the slot of the gearshift disk during engagement of the reverse gear.

The reverse shift handle is fastened on the knurled cone of the lever spindle and must be set to the required position before tightening the nut.

Clutch release mechanism actuated in gear shifting. When changing the gears, crank-cam 2 (Fig. 22) turning forward or backward from its middle position, raises the long arm with the roller of inner 4 arranged in the gearcase space.

The short arm of this lever acts on compound intermediate rod 5 which, with its external end, presses adjusting bolt 6 of outer clutch release lever 17.

The outer lever swinging on the pin, acts on clutch release rod 12 via slide block 16, bearing 15 and end piece 13.

Directions for Use

Servicing the gearbox consists in timely changing oil in the gearcase and adjusting, as required, the clutch release mechanism.

Change oil at the time intervals prescribed by this Manual. The oil level in the gearcase is to be checked with a dipstick as directed in Section "Preparing for Departure".

The dipstick has a red-coloured polyethylene head used as a breather. Should it be necessary to clean the breather, the head may be removed.

It is good practice to change oil in the gearbox shortly after a return from a trip. Before discharging the used oil from the gearbox and priming it with fresh one, thoroughly clean off dust and dirt from the filling and drain holes with plugs. Following that, screw out the plugs of the filling and drain holes, discharge the used oil and pour fresh oil into the gearcase through a funnel with a gauze. The oil level in the gearcase must reach the upper mark on the dipstick inserted up to the stop in the filling hole with an unscrewed plug.

When changing oil of one grade for that of another grade, wash the gearcase after draining the used oil. For this purpose pour 1.4 l of oil into the gearcase to wash the latter, screw in the filling hole plug, start the engine and allow it to operate for 2–3 min at the crankshaft average rotational speed, engaging in turn the 1st, 2nd, 3rd and 4th speeds (the motorcycle must stand on a support with the rear wheel slightly raised). Then discharge the flushing oil and pour fresh oil into the gearcase through a funnel with a gauze.

Long-time coasting or engine operation with the clutch disengaged is inadmissible as this will lead to thrust bearing overheating and its failure. To avoid difficulties, it is advisable to put in the neutral position or the gear close to the neutral position (1st or 2nd gears) during slowing-down before the motorcycle is brought to a full stop. In case of failure to engage any of the gears on the spot, release the clutch operating lever (after this is done, the primary shaft starts to rotate), following which press again the clutch operating lever and engage the required gear.

To engage the first or reverse speed without impacts during getaway, after disengaging the clutch, wait a few seconds before putting in the required gear till the primary shaft rotational speed decreases.

The reverse gear can be engaged only with the main neutral position corresponding to the position of the gearshift mechanism between the 1st and 2nd gears. This position is shown by the lighting up of the neutral position indicator lamp. Applying too much force to put in the reverse gear with the gearshift disk in the other positions may lead to a breakdown. A breakdown may be also caused by an attempt to engage any of the gears by applying excessive force when the reverse gear is engaged. It is forbidden to engage and disengage the reverse gear with the foot.

The gearbox has one more fixed neutral position between the 3rd and 4th speed gears. This neutral position should be used in coasting. The neutral position should be found when the clutch is disengaged with the manual lever. To engage the 3rd and 4th gears without impacts after coasting, it is necessary to increase the engine speed and only then put in the required gear.

During operation in a cold season when the gearbox is not heated, there may appear noise (crack) produced by the starting mechanism ratchet. In this case avoid considerably increasing the engine speed. The noise will vanish as the gearbox becomes heated.

To ensure more reliable sealing of the joint between the speedometer flexible shaft and the gearbox cover, a rubber ring may be fitted. To prevent dirtying, the recess in which the ring is fitted must be filled with lubricant grease.

Dismantling and Assembling Procedure

Dismantling. To be carried out proceeding as follows:

1. Remove the starting mechanism lever, clutch release lever, slide block, thrust bearing and clutch release rod end piece. Take off the elastic coupling disk.
2. Undo the two screws securing the starting mechanism shaft bushing to

the gearcase front wall, relieve the winding-up (tension) of the starting mechanism shaft spring.

3. Unscrew the nine bolts securing the cover.

4. Set the clutch release lever pin and pass a soft cord through it. Holding the cover by the cord, drive out the primary and secondary shafts by slightly tapping them. Remove the cover. In doing so, take care to ensure that the gasket is intact.

Remove the idle reverse gear. Remove the reverse gear with the fork from the secondary shaft.

5. Remove the starting mechanism shaft assembly, take off the spring, gears and washers from the intermediate shaft.

6. Extract the fork shaft from the opening in the gearcase (without pulling the shaft out of the forks).

7. Withdraw the forks with the shaft from the gearshift disk slots.

8. Fit the elastic coupling disk on the secondary shaft and secure it with the nut.

9. By gently tapping the primary shaft front end and elastic coupling disk, drive the shafts with the forks from the gearcase.

10. Slightly pull back the catch, remove the gearshift disk from the pun.

11. Extract the pawl spindle, the pawl and spring.

12. Uncotter and unscrew the nut fastening the crank-cam, remove the crank-cam from the shifter shaft splines, withdraw the shifter shaft.

13. Take off the reverse gear engaging handle, extract the pin and lever from the gearcase.

Assembling. To be carried out proceeding as follows:

1. Install the gearshift mechanism.

2. Install the primary shaft assembly into the gearcase so that the shaft front bearing is recessed to half of its length into the gearcase seat.

3. Insert the shift forks into the slots of the secondary shaft gearshift sleeves, pass the fork shaft through the forks and install the secondary shaft into the gearcase. By slightly tapping it with a soft-metal hammer, drive the shaft into the gearcase so that the gear rims on the primary and secondary shafts are brought into coincidence, fully press-fit the shafts into the gearcase. Insert the forks into the gearshift disk slots, and the fork shaft, into the gearcase.

Further assembly does not involve any difficulties and must be performed in reverse order to dismantling.

Main Drive and Differential Gear

The main drive and differential gear are mounted in a common split housing made up of three parts: differential cover 1 (Fig. 23), differential casing 3 and main drive casing 6.

The main drive consists of a pair of spiral bevel gears 7 and 9.

The motorcycle spur differential consists of the following parts: two hubs 8 and 14, two satellites 10, two idle gears 13 and differential half 15.

Hub 8 is mounted in the main drive casing on two needle bearings, hub 14 in the differential half.

The satellites and idle gears are installed on axles 11 whose tenons, on one side, enter differential half 15, and on the other side, large bevel gear 9. The differential half and gear are centred by means of two rollers and tightened together by two bolts which are secured by a special lock washer.

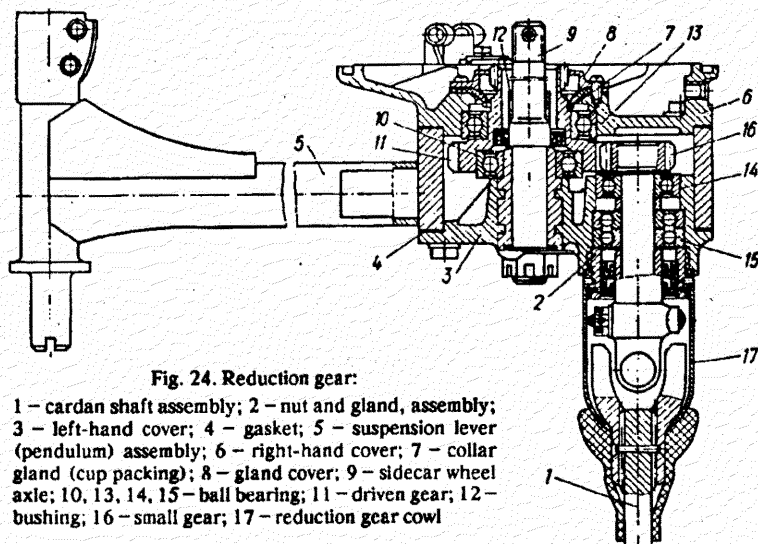


Fig. 24. Reduction gear:

1 - cardan shaft assembly; 2 - nut and gland, assembly; 3 - left-hand cover; 4 - gasket; 5 - suspension lever (pendulum) assembly; 6 - right-hand cover; 7 - collar gland (cup packing); 8 - gland cover; 9 - sidecar wheel axle; 10, 13, 14, 15 - ball bearing; 11 - driven gear; 12 - bushing; 16 - small gear; 17 - reduction gear cowl

The assembled differential is supported by two bearings: ball bearing 16 mounted in the differential casing, and roller (compound) bearing in the main drive casing.

The force from the differential is transmitted to the side car wheel through the pair of gears 18 and 19. Gear 18 is mounted on the splines of hub 14 and fixed with lock ring 20.

Nuts 5 have a left-hand thread at both ends.

Oil is to be poured into the main drive casing through the filling hole, and into the differential gear, through the side port in the cover. If the oil level drops below the lower mark on the dipstick, it is forbidden to use the motorcycle.

Reduction Gear

The force from the differential gear is transmitted via the transverse torsion cardan shaft to reduction gear small gear 16 (Fig. 24) which is in mesh with gear 11.

The transverse cardan shaft is designed in such a manner that owing to its flexibility it cushions impact loads arising in the power transmission of the sidecar wheel drive.

Gear 16 is interchangeable with differential gear 19 (Fig. 23).

Gear 11 (Fig. 24) is mounted on two ball bearings 10 and 13.

Covers 3 and 6 are fastened to the casing with the aid of bolts.

Reduction gear air-tightness is ensured by use of gaskets 4, collar gland 7 and two rubber glands press-fitted in nut 2.

Oil is to be poured into the reduction gear casing through the filling hole. If the oil level drops below the lower mark on the dipstick, it is forbidden to use the motorcycle.

When mounting the reduction gear cardan shaft, take care to ensure the proper position of the joint forks. The forks press-fitted on the cardan shaft splines must be arranged in the same plane.

Servicing the differential and reduction gear comes to checking the oil level and changing oil in due time at the time intervals specified in Section "Maintenance".

It is good practice to change oil in the differential and reduction gear just after a return from a trip when the oil is warm and can be easily drained. If the same oil is used in the differential and reduction gear during all seasons, the casings need not be washed during changing oil. In case oil of another grade has to be poured into the casings (when changing oil), the differential and reduction gear casings must be washed with oil used for washing the gearbox, following the same sequence of operations. The needle bearings of the universal joints are to be coated with lubricant Lithol-24 via the pressure lubricators screwed into the universal joint centre-crosses.

To lubricate the universal joint, shift off the rubber seal and unscrew the protective cap with the aid of a radius wrench. Differential cowls 23 (Fig. 23) have a left-hand thread and reduction gear cowl 17 (Fig. 24), a right-hand thread.

WHEELS

The motorcycle wheels (Fig. 25) have a steel rim, and cast aluminium body reinforced with a steel brake drum. Mounted in the wheel body are adjustable tapered roller bearings. The labyrinth packing in the brake-to-wheel joint protects brake parts against direct ingress of dirt.

Care of Wheels

During the running-in period, the tensioning of wheel spokes may get weaker. An indication of loose spokes is a lower-pitch sound produced during a tap test. For this reason, during the running-in period it is necessary to periodically check spoke tensioning and tighten up the spokes as required.

Subsequently, as the distance run by the motorcycle increases, the number of spokes that lost tensioning will considerably diminish.

The spokes must be tensioned uniformly and tightly. Check the tensioning by tapping the spokes with a wrench or some other metal object, and the uniformity of their tensioning is to be determined by a monotonous sound produced during a tap test.

Simultaneously with checking spoke tensioning during the motorcycle running-in period it is necessary to verify the clearance in wheel bearings and, if required, adjust it.

To adjust the bearings, proceed as follows:

raise the wheel above the ground;

remove the axle;

take off the sand collar;

insert and tighten up the axle (without the collar);

holding the wheel, smoothly screw in the nut till eliminating the clearance (to be determined by the wheel rocking);

unscrew nut by 10° – 15° ;

holding a nut, tighten the lock nut;

take out the axle and fit the sand washer, insert and tighten the axle;

make sure there is clearance in the bearing assembly unit and wheel is free to rotate. There should be no perceptible clearance. The overtightening of bearings is inadmissible.

After adjusting the bearings, check them for heating during motorcycle movement. Heating is to be checked by touching with the hand the parts of the wheel body that are closer to its centre, shortly after completing a 5–6 km run without stoppage and braking. If the bearings are overtightened, the wheel body will get much heated (to be checked by feel) and adjustment has to be repeated.

Checking the wheel bearings for proper tightening, their adjustment and lubrication should be carried out at the time intervals specified in Section "Maintenance".

To lubricate the wheel bearings, proceed as follows: remove the wheel, screw off lock nut 2 (Fig. 25) and nut 1; insert the wheel axle into the bearings from the end of the hub splined rim and by gently tapping the axle thickened end, press off the bearings (the bearing outer race installed

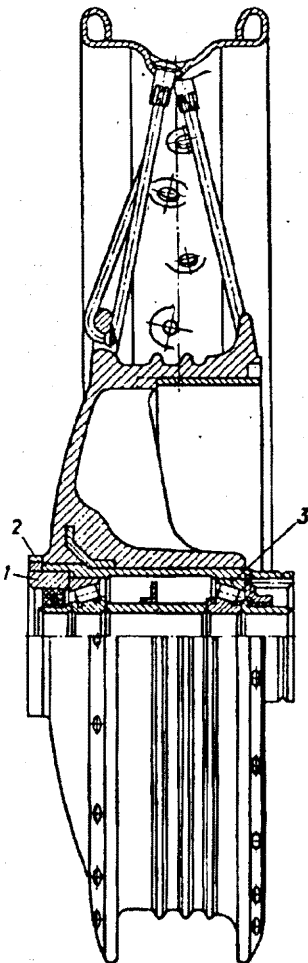


Fig. 25. Wheel:

1 – bearing adjusting nut; 2 – lock nut; 3 – tapered roller bearing

at the side of splines not to be pressed off); remove the old lubricant from the bearings and hub, wash them in kerosene and dry; coat the bearings with fresh lubricant and re-assemble the wheel in reverse order.

Re-mount the wheel and adjust the bearings for proper tightening.

TYRES

The service life of tyres largely depends on the air pressure in them and on the load applied to them. Riding with tyres having a reduced air pressure will cause damage to the protector and cord on the sides of a tyre.

In case of prolonged usage of the motorcycle with a partial load (a driver and one passenger in the sidecar body), it is advisable to reduce the air pressure in the rear wheel tyre by 0.05 MPa (0.5 kgf/cm^2).

The rear wheel tyre operates under more arduous conditions. To ensure even wear of all the tyres, it is necessary to interchange the wheels after every 5000 km, i. e., fit the rear wheel in place of the front one, the front wheel instead of the sidecar wheel, the sidecar wheel instead of the spare wheel, and the latter in place of the rear wheel. Parking the motorcycle on tyres for a long time (more than 30 days) is inadmissible. In case of preservation and putting in storage, the motorcycle must be installed on supports to ensure full relief of the tyres.

While the motorcycle is in use, there may arise the need to repair inner tubes (eliminating a puncture) or replace them, which involves dismounting and mounting of tyres.

Dismounting. To remove the tyre, do the following:

fully deflate the tube;

push the valve inside the tyre;

place the wheel on the floor, stand with your both feet on the tyre and press the tyre bead into the rim recess;

lever up the tyre bead with tyre mounting tools at the point spaced at about $1/4$ of the rim circumference from the valve and bring the bead over the rim edge. In this case the opposite part of the bead must remain inserted in the rim recess;

re-positioning both tyre tools around the rim edge, gradually take out the entire tyre bead and then pull out the inner tube.

If necessary, take out the other bead, proceeding in the same manner.

Repairing a damaged inner tube. A damaged point on a tube can be detected by the noise of leaking air. If a puncture is too small, immerse the tube in water and then escaping air bubbles will indicate a point of puncture. A damaged spot should be mended by vulcanization.

