MOTORCYCLES "DNEPR"

MT9 and MT10

REPAIR MANUAL

V/O AVTOEXPORT · USSR · MOSCOW

CONTENTS

I. PREPARING THE MOTORCYCLE FOR REPAIRS

Regardless of the type of repairs to be carried out, one must do the following:

wash the motorcycle;

check it for technical condition;

draw up an inspection report.

Prior to washing the motorcycle, take out the tools; remove the seat cushion and back, take off the cover as these should be washed separately.

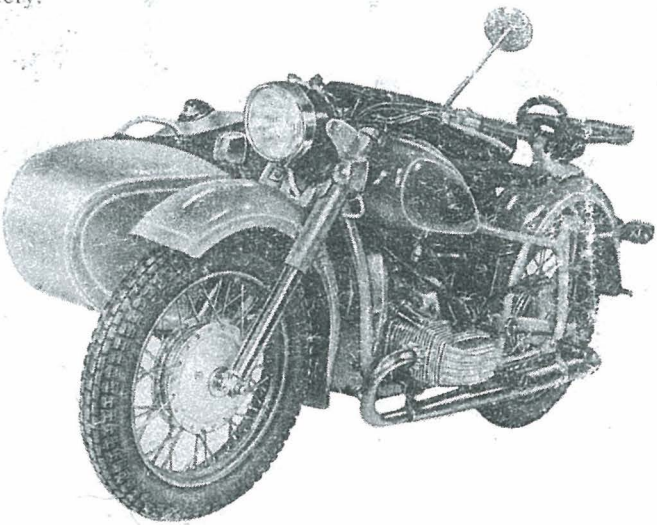

Fig. 1. Motorcycle "Dnepr" MT9

When washing, take care to keep water out of the electrical devices, carburettors, air filter, air passages and petrol tank.

The technical condition of the motorcycle should be checked by inspection as well as by testing the appropriate units or assemblies during riding.

Before doing this, it is necessary to adjust:
spark plug gaps;
contact breaker gaps;
clearances in the valve gear drive;
carburettors for idling, average speed and for the synchronous operation of the cylinders;
brakes controls;
clutch release drive;
tyre pressure.

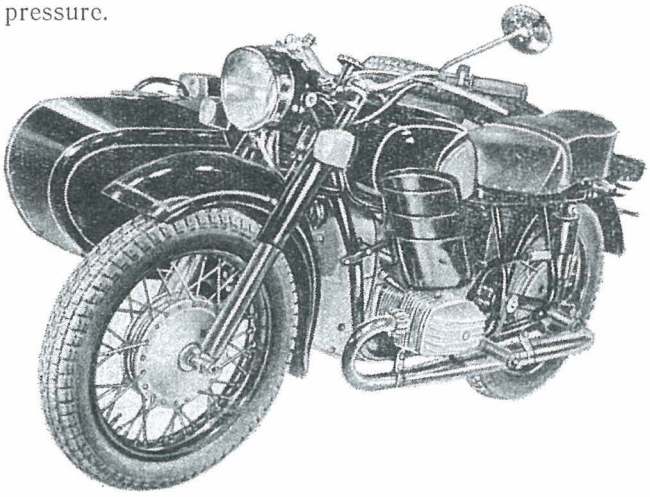

Fig. 2. Motorcycle "Dnepr" MT10

At the same time, check the amount of oil in the crankcase and in the gear box and main drive casings.

Adjust the clearances in accordance with the Operating Instructions.

II. CHECKING THE MOTORCYCLE FOR TECHNICAL CONDITION

The technical condition of the motorcycle, of its units and assemblies deteriorates in the process of continuous service. As the components become worn, the engine power diminishes, fuel and oil consumption increases, operation of some of the units becomes noisy and failures occur more frequently due to fatigue and corrosion. The wear of components leads to increased clearances in the joints, and causes the dynamic, economical and operating characteristics of the motorcycle to deteriorate.

Therefore, periodic checks of the motorcycle for technical condition and elimination of detected faults in due time are most important to prolong its service life. In order to determine whether the

motorcycle and its units are in good condition, it is necessary to:

1. Check that the motorcycle is complete with all necessary units, parts and accessories.

2. Check the general condition of the motorcycle, including:

free rolling path;

maximum speed;

braking distance;

trial petrol consumption.

3. Check the engine condition:

oil consumption;

compression in the cylinders;

make sure that:

no extraneous noises are produced during operation;

no local heating is observed;

there are no oil leakages;

check the engine operation under load at various rotational speeds.

4. Check the clutch mechanism condition, including:

disengagement of disks during declutching;

smoothness of engagement;

absence of slipping;

absence of extraneous noise with the clutch released.

5. Check the gear box condition:

return of the starting mechanism pedal;

easy and faultless gearshifting;

make sure that:

the gears do not disengage by themselves;

there are no oil leakages;

no local overheating is observed;

no extraneous noises are heard.

6. Check the propeller shaft and the main drive for:

the absence of increased clearances in the joints of elastic coupling, in the universal joint, gearing and at the wheel hub junction;

absence of oil leakage;

absence of local overheating and increased run-out of the propeller shaft;

check the elastic coupling for good condition.

7. Check the wheels for:

wear of the tyres and possible damage;

wear of the shoes and of internal surfaces of the brake drums;

wear of the bearings;

radial and axial run-out of the rim and tyre;

make sure that the spokes are all available and uniformly tensioned;

check the condition of the toothed coupling with the wheel hub.

8. Check the front fork for:

clearances in the steering column, lower end pieces of the fork, as well as at the bridge and traverse joints;

smoothness of operation during riding, the condition of the casings and fender;

tightening of fastenings;

absence of heavy shocks during operation;

condition of the springs;

absence of damping fluid leakage.

9. Check the motorcycle frame for:

tightening of fastenings;

absence of cracks at weld seams;

absence of external signs of damage;

proper condition of fenders.

10. Check the condition of the hydraulic shock absorbers, including:

smoothness of their operation during riding;

condition of the casings and silent-blocks;

absence of heavy shocks during operation;

absence of damping fluid leakage;

clearances in the joints.

11. Check the condition of the petrol tank by making sure that:

petrol does not leak through weld seams and joints;

the petrol cock and hoses are in good condition;

the petrol tank is free of dents and other injuries.

12. Check the exhaust system for:

tight connections;

absence of dents and other signs of damage on the tubes and silencers.

13. Check the condition of the controls, including:

condition of the handlebar and of the levers and other mechanisms disposed on it;

condition of cables and cable sheaths;

foot brake pedal and brake controls;

braking effect, when using the both brakes.

14. Check the condition of the sidecar, including:

condition of the shock absorber;

absence of clearances in the sidecar-to-motorcycle attachment hinges;

condition of the wheel fender, body, sidecar frame, seat cushion and back, cover.

15. Check the condition of the electric devices:

operation of the ignition lock;

operation of the light switch;

condition of the lighting devices;

operation of the ignition system;

operation of the horn;

condition of the pilot lamps;

condition of the wiring;

condition of the speedometer;

operation of the emergency oil pressure transmitter, stop light, neutral position indicator and turn indicator switch.

METHODS FOR CHECKING THE MOTORCYCLE'S PARAMETERS

The free rolling path of the motorcycle is measured by riding a fully loaded motorcycle on a straight-line section of the hard-surface road, in dry weather, at a wind speed not exceeding 3 m/s. The motorcycle is accelerated up to 50 km/hr, following which the clutch is withdrawn, the gearshift lever is set to the neutral position and the motorcycle is allowed to move until it comes to a full stop. Measurements are made by riding the motorcycle in both directions. The length of the rolling path is measured from the point of clutch withdrawal to the full stop of the motorcycle.

The free rolling path is determined as the arithmetic mean of two rides in both directions and, with the motorcycle in good repairs, must be not less than 250 m.

The maximum speed is determined by riding on a measured (1 km long) stretch of the road, the time being measured with a stopwatch. The maximum speed is determined as the arithmetic mean of the speeds developed during two rides in the opposite directions and must be not less than 100 km/hr for the MT9 motorcycle, and 105 km/hr for the MT10 model.

The acceleration must be sufficient to allow the motorcycle to develop the maximum steady speed before reaching the measured stretch of the road, the road conditions being the same as when measuring a free rolling path. If the maximum speed is below the specified figure, with the length of the free rolling path being normal, this means that the engine power is insufficient and the engine has to be repaired.

The trial petrol consumption must be determined by riding the serviceable motorcycle under full load in two opposite directions, on a measured (10 km long) stretch of the dry, hard-surface road having no steep upgrades and descents, with the motorcycle running in a high gear at 75 km/hr speed.

The petrol consumption must not exceed 7.2 l per 100 km (to be measured by adding petrol into the tank from a measuring vessel). Simultaneously with measuring petrol consumption, oil consumption is checked, which must not exceed 0.15 l per 100 km.

The engine condition to be diagnosed by extraneous noises produced during the engine operation, as well as the compression in the cylinders are checked empirically by a skilled mechanic of a service station or maintenance shop (Table 1).

Local heating and general overheating can be detected to the touch. The clutch mechanism is checked for condition in the following manner:

when the engine is inoperative, release the clutch and turn the kick lever, in this case the engine crankshaft must not turn;

when the engine is running, with the first speed gear engaged and the clutch released, the motorcycle must not move. When gradually engaging the clutch release lever, the motorcycle must start moving smoothly, without jerks. With the gear and clutch engaged,

a sudden opening of the throttles must cause the motorcycle to rapidly increase its speed without any noticeable clutch slip. The gear box, propeller shaft and main drive should be checked for good condition by testing the operation of these mechanisms with the motorcycle at rest and on the go.

The backlash in the main drive gearing must be within 0.1 and 0.3 mm, the permissible run-out of the propeller shaft not exceeding 1.5 mm.

The wheels are checked for condition by successively inspecting each of them (by raising, rotating the wheel and rocking it from side to side). The wheels must rotate freely, without play, snaps and seizures. The permissible (lateral and radial) run-out of the rim should be 1.5 mm. The spokes are checked for uniform tensioning by listening to the sound produced when tapping the spokes.

The front fork, hydraulic shock absorbers, steering controls and brakes are checked for condition by inspecting them with the motorcycle at rest or by testing their operation on the go. The fork must be free to rotate in the steering column, without plays and stopping in certain positions.

When inspecting and checking the motorcycle units, make sure that the antirust coating and painting of the component parts are in good condition. The causes of faults and troubleshooting procedures are given in Table 2.

On completing the inspection and checking, draw up a technical condition report, on the basis of which the motorcycle may be subjected to adjustment, partial or total dismantling and required repairs.

III. MOUNTING AND DISMANTLING OPERATIONS

If, as the result of checking for technical condition, it is found necessary to perform a partial or total dismantling of some of the units, assemblies or the entire motorcycle for the purpose of repairing or replacing the component parts, the dismantling should be carried out to the extent not greater than required.

Subjected to partial dismantling may be the assemblies that are removed or not removed from the motorcycle.

Prior to dismantling, clean and wash the entire assembly to remove oil, dirt and dust that may foul the friction parts of the jointed members during dismantling. After disassembling, clean off dirt, carbon deposits and remnants of bakelite lacquer from the component parts, wash and examine them for good condition, make appropriate measurements to determine the degree of wear. The maintenance shop or service station must have at its disposal a complete set of tools necessary for dismantling or assembling the motorcycle units. In case the units or assemblies have to be dismantled without removing them from the motorcycle or when their removal is required, it is advisable to detach the sidecar to ensure a better access and thus facilitate the repair operations.

Table 1

Checking the Motorcycle Engine for Technical Condition by Noises and Knocks

Points (junction of components) of possible knocks	Engine thermal conditions	Engine operating conditions	Points (locations) to be listened to	Nature of knocks	Conclusions regarding further usage
Piston pin — connecting-rod small end	Warmed up	Under load, followed by a sudden increase in rotational speed	Cylinder location	Clear shrill metallic knock	Must not be operated. Clean the combustion chamber to remove carbon deposits; if necessary, replace the piston pin ensuring that its colouring corresponds to that of connecting rod small end
Piston pin — piston boss	Same	Same	Same	Knocks not so clear but become more distinct as the engine warms to a higher temperature	Same
Piston — cylinder	Cold	Idling	Cylinder location	Dry metallic knock which becomes more apparent as the rotational speed changes; the knock becomes less audible as the engine warms up	May be operated in case the knock disappears as the engine warms up. When repairing, replace the piston
				Similar knock due to the pin being seized in the connecting-rod small end	Must not be operated. Replace the piston and pin

Continued

Points (junction of components) of possible knocks	Engine thermal conditions	Engine operating conditions	Points (locations) to be listened to	Nature of knocks	Conclusions regarding further usage
Connecting-rod big end — crankpin (of the crankshaft)	Any	During idling and especially when the motorcycle runs after coasting, at slightly closed throttles (throttled down slightly)	Central portion of the engine crankcase	Medium pitch thud	Must not be operated. Engine needs to be repaired
Crankshaft bearings — crankshaft	Warmed-up	Under load and when the throttles are suddenly opened	Crankcase, at points where bearings are located	Low pitch thud	Same
Valve timing pinion	Same	Idling	Location of pinions	Frequent metallic rumbling knock (of varying tone)	May be operated. When repairing the engine, replace the pinions
Valves — valve seats	Warmed up	During idling and coasting	Cylinder heads	Frequent clear sound which increases with increasing rotational speed regardless of the load on engine	May be operated. Adjust the clearance. When repairing the engine, lap the valves
Clutch disks	Any	Clutch released	Zone of clutch location	Clear metallic knock	May be operated. When repairing the engine, examine the clutch
Flywheel — crankshaft	Same	Idling, clutch not released	Rear portion of the engine	Strong metallic thud, which disappears when the clutch is released	Must not be operated. Remove the clutch and flywheel, check the key joint, fit the flywheel in place and secure reliably

Continued

Points (junction of components) of possible knocks	Engine thermal conditions	Engine operating conditions	Points (locations) to be listened to	Nature of knocks	Conclusions regarding further usage
Generator gear — camshaft gear	Any	Variable duty	Front upper portion of the engine	Frequent rumbling metallic knock, "howl"	May be operated after adjusting the clearance in the gearing (by turning the generator body)
Breather — front cover	Warmed up	Idling	Front portion of the engine	Frequent metallic knocks	May be operated. At the first opportunity examine the breather after first removing the distributor cover

Table 2

Troubleshooting of the Motorcycle Units

Trouble	Cause	Symptoms and fault tracing	Remedy
		Engine	
Engine will not start	1. Petrol not supplied to carburettor	1. Press down on carburettor depressor with your finger; if petrol does not flow out of it, this means that fuel is not supplied to carburettor	1. Open the petrol cock
	2. Excess of petrol in cylinders (especially when engine is hot)	2. Sporadic flashes with backfire	2. Close the petrol cock, fully open the throttle, press down the kick lever 5 to 10 times, start the engine

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
	3. Filter and petrol cock dirty or clogged	3. Disconnect petrol supply pipes from carburettors and check to see whether petrol runs if cock is opened for reserve fuel consumption	3. Disconnect the ends of petrol supply pipes from carburettors and blow them through (one after another, by clutching the other pipe). If this fails to make petrol flow in a full jet, remove settler, cock filter and wash them with petrol
	4. No spark produced by plug:		
	a) no gap between plug electrodes, dirt and carbon deposits in plugs, insulator punctured;	a) screw out the plug, connect its body to "earth" and check whether spark is produced at plug electrodes;	a) replace plugs or, if their condition permits, set the required gap between electrodes, clean the plugs;
	b) no gap between breaker (contact) points, breaker points oiled or burnt;	b) remove wire tip and check whether spark appears at tip by connecting it to "earth", with a small air gap. If spark is produced, this means that plug is faulty. Absence of spark indicates that there is no gap between breaker points;	b) after removing crankcase outer cover, set breaker point gap within 0.4 and 0.6 mm. Clean and, if necessary, trim the contact points with needle file;
	c) ignition coil faulty;	c) if, during checking by method specified in step "b", spark does not appear, this indicates that ignition coil is probably at fault;	c) replace ignition coil
	d) low-tension wires broken	d) remove front cover, switch on ignition. Check portable lamp circuit, for which	

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
		lamp wire to "earth", and the other end — to low-tension terminals of ignition coil, and then — to terminal of breaker wire. Lamp will not light up: if connected to input terminal of ignition coil, in case headlamp-to-ignition coil wire is broken; if connected to output terminal of ignition coil, in case primary circuit of ignition coil itself is broken; if connected to terminal of breaker wire, in case ignition coil-to-breaker wire is broken; in this case breaker points must be in a disconnected state	
	5. No compression or insufficient compression in engine:		
	a) no clearances in valve gear;	a) when depressing starting pedal, engine crankshaft will turn without compression;	a) adjust clearances;
	b) valves loosely fitted due to the presence of carbon deposits or valve retainers being burnt through;	b) same	b) repair the engine, lap or repair the valves;
	c) piston rings are burnt or broken	c) smoke escaping from breather	c) repair the engine, clean the piston rings and grooves to remove carbon deposits, replace rings

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
	6. Clutch slipping	6. Engine crankshaft will not rotate when pressing down starting pedal	6. Adjust the drive; if clutch continues to slip, repair the clutch (dismantle and examine it)
Irregular, erratic operation of engine; only one cylinder functioning	1. Mixture too lean: a) petrol supply to carburettor is insufficient and irregular; b) carburettor jets dirty; c) water in petrol	1. Engine back-fires	1. Same as in step 3 of the first failure of engine; c) change petrol
	2. Plugs faulty	2. Same as in step 4 a of the first failure of engine	2. Same as in step 4 a of the first failure of engine
	3. Poor contact at storage battery terminals	3. Pilot lamp blinks	3. Ensure good contact at storage battery terminals. Clean the contacts, tighten screws fastening the wires
	4. Bad condition of breaker points	4. Spark occurs irregularly between wire tips and "earth"	4. Examine contact points, trim or file them off, adjust the gap
	5. Capacitor faulty or badly connected	5. Bangs heard from silencer, bad spark	5. Ensure good contact or replace capacitor
	6. Mixture enrichment due to float chamber being overfilled with petrol: a) float needle valve dirty and leaky (lets petrol out);	a) engine smokes badly, bangs heard from silencer, petrol leaking through carburettor	a) clean the needle valve;
	b) leaky float		b) repair the carburettor, replace or repair the float;
	c) carburettor jet came unscrewed		fit the jet properly

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
	7. Carburettor maladjusted	7. Operation of cylinders not synchronized	7. Adjust the carburettors
	8. Piston rings burnt or broken	8. Bad compression, engine smokes and splashes plugs with oil	8. Repair the engine, clean or repair the rings
	9. Valves loosely fitted to their seats due to great amount of carbon	9. Insufficient compression	9. Repair the engine, clean off carbon and lap the valves
Engine knocks	1. Early ignition (above permissible)	1. Knocks disappear at late ignition	1. Adjust ignition
	2. Engine overheats	2. Hot surface ignition begins to take place	2. Stop the engine and allow it to cool
	3. Piston pins, pistons, cylinders, connecting rod bushings, crankshaft bearings worn out	3. Faults to be traced by listening to the engine	3. Repair the engine
Engine operates well at high speed but back-fires at average speed and dies out at low speed	1. Idling jet clogged or maladjusted		1. Adjust idling and blow air through the jet
	2. Carburettors maladjusted (carburettors operation not synchronized)	2. Faults to be located by listening to engine	2. Adjust carburettors for synchronous operation
	3. Clearance between valve and rocker end is incorrectly set	3. Check the size of clearance with a feeler. Clearance must be equal to 0.07 mm with engine cold	3. Adjust the clearance in valves
Engine fails to develop full power (insufficient "traction", when throttle is fully opened, motorcycle fails to develop sufficient acceleration)	1. Late ignition is set or breaker gap too small	1. Power increases at early ignition	1. Set ignition correctly. Check breaker gap
	2. Air cleaner or air hole in petrol tank plug clogged		2. Remove and wash out the air cleaner with kerosene and fill it with motor oil, clean out the hole in plug

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
	3. Valves do not fit closely to their seats due to accumulation of carbon deposits	3. Low compression is observed	3. Repair the engine. Clean off carbon and lap the valves
	4. Gases burst forth from under cylinder head	4. Bangs are heard and low compression is observed	4. Tighten the nuts securing the heads to cylinder
	5. Piston rings burnt or broken	5. Low compression, engine smokes and splashes the plugs with oil	5. Repair the engine. Clean or replace the rings
	6. Cylinders and pistons excessively worn	6. To be checked at maintenance shop	6. Repair the engine. Replace or repair the cylinders and pistons at maintenance shop
Engine overheats	1. No oil or insufficient amount of it in the crankcase	1. Check oil level	1. Fill up with oil
	2. Enriched mixture:	2. Engine fails to develop sufficient speed:	2. Clean dirt from the float chamber:
	a) carburettor overfilled due to float needle valve being badly seated;	a) check whether petrol flows from float chamber (chamber overfilled)	a) repair the carburettor and lap the needle valve;
	b) air cleaner dirty;		b) remove the air cleaner and wash it;
	c) carburettor throttle needle wrongly set		c) adjust the carburettor
	3. Diluted mixture:		
	a) throttle needle incorrectly set;	a) engine, if under load, fails to develop the proper speed;	a) adjust the carburettor;
	b) air inleakage at carburettor-to-head junctions	b) bangs in the carburettor	b) tighten the nuts securing the carburettor to the head. If inleakage continues to take place, replace the gasket.
	4. Late ignition advance		Check the breaker gap. Set the ignition

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Trouble	Cause	Symptoms and fault tracing	Remedy
Excessive oil consumption	a) piston rings burnt or broken; b) cylinder face or piston worn; c) fitting place for breather in the cover of distribution box worn out; d) drain holes for discharging oil from cylinder heads clogged		a) repair the engine. Replace the piston rings; b) repair the engine. Bore the cylinders or replace with new ones (at the same time replace the piston and rings); c) repair the engine; d) clean out the drain holes
Emergency oil pressure transmitter lamp is on	1. Faulty transmitter 2. Engine out of order	1. Check with reference pressure gauge 2. Same	1. Replace the transmitter 2. Repair the engine
	Power Transmission		
Clutch slipping	1. Incomplete engagement due to maladjustment of control drive 2. Driven disk facings greasy 3. Driven disk facings worn or burnt	1. Check the clutch control lever for proper free travel 2. Check during dismantling and examine 3. Same	1. Adjust the control drive by turning the adjusting screw until a free travel of 5 to 8 mm is ensured at the end of clutch lever 2. Dismantle the clutch. Wash the facings with petrol 3. Repair the clutch. Replace the facings or disk assembly
Clutch will not disengage completely	1. Clutch drive maladjusted (free travel of lever too great)	1. Check the clutch lever on handlebar for free travel	1. Adjust the clutch drive by turning the adjusting screw so as to ensure complete disengagement of the clutch and to provide a 5 to 8 mm free travel at the end of clutch lever

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Trouble	Cause	Symptoms and fault tracing	Remedy
When depressing the kick starter lever of gear box, the lever goes down, but engine crankshaft fails to turn	a) ratchet gear teeth broken;	a) when depressing the kick starter lever, with speed gear engaged, motorcycle remains at rest;	a) repair the gear box. Replace the gears on intermediate shaft;
	b) quadrant teeth broken;	b) same;	b) replace the quadrant;
	c) clutch slipping	c) starting mechanism operates (motorcycle moves) but engine crankshaft fails to turn	c) check the clutch control drive for proper adjustment; if necessary, adjust
Kick lever fails to return to upper position	Starting mechanism spring broken or front bushing washer came out of mesh with the end face lugs of the bushing	Kick lever can be easily raised to upper position by hand	Repair the gear box. Replace the spring. Check whether quadrant is correctly pressed on (refer to Fig. 28), bring the washer in mesh with the lugs of bushing
Free travel of starting lever is too great	Wedge became loose and lever turns free with respect to starting shaft		Drive the wedge in and tighten the nut
One of the gears will not engage	One of the pins in gearshift disk is broken		Repair the gear box
Gears disengage by themselves during riding	Splines of gearshift sleeves or gear splines worn out		Repair the gear box. Replace the sleeves or gears
Gear box operates with noise	1. Little oil in the gear box casing	1. Check oil level	1. Add oil
	2. Gear teeth worn		2. Repair the gear box. Replace worn gears
	3. Bearings of the primary or secondary shaft worn		3. Repair the gear box. Replace worn bearings
Main drive gears noisy	1. Little oil in the main drive casing	1. Check the presence of oil	1. Add oil
	2. Gearing maladjusted (backlash must be within 0.1 and 0.3 mm).		2. Adjust the backlash

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
	3. Key bolt loosened	3. Too great axial play of the universal joint	3. Tighten up the nut of key bolt
Main drive casing overheats	1. No oil or oil of inadequate grade	1. Check the presence and quality of oil	1. Add oil or replace it
	2. Component parts worn or broken	2. Dismantle the main drive and check it for condition at maintenance shop	2. Repair the main drive. Replace worn component parts
		Running Gear	
Front fork knocking	1. Play of steering column in radial bearings	1. Brake the front wheel and, holding the motorcycle by the handlebar, push it backward and forward to determine whether there is a play in radial bearings	1. Eliminate the play by tightening the bearings
	2. Play of tapered end pieces of fork legs in traverse due to clamp nuts getting loose	2. Check for the play by pushing the motorcycle forward and backward with the front wheel braked	2. Eliminate the play by screwing in the nuts
	3. Fastening of the front fender or headlamp is disturbed	3. Examine and check the nuts for proper tightening by using a wrench	3. Eliminate the fault by tightening the nuts
	4. Bushings of the fork leg tubes are excessively worn, lower bushing disconnected or dropped	4. Place the motorcycle on a support and raise the front wheel. Too great a play, revealed when shifting the legs up and down, indicates that the front fork is faulty	4. Repair the front fork. Check the component parts for condition, replace the bushings

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
	5. End pieces came unscrewed from the spring		5. After unscrewing the clamp nut, check and, if necessary, screw up the end pieces
Recurrent heavy shocks in the front fork (bad shock absorption)	1. No oil in the front fork due to leakage	1. Take out the drain screw of fork leg end piece (located at the bottom), check the presence of oil (130 cm^3 of oil is required for each fork leg). Locate oil leakage by inspection	1. If oil is leaking through the drain screw, screw up the latter tightly after first cleaning the gasket washer. Having undone the clamp nut of fork leg tube, fill oil into the fork and make sure there is no leakage. If oil leaks from under the axle, partially dismantle the fork (remove the wheel, screw off the clamp nut on the traverse, unscrew the gland housing on fork leg end piece, remove end pieces together with shock absorber). In this case oil may leak from under the shock absorber bottom. Eliminate the leakage by tightening the bolt. Pour in kerosene to check the tightness. Assemble the fork and fill it with oil, make sure there is no leakage
	2. Front fork springs lost elasticity	2. Dismantle the fork, remove the springs and check	2. Repair the fork. Replace the springs

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
Fork hard to rotate	1. Wing nut of handlebar shock absorber is overtightened		1. Slacken the wing nut by turning it counterclockwise
	2. Friction washers of handlebar shock absorber are damaged (scored)	2. Dismantle handlebar shock absorber and examine it	2. Trim or replace friction washers
	3. Steering column bearings overtightened	3. Adjust the fork for proper rotation by changing the tightening of bearings	3. Loosen the tightening of bearings
Handlebar shock absorber at fault (fails to be tightened)	1. Friction washers of shock absorber are greasy or dirty	1. Dismantle shock absorber and examine washers	1. Clean the friction washers, make sure that the surfaces are not warped
Fluid of rear suspension shock absorber is leaking	a) reservoir nut loosened;	a) oil leaking from under the nut;	a) tighten up reservoir nut;
	b) sealing ring broken;	b) oil leaking from under the nut;	b) replace the ring with a new one;
	c) rod damaged or worn;	c) fluid flowing along the rod;	c) replace the rod;
	d) gland damaged or worn;	d) fluid flowing along the rod;	d) replace the gland;
	e) gland cocked (gland spring broken and warped, the nut deformed)	e) fluid flowing along the rod	e) check the component parts, replace faulty ones, if any
Excessive wobbling of rear suspension; knocks at full extension	a) damping fluid lacking;		a) check the amount of fluid; add, if necessary;
	b) low viscosity of damping fluid;		b) fill up with suitable fluid;
	c) piston upper valve seats loosely;		c) overhaul and wash the shock absorber, grind the valve and piston end face, if necessary;

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
	d) lower valve seats loosely;		d) overhaul and wash the shock absorber, grind the valve and piston end face, if necessary;
	e) piston, rod and tube worn		e) overhaul the shock absorber, replace worn parts with new ones
Knocks during shock absorber operation	a) rubber bushings or silent-blocks securing the end pieces are damaged;		a) replace the rubber bushings or silent-blocks with new ones;
	b) bolts securing the shock absorber become loose		b) tighten up the bolts
Upper casing of shock absorber misaligned	a) carrying spring bent;		a) replace the spring
	b) rod bent;		b) replace the rod;
	c) carrying spring broken		c) replace the spring
Squeaking during operation of shock absorber	a) carrying spring bent, rod bent		a) replace the spring, replace the rod
Hard operation of suspension (shaking)	a) spring sunk;		a) replace the spring;
	b) thick fluid filled in;		b) overhaul the shock absorber and fill it with suitable fluid;
	c) too great an effort required by shock absorber to perform expansion stroke (being sucked in) or compression stroke (dosing grooves of the piston or lower valve are clogged)		c) overhaul the shock absorber, wash the component parts

