Zetor 25
Zetor 25A
Zetor 25K

Tractors

Dismantling, Reassembly and Repairs

1959

FOREWORD

This instruction book dealing with correct dismantling, reassembly and reconditioning of the Zetor 25, Zetor 35 A and Zetor 25 K tractors is absolutely essential for the prevention of inexpert tampering with and possible additional damage to the machine.

It is designed for specialized shops equipped with standard as well as special tools and jigs for the aforementioned jobs.

The instructions contained herein require a highly qualified staff, familiar with any operations likely to be carried out in the course of normal reconditioning of the vehicles.

The purpose of this manual is to draw attention to the special procedures of dismantling, reassembly and reconditioning of up-to-date Zetor 25, Zetor 25 A and Zetor 25 K tractors.

A special set of tools and jigs for reconditioning of the tractors is being supplied ensuring expert, competent dismantling, reassembly and reconditioning. In this handbook a complete knowledge of the Operator's Instruction Book for the Zetor Tractors, of the List of Spare Parts and of other technical literature dealing with routine maintenance of the tractors is presumed. The above mentioned manuals represent an essential means of information due to the data and illustrations they contain.

The descriptions as well as the Part Nos. of the respective components are identical with those given in the List of Spare Parts for the tractors.

Both the dismantling and reassembly procedures described should be strictly adhered to, as they are the result of experience acquired by the makers in the course of production as well as from their cooperation with workshops and service stations.

- This handbook is a collection of instructions dealing with the respective jobs described.
- Every instruction is marked and the individual operations are numbered.
- In addition every instruction includes a list of special tools required for expert mechanic carrying out of the respective disassembly or assembly procedure.

For general use

467.30 Double-ended box wrench 14 and 17

417.30 Stud bolt replacer

Ball and Roller Bearings

The ball and roller bearings to be fitted to the gearbox or any other assembly group where they run in an oil bath should be freed from their protective grease coating prior to fitting.

The bearings must bear no traces of rust. The respective bearing rollers, taper rollers or balls must be fitted loosely.

Bearings subject to a prolonged period of storage may be deprotected by a hardened protective grease coating.

Special attention should be paid to careful packing of the bearings in stock to prevent the penetration of dust and other foreign matter likely to affect them adversely.

Ball and roller bearings subject to prolonged storage should be degreased and washed in paraffin oil. After thorough drying pack the bearings with lubrication grease.

Fig. 1.

1. Spring
2. Assembly Grip
3. Shaft

Fig. 2

Fig. 4.

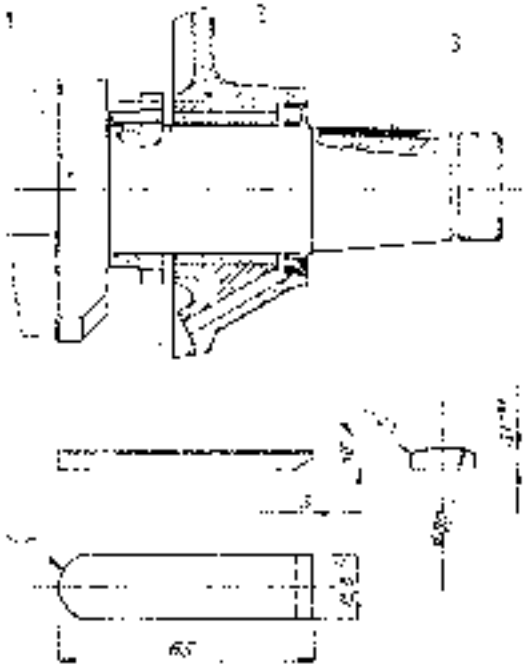


Fig. 3.

1. Crankshaft
2. Rear lid
3. Fitting key

Fitting Seal Rings

Particular attention should be paid to the fitting of seal rings to avoid early damage in the course of fitting.

1. Prior to fitting, check the sealing face for the rings and wipe it with a clean rag dipped in oil. Or dip the seal ring in a container with clean oil.

2. Check the spring for correct seating.

3. Using a uniform pressure, press-fit the respective seal ring to the corresponding cover and ensure proper contact of the entire sealing face. Avoid the application of a hammer without a suitable drift.

4. When fitting over sharp edges use a tapered fitting cartridge or hollow drift one end of which has a diameter larger by several hundredths of millimetres than the shaft it is to be fitted to (see Fig. 1). To prevent damage to the seal ring of the crankshaft caused by the sharp edge of the keyway in the crankshaft it is advisable to use a fitting key as shown in Fig. 2.

   The seal rings of the water pump (see Fig. 3), the clutch housing, the brake body (see Fig. 4), the rear axle housing cover (see Fig. 5), the belt pulley cover (see Fig. 6), the power take-off cover (see Fig. 7) as well as the corresponding ones, should be press-fitted using and hand press or a hollow drift.

5. Continuous lubrication while the engine is running is essential for sound condition of the seal rings. If the ring runs dry it is subject to dangerous overheating within a few minutes, influencing most unfavourably the surface of the sealing edge, which becomes brittle and cracked, thus causing bad condition of the seal ring, which ceases to seal and allows oil leakage.

Fig. 3

Fig. 5.

Fig. 7

4428.90

4432.90

In the case of the Zetor 25 K tractor adjust the plain jacks as follows: slip the sleeve nut on the base up to the dead stop and lock it in this position by means of the lock pin.

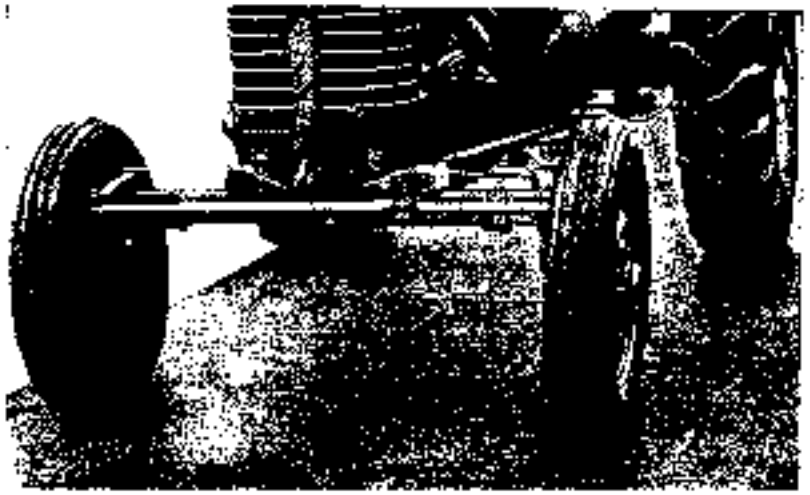


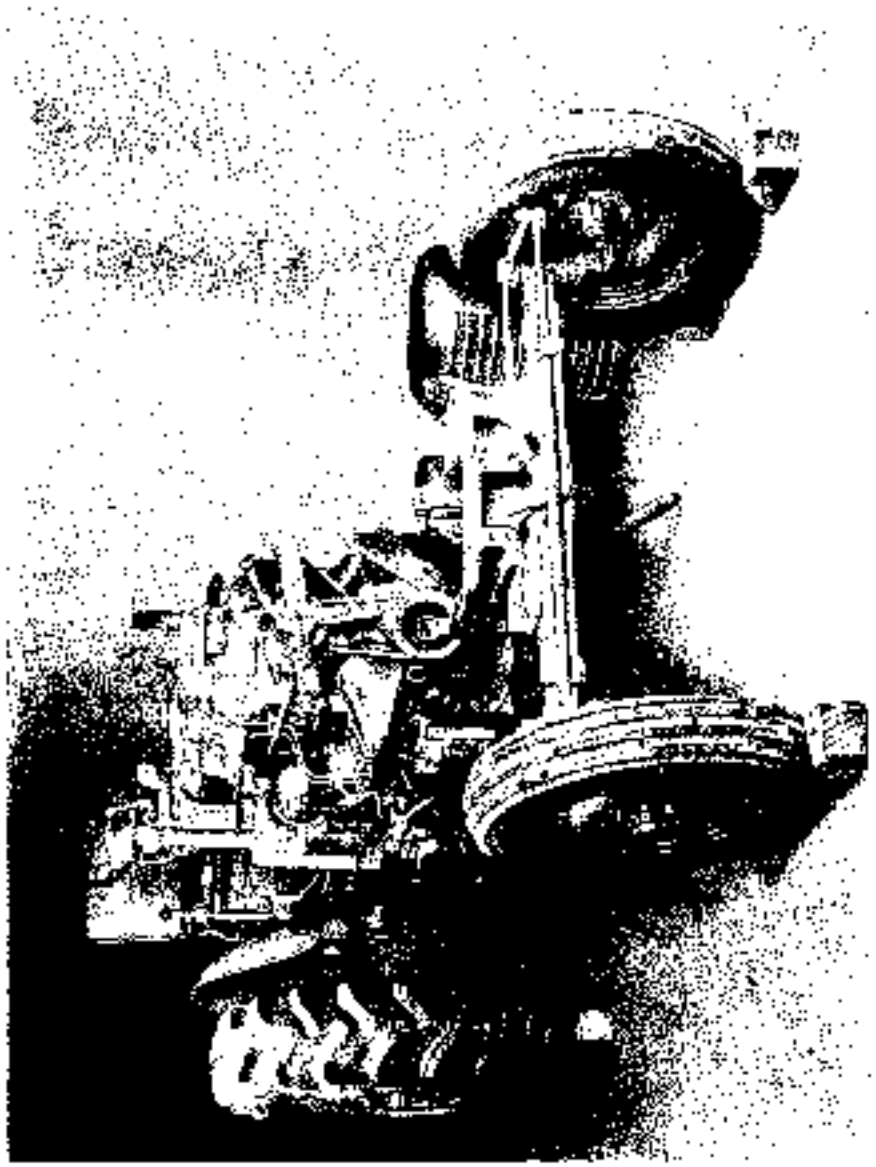
Fig. 8.

To Remove Front Axle Bracket

Special tools: support and force plain jacks 4428.90, socket spanner 4432.90.

Prior to detaching the front axle bracket (which carries the radiator complete with grille, the front axle and the steering unit) from the tractor assembly, remove the cowl of the brake valve and then proceed as follows:

1. Apply the hand brake and support the tractor by means of the support and jacks 4428.90. Slightly raise the tractor by means of the axle jacks. Lock the front axle in position by means of two wedged wooden blocks inserted between the axle and the rubber buffers of the bracket as shown in Fig. 8.
2. Drain the water from the radiator (14.4 litres or 3.13 Imp. gallst).
3. Remove the bonnet.
4. Disconnect and take out the storage battery from its housing in the case of Zetor 25 tractors fitted with a 6 V electrical equipment, i.e. without an electric starter motor).
5. Unscrew the bolt securing the radiator to the bracket on the cylinder head and disconnect the electric leads from the junction boxes between the radiator and the cylinder head.
6. Disconnect the leads from the dynamo terminals.
7. Remove the radiator filler plug and — by screwing out the side bolts — the radiator grille.
8. Detach the control rod of the shutters next to the fuel tank on Zetor 25 tractors up to Serial No. 125-10075 only. Further the shutters are not supplied. From Serial No. 125-10076 of the Zetor 25 model the radiator shutters (Part No. 3811.32) have been replaced with the rod and nuts (Part No. 2903.25, which is supplied for Zetor 25 and Zetor 25 A models up to Serial No. 125-37156 and for Zetor 25 K models up to Serial No. 225-17095 only). From Serial No. 125-37157 of the Zetor 25 and 25 A models and from Serial No. 225-17097 of the Zetor 25 K models onwards the radiator nuts is superseded by a rubber blind (Part No. 4651.23).
9. Unscrew the adjuster screw from the cable clip and detach the cable of the radiator blind.
10. Remove the fan complete with hub.
11. Slacken by one clamping band on the rubber hoses connecting the radiator with the cylinder head, water pump and thermostatic temperature control.
12. Detach the bottom pipe of the radiator by slackening the clamp band on the rubber hose.
13. Screw out the nuts and slip off the springs from the bolts securing the radiator to the bracket. Having thus eased the radiator lift it clear off the assembly.



14. Drive out the lock pin from the thrust ring of the spring on the rod of the starting crank and slightly pull out the rod.
15. Remove the V-belt.
16. Using the socket spanner 4632-90 screw off the driver from the crankshaft and remove the belt pulley.
17. Remove the oil filter II (see p. 64). In the latter is not fitted to the front axle bracket, this operation is omitted.
18. Unscrew the visible nuts securing the front axle bracket. Move the front axle complete with bracket clear of the assembly, rolling it on the road wheels. (See Fig. 9.)

    On reassembly reverse the above procedure.

    In the case of the Zetor 25A tractor adjust the plain jacks as follows: slip the screw nut of the base up to the dead stop and lock it in this position by means of the lock pin.

To Fit and Remove Front Axle Counterweight — D-1/2

To prevent the front axle from being relieved and to ensure better adhesion, the bottom of the front axle bracket can be fitted with a counterweight (Part No. 4029 47). For this purpose the front axle bracket is fitted with two holes taking the bolts securing the counterweight in its bottom.

Additional fitting of the counterweight can be carried out after having accomplished operations 1 to 15 of the instruction D-1/1. Then proceed as follows:

1. Slip bolt attaching bolts M 10/220 (Part No. 4650.7.0) into the apertures of the attaching plate (Part No. 4029 47) and then insert the bolts into the holes of the front axle bracket.
2. Place the counterweight under the front axle bracket and using two jacks, jack the weight up. The bolts screw as guides.
3. After the counterweight has been jacked up so as to enable the fitting of spring washers and screwing on of nuts to the attaching bolts, proceed to tighten the nuts evenly until the counterweight fits snugly to the bottom of the bracket.

Removal is effected by reversing the above directions.

After every 300 hours of operation drain the water from the radiator and fill the radiator with a 5 to 10% solution of sodium carbonate to dissolve the boiler stone deposits.

After a full day's action in the cooling system drain the sodium bicarbonate solution after having circulated operation and flush the radiator with clean water.

If the radiator is badly contaminated with boiler stone, remove it according to Instruction D-1/1 operations 1 to 13.

First flush the radiator with trichlorethylene or with a 5 to 10% solution of sodium bicarbonate to remove any traces of grease.

After having flushed the radiator with warm water fill it with 2.5 litres or 2.2 Imp. quarts of hydrochloric acid added to 5.5 litres or 2.22 Imp. gall. water. Let the solution act on the boiler stone deposits for a period not exceeding 10 minutes, shaking the radiator continuously.

Should the stipulated period be exceeded, the solution of hydrochloric acid would corrode the radiator.

If the deposits fail to be dissolved completely, flush the radiator with hot water and repeat the above procedure.

Pour out the dissolved deposits through the top filler neck of the radiator, then flush and spray the radiator thoroughly first with hot water and then fill it with a weak solution of sodium bicarbonate which will completely neutralize any traces of the hydrochloric acid solution after a short period.

Flush the radiator until the reaction of the litmus paper ceases to be acid. Ensure that any traces of red colour are absent.

Special tools: support and three plain jacks (442-90).

When dismantling the engine, replacing the crankshaft or reconditioning the clutch mechanism, the tractor must be disconnected between the crankcase and the clutch or bell housing, proceeding as follows:

1. Block the front wheels.
2. Lock the front axle in position by inserting two wedged wood blocks between the axle and the shifters of the bracket (see Fig. 6).
3. Screw out the lowest bolt from the flange of the clutch or bell housing.
4. Place two plain jacks under the crankcase and one low support (442-90) under the clutch housing; then use a tommy bar to adjust the jacks so as to raise the assembly slightly.
5. Detach the exhaust manifold from the cylinder head (in the case of tractors fitted with a vertical exhaust pipe remove only the exhaust silencer).
6. Disconnect the steering rod in the rear ball pin (in driving direction).
7. Remove the bonnet.
8. In the case of Zetor 25 models fitted with 6 V electrical equipment disconnect and take out the battery from its box.
9. Disconnect the control rod of the shutters next to the fuel tank (on Zetor 25 models up to Serial No. 125-10079 only; further the shutters are not supplied).

   From Serial No. 125-10079 of the Zetor 25 tractor the radiator shutters (Part No. 3831.24) have been replaced with the radiator mask Part No. 3834.24, which is supplied solely in the case of Zetor 25 and Zetor 25 A models up to Serial No. 125-37156 and in that of Zetor 25 K models up to Serial No. 325-17096.

   From Serial No. 125-37157 of the Zetor 25 and Zetor 25 A tractors and from Serial No. 325-17097 of the Zetor 25 K models towards the radiator mask is superseded by a roller blind (Part No. 4751.231).
10. Screw out the adjuster screw from the cable clip and detach the cable of the radiator blind.
11. Disconnect the leads from the dynamo terminals and junction box between the radiator and the cylinder head.
12. Disconnect and detach the horn from the leads.
13. Slacken the dished ring nut, thus moving the telethermometer from the elbow pipe for cooling water which connects the cylinder head with the radiator. If the telethermometer is not fitted, this operation is omitted.
14. Detach the throttle control rod (Part No. 4705.25) from the throttle control lever on the steering wheel by pulling out the cotter pin. After having pulled the rod off the ball pin of the operating lever of the speed governor, remove the throttle control rod.

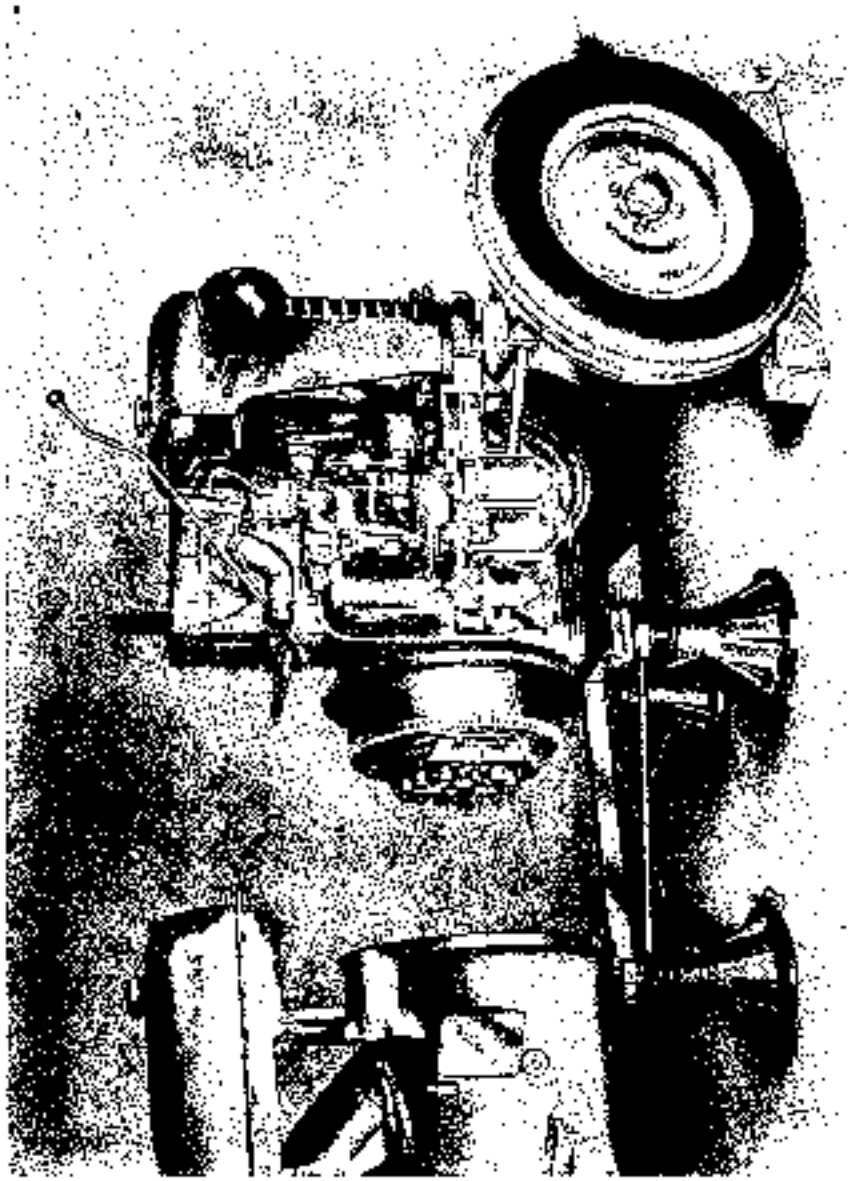
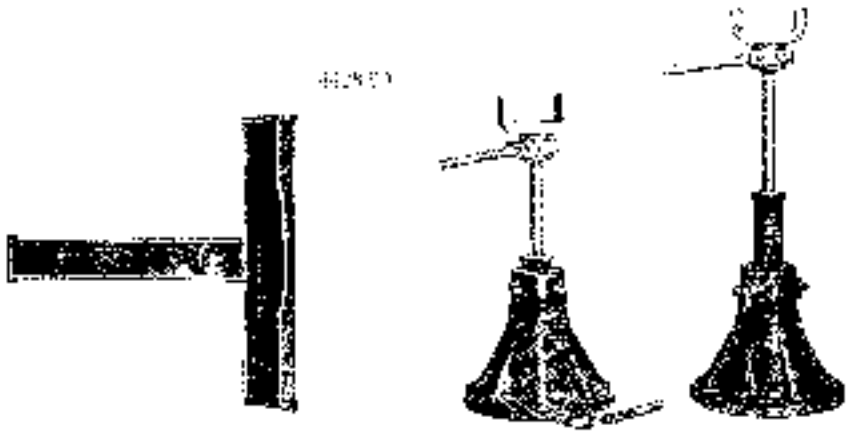


Fig. 10

If the tractors Zetor 25 and Zetor 25 A (from Serial No. 125-19470 onwards) or Zetor 25 K (from Serial No. 225-20933 onwards) are fitted with an accelerator pedal, the throttle control rod (Part No. 6010.660) can be disengaged from the relay lever of the accelerator link (Part No. 6009.661) after having pulled out the cotter pin and removed the washer. Then the control rod must be pulled off the ball pin of the governor operating lever.

15. Close the fuel tap, disconnect the fuel feed pipe and, after having screwed out the two nuts from the carrier of the air cleaner, remove the fuel filter.
From Serial No. 125-56040 of the Zetor 25 and Zetor 25 A models and from Serial No. 225-19637 of the Zetor 25 K model onwards, a new crankcase is being fitted (Part No. 1650.021). From these Serial Nos. onwards the fuel filter is mounted on the crankcase. For this design we supply the fuel feed pipe from the filter to the fuel transfer pump under the Part No. 1691.130.
16. Loosen the clamp bands of the rubber hose for the air cleaner and, after having screwed out the attaching bolts, remove the air cleaner.
17. Disconnect the oil pressure gauge on the dashboard.
18. In the case of tractors fitted with a pressure air brake system (group 62), disconnect the pipe of the air pressure gauge from the T-connector.
19. Disconnect the electric leads from the rear heater plug and from the starter motor.
20. From the junction board located in the tool box disconnect and mark the leads leading current to the dashboard, the horn and the horn button.
21. After having removed the four cotter pins slacken the four castle nuts and remove the fuel tank.
22. Disconnect the air pipe from the air pressure governor to the air reservoir (solely on tractors fitted with a pressure air brake system group 62).
23. Disconnect the pipe between the air reservoir and the brake valve. Then screw out the clamp bolts of the strap securing the air reservoir and remove the reservoir (in the case of tractors fitted with pressure air brake system Group 62 only).
24. Remove the starter motor from the clutch housing.
25. Screw out the bolts from the flange of the clutch housing. Likewise slacken the cable clamp (Part No. 1905.570) if the electric oil heater is fitted.
26. Rolling it on the rear wheels, move the rear part of the tractor rearwards along the support. Proceed with caution so as not to let the clutch housing flange slip off the support during this operation (See Fig. 10).
On reassembly fit the rear part of the tractor in position, moving it along the support in the opposite direction. Proceed with caution so as not to damage the clutch plate during this operation. To facilitate fitting preferable lift the decompressor lever and assist the fitting by slowly cranking the engine with the starting crank. Further reassembly procedure is effected by reversing the dismantling procedure.



[illegible] handling the Zetor 25 K model's gearbox as follows to adjust the plain jacks. Move the sleeve nut on the screw up to the dead stop and lock it in this position by means of the lock pin.

To Disconnect Tractor Between Clutch Housing and Gearbox D-3

Special tools: support and three plain jacks 4428 00.

When reconditioning the clutch housing or the gearbox as well as any components housed in them disconnect the gearbox (see Fig. 11) proceeding as follows.

1. Drain the oil by unscrewing the bottom plug on the LH side (in driving direction) and of the drain plug in the rear bottom part of the gearbox.
2. Detach the exhaust pipe from the cylinder head (in the case of tractors fitted with a vertical exhaust pipe this operation is omitted).
3. Disconnect the clutch link by pulling out the pin.
4. Disconnect the starter cable from the battery. Mark the electric wiring leading from the dashboard to the tail lamps to eliminate any mistake on reassembly.
5. Screw out the bottom bolt from the gearbox flange.
6. Place one plain jack under the gearbox and two jacks on either side of it (see Fig. 11) under the clutch housing. Using a wooden bar screw in the rear jack so as to move the gearbox slightly.

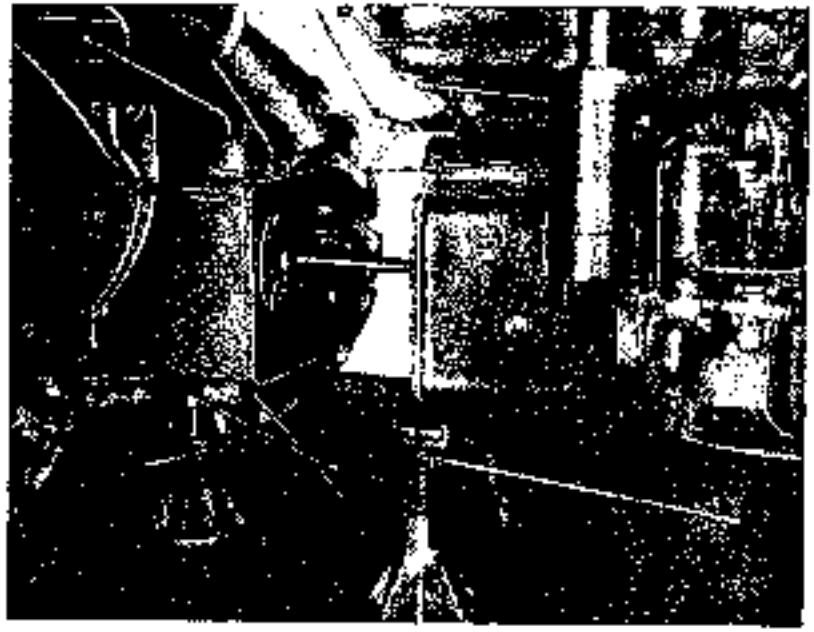


Fig. 11.

7. Proceeding according to Fig. 8 lock in position the front axle bracket by means of a wedged wood stick between the axle and the rubber buffers of the bracket.
8. Detach the air pipe from the air reservoir to the brake valve (in the case of tractors fitted with a pressure air brake system group 62 only).
9. Slacken the union nut of the pipe between the air pressure governor and the air reservoir then unscrew the clamp bolts of the strap securing the air reservoir and remove the layer (in the case of tractors fitted with a pressure air brake system group 62 only).
10. Screw out the remaining bolts from the gearbox flange.
11. Move the rear part of the tractor clear of the assembly along the support by turning the rear wheels.

On refitting the gearbox and clutch housing proceed as follows:

1. Clean the sealing surfaces of the gearbox and clutch housing, smear them with lubrication grease and replace the seals, which in no case should be re-used.

2. Turning the rear wheels, move the rear part of the tractor in position along the support. During this operation rotate with the hand the clutch or first motion shaft with the V-th or VI-th speed engaged. The splined pin of the shaft must be carefully inserted into the rubber seal ring in the partition of the clutch housing. Then disengage the respective speed and move the detached part by turning the rear wheels until the clutch or first motion shaft is properly fitted into the splines of the clutch plate driver and the flanges of both housings are snugly seated. To facilitate the fitting of the clutch shaft to the splines of the driver, the engine can also be cranked by hand by means of the starting crank. If the tractor is fitted with a belt pulley, the pulley drive can be engaged and the fitting carried out by rotating the belt pulley by hand until the splines of the clutch or first motion shaft engage with those of the clutch plate driver. Then disengage the pulley drive and rotating the rear wheels, push home the flanges until they fit snugly.

Further assembly procedure is effected by reversing the dismantling procedure

To Remove Front Axle c/w Front Wheels of Zetor 25 Tractors D-4/1

Special tools: socket spanner 4431.99, puller 4433.99.

Due to the simplicity and neat arrangement of the assembled parts removal of the front axle and front wheels requires no special directions. After every 120 hours of operation however, check the toe-in of the front wheels and the correct play (clearance) of the taper roller bearings proceeding as follows.

Support the front axle with a wooden block so as to lift the wheels clear of the ground and ensure their free rotation; the play of the bearings should be negligible. If, however, undue play of the wheels is ascertained by pressing

1.34.99

443.99

with the hand against the wheel circumference, it must be eliminated by tightening the attaching nut as shown in Fig. 12.

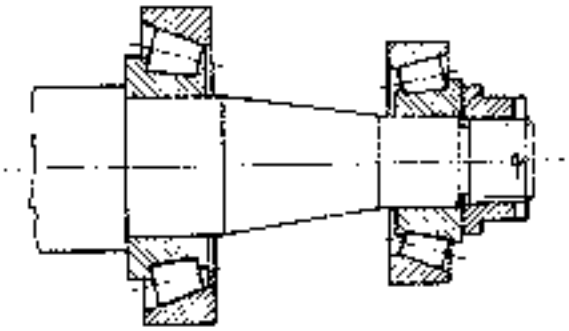


Fig. 12.

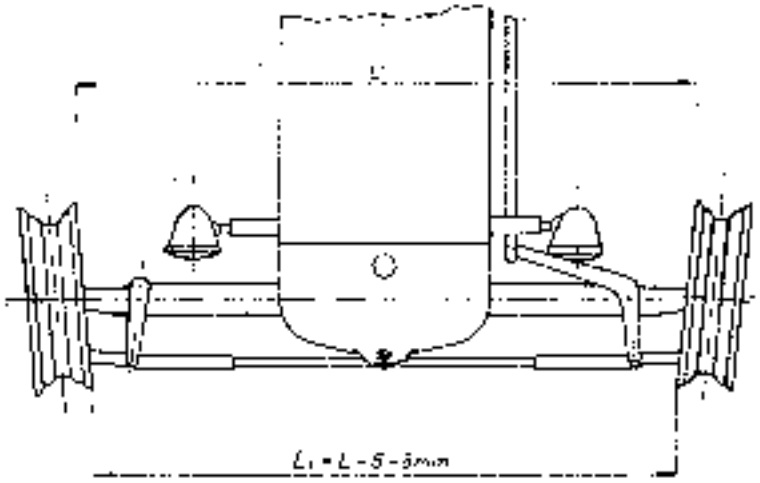


Fig. 13

When replacing the steering knuckles with new ones proceed as follows:

1. Using the wheel nut brace screw out the four nuts of the disc wheel bolts and remove the road wheel.
2. Screw out the cap nut, remove the washer and then drive out the cotter pin 4'S40 from the steering knuckle.
3. Using the socket spanner 4434.90 screw out the attaching nut.
4. Install the puller 4433.90 into the hub and pull off the hub by tightening the puller bolt.

   On reassembly: If the attaching nut, tightened by means of the socket spanner 4434.90, contacts the shoulder of the steering knuckle and the bearings cannot be further tightened, place the washer Part No. 669.06 under the nut.

   If the toe-in of the front wheels (L = 1. — 6 to 8 mm or .236 to .317", see Fig.13) is disturbed owing to an encountered stone, an accident, etc., the slightly distorted steering linkage and leverage must be aligned. Badly damaged parts should be replaced with new ones.

   Adjustment of the toe-in by filing a new groove into the track rod (Part No. 669.06) must be avoided.
   If the toe-in is disturbed, the front tyres are subject to undue, premature wear. Therefore check the toe-in periodically using the figure shown in Fig. 14.

   Reconditioning of worn out pin holes by reaming should be carried out in compliance with Plate I and Figs. 15, 16, 17, 18 and 19. Be sure to replace the worn pins with oversize pins according to the List of Spare Parts (Group 061).

To insure longer mileage of the tyres it is advisable to interchange them after every 100 hours of operation: that is to say fit the RH tyre to the LH wheel and vice versa.

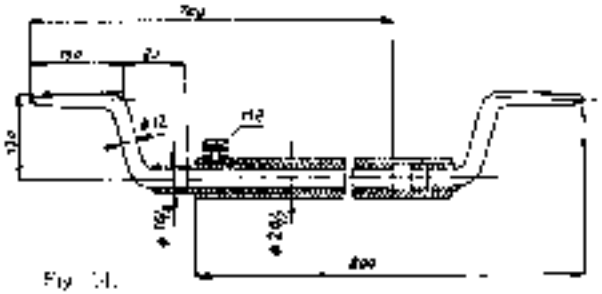


Fig. 14.

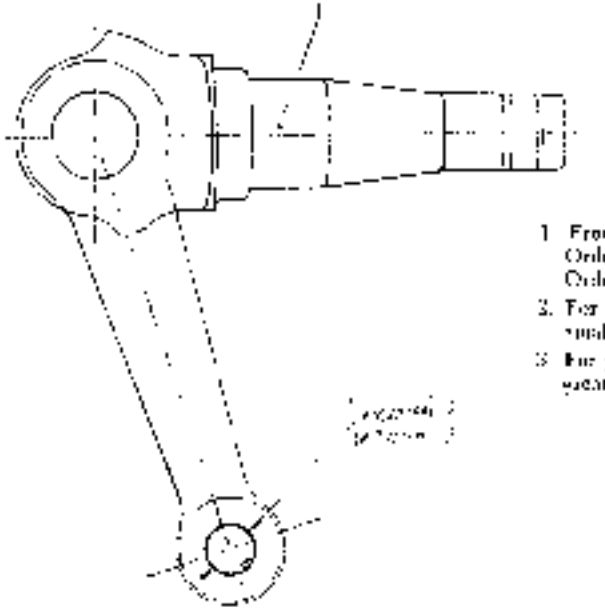


Fig. 15.

