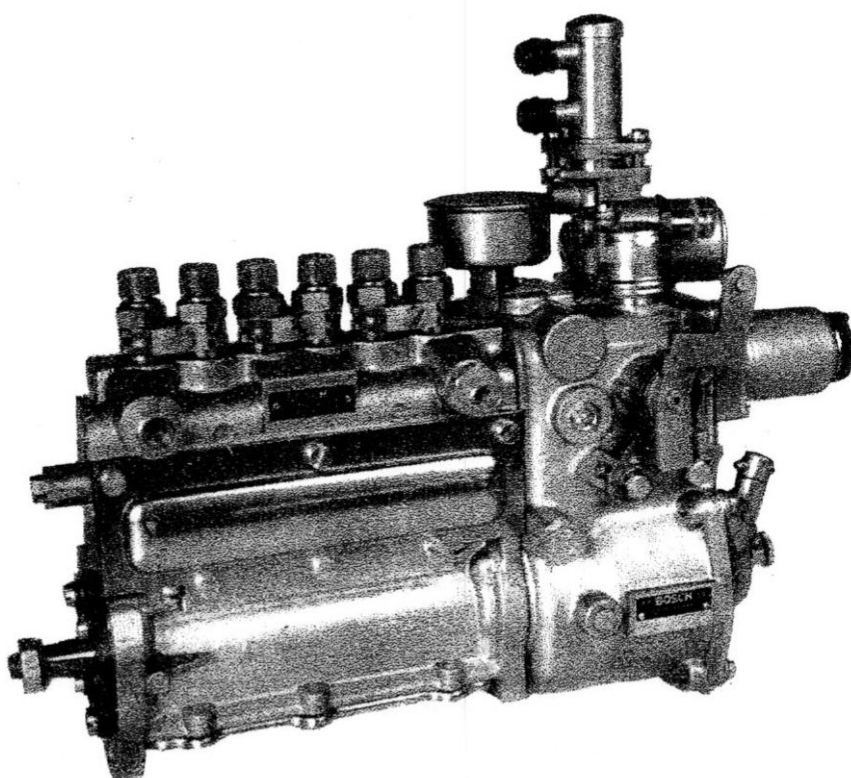


BOSCH

INSPECTION INSTRUCTIONS

PES 6 KL.. 0 418 076..
PES 8 KL .. 0 418 078..

with governor
EP/RLA 0 428 023..



mechanical
fuel injection system

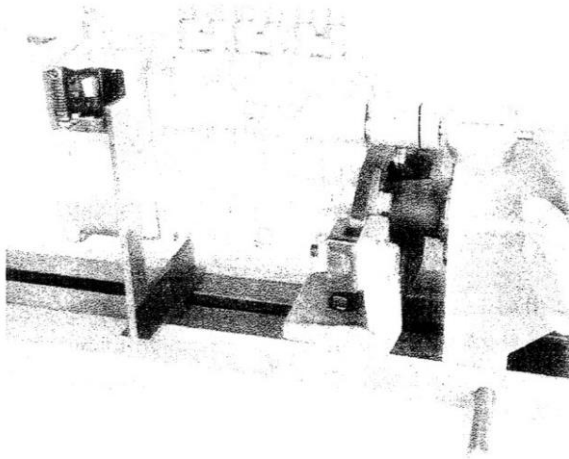


Fig. 5

4. Settings

Follow the sequence!

4.1.

Mount the injection pump-governor assembly onto the test bench, but without valve spool, aneroid capsule carrier, control rod head and governor. Use long drive coupling ZKH 74 Z 9 X. Use a try square to align the pump vertically; attach the control stroke measuring device. Reset dial indicator EFAW 114 to zero with the control rod in stop position. Check that the maximum control stroke is 18 - 18.5 mm. Lubricate tappet guides and ball bearings.

