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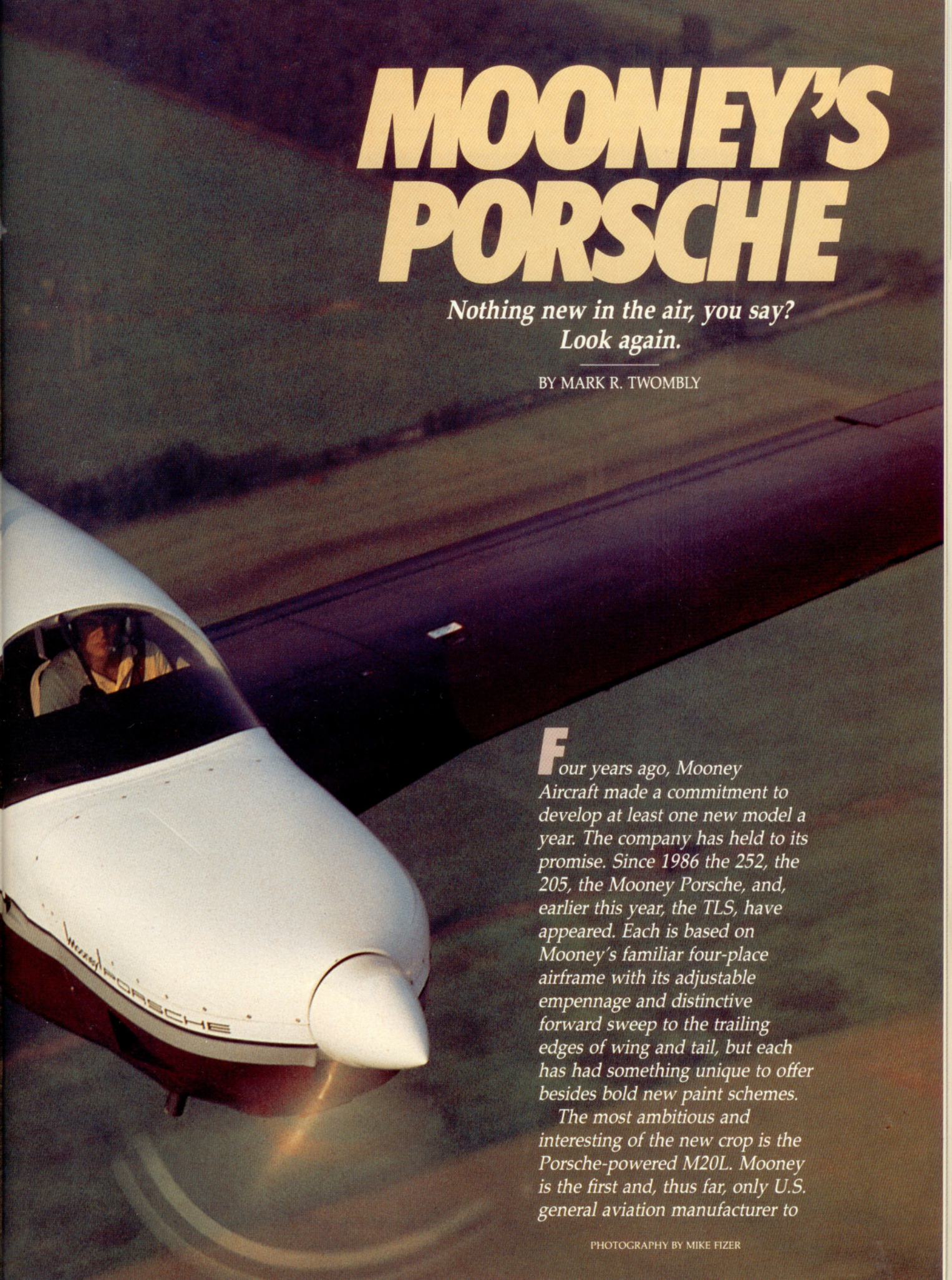
MOONEY'S PORSCHE

Nothing new in the air, you say? Look again.

