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suitable sealing compound to cylinder block and rear main bearing cap face.

6. Coat gasket faces of the housings with suitable sealing compound.

7. Smear a film of graphite grease over the exposed inside diameter surface of the oil seal.

8. Coat the half housing butt faces with sealing compound.

9. Lubricate the crankshaft rear end oil return groove.

10. Place the half housings in position on the engine (half housing with shroud to the top) and locate all setscrews finger tight. Refer to Figs. 28 and 29.

11. Tighten the clamping bolts to a torque of only 4 to 6 ft.-lbs. (0,55/0,83 kgf m).

12. Tighten the setscrews in the cylinder block and main bearing cap to a torque of 12 ft.-lbs. (1,66 kgf m).

13. Finally tighten clamping bolts to a torque of 12 ft.-lbs. (1,66 kgf m).

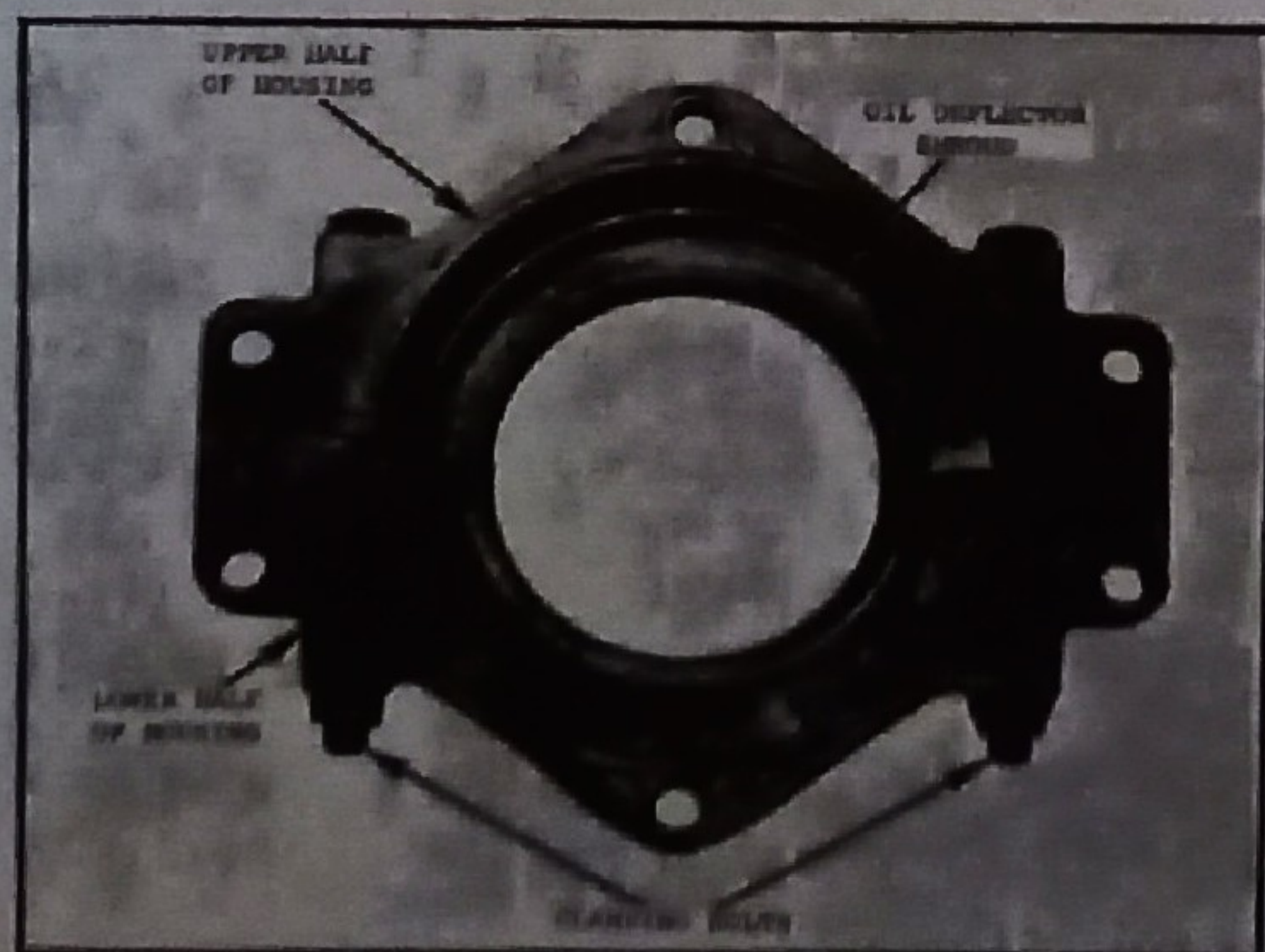


Fig. 28 - View of Upper and Lower Halves Showing Oil Deflector Shroud

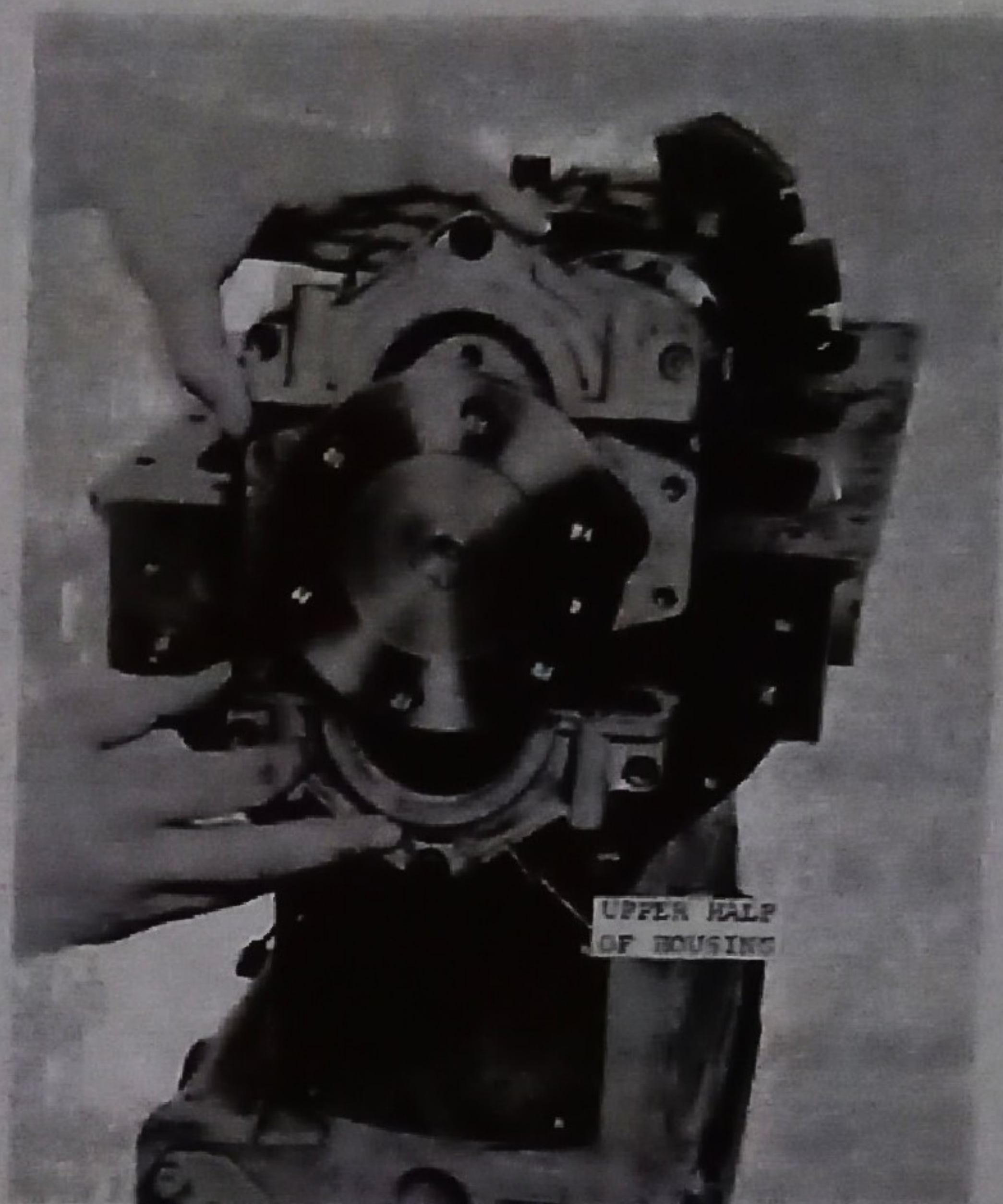


Fig. 29 - Removing or Installing Upper and Lower Halves of Oil Seal Housing (Engine Shown Inverted)