Under road conditions, repair must be carried out with the aid of a tyre patch kit following the instructions to be found in it.

A faulty valve must be replaced. If the air leaks between the valve and tube, tighten the nut securing the valve, using two wrenches.

Mounting. To mount the tyre and tube, proceed as follows:

powder the tyre inside surface with talcum; fit the rim band on the rim and

mate the valve hole in the band with the hole in the rim. Take care to ensure that the rim band completely covers all the nipple heads and the spokes do not protrude from the nipple heads;

insert part of the tyre bead into the rim recess and, using tyre mounting tools, fit the entire bead on the wheel rim;

insert the tube valve into the hole in the rim, screw the control valve into the tube valve, slightly inflate the tube and enclose it into the tyre. In doing so, see that no folds are formed;

fit the other tyre bead, starting from the side opposite to the valve. See that the fitted part of the tyre bead enters the rim recess. As a rule, about $\frac{2}{3}$ of the bead is to be inserted by hand and the remaining portion, with the aid of tyre mounting tools. When using these latter, take care not to damage the tube. Do not apply excessive force in mounting the tyre bead so as not to cause damage to the bead cable;

after mounting the tyre, push the valve slightly inwards, inflate the tube to a greater extent and tap the tyre around its circumference with a mallet so that the tyre seats uniformly in the rim recess;

inflate the tube to the required pressure and screw on the cap;

make sure the tyre is properly arranged on the rim (the check strips on the tyre must be concentric with the rim).

Note: No lock nut is fitted on the valve on tubes of tyres with rubber-metal valves.

FRONT FORK

The front fork consists of two tubes, end pieces, springs, parts of hydraulic shock absorbers, traverse and bridge with a steering column bar. Mounted on the fork is a handlebar shock absorber.

Tubes 30 (Fig. 26) inserted into the slotted holes of bridge 18 and clamped in it by coupling bolts 47 are load bearing parts of the fork. The tubes terminate in cones on which traverse 3 is fitted. Screwed into the upper portion of the tube cones are nuts 8 which link the tubes with the traverse. Casings 27 with headlamp mounting brackets 1 are installed on the fork tubes between the traverse and bridge. Fitted on the lower portion of the tubes are bushings 32 which are prevented from displacement by lock rings 33. Radial bores in the tubes over the bushings are used for the passage of oil. Provided inside the tubes are shock absorber rods 45. At the top the rods are screwed into nuts 8 and secured with lock nuts 7.

Attached to the lower parts of the rods are guides 42. Pistons 43 are freely fitted on the rods over the guides. The circular clearance between the hole in the piston and the rod is a flow section for shock absorber fluid of the hydraulic shock absorber. Spiral springs 46 are fitted on the shock absorber rods and secured, at the top, on the spiral slots of upper end pieces 4, and below, with the aid of nuts 31 screwed on the shock absorber bodies.

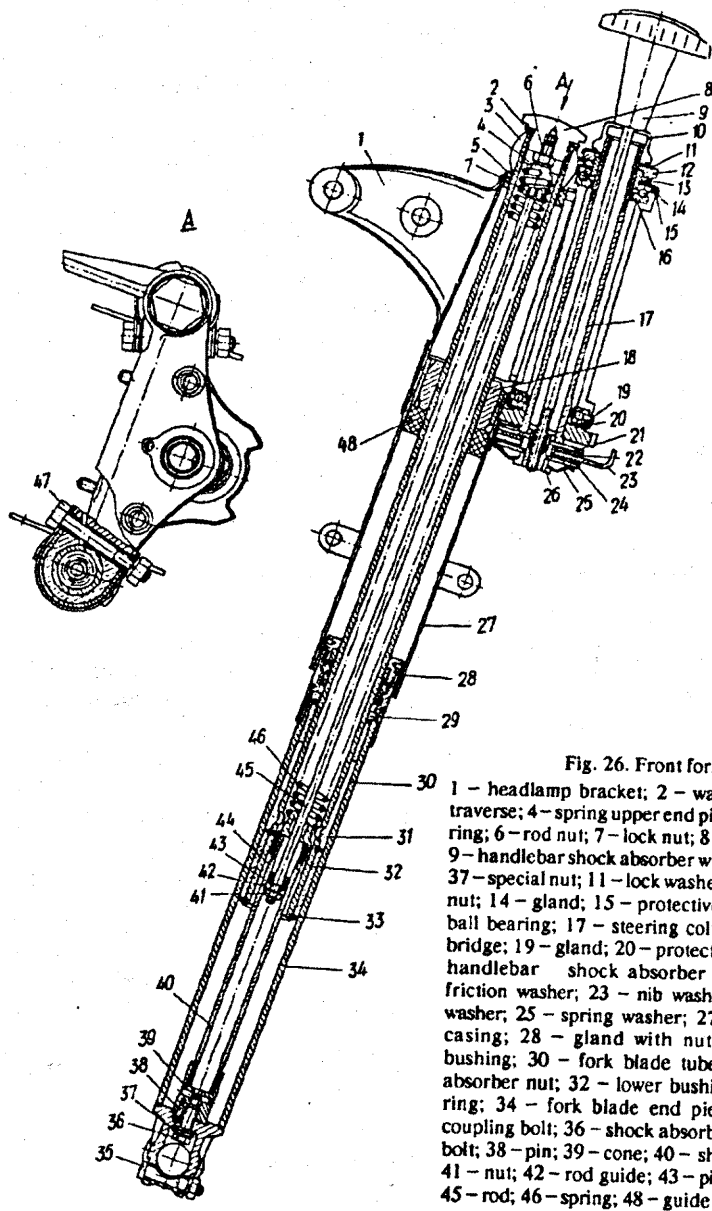


Fig. 26. Front fork:

- 1 - headlamp bracket; 2 - washer; 3, 12 - traverse; 4 - spring upper end piece; 5 - sealing ring; 6 - rod nut; 7 - lock nut; 8 - coupling nut; 9 - handlebar shock absorber wing nut; 10, 26, 37 - special nut; 11 - lock washer; 13 - bearing nut; 14 - gland; 15 - protective washer; 16 - ball bearing; 17 - steering column bar; 18 - bridge; 19 - gland; 20 - protective washer; 21 - handlebar shock absorber washer; 22 - friction washer; 23 - nib washer; 24 - lower washer; 25 - spring washer; 27 - fork blade casing; 28 - gland with nut; 29 - shock absorber nut; 30 - fork blade tube; 31 - shock absorber nut; 32 - lower bushing; 33 - lock ring; 34 - fork blade end piece; 35, 47 - coupling bolt; 36 - shock absorber cone fixing bolt; 38 - pin; 39 - cone; 40 - shock absorber; 41 - nut; 42 - rod guide; 43 - piston; 44 - pin; 45 - rod; 46 - spring; 48 - guide coupling

The fork tubes with the rods secured inside are a stationary portion of the front fork, and fork blade end pieces 34 with the bases for fastening the front wheel axles and pipes of hydraulic shock absorbers 40 are a movable portion of the fork.

The wheel axle is passed through the hole of the right-hand end piece base, screwed into the thread of the left-hand end piece and then locked with bolt 35. Provided in the lower portion of both end piece bases is a threaded hole for bolts 36 securing shock absorber cones 39. During jolting on a rough road, the end pieces together with upper bushings 29 move along the fork blade tubes, sliding on lower bushings 32.

Glands 28 screwed on the end piece tubes hold the upper bushings, preventing outflow of oil from the fork inner space and protecting the tube surface against ingress of sand and dust. The glands consisting of three-edge cups, pressure springs, felt rings and washers are held in place by nuts screwed on the gland housings.

Dismantling. It is not advisable to dismantle the front fork unless absolutely necessary.

Before dismantling, place the motorcycle on a support, raise its front wheel and put a rest under the motorcycle front portion.

Screw off the nut of left-hand end piece bolt 35, screw out the front wheel axle (left-hand thread) and, having withdrawn the front wheel from the brake disk, remove the wheel (after first disconnecting the front wheel brake cable). Screw off nut 26 and take off wing nut 9. Unscrew nuts 8 and 10, remove nuts 8 from the rods and take off traverse 3. Release the nuts of bolts 47 and remove fork blade end pieces 34 with guide tubes 30. Screw out the housings of glands 28 and withdraw tubes 30 from end pieces 34. Remove lock rings 33, bushings 32 and 29 and gland 28 from tubes 30.

To dismantle the fork shock absorber, unscrew shock absorber fixing bolt 36 and extract shock absorber 40 assembly. Then screw off the nut in the rod upper portion, remove the upper end piece and fork spring. Screw out the spring lower end piece and remove the rod-and-piston assembly (take care to protect the shock absorber tube against damage). To disassemble gland 28, screw off the gland nut, take out the felt ring, withdraw the gland cup spring and remove the cup.

To remove casing 27, detach the headlamp, screw off the nuts and withdraw bolts 47 securing the guard to the casing. Unscrew the nuts securing the front guard to the bridge and remove the guard. Extract the bolts and remove the casings.

Assembling. Prior to assembling, all the fork parts must be thoroughly cleaned of dirt and washed in kerosene.

To assemble the fork, proceed as follows: assemble shock absorber 40, fit the spring, insert the shock absorber with the spring into fork end pieces 34 and tighten with bolt 36. Fit the body of gland 28 in assembly, guide bushings 29 and 32 lock ring 33 on tube 30. Insert tube 30 into end piece 34 and screw the

gland housing on the end piece. Coat the gland housing thread with minium or bakelite lacquer. Insert tube 30 with end piece 34 into the casing and pass it through steering column bridge 18. As a preliminary, secure the tube in the bridge with coupling bolt 47. Pour clean oil into each fork blade.

Installing on the frame. Before installing the front fork on the frame, check the number of balls in the steering column bearings (there must be 22 pcs in each of them). Fit the balls into the races of bearings press-fitted into the frame head, applying a coat of lubricant Lithol-24. Insert the fork into the frame head and secure with nut 13, then mount traverse 3 on the cones of tubes 30. Screw up the ends of the shock absorber rods into nuts 8 having secured with lock nuts 7.

Ensure that the clearance between the lock nut end faces and spring upper end piece 4 is within 0.2–0.4 mm. Slightly screw in nuts 8, loosen bolts 47, screw home nuts 8 on traverse 3 and tighten bolts 47; screw up nut 10 and shock absorber wing nut 9 and cotter-pin the latter.

Connect the front wheel brake cable to the level on the brake disk and insert the disk together with the wheel between the fork blades. Pass the front wheel axle through the hub and brake disk and strew the axle right home (left-hand thread).

Secure the axle in the left-hand end piece of the fork blade with bolt 35.

Checking and adjusting the clearance between the lock nut and spring upper end piece. The clearance between lock nut 7 and spring upper end piece 4 must always be within 0.2–0.4 mm. To check and adjust the clearance, remove the front wheel, screw out nut 8 securing the tube to the traverse and, after raising end piece 34 upwards, withdraw the rod together with the nut and spring end piece from the tube. If, as a result of checking, the clearance is found to be out of the specified limits and has to be adjusted, it is necessary to slacken lock nut 7 and slightly screw nut 8 off the rod. By screwing the lock nut on or off the rod, set the required clearance between the lock nut and end piece. Holding the lock nut with a wrench, screw on nut 8 until it rests against the lock nut and tighten them up reliably. Lower end piece 34 and screw nut 8 into the fork tube.

After adjusting the clearance in one fork tube, follow the same procedure to adjust the clearance in the other tube.

Adjusting the steering column bearings. While the motorcycle is in use, it is necessary to adjust the steering column bearings. They should be tightened so as to eliminate the clearance and at the same time ensure free turning of the handlebar.

Adjust the bearings for proper tightening, proceeding as follows:

raise the motorcycle front portion so that the front wheel does not touch the ground;

screw out handlebar shock absorber wing nut 9 and remove washers 21–24. By rocking the front fork up and down by the handlebar or fork blade end pieces 34, check the clearance for availability.

If there is clearance in the bearings, screw out the nuts of the handlebar-to-traverse attaching brackets and, without disconnecting the cables and

electric wires, remove the handlebar from the traverse and place it on the petrol tank. Unscrew nut 10 and coupling nuts 8, take off nuts 8 from the rods and remove traverse 12. If the traverse is hard to remove from the fork tubes, knock the traverse off the tubes by gently tapping it with a mallet through the use of a wooden extension. Tighten up bearing nut 13 fully and then slacken it by $1/8 - 1/6$ turn. Check again the bearing clearance for the presence. The front fork must turn without seizure and without applying too great force.

On completing the adjustment, re-install the traverse, handlebar and re-assemble the handle shock absorber.

Changing oil in shock absorber. To change oil in the front fork shock absorber, raise the motorcycle front portion, remove the front wheel and slacken the nuts of bolts 47.

Screw out coupling nuts 8, take them off the rods, remove the right- and left-hand blades of the fork. Turn over the blades so that end pieces 34 are directed upwards and discharge the used oil. Pour 150 to 200 cm³ of kerosene into tubes 30 of each blade; by shaking up, rinse the inner spaces of fork blade shock absorbers and tubes, drain the kerosene and pour fresh oil into the tubes.

In order to completely discharge the flushing kerosene, the fork blades must be kept with the end pieces upwards within 10 and 15 min.

REAR WHEEL SUSPENSION

The rear wheel levered suspension using spring-hydraulic double-acting shock absorbers ensures riding comfort.

The vertical forces arising due to road roughness are taken up by the wheel and transmitted through the suspension lever and shock absorber to the frame. The spring-hydraulic shock absorbers dampen impacts and suppress suspension vibrations. The lateral forces are transmitted from the wheel to the frame via the suspension lever installed on rubber bushings. The articulated joints of the spring-hydraulic shock absorbers with the suspension lever and lever-to-frame connection are also made with the use of rubber bushings. Such joints ensure silent operation and practically do not wear, therefore care is servicing the joints consists in checking the fasteners for reliable tightening.

Spring-hydraulic shock absorbers. These are basically easily removable and interchangeable units.

Bearing spring 4 (Fig. 27) is an elastic element of the shock absorber. The vibrations are dampened by double-acting hydraulic shock absorbers arranged in body 7. The shock absorber is essentially an air-tight vessel closed at the top by nut 6 and gland 33 through which rod 9 passes. Positioned inside the body is cylinder 8 in which piston 27 secured to the rod by nut 15 reciprocates.