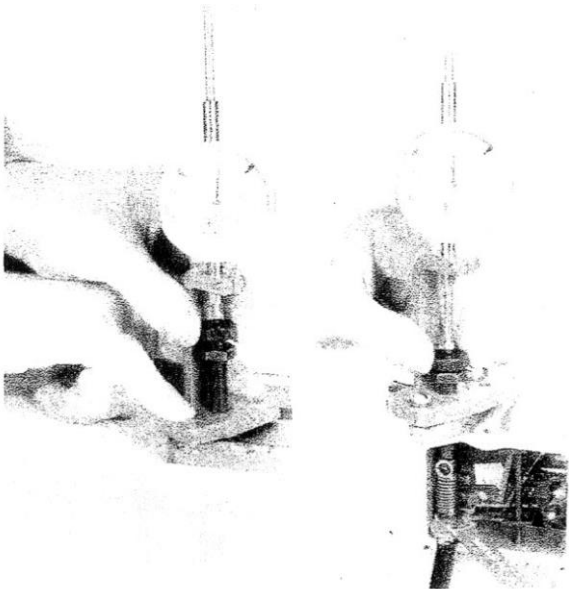


Fig. 6

4.2. Adjusting distance "d".

Set up EFEP 416 A flush with a flat surface and reset dial EFAW 63 indicator to zero at a pre-tension distance of 30 mm; the knurled screw must spin smoothly along the entire length of the screw! During the following step do not adjust the dial indicator or the dial! Bolt EFEP 416 A onto the governor housing; do not fit any oval discs! Screw in the knurled screw until the guide piece stops at the guide pin; the dial indicator should now show distance "d" according to the inspection sheet. Adjust via the guide pin's hex head. Tighten the counter nut!

Refer also to fig. 34

4.3. Adjusting downward correction "air".

Back off the knurled screw, attach EFEP 416 to the valve spool. Blow through the connection pipe (without air filter). Screw in the knurled screw until the valve spool piston closes off the air passage (adjust by ear). In doing so, press against the pressure stud. The dial indicator should now show a protrusion distance "f" = downward correction "air" (according to the inspection sheet). Adjust by turning the hex screw and/or changing the compensation disks (the thick disk goes on top!) inside the valve spool piston. Do not alter the position of the hex nuts at the pressure stud of the new temperature sensor!

Refer also to fig. 35



Fig. 7

4.4. Adjusting downward correction "volume".
When measurement "f" = downward correction volume (according to inspection sheet) applies, measurement "e" (fig. 35) must be set to the same value as measurement "d":

Back off the knurled screw. Place oval disks and a measuring sleeve corresponding to measurement "d" over the valve spool and use a level surface to push them on. (Do not use the old measuring sleeve 1 680 400 009 - EFEP 416/3 at 23.4 mm!) Wind in the knurled screw until resistance can be felt. The dial indicator should now show distance "f" = downward correction "volume". Adjust by swapping the oval disks.

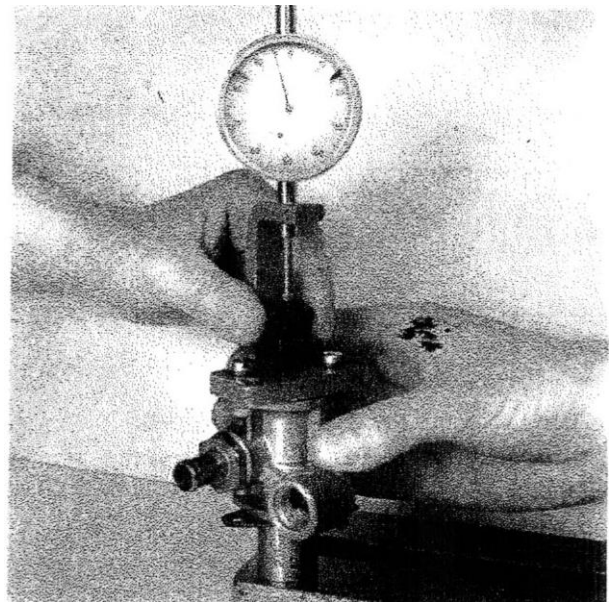


Fig. 8

4.5. Checking of measurements "d" and "e".
Back off the knurled screw. Fit the valve spool to the governor using the previously established disks. Push the guide element against the stop. Wind the knurled screw in until resistance can be felt (overpressure spring is triggered). The dial indicator should now show distance "f" = downward correction volume again. Otherwise, measurement "d" or "e" is not correct.

Wind in the knurled screw by approx. 2 mm and tighten the counter nut (valve spool goes beyond the end position and/or locks).

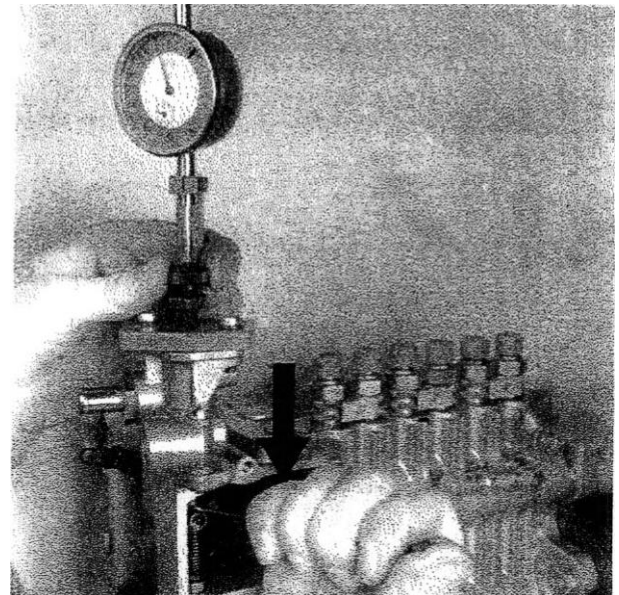


Fig. 9

4.6. Setting the cam follower to "centre".
Check the axial play of cam follower and roller lever; max. 0.05 mm each. Mount EFEP 555 with measuring ring, do not hook in the swivel lever! Cam follower drops into the hole. Wind in the adjustment screw on roller lever all the way and then slowly out again. Do this until the end of the measuring block sits against the guide pin of the control rod head except for a play of approx. 0.1 mm (twist the measuring ring slightly but do not lift off the cam follower). Remove the measuring ring.

