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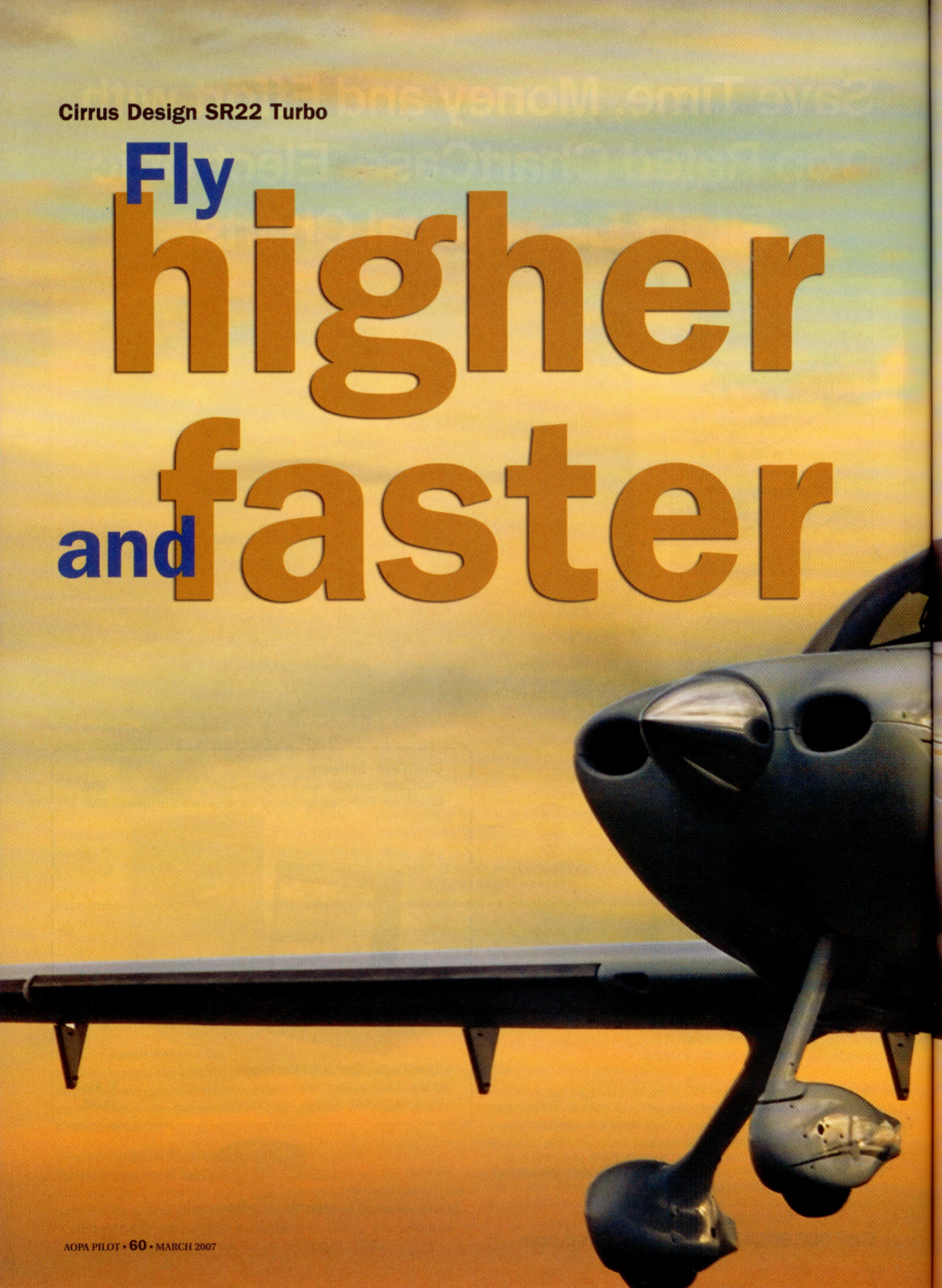
PHOTOGRAPHY BY CHRIS ROSE

Cirrus Design SR22 Turbo

Fly higher and faster



A continent-hopping speedster

BY STEVEN W. ELLS

Cirrus Design again increased and widened the scope of its brand when the company received a supplemental type certificate (STC) for adding a bolt-on performance-enhancing mod to the company's 310-horsepower SR22. The new turbonormalizer (TN) installation provides a substantial increase in performance that boosts economy cruise numbers to 218 knots true airspeed (TAS) at 25,000 feet while burning 17.5 gallons per hour.

