Makes You Go Hmmm

The rotor versus the piston—understanding the physics.

BY PAUL LAMAR



Editor's note: Author Paul Lamar is by any measure an outspoken proponent of the rotary engine for aircraft use. But there are undeniable challenges in adapting the engine for light-aircraft use—all of them, according to Lamar, eminently solvable. His appreciation of the Wankel comes from an intimate understanding of its clever design. We'll permit him to take it from here.

Let's analyze the motion of an aircraft piston engine rotating at 2500 rpm. Assume the bore is 5 inches and the stroke is 5 inches. At the 3 o'clock position of the crank, the piston is moving down the bore at maximum speed. At the 9 o'clock position, the piston is moving up the bore at maximum speed. At noon and 6 o'clock the piston is stopped at the top and the bottom of the bore, respectively. The circumference of the crank is pi times 5 inches or 15.7 inches. That is 1.31 feet.

When the crank is turning 2500 rpm, that's 42 revolutions per second, and the speed of the crankpin is 55 feet per second, moving in a circle (42 rev/sec x 1.31 feet). The piston speed is therefore the same as the crankpin speed at the 3 and the 9 o'clock positions.