

decreased cooling airflow. When doing touch-and-goes, the pilot should open cowl flaps before applying takeoff power.

Frequently you will see pilots—sometimes encouraged by their instructors—keep the cowl flaps open while doing touch-and-goes. The reasoning goes something like this, “While it may hurt the engine to forget and leave them closed during takeoff, it doesn’t hurt to leave them open and searching for cowl flaps is an unnecessary distraction when you know you are going to be doing a number of touch-and-goes.” An efficiency expert might tend to agree, but an educational theorist would cringe at the thought.

The problem is that every takeoff will reinforce not using cowl flaps, increasing the probability that they will be overlooked in emergency operations. Being a pilot means learning to operate the airplane correctly under all situations, and convenient shortcuts may inconveniently lead to trouble.

Before shutting down the engine after flight, consider that you are about to end what little cooling airflow the engine is getting. Just because you stop, it doesn’t mean the engine mysteriously cools off. The same laws of cooling still apply; the only difference is that there will no longer be any airflow to help dissipate the heat. The air remaining in the cowling will be heated by residual engine heat, which may require as much as several hours to cool to ambient during the summer. Meanwhile, all the fuel lines and metering devices forward of the firewall will absorb the high temperature, causing fuel expansion. As fuel expands, it is forced back to the tank, leaving vapor in the fuel lines. It is this fuel vapor in the lines and metering devices that causes problematic hot starts. Therefore, on hot days it is a good idea to avoid high power settings after landing and to idle the engine for a few minutes prior to actual shutdown to promote cooling.

ENGINE IGNITION SYSTEMS

The aircraft ignition system provides an electric spark to ignite the compressed fuel/air mixture within each engine cylinder. The FAA requires each certificated airplane with one or more reciprocating engines to have two magnetos per engine, two spark plugs per cylinder, and two wiring harnesses connecting the magnetos to the plugs.

Some magneto designs combine two magnetos within one housing. There have been serious questions about whether dual magnetos within one housing really constitute a redundant system. The two magnetos share the same housing, magneto, and common driveshaft but have independent distribution systems, coils, and points. This gives the distinct advantage of lower weight, reduced maintenance, simpler installation, and increased space availability under the cowling.

As stated previously in this chapter, aircraft engines have four strokes per cycle: intake, compression, power, and exhaust. The beginning and end of each stroke coincide with the piston positioned either at TDC or BDC within the engine cylinder. Theoretically, the spark plug should fire when the piston is at TDC at the end of the compression stroke with expanding combustion gases pushing the piston down on its power stroke. In practice, taking advantage of piston momentum, the spark plug actually fires several degrees (of crankshaft rotation) prior to TDC. This permits time for normal combustion