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
Wheel spokes broken	1. Spokes loose or ununiformly tensioned	1. Examine and check the spokes for proper tensioning, for which purpose place the motorcycle on a support, quickly turn the wheel and, by slightly pressing a wrench to the spokes, listen to the sound to determine whether the spokes are uniformly tensioned	1. Repair the wheel. Replace broken spokes and adjust all the spokes for proper tensioning
Wheel play at the axle and wheel run-out in the plane of frame	1. Axle not tightened	1. Check for play and proper tightening of the axle after first placing the motorcycle on a support	1. Eliminate the play at rear wheel, tighten the axle with nut, slacken the set screw of front wheel end piece and screw the axle into right-hand threaded end piece of the fork (left-hand thread), tighten again the set screw with nut.
	2. Gland nut came unscrewed and moved off	2. Check the gland for proper fastening	2. Screw home the gland nut, slacken it back $^1/_{10}$ turn and secure
	3. Roller bearings worn	3. Having made sure that failure is not due to causes specified in steps 1 and 2, check the wheel for wobbling without removing it from the motorcycle	3. Repair the wheel. Adjust the bearings for proper tightening. When replacing the bearings, stuff the hub with grease to $^1/_3$ of its capacity
	4. Spokes maladjusted due to continuous service	4. Place the motorcycle on a support, rotate the wheel. Check the run-out (the permissible run-out must not exceed 1.5 mm over the wheel rim)	4. Adjust all the spokes for proper tensioning

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
Axle hard to fit when replacing the rear wheel	1. Internal splines of the wheel hub are not matched with external splines of main drive hub	1. Axle will not pass through	1. Turn the wheel and, by inserting into hub splines, ensure that the splines are matched and the axle can easily pass through. Install the axle by rotating but not by driving it in
Axle difficult to install when replacing the front wheel	1. Front fork wrongly fitted (cocked) during installation	1. Threaded end of wheel axle fails to enter the thread of fork end piece	1. Place the motorcycle on a support and raise motorcycle front part so that the front wheel together with the fork is lifted up, then fit the wheel
Knocking in the sidecar-to-frame attachment hinges	1. Bolts of upper tie rod-struts are worn out	1. Test the fastening by rocking the motorcycle at rest	1. Replace the bolts
	2. Loose brackets at upper points of fastening the tie rod-struts to the frame	2. Check the bracket fastening with a wrench	2. Tighten up the nuts
	3. Collet attachment at lower points not tightened	3. Check the collet attachment by rocking the motorcycle at rest	3. Tighten up the collet attachment
	Control Mechanism		
Carburettor throttle control grip is hard to rotate	1. Adjusting screw overtightened		1. Slacken the adjusting screw and secure it
	2. Slide block seizing	2. Check the grip for proper rotation after lubrication. Pull the cable sheaths out of grip body and, by rotating the grip and simultaneously lowering the cable sheaths, determine the cause of seizing	2. Lubricate the slide block. If hard to rotate, remove the grip, check it and clean to remove dirt

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
	3. Sheath crumpled or cores of throttle control cable ruptured	3. Examine the sheath to check that it is intact. To check whether cable is intact, take the end pieces out of their nests and, by moving the sheath along the cable in one direction or the other, examine the cable ends, make sure that the cable does not seize in the sheath and cable cores are intact	3. Replace the damaged cable or damaged sheath. Before soldering a new cable in the end piece, pull the cable ends apart so as to form a fascicle. If cables are seizing, remove them, wash and lubricate
Carburettor throttle will not move when rotating the grip	1. Rubber grip slips		1. Replace the grip or wind a tight layer of insulating tape under rubber grip
	2. Cable broken at the points of soldering, cable cores ruptured or sheath crumpled	2. Examine the sheath or throttle control cable	2. Replace the damaged cable or damaged sheath
Throttle control grip turns spontaneously on withdrawing the hand	1. Adjusting screw came loose	1. Trouble is remedied by tightening the screw	1. Adjust the screw and secure it
	2. Spring braking the grip is broken	2. Trouble is not eliminated by tightening the screw	2. Repair the grip. Remove the grip and replace the spring
Front brake and clutch lever brackets turn freely on the handlebar	Bolts keeping the brackets from turning are insufficiently tightened	Try out the levers by tightening the bolts	Tighten the bolts
Rear wheel fails to be braked	1. Free travel of brake pedal maladjusted	1. Try out the rear brake by changing adjustment	1. Reduce the free travel of brake by adjusting the draw rods and cone, at the same time check the wheel for proper rotation. Maintain the small (15—25 mm) free travel of pedal to avoid brake overheating. On completing adjustment, check the braking action

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
	2. Brake shoe linings greasy or dirty	2. After performing adjustment according to step 1, the brake shoes slip	2. Remove the wheel, wash brake shoes with petrol and wipe them dry. If linings become greasy again, check the amount and quality of oil in reverse gear, also check the gland for good condition
	3. Brake shoe linings worn	3. Same	3. Repair the shoes. Replace the linings or brake shoe assembly
Front wheel fails to be braked	1. Same as for the rear brake	1. Same as for the rear brake	1. Reduce free travel of brake lever on the handlebar by using the adjusting screw and cone
	2. Cable broken where it was soldered to end piece, or cable and sheath damaged	2. Try out by pressing the brake lever on handlebar to the full extent, check whether lever moves on brake cover. If it does not, remove the cable	2. If cable is broken at the point of soldering, solder it after first separating the cable ends so as to form a fascicle. Replace broken cable or damaged sheath
Brakes heating	1. No free travel of rear brake pedal or of front brake lever, as a result, brake shoes are constantly pressed to drum	1. Place the motorcycle on a support and check the wheel for proper rotation without pressing down brake pedal and lever	1. Adjust the clearance between brake shoes and drum
	2. Expansion cam pin seized due to belated lubrication, and shoes remaining pressed to brake drum	2. Cam stuck in position corresponding to braking and refuses to return to normal position	2. Lubricate. If this does not help, remove the wheel, extract expansion cam, wash and, if necessary, trim it

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
	Electrical Equipment		
With ignition key inserted to full extent, pilot lamp will not light up. Horn does not operate when depressing the button	Broken connection at battery terminals, at terminal *Б* of regulator or terminal *Б* of master switch; ignition lock contacts dirty		Trim the wire lugs and tighten up. Trim the lock contacts
With ignition key inserted to full extent, pilot lamp will not light up. Horn operates when depressing the button	Lamp burnt out. Broken connection at terminal *Я* of generator or terminal *Я* of master switch		Replace the lamp. Tighten up the connections
With ignition key inserted to full extent, pilot lamp is on. When the key is turned to the right or left, lamp extinguishes	Headlamp fuse blown		Replace the fuse
When parking lamp is switched on, sidecar marker lamps are out	1. Bad contact in the coupler	1. Shorting the wires outside the coupler makes the lamps light up	1. Repair the connections
	2. Wires broken in the circuit from terminal *Ф* of master switch (black wire) to coupler	2. Lamps will not light up, when shorting the wires outside the coupler	2. Locate and eliminate wire break
When parking lamp is switched on, only front or rear lamp of sidecar is on	1. One of the bulbs is burnt out	3. Take out extinct bulb and check it by examining the filament or by connecting it directly to battery	3. Replace damaged bulb
	2. Wire broken beyond the coupler	2. Lamp checked and found to be in good order	2. Locate and eliminate wire break

Continued

Trouble	Cause	Symptoms and fault tracing	Remedy
With lower or high beam switched on, only lower or high beam lights up when switching over the lights	1. Broken connections of switch wires, faulty switch	1. Remove the rim together with reflector and diffuser and check the wires for proper connection and the switch for good condition	1. Tighten up the wires at terminals, replace switch
	2. Lamp burnt out		2. Replace the lamp
With ignition key inserted, horn functions without depressing the button	1. Button seized		1. Dismantle the button and adjust it ,
With engine operating within all speed range, pilot lamp glows steadily	1. Broken connection at terminal *Я* of generator	1. When pressing terminal *Я* of generator (with engine operating), the lamp must go out	1. Trim the wire tip and tighten up the the connections
	2. Broken connection at terminal *Ш* of current-and-voltage regulator	2. When terminal *Ш* of generator is connected to frame (with engine operating), the lamp must go out	2. Same
	3. Fault inside the current-and-voltage regulator	3. When shorting the wire detached from terminal *Ш* to frame, pilot lamp will extinguish	3. Replace voltage-and-current regulator or send it to maintenance shop for repairs
	4. Generator fails to develop the required voltage		4. Check generator for proper condition
With the motorcycle in motion, pilot lamp lights up and extinguishes	1. Bad contact at battery terminals or at the tips of wire extending from battery to motorcycle frame		1. Trim the wire tips and terminals: tighten up the connections

1. REMOVAL AND INSTALLATION OF THE ENGINE TOGETHER WITH GEAR BOX

To remove the engine together with the gear box from the motorcycle, proceed as follows:

drain petrol from the petrol tank;

place the motorcycle on a support;

remove the petrol tank (refer to Section 5);

unscrew the nuts of the studs securing the engine at the lower points;

remove the silencers and exhaust pipes (refer to Section 4);

remove the footsteps;

remove the air filter (refer to Section 4);

take down the storage battery (refer to Section 11);

disconnect the wires from the generator terminals;

disconnect the low-tension wire;

disconnect the wire from the engine oil pressure transmitter;

disconnect the wire of the gear box neutral position pick-up;

take down the carburettor covers, extract the carburettor throttles, disconnect the gas grip cables from the throttle bodies, re-install the covers and throttles of carburettors;

disconnect the adjusting bolts of clutch cable from the clutch release lever at the gear box and from the abutment stop of clutch cable sheath;

unscrew the bolt of speedometer drive bushing, take out the speedometer drive and draw it aside, insert the bolt back in place;

unscrew the nuts of the studs securing the engine at the upper points, remove the wire connected to "earth" from the stud;

unscrew the nut of the sidecar rod bracket by a few turns and slightly raise the engine fastening plate;

having engaged the first gear, turn the propeller shaft by means of the starting pedal, ensuring that the pins of the flexible universal joint disk, which enter the rubber coupling, are arranged in a horizontal plane;

extract the rear stud securing the engine;

extract the front stud securing the engine and, by tilting the engine to the right so that the generator is at the right-hand side of the frame crest, slightly raise the engine and move it out to the left.

The engine should be removed by two persons. On removing the engine with the gear box, place it on a mounting support for engine ПСБ-1252.

To install the engine together with the gear box into the motorcycle frame, follow the procedure reverse to that of dismantling.

2. REMOVAL AND INSTALLATION OF THE GEAR BOX

To remove the gear box from the motorcycle without removing the engine, proceed as follows:

place the motorcycle on a support;

remove the rear wheel (refer to Section 6);

unscrew the nuts securing the reverse gear casing to the lug of pendulous fork;

remove the reverse gear from the pendulous fork lug;

remove the flexible joint disk together with the rubber coupling from the pins of the disk of the gear box elastic coupling;

remove the suction pipes extending to the carburettors;

detach the gear box from the engine;

remove the air filter;

take down the storage battery (refer to Section 11);

disconnect the speedometer drive after first unscrewing the bolt of drive bushing;

disconnect the adjusting bolt of clutch cable from the release lever at the gear box;

unscrew the nuts of the studs securing the gear box and the engine and screw off the bolt located below, at the right-hand side;

shift the gear box backward and, moving it to the left, take it out of the frame.

Install the gear box on the engine in reverse order. Before installing the gear box, proceed as follows:

by using handle ПР-1119, make sure that the splines of the clutch driven disk hubs are properly aligned; if necessary, adjust the position of the hubs so that the handle end can easily enter the splined holes of the both hubs;

by turning the shaft, ensure that the splines of the gear box primary shaft are aligned with the splines of the clutch driven disk hubs.

In order to re-install the gear box, do the following:

advance the clutch release rod some distance forward;

insert the rod into the square hole of the clutch pressure disk;

moving the gear box on, insert the primary shaft into the splined holes of the clutch driven disks.

3. DISCONNECTION AND ATTACHMENT OF THE SIDECAR

To detach the sidecar, proceed as follows:

place the motorcycle on a support;

disconnect the wires extending to the sidecar lamps;

unscrew the nuts of the bolts securing the sidecar frame rods to the motorcycle and extract the bolts;

uncotter the bolts of the lower collet fastenings of the sidecar frame to the motorcycle and screw them off approximately 12 to 15 mm;

separate the front collet fastening, by moving it off the ball pin of the motorcycle frame and then, in turn, the rear collet fastening; move the sidecar aside.

In order to attach the sidecar, follow the steps given below:

place the motorcycle on a support and slightly lubricate the collet fastening ball pins with grease;

bring the sidecar up to the motorcycle ensuring that the collet fastenings are arranged under the ball pins of the motorcycle frame;

move the front collet chuck out of the nest as far as it will go;

raise the front part of the sidecar frame, fit the collet chuck on the front ball pin and screw it in without tightening up.

Follow the same procedure to attach the rear collet fastening.

If the rear collet fastening is not matched with the ball pin on the motorcycle frame, unscrew the bolts securing the steering knuckle and rotate the latter in one direction or the other until the collet chucks are made to coincide with the ball pin;

connect the rods fastening the sidecar frame to the motorcycle frame by means of bolts and secure the latters with nuts.

If the holes in the rod forks are not matched with the holes in the brackets on motorcycle frame, unlock the rod forks and, by screwing them in or out of the struts, obtain the required length of the forks.

After tightening all the fastenings, remove the motorcycle from the support and check the wheels for proper toe-in and camber. To check the wheels for proper toe-in, place bars along the motorcycle's rear wheel and sidecar wheel. The distance between the bars at the front of the motorcycle (at the front wheel) must be 10 to 15 mm shorter than the distance between the bars at the rear of the motorcycle (at the rear wheel). If this difference cannot be obtained, slacken the bolts securing the steering knuckle of the rear lower collet fastening and, by moving the knuckle in or out of the sidecar frame, ensure the required toe-in.

The motorcycle camber is adjusted by means of the rods fastening the sidecar frame to the motorcycle (by screwing the forks in or out of the rod-struts) and must be equal to approximately 2°.

On completing all the adjustments, check to see that the sidecar is reliably attached to the motorcycle at all fastening points.

The wheels should be checked for correct toe-in and camber during riding over a level section of the road. The motorcycle must not "stray" aside when riding under full load.

4. REMOVAL AND INSTALLATION OF THE INTAKE AND EXHAUST SYSTEMS

In order to remove the air filter, disconnect the rubber tube of the breather, undo two lock screws in the gear box throat and, by moving the air filter up and down, take it out of the throat, and then off the motorcycle frame, moving the filter in the left-hand

direction. When doing so, press down the starting pedal with your foot.

The air filter is to be re-installed in reverse order.

To remove the air ducts of the right- and left-hand cylinders, release the fastening collars, disconnect the air ducts from the carburettors and take them out of the air filter throat.

The air ducts are to be installed in reverse order.

To remove the exhaust system, do the following:

unscrew the nuts of the front stud securing the engine, thus releasing the clamping collars fastening the silencers with the exhaust pipe;

unscrew the special nuts of the heads and remove the exhaust pipes from the cylinder head channels, then unscrew and extract the bolts, securing the silencers to the brackets which are welded on to the frame at the rear point, remove the silencers.

The exhaust system is to be re-installed in reverse order, the collars fastening the exhaust pipes should be the last to be tightened.

5. REMOVAL AND INSTALLATION OF THE FUEL SUPPLY SYSTEM

To remove the petrol tank, proceed as follows:

drain petrol from the petrol tank through the petrol supply hoses leading to the carburettors after first removing the hoses from the carburettors unions;

remove the connecting hose of the petrol tank halves;

unscrew the bolts of the petrol tank front and lower fastenings and, by moving the petrol tank forward and raising up its rear portion, take down the tank after first removing the driver's saddle.

The petrol tank is to be re-installed in reverse order.

To remove the carburettor, do the following:

disconnect the air duct;

undo two screws of the throttle chamber cover, take out the throttles, detach the cables, re-install the throttles and the cover, put in two screws in their original places;

unscrew the nuts securing the carburettor to the cylinder head and remove the carburettor.

Re-install the carburettor in reverse order.

6. REMOVAL AND RE-FITTING OF THE WHEELS

To remove the front wheel of the motorcycle, proceed as follows:

place the motorcycle on a support and raise the front wheel by putting a backing under the front portion of the motorcycle frame;

slacken back by several turns the nut of the coupling bolt of the fork leg left-hand end piece and unscrew the wheel front axle having a left-hand thread;

holding up the wheel, take out the front axle and remove the hub deflector from the wheel;

remove the front wheel together with the brake cover;

detach the wheel from the brake cover.

Re-install the front wheel in reverse order. When fitting the axle back in place, lubricate it with engine oil.

To remove the rear wheel, do the following:

place the motorcycle on a support;

unfasten the ends of the rear fender hoop and the folding part of the rear fender;

slightly slacken the coupling bolt nut of the left-hand end piece of the rear axle fastening;

extract the cotter pin of the axle crown nut, unscrew the nut fastening the rear axle, take out the axle and remove the hub deflector;

move the wheel to the left to get it off the brake shoes, remove the wheel from the frame.

Fit the rear wheel back in its place in reverse order. Before re-installing the axle, lubricate it with engine oil.

When fitting the wheel on the brake shoes, turn it until the junction splines are made to coincide.

To remove the sidecar wheel, proceed as follows:

extract the cotter pin, unscrew the nut and remove the hub deflector;

place a support under the sidecar frame, raise the sidecar wheel and remove it (then remove the protective disk).

Fit the sidecar wheel back in place in reverse order after first lubricating it with engine oil.

7. REMOVAL AND INSTALLATION OF THE MAIN DRIVE

To remove the main drive together with the propeller shaft, proceed as follows:

place the motorcycle on a support and remove the rear wheel (refer to Section 6);

unscrew the nut of the rear brake rod at the brake lever;

unscrew the nuts of the studs securing the main drive to the lug of pendulous fork;

remove the main drive from the pendulous fork lug and take it down by moving it backwards. In doing so, remove the elastic coupling disk to ensure the passage of the propeller shaft through the hole in the rear wheel suspension lever. Re-install the main drive in reverse order.

The total clearance (on either side) between the disks and the elastic coupling must be within 3 and 6 mm. The adjustment is to be carried out by shifting the locking ring along the grooves of the propeller shaft with the pendulous fork in the middle position.

8. REMOVAL AND INSTALLATION OF THE HANDLEBAR TOGETHER WITH CONTROL CABLES

To remove the handlebar with all its control cables, do the following:

remove the petrol tank (refer to Section 5);

disconnect the control cables from the carburettor throttles (refer to Section 5);

disconnect the clutch cable (refer to Section 1),

disconnect the front brake cable from the brake drum cover, for which purpose screw in the adjusting screw and, by pressing home the brake lever on the cover, withdraw the cable end piece from the nest in the lever pin, unscrew the adjusting screw and take out the cable;

disconnect the wires of the turn indicators;

disconnect the wires of the horn and the light switch;

screw off the nuts securing the handlebar brackets to the fork traverse, remove the handlebar.

To install the handlebar, follow the procedure reverse to that described above.

9. REMOVAL AND INSTALLATION OF THE FRONT FORK

To remove the front fork, do the following:

place the motorcycle on a support and ensure that the front wheel is lifted up, by putting a backing under the front portion of motorcycle frame;

remove the front wheel (refer to Section 6) and the brake drum cover, after first disconnecting the front brake cable from the cover;

having unscrewed the nuts securing the handlebar brackets, remove the handlebar and place it on the tank;

uncotter and screw out the wing nut of the handlebar shock absorber, remove the shock absorber component parts and unscrew the nut of the steering column bar;

unscrew the clamp nuts of the fork legs, take off the washers and traverse;

unscrew the bolts fastening the front fender to the casings and to the steering column bridge, remove the fender;

remove the headlamp after first unscrewing the bolts securing it to the casing brackets, place the headlamp on the petrol tank;

unscrew the bearing nut and remove the protective washer of thrust ball bearing (when unscrewing the nut, hold up the front fork), remove the upper ring of thrust bearing;

take out the front fork, moving it downwards. While removing the steering column bar from the column itself, take care not to spill the balls of the upper and lower thrust bearings;

remove the balls of thrust bearings.

Re-install the front fork in reverse order.

When assembling the steering column, take care to ensure that all the 24 balls of thrust ball bearings remain in their places and are not dislodged during assembling.

The balls gathered in the bearing must be lubricated with grease. Tighten the bearing nut in such a way as to ensure that the fork turns freely in the bearings without seizing and any noticeable play (tighten the nut home and then slacken it back by 1/8 to 1/6 turn).

10. REMOVAL AND INSTALLATION OF THE REAR SUSPENSION

To remove the rear suspension of the motorcycle, proceed as follows.

place the motorcycle on a support and remove the rear wheel (refer to Section 6);

remove the main drive (refer to Section 7);

take down the spring-and-hydraulic shock absorbers, unscrew their lower and upper fastenings;

remove the rear fender, taking care not to break the wires leading to the rear lamp;

unscrew the bolts securing the lever of rear wheel suspension, take out the detachable journal, remove the suspension lever from the frame.

Re-install the rear suspension in reverse order. When installing the suspension lever, tighten the bolts securing the silent-blocks with the suspension lever in the middle of its travel (the suspension levers must be arranged parallel to the frame lower tubes).

11. REMOVAL AND INSTALLATION OF ELECTRICAL SYSTEM DEVICES

To remove the storage battery, proceed as follows:

shift the protective caps off the wires connected to the battery output terminals. To avoid short-circuiting, first disconnect the wire leading to "earth", then the wire extending to the current-and-voltage regulator;

unscrew the wing nut tightening the storage battery fastening band and take down the battery.

Remove the storage battery from the frame by tilting its upper portion forward, after first taking off the battery cover.

Re-install the battery in reverse order.

To remove the generator, do the following:

remove the air filter;

shift off the protective caps of the wires connected to the generator output terminals and disconnect the wires;

unscrew the nut securing the generator stop and remove the latter;

unscrew the coupling bolt of the generator fastening collar and take down the generator by moving it backward.

Re-install the generator in the order reverse to removal. In doing this, set the correct clearance in the drive gearing. For this purpose, after installing the generator in place, turn it fully clockwise (when looking at the generator from the side of output terminals), then turn it in the opposite direction through 3 to 4 mm, as counted against the outside diameter of the generator body. Secure the generator in this position. Check the clearance setting when starting the engine, judging by the presence or absence of increased noises produced during generator operation. Turning the generator in one direction or the other (with the engine inoperative), ensure that the gearing noise is as least as possible.

To remove the current-and-voltage regulator, do the following:

take down the storage battery;

shift off the protective caps and disconnect the wire ends from the current-and-voltage regulator;

unscrew the screws securing the current-and-voltage regulator to the bracket and remove the current-and-voltage regulator.

To re-install the current-and-voltage regulator, follow the reverse order.

In order to remove the headlamp together with wires and flexible shaft of the speedometer drive, proceed as follows:

remove the petrol tank (refer to Section 5);

disconnect the speedometer drive flexible shaft from the gear box (refer to Section 1);

disconnect the ends of wires from the terminals of the storage battery, current-and-voltage regulator, generator, horn and stop light switch;

disconnect the wires of the light switch and of turn indicators on the handlebar;

part the connector of wires extending to the lamps of the attachable sidecar and motorcycle;

disconnect the wire leading to the headlamp from the low-tension terminal of ignition coil;

disconnect the wire from the emergency oil pressure transmitter;

disconnect the headlamp-to-"earth" wire under the nut of the upper fastening point of the engine;

disconnect the wire of the gear box neutral position pick-up;

remove all the bands fastening the wires to the frame;

remove the headlamp, unscrew the bolts securing it to the brackets of front fork casings.

Re-install the headlamp with its wires in reverse order.

To remove the headlamp without wires, do the following:

remove the rim together with diffuser from the headlamp, unscrew the lower bolt securing the rim;

disconnect from the terminals and take out all the wires contained in the headlamp body. In order to avoid the possibility of

confusing the conductors during wiring, make appropriate marks to know which conductor to which terminal is to be connected;

disconnect the drive flexible shaft from the speedometer body after unscrewing the union nut;

remove the headlamp after first unscrewing the bolts securing the headlamp to the bracket of front fork casings.

Re-install the headlamp in the sequence reverse to removal.

To remove the rear lamps of the motorcycle or sidecar, as well as the sidecar marker lamp, proceed as follows:

remove the lamp external casing after undoing its fastening screw; disconnect the wire end;

remove the lamp base after first undoing the screws fastening it to the fender.

The lamps are to be re-installed in reverse order.

To remove the ignition coil, do the following:

take off the front cover of engine crankcase;

disconnect the high-tension wire and low-tension wires from the ignition coil terminals;

undo the fastening screws and remove the ignition coil;

re-install the coil in reverse order.

To remove the ПМ-05 distributor, proceed as follows:

take off the front cover of engine crankcase, disconnect the wires, turn aside the plate spring fastening the distributor cover;

remove the distributor rotor, disconnect the ignition advance cable, then, using a wrench, unscrew the special nut with a spring, undo two screws securing the distributor to the front cover, remove the distributor.

Re-install the distributor in reverse order.

To remove the ПМ-302 contact breaker with the ignition advance automatic device, do the following:

remove the front cover of the engine, disconnect the wires;

turn aside the spring plate and remove the breaker cover;

remove the ignition advance automatic device and breaker cam, after undoing the screw securing the automatic device;

undo two screws and the post, securing the breaker body, and remove the breaker body.

Before undoing the screws, it is advisable to make a mark on the crankcase cover, against a pointer on the breaker body, to ensure the correct installation of the body during assemblage.

The contact breaker with ignition advance automatic device is to be installed in reverse order.

IV. ENGINE RECONDITIONING

1. DISMANTLING AND ASSEMBLING THE ENGINE

Removal and Installation of the Cylinder Head

To remove the cylinder head from the engine, proceed as follows:

ease off the nuts of the front stud securing the engine;

unscrew the nut fastening the exhaust pipe, remove the silencer and exhaust pipe;

remove the high-tension wire with the tip from the spark plug;

remove the petrol pipe from the union of the carburettor float chamber after first making sure that the petrol cock is closed and there is no petrol leakage;

Note. To remove the right-hand cylinder head, first detach the sidecar.

disconnect the suction branch pipe of the carburettor;

remove the carburettor with the gasket;

remove the cylinder head cover after first placing a tray under the joint to take up the oil left in the cover and cylinder head;

remove the gasket of the cylinder head cover;

using a handle ПР-1119 (or starting pedal), turn the crankshaft until the piston is at U.D.C., so that the both valves of the given cylinder are closed;

unscrew four special nuts and remove the cylinder head;

withdraw the tappet rods from the cylinder head, after first marking them so that they can be correctly installed during assemblage;

check whether the working chamfers of the valves are properly fitted to their seats, by alternately pouring kerosene into the exhaust and inlet ports (channels) of the cylinder head;

clean the cylinder head to remove carbon deposits, wash out and thoroughly examine it. If necessary, repair the cylinder head.

Re-install the cylinder head in reverse order, with the piston at U.D.C.

During assemblage, particular care should be taken to ensure that the rod is properly installed in the tappet (pusher) nest and that the clearance is provided between the valve end face and the rocker nose, when tightening up the four special nuts.

Failure to comply with this requirement may lead to the bending of the valves or rods.

To ensure the correct fit between the cylinder end face and the end face of the cylinder head, tighten the four special nuts in a criss-cross manner, following which adjust the expansion gap as shown in Fig. 3. Use a 0.07 mm feeler gauge to measure the gap between the rocker end face and the valve stem.

On completing the adjustment, lock the adjusting bolt with a nut. Before re-installing the cylinder head cover, oil the rocker pin and rocker end face as well as the rod end piece.

After finishing the assembling, check that the cylinder head gasket and the caps of rod housings are fitted correctly.

Before fitting the nut securing the exhaust pipe, lubricate the threaded part of the cylinder head with graphite grease.

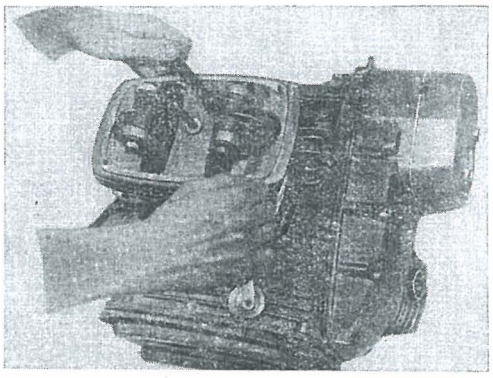


Fig. 3. Adjustment of expansion gap

Removal and Installation of the Cylinder

To remove the cylinder, do the following:

remove the cylinder head;

remove the cylinder;

remove the cylinder gasket;

clean, wash out and examine the cylinder. If necessary, repair the cylinder.

Prior to installing the cylinder in place, arrange the rings on the piston so that their ends are set apart at an angle of 120° to one another, lubricate the piston face (working surface) and its skirt with engine oil.

Re-install the cylinder in reverse order. When fitting the cylinder on the piston, the piston rings must be preliminarily compressed by means of an appliance РИ-4697 (Fig. 4).