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PHOTOGRAPHY BY CHRIS ROSE

2088) maintained a 1,000-foot-per-minute climb—at a cruise-climb indicated airspeed of 105 knots—through 12,000 feet, then through the midteens, and on into the flight levels before reaching the airplane's certified ceiling of 25,000 feet. Time from brake release to level off was 26 minutes. Never once did Sallach touch the engine controls.

"We think of it as a 1,000-foot-per-minute elevator," said Sallach as he pointed out the very cool cylinder head temperatures (CHTs) displayed on the engine and fuel-monitoring (EMax) page of the Avidyne FlightMax EX5000 multifunction display. During this extended climb the hottest CHT never got above 354 degrees Fahrenheit.

There are distinct advantages to operating in the airspace defined in midlevels of altitude—there's a lot less traffic, the ride is typically a lot smoother since the airplane is above thermal activity and low-altitude weather, and air traffic controllers are a lot more likely to grant direct-to routing requests. These advantages, the ease of engine operation, and the 200-plus-knot true airspeeds will undoubtedly make the turbonormalizer a very popular option for Cirrus buyers. The complete TN package—a $62,800 option—includes the turbonormalizer system; a matched set of GAMIjector fuel-injection nozzles; a radical-looking, three-blade wide-chord, second-generation advanced structural composite (ASC II) Hartzell propeller; and a built-in 77-cubic-foot four-place oxygen system from Precise Flight. This high-altitude increased performance package adds 55 pounds to the empty weight, resulting in a useful load that Cirrus advertises at 982 pounds. At this point there seems to be only one drawback—buyers must choose between cool comfort and speed since weight-and-balance restrictions prevent the installation of both the TN option and air conditioning.

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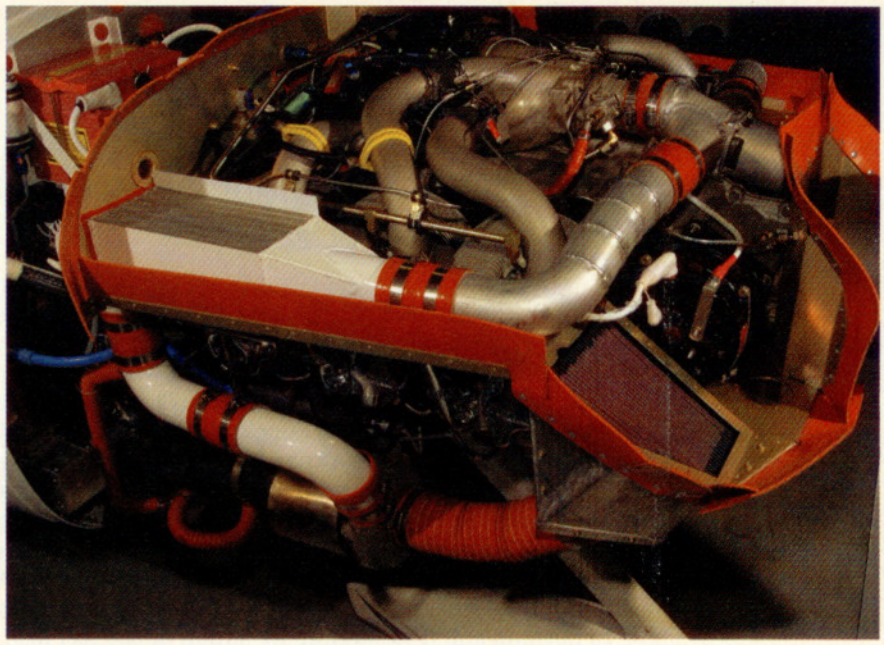

Induction air passes through the filter (above, purple square) before entering the turbocharger scroll through the flexible orange hose. Compressed air is ducted through the white pipe to intercoolers before entering the induction system. Hartzell's second-generation wide-chord advanced structural composite (ASC II) propeller (left) and a built-in 77-cubic-foot oxygen system from Precise Flight (below) are standard equipment on the turbonormalized Cirrus.