1. Front wheel pivot (right hand Order No. 913.06, left hand Order No. 913.061)
2. For pin Order No. 674.06 for smaller wear
3. For pin Order No. 675.06 for greater wear

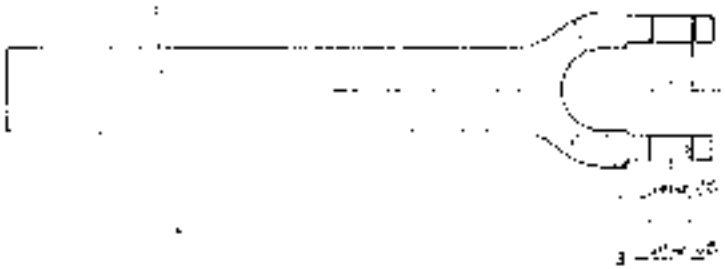


Fig. 16.

1. Link (right hand Order No. 662.06, left hand Order No. 661.061
2. For pin Order No. 711.06 for smaller wear
3. For pin Order No. 711.06 for greater wear
4. Connecting link of steering (Order No. 666.061
5. For pin Order No. 674.06 (for smaller wear)
6. For pin Order No. 675.06 (for greater wear)
7. For pin Order No. 711.06 for smaller wear
8. For pin Order No. 711.06 for greater wear

When replacing the steering knuckles with new ones proceed as follows:

1. Using the wheel nut brace screw out the four nuts of the disc wheel bolts and remove the road wheel.
2. Screw out the cap nut, remove the washer and then drive out the cotter pin 4×40 from the steering knuckle.
3. Using the socket spanner 4434.90 screw out the attaching nut.
4. Install the puller 4433.90 into the hub and pull off the hub by tightening the puller bolt.

On reassembly: If the attaching nut, tightened by means of the socket spanner 4434.90, contacts the shoulder of the steering knuckle and the bearings cannot be further tightened, place the washer Part No. 699.06 under the nut.

If the toe-in of the front wheels (L — L — 6 to 8 mm or .236 to .315", see Fig.13) is disturbed owing to an encountered stone, an accident, etc., the slightly distorted steering linkage and leverage must be aligned. Badly damaged parts should be replaced with new ones.

Adjustment of the toe-in by filing a new groove into the track rod (Part No. 669.06) must be avoided.
If the toe-in is disturbed, the front tyres are subject to undue, premature wear. Therefore check the toe-in periodically using the figure shown in Fig. 14.

Reconditioning of worn out pin holes by reaming should be carried out in compliance with Plate I and Figs. 15, 16, 17, 18 and 19. Be sure to replace the worn pins with oversize pins according to the List of Spare Parts (Group 06).

To ensure longer mileage of the tyres it is advisable to interchange them after every 600 hours of operation: that is to say: fit the RH tyre to the LH wheel and vice versa.

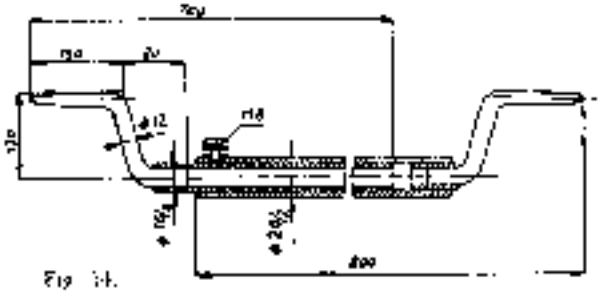


Fig. 14.

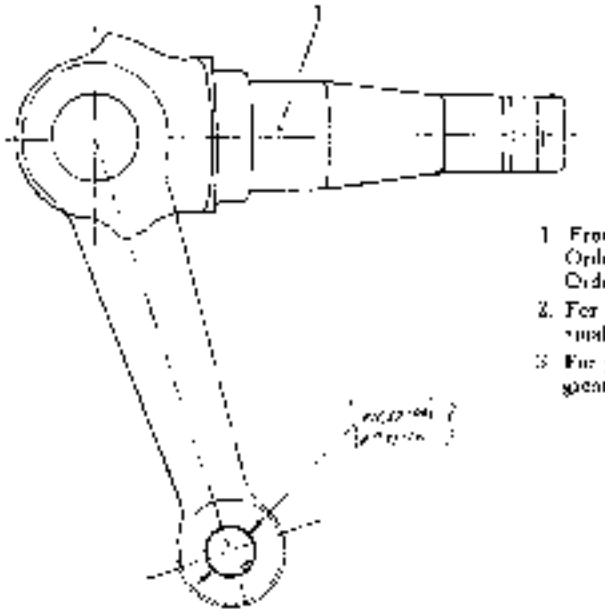


Fig. 15.

1. Front wheel pivot (right hand Order No. 633.06, left hand Order No. 631.06)
2. For pin Order No. 679.06 for smaller wear
3. For pin Order No. 675.06 for greater wear

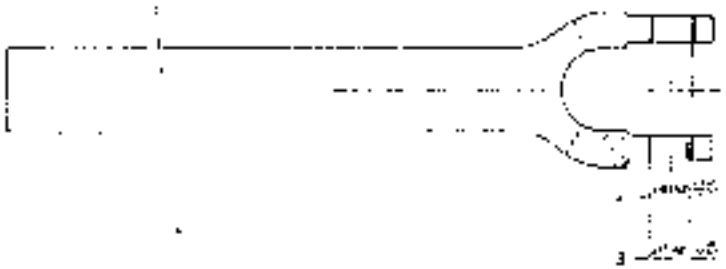
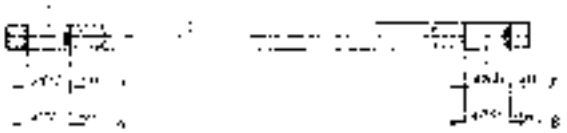


Fig. 16.



1. Fork (right hand Order No. 662.06, left hand Order No. 661.06)
2. For pin Order No. 712.06 for smaller wear
3. For pin Order No. 714.06 for greater wear
4. Connecting link of steering (Order No. 664.06)
5. For pin Order No. 674.06 (for smaller wear)
6. For pin Order No. 675.06 (for greater wear)
7. For pin Order No. 711.06 for smaller wear
8. For pin Order No. 713.06 for greater wear

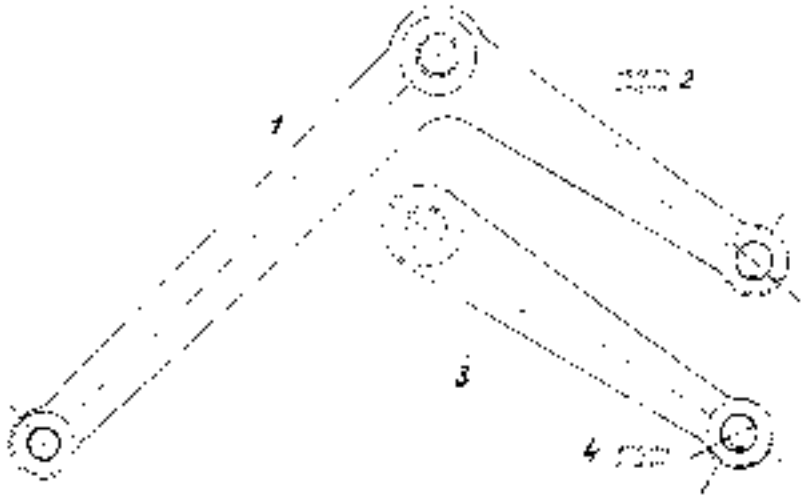


Fig. 17

1. Angle lever of steering (Order No. 710.06)
2. Ball pin Order No. 713.06 for smaller wear
   for pin Order No. 714.06 for greater wear
3. Drag rod lever of steering (Order No. 711.06)
4. Ball pin Order No. 713.06 for smaller wear
   for pin Order No. 714.06 for greater wear

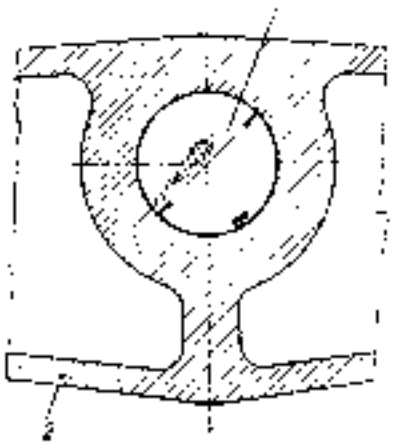


Fig. 18

1. Ball pin Order No. 713.06
2. Front axle

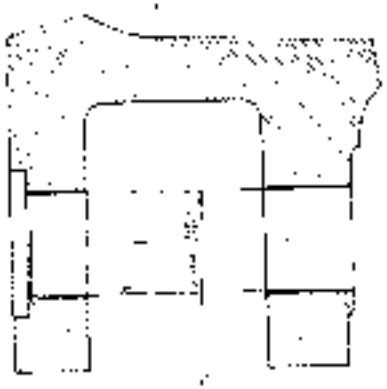
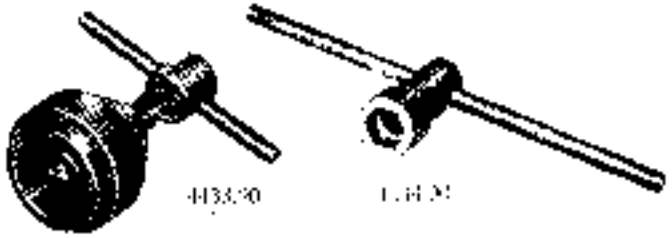


Fig. 19

1. Front axle Bracket
2. Ball pin Order No. 713.06

Special tools: socket spanner 4134.90, puller 4437.90.

Both removal and replacement of the front wheels of the Zetor 25 A (from Serial No. 126-35120 onwards) and Zetor 25 K models are effected similarly to those of the Zetor 25.



After every 120 hours of operation check the steering system and correct play of the taper roller bearings, proceeding as follows:

Support the front axle with a wooden block so as to lift it clear of the ground and to ensure free rotation of the wheels; the bearings should have a negligible play. If, however, undue play is ascertained by applying hard pressure against the wheel circumference, it must be eliminated by tightening the adjusting nut as shown in Fig. 19, or possibly by installing under the nut the adjusting shim Part No. 690.06.

Any play ascertained in the vertical mounting of the steering knuckle should be eliminated by replacing with a new one the adjusting shim P as shown in Fig. 20 (Part No. 8020.06 or possibly 8011.06) under the shoulder of the

Fig. 20

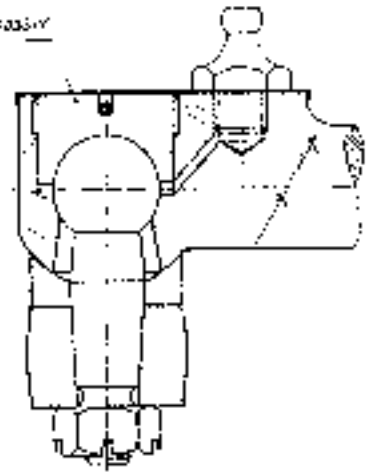


Fig. 21

track rod (Part No. 8025.06) and under the steering relay lever (Part No. 8015.06 or possibly 8012.06)

If undue excessive play of the ball joints of the steering system is ascertained eliminate it by tightening the nuts Part No. 8033-05 (see Fig. 21). First remove the grease fitting, remove the cap of the ball joint (no cotter supplied) and pull out the cotter pin from the nut of the ball joint. After the nut has been tightened the tube of the track rod (Part No. 8320-00) as well as the track rod (Part No. 735-00) must revolve freely on the ball joints without any undue play.

When adjusting the required wheel toed the toe-in of the sleeve of the track rod must remain undisturbed after the clamp bolt has been slackened: this position is fixed-by-set. By altering the position of the sleeve O the toe-in of the front wheels would be altered. (See Fig. 22).

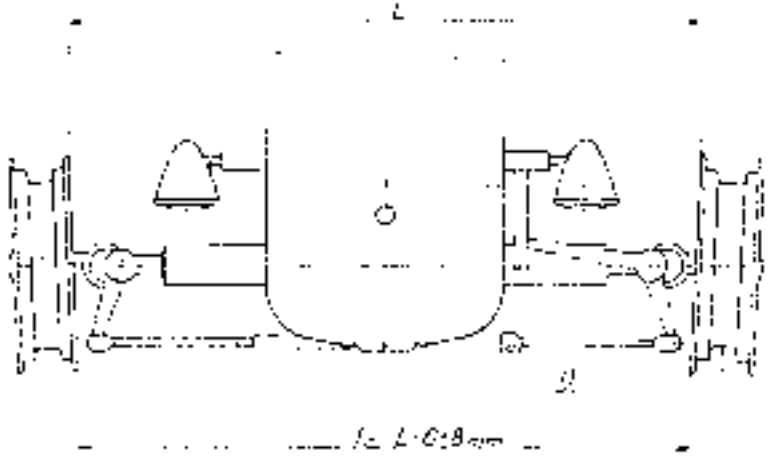


Fig. 22

If the front wheel toe-in (i.e. = 1.5 to 5 mm or .236 to .197") is disturbed owing to an encountered stone, to accident, etc. align the steering linkage and leverage should it be slightly distorted. Badly affected parts, however, must be replaced with new ones. Then adjust the toe-in of the front wheels by slackening or tightening respectively the sleeve O of the track rod after having first slackened the clamp bolt.

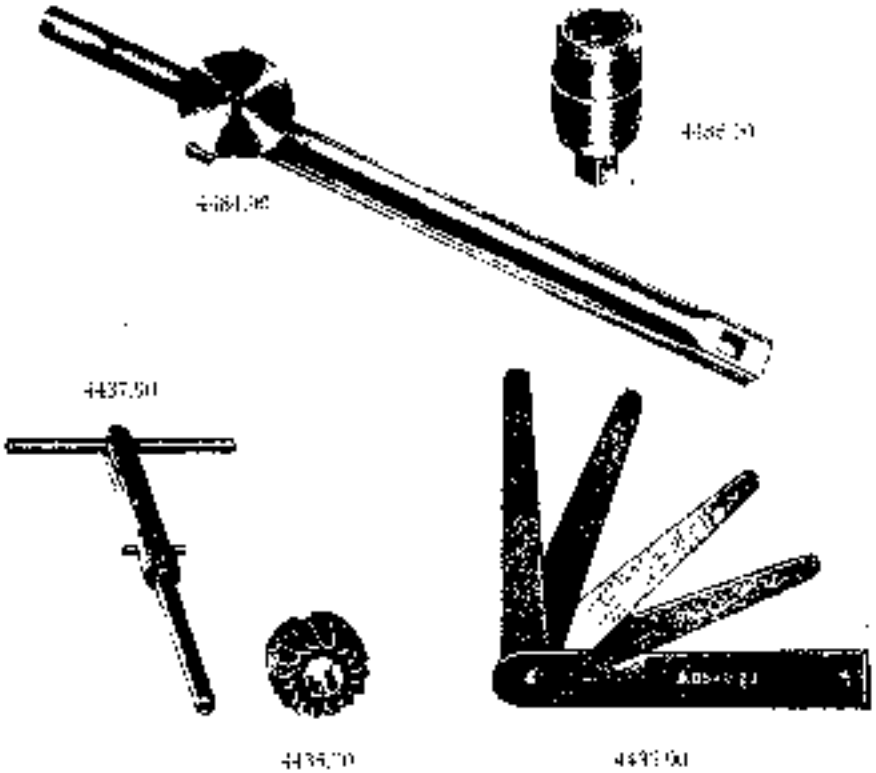
During complete locking of the wheels a clearance of approximately 4 to 5 mm or .157 to .197" should occur between the axle and the rear arm of the steering relay lever.

Badly worn top or bottom bushes of the retractable RH or LH part of the axle must be pressed out and replaced with new ones to prevent premature wear of the steering knuckles.

If undue wear of the king pin is ascertained (Part No. 617-06) it is advisable to replace the pin with an oversize one, thicker by one mm or .0394" (Part No. 717-00).

If the toe-in is disturbed the front tyre covers are subject to premature wear, causing erratic operation of the steering system. To avoid this periodically check the front wheel toe-in, using the fixture shown in Fig. 14.

To ensure increased mileage of the tyres it is advisable to interchange them after every 500 hours of operation, i. e. to fit the RH tyre to the LH wheel and vice versa.



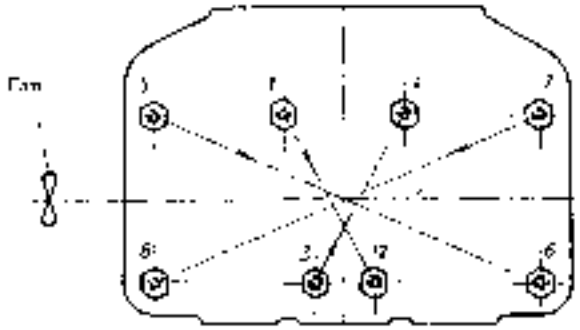


Fig. 21

To Remove Cylinder Head c/w Attachments

Special tools: torque wrench 4484.90 c/w lever 24 — 4430.00, and mill 4430.90 c/w spindle 4437.90; feeler gauge 4417.90.

In the course of reconditioning requiring the removal of the cylinder head proceed as follows:

1. Drain the cooling water through the taps on the crankcase and on the bottom of the radiator and remove the engine bonnet. In the case of tractors fitted with a vertical exhaust pipe remove the exhaust silencer prior to removing the bonnet.
2. Detach the top rubber union between the radiator and the cylinder head.
3. Detach the control rod of the radiator shutters by removing the cotter pin next to the fuel tank (see Section D-2, operation 5).
4. Detach the exhaust pipe from the exhaust elbow piece (this operation is omitted in the case of tractors fitted with a vertical exhaust pipe).
5. By slackening the slotted ring nut remove the body of the telethermometer from the elbow piece of the cooling water connecting the cylinder head with the radiator. This operation is omitted if the water telethermometer is not fitted.
6. Using a screw driver straighten the clamp of the capillary tube and detach the connection of the telethermometer. This operation is omitted if the telethermometer is not fitted.
7. Disconnect the electric leads to the headlamps and disengage them from the clamp.
8. Unscrew the bracket carrying the junction box for the headlamps, this being located between the radiator and the cylinder head.
9. Having unscrewed the screw bolts remove the cylinder head cover.
10. Disconnect the electric leads from the heater plugs.
11. Detach the fuel return pipes from the injectors.
12. Detach the delivery pipes from the injectors.
13. Unbolt the intake stump from the cylinder head.
14. Remove the valve rocker supports.
15. Take out the pushrods.
16. Unscrew the nuts of the eight bolts securing the cylinder head.

If the cylinder head gasket is leaky, the nuts of the cylinder head bolts should be tightened while the engine is hot. If the trouble still continues, the gasket must be replaced with a new one or, if necessary, the cylinder head regrooved. Or reface the seating face of the crankcase.

Earlier cylinder head gasket must be replaced with a new one.

From Serial No. 125-37191 of the Zetor 25 and Zetor 27 A tractors and from Serial No. 225-11044 of the Zetor 25 K tractors, the gasket Part No. 103.02 is not supplied as new cylinder liners, Part No. 1653.01, are being fitted to the tractors and the gasket Part No. 1919.02 is being used.

If the engine is fitted with cylinder liners Part No. 17.01 and the cylinder head gaskets Part No. 103.02 are not available from stock, the new gasket Part No. 1670.02 can be used.

If, on the other hand, the cylinder liners Part No. 17.01 have been replaced with the new cylinder liners Part No. 1653.01, the top face of which is fitted with a postrusion, it is absolutely essential to use the new cylinder head gasket Part No. 1670.02, bore dia. 113 mm or 4.63".

On refitting the cylinder head check on the correct tightening of the cylinder head nuts using a torque wrench 4184.90 and applying an effort of 15 to 20 kgm or 130 to 145 ft.-lbs. The tightening order of the cylinder head nuts is: 1-2, 3-4, 5-6, 7-8 as shown in Fig. 25.

If grinding-in of the valves, reseating of the seats or replacement of the valve springs is necessary, proceed as follows.

1. Remove the two outer springs (Part No. 164.721) from the valve rocker shaft.
2. Pull off the shaft bolts and valve rockers.
3. Slacken the lock bolts of the valve rocker supports.
4. Screw out the lock bolts of the valve rocker supports.
5. Remove the valve thrust cup. This operation is carried out solely on the Zetor 25 tractors up to Serial No. 125-26789 and on the Zetor 27 K tractors up to Serial No. 225-5 31. From the or Serial Nos. onwards this operation is omitted, the exhaust valves, Part No. 1617.12 as well as the intake valves, Part No. 1615.02, are not fitted.
6. Depress the valve spring by using the spring cup, remove the cotter pins and the valve.
7. If one of the valve guides is replaced with a new one, it must be pressed out by means of a collared pin.

For reseating of the valve seats use a hand operated reed mill 4147.90. Then the spindle 4147.90 is fitted in and for applying a slight pressure. The valve seats should be only skimmed, deeper reseating are being advisable. For final grinding in use grinding compound applied to the valve seat.

Properly ground in valves must not leak either petrol or any other volatile liquid. When fitting new valve guides countersink the valves within the limits of from 1.9 up to 2.3 mm or from .0748 up to .0907" (see Fig. 24).

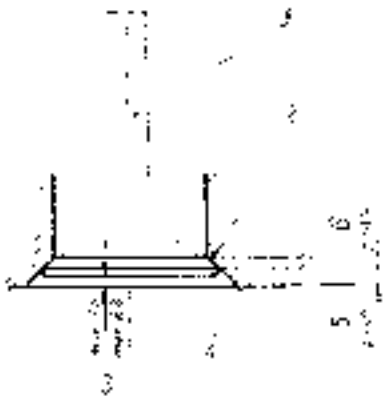


Fig. 24.

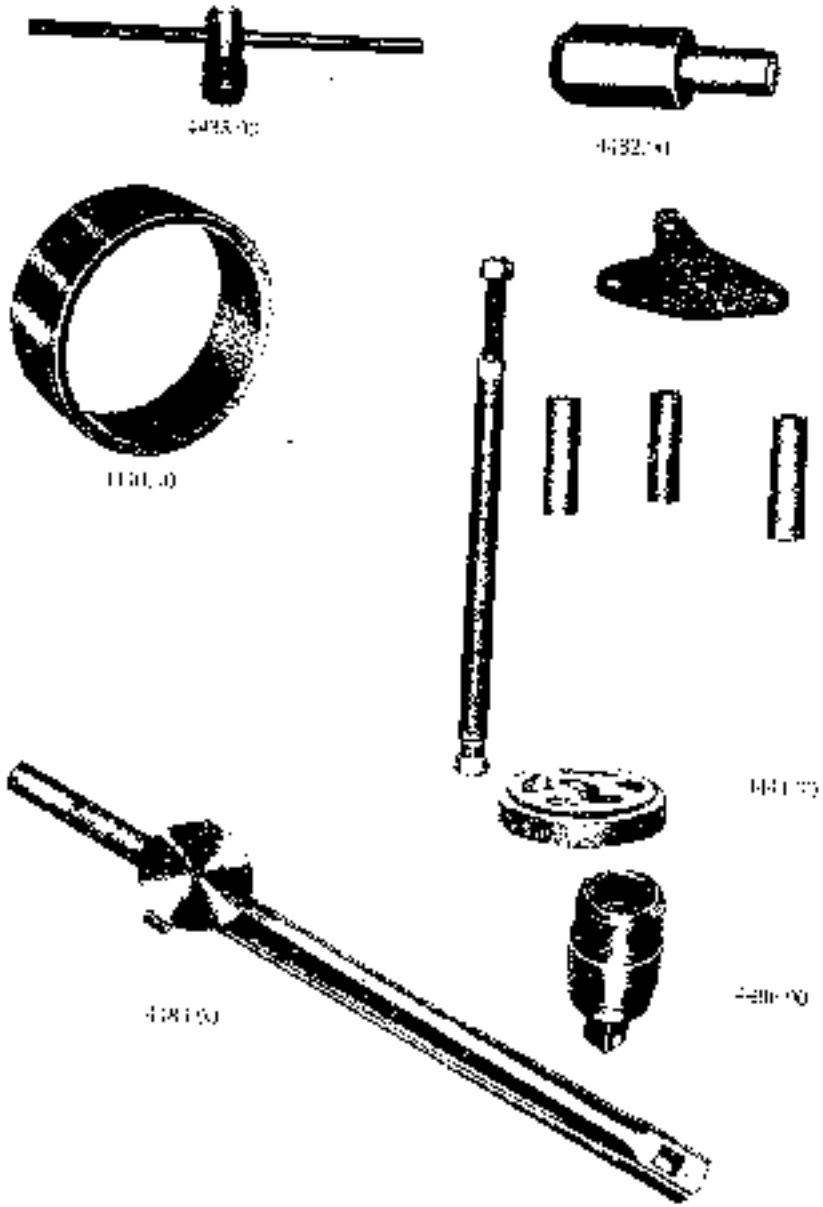
1. Valve
2. Valve seat in cylinder head
3. Countersink of valve
4. 2 mm in case of cylinder head
5. Chamfer of seat
6. Width of seat in cylinder head

For reassembly, the following points are essential:

1. Be careful not to interchange the valves. Valves marked on their head with the letter "V" are exhaust valves, while valves bearing the letter "S" are intake inlet valves.
2. The valve pushrods fitted with collars for the decompressor lever to the intake valves. The front rocker support on the right side of the support must not obstruct the passage of lubricating oil.
3. The cylinder head gasket should be installed so as not to obstruct the passage of lubricating oil from the crankcase. Avoid reverse fitting!

Check the valve clearances, which are 0.6 mm or .024" for the intake valves and 0.8 mm or .031" for the exhaust valves. When checking, crank the engine by means of the starting shaft so as to close the valves to be being checked in the position of the working stroke. Using the feeler gauge 4153.90 check the clearance between the seating face of the valve and the stop of the valve rocker.

Reassembly is effected by reversing the dismantling procedure.



Special tools: socket spanner 4434.90, hollow cam 4182.90, guide rings 4443.00, 4479.90 and 4459.90, puller 4441.00; torque wrench 4384.90 c/w liner 22 - 4468.90 and liner 24 - 4486.90.

Prior to removal of the connecting rods, pistons or cylinder liners remove the cylinder head as described in Instruction M-1. Then proceed as follows:

1. Remove the sump cover and crank the engine with the hand using the starting crank until the tab washers on the connecting rod bolts can be unlocked by means of a screwdriver or chisel.

   Avoid using the worn tab washers on reassembly, as they are likely to break at the point of bending, thus permitting loosening of the connecting rod bolts. Use of always freely bend new tab washers for locking the connecting rod bolts is essential.

2. Using the socket spanner 4434.90 screw out the connecting rod bolts.

3. Take out the bottom parts of the connecting rod and the big end bearing shells.

4. Pull upwards the connecting rods complete with the other half of the big end bearing shell and the pistons (see Fig. 25).

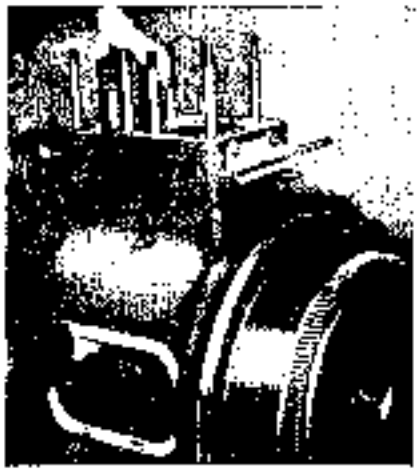


Fig. 25.

   For overhauls, replacement big end bearings and small end bushes are being supplied - two bearing liners Part No. 217.04 and two small end bushes 20.9 mm or 1.5" dia. part No. 220.04, according to Table II.

   On reassembly be sure not to reverse the connecting rods; install them properly in position. The big end liners and caps are marked with equivalent numerals and must never be interchanged.

   When fitting replacement connecting rods selective assembly is necessary to ensure approximately equal weight of the rod. Omission of this precaution may result disturbed balance of the crankshaft. The maximum permissible tolerance limits are ± 50 grams or 1.75 oz.

5. To prevent the piston rings from cracking remove them in the orthodox manner using three sheet metal strips.
6. Remove the circlips from the gudgeon pins.
7. If the gudgeon pins cannot be removed from the pistons it is advisable to warm up the pistons in a hot oil bath or electric furnace to approximately 100°C or 212°F and then drive out the gudgeon pins using a suitable drift. The gudgeon pins must be replaced if they are so worn as to have a clearance of 0.05 mm or .0020". For fitting the replacement gudgeon pins use the fitting drift 4482.01.
8. To fit the piston rings to the pistons use the guide rings (Part Nos. 4440.01, 4479.01 and 4497.01) and install the piston rings with the mark facing upwards.
The clearance between the ends of the rings should be 0.5 to 0.6 mm or .0197 to .0236". On fitting the pistons to the cylinder liners be sure that the ring gaps are not in line.
9. If the cylinder liners must be removed for relining or replacement, use the puller 4441.00 as shown in Fig. 26 and proceed as follows:

Fig. 26.

Fit the spacer tubes of the puller on to the cylinder head studs so they do not contact the edge of the liner. Place the circular pad provided with a recess for the shaft with the nut to the bottom of the liner inside the crankcase. Proceeding from above, insert the shaft with the nut shorter threaded end first into the aperture of the circular pad. The triangular pad should be installed on the hub and on three studs of the cylinder head studs. Press out the liner by tightening the top nut.

For measuring cylinder liners in position on the engine use a calliper as shown in Fig. 27a. Proceed in the centre line of the engine and in the perpendicular plane, i.e. at the points where the rubber seal rings are installed, and then again in either direction some 20 mm or .7874" below the top edge of the liner.

Fig. 27.

If the cylinder liners require relining observe the dimensions given in Table III so as to ensure proper fitting of the replacement pistons and piston rings. The correct clearance between the piston top and the cylinder head is 1.2 mm or .0472" min., with the piston in top dead centre. Replacement oversize pistons for relining II and III (see Table III) are supplied according to the List of Spare Parts.

As pistons for relining I have not generally been required, the makers no longer supply relining I pistons. For better information the respective dimensions can be found in Tables III, IV and V.

Relining III pistons are being supplied with a gudgeon pin bore of 39.70 mm or 1.5670" dia. Accordingly, the existing gudgeon pins must be reground to 39.69 up to 39.70 mm or 1.5672 up to 1.5675" replacing simultaneously also the small end bush, which must be reground to 39.71 mm or 1.5676" dia. observing the clearances stipulated in the respective Table II, i.e. 39.709 up to 39.725 mm or 1.5662 up to 1.5668".

Early models up to Serial No. 125-34142 of Zetor 25 and Zetor 25 A and 225-16739 of Zetor 25 K tractors were fitted with flat top cylinder liners (Part No. 17.01 [illegible] see Fig. 27b). From Serial No. 125-34743 up to Serial No. 125-37190 of the Zetor 25 and Zetor 25 A models, and from Serial No. 225-16739 up to Serial No. 225-17944 of the Zetor 25 K models, cylinder liners bearing the same Part No. 17.01, were fitted, but with oblique top flange face at an angle of 17°30' (see Fig. 27b). The latest model of cylinder liner Part No. 1653.01, superseding both previous ones, has a collared top face (see Fig. 27c), being fitted to the Zetor 25 and 25 A models from Serial No. 125-37191 and to the Zetor 25 K models from Serial No. 225-17944 onwards. From Serial No. 125-41080 of the Zetor 25 A model and from Serial No. 225-24096 of the Zetor 25 K model onwards a new improvement has been introduced: the cylinder liner (Part No. 1653.01) is reinforced above the grooves taking the rubber seal rings and supersedes all the previous models (See Fig. 27d).

Fig. 27b.

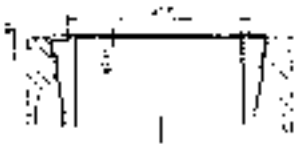


Fig. 27c

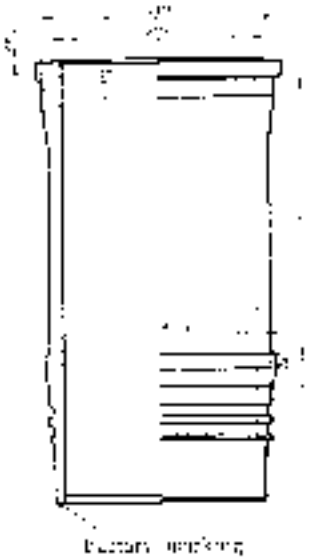


Fig. 27d.

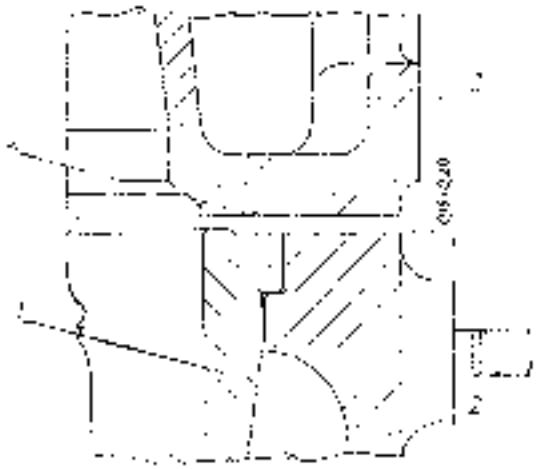


Fig. 27e.

1. Cylinder liner
2. Crankcase
3. Cylinder head
4. Groove

In the case of the above mentioned cylinder liners the overlap above the top face of the crankcase was 0.02 to 0.04 mm or .000787 to .001 57" (see Fig. 27a). From Serial No. 127-49371 of the Zetor 25 A tractors and from Serial No. 227-20162 of the Zetor 25 K tractors the liner overlap has been increased to 0.16 up to 0.20 mm or from .0063 up to .00787" (see Fig. 27e) and the top face of the cylinder liner provided with two circular grooves. The seating

face of the cylinder head has two corresponding grooves. Consequently the cylinder head gasket is pressed into these grooves both in the liners flanges and in the cylinder head, thus ensuring a perfectly tight joint when the head is tightened.