Removal and Installation of the Piston and Piston Rings

To remove the piston and the piston rings, proceed as follows:

mark the piston;

remove the locking rings of the piston pin;

fit an appliance ПР-1365 on the piston and press out the piston pin (Fig. 5);

take out the piston pins, using an appliance ПР-1254.

When removing the piston rings, make marks on them in order to correctly re-install them into appropriate grooves of the piston, with appropriate side up.

After dismantling, clean the piston and piston rings of carbon deposit, wash out and examine them and make the required measurements. If necessary, replace the worn-out parts.

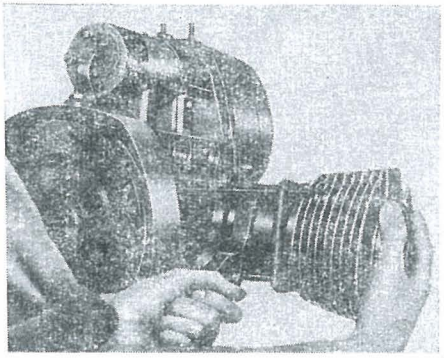


Fig. 4. Installing the cylinder

Re-assemble the piston and piston rings in the following order:

heat the piston up to 80—100°C;

fit the pin on a mandrel ПР-1255, and, from the other side, insert a guiding cone into the pin hole. Lubricate the pin with oil;

ensure that the opening in the piston is matched with the opening in the connecting rod small end, and the pointer on the piston head is directed forward (towards the centrifuge), then press down the piston pin by hand to fit it back in its place.

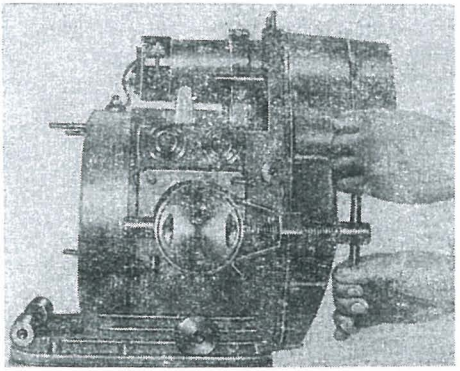


Fig. 5. Pressing-out the piston pin

A certain amount of skill is required to install the piston pin (Fig. 6), into the piston since the piston cools down quickly and the pin may be "seized".

After installing the piston pin, insert the locking rings. Then fit the piston rings, using an appliance ПР-1254.

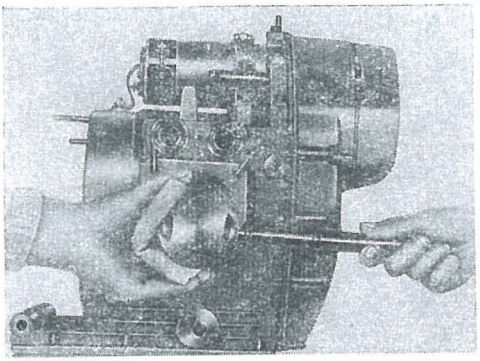


Fig. 6. Installing the piston pin

Removal and Installation of the Tappets

Insert a hook into the tappet opening and remove the tappets. Mark the tappets so as not to confuse them during assemblage. When installing the tappets, lubricate them with engine oil.

Removal and Installation of the Cover of Timing Pinions

To remove the cover of the timing pinions, do the following:

drain oil from the engine crankcase;

take down the front cover after first unscrewing the special nut;

disconnect all the wires from the terminals;

unscrew the cover bolts and take down the timing pinion cover after moving it off its seat by light taps;

remove the breather;

remove the gasket.

On removing the timing pinion cover, wash out and examine the component parts and make the required measurements.

Re-install the cover (Fig. 7) in reverse order, ensuring that the breather opening is matched with the driving pin pressed into the driven timing pinion.

Before installation, lubricate the breather with oil.

Removal and Installation of the Centrifuge

unscrew the centrifuge fastening bolt;

remove the washer as well as the paper and sealing rubber gaskets;

screw an end piece B_3-362 into the opening of the crankshaft butt end;

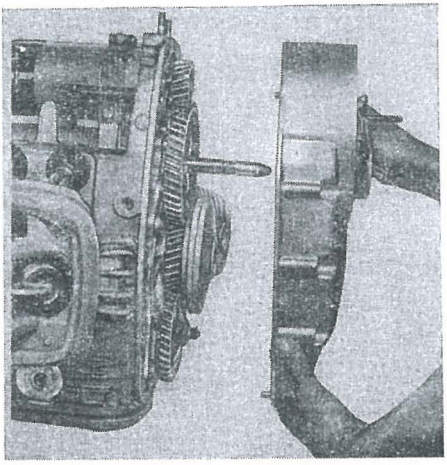


Fig. 7. Installing the cover of timing pinions

remove the body together with the cover, using a lifter ПР-1367;

detach the cover from the centrifuge body and take out the screen.

A method for removal of the centrifuge is shown in Fig. 8.

After dismantling, wash and examine the component parts, check the sealing rubber parts for good condition.

To re-assemble the centrifuge, proceed as follows:

press fit the centrifuge body;

install the centrifuge sealing ring;

install the screen in such a way that its tab can enter the opening of the centrifuge body;

install the centrifuge cover;

fit the spring washer, centrifuge washer, paper gasket and sealing ring on the bolt and secure the centrifuge with the bolt.

Removal and Installation of the Camshaft

Prior to removing the camshaft, measure the backlash in the timing pinion toothing (as shown in Fig. 9), for which purpose do the following:

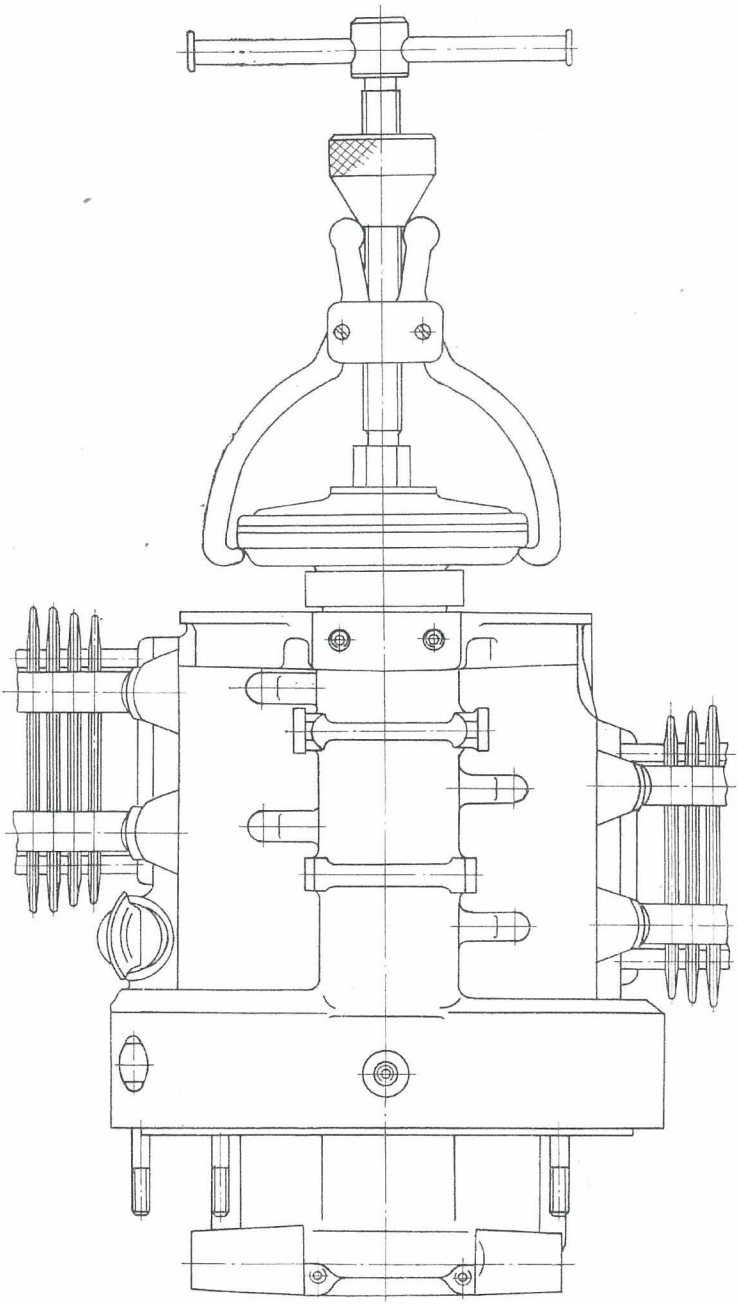


Fig. 8. Removal of the centrifuge

ease off the nuts of the coupling bolt of the generator and rear stop collar, remove the generator.

Set up an appliance for measuring the gearing backlash.

Measure the backlash and remove the appliance.

The gearing backlash must not exceed 0.08 mm.

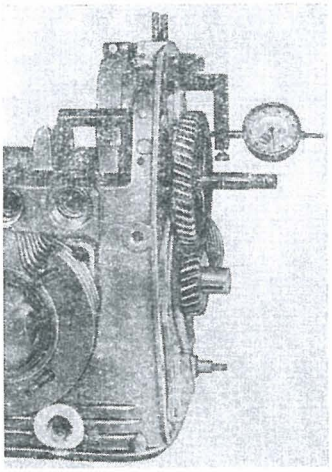


Fig. 9. Measuring the backlash in the timing pinion meshing

If the backlash is found to be larger than required, replace the pinions.

To remove the camshaft, proceed as follows:

undo the screws, securing the camshaft flange, through the holes of the driven timing pinion;

unscrew the plug in the engine crankcase;

press out the camshaft (Fig. 10) together with the pinion.

After dismantling, wash and examine the component parts and make the required measurements.

Re-install the shaft in reverse order. Before pressing-in of the camshaft, lubricate the bearings with oil. The camshaft should be pressed in by light taps, using a mandrel ПР-1111, to be fitted on the shaft end and set against the pinion hub.

Care should be taken to ensure the proper matching of the marks on the timing pinions.

Removal and Installation of the Clutch

To remove the clutch disks, proceed as follows:

insert a screwdriver into the slot of the screw securing the clutch bearing disk and, by tapping the screwdriver with a hammer, knock off the splash of disk metal in the screw slot;

fit an appliance ПР-1112 and release the clutch (Fig. 11);

undo the screws fastening the bearing disk;

engage the clutch and remove the appliance;

remove the clutch disks and springs.

After dismantling the clutch, wash and examine its component parts and make the required measurements.

Re-assemble the clutch in the following order:

insert the springs of the same colour marking into the flywheel nests;

fit the pressure disk on the flywheel pins and make sure that the bearing surfaces of the springs are properly bedded in the appropriate recesses of the disk;

re-install the clutch driven disk, intermediate driving disk, the second driven disk and the clutch bearing disk;

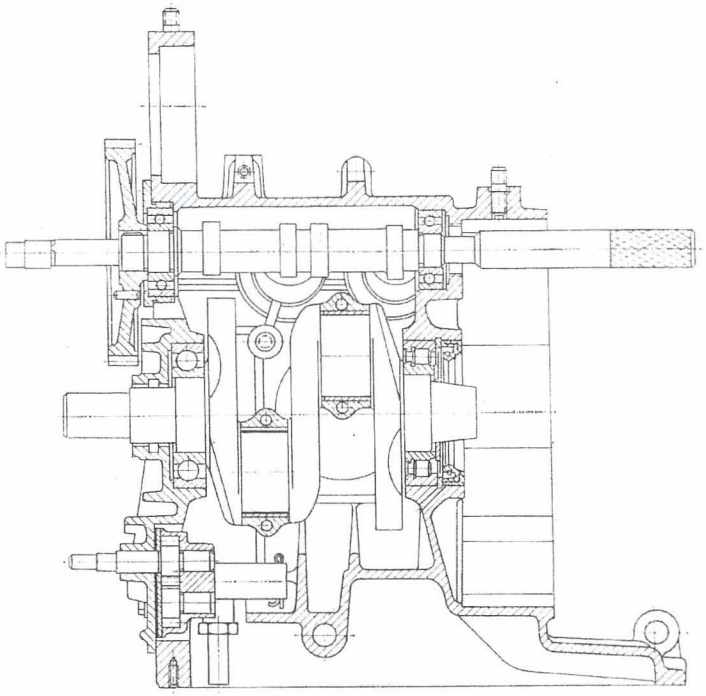


Fig. 10. Pressing out the camshaft

insert the splined mandrel of the appliance, ensuring that the holes of the clutch driven disks and of the pressure disk are matched;

install appliance ПР-1112 and compress the springs;

having matched the holes of the bearing disk with those of the pins, screw up the bearing disk fastening screws. Tighten up the screws in a criss-cross manner;

remove the appliance;

centre punch each screw at two points, pressing the disk metal into the screw slot.

Removal and Installation of the Flywheel

To remove the flywheel, do the following:

unbend the locking washer of the flywheel bolt;

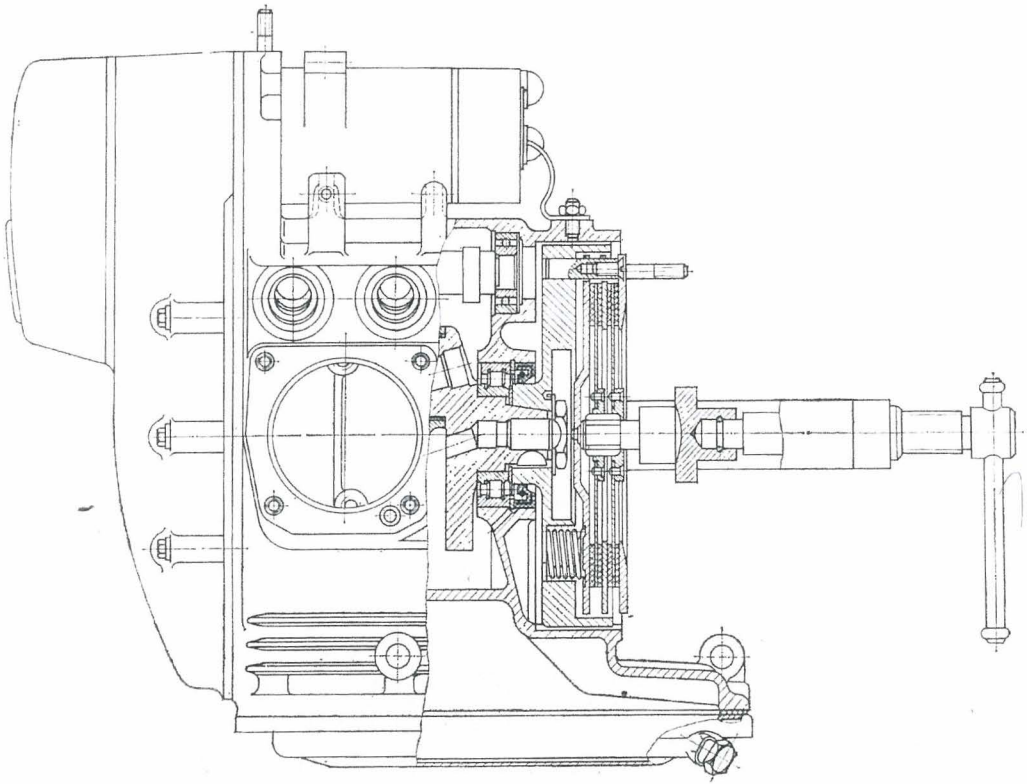


Fig. 11. Removal and installation of the clutch disks

install an appliance ПР-1135 and unscrew the flywheel fastening bolt by means of a wrench ПР-1256, remove the lock washer;

fix an appliance ПР-1258;

remove the flywheel from the crankshaft cone (Fig. 12), following which unfasten the appliance.

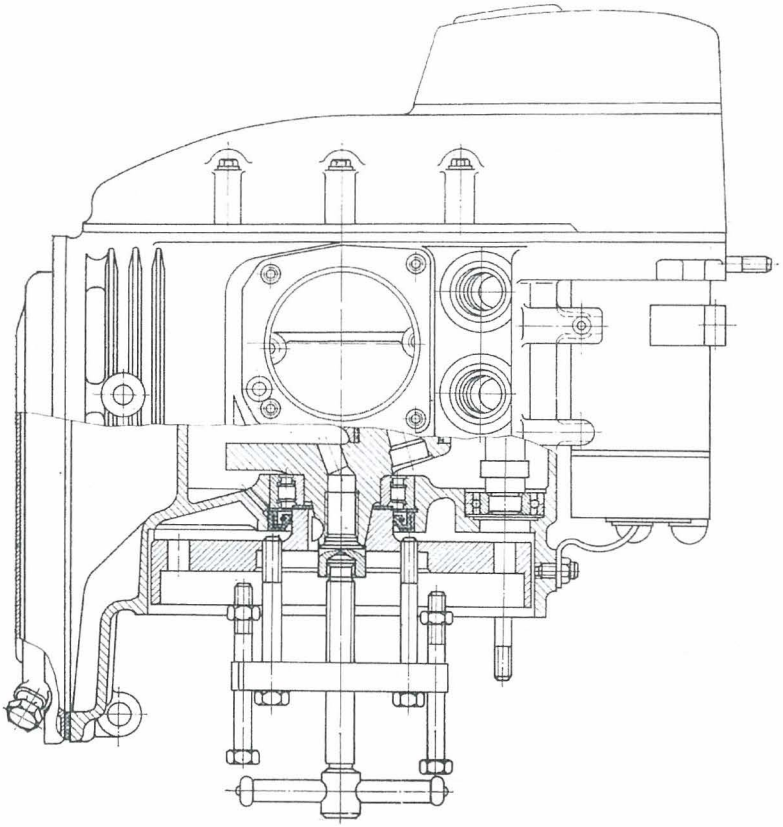


Fig. 12. Removal of the flywheel

After dismantling the flywheel, wash and examine its component parts.

Re-install the flywheel in the following order:

fit the flywheel on the cone end of the crankshaft, ensuring that the rubber gland is properly fitted on the flywheel hub and the key is matched with the keyslot in the flywheel hub;

fit the lock washer;

install the appliance ПР-1135;

securely tighten up the flywheel fastening bolt by means of a wrench ПР-1256;

unbend the lock washer onto one of the bolt edges;

remove the appliance.

Removal and Installation of the Connecting Rod

To remove the connecting rod, do the following:

unbend the nibs of the cotter pins;

take out the cotter pins;

unscrew the nuts of the connecting rod bolts by means of a socket wrench;

take down the connecting rod cap with the bush;

remove the connecting rod together with the bush.

When dismantling, mark the connecting rods, connecting rod caps and bushes so as not to confuse them during assemblage.

After dismantling, wash and examine the component parts and make the necessary measurements.

Re-assemble the connecting rods in reverse order, taking into account that the connecting rod big end is not symmetrical.

To correctly install the connecting rods on the crankshaft, the connecting rod blades are provided with lugs which must be directed outwards with respect to the crankshaft web (in the case of the right-hand connecting rod, the lug is turned towards the flywheel, in the case of the left-hand connecting rod, towards the centrifuge). The nuts of the connecting rod bolts should be tightened up and locked by cotter pins, provision being made to ensure that the connecting rod turns freely on the crankshaft.

Avoid using old cotter pins.

Prior to installing the connecting rods, lubricate the working surface of the bush with engine oil.

Removal and Installation of the Crankshaft

In order to remove the crankshaft, carry out the dismantling in the following order:

remove the driving timing pinion, using a lifter ПР-1367 with end piece P_3-362 and take out the keys of the centrifuge and of driving pinion;

remove the driving gear of the oil pump with the help of a lifter ПР-1367, using an end piece B_3-363;

unbend the locking washers securing the front bearing body and the oil pump, unscrew the bolts fastening the front bearing.

Remove the sump, unscrew two bolts securing the oil header, remove the oil header and unscrew the oil intake pipe, for which purpose ease off the check nut;

remove the front bearing body together with oil pump (Fig. 13) by means of a lifter ПР-1258;

take out the crankshaft with connecting rods from the engine crankcase;

remove the oil pump, unscrew four bolts;

press the bearing out of the front body, using two special openings;

uncotter and take out the cap, spring, and reducing valve ball;

remove the connecting rods and screw off two plugs at the ends of crankpins;

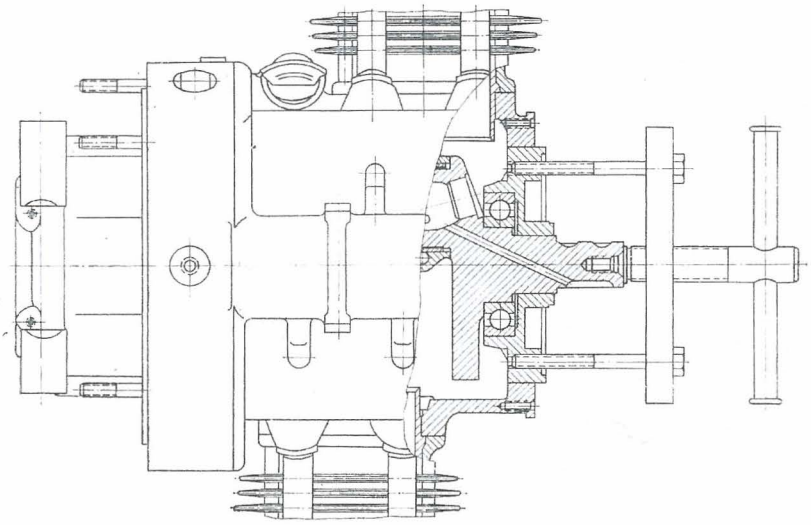


Fig. 13. Pressing out the front bearing body from the crankcase

remove the inner race of the roller bearing;

take out the crankshaft gland, oil slinger and distance washer;

extract the locking ring;

press out the outer race, together with rollers of crankshaft bearing, from the crankcase, using a mandrel ПР-1260.

Clean the crankshaft catchers to remove the dirt that has collected in them, thoroughly wash and examine all the component parts, and make the required measurements.

Re-install the crankshaft in the crankcase in the following order:

re-assemble the crankshaft, for which purpose screw up two plugs, and centre punch them, re-assemble the connecting rods, ensuring that the connecting rods are properly installed on the crankshaft (refer to the Section "Removal and Installation of the Connecting Rod");

press the inner race of the roller bearing on the rear journal;

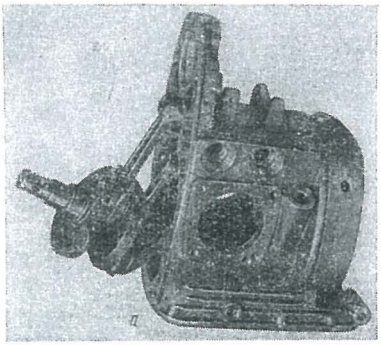
re-assemble the reducing valve;

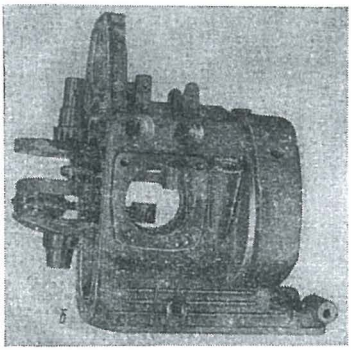
re-assemble the oil pump, ensuring free rotation of the gears, secure the bolts by unbending the lock washer onto the bolt edge, install the oil pump gear and lock it by a cotter pin;

press the bearing into the front body, using a mandrel ПР-1260;

press the bearing outer race together with rollers into the crankcase, using a mandrel ПР-1260;

install the locking ring, oil slinger and spring washer in the crankcase and press in the crankshaft gland;





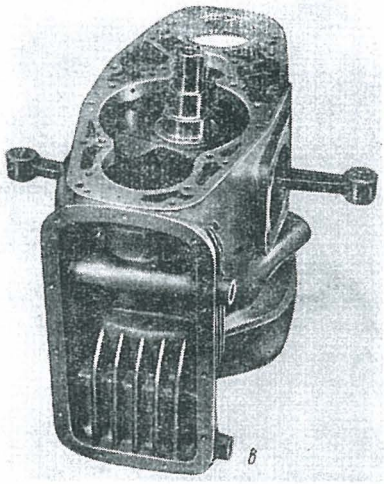


Fig. 14. Alignment of the crankshaft during assembly

install the crankshaft, assembled with connecting rods, into the crankcase, for which purpose align the crankshaft with respect to the crankcase, as shown in Fig. 14;

press the bearing front body into the crankcase and, at the same time, press the ball bearing on the front journal, tighten up the front body of the bearing by bolts. If correctly assembled, the crankshaft should rotate freely in the crankshaft bearings;

secure the bolts by unbending the lock washers onto the edges of the bolts fastening the bearing front body;

set a key on the crankshaft and press fit the driving timing pinion;

screw up the oil intake pipe and secure the oil header;

install the sump and secure it;

Table 3

Nominal Sizes, Tolerances and Interferences in the Basic Mating Members of the Engine and Clutch

Number and description of component part (shaft)	Nominal size and tolerance, mm	Number and description of mating member (opening)	Nominal size and tolerance, mm	Tolerance zone, mm				Remarks
				clearance		interference		
				minimum	maximum	minimum	maximum	
MT801237 piston (diameter of skirt)	$78^{-0.02}_{-0.06}$	MT801301 cylinder	$78^{+0.04}$					Ellipticity and conicity dia. 78+0.04 within 0.015
			Size Groups					
	77.95 / 77.95—77.94		1 / 78.01—78.00	0.05	0.07			The group index is stamped on the piston head and on the lower end face of the cylinder
	77.96 / 77.96—77.95		2 / 78.02—78.01	0.05	0.07			
	77.97 / 77.97—77.96		3 / 78.03—78.02	0.05	0.07			
MT801238 piston pin (outside diameter)	$21_{-0.01}$	MT801238 piston (an opening in the boss)	$21^{-0.007}_{-0.017}$					Ellipticity and conicity of the pin within 0.0025
			Size Groups					
	White 21.0000—20.9975		White 20.9930—20.9905			0.0045	0.0095	The colour index of the group is marked on one of the internal end sides of the pins and on one of the
	Black 20.9975—20.9950		Black 20.9905—20.9880			0.0045	0.0095	
	Red 20.9950—20.9925		Red 20.9880—20.9855			0.0045	0.0095	

Continued

Number and description of component part (shaft)	Nominal size and tolerance, mm	Number and description of mating member (opening)	Nominal size and tolerance, mm	Tolerance zone, mm				Remarks
				clearance		interference		
				minimum	maximum	minimum	maximum	
	Green 20.9925—20.9900		Green 20.9855—20.9830			0.0045	0.0095	bosses inside the piston
	77.98 77.98—77.97		78.04—78.03	0.05	0.07			
MT801238 piston pin (outside diameter)	$21_{-0.01}$	MT8012—2 connecting rod, ass'y (opening of the connecting rod small end)	$21^{+0.007}_{-0.003}$					Ellipticity and conicity of the connecting rod small end within 0.0025
		Size Groups						
	White 21.0000—20.9975		White 21.0070—21.0045	0.0045	0.0095			The colour indices are marked on one of the internal end sides of the pins and on the connecting rod blade at the small end
	Black 20.9975—20.9950		Black 21.0045—21.0020	0.0045	0.0095			
	Red 20.9950—20.9925		Red 21.0020—20.9995	0.0045	0.0095			
	Green 20.9925—20.9900		Green 20.9995—20.9970	0.0045	0.0095			
6101217 compression piston ring (ring width)	$2.5^{-0.010}_{-0.022}$	MT801237 piston (groove width)	$2.5^{+0.055}_{+0.030}$	0.040	0.077			Top compression ring
			$2.5^{+0.045}_{+0.025}$	0.025	0.057			Bottom compression ring
7201218—A oil piston ring (ring width)	$5_{-0.015}$	MT8011237 piston (groove width)	$5^{-0.050}_{+0.025}$	0.025	0.065			

Continued

Number and description of component part (shaft)	Nominal size and tolerance, mm	Number and description of mating member (opening)	Nominal size and tolerance, mm	Tolerance zone, mm				Remarks
				clearance		interference		
				minimum	maximum	minimum	maximum	
MT801201 crankshaft (oil feed journals)	$34^{-0.025}_{-0.050}$	MT801140 front bearing body	$34^{+0.027}$	0.025	0.077			
MT801201 crankshaft (front journal)	45 ± 0.008	209 GOST 8338—57 ball bearing	$45^{+0.003}_{-0.015}$		0.011		0.023	
MT801201 crankshaft (rear journal)	45 ± 0.008	209 GOST 8338—57 ball bearing	$45^{+0.003}_{-0.015}$		0.011		0.023	
MT801140 front bearing body	$140^{+0.040}_{+0.013}$	MT801101 crankcase	$140^{+0.040}$		0.027		0.040	
209 GOST 8338—57 ball bearing	$85^{+0.005}_{-0.020}$	MT801140 front bearing body	$85^{-0.010}_{-0.045}$		0.010		0.050	
209 GOST 8338—53 ball bearing	$85^{+0.005}_{-0.020}$	MT801101 crankcase	$85^{-0.010}_{-0.045}$		0.010		0.050	
MT801201 crankshaft (oil feed journal)	$34^{-0.025}_{-0.050}$	MT801140 front bearing body	$34^{+0.027}$	0.025	0.077			
MT801201 crankshaft (front journal)	45 ± 0.008	209 GOST 8338—57 ball bearing	$45^{+0.003}_{-0.015}$		0.011		0.023	

Continued

Number and description of component part (shaft)	Nominal size and tolerance, mm	Number and description of mating member (opening)	Nominal size and tolerance, mm	Tolerance zone, mm				Remarks
				clearance		interference		
				minimum	maximum	minimum	maximum	
MT801201 crankshaft (rear journal)	45 ± 0.008	209 GOST 8338—57 ball bearing	$45^{+0.003}_{-0.015}$		0.011		0.023	
MT801140 front bearing body	$140^{+0.040}_{+0.013}$	MT801101 crankcase	$140^{+0.040}$		0.027		0.040	
MT801201 crankshaft	$27_{-0.014}$	MT801229 driving timing pinion	$27^{+0.006}_{-0.017}$		0.020		0.017	
MT801201 crankshaft	$27_{-0.014}$	MT801208 centrifuge body	$27^{+0.033}$		0.047			
		MT801210 centrifuge cover	$27^{+0.016}_{-0.007}$		0.030		0.007	
MT801401 camshaft	$22^{+0.062}_{+0.039}$	MT801406 timing pinion	$22^{+0.023}$			0.016	0.062	
MT801401 camshaft	$25^{+0.017}_{+0.002}$	205 GOST 8338—57 ball bearing	$25^{+0.003}_{-0.013}$		0.001		0.030	
MT801401 camshaft	$20^{+0.017}_{+0.002}$	204 GOST 8338—57 ball bearing	$20^{+0.003}_{-0.013}$		0.001		0.030	
MT801411 tappet	$20^{-0.02}_{-0.04}$	MT801101 crankcase	$20^{+0.023}$	0.020	0.063			

Continued

Number and description of component part (shaft)	Nominal size and tolerance, mm	Number and description of mating member (opening)	Nominal size and tolerance, mm	Tolerance zone, mm				Remarks
				clearance		interference		
				minimum	maximum	minimum	maximum	
MT801541 rocker bushing	$15^{-0.030}_{-0.055}$	MT801533 left-hand rocker	$15^{+0.027}$	0.030	0.082			
MT801541 rocker bushing	$15^{-0.030}_{-0.055}$	MT801534 right-hand rocker	$15^{+0.027}$	0.030	0.082			
MT801526 valve seat	$41.2^{+0.10}_{+0.06}$	MT801502/503 cylinder heads	$41^{+0.050}$			0.210	0.030	
MT801524 valve guide	$14^{+0.080}_{+0.045}$	MT801502/503 cylinder heads	$14^{+0.015}_{-0.012}$			0.026	0.080	
MT801523 valve	$8^{-0.035}_{-0.060}$	MT801524 valve guide	$8^{+0.022}$	0.035	0.082			
7201225 clutch pin	$12^{+0.080}_{+0.045}$	MT801223 flywheel	$12^{+0.035}$			0.010	0.080	
7201225 clutch pin	$12^{+0.080}_{+0.045}$	7203117 clutch intermediate driving disk	$12.5^{+0.07}$	0.420	0.525			
7201225 clutch pin	$12^{+0.080}_{+0.045}$	7203121-A clutch driving pressure disk	$12.5^{+0.07}$	0.420	0.525			

Table 4

Maximum Permissible Values of Wear and Clearances in the Basic Mating Members of the Engine

Component parts and their conjugate pairs	Maximum permissible dimensions, mm	
	diameter wear	diametral clearance
Crankpin — connecting rod bushing	—	0.100
Cylinder (face)	0.200	—
Cylinder — piston	—	0.250
Piston pin	0.015	—
Piston pin opening	0.020	—
Piston — piston pin	—	0.010
Connecting rod small end bush	0.025	—
Piston pin — connecting rod small end bush	—	0.030
Compression piston ring (width)	0.050	—
Piston groove — piston ring	—	0.150 (as to height)
Valve stem	0.120	—
Valve guide bushing	0.150	—
Valve stem — valve guide bushing	—	0.250
Rocker bushing	0.070	—
Rocker (opening)	0.070	—
Rocker bushing — rocker	—	0.120
Tappet	0.050	—
Opening for the tappet	0.050	—

2. REPAIRING THE ENGINE UNITS AND COMPONENT PARTS

When repairing the engine units and component parts, ensure that the clearances and interferences between the mating parts are of the magnitudes established during factory assembly and specified in Table 3.

