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General Reference

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With this type of drive, it can be seen that the teeth in the hub of the flywheel and the splines on the crankshaft gear sleeve must be "timed" correctly. Otherwise the relationship of the crankshaft, valve mechanism and point of fuel injection will be incorrect.

The hub of the damper flywheel is marked on its rear face with a "C" at (A), while the sleeve is marked with a straight line at (B). These two marks should be aligned when replacing the damper. Inasmuch as these two timing marks are difficult to see when installing the damper, it may help to mark the mating teeth with paint or chalk.

Crankshaft End-Play

The crankshaft end-play of $3\frac{3}{4}$ " and $4\frac{1}{4}$ " bore engines is from .005 to .007" (.127 to .178 mm.), and of $5\frac{1}{4}$ " and $5\frac{3}{4}$ " bore engines from .007 to .010" (.178 to .254 mm.) when the engine leaves the factory. The crankshaft end-play is controlled by thrust plates and spacers just to the rear of the crankshaft gear or by the center main bearing.

Should the end-play of the crankshaft exceed .020" (.508 mm.) on $3\frac{3}{4}$ " and $4\frac{1}{4}$ " bore engines or .025" (.635 mm.) on $5\frac{1}{4}$ " and $5\frac{3}{4}$ " bore engines, the thrust plate and spacers or center main bearing (depending on which takes the thrust) should be replaced.

can be done with shims located between the governor shaft lower bearing cage and the governor housing. Adding shims raises the gear.

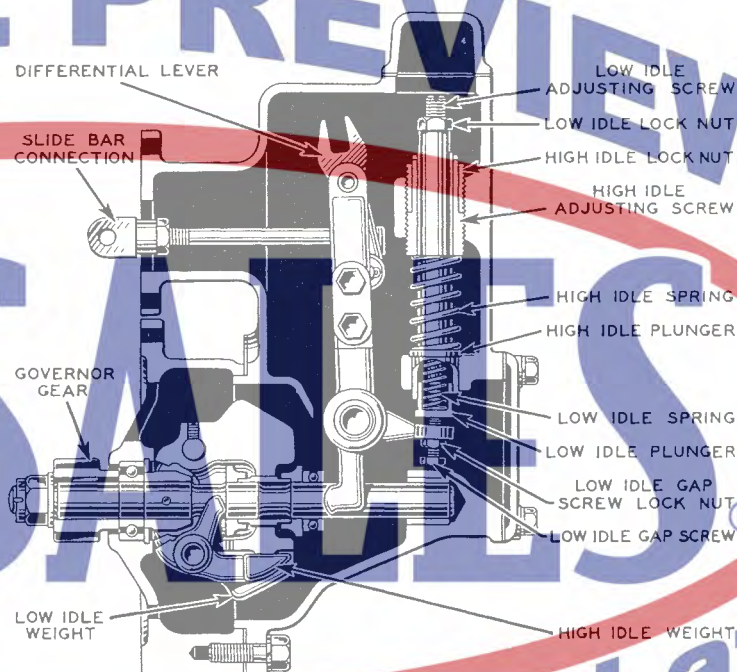
The back lash of the gear can be obtained by moving the accessory shaft forward or backward. This is controlled by shims between the thrust plate and the front of the governor housing. Adding shims moves the gear forward. Removing shims moves the shaft to the rear.

AUTOMOTIVE GOVERNOR

Two types of governors have been used on the automotive engine. Although these governors are similar in operation, they differ somewhat in the type of drive and the method and location of adjustments.

The first type governor was driven through helical gears from the fuel injection pump camshaft and had adjustments for the low idle gap and governor to slide bar connection.

The second type governor is driven from a bevel gear on the rear of the fuel injection pump camshaft. Shims are used to adjust the low idle gap instead of an adjusting screw and the governor to slide bar connection is not adjustable.



First Type Governor

In both governor assemblies the engine speed is accelerator controlled between high idle speed and low idle speed.

When the engine is operating with the speed control lever in the low idle position, the large or low idle weights and low idle spring are governing the speed.

To increase the speed, the speed control lever is moved out of the low idle position. As the speed increases, the low idle weights strike their stop and cease to govern the engine speed. The engine speed is now under direct control of the operator and can be further increased.

As the engine speed increases, the force of the small or high idle speed weights increases until at 1800 r.p.m. the high speed weights acting against the force of the high speed spring govern the engine speed. When the upper speed range is governor controlled, further movement of the accelerator control lever toward the full load position has but little effect on the full load governed speed.

If the speed control lever is returned to the low idle position, the engine speed drops to the low idle speed setting.

Removing Pistons (3 $\frac{3}{4}$ " Bore Engines)

The piston and ring assembly should be taken out the bottom of the engine after removing the oil pan.

Restricted space prevents removing the piston pin from the piston without completely removing the piston from the cylinder liner.

Replacing Pistons (3 $\frac{3}{4}$ " Bore Engines)

A chamfer at the bottom of the cylinder liner acts as a ring compressor when replacing the piston and ring assembly into the cylinder liner. Always center the rings in the chamfered portion of the liner before applying pressure, otherwise the rings are likely to be broken.

CLEANING PISTONS

Pistons which are not excessively worn or badly scored should be cleaned and used again, providing the ring grooves are square and not damaged, and there is not too much clearance between the ring and groove. The side clearance between a new ring and the top ring groove should not exceed .008" (.203 mm.) on 3 $\frac{3}{4}$ " and 4 $\frac{1}{4}$ " bore engines nor .012" (.305 mm.) on larger bore engines. Pistons with ring grooves worn beyond this limit should be replaced. Slight surface cracks or checks on the top of pistons are not detrimental.

Never scrape the contact surfaces of aluminum alloy pistons to clean them. The area above the top ring may be filed smooth but pistons badly scored below the top ring groove should be replaced.

To avoid damage to the piston, remove the rings with a ring expander and clean the bottom of the ring grooves. *Do not scrape the sides of the ring grooves.*

REPLACING RINGS

Always install piston rings with the piston ring expanding tool. The ring expander is not only a great time saver but will also prevent broken and distorted rings or damaged ring grooves.

Normally, pistons should not be removed and new rings installed if the engine is dismantled for some other reason.

PISTON PIN PLUGS

The piston pin plugs should be a hand press fit in the piston at normal room temperature (70°F. or 21°C.).

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