MAKING IT HOLE

A new cowl plus spats, splitters, fairings, and flanges transform a Comanche.

BY MARK R. TWOMBLY

Roy LoPresti has devoted his general aviation career to making airplanes look and go faster. He has worked at Grumman American, Mooney, Beech, and his own Piper-affiliated company and had a hand in developing the Tiger, the 201, and the stillborn LoPresti Piper SwiftFury. ■ He still has hope that the SwiftFury will someday be certified and put in production, but these days, LoPresti is in the business of designing and marketing drag-reduction/speed-enhancing kits for a variety of existing aircraft. ■ LoPresti Speed Merchants (LSM) at the Vero Beach (Florida) Municipal Airport has a rapidly expanding product line of performance kits that now covers most Piper piston models, from Cherokees to Senecas. Speed kits are in the works for the Cessna 172 and various Mooney models, and the company is surveying the fleet for other candidate air-

PHOTOGRAPHY BY WINSTON LUZIER

planes. "We want to become the premier modifier of piston singles and twins," LoPresti declares.

Current LSM mods include new engine cowlings, main landing gear fairings, flap hinge fairings, and flap and aileron gap seals. A chart on one of the company's brochures for its so-called Mach 1 kits (all of the previously mentioned mods except for the engine cowl) breaks down the effects of each of the drag reduction devices by model. For example, installing flap hinge fairings ("splitters") on a PA–28-140 Cherokee increases speed 2.5 miles per hour (about 2.2 knots). Add flap seals and enjoy another 2.5 mph—5 mph (4.3 knots) total. An Arrow modified with splitters, flap gap "feel seals," and main gear fairings ("spats," which smooth airflow over the retracted but slightly exposed main landing gear wheels and tires) will pick up 10 mph (8.7 knots), according to LSM.

The company's major modification is a new fiberglass engine cowl designed to significantly reduce cooling drag and, nearly as important in LSM's opinion, look good while doing it. New cowls currently are available

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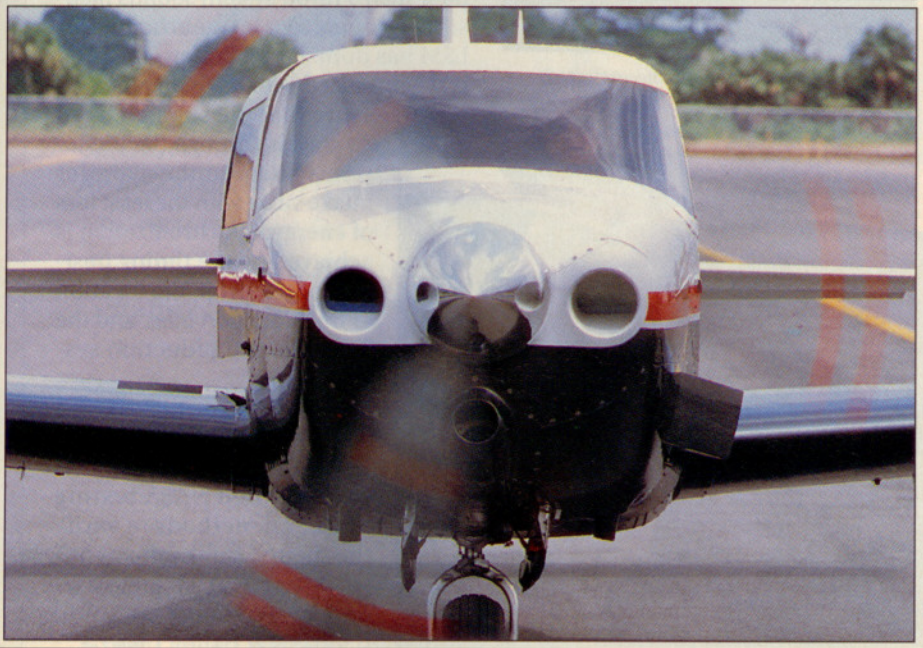
for the Piper PA–30 Twin Comanche and PA–24 Comanche (180, 250, 260, and 260B models). Next in line for the cowling treatment are the PA–32 Cherokee Six/Lance/Saratoga and the PA–28R Arrow series.