Also, refer to Table 4, listing the maximum permissible values of wear and clearances in the basic mating members of the engine.

Repairing the Crank and Connecting-rod Assembly

The crank and connecting-rod assembly is liable to repairs in case the following faults are detected in the engine:

knocks in the zone of crankshaft bearings, connecting rod big and small ends, cylinder-and-piston assembly;

compression drop in the cylinders due to poor air-tightness of the cylinder rings, resulting in the power drop and increased oil consumption;

in the case of total disassembly of the engine, if some of the parts of the crank and connecting-rod assembly are found to be defective.

Crankshaft

Prior to inspecting and making measurements, clean dirt from all the channels and wash the component parts.

Check all the parts, especially mating surfaces, for general condition.

In order to determine whether the crankshaft is good for further usage, measure the following:

wear of the bushes of connecting rod small ends;

wear of the crankshaft bushings and crankpins;

run-out of crankshaft journals with respect to one another.

Measure the wear of the connecting rod small end bush with the aid of a telescope internal gauge. If the amount of wear exceeds the permissible value, do the following:

press out the worn-out bush by means of a mandrel ПР-1116, using a hand press, and press in a new bush;

drill 2.5 mm dia. holes in the bush for lubrication of the piston pin through the openings in the connecting rod small end, caulk the bush in the connecting rod small end and perform the reaming by means of a reamer A-628;

measure the actual size of the hole, mark it according to Table 5 and select a piston pin of a suitable colour.

Table 5

Colour Markings of the Piston Pin, Connecting Rod Small End and of Openings in Piston Bosses

Colour index	Pin diameter, mm	Diameter of openings in connecting rod small end, mm	Diameter of openings in piston bosses, mm
White	21.0000—20.9975	21.0070—21.0045	20.9930—20.9905
Black	20.9975—20.9950	21.0045—21.0020	20.9905—20.9880
Red	20.9950—20.9925	21.0020—20.9995	20.9880—20.9855
Green	20.9925—20.9900	20.9995—20.9970	20.9855—20.9830

The wear of the crankpins must be measured by means of a micrometer gauge, and that of the connecting rod bushing — by means of a micrometer gauge with a spherical end piece. The run-out of the crankshaft journals with respect to one another should be measured at the centres with an indicating gauge. The run-out must not be greater than 0.03 mm.

After checking, re-assemble the crankshaft and connecting rods.

Cylinder

Clean and wash out the cylinder before inspecting it and making measurements. Make sure that the cylinder face is free of scores. Measure the internal diameter of the cylinder at five zones spaced at 15, 25, 50, 75 and 85 mm intervals from the upper plane of the

cylinder, measurements to be made in two planes: in the plane of connecting rod swinging and in the plane perpendicular to the former one.

If the wear exceeds the values specified in Table 4, the cylinder has to be bored out to suit the nearest repair size of the piston.

After finishing, wash the cylinder face with a brush moistened with aqueous solution of soap, then wipe it dry with a piece of clean dry cloth.

Piston Rings

A tardy replacement of the piston rings will lead to premature wear of the cylinder walls and of the rings themselves, to rapid accumulation of carbon deposits and increased oil consumption.

Before checking the piston rings for condition, clean them of carbon and wash.

If, during inspection, the piston rings are found to be defective (cracks, chips, large areas that has not been lapped to the cylinder, diminished flexibility of the rings themselves), replace the rings.

The ring must be also replaced if its average width is found to be 0.05 mm less than the least size specified in Table 3 or the radial thickness is less than 2.7 mm, or if the piston ring gap in bore is greater than 1.5 mm.

When repairing the cylinder, replace the piston rings with repair ones of the appropriate size.

Table 6

Repair groups	Repair sizes of cylinders	Piston Nos	Piston sizes	Remarks
P1	78.20—78.23	MT801237-P1	78.14—78.17	
P2	78.50—78.53	MT801237-P2	78.44—78.47	

Piston

Before attempting inspection and measurements, clean the piston to remove carbon deposits, especially from the piston head and grooves, then wash the piston.

Make sure that the piston skirt is free of scores and cracks and that the locking ring grooves in the piston pin opening are intact and not worn out.

The permissible wear of the piston pin opening must not be greater than 0.02 mm. If the piston pin opening and piston ring grooves become worn beyond permissible limits, or if scores are found on the piston skirt, the piston must be replaced.

When replacing the pistons for the first time in the cylinders that are negligibly worn and do not require boring and polishing, install the standard size pistons of the group corresponding to the actual size of the cylinder.

Pistons must be selected such as to match the cylinder not only by the diameter of the skirt, but also by their weight. The difference in the weight of the engine pistons must not exceed 4 g.

With this kind of pistons, the colour marking of the piston pin openings must correspond to the marking of the opening of the connecting rod small end.

Piston Pin

Examine the external surface of the pin, check it for the absence of notches, dents, bronze galling and noticeable wear.

The wear of the piston pin to be measured along the edges and in the middle part of it, must not exceed 0.015 mm of the minimal size of the colour marking.

When replacing the connecting rod, the bush in the connecting rod small end, the piston or pin itself, select a new pin of the colour marking corresponding to that of the piston pin openings and of the connecting rod small end.

The selection of pins for connecting rods should be carried out at room temperature of 20±5°C.

Repairing the Valve Timing Gear

The valve timing gear has to be repaired in cases the following faults are detected in the engine:

compression drop in the cylinders due to poor air-tightness of the valves, accompanied by power drop, increased petrol consumption and impeded starting of the engine;

increased noise during operation of the valve gear;

in the case of total disassembly of the engine, if some of the component parts of the valve timing gear are found to be defective.

Cylinder Head

Examine all the accessible places in the cylinder head for the absence of cracks and other signs of damage, make sure that the valves are not burnt out and the threads of screw not stripped. Remove the valves to inspect them and other parts — springs, valve guides and valve seats — for good condition, and to make the necessary measurements for determining the amount of wear (Fig. 15).

In order to remove the valves, proceed as follows:

mark the valves;

fix the cylinder head on an appliance ПСБ-4659;

compress the valve springs and take out the slide blocks;

remove the upper spring disks, springs, lower disks with washers and take out the valves.

Thoroughly clean the taken-out parts to remove carbon and resinous deposits, then wash these parts. After washing, check them for good condition.

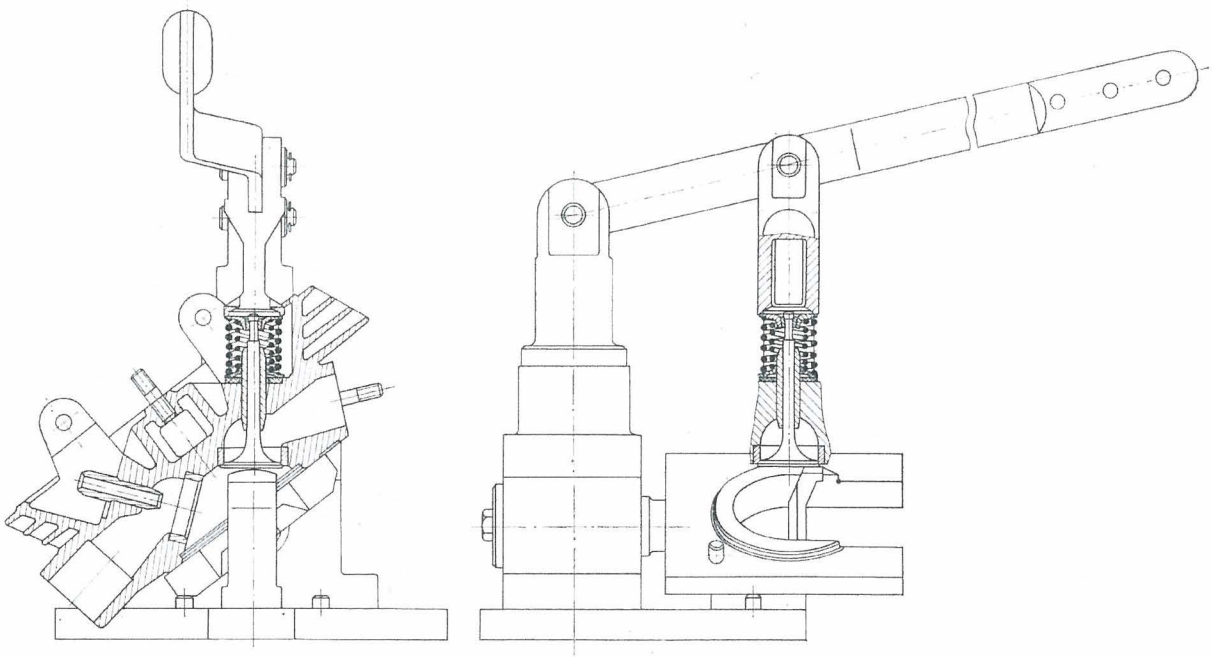


Fig. 15. Removal of the valve springs

When inspecting the valves, check the following:

stem-to-guide side clearance;

wear of the stem;

condition of the fitting chamfer of valve head.

Check the spring for flexibility and for proper length in a free state.

The stem-to-guide side clearance must not be greater than 0.25 mm. If the clearance exceeds the specified figure, replace the valve or guide bushing, or the both components, for which purpose measure the diameter of the valve stem and guide bushing at a distance of 5 mm from the upper and lower edges of the working surfaces.

If the wear of the valve stem is greater than 0.12 mm, replace the valve. If the bushing wear exceeds 0.15 mm, replace the bushing.

The guide bushing is to be replaced in the following order:

thoroughly clean off carbon from the guide bushing in the throat;

fix the cylinder head and press out the valve guide bushing;

check the guide bushing opening for proper condition, heat the cylinder head up to 200°C and press the bushing back in place;

ream the guide bushing opening by means of a reamer of $8_{+0.022}$ to 8.00—8.03 mm in diameter, check the opening for being rectilinear. After repairing the guide bushing, check the valve seat chamfer for concentricity and, if necessary, work the valve seat chamfer with a milling cutter.

In case any pits, worn-out or burnt places and other signs of damage are found on the working surfaces of the seats and valves, these defects must be eliminated by working the seat chamfer with a milling cutter 3-314 and by grinding the valve head chamfer.

If the valve head is excessively warped or cracks are found on it, replace the valve.

After grinding, check the play of the valve head chamfer with respect to the stem, using an appliance ПК-474 for this purpose. The play must not be greater than 0.03 mm.

After repairing the seat chamfer, check its concentricity with respect to the guide bushing opening (Fig. 16). The permissible play must not exceed 0.03 mm.

If the valve seat is greatly worn out or has other defects that cannot be eliminated by means of a milling cutter, such a seat must be replaced by a new one, for which purpose proceed as follows:

cut a thread on the inside of the valve seat, heat the head to approximately 200°C and remove the valve seat with the aid of a lifter ПР-1262 (Fig. 17);

heat the cylinder head again and press in a new valve seat.

After grinding the valve head and working the seat with the milling cutter, it is necessary to lap their working chamfers.

Lap the valve head and seat in the following order:

fit a spring on the stem of the valve to be lapped;

apply a thin layer of abrasive paste to the valve head chamfer and, after first inserting the valve with the pressing-out spring into the guide bushing, fit an appliance ПР-1366 on the end of valve stem for rotation of the valve;

rotate the valve by means of the appliance in both directions so that the valve turns progressively in one direction or the other. While rotating the valve, periodically press it down to the seat.

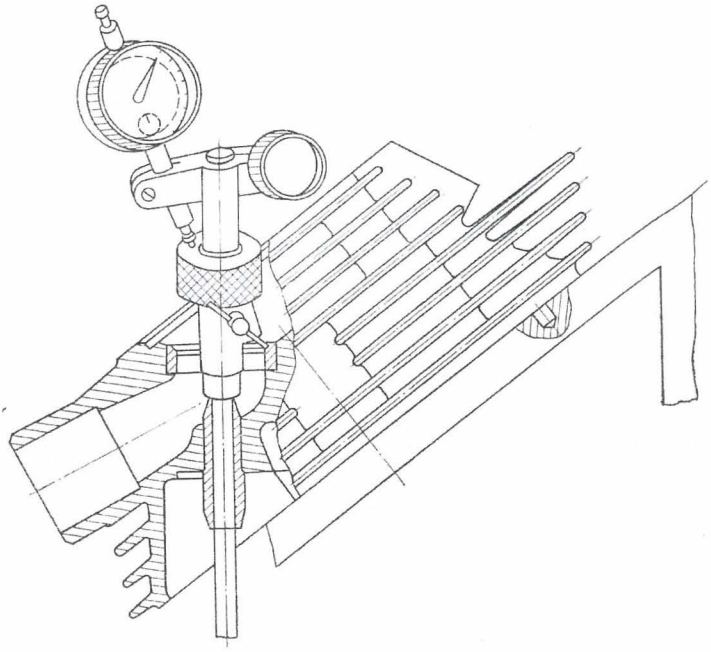


Fig. 16. Checking the valve seat for play

Lap the head into the seat carefully so as not to remove too much metal from the working chamfers as this will reduce the number of permissible repairs. Towards the end of lapping, reduce the amount of paste and, at the final stage, perform the lapping using only a pure oil.

Continue the lapping until a uniform lustreless colour appears on the working surfaces of the valve head and seat, which is an indication of satisfactory lapping.

After lapping, thoroughly wash the valves, valve seats, guide bushings, throat and cylinder head compression chamber to completely remove all the abrasive paste, then wipe them dry with a clean cloth.

Following that, check the valve seating for air-tightness, for which purpose fit the valves in place and pour kerosene in the inlet and exhaust ports (channels) of the cylinder head. The kerosene must not leak out within 30 s. If the kerosene starts to leak out before this period of time has elapsed, an additional lapping is required.

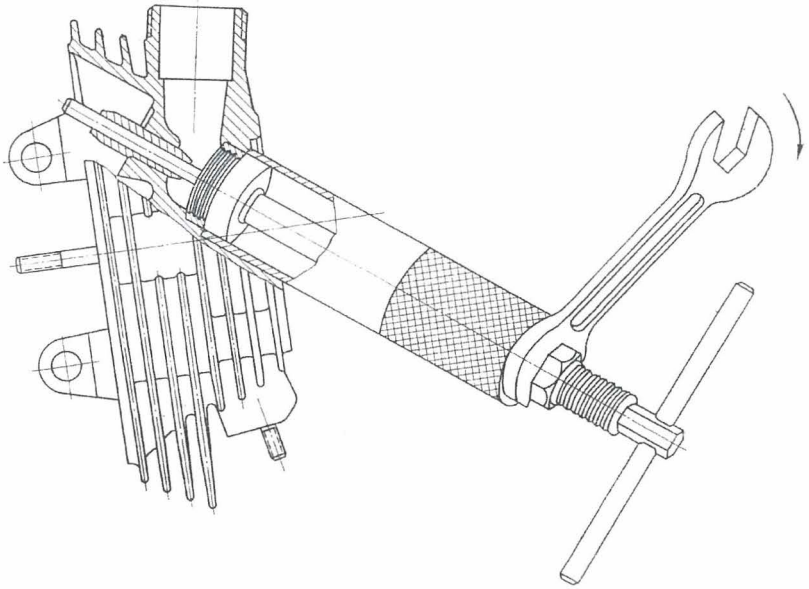


Fig. 17. Pressing out the valve seat

The valve springs must be checked for flexibility in accordance with the data presented in Table 7.

Table 7

Characteristics of Valve Springs

Component part No.	Description of component part	Size of wires, mm	Length of spring in a free state, mm	Spring flexibility
MT801465	Internal spring of valve	3	~39	When compressed to 30.5 mm, P≈10.5 kg. When compressed to 22 mm, P≈21—24 kg.
MT801466	External spring of valve	4	~43	When compressed to 34 mm, P≈16 kg. When compressed to 25.75 mm, P≈30—35 kg

On completing the inspection, taking measurements and performing the required repairs, re-install the valves.

The valves are re-installed in reverse order, the valve stems being lubricated with graphite grease.

Valve Rocker with Pin

To remove the rockers, unscrew the nut and take the rocker pin out of the brackets of the cylinder head. In doing this, mark the rockers together with their bushings so that they can be correctly installed in their original places.

After removal of the valve rockers, wash the component parts, examine them and make the necessary measurements.

Make sure there are no cracks, dents, scores on the pin, in the rocker opening and in the cylinder head brackets; also, check the rocker bushings and the internal openings of the rockers themselves for wear.

If the bushings or openings in the rockers are worn to the extent of more than 0.07 mm, replace the component parts.

Re-install the rockers on the head in the following order:

install the lower thrust washer, rocker and upper thrust washer in the brackets of the cylinder head;

lubricate the rocker pin with engine oil and slightly press the pin into the cylinder head brackets;

fit the spring washer and special washer on the bolt and screw the bolt into the opening of the rocker pin.

If the adjusting bolt has been screwed out of the rocker, insert it back in place and screw it in as far as it will go, then screw on the check nut.

Push Rods

Examine the removed push rods, check the rod end pieces for wear or damage, also check the rods for being rectilinear.

If found not rectilinear, straighten the rods on a check faceplate by tapping a bar with a hammer through a soft metal mandrel. When checking on the plate, a 0.2 mm feeler gauge must not pass between the rod and plate.

The total length of the rod must be $256\ ^{+1.0}_{-0.5}$ mm.

Tappets

Wash and thoroughly examine the tappets that have been removed during engine disassembly.

The tappets having worn-out or pitted surfaces or scores on the end faces contacting the camshaft cams, must be replaced by new ones.

The tappets that are worn at the internal spherical surface con-

tacting the rod sphere, must be also replaced. The clearance in the tappet-to-tappet guide conjunction must not be greater than 0.10 mm. If the clearance exceeds the specified figure, replace the tappet.

Valve Timing Drive Pinions

The backlash in the pinions should be checked during engine dismantling as well as during replacement of the pinions.

On a new engine, the backlash must be within 0.03 to 0.08 mm.

In service, the maximum permissible backlash must not exceed 0.2 mm.

If the backlash is too large, it is permissible to replace any of the pinions. However, it is better to replace the both pinions at a time since the pinions are factory-coupled forming a single set.

The burrs and dents, if any, should be thoroughly trimmed with a needle file.

Camshaft

Carefully inspect the camshaft that has been washed and wiped dry. If the camshaft has scores at its cams, worn or pitted (crumbled) surfaces, it must be replaced. Check the ball bearings for good condition, replace them, if found to be defective.

Repairing the Lubrication System

The lubrication system should be checked and, if necessary, repaired in the case of total disassembly of the engine and when the lack of oil is observed during engine operation.

Oil Pump

Thoroughly wash the oil pump, for which purpose immerse the pump housing in kerosene and rotate the shank of the driving gear. In the pump that has been subjected to washing, the gears must rotate freely, without seizing.

After washing the pump, check the reducing valve for air-tightness.

If the pressure in the space ahead of reducing valve is 3.5 kgf/cm^2, the leakage from the slant channel may take place in the form of drops (the valve is closed);

if the pressure in the space ahead of reducing valve is 3.8 to 4.5 kgf/cm^2, at a 1000 r.p.m. speed of the oil pump, the valve must be opened.

The valve is to be checked twice under the specified conditions.

The reducing valves that fail to comply with the test conditions specified above, must be overhauled and then tested again. If necessary, the plunger, spring and the housing of the oil pump should be replaced.

Repairing the Engine Crankcase and Covers

In the case of total or partial disassembly of the engine, check the engine crankcase and covers for good condition.

When inspecting, check the following:

absence of cracks or any other signs of damage;

absence of dents, burrs on the joint surfaces where gaskets were previously installed;

surface finish;

wear of fitting places;

also, check that the studs are properly secured and the threads of screw are not stripped;

that the breather opening in the distribution box cover is not worn and free of scores.

Eliminate the faults detected, if this is impossible to do, replace the component parts.

At the same time, check the removed bearings for good condition. Replace the bearings, if worn out.

Oil Lines

In the case of total disassembly of the engine and especially when assembling it, particular care should be taken to ensure the correct installation of the component parts, proper alignment of the lubrication ducts and their cleanliness.

Repairing the Clutch Mechanism

After dismantling, wash and examine the component parts of the clutch mechanism.

When examining, check the following:

condition of the working surfaces of the clutch disks, absence of scores, wear of the friction facings;

condition of the splines in the hub of the driven disks;

fastening of the facings of clutch driven disks;

riveting of the hubs of clutch driven disks;

wear of the clutch pins and tightness of their press-fit in the flywheel;

wear of the openings in the clutch driving disks;

flexibility of the springs.

If scored or badly worn (up to 0.8 mm), the clutch disks must be replaced.

In case the openings in the clutch intermediate driving disk are worn by more than 1 mm, it is permissible to drill and ream holes of $12.5^{+0.07}$ dia. at an angle of 30° to the old openings.

If the pins are worn by more than 1 mm, replace them. In order to replace the clutch pins, proceed as follows:

press out the worn pins after first measuring the distance the pin ends protrude over the flywheel edge;

press in new pins, ensuring a grinding allowance at the ends of the pins;

fit a tapered mandrel ПШ-4152 and grind the pins to the size measured before pressing out the pins.

After repairing, check the flywheel for proper balancing. For this purpose, fit the flywheel on a tapered mandrel ПР-4875 and install it on knife edges (ПР-4874). The unbalance must not be greater than 8 g·cm. If the facings of the clutch driven disks are worn, remove the worn facings and rivet new ones. In case the riveted joints become loose, close up loose rivets.

The springs of the clutch mechanism must be of the same colour marking. When the springs are compressed to 21 mm, their marking must correspond to the following loads, kg:

blue	17 to 19
brown	16 to 17
green	15 to 16

3. ADJUSTMENT AND RUNNING-IN OF REPAIRED ENGINE

After repairing and assembling, adjust and run in the engine to check the quality of repairs and assembling and to ensure the initial wear-in of the friction parts. It is recommended that the engine be run-in on a test bench, using a forced air cooling.

Prior to installing the engine on the bench, adjust the following:

breaker point gap and ignition advance angles;

gap in the spark plugs;

gap in the valve gear.

The breaker point gap, provided the points are fully opened, must be equal to 0.5 to 0.6 mm. To adjust the gap, ease off the lock screw securing the contact leg (fixed contact) and move the contact leg in one direction or the other by rotating the eccentric head screw. On securing the lock screw, check the point gap once again.

To set the early ignition advance angle in the ПМ-05 breaker, do the following:

set the ignition advance to the "Раннее" ("Early") position by turning the movable disk clockwise;

connect the negative terminal of the storage battery to "earth" and the positive terminal,— to the low-tension terminal of the ПМ-05 breaker, with a portable lamp series-connected between these terminals;

turn the crankshaft in the direction of its rotation until the piston is 34±2° before the upper dead centre (U.D.C.). In doing this, refer to the mark "P" (early) on the flywheel.

In this position, the portable lamp connected into the circuit must

extinguish. If the early ignition advance angle does not correspond to 34±2°, adjust the breaker.

For this purpose, turn the movable plate of the breaker in one direction or the other by means of the adjusting eccentric. After setting the eccentric, secure it with a check nut.

The late ignition advance angle in the breaker is set in the following manner:

set the ignition advance to the "Позднее" ("Late") position by turning the movable disk counterclockwise;

turn the crankshaft in the direction of its rotation until the piston is 4±2° before U.D.C. When doing so, use mark "П" (late) on the flywheel as a guide. In this position, the portable lamp connected into the circuit must extinguish. Whenever the ignition advance angle has to be adjusted, use a special adjusting screw provided on the breaker body.

Turning the screw forward makes the ignition advance angle increase, when the screw is turned back, the angle decreases. On completing the adjustment, fix the screw with a check nut.

In order to set the early ignition advance angle in the ПМ-302 breaker, proceed as follows:

turn the crankshaft in the direction of its rotation until the piston is 34±2° before U.D.C. In doing this, use mark "Р" (early) on the flywheel as a guide;

bring apart the weights of the automatic device and rotate the breaker body, easing off its fixing screws until the portable lamp, connected into the circuit together with the storage battery, goes out.

Fix the breaker body in this position, make a mark against the pointer on the breaker body and secure the latter with screws;

check the gap between the spark dischargers in the ignition coil, which gap must be within 8 and 9 mm. If necessary, adjust the gap.

To check the gap in the spark plugs, screw the latter out of the cylinder heads. The gap between the electrodes must be equal to 0.5 to 0.6 mm. When adjusting the gap, bend the side electrode.

To set the expansion gap between the valve stem and the rocker end, proceed as follows:

place a tray under the cylinder head, remove the cylinder head cover and drain the oil that has accumulated;

turn the engine crankshaft until the inlet valve is closed (a noticeable clearance must be provided between the inlet valve stem and the rocker end). When this position is achieved, adjust the exhaust valve clearance. For this purpose ease off the check nut and rotate the adjusting bolt in one direction or the other depending on whether the clearance has to be increased or diminished. Following that, tighten up the check nut;

by turning the crankshaft until the exhaust valve starts to rise, set the clearance of the inlet valve.

Adjust the clearance when the engine is cold. The clearance must be equal to 0.07 mm for both the exhaust and inlet valves.