TOP: STEVE ELLIS

Performance cruising at altitude

Once the airplane was leveled off at 25,000 feet, the power lever was pulled back to the position Sallach termed "the bump." Moving the throttle lever aft slightly slows the propeller rpm down to 2,500 while the throttle remains wide open. The mixture is then leaned to 17.5 gallons per hour. This results in a lean-of-peak (LOP) mixture at 86-percent power. A few minutes later the airplane had accelerated to a TAS of 217 knots.

True airspeed runs also resulted in true airspeeds of 203 knots at 16,500 feet and 196 knots at 13,500 feet. Again, the engine had been "parked" at 86-percent power, burning 17.5 to 17.6 gallons per hour at all three altitudes.

For the sake of illustration let's pencil in numbers for a cross-country flight following the climb to 25,000 feet. Usable fuel in an SR22 is 86 gallons. About 15.7 gallons were consumed in the climb, leaving just over 70 gallons. At 17.5 gph, this will totally exhaust the fuel in a little more than four hours. Even after setting aside a one-hour cruise consumption fuel reserve, the airplane will still cover over 650 nm in three hours.

e Avidyne FlightMax Entegra PFD with ght director functions and the MFD with Max engine monitoring and terrain vareness warning system are standard uipment. Skywatch traffic awareness, Max paperless cockpit, enchanced TAWS, d XM weather and Stormscope data can added from the option list. Dual Garmin 0 GNS navigators handle the GPS and VHF v and com chores.

The turbonormalizer system is auto-atically controlled by a fixed absolute ressure controller. This unit continu-ly compares the air pressure exiting e turbocharger compressor (which is rmed the "upper deck pressure") with reference pressure and automatically djusts the exhaust wastegate to main-in the proper upper deck pressure. 's a simple system that requires very ttle pilot input.

AT and Cirrus

ornado Alley Turbo (TAT), of Ada, klahoma, worked with Cirrus' engi-eering department to develop the rbonormalizing system for Cirrus. AT began as General Aviation Modifi-ations Inc., or GAMI, in 1996. AOPA nstalled one of its TN systems on OPA's 2001 Bonanza Sweepstakes air-lane. For nearly 10 years, TAT has een at the forefront of creating bolt-n changes to make general aviation ngines run better.

The Cirrus TN system features two gh-efficiency turbochargers—one on ach bank of three cylinders—with

SPECSHEET

Cirrus Design SR22 Turbo
Base price: $530,300
Price as tested: $536,645

Specifications

Powerplant ..... Tornado Alley Turbo, Inc. turbonormalized TCM IO-550N, 310 hp twin turbos, dual intercoolers, automatic wastegate control, GAMIjector fuel injection nozzles
Recommended TBO.....2,000 hr
Propeller(s)...Hartzell Advanced Composite Construction (ASC) II three blade
Length .....26 ft
Height .....8 ft 7 in
Wingspan .....38 ft 4 in
Wing area .....149.9 sq ft
Wing loading ..... 22.68 lb/sq ft
Power loading .....10.96 lb
Seats.....4
Cabin length .....10 ft 10 in
Cabin width .....4 ft 1 in
Cabin height .....4 ft 2 in
Empty weight (with ice protection and oxygen system) .....2,418 lb
Empty weight, as tested .....2,434 lb
Max gross weight .....3,400 lb
Useful load.....982 lb
Useful load, as tested.....966 lb
Payload w/full fuel .....496 lb
Payload w/full fuel, as tested.....480 lb
Max takeoff weight .....3,400 lb
Max landing weight .....3,400 lb
Fuel capacity, std....84 gal (81 gal usable) 504 lb (486 lb usable)
Oil capacity .....8 qt
Baggage capacity .....130 lb

