

DEGREEING CAMS

by John Kouba

This article is particularly directed toward the competition minded but can be of value to anyone desiring to get the last extra BHP from their engine.

To derive all that a camshaft was designed to deliver, it must open and close at the proper time. The difference becomes more significant when the stock cams are replaced. With the stock setup an error of + or - $4\frac{1}{2}^{\circ}$ can exist assuming that the crank pulley and timing chest read a good T.D.C., and that the engine has been setup according to the workshop manual. Assuming that the timing chest marks indicate T.D.C. is unwise, Jim Gallagher's was off by several degrees.

Therefore, the first step is to find T.D.C. At T.D.C. (top dead center) the #1 piston is at the highest position it attains. To find this a sparking plug should be drilled through its center with a $1/8 - 1/4$ " bit, care being taken to keep things square. The task will be difficult, but perseverance will be rewarded accordingly. The crank pulley bolt should be removed and a timing disc (available from most good auto parts stores) is inserted between bolt and pulley. The engine should be rotated in a clockwise direction (so the crank bolt does not back out) with a long handled wrench so that the approximate T.D.C. indicated on the timing chest is reached. The cam covers are removed and the trick sparking plug inserted in cylinder one. A steel rod is placed through the hole (a snug fit is imperative). A dial indicator is placed on the cam cover mating surface and the relative height is judged by the rod passing through the plug. The engine is now rotated slowly back and forth to get the highest point of the piston arc. Securely tie a piece of stiff wire to the timing chest and point the end at the T.D.C. mark of the timing pulley.

Now, to test the T.D.C. rotate the engine clockwise for .200" of piston movement. Note the position of the timing wheel. The rotate counterclockwise of T.D.C. for .200" movement and note the reading. The two should be equiangular from T.D.C. i.e. 20° after T.D.C. and 340° or 20° before T.D.C. If reading is not within + or - 2° , it can be done better.

Now look up manufacturer's spec on cam to see when the intake valve should open. Rotate the engine in a clockwise direction until a .001" feeler or a piece of tissue paper is just trapped under the cam. Note: more than a complete turn may be necessary due to the motor requiring two revolutions for one cycle. Now note the reading on the timing disc. This is when the cam is open. If it is within 1° or 2° , you're lucky and you can go on to do the exhaust cam. If the difference is less than 9° the appropriate offset dowel should be inserted between sprocket and cam. These dowels can be had from Lotus East. If the difference is more than 9° , take up 9° by one tooth change and use an offset dowel for the balance. Now go to the exhaust cam and repeat procedure. With care you can expect to be within 2° .