Aero SUV

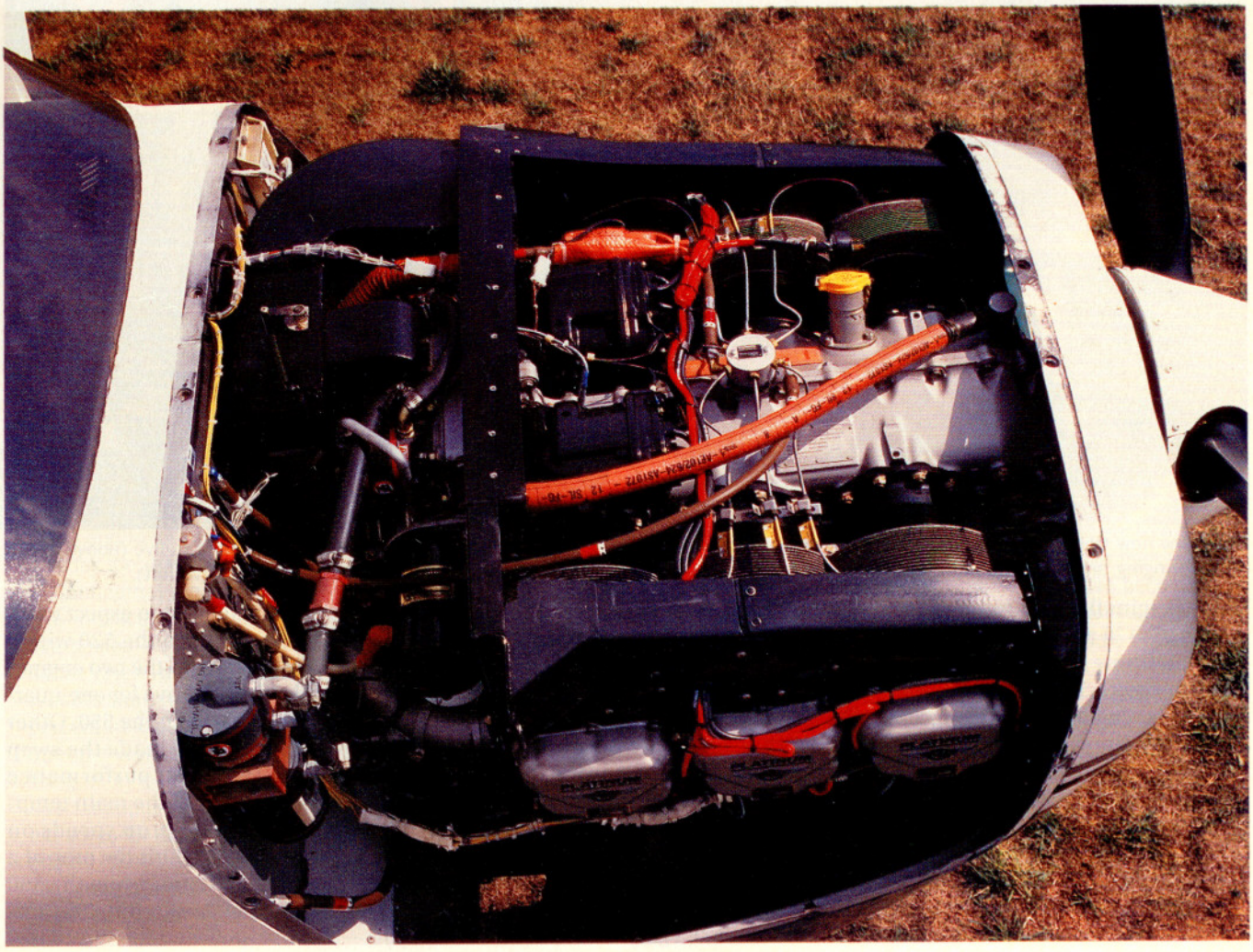
1999 sweepstakes

Persuasion of power

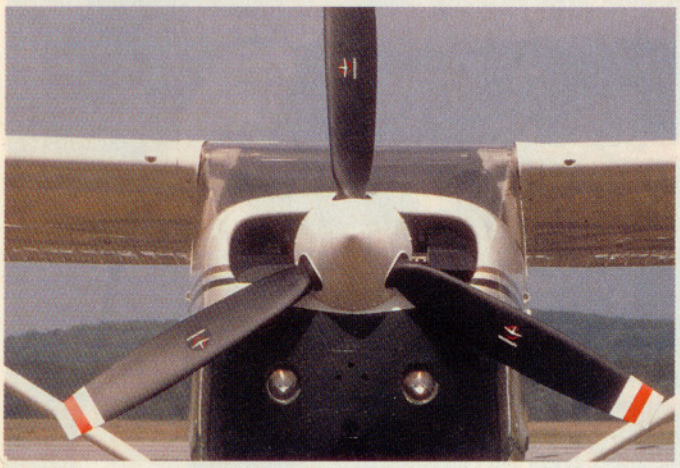
A new Continental Platinum engine heads up our firewall-forward rejuvenation

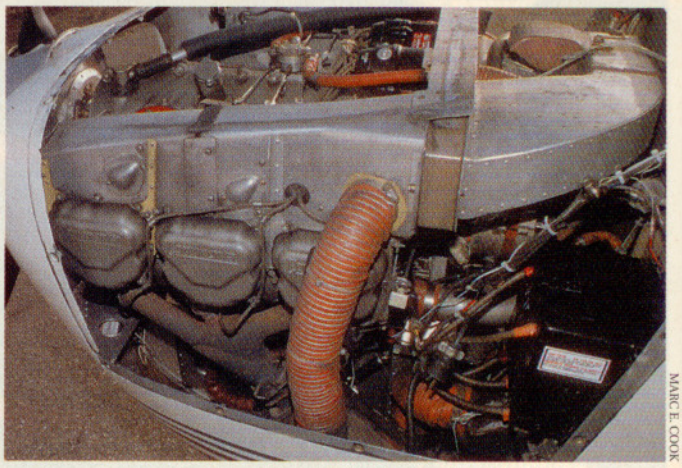
By Marc E. Cook

Modifying airplanes to accept different or more powerful engines has become a big part of the general aviation aftermarket. With the carrot of extra power or more modern-specification engines dangling over their heads, more aircraft owners are yanking out *old reliable* for something a bit—or, in some cases, a lot—different from what mother manufacturer put there in the first place. These engine swaps are taking place not just in the aftermarket but also in the R&D departments of the original-equipment manufacturers. Witness Cessna's across-the-board adoption of Lycoming engines where, in all but one model, Continentals held sway. (The fact that Textron is the parent company of Lycoming and Cessna *may* have had something to do with it.) ■ In any event, the Cessna 206 airframe has received its fair share of engine transplants—again, many of which were perpetrated by Cessna



PHOTOGRAPHY BY MICHAEL P. COLLINS





MARC E. COOK

The shiny new Continental IO-550-F Platinum engine (top) takes up residence where the traditional IO-520 used to live (above right), bringing another 15 continuous horsepower to the party. It drives a new three-blade McCauley prop (above left).

itself. Originally powered by a Continental IO-470 as the Cessna 205, this basic airframe eventually got a 285-horsepower IO-520, then a 300-hp version of that engine. Turbo-charged variants came along packing as much as 310 hp.

AOPA's 1999 Aero SUV sweepstakes airplane started life as a 1976 U206F and came with an IO-520-F, rated at 300 hp maximum for five minutes and 285 hp continuous. It's a well-known, comparatively durable engine, but there is at least one more powerful engine that'll fit. Atlantic Aero in Greensboro, North Carolina, holds a number of supplemental type certificate approvals for supplanting 520s with 550s in Cessna 206s and 210s. We chose Atlantic Aero's STC in part because the company also has an approved remote-mount oil cooler kit and a slick six-point engine mount. Some Stationair operators have complained about higher oil temps with the 550, so Atlantic Aero's 50-percent-larger oil cooler seemed like a good idea.

