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# Cam Degree Kit - 20R/22R/RE/RET
# Part #1090010

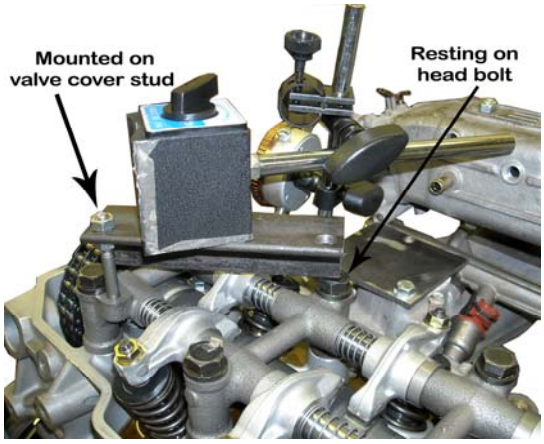
Thanks for purchasing your cam degree kit from LC Engineering!! This is a universal kit that will fit just about any applications, but we have supplied specific adapters for your 20R/22R/RE/RET. Since this kit has a dial indicator with a magnetic base it can also be used checking flywheel runout, crankshaft endplay and even ring gear backlash!

**Degree Wheel Installation**

First turn your engine over by hand to top dead center (compression stroke). Remove two of the outer bolts (3 O'clock and 9 O'clock positions) that hold the power steering pulley onto the crank pulley (if equipped). You will then use the 2 aluminum spacers, bolts and washers to install the degree wheel onto your crank pulley. Install the washers onto the bolt then put the bolt through the degree wheel and with the spacers behind the wheel. The bolts will then thread directly into the crank pulley. See pics below.


**Magnetic Base Plate Installation**

With the valve cover off you will use a valve cover stud to mount the magnetic base plate. Install one of the supplied nuts onto the valve cover stud. Install the plate over that stud and adjust the nut so the plate will rest flat on the nut with the opposite corner resting on top of the head bolt (or stud). Install the other supplied nut on top of the plate and snug it down to hold the plate from moving. See pic below.




**Finding True Top Dead Center (TDC)**

1. The first step is to Install the degree wheel on the crankshaft, then make a pointer for the degree wheel using a stiif piece of wire, such as a metal coat hanger. Loop the opposite end of the wire onto one of the engine bolts (usually you can use a timing cover or water pump bolt).
2. Remove all spark plugs to make it easier to turn the engine by hand.
3. Rotate the crankshaft to approximate TDC on the #1 cylinder, compression stroke. The camshaft dowel pin will be in the 12 O'clock position.
4. Adjust your fabricated pointer to the "0" mark on the degree wheel.
5. Rotate the engine by hand (not using the starter) 90º. Remove #1 cylinder spark plug.

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6. Adjust your piston stop so that the bottom of the stop is exactly 2” from the spark plug seat part of the stop. This is very important; if you adjust it too far down it can damage your valves and/or piston.
7. Rotate the engine (by hand) counterclockwise until the piston contacts the piston stop. Mark and record the number that the pointer is at on the degree wheel.
8. Rotate the engine (by hand) clockwise until the piston contacts the piston stop. Mark and record the number that the pointer is at on the degree wheel.
9. Add the 2 recorded numbers together and divide the answer by 2. Record that answer.
10. The answer from the previous step will be where your pointer will go now. For example: If you get 11º after top dead center (left side of “0” on degree wheel) and then you get 5º before top dead center (right side of “0” on degree wheel). You will add 11º + 5º = 16º. Then 16º ÷ 2 = 8º. You will now adjust your pointer to point at the 8º mark before top dead center (right side of degree wheel).
11. Recheck TDC by rotating the engine (by hand) counterclockwise until the piston contacts the piston stop. Record the number that the pointer is at on the degree wheel.
12. Rotate the engine (by hand) clockwise until the piston contacts the piston stop. Record the number that the pointer is at on the degree wheel.
13. The numbers recorded this time around should be the same. If not readjust the pointer and recheck TDC. For example: If you use the same example from step #9 your pointer should be at 8º on both sides of “0”.
14. Once you have found true TDC remove the piston stop from cylinder head.
15. Install a dial indicator (with magnetic base and fixture plate). Position the indicator on the #1 intake valve retainer so that the dial indicator shaft will travel parallel to the valve.

**Cam Card Specifications -** Review the cam card provided with your camshaft. Find the intake center line the cam was ground on. If not provided you can compute the center line by adding the intake opening degrees at .050” valve lift to the intake close degrees at .050” valve lift plus 180º crank rotation. Divide this number by 2 and subtract the smaller number. This is your intake center line of the cam you are about to degree. Check every cam, they will differ from cam to cam. Example below.

Opens 13º + Closes 37° + 180° = 230°

230° ÷ 2 = 115°

115° - 13° = 102° Lobe Center

**Note:** Always rotate the crankshaft in the running rotation (clockwise looking at the front of the engine). Never reverse crankshaft rotation to achieve a reading when degreeing the camshaft.

**Step 1: Find Valve Open @ .050” Lift -** With your indicator on the retainer and the rocker set at zero lash on the base circle, zero the dial indicator. Rotate the crank until the indicator reads .050” valve lift off base circle. Read the degree wheel and record. Example would be 11º on the degree wheel BTDC.

**Step 2: Find Valve Closes @ .050” Lift -** Rotate the crankshaft until the dial indicator reads .050” off the base circle (valve closing). Read the degree wheel and record. Example 39° on the degree wheel ABDC.

**Step 3: Calculate Lobe Center -** To figure the exact lobe center add intake open number and intake close number plus 180º. Divide this total by 2 and subtract the smaller number (usually the intake open number). Example below.

Intake open 11° + Intake close 39° + 180° = 230°

230° Duration ÷ 2 = 115°

115° - 11° = 104° Lobe Center

In our example your cam is currently set to a 104° Lobe Center. Compare your actual findings with the information from your cam card and adjust the cam accordingly.

**Step 4: Adjusting The Camshaft -** Loosen the three 10mm lock nuts on the cam gear. Advance or retard the gear to achieve the proper intake center line for your specific cam. Torque the nuts to 8ft.-lb. And recheck your numbers to assure a proper setting.
Once indexed correctly, using a sharp small chisel, align with the zero mark on the gear hub and make a reference mark on the outer gear for future reference. You have now completed the degreeing process.
Calculating Duration. To calculate duration at .050 valve lift . Add the degrees when the valve opens @ .050” to the degrees the valve closes @ .050” plus 180°. Example below.

Opens 11º + Closes 39º + 180º = 230º Duration @ .050” Valve Lift

## Performance Tips

To change the performance of your engine, you can advance the cam to achieve a lower RPM torque curve (bottom end power) or retard the cam to achieve a higher RPM torque curve (top end power). Make small adjustments and record your results. This way you can always refer back to your previous settings.
Ignition timing and cam timing are not the same. Since the distributor is turned by the camshaft, always recheck your ignition timing after adjusting the cam timing

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