TIMING GEAR COVER AND FRONT CRANKSHAFT OIL SEAL

Removing Timing Gear Cover

1. Remove fan belt and generator.
2. Remove water pump and hoses.
3. Disconnect carburetor control rod. Refer to Fig. 30.
4. Remove breather pipe.
5. Remove crankshaft pulley.
6. Remove timing gear cover setscrews. Note the different lengths used.

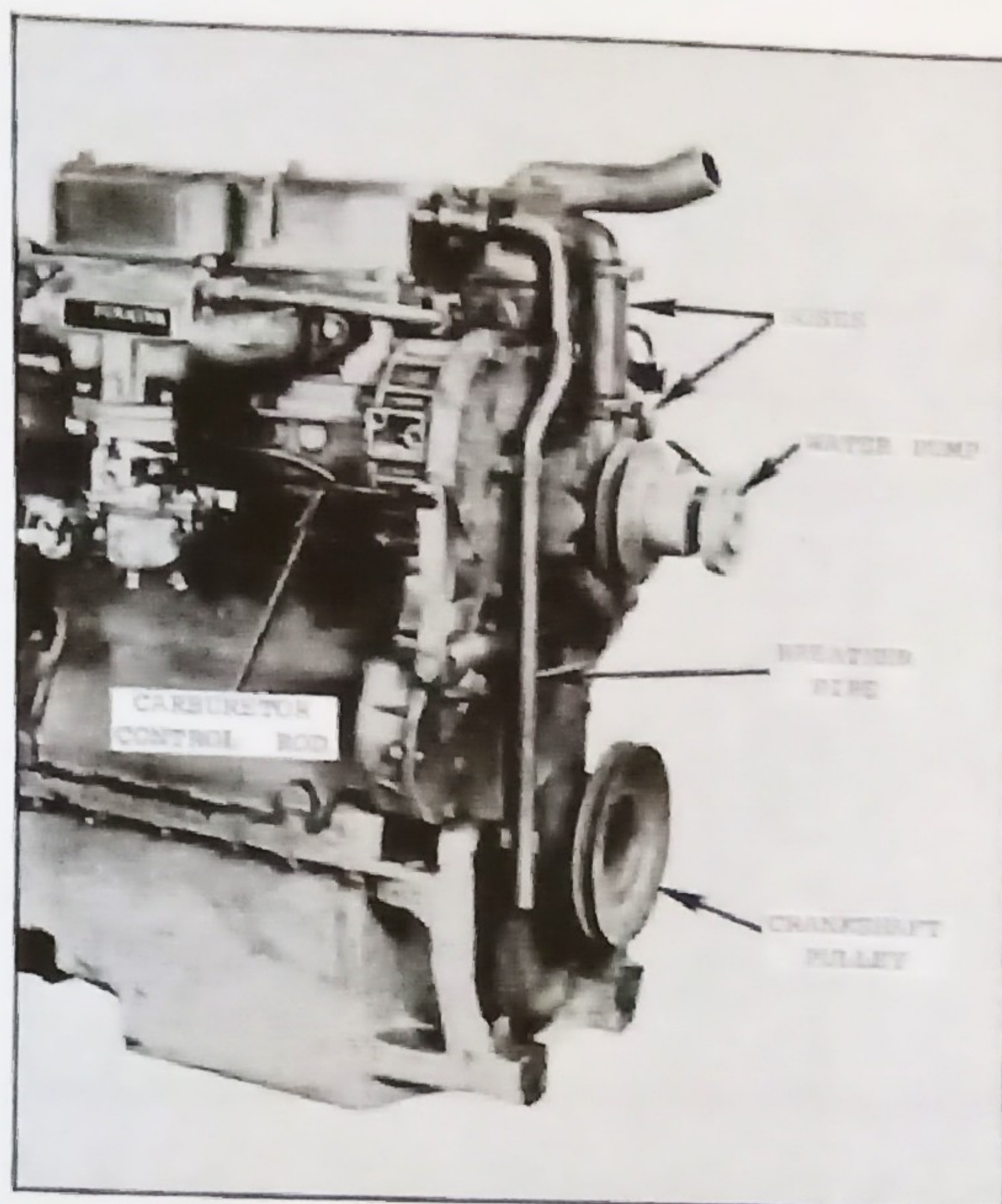


Fig. 30 - View of Timing Gear Cover and Related Parts

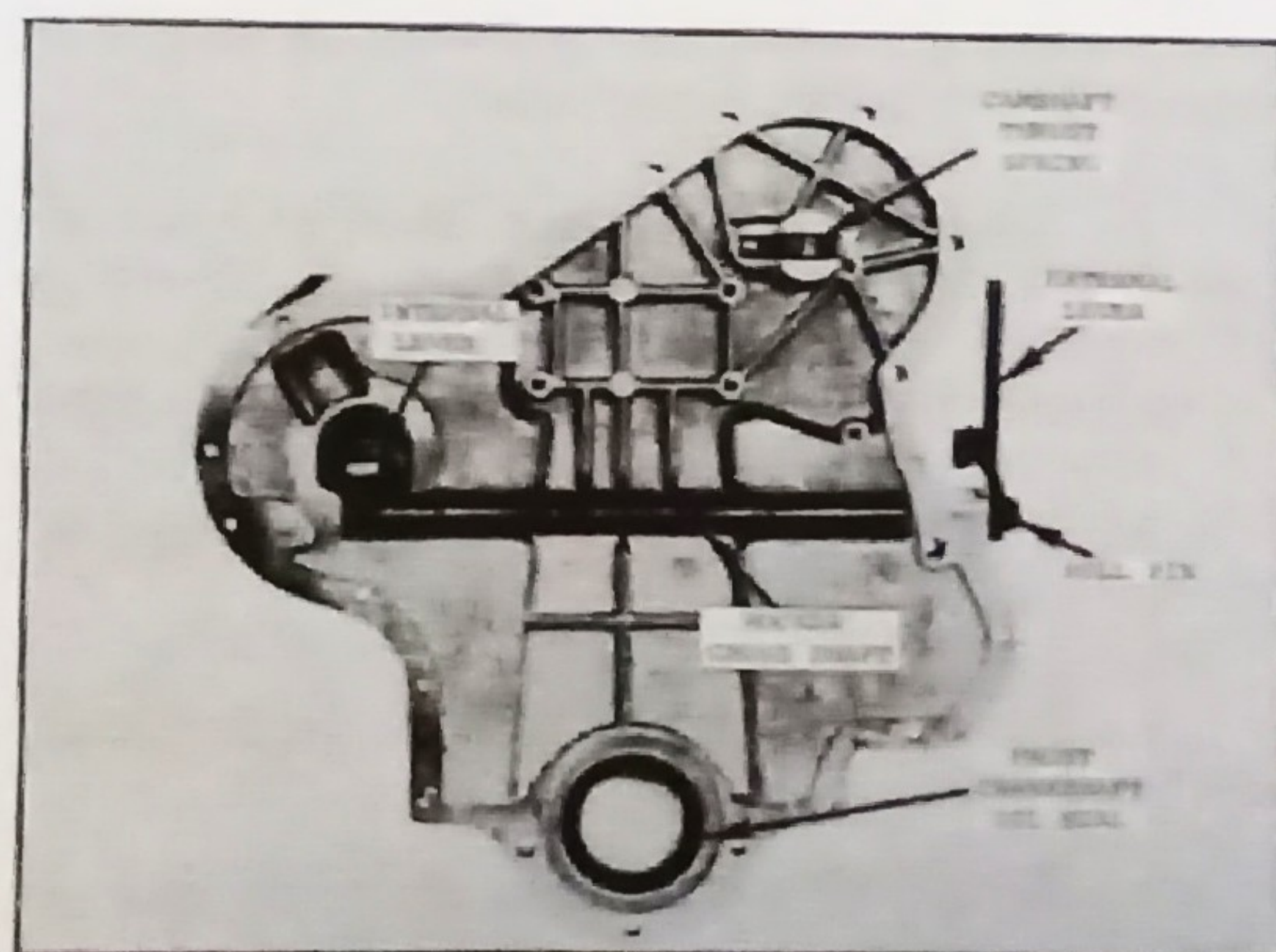


Fig. 31 - Rear View of Timing Gear Cover

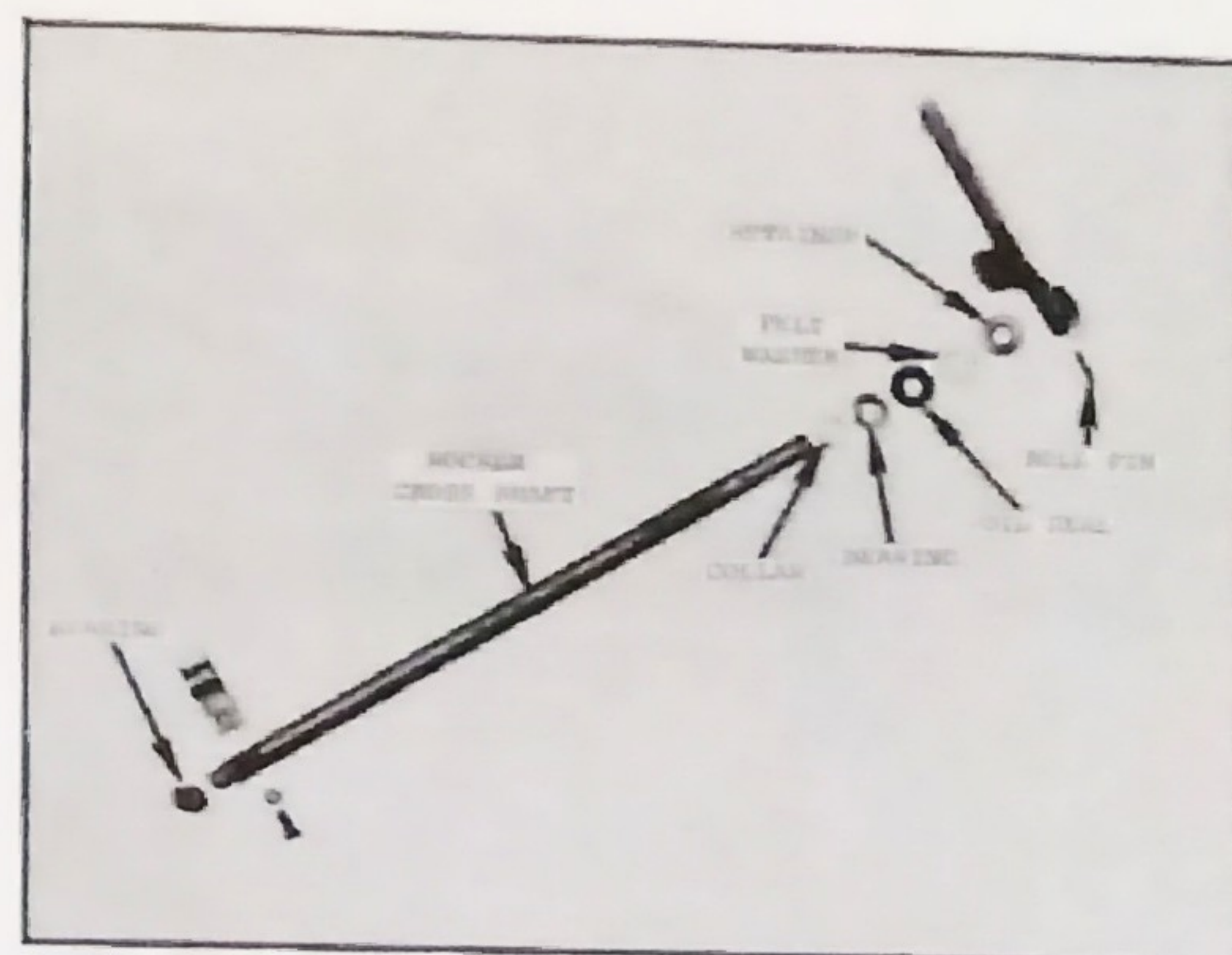


Fig. 32 - Governor Rocker Cross Shaft - Sequence of Parts

7. Remove timing gear cover.

Removing Governor Control Cross Shaft

1. Remove roll pin, retaining external lever, and remove lever. Refer to Fig. 31.
2. Remove internal lever.
3. Press shaft toward the oil filler side of the cover and release needle bearing.
4. Press shaft in the opposite direction removing collar, bearing, oil seal, felt washer and retainer. Refer to Fig. 32.

Installing Governor Control Cross Shaft

1. Assemble collar, bearing, oil seal, felt washer and retainer on the shaft and press into cover. Refer to Figs. 32 and 31.
2. Press needle bearing into the cover at the other end of the shaft until it just contacts an 0.008 in. (0,20 mm) feeler gauge between the shaft shoulder and the needle bearing end face as shown in Fig. 33.

