[Mr. In Between

his Cessna 180 gives new meaning to th

BY ALTON K. MARSH

The photo on this page is
180—something that is hard
edented. It is owned by Rob
Norma, of Cameron Park, California. While you may never find one
Cessna 180s out there to buy, although current owners are reluctan

Split the difference and call it a Cessna 181.5. It's not really a
includes major parts from a Cessna 185 airframe. And it's not really
the airframe, is also a unique blend of parts from different engine
both engine and airframe are so rare they had to be field approved

There are still more than 3,000 less exotic Cessna 180s registered
of the 6,200 built between the first flight on May 26, 1952,

PHOTOGRAPHY BY RICHAR

This Cessna 180 gives new meaning to the term 'composite'

BY ALTON K. MARSH

The photo on this page is a 310-horsepower Cessna 180—something that is hard to define and may be unprecedented. It is owned by Robert C. Petersen and his wife, Norma, of Cameron Park, California. While you may never find one like it, there are lots of normal Cessna 180s out there to buy, although current owners are reluctant to sell them.

Split the difference and call it a Cessna 181.5. It's not really a Cessna 180, given that it now includes major parts from a Cessna 185 airframe. And it's not really a 185, either. The engine, like the airframe, is also a unique blend of parts from different engine models. The modifications to both engine and airframe are so rare they had to be field approved by the FAA.

There are still more than 3,000 less exotic Cessna 180s registered out of the 6,200 built between the first flight on May 26, 1952,

PHOTOGRAPHY BY RICHARD VANDERMEULEN

and 1981 when production stopped (it wasn't called a Skywagon until 1969). Cessna 180 dealer Mark Pilkington of Stancil Aviation (Skywagons.com) at Placerville Airport, California, said a typical price for a low-time 180 is in the range of $60,000 to $110,000. He and owner Joe Stancil have bought (cash purchases, not trade-ins) and sold more than 445 180s and 185s over the years. Here is their rule of thumb for determining a 180 price: Add $10,000 to the model year. A 1970 180, for example, might sell for $80,000.

You can buy the stock 180 at an economical price, improve it with dozens of approved modifications if you desire, or easily find a 180 with most of the mods already installed. Stancil lists 14 top modifications on his Web site. There are 94 supplemental type certificates for the 180.

What's your impression of a 180? To me it brings visions of a tough Alaskan bush plane filled with 55-gallon drums of fuel oil. But a word of caution: It is still a tailwheel airplane, and that means it costs more to insure. AOPA Insurance Agency officials said pilots who get the best rates have at least 250 hours total flying time, including 50 tailwheel hours and hopefully 25 hours in make and model. If you do not meet these criteria, you fall into the "special risk" category and can expect the insurance quotes to be up to 75 percent higher. A quick comparison was made by an AOPA Insurance Agency official of a 1960 $75,000 Cessna 180 and a 1972 $75,000 Cessna 172. A 1972 model was selected in order to find an equivalent hull value. The results show that the annual insurance premium for the 180 is $2,200 while the 172 premium would be $1,293. The assumption was made that they are both flown by qualified pilots as listed above.

As for airworthiness directives (ADs), Pilkington said there are no major ones. There are minor ADs affecting parts on the engine and the fuses for the cigarette lighter that affect many models of Cessnas, including the 180.

Mods gone wild

Petersen made an investment well in excess of $250,000 in his aircraft and has refused an offer of $200,000; he won't sell at any price right now because he has the aircraft just the way he wants it. You can easily find highly modified 180s that at least come close to his. Five Cessna 180s considered for this article had more than 20 improvements each, with 40 to 60 percent of those related to avionics and electronics. Petersen is king of the upgrades, though, with 34, one of them from a previous owner (that was the Horton STOL Conversion). There are so many highly modified classic aircraft out there of all types—not just 180s—that officials at EAA AirVenture in Oshkosh had to create a new category called Custom Class for judging classic show airplanes, a category Petersen won in 2003. Previously such owners were not eligible for any award because they did not restore the aircraft to its original condition.

