

II. Checking the Control Rod Travel and Adjusting the Full Load Stop of the Throttle Butterfly and/or the Adjusting Screw of the Feed Volume Full Load Stop

The control rod travel must be checked if the lead seal of the full load stop has been damaged, if the engine smokes heavily, and if the fuel consumption is too high.

When checking the control rod travel measure from full load stop to extreme stop position. The protecting cap on the control rod must be removed for this purpose. In order to avoid measuring faults the control rod must first be checked for operational ease. If such a test is conducted in the vehicle, the start and stop cable control must also be disengaged at the adjusting lever.

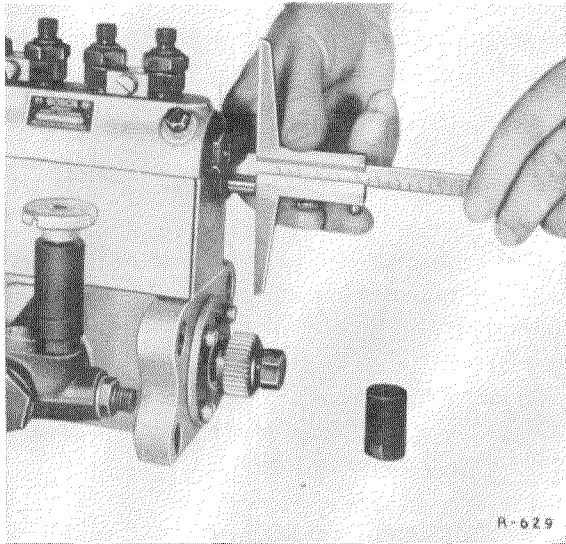


Figure 07-8/2
OM 636

During this test the function of the adapting device can also be checked. Press in the control rod and determine the control rod travel after which the adapting spring has been relieved and the pressure bolt starts leaving the full load stop; the control rod now moves somewhat harder. When releasing the control rod determine in the opposite order the control rod travel after which the pressure bolt comes in contact with the full load stop and begins to tension the adapting spring. The force of the control spring applied to the control rod will be somewhat reduced (see Figure 07-5/11).

The max. adapting travel is 0.6 to 1.2 mm (see the following table on control rod travel and adapting travel). If it is found out during checking that the pressure bolt sticks in the diaphragm bolt, restore operational ease. For this purpose the diaphragm (4) must be disassembled and the pressure bolt must be removed together with the adapting spring (6). Make absolutely sure of the compensating washers (7) (see Figure 07-5/11).

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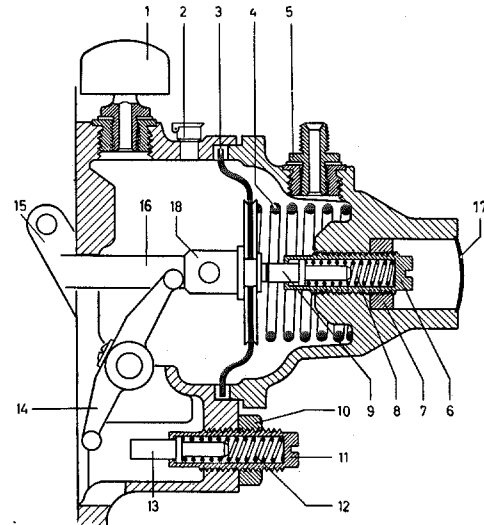


Figure 07-8/3
OM 636

Stop Position or No-delivery Position

- 1 Air filter of the atmospheric chamber
- 2 Cap oiler to lubricate the governor linkage
- 3 Diaphragm
- 4 Control spring
- 5 Vacuum connector on the vacuum chamber
- 6 Adjusting screw with helper spring (booster)
- 7 Lock nut of adjusting screw
- 8 Helper spring
- 9 Stop bolt (booster)
- 10 Lock nut
- 11 Adjusting screw with full load stop
- 12 Spring
- 13 Stop bolt
- 14 Double lever
- 15 Adjusting lever
- 16 Control rod
- 17 End plate in governor housing
- 18 Diaphragm bolt

The control rod travel is measured as follows:

Measure the protruding part of the control rod with depth gauge (full load position) (Figure 07-8/2). Now press in the control rod (16) by turning the adjusting lever (15), so that the lower arm of the double lever (14) comes in contact with the housing or the helper spring (8) is compressed completely (stop position) (see Figure 07-8/3).