On completing the adjustment of the clearance, lubricate the rocker pins through the central openings and close the heads with covers.

Before attempting the running-in, attach the gear box to the engine, install the assembled units on a running-in bench and perform all necessary connections (exhaust pipes, petrol supply, ignition devices, installation of a pressure gauge, etc.).

Prior to starting the running-in, fill the engine and gear box with engine oil. Pour oil into the engine up to the upper mark of the inserted dipstick (the latter not to be screwed in), and into the gear box — to the lower screw threads of the filling hole.

The engine should be subjected to running-in in accordance with the conditions listed in Table 8.

Table 8

Running-in Conditions

Operating conditions	Engine speed, r.p.m.	Operating time, min	Gear engaged	Load on brake arm, kg
Cold running-in	625	15	IV	
	625	15	III	
Running-in at higher speeds	600 to 750	5	IV	Idling
	2000	10	IV	2.6
	2600	15	IV	5.0

After cold running-in, drain oil from the sump, wash the engine with clean oil and pour in a fresh oil. Before starting the engine for operation under idling conditions, adjust the carburettors, for which purpose do the following:

check the throttle needles of the both carburettors for proper setting. The needles must be set to the same (middle) positions;

start the engine and allow it to warm up.

With the engine running at slow idling speed, adjust each of the carburettors separately, in the following order:

set the lever to the late ignition position;

ease off the check nut securing the adjusting screw of the throttle and screw in the latter until the throttle is raised and the engine can develop a higher speed;

turn home the air-fuel ratio adjusting screw and, as far as possible, reduce the engine speed, by turning back the throttle adjusting screw;

listening to the engine, turn back the air-fuel ratio adjusting screw until such a position is achieved whereat the engine operates uniformly, developing the maximum rotational speed. Then turn back the throttle adjusting screw, reducing the rotational speed to the least possible steady speed. On completing the adjustment, fix the screws by means of check nuts;

raise the throttle of the carburettor being adjusted, by pulling the cable; if this gives an increase in the rotational speed, the adjustment may be considered finished.

Following that, adjust the carburettors for synchronous operation of the cylinders in the order given below:

start the engine and adjust it for operation at 1500 to 1800 r.p.m. (with the speedometer reading 40 km/hr in the fourth gear);

by alternately switching off each of the cylinders, ensure (by referring to the speedometer) that the engine develops the same speed when operating at one cylinder.

The carburettors are adjusted by rotating the unions on the carburettor covers and thus lifting or lowering the throttle until the same speed readings are obtained.

On completing the adjustment for synchronous operation, secure the unions in the set position. During running-in of the engine, check the following:

absence of oil leakage at the joints;

absence of extraneous noises;

absence of local heating;

operation of the engine at various speeds and loads. Eliminate the detected faults, if any.

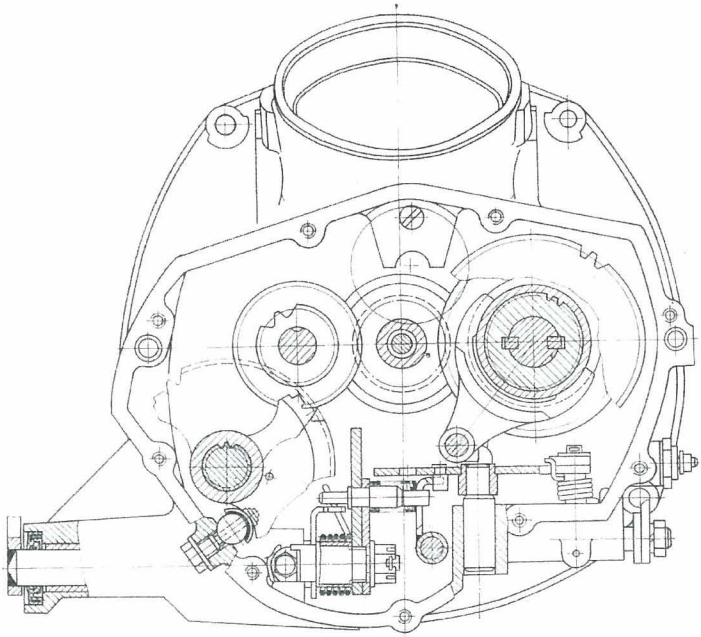


Fig. 18. Gear box cross-section

V. REPAIRING THE GEAR BOX

(the gear box removed from the motorcycle)

The cross-sectional view of the gear box and lay-out of the shafts are presented in Figs. 18 and 19.

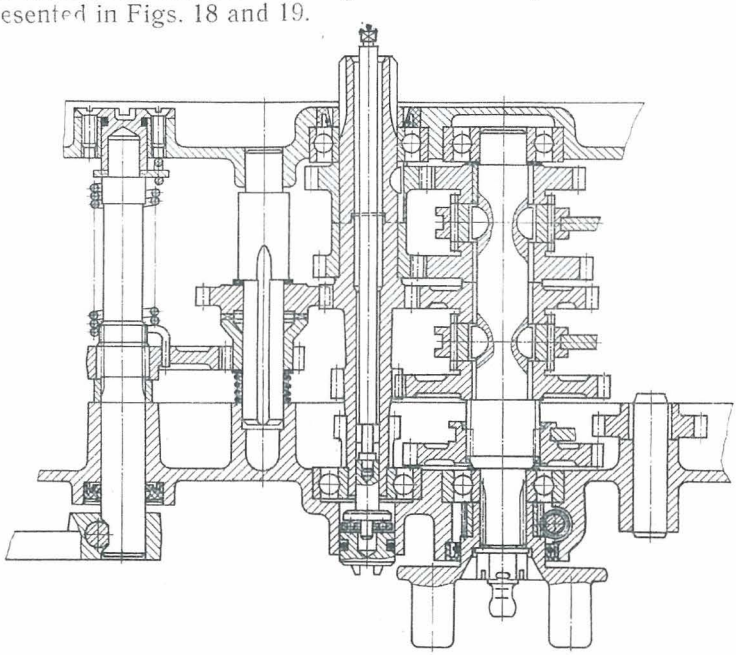


Fig. 19. Lay-out of shafts

1. DISMANTLING AND ASSEMBLING THE GEAR BOX

Drain oil through the drain hole in the cover and install the gear box into an appliance ПСБ-4817 (Fig. 20).

Removal and Installation of the Clutch Release Mechanism

To remove the clutch release mechanism, proceed as follows:

remove the clutch release lever after first uncottering and extracting the lever pin; unscrew the adjusting bolt from the lever;

press down the front end of the clutch release rod and take out the slider, thrust ball bearing, rod washer and the rod itself.

Wash the dismantled component parts and thoroughly inspect them. If necessary, replace the component parts.

After re-assembling the gear box together with the engine, re-install the component parts of the clutch release mechanism in the following order:

using a special appliance РИ-1690, insert the clutch release rod together with the gland into the opening of the primary shaft so that the square end of the rod can enter the square hole of the clutch pressure disk. Before installation, slightly grease the gland and the rod neck for the gland. When installing, take care not to damage the gland;

fit the rod washer;

insert the thrust ball bearing after first lubricating it with grease;

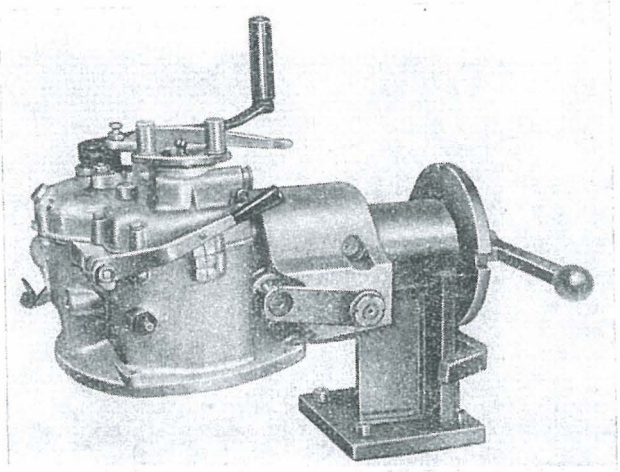


Fig. 20. Installing the gear box into an appliance

insert the clutch release slider after first greasing the rubber ring of the slider with grease. Be careful not to damage the rubber ring during installation by inadvertently touching it against the edge of the opening in the cover;

install the clutch release lever on the gear box cover;

insert the lever pin and cotter it;

screw the adjusting bolt with the check nut into the lower head of the lever so as to ensure a clearance between the round end of the bolt and the end of the intermediate rod. The presence of the clearance can be judged by the play of the lever upper head. The longitudinal play of the upper head is mandatory but it must not be greater than 1 mm.

Removal and Installation of the Speedometer Drive

To remove the speedometer drive, proceed as follows:

unscrew the bolt of the speedometer drive bushing and take out the thrust bushing; remove the driven gear of the speedometer drive by rotating the secondary drive counterclockwise by means of the

elastic coupling disk and holding back the driven gear of the speedometer drive with the aid of a screwdriver inserted into the gear slot; uncotter the nut of the secondary shaft, screw it off, remove the washer and the driving disk of the propeller shaft elastic coupling. Wash and examine the removed parts. In case the teeth are found to be worn out, replace the worn parts. Re-assemble the speedometer drive in reverse order. Prior to installation, lubricate the disk slots and the driven gear with grease.

Disassembling of the Gear Box into Basic Units and Subsequent Re-assembling

Before attempting a total disassembly of the gear box, first take it apart into its basic units, viz. the cover assembly, shafts assembly, casing with gearshift mechanism.

Removal of the Cover

To remove the cover, proceed as follows:

unscrew the nut securing the key bolt of the starting mechanism shaft, drive out the bolt, using a soft metal mandrel for the purpose, and remove the kick starter lever (starting mechanism lever) from the shaft; holding the front bushing of the starting mechanism shaft by means of a wrench B_3-5265, undo two screws fastening the bushing, give the bushing a half-turn clockwise, take out the bushing together with the rubber ring from the boss in the front wall of the casing;

unscrew nine bolts securing the cover to the casing.

Using an appliance ПР-1693 (Fig. 21), remove the cover, detach the paperboard gasket.

When removing the cover, the secondary shaft must be kept in place in the casing in order to avoid damage to the gearshift forks. As regards the type of their fit, the bearings of the rear supports of the primary and secondary shafts, in most cases, are found to be removed from the shafts, together with the cover.

Removal and Installation of the Shafts and Gears

The shafts and gears are removed in the following order:

remove the idle gear, take off the washers and reverse gear from the secondary shaft;

take out the starting mechanism shaft together with the quadrant, bushing, spring and spring washer;

remove the spring, starting gears and two thrust washers from the intermediate shaft, extract the fork shaft from the opening in the casing, withdraw the shaft with its forks from the slots of the gearshift disk;

remove the primary shaft assembly by lightly tapping the front

end of the shaft, and the secondary shaft assembly, using an appliance PH-1691.

If necessary, drive the primary shaft bearing No. 205 out of the casing and extract bearing No. 304 from the casing by means of an appliance PH-1692;

remove the washer fitted in the seat of the primary shaft bearing, from the casing.

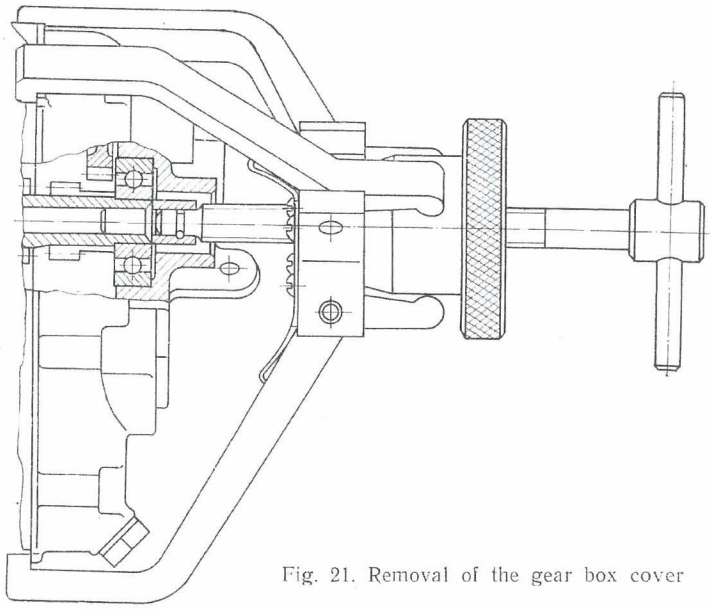


Fig. 21. Removal of the gear box cover

The shafts and gears are re-installed into the casing in the following order:

set the gearshift disk to the neutral position;

fit the spacer washer into the casing opening for the primary shaft;

press the primary shaft assembly into the casing for $^1/_3$ to $^1/_4$ of the bearing length;

install two gearshift forks into the appropriate slots of the gearshift sleeves of the secondary shaft assembly (without rear bearing of the reverse gear);

pass the fork shaft through the openings of the forks;

install the secondary shaft, together with the forks and fork shaft, into the casing, press the shafts into the openings of the casing with the aid of a hammer and mandrels O-1694 and O-1695;

insert the lugs of the gearshift forks into the gearshift disk slots, and install the fork shaft into the appropriate opening of the casing;

install the reverse gear with the fork on the secondary shaft and, at the same time, insert the upper end of the reverse lever into the fork slot;

shift the fork and reverse gear to the end front position;

fit the rear washer and bearing No. 304 on the secondary shaft;

place a paperboard gasket on the parting plane of the casing;

using an appliance К3-4794, measure the distance (clearance) between the gasket and the outer face of the rear bearing of secondary shaft (Fig. 22).

If the distance is found to be less than 43.8 mm, remove the bearing by means of a lifter Пр-1674 and fit adjusting shims between the bearing and rear washer so that the distance is within $44_{-0.2}$ mm;

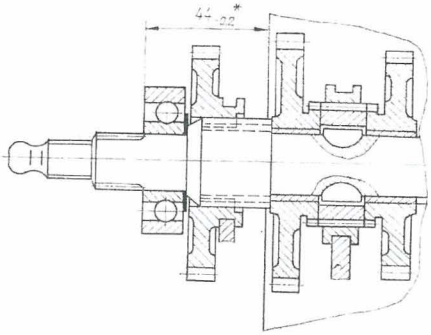


Fig. 22. Installing the rear bearing of the secondary shaft
* To gasket

install the starting mechanism gears, two thrust washers and spring on the intermediate shaft;

install the starting mechanism shaft together with the spring and spring washer.

Installation of the Cover

The cover must be re-assembled before installation. In order to install the cover, proceed as follows:

install the casing assembled with the shafts and gearshift mechanism in such a way that the front flange of the casing is turned downwards and the axes of the shafts are aligned vertically;

set the cover in such a manner that the roller of the inner lever, fitted on the cover, is located on the shaped surface of the crank of the gearshift mechanism;

lightly tapping with a soft metal hammer, press the cover on the shafts so that the locking pins, pressed into the cover, can enter the appropriate openings in the casing;

secure the cover on the casing with nine bolts.

Final Steps in Assembling the Gear Box

Install the front bushing of the starting mechanism shaft with the rubber ring, from the side of the casing front flange, catch the shaft pin and, by means of the end face lugs of the bushing, catch the washer of the starting mechanism spring;

using a special wrench B_3-5265, turn the bushing through 200° counterclockwise to wind up the starting mechanism spring;

holding the bushing with the wrench, secure it with two screws;

using a mandrel O-4162, press in the primary shaft gland together with the spring so that the gland is flush with the end face surface of the casing;

using a mandrel O-4585, press home the secondary shaft gland;

using a mandrel B_3-5221, press home the gland of the starting mechanism shaft together with the spring;

install the component parts of the speedometer drive and of the clutch drive in the sequence outlined in the relevant sections;

install the kick starter lever and secure it with a key bolt.

2. REPAIRING THE GEAR BOX UNITS AND COMPONENT PARTS

When repairing the gear box units and component parts, adjust the clearances and interferences between the mating members in accordance with the data listed in Appendix.

To determine whether certain parts are fit for further usage, refer to Appendix listing the maximum permissible values of wear and clearances in the basic mating members.

Repairing the Clutch Release Mechanism

The clutch release mechanism must be repaired in case:

any faults are found in the clutch release mechanism;

grease is leaking through the central opening of the primary shaft.

Reconditioning of the clutch release mechanism is confined to replacement of the defective parts revealed during their inspection after washing.

When inspecting, check the following:

condition of the rubber ring of the slider;

absence of indentations on the bearing (cemented) surface of the slider and the rod washer for the thrust bearing;

condition of the rubber gland of the clutch release rod;

condition of the square at the end of the rod, and of the bearing butt-ends of the rod.

Replace the defective parts, if any.

In case the gland of the gearshift pedal shaft is to be replaced install a new gland with the aid of a mandrel Пр-1698.

Repairing the Speedometer Drive

The speedometer drive has to be repaired in case the teeth of the screw gear and the gland-mating surface of the elastic coupling disk are found to be defective.

The repairing procedure is confined, in this case, to replacemen

of the worn parts. When replacing the parts, ensure that the toothed members are free to rotate and a backlash is provided in the gearing (with the elastic coupling disk stopped in any position, the driven gear must have only a small backlash).

Repairing the Gearshift Mechanism and Other Component Parts Assembled in the Casing

A gearshift mechanism is shown in Fig. 18 and 23.

Dismantle the gearshift mechanism, wash its parts and examine for good condition. To disassemble the mechanism, proceed as follows:

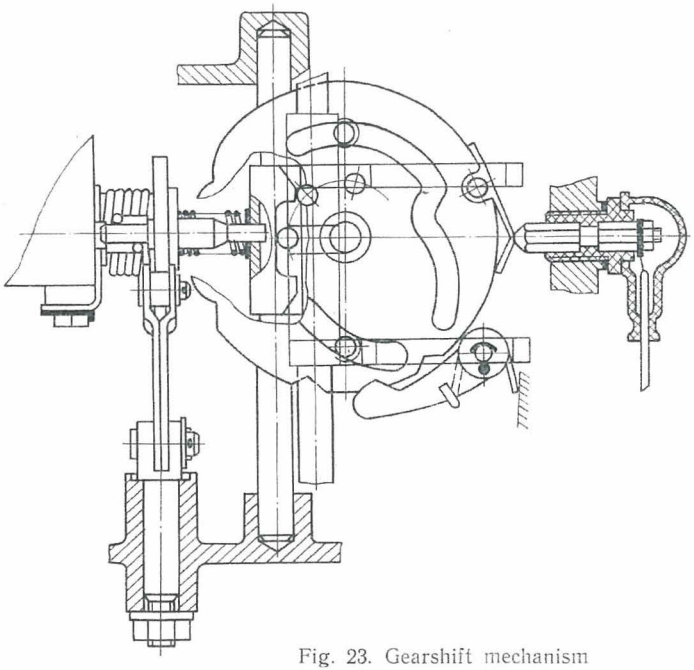


Fig. 23. Gearshift mechanism

draw off the catch and remove the gearshift disk from the axle;

extract the pawl spindle from the casing, then remove the pawl itself, the spring and spring-actuated washer;

uncotter the catch pin, remove the catch and its spring;

check the component parts for general working condition.

Make sure that the working surfaces of the gearshift mechanism pawl and the slot are not worn out or chipped. It is essential that the

gearshift disk pins and bushing are reliably secured in the disk The gearshift disk slots must have a clean surface.

The width of the slot must not exceed 7.8 mm.

Examine the crank pin and make sure that it is not loose, and its wear is not greater than 0.2 mm on one side, at the points conjugate with the pawl.

The working (shaped) surface of the crank must not be chipped

The crank should not swing loosely on the gearshift pedal shaft

When the crank has to be replaced, remove it from the shaft. For this purpose uncotter the slotted nut and, by lightly tapping the crank through an extension piece, remove the crank from the splines of the gearshift pedal shaft; take off the return spring and remove the gearshift pedal from the gear box.

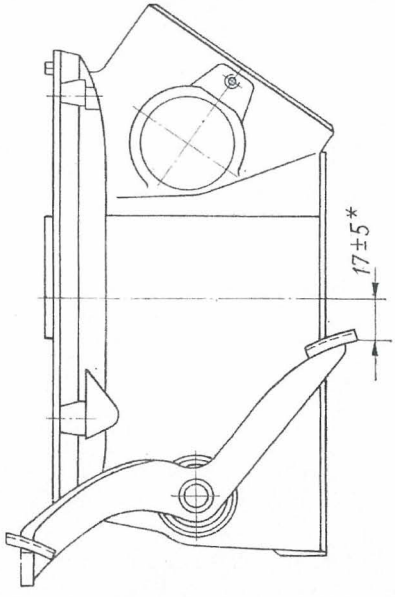


Fig. 24. Fitting the gearshift pedal
* To plane of shafts

Check the crank-and-gearshift pedal toothing for good condition Make sure that the catch and the pin on which the former is fitted are in good working order.

Re-assemble the gearshift mechanism in reverse order to dismantling.

Take care to ensure that the crank is correctly attached to the gearshift pedal shaft. With the crank in the middle position, the position of the pedal must correspond to the size specified in Fig. 24.

Install the pedal with the use of a template III-5521. In case the gland of the gearshift pedal shaft has to be replaced, install a new gland by means of a mandrel O-4531.

If the replacement of component parts is intended, disassemble the recoil buffers, whose parts are secured on two special bolts by means of cotter pins.

The reverse lever is fastened to the grooved conical end of the shaft; remove the lever from the cone by lightly tapping the butt of the threaded end with a soft metal hammer after first placing a gasket between the boss of the casing and the lever.

Install the lever after mounting the shafts, with the reverse shift fork in the end front position. In doing so, make sure that the spherical part of the lever catch is located on the (front) bevel.

Repairing the Cover and Component Parts Secured on it

Wash the cover assembly and examine the component parts. The inner lever must be located in the plane perpendicular to that passing through the locking pins.

The lever must swing freely on the pin fitted in the bracket, and the roller must be free to turn on the pin installed in the lever.

Dismantling and assembling of the cover do not require any special explanation. When replacing (pressing-in) the idle gear axle, observe the sizes specified in Fig. 25.

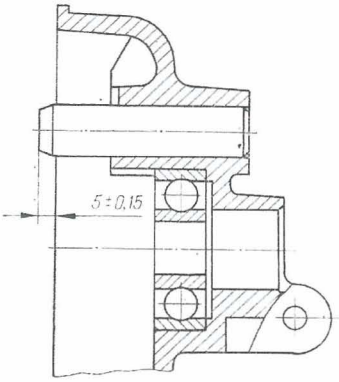


Fig. 25. Installing the idle gear axle

Repairing the Casing

Wash the casing assembly and examine its component parts.

Check the parts pressed into the casing for good condition, make sure that the casing itself and the parting plane are in good condition.

If necessary, replace the parts.

The sizes determining the position of the pressed-in parts in the casing and cover are listed in Fig. 26.

Repairing the Gear Box Shafts

Wash and examine all the shafts, check the bearings, the teeth of the gears and of the splined joints. The gears on the secondary shaft must rotate freely, without seizing, and the teeth of the gear-shift sleeves must not be too much worn.

If some of the parts are found to be defective, replace them, carrying out the necessary dismantling and assembling of the shafts.

Primary Shaft

Dismantle the primary shaft in the following order:

install the fourth speed gear on the knife-edges of an appliance ПУ-1697 and press out the shaft through a mandrel О-1696 (Fig. 27), remove the gland coupling, paperboard gasket, bearing and gear from the shaft;

remove the key from the slot;

install the third speed gear on the knife-edges of the same appliance, press out the shaft and remove the gear.

Re-assemble the shaft in reverse order, the only difference being that the third speed gear is first pressed on not to the full extent, but to that part of the shaft whose outer diameter is smaller, so that the gear is free to rotate on the shaft. Insert the key into the shaft slot and press on the fourth speed gear until it is engaged with the end face teeth of the third gear, following which press the both gears home.

Press on the bearing, fit the paperboard gasket and then the gland coupling.

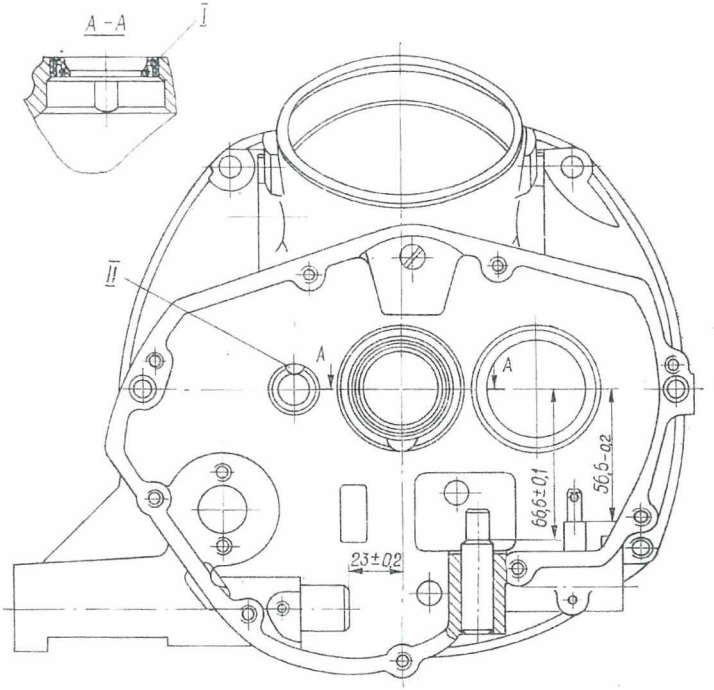


Fig. 26. Casing assembly:
I — gland to be press-fitted flush. Protruding or dipping of gland is not more than 0.2 mm; *II* — slot to be located in vertical plane ±3°

Secondary Shaft

Dismantle the secondary shaft in the following order:

If required, in case the bearings remain on the shaft, press out the splined end of the shaft from bearing No. 304, using an appliance Пр-1674 for the purpose.

Remove the rear washer, adjusting shims, if the latter were fitted during assembly, and the reverse gear.

Install the fourth gear on the knife-edges of an appliance ПУ-1697 and, using a mandrel О-1696, press the shaft out of front bearing No. 304.

Remove the front washer, fourth gear, gearshift sleeve and, if possible, the fourth gear bushing from the shaft.

Install the second gear on the knife-edges and, using a mandrel О-1696, press the shaft out of the front splined sleeve, remove the gears and gearshift sleeve, then extract two keys from the shaft slots, trim off the burrs on the edges of the key slots and remove two bushings of the second and third gears, if these can be removed manually. If not, the bushings are pressed off the shaft together with the rear splined sleeve.

Install the first gear on the knife-edges and press the shaft out of the rear splined sleeve.

Remove the first gear from the shaft, then extract two keys from the shaft slots, deburr the edges of the key slots and take out the first gear bushing.

Assemble the shaft in reverse order. When assembling, lubricate all the friction surfaces with engine oil.

On completing the assembly, make sure that all the gears are free to rotate around the shaft bushings.

After the last (bronze) bushing has been pressed on the shaft, check to see that it does not overhang from the cylindrical surface of the 22 dia. shaft. If the bushing does not overhang, the shaft is assembled correctly.

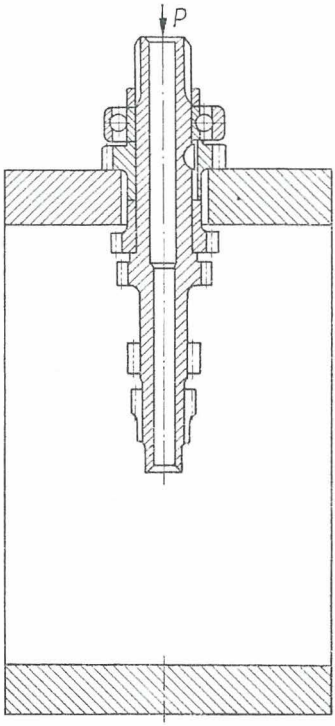


Fig. 27. Dismantling the primary shaft

Starting Mechanism Shaft

The shaft is disassembled with the help of a press. When assembling, ensure that the quadrant is installed correctly with respect to the shaft, in accordance with the sizes specified in Fig. 28.

VI. REPAIRING THE MAIN DRIVE

1. DISMANTLING AND ASSEMBLING THE MAIN DRIVE

Removal and Installation of the Propeller Shaft and Universal Joint

The propeller shaft with a sealing rubber ring is easily removable from the propeller shaft yoke.

On removing the propeller shaft, take down the universal joint in the following order:

unscrew the propeller shaft casing having a left-hand thread;

uncotter the key bolt nut, screw it off and, using a soft metal mandrel, drive out the key bolt;

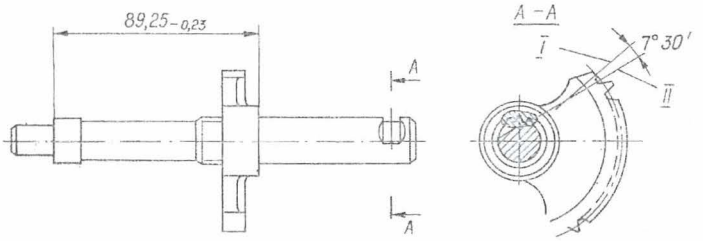


Fig. 28. Fitting the quadrant of the starting mechanism shaft:
I — tooth symmetry plane; *II* — slot on shaft

remove the universal joint from the driving gear shank (a rubber or bronze hammer may be used for tapping).