These cylinder liners are supplied also under the Part No. 107031.

Both cylinder liners, however, must be of similar design: on replacement either fit two liners of the latest design, or of early design.

Never use the early cylinder head gasket (Part No. 107021 with 5-mm dia. 107.5 mm or 4.23") when the new cylinder liners (Part No. 107301) have been fitted.

For tightening the connecting rod bolts use the torque wrench (48-1.90), applying an effort of 13 to 14 kgm or 94 to 101 ft. lb. After every general overhaul, i.e. approximately after 300 hours of operation, replace the connecting rod bolts with new ones.

When dismantling the crankcase or refilling the oil, remove the oil filter cartridge (Part No. 55013) placed in the strainer of the oil filler neck of the rocker cover, wash it in petrol and let it dry to ensure proper breathing of the engine. A clogged filter cartridge would prevent breathing and might cause the oil from the crankcase to be forced into the fuel injection pump through the lamp rod (Part No. 32138).

Reassembly is effected by directly reversing the dismantling procedure. Special attention should be paid to proper alignment of the connecting rods and the crankshaft (see Fig. 28).

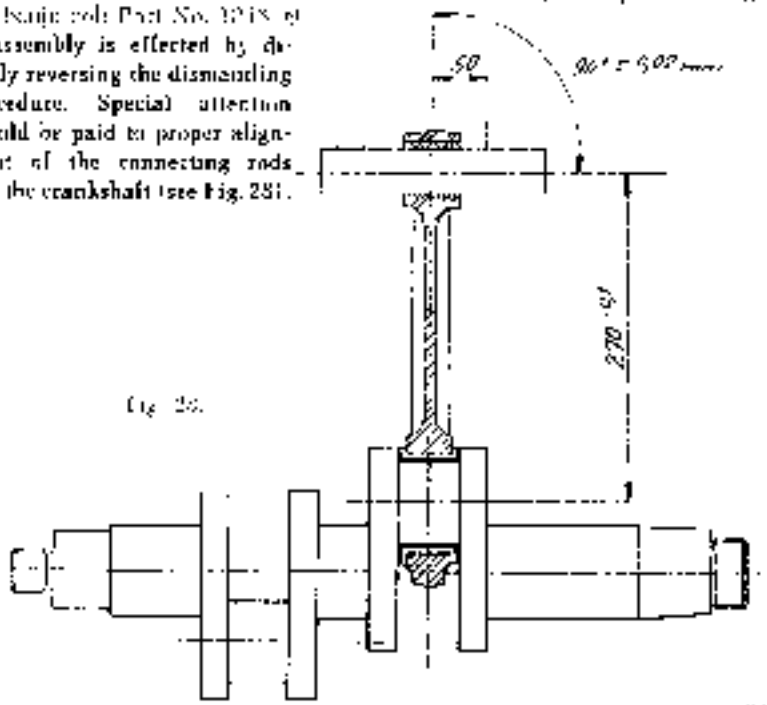
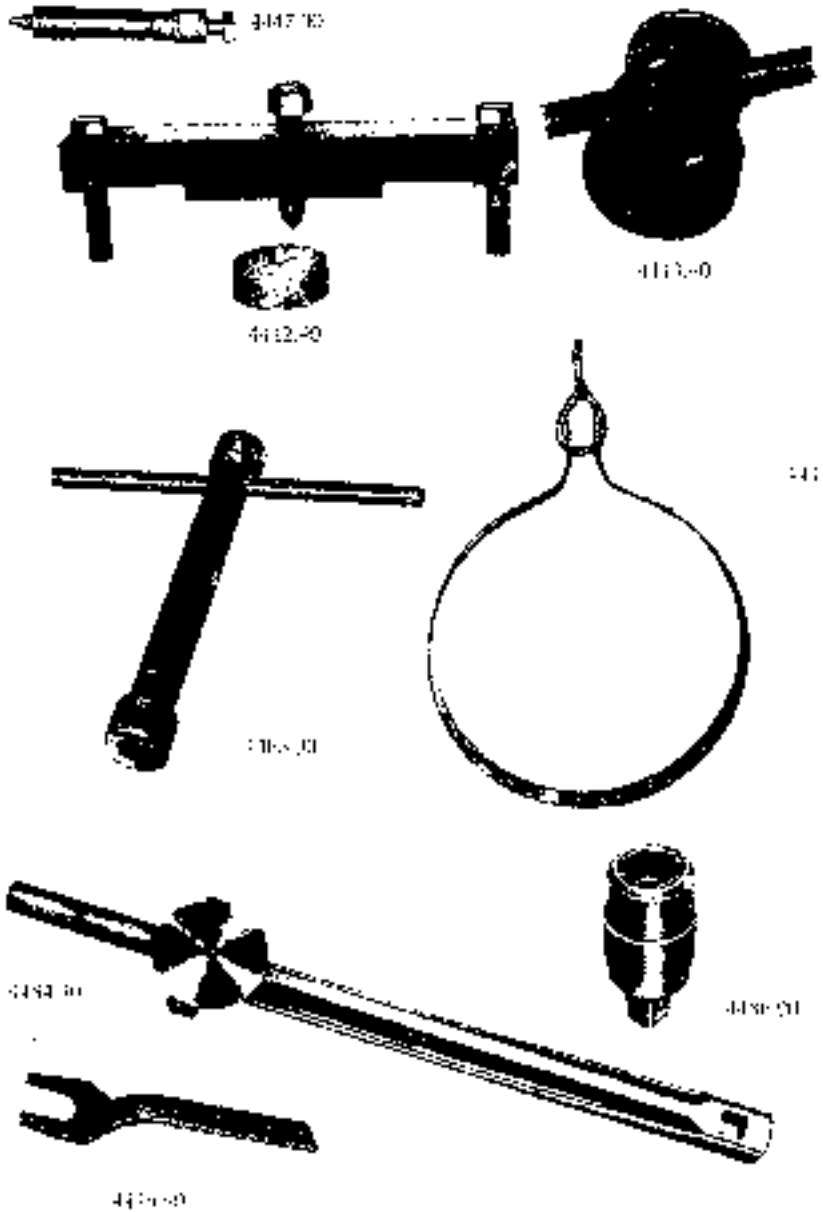


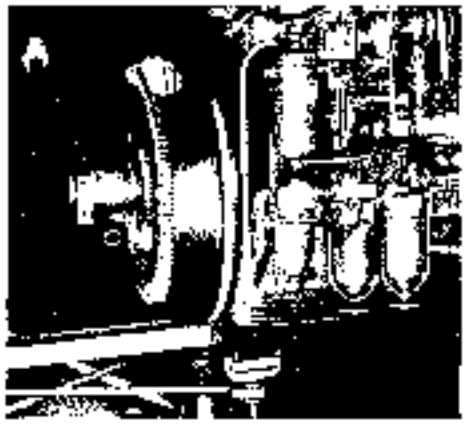
Fig. 28.



Special tools: puller 4447.90; socket spanner 4443.90; puller 4442.90, suspension strap 4444.90; socket spanner 4465.90; torque wrench 4454.90, or Jaguar 24 - 4450.00; spanner 4446.90.

When removing the crankshaft from the crankcase proceed as follows.

1. Remove the cylinder head, operations 1 to 16, see Instruction M-1.
2. Remove the connecting rods complete with pistons, operations 1 to 4, see Instruction M-2.
3. Carry out operations 1 to 15, see Instruction D-1.1.
4. Screw out the drain plug in the crankcase oil pan (bottom cover) and drain the oil.
5. Remove the crankcase oil pan (complete with the electric oil heater if fitted). It is advisable to remove the suction strainer of the oil filter and wash it in paraffin oil.
6. Carry out operations 1 to 26, see Instruction D-2. Further dismantling of the crankcase should be carried out on a rolling approved work bench.
7. Remove the clutch, see operations 1 to 3, Instruction S-1.1.
8. When replacing the ball bearing 6904 (Part No. 243.747) of the clutch or first motion shaft, which is press-fitted to the crankshaft, first remove the circlip (Part No. 240.721) and the bearing shim (Part No. 244.040). Then use the puller 4447.90 for pressing out the bearing.
9. Using a screw driver or a chisel unlock the tab washer of the crankshaft.
10. Install the socket spanner 4443.90 on the crankshaft nut and slacken it so that four threads only remain to be unscrewed at the most. Prior to slackening, lock the flywheel in position to prevent it from rotating.
11. Using two bolts, attach the puller 4442.90 to the flywheel. Place a circular pad on the crankshaft nut to provide support for the centre bolt of the puller. Ease the flywheel by tightening the puller centre bolt and move the flywheel towards the nut along the crankshaft. (See Fig. 29)



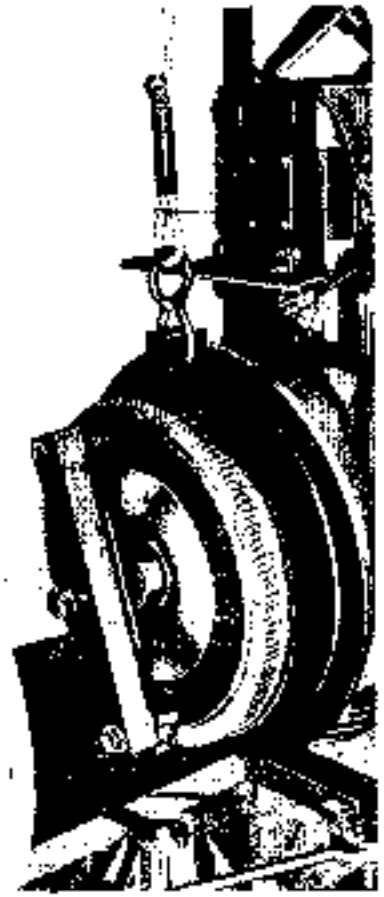


Fig. 29.

12. Install on the flywheel the suspension strap 4111.90 attached to a pulley block. Slightly raise the flywheel and screw out completely the crankshaft nut. Then remove the flywheel taking care not to damage the threaded end of the crankshaft.

13. Remove the crankshaft key from its keygroove.

14. Using a screw driver or a chisel unlock the tab washers of the crankcweight bolts. Hold in position the counterweights and screw out the bolts using the socket spanner 4468.00. It is advisable to use new counterweight bolts on reassembling. The interchanging might entail damage to the respective threads or an even more serious defect. Faulty bolts should be replaced with new ones. Likewise replace with new ones worn bolts on every major recondition or general overhaul. The sheet metal tab washers must be replaced with new ones on every reassembly. The use of old tab washers may entail slackening of the bolts and thus damage to the crankcase. Check the counterweight bolts for correct tightening using the torque wrench 4484.00 (with lever 24 — 4486.900) and applying an effort of 10 to 11 kgm or 72.35 to 80 ft. lbs. Then lock the bolts in position by bending the tab washers.

If the tractors Zetor 25 and Zetor 25 A from Serial No. 12-43060 and the Zetor 25 K tractors from 225-10637 onwards which have the crankcase Part No. 160950 are equipped with the pressure air brake system the air compressor of which is fitted to the RH side of the crankcase, carry out the operations 15 and 16.

15. Disconnect the pipe to the tyre inflator from the air compressor. If the pressure air brake system is not fitted this operation is omitted.

16. Remove the air compressor, proceeding according to Instruction M-5. If the brake system is not fitted, this operation is omitted.

17. Remove the speed governor according to the description in Instruction M-5.2.

18. Remove the fuel injection pump proceeding according to Instruction M-5.3.

19. Remove the tapets of the fuel injection pump from the crankcase. Using a screw driver unlock the tab washer (Part No. 90.01 or 26-2.01 from Serial No. 12-38040 of the Zetor 25 and 25 A models and from Serial No. 225-10637 of the Zetor 25 K model onwards) of the timing gear (Part No. 03.01 or 165.1.01 for Zetor 25 A models from Serial No. 12-38040 and for Zetor 25 K models from Serial No. 225-10637 onwards) and after having screwed out the crankshaft nut using the spanner 4456.90, push out the crankshaft.

20. Unlock both tops of the tab washers of the centre bearing nuts, screw out the bolts and take out the cap of the centre bearing.

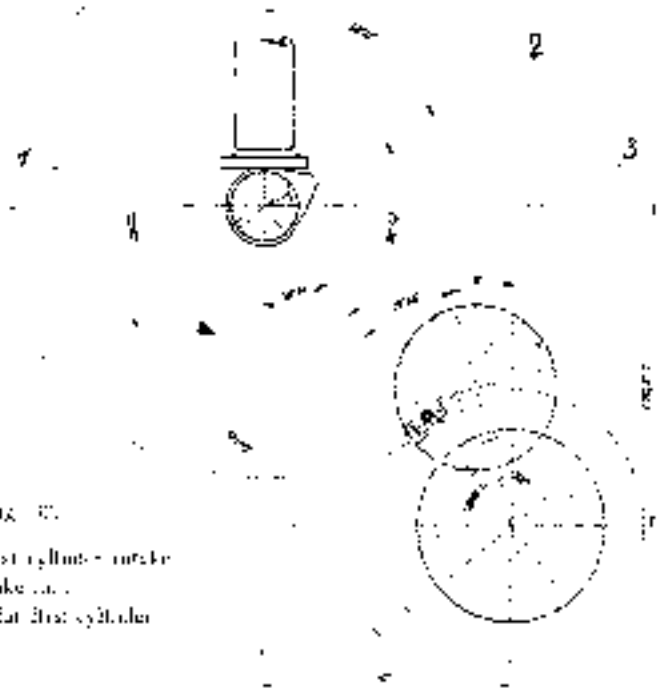


Fig. 30.

1. Beginning of first cylinder intake
2. Axis of first intake cam
3. Crankshaft pin for first cylinder

21. Attach the crankshaft to a cable or secure it in another manner to prevent damage to the crankpins when the rear and front cap are removed.
22. Screw out the seven bolts of the rear crankcase cover, using three of them to press the cover clear of the crankcase flange.
23. Screw out the six bolts of the timing gear (front) cover. Using three of these bolts press the cover clear of the crankcase flange and then remove it.
24. Unfasten the cable, lift the crankshaft with both hands (one on girder and one on the bottom bearing shell for the centre bearing by tapping. Turn the crankshaft into a suitable position and remove it from the crankcase through the aperture of the rear cover.

   Disassembly. Take out the bearing shells according to the numerical marks. The numerals should face the side cover.

   In addition, bear in mind that correct mark of the timing gears is indicated with punch marks (as shown in Fig. 30). Observe these marks in order not to disturb the correct valve timing, i.e. commencement of opening and closing of the valves.

   The commencement of the fuel injection 30° before top dead centre (as shown in diagram, Fig. 31) is indicated by the notch on the flywheel and the injection commencement indicator mounted in the side aperture of the clutch or bell housing.

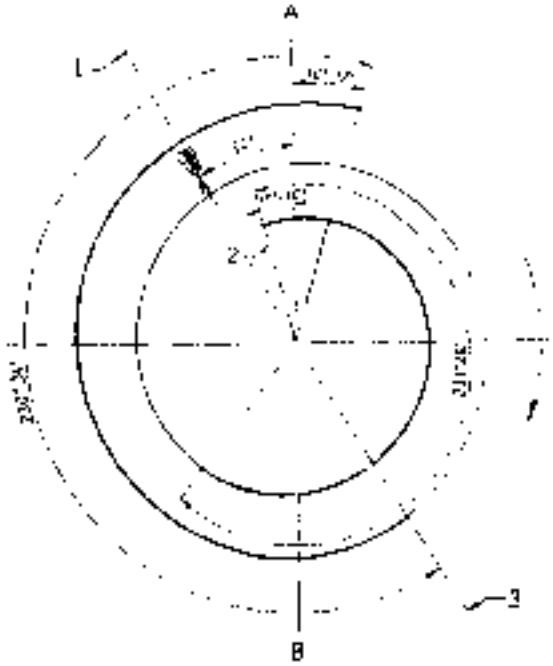


Fig. 31

A Top dead centre
B Bottom dead centre

1 Beginning of injection
2 Intake valve opens
3 Exhaust valve opens

To Balance Crankshaft

M-3/2

Special tools: torque wrench 465.590; cylinder 24 — 119.590.

The crankshafts are factory-balanced. If the counterweight or balance weight had never replaced in the course of reconditioning, the crankshaft must be rebalanced, using the standard balance discs or rails set precisely according to a spirit level and ground to a blunt edge.

After having bolted on counterweights of equal weight of the main bearing of the rotor weighing one ounce (1 of 29 mm or .287" diameter) off to a depth of 5 mm or .197" equals approximately 1 dbs or .393 oz weight.

Check the counterweight bolts for correct tightening, using the aforementioned torque wrench and applying an effort of approximately 10 to 11 kgm or 72 to 80 ft. lbs.

To Regrind Crankshaft

M-3/3

If the out-of-round of the crankpins exceeds 0.10 mm or .0004", regrinding must be carried out.

The respective undersize dimensions of reground crankpins for main and conrod bearings are as follows:

Stage of regrinding	Main crankpins diameter		Journal pins diameter	
I	79.75	+0.01 −0.019	49.75	+0.00 −0.019
II	79.50	+0.01 −0.019	49.50	+0.00 −0.019
III	79.25	+0.01 −0.019	49.25	+0.00 −0.019
IV	79.00	+0.01 −0.019	49.00	+0.00 −0.019
V	78.75	+0.01 −0.019	48.75	+0.00 −0.019

The surface of the crankshafts is nitrided to a depth of approximately 0.3 mm or .012", the hardness decreasing with increasing depth.

When aligning an unevenly worn crankshaft by grinding, the nitrided layer can easily be ground through; checking of the crankpins for hardness after they have been reground is therefore essential.

The surface hardness must never drop below the minimum of 498 Vickers units. Prior to nitridation, grind the crankpins with a mild surface to the next lower diameter in compliance with the above Table, with an allowance of 0.1 mm or .0004". Do not regrind the run of the small timing gear (see Fig. 32).

Fig. 32.

1. The specified pin diameters are valid for a fully ground Siebrand crankshaft.
2. The grinding boss is 3 to 4 mm.
3. Much of the pin fine grinding of crankshaft pins is given on the diagram. If grinding is required it is necessary to mark the crankshaft anew.
4. Spare bearings according to Table II are supplied for repairs.
5. When machining spare bearings it is necessary to comply with the specified plays.
6. By play on the diagram is understood the play between the crankshaft pin and the bearing. By play given on the length is understood the play between the bearing and the crankshaft shoulder.
7. The joints of permits the reduction of the pin diameter further into diagram 1 12 mm on the diameter.
8. For grinding over 0.5 mm it is necessary to provide spindles of 104 × 30 Ø.

Normalisation finished, carry out final regrinding of the pins i.e. to the diameter of the respective grinding stage according to the Table.

When regrinding to a certain stage, the diameters of all the pins must be kept within the respective tolerance limits of a certain stage of regrinding.

Prior to nitridation, during periodical overhauls, or if an oil refill in the crankcase has been omitted for a prolonged period and the crankcase complete with oil filters has been drained during oil refill, drill off and then screw out the blank plugs of the lubrication passages in order to remove hard deposits of sludge likely to accumulate on the surroundings of the blank plugs (see Fig. 33) and to hamper circulation of the oil to such an extent as to cause even seizing of the front bearing. Flushing of the lubrication ducts with fuel or another cleaning liquid or blowing through them with pressure air often proves inadequate, preferably scrape the ducts clean after having screwed out the plugs and only then flush the ducts. It is advisable to proceed in a similar manner also after nitridation to ensure perfect circulation of the lubrication oil and then to blank the passages with blank plugs.

Undersize bearings of 78.50 −0.2 mm and 68.50 −0.2 mm dia. for the above mentioned diameters of crankpins can be supplied from stock; these can be easily ground down to suit the respective regrinding stage. The dimensions of the bearings for reserve crankshafts will be found in Table II.

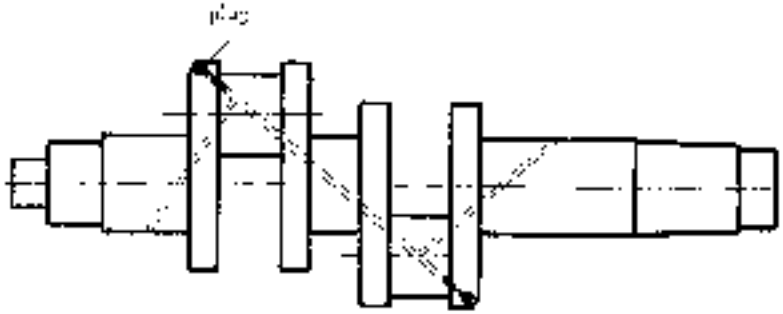


Fig. 33

To Remove Front Bearing

M-3/4

When replacing the front bearing on the crankshaft with a new one (see Table II) remove the front axle bracket as described in Instruction D-1/1, remove the speed governor according to Instruction M-3/2 and then use three press-off bolts to pull off the timing gear cover complete with the bearing off the crankshaft.

If the front bearing is badly seized and sticks so fast that the cover complete with bearing cannot be removed by means of the three press-off bolts, remove the side cover of the crankshaft and, using a long screw driver, screw out from the timing gear cover the lock bolt of the front bearing Part No. 36-50.

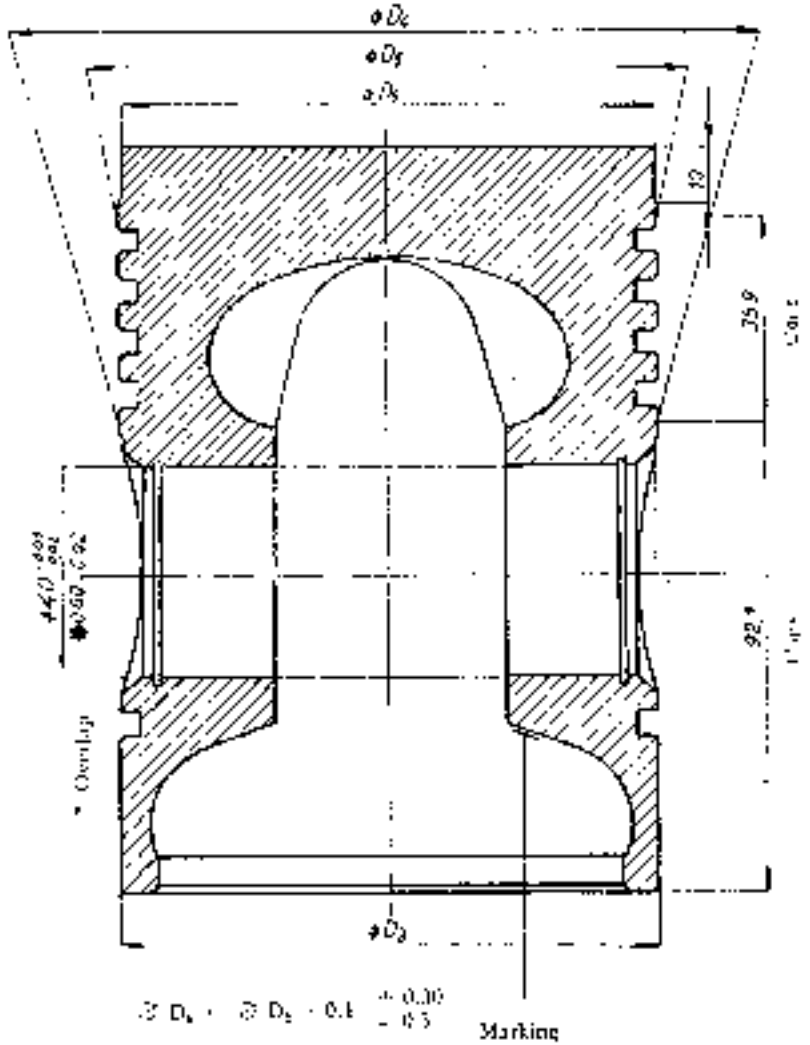


Fig. 36.

If the position of the crankshaft prevents the lock bolt from being screwed out from the timing gear cover, press off the cover with force until the lock bolt breaks off the edge of the timing gear cover.

In this case a new bore must be drilled and a new thread cut in the timing gear cover for the lock bolt on reassembly. The seized crankshaft bearing must be knocked off by a series of a chisel of suitable length.

The clearance of the crankpin in the front bearing should be from 0.08 up to 0.120 mm or from .00317 up to .00473".

To Remove Rear Bearing M-3/5

When replacing the rear crankshaft bearing with a new one proceed in a similar manner as when replacing the front bearing. First disconnect the tractor between the crankcase and the clutch or bell housing as described in Instruction D-3 and remove the flywheel according to Instruction M-3/2, operations 1 to 13.

Maximum Permissible Wear Limits of Engine M-3/6

Table IV indicates the individual points of wear ascertained in operation.

Grading Pistons and Cylinder Liners M-3/7

Early production cylinder liners and pistons were marked with a numeral (see Fig. 27a, 27b, 27c, 27d and 30), indicating the last two decimal points of the nominal size in mm (see Plate V part A & B).

From 1st January, 1950, the pistons bear new marks. They are stamped with the last numeral of the nominal bore diameter and the letter indicating the respective grading. The markings of the cylinder liners remains unchanged.

Table V, part B, shows selective assembly of cylinder liners and pistons; the normal clearance should be 0.16 mm or .00630". But even assemblies having a clearance of 0.15 mm or .00591" can be used.

Example of selective assembly:

A cylinder liner bearing the mark 1 (early mark 1) should be fitted with a piston bearing the mark 3-2 (early marking with the letter E) as possible with the number 63) in the first place, while a piston bearing the mark 3-1 (early mark with the letter F, or possibly with the number 6) can also be used, but in second place only.

a) **Oil filter with strainer filter element**

for tractors Zetor 25 up to Serial No. 125-30275 and on tractors 25 or 25 K up to Serial No. 225-9105)

On every refill of oil in the engine crankcase and also after every 30 hours of operation of the tractor the oil filter must be thoroughly cleaned. After having drained the oil from the filter bowl proceed as follows

1. Screw out the three bolts securing the filter bowl to the bracket
2. Remove the filter element complete with spring from the bowl
3. Using a paint brush or a loose hair brush dipped in paraffin oil clean both the bowl and spring.
4. Remove from the filter element the seal and the distributor cap. Wash in paraffin oil, using a paint brush and dry
5. Install a spanner or 24 mm or .94" on the key in region of the through bolt and, using a screw driver, slacken the bolt M 8 from the opposite side
6. Using a fine paint brush or and brush wash the honeycomb filter plates in paraffin or preferably in petrol

   Avoid using any sharp object or hard brush for cleaning the filter plates to prevent the fine filter strainers from being damaged. If in doing damage of the plate is ascertained it can be repaired by soldering. Major defects of the plates necessitate replacement with new ones.
7. Remove the filter bracket and flush it with fuel oil
8. Examine dried the disassembled components of the filter and the bowl with fresh oil and proceed to assemble in reverse order to the above directions, observing absolute cleanliness.

b) **Oil filter I and II**

(fitted to special order to Zetor 25 tractors from Serial No. 125-24263 up to Serial No. 125-30275 and to Zetor 25 K tractors from Serial No. 225-9107 up to Serial No. 225-9105 see Group 0-1).

After having cleaned the oil filter I according to the previous instruction, part of operation 1 to 8, proceed to clean the oil filter II as follows.

1. Screw out the cap nut
2. Disconnect and swing clear of the through bolt the outlet pipe
3. Remove the lower cap and pull off the through bolt the filter earth cap complete with felt pads and spring.
4. Screw out the plug screw and thoroughly flush the bowl with fuel oil or paraffin oil.
5. Dip the filter cartridge complete with pads and spring into a container with clear paraffin oil and after the dirt has softened, wash it with a paint brush

It is advisable to replace the felt element with a new one after approximately every 360 hours of operation.

6. After the filter cartridge has thoroughly dried reassemble the filter in reverse order and fill the bowl with fresh oil.

c) **Dual oil filter**

for Zetor 25 tractors from Serial No. 125-30275 and on Zetor 25 K tractors from Serial No. 225-9105 onwards).

Dismantling and cleaning procedure:

1. Slightly slacken the clamp bolt of the filter bowl I, swing clear the clamp and remove the bowl (see Fig. 36).

Fig. 36

2. Remove the strainer filter element complete with spring from the bowl. Discard contaminated oil.
3. Dip the filter element complete with spring and bowl into clean paraffin oil to soften the accumulated sludge
4. Proceed in the same manner with the other bowl (see Fig. 36) and then use a clean rag to wipe both bowls dry. Using a paint brush wash the filter elements carefully so as not to damage them (see Fig. 37)

Fig. 37.

Fig. 36.

6. Disconnect the pipe to the oil pressure gauge from the bracket body. Test the pipe with paraffin oil and blow through it with pressure air.
7. Screw out the three bolts securing the oil scissor valve and remove the valve. Flush both the filter bracket and the scissor valve in paraffin oil and blow through them with pressure air. After they have dripped oil, wipe them dry. If the valve seal is damaged, replace it with a new one on reassembly.

   Distorted or concave diamond seal rings of the bowls must not be replaced in position as the bowls would leak.

   On reassembly fill the bowls with fresh oil up to 2/3 of their capacity, then install the springs complete with filter elements and secure the bowls to the bracket by means of the clamping screw yokes.

To Remove Oil Pump and Adjust Oil Pressure — M-4/2

When reconditioning the oil pump first remove the oil filter complete with the bracket as described in Instruction M-4/1, part 3. In the case of Zetor 25 and Zetor 25 K tractors which have been fitted with oil filter I and II Group 64 supplied to special order, slacken the oil inlet pipe (Part No. 4504/64) and proceed to remove the oil filters as described in Instruction M-4/1, part 3.

In the case of Zetor 25, 25 A and 25 K tractors fitted with the dual oil filter, remove the filter in the manner described in Instruction M-4/1, part 3. To remove the oil pump, proceed as follows:

1. Screw out the three bolts securing the pump.

   Take out the oil pump from the crankcase.
2. Bend out the tab washer, unscrew the castle nut, remove the shim and knock the drive gear off the drive shaft key.
3. Screw out the four bolts of the cover, remove the cover and take out from the pump body both the drive and driven gears.
4. Screw off the union nut and slacken the regulating bolt by screwing out the adjuster screw with the lock nut.
5. Thoroughly clean the regulation bolt seat. Wash the bolt, spring and adjuster screw with clean fuel oil.

On reassembly proceed in reverse order.

If the pressure drops below 2 kg/cm² or 28.5 psi with the engine warmed up and running at full speed, raise the oil pressure to 3 kg/cm² or 77 psi with the pressure deadjuster as follows:

1. Screw off the cap nut and slacken the lock nut.
2. Using a screw driver tighten the adjuster screw clockwise till the oil pressure has dropped.
3. Having set the required pressure, tighten the lock nut of the adjuster screw and screw on the cap nut.

To Remove Fuel Filter — M-4/3

1. When cleaning the early fuel filter with felt filter element, fitted to Zetor 25 tractors up to Serial No. 125-31820, proceed as follows

1. Cut off the supply of fuel from the tank by closing the fuel tap.
2. Screw out the plug of the filter and drain the fuel out.
3. Slacken the cap nut on the filter cover and disconnect the inlet pipe to the injection pump.
4. Take off the filter cover and remove the filter element.
5. Having thoroughly cleaned the filter bowl as well as the element in petrol and dried them, reassemble the filter.
6. After has opened the fuel tap and filled the filter with fuel bleed the fuel system.

   It is advisable to replace the felt filter element after approximately every 160 hours of operation.

b) **To clean the fuel fine filter FJ-4B-3N and the fuel prefilter proceed as follows:**

1. Close the fuel tap, thus cutting off the supply from the fuel tank.
2. Screw out the drain plug and drain the fuel from the filter bowl.
3. Disconnect the fuel feed pipe from the tank from the fuel prefilter.
4. Disconnect from the bottom of the filter bowl the fuel feed pipe to the injection pump.
5. Slacken the wing nut of the yoke of the glass bowl of the prefilter and pull the washer off the yoke bolt. Then swing the yoke clear of the bowl and remove the glass bowl, wash it in paraffin oil and wipe it dry with a clean rag.
6. Screw out the nut and cap of the filter strainer. Carefully pull off the strainer from the bolt and clean it carefully avoiding any damage, by means of a paint brush.

Fig. 38

7. Screw out the union nut securing the cover of the prefilter to the connector screwed in to the filter bowl.
8. Wash thoroughly in paraffin oil the cover of the prefilter and blow through it with pressure air.
9. Screw out the bolt of the bowl cover with the breather hole and remove the cover.
10. Take out the filter element from the bowl and thoroughly wash it in paraffin oil using a paint brush or a horse-hair brush.
11. Flush the bowl with paraffin oil and, after it has drained wipe it dry using a clean rag.

    It is advisable to replace the paper plates of the filter element with new ones after approximately every 360 hours of operation.

To install the filter element use a hand vice (made according to Fig. 39).

Install the following items on the through shaft and the auxiliary pilot shafts of the hand vice:

Bottom cover (see Rel. No. 2, Fig. 39); paper filter plate (3); outer spacer ring (4); another paper filter plate (3), inner spacer ring (5), paper filter plate (3), outer spacer ring (4), etc. up to a height of approximately 135 mm or 5.32".

Close the thus assembled column with the top cover (6) and tighten the vice nut to a height of 135 mm or 5.32".

Install the clips (1) the ends of which must be bent.

Having thus assembled the filter element pull it off the centre shaft of the vice, install the eye clips (7), as shown in Fig. 39, and bend their ends.

Tightening to a length of 135 mm or 5.32" should result in a rigid assembly. A rough check of the rigidity should be carried out by twisting in the longitudinal centre line the dry, assembled filter element. The out-of-true of the top cover (6) against the bottom one (2) may be from 3 up to 5 mm or from .0118 up to .0197", measured on a diameter of 75 mm or 2.91".

If the out-of-true exceeds the above limit, add another paper filter plate (3) and additional spacer rings (4 and 5). If the covers and spacer rings are strictly aligned prior to assembly, no unfiltered fuel can pass through the filter element assembly in position.

To reassemble the fuel filter reverse the above procedure.