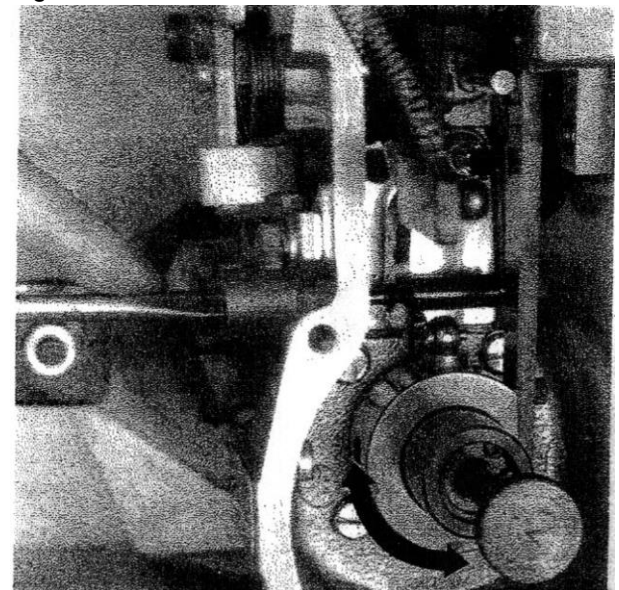


Fig. 10



Fig. 11

4.7. Setting the "gearing ratio" between the cam follower and the control rod.

Establish and note down the atmospheric pressure in mm Hg – relative to the current elevation above sea level. For normal pressure (refer to 3.6), fit the aneroid capsule carrier, tested according to 4.16, otherwise fit EFEP 417 without using the dial indicator. Insert the stepped bushing of EFEP 555 all the way to the stop on the governor housing. Fit the control rod head, adjust to approx. 3mm travel. Spin the pump at approx. 200 rpm. Slide the bushing and the cam follower moves from one step to the next. In doing so, it should move the control rod by the distance specified in the inspection sheet.

Adjust the aneroid capsule carrier (PES 8 KL ..), use shim discs (PES 6 KL ..) or adjust the knurled screw of EFEP 417 until the specified distance is reached. Tighten the counter nut on the knurled screw, check the "gearing ratio", shut down the test bench.

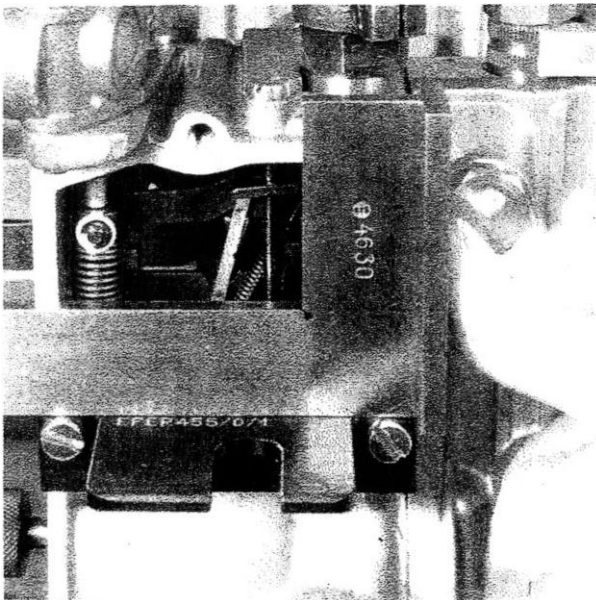


Fig. 12

4.8. Checking distance "c".

Attach EFEP 455 horizontally. Hook in the dial indicator EFAW 7 using the holder, modified according to fig. 3, together with the probe (should be moving upwards quickly) and set to zero at the guide roller's bearing pin. The centre of the bell crank lever's bearing pin should now extend beyond the centre of the guide roller by distance "c" as specified in the inspection sheet (new tolerance!). (fig. 13 and 34)

A distance "c" that is outside the tolerance indicates that the reference distance of the roller lever (fig. 14) is incorrect. Replace the lever (adjust the shape, if applicable). Then check and/or adjust items 4.6 to 4.8.