Hold the control rod in this position and measure again with the depth gauge (Figure 07-8/2).

The difference between full load position and stop position is the control rod travel including adapting travel.

Model	Injection Pump	Governor	Control Rod Travel* including Adapting Travel	Adapting Travel
OM 636	PES 4 A 50 B 410 S 17 S 17 z	EP/M 60 A 30	11.9–12.0 mm without adapting travel	has no adaption
	S 17 RS 17 RS 60	EP/M 60 A 31 d	12.5–12.6 mm 12.5–12.6 mm 11.5–11.6 mm	1.0±0.1 mm
	RS 17 RS 50 RS 60 RS 68	EP/MZ 60 A 39 d	13.0–13.1 mm 13.0–13.1 mm 12.1–12.2 mm 12.1–12.2 mm	1.0±0.1 mm
	RS 50 RS 68	EP/MZ 60 A 48 d	13.0–13.1 mm 12.1–12.2 mm	1.0±0.1 mm
	RS 50	EP/MZ 60 A 51 d	13.0–13.1 mm	1.0±0.1 mm
	RS 50 RS 68	EP/MZ 60 A 52 d	13.0–13.1 mm 12.1–12.2 mm	1.0±0.1 mm
	RS 17 RS 50 RS 50 z RS 68	EP/M 60 A 55 d	13.3–13.4 mm 13.3–13.4 mm 12.3–12.4 mm 12.3–12.4 mm	1.0±0.1 mm
	RS 50 RS 68	EP/MZ 60 A 57 d	13.5–13.6 mm 12.5–12.6 mm	1.0±0.1 mm
	RS 17 RS 50 RS 50 z RS 60 RS 63	EP/MZ 60 A 58 d	13.5–13.6 mm 13.5–13.6 mm 12.5–12.6 mm 12.5–12.6 mm 12.5–12.6 mm	1.0±0.1 mm
	x RS 17 RS 50 RS 50 z RS 68	EP/M 60 A 71 d	13.3–13.4 mm 13.3–13.4 mm 12.3–12.4 mm 12.3–12.4 mm	1.0±0.1 mm
	RS 144 RS 144 z	EP/MZ 60 A 72 d	13.5–13.6 mm 12.3–12.4 mm	1.0±0.1 mm
	RS 204	EP/MZ 60 A 87 d	14.2–14.3 mm	1.2±0.1 mm
	RS 204	EP/M 60 A 89 d	14.2–14.3 mm	1.2±0.1 mm
	RS 204 RS 204 z	EP/MZ 60 A 91 d	14.2–14.3 mm 13.0–13.1 mm	1.2±0.1 mm
	RS 144 RS 144 z	EP/MZ 60 A 93 d	13.6–13.7 mm 12.5–12.6 mm	0.6±0.1 mm
	RS 144 RS 144 z	EP/MZ 60 A 94 d	13.4–13.5 mm 12.3–12.4 mm	0.6±0.1 mm
	RS 144 RS 144 z	EP/MZ 60 A 99 d	13.4–13.5 mm 12.3–12.4 mm	0.6±0.1 mm
	RS 50 RS 50 z RS 68 RS 68 z x RS 1026	EP/M 60 A 102 d	13.3–13.4 mm 12.3–12.4 mm 12.3–12.4 mm 13.0–13.1 mm 13.0–13.1 mm	1.0±0.1 mm
	x RS 50 x RS 68 x RS 68 z	EP/M 60 A 121 d	13.3–13.4 mm 12.2–12.3 mm 13.0–13.1 mm	1.0±0.1 mm
	PES 4 A 50 C 410 x RS 1010	EP/M 60 A 125 D	13.3–13.4 mm	1.0±0.1 mm
	x RS 1010 x x RS 1010 y x RS 1010 z x RS 1010	EP/M 60 A 126 D	12.3–12.4 mm 12.7–12.8 mm 13.0–13.1 mm 13.3–13.4 mm	1.0±0.1 mm
	x RS 1026	EP/M 60 A 126 D	13.0–13.1 mm	1.0±0.1 mm
	x RS 1010	EP/M 60 A 131 D	13.3–13.4 mm	1.0±0.1 mm
	x RS 1010	EP/M 60 A 132 D	13.3–13.4 mm	0.6±0.1 mm
	x RS 1010	EP/M 60 A 138 D	13.3–13.4 mm	1.0±0.1 mm
	x RS 1010	EP/M 60 A 143 D	13.3–13.4 mm	0.6±0.1 mm