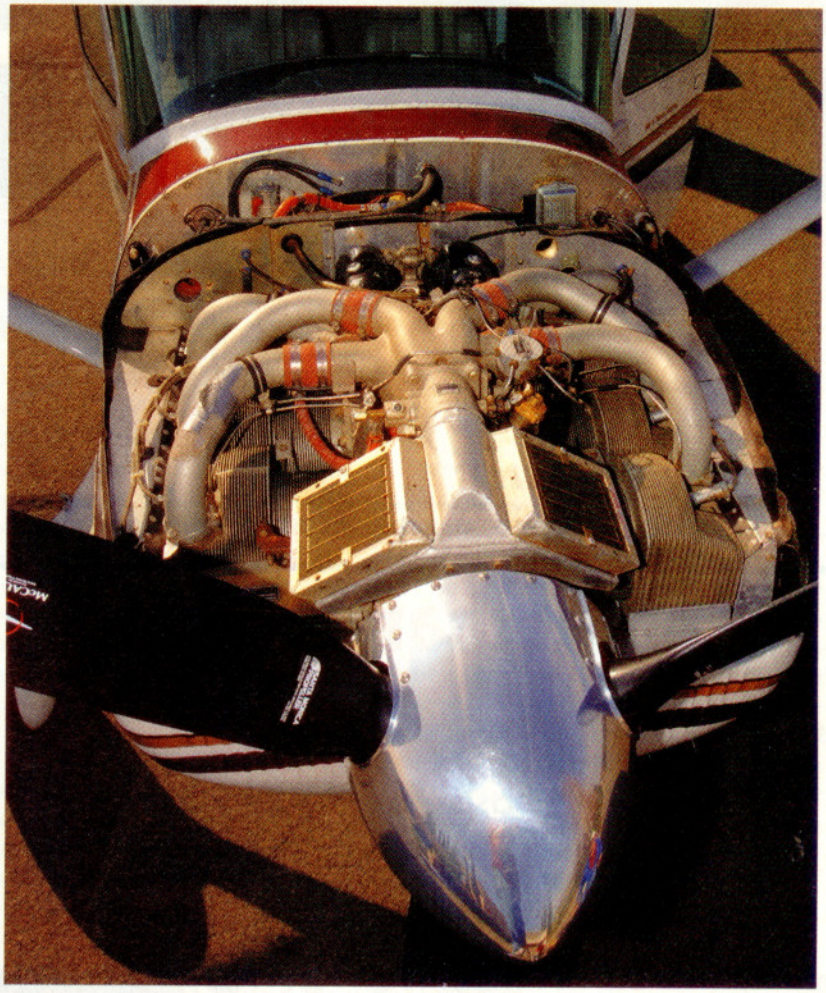
Another candidate considered for this article was found in Puyallup, Washington. Jim Hill's 1954 Cessna 180 based there has the first supplemental type certificate-approved Sagem (formerly Arnav) glass cockpit in the nation; Hill is the Sagem test pilot. Did I mention he has a Sagem satellite telephone in the cargo bay with a dialer pad on the instrument panel? Sounds more like a corporate jet.

Petersen's 180 restoration was the rise of the Phoenix, because the airframe modification using Cessna 185 parts resulted from one of two accidents Petersen has had. The first accident occurred after his seat slipped back dur-

Is this the world's most modified Cessna 180? Cockpit trimmings, speed mods on the wheels, and a Cessna 185 horizontal stabilizer (right) indicate that it is. Note the sheriff's badge on the tail indicating this aircraft is used for volunteer law enforcement missions (looking for marijuana fields). The real secret is the souped-up powerplant with cylinders from yet another engine model and intake pipes sized to maintain equal air flow to all cylinders (below).

ing the takeoff run, resulting in a nasty ground loop—and the second, he readily admits, resulted from mismanagement of the fuel valve, resulting in an off-airport landing. The landing was successful until he caught a wing on a small tree along the side of the dirt road on which he landed, causing considerable damage. At the time his aircraft already had its current souped-up engine. To bring it back to flying status after the first accident, he did whatever it took to please an FAA inspector who was concerned about all that power up front and its fatigue effect on a 180 airframe. That led to putting more robust 185 parts in the aircraft, since the 185 was built to handle more horsepower and a greater useful load.