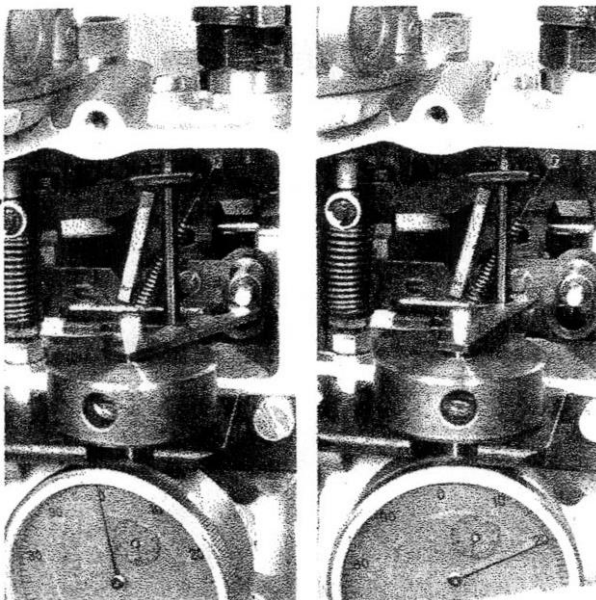
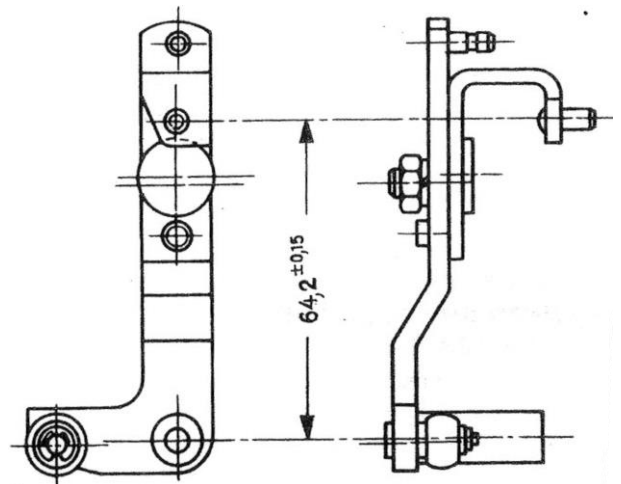


Fig. 13



Reference distance with eccentric bushing in centre position
Fig. 14

4.9. Setting the idle stop (fig. 36)

Unhook the spring of the adjustment lever. Loosen the idle stop. Mount adjusting device EFEP 56 C, align with the centre of the pump axis and parallel to the pump, set the measuring arm to horizontal and tighten (fig. 15).

PES 6 KL.. only: set scale to angle " α " according to the inspection sheet. Fit the clamping sleeve with stop pin, tighten the nuts well, clamp ball head fixture in horizontal position (must be easy to insert), (fig. 16).

PES 8 KL.. only: swivel the measuring arm horizontally to the front by 180° on the scale (in 2 motions of 90° each); tighten. Set scale to angle " α ", according to the inspection sheet. Place clamping sleeve directly onto the ball head; tighten the nuts (fig. 17).

PES 6 and 8 KL.: Loosen the measuring arm (must travel easily through the entire adjustment range), set back to 0° and tighten. Place the idle stop against the adjustment lever and tighten the screws. Loosen the measuring arm and check that it is in 0° position when against the idle stop. Hook in the spring (fig. 18).

If no EFEP 56 is available, the idle stop may be adjusted to distance "g" according to the inspection sheet. Fabricate a measuring plate according to fig. 4 and bolt to the governor housing's seal face. Do not unhook the spring. Use a depth gauge to measure the distance to the ball head and to the shoulder of the adjustment lever shaft. Adjust the idle stop until measurement "g" is correct. Then attach and align EFEP 56.. Set the scale to 0° with the adjustment lever against the idle stop (fig. 19).

