



## INSTRUCTION SHEET FOR USING THE LUNATI CAMS 10 & 14" DIAMETER DEGREE WHEEL

These instructions are specifically intended for use with the LUNATI, LLC Professional Degree Wheel when mounted on the LUNATI, LLC Universal Adapter Hub. The LUNATI, LLC camshaft Data Sheet should be used to record cam lift and duration information and to calculate cam lobe centers and phasing (advance or retard cam timing). These instructions should not be used as a "How to degree a camshaft" guide for beginners, but as an aid for the experienced engine builder who wants to accurately and thoroughly check out a camshaft and permanently record the information.

**EQUIPMENT NEEDED:** LUNATI Professional Degree Wheel; LUNATI Universal Degree Wheel Adapter Hub; LUNATI Cam Data Sheet; a dial indicator with at least .500" travel mounted on an adjustable, magnetic base stand.

**STEP 1: Attaching the adapter and wheel to the crankshaft:** Select the correct reducer sleeve and bolt that fits your crankshaft and slip them into the Hub with the knurl-nut OUT (away from the crankshaft). Securely tighten the assembly on to the front of the crankshaft. Make sure that the bolt is tight enough so that the engine can be turned backwards without loosening the hub assembly. Remove the knurl-nut and slip the degree Wheel onto the Hub. Replace the knurl-nut and snug it finger tight to secure the degree wheel. **IMPORTANT:** For checking cam phasing, lobe centers, and overlap use the side of the wheel marked 0-180-0 degrees. For checking advertised and .050 tappet lift duration, use the side of the wheel marked 0-360 degrees and go to step 5 on this instruction sheet.

**STEP 2: Finding the exact top dead center:** Attach a suitable pointer to the front of the engine and adjust it to the front edge of the degree wheel. Mount the dial indicator stand on the deck surface of the block and adjust the indicator, so that the plunger extends about 1/8" into the cylinder to be checked. The plunger should contact the piston on its flat surface as close to the center as possible. Now rotate the crankshaft until the piston rises to the top of its travel. Push down on either the left or right edge of the piston to rock it in the bore and then "zero" the dial indicator. Loosen the knurl-nut on the adapter hub and adjust the degree wheel until the pointer lines up with 0 degrees TDC. Now rotate the crankshaft backwards (counter clockwise) until the indicator reads MORE than .050 down from TDC. Putting pressure on the SAME SIDE of the piston as before, rotate the crankshaft (clockwise) until the piston rises to EXACTLY .050 below TDC. If the degree wheel reads more or less than 12 degrees ATDC, loosen the knurl-nut and adjust it to 1/2 of the difference. Repeat this procedure until the degree wheel reads exactly the same at .050 before and after TDC. You have now located the EXACT TDC of that piston in that cylinder on the degree wheel.

**STEP 3: Checking overlap and lobe lift:** Relocate the dial indicator so that the plunger contacts the top edge of the INTAKE tappet and is parallel to the centerline of the tappet bore. Rotate the crankshaft clockwise until the tappet is at the bottom of its travel on the base circle of the camshaft. "Zero" the indicator. Continue to rotate the crankshaft until the tappet lifts to the manufacturer's checking height for advertised duration (this is normally calculated by dividing the recommended valve lash by the rocker arm ratio and then adding 0.003. Record the number of degrees BTDC in the correct square on the cam data sheet (side 2). Continue to rotate the crankshaft until the tappet reaches its maximum lift and record this in the corresponding square on the cam data sheet (side 2). Now relocate the dial indicator to the exhaust tappet and repeat this procedure in a reverse order. In other words, check for maximum lobe lift first and then check for the number of degrees ATDC when the tappet reaches the checking clearance on the CLOSING side of the cam lobe.

**STEP 4: Checking the cam phasing and lobe centerlines:** Rotate the crankshaft clockwise until the INTAKE tappet rises to its maximum lift and "zero" the indicator. Now rotate the crankshaft backwards (counter clockwise) until the tappet drops MORE than .050 down from its maximum lift. Now rotate the crankshaft (clockwise) until the tappet is EXACTLY .050 below maximum lift. Record the number of degrees ATDC in the correct square on the cam data sheet (side 1). Continue to rotate the crankshaft until the tappet has risen to its maximum lift and then drops EXACTLY .050 below full lift. Record the number of degrees ATDC in the correct square on the cam data sheet (side 1). Follow the directions at the top of the cam data sheet to calculate the INTAKE lobe centerline in degrees ATCD. Now relocate the dial indicator to the EXHAUST tappet and repeat the above procedure. Please keep in mind that the exhaust lobe centerline occurs BEFORE TDC. Follow the directions at the top of the sheet (side 1) to calculate the cam lobe centerline separation in CAM DEGREES (commonly called the "LOBE CENTERS"). At this point, you may decide to "degree in" the cam according to the data on one cylinder only, or you can continue this procedure on the rest of the cylinders and then "degree" the cam according to the average results.

**STEP 5: Checking the total (advertised) duration and the .050 tappet lift duration:** If you are proceeding directly from step 1, attach a suitable pointer to the front of the engine and adjust it to the front edge of the degree wheel. If you have been checking the cam lobe centers, turn the degree wheel around so that the 0-360-0 side faces to the front. Locate the dial indicator so the plunger contacts the top edge of the tappet on the lobe that you wish to check. (See step 3). Rotate the crankshaft clockwise until the tappet has dropped to its lowest point and is on the BASE CIRCLE of the cam lobe. "Zero" the dial indicator. Continue to rotate the crankshaft clockwise until the tappet lifts to the checking height that you wish to use. Loosen the knurl-nut on the adapter hub and adjust the degree wheel to 0 DEGREES (TDC). Now continue to rotate the crankshaft until the tappet has risen to its full lift and then drops to the checking lift on the CLOSING side of the lobe. Please note that the degree numbers on the outside circle increase in a COUNTER-CLOCKWISE direction and now show you the EXACT duration of the cam lobe without the necessity of any calculations. Record the cam duration in the correct square on the cam data sheet (side 2) and repeat this procedure to check the duration at different lifts. Repeat step 5 on the rest of the cylinders to check all of the cam lobes.

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