"The FAA inspector was pretty conservative. He wanted to be sure that we weren't putting too much horsepower in the wrong airframe," Petersen said. "[The FAA inspector] had experience with the horizontal stabilizer. If you increase the horsepower in a Cessna 180 without beefing up the horizontal stabilizer, you'll get cracking. So it has a 185 horizontal stabilizer." (Petersen had to contact a Cessna engineer to help him prove that a 185 vertical stabilizer was not needed.)



"The engine mount on the 185 is a lot stronger. I got a seaplane engine mount because I was told it was the best. It is very structurally sound and results in less engine vibration. Others have put the IO-550D on the existing 180 engine mount [under an STC], but they vibrate. If you want the best, you buy the Kosola and Associates seaplane engine mount.

"Also field approved were the 185 wing struts, the 185 landing gear, and the 185 gearbox and door frame. The door-frame improvements were done just because the early 180 door latches weren't adequate," Petersen said. In all, 15 items were field approved as part of a package.

Souped-up engine

The engine power in Petersen's 180 comes from a modified Continental IO-550 putting out 310 horsepower. There are only four Cessna 180s and one Cessna 185 on the FAA registry using the IO-550D. But Petersen's IO-550D has been modified with IO-550G parts for more power. First, Petersen had to purchase the IO-550D engine and three-blade propeller kit (your choice of Hartzell or McCauley) from Air Plains in Wellington, Kansas, which has the supplemental type certificate for converting a Cessna 180 (and other aircraft) to 300 horsepower. Cessna 180s originally came with the 230-horsepower Continental O-470. (You'll need the old engine for a core trade-in, but don't bring the shop an O-470A used in the first Cessna 180s because Continental no longer accepts those cores. If you do, you'll pay an extra $10,000 charge.) Petersen opted for the McCauley three-blade propeller.

"There is no STC for the G cylinder conversion," Petersen said. "The [FAA] field approval is very specifically for this airplane and was tied into the modifications on the rest of the airframe and the gross-weight increase. The 3,200-pound gross weight was selected because it was the gross weight of the early 185s. We used a 1961 Cessna 185 owner's manual as basic data for the weight approval." That means, to be legal, Petersen must fly with both a Cessna 185 and a 1954 Cessna 180 pilot's operating handbook (actually they were "owner's manuals" back then) aboard. The 185 manual is used for weight calculations, and the 180 manual is used for everything else, including speed limitations.

Petersen said that to his knowledge his is the only earlier model 180 with a gross weight of 3,200 pounds. It was

The engine, like the airframe, is also a unique blend of parts from different engine models.

SPECSHEET

1954 Cessna 180
Price when new: $15,000
Today's *Vref* base price: $64,000
Price as tested: $200,000

Specifications

Powerplant	310-hp modified Continental IO 550-D16B
Recommended TBO	1,700 hr
Propeller	McCauley 88-in constant-speed 3 blade
Length	26 ft
Height	7 ft 5 in
Wingspan	36 ft
Wing area	174 sq ft
Wing loading	18.4 lb/sq ft
Power loading	10.32 lb/hp
Seats	4, 6 possible on some models
Cabin length	7 ft 6 in
Cabin width	3 ft 4 in
Cabin height	3 ft 11 in
Standard empty weight	1,540 lb
Empty weight, as tested	1,850 lb
Max gross weight, as tested	3,200 lb
Max useful load	1,660 lb
Max useful load, as tested	1,350 lb
Max payload w/full fuel, as tested	822 lb
Max takeoff weight	3,200 lb
Fuel capacity	93 gal (88 gal usable) 558 lb (528 lb usable)
Baggage capacity	350 lb, 25 cu ft
Baggage door	15.5 x 22 in

