



*550 for the 206*

# TWEAKING THE TRUCK

*More power to the Cessna 206*

BY THOMAS A. HORNE

**T**he Cessna 206 is a rarity among general aviation airplanes: it delivers what it promises. Unlike so many other piston singles and twins, you really can fill the tanks (usable fuel ranges from 59 gallons with standard tanks to 88 gallons with long-range tanks, depending on the year and model), load up all six seats, and take off without busting either the 3,300- to 3,600-pound maximum gross weight (again, depending on the model) or the generous, seven-inch-wide center of gravity envelope. With useful loads ranging from 1,600 to 1,800 pounds and big Continental engines delivering anywhere from 285 to 310 horsepower, the 206 has justly earned its reputation as general aviation's answer to the

PHOTOGRAPHY BY MICHAEL P. COLLINS

half-ton pickup.

As such, 206s—be they the early, 1965 to 1970 P206 “Super Skywagons” and “Super Skylanes,” the utility version U206s built from 1965 to 1986, or the turbocharged versions of either of the above—are the singles of choice for serious load haulers. Able to handle both big loads and short, unimproved strips, 206s can be found hard at work in boondocks everywhere, be it jungle, tundra, mountains, or anything in between.

While stock 206s perform admirably, there are several modifications that allow operators to expand the airplane’s capabilities. Seaplane conversions are extremely popular, as are STOL kits, belly-mounted cargo pods, wingtip auxiliary fuel tanks, and blister windows and camera ports.

There’s even been a conversion that drops a 418-shaft horsepower Allison 250 turbine engine into the 206.

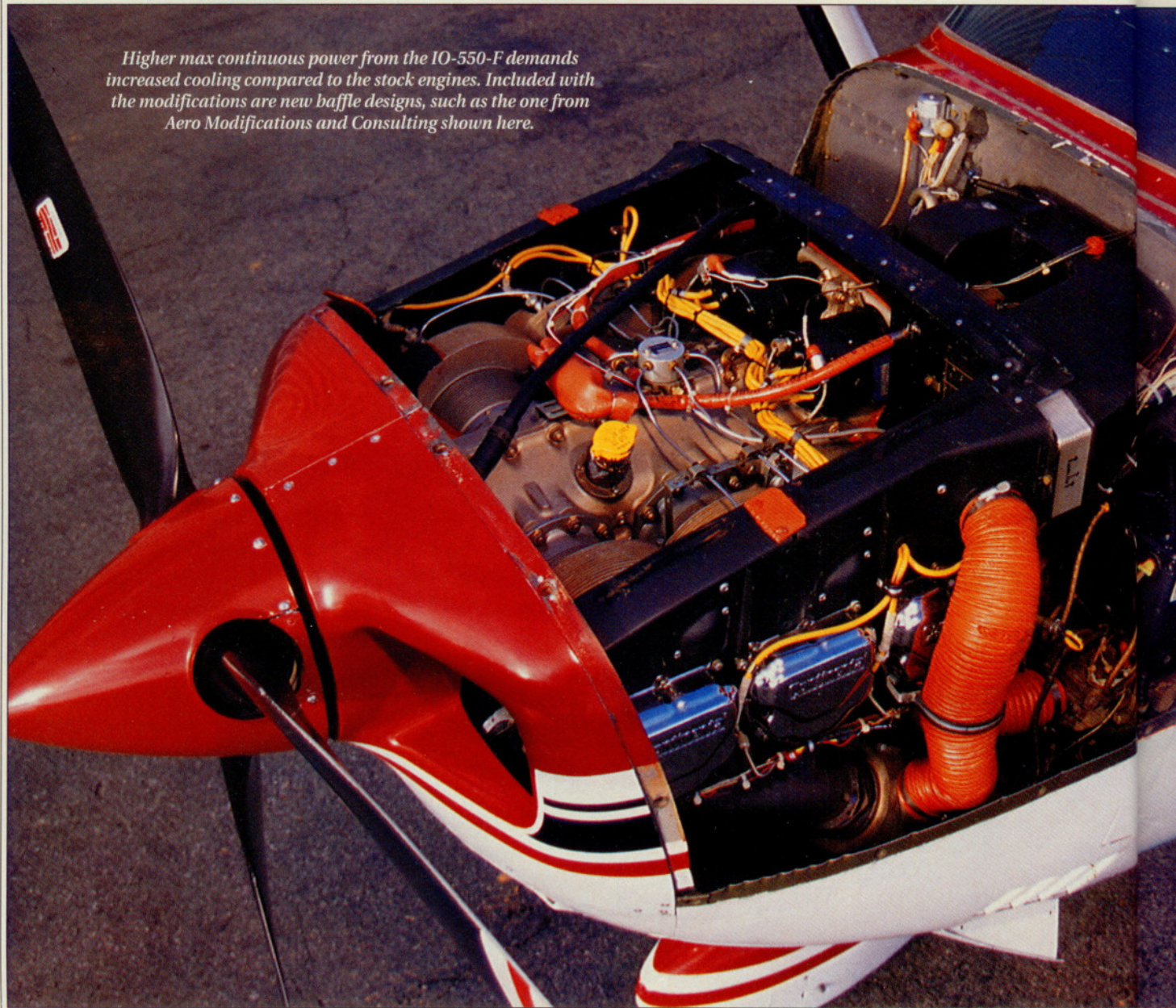
Since 1991 another, more practical engine conversion has joined the ranks of 206 mods. This involves swapping a 206’s stock Continental IO-520 or TSIO-520 engine for a Continental IO-550-F. The modification includes a new McCauley Black Mac three-blade propeller, though one modification offers buyers the option of a Hartzell three-blade propeller.

