TEXAS SKYWAYS INC.

"Serving to Serve Again"

Leaning Procedures

Carburetors on O-470 engines used in Cessna 180 and 182 aircraft are usually set slightly rich. The carburetors used on Texas Skyways modified engines are set very rich.

Whether the engine is a standard O-470 or a modified 470, 520 or 550, the reason for the rich setting is the same, proper cooling of the engine. If the mixture of the fuel and air is too rich, this mixture can easily be corrected by proper use of the mixture control.

If a carburetor is set with the fuel and air mixture too lean, the pilot can do nothing to richen the mixture except pull on the carburetor heat to reduce the amount of air going into the carburetor. This also reduces power. A controllable rich mixture is far better than loosing power.

Some pilots believe that the mixture should never be leaned below 5000 feet. While this may serve as a rule of thumb for many young pilots until they have gained experience in flying, we feel that this should be a short term practice and then discarded. It would be like having a constant speed propeller on your airplane and never learning how to use it. Since some field elevations are higher than 5000 feet the practice of not leaning is not an option.

When full throttle is applied and the airplane is moving down the runway, the engine should achieve maximum RPM. A quick glance at the tachometer will tell whether the engine is producing proper power or not. Let's assume full throttle is applied, the airplane has accelerated to 30 or 40 KIAS and the tachometer shows the engine speed is two or three hundred RPM below maximum with the mixture control knob in the full rich position. If so, lean the mixture just a bit. If couple of twist on a veriner mixture control or a half inch pull on the standard mixture control results in an increase in engine RPM, you will know the mixture was too rich for the density altitude and further leaning may be in order.

Once maximum RPM is achieved and the engine is running smooth, further leaning is not required during takeoff and initial climb. The engine analyzer will show the exhaust gas temperatures (EGT) and these temperatures should be at least 1250 degrees F. It is permissible for higher EGT at this time but at least 1250 degrees F. DO NOT OVER LEAN. Some will say "lean for maximum power." This isn't all bad, but it is better to stay slightly rich of best power.

The actual EGT will vary with altitude and power settings. We recommend that EGT stay below 1475 degrees F. At higher altitudes with normally aspirated engines, you

308 Boerne Stage Airfield ◂ Boerne, Texas 78006 ◂ (830) 755-8989 ◂ Fax (830) 755-2384

probably can't get as high as 1475 degrees. There you will be leaning to slightly rich of best power. For example, if you are at an altitude so high that peak EGT is 1300 degrees, best power may be 1280 degrees, slightly rich of peak.

At lower altitudes the peak EGT may be as high as 1550 degrees. Since Teledyne Continental says not to exceed 1600 degrees, you are in a danger zone. Cool it down with the mixture control. If you don't have a vernier mixture control, get one. It will probably save about a gallon of fuel per hour and still allow proper engine operation.

If you don't have an engine analyzer, get one of those also. Yes, they are expensive but it's the only instrument that will tell you what the engine is doing. Until you have an analyzer, go back to the old way, "lean until it gets rough and then richen until it gets smooth, plus a couple of twist or notches."

After all of this leaning and monitoring during takeoff and climb, we now consider cruise. Since the engine produces maximum torque at about 2400 RPM, we recommend cruising at 2400 RPM. Use the throttle to control the airspeed. Keep the mixture rich of peak. The greater the altitude, the lower the EGT will be at peak. With lower peak temperature, the closer to peak the engine may be operated.

Some say that operating lean of peak will save fuel. If you are willing to fly slower by operating the engine lean of peak, try reducing power with the throttle to the same airspeed that you have when lean of peak. You will probably use the same amount of fuel rich of peak that you used lean of peak at the same airspeed.

Remember it takes so many pounds of fuel and so many pounds of air to create so many BTU's of energy.

308 Boerne Stage Airfield ◂▸ Boerne, Texas 78006 ◂▸ (830) 755-8989 ◂▸ Fax (830) 755-2384