

# TURBO WAGON

*Turbotech magic does wonders for your average Cessna.*

BY THOMAS B. HAINES

**I**N one of Gary Larson's "The Far Side" cartoons, a pair of cheetahs is peering through weeds at a herd of gazelles. Emblazoned across the flanks of the gazelles is the word "Turbo." One cheetah looks disgustedly at the other and says, "Forget these guys." ■ In the minds of many, turbocharging equates to speed. A turbocharged car can blow by others on the freeway. A single-engine turbocharged airplane is faster than its normally aspirated counterpart. For example, the Turbo Bullet add-on turbo system sends the already quick Mooney 201 into the flight levels at cruise speeds greater than 200 knots (see "Aircraft Design Turbo Bullet," October *Pilot*). ■ Some people with an interest in turbocharging, though, have a need other than to fly high and fast. They want maximum

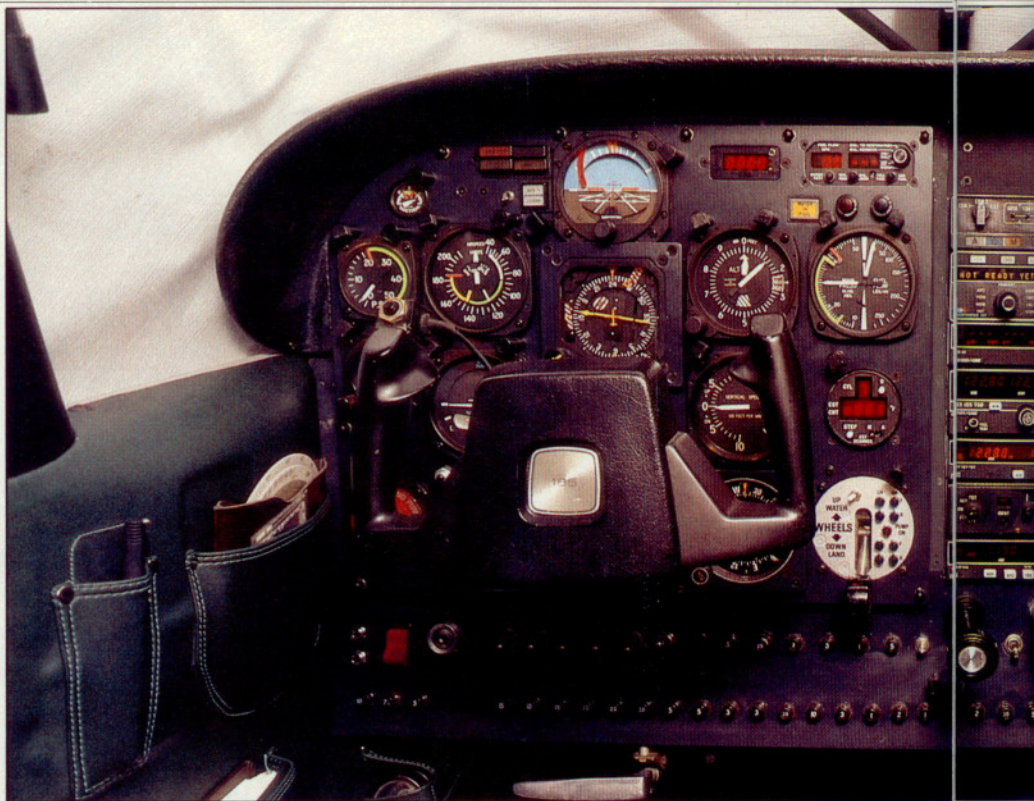


power for the times when density altitude plays havoc with takeoff performance. These include the people who want to be able to stuff an airplane on amphibious floats full of fishermen and gear and still get out of high-altitude lakes in midsummer.

For 20 years now, many of these people have been turning to Turbotech, Incorporated, of Kelso, Washington. The company has come a long way from the days when Louis Soukup wedged 225-horsepower turbocharged Franklin engines into the cowlings of Cessna 172 floatplanes. His Sea Planes, Incorporated, now goes by the name Turbotech, and one product is a bolt-on AiResearch turbocharger for the 300-hp Teledyne Continental IO-520s installed in Cessna 185 Skywagons. But the biggest activity today is to replace the Continentals in the Skywagons and in Cessna 206 Stationairs with 350-hp Textron Lycoming TIO-540s, according to Louis's daughter, Nancy Soukup.

