COPA

Hot Starts

by TIM TIMMERMAN

It's a nice warm summer day, perfect for flying. You stop at an airport to drop off a passenger and add some fuel before returning home. You are on the ground about 20 minutes and get back in the airplane, attempting to start it using your normal procedure. The engine roars to life, then suddenly dies. You have encountered the dreaded "hot start" situation, but don't panic; once you know what is going on, it is easy to solve and get your airplane restarted and back on your way.

What happened?

When the engine is shut down after a flight, residual heat from the engine is trapped inside the engine cowl. On warmer days, this heat is enough to vaporize the fuel in the fuel system components under the cowl and forward of the firewall. Some of this vaporized fuel is pushed into the cylinders; the rest is pushed back towards the fuel tank. Once the fuel is vaporized, the engine driven fuel pump can no longer push the fuel to the injectors at each cylinder. Essentially the engine is out of fuel and will not run. The false start was a result of the residual fuel in the cylinders allowing the engine to run momentarily.

What do you do now?

Now that you know what is happening, you can apply the proper procedure to get the engine started. The engine won't start because there is no fuel flowing to the engine. There are MANY techniques out there for hot starting an airplane, but they all have one thing in common, and that's getting the vapors out and fuel to the injectors.

One way recommended by Cirrus Field Service is that you simply need to run the electric fuel pump in the prime position until fuel flow to the engine is re-established. The only concern with this approach is running the pump long enough to purge the vapor from the fuel system, but not so long as to flood the engine with too much fuel.

You've probably noticed that sometimes when you prime the engine, the electric pump seems to run at an unusually high speed, and then suddenly slows down. This slow-down is when the pump actually starts pumping fuel. If you had been watching the fuel flow gauge, you would have noticed little to no movement while the pump was running at this elevated speed, then a sudden increase of fuel flow as the electric pump slowed to its normal speed. This sight and sound picture lets you know how long to prime the engine for the hot start. The idea is to push fuel through the system just up to the injectors, but not actually into the cylinders. Remember, the engine is warm so no additional fuel is required, unlike a cold start that requires this extra fuel in the cylinders to start the engine. Run the prime pump until you see (or hear) a positive fuel flow indication then STOP. Sometimes this takes several seconds if there is a lot of vapor in the system, and other times it only takes a second or two. Now the engine is ready to start.

Step-by-Step

The following is the step-by-step procedure for a Hot Start:

1. Mixture control ..... full rich
2. Throttle ..... fully open
3. Electric fuel pump ..... prime until fuel FF just registers, then go to boost position
4. Throttle ..... cracked or partially open
5. Starter ..... engage

What if I flood the engine?

If you have flooded the engine (fuel dripping from engine drain under cowl), don't worry. It's easier to start a flooded engine than it is to start an engine that has no fuel going to the injectors (the hot start scenario). Just follow the procedures in section four of the POH to start a flooded engine.

Additional notes and tips

- Starting a hot engine is likely to require a little extra cranking on the starter, but it shouldn't be excessive. Be sure to follow the POH for starter cranking and cool-down limits to avoid damaging your starter. Typically crank for 10 seconds, then let it cool for 20 seconds. Abused or burnt-out starters are not covered under warranty.
- During short stops such as for refueling, some pilots like to open the oil door for additional engine cooling and (hopefully) an easier hot start. If you do this, just be sure you remember to secure the oil door before re-starting the engine. You do another pre-flight prior to each leg of your flight, don't you?
- For additional information about Hot Start procedures, refer to Continental Motors publication TEC-1 "Tips on Engine Care."

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