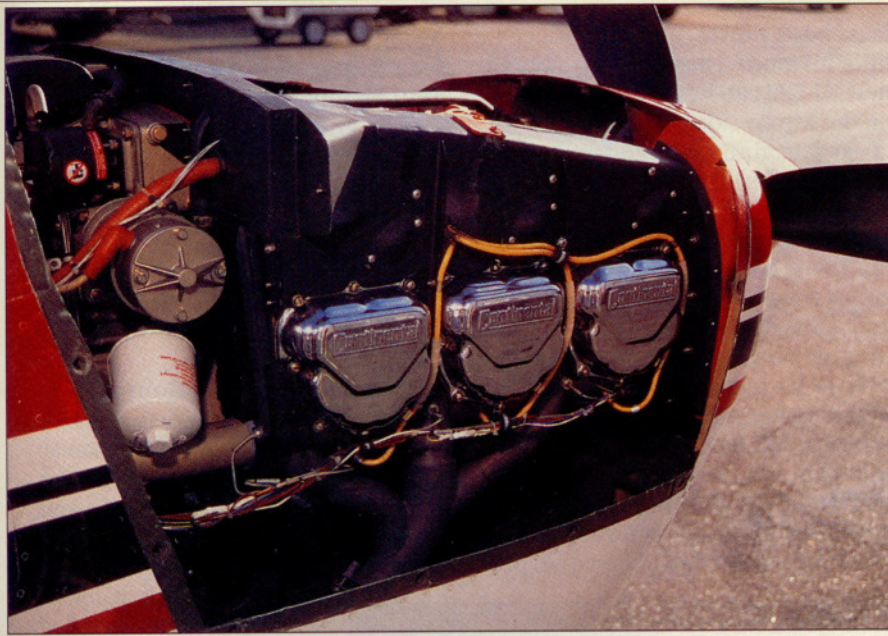
Cessna began the 206 line using 285-hp Continental IO-520-A engines. Beginning in 1966, a 285-hp, turbocharged TSIO-520-C engine was offered. But in 1967, the so-called “utility” versions (thus the “U” in the U206 designation; the “P” prefix stood for passenger) received a power upgrade

to 300 hp with the IO-520-F engine. From 1971 on, when all 206 models were renamed Stationair 6s, Cessna made the -F engine the standard normally aspirated engine. The turbocharged 206s retained the original TSIO-520-C until 1977, when the 310-hp TSIO-520-M engine was introduced.

What makes the IO-550 so well suited for the 206? First off, there’s a 15-hp power advantage over the -A engine. Secondly, those 300 hp in the -F engine were limited to five minutes’ duration for takeoff. Full power meant full throttle and 2,850 rpm; but after takeoff, pilots with -F engines were advised to cut the propeller back to 2,700 rpm for a maximum continuous power setting of 285 hp. For extended climbs, 2,550 rpm is suggested. The 310-hp turbocharged -M engine has a similar

*Higher max continuous power from the IO-550-F demands increased cooling compared to the stock engines. Included with the modifications are new baffle designs, such as the one from Aero Modifications and Consulting shown here.*





five-minute full power limitation.

The IO-550-F engine has no time limitations on its maximum power rating. You can leave the throttle, prop, and mixture controls all the way forward for as long as necessary. Also, the Black Mac is set for 2,700 rpm at takeoff power—150 rpm lower than the standard -520 engine setup—which makes for greater propeller efficiency. The benefit here is higher power for indefinite periods of time, and more thrust and torque due to the combination of high power and low rpm. It's this kind of pulling power that comes in extra handy for float-plane, short-strip, or high density altitude takeoffs. In short, the IO-550 can make the same amount of takeoff power as the IO-520, but without working as hard.