Compression valve 26 is mounted in the lower portion of the shock absorber cylinder and the by-pass valve consisting of retainers 22, 24 and spring 23 is arranged on the piston upper end face. Installed in the cylinder upper portion are rod guide 28, gland housing 31 with gland 33. Spring-hydraulic shock absorbers are provided with a cam-type regulating device (11 – movable cam,

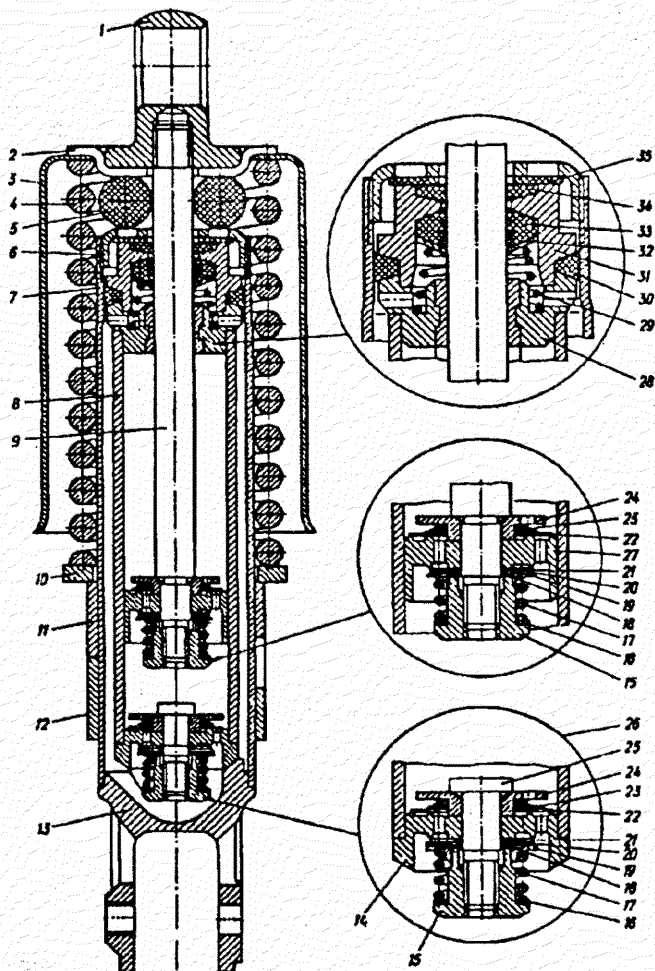


Fig. 27. Shock absorber design:

1 - upper end piece; 2 - block; 3 - upper housing; 4 - spring; 5 - buffer; 6 - reservoir nut; 7 - shock absorber body; 8 - working cylinder; 9 - rod; 10 - bearing ring; 11 - movable cam; 12 - fixed cam; 13 - lower end piece; 14 - compression valve body; 15 - rebound valve nut; 16 - rebound valve adjusting washer; 17 - rebound valve spring; 18 - rebound valve washer; 19 - rebound valve retainer; 20 - rebound valve disk; 21 - rebound valve throttle disk; 22 - inlet valve retainer; 23 - by-pass valve spring; 24 - by-pass valve limiting retainer; 25 - compression valve stem; 26 - compression valve assembly; 27 - piston; 28 - rod guide; 29 - gland spring; 30 - reservoir nut gland; 31 - gland housing; 32 - gland washer; 33 - rod rubber gland; 34 - rod felt gland; 35 - packing washer

12 – fixed cam) to change the degree of precompression of bearing springs depending on the load and road conditions.

Spring precompression is adjusted for two positions. The first position: springs are not contracted (corresponding to the load comprising a driver and a passenger in the sidcar); the second position: springs are contracted (corresponding to the maximum load and movement over poor roads). Adjustment is to be carried out by turning movable cam 11 counterclockwise with a special wrench until the cam is locked in the upper position.

Dismantling. To disassemble the shock absorber, remove the latter from the motorcycle after first placing the motorcycle on a support. Then install the shock absorber in a vertical position and clamp its lower end piece in a vice. To dismantle the shock absorber, proceed as follows:

1. By pressing housing 3, lower it by 5 to 10 mm and remove released blocks 2.

2. Remove housing 3, spring 4, bearing ring 10 and movable cam 11.

3. Move end piece 1 with rod 9 upwards and unscrew nut 6 with a special wrench. Take the rod upper end piece with the hand and raise it up in jerks. This must cause the rod assembled with piston 27, housing 31 and working cylinder 8 to come outside.

4. Immerse the rod assembled with the cylinder and lower valve body into kerosene and, holding the cylinder with the left hand, move the rod several times up and down with the right hand. Take the cylinder together with the rod out of the kerosene and, holding the cylinder with one hand, remove from it the rod together with the glands housing, guide 28 and piston assembly. Pour oil out of the cylinder and shock absorber body.

5. Secure the rod by the upper end piece in a vice and screw off rebound valve nut 15.

6. Remove the piston with all the valve parts, rod guide, spring 29 and gland housing 31 assembly.

7. Carefully take out felt gland 34 from the housing, remove the reservoir nut gland and, using a wooden rod, push out rubber gland 33 from the upper side of the housing.

8. Press out the compression valve assembly from the working cylinder by gently tapping a wooden drift with a mallet.

Re-assemble the shock absorber in reverse order. To avoid damage to the rubber gland when fitting the gland housing on the rod, use should be made of a tapered end piece.

Oil should be poured in with the working cylinder inserted and with the compression valve in the shock absorber body. Fill the working cylinder with oil up to the brim, the remaining oil is to be poured into the shock absorber body.

After priming with oil, insert the rod with the piston into the working cylinder, close the cylinder with the rod guide and, having carefully moved the gland housing up to the guide, screw up the reservoir nut. Following that,

manually perform several pumping motions, moving the rod with the piston up and down in order to remove air from the cylinder.

Note: Perform total disassembly of the shock absorber only when it is necessary to replace parts. For inspection or in case oil has to be changed, dismantle the shock absorber to the extent specified in steps 1-4. When dismantling, take care to protect the cylinder internal surface, the piston and rod external surfaces against scratches and dents.

Servicing. Pour clean oil into the shock absorbers. After every 10 000 km run, it is advisable to remove the shock absorbers, disassemble them, wash all the parts in clean kerosene and then prime with oil.

Take care to prevent oil and petrol from getting on the end piece silent blocks and buffers. If any leak is detected in the shock absorbers, overhaul them and replace unserviceable parts (gland, rod).

BRAKES

The brakes of all the motorcycle wheels have a mechanical linkage.

The front-wheel brake is equipped with a separate linkage from the lever on the handlebar. The brake of the rear wheel and sidecar wheel is operated from the common foot pedal.

Front-wheel brake. Brake shoes 1 (Fig. 28) rest with their spherical seats on the heads of tappets 5, and with their pressure pads, on cams 3 installed in disk 4. Attached to the cams by means of slots are driving (7) and driven (8) levers arranged on the face side of the brake disk.

The levers are interconnected by tie rod 2 adjustable as to a length.

The driving lever is linked through a cable to the front-wheel brake control lever arranged on the motorcycle handlebar. When depressing the front-wheel brake control lever, the cable acts on the brake driving lever and both levers turn the cams simultaneously, as a result, the shoes move apart, being pressed against the wheel brake drum. The shoes return to the initial position under the action of two springs 6.

To compensate for wear of the brake linings, the brake design provides for the use of special devices.

Compensation for wear is first achieved by tightening the cable sheath, for which purpose, it is necessary to screw out adjusting union 11. Subsequently, when adjustment with the union is impossible, screw the union right home, remove both driving and driven levers from the cams and set them to a new position, after turning them by 10° counterclockwise with respect to the cams (by one tooth). After this is done, perform brake adjustment to screwing out the union.

When in the process of operation and further wear of the linings, the length of the union is found again to be insufficient for adjustment, disassemble the brake and turn the cams through 180° about their axis. In this case, owing to the cam being asymmetrical with respect to the axis of its stem, the brake shoes are set to a position whereat wear of the linings is compensated by 3 mm across diameter.

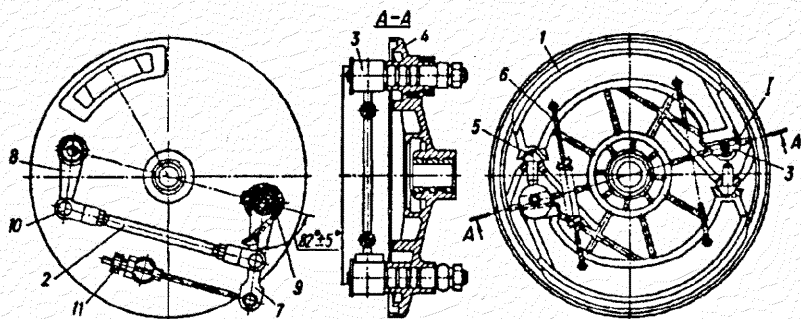


Fig. 28. Front-wheel brake:

1 - brake shoe; 2 - tie rod with forks; 3 - cam; 4 - disk; 5 - tappet; 6 - spring; 7 - driving lever; 8 - driven lever; 9 - return spring; 10 - pin; 11 - adjusting union; I - washer conventionally not shown; A - A - revolved

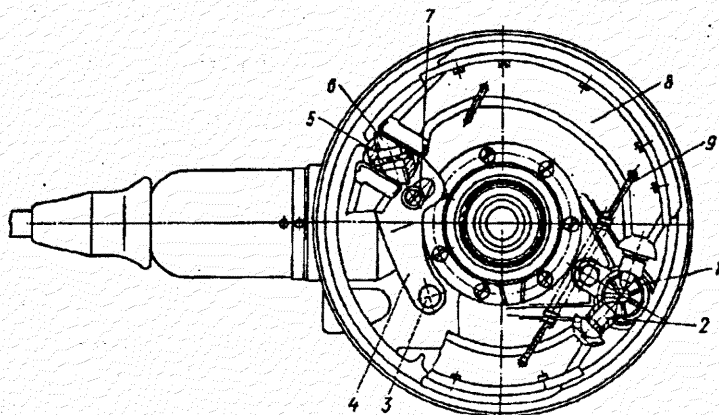


Fig. 29. Rear-wheel brake:

1 - adjusting cone; 2 - tappet; 3 - lever pin; 4 - lever; 5 - cam; 6 - equalizer; 7 - lever screw; 8 - brake shoe; 9 - brake shoe spring

If the wear is less than specified, turning of the cam will be premature and will make it impossible for the shoes in the assembled brake to enter the wheel brake drum. The possibility is not ruled out that in certain cases the cam can be turned through 180° without preliminary re-positioning of the levers.

If necessary, wear of the linings can be further compensated by placing adjusting washers of the same thickness between the tappets and their supports in the brake disk (the motorcycle is not stocked with spare washers).

Dismantling the brake is a simple procedure and does not require any special explanation.

Re-assemble the brake, proceeding as follows:

install the cams into the disk holes;

fit return spring 9 by hooking it directly to the disk hole;

install the shoes with springs on the spherical ends of the tappets and cam bearing surfaces;

mount the driving and driven levers and secure them to the cam slots, maintaining angles of $82^{\circ} \pm 5^{\circ}$ as shown in Fig. 28. Error in parallelism of the levers must not be greater than 5° .

After mounting the brake on the motorcycle, link the tie rod with the driving lever.

Turn each lever clockwise until the shoes are pressed against the wheel brake drum.

Screwing in or out the tie rod into the forks, adjust the distance between the centres of holes in the forks so that the pin linking the fork with the driven lever can freely enter the holes of the lever and fork. The tie rod must be screwed into the fork for a distance of not less than 5 mm.

Lock the tie rod in the fork, link the tie rod to the driven lever and cotter-pin it. Insert the return spring. Adhering to the abovementioned assembly rules will ensure the required conditions for reliable operation of the brake owing to both shoes being simultaneously pressed against the wheel brake drum. When re-assembling the brake, install the shoes in their original places, otherwise wear-in will be disturbed and braking efficiency will deteriorate for some time.

Also, pay attention to the cam surfaces on which the shoes rested since the cam surfaces are asymmetrical with respect to the cam axis of rotation. Both shoes must rest on the cam surfaces that are equally displaced with respect to the stem.

In operation, the brakes are to be adjusted as required by screwing out the adjusting union as directed above. On completing the adjustment, lock the union.

The brake must be so adjusted that the wheel raised above the ground is free to rotate without rubbing against the shoes and the required efficiency and convenience in grasping the lever with the hand is ensured during braking.

Rear-wheel brake. Brake shoes 8 (Fig. 29) rest with their seats on the heads of tappets 2, and with the pressure pads on cam 5. The cam has a slot in which equalizer 6 is mounted. Turning the cam with the equalizer causes the shoes to be pressed against the brake drum.

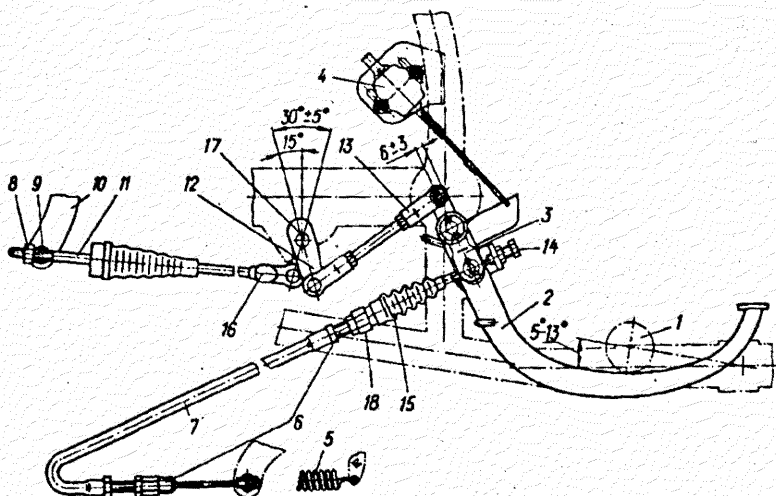


Fig. 30. Rear-wheel and sidecar wheel brake linkage:

1 - footstep; 2 - pedal; 3 - equalizer; 4 - stop light switch; 5 - cable return spring; 6 - adjusting union; 7 - sidecar wheel brake cable; 8 - nut; 9 - lever pin; 10 - brake cam lever; 11 - rear tie-rod; 12 - intermediate lever; 13 - front tie-rod; 14 - equalizer adjusting bolt; 15 - coupling; 16 - rear tie-rod fork; 17 - outer hinge pin; 18 - stop

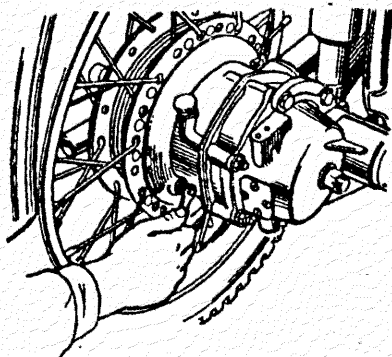


Fig. 31. Adjustment of rear-wheel brake

As the brake linings become worn, the clearance between the brake shoes and wheel brake drum increases. To maintain the clearance within the specified limits, the brake is provided with a slack adjuster in the form of cone 1. The latter is to be screwed in as required (on the outside of the brake disk) so as to move apart tappets 2 which bring the brake shoes nearer to the drum and cam. To clamp the cone in position, its surface has longitudinal grooves into which the tappets enter under the action of springs 9 tightening the brake shoes together.

The need for brake adjustment is to be determined by the value of free travel of outside hinge lever 19 (Fig. 30). The free travel can be considered normal if it does not exceed 35 mm. If the free travel is greater than the specified value, raise the rear wheel and, using a wrench with a 8 mm mouth, turn the protruding square of the adjusting cone (as shown in Fig. 31) clockwise until the shoes start to touch the brake drum during turning the wheel. Following that, turn the adjusting cone back by one fixed interval so that the wheel can rotate without touching the brake shoes.

The brake of the rear wheel and sidecar wheel is operated from the foot pedal through equalizer 3 (Fig. 30). The equalizer upper arm is connected with the rear wheel brake linkage, the lower arm being connected with the sidecar wheel brake. The availability of the equalizer ensures the correct distribution of braking moments and synchronous operation of the brakes.

The length of front tie-rod 13 of the rear wheel brake linkage must be such as to ensure the distance of 3 to 9 mm from the equalizer symmetry plane to the axis of oscillation of the rear wheel suspension lever. The equalizer symmetry plane must coincide with the symmetry plane of the upper arm of brake pedal 2. The brake pedal must be pressed against footstep rubber roller 1, the footstep is to be installed according to Fig. 31 (5°–13°).

The length of rear tie-rod 11 is to be adjusted when mounting the latter or when repairing the brakes.

Adjustment is to be carried out with the wheel removed, the brake assembled and the brake pedal pressed against the motorcycle footstep, proceeding as follows:

- press lever 10 forward (clockwise) and bring nut 8 out of the lever;
- screwing off or on the nut, bring end face to pin 9 without clearance.

Displacement of the cam lever lower head is permissible up to 3 mm forward (in the direction of breaking). The tie-rod threaded part must not be recessed in the nut.

Sidecar wheel brake. This brake is similar in design to the rear wheel brake. The brake is operated by means of cable 7 (Fig. 30). Fitted at both ends of the cable are adjusting unions 6 with a protective rubber pipe slipped over them. To keep dirt away from the cable, see that the pipe is pulled over the unions and rubber sleeve 17 seals well the cable front end.

