



Timing Gear, Timing Chain And Sprocket Installation

An incorrectly installed timing gear has a direct effect on the efficiency and overall operation of the rebuilt engine. For example, a crank gear incorrectly meshed with a cam gear by only one tooth to the right or left will cause a lag or advance of valve opening or closing of from 3 to 7 degrees of crank travel. It is important that the utmost care be used while installing timing gears. All timing gears are accurately marked for easy identification with an indented timing mark to cut installation time and offer you perfect valve action.

The following 10 steps will assist you in installing your gears. Followed correctly, these 10 steps will be a time-saver as well as offering your customers a properly timed engine.

Ten Steps to Timing Gear Installation

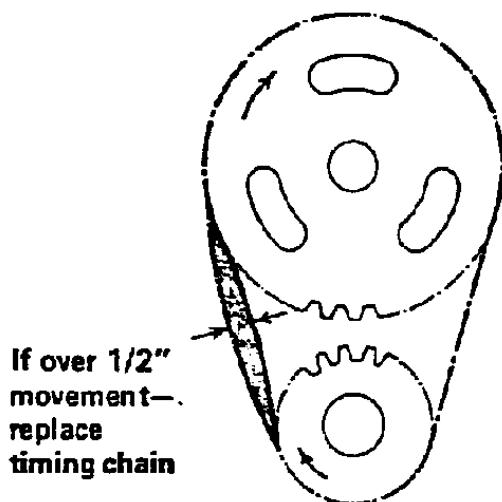
1. **INSURE CLEANLINESS** - Remove all burrs and sediment from the camshaft and the gear bore.
2. **HEAT BORES OF ALL METAL AND ALUMINUM GEARS** - Heat all metal and aluminum gears to from 200° to 250° with a hot plate, hot oil, or boiling water; be sure the gear is installed while hot to allow an easy fit and necessary tight shrinkage on shaft. This step does not apply to fiber gears.
3. **ENTER GEAR SQUARELY ON SHAFT** - Install the new gear on the shaft. Usually the new gear is installed on the shaft with the side toward you that has the timing mark. Insure that the gear is started on the shaft so the shaft aligns with the gear's keyway. If done properly, the gear will slide on freely without wobbling. Never hammer gears on the shaft as this will cause teeth to flare out.
4. **AVOID UNNECESSARY PRESSURE** - The most critical step of installation is to avoid exerting any pressure against any part of the gear except the steel hub, especially when fiber gears are involved. If a gear is driven on with a pipe or tubing, the diameter of the driving instrument or block should not exceed the diameter of the gear's bushing. (The same applies when an arbor press is used.) The proper pressure on the steel hub will insure straight alignment and prevent fiber gears from cracking.
5. **DOUBLE CHECK ALIGNMENT** - When gear is halfway on, check again to verify that the gear is going on straight and the key is aligned. Be sure timing marks mesh after installation.
6. **CHECK SHAFT** - Be sure to check the trueness of the shaft. One method is to use a surface gauge with dial indicator to insure that the shaft is true all the way around.

7. **CHECK BEARINGS** - Excessive clearance requires installation of new camshaft bearings. The surface gauge used to check the shaft may also be used to check bearings.
8. **CHECK BACKLASH** - A feeler gauge can be used to check the backlash (clearance) between the teeth of the mating gears. The backlash should not be too loose (over .010") or too tight (.003") on the gear's pitch line and should always be on the same side of the tooth. For total accuracy, check the gear at four different meshings, approximately 90° apart.
9. **CHECK THRUST PLATE** - To prevent the gear from being twisted or thrown, check that the thrust plate is at a right angle to the shaft.
10. **REPLACE TIMING COVER** - When gears have been found to run smoothly, pour oil over them and replace the timing cover, using a new gasket if needed. When the engine is fully assembled run it slowly for the first ten minutes to allow the oil to work into the gears.

Tips for Checking Timing Chains & Sprockets

1. After the timing chain cover is removed, crank the engine so all the slack is on one side.
2. Grasping the slack chain midway between the sprockets, pull the chain in and out. If the slack exceeds 1/2", replace the chain.
3. Once the chain is removed, the sprockets are checked by running your fingernail along the teeth of each sprocket. If your fingernail catches at any point, the sprocket is worn and should be replaced.

The AERA Technical Committee



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