LSM's expectations for the cowl are high—a 15-mph (13-knot) gain in top speed for the Comanche and 8 mph (7 knots) for the Twin Comanche. (The stock "tiger shark" cowling on the Twin Comanche is more aerodynamically efficient than the stock Comanche cowl.)

The company has taken all of its magic—flap hinge fairings, aileron and flap gap seals, main gear fairings, and the cowl—and installed it on a Comanche 260. In characteristic fashion, LoPresti has given the tricked-out airplane a fast new name: the GTO



(Gran Turismo Omologato, as in Ferrari, not Pontiac; LoPresti prefers the nobility of the prancing horse—he drives a Ferrari—to the tire-smoking, in-your-face attitude of the General Motors muscle car; if it were otherwise, he probably would be flying a Comanche 400).

The LSM cowl gives the 1965 Comanche a contemporary look, much like Piper's new firewall-forward treatment for the Saratoga and Seneca. The Piper and LSM cowls look very similar but were developed independently. In fact, cowls featuring those distinctive circular, protruding cooling inlets have been used on other designs—Ed Swearingen's SX–300 and Lance Neibauer's Lancair kitplanes, for example.

LSM arrived at the specific shape and dimensions of the circular inlets through trial-and-error flight testing. Experimental cowls were coated with dyes that, in flight, revealed areas of high- and low-efficiency airflow into the cooling inlets. LSM didn't start out with circular inlets, but that's where it arrived after testing a variety of other shapes.

The cowl also has a refined shape for the induction air inlet below the spinner. As with the cooling inlets, the mouth of the induction air scoop is closer to the propeller than on the stock cowl to capture more of the energy of the prop blast. The air then travels down an expanding duct to further pressurize it. Beech took the same approach several years ago with the King Air, extending the air intake on the PT6 cowl to just behind the propeller disk. Beech calls it the "pitot cowl."

Each side of the new cowl is hinged. Unscrew a half-dozen cam locks on each side, and you can then lift the cowl to reveal the engine and accessories. Although the hinged panels do not extend as far down the sides of the cowl as on the standard Comanche cowl, it's still possible to get a socket on the lower set of spark plugs without removing the lower cowl. The nosebowl also can be removed without taking off the entire cowl.

New baffling is installed as part of the cowling change, and the oil cooler is relocated from below the engine to behind it.

The cowl also features longer nosewheel doors that completely enclose the nose gear when it is retracted. On the stock airplane, the short nosewheel door is connected to and actuated by

the gear. Initially, it worked the same on the LSM cowl. Then it was discovered that in flight, the gear was being sucked down by low-pressure air flowing over the nose-gear door. That led to a design change in which the nose-gear door has its own extend/retract actuation system. A firewall-mounted electric motor drives a series of rods that open and close the door in sequence with the gear. The door motor is activated by the gear handle switch, but a separate gear door handle must be pulled before releasing the emergency gear extension system.

The stock Comanche does not have a cowl flap. Cooling air exits the engine compartment from behind the nosewheel. Because that area is covered by the long nosewheel door, the LSM cowl has a cowl flap. It's on the left side of the cowl and looks monstrously large but only because we're used to cowl flaps being hidden under the nose.

The GTO includes all LSM mods except aileron seals. Tests with the seals installed showed a degradation of stall characteristics. Aileron seals are offered for other Piper models, principally to improve roll response. All fairings and seals are made of fiberglass and attached with rivets and sealant. A Teflon strip is attached with adhesive to flap and aileron seals to reduce friction between the seal and the flap or aileron surface.