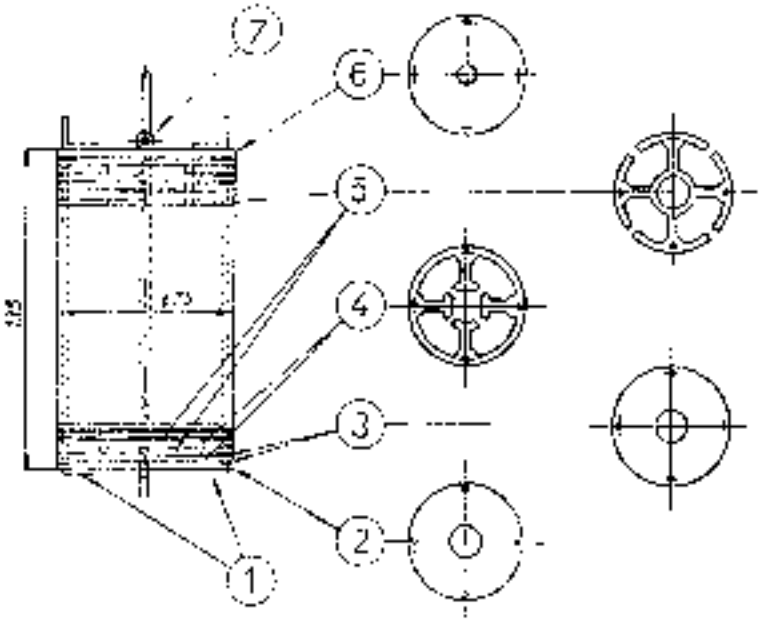


Fig. 39

To Remove, Refit and Adjust Fuel System — M-5/1

Dismantling, reassembly, reconditioning and adjustment of both the fuel injection pump and the speed governor can be carried out solely by service shops equipped with a testing of fuel injection pumps.

Absolute cleanliness is essential for all operations regarding these components.

The fuel injection pump, the speed governor and the tappets must be adjusted as a unit on the test station.

The individual parts are stamped with the respective Serial No. of the pump; parts from different pumps must not be interchanged during overhauls.

Checking of the injection pump in position on the engine crankcase can be carried out by means of a pressure gauge (for 600 kg/cm² or 8534 psi), proceeding as follows:

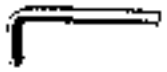
Screw on the pressure gauge instead of the delivery pipe and crank the engine with the hand crank until the pointer of the pressure gauge starts indicating (after the fuel has penetrated under the gauge plunger). The respective pressure reading after several strokes of the pump must be 300 kg/cm² or 4267 psi.

To Dismantle Speed Governor — M-5/2

Special tools: socket spanner 4487.90, socket spanner 4490.90, puller 4470.90.

Only a qualified expert may dismantle the speed governor. The respective procedure is as follows:

1. Remove the fan V-belt.
2. Remove the detachable rim of the fan cowl.
3. Using the socket spanner 4487.90 screw out the seven bolts (inner hexagon) securing the governor cowl and remove the cowl.
4. Slacken the wrench nuts M 6 and push out in turn the bolts securing the governor weights.
5. Using the spanner 4490.90 screw out the camshaft nut.
6. Screw the puller 4470.90 into the governor driver and press it off the camshaft by tightening the press-off bolt of the puller.


4487.90


4490.90


4470.90

7. Take out the key from its groove in the camshaft.
8. Detach the clevis from the racked rod of the injection pump.
9. Take the governor operating lever and remove it together with the key.

10. Screw out the bolts securing the cover bearing and remove the bearing with the governor from the speed governor housing.
11. Pull out the governor operating lever with the governor rod.
12. Screw out the bolts securing the governor housing and remove the housing.

For reassembly see Instruction M-5.7 or M-5.8.

To Dismantle Fuel Injection Pump — M-5/3

Special tools: puller 4471.90.

Dismantling procedure.


4471.90

1. Cut off the fuel supply by closing the fuel cap under the tank.
2. Disconnect the fuel feed and return pipes from the pump.
3. Screw out the attaching bolt (or possibly four bolts) and remove the pump cover.
4. Using the starting crank, crank the crankshaft until the next plunger of the fuel injection pump is in its top dead centre and then insert an auxiliary piece of sheet metal under the spring cup to prevent it from falling out during removal of the body. Proceed in a similar manner with the other plunger.
5. Screw out the four bolts securing the pump body and remove the pump. The tappets, tappet guides and circlip which remain in the crankcase can be removed with the hand.
6. Clamp the pump body into a vice and remove the auxiliary piece of sheet metal. Pull out the thus freed spring cup complete with spring and plunger. Proceed in the same manner with the other plunger.
   Be sure not to interchange the plungers and barrels, which are lapped together.
7. Pull off the plunger barrel the guide sleeve complete with toothed quadrant.
8. Screw out the banjo bolt with the adjustable connector and take out the valve spring.
9. Screw out the lock nut.
10. Screw on to the thread of the valve body the puller 4471.90 and by pulling it, pull out the body complete with seat. Proceed in a similar manner to pull out the other valve body.
11. Slacken in turn the bolts securing the pump barrel I and II and press the respective cylinder barrels off the pump body by hand.
    When dismantling, observe the marks stamped on the quadrant sleeves opposite No. 1 tooth gap of the quadrants. This mark (notch) indicates the correct injection commencement and equal volume of fuel of both injectors.
    On reassembly proceed according to Instruction M-5.6.

Fix the fuel injection pump to the test station together with the tappets which are set to a calibrated length of 51 mm or 2.01" (distance between the roller surface and the head of the tappet bolt). When using a modified „Bosch" test station the stroke of the cams must be 10 mm or .394" and their angle of alignment 90°, i.e. equal to that of the „Z" pump. The „Z" test station is driven by an anti-clockwise rotating electric motor fitted with a variator enabling smooth variation of the revolution rate from 200 to 1400 RPM. The shaft of the test station bears a plate the circumference of which is divided into 360° for reading the angle of the fuel injection commencement.

The test station serves for the following tests:

Adjustment of equal injection commencement and of equal volume of injected fuel on both injection valves and of the stipulated quantity of fuel. After having attached the injection pump to the test station connect the fuel feed pipes to the fuel transfer pump and the injection valves to the delivery pipes. Place glass test containers for fuel under the injectors.

For testing the fuel injection pump use injection valves set to the correct pressure of 125 kg/cm² or 1778 psi.

It is advisable to have for this purpose several test injectors set to the correct pressure and marked with paint to prevent them from being interchanged with faulty or incorrectly set injection valves. Prior to operating the test station, thoroughly bleed the injection pump to be tested by slackening the bleeder screw between the delivery pipes and waiting until absolutely bubble-free fuel starts flowing out and then retightening the screw.

a) **To adjust simultaneous injection commencement of both injectors:**

Set the speed of the test station to 900 RPM by means of the variator. After the station is running carefully observe both injectors and slowly push in the toothed control rod of the injection pump. It may happen - at such a low speed - that one of the injectors does not deliver any fuel.

In this case as well as if both injectors fail to operate simultaneously slacken the clamp bolt of the quadrant and swing the guide sleeve slowly. By swinging the sleeve clockwise (to the right) the quantity of delivered fuel is increased, while by swinging it anticlockwise it is reduced.

Proceed to adjusting the injection commencement or uniform quantity of delivered fuel until both injection valves form spray cones of equal strength and start operating almost simultaneously.

Absolutely simultaneous injection only appears to have been achieved. The respective interval is so short that the injection appears to be simultaneous. Actually the individual injections follow one another at intervals corresponding to the angular position of the cams (90°).

b) **To adjust equal volume of fuel injected by both injectors:**

After having adjusted the injection commencement - as described in the previous instruction - checking or possibly adjustment of the fuel injection pump can be carried out so that both injectors deliver uniform quantities of injected fuel at the specified speed and within the specified period.

The respective volume of fuel delivered per one minute by one injection valve at a speed of 900 RPM (or 500 RPM in the case of the Zetor 25 K model) of the test station (corresponding to 1800 RPM of the Zetor 25 and 25 A engines or 1000 RPM of the Zetor 25 K engine) should be 67 c.c. or 4.09 cu. in., that is to say, if the specific weight of fuel is 0.85, to 57 gr. or 2 oz. fuel.

The quantity of fuel delivered by both injectors must be equal. The respective permissible allowance at the aforementioned revolution rate and within the also mentioned period is 2 c.c. or .122 cu. in. (1.5 gr or .0529 oz.).

If the difference exceeds the above value, the defect is most likely due to unequal wear of the expansion valves (in the case of new valves within the permissible production tolerance limits), which results in unequal travel in their respective guides and consequently a slightly different stroke period. In this case interchange the valves complete with bodies (or possibly the plungers of the injection pump complete with barrels), or replace them with new ones. It goes without saying that the pump must be reset so as to ensure simultaneous commencement of the operation of both injection valves. (See point a).

Not until both injection valves inject simultaneously and the respective volumes of the delivered fuel are uniform should a new notch be stamped on the guide sleeve opposite the first tooth gap. (The original notches have been stamped on the guide sleeves at the factory test station after correct adjustment of the injection pump.)

The fuel injection pumps for the Zetor 25 K tractors are marked with the year of production, with the Serial No. (the same as that on the speed governor) and with the letter K.

Fuel injection pumps bearing the mark "K" cannot be fitted either to the Zetor 25 or Zetor 25 A tractor without first adjusting the speed governor to a higher speed.

c) **To adjust quantity of injected fuel:**

After a uniform but not the specified quantity of injected fuel has been obtained, adjust the fuel quantity to the specified value by means of the adjuster screw which serves as dead stop of the toothed control rod.

An increased volume of delivered fuel is obtained by slackening the adjuster screw i.e. by inserting the toothed control rod into the pump body. By tightening the adjuster screw the volume is reduced (the toothed control rod is pushed off the pump body). Proceed with adjusting and checking until the required quantity of injected fuel is obtained. Then lock the adjuster screw in the respective position by means of a cotter pin (on new pumps the adjuster screw is pinned).

To Adjust Speed Governor

M-5/5

To adjust the speed governor on the test station proceed as follows

Prior to installing the weight systems on the shaft of the rotor (staff adjusting shims and tighten the nut securely) the top spring cover so that it is flush with the top face of the cup. If the adjustment of the speed governor is correct, only the outer spring (1) should be slightly loaded approximately to a preload of 0.2 up to 4 kg or .44 up to .88 lbs), while the centre spring (2) is to be unloaded, having a clearance of 0.1 up to 0.3 mm or .004 up to .012", the inner one (3) having a clearance of 3 to 17 mm or .12 to .140". The correct clearance of the springs is essential for correct operation of the governor with regard to surge, i.e. the governor must adapt the adjustment of the fuel injection pump to the varying load within the specified speed limits (see Fig. 40).

When adjusting the speed governor increase the pump speed up to 900 RPM (or 800 RPM in the case of Zetor 25 K tractors) i.e. up to the point at which the speed governor starts cutting out. An indication of this is slackening of the marked quadrant which has hitherto been under pressure (in mesh with the toothed control rod), while the toothed control rod shows a certain amount of axial play at this point. When the speed is further increased, the speed governor must cut off completely after a speed of 1080 to 1130 RPM for 900 to 930 RPM in the case of Zetor 25 K tractors) has been attained, i.e. the fuel injection pump must be put out of operation. At this point the toothed control rod should be completely withdrawn from the pump body.

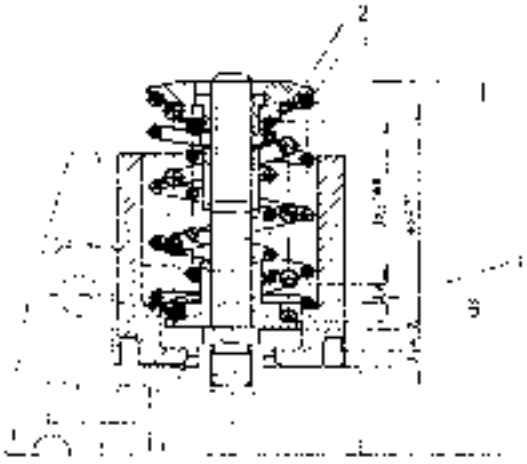


Fig. 40

If the speed governor starts cutting off prematurely, i.e. before a speed of 900 RPM (or 800 RPM with the Zetor 25 K models) has been attained, the preload of the springs must be increased. This can be achieved by inserting additional adjusting shims under the springs. If the difference is slight, tightening of the cup nuts will prove adequate.

If the governor starts cutting off too late, proceed in reverse order, i.e. remove the adjusting shims. Continue adjusting until the correct commencement of cutting off at 900 RPM in the case of the Zetor 25 and 25 A models or 930 RPM with the Zetor 25 K models is obtained. (the respective values may be lower, e.g. 850 and 750 respectively, but never higher, i.e. exceeding 900 or 850 RPM as specified).

It is essential that the speed governor puts the fuel injection pump out of operation at 1080 RPM in the case of Zetor 25 and Zetor 25 A tractors and at 930 RPM in that of Zetor 25 K tractors.

The respective revolution rates apply to the speed governor proper - that is to say to the crankshaft - which those of the engine i.e. of the crankshaft, are twofold!

At 900 RPM (or 800 RPM) the pin on the rearing of the governor lever must contact the adjuster screw which limits the stroke of the governor operating lever.

After having adjusted the speed of the governor lock the adjuster screw in position by tightening the lock nut; never slacken or tighten the adjuster screw which limits precisely the stroke of the governor operating lever at full speed.

The speed governors for the Zetor 25 K models are marked with the letter K and cannot be fitted to the Zetor 25 or 25 A models. Accordingly, the speed governors of the Zetor 25 and 25 A models cannot be fitted to the Zetor 25 K tractors.

To Fit Injection Pump in Position on Tractor and to Adjust Injection Commencement

M-5/6

Special tools: capillary tube 4452.90, generator 4473.90, straight flat spanner 4454.90, cranked flat spanner 4456.90.

1. Bolt lightly the body of the injection pump to the crankcase by means of the four securing bolts.

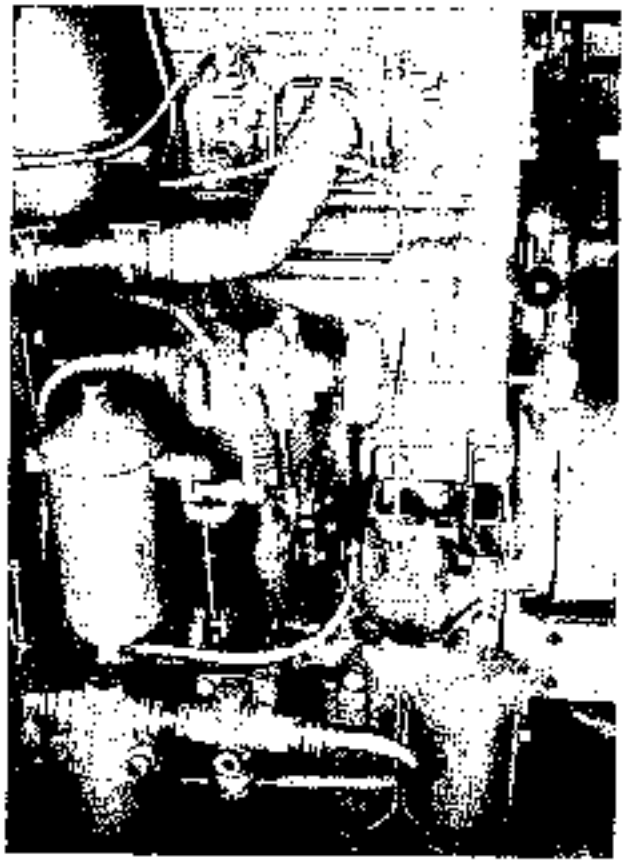


Fig. 41.

Be sure not to interchange the locks. The RH locom bolt is fitted with a hole for the outlet of oil from the pump housing.

2. Into the recess in the governor housing install the rubber gasket, position the pump gasket, then install the governor housing on the camshaft and bolt it on by means of the four bolts.
3. After having tightened the four bolts securing the pump body check with the hand the toothed control rod for free movement.
4. Connect the fuel feed pipe to the injection pump.
5. Open the fuel tap and bleed the fuel filter and the injection pump.
6. Install a spirit level on the machined face of the engine crankcase in the aperture taking the side cover and check the angular position of the tractor, which should be strictly horizontal.

7. Screw on the capillary tube 4452.90 to the pump body (see Fig. 42) instead of the fuel feed pipe.
8. Using the starting crank crank the engine until fuel is delivered to the capillary tube and check the fuel level in the tube during the cranking procedure; if the level moves, stop cranking and using the protractor 4455.91 installed on the machined face of the crankshaft check the angle of the injection commencement which should be set to 30° before top dead centre (see Fig. 42).

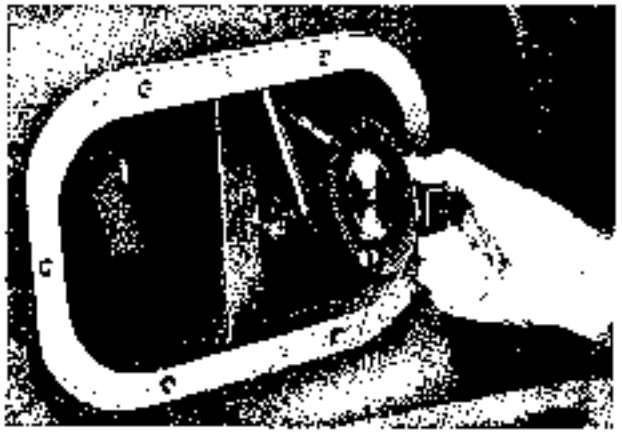


Fig. 42.

If the angle ascertained in the course of checking exceeds 30° it is an indication of the pump plunger ascending too early; accordingly, the adjuster screw of the tappet or lifter must be lowered by screwing in. If the ascertained angle is smaller than 30° the pump plunger is lifted relatively and the adjuster screw of the tappet must be heightened by being screwed out. Lock the adjuster screw in the required position by means of the lock nut using the spanners 4454.90 and 4455.90.

Turning of the adjuster screw by 1/6 of a turn equals 2° by which the injection angle measured on the crankshaft is altered. Continue adjusting until the required injection commencement i.e. 30° before top dead centre of the engine piston.

To adjust the injection commencement of the other cylinder of the injection pump proceed in a similar manner as in the case of the first cylinder.

To Fit Standard Speed Governor

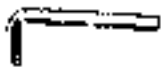
M-5/7

Special tools: socket spanner 4449.00, socket spanner 4187.00.

The standard speed governors were fitted to the Zetor 25 tractors up to Serial No. 127 10071.

To fit the governor proceed as follows:

1. Install the governor sleeve together with the yoke and governor operating lever on the camshaft.
2. Install the excenter shaft complete with excenter into the governor operating lever. Install on the shaft the bearing on the excenter, lock it on by means of the two bolts and check the mechanism for free movement.
3. Install the key into the groove in the excenter shaft and lock in position the governor operating lever by tightening the bolt.
4. Install the key with its spacer on the camshaft and fit the assembled driver plate on the speed governor.
   Install the spring washer and tighten the camshaft nut properly using the spanner 4449.00.
5. Install the pins of the fork into the governor operating lever. Connect the fork with the rack by means of a screw and see whether the mechanism is free movable.
6. Fit the bolt securing the governor weight into the rocker lever and the governor sleeve. Screw on the nut and tighten the lock nut. After having checked the mechanism for free movement lock the nuts in position by means of a cotter pin. Then fit the other bolt in a similar manner.
7. Install the governor cover and screw in the seven bolts using the socket spanner 4497.00.



4449.00

4497.00

To Fit Speed and Output Governor

M-5/8

Special tools: socket spanner 4449.00, socket spanner 4467.00.

The Zetor 25 tractors from Serial No. 127-10071 onwards as well as the Zetor 25 A and Zetor 25 K tractors are fitted with speed and output governors.

Fitting procedure:

1. Install the governor sleeve together with the yoke and operating lever on the camshaft.
2. Install the excenter shaft provided with a spacer ring into the governor operating lever and screw in the through bolt.

3. Slip on to the shaft the excenter bearing, bolt it on by means of the two bolts and check the leverage for easy operation.
4. Install the key into the keyway of the camshaft and slip on the assembled speed and output governor. Slip on the spring washer and using the socket spanner 4449.00 tighten the camshaft nut.
5. Insert the check pins into the governor operating lever and bolt on the clevis to the racked rod of the injection pump according to the stamped mark. Check the leverage again for easy operation. If necessary, set the position of the operating lever by inserting a spacer ring under the excenter shaft.
6. Insert the governor weight bolt into the rocker lever and governor sleeve. Screw on the nut, tighten the lock nut and check the mechanism for easy operation. Proceed in a similar manner with the other bolt.
7. Install the operating lever lever on the excenter shaft and lock it in position with the bolt.
8. Install the spring on the bolt of the lever and secure it with the cotter pin.
9. Using the socket spanner 4467.00 bolt on the governor cover with the seven bolts.

   On fitting, be sure not to interchange the components parts of the early model speed governor with those of the speed and output governor, or of the Zetor 25 K governor which is marked with the respective Serial No. on the injection pump and with the letter "K".

If no injection pump tester is available, the injection pump can, to a certain extent, be adjusted in position on the crankcase (particularly if one or both pump elements have been replaced with new ones), proceeding as follows:

Disconnect the delivery pipes from the injectors which have been removed from the cylinder head and screw on to the pipes test injectors set to a pressure of 125 kg/cm² or 1778 psi.

Place under each injector a calibrated glass container to ascertain the volume of injected fuel in grams or c.c. (oz. or cu. in.).

The injectors being removed from the cylinder head, the engine can be hand-cranked with the throttle fully open, i.e. with the racked control rod pushed fully home into the pump. On operating the starting crank 2.67 times, equalling 100 strokes of the pump (revolutions of the crankshaft), 6.3 gr. or .2226 oz. (7.4 c.c. or .4514 cu. in.) fuel of 0.85 specific weight should be ascertained if the setting is correct.

If one of the pump plungers delivers an inadequate quantity of fuel, slacken the bolt of the toothed quadrant, lift the quadrant with the left hand and swing the sleeve to the right with the right hand. The collar of the sleeve is provided with holes enabling it to be swung by means of a suitable bar. Setting finished, tighten the bolt securing the toothed quadrant and proceed to check until the correct volume of 6.3 gr. (7.4 c.c. or .2226 oz. (.4514 cu. in.)) is obtained.

If one of the pump plungers delivers an excessive quantity of fuel, proceed in a similar manner, but swing the governor sleeve to the left.

Setting finished, stamp a new notch on the quadrant sleeve corresponding to the of the first tooth gap of the quadrant in order to avoid additional adjustments of position the fuel volume during possible future overhauls.

When both pump plungers are being adjusted and the quantity of fuel delivered by one of the elements is, for instance, 7.2 c.c. or .439 cu. in., the sleeve must not be swung any more; lock the bolt of the toothed quadrant in position and adjust the other pump element to the same quantity of 7.2 c.c. or .439 cu. in. and then stamp a new notch. To increase the fuel volume to 7.6 c.c. or .4636 cu. in., turn the adjuster screw to the left (anti-clockwise), thus inserting the racked control rod deeper into the pump body. Re-check the volume and, if correct, cotter-pin in position the bolt bolt.

If the fuel quantity ascertained during the test is an excessive 7.6 c.c. or .4636 cu. in., it can be reduced to the correct value by turning the adjuster screw to the right (clockwise), thus moving the racked control rod slightly off the pump body. Correct setting finished, cotter pin the bolt in position.

Special tools: two capillary tubes 4452.50

To ascertain uniform volumes of fuel delivered by the individual pump elements with the injection advance preset, irrespective of the delivered quantity of fuel (with the injection pump in position on the crankcase), proceed as follows:

Disconnect the delivery pipes from the injection pump and screw on instead two capillary tubes 4452.50 of equal inner diameter.

Fill the capillary tubes with fuel by cranking the engine with full throttle. After having filled the capillary tubes continue cranking while reducing the fuel quantity by pulling out the racked control rod until the fuel level in the capillary tubes shows the least vibrations.

The difference between the respective vibrations of both capillary tubes indicates which cylinder is fed with a larger or smaller quantity of fuel. The capillary tube in which the fuel level has come to a standstill (while the other still vibrates) indicates that the respective cylinder is supplied with a smaller quantity of fuel. Consequently increase the volume by swinging the sleeve to the right (clockwise). Continue checking in this manner until the fuel levels in both capillary tubes show level vibrations of equal height with the minimum of fuel delivered.

Uniform volumes adjusted check the fuel delivery as follows:

Replace the capillary tubes with two new injectors set to an equal value of 125 kg/cm² or 1778 psi. After 100 strokes of the injection pump the quantity of fuel delivery by each pump element (captured in the calibrated containers) must be 6.3 gr. (7.4 c.c.) or .2226 oz. (.4514 cu. in.).

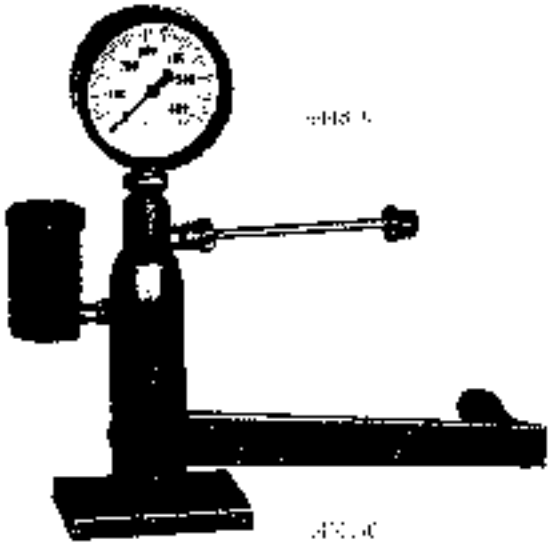
These values are effective for fuel having a specific weight of 0.85. To adjust the delivered quantity to the specified value work the adjuster screw of the fuel injection pump.

This method of checking is also suitable in the case of worn out thread edges of the pump plunger, provided the plunger is not worn to such an extent as not to maintain the minimum pressure necessary for starting the engine.

If the fuel injection pump has been disassembled, take care not to interchange the respective pump elements. After reassembly re-check the adjustment of the injection commencement, fuel delivery (according to Instruction M-5.0, operations 7 and 8).

If the injection pressure obtained is inadequate and, accordingly, the engine cannot be started, the plunger and barrel assemblies of the fuel injection pump must be replaced with new ones.

The pump barrels and plungers are lapped together and therefore not interchangeable. Barrel-plunger assemblies must always be replaced.



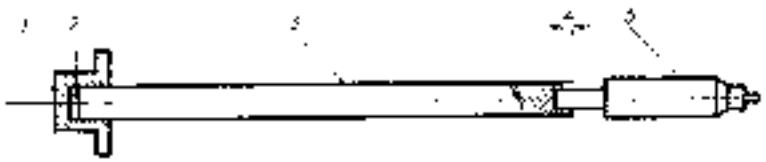


Fig. 43.

1. Plate
2. Washer
3. Thrust rod
4. File down by thickness of washer for needle

Special fixtures: test pump 4457.90, pressure gauge 4448.90.

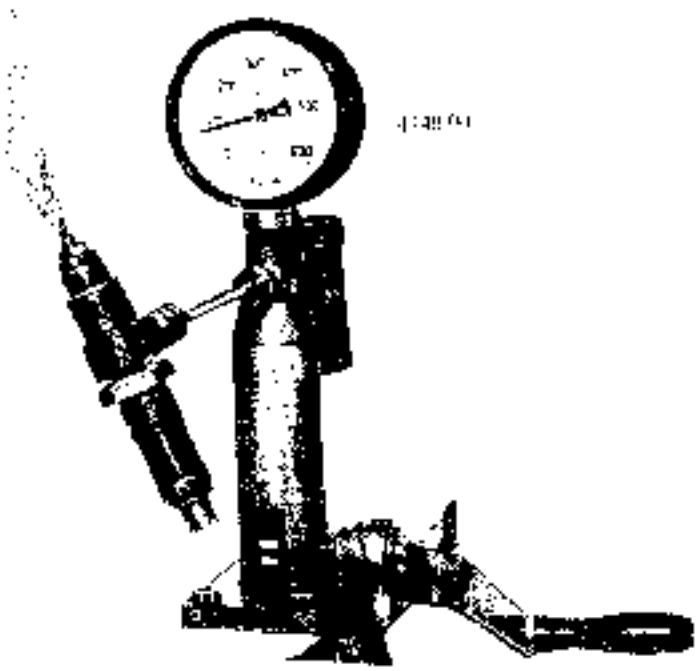
Dismantling procedure:

1. Disconnect the fuel return and delivery pipes from the injection valves (injectors).
2. After having screwed out the union nut remove the injectors complete with seals from the cylinder head.
3. Clamp the nozzle holder body into a vice and slacken the lower union nut.
4. Press or drive out from the nut the injection nozzle complete with needle.
5. Unscrew the connector complete with filter.
6. Unscrew the cap union nut and remove the seal. Then screw out the banjo bolt complete with setscrew and lock nut.
7. Take out the cup, spring and thrust plate with thrust rod.

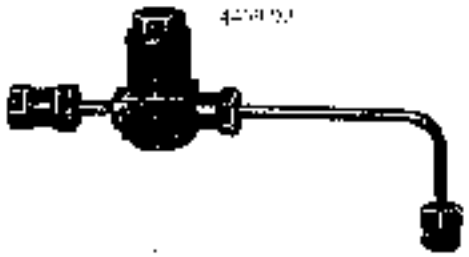
Reassembly is effected by reversing the dismantling procedure:

1. Insert into the holder body clamped in a vice the thrust rod complete with thrust plate, then fit the injector spring, the other spring cup and screw in the banjo bolt. Then screw in the adjuster or set screw with its lock nut into the banjo bolt and centre the hexed ring.
2. Fit to the holder body the union nut for securing the injection valve or injector to the cylinder head.
3. Secure the nozzle complete with needle to the nozzle holder by means of the bottom union nut.

   The nozzle needles and nozzles are lapped together and cannot be interchanged.
4. Place the seal into the holder body and screw on the connector with the filter.
5. Using the test pump 4457.90 adjust the injection pressure of the injector as described in Instruction M-10.
   In the case of long wear injectors the nozzle needle may be so firmly pressed into the cone a part of the thrust rod as to prevent any further adjustment of the injector by means of the adjuster screw or setscrew. To rectify this trouble it is advisable to insert a shim of 2.5 to 3.0 mm or .0984 to .118" thickness and then to file off the bottom end of the thrust rod by the thickness of the inserted shim as shown in Fig. 43.
   If the injector cannot be rectified in the last-described manner the thrust rod must be replaced with a new one (Part No. 1055.00).
6. Install the injector seat into the cylinder head and firmly fasten the injector in position by means of the union nut.



4457.90



4459.90

Special tools: test pump 4457.90, pressure gauge 4458.90
auxiliary pipe 4459.90.

The adjustment can be carried out.

a) **On the test pump 4457.90.**

The injection valve or injector to be tested must be attached — without the top union nut – to the test pump bolted to the work bench. By rocking (pumping) the lever in downward direction operate the plunger which forces the fuel into the body of the nozzle holder and into the three nozzle holes, thus lifting the needle cone and causing the fuel to be pulverised or injected.

By slackening the adjuster screw (turnbuck) to the left the injection pressure is reduced, while by tightening the screw to the right the pressure is increased. Continue adjusting the injection valve or injector until the pressure gauge indicates a pressure of 125 kg cm² or 1778 psi at the injection moment.

Having adjusted the pressure to the value of 125 kg cm² or 1778 psi and obtained a perfect spray cone, tighten the lock nut, fit the seal and firmly screw on the top union nut.

b) **By means of 4459.90 auxiliary T-pipe.**

If no test pump is available, the injector can be adjusted to the specified pressure by means of the auxiliary T-pipe with screwed-on pressure gauge. In this case the test pump 4457.90 is replaced with the fuel injection pump into which the auxiliary T-pipe should be fitted instead of the delivery pipe. The injector to be tested without its return pipe and top cap nut should be fitted to the opposite end of the T-pipe. Crank the engine with the starting crank and adjust the pressure as described sub a) by slackening or tightening respectively the adjuster screw until the required pressure is obtained. For further procedure see previous instruction.

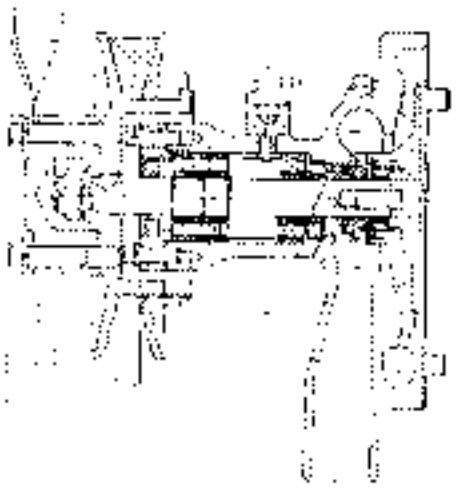


Fig. 31

Fig. 36

1. Belt pulley of water pump
2. Belt pulley of dynamo
3. Permissible deviation in place of belt pulley max. 0.5 mm
4. Belt pulley of fan shaft

If the water pump is leaky or faulty operation is ascertained dismantle it as follows:

1. Drain the water from the radiator and engine water jacket.
2. Slacken screw out the adjusting screw of the dynamo securing strap, slacken the V-belt, then discharge it from the belt pulley grooves.
3. Remove the fan complete with hub.
4. Slacken the clamps of both rubber water hoses and slip the hoses off the pump connection necks.
5. Using a spanner slacken the four nuts and take the pump off the securing studs.
6. Remove the cotter pin from the castle nut of the water pump shaft and knock the belt pulley off the shaft by tapping it slightly.
7. Having removed the key from its keyway in the shaft screw out the four bolts securing the pump cover. Carefully pull off the cover along the shaft, paying attention not to damage the seal ring mounted on the cover. Simultaneously remove the adjusting shims.
8. Screw out the ventilation complete with grease nipple.
9. Screw out the securing bolt from the impeller wheel.
10. Using a suitable drift and a hand press press off the impeller wheel and pump both the shaft complete with bearings, spacer tube and seal ring. Remove the rubber seal ring and the shrank metal one from the space of the impeller wheel.
11. After having removed the circlip take off from the impeller wheel the fibre washer, the sealing collar and the spring.
12. If one of the bearings is to be replaced, first pull off the circlip next to the bearing. Proceeding from the opposite end of the shaft, carefully pull off the seal ring so as not to damage it, and the adjusting shims. Then, using a hand press, proceed in the direction away from the fan to press off both front bearings complete with spacer tube. After having removed the other circlip press off the third bearing as well.