We weren't sure what to expect when we decided to replace the 520 with a new IO-550 of 300 hp—the two engines are virtually identical save for one-quarter-inch more stroke in the 550. Other 206 owners who have made the swap report good if modest performance improvements. One of the main temptations was reduced prop speeds on takeoff—the IO-520 whirls the prop at a din-making 2,850 rpm, while the 550 does the deed at 2,700 rpm. Stationairs—and like-powered Cessna 185s—

are notoriously rowdy neighbors.

Let's cut right to the chase, then. This Stationair—as trucklike, boxes-with-wings airplanes go—fairly romps. Cruise performance is up to nearly 150 knots true—at optimum altitude and 75-percent power—that's at a real-world weight and without wheel pants. Just as important, the 206's climb performance has been usefully bolstered. Matching vertical speeds with the old, the newly IO-550-powered Cessna plows upward at anywhere from 10 to 15 kt greater indicated airspeeds. At similar indicated speeds, the Aero SUV now posts a climb rate some 300 to 400 fpm better than before. What's more, the airplane is able to maintain a healthy climb rate to a much higher altitude than before, and it can stay on the good side of 140 KTAS to a density altitude of 12,000 feet—again, without the wheel fairings.

Naturally, the larger engine consumes more fuel. Typical high-cruise consumption is 17 gph or more at best-power mixture settings. With GAMIjectors installed, this IO-550 is perfectly happy and smooth lean of peak, where it swills significantly less avgas with a minor hit in forward progress. Don't believe it? Here's but one data point: At 7,500 feet (density altitude of 9,100 feet), full throttle, 2,300 rpm, and 75 degrees rich of peak, the 206 posted a 144-kt cruise on 15.6 gph with the hottest cylinder at 401 degrees F. Under exactly the same conditions, turn the prop up to 2,500 rpm, dial the mixture back to 30 degrees lean of peak, and the airplane will turn in the same cruise speed on 13.9 gph with the hottest CHT at 388. After that set of test flights, Atlantic Aero made minor changes to the baffling near the number-five cylinder that resulted in CHTs all below 385 even at high-power cruise.

If you fly an IO-520-powered Stationair, you know we're seeing fuel burns

Continental machinations

Pumping up new-engine volume

In August, Teledyne Continental Motors announced a reshuffling of its engine products that will undoubtedly leave a lasting mark on the industry. Until then, the company built new engines mainly for original-equipment manufacturers while it cranked out remanufactured (Continental calls them "rebuilt") powerplants for the aftermarket. It also built—and continues to build—the Platinum engine, a premium new engine aimed at countering the products of the "boutique" overhaul shops.

Now, however, Continental has something called *Aftermarket New.* It's an all-new, standard-specification engine—as opposed to the Platinum or the Special Edition versions TCM sells to Raytheon—priced just above the cost of remanufactured engines. How close? An Aftermarket New IO-550-A costs about $3,000 more than a rebuilt version. Moreover, the Aftermarket New engine comes with a three-year, 1,000-hour warranty—parts and labor for the first year, parts only for the remaining period.

Continental's move toward selling new in place of remanufactured or overhauled engines makes more sense when you consider that the rebuilts were made up of nearly 70 percent new parts anyway. It also streamlines the company's ability to bring all of its output to the latest specification. When TCM starts with old cores for a reman, it routinely makes changes to bring them up to the latest standard. With new parts, this step is automatically eliminated.

Factory remans still trundle out of Mobile, and include a one-year, 500-hour warranty on most of the engine. A longer warranty applies to TopCare cylinders, giving power sections a three-year, 1,000-hour warranty. Part of the cost differential to the Aftermarket New engine has come by way of a modest price increase on remans.