* The data of control rod travel indicates the travel of the control rod from full load stop to utmost stop position.

Model	Injection Pump		Governor	Control Rod Travel* including Adapting Travel	Adapting Travel	
OM 621	PES 4 M 50/320	R 1/24 R 3/24 R 4/24	EP/M 60 M 3 d or EP/M 60 M 4 d	14.9–15.0 mm	2.2+0.1 mm	
		R 1/2 z R 3/24 z R 4/24 z	EP/M 60 M 4 d	13.9–14.0 mm	2.2+0.1 mm	
		x R 14	EP/M 60 M 7 d or EP/M 60 M 8 d	14.9–15.0 mm	1.6+0.1 mm	
			EP/M 60 M 9 d	14.9–15.0 mm	2.5+0.1 mm	
			EP/M 60 M 11 d	13.9–14.0 mm	2.1+0.1 mm	
			EP/M 60 M 12 d or EP/M 60 M 13 d	14.9–15.0 mm	1.2+0.1 mm	
			EP/M 60 M 14 d	15.3–15.4 mm	2.6+0.1 mm	
			EP/M 60 M 15 d or EP/M 60 M 16 d	14.9–15.0 mm	1.2+0.1 mm	
			x R 14 z	EP/M 60 M 11 d	13.1–13.2 mm	2.1+0.1 mm
				EP/M 60 M 12 d or EP/M 60 M 13 d	14.0–14.1 mm	1.2+0.1 mm
		EP/M 60 M 14 d		14.4–14.5 mm	2.6+0.1 mm	
		EP/M 60 M 15 d or EP/M 60 M 16 d		14.0–14.1 mm	1.2+0.1 mm	

* The data of control rod travel indicates the travel of the control rod from full load stop to utmost stop position.

The control rod travels of the different type of governors are contained in the table. If the control rod travel is greater than the value specified in the table, the injection rate is too high.

The specified control rod travels, however, can slightly deviate from the actual travel after an exact adjusting of the specified injection rate on the test stand. But the specified values are a useful preliminary basis, by which the full load stop can be adjusted without test stand in an emergency.

Tightening of the full load stop causes a **shorter** control rod travel and **lower injection rate**, unscrewing of the full load stop results in a **longer** control rod travel and **higher injection rate**.

The max. discharge rate (adjusting the smoking limit) can be determined in vehicles by road tests as described below; under the provision that the vacuum system is absolutely airtight.

Due to the fact that load cannot be applied to the engine while the vehicle is stationary, the no-load max. speed must be adjusted at the throttle butterfly.

1. Warm-up engine, then with the throttle butterfly wide open against the full load stop determine with revolution counter the max. no-load speed. If the max. no-load speed is higher than specified in the technical data (see Page 0–1/11 through 0–1/31 and 0–2/1), the full load stop screw (5) must be screwed in so far (close butterfly a little), that the specified speed is obtained (see Fig. 07–8/5). In order to obtain correct results on Model OM 636, make sure that the adjusting screw with additional spring (6) is adjusted properly (see Fig. 07–8/6 and respective test sheet). If the max. no-load speed is not reached, increase speed by unscrewing the full load stop screw (5) (open butterfly more) (also see Fig. 07–8/5).

If the throttle butterfly has already reached max. opening, increase initial tension of control spring in injection pump by installing washers (20 and/or 14) (see Fig. 07-8/6 for OM 636 and Fig. 07-4/26 for OM 621).

The installation of a washer 1 mm thick causes an average increase of engine speed of approx. 120 to 150 rpm, depending on the properties of the control springs.