On reassembly proceed as follows:

1. Install the spring, the sealing collar and the fibre washer into the recess of the impeller wheel. Lightly press down the installed components and lock them in position by means of the wire circlip.
2. Slip the circlip on the fan shaft. Press up to it the two ball bearings and slip on the other circlip, the spacer tube (lubrication recess facing the impeller wheel) and press for the third ball bearing, slip on the adjusting shims and the seal ring (see Fig. 44).

3. Proceeding from the side of the fan press-fit into the pump body the shaft complete with bearings by means of a hand press.
4. Eliminate any undue play between the bearing and the face of the pump body by means of adjusting shims.
5. Clean the seating face of the cover, smear it with lubrication grease, fit the gasket and bolt on the cover by means of the four bolts.
6. Install the rubber seal ring and the shrunk metal one on the pump shaft into the space of the impeller wheel.
7. Press-fit the impeller wheel to the shaft and secure it with the bolt.
8. Screw in to the pump body the extension complete with grease nipple.
9. Install the key in to its key-groove in the shaft, drive home the belt pulley, slip on the washer and tighten the castle nut. Cotter-pin the nut in position.
10. Clean the seating faces of both the pump and the crankcase smear them with lubrication grease and install the gasket. Secure the water pump by means of the four nuts.
11. Install the V-belt both on the pump pulley and on the dynamo belt pulley.
12. Bolt on the hub complete with fan by means of the four bolts.
13. Slip the rubber hoses on to the water pump necks and clamp them with the hose clamps.
14. After having checked the belt pulleys for correct alignment (see Fig. 47 permissible out-of-line of the belt pulleys is 0.5 mm or .0197" maximum) tighten the adjuster screw of the dynamo so (illegible)
15. Check the V-belt for correct tension by pressing it down with the thumb between the belt pulley of the fan and that of the dynamo. If the depression is approximately 15 to 20 mm or .6 to .8", the tension of the V-belt is correct. An excessively tensioned V-belt is subject to premature wear and adversely affects also the longevity of the bearings.
    If the depression of the V-belt is larger adjust its tension by swinging the rear part of the pulley by 90°.
16. Pack the grease nipple with lubrication grease using the grease gun.
17. Fill the radiator with water.

During the periodical cleaning after every 30 hours of operation (maximum) proceed as follows:

1. Slacken the clamp bolt of the air cleaner (on tractors up to Serial No. 125-264621 or the 2 wing nuts of the bolt securing the oil bath (on Z-25 models from Serial No. 125-264465 onwards, on Zetor 25 K models from Serial No. 225-1001 onwards) and discard the used oil from the bath.
2. Remove any sludge and foreign matter from the container and thoroughly wash it in paraffin oil.
3. In the case of an air cleaner of early design (up to Serial No. 125-264621) remove the cleaner from its bracket and, having removed the cap, clean the extension of the cleaner using a scraper or a wire brush.
4. Flush the wire gauze filter element by spraying it with paraffin oil. If the element is badly contaminated with dirt, fix oil the weld on its collar and thoroughly clean the removed filter element as well as the interior of the cleaner.
5. Install the cleaned or new wire element into the cleaner body and weld on the collar again.
6. On Zetor 25 tractors from Serial No. 125-76163 and on Zetor 25 K tractors from Serial No. 225-1001 onwards the cleaner need not be removed from its bracket for cleaning of the wire gauze element and the cleaner interior, simply pull out the cotter pin from the bottom part of the extension, pull off the spacer tube and remove the wire gauze filter element (Part No. 1250.130) from the cleaner body. Further cleaning procedure is similar to that applied for cleaners of early design.
7. In the case of Zetor 25 tractors from Serial No. 125-264621 onwards and of Zetor 25 K tractors from Serial No. 225-1001 onwards slacken the clamp bolt of the glass bowl, remove the bowl and clean it from dust or other sediments.
8. Slacken the bolt of the cleaner clamp and pull off the top part of the cleaner body, blow through it and wash it in paraffin oil.
9. Fill the oil bath with fresh oil up to the level of the bath overflow holes. Then reassemble the air cleaner.

For reassembly reverse the above procedure.
It is not advisable to fill the glass bowl of the cleaner either with water or with oil.

4460.00

4461.00

Fig. 46

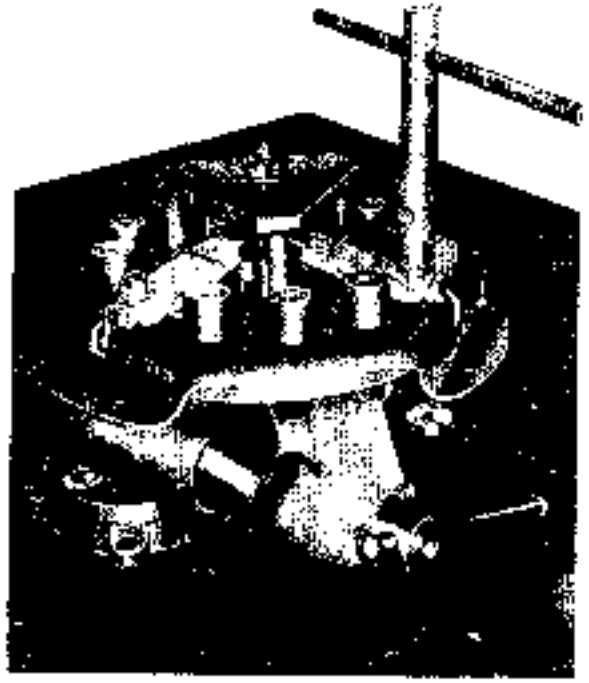


Fig. 47

To Dismantle Clutch

S-1/*

Special tools: drift 4460.00, puller 4461.00

When replacing the clutch lining or other components of the clutch the tractor must first be disconnected between the transmission and the clutch or bell housing as described in Instruction D-2.

Then proceed as follows:

1. Install the auxiliary drift or pilot shaft 4460.00 into the crankshaft bearing to prevent the clutch plate from falling off after the bolts securing the housing have been slackened (see Fig. 46).
2. Screw out the six bolts securing the clutch housing to the flywheel and pull the housing off the shaft.
3. Remove the clutch plate complete with linings.
4. Clamp the clutch housing into a vice as shown in Fig. 47. Unscrew the clutch cover by applying the puller tool 4461.00 against the pressure plate so that both parts of the clutch remain together after the adjuster nuts have been screwed out.
5. Having removed the thrust washers and the clutch release levers slacken the puller.
6. Dismantle the clutch presser.

To Assemble Clutch

S-1/2

Special tools: puller 4461.00, pilot shaft 4460.00.

1. Having assembled the clutch housing, the pressure plate and the springs with washers off these components by means of the puller 4461.00.
2. Install the thrust washers on the driver bolts, then screw on the adjuster nuts to a uniform level so that three bolt threads overlap the nuts.
3. Install the clutch plate on the pilot shaft 4460.00 and insert the shaft into the crankshaft bearing.
4. Bolt on the clutch housing to the flywheel, using one bolt for each arm at first. Then gradually screw in and tighten the remaining bolts.
5. Using a dial gauge adjust the clutch release levers to a uniform level (see) to a distance of 73 mm or 2.87" from the flywheel with a permissible allowance of ± 0.2 mm or .00787").
6. Pull the pilot shaft 4460.00 off the crankshaft bearing and proceed to reassemble the tractor according to Instruction D-2.

To Remove Clutch Release Sleeve S-1/3

1. Disconnect the tractor between the crankcase and the clutch or bell housing according to Instruction D-2.
2. Screw out the bolt M 10×35 (Part No. 3474.70) from the clutch operating lever (Part No. 2452.17) and knock the lever off the clutch release shaft. Then take out the key from its key-groove.
3. Slacken the clamp bolt of the clutch release lever, shift the shaft from the LH to the RH side of the clutch housing and, after having removed the key of the release lever, push the shaft off the housing.
4. Pull the clutch release sleeve off the pilot bush in forward direction.
5. When replacing the thrust bearing of the clutch release sleeve first pull off the cap ring. After having fitted a brand new bearing press-fit a brand-new cap ring.
6. To fit the clutch release sleeve reverse the above procedure.

Adjust Clutch S-1/4

Periodically check and, if necessary, adjust the clutch release mechanism particularly if the clutch has been subject to inexperienced handling, it may slip. In this case proceed as follows.

1. Remove the side cover from the RH side of the clutch or bell housing.
2. Crank the engine slightly and re-insert pin in turn all the adjuster nuts.
3. Gradually tighten the adjuster nuts by an equal number of turns and, using a caliper, check the distance or gap between the clutch release sleeve and release levers (3 to 4 mm or .118 to .157").

   This gap ensures correct free travel of the clutch, which should be adjusted for the clutch control lever by means of the bolt and point of the clutch control rod. The clutch release levers must operate simultaneously when the clutch is released.

To Replace Clutch Plate Lining S-1/5

The clutch plate lining (Part No. 893.11) of 3 mm or .118" thickness must be replaced immediately after the wear has reached the rivet heads, i. e. approximately 1.5 mm or .059".

Replacement procedure:

1. Dismantle the clutch as described in Instruction S-1/1.
2. Drill off the worn hollow rivets securing the clutch lining to the clutch plate.
3. Install the new lining and rivet it on by means of sixteen hollow rivets.
4. True the clutch plate assembly.
5. Face the clutch lining by shaping it to ensure overall seating.
6. Reassemble the clutch.

   The most frequent causes of a worn or damaged clutch are out of place, incorrect application or prolonged slipping, which has certain overheating and destroyed the springs. On possible replacement of the springs check the spring length. Their free length should be approximately 63 mm or 2.480", under a load of 22 kg or 48.5 lbs or 154.72 or 7.73 lbs, while the spring length should be 51 mm or 2.07".

   After having assembled the clutch check it repeatedly for overall seating. After the seating has been slightly worn check the torque transmitted by the clutch. For this purpose use a splined pilot shaft the splines of which correspond to those of the plate driven, and an arm of 1 metre or 3.28 ft length carrying a cup for weights (see Fig. 45). The minimum torque should be 16 kgm or 114.73 ft. lbs., i. e. the slipping clutch stops at the point of being loaded with 16 kg or 35.27 lbs carried by an arm of 1 metre or 3.28 ft. in length.

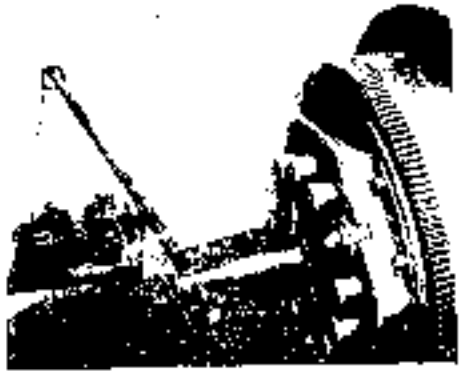


Fig. 45

4431.90

In the case of the Series 40 E tractor adjust the plain jacks as follows: slip the lever out of the stand up to the dead stop and lock it in this position by means of the lock pin.

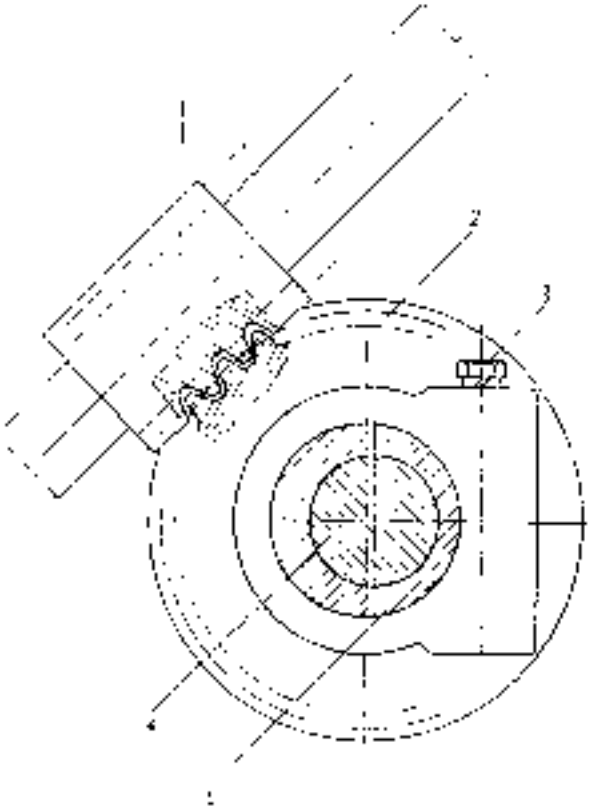


Fig. 95

1. Worm and ring with seal (Order No. 4361.12 and 4417.12, respectively)
2. Worm wheel (Order No. 4074.12 and 4118.12, respectively)
3. Retaining bolt (Order No. 4354.12)
4. Worm wheel shaft (Order No. 4075.12)
5. Fastening sleeve of shaft (Order No. 4170.12 and 4361.12, respectively)

To Dismantle and Reassemble Steering Unit

S-2/1

Special tool: plain jack 4431.90.

Dismantling procedure:

1. Place the plain jack 4431.90 on a wooden block under the front axle so as to lift the front wheels clear of the ground covering the shielding.
2. Remove the fuel tank.
3. Remove the clutch lever, bracket.
4. Remove the dashboard.
5. Disconnect the steering rod from the ball joint by removing the cotter pin and slackening the screw plug.
6. Screw out the four bolts securing the steering gear cover. In addition, the cover is held in position by means of two dowel pins and therefore must be pried clear by means of two screwdrivers and by tapping.
7. While lifting off the steering gear cover turn the steering wheel to the right in order to disengage the steering worm from mesh with the worm gear. Proceed to lift off the cover in the direction of the steering column. This operation will open the interior of the steering box housing the steering worm gear.
8. By operating the steering drop arm attached to the worm gear shaft swing the steering worm gear so as to enable unlocking of the tab washer of the adjuster nut using a suitable chisel and hammer.
9. Screw out the adjuster nut, drive the steering worm gear shaft off the steering box and take out the steering worm gear.
10. Have the eccentric sleeve of the worm gear shaft by slackening the lock bolt (see Fig. 95).
11. Using petroleum wash the dismantled parts as well as the steering box. Then thoroughly dry the parts. After having replaced the parts in position fill the steering box with fresh lubrication grease.
    Likewise repack the box with fresh grease on every general overhaul.

When reassembling reverse the order of the above directions.

To Recondition and Adjust Steering Unit

S-2/2

Special tool: spanner 4488.90.

4488.90

Excessive free travel of the steering wheel is perceptible when driving, fewer 30° measured on the circumference of the steering wheel), the steering box cover complete with steering column shaft and

steering wheel need not be removed. Swinging of the excenter sleeve using the spanner 448.001 of the worm gear seats for the L.H. side of the tractor will prove completely sufficient. Swing the excenter sleeve until the minimum free travel on the steering wheel is obtained. The free travel lower than 1/12 of a turn of the steering wheel (lower than 30°). By swinging the excenter sleeve the worm gear is shifted into mesh with the steering worm, thus reducing the free travel of the steering wheel.

If the excessive free travel fails to be eliminated by this method, dismantle the steering unit assembly, to Instruction 5-2-1, operations 1 to 21. If disassembling proves this notion to be caused by excessive wear of the gearing and its elimination by swinging of the excenter sleeve impossible, swing the worm gear by 180°. The worm gear meshes with fresh teeth only, thus enabling the elimination of its lost backlash three times.

If the steering is hard and unmanageable the defect should be looked for in incorrect mesh between the teeth of the steering worm and steering segment. Correct setting of the worm gear can be obtained by installing or removing respectively adjusting shims of 0.1, 0.2 and 0.5 mm or .004, .008 and .020" (Part Nos. 3120.12, 3119.12 and 3120.12) between the thrust ring and the steering box. The end play of the steering worm can be adjusted by installing a shim of 0.05 mm or .002" (Part No. 3113.12) between the thrust ring (Part No. 3103.12) and the flange of the steering worm bush (Part No. 3137.12) press-fitted to the clutch housing.

If the adjustment of the play by means of the shim proves inadequate, a paper adjusting shim of 0.05 mm or .00197" (Part No. 3162.12) can be placed on the paper gasket of the cover of 0.2 mm or .008" in thickness (Part No. 3097.12). The assembly of the steering unit having been accomplished, operate the steering wheel separately in both directions to check the unit for tension and correct play.

If the gearbox is open, checking of the individual components or ascertaining of any defect is easy.

To remove the cover proceed as follows:

1. Having unscrewed the four wing nuts remove the seat.
2. Take off the battery box cover.
3. Disconnect the storage battery and remove it from the battery box.
4. Using a socket spanner screw out the bolts securing the battery box and remove the battery.
5. Disconnect the rail light cables.
6. Raise the spring of the stop light switch.
7. Screw out the two bolts M 6×28 (30) securing the bearing of the differential lock control rod to the gearbox cover.
8. Screw out the two bolts M 6×28 securing the accelerator pedal pad.
9. Screw out the bolts securing the gearbox cover, thus easing also the pipe line.
10. Disengage the spring of the clutch pedal and the springs of the brake pedals.
11. Slacken the ratchet of the hand brake. Screw out the front bolt securing the hand brake ratchet, merely slacken the rear bolt and then swing the ratchet round its rear bolt so that it does not obstruct.
12. Lift the cased cover of the front part and remove it by pulling it towards you.

To assemble reverse the described procedure.

Important production change:

As from Serial No. 126-306.0 of the Zetor 25 A models and Serial No. 225-20035 of the Zetor 25 K model improved mounting of the pinion in two taper roller bearings has been introduced.

Accordingly the existing gearbox Part No. 3300.12 has been replaced with Part No. 4324.13. The gearbox (gear change) cover Part No. 3519.13 has likewise been replaced with a new one, Part No. 3625.12. The remaining component parts of the group 13 "Gearbox" remain unaltered.

In the case of the Zetor 25 A and Zetor 25 K models the modification of the bevel pinion mounting affects the following groups: "Countershaft", "Direct mesh c/w reduction gears" and "Gear shift mechanism". If one of the component parts or entire assembly groups calls for replacement in the case of tractors bearing

the aforementioned Serial Nos., it cannot be replaced with the corresponding part or group of the new design. The new groups are marked with the letter "A" (17a, 14a, K 14a, 15a, K 15a, K 16a).

It is absolutely impossible to fit the early groups to tractors of new design.

To Remove Mudguard and Bottom Drawbar — R-2

1. Screw out the bolts securing the mudguards complete with top frame to the brackets of the drawbar.
2. Pull off the mudguard complete with top frame, proceeding in rear-rear direction.
3. In the case of tractors fitted with a starter motor disconnect the battery cables.
4. Slacken the bottom bolt securing the brackets to the rear half-axle tubes and, after having screwed out the top bolt, lower the drawbar to the ground.

On reassembly reverse the above procedure.

To Remove Gearbox — R-3

Prior to removing the gearbox drain the oil.

1. Remove the gearbox cover according to Instruction R-1.
2. Disconnect the tractor as described in Instruction D-3.
3. Remove the mudguards and the bottom drawbar or frame according to Instruction R-2.
4. Jack up the rear end of the tractor clear of the ground.
5. Slacken the bolts in the rear wheel hubs and remove the road wheels.

Reverse the above directions when reassembling.

To Remove Differential Lock and Brakes — R-4

Special tools: socket spanner 4478/90, hook spanner 4476/90, socket spanner 4477/91.

Removal:

1. Remove the mudguards as described in Instruction R-2.
2. Remove the cotter pin 4×20 and the pin thus detaching the link from the lock operating lever. The link bearing which is secured by means of two bolts to the gearbox cover and the link secured to the bearing by means of another pin need not be detached.
3. Screw out from the differential shaft the bolt M 10×22 and remove the dead stop of the dog coupling.
4. By coupling the sleeve of the dog coupling pull off the sleeve body from the splines of the differential shaft together with the return spring and washer.

If one of the component parts of the dog coupling of the differential lock calls for replacement proceed as follows:

5. Having slackened the nuts of the two clamp bolts dismantle the operating lever of the differential gear lock.
6. Knock off the coupling cover the bottom part of which is locked in position by a punch mark.
7. Screw out the four clamp bolts of the dog coupling and take off the sleeve cap complete with gasket.
8. Remove the circlip securing the thrust bearing of the dog coupling and press off the sleeve the dog coupling complete with the thrust ball bearing.

   If the ball bearing has been overpacked with grease which has hardened, not only the bearing, but also the interior of the dog coupling must be thoroughly washed with paraffin oil. On reassembly pack lightly with lubrication grease, observing proper alignment of the lubrication grooves in the coupling sleeve cap with those in the coupling sleeve.

To remove hand brake band proceed as follows:

9. Remove the RH brake rivet.
10. After having screwed out the adjuster nut of the RH brake band and removed the cap or bottom lock pin remove the brake band.
11. Disengage the spring of the stop light and, after having removed the brake cover, pull out the cotter pin 5×40 and remove the washer from the brake shaft.
12. Pull out the cotter pin 2×16 from the spring link slipped through the brake arm and the brake hand lever and remove the washer. From the opposite end of the link screw off the nut and remove the spring retainer complete with spring.
13. Screw out the adjuster nut of the brake band and, after having removed the top or the bottom lock pin, take off the brake band.

14. By tapping knock off the brake shaft the hand brake operating lever complete with arm (Part No. 3070.20) thus enabling removal of the spring link from the eye rings of the arm and lever.
On reassembly be sure that the brake arm is properly positioned on the spline of the brake shaft.
15. Now the brake shaft complete with the RH brake arm can be pulled off the gearbox.
If the brakes are adjusted and the brake lining not worn, a total of the bottom lock pins will be sufficient when taking off the brake bands. Consequently the adjuster nuts of the brake band must not be slackened.
Be sure not to interchange the brake bands on refitting. The brake lining (Part No. 3637.20) must be replaced immediately if it is worn to such an extent as to bind with the rivet heads, i.e. if the amount of the wear is some 3 mm or .118".
The brake bands must likewise be replaced with new ones if they do not brake even after the adjuster nuts have been tightened to the maximum.
When replacing the brake lining or the brake band assemblies the brakes must be adjusted by means of the adjuster nuts. When the brakes are released, brake bands should rest freely on the brake drum. Braking should not affected by the entire surface of the brake lining.
When replacing the lining of the foot operated brakes on tractors lacking the differential gear lock remove the brake drums after having screwed out the respective bolts. In the case of tractors fitted with differential gear locks proceed as follows.
16. Disengage the pull-off springs of the relay levers of the clutch and of the foot operated brake.
17. From the LH side pull out the cotter pin 3N28 from the pin (Part. No. 3469.17) connecting the LH brake relay lever (Part No. 3451.17) with the bush of the brake link, remove the washer and drive out the pin.
18. Proceed in the same manner on the RH side. If, however, respective tractor is fitted with the pressure air brake system the disconnection must be carried out by pulling out the clevis pin (Part No. 5622.72) connecting the clevis (Part No. 3323.62) to the RH brake relay lever (Part No. 3461.17) which is reverse mounted in this case.
19. From the LH side screw out the bolt M 10×30 from the nut of the LH differential shaft.
20. Using the socket spanner 4478.90 screw out the nuts of the LH differential shaft and remove the seals.
To increase or reduce as necessary the respective backlash between the teeth of the RH brake drum and the dog clutch of the differential lock insert screw the adjusting shims of 0.5, 1.0 and 2.0 mm or .0197, .0394 and .0787" (Part Nos. 4613.18, 4615.18 and 4614.18) installed between the nut seal of the LH differential shaft and the LH differential shaft.

21. Using the hook spanner 4479.90 screw out the adjuster nut of the LH brake drum (Part No. 4510.18) from the differential shaft.
22. Pull off the brake drum as well as the shaft circlip from the splines of the differential shaft thus enabling access to the brake mechanism.
23. On the RH side remove from the differential shaft the circlip (Part No. 4821.72) and then screw off the body of the RH brake drum the lock bolt (Part No. 4870.18) which prevents the adjuster nut of the brake drum from turning.
24. Install the socket spanner 4477.90 into the slots of the adjuster nut and screw it out.
25. Pull off the RH brake drum and the shaft circlip from the splines of the differential shaft, thus enabling access to the RH brake mechanism.
All further dismantling procedure is the same for both the RH and LH sides.
26. Slacken the nut M 8, remove the spring washer and carefully tap off the brake cam lever (Part No. 3451.17) the bolt M 8×40.
27. Knock the brake cam lever off the splines of the brake cam pin.
28. When expanded, the brake shoes complete with lining will be disengaged from the slots on the brake shoe anchor pins. Repeat the expansion, thus removing the brake shoes from the brake cam, drive out the brake pin and remove the brake cam.
29. Slacken the nut M 12 of the adjuster screw, screw out the screw and pull off the brake back plate both brake shoe anchor pins with the spacer pin.
The maximum amount of wear of the foot operated brake lining (Part No. 3534.13) should not exceed 3.7 or .138", i.e. approximately up to the level of the heads of the hollow rivets. When replacing the brake lining drill off the rivets, remove the worn lining and rivet on the new one. On reassembly be sure to adjust the brakes so as to ensure a clearance of approximately 1 mm or .04" between the brake drum and the lining so as to prevent the lining from binding against the drum while in motion.
To adjust the brakes slacken or tighten respectively the adjuster screw using the spanner (Part No. 4285.90). The adjustment accomplished, lock the screw in position by means of the lock nut.
30. Screw out from either side the four bolts M 12×65 by means of which the brake back plates are secured and pull the thus eased back plates complete with seal rings and adjusting shims off the differential shafts.
On reassembly adjust the play between the taper roller bearing and brake back plate by means of adjustings shims (Part No. 3520.18 — 1.0 mm or .0394"; 3521.18 — 0.5 mm or .0197"; 3522.18 — 0.1 mm or .004" and 3523.18 — 0.2 mm or .0079").
Reassembly is effected by directly reversing of the dismantling procedure. Be sure, however, to avoid damaging to the seal ring of the brake back plate on the splines of the differential shaft.

To Remove Rear Half Axles — R-5

To remove the rear half axles proceed as follows:

1. Remove the gearbox rotor as described in Instruction R-1.
2. Remove the mudguards and the motor drawbar according to Instruction R-2.
3. Remove the gearbox proceeding in the manner described in Instruction R-3 with the exception of point 2, which need not be carried out during every reconditioning procedure.
4. Screw out the bolt securing the sun wheel of the rear half axle and remove the washer.
5. On tractors fitted with a hydraulic power lift disconnect the motor links from the pins of the links which are press-fitted into the flanges of the rear half axle tubes.
6. Screw out the bolts securing the rear half axle tubes.
7. Pull out the half axles from the gearbox, simultaneously pulling the sun wheels off the splines.

To reassemble reverse the above procedure.

To Dismantle Differential — R-6

Special tools: puller 4489.00 complete with nuts I and II.

Having removed the mudguards complete with the motor drawbar according to Instruction R-2, carrying out operations 2, 4 and 5 of Instruction R-1, removed the differential gear lock complete with brake back plates as described in Instruction R-4 and removed the rear half axles according to Instruction R-5, operations 4 to 7, proceed to remove the differential.

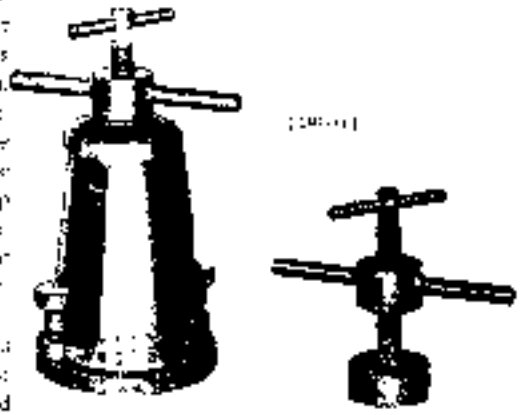
In the case of tractors not fitted with the differential gear lock remove the splined differential shafts as follows:

1. Screw in the LH threaded bolt securing the brake drum into the hollow differential shaft. Then, using a hammer and a suitable drift inserted into the RH hollow differential shaft and propped against the differential shaft, drive out the outer race of the LH taper roller bearing.
2. Drive out the outer race of the RH taper roller bearing proceeding in a similar manner i.e. screw out the LH threaded bolt of the brake drum and screw in the RH thread one. All further procedure is the same as that described in the previous operation.
3. Using a bar of smaller diameter than that of the aperture of the hollow shafts, press out the differential shaft.

In the case of tractors fitted with differential gear locks the first three operations are different but the rest of the procedure is identical.

1. Proceeding from the LH to the RH side, press out the differential shaft.

2. Using two auxiliary bolts secure the body of the puller 4489.00 into the bolt holes of the brake back plate on the RH side of the gearbox. Insert into the recess in the puller body the bolt with the RH threaded nut the top face of which bears No. 4489.00 II. Screw on the nut to the thread of the differential splined shaft. Tighten the puller bolt thus pressing out the outer race of the taper roller bearing and consequently easing the RH splined differential shaft.



3. Remove the hydraulic power lift and the power take-off shaft, proceeding according to Instructions R-11 and 2, otherwise operation 5 could not be carried out.
4. Remove from the gearbox both the RH and LH sun wheels of the rear half axles.
5. For pressing out the outer race of the taper roller bearing and easing the LH splined differential shaft likewise use the puller 4489.00, but the bolt with the LH threaded nut marked with the number 4489.00 II.
6. Remove the differential body from the gearbox.
7. Remove from the gearbox both the RH and LH splined differential shafts complete with oil slinger rings and friction rings.

   If the crown wheel must be replaced with a new one or any other repairing carried out, proceed to dismantle as follows:

8. Cut in two the locking wire of the bolts securing the crown wheel to the differential cage.
9. Clamp the differential cage (body) into a vice and, using a chisel and a hammer, unlock the four tab washers of the bolts securing the star pinion or planet pins.

   Do reasonably avoid using old tab washers for locking to prevent the bolts securing the star pinion or planet pins! Brand new tab washers must be used.

10. Screw out the lock bolts of the star pinion or planet pins. Remove from the differential cage the thus eased star pinion pins complete with star pinions or planets and thrust rings.

11. Having screwed out the eight bolts securing the crown wheel knock the wheel off its dowel pins by tapping its circumference.
If the dowel pins have remained in the differential case, they must be driven out. When locking a new crown wheel in position be sure to use new dowel pins. After having firmly tightened the securing bolts lock the pins in position by means of punch marks.
To reassemble reverse the above procedure.
Special attention should be paid, however, to correct meshing of the bevel pinion with the crown wheel and to proper adjustment of the axial clearance of both the splined differential shaft and the star pinions or planets.

Procedure:

1. Reassemble the differential, proceeding in reversing the order of the above directions. Install on the dowel pins, splines facing the star pinions, the thrust rings of the star pinions or planets (Part No. 4889.18 — thickness 2.0 mm or .079"; 4847.18 — thickness 1.9 mm or .075"; 4854.18 — thickness 1.8 mm or .071"; 4848.18 — thickness 1.7 mm or .067"; 1847.18 — thickness 1.6 mm or .063").
2. Install into the gearbox the assembled differential complete with thrust rings (Part No. 4890.18 — thickness 3.1 mm or .122"; 4844.18 — thickness 3.0 mm or .118"; 4882.18 — thickness 2.9 mm or .114"; 4881.18 — thickness 2.8 mm or .11"; 4845.18 — thickness 2.7 mm or .106"; 4843.18 — thickness 2.6 mm or .102") — fabrication number. Insert splined shafts and drive home the differential shafts.
3. Proceeding from the RH side install the differential shaft. To ensure correct mesh of the bevel pinion with the crown wheel any inadequate or excessive backlash should be adjusted by means of the thrust rings of the star pinions and of the splined shafts.
To ensure tight and quiet operation adjust the backlash between the bevel pinion and crown wheel to approximately 0.3 mm or .015".
The play of the ball bearings of the splined shafts must be adjusted by means of adjusting shims (Part Nos. 3720.18, 3621.18, 1622.16 and 3623.18; thickness 1.0 mm or .0394", 0.5 mm or .0197", 0.1 mm or .0039" and 0.2 mm or .0079") inserted as necessary between the outer bearing race and the brake back plate.
The correct mesh of the teeth having been adjusted, proceed with assembly.

To Dismantle and Reassemble Gear Shift Mechanism R-7

To dismantle the gear shift mechanism proceed as follows:

1. Remove the gearbox cover according to Instruction R-1.
2. Disconnect the tractor according to Instruction D-3.

3. Slacken the nut M 8 and, using a screw driver, slightly screw out the adjuster screw M 6 x 25 of the reduction shifter lever (Part No. 3434.16); then knock off the lever from the reduction shifter shaft (Part No. 3424.16).
4. Having screwed out the four bolts remove the cover of the shifter shafts.
5. Screw out from the bore in the front wall of the gearbox the adjuster screw which holds in position the spring of the lock ball or of the ball lock in the case of Zetor 25 K tractors of the reduction shifter shaft. The ball lock (Part No. 1551.16) is fitted to the Zetor 25 K tractors as replacement for the lock ball (Part No. 9114.74) of the reduction shifter shaft from Serial No. 225-19527 onwards.
This replacement can be carried out on every Zetor 25 K tractor, irrespective of early Serial Nos.
6. Carefully withdraw the reduction shifter shaft from the gearbox in forward direction, paying attention to the lock ball or ball lock complete with spring, which might fall into the interior of the gearbox.
7. Having unscrewed the four bolts M 6 x 12 remove from the gearbox the guide of the shifter shaft.
8. Proceeding in forward direction, press out from the gearbox the shifter shaft of the first and reverse speeds (Part No. 3432.16) as well as the shifter shaft of the second and third speeds (Part No. 1123.16).
9. Pull off the shifter shafts the shifter lever of the first and reverse speeds (Part No. 3428.16) and the shifter lever of the second and third speeds (Part No. 3429.16). Be sure not to let fall into the gearbox interior the lock balls which are forced off their respective apertures by the springs.