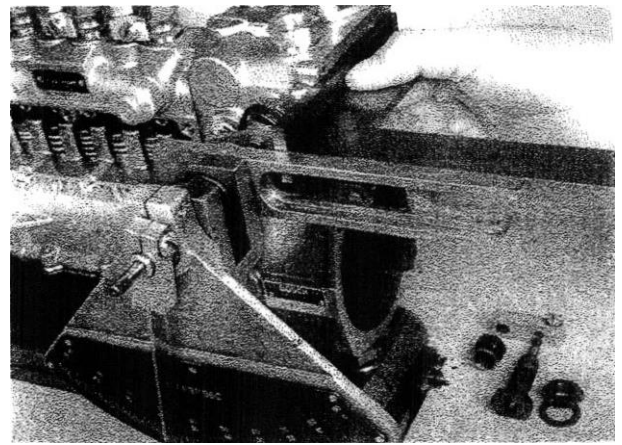


Fig. 15

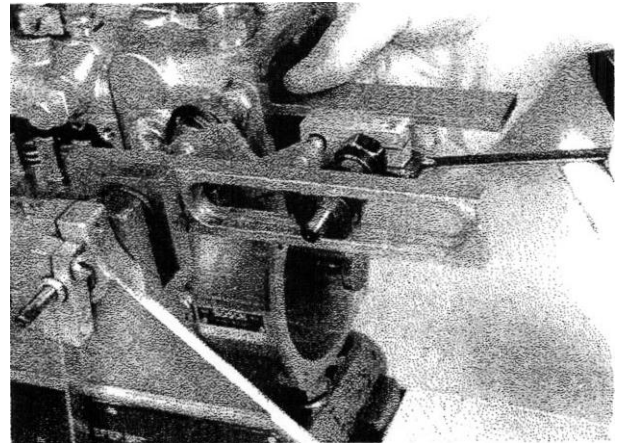


Fig. 16

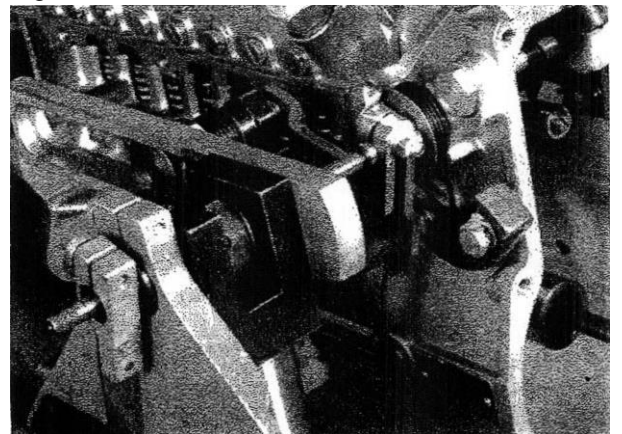


Fig. 17

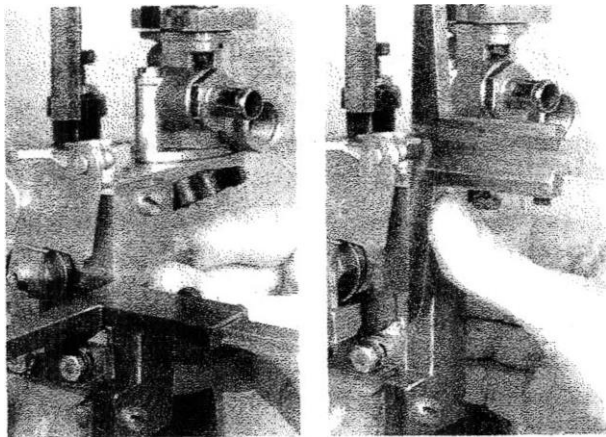


Fig. 19

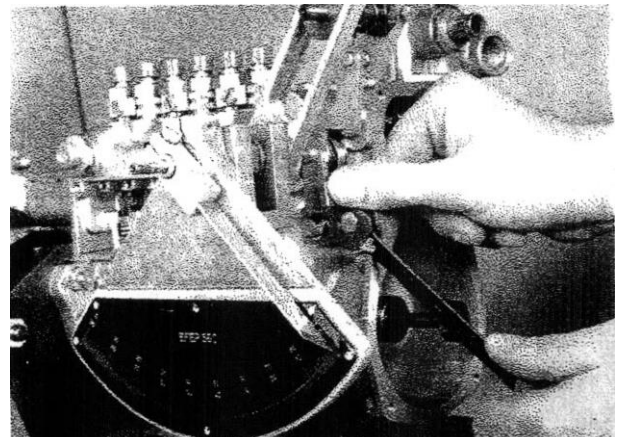


Fig. 18

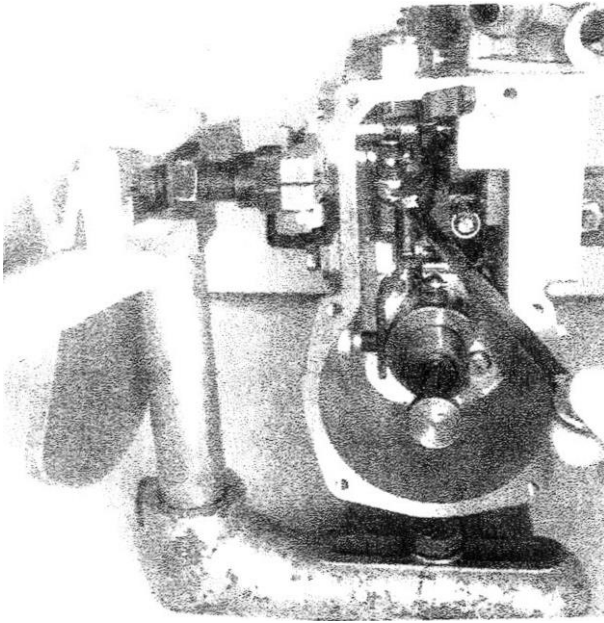


Fig. 20

4.10. Adjusting the "allocation" of adjustment levers to face cams.

Wind in the adjustment screw on the control rod head completely. Insert the measuring ring of EFEP 555 without the measuring block but with the swivel lever attached; the cam follower engages with the hole. (Pay attention to the clearance at the pin (mushroom tappet)). Move the measuring arm slightly up and down, the adjustment lever must have no more than 1° of play before the cam follower lifts off. The average value of this play should correspond to the adjustment lever position = angle "β" according to the inspection sheet.

