

## Chapter Four

75 percent power is recommended. In either case, slightly increase climb speed on hot days by climbing at a slightly lower pitch angle—obstructions permitting—to get maximum cooling airflow through the cowling.

While the cruise phase of flight presents the lowest apparent engine workload, the pilot must be careful to avoid complacency. Seldom does an engine just fail. Usually, there are indications long before a problem arises. The vigilant pilot will use a regular scan of engine instruments and compare previous readings with current ones. Deviations should be noted and trends watched so intelligent decisions can be made early enough to allow safe, corrective action.

Generally, long descents with the engine idle should be avoided. The engine cools too rapidly, causing thermal shock and high engine wear. Start letdowns far enough out to permit carrying a little power on descent to keep engine instruments in the “green.” Make the mixture richer gradually during descent until you are full rich for landing, except in high-density altitude conditions. When landing at airports with a high-density altitude, land with the mixture leaned to produce maximum power in the event of a go-around.

### Proper Engine Leaning Technique

Whenever engine power is 75 percent or less, or during high-density-altitude airport operations, you should lean the engine. For taxi, lean at 1000 RPM until RPM peaks, then enrich slightly. During takeoff, use full throttle and lean until maximum RPM with a fixed-pitch prop, then enrich slightly. If you have a constant-speed prop, but carburetor-equipped engine, lean until the engine runs smooth. Fuel-injected engines should be leaned to the fuel flow setting in the POH.

The application of carburetor heat introduces warmer, less dense air into the engine, which has the effect of enriching the mixture. Use of carburetor heat also may require leaning for maximum performance. Use caution when applying carburetor heat. Some engines require it only when operating in known icing conditions, others whenever power falls outside of the tachometer’s green arc. Finally, the pilot always should lean the mixture when operating in excess of 5000 feet (some POHs specify 3000 feet).

Pilots whose aircraft do not have exhaust gas temperature gauges, fuel flow meters, and other more sophisticated instrumentation must lean according to the rough engine method. This may be used with any prop as long as the engine has a float-type carburetor. First, set the throttle to the recommended power setting. Slowly lean the mixture until roughness occurs, then enrich it until the engine first runs smoothly. This will give the best economy setting.

## ENGINE COOLING SYSTEMS

There are two basic cooling systems for the aircraft reciprocating engine: liquid and air. Of the two, the most efficient is liquid, but the most practical is air.

Initially, the lightest and simplest air-cooling system that was developed is what is technically termed “velocity cooling.” All that means is the engine and its cylinders are sticking out into the airstream uncovered where the air rushing past can dissipate the heat