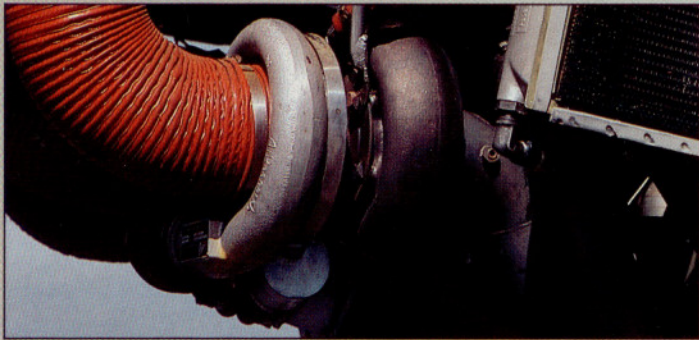
Despite a tumultuous year, the company is still churning out the conversions and investigating and investing in new products, she says. She bought the company last year from her father, but the factory was ravaged by fire in December 1989. That blow was followed in January by the death of Louis. The fire destroyed many drawings and parts and much tooling. Several customer airplanes also were damaged in the blaze. Since then, she has moved the company 25 nautical miles north from its longtime home at Pearson Airpark in Vancouver, Washington, to new facilities at the Kelso-Longview Airport.

With 1,000 hours in stock Cessna 185s, California resident George Cordingly is continually amazed by the performance and capabilities of his 1976 185 with Turbotech's Lycoming conversion. "A standard 185 on floats can't take off from Lake Tahoe—even with just one person on board," claims Cordingly, noting the lake's 6,200-foot elevation and the frequent high ambient temperatures, which drive density altitudes even higher. Cordingly is a retired Continental Airlines pilot. He now is a seaplane and mountain-flying instructor and the owner of a country inn near Yosemite National Park in California. When *AOPA Pilot* staffers flew Cordingly's airplane, it was still on wheels but was scheduled to be put on amphibious floats. The runway performance is impressive, and Cordingly is sure water takeoffs will be just as precipitous and



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exhilarating.

With three on board, mostly full tanks, 20 degrees of flaps, and an outside temperature of 80 degrees Fahrenheit at Kelso, elevation 17 feet, the gray, green, and yellow Cessna leaped off the runway in less than 350 feet, almost before the throttle had met the panel. The 350 hp and three-blade Hartzell propeller required the use of full right rudder trim for takeoff and a substantial assist with the right foot.

The turbo Lycoming installation on Cordingly's airplane includes an automatic wastegate, so full-throttle takeoffs are the norm. Maximum power is achieved with 42 inches of manifold pressure and 2,575 rpm, pegging the vertical speed indicator at 2,000 feet per minute that day. Cordingly recommended a cruise climb of 38 inches and 2,450 rpm, which resulted in 1,300 fpm at 110 knots.

Seaplanes seldom have a need to climb above 12,000 feet, and normal cruise is at 7,000 to 9,000 feet, Cordingly advised. We leveled off initially at 7,500 feet and cruised by what was left of Mount St. Helens. At 70-percent power, the Cessna was burning 17.5 gallons per hour and producing 154 KTAS.

By comparison, a stock 185 with the normally aspirated 300-hp Continental would cruise at that setting and altitude at about 135 KTAS, but its fuel flow would be in the 13- to 14-gph range. Incidentally, the Continental is limited to 300 hp for five minutes only. Maximum continuous power is 285 hp.

To ensure proper fuel management and leaning of the Lycoming, Turbotech recommends installing a fuel totalizer and engine temperature scanner.

To better accommodate the thirsty Lycoming, Cordingly opted for auxiliary Flint fuel tanks in the wings, increasing the airplane's fuel capacity from the stock 88 gallons to 104 gallons, 97 usable. Turbotech says the result is a 4.5-hour endurance with a 45-minute reserve when cruising at 12,000 feet. Cruise there should be 175 KTAS for a 780-nm no-wind range. Cordingly predicted he will lose about 12 knots in cruise and 80 miles in range when he adds the amphibious floats.

The engine in Cordingly's airplane is slightly different from the normal Lycoming Turbotech installs. His is a modified TIO-540-V2AD, which was developed for use in the Piper Mojave. The engine Turbotech normally installs is the TIO-540-J2BD, which powers the

Piper Navajo Chieftain.

The installation on Cordingly's airplane includes an absolute pressure controller to complement the automatic wastegate, meaning the pilot can set his throttle and forget it. The equipment automatically maintains the selected manifold pressure throughout the climb until critical altitude is reached. The engine can put out 350 hp all the way up to 18,000 feet, according to Dwight Krauss, Turbotech's special projects manager. Service ceiling is 25,000 feet. The Mojave engine also includes an intercooler to cool induction air after it has been compressed by the turbocharger.

In the future, the company will continue to install the -J2BD Chieftain engine unless a customer asks for the Mojave engine, which is more expensive and difficult to find, Krauss says.

Though the -J2BD engine is equipped with a form of automatic wastegate when it is installed on the Chieftain, Turbotech's installation utilizes a manual wastegate. The pilot must adjust a mixture control knob, to prevent overboosting and to maintain optimum power. This is a simpler and less costly system than an automatic wastegate, but it does add to pilot work load. Soukup soon hopes to offer an automatic wastegate as an option.