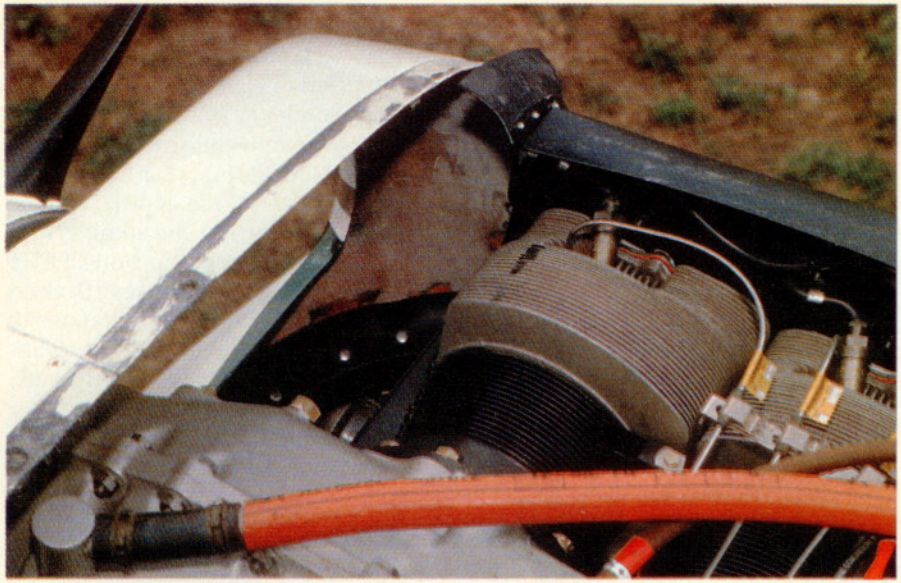
MARC E. COOK

Continental's Fairhope, Alabama, crew (left to right): Gene Scott, Roger Gradle, James Towle, Steve Hotard, John Bodenmann, and Ron Humphrey.

Continental is working harder than ever to sell the concept of the Platinum engine. Platinums have tighter production tolerances—particularly where the balancing of the engine's internals are concerned—and other labor-intensive measures that would be uneconomical to perform on the regular production line. For example, the intake and exhaust ports of the Platinum's cylinders are slightly smoothed and matched, although Continental is careful to point out that improving air flow through the cylinders has not come at the expense of head integrity and wall thicknesses.

To sweeten the deal, Continental sends out the Platinum engine with an impressive warranty—five years, right to TBO, including parts and labor for the first two years and parts only afterward. Other incentives include free engine-oil analysis services and two annual engine inspections at no charge. All Platinums are installed at the factory's Fairhope facility, although the cost is no longer bundled in with the total engine price as has been the case until recently. Comparing a typical specification of IO-550-Bs, the Platinum checks in at $32,499—that rates quite favorably to an Aftermarket New at $28,464 and a reman at $24,733.

Continental's efforts appear to be paying off. Fairhope is busier than ever, and the Platinum engines are becoming a larger part of the mix. Continental's engineers believe the TopCare cylinder program has stemmed the tide of poor top-end life on many of its engines. Together with an aggressive stance on getting newer-technology engines—hence the IO-550-N that will appear in 206s and 210s under an Atlantic Aero STC—and its FADEC powerplant controls to market, Continental looks to follow through on its threat to push boldly into the new millennium. —*MEC*



New Gee-Bee prepunched flexible baffles were fitted, and the fixed baffling was powder-coated black. Part of the close-out ahead of the number five cylinder (above) was removed to improve cooling; normally there's an oil cooler there.