Performance

Takeoff distance, ground roll	382 ft
Takeoff distance over 50-ft obstacle	995 ft
Max crosswind component	11 mph
Rate of climb, sea level	1,500 fpm
Max level speed, sea level	183 mph (redline is 184 mph)
Cruise speed/endurance w/45-min rsv, std fuel (fuel consumption), 10,500 ft @64% power, best economy	207 mph/5.2 hr (90 pph/15 gph)
Range	812 nm
Service ceiling	21,200 ft
Landing distance over 50-ft obstacle	1,200 ft
Landing distance, ground roll	372 ft

Limiting and Recommended Airspeeds

V_X (best angle of climb)	70 mph KIAS
V_Y (best rate of climb)	90 mph KIAS
V_A (design maneuvering)	122 mph KIAS
V_{FE} (max flap extended)	100 mph KIAS
V_{NO} (max structural cruising)	160 mph KIAS
V_{NE} (never exceed)	184 mph KIAS
V_R (rotation)	55 mph KIAS
V_{S1} (stall, clean)	60 mph KIAS
V_{SO} (stall, in landing configuration)	55 mph KIAS

Specifications were interpolated by the owner or are based on manufacturer's and owner's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.

needed because with full fuel, the airplane would have used up so much of its available payload that only a person weighing 150 pounds or less could fly it. An STC is available for an increase to 3,190 pounds but requires a larger vertical stabilizer and dorsal fin than Petersen wanted. Petersen contacted Cessna and was told that the larger dorsal fin wasn't necessary if floatplane operations are not involved. He was then able to hire a designated engineering representative for $15,000 to conduct the months-long approval process that resulted in the full 3,200-pound gross weight.

For the IO-550D engine, he talked to a company at Van Nuys, California. The company suggested converting the engine to G cylinders because those cylinders have better airflow (called "cross-flow") and are equipped for a tuned induction system. Tuned induction adds slightly more efficiency and 10 more horsepower by providing intake pipes to each cylinder that are sized so that each pipe carries exactly the same volume of air. The paperwork was never completed, so Petersen and the designated engineering representative ended up having to do it themselves.

To approve the engine, FAA officials contacted Ken Tunnell of Lycon Aircraft Engines, who said, "It's a good idea, wish I had thought of it." He was the FAA's technical consultant, and "if Lycon thought it was a good idea, then the FAA would look kindly on it," Petersen recalled. Lycon, located in Visalia, California, even added a letter with data on parts numbers that aided in the approval process. The cowling had to be redesigned slightly to fit over the induction system.

When I flew Petersen's 180, I found the engine smooth and, as expected, capable of amazing climb rates. The climb rate with two on board and 76 gallons of avgas was a sustained 1,500 fpm that continued long after takeoff. Airspeed tests at a typical cruise setting of 24 inches and 2,400 rpm showed a true airspeed of 152 KTAS at 4,500 feet where, on that December day east of Sacramento, it was 45 degrees Fahrenheit. That's a 20-knot gain compared with a stock Cessna 180, and a five-knot gain over an average Cessna 185 with a 260-horsepower Continental IO-470 engine. (A later 185 model had a Lycoming IO-520D engine that could sustain 300 horsepower for five minutes and cruise at 285 horsepower.) Petersen can cruise at 310 horsepower continuously.

On my flight there could have been up to 88 gallons of usable fuel on board resulting from another of the aircraft's modifications: four fuel tanks. "Monarch Air and Development made a nice, heavy [quarter-inch-thick polypropylene] gas tank system that has a total of 93 gallons if you get the main tanks and the aux tanks. We used 88 useful for the data, just because there were five unusable gallons in the original 180 and we didn't want to change the basic data," Petersen said. "The aux tanks are plumbed into the main [tanks], so there are no pumps. It's gravity feed. You have a fuel system identical to the 180 fuel system, except all the lines have been changed to a half-inch so that the fuel flows [fast enough] to feed the bigger engine. This will fly at least six hours. At 7,500 feet with 23 inches and 2,300 rpm the speed is normally 150 knots."