More power was only part of what Cordingly had in mind for his 185. Since taking delivery of the airplane from Turbotech last January, he has had it repainted and has had a new interior and panel installed. Krauss designed the panel on a computer at Turbotech.

Inside and out, Cordingly has done an excellent job of refitting his airplane. He opted for only three seats because he likes to leave room for his two dogs, which travel with him regularly. A ski tube extends into the tailcone, and a survival kit is stashed behind the rear seat. Ropes neatly hang on the side walls for mooring the airplane once the floats are installed. New wing tips, by RMD Aircraft Lighting, Incorporated, of Hillsboro, Oregon, include landing and recognition lights.

With all said and done, Cordingly figures his airplane is worth \$150,000. By contrast, the average retail price of a stock 1976 185 is \$50,500, according to the *Aircraft Bluebook-Price Digest*.

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installation adds about 120 pounds, which comes out of the airplane's useful load. Stock 185s generally have a useful load of more than 1,500 pounds.

Besides the Lycoming conversion, Turbotech also markets an add-on turbocharger for the Continental in the stock 185. With the modification, the 185 climbs faster and farther, and it will maintain sea-level manifold pressure up to 20,000 feet, according to the company. Service ceiling is 24,000 feet. Service ceiling on the normally aspirated 185 is 17,900.

As noted earlier, Turbotech modifications are not limited to the 185. The company has discovered another market for the Lycoming—in the Cessna 206. Like the stock 185, the Cessna 206 normally is powered by a 300-hp Continental. With Turbotech's Lycoming conversion out front, a 206 at 10,000 feet will cruise about 30 knots faster than a stock version. An automatic wastegate is an option with the 206 conversion.

Turbotech does not offer an add-on turbocharger for the 206 because Cessna offered its own, the TU206, which was powered by a 310-hp Continental. Turbotech's 350-hp Lycoming conversion cruises about 15 knots faster than the TU206.

Putting the Lycoming in the 206 adds only about 104 pounds, which can be offset with a gross weight increase in some models. Gross weight of the 206 can increase by up to 205 pounds if Flint auxiliary fuel tanks are added. The tanks can add either 28 or 30 gallons of capacity, depending on the year of the airplane. The stock cowling of the 206 is roomy enough to absorb the TIO-540 without modification.

The cost of the conversion kit for the 185 and the 206 is \$17,570. A factory-new Lycoming is \$66,030, and the three-blade, 80-inch propeller is another \$9,884. Turbotech will sell the whole outfit for \$79,390. Using an overhauled engine, the price is \$56,990. The price does not include the cost of the approximately 250 man-hours needed for installation in the 185. About 175 hours is required for the 206 conversion because less sheet metal is cut. Turbotech installs about one of five kits it sells. Any reasonably well-equipped shop can do the installation, Krauss says.

The price for a bolt-on turbocharger for the 185 is \$9,255. Installation takes about 35 hours.

Of course, there is a caveat that goes with all turbocharged engines. Turbo-

charged engines, as a rule, do not make it to TBO as frequently as do normally aspirated versions. At overhaul time, the bill will be bigger, because there is more to rebuild. Unscheduled maintenance also can be more expensive. Fuel consumption is higher when the turbocharger is put to work because it allows the engine to produce more power at higher altitudes. Finally, pilot work load can be greater, depending on the turbo installation.

Cordingly believes the price was well worth it. The resulting airplane is the best of all worlds, he insists. By pulling the power back to 55 or 60 percent, he can get the cruise speeds and fuel flows comparable to any Cessna 185, but he also has the option of using all 350 hp to lift the heavily laded floatplane off of high lakes, even on hot days. If his schedule is pressing, he can push the throttle in to cruise at 175 knots, or he can zoom up to high altitudes to by-pass weather or fly over rugged terrain.

Krauss agrees with Cordingly's analysis. The best thing about airplanes on amphibious floats is their versatility. Surf or turf, there's always some place to land. Turbocharging adds to that versatility. "The flight envelope is huge," he says of the Lycoming-powered Turbotech 185. Stall speed remains a docile 48 knots, and maximum cruise is 184 knots at 16,000 feet. "Some people want speed. Some want altitude. Parachutists, for instance, want a quick-climbing airplane. Ours will do 2,000-foot-per-minute plus at low altitudes and still make 800 fpm at 15,000 feet."

According to owner Soukup, Turbotech has put turbochargers on about 20 Continental-powered 185s over the years. Lycomings have been placed in some thirty 185s and 206s. About 55 percent of the airplanes in either case are on floats. The company's modifications are approved for use on land, float, and ski airplanes.

Turbotech's future looks bright. The prices of the rugged 185s and 206s have been steadily increasing, and with no such equipment being produced these days, owners are investing in their airplanes. Cessna churned out more than 4,000 185s and about 7,500 206s over the years, and who among the owners wouldn't like to enjoy the extra performance that comes with the word "Turbo." □

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