BY MARK R. TWOMBLY



Four years ago, Mooney Aircraft made a commitment to develop at least one new model a year. The company has held to its promise. Since 1986 the 252, the 205, the Mooney Porsche, and, earlier this year, the TLS, have appeared. Each is based on Mooney's familiar four-place airframe with its adjustable empennage and distinctive forward sweep to the trailing edges of wing and tail, but each has had something unique to offer besides bold new paint schemes.

The most ambitious and interesting of the new crop is the Porsche-powered M20L. Mooney is the first and, thus far, only U.S. general aviation manufacturer to

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offer the PFM 3200 (Porsche Flugmotor, 3,200-cubic-centimeter displacement) engine on a production airframe. Robin, a French company, builds a Porsche-powered sportplane, the DR400, that is popular as a glider tug.

In 1985 Porsche asked Mooney to install prototype PFM engines in a pair of 231 airframes. One of the airplanes was flown on an around-the-world trip undertaken by Porsche as an engine reliability test and for marketing purposes.

Mooney then began work on its own Porsche-powered model in secret, although it was rumored the project was under way.

The Mooney Porsche, or Mooney PFM, was formally unveiled at a November 1987 press conference and dealer meeting. A collection of Porsche cars borrowed from a San Antonio dealer was put on display to complement the airplane's sports-car cachet.

The PFM represents a significant departure for Mooney. Since the 201 debuted in 1976, Mooney's emphasis has been on speed—more of it. Each new model was named for its top speed in miles per hour. Not so the PFM. Its performance is comparable to a 201 and is even a few knots slower. The PFM's strengths lie elsewhere: style, simplicity of operation, efficiency, and the new technology it incorporates.

In eight months of operating a PFM, we have learned to add 15 minutes to each fuel stop. The airplane attracts a lot of interest on the ramp. People want to look it over, peek inside, ask questions about it. This Mooney looks different than any other. The fuselage is a foot longer aft of the rear seats, the nosewheel is eight inches farther forward, and the engine cowl is rounder and longer. And yes, it has a bold new paint scheme. The final flourish is the Porsche logo on the cowl.

The airplane sounds different, too. The engine revs at more than twice the rpm of the geared propeller. If the propeller is spinning at 1,000 rpm when you taxi onto the ramp, the engine is busily churning at better than 2,260 rpm. Mixed in is the whoosh of the engine cooling fan. The impression made upon the people who watch you arrive is that this Mooney is special.

Pop the door open and show off the inside. It's the work of Porsche designers who were given a bare fuselage to use as a template. Fabric color matches the exterior paint and is imprinted with the Porsche logo. The baggage bay is voluminous, and the hatrack has been turned into a handy compartmented chest for stashing cowl plugs, documents, and even a hat or two. Front- and rear-seat indirect lights buried in an overhead console are the best to be found in any single. Mooney also has designed beefy new control yokes for the PFM.

The next stop on the tour is the panel, which has been raised a few inches in deference to knees. The pedestal is farther forward as well, and the extra space is given to a swing-out rack useful for storing the pilot's operating handbook or charts.

THE cream-colored metal panel contains a new cluster of attractive and functional electronic engine instruments. Propeller rpm, fuel flow, fuel quantity, cylinder head and oil temperatures, and fuel and oil pressures are displayed on circular pointer instruments that are both very legible and unusually accurate. Push a small button next to each instrument, and the numerical value appears in a liquid crystal display at the top of the cluster. Trim and flap positions, outside air temperature, and electrical load also are shown on separate LCDs. The look is state of the art, sophisticated, and very appealing.

One last panel item to point out before looking under the hood: It appears to be a grab handle for the pilot to pull himself out of the low-slung seat. It's actually the throttle, propeller control, and mixture adjustment combined into a single towel-bar-shaped control.