MASSEY-FERGUSON

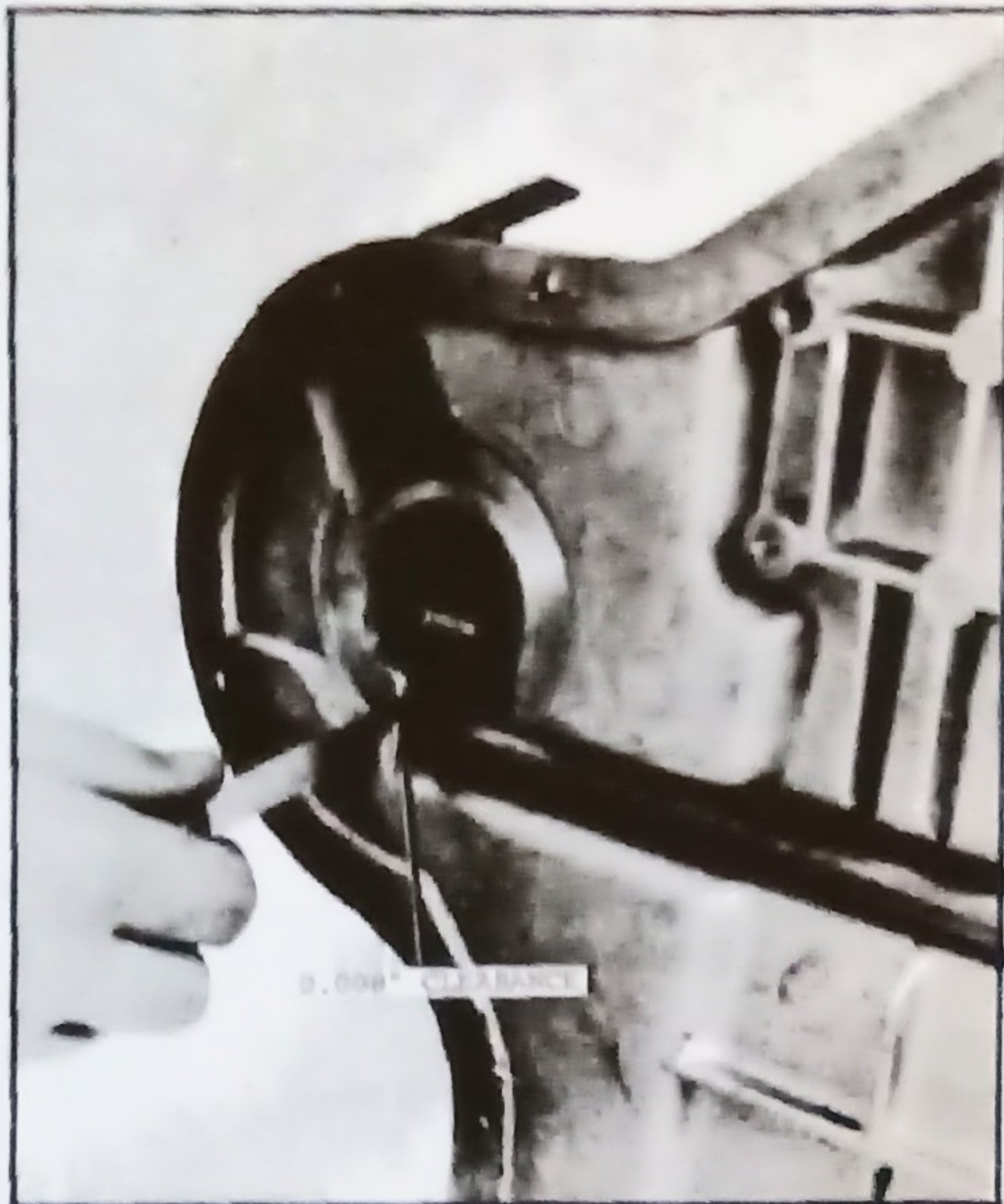


Fig. 33 - Measuring Clearance between Bearing and Shaft

3. Reinstall internal and external levers.

Replacing Front Crankshaft Oil Seal

1. Press out old seal. Do not pry out as this practice may damage aluminum cover.

2. Use special tool MFN 747AA and press new oil seal into cover. Use of special tool will assure that seal is concentric with bore and properly located 0.320-0.330 in. (8.13/8, 38 mm) from front face of cover. Use double stepped side of tool and make sure lip of seal is toward source of oil. When tool contacts face of cover, seal will be correctly located. Refer to Fig. 34.

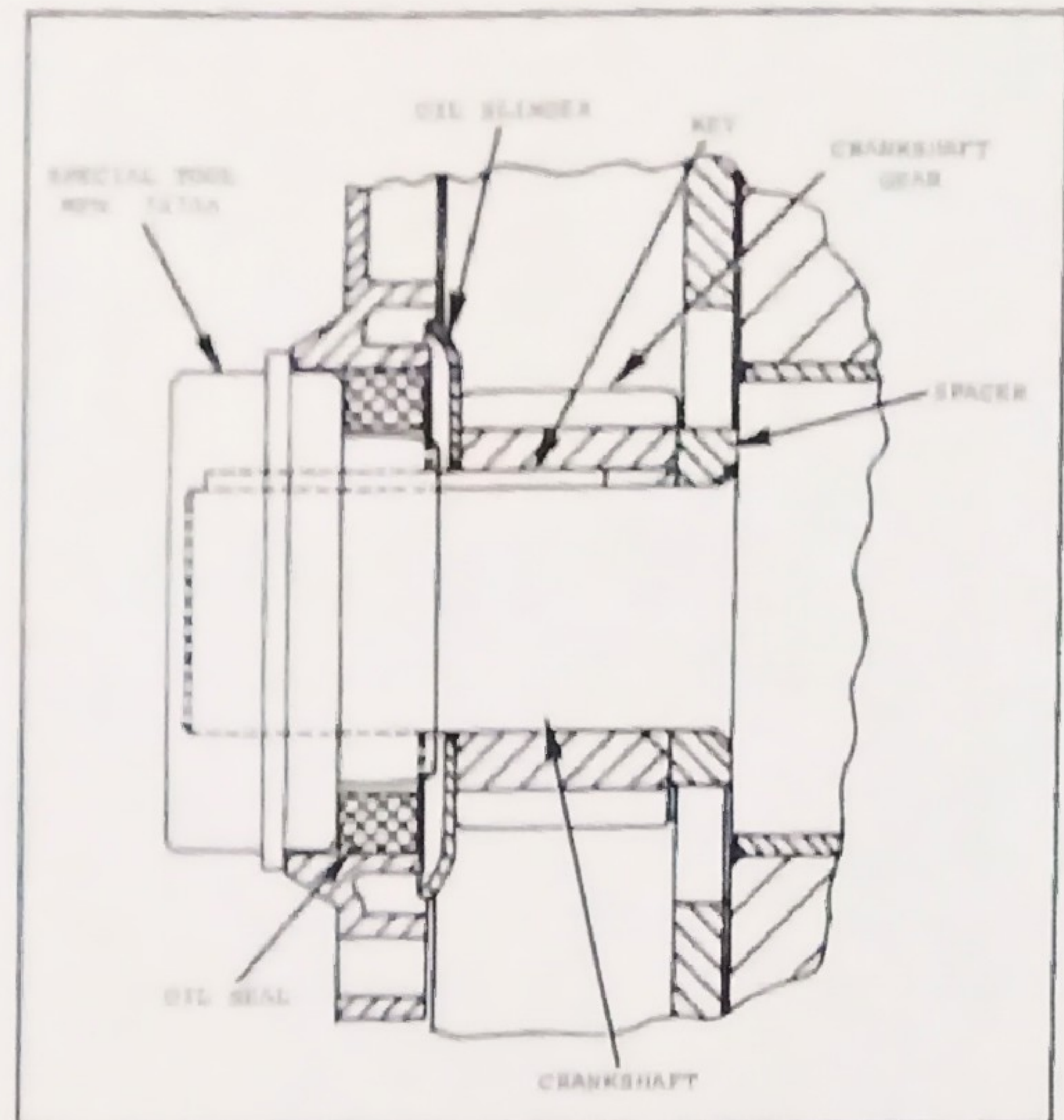


Fig. 34 - Sectional View Showing Oil Seal Locating Side of Special Tool MFN 747 AA - Shown with Cover Installed. Note Direction of Oil Slinger and Timing Gear Spacer

Installing Timing Gear Cover

1. Install cover using a new gasket, but do not fully tighten setscrews.

2. Slide single stepped side of special tool MFN 747AA on crankshaft and locate it in bore of cover to correctly position cover in relation to crankshaft. Refer to Fig. 35.