A motorcycle rumble

Inside the cabin and wearing a noise-canceling headset, the noise level seemed typical of aircraft equipped with similar engines. But on the ground it's a different story. Petersen, who had remained on the ground while I flew with his friend, flight instructor Don Knight, said it sounded extremely loud as Knight and I passed over his house at Cameron Airpark 30 miles east of Sacramento. He asked if Knight and I were at a high power setting, but actually we were in a descent at reduced power. Petersen seemed surprised, but his wife, Norma, said their granddaughter could identify her grandfather's airplane from inside her school classroom near Cameron Airpark. So yes, it's got a throaty roar.

Petersen said he flight-plans for 150 KTAS, and normally cruises at 10,500 to 12,500 feet for fuel economy and range. "If you are up in the 10,000-foot range, wide open, 19 or 20 inches [manifold pressure] at 2,300 rpm, it burns a little less than 15 gallons per hour.

"I would say my operating cost, counting everything [maintenance set aside,

Shown outside the owner's hangar, this 180 was approved for a higher gross weight to restore its utility.

Five Cessna 180s considered for this article had more than 20 improvements each, with 40 to 60 percent of those related to avionics and electronics.

engine set aside, gas, fuel, oil], is $120 to $150 an hour. I don't figure it precisely," he said. Since he lives in the Cameron Airpark fly-in community, the aircraft is hangared on his property in a hangar he owns. "My insurance went higher because I bent [the airplane] a couple of times, so I don't have hull insurance. Otherwise, it would be $6,000 for $110,000 in coverage. It's worth way more than that, so I am self-insured on the hull. I carry the million-dollar liability."

He leans the mixture, on the advice of Lycon Aircraft Engines, to run rich of peak. (When Knight and I were flying at lower altitudes and had the mixture full rich, I saw fuel flows not uncommon to the IO-550 engine series of 18 to 21 gph.)

With such a big engine, the first thing most pilots would worry about is overheating. Not a problem, Petersen said.

"I fly pretty much year round with the cowl flaps closed because it cools so well. During the flight test for FAA approval [of the engine and 185 parts], we climbed at 89 mph indicated, slowing to 84 mph indicated at 10,000 feet, 2,700 rpm, throttle wide open, and you would expect the engine to heat up. We had everything monitored with calibrated instruments and the designated engineering representative was in the plane during the flight recording all the data. The only temperature that even got close to limits was the oil temperature, and it had a redline of 240 but only got up to 203 degrees. Then [for testing purposes] you normalize the numbers to the FAA 100-degree day, and it put the oil temperature up at 236."

Here comes the sheriff

Further proof that the engine runs cool comes from his law-enforcement flights. Petersen is commander of the volunteer El Dorado County Sheriff's Air Squadron. "We fly the deputies and detectives for surveillance and other kinds of applications. [A deputy] was looking for pot farms one day and I had the aircraft trimmed out for 65 mph. I was at 12 inches manifold pressure and 2,000 rpm for 1.5 hours, and flew with no heating problems."

He took advantage of the aircraft's range when he flew it to the shops that participated in the aircraft's rebirth. Major structure work was done by Beegles Aircraft Service in Greeley, Colorado. For paint, he went to Gray's Aircraft Refinishing in Ozark, Arkansas. The interior was done by Elite Air Interiors at Sacramento Mather Airport, while the rosewood panel was installed by Pflueger's Custom Aircraft Panels in Trinity Center, California.

The 180 could easily have disappeared when the nosewheel-equipped Cessna 182 came to market. By then it had established itself as an indispensable utility aircraft. The proof lies in a production run that continued for 25 years. As Petersen has proven, once you get a 180, you can tweak it to a 181.5 and make it do anything you want. AOPA

E-mail the author at alton.marsh@aopa.org.