The power couldn't be any easier to manage. Push the control in to the stop for full power for takeoff, and leave it there throughout the climb. Once you've reached cruise altitude and accelerated to cruise airspeed, pull the control back slightly to reduce to the desired propeller rpm. That's it, that's all. No need to tweak manifold pressure or prop rpm or lean the mixture according to the exhaust gas temperature. It's all done for you ahead of the fire wall.

The control is mechanically linked to the propeller governor and the fuel injection system. From idle to 2,300 engine rpm (the tachometer displays propeller rpm), the control adjusts throttle. Further movement adjusts prop pitch as well as throttle. At 4,200 engine rpm (approximately 1,850 rpm at the prop), the throttle is fully open, and pushing the control in adjusts prop pitch only.

The Bosch fuel injection system does a marvelous job of thinking for itself.

Maximum engine speed is 5,300 rpm, which the gearbox reduces to a propeller speed of 2,343 rpm.

At 193 cubic inches, the six-cylinder, overhead-camshaft engine has a bit more than half the displacement of the four-cylinder Lycoming IO-360 that powers the Mooney 201, yet it produces 17 more horsepower. With a compression ratio of 10.5:1, forget about pulling the prop through on a frosty morn.

The basic design, configuration, and components are based on the Porsche 911 car engine, but the aviation version is manufactured to different tolerances. Parts are not interchangeable.

The engine has a host of features new to general aviation: microprocessor-controlled ignition, a fuel injection system that automatically selects best-economy or best-power mixture, and fan cooling. Porsche also has a novel cost-assurance program that limits an owner's expense for unscheduled engine maintenance to $2,500 and guarantees an overhaul exchange price of $14,000. To qualify, the owner must adhere to a policy of 100-hour inspections on the engine.

The Bosch K-Jetronic fuel injection system monitors density of the intake air to maintain a lean, best-economy air/fuel mixture of 16:1 at every power setting except full power. The system does a marvelous job of thinking for itself. If the OAT rises a degree or two, fuel flow decreases a tenth of a gallon an hour. At full power, a microswitch on the power control activates a second air-density regulator in the Bosch fuel injection unit, enriching the mixture to a best-power ratio of 12.5:1.

An Enrich switch is used for starting whenever CHTs are lower than 25 degrees Celsius. Flipping the switch and engaging the starter squirts fuel into the intake manifold. Cold or hot, the engine routinely starts in one or two revolutions of the prop.

Two high-pressure electric fuel pumps supply the engine. A third emergency pump is switched on for takeoff and landing. Fuel pressure is high enough to preclude the formation of vapor locks. Hot starts are not even mentioned in the POH. Porsche has certified a 209-hp version of the engine for auto fuel use, but it is not available in the Mooney Porsche.

The engine is the first for general aviation to be certified with electronic ignition. The heart of the dual, independent Magneti Marelli ignition systems is a pair of microprocessors that continuously adjust timing based on crankshaft rpm, absolute manifold pressure, piston top dead center, and intake air temperature. The only moving parts are the distributor rotors.