Checking the brake and its linkage for proper adjustment is to be done with the wheel raised.

At first you are to check the adjustment of the clearance between the brake shoes and drum with the aid of the adjusting cone (following the same procedure as that recommended for the rear wheel brake). Adjusting unions 6 must be turned to such a position as to prevent the cable action on the brake cam lever.

Next, adjust the cable for proper tensioning with the help of unions 6. First, by unscrewing the unions or one of them, set the position at which wheel braking begins. Following that, by screwing in one of the unions, release the brake applied to the wheel.

The absence of cable skewness is a mandatory condition for satisfactory operation of the sidecar wheel brake linkage. Here, attention should be given to the position of stop 20. If required, the latter must be screwed in or out and locked.

To reduce friction of the cable on the sheath during adjustment, slightly shake the cable up.

Excessive tensioning of the cable may cause – through the equalizer – braking of not only the sidecar wheel, but also the rear wheel. After completing the adjustment of the brake system, check its efficiency when braking at a slow speed and make sure there is no heating of the wheel bodies during movement. The wheel bodies should not be heated during movement without braking. If, in braking, the wheel bodies excessively run hot, increase the clearance between the shoes and brake drums.

Fitted on the bracket of pedal 2 is adjusting bolt 14 limiting the turning of equalizer 3. When the position of bolt 14 is properly adjusted, on depressing the pedal with a 40 to 50 kgf force, the clearance between the equalizer and bolt 14 end must be within 2 and 3 mm.

Pressing the equalizer against bolt 14 weakens the action of the sidecar wheel brake or puts the latter out of operation at all. The above bolt serves as a stop for the equalizer lower arm in case the cable gets broken.

Brake parts should be lubricated at the time intervals specified in Section "Maintenance". Excess lubricant must be removed to prevent greasing of the linings.

The maximum wear of the brake lining is subject to the rivet head seat depth, which should make at least 0.3 mm.

SADDLES

Depending on the mass of a driver or a passenger the stiffness of the saddles is adjusted by shifting of the springs along supports; in this case you are required to slacken fastening bolts. The shifting of the spring towards the front hinge ensures the more soft cushioning of the saddle, the shifting of the spring in the opposite side ensures the more stiff cushioning of the saddle. The adjustment over, reliably tighten the bolts.

Check the tightening of the saddle fasteners after every 2500 km of the run.

SIDECAR

The motorcycle is intended for use only with a sidecar. The motorcycle sidecar is single-seat, with a levered wheel suspension using a spring-hydraulic shock absorber.

The sidecar metal body is passenger-type, welded. It is equipped with an upholstered seat consisting of two cushions (seat and back). The easily

removable folding back opens access to the luggage boot. To open the luggage boot, depress the button of the lock fitted on the back. The boot can be locked with the aid of a special key. Provided on the left-hand inside lateral wall of the boot are brackets for fastening a pump, a holder for a fuel can and a gadget for fastening a shovel.

The sidecar body is attached to the frame front tube by use of two clamps with rubber pads. The rear portion of the body is secured to two rubber springs fastened to the brackets of the frame rear tube.

To reduce body vibrations, a stop bar with a rubber buffer is fitted in the frame rear portion.

To protect the

shock absorber against

very strong impacts during movement with a full load over poor roads, a shock absorber travel limiter with a rubber buffer taking up impacts during extreme downward deviation of the wheel carrier lever is mounted on the right-hand longitudinal tube of the sidecar frame.

The sidecar is attached to the motorcycle at four points (Fig. 32). The two

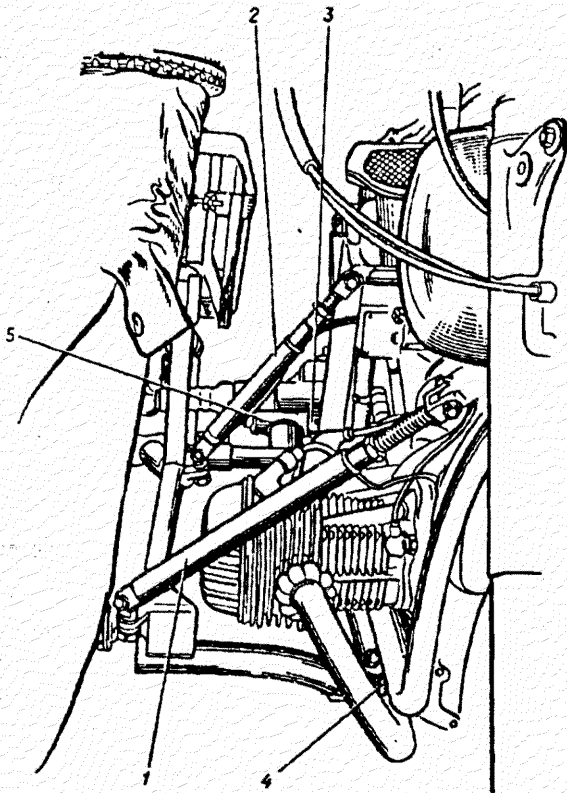


Fig. 32. Attaching of sidecar to motorcycle:

- 1 - front tie-rod; 2 - rear tie-rod; 3 - rear collet; 4 - front collet; 5 - bracket

lower attaching points are essentially collet hinges embracing the ball brackets of the motorcycle frame. The rear collet hinge is mounted in bracket 5 secured to the sidecar frame by two coupling bolts. When the bolts are slackened, the bracket can be turned or moved out of the sidecar frame tube.

The upper attachment consists of two tie-rods adjustable as to length. The tie-rods are articulately connected to the sidecar frame ears and motorcycle frame brackets.

The sidecar wheel is mounted as a cantilever on the axle of the reduction gear hinged to the frame. The vertical forces exerted on the wheel are suppressed by the spring-hydraulic shock absorber installed on the frame arc and in the reduction gear bracket with the use of rubber hinges-bushings. The wheel suspension lever is linked to the frame with the aid of rubber hinges-bushings similar to bushings used in the motorcycle rear wheel suspension.

The motorcycle with a properly mounted sidecar is easily steerable and does not deviate from the selected travel direction. Since the motorcycle has two driving wheels (sidecar and rear wheels), when installing the sidecar with respect to the motorcycle, try to ensure such a position at which the sidecar wheel is parallel to the motorcycle wheels and all the wheels are perpendicular to the horizontal plane of a road. Checking for correct positioning of the sidecar with respect to the motorcycle is to be carried out in the process of operation when moving at a slow speed over an even horizontal road section, with the handlebar released. The motorcycle must not wander aside.

Should it be necessary to adjust the wheels for parallelism, loosen the coupling bolts clamping bracket 5 and move the latter in or out of the rear tube until the correct relative position of the wheels is achieved. This position can be checked with the aid of two straight bars to be applied to the wheels at 90 to 100 mm above the ground.

Perpendicularity of the wheels with respect to the road is attained by increasing or reducing the length of adjustable tie-rods 1 and 2.

When performing adjustment, coat all the hinges with lubricant Lithol-24.

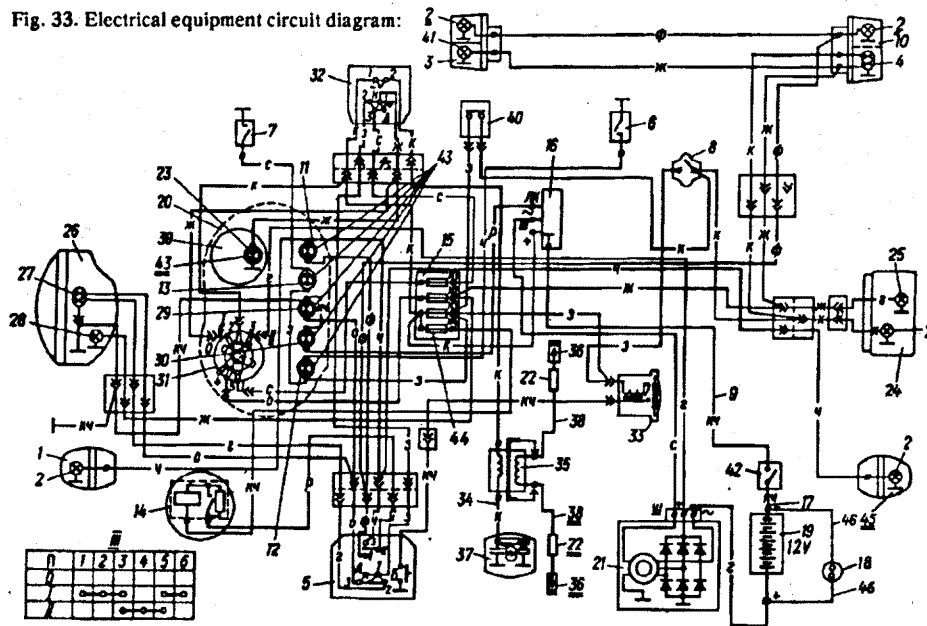
ELECTRICAL EQUIPMENT

The motorcycle electrical equipment comprises electric power sources and using equipment, auxiliary devices and electric circuit. The electrical equipment ensures ignition of air-fuel mixture in the engine cylinders, lighting, audible and light signalling.

A circuit diagram of the motorcycle electrical equipment is shown in Fig. 33.

The electric circuit consisting of low-tension wires is made up according to a single-wire system, i. e., with one wire extending from electric power sources to the using devices (from the positive terminals of storage batteries and generator), the frame and other metal parts of the motorcycle and the devices proper ("earth") are used as the other wire.

Fig. 33. Electrical equipment circuit diagram:



23 - bulb holder ПП1-200; 24 - rear lamp 171.3716; 25 - bulb A12-5; 26 - headlamp ФГ137Б; 27 - bulb A12-45+40; 28 - bulb A12-4; 29 - high beam indicator lamp ПД20М; 30 - generator operation indicator lamp ПД20Е; 31 - ignition lock 141.3704; 32 - switch 181.3709; 33 - horn C205Б; 34 - ignition coil-breaker wire; 35 - ignition coil Б204; 36 - spark plug А14Б; 37 - breaker ПМ302А; 38 - high-voltage wire; 39 - speedometer СП102; 40 - hand brake stop signal switch 13.3720; 41 - bulb A12-8; 42 - switch 46.3710; 43 - bulb A12-1; 44 - fuse П119Б-210; 45 - turn indicator 161.3726; 46 - socket wire; О - OFF; I - motion; II - parking; III - wiring diagram of ignition lock 31; П - position (1-6 terminal Nos). Wire colours: r - blue; ж - yellow; з - green; о - orange; к - red; к4 - brown; с - grey; ф - violet; ч - black

1 - turn indicator 162.3726; 2 - bulb A12-21-3; 3 - sidecar front lamp ПФ232Б; 4 - bulb A12-21+6; 5 - switch 171.3709; 6 - contact plug; 7 - emergency oil pressure transmitter ММ126; 8 - stop light switch БК854Б; 9 - switch 46.3710 - voltage regulator 33.3702 "frame" wire; 10 - sidecar rear lamp ФП219Б; 11 - turn indicator pilot lamp ПД20Д; 12 - neutral position transmitter indicator lamp ПД20Д; 13 - emergency oil pressure indicator lamp П20Е; 14 - turn indicator interrupter PC427; 15 - fuse unit ПП11М; 16 - voltage regulator 33.3702; 17 - storage battery "frame" - switch 46.3710 wire; 18 - socket 47К; 19 - storage battery 6МТC9; 20 - dashboard; 21 - generator Г424; 22 - interference-suppressing end piece А14;

The negative terminals of the storage batteries and generator are connected to the frame ("earth"). To check operation of the generator and current-and-voltage regulator, an indicator (red) lamp ПД20Е is provided. Extinction of the lamp with the engine operating indicates that the generator and current-and-voltage regulator are in good working order.

To check the oil pressure in the engine system, emergency oil pressure transmitter ММ126 is fitted, with indicator (red) lamp ПД20Е serving as an emergency oil pressure warning light.

The neutral position of the gearshift mechanism and switching on of the turn indicator is signalled by indicator (green) lamps ПД20Д, switching on of the high beam being signalled by indicator (blue) lamp ПД20М.

When mounting or dismounting the electrical equipment devices, it is necessary to break the circuit with the aid of battery switch 46.3710.

Electric Power Sources

Storage Batteries

Installed on the motorcycle is a storage battery type 6МТC9. The rated voltage of one battery is 12 V, the capacity is 9 A · h.

The storage batteries supply power to all using devices of the motorcycle with the engine not operating or running at a slow rotational speed. When the engine speed is higher than 1800 min^{-1} , the load is switched over from the storage batteries to the generator from which the batteries are charged.

When using and servicing the storage batteries, adhere to their operating instructions.

Generator

Mounted on the motorcycle is generator Г424 designed for the rated voltage of 14 V and having the rated power of 150 W.

The maximum power at short-time loads is 200 W. The mass of the generator is 3.7 kg.

Design. The generator is basically a three-phase synchronous electrical machine with electromagnetic excitation, having the following structural elements and characteristic design features: cover 1 (Fig. 34) has, at the drive end, a cylindrical boss that is eccentric to the rotor axis, for adjusting the centre-to-centre distance of the drive gearing, and flange for securing the generator to the motorcycle crankcase.

At the drive end the generator has rubber gland 2 to seal off the generator inner space from the corrosive medium of the crankcase. Rotating in bearings 11 (with make-up lubrication and double-end packing) is rotor 3 with an excitation winding and slip rings.

Three-phase stator winding 4 is star-connected with the insulated neutral. The phase leads are soldered to the heads of the bolts securing rectifier unit 8.

Two covers 1 and 6 and also the stator are drawn together by three screws M6. The brushes with current carrying plates are secured to brush holder 7 and cover 6 by means of captive screws.

Semiconductor rectifier unit 8 built into the generator makes it possible to obtain direct current at the generator terminals.

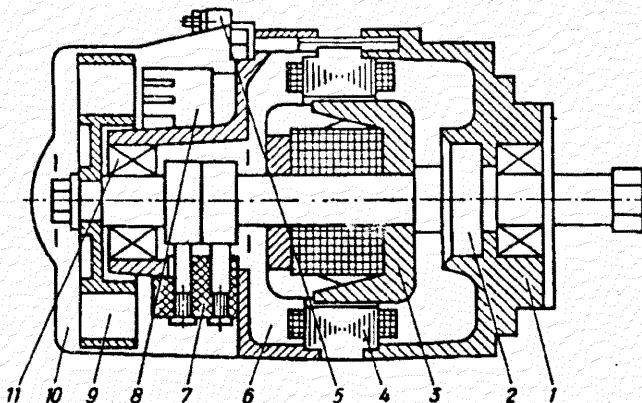


Fig. 34. Generator Г424:

1 – cover; 2 – gland; 3 – rotor; 4 – stator winding; 5 – terminal block; 6 – rear cover; 7 – brush holder; 8 – rectifier unit; 9 – fan; 10 – protective casing; 11 – bearing

The rectifier unit consists of three monoblocks cast from aluminium alloy, with finning for convective heat transfer. Built into each monoblock are two semiconductor elements of opposite polarity, the electrical connection of which is made with the aid of two busbars: an "earth" and an insulated busbar. The insulated busbar has a contact screw.

It is forbidden to dismantle the rectifier unit.

Terminals for connecting the generator to the motorcycle electric circuit are fitted on common terminal block 5. They have limiting washers preventing the possibility of wire misconnection during assembly and spontaneous disconnection of wires in operation.

Operating principle. Generator Г424 is classified among three-phase synchronous electrical machines with electromagnetic excitation. The characteristic features of the generator are as follows: at the slow rotational speed of the rotor the generator excitation winding must be fed from an external d. c. source (storage battery) and only after excitation from a storage battery at a

rotor speed exceeding 2400 min^{-1} , the generator starts to operate from self-excitation.