3. Tighten setscrews, then remove special tool.

4. Reinstall crankshaft pulley and breather pipe.

5. Reinstall carburetor control rod to lever.

6. Reinstall water pump, hoses, generator and fan belt.

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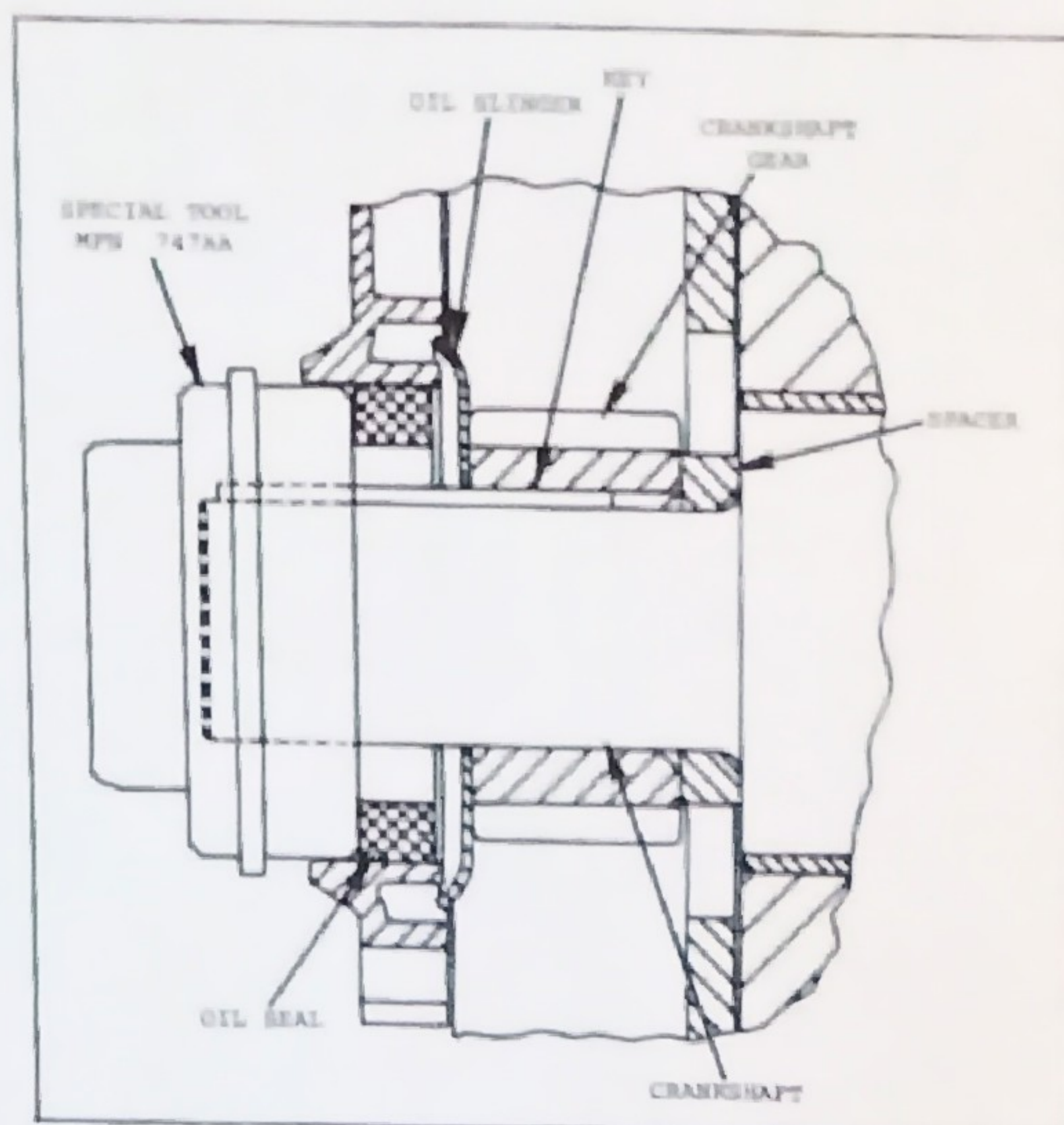


Fig. 35 - Sectional View Showing Timing Gear Cover Locating Side of Special Tool MFN 747 AA - Shown being Used with Oil Seal in Place

TIMING GEARS

The camshaft gear, crankshaft gear, idler gear and distributor drive gear, are suitably marked during production to facilitate re-timing. Fig. 36 shows the timing marks correctly positioned with No. 1 piston at T.D.C. on compression stroke.

Checking Timing Gear Backlash

1. Remove timing gear cover as outlined earlier.

2. Check backlash between the timing gears with a feeler gauge. Refer to Fig. 37. Backlash between idler gear and its other three mating gears should be 0.003 in. (0,08 mm) minimum). Backlash between crankshaft gear and oil pump gear should be

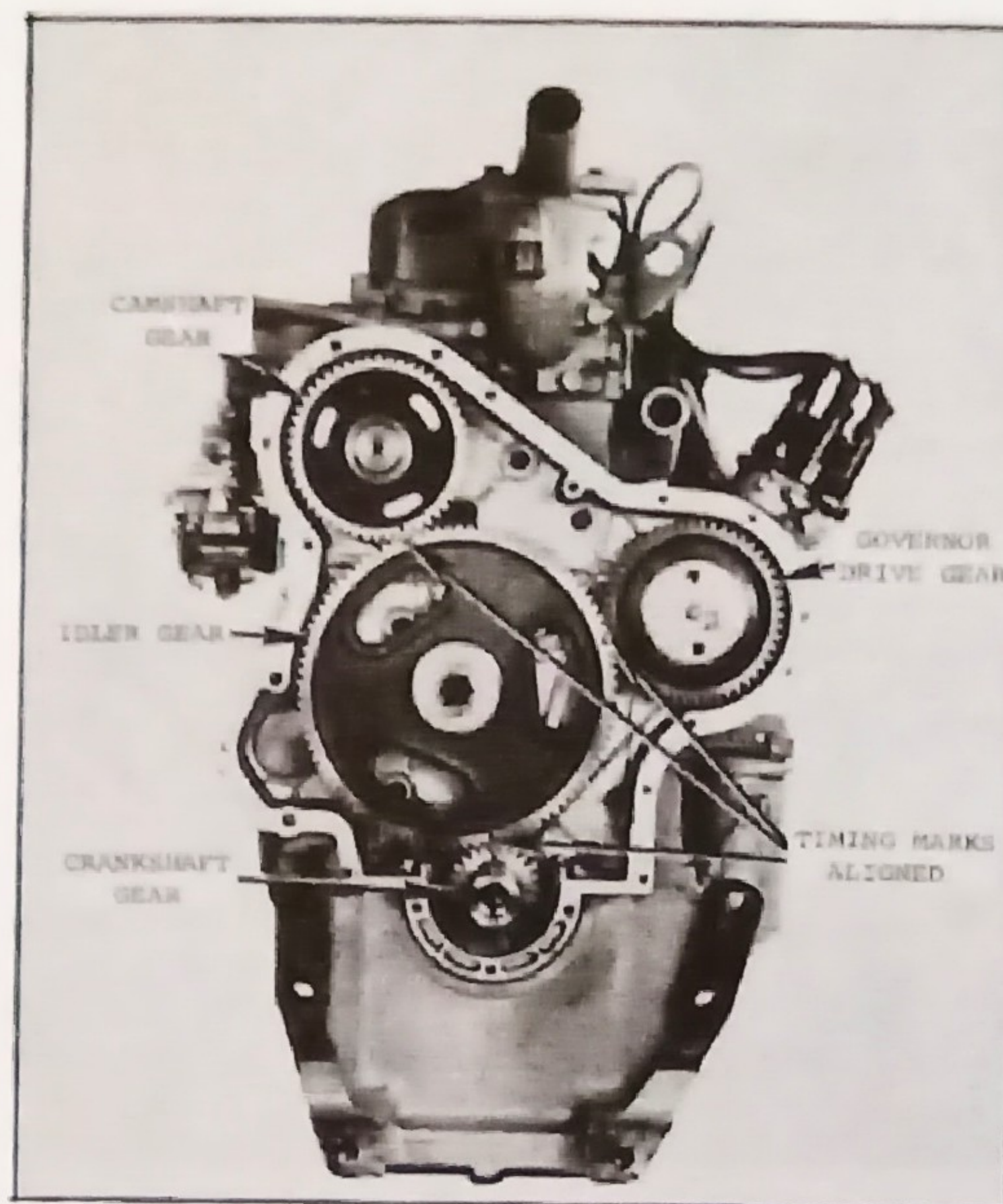


Fig. 36 - View of Timing Gear Showing Timing Marks Aligned

0.0075-0.0125 in. (0,19/0,32 mm). Refer to Fig. 38.

