



Best Economy

I've always been a supporter of the Roy LoPresti philosophy of cruise management, "Life is short, fly fast." In other words, I've always used what the old timers called high cruise.

In most instances, the technique couldn't be much simpler: Push full forward to go, pull back to stop. In the early days, like most readers, I rented airplanes. The rates were nearly always wet, so the most logical way to fly was as fast as I possibly could, consistent with the engine manufacturer's limitations.

Nothing wrong with that in principle, especially in the first airplanes I rented as a private pilot. Immediately after earning my license, I flew mostly Cherokees; 160s and 180s. These were fitted with Lycoming O-320s or O-360s, and the prevailing wisdom was that they thrived on high rpm.

The Cherokees were simple machines with fixed-pitch props, and the leaning procedure was appropriately elementary. Climb to an altitude where 75 percent power or less was all there was to it, ease back the mixture until the engine ran rough, then, push the control forward until the engine was smooth again.

(Anecdotal but true; Back in the 1970s when Lyle Shelton

was building up his racing Bearcat, "Rare Bear", in the hangar next to mine at Compton Airport, he also owned a Cherokee 140 as a run-around airplane. Several of us had keys to it, and we were welcome to use it anytime we wished as long as we followed the cardinal rule—keep the left knob against the panel except for landing. The engine ran almost 3000 hours before its major, and when the crew finally did overhaul it, they discovered it was in such excellent shape, it easily could have run another 600-800 hours.)

This simple procedure was long before the age of single-probe EGTs, much less full engine analyzers, so there was no way to know if we were flying rich, lean or at peak EGT. Of course, since we were flying behind carbureted engines with wildly variable fuel distribution between cylinders, an engine analyzer wouldn't have helped much anyway.

Fortunately for the modern generation of pilots, fuel injection and engine analyzers are the rule these days. Twenty-first century pilots flying new aircraft typically have excellent engine diagnostic ability.

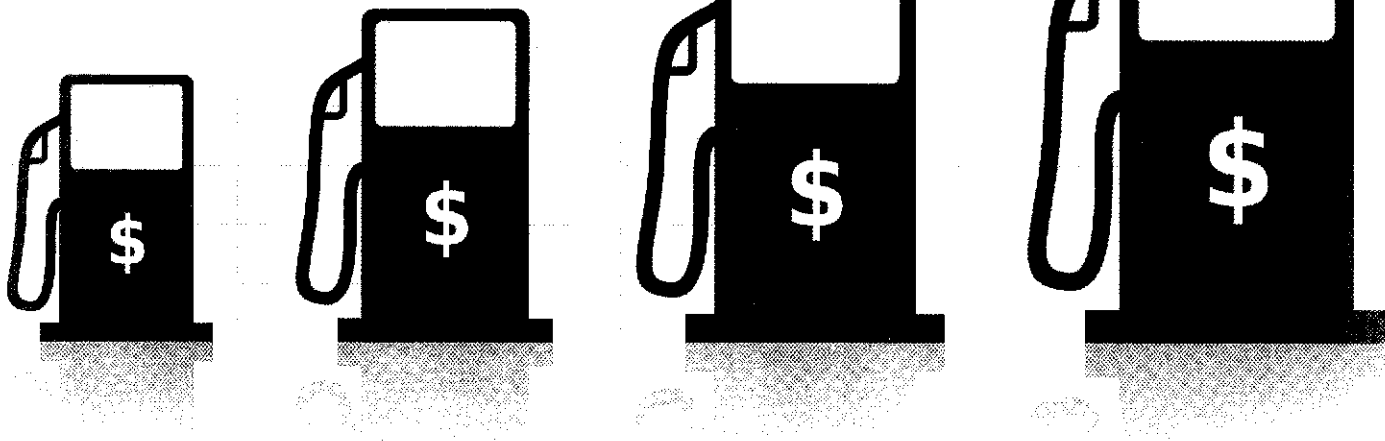
Over the years, I've used most of the engine analyzer systems available on the market. I started with an Alcor, a straight

EGT gauge that allowed switching between cylinder probes manually. Then, I switched to an early Electronics International unit with slightly more talent. There was an Insight gauge in there somewhere, as well.

Today, I use a JPI EDM-800 in my airplane, certainly the best diagnostic tool I've seen. As a result, I know exactly what's happening in each cylinder, and I have reasonable warning of impending problems. I can just imagine the emails I'll receive, but I'm convinced that every airplane flying behind an injected engine should have an engine analyzer.

This isn't about engine analyzers, however. Lately, I've been dragged, kicking and screaming, into the lean of peak debate. George Braly and Tim Roehl of GAMI in Ada, Oklahoma have been friends for a lot of years. I've used their GAMIjectors for quite a while, but until recently, I didn't subscribe to their philosophy of running engines lean of peak.

Prior to the recent escalation of 100 octane fuel prices, my philosophy was always, "Fuel is cheap." That's no longer the case. America is finally being forced to



accept the reality of fuel prices that Europeans have endured for decades. These days, \$4/gallon is considered a bargain.

I used to run my airplane's 200 hp Lycoming IO-360 at a fairly consistent 50 degrees rich of peak and simply accepted the resulting fuel flow. At that setting, I blocked the airplane at 12.5 gph.