Generator operation with fully discharged storage batteries is impossible since the generator fails to build up.

It is forbidden to operate the generator under no load.

In case the generator operates without load (with the wires extending to using devices broken or disconnected) at a high rotational speed, the interphase a. c. voltage will reach the values at which it may break down the semiconductor elements of the unit, thus causing damage to the generator.

Mounting on the motorcycle. Insert the mounting boss of the cover (at the drive end) into the engine crankcase mounting hole. At the same time ensure that the gears move into mesh and the studs enter the elongated holes of the generator flange. A gasket must be fitted between the crankcase and generator end face planes.

Fit flat and spring washers on the studs and screw on the nuts until the generator is slightly pressed against the crankcase. Connect the wires to the terminal bolts and mount the safety caps.

Start the engine and, slowly turning over the generator counter- and clockwise (at engine slow speed), find the optimum position of gear meshing, at which the gears operate with the least noise. Without changing the generator position, tighten up the nuts.

If the drive gear meshing is improperly adjusted, this may lead to a breakdown of the generator shaft.

Care of the generator. The design of generator Г424 makes it possible to reduce its maintenance in operation to minimum. The use of bearings with make-up lubrication eliminates the need for periodic lubrication of the bearings. The factory-stuffed lubricant in the bearings is sufficient for the entire operating life of the generator. The generator slip rings do not form carbon deposit in operation, practically wear very little, are not fouled with brush dust and, therefore, do not require frequent grinding and periodic polishing.

The electric brushes fitted on generator are sufficient for the entire service life.

While the generator is in use, check for reliable tightening of the nuts of the terminal bolts with cable lugs, generator coupling screws, fan fastening screw and generator fastening nuts.

After the expiry of the generator operating time (20 000 km run of the motorcycle) clean off brush dust from the cover inner space at the slip ring end.

To facilitate the cleaning procedure, it is advisable to remove the generator from the motorcycle, take off the casing and brush holder with brushes.

Total disassembly of the generator before the expiry of the guarantee period is not allowable.

Voltage Regulator

Generator Г424 operates together with contactless voltage regulator 33.3702. The voltage regulator is intended for automatic maintaining the voltage of the generator terminals and controlling the pilot lamp of storage battery charging: after starting the engine the pilot lamp goes out, indicating the serviceability of the generator and of the voltage regulator (pilot lamp may blink when the motorcycle moves with 30 km/h speed and at the instant the additional load is connected to the circuit).

When installing the voltage regulator on the motorcycle, see that the regulator body would be reliably connected to the motorcycle "frame" with the aid of a fastening bolt.

Electric Power Using Equipment

To produce high-tension current, the motorcycle engine is fitted with an ignition coil B204 and breaker ПМ302А with an automatic spark timer.

The position of the ignition coil and breaker is shown in Fig. 35.

Ignition Coil

Ignition coil B204 has two leads each of which feeds current to one of the cylinder spark plugs and operates in conjunction with the breaker having an automatic spark timer.

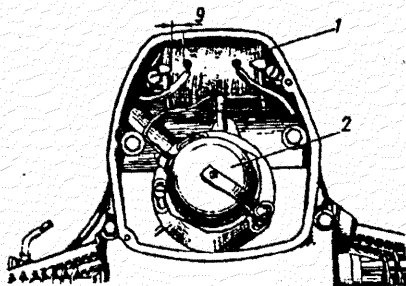


Fig. 35. Ignition coil and breaker with automatic spark timer:

1 – coil B204; 2 – breaker ПМ302А

The clearance between the discharger and high-tension terminals is set to 9 mm. An increase or reduction of the clearance in operation, loosening of fastening of the current-carrying wires to the terminals, fouling of the wires and terminals are inadmissible.

Breaker with Automatic Spark Timer

Keep the breaker clean, tighten the fastenings in due time, replenish the lubricant for the oil wick and friction surfaces of the automatic spark timer. Wipe the breaker with a clean cloth moistened with petrol.

After 500 km (at the beginning of the running-in period) and subsequently after every 5000 km, check the contacts for good condition, dress them, if necessary, and adjust the gap. Dressing the contacts should be carried out with a needle file or some other tool leaving no abrasive dust. When dressing, remove

a small knob on one of the contacts, but a recess on the other contact should not be eliminated. After dressing, wash the contacts with clean petrol and set a gap of 0.4 to 0.6 mm.

After every 5000 km, the breaker lever pin and weight-pin clearance should be lubricated with one drop of oil T22. The cam-bushing clearances and oil wick are to be lubricated with 2–3 drops of oil T22.

Operation of Ignition System

On switching on the ignition, the circuit of the ignition coil primary winding becomes energized. When the breaker contact points are opened, a high-tension current (10 000 to 15 000 V) necessary to ignite the air-fuel

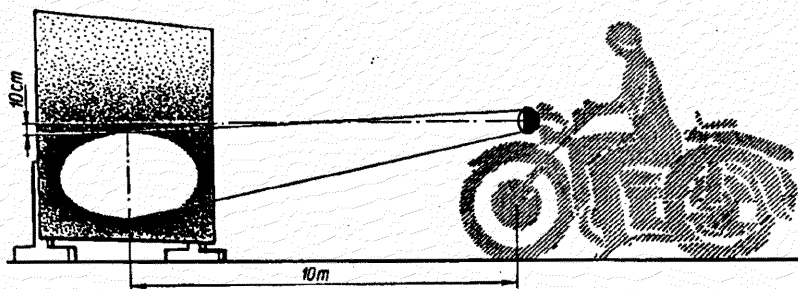


Fig. 36. Headlamp setting diagram

mixture arises in the secondary winding, at the same time sparks are formed between the spark-plug electrodes of the left- and right-hand cylinders: one spark is formed when the compression stroke comes to an end in one of the cylinders, the other strikes during the exhaust stroke period.

Headlamp, Dashboard, Motorcycle and Sidecar Lamps, Horn and Stop Light Switch

The motorcycle is provided with a headlamp type $\Phi\Gamma 137-B$. Mounted in the headlamp are a high and lower beam bulb and clearance (parking) light bulb.

Indicator (pilot) lamps of the generator operation, emergency oil pressure, gearshift mechanism neutral position, switching-on of turn indicators and high beam, as well as the speedometer with a lighting bulb, and the ignition lock are all arranged on the dashboard.

To set the headlamp to the correct position, proceed as follows:

· install the motorcycle (with a load) on a level ground in front of a white wall or screen at a 10 m distance from the headlamp glass to the wall (Fig. 36);

slacken the bolts securing the headlamp and set the latter to such a position whereat the axis of the light beam from the high beam filament is horizontal, i. e., the centre of a light spot on the screen and the headlamp centre are equidistant from the ground;

check the lower beam. The upper boundary of the light spot on the screen, with the lower beam filament switched on, must be not less than 10 cm below the headlamp centre;

secure the headlamp fastening bolts.

The motorcycle is fitted with turn indicators with orange lenses and bulbs A12-21-3.

Red lamp 17.3716 with bulbs A12-21-3 and A12-5 is fitted on the motorcycle rear wheel guard; mounted in the lamp lower portion is a clear lens for license plate illumination.

Fitted on the sidecar guard front portion is a two-section lamp ПФ232Б with bulb A12-8 in the clear lens section, and bulb A12-21-3 in the orange section. Mounted on the sidecar guard rear portion is a two-section lamp ФП219Б with bulb A12-21-3 in the orange lens section, and bulb A12-21-6 in the red lens section.

The motorcycle is provided with horn C205Б. The latter operates with the ignition switched on, upon depression of the horn button located on the left-hand side of the handlebar.

Switches BK854 and 13.3720 are used on the motorcycle as stop light switches.

Wiring

Electric power sources and using equipment as well as auxiliary devices are interconnected by wires. For ease of wiring, the wires (except the high-tension wires) are assembled in bundles. The wires are connected to one another and to using devices through metal connections protected by rubber tubes to prevent a contact-to-frame fault, the wire lugs being protected by rubber caps.

Bundled conductors are fastened to the motorcycle and sidecar frame by tapes and tightened together with clips.

All the light signalling devices are protected by fuses. Fuse unit ПП 11М with four 15 A fuses fitted in it is installed on the bracket under the dashboard.

Upper fuse No. 1 is intended to protect the "day – night" switch circuit against short circuits. Fuse No. 2 is designed to protect the clearance light circuit against short circuits. Fuse No. 3 ensures short-circuit protection for the horn circuit, hand and foot brake stop switches and neutral position and oil pressure indicator lamp circuit. Fuse No. 4 protects the turn indicator relay circuit against short circuits. A 10 A fuse may be inserted in this circuit instead of a 15 A fuse.

Troubleshooting the Motorcycle Electric Circuits and Units

Failure of electric power sources and using equipment (generator, voltage regulator, instrumentation, lighting devices, etc.) may be indicative of a faulty electric circuit.

In this case malfunction may be caused by the following faults:

broken or disturbed contact in the wires connecting a using device to the power source;

faulty fuses or switching devices (ignition lock, switches, pickups, etc);

a short circuit or overload in a circuit, causing fuses to operate.

Before checking the electric circuit, make sure the fuse is in good condition. The latter can be verified with the aid of a test lamp by connecting end of the wire to the "+" of the storage batteries, and other, to one of the ends of the fuse under check. The other (free) end of the fuse should be connected through the test lamp to the "-" of the storage batteries or to the motorcycle frame ("earth"). If the fuse is serviceable, the lamp will be alight.

To check the electric circuits, proceed as follows:

switch on the ignition lock;

switch on the checked circuit with using devices.

If any of the using devices is inoperative and the fuse is in good condition, then circuit or using device is faulty. Checking for the presence of voltage should be started with the terminals of using devices. In this case the following versions may be possible:

no voltage at the using device terminals (the test lamp will not light up) – check the circuit running from the using devices to the source;

a wire may be broken or there is no contact in connections. In this case, depending on the nature of fault, tighten up the contacts in connections or replace the wire;

the terminals are energized (test lamp comes on) – check the using device for serviceability (replace burnt lamps).

If the fuse blows, there is a short in the circuit. It is necessary to locate and eliminate the fault before switching on the ignition lock or a circuit section under test. The checking is to be done as in previous case.

When checking the voltage in the high-voltage coil primary winding the breaker points should be closed.

Trouble Shooting in Generator and Voltage Regulator

When the test lamp of operation of the generator and voltage regulator fails to light up upon switching on the ignition, check connection of terminals on the voltage regulator and storage battery as well as connection of the voltage regulator body to the "frame" for reliability, voltage on the positive "+" terminal of the voltage regulator for presence.

If this test was ineffectual check the serviceability of the test lamp circuit from the dashboard to the terminal "JK" of the voltage regulator. For this

purpose disconnect the wire from the terminal "JK" on the voltage regulator, switch on the ignition and touch the positive terminal of the voltage regulator with the disconnected wire. If in this case the lamp fails to light up, with the voltage available at positive terminal, check the wires, the reliability of contacts and the test lamp. If upon closing the circuit the lamp lights up, the cause of a trouble is in the voltage regulator which must be replaced.

When the test lamp of operation of the generator and voltage regulator fails to go out after starting the engine, with the operating engine, you are to switch on the distance light, then switch off the storage battery with battery switch.

When the generator and its exciting circuit are sound, the engine continues to operate and the lighting of the lamp in the headlight varies negligibly. In this case the lighting of the test lamp is indicative of a loose contact on the storage battery terminals or malfunction of the voltage regulator which must be replaced. Never attempt to check the serviceability of the generator by closing to the frame the terminal designated with the positive sign since in this case the rectifier unit in the generator can fail.

The erroneous connection of the positive terminal of the storage battery to the motorcycle "frame" can result in the same consequences.

When at a medium speed of crankshaft rotation the engine stalls upon disconnecting the positive terminal of the storage battery, first of all you are to make sure that the generator exciting circuit is energized. For this purpose, when the engine is not operating and the ignition is switched off, you are to disconnect the wire from the "III" terminal of the voltage regulator and contact it for a short time to the positive terminal of the voltage regulator. When in this case a small spark appears, the generator excitation circuit is serviceable.

The absence of sparking on the positive terminal is indicative of (if the wire from the "III" terminal of the generator to the voltage regulator is not damaged) a trouble in the generator. After checking the intact condition of wires and the reliability of connections (on the storage battery, generator and voltage regulator) you are to check the generator for serviceability.

The generator and its semiconductor rectifier can be also checked with the aid of a test lamp with the engine inoperative.

To check the semiconductor rectifier, disconnect the generator from the circuit and then perform the following operations:

1. Connect the storage battery positive terminal to generator terminal "⌋"; and the storage battery negative terminal through the test lamp to the generator body. The test lamp must not light up in this case. Then connect the storage battery positive terminal to the generator body, and the negative terminal to generator terminal "⌋" through the test lamp. The latter must come on. If in the first case the lamp has lighted up, this means that the semiconductor rectifier (the lower semiconductor element) is faulty. If the lamp is not alight in the second case, this indicates that the "⌋" - generator frame circuit is broken.

2. Connect the storage battery positive terminal to the generator positive terminal, and the negative terminal through the test lamp to generator terminal

"~". The test lamp must not light up. Next, connect the storage battery positive terminal to generator terminal "~", and the negative terminal to the generator positive terminal through the test lamp, the latter must light up. If the lamp comes on in the first case, the semiconductor rectifier (upper semiconductor element) is faulty. If the lamp is not alight in the second case, this means that the "~" – generator "+" circuit is broken.

In addition, check the generator excitation circuit for serviceability, which can also be done with the aid of a test lamp. For this purpose, the storage battery positive terminal should be connected through the test lamp to "terminal III" (generator shunt) after first disconnecting terminal "III" from the current-and-voltage regulator, and the storage battery negative terminal, to the generator body.

Turning over the generator rotor with the aid of a cranking lever, watch the glow of the test lamp. If the latter glows without flickering, this indicates that the excitation circuit contacts are in good condition. Intermittent light of the lamp points to poor contact between the brush and ring, or between the ring and generator excitation winding leads.

Care of Electrical Equipment

During daily maintenance, check the headlamp, horn, lamps, storage batteries, generator and ignition for proper operation. In case of failure of headlamp electric bulbs, replace them.

To replace the clearance (parking) light bulbs, remove the holder with the bulb and separate the bulb from the holder.

To replace a burnt-out indicator (pilot) bulb in the lamps, remove the lamp from the case and separate the bulb from the holder.

If horn sounding deteriorates, adjust the horn by turning the adjusting screw in one direction or the other.

After every 5000 km run, check the following:

- the gap between the sparking-plug electrodes; if necessary, clean the spark plugs of carbon deposit;

- the wires for reliable connection;

- fastening and serviceability of bulbs in the headlamp and lamps; if required, remove dust from the reflectors, wipe the lamp glasses.

Before replacing a blown fuse, locate and eliminate a fault in the electric circuit.

During operation of the motorcycle it is necessary to periodically check the reliability of the speedometer fastening on the dashboard panel and its connection with a flexible shaft.

When a squeak appears, it is necessary to add lubricant to the union end or to the instrument lubricator.

For this purpose remove the speedometer and clear a hole in the plug. Then arrange the speedometer so that the lubricating hole and union end (in case the hole is absent) were from above and turning the axle manually, pour some five-six drops of isoparaffine ИПМ-1 of other equivalent instrument oil.