Adjustments can be made at the clamping piece on the adjustment lever shaft.

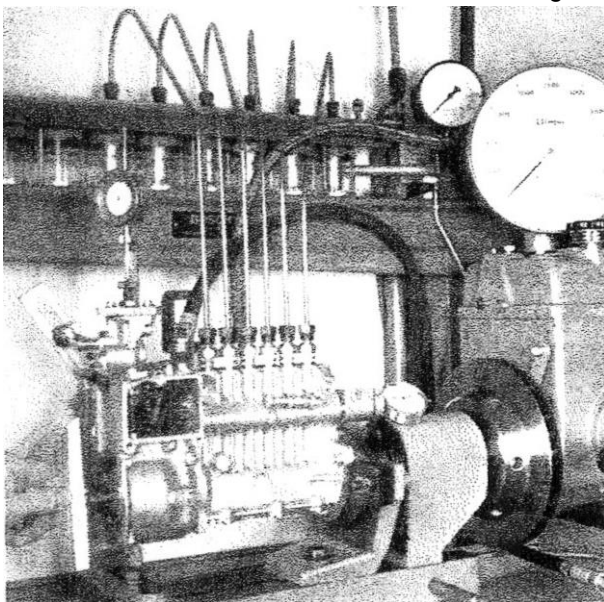


Fig. 21

4.11. Fitting of the governor; refer also to VDT-WJP711/1 fig. 69 to 72. (Pay attention to the clearance at the pin (mushroom tappet)). Back off the control spring adjustment screws until they are flush with the edge of the cover plate. Connect pressure lines and test oil hoses. Feed and return lines are routed differentially; connect hoses in the same way as in the vehicle. The feed line can be identified by the larger connection fitting; the return line is fitted with the pressure relief valve. Use connecting elbow EFEP 435 on the return line. For PES 8 KL.. use the pressure relieve valve PVE 53 S 17 Z on the return line instead of the threaded connection. Use high gaskets, otherwise, the tread will touch the bottom of the hole (fig. 22).

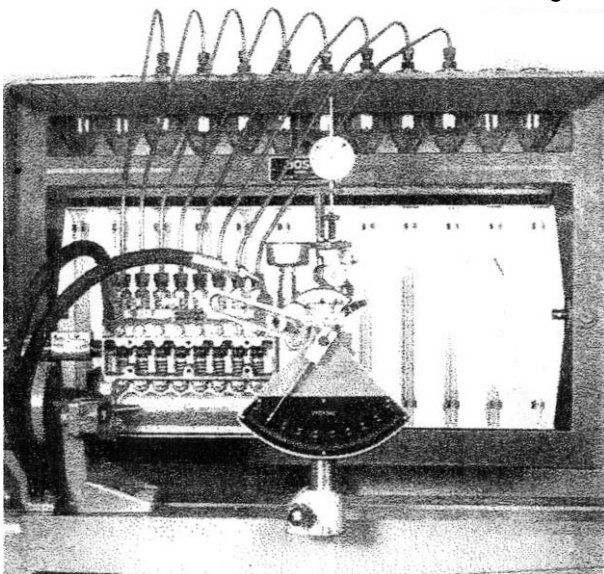


Fig. 22

4.12. Pre-setting the control springs.

Inspection sheet, section A:

Adjust the control rod head and the controller springs until the specified control strokes for each speed and adjustment lever position is reached.

Caution: If the control rod head is adjusted, the control stroke of all inspection points changes. (For adjustment range refer to page 14) Repeat all adjustments in sequence with the inspection sheet until all values are correct. When making adjustments, ensure to adjust by the same number of notches per spring pair so that the spring support remains parallel.

4.13. Adjusting the warm-up correction. Move the adjustment lever to the idle stop. Adjust measurement "f" = start point according to the inspection sheet. Read the control stroke at the rpm specified. Adjust measurement "f" = endpoint. The control stroke should now be reduced by the specified value. Adjustment by rotating the eccentric bushing in the roller lever. Push valve spool beyond the end position; tighten the counter nut on the knurled screw.