After dismantling, wash and inspect the propeller shaft and universal joint. If necessary, disassemble the universal joint, inspect it, make the necessary measurements and replace the worn parts (refer to the Section describing the repairing procedure). Re-install the universal joint and propeller shaft in reverse order.

When assembling, take care to ensure that the double-row radial thrust bearing of the driving gear is reliably tightened by the splined fork of the universal joint (with the aid of key bolt).

The gear shank is provided with a slot inclined to the gear axis.

When installing the splined fork on the gear shank, see that the boss with an opening (on the fork) is on that side of the slot edge which is closer to the shank end. Insert the key bolt from the boss side, with the skew towards the universal joint.

In case the set of adjusting shims, placed between the bearing and the universal joint fork, is selected correctly, the head of the key bolt, after tightening the nut, must be flush with the fork boss.

Dismantling and Assembling the Universal Joint

To disassemble the universal joint, proceed as follows:

remove the lock wheels of the universal joint bearings;

place a propeller shaft yoke under a hand press, and, by pressing in one of the needle bearings, slightly press out the opposite needle bearing (Fig. 29) through the universal joint cross;

grip the protruding portion of the bearing in a vice and extract the bearing from the yoke;

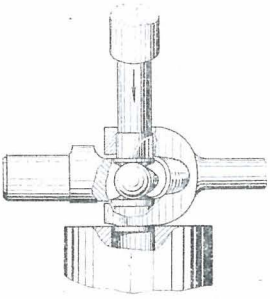


Fig. 29. Pressing out the bearings

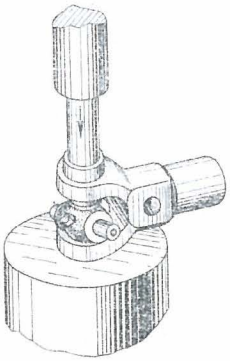


Fig. 30. Assembling the universal joint

turn the universal joint and, from the opposite side, press out the other needle bearing through the universal joint cross;

take off the girdles and sealing rubber rings from the universal joint cross pins and remove the propeller shaft yoke from the universal joint cross.

In a similar manner, press out the needle bearings from the splined fork of the universal joint, remove the girdles and sealing rings, take out the universal joint cross.

After dismantling, wash out and examine all the component parts, replace the defective parts, if necessary. Re-assemble the universal joint in the following order:

lubricate the inner surface of the needle bearings with grease and fit the needles into bearings;

insert the universal joint cross with the lubricator into the splined fork of the universal joint, as shown in Fig. 30;

fit the sealing rubber rings and girdles (which must cover the sealing rings) over the inserted pins of the universal joint cross;

press in the needle bearings, taking care to ensure that the universal joint cross pin enters the bearing without dislodging the needle. Care must be also taken that the bearing is not pressed in deeper than it is required for installation of the locking ring, otherwise the universal joint cross will be clamped by the bearings;

install the locking rings;

install the propeller shaft yoke on the second pair of the cross pins, with the lubricator towards the lubricating gun recess; in a like manner, fit the sealing rings, girdles press in the bearings and install the locking rings.

Dismantling and Assembling the Main Drive

To disassemble the main drive, do the following:

remove the brake shoes with the springs;

unscrew the plug of the filling hole, drain off the oil and wash the inner space with kerosene;

undo the screw securing the brake cam lever and remove the cam;

unscrew the dipstick;

undo the screws securing the gland cover, remove the cover and the collar rubber gland with the spring;

unscrew the nuts securing the casing cover, remove the washers and, by tapping the end of the driven gear hub with a copper hammer, remove the cover with the gasket and the driven gear-hub assembly;

remove the needle rollers (45 pcs) and adjusting bronze washer from the hub;

remove the driven gear-hub assembly from the casing cover. To do this, insert the rear wheel axle into the central opening from the side of the hub so that the axle is set against the distance bushing; holding the hub by hand, knock the cover off the bearing by tapping the axle end;

press out the ball bearing from the hub through three special holes made in it;

when pressing out, take care to prevent the bearing misalignment;

unscrew the nut fastening the driving gear bearing, turning the nut clockwise (left-hand thread);

install the casing in a vice and, by knocking out the radial thrust bearing through the slot in the casing by means of a copper drift, remove the gear;

remove the adjusting washers;

take out the needles of the driving gear needle bearing from the casing.

Replace the defective parts, if any.

Re-assemble the main drive in reverse order.

When fitting the needle rollers into the bearings, lubricate their seats with grease and take care not to let the rollers fall out during assembly of the mating members. Use a mandrel to fit the collar gland on the hub. In doing so, care must be taken to ensure that the drain hole in the casing is aligned with the special hole of the gland.

The main drive assembly is illustrated in Fig. 31.

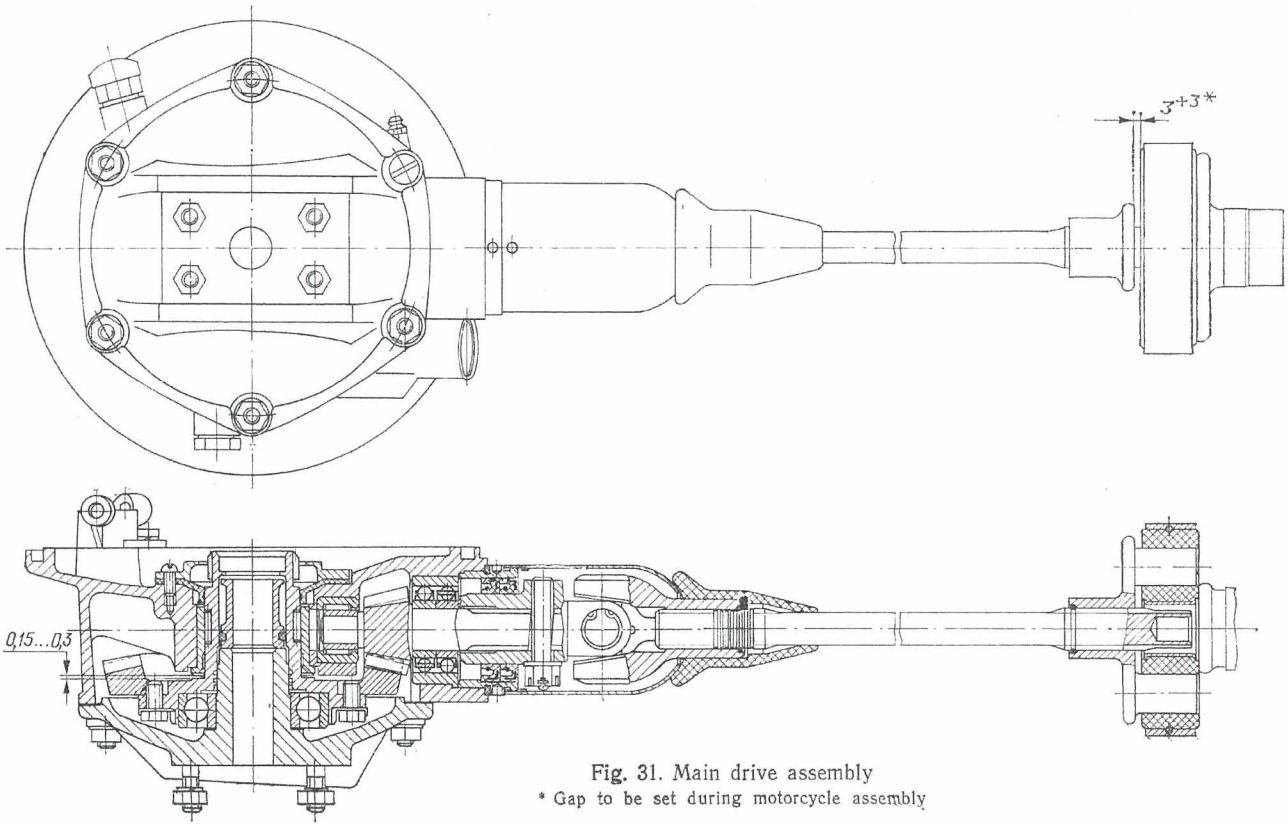


Fig. 31. Main drive assembly

* Gap to be set during motorcycle assembly

Table 9

Nominal Sizes, Tolerances and Interferences in the Basic Mating Members of the Main Drive and Propeller Shaft

Number and description of component part (shaft)	Nominal size and tolerance, mm	Number and description of mating member (opening)	Nominal size and tolerance, mm	Tolerance zone, mm			
				clearance		interference	
				minimum	maximum	minimum	maximum
72052-2 Double-row radial thrust ball bearing	$52_{-0.013}$	75005101-B Main drive casing	$52^{+0.030}$	0.000	0.043		
7205202-Б Driving gear of main drive	$20_{-0.014}$	72052-2 Double-row radial thrust ball bearing	$20_{-0.010}$		0.014		0.010
7205202-Б Driving gear of main drive	$13^{+0.019}_{+0.007}$	72052-1 Needle bearing	$13_{-0.010}$			0.007	0.029
72052-1 Needle bearing	$32_{-0.011}$	75005101-B Main drive casing	$32^{-0.007}_{-0.035}$		0.004		0.035
75005104-B Bushing of main drive casing	$54^{+0.065}_{+0.045}$	75005101-B Main drive casing	$54^{+0.030}$			0.015	0.065
207 GOST 8338—57 Ball bearing	$72^{+0.017}_{+0.004}$	7205229 Driven gear hub	$72^{-0.008}_{-0.040}$			0.012	0.057
72H05121 Main drive casing cover	$35^{-0.015}_{-0.040}$	201 GOST 8338—57 Ball bearing	$35^{+0.033}_{-0.015}$		0.013		0.060
7205229 Driven gear hub	$82_{-0.023}$	7205227-Б Driven gear of main drive	$82^{+0.030}$	0.000	0.053		
72053-2 Needle bearing	$19_{-0.009}$	75005314, 7205309 Universal joint forks	$19_{-0.023}$		0.009		0.023
7205311 Universal joint cross	$10_{-0.010}$	72053-2 Needle bearing	$10^{+0.035}_{+0.015}$	0.015	0.045		
72H05121 Casing cover	$146_{-0.040}$	75005101-B Main drive casing	$146^{+0.04}$	0.000	0.080		

2. REPAIRING THE MAIN DRIVE UNITS AND COMPONENT PARTS

When repairing the main drive units and component parts, proper attention should be given to ensure the correct clearances and interferences between the mating parts in accordance with the data listed in Table 9.

In order to determine whether some of the parts are good for further usage, refer to Table 10 listing the maximum permissible values of wear and clearances in the basic mating members.

Repairing the Propeller Shaft and Universal Joint

The propeller shaft and universal joint are subject to repairs in case any faults are detected during their operation (the propeller shaft bent, universal joint parts or elastic coupling worn).

Inspect all the component parts and especially the mating surfaces, check the following parts for good condition:

coupling of the flexible universal joint;
splines of the propeller shaft;
needle bearings of the universal joint cross;
universal joint forks.

Replace the defective parts.

Table 10

Maximum Permissible Values of Wear and Clearances in the Basic Component Parts of Main Drive

Component Parts	Maximum permissible	
	wear, mm	clearance, mm
Splines of driven gear hub (as to tooth thickness)	0.75	
Universal joint cross journals (as to diameter)	0.05	
Main drive gears (as to tooth thickness)	0.15	
Driven gear hub bearing (as to diameter)		0.12

Repairing the Main Drive

Before attempting to dismantle the main drive, measure the backlash between the teeth of the bevel-gear pair, which backlash must be within 0.1 and 0.3 mm.

During external inspection, particular care should be taken to check the condition of the following parts:

packing glands;
casing bushing used as an outer race of the roller bearing of the driven gear hub;
running surface of the roller bearing and the splines of the driven gear hub;
bearings;
teeth of the bevel gears;
threaded joints.

Replace the parts that are excessively worn or defective. The bevel gears should be replaced only by pairs, as made up by the Manufacturer.

To remove the radial thrust bearing from the driving bevel gear, use an appliance ПР-1363.

In order to press out the outer race of the needle bearing from the casing, heat the latter up to 75—90°C and, using a lifter ПР-1361, remove the bearing race.

To press out the casing bushing which is used as an outer race of the roller bearing of the driven gear hub, first heat the casing up to 75—90°C.

After repairing and assembling the main drive, in case replacement of the gears has been carried out, check the backlash in the gearing. The backlash is set by placing adjusting washers between the ball bearing of driven gear hub and the casing cover.

VII. REPAIRING THE WHEEL

Prior to repairing the removed wheel, check the following:
wear of the tyre (signs of damage on it);
absence of cracks and dents on the rim;
wear of the brake drum surface;
condition of the tapered roller bearings;
radial and lateral run-out of the rim and tyre;
availability of the spokes and their uniform tensioning.

The wheel hub bearings are checked for good condition by rotating the tightened axle and rocking it in the wheel rather than by rotating and rocking the wheel on the axle, since in the latter case the overtightening of the bearings may not be noticed owing to the great mass of the wheel.

The axle must rotate freely, without any noticeable play and seizing, producing no clicks, etc.

The following radial and lateral run-outs are permissible during rotation of the wheel: for wheel rim — not greater than 1.5 mm, for tyre — not greater than 3 mm. Repair the wheel, if found defective.

1. DISMANTLING AND ASSEMBLING THE WHEEL

Removal and Re-fitting of the Tyre

To remove the tyre from the wheel, proceed as follows:

unscrew the valve cap and deflate the tyre by screwing out the valve core; undo the nut securing the removable valve to the rim and push the valve inside the tyre;

place the wheel with the brake drum down and press out the tyre sides so as to make them separate from the sides of the rim;

at a point approximately 1/4 of the circumference from the tube

air-valve, depress the tyre bead into the middle recess of the rim and, working with tyre irons on the diametrically opposite side, seize the tyre bead and draw it over the rim edge. To facilitate the operation with tyre irons, lubricate their ends with liquid soap;

by successively moving the tyre irons around and pressing down the tyre beads into the rim recess on the diametrically opposite side, gradually remove the entire bead of the tyre. When separating the tyre bead from the rim, take care not to pinch the tube with tyre irons. Avoid using too great an effort as this may break the tyre bead wire. Also, take care to ensure that the tyre bead which has not yet been removed on the diametrically opposite side, rests in the middle recess of the im and the inner tube does not interfere with this position of the bead (that the tube is not pinched);

after separating one side of the tyre from the rim, pull the tyre off (preferably near the location of the tube valve) and take out the tube and rim band.

To completely remove the tyre from the wheel rim, proceed as follows: holding the wheel vertically, insert the tyre iron at the side of the tyre bead that has not yet been removed, lever it off the opposite bead of the rim with the end of the tyre iron and force the tyre bead outwards (in doing so, also see that the tyre bead not removed on the diametrically opposite side rests in the rim recess). Moving the tyre irons around, remove all the tyre from the rim.

After dismantling, examine the tyre and tube, check them for the absence of punctures and other signs of damage, make sure that the inner surface of the tyre is free of sharp objects that may stick to it. Whenever necessary, repair the tyre or tube or replace them.

Re-fit the tyre and tube in the following order:

powder the inner surface of the tyre with talcum;

fit the rim band, ensuring that the hole made in the band for the valve is matched with the hole in the rim. See that the rim band completely covers all the heads of the nipples and the spokes do not stick out of the nipple heads;

push a part of the tyre bead into the rim recess and fit the entire bead of tyre by means of tyre irons;

insert the tube valve into the rim hole, screw a fastening nut onto the removable valve by two or three threads; insert the valve core into the tube valve, slightly pump up the tube and push it into the tyre. Care must be taken to avoid creasing of the tube;

fit the other bead of the tyre, starting working from the side opposite to the valve. In doing this, see that the fitted part of the bead enters the rim recess. As a rule, about $^2/_3$ of the bead is fitted manually, the remaining part being fitted by means of tyre irons. When using tyre irons, take care to prevent pinching and, consequently, damage to the tube. To facilitate the re-fitting operation, the tyre bead may be slightly lubricated with liquid soap. When refitting the tyre bead, avoid applying too great an effort as this may break the bead wire.

After the tyre beads have been fitted, slightly press down the valve inwards, pump up the tube and tap the tyre all round with a rubber hammer so that it is uniformly seated in the rim recess. Screw the valve nut home. Inflate the tube to the required pressure and screw on the cap.

The wheels may be equipped with inner tubes having rubber-metal valves that are fitted without using a check nut. Whenever necessary, the valve may be held in place by means of a threaded union of a pump. Make sure that the tyre is correctly set on the rim (centring marks must be equidistant from the rim all around the tyre circumference).

Tyre pressure, kgf/cm²:	
front wheel and sidecar wheel	1.5+0.1
rear wheel	2.6+0.1
spare wheel	2.6+0.1

Dismantling and Assembling the Wheel Hub

To disassemble the wheel hub, proceed as follows:

ease off the check nut, unscrew the nut of the gland and remove the left-hand distance bushing;

insert the wheel axle from the side of splines, press out the extreme bearing from the wheel hub, remove the intermediate bushing, inner race of the second roller bearing and the right-hand distance bushing;

using a mandrel ПР-1117, press out the thrust washer and outer race of the roller bearing.

After dismantling, wash the component parts and examine them for good condition, replace the defective parts, if any.

Re-assemble the hub in the following order:

insert the thrust washer and the right-hand distance bushing into the hub, ensuring that the bushing shoulder enters the recess of the thrust washer;

press in the bearing outer race with the smaller diameter of the taper hole towards the thrust washer. The bearing must be pressed against the thrust washer. Insert the inner race of the bearing together with rollers after first lubricating them with grease 1-13 GOST 1631—61;

insert the intermediate bushing into the opening of the hub after first filling the inner space of the hub to $^1/_3$ of its capacity with the above-mentioned grease;

lubricate the second roller bearing with the same grease and press it in, with the smaller diameter of the outer race towards the hub nut;

insert, from the side of the bearing, the left-hand distance bushing into the nut assembled with the gland, screw the nut home to tighten up the bearings;

screw off the nut by $^1/_{10}$ turn and tighten up the check nut.

After assembling, check the bearings for proper tightening and, if necessary, perform the required adjustments.

To check the bearings for proper tightening, proceed as follows:

insert the wheel axle into the assembled hub and, using the nut, tighten the inner bushings and races of the bearings on the axle with the aid of an additional bushing;

by turning and rocking the wheel axle, make sure that it rotates freely, without any noticeable play.

The axial play must be within 0.04 and 0.07 mm.

If necessary, unscrew the chuck nut and adjust the bearings for proper tightening.

2. REPAIRING THE WHEEL ASSEMBLIES AND COMPONENTS

Repairing the Tyre and Inner Tube

Inspect the tyre that has been removed. If its tread is worn, the side walls damaged, cord ruptured and bead wire broken, replace the tyre.

In exceptional cases when the cord inside the tyre is slightly damaged, the latter should be repaired at special maintenance shops. When inspecting the tyre, make sure that its inner surface is free of sharp objects stuck to it, which may subsequently cause a puncture of the inner tube.

After inflating the removed tube, check it for the absence of air leakage. In case air leakage is found at the valve, tighten up the nut securing the valve.

If the tube is punctured, apply a patch to the damaged spot, using a vulcanization method. Replace the tube, if badly damaged.

Repairing the Wheel Hub

Repair the wheel hub in case the following parts are worn:

working surface of the brake drum;

tapered roller bearings;

splined rim of the hub;

or if other faults are found making impossible the further usage of the wheels.

In case the working surface of the brake drum, bearings, splines are worn or other signs of damage are detected, replace the defective parts with new ones.

Replacing the Rim and Spokes

If any cracks or dents are found on the rim, replace it in the following order:

using a wrench B_3-4503, screw out all the nipples from the spokes, remove the spokes and inspect them. Replace the spokes and nipples, if defective;

insert 20 spokes into the openings on one side of the wheel housing;

place the wheel housing and the rim on a work bench, connect the spokes to the rim by manually screwing on 20 nipples. Take care to ensure that the valve hole in the rim is located diametrically opposite the lubricator on the wheel housing;

insert 20 spokes into the openings of the wheel housing on the other side and connect the spokes to the rim in the same manner.

The arrangement of the spokes is shown in Fig. 32.

After all the spokes are fitted, uniformly screw up all the nipples and tension the spokes.

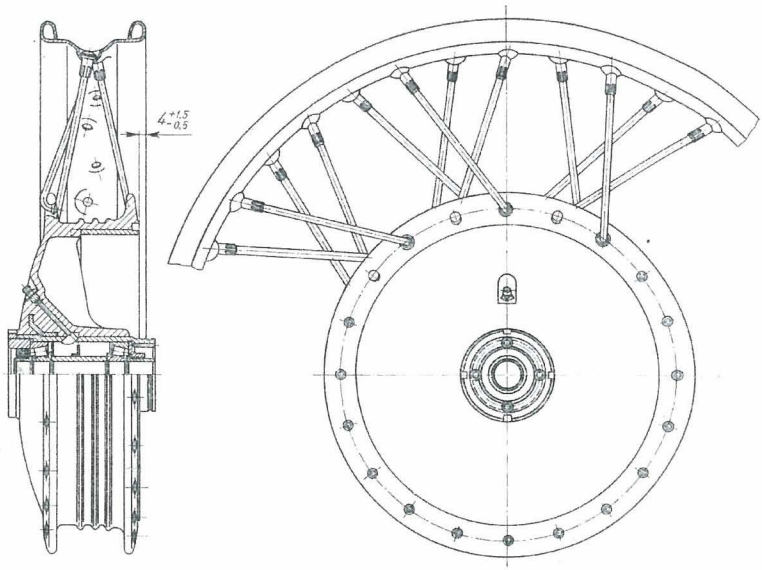


Fig. 32. Wheel

By tensioning the spokes, adjust the axial and radial run-out of the rim with respect to the wheel axle, the run-out must not be greater than 1.5 mm. Check the spokes for proper tensioning by the sound.

Before performing the adjustment, tap down the spoke heads in the nests. When tensioning the spokes, ensure that the distance between the brake drum end face and the rim is equal to $4^{+1.5}_{-0.5}$ (refer to Fig. 32).

After the spokes are tensioned and the wheels centered, all the projecting ends of the spokes must be removed to be flush with the nipple head.

The wheels must be also checked for proper centring when replacing the spokes that are bent or broken. Newly fitted spokes must be tensioned to the same degree as the remaining spokes. If other spokes are found to be loose, tighten them up.

VIII. REPAIRING THE FRONT FORK

1. DISMANTLING AND ASSEMBLING THE FRONT FORK

The front fork may be subjected to partial disassembly and repairs without removing the entire fork.

Dismantling and Assembling the Fork Leg

To disassemble the front fork leg, proceed as follows:

undo the screw in the fork leg end piece and drain the oil;

unscrew the clamp nut securing the fork leg tube to the traverse, by slightly pulling up the shock absorber rod, slacken the check nut of the rod and unscrew the clamp nut from the shock absorber rod;

insert the front axle into the fork leg end piece and, using a radius wrench, unscrew the gland housing assembly;

remove the fork leg end piece together with the shock absorber and spring from the fork leg tube;

remove the spring rings securing the lower bushing of the fork leg tube, remove the lower bushing, take down the upper bushing of the fork leg tube, remove the housing together with the gland;

screw off the nut of the bridge coupling bolt by two or three turns and take out the fork leg tube by moving it down (to facilitate this operation, it is permissible to screw the clamp nut on to the end of the fork leg tube by four — five threads and drive the tube out of the traverse cone by slightly tapping it with a rubber hammer).

Wash the removed assemblies and components in kerosene and thoroughly inspect them, replace the defective parts, if any.

Re-assemble the fork leg in reverse order after first lubricating the friction members with automotive engine oil. To mount the gland housing on the tube, use a mandrel O-4337.

When screwing the shock absorber rod into the clamp nut and securing the rod, take care to ensure that the clearance between the nuts on the rod and the upper end piece of the spring (axial clearance) is within 0.2 and 0.5 mm.

Before screwing up the clamp nut securing the fork leg tube in the traverse, screw up the lower screw used for draining oil from the fork leg end piece and, from above, fill 130 cm^3 of automotive engine oil АКп-10 (to be used in summer) into the fork leg tube.

In the winter time, at sub-zero temperatures, use oil АКЗп-6 GOST 1862—63.

When screwing up the clamp nut, ease off the nut of the fork bridge coupling bolt and screw it up only after the clamp nut has been screwed up, in order to ensure a tight fit of the taper joint in the traverse.

Dismantling and Assembling the Front Fork Shock Absorber

To dismantle the front fork shock absorber, proceed as follows: using a socket wrench, unscrew the bolt securing the shock absorber body and located at the lower part of the fork leg end piece, remove the shock absorber washer and gasket washer fitted under the bolt, take out the shock absorber together with the spring. Undo the upper nut on the shock absorber rod, unscrew the upper end piece from the spring. Remove the spring, screw off the upper end piece of the shock absorber tube and extract the rod. Wash the removed parts with kerosene and inspect them. Replace the defective parts. Re-assemble the front fork shock absorber in reverse order. The axial clearance between the nuts and the upper end piece of the spring must be within 0.2 and 0.5 mm. Make sure that the pin of the shock absorber body enters the special hole of the fork leg end piece and the packing aluminium washer, placed under the washer of the bolt securing the shock absorber, fits closely to the end piece, thus ensuring the required air-tightness.

The shock absorber installed in the end piece of the fork leg must be kept in a position concentric with the internal surface of the end piece tube. Permissible deviation of the upper end of the shock absorber tube (concentricity tolerance) must be not greater than 0.5 mm.

2. REPAIRING THE FRONT FORK COMPONENT PARTS

Clearances and interferences for the mating members are given in Table 11.

The maximum permissible values of wear and clearances in the basic mating members are presented in Table 12.

The front fork has to be repaired in case any faults are detected rendering impossible the further usage of the fork, and also in the case of a total disassembly or reconditioning of the entire motorcycle.

Inspect all the component parts and mating surfaces. Check the following:

front fender and casings for the absence of cracks and mechanical damage; eliminate the detected faults and, if necessary, paint the repaired surfaces;

traverse and bridge for the absence of cracks, breaks or bending (replace the defective parts);

fork leg bushings for the absence of cracks, chipped surfaces, wear of friction surfaces, etc.;

Table 11

Nominal Sizes, Tolerances and Interferences in the Basic Mating Members of the Front Fork

Number and description of component part (shaft)	Nominal size and tolerance, mm	Number and description of mating member (opening)	Nominal size and tolerance, mm	Tolerance zone, mm				Remarks
				clearance		interference		
				minimum	maximum	minimum	maximum	
75008120 Lower bushing of fork leg tube	$42^{-0.032}_{-0.100}$	75008007 Right-hand end piece of fork leg	$42^{+0.100}$	0.032	0.2			
75008101 Fork leg tube	$36^{-0.075}_{-0.160}$	75008120 Bushing of fork leg tube	$36^{+0.100}$	0.075	0.26			
75008101 Fork leg tube	$36^{-0.075}_{-0.160}$	75008113 Upper bushing of fork leg tube	$36^{+0.100}$	0.075	0.26			
75008113 Upper bushing of fork leg tube	$42^{-0.032}_{-0.100}$	75008007 Right-hand end piece of fork leg	$42^{+0.100}$	0.032	0.200			
7208151 Steering column bar	$28^{+0.145}_{+0.100}$	6208155-A Steering column bridge	$28^{+0.045}$			0.055	0.145	
6208155-A Steering column bridge	$34^{+0.015}_{-0.01}$	7208 1-2 Radial thrust bearing without cage	$34^{-0.012}$		0.010		0.027	

fork leg tubes for the absence of bending, cracks and wear of friction surfaces;

thrust bearings — make sure that their races are not cracked, chipped or pitted (replace the defective parts);

glands for condition of their working edges.

Table 12

Maximum Permissible Values of Wear and Clearances in the Basic Mating Members of Front Fork

Component parts	Diameter wear, mm	Clearance, mm
Lower bushing of fork leg	0.15	
Fork leg end piece	0.15	
Lower bushing of fork leg — fork leg end piece		0.30
Upper bushing of fork leg	0.30	
Fork leg tube	0.20	
Upper bushing of fork leg — fork leg tube		0.50

IX. REPAIRING THE FRAME

Check the motorcycle frame for good condition. Before inspection, wash the frame to remove dirt and oil. The motorcycle frame is subject to repairs in case mechanical damages are detected — breaks, cracks or some other faults which make impossible the further usage of the frame. If badly damaged (large cracks or breaks), the frame or some of its parts has to be replaced. If the cracks or other damages are negligibly small, weld up the cracks and remedy the damaged places. It is good practice to reinforce the damaged places with butt straps. The repaired places must be thoroughly cleaned off and painted.

X. REPAIRING THE REAR SUSPENSION

1. DISMANTLING AND ASSEMBLING THE REAR SUSPENSION

The rear suspension consists of two shock absorbers of the rear wheel levered suspension, and rubber bushings.

Dismantling and Assembling the Shock Absorber

When dismantling and assembling the shock absorber, take care to ensure that the working place, tools and accessories are as clean as possible in order to avoid fouling and damaging the component parts of the shock absorber.