TROUBLESHOOTING PROCEDURE

Trouble	Cause	Remedy
Engine		
Engine fails to start	No spark at spark plug electrodes: spark plugs inoperative; incorrect gap or breaker points burnt; burnt-out ignition coil; punctured capacitor; no contact in wire connection or in ignition emergency switch; no clearance in valves No petrol fed to carburettors: clogged hole in petrol tank cover; clogged cock or its settler; clogged carburettors (jets, ducts, fuel filter); carburettor attachment went loose; low-quality petrol	Clean spark plugs, set the gap, replace, if necessary; set the gap, dress contact points; replace coil; replace capacitor; restore contact; adjust clearance clear out hole; clean and wash cock or settler; clear and wash carburettors; draw it up tight;
Engine overheats	Ignition timing maladjusted; no synchronism in operation of carburettors; rich or poor mixture; dirtied air cleaner; air leakage in connections; poor cooling because of dirty interstices between head and cylinder fins	Adjust ignition timing according to instructions; adjust carburettors; adjust carburettors; wash air cleaner; eliminate air leakage; clean engine of dirt
Engine misses, with one cylinder functioning	Breaker point gap maladjusted; maladjusted gap in ignition coil discharger; one of spark plugs inoperative; high-tension wire insulation broken down or no contact in wire connections; valve clearances out of adjustment; carburettors maladjusted	Set the gap; set the gap; replace spark plug with a new one; check wires and their connections for good condition, replace wires, if necessary; adjust clearances; adjust carburettors
Engine pings	Maladjusted ignition timing (early ignition); valve clearances out of adjustment;	Adjust ignition timing according to Instructions adjust clearances;

Trouble	Cause	Remedy
Engine fails to develop full power	carburettors maladjusted;	adjust carburettors for synchronous operation of cylinders;
	low-quality petrol in fuel tank;	change petrol;
	much carbon deposit on pistons and heads;	clean parts to remove carbon deposit;
	cylinder-piston group worn out	replace worn parts
Engine consumes too much petrol	Maladjusted ignition timing;	Adjust ignition timing according to Instructions;
	carburettors clogged or out of adjustment;	adjust carburettors for synchronous operation and proper air-fuel ratio, clean and wash them;
	valves loosely seated;	clean valves to remove carbon deposit and grind them;
	filter element of air cleaner dirty;	wash filter element of air cleaner;
	engine overheated	allow engine to cool
	Maladjusted ignition timing;	Adjust ignition timing according to Instructions;
	carburettors out of adjustment;	adjust carburettors;
	motorcycle wheel camber and toe-in set improperly;	set according to Instructions;
	low tyre pressure;	inflate tyres as required;
	wheel brakes maladjusted;	adjust brakes according to Instructions;
	piston group worn	replace worn parts

Clutch

Clutch slippage	Incomplete engagement due to maladjustment of clutch release linkage;	Adjust clutch release linkage;
Clutch fails to be bully disengaged	greasy linings of driven disks;	wash linings with petrol and dry;
	driven disk linings worn out	replace driven disks
	Clutch release linkage maladjusted	Adjust linkage

Gearbox

Oil leakage along primary shaft splines	Primary shaft gland coupling has come off bearing	Press-fit coupling up to stop
Oil leakage from gearbox breather	Excess amount of oil gearcase	Discharge oil to required level, clean out breather
Noise and jerks during gear shifting	Clutch release mechanism not adjusted	Adjust with the aid of adjusting bolt

Trouble	Cause	Remedy
Noise in gearbox during motorcycle movement	Worn gears; insufficient oil level in gearcase	Replace gears; top up
Self-disengagement of gears	Engaging clutch teeth worn out; gearshift disk loosely held in position; clutch release mechanism not adjusted	Replace worn clutches; replace catch spring; adjust mechanism

Main Drive

Oil leakage from casing drain hole or from labyrinth packing between wheel and main drive	Too high oil level in casing; collar gland damaged; wheel axle nut not tightened	Drain oil to required level; replace gland; tighten up nut
Main drive casing overheated	Insufficient oil level in casing; brake shoes rubbing against wheel brake drum	Add oil; adjust brake

Reduction Gear

Oil leakage from wheel side	Excessive level of oil; worn-out final drive seal	Drain oil and pour 200 cm ³ of fresh oil; replace seal
Great cardan shaft play as viewed from differential end	Slackened tightening of wedge	Tighten wedge

Front Fork

Knocks in front fork	Clearance in steering column bearings; clearance if fork blade tube joint in traverse due to screwing-off of coupling nuts; no oil or insufficient amount of it in fork shock absorbers; too great clearance between lock nut and spring upper end piece; fork blade tube bushing much worn	Eliminate clearance by tightening bearings; eliminate clearance by tightening nuts; investigate cause of oil leakage. Eliminate leaks. Prime shock absorbers with oil; set clearance according to Instructions; replace bushings
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Shock Absorbers

Leaky shock absorbers	Rod gland worn out; sealing ring damaged; worn rod	Replace gland; replace ring; replace rod
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Trouble	Cause	Remedy
Rear suspension badly wobbles	Insufficient amount of oil in shock absorbers; piston upper valve loosely seated or shock absorber lower valve does not fit properly in its seat; worn piston, tube	Overhaul, wash and prime shock absorbers with required amount of oil; overhaul and wash shock absorber; if necessary, grind valve and piston end face; replace worn parts
Hard operation of rear suspension	Dosing ducts of piston or on shock absorber lower valve are clogged	Dismantle shock absorbers, wash and prime with oil

Electrical Equipment

Ignition key inserted up to stop and turned to position 1 (Fig. 3); generator operation indicator lamp, gearbox neutral position indicator lamp and emergency oil pressure lamp (with engine not operating) are not alight, horn is inoperative	Fuse blown; no contact in the circuit of listed devices; plug of terminals "2" and "3" of ignition lock disconnected	Replace fuse; restore contact; connect plug
When engine rotational speed is changed from low to high, and voltage regulator and generator operation indicator lamp will not go out (glows steadily)	Generator fails to provide required voltage, voltage regulator is inoperative, loose contact of storage battery terminals	Check generator and voltage regulator wires for reliable connections, make sure generator and voltage regulator are in good condition, trim and tighten terminals
With headlamp bulb switched on (by operating light switch), only high or lower beam is on	One of bulb filaments burnt out; broken contact in light switch	Replace bulb; restore contact
Stop lamp is continually alight	Stop light switch spring over tensioned; rod outer end dirty	Adjust spring for proper tensioning by shifting switch; clean off dirt
On closing turn indicator switch, turn indicator bulbs will not light up	Burnt-out bulbs or broken contact in connections; faulty interrupter-relay of turn indicator; fuse is burnt	Replace bulbs, restore contact; replace relay; replace fuse

RUNNING-IN A NEW MOTORCYCLE

Correct running-in of a new motorcycle will increase its service life.

Running-in of the motorcycle is subdivided into two stages:

up to 1000 km run and from 1000 to 2500 km run (see Table 1).

Fitted on the motorcycle carburettors are throttle lift limiters. After 2500 km run they should be removed.

Running-in should be carried out on hard-surface roads or on improved cart roads with a load on the motorcycle not exceeding 50 per cent of the maximum value.

To avoid engine overheating, it is not advisable to move at speeds higher than permissible.

For a run-in motorcycle, it is not allowable to exceed the following maximum permissible speeds: in the 1st gear – 20, in the 2nd gear – 40, in the 3rd gear – 70, in the 4th gear – 95 km/h. Riding at these speeds must be short-time (not longer than 2–3 min).

The recommended speed for a run-in motorcycle should be 60–70 km/h when moving on an improved-surface highway.

Table 1

Permissible Running-in Speeds (km/h)

Gear	Run, km		Gear	Run, km	
	up to 1000	from 1000 to 2500		up to 1000	from 1000 to 2500
I	20	20	III	45	55
II	35	40	IV	60	70

OPERATION PECULIARITIES

GENERAL

Before operating a new motorcycle, carefully read these instructions and carry out the following operations:

remove the protective (antirust) coating from chromized parts using a soft cleaning cloth moistened with white spirit or clear petrol, and then wipe the surface with a dry clean cloth;

- check the level of oil in the engine crankcases, gearcase, main drive casing, a differential gear and reduction gear, add oil, if necessary;
- check and, if required, regulate the tyre pressure, make sure the wheel spokes are uniformly tightened;
- pour petrol into the fuel tank;
- render the storage batteries serviceable as directed in the relevant instructions and install them in their intended places;
- fit the following;
 - spark plug tips on the high-tension wires;
 - orange cat's eyes at the side of the sidecar body and on the front fork, a red cat's eye on the sidecar rear guard;
 - rear-view mirror;
 - licence plate bracket and mudguards;
 - linings of brake pedal and shift pedal;
 - mount an anti-theft device on the frame;
- check the controls, clutch and brakes for proper operation;
- check the fastenings, especially of the wheel axles, the sidecar, handlebar, front fork and tighten up, if necessary;
- check the motorcycle lighting equipment for proper operation;
- after starting the engine, check and, if necessary, adjust the carburettors for minimum steady rotational speed and synchronous operation of the cylinders.

When servicing the motorcycle, use oils and lubricants recommended by the Manufacturer. The use of oils and lubricants other than specified may cause damage to the motorcycle units and assemblies.

PREPARING FOR DEPARTURE

Thorough checking of the motorcycle before departure is a guarantee of trouble-free operation. Prior to departure, pay attention to the fastening of the wheel axles and handlebar, check the brakes, turn indicators and stop-light switches for good condition, make sure the headlamp and lamps give light.

It is necessary to check the level of oil in the cases with a dipstick mounted into the plug of the filler of each unit and having two check marks: the upper mark to indicate full priming, and the lower one showing the lowest permissible level. The dipsticks of the gearbox and main drive are identical in design, differing only by the length and arrangement of marks. The shorter dipstick is screwed into the gearcase. When checking the oil level, the plug with a dipstick should not be screwed in, but rather inserted into the hole until it is pressed against the thread.

Check the tyre pressure with the aid of a pressure gauge and, if necessary, inflate the tyre to the required pressure.

On completing the examination and priming of the motorcycle, proceed to starting the engine.

ENGINE STARTING

To start the engine, do the following:

close the battery switch by setting it to the BKJ. (ON) position. Check the emergency ignition switching-off key for proper position. The key must be set to the lowermost position;

check and, if required, set the reverse shift handle to the rear position;

set the main neutral position (between the 1st and 2nd gears) of the gearshift mechanism. After this is done, the neutral position indicator lamp located on the dashboard must light up, with the ignition switched on;

open the fuel cock (refer to Fig. 14) by setting its handle to the O (ОТКРЫТО) (OPEN) position;

when starting the cold engine (at ambient temperature up to -15°C) it is necessary to use the carburettors starting device. For this purpose turn up starting device lever 23 (Fig. 15) and then the throttle control handle turn a little back.

After the engine is warmed up, return the starting device lever to the initial position (down).

At an ambient temperature from -15°C and below it is recommended to depress additionally on the float depressor. Then depress the starting mechanism lever several times;

insert the ignition key up to the stop and turn it clockwise to the first fixed position. After this is done, the battery charge and generator operation indicator lamp, emergency oil pressure transmitter indicator lamp and neutral position indicator lamp will light up;

by gradually depressing the starting mechanism lever with your foot, bring the toothed quadrant of the starting mechanism shaft into mesh with intermediate shaft small gear, following which start the engine with a sharp jerk of your foot. If the quadrant fails to come into mesh (stiff resistance is felt), move the motorcycle forward or backward. If, during starting, an excessive force is applied to overcome the resistance, this may cause breakdowns. Do not remove your foot from the lever during repeated jerks.

After starting, warm up the engine. Warming up a cold engine is a must since in this case the friction surfaces will operate with insufficient lubrication due to thick oil and this will lead to their increased wear.

It should be borne in mind that after starting a cold engine (at ambient temperatures below 0 °C) the latter must not be allowed to develop a high rotational speed. Otherwise the centrifuge gasket may be pressed out and no oil will be fed to the connecting-rod bearings, as a result, the latter will be damaged.

After starting the engine, the generator operation indicator lamp and emergency oil pressure lamp will go out. Engaging any of the forward gears will cause the neutral position indicator lamp to go out. The lamp is on when the reverse gear is engaged.

A properly adjusted engine must run steadily at a low rotational speed with the throttle control handle fully turned forward.

Start riding only after the engine is warmed up and operates steadily at a low rotational speed. At subfreezing ambient temperatures and after the motorcycle has been standing idle for a long time, it is advisable not to operate the engine, after first 3 to 5 km of travel, at a high rotational speed and move at 30 to 40 km/h speed so that the oil in the gearbox and main drive becomes heated and acquires the viscosity necessary for normal lubrication of the gears and bearings.

MOTORCYCLE DRIVING

Start riding only in the first gear. When taking off, be careful not to release sharply the clutch operating lever as this may lead to a jerk or motorcycle breakdown. The engine rotational speed must be such that the engine will not stall when the clutch is smoothly engaged.

After bringing the motorcycle up to 15–20 km/h speed, put in the second gear. When the speed reaches 25–35 km/h, put in the third gear, and at 45–50 km/h speed, the fourth gear. After that, the speed should be governed with the throttle control handle.

After starting out, be sure to check the brakes for good condition by applying them several times to the motorcycle wheels.

Avoid moving for a long time in the first and second gears unless this is necessitated by road conditions since in this case the engine will develop a high rotational speed and, being poorly cooled, will wear rapidly. Besides, movement in the lower gears will lead to excessive consumption of fuel. To quickly reduce the travelling speed, apply the brakes to the motorcycle wheels.

There are three methods of braking: with the aid of brakes, by means of the engine, using the engine and brakes simultaneously.

The first braking method can be resorted to whenever it is necessary to quickly stop the motorcycle provided the road grip of tyres is good. For this purpose, throw out the clutch and at the same time decrease the engine speed

(throttle down) and gradually depress the pedal of the rear-wheel and sidecar wheel brake and the front-wheel brake lever. With the brakes applied to all the wheels simultaneously, the motorcycle riding stability is higher than with one brake applied.

To brake the motorcycle with the aid of the engine, decrease the engine speed without disengaging the clutch. When the engine speed is considerably reduced in the process of braking, throw out the clutch to prevent engine stalling and, if necessary, stop the motorcycle by applying the brakes to its wheels. Engine braking may be resorted to on long downgrades or on road straights, and also whenever it is necessary to reduce the travelling speed on a slippery road.

Slowing down the motorcycle simultaneously with the engine and brakes should be effected on steep descents and when riding on a slippery road in order to avoid skidding. Apply the brakes gradually. Hard braking may cause skidding and overturn of the motorcycle. Especially dangerous is hard braking in winter time and on a wet road. During emergency braking the motorcycle may turn somewhat aside, especially when braking is effected without applying the brake to the front wheel.

For this reason, before operating the motorcycle, test it for proper handling at a low speed under the following braking conditions: separately with the front-wheel brake, the rear-wheel and sidecar wheel brakes and using all the brakes simultaneously at different loads.

A friction-type handlebar shock absorber is provided to absorb lateral jolts acting on the front wheel during movement on a rough road.

The degree of shock absorber tightening should depend on road conditions and travelling speed. In case of riding at a high speed, especially on a rough road (on cobbles), the handlebar shock absorber wing nut must be tightened to a greater extent; when moving slowly, with frequent turns, the handlebar shock absorber wing nut should be slackened so as not to impede the turning of the motorcycle.

Motorcycle stability at right- and left-hand turns is not the same. When turning to the right, i. e., towards the sidecar, the motorcycle is less stable and more liable to overturn than when turning to the left.

It should be remembered that a certain minimum permissible radius of turn must correspond to a definite travelling speed of the motorcycle. The permissible radius of turn must be increased as the travelling speed rises. The motorcycle handlebar should be turned smoothly, without jerks, especially when turning to the right.

In operating the motorcycle, keep a close watch on the thermal conditions of operation of the engine, power transmission units and running gear mechanisms.

Normal operation of the engine is indicated by good acceleration characteristics of the motorcycle, absence of knocks in the crank gear. Signs of engine overheating are as follows: engine operation at hot-bulb ignition, loss of power as a result of which the motorcycle is slow to gather speed and harsh metallic knocks appear in the crank gear.

It must be remembered that a long-time riding with an overheated engine may lead to a breakdown and accident. To avoid overheating, try to use the most appropriate gears and choose such sections of a road where engine overload can be excluded.

