

The Airframe

hard landings. Most susceptible are those aircraft with low wings whose landing gear are attached to the wing spar. The excessive stress causes the wing spar to bend upward, which stretches the skin under the wing. Wrinkles in the aluminum skin on the bottom of the wing are a telltale sign. And once stretched, the skin never completely returns to normal, so you can slightly flex the skin by pressing on it, much like pressing on the side of a gas or oil can; hence the name “oil canning.”

Student pilots notwithstanding, some “give” in the surface is to be expected, but considerable flex may indicate severe damage to the wing and spar. Another sign of the same type of damage would be popped rivets on either the top or bottom of the wing. Trainer aircraft experience a higher than average incidence of hard landings, so you should look for popped rivets and oil canning first when considering renting or purchasing a low-wing trainer aircraft. The potential damage resulting from hard landings is one of the reasons why I would personally never buy a used aircraft that had been used extensively for pilot training.

Heat provides both direct and indirect concerns for the aircraft operator. Directly, carbon monoxide can leak into a cabin because of a faulty weld in the aircraft exhaust system. Exhaust welds should be periodically checked, and all aircraft should have an inexpensive carbon monoxide detector inside the cabin. Not only should the pilot frequently check the detector because the gas is colorless, odorless, and tasteless, but the detector should be replaced frequently. Carbon monoxide detectors do not have a long life span, so they should be replaced several times a year.

Indirect heat problems also tend to relate to engine operation such as inadequate engine cooling. Preflight and in-flight symptoms indicating potentially severe engine problems are high oil and cylinder head temps, the odor of burned oil or hot rubber during engine operation or shortly after shutdown, and auto-ignition of an engine after shutdown. Auto-ignition refers to a situation in which the pilot attempts to shut down the engine and it continues to keep running by itself.

One sure sign of an indirect heat problem is watching cowling paint over the engine blister during start. This is a sure sign of an induction fire. The average pilot will panic and stop trying to start the engine, which will significantly worsen the problem. Shutting down the engine during an induction fire allows the fire to burn inside the cowling, resulting in potentially major damage. What has happened is a fire has occurred in the engine’s fuel/air induction system. Continued cranking of the engine will result in the fire being drawn back into the cylinders where it belongs. Make no mistake; once the fire is out and you do disengage the starter, the engine has a serious problem and needs to be referred immediately to a mechanic.

The last of the five aging elements is vibration. There are many normal vibrations in an aircraft which, over time, contribute to the aircraft’s deterioration. Normal flight-related vibrations will loosen unsecured nuts and bolts over time, stress components, and contribute to gyro bearing wear to name a few. There really isn’t anything you can do to prevent normal aircraft vibration, but unusual vibrations signal danger.

There are several typical causes of abnormal vibrations—for instance, ice disrupting the airflow over the airframe, a control surface, or antenna. A loose control surface will