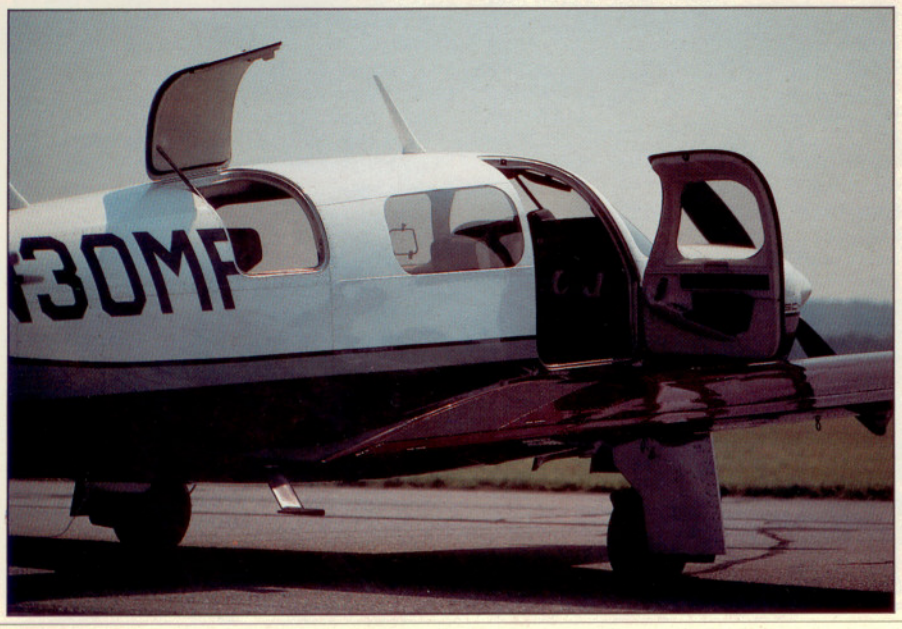
The airplane has two 24-volt batteries, two 70-amp alternators, and two independent electrical buses. If a problem should develop on one bus and troubleshooting proves unsuccessful, the drill is to lift a large red guard at the top of a forest of circuit breakers on the right side of the panel and push the crossover breaker underneath. This pulls the plug on the affected bus and transfers the load to the other.

Next, find an airport. With one bus out of the loop, redundancy is lost, and a problem on the remaining circuit could leave you with no electrical options other than battery power to the electronic ignition and electric fuel pumps. The greatest challenge in flying the Porsche Mooney is learning the intricacies of the electrical system and memorizing emergency procedures.

TBO on the engine is 2,000 hours, but

with experience, Porsche hopes to reach a 3,000-hour TBO. One reason is fan cooling. Air enters the engine plenum through a flush duct on the lower right side of the cowl and cools accessories at the back of the engine before it is sucked into the fan. The fan directs the air through a shroud and over the finned cylinders. The air exits into the slipstream through louvers on the bottom of the cowl.

Two engine-driven V-belts turn the fan, so its speed and, therefore, the volume of cooling air in the shroud is proportional to engine rpm. The advantage of the fan and shroud arrangement is that CHTs are consistent and stable, even on a hot-day climb or with gross changes in power. Chop the throttle for a precipitous descent, and fan speed drops in concert with engine and propeller rpm. With no ram airflow, shock-cooling ceases to be of critical concern.



What burden does all of this new-to-general-aviation technology place on the Porsche Mooney pilot? None, and that is the point. Operating the engine is almost as easy as stepping on the gas pedal in a car. To start it, switch on the master, the two battery switches, and the two fuel pumps, and turn the key. Push the power control in to go, pull it back to slow down. Even shutting down is different. Flip off the two fuel pumps, and the engine and propeller instantly stop as if they have seized. The Hartzell prop is made of Kevlar and is very light, so there is little flywheel effect.

Engine and interior furnishings aside, the PFM is much like other Mooneys, which is to say efficient and highly personal. You don't so much climb into the cockpit as slip it on. The seats sit low to the floor, and the rudder pedals are recessed deep in the foot wells. The cabin may feel somewhat confining initially, but a Mooney grows on you.

