

**MILODON**  
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**GEAR DRIVE INSTALLATION**

#13600, 13700, 13900, 14000, 14100, 14200, 14300, 14500 and 14600

**302-460 Ford, 340-360 Small Block Chrysler, Pontiac, Olds and AMC**

Congratulations! You have just purchased the finest competition gear drive on the market today. This unit is made of aircraft quality steel right here in the United States, all in Milodon's own plant. With proper installation, this gear drive will out last and out perform any other cam timing device available.

***Follow these instructions carefully.*** We recommend that the engine be on an engine stand to install the gear drive. If this gear drive is to be installed on a fully assembled engine, rather than just initially being assembled, rotate the engine to T.D.C. #1 cylinder compression stroke. Remove the stock cover, gears, timing chain. Prepare the front of the block with a stone or file, and debur the area around the front of the cam boss.

Install the mounting plate, using the Milodon supplied bolts, loosely in the stock cam retainer bolt holes. Place the 3 piece roller bearing assembly on the back of the new cam hub. Be sure the bearing has a thrust washer on each side. Installation Tip: Bearings can be held in place while assembling by coating with thick grease. Slide the hub assembly on the front of the cam. Be sure the dowel pin is in good condition then proceed to install the cam gear on the hub. The Milodon cam hub for 14200 and 14600 Fords is double drilled to stop shearing off the single factory dowel, and any high end use should use a double doweled cam to match this hub. The hub has a seven bolt verneer pattern. Bolt it up in any hole location at this time. Install the crank gear with the chamfer toward the engine.

You can now proceed with the backlash adjustment. Use a single strip of newsprint (not gloss magazine paper) 1/2" wide x 6" long, and wrap the newsprint around the idler gear, between the cam gear, idler gear and crank gear. Press the mounting plate and idler gear assembly firmly by hand toward the cam and crank gears, being sure the newsprint is in place. This centers the idler gear between the other two gears as well as sets the lash between two pairs of gears all in one procedure. A dial indicator while appearing more high tech, can not accomplish all these procedures.

Extreme care must be taken to correctly position the lower mounting holes, as these are the holes that will locate your gear drive and hold the correct lash while in operation. Holding pressure firmly against idler, with the newspaper still in place, tighten the top bolts. Using the mounting plate as drill fixture, drill and tap the bottom holes as follows. For 1/4" diameter bolts as on 14100, 14200, 14500 and 14600 use a 1/4" drill and just spot drill 1/16" deep only, then drill through using a #7 drill. Tap, using a 1/4" x 20 tap. For 5/16" bolts as on 13600, 13700 and 14000 use a 5/16" drill and just spot 1/16" deep only, drill through with a letter "F" drill, if a letter "F" drill is not available use a 17/64 drill, tap 5/16" x 18. For 13800 and 13900 drill through the plate into the block with a #7 drill. Remove plate and redrill lower plate holes to 1/4" and tap the block for 1/4 x 20 thread.

Again, extreme care must be taken to ensure the correct positioning of these holes. Also be sure the holes are drilled and taped straight. Now install and tighten all the plate mounting bolts using Loctite. Run another strip of newspaper through the gears. If the paper tears through, then the gear lash is too tight and must be reset. Gear lash that is too tight will overload the idler bearing causing failure that will void all warranty. If the mesh is correct there should only be a slight impression on the paper. If a dial indicator is used to check the lash between gears, the lash should be .006 to .008 on each pair of gears.

***Important:*** The idler axle has been installed at the factory with Loctite using 18 ft/lbs torque on 1/4-28 bolts and 22 ft/lbs on 5/16-24 bolts. It is recommended that this torque be checked before initial installation. Each time the engine is disassembled these bolts should also be removed, cleaned, re-Loctited and retorqued to the proper specs. This will provide worry free, reliability even in 500 mile races, and in street use this assembly will last indefinitely.

**Engine Specific Instruction Sheets**

### #13700 AMERICAN MOTORS

When using with stock timing cover, it must be modified and welded to clear idler gear. The outline included below indicated area to be cut. (shaded area)

Aluminum angle supplied will fit on front cover and should be welded in place. After angle is welded redrill cover hole, using existing hole as drill guide. see fig 2

### #14200 351 Cleveland Geardrive

Due to irregularities between the machined surfaces at the cam and the machine surfaces at the front main the geardrive plate will have to be shimmed accordingly. This can be done by bolting the geardrive plate to the cam area measuring the clearance between the plate and the block with a "feeler" gauge to determine the shim dimension. see fig 1 .

### #14300 427 SOHC Primary Drive Only

To install gear drive, remove stub shaft from engine and press off both stock gears. Install new stub shaft, then press on stock secondary gear.

### #14600 460 Ford

Due to irregularities in the front timing cover castings from Ford, it may be necessary to grind the inside of the timing cover in the shaded area shown in figure #3

## **TIMING THE ENGINE**

Once gear drive has been properly installed as far as lash adjustment, we can now proceed to the timing. There are no dots or line up marks on our gears because these are usually inaccurate. We start by finding the exact "straight up pattern" (no advance or retard). Once this position has been found, advancing or retarding cam timing can be done quickly and accurately without messing around with offset bushings and keyways. All Milodon gear drives use our venieer cam bolt pattern to set and adjust cam timing.

With the engine disassembled, install cam hub, less the cam gear, on the cam and crank gear on crank snout. Install degree wheel on crank and set indicator on T.D.C. for #1 cylinder. Using cam manufacturer's specs, find the #1 intake opening and move crank to that position. Place dial indicator on #1 intake and open to what the cam manufacturer used for a checking clearance. For example, if the cam specs were intake opens at 39 degrees BTDC at .050" cam lift, you would set the crank degree wheel at 39 degrees and the dial indicator on #1 intake at .050" lift.

The cam and crank are now in the "straight up" position set EXACTLY with 0 degrees advance or retard. The cam gear is now installed onto the cam hub, with no bolts as yet. It will engage idler gear teeth and allow the cam gear bolts to exactly align with hub bolt holes in only one position. (There are 7 bolt holes and, therefore 7 possible positions). Once the correct cam gear to hub position has been found, install all seven cam gear bolts. These should be torqued to 22 ft/lbs.

Scribe an indicator mark on the cam hub adjacent to any cam gear bolt hole. Mark that bolt hole with #1. Going clockwise mark the other bolt holes #2 - #7. Now using the chart supplied, you can advance or retard the cam to any position, from any position. There will be two tooth locations possible for each bolt hole position. The one for which the cam must be rotated clockwise to align holes will advance the cam. The one for which the cam must be rotated counterclockwise will retard the cam.

<b>Position #</b>	<b>Advance</b>	<b>Retard</b>
1	0	0
2	6.5	7.5
3	12	2
4	4	10
5	10	4
6	2	12
7	7.5	6.5

The Milodon "Gear Drive Install and Cam Degree" video gives clear and easy to understand direction, if needed. Contact your parts supplier for part # 14900.