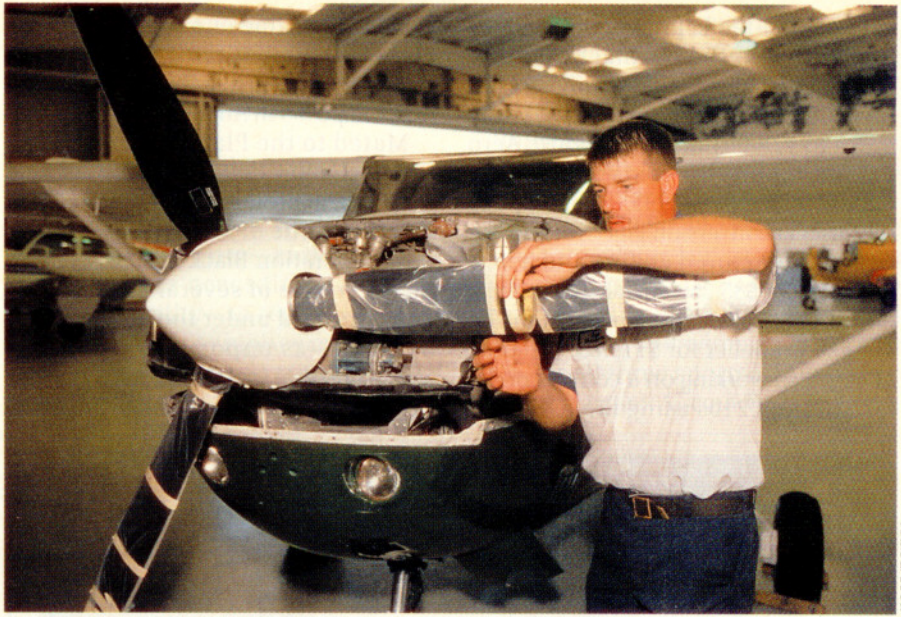
nearly 2 gph more gluttonsome than before. This observation feeds into a widely held belief among the engine watchers in GA that the IO-550 is in fact stronger than its rated output, while the 520 was slightly shy of the mark. Trace the difference back, in part, to the murky old days of the early 1960s, when the 520 was certified. Then the standard called for rated output, plus or minus 2.5 percent, giving manufacturers some latitude in the day-to-day production variances. Your dutiful public servants put up stricter rules in the early 1980s, when the 550 proved its certification mettle. Specifically, the rules call for minimum rated power—in this case 300 and not a pony less—and up to 5 percent over. At the top end of the tolerance, that puts our 550 up to an impressive 315 hp. There is also a consensus that the minor porting cleanup that Continental lavishes on the Platinum series could liberate a few more horses, although TCM can't so much as admit to the possibility. Taking into account the upped performance and greater fuel consumption, it's reasonable to assume our Platinum 550 is one burly fellow. Current price is $32,499.

Part of the Platinum experience includes installation at the factory's Fairhope, Alabama, service center. Think of Fairhope as a full-featured shop that just happens to be owned and run by Continental. Why the Fairhope airport and not on Continental's home field across Mobile Bay? Land, inexpensive buildings, and a severely underutilized airport are but three answers. Sales Manager James Towle oversaw the logistics of our project, and Maintenance Supervisor Ron Humphrey took the lead on the shop floor. Amidst numerous engine exchanges and the remnants of its crankshaft inspections, Continental squeezed our 206 into the jam-packed

calendar. To its credit, the airplane remained on schedule until outside vendors held up critical parts and pushed the project straight over a long holiday weekend. Moreover, the work performed by the Fairhope staff was high-caliber; their attention to detail is clearly evident in the 206's engine bay.

Changing an IO-520 for an IO-550 is, physically at least, very nearly a no-brainer. We elected to keep the standard, non-altitude-compensating fuel pump for our Cessna, so there were no changes to the fuel system. There have been numerous changes to the aneroid-equipped fuel pump over the years and a clear pattern emerged that it's hard to set up in the field to feed the muscular 550. Simpler, we hoped, would be better. In addition, both engines are the same size and nearly the same weight. Original baffling and exhaust systems slide right into place. (We are anxious to try a tuned exhaust system donated to the project by Leading Edge Exhaust Systems of Anchorage. Look for updates on the Aero SUV Web page in October.)