Cruise speed on our trips was a con-

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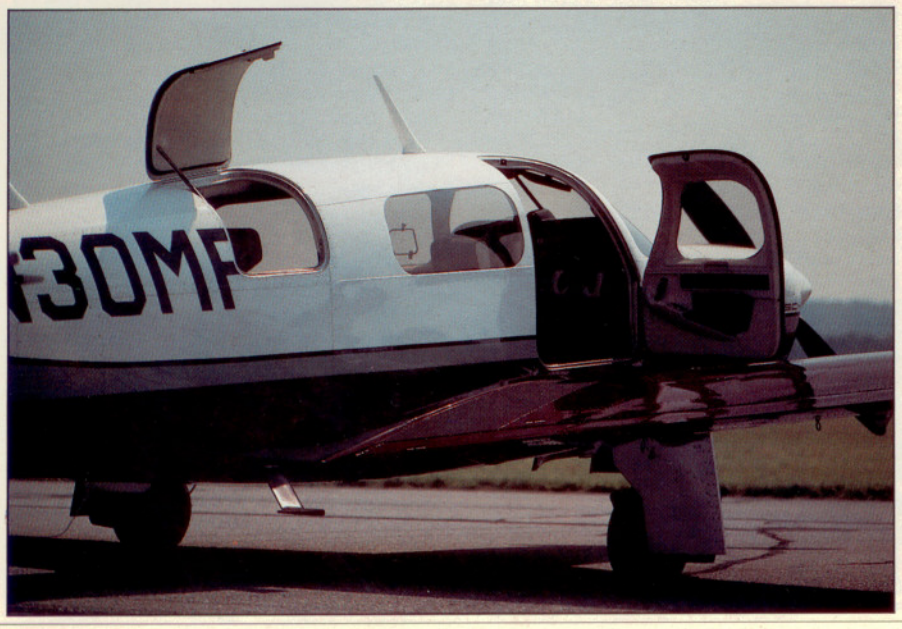

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sistent 155 KTAS at 2,300 rpm. Fuel flow varied between 9.5 and 10.5 gallons per hour, depending on altitude and ambient temperature.

One flight in particular showcased the PFM's cross-country talents. The itinerary was Frederick, Maryland, to Kenosha, Wisconsin, in the morning and returning that same evening. Winds were not a factor westbound, so 12,000 feet was the requested altitude. The POH calls for a cruise climb of 90 to 100 KIAS, but with the short prop, 110 knots works just as well. The initial climb rate with one aboard and full fuel was 1,000 feet per minute, which gradually decreased to 650 fpm at 8,000 feet. The interesting part was watching the Bosch system do its thing, reducing fuel flow from 16 gph down low to 13 gph at 8,000 feet, even though the power control stayed put.

The absence of a headwind meant an early arrival for the appointment in Kenosha, so the extra time was used to experiment. The initial cruise power setting was 2,300 rpm, which yielded 153 knots true at 8.8 gph or 16.3 miles per gallon, according to the Arnav 50 loran. Reducing the power 1,000 rpm reduced fuel flow four tenths of a gallon at the expense of two knots. Another 1,000 rpm, another four tenths and two knots. At 2,000 rpm, fuel flow settled on 7.6 gph at 145 knots true, and the noise from engine and prop was little more than soothing background music.

Vibration and noise levels are noticeably low in the PFM, which increases the comfort level considerably. The engine hangs from a three-point, low-vibration mount, and the gearbox is coupled to the engine through a fabric-reinforced rubber disk that absorbs torsional vibration. The slow-turning propeller generates fewer decibels, and engine noise is effectively attenuated by the exhaust muffler and also by the interior soundproofing.

The flight took exactly four hours. The lineman replenished the tanks with 35.6 gallons. The Mooney could have flown for another two hours and still have had legal IFR reserves. Dinner was waiting at the end of the return leg, so it was flown at high power in 3 hours 24 minutes. The tanks took 41.2 gallons.

With 60.5 gallons usable fuel, the PFM has excellent endurance. The compromise is restricted payload. Our PFM can carry 2.3 170-pound souls with the tanks topped off. With four FAA-standard adults aboard and 50 pounds of bags, you could depart with enough fuel to taxi out and check the ignition before running dry. Between the two extremes—full fuel or full cabin—lies a fair amount of flexibility in trading one for the other. Mooney says it is working on increasing the useful load.

Base price of the PFM is $149,900. Average equipped retail price of an IFR-equipped one is $185,000. The price reflects an expensive certification effort, the higher cost of the Porsche engine, and Mooney's decision to set the PFM apart with a first-class interior and instrumentation.