To disassemble the shock absorber, proceed as follows:

grip the lower end piece in a vice with the shock absorber in a vertical position (if a vice is not available, fit the lower end piece of the shock absorber on some plate 25 mm wide);

pressing down the upper casing, compress the shock absorber spring by 5 to 10 mm and remove the slide blocks;

remove the upper casing, spring and lower casing (Figs. 33 and 34);

using a special wrench, unscrew the nut of the reservoir, grasp the upper end piece of the rod and pull it up with jerks. This must cause the rod together with the piston, bearing, cylinder and lower valve body to move outwards. If this method of removal (with light jerks) does not help, then slightly raise the nut of the reservoir and carefully extract the sealing ring;

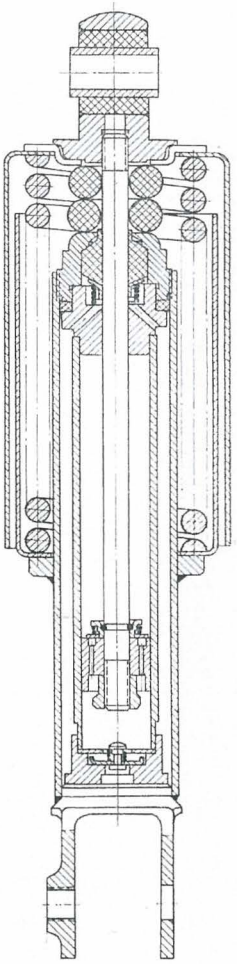


Fig. 33. Shock absorber

immerse the rod together with the cylinder and lower valve body into kerosene or petrol and, holding the cylinder with the left hand, rock the rod up and down several times with the right hand until no stiffness is felt in the movement of the piston. After taking out the cylinder with the rod from the kerosene, grasp the rod with one hand, and the cylinder with the other, and, by sharply pushing the rod, drive the bearing out of the cylinder;

attach the rod to the end piece in the vice, screw off the nut, remove the piston, valve, spring and stop; first part the locking ring by means of a screwdriver or pliers and then take it off. Next, remove the following: the bearing, gland spring, gland washer, nut together with gland, and buffers. Be careful when removing the nut with the gland since the gland edges may be damaged by the thread at the end of the rod;

press the gland out of the nut;

insert a copper or wooden drift of 15 to 19 mm dia., having a 5 to 7 mm dia. recess at its lower end, into the shock absorber cylinder.

Holding the cylinder by hand, strike the drift with a hammer and remove the suction valve body from the tube.

Thoroughly and carefully wash the dismantled parts in kerosene, particular care should be taken to check them for the absence of dents, scores, signs of wear, cracks, fluid leakage from the reservoir. Replace the defective parts, if any.

Re-assemble the shock absorber in reverse order.

When fitting the nut with gland on the rod, use a special mounting jig B_3-4637 to avoid damage to the rubber gland.

To ensure the proper operation of the shock absorber, fill the latter with 70 cm³ of damping fluid (105 cm³ for the shock absorbers released in 1973). Industrial oil 12 (spindle oil 2) is used as a damping fluid. Also, automotive engine oil 10 (avtol) mixed with kerosene (75 to 80% of avtol, the rest being kerosene) or 50% of turbine oil "22" and 50% of transformer oil may be used for the purpose.

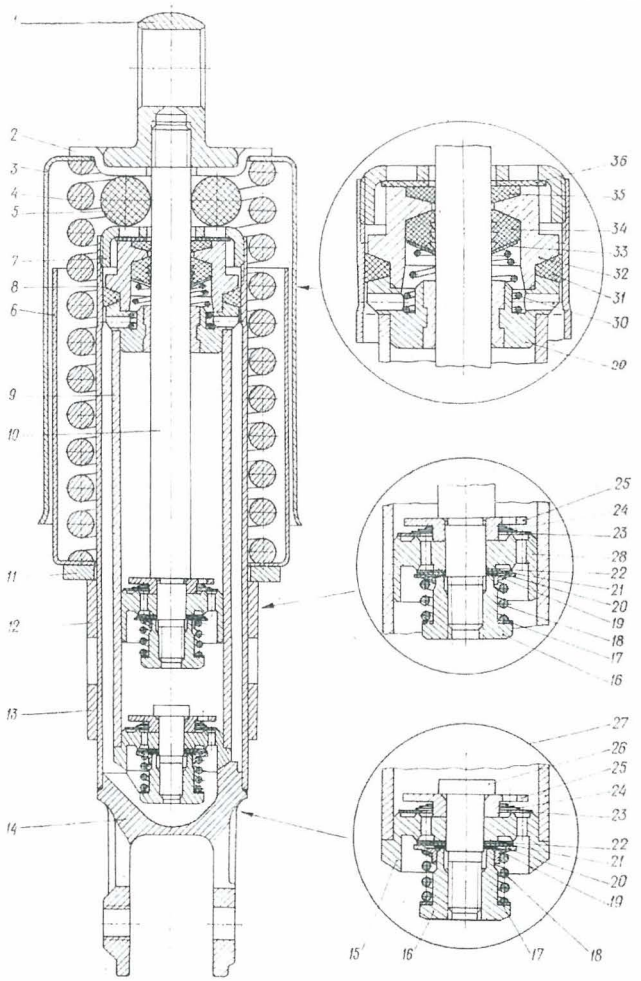


Fig. 34. Shock absorber (1973 model)

The fluid should be poured in only after the shock absorber body is gripped in a vice and set to a vertical position, with the cylinder-and-suction valve body assembly installed in the shock absorber body.

Insert the rod together with the piston, bearing and nut into the cylinder. Carefully lay down the sealing ring, using some sharp object for the purpose.

Screw the reservoir nut home (if correctly assembled, the screw thread of the nut must protrude by not more than one thread or be sunk the same distance).

After the reservoir nut is screwed in, rock the rod with the piston by hand to remove air from the working cylinder.

When dismantling or repairing the shock absorbers, check to see that the silent-blocks are properly secured and in good working order; if their rubber are found to be damaged, replace them.

Removal and Installation of the Rear Suspension Lever

To remove the rear suspension lever, proceed as follows:

unscrew the bolts tightening the rubber bushings, remove the outer covers and fixing washers; take out the outer rubber bushings;

unscrew the nuts of coupling bolts of the rear suspension lever and remove the inner coupling bolt;

remove the left-hand journal;

press the lever at the base in the left-hand direction, turn the lever end to the right and take the lever out.

On removal, wash the rear suspension lever and check it for damage.

Take care to check whether the rubber bushings are intact. Replace the defective bushings.

Re-assemble the rear suspension lever in reverse order. The silent-blocks should be tightened with the rear suspension lever in a horizontal position, taking care to ensure that the silent-block inner bushes are reliably tightened.

XI. REPAIRING THE HANDLEBAR AND CONTROL CABLES

1. DISMANTLING AND ASSEMBLING THE THROTTLE CONTROL GRIP

To dismantle the throttle control grip, proceed as follows:

undo the screw securing the body cover, remove the body cover and withdraw the cable end pieces from the slider;

unlock the screw securing the body and screw it off a few turns. Remove the grip from the handlebar;

move aside the handlebar rubber grip and protective washer, take out the locking ring and move aside the inner washer;

unlock the adjusting screw, undo it and remove the grip tube, together with the chain and slider, from the body.

Wash and examine the dismantled parts. Replace the defective parts, if any.

Re-assemble the throttle control grip in reverse order. When assembling, the body of the throttle control grip should be lubricated with grease at the points of grip tube rotation and slider movement.

2. REPAIRING THE CLUTCH AND BRAKE CABLES AND LEVERS

Whatever repairs of the motorcycle may be undertaken, always check the cables for good condition.

If only a single wire of the cable is found to be ruptured or the cable sheath is pinched, drawn or broken, replace the cable or its sheath. In case the cable-to-end piece connection is disturbed (the end piece pulled off the cable), solder a new end piece, after first drawing apart the wires at the end of the cable to ensure a better connection.

The handlebar levers must be screwed onto their bases without play, but in such a way that they can freely turn on their axles.

When inspecting the handlebar, proper attention should be given to the attachment of handlebar brackets to the fork traverse. Check for the absence of cracks at the base of the bracket which is used to secure the handlebar to the traverse.

Replace the brackets, if found defective. To remove the brackets from the handlebar tube, screw off the nuts of the bolts fastening the handlebar tube with the brackets, insert a wedge plate into the slot of the bracket and, by driving the plate in, widen the slot in such a way that the bracket can be removed from the handlebar tube. Fit the brackets in the reverse sequence of operations.

XII. REPAIRING THE FUEL SUPPLY SYSTEM

1. DISMANTLING AND ASSEMBLING THE K-301B CARBURETTOR

To dismantle the carburettor, proceed as follows:

undo the screws securing the float chamber cover, remove the cover and take out the float with the obturating needle;

undo the screws securing the cover of the carburettor throttle, remove the cover, extract the spring, take out the flat throttle with the dosing needle;

unscrew the plug and screw out the main jet;

screw out the idling jet;

screw out the idle adjustment screw;

unscrew the plug and remove the carburettor filter.

Thoroughly wash the dismantled parts, blow through the channels with compressed air, inspect the parts, check the float for airtightness and the carburettor fastening flange for flatness.

The jets must never be cleaned with a steel wire.

After the inspection has been completed and required repairs performed, re-assemble the carburettor in reverse order.

2. REPAIRING THE FUEL SUPPLY SYSTEM UNITS

Repairing the Petrol Tank

Belated reconditioning of the petrol tank, especially in the case of petrol leakage, may lead to grave consequences — inflammation of petrol that may get on the hot parts of the engine.

Inspect the petrol tank and check it for the absence of cracks, dents, scaling paint and other defects. Check the petrol tank for air-tightness under a pressure of 0.4 kgf/cm^2 by immersing it into water.

In case any cracks are detected, weld them up after thoroughly washing the tank with soda solution.

The spots where the paint has scaled off should be thoroughly cleaned and re-painted.

Repairing the Petrol Cock and Hoses

The petrol cock should be checked for air-tightness when turned off, and for full flow of petrol into the hoses, when open.

In the case of poor air-tightness, dismantle the petrol cock and grind in the plug with paste, following which thoroughly wash out the petrol cock.

Disassemble the settler and clean out the filter, wash it in petrol. Inspect the petrol hoses and make sure they are not swollen with petrol, replace the hoses, if necessary.

Repairing the Carburettor

The carburettor has to be repaired and, consequently, disassembled only when this is indispensable for the correct and reliable operation of the motorcycle. During external inspection of the carburettor that has been subjected to partial or total disassembly, particular care must be taken to check the wear of the throttle, air-tightness of the float, flatness of the carburettor fastening flange.

If the flange surface is bent, level it by filing.

The float that has lost its air-tightness must be replaced by a new one. In exceptional cases, it is permissible to carefully solder the float after first drying it. In doing so, avoid increasing the weight of the float by excessive amount of solder.

The jets must be checked and, if necessary, selected of proper size, using only special devices.

XIII. REPAIRING THE INTAKE AND EXHAUST SYSTEMS

The intake and exhaust systems (air filter, air choke, inlet branch pipes, exhaust pipes and silencers) should be repaired as needed, when inspecting them during partial or total disassembly of the motorcycle, and also when any defects are found that make impossible the further usage of the intake and exhaust systems.

XIV. REPAIRING THE SIDECAR

The sidecar has to be repaired in case its fastenings are found to be worn or some of its component parts and units have been damaged in service.

1. DISMANTLING AND ASSEMBLING THE SIDECAR

In order to detach the sidecar body, proceed as follows:

unscrew the nuts (3 pcs), securing the beams of the body rear suspension to the rear tube of the frame after first removing the seat back and cushion from the body;

take out the mat and unscrew the nuts of the bolts of the front fastening of sidecar body to the frame, remove the clamps and suspension cushions;

remove the sidecar body from the frame.

After performing the required repairs, re-assemble the sidecar in reverse order.

To remove the sidecar wheel shock absorber, do the following:

place a support under the sidecar frame so that the wheel is raised above the ground, remove the sidecar wheel;

unscrew the lower and upper bolts securing the shock absorber after which remove the shock absorber.

In order to detach the wheel suspension lever from the frame proceed as follows:

unscrew and remove two coupling bolts of the lever axle;

loosen and extract the bolts located at the ends of the axle and tightening the rubber bushings of the lever;

knock out the pin (journal) from the lever axle.

Following that, disengage, by turning out the lever, the left-hand journal of the axle from the frame hinge.

On dismantling, wash and clean the component parts.

Re-assemble the lever together with the frame in reverse order.

Dismantling of the remaining assemblies and their re-assembling are so simple that do not require any special explanations.

2. REPAIRING THE SIDECAR

Repairing the Sidecar Body

The sidecar body should be repaired in case cracks or other mechanical damages are found on it or when re-painting is intended.

All the crumpled places must be dressed, the cracks to be welded up.

At the points of cracks, strengthening straps may be welded on the inside for reinforcement.

After welding, trimming and dressing, it is necessary to paint the repaired places or re-paint the entire body.

It must be borne in mind that the component parts are painted by the Maker with baking enamels type МЛ-12.

Repairing the Sidecar Frame

The sidecar frame should be removed in the case of a total disassembly of the motorcycle, for the purpose of re-painting, and also when any faults are detected in service.

If, during disassembly, some of the component parts are found to be broken or worn out, these must be replaced by new ones.

In case the frame itself is cracked or broken, weld up the cracks using reinforcing straps or gusset plates.

XV. ELECTRICAL SYSTEM DEVICES

1. STORAGE BATTERY

Specifications

	MT9	MT10
Type	3MT-12	3MT-6 (2 pcs *)
Rated voltage, V	6	12
Discharge current at 10 hour discharge rate, A	1.2	0.6
Capacity at 10 hour discharge rate, A·h	12	6

The above data correspond to the specific gravity of electrolyte at the beginning of discharge, equal to 1.28±0.010 and average electrolyte temperature of 30°C.

Before checking the storage battery, thoroughly wipe its outside with a cloth moistened with a 10 per cent solution of ammonia spirit or soda solution. Particular care should be taken to carefully wipe, on removal the cover, the upper surface of the storage battery cells.

Checking the Storage Battery for Condition

Tools and accessories to be used:

densimeter with a syringe and scale ranging from 1.10 to 1.32, the scale division being equal to 0.01;

thermometer with a scale from —30°C to +65°C;

battery cell tester;

glass tubule for measuring the level of electrolyte.

Check the following:

absence of electrolyte leakage;

degree of battery discharge;

level of electrolyte;

capacity and voltage drop of a fully charged battery.

When inspecting, make sure that the battery is intact, the cells are free of cracks, and the output terminals are reliably connected to the wire terminals.

The degree of battery discharge is determined from the specific gravity of the electrolyte (if the initial specific gravity of a fully charged battery is known or if electrolyte was not added during usage) or by using a battery cell tester.

* Two storage batteries 3MT-6 on motorcycle MT10 are to be connected in series.

Determining the Degree of Discharge from Specific Gravity of Electrolyte

Specific gravity of electrolyte at +15°C		
fully charged battery	25% discharged	50% discharged
1.290 1.270	1.260 1.240	1.230 1.210

In case measurements are made at temperatures other than specified, the densimeter readings should be corrected (by adding or subtracting) in accordance with the Table given below:

Electrolyte temperature, °C	+45	+30	+15	0	—15	—30	—45
Correction for densimeter reading	+0.02	+0.01	0	—0.01	—0.02	—0.03	—0.04

Fluctuations in the specific gravity of the battery cells must not be greater than 0.01.

In order to measure the specific gravity of electrolyte, proceed as follows:

unscrew the plug from the cover of a battery cell;

draw in some electrolyte with the densimeter syringe;

by means of a thermometer, measure the temperature of the electrolyte in the cell;

determine the specific gravity of electrolyte on the basis of densimeter readings corrected for temperature.

The level of electrolyte over the plates should be measured by means of a glass tubule inserted into the filling hole of each cell, for which purpose proceed as follows:

unscrew the plug from the battery cell cover;

lower the tubule until it is against the protective shield;

close the upper end with the finger;

take out the tubule.

The level of the electrolyte must be 10 to 12 mm above the protective shield.

The storage battery capacity is determined after full charging followed by 10 hour rate of discharge, the discharge current being equal to 1.2 A for 3MT-12 and 0.6 A for 3MT-6. In this case the final voltage must be within 1.7 V for each of the cells.

If the voltage is below the specified figure, this means that the battery is faulty.

To fully charge the battery being checked, proceed as follows:

add distilled water into the cells up to the required level;

charge the battery with 1.5 A current in the case of 3MT-12

battery or 0.5 A current in the case of 3MT-6, until intensive gassing takes place in all the cells, at constant specific gravity of the electrolyte and constant voltage in all the cells, within two hours.

Unserviceable storage batteries should be repaired and new batteries charged at specialized maintenance shops, the charging to be carried out in full compliance with the instructions supplied with the batteries.

2. GENERATOR Г414

Specifications

The MT9 motorcycles are provided with a d.c. shunt excitation generator, the diagram of which is presented in Fig. 35.

Type	Г414
Rated voltage, V	6
Full output current, A	10
Direction of armature rotation (if viewed from the drive side)	right-hand
Rotative speed of armature, ensuring a voltage of 6.5 V at an ambient temperature of 20°C, r.p.m.:	
at zero load	1350
at full load (10 A)	1950
Idle current (with the generator operating as a motor), A	6
Polarity of the frame	minus

Generator Winding Data

Field Coil

Wire	copper, enamelled, grade ПЭЛ, size 0.74 mm
Winding-on	counterclockwise
Number of turns	300
Number of layers	24
Insulation	half-overlapping, one layer of taffeta tape 0.25×15 mm

Output terminals are marked: "*Я*" and "*Ш*".

Generator Armature

Wire	copper, insulation: two layers of high-strength enamel, grade ПЭВ-2, size 1.16 mm
Number of turns in the section	5
Number of wires in the slot	20
Number of sections	2
Number of slots	14
Number of commutator sheets	28
Slot pitch	1—7
Commutator sheet pitch	1—2

Checking the Generator for Proper Operation

The proper operation of the generator should be checked on a special bench:

in the motor duty;

during idling;

under load.

In all checks, where application of voltage is required, strictly observe the polarity of connection, i.e. connect only a plus wire to terminal "*Я*".

Checking the Generator in the Motor Duty

The generator should be checked for mechanical and electrical faults in the following order:

turn the armature by hand to check it for free rotation;

remove the protective band, secure the generator in a holding device on the bench and make connections as shown in the diagram (Fig. 36);

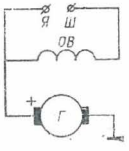


Fig. 35. Generator diagram

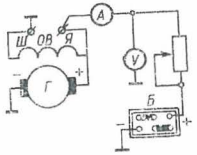


Fig. 36. Diagram showing the connection of generator for testing under motor duty conditions

using the rheostat, adjust the rotative speed of the armature for $n=200$ to 250 r.p.m. Check the armature for smooth rotation. Non-uniform rotation indicates that the armature winding or commutator sheets are at fault;

by cutting out the rheostat, allow the generator to develop the maximum no-load speed and check the intensity of sparking under the brushes, which intensity must be fairly small if the generator is in good condition;

measure the current consumed by the generator.

If the current consumed is above 6 A, this may be caused by mechanical faults, by turn-to-turn short circuit or short circuits in the armature windings or field winding;

check the field coil winding for good condition by measuring its resistance with an ohmmeter. The resistance must be equal to 2.28 ± 0.12 Ω, if the generator is in good condition;

check the field coil winding for short circuit to frame. For this purpose disconnect the coil lead from the frame and then apply a voltage from the storage battery or mains to output terminal "*Ш*" and generator frame. The filament of the lamp connected into the circuit must not glow.

Determining the Rotative Speed of Generator Corresponding to the Beginning of Excitation

Determine the generator speed during idling and under load.

In order to determine the beginning of excitation during idling, connect the generator as shown in the diagram (Fig. 37). By gradually increasing the armature speed, observe the voltmeter readings. In a serviceable generator, the armature speed must not be greater than 1350 r.p.m. at a voltmeter reading of 6.5 V.

To determine the beginning of excitation under load, connect the generator as shown in the diagram (Fig. 38).

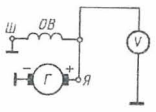


Fig. 37. Diagram showing the connection of generator for testing under idling conditions

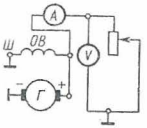


Fig. 38. Diagram showing the connection of generator for testing under load

By gradually increasing the armature speed and, at the same time, loading the generator (by varying the rheostat resistance) up to 10 A, observe the voltmeter readings. In a serviceable generator, the armature speed must not be greater than 1950 r.p.m. at a voltmeter reading of 6.5 V. Fluctuations in the voltage will indicate that the brushes are faulty.

Sparking under the brushes must be weak all over the working surfaces of the brushes and have a bluish tint. Heavy sparking of strawy colour and emission of sparks from under the brushes indicates that the brush assembly is out of order.

Checking the Generator on Motorcycle

In the absence of a test bench, the electrical characteristics may be roughly determined on an operating engine, for which purpose place the motorcycle on a support and use a portable ammeter, class 1.5, with readings of up to 15 A, a voltmeter, class 1, with readings of up to 15 V, and loading rheostat rated for 2 Ω at permissible current of up to 20 A. In this case, with the fourth speed engaged, the speedometer will read 18 km/hr, at a generator speed of 1350 r.p.m., and 27 km/hr, at 1950 r.p.m.

Dismantling and Assembling the Generator

To dismantle the generator, proceed as follows:

uncotter and then screw off the nut securing the gear, remove the gear and its key;

remove the generator protective band and gasket after first undoing the coupling screw;

unscrew two coupling bolts on the rear cover;

undo the screws and detach the ends of the field coil wires from the output terminals of the generator;

extract the screws fastening the plug of the rear cover ball bearing, remove the plug, gasket and spring cap;

by setting a lifter against the end of the armature shaft and engaging it by the windows, remove the cover from the commutator side;

withdraw the generator armature together with the front cover;

using a lifter, remove the front cover from the armature shaft;

undo the screws securing the left gland housing and the front cover, remove the housing.

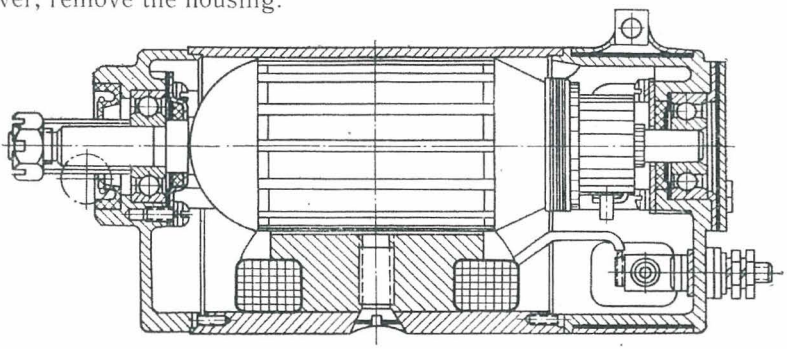


Fig. 39. Generator Г414

Clean and carefully inspect the dismantled parts. Replace the defective parts, if any. Prior to re-assembling, lubricate the bearings with grease ЦИАТИМ-201.

Re-assemble the generator in reverse order.

When installing the rear cover, remove the brushes from the brush holder, bearing in mind that the brush with an insulated copper-wire rope should be fitted into an insulated brush holder.

When installing the gear on the generator shaft take care to ensure that the plug of the generator rear cover is removed and the shaft end rests against the rigid stop.

General view of the generator is shown in Fig. 39.

Repairing the Generator

Clean the dismantled parts to remove dust and dirt.

Inspect all the parts and make sure that:

the ball bearings are in good condition;

the armature does not brush against the shoe of the field coil;

the brushes do not stick in the brush holder;

the commutator is not worn out;

there is no turn-to-turn short circuit in the armature winding (to be checked on a special bench);

the leads of the armature winding are properly soldered to the commutator bars;

the brushes are not shorted to frame.

The brushes must contact the commutator with not less than 80% of their working surface and must be free of pits. If the brush surface is badly pitted and its height is less than 10 mm, such a brush must be replaced.

As an exception, it is permissible to turn the commutator whose surface is greatly worn out, following which the slots between the commutator bars should be cleaned to remove the bronze galling.

A smooth lustrous film on the commutator surface indicates that the operation is normal, and, consequently, must not be removed.

3. GENERATOR Г424

The motorcycles "Dnepr" MT10 are fitted with a generator Г424 which is a three-phase synchronous machine with electromagnetic excitation and built-in rectifier.

Specifications

Rated voltage, V	14
Rated power, W	160
Maximum power at short-time overloads, W	200
Rated power speed, r.p.m.	2400
Maximum power speed, r.p.m.	5000
Mass, kg	3.7

At an ambient temperature and that of the generator equal to 25±10°C, at the rotative speed and load specified in Table 13, the generator must develop a rectified voltage not lower than 14 V.

Table 13

Test conditions	Idling	Rated load
Rotative speed, r.p.m.	1300	2000
Load current, A	0	11

4. CURRENT-AND-VOLTAGE REGULATOR PP302

The motorcycles are provided with a two-element current-and-voltage regulator consisting of a reverse-current relay and voltage regulator. The current-and-voltage regulator operates in conjunction with generator Г414.

Winding Data

The shunt winding of the voltage regulator: wire, grade ПЭЛ, dia. 0.29 mm, 1120±10 turns, counterclockwise winding (top view), resistance 14.9±0.9 Ω.

The compensating winding of the voltage regulator: wire, grade

ПЭЛ, dia. 0.72 mm, 25 turns, one layer, counterclockwise winding (top view).

Shunt winding of reverse-current relay: wire, grade ПЭЛ, dia. 0.17 mm, 1420±10 turns, counterclockwise winding (top view), resistance $37^{+4.5}_{-4.0}$ Ω.

The series winding consists of the voltage regulator winding (1.5 turns) and reverse-current relay winding (14.25 turns wound in two layers). Counterclockwise winding. Wire, grade ПЭВ-2, dia. 1.81 mm.

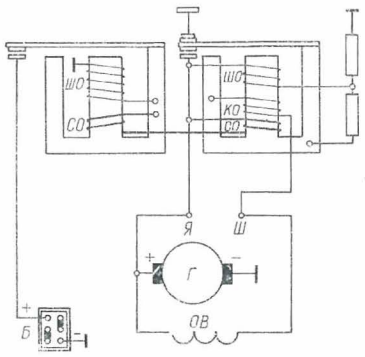


Fig. 40. Diagram of current-and-voltage regulator PP302

The resistors are connected in series with the shunt winding of the voltage regulator, but in parallel with each other. The wire-wound resistors are rated for 1.2±1 Ω ($R_у$), dia. 0.5 mm, grade 05 СЦ-Х15Н60 GOST 2338—58, 350 mm long, and for 4.4±0.2 Ω ($R_д$), dia. 0.4 mm, grade Х15Н60 GOST 8803—58, 497 mm long.

The diagram of the current-and-voltage regulator is shown in Fig. 40.

Specifications

Type	PP302
Cutting-in voltage of reverse-current relay, V	6 to 6.6
Reverse current for cutting off the reverse-current relay, A	0.5 to 3.5
Voltage maintained by he voltage regulator at generator speed of 3500 r.p.m., V:	
at load current 10 A	6.5 to 7.0
at load current 0 A	not greater than 8

Checking the Current-and-Voltage Regulator for Proper Operation

The current-and-voltage regulator should be checked for proper operation using a bench for testing the generators.

To check the operation of the reverse-current relay, connect the current-and-voltage regulator in accordance with the diagram (Fig. 41) (checking may be also performed on the motorcycle). By gradually increasing the rotative speed of the generator armature, determine the voltage at which the contacts of the reverse-current relay close. The voltmeter should read within 6 and 6.6 V. The moment at which the contacts of the reverse-current relay close will be indicated by the deflection of the ammeter pointer.

To check the voltage regulator, connect the current-and-voltage regulator according to the diagram (Fig. 42). With the generator armature rotating at 3500 r.p.m. and at rheostat load of 10 A, the voltmeter must read within 6.5 and 7 V.

Adjusting the Current-and-Voltage Regulator

The current-and-voltage regulator is subject to adjustment in case the following faults are detected during check-up:

cutting-in voltage or the relay deviates by 0.5 V from the specified limits;

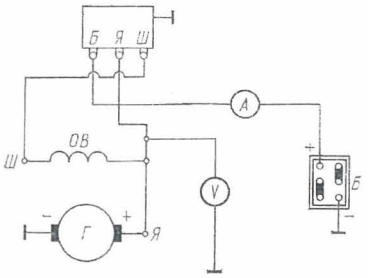


Fig. 41. Diagram of the connection of the current-and-voltage regulator for testing the reverse-current relay

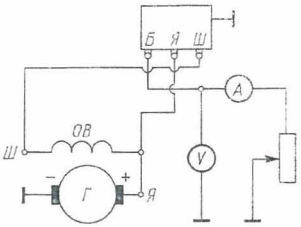


Fig. 42. Diagram of the connection of the current-and-voltage regulator for testing the voltage regulator

the difference between the voltage being regulated and the cutting-in voltage of the reverse-current relay is less than 0.3 V;

the regulated voltage deviates by 0.5 V from the specified limits;

reverse current for cutting off the reverse-current relay is 0.5 V above the specified limit.

