

## Powerplants

The air filter also should be changed at least every 100 hours, more often in high dust or smoke environments. Unlike its automotive counterpart, the aircraft filter doesn't carry dirt well and quickly leads to loss of power, excessively rich mixtures, fouled spark plugs, carbon buildup in cylinders, and even shortened TBOs.

The compression check, a relatively simple test, is a true indication of the engine's ability to produce its rated power. Unlike its automotive counterpart, an aircraft engine compression check compares cylinder pressure against a known pressure, typically 80 psi. The FAA requires that the check be conducted by, or under the supervision of, a qualified mechanic for several reasons, not the least of which is the potential danger of being struck by the prop when pressure is introduced.

All cylinders will have some air leakage, therefore you will never get the perfect reading of 80/80; the question is how much leakage and where it occurs. Readings of 75/80 indicate a pretty healthy engine. Note the compression ratio numbers written on the cylinders in Figure 4-3. It is a common practice to list the variable number, which is always "over 80" for future reference. The FAA says leakage of 25 percent or more of the input pressure means trouble. Because the industry standard input pressure is 80, that means 60/80 and lower is cause for concern. There are three places where the air can leak past: the intake valve, the exhaust valve, and the piston into the crankcase. By listening at the air-induction inlet, exhaust pipe, and crankcase breather cap, you can determine which of the three is the culprit by the sound of rushing air.

In all three cases, however, there still is hope. Bad valves could be the result of a bit of carbon that is preventing complete closure. The mechanic, by giving the rocker valve an educated whack called "staking," hopefully can dislodge the carbon. A subsequent normal reading means you have just saved a bundle of money, but continued low readings indicate a bad valve.

In the case of air blowing by the piston, the problem may be that the engine has cooled too much and the oil has drained away from the cylinder wall, which reduces the airtight integrity. Running up the engine again, then performing another compression check, may make the difference. If there is no change in the pressure reading, you have a real problem. Readings for all cylinders should be within 5 psi of each other, indicating generally uniform wear. Readings below 60/80 on all cylinders, or more than 5-psi difference between one cylinder and the rest, require further investigation.

There is one last line of defense before actual removal of the cylinders. Your mechanic can use an instrument called a *borescope*, which permits an inexpensive, visual inspection of cylinder walls, rings, and the top of the piston without disassembly of the cylinder.

The 50-hour inspection—another good investment of time and money—may be performed by the pilot. It calls for a thorough preflight inspection and then a careful security check of all visible systems such as ignition, fuel/induction, cooling, lubrication, and exhaust. The main thrust is to assure that everything is tight, free of damage, and leak-free with no excessive wear or indications of heat damage. Finally, the oil should be drained and replaced. Oil loses effectiveness with time, making oil changes and clean oil filters extremely important to engine health and longevity.