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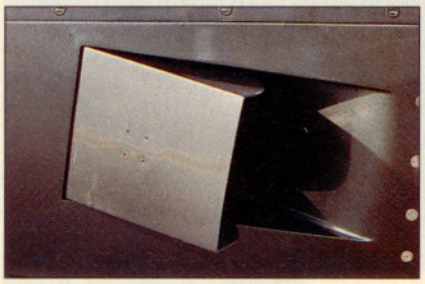
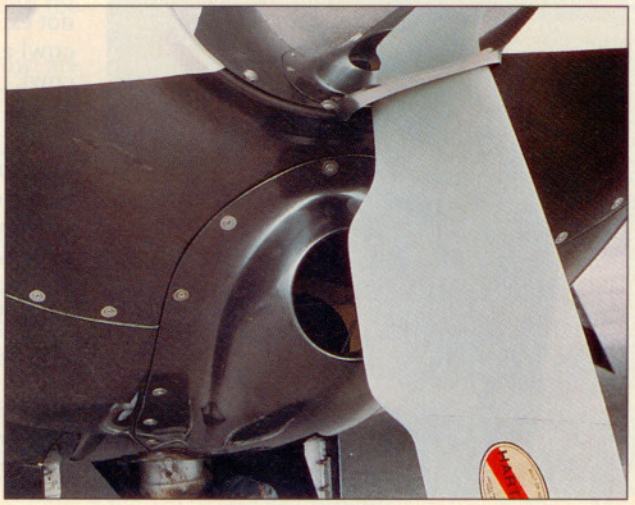


New nosewheel doors necessitated addition of cowl flap (above). Flange on prop boosts induction air pressure.



When I visited LSM, the GTO still wore an "Experimental" sticker because of the unusual propeller. The Hartzell three-blade prop has a unique planform with swept leading edges and a small trailing edge flange on each blade near the hub. The flange is supposed to give the air an extra push as it enters the induction scoop. This poor man's turbo system sounds plausible enough to a lay gearhead, but LSM has done it one better: The prop is synchronized with the induction system to ensure that the supercharged air travels through the induction system to the cylinder intake valve with the least loss of energy. Synchronization is achieved by the timing position of the prop, the location of the induction inlet, and the length of the induction system ducting.

If all this sounds like an engineering sleight of hand, well, LoPresti won't claim to have applied NASA testing tools and methods to verify the theory. But he does contend that precise measurements of average manifold

pressure show about a 1-inch increase at typical cruise speeds from the special prop. The tuned prop, spinner, and induction system package adds 5.5 mph (4.8 kts) to the Comanche's speed, according to LSM.

LSM is developing the special prop in partnership with Hartzell, and an STC is expected sometime this summer.

What does all of LSM's plastic surgery do to a Comanche besides make it look like a current production airplane? Based on what I observed, it enables it to go one heck of a lot faster.

Curt LoPresti, LSM's chief designer and test pilot, and I, plus about 90 gallons of gas, departed Vero Beach Municipal and climbed at 110 KIAS. The 5-degree pitch attitude afforded an adequate view over the nose and a 900-foot-per-minute rate of climb at lower altitudes. Cylinder head temperatures during the climb appeared to be about 350 degrees, judging by the Insight GEM EGT/CHT display. The heads cooled as ambient air temperature decreased during the climb to altitude.

The engine in the GTO is exceptionally smooth for a 540-cubic-inch Lycoming, perhaps due in part to the experimental three-blade prop. The only changes to the cockpit related to the LSM mods are the addition of a red emergency nose-gear-door release handle and a T-handle to open and close the cowl flap.

I sampled a couple of cruise altitudes and power settings. At 8,500 feet, full throttle (22 inches), and 2,500 rpm, with the mixture leaned to 50 degrees rich of peak (about 15.5 gallons per hour), the airspeed indicator stabilized at 148 KIAS/170 mph. Backing off to 2,400 rpm scrubbed a couple of knots off the speed. At 6,500 feet, full throttle (23.5 inches), and 2,400 rpm, I was looking at 151 KIAS/174 mph.

Back on the ground, we fed the data to Jim LoPresti's computer (LSM is a family affair; along with Curt and Jim, a third LoPresti son, David, is involved with the company, as is Roy LoPresti's wife, Peggy), and it crunched out some impressive true airspeeds: 171.5 knots/197.6 mph at the higher altitude, and 170.4 knots/196.3 mph down lower. The LoPrestis tactfully pointed out that the speeds I recorded were a tad under the numbers they had been seeing and were not corrected for standard conditions. So be it, I said; what I saw is what I got. Even so, these speeds represent healthy increases over a stock 260-hp Comanche and in fact are typical of a 300-hp Bonanza. Higher speeds on the same horsepower mean an increase in range and endurance on the same fuel capacity, too. Not bad for a 29-year-old (referring to the airplane, of course).