Before adjustment, inspect the surfaces of the movable and fixed contacts since the reliable operation of the current-and-voltage regulator is much dependent on their cleanliness and good condition. Blackened contacts should be washed with alcohol, the burnt contacts to be trimmed with a fine-grained sandpaper of 80 to 100 grain size, then washed with alcohol.

Adjust the current-and-voltage regulator by varying the tension of the springs of corresponding armatures and bending the shanks of the angles.

If the parameters obtained are greater than required, loosen the tension of the corresponding springs, if the parameters are lesser, increase the tension. Avoid using a screwdriver for bending the shanks of the angles.

After trimming the contacts and repairing the current-and-voltage regulator, (in case repairs involve replacement of contact assemblies, coils, etc.), check and, whenever necessary, adjust the gaps between the armature and cores as well as between the contacts.

The gap between the armature and core of the voltage regulator must be set within 0.9 and 1.1 mm, with the upper pair of contacts closed, by shifting the angle with the contact holders.

The travel of the movable contact between the fixed ones must be set within 0.25 and 0.30 mm by bending the travel arrester of the voltage regulator armature.

Misalignment of contact axes must be not greater than 0.2 mm.

The gap between the armature and core of the reverse-current relay is to be set within 0.6 and 0.8 mm with the contacts opened. The contact gap should be not less than 0.25 mm. Misalignment of contact axes must not be greater than 0.25 mm.

5. CURRENT-AND-VOLTAGE REGULATOR PP330

The motorcycle "Dnepr" MT10 is provided with a current-and-voltage regulator PP330.

The basic difference between this type of the regulator and the earlier models is that it is used in the a.c. generator set circuit.

Specifications

Type	PP330
Rated voltage, V	12
Rated current, A	8
Design	electromagnetic, single-stage
Number of elements, pcs	2
Ambient temperature range	—40 to +70°C

The current-and-voltage regulator maintains the voltage at the generator terminals within the specified limits and controls the battery charge control lamp: when the battery is discharged, the lamp comes on, when charged, the lamp is out.

The current-and-voltage regulator is a dust-tight device, consisting of a vibrator-type voltage regulator and relay for switching on the charge control lamp, that are mounted on a common panel and enclosed in a common case.

As regards its characteristics, the current-and-voltage regulator must comply with the data listed in Table 14.

Table 14

Item No.	Basic characteristics	Unit of measurement	Numerical values	Remarks
1	Operating voltage of charge control lamp relay	V	6.2 to 6.8	
2	Regulated voltage at +20°C temperature of current-and voltage regulator and environment, at generator rotor speed of 3500 r.p.m. and load current of 4 A	V	13.3 to 14.3	
3	Same at a temperature of +70°C	V	12.8 to 14.5	

Continued

Item No.	Basic characteristics	Unit of measurement	Numerical values	Remarks
4	Regulated voltage within the generator rotor speed range from 2500 7000 r.p.m., at rectified current of 4 A and at +20°C temperature of the current-and-voltage regulator and environment, must differ from the voltage measured according to step 2	V	Not greater than +0.8	
5	Permissible deviation of regulated voltage from that measured according to step 2, with rectified current changing from the minimum value of charge current to 8 A at generator rotor speed of 3500 r.p.m.	V	Not greater than +0.4 Not greater than —0.6	At load current equal to the minimum charge current (2.5 A or less), at load current equal to 8 A

Note. The parameters listed in Table 14 are subject to improvement on the basis of data accumulated in service.

6. IGNITION SYSTEM DEVICES

On the motorcycle "Dnepr" MT9, provision is made for using two versions of the ignition system.

Version 1

The ignition system (Fig. 43) consists of:
breaker with ignition advance automatic device;
two-tap ignition coil;
spark plugs;
suppressor resistors.

Specifications for the Breaker and Ignition Advance Automatic Device

Type ПМ302

Breaker point gap, mm . . . . . 0.4 to 0.6

Shaft speed ensuring uninterrupted sparking at a standardized three-electrode needle discharger, at a length of spark gaps at one electrode equal to 7 mm and at the other — to 0.5 mm, r.p.m. . . . . from 100 to 3000

Capacitance, μF 0.13

Direction of rotation (from the side of automatic device) . . . . left-hand

Maximum ignition advance as to the angle of camshaft rotation, deg . 16

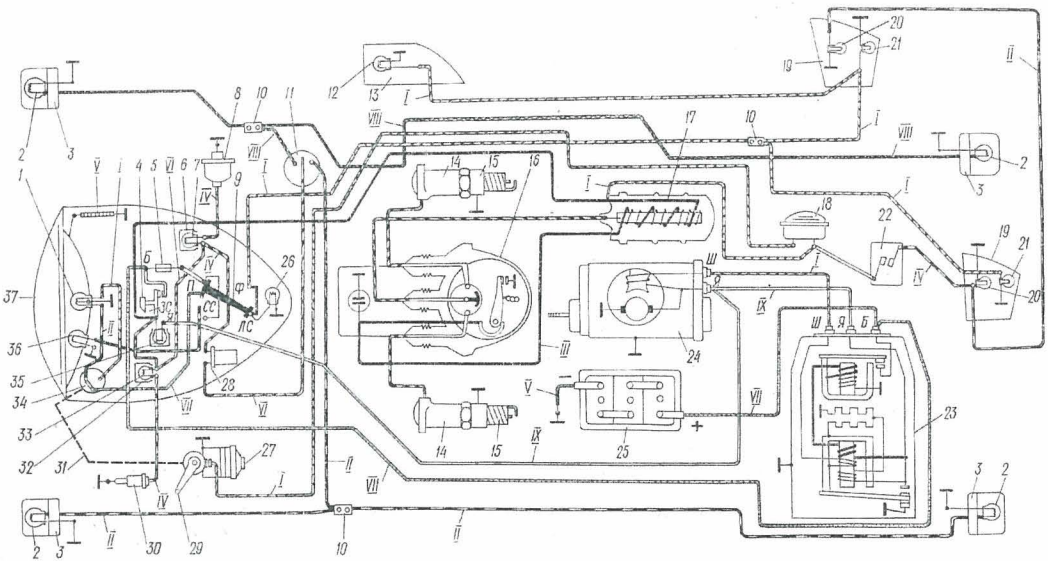


Fig. 43. Diagram of the electrical equipment and colour coding of wires:

1 — high and lower beam bulb А6-32+32; *2* — bulb А6-15; *3* — turn indicator lamp УП223; *4* — ignition key; *5* — fuse 15 А; *6* — pilot lamp ПД-20; *7* — oil pressure warning bulb А6-1; *8* — emergency oil pressure transmitter ММ106А; *9* — master switch; *10* — wire coupler; *11* — turn indicator switch П-25А; *12* — (marker) bulb А6-2 of sidecar front lamp; *13* — sidecar front lamp ПФ200; *14* — spark plug tip; *15* — spark plug А8У; *16* — distributor-and-contact breaker unit ПМ05; *17* — ignition coil Б2Б; *18* — horn С37А; *19* — rear lamp ФП230; *20* — stop light bulb А6-15; *21* — marker bulb А6-3 of rear lamp; *22* — stop light switch ВК854; *23* — current-and-voltage regulator РР302; *24* — d.c. generator Г414; *25* — storage battery ЗМТ-12; *26* — speedometer lighting bulb А6-2; *27* — horn button; *28* — interrupter-relay РС419 of turn indicator; *29* — ignition angle adjusting lever; *30* — neutral position pick-up (contact plug); *31* — light switch cable; *32* — pilot lamp ПД-20Г; *33* — bulb А6-1, an indicator of neutral position of gearshift mechanism; *34* — light switch П145; *35* — battery charge control bulb А6-0.25; *36* — parking light bulb А6-2; *37* — headlamp ФГ116;

I — black; *II* — white; *III* — red; *IV* — green; *V* — brown; *VI* — yellow; *VII* — light blue; *VIII* — violet; *IX* — grey

Characteristics of the Automatic Device

Camshaft speed, r.p.m.	550	1200	2050	2500	2800
Ignition advance angle, deg	1—3	5—7.5	10—13	13—16	13—16

When repairing the breaker with the ignition advance automatic device, proper attention should be given to the condition of the breaker contacts.

Burnt contacts must be trimmed with a fine-grained sandpaper or with a flat needle file.

After trimming, wash the contacts.

When dismantling the automatic device, mark the mating parts so that they can be correctly re-assembled.

The automatic device having loose axles or broken openings in the bushings must be replaced.

A free-idle travel of the weights on the installed automatic device should be eliminated by unbending the leg fastening the spring.

Specifications for Two-Tap Ignition Coil

Type	Б201
Rated voltage at primary winding terminals, V	6
Gap between dischargers and high-tension terminals, mm	9
Maximum camshaft speed at which ignition ensures uninterrupted sparking at standardized three-electrode needle discharger as per GOST 8028—56 at 7 mm spark gap over the entire speed range, r.p.m.	from 100 to 3000

Winding Data

The primary winding consists of 300±5 turns of wire, grade ПЭЛ, dia. 0.55 mm, wound-on in three layers. The secondary winding consists of 19000±200 turns of wire ПЭЛ, dia. 0.09 mm, wound-on in two sections.

Spark Plug

Type	А8У
Spark gap, mm	0.6 to 0.75
Thread of screwed-in part of the plug	СП 14×1.25
Wrench opening, mm	22

Version 2

The ignition system (Fig. 44) consists of:

distributor-and-contact breaker unit with manual ignition advance;

ignition coil;

spark plugs;

suppressor resistors.

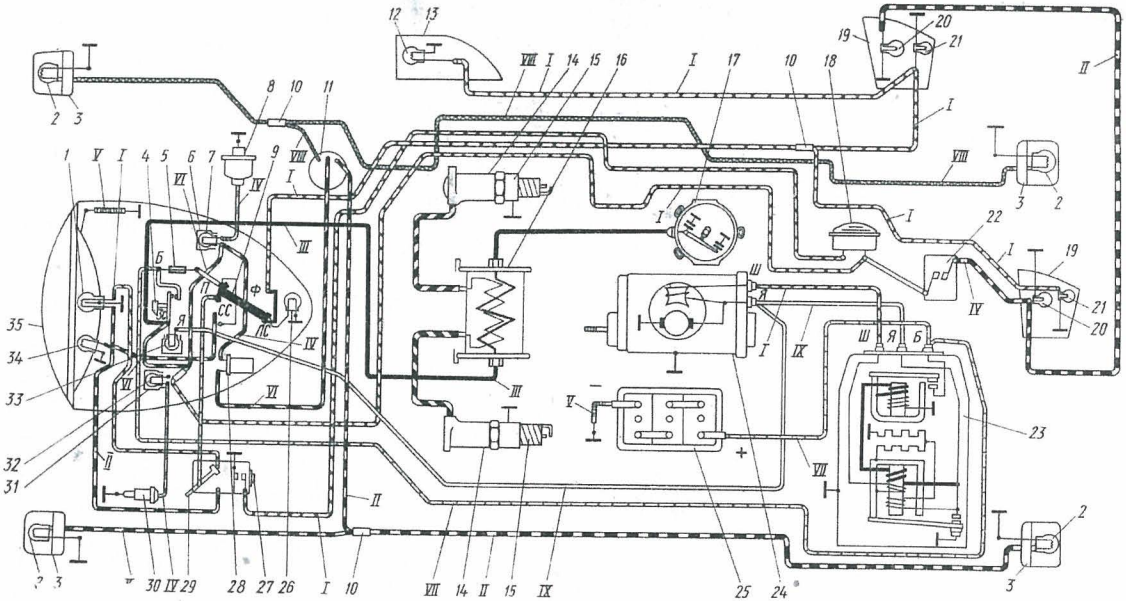
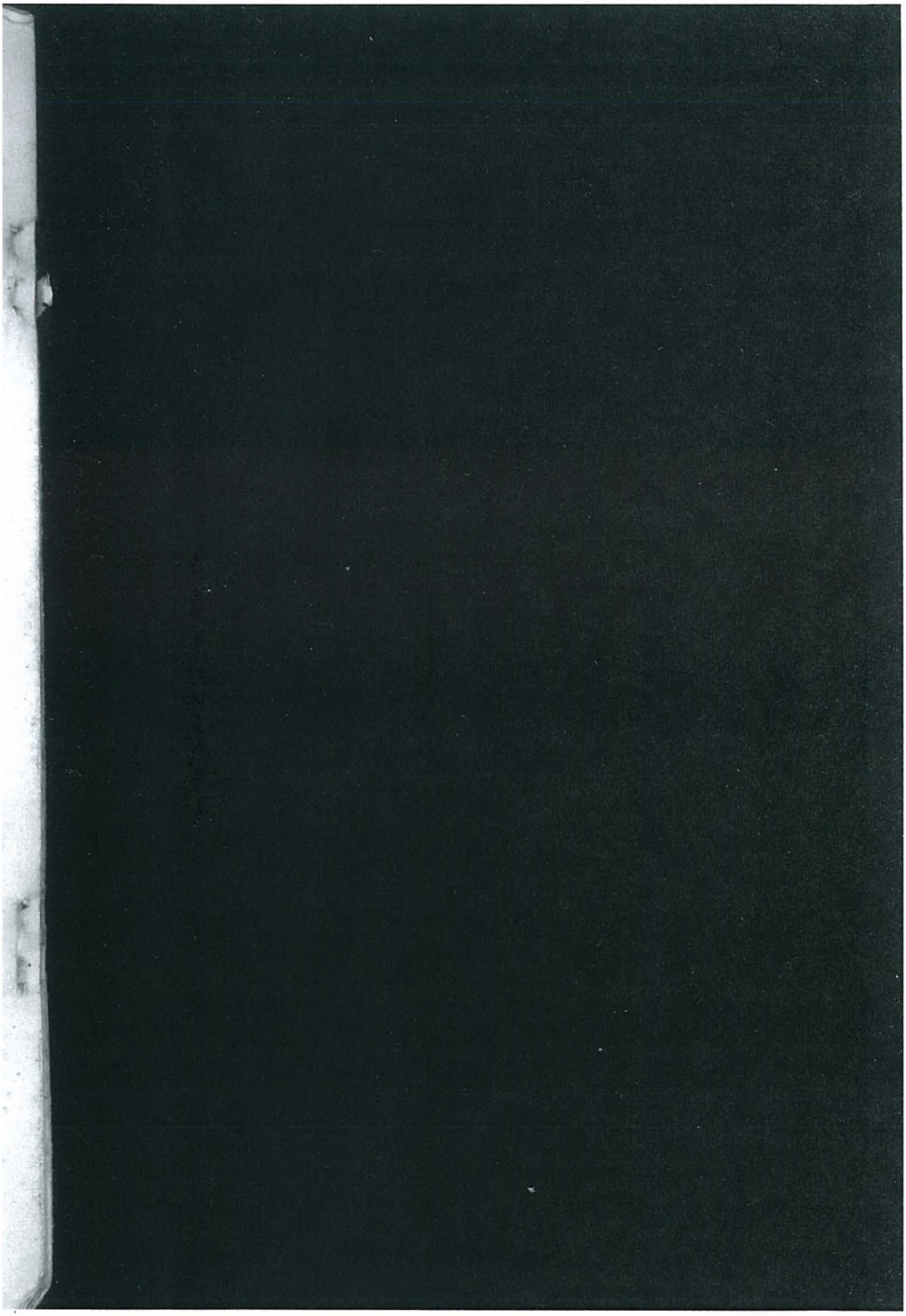


Fig. 44. Diagram of the electrical equipment and colour coding of wires: (two-tap ignition coil version):

1 — high and lower beam bulb A6-32+32; *2* — bulb A6-15; *3* — turn indicator lamp УП-223; *4* — ignition key; *5* — fuse 15A; *6* — pilot lamp ПД-20; *7* — oil pressure warning bulb A6-1; *8* — emergency oil pressure transmitter ММ106А; *9* — master switch; *10* — wire coupler; *11* — turn indicator switch П201; *12* — bulb A6-2; *13* — sidecar front lamp ПФ200; *14* — spark plug tip; *15* — spark plug А8У; *16* — ignition coil Б201А; *17* — contact breaker ПМ302; *18* — horn С37А; *19* — rear lamp ФП230; *20* — bulb A6-15; *21* — bulb A6-3; *22* — stop light switch ВК854; *23* — current-and-voltage regulator РР302; *24* — d.c. generator Г414; *25* — storage battery ЗМТ-12; *26* — speedometer lighting bulb; *27* — horn button; *28* — interrupter-relay РС419 of turn indicator; *29* — light switch П25; *30* — neutral position pick-up (contact plug); *31* — pilot lamp; *32* — bulb A6-1, an indicator of neutral position of gearshift lever; *33* — generator switched-on pilot bulb A6-0.25; *34* — parking bulb A6-2; *35* — headlamp ФГ-116; *I* — black; *II* — white; *III* — red; *IV* — green; *V* — brown; *VI* — yellow; *VII* — light blue; *VIII* — violet; *IX* — grey



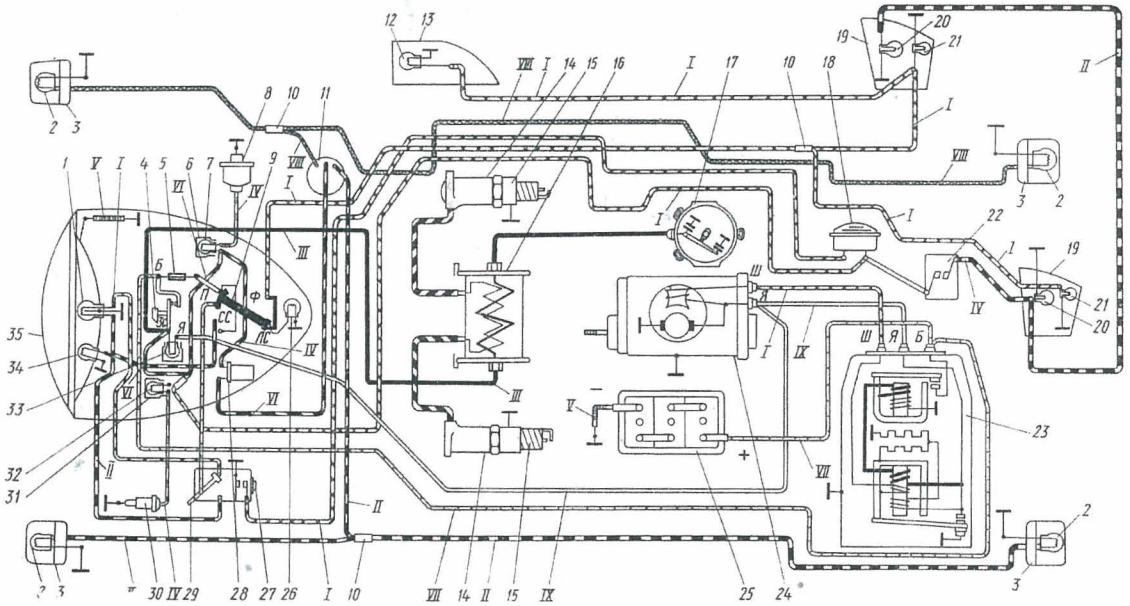


Fig. 44. Diagram of the electrical equipment and colour coding of wires: (two-tap ignition coil version):

1 — high and lower beam bulb A6-32+32; *2* — bulb A6-15; *3* — turn indicator lamp УП-223; *4* — ignition key; *5* — fuse 15A; *6* — pilot lamp ПД-20; *7* — oil pressure warning bulb A6-1; *8* — emergency oil pressure transmitter ММ106А; *9* — master switch; *10* — wire coupler; *11* — turn indicator switch П201; *12* — bulb A6-2; *13* — sidecar front lamp ПФ200; *14* — spark plug tip; *15* — spark plug А8У; *16* — ignition coil Б201А; *17* — contact breaker ПМ302; *18* — horn С37А; *19* — rear lamp ФП230; *20* — bulb A6-15; *21* — bulb A6-3; *22* — stop light switch ВК854; *23* — current-and-voltage regulator РР302; *24* — d.c. generator Г414; *25* — storage battery 3МТ-12; *26* — speedometer lighting bulb; *27* — horn button; *28* — interrupter-relay РС419 of turn indicator; *29* — light switch П25; *30* — neutral position pick-up (contact plug); *31* — pilot lamp; *32* — bulb A6-1, an indicator of neutral position of gearshift lever; *33* — generator switched-on pilot bulb A6-0.25; *34* — parking bulb A6-2; *35* — headlamp ФГ-116; *I* — black; *II* — white; *III* — red; *IV* — green; *V* — brown; *VI* — yellow; *VII* — light blue; *VIII* — violet; *IX* — grey

Note: When operating the motorcycle with the sidecar, the lamps marked * are disconnected

Specifications for Distributor-and-Contact Breaker Unit

Type	ПМ05
Direction of rotation	left-hand
Breaker point gap, mm	0.4 to 0.6
Sparking alternation, deg	180
Maximum speed at which uninterrupted sparking is ensured at standardized three-electrode needle discharger, at a length of spark gap equal to 7 mm, r.p.m.	3000
Capacitance, μF	0.15 to 0.30
Manual adjustment of ignition advance, deg	18 (minimum)
Mass, kg	0.6

Ignition Coil Specifications

Type	Б2-Б
Rated voltage, V	6
Uninterrupted sparking is ensured by ignition coil at a speed of shaft of two-spark distributor-and-contact breaker unit and at 7 mm length of spark gap on discharger, r.p.m.	up to 3000

Each time after repairing breaker ПМ302, ПМ05 as well as ignition coils Б2-Б, Б201, it is necessary to check them for uninterrupted sparking on a special bench, in accordance with the specified data.

A diagram for the electrical equipment of motorcycle "Dnepr" MT10 is presented in Fig. 45.

Repairing the Headlamp

The headlamps should be inspected and repaired in the case of any repairs involving the dismantling of the motorcycle.

To correctly perform the wiring in the headlamp, take note of the wire colouring according to the diargam attached to the headlamp body.

When inspecting the headlamp, make sure that the terminals are reliably connected to the switch panel as the loose terminals will create a high transient resistance and the pilot lamp will glow weakly with the current-and-voltage regulator operating correctly.

The optical element should be disassembled only during replacement of the diffuser, taking care to avoid touching the mirror surface of the reflector.

In exceptional cases the reflector should be washed in a clean warm water by making circular movements with a cotton wool pad (avoiding pressing the pad to the reflector surface) and periodically changing dirty water and pad. After washing, the reflector has to be dried at room temperature, in an overturned position (with its mirror surface down).

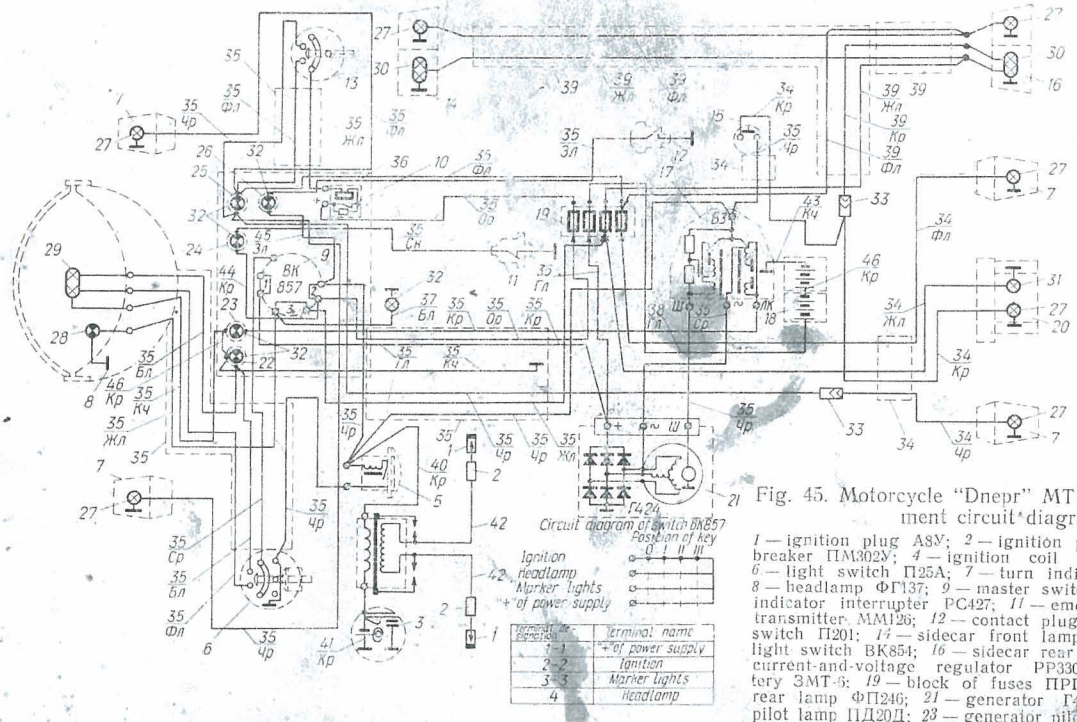


Fig. 45. Motorcycle "Dnepr" MT10 electrical equipment circuit diagram:

1 — ignition plug A8У; *2* — ignition plug tip; *3* — contact breaker ПМ302У; *4* — ignition coil Б204; *5* — horn С3Б; *6* — light switch П25А; *7* — turn indicator lamp УП223Б; *8* — headlamp ФГ137; *9* — master switch ВК-857; *10* — turn indicator interrupter РС427; *11* — emergency oil pressure transmitter ММ126; *12* — contact plug; *13* — turn indicator switch П201; *14* — sidecar front lamp ПФ232Б; *15* — stop light switch ВК854; *16* — sidecar rear lamp ФП219Б; *17* — current-and-voltage regulator РР330; *18* — storage battery 3МТ-6; *19* — block of fuses ПРП-В; *20* — motorcycle rear lamp ФП246; *21* — generator Г421; *22* — high beam pilot lamp ПД20Д; *23* — generator pilot lamp ПД20Е; *24* — emergency oil pressure control lamp ПД20Е; *25* — turn indicator control lamp ПД20Л; *26* — neutral position transmitter pilot lamp; *27* — bulb А12-21; *28* — bulb А12-4; *29* — bulb А12-45+40; *30* — bulb А12-21+6; *31* — bulb А12-3; *32* — bulb А12-1; *33* — tips 540401—540402; *34* — switch wiring assembly of stop light and rear lamps; *35* — motorcycle wiring assembly; *36* — dashboard; *37* — speedometer wire; *38* — accumulator-to-block of fuses wire; *39* — wiring assembly of sidecar lamps; *40* — horn-to-ignition coil wire; *41* — ignition coil-to-interrupter wire; *42* — high-tension wire; *43* — accumulator-to-earth-to-PP330 relay earth wire; *44* — emergency oil ... ire transmitter lamp ПД20Е-to-master switch terminal "3" wire; *45* — neutral position indicator lamp ПД20Д-to-"2"; *46* — accumulators wire; *Бл* — white; *Кр* — red; *Жл* — yellow; *Фл* — violet; *Чр* — black; *Ср* — grey; *Оп* — orange

7. LIGHTING AND SIGNALLING EQUIPMENT

Device	Type of device		Application of bulb		Type of bulb		Light intensity, cd	
	MT9	MT10	MT9	MT10	MT9	MT10	MT9	MT10
Headlamp	ФГ116		High-lower beam	High-lower beam	A6-32+32	A12-50+40	32×32	50×40
			Parking light		A6-2	A12-1.5	2	1.5
			Speedometer lighting		A6-2	A12-1	2	1
			Pilot bulb of emergency oil pressure transmitter		A6-1	A12-1	1	1
			Pilot bulb of contact plug (neutral position pick-up)		A6-1	A12-1	1	1
			Generator operation pilot bulb		A6-0.25	A12-1	1	1
Sidecar front lamp	ПФ200	ПФ232	Front right-hand marker light		A6-2	A12-3	2	3
				Right-hand front turn		A12-21	—	21
Sidecar rear lamp	ФП230	ФП219	Rear right-hand marker light		A6-3	A12-21+6	3	6
			Stop light		A6-15	A12-21+6	15	21
				Right-hand rear turn	—	A12-21	—	21
Front turn indicator of motorcycle	УП223	УП223	Front left-hand turn indicator		A6-15	A12-21	15	21
Rear turn indicator of motorcycle	УП223	УП223	Rear left-hand turn indicator		A6-15	A12-21	15	21
Rear lamp of motorcycle	ФП230	ФП246	Number plate lighting and left-hand marker light		A6-3	A12-3	3	3
			Stop light		A6-15	A12-21	15	21

8. HORN

Type	MT9 / C-37A	–
Rated voltage, V	6	
Operating voltage, V	5.2 to 7.4	10
Current consumed, A, not greater than	3	
Loudness level, db, not less than	95	
Basic audio frequency, Hz	330 to 400	33
Mass, kg	0.4	

Malfunctions of the horn most commonly occur due to hc
ton failures or the horn diaphragm being dirty. To remedy th
les, dismantle and clean the appropriate assemblies.

The horn sound is adjusted with a screw at the rear of t
body.

9. WIRES

Used on the motorcycle are the following wires: in the l
sion circuit — grade ПГВА, cross-section 1.5 mm² and 1.0 r
the high-tension circuit — grade ПВЛ-1.

The colour coding of the wires is in accordance with th
vant diagrams (Fig. 43 and Fig. 44).

Мотоциклы «Днепр» МТ9 и МТ10
Инструкция по ремонту на английском языке.

Внешторгиздат. 2594У/74 (1958).