Mooney has built 41 PFMs, about half of which have been sold. The company admits to a mistake in initially marketing the PFM to its traditional customer base—existing Mooney owners—rather than to first-time buyers. New incentive programs are being considered to attract PFM sales.

Porsche, meanwhile, has had to conduct some damage control following a decision to sell its Galesburg, Illinois, base and discontinue its effort to reengine Cessna 172s with the PFM 3200. Porsche's aviation activities now will be handled by Porsche Cars North America in Reno, Nevada. Technical support, including parts inventory, spare engines, and customer assistance, are unaffected by the change, except for relocating to Reno. About 100 aviation mechanics have attended special PFM 3200 training classes.

The announcement prompted wide speculation that Porsche would soon bail out of airplane engine production altogether. Sales of Porsche cars in the United States have declined steadily since 1986. The company has cut production of its cars and has altered its marketing approach to emphasize low volume and high exclusivity rather than volume sales. That strategy would appear to fit the PFM 3200 perfectly, but a Porsche spokesman said the likelihood of continued production and development of the PFM 3200 (a turbocharged version has been tested) has yet to be determined in light of Porsche's woes.

The strength of the PFM is not, as some believe, the prestige of driving up to the fixed-base operation airside ramp in a Porsche, although that is a pleasant extra. The benefits are much more pragmatic. They include the ease of managing the power, fuel economy, the absence of vibration and noise, instant starting, and the very real potential for longer, more reliable service. Mooney and Porsche have taken a long step forward with the M20L. In an arena in which technology advances almost imperceptibly, their achievement deserves a full measure of attention, recognition, and support. □

Mooney M20L PFM
Base price: $149,900
Average equipped price: $185,000

Specifications

Powerplant	Porsche PFM 3200-NO3, 217 hp @ 2,343 prop rpm
Recommended TBO	2,000 hr
Propeller	Hartzell composite, two-blade, constant-speed, 74-in diameter
Length	26.92 ft
Height	8.33 ft
Wingspan	36.08 ft
Wing area	174.8 sq ft
Wing loading	16.6 lb/sq ft
Power loading	13.4 lb/hp
Seats	4
Cabin length	10.5 ft
Cabin width	3.6 ft
Cabin height	3.7 ft
Empty weight	1,952 lb
Empty weight, as tested	2,140 lb
Useful load	948 lb
Useful load, as tested	759 lb
Payload w/full fuel	585 lb
Payload w/full fuel, as tested	396 lb
Max takeoff weight	2,900 lb
Max landing weight	2,900 lb
Fuel capacity	66.5 gal (60.5 gal usable) 399 lb (363 lb usable)
Oil capacity	13.5 qt
Baggage capacity	120 lb, 22.6 cu ft

Performance

Takeoff distance, ground roll	1,250 ft
Takeoff distance over 50-ft obstacle	2,510 ft
Rate of climb, sea level	1,050 fpm
Max level speed, sea level	168 kt
Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption)	
@ 2,300 prop rpm	160 kt/4.5 hr
9,000 ft	(66.6 pph/11.1 gph)
@ 2,100 prop rpm	152 kt/5.2 hr
9,000 ft	(58.2 pph/9.7 gph)
@ 2,000 prop rpm	145 kt/5.9 hr
9,000 ft	(51.6 pph/8.6 gph)
Max operating altitude	19,300 ft
Landing distance over 50-ft obstacle	1,900 ft
Landing distance, ground roll	900 ft

Limiting and Recommended Airspeeds

Vx (best angle of climb)	75 KIAS
Vy (best rate of climb)	96 KIAS
Va (design maneuvering)	117 KIAS
Vfe (max flap extended)	110 KIAS
Vle (max gear extended)	129 KIAS
Vlo (max gear operating)	
Extend	129 KIAS
Retract	106 KIAS
Vno (max structural cruising)	174 KIAS
Vne (never exceed)	195 KIAS
Vr (rotation)	65 KIAS
Vs1 (stall, clean)	64 KIAS
Vso (stall, in landing configuration)	57 KIAS

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted. □