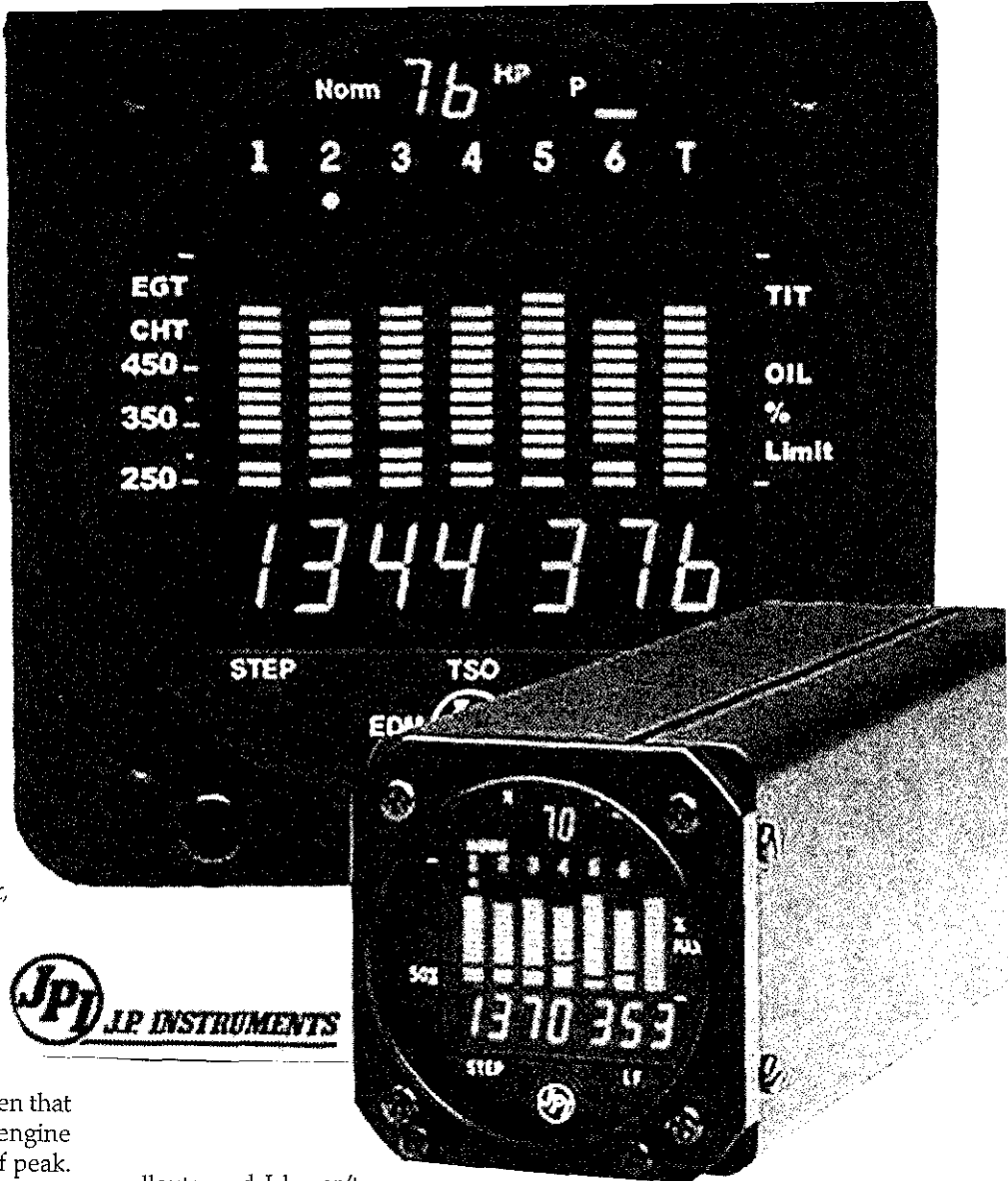
Things have changed. It's now tough to find 100 octane for less than \$4.00/gallon which translates to \$50/hr just for avgas. Using one popular theory that avgas represents somewhere between 25 and 33 percent of the total operating cost of a typical aircraft, that means my bottom line hourly cost is somewhere between \$150 and \$200.

In a time of high fuel prices, I feel fortunate that I fly one of the world's most fuel efficient production airplanes. Still, if I could somehow reduce the fuel burn to a more reasonable number, I could save significant bucks. A reduction to 10 gph would mean \$10/hr less in fuel, \$30 to \$40 less an hour in total operating cost.

Traditional wisdom in the piston engine business has always been that the wisest choice for maximum engine life was to run the mixture rich of peak. When fuel was comparatively inexpensive, that was an easy no-brainer. A rich mixture runs cooler, and under most circumstances, cooler is better.

Trouble is, lean of peak also can result in cooler temperatures, along with reduced cylinder pressures. Braly and Roehl have spent the last 15 years fighting an uphill battle trying to prove that lean of peak is the way to go.

To that end, they've assembled a formidable battery of diagnostic engine equipment in Ada, Oklahoma, and they conduct Advanced Pilot Training seminars periodically to prove to stubborn pilots from the old school (such as me) the benefits of lean of peak operation. The seminars are always



sellouts, and I haven't been able to make it to one yet, but I'll definitely be attending the next one I can catch.

Lean of peak operation is far from new. A pilot you may have heard of named Charles Lindbergh regularly operated his engines lean of peak. Lindbergh even went overseas during WWII and taught his leaning techniques to P-38 fighter pilots in the Pacific theatre. He demonstrated that super-lean mixtures and oversquare power settings could work very well without damaging the engine. Such lean settings extended range considerably, a critical consideration when most flights were over water.

Braly and Roehl preach that mixture settings in the vicinity of 25-50 degrees of the lean side of peak can actually be beneficial, keeping the plugs clean, reducing fuel burn by as much as 15 percent and running the engine cooler rather than hotter. As long as the engine runs smoothly there's no possibility of damage. It's counterintuitive to run any engine rough.

I still run my engine at 75 percent most of the time (even that may change if prices continue to rise), but I realize better fuel economy and nearly the same speed as when I ran rich settings. I'll have more to say about power settings and running lean of peak in future columns. —