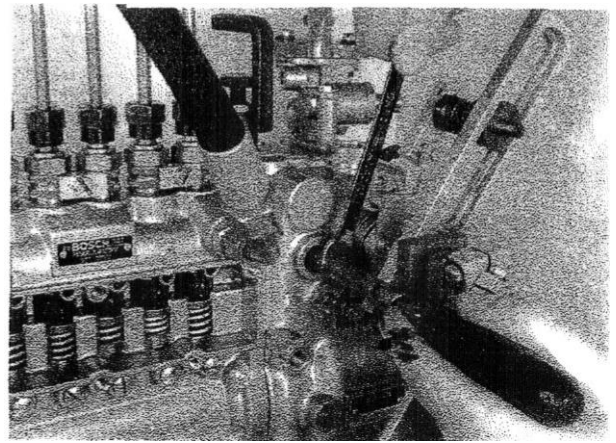


Fig. 23

4.14. Adjusting the fuel delivery. Remove the dial indicator from EFEP 416 A. Valve spool remains beyond the end position. Run the pump until it reaches operating temperature. Check feed pressure and test oil temperature. Adjust equal delivery at full load: inspection sheet, section B, boxed-in value. Adjust the specified control stroke at the control rod head. Set the adjusters at the control sleeves to the specified fuel delivery at the smallest variation achievable. Check equal delivery at idle: inspection sheet, section C, boxed-in value. Adjust the 1st spring to achieve the specified fuel delivery; correct variations, if required. Then check equal delivery under full load; variations should be inside the tolerance.

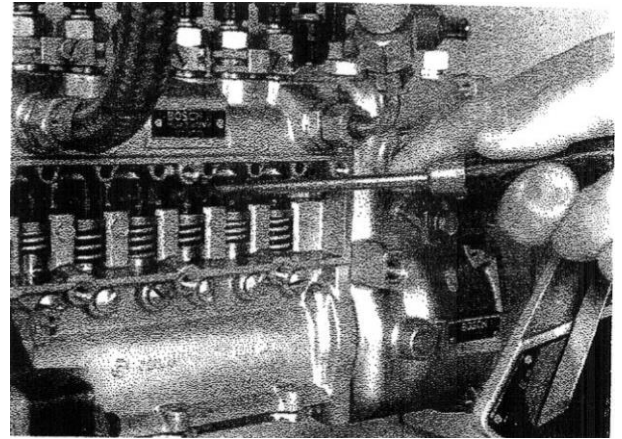


Fig. 24

Check full load volumes; section B. Adjust the 3rd spring if required.

Check partial load volumes; section C. Readjust adjustment springs if required.

Check volumes as per sections B and C in sequence until all values are correct.

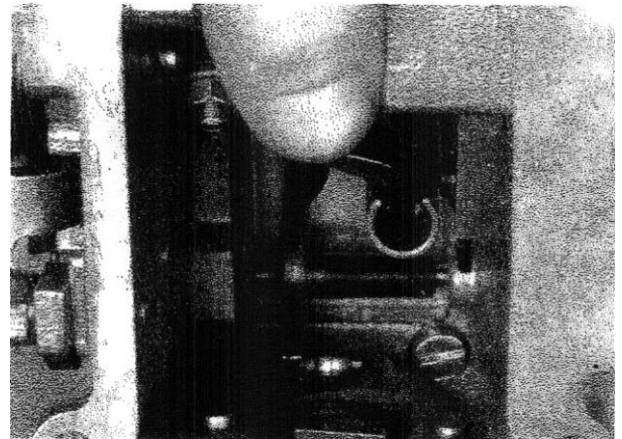


Fig. 25

4.15. Adjusting the starting volume. The starting lever must not rub on the inside of the control rod head (fig. 25), fit the governor cover with seal. Connect start solenoid to a 12 V battery. Check control stroke and/or delivery volume at the rpm specified in the inspection sheet. Adjust at the domed cap nut of the start solenoid. Do not keep the start solenoid energised longer than necessary!