The 2,700-rpm maximum brings other benefits. Lower propeller tip speeds mean lower noise levels inside and out, a welcome change from the racket generated by stock 206s. Lower rpm also means that the engine isn't working as hard and that annoying airframe vibrations are cut way back. The Black Mac's 80-inch diameter also limits prop tip erosion during ground operations.

Then there's the ramp appeal of a three-blade propeller. Until 1970, normally aspirated 206s came with two-blade propellers as standard equipment.

The STC holders who offer the 206's -550 conversion claim that short-field takeoff distances are reduced by some 15 to 25 percent, depending on the model. In the case of a 1978 U206G,

for example, the gross weight/sea level/standard conditions takeoff ground run would be reduced from the stock airplane's 903 feet to between 768 and 678 feet. To clear the 50-foot obstacle, distances can drop from 1,780 feet to anywhere between 1,513 and 1,335 feet. Takeoff runs in float-equipped 206s can be cut by 25 to 30 percent, according to claims.

Climb rates also benefit from the conversion, according to STC holders. They are reluctant to nail down specific increases but sometimes mention an "approximately" 20 percent boost over the standard airplane. Again, for the 1978 U206G, this translates into a jump from 943 to 1,132 fpm under standard conditions.

Hikes in cruise speed are similarly modest. In the case of our sample airplane, at a pressure altitude of 8,000 feet you'd be tooling along at 154 KTAS instead of the stock airplane's 145 KTAS using the same 22-inch manifold pressure, 2,550-rpm power setting. Big deal, you may say, the 206 was never known as a speed demon; and you'd be correct. Still, 10 knots is 10 knots, and every little bit counts when you're flying the truck-like 206.

The IO-550's automatic, altitude-compensating fuel pump is cited as another good reason for swapping out a -520 engine. This fuel pump lets you leave the mixture control in the full-rich position as you take off and climb to cruising altitude. An aneroid device in the pump senses the changes in atmospheric pressure as you climb and is designed to lean the fuel-air mixture automatically and continuously to the best-power setting. It's a workload-reducing feature that most appreciate. Leaning for cruise power, as well as enriching during descents, must still be performed manually with this system.

Those with run-out turbocharged 206s may also find the -550 conversion appealing. Without the complexity, heat, and potential for abuse that a turbocharged engine carries, opting for the non-turbocharged -550 may spell relief in the form of reduced maintenance.

Another advantage of the -550 over the -520 is the engine's construction. The IO-520-Fs used in stock 206s earned an unenviable reputation as being prone to crankcase cracks. This often meant trashing the case and starting over with new parts, though smaller cracks may be welded. Still,

anyone facing an overhaul or replacement of a 206's IO-520 would surely cast an envious eye on the IO-550's beefed-up crankcase.

The IO-550 has an improved cylinder design and two more case studs. These are located on either side of the middle cylinders and hold down a bracket that helps secure the cylinders more firmly to the case halves. This stud/bracket arrangement reduces structural loads on the crankcase's cylinder decks and minimizes the kind of stress concentrations that can lead to case cracking.

Other design improvements over the -520 engine include a spin-on oil filter (the -520s used internal filter screens), cylinder barrels with tapered cooling fins, and baffles between the cylinders for additional cooling.

Finally, the IO-550 is certified to stricter standards than the IO-520. Among other things, the -550 has to prove that it can produce its maximum rated horsepower within a margin of plus five percent and minus zero percent. The IO-520's certification rules allow it a plus or minus 2.5 percent variance. This means that the driver of a brand-new IO-550 can rest assured that his engine will put out at

least book power, and maybe even a little bit more. Theoretically, a brand-new IO-520 can leave the factory a tad on the wimpy side.

To date, three STC holders can provide the 206's -550 conversion.

Aero Modifications and Consulting, offers the conversion for all U206s made between 1967 and 1986. The company has sold five STCs for the 206 conversion in the past year; they've converted some 40 Cessna 210s to IO-550 power under another STC. Cessna 206 STC ship-out kits are priced at \$31,000 plus tax and include shipment of a factory-rebuilt engine; a McCauley Black Mac propeller; and new Lord mounts, tachometer, and fuel flow gauge. The old engine, pro-

PELLER, fuel flow gauge, and tachometer are exchanged as part of the deal. Aero Modifications will install the kit for you at their location for an additional \$2,000 in labor. Contact Aero Modifications and Consulting at Atlantic Aero, Inc., Piedmont Triad International Airport, Post Office Box 35408, Greensboro, North Carolina 27425-5408 for further details; reach them by telephone at 800/668-0411, or by fax at 910/668-4434.

Bonaire Aviation Company of Blountville, Tennessee, is another supplier. They have sold more than 60 IO-550 conversions for all Cessna 206s, including the early P206s and those equipped with floats. The float-

plane engine conversion differs from the others in that it comes with specially designed rubber doughnuts that serve as shock mounts to handle the loads peculiar to singles on floats.