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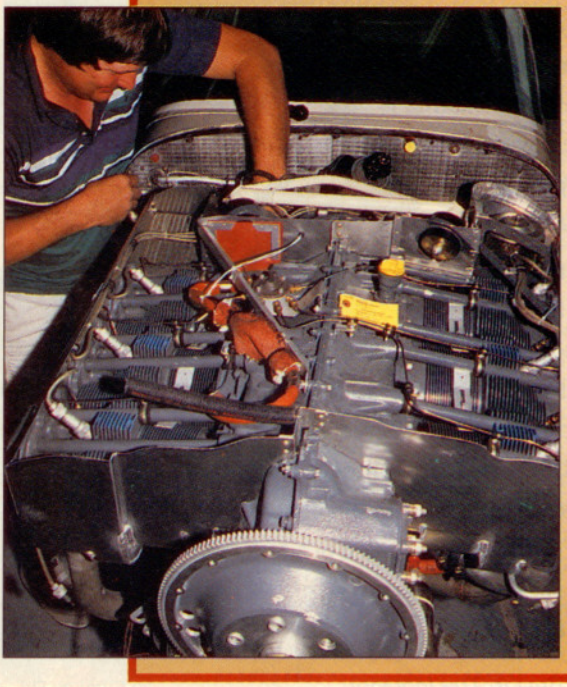
MOONEY MUSCLE



Given his past affiliation with Mooney Aircraft, it should come as no surprise that LoPresti has plans to modify a Mooney. At the time of our visit to the LSM shop at Vero Beach, the finishing touches were being put on a 260-hp Lycoming IO-540-powered Mooney 231. The conversion will mean 50 more non-turbocharged horsepower for the 231.

LSM's computer analysis predicts the airplane will fly at 187 to 191 knots at non-oxygen altitudes, largely due to a more efficient cowling being designed, according to LoPresti.

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The cost of the GTO mods, without considering installation expense, is $10,900 for the cowl (not including a $1,400 credit for exchanging the stock cowl and spinner); $695 for the main gear fairings; $795 for the flap hinge fairings; and $695 for the flap gap seals. Aileron gap seals for other Piper models are $395 uninstalled. Modification kits are sold through dealers for installation in the field.

The Hartzell prop, hub, and spinner will be about $7,500, according to LSM.

It takes about a week to install the new cowl, according to LSM, because of changes to the baffling, induction system, oil cooler, cowl flap, and gear doors.

In the end, LSM's performance package for the Comanche probably will prove more expensive to customers than the cost of the hardware and installation. Once a Comanche owner sees and flies his GTO, he's going to realize it's a whole new airplane. You simply can't fly around with old paint on a new airplane. And those scratchy, analog radios? Gotta come out to make room for the digital flip-flop displays and GPS, so you can observe those faster groundspeeds. And how about that fading, threadbare interior. . . . □

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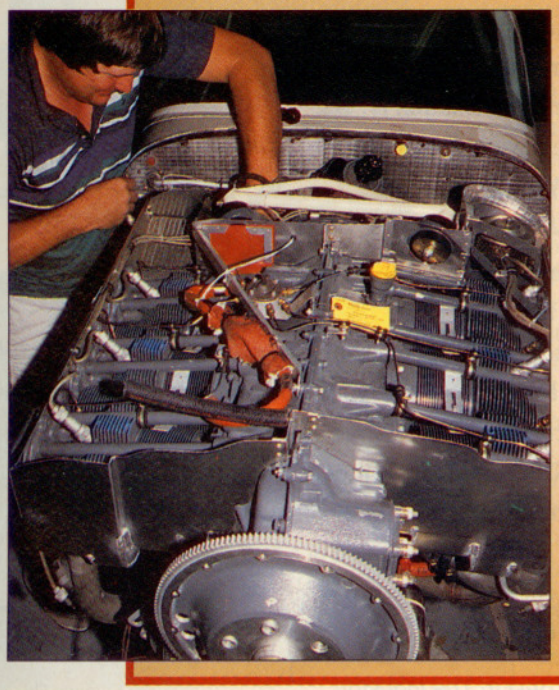

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