Reassembly:

When shifting gears, the shifter gears must in mesh full width with the teeth of the fixed gears. To ensure correct mesh use the "L" dead stops (Part No. 3622.16 and 3621.16), fitted on by means of the bolts securing the guide of the shifter shafts and limiting the travel of the shifter levers. If necessary, use the adjusting shims (Part No. 3430.16 — thickness 0.2 mm or .0079" and 3431.16 — thickness 0.5 mm or .0197") installed under the bolts securing the shifter shafts.
When tightening the bolts of the shifter shaft cover check the shifter shaft for easy operation. If the shaft binds centre the cover properly.
In the case of the Zetor 25 K tractors both the assembly and the dismantling procedure are identical to those of the Zetor 25 and Zetor 25 A tractors.
The following parts, however, cannot be fitted to the Zetor 25 or Zetor 25 A tractors:

Reduction shifter shaft (Part No. 8075.16)
Shifter lever for 1st and reverse speeds (Part No. 8076.16)
Shifter lever for 2nd and 3rd speeds (Part No. 8077.16)
Shifter shaft for 1st and reverse speeds (Part No. 8078.16)
Shifter shaft for 2nd and 3rd speeds (Part No. 8079.16)

The rest of the component parts are identical (see List of Spare Parts, Group 16 and 19 K).

With regard to the modification of the bevel pinion mounting recently introduced (see Instruction R-11), the reduction shifter shaft Part No. 8076.16 is replaced with the reduction shifter shaft Part No. 9080.16 from Serial No. 225-23975 of the Zetor 25 K tractor onwards.

From Serial No. 125-40019 onwards of the Zetor 25 A model the speeds have been reduced as follows: fourth from 14.6 to 12.1 km/h from 8.[illegible] to 7.52 miles, fifth from 22.4 to 18.8 km/h from 13.[illegible] to 11.[illegible] miles, sixth from 27.7 to 23.3 km/h from 17.[illegible] to 14.[illegible] miles, and second and reverse from 9.9 to 8.4 km/h from 6.15 to 5.15 miles p.h. In addition, some parts of the groups "Countershaft, Driver Mesh and Reduction Gear" and "Gear Shift Mechanism" have been standardized simultaneously with the above mentioned modification. For the case of Zetor 25 K tractors from Serial No. 225-30697 onwards (or prior) interchanging of those parts which differ is a slight extent.

In the Group "Gear Shift Mechanism" the reduction shifter shaft Part No. 3426.16 (for Zetor 25 A models) or Part No. 5938.16 (for Zetor 25 K models) is replaced with the reduction shifter shaft Part No. 4774.16 which replaces both the above mentioned Part Nos. It differs from the early model in having a thread M 18×1 and M 16×1 on its end taking the reduction shifter lever.

The reduction shifter lever Part No. 3434 is attached to the shifter shaft by means of two nuts with tab washers: the left M 8×25 Part No. 3433.70 and the rear M 8 Part No. 115.70 by means of which the reduction shifter lever has a thread been attached or supplied for early models only.

In this case operation No. 3 of this Instruction should be carried out as follows: After having unlocked both tabs of the tab washers (Part No. 4774.16), by means of a chisel or a screw driver, screw out the nut Part No. 4752.16 with M 16×1 thread (number No. 1 tab washer), knock off the reduction shifter lever, pull off No. 2 tab washer and screw out the nut Part No. 4773.16 with M 18×1 thread. To refit the reduction shifter lever reverse the above procedure. Do not tighten the nuts and lock them with the tab washers before having adjusted the reduction shifter lever in position in the spline of the reduction sliding gear. Removal and refitting of the remaining parts is not affected by the standardization.

The shifter lever for first and reverse speed Part No. 3426.16 of the Zetor 25 A model is replaced with Part No. 4775.16, which also replaces the Part No. 8076.16 of the Zetor 25 K tractor.

The shifter lever for the second and third speeds Part No. 3429.16 of the Zetor 25 A tractor is replaced with Part No. 4776.16 which also replaces the Part No. 8077.16 of the Zetor 25 K model.

The shifter shaft for the second and third speeds Part No. 3433.16 of the Zetor 25 A model is replaced with Part No. 4777.16, replacing also the Part No. 8079.16 of the Zetor 25 K tractor.

A. Early Model

In the case of Zetor 25 and Zetor 25 A tractors up to Serial No. 125-89009 and of the Zetor 25 K tractors up to Serial No. 225-30954 it is advisable to check the axial play of the pinion bearings after every 200 hours of operation during the running-in period or after a general overhaul.

If after operation periodical checks no undue axial play is ascertained, the preventive checks can be carried out less frequently.

Tractors having excessive axial play of the pinion bearings are unfit for operation. In addition, this defect may entail broken teeth of both the pinion and the crown wheel of the drive unit; immediate rectification is therefore essential.

The checking must be carried out while the oil in the gearbox is still hot, i.e. immediately after having finished operation.

For checking purposes, simply remove the gearbox cover as described in Instruction R-1, operations 1 to 11. Then, using a screw driver or thick opener, the slotted ring nut (Part No. 3368.17 or 3416.17) (depending), screwed on to the bevel pinion. Check the axial play of the bearings.

After having removed the mudguards and the bonnet (crawlbar according to Instruction R-2 disconnect the tractor according to Instruction D-3, carry out the operations 4 and 5 according to Instruction R-3, remove the differential gear lock and brakes as described in Instruction R-4, remove the rear half axles according to Instruction R-5, operations 4 to 7, remove the differential as described in Instruction R-6, take off the reduction shifter lever according to Instruction R-7, operation 3, and then proceed as follows:

1. After having unscrewed the two bolts M 8×18 remove the oil sump cover from the gearbox.
2. Pull out the cotter pins from the castle nuts which secure the cup of the taper roller bearing of the bevel pinion in No. 2 partition of the gearbox. Screw off the nuts and remove the washers.
3. Unlock the slotted nut (up to Serial No. 125-29873 of the Zetor 25 tractors and up to Serial No. 225-10302 of the Zetor 25 K tractors the nut Part No. 3368.17 has been used, while the nut Part No. 3416.17 is used from Serial No. 125-29874 of the Zetor 25 and from Serial No. 225-10303 of the Zetor 25 K models onwards) which secures the reduction gear and slacken the nut as far as possible.
4. Screw into the threaded holes of the taper roller bearing cup two auxiliary bolts M 10 of approximately 50 mm or 2" length. By gradually tightening the two bolts the bearing cup complete with the outer bearing race and bevel pinion can be pressed out from the gearbox wall.

   This operation can also be carried out by slackening the slotted ring nut which thrusts against the taper roller bearing, pressing out the bevel pinion

complete with the taper roller bearing cup from the gearbox wall. After the slotted nut has been temporarily removed out, the bearing cup can be easily pried out using a screw driver.

5. Take out in turn the slotted ring nut and the reduction gear (possibly also the washer ring) which have been eased in the course of the previous operations.
6. Knock off the bevel pinion the inner races of both the front and the rear bearings.

To Adjust Axial Bearing Play and Reassemble.

1. Remove the clutch or first motor shaft as described in instruction 8-9.
2. Drive home into the cup of the ball bearing of the clutch or first motor gear and carefully adjusting shim of 1.8 mm or .07087" thickness (Part No. 3379.17). Any additional undue axial play can be eliminated by installing adjusting shims of 0.1 mm or .00394" thickness (Part No. 3556.15) of 0.2 mm or .00787" thickness (Part No. 3381.15) and of 0.5 mm or .01969" thickness (Part No. 3382.15), as described below.

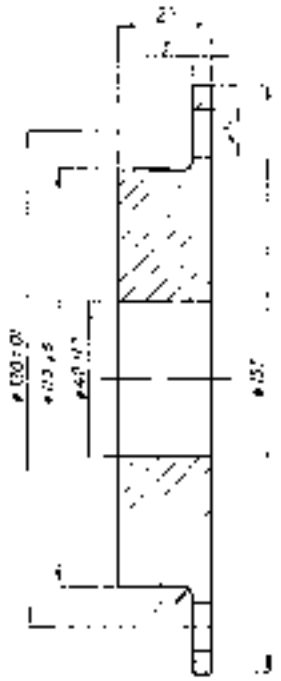


Fig. 30.

3. Proceed to fit the bevel pinion the inner races of both the rear and the front taper roller bearings.

   To prevent damage to the outer race of the front taper roller bearings in the course of further checking and adjustments of the axial play as described in the following operations it is advisable to effect the following precaution measures:

   Grind off the circumference of an outer race of a discarded taper roller bearing range 31.606 (Part No. 339.074) so as to ensure its easy screwing and withdrawal from the cup and subsequently use it as a fitting fixture.

4. Install the bevel pinion without the reduction gear into the pilot outer bearing race in the centre partition.
5. Install on the studs in the rear wall the cup of the rear bearing.
6. Fit the differential according to Instruction 8-6.

To facilitate this job, make two plate fixtures as shown in drawing (see Fig. 30), install the fixtures into the apertures taking the bearings of the differential splined shafts, securing each fixture by means of a left M 12 × 20 screwed in head, install the differential closer into the apertures and set it in the differential assembly.

7. The mesh of the bevel pinion teeth with those of the crown wheel should be adjusted so that not only centre meshing is ensured, but also that the backlash does not exceed 0.2 mm or .0079". While adjusting the correct mesh move the cup of the taper roller bearing as far as possible towards the interior of the gearbox.
8. Check the gap between the flange of the taper roller bearing cup and the gearbox wall.
9. Remove again from the gearbox the differential complete with the bevel pinion.
10. Fill up the gap between the flange of the taper roller bearing cup and the gearbox wall with the adjusting shims.

   The adjusting shims are supplied in the following sizes:

mm	in	Part No.
1.0	.0312	3413.15
1.0	.0394	3567.15
0.5	.0197	3382.15
0.3	.0118	3413.35
0.1	.00394	3393.35

   If the play of the bearings cannot be adjusted to the correct value in the manner described, use the adjusting shims inserted between the ball bearing and the taper roller bearing pressed into the cup (Part No. 4316.15). For this purpose use the adjusting shims of 1.0 mm or 0.7087" thickness (Part No. 3379.15), 0.5 mm (Part No. 3382.15), 0.2 mm or .0079" (Part No. 4361.15), and 0.1 mm or .00787" thickness (Part No. 3390.15).

   Moreover bear in mind that the Zetor 25 tractors up to Serial No. 125-01325 and the Zetor 25 K tractors up to Serial No. 225-0130 are fitted with the taper roller bearing 27.305 (Part No. 3384.74) and with the reduction gear (Part No. 3609.15 or Part No. 3766.15 for the Zetor 25 K tractors) mounted with the spacer ring (Part No. 3361.15). The spacer ring is located between the reduction gear and the taper roller bearing (Part No. 3384.74).

   From Serial No. 125-01326 of the Zetor 25 model and from Serial No. 225-0131 of the Zetor 25 K model onwards the tractors are fitted with the reduction gear (Part No. 4362.15 or Part No. 3972.15 for the Zetor 25 K tractors), to be mounted without the spacer ring (Part No. 3337.15) but with the taper roller bearing 32.308 (Part No. 3417.74).

   Any play likely to be ascertained during overhauling between this bearing and the reduction gear can be adjusted by means of adjusting shims of

0.5 mm or .01877" thickness (Part No. 341.[illegible]) and [illegible] mm or .00984" thickness (Part No. 341[illegible]).

11. Then fit the bevel pinion, the elastic gear and the slotted ring nut, proceeding in reverse order to the disassembling procedure.
12. Gently tighten the castle nuts of the bearing cup and lock them in position by means of cotter pins 2 × 25.
13. For the differential as described in Instruction R-6 and check for correct mesh the tooth of the bevel pinion and the crown wheel by marking with paint. Proceed as follows: Smear three teeth of the crown wheel with chin paint and turn the differential a few times. The marking tails to show on the pitch line of the driving side to extend from the pitch line to about three quarters of the tooth face towards the top. The fitting procedure must be repeated until correct mesh is obtained.
    The utmost responsibility and care are essential when carrying out the described operations to prevent the occurrence of any additional defects.
14. Reverse the disassembly procedure to refit the remaining groups.

B. New Model:

Special tool: lock spanner 4476.30

With regard to the mounting of the bevel pinion on two taper roller bearings from Serial No. 125-39509 of the Zetor 25A model and from Serial No. 257-17987 of the Zetor 25K model onwards, the disassembling procedure should be carried out as follows.

After having removed the rear lift cover according to Instruction R-1, remove the mudguards and the bottom bracket as described in Instruction R-2, disconnect the tracks according to Instruction R-3, carry out operations 4 and 5 according to Instruction R-3, remove the differential gear lock complete with bevels as described in Instruction R-4, remove the rear lift axle according to Instruction R-5, operations 1 to 5, remove the differential as described in Instruction R-6 and take off the reduction shifter levers, proceeding in the manner described in Instruction R-[illegible], operation 1.

Then proceed as follows:

1. After having removed the two bolts M 8×25 remove the oil pan from the gearbox.
2. Take out the cotter pins from the castle nuts securing the cups of the taper roller bearings of the bevel pinion to the rear wall of the gearbox. Screw out the nuts and take off the washers.
3. Unlock the slotted ring nut and slacken it as far as possible using the lock spanner 4476.30.
4. Screw in two auxiliary bolts M 10 with a thread of about 10 mm or 2.36" length into the bores of the taper roller bearing cup in place of the nuts.
5. Press off the cup of the taper roller bearings complete with bevel pinion from the gearbox wall by simultaneous slackening of the slotted ring nut and progressive tightening of the auxiliary bolts.
6. Gradually take out the slotted ring nut and the reduction gear which were eased in the course of this operation. Likewise, remove the inner race of the roller bearing (Part No. 9067.54) press fitted to the cup (Part No. 3962.15) in the centre wall of the gearbox.
7. Remove the key from its key groove in the bevel shaft. Then press out the bevel shaft from the cup of the taper roller bearings using a hand press (see Fig. 51).
8. Using a hand press, press off the rear inner race of the taper roller bearing from the pinion (see Fig. 52).

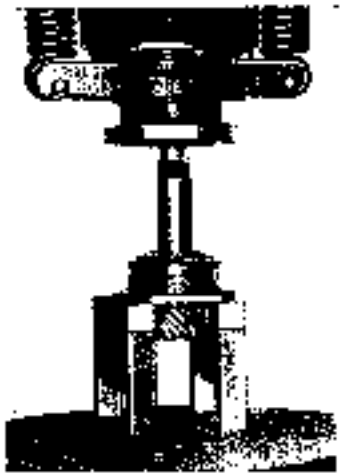


Fig. 51.

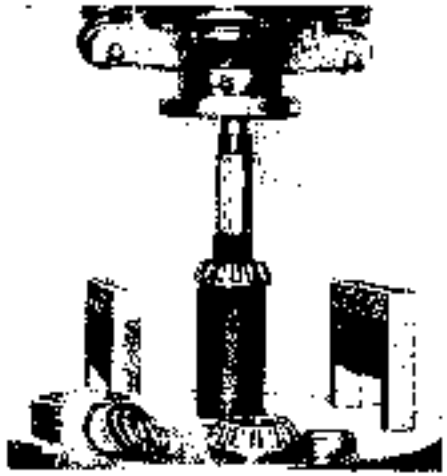


Fig. 52

Reassembly and Adjustment of Correct Tooth Mesh:

1. Using a hand press press fit the outer race of the rear taper roller bearing to the cup.
2. Reverse the bearing cup and press in the outer race of the front bearing. When fitting the two taper roller bearings into the cup for the first time experience is lacking, regarding the number of adjusting shims necessary to ensure a revolute fit without any undue play in the press-fitted taper roller

bearings. The bearings must not touch against each other. According to the List of Spare Parts adjusting shims can be obtained in the following sizes and under the following Part Nos:

mm	in	Part No
0.05	.00197	[illegible]
0.1	.00394	[illegible]
0.2	.00787	[illegible]
0.4	.0157	3368.15
0.5	.0197	3369.15
1.0	.0394	[illegible]

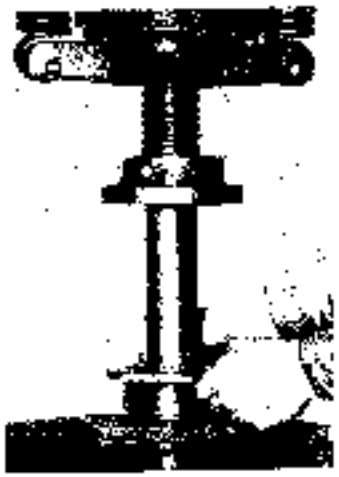


Fig. 93

Fig. 94

The utmost care in the process being essential for carrying out this operation, preferably pile up the adjusting shims so as to obtain a total of 1.7 mm or .0591".

This dimension need not be final as will be seen in practice. The adjusting shims may be piled even to a total height of 2 mm or .07874".

3. Install into the cup the inner race of the rear taper roller bearing, the adjusting shims of the required thickness, the spacer ring and the inner race of the taper roller bearing. Using a press check the cup for free rotation, without undue play on the press-fitted taper roller bearings (see Fig. 95). Add or remove the adjusting shims as necessary.
4. Using a suitable single at pipe cross fork bore on the bevel pinion the inner race of the rear taper roller bearing.

5. Then install into the cup the previously chosen set of adjusting shims, the spacer ring, the inner race of the front taper roller bearing and press-fit the assembly to the bevel pinion. Press-fitting accomplished, check the assembly for free rotation without undue play on the pinion.

   Having adjusted the play of the taper roller bearings, proceed to adjust the correct mesh of the bevel gears as follows.
6. Install an adjusting shim of 0.2 mm or .00787" thickness (Part No. 3364.15) on the studs securing the bearing cup to the gearbox partition. Install the bevel pinion complete with pressed-fitted taper roller bearings and bearing cup, but without the reduction gear, the slotted ring nut and the inner race of the roller bearing into the aperture in the gearbox partition. Secure the cup to the partition by means of two nuts.
7. Install into the bores taking the bearings of the splined differential shafts the plate-shaped fixtures (see Fig. 96). Hold the differential assembly so as to ensure the fitting of the differential shafts (see Fig. 97).
8. Smear several teeth of the crown wheel, i.e. about three (every other from six) with thin paint. Turn the differential a few turns and then check the paint marking on the bevel pinion. If the paint marking fails to show on the driving side of the pitch line of the teeth or extend from the pitch line to about three quarters of the teeth face towards the top (see Fig. 98), drive out from the gearbox wall the cup of the taper roller bearings complete with the bevel pinion and then add or remove the adjusting shims as necessary. The shims are available in the following dimensions:

mm	in.	Part No.
0.2	.00787	3364.15
0.3	.0118	3365.15
0.5	.0197	3366.15

   Do not proceed with assembly until the correct mesh of the teeth has been obtained with a backlash of 0.8 mm or .03937".
9. Checking finished, remove the shaft and take out the differential as well as the plate-shaped fixtures from the slide apertures of the gearbox.
10. Screw out both nuts by means of which the cup of the taper roller bearings has been temporarily attached to the gearbox partition.
11. Using a blunt drift drive out from the partition the bearing cup complete with bevel pinion.

    Be sure not to interchange the chosen and checked adjusting shims (adjusting correct play between the bearing cup and the partition) by means of which the correct mesh of the bevel pinion and crown wheel teeth has been ensured.
12. Install the inner race into the roller bearing in the outer partition of the gearbox.

13. Install the key into the key groove of the bevel pinion and the slotted ring nut into the recess of the reduction gear.
14. Hold the reduction gear against the aperture of the partition (Caution! Do not forget the adjusting shims!) and install into it the bevel pinion. Then, using a soft metal mallet drive home the bevel pinion until it is seated and penetrates into the inner race of the roller bearing. Then, the washers can be installed and the castle nuts screwed on to the studs of the locking cup.
15. As the slotted ring nut has been connected to the recess of the reduction gear in the course of this operation, use a chisel and a vertical drift to move the reduction gear slightly back to fast. The hook spanner 6470.00 can be installed into the slots of the nut in order to tend the nut in order to force it engages into the first thread of the bevel pinion.
16. Prop the hook spanner against the reduction shaft or against the gearbox wall. See Fig. 251 and turn the clutch or first motion shaft so as to tighten the nut.

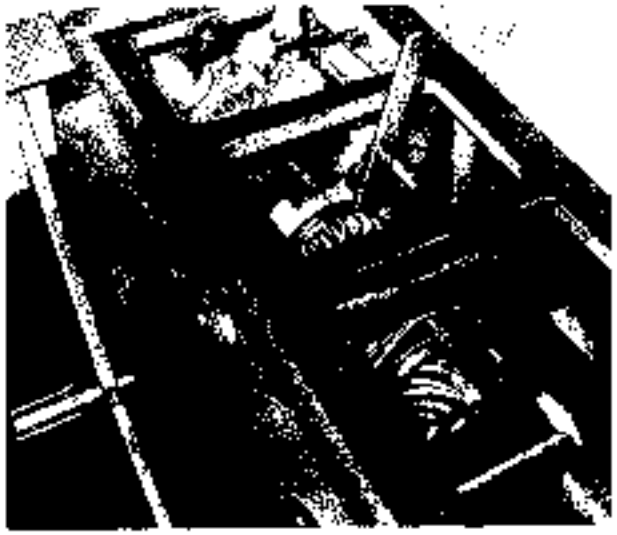


Fig. 251

17. Tighten the slotted nut until it is properly bedded. Then lock it in position by means of a wire clip.
18. Having tightened the castle nuts of the bearing cup, lock them in position by means of cotter pins.

Proceed with assembly in reverse order to the dismantling procedure.

Both the dismantling and the reassembly of this group are identical in the case of the Zetor 25 K tractors and in that of the Zetor 25 A tractors, with the exception of the reduction gear (Part No. 3020.15), which cannot be fitted to the Zetor 25 K models, while the reduction gear Part No. 3073.7 cannot be fitted to the Zetor 25 A model.

On Zetor 25 A tractors (from Serial No. 125-06619) onwards, with lower speeds the reduction gear Part No. 3020.15 is replaced with the reduction gear Part No. 3326.15. The reduction gear Part No. 3073.1 for the Zetor 25 K model remains unaltered.

To Remove Clutch Shaft and Reverse Gear R-9

When removing the clutch or first motion shaft of early design (up to Serial No. 125-10608 of the Zetor 25 and Zetor 25 A tractors and up to Serial No. 225-2903 of the Zetor 25 K tractors) first remove the gearbox cover according to Instruction R-1, remove the mudguards and the bonnet (bonnet as described in Instruction R-2, disconnect the tractor proceeding according to Instruction D-9, carry out operations 3 and 4 according to Instruction R-3, remove the differential gear lock and brakes as described in Instruction R-4, remove the rear half axles according to Instruction R-5, operations 4 to 7, remove the differential as described in Instruction R-6, remove the gear shift mechanism according to Instruction R-7, remove the reduction gear and the bevel pinion according to Instruction R-8 (paragraph "Clutch Model") and then proceed as follows.

1. Screw out the four bolts securing the clutch shaft cap.
2. Remove the lubrication oil pipe of the cover (pass-over drive).
3. Remove the clutch shaft cap and take out the adjusting shims from underneath it.
4. Remove the lock of the vertical cross cover drive shaft (see Group 450).
5. Using a soft metal mallet, drive the clutch shaft inside the gearbox while driving out the cup (ball bearing), the adjusting shims and the taper roller bearing.
6. Hold the direct mesh gear which has been eased from its key during the driving out of the clutch shaft to prevent it from falling into the gearbox.

   To remove the clutch shaft of the Zetor 25 K tractor proceed in a similar manner as when removing the clutch shaft of the Zetor 25 and Zetor 25 A tractors, the only difference being in the following parts which cannot be fitted to either the Zetor 25 or the Zetor 25 A tractors: the clutch or first motion shaft (Part No. 8[illegible]) and direct mesh gear (Part No. 8086.15).
7. Take out the cotter pin (N 3) from the castle nut of the reverse gear and screw out the nut.

8. Remove the washer and using a soft metal mallet, drive out in driving direction the reverse pin (Part No. 3403.15) from the gearbox partition. Pull off its pin the reverse gear (Part No. 3417.15).

   To remove the reverse gear of the Zetor 25 K tractors proceed in the same manner, bearing in mind however, that the reverse gear Part No. 8106.15 and the reverse pin Part No. 8171.15 cannot be fitted to the Zetor 25 A tractors.

   To refit the clutch or first motion shaft and the reverse gear, reverse the procedure described above.

To Remove Clutch Shaft of New Design:

With regard to the reconstruction of the bevel pinion housing, the fitting of the clutch shaft is different from Serial No. 125-[illegible] of the Zetor 25 A model and from Serial No. 225-23937 of the Zetor 25 K models onwards.

When removing the clutch shaft of new design, the initial dismantling operations are the same as those described in the case of the early design. Like wise carry out operations 1 to 4. For further dismantling however, proceed as follows:

1. Take out from the interior of the bearing cup (Part No. 3369.15) the circlip of 7.1 mm or 2.937" dia. (Part No. 9971.73) which secures the roller bearing NJ 306 (Part No. 3637.74).
2. Using a soft metal mallet drive the clutch shaft inside the gearbox thus easing from the cup both the ball and roller bearing complete with spacer ring.
3. Having pulled out the clutch or first motion shaft, now take out the cased direct mesh gear.
5. Using a suitable drift, drive out from the centre partition the bearing cup (Part No. 3362.15) proceeding in reverse direction, i.e. from rear to front in driving direction.

Reassembly:

1. Drive home into the aperture in the centre partition the bearing cup, proceeding in reverse direction.
2. Through the bearing cup insert into the front spare of the gearbox the clutch or first motion shaft (Part No. 3412.15 or Part No. 8074.15 in the case of the Zetor 25 K tractors) with the key (Part No. 3475.15) installed in the key groove.
3. Tapping the shaft with a soft metal mallet press-fit it to the prepared direct mesh gear (Part No. 3372.15 or in the case of Zetor 25 K Part No. 9106.15).
4. Using a soft metal mallet, press the ball bearing 6309 (Part No. 3337.74) first in the clutch shaft and then into the bearing cup.
5. Then install into the cup the spacer ring of 1.5 mm or .0709" (Part No. 3379.15) or of 0.2 mm or .00787" (Part No. 3381.15) or of 0.5 mm or

.0197" thickness (Part No. 3382.15) and press-fit the roller bearing NJ 306 (Part No. 3637.74), locking it in position by means of the circlip 72 (Part No. 3369.73).

6. Press-fit the ball bearing 6309 (Part No. 3337.74) into the bearing bore in the front face of the gearbox and on the clutch shaft.
7. Using a depth gauge check the clearance between the inner face of the collar of the clutch shaft, inner and the ball bearing. Adjust the ascertained play as necessary, using the adjusting shims of .39" or 10 mm thickness (Part No. 3371.15), 1.0 mm or .0394" thickness (Part No. 3416.15), 0.5 mm or .0197" (Part No. 3416.15), 0.2 mm or .00787" (Part No. 3369.15), 0.1 mm or .00394" (Part No. 9330.15).

The dismantling and reassembly procedures of the Zetor 25 K tractors are generally similar to those of the Zetor 25 A tractors. The following points, however, should be borne in mind:

a) The Zetor 25 A tractors from Serial No. 125-39129 onwards are fitted as well as the Zetor 25 tractors — with the clutch or first motion shaft Part No. 8371.15 and with the direct mesh gear Part No. 3372.15.

b) From Serial No. 125-39689 onwards the clutch shaft Part No. 3371.15 is replaced with the shaft Part No. 3472.15, while the direct mesh gear remains unchanged.

c) From Serial No. 125-[illegible] onwards the clutch shaft Part No. 3462.15 is replaced with Part No. 3774.15, while the direct mesh gear remains unaltered.

d) In the case of Zetor 25 A tractors from Serial No. 125-39120 up to Serial No. 125-39689 the clutch shaft Part No. 3371.15 can also be replaced with the clutch shaft Part No. 8071.15. In this case however, the clearance between the front face of the clutch shaft and the ball bearing Part No. 3337.74 must be adjusted by means of two adjusting shims of 1 mm or .0394" thickness (Part No. 3377.15). The direct mesh gear Part No. 3372.15 remains unchanged.

e) The Zetor 25 K tractors up to Serial No. 225-23934 are fitted with the clutch shaft Part No. 9067.15 and with the direct mesh gear Part No. 9066.15.

f) The Zetor 25 K tractors from Serial No. 225-23935 onwards are fitted with the clutch shaft Part No. 8074.15 in replacement for Part No. 9067.15 and with the direct mesh gear Part No. 9066.15.

g) In view the standardization of parts the reverse gear Part No. 3417.15 is omitted from Serial No. 125-[illegible] of Zetor 25 A models onwards. Hence replaced with the Part No. 8071.15; the reverse gear bush Part No. 3403.15 is replaced with Part No. 8064.15; the reverse pin Part No. 3403.15 is replaced with the pin Part No. 8171.15. All the above parts must be fitted simultaneously.

Special tool: socket spanner 4465.00.

Prior to removing the counter shaft of early design (up to Serial No. 127-30608 of the Zetor 25 and 25 A models and up to Serial No. 225-23934 of the Zetor 25 K models) remove the gearbox cover according to Instruction R-1, remove the mudguards and the lower drawbar as described in Instruction R-2, disconnect the motor proceeding according to Instruction R-3, carry out operations 4 and 5 according to Instruction R-3, remove the differential gear lock and the brakes as described in Instruction R-4, remove the rear half axles according to Instruction R-5, operations 4 to 7, remove the differential as described in Instruction R-5, remove the gear shift mechanism according to Instruction R-7, remove the reduction gear and the bevel pinion as described in Instruction R-8 (Chapter A - Early design), remove the clutch or gear motion shaft according to Instruction R-9 and then proceed as follows:

1. Screw out the four bolts securing the counter shaft cap and remove the cap. Then take out the adjusting shims.
2. Remove from the groove of the counter shaft the circlip which locks in position the ball bearing installed in the rear partition.
3. Remove from the groove of the counter shaft the circlip which locks in position the ball bearing in the centre partition.
4. Remove the cotter pin from the castle nut of the counter shaft. Install the socket spanner 4465.00 on the castle nut and screw it out.
5. Using a mallet and a suitable drift — to avoid damage to the thread of the castle nut - drive the counter shaft inside the gearbox so as to enable gradual removal of the thrust washer of the constant mesh gear, the constant mesh gear, the circlip, the sliding gear for second and third speed, and the first and reverse speed gear.
6. Knock off the counter shaft the pressed out ball bearings (both the rear and the centre one).
7. Proceeding in the direction towards the outside of the gearbox drive out the front taper roller bearing - after having removed the circlip.
8. Move the counter shaft from the rear to the front and, when in centre position, remove the reduction sliding gear.

   To reassemble, reverse the described procedure. Bear in mind, however, that the following parts must be fitted to the Zetor 25 K tractors:

   Reduction sliding gear (Part No. 8057.141).
   First speed and reverse sliding gear (Part No. 8062.141).
   Second and third speed sliding gear (Part No. 8063.141).
   Constant mesh gear (Part No. 8064.141).

To Dismantle Counter Shaft of New Design:

Special tool: socket spanner 4465.00.

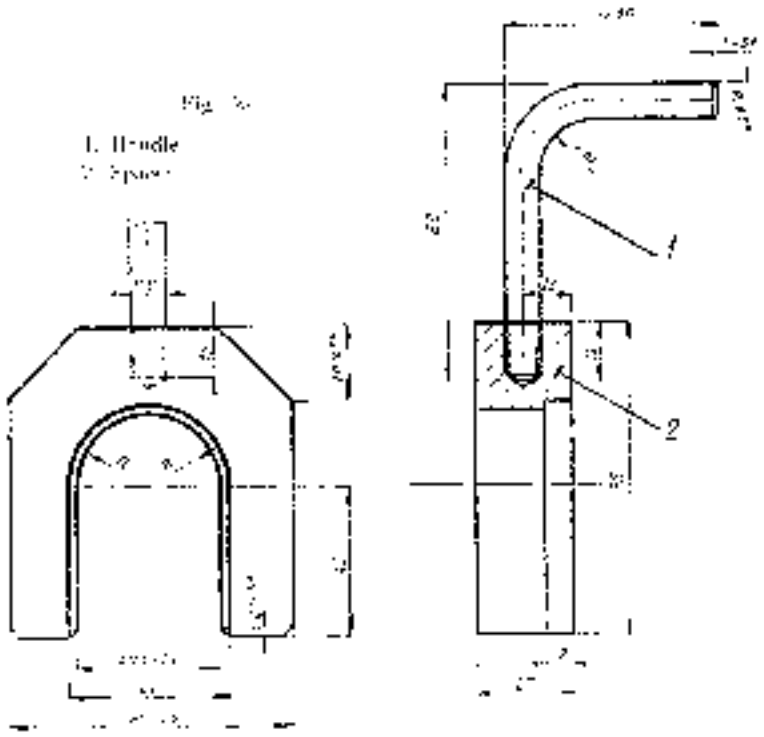
From Serial No. 127-30609 of the Zetor 25 A model and Serial No. 225-23935 onwards of the Zetor 25 K model a change in the mounting of the counter shaft has been introduced owing to the introduction of the mounting of the bevel pinion on two taper roller bearings. From the aforementioned Serial Nos. onwards bear in mind that no group whatsoever of the early models can be individually replaced with a group of new design (early models up to Serial No. 127-30609 of the Zetor 25 A tractors and up to Serial No. 225-23934 of the Zetor 25 K tractors).