Washer 1 mm thick Part No. 180 990 18 40

Washer 0.5 mm thick Part No. 180 990 17 40

Washer 0.2 mm thick Part No. 180 990 16 40

2. In order to test the injection rate accelerate the vehicle in 3rd gear on a level or **slightly ascending stretch** from a low speed (approx. 20 km/h) to the line mark for 3rd gear range on the speedometer. During this drive the exhaust gases must be observed by another person in the vehicle or by driving past the person observing or by trailing in a 2nd vehicle. If the exhaust gases are black and still clearly visible approx. 1 m and more behind the vehicle, then the max. discharge rate is too high. Therefore, screw in the adjusting screw (11 and/or 23) until the clearly visible smoking is no longer observed (see Fig. 07-8/6 for OM 636 and Fig. 07-4/26 for OM 621).

If the exhaust gases are correct during the first check or if clouding can hardly be observed, then the max. discharge rate is either correct or too low. In order to avoid a loss of output due to a reduced discharge rate, the adjusting screw must be unscrewed so far that the permissible exhaust gas clouding is obtained during the test run. **Check again the max. no-load speed and readjust if necessary.**

The smoke test should possibly be conducted with a Smoke Tester (e.g., Bosch Smoke Tester EFAW 78, consisting of the Suction Pump with Accessories EFAW 65 and the Photo-electric Evaluator EFAW 68). Such instruments can be used for smoke testing, not only on a test stand (e.g., dynamometer or Clayton test stand) but also during road tests. It is of importance that the test is conducted at full load and during a state of equilibrium, but not while changing gears.

A limiting curve has been plotted for the shading of the exhaust gases of diesel engines in relation to the nominal power output of the engines, which must not be surpassed in the speed range of 40 to 100% of the max. speed while load is applied to the engine (see Fig. 07-8/4).

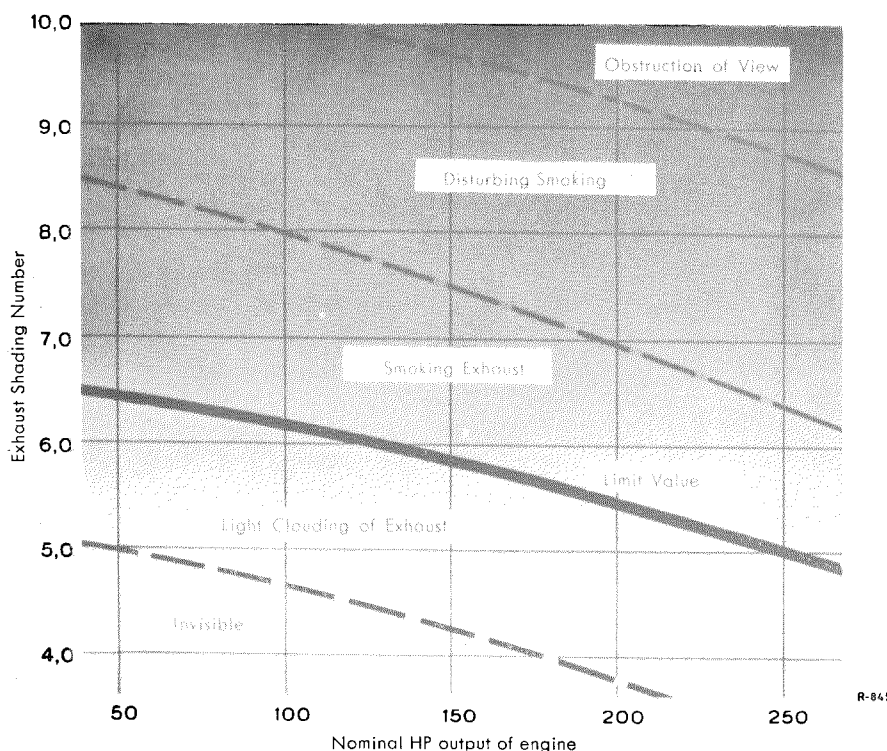


Fig. 07-8/4

When employing a smoke tester strictly follow the respective operating instructions.

= At the limit value the exhaust is slightly visible but by no means disturbing