Continental prides itself on making smooth engines, and the Platinum's more stringent internal balancing held the potential to make our Stationair one velvety vehicle. Not that we were complaining—the standard 520 and the three-blade McCauley prop were obviously happy with each other and the airframe. To hedge a bet or two, we installed Atlantic Aero's six-point engine mount, an adaptation of Cessna's own mount for the turbocharged 206s and 210s. By doubling up the front engine mounts, each rubber isolator has to carry less load—improving longevity—and the arrangement helps change the frequency at which the airframe and the engine/prop combination resonate. In flight testing, Atlantic Aero determined that in some airframes, the 550 engine



MARC E. COOK

Upon delivery to TCM's Fairhope facility, the Aero SUV is stripped of its old prop. Soon the engine itself would be missing in action.

with a three-blade prop created a harmonic within the normal operating range signaled by an annoying judder; this 206 is now shake-free all the way down to 1,900 rpm. The Atlantic Aero engine-mount kit costs $2,495; the remote oil cooler $2,995. The company sells its 550 conversion kits with a factory remanufactured engine and a new propeller for $35,250, installed complete for $38,250; you can also buy just the kit and the propeller for $11,985. (Atlantic Aero is also working on a conversion kit for 206s and 210s using the IO-550-N engine, the same one used in the new Lancair Columbia, rated to 310 hp. The company will have a flying example at AOPA Expo '99 in Atlantic City.)

Mated to the Platinum engine is a new McCauley C401 80-inch-diameter, three-blade propeller. You'll notice that this is not one of McCauley's swoopy, next-generation Black Mac props. It is, however, one of several props tested and approved under the Atlantic Aero STC and—as important to our mission—one that in Atlantic Aero's testing offered an excellent compromise of

Aero SUV assistance

Engine and installation
Teledyne Continental Motors
Post Office Box 90
Mobile, Alabama 36601
334/438-3411
www.tcmlink.com

Engine STC, six-point engine mount, remote oil cooler
Atlantic Aero Inc.
Piedmont Triad International Airport
Post Office Box 35408
Greensboro, North Carolina
27425-5408
336/668-0411; 800/334-2001
Fax 336/668-4434
www.atlantic-aero.com
info@atlantic-aero.com

Flexible baffle seals
Gee-Bee
Post Office Box 5061
Palm Springs, California 92263
800/556-3160
fax 760/341-6947

GAMIjector fuel injectors
General Aviation Modifications Inc.
2800 Airport Road
Hangar A
Ada, Oklahoma 74820
888/FLY-GAMI; 580/436-4833
www.gami.com

takeoff and climb thrust to cruise efficiency. (Let's be honest: You don't need a prop optimized for cruise on a 206.) So far, we are delighted with the prop's performance.

No engine installation is complete once you've bought the engine and propeller and accessories. While you're in there, it's good form—and, indeed, a requirement, according to TCM's Fairhope facility—to replace all fluid hoses and repair or replace baffling. For the hoses, we had Sacramento Sky Ranch fabricate integral-firesleeve Teflon hoses. Meanwhile, Gee-Bee took the old rigid baffles, reworked them as necessary, sent them out to be powder-coated black, and fitted them with the company's own custom flexible seals. These seals are die-cut and prepunched for easy installation. Seals for most 206s run about $150 for all. While the engine compartment was laid bare, we had the TCM techs install new Cessna engine controls—all of this 206's controls had become quite stiff with age. Parts cost $235 for all three controls, purchased through Yingling Aircraft Parts in Wichi-

The Fairhope staff performs a pre-engine-change flight on every airplane it touches, to determine the condition of the airframe, engine cooling, and other variables.