To cool an overheated engine, stop the movement and shut down the engine.

In case of engine stoppage turn off the fuel cock.

It is forbidden to cool the engine with water since this may cause damage to cylinders and their heads.

To stop an overheated engine, reduce the engine rotational speed to a minimum, switch off the ignition and sharply open carburettor throttles to the stop with a throttle control handle.

MAINTENANCE

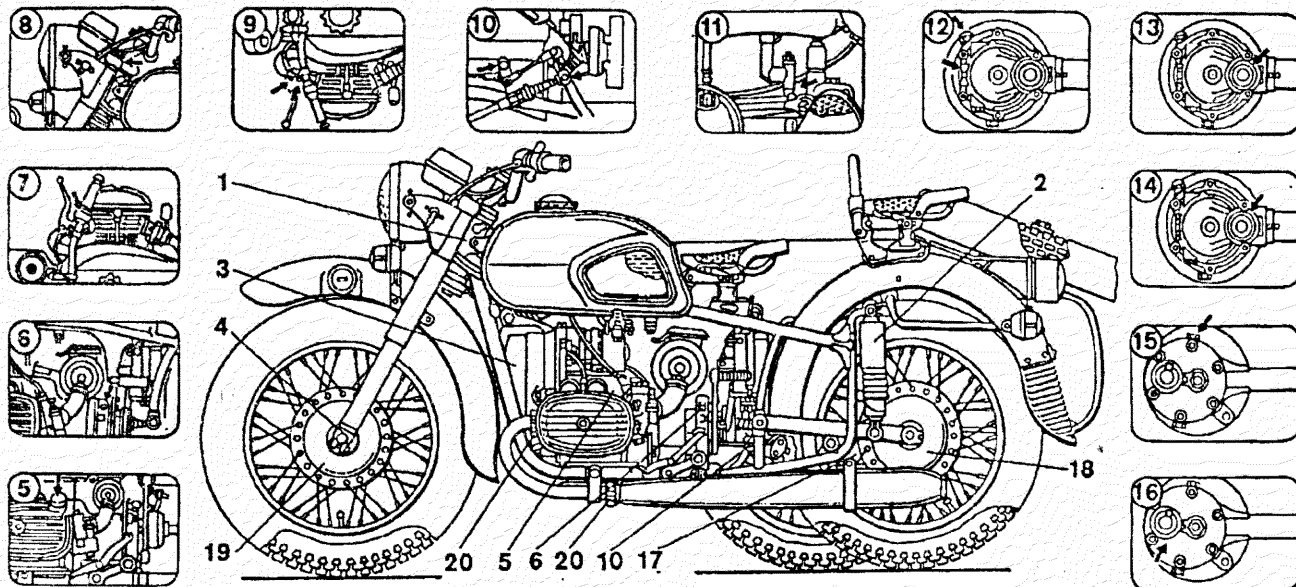
The motorcycle service life to a great extent depends on the quality of maintenance and service materials used. Servicing the motorcycle consists in regular cleaning and washing, checking its assemblies and units for technical condition, adjustment and lubrication.

Motorcycle maintenance includes the following:

- check inspection and daily maintenance;
- maintenance after 500 km run (running-in);
- maintenance after 2500 km run (running-in);
- maintenance No. 1 (M-1) after 5000 km run;
- maintenance No. 2 (M-2) after 10 000 km run;
- seasonal maintenance (in autumn and spring time);
- maintenance during the prolonged storage.

The above-mentioned maintenance intervals are recommended for motorcycle operation on roads with low dust content. When riding over dusty or dirty roads, maintenance intervals must be reduced. During each maintenance procedure, all detected faults must be eliminated in addition to the obligatory list of maintenance operations.

The list of motorcycle maintenance operations depending on a travelled distance and lubrication intervals of lubricating operations are presented in Table 2, and oils and lubricants to be used are listed in Table 3.



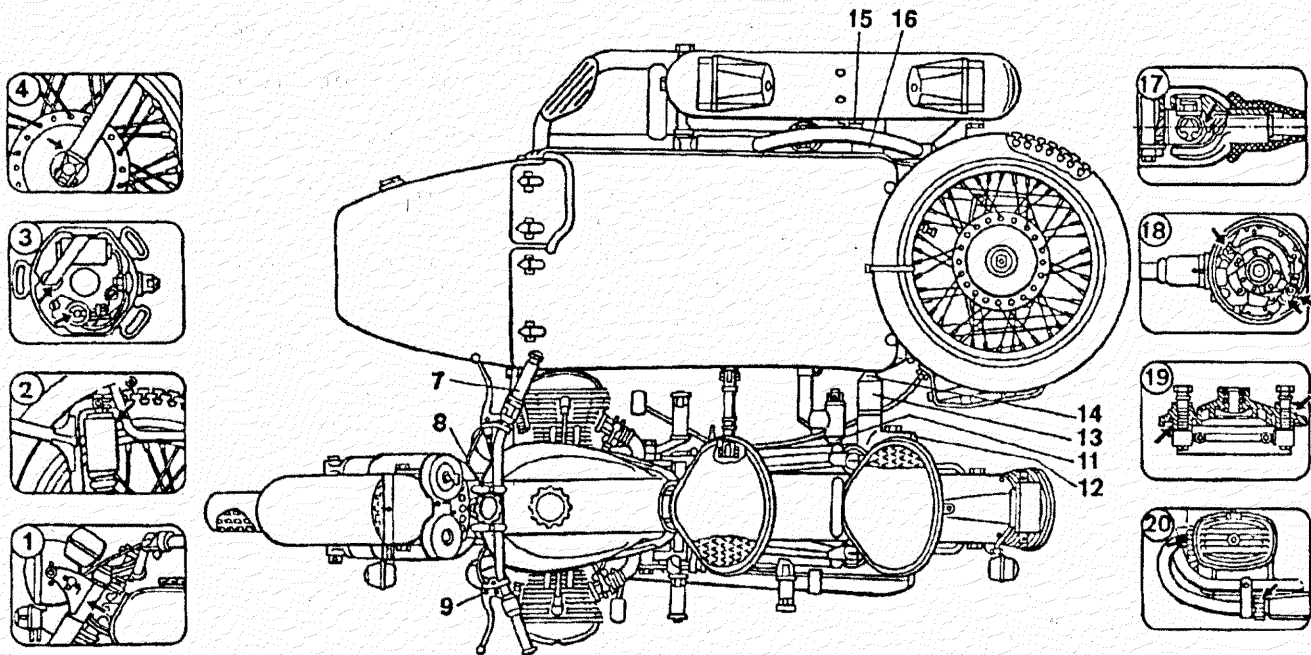


Fig. 37. Lubrication diagram

List of Maintenance Operations and Maintenance Intervals

Operations	Reference in lubrication diagram (Fig. 37)	Number of lubrication points	Kind of maintenance				Tools, instrument used for performing operations
			500 (running-in period)	2500 (running-in period)	M-1	M-2	
Engine							
Tighten nuts of cylinder head securing studs				x		x	Head 12, wrench with squares
Check and, if necessary, adjust valve stem-to-rocker end expansion clearance			x	x	x		Wrench 12x13, head 13, wrench with squares, feeler gauge
Wash settler and fuel filter of fuel cock, remove and wash carburetors, blow compressed air through jets and ducts				x		x	Wrench 12x13
Check and, if required, adjust carburetors for minimum steady idling speed of crankshaft and for synchronous operation of cylinders			x	x	x	x	Wrench 8x10, screwdriver
Remove carbon deposit from the surfaces of cylinder head combustion chambers, pistons, piston rings and valves.						x	Wrenches 12x13, 14x17, heads 12, 13, wrench with squares
Check valves for air-tightness and, if required, grind them						x	
Remove centrifuge, dismantle and clean it of dirt						x	Wrenches 8x10, 14x17, head 13, wrench with squares
Check oil level in engine crankcase and top up, if necessary.	5	1	During daily maintenance				
Change oil			x	x		x	

Tighten carburettors fastening nuts and screws				x		x	Wrench 12x13, screwdriver
Blow through air filter element with dry compressed air					x	x	Wrench 12x13
Replace air filter element						x	Wrench 12x13
Power Transmission and Running Gear							
Check the engine, gearbox, main drive, differential gear, reduction gear, front fork, handlebar, shock absorbers, petrol tank, silencers, generator, etc. for reliable fastening; also make sure sidecar is properly attached to motorcycle and sidecar body to frame. Tighten up fastenings, if necessary			x		x	x	Wrenches 12x13, 14x17, 19x22, 36x41, box spanner 19x21 and round wrench
Check oil level in gearbox crankcase, top up, if necessary	6	1	During daily maintenance				
Change oil			x	x		x	
Lubricate bearings of cardan shaft joint	13, 16, 17	1				x	Grease gun
Lubricate splines of reduction gear cardan shaft	14	1			x	x	
Check oil level in reduction gear case and pour fresh oil, if necessary							
Change oil	15	1	x		x	x	
Check oil level in main drive casing, top up, if required	12	1	During daily maintenance				Wrench 14x17
Change oil			x	x		x	
Check and, if necessary, adjust clutch release mechanism and brake linkages				x	x	x	Pliers, wrenches 8x10, 12x13, 14x17
Remove wheel, disassemble brake, wash cams and holes, apply fresh lubricant to:	18, 19					x	Wrenches 8x10, 14x17, 19x22, tommy bar, hammer
axles of cams		4				x	
conc thread		2				x	
bearing surfaces of shoes and fitted to them		12				x	
cams and tappets							
Remove oozed out lubricant						x	

Operations	Reference in lubrication diagram (Fig. 37)	Number of lubrication points	Kind of maintenance				Tools, instrument used for performing operations
			500 (running-in period)	2500 (running-in period)	M-1	M-2	
Lubricate rear wheel brake linkage hinges	10	2			x	x	Grease gun
Lubricate the thread of exhaust pipes fastening nuts	20	4	When removing and re-installing pipes				Round wrench
Apply two-three drops of oil into the front wheel brake and clutch operating lever pins and control cables	9	4			x	x	Grease gun
Pour 2—3 cm ³ of oil into sheaths of clutch and brake control cables		4			x	x	
Lubricate slide block and chain, throttle control handle and cables	7	1			x	x	Screwdriver, grease gun
Check the wheel spokes tensioning, and tighten, if required				x	x	x	Wrench 27
Check and if required, adjust the wheel bearings tightening				x	x	x	Wrench 27, round wrench
Remove wheel, take out bearings of wheel hubs, remove used grease from hub, wash bearings in kerosene and lubricate	4	3				x	Wrench 27, round wrench, hammer
Disassemble the steering column, wash radial bearings, fill with fresh lubricant, assemble	1	2			x	x	Wrenches 14x17, 36x41
Check and, if necessary, adjust the tensioning of the steering column bearings				x	x	x	Wrench 36x41
Change oil in the front fork shock absorbers	8	2				x	Wrenches 12x13, 14x17, 36x41

Change oil in the shock absorbers of the rear wheel and sidecar wheel suspension*	2	3				x	Wrench 14x17
Lubricate the thread of the sidecar-to-motorcycle collet hinges attaching bolts	11	2	During adjustment				
Check and, if necessary, tighten up body travel limiter bar and fastening of sidecar rubber springs				x	x	x	Wrench 14x17
Check and adjust toe-in and camber angle of motorcycle and sidecar wheels*			x	x	x	x	Wrenches 14x17, 19x22
Interchange wheels					x	x	Wrenches 12x13, 19x22, 27
Electrical Equipment							
Check all electric devices for proper operation and insulation in electric circuits for good condition. Eliminate detected faults				x	x	x	
Check the ignition advance angle and adjust, if necessary			x	x	x	x	Screwdriver
Check and, if necessary, adjust breaker point gap			x	x	x	x	Screwdriver, feeler gauge
Remove breaker from the camshaft and front fork of crankcase, clean off dirt from parts, lubricate friction surfaces and apply one-two drops of oil on:		3					
lever pin;		1				x	
weight pin;		2				x	
felt wick;		1				x	
cam bush		1				x	

* When difficulties appear in performing the operation, address to the service station or to a specialized shop.

Operations	Reference in lubrication diagram (Fig. 37)	Number of lubrication points	Kind of maintenance				Tools, instrument used for performing operations
			500 (running-in period)	2500 (running-in period)	M-1	M-2	
Check contacts for good condition, dress them, if required, adjust gap and ignition advance angle					x	x	Screwdriver, feeler gauge
Clean spark plugs to remove carbon deposit, check, and, if necessary, adjust electrode gap						x	Wrench, feeler gauge
Remove generator, disassemble it partially, clean off brush and copper dust from generator inner space						x	Wrench 8x10, wrench with squares, heads 12 and 13

Notes: 1. The sign "x" indicates that required maintenance operations have to be carried out after the specified distances run by the motorcycle. A deviation of not more than 200 km is allowable. 2. In the process of usage, for various reasons, the need may arise to perform any of the operations specified in Table 2 irrespective of the distance run by the motorcycle. Carrying out such operation should not be postponed until the next maintenance procedure. 3. The storage batteries should be serviced according to the relevant operating instructions. 4. When using oil TAPI-15B or TCn-15K the periodicity of oil change intervals makes 10 000 km.

Table 3

Oils and Lubricants to be Used

Ref. No. in Fig. 37	Unit or mechanism	Oils and lubricants
5	Crankcase	Oil M-8B for compression ratio 7.0; M-63/10Г for compression ratio 8.5
6	Gearcase	Oil M-8B, ТАП-15В or ТСн-15К
12	Main drive casing with differential gear	Oil ТАП-15В or ТСн-15К
15	Reduction gear case	Oil ТАП-15В or ТСн-15К
1	Steering column bearings	Lithol-24 lubricant
4	Wheel hub bearings	Same
17	Cardan shaft joint bearing	"
18, 19	Brake shoe cams, adjusting cone, tappets and shoes (bearing surfaces)	"
10	Rear wheel brake linkage hinges	"
11	Sidcar attaching collet hinges	"
7	Throttle control handle and cables	"
3	Breaker: lever pin, weight pin, bushing, felt wick	Oil T ₂₂
9	Brake and clutch operating lever pins. Brake and clutch control cables	Oil M-8B or M-63/10Г
8	Front fork shock absorbers	Same
2	Shock absorbers of sidcar wheel and rear wheel suspension	Oil МГТ-10 or АЖ-12Т or АУП
13, 16	Cardan shaft hinge bearings	Grease Lithol-24
14	Splines of reduction gear cardan shaft	Same
20	Exhaust pipe fastening nuts	Graphite lubricant БВН-1

Check inspection

Check inspection should be carried out before departure in order to check the motorcycle whose technical condition must comply with the rules of road and the requirements of this Manual.

During check inspection, verify the following: the presence of petrol in the tank and the level of oil in the units; proper operation of the brakes and control mechanisms: air pressure in the wheel tyres; operation of the headlamp, stop light, horn, turn indicators of the motorcycle. Eliminate all detected faults.

DAILY MAINTENANCE

Daily maintenance includes the following: cleaning the motorcycle of dust and dirt and, if necessary, washing it; checking the fastening for good condition. In the latter case particular care must be taken to check the fastenings

of the handlebar, front fork to the steering column, sidecar to the motorcycle; tightening of the wheel axles; inspection of the wheels and tyres for good condition; checking the brakes, light and audible signalling devices, headlamp, instrumentation and motorcycle controls for serviceability; priming the motorcycle with petrol and oil.

Brake operation is to be checked on the move. Detected faults must be eliminated. The engine, gearbox and main drive are best cleaned with a kerosene-moistened hair brush. Synthetic detergents may be used.

An engine that has just cooled off may be washed with the aid of a hose. When washing the motorcycle, avoid using water under high pressure, do not aim a jet of water directly at the generator, voltage regulator, storage batteries, breather plugs of the gearbox, main drive and reduction gear. Moisture that has penetrated inside some of the units may cause corrosion and give rise to defects that will be hard to eliminate.