Performance

Takeoff distance, ground roll .....1,020 ft
Takeoff distance over 50-ft obstacle ....1,574 ft
Max demonstrated crosswind component .. ..20 kt
Rate of climb, sea level .....1,304 fpm
Max level speed, 25,000 ft .....225 KTAS
High cruise speed/endurance w/45-min rsv, std fuel (fuel consumption)
@ 2,500 rpm and 12,000 feet ....194 KTAS/3.9 hr (105 pph/17.5 gph)
@ 2,500 rpm and 18,000 ft ....203 KTAS/3.9 hr (105 pph/17.5 gph)
@ 2,500 rpm and 25,000 ft ....211 kt/3.9 hr (105 pph/17.5 gph)
Cruise power range (75% power 200 KTAS 16 gph 3.9 hr) .....840 nm
Max range (55% power 173 KTAS 11.2 gph 5.3 hr) .....950 nm
Max operating altitude.....25,000 ft
Landing distance over 50-ft obstacle ....2,325 ft
Landing distance, ground roll .....1,141 ft

Limiting and Recommended Airspeeds

V_X (best angle of climb) .....80 KIAS
V_Y (best rate of climb) .....100 KIAS
V_O (operating maneuvering) @3,400 lb..... .....133 KIAS
V_{FE} (max flap extended).....104 KIAS
V_{NO} (max structural cruising) ....178 KCAS
V_{NE} (never exceed) .....204 KCAS
V_R (rotation) ..... 70–73 KIAS
V_{S1} (stall, clean) .....66 KIAS
V_{SO} (stall, in landing configuration) ..61 KIAS
V_{PD} (maximum parachute deployment speed) .....133 KIAS

For more information, contact Cirrus Design, 4515 Taylor Circle, Duluth, Minnesota 55811 866/386-0750; www.cirrusdesign.com.

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.

high-temperature Inconel turbine rotors that push compressed air through large intercoolers to the engine induction inlet. Unlike a turbocharger system, this turbonormalizer, like all TAT systems, doesn't boost the induction air (manifold) pressure flowing into the 310-horsepower six-cylinder Teledyne Continental Motors IO-550 above what Mother Nature provides at sea level; it merely enables the pilot to take advantage of, and enjoy the many benefits of, being able to maintain full-rated sea-level power (100 percent) up to 25,000 feet.

Very few mixture manipulations

Climbs can be at full-rich or lean-of-peak mixtures. Full-rich climbs, the method pilots are most familiar with, consist of pushing the throttle and mixture controls forward to the stops and leaving them there until reaching the intended cruising altitude. This is the method used to get to 25,000 feet in 26 minutes. Full-rich 100-percent-power operation consumes 36.2 gallons per hour. This method consumed 15.7 gallons of 100LL during the 26-minute climb to 25,000 feet msl. With a fuel load of 45 gallons, two 200-pounders, and 40 pounds of gear aboard, the estimated weight was 280 pounds below the maximum takeoff weight of 3,400 pounds.

Lean-of-peak climbs are also an option. Here's how it's done. Takeoff and initial climb are flown at full-rich mixture. After the airplane is out of the airport traffic area, pull the power lever back to "the bump," or 2,500 rpm. Then quickly pull the mixture knob back to 17.5 gallons per hour. This results in a LOP climb at 86-percent power. Lean-of-peak climbs result in a slightly slower climb rate than the full-rich-mixture method but have the advantage of saving a little fuel. A lean-of-peak climb to 25,000 feet would require approximately seven or eight more minutes than the rich-of-peak climb, but the fuel burn would be reduced by four or five gallons.

Initially all TN installation will be completed at the Cirrus Design facility in Duluth. Plans to develop other installation centers are being considered. Retrofit packages for normally aspirated SR22s are also being considered. The fact that the TN option is approved by STC instead of being included in the airplane type certificate makes the possibility of a retrofit program a viable option if there's enough interest.

To mark the company's twenty-second anniversary in June 2006, Cirrus is producing 50 limited-edition SR22s featuring special paint and an airframe embossed with the signatures of co-founders Dale and Alan Klapmeier.

The long-awaited turbonormalizing option greatly expands the Cirrus SR22 operating envelope. And that's a good thing for Cirrus and for twenty-first-century pilots who can afford to fly really high and go really fast. AOPA

E-mail the author at steve.ells@aopa.org.

Links to additional information about Cirrus may be found on AOPA Pilot *Online (www.aopa.org/pilot/links.shtml).*

COURTESY CIRRUS