Setting up and Timing a K2F Magneto

It seems like this topic keeps coming up, and I have to write it over and over. Hopefully, one comprehensive discourse will settle it. If anyone finds anything confusing, please let me know so I can revise.

The following procedure assumes the magneto armature is properly centered and aligned. This part of magneto set up is not a DIY project, and is best left to competent magneto rebuilders.

1) The first step in setting up a Lucas K2F magneto is to check the point gap on each ramp. The proper gap is 0.012 inch, but it is far more important the gap be the same on both ramps, than hitting 0.012 exactly. See Note 5) below. I have measured the timing difference for unequal gaps, and I find the timing difference between cylinders varies 2 degrees for each 0.001 inch difference in gaps.

Checking the gaps is best done with the magneto off the bike, but it can be done on the bike. Remove both spark plugs so you can rotate the engine without fighting the compression. Rotate the engine (forward direction) until the rubbing block shoe is fully on the ramp, just past the leading edge of the ramp (the mid point of the ramp is irrelevant to timing, so do not use it as your gap reference point). Carefully insert a thickness gauge being careful that you are not wedging the gap open with the gauge, either because the gauge is too thick, or because it is cocked going in.

Repeat on the other ramp. There should be no measurable difference in the gaps, or at most 0.001 inch. If this is the case, proceed to Step 6.

2) There are two reasons why the gaps are different; most probable is the cam ring is not centered in the magneto housing, the other is a poorly machined cam ring having a greater thickness on one ramp vs the other. Cam rings manufactured in the 50's to 60's suffered from being made on machinery worn out by the demands of WWII. Newly made cam rings are made on CNC machines and are spot on.

Either way, the cam ring has to come out. Before removing the cam ring, make a note of which ramp has the greater gap. Remove the contact block. The cam ring

has a small hole on each ramp (for oil wicks), and a small Allen key can be inserted into each hole and the ring pulled out. If the ring is stuck, try wedging a small tool with an "L" shaped tip behind the ring - there is a groove at the rear of the ring into which the tool tip can be placed. Wedge evenly around the ring as the fit is close and it will jam if cocked.

When the ring is out, measure each ramp thickness with a micrometer to be certain poor machining is not the cause of gap difference. A ramp thickness difference less than 0.005 can be corrected by the centering of the cam ring. Consider a new cam ring if the thickness difference is greater than 0.005.

Visually inspect the leading edge of each ramp. A normal ramp has a rather abrupt rise, a worn ramp has a gentle slope. The trailing edge of the ramp is less likely to wear, thus you can use the trailing edge as a guide to evaluate the profile of the leading edge. A new cam ring is necessary if the ramp profile shows wear.

Equalizing the gap requires the cam ring be shifted on the diameter joining the two ramps. In theory, the shift needs to be 1/2 the gap difference, and the ramp with the larger gap must be shifted away from the ring center.

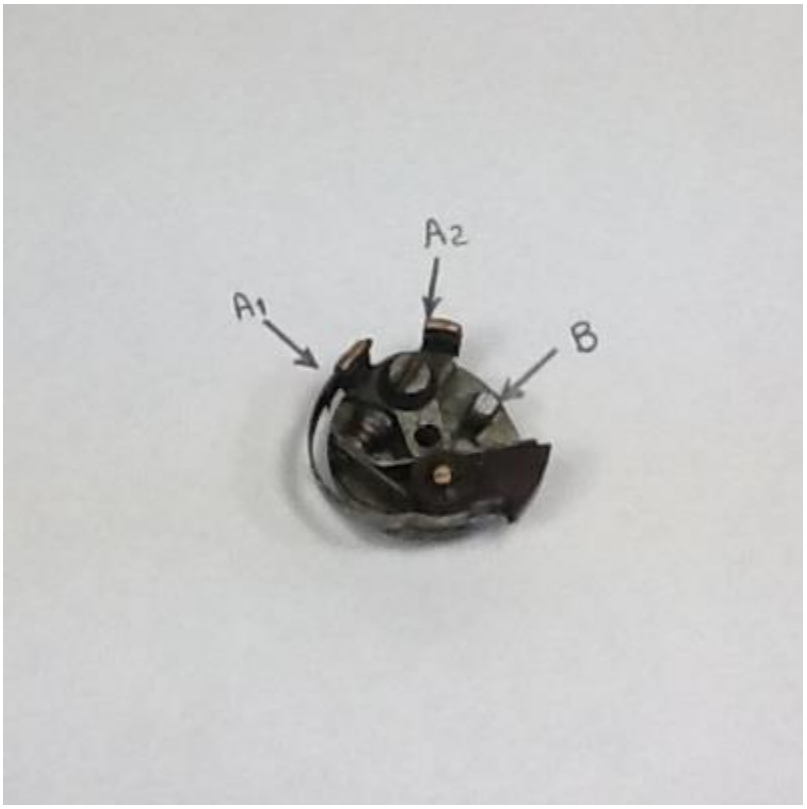
3) Sand a small amount off the back side of the cam ring behind the ramp with the larger gap. Start out by sanding an arc of no more than 45 degrees. On the opposite backside, place a strip of cellophane tape behind the ramp with the smaller gap. Start out with a strip covering an arc no more than 30 degrees.