Bonaire gives customers two big choices: Both the McCauley Black Mac and a Hartzell three-blade propeller are offered. Because the Black Mac carries limitations against continuous operation in the 1,950 to 2,150 rpm range (1,950 to 2,400 rpm in seaplane applications), Bonaire president James Gillenwater says that most of his 206



*The 550 conversion includes either a Hartzell or McCauley (above) three-bladed propeller. A new tach and fuel flow gauge are also included.*





*Cruise speed gains are more modest than those for takeoff distance. At 8,000 feet the IO-550-powered 206 turns in 154 knots*

kits are now sold with the Hartzell prop.

The Black Mac rpm restriction is designed to protect the engine and its mounts from damaging vibrations. The McCauley three-blade propeller used in Bonaire's conversion also has a limitation. It specifies that manifold pressures above 20 inches not be used for extended periods of time while the propeller is set at or below 2,250 rpm.

Customers also have the option of sticking with the altitude-compensating fuel pump or exchanging it for a manual mixture control. "Less than 30 percent of our kits go out with the automatic mixture control," Gillenwater says, because "... with a misadjusted or faulty automatic pump, you can't enrich the mixture, only lean it. If you're out in the Australian desert, with no mechanic anywhere, and your engine starts running hot, what are you going to do? You're stuck."

Many of the 206s that Bonaire converts are operated by the Missionary Aviation Fellowship (MAF), a Christian organization that carries out medical and other humanitarian initiatives at remote locations around the world. The MAF, the largest single owner of 206s in the world (its 206 fleet is 48 strong, and growing), sends its airplanes to the world's shortest and most obstacle-littered runways. As their airplanes' engines near TBO or meet with major

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misfortune, Bonaire has been steadily refitting them with IO-550s. The company also holds IO-550 STCs for Cessna models 185, 188, 207, T207, and 210.

Bonaire's STC kit involves exchanging the old engine, propeller, and engine instruments for a factory-rebuilt IO-550. The exchange engine comes with new or remanufactured magnetos, wiring harness, spark plugs, starter, all flexible fluid hoses, new engine shock mounts, and new or rebuilt and re-marked fuel flow and tachometer gauges. Typical cost of the kit is \$35,000, which includes approximately \$1,500 in labor costs for installation.

For more information, contact Bonaire at Post Office Box 1158 TCAS, Blountville, Tennessee 37617; telephone 615/323-4282, or fax 615/323-4006.

Wipaire, Inc., the well-known float manufacturer, also offers an IO-550 conversion—for both the Cessna 206

and Cessna 185F. Its STC includes a package similar to that of Bonaire, but specifies the Black Mac propeller only. Cost of the kit is approximately \$39,700. Shipping, installation, and sales tax are not included in the price. For more specific information, contact Wipaire at 8520 River Road, Inver Grove Heights, Minnesota 55076; telephone 612/451-1205, or fax 612/451-1786.

Aero Modifications graciously offered us a chance to fly one of their IO-550-converted 206s. In this author's opinion, the airplane performed with much more alacrity than the standard 206s I'd flown for more than 300 hours. Acceleration on the takeoff run was noticeably improved, as was the drop in noise levels. Precise quantification of runway performance was difficult, since we were extremely light. However, I saw a 1,500-fpm climb rate just after takeoff, and cruise speeds matched Aero Modifications claims. The company also spiffed up the aging panel and added a batch of new avionics.

Other than that, the airplane behaved, well, just like a 206. Solid aileron and elevator forces are the rule—just what you'd expect from an airplane of this size and weight. With a forward CG situation, a fair amount of pulling is required for takeoff rotation and the landing flare. But fill the 206 with a good load and pitch forces



*Cessna plans to resume production of the 206 and turbo 206. It will be interesting to see if Cessna equips them with the IO-550.*

become surprisingly pleasant for a nearly two-ton airplane. It's a fine instrument platform, too. But if its handling and sex appeal are pictures of stodginess, the airplane's irrepressible, unpretentious blue-collar, working class credentials more than save the day.

Because of these attributes, Cessna has plans to reintroduce the 206 and turbo 206 as part of its initiative to restart production of single-engine

piston airplanes. There should be no problem selling them, since these hard workers have always been in demand. Since Cessna stopped building them in 1986, there's sure to be a significant pent-up demand.

It will be interesting to see if Cessna equips the new incarnation of the Stationair 6 with the IO-550. Being a Teledyne Continental product may not help these days, even though 206s

have always been certified with Continentals. Cessna's parent company is now Textron, the firm that manufactures Lycoming engines.

Even if Cessna opts for a Lycoming engine, the STC holders profiled here will presumably earn the paperwork to install them in new 206s. If this comes about, customers will still have the option of mating a great engine with a truly great single-engine airplane. □