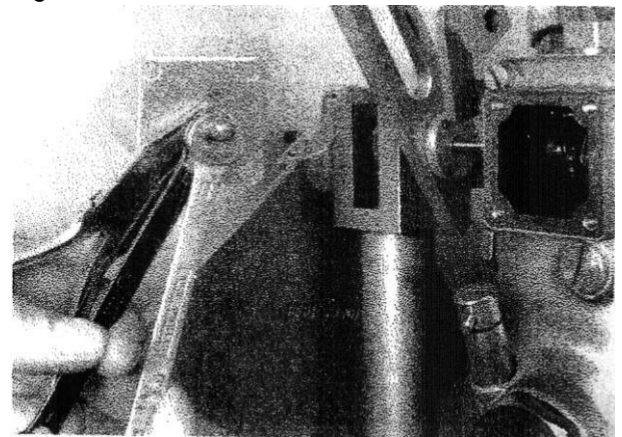


Fig. 26

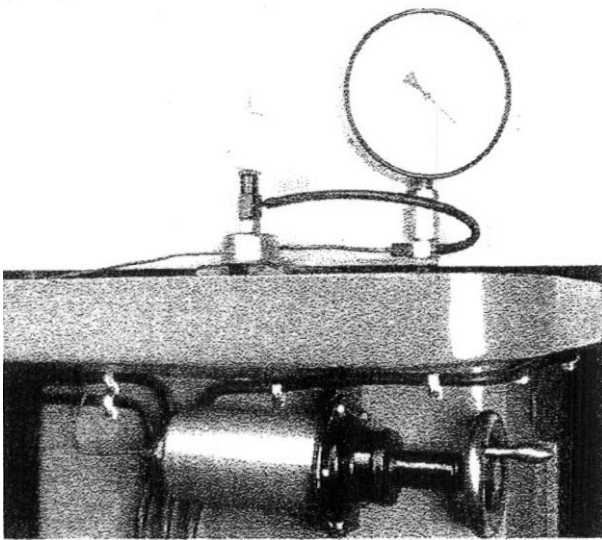


Fig. 27

4.16. Checking the aneroid capsule carrier. Every 100 mm Hg change in pressure = 0.58 mm stroke.

Mount EFEP 418 with dial indicator EFAW 7 and O-rings to the aneroid capsule. Connect a vacuum pump, set 20 mm Hg below atmospheric, set the dial indicator to zero. Reduce the pressure by 200 mm Hg. The stroke should now be 1.0 – 1.25 mm (limits); otherwise, replace the aneroid capsule carrier. (overcome any friction by lightly tapping the aneroid capsule carrier).

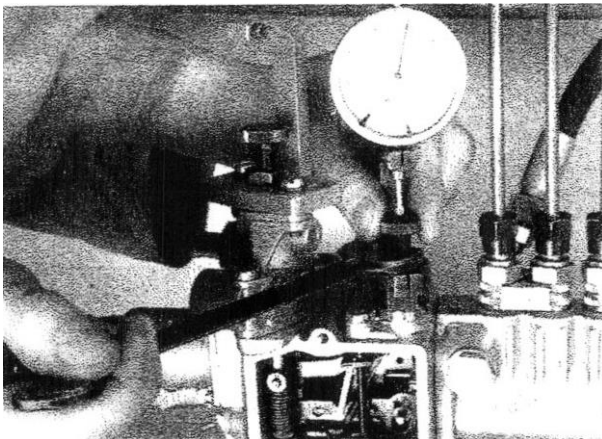


Fig. 28

4.17. Fitting the aneroid capsule carrier.

Calculate the difference to the current atmospheric pressure (4.7) to 737 mm Hg and the resulting stroke:

Example:

average normal atmospheric pressure	737 mm Hg
actual pressure	600 mm Hg
difference minus	137 mm Hg
137 mm Hg =	$\frac{0.58 \cdot 137}{100} =$
	0.79 mm Hg

Wind the knurled screw in by 0.79 mm.



Fig. 29

Mount dial indicator EFAW 7 to EFEP 417 and set to zero at approx. 3 mm pre-tension. Move the knurled screw by the calculated stroke. Tighten the counter nut. Measure new full load volume and control stroke and note it down. Fit the aneroid capsule carrier instead of EFEP 417; place shim disks or adjust until this new control stroke and delivery volume are reached again.

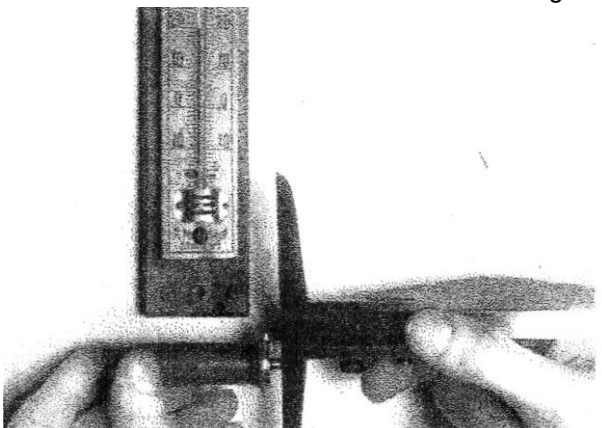


Fig. 30

4.18. Checking the temperature sensor.

For temperature sensor EPMJ 11 P 2 Z (old version) check measurement "f" corresponding to the current temperature (page 14). When force is applied, the pressure pin should not be pushed-in significantly.

The temperature sensor EPMJ 15 P 1 Z (new version) cannot be tested. Caution: do not pull out the pressure pin! The specified measurements are only applicable for adjusting the valve spool. Replace this temperature sensor after longer operation or if in doubt.