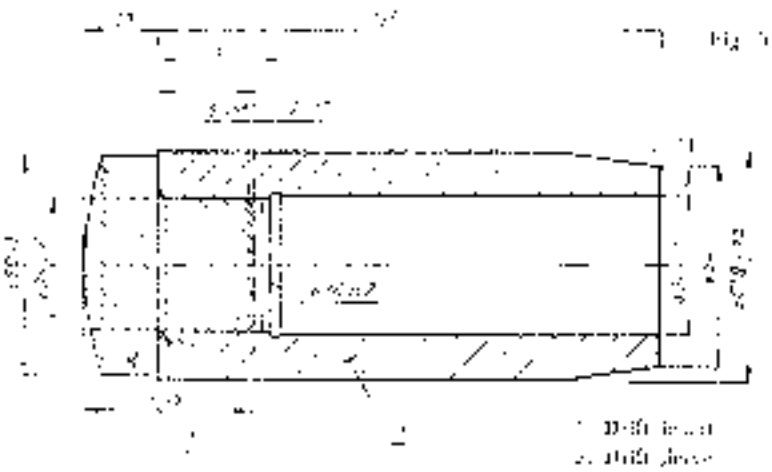
To facilitate both removal and refitting of the counter shaft it is advisable to manufacture the four fixtures in drawings shown in Figs. 56, 57, 58 and 59.

Dismantling procedure:

1. Screw out the four bolts securing the counter shaft cap and remove the cap.
2. Take out the adjusting shims from underneath the counter shaft cap.
3. Remove the circlip dia. 30 (Part No. 3351.721) of the roller bearing (Part No. 3658.74) from the groove of the counter shaft rear pin.
4. Using a screw driver or a chisel, unlock the sheet metal tab washer (Part No. 3530.141) of the counter shaft nut (Part No. 3329.141).

   On reassembly, be sure to replace the used tab washer with a new one.
5. Install the socket spanner 4465.00 on the nut Part No. 3329.141 and screw out the nut.
6. Tapping a suitable drift with a mallet drive the counter shaft from forward direction inside the gearbox so far as to enable removal of the thrust washer for the constant mesh gear (Part No. 3345.141), the constant mesh gear (Part No. 3345.141) and the circlip (Part No. 3342.141). Simultaneously press out the inner race of the roller bearing (Part No. 3658.74) and, from the centre partition, the ball bearing 6206 (Part No. 3330.74).
7. Remove from the groove of the counter shaft the circlip dia. 40 (Part No. 3539.721) of the centre ball bearing and move it along the shaft to the reduction sliding gear.
8. Then drive the counter shaft in opposite direction, i.e. from the rear to the front, having installed the fixture shown in Fig. 56 between the reduction sliding gear (Part No. 3339.16 or, in the case of Zetor 25 K tractors, Part No. 8061.141) and the circlip dia. 40 (Part No. 3336.72), to avoid damage to the reduction gear against the shaft splines during removal of the ball bearing (Part No. 3336.74).
9. Proceed to drive the counter shaft from the rear towards the front until also the front ball bearing (Part No. 3337.74) is pressed out from the front wall of the gearbox.





10. This accomplished, the counter shaft can be easily moved forward and withdrawn from the housing; the sliding gears can be gradually slipped off the shaft and taken out.
11. Remove both cup-type dia 62 (Part No. 3962.72) from the hollow at the rear wall and then take out the roller bearing (Part No. 2 [illegible]).

When reassembling, reserve the above procedure as follows:

1. Mark with chalk or with paint the positions of the sliding gears for the second and third speeds (Part No. 3711.14 or, in the case of Zetor 25 K tractors 8063.14) for first and reverse speeds (Part No. 3940.14 or 8062.14 for Zetor 25 K tractors) and of the reduction gear (Part No. 4[illegible].14 or, for Zetor 25 K tractors 8061.14) on the splines of the counter shaft (Part No. 3399.14).
2. Marking finished, remove the sliding gears from the counter shaft and install the latter from forward direction through the aperture in the gearbox front face into the first compartment of the gearbox. While pushing home the counter shaft, install on its splines in turn the sliding gear for the second and third speeds and then that of the first and reverse speeds according to the marking.
3. Having pushed the counter shaft through the aperture of the first partition into the second compartment of the gearbox, slip on it from the ball bearing 5208 (Part No. 3[illegible].74), the cup-type 40 (Part No. 3[illegible].72) and the reduction sliding gear.
4. Push the counter shaft fully home and then install between the ball bearing and the cup-type and the reduction gear the fixture as shown in Fig. 58 to avoid [illegible] fitting of the ball bearing to the shaft. To prevent the circlip from being displaced [illegible] to the reduction gear.
5. Install the hollow drift (see Fig. 57) on the rear end of the counter shaft and place the retaining plate as shown in Fig. 58 into the front wall. Heat up the drift with a mallet so as to press the ball bearing to the counter shaft and this accomplished, remove the fixture fixtures.
6. Press the counter shaft as far as possible into the rear bearing portion and fit in its front end in the front compartment of the gearbox the circlip (Part No. 3443.14) and the constant mesh gear (Part No. 3[illegible].14 or, in the case of Zetor 25 K models 8064.14).
7. Install the fixture shown in Fig. 56 between the ball bearing and the reduction sliding gear. At the rear end of the counter shaft the hollow drift as shown in Fig. 57, and place the fixture shown in Fig. 59 for centering the counter shaft during the press-fitting of the ball bearing into the aperture taking the counter shaft cup. Tapping the hollow drift with a mallet press-fit the ball bearing (Part No. 3936.74) into the centre aperture.

8. Having removed the setting fixtures, lock the centre ball bearing in position by means of a circlip.

9. Proceeding through the front aperture install the circlip dia. 80 (Part No. 3547.72), then fit the thrust washer of the constant mesh gear and, using a suitable drift, press-fit fully home the ball bearing 6209 (Part No. 3503.74).

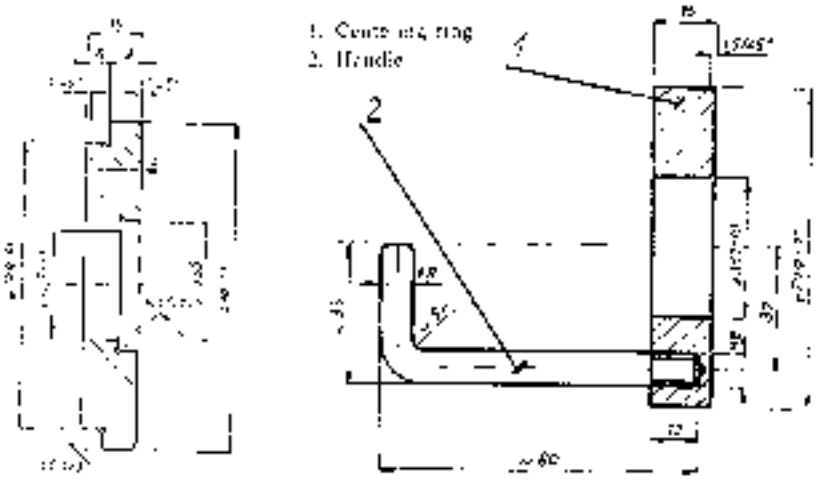


Fig. 18 Fig. 19

10. Proceeding from rearwards direction install into the aperture taking the rear roller bearing the circlip dia. 52 (Part No. 3560.72), press-fit the roller bearing NU 2206 (Part No. 3678.74), install the other circlip dia. 62 lock the bearing in position by means of an additional circlip of 30 dia. (Part No. 3571.72).

11. Slip on to the counter shaft the sheet metal tab washer of the counter shaft nut. Then finally tighten the counter shaft nut using the socket spanner 4665.90. Check the counter shaft for free rotation and then lock the counter shaft in position (or by bending the tab washer to the edge of the nut).

12. Using a depth gauge check, the clearance between the ball bearing and the counter shaft cap. If necessary, adjust the ascertained clearance by installing adjusting shims which are supplied in the following dimensions.

mm	in.	Part No
0.5	.0197	3348.14
0.2	.00787	3349.14
0.1	.00394	3350.14

To eliminate undue play even several adjustment shims of equal size can be used, piled even in a greater thickness than the total thickness of all the above mentioned shims (0.5 mm or .0197") if this total proves to be inadequate.

13. Attach the counter shaft cap to the front face of the gearbox by means of four bolts M 8×25 with spring washers.

To reassemble the remaining groups which have been dismantled observe the respective Instructions, proceeding in reverse order.

From Serial No. 125-44619 of the Zetor 25 A model and from Serial No. 25-5340,7 of the Zetor 25 K model towards the following modifications have been introduced into this group:

a) The sliding gear for the second and third speeds (Part No. 3341.14 for Zetor 25 A model or Part 3653.14 for Zetor 25 K model) remains unaltered.

b) The sliding gear for the first and reverse speeds Part No. 3340.14 is actual being replaced with Part No. 3652.14, fitted to the Zetor 25 K tractors only. This means that both models are now fitted with the same sliding gear for the first and reverse speeds.

c) The reduction sliding gear for the Zetor 25 A model, Part No. 3339.14 is likewise omitted, being replaced with the reduction sliding gear Part No. 3327.14, while the reduction sliding gear Part No. 3651.14 for the Zetor 25 K tractor remains unchanged.

To Dismantle Gear Shift Mechanism and Power Take-off Shaft R-11/1

Prior to removing the belt pulley drive remove the gearbox cover according to Instruction R-1, disconnect the tractor as described in Instruction D-9, remove the mudguards with the top drawbar according to Instruction R-2 (the bottom drawbar need not be removed) and then proceed as follows.

1. After having screwed out the lock nut of the drive coupling sleeve drive out in forward direction the coupling shaft and remove it together with the coupling sleeve. When driving out the shaft be careful not to let the lock ball complete with the spring of the coupling sleeve fall down into the gearbox.
2. Using a screw driver or a chisel to lock the sheet metal tab washer of the nut securing the bevel drive gear of the grass cutter to the power take-off shaft.
3. Knock the drive bevel gear off the shaft, pull off the adjusting shim and take out the key from its groove.
4. Remove the brake of the cutter drive and the lubrication oil pipe according to Instruction R-9, operations 2 and 4.
5. Remove the oil sump and oil pan.
6. Screw out the four securing bolts M 8×30 and remove the guard of the power take-off shaft (group 45).
7. Screw out the two nuts M 8 and remove the belt pulley guard (group 43, or possibly 50).

8. Screw out the bolts securing the housing of the belt pulley drive.
9. Using a suitable drift [illegible] to the thread of the power take-off shaft and a mallet, drive out the power take-off shaft towards the marble and the rear ball bearing, [illegible] the right of the centre compartment of the gearbox. Then remove the circlip at 37 dia. and tap off the ball bearing.
10. While driving out the power take-off shaft and ball bearing, remove the individual gear parts.
    The power take-off driving gear (Part No. 3705.21) is lapped in, [illegible] the power take-off shaft and consequently its position on the shaft [illegible] must be marked with paint.
    If the threaded pin of the power take-off shaft has broken (Part No. 3667.21), [illegible] according to Fig. 10 can be carried out.

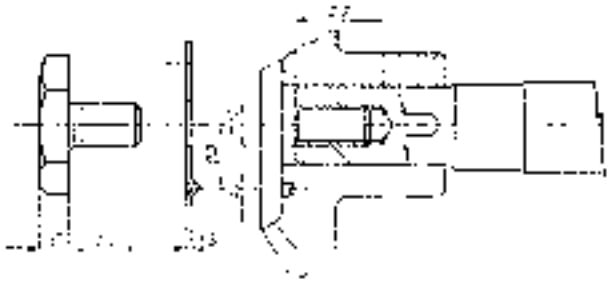


Fig. 10

When reassembling, reverse the above procedure.
Be sure however, that the face of the bearing on the coupling, [illegible] is flush with the washer when tightened.
Adjust the axial play [illegible] of the warning of the [illegible] of the [illegible] of the [illegible] by means of adjusting shims of a thickness of 0.5 mm, 0.2 mm and 0.1 mm or .0197", .00787" and .00394" (Part Nos. 3739.40, 3738.21 and 3737.21).
Assembly is complete, the power take-off shaft must be freely rotatable by the hand. If [illegible] is necessary to remove the shaft from the rear, adjust it by means of adjusting shims of a thickness of 0.5 mm or .0197" (Part No. 3702.21), 0.2 mm or .00787" (Part No. 3705.21), or 1.0 mm or .0394" (Part No. 3704.21).

To Dismantle Belt Pulley Drive Housing and Power Take-off Shaft R-13/2

Special tools: [illegible] 4466.00
First remove the gear shift mechanism and the power take-off shaft as described in Instruction R-11/1 and then proceed as follows:

1. Clamp the power take-off shaft, complete with the power take-off housing into a vice. After having screwed out the securing nut and removed the washer, tap the belt pulley off the splines.
2. Slacken the clamp bolt of the power take-off guard (spanner [illegible]) and remove the guard or possibly, after having screwed out the four bolts, remove the guard of the power take-off shaft (Part No. 3721.00).
3. Press off the power take-off housing from the shaft, pressing towards the rear. Be sure not to damage the seal ring at the spline end of the power take-off shaft.
4. Take out through the aperture taking the belt pulley bush the power take-off bevel gear which has remained in the housing. Pull the remaining parts off the shaft.
5. After having screwed out the securing bolts remove the cap of the bush of the belt pulley shaft.
6. Bolt on to the belt pulley shaft bush, clamped in a vice the pulley 4466.00. Install a suitable pad on the shaft to prevent damage to its thread and press out the shaft from the bush.

On reassembly, during which the dismantling procedure is reversed check the gear wheels for correct operation.
After having been assembled, the gear wheels must rotate freely, their operation must not be noisy and no excessive backlash should be ascertained.
Correct mesh of the gear wheels can be adjusted by means of adjusting shims of a thickness of 0.1 or 1.0 mm or .00394 or .0394" (Part Nos. 3749.21 and 3750.21) installed under the gear wheel into the power take-off housing as necessary.
The split shim of the belt pulley can be dismantled as necessary by means of adjusting shims of a thickness of 0.1, 0.2 and 0.5 mm or .00394, .00787 and .0197" (Part Nos. 3734.21, 3650.21 and 3757.21).
The axial play between the spacer tube and the circlip can be adjusted as necessary by means of adjusting shims of a thickness of 0.1, 0.2, 0.5 and 1.0 mm or .00394, .00787, .0197 and .0394" (Part Nos. 3676.21, 3677.21, 3678.21 and 3759.21).
The clearance between the cover of the power take-off housing and the rear ball bearing can be adjusted as necessary by means of adjusting shims of a thickness of 0.1, 0.2 and 1.0 mm or .00394, .00787 and .0394" (Part Nos. 3670.21, 3671.21 and 3672.21).

Special tools: socket spanner 4272.30, pulley 4216.90

1. Screw out the drain plug from the bottom of the hydraulic power unit and drain the oil.
2. Pull out the oil dipstick and then screw out the six bolts securing the hydraulic power unit. Two of the bolts have heads with inner hexagon and can be screwed out by means of the socket spanner 4272.30. Then remove the cover.

Fig. 61

3. Screw out the two bolts M 8 × 16 and take out the oil pump (see Serial No. 54602 of the hydraulic power unit regards this operation is omitted).

Fig. 62

4. After having pulled out the cotter pin from the link pin screw out the two nuts M 6 pull off the spring cup, the spring and the oppositespring cup (see Fig. 62).
5. After having removed the cotter pin and the washer withdraw the piston rod pin from the rotary arm.

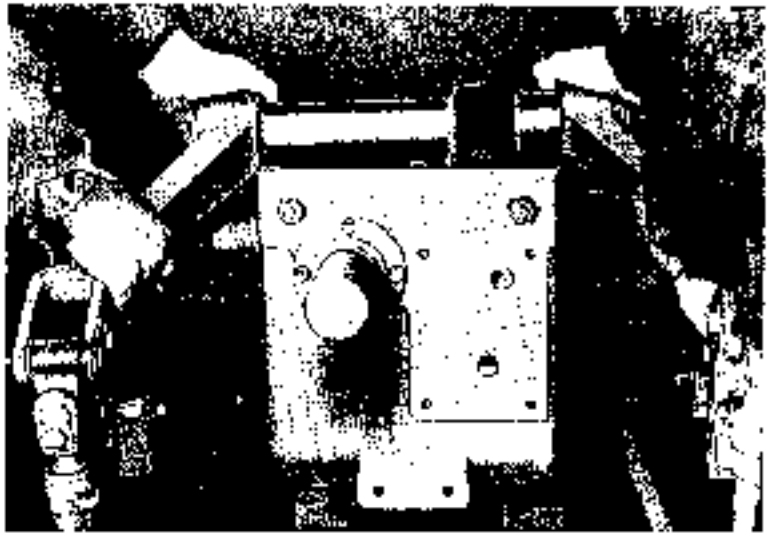


Fig. 63

Fig. 64

Fig. 65

Fig. 66

6. After having pulled out the cotter pin remove the pin of the adjuster lever of the slide valve from the control lever.
7. Screw out the bolt M 8×8 and tap the operating lever off the shaft.
8. Remove from the housing the shaft complete with lifting arms (see Fig. 65).
9. On the LH side of the housing screw out the LH bolt and, tapping lightly, move the shaft of the ram cylinder through the RH aperture out of the housing (see Fig. 66). During this operation slightly lift the ram cylinder. The lock bolt of the ram cylinder shaft or the bottom of the housing can be slightly slackened (the one ram at the moment, as it serves as a guide at assembly). Then it must be firmly retightened.
10. Using the cylinder socket spanner, screw out the four clamp bolts of the ram cylinder and withdraw from the housing the cylinder complete with piston rod and piston (see Fig. 67).
11. Swing the bottom of the ram cylinder by 90° to the right and remove it complete with the sleeve valve from the housing (see Fig. 68).
The ram cylinder bottom is supplied complete with the sleeve valve, the same applies to the piston and piston valve — neither of these parts can be replaced individually.
12. If the hydraulic oil pump should be removed, use a circular box spanner to screw out the two nuts of the securing bolts M 10×130, take out the suction line and withdraw the pump along the bolts (see Fig. 67).

Fig. 67

The front cover, the body and the rear cover of the pump are lapped together and, accordingly, cannot be interchanged with parts of another pump. It is not advisable, therefore, to dismantle the pump in more individual components.

13. If the bevel gear or the power take-off gear or the belt pulley shaft call for replacement first slacken the nuts of the through bolts and remove the housing of the hydraulic power unit along these long bolts, using the puller 4166.90; then gradually pull off the power take-off shaft the bevel gear, the adjusting shims and the spacer tube.

4166.90

14. Having removed the housing of the hydraulic power unit from position on the tractor, use the puller 4166.90 to press out the belt pulley shaft, proceeding towards the interior of the housing.

To reassemble reverse the above procedure.

After having fitted the oil pump install into the housing the assembled ram cylinder complete with bottom and sleeve valve (tighten the through bolts of the ram cylinder by hand only).

When installing the ram cylinder shaft into the housing and the cylinder head from the RH side, the shaft must be swung so that the oil inlet hole is at the top and the groove taking the lock bolt at the bottom. This position can best be found by slightly swinging the shaft.

Only then tighten the through bolts completely.

To Fit Hydraulic Clutch Release — H-2

If the Zetor tractors with hydraulic power lift are not fitted the hydraulic clutch overload release, then the clutch release assembly is supplied and can be additionally mounted as follows

1. Disconnect the clevis from the clutch release shaft (Part No. 7539.51) after having removed both cotter pins 2×15 (Part No. 223.72) the washers 9.5 (Part No. 109.71) and pulled out the clevis pin (Part No. 7542.73) from the clevis arms (Part No. 7541.51).
2. Screw out the bolts M 6×10 of the clevis arms (Part No. 7511.79) and pull off the clutch release shaft the RH clevis arm. Remove the arm key (Part No. 7540.73) from its groove in the shaft
3. From the operator side screw off the nut M 36 (Part No. 42.70) and remove to turn the washer 13 (Part No. 7543.71), the clevis (Part No. 7791.51), the clutch overload release body (Part No. 7567.51), the clutch release bearing (Part No. 1346.51) and the other clevis arm. Remove from the shaft the key of the other clevis arm
4. Install the clutch release shaft (Part No. 7539.51) into the apertures in the bosses of the hydraulic power lift housing. Then fit to the shaft the clutch release bearing
5. Screw out the two lock bolts from the LH side of the cover of the hydraulic power unit and bolt on with them the clutch release bearing (inner hexagon bolts).
6. Install on the overload release shaft the remaining parts which have been removed in the course of operations 1 to 3, proceeding in reverse order.
7. Install the top link with the fitted on hydraulic overload release between the bosses of the hydraulic power lift housing and secure it with the pin (Part No. 7223.79), locking the pin in position by means of the washer 25 (Part No. 7155.71) and the cotter pin 4×40 (Part No. 707.72).
8. Screw out the lock bolt (Part No. 7538.51), swing home the clevis (Part No. 7536.51) and re-bolt the clevis lock (Part No. 7551.51).
9. Screw out from the LH flank of the housing the lock securing the shaft of the ram cylinder (Part No. 7114.71) and screw in instead the LH pin-bolt (Part No. 7556.50)
10. Install on the pin of the bolt the rocker lever (Part No. 7555.51) with the fitted on connecting link (Part No. 7553.51) which, in the case of group 67 - three position drawbar - is replaced with (Part No. 7571.51) and the clutch control rod (Part No. 7561.51), which is replaced with (Part No. 7574.71) in the case of group 67 - three position drawbar. Lock the rocker lever in position by means of the lock ring (Part No. 7537.72)

11. Install the connecting link into the clevis of the overload release body (Part No. 7545.71), fit the clevis pin (Part No. 7552.73) and lock it in position by means of the cotter pin 2×15 (Part No. 223.72).
12. Unscrew from the clutch control rod (Part No. 3460.17) the rod joint (Part No. 3469.17) and screw on instead the rod joint (Part No. 7505.51).
13. Install into the joint bore the clevis (Part No. 7503.51) by means of the pin (Part No. 7504.73) and of the cotter pin 3×25 (Part No. 671.72).
14. By turning the clutch control rod clockwise or anticlockwise as necessary adjust the clutch release mechanism so as to throw off the clutch with the clutch operating lever at a distance of 20 mm or .787" from the gearbox cover. The length of the control rod can be adjusted by tightening the adjuster nut (Part No. 7560.51) down to the arm of the rocker lever.
15. If the length of the clutch control rod is inadequate or excessive, adjust it by screwing the rod into the joint or out of it respectively. Lock the joint in the required position by means of the lock nut M 14 (Part No. 705.70).

Dismantling is effected by reversing of the above directions.

The clutch overload release can be adjusted so as to suit the respective character of the soil and ploughing by means of the adjuster screw (Part No. 7515.51). For this purpose screw out the cap nut (Part No. 7519.51) from the body of the ram cylinder (Part No. 7510.51) and slacken the lock nut (Part No. 7517.51). Then only can the adjuster screw be slackened or tightened as necessary. Finally screw on the cap nut

Additional Fitting of Hydraulic Oil Pressure Governor for Remote Mounted Ram Cylinders — H-3

This system is supplied on special order and therefore not fitted to all the tractors. Additional fitting to the housing of the hydraulic power lift is carried out as follows

1. Screw out the drain plug from the bottom of the hydraulic power lift housing and drain the oil.
2. Carry out operations 1 to 12 of Instruction H-1
3. Screw out the side plug from the housing
4. Clean the face of the housing on the LH side round the bosses taking the bolts of the hydraulic oil pump and round the plug hole.
5. Install per one sealing washer (Part No. 7012.53) on the two bolts (Part No. 7327.08, size M 10×170), which replace the securing bolts of the oil pump (Part No. 7370.70), then install the oil pressure governor body (Part No. 7324.69) complete with governor pipe lines (Part No. 7319.69) and the governor gasket (Part No. 7323.54)
6. Install the bolts with the fitted governor body into the bosses of the housing. Bolt the oil pump and secure it from inside the housing by means of nuts.

7. Screw a blank plug (Part No. 7327.68) into the core in the governor body, thus blanking the side plug hole. Lock the plug in position by a punch mark.

8. Check the governor body for proper seating on the rear wall of the hydraulic power lift housing.

   If the four holes with M 12 thread needed for the bolts securing the governor body have not been drilled previously, mark the pitch of the holes according to the paper gasket Part No. 7343.68 and drill the holes. In addition, drill two holes of 14 mm or .551" dia. for the oil outlet, proceeding likewise according to the aforementioned paper gasket.

9. Install the paper gasket (Part No. 7335.68) on the oil pressure governor, smear it with jointing sealant and then secure the governor to the housing of the hydraulic power lift by means of four bolts M 12×25 (Part No. 294.70).

10. Screw out the LH bolt of the ram cylinder shaft from underneath the governor body, namely:

a) the bolt Part No. 7114.96 (Fig. 69), the tractor being fitted with the hydraulic power lift only;

b) the bolt Part No. 7336.70 (Fig. 69), eventually, the tractor being fitted with the hydraulic clutch release besides the hydraulic power lift;

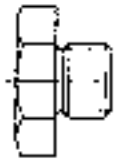


Fig. 68

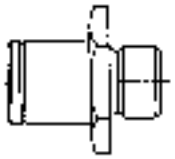


Fig. 69

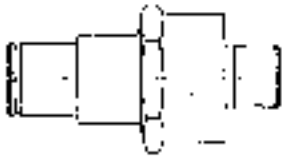


Fig. 70

c) in the bolt Part No. 7775.70 (Fig. 70), the tractor being fitted with the adjustable three-position drawbar besides the above-mentioned groups.

   On tractors fitted with the oil pressure governor for hydraulic power control of the remote mounted ram cylinders, but not fitted with the hydraulic clutch overload release, the aforementioned bolt should be replaced with the bolt Part No. 7329.68 (see drawing on Fig. 71).

   On tractors fitted with both the oil pressure governor for hydraulic power control of the remote mounted ram cylinders and with the hydraulic clutch overload release, the bolt Part No. 7329.68 must be replaced with the bolt Part No. 7330.68 (see drawing on Fig. 72).

   On tractors fitted not only with the hydraulic clutch overload release, but also with the adjustable three-position drawbar and with the oil pressure governor for hydraulic power control of the remote-mounted ram cylinders, only the bolt Part No. 7338.68 (see Fig. 73) is used as replacement for both the bolt Part No. 7329.68 and Part No. 7330.68.

11. Secure the longer governor pipe using a suitable bolt, according to the equipment of the tractor as described in the previous note.

12. Install the control spacer on the control lever and secure it to the housing of the hydraulic power lift by means of two bolts M 6×10 (Part No. 7204.70) fitted with spring washers 6.1 (Part No. 157.75).

13. Drive on to the control lever the lever knob Part No. 191.75.

14. Adjustment of the working speed, lowering or sinking is effected by means of the adjuster screw Part No. 7317.68 on the RH side of the governor. By screwing the screw in or out the flow section of the oil cylinder is altered. Correct adjustment accomplished, lock the adjuster screw in position by means of the lock nut M 12×1.5 (Part No. 5079.70) and then screw on the cap nut (Part No. 7317.68).

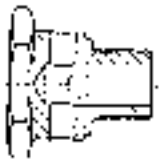


Fig. 71

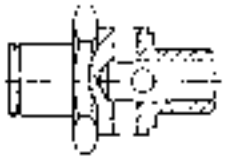


Fig. 72.

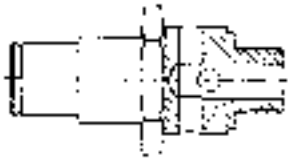


Fig. 73

15. The LH side of the oil pressure governor carries the straight connector Part No. 7322.68 with metric thread M 22×1.5, or possibly Part No. 7321.68 with G 1/2" thread (for screwing on of the cap nut Part No. 7322.68 if the oil pressure governor is not used). In the opposite case connect to the straight connector the delivery hose for feeding of the remote mounted ram cylinders.

16. Having thus assembled the oil pressure governor, check it for correct operation, and install the cover Part No. 7330.68, securing it by means of the governor top bolts.

    Avoid removing the plunger from the governor body: it forms with it a lapped together unit.

    Dismantling is effected by reversing the assembly procedure.

Table 1. — Repairs of front axle of Zetor 25 tractor

Designation	Order No	Figure	Machined part: Hole: standard dia mm	Machined part: Hole: dia for 1st exchange mm (to be turned)	Machined part: Hole: dia for 2nd exchange mm (to be turned)	Spare pin: for 1st exchange: Order No	Spare pin: for 1st exchange: dia mm	Spare pin: for 2nd exchange: Order No	Spare pin: for 2nd exchange: dia mm
Pivot, right and left	613.06 613.06	[illegible]	16.02 – 16.05	16.52 – 16.55	17.02 – 17.05	614.06	16.507 – 16.525	675.06	17.007 – 17.025
Fork, right and left	615.06 615.06	[illegible]	16.02 – 16.027	16.50 – 16.527	17.00 – 17.027	714.06	16.507 – 16.525	714.06	17.007 – 17.025
Connecting link of steering	614.06	[illegible]	16.02 – 16.05	16.52 – 16.55	17.02 – 17.05	614.06 615.06	16.507 – 16.525	675.06 714.06	17.007 – 17.025
Angle lever of steering	710.06	17	16.02 – 16.05	16.52 – 16.55	17.02 – 17.05	713.06	16.507 – 16.525	714.06	17.007 – 17.025
Distance rod lever of steering	711.06	17	16.02 – 16.05	16.52 – 16.55	17.02 – 17.05	713.06	16.507 – 16.525	714.06	17.007 – 17.025
Front axle	609.06	18	40.03 – 40.059	41.00 – 41.030	–	713.06	40.961 – 41.000	–	–
Bracket of front axle	602.06	19	40.03 – 40.059	41.00 – 41.029	–	715.06	40.961 – 41.000		–

Table II. – Regrinding of crankshaft, exchange of bearings, connecting rod bearings, and bushes

Bearings	Play mm		Standard bearing			Bearings for ground crankshafts below undersizes to reduced diameter		
	on diameter of crankshaft pin	between crankshaft arms	Order No.	dia. mm	length mm	Order No.	dia. mm	length mm
front	[illegible]	–	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
central	[illegible]	0.15–0.25	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
rear	[illegible]	–	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
connecting rod	[illegible]	0.10–0.20	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
connecting rod bush	[illegible]	–	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Table III. – Regrinding of cylinder liners, exchange of pistons and rings

Cylinder liner						Piston								Piston rings and valve piston rings	
Design	Factory designation	Order No.	dia. D_2 mm	Stamped factory designation old	Stamped factory designation new	Order No.	dia. on open end		dia. below rings		dia. above rings		Order No.	dia. D_1 mm	dia. D_3 mm
							dia. D_1 mm	play mm	dia. D_4 mm	play mm	dia. D_5 mm	play mm			
Standard	[illegible]	1659.01	105.00 105.01 105.02	84 85 86	5-D 5-E 5-F	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bad grade			106.00 106.01 106.02	784 785 786	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Third grade			107.00 107.01 107.02	684 685 686	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Note: Piston locking and oiling rings for the first grind are not supplied

Table 11. – Maximum permissible wear in engine

Point of wear	Order No	Play in new parts	Range of wear	Method of repair	Parts for repair supplied by manufacturer: Order No.	Designation
cylinder liner engine piston	7.01* 6.01* 3.02.01	0.10 mm (between diameter of cylinder liner and piston at bottom open end)	max. 0.20 mm (measured only on cylinder liner) 0.4 mm (between diameter of cylinder liner and piston)	regrind of cylinder liner and exchange of pistons and piston rings	224.06 215.04	Piston for final grind Liner 5. Ultra oversd
cylinder liner piston packing piston packing ring	17.01* 6.01* 225.04 226.04	0.5 – 0.5 mm (piston head)	max. 2 mm (play in lock)	exchange of piston rings packing and oiling	227.04 251.04 248.04 265.04	Packing ring dia. 100.0×4 Packing ring dia. 110.0×4 Oiling ring dia. 100.0×3.5 Oiling ring dia. 110.0×3.5
crankshaft and bearing at centre bearing	24.04 45.01< 9.01	0.150 – 0.120 mm (between bearing and crankshaft pin)	0.1 mm max. ovality of pins max. 0.23 mm (between bearing and crankshaft pin)	regrinding of crankshaft pins and exchange of bearings	44.01 9.01	Iron bearing for reground crankshafts (with machining allowance) Center bearing for reground crankshafts (with machining allowance)
crankshaft and rear connecting rod bearing	247.04 74.01 216.04	0.16 – 0.09 mm (between bearing and crankshaft pin)	0.1 mm max. ovality of pins max. 0.18 mm (between bearing and crankshaft pin)	regrinding of crankshaft pins and exchange of bearings	74.01 217.04	Rear bearing for regrind crankshafts (with machining allowance) Connecting rod bearing for regrind crankshafts (with machining allowance)
piston pin and connecting rod bush	221.04 219.04	0.03 – 0.07 mm (between connecting rod bush and piston pin)	0.06 mm max. ovality of piston pin max. 0.10 mm (between connecting rod bush and piston pin)	exchange of connecting rod bush and of piston pin	220.04 250.04	Connecting rod bush (without bush allowance) Connecting rod bushing rule

** Cylinder liner Order No. 7.01 only up to Serial No. 125-[illegible]0 of the Zetor 25 and Zetor 25 A tractor, and up to Serial No. 225-17047 of the Zetor 25 K tractor.

Cylinder liner Order No. 6.01 from Serial No. 125-[illegible] of the Zetor 25 and Zetor 25 A tractor, and from Serial No. 225-17044 of the Zetor 25 K tractor.

Table V — Classification of pistons and cylinder liners.

Part A

Cylinder liner*)			Piston standard Order No. 222 04				
Stamped marking		dia. D_1 mm	Stamped marking		dia. D_1 mm	dia. D_2 mm	dia. D_3 mm
now	before		now	before			
A	1	104.97	5-A	87	104.81	104.79	104.66
B	—2	104.98	5-B	82	104.82	104.80	104.67
C	—1	104.99	5-C	83	104.83	104.81	104.68
D	0	105.00	5-D	84	104.84	104.82	104.69
E	1	105.01	5-E	85	104.85	104.83	104.70
F	2	105.02	5-F	86	104.86	104.84	104.71
G	3	105.03	5-G	87	104.87	104.85	104.72
—		—	5-H	88	104.88	104.86	104.73
Regrind liner			Piston for second grind Order No. 224 01				
		105.00	6-D	86	105.86	105.82	105.70
—	—	106.01	6-E	87	105.87	105.83	105.71
—	—	106.02	6-F	88	105.88	105.84	105.72
Repeated liner			Piston for third grind Order No. 226 01				
—		107.00	7-D	89	106.89	106.82	106.70
		107.01	7-E	90	106.90	106.83	106.71
		107.02	7-F	91	106.91	106.84	106.72

*) Cylinder liner Order No. 1-01 only up to Serial No. 125-37190 of the Zetor 25 and Zetor 25 A tractor and up to Serial No. 225-17415 of the Zetor 25 K tractor.
Cylinder liner Order No. 1-02/01 from Serial No. 125-37191 of the Zetor 25 and Zetor 25 A tractor and from Serial No. 225-17416 of the Zetor 25 K tractor.