Removing Idler Gear and Hub

1. Bend back the locking tab on the idler gear retaining setscrew and remove the setscrew, tab washer and idler gear retaining plate.

2. Remove idler gear from its hub as shown in Fig. 39.

3. Remove idler gear hub from its machined location as shown in Fig. 40.

Installing Idler Gear and Hub

1. Install the idler gear hub so that the small locating dowel in the cylinder block aligns with the hole in the hub.

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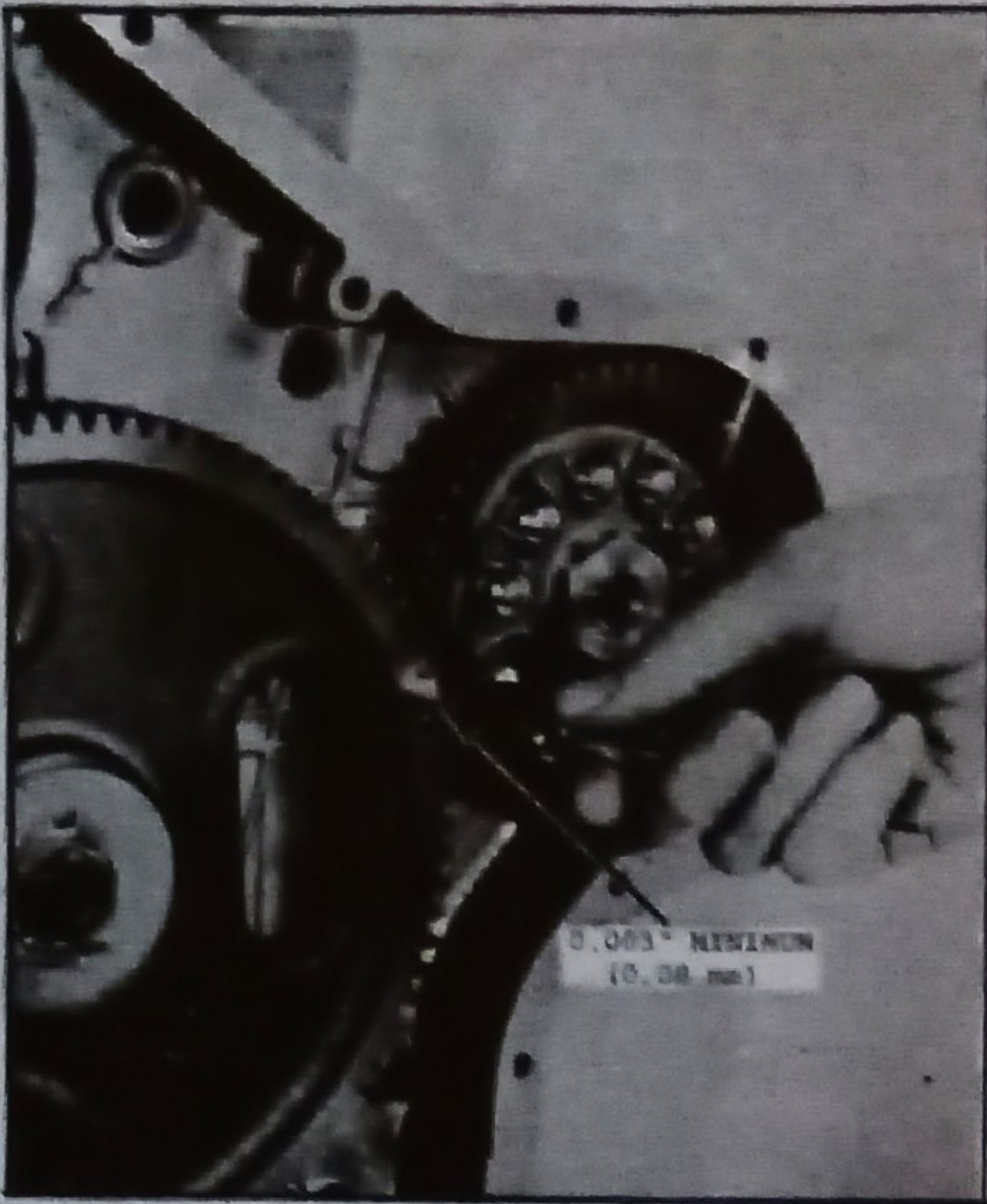


Fig. 37 - Measuring Timing Gear Backlash Between Idler Gear and its Other Three Mating Gears

2. Install the idler gear to the hub with all timing gear marks lined up.

3. Install retaining plate, tab washer and setscrew. Torque to the value given in "Specifications". Make sure that the idler gear has end play of 0.005-0.015 in. (0,13/0,38 mm).

Removing Camshaft Gear

Remove the three securing setscrews and remove camshaft gear.

Installing Camshaft Gear

1. Remove idler gear and release rocker assembly to enable camshaft to be



Fig. 38 - Measuring Backlash Between Crankshaft Gear and Oil Pump Gear (Engine Shown Inverted)

turned. On the camshaft hub the letter "D" is stamped and on the camshaft gear the "D" is cast. The gear must be installed on the camshaft so that the two letters are aligned as shown in Fig. 41.

