

## Fuel Systems

fuel to the engine, but — more importantly — airplanes with fuel injection are highly susceptible to the termination of fuel flow. Getting a fuel-injected engine started again after running a tank dry can be a major problem.

Finally, flight instructors should be aware that when they switch off the fuel selector to simulate an emergency, they have created one! There have been numerous forced landings when the fuel selector failed after being switched off. For a number of years, instructors changed their tactics and went to pulling the mixture control, but even that can result in an emergency if there is a control failure. A dead engine is a windmilling engine that creates staggering drag. Instead, go to zero thrust by pulling back the throttle; at least the engine is still running.

Both manual and electric primers supply a small amount of fuel to the cylinders for engine starting. The manual type is a single-action piston pump, which requires the pilot to pull out the primer, creating a partial pressure that causes fuel flow into the primer cylinder. When pushed in, the fuel is forced through a primer distributor to either individual cylinders or the intake manifold, depending on the type of system.

The main advantages of a manual primer are that it is inexpensive and simple. A significant disadvantage is the fire hazard that results from fuel routed through the cabin to the primer. During preflight, take a very close look at the primer itself, in front and behind the instrument panel, to make sure there is no fuel leak. Under the cowling, look for and check the condition of the fine primer tubing that runs into the cylinders or intake manifold.

The electric primer is a solenoid plunger. It acts like a door, permitting fuel to flow from a source pressurized by the auxiliary fuel pump to the primer distribution system. Because it is controlled by a remote switch in the cabin, you would preflight this system the same way you would a manual engine primer. The advantage is that there are no fuel lines running into the cabin, so you don't have to worry about a potential fuel leak.

The fuel pressure gauge takes its measurement at the carburetor inlet. There are two types: Bourdon tube and autosyn transmitter. The Bourdon tube is a small, coiled tube with a movable, sealed end. A fuel pressure increase causes the tube to unwind, and the end mechanically moves an indicator needle in the gauge. It has the advantage of being simple, inexpensive, and totally self-powered, but like the manual primer, it is a fire hazard because fuel is actually brought into the cabin to operate it.

The autosyn transmitter measures fuel pressure in the same manner as the Bourdon tube, but the pressure-sensing device is mounted on the engine side of the firewall with a transmitter armature electrically sending the appropriate indication to the cabin instrument. While it does require electrical power to operate, its significant advantage is that no fuel ever enters the cabin.

## FUELING CONSIDERATIONS

As an aircraft moves through the air, the resulting friction causes it to become negatively charged, much the same as rubbing your shoe on a carpet. Cold, dry weather makes it worse. The earth, which tends to be positively charged, would cancel the airplane charge