Table V — Classification of pistons and cylinder liners.

Part B

Factory of cylinder liners and pistons (fits slip between dia. D_1 and dia. D_2 = 0.01 mm)

Designation of bushes		Designation of pistons																	
new	before	new	before	new	before	new	before	new	before	new	before	new	before	new	before	new	before	new	before
A	−2	5-A	81	5-B	82														
B	2			5-B	82	5-C	83												
C	−1					5-C	83	5-D	84										
D	3							5-D	84	5-E	85								
E	1									5-E	85	5-F	86						
F	2											5-F	86	5-G	87				
G	2													5-G	87	5-H	88		

Note.

1 From January 1st, 1955 all pistons are designated with the new factory marks according to table III, i. e. on the pistons is stamped the last figure of the rated bore diameter and a letter which gives the classification.

2 From the same date only pistons with the factory marks D, E and F are supplied.

3 Third grind pistons are supplied with a reduced diameter of the piston pin opening, i. e. dia. 30.7 mm instead of the normal dia. 40 mm.

From Serial No. 125-0501 onwards the Zetor 25 tractors have been fitted with the following 12 V electrical equipment:

a) Up to Serial No. 125-10145: dynamo model 02-9055.25 (DGD 280), Part No. 401.01 and voltage regulator model 02-9403.08, Part No. 4220.29

b) From Serial No. 125-10147 up to Serial No. 125-40724 of the Zetor 25 and Zetor 35 A tractors (supplied from Serial No. 125-35120 onwards) and from Serial No. 225-1001 up to Serial No. 225-6429 of the Zetor 25 K tractors: dynamo model 02-9055.02 (DGD 44) Part No. 2143.05, with built-in single-coil voltage regulator 02-9402.01, Part No. 530.05 - for wiring diagrams see Fig. 74 and 75.

c) From Serial No. 125-40725 up to Serial No. 125-45000 of the Zetor 25 A tractors and from Serial No. 225-24331 up to Serial No. 225-30532 of the Zetor 25 K tractor: dynamo model 02-9055.04, Part No. 1301.07 and voltage regulator model 02-9403.28, Part No. 4320.29 - for wiring diagram see Fig. 76.

d) From Serial No. 125-45001 of the Zetor 35 A tractor and from Serial No. 225-30533 of the Zetor 25 K tractors onwards: dynamo model 02-9055.02, Part No. 1302.07 and voltage regulator model 02-9403.31, Part No. 4340.29 - for wiring diagram see Fig. 77.

This dynamo and voltage regulator replace all the models of dynamos and voltage regulators described in points a, b and c which are not supplied any more to supplement stocks of spare parts. Consequently, the respective procedures for reconditioning these early dynamos and voltage regulators are not given.

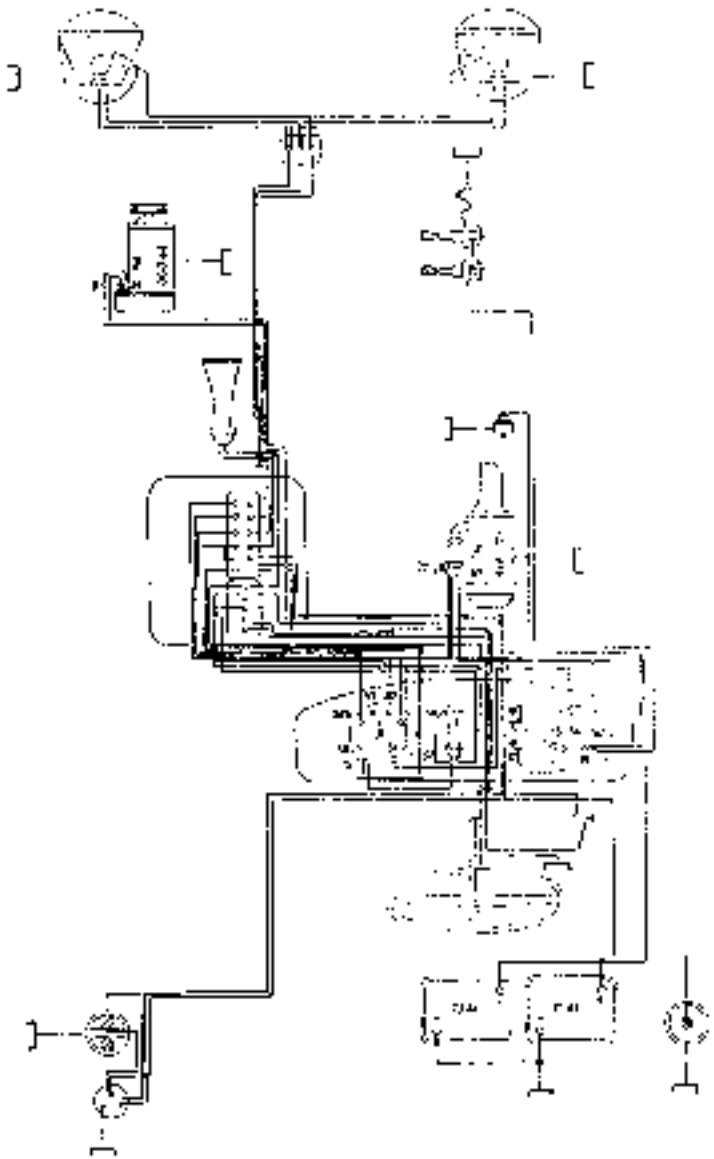


Fig. 74

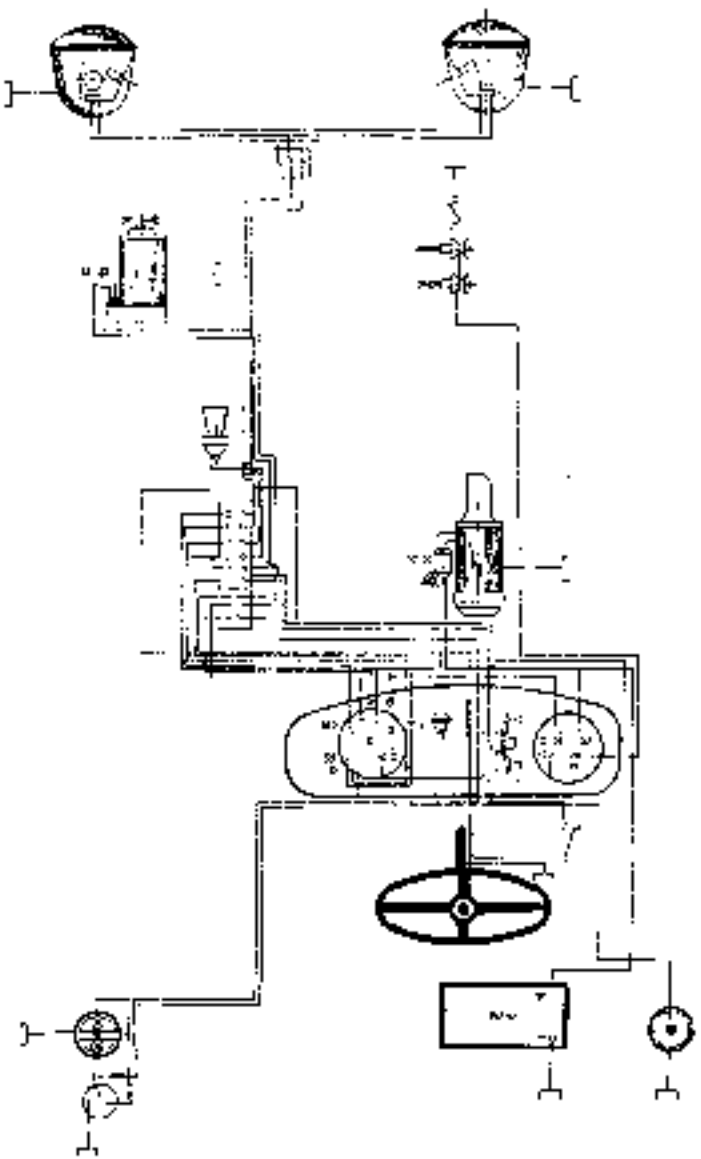


Fig. 75

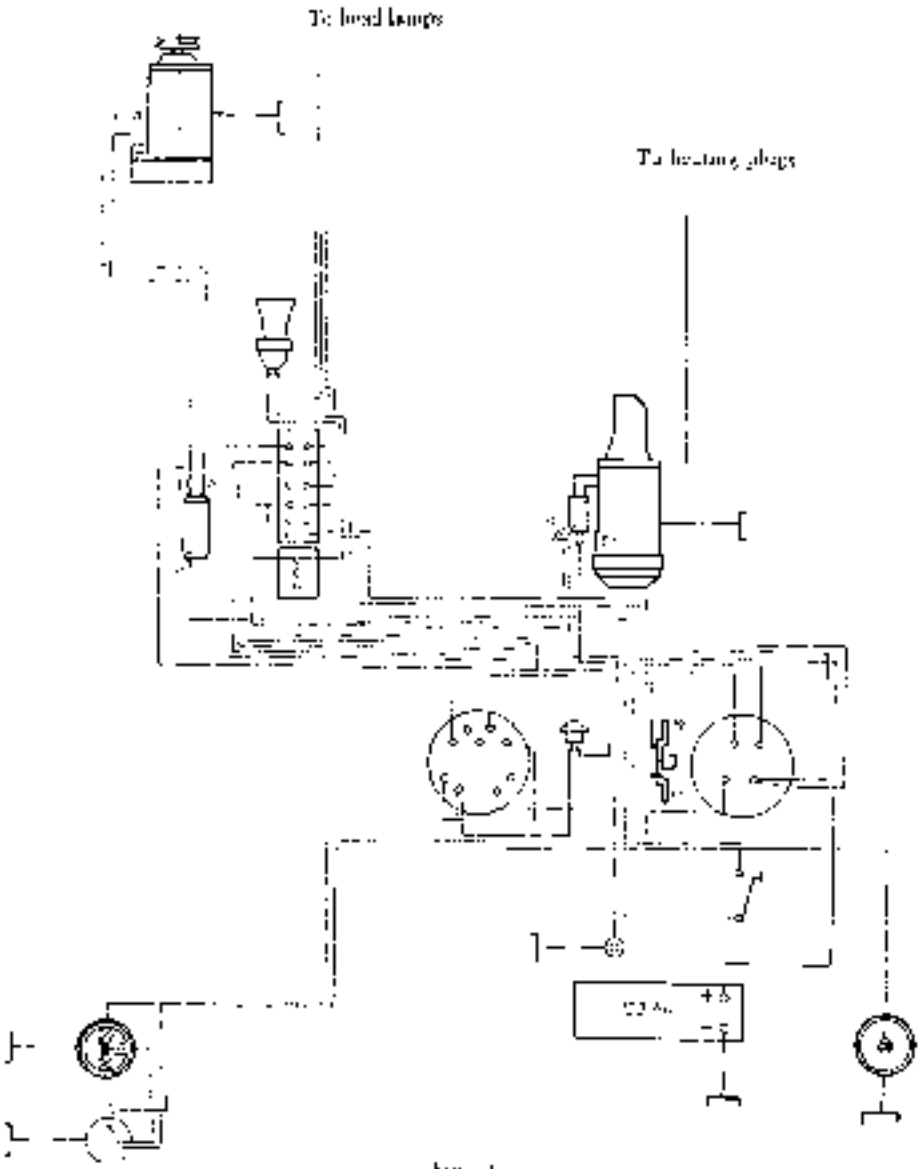


Fig. 21.

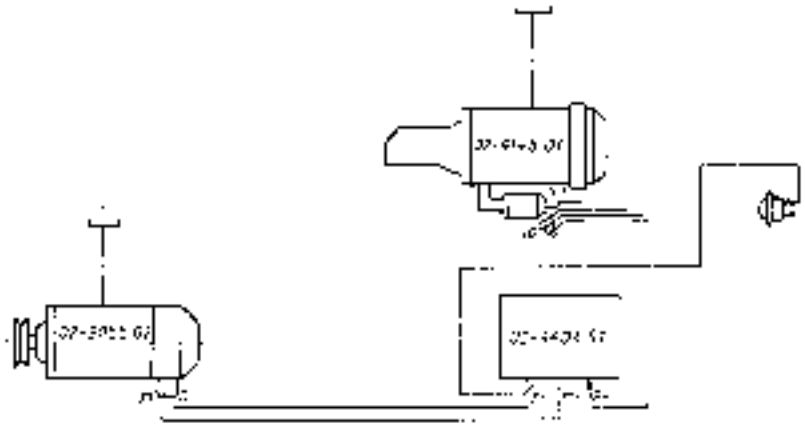


Fig. 22

To Dismantle and Reassemble Dynamo
Type 02-9055.02, 12 V, 150 W E-1

On possible overhauls, when replacing the brushes or when packing the bearings with petroleum jelly, the dynamo type 02-9055.02 Part No. 1302.05 should be dismantled as follows:

1. Disconnect the leads from the storage battery.
2. Open the cap of the junction box and disconnect the leads from the dynamo.
3. Slacken the adjuster screw of the dynamo securing strap, slip the belt off the fan pulley and remove the dynamo from position on the tractor.
4. Screw out the securing nut of the belt pulley, remove the spring washer and knock the belt pulley off the shaft. Remove the key from its key groove.
5. Using a screw driver, slacken the clamp bolt of the dynamo cover band.
6. Having slackened the bolts ease the connecting cables of the brushes, lift the pressure springs and remove the brushes from their holders.
7. Screw out the bolts securing the terminals of the field coils.
8. Screw out the nuts of the dynamo through bolts and, using two screw drivers, pry-off the commutator end plate.
9. Remove the armature complete with drive end plate from the dynamo yoke.

To reassemble reverse the above procedure, bearing in mind, however, that the extensions on the rim of the yoke collar must engage into the respective recesses in both the commutator end plate the drive end plate.

Defects of the Dynamo and Their Rectification E-2

The majority of defects are caused by negligence of the periodical routine maintenance and servicing. Early elimination of minor defects ensures trouble-free and reliable operation.

Check periodically the following points:

1. Fuses for condition. Replacement fuses should always be genuine.
2. Tightness of terminals of the dynamo, voltage regulator and dashboard. Simultaneously examine the connecting cables which must be neither broken nor otherwise damaged. Slackened or damaged cables may cause a short circuit and thus damage to both the dynamo and the voltage regulator.
3. Condition and proper adjustment of V-belt. A slack V-belt slips, is subject to premature wear and impairs the output of the dynamo. An excessively tensioned V-belt entails overheating and premature wear of the bearings. Adjust the correct tension of the V-belt according to Instruction M 17.
4. Condition of brushes and pressure springs. The brushes must be clean, rhomb-rush-fit in their guides, with a smooth, level seating face without cracked rims. The springs should thrust the brushes against the commutator so as to prevent it from being pitted. Replace any weak or broken springs. Greasy brushes should be replaced with new ones or cleaned in alcohol. Excessively worn brushes must be replaced with new ones. The seating faces of the replacement brushes should be carefully ground-in with emery cloth inserted between the brush and the commutator. Then thoroughly blow out any dust or other traces of grinding.
5. Condition of commutator. The face of the commutator along the path of the brushes must be smooth and free of stains. If dirty, clean the commutator with a rag dipped in alcohol. Avoid cleaning the commutator with emery cloth or lubricating it with grease.

Adjusting of Twin Coil Voltage Regulator Type 02-9403.51 E-3

The voltage regulator comprises two systems:

a) The voltage regulator (with a longer spring) which maintains the voltage of the dynamo within the specified limits during variation of the dynamo speed. Constant voltage is essential, since increased speed of the dynamo entails an increased voltage which, if not regulated by the voltage regulator, might cause damage of the appliances and damage to the storage battery;

b) The switch (with a shorter spring) which serves to connect the dynamo to the storage battery only when the dynamo voltage is slightly higher than the storage battery voltage. When disconnecting, it is the purpose of the switch to disconnect the dynamo from the storage battery before the reverse current from the storage battery before the reverse current from the storage battery reaches the specified value.

To comply with these requirements, the voltage regulator must be correctly adjusted. As it is impossible to carry out such adjustments on the vehicle, it is advisable to dismantle the faulty voltage regulator and replace it with a new one.

The voltage regulator may be adjusted in two ways: mechanically and electrically.

A. Mechanical Adjustment:

I. Setting of Voltage Regulator Air Gaps.

This is carried out without prestressing the spring suspension in such a way that the centre contact lightly touches the bottom contact.

1. With a tightly made bottom and centre contact, the gap between the core and the contact rivet should be 0.2 to 0.3 mm (Fig. 78).

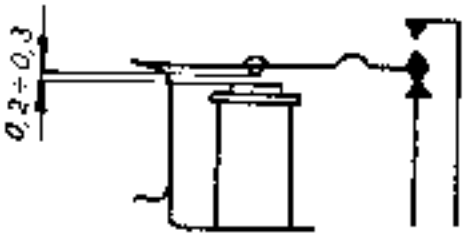


Fig. 78.

2. Release the armature which is lifted by the pad of spring P, and its contact touches the upper contact. By bending the top contact holder adjust the gap between the centre contact (armature contact) and the bottom contact to 0.2 to 0.4 mm (Fig. 79).

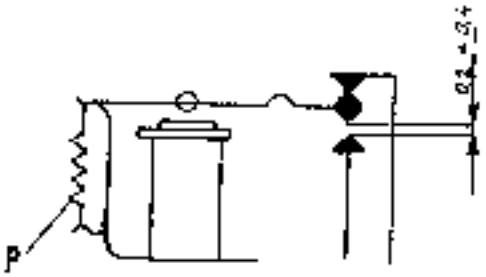


Fig. 79

II. Adjustment of Switch Air Gaps.

The adjustment of the contact air gaps and the setting of the air gaps between the armature and the coil of the switch is carried out without force spring P and without prestressing the spring suspension in such a way that the contacts make lightly.

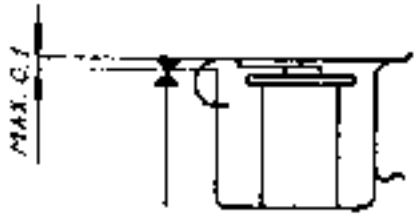


Fig. 80

1. Adjust the armature of the switch in such a way that it makes contact with its center with the core over a stop plate whereby the gap between the front part of the armature and the yoke should be covered (Fig. 51)

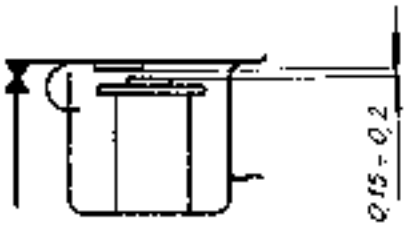


Fig. 51

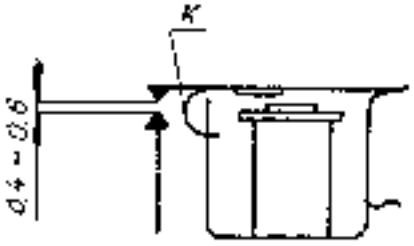


Fig. 52

2. With lightly made contacts, set the gap between the core and the stop plate at the point of contact of the stop plate and core to 0,15 to 0,2 mm (Fig. 51)
3. The distance between the functional armature contact face and the functional face of the bottom contact must be 0,4 to 0,6 mm (Fig. 52). The magnitude of this air gap must be secured by increasing or decreasing the radius on the bent end of the spring (Characteristic K) which engages into a cutout in the switch yoke

B. Electrical Adjustment

The electrical adjustment must be carried out at a temperature of 20 ± 5°C. The voltage regulator must be attached to the test bench in its working position, i.e. terminals downward. All leads must have the required cross section and perfect contact with the terminals

Instruments:

Voltmeter	range 25 V
Ammeter	up to 30 Amps with zero in the center
Speed indicator	up to 3000 RPM

First Adjustment

a) Adjustment of Voltage Regulator.

Connect terminals M and D to the corresponding dynamo terminals. Connect the voltmeter between terminal D and earth. It is also necessary to interconnect the earthing cables of the dynamo and the voltage regulator

The adjustment of the voltage regulator varies, i.e. the voltage difference in the regulation of the center contact on the upper contact or on the lower contact is carried out in accordance with the table by bending the center contact

b) Setting of Switch.

The voltage regulator terminals M and D are to be connected to the corresponding dynamo terminals. Between terminal D and earth connect the voltmeter, join terminal B across the ammeter and a variable resistor to the dynamo earth. The earth of the dynamo and of the voltage regulator must be interconnected. If the variation of the voltage regulator is correctly set, it is possible to set the switching voltage of the switch according to the values in the table

c) Adjustment of Output

The voltage regulator terminals M and D are to be connected to the corresponding dynamo terminals (Fig. 53). Between terminal D and earth connect the voltmeter, join terminal B across the ammeter and a variable resistor to the dynamo earth. The earth of the dynamo and of the voltage regulator must be interconnected. The output is set according to the values listed in the table by bending forward or backward the spring header

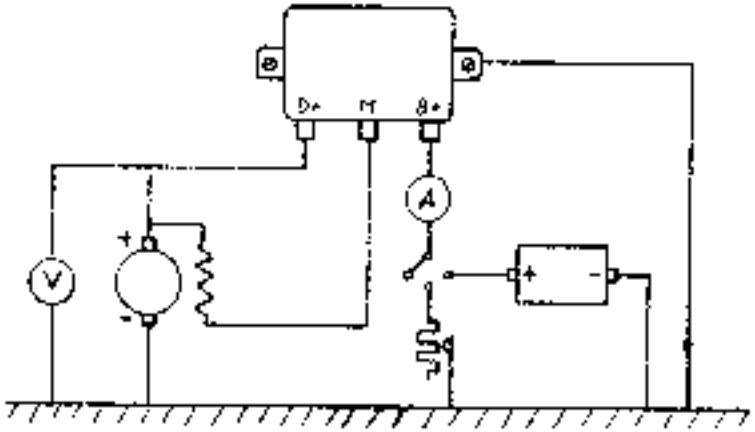


Fig. 53.

Rated voltage	No load speed	Regulation of rated load	Switching voltage max.	Return current min.	Output
12 V	16 V	12,4 - 12,5 V	13,5 V	5,7 - 6 Amps	150 W

d) Checking of Return Current

The voltage regulator terminals M and D are to be connected to the corresponding dynamo terminals. Connect the voltmeter between terminal D and the dynamo earth. Join terminal B across the ammeter to one pole of the storage battery, connect the second pole of the storage battery to the dynamo earth. The earth on the dynamo end of the voltage regulator must be unconnected. Run the dynamo up to rated speed and check the charging current (load or Amps). Reduce slowly the dynamo speed until the charging current is equal to zero. With a further reduction of the dynamo speed and with the still made contacts of the switch, the current flows from the storage battery into the dynamo. This current is called return current and it must be within the range of 2.5 Amps to 8 Amps (see Table).

Second Adjustment.

The second adjustment is carried not only as a check if no change has occurred in the values specified after the first adjustment.

To Adjust 12 V Horn E-4

Prior to adjusting clamp the horn firmly into a vice with its bracket for the points marked (see Fig. 94) and, using a spanner, tighten well all the nuts (5).

Horn Sound Hoarse:

Using a spanner, turn the nut (1) to the left, thus slackening it, while slowly turning to the right the screw (2) by means of a screw driver (edge 0.9×5 mm), thus reducing the current consumption and obtaining a clear sound. Tuning finished, hold the screw (2) in position by means of the screw driver and firmly tighten the nut (1).

Horn Sound Weak:

Turn the nut (1) to the left, thus slackening it, by means of a spanner, while slowly turning the screw (2) to the left by means of a screw driver (edge 0.9×5 mm), thus increasing the current consumption until a clear sound is obtained. Tuning accomplished, hold the screw (2) in position by means of the screw driver and firmly tighten the nut (1).

No Sound At All:

Using a screw driver (edge 0.45×3.5 mm), screw out the RH screw (3), slacken the LH screw and swing round to the identity plate, thus pairing access to the screw (4) and nut (5). Using a tubular box spanner with inserted screw driver (edge 1.4×8 mm) slacken the nut (5) by approximately three to four turns to

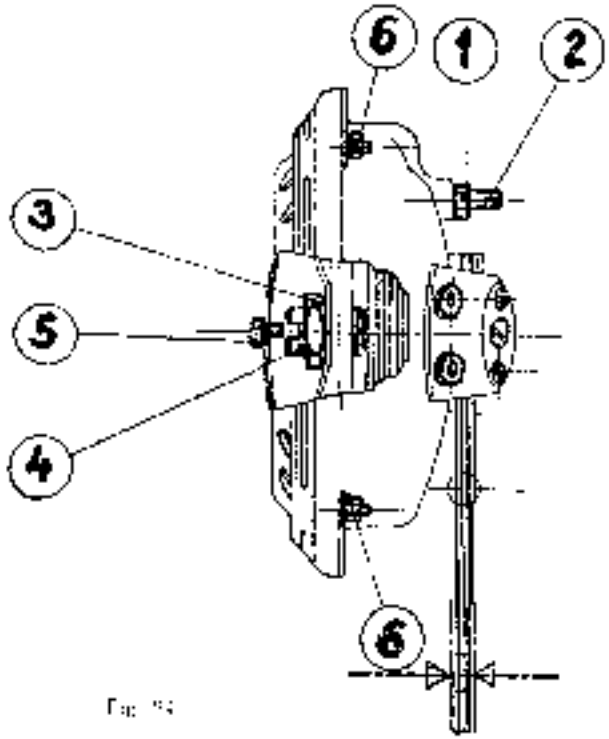


Fig. 94

the left, while using the screw driver for turning the screw (4) to the right until it firmly secures the core. By turning the screw (4) back by one half or, at the maximum, by three quarters of a turn, adjust the gap between the core and the armature. In this position hold the screw (4) by means of the screw driver and firmly tighten the nut (5) by turning it to the right. Using a spanner (1) and a screw driver (edge 0.9×5 mm), slacken the nut (1) and the screw (2) by turning to the left. After the 12 V 1.5/7 Ah battery has been connected, a click is heard as the armature hammer clicked home. After tools putting in and out the battery, turn carefully and slowly the screw (2) to the right until the horn starts sounding. For fine tuning to the loudest sound slightly turn the screw (2) to the right or back, then hold it in position by means of the screw driver and firmly tighten the nut (1). Then put in the battery and check the horn for proper tuning.

In checking the current consumption of the horn, be sure to use a 12 V 1.5/7 Ah battery only.

Fig. 85

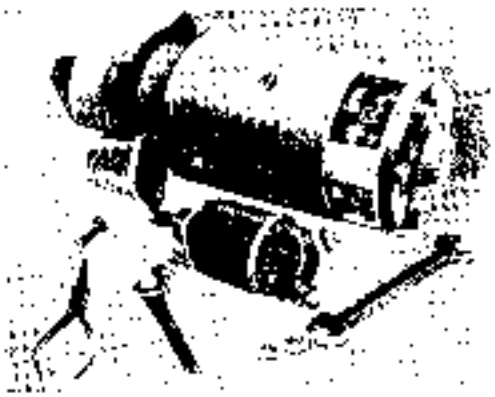


Fig. 86

Fig. 87.

When cleaning or servicing and the recommended inspections examine the condition of the brushes and pressure springs. The brushes must be neither greasy nor gummed up the sides. The armature teeth should always be thoroughly cleaned and then lightened with a high quality lubrication grease.

When using petrol for cleaning special attention should be paid to prevent its penetration into the self lubricating bearing of the starter pinion which may be seized.

To dismantle, proceed as follows:

1. Disconnect the cable from the battery.
2. Disconnect the connecting cable from the starter motor.
3. Screw out the three bolts securing the starter motor.
4. After having screwed out the bolt securing the commutator end plate remove both the end plate and the cover band (see Fig. 85).
5. Screw out the bolts of the four brush holders. Be not to lift the brushes more than necessary.
6. Screw out the nut securing the connecting strap of the starter motor to the solenoid switch (see Fig. 86).
7. Pull out the cotter pin from the pin of the operating lever and withdraw the pin

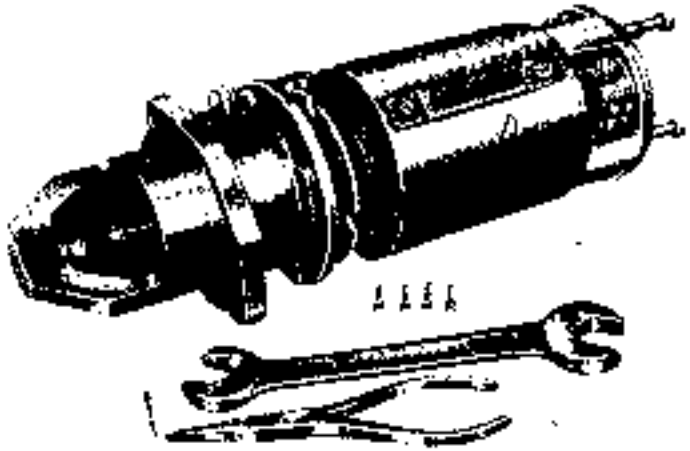


Fig. 88

8. Screw out both bolts securing the solenoid switch to the starter motor.
9. Pick up a piece of wire of approximately 2 mm or 1/16" thickness shaped to a hook (87), slide it on the pressure springs of the brushes and remove the brushes (see Fig. 87).

   Be sure not to swing the pressure springs.
10. Having screwed out the four bolts securing the yoke to the commutator end plate remove the end plate from the shaft (see Fig. 88).

    Caution: Be sure to retain the insulation sleeve installed on the through bolt at the rear. Omission of this precaution may cause a short circuit.
11. Tapping moderately the surface yoke with the palm, move the yoke along the armature.
12. Having pulled out the cotter pin from the castle nut and screwed out the nut and washer withdraw the yoke together with the armature from the drive end plate.

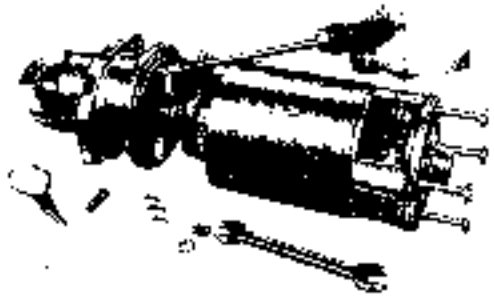


Fig. 89

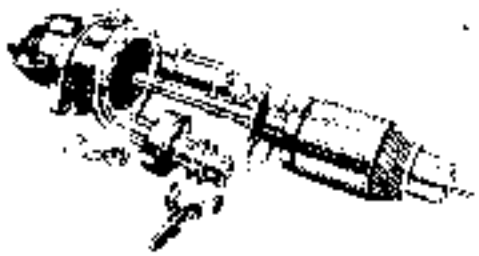


Fig. 91

Fig. 91

13. Having screwed out the [illegible] from the operation case the latter [illegible] Fig. 91).

14. [illegible] the armature from the pole [illegible] and first [illegible] Fig. 91).

15. Swing out the idler from the [illegible] plate and, after having removed the operating lever, remove the idler.

16. By compressing the [illegible] spring remove the spring clip [illegible] spring complete with thrust ring and the front part of the [illegible] on the idler [illegible] Fig. 91).

17. After having pressed down the striker spring take out the spring clip and remove the other part of the idler bracket, the striker spring and the thrust ring.

To Dismantle Electromagnetic Automatic Cut-out E-5/2

Fig. 92

1. After having screwed out the four bolts from the cover of the current switch, take off the cover complete with [illegible] (see Fig. 92).

2. [illegible] the cover of the switch [illegible] the contact and to [illegible] washer and [illegible] the armature [illegible] of the current switch.

   If only the clevis is damaged the current switch need

not be disassembled. Simply screw out the clevis after having slackened the nut M 8 while holding the adjusting shim in position in the slot.

Avoid reducing the set distance of the clevis!

After the armature is seated on the core the distance between the centre line of the clevis pin and the bottom face of the attaching flange must be 33.5 ± 0.2 mm or 1.319" ± .0079".

To Check Operation of Electromagnetic Cut-out E-5/3

When the current circuit is [illegible] to the terminal 50 the idler is pushed out, but the starter [illegible] fails to [illegible].

Cause: Cut-out [illegible] contact K 50 and starter winding.

This defect can be caused by worn or burnt [illegible] faces of the contacts K 50 and K[illegible] or possibly by burnt, worn or broken contacts.

Ascertainment of defect: Unclip the [illegible] strip to the terminal K[illegible] and to the earthing of the cut-out, the storage battery [illegible] pole to the terminal K 40 and the [illegible] pole to the earthing of the cut-out switch. Then connect the [illegible] pole of the storage battery to the terminal 50.

Though the switch pole in the armature complete with contact bridge, the latter fails to close the current due to the aforementioned defects and the test strip will not glow.

In this case replace the damaged or worn parts with new ones.

When connecting the current circuit to the terminal 50 the [illegible] fails to [illegible].

Cause: Broken winding of electromagnetic cut-out switch — replace the switch with a new one.

To Replace Burnt Heater Plug Monitor E-6

1. Remove the dashboard.
2. After having screwed out the two side bolts disconnect the connecting wire at the heater plug monitor.
3. Remove the body of the heater plug monitor from the dashboard.
4. Slacken the lock nut and replace the burnt resistance wire Part No. 3094 [illegible] with a new one, pay attention that the coil of the resistance wire which must not contact the earthing on the back of the heater plug monitor.
5. Replace the unit in position, connect the leads and refit the dashboard.

Storage Battery Type 6 St 165, 12 V Voltage, 165 Ah Capacity E 7

See test certificate of the storage battery.

GENERAL INDEX

Title: Zetor 25 – Zetor 25 A – Zetor 25 K Tractors
Dismantling, Reassembly and Repairs

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