MARC E. COOK

Preheater
Tanis Aircraft Services Inc.
Post Office Box 117
Glenwood, Minnesota 56334
800/443-2136; 320/634-4772
E-mail info@tanair.com
www.tanair.com

Power controls (Cessna)
Yingling Aircraft Inc.
2010 Airport Road
Wichita, Kansas 67209
316/943-3246

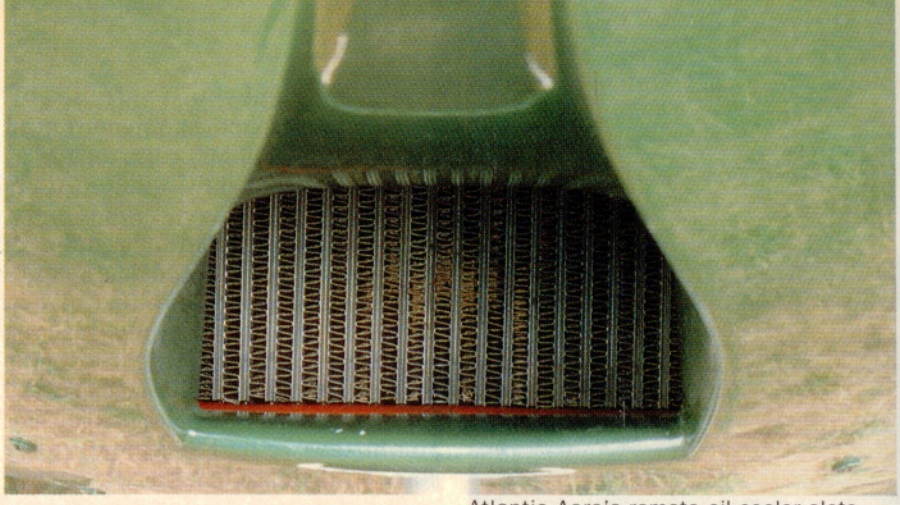
Propeller, spinner, and governor
McCauley Propeller Systems
3535 McCauley Drive
Vandalia, Ohio 45377
800/621-PROP (7767)
fax 937/890-6001
www.mccauley.textron.com

Teflon hoses
Sacramento Sky Ranch
6622 Freeport Boulevard
Sacramento, California 95822
916/421-7672
fax 916/421-5719

Recombinant-gas battery
Concorde Battery Corporation
2009 San Bernardino Road
West Covina, California 91790
626/813-1234
fax 626/813-1235
www.concordebattery.com

ta. Finally, a new Concorde recombinant-gas battery was slipped into the Cessna's box.

A sport-utility machine may be called upon to operate in extreme environments, so we fitted a full Tanis preheater system to the big Cessna. In the past, the Tanis system would take up all of the standard CHT-probe wells, creating a scramble for those intent on having an engine analyzer as well. Now, the Tanis has a new system that uses heating elements embedded in rocker-gasket material, leaving the CHT sockets open



Atlantic Aero's remote oil cooler slots into the normally empty nosewheel bay. It's some 50 percent larger than the standard, engine-mounted cooler.

for our J.P. Instruments' six-pack of probes. The rocker-box heaters are joined by an oil sump pad and both engine-cowl and prop covers to help keep snow and ice off the thrust-making bits and to retain as much heat as possible inside the engine compartment. We look forward to taking the Stationair to colder climates to test the system.

This 206 sports about $63,000 worth of improvements, a big chunk of which is the engine itself.

In case you're wondering what kind of investment you'll have to make in your 206 to duplicate the Aero SUV ahead of the firewall, here's the good-news, bad-news answer. Including a $3,000 allowance for installation labor—it could be more or less, depending upon the condition of your airframe—this 206 sports about $63,000 worth of improvements, a big chunk of which is the engine itself. Yes, upgrading to the 550 is a notably more expensive proposition than keeping your 206's 520 in place. That's the bad news. The good news is that the improvements in performance, particularly climb ability, add a new dimension to the Cessna's abilities that further strengthen its SUV-like prowess. □

Links to additional information about engine alternatives may be found on AOPA Online (www.aopa.org/pilot/links.shtml). E-mail the author at marc.cook@aopa.org