4) Replace the cam ring, and contact block. Check the point gaps. A small difference can be corrected by increasing the arc covered by the tape, rather than doubling the tape thickness. Work carefully, you do not want to screw up a $100 cam ring.

5) When the gaps are equal or within 0.001 inch, check that the gaps are the specified 0.012 inch, if not, set to 0.012. Remove the cam ring again, oil the felt wick in the groove inside the cam ring housing. If the wick is missing, make one from felt weatherstrip. Cut felt plugs using a leather punch and plug the holes in the ramps so the plugs contact the felt strip in the groove, and the rubbing shoe.

6) Install the cam ring, and contact block. Do not install the long screw that

secures the contact block. Using small alligator clips, connect one lead of a VOM, set up on Ohm scale, to either lug A1 or A2, and the other lead to lug B, as shown in the photo below. Check your connections: when the points are closed, the VOM should indicate zero Ohms (or an audible sound), and when the points open, the VOM should read infinity (or no audible sound). Lug B is connected to the magneto frame (earth), thus attaching the second VOM lead to any earth point on the engine may be more convenient.



7) Set up a timing wheel on the engine's alternator rotor and install a pointer on one of the stator studs.

8.) Rotate the engine by hand, and while looking in the left cylinder spark plug hole, watch for the intake valve to come into view. Continue rotating until the valve disappears from view. At this point, the engine is approximately at bottom dead center (BDC) and is about to begin the compression stroke. Rotate the engine about 180 degrees, and with a rod or slim screwdriver in the left plug

hole, feel for the piston to come to top dead center (TDC). Rock the engine back and forth and split the difference where the piston can be felt to pass through TDC, and set the pointer and degree wheel to zero at that spot. You might want to mark the rotor for future reference.

9) If the magneto or automatic advance unit has not been disturbed from a previously running machine, the rubbing block should be on the cam near the 5 o'clock position. If it is at the 11 o'clock position, re-do step 8. If you are setting up a magneto that has been off the machine, loosen the AAU from the shaft taper.

10) Cut a small piece of 1/4 or 5/16 vacuum tubing (about 1/4 inch long) and wedge this into the tabs of the AAU, holding the yoke open (advanced position) against the return springs. Check that the tubing fully advances the yoke.

11) It is best to rotate the engine with a socket on the camshaft nut, clutch center nut, or oil pump drive worm nut, and using a long handled bar rotate the engine backwards about 35 degrees.

12) If setting up a magneto that has been off the machine, rotate the contact block until it is barely in contact with the cam leading edge at the 5 o'clock position. Press the AAU onto the magneto shaft and tighten the center bolt with the fingers only.

13) Check that the VOM leads are still as set in Step 6; the VOM should be indicating points closed at this point. Slowly rotate the engine forward until the VOM indicates points open. Note the reading on the degree wheel. Rotate the engine backwards again until points are again closed. Slowly rotate engine forward until points open, noting the reading on the degree wheel. Do this several times until you are confident your technique is producing consistent results. I have been able to obtain consistent results within 1/2 degree.

14) If the value on the degree wheel in Step 13 is not your target timing point, break the AAU on the taper and shift the contact block relative to the AAU as

necessary to bring the points opening toward the target. Repeat Steps 13 and 14 until the points open at your target timing point.

15) Now rotate the engine 360 degrees and repeat Step 13. The value on the degree wheel (at this point, the right cylinder is firing) should be within 1-2 degrees of that for the left cylinder.

16) If the point gaps were equal in Step 1, and if the cam ring machining is up to CNC standards, the specification of 1-2 degrees given in Step 3 is assured. If you cannot achieve this tolerance, consider a new cam ring (review Step 2).

17) Install the center bolt in the contact block, tighten the center bolt in the AAU, and REMOVE THE WEDGE in the AAU.

GENERAL NOTES

1) The magneto drive chain should have 3/16 to 1/4 inch up/down play in mid-run. Adjust by sliding the magneto on the three mounting studs. Caution: It is known that an overly tight chain will cause the AAU to "stick" in advanced position.

2) The lower high tension pickup goes to the left cylinder.

3) At the high tension pickups, the high tension wires should be passed thru a brass washer, then the wire strands splayed open. Do not solder. Per Norton Manual.

4) Avoid using resistor high tension wires or resistor plug caps; these were not common in the period, and may adversely affect the magneto's capacitor.

5) You may find, in some publications, a specification that the point gap should be 0.015 inch. In fact, my original tool kit included a thickness gauge, branded Lucas with a 0.015 gauge attached. My factory published manuals call for 0.012 inch, which is what I use herein.

Slick

PS ... Comments are welcome. PM me so I can revise as necessary to make this a useful "tool" for setting up a K2F.