427 SOHC Degree Procedure

After re-reading the article I posted in response to customers asking how to time the cams, I realized that it was not as clear as it could have been. It has been revised to include a finer level of detail for those just acclimating themselves to this engine. Below are photos of the front of the engine with the timing cover off. I will assume for purposes of this article that a lower and upper chain (as in the first photo) are being used which is how it came from the factory. The second photo is of the Milodon gear drive that we use on most of the engines we build. Separate detail will be added for gear drive set up. Unfortunately in our era of litigation, the procedures recommended herein are only for reference and neither Racedyne nor any of its employees or affiliates accepts any liability of any kind for any reason. All parties agree that these procedures in whole or in part are done completely and solely at your own risk.

Figure 1; Internet picture of original chain drives

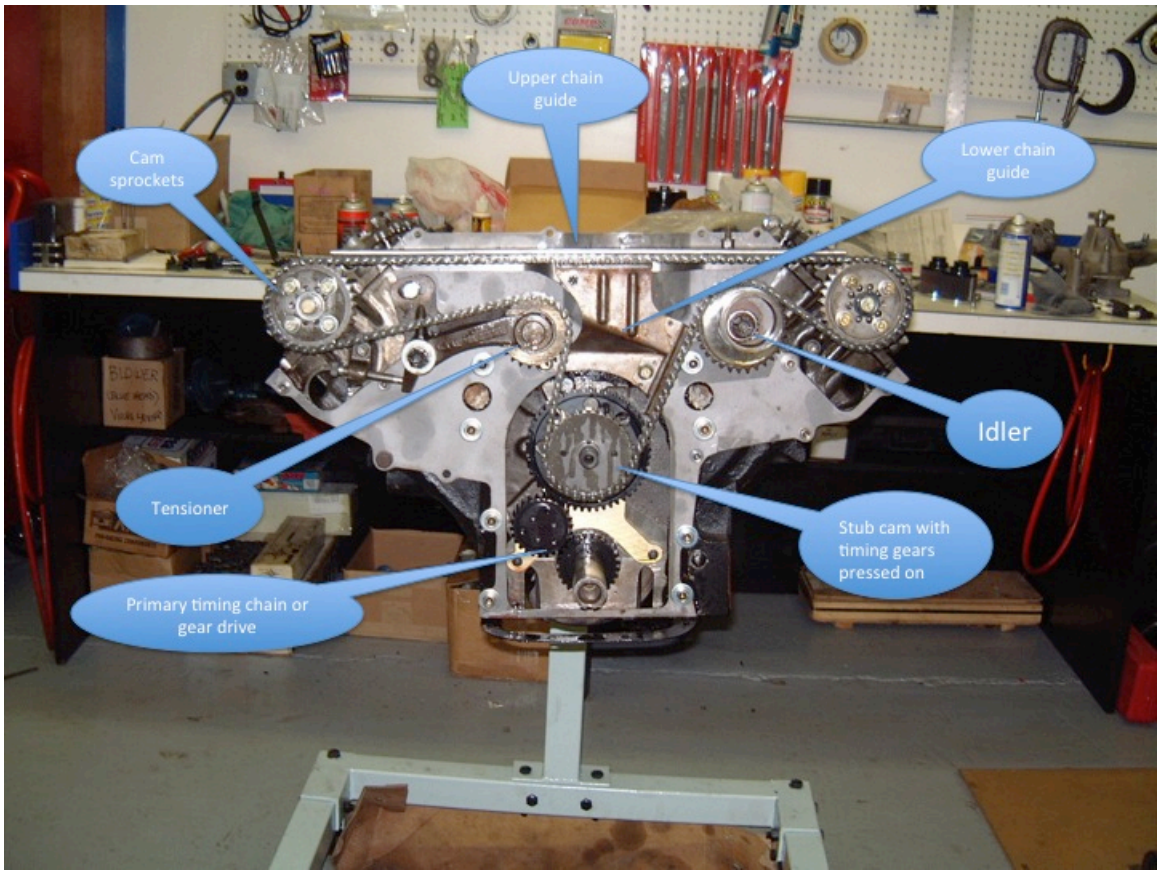

Figure 2; Milodon gear drive installed on stock cammer

Step 1: Preparation

Presuming there are timing marks on the lower (main) timing sprockets, install and align them as you would any other V8 so that the crank sprocket mark faces up and the stub cam sprocket mark faces down directly aligning the marks. If for some reason you have a degreed crank sprocket, use the 0 key way. For the gear drive, there usually are no marks on the crank or cam gear. TDC will need to be determined and then marked on the two gears (use a white paint marker or something that won't rub off). It doesn't matter what position any of the gears or stub cam sprocket are prior to applying the TDC mark is as long as the mark isn't removed after TDC has been located. Install and correctly locate TDC on the degree wheel (Hint, lay the chain over the crank snout prior to putting the degree wheel and pointers on) and then *ALSO position another pointer at 90 BTDC (so it will be on the drivers side or left bank), which will act as a TDC pointer for number 5 cylinder.*

Remove the rocker arm spacer clips and slide all rockers out of the way.

Step 2: Component installation

Install the idler (torque to 120 ftlbs.), tensioner and cam sprockets (be sure to lubricate the sprocket to cam register interface with a thin film of grease). Only install the Center bolt on the cam sprockets, do not torque them down at this point. A snug is all that is needed. Snug the tensioner but do not torque. The tensioner must be fairly snug and the position (smaller) bolt must also be just a ¼ turn or so from tight. If it is too loose, when torqued, the cam timing will retard.

Step 3: Chain installation and alignment

If Racedyne, Crane or factory cams are used, with the engine at TDC, rotate them so that the 0 degree mark on the cam journal lines up with the mark on the cam journal cap (see caption 3&4 below). It may not line up exactly due to valve events so use an open end to hold it in place while rotating the cam sprockets so that the timing mark on the face of the sprocket (see caption 5 below) is perpendicular with the head. In other words, if the head or engine bank was rotated so that it was parallel with the floor, the timing mark should be straight up (like the crank sprocket). Install the chain, which may require the help of a friend while the cams and sprockets are held in position. Install but don't tighten the guides yet.

Figure 3 Rotate cams with an open end via one of the two flats

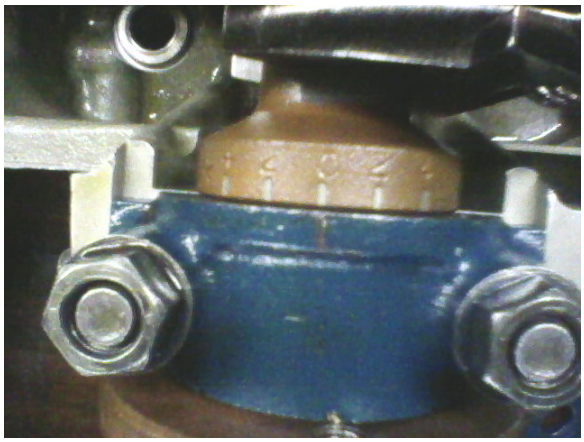

Figure 4: Rotate the cams so the degree marks line up as closely as possible to 0

Figure 5; Note timing Dot on the original cam sprockets

Step 4: Chain tension and timing

Torque the chain tensioner adjuster bolt to 110 INCH pounds (not ftlbs.) and ensure that the tensioner has been secured as per the procedure above. As you know cylinders 4&5 rockers can't be disengaged. Rotate the engine twice completely around (the cams won't rotate past the valve spring pressure) to TDC so that the timing mark on the face of the cam sprockets are perpendicular to the head and re-torque the chain (it will have lost tension). Repeat this procedure until the torque is consistently 110 inch pounds. If it takes more than 2 or three cycles, something is wrong. Once the chain tension is set, torque the tensioner to 120 ftlbs for the large bolt and 50-55 for the position (5/8) bolt. Re-check that when the engine is at TDC the cam sprocket marks should be very close to perpendicular to the head (they wont be exact) and then use an open end to rotate the cams while inserting the roll pin in the front of the cams in the hole that it most closely lines up with the cam 0 degree mark and cam journal mark (caption 4).

Step 5: Setting intake centerline

Install one perimeter cam bolt on each cam (snug) and reposition the rockers over cylinder 1 (5 is of course already positioned) valves and replace the rocker retaining clips. Set up a dial indicator on the Intake valve of number 1 on the retainer somewhere and use a feeler gauge to take up any lash (0 lash). Rotate the engine to 108 ATDC (or wherever the desired centerline) and then (be sure the center cam bolts are snug but not torqued). *Rotate the ENGINE so that you verify* the cam lobe is at its highest lift. Rotate the engine clockwise until the dial indicator reads 0.066 down

(which is 0.050 lobe lift) from max lift and note the mark on the degree wheel. Rotate the engine counter clockwise until the dial indicator reaches max lift and then descends 0.066, note the degree wheel mark. Add the two degree marks together and divide by 2, that is the centerline. For example, if the two marks at + and – 0.066 were 112 and 104 it would be 112+104=216/2=108.
If the centerline is correct, this cam is finished. If not, adjust the locating dowel + or – to correct and repeat the procedure. Install and snug the remaining perimeter bolts (I torque them all at once when I have finished with both cams: 20 ftlbs for the perimeter bolts and 55-60 ftlbs for the center bolt).

Step 6: Timing the left (driver) cam

Rotate the engine so that the TDC mark on the degree wheel is now on the second pointer (the one 90 degrees before the TDC for number 1 cylinder and repeat the above process. Be careful that the engine did not get rotated one full turn from the previous position (which is easy since one would naturally continue on clock wise from the previous cylinder) or the drivers cam will be 180 degrees out of phase. A quick check to verify is with the engine at TDC (cylinder 1), both cam sprocket timing marks and the 0 degree cam/cap marks should be close to where they were in step 3

Step 7:

This is for convenience, after you have ensured that both cams have been degreed to the desired position, take a reading with a dial gauge at TDC for number 1 cylinder (with whatever lash setting being used, I.e. 0.020 for factory and obviously on overlap and not compression) and note the intake vale lift. Then swap the dial gauge to number 5 cylinder (two dial gauges makes it much faster) and take a reading on the EXHAUST valve again at TDC for number 1 cylinder. Note the lift. From now on, with ***these cams only***, anytime centerline verification is needed, simply rotate the motor to TDC overlap and read the lift. This is really convenient if a midnight thrash has been done and some of the timing marks on the sprockets are either obscured or in the wrong position. As long as the lift is correct, its good to go.

One final note:

After the above procedure and prior to installing the front cover, loosen the tensioner bolts slightly and back the tensioner off so that there is no tension on the chain (it doesn't have to be too sloppy). Install the front cover, oil pan (if not already on) and water pump then torque in place. Re-tension the chain to 110 inch pounds and it is ready to go. This procedure prevent abnormal front cam bearing ware (the first stub cam bearing).