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HOW TO DEGREE IN YOUR CAMSHAFT

Degreeing in your camshaft means synchronizing the camshaft's position with the crankshaft. A few degrees of misalignment can affect the engine's operation dramatically. If there were no manufacturing tolerances, you would only need to line up the marks on the timing chain sprockets and the cam would be degreed, but with a group of components (the camshaft, crankshaft, timing chain, and sprockets) all with their own standards and tolerances that when installed, can stack up against you. You can never be sure that the cam is in its correct position. For best performance, you must degree in your Web-Cam camshaft. The basic tools required are a degree wheel, a stable pointer that can be mounted to the engine, a dial indicator with at least one inch of travel in .001" increments, a stand that mounts it to the engine, and a positive stop device to locate TDC. Web-Cam offers a complete cam degreeing kit. Please call for more information.

If you change your timing belt or chain, tensioner, cut your head, or deck your block, you must degree in your cams.

FINDING *TRUE* TOP DEAD CENTER (TDC)

DISCONNECT THE BATTERY! ***Do not*** use the starter to perform any of these steps. To find Top Dead Center use a piston stop, to stop the piston in the same position on either side of TDC and take readings from the degree wheel. You will then split the difference in these readings and move the pointer this amount, making it the true TDC point.

- First mount the degree wheel on the end of the crankshaft, and rotate the engine to approximate TDC
- Mount the pointer and line it up at zero on the degree wheel.
- Now rotate the engine to move the piston down into the cylinder. Install your positive stop device into the spark plug hole and extend the bolt.
- ***Turn the engine by hand***, rotating it until the piston comes up and stops against the piston stop bolt.
- Look at the degree wheel and write down the number of degrees shown by the pointer.
- ***Turn the engine by hand*** in the opposite direction until the piston comes up and stops on the piston stop bolt again.
- Go back to the degree wheel and write down the degrees it now reads.
- Add these two readings together and divide the answer by two.
- Now either move your pointer by this many degrees, or carefully loosen the degree wheel (without disturbing the position of the crankshaft) and move the wheel this required amount.
- Retighten the bolts, and rotate the engine again making sure that the readings on each side of TDC are equal degrees away from zero. If they are, the zero on the degree wheel will now be the true TDC point.
- Remove the positive stop device from the spark plug hole.
- After you're done finding *true* TDC proceed to the following page

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FINDING INTAKE LOBE CENTER

Remove ***ALL*** lash. With your dial indicator on the retainer or follower, rotate the engine in the direction it would normally turn, and come up to .050 inches of lift. Write down that figure from the degree wheel. This is your opening figure. This is when the intake opens BEFORE Top Dead Center. Example would be 10 degrees on the degree wheel BTDC.

Now go over the top on the lobe until your indicator is .050 inches off the Base Circle. Now you should be where the intake closes AFTER Bottom Dead Center. Keep in mind to continue turning the engine in the same direction it runs and DO NOT BACK UP. Example would be 39 degrees on the degree wheel ABDC.

You can now calculate your duration. The valve opens at 10 degrees, plus it closes 39 degrees, plus 180 degrees (the distance in degrees between TDC and BDC). Your duration at .050 inches of lift would be 229 degrees.

+ 10°	Opening Before Top Dead Center (BTDC)
+ 39°	Closing After Bottom Dead Center (ABDC)
+ 180°	Distance from Top Dead Center (TDC) to Bottom Dead Center (BDC)
= 229°	Total duration @ .050 inches of lift

You can now calculate your lobe centerline. Divide your total duration by 2 and ***subtract*** your intake-opening figure. This would normally be the smaller number of the two figures.

229° / 2 = 114.5°
114.5° - 10° = 104.5° 104.5° would be your lobe centerline.

Please Note:

If you have a low overlap cam, the intake opening may be AFTER TDC, if so, you will have to SUBTRACT that figure from the closing number and add 180. This will be the duration at .050 inches of lift.

- 10°	Opening After Top Dead Center (ATDC)
+ 39°	Closing After Bottom Dead Center (ABDC)
+ 180°	Distance from Top Dead Center (TDC) to Bottom Dead Center (BDC)
= 209°	Total duration @ .050 inches of lift

You can now calculate your lobe centerline. Divide your total duration by 2 and ***add*** your intake opening figure. This would normally be the smaller number of the two figures.

209° / 2 = 104.5°
104.5° + 10° = 114.5° 114.5° would be your lobe centerline.

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FINDING EXHAUST LOBE CENTER

Remove ***ALL*** lash. With your dial indicator on the retainer or follower, rotate the engine in the direction it would normally turn, and come up to .050 inches of lift. Write down that figure from the degree wheel. This is your opening figure. This is when the exhaust opens BEFORE Bottom Dead Center. Example would be 44 degrees on the degree wheel BBDC.

Now go over the top on the lobe until your indicator is .050 inches off the Base Circle. Now you should be where the exhaust closes AFTER Top Dead Center. Keep in mind to continue turning the engine in the same direction it runs and DO NOT BACK UP. Example would be 8 degrees on the degree wheel ATDC.

You can now calculate your duration. The valve opens at 44 degrees, plus it closes 8 degrees, plus 180 degrees (the distance in degrees between TDC and BDC). Your duration at .050 inches of lift would be 232 degrees.

+ 44°	Opening Before Bottom Dead Center (BBDC)
+ 8°	Closing After Top Dead Center (ATDC)
+ 180°	Distance from Top Dead Center (TDC) to Bottom Dead Center (BDC)
= 232°	Total duration @ .050 inches of lift

You can now calculate your lobe centerline. Divide your total duration by 2 and ***subtract*** your exhaust closing figure. This would normally be the smaller number of the two figures.

232° / 2 = 116°
116° - 8° = 108° 108° would be your lobe centerline.

Please Note:

If you have a low overlap cam, the exhaust closing may be BEFORE TDC, if so, you will have to SUBTRACT that figure from the closing number and add 180. This will be the duration at .050 inches of lift.

+ 26°	Opening Before Bottom Dead Center (BBDC)
- 10°	Closing Before Bottom Dead Center (BTDC)
+ 180°	Distance from Top Dead Center (TDC) to Bottom Dead Center (BDC)
= 196°	Total duration @ .050 inches of lift

You can now calculate your lobe centerline. Divide your total duration by 2 and ***add*** your exhaust closing figure. This would normally be the smaller number of the two figures.

196° / 2 = 98°
98° + 10° = 108° 108° would be your lobe centerline.

ADJUSTING LOBE CENTER SEPARATION

You may move the cam to the desired lobe center and check again. If you move the lobe centers closer together, it would normally give you more low to mid range. If you move the lobe centers apart, it would normally give you more mid to top range. Not all engines can handle tight lobe centers. Certain applications require wider lobe centers, such as stock fuel injected engines or blown applications. For our best recommendation, please call us directly.

CHECKING CLEARANCES

Always check all clearances (i.e. piston to valve, valve to valve), check for coil bind, and check retainer to guide clearance when you degree in your cams. If you need help, please call us directly. Thank you.