SEASONAL MAINTENANCE

In autumn, wash the tank with clean petrol after first removing any sediment and thoroughly check the ignition system in order to avoid difficulties when starting a cold engine in winter.

In autumn and spring, change the density of electrolyte in the storage batteries if this is required by climatic conditions under which the motorcycle is to be operated.

MAINTENANCE DURING PROLONGED STORAGE

When preparing the motorcycle for prolonged storage, do the following:

- thoroughly clean the motorcycle of dust and dirt and wash it:

- after washing, wipe it dry, remove traces of corrosion and paint up places where the paint coating is damaged;

- fully prime with petrol and turn off the cock;

- start the engine and allow the petrol in the carburettor float chambers to be fully burned out;

- screw out the spark plugs and pour 25...30 cm³ of motor oil, heated up to 70...80 °C, into the cylinders;

- on depressing the starting mechanism lever pedal, turn over the crankshaft by 10...15 revolutions and screw the spark plugs into the cylinders;

- coat all the chromized surfaces with corrosion-preventive compound;

- remove the silencers, close the inlet and outlet holes with rags or a plug, pour 1.5...2.0 l of motor oil (use may be made of waste oil) through the adapter branch pipe;

- close the hole in the branch pipe and turn over the silencer several times about its axis. Following that, discharge oil from the silencer, re-install the latter and close the outlet holes tightly with oiled rags or a plug.

Coat the chromized parts with warmed up petrolatum or microwax ЗБВД or ПЭВ-74 or preservative compound: rosin – 20 %, lacquer No. 17–30 %, white spirit – 50 %.

Install the motorcycle on supports (blocks) and reduce the tyre pressure down to 0.05...0.1 MPa (0.5...1.0 kgf/cm²).

Lubricate the set of tools with corrosion-preventive compound and wrap them in oiled paper.

Servicing the motorcycle during storage consists in the following:

once every two months inspect the motorcycle, if any traces of corrosion are detected, scrape bright corrosion-affected places and paint them;

screw out the spark plugs, put in the first gear, turn over the crankshaft by 10...15 revolutions with the aid of a cranking gear and screw in the spark plugs again;

depress the pedal and levers of the brake and clutch three to five times, turn over the throttle control handle.

STORAGE RULES

The motorcycle can be best stored in dry, well ventilated room with relative humidity of 50–70 %.

The motorcycle can be stored in unheated room or under a shed that decreases the intensity of solar radiation and excludes the effect of atmospheric precipitation.

Never store the motorcycle in the room with acids, alkalies, fertilizers and other aggressive substances.

The storage battery should be stored separately as recommended by the Operating Instructions for the storage battery.

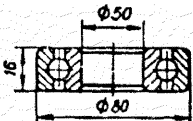
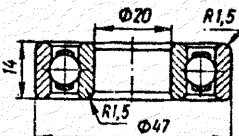
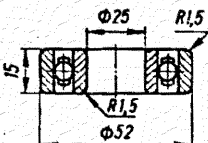
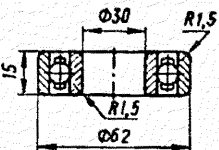
When preparing the motorcycle for long-term storage it is necessary to thoroughly clean it of dust and dirt, wash it, wipe dry, remove the traces of corrosion, to paint damaged places, if necessary, to prime with petrol, to close the cock and install the motorcycle in the place of storage.

After storage it is necessary to remove the motorcycle from supports (blocks) and depreserve it, for this purpose remove preservative compound from the chromized surfaces using soft waste moistened with white spirit or clear petrol, with subsequent wiping the surfaces with dry clean waste.

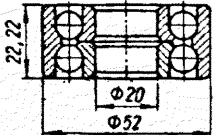
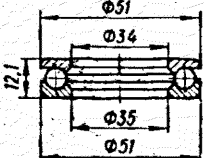
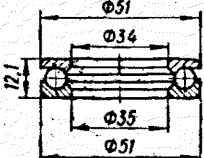
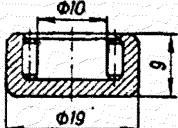
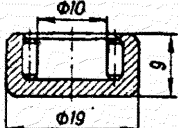
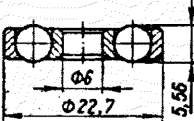
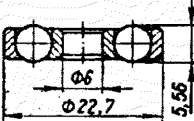
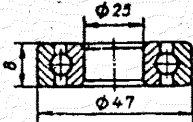
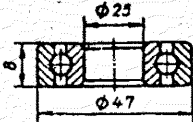
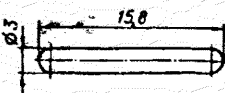
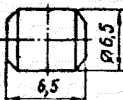
APPENDICES

APPENDIX I

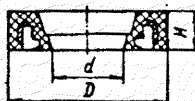
BEARINGS

Sketch	Bearing No. and type	Place of installation	Q'ty per motor- cycle, pc
	110 Radial ball bearing	Differential cup Right-hand cover of reduction gear	1 1
	204 Single-row radial ball bearing	Camshaft rear bearing Differential cover Left-hand cover of reduction gear	1 1 1
	205 Single-row radial ball bearing	Camshaft front bearing Gearbox primary shaft	1 1
	206 Radial ball bearing	Left-hand cover of reduction gear	1

Sketch	Bearing No. and type	Place of installation	Q'ty per motor- cycle, pc
	209 Single-row radial ball bearing	Crankshaft front bearing	1
	42209 Radial roller bearing with short cylindrical rollers	Crankshaft rear bearing	1
	303 Single-row radial ball bearing	Gearbox primary shaft	1
	304 Single-row radial ball bearing	Gearbox secondary shaft	2
	6-7204 Single-row tapered roller bearing	Wheel hub	8
	874901 Needle bearing	Main drive driving gear	1

Sketch	Bearing No. and type	Place of installation	Q'ty per motor-cycle, pc
	3086304Jl	Main drive driving gear	1
	778707	Differential cover Left-hand cover of reduction gear	1 1
	Radial thrust ball bearing	Steering column of motorcycle frame	2
	904700	Universal-joint centre cross	12
	Needle bearing		
	948066	Gearbox clutch release mechanism	1
	Thrust ball bearing without races		
	7000105	Differential left-hand hub	1
	Radial ball bearing		
	Needle roller 3x15.8	Main drive casing	90
	Roller DV 6.5x6.5 BP	Main drive casing	29
	Ball V 10 H	Oil pump body	1

RUBBER GLANDS



Part No.	Part or assembly to be packed	Q'ty per motor-cycle, pc	Dimensions, mm		
			<i>D</i>	<i>d</i>	<i>H</i>
7201124-B	Camshaft	1	30	15	7
MT801190	Crankshaft	1	85	59.7	12
75004122	Starting mechanism shaft	1	34	19.5	8.5
7204151	Primary shaft	1	45	31.5	7
KM3-8.15204156	Secondary shaft	1	48	36	8
7205113-B	Main drive casing	2	93	44	12.5
7205033	Universal-joint fork	6	49.3	33.8	8
75006350-A	Wheel hub, differential	6	38	24.8	8
MT804130	Gearbox crank shaft	1	30	15.8	7
75008121	Front fork	2	45	34.5	16.6
75008159	Steering column	2	59.6	51	5
63-26155	Shock absorber rod	3	24	11.1	8
MT803605	Clutch-release rod	1	10.3	4.4	8

APPENDIX 3

TIGHTENING TORQUE VALUES

Part name	Tightening torque value, kgf · m
Engine	
Flywheel fastening bolt	25-28
Centrifuge fastening bolt	2.2-3.2
Cylinder heads fastening nut	1.2-1.6
(diametrically opposite sequence in two steps)	2.8-3.6
Engine fastening stud	0.6-0.8
Stud fastening gearbox to engine	0.6-0.8
Generator fastening studs	1.1-1.6
Engine heads fastening studs	1.1-1.6

Part name	Tightening torque value, kgf · m
Generator fastening nuts	2.2–2.8
Nuts of connecting rod bolts	3.2–3.6
Nuts fastening rocker axles in cylinder heads	2.2–2.4
Gearbox	
Elastic coupling disk fastening nut	8–10
Shift pedal fastening nut	1.4–1.8
Fastening nut of reverse handle	1.4–1.8
Main Drive	
Crankcase cover fastening nut	1.4–1.8
Running Gear	
Engine fastening nuts	4.4–6.2
Rear wheel axle fastening nut	8
Nut fastening handlebar to cross member	2.8–3.6
Front wheel axle fastening nut	14–20
Front wheel axle clamp	1.4–1.8
Rear wheel axle clamp	1.4–1.8
Tie-rod-to-frame fastening nut	4.4–6.2
Clamp of trailer tie rod bracket	4.4–6.2
Front fork bearing nut	8–9
Nut of shock absorber reservoir	5–9
Nut of shock absorber rod rebound valve	1–1.5
Differential Drive	
Nut of universal-joint center cross tapered bolt	1.6–1.8
Nuts fastening main drive casing to differential gear cover and case	1.6–1.8
Nut fastening main drive gear to cardan joint fork	1.6–1.8
Bolt fastening main drive casing to motorcycle pendulum	0.8
Reduction Gear	
Nut fastening wheel axle in reduction gear	25.0–28.0
Tightening bolts for reduction gear covers	1.6–1.8
Nut of universal-joint center cross tapered bolt	1.6–1.8

DIRECTIONS ON INSTALLATION OF REMOVABLE EQUIPMENT

Mounting of Anti-theft Device Lock

Take out an anti-theft device lock with keys, a cover, a rivet and spring from a tool and spare parts bag.

To assemble the anti-theft device lock fit spring 3 (Fig. 1) on bar 1 of the anti-theft device lock and mount it into body 4 arranged on the steering column of the motorcycle frame having chosen the required position of the lock by rotating the key. Take the key out, attach cover 2 to body 4 with rivet 5.

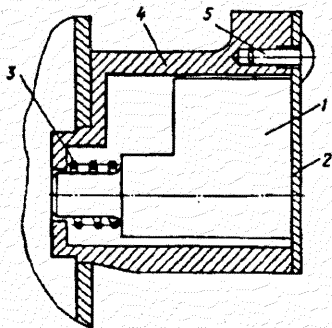
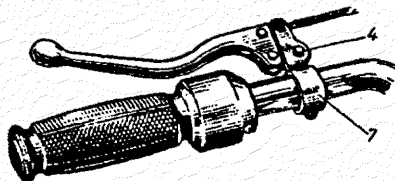
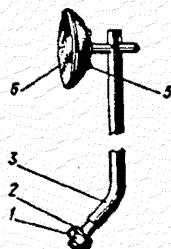


Fig. 1. Anti-theft device lock:
1 – anti-theft device lock bar; 2 – cover; 3 – spring; 4 – body; 5 – rivet

Fig. 2. Rear-view mirror:

1 – nut; 2 – washer; 3 – post; 4 – hole; 5 – screw; 6 – mirror; 7 – left-hand bracket



Installation of Rear-View Mirror

To install the rear-view mirror on the motorcycle proceed as follows:
inscrew nut 1 (Fig. 2) and remove washer 2 from post 3 of the mirror;
insert post 3 into hole 4 of left-hand bracket 7;
mount the washer and the nut and tighten the latter;
by turning post 3 and mirror 6 (having preliminary slackened screws 5),
set the mirror to such a position as to enable the driver to see the vehicles
following the motorcycle without moving his body;
draw up post nut 1 and screws 5 of the mirror ball joint tight.

Installation of Mudguards

To install the left-hand mudguard (or the right-hand one) on the motorcycle, proceed as follows:

take the left-hand mudguard (or the right-hand one) in assembly out of the boot;

unscrew one bolt 1 (Fig. 3) intended for fastening of clamp 2 and slacken the other one;

install mudguard 3 on front sidepipe 4 of the motorcycle frame, in doing so put the clamp on the sidepipe and mount the previously unscrewed fastening

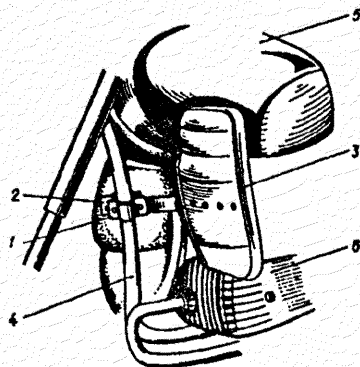


Fig. 3. Mudguards installation:

1 – bolt; 2 – clamp; 3 – left-hand mudguard;
4 – sidepipe of frame; 5 – gasoline tank; 6 – engine

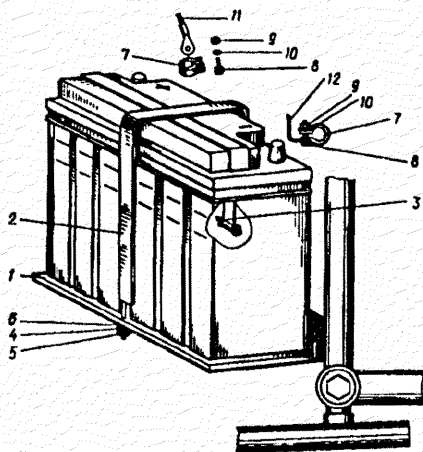


Fig. 4. Storage battery 6MTC9:

1 – liner; 2 – storage battery strap; 3 – bracket;
4, 5 – nut; 6 – washer; 7 – lug; 8 – bolt; 9 – nut;
10 – washer; 11, 12 – wire

bolt, then position the mudguard in such a manner so that it would not touch gasoline tank 5 and engine 6;

draw up nuts of the clamp fastening bolts tight.

Installation of Storage Battery

In case the motorcycle is supplied together with the 6MTC9 storage battery placed in the boot, install the storage battery on the motorcycle, to do so proceed as follows.

Put liner 1 (Fig. 4) on the storage battery platform, install the storage battery on it and fasten the battery with strap 2, in so doing hook one of the strap ends over the projections of bracket 3 and pass the other one through a

hole in the storage battery platform following which secure the strap ends by nuts 4 and 5 preliminary putting washer 6.

Connect lugs 7 to wires 11 and 12 with the help of bolts 8, nuts 9 and washers 10 (Ref. Nos 7, 8, 9, 10 are to be found in the boot together with the SPTA bag).

Connect the wire lugs to the storage battery terminals (wire 11 running from the main cable – to the "+" terminal and wire 12 running from the "frame" switch – to the "-" terminal). Tighten up bolts 8.

Installation of Licence Plate Bracket

Take the licence plate bracket from the sidecar boot.

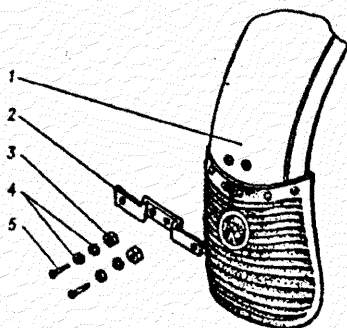
Fix bracket 2 (Fig. 5) in the bottom part of the motorcycle rear guard with nuts 3 and washers.

Washers and nuts are to be fitted from the inner side of the mudguard.

Mounting of Cat's Eyes

Take three cat's eyes (two orange and one red) from the tool and spare parts bag. Take nuts and washer (3 pcs each) from the tool kit.

Fig. 5. Licence plate bracket:
1 – rear guard; 2 – licence plate bracket;
3 – nut; 4 – washer; 5 – screw



Mount red cat's eye on the sidecar guard from behind and orange cat's eyes on the sidecar body at the front from the right-hand side or on the headlamp left-hand bracket.

Spherical-head screw on the cat's eye should enter the mounting hole. Fit a washer, a nut and tighten it.

Fitting of Plug Cap

Take plug caps from tool and spare parts bag.

Screw the cap into the copper core of the high-voltage wire and fully fit it on the electrode of the plug. Fit another cap in a similar way.

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