2. Reinstall and tighten setscrews.

3. Install idler gear with all timing marks aligned.

4. Secure rocker assembly.

Removing Distributor and Governor Drive Gear

1. Remove governor thrust plate assembly as shown in Fig. 42.

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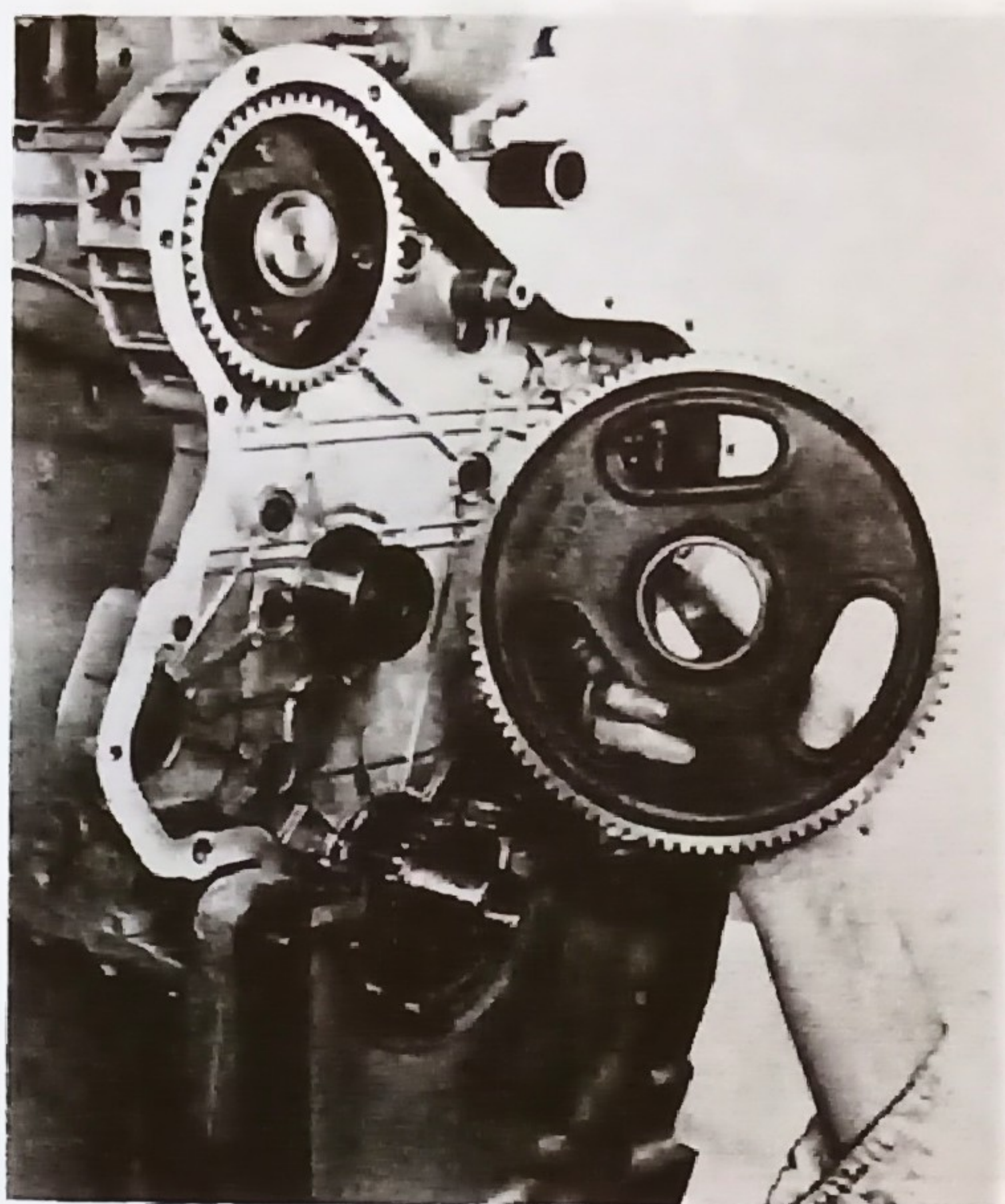


Fig. 39 - Removing or Installing Idler Gear

2. The nut retaining the ball race assembly and the governor gear has a left-handed thread. The nut is stamped "L.H.".

3. Unscrew retaining nut and remove ball race assembly.

4. Release governor gear from its keyed location.

Installing Distributor and Governor Drive Gear

Installation of the gear is the reversal of removal. Refer to Figs. 43 and 42. Torque retaining nut to value given in "Specifications".

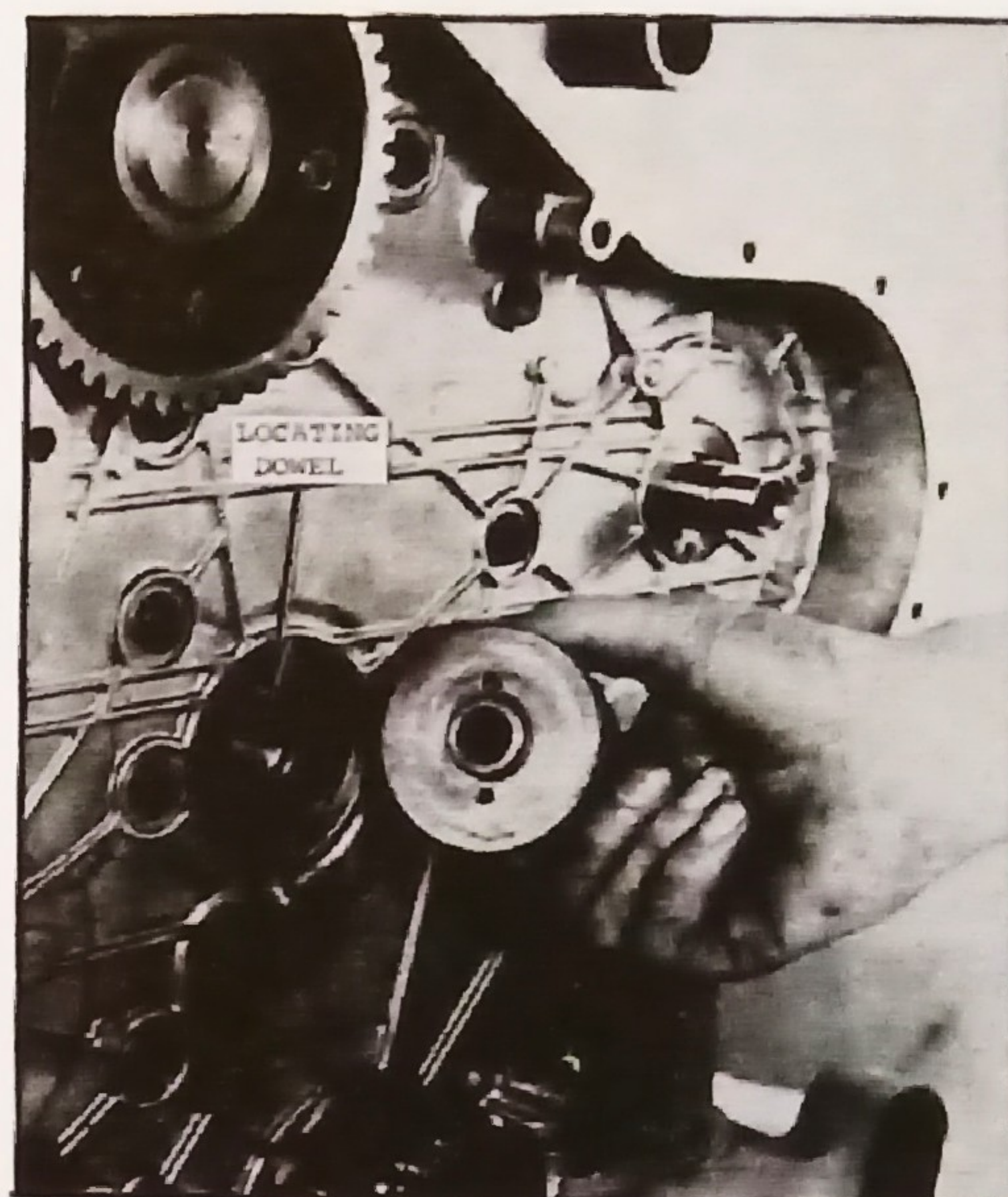


Fig. 40 - Removing or Installing Idler Gear Hub

CAMSHAFT

Removing Camshaft

1. Remove rocker shaft assembly.
2. Remove timing gear cover.
3. Align all timing gear marks.
4. Lift tappets and remove camshaft as shown in Fig. 44 taking care not to damage journals, cams or tappets.

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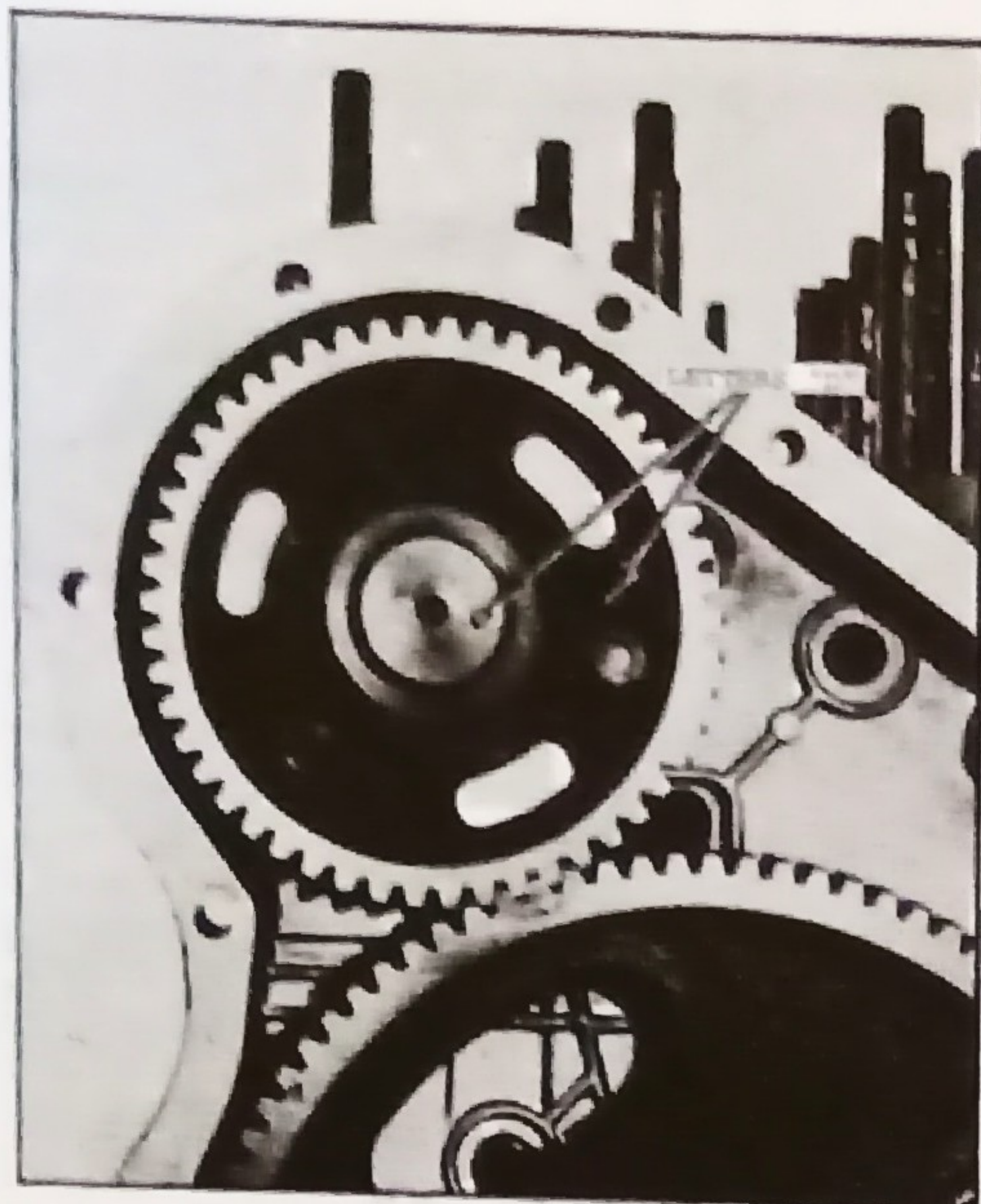


Fig. 41 - Camshaft and its Gear are Marked with Letters "D" to Indicate Proper Gear Installation

Installing Camshaft

1. Lift tappets and carefully install the camshaft into the cylinder block, taking care not to damage journals, cams or tappets. Make sure all timing marks line up.

2. Install timing gear cover.

3. Reinstall rocker shaft assembly and check and re-set valve tappet clearances if necessary.

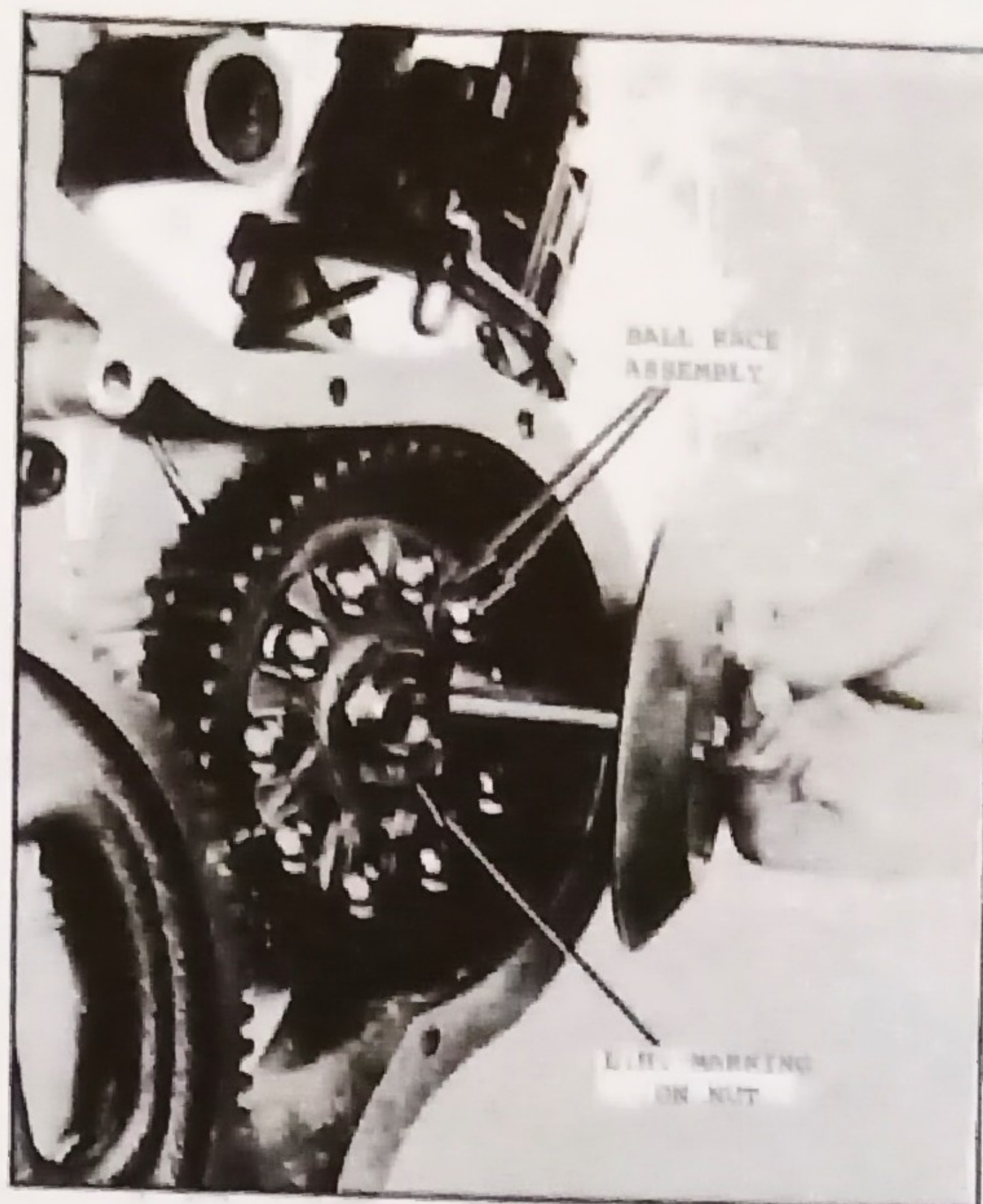


Fig. 42 - Removing or Installing the Governor Thrust Plate Assembly

Camshaft End Play

The camshaft end play is taken up by a thrust spring which is attached to the rear of the timing gear cover, as shown in Fig. 31.

TIMING CASE

Removing the Timing Case

1. Remove timing gear cover as outlined earlier.

2. Remove rocker shaft assembly.

3. Remove oil pan.

4